

Revised in December 2017

## Features

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

## Typical Applications

Rubidium Standard Replacement  
 GPS Receivers  
 Instrumentation  
 Stratum 2 Clock Systems

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

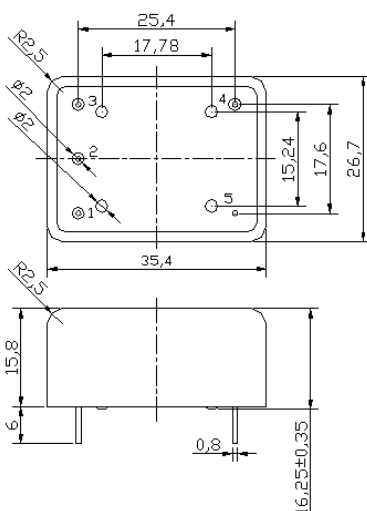


RoHS compliant

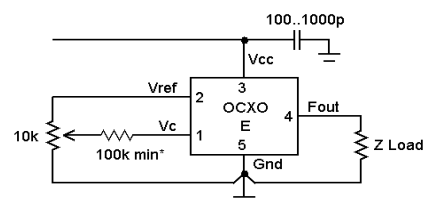
## Description

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 cm<sup>3</sup> volume and about 1.5 W power consumption the OCXOs provide up to  $5 \times 10^{-11}$  temperature stability in (-40 +85) $^{\circ}$ C,  $5 \times 10^{-13}$  /1s Allan variance and aging  $1 \times 10^{-10}$ /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

Revised in December 2017

**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		
<b>RF output</b>								
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
<b>Power supply</b>								
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	
<b>Frequency control</b>								
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		
<b>Frequency stability</b>								
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 Typical phase noise is default option. For different phase noise consult the factory.		1 Hz	-110	-95		dBc/Hz	10MHz $V_{cc}=5\text{V}, 12\text{V}$	
		10 Hz	-140	-121				
		100 Hz	-155	-141				
		1 kHz	-165	-155				
		10 kHz	-168	-160				
		100 kHz	-168	-160				
Allan deviation		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		
<b>Environmental, mechanical conditions</b>								
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**

Revised in December 2017

**Ordering code**

<b>MXODE</b>	-	<b>B</b>	<b>50</b>	<b>B</b>	<b>5</b>	<b>T</b>	-	<b>10 MHz</b>
		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>		

<b>1</b>	<b>Temperature range</b>
<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

<b>2</b>	<b>Stability over temperature</b>	
<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

<b>3</b>	<b>Aging per day/year, ppb/ppm</b>
<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

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

<b>5</b>	<b>Output</b>
<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.**