

SECTION 1.6

**OVEN CONTROLLED CRYSTAL
OSCILLATORS**

OVEN CONTROLLED CRYSTAL OSCILLATORS (OCXO)

INTRODUCTION

1. Application and Technology Notes:

Oven Controlled Crystal Oscillators (OCXO) offer ultra high temperature stability by way of an internal oven. The oven temperature is set to optimise the crystal temperature curve at the turnover point, Isolating the flatest part of the temperature curve allows the device to maintain the high stability throughout the operating temperature range of the oscillator. To maintain the ageing characteristics, specially cut (AT and SC-cut) crystals are used. The processing of the crystal is essential to ensure optimum performance in the oscillator so only highest quality crystals are used for these applications.

The OCXO in general is the most practical choice for high stability/low ageing system requirements. The DFO 25 is particularly well suited for volume applications where high stabilities and very low ageing are required as it meets the Stratum III and IIIE standards. Examples include GSM, PCS and Cellular base stations and Switching applications

2. Code definition

DFO Φ - Φ 13.000 MHz

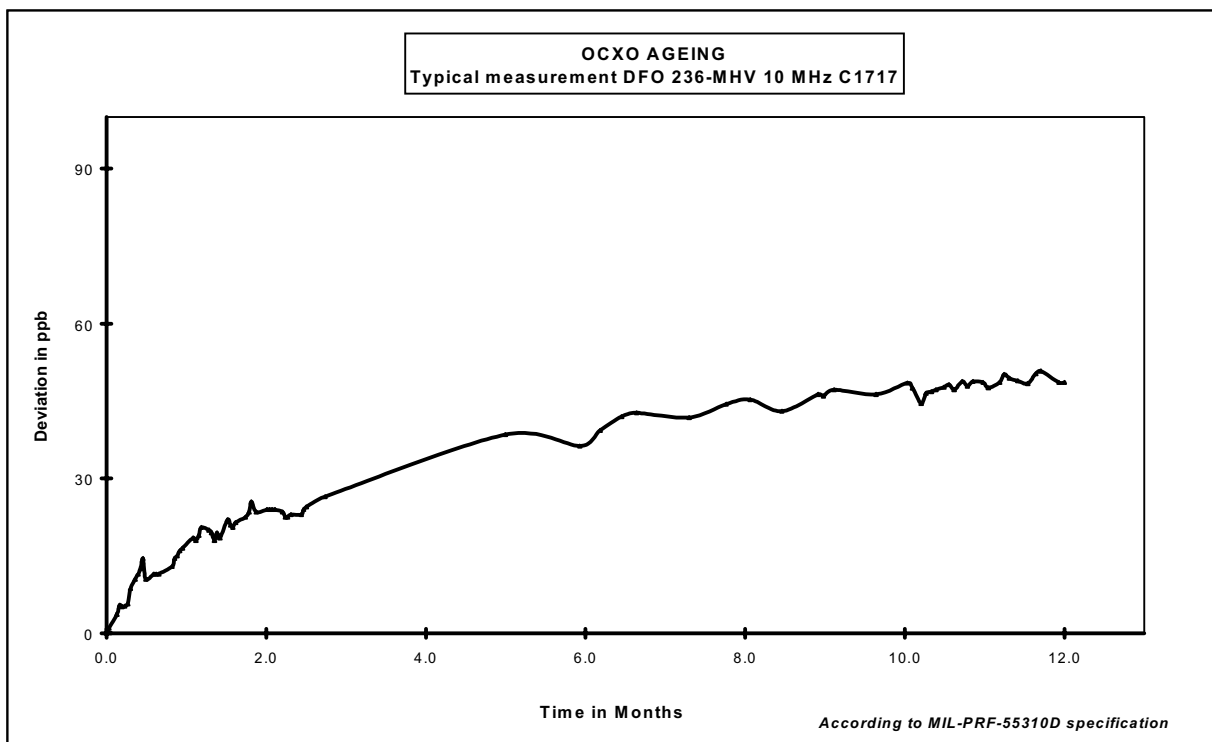
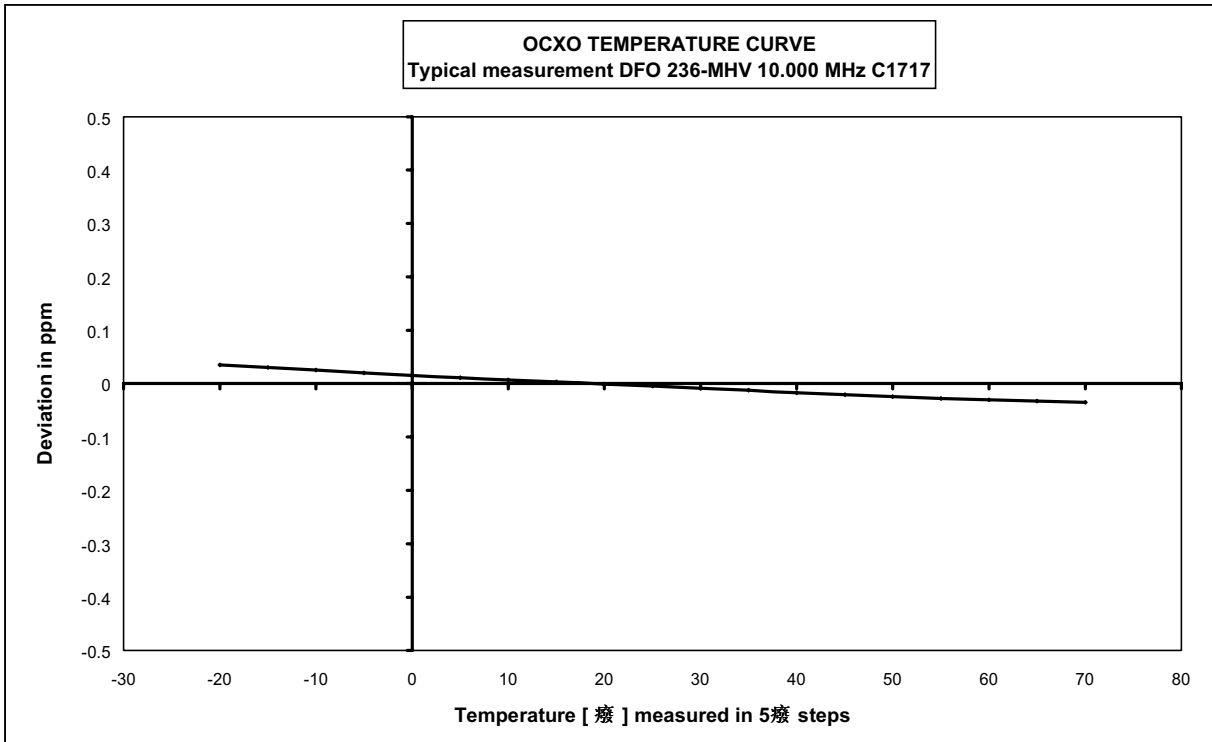
	Package Code [L x W x H mm]	Output Code	Option Code	Temperature Code	Temperature Stability Code	Ageing Code [1 st year]
L E A D E D	25 = 25 x 25 x H	H = HCMOS	V = ext. volt. control	B = 0 to 70°C	17 = 1 x 10E-7	17 = 1 x 10E-7
		S = sine wave		C = -20 to 70°C	57 = 5 x 10E-7	27 = 2 x 10E-7
	36 = 36 x 27 x H		E = -40 to 85°C	58 = 5 x 10E-8	57 = 5 x 10E-7	
				18 = 1 x 10E-8		
				S3 = Strat. III		
				S3E = Strat. IIIE		

Some codes/options are product specific. Other codes/options also available. Please consult factory for details.
 Φ Internal codes for production use only. * A unique specification will be issued for custom requirements.

3. Detailed Specifications

Package	Description	Page No.
25 x 25 x 13	HCMOS or TTL, 12.8 MHz Stratum III and Stratum IIIE	68
27 x 36 x 17	Sine or HCMOS or TTL, 4 - 60 MHz and ≤ 1 W supply power to maintain $\leq \pm 1 \times 10E-8$	69

**OVEN CONTROLLED CRYSTAL OSCILLATORS (OCXO)
MEASUREMENT DATA**



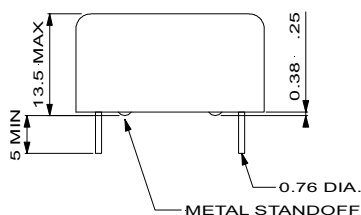
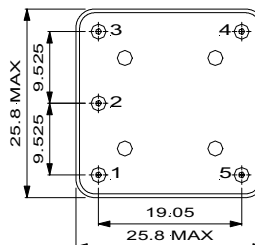
STRATUM III & STRATUM IIIE MINIATURE OCXO TYPE DFO 25-SH

STRATUM III AND IIIE COMPLIANT

LOW PROFILE PACKAGE

VERY TIGHT STABILITIES

EXCELLENT PHASE NOISE



Function	DFO 25
Output	1
GND	2
NC	3
NC	4
Vcc	5

TYPE	DFO 25-SH BS3/ES3	DFO 25-SH BS3E/ES3E
Frequency	12.800 MHz	

ELECTRICAL SPECIFICATIONS		
supply voltage	5 V ± 5 %	5 V ± 5 %
supply power (no load) @ 25°C	≤ 1.4 W	≤ 1.6 W
supply power during warm up	≤ 5.5 W	≤ 5.5 W
output load	HCMOS 15 pF or 2 TTL	HCMOS 15 pF or 2 TTL
duty cycle @ 50 % level	40/60...60/40 %	40/60...60/40 %
rise & fall times (10 to 90%)	≤ 10 ns	≤ 10 ns
high/low levels or output amplitude	≥ (Vcc - 0.6 V) ≤ 0.5 V	≥ (Vcc - 0.6 V) ≤ 0.5 V
SSB phase noise /1 Hz BW @ 100 Hz	≤ -130 dBc/Hz	≤ -130 dBc/Hz
@ 1 kHz	≤ -145 dBc/Hz	≤ -145 dBc/Hz
@ 10 kHz	≤ -150 dBc/Hz	≤ -150 dBc/Hz
@ 100kHz	≤ -150 dBc/Hz	≤ -150 dBc/Hz
warm up time ref @ 1 hour frequency	≤ 1 x 10 ^E -7 in 5 min @ 25°C	≤ 1 x 10 ^E -8 in 5 min @ 25°C

FREQUENCY STABILITY			detailed tolerances after 30 days of operation					
type	temperature range	model code	stability versus :				Overall Stability/ 20 years	
			Temperature (ref. To 25°C)	24 hrs drift	Daily ageing	Short term (1 sec)		Vcc ± 5 %
all types	0 to 70°C	BS3	≤ ± 2.8 x 10 ^E -7	≤ ± 4 x 10 ^E -8	≤ ± 1.5 x 10 ^E -8	≤ 1 x 10 ^E -10	≤ ± 1 x 10 ^E -8	≤ ± 4.6 ppm
	-40 to 85°C	ES3	≤ ± 2.8 x 10 ^E -7	≤ ± 4 x 10 ^E -8	≤ ± 1.5 x 10 ^E -8	≤ 1 x 10 ^E -10	≤ ± 1 x 10 ^E -8	≤ ± 4.6 ppm
	0 to 70°C	BS3E	≤ ± 8 x 10 ^E -9	≤ ± 1 x 10 ^E -9	≤ ± 5 x 10 ^E -10	≤ 1 x 10 ^E -11	≤ ± 2.5 x 10 ^E -9	≤ ± 2.3 ppm
	-40 to 85°C	ES3E	≤ ± 8 x 10 ^E -9	≤ ± 1 x 10 ^E -9	≤ ± 5 x 10 ^E -10	≤ 1 x 10 ^E -11	≤ ± 2.5 x 10 ^E -9	≤ ± 2.3 ppm
24 hours drift definition		BS3/ES3	including Vcc ± 5 %, ± 2.78°C and daily ageing					
		BS3E/ES3E	including Vcc ± 0.25 %, ± 2.78°C and daily ageing					
20 years ageing		BS3/ES3	≤ ± 3 ppm					
		BS3E/ES3E	≤ ± 1 ppm					
Calibration @ 25°C			≤ ± 1.2 ppm					

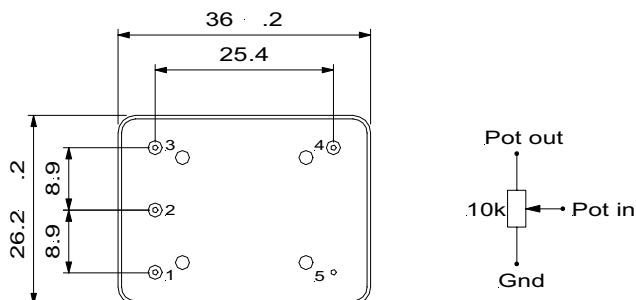
ORDERING CODE	type + option code + frequency + model code
Example	DFO 25-SH 12.8 MHz ES3

HIGH STABILITY MINIATURE OCXO TYPES DFO 236-M & DFO 236-MS

EXCELLENT SHORT TERM STABILITY

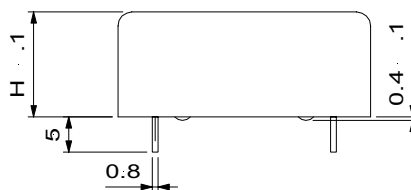
LOW POWER CONSUMPTION

FAST WARM UP



Function	DFO 236-M/MS
Pot in/V control	1
Pot out/NC	2
Vcc	3
Output	4
GND	5

H = 17.0 mm



TYPE	DFO 236-MS	DFO 236-MSS	DFO 236-MH	DFO 236-MSH
Frequency Range	4 to 50 MHz	4 to 50 MHz	4 to 50 MHz	4 to 20 MHz

ELECTRICAL SPECIFICATIONS		DFO 236-MS	DFO 236-MSS	DFO 236-MH	DFO 236-MSH
supply voltage		5 V ± 5 % to 15 V ± 10 %	5 V ± 5 % to 15 V ± 10 %	5 V ± 5 % to 15 V ± 10 %	
supply power (no load) @ 25°C		≤ 1 W	≤ 1 W	≤ 1 W	
supply power during warm up		≤ 5 W	≤ 5 W	≤ 5 W	
output load		Sine 50 Ω ± 10 %	Sine 50 Ω ± 10 %	HCMOS 15 pF or 2 TTL	
duty cycle @ 2.5 V				40/60...60/40 %	
rise & fall times (10 to 90%)				≤ 15 ns	
high/low levels or output amplitude		0 dBm ± 2 dB	0 dBm ± 2 dB	≥ 3.5 V/≤ 0.5 V	
SSB phase noise (1 Hz BW) @ 1 Hz		≤ -70 dBc/Hz	≤ -90 dBc/Hz		
(typical @ 10MHz) @ 10 Hz		≤ -100 dBc/Hz	≤ -120 dBc/Hz		
@ 100 Hz		≤ -120 dBc/Hz	≤ -130 dBc/Hz		
@ 1 kHz		≤ -130 dBc/Hz	≤ -135 dBc/Hz		
harmonics		≤ -20 dBc	≤ -25 dBc		
spurious		≤ -70 dBc	≤ -70 dBc		
warm up time to reach ≤ 1 x 10 ^{E-7}		≤ 10 min	≤ 10 min	≤ 10 min	

FREQUENCY STABILITY			detailed tolerances				
type	temperature range	model code	stability versus :			10 kΩ pot. pulling range	
			temperature	ageing/day	ageing/ 1 st year		short term
DFO 236-M	-20 to 70°C	C1717	≤ ± 1 x 10 ^{E-7}	≤ 1 x 10 ^{E-9}	≤ 1 x 10 ^{E-7}	≤ 1 x 10 ^{E-10}	≥ ± 1 x 10 ^{E-6}
		C5817	≤ ± 5 x 10 ^{E-8}			≤ 5 x 10 ^{E-11}	≥ ± 5 x 10 ^{E-7}
DFO 236-MSH		C1817	≤ ± 1 x 10 ^{E-8}				
DFO 236-MSS							
stability versus supply voltage			≤ 1 x 10 ^{E-9} for Vcc ± 10 % (5 V ± 5 %)				

OPTIONS	CODE	
external voltage	V	2.5 V ± 2 V ≥ ± 1 ppm, positive slope

ORDERING CODE	type + option code + frequency + model code + voltage value
Example	DFO 236-MHV 13.000 MHz C1717/12