GEYER
quartz technology

# Your Solution for Frequency Control Products

# OSCILLATORS
# PXO / XO

QUALITY FOR MORE THAN 50 YEARS
GEYER

Edition 01//2017

**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** (PXO/XO) 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 **Clock Oscillators** (PXO/XO). 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.


See page 16.

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- GEYER Overview Crystal Products
- GEYER Tuning Fork Crystals
- GEYER Oscillators, VCXO TCXO VCTCXO LVDS PECL
- GEYER VCO and PLL Modules
- GEYER SAW Filter

www.geyer-electronic/service

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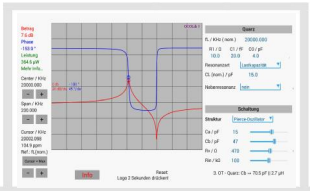

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# Design und Testcenter

**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

SERVICE


RoHS 2011/65/EU | REACH compliant | Conflict minerals free

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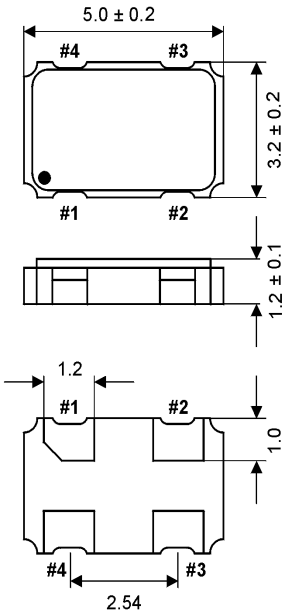
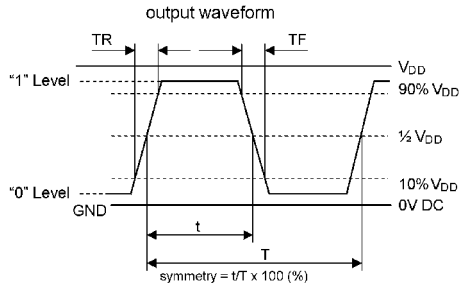
## SSO Spread Spectrum Oscillator — SMD-version

| model | KXO-56 | | | | |
|---|---|---|---|---|---|
| frequency range | 1,0 ~ 134,0 MHz | | | | |
| frequency stability max. | ± 50 ppm | | | | |
| operating temperature | -40° ~ +85°C | | | | |
| storage temperature | -40° ~ +85°C | | | | |
| symmetry (duty) | 40% ~ 60% | | | | |
| center spread ±0,5% ~ ±2% | **±0,5%** = Typ C05 | **±0,75%** =TypC07 | **±1,0%** = Typ C10 | **±1,5%** = Typ C15 | **±2,0%** = Typ C20 |
| down spread -0,5% ~ -4% | **-0,5%** = Typ D05 | **-1,0%** = Typ D10 | **-1,5%** = Typ D15 | **-2,0%** = Typ D20 | **-3,0%** = Typ D30 | **-4,0%**=Typ D40 |
| output rise & fall time | 10 ns max. | | | | |
| high output voltage | 80% $V_{DD}$ min. | | | | |
| low output voltage | 20% $V_{DD}$ max. | | | | |
| input voltage $V_{DD}$ | +3,3V ±10% | | | | |
| Input current max. | 20 mA | | | | |
| supply voltage | -0,5V ~ +4V DC | | | | |
| output load | CMOS 15 pF | | | | |
| output enable voltage | 80% $V_{DD}$ min. | | | | |
| output disable voltage | 20% $V_{DD}$ max. | | | | |
| oscillation start up time | 10 ms max. | | | | |
| period jitter | 100 ps max. | | | | |
| contents of reel | 1000 pcs. | | | | actual size |
| part no. | 12.xxxxx | | | | |

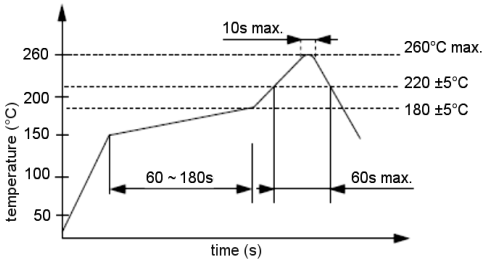
### Dimensions (mm):



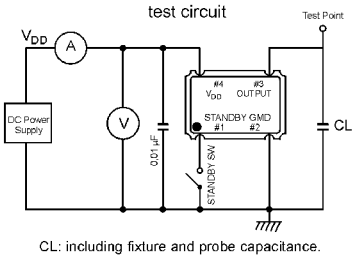

### Output waveform:




### Reflow soldering condition:

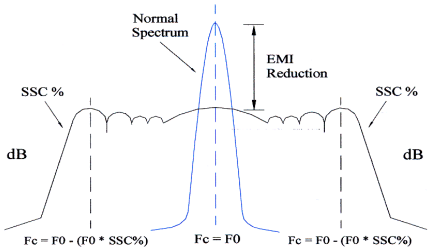



### Test circuit:




CL: including fixture and probe capacitance.

### Center Spread:

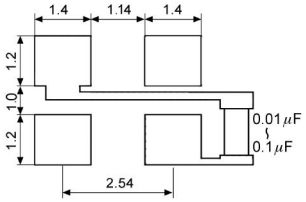



Clock Frequency

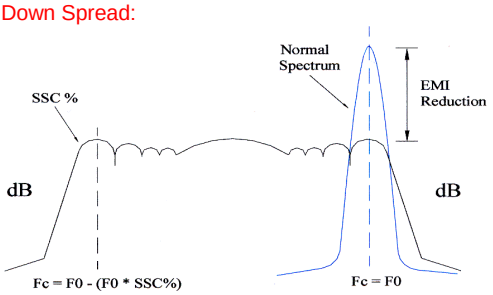
| PIN | Connection | |
|---|---|---|
| 1 | "L"(OV) | "H" or OPEN |
| 2 | GND | |
| 3 | Z | OUTPUT |
| 4 | $V_{DD}$ | |

Z= High Impedance

### Suggested soldering pad:




### Down Spread:




Clock Freqeuncy

SSO – Spread Spectrum Oscillator KXO-56


RoHS 2011/65/EU ✓ REACH compliant ✓ Conflict minerals free ✓

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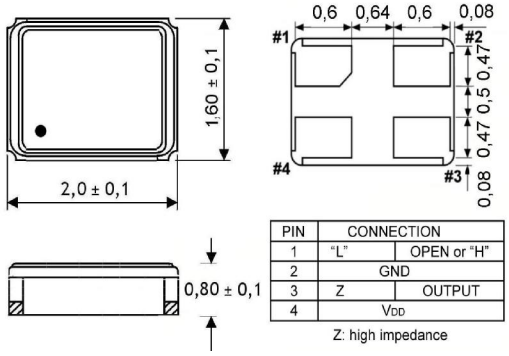
## Clock Oscillator SMD-version

**+1.8V / +2.5V / +2.8V / +3.0V / +3.3V**

| | | | | |
|---|---|---|---|---|
| model | KXO-V94 | | | |
| frequency range | 1.0 ~ 80.0 MHz | | | |
| frequency stability<br>at -20° ~ +70°C<br>at -40° ~ +85°C | <br>± 50 ppm<br>± 100 ppm | | | |
| operating temperature | standard -20° ~ +70°C<br>available -40° ~ +85°C (=KXO-V94T) | | | |
| storage temperature | -55° ~ +100°C | | | |
| symmetry | 45% ~ 55% at 50% $V_{DD}$ level | | | |
| rise & fall time max. | 6 ns (10% $V_{DD}$ ~ 90% $V_{DD}$ level)/$V_{DD}$ = +1,8V<br>5 ns (10% $V_{DD}$ ~ 90% $V_{DD}$ level)/$V_{DD}$ +1.8V, +2.5V +2.8V +3.0V +3.3V | | | |
| "O" level max. | VOL: 10% $V_{DD}$ | | | |
| "1" level min. | VOH: 90% $V_{DD}$ | | | |
| input voltage $V_{DD}$ | +1.8V, +2.5V, +2.8V, +3.0V, +3.3V DC ±5% | | | |
| tri-state control voltage (Pin#1) | VIH: $V_{DD}$ x 0,7 min.<br>VIL: $V_{DD}$ x 0,3 max. | | | |
| supply voltage | -0.5V ~ +4.0V | | | |
| input current max. | | +1.8V | +2.5V/+2.8V | +3.0V/+3.3V |
| | 0.75 ~ 19.9 MHz | 2.5mA | 4.5mA | 6.0mA |
| | 20.0 ~ 39.9 MHz | 3.0mA | 5.5mA | 7.0mA |
| | 40.0 ~ 49.9 MHz | 3.5mA | 6.5mA | 8.0mA |
| | 50.0 ~ 80.0 MHz | 6.5mA | 7.0mA | 9.0mA |
| output load max. | 15pF (CMOS) | | | |
| start up time max. | 10 ms | | | |
| disable delay time max. | 150 ns | | | |
| enable delay time max. | 10 ms | | | |
| stand by current max. | 10 µA (Pin #1=VIL) | | | |
| contents of reel | 1000 pcs. | | | actual size |
| part no. | 12.xxxxx | | | |

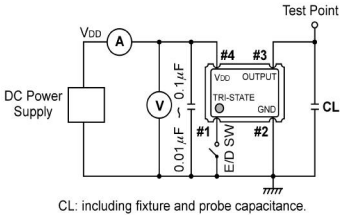
### Dimensions (mm):




| PIN | CONNECTION | |
|---|---|---|
| 1 | "L" | OPEN or "H" |
| 2 | GND | |
| 3 | Z | OUTPUT |
| 4 | $V_{DD}$ | |

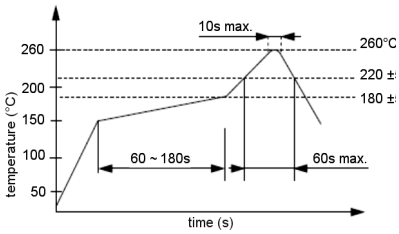
Z: high impedance

### Test circuit:

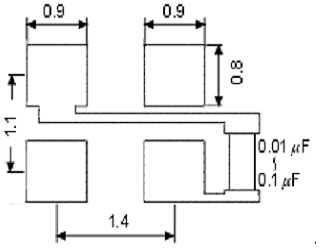



CL: including fixture and probe capacitance.

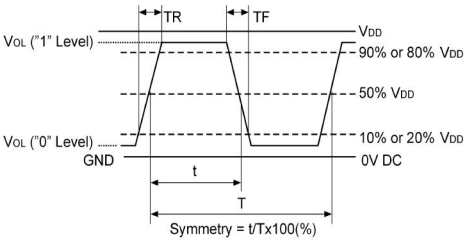
### Reflow soldering condition:



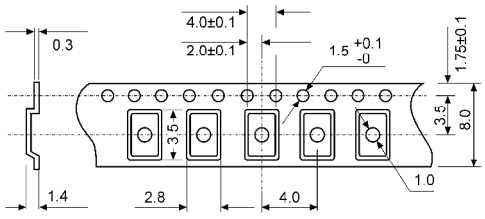

### Suggested soldering pad:




### Output waveform:

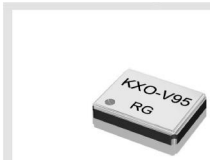



### Tape specification:




reel diameter 245 mm

**OSCILLATOR** – KXO-V94

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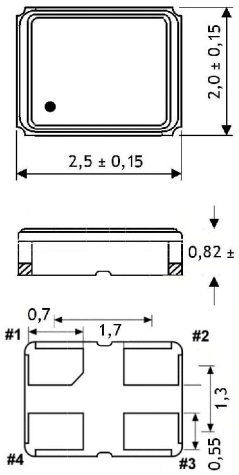
## Clock Oscillator SMD-version

**+1.8V / +2.5V / +2.8V / +3.0V / +3.3V**

| | | | | |
|---|---|---|---|---|
| model | KXO-V95 | | | |
| frequency range | 1.0 ~ 70.0 MHz | | | |
| frequency stability<br>at -20° ~ + 70°C<br>at -40° ~ + 85°C<br>at -40° ~ +105°C | <br>± 50 ppm<br>± 100 ppm<br>± 120 ppm | | | |
| operating temperature | standard -20° ~ + 70°C<br>available -40° ~ + 85°C (=KXO-V95T)<br>available -40° ~ +105°C (=KXO-V95E) | | | |
| storage temperature | -40° ~ +85°C | | | |
| symmetry | 40% ~ 60% at 50% $V_{DD}$ level | | | |
| rise & fall time max. | 10 ns (10% $V_{DD}$ ~ 90% $V_{DD}$ level) | | | |
| "O" level max. | VOL: 10% $V_{DD}$ | | | |
| "1" level min. | VOH: 90% $V_{DD}$ | | | |
| input voltage $V_{DD}$ | +1.8 ~ +3.3V ±5% | | | |
| tri-state control voltage (Pin#1) | VIH: $V_{DD}$ x 0,7 min.<br>VIL: $V_{DD}$ x 0,3 max. | | | |
| supply voltage | -0.5V ~ +7.0V | | | |
| input current | | +1.8V | +2.5V | +3.0V/+3.3V |
| | 1.0 ~ 20.0MHz | 3.5 mA typ., 6.0 mA max. | 4.0 mA typ., 6.0 mA max. | 4.0 mA typ., 6.0 mA max. |
| | 20.1 ~ 50.0MHz | 4.5 mA typ., 6.0 mA max. | 4.0 mA typ.11.0 mA max. | 6.0 mA typ 11.0 mA max. |
| | 50.1 ~ 70.0MHz | 6.0 mA typ.11.0 mA max. | 6.0 mA typ.11.0 mA max. | 9.0 mA typ.16.0 mA max. |
| output load max. | 15pF (CMOS) | | | |
| start up time max. | 10 ms | | | |
| disable delay time max. | 150 ns | | | |
| enable delay time max. | 10 ms | | | |
| stand by current max. | 50 µA (Pin #1=VIL) | | | |
| jitter | deterministic jitter 5ps max. norm 1-sigma 7ps max.<br>random jitter 7ps max. peak to peak 40ps max. | | | |
| AECQ 200 | available | | | |
| contents of reel | 1000 pcs. | | | actual size |
| part no. | 12.xxxxx | | | |

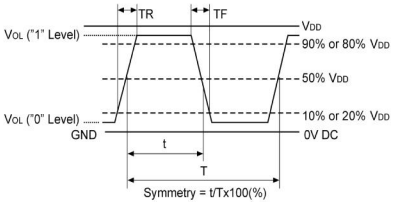
### Dimensions (mm):



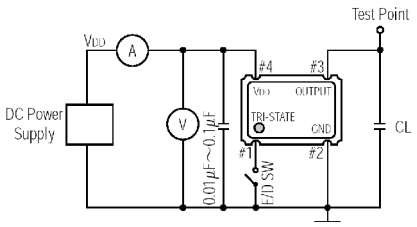

| PIN | CONNECTION | |
|---|---|---|
| 1 | "L" | OPEN or "H" |
| 2 | GND | |
| 3 | Z | OUTPUT |
| 4 | $V_{DD}$ | |

Z: high impedance

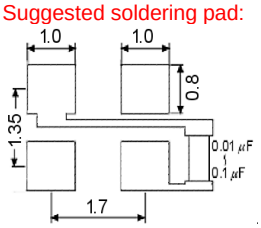
### Output waveform:



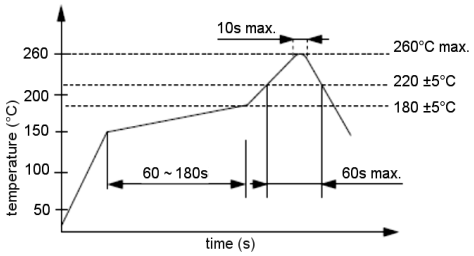

### Test circuit:



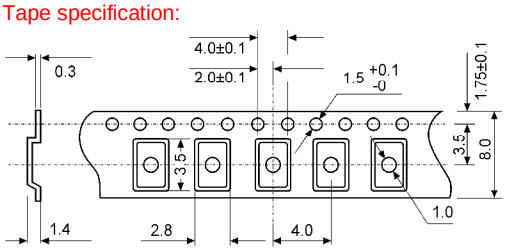

### Suggested soldering pad:




### Reflow soldering condition:




### Tape specification:




reel diameter 245 mm

OSCILLATOR – KXO-V95


RoHS 2011/65/EU REACH compliant Conflict minerals free

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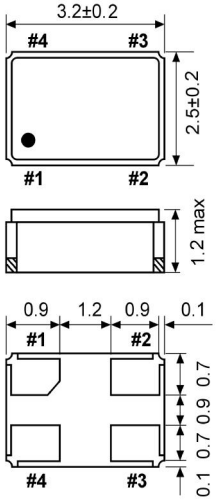
## Clock Oscillator SMD-version

**1.8V / +2.5V / +2.8V / +3.0V / +3.3V**

| | | | | |
|---|---|---|---|---|
| model | KXO-V96 | | | |
| frequency range | 1.0 ~ 133.0 MHz | | | |
| frequency stability<br>at -20° ~ + 70°C<br>at -40° ~ + 85°C<br>at -40° ~ +105°C | <br>± 50 ppm<br>± 100 ppm<br>± 120 ppm | | | |
| operating temperature | standard -20° ~ + 70°C<br>available -40° ~ + 85°C (=KXO-V96T)<br>available -40° ~ +105°C (=KXO-V96E) | | | |
| storage temperature | -50° ~ +125°C | | | |
| symmetry | 40% ~ 60% at 50% $V_{DD}$ level | | | |
| rise & fall time max. | 5 ns (10% $V_{DD}$ ~ 90% $V_{DD}$ level) | | | |
| "O" level max. | VOL: 10% $V_{DD}$ | | | |
| "1" level min. | VOH: 90% $V_{DD}$ | | | |
| input voltage $V_{DD}$ | +1.8 ~ +3.3V ±5% | | | |
| stand-by control voltage (pin#1) | VIH(min): 70% $V_{DD}$<br>VIL(max): 30%$V_{DD}$* | | | |
| supply voltage | -0.5V ~ +7.0V | | | |
| input current | | +1.8V | +2.5V | +3.0V/+3.3V |
| | 1.0 ~ 20.0MHz | 3.5 mA typ., 6.0 mA max. | 4.0 mA typ., 6.0 mA max. | 4.0 mA typ., 6.0 mA max. |
| | 20.1 ~ 50.0MHz | 4.5 mA typ., 6.0 mA max. | 4.0 mA typ.11.0 mA max. | 6.0 mA typ 11.0 mA max. |
| | 50.1 ~ 80.0MHz | 6.0 mA typ.11.0mA max. | 6.0 mA typ.11.0 mA max. | 9.0 mA typ.16.0 mA max. |
| | 80.1 ~ 133.0MHz | 15 mA typ., 20 mA max. | 20 mA typ., 40 mA max. | 20 mA typ., 40 mA max. |
| output load max. | 15pF (HCMOS) | | | |
| start up time max. | 10 ms | | | |
| disable delay time max. | 150 ns | | | |
| enable delay time max. | 10 ms | | | |
| stand by current max. | 50 µA (Pin #1=VIL) | | | |
| jitter | deterministic jitter 5ps max. norm 1-sigma 7ps max.<br>random jitter 7ps max. peak to peak 40ps max. | | | |
| AECQ 200 | available | | | |
| contents of reel | 1000 pcs. | | | actual size |
| part no. | 12.xxxxx | | | |

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

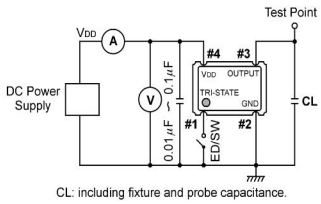
### Dimensions (mm):




| PIN | CONNECTION | |
|---|---|---|
| 1 | "L" | OPEN or "H" |
| 2 | GND | |
| 3 | Z | OUTPUT |
| 4 | $V_{DD}$ | |

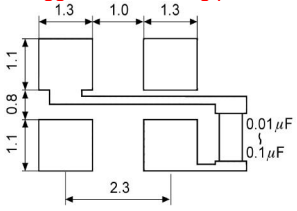
Z: high impedance

### Test circuit:

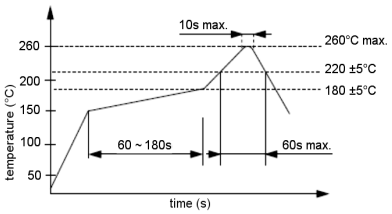



CL: including fixture and probe capacitance.

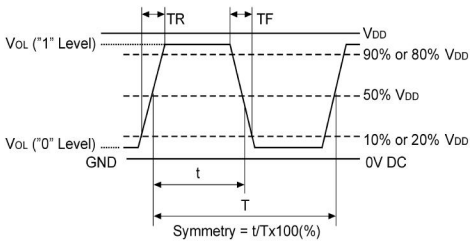
### Suggested soldering pad:



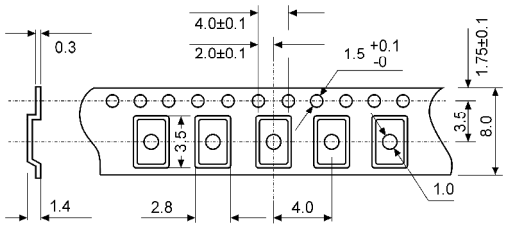

### Reflow soldering condition:




### Output waveform:




### Tape specification:




reel diameter 245 mm

OSCILLATOR – KXO-V96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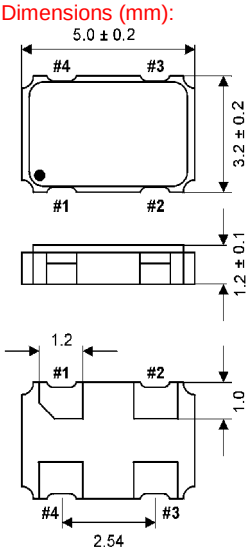
GEYER quartz technology

## Clock Oscillator SMD-version

**+1.8V / +2.5V / +3.0V / +3.3V**

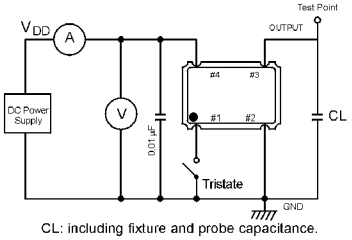
| | | | | |
|---|---|---|---|---|
| model | KXO-V99 | | | |
| frequency range | 1.0 ~ 200.0 MHz | | | |
| frequency stability<br>at -20° ~ + 70°C<br>at -40° ~ + 85°C<br>at -40° ~ +105°C | <br>± 50 ppm<br>± 100 ppm<br>± 120 ppm | | | |
| operating temperature | standard -20° ~ + 70°C<br>available -40° ~ + 85°C (=KXO-V99T)<br>available -40° ~ +105°C (=KXO-V99E) | | | |
| storage temperature | -55° ~ +125°C | | | |
| symmetry<br>at 1,0 ~ 70,0 MHz<br>at 70,1 ~200,0 MHz | <br>45%/55% ± 10% at ½ $V_{DD}$ level<br>40%/60% ± 10% at ½ $V_{DD}$ level | | | |
| rise & fall time max. | 4 ns | | | |
| "O" level max. | $V_{DD}$ x 0,1V | | | |
| "1" level min. | $V_{DD}$ x 0,9 V | | | |
| input voltage $V_{DD}$ | standard + 3.3V ± 5%<br>available +1.8V ± 5%/ +2.5V / +3.0V each type ±5% | | | |
| input current | | +1.8V | +2.5V | +3.0V/+3.3V |
| | 1.0 ~ 20.0MHz | 3.5 mA typ., 6.0 mA max. | 4.0 mA typ., 6.0 mA max. | 4.0 mA typ., 6.0 mA max. |
| | 20.1 ~ 50.0MHz | 4.5 mA typ., 6.0 mA max. | 4.0 mA typ.11.0 mA max. | 6.0 mA typ 11.0 mA max. |
| | 50.1 ~ 80.0MHz | 6,0 mA typ.11.0 mA max. | 6.0 mA typ.11.0 mA max. | 9.0 mA typ.16.0 mA max. |
| | 80.1 ~ 125.0MHz | 30 mA typ., 50 mA max. | 30 mA typ., 50 mA max. | 30 mA typ., 50 mA max. |
| | 125.1 ~ 165.0MHz | 50 mA typ., 65 mA max. | 50 mA typ., 65 mA max. | 50 mA typ., 65 mA max. |
| | 165.1 ~ 200.0MHz | 60 mA typ., 75 mA max | 60 mA typ., 75 mA max | 60 mA typ., 75 mA max |
| output load | 15pF | | | |
| start up time max. | 10 ms | | | |
| tristate funcion | yes | | | |
| disable delay time | 100 ns max. | | | |
| enable delay time | 4 ms max. | | | |
| stand by current | 10 µA max. | | | |
| random jitter | 7pS max. | | | |
| peak to peak jitter | 40pS max. | | | actual size |
| contents of reel | 1000 pcs. | | | |
| part no. | 12.xxxxx | | | |

Dimensions (mm):



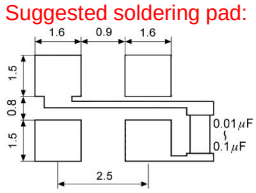

| PIN | Connection | |
|---|---|---|
| 1 | "L" (OV) | "H" or OPEN |
| 2 | GND | |
| 3 | Z | OUTPUT |
| 4 | $V_{DD}$ | |

Test circuit:

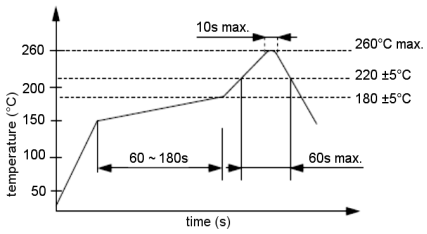



CL: including fixture and probe capacitance.

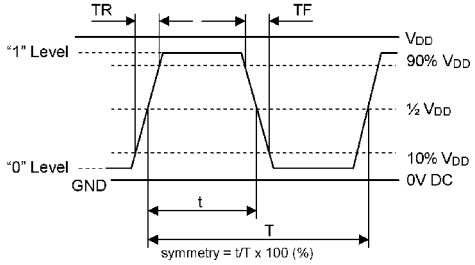
Suggested soldering pad:



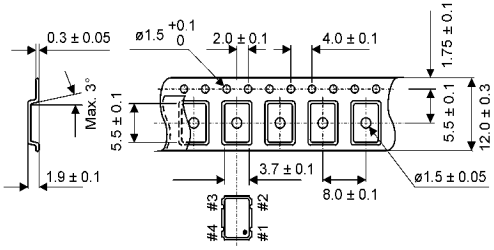

Reflow soldering condition:




Output waveform:




Tape specification:




reel diameter 180mm

OSCILLATOR – KXO-V99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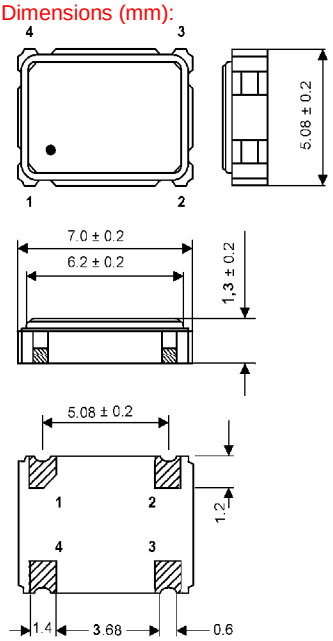
GEYER quartz technology

## Clock Oscillator SMD-version

**+1.8V / +2.5V / +3.0V / +3.3V**

| model | KXO-V97 | | |
|---|---|---|---|
| frequency range | 1.0 ~ 50.0 MHz | 50.1 ~ 80.0 MHz | 80.1 ~ 160.0 MHz |
| frequency stability<br>at -20° ~ + 70°C<br>at -40° ~ + 85°C<br>at -40° ~ +105°C | ± 50 ppm<br>± 100 ppm<br>± 120 ppm | | |
| operating temperature | standard -20° ~ + 70°C<br>available -40° ~ + 85°C (=KXO-V97T)<br>available -40° ~ +105°C (=KXO-V97E) | | |
| storage temperature | -40° ~ +85°C | | |
| symmetry | 50% ± 10% at ½ $V_{DD}$ level | | |
| rise & fall time max. | 6 ns | 5 ns | 2,5 ns |
| "O" level max. | + 0.4V | | |
| "1" level min. | $V_{DD}$ -0.5V | | |
| input voltage $V_{DD}$ | standard + 3.3V ± 10%<br>available +1.8V ± 5%/ +2.5V ± 5%/ +3.0V ±10% | | |
| input current | 3.5 ~ 6.0 mA typ.<br>6.0 ~ 11.0 mA max. | 6.0 ~ 9.0 mA typ.<br>11.0 ~ 16.0 mA max. | 30.0 mA typ., 40.0 mA max. |
| output load | 1.0 ~ 33.0 MHz 30 pF<br>33.1 ~ 75.0 MHz 30 pF<br>75.1 ~ 150.0 MHz 15 pF | | |
| start up time max. | 10 ms | 10 ms | 4 ms |
| tristate funcion | yes | | |
| disable delay time | 100 ns max. | | |
| enable delay time | 4 ms max. | | |
| random jitter | 7ps max. | | |
| peak to peak jitter | 40ps max. | | |
| contents of reel | 1000 pcs. | | |
| part no. | 12.xxxxx | | |

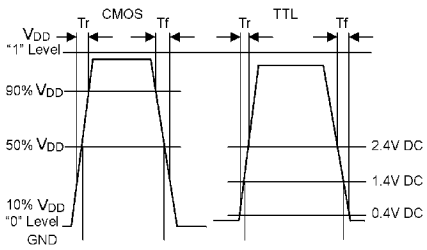

### Dimensions (mm):



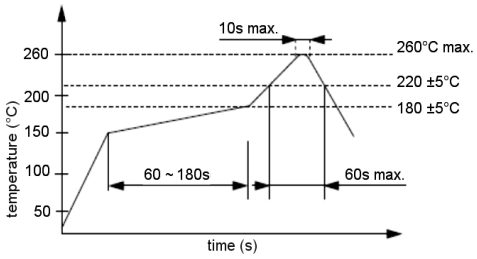

| PIN | CONNECTION | |
|---|---|---|
| 1 | "L" (OV) | "H" or OPEN |
| 2 | GND | |
| 3 | Z | OUTPUT |
| 4 | $V_{DD}$ | |

Z: high impedance

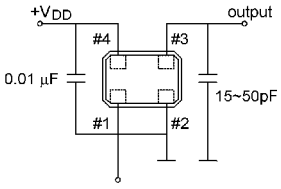
### Output waveform:



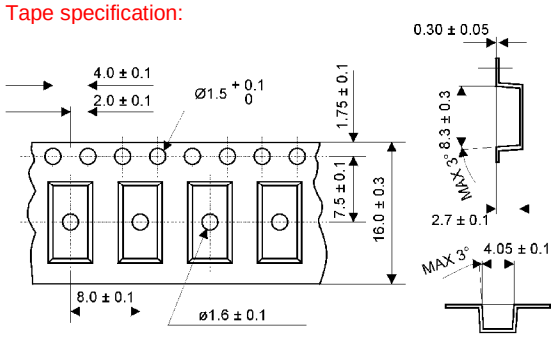

### Reflow soldering condition:




### Test circuit:

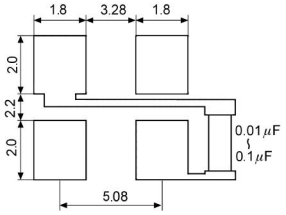



### Tape specification:




reel diameter 330 mm

### Suggested soldering pad:




OSCILLATOR – KXO-V97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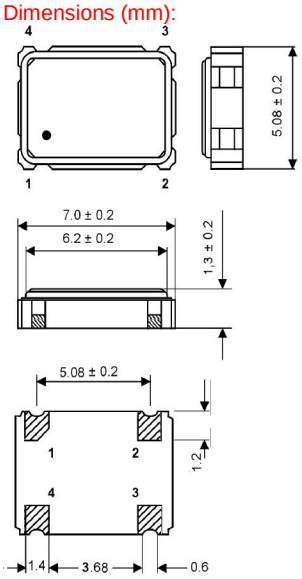
## Clock Oscillator SMD-version

**+5V**

| model | KXO-97 | | |
|---|---|---|---|
| frequency range | 1.0 ~ 50.0 MHz | 50,1 ~ 80,0 MHz | 80,1 ~ 100,0 MHz |
| frequency stability<br>at -20° ~ + 70°C<br>at -40° ~ + 85°C<br>at -40° ~ +105°C | <br>± 50 ppm<br>± 100 ppm<br>± 120 ppm | | |
| operating temperature | standard -20° ~ + 70°C<br>available -40° ~ + 85°C (=KXO-97T)<br>available -40° ~ +105°C (=KXO-97E) | | |
| storage temperature | -40° ~ +85°C | | |
| symmetry | 50% ± 10%<br>at 1,.4V DC level<br>or ½ $V_{DD}$ level | | |
| rise & fall time max. | TTL: 6 ns / CMOS: 10 ns | 5 ns | |
| "O" level max. | + 0.4V (TTL) / + 0.5V (CMOS) | | |
| "1" level min. | +2.4V (TTL) / $V_{DD}$ -0.5V (CMOS) | | |
| input voltage $V_{DD}$ | + 5V DC ± 10% | | |
| input current | 1.0 ~ 9.9 MHz 10 mA max.<br>10.0 ~ 19.9 MHz 15 mA max.<br>20.0 ~ 29.9 MHz 25 mA max.<br>30.0 ~ 50.0 MHz 35 mA max. | 40 mA typ., 50 mA max. | 60 mA typ, 80 mA max. |
| output load | 1.0 ~ 33.0 MHz 10 TTL gates 50 pF<br>33.1 ~ 75.0 MHz 5 TTL gates 30 pF<br>75.1 ~ 100.0 MHz 5 TTL gates 15 pF | | |
| start up time max. | 10 ms | | |
| tristate funcion | yes | | |
| disable delay time | 100 ns max. | | |
| enable delay time | 4 ms max. | | |
| random jitter | 7ps max. | | |
| peak to peak jitter | 40ps max. | |  |
| contents of reel | 1000 pcs. | | actual size |
| part no. | 12.xxxxx | | |

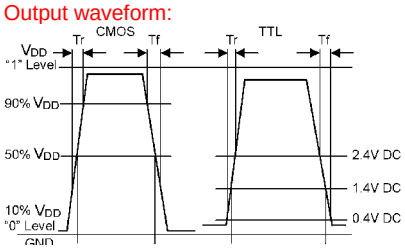
### Dimensions (mm):



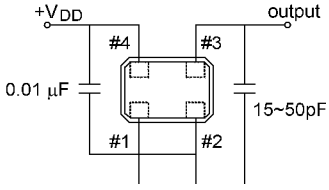

| PIN | CONNECTION | |
|---|---|---|
| 1 | "L" (OV) | "H" or OPEN |
| 2 | GND | |
| 3 | Z | OUTPUT |
| 4 | $V_{DD}$ | |

Z: high impedance

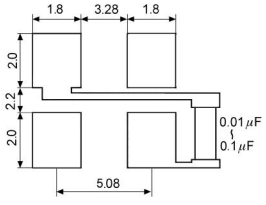
### Output waveform:



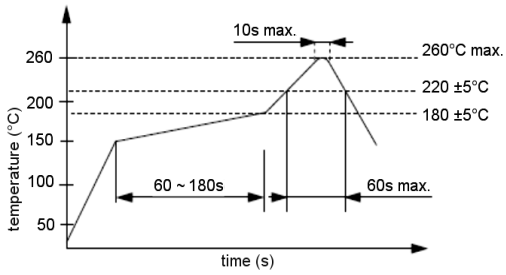

### Test circuit:



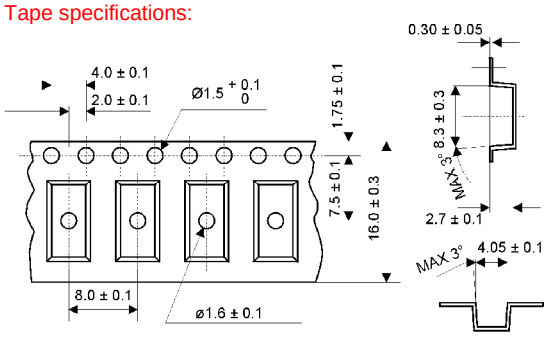

### Suggested soldering pad:




### Reflow soldering condition:




### Tape specifications:




reel diameter 330 mm

**OSCILLATOR – KXO-97**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## Clock Oscillator — TTL / HCMOS, TRI-STATE

| item | TTL & HCMOS | | Tri-State | |
|---|---|---|---|---|
| model | KXO-200 | KXO-210 | KXO-400 | KXO-410 |
| package | DIL 14 | DIL 8 | DIL 14 | DIL 8 |
| frequency range | 0.5 ~ 100 MHz * | | 0.5 ~ 100 MHz | |
| frequency stability | standard ± 100 ppm<br>available ± 25 ppm ~ ± 100 ppm | | | |
| storage temperature range | -55°C ~ +125°C | | | |
| operating temperature range | standard -20°C ~ + 70°C<br>available -40°C ~ + 85°C (=KXO-205/215) (=KXO-405/415) | | | |
| symmetry | standard 60/40% (+ ½ $V_{DD}$)<br>available 55/45% | | standard 60/40% (+ ½ $V_{DD}$)<br>available 55/45% | |
| rise and fall time max. | 10 ns 0.5 ~ 25 MHz<br>6 ns 25.1 ~ 70 MHz<br>4 ns 70.1 ~ 100 MHz | | 10 ns 0.5 ~ 25 MHz<br>6 ns 25.1 ~ 70 MHz<br>4 ns 70.1 ~ 100 MHz | |
| "O" level max. | +0.5V (10%$V_{DD}$) | | +0.5V (10%$V_{DD}$) | |
| "1" level min. | +4.5V (90%$V_{DD}$) | | +4.5V (90%$V_{DD}$) | |
| input voltage | +5.0V DC ± 10% | | +5.0V DC ± 10% | |
| input current max. | 20 mA 0.5 ~ 20 MHz<br>40 mA 20.1 ~ 70 MHz<br>60 mA 70.1 ~ 100 MHz | | 20 mA 0.5 ~ 20 MHz<br>40 mA 20.1 ~ 70 MHz<br>60 mA 70.1 ~ 100 MHz | |
| output load | 1 - 8 TTL or<br>CL = 50pF (TYP) | | 1 - 8TTL or<br>CL = 50pF (TYP) | |
| dimension | fig.1 | fig.2 | fig.1 | fig.2 |
| logic family | TTL & HCMOS compatible | | TTL or HCMOS compatible | |
| test circuit | fig. 3. 4 | | fig. 3. 4 | |
| pin connection | # 1 (#1): NC<br># 7 (#4): CASE GND<br># 8 (#5): OUTPUT<br>#14 (#8): +$V_{DD}$ | | PIN / CONNECTION<br>#1 (#1): „L"(0V) „H"(+5V) or OPEN<br>#7 (#4): GND<br>#8 (#5): Z OUTPUT<br>#14 (#8): VDD | |
| packing unit | 25 pcs. | 40 pcs. | 25 pcs. | 40 pcs. |
| order no. | 12.xxxxx | 12.xxxxx | 12.xxxxx | 12.xxxxx |

* > 100,0 MHz on request

Z: high impedance

**Enable/Disable Phase Delay Time** 100 ns max.

## 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 +/-0.5% to +/-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 +/-350mV. 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 +/-800mV. Typical supply voltage 2.5V/3.3V. Medium to high power consumption- |

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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.Offers 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 unpromissing.
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.