



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 ($f_o > 230$ 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	6pin, OE function	
Output frequency range	f _o	60.000 MHz to 700.000 MHz		
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		OUT1(Positive)
5	N.C.		OUT2(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.