

Your Solution for Frequency Control Products



Oscillators
VCXO TCXO VCTCXO LVDS PECL





Mit 50 Jahren Erfahrung in der Quarz Branche ist **GEYER electronic** ein weltweit bekannter Hersteller von hochwertigen Schwingquarzen und Oszillatoren.

Der vorliegende Katalog bietet einen Überblick über das **GEYER Oszillatoren VCXO, VCTCXO TCXO LVDS und PECL** Bauteilesortiment. Weitere Bauformen und Sondertypen sind auf Anfrage lieferbar.

Für Neuentwicklungen und Freigabeprozesse stellt **GEYER electronic** kurzfristig geeignete Musterbauteile zur Verfügung. Darüber hinaus steht ein kompetentes Team von Design- und Entwicklungsingenieuren ganz im Dienste des Kunden und unterstützt bei der Auslegung von Schaltungen. Im **GEYER electronic** Design- und Testzentrum sind verschiedenste Messungen und Analysen, auch in der Klimasimulation, möglich.

With 50 years' experience in the frequency control marketplace, **GEYER electronic** is a world-renown manufacturer of quality quartz crystals and oscillators.

The catalog in front of you offers an overview of the **GEYER** component product range of **Oscillators VCXO, VCTCXO TCXO LVDS und PECL**. A variety of further packages and special types is available on request.

GEYER is pleased to provide suitable samples at short notice for new developments and approval processes. In addition, a competent team of design and development engineers committed to customers is available to provide support for the design of circuits. In the **GEYER electronic** Design and Test Center, a wide variety of measurements and analyses can be carried out, including in our climactic simulation test chamber.


























Be sure with Quartz Crystals from GEYER

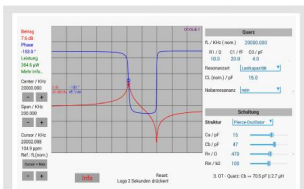


This catalogue replaces all former catalogues. All specifications represent the latest technical information and are subject to change without notice. For current update please refer to www.geyer-electronic.com.

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Design und Testcenter

Auswahl von Bauteilen

Schaltungsbegutachtung

Messungen und Analysen von Baugruppen

Wir bieten einen weltweit außergewöhnlichen Service:

- Ausführliche Beratung
- Validierung Ihrer Schaltung
- Ausgemessene Muster für Vorserien und Prototypen
- Abgestimmte Spezifikationen und Baugrößen
- 3D Modelle unserer Bauteile zur Erleichterung des Design-in
- Kostenlose Simulations - App
- Test der fertigen Baugruppe auf verschiedenste Parameter

Die Vorteile für Sie:

- Vermeidung von Unsicherheiten bei der Bauteileauswahl oder Spezifikation
- Verkürzte Entwicklungsdauer
- Erhöhte Betriebssicherheit in der Serie
- Kostenoptimierte Bauteileauswahl
- Optimale Lebenserwartung in der Serie

Sie erhalten:

- Ausführliche Beratung zum Schaltungsdesign neuer Schaltungen

Unter den Gesichtspunkten von:

- Frequenzgenauigkeit von unterschiedlichen Versorgungsspannungen
- Frequenzgenauigkeit über den Arbeitstemperaturbereich
- Anschwingverhalten bei verschiedenen Temperaturen
- Anschwingsicherheit
- Stromverbrauch
- Layout Optimierung
- Auswahl kostengünstiger Bauteile

Part selection

Evaluation of Circuit Design

Measurements and Analysis of PCBs

We offer your Design Engineers an exceptional worldwide service:

- Comprehensive consulting
- Validation of your design
- Our own Design and Test center
- Selected samples for prototypes and pilot series
- Matched specifications and design sizes
- 3D models of our components for easy design-in
- Free Geyer App-Y-Quartz with analyzing tool
- Testing of boards on selected parameters

As a customer you can expect the following benefits:

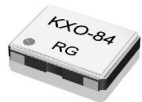
- Prevention from incorrect decisions in component selection or specification
- Shorter development time
- Enhanced reliability of operation in production run
- Cost-optimized component selection
- Optimum design life in production run

You get:

- Comprehensive advice in design of new circuits


With regard to:

- Frequency deviation at different supply voltages
- Frequency deviation at different temperatures
- Start-up at different temperatures
- Start allowance
- Current consumption
- Layout optimizing
- Selection of economic components

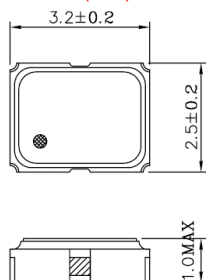


VCXO Voltage Controlled Crystal Oscillator

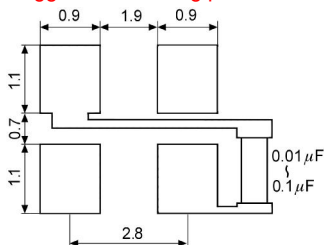
SMD-version +1.8V / +2.8V +3.3V

model	KXO-84	
frequency range	10.0 ~ 26.0 MHz	
output	load	10 k Ohm $\pm 10\%$ // 10pF $\pm 10\%$
	voltage	0,8Vp-p min. at 10 k Ohm // 10 pF
	waveform	clipped sine wave
frequency stability	vs. temp.range	± 2.5 ppm at $-30^{\circ}\text{C} \sim +75^{\circ}\text{C}$
	vs. input voltage	± 0.3 ppm at V DC
	vs. load	± 0.2 ppm max. at 10 kOhm $\pm 10\%$ / 10 pF $\pm 10\%$
	vs. aging	± 1.0 ppm / year max. at $+25^{\circ}\text{C}$
operating temperature range	$-30^{\circ}\text{C} \sim +75^{\circ}\text{C}$	
storage temperature	$-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$	
input voltage V _{DD}	+1.8V DC, +2.8V DC or +3.3V DC $\pm 5\%$	
frequency control voltage VC	+1.5V DC ± 1 V DC	
input current max.	1.5 mA	
frequency adjustment (pullability)	± 9 ppm $\sim \pm 15$ ppm (VC= +1,2V _{DD} ± 1 V DC)	
start-up time	3 ms max.	
harmonics	-5.0 dBc max.	
phase noise	-80 dBc/Hz max. at 10 Hz -110 dBc/Hz max. at 100 Hz -130 dBc/Hz max. at 1 kHz -145 dBc/Hz max. at 10 kHz -145 dBc/Hz max. at 100 kHz -150 dBc/Hz max. at 1 MHz	
contents of reel	1000 pcs.	 actual size
part no.	12.xxxxx	

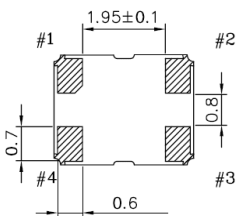
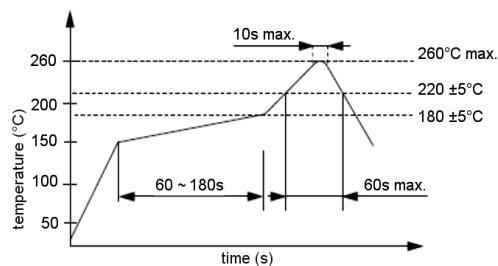
Dimensions (mm):



Suggested soldering pad:

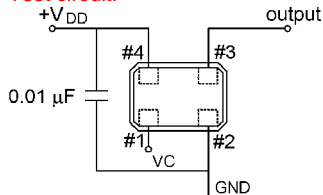


Reflow soldering condition:

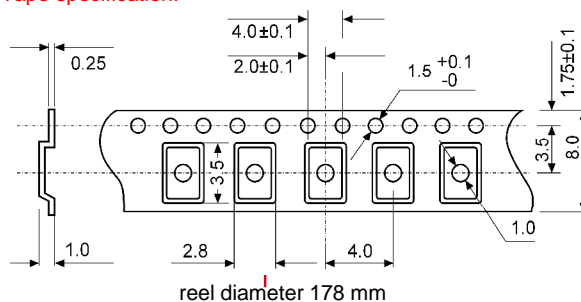


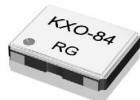
Pin	Connection
1	VC
2	GND
3	OUTPUT
4	V _{DD}

Test circuit:



Tape specification:





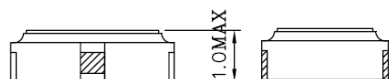
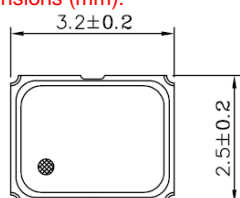
VCXO Voltage Controlled Crystal Oscillator

SMD-version +1.8V / +2.8V +3.3V

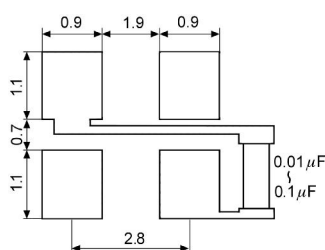
model	KXO-84		
frequency range	1.25 ~ 54.0 MHz		
frequency stability	standard ± 50 ppm available ± 25 ppm		
operating temperature	standard $-20^{\circ} \sim +70^{\circ}\text{C}$ available $-40^{\circ} \sim +85^{\circ}\text{C}$		
input voltage (V_{DD})	+1.8V DC, +2.8V DC or +3.3V DC $\pm 5\%$		
storage temperature	$-55^{\circ}\text{C} \sim +125^{\circ}\text{C}$		
input current max.	10 mA		
output	CMOS 15 pF		
symmetry	$50\% \pm 5\%$		
frequency linearity max.	10%		
deviation slope	positive		
APR (absolute pulling range) min.	± 50 ppm ($V_{con} = +\text{Center } V_{DD} \pm \text{pin 1 option}$)		
rise and fall time max.	10 ns		
output high level min.	$90\% V_{DD}$		
output low level max.	$10\% V_{DD}$		
Vcon input impedance min.	5 M Ohm at DC characteristic		
pin 1 control voltage	+1.8V (up to 36 MHz) 0.9V \pm 0.75V (0.9V)	+2.5V 1.25V \pm 1.05V (1.25V)	+3.3V 1.65V \pm 1.35V (1.65V)
phase jitter (12kHz ~ 20MHz) max.	1ps RMS		
periode jitter (pk-pk) max.	25ps		
typical phase noise	$-130 \text{ dBc/Hz max. @ } 1 \text{ kHz}$ $-155 \text{ dBc/Hz max. at } 1 \text{ MHz}$		
start up time max.	5 ms		
contents of reel	1000 pcs.		
part no.	12.xxxxx		

actual size

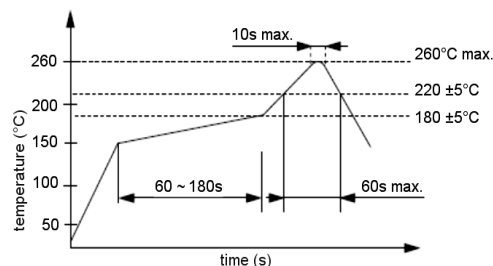
Dimensions (mm):



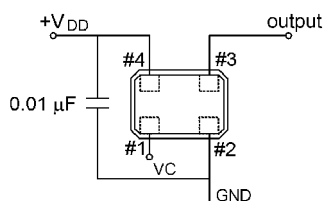
Suggested soldering pad:



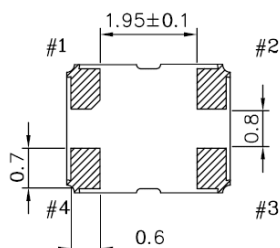
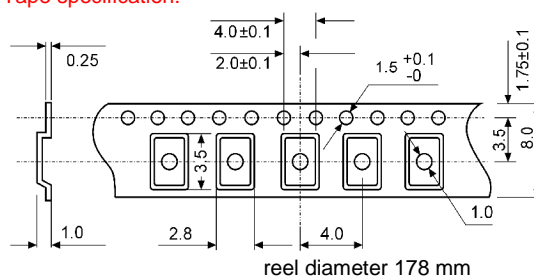
Reflow soldering condition:



Test circuit:



Tape specification:



Pin	Connection
1	VC
2	GND
3	OUTPUT
4	V_{DD}



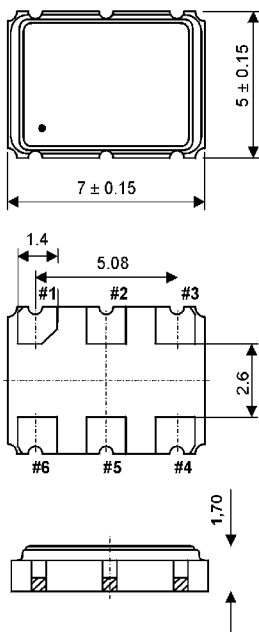
VCXO Voltage Controlled Crystal Oscillator

SMD-version +3.3V

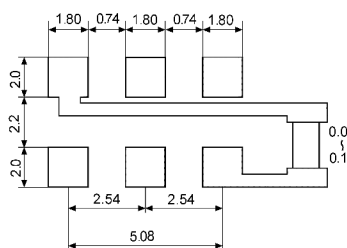
model	KXO-75
frequency range	1.544 ~ 77.760 MHz
frequency stability	
at -10° ~ +60°C	±10 ~ ±50ppm
at -20° ~ +70°C	±20 ~ ±50ppm
at -40° ~ +85°C	±30 ~ ±50ppm
operating temperature	-10°C ~ +60°C
	-40°C ~ +85°C
storage temperature	-40°C ~ +85°C
symmetry at ½ V _{DD} level	50% ± 5%
rise and fall time max.	5 ns
20% ~ 80% V _{DD} level	
start up time max.	10 ms
output level	VOH : 90% of V _{DD} min. VOL: 10% of V _{DD} max.
input voltage V _{DD}	3.3V ± 5%
input current max.	1.544 ~ 20.0 MHz = 10mA
no load	20.1 ~ 40.0 MHz = 15mA
	40.1 ~ 77.760 MHz = 25mA
output load CMOS	15 pF
control voltage VC	0 V ~ 3.3V
pulling range min.	±50 ~ ±150ppm min.
frequency linearity max.	± 15% max.
period jitter: absolut max.	±100ps max.
period jitter: one sigma max.	± 10ps max.
contents of reel	1000 pcs.
part no.	12.xxxxx



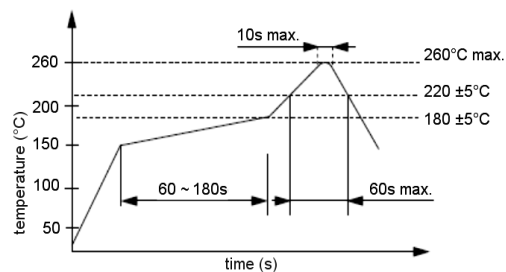
Dimensions (mm):



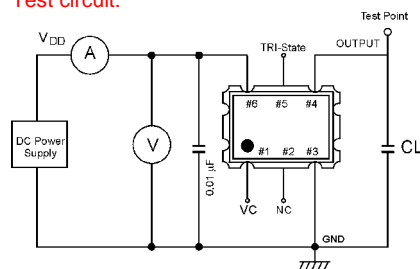
Suggested soldering pad:



Reflow soldering condition:



Test circuit:



PIN	Connection
1	VC
2	NC
3	GND
4	Z
5	"L" (OV) "H" (+3.3V) or OPEN
6	V _{DD}

Z= High Impedance



VCXO Voltage Controlled Crystal Oscillator

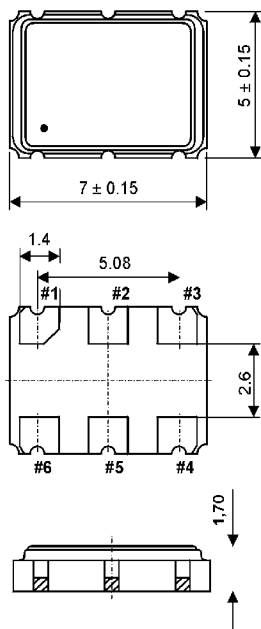
SMD-version +3.3V

model	KXO-75R
frequency range	1.544 ~ 77.760 MHz
frequency stability	
at -10° ~ +60°C	±10 ~ ±50ppm
at -20° ~ +70°C	±20 ~ ±50ppm
at -40° ~ +85°C	±30 ~ ±50ppm
operating temperature	-10°C ~ +60°C
	-40°C ~ +85°C
storage temperature	-40°C ~ +85°C
symmetry at ½ V _{DD} level	50% ± 5%
rise and fall time max.	5 ns
20% ~ 80% V _{DD} level	
start up time max.	10 ms
output level	VOH : 90% of V _{DD} min. VOL: 10% of V _{DD} max.
input voltage V _{DD}	3.3V ± 5%
input current max.	1.544 ~ 20.0 MHz = 10mA
no load	20.1 ~ 40.0 MHz = 15mA
	40.1 ~ 77.760 MHz = 25mA
output load CMOS	15 pF
control voltage VC	0 V ~ 3.3V
pulling range min.	±50 ~ ±150 ppm min.
frequency linearity max.	± 15% max.
period jitter: absolut max.	±100ps max.
period jitter: one sigma max.	± 10ps max.
contents of reel	1000 pcs.
part no.	12.xxxxx

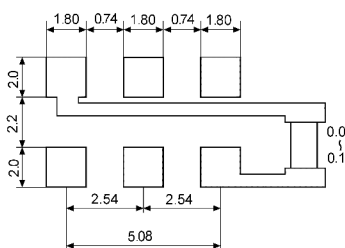


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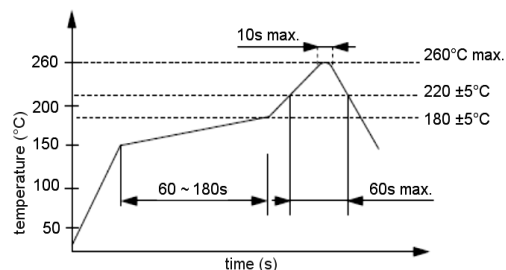
Dimensions (mm):



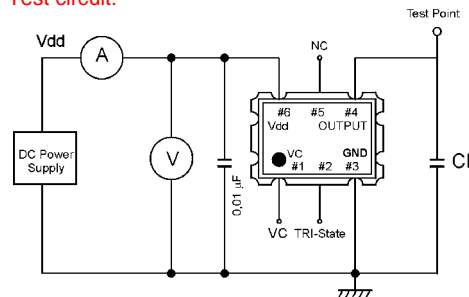
Suggested soldering pad:



Reflow soldering condition:

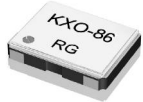


Test circuit:



PIN	Connection
1	VC
2	"L" (OV) "H" (+3.3V) or OPEN
3	GND
4	Z OUTPUT
5	NC
6	V _{DD}

Z= High Impedance



TCXO

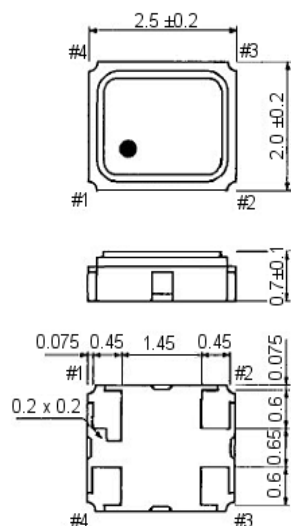
Temperature Compensated Crystal Oscillator

SMD-version +2.5V +2.8V +3.0V

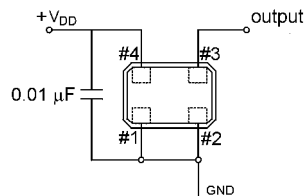
model	KXO-86
frequency range	12.0 ~ 26.0 MHz
Initial frequency tolerance	±1.5ppm max. (Vcon = +1,35V DC at +25°±2°C)
frequency stability	±2.5ppm over -30°C ~ +75°C (referred to +25°C)
temperature range	±0,2ppm max. at V _{DD} ±5% DC
input voltage change	±0.2ppm max. at 10kΩ ±10% with 10 pF ±10%
output load change	±1.0ppm max. / year at +25°C ±2°C
aging	
operating conditions	
operating temperature	-30°C ~ +75°C (standard)
input voltage (V _{DD})	+2.5 V, +2.8V, +3.0V DC ±5%
storage temperature	-40°C ~ +85°C
input current	1.5 mA max.
output	
level	0.8Vp-p min. at 10kΩ//10 pF
load	10k Ω ±10% // 10 pF ± 10%
waveform	clipped sine wave (DC-coupling)
phase noise	-130 dBc/Hz at 1 kHz offset
reflow frequency change	± 1.0ppm at 24H after reflow (at +25°C ± 2°C)
start up time	3 mS max. (V _{out} ≥ 90%Vp-p) 4 mS max. (within ±2,5ppm)
reflow soldering condition	+250°C ±10°C for 10 seconds, see diagram
contents of reel	2000 pcs.
part no.	12.xxxxx



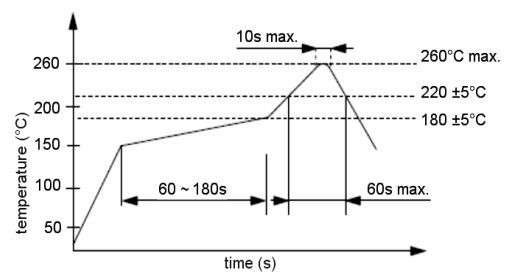
Dimensions (mm):



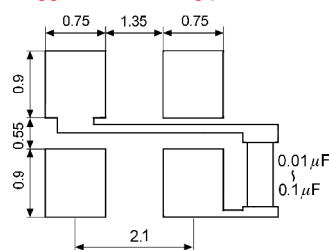
Test circuit:



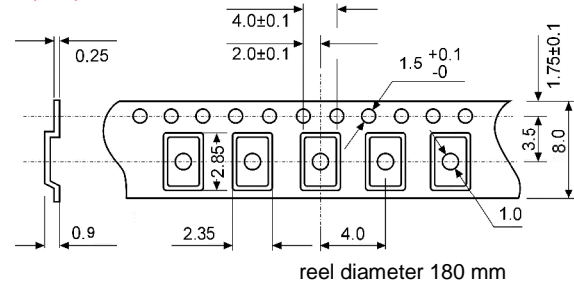
Reflow soldering condition:



Suggested soldering pad:



Tape specification:



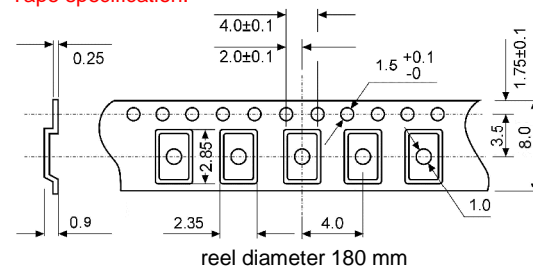
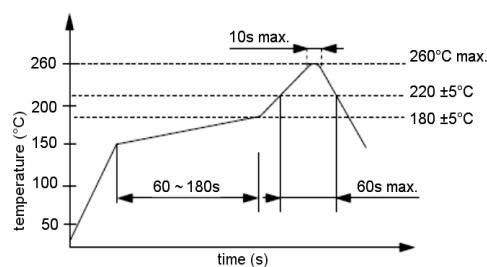
PIN	Connection
1	GND
2	GND
3	OUTPUT
4	V _{DD}



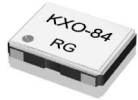
SMD-version +1.8V +2.5V +3.3V

actual size

Reflow soldering condition:




TCXO – KXO-86 HCMOS



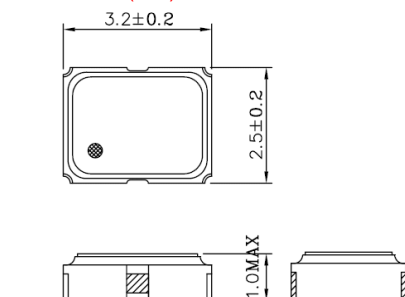
TCXO

Temperature Compensated Crystal Oscillator

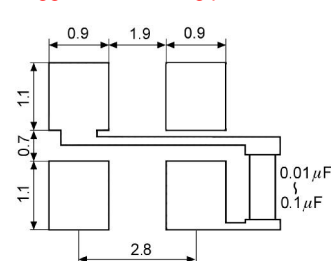
SMD-version +1.8 +2.8 +3.3V

model	KXO-84	
frequency range	10.0 ~ 40.0 MHz	
output	load	10 k Ohm $\pm 10\%$ // 10pF $\pm 10\%$
	voltage	0.8Vp-p min. at 10 k Ohm // 10 pF
	waveform	clipped sine wave
frequency stability	vs. temp.range	$\pm 2.5\text{ppm}$ at $-30^\circ\text{C} \sim +75^\circ\text{C}$
	vs. input voltage	$\pm 0.3\text{ppm}$ at V DC
	vs. load	$\pm 0.2\text{ppm}$ max. at 10 k Ohm $\pm 10\%$ // 10 pF $\pm 10\%$
	vs. aging	$\pm 1.0\text{ppm}$ / year max. at $+25^\circ\text{C}$
operating temperature range	$-30^\circ\text{C} \sim +75^\circ\text{C}$	
storage temperature	$-40^\circ\text{C} \sim +85^\circ\text{C}$	
input voltage V _{DD}	+ 1.8V DC, +2.8V DC or +3.3V DC $\pm 5\%$	
input current max.	1.5 mA	
start-up time	3 ms max.	
harmonics	-5.0 dBc max.	
phase noise	-80 dBc/Hz max. at 10 Hz	
	-110 dBc/Hz max. at 100 Hz	
	-130 dBc/Hz max. at 1 kHz	
	-145 dBc/Hz max. at 10 kHz	
	-150 dBc/Hz max. at 100 kHz	
	-150 dBc/Hz max. at 1 MHz	
contents of reel	1000 pcs.	 actual size
part no.	12.xxxxx	

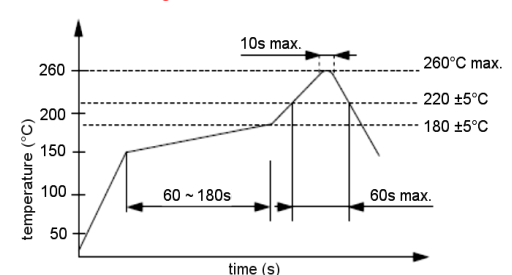
Dimensions (mm):



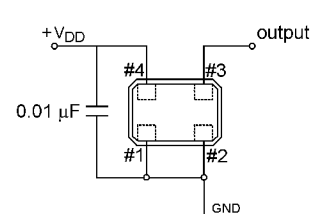
Suggested soldering pad:



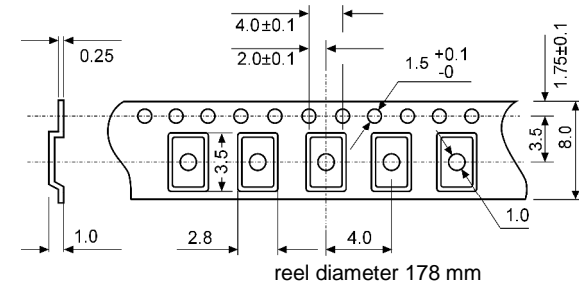
Reflow soldering condition:



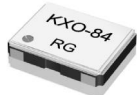
Test circuit:



Tape specification:



Pin	Connection
1	GND
2	GND
3	OUTPUT
4	V _{DD}



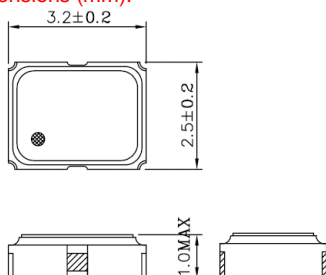
TCXO

Temperature Compensated Crystal Oscillator

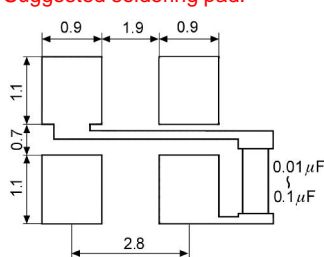
SMD-version +1.8V +2.5V +3.3V

model	KXO-84
frequency range	10.0 ~ 40.0 MHz
initial frequency tolerance	±0.5ppm max.
frequency stability	±2.5ppm over -30°C ~ +75°C (referred to +25°C)
temperature range	±0.3ppm max. at V _{DD} ±5% DC
input voltage change	±0.2ppm max.
output load change	±1.0ppm max. / year at +25°C ±2°C
aging	
operating conditions	
operating temperature	-30°C ~ +75°C
input voltage (V _{DD})	+1.8V DC, +2.5V DC or +3.3V DC ±5%
storage temperature	-40°C ~ +85°C
input current	6.0 mA max.
output	HCMOS 15 pF
symmetry	45% / 55% at ½ V _{DD} level
rise and fall time max.	5 ns (10% V _{DD} ~ 90% V _{DD} level)
"0" level	V _{OL} : 10% V _{DD} max.
"1" level	V _{OH} : 90% V _{DD} min.
reflow frequency change	± 1.0ppm after reflow (at +25°C ± 2°C)
start up time	2 mS max.
typical phase noise	-80 dBc/Hz max. @t 10 Hz -110 dBc/Hz max. at 100 Hz -130 dBc/Hz max. at 1 kHz -145 dBc/Hz max. at 10 kHz -150 dBc/Hz max. at 100 kHz -150 dBc/Hz max. at 1 MHz
contents of reel	2000 pcs.
part no.	12.xxxxx
	actual size

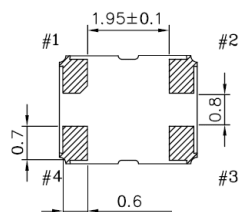
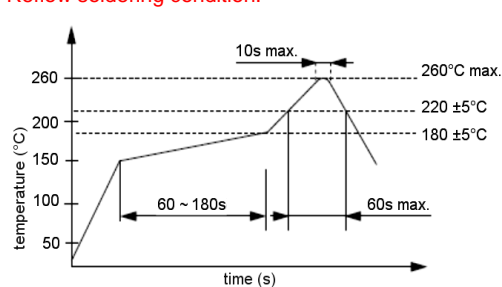
Dimensions (mm):



Suggested soldering pad:

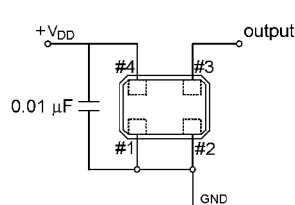


Reflow soldering condition:

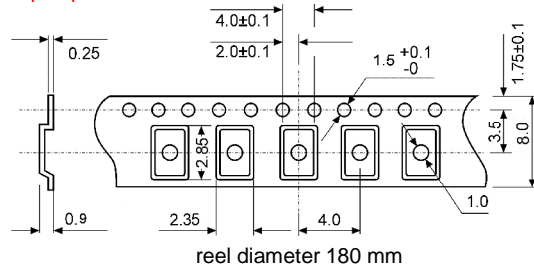


PIN	Connection
1	GND
2	GND
3	OUTPUT
4	V _{DD}

Test circuit:



Tape specification:




reel diameter 180 mm

TCXO

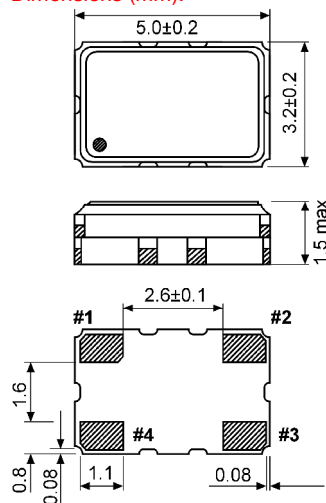
Temperature Compensated Crystal Oscillator

SMD-version +3.0V

model		KXO-83
frequency range		12.0 ~ 26.0 MHz
output	load	10 k Ohm // 10pF
	voltage	0.8Vp-p min.
	waveform	clipped sine wave
frequency stability	vs. temp.range	$\pm 1.5 \sim \pm 5.0\text{ppm}$ at $-10^{\circ}\text{C} \sim +60^{\circ}\text{C}$ $\pm 2.0 \sim \pm 5.0\text{ppm}$ at $-20^{\circ}\text{C} \sim +70^{\circ}\text{C}$ $\pm 2.0 \sim \pm 5.0\text{ppm}$ at $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$
	vs. input voltage	$\pm 0.3\text{ppm max.} \pm 5\%$
	vs. load	$\pm 0.3\text{ppm max.}$ at 10 k Ohm $\pm 10\%/10\text{ pF} \pm 10\%$
	vs. aging	$\pm 1.0\text{ppm / year max.}$ at $+25^{\circ}\text{C}$
operating temperature range		$-10^{\circ}\text{C} \sim +60^{\circ}\text{C}$ $-20^{\circ}\text{C} \sim +70^{\circ}\text{C}$ $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$
input voltage V _{DD}		+3.3V DC, + 3V DC $\pm 5\%$
input current max.		1.2 mA typ. (2mA max. without load)
start-up time		3 ms max.
typical phase noise		-80 dBc/Hz at 10 Hz -110 dBc/Hz at 100 Hz -130 dBc/Hz at 1 kHz -145 dBc/Hz at 10 kHz -150 dBc/Hz at 100 kHz -150 dBc/Hz at 1 MHz
contents of reel		1000 pcs.
part no.		12.xxxxx

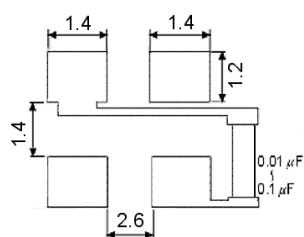
 actual size

Dimensions (mm):

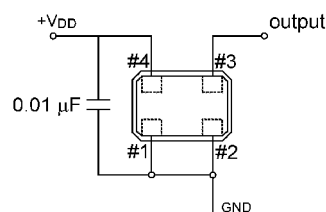


Pin	Connection
1	GND
2	GND
3	OUTPUT
4	V_{DD}

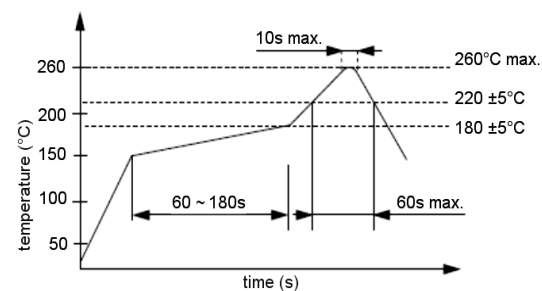
Suggested soldering pad:



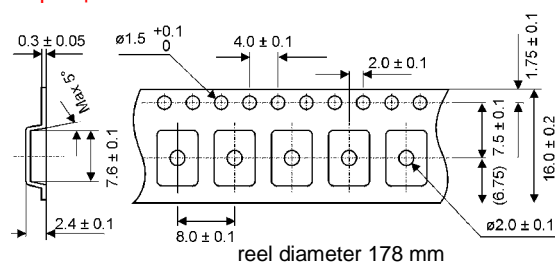
Test circuit:



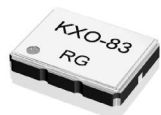
Reflow soldering condition:



Tape specification:



TCXO — KXO-83 clipped sine wave



TCXO

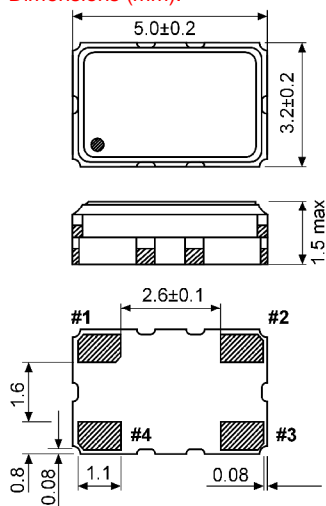
Temperature Compensated Crystal Oscillator

SMD-version +2.8V +3.3V

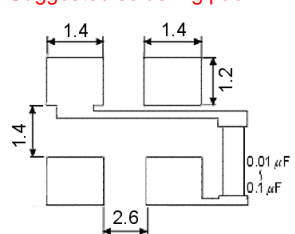
model	KXO-83
frequency range	10.0 ~ 40.0 MHz
initial frequency tolerance	±1.0ppm max.
frequency stability	±1.0ppm ~ 3.0ppm (referred to +25°C)
temperature range	±0.3ppm max. at V _{DD} ±5% DC
input voltage change	±0.3ppm max. / 15pF ±5%
output load change	±1.0ppm max. / year at +25°C ±2°C
aging	
supply voltage	+2.8 ~ 3.5V ±5%
operating conditions	
operating temperature	-20°C ~ +70°C standard, -40°C ~ +85°C available
input voltage (V _{DD})	+2.8V DC or +3.3V DC ±5%
storage temperature	-55°C ~ +125°C
input current	10 mA typ., 20 mA max.
output	HCMOS 15 pF
symmetry	40% / 60% at ½ V _{DD} level
rise and fall time max.	5 ns (10% V _{DD} ~ 90% V _{DD} level)
typical phase noise	-80 dBc/Hz @ 10 Hz
at 20 MHz offset	-110 dBc/Hz @ 100 Hz -135 dBc/Hz @ 1 kHz -140 dBc/Hz @ 10 kHz -145 dBc/Hz @ 100 kHz
start up time	3 mS max.
contents of reel	2000 pcs.
part no.	12.xxxxx



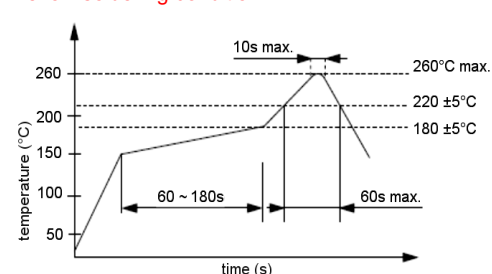
Dimensions (mm):



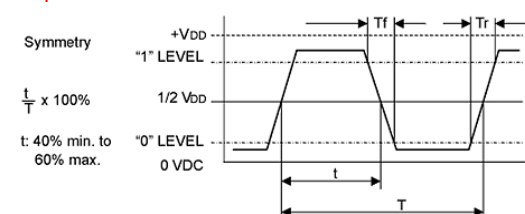
Suggested soldering pad:



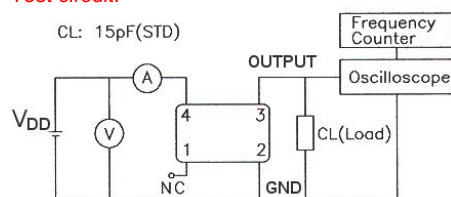
Reflow soldering condition:



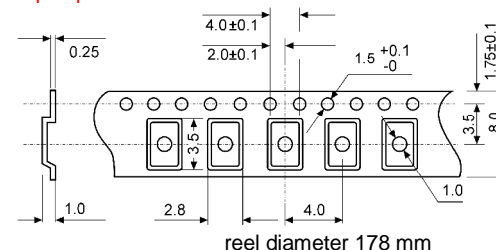
Output waveform:



Test circuit:



Tape specification:






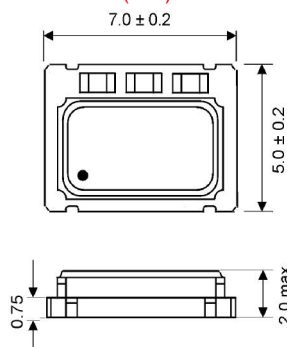
TCXO

Temperature Compensated Crystal Oscillator

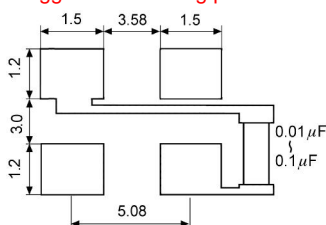
SMD-version +3.0V

model	KXO-82	
frequency range	10.0 ~ 30.0 MHz	
output	load	10 k Ohm // 10pF
	voltage	0.8Vp-p min.
	waveform	clipped sine wave (DC-cut)
frequency stability	vs. temp.range	± 2.0ppm
	vs. input voltage	± 0.2ppm max. at ± 3V DC ± 5%
	vs. load	± 0.2ppm max. at 10 k Ohm ± 10%/10 pF ± 10%
	vs. aging	± 1.0ppm / year max. at +25°C
operating temperature range	-30°C ~ +80°C	
storage temperature	-40°C ~ +85°C	
input voltage V _{DD}	+ 3V DC ± 5%	
input current max.	1.2mA typ. (20mA max. without load)	
start-up time	3 ms max.	
harmonic distortion	-5 dBc max.	
phase noise	-80 dBc/Hz at 10 Hz -110 dBc/Hz at 100 Hz -130 dBc/Hz at 1 kHz -145 dBc/Hz at 10 kHz -150 dBc/Hz at 100 kHz -150 dBc/Hz at 1 MHz	
contents of reel	1000 pcs.	 actual size
part no.	12.xxxxx	

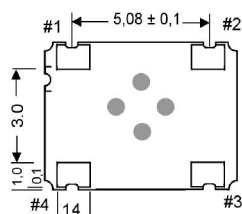
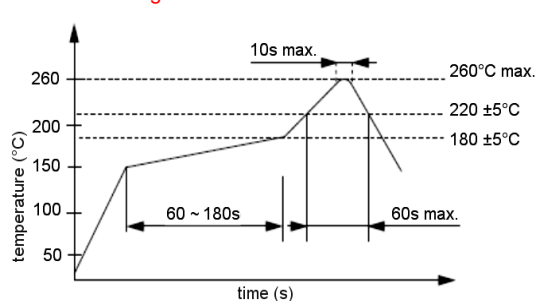
Dimensions (mm):



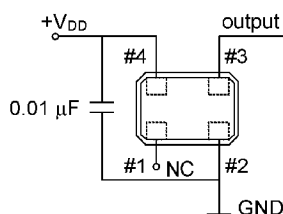
Suggested soldering pad:



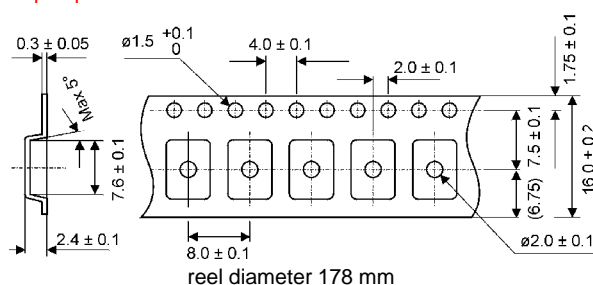
Reflow soldering condition:



Test circuit:



Tape specification:



PIN	CONNECTION
1	NC
2	GND
3	OUTPUT
4	V _{DD}



TCXO

Temperature Compensated Crystal Oscillator

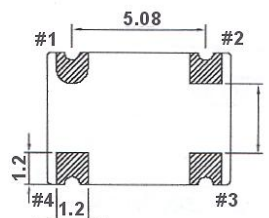
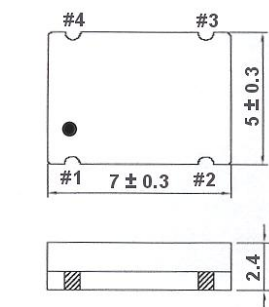
SMD-version +2.8V +3.3V

model	KXO-82
frequency range	10.0 ~ 30.0 MHz
initial frequency tolerance	±2.0ppm max.
frequency stability	±1.0ppm ~ 3.0ppm (referred to +25°C)
temperature range	±0.3ppm max. at V _{DD} ±5% DC
input voltage change	±0.3ppm max. / 15pF ±5%
output load change	±1.0ppm max. / year at +25°C ±2°C
aging	
supply voltage	+2.6 ~ 3.5V ±5%
operating conditions	
operating temperature	-20°C ~ +70°C standard, -40°C ~ +85°C available
input voltage (V _{DD})	+2.8V DC or +3.3V DC ±5%
storage temperature	-55°C ~ +125°C
input current	10 mA typ., 20 mA max.
output	HCMOS 15 pF
symmetry	40% / 60% at ½ V _{DD} level
rise and fall time max.	10 ns (10% V _{DD} ~ 90% V _{DD} level)
phase noise (typical)	-80 dBc/Hz @ 10 Hz
at 20 MHz offset	-110 dBc/Hz @ 100 Hz -130 dBc/Hz @ 1 kHz -140 dBc/Hz @ 10 kHz -145 dBc/Hz @ 100 kHz
start up time	3 mS max.
contents of reel	2000 pcs.
part no.	12.xxxxx



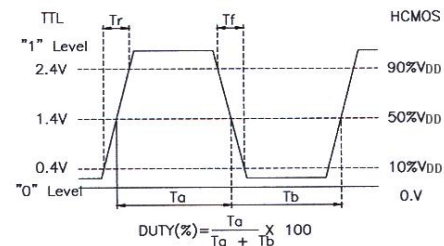
actual size

Dimensions (mm):

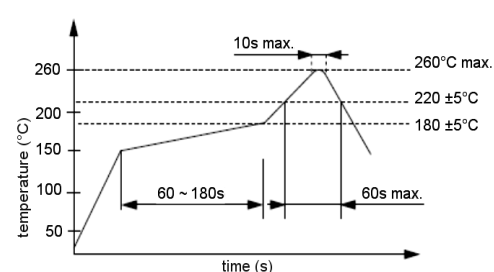


PAD No.	CONNECTION
#1	GND
#2	GND
#3	OUTPUT
#4	V _{DD}

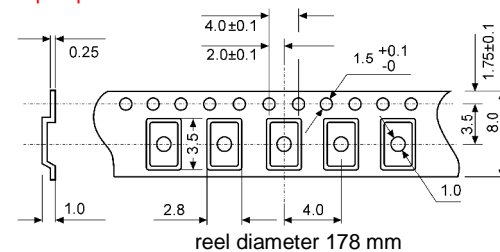
Output waveform:



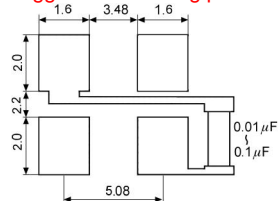
Reflow soldering condition:



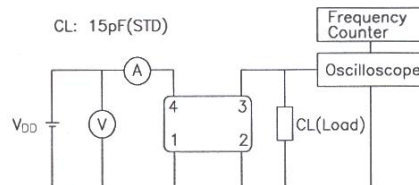
Tape specification:



Suggested soldering pad:



Test circuit:





VCTCXO

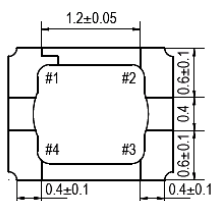
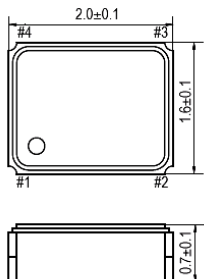
Voltage Controlled Temperature Compensated Crystal Oscillator

SMD-version +1.2V +1.8V +2.5V +3.3V

model	KXO-81
frequency range	1.25 ~ 54.0 MHz
initial frequency tolerance	± 1.5ppm max.
frequency stability	
temperature range	±2.5ppm over -30°C ~ +75°C (referred to +25°C)
input voltage change	±0.3ppm max. at $V_{DD} \pm 5\%$ DC
output load change	± 0.2ppm max.
aging	± 1.0ppm max. / year at +25°C ±2°C
supply voltage	-0,3 ~ 6,0V
operating conditions	
operating temperature	-30°C ~ +75°C
input voltage (V_{DD})	+1.2V DC, +1.8V DC, +2.5V DC, +3.3V DC ±5%
control voltage (VC)	$\frac{1}{2} V_{DD} \pm 1V$ DC
storage temperature	-40°C ~ +85°C
input current	1.5 mA max.
output	clipped sine wave level: 0,8Vp-p min. at 10 k Ω /10 p load: 10k $\Omega \pm 10\%$ // 10 pF ± 10% waveform: clipped sine wave(DC-coupling)
pulling range	± 9 ppm ~ ± 15 ppm
reflow frequency change	± 1.0ppm after reflow (at +25°C ± 2°C)
start up time	2 mS max.
typical phase noise	-80 dBc/Hz at 10 Hz -110 dBc/Hz at 100 Hz -130 dBc/Hz at 1 kHz -145 dBc/Hz at 10 kHz -150 dBc/Hz at 100 kHz -150 dBc/Hz at 1 MHz
contents of reel	2000 pcs.
part no.	12.xxxxx

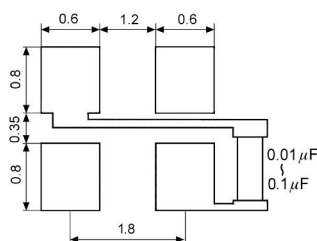
actual size

Dimensions (mm):

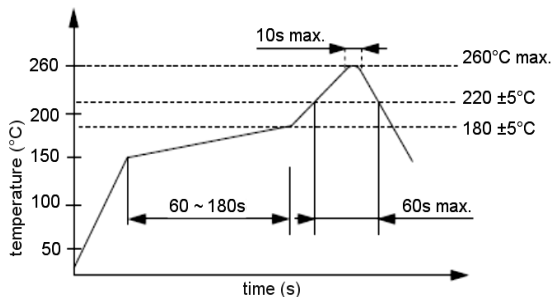


PIN	Connection
1	VC
2	GND
3	OUTPUT
4	V_{DD}

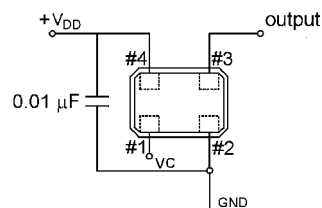
Suggested soldering pad:



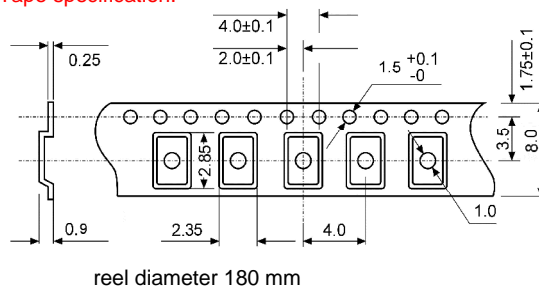
Reflow soldering condition:

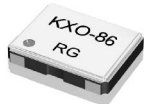


Test circuit:



Tape specification:





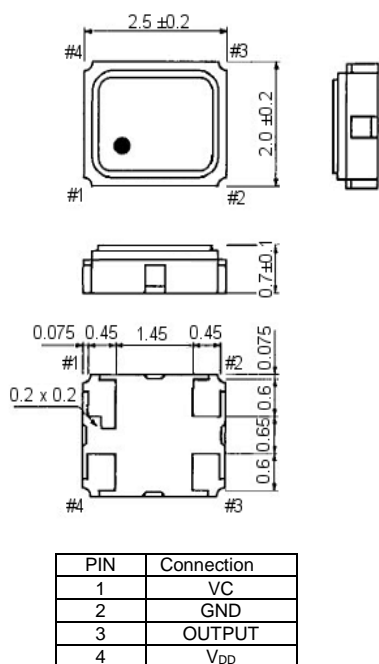
VCTCXO

Voltage Controlled Temperature Compensated Crystal Oscillator

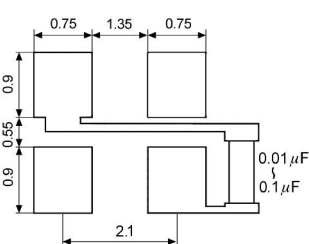
SMD-version +2.5V +3.3V

model	KXO-86
frequency range	13.0 ~ 4.0 MHz
initial frequency tolerance	± 1.5ppm max.
frequency stability	±2.5ppm over -30°C ~ +75°C (referred to +25°C)
temperature range	±0.3ppm max. at $V_{DD} \pm 5\%$ DC
input voltage change	± 0.2 ppm max.
output load change	± 1.0ppm max. / year at +25°C ±2°C
aging	
supply voltage	-0.3 ~ 6.0V
operating conditions	
operating temperature	-30°C ~ +75°C
input voltage (V_{DD})	+2.5V DC or +3.3V DC ±5%
control voltage (V_C)	$\frac{1}{2} V_{DD} \pm 1V$ DC
storage temperature	-40°C ~ +85°C
input current	1.5 mA max.
output	clipped sine wave level: 0.8Vp-p min. at 10 k Ω /10 p load: 10k Ω ±10% // 10 pF ± 10% waveform: clipped sine wave(DC-coupling)
frequency control	± 9 ppm ~ ± 15 ppm
reflow frequency change	± 1.0ppm after reflow (at +25°C ± 2°C)
start up time	2 mS max.
typical phase noise	-80 dBc/Hz at 10 Hz -110 dBc/Hz at 100 Hz -130 dBc/Hz at 1 kHz -145 dBc/Hz at 10 kHz -150 dBc/Hz at 100 kHz -150 dBc/Hz at 1 MHz
contents of reel	2000 pcs.
part no.	12.xxxxx
	actual size

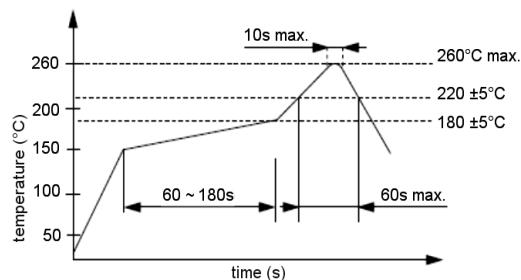
Dimensions (mm):



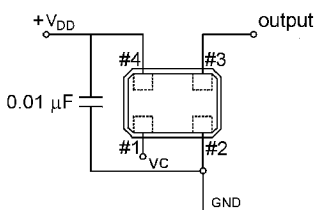
Suggested soldering pad:



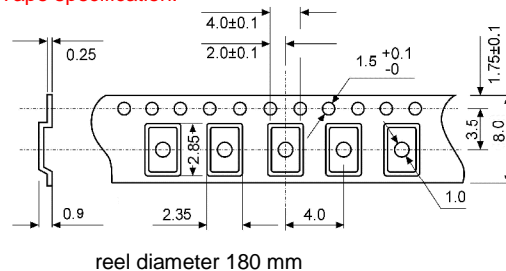
Reflow soldering condition:

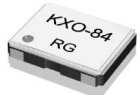


Test circuit:



Tape specification:





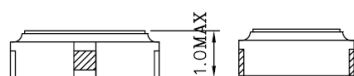
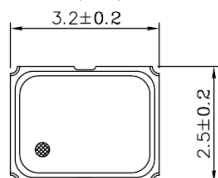
VCTCXO

Voltage Controlled Temperature Compensated Crystal Oscillator

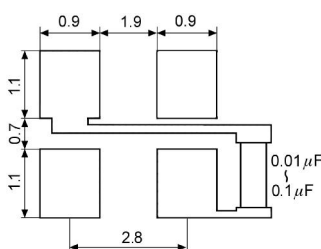
SMD-version +1.8V / +2.8V +3.3V

model	KXO-84	
frequency range	10.0 ~ 40.0 MHz	
output	load	10 k Ohm $\pm 10\%$ // 10pF $\pm 10\%$
	voltage	0.8Vp-p min. at 10 k Ohm // 10 pF
	waveform	clipped sine wave
frequency stability	vs. temp.range	± 2.5 ppm at $-30^{\circ}\text{C} \sim +75^{\circ}\text{C}$
	vs. input voltage	± 0.3 ppm at V DC
	vs. load	± 0.2 ppm max. at 10 k Ohm $\pm 10\%$ // 10 pF $\pm 10\%$
	vs. aging	± 1.0 ppm / year max. at $+25^{\circ}\text{C}$
operating temperature range	$-30^{\circ}\text{C} \sim +75^{\circ}\text{C}$	
storage temperature	$-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$	
input voltage V _{DD}	+ 1.8V DC, +2.8V DC or +3.3V DC $\pm 5\%$	
frequency control voltage (VC)	+ 1.5V DC ± 1 V DC	
input current max.	1.5 mA	
frequency adjustment (pullability)	± 9 ppm $\sim \pm 15$ ppm (VC= +1.2V _{DD} ± 1 V DC)	
start-up time	3 ms max.	
harmonics	-5.0 dBc max.	
phase noise	-80 dBc/Hz max. at 10 Hz -110 dBc/Hz max. at 100 Hz -130 dBc/Hz max. at 1 kHz -145 dBc/Hz max. at 10 kHz -150 dBc/Hz max. at 100 kHz -150 dBc/Hz max. at 1 MHz	
contents of reel	1000 pcs.	actual size
part no.	12.xxxxx	

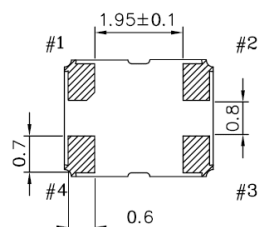
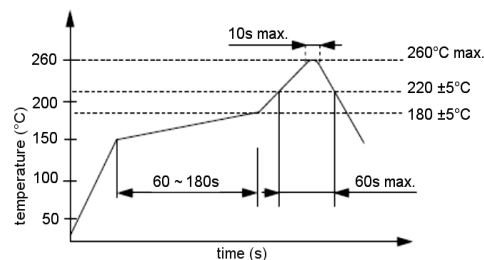
Dimensions (mm):



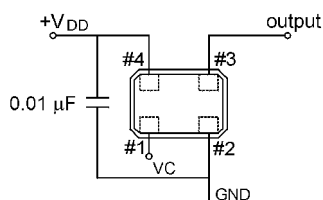
Suggested soldering pad:



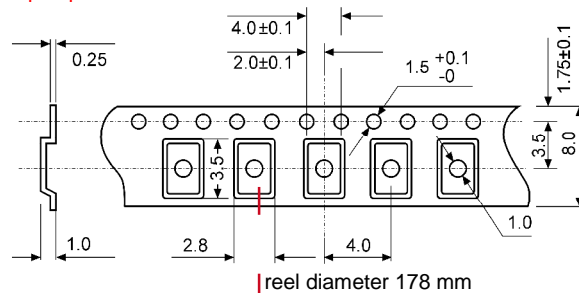
Reflow soldering condition:



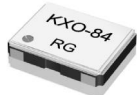
Test circuit:



Tape specification:



Pin	Connection
1	VC
2	GND
3	OUTPUT
4	V _{DD}

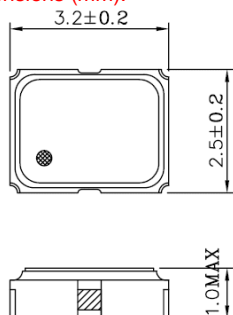


VCTCXO

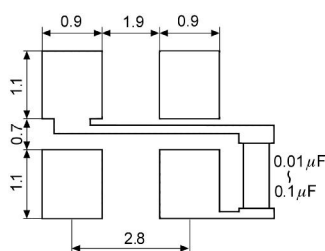
Voltage Controlled Temperature Compensated Crystal Oscillator

model	KXO-84	SMD-version +2.8V +3.3V
frequency range	8.0 ~ 40.0 MHz	
initial frequency tolerance	±1.5ppm max.	
frequency stability		
temperature range	±1.0ppm over -30°C ~ +85°C (referred to +25°C)	
input voltage change	±0.3ppm max. at V _{DD} ±5% DC	
output load change	±0.3ppm max. / 15pF ±5%	
aging	±1.0ppm max. / year at +25°C ±2°C	
supply voltage	+2.6 ~ 3.5V ±5%	
operating conditions		
operating temperature	-40°C ~ +85°C	
input voltage (V _{DD})	+2.8V DC or +3.3V DC ±5%	
storage temperature	-40°C ~ +90°C	
input current	7.0 mA max.	
output	HCMOS	
	15 pF	
symmetry	40% / 60% at ½ V _{DD} level	
rise and fall time max.	5 ns (10% V _{DD} ~ 90% V _{DD} level)	
"0" level	V _{OL} : 0.5V max.	
"1" level	V _{OH} : 80% V _{DD} min.	
pulling range	±5 ppm ~ ±20ppm	
control voltage range	+1.5V ±1.0V (V _{DD} : 3.0V)	
typical phase noise	-80 dBc/Hz max. @t 10 Hz -110 dBc/Hz max. at 100 Hz -130 dBc/Hz max. at 1 kHz -145 dBc/Hz max. at 10 kHz -150 dBc/Hz max. at 100 kHz -150 dBc/Hz max. at 1 MHz	
start up time max.	3 ms	
contents of reel	1000 pcs.	
part no.	12.xxxxx	actual size

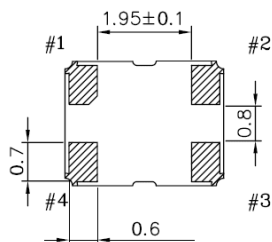
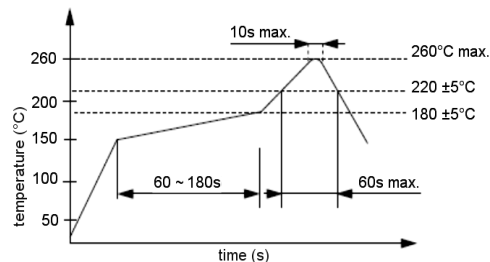
Dimensions (mm):



Suggested soldering pad:

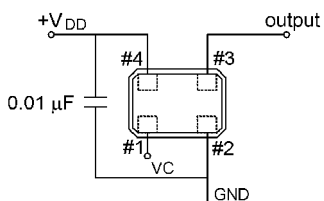


Reflow soldering condition:

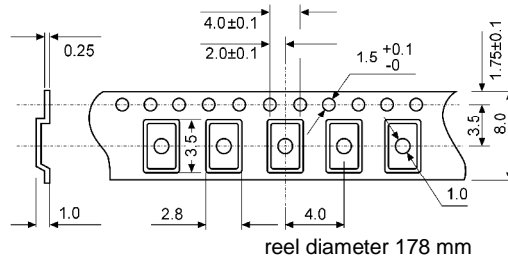


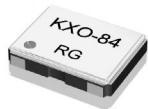
Pin	Connection
1	VC
2	GND
3	OUTPUT
4	V _{DD}

Test circuit:



Tape specification:






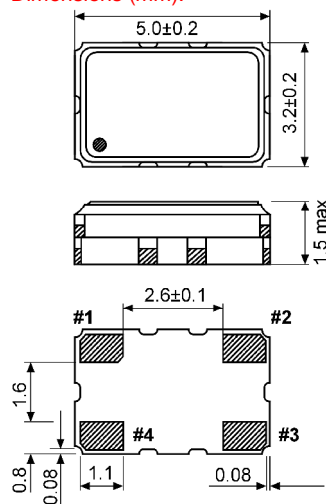
VCTCXO

Voltage Controlled Temperature Compensated Crystal Oscillator

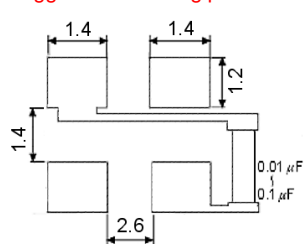
SMD-version +3.0V

model	KXO-83	
frequency range	12.0 ~ 26.0 MHz	
output	load	10 k Ohm // 10pF
	voltage	0.8Vp-p min.
	waveform	clipped sine wave
frequency stability	vs. temp.range	±1.5 ~ ±5.0ppm at -10°C ~ +60°C ±2.0 ~ ±5.0ppm at -20°C ~ +70°C ±2.0 ~ ±5.0ppm at -40°C ~ +85°C
	vs. input voltage	± 0.3ppm max. ± 5%
	vs. load	± 0.3ppm max. at 10 k Ohm ± 10%/10 pF ± 10%
	vs. aging	± 1.0ppm / year max. at +25°C
operating temperature range	-10°C ~ +60°C -20°C ~ +70°C -40°C ~ +85°C	
input voltage V _{DD}	+ 3V DC ± 5%	
frequency control voltage (VC)	+ 1.5V DC ± 1V DC positive transfer characteristic	
input current max.	1.2mA typ. (2mA max. without load)	
frequency adjustment (pullability)	voltage control ± 5 ppm min. positive slope	
start-up time	3 ms max.	
typical phase noise	-80 dBc/Hz at 10 Hz -110 dBc/Hz at 100 Hz -130 dBc/Hz at 1 kHz -145 dBc/Hz at 10 kHz -150 dBc/Hz at 100 kHz -150 dBc/Hz at 1 MHz	
contents of reel	1000 pcs.	 actual size
part no.	12.xxxxx	

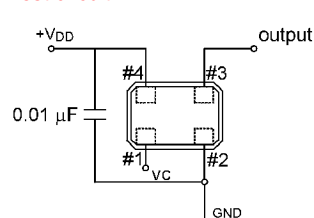
Dimensions (mm):



Suggested soldering pad:

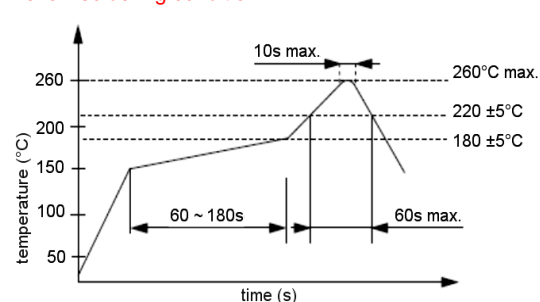


Test circuit:

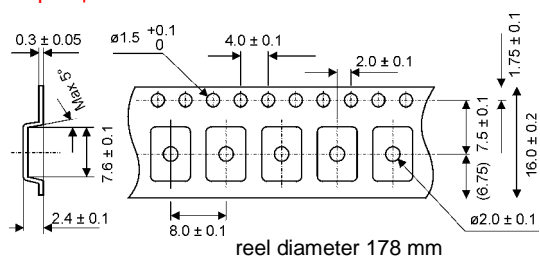


Pin	Connection
1	VC
2	GND
3	OUTPUT
4	V _{DD}

Reflow soldering condition:



Tape specification:






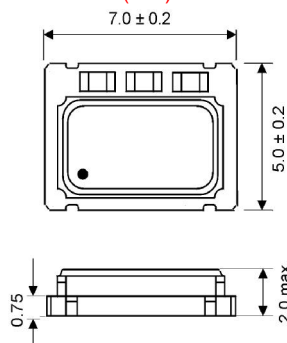
VCTCXO

Voltage Controlled Temperature Compensated Crystal Oscillator

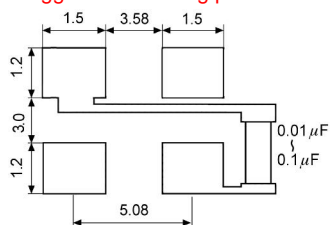
SMD-version +3.0V

model	KXO-82	
frequency range	12.60 ~ 20.0 MHz	
output	load	10 k Ohm // 10pF
	level	0.8Vp-p min.
	waveform	clipped sine wave (DC-cut)
frequency stability	vs. temp.range	± 2.0 ppm
	vs. input voltage	± 0.2ppm max. at ± 3V DC ± 5%
	vs. load	± 0.2ppm max. at 10 k Ohm ± 10%/10 pF ± 10%
	vs. aging	± 1.0ppm / year max. at +25°C
operating temperature range	-30°C ~ +80°C	
storage temperature	-40°C ~ +85°C	
input voltage V _{DD}	+ 3V DC ± 5%	
frequency control voltage (VC)	+ 1.5V DC ± 1V	
input current max.	1.2 mA typ. (20 mA max. without load)	
frequency adjustment (pullability)	voltage control ± 5 ppm min. positive slope	
start-up time	3 ms max.	
harmonic distortion	-5 dBc max.	
phase noise	-80 dBc/Hz at 10 Hz -110 dBc/Hz at 100 Hz -130 dBc/Hz at 1 kHz -145 dBc/Hz at 10 kHz -150 dBc/Hz at 100 kHz -150 dBc/Hz at 1 MHz	
contents of reel	2000 pcs.	 actual size
part no.	12.xxxxx	

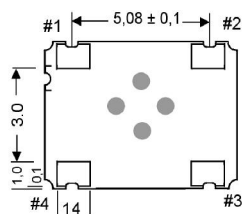
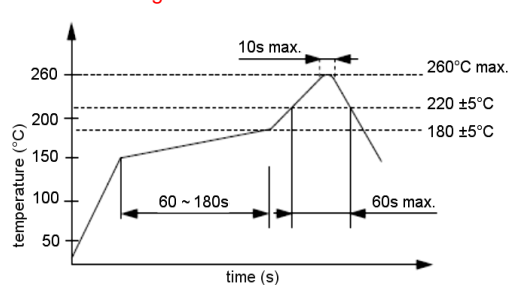
Dimensions (mm):



Suggested soldering pad:

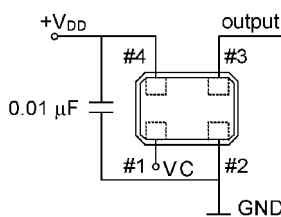


Reflow soldering condition:

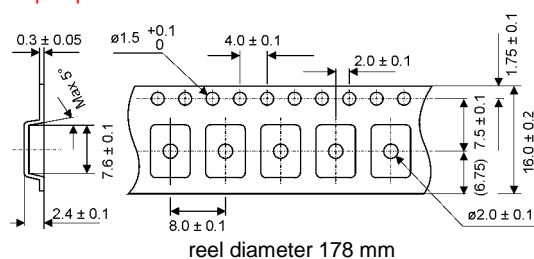


PIN	CONNECTION
1	VC
2	GND
3	OUTPUT
4	V _{DD}

Test circuit:



Tape specification:





LVDS Clock Oscillator

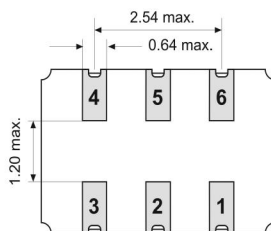
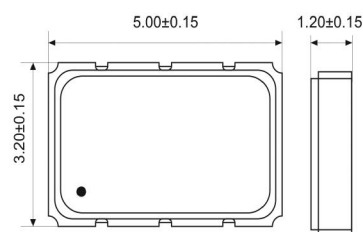
SMD-version +2.5V +3.3V

model	KXO-V66
frequency range	40.0 ~ 600.0 MHz
frequency stability incl. temperature stability, input voltage and load stability, aging. at -20° ~ +70°C at -40° ~ +85°C	±25ppm ~ ±100ppm ±25ppm ~ ±100ppm
operating temperature	standard -20° ~ +70°C available -40° ~ +85°C (=KXO-V66T)
storage temperature	-55° ~ +125°C
symmetry	50% ± 5% at ½ Output level
rise & fall time (Tr) max.	300 ps typ. 600 ps max. (20% ~ 80% of waveform)
rise & fall time (Tf) max.	300 ps typ. 600 ps max. (80% ~ 20% of waveform)
LVDS offset output voltage	1.125V ~ 1.375V
"O" level max.	0.9V ~ 1.1V
"1" level min.	1.4V ~ 1.6V
input voltage V _{DD}	+2.5V, + 3.3V ± 5%
input current	80 mA
output load	100 Ohm
start up time max.	10 ms
tristate function	yes
disable delay time	200 ns max.
enable delay time	4 ms max.
phase jitter (12kHz ~ 20MHz)	RMS: 1ps max.
typical phase noise	-70 dBc/Hz at 10 Hz -105 dBc/Hz at 100 Hz -130 dBc/Hz at 1 kHz -145 dBc/Hz at 10 kHz -145 dBc/Hz at 100 kHz -145 dBc/Hz at 1 MHz
contents of reel	1000 pcs.
part no.	12.xxxxx



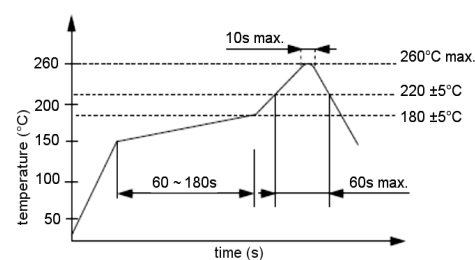
actual size

Dimensions (mm):

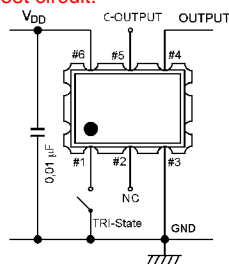


PIN	CONNECTION
1	Tri-state*
2	NC
3	GND
4	Output
5	C-Output V _{DD}
6	

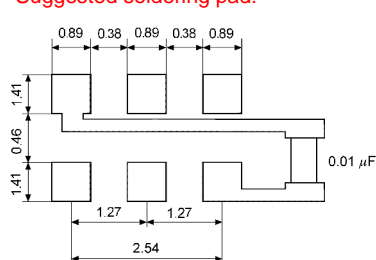
Reflow soldering condition:



Test circuit:

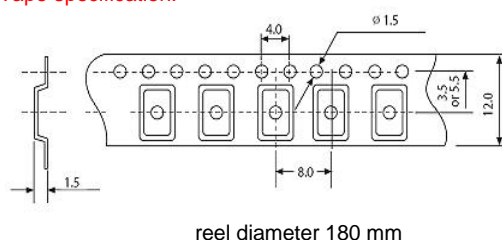


Suggested soldering pad:



note:
A capacitor of value 0,01µF and 10µF
between V_{DD} and GND is recommended.


Tape specification:



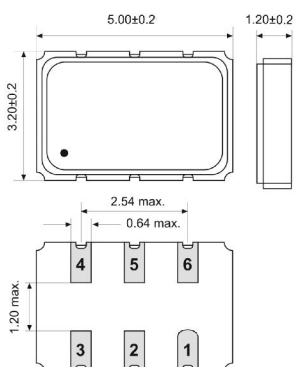


LVDS VCXO

SMD-version +2.5V +3.3V

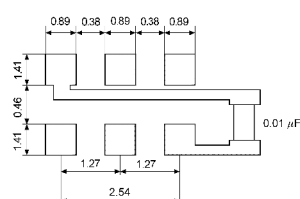
model	KXO-V62	
frequency range	20.0 ~ 700.0 MHz	
frequency stability incl. temperature stability	± 50ppm standard	
input voltage and load stability, aging	±25ppm available	
operating temperature	-20° ~ +70°C standard	
	-40° ~ +85°C available	
storage temperature	-40° ~ +125°C	
symmetry	50% ± 5%	
rise & fall time max.	0.4 ns (20% ~ 80% of output level)	
output high level max.	1.43V typ. ~ 1.60V	
output low level	0.90V min. ~ 1.10V typ.	
input voltage V _{DD}	+2.5V, + 3.3V ± 5%	
input current max.	65 mA	
output load	100 Ohm (OUT – OUTN)	
start up time max.	5 ms	
APR (absolute pulling range) min.	± 50 ppm (Vcon = +1,65V ± 1,65V)	
frequency linearity max.	10%	
frequency slope	positive	
Vcon input impedance min.	10 M Ohm at DC characteristic	
disable delay time max.	200 ns	
enable delay time max.	4 ms	
pin 1 control voltage	1.25V±1.05V (1.25V), 1.65V±1.35V (1.65V)	
pin 2 function	enable input voltage	
pin 2 function	enable input voltage	70% V _{DD} min. or NC
	disable input voltage	30% V _{DD} max.
output disable current (Pin #2 = VIL) max.	3.5 mA	
phase jitter (12kHz ~ 20MHz) RMS max.	1.0 ps	
typical phase noise	-125 dBc / 1 kHz	
	-160 dBc / 10 MHz	
contents of reel	1000 pcs.	
part no.	12.xxxxx	
		 actual size

Dimensions (mm):

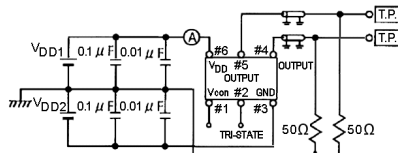


PIN	CONNECTION
1	VC
2	"L" Open or "H"
3	GND
4	Z Output
5	Z C-Output
6	V _{DD}

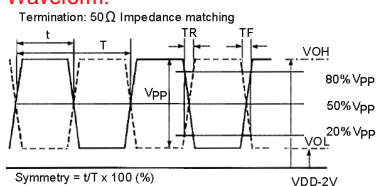
Suggested soldering pad:



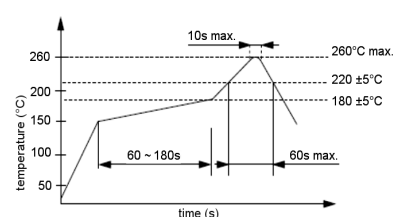
Test circuit:



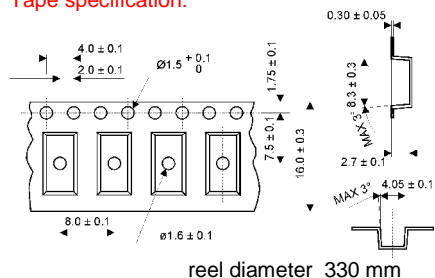
Waveform:



Reflow soldering condition:



Tape specification:





LVDS Clock Oscillator

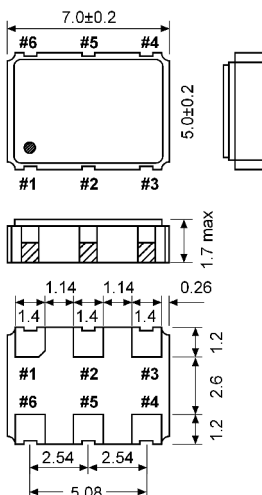
SMD-version +2.5V +3.3V

model	KXO-V65
frequency range	19.440 ~ 700.0 MHz
frequency stability at -20° ~ +70°C at -40° ~ +85°C	± 50ppm ± 100ppm
operating temperature	standard -20° ~ +70°C available -40° ~ +85°C (= KXO-V65T)
storage temperature	-55° ~ +125°C
symmetry	50% ±5% at ½ V _{DD} level
rise and fall time (Tr) max.	300ps typ. 600ps max. (20% ~ 80% of waveform)
rise and fall time (Tf) max.	300ps typ. 600ps max. (80% ~ 20% of waveform)
LVDS offset output voltage	1.125V ~ 1.375V
"0" level max.	0.9V ~ 1.1V
"1" level min.	1.43V ~ 1.6V
input voltage V _{DD}	+2.5V, +3.3V ± 5%
input current max.	80 mA
output load	100 Ohm
start up time max.	10 ms
tristate function	yes
disable delay time	200 ns max.
enable delay time	4 ms max.
typical phase noise	-70 dBc/Hz at 10 Hz -105 dBc/Hz at 100 Hz -130 dBc/Hz at 1 kHz -145 dBc/Hz at 10 kHz -145 dBc/Hz at 100 kHz -145 dBc/Hz at 1 MHz
phase jitter (12kHz ~ 20MHz)	RMS: 19.440 ~ 212,5 MHz 1ps max. < 700,0 MHz 4ps max.
contents of reel	1000 pcs.
part no.	12.xxxxx



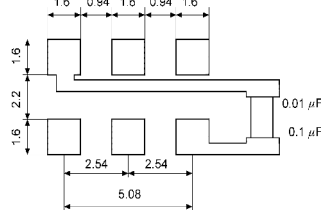
actual size

Dimensions (mm):

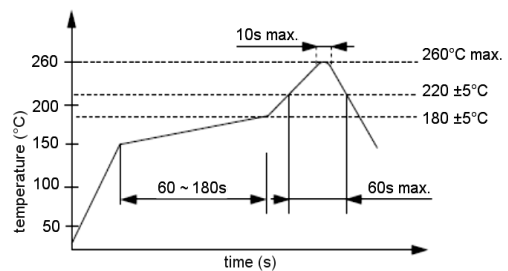


PIN	CONNECTION
1	Tri-state
2	NC
3	GND
4	Output
5	C-Output
6	V _{DD}

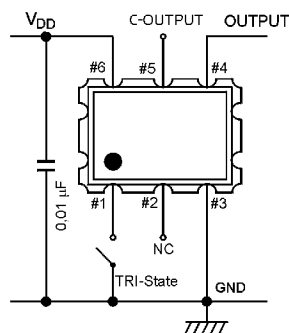
Suggested soldering pad:



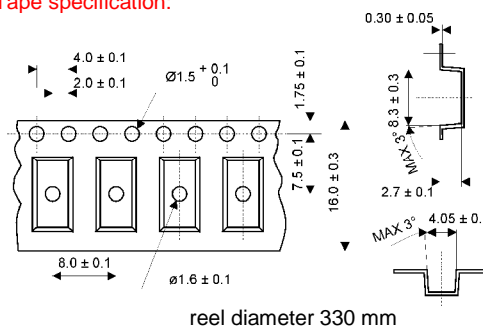
Reflow soldering condition:



Test circuit:



Tape specification:



reel diameter 330 mm



LVDS VCXO

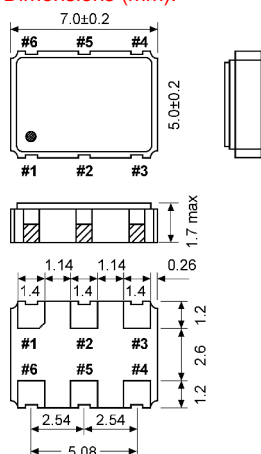
SMD-version +2.5V +3.3V

model	KXO-V63
frequency range	20.0 ~ 700.0 MHz
frequency stability incl. temperature stability input voltage and load stability, aging. at -20° ~ +70°C at -40° ~ +85°C	±25ppm ~ ±100ppm ±25ppm ~ ±100ppm
operating temperature	standard -20° ~ +70°C available -40° ~ +85°C (=KXO-V63T)
storage temperature	-40° ~ +125°C
symmetry	50% of waveform
rise & fall time (Tr) max.	400ps typ 850ps max. (20% ~ 80% of waveform)
rise & fall time (Tf) max.	400ps typ 850ps max. (80% ~ 20% of waveform)
LVDS offset output voltage	1.125V ~ 1.375V
"O" level max.	0.9V ~ 1.1V
"1" level min.	1.43V ~ 1.6V
input voltage V _{DD}	+2.5V, + 3.3V ± 5%
input current max.	45 ~ 60 mA
output load	100 Ohm
start up time max.	10 ms
frequency adjustment (pullability)	± 50ppm, ± 100ppm
tristate function	yes
disable delay time	200 ns max.
enable delay time	4 ms max.
phase jitter (12kHz ~ 20MHz)	RMS: 1ps typ, 3ps max.
typical phase noise	-70 dBc/Hz at 10 Hz -105 dBc/Hz at 100 Hz -130 dBc/Hz at 1 kHz -145 dBc/Hz at 10 kHz -145 dBc/Hz at 100 kHz -145 dBc/Hz at 1 MHz
contents of reel	1000 pcs.
part no.	12.xxxxx



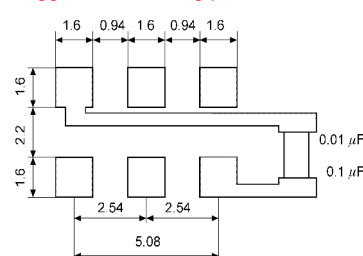
actual size

Dimensions (mm):

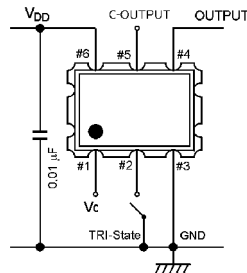


PIN	CONNECTION
1	VC
2	Tri-state
3	GND
4	Output
5	C-Output
6	V _{DD}

Suggested soldering pad:

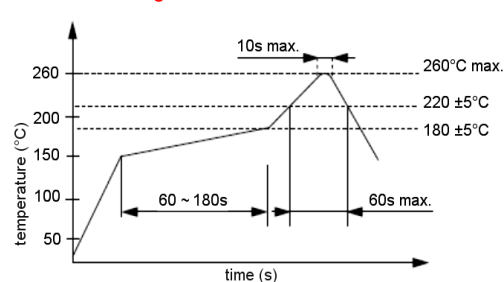


Test circuit:

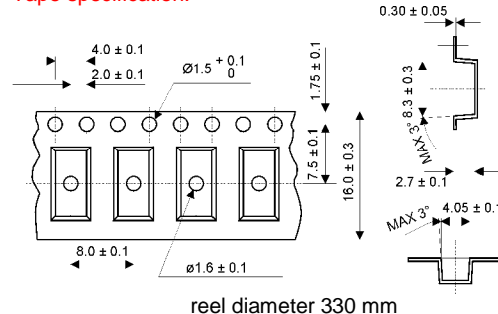


pin #2 "L" (0 V) "H" (+3.3 V) or OPEN	pin #4 / pin #5 HIGH IMPEDANCE (Z) OUTPUT
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Reflow soldering condition:



Tape specification:



reel diameter 330 mm



PECL

Positive Emitter Coupled Oscillator

SMD-version +2.5V +3.3V

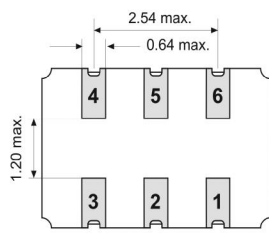
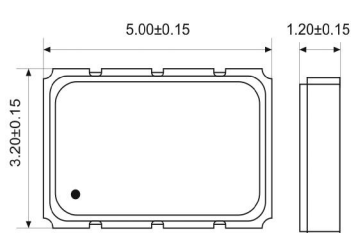
model	KXO-68
frequency range	25.0 ~ 180.0 MHz
frequency stability over all conditions	±100 ppm = KXO-68A ± 50 ppm = KXO-68B ± 25 ppm = KXO-68D
storage temperature	-55°C ~ +125°C
operating temperature range	standard -20°C ~ +70°C available -40°C ~ +85°C
symmetry	40% ~ 60% (at crossing point)
rise and fall time (max.)	1.0 ns (20% ~ 80% of amplitude)
start up time (max.)	10 ms
"O" level max.	V _{DD} to +1.62V DC
"1" level min.	V _{DD} to +1.025V DC
disable delay time max.	100 ns
enable delay time max.	10 ms
input voltage (V _{DD})	+2.5V DC, + 3.3V DC ± 5%
supply voltage	-0.5V to +7.0V
input current (Pin#1=Open or VIH)	90 mA max.
load	50 Ohm (V _{DD} to +2.0V)
stand-by control voltage	VIH: +0,7V _{DD} min. VIL: +0,3V _{DD} max.*
stand-by current (Pin#1=VIL)	100 µA max.
phase jitter (12 kHz to 20 MHz band)	1 ps RMS max.
typical phase noise	-70 dBc/Hz at 10 Hz -105 dBc/Hz at 100 Hz -130 dBc/Hz at 1 kHz -145 dBc/Hz at 10 kHz -145 dBc/Hz at 100 kHz -145 dBc/Hz at 1 MHz
contents of reel	1000 pcs.
part no.	12.xxxxx



actual size

* Internal crystal oscillation to be halted (Pin#1=VIL).

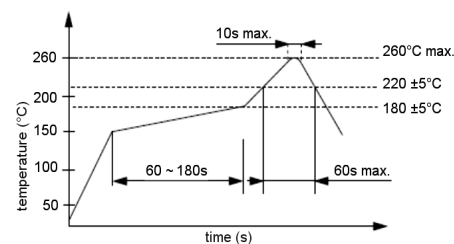
Dimensions (mm):



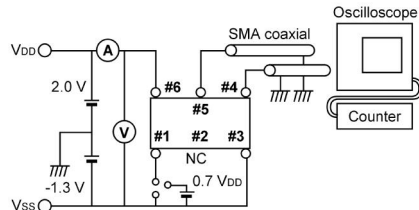
PIN	CONNECTION
1	Tri-state*
2	NC
3	GND
4	Output
5	C-Output
6	V _{DD}

*enable high

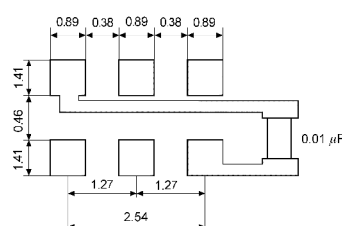
Reflow soldering condition:



Test circuit:

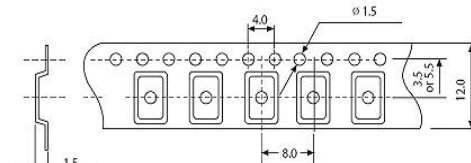


Suggested soldering pad:



Note:
A capacitor of value 0.01µF and 10µF
between V_{DD} and GND is recommended.

Tape specification:



reel diameter 180 mm



PECL

Positive Emitter Coupled Oscillator

SMD-version +2.5V +3.3V

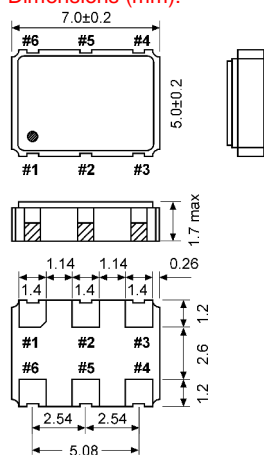
model	KXO-67
frequency range	50.0 ~ 212.50 MHz
frequency stability over all conditions	±100ppm = KXO-67A ± 50ppm = KXO-67B ± 25ppm = KXO-67D
storage temp.range	-50°C ~ +125°C
operating temp.range	standard -20°C ~ +70°C available -40°C ~ +85°C
symmetry	40% ~ 60% (at crossing point)
rise and fall time (max.)	0.8 ns (20% ~ 80% of amplitude)
start up time (max.)	10 ms
"O" level max.	V _{DD} to +1.63V
"1" level min.	V _{DD} to +1.02V
disable delay time max.	100 ns
enable delay time max.	10 ms
input voltage (V _{DD})	+3.3V DC ±5%
supply voltage	-0.5V to +7.0V
input current (Pin#1=Open or VIH)	90 mA max.
load	50 Ohm (V _{DD} to +2,0V)
stand-by control voltage	VIH: +0.7V _{DD} min. VIL: +0.3V _{DD} max.*
stand-by current (Pin#1=VIL)	100 µA max.
phase jitter (12 kHz to 20 MHz band)	RMS: 1 ps max.
aging at 25°C (first year) max.	± 5ppm max.
typical phase noise	-70 dBc/Hz at 10 Hz -105 dBc/Hz at 100 Hz -130 dBc/Hz at 1 kHz -145 dBc/Hz at 10 kHz -145 dBc/Hz at 100 kHz -145 dBc/Hz at 1 MHz
contents of reel	1000 pcs.
part no.	12.xxxxx



actual size

* Internal crystal oscillation to be halted (Pin#1=VIL).

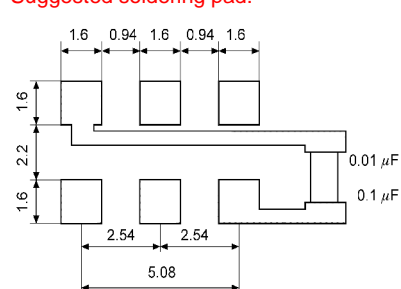
Dimensions (mm):



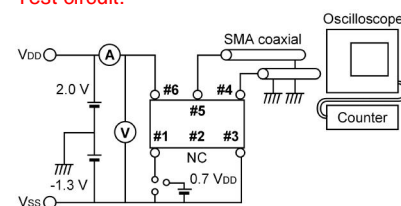
PIN	CONNECTION
1	Tri-state*
2	NC
3	GND
4	Output
5	C-Output
6	V _{DD}

*enable high

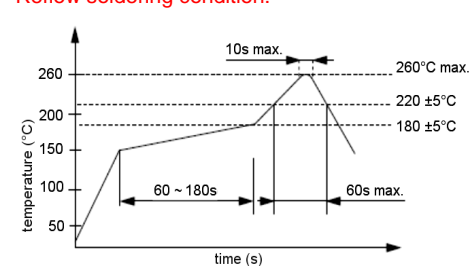
Suggested soldering pad:



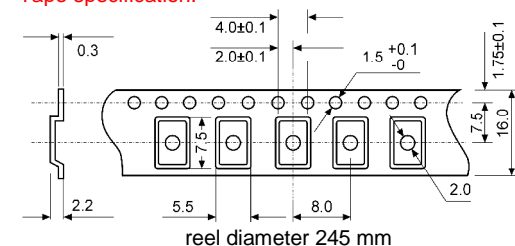
Test circuit:



Reflow soldering condition:



Tape specification:



Technical explanation of crystal oscillators

XO	Crystal oscillator	Typical supply voltages: 1.8/2.5/3.0/3.3 or 5 Volt. Typical output levels: clipped sine/TTL/HCMOS. The same temperature characteristics as a corresponding crystal.
VCXO	Voltage controlled oscillator	Typical supply voltages and output levels as above. Can be pulled up or down over a specified frequency range by applying a control voltage to a control pin. Note: This pin must be connected to a specified voltage. Grounding, pulling to V_{DD} or leave open (NC) will seriously degrade the properties of the oscillator. If the pullability is not needed, better choose a XO.
TCXO	Temperature compensated oscillator	Typical supply voltages and output levels as above. About one order of magnitude better accuracy over temperature than XOs.
VCTCXO	Voltage controlled temperature compensated oscillator	A combination of the oscillator types mentioned afore. The same note also applies here.
SSO	Spread spectrum oscillator	The output frequency varies continuously around the desired frequency to avoid discrete signal peaks in the output noise spectrum. Typical center sweeps are $\pm 0.5\%$ to $\pm 2.0\%$, typical down sweeps are -0.5% to -4% . Typical supply voltage is 3.3V. Typical output signal level is HCMOS.
LVDS	Low-voltage differential signal oscillator	High speed oscillator with differential output (ANSI/TIA/EIA-644A). Output swing $\pm 350\text{mV}$. Typical supply voltage 2.5V/3.3V. Low power consumption.
(LV)PECL	Low-Voltage Positive-Emitter-Coupled Logic	High speed oscillator with differential output. Output swing $\pm 800\text{mV}$. Typical supply voltage 2.5V/3.3V. Medium to high power consumption-

GEYER worldwide



www.geyer-electronic.com

GEYER ELECTRONIC . HQ GERMANY
Lochhamer Schlag 5 D-82166 Gräfelfing / München
Tel: +49 89 546868-0 Fax: +49 89 546868-91 e-mail: info@geyer-electronic.de

GEYER ELECTRONIC UK office
Romsey/Hampshire
Tel: +44 1794 329341 • e-mail: sales@geyer-electronic.co.uk

GEYER ELECTRONIC France Office
Brehal / Manche
Tel: +33 950 32 4987 Cellphone: +33 781 51 6993 e-mail: poullain@geyer-france.fr

GEYER ELECTRONIC HUNGARY Kft.
Budapest
Tel: +36 70 413 84 32 Fax: +36 7090 83 000
e-mail: kollmann@geyer-electronic.hu e-mail: machata@geyer-electronic.hu

GEYER ELECTRONIC AMERICA, Inc.
El Cajon / San Diego
Tel: +1 619 401-4038 Fax: 1 619 401-4095 e-mail: sales@geyer-usa.com

GEYER ELECTRONIC India Office
Bangalore
Tel: +91 80 23210173 Cellphone: 9880213077 e-mail: raghavendra@geyer-india.com

GEYER ELECTRONIC (Asia) Pte. Ltd.
Singapore
Tel: +65 6766 6938 Fax: +65 6766 6392 e-mail: sales@geyer-electronic.net

GEYER ELECTRONIC Taiwan Office
Taipei
Tel: +886 2 5582 5888 e-mail: sales6@geyer-electronic.net

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General Terms and Conditions of Sale of GEYER ELECTRONIC e. K (Rev. 01/2016)

I.Scope of Validity

- 1.These Conditions shall apply exclusively to all our offers, supplies and services to our Customer. These Conditions shall also apply for future orders, supplies and services without the need of any express agreement thereon at the conclusion of such transaction.
- 2.Any conditions of the Customer, which differ from our Conditions shall not be recognized, whether or not we have objected to such conditions. Our Conditions shall also apply, if we, knowing of any contradictory or dissenting conditions of our Customer, unconditionally execute the supply.
- 3.Our Conditions shall apply only to contractors as defined by § 310, Section 1 BGB (German Civil Code).

II.Offer and Acceptance

- 1.Our quotations are subject to change without notice and are not binding unless they are expressly described as being binding.
- 2.Any describing data of our products, such as illustrations, drawings, specifications, weights, dimensions, performance-, operational- and consumption data, loading capacities, tolerances, and information relating to the use or suitability for a particular application, contained in our offer, in prospectus, catalogues or similar documents, constitute an approximate guide and shall not be binding unless expressly described as binding. Any such data relate to serial products which have been tested under central European operation conditions and describe their standard functions. They are not to be deemed guaranteed properties but are descriptions or definitions of the goods or services.
- 3.Customary changes in quantities, quality or specifications of the goods, changes as a result of a change of law and technical improvements shall be allowed. We may also replace parts of the goods with other equal parts provided such parts do not impair their suitability for the purpose provided for by the contract.
- 4.We reserve the right of ownership and copyright of all quotation documents; they may not be made available to third parties unless upon our approval.
- 5.Offer made by the Customer shall be in writing (letter, telefax, e-mail).
- 6.We may accept an order made by a Customer within 4 weeks after its receipt, which shall be confirmed in writing.

III.Prices and Terms of Payment

- 1.The prices quoted by us are in EURO and are given on the basis ex works (EXW as per Incoterms 2000) for deliveries within and outside Germany, subject to the provisions under Section IV.1 hereunder. Value added tax shall be added at the rate applicable at the time of invoicing.
- 2.Unless otherwise agreed, the price shall be paid within 30 calendar days (without discount).
- 3.If the Customer is in delay in making payment, we are entitled to charge interest for late payment at the rate of 9 % p.a. above the relevant base rate of the Deutsche Bundesbank. The creditor of a remuneration has in case of default also the right to get a flat payment of 40 Euro. If we are able to demonstrate a greater loss as a result of late payment, then we are entitled to claim for this loss.
- 4.Any offsetting or retaining of payment by the Customer is only permitted if Customer's counterclaims are not contested or have been finally decided by the court.

IV.Delivery

- 1.Deliveries within Germany and outside Germany shall be made Ex Works (EXW according to Incoterms 2000). The means of shipment shall be at our sole discretion. We will deliver in customary packaging. Unless otherwise agreed upon, we will charge the Customer for all shipment and packaging costs as accrued. At the request of the Customer, the deliveries will be insured by us at his expense.
- 2.We are entitled to make partial deliveries.
- 3.We are entitled to charge the Customer for costs incurred by us due to Customer's failure to accept the goods or because of false information given by him.
- 4.The minimum order value for shipments shall be EURO 25,- (without VAT).

V.Transfer of Risk

- 1.The risk of accidental loss and accidental deterioration of the goods passes to the Customer when the goods are ready for shipment.
- 2.If the delivery is delayed due to circumstances for which the Customer is responsible for, the risk passes over to him from the date of readiness for shipment.

VI.Transportation Damages

- 1.The Customer shall give notice in writing without delay to us as well as to the carrier or such other party in charge of the transport of any transport damage within the following time-limits :

In case of damaged packaging :

- a) Mail :The damage needs to be confirmed upon handing over and to be notified at the post office within 24 hours (!). The damage needs to be notified to us within 48 hours.
- b) Parcel Post :The damaged goods need to be unpacked in the presence of the driver and the damage needs to be confirmed by him. The damage is to be notified to us within 48 hours.
- c) Transport: The damaged goods need to be unpacked in the presence of the driver and the damage needs to be confirmed on the bill of lading. The damage is to be notified to us within 48 hours.

In case of undamaged packaging :

- a) Mail: Immediately (within 24 hours) the post office in charge needs to be notified and an inspection and a finding of facts is to be applied for. The damage is to be notified to us within 48 hours.
- b) Parcel Post: The damage is to be notified to us within 48 hours.
- c) Transport :The damaged goods need to be unpacked in the presence of the driver and the damage needs to be confirmed on the bill of lading, indicating that the packaging has been undamaged prior to the ascertainment of the damage. The damage is to be notified to us within 48 hours.

VII.Delivery Time

- 1.Compliance with the agreed due dates for delivery requires that the Customer has fulfilled all his obligations in good time and in the appropriate way.
- 2.The delivery time has been complied with if by the end of the delivery period, the ordered goods have been handed over to the Customer, or the carrier or the other party in charge of the transport, or is ready for shipment and this has been notified to the Customer.
- 3.If non-compliance with an agreed delivery period is due to force majeure or other circumstances for which we are not responsible, the delivery period will be extended by the duration of such events.
- 4.If a delivery is in delay due to circumstances for which we are responsible for, or becomes impossible, our liability for damages shall be limited in accordance with the provisions of Section X hereunder.

VIII.Retention of Title

- 1.The property of all goods supplied shall remain with us until all amounts outstanding to us under the business relationship with the Customer are fully paid. In the event of a breach of contract by the Customer, especially in case of default of payment or in case of enforcement measures by third parties, we are entitled to demand return of the goods. Return of the goods or their seizure shall not be deemed termination or cancellation of the contract, unless we have expressly declared so. We are entitled to the sale or any other use or exploitation of such returned goods.
 - 2.The Customer may neither pledge nor assign the goods by way of security. The Customer shall notify us immediately in the event of seizures of or other enforcement measures by third parties to the goods.
 - 3.The Customer is entitled to resell the goods in the ordinary course of business.
- Once the goods are resold, payment claims by the customer against his own buyer as a result of the resale are deemed to have been assigned to us, whether or not such goods have been incorporated into, processed or mixed with other goods. We herewith accept such assignment. Upon assignment the Customer shall be entitled to collect any receivables arising from the resale of the goods. We reserve our right to collect such receivables by ourselves in case the Customer fails to fulfil his payment obligations.
- 4.Any processing of the goods shall always be made in our name and for our behalf. In case the goods are incorporated into or mixed with other goods not belonging to us, we will become the co-owner of such other goods in relation of the value of our goods to the value of the other goods.
 - 5.We undertake to release the securities due to us at the request of the Customer in so far as their value exceed the secured debts by more than 20 %, in so far as these have not yet been settled.

IX.Liability for Defects

- 1.We accept liability for defects of the goods or services supplied only if the Customer has complied with his legal inspection and notification duties. The Customer shall inspect the goods without delay upon delivery and shall give notice to us of any defect without delay. If the Customer fails to give such notice, the goods shall be conclusively accepted, except for a defect which has not been detectable during inspection.
- 2.In case of a defect, we shall make good such defect at our option by repair or by the supply of a replacement. In case of repair we will bear all expenses necessary for such repair, except those expenses which are the result of the goods being transferred to another location than the place of performance agreed upon.
- 3.If repair or replacement is unsuccessful, the Customer is entitled, at his option, to demand a corresponding reduction in the purchase price or cancellation of the contract.
- 4.No claims for defects can be made in case of minor deviations from the properties agreed upon or in case of a minor impairment of the suitability, in case of normal wear and tear, in case of damages resulting from misuse, use of unsuitable operating materials, in case of external influences, which have not been agreed upon or have not been a condition of the contract, or in case of defects of the software which cannot be reproduced.
- 5.This liability for defects does also not apply if the Customer modifies the goods without our consent or has them modified by third parties and such modification makes the remedy more difficult or impossible. In either case the Customer shall be liable for the additional expenses incurred due to such modification.
- 6.In case of defects in goods as are not of our manufacture, we are entitled at our option to pursue our warranty claims against the manufacturer or supplier of such goods or to assign such claims to our Customer. The Customer may claim against us in case of such defects only, if Customers claim against the supplier or manufacturer has been unsuccessful or, for instance due to insolvency, is unpromising.
- 7.Claims for defects hereunder are always subject to the return of defective parts by the Customer to us.
- 8.The defects liability period is one (1) year from delivery of the goods.
- 9.Used goods are sold without any liability for defects.
- 10.We are not giving the Customer any guarantees within the legal meaning of the word, unless we expressly grant such a guarantee in a given case.
- 11.The provisions under Section X – Liability apply to any claims for damages by the Customer.

X.Liability

- 1.Our liability for damages or compensation, irrespective of the legal ground, in particular with respect to impossibility of performance, delays, defective of false supply, breach of contract, defective or non performed consulting or information, breach of duties in negotiations and wrongful acts, in so far as negligence is legally required, shall be limited to the extent set forth in this Section X.
- 2.We shall not be liable in case of ordinary negligence on the part of our managing director, legal representatives, executives or other agents.
- 3.We are liable under the legal provisions, if the damage was caused by negligent breach of a major contractual obligation (cardinal obligation); in such a case our liability for compensation shall be limited to the foreseeable damage that may typically occur. Cardinal obligations are understood to be obligations, which are mandatory for the proper performance of the contract and upon which the Customer could rely upon on a regular basis.
- 4.The foregoing limitations and exclusions of liability shall not apply in case of guaranteed properties, not in case of physical injuries or damage to health or loss of life for which we are responsible for and shall also not apply for claims made by the Customer under product liability.

XI.Waste Disposal under the German Electrical and Electronic Appliances Act

- 1.If the goods are subject to the German Electrical and Electronic Appliances Act, we offer to our Customer the option to carry out for him the waste disposal as stipulated by law. This service is provided against reimbursement of the actual cost that have been incurred and on condition that it has been requested in writing at the time of the purchase contract. Otherwise the Customer himself shall be liable for the correct legally stipulated waste disposal of the delivered goods at his own expense upon the termination of use of the goods.
- 2.In such a case the Customer shall indemnify us and our suppliers against any duties arising from section 10 II of the German Electrical and Electronic Appliances Act (Reacceptance Duty of the Manufacturer) and thus also against any associated third-party claims.
- 3.The Customer shall impose a contractual commitment on any third-party contractor to which he passes on the delivered good, specifying that the third party shall, at its own expense, ensure the correct legally stipulated waste disposal of the delivered good upon termination of use and that the third party shall furthermore impose the same commitment on further third parties in case that the relevant goods are passed on further. If the customer fails to impose a waste disposal commitment and a passing-on duty in respect of this commitment in his relationship with third-party contractors to which he passes on the delivered goods, then the Customer shall be liable to reaccept the delivered goods upon termination of use at his own expense and to ensure correct legally stipulated waste disposal of the same. If the Customer passes on the goods to non contractors, then the provisions of Section XI.2 here above shall apply.
- 4.Our claim towards Customer for take-over/indemnification shall not become subject to statute-barring until the expiration of two years following the final termination of use of the goods. This period shall start no earlier than our receipt of written notification from the Customer and/or from the Customer's customer concerning termination of use.

XII.Final Provisions

- 1.In the case of disputes arising out of the business relationship with contractors, München is agreed as the legal venue, or, at our option, the principal place of business of our Customer.
- 2.Unless otherwise agreed, the place of performance is München.
- 3.The laws of the Federal Republic of Germany shall apply. The provisions of the United Nations Convention on Contracts for the International Sale of Goods do not apply.

GEYER ELECTRONIC e.K.

GEYER ELECTRONIC e. K.

Lochhamer Schlag 5

D-82166 Gräfelfing / München Germany

Tel. +49 89 546868-0

info@geyer-electronic.de

www.geyer-electronic.de