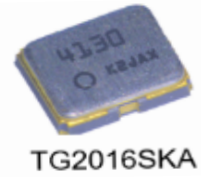


TCXO for Automotive 105 °C High temperature range
AEC-Q100 compliant
TG2016SKA: -40 °C to +105 °C



Features

- Output frequency : 13 MHz to 55 MHz
- Supply voltage : 1.8 V Typ. / 2.8 V Typ. / 3.0 V Typ. / 3.3 V Typ.
- Operation temperature : -40 °C to +105 °C
- Frequency / temperature characteristics : $\pm 0.5 \times 10^{-6}$ Max.
- G-sensitivity : $\pm 1.5 \times 10^{-9}$ /G Max.
- Phase Jitter (12kHz to 5MHz) : 0.22 ps Typ. @ 26 MHz , 0.13 ps Typ. @ 38.4 MHz
- External dimensions : 2.0 × 1.6 × 0.7 mm Max.
- AEC-Q100 compliant, VC-TCXO / TCXO / TCXO-Standby function

Description

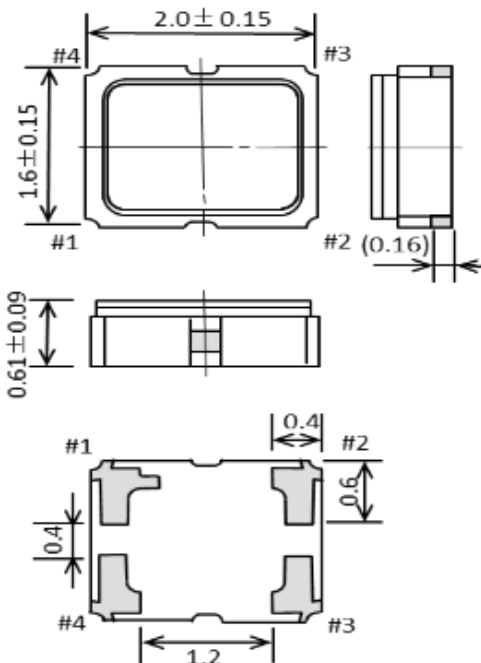
TG2016SKA are automotive grade AEC-Q100 compliant temperature-compensated crystal oscillators. Using an Epson-developed and fabricated IC and MHz fundamental crystal, it supports high temperatures up to 105 °C, features a frequency slope and G sensitivity suitable for GNSS reception, and low jitter suitable for Wi-Fi used for V2X.

Target Application

- GNSS for Automotive
- V2X (TCU, DSRC)*

* GNSS: Global Navigation Satellite System
 V2X: Vehicle to Everything
 TCU: Telematics control unit
 DSRC: Dedicated Short Range Communication

Outline dimensions

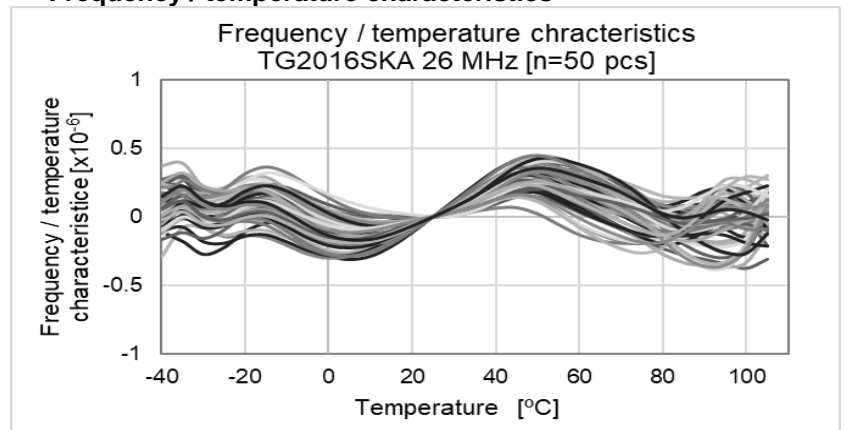


Pin information

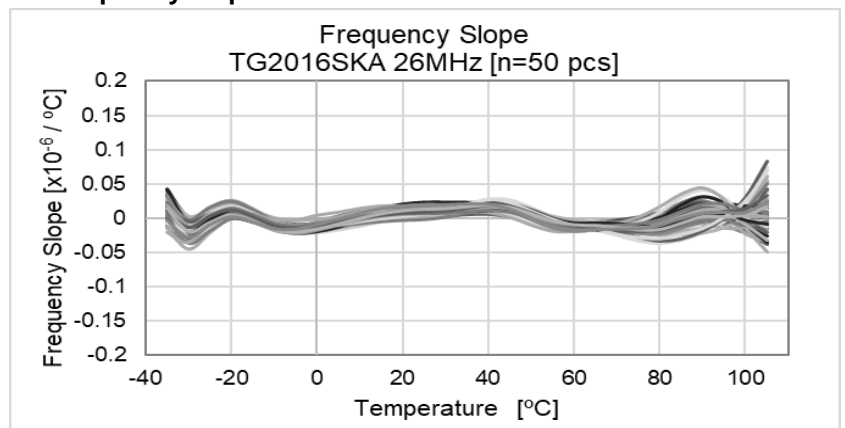
Pin #	Connection		
	VC-TCXO	TCXO	Standby
1	Vc	N.C.	ST
2	GND		
3	OUT		
4	Vcc		

Characteristics

Frequency / temperature characteristics



Frequency slope



[1] Product Number / Product Name

(1) Product Name (Standard Form)

TG2016 SKA 26.000000MHz E C H N N M
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

① Model (TG2016) ② Output (S: Clipped sine wave) ③ Frequency ④ Supply voltage (Refer to symbol table)

⑤ Frequency / temperature characteristics (C: $\pm 0.5 \times 10^{-6}$ Max.) ⑥ Operating temperature (H: -40 °C to +105 °C, G: -40 °C to +85 °C)⑦ Standby function (N: Non, S: Standby) ⑧ V_C function (Refer to symbol table, N: Non for TCXO, Standby) ⑨ Internal identification code

④ Supply voltage [V_{CC}], ⑧ V_C function [V_C] (Symbol table)					
Voltage [V]	TCXO				
	VC-TCXO				
④ V_{CC} (Typ.)	E: 1.8	E: 1.8	B: 2.8	A: 3.0	C: 3.3
⑧ V_C (Typ.)	N: Non	B: 0.9	C: 1.4	D: 1.5	E: 1.65

①

(2) Product Number / Ordering Code

[Please refer to the web site for the latest information](#)

Frequency [MHz]	TG2016SKA (-40 °C to +105 °C)	
	$V_{CC} = 1.8 \text{ V}$	$V_{CC} = 3.3 \text{ V}$
26	X1G0053710 200 16 Suffix: ECHNNN	X1G0053710 301 16 Suffix: CCHNNM
	X1G0053710 206 16 Suffix: ECHNNM	X1G0053710 306 16 Suffix: CCHNNM

[2] Absolute Maximum Ratings

Parameter	Symbol	Specifications			Unit	Conditions
		Min.	Typ.	Max.		
Supply voltage	V_{CC-GND}	-0.5	-	+4.0	V	
Frequency control voltage	V_C-GND	-0.3	-	$V_{CC} + 0.3$	V	V_C Terminal
Input voltage	V_{IN}	-0.3	-	$V_{CC} + 0.3$	V	ST Terminal
Storage temperature range	T_{stg}	-55	-	+125	°C	Storage as single product

[3] Recommended Operating Conditions

Parameter	Symbol	Specifications			Unit	Conditions
		Min.	Typ.	Max.		
Supply voltage	V_{CC}	1.7	1.8	1.9	V	$V_{CC} = 1.8 \text{ V} \pm 0.1 \text{ V}$
		2.66	2.8	2.94	V	$V_{CC} = 2.8 \text{ V} \pm 5 \%$
		2.85	3.0	3.15	V	$V_{CC} = 3.0 \text{ V} \pm 5 \%$
		3.135	3.3	3.465	V	$V_{CC} = 3.3 \text{ V} \pm 5 \%$
	GND	0	-	0	V	
Frequency control voltage	V_C	0.3	0.9	1.5	V	$V_{CC} = 1.8 \text{ V}$
		0.4	1.4	2.4	V	$V_C \leq V_{CC} / 2$
		0.5	1.5	2.5	V	
		0.65	1.65	2.65	V	
Operating temperature range	T_{use}	-40	+25	+105	°C	TG2016SKA
Output load (Clipped sin wave)	Load_R	9	10	11	k Ω	
	Load_C	9	10	11	pF	
	Cc	0.01	-	-	μF	DC-cut capacitor *

* DC-cut capacitor is not included in this TCXO. Please attach an external DC-cut capacitor to the out pin.

[4] Frequency Characteristics

1) Frequency Characteristics

(Unless stated otherwise [3] Recommended operating conditions)

Parameter	Symbol	Specifications			Unit	Conditions
		Min.	Typ.	Max.		
Output Frequency	fo	13	-	55	MHz	
Frequency tolerance *1	f_tol	-2.0	-	+2.0	x10 ⁻⁶	T _{use} = +25 °C ± 2 °C After 3 reflows *2
Frequency / temperature characteristics	fo-Tc	-0.5	-	+0.5	x10 ⁻⁶	T _{use} = -40 °C to +105 °C (Reference to +25 °C)
Frequency / load coefficient	fo-Load	-0.2	-	+0.2	x10 ⁻⁶	Load ± 10 %
Frequency / voltage coefficient	fo-V _{CC}	-0.2	-	+0.2	x10 ⁻⁶	V _{CC} ± 5 %
Frequency aging_1 year *3	f_age	-1.0	-	+1.0	x10 ⁻⁶	13 MHz ≤ fo ≤ 20 MHz 26 MHz ≤ fo ≤ 40 MHz
		-1.5	-	+1.5	x10 ⁻⁶	20 MHz < fo < 26 MHz 40 MHz < fo ≤ 55 MHz
Frequency aging_5 year *3	f_age	-3.0	-	+3.0	x10 ⁻⁶	
Frequency aging_10 year *3	f_age	-5.0	-	+5.0	x10 ⁻⁶	
G sensitivity	-	-	-	1.5	x10 ⁻⁹ /G	3 axes, 30 Hz to 3 000 Hz

*1 Include initial frequency tolerance and frequency deviation after reflow cycles.

*2 Measured in the elapse of 24 hours after reflow soldering.

*3 Aging stability is estimated from environmental reliability tests; expected amount of the frequency variation.

2) Frequency Control Characteristics *VC-TCXO only (Unless stated otherwise [3] Recommended operating conditions)

Parameter	Symbol	Specifications			Unit	Conditions
		Min.	Typ.	Max.		
Frequency control range	f_cont	-15	-	-8	x10 ⁻⁶	Vc = 0.9 V - 0.6 V at V _{CC} = 1.8 V Vc = 1.4 V - 1.0 V at V _{CC} = 2.8 V Vc = 1.5 V - 1.0 V at V _{CC} = 3.0 V Vc = 1.65 V - 1.0 V at V _{CC} = 3.3 V
		+8	-	+15	x10 ⁻⁶	Vc = 0.9 V + 0.6 V at V _{CC} = 1.8 V Vc = 1.4 V + 1.0 V at V _{CC} = 2.8 V Vc = 1.5 V + 1.0 V at V _{CC} = 3.0 V Vc = 1.65 V + 1.0 V at V _{CC} = 3.3 V
Input impedance	Zin	500	-	-	kΩ	Vc - GND (DC)
Frequency change polarity	-	Positive polarity			-	

[5] Electrical Characteristics

1) Electrical Characteristics

(Unless stated otherwise [3] Recommended operating conditions)

Parameter	Symbol	Specifications			Unit	Conditions
		Min.	Typ.	Max.		
Current consumption	I _{CC}	-	-	2.0 2.5	mA	13 MHz ≤ fo ≤ 40 MHz 40 MHz < fo ≤ 55 MHz
Output level	Vp-p	0.8	-	1.5	V	Peak to peak voltage
Start up time	t_sta	-	-	2.0	ms	Until output signal has been reached min 90 % of final amp.
	t_sta	-	-	2.0	ms	Until frequency has been reached within ±0.5 x 10 ⁻⁶ of final frequency.
Symmetry	SYM	40	50	60	%	GND level (DC-cut)
Harmonics	-	-	-	-10.0	dBc	
Phase noise (fo = 26 MHz) *	L(f)	-	-61	-	dBc/Hz	1 Hz offset
		-	-90	-		10 Hz offset
		-	-116	-		100 Hz offset
		-	-138	-		1 kHz offset
		-	-155	-		10 kHz offset
		-	-161	-		100 kHz offset
Phase jitter (fo = 26 MHz) *	PJ	-	0.22	-	ps	1 MHz offset
		-	0.22	-		12 kHz to 5 MHz

* For other frequencies, refer to Page 9 (6-11) Phase noise

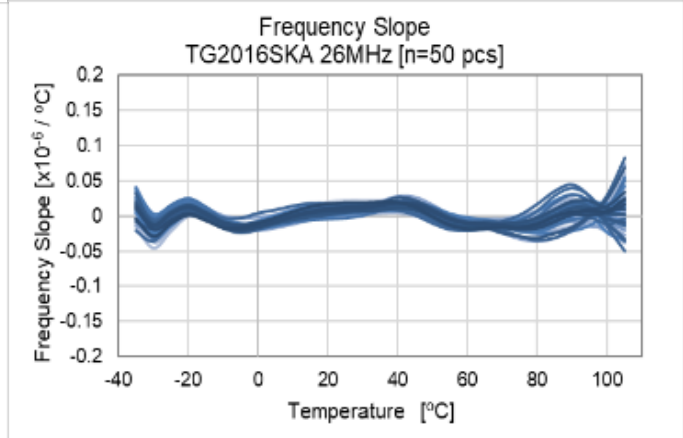
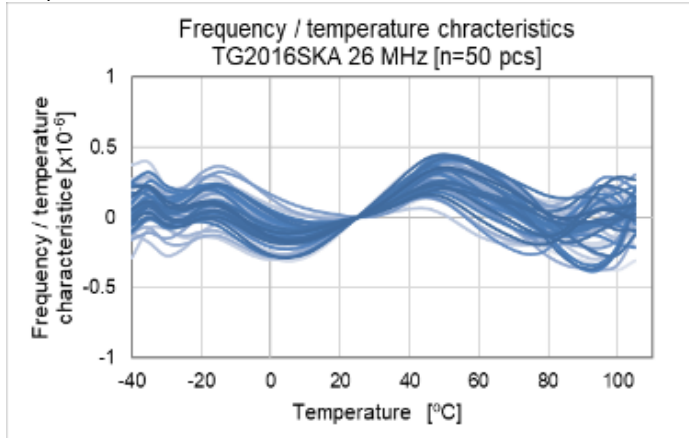
2) Standby Function * Standby-TCXO only (Unless stated otherwise [3] Recommended operating conditions)

Parameter	Symbol	Specifications			Unit	Conditions
		Min.	Typ.	Max.		
Standby current	I_std	-	-	10	μA	$\overline{ST} = \text{GND}$
Input voltage	V _{IH}	80 % V _{CC}	-	-	V	\overline{ST} terminal
Input voltage	V _{IL}	-	-	20 % V _{CC}	V	\overline{ST} terminal
Output disable time	t_stp	-	-	150	ns	\overline{ST} terminal: High to Low
Output enable time	t_sta	-	-	2	ms	\overline{ST} terminal: Low to High

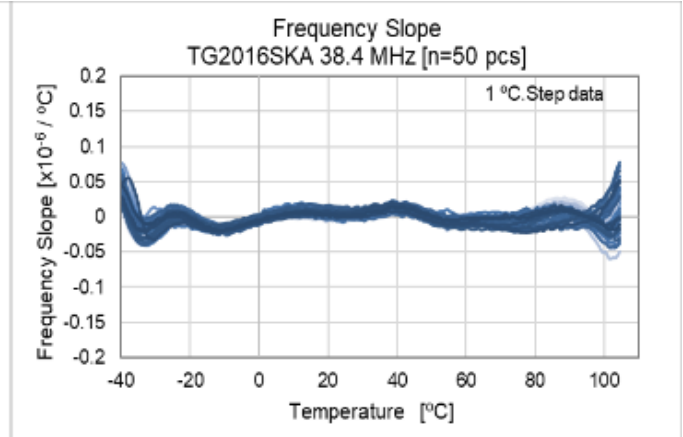
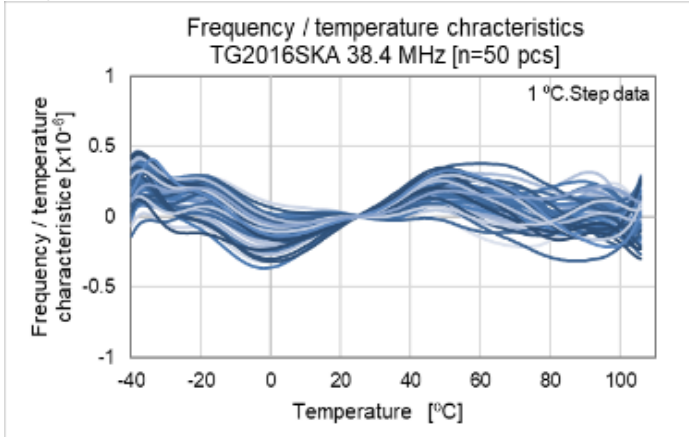
[6] Characteristic Data

(6-1) Frequency / Temperature Characteristics & Frequency Slope

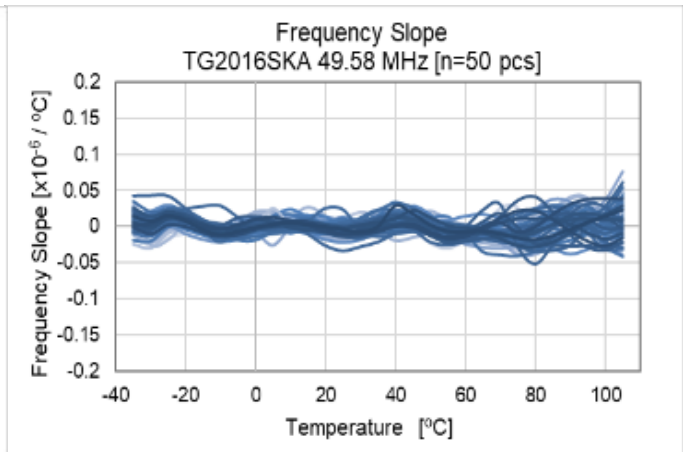
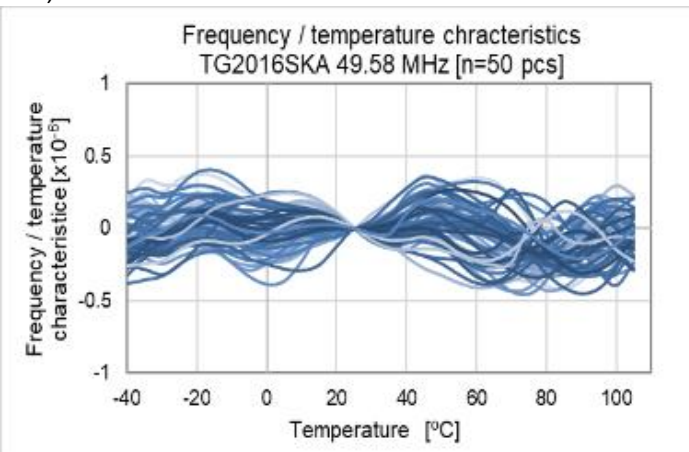
1) fo = 26 MHz



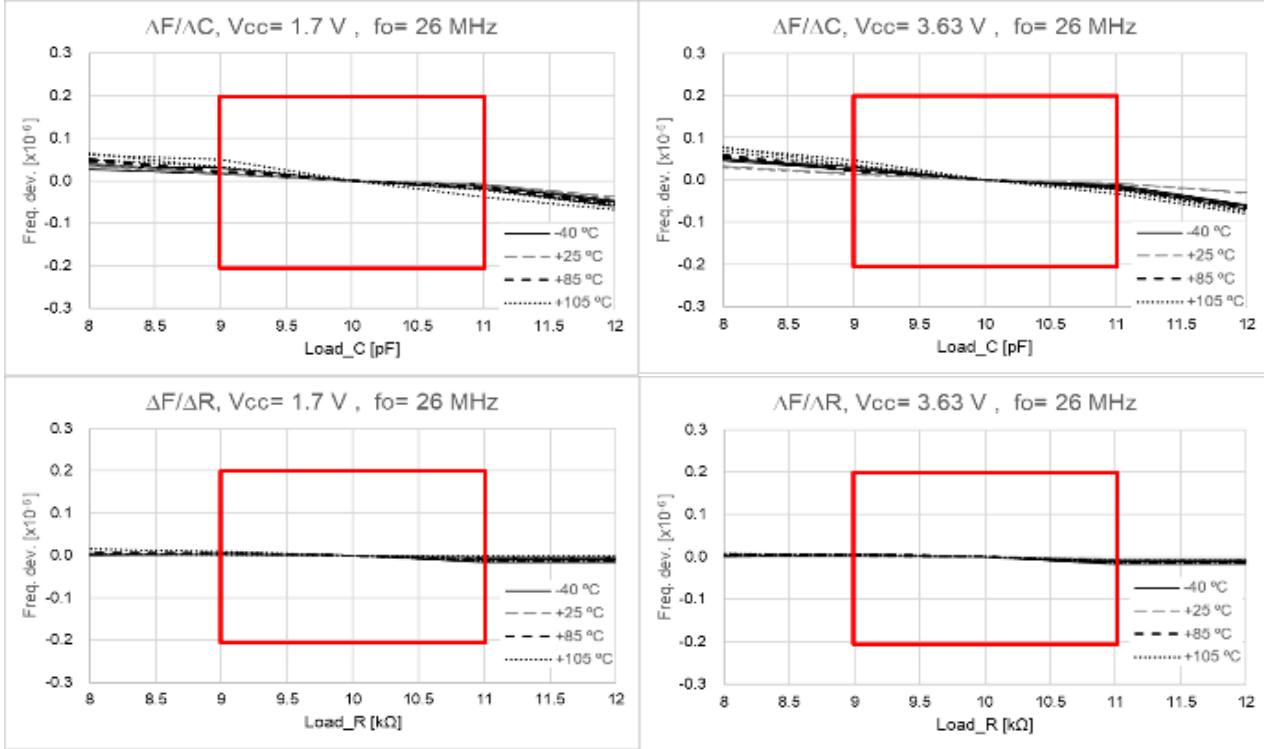
2) fo = 38.4 MHz



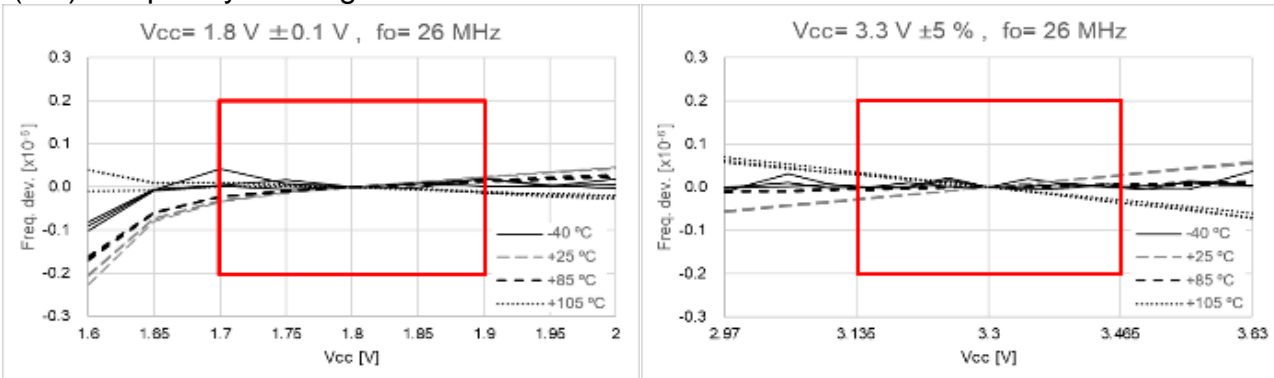
3) fo = 49.58 MHz



(6-2) Frequency / Load Coefficient



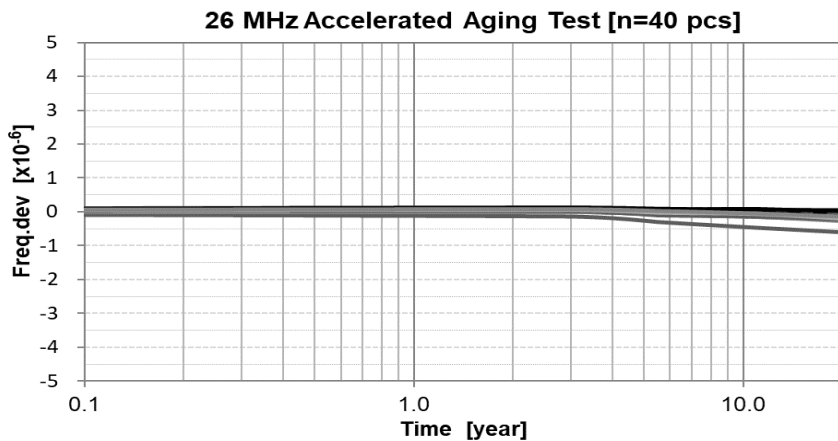
(6-3) Frequency / Voltage Coefficient



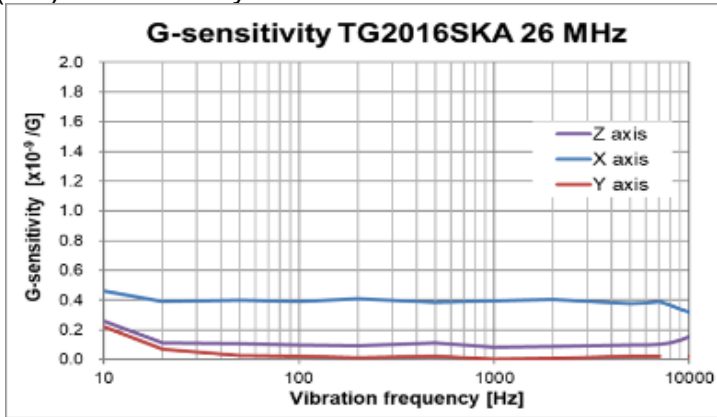
(6-4) Frequency Aging Conversion

*Aging stability is estimated from environmental reliability tests; expected amount of the frequency variation.

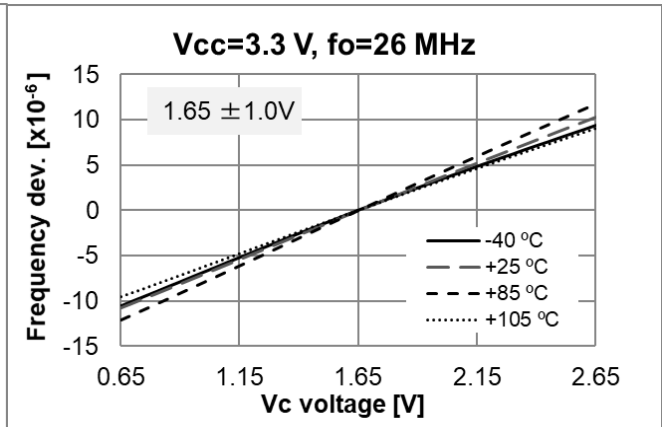
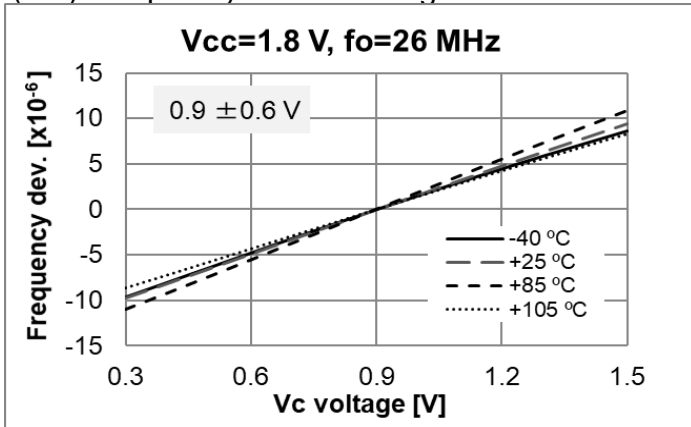
It is not intended as a guarantee of performance over the product-life cycle.



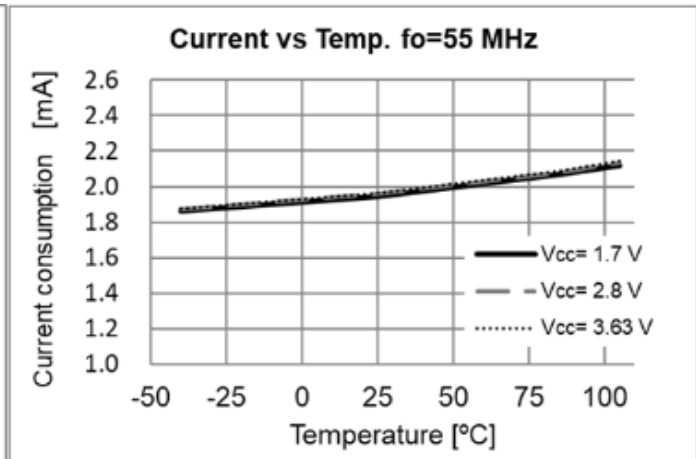
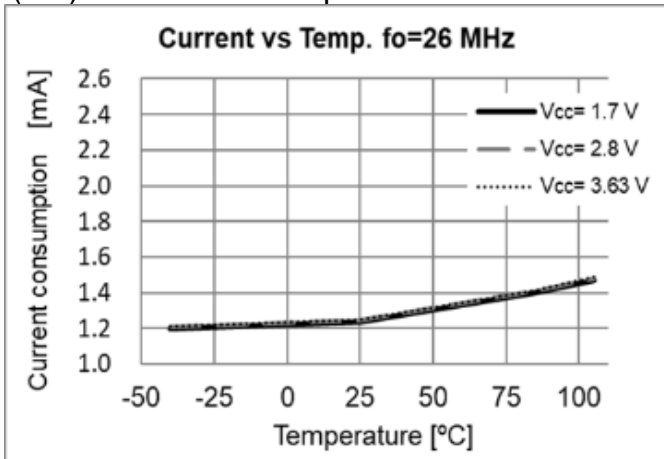
(6-5) G Sensitivity



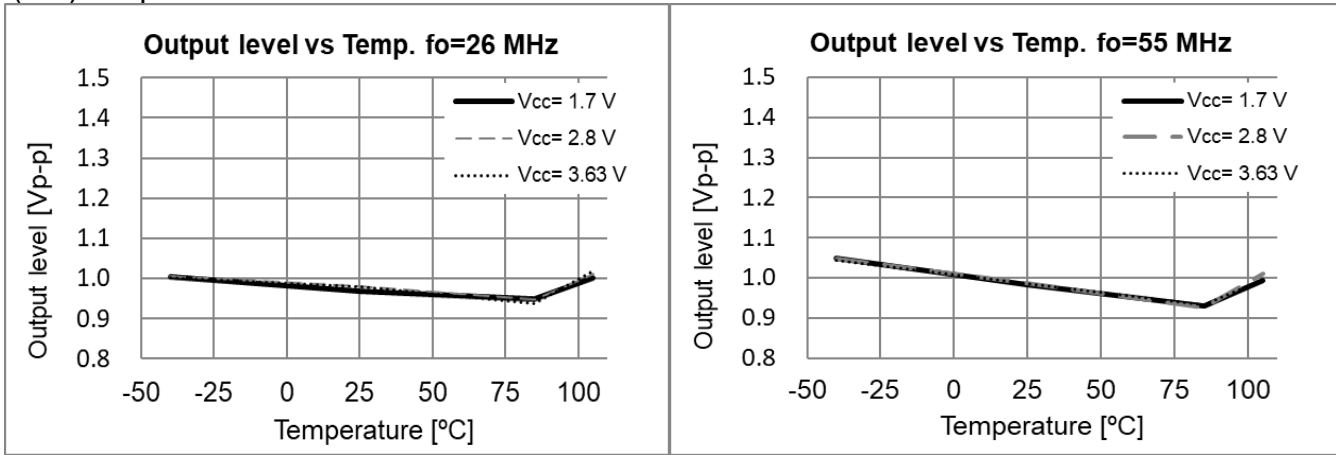
(6-6) Frequency Control Range



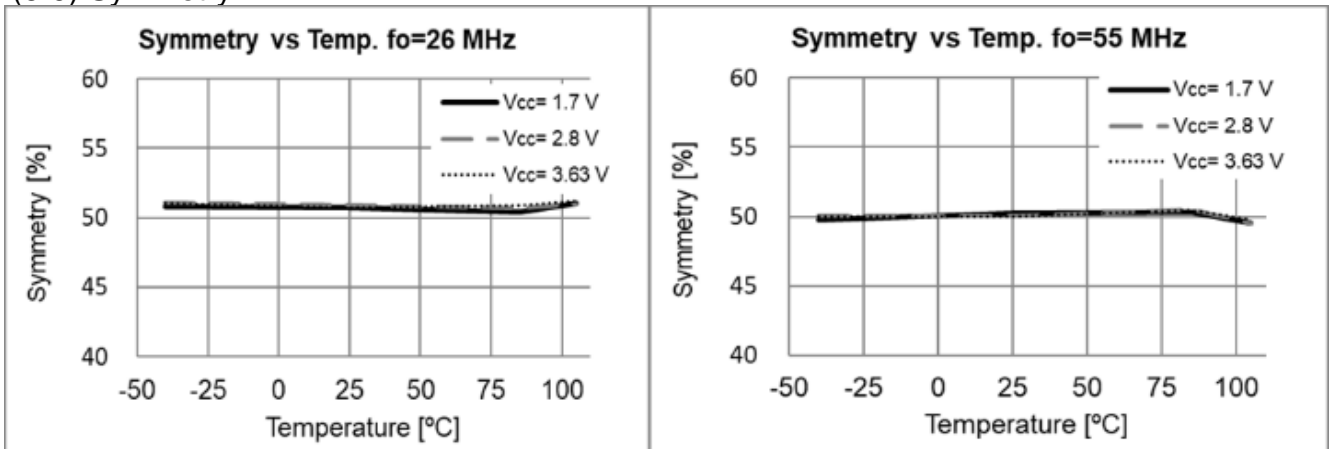
(6-7) Current Consumption



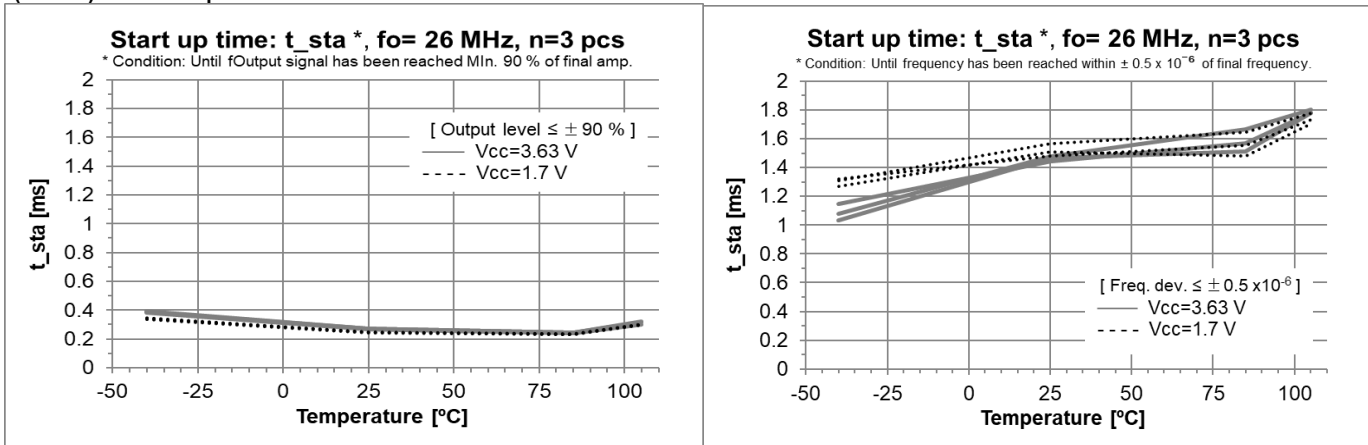
(6-8) Output Level



(6-9) Symmetry

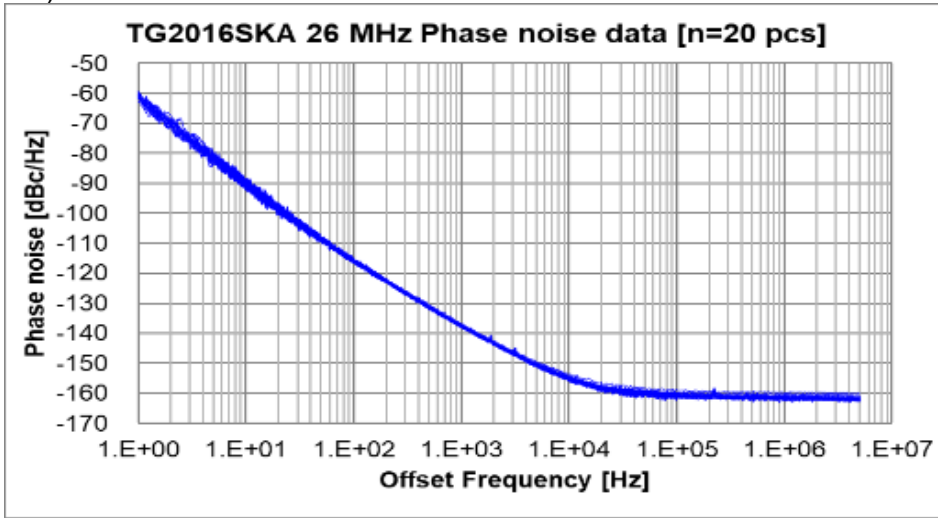


(6-10) Start Up Time



(6-11) Phase Noise

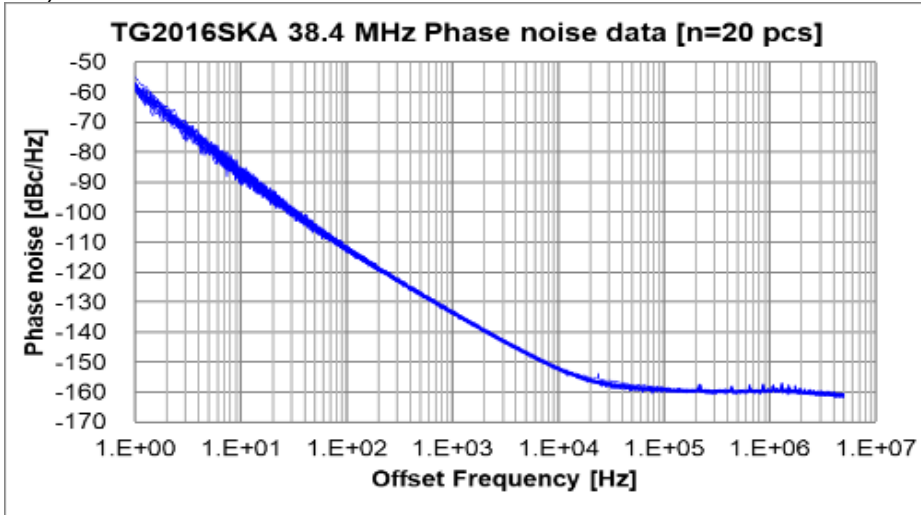
1) fo = 26 MHz



fo=26 MHz

Offset Freq.	P. noise [dBc/Hz]
1 Hz	-61
10 Hz	-90
100 Hz	-116
1 kHz	-138
10 kHz	-155
100 kHz	-161
1 MHz	-161
5 MHz	-162
Phase Jitter (12 kHz to 5 MHz)	
0.22 [ps]	

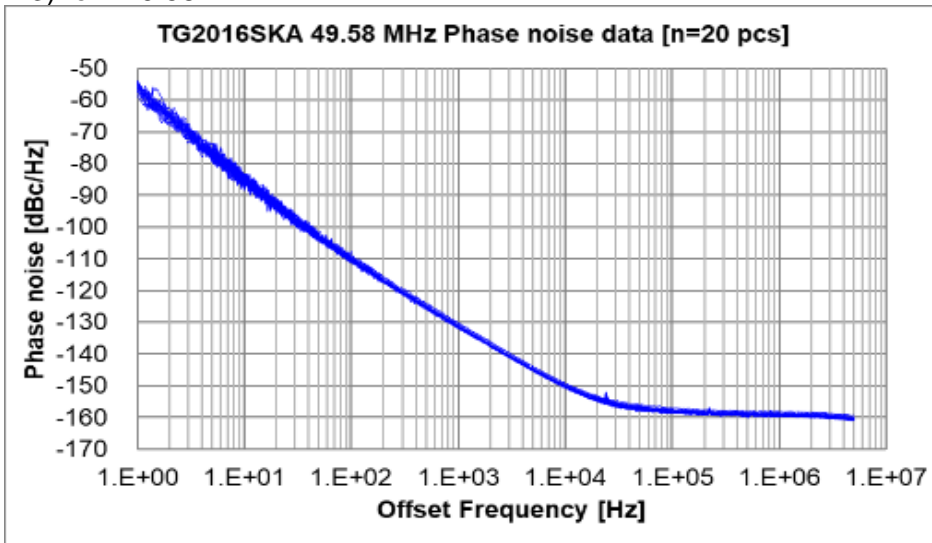
2) fo = 38.4 MHz



fo=38.4 MHz

Offset Freq.	P. noise [dBc/Hz]
1 Hz	-58
10 Hz	-87
100 Hz	-112
1 kHz	-134
10 kHz	-152
100 kHz	-159
1 MHz	-159
5 MHz	-161
Phase Jitter (12 kHz to 5 MHz)	
0.13 [ps]	

3) fo = 49.58 MHz



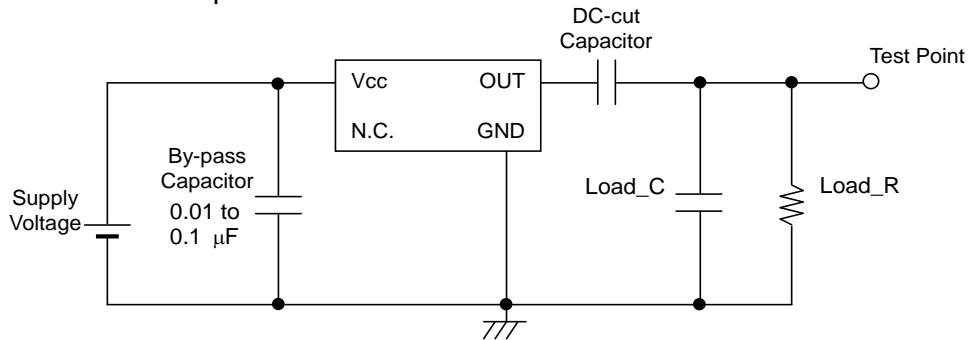
fo=49.58 MHz

Offset Freq.	P. noise [dBc/Hz]
1 Hz	-56
10 Hz	-85
100 Hz	-110
1 kHz	-131
10 kHz	-150
100 kHz	-158
1 MHz	-159
5 MHz	-160
Phase Jitter (12 kHz to 5 MHz)	
0.11 [ps]	

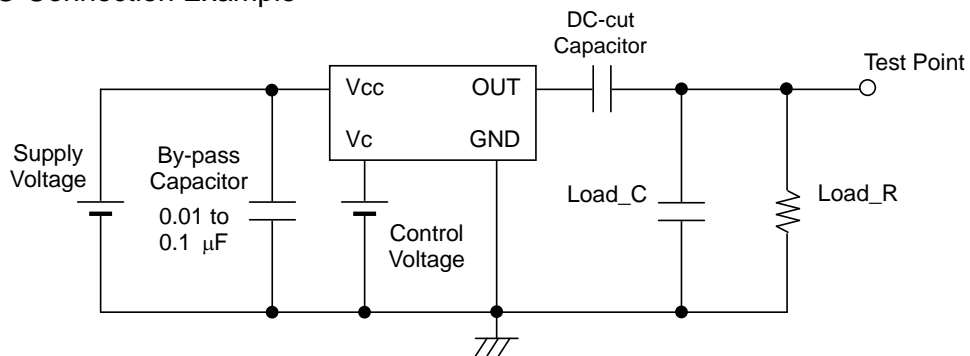
[7] Test Circuit

(7-1) Output Load : Load_R // Load_C = 10 kΩ // 10 pF

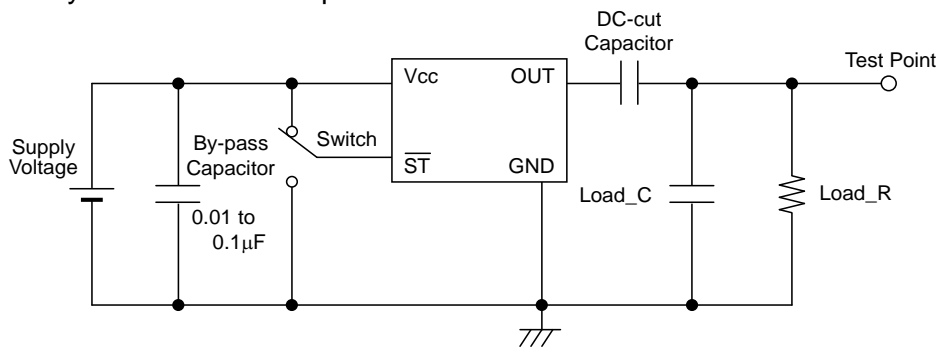
(1) TCXO Connection Example



(2) VC-TCXO Connection Example

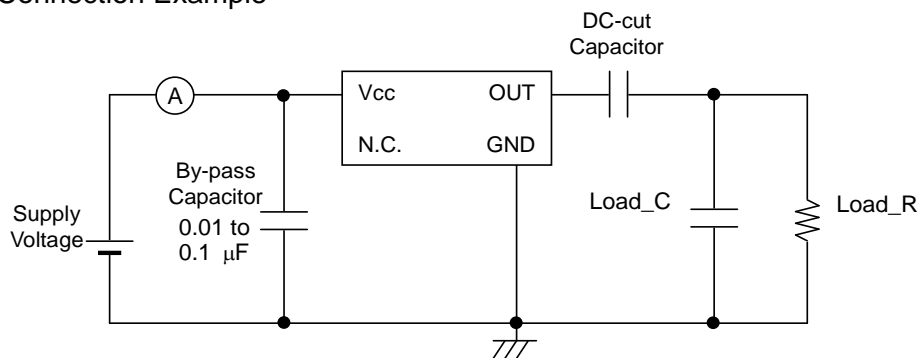


(3) TCXO-Standby Connection Example

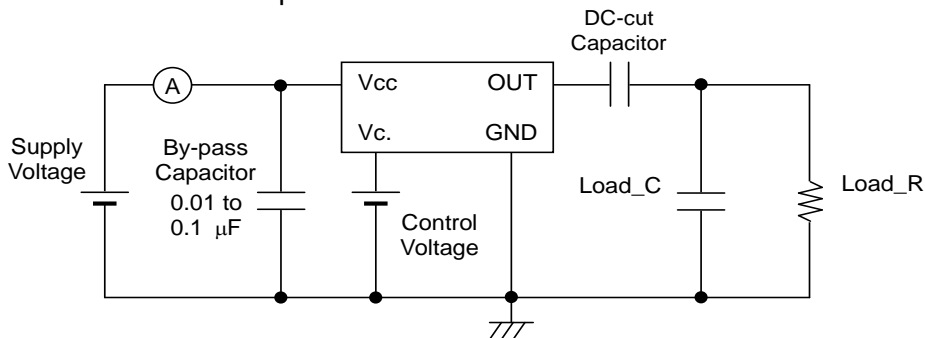


(7-2) Current Consumption

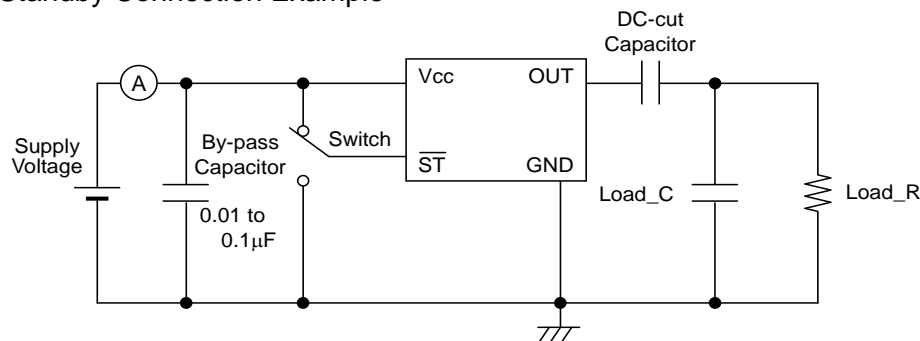
(1) TCXO Connection Example



(2) VC-TCXO Connection Example



(3) TCXO-Standby Connection Example



(7-3) Conditions

1. Oscilloscope: Impedance Min. $1M\Omega$
Input capacitance Max. 10 pF
Band width Min. 300 MHz

Impossible to measure both frequency and wave form at the same time.

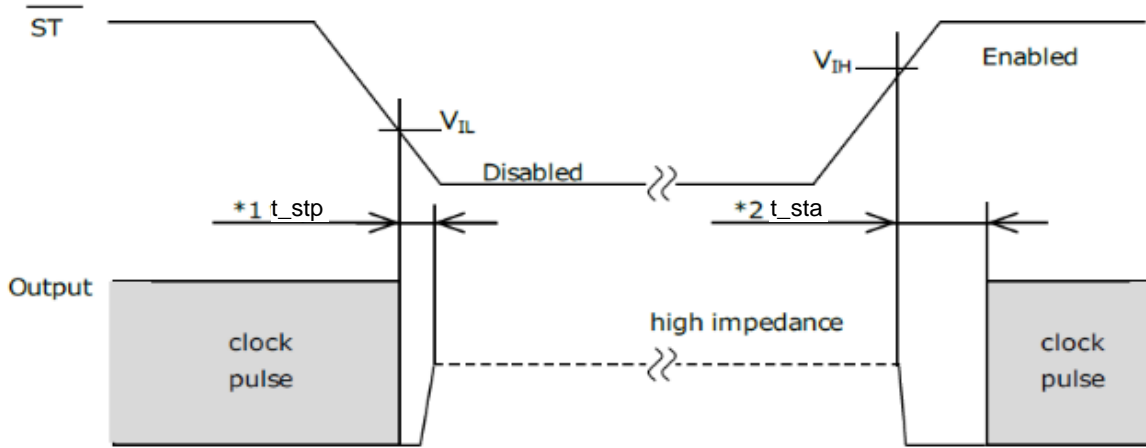
(In case of using oscilloscope's amplifier output, possible to measure both at the same time.)

2. Load_C includes probe capacitance.
3. A capacitor (By-pass: $0.01\ \mu\text{F}$ to $0.1\ \mu\text{F}$) should be placed between V_{CC} and GND, and closely to TCXO.
4. Use the current meter with a low internal impedance.
5. Power Supply
 - Impedance of power supply should be as low as possible.
6. GND pin should be connected to low impedance GND.

(7-4) Timing Chart

(1) Standby Function and Timing

Standby input	Osc. Circuit	Output status
High or OPEN	Oscillation	Specified frequency output: Enable
Low	Stop	Output becomes high impedance: Disable

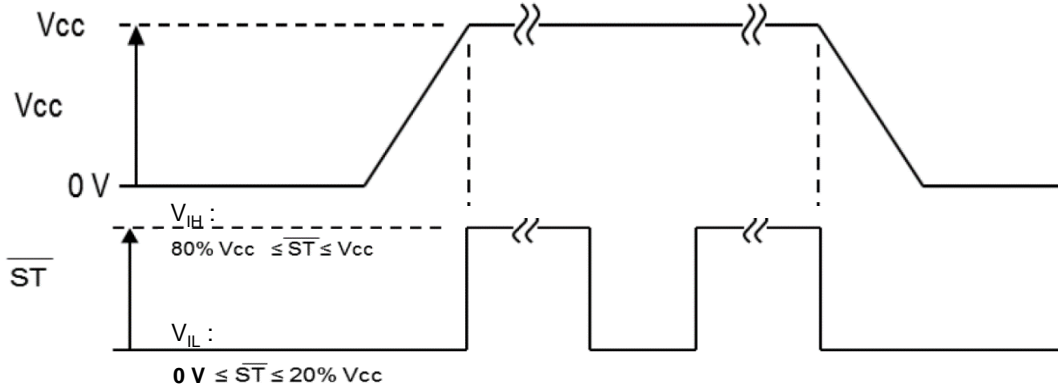


- *1 t_{stp}: The time from $\overline{ST} = V_{IL}$ to output = disable (high impedance)
- *2 t_{sta}: The time from $\overline{ST} = V_{IH}$ to starting output

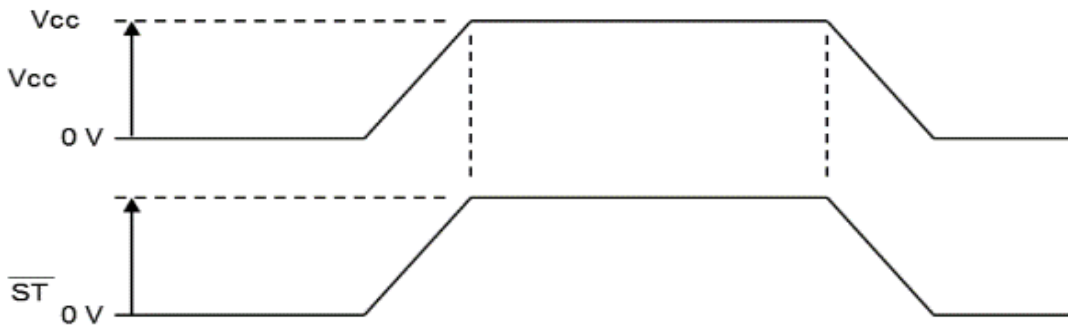
(2) Standby Control Timing

Standby control voltage must be in the range of V_{IN} ([2] Absolute maximum rating), V_{IH}, V_{IL} ([5] Electrical characteristics).

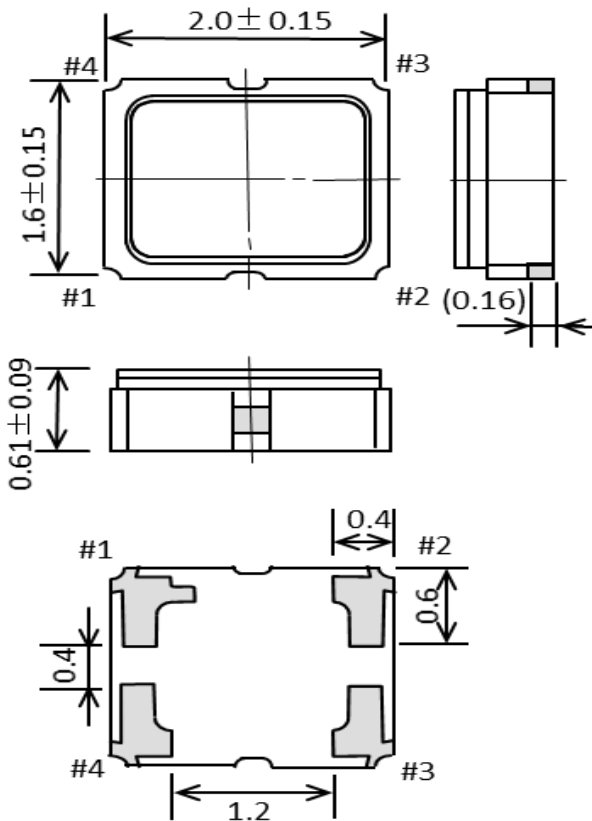
When standby control and V_{CC} control are different



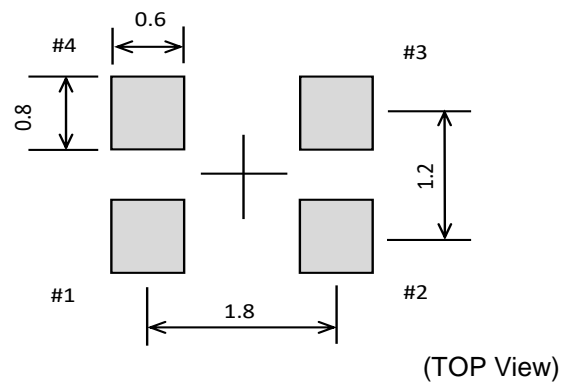
When standby control and V_{CC} control are the same



[8] Outline Drawing unit: mm



Recommended Foot Print unit: mm



Pin map

Pin #	Connection		
	VC-TCXO	TCXO	Standby
1	Vc	N.C. *	\overline{ST}
2	GND		
3	OUT		
4	Vcc		

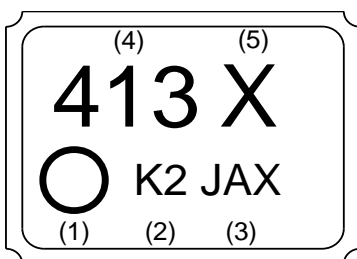
* Please keep "N.C." pin OPEN condition or GND connection.

"N.C." pin doesn't work as a ground pin.

Terminal coating : Au plating

To maintain stable operation, provide a 0.01 μ F to 0.1 μ F by-pass capacitor at a location as near as possible to the power source terminal of the crystal product (between V_{CC} - GND).

Marking



- (1) Pin 1 identifier: ○
- (2) Arbitrary marking area (2 digits)
- (3) TCXO Lot No. (3digits)
- (4) TCXO model ID. (3digits)

TG2016SKA code: 4xx

- (5) Image recognition mark (1digit)

[9] Moisture Sensitivity Level , Electro-Static Discharge

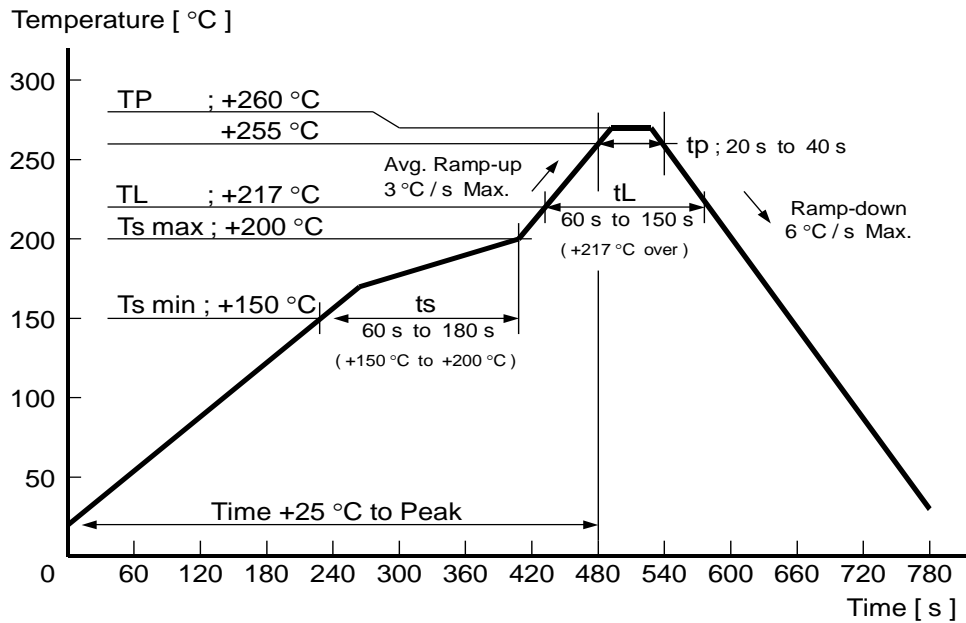
(1) Moisture Sensitivity Level (MSL)

Parameter	Specifications	Conditions
MSL	LEVEL1	JEDEC J-STD-020D

(2) Electro-Static Discharge (ESD)

Parameter	Specifications	Conditions
Human Body Model (HBM)	2 000 V Min.	IEC 60749-26 Ed.2.0:2006(b), 100 pF, 1.5 kΩ, 3 times
Machine Model (MM)	200 V Min.	IEC 60749-27 Ed.2.0:2006(b), 200 pF, 0 Ω, 1 time
Charging Device Model (CDM)	750 V Min.	IEC 60749-28 ,3 times

[10] Reflow profile (follow to IPC / JEDEC J-STD-020D.1)



[11] Packing Information

(1) Quantity

For this product series, the standard for the last two digits of the product number is "16", 3 000 pcs/Reel.

TG2016SKA: X 1G00537 1 xxxx **16**

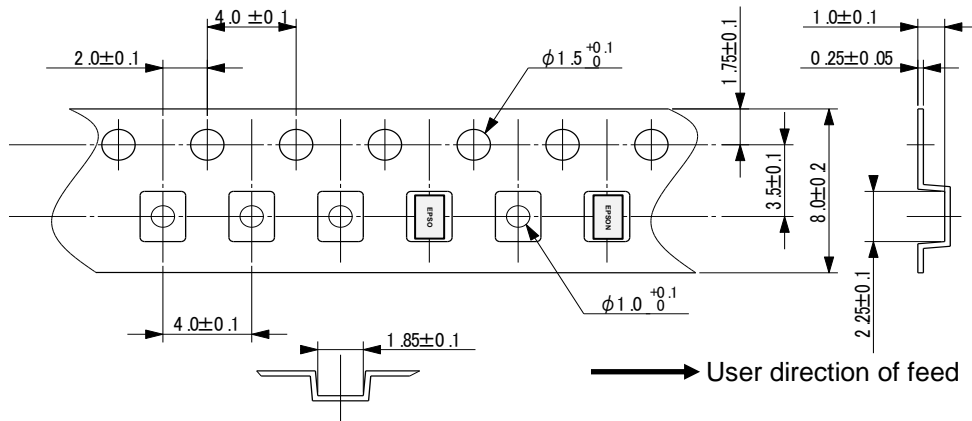
(2) Taping Specification Subject to EIA-481, IEC-60286, JIS C0806

1) Tape Dimensions TE0804L

Material of the Carrier Tape : PS (Polystyrene)

Material of the Top Tape : PET (Polyethylene Terephthalate) + PE (Polyethylene)

unit: mm

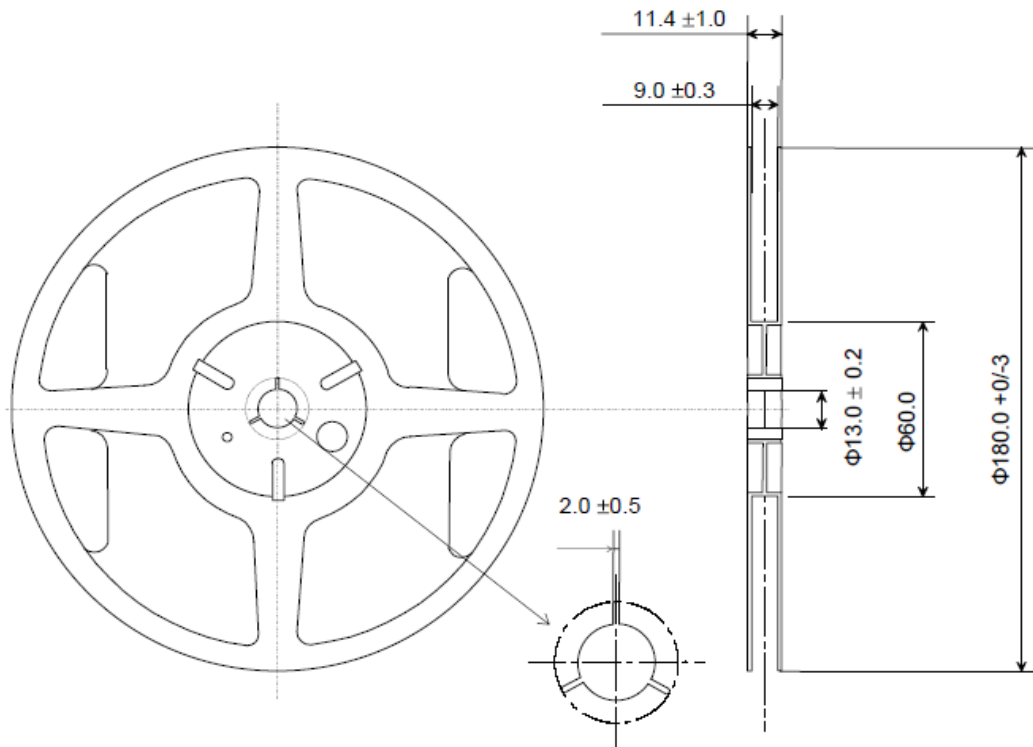


2) Reel Dimensions

EIAJ RRM08B60

Center Material: PS (Polystyrene)

Reel Material: PS (Polystyrene)



[12] Handling Precautions

Prior to using this product, please carefully read the section entitled "Precautions" on our Web site (<https://www5.epsondevice.com/en/information/#precaution>) for instructions on how to handle and use the product properly to ensure optimal performance of the product in your equipment.

Before using the product under any conditions other than those specified therein, please consult with us to verify and confirm that the performance of the product will not be negatively affected by use under such conditions.

In addition to the foregoing precautions, in order to avoid the deteriorating performance of the product, we strongly recommend that you DO NOT use the product under ANY of the following conditions:

- (1) Do not expose this product to excessive mechanical shock or vibration.
- (2) This product can be damaged by mechanical shock during the soldering process depending on the equipment used, process conditions, and any impact forces experienced. Always follow appropriate procedures, particularly when changing the assembly process in anyway and be sure to follow applicable process qualification standards before starting production.
- (3) These devices are sensitive to ESD, please use appropriate precautions during handling, assembly, test, shipment, and installation.
- (4) This product contains semiconductor content that should not be exposed to electromagnetic waves.
- (5) The use of ultrasonic technology for cleaning, bonding, etc. can damage the Xtal unit inside this product. Please carefully check for this consideration before using ultrasonic equipment for volume production with this product.
- (6) Noise and ripple on the power supply may have undesirable effects on operation and cause degradation of phase noise characteristics. Evaluate the operation of this device with appropriate power supplies carefully before use.
- (7) When applying power, ensure that the supply voltage increases monotonically for proper operation. On power down, do not reapply power until the supplies, bypass capacitors, and any bulk capacitors are completely discharged since that may cause the unit to malfunction.
- (8) Aging specifications are estimated from environmental reliability tests and expected frequency variation over time. They do not provide a guarantee of aging over the product lifecycle.
- (9) The metal cap on top of the device is directly connected to the GND terminal (pin #2). Take necessary precautions to prevent any conductor not at ground potential from contacting the cap as that could cause a short circuit to GND.
- (10) Do not route any signal lines, supply voltage lines, or GND lines underneath the area where the oscillators are mounted including any internal layers and on the opposite side of the PCB. To avoid any issues due to interference of other signal lines, please take care not to place signal lines near the product as this may have an adverse affect on the performance of the product.
- (11) A bypass capacitor of the recommended value(s) must be connected between the V_{CC} and GND terminals of the product. Whenever possible, mount the capacitor(s) on the same side of the PCB and as close to the product as possible to keep the routing traces short.
- (12) Power supply connections to V_{CC} and GND pins should be routed as thick as possible while keeping the high frequency impedance low in order to get the best performance.
- (13) The use of a filter or similar element in series with the power supply connections to protect from electromagnetic radiation noise may increase the high frequency impedance of the power supply line and may cause the oscillator to not operate properly. Please verify the design to ensure sufficient operational margin prior to use.
- (14) Keep PCB routing from the output terminal(s) to the load as short as possible for best performance.
- (15) Do not short the output to GND as that will damage the product. Always use with an appropriate load resistor connected.
- (16) Product failures during the warranty period only apply when the product is used according to the recommended operating conditions described in the specifications. Products that have been opened for analysis or damaged will not be covered. It is recommended to store and use in normal temperature and humidity environments described in the specifications to ensure frequency accuracy and prevent moisture condensation. If the product is stored for more than one year, please confirm the pin solderability prior to use.
- (17) If the oscillation circuit is exposed to condensation, the frequency may change or oscillation may stop. Do not use in any conditions where condensation occurs.
- (18) Do not store or use the product in an environment where it can be exposed to chemical substances that are corrosive to metal or plastics such as salt water, organic solvents, chemical gasses, etc. Do not use the product when it is exposed to sunlight, dust, corrosive gasses, or other materials for long periods of time.
- (19) When using water-soluble solder flux make sure to completely remove the flux residue after soldering. Pay particular attention when the residues contain active halogens which will negatively affect the product and its performance.
- (20) Terminals on the side of the product are internally connected to the IC, be careful not to cause short-circuits or reduce the insulation resistance of them in any way.

PROMOTION OF ENVIRONMENTAL MANAGEMENT SYSTEM CONFORMING TO INTERNATIONAL STANDARDS

At Seiko Epson, all environmental initiatives operate under the Plan-Do-Check-Action (PDCA) cycle designed to achieve continuous improvements. The environmental management system (EMS) operates under the ISO 14001 environmental management standard.

All of our major manufacturing and non-manufacturing sites, in Japan and overseas, completed the acquisition of ISO 14001 certification.




ISO 14000 is an international standard for environmental management that was established by the International Standards Organization in 1996 against the background of growing concern regarding global warming, destruction of

WORKING FOR HIGH QUALITY

In order provide high quality and reliable products and services than meet customer needs, Seiko Epson made early efforts towards obtaining ISO9000 series certification and has acquired ISO9001 for all business establishments in Japan and abroad. We have also acquired IATF 16949 certification that is requested strongly by major manufacturers as standard.

IATF 16949 is the international standard that added the sector-specific supplemental requirements for automotive industry based on ISO9001.

■ Explanation of marks used in this datasheet

	● Pb free.
	● Complies with EU RoHS directive. *About the products without the Pb-free mark. Contains Pb in products exempted by EU RoHS directive (Contains Pb in sealing glass, high melting temperature type solder or other)
	● Designed for automotive applications such as Car Multimedia, Body Electronics, Remote Keyless Entry etc.

NOTICE: PLEASE READ CAREFULLY BELOW BEFORE THE USE OF THIS DOCUMENT

- The content of this document is subject to change without notice. Before purchasing or using Epson products, please contact with sales representative of Seiko Epson Corporation ("Epson") for the latest information and be always sure to check the latest information published on Epson's official web sites and resources.
- This document may not be copied, reproduced, or used for any other purposes, in whole or in part, without Epson's prior consent.
- Information provided in this document including, but not limited to application circuits, programs and usage, is for reference purpose only. Epson makes no guarantees against any infringements or damages to any third parties' intellectual property rights or any other rights resulting from the information. This document does not grant you any licenses, any intellectual property rights or any other rights with respect to Epson products owned by Epson or any third parties.
- Epson has prepared this document carefully to be accurate and dependable, but Epson does not guarantee that the information is always accurate and complete. Epson assumes no responsibility for any damages you incurred due to any misinformation in this document.
- Epson products listed in this document and our associated technologies shall not be used in any equipment or systems that laws and regulations in Japan or any other countries prohibit to manufacture, use or sell. Furthermore, Epson products and our associated technologies shall not be used for the purposes of military weapons development (e.g. mass destruction weapons), military use, or any other military applications. If exporting Epson products or our associated technologies, please be sure to comply with the Foreign Exchange and Foreign Trade Control Act in Japan, Export Administration Regulations in the U.S.A (EAR) and other export-related laws and regulations in Japan and any other countries and to follow their required procedures.
- Epson assumes no responsibility for any damages (whether direct or indirect) caused by or in relation with your non-compliance with the terms and conditions in this document or for any damages (whether direct or indirect) incurred by any third party that you give, transfer or assign Epson products.
- For more details or other concerns about this document, please contact our sales representative.
- Company names and product names listed in this document are trademarks or registered trademarks of their respective companies.

● Disclaimer

- Epson products are designed for use in general electronic equipment applications that do not require extremely high reliability or safety.
- Epson does not represent or warrant that its products will not cause a failure for any particular application, except for cases where the failure is a direct result caused by defects in materials and workmanship of this product.
If a product fails due to defects in materials and workmanship, to the maximum extent permitted by law, we will, at our sole discretion, refund or replace the affected product.
- When products for used directly or indirectly in certain devices or applications (ex. Nuclear power, aerospace, infrastructure facilities, medical equipment, etc.) which are connected to or affect safety of human life or property, Customer is solely responsible for determining if the products and respective specifications are suitable for the intended use in particular customer applications.
Customer shall implement necessary and proper safety design and measures (including redundant design, malfunction prevention design, etc.) to ensure reliability and safety before using the products in/with customer's Equipment.
- For the products designed for automotive applications, the products comply with AEC-Q100 or AEC-Q200.
Products do not comply with ISO 26262 (Products are not categorized to ASIL A, B, C and D).
- No dismantling, analysis, reverse engineering, modification, alteration, adaptation, reproduction, etc., of Epson products is allowed.
Furthermore, any defects caused by this are not covered by the warranty.