

Revised in May 2017

Ultra-stable double-oven OCXO
Features

Ultra high stability - to $\pm 5 \times 10^{-11}$ (-40 to +85)°C
 Very low aging - to $\pm 1 \times 10^{-10}$ /day, 1.5×10^{-8} /year
 Low phase-noise level (-165 dBc/Hz, TYP, floor)
 Excellent Allan variance, 1s to 5×10^{-13}
 Small size packaging

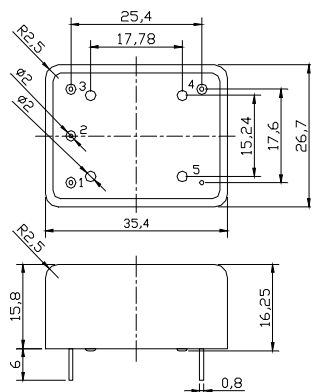
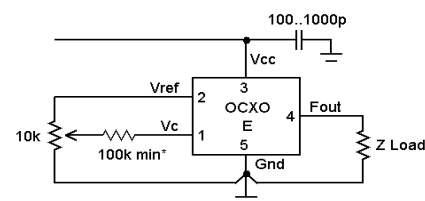
Typical Applications

Rubidium Standard Replacement
 GPS Receivers
 Instrumentation
 Stratum 2 Clock Systems

Packaging: "Europack" 35.4x26.7x16.3 mm

RoHS compliant
Description

The OCXOs of MXODE series use the double-oven structure providing perfect temperature stabilization of the high precision crystal resonator and the oscillator circuitry. At only 15 cm³ volume and about 1.5 W power consumption the OCXOs provide up to 5×10^{-11} temperature stability in (-40 +85)°C, 5×10^{-13} /1s Allan variance and aging 1×10^{-10} /day aging rate. The MXODE series is excellent to use in Stratum II clock system, instrumentations, local reference as Rb-standard replacement and in other high-end applications. The oscillators are available in 8 - 100 MHz operational frequency range.

Physical Dimensions

Pin Connections


* required for some versions

Pin	Signal
1	Electrical tuning
2	Reference voltage
3	+V Supply
4	RF Out
5	GND

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Specification

Parameter	Sym.	Conditions	Value			Unit	Note	
			Min.	Typ.	Max.			
Frequency range	f_0		5		100	MHz		
Initial tolerance	$(f-f_0)/f_0$	+25°C, $V_{cc}=0.5*V_{ref}$	±0.01	±0.1		ppm		
RF output								
HCMOS (TTL) option	Load		10		15/5	kOhm pF	10/100 MHz	
	H-level voltage	V_{Hi}	$V_{cc}=5\text{ V}, 12\text{ V}$ $V_{cc}=3.3\text{ V}$	3.7 2.4		V		
	L-level voltage	V_{Li}			0.4	V		
	Duty cycle			45		55	%	
	Rise/Fall time					10/3	ns	10/100 MHz
Sine-wave option	Level	L	$V_{cc}=5\text{ V}, 12\text{ V}$ $V_{cc}=3.3\text{ V}$	+7 +4		dBm		
	Load	R_L			50	Ohm		
	Harmonics level				-30	dBc		
Sub-harmonics level			Operational frequency <24 MHz Operational frequency ≥24 MHz		none	-40	dBc	Frequency multiplier is used
Power supply								
Voltage	V_{cc}		11.4 4.75 3.15	12.0 5.0 3.3	12.6 5.25 3.45	V		
Power consumption		Warm-up time Steady state, +25°C		6000 1500		mW	10MHz, -40°C..85°C	
Warm-up time	t_{up}	at +25°C to $\Delta f/f=1e-8$			300	s	ref. to freq. after 15 min. of operation	
Frequency control								
Control voltage range	V_c	$V_{cc}=5\text{ V}$ $V_{cc}=3.3\text{ V}$	0 0		4.3 3.1	V		
Tuning range		Compliance with 10 years of aging	±0.3			ppm	positive slope	
Reference voltage	V_{ref}	$V_{cc}=5\text{ V}$ $V_{cc}=3.3\text{ V}$	4.0 2.5		4.3 3.1	V		
Frequency stability								
vs. temperature		ref. 25°C, air flow 0.5 m/s max.	±0.1			ppb	See ordering code	
vs. supply voltage		ref V_{cc} typ.		±0.2		ppb		
G – sensitivity		worst direction, 0 – 1kHz vibration BW (for 0 – 2kHz BW consult the factory)	±0.5	±1.0		ppb/G		
Retrace		24h work after 24h off			±10	ppb	10MHz	
SSB Phase noise		1 Hz	-110		-95	dBc/Hz	10MHz $V_{cc}=5\text{V}, 12\text{V}$	
		10 Hz	-140		-125			
		100 Hz	-155		-145			
		1 kHz	-165		-155			
		10 kHz	-168		-160			
		100 kHz	-168		-160			
Allan variance		1 s	0.5		10	e-12	10MHz	
Aging	per day	after 30 days of operation	±0.1			ppb	10MHz see ordering code	
	first year		±0.015			ppm		
Environmental, mechanical conditions								
Airflow velocity	0.5 m/s maximum							
Operating temperature range	See ordering code							
Storage temperature range	-60°C to +85°C							
Power voltage	-0.5V to $V_{cc}+20\%$							
Control voltage	-0.5V to 6V							
Humidity	Hermetically sealed							
Mechanical shock	Per MIL-STD-202, 30G half sine pulse, 11ms (100G, 11ms-optionally)							
Vibration	Per MIL-STD-202, 5G swept sine 0 to 500Hz (10G swept sine 0 to 2000Hz-optionally)							
Soldering conditions	Hand solder only – not reflow compatible. 260°C 10s (on pins)							
Washing Conditions	Washing with water or alcohol based detergent allowed only with final enough drying stage							

For ordering code – see next page

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Ordering code

MXODE	-	B	50	B	5	T	-	10 MHz
		1	2	3	4	5		

1	Temperature range
<i>Code</i>	<i>Specification</i>
A	0°C..50°C
B	-10°C..60°C
C	0°C..70°C
D	-20°C..70°C
E	-30°C..70°C
F	-40°C..85°C
G	-55°C..85°C
Q	-60°C..85°C

2	Stability over temperature	
<i>Code</i>	<i>Specific.</i>	<i>Temperature range code available for 10MHz 5V</i>
XY	±Xe-Y	
51	±5e-11	A, B, C, D, E, F
10	±1e-10	A, B, C, D, E, F, G
20	±2e-10	A, B, C, D, E, F, G
30	±3e-10	A, B, C, D, E, F, G, Q
50	±5e-10	A, B, C, D, E, F, G, Q
19	±1e-9	A, B, C, D, E, F, G, Q

3	Aging per day/year, ppb/ppm
<i>Code</i>	<i>Specification</i>
A	0.1/0.015
B	0.2/0.02
Z	0.3/0.03
C	0.5/0.05
D	1/0.1
E	1.5/0.15
F	2/0.2
G	3/0.3

4	Supply voltage
<i>Code</i>	<i>Specification</i>
3	3.3V±5%
5	5V±5%
2	12V±5%

5	Output
<i>Code</i>	<i>Specification</i>
T	HSMOS/TTL
S	Sine wave

Deviation of the parameters is possible on customer's requirements. Please consult the factory.