

# Handling Instructions

## ■ Soldering

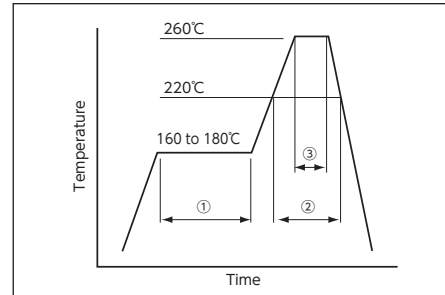
Our products are designed so they may withstand the same standard reflow soldering temperatures as most other electronics components. However, if the reflow temperature is higher than our specification allows, the performance may be affected. Avoid soldering the product at temperatures higher than specified.

For the reflow temperature profile of SMD products, refer to the figure below.

①	Preheat	160 to 180°C	120sec.
②	Primary heat	220°C	60sec
③	Peak	260°C	10sec. max.

※ The reflow temperature profile may vary depending on the product model, specifications and frequency range. Refer to the individual product specifications for details.

Reflow Temperature Profile  
(Available for lead free soldering)



## ■ Cleaning

- General cleaning solutions or ultrasonic cleaning may be used to clean our crystal products, but verification tests are recommended prior to use.
- Tuning fork crystals resonate at frequency bands that are close to the washing frequency of ultrasonic cleaning machines and this may cause resonance deterioration in the crystal. Therefore the use of ultrasonic cleaning machines to clean tuning fork crystals should be avoided. After applying ultrasonic cleaning, the functionality of crystals should be verified by testing the performance of the end product.

## ■ Shock

Crystal products are designed to resist shock, but if the products receive excessive shocks or are dropped on the ground, be sure to check for any damages before using.

## ■ Mounting

### 〈SMD crystal products〉

- Surface mount crystals are designed to be compatible with most automatic mounting processes, but some processes may exert excessive shock which may damage the crystal. Therefore test mounting of the crystal prior to mass production is necessary. If there is a possibility that PCB may be warped, make sure the warping is not to such a degree that the crystal products' operating characteristics or soldering conditions will be negatively affected.
- Avoid mounting and processing by Ultrasonic welding because this method has a possibility of an excessive vibration spreading inside the crystal products and becoming the cause of characteristic deterioration and not oscillating.

### 〈Lead type〉

- When bending, forming, or mounting leaded crystal products be careful not to put too much pressure on the glassed part of the base, as it may crack and negatively affect the crystals' performance.

## ■ Storage

Storing crystal products at high temperatures or high humidity may deteriorate the soldering condition of pins. Do not store in direct sunlight or damp environments.

## ■ Others

### 〈Crystal Resonators〉

- When excessive voltage is applied to crystal resonators, their performance may be affected or the crystal blank may be damaged. When handling the product, use the product within the specifications provided.
- Negative resistance determines the tolerance margin of a circuit that oscillates the resonator. We recommend that the negative resistance be at least five times the standard series resistance for standard applications.

### 〈Crystal Oscillators〉

- C-MOS is used for internal circuit of crystal oscillators. To prevent latch-up phenomena or static electricity, take careful note.
- Some crystal oscillators do not have internally connected bypass capacitors. When using the product, use a capacitor with a good high frequency characteristic of 0.01μ F between Vcc and GND (e.g. Ceramic chip capacitor) and connect it at the shortest possible distance. For details, refer to the specifications of each individual product.

### 〈Monolithic Crystal Filters〉

- Take care so that the input pin and the output pin do not close on the PCB.
- If the floating capacity of a PCB (on which a crystal filter is to be mounted) is too large, circuit tuning may be required to cancel out the excess floating capacity.
- When excessive voltage is applied to crystal filters, their performance may be affected or the crystal blank may be damaged. When handling the product, use at its input level equal to or less than -10dBm.

# RoHS/ELV Compliant Lead-free and Halogen-free products from KDS.

KDS is fully committed to environmental protection and has been proactively working to comply with the major environmental regulations such as RoHS Directive (Directive of the Restriction of the use of certain Hazardous Substances : 2011/65/EU and (EU) 2015/863), ELV Directive (End-of-Life Vehicles Directive : 2000/53/EC) and Halogen-free activities etc. The below spreadsheet provide the current status of the product compliance in each environmental regulations. Please visit our website for the latest information.(<https://www.kds.info>)

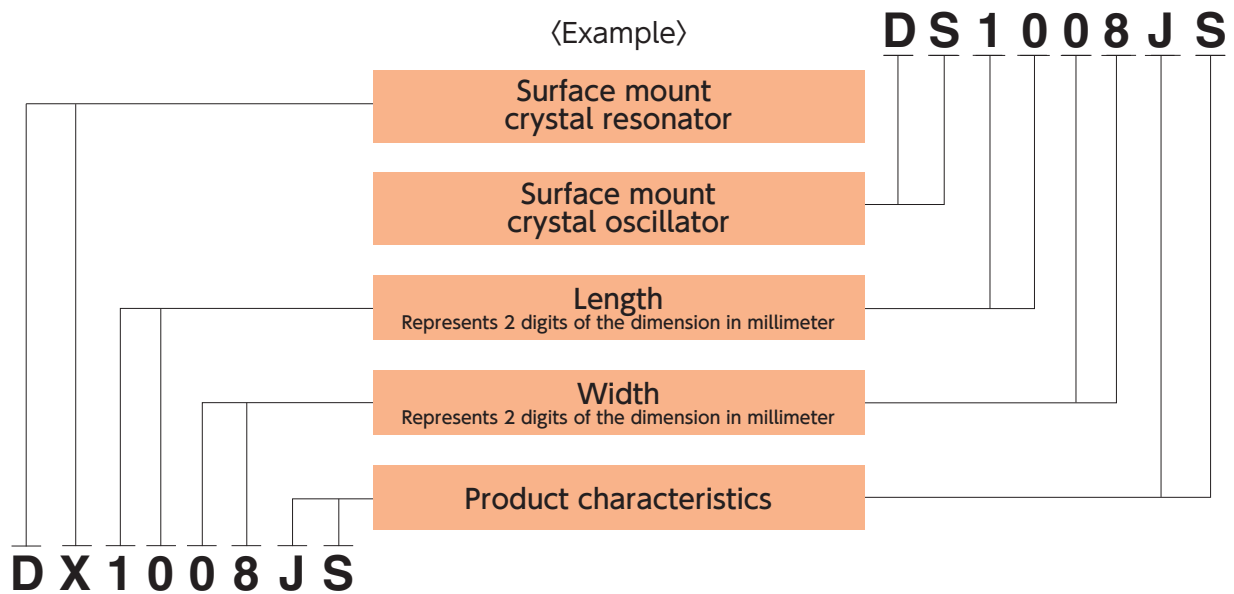
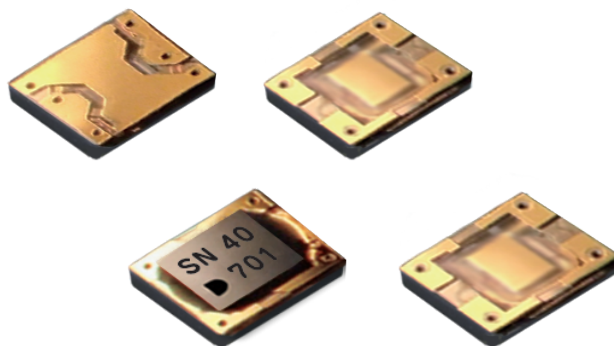
As of sept.30.2024

	Type	RoHS/ELV Compliant	Halogen-free	Pb-free	Materials of pin	Note
Crystal Resonators/ MHz Band Crystal Resonators	DX1008J SERIES	○	○	○	Ni/Au	
	DSX1210A	○	○	○	Ni/Au	
	DSX1612S	○	○	○	Ni/Au	
	DSX211S, DSX211SH	○	○	○	Ni/Au	
	DSX221SH	○	○	○	Ni/Au	
	DSX321SH	○	○	○	Ni/Au	
	DSX210GE	○	○	Pb in sealing-glass	Ni/Au	Pb in sealing-glass is exempted from RoHS/ELV Directive. <sup>(*)</sup>
	DSX320GE	○	○	Pb in sealing-glass	Ni/Au	Pb in sealing-glass is exempted from RoHS/ELV Directive. <sup>(*)</sup>
	DSX211G	○	○	Pb in sealing-glass	Ni/Au	Pb in sealing-glass is exempted from RoHS/ELV Directive. <sup>(*)</sup>
	DSX321G, DSX321GK	○	○	Pb in sealing-glass	Ni/Au	Pb in sealing-glass is exempted from RoHS/ELV Directive. <sup>(*)</sup>
Tuning Fork Crystal Resonators/ kHz Band Crystal Resonators	DSX530GA	○	○	Pb in sealing-glass	Ni/Au	Pb in sealing-glass is exempted from RoHS/ELV Directive. <sup>(*)</sup>
	DST1210A	○	○	○	Ni/Au	
	DST1610A	○	○	○	Ni/Au	
	DST210AC	○	○	○	Ni/Au	
Crystal Resonators with dedicated temperature sensor/ MHz Band Crystal Resonators	DST310SA	○	○	○	Ni/Au	
	DSR1210ATH	○	○	○	Ni/Au	
	DSR1612ATH	○	○	○	Ni/Au	
	DSR211STH	○	○	○	Ni/Au	
Temperature Compensated Crystal Oscillators (TCXO)	DSR221STH	○	○	○	Ni/Au	
	DA/DB2016AS	○	○	○	Ni/Au	
	DSA/DSB1612 SERIES	○	○	○	Ni/Au	
	DSA/DSB211 SERIES	○	○	○	Ni/Au	
	DSA/DSB221 SERIES	○	○	○	Ni/Au	
	DSA/DSB321 SERIES	○	○	○	Ni/Au	
	DSA/DSB535 SERIES	○	○	○	Ni/Au	
Real Time Clock Module (RTC)	DSK1612ATD	○	○	○	Ni/Au	
	DSK321STD	○	○	○	Ni/Au	
Simple Packaged Crystal Oscillators (SPXO)	DD3225TS, DD3225TR	○	○	○	Ni/Au	
	DS1008J SERIES	○	○	○	Ni/Au	
	DS2016A SERIES	○	○	○	Ni/Au	
	DS2520A SERIES	○	○	○	Ni/Au	
	DS3225A SERIES	○	○	○	Ni/Au	
	DSO1612AR	○	○	○	Ni/Au	
	DSO211S SERIES	○	○	○	Ni/Au	
	DSO221S SERIES	○	○	○	Ni/Au	
	DSO223S SERIES	○	○	○	Ni/Au	
	DSO321S SERIES	○	○	○	Ni/Au	
	DSO323S SERIES	○	○	○	Ni/Au	
	DSO531S SERIES	○	○	○	Ni/Au	
	DSO533 SERIES	○	○	○	Ni/Au	
	DLO555MBA	○	○	○	Sn	
	DSO751S SERIES	○	○	○	Ni/Au	
DSO753S SERIES	○	○	○	Ni/Au		
Voltage Controlled Crystal Oscillators (VCXO)	DSV221SV	○	○	○	Ni/Au	
	DSV321S	○	○	○	Ni/Au	
Monolithic Crystal Filters	DSF334 SERIES	○	○	○	Ni/Au	
	DSF444 SERIES	○	○	○	Ni/Au	
	DSF633 SERIES	○	○	○	Ni/Au	
	DSF753 SERIES	○	○	○	Ni/Au	

\* RoHS Directive and ELV Directive exemptions are granted for high temperature solder, lead content in low-melting glass of DSX-G Series.

# Quartz Devices

## Arkh.Series



# Ark.3G SERIES

## About Arkh.Series



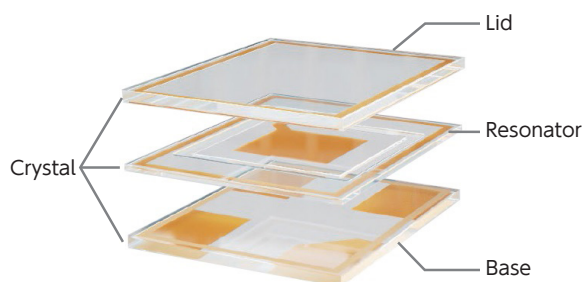
**Ark. Series**

The Arkh Series is a device with an unprecedented new structure developed as the third generation following the lead type and the surface-mount type.

The brand name "Arkh" is taken from the ancient Greek word "Arkhitekton", which is the origin of the English word "Architecture". It is not just a structure, but contains the desire to emphasize that it is the origin of crystal devices with a completely new structure.

## About the Structure of the Arkh Series

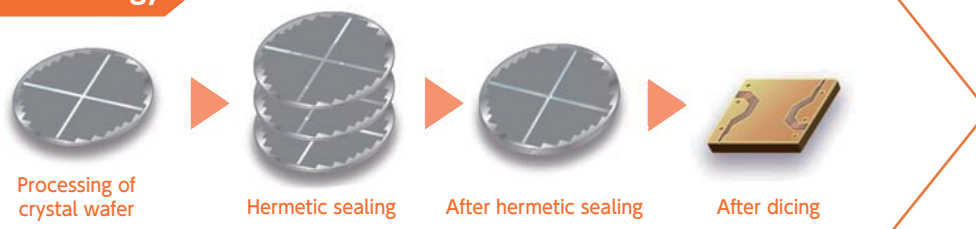
### <Ark.3G>



The Arkh.3G is an ultra-compact and thin device realized by WLP (Wafer Level Package) technology and is arranged in a three-layer structure consisting of a lid, resonator, and base, the host of which is quartz crystal. With the outlines of the resonator and other parts having been formed by a photolithographic process, three quartz crystal wafers are bonded and diced into a waferlevel package. Thus the holder and resonator parts are formed into an integrated structure without the use of a conductive adhesive.

This design has solved the challenges that the conventional structure needed to meet for product size reduction, namely, improved accuracy in conductive adhesive application and the provision of a margin for ensuring a quartz crystal element mounting location. Additionally, it is possible to reduce quality risks by carrying out processes ranging from wafer cleaning to bonding in a vacuum environment.

### WLP technology



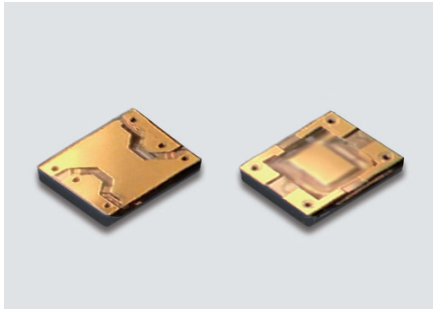
## About Mounting and Usage of the Arkh.Series

The Arkh.Series can be soldered to circuit boards with a pick-and-place machine in the conventional manner. The Arkh.3G can also be built into an IC package or used for wire bonding or molding.

\*Note that, as with conventional products, the Arkh.3G is subject to resonance fracture or damage, depending on conditions such as ultrasonic cleaning and molding pressure. Therefore, it is necessary to check the Arkh.3G in advance under your particular operating conditions.

# SMD Crystal Resonators / MHz Band Crystal Resonators

## DX1008JS



Actual size □

### ■ Features

- 1008 size, height 0.12mm  
Unprecedented extremely low-profile package using a novel structure
- Composed only of quartz crystal plates and metallic films without the use of a ceramic base
- Long-term high resistance to aging, due to avoiding the use of an organic conductive adhesive
- Reduced risk of the inclusion of foreign matter due to assembly in a vacuum environment



### ■ Applications

- Mobile communications and short-range wireless modules
- Wearable devices
- Multimedia devices

### ■ Standard Specification

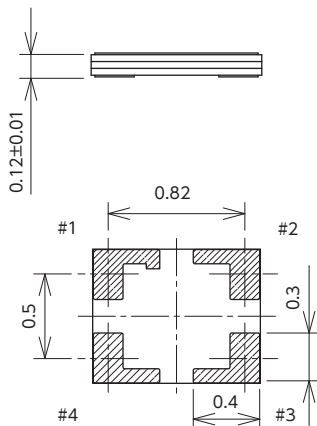
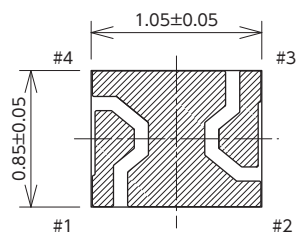
Item \ Type	DX1008JS		
Frequency Range	48 to 52MHz	52 to 96MHz	96 to 120MHz
Overtone Order	Fundamental		
Load Capacitance	8pF, 10pF, 12pF		
Drive Level	10μW (100μW max.)		
Frequency Tolerance	±20×10 <sup>-6</sup> (at 25°C)		±100×10 <sup>-6</sup> (at 25°C)
Series Resistance	100Ω max.	60Ω max.	40Ω max.
Frequency Characteristics over Temperature	±30×10 <sup>-6</sup> / -30 to +85°C (Ref.To 25°C)		
Storage Temperature Range	-40 to +85°C		
Packing Unit (1)	3000pcs./reel (φ180)		

(1) Moisture prevention packing is unnecessary.  
Moisture Sensitivity Level: LEVEL1 (IPC/JEDEC J-STD-033)

Consult our sales representative for other specifications

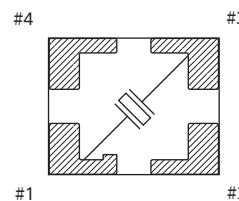
[mm]

### ■ Dimensions



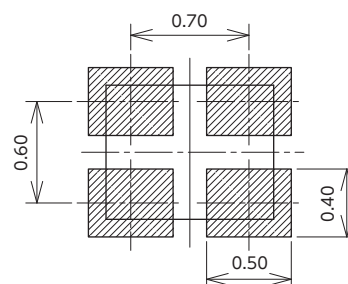
### ■ Internal Connections

〈Top View〉



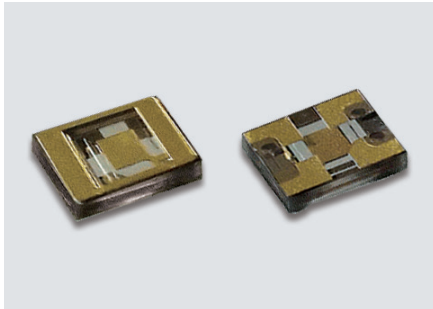
### ■ Recommended Land Pattern

〈Top View〉



# SMD Crystal Resonators / MHz Band Crystal Resonators

## DX1008JT



### Features

- 1008 size, height 0.18mm  
Unprecedented extremely low-profile package using a novel structure
- Composed only of quartz crystal plates and metallic films without the use of a ceramic base
- Long-term high resistance to aging, due to avoiding the use of an organic conductive adhesive

### Applications

- Mobile communications and short-range wireless modules
- Wearable devices
- Multimedia devices



### Standard Specification

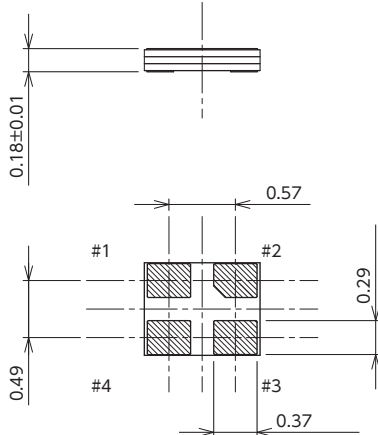
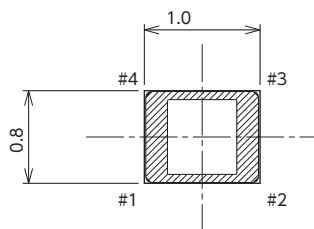
Item	Type	DX1008JT	
Frequency Range		59.97MHz	76.8MHz
Overtone Order		Fundamental	
Load Capacitance		5pF, 8pF, 10pF, 12pF	
Drive Level		10μW (100μW max.)	
Frequency Tolerance		±10×10 <sup>-6</sup> , ±20×10 <sup>-6</sup>	
Series Resistance		60Ω max.	50Ω max.
Frequency Characteristics over Temperature		±12×10 <sup>-6</sup> , ±30×10 <sup>-6</sup> / -30 to +85°C (Ref.To 25°C)	
Storage Temperature Range		-40 to +85°C	
Packing Unit (1)		3000pcs./reel (φ180)	

(1) Moisture prevention packing is unnecessary.  
Moisture Sensitivity Level: LEVEL1 (IPC/JEDEC J-STD-033)

Consult our sales representative for other specifications

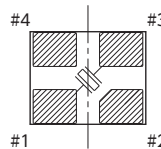
[mm]

### Dimensions



### Internal Connections

〈Top View〉

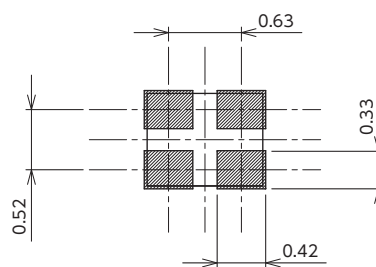


Pin Connection

Pin No.	Connection
#1	Xtal
#2	GND
#3	Xtal
#4	GND

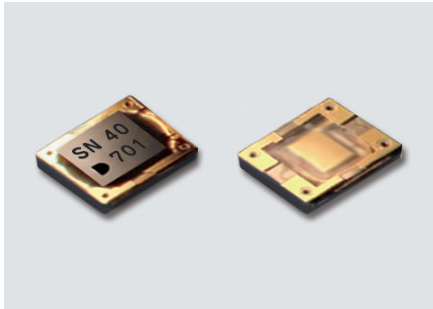
### Recommended Land Pattern

〈Top View〉



## SMD Crystal Oscillators

### DS1008JN



Actual size □

#### ■ Features

- 1008 size, height 0.22mm
- Unprecedented extremely low-profile package using a novel structure
- Available frequency range : 1 to 100MHz
- Low Supply Voltage : 0.9V/ 1.2V/ 1.3V/ 1.5V typ.
- 3-state function
- CMOS level output
- Available up to 100MHz by using AT cut fundamental resonator.
- Low jitter provides for high performance.

#### ■ Applications

- Medical camera
- Wearable devices
- IoT devices
- Multimedia device



[Function Code]  
DS1008JN E A

E : 1.5V	←	A : ±100×10 <sup>-6</sup>
F : 1.3V	←	B : ±50×10 <sup>-6</sup>
G : 1.2V	←	C : ±30×10 <sup>-6</sup>
H : 0.9V	←	E : ±20×10 <sup>-6</sup>

When requesting the product, please select the model and function code of your request.

#### ■ Standard Specification

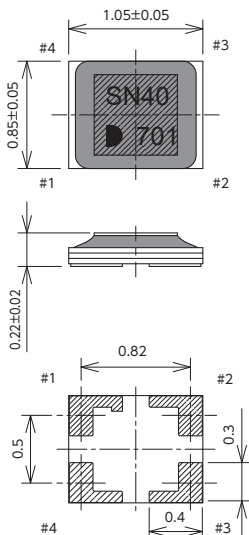
Item	Type	Function Code		Output Frequency Range (MHz)	Legend	Spec.			Unit	Condition	
		Supply Voltage	Frequency Tolerance			min.	typ.	max.			
Supply Voltage		E	*	1 ≤ f <sub>0</sub> ≤ 100	Vcc	1.4	1.5	1.6	V		
		F				1.2	1.3	1.4			
		G				1.1	1.2	1.3			
		H				0.8	0.9	1.0			
Frequency Tolerance (Includes frequency tolerance at room temperature.)	*	A	*	*	f <sub>tol</sub>	—	—	±100	ppm	-40 to +125°C	-20 to +70°C (Standard Operating Temperature Range)
		B				—	—	±50			
		C				—	—	±30			
		E				—	—	±20			
Current Consumption	E	*	80 ≤ f <sub>0</sub> ≤ 100	l <sub>cc</sub>		—	—	3.1	mA	No Load	
						50 ≤ f <sub>0</sub> < 80	—	—			2.7
	F	*	80 ≤ f <sub>0</sub> ≤ 100	1 ≤ f <sub>0</sub> < 50		—	—	2.2			
						50 ≤ f <sub>0</sub> < 80	—	—			2.8
	G	*	80 ≤ f <sub>0</sub> ≤ 100	1 ≤ f <sub>0</sub> < 50		—	—	2.5			
						50 ≤ f <sub>0</sub> < 80	—	—			2.1
	H	*	80 ≤ f <sub>0</sub> ≤ 100	1 ≤ f <sub>0</sub> < 50		—	—	2.7			
						50 ≤ f <sub>0</sub> < 80	—	—			2.4
						—	—	2.0			
						80 ≤ f <sub>0</sub> ≤ 100	—	—			2.3
						—	—	2.1			
						50 ≤ f <sub>0</sub> < 80	—	—			1.8
				—	—	1.8					
				1 ≤ f <sub>0</sub> < 50	—	—	1.8				
Stand-by Current (#1 pin "L" Level)	*	*	*	L <sub>std</sub>	—	—	0.02	mA			
Load Condition	*	*	*	L <sub>CMOS</sub>	—	—	15	pF			
Symmetry	*	*	*	SYM	40	50	60	%	at 50%		
Rise and Fall Time	*	*	*	tr, tf	—	—	5	ns	10 to 90% Vcc Level		
Output Enable Time	*	*	*	tPZL	—	—	2	ms			
Output Disable Time	*	*	*	tPLZ	—	—	200	ns			
OE Pin 1 Level Input Voltage	*	*	*	V <sub>IH</sub>	Vcc×0.8	—	—	V			
OE Pin 0 Level Input Voltage	*	*	*	V <sub>IL</sub>	—	—	Vcc×0.2	V			
Packing Unit (1)	3000pcs./reel(φ180)										

(1) Moisture prevention packing

Consult our sales representative for other specifications

[mm]

#### ■ Dimensions



#### Pin Connection

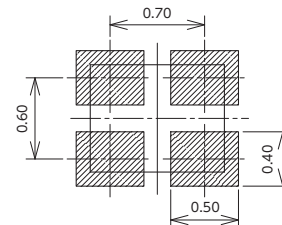
Pin No.	Connection
#1	OE (Output Enable)
#2	GND
#3	Output
#4	Vcc

#### Function

#1 Input	#3 Output condition
H	Oscillation out
Open	Oscillation out
L	High Z

#### ■ Recommended Land Pattern

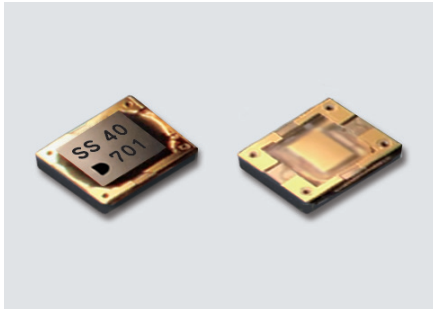
<Top View>





## SMD Crystal Oscillators

### DS1008JS



Actual size □

#### ■ Features

- 1008 size, height 0.22mm
- Unprecedented extremely low-profile package using a novel structure
- Available frequency range : 1 to 100MHz
- Supply Voltage : +1.8V to +3.3V
- 3-state function
- CMOS level output
- Available up to 100MHz by using AT cut fundamental resonator.
- Low jitter provides for high performance.



#### ■ Applications

- Mobile communications and short-range wireless modules
- Wearable devices
- Multimedia device

[Function Code]

DS1008JS A A

A : 3.3V     A :  $\pm 100 \times 10^{-6}$   
 B : 2.8V     B :  $\pm 50 \times 10^{-6}$   
 C : 2.5V     C :  $\pm 30 \times 10^{-6}$   
 D : 1.8V     E :  $\pm 20 \times 10^{-6}$

When requesting the product, please select the model and function code of your request.

#### ■ Standard Specification

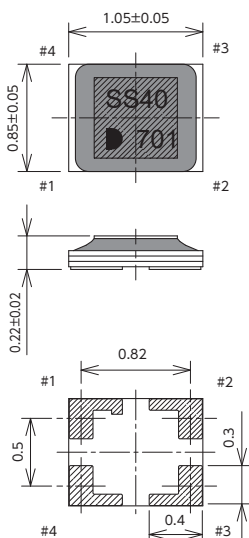
Item	Type	Function Code		Output Frequency Range (MHz)	Legend	Spec			Unit	Condition					
		Frequency Tolerance	Frequency Tolerance			min.	typ.	max.							
Supply Voltage	A	*	*	$1 \leq f_0 \leq 100$	Vcc	3.0	3.3	3.6	V						
	B					2.6	2.8	3.0							
	C					2.25	2.5	2.75							
	D					1.6	1.8	2.0							
Frequency Tolerance (Includes frequency tolerance at room temperature.)	*	*	*	*	f_tol	—	—	$\pm 100$	ppm	-40 to +125°C	-20 to +70°C (Standard Operating Temperature Range)				
	B					—	—	$\pm 50$							
	C					—	—	$\pm 30$							
	E					—	—	$\pm 20$							
Current Consumption	A	*	*	$80 \leq f_0 \leq 100$	lcc	—	—	4.9	mA	No Load					
				$48 \leq f_0 < 80$		—	—	4.2							
				$1 \leq f_0 < 48$		—	—	3.1							
	B	*	*	$80 \leq f_0 \leq 100$		—	—	4.2							
				$48 \leq f_0 < 80$		—	—	3.7							
				$1 \leq f_0 < 48$		—	—	2.7							
	C	*	*	$80 \leq f_0 \leq 100$		—	—	3.9							
				$48 \leq f_0 < 80$		—	—	3.4							
				$1 \leq f_0 < 48$		—	—	2.6							
	D	*	*	$80 \leq f_0 \leq 100$		—	—	3.1							
				$48 \leq f_0 < 80$		—	—	2.8							
				$1 \leq f_0 < 48$		—	—	2.1							
	Stand-by Current (#1 pin "I" Level)	*	*	*		l_std	—	—				0.01	mA		
	Load Condition	*	*	*		L_cmos	—	—				15	pF		
	Symmetry	*	*	*		SYM	45	50				55	%	at 50% Vcc f <sub>0</sub> < 60MHz	
	Rise and Fall Time	*	*	*		tr, tf	—	—				5	ns	10 to 90% Vcc Level	
Output Enable Time	*	*	*	tPZL	—	—	2	ms							
Output Disable Time	*	*	*	tPLZ	—	—	200	ns							
OE Pin 1 Level Input Voltage	*	*	*	VIH	Vcc × 0.8	—	—	V							
OE Pin 0 Level Input Voltage	*	*	*	VIL	—	—	Vcc × 0.2	V							
Packing Unit (1)	3000pcs./reel(φ180)														

(1) Moisture prevention packing

Consult our sales representative for other specifications

[mm]

#### ■ Dimensions



#### Pin Connection

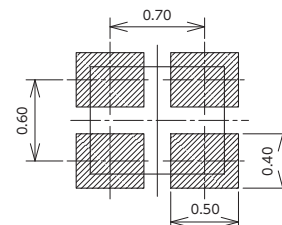
Pin No.	Connection
#1	OE (Output Enable)
#2	GND
#3	Output
#4	Vcc

#### Function

#1 Input	#3 Output condition
H	Oscillation out
Open	Oscillation out
L	High Z

#### ■ Recommended Land Pattern

<Top View>

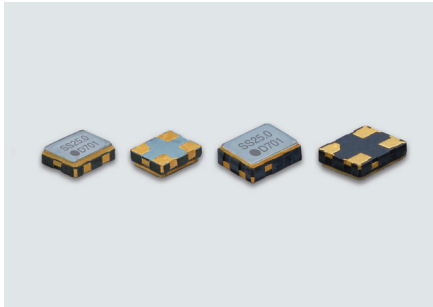




## SMD Crystal Oscillators

Under Development

### DS2016AS/DS2520AS



Actual size DS2016AS  DS2520AS

#### Features

- Supply Voltage : 1.8V/2.5V/2.8V/3.3V
- Available Frequency range: 1 to 125MHz
- Low Profile : 0.7mm(DS2016AS), 0.8mm(DS2520AS)
- CMOS Level Output
- Supports a wide operating temperature range from -40 to 125°C
- AEC-Q100/AEC-Q200 compliant

#### Applications

- Audio equipment, communication equipment, video equipment, factory automation equipment, PCs, amusement equipment, In-vehicle driving safety applications



[Function Code]

DS\*\*\*\*AS A A

- |          |                           |
|----------|---------------------------|
| A : 3.3V | A : ±100×10 <sup>-6</sup> |
| B : 2.8V | Z : ±80×10 <sup>-6</sup>  |
| C : 2.5V | B : ±50×10 <sup>-6</sup>  |
| D : 1.5V | C : ±30×10 <sup>-6</sup>  |
|          | D : ±25×10 <sup>-6</sup>  |
|          | E : ±20×10 <sup>-6</sup>  |

When requesting the product, please select the model and function code of your request.

#### Standard Specification

Item	Function Code		Output Frequency Range (MHz)	Legend	Spec.			Unit	Condition	
	Supply Voltage	Frequency tolerance			min	typ.	max.			
Supply Voltage	A	*	1 ≤ fo ≤ 125	Vcc	+3.0	+3.3	+3.6	V		
	B				+2.6	+2.8	+3.0			
	C				+2.25	+2.5	+2.75			
	D				+1.6	+1.8	+2.0			
Frequency Tolerance (Includes frequency tolerance at room temperature)	*	A	*	f_tol	-100	-	+100	× 10 <sup>-6</sup>	-40 to +125 °C	-10 to +70°C (Standard Operating Temperature Range)
		Z			-80	-	+80			
		B			-50	-	+50			
		C			-50	-	+50		-40 to +85 °C	
		D			-30	-	+30			
E	-25	-	+25	-20 to +70 °C						
	-20	-	+20							
Current Consumption	A	*		Icc	1 ≤ fo < 40	-	2.4	mA	No Load	
					40 ≤ fo < 100	-	4.2			
					100 ≤ fo ≤ 125	-	10.0			
	B				1 ≤ fo < 40	-	2.2			
					40 ≤ fo < 100	-	3.7			
					100 ≤ fo ≤ 125	-	9.0			
	C				1 ≤ fo < 40	-	2.0			
					40 ≤ fo < 100	-	3.4			
					100 ≤ fo ≤ 125	-	8.0			
	D				1 ≤ fo < 40	-	1.7			
					40 ≤ fo ≤ 100	-	2.7			
Stand-by Current (#1 pin"L Level)	*	*	*	I_std	-	-	10.0	μA		
Load Condition	*	*	*	L_cmos	-	-	15	pF		
Symmetry	*	*	*	SYM	45	50	55	%	at 50% Vcc	
0 Level Output Voltage	*	*	*	VOL	-	-	Vcc × 0.1	V		
1 Level Output Voltage	*	*	*	VOH	Vcc × 0.9	-	-	V		
Rise and Fall Time	A, B, C	*	*	tr, tf	-	-	3	ns	10 to 90% Vcc Level	
	D				-	-	5			
OE Pin 0 Level Input Voltage	*	*	*	VIL	-	-	Vcc × 0.3	V		
OE Pin 1 Level Input Voltage	*	*	*	VIH	Vcc × 0.7	-	-	V		
Output Disable Time	*	*	*	tPLZ	-	-	200	ns		
Output Enable Time	*	*	*	tPZL	-	-	2	ms		
Phase Jitter	*	*	40 ≤ fo ≤ 125	tpj	-	-	1	ps	fo offset: 12kHz to 20MHz	
			10 ≤ fo < 40						fo offset: 12kHz to 5MHz	
Packing unit(1)					3000pcs./reel(Φ 180)					

(1) Moisture prevention packing is unnecessary.

Moisture Sensitivity Level: Level1 (IPC/JEDEC J-STD-033)

Consult our sales representative for other specifications

#### DS2016AS

[mm]

#### DS2520AS

[mm]

#### Dimensions

Model Code: 2.0±0.1, Frequency

Pin Connections:

Pin No.	Connection
#1	OE(Output Enable)
#2	GND
#3	Output
#4	Vcc

Function:

#1 Input	#3 Output condition
H	Oscillation out
L	High Z

#### Recommended Land Pattern (Top View)

#### Dimensions

Model Code: 2.5±0.15, Frequency

Pin Connections:

Pin No.	Connection
#1	OE(Output Enable)
#2	GND
#3	Output
#4	Vcc

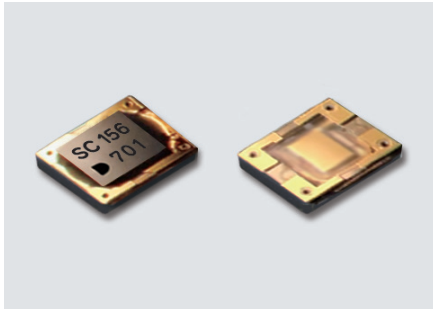
Function:

#1 Input	#3 Output condition
H	Oscillation out
L	High Z

#### Recommended Land Pattern (Top View)

## SMD Differential Output Crystal Oscillators

### DS1008JC/DS1008JK/DS1008JJ



Actual size ◻

#### ■ Features

- 1008 size, height 0.24mm  
Unprecedented extremely low-profile package using a novel structure
- Available frequency range : 156.25MHz
- HD-LVDS output (DS1008JC)
- LV-PECL out put (DS1008JK)
- LVDS output (DS1008JJ)
- By using AT cut fundamental resonator, low jitter provides for high performance.



#### ■ Applications

- Optical transmission device

#### ■ Standard Specification

Item	Type	Legend	DS1008JC	DS1008JK	DS1008JJ	Condition
Output Specification	—		HD-LVDS	LV-PECL	LVDS	
Output Frequency Range	f <sub>o</sub>		156.25MHz			
Supply Voltage	V <sub>cc</sub>		+3.3V±0.165V		+2.5V±0.125V / +3.3V±0.165V	
Frequency Tolerance (Includes frequency tolerance at room temperature.)	f <sub>tol</sub>		±100×10 <sup>-6</sup> max.			-40 to +85°C
Current Consumption	I <sub>cc</sub>		35mA max.	57mA max.	26mA max.	
Load Condition	Load-R		100Ω (Output-OutputN, DC Cut)	50Ω to V <sub>cc</sub> -2.0V	100Ω (Output-OutputN)	
Symmetry	SYM		45 to 55%			at outputs cross point
0 Level Output Voltage	V <sub>OL</sub>		—	V <sub>cc</sub> -1.81 to V <sub>cc</sub> -1.62	—	
1 Level Output Voltage	V <sub>OH</sub>		—	V <sub>cc</sub> -1.025 to V <sub>cc</sub> -0.88	—	
Rise and Fall Time	t <sub>r</sub> , t <sub>f</sub>		0.4ns max	0.5ns max	0.4ns max	20 to 80% Output-OutputN
Differential Output Voltage	V <sub>OD1</sub> , V <sub>OD2</sub>		0.500 to 1.000V	—	0.247 to 0.454V	
Change to V <sub>OD</sub>	ΔV <sub>OD</sub>		—	—	50mV	ΔV <sub>OD</sub> =ABS(V <sub>OD1</sub> -V <sub>OD2</sub> )
Offset Voltage	V <sub>OS</sub>		—	—	1.125 to 1.375V	Output, OutputN Offset Voltage
Offset to V <sub>OS</sub>	ΔV <sub>OS</sub>		—	—	50mV	Magnitude Change V <sub>OS</sub>
Start Up Time	T <sub>st</sub>		2ms			
Period Jitter (1)	t <sub>RMS</sub>		2.5ps typ.			
	t <sub>p-p</sub>		22ps typ.			Peak to peak
Phase Jitter (2)	t <sub>pj</sub>		0.1ps max.		0.12ps max.	f <sub>o</sub> offset: 12kHz to 20MHz @ +25°C
Packing Unit (3)			3000pcs./reel (φ180)			

(1) Measured WAVECREST DTS-2075

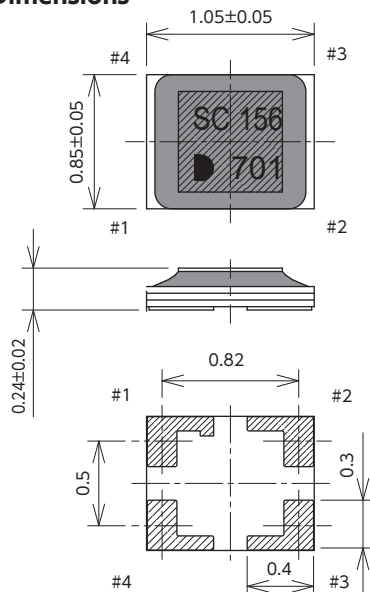
(2) Measured Keysight Technologies E5052B

(3) Moisture prevention packing

Consult our sales representative for other specifications

[mm]

#### ■ Dimensions

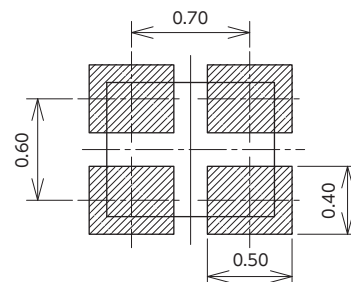


#### Pin Connection

Pin No.	Connection
#1	GND
#2	OutputN
#3	Output
#4	V <sub>cc</sub>

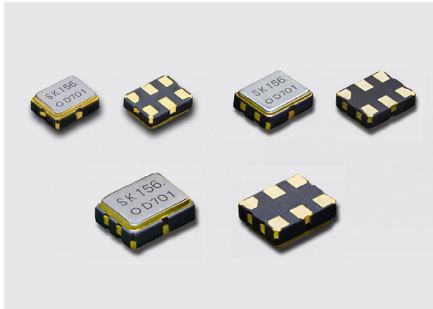
#### ■ Recommended Land Pattern

<Top View>



## SMD Differential Output Crystal Oscillators

DS2016AK/DS2520AK/DS3225AK/DS2016AJ/DS2520AJ/DS3225AJ/DS2016AD/DS2520AD/DS3225AD



Actual size DS2016A SERIES □ DS2520A SERIES □  
DS3225A SERIES □

### ■ Features

- Available frequency: 100MHz, 125MHz, 156.25MHz
- Capable of operating over a wide temperature range from -40 to 105°C
- LV-PECL Output (DS2016AK/DS2520AK/DS3225AK), 2.5V/3.3V operating
- LVDS Output (DS2016AJ/DS2520AJ/DS3225AJ), 1.8V/2.5V/3.3V operating
- HCSL Output (DS2016AD/DS2520AD/DS3225AD), 1.8V/2.5V/3.3V operating
- AEC-Q100/AEC-Q200 compliant

### ■ Applications

- Optical transceiver, Optical transmission device, Communication base station, Automotive multimedia device



[Function Code]

DS\*\*\*\*AK A A

A : 3.3V  
C : 2.5V  
D : 1.8V

A : ±100×10<sup>-6</sup>  
B : ±50×10<sup>-6</sup>

When requesting the product, please select the model and function code of your request.

### ■ Standard Specification

Item	Type	Symbol	DS2016AK DS2520AK DS3225AK	DS2016AJ DS2520AJ DS3225AJ	DS2016AD DS2520AD DS3225AD
Output Specification		—	LV-PECL	LVDS	HCSL
Output Frequency Range		f <sub>o</sub>	100MHz/125MHz/156.25MHz		
Supply Voltage		V <sub>cc</sub>	+2.5±0.125V/+3.3±0.165V	+1.8±0.090V/+2.5±0.125V/+3.3±0.165V	
Frequency Tolerance		f <sub>tol</sub>	±50×10 <sup>-6</sup> max., ±100×10 <sup>-6</sup> max.		
Storage Temperature Range		T <sub>stg</sub>	-40 to +125°C		
Operating Temperature Range		T <sub>use</sub>	-40 to +85°C, -40 to +105°C, -40 to +125°C		
Current Consumption		I <sub>cc</sub>	60mA max.	20mA max.	40mA max.
Stand-by Current (#1 pin "L" Level)		I <sub>std</sub>	10 μA max.		
Load Condition		Load-R	50Ω to V <sub>cc</sub> -2V	100Ω Output-OutputN	50Ω
Symmetry		SYM	45 to 55% [1/2V <sub>OPP</sub> ]		
0 Level Output Voltage		V <sub>OL</sub>	V <sub>cc</sub> -1.810 to V <sub>cc</sub> -1.590V	0.90V min.	-0.15 to +0.15V
1 Level Output Voltage		V <sub>OH</sub>	V <sub>cc</sub> -1.105 to V <sub>cc</sub> -0.860V	1.60V max.	+0.55 to +0.90V
Rise and Fall Time		tr, tf	0.4ns max. [20 to 80% V <sub>OPP</sub> ]		0.5ns max.(2.5V,3.3V), 0.6ns max.(1.8V) [20 to 80% V <sub>OPP</sub> ]
Output Voltage		V <sub>OPP</sub>	0.40V min.	0.25V min.	0.55V min
Differential Output Voltage		V <sub>OD1</sub> , V <sub>OD2</sub>	—	0.247 to 0.454V	—
Change to V <sub>OD</sub>		ΔV <sub>OD</sub>	—	50mV [ΔV <sub>OD</sub> = V <sub>OD1</sub> -V <sub>OD2</sub>  ]	—
Offset Voltage		V <sub>OS</sub>	—	1.125 to 1.375V	—
Offset to V <sub>OS</sub>		ΔV <sub>OS</sub>	—	50mV	—
OE pin 0 Level input Voltage		V <sub>IL</sub>	V <sub>cc</sub> ×0.3max.		
OE pin 1 Level input Voltage		V <sub>IH</sub>	V <sub>cc</sub> ×0.7min.		
Output Disable time		t <sub>PLZ</sub>	200ns		
Output Enable time		t <sub>PZL</sub>	2ms		
Phase Jitter [fo offset: 1.2kHz to 20MHz]		t <sub>pj</sub>	32fs typ., 60fs max. (156.25MHz/V <sub>cc</sub> =+2.5V, +3.3V)	38fs typ., 60fs max. (156.25MHz/V <sub>cc</sub> =+2.5V, +3.3V) 45fs typ., 80fs max. (156.25MHz/V <sub>cc</sub> =+1.8V)	34fs typ., 60fs max. (156.25MHz/V <sub>cc</sub> =+2.5V, +3.3V) 43fs typ., 80fs max. (156.25MHz/V <sub>cc</sub> =+1.8V)
Packing Unit(1)			DS2016A SERIES, DS2520A SERIES: 3000pcs./reel (Φ180), DS3225A SERIES: 2000pcs./reel (Φ180)		

(1) Moisture prevention packing is unnecessary.  
Moisture Sensitivity Level: Level1 (IPC/JEDEC J-STD-033)

Consult our sales representative for other specifications

### ■ DS2016A SERIES [mm]

### ■ DS2520A SERIES [mm]

### ■ DS3225A SERIES [mm]

Model Code	Frequency	Pin Connections	Function
DS2016AKSK DS2016AKSJ DS2016ADSD	2.0±0.15	#1 OE #2 NC #3 GND #4 Output #5 OutputN #6 Vcc	#1 Input #4, #5 Output condition Open or "H" Oscillation out High-Z
DS2520AKSK DS2520AKSJ DS2520ADSD	2.5±0.15	#1 OE #2 NC #3 GND #4 Output #5 OutputN #6 Vcc	#1 Input #4, #5 Output condition Open or "H" Oscillation out High-Z
DS3225AKSK DS3225AKSJ DS3225ADSD	3.2±0.15	#1 OE #2 NC #3 GND #4 Output #5 OutputN #6 Vcc	#1 Input #4, #5 Output condition Open or "H" Oscillation out High-Z

#### ■ Dimensions

#### ■ Recommended Land Pattern (Top View)

#### ■ Dimensions

#### ■ Recommended Land Pattern (Top View)

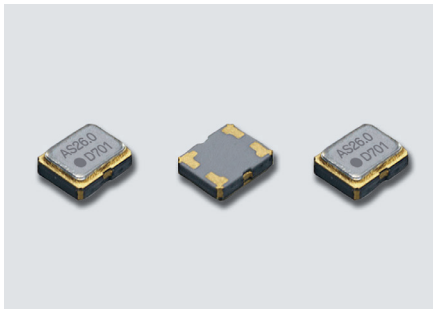
#### ■ Dimensions

#### ■ Recommended Land Pattern (Top View)

## High-precision SMD TCXO

Under Development

### DA2016AS/DB2016AS



Actual size

#### Features

- Supply Voltage : 1.8V/2.6V/2.8V/3.0V/3.3V
- Available Frequency range: 26MHz, 52MHz
- Clipped Sinewave
- Low phase noise
- Single package structure
- AEC-Q200 Compliant (Option: Equivalent to AEC-Q100)

#### Applications

- GPS/GNSS, Mobile devices, Satellite communication devices, industrial wireless communication devices, etc.



#### Standard Specification

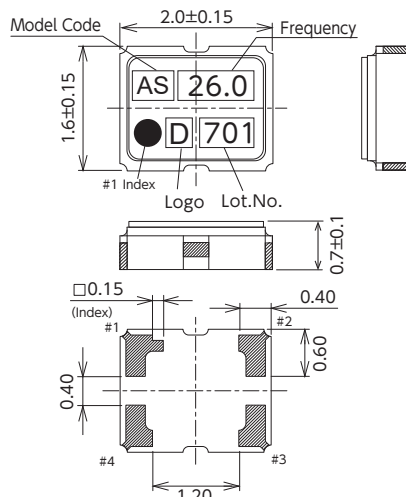
Item	Type	VC-TCXO	TCXO
		DA2016AS	DB2016AS
Standard Frequency		26MHz/52MHz	
Supply Voltage Range		+1.68 to +3.5V	
Supply Voltage		+1.8V/+2.6V/+2.8V/+3.0V+3.3V	
Current Consumption		+1.5mA max. (26MHz) / +2.0mA max. (52MHz)	
Output Level		0.8Vp-p min. (Clipped Sinewave / DC-coupled)	
Output Load		10kΩ//10pF	
Frequency Stability		±1.5×10 <sup>-6</sup> max. (After 2 reflows)	
Tolerance			
vs. Temperature		±1.0×10 <sup>-6</sup> , ±2.5×10 <sup>-6</sup> max. / -30 to +85°C ±1.0×10 <sup>-6</sup> , ±2.5×10 <sup>-6</sup> max. / -40 to +85°C (Option)	±0.5×10 <sup>-6</sup> , ±2.5×10 <sup>-6</sup> max. / -30 to +85°C ±0.5×10 <sup>-6</sup> , ±2.5×10 <sup>-6</sup> max. / -40 to +85°C (Option)
vs. Supply Voltage		±0.2×10 <sup>-6</sup> max. (Vcc ±5%)	
vs. Load Variation		±0.2×10 <sup>-6</sup> max. (10kΩ//10pF ±10%)	
vs. Aging		±1.0×10 <sup>-6</sup> max. /year	
Frequency Control			
Control Sensitivity		±3.0×10 <sup>-6</sup> , ±5.0×10 <sup>-6</sup> /Vcont=+1.4V±1.0V @Vcc≥+2.6V ±3.0×10 <sup>-6</sup> , ±5.0×10 <sup>-6</sup> /Vcont=+0.9V±0.6V @Vcc=+1.8V	-
Response Slope		Positiv	-
Start up Time		2.0ms max.	
Phase Noise		[26MHz]	[52MHz]
Offset 100Hz		-115dBc/Hz max.	-105dBc/Hz max.
Offset 1kHz		-130dBc/Hz max.	-125dBc/Hz max.
Offset 10kHz		-150dBc/Hz max.	-145dBc/Hz max.
Offset 100kHz		-155dBc/Hz max.	-150dBc/Hz max.
Packing Unit(1)		3000pcs./reel (φ180)	

(1) Moisture prevention packing is unnecessary.  
Moisture Sensitivity Level:Level1 (IPC/JEDEC J-STD-033)

Consult our sales representative for other specifications

[mm]

#### Dimensions



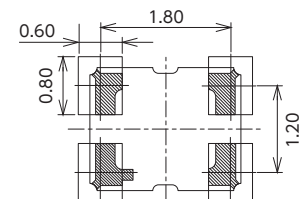
#### Recommended Land Pattern

(Top View)

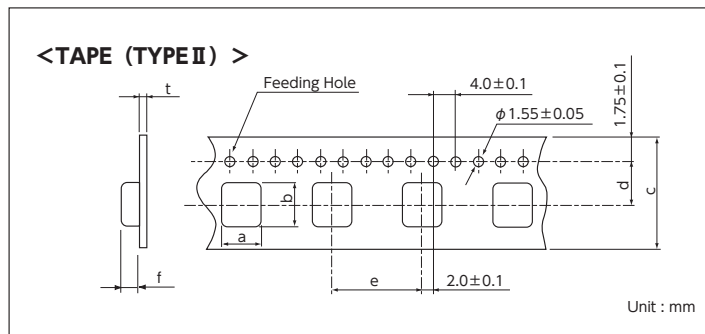
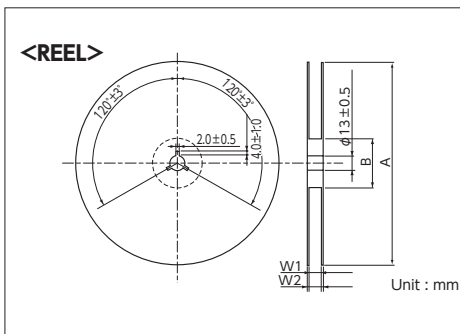
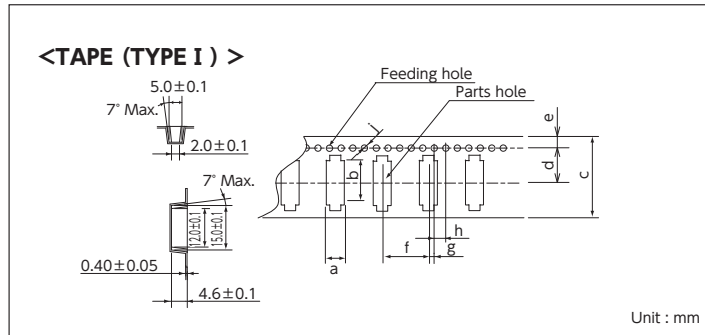
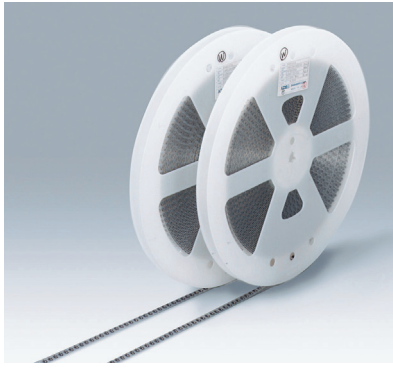
Model Code  
DA2016AS : AS (VC-TCXO)  
DB2016AS : BS (TCXO)

#### Pin Connections

Pin No.	Connection
#1	Vcont (VC-TCXO)/ GND (TCXO)
#2	GND
#3	Output
#4	Vcc



# Emboss Carrier Tape (SMD Crystal Resonators)



## Standard Specification

MHz Band Crystal Resonators / Crystal Resonators with dedicated temperature sensor

TYPE II	a	b	c	d	e	f	t	A	B	W1	W2
DSX530GA	3.6 ±0.1	5.45 ±0.10	12.0 ±0.2	5.50 ±0.10	8.0 ±0.1	1.55 ±0.10	0.30 ±0.05	φ180 +0/-3	φ60 +1.0/-0	13.0 ±0.3	15.4 ±1.0
DSX321G/GK DSX320GE	2.8 ±0.1	3.5 ±0.1	8.0 ±0.2	3.50 ±0.05	4.0 ±0.1	1.0 ±0.1	0.25 ±0.05	φ180 +0/-3	φ60 +1/-0	9.0 ±0.3	11.4 ±1.0
DSX321SH	2.7 ±0.1	3.4 ±0.1	8.0 ±0.2	3.50 ±0.05	4.0 ±0.1	1.4 ±0.1	0.25 ±0.05	φ180 +0/-3	φ60.0 +1/-0	9.0 ±0.3	11.4 ±1.0
DSX221SH	2.25 ±0.1	2.7 ±0.1	8.0 ±0.2	3.50 ±0.05	4.0 ±0.1	0.8 ±0.05	0.25 ±0.05	φ180 +0/-3	φ60.0 +1/-0	9.0 ±0.3	11.4 ±1.0
DSX211S/SH	1.9 ±0.1	2.3 ±0.1	8.0 ±0.2	3.50 ±0.05	4.0 ±0.1	0.65 ±0.10	0.25 ±0.05	φ180 +0/-3	φ60.0 +1/-0	9.0 ±0.3	11.4 ±1.0
DSX211G	1.85 ±0.10	2.25 ±0.10	8.0 ±0.2	3.50 ±0.05	4.0 ±0.1	0.95 ±0.10	0.25 ±0.05	φ180 +0/-3	φ60 +1/-0	9.0 ±0.3	11.4 ±1.0
DSX210GE	2.0 ±0.1	2.4 ±0.1	8.0 ±0.2	3.50 ±0.05	4.0 ±0.1	0.95 ±0.1	0.25 ±0.05	φ180 +0/-3	φ60 +1/-0	9.0 ±0.3	11.4 ±1.0
DSX1612S	1.45 ±0.15	1.85 ±0.15	8.0 ±0.2	3.50 ±0.05	4.0 ±0.1	0.45 ±0.15	0.25 ±0.05	φ180 +0/-3	φ60 +1/-0	9.0 ±0.3	11.4 ±1.0
DSX1210A	1.17 ±0.05	1.42 ±0.05	8.0 +0.3/-0.1	3.50 ±0.05	4.0 ±0.1	0.48 ±0.05	0.20 ±0.05	φ180 +0/-3	φ60 +1/-0	9.0 ±0.3	11.4 ±1.0
DX1008JS/JT	1.0 ±0.05	1.2 ±0.05	8.0 ±0.2	3.50 ±0.05	4.0 ±0.1	0.45 ±0.05	0.20 ±0.05	φ180 +0/-3	φ60 +1/-0	9.0 ±0.3	11.4 ±1.0
DSR221STH	2.25 ±0.1	2.7 ±0.1	8.0 ±0.2	3.50 ±0.05	4.0 ±0.1	1.15 ±0.10	0.25 ±0.05	φ180 +0/-3	φ60 +1/-0	9.0 ±0.3	11.4 ±1.0
DSR211STH	1.9 ±0.1	2.3 ±0.1	8.0 ±0.2	3.50 ±0.05	4.0 ±0.1	0.85 ±0.10	0.25 ±0.05	φ180 +0/-3	φ60 +1/-0	9.0 ±0.3	11.4 ±1.0
DSR1612ATH	1.40 ±0.1	1.80 ±0.1	8.0 ±0.2	3.50 ±0.05	4.0 ±0.1	0.70 ±0.10	0.25 ±0.05	φ180 +0/-3	φ60 +1/-0	9.0 ±0.3	11.4 ±1.0
DSR1210ATH	1.3 ±0.1	1.5 ±0.1	8.0 ±0.2	3.5 ±0.05	4.0 ±0.1	0.65 ±0.01	0.25 ±0.05	φ180 +0/-3	φ60 +1/-0	9.0 ±0.3	11.4 ±1.0

kHz Band Crystal Resonators

DST310SA	1.70 ±0.05	3.40 ±0.05	12.0 ±0.2	5.50 ±0.05	4.0 ±0.1	0.95 ±0.05	0.25 ±0.05	φ180 +0/-3	φ60 +1/-0	13.0 ±0.3	15.5 ±1.0
DST210AC	1.45 ±0.1	2.3 ±0.1	8.0 ±0.2	3.50 ±0.05	4.0 ±0.1	0.65 ±0.10	0.20 ±0.05	φ180 +0/-3	φ60 +1/-0	9.0 ±0.3	11.4 ±1.0
DST1610A	1.28 ±0.05	1.79 ±0.05	8.0 +0.3/-0.1	3.50 ±0.05	4.0 ±0.1	0.65 ±0.10	0.20 ±0.05	φ180 +0/-3	φ60 +1/-0	9.0 ±0.3	11.4 ±1.0
DST1210A	1.17 ±0.05	1.42 ±0.05	8.0 +0.3/-0.1	3.50 ±0.05	4.0 ±0.1	0.48 ±0.05	0.20 ±0.05	φ180 +0/-3	φ60 +1/-0	9.0 ±0.3	11.4 ±1.0

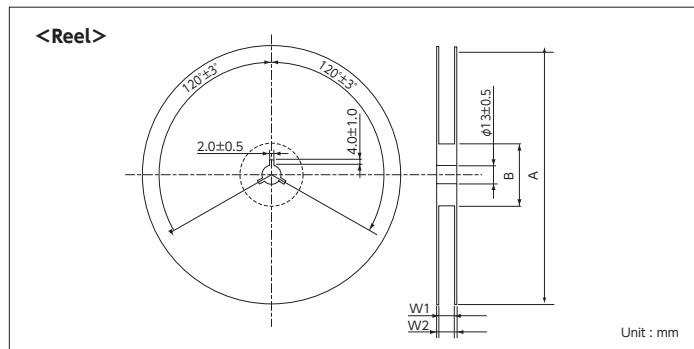
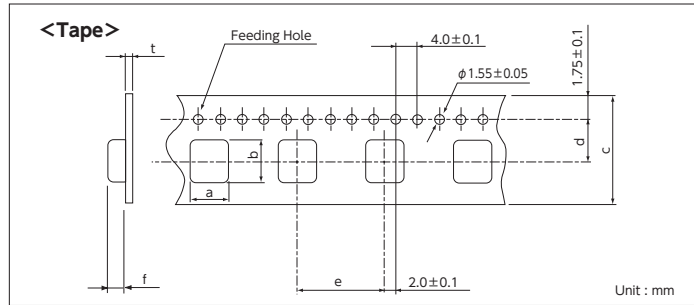
※1: To indicate product name and other information, place those information on a label, and affix the label on one side of the flange.

2: For DSX321G, DSX1612S pin No.1 is located on the sprocket-hole side of the tape.

3: For other models, the insertion direction is not specified.



# Emboss Carrier Tape (SMD Crystal Oscillators)



## Standard Specification

VC-TCXO/TCXO

TYPE	a	b	c	d	e	f	t	A	B	W1	W2
DSA/DSB535SGA DSA535SGB	3.5 ±0.1	5.4 ±0.1	12.0 ±0.2	5.50 ±0.1	8.0 ±0.1	1.7 ±0.1	0.30 ±0.05	φ330 ±2	φ100 ±1	13.5 ±1.0	18.5 max.
DSA/DSB321SDN DSK321STD	2.8 ±0.1	3.5 ±0.1	8.0 ±0.2	3.50 ±0.05	4.0 ±0.1	1.5 ±0.1	0.25 ±0.05	φ180 +0/-3	φ60 +1/-0	9.0 ±0.3	11.4 ±1.0
DSA/DSB221SDN DSB221SJA	2.3 ±0.1	2.8 ±0.1	8.0 ±0.2	3.50 ±0.05	4.0 ±0.1	1.15 ±0.1	0.30 ±0.05	φ180 +0/-3	φ60 +1/-0	9.0 ±0.3	11.4 ±1.0
DA/DB2016AS DSA/DSB211SDN/SP DSB211SJA	1.95 ±0.10	2.35 ±0.10	8.0 ±0.2	3.50 ±0.05	4.0 ±0.1	0.85 ±0.1	0.20 ±0.05	φ180 +0/-3	φ60 +1/-0	9.0 ±0.3	11.4 ±1.0
DSA/DSB1612SDN DSB1612SEB	1.4 ±0.10	1.8 ±0.10	8.0 ±0.2	3.50 ±0.05	4.0 ±0.1	0.7 ±0.1	0.25 ±0.05	φ180 +0/-3	φ60 +1/-0	9.0 ±0.3	11.4 ±1.0
DSK1612ATD	1.45 ±0.10	1.8 ±0.1	8.0 ±0.2	3.50 ±0.05	4.0 ±0.1	0.75 ±0.10	0.25 ±0.05	φ180 +0/-3	φ60 +1/-0	9.0 ±0.3	11.4 ±1.0

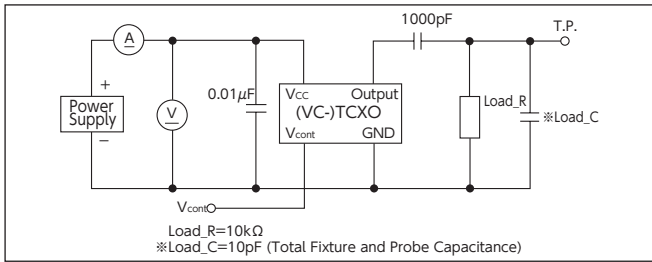
SPXO/VCXO/RTC

TYPE	a	b	c	d	e	f	t	A	B	W1	W2
DSO751SR/SBM DSO753SK/SJ/SD	5.5 ±0.1	7.9 ±0.1	16.0 ±0.3	7.5 ±0.1	8.0 ±0.1	2.4 ±0.1	0.30 ±0.05	φ254 ±2	φ80 ±0.5	17.0 ±0.5	21.0 ±1.0
DSO531SR/SBM DSO533SK/SJ	3.6 ±0.1	5.45 ±0.1	12.0 ±0.2	5.50 ±0.05	8.0 ±0.1	1.55 ±0.10	0.30 ±0.05	φ180 +0/-3	φ60 +1/-0	13.0 ±0.3	15.4 ±1.0
DD3225TR/TS DS3225AD/AJ/AK DSO321SH/SR/SY/SBM/SHH/SRS DSO323SD/SJ/SK DSV321SV	2.8 ±0.1	3.5 ±0.1	8.0 ±0.2	3.50 ±0.05	4.0 ±0.1	1.5 ±0.1	0.25 ±0.05	φ180 +0/-3	φ60 +1/-0	9.0 ±0.3	11.4 ±1.0
DS2520AD/AJ/AK/AS DSO221SH/SR/SX/SY/SBM/SHH/SXF DSO223SD/SJ/SK DSV221SV	2.3 ±0.1	2.8 ±0.1	8.0 ±0.2	3.50 ±0.05	4.0 ±0.1	1.15 ±0.10	0.30 ±0.05	φ180 +0/-3	φ60 +1/-0	9.0 ±0.3	11.4 ±1.0
DS2016AD/AJ/AK/AS DSO211SX/SXF	1.85 ±0.10	2.25 ±0.10	8.0 ±0.2	3.50 ±0.05	4.0 ±0.1	0.95 ±0.10	0.25 ±0.05	φ180 +0/-3	φ60 +1/-0	9.0 ±0.3	11.4 ±1.0
DSO1612AR	1.4 ±0.1	1.8 ±0.1	8.0 ±0.2	3.50 ±0.05	4.0 ±0.1	0.7 ±0.1	0.25 ±0.05	φ180 +0/-3	φ60 +1/-0	9.0 ±0.3	11.4 ±1.0
DS1008JC/JJ/JK/JN/JS	1.0 ±0.05	1.2 ±0.05	8.0 ±0.2	3.50 ±0.05	4.0 ±0.1	0.45 ±0.05	0.20 ±0.05	φ180 +0/-3	φ60 +1/-0	9.0 ±0.3	11.4 ±1.0

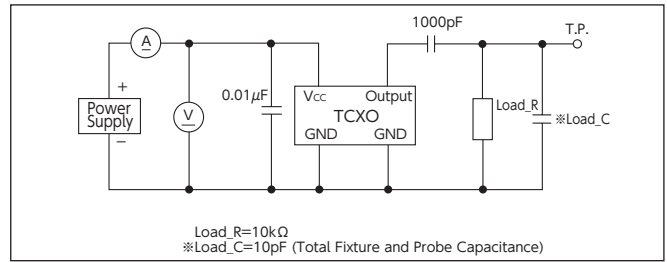
\* 1: To indicate product name and other information, place those information on a label, and affix the label on one side of the flange.  
2: DSA/DSB535SGA, DSA535SGB: reel φ180 available.

# Measurement Circuit (Crystal Oscillators)

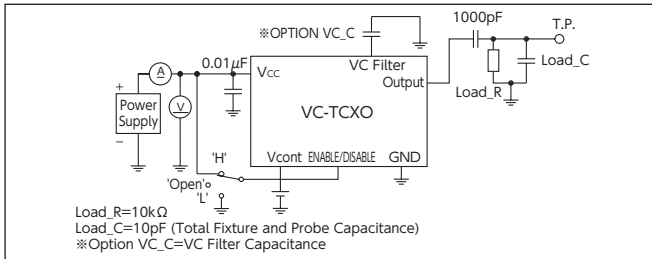
## VC-TCXO (DA2016AS, DSA\*\*\*SDN, SP)



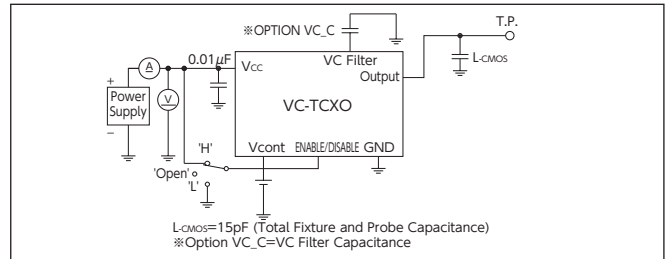
## TCXO (DB2016AS, DSB\*\*\*SDN, SP)



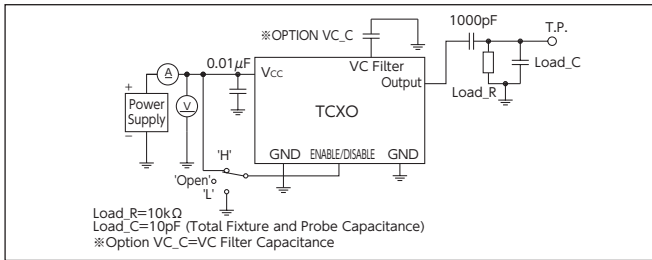
## DSA535SGA, DSA535SGB (Clipped Sine)



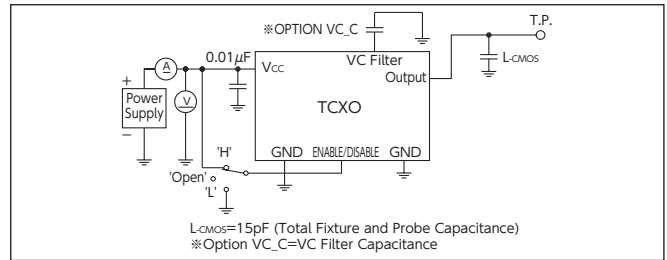
## DSA535SGA, DSA535SGB (CMOS)



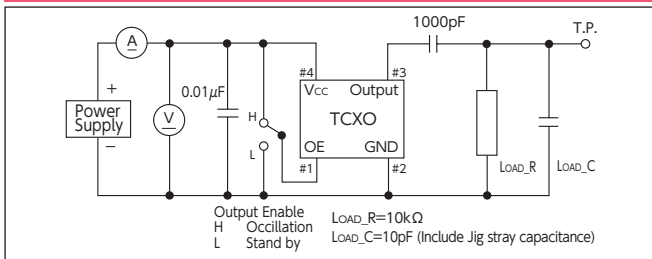
## DSB535SGA (Clipped Sine)



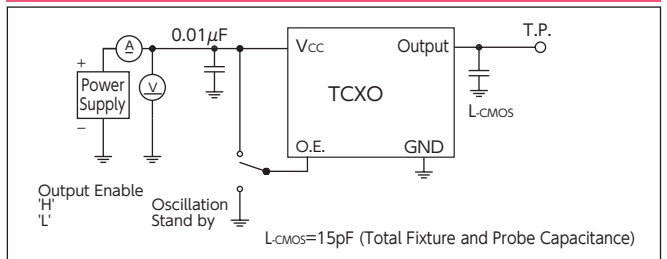
## DSB535SGA (CMOS)



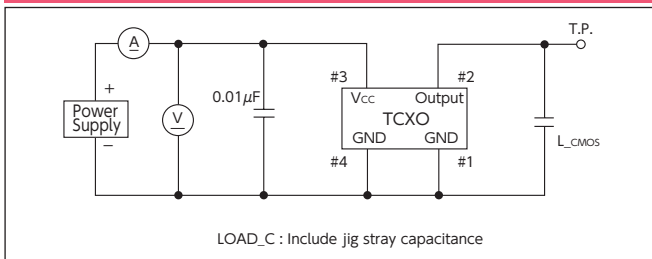
## DSB1612SEB



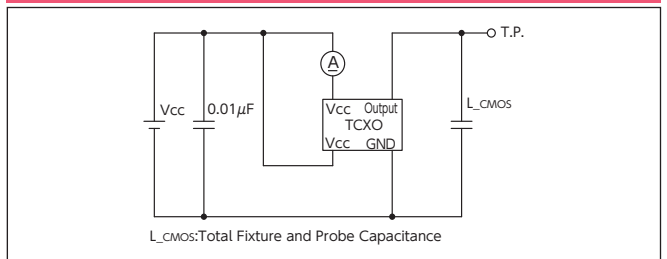
## DSB211SJA, 221SJA



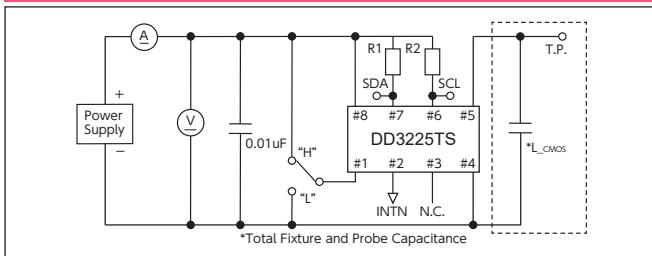
## DSK1612ATD



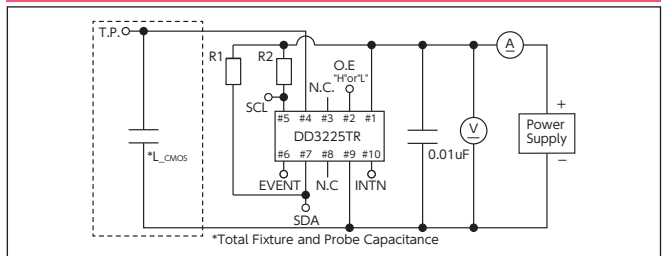
## DSK321STD



## DD3225TS



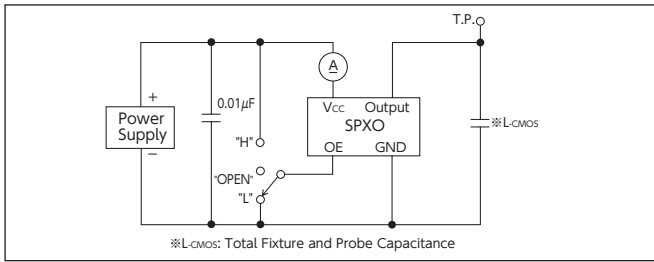
## DD3225TR



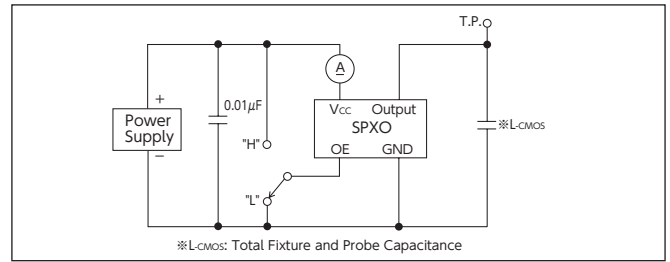


# Measurement Circuit (Crystal Oscillators)

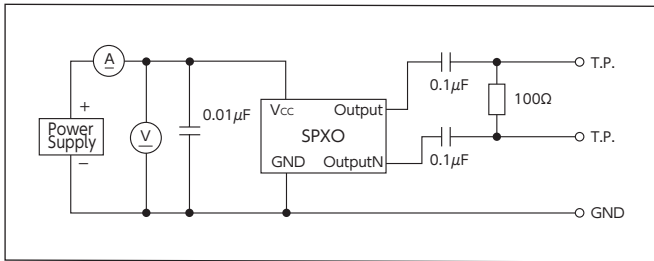
**DS1008JS, JN, DSO\*\*\*AR, SR, SH, SY, SRS, SBM, SHH**



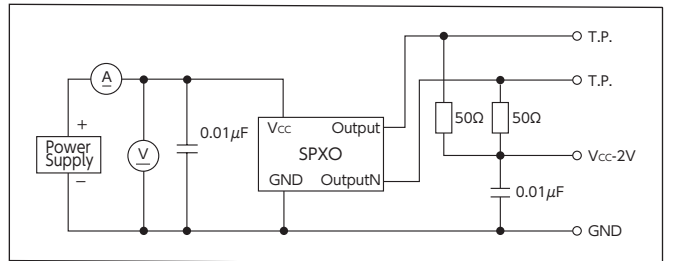
**DS\*\*\*AS, DSO\*\*\*SX, SXF**



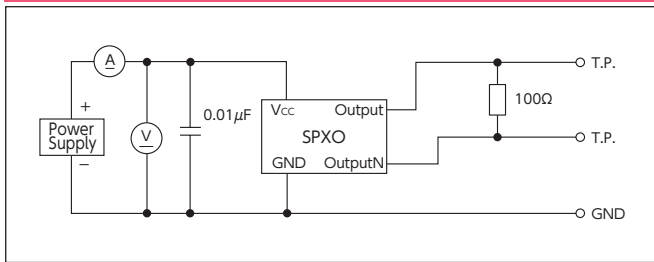
**DS1008JC**



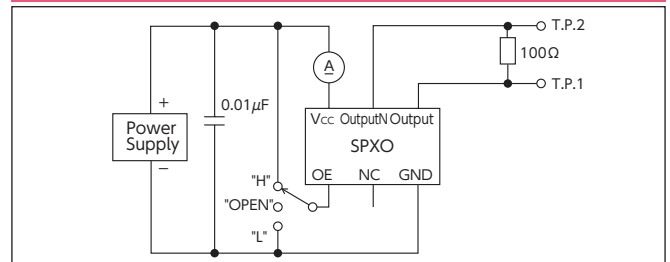
**DS1008JK**



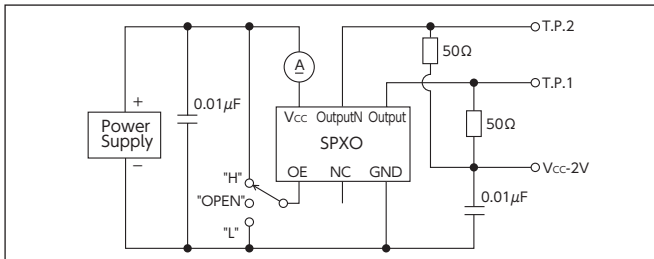
**DS1008JJ**



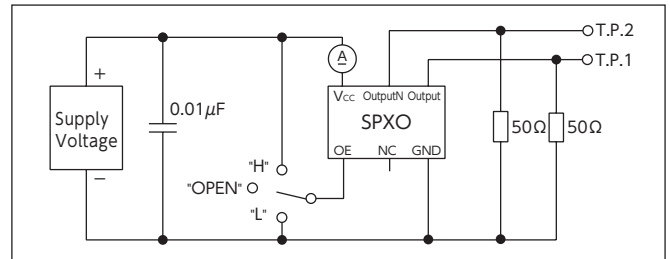
**DS\*\*\*AJ, DSO\*\*\*SJ**



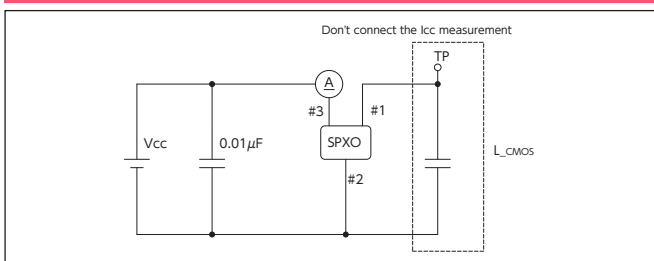
**DS\*\*\*AK, DSO\*\*\*SK**



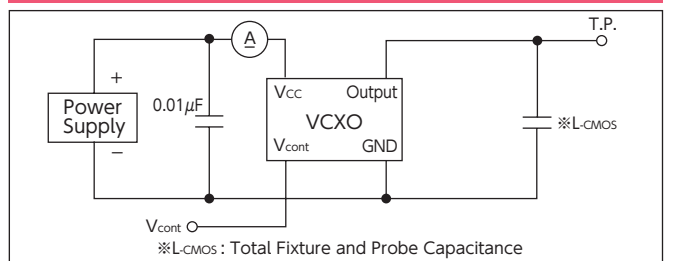
**DS\*\*\*AD, DSO\*\*\*SD**



**DLO55MBA**

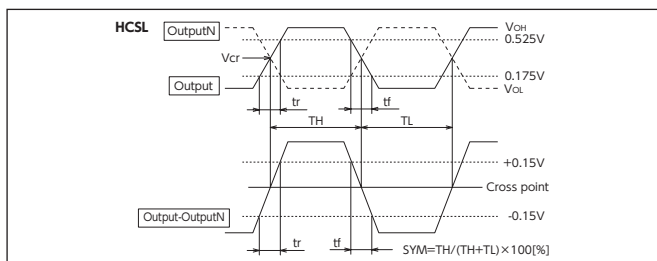
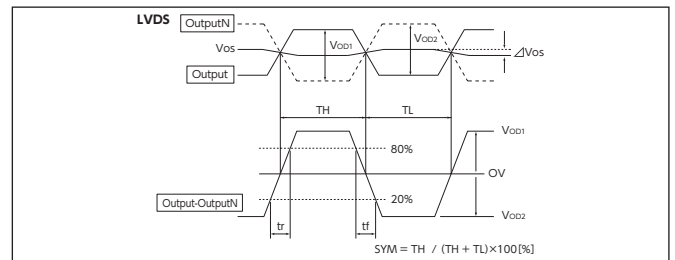
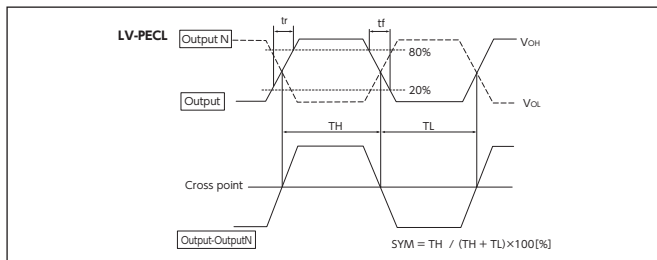
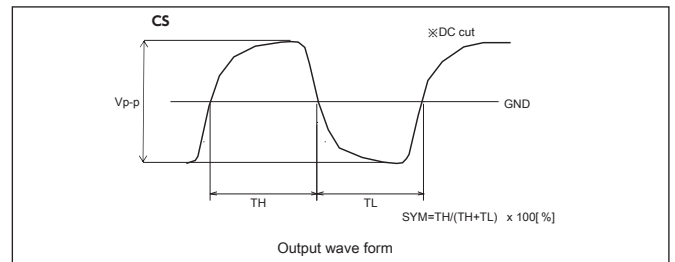
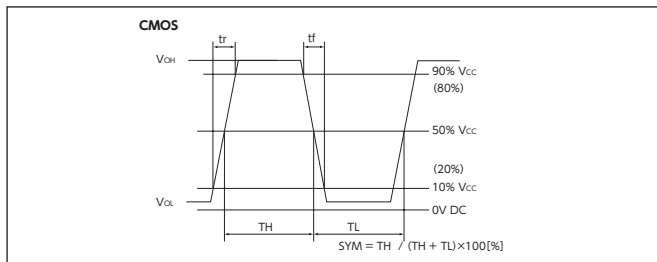


**DSV221SV, 321SV**



# Measurement Circuit

## Output Wave Form



## Input and Output Conditions

