瑞澤電子股份有限公司
Horustech Electronics Co., Ltd

瑞澤電子在電子零件產業領域已有數十年經驗，坐落在桃園市中壢區，研發製造各項電子開關、連接器及其精密模具的開發、設計，為專業電子零組件的製造商及代理商。

瑞澤電子提供世界級的研發能力及製程技術給全球的客戶，我們將顧客滿意度為優先，以良好的服務、優良的品質、準確、快速的交貨時程及創新的研發能力滿足客戶需求，不斷強化專業的技術服務及提供優化的電子零組件方案，也代理各大廠牌電子零件產品，共同開發國際市場，提供客戶更多元的選擇。

瑞澤電子以永續經營為目標，並將企業經營成果回饋給社會，善盡企業應盡之社會責任。

Horustech Electronics Co.,Ltd. has the experience in the field of electronic components industry more than 10 years. Our parent company-Lizard Precision Industrial Co., Ltd was Founded in Apr. 2003 located in Bade district, Taoyuan City, Taiwan and specializes in research and development, manufacturing of precision tooling for various electronic components.

In order to offer further services to customers, global sales headquarter-Horustech Electronics Co., Ltd. was established in Feb. 2011 located in Zhongli, Taiwan which is a professional manufacturer and distributor of various electronic switches, connectors, variable potentiometer and related components can be widely applied to household, communication, automobile, electronic & medical equipment and other electronic applications.

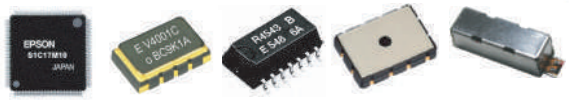
Horustech Electronics Co., Ltd. is responsible to expand continuously our product lines to provide a complete solution and rapid delivery schedule, best quality and service, Innovative and technical capability for our customers to fulfill the fast changing market's demand, we also expect to be one of global and best suppliers for electric components.

Line Cards

EPSON
MinebeaMitsumi
Passion to Create Value through Difference
C.C.P.
Firstohm®
Nidec
FORWARD
FORWARD ELECTRONICS
PANJIT
Speed & Passion
DIPTRONICS
德利威電子股份有限公司
Dailywell Electronics Co.,Ltd.
Shinmei 神明電機株式会社
SHINMEI ELECTRIC CO., LTD.

Products

Switch, Encoder, Potentiometer



MCU, IC, Sensor, motor

Crystal, Oscillator, Coil, Solenoid

Diodes, Mosfet, MELF, Pogo pin

INDEX

MinebeaMitsumi

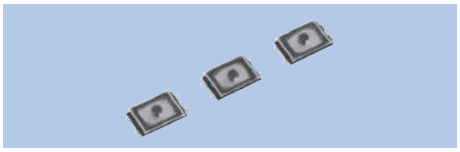
Passion to Create Value through Difference

- SWITCH
- CONNECTOR
- CAR CONNECTOR
- COIL
- IC

THE LINE CARDS

◆Tactile Switches

Small Type Tactile Switches
STI Series



Electrical Characteristics

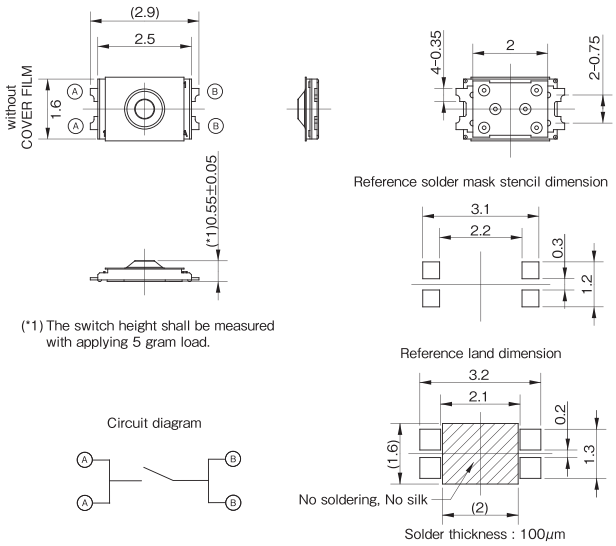
Rating (Resistive load)	DC15V, 20mA
Contact Resistance	1Ω or less
Insulation Resistance	10MΩ or more
Withstand Voltage	1 minute at AC 100V

Life

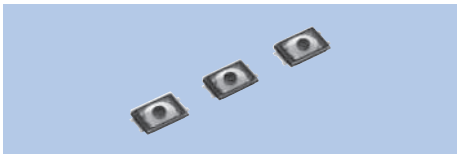
STI-055A12AX	500,000 times
STI-055A16AX	500,000 times
STI-055A24AX	200,000 times

Water

Resistance Protective resistance	IPX8



Small Type Tactile Switches
STO Series



Electrical Characteristics

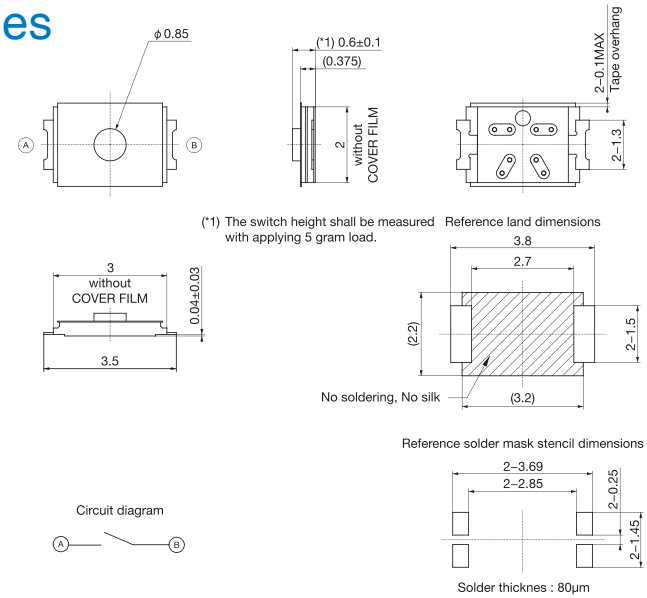
Rating (Resistive load)	DC15V, 20mA
Contact Resistance	500m or less
Insulation Resistance	50M or more
Withstand Voltage	1 minute at AC 100V

Life

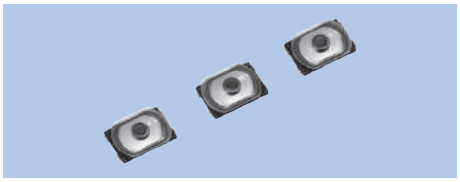
STO-060A16AB	500,000 times
STO-060A24AB	500,000 times
STO-060A33AC	300,000 times

Water

Resistance Protective resistance	IPX8



Waterproof Small Type Tactile Switches
STU Series



Electrical Characteristics

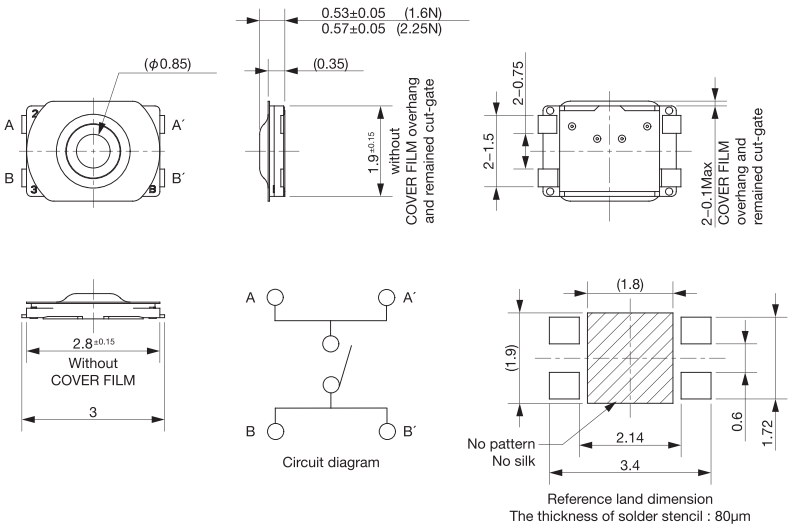
Rating (Resistive load)	DC15V, 20mA (maximum)
	DC2V, 10μA (minimum)
Contact Resistance	500mΩ or less

Life

STU-053A16AX	300,000 times
STU-057A23AX	500,000 times

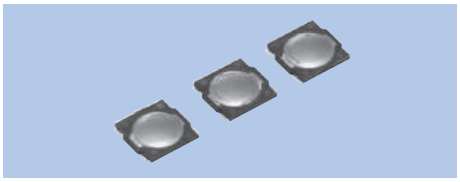
Water

Resistance Protective resistance	IPX8



◆Tactile Switches

Small Type Tactile Switches
SOG Series

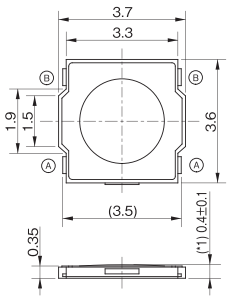


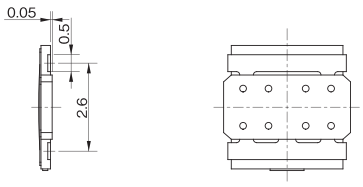
Electrical Characteristics

Rating (Resistive load)	DC15V, 20mA
Contact Resistance	1Ω or less
Insulation Resistance	10MΩ or more
Withstand Voltage	1 minute at AC 100V

Life

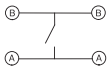
SOG-152ANT	1,000,000 times
SOG-154ANT	500,000 times





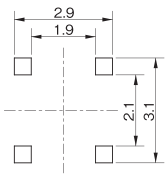
(*1) This switch height shall be measured with applying 15 gram load.

Circuit diagram

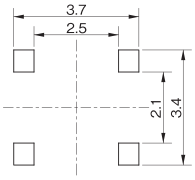


Reference land dimensions

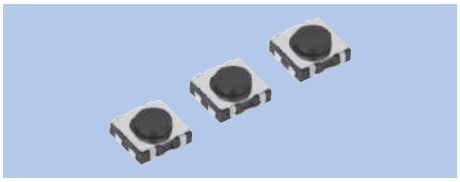
Refer-1
Bottom soldering



Refer-2



Long-Life Tactile Switches
SOV Series

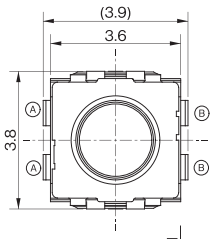


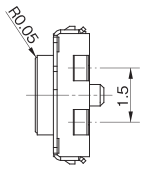
Electrical Characteristics

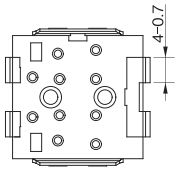
Rating (Resistive load)	DC12V, 50mA
Contact Resistance	1Ω or less
Insulation Resistance	10MΩ or more
Withstand Voltage	1 minute at AC 100V

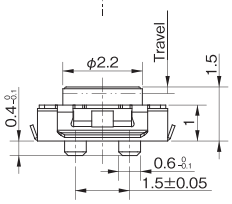
Life

SOV-168HST	1,000,000 times
SOV-168HNT	1,000,000 times
SOV-169HST	500,000 times
SOV-169HNT	500,000 times



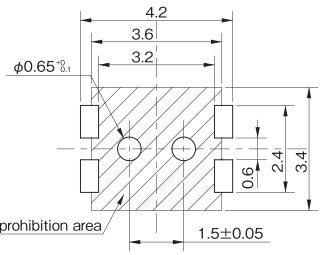




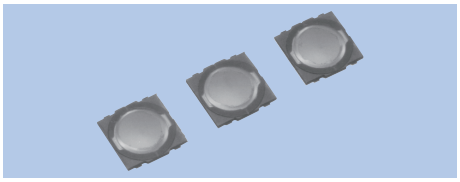


Circuit diagram

Reference land dimensions



Super Thin Type Tactile Switches
SOC Series

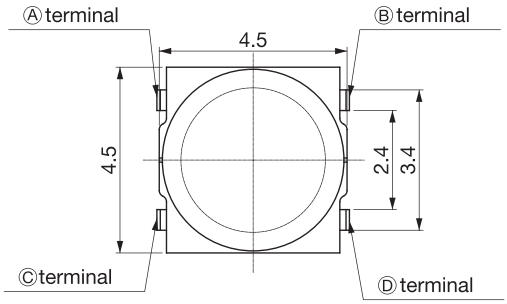


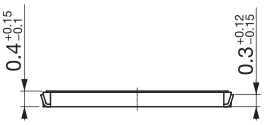
Electrical Characteristics

Rating (Resistive load)	20mA, 15V DC
Contact Resistance	200m or less
Insulation Resistance	50M or more
Withstand Voltage	1 minute at 100V AC

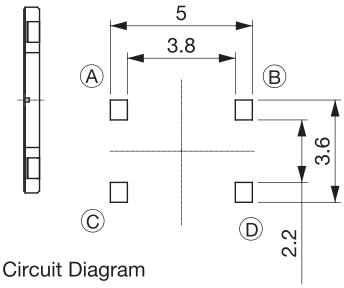
Life

SOC-152HST	500,000 times
SOC-152SST	500,000 times
SOC-153HST	1,000,000 times
SOC-154HST	200,000 times

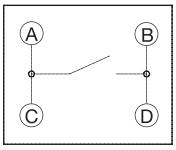




Reference land dimensions

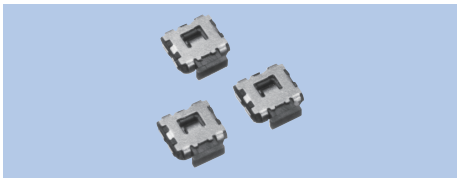


Circuit Diagram



◆Tactile Switches

Side Click Type Tactile Switches
SOU Series

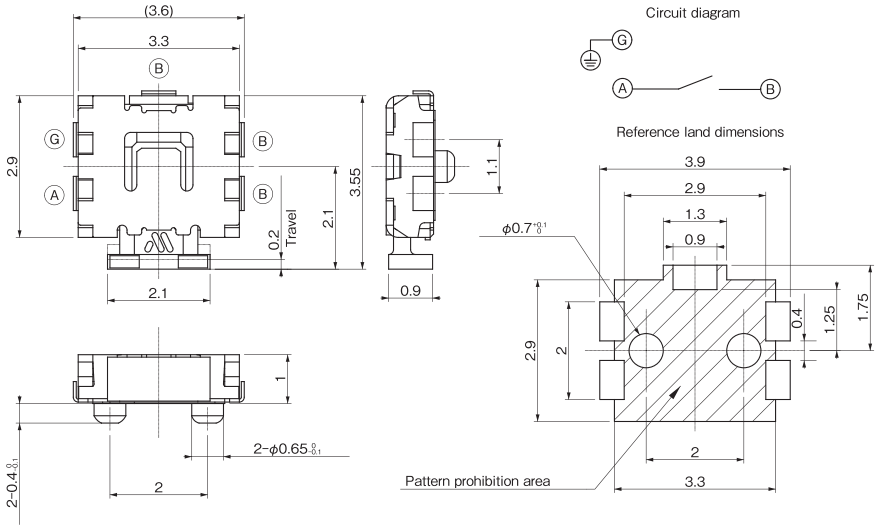


Electrical Characteristics

Rating (Resistive load)	50mA, 12V DC
Contact Resistance	1Ω or less
Insulation Resistance	10MΩ or more
Withstand Voltage	1 minute at AC 100V

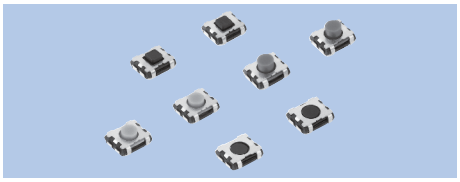
Life

SOU-242HST, SOU-242HNT	100,000 times
SOU-244HNT, SOU-244HST	100,000 times
SOU-248HNT, SOU-248HST	100,000 times



Tactile Switches With Button
SOF Series

(Circle button)

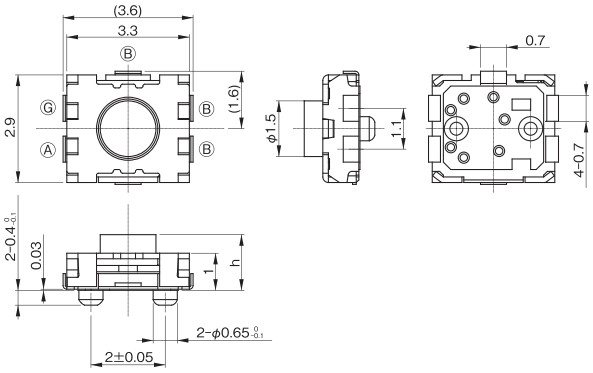


Electrical Characteristics

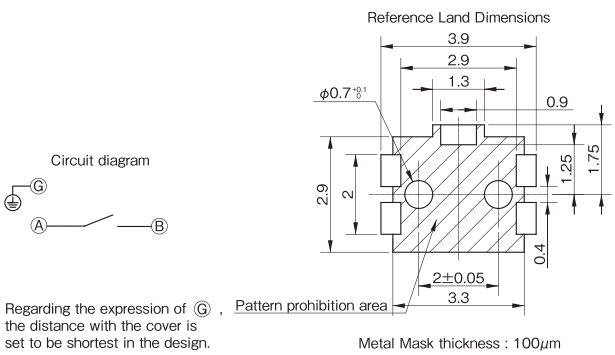
Rating (Resistive load)	50mA, 12V DC
Contact Resistance	1Ω or less
Insulation Resistance	10MΩ or more
Withstand Voltage	1 minute at AC 100V

Life

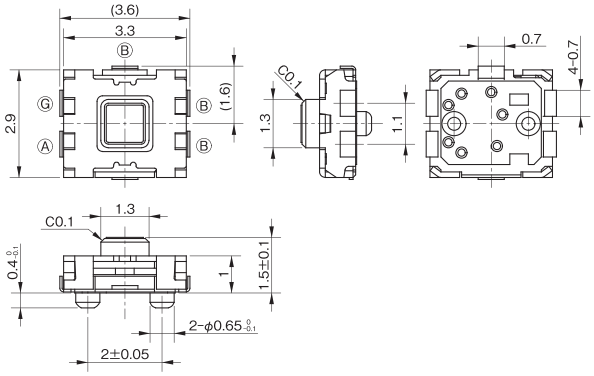
	100,000 times



(Square button)



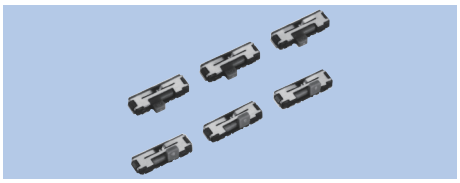
Regarding the expression of Ⓖ, the distance with the cover is set to be shortest in the design.



SWITCHES

◆Slide Switches

H=1.2mm Slide Switches
SSU Series



Electrical Characteristics

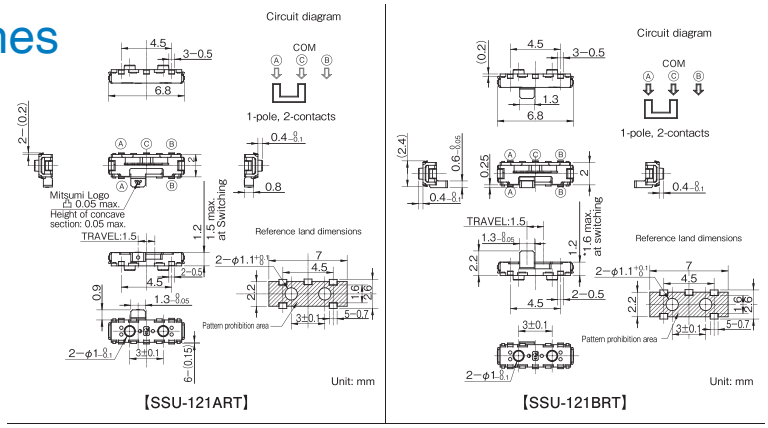
Rating (Resistive load)	0.3A, 4V DC
Contact Resistance	1Ω or less
Insulation Resistance	10MΩ or more
Withstand Voltage	1 minute at 100V AC

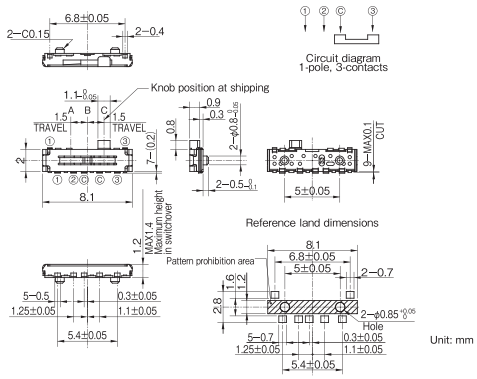
Mechanical Characteristics

Operating Force	2-contacts type
	1.5±1.0N
	3-contacts type
	a→b/c→b 1.5±1.0N
	b→a/b→c 1.6±1.0N

Life

	10,000cycles





Model Name Code	Order Number	No. of Poles	No. of Contacts	Travel (mm)	Knob Direction	Terminal Earth	Pcs/Reel
SSU-121ART	R 667016	1	2	1.5	Horizontal	without	5,000
SSU-121BRT	R 667053	1	2	1.5	Vertical	without	3,000
SSU-131MAT	R 667065	1	3	1.5	Horizontal	without	4,000

SWITCHES

◆Rotary Switches

Slide and Rotary Encoder Switches
SIQ Series

SIQ-02FVS3

Electrical Characteristics

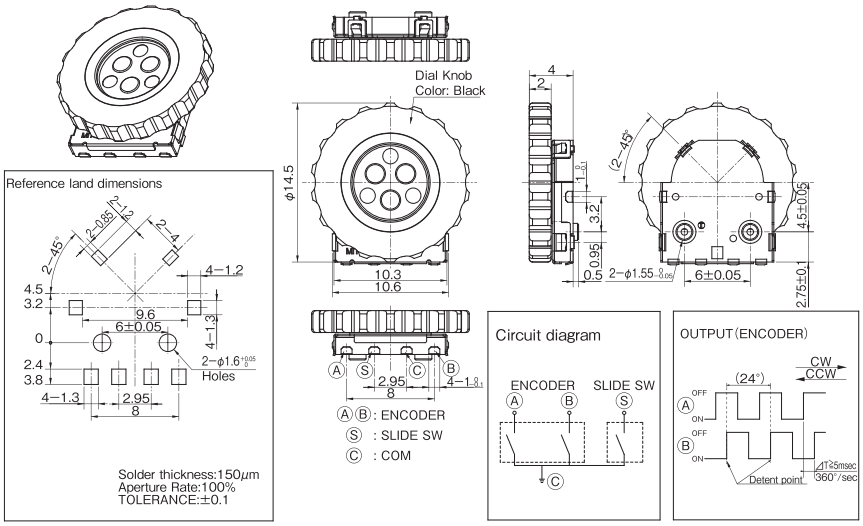
Rating (Resistive load)	10mA, 5V DC
Contact Resistance	1Ω or less

Mechanical Characteristics

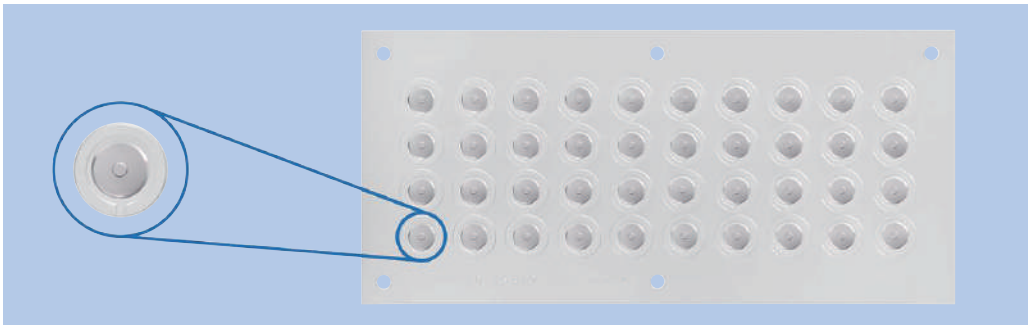
Operating Force	2～6N (Slide)
Rotational Torque	1～10mN·m (Rotary encoder)

Life

	50,000 cycles (Slide)
	50,000 cycles (Rotary encoder)



Switches Sheet
SBH Series



特長／FEATURES

1. カバーテープ粘着面にメタルドームを搭載し、メタルドームにて基板（リジッドまたはフレキシブル）上のパターンをショートさせる構造としたもので、フィーリングに優れ、電気的にも安定。
2. スイッチユニットを非常に薄くすることが可能。
3. カバーテープにメタルドームを搭載した、スイッチシートタイプを多くラインナップに揃え、更なるセットの薄型化に貢献。

1. Achieved a nice feeling and stable electrical specification.
2. Achieve low profile equipment by using SBH series.
3. Provide product lineup that has a variety of switch sheet types to help make the set thinner. These type of switches have the metal dome mounted on the cover tape.

主な用途／APPLICATIONS

1. 小型、ポータブルAV機器の操作スイッチ。
2. 携帯電話、スマートフォン、PDA等の入力キースイッチ。

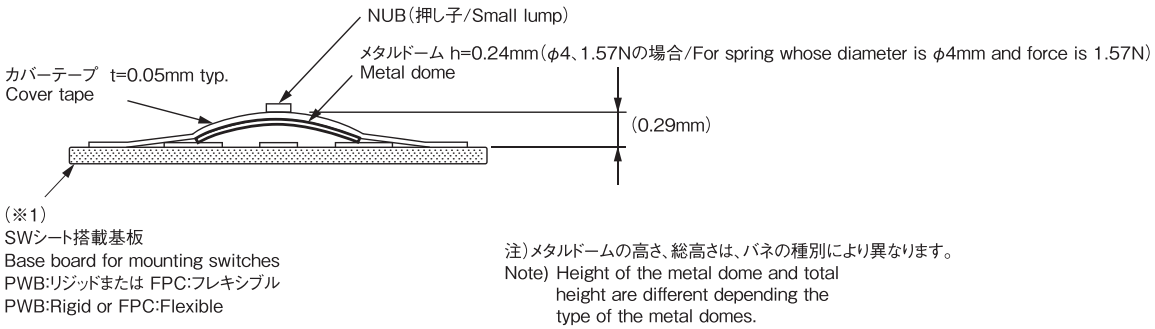
1. For small, portable AV equipment operating switches.
2. For mobile phones, smartphones, PDAs input key switches.

SBH Series 規格／SPECIFICATIONS

電気的特性 Electrical Characteristics	定格（抵抗負荷）：Rating（Resistive load）	DC 12V 0.1A	0.1A, 12V DC
	接触抵抗：Contact Resistance	1Ω以下	1Ω or less
	絶縁抵抗：Insulation Resistance	10MΩ以上	10MΩ or more
	耐電圧：Withstand Voltage	AC 100V 1分間	1 minute at 100V AC
機械的特性 Mechanical Characteristics	作動力：Operating Force	1.0N～3.8N（φ2.4, φ3.0, φ3.0×2, φ4.0, φ4.0×2.8, φ5.0, φ6.0）	
寿命性	Life	200,000～1,000,000回	200,000～1,000,000 times

構造／CONSTRUCTION

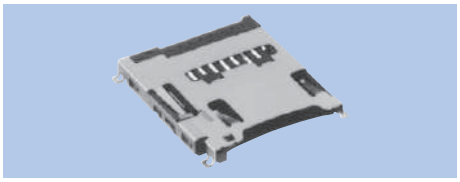
（基板取付参考例/Example of board mounting）



注）メタルドームの高さ、総高さは、バネの種別により異なります。
Note) Height of the metal dome and total height are different depending the type of the metal domes.

◆Memory Card Connectors

microSD Memory Card Connectors
CIM-H52R



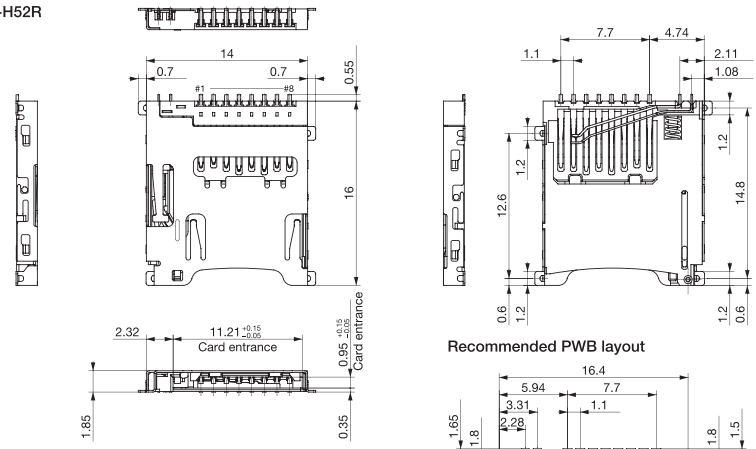
ELECTRICAL CHARACTERISTICS

Rated Voltage	AC 50V (rms)
Rated Current	0.5A
Withstanding Voltage	500V AC (rms) 1minute
Insulation Resistance	1000MΩ min. (Initial value)
Contact Resistance	100mΩ max. (Initial value)

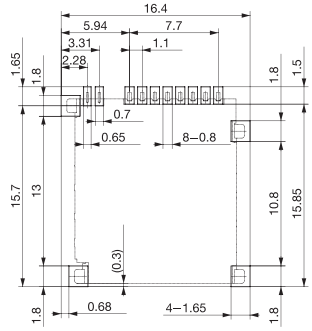
MECHANICAL CHARACTERISTICS

Life (Matching Cycle)	10,000times
Card Insertion Force	2.0N~6.0N
Eject Force	2.0N~6.0N
Using Temperature Range	-25~+85°C

CIM-H52R

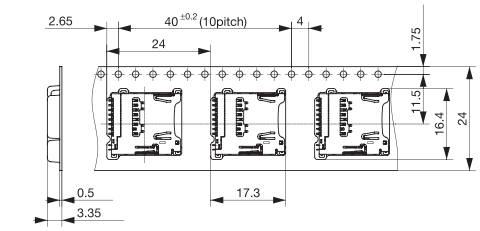


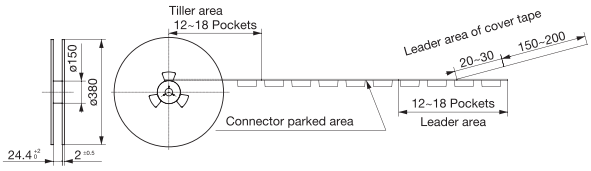
Recommended PWB layout



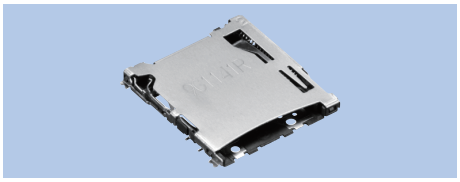
Recommended PWB layout (NTS) ±0.05

Packing specification





microSD Memory Card Connectors
CIM-H75N Series



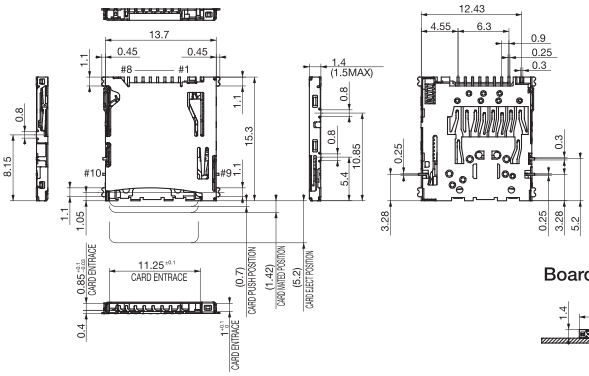
ELECTRICAL CHARACTERISTICS

Rated Voltage	DC 10V
Rated Current	0.5A
Withstanding Voltage	500V AC (rms) 1minute
Insulation Resistance	1000M min. (Initial value)
Contact Resista	100m max. (Initial value)

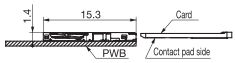
MECHANICAL CHARACTERISTICS

Life (Matching Cycle)	10,000 cycles
Card Insertion Force	4.5N~7.5N
Eject Force	4.5N~7.5N
Using Temperature Range	−40~+85°C

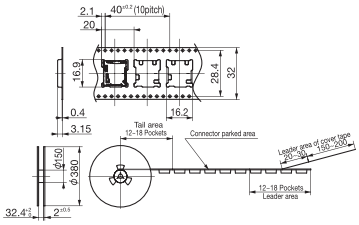
CIM-H75N4



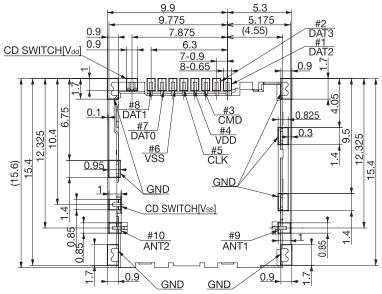
Board installation condition



Packing specification



Recommended PWB layout



RECOMMENDED PEB LAYOUT(NTS)±0.05

◆USB Connectors

Micro-USB Connectors “Micro-B Series”
CAM-K01ND4

CAM-K01ND4

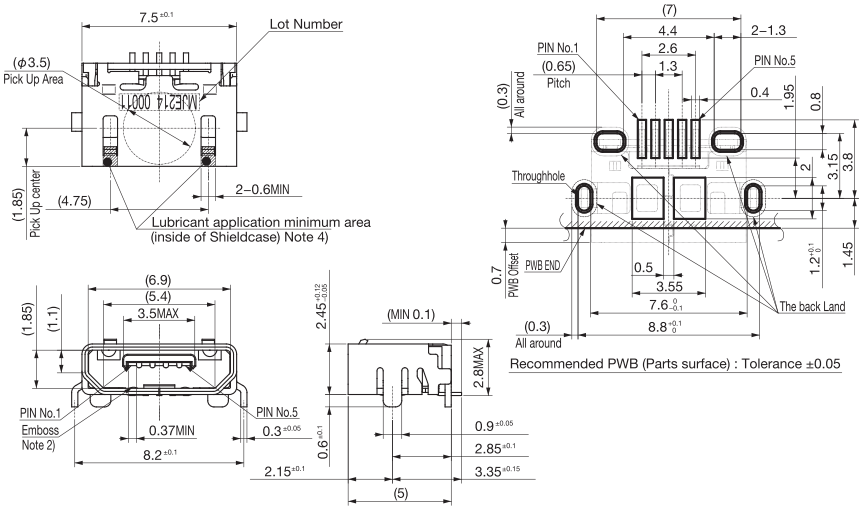
ELECTRICAL CHARACTERISTICS

Rated Current	When power is being applied on the power supply terminal; 1.8A/1 contact (No. 1&5 pin) When power is being applied on the signal terminal; 1A/1 contact (No. 2&3&4 pin)
Withstanding Voltage	100V AC (rms) 1minute
Contact Resistance	30mΩ max.

MECHANICAL CHARACTERISTICS

Life (Matching Cycle)	10,000 times
Total Insertion Force	35N(3.57kgf) max.
Total Withdrawal Force	Beginning 8N(0.82kgf) min. After 10,000 times 8~20N(0.82~2.04kgf)

CAM-K01ND4



Notes

1) Correspond to Micro-USB specification.
2) Provides an emboss shape.
3) The product is made for reflow mounting.
   The soldering area of the dip part is reduced to prevent the solder from going up to the connector.
4) It applies a fluorinated lubricant to the illustration range.

Micro-USB Connectors “Micro-B Series”
CAM-K01RD4

CAM-K01RD4

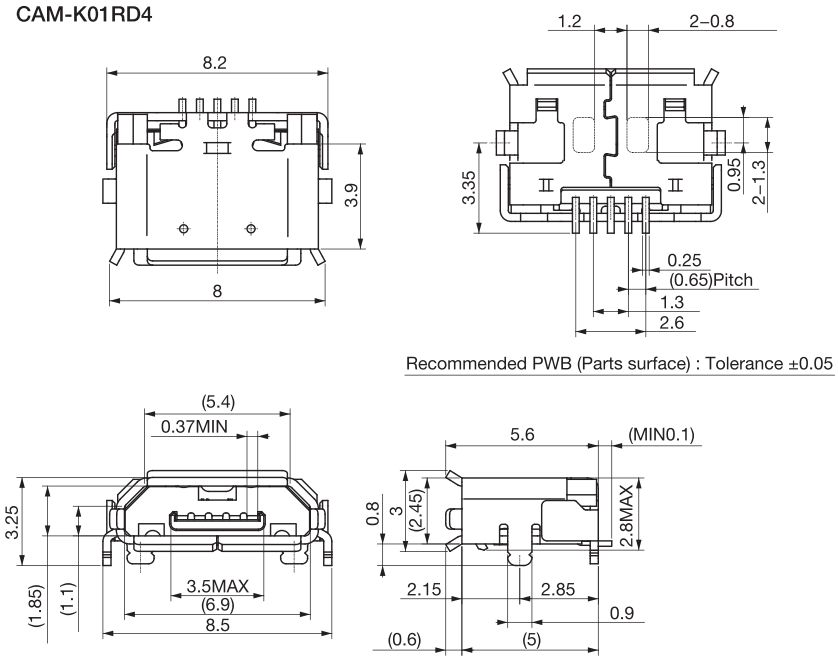
ELECTRICAL CHARACTERISTICS

Rated Current	When power is being applied on the power supply terminal; 1.8A/1 contact (No. 1&5 pin) When power is being applied on the signal terminal; 1A/1 contact (No. 2&3&4 pin)
Withstanding Voltage	100V AC (rms) 1minute
Contact Resistance	30mΩ max.

MECHANICAL CHARACTERISTICS

Life (Matching Cycle)	10,000 times
Total Insertion Force	35N(3.57kgf) max.
Total Withdrawal Force	Beginning 8N(0.82kgf) min. After 10,000 times 8~20N(0.82~2.04kgf)

CAM-K01RD4



Notes

1) Correspond to Micro-USB specification.
2) Provides an emboss shape.
3) The product is made for reflow mounting.
   The soldering area of the dip part is reduced to prevent the solder from going up to the connector.
4) It applies a fluorinated lubricant to the illustration range.

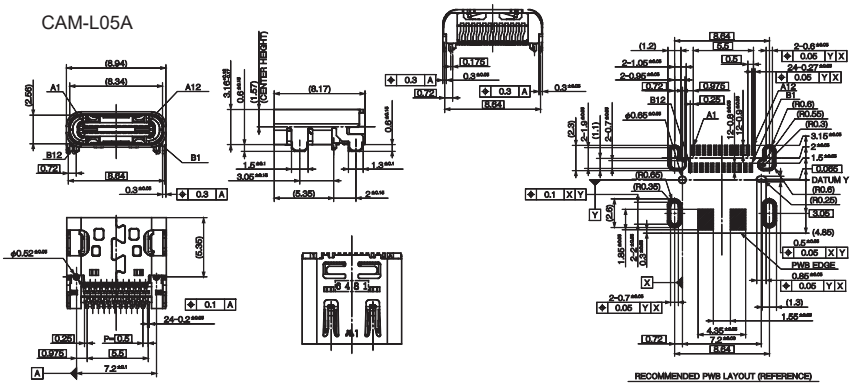
◆USB Connectors

USB Connectors "Type-C Series"
CAM-L05 Series

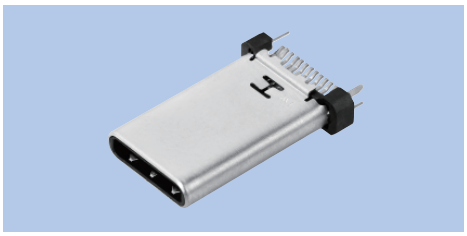
FEATURES

1. USB 3.1 Type-C™ Standard Compliant
2. Get TID Certification
3. USB PD Support
4. Improved wrenching strength
5. Optimized design with Precise processing technology advantage
6. High Quality

CAM-L05A

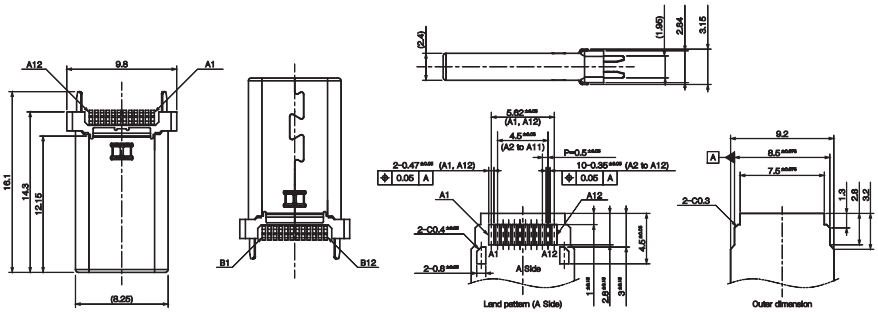


USB Connectors" Type-C Series"
CAM-L06 Series

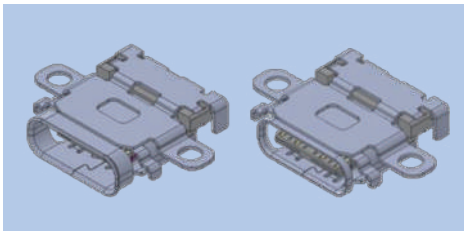


FEATURES

1. USB 3.1 Type-C™ Standard Compliant
2. Get TID Certification
3. USB PD Support
4. Improved wrenching strength
5. Optimized design with Precise processing technology advantage
6. High Quality



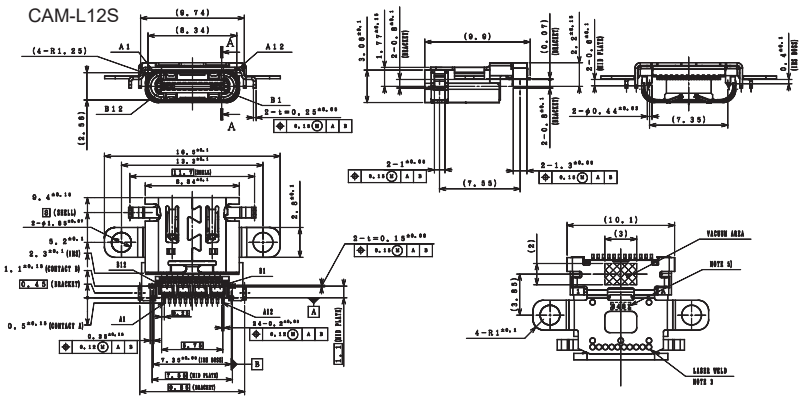
USB Connectors" Type-C Series"
CAM-L12 Series



FEATURES

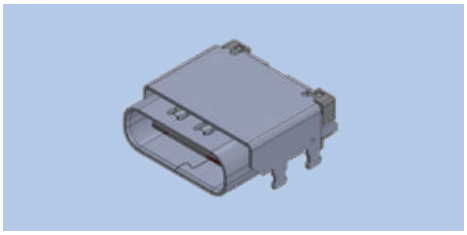
1. USB 3.1 Type-C™ Standard Compliant
2. Get TID Certification
3. USB PD Support
4. Improved wrenching strength
5. Optimized design with Precise processing technology advantage
6.High Quality

CAM-L12S



◆USB Connectors

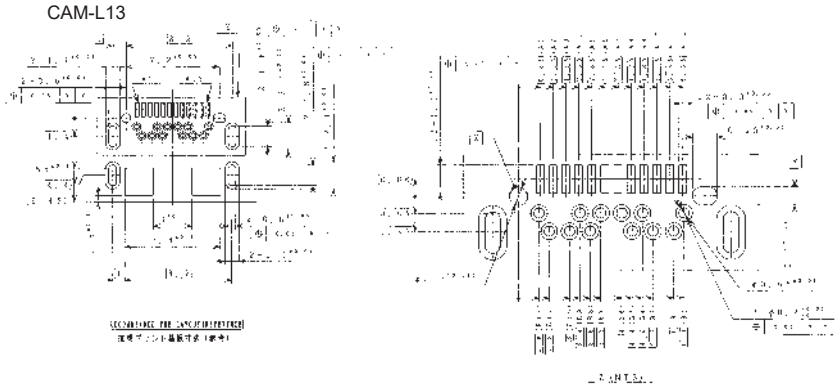
USB Connectors “Type-C Series”
CAM-L13 Series

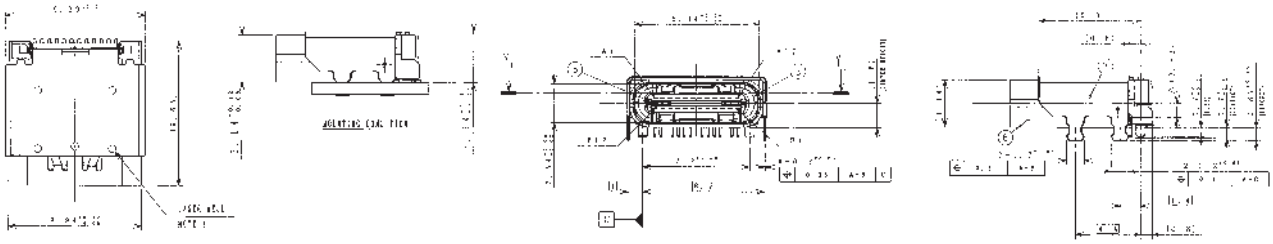


FEATURES

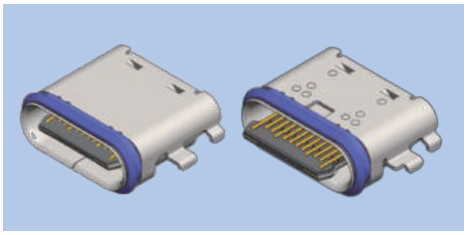
1. USB 3.1 Type-C™ Standard Compliant
2. Get TID Certification
3. USB PD Support
4. Improved wrenching strength
5. Optimized design with Precise processing technology advantage
6. High Quality

CAM-L13





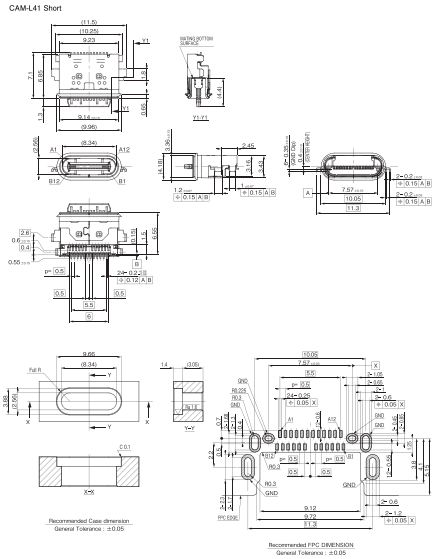
USB Connectors “Type-C Series”
CAM-L41 Series



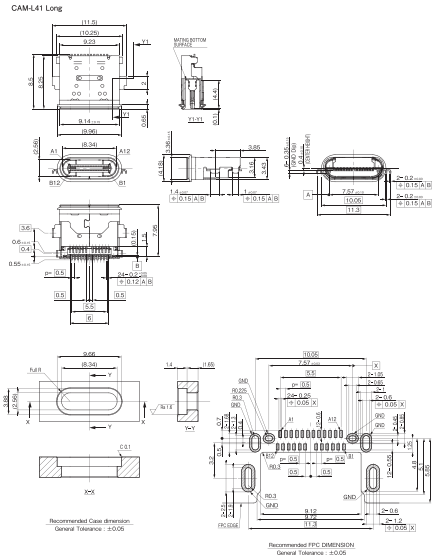
FEATURES

1. Conform to USB 3.2 Type-C™ Standard *1 (Differs by part No)
2. Waterproof performance IPx8 (1.5m, 30 minutes)
3. World's first waterproof Type-C, correspond with Thunderbolt™3 *2 (According to our research)
4. Correspond with USB PD
5. High quality waterproof performance by our original structure (Patent applied)Space-saving design

CAM-L41 Short

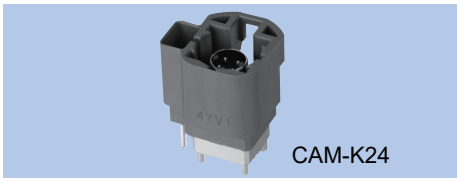


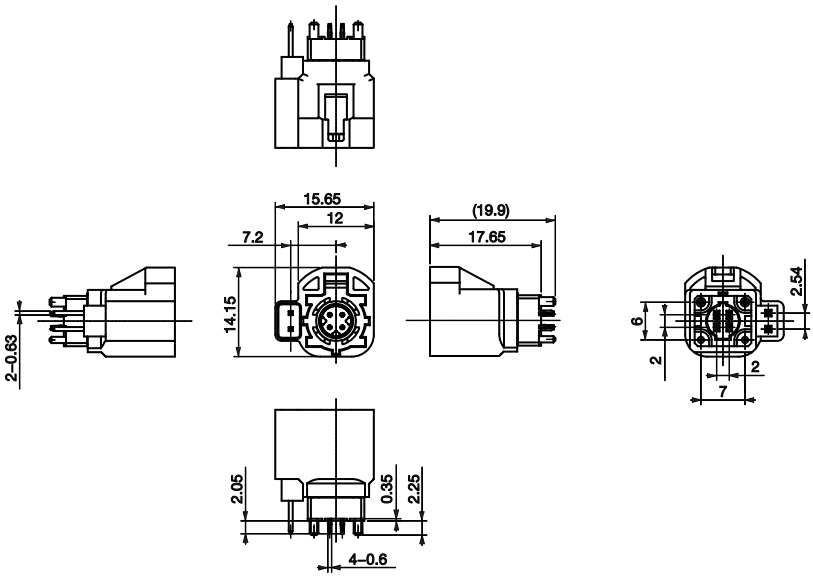
CAM-L41 Long



◆Power Supply Connectors for Car Audio

HSD Connector
CAM-K24





ELECTRICAL CHARACTERISTICS	
Rated Voltage	100V DC
Rated Current	1.5A DC
Characteristic Impedance	100
Insertion Loss	≤ 0.1dB to 1GHz
Return Loss	≤ -20dB to 1GHz
	≤ -17dB to 2GHz

MECHANICAL CHARACTERISTICS	
Life (Mating Cycle)	25 times
Total Insertion Force	≤ 60N
Total Withdrawal Force	5N to 60N

HSD コーディング／ HSD Coding

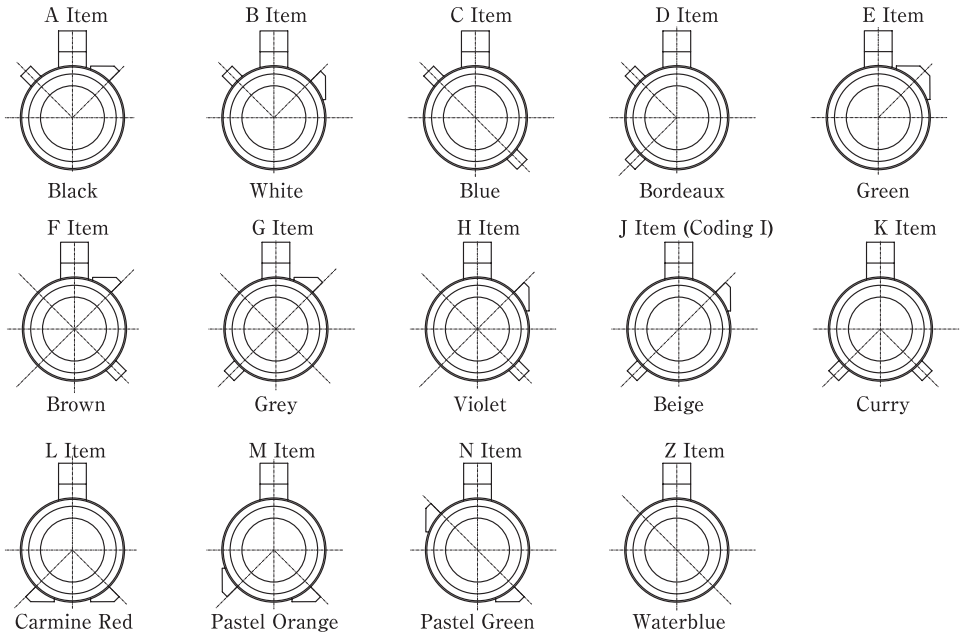
	Shape	Coding	Color	RAL No.
Normal		A	Jet Black	9005
		B	Cream	9001
		C	Signal Blue	5005
		D	Claret Violet	4004
		E	Leaf Green	6002
		F	Nut Brown	8011
		Z	Water Blue	5021

	Shape	Coding	Color	RAL No.
Reverse		G	Blue Grey	7031
		H	Heather Violet	4003
		J	Beige	1001
		K	Curry	1027
		L	Yellow Green	6018
		M	Pastel Orange	2003
		O	Light Green	6027

FAKRA コネクタ ラインナップ一覧
FAKRA Connector Lineup Index

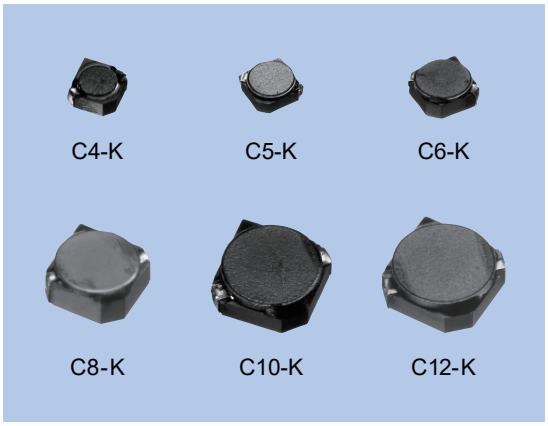
	Model	Pict.	Type	External Dimension		Description	Coding
1	CDM-K35(J83)		Diecast	H	13.4mm	· Angle type(Horizontal against Substrate) · Die casting body	A B C D E F G H I K L M N Z
				W	7.5mm		
				D	21.0mm		
2	CDM-J97		Low Height	H	5.45mm	· Angle type(Horizontal against Substrate) · Die casting body · Low height type	A B C D E F G H I K L M N Z
				W	7.5mm		
				D	22.7mm		
3	CDM-J97W		Low Height Dual	H	5.45mm	· Angle type(Horizontal against Substrate) · Die casting body · Low height type · Dual port type	A B C D E F G H I K L M N Z
				W	15.5mm		
				D	24.85mm		
4	CDM-K06		Mold Long	H	14.05mm	· Angle type(Horizontal against Substrate) · Molded body · Long interdigitation type	A B C D E F G H I K L M N Z
				W	8.6mm		
				D	23.82mm		
5	CDM-K06W		Mold Long Dual	H	14.05mm	· Angle type(Horizontal against Substrate) · Molded body · Long interdigitation type · Dual port type	A B C D E F G H I K L M N Z
				W	18.2mm		
				D	23.82mm		
6	CDM-K27W		Diecast Long Dual 8mm pitch	H	11.15mm	· Angle type(Horizontal against Substrate) · Molded body · Long interdigitation type · Dual port type(pitch:8mm)	A B C D E F G H I K L M N Z
				W	15.5mm		
				D	23.5mm		
7	CDM-K29W		Diecast Dual 12.7mm pitch	H	11.4mm	· Angle type(Horizontal against Substrate) · Molded body · Dual port type(pitch:12.7mm)	A B C D E F G H I K L M N Z
				W	20.2mm		
				D	21.0mm		
8	CDM-K30		Mold Short	H	12.75mm	· Angle type(Horizontal against Substrate) · Molded body	A B C D E F G H I K L M N Z
				W	9.0mm		
				D	18.1mm		
9	CDM-K33		Vertical	H	13.1mm	· Vertical type(Vertical against Substrate) · Die casting body	A B C D E F G H I K L M N Z
				W	8.1mm		
				D	17.5mm		

FAKRA coading type and color



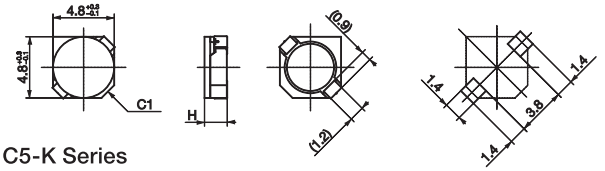
◆Power Inductors

Power Inductors
CK Series

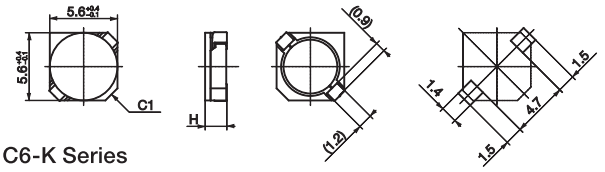


Type	Size (mm)	H length (mm)	Inductance (μH)	Operational Frequency (kHz)	Rated DC Current (A)	DC Resistance (mΩ)	Pcs/Reel
C4-K1.8R	4.8×4.8	1.9	1.0~150	10~500	0.22~2.40	18~1,420	2,000
C4-K1.8RA	4.8×4.8	1.9	1.0~150	10~500	0.31~3.50	22~2,100	2,000
C4-K3L	4.8×4.8	3.0	1.0~150	10~500	0.20~1.95	12~485	2,000
C4-K3LA	4.8×4.8	3.0	1.0~150	10~500	0.36~3.00	13~976	2,000
C5-K3LGA	5.6×5.6	3.0	1.2~100	10~500	0.65~5.00	17~590	2,000
C6-K3LG	6.6×6.6	3.2	1.0~1,000	10~500	0.21~6.30	8~3,800	1,000
C6-K5LGA	6.6×6.6	5.0	1.2~3,300	10~500	0.23~9.00	10~10,700	700
C6-K5RA	6.6×6.6	5.0	1.5~100	10~500	1.1~8.5	14~390	700
C8-K4L	8×8	4.0	1.0~150	10~500	0.73~7.00	10~421	500
C10-K6L	10×10	6.0	2.2~100	10~500	0.50~8.50	16~200	500
C12-K4.5L	11.5×11.5	4.5	1.0~150	10~500	1.20~7.10	7~430	500
C12-K7.5L	11.5×11.5	7.5	1.0~5,600	10~500	0.28~23.5	6~5,500	400

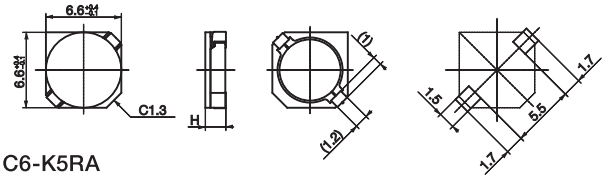
C4-K Series



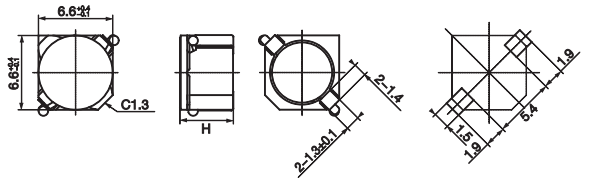
C5-K Series



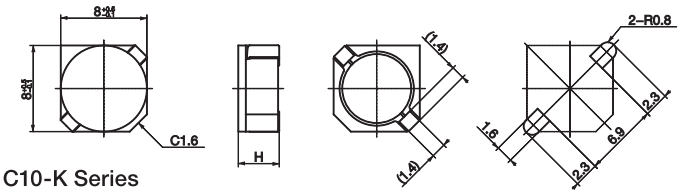
C6-K Series



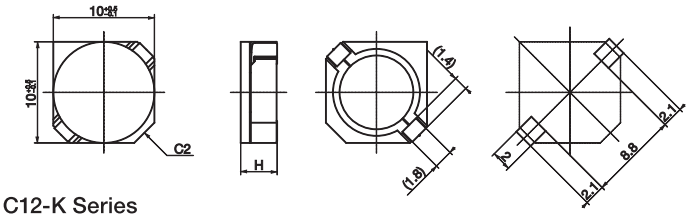
C6-K5RA



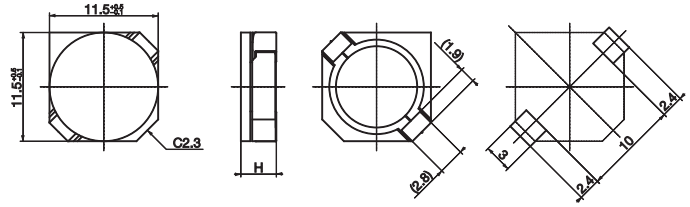
C8-K Series



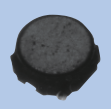
C10-K Series

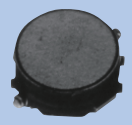


C12-K Series



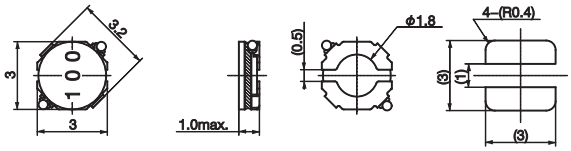
Power Inductors
CP Series


C3-P Series

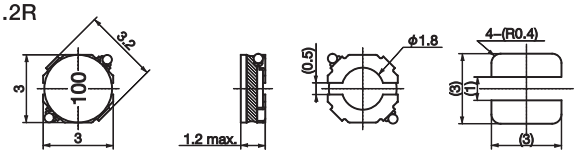

C4-P Series

Type	Size (mm)	H length (Unit : mm)	Inductance (μH)	Rated DC Current (A)	DC Resistance (mΩ)	Pcs/Reel
C3-P1.0R	3.0×3.0	1.0max.	1.2~10	0.57~1.50	120~630	5,000
C3-P1.2R	3.0×3.0	1.2max.	1.2~47	0.26~1.50	55~1,300	5,000
C3-P1.2RA	3.0×3.0	1.2max.	1.0~18	0.52~2.00	65~750	5,000
C3-P1.5R	3.0×3.0	1.5max.	1.5~47	0.33~2.40	58~1,050	4,000
C4-P1.5R	4.0×4.0	1.5max.	1.0~47	0.35~2.85	45~850	4,000
C4-P1.8R	4.0×4.0	1.8max.	1.2~68	0.37~2.70	40~920	3,000

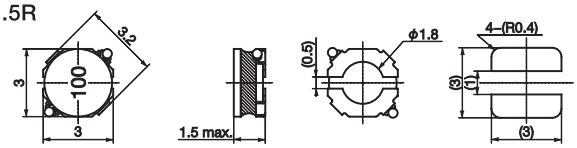
C3-P1.0R



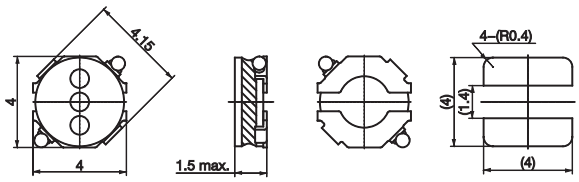
C3-P1.2R



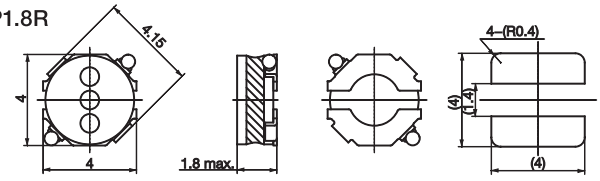
C3-P1.5R



C4-P1.5R

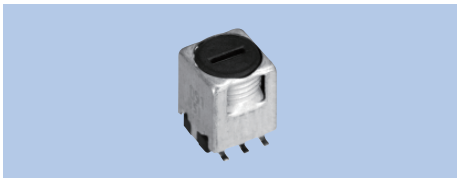


C4-P1.8R

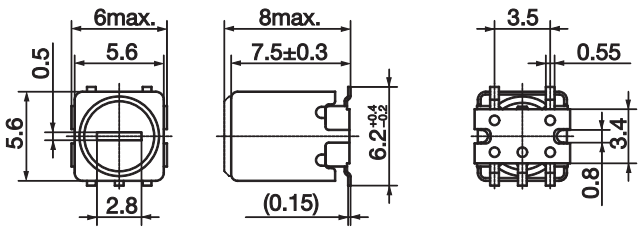


POWER INDUCTORS,TRANSFORMERS,COILS
◆Power Inductors

Coils for Corner sensor
K5-RS Series



Specifications
(1) 0.1~8.5mH
(2) 10~500kHz
(3) F:±2%
L:±5%
(4) -
(5) Q:50~80
Features
SMD
500pcs./Reel



1

二次電池関連 IC

- 1セル用から多セル用までラインナップ。携帯機器から電動自転車まで幅広い機器に対応します
- 高い検出精度、豊富な機能を備え、電池の安全な充電と保護を可能にします
- 電池残量計ICは、残量予測の高精度、劣化判定機能により電池を安全かつ有効に利用できます

SECONDARY BATTERY IC

- Various types of battery IC for single cell to multy–cells are lined up. They are applicable to various devices from mobile gadgets to Electric bicycle.
- The battery IC is provided with a high detection accuracy and abundant functions, enabling safe battery charging and protection.
- MITSUMI's Fuel Gauge IC achieves safe and effective use of batteries by detecting the battery level.

2

電源 IC

- レギュレータICは出力電流150mAから1.5Aまでラインナップ。高精度、低消費電流等、特長のある製品で様々なアプリケーションに対応します
- DC-DCコンバータICは昇圧、降圧、反転タイプをラインナップ。幅広い入力電圧範囲において高効率、高精度な出力を供給します

POWER SUPPLY IC

- The regulator IC lineup is available with an output current of 150mA to 1.5A. Suited to various applications with a range of products offering features such as high–precision and low consumption current.
- DC–DC converter ICs are available in step–up/step–down/ inversion type variations. Delivers high–efficiency, high–precision output over a wide input voltage range.

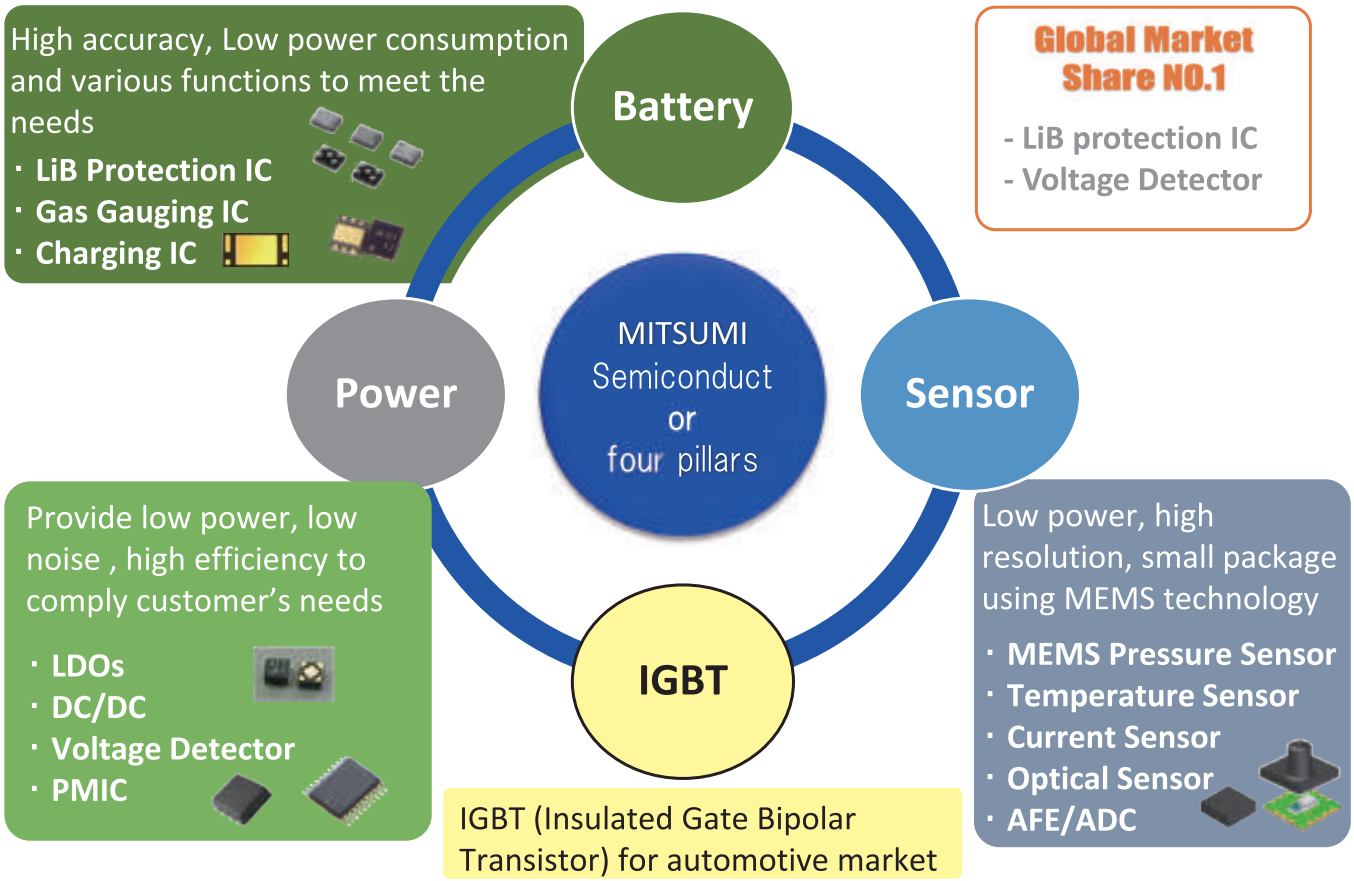
3

センサ IC

- 高い検出温度精度と低消費電流が特長。デジタル圧力センサはMEMS技術により開発しています
- 豊富なランク展開、I^2C BUS対応インターフェイスにより幅広いアプリケーションに対応できます

SENSOR IC

- The sensor IC is characterized by high detecting temperature accuracy and low current consumption. Digital pressure sensors are being developed by MEMS technology.
- The sensor IC is applicable to various applications through abundant rank expansion and I^2C BUS intended interface.



AEC-Q100 Qualification Plan

	Series	Features	Package	AEC-Q100 Test Status
Reset IC	PST82xxURT	No Delay/ 12V Rating/ Open drain Output	SC-82ABB	Grade2 compliant
	PST83xxURT	Adjustable Delay/ 12V Rating/ CMOS Output	SC-82ABB	Grade2 compliant
	PST84xxNRT	Adjustable Delay/ 12V Rating/ Open drain Output	SOT-25A	Grade2 compliant
	PST819xxxxUV	Fixed Delay/ Manual reset/ 7V Rating/ CMOS Output	SC-82ABB	Grade2 compliant
	IC-PST84xxRL	Adjustable Delay/ 12V Rating/ Open drain Output	SSON-4B	Grade2 compliant Plan (Apr.2020 completed)
LDO	MM3571xxxNS2	Inrush current protection /300mA /7V Rating	SOT-25A	Grade2 compliant
	MM3534xxxNS2	Low current consumption/ 150mA /7V Rating	SOT-25A	Grade2 compliant
	MM3703FxxHC2	Soft-Start/ 1000mA/ 7V Rating	HSOP-8E	Grade2 compliant
	MM1839xxxNS2	Reverse bias protection/ 200mA/ 16V Rating	SOT-25A	Grade2 compliant Plan (Sep.2019 completed)
	MM1926xxxHC2	Open-Short Detection / 250mA/ 16V Rating	HSOP-8E	Grade2 compliant Plan (Oct.2019 completed)
DCDC	MM3630XVBHG2	Cable compensation for USB/ 2.5A/ 40V Rating/ 200kHz～1MHz	TSOP-20G	Grade2 compliant
	MM3680AR	Cable compensation for USB/ 3.0A/ 48V Rating/ 200kHz～2.5MHz	SSON-16	Grade2 compliant Plan (May.2020 completed)

LDO Line-up [1]

150mA～200mA LDO

Io[mA]	Model	Features	Absolute maximum Vin max[V]	Operating Vin max[V]	Vo[V]	Vo Accuracy [%]	Vio [V]	PSRR [dB]	Iq [uA]	Package
150	MM3376	Reverse current protection low current consumption	6.5	6.0	0.8～5.0	2.0	0.05 *Vo=3V (Io=10mA)	-	1.7	SSON-4B SC-82 SOT-25
	Recommended MM3534	Low current consumption	7.0	6.0	1.2～5.0	0.8	0.24 *Vo=3V (Io=150mA)	50 (f=1kHz)	0.9	SC-82 SOT-25
	MM3755	Low current consumption	7.0	6.0	1.2～5.0	0.8	0.24 *Vo=3V (Io=150mA)	50 (f=1kHz)	0.9	PLP-4C
200	MM3404	Low dropout voltage High PSRR	7.0	6.5	0.8～5.0	1.0	0.08 *Vo=3V (Io=100mA)	75 (f=1kHz)	20	SC-82 SOT-25
	MM3764	Low dropout voltage High PSRR	7.0	6.5	0.8～5.0	1.0	0.08 *Vo=3V (Io=100mA)	75 (f=1kHz)	20	PLP-4C
	MM3416	Inrush current protection High PSRR, Low noise	6.5	5.5	1.0～5.0	1.0	0.29 *Vo=3V (Io=200mA)	75 (f=1kHz)	42	SC-82 SOT-25
	MM3816	Inrush current protection High PSRR, Low noise	6.5	5.5	1.0～5.0	1.0	0.29 *Vo=3V (Io=200mA)	75 (f=1kHz)	42	PLP-4C
	Recommended MM3411	Inrush current protection High speed transient response	7.0	6.5	0.8～5.0	1.0	0.40 *Vo=3V (Io=200mA)	70 (f=1kHz)	25	SC-82 SOT-25
	MM3763	Inrush current protection High speed transient response	7.0	6.5	0.8～5.0	1.0	0.40 *Vo=3V (Io=200mA)	70 (f=1kHz)	25	PLP-4C
	MM3566	Cap Less low current consumption	7.0	6.0	1.2～5.0	1.0	0.35 *Vo=3V (Io=200mA)	50 (f=1kHz)	0.9	SC-82 SOT-25
	MM3866	Cap Less low current consumption	7.0	6.0	1.2～5.0	1.0	0.35 *Vo=3V (Io=200mA)	50 (f=1kHz)	0.9	PLP-4C
	MM1836 MM1856	15V supply voltage	15.0	14.0	1.5～5.0	2.0	0.3 (Io=200mA)	70 (f=1kHz)	75	SOT-25
	Recommended MM1839	16V supply voltage Reverse bias protection	16.0	14.0	1.5～5.0	2.0	0.3 (Io=200mA)	70 (f=1kHz)	85	SSON-6E SOT-25

200mA～300mA LDO

Io[mA]	Model	Features	Absolute maximum Vin max[V]	Operating Vin max[V]	Vo[V]	Vo Accuracy [%]	Vio [V]	PSRR [dB]	Iq [uA]	Package
200	New MM1898	Negative Voltage Regulator Low noise Soft-Start	-12.0	-10.0	-0.9～-5.0	1.0	0.5 (Io=200mA)	70 (f=1kHz)	160	SSON-6A SOT-25
	New MM1998	Negative Voltage Regulator Low noise Quick-Start	-12.0	-10.0	-0.9～-5.0	1.0	0.5 (Io=200mA)	70 (f=1kHz)	160	SSON-6A SOT-25
300	MM3464	Low dropout voltage High PSRR	7.0	6.5	1.0～5.0 (0.05VStep)	1.0	0.24 *Vo=3V (Io=300mA)	75 (f=1kHz)	20	SC-82 SOT-25 SOT89-5
	MM3864	Low dropout voltage High PSRR	7.0	6.5	1.0～5.0 (0.05VStep)	1.0	0.24 *Vo=3V (Io=300mA)	75 (f=1kHz)	20	PLP-4C
	Recommended MM3571	Inrush current protection High speed transient response	7.0	6.5	1.0～5.0	1.0	0.62 *Vo=3V (Io=300mA)	70 (f=1kHz)	25	SC-82 SOT-25 SOT89-5
	MM3871	Inrush current protection High speed transient response	7.0	6.5	1.0～5.0	1.0	0.62 *Vo=3V (Io=300mA)	70 (f=1kHz)	25	PLP-4C
	MM3608	Thermal shutdown	7.0	6.5	0.8～5.0	1.0	0.24 *Vo=3V (Io=300mA)	70 (f=1kHz)	90	SOT-25
	MM3615	Temperature sense function	7.0	6.5	0.8～5.0	1.0	0.24 *Vo=3V (Io=300mA)	70 (f=1kHz)	90	SOT-25
	New MM1899	Low noise (Reduce the output voltage dependency)	15.0	14.0	1.5～5.4	1.0	0.35 (Io=300mA)	70 (f=1kHz)	140	SSON-6A SOT-25
	MM1849 MM1890	16V supply voltage High Output voltage	16.0	14.0	8.0～10.0	2.0	0.45 (Io=300mA)	60 (f=120Hz)	75	SOT-25
	Recommended MM1886	15V supply voltage	15.0	14.0	1.5～5.0	2.0	0.45 (Io=300mA)	70 (f=1kHz)	75	SSON-6A SOT-25 SOT-89-5

500mA～1500mA LDO

Io[mA]	Model	Features	Absolute maximum Vin max[V]	Operating Vin max[V]	Vo[V]	Vo Accuracy [%]	Vio [V]	PSRR [dB]	Iq [uA]	Package
500	MM3478 MM3526	Soft-Start	6.5	6.0	1.2～5.0	1.0	0.25 *Vo=3V (Io=500mA)	70 (f=1kHz)	50	SSON-6A SOT-25 SOT89-5
	MM3532	For SDXC Switchable Output voltage	6.5	6.0	1.8/3.3	1.0	0.43/0.36V *Vo=1.8/3.3V (Io=500mA)	70 (f=1kHz)	50	SC-82 SOT-25
1000	MM3479 MM3529	Soft-Start	6.5	6.0	1.2～5.0	1.0	0.50 *Vo=3V (Io=1A)	70 (f=1kHz)	50	SSON-6A SOT89-5
	MM3580	Soft-Start	6.5	6.0	1.2～5.0	1.0	0.50 *Vo=3V (Io=1A)	70 (f=1kHz)	50	HSOP-8A
	New MM3703	Soft-Start Output voltage support 1.0V	7.0	6.5	1.0～5.0	1.0	0.46 *Vo=3V (Io=1A)	65 (f=1kHz)	60	SSON-6A SOT89-5 HSOP-8E
	MM3687	Adjustable output voltage	6.5	5.5	0.8～4.5 ADJ	1.0	0.4 *Vo=3V (Io=1A)	65 (f=1kHz)	270	HSOP-8D
	MM1868	Low voltage operation Low dropout voltage	12.0	10.0	0.9～5.0	2.0	0.18 (Io=1A)	65 (f=1kHz)	1000	HSOP-8A TO-252-3
	Recommended MM1877	Standard	15.0	14.0	1.5～5.0	2.0	0.25 (Io=500mA)	60 (f=1kHz)	2000	HSOP-8A
1500	MM1870	Low voltage operation Low dropout voltage	12.0	10.0	0.9～5.0	2.0	0.26 (Io=1.5A)	65 (f=1kHz)	1000	HSOP-8A TO-252-5

Reset IC Line-up [1]

Delay Circuit	Model	Output Type	Output Logic	Manual reset	Sense pin separated	Absolute maximum Vin max[V]	Operating Vin max[V]	VD [V]	VD Accuracy [%]	Iq [uA]	Delay Time	Package
No Delay	IC-PST81	CMOS	Active-Low	No	No	12	10	0.8～6.0	±0.5	0.25μA	-	SOT-25 SC-82 SSON-4
	IC-PST82	Open drain	Active-Low	No	No	12	10	0.8～6.0	±0.5	0.25μA	-	SOT-25 SC-82 SSON-4
	IC-PST86	CMOS	Active-Low	No	No	7	6.5	1.2～5.2	±1.0	0.25μA	-	SOT-25 SC-82
	PST851A	Open drain	Active-Low	No	Yes	12	10	0.8～6.0	±0.5	0.35μA	-	SOT-25 SC-82 SSON-4
	PST852A	Open drain	Active-Low	No	Yes	12	10	0.8～6.0	±0.5	0.35μA	-	SOT-25 SC-82 SSON-4

Delay Circuit	Model	Output Type	Output Logic	Manual reset	Sense pin separated	Absolute maximum Vin max[V]	Operating Vin max[V]	VD [V]	VD Accuracy [%]	Iq [uA]	Delay Time	Package
Adjustable Delay	IC-PST83	CMOS	Active-Low	No	No	12	10	0.8～6.0	±0.5	0.35	External capacitor	SOT-25 SC-82 SSON-4
	IC-PST84	Open drain	Active-Low	No	No	12	10	0.8～6.0	±0.5	0.35	External capacitor	SOT-25 SC-82 SSON-4
	PST893A	CMOS	Active-Low	No	No	7	6.5	1.2～5.2	±1.0	0.35	External capacitor	SOT-25 SC-82 PLP-4C
	PST894A	Open drain	Active-Low	No	No	7	6.5	1.2～5.2	±1.0	0.35	External capacitor	SOT-25 SC-82 PLP-4C
	PST893B	CMOS	Active-Low	No	No	7	6.5	1.2～5.2	±1.0	0.35	External capacitor Low temperature fluctuation	SOT-25 SC-82 PLP-4C
	PST894B	Open drain	Active-Low	No	No	7	6.5	1.2～5.2	±1.0	0.35	External capacitor Low temperature fluctuation	SOT-25 SC-82 PLP-4C
	PST893R	CMOS	Active-Low	Yes	No	6.5	6	0.8～5.2	±1.0	0.35	External capacitor	SOT-25
	PST894R	Open drain	Active-Low	Yes	No	6.5	6	0.8～5.2	±1.0	0.35	External capacitor	SOT-25
	PST853A	CMOS	Active-Low	No	Yes	6.5	6	0.8～5.2	±1.0	0.35	External capacitor	SOT-25
	PST854A	Open drain	Active-Low	No	Yes	6.5	6	0.8～5.2	±1.0	0.35	External capacitor	SOT-25

Delay Circuit	Model	Output Type	Output Logic	Manual reset	Sense pin separated	Absolute maximum Vin max[V]	Operating Vin max[V]	VD [V]	VD Accuracy [%]	Iq [uA]	Delay Time	Package
Fixed Delay	PST87xA	CMOS	Active-Low	No	No	6	5.5	1.6～4.6	±1.5	1.0	20ms,50ms, 100ms,200ms	SOT-25 SC-82 SSON-4
	PST88xA	Open drain	Active-Low	No	No	6	5.5	1.6～4.6	±1.5	1.0	20ms,50ms, 100ms,200ms	SOT-25 SC-82 SSON-4
	PST87xR	CMOS	Active-Low	Yes	No	6	5.5	1.6～4.6	±1.5	1.0	20ms,50ms, 100ms,200ms	SOT-25 SC-82 SSON-4
	PST88xR	Open drain	Active-Low	Yes	No	6	5.5	1.6～4.6	±1.5	1.0	20ms,50ms, 100ms,200ms	SOT-25 SC-82 SSON-4
	PST803 PST805	Open drain	Active-Low	No	No	7	6.5	1.6～5.0	±1.5	1.0	50ms,100ms,200ms 240ms,400ms	SOT-23 SC-82
	PST804 PST806	Open drain	Active-High	No	No	7	6.5	1.6～5.0	±1.0	0.5	50ms,100ms,200ms 240ms,400ms	SOT-23 SC-82
	PST807 PST809	CMOS	Active-Low	No	No	7	6.5	1.6～5.0	±1.0	0.5	50ms,100ms,200ms 240ms,400ms	SOT-23 SC-82
	PST808 PST810	CMOS	Active-High	No	No	7	6.5	1.6～5.0	±1.0	0.5	50ms,100ms,200ms 240ms,400ms	SOT-23 SC-82

THE LINE CARDS

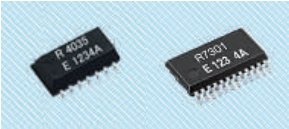
- CRYSTAL UNIT
- OSCILLATOR
- REAL TIME CLOCK MODULE
- SENSOR
- MCU
- IC

EPSON

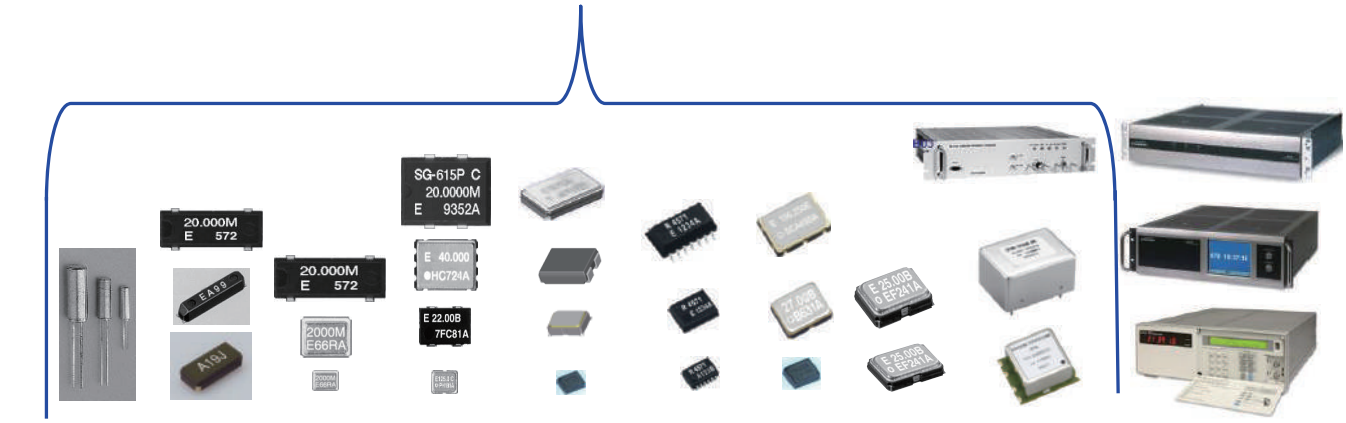
EPSON

PRODUCT LINE-UP

Products

Crystal unit	Microminiaturize by Photolithography Process • kHz Range Crystal Unit • MHZ Range Crystal Unit • SAW Resonator	
Oscillator	Compact, Low Current Consumption • SPXO • VCXO • TCXO • OCXO	
Real Time Clock Module	Built in crystal unit and Real Time Clock IC in One package • Serial Interface 4-Wire • Parallel Interface 4-Bit	
Sensor	Microminiaturize by Photolithography Process • Gyro Sensor • Pressure Sensing Crystal	

EPSON Timing Products (石英元件)



kHz Tuning Fork | kHz Tuning Fork SMD | AT Cut MHz Crystals | AT Cut MHz Oscillators | TCXO/VC-TCXO | Real Time Clocks | VCXOs | High Speed SAW | OCXO, RbXO | Cesium XO

Low Cost ⟷ High Cost

EPSON

kHz range crystal unit

Example of use: time, sleep clock for CPU and real time clock.

► kHz range crystal unit

Model	Actual size (mm) t Max.	Nominal frequency range (kHz) 20 32 100 200 300	Frequency tolerance (Standard) f_tol (× 10^{-6})	Motional resistance (Max.) R1	Load capacitance (Standard) CL	Storage temperature T_stg	Operating temperature T_use	Frequency vs. temperature characteristics Turnover Temperature (+25 °C Typ.)
FC1610AN	1.6×1.0×0.5	32.768 kHz	±20	90 kΩ	9 pF 12.5 pF	-55 °C to +125 °C	-40 °C to +85 °C	Parabolic coefficient (B): -0.04 × 10^{-6} / °C ^{2} Max. f_tem =B (Ti−θx) ^{2}
FC-12M	2.05×1.2×0.6	32.768 kHz	±20 ±30	90 kΩ	12.5 pF			
		32 kHz 77.5 kHz		90 kΩ to 65 kΩ				
FC-12D	2.05×1.25×0.35	32.768 kHz	±20	75 kΩ	7 pF 9 pF 12.5 pF			
FC-135R	3.2×1.5×0.9	32.768 kHz	±20	50 kΩ	7 pF 9 pF 12.5 pF			
FC-135		32.768 kHz		70 kΩ				
		32 kHz 77.5 kHz		70 kΩ to 45 kΩ				
MC-146	7.0×1.5×1.4	32.768 kHz	±20 ±50	65 kΩ	7 pF 9 pF 12.5 pF			
		32 kHz 100 kHz	±50 ±100	65 kΩ to 25 kΩ				
MC-306	8.0×3.8×2.54	32.768 kHz	±20 ±50	50 kΩ	12.5 pF			
		20 kHz 120 kHz	±50 ±100	55 kΩ to 12 kΩ				
MC-405 MC-406	10.41×4.06×3.6	32.768 kHz	±20 ±50	50 kΩ				
		20 kHz 120 kHz	±50 ±100	55 kΩ to 12 kΩ				

► kHz range crystal unit (For Automotive)

Model	Actual size (mm) t Max.	Nominal frequency range (kHz) 20 32 100 200 300	Frequency tolerance (Standard) f_tol (× 10^{-6})	Motional resistance (Max.) R1	Load capacitance (Standard) CL	Storage temperature T_stg	Operating temperature T_use	Frequency vs. temperature characteristics Turnover Temperature (+25 °C Typ.)
FC-13A (AEC-Q200)	3.2×1.5×0.9	32.768 kHz	±20 ±30 ±50	70 kΩ	9 pF 12.5 pF	-55 °C to +125 °C	-40 °C to +125 °C	Parabolic coefficient (B): -0.04 × 10^{-6} / °C ^{2} Max. f_tem =B (Ti−θx) ^{2}
MC-30A (AEC-Q200)	8.0×3.8×2.54	32.768 kHz	±20 ±50	50 kΩ	12.5 pF		-40 °C to +85 °C	
		20 kHz 120 kHz	±50 ±100	55 kΩ to 12 kΩ				

MHz range crystal unit

Example of use: clock for and reference clock for wired / wireless communications.

► MHz range crystal unit

Model	Actual size (mm) t Max.	Nominal frequency range (MHz) 1 10 20 64	Frequency tolerance (Standard) f_tol (× 10⁻⁶)	Frequency vs. temperature characteristics (Operating temperature) f_tem (× 10⁻⁶)	Motional resistance (Max.) R1	Load Capacitance (Standard) CL	Storage temperature T_stg	Operating temperature T_use
FA-118T	1.6×1.2×0.35	24 MHz – 54 MHz	±10 ±30	±10,±12 (-20 °C to +75 °C) ±30 (-20 °C to +75 °C)	80 Ω to 200 Ω	6 pF to ∞	-40 °C to +125 °C	-40 °C to +85 °C
FA-128	2.0×1.6×0.5	16 MHz – 54 MHz			60 Ω to 200 Ω			
FA-20H	2.5×2.0×0.55	12 MHz – 54 MHz			40 Ω to 150 Ω			
FA-238V	3.2×2.5×0.7	12 MHz – 15.999 MHz	±50	±30 (-20 °C to +70 °C)	80 Ω to 100 Ω	7 pF to ∞		
FA-238	3.2×2.5×0.7	16 MHz – 60 MHz			40 Ω to 80 Ω			
TSX-3225	3.2×2.5×0.6	16 MHz – 48 MHz	±10	±10 (-20 °C to +75 °C)	40 Ω to 60 Ω			

► MHz range crystal unit (Built-in Thermistor)

P	Model	Actual size (mm) t Max.	Nominal frequency range (MHz) 1 10 20 64	Frequency tolerance (Standard) f_tol (× 10⁻⁶)	Frequency vs. temperature characteristics (Operating temperature) f_tem (× 10⁻⁶)	Motional resistance (Max.) R1	Load Capacitance (Standard) CL	Storage temperature T_stg	Operating temperature T_use
140	FA1612AS	1.6×1.2×0.65 (Built-in thermistor)	38.4 MHz	±10	±12 (-30 °C to +85 °C)	80 Ω	6 pF to ∞	-40 °C to +125 °C	-40 °C to +85 °C
141	FA2016AS	2.0×1.6×0.65 (Built-in thermistor)	26 MHz 38.4 MHz			60 Ω			
142	FA-20HS	2.5×2.0×1.0 ((Built-in thermistor)	19.2 MHz 26 MHz			19.2MHz 80 Ω 26.0MHz 60 Ω			

► MHz range crystal unit (For Automotive)

P	Model	Actual size (mm) t Max.	Nominal frequency range (MHz) 1 10 20 64	Frequency tolerance (Standard) f_tol (× 10⁻⁶)	Frequency vs. temperature characteristics (Operating temperature) f_tem (× 10⁻⁶)	Motional resistance (Max.) R1	Load Capacitance (Standard) CL	Storage temperature T_stg	Operating temperature T_use
143	FA2016AA (AEC-Q200)	2.0×1.6×0.5	16 MHz – 54 MHz	±10	±20 (-40 °C to +85 °C) ±50 (-40 °C to +125 °C)	40 Ω to 200 Ω	6 pF to ∞	-40 °C to +125 °C	-40 °C to +125 °C
144	FA-238A (AEC-Q200)	3.2×2.5×0.7	12 MHz – 62.4 MHz	±15 to ±50	±30 (-40 °C to +85 °C) ±50 (-40 °C to +125 °C)	50 Ω to 120 Ω	7 pF to ∞	-40 °C to +125 °C	-40 °C to +125 °C

EPSON

kHz range crystal oscillator

Example of use: time and sleep clock for CPU.

► Output : CMOS (32.768kHz)

Model	Actual size (mm)	Nominal frequency range (MHz) 1 50 100 200	Frequency Tolerance ($x10^{-6}$)	Operating temperature	Supply voltage	Current consumption (Max.) (Vcc)	Output load condition	Output control
SG-3030CM	3.2×1.5×0.9	● 32.768 kHz	5±23	+25 °C	1.5 V to 5.5 V	2 μA (3.3 V)	15 pF	VIO
SG-3030LC	3.6×2.8×1.2	● 32.768 kHz			1.5 V to 5.5 V	2 μA (3.3 V)	15 pF	VIO
SG-3040LC					0.9 V to 3.6 V	3.1 μA (3.3 V)		
SG-3030JF	7.1×5.1×1.5	● 32.768 kHz			1.5 V to 5.5 V	2 μA (3.3 V)	15 pF	VIO
SG-3030JC	10.5×5.8×2.7	● 32.768 kHz			1.5 V to 5.5 V	2 μA (3.3 V)	15 pF	VIO
SG-3040JC					0.9 V to 3.6 V	3.1 μA (3.3 V)		
TG-3541CE	3.2×2.5×1.0 (t: Typ.)	● 32.768 kHz	±3.4 ±5.0 ±8.0	-40 to +85 °C -40 to +85 °C +85 to +105 °C	1.5 V to 5.5 V	1.5 μA (3.0 V)	30 pF	OE

► Output : CMOS (32.768kHz) For Automotive

Model	Actual size (mm)	Nominal frequency range (MHz) 1 50 100 200	Frequency Tolerance ($x10^{-6}$)	Operating temperature	Supply voltage	Current consumption (Max.) (Vcc)	Output load condition	Output control
TG-3541CEA (AEC-Q100)	3.2×2.5×1.0 (t: Typ.)	● 32.768 kHz	±3.4 ±5.0 ±8.0	-40 to +85 °C -40 to +85 °C +85 to +105 °C	1.5 V to 5.5 V	1.5 μA (3.0 V)	30 pF	OE

MHz range crystal oscillator

►Output : CMOS (MHz)

Model		Actual size (mm)	Nominal frequency range (MHz) 1 50 100 200	Frequency Tolerance ($x10^{-6}$)	Operating temperature	Supply voltage	Current consumption (Max.)	Output load condition	Output control
SG2016CAN		2.0x1.6x0.7 (t: Typ.)	1.2MHz 75MHz	±25 ±50 ±50, ±100	-20 °C to +70 °C -40 °C to +85 °C -40 °C to +105 °C	1.6 V to 2.2 V	2.4 mA	15 pF	$\overline{ST}$
						2.2 V to 2.7 V	2.8 mA		
						2.7 V to 3.6 V	3.0 mA		
SG-211 series	SEE	2.5×2.0×0.7 (t: Typ.)	2.375 MHz 60 MHz	±15 ±20 ±25	-20 °C to +70 °C -40 °C to +85 °C -40 °C to +90 °C	1.6 V to 2.2 V	4.5 mA	15 pF	$\overline{ST}$
	SDE					2.2 V to 2.7 V	5.0 mA		
	SCE					2.7 V to 3.6 V	6.0 mA		
SG-210 series	STF	2.5×2.0×0.8 (t: Typ.)	1 MHz 75 MHz	±25 ±50 ±50,±100	-20 °C to +70 °C -40 °C to +85 °C -40 °C to +105 °C	1.6 V to 2.2 V	2.4 mA	15 pF	$\overline{ST}$
						2.2 V to 2.7 V	2.8 mA		
						2.7 V to 3.6 V	3.0 mA		
	SEH		80 MHz 170 MHz	±50,±100	-20 °C to +70 °C -40 °C to +85 °C	1.8 V±10 %	8.0 mA	15 pF	$\overline{ST}$
	SDH					2.5 V±10 %	9.0 mA		
	SCH					3.3 V±10 %	11.0 mA		
SG-310 series	SEF	3.2×2.5×1.05 (t: Typ.)	2 MHz 48 MHz	±50,±100	-20 °C to +70 °C -40 °C to +85 °C	1.6 V to 2.2 V	3.0 mA	15 pF	$\overline{ST}$
	SDF					2.2 V to 3.0 V	3.5 mA		
	SCF					2.7 V to 3.6 V	4.5 mA		
	SDN		3 MHz 80 MHz	±20,±25, ±50,±100 ±20,±25 ±25, ±50,±100	-20 °C to +70 °C -30 °C to +85 °C -40 °C to +85 °C	2.2 V to 2.7 V	6.0 mA		
	SCN					2.7 V to 3.6 V	7.0 mA		
SG5032C*N SG7050C*N	CAN	5.0×3.2×1.1 (t: Typ.)	1 MHz 75 MHz	±25 ±50 ±50,±100	-20 °C to +70 °C -40 °C to +85 °C -40 °C to +105 °C	1.6 V to 3.6 V	3.0 mA	15 pF	$\overline{ST}$
	CBN	7.0×5.0×1.3 (t: Typ.)	80 MHz 170 MHz	±50	-40 °C to +85 °C		11.0 mA		
	CCN		2.5 MHz 50 MHz			4.5 V to 5.5 V	20.0 mA	50 pF	OE

►Output : CMOS(For Automotive MHz)

Model		Actual size (mm)	Nominal frequency range (MHz) 1 50 100 200	Frequency Tolerance ($x10^{-6}$)	Operating temperature	Supply voltage	Current consumption (Max.)	Output load condition	Output control
SG2016CAA (AEC-Q200)		2.0x1.6x0.7 (t: Typ.)	1.2MHz 75MHz	±50, ±100	-40 °C to +85 °C	1.6 V to 2.2 V	2.9 mA	15 pF	$\overline{ST}$
				±50, ±100	-40 °C to +105 °C	2.2 V to 2.7 V	3.3 mA		
				±100, ±150	-40 °C to +125 °C	2.7 V to 3.6 V	3.5 mA		
SG-210S*BA (AEC-Q200)	SEBA	2.5×2.0×0.8 (t: Typ.)	2 MHz 60 MHz	±50,±100	-20 °C to +70 °C	1.6 V to 2.2 V	2.0 mA	15 pF	$\overline{ST}$
	SDBA			±50,±100	-40 °C to +85 °C	2.2 V to 3.0 V	3.0 mA		
	SCBA			±50,±100	-40 °C to +105 °C	2.7 V to 3.6 V	4.0 mA		
				±100,±150	-40 °C to +125 °C				

EPSON

MHz range crystal oscillator

►Output : CMOS (MHz) Programmable OSC

Model	Actual size (mm)	Nominal frequency range (MHz) 1 50 100 200	Frequency Tolerance ($x10^{-6}$)	Operating temperature	Supply voltage	Current consumption (Max.)	Output load condition	Output control
SG-8101CG series	2.5×2.0×0.7 (t: Typ.)	0.67MHz – 170MHz	±15	-40 °C to +85 °C	1.62V to 1.98V	5.5 mA	15 pF	OE or $\overline{ST}$
					1.98 V to 2.2 V	5.8 mA		
			±20 / ±50	-40 °C to +105 °C	2.2 V to 2.8 V	6.7 mA		
					2.7 V to 3.63 V	8.1 mA		
SG-8101CE series	3.2×2.5×1.05 (t: Typ.)	0.67MHz – 170MHz	±15	-40 °C to +85 °C	1.62V to 1.98V	5.5 mA		
					1.98 V to 2.2 V	5.8 mA		
			±20 / ±50	-40 °C to +105 °C	2.2 V to 2.8 V	6.7 mA		
					2.7 V to 3.63 V	8.1 mA		
SG-8101CB series	5.0×3.2×1.1 (t: Typ.)	0.67MHz – 170MHZ	±15	-40 °C to +85 °C	1.62V to 1.98V	5.5 mA		
					1.98 V to 2.2 V	5.8 mA		
			±20 / ±50	-40 °C to +105 °C	2.2 V to 2.8 V	6.7 mA		
					2.7 V to 3.63 V	8.1 mA		
SG-8101CA series	7.0×5.0×1.3 (t: Typ.)	0.67MHz – 170MHz	±15	-40 °C to +85 °C	1.62V to 1.98V	5.5 mA		
					1.98 V to 2.2 V	5.8 mA		
			±20 / ±50	-40 °C to +105 °C	2.2 V to 2.8 V	6.7 mA		
					2.7 V to 3.63 V	8.1 mA		

►Output : CMOS (MHz) Programmable OSC For Automotive

Model	Actual size (mm)	Nominal frequency range (MHz) 1 50 100 200	Frequency Tolerance ($x10^{-6}$)	Operating temperature	Supply voltage	Current consumption (Max.)	Output load condition	Output control
SG-8101CGA (AEC-Q100)	2.5×2.0×0.7 (t: Typ.)	0.67MHz – 170MHz	±15	-40 °C to +85 °C	1.62V to 1.98V	5.5 mA	15 pF	OE or $\overline{ST}$
					1.98 V to 2.2 V	5.8 mA		
			±20	-40 °C to +105 °C	2.2 V to 2.8 V	6.7 mA		
			±50 / ±100	-40 °C to +125 °C	2.7 V to 3.63 V	8.1 mA		

►Output : LV-PECL / LVDS / HCSL (MHz)

Model		Actual size (mm)	Nominal frequency range (MHz) 50 100 500 800	Frequency Tolerance ($x10^{-6}$)	Operating temperature	Supply voltage	Current consumption (Max.)	Output load condition	Output control
SG3225EEN SG7050EEN (Ultra Low phase Jitter)	LV-PECL	3.2×2.5×1.05 (t: Typ.)	25 MHz – 325 MHz	±25 ±50 ±100	-40 °C to +85 °C -40 °C to +105 °C	2.5 V ± 0.125 V 3.3 V ± 0.165 V	60 mA	50 Ω	OE
SG3225VEN SG7050VEN (Ultra Low phase Jitter)	LVDS	7.0×5.0×1.4 (t: Typ.)					25 mA	100 Ω	
SG3225EAN SG5032EAN SG7050EAN	LV-PECL	3.2×2.5×1.05 (t: Typ.) 5.0×3.2×1.0 (t: Typ.)	73.5 MHz – 700 MHz	±20 ±30 ±50	-20 °C to +70 °C -40 °C to +85 °C	2.5 V to 3.3 V	65 mA	50 Ω	OE
SG3225VAN SG5032VAN SG7050VAN	LVDS	7.0×5.0×1.4 (t: Typ.)					30 mA	100 Ω	
SG7050EBN (Ultra Low phase Jitter)	LV-PECL	7.0×5.0×1.5 (t: Typ.)	100 MHz – 175 MHz	±50	-40 °C to +85 °C	2.5 V±0.125 V	55 mA	50 Ω	OE
						3.3 V±0.165 V	75 mA		
SG3225HBN	HCSL	3.2x2.5x1.05 (t: Typ.)	100MHz – 325MHz	±50 ±100	-40 °C to +85 °C	3.3 V ± 0.33 V	35mA	50 Ω	OE

TCXO / VC-TCXO

High stability over operating temperature (±0.1 ~ 2.0ppm)
Example of use: Reference (RF) clock for wireless communication and GPS

▶Output : Clipped sine wave

Model	Actual size (mm) t Typ.	Nominal frequency range (MHz) 1 10 50 100	Frequency tolerance (× 10^{-6})	Frequency / Temperature Characteristics (× 10^{-6})	Operating temperature	Supply voltage	Current consumption (Max.)	Output load condition	Output control
TG2016SMN	2.0×1.6×0.73	10 MHz 55 MHz	±1.5	±0.5	-40 to +85 °C	1.8 V ±0.1 V 2.8 V 3.0 V 3.3V ±5 %	1.5 mA (≦ 26MHz) 2.1 mA (> 26MHz)	10 kΩ//10 pF	Vc
TG2520SMN	2.5×2.0×0.8								
TG2016SBN	2.0×1.6×0.73	13 MHz 55 MHz	±1.5	±0.5	-40 to +85 °C	1.8 V ±0.1 V 2.8 V 3.0 V 3.3V ±5 %	1.5 mA (≦ 36MHz) 2.2 mA (> 36MHz)	10 kΩ//10 pF	Vc
TG2520SBN	2.5×2.0×0.8								
TG-5006CJ	2.0×1.6×0.73	13 MHz 52 MHz	±2.0	±0.5	-30 to +85 °C	1.8 V ±0.1 V 2.8 V 3.0 V 3.3 V ±5 %	1.5 mA (≦ 26MHz) 2.0 mA (> 26MHz)	10 kΩ//10 pF	Vc
TG-5006CG	2.5×2.0×0.8								
TG-5006CE	3.2×2.5×0.9	13 MHz 20 MHz 26 MHz 40 MHz							
TG-5035CJ	2.0×1.6×0.73	13 MHz 52 MHz	±2.0	±0.5	-40 to +85 °C	1.8 V ±0.1 V 2.8 V 3.0 V 3.3 V ±5 %	2.0 mA	10 kΩ//10 pF	Vc
TG-5035CG	2.5×2.0×0.8								
TG-5035CE	3.2×2.5×0.9	10 MHz 40 MHz							
TG2016SAN	2.0×1.6×0.73	13MHz 20MHZ 25MHz 40MHz	±2.0	±0.5	-30 to +85 °C	1.2 V ±0.1 V	1.6 mA (≦ 26MHz) 2.1 mA (> 26MHz)	10 kΩ//10 pF	ST
TG-5035CJ (AEC-Q200)	2.0×1.6×0.73	13 MHz 52 MHz	±2.0	±0.5	-40 to +85 °C	1.8 V ±0.1 V 2.8 V 3.0 V 3.3 V ±5 %	2.0 mA (≦ 40MHz) 2.5 mA (> 40MHz)	10 kΩ//10 pF	Vc
TG-5035CG (AEC-Q200)	2.5×2.0×0.8	13 MHz 52 MHz	±2.0	±0.5	-40 to +85 °C	1.8 V ±0.1 V 2.8 V 3.0 V 3.3 V ±5 %	2.0 mA (≦ 40MHz) 2.5 mA (> 40MHz)	10 kΩ//10 pF	Vc

▶Output : CMOS

Model	Actual size (mm) t Typ.	Nominal frequency range (MHz) 1 10 50 100	Frequency tolerance (× 10^{-6})	Frequency / Temperature Characteristics (× 10^{-6})	Operating temperature	Supply voltage	Current consumption (Max.)	Output load condition	Output control
TG2520CEN (CMOS Output)	2.5×2.0×0.8	12 MHz 52 MHz	±2.0	±2.0	-40 to +85 °C	2.8 V 3.0 V 3.3 V ±5 %	6.5mA	15pF	Vc
TG3225CEN (CMOS Output)	3.2×2.5×0.9	12 MHz 52 MHz	±2.0	±2.0	-40 to +85 °C	2.8 V 3.0 V 3.3 V ±5 %	6.5mA	15pF	Vc

EPSON

Gyro Sensor

High stability over operating temperature (±0.1 ~ 2.0ppm)

Example of use: Reference (RF) clock for wireless communication and GPS

▶Gyro Sensor

P	Model	External Dimensions (mm)	Supply Voltage (V)	Bias	Rate Range (°/s)	Scale Factor (mV/(°/s))	Non Linearity (%FS)	Operating Temperature	Recommended Application
148	**XV7021BB (SPI / I²C)**	**5.0×3.2×1.3**	2.7 ~ 3.6	0 LSB Typ. ± 1 °/s (Digital output)	±400	24bit : 17920 LSB/(°/s) ± 5 % (Digital output)	± 0.5	-20 °C ~ +80 °C (Please contact us about -40 °C ~ +85 °C)	Anti vibration and attitude control for industrial applications etc. Motion detection for man machine interface
149	**XV7011BB (SPI / I²C)**	**5.0×3.2×1.3**	2.7 ~ 3.6	0 LSB Typ. ± 1 °/s (Digital output)	±100	24bit : 71680 LSB/(°/s) ± 5 % (Digital output)	± 0.5	-20 °C ~ +80 °C (Please contact us about -40 °C ~ +85 °C)	
150	**XV7001BB (SPI / I²C)**	**5.0×3.2×1.3**	2.7 ~ 3.6	0 LSB Typ. ± 1 °/s (Digital output)	±100	16bit : 280 LSB/(°/s) ± 5 % (Digital output)	± 0.5	-20 °C ~ +80 °C	
151	**XV-3900CB**	**5.0×3.2×1.3**	2.7 ~ 3.3	1500 mV	±100	8.0	± 1	-20 °C ~ +80 °C	Detection picture stabilization
152	**XV-3510CB**	**5.0×3.2×1.3**	2.7 ~ 3.3	1430 mV	±300	3.0	± 0.5	-20 °C ~ +80 °C	Detection picture stabilization
Web Site	**XV-3500CB**	**5.0×3.2×1.3**		1350 mV	±100	0.67	± 5		

▶Gyro sensor for automotive

P	Model	External Dimensions (mm)	Supply Voltage (V)	Bias	Rate Range (°/s)	Scale Factor (mV/(°/s))	Non Linearity (%FS)	Operating Temperature	Recommended Application
153	**XV-9100CD (AEC-Q100)**	**5.0×5.0×1.4**	4.75 ~ 5.25	0.5 × V_{DD} V	±100	0.004 × V_{DD}	± 0.5	-40 °C ~ +105 °C	Electric Stability Control System, Rollover Protection System
	XV-9300CD (AEC-Q100)				±300	0.0012 × V_{DD}			
154	**XV-9100LV (AEC-Q100)**	**7.0×6.8×3.3**			±100	0.004 × V_{DD}		-40 °C ~ +125 °C	
	XV-9300LV (AEC-Q100)				±300	0.0012 × V_{DD}			
	XV-9100LP (AEC-Q100)	**9.5×5.0×7.2**			±100	0.004 × V_{DD}			
	XV-9300LP (AEC-Q100)				±300	0.0012 × V_{DD}			
155	**XV4001KC (I²C-Bus) XV4001KD (SPI-Bus) (AEC-Q200)**	**6.0×4.8×3.3 Inclined**	3.0 ~ 3.6	0 LSB Typ. ± 2 °/s (Digital output)	±70	370 LSB/(°/s) ±1.5% (Digital output)	± 0.5	-40 °C ~ +85 °C	Car navigation system,
	XV4001BC (I²C-Bus) XV4001BD (SPI-Bus) (AEC-Q200)	**5.0×3.2×1.3**							

▶Gyro sensor for automotive

P	Model	External Dimensions (mm)	Supply Voltage (V)	Bias	Rate Range (°/s)	Scale Factor (mV/(°/s))	Non Linearity (%FS)	Operating Temperature	Recommended Application
Web Site	**XV-8000LK (AEC-Q200)**	**6.0×4.8×3.3 Inclined**	4.75 ~ 5.25	0.5 × V_{DD} V	±60	0.005 × V_{DD}	± 0.5	-40 °C ~ +85 °C	Car navigation system,
	XV-8000CB (AEC-Q200)	**5.0×3.2×1.3**							

WHAT'S a REAL TIME CLOCK MODULE?

Real Time Clock module

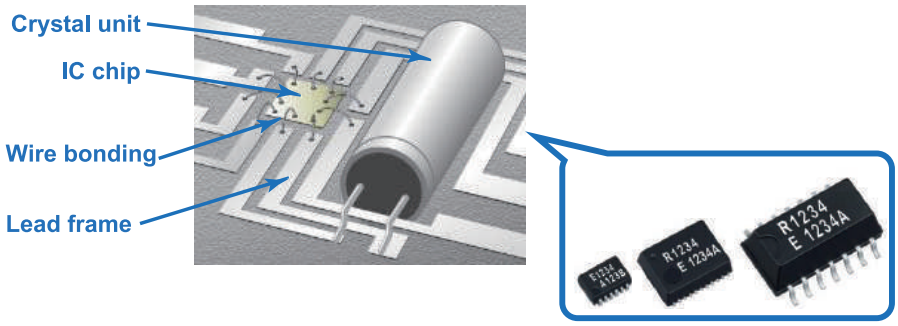
A real time clock module is a crystal device incorporating into a single package a 32.768 kHz crystal unit and a real time clock IC. This module is used in computers and fax machines and other electronic equipment that requires time management functions. Not only do these modules to eliminate the need to design an oscillation circuit and the need to adjust a timepiece function, they also conserve space on the circuit board.

Real time clock module

Tuning fork crystal (32.768kHz)

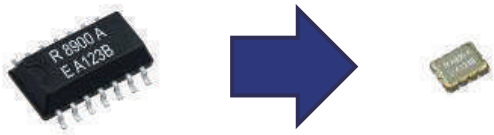
+

RTC IC (OSC circuit, Clock/Calendar function, Alarm interrupt, etc.)



Size	SSOP-24pin	SOP-14pin	VSOJ-20pin	SOP8	SON-22pin	VSOJ-20pin	3.2x2.5-10pin
							
Actual size [mm]	SF : 10.2×7.8×2.0 t	SA : 10.1×7.4×3.3 t	JE : 7.3×6.2×1.5 t	SJ : 7.0×6.0×2.65 t	NB : 6.3×5.0×1.4 t	LC : 3.6×2.8×1.2 t	CE : 3.2×2.5×1.0 t

Tiny size RTC module



SA package
10.1x7.4x3.3mm

CE package
3.2x2.5x1.0mm

 RX8900CE  RX8130CE

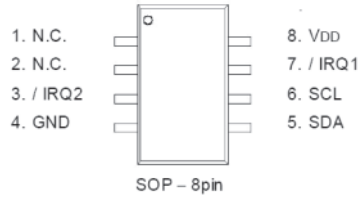
EPSON

THE BEST C/P PRODUCT

RX8010SJ : SOP8 RTC module

High reliability and Low power Real time clock module

- Easy to replace your SOP8 RTC IC + X'tal structure
- Solve your oscillation problem and power issue
- Best C/P value -> attractive price



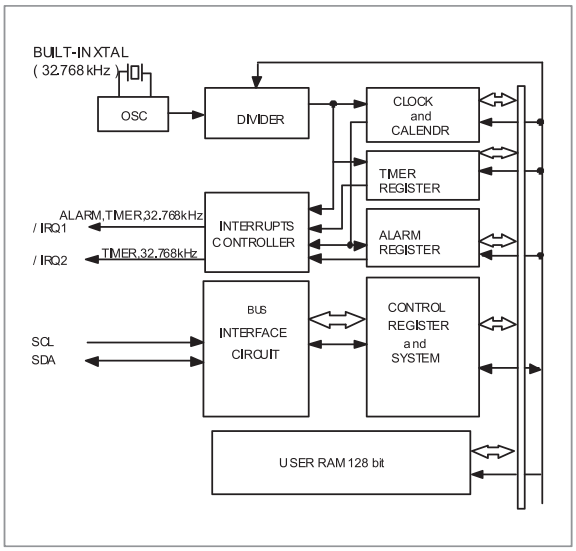
Feature

- Low current consumption : Typ.160nA / 3V
- SOP-8 package : 7.0 x 6.0 x 2.65t mm
- Interface type : I2C-bus

Overview

I/F	I2C-bus
Current consumption	160nA Typ. /3V , Ta=+25°C 320nA Max. / 3V, Ta=-40°C to +85°C
Frequency tolerance	$5\pm23\times10^{-6}$ / 3V, Ta=+25°C
RAM	128 bit
Other function	Alarm, Timer, 32.768kHz Output
Package Built-in crystal	SJ : 7.0 x 6.0mm t=2.65mm Max

Blockdiagram



	RX6110SA	RX8010SJ	RX8130CE	RX8900CE/SA	RX8803SA/LC RX4803SA/LC
Availability	SPI/I²C	I²C	I²C	I²C	I²C SPI
Size	10.1x7.4x3.3mm (SA)	✓ 7.0x6.0x2.4mm (SJ)	✓✓✓ 3.2x2.5x1.0mm(CE)	✓✓✓ 10.1x7.4x3.3mm (SA) 3.2x2.5x1.0mm(CE)	✓✓ 10.1x7.4x3.3mm (SA) 3.6x2.8x1.2mm(LC)
Low Power	✓✓✓ 130nA / 3V	✓✓✓ 160nA / 3V	✓✓ 300nA / 3V	✓ 700nA / 3V	✓ 750nA / 3V
High Stability	✓ 5±23ppm / +25℃	✓ 5±23ppm / +25℃	✓ 5±23ppm / +25℃	✓✓✓ UA:±3.4ppm/-40~85℃ UB:±5ppm/-40~85℃	✓✓✓ UA:±3.4ppm/-40~85℃ UB:±5ppm/-40~85℃
Power Switching	✓✓	-	✓✓✓	✓✓	-

迴路分析報告說明 (Example-1, QZ / 32.768kHz)

EPSON

1. Outline of evaluation

[Specifications of crystal unit]

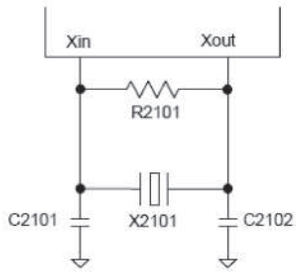
Model	: MC-146
Nominal frequency(f)	: 32.768[kHz]
Frequency tolerance	: +/-20[x10^{-6}]
Load capacitance(C_L)	: 7.0[pF] / 12.5[pF]
Series resistance(R_1)	: 65[kΩ]Max.
Drive level(DL)	: 0.5[μW]Max.
Negative resistance(|-R|) (recommended value)	: 325[kΩ]Min. (Five times or more R_1)

[Evaluation board]

PCB	: ABC-123
Supply voltage	: AC Adapter
IC for oscillation	: Intel / E22xxx

[Evaluation items]

Standard	: Frequency deviation / DL / |-R|



・Frequency temperature characteristics : Data is shown in Fig.-2.
(R2101=10M , C2101=5pF , C2102=5pF , VDD=DC +3.0V)

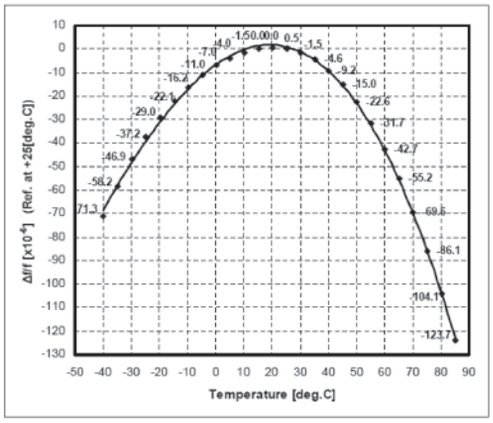


Fig.-2. Frequency temperature characteristics (Present circuit constants)

Table-1. Matching Data

Status	R2101 [MΩ]	C2101 [pF]	C2102 [pF]	Frequency deviation[x10^{-6}] C_L= 7.0 [pF]	Frequency deviation[x10^{-6}] C_L= 12.5 [pF]	DL [μW]	|-R| [kΩ]
Present	**10**	**5**	**5**	**+9.9**	+57.4	**0.051**	**1000**
	10	4	4	+19.7	+67.2	0.041	1000
	10	3	3	+31.3	+78.8	0.036	1000
Proposal	**10**	**15**	**15**	-40.1	**+7.4**	**0.082**	**680**
	10	12	12	-31.6	+15.9	0.076	820
	10	10	10	-23.3	+24.2	0.068	1000

迴路分析報告說明 (Example-2, AT / 32MHz)

EPSON

1. Outline of evaluation

[Specifications of crystal unit]

Model	: TSX-3225
Nominal frequency(f)	: 32.000000[MHz]
Frequency tolerance	: +/-10[x10^{-6}]
Load capacitance(C_L)	: 12.0[pF]⇒10.0[pF]
Series resistance(R_1)	: 40[Ω]Max.
Drive level(DL)	: 200[μW]Max.
Negative resistance(|-R|) (recommended value)	: 200[Ω]Min. (Five times or more R_1)

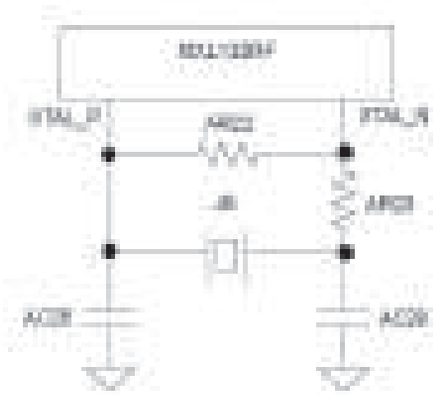


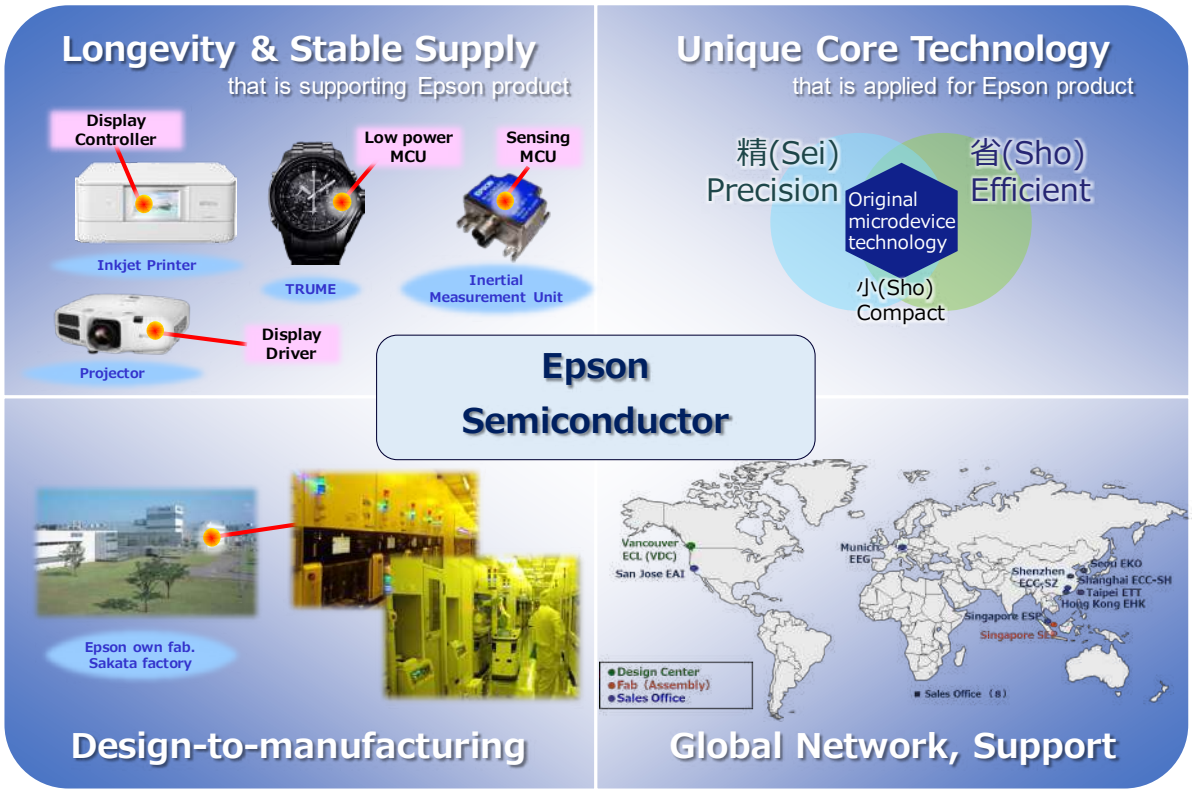
Table-2. Matching Data

Status	AR22 [MΩ]	AR23 [Ω]	AC25 [pF]	AC26 [pF]	Frequency deviation[x10^{-6}] C_L= 10.0[pF]	Frequency deviation[x10^{-6}] C_L=12.0[pF]	DL [μW]	|-R| [Ω]
	N.M.	0	12	12	+22.5	+48.8	44	445
Present /Proposal	**N.M.**	**0**	**15**	**15**	**-4.6**	+21.7	**48**	**285**
	N.M.	0	18	18	-29.1	-2.8	53	195

EPSON

EPSON BRAND IC

Why Choosing Epson Devices ?



Epson MCU Overview

■ Core Line-up

16-bit CPU
S1C17 Family

- Low power consumption
- Wide voltage range min.1.2V, max.5.5V
- Equipped with LCD / LED / EPD dr.

ARM® Cortex® –M0+
S1C31 Family

- Low power consumption
- High Performance
- 5V operation
- Large capacity Flash memory
- Unique peripherals with MDC / Voice

■ Application Example

EPSON

16-bit Single Chip Microcontroller S1C17M40

Overview

- Low power operation with embedded 48K bytes Flash memory.
- Equipped with an LCD driver capable of driving 36 SEG × 8COM / 40 SEG x 4 COM LCD panel.
- Built-in EEPROM that can be reprogrammed from an application software.
- Internal OSC achieved high accuracy that 16MHz ±1%(0℃～85℃)
- Contribute to reduce cost and simplify design.
- Supports 1.8V to 5.5V wide range operating voltage.

Advantage

◆High accuracy internal OSC

Embedded oscillator stability 16MHz ±1% (0℃～85℃) that will reduce the number of components in customer's products, save board space.

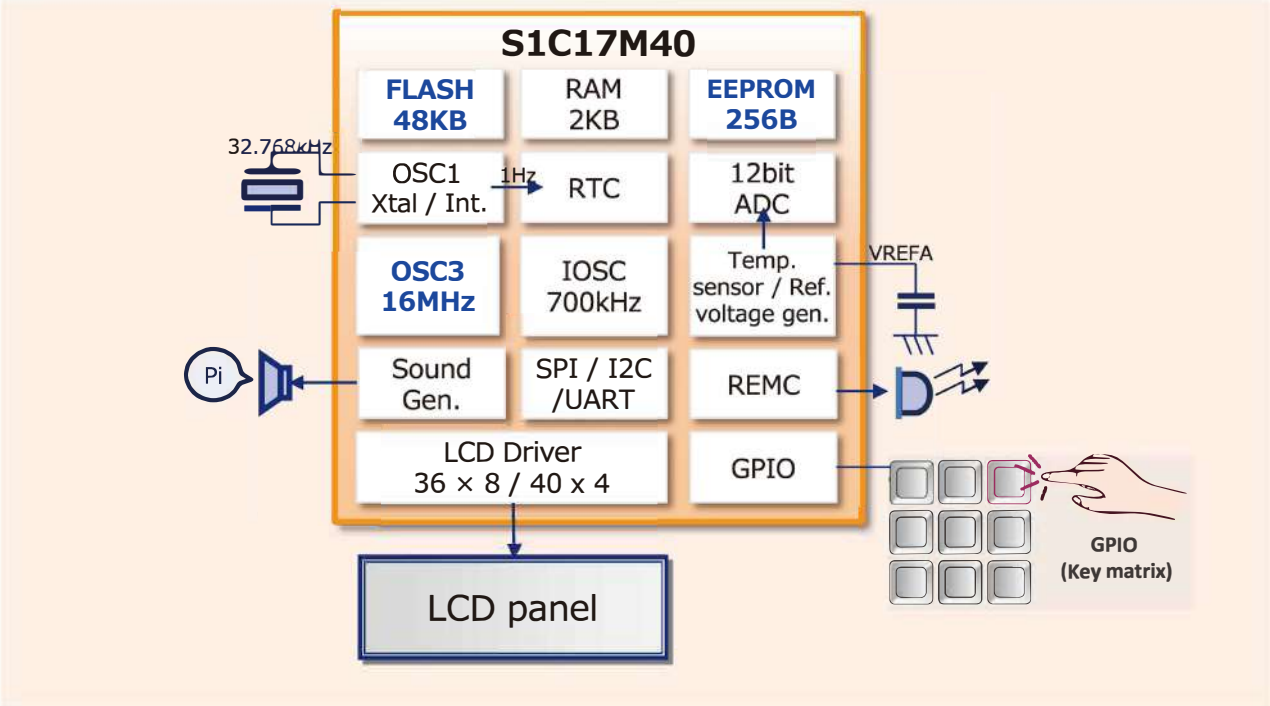
◆Embedded EEPROM

Electrically erasable programmable read-only memory
Erase/program count:100,000 times(min.)

◆Support up to 5.5V operation voltage with low current consumption

Address the strong need in factory automation equipment and some home appliances for MCUs that support 5 V operation.
Also suitable for battery products which need save power consumption.

Block Diagram



EPSON

Features

CPU core	EPSON Original 16bit RISC CPU Core S1C17
Flash ROM / RAM / EEPROM	Flash : 48KB / RAM : 2KB / EEPROM : 256 bytes
Current consumption	SLEEP mode: 0.25μA (typical), RUN mode: 170μA/MHz (typical)
LCD driver	36 SEG x 5-8 COM (max.), 40 SEG x 1- 4 COM (max.)
Supply voltage detector	VDD: 32 levels (1.7 to 5.0 V) / external voltage: 32 levels (1.7 to 5.0 V)
Infrared remote controller	1 channel (can be used to generate EL lamp driving waveforms)
Analog-digital converter	3 inputs (12-bit successive-approximation ADC) TQFP12-48 pin package 4 inputs (12-bit successive-approximation ADC) QFP13-64 pin package
Timer	16-bit PWM timer: 3 ch. 16-bit timer: 4 ch. Watchdog timer Real-time clock
Serial I/F	UART (3 ch.), SPI (2 ch.), and I2C (1 ch.) interfaces
Pin configuration	SPI, I2C, REMC3, T16B, UART and PWM can be assigned to each port freely by UPMUX software.
I/O ports	54 max. 32 of these ports support universal port multiplexers (UPMUX)
Package	TQFP12-48 (pin pitch: 0.5 mm) QFP13-64 (pin pitch: 0.5 mm)

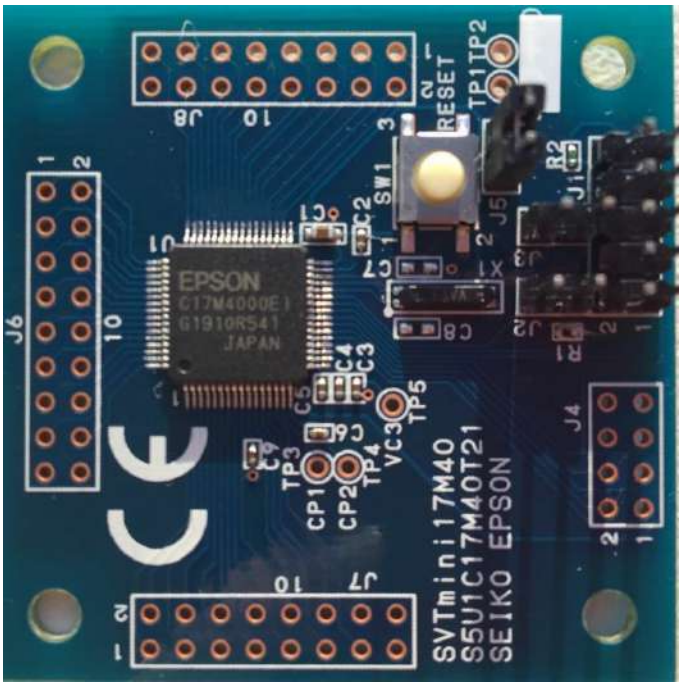
Application Examples

Timer counter/Temp controller

Thermostat

Remote controller

Evaluation Board



EPSON

Cortex®-M0+
32-bit Single Chip Microcontroller
S1C31W65/S1C31W73

Overview

EPSON

- ◆Expand operation temperature up to 105℃
- ◆Low Power Consumption
- ◆LCD driving with High Quality and Stability
  - ・Internal voltage booster circuit
  - ・Software contrast adjustment
- ◆Flexible GPIO pin assignment „UPMUX“ *1
- ◆Wide variety of Sensing Interface
- ◆High accuracy Temperature and Humidity Measurement(24bit RFC)

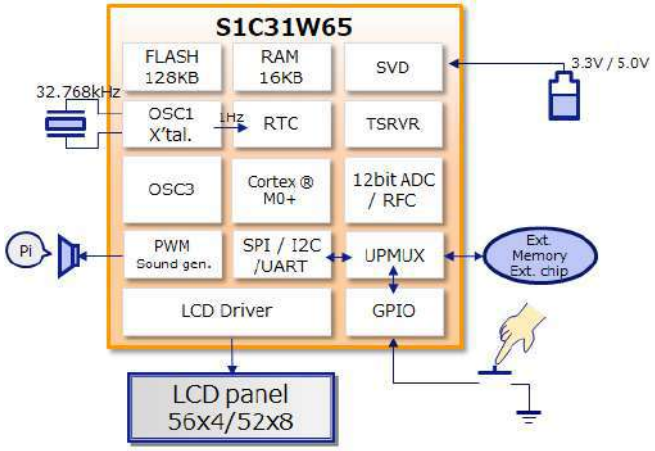
Suitable for Industry application with display

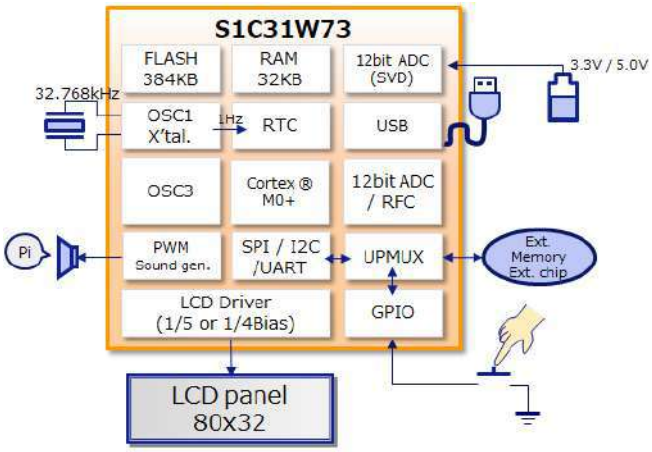
Specification

Function	S1C31W65 (seg LCD-dr)	S131W73 (Dot-matrix LCD-dr)
Core	ARM® 32-bit RISC CPU core Cortex®-M0+	
ROM	128K bytes	384K bytes
RAM	16K bytes	32K bytes
Clock	32.768 kHz(typ.) crystal oscillator 32 kHz(typ.) embedded oscillator 33 MHz(max.) crystal/ceramic oscillator 16MHz (typ.) embedded oscillator	
LCD driver	56x4, 52x8	96x16, 88x24, 80x32
Timer	Real-time clock, 16bit timer, PWM timer, Watchdog timer	
Serial I/F	UART=2ch I2C=2ch SPI=2ch	UART=2ch I2C=2ch SPI=2ch, QSPI=1ch
Analog Circuit	12bit A/D converter 24bit R/F converter	
Peripheral	GPIO (UPMUX *1) Supply voltage detector Power On Reset	GPIO (UPMUX *1) Supply voltage detector Power On Reset USB 2.0 FS
Operation Voltage	1.8V -5.5V	
Power consumption	TBD	
Operation Temperature	-40° C to 105° C	
Shipment form	TQFP14-100pin	QFP21-216pin Die form

*1:UPMUX (Universal Port Multiplexer)= SPI, I2C,UART,16-bit PWM, and othre terminals can be freely allocated

Block Diagram Example





Application Examples

Home central controller

Temperature controller

Timer counter

Thermostat

Demo/Evaluation Board

Coming soon!

Release schedule

◆*S1C31W65*

Sample	*Available*
MP	*February 2020*
Manual	*Available(Rev 0.12)*

◆*S1C31W73*

Sample	*Available*
MP	*February 2020*
Manual	*Available(Rev 0.12)*

EPSON

ARM®MCU with Dedicated Sound Hardware S1C31D50

Overview

- Independent HW processor
  - Voice play without CPU resource
  - 2ch Voice/Audio mixing play
  - Built in Self-Memory Check
  - Built in Voice speed conversion
- Supported by Epson Voice Creation PC Tool
  - Easy to change/Natural voice/ No need studio, narrator fee
  - Supported 12 language

Advantage

◆Simple Firmware development to sound play

Epson Voice Creation PC tool **S1C31D50**

◆CPU (ARM cortex M0+)can do full-operation under supported by HW processor

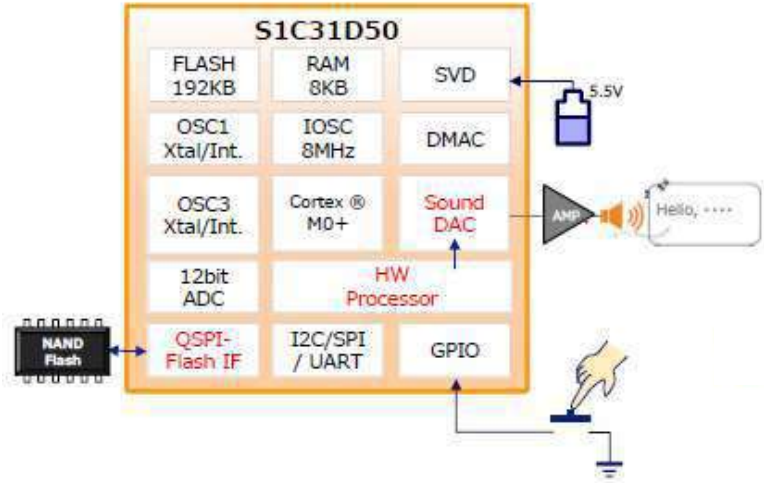
Can concentrate
・Main work

ARM cortex M0+

HW Processor

Independent work
・Voice/Audio Play
・Self memory check

Block Diagram



Power supply for SPI-Flash Interface.

SPI-Flash MAX size:16MB(more than 2hours sound should be on)

By Quad access, Image data can be read in short time from external SPI-Flash.

EPSON

Features

CPU core	ARM® 32-bit RISC CPU core Cortex®-M0+
Flash ROM / RAM	Flash : 192KB / RAM : 8K bytes + 14K bytes (when HW Processor is not active)
Operating Frequency Power Consumption	Operating Frequency / Voltage : 16MHz / 1.8~5.5V (IOSC : 4M, 8M, 16MHz) Power consumption (Typ.) : Sleep 0.46μA, Halt 180μA, Run 250μA/MHz
Hard ware processor	
Sound Play function	
Sound algorithm	EPSON high quality and high compression algorithm (EOV: EPSON Original Sound Format)
Playback channels	2 channels with mixing supported (e.g. Ch.0: voice, Ch.1: BGM)
Sampling frequency	15.625 kHz
Bitrate	16/24/32/40 kbps
Voice speed conversion	75% to 125% (5% steps)
Memory check function	
Embedded RAM check	Read/write check, March-C
Embedded Flash check	Checksum, CRC
External QSPI-Flash check	Checksum, CRC
Sound DAC(SDAC)	Sampling frequency=15.625 kHz
DMA	4 channels
Timer	16bit x 8ch, 16bit PWM (4 signals), WDT, RTC
Serial I/F	SPI x 3ch , I2C x 3ch, UART x 3ch, QSPI x 1ch
Pin configuration	SPI, I2C, UART and PWM can be assigned to each port freely by UPMUX software.
IR remote controller	Generate carrier wave for IR remote controller
SVD	Select voltage each 0.1V to detect for VDD and external voltage
Others	POR, 12-bit A/D converter,24-bit R/F converter

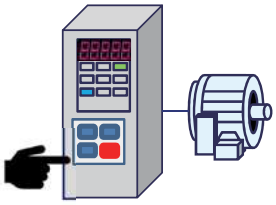
Application Examples

Coffee machine

Door lock

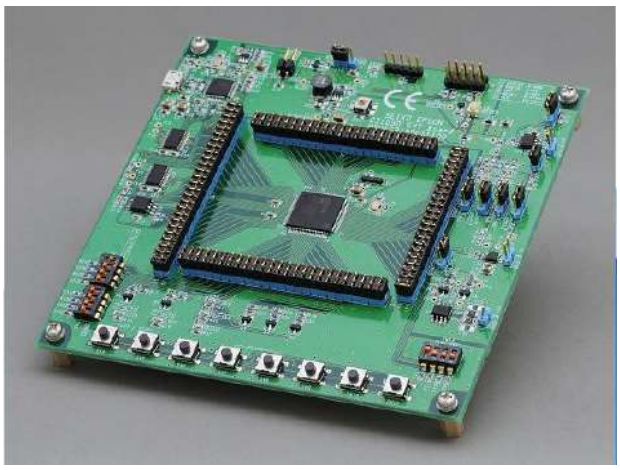
Fire alarm/Smoke detector

Home central controller



Operation guidance for factory equipment

Demo/Evaluation Board



EPSON

S1C17W00 Group Comparison (Dr. less)

Model			S1C17W03	S1C17W04	S1C17W05	S1C17W06
Memory	Flash		16KB	32KB	48KB	64KB
	RAM		2KB	2KB	2KB	4KB
Clock	IOSC *		700kHz	700kHz	700kHz	700kHz
	OSC1	X'tal	32.768kHz	32.768kHz	32.768kHz	32.768kHz
		Internal *	-	-	32kHz	32kHz
	OSC3	X'tal / Cera	4MHz	4MHz	4MHz	4MHz
		Internal *	0.25-4MHz	0.25-4MHz	0.25-4MHz	0.25-4MHz
LCD Driver			-	-	-	-
GPIO (max.)			34+1(O)	34+1(O)	34+1(O)	52+1(O)
Timer	RTC / WDT		1 / 1	1 / 1	1 / 1	1 / 1
	16bit / PWM		4 / 2 (4 ports)	4 / 2 (4 ports)	4 / 2 (4 ports)	3 / 2 (4 ports)
Serial I/F	UART		2	2	2	2
	SPI		2	2	2	2
	I2C		1	1	1	1
	SMCIF		-	-	-	1
Analog I/F	24 bit RFC		2	2	2	2
	12 bit ADC		1 (6 inputs)	1 (6 inputs)	1 (6 inputs)	1 (8 inputs)
	OPAmp		-	-	-	-
	Temp. Sensor		-	-	1	-
Others	Arithmetic Circuit		Mul./Div./MAC.	Mul./Div./MAC.	Mul./Div./MAC.	Mul./Div./MAC.
	POR / SVD		1 / 1	1 / 1	1 / 1	1 / 1
	IrREMC / Melody		1/ 1	1/ 1	1/ 1	1 / 1
	Others		-	-	Temp. Sensor Vref Gen.	-.
Current Consum-ption	Sleep		0.15uA	0.15uA	0.15uA	0.15uA
	Halt		0.3uA	0.3uA	0.3uA	0.3uA
	32kHz Run		4uA	4uA	3uA	3uA
	1MHz Run		250uA	250uA	150uA	150uA
Voltage	Operation		1.2~3.6V	1.2~3.6V	1.2~3.6V	1.2~3.6V
	Program (VPP)		7.5V	7.5V	7.5V or Internal	7.5V or Internal
Operation Temperature			-40~85° C	-40~85° C	-40~85° C	-40~85° C
Shipping form			SQFN5-32 TQFP12-48 Chip (80um pp)	SQFN5-32 TQFP12-48 Chip (80um pp)	TQFP12-48 Chip (80um pp)	QFP13-64 Chip (80um pp)

* Internal oscillator

MP | Under development | Under Investigation | Idea level

S1C17W10 Group Comparison (Seg Dr.)

Model			S1C17W10	S1C17W12	S1C17W13	S1C17W14	S1C17W15	S1C17W16	S1C17W17	S1C17W18
Memory	Flash		16KB	32KB	48KB	48KB	64KB	64KB	96KB	128KB
	RAM		2KB	2KB	2KB	4KB	4KB	8KB	8KB	8KB
Clock	IOSC *		700kHz	700kHz	700kHz	700kHz	700kHz	700kHz	700kHz	700kHz
	OSC1	X'tal	32.768kHz	32.768kHz	32.768kHz	32.768kHz	32.768kHz	32.768kHz	32.768kHz	32.768kHz
		Internal *	32kHz	32kHz	32kHz	-	-	-	32kHz	-
	OSC3	X'tal / Cera	4MHz	4MHz	4MHz	4MHz	4MHz	4MHz	4MHz	4MHz
		Internal *	0.25-4MHz	0.25-4MHz	0.25-4MHz	0.25-4MHz	0.5-4MHz	0.25-4MHz	0.25-4MHz	0.25-4MHz
LCD Driver			15 x 5 16 x 4	36 x 8 40 x 4	24 x 4	50 x 8 54 x 4	30 x 8 34 x 4	56 x 8 60 x 4	36 x 8 40 x 4	44 x 8 48 x 4
GPIO (max.)			20+1(O)	28+1(O)	31+1(O)	32+1(O)	35+1(O)	39+1(O)	44+1(O)	67+1(O)
Timer	RTC / WDT		1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1
	16bit / PWM		2 / 1 (2 ports)	2 / 2 (4 ports)	3 / 2 (4 ports)	3 / 2 (4 ports)	3 / 2 (4 ports)	5 / 2 (4 ports)	3 / 2 (4 ports)	4 / 3 (6 ports)
Serial I/F	UART		1	1	2	2	2	2	2	2
	SPI		1	1	1	2	1	3	2	2
	I2C		1	1	1	1	1	1	1	1
	SMCIF		-	-	-	-	-	-	-	-
Analog I/F	24 bit RFC		1	1	1	1	4	2	2	2
	12 bit ADC		-	-	-	-	-	1 (4 inputs)	1 (4 inputs)	1 (7 inputs)
	OPAmp		-	-	-	-	-	-	-	-
	Temp. Sensor		-	-	-	-	-	-	1	1
Others	Arithmetic Circuit		Mul./Div./MAC.	Mul./Div./MAC.	Mul./Div./MAC.	Mul./Div./MAC.	Mul./Div./MAC.	Mul./Div./MAC.	Mul./Div./MAC.	Mul./Div./MAC.
	POR / SVD		1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1
	IrREMC / Sound		- / 1	1 / 1	1 / 1	1 / 1	- / 1	1 / 1	1 / 1	1 / 1
	Others		-	-	LED pin x 2	-	-	-	-	Temp. Sensor Vref Gen.
Current Consum-ption	Sleep		0.15uA	0.15uA	0.15uA	0.15uA	0.15uA	0.15uA	0.15uA	0.15uA
	Halt		0.3uA	0.3uA	0.3uA	0.3uA	0.3uA	0.3uA	0.3uA	0.3uA
	32kHz Run		3uA	2uA	2uA	3uA	4uA	3uA	3uA	2uA
	1MHz Run		140uA	140uA	140uA	200uA	250uA	200uA	150uA	140uA
Voltage	Operation		1.2~3.6V	1.2~3.6V	1.2~3.6V	1.2~3.6V	1.2~3.6V	1.2~3.6V	1.2~3.6V	1.2~3.6V
	Program(VPP)		7.5V	7.5V	7.5V	7.5V	7.5V	7.5V	7.5V or Internal	7.5V or Internal
Operation Temperature			-40~85° C	-40~85° C	-40~85° C	-40~85° C	-40~85° C	-40~85° C	-40~85° C	-40~85° C
Shipping form			TQFP12-48 Chip (80um pp)	TQFP14-80 Chip (80um pp)	TQFP13-64 SQFN7-48 TQFP12-48 Chip (80um pp)	QFP15-100 Chip (80um pp)	SQFN9-64 TQFP13-64 TQFP14-80 QFP15-100 Chip (80um pp)	TQFP15-128 Chip (80um pp)	TQFP15-100 Chip (80um pp)	TQFP15-128 TQFP14-80 SQFN9-64 Chip (80um pp)

* Internal oscillator

MP | Under development | Under Investigation | Idea level

EPSON

S1C17W20/W30 Group Comparison (Seg & Dot Dr.)

Model			S1C17W20	S1C17W21	S1C17W22	S1C17W23	S1C17W24	S1C17W26	S1C17W32	S1C17W34	S1C17W35	S1C17W36
Memory	Flash		32KB	64KB	64KB	96KB	128KB	192KB	64KB	128KB	256KB	384KB
	RAM		2KB	4KB	4KB	8KB	8KB	12KB	8KB	12KB	12KB	16KB
Clock	IOSC *		700kHz	700kHz	700kHz	700kHz	700kHz	700kHz	700kHz	700kHz	700kHz	700kHz
	OSC1	X'tal	32.768kHz	32.768kHz	32.768kHz	32.768kHz	32.768kHz	32.768kHz	32.768kHz	32.768kHz	32.768kHz	32.768kHz
		Internal *	32kHz	32kHz	-	-	32kHz	32kHz	32kHz	-	-	-
	OSC3	X'tal/Cera	4MHz	4MHz	4MHz	4MHz	4MHz	4MHz	4MHz	4MHz	4MHz	4MHz
		Internal *	0.25-4MHz	0.25-4MHz	0.5-4MHz	0.5-4MHz	0.25-4MHz	0.25-4MHz	0.25-4MHz	0.25-4MHz	0.25-4MHz	0.25-4MHz
LCD Driver			30 x16 38 x 8	48 x 16 56 x 8	56 x 24 64 x 16 72 x 8	56 x 24 64 x 16 72 x 8	64 x 16 72 x 8	70 x 16 78 x 8	60 x 32 72 x 16	64 x 32 80 x 16	64 x 32 80 x 16	64 x 32 80 x 16
GPIO (max.)			28+1(O)	24+1(O)	41+1(O)	41+1(O)	41+1(O)	44+1(O)	43+1(O)	52+1(O)	52+1(O)	52+1(O)
Timer	RTC / WDT		1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	3 / 1	3 / 1	3 / 1
	16bit / PWM		2 / 1 (2 ports)	2 / 2 (4 ports)	2 / 2 (4 ports)	4 / 3 (6 ports)	4 / 3 (6 ports)	4 / 3 (6 ports)	2 / 3 (6 ports)	4 / 3 (6 ports)	4 / 3 (6 ports)	4 / 3 (6 ports)
Serial I/F	UART		1	1	1	2	2	2	2	2	2	2
	SPI		1	1	1	2	2	2	2	2	2	2
	I2C		1	1	1	1	1	1	1	1	1	1
	SMCIF		-	-	-	-	-	-	-	-	-	-
Analog I/F	24 bit RFC		-	1	2	2	2	2	2	2	2	2
	12 bit ADC		-	-	-	1 (6 inputs)	1 (6 inputs)	1 (6 inputs)	1 (8 inputs)	1 (8 inputs)	1 (8 inputs)	1 (8 inputs)
	OPAmp		-	-	-	2	-	-	-	-	-	-
	Temp. Sensor		-	-	-	-	-	1	1	1	1	1
Others	Arithmetic Circuit		Mul./Div./MAC.	Mul./Div./MAC.	Mul./Div./MAC.	Mul./Div./MAC.	Mul./Div./MAC.	Mul./Div./MAC.	Mul./Div./MAC.	Mul./Div./MAC.	Mul./Div./MAC.	Mul./Div./MAC.
	POR / SVD		1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1
	IrREMC / Sound		1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1
	Others		-	-	-	-	-	-	-	Temp. Sensor Vref Gen.	Temp. Sensor Vref Gen.	Temp. Sensor Vref Gen.
Current Consum-ption	Sleep		0.15uA	0.15uA	0.15uA	0.15uA	0.15uA	0.15uA	0.15uA	0.15uA	0.15uA	0.15uA
	Halt		0.3uA	0.3uA	0.3uA	0.3uA	0.3uA	0.3uA	0.3uA	0.4uA	0.4uA	0.4uA
	32kHz Run		3uA	3uA	4uA	4uA	3uA	3uA	3uA	3uA	3uA	3uA
	1MHz Run		150uA	150uA	250uA	250uA	150uA	150uA	150uA	150uA	150uA	150uA
Voltage	Operation		1.2~3.6V	1.2~3.6V	1.2~3.6V	1.2~3.6V	1.2~3.6V	1.2~3.6V	1.2~3.6V	1.2~3.6V	1.2~3.6V	1.2~3.6V
	Program(VPP)		7.5V or Internal	7.5V or Internal	7.5V	7.5V	7.5V or Internal	7.5V or Internal	7.5V or Internal	7.5V or Internal	7.5V or Internal	7.5V or Internal
Operation Temperature			-40~85° C	-40~85° C	-40~85° C	-40~85° C	-40~85° C	-40~85° C	-40~85° C	-40~85° C	-40~85° C	-40~85° C
Shipping form			QFP14-100 Chip (80um)	QFP14-100 Chip (80um)	TQFP15-128 Chip (80um)	TQFP15-128 Chip (80um)	TQFP15-128 Chip (80um)	TQFP24-144 Chip (80um)	TQFP24-144 Chip (80um)	TQFP21-176 Chip (80um)	TQFP21-176 Chip (80um)	TQFP21-176 Chip (80um)

* Internal oscillator

MP | Under development | Under Investigation | Idea level

S1C17M00/M10 Group Comparison

Model			S1C17M12	S1C17M13	S1C17M14	S1C17M01	S1C17M10	S7C17M11
Memory	Flash		16KB	16KB	32KB	32KB	64KB	126KB
	RAM		2KB	2KB	4KB	4KB	4KB	8KB
Clock	IOSC *		700kHz	700kHz	700kHz	7.37MHz	700kHz	700kHz
	OSC1	Xtal	-	-	32.768kHz	32.768kHz	32.768kHz	-
		Internal *	-	-	-		32kHz	DTCXO
	OSC3	Xtal, Cera	-	-	-	16.3MHz	16.8MHz	16.8MHz
		Internal *	4M-16MHz	4M-16MHz	4M-16MHz		4M-16MHz	4M-16MHz
LCD Driver			-	-	-	32x4, 28x8	88x8, 80x16	30x8, 32x6, 34x4
GPIO (max.)			24+1(o)	24+1(o)	36+1(o)	19	32+1(O)	42+1(O)
Timer	8bit / 16bit / PWM		- / 4 / 1x2	- / 4 / 1x2	- / 4 / 2x6	- / 5 / -	- / 5 / 1	- / 4 / 1
	CT / RTC / WDT		- / - / 1	- / - / 1	- / 1 / 1	- / 1 / 1	- / 1 / 1	- / 1 / 1
	Stopwatch		-	-	-	RTCに含む	RTCに含む	-
SIO	UART		1	1	2	1	1	4
	SPI		2	2	2	2	1	1
	I2C		1	1	1	1	1	2
	SMCIF		-	-	-	-	1	2
	REMC		1	1	1	-	-	-
Analog	24bit RFC		-	-	-	1	-	-
	12bit ADC		-	8	8	-	-	8
	AMRC		-	-	-	1	-	-
Others	Arithmetic Circuit		Mul./Div./MAC.	Mul./Div./MAC.	Mul./Div./MAC.	-	-	Mul./Div./MAC.
	SVD		1	1	1	1	1 (int., ext. x 2)	1 (int., ext. x 2)
	Etc.		LED Cntl./Driver 8x5	LED Cntl./Driver 8x5	LED Cntl./Driver 8x10	-	-	Power Supply Switching
Current Consumption	Sleep		0.5uA	0.5uA	0.5uA	0.35uA	0.16uA	2.25uA
	Halt		40uA	40uA	40uA	0.8uA	0.6uA	2.35uA
	32KHz run		-	-	-	12.5uA	4uA	8uA
	1MHz run		150uA	150uA	150uA	210uA	145uA	187uA
Voltage	Operation		1.8~5.5V	1.8~5.5V	1.8~5.5V	1.8~5.5V	1.8~5.5V	2.0~5.5V
	Program		7.5V	7.5V	7.5V	7.5V	7.5V	2.7-5.5(vpp gene ON)
Shipping form	Package		TQFP12-48	TQFP12-48	TQFP13-64	TQFP13-64	TQFP15-128	H4QFP15-100pin
	Chip		-	-	-	100u p.p.	80u p.p.	-

* Internal oscillator

MP | Under development | Under Investigation | Idea level

EPSON

S1C17M20 Group Comparison

Model			S1C17M20	S1C17M21	S1C17M22	S1C17M23	S1C17M24	S1C17M25
Memory	Flash		16KB	16KB	16KB	32KB	32KB	32KB
	RAM		4KB	4KB	4KB	4KB	4KB	4KB
Clock	IOSC *		700k	700k	700k	700k	700k	700k
	OSC1	Xtal	-	32.768kHz	32.768kHz	-	32.768kHz	32.768kHz
		Internal *	-	32kHz	32kHz	-	32kHz	32kHz
	OSC3	Xtal, Cera	21MHz	21MHz	21MHz	21MHz	21MHz	21MHz
		Internal *	12M/16M/20MHz	12M/16M/20MHz	12M/16M/20MHz	12M/16M/20MHz	12M/16M/20MHz	12M/16M/20MHz
LCD Driver			-	-	-	-	-	-
GPIO (max.)			18/25 +1(O)	25 +1(O)	40+1(O)	18/25 +1(O)	25 +1(O)	40 +1(O)
Timer	8bit / 16bit / PWM		- / 4 / 2x2	- / 4 / 2x2	- / 4 / 2x2	- / 4 / 2x2	- / 4 / 2x2	- / 4 / 2x2
	CT / RTC / WDT		- / 1 / 1	- / 1 / 1	- / 1 / 1	- / 1 / 1	- / 1 / 1	- / 1 / 1
	Stopwatch		Included RTC	Included RTC	Included RTC	Included RTC	Included RTC	Included RTC
SIO	UART		2	2	2	2	2	2
	SPI		2	2	2	2	2	2
	I2C		1	1	1	1	1	1
	SMCIF		-	-	-	-	-	-
	REMC		1	1	1	1	1	1
Analog	24bit RFC		-	-	2	-	-	2
	12bit ADC		4/6	6	8	4/6	6	8
	AMRC		-	-	-	-	-	-
Others	Arithmetic Circuit		Mul./Div./MAC.	Mul./Div./MAC.	Mul./Div./MAC.	Mul./Div./MAC.	Mul./Div./MAC.	Mul./Div./MAC.
	SVD		1	1	1	1	1	1
	Etc.		POR / BOR	POR / BOR	POR / BOR	POR / BOR	POR / BOR	POR / BOR
Current Consumption	Sleep		0.36uA	0.36uA	0.36uA	0.36uA	0.36uA	0.36uA
	Halt		0.7uA	0.7uA	0.7uA	0.7uA	0.7uA	0.7uA
	32KHz run		5uA	5uA	5uA	5uA	5uA	5uA
	1MHz run		160uA	160uA	160uA	160uA	160uA	160uA
Voltage	Operation		1.8~5.5V	1.8~5.5V	1.8~5.5V	1.8~5.5V	1.8~5.5V	1.8~5.5V
	Program		2.7-5.5(vpp gene ON)	2.7-5.5(vpp gene ON)	2.7-5.5(vpp gene ON)	2.7-5.5(vpp gene ON)	2.7-5.5(vpp gene ON)	2.7-5.5(vpp gene ON)
Shipping form	Package		SQFN4-24 SQFN5-32	TQFP12-32	TQFP12-48	SQFN4-24 SQFN5-32	TQFP12-32	TQFP12-48
	Chip		-	-	-	-	-	-

* Internal oscillator

MP | Under development | Under Investigation | Idea level

S1C17M30 Group Comparison

Model			S1C17M30	S1C17M31	S1C17M32	S1C17M34	S1C17M33
Memory	Flash		48KB	48KB	64KB	64KB	96KB
	RAM		4KB	4KB	4KB	4KB	4KB
Clock	IOSC *		700k	700k	700k	700k	700k
	OSC1	Xtal	32.768kHz	32.768kHz	32.768kHz	32.768kHz	32.768kHz
		Internal *	32kHz	32kHz	32kHz	32kHz	32kHz
	OSC3	Xtal, Cera	16.8MHz	16.8MHz	16.8MHz	16.8MHz	16.8MHz
		Internal *	12M/16MHz	12M/16MHz	12M/16MHz	12M/16MHz	12M/16MHz
LCD Driver			22x8, 26x4 External Voltage Application Mode	22x8, 26x4	38x8, 42x4 External Voltage Application Mode	33x8, 37x4	46x8, 50x4
GPIO (max.)			37 +1(O)	37 +1(O)	53+1(O)	51 +1(O)	65 +1(O)
Timer	8bit / 16bit / PWM		- / 4 / 3	- / 4 / 3	- / 4 / 3	- / 4 / 3	- / 4 / 3
	CT / RTC / WDT		- / 1 / 1	- / 1 / 1	- / 1 / 1	- / 1 / 1	- / 1 / 1
	Stopwatch		Included RTC	Included RTC	Included RTC	Included RTC	Included RTC
SIO	UART		2	2	2	2	2
	SPI		1	1	1	1	1
	I2C		1	1	1	1	1
	SMCIF		-	-	-	-	-
	REMC		1	1	1	1	1
Analog	24bit RFC		2	2	2	2	2
	12bit ADC		2	2	2	2	5
	AMRC		-	-	-	-	-
Others	Arithmetic Circuit		Mul./Div./MAC.	Mul./Div./MAC.	Mul./Div./MAC.	Mul./Div./MAC.	Mul./Div./MAC.
	SVD		1	1	1	1	1
	Etc.		POR / BOR	POR / BOR	POR / BOR	POR / BOR	POR / BOR
Current Consumption	Sleep		0.2uA	0.2uA	0.2uA	0.2uA	0.2uA
	Halt		0.7uA	0.7uA	0.7uA	0.7uA	0.7uA
	32KHz run		5uA	5uA	5uA	5uA	5uA
	1MHz run		160uA	160uA	160uA	160uA	160uA
Voltage	Operation		1.8~5.5V	1.8~5.5V	1.8~5.5V	1.8~5.5V	1.8~5.5V
	Program		2.7-5.5(vpp gene ON)	2.7-5.5(vpp gene ON)	2.7-5.5(vpp gene ON)	2.7-5.5(vpp gene ON)	2.7-5.5(vpp gene ON)
Shipping form	Package		TQFP12-48	TQFP12-48	TQFP13-64	TQFP13-64	TQFP14-80
	Chip		-	-	-	-	Chip (80um pitch)

* Internal oscillator

MP | Under development | Under Investigation | Idea level

EPSON

S1C17M4 Group Comparison

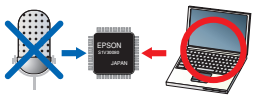
Model			S1C17M40		S1C17M4x	S1C17M4y	S1C17M4z
Memory	Flash		48KB	48KB	64KB	96KB	128KB
	RAM		2KB	2KB	4KB	4KB	4KB
	EEPROM		256B	256B	256B	512B	512B
Clock	IOSC		700kHz	700kHz	700kHz	700kHz	700kHz
	OSC1	Xtal	-	32.768kHz	32.768kHz	32.768kHz	32.768kHz
		Internal	32kHz	32kHz	32kHz	32kHz	32kHz
	OSC3	Xtal, Cera	-	-	16.8MHz	16.8MHz	16.8MHz
		Internal	16MHz	16MHz	12M/16MHz	12M/16MHz	12M/16MHz
LCD Driver			24x8, 28x4	36x8, 40x4	38x8, 42x4	46x8, 50x4	46x8, 50x4
GPIO (max.)			40 +1(O)	54 +1(O)	54+1(O)	65 +1(O)	65 +1(O)
Timer	8bit / 16bit / PWM		- / 4 / 3	- / 4 / 3	- / 4 / 3	- / 4 / 3	- / 4 / 3
	CT / RTC / WDT		- / - / 1	- / 1 / 1	- / 1 / 1	- / 1 / 1	- / 1 / 1
	Stopwatch		-	Included RTC	Included RTC	Included RTC	Included RTC
SIO	UART		3	3	3	3	3
	SPI		2	2	2	2	2
	I2C		1	1	1	1	1
	SMCIF		-	-	-	-	-
	REMC		1	1	1	1	1
Analog	24bit RFC		-	-	2	2	2
	12bit ADC		3	4	5	8	8
	AMRC		-	-	-	-	-
Others	Arithmetic Circuit		Mul./Div./MAC.	Mul./Div./MAC.	Mul./Div./MAC.	Mul./Div./MAC.	Mul./Div./MAC.
	SVD		1	1	1	1	1
	Etc.		POR / BOR	POR / BOR	POR / BOR	POR / BOR	POR / BOR
Current Consumption	Sleep		0.2uA	0.2uA	0.2uA	0.2uA	0.2uA
	Halt		0.7uA	0.7uA	0.7uA	0.7uA	0.7uA
	32KHz run		5uA	5uA	5uA	5uA	5uA
	1MHz run		140uA	140uA	140uA	140uA	140uA
Voltage	Operation		1.8 to 5.5V	1.8 to 5.5V	1.8 to 5.5V	1.8 to 5.5V	1.8 to 5.5V
	Program		2.2-5.5(vpp gene ON)	2.2-5.5(vpp gene ON)	2.2-5.5(vpp gene ON)	2.2-5.5(vpp gene ON)	2.2-5.5(vpp gene ON)
Shipping form	Package		TQFP12-48	QFP13-64	TQFP13-64	TQFP14-80	TQFP14-80
	Chip		-	-	-	-	-

MP | Under development | Under Investigation | Idea level

■ Features of "Silky Voice" Voice Guide LSI
Opening new worlds through spoken communication.

Feature 1 No studio recording required!

Epson Voice Guide LSI does not require arrangement of dubbing artists or studios to create sound data. This contributes to a drastic reduction in the amount of time and cost required by the customer. By using Epson Voice Data Creation PC tool offered you can easily create and edit sound data using a PC. The TTS tool supports English, Chinese(Mandarin), Korean, Japanese.



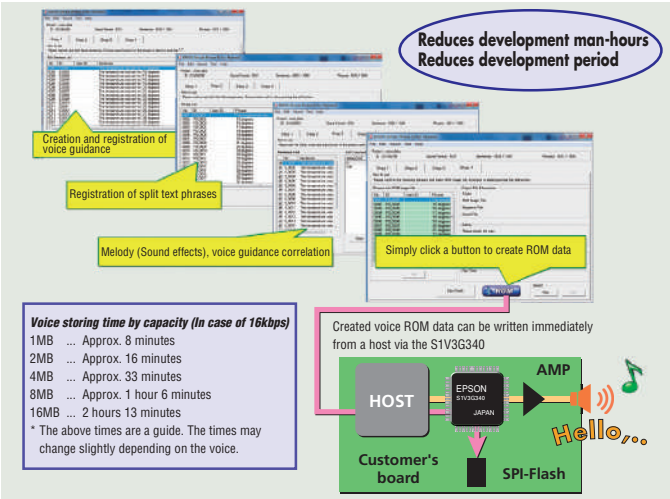
Feature 2 High-quality sound and double to quad message amount!

Using the high-compression Epson format provides a maximum 1/4 compression ratio as compared to the conventional ADPCM method. Using sound quality that is dramatically higher than that of the ADPCM method with the incorporated high-quality DAC enables playback of high-quality sound by combining "Silky Voice" and sound effects.

	Epson (16kHz)	ADPCM (16kHz)	ADPCM (8kHz)
Bit rate	16[kbps]	64[kbps]	32[kbps]
Memory size (10sec.)	160[kbit]	640[kbit]	320[kbit]
Memory size (1min.)	960[kbit]	3,840[kbit]	1,920[kbit]
Memory size (2min.)	1,920[kbit]	7,680[kbit]	3,840[kbit]
Memory size (3min.)	2,880[kbit]	11,520[kbit]	5,760[kbit]

■ Easy Development Flow

The combination of the All in One PC tool "Silky Voice" generator, and use of external SPI-Flash with the S1V3G340 makes it easy to create, write and evaluate voice data. The created voice ROM data can be written to SPI-Flash from a Host CPU via the S1V3G340. The use of high-quality audio and a high-compression format also enables the loading of large voice data capacity.



EPSON

Speech & Audio Product Line up S1V3G340

ASSPs

■ Overview

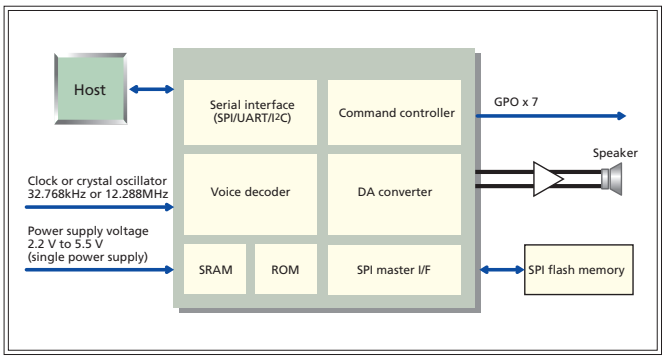
The S1V3G340 is an LSI incorporating high-compression, high-quality audio decoding functions, external SPI flash memory interface, and a DA converter, making it ideal for use in voice guidance products. Epson Voice Data Creation PC tool allows easy creation of high-quality voice data without the need for studio recording. Use of external SPI flash memory allows a large size voice data and easy interchanging of voice data. Voice data can be transferred from a host when required. All functions are controlled by commands via a serial interface for easy addition to any existing system incorporating a host.
The S1V3G340 will help users reduce time-to-market for products incorporating built-in voice guidance functions.

■ Features

- **Audio playback**
  - High-compression, high-quality audio decoder (proprietary Epson data format)
  - Bitrate: 40 kbps, 32 kbps, 24 kbps, 16 kbps
  - Sampling rate: 16 kHz
- **Sequencer function (phrase interval setting)**
  - Sequence setting for up to 64 phrases (unlimited combinations)
  - Variable phrase interval delay setting: 0 ms or 20 ms to 2,047 ms (in 1 ms steps)
- **External SPI flash memory interface**
  - Clock synchronized serial interface (SPI)
  - Maximum approx. 2 hour 13 minutes (16 Mbytes)
- **GPO**
  - 7 pins
- **Host interface**
  - Clock synchronized serial interface, supporting UART and I²C
  - Command control
- **High-quality 16-bit DA converter**
  - Sampling rate (fs): 16 kHz
  - Input bits: 16-bit
- **Clock**
  - Clock input: 32.768 kHz or 12.288 MHz
  - Crystal oscillator: 32.768 kHz
- **Package**
  - QFP-52 pin (10 mm x 10 mm) 0.65 mm pin pitch
  - QFP-48 pin (7 mm x 7 mm) 0.5 mm pin pitch
  - SQFN-48 pin (7 mm x 7 mm) 0.5 mm pin pitch
- **Power supply voltage**
  - 2.2 V to 5.5 V (single power supply)

■ Standard Application System

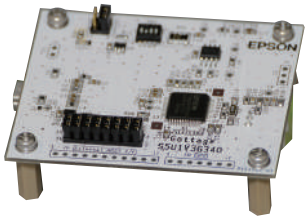
The S1V3G340 standard application system is configured as shown in the diagram below. The S1V3G340 is command-controlled by the host using a messaging protocol via the serial interface.
Controlled by commands sent from the host via the serial interface the S1V3G340 outputs voice audio while internally decoding and processing external SPI Flash memory or streamed (via host command transfer) compressed audio data.



■ Development Tools

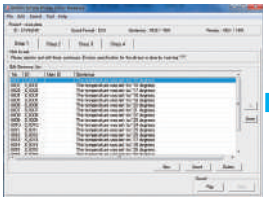
- Evaluation board*1
- Audio data creation tool
- Sample programs

Cottage

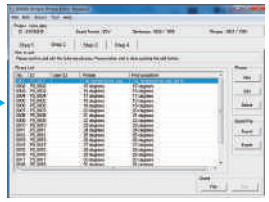


[Overview of voice data creation tool]

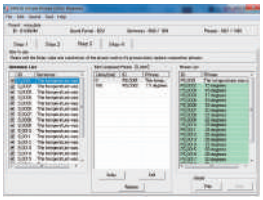
Step.1: Voice guidance registration



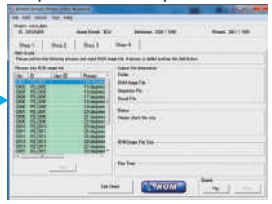
Step.2: Pronunciation editing



Step.3: Phrase editing



Step.4: ROM data production



- Supported languages : English, Chinese(Mandarin), Korean, Japanese (all female voices)

Nidec
All for dreams

Product Guide

To The Next Generation

NIDEC COPAL ELECTRONICS CORP.

Switches

S : SMD type available

Rotary coded switches

S

S-4000
- Code: BCD
- Contact rating:
  Non-switching 100mA 50VDC
  Switching 100mA 2.4VDC
- Contact resistance 100mΩ max.
- Dimensions: □4.8×2.6mm

S

SA-7000
- Code: BCD, BCH
- Contact rating:
  Non-switching 100mA 50VDC
  Switching 100mA 5VDC
- Contact resistance 100mΩ max.
- Dimensions: □7.2×3mm

S

S-7000 WASHABLE
- Code: BCD, BCH
- Contact rating:
  Non-switching 100mA 50VDC
  Switching 100mA 5VDC
- Contact resistance 100mΩ max.
- Dimensions: □7.2×2.9mm

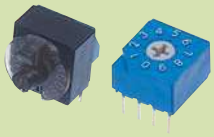
S

SH-7000 WASHABLE
- Code: BCD, BCH
- Contact rating:
  Non-switching 100mA 50VDC
  Switching 100mA 5VDC
- Contact resistance 100 mΩ max.
- Dimensions: 7.3×7.1×3.7~3.75mm
- Gray code output available

S

WASHABLE

DRS/DRR/SMR/SMRR
- Code: BCD, BCH
- Contact rating:
  Non-switching 100mA 50VDC
  Switching 30 mA 15VDC
- Dimensions: □7.5×4.1mm



WASHABLE

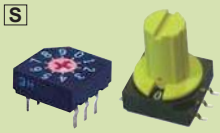
S-1000A/2000A
- Code: BCD, BCH
- Contact rating:
  Non-switching 100mA 50VDC,
  Switching 100mA 5VDC
- Dimensions: □10×7mm

S

WASHABLE

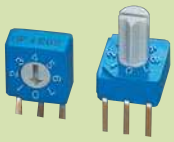
SC-1000/2000
- Code: BCD, BCH
- Contact rating:
  Non-switching 100 mA 50VDC,
  Switching 100mA 5VDC
- Terminal pin layout 4-1
- Dimensions: □10×3.9mm

S



SD-1000/2000
- Code: BCD, BCH
- Contact rating:
  Non-switching 100 mA 50VDC,
  Switching 100mA 5VDC
- Terminal pin layout 3-3
- Heat resistern knob type available (MTO)
- Dimensions: □10×3.9mm

SA-5000 WASHABLE
- Code: BCD, BCH
- Contact rating:
  Non-switching 100mA 50VDC,
  Switching 100mA 5VDC
- Integrated circuit: Pull-up resistors, diodes
- Dimensions: □11×9.5mm



S-8000 WASHABLE
- Code: BCO
- SCSI compatible
- Contact rating:
  Non-switching 100mA 50VDC,
  Switching 100mA 5VDC
- Dimensions: □7.2×3.9mm

RD WASHABLE
- Code: Binary code
- Contact rating:
  Switching 1VA (1A 30VDC max.)
- Dimensions: 17.8×12×17.8mm

Dip slide switches

S

CVS(1mm pitch)
- No.of bits: 1,2,3,4,8 bits
- Contact rating:
  Non-switching 100mA 50VDC,
  Switching 100mA 6VDC, 25mA 24VDC
- Contact resistance: 200mΩ max.
- Dimensions: 4.7×2~9×1.45mm

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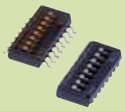


CHS(Half pitch) WASHABLE
- No. of bits: 1, 2, 4, 6, 8, 10 bits
- Contact rating:
  Non-switching 100mA 50VDC,
  Switching 100mA 6VDC, 25mA 24VDC
- Contact resistance: 50mΩmax.
- Dimensions: 5.4×2.5~14.3×2.5mm

S

CHP(Half pitch)
- No. of bits: 2, 4, 8 bits
- Contact rating:
  Non-switching 100mA 50VDC,
  Switching 100mA 6VDC, 25mA 24VDC
- Contact resistance: 50mΩ max.
- Dimensions: 5.9×4.6~12.2×4.6mm

S

CFS(Full pitch) WASHABLE
- No. of bits: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 bits
- Contact rating:
  Non-switching DC50V 100mA,
  Switching DC6V 100mA, DC24V 25mA
- Contact resistance: 50mΩ max.
- Dimensions:6.4×3.95~26.9×4.5mm

S

CFP(Full pitch)
- No. of bits: 2, 3, 4, 5, 6, 8, 10bits
- Contact rating:
  Non-switching 100mA 50VDC,
  Switching 100mA 6VDC, 25mA 24VDC
- Contact resistance: 50mΩmax.
- Dimensions: 8.6×7.5~22.8×6.7mm

S

WASHABLE

CYP(Full pitch, Low profile)
- No. of bits: 2, 4, 6, 8, 10 bits
- Contact rating:
  Non-switching 100mA 50VDC,
  Switching 100mA 6VDC, 25mA 24VDC
- Contact resistance: 100mΩ max.
- Dimensions: 6×6.48~26.8×5mm

CES(Full pitch, Tall profile)
- No. of bits: 2, 4, 6, 8 bits
- Contact rating:
  Non-switching 100mA 50VDC,
  Switching 100mA 6VDC, 25mA 24VDC
- Contact resistance: 50mΩmax.
- Dimensions: 10×7.66~22.9×10mm

Slide switches

S

CJS WASHABLE
- Ideal for replacing jumper pins
- Circuit structure: SPDT
  (with neutral detent type available)
- Contact rating:
  Non-switching 100mA 50VDC,
  Switching 100mA 6VDC, 25mA 24VDC
- Contact resistance: 100mΩ max.
- Dimensions: 2.5×5.4~6×2.5mm

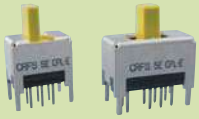
S

CAS WASHABLE
- Ideal for replacing jumper pins
- Circuit structure: SPDT
  SPDT/2PDT/Dual SPDT
- Contact rating:
  Non-switching 100mA 50VDC,
  Switching 100mA 6VDC, 25mA 24VDC
- Contact resistance: 50mΩ max.
- Dimensions: 2.5~3.9×5.4×2.5mm

CL-SA
- Ideal for replacing jumper pins
- Continuous mountable with 2.54 mm pitch
- Circuit structure: SPDT
- Contact rating:
  Non-switching 500mA 50VDC,
  Switching 500mA 12VDC
- Contact resistance: 22mΩ max.
- Mounting Type PC, PC-R/A
- Dimensions: 2.54×10×4.5mm

S

CL-SB
- Wide variety 48 types, silver/gold contact
- Circuit structure:
  SPDT/SP3T/2PDT/2P3T
- Contact rating: Non-switching
  200mA 50VDC, Switching 200mA 12VDC
- Contact resistance:
  Silver 50mΩ max.Gold 70mΩ max.
- Dimensions: 3.5×8.5~12×3.5mm



CRFS
- High frequency: DC ~1.0GHz
- Circuit structure: 2PDT/2P3T
- Contact rating:
  Non-switching 100mA DC50V,
  Switching 100mA 12VDC
- Contact resistance: 70mΩ max.
- Dimensions: 6~6.5×10~13.8×8.5mm

S

CMS
- Circuit structure:
  2PDT/2P3T/2P4T/4PDT
- Contact rating:
  Non-switching 100mA 50VDC,
  Switching 100mA 12VDC
- Contact resistance: 70mΩ max.
- Dimensions: 5×10.8~17.8x3.5~4.7mm

S

CUS
- Circuit structure:
  SPDT/SP3T/2PDT/SP4T
- Contact rating:
  Non-switching 100mA DC50V
  Switching 300mA 4VDC
- Contact resistance 70mΩ max.
- Low-profile of 1.4mm
- Dimensions:2.6~4.1×6.7~11.3×2mm

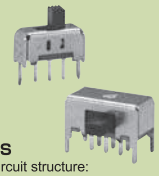
S

CSS
- Circuit structure: SPDT/SP3T
- Contact rating:
  Non-switching 100mA 50VDC
  Switching 100mA 12VDC
- Contact resistance 70mΩ max.
- Low-profile of 2.0mm
- Self-return type available
- Dimensions:3×8.85~12.5×2mm

MHS
- Circuit structure:
  SPDT/SP3T/2PDT/2P3T/4P2T
- Contact rating: 200mA 12VDC
- Switching function
  On-On-On/On-On
- Low-profile of 3.5mm
- Dimensions:3.5×8.6~14×3.5mm

MFS
- Circuit structure:
  SPDT/SP3T/2PDT/2P3T/4P4T
- Contact resistance:20~50mΩmax.
- Switching function
  On-On-On/On-On
- Shorting/Non-shorting
- Wide variety

Slide switches



MCS
- Circuit structure: SPDT/SP3T/2PDT/2P3T 4P2T/6P2T/4P3T/4P4T
- Switching function On-On-On/On-On-On/ On-Off-On/On-On-On-On
- Shorting/Non-shorting
- Wide variety

MCS-N
- Circuit structure: 2PDT/4P2T
- Contact rating Silver: Switching 0.2A 30VDC Gold: 0.4VA (50mA 30VDC max.)
- Contact resistance: Silver 30mΩ max. Gold 50mΩ max.
- Switching function: On-On
- Dimensions: 6.6×11.2~16.2×5mm

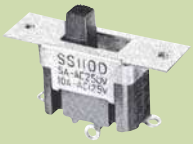
ASE WASHABLE
- High reliability by twin-contact clip
- Circuit structure: SPDT, 2PDT
- Contact rating: Switching 50mA 48VAC/DC
- Contact material: gold
- UL approved
- Dimensions: 5×9.5×8mm

AS
- High reliability by twin-contact clip
- Circuit structure: SPDT, 2PDT
- Contact rating: Switching 50mA 48VAC/DC
- Contact material: gold
- Dimensions: 5×9.5×8mm

8SS
- High reliable power supply switch
- Circuit structure: SPDT, 2PDT
- Contacts material: Silver/Gold(MTO)
- Contact rating: Switching 6A 125VAC 4A 30VDC/ 25mA 20VDC(Gold)
- For panel mounting or PCB
- UL approved
- Dimensions: 7.9~12.9×13×8.5mm

HSS
- Circuit structure: SPST/SPDT/2PST/2PDT
- Contact rating: Switching 12A 125VAC, 6A 250VAC (1pole) 8A 125VAC, 5A 250VAC (2poles)
- For panel mounting
- Dimensions: 15×21×14mm

S
- Circuit structure: 2PDT
- Contact rating: 8A 125VAC, 4A 250VAC
- Switching function: On-On
- UL approved
- Dimensions:14×20×10mm



SS
- Circuit structure: SPDT
- Contact rating: 10A 125VAC / 6A 250VAC
- Switching function Off-On/On-On/On-Off-On
- Dimensions:16×29×22 mm

ES
- Circuit structure: SPST/SPDT/2PDT
- Contact rating: 25A 125VAC / 25A/12A 250VAC, 15A 125VAC / 15A/7A 250VAC
- For panel mounting
- Dimensions: 16x28.8x15.8mm 19.3×33×19.9mm

SS220K-23
- High inrush: 70A
- Circuit structure: 2PST
- Contact rating: 20A 250VAC
- For built-in use (ex. Electronical tools)
- Melting protection structure
- Dimensions: 14×27.5×19.8mm

Rotary selector switches

S

CS-32 WASHABLE
- Circuit structure: SP2T
- Contact rating: Non-switching 0.5VA Switching 100mA 16VDC
- Contact resistance: 2Ω max.
- Dimensions: 3.4×3.4×2mm

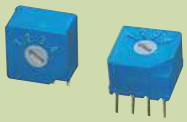
S

CS-4 WASHABLE
- Circuit structure: SPDT/SP3T/2PDT/SP4T
- Contact rating: Non-switching 0.5VA Switching 100mA 16VDC
- Contact resistance: 100mΩ max.
- Dimensions: 5×4.5×2.3mm

S

CS-7 WASHABLE
- Circuit structure: SP4T
- Contact rating: Non-switching 100mA 50VDC, Switching 100mA 5VDC
- Contact resistance: 100mΩ max.
- Dimensions: 7.3×7.1×3.75mm

SS-10 WASHABLE
- Circuit structure: SP5T/SP6T/2P3T
- Contact rating: Non-switching 100mA 50VDC, Switching 100mA 5VDC
- Contact resistance: 100mΩ max.
- Dimensions: 10×10×7mm



S-2050 WASHABLE
- Circuit structure: SP4T
- Contact rating: Non-switching 100mA 50VDC, Switching 100mA 5VDC
- Contact resistance 100 mΩ max.
- Dimensions:10×10×7 mm

RS/RG WASHABLE
- Circuit structure: 1~3 poles 2~12 contacts, 4~6 poles 2~6 contacts
- Contact rating: 1VA (1A 30VDC max.)
- Contact resistance: 100mΩ max.
- Dimensions: 17.8×12×17.8mm (1block)

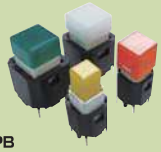
MRE(36° step)
- Circuit structure: 1-10, 2-5, 3-3, 4-2
- Contact rating: 500mA 125VAC
- Panel seal
- Dimensions: ϕ 16×15.3 mm

MR(30°/36° step)
- Circuit structure: 1-10, 2-5, 3-3, 4-2 (36° step) 1-12, 2-6, 3-4, 4-3 (30° step)
- Contact rating: 500mA 125VAC
- Variable stopper available (36°step)
- Dimensions: ϕ 16×14.5 mm

MRB(45° step) WASHABLE
- Circuit structure: SP3T
- Contact Rating: Switching 0.4VA (12VDC max.)
- Twin contact type
- Gold contacts (for use in dry circuit)
- Dimensions: □15.8 ×11mm

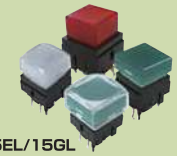
SRF
- Circuit structure: SPDT (90° step) SP3T/SP4T (45° step)
- Contact Rating: 6A 125VAC / 3A 250VAC (SPDT, SP3T) 3A 125VAC / 1A 250VAC (SP4T)
- Dimensions: ϕ 28×18.5~20mm

Push-button switches (Illuminated type)



CFPB
- Full surface illumination by LED
- Circuit structure: SPST
- Contact rating: 5mA 5VDC, 1mA 20VDC
- Soft operating feel
- Wide variety of key-top dimensions: □6mm/□9mm/□11mm/□12mm
- Dimensions: □9.9~14.8×12~14mm

13AL/13BL
- Full surface illumination by LED
- Circuit structure: SPST
- Contact rating: 5mA 5VDC, 1mA 20VDC
- Wide variety of key-top dimensions: □6mm/□9mm/□11mm
- Dimensions: □9.9~15×12~14mm



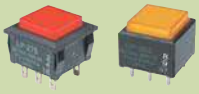
15EL/15GL
- Full surface illumination by LED
- Circuit structure: SPST
- Contact rating: 5mA 5VDC, 1mA 20VDC
- Wide variety of key-top dimensions: □12mm/□14mm/□15mm/□18mm
- With concave face shape clear button-cover available (15GL)
- Dimensions: 15×14×12.5mm

TM/TR
- Ultra-Miniature Switch with LED
- Metal contact / Rubber contact
- Circuit structure: SPST
- Contact rating: 10mA 12VDC(TR) 1VA (50mA 48VDC max.) (TM)
- Contact material: Silver/Gold (TM)
- Wide variety of button's color & style
- Dimensions: 5.9~10.5×7~11.5×6.5mm

LTM/LTR
- Full surface illumination by LED
- Metal contact / Rubber contact
- Circuit structure: SPST
- Contact rating: 10mA 12VDC(LTR) 1VA (50mA 48VDC max.) (LTM)
- Contact material: Silver/Gold (LTM)
- Wide variety of button's color & style
- Dimensions: □6×6.5mm

LTM3
- Connector wiring
- Snap-in panel mounting
- Sharp operating feel
- Circuit structure: SPST
- Contact rating: 1VA (50mA max.48VDC max.)
- Contact material: Silver/Gold
- Dimention: 12×11.5×13.5mm

TP/TPL
- Circuit structure: 2PDT
- Contact rating: 0.1A 30VDC
- Contact material: Silver/Gold
- TPL: Lock type (stroke: 1mm) PL: Non-lock type (stroke: 1.5mm)
- Wide variety of button's color & style
- Dimentions: 8.5×7.5×6.5mm



LP
- Full face illumination by LED
- Circuit structure: SPDT/2PDT
- Contact rating: 3A 125VAC / 3A 250VAC / 3A 30VDC, 0.4VAC/DC (Gold contacts)
- LED illuminated / LED indicator
- For panel Snap-in mounting or PCB
- UL, CSA approved (except indicator)
- Dimentions: 15.2~19×15.2×10mm

DP1~3
- Circuit structure: SPST/4PST
- Contact rating: 50mA 24VDC
- Contact material: Silver/Gold
- Self-cleaning contact mechanism
- Light operating feel
- Wide variety of button's color & style
- Dimentions: 12.4~19×12.4~17.4×6.5~8.3mm

Push-button switches

DP4
- Non-illuminated type
- Circuit structure: 2PDT
- Contact rating: 100mA 5VDC
- Switching function: On-On/On-Mom
- Contact material: Silver/Gold
- Self-cleaning contact mechanism
- Dimentions: □12.6×10.2mm

Push-button switches (Non-illuminated type)

S

CFPA WASHABLE
- Reflow solderable, Right angle
- Circuit structure: SPDT
- Contact rating: 0.4VA (28VDC max.)
- Contact material: Gold
- Switching function: On-Mom
- Dimensions: 7.5×8.5×5.3mm

S

SMAP WASHABLE
- Reflow solderable, Right angle
- Circuit structure: SPDT/2PDT
- Contact rating: 0.4VA (28VDC max.)
- Contact material: Gold
- Switching function: On-Mom
- Dimensions: 8.35×11.75×5mm

FP WASHABLE
- Circuit structure: SPDT/2PDT
- Contact rating: 0.4VA (28VDC max.)
- Switching function: On-Mom
- Gold plated contacts
- Terminal: Wavy
- Dimensions:4.5×7.0×5.4 mm

CFP2 WASHABLE
- Circuit structure: SPDT/2PDT
- Contact rating: 0.4VA (28VDC max.)
- Switching function: On-Mom
- Gold plated contacts
- Terminal: Straight
- Dimensions:4.5×7.0×5.4 mm

APE WASHABLE
- Circuit structure: SPDT/2PDT
- Contact rating: 0.4VA (50mA 60VAC/DC max.)
- Switching function: On-Mom
- Gold plated contacts
- UL approved
- Dimensions:5×9.5×8 mm

AP
- Circuit structure: SPDT/2PDT
- Contact rating: 0.4VA (50mA 60VAC/DC max.)
- Switching function: On-Mom
- Gold plated contacts
- Dimensions: 5×9.5×8mm

CF-PD
- Fixed panel by assembly resin nut
- Connector wiring
- Sharp click feeling
- Circuit structure: SPST
- Contact rating: 1 VA (50mA 48VDC max.)
- Switching function: On-Mom
- Dimensions: ϕ20×16.8mm

SP101
- Sharp and light operating feel
- Snap-in panel mounting
- Circuit structure: SPST/SPDT
- Contact rating: 60mA 30VDC
- Contact material: Gold
- Connector wiring, PC terminal available
- Switching function: On-Mom
- Dimensions: 10.5×20×11mm

SPC103
- Sharp and light operating feel
- Wide variety of button colors
- Snap-in panel mounting
- Circuit structure: SPDT
- Contact rating: 3A AC125V/AC250V/DC30V
- Switching function: On-Mom
- Dimensions: □18×14.8mm

MSP
- Circuit structure: SPST
- Contact rating: Silver contact: 3A 125VAC Gold contact: 25mA 20VDC
- Switching function: On-Mom/Off-Mom
- Small size ●For set/resetting
- Dimensions: ϕ12×19 mm

8 series
- Circuit structure: 1~4PDT
- Contact rating: 6A 125VAC / 3A 250VAC / 4A 30VDC
- Contacts material: Silver / Gold (MTO)
- Switching function: On-On/On-Mom
- For panel mounting or PCB
- Dimensions: 13×8~22.6×11.7~19.8mm
- UL, CSA approved models available
- Self-extinguishing resin housing
- Wide variety of button styles
- Panel water proof type (8P) *class IP67
- Light and soft operating feel by snap action construction (8R-n/8W-n)
- Snap-in panel mounting (8W-n)

SP/SPP/S2P
- Circuit structure: SPST/SPDT/2PST/2PDT
- Contact rating: AC125 V 3 A / AC250 V 1 A, AC125 V 10 A / AC250 V 6 A
- Switching function: On-(On)
- UL, CSA approved
- Wide variety of button selections

Tactile switches (Non-illuminated type)

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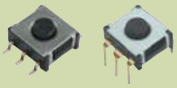


SMT1/TME1 WASHABLE
- Sharp tactile feel
- Circuit structure: SPST
- Contact rating: 1VA (DC48V 50mA max.)
- Contact material: Silver/Gold
- Switching function: On-Mom
- Anti-static electricity
- Dimensions: 6.5×7.5×3mm

S

SMT3/SMTE3 WASHABLE [SMTE3]
- Sharp tactile feel
- Circuit structure: SPST
- Contact rating: 0.6VA (DC24V 30mA max.)
- Contact material: Silver/Gold
- Switching function: On-Mom
- Anti-static electricity (SMTE3)
- Dimensions: 6.8×7×2.5mm

S

CF-CA
- Right angle tactile switches
- Circuit structure: SPST
- Contact rating: 1VA (50mA 32VDC max.)
- Contact material: Silver/Gold
- Switching function: On-Mom
- Wide variety of button length
- Dimensions: 3.8×6.7×7mm

Detect switches

S

CL-DA
- Used in A-TCA standard package
- Direction for operation: side
- Circuit structure: SPST
- Contact rating: 100mA 12VDC
- Contacts material: Gold
- Switching function: On-Mom/Off-Mom
- Dimensions: 4×5.7×2mm

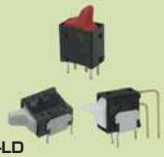
CL-DB
- Used in μ-TCA standard package
- Direction for operation: top or side
- Circuit structure: SPST
- Contact rating: 1mA 5VDC
- Contacts material: Gold
- Switching function: Off-Mom
- Dimensions: 2.8×3.5×1.95mm

CF-DA
- Long stroke: 7.5mm
- Connector wiring
- Snap-in panel mounting
- Circuit structure: SPST
- Contact rating: 100mA 30VDC
- Contacts material: Silver
- Switching function: Off-Mom
- Dimensions: 11×19×13mm

SPB101
- Long stroke: 5mm
- Connector wiring
- Snap-in panel mounting
- Circuit structure: SPST
- Contact rating: 50mA 48VDC
- Contacts material: Silver/Gold
- Switching function: On-Mom/Off-Mom
- Dimensions: 9×13.3×12.5mm

Lever rocker switches

FL WASHABLE
- Ultra-compact type
- Circuit structure: SPDT/2PDT
- Contact rating: 0.4VA (DC28V max.)
- Contact material: gold
- PC, R.A. terminals
- Dimensions: 4.5×7×5.4mm



CF-LD
- Light operate feeling and clear visibility in lever design
- Ultra-compact type
- Circuit structure: SPDT
- Contact rating: 0.4VA (0.1A 28VAC/DC max.)
- 3 lever colors: White/Red/Gray
- Dimensions:7×4.5×7 mm

ALE WASHABLE
- High reliability by twin-contact clip
- Circuit structure: SPDT/2PDT
- Contact rating: 0.4 VA (50mA 60VAC/DC max.)
- Contact material: gold
- PC and R.A. terminals
- UL approved
- Dimensions: 5×9.5×8mm

CF-LA (Dust proof)
- High inrush: 160A
- Circuit structure: SPST/2PST
- Contact rating: 16A 125VAC, 16A 250VAC
- Wide variety of terminal styles (5 kinds)
- Snap-in panel mounting
- C-US UL, UL(TV-6), ENEC approved
- Dimensions: 10.8×27.8×17.8mm

SLE6 / SLE10 (Dust proof)
- Circuit structure: SPST/SPDT
- Contact Rating: 6A 125VAC / 4A 250VAC(SLE6) 10A 125VAC / 5A 250VAC(SLE10)
- Snap-in panel mounting
- With rubber cover types available
- C-US UL, CSA, VDE, SEMKO approved
- Dimensions: 12.9×18.8×12.5mm

SLE210K(Dust proof)
- High inrush: 100A
- Circuit structure: 2PST
- Contact Rating: 10A 125VAC / 10A 250VAC
- Snap-in panel mounting
- C-US UL, VDE, SEMKO approved

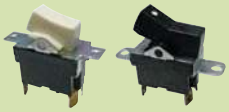
SL10K
- High inrush: 100A
- Circuit structure: 2PST
- Contact Rating: 10A 125VAC / 6A 250VAC
- Snap-in panel mounting
- UL, CSA, VDE approved

SLE10K
- High inrush: 60A
- Panel water proof *class IP64
- Circuit structure: 2PST
- Contact Rating: 10A 125VAC / 6A 250VAC
- Snap-in panel mounting
- UL, CSA, VDE approved

SLA215K
- Circuit structure: 2PST
- Contact Rating: 15A 125VAC / 15A 250VAC
- Enhanced isolation structure
- Snap-in panel mounting
- UL, CSA, ENEC approved
- Dimensions: 13×18.8×13mm

ELE120(Dust proof)
- High inrush: 120A
- Circuit structure: SPST
- Contact rating: 20A 125VAC / 12A 250VAC
- C-US UL approved
- Dimensions: 16~19.5×28.8~33×16~24.6mm

Lever rocker switches



EL/ELE
- Circuit structure: 1~2P1~2T
- Contact Rating: 25/20/15/10A 125VAC 25/15/12/7A 250VAC
- Self-extinguishing resin housing
- Screw panel mount
- Dust proof (ELE)
- Dimensions: 16~19.3×29~33×22~23.6mm

HLA/HLC/HLS
- Circuit structure: SPST/2PST/3PST/SPDT/2PDT
- Contact Rating: 8A 125VAC, 5A 250VAC, 12A 125VAC, 6A 250VAC
- Self-extinguishing resin housing
- For panel snap-in mounting
- UL, CSA approved
- Dimensions: 15~25×21~28×9~21.5mm

8 series
- High reliable power supply switch
- Circuit structure: 1~4PDT
- Contact rating: 6A 125VAC, 3A 250VAC, 4A 30VDC / 25mA 20VDC
- Contacts material: silver/gold (MTO)
- Dimensions: 13×8~22.6×9~17.5mm
- UL, CSA approved models available
- Self-extinguishing resin housing
- Wide variety of actuator styles
- For panel mounting or PCB
- Dust proof type (8HD)
- Snap-in panel mounting type (8H/8HD)

Panel seal rocker switches

CL-LB
- Multifunction and utility switch
- Panel seal (IP68 compatible)
- Switching function: 8 types
- Rich lineup such as illuminated type
- Actuator designed for excellent operability from ergonomics standpoint
- Circuit structure: SPST/SPDT/2PST/2PDT
- Snap-in panel mounting
- Contact rating: 15A 24VDC, 20A 12VDC, 10A 250VAC / 15A 125VAC
- Dimensions: 24.5×48.4×27.4mm
- Applications: Function operation for construction machinery, automobile use, etc.

Toggle switches

FT WASHABLE
- Ultra-compact type
- Circuit structure: SPDT/2PDT
- Contact rating: 0.4VA (28VDC max.)
- Contact material: Gold
- Terminal: Wavy
- Dimensions: 4.5×7×5.4mm

CFT2 WASHABLE
- Ultra-compact type
- Circuit structure: SPDT/2PDT
- Contact rating: 0.4VA (28VDC max.)
- Contact material: Gold
- Terminal: Straight
- Dimensions: 4.5×7×5.4mm

ATE WASHABLE
- High reliability by twin-contact clip
- Circuit structure: SPDT/2PDT
- Contact rating: 0.4V/A (50mA 60VAC/DC)
- Contact material: Gold
- Terminal pin pitch: 2.54mm
- UL approved (except with cap type)

ATE4/ATLE4 WASHABLE
- High reliability by twin-contact clip
- Circuit structure: SPDT/2PDT
- Contact rating: 50mA 48VAC/DC
- Contact material: Gold
- Lever lock type
- UL approved (except with cap type)

BT
- Circuit structure: SPDT/DPDT
- Contact rating: 50mA 20VAC/DC
- Contact material: Gold
- Insuration resistance 10000MΩ min.
- Dimensions: 7.6~12.7×15.8×8.5mm

S

CF-TA
- Through hall reflow toggle SW (R/A)
- Circuit structure: SPDT
- Contact rating: 50mA 48VAC/DC
- Contact material: gold
- Lever-lock type available
- Dimensions: 8×9.5×5mm

8 series
- High reliable power supply switch
- Circuit structure: 1~4PDT
- Contact rating: 6A 125VAC, 3A 250VAC, 4A 30VDC / 25mA 20VDC
- Contacts material: silver/gold (MTO)
- Dimensions: 13×7.9~22.6×9~11.3mm
- UL, CSA approved models available
- Self-extinguishing resin housing
- Wide variety of actuator styles
- Panel water proof type (8F) *class IP67
- Lever-lock type (8E)

WASHABLE
[8G,8GA,8GD,8GS]

ET
- Circuit structure: 1~4PST/1~4PDT/6PST/6PDT
- Contact Rating: Switching 3~30A 125VAC, 2~25A 250VAC
- UL, CSA approved models available
- Self-extinguishing resin housing
- For panel mounting
- Dimensions: 16~57×25.5~33.5×14.5~29.2mm

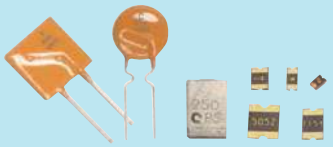
Key switches

MRK/MRKC
- Circuit structure: 1~2P 2~4T
- Contact rating: 0.4VA (20VDC max.)
- Click operation feeling
- MRKC: Cylinder key type
- Dimensions: 14.5×15.8×11.8mm / □15.8×11.8mm (MRKC)

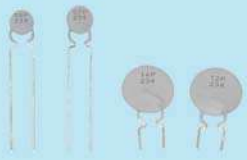
MRKC1052B
- High security for the exclusive key
- Circuit structure: SP5T
- Contact rating: 100mA 35VDC
- Connector wiring
- Nut attachment on panel
- Dimensions: ϕ21.4×25mm

Circuit protectors

Resettable Fuses



PRCP series
- Polymer PTC Thermistors
- Quick rising edge at trip point
- UL, CSA, TÜV approved
- Max. rated voltage (V max.): 6.0~72V
- Hold current: 0.05~13A, Trip current: 0.1~24A
- Max. rated current (I max.): 10~100A
- Min. resistance value (R min.): 0.003~7.3Ω



CR-CP series
- Ceramic PTC Thermistors
- Quick rising edge at trip point
- Operated more than 100,000 times repeatedly
- Max. rated voltage (V max.): 16V *low operating voltage
- Hold current: 470~1550mA, Trip current: 880~2860mA
- Max. rated current (I max.): 2~10A
- Resistance: 0.15~1.0Ω *low resistance

C-FAP series
- Fast response (less than 1 μsec)
- Wide bandwidth (fc=3GHz)
- Small SMD package (DFN)
- Small energy comsumption (100nJ)
- UL approved
- Max. trigger current (i trigger max.): 50/100/200/300/500mA
- Max. impulse voltage (V imp): 250/400/500/650/850V

Trimmer potentiometers

S : SMD type
T : Through hole pin type

S

ST-2
- Adjustment turns: 1 turn
- Sealed
- Resistance range: 100~1MΩ
- Resistance tolerance: ±20%
- Power rating: 0.1W (70˚C), 0W (125˚C)
- Dimensions: 2.4×1.7×2.8mm

S

ST-32
- Adjustment turns: 1 turn
- Sealed
- Resistance range: 10~2MΩ
- Resistance tolerance: ±20%
- Power rating: 0.125W (70˚C), 0W (125˚C)
- Dimensions: 3.4×2.0×3.4mm

S

ST-4/ST-42
- Adjustment turns: 1 turn
- Sealed
- Resistance range: 10~2MΩ
- Resistance tolerance: ±20%
- Power rating: 0.25W (70˚C), 0W (125˚C)
- Dimensions: 5.0×2.3×4.5mm

S

ST-5
- Adjustment turns: 14 turns
- Sealed
- Resistance range: 10~2MΩ
- Resistance tolerance: ±10%
- Power rating: 0.25W (85˚C), 0W (120˚C)
- Dimensions: 6.75×4.3×6.0mm

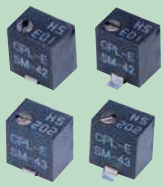
S

ST-7
- Adjustment turns: 3 turns
- Sealed
- Resistance range: 50~1MΩ
- Resistance tolerance: ±20%
- Power rating: 0.25W (70˚C), 0W (125˚C)
- Dimensions: 6.4×3.4×6.1mm

S

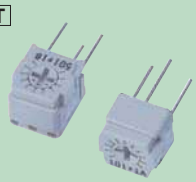
SM-3/SM-31
- Adjustment turns: 11 turns(SM-3) /5 turns(SM-31) ●Sealed
- Resistance range: 50~2MΩ
- Resistance tolerance: ±20%
- Power rating: 0.125W (70˚C), 0W (150˚C)
- Dimensions: 3.2×3.9×3.9mm

S



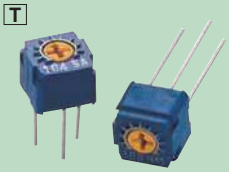
SM-42/SM-43
- Adjustment turns: 11 turns(SM-42) /5 turns(SM-43) ●Sealed
- Resistance range: 10~2MΩ
- Resistance tolerance: ±10%
- Power rating: 0.25W (85˚C), 0W (150˚C)
- Dimensions: 3.9×5.3×4.8mm

T



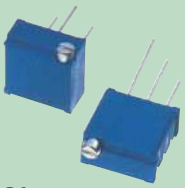
FT-63
- Adjustment turns: 1 turn
- Sealed
- Resistance range: 10~2MΩ
- Resistance tolerance: ±10%
- Power rating: 0.5W (70˚C), 0W (125˚C)
- Dimensions: 7.0×5.8×7.0mm

T



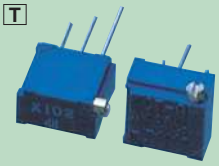
CT-6
- Adjustment turns: 1 turn
- Sealed
- Resistance range: 10~2MΩ
- Resistance tolerance: ±10%
- Power rating: 0.5W (70˚C), 0W (120˚C)
- Dimensions: 7.0×5.8×7.0mm

T



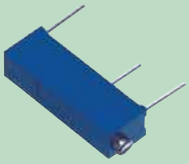
CT-94
- Adjustment turns: 18 turns
- Sealed
- Resistance range: 10~2MΩ
- Resistance tolerance: ±10%
- Power rating: 0.5W (70˚C), 0W (125˚C)
- Dimensions: 4.8×9.6×9.6mm

T



CT-9
- Adjustment turns: 18 turns
- Sealed
- Resistance range: 10~2MΩ
- Resistance tolerance: ±10%
- Power rating: 0.5W (70˚C), 0W (125˚C)
- Dimensions: 5.5×9.6×9.6mm

T



CT-20
- Adjustment turns: 15 turns
- Sealed
- Resistance range: 10~5MΩ
- Resistance tolerance: ±10%
- Power rating: 0.5W (70˚C), 0W (120˚C)
- Dimensions: 5.0×6.4×19mm

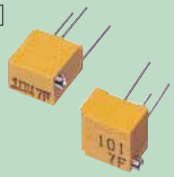
T

TM-7
- Adjustment turns: 3 turns
- Sealed
- Resistance range: 50~2MΩ
- Resistance tolerance: ±10%
- Power rating: 0.5W (70˚C), 0W (120˚C)
- Dimensions: ϕ7.2×6.9mm

T

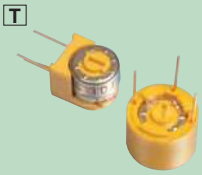
RJ-4
- Adjustment turns: 3 turns
- Sealed
- Resistance range: 10~2MΩ
- Resistance tolerance: ±10%
- Power rating: 0.5W (70˚C), 0W (120˚C)
- Dimensions: ϕ4.9×4.5mm

T



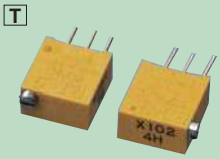
RJ-5
- Adjustment turns: 14 turns
- Sealed
- Resistance range: 10~2MΩ
- Resistance tolerance: ±10%
- Power rating: 0.25W (85˚C), 0W (120˚C)
- Dimensions: 4.3×6.75×6.0mm

T



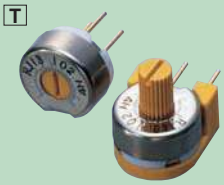
RJ-6
- Adjustment turns: 1 turn
- Sealed
- Resistance range: 10~5MΩ
- Resistance tolerance: ±10%
- Power rating: 0.5W (70˚C), 0W (120˚C)
- Dimensions: ϕ7.0×5.8mm

T



RJ-9
- Adjustment turns: 18 turns
- Sealed
- Resistance range: 10~5MΩ
- Resistance tolerance: ±10%
- Power rating: 0.5W (70˚C), 0W (120˚C)
- Dimensions: 4.7×9.7×9.0mm

T



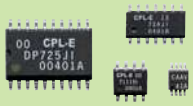
RJ-13
- Adjustment turns: 1 turn
- Sealed
- Resistance range: 10~5MΩ
- Resistance tolerance: ±10%
- Power rating: 0.75W (70˚C), 0W (120˚C)
- Dimensions: ϕ12.4×6.3mm

Attenuators, Mixed signal devices

Attenuators

T2114/T2710
- Step type variable attenuators
- For speech equipments of 600Ω
- Corresponds to the unbalanced circuit / balanced circuit (T2114 only)
- Attenuation: 0.5~8dB (15.5dB total), 1~16dB (31dB total)
- Impedance: 600Ω
- Rated Power: 50 mW
- Frequency: DC~150kHz

Digital potentiometers



DP series
- Digital controlable potentiometers
- Automatic adjustment possible by automatic adjustment
- Non-volatile wiper storage
- Low power CMOS technolozy
- Number of taps: 16/32/64/100/128/256
- Package: SC70/SOT-23/MSOP/SOIC /TSSOP/TDFN

White LED drivers

W series
- Driver ICs for activating white LEDs
- Small size and low-profile package
- Available types: 1. Simple LED activation
- 2. Individual activation of 4 separate LEDs, 3. Activation of grouped 6 LEDs
- Applications: Lighting for automotive instrument panel, Camera flash, LCD/Keypad backlighting for hand-held electronics devices
- Package: SOIC/SOT-23/MSOP/TDFN/OFN

Current sensors

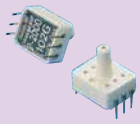
Current Sensors

C-CT
- AC0.1~200A, 4 types lineup
- Output linearity outstanding
- Compact, so easy installation in distributing box
- Clamp-on type, so also supports the existing box

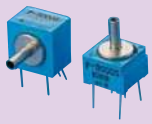
C-DCZCT
- Small DC current's measurements: DC1~200mA
- High accuracy: ±1%FS ±20mV
- Least influence of magnetization: Less than DC1mA in current level
- Convenient Single Supply (+5V)

Pressure sensors

Pressure transducers (module only)

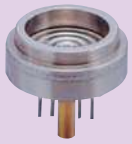


P-2000
- 0~9.81, ~981 kPa, Gauge
- Media: non-corrosive gases
- Output: 90±40mV
- Power: 1.5mADC
- Dimensions: 12×11×12.5mm



P-3000S
- 0~4.9,~9.81,~49,~98.1,~490,~686kPa, Gauge, ±49, ±98.1kPa, Differential, 0~34.3,~98.1kPa, Absolute
- Media: non-corrosive gases
- Output: 100±30mV
- Power: 1.5mADC
- Dimensions: □15×21.5mm/□17×30.5mm

P-7100
- 0~100 kPa, −100~100 kPa, 0~1 MPa, 0~133.3 kPa abs
- Media: gases and liquids
- Output: 0.5~4.5 V (ratio metric)
- Power: 5±0.5 VDC
- Dimensions: R type ϕ17×27.7 mm
  M5 type ϕ17×18.7 mm



P-8300
- 0~49,~98.1,~343,~981 kPa Gauge, 0~34.3,~98.1 kPa, Absolute
- Media: gases and liquids
- Output: 100±50mV
- Power: 1.5mADC
- Dimensions: ϕ23.5×23.2/10.8mm

P-8305
- 0~10 kPa, Gauge
- Media: gases and liquids
- Output: 25±10 mV
- Power: 1.5 mA DC
- Dimensions: ϕ29.8×7.7 (mm)

P-8505
- 0~50,~ 100,~350,1000kpa, Gauge
- Media: gases and liquids
- Output: 90±10mV
- Power: 1.5mADC
- Dimensions: ϕ20×15.3mm

Pressure transducers (with Amp.)

PA-20
- 0~−100kPa, Gauge, −100~300kPa, Compound
- Media: non-corrosive gases
- Output: 1~5VDC
- Power: 12~24VDC
- Dimensions: 10×25.5×20.5mm

PA-100
- 0~1,~2,~5kPa,Gauge, ±1, ±2, ±5kPa, Differential
- Media: non-corrosive gases
- (*for low differential pressure)
- Output: 0.5~4.5V
- Power: 5VDC
- Dimensions: 22.5×25×18.1mm

PA-204
- 0~5, ~10, ~50, ~100kPa, Gauge
- Media: Non-corrosive gases
- Output: 0.5~4.5V（ratiomtricoutput）
- Power: 5V±0.5V
- Dimensions:19×19×15mm

PA-500
- 0~49,~98.1,~343,~490,~981 kPa, ~−9.81kPa, Gauge
- Media: gases and liquids
- Output: 1~5V
- Power: 12~24VDC
- Dimensions: ϕ28×49.7mm

PA-708
- −100~100,~300,~600kPa, Compound
- Media: gases and liquids
- For ultra high purity aggressive fluids (*PFA pressure port)
- Output: 1~5V ●Power: 12~24VDC
- Dimensions: ϕ45×98mm

PA-750/758
- 0~100,~350kPa,~1,~3.5MPa,~−100kPa, Gauge, −100~100,~300kPa,Compound, 0~100kPs, Absolute
- Media: Gases and liquids
- Output: 1~5V/4~20mA
- Power: 10.8~30VDC, 24VDC
- Dimensions: ϕ23.5×61.6/63.5mm

PA-8008
- 0~98.1,~343,~981,~−98.1kPa, Gauge
- Media: gases and liquids
- Output: 1~5V
- Power: 12~24VDC
- Dimensions: ϕ28×50.2mm

PA-838-D
- 0~10,~50,~100kPa, Differential
- Media: gases and liquids
- Output: 4~20mA
- Power: 24VDC
- Dimensions: 40×70×79.5mm

PA-830/838
- 0~49,~98.1,~981kPa, Gauge(PA-838), 0~9.81,~49,~98.1,~343,~981,~−98.1kPa, Gauge, 0~34.3~98.1, Absolute(PA-830)
- Media: gases and liquids
- Output: 1~5V/4~20mA
- Power: 12~24VDC/24VDC
- Dimensions: ϕ30×55~59mm

PA-840/848
- −0.1~0.1,~0.35 MPa, 0~1.0,~3.5 MPa, Gauge, 0.1 MPa, Absolute
- Output: 1~5 VDC/ 4~20 mA
- Power: 10.8~26.4 / 21.6~26.4 VDC
- High weather resistance thanks to hard connection head
- Comply with IP67

PA-850/858
- 0~100,~350,~1000,~−100kPa, Gauge, −100~300kPa, Compound, 0~100kPa, Absolute
- Media: gases and liquids
- Output: 1~5V with 1 switch/4~20mA
- Power: 12~24VDC/24VDC
- Dimensions: ϕ35.2×48~49mm

PA-860/868
- 0~5,~10,~20,~35MPa, Gauge
- Media: hydraulic oil
- Output: 1~5V/4~20mA
- Power: 12~24VDC
- Dimensions: ϕ30×41mm

PA-870/878
- 0~2,~3.5,~5MPa, Gauge
- Media: gases and liquids
- Output: 1~5V/4~20mA
- Power: 12~24VDC
- Dimensions: ϕ30×47.5mm

PA-920/928
- 0~0.5, 0~1, -0.1~0.5, -0.1~1MPa
- Media: gases and liquids
- Output: 1~5 VDC/ 4~20 mA
- Power: 12 ~24 VDC
- Fitting: 1.125"W-Seal, 1.125"C-Seal, VC male/female(9/16-18UNF), UJR, TVC(9/16-18UNF)

PA-930 High-temperature type
- −100~ 100 kPa,0~ 1000 KPa, Gauge
- Media: gases and liquids
- Output: 1~5 VDC
- Power: 12~24 VDC
- Dimensions: ϕ30×91.5 mm

PA-930-A High-temperature type
- 0~200 kPa Absolute
- Media: gases and liquids
- Output: 1~5 VDC
- Power: 12~24 VDC
- Dimensions: ϕ30×101.5 mm

PA-960/968
- 0~5,~10,~20,~35,~50 MPa, Gauge
- Media: gases and liquids compatible with 17-4PH (SUS630)
- Output: 1~5 VDC/ 4~20 mA
- Power: 10.8~30 VDC (including ripple)
- Comply with IP67 (when mounting connector)

Pressure switches

PS20
- 0~−100kPa, Gauge, −100~300kPa, Compound
- Media: non-corrosive gases
- 1 switch output
- Power: 12~24VDC
- Dimensions: 10×25.5×20.5mm

PS6
- 0~100,~1000,~−100kPa, Gauge
- Media: non-corrosive gases
- 2 digits LED
- Output: 1~5V with 1switch, or 2 switch outputs
- Power: 12~24VDC
- Dimensions: 10×52.5×25mm

PS40
- 0~−100,~1000kPa, Gauge
- Media: non-corrosive gases
- Output: 1~5V with 1 or 2 switch outputs
- Power: 10.8~30VDC
- Dimensions: 24.8×45×15mm

PS30
- −100~100,~1000kPa, Compound
- Media: non-corrosive gases
- 2.5 digits LED
- Output: 2 switch outputs
- Power: 12~24VDC
- Dimensions: □30×29mm

PS60
- −100~100,~3000,~1000kPa, Compound
- Media: non-corrosive gases
- 3 digits LED
- Output: 2 switch outputs
- Power: 12~24VDC
- Dimensions: 10×52.5×25mm

Pressure switches

PS8
- 0~98.1,~343,~981,~~98.1kPa,Gauge
- Media: gases and liquids
- Output: 2 switch outputs
- Power: 12~24VDC
- Dimensions: ϕ28×50.2mm

PS83
- 0~9.81,~49,~98.1,~343,~981kPa, ~~98.1,Gauge,0~34.3,~98.1,absolute
- Media: gases and liquids
- Output: 2 switch outputs
- Power: 12~24VDC
- Dimensions: ϕ30×55~59mm

PS85
- −100~100, ~300, ~1000kPa, Compound
- Media: gases and liquids
- Output: 2 switch outputs
- Power: 12~24VDC
- Dimensions: ϕ35.2×48~49mm

PS86
- 0~5, ~10, ~20, ~35MPa,Gauge
- Media: hydraulic oil
- Output: 2 switch outputs
- Power: 12~24VDC
- Dimensions: ϕ30×41mm

PS87
- 0~3.5, ~5MPa, Gauge
- Media: gases and liquids
- 1 switch output
- Power: 12~24VDC
- Dimensions: ϕ30×26mm

PS91
- −100~10kPa, Compound
- Media: gases and liquids
- 2 switch outputs
- Power: 12~24VDC
- Dimensions: ϕ40×57.5mm

Handheld digital manometers

PG-100N
- −10~10, −100~100, ~1000kPa, Compound
- Media: non-corrosive gases
- 3.5 digits LCD
- Power: 2 AAA dry batteries
- Dimensions: 55×110×16.9mm

PG-100B
- −100~100,~1000kPa,Compound 0~100kPa, Absolute
- Media: Gases and liquids
- 3.5 digits LCD
- Power: 2 AAA dry batteries
- Dimensions: 55×100×16.9mm

PG-100
- 0~10,~100,~1000kPa,~~100, Gauge −10~10,~100,~1000kPa, Compound 0~100kPa, Absolute
- Media: non-corrosive gases
- 3.5 digits LCD
- Power: 3.6VDC(Lithium buttery)
- Dimensions: 60×90×20mm

Pressure gauges

PG-20
- 0~0.5,~1MPa, Gauge, −0.1~0.5MPa,~1MPa Compound
- Media: gases and liquids
- 3.5 digits LCD
- Output: 1~5V/4~20mA with
- 1 switch output or 2 switch outputs
- Power: 24VDC/12~24VDC
- Dimensions: □38×135mm/□28×127mm

PG-30
- −10～10, −100～100, ～1000kPa, Compound
- Media: non-corrosive gases
- 3 digits LED
- Output: 1~5V with 2 switch outputs
- Power: 10.8~30VDC
- Dimensions: □30×35.5mm

PG-35
- −100~100,~1000kPa, Compound, 0~100kPa, Absolute
- Media: gases and liquids
- 3 digits LED
- Output: 1~5V with 2 switch outputs
- Power: 10.8~30VDC
- Dimensions: □30×37mm

PG-35H
- −0.1~10,~35MPa, Compound
- Media: gases and liquids
- 3 digits LED
- Output: 1~5V with 2 switch outputs
- Power: 10.8~30VDC
- Dimensions: □30×37mm

PG-35L
- −100~100,~1000kPa, Compound
- Media: gases and liquids
- 3 digits LED
- Output: 1~5V with 2 switch outputs
- Power: 10.8~30VDC
- Dimensions: □30×37mm

PG-75
- 0~0.1,~1,~3.5MPa, Gauge, −0.1~0.1,~1,~3.5MPa, Compound
- Media: gases and liquids
- 3.5 digits LED
- Output: 1~5V/4~20mA with 2 switch outputs
- Power: 10.8~30VDC
- Dimensions: 30×37×72mm

PG-200
- 0~~100, ~1000kPa, Gauge 0~100kPa, Absolute
- Media: non-corrosive gases
- 3.5 digits LCD
- Output: 0~1V with 1 or 2 switch outputs
- Power: 3.6VDC(Lithium battery) /5~24VDC(External power)
- Dimensions: □72×40mm

PG-208
- 0~~100, ~1000kPa, Gauge
- Media: gases and liquids
- 3.5 digits LCD
- Output: 0~1V with 1 or 2 switch outputs
- Power: 3.6VDC(Lithium battery) /3~24VDC(External power)
- Dimensions: □72×40mm

Pressure indicators

PZ-30
- Input signal: 1~5V/4~20mA
- 3 digits LED
- Output: 1~5V/4~20mA with 2switch outputs
- Power: 10.8~30VDC
- Dimensions: □31×35mm

PZ-200
- Input signal: 1~5V/4~20mA
- 3.5 digits LCD
- Output: 4~20mA with 4swtch outputs
- Power: 12~24VDC
- Dimensions: □72×40mm

Liquid leak sensors

WL10
- Infrared reflectance method
- Media: Water
- Power: 12~24VDC
- Dimensions: ϕ25×10.6mm

Potentiometers

- W : Wirewound type
- P : Conductive plastic type
- C : Cermet type
- O : Optical contactless type

For manual setting

W

M-1303/1305
- Adjustment turns: 3 turns/5 turns
- Effective electrical angle: 1080°/1800°
- Linearity: ±0.5%
- Resistance range: 100~20kΩ
- Rotational life: 15000 cycles
- Dimensions: ϕ13×16.1mm

W

M-22S10/M-22E10
- Adjustment turns: 10 turns
- Effective electrical angle: 3600°
- Linearity: ±0.2%
- Resistance range: 100~100kΩ /1~20kΩ
- Rotational life: 25000 cycles
- Dimensions: ϕ22×18.5mm/ϕ22×19mm

C

JP-30B
- Adjustment turns: Single
- Effective electrical angle: 300°
- Resistance range: 500 Ω~100 kΩ
- Linearity: ±0.5 %
- Rotational life: 100 thousand cycles
- Dimensions: ϕ30×14.5 mm

For sensor

O

JT22
- Effective electrical angle: 120˚, 360˚
- Linearity: ±3.0%
- Output voltage: 0.5~+4.5V
- Rotational life: 100 million cycles
- Dimensions: ϕ22×15mm

O

JT30
- Effective electrical angle: 120˚, 360˚
- Linearity: ±3.0%
- Output voltage: 0.5~+4.5V
- Rotational life: 100 million cycles
- Dimensions: ϕ22×15mm

W

J40S/J45S/J50S
- Adjustment turns: 1 turn
- Effective electrical angle: 353˚
- Linearity: ±0.1~0.15%
- Resistance range: 500~50kΩ
- Rotational life: 1~10 million cycles
- Dimensions: ϕ44.5×16.6mm

W

M22L10
- Adjustment turns: 10 turns
- Effective electrical angle: 3600˚
- Linearity: ±0.2%
- Resistance range: 1k~20kΩ
- Rotational life: 5 million cycles
- Dimensions: ϕ22×18.5mm

P

MC1003
- Adjustment turns: 3 turns
- Effective electrical angle: 1080˚
- Linearity: ±1%
- Resistance range: 5k~20kΩ
- Rotational life: 1 million cycles
- Dimensions: ϕ10×12.6mm

For sensor

P

JC10
- Adjustment turns: 1 turn
- Effective electrical angle: 324°
- Linearity: ±2%
- Resistance range: 2k, 5k, 10kΩ
- Rotational life: 5 million cycles
- Dimensions: ϕ10×7.6mm

P

JC22E
- Adjustment turns: 1 turn
- Effective electrical angle: 320°
- Linearity: ±1%
- Resistance range: 1k~10kΩ
- Rotational life: 10 million cycles
- Dimensions: ϕ22×12mm

P

JC22S
- Adjustment turns: 1 turn
- Effective electrical angle: 340°
- Linearity: ±0.5%
- Resistance range: 200~10kΩ
- Rotational life: 20 million cycles
- Dimensions: ϕ22.5×23.8mm

P

JC30S/JC40S
- Adjustment turns: 1 turn
- Effective electrical angle: 343°/345°
- Linearity: ±0.5% / ±0.3%
- Resistance range: 500~20kΩ
- Rotational life: 30 million cycles
- Dimensions: ϕ30×17mm/ϕ40×20mm

P

CRV16
- Adjustment turns: 1 turn
- Effective electrical angle: 220°+5°
- Linearity: ±1%
- Resistance range: 1k,2k,5k,10kΩ
- Rotational life: 0.5 million cycles
- Dimensions: ϕ16.2×6.7mm

P

JCL
- Effective electrical travel: 10~50mm
- Linearity: ±0.5%
- Resistance range: 1k~10kΩ
- Machanical life: 20 million cycles
- Dimensions: 45~85×18×14mm

P

JCL B
- Effective electrical travel: 100~500mm
- Linearity: ±0.5%
- Resistance range: 1k~10kΩ
- Machanical life: 4~20 million cycles
- Dimensions: 159~569×22×24mm

C

JP-30
- Adjustment turns: Single
- Effective electrical angle: 300°
- Resistance range: 500~100 kΩ
- Linearity: ±0.5 %
- Rotational life: 3 million revolution
- Dimensions: ϕ30×14.5 mm

Joystick encoders

Joystick encoders

CJ25
- Multi-function device...Joystick, encoder, and push switch in one package
- Joystick available in 4 or 8 directions
- 20 positions (5 P/R)
- Long life ... Joystick 500 K cycles, encoder & switch 1 M cycles
- Square wave, A and B phases
- Dimensions: ϕ25.4×16.4 mm

Rotary encoders

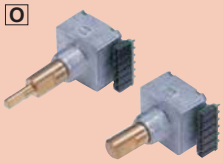
O : Optical contactless type
M : Magnetic contactless type
C : Contact type

For manual setting

O

REC16K/L/M(K,L:With Click)
- Smooth oparational feel, long life
- Input voltage 5VDC
- Square wave, A and B phases
- Resolution: 25 P/R
- Single shaft/Double shaft
- With push switch / without push switch
- Dimensions: □16×10.5 mm

O



REC16D/REC16F
- Input voltage: 5VDC
- Square wave, A and B phases
- Resolution: 25 P/R
- With switch Single shaft / Double shaft
- Dimensions: □16×10 mm

O

REC16/RES16
- Input voltage: 5VDC
- Square wave, A and B phases
- With push switch(except RES16) /Without push switch
- With click / Without click
- Resolutions: 20, 50 P/R
- Dimensions: □16×10mm

O

REC20
- Input voltage: 5VDC
- Square wave, A and B phases
- With click
- Resolutions: 25 P/R
- Dimensions: ϕ20×18mm

O

RES20B
- Input voltage: 5VDC
- Square wave, A and B phases
- Without click
- Resolution: 25 P/R
- Dimensions: ϕ20×18mm

O

REC20D/RES20D
- Input voltage: 5VDC
- Square wave, A and B phases
- With click/Without click
- Resolution: 25, 50 P/R
- Dimensions: ϕ20×11mm

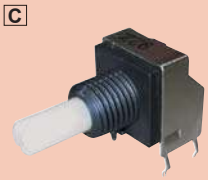
O

RECW20D/RESW20D
- Input voltage: 5VDC
- Square wave, A and B phases
- With click/Without click
- Resolutions: 25, 50 P/R
- Dimensions: ϕ20×11mm
- Panel seal type

M

RMS20(Magnetic)
- Magnetic encoders
- Input voltage: 5VDC
- Square wave, A and B phases
- Without click
- Resolution: 100, 250, 256 P/R
- Dimensions: ϕ20×13.5mm

C



MRP
- Input voltage: 10mA 5VDC
- Square wave
- Resolution: 20 P/R
- Dimensions: □10×7.5 mm

For sensor

O

RE12
- Ultra-small size
- Input voltage: 5VDC
- Quasi-sinusoidal wave, A phase
- Resolution: 100~300 P/R
- Dimensions: ϕ12×12mm

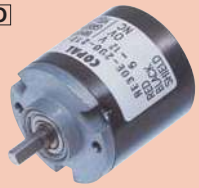
O

RE12D
- Ultra-small size
- Input voltage: 5VDC
- Square wave, A and B phases
- Resolution: 100~300 P/R
- Dimensions: ϕ12×15.5mm

O

RE20F
- Input voltage: 5VDC
- Quasi-sinusoidal wave, A phase or A and B phases
- Resolution: 100, 300 P/R
- Dimensions: ϕ20×13.4mm

O



RE30E
- Input voltage: 5~12, 24VDC
- Square wave, A, B and Z phases
- Resolutions:100~1024 P/R
- Dimensions: ϕ30×30mm

Motors

DC geared motors

LC30G
- Rated voltage: 24 VDC
- Rated torque: 9.81 mN·m
- Rated speed: 5400 min^{-1}
- No load speed: 7000 min^{-1}
- Gear ratio: 1/10～1/1500

LC37G
- Rated voltage: 24 VDC
- Rated torque: 4.9 mN·m
- Rated speed: 5200 min^{-1}
- No load speed: 7400 min^{-1}
- Gear ratio: 1/10～1/1500

HG37
- Rated voltage: 12, 24 VDC
- Rated torque: 29～588 mN·m
- Rated speed: 460～14.5 min^{-1}
- No load speed: 570～16.3 min^{-1}
- Gear ratio: 1/10～1/300

HG16
- Rated voltage: 6, 12 VDC
- Rated torque: 24.5～49 mN·m
- Rated speed: 310～55 min^{-1}
- No load speed: 390～60 min^{-1}
- Gear ratio: 1/30～1/240

MG16B
- Metal injection molding adopt
- Rated voltage: 6, 12 VDC
- Rated torque: 20～160 mN·m
- Rated speed: 380～34 min^{-1}
- No load speed: 477～45 min^{-1}
- Gear ratio: 1/30～1/300

LA16G324B
- Rated voltage: 12 VDC
- Rated torque: 14.7, 24.5 mN·m
- Rated speed: 150 min^{-1}, 65 min^{-1}
- No load speed: 190 min^{-1}, 78 min^{-1}
- Gear ratio: 1/50, 1/120

LC20G
- Rated voltage: 12 VDC
- Rated torque: 0.98 mN·m
- Rated speed: 6000 min^{-1}
- No load speed: 7100 min^{-1}
- Gear ratio: 1/10~1/1500

LC22G-103/105
- Rated voltage: 12, 24 VDC
- Rated torque: 1.96 mN·m
- Rated speed: 4900 min^{-1}/5100 min^{-1}
- No load speed: 6100 min^{-1}
- Gear ratio: 1/30～1/240

LC22G-107/108
- Rated voltage: 12, 24 VDC
- Rated torque: 1.96 mN·m
- Rated speed: 7000 min^{-1}/6100 min^{-1}
- No load speed: 8100 min^{-1}/7300 min^{-1}
- Gear ratio: 1/30～1/240

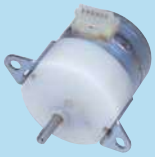
Flat servomotors

MS40
- Low profile: ϕ40×7.5mm
- Long life (Blushless)
- High speed, High torque
- High presition control: 0.17°
- Costomized motor and driver solutions

MS22
- Compact design: ϕ22×7.5mm
- Long life (Blushless)
- High speed, High torque
- Costomized motor and driver solutions

Stepping motors

SPG20-1000
- Rotational motion ●10 poles
- Number of phases: 4 phases
- Excitation: 2 phases unipolar
- Step angle: 18° (Motor only)
- Gear ratio: 1/6~1/36
- Dimensions: ϕ20×20 mm



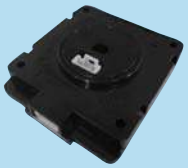
SPG27-1000
- Rotational motion ●12 poles
- Number of phases: 4 phases
- Excitation: 2 phases unipolar
- Step angle: 15° (Motor only)
- Gear ratio: 1/2.5~1/12
- Dimensions: ϕ27×28.7 mm

SPS20/SPS10
- Linear motion ●10 poles
- Number of phases: 4 phases / 2 phases
- Excitation: 2 phases unipolar /2 phases bipolar
- Step size: 25 μm / 20 μm
- Dimensions: ϕ20×18.5 / ϕ10×10.1mm

Solenoid

PLA002
- Compact
- Easy connection with connector terminal
- Widing resistance: 35 Ω ±10%
- Rated voltage: 12 VDC
- Pull-force: 0.35 mN·m Min.
- Dimensions: 20×16×25.5 mm

Slip ring



PLR40-1000
- Easy connection with connector terminal
- Number of poles: 6
- Contact resistance/1pole: 2 Ω Max.
- Allowable current/1pole: 1 A Max.
- Rotational torque: 9.8 mN·m Max.
- Rotational speed: 300 r/min Max.

PLR32-2000
- Easy connection with connector terminal (Input side)
- Number of poles: 7
- Contact resistance/1pole: 300 mΩ Max.
- Allowable current/1pole: 1 A Max.
- Rotational torque: 9.8 mN·m Max.
- Rotational speed: 100 r/min Max.

Micro blowers

Micro blowers (Aerodynamic bearings)

Compact, Light weight, So powerful, Less vibration, Long life

TF037C-2100
- With mounting bracket
- Rated voltage: 24 VDC ±10%
- Rated power supply current: 1.2 A Max.
- Rotation speed (Max./ Rated): 45,000 r/min / 40,000 r/min
- Pressure (Max./ Rated): 4.5 kPa / 4 kPa
- Rated air flow: 100 ℓ/min
- Acoustic audible noise: 67.0 dB(A) Max.
- Rated power consumption: 29 W Max.
- Weight: Approx. 94 g
- Material: Resin in full compliance with UL94 V0
- Driver set also available

TF037F-2000
- Rated voltage: 12~24 VDC
- Rated power supply current: 0.67 A Max.
- Rotation speed (Max./ Rated): 45,000 r/min / 31,000 r/min
- Pressure (Max./ Rated): 4.5 kPa / 2 kPa
- Rated air flow: 100 ℓ/min
- Acoustic audible noise: 65.0 dB(A) Max.
- Rated power consumption: 16.1 W Max.
- Weight: Approx. 72 g
- Material: Resin in full compliance with FDA standards
- Driver set also available

TF029B-1000
- Rated voltage: 12~27 VDC
- Rated power supply current: 0.62 A Max.
- Rotation speed (Max./ Rated): 50,000 r/min / 36,000 r/min
- Pressure (Max./ Rated): 3.5 kPa / 2 kPa
- Rated air flow: 100 ℓ/min
- Acoustic audible noise: 65.0 dB(A) Max.
- Rated power consumption: 14.9 W Max.
- Weight: Approx. 55 g
- Material: Resin in full compliance with FDA standards
- Driver set also available

TF037C-2000
- Rated voltage: 24 VDC ±10%
- Rated power supply current: 1.2 A Max.
- Rotation speed (Max./ Rated): 45,000 r/min / 40,000 r/min
- Pressure (Max./ Rated): 4.5 kPa / 4 kPa
- Rated air flow: 100 ℓ/min
- Acoustic audible noise: 67.0 dB(A) Max.
- Rated power consumption: 29 W Max.
- Weight: Approx. 90 g
- Material: Resin in full compliance with UL94 V0

TF037E-2000
- With mounting bracket
- Rated voltage: 24 VDC ±10%
- Rated power supply current: 0.86 A Max.
- Rotation speed (Max./ Rated): 45,000 r/min / 35,500 r/min
- Pressure (Max./ Rated): 4.5 kPa / 3 kPa
- Rated air flow: 100 ℓ/min
- Acoustic audible noise: 65.0 dB(A) Max.
- Rated power consumption: 22.7 W Max.
- Weight: Approx. 165 g
- Material: Resin in full compliance with UL94 V0

*The above specs are besed on rated voltage 24 VDC ±10%.

Brushless DC Fans

DC fans

F16EA
- Air flow: 0.012 m³/min
- Static pressure: 4.7 Pa
- Noise: 3 dB(A)
- Rated voltage: 3.3 VDC
- Dimensions: □16×4 mm

F17HA
- Air flow: 0.015 m³/min
- Static pressure: 10 Pa
- Noise: 7 dB(A)
- Rated voltage: 5 VDC
- Dimensions: □17×8 mm

F17FA
- Air flow: 0.01 m³/min
- Static pressure: 6 Pa
- Low noise: 5 dB(A)
- Rated voltage: 3.3 VDC
- Dimensions: □17×5 mm

F251R
- Air flow: 0.04, 0.05, 0.06 m³/min
- Static pressure: 20, 30, 47 Pa
- Noise: 11, 15, 20 dB(A)
- Rated voltage: 5, 12 VDC
- Dimensions: □25×10 mm

F310R
- Air flow: 0.06, 0.09 m³/min
- Static pressure: 14, 23 Pa
- Noise: 13, 17 dB(A)
- Rated voltage: 5, 12 VDC
- Dimensions: □30×10 mm

F412R
- Air flow: 0.11, 0.15 m³/min
- Static pressure: 15, 26 Pa
- Noise: 16, 23 dB(A)
- Rated voltage: 5, 12, 24 VDC
- Dimensions: □41×12.2 mm

F410T
- Air flow: 0.11, 0.15 m³/min
- Static pressure: 10, 23 Pa
- Noise: 12, 18 dB(A)
- Rated voltage: 5, 12 VDC
- Dimensions: □40×10 mm

F614T
- Air flow: 0.36, 0.43 m³/min
- Static pressure: 20, 29 Pa
- Noise: 23, 29 dB(A)
- Rated voltage: 5, 12, 24 VDC
- Dimensions: □62×14.5 mm

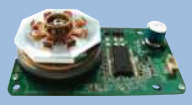
F455B (Side flow type)
- Air flow: 0.28 m³/min
- Static pressure: 44 Pa
- Noise: 20 dB(A)
- Rated voltage: 5 VDC
- Dimensions: □45×5 mm

Polygon laser scanners (Custom products)

High accuracy type (Ball bearings)

PD30LA
- Mirror size: ϕ40 mm
- Dynamic pyramidal angle error accuracy 120/60 sec.
- Speed range 1500~2000 r/min.
- For digital PPCs,digital photo labs

PD40LA
- Mirror size: ϕ40 mm
- Dynamic pyramidal angle error accuracy 60/30 sec.
- Speed range 1600~2800 r/min.
- For digital PPCs,digital photo labs



PD40ERB
- Mirror size: ϕ40 mm
- Dynamic pyramidal angle error accuracy 90/60 sec.
- Speed range 3000~8000 r/min.
- For barcode readers

PD60EA
- Mirror size: ϕ55 mm
- Dynamic pyramidal angle error accuracy 60/30 sec.
- Speed range 1500~5000 r/min.
- For digital PPCs, digital photo labs

PD60ER
- Mirror size: ϕ72 mm
- Dynamic pyramidal angle error accuracy 60/30 sec.
- Speed range 5000~12000 r/min.
- For digital PPCs, digital photo labs

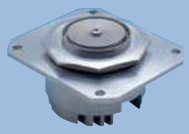
PD60LA
- Mirror size: ϕ65 mm
- Dynamic pyramidal angle error accuracy 20/10 sec.
- Speed range 2500~5000 r/min.
- For medical equipment

PD60SRB
- Mirror size: ϕ84 mm
- Dynamic pyramidal angle error accuracy 60/30 sec.
- Speed range 15000 r/min.
- For imagers

High rotation speed type (Aerodynamic bearings)

PT22ERG
- Mirror size: ϕ26 mm
- Dynamic pyramidal angle error accuracy 90/60 sec.
- Speed range 20000~50000 r/min.
- For laser printer

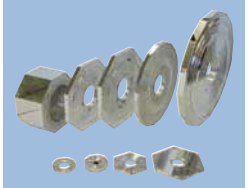
PTC30ERG
- Mirror size: ϕ40 mm
- Dynamic pyramidal angle error accuracy 90/60 sec.
- Speed range 20000~50000 r/min.
- For Laser printers, medical equipment



PT60SRG
- Mirror size: ϕ65mm
- Dynamic pyramidal angle error accuracy 80/40 sec.
- Speed range 20000~40000 r/min.
- For digital PPCs, digital photo labs

PV60SRG
- Mirror size: ϕ50~70 mA(t=3 to 5mm)
- Dynamic pyramidal angle error accuracy 30 sec.(peak to peak)
- Speed range 55000~70000 r/min.
- For Semiconductor Inspection, Non-Destructive Inspection, etc

Mirrors



- Various polygon mirrors & monogon mirrors

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