



VOLTAGE-CONTROLLED CRYSTAL OSCILLATOR (VCXO)

TCO-2000 / 2100 series

- Frequency range : 60 MHz to 800 MHz
- Supply voltage : 3.3 V
- Frequency control range : $\pm 100 \times 10^{-6}$ Min.
- Features : High reliability(20 years aging)
: Wide frequency control range
: Low phase noise, low jitter
: With HFF-XTAL technology
Fundamental oscillation (60 MHz to 230 MHz)
Multiplier oscillation ($f_o \geq 230$ MHz)

Product Number (please contact us)
X1G00Xxxxxxxx00

Actual size

TCO-2000 Series



TCO-2100 Series



Specifications (characteristics)

| Item | Symbol | Specifications | | Remarks |
|------------------------------|-------------|---|----------------------|---|
| | | TCO-2002 TCO-2102 | TCO-2004 TCO-2104 | |
| Output frequency range | f_o | 60.000 MHz to 125.000 MHz | | 4 pin 6 pin |
| Supply voltage | V_{cc} | 3.3 V ± 0.165 V | | |
| Storage temperature range | T_{stg} | -45 °C to +90 °C | | Store as bare product after unpacking |
| Operating temperature range | T_{use} | -40 °C to +85 °C | | |
| Frequency tolerance | f_{tol} | As per table 1 | | -40 °C to +85 °C |
| Current consumption | I_{cc} | 50 mA Max. | | |
| Frequency control range | f_{cont} | As per table 1. ($V_c = 1.65$ V ± 1.65 V) | | |
| Absolute pull range | APR | As per table 1 | | |
| Input resistance | R_{in} | 100 k Ω Min. | | DC level |
| Frequency change polarity | — | Positive slope | | $V_c = 0$ V to 3.3 V or $V_c = 0.5$ V to 4.5 V |
| Output load condition (TTL) | L_{TTL} | 2 TTL Max. | | |
| Output load condition (CMOS) | L_{CMOS} | — 15 pF Max. | | |
| Start-up time | t_{str} | 10 ms Max. *1 | | |
| Frequency aging | f_{aging} | As per table 1 | | +25 °C |

Specifications (characteristics)

| Item | Symbol | Specifications | | Remarks |
|------------------------------|-------------|--------------------------|----------|---------------------------------------|
| | | TCO-2106 | TCO-2107 | |
| Output frequency range | f_o | 60.000 MHz to 80.000 MHz | | 6pin, OE function |
| Supply voltage | V_{cc} | 3.3 V ± 0.165 V | | |
| Storage temperature range | T_{stg} | -45 °C to +90 °C | | Store as bare product after unpacking |
| Operating temperature range | T_{use} | -40 °C to +85 °C | | |
| Frequency tolerance | f_{tol} | As per table 1 | | -40 °C to +85 °C |
| Current consumption | I_{cc} | 30 mA Max. | | |
| Frequency control range | f_{cont} | As per table 1 | | $V_c = 1.65$ V ± 1.65 V |
| Absolute pull range | APR | As per table 1 | | |
| Input resistance | R_{in} | 100 k Ω Min. | | DC level |
| Frequency change polarity | — | Positive slope | | $V_c = 0$ V to 3.3 V |
| Output load condition (TTL) | L_{TTL} | 2 TTL Max. | | |
| Output load condition (CMOS) | L_{CMOS} | — 15 pF Max. | | |
| Start-up time | t_{str} | 10 ms Max. *1 | | |
| Frequency aging | f_{aging} | As per table 1 | | +25 °C |

Specifications (characteristics)

| Item | Symbol | Specifications | | Remarks |
|-----------------------------|-------------|--|--|---|
| | | TCO-2111 | TCO-2114 | |
| Output frequency range | f_o | 60.000 MHz to 800.000 MHz | 60.000 MHz to 230.000 MHz | 6 pin |
| Supply voltage | V_{cc} | 3.3 V ± 0.165 V | | |
| Storage temperature range | T_{stg} | -45 °C to +90 °C | | Store as bare product after unpacking |
| Operating temperature range | T_{use} | -40 °C to +85 °C | | |
| Frequency tolerance | f_{tol} | As per table 1 | | -40 °C to +85 °C |
| Current consumption | I_{cc} | 65 mA Max. | 40 mA Max. | |
| Frequency control range | f_{cont} | As per table 1 ($V_c = 1.65$ V ± 1.65 V) | As per table 1 ($V_c = 1.65$ V ± 1.65 V) | |
| Absolute pull range | APR | As per table 1 | | |
| Input resistance | R_{in} | 100 k Ω Min. | | DC level |
| Frequency change polarity | — | Positive slope | | $V_c = 0$ V to 3.3 V or $V_c = 0.5$ V to 4.5 V |
| Output level | — | LV-PECL | LVDS | |
| Start-up time | t_{str} | 10 ms Max. *1 | | |
| Frequency aging | f_{aging} | As per table 1 | | +25 °C |



Specifications (characteristics)

| Item | Symbol | Specifications | | Remarks |
|-----------------------------|--------------------|---------------------------|--|---------------------------------------|
| | | TCO-2131 | | |
| Output frequency range | f _o | 60.000 MHz to 700.000 MHz | | 6pin, OE function |
| Supply voltage | V _{cc} | 3.3 V ±0.165 V | | |
| Storage temperature range | T _{stg} | -45 °C to +90 °C | | Store as bare product after unpacking |
| Operating temperature range | T _{use} | -40 °C to +85 °C | | |
| Frequency tolerance | f _{tol} | As per table 1 | | -40 °C to +85 °C |
| Current consumption | I _{cc} | 75 mA Max. | | |
| Frequency control range | f _{cont} | As per table 1 | | V _c = 1.65 V ±1.65 V |
| Absolute pull range | APR | As per table 1 | | |
| Input resistance | R _{in} | 100 kΩ Min. | | DC level |
| Frequency change polarity | — | Positive slope | | V _c = 0 V to 3.3 V |
| Output load condition | — | LV-PECL | | |
| Start-up time | t _{str} | 10 ms Max. *1. | | |
| Frequency aging | f _{aging} | As per table 1 | | +25 °C |

Table 1. Frequency tolerance, Absolute pull range and aging (TCO-2102-xx)

| xx | Frequency tolerance | Absolute pull range *4 | (Frequency control range) | Aging |
|----|--------------------------------|------------------------------|------------------------------|------------------------|
| AA | ±50 × 10 ⁻⁶ Max. *2 | ±50 × 10 ⁻⁶ Min. | ±100 × 10 ⁻⁶ Min. | 1 year (First year) |
| AB | | ±100 × 10 ⁻⁶ Min. | ±150 × 10 ⁻⁶ Min. | |
| BA | ±60 × 10 ⁻⁶ Max. *3 | ±50 × 10 ⁻⁶ Min. | ±110 × 10 ⁻⁶ Min. | 20 years |
| BB | | ±100 × 10 ⁻⁶ Min. | ±160 × 10 ⁻⁶ Min. | |

*1 Time at minimum supply voltage to be 0 s.

*2 This includes initial frequency tolerance, temperature variation, supply voltage variation and aging (+25°C, 1 year).

*3 This includes initial frequency tolerance, temperature variation, supply voltage variation and aging (+25°C, 20 years).

*4 Absolute pull range = Frequency control range - Frequency tolerance

External dimensions

(Unit:mm)

●TCO-2002/2004

Pin map

| Pin | CONNECTION |
|-----|------------|
| 1 | VC |
| 2 | GND/case |
| 3 | OUT |
| 4 | VCC |

●TCO-2102/2104

Pin map

| Pin | CONNECTION |
|-----|------------|
| 1 | VC |
| 2 | N.C. |
| 3 | GND/case |
| 4 | OUT |
| 5 | N.C. |
| 6 | Vcc |

●TCO-2106/2107/2111/2114/2131

Pin map

| Pin | CONNECTION | | |
|-----|---------------|-----------------|----------|
| | TCO-2106/2107 | TCO-2110 series | TCO-2131 |
| 1 | VC | | |
| 2 | OE | N.C. | OE |
| 3 | | GND/case | |
| 4 | OUT | OUT 1(Positive) | |
| 5 | N.C. | OUT 2(Negative) | |
| 6 | | Vcc | |

External dimensions

(Unit:mm)

●TCO-2000 series

●TCO-2100 series

OE terminal

●TCO-2106 / 2107

OE pin = "H" or "open" : Specified frequency output.
 OE pin = "L" : Output is high impedance, oscillation stops.

●TCO-2131

OE pin = "L" or "open" : Specified frequency output.
 OE pin = "H" : Output is high impedance, oscillation stops.