



**ОАО «МОРИОН» (С-Петербург)**

**MORION, Inc. (St. Petersburg)**



**MORION, Inc.**

**Quartz Frequency Control  
Products: quartz oscillators.**

**Product Catalogue**

**September 2010**

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# Morion, Inc. – company profile

Morion, Inc. is well-known both in Russia and worldwide designer and manufacturer of quartz frequency control products (FCP) - quartz oscillators, filters and crystals dedicated for various applications such as telecommunications, navigation, test & measurement, digital broadcasting, search and rescue systems, etc.

As of today Morion is equipped with state-of-the-art production and testing equipment and has the most advanced in the field technologies.

Over 75 years of experience and high level expertise of employees allowed Morion to become a premier producer in Russia and one of the worldwide leading manufacturers of high end quartz products. Morion holds a lot of patents for many original concepts in FCP field.



Morion supports and continuously improves quality control system based on Russian Space and military standards as well as international standards. Since 1999 Morion is an ISO-9001 certified company being recertified in accordance with ISO-9001:2000 back in the year 2003.



Precision quartz oscillators manufactured by Morion are certified for use in programs of The Russian Federal Space Agency. Thanks to highly qualified personnel, effectively operating quality control system and technology excellence Morion successfully supplies products not only in Russia and CIS, but also to the markets of the USA, Canada, Germany, the UK, France, Italy, Switzerland, Korea, China, Japan, Malaysia and many other countries. In 2007 Morion received awards from the Government of St. Petersburg for achievements on the field of the export of the products. Morion is named «The Best Exporter» in 2007, 2008, 2009

Trade mark of Morion is registered in many countries: the USA, Korea, China, countries of EU.

Morion, Inc. in figures:

- Production facilities area - about **27 000 square meters**,
- Number of employees - about **480** people including about **100** engineers, **16** PhDs and **2** Doctors;
- Structure - 4 Scientific Production Departments (SPD) engaged in design and manufacturing of:
  - SPD-1 - precision quartz oscillators,
  - SPD-2 - quartz filters and crystals,
  - SPD-3 - quartz blanks,
  - SPD-5 - tools and specially designed production and test equipment.
- Product portfolio: about **65%** are precision quartz oscillators; about **35%** are quartz filters, crystals, standard oscillators, quartz blanks;
- International relationships: about **50%** of products are being exported to more than **36** countries;
- Extensive participation in space programs - more than **2 000** units working in Space.

# Morion, Inc. – company profile

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Main activity of Morion is development and volume production of the following products:

- precision oscillators (OCXOs, DOCXOs, TCXOs, VCXOs, XO's),
- complicated crystals,
- multi-pole filters,
- quartz blanks.

The whole production process from a quartz blank to a finished quartz oscillator takes place at one facility. Morion is a unique company with an advantage of all critical processes taking place in-house. It's one of the reasons that allowed Morion to become a reliable supplier successfully participating in long term and high volume projects.

In the year 2001, the annual "C.B. Sawyer Award" was granted to president of Morion, Inc., Dr. Yakov L. Vorokhovskiy "...for outstanding entrepreneurship in leading Morion, Inc. to become a world class company and for the years dedicated to the quartz industry...". This award is the highest award in quartz industry.



Thanks to our unique approach of establishing close working relationship between our engineers and our customers, we are capable to offer flexible solutions meeting customers' exact needs. This enables our customers to quickly respond to the changing trends and requirements and keep their competitiveness on the market.

We are certain that we can offer you what you require for your business success:

- High quality and reliability of up-to-date products,
- Flexible designs in accordance with requirements of our customers,
- Committed engineering service;
- Short and on-time deliveries;
- Competitive prices;
- All order sizes.

Our advantages:

- Over 75 years of experience in quartz field;
- Wide range of high end products for various applications;
- Full production cycle at one facility: from a quartz blank to a finished quartz oscillator;
- 100% testing of all key parameters including aging and stability vs. temperature
- Very good financial shape confirmed by regular audits;
- State-of-the-art facilities for development and scientific research;
- Highly qualified workforce;
- ISO 9001:2000 certificate, Russian Space and military certificates;
- International patents and awards.

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# OCXO SELECTION GUIDE

## By stability vs. temperature:

Stability vs. temperature		Package footprint size, mm	Height, mm	Frequency range, MHz	Aging, per year $\pm E^{-8}$	Power supply			Output	
Min	Max					12V	5V	3.3V	SIN	HCMOS
$\pm 5 \times 10^{-11}$	$\pm 2 \times 10^{-10}$	51x51	38.0	5.0; 10.0	0.5...1.5	MV216	-	-	MV216	-
$\pm 5 \times 10^{-11}$	$\pm 5 \times 10^{-10}$	51x51	38.0	5.0-20.0	0.5...5	MV89	-	-	MV89	-
$\pm 1 \times 10^{-10}$	$\pm 1 \times 10^{-9}$	51x41	20.0	5.0-10.0	1...5	MV268	-	-	MV268	-
$\pm 1 \times 10^{-10}$	$\pm 1 \times 10^{-9}$	51x41	19.0	5.0-20.0	1...5	MV180	-	-	MV180	MV180
$\pm 1 \times 10^{-10}$	$\pm 1 \times 10^{-9}$	51x51	19.0	5.0-20.0	1...5	MV180	MV180	-	MV180	MV180
$\pm 2 \times 10^{-10}$	$\pm 1 \times 10^{-9}$	36x27	19.0	5.0-10.0	2...10	MV209	-	-	MV209	-
$\pm 2 \times 10^{-10}$	$\pm 5 \times 10^{-9}$	51x51	10.0-19.0	10.0-40.0	2...20	MV200	MV200	-	MV200	MV200
$\pm 2 \times 10^{-10}$	$\pm 5 \times 10^{-9}$	51x51	10.0-19.0	10.0	3...10	MV220	-	-	MV220	-
$\pm 5 \times 10^{-10}$	$\pm 5 \times 10^{-9}$	36x27	10.0-16.0	10.0-25.0	2...20	MV197	MV197	-	MV197	MV197
$\pm 5 \times 10^{-10}$	$\pm 3 \times 10^{-9}$	51x51	16.0-19.0	5.0	1...5	MV267	-	-	MV267	-
$\pm 1 \times 10^{-9}$	$\pm 5 \times 10^{-9}$	20x20	12.7	10.0-20.0	3...20	MV285	MV285	-	MV285	MV285
$\pm 1 \times 10^{-9}$	$\pm 5 \times 10^{-9}$	20x20	12.7	10.0-20.0	3...20	MV199	MV199	-	MV199	MV199
$\pm 1 \times 10^{-9}$	$\pm 5 \times 10^{-9}$	36x27	17.0	5.0;10.0	2...10	MV272	-	-	MV272	-
$\pm 1 \times 10^{-9}$	$\pm 1 \times 10^{-8}$	51x51	19.0-25.0	5.0-20.0	0.5...5	MV172	MV172	-	MV172	MV172
$\pm 1 \times 10^{-9}$	$\pm 1 \times 10^{-8}$	51x51	16.0-19.0	100.0	5...10	MV137	-	-	MV137	-
$\pm 5 \times 10^{-9}$	$\pm 5 \times 10^{-8}$	25x22 SMD	14.0	10.0-40.0	3...20	-	MV115	MV115	-	MV115
$\pm 5 \times 10^{-9}$	$\pm 5 \times 10^{-8}$	25x22 SMD	12.5-14.0	10.0-20.0	3...20	MV140	-	-	MV140	-
$\pm 5 \times 10^{-9}$	$\pm 5 \times 10^{-8}$	51x51	25.4	5.0; 10.0	3...10	MV83M	-	-	MV83M	-
$\pm 5 \times 10^{-9}$	$\pm 1 \times 10^{-7}$	25x25	12.7	10.0-25.0	3...20	MV85	MV85	-	MV85	MV85
$\pm 7.5 \times 10^{-9}$	$\pm 1 \times 10^{-7}$	36x27	16.0	10.0-40.0	3...20	MV103	MV103	-	MV103	MV103
$\pm 1 \times 10^{-8}$	$\pm 1 \times 10^{-7}$	20x20	10.0	10.0 – 25.0	3...20	-	MV118	MV118		MV118
$\pm 2 \times 10^{-8}$	$\pm 1 \times 10^{-7}$	51x41	25.0	5.0-10.5	10...30	MV80	MV80	-	MV80	MV80
$\pm 5 \times 10^{-8}$	$\pm 5 \times 10^{-7}$	36x27	16.0	50.0-120.0	30...50	MV136	MV136	-	MV136	-
$\pm 5 \times 10^{-8}$	$\pm 5 \times 10^{-7}$	51x51	12.7	50.0-700.0	30...50	MV87	-	-	MV87	-
$\pm 5 \times 10^{-8}$	$\pm 5 \times 10^{-7}$	25x25	12.7	50.0-700.0	20...100	MV218	MV218	-	MV218	-

## By aging:

Package size, mm	OCXO types	Aging per year, $\pm 10^{-8}$								
		0.5	1.0	2.0	3.0	5.0	10.0	20.0	30.0	50.0
20x20	MV118				+	+	+			
	MV199				+	+	+	+		
25x25	MV85				+	+	+			
	MV218							+	+	+
	MV 285				+	+	+			
25x22 SMD	MV115				+	+	+			
	MV140				+	+	+			
36x27	MV209			+	+	+	+			
	MV103				+	+	+	+		
	MV197			+	+	+	+			
	MV205			+	+	+	+	+		
	MV136								+	+
	MV 272			+	+	+	+			
51x41	MV62			+	+	+	+			
	MV80						+	+		
	MV180		+	+	+	+				
	MV201			+	+	+	+			
51x51	MV83M				+	+	+			
	MV87								+	+
	MV89	+	+	+	+	+				
	MV137					+	+			
	MV172	+	+	+	+	+				
	MV180		+	+	+	+				
	MV200			+	+	+	+			
	MV220				+	+	+			
	MV216	+	+							
	MV267		+	+	+	+				
	MV268		+	+	+	+				

# OCXO SELECTION GUIDE

## By package:

Package footprint size, mm	Height, mm	Frequency range, MHz	Stability vs. temperature		Aging, per year, $\pm 10^{-8}$	OCXO model name and available options				
			Min	Max		OCXO model	Power supply			Output
							12V	5V	3.3V	SIN HCMOS
20x20	10.0	10.0 – 40.0	$\pm 1 \times 10^{-8}$	$\pm 1 \times 10^{-7}$	3...20	MV118	-	+	+	- +
	12.7	10.0 – 20.0	$\pm 1 \times 10^{-9}$	$\pm 5 \times 10^{-9}$	3...20	MV199	+	+	-	+ +
25x22 SMD	14.0	10.0-40.0	$\pm 5 \times 10^{-8}$	$\pm 1 \times 10^{-7}$	3...20	MV115	-	+	+	+ +
	12.5-14.0	10.0-20.0	$\pm 5 \times 10^{-8}$	$\pm 1 \times 10^{-7}$	3...20	MV140	+	-	-	+ -
25x25	12.7	10.0-25.0	$\pm 5 \times 10^{-9}$	$\pm 1 \times 10^{-7}$	3...20	MV85	+	+	+	+ +
	12.7	10.0 – 20.0	$\pm 1 \times 10^{-9}$	$\pm 5 \times 10^{-9}$	3...20	MV285	+	+	-	+ +
	12.7	50.0-700.0	$\pm 5 \times 10^{-8}$	$\pm 5 \times 10^{-7}$	20...100	MV218	+	+	-	+ -
36x27	16.0	10.0-40.0	$\pm 7.5 \times 10^{-9}$	$\pm 1 \times 10^{-7}$	3...20	MV103	+	+	-	+ +
	10.0-16.0	10.0-25.0	$\pm 5 \times 10^{-10}$	$\pm 1 \times 10^{-8}$	2...20	MV197	+	+	-	+ +
	10.0-16.0	16.384-40.0	$\pm 1 \times 10^{-9}$	$\pm 5 \times 10^{-9}$	2...20	MV205	+	+	-	+ +
	19.0	5.0-10.0	$\pm 2 \times 10^{-10}$	$\pm 1 \times 10^{-9}$	2...10	MV209	+	-	-	+ -
	16.0	50.0-120.0	$\pm 5 \times 10^{-8}$	$\pm 5 \times 10^{-7}$	30...50	MV136	+	+	-	+ -
	12.7-19.0	10.0-40.0	$\pm 5 \times 10^{-10}$	$\pm 5 \times 10^{-9}$	2...20	MV201	+	+	-	+ +
	25.0	10.0	$\pm 1 \times 10^{-8}$	$\pm 1 \times 10^{-7}$	10...20	MV80	+	+	-	+ +
	19.0	5.0-20.0	$\pm 1 \times 10^{-10}$	$\pm 1 \times 10^{-9}$	1...5	MV180	+	+	-	+ +
	17.0	5.0; 10.0	$\pm 1 \times 10^{-9}$	$\pm 5 \times 10^{-9}$	2...10	MV272	+	-	-	+ -
51x51	25.4	5.0; 10.0	$\pm 5 \times 10^{-9}$	$\pm 5 \times 10^{-8}$	3...10	MV83M	+	-	-	+ -
	10.0-19.0	5.0-100.0	$\pm 2 \times 10^{-10}$	$\pm 5 \times 10^{-9}$	2...20	MV200	+	+	-	+ +
	10.0-19.0	10.0	$\pm 2 \times 10^{-10}$	$\pm 5 \times 10^{-9}$	3...10	MV220	+	-	-	+ -
	16.0-19.0	5.0	$\pm 5 \times 10^{-10}$	$\pm 3 \times 10^{-9}$	1...5	MV267	+	-	-	+ -
	19.0	5.0-20.0	$\pm 1 \times 10^{-10}$	$\pm 1 \times 10^{-9}$	1...5	MV180	+	+	-	+ +
	19.0-25.0	5.0-20.0	$\pm 1 \times 10^{-9}$	$\pm 1 \times 10^{-8}$	0.5...5	MV172	+	+	-	+ +
	38.0	5.0-20.0	$\pm 5 \times 10^{-11}$	$\pm 5 \times 10^{-10}$	0.5...5	MV89	+	-	-	+ -
	38.0	5.0; 10.0	$\pm 5 \times 10^{-11}$	$\pm 2 \times 10^{-10}$	0.5...1.5	MV216	+	-	-	+ -
	12.7	50.0-700.0	$\pm 5 \times 10^{-8}$	$\pm 5 \times 10^{-7}$	30...50	MV87	+	-	-	+ -
	16.0-19.0	100.0	$\pm 1 \times 10^{-9}$	$\pm 1 \times 10^{-8}$	5...10	MV137	+	-	-	+ -
	20.0	5.0-10.0	$\pm 1 \times 10^{-10}$	$\pm 1 \times 10^{-9}$	1...5	MV268	+	-	-	+ -

## By features:

OCXOs' features	Model	Description
Low phase noise for 5 MHz, 10 MHz	MV83M	Low phase noise near the carrier: $< -115$ dBc/Hz @ 1 Hz (for 5 MHz, LN option). Low power consumption OCXO, excellent short term stability.
	MV267	Low phase noise near the carrier: $< -118$ dBc/Hz @ 1 Hz; $< -148$ dBc/Hz @ 10 Hz (for 5 MHz, ULN option). High precision and low aging OCXO.
	MV200	Low phase noise performance: $< -108$ dBc/Hz @ 1 Hz; $< -137$ dBc/Hz @ 10 Hz; $< -162$ dBc/Hz @ 10 kHz (for 10 MHz, ULN option). High precision, low profile.
	MV220	Low phase noise at floor: $< -163$ dBc/Hz @ 1 kHz; $< -168$ dBc/Hz @ 10 kHz (for 10 MHz, LN option). High precision, low profile.
Low phase noise, high frequency	MV137	Low phase noise performance for 100 MHz: $< -125$ dBc/Hz @ 100 Hz; $< -165$ dBc/Hz @ 10 kHz. High precision (up to $\pm 1 \times 10^{-9}$ vs. operating temperature range), low aging.
	MV218	Low phase noise performance for 100 MHz: $< -127$ dBc/Hz @ 100 Hz; $< -167$ dBc/Hz @ 10 kHz. Small size, option with SMA connector.
Low G-sensitivity	MV207	Low G-sensitivity (in frequency range 0-500 Hz) $< 1 \times 10^{-9}/g$
Excellent short term stability	MV83M	Short term stability up to per $< 5 \times 10^{-13}$ per 1 s. Low phase noise and low power consumption OCXO for 5 & 10 MHz.
	MV200	Short term stability up to per $< 1 \times 10^{-12}$ per 1 s. (optional for 10 MHz). Low phase noise, high precision and low profile OCXO.
	MV267	Short term stability up to per $< 1 \times 10^{-12}$ per 1 s. (optional for 5 MHz). Low phase noise precision OCXO.
Low profile (low height) package	MV200	Height: down to 10 mm. 51x51 mm footprint. Low phase noise, high precision OCXO.
	MV197	Height: down to 10 mm. 36x27 mm footprint. Low phase noise, high precision OCXO.
	MV199	12.7 mm height. 20x20 mm footprint. High precision ultra miniature OCXO.
Digital frequency control	MV268	Ultra precision DOCXO is available with frequency control by SPI protocol
RoHS compliance	ALL	Morion's OCXOs are RoHS compliant with an exception stated in item 7 of the annex to EU directive 2002/95/EC - lead solder (allowed as per subject annex) is used at interconnecting level. Upon request Morion supplies Lead Free (RoHS 6) OCXOs.



# HIGH STABILITY FAST WARM-UP LOW POWER CONSUMPTION OCXO MV80

## Features:

- Short warm-up time – less than 60 seconds
- Frequency stability vs. temperature – up to  $\pm 2 \times 10^{-8}$
- Option with 5 V power supply
- Very low power consumption – up to 0.2 W
- Low phase noise

Frequency range: 9.5-10.5 MHz

Standard frequency: 10.0 MHz

ORDERING GUIDE: MV80-C 30 H-60 - SIN - 12V-10.0 MHz

Availability of certain stability vs. operating temperature range		$\pm 1 \times 10^{-7}$	$\pm 5 \times 10^{-8}$	$\pm 3 \times 10^{-8}$	$\pm 2 \times 10^{-8}$
		100	50	30	20
A	0...+55 °C	A	A	A	A
B	- 10...+60 °C	A	A	A	A
C	- 20...+70 °C	A	A	A	C
D	-40...+70 °C	A	A	C	C

A – available, NA – not available, C – consult factory

For other temperature ranges see designation at the end of Data Sheet

Warm-up time within $\pm 5 \times 10^{-7}$ @ 25°C	
60	60 seconds
90	90 seconds

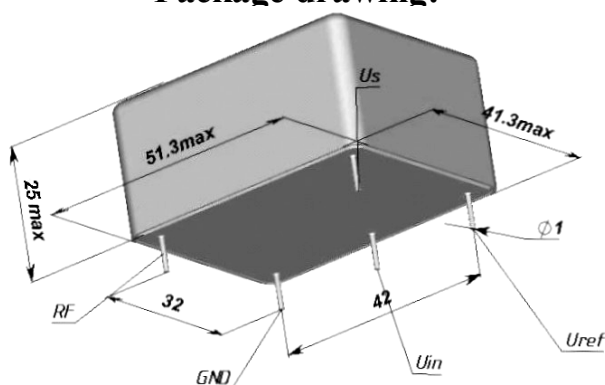
Power Supply	
12 V	
5 V	

Aging	
I	$\pm 3 \times 10^{-7}$ /year
H	$\pm 2 \times 10^{-7}$ /year
G	$\pm 1 \times 10^{-7}$ /year

Output type	
SIN	
HCMOS	

A – available, NA – not available, C – consult factory

## Package drawing:



Short term stability (Allan deviation) per 1 sec, typical	$< 3 \times 10^{-11}$	
Frequency stability vs. load changes	$< \pm 3 \times 10^{-9}$	
Frequency stability vs. power supply changes	$< \pm 3 \times 10^{-9}$	
Power supply (Us)	5 V	12 V
Steady state current consumption @ 25°C	40 mA	35 mA
Peak current consumption during warm-up	250 mA	150 mA
Frequency pulling range	$> \pm 7.5 \times 10^{-7}$	
with external voltage range (Uin)	0...+4.5 V	0...+5 V
with external potentiometer	20 kOhm	
Reference voltage output (Uref)	+4.5 V	+5 V
Slope	Positive	
Vibrations	10-200 Hz, 8g	
Shock	100g, 3 ms	

Output	SIN	HCMOS
Level	$> 225$ mV (0dBm)	5 V/ 40...60%
Load	50 Ohm $\pm 5\%$	10 kOhm/15 pF
Harmonic suppression	$> 30$ dB	-
Phase noise, typical (for 10 MHz) @ 1 Hz	-90 dBc/Hz	-90 dBc/Hz
10 Hz	-125 dBc/Hz	-120 dBc/Hz
100 Hz	-140 dBc/Hz	-135 dBc/Hz
1000 Hz	-150 dBc/Hz	-145 dBc/Hz
10000 Hz	-155 dBc/Hz	-150 dBc/Hz

## Additional notes:

- Please consult factory for daily aging values. Normally typical correspondence of daily aging per day to aging per year is as following:  $\pm 5 \times 10^{-7}$ /year -  $\pm 5 \times 10^{-9}$ /day;  $\pm 3 \times 10^{-7}$ /year -  $\pm 3 \times 10^{-9}$ /day;  $\pm 2 \times 10^{-7}$ /year -  $\pm 2 \times 10^{-9}$ /day.
- For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit), °C:

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85

# LOW POWER CONSUMPTION OCXO WITH EXCELLENT SHORT TERM STABILITY AND EXTREMELY LOW PHASE NOISE MV83M

## Features:

- Excellent short-term stability - up to  $<5 \times 10^{-13}$  per 1 sec
- High stability - up to  $\pm 5 \times 10^{-9}$
- Excellent phase noise
- Low power consumption
- Low aging - up to  $\pm 3 \times 10^{-8}$ /year
- Frequencies 5.0 & 10.0 MHz

Frequency	
5.0 MHz	
10.0 MHz	
Short term stability (Allan deviation) per 1 sec.	
05	$<5 \times 10^{-13}$
1	$<1 \times 10^{-12}$
2	$<2 \times 10^{-12}$
3	$<3 \times 10^{-12}$

Aging	
G	$\pm 1 \times 10^{-7}$ /year
F	$\pm 5 \times 10^{-8}$ /year
E	$\pm 3 \times 10^{-8}$ /year

## ORDERING GUIDE: MV83M – C 10 F – 5.0 MHz – 2 – LN

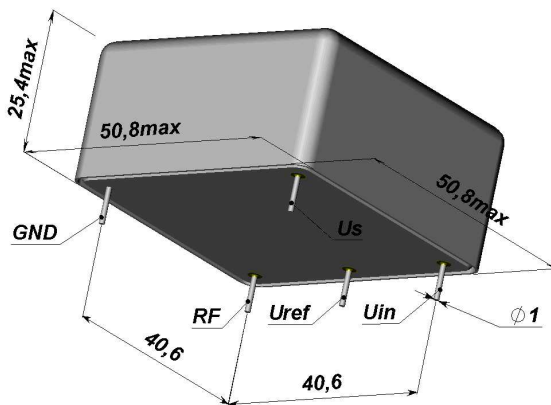
Availability of certain stability vs. operating temperature range		$\pm 5 \times 10^{-8}$	$\pm 3 \times 10^{-8}$	$\pm 2 \times 10^{-8}$	$\pm 1 \times 10^{-8}$	$\pm 7.5 \times 10^{-9}$	$\pm 5 \times 10^{-9}$
		50	30	20	10	7	5
A	0...+55 °C	A	A	A	A	A	A
B	- 10...+60 °C	A	A	A	A	C	C
C	- 20...+70 °C	A	A	A	A	NA	NA
D	-40...+70 °C	A	A	A	C	NA	NA

A – available, NA – not available, C – consult factory.

For other temperature ranges see designation at the end of Data Sheet

Output	SIN (5 MHz)	SIN (10 MHz)
Level	>225 mV (0dBm)	225 (0dBm)
Load	50 Ohm $\pm 5\%$	50 Ohm
Harmonic	<-30dBc	<-30dBc
Sub Harmonic	-	<-35dBc
Phase noise typical, dBc/Hz	-	LN
1Hz	-100	-115
10 Hz	-135	-140
100 Hz	-150	-145
1000 Hz	-155	-155
10000 Hz	-158	-158

## Package drawing:



Frequency stability vs. load changes	$<\pm 1 \times 10^{-9}$
Frequency stability vs. power supply changes	$<\pm 1 \times 10^{-9}$
Power supply (Us)	12V $\pm 5\%$
Peak current consumption during warm-up	<400 mA
Steady state current consumption @ +25°C	<35 mA
Warm-up time within $<\pm 5 \times 10^{-8}$ @ +25 °C	<5min
Frequency pulling range	$>\pm 3 \times 10^{-7}$
with external voltage range (Uin)	+1...+8V
with external potentiometer	20 kOhm
Reference voltage output (Uref)	+8V
Slope	Positive

## Mechanical characteristics:

Storage temperature range	-55...+85 °C
Vibrations	10-500 Hz, 10 g
Shock	100g
Humidity @ +35 °C	98 %

## Additional notes:

- Please consult factory for daily aging values. Normally typical correspondence of daily aging per day to aging per year is as following:  
 $\pm 2 \times 10^{-7}$ /year -  $\pm 2 \times 10^{-9}$ /day;  $\pm 1 \times 10^{-7}$ /year -  $\pm 1 \times 10^{-9}$ /day;  $\pm 5 \times 10^{-8}$ /year -  $\pm 5 \times 10^{-10}$ /day;  $\pm 3 \times 10^{-8}$ /year -  $\pm 3 \times 10^{-10}$ /day.
- For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit), °C:

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85



# HIGH STABILITY MINIATURE OCXO MV85

## Features:

- Small package – 1"x1"x0.5" (25x25x12.7 mm)
- High stability vs. temperature - up to  $\pm 5 \times 10^{-9}$
- Low aging - up to  $\pm 3 \times 10^{-8}$ /year
- Low phase noise
- 3.3 V, 5V or 12V power supply
- Frequency range 10.0-30.0 MHz
- Available as RoHS

## Output type

SIN

HCMOS

## Power supply

3.3 V

5 V

12 V

Phase noise, dBc/Hz, for 10-13 MHz, SIN

	-	LN	ULN (10MHz)
1 Hz	<-85	<-95	<-95
10 Hz	<-115	<-120	<-125
100 Hz	<-140	<-140	<-145
1000 Hz *	<-150	<-150	<-150
10000 Hz *	<-155	<-155	<-155

\* - for 3.3 V: consult factory

## ORDERING GUIDE: MV85 – B 20 G – 5V – SIN – 10.0 MHz – LN

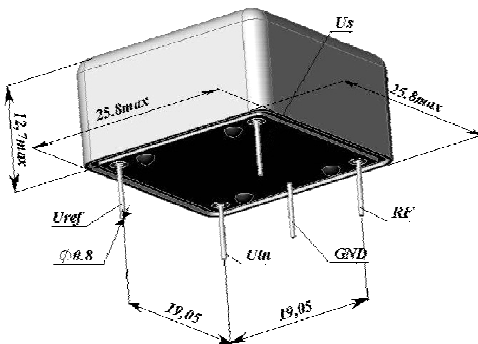
Availability of certain stability vs. operating temperature range		$\pm 1 \times 10^{-7}$	$\pm 5 \times 10^{-8}$	$\pm 3 \times 10^{-8}$	$\pm 2 \times 10^{-8}$	$\pm 1 \times 10^{-8}$	$\pm 5 \times 10^{-9}$
		100	50	30	20	10	5
A	0...+55 °C	A	A	A	A	A	A
B	- 10...+60 °C	A	A	A	A	A	A
C	- 20...+70 °C	A	A	A	A	A	C
D	-40...+70 °C	A	A	A	A	A	NA
EX	-40...+85 °C	A	A	A	A	C	NA

A – available, NA – not available, C – consult factory

Availability of certain aging values for certain frequencies		Standard frequencies						
		10.0 MHz	12.8 MHz	13.0 MHz	16.384 MHz	20.0 MHz	25.0 MHz	30.0 MHz
H	$\pm 2 \times 10^{-7}$ /year	A	A	A	A	A	A	A
G	$\pm 1 \times 10^{-7}$ /year	A	A	A	A	C	C	C
F	$\pm 5 \times 10^{-8}$ /year	A	A	A	C	NA	NA	NA
E	$\pm 3 \times 10^{-8}$ /year	A	C	C	NA	NA	NA	NA

A – available, NA – not available, C – consult factory

## Package drawing:



Frequency stability vs. load changes	$< \pm 5 \times 10^{-9}$		
Frequency stability vs. power supply changes	$< \pm 5 \times 10^{-9}$		
Warm-up time @ 25 °C within accuracy of $< \pm 1 \times 10^{-7}$	<2 min		
Power supply (Us)	3.3V $\pm 5\%$	5V $\pm 5\%$	12V $\pm 5\%$
Steady state current consumption @ 25°C	<450 mA	<200 mA	<80 mA
Peak current consumption during warm-up	<1 A	<600 mA	<300 mA
Frequency pulling range	$> \pm 5 \times 10^{-7}$		
with external voltage range (Uin)	0...+3.0V	0...+4.5V	0...+5 V
with external potentiometer	20 kOhm		
Reference voltage output (Uref)	+3 V	+4.5 V	+5 V
Slope	Positive		

Frequencies, MHz	>10-13	>13-16	>16-20	>20-30	>13-16	>16-20	>20-30
Output	HCMOS				SIN		
Level	>4.0 V/ 45...55%				>225 mV (0dBm)		
Load	10 kOhm/15 pF				50 Ohm $\pm 10\%$		
Harmonics	-				<-30 dBc		
Phase noise, dBc/Hz @ 1 Hz	<-90	<-80	<-75	<-70	<-90	<-75	<-70
10 Hz	<-120	<-105	<-100	<-95	<-120	<-105	<-100
100 Hz	<-140	<-130	<-130	<-130	<-140	<-135	<-135
1000 Hz *	<-145	<-145	<-145	<-145	<-150	<-150	<-150
10000 Hz *	<-150	<-150	<-150	<-150	<-155	<-155	<-155
Short term stability (Allan deviation) per 1 sec	$< 1 \times 10^{-11}$	$< 1 \times 10^{-11}$	$< 2 \times 10^{-11}$	$< 3 \times 10^{-11}$	$< 1 \times 10^{-11}$	$< 2 \times 10^{-11}$	$< 3 \times 10^{-11}$

## Additional notes:

\* - for 3.3 V: consult factory

- Showed values of frequency stability vs. temperature usually are tested in Still Air test conditions. Please inform factory about different conditions in operation to provide appropriate tests.
- Please consult factory for daily aging values. Normally typical correspondence of daily aging per day to aging per year is as following:  $\pm 2 \times 10^{-7}$ /year -  $\pm 2 \times 10^{-9}$ /day;  $\pm 1 \times 10^{-7}$ /year -  $\pm 1 \times 10^{-9}$ /day;  $\pm 5 \times 10^{-8}$ /year -  $\pm 5 \times 10^{-10}$ /day.

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85

## Mechanical characteristics:

Vibrations:	
Frequency range	10-500 Hz
Acceleration	10g
Shock:	
Acceleration	100 g
Duration	3 $\pm 1$ ms
Humidity @ 25 °C	98%
Storage temperature range	-55...+80 °C

# HIGH FREQUENCY LOW PHASE NOISE OCXO MV87

## Features:

- Frequency range: 48.0-120.0 MHz without internal multiplication
- Low phase noise – floor of  $<-167$  dBc/Hz
- High stability vs. temperature – up to  $\pm 5 \times 10^{-8}$
- Low harmonics and sub-harmonics (optional)
- SMA output (optional)
- Low profile – just 12.7 mm height
- Ideal for PLL, VSAT, Frequency synthesizers

Frequency range: 48.0- 700.0 MHz
Standard Frequency: 48.0; 56.0; 60.0; 80.0; 100.0; 400.0; 500.0 MHz

Package type	
50.8x50.8x12.7 mm	
F	48.0 ... 120.0 MHz
G	100 ... 700.0 MHz

## ORDERING GUIDE: MV87-B 300 J - 3 - 100.0 MHz - F

Availability of certain stability vs. operating temperature range		$\pm 5 \times 10^{-7}$	$\pm 3 \times 10^{-7}$	$\pm 1 \times 10^{-7}$	$\pm 7.5 \times 10^{-8}$	$\pm 5 \times 10^{-8}$
		500	300	100	75	50
A	0...+50 °C	A	A	A	A	A
B	- 10...+60 °C	A	A	A	A	C
C	- 20...+70 °C	A	A	A	C	NA
D	- 40...+70 °C	A	A	A	C	NA

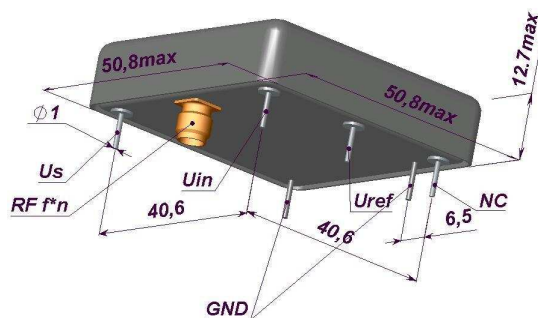
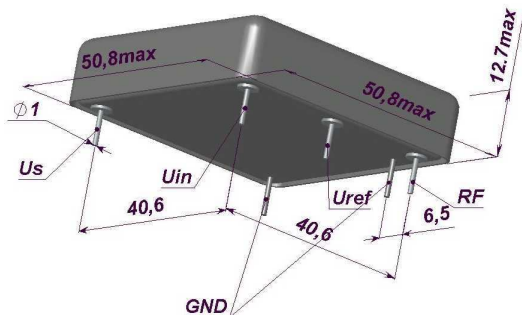
A – available, NA – not available, C – consult factory

+75°, +80°, +85°C upper temperature limits may be available on a separate request. For other temperature ranges see designation at the end of Data Sheet

Phase noise, dBc/Hz (for 100.0 & 500.0 MHz)									
Option	1		2		3		4	5	6
Freq.	100	500	100	500	100	500	100	100	100
10 Hz	-85	-70	-90	-75	-95	-80	-98	-100	-100
100 Hz	-115	-100	-120	-105	-125	-110	-128	-130	-130
1000 Hz	-140	-125	-145	-130	-150	-135	-150	-152	-155
10000 Hz	-160	-140	-162	-142	-165	-145	-165	-165	-167

Aging	
K	$\pm 1 \times 10^{-6}$ /year
J	$\pm 5 \times 10^{-7}$ /year
I	$\pm 3 \times 10^{-7}$ /year

## Package drawings:



## Additional notes:

- For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit), °C:

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85

Frequency stability vs. load changes	$< \pm 5 \times 10^{-8}$
Frequency stability vs. power supply changes	$< \pm 5 \times 10^{-8}$
Warm-up time with accuracy of $< \pm 2 \times 10^{-7}$ at +25 °C	$< 3$ min
Power supply (Us)	12V $\pm 10\%$
Steady state current consumption @ 25°C (still air)	$< 150$ mA
Peak current consumption during warm-up	$< 450$ mA
Frequency pulling range	$> \pm 3 \times 10^{-6}$
with external control voltage range (Uin)	0...+8 V
Reference voltage (Uref)	+8 V

Output	SIN
Level	$> 400$ mV
Load	50 Ohm $\pm 10\%$
Harmonics & subharmonics	$< -25$ dBc ( $< -40$ dBc optional and available for Package Type G)
Vibrations	10-500 Hz, 5g
Storage temperature range	-55...+80 °C

# DOUBLE OVEN ULTRA PRECISION OCXO MV89

## Features:

- Frequency range 4.096 - 10.0 MHz
- Very high stability vs. temperature - up to  $\pm 5 \times 10^{-11}$
- Very low aging - up to  $\pm 5 \times 10^{-9}$ /year
- Not sensitive for rapid changes of ambient temperature
- Ideal for GPS, CDMA, 3G applications

## ORDERING GUIDE: MV89 – B 01 E – 10.0 MHz

Availability of certain stability vs. operating temperature range		$\pm 3 \times 10^{-10}$	$\pm 2 \times 10^{-10}$	$\pm 1 \times 10^{-10}$	$\pm 5 \times 10^{-11}$
		03	02	01	005
A	0...+55 °C	A	A	A	A
B	-10...+60 °C	A	A	A	A
C	-20...+70 °C	A	A	A	C
D	-40...+70 °C	A	A	C	NA

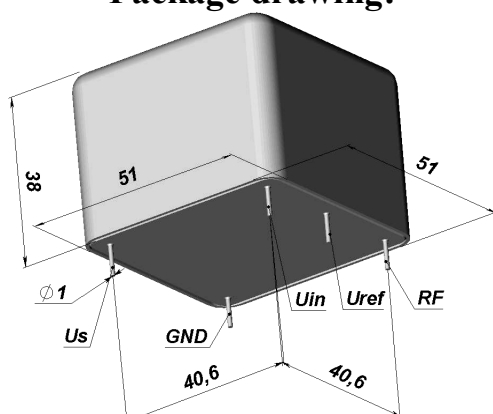
A – available, NA – not available, C – consult factory

For other temperature ranges see designation at the end of Data Sheet

Availability of certain aging values for certain frequencies		Standard frequencies			
		4.096 MHz	5.0 MHz	8.192 MHz	10.0 MHz
E	$\pm 3 \times 10^{-8}$ /year	A	A	A	A
D	$\pm 2 \times 10^{-8}$ /year	A	A	A	A
C	$\pm 1 \times 10^{-8}$ /year	C	A	C	A
B	$\pm 5 \times 10^{-9}$ /year	C	A	C	A

A – available NA – not available C – consult factory

## Package drawing:



## Mechanical characteristics:

Vibrations:	
Frequency range	1-200 Hz
Acceleration	5g
Shock:	
Acceleration	150 g
Duration	3±1 ms
Storage temperature range	-55...+80 °C

Short term stability (Allan deviation) per 1 s, typical	$< 2 \times 10^{-12}$
Frequency stability vs. load changes	$< \pm 1 \times 10^{-10}$
Frequency stability vs. power supply changes	$< \pm 1 \times 10^{-10}$
Warm-up time with accuracy of $< \pm 5 \times 10^{-8}$	$< 15$ min
Power supply (Us)	12V±5%
Steady state current consumption @ 25°C (still air)	$< 350$ mA
Peak current consumption during warm-up @ 25°C	$< 1.5$ A
Frequency pulling range	$> \pm 2.5 \times 10^{-7}$
with external control voltage range (Uin)	0...+5 V
Reference voltage (Uref)	+5V

Output	SIN
Level	+7 ±2 dBm
Load	50 Ohm±5%
Subharmonics (for 8.192, 10.0 MHz)	$< -40$ dBc
Harmonic suppression	$> 30$ dBc
Phase noise, typical (for 5 MHz)	
1 Hz	-105 dBc/Hz
10 Hz	-130 dBc/Hz
100 Hz	-145 dBc/Hz
1000 Hz	-150 dBc/Hz
10000 Hz	-155 dBc/Hz

## ADDITIONAL NOTES:

- Showed values of frequency stability vs. temperature usually are tested in Still Air test conditions. Please inform factory about different conditions in operation to provide appropriate tests.
- Please consult factory for daily aging values. Normally typical correspondence of daily aging per day to aging per year is as following:  $\pm 5 \times 10^{-8}$ /year -  $\pm 5 \times 10^{-10}$ /day;  $\pm 3 \times 10^{-8}$ /year -  $\pm 3 \times 10^{-10}$ /day;  $\pm 2 \times 10^{-8}$ /year -  $\pm 2 \times 10^{-10}$ /day;  $\pm 1 \times 10^{-8}$ /year -  $\pm 1 \times 10^{-10}$ /day.
- For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit), °C:

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85

# HIGH STABILITY SMALL SIZE OCXO MV103

## Features:

- Small size
- 5V or 12V power supply
- Available as RoHS
- Frequency range 10.0-40.0 MHz

Output	Power Supply
SIN	12 V
HCMOS	5 V

## ORDERING GUIDE: MV103 – B 20G – SIN – 12V – 10.0 MHz

Availability of certain stability vs. operating temperature range		$\pm 5 \times 10^{-8}$	$\pm 2 \times 10^{-8}$	$\pm 1 \times 10^{-8}$	$\pm 7.5 \times 10^{-9}$
		50	20	10	7
A	0...+55 °C	A	A	A	C
B	-10...+60 °C	A	A	A	C
C	-20...+70 °C	A	A	A	C
D	-40...+70 °C	A	A	C	NA
EX	-40...+85 °C	A	C	C	NA

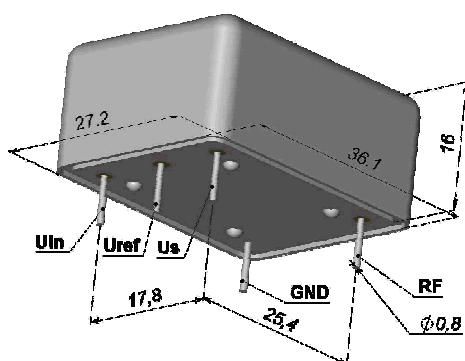
A – available, NA – not available, C – consult factory

For other temperature ranges see designation at the end of Data Sheet.

Availability of certain aging values for certain frequencies		Standard frequencies			
		10.0 MHz	12.8 MHz	13.0 MHz	16.384 MHz
		Multiplied frequencies			
		20.0 MHz	25.6 MHz	26.0 MHz	32.768 MHz
H	$\pm 2 \times 10^{-7}$ /year	A	A	A	A
G	$\pm 1 \times 10^{-7}$ /year	A	A	A	A
F	$\pm 5 \times 10^{-8}$ /year	A	A	A	C
E	$\pm 3 \times 10^{-8}$ /year	A	C	C	NA

A – available, NA – not available, C – consult factory

## Package drawing:



## Mechanical characteristics:

Vibrations:	
Frequency range	10-500 Hz
Acceleration	10g
Shock:	
Acceleration	100 g
Duration	3±1 ms
Storage temperature range	-55...+85 °C

Frequency stability vs. load changes	$< \pm 5 \times 10^{-9}$
Frequency stability vs. power supply changes	$< \pm 5 \times 10^{-9}$
Power supply (Us)	5V±5%   12V±5%
Current consumption at steady state @ 25°C	<200 mA   <80 mA
Peak current consumption during warm-up	<600 mA   <300 mA
Reference voltage output (Uref)	+4.5 V   +5V
Warm-up time within $< \pm 1 \times 10^{-7}$ @ 25 °C	<3 min
Frequency pulling range	$> \pm 5 \times 10^{-7}$
with external voltage range (Uin)	0...+4.5 V   0...+5 V
or with external potentiometer	20 kOhm

Preferable frequencies: 10 MHz; 12,8 MHz; 13 MHz; 15,36 MHz; 16 MHz; 16,384 MHz; 20 MHz; 26 MHz; 30,72 MHz; 32 MHz; 32,768 MHz

10, 20, 40 MHz, 20 MHz, 20 MHz, 20, 40 MHz, 20 MHz, 20, 40 MHz							
Frequency range, MHz	10-13	13-20 ^	20-40 ^	10-13	13-20 ^	20-40 ^	
Output	HCMOS			SIN			
Level	-			> 225 mV			
Harmonics/Subharmonics	-			<-30 dBc			
Level High/Low	>4,0/<0,4			-/-			
Duty factor	45...55%			-			
Phase noise, typical, at 1 Hz	-90	-75	-70	-90	-75	-70	
10 Hz	-120	-105	-100	-120	-105	-100	
100 Hz	-140	-135	-125	-140	-135	-125	
1000 Hz	-145	-145	-135	-150	-150	-140	
10000 Hz	-150	-150	-140	-155	-150	-145	
Short term stability (Allan deviation) per 1 sec. x10 <sup>-11</sup>	<1	<2	<3	<1	<2	<3	

## Additional notes:

- Shown values of frequency stability vs. temperature usually are tested in Still Air test conditions. Please inform factory about different conditions in operation to provide appropriate tests.
- For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit), °C:

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85

# PRECISION OCXO IN SMD PACKAGE MV115

## Features:

- High frequency stability vs. temperature - up to  $\pm 5.0 \times 10^{-9}$
- Standard 25x22 mm SMD package
- 5 V or 3.3 V supply voltage
- HCMOS or SIN output
- Frequency range: 10.0 – 40.0 MHz
- Available as RoHS

Power Supply
5 V
3.3 V

Output type
HCMOS
SIN

**ORDERING GUIDE: MV115-B 20 F-5V-HCMOS-10.0 MHz-2**

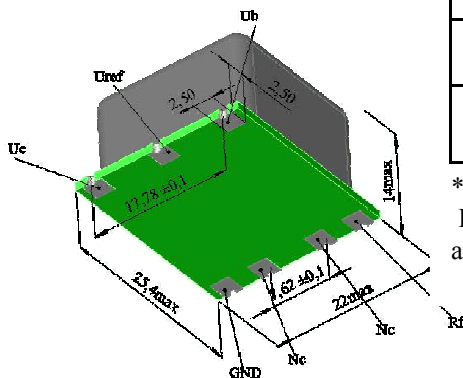
Availability of certain stability vs. operating temperature range		$\pm 5 \times 10^{-8}$	$\pm 2 \times 10^{-8}$	$\pm 1 \times 10^{-8}$	$\pm 5 \times 10^{-9}$
		50	20	10	5
A	0...+55 °C	A	A	A	A
B	-10...+60 °C	A	A	A	C
C	-20...+70 °C	A	A	A	C
D*	-40...+70 °C	A	A	C	NA
EX*	-40...+85 °C	A	C	NA	NA

\* for 5 V power supply only.

Availability of certain aging values for certain frequencies		Standard frequencies				
		10.0 MHz	12.8 MHz	13.0 MHz	16.384 MHz	20.0 MHz
		Multiplied frequencies				
		20.0 MHz	25.6 MHz	26.0 MHz	32.768 MHz	40.0 MHz
H	$\pm 2 \times 10^{-7}$ /year	A	A	A	A	A
G	$\pm 1 \times 10^{-7}$ /year	A	A	A	A	C
F	$\pm 5 \times 10^{-8}$ /year	A	A	A	C	NA
E	$\pm 3 \times 10^{-8}$ /year	A	C	C	NA	NA

A – available, NA – not available, C – consult factory

## Package drawing:

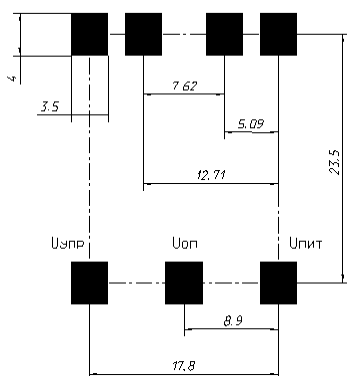


Vibrations:	
Frequency range	10-500 Hz
Acceleration	10g
Shock: Acceleration	100 g
Duration	3±1 ms
Storage temperature range	-55...+85 °C

\* for SIN output only.  
Please consult factory for availability of options 1 and 2.

Phase noise, typical, dBc/Hz (for 10 MHz)			
	-	2*	1*
1 Hz	-	<-90	<-100
10 Hz	<-120	<-120	<-130
100 Hz	<-135	<-140	<-145
1000 Hz	<-145	<-150	<-150
10000 Hz	<-150	<-155	<-155

## Recommended PCB layout:



## Outputs designations

1. Ub - Power supply
2. Uref – Reference voltage output
3. Uc – Control voltage input
4. GND – Ground
5. NC – Not connected
6. NC – Not connected
7. Rf - Rf output

## Additional notes:

- Please consult factory for daily aging values. Normally typical correspondence of daily aging per day to aging per year is as following:  $\pm 2 \times 10^{-7}$ /year -  $\pm 2 \times 10^{-9}$ /day;  $\pm 1 \times 10^{-7}$ /year -  $\pm 1 \times 10^{-9}$ /day;  $\pm 5 \times 10^{-8}$ /year -  $\pm 5 \times 10^{-10}$ /day.
- For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit), °C:

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85

Short term stability (Allan deviation) per 1 sec, for 10 MHz	$< 2 \times 10^{-11}$	
Frequency stability vs. load changes	$< \pm 3 \times 10^{-9}$	
Frequency stability vs. power supply changes	$< \pm 3 \times 10^{-9}$	
Power supply (Ub)	5V±5%	3.3V±5%
Current consumption at steady state @ 25°C	< 200mA	< 300mA
Peak current consumption during warm-up	< 600mA	< 750mA
Warm-up time within $< \pm 1 \times 10^{-7}$ @ 25 °C	< 3 min	
Frequency pulling range	$> \pm 5 \times 10^{-7}$	
with external voltage range (Uc)	0...+4.5 V	0...+3.0 V
or with external potentiometer	20 kOhm	
reference voltage output (Uref)	+ 4.5 V	+3.0 V
Pulling slope	Positive	
Output	HCMOS	
Level	For 5 V: 4.5/0.5V	For 3.3 V: 3/0.3 V
Load	10 kOhm/15 pF	50 Ohm



# ULTRA MINIATURE OCXO MV118

## Features:

- Small package of 20x20x10 mm
- High stability vs temperature – up to  $\pm 1 \times 10^{-8}$
- Frequency range: 10.0 – 25.0 MHz
- 3.3V or 5V supply voltage
- Available as RoHS
- Output type – HCMOS

## Power Supply

5 V  
3.3 V

## ORDERING GUIDE: MV118-B 20 - G - 3.3V - 10.0 MHz

Availability of certain stability vs. operating temperature		$\pm 1 \times 10^{-7}$	$\pm 5 \times 10^{-8}$	$\pm 2 \times 10^{-8}$	$\pm 1 \times 10^{-8}$
		100	50	20	10
A	0...+55°C	A	A	A	C
B	-10...+60°C	A	A	A	C
C	-20...+70°C	A	A	A	NA
D	-40...+70°C	A	A	C	NA
EX	-40...+85°C	A	C	NA	NA

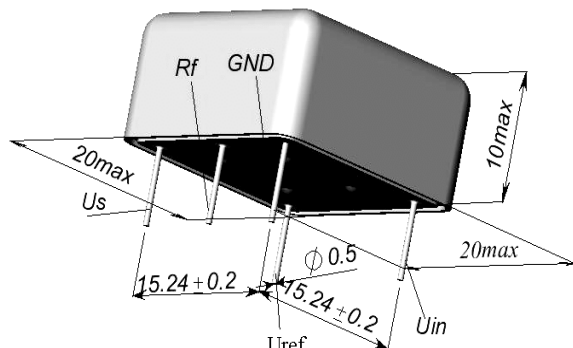
A – available, NA – not available, C – consult factory

For other temperature ranges see designation at the end of Data Sheet

Availability of certain aging values for certain frequencies		Standard frequencies, MHz				
		10,0	12,8	13,0	16,384	20,0
H	$\pm 2.0 \times 10^{-7}$	A	A	A	A	A
G	$\pm 1.0 \times 10^{-7}$	A	A	A	A	C
F	$\pm 5.0 \times 10^{-8}$	A	A	A	C	NA
E	$\pm 3.0 \times 10^{-8}$	A	C	C	NA	NA

A – available, NA – not available, C – consult factory

## Package drawing:



<b>Vibrations:</b>	
Frequency range	10-500 Hz
Acceleration	10g
<b>Shock:</b>	
Acceleration	75 g
Duration	3±1 ms
Storage temperature range	-55...+85 °C

## Additional notes:

- Showed values of frequency stability vs. temperature usually are tested in Still Air test conditions. Please inform factory about different conditions in operation to provide appropriate tests.
- Please consult factory for daily aging values. Normally typical correspondence of daily aging per day to aging per year is as following:  $\pm 2 \times 10^{-7}$ /year -  $\pm 2 \times 10^{-9}$ /day;  $\pm 1 \times 10^{-7}$ /year -  $\pm 1 \times 10^{-9}$ /day;  $\pm 5 \times 10^{-8}$ /year -  $\pm 5 \times 10^{-10}$ /day.
- Please mention RoHS requirement (if any) while requesting for quote or while placing PO.
- For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit), °C:

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85

Frequency stability vs. load changes	$< \pm 5 \times 10^{-9}$	
Frequency stability vs. power supply changes	$< \pm 5 \times 10^{-9}$	
Power supply (Us)	5V±5%	3.3V±5%
Current consumption at steady state	< 150 mA	< 250 mA
Peak current consumption during warm-up @ 25°C	< 450 mA	< 700 mA
Warm-up time within $\pm 1 \times 10^{-7}$ @ 25 °C	< 3 min	
Frequency pulling range	$> \pm 5 \times 10^{-7}$	
with external voltage range (Uin)	0...+4.5 V	0...+3.0 V
or with external potentiometer	20 kOhm	
reference voltage output (Uref)	+ 4.5 V	+3.0 V
Pulling slope	Positive	
Output	HCMOS	
Load	10 kOhm/15 pF	
Level High/Low	4.5/0.5V	3.0/0.3V

Phase noise, dB/Hz, at	10 - 13 MHz	> 13 - 25 MHz
1 Hz	< -90	< -75
10 Hz	< -120	< -105
100 Hz	< -140	< -125
1000 Hz	< -145	< -135
10000 Hz	< -150	< -145
Short term stability (Allan deviation) per 1 sec, typical	$< 1 \times 10^{-11}$	$< 3 \times 10^{-11}$



# HIGH FREQUENCY PRECISION LOW PHASE NOISE OCXO MV136

## Features:

- Frequency range 48.0 – 120.0 MHz
- Low Phase Noise – floor of  $<-165$  dBc/Hz
- Small size package: 36x27x16 mm
- Ideal for PLL, VSAT, Frequency synthesizers

**ORDERING GUIDE: MV136 – B 300 J – 5V – B16 – 3 – 100.0 MHz**

Availability of certain stability vs. operating temperature range		$\pm 5 \times 10^{-7}$	$\pm 3 \times 10^{-7}$	$\pm 1 \times 10^{-7}$	$\pm 7.5 \times 10^{-8}$	$\pm 5 \times 10^{-8}$
		500	300	100	75	50
A	0...+50 °C	A	A	A	A	A
B	-10...+60 °C	A	A	A	A	A
C	-20...+70 °C	A	A	A	A	C
D	-40...+70 °C	A	A	A	C	NA

A – available, NA – not available, C – consult factory  
 -55 °C lower temperature limit and +75 °C, +80 °C, +85 °C upper temperature limits may be available on a separate request. For other temperature ranges see designation at the end of Data Sheet

Frequency range: 48.0-120.0 MHz  
 Standard Frequencies: 48.0; 56.0; 60.0; 80.0; 100.0 MHz

## Power Supply

5 V

12 V

## Phase noise dBc/Hz

(typical for 100 MHz, 12 V power supply)

	1	2	3	4	5
10 Hz	-85	-90	-95	-98	-100
100 Hz	-115	-120	-125	-128	-130
1000 Hz	-140	-145	-150	-150	-152
10000 Hz	-160	-162	-165	-165	-165

## Package

B16	27x36x16 mm
M16*	36x36x16 mm (preliminary)

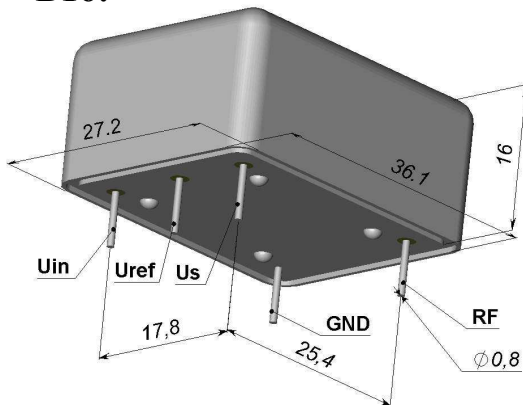
\* Pin configuration to be advised by manufacturer upon request

## Aging

K	$\pm 1 \times 10^{-6}$ /year
J	$\pm 5 \times 10^{-7}$ /year
I	$\pm 3 \times 10^{-7}$ /year

## Package drawing:

B16:



Frequency stability vs. load changes	$< \pm 5 \times 10^{-8}$	
Frequency stability vs. power supply changes	$< \pm 1 \times 10^{-7}$	
Warm-up time within accuracy of $< \pm 1 \times 10^{-6}$ @ 25 °C	< 2 min	
Power supply (Us)	5V $\pm 10\%$	12V $\pm 10\%$
Steady state current consumption @ 25 °C	< 300 mA	< 150 mA
Peak current consumption during warm-up	< 950 mA	< 500 mA
Frequency pulling range	$> \pm 3 \times 10^{-6}$	
with external control voltage range (Uin)	0...+4 V	0...+8 V
Reference voltage output (Uref)	+4V	+8 V

Output	SIN
Level	> 400 mV
Load	50 Ohm $\pm 10\%$
Harmonics	< -25 dBc
Vibrations	10-500 Hz, 5g
Storage temperature range	-55...+80 °C

## Additional notes:

- For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit), °C:

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85

# HIGH FREQUENCY ULTRA PRECISION LOW PHASE NOISE OCXO MV137

## Features:

- *Standard frequency – 100 MHz*
- *Low Phase Noise – floor of <-165 dBc/Hz*
- *High stability vs. temperature – up to  $\pm 1 \times 10^{-9}$*
- *Excellent aging – up to  $\pm 3 \times 10^{-8}$ /year*
- *Ideal for VSAT, Frequency synthesizers*

**ORDERING GUIDE:** MV137 – B 3 F – 1 – F16 – 100.0 MHz

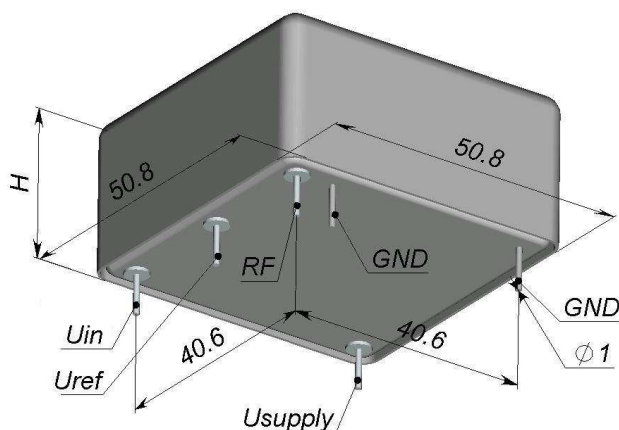
Availability of certain stability vs. operating temperature range		$\pm 5 \times 10^{-9}$	$\pm 3 \times 10^{-9}$	$\pm 2 \times 10^{-9}$	$\pm 1 \times 10^{-9}$
		5	3	2	1
A	0...+50 °C	A	A	A	A
B	- 10...+60 °C	A	A	A	C
C	- 20...+70 °C	A	A	C	NA
D	-40...+70 °C	A	C	NA	NA
E	-55...+70 °C	A	C	NA	NA

A – available, NA – not available, C – consult factory  
For other temperature ranges see designation at the end of Data Sheet

Phase noise, dBc/Hz				
	1	2	3	4
10 Hz	<-95	<-100	<-105	<-105
100 Hz	<-110	<-115	<-120	<-125
1000 Hz	<-140	<-145	<-150	<-150
10000 Hz	<-160	<-162	<-165	<-165

Aging	
G	$\pm 1 \times 10^{-7}$ /year
F	$\pm 5 \times 10^{-8}$ /year
E	$\pm 3 \times 10^{-8}$ /year

## Package drawing:



H=16 mm for F16 package;  
H=19 mm for F19 package.

## Additional notes:

- For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit), °C:

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85

Frequency stability vs. load changes	$< \pm 1 \times 10^{-10}$
Frequency stability vs. power supply changes	$< \pm 1 \times 10^{-9}$
Warm-up time within accuracy of $< \pm 1 \times 10^{-8}$ @ 25 °C	<5 min
Power supply (Usupply)	12V $\pm$ 10%
Steady state current consumption @ 25 °C	< 300 mA
Peak current consumption during warm-up	<700 mA
Frequency pulling range	$> \pm 5 \times 10^{-7}$
with external control voltage range (Uin)	0...+5 V
Reference voltage output (Uref)	+5 V

Output	SIN
Level	>400 mV
Load	50 Ohm $\pm$ 10%
Harmonics	<-40 dBc
Spurious & subharmonics	< -60 dBc (standard)
Optional subharmonics	< -100 dBc (optional)
Vibrations	10-500 Hz, 5g
Storage temperature range	-55...+80 °C

# PRECISION OCXO IN SMD PACKAGE MV140

## Features:

- High frequency stability vs. temperature - up to  $\pm 5.0 \times 10^{-9}$
- Standard 25x22 mm SMD package
- Oven alarm & oscillator On/Off function
- Available as RoHS
- Frequency range: 10 – 20 MHz

## ORDERING GUIDE: MV140-B 20 F - 10.0 MHz - 1

Availability of certain stability vs. operating temperature range		$\pm 5 \times 10^{-8}$	$\pm 2 \times 10^{-8}$	$\pm 1 \times 10^{-8}$	$\pm 5 \times 10^{-9}$
		50	20	10	5
A	0...+55 °C	A	A	A	A
B	-10...+60 °C	A	A	A	A
C	-20...+70 °C	A	A	A	A
D	-40...+70 °C	A	A	A	C
EX	-40...+85 °C	A	C	NA	NA

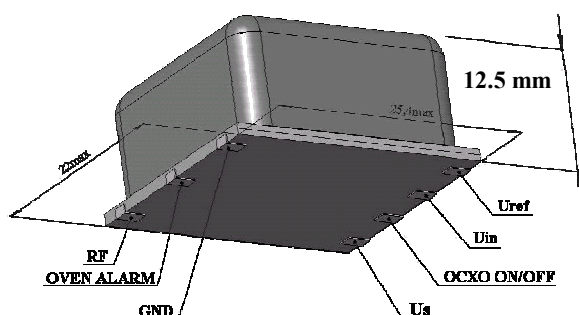
A – available, NA – not available, C – consult factory

+75°, +80°, +85 °C upper temperature limits may be available on a separate request. For other temperature ranges see designation at the end of Data Sheet.

Availability of certain aging values for certain frequencies		Standard frequencies, MHz				
		10.0	12.8	13.0	16.384	20.0
H	$\pm 2.0 \times 10^{-7}$	A	A	A	A	A
G	$\pm 1.0 \times 10^{-7}$	A	A	A	A	C
F	$\pm 5.0 \times 10^{-8}$	A	A	A	C	NA
E	$\pm 3.0 \times 10^{-8}$	A	C	C	NA	NA

A – available, NA – not available, C – consult factory

## Package drawing:



	1	2	3
Short term stability (Allan deviation) per 1 sec, for 10 MHz	$< 5 \times 10^{-12}$	$< 5 \times 10^{-11}$	$< 5 \times 10^{-10}$
Frequency stability vs. load changes	$< \pm 2 \times 10^{-10}$	$< \pm 2 \times 10^{-9}$	$< \pm 5 \times 10^{-9}$
Frequency stability vs. power supply changes	$< \pm 2 \times 10^{-10}$	$< \pm 2 \times 10^{-9}$	$< \pm 5 \times 10^{-9}$
Power supply (Us)	12V $\pm$ 5%		
Current maximum value @ 25 °C	340 mA		
Warm-up time within $< \pm 1 \times 10^{-7}$ @ 25 °C	<3 min		
Frequency pulling range	$> \pm 5 \times 10^{-7}$		
with external voltage range (Uin)	0...+5 V		
Reference voltage output (Uref)	+5 V		
Output	SIN		
Level	> 400 mV		
Load	50 Ohm		
Phase noise, (for 10 MHz) , dBc/Hz			
1 Hz	<-100	<-90	<-80
10 Hz	<-130	<-120	<-110
100 Hz	<-145	<-140	<-135
1000 Hz	<-150	<-150	<-145
10000 Hz	<-155	<-155	<-155

Vibrations:	
Frequency range	10-500 Hz
Acceleration	10g
Shock:	
Acceleration	100 g
Storage temperature range	-55...+85 °C

## Additional notes:

- Showed values of frequency stability vs. temperature usually are tested in Still Air test conditions. Please inform factory about different conditions in operation to provide appropriate tests.
- For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit), °C:

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85

# PRECISION OCXO MV172

## Features:

- High stability vs. temperature - up to  $\pm 1 \times 10^{-9}$
- Low aging - up to  $\pm 1 \times 10^{-8}$  /year
- Low phase noise
- 5V or 12V power supply
- Available as RoHS
- Frequency range 4.096-20.0 MHz

Output type
SIN
HCMOS
Power Supply
12V
5V

Package type	
Z25	50.8x50.8x25 mm
Z19	50.8x50.8x19 mm

## ORDERING GUIDE: MV172 – B 1 E – SIN – 5V – Z25 – 5.0 MHz

Availability of certain stability vs. operating temperature range		$\pm 1 \times 10^{-8}$	$\pm 5 \times 10^{-9}$	$\pm 2 \times 10^{-9}$	$\pm 1 \times 10^{-9}$
		10	5	2	1
A	0...+55 °C	A	A	A	A
B	- 10...+60 °C	A	A	A	A*
C	- 20...+70 °C	A	A	A*	C*
D	- 40...+70 °C	A	A*	C*	C*
EX	- 40...+85 °C	A*	C	C	NA

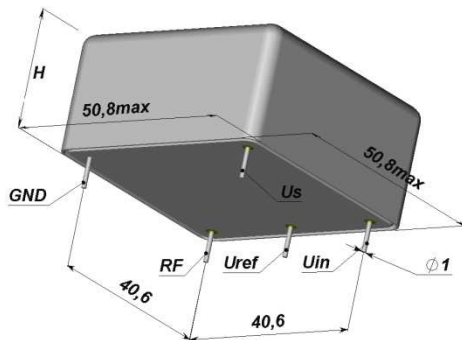
\* for 25mm height

Availability of certain aging values for certain frequencies		Standard frequencies	
		5.0 MHz (5 x k) MHz	4.096 MHz (4.096 x k) MHz
E	$\pm 3 \times 10^{-8}$ /year	A	A
D	$\pm 2 \times 10^{-8}$ /year	A	A
C	$\pm 1 \times 10^{-8}$ /year	A	A

A – available, NA – not available, C – consult factory

A – available, NA – not available, C – consult factory  
+75 °, +80 °, +85 °C upper temperature limits may be available on a separate request. For other temperature ranges see designation at the end of Data Sheet.

## Package drawing:



H=25 mm for Z25; H=19 mm for Z19.

Short term stability per 1 sec (for 5MHz)	$< 2 \times 10^{-12}$	
Frequency stability vs. load changes	$< \pm 5 \times 10^{-10}$	
Frequency stability vs. power supply changes	$< \pm 5 \times 10^{-10}$	
Warm-up time within accuracy of $< \pm 2 \times 10^{-8}$ @ 25°C	< 8 min	
Power supply (Us)	5V $\pm$ 5%	12V $\pm$ 5%
Steady state current consumption @ 25°C	< 500mA	< 200mA
Peak current consumption during warm-up (for "D" temp. range)	< 1.2 A	< 0.6 A
Frequency pulling range	$> \pm 3.0 \times 10^{-7}$	
with external voltage range (Uin)	0...+4.5 V	0...+5 V
with external potentiometer	20 kOhm	
Reference voltage (Uref)	+4.5 V	+5 V
Slope	Negative (positive)	

Vibrations:	
Frequency range	10-200 Hz
Acceleration	5g
Shock:	
Acceleration	75 g
Duration	3 $\pm$ 1 ms
Storage temperature range	-55...+85 °C

Output	SIN
Level	>300 mV
Load	50 Ohm $\pm$ 5%
Harmonic suppression	>30dBc (standard) (>50 optional)
Phase noise (for 5 MHz)	
@ 1 Hz	<-100 dBc/Hz
10 Hz	<-130 dBc/Hz
100 Hz	<-145 dBc/Hz
1000 Hz	<-150 dBc/Hz
10000 Hz	<-155 dBc/Hz

## Additional notes:

- Please consult factory for daily aging values. Normally typical correspondence of daily aging (after 30 days of operation) to aging per year is as following:  $\pm 3 \times 10^{-8}$  /year -  $\pm 3 \times 10^{-10}$  /day;  $\pm 2 \times 10^{-8}$  /year -  $\pm 2 \times 10^{-10}$  /day;  $\pm 1 \times 10^{-8}$  /year -  $\pm 1 \times 10^{-10}$  /day.
- Please mention RoHS requirement (if any) while requesting for quote or while placing PO.
- For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit), °C:

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85





# MINIATURE PRECISION OCXO MV197

## Features:

- Package height from 16 mm, down to 10 mm
- High stability vs. temperature: up to  $\pm 5 \times 10^{-10}$
- Long term stability up to  $\pm 2 \times 10^{-8}$ /year
- Low phase noise option
- Fast warm-up time up to 1 min
- Available as RoHS
- Frequency range: 8.192 – 20.0 MHz

Power supply	Output	Package type	
12V	SIN	36x27x16 mm	B16
5V	HCMOS	36x27x12.7 mm	B12.7
		36x27x10 mm	B10

## ORDERING GUIDE: MV197– C 3 F – 12V – SIN – B12.7 – LN – 10.0 MHz

Availability of certain stability vs. operating temperature range (for 10 MHz)		$\pm 5 \times 10^{-9}$	$\pm 3 \times 10^{-9}$	$\pm 2 \times 10^{-9}$	$\pm 1 \times 10^{-9}$	$\pm 7.5 \times 10^{-10}$	$\pm 5 \times 10^{-10}$
		5	3	2	1	075	05
A	0...+55 °C	A	A	A	A	A	A
B	- 10...+60 °C	A	A	A	A	A	A
C	- 20...+70 °C	A	A	A	A	A*	A*
D	- 40...+70 °C	A	A	A	A	A*	A*
EX	- 40...+85 °C	A	A	A	A	A*	C

\* - "C" for B10 package.

A – available, NA – not available, C – consult factory

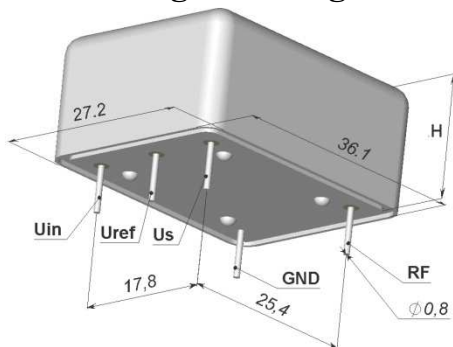
For other temperature ranges see designation at the end of Data Sheet.

Availability of certain aging values for certain frequencies		Standard frequencies				
		10.0 MHz	12.8 MHz	13.0 MHz	16.384 MHz	20.0 MHz
H	$\pm 2 \times 10^{-7}$ /year	A	A	A	A	A
G	$\pm 1 \times 10^{-7}$ /year	A	A	A	A	C
F	$\pm 5 \times 10^{-8}$ /year	A	A	A	C	NA
E	$\pm 3 \times 10^{-8}$ /year	A	C	C	NA	NA
D*	$\pm 2 \times 10^{-8}$ /year	A	C	NA	NA	NA

\* - only for B16 package

Phase noise, dBc/Hz, for 10MHz	-	LN	ULN
		For 12V, SIN	
1 Hz	<-95	<-100	<-103
10 Hz	<-125	<-130	<-133
100 Hz	<-145	<-153	<-155
1000 Hz	<-150	<-158	<-160
10000 Hz	<-155	<-160	<-161

## Package drawings:



For "H" definition please see package type

Vibrations:	
Frequency range	10-200 Hz
Acceleration	5 g

Shock:	
Acceleration	75 g
Duration	3±1 ms

Humidity @ 25 °C	98%
Storage temperature range	-55...+85 °C

\* Available on request

## Additional notes:

- Start-up time < 100 mSec – optional.
- Please consult factory for daily aging values. Normally typical correspondence of daily to aging per year is as following:  
 $\pm 1 \times 10^{-7}$ /year –  $\pm 1 \times 10^{-9}$ /day;  $\pm 5 \times 10^{-8}$ /year –  $\pm 5 \times 10^{-10}$ /day;  $\pm 3 \times 10^{-8}$ /year –  $\pm 3 \times 10^{-10}$ /day
- Please mention RoHS requirement (if any) while requesting for quote or while placing PO.
- For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit), °C:

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85

Short term stability (Allan deviation) per 1 sec, for 10 MHz	< $5 \times 10^{-12}$
--	-----------------------

Optional*	< $2 \times 10^{-12}$
-----------	-----------------------

Frequency stability vs. load changes (±5%)	< $\pm 5 \times 10^{-10}$
--	---------------------------

Optional*	< $\pm 2 \times 10^{-10}$
-----------	---------------------------

Frequency stability vs. power supply changes (±5%)	< $\pm 5 \times 10^{-10}$
--	---------------------------

Optional*	< $\pm 2 \times 10^{-10}$
-----------	---------------------------

Warm-up time within accuracy of $\pm 2 \times 10^{-8}$ @ 25°C	<3 min
---	--------

Optional*, within accuracy of $\pm 1 \times 10^{-7}$ @ 25°C	<1 min
---	--------

Power supply (Us)	12V±5%	5V±5%
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Steady state current consumption @ +25°C	<150 mA	<400 mA
--	---------	---------

Peak current consumption during warm-up (for "D" temp. range)	<400 mA	<1000 mA
---	---------	----------

Frequency pulling range (for 10 MHz)	$> \pm 4.0 \times 10^{-7}$	
--------------------------------------	----------------------------	--

Control voltage range (Uin)	0...5 V	0...4.5V
-----------------------------	---------	----------

Reference voltage (Uref)	+5 V	+4.5 V
--------------------------	------	--------

Output	HCMOS	SIN
Level	"0" <0.5V "1" >4.0V	>300 mV (to 9±0.5dBm - optional for 12V power supply)*
Load	10kOhm/30pF	50 Ohm±5%
Rise/Fall time	<6 ns (<3 ns optional)	-
Harmonics	-	>30 dBc



# ULTRA MINIATURE PRECISION OCXO MV199

## Features:

- Ultra miniature package 20x20x12.7 mm
- High stability vs. temperature: up to  $\pm 1 \times 10^{-9}$
- Long term stability up to  $\pm 3 \times 10^{-8}$ /year
- Available as RoHS
- Frequency range: 8.192 – 20.0 MHz

Power supply	Output
12V	SIN
5V	HCMOS

## ORDERING GUIDE: MV199 – C 3 F – 12V – SIN – 10.0 MHz – LN

Availability of certain stability vs. operating temperature range		$\pm 5 \times 10^{-9}$	$\pm 3 \times 10^{-9}$	$\pm 2 \times 10^{-9}$	$\pm 1 \times 10^{-9}$
		5	3	2	1
A	0...+55 °C	A	A	A	A
B	- 10...+60 °C	A	A	A	A
C	- 20...+70 °C	A	A	A	C
D	- 40...+70 °C	A	A	A	C
EX	- 40...+85 °C	A	A	C	C

A – available, NA – not available, C – consult factory

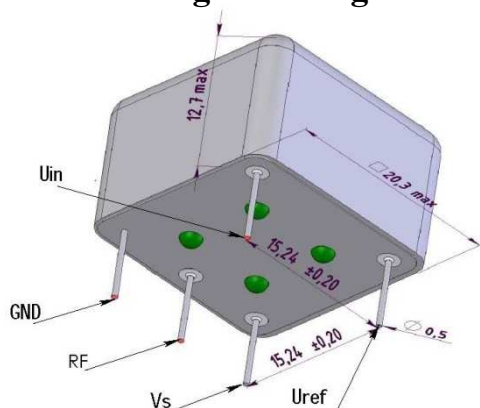
For other temperature ranges see designation at the end of Data Sheet.

Availability of certain aging values for certain frequencies		Standard frequencies				
		10.0 MHz	12.8 MHz	13.0 MHz	16.384 MHz	20.0 MHz
H	$\pm 2 \times 10^{-7}$ / year	A	A	A	A	A
G	$\pm 1 \times 10^{-7}$ / year	A	A	A	A	C
F	$\pm 5 \times 10^{-8}$ / year	A	A	A	C	NA
E	$\pm 3 \times 10^{-8}$ / year	A	C	C	NA	NA

A – available, NA – not available, C – consult factory

Phase noise, dBc/Hz, for 10MHz, SIN		LN
		For 12V, SIN
1 Hz	<-95	<-100
10 Hz	<-125	<-130
100 Hz	<-145	<-150
1000 Hz	<-150	<-157
10000 Hz	<-155	<-159

## Package drawing:



<b>Vibrations:</b>	
Frequency range	10-200 Hz
Acceleration	5 g
<b>Shock:</b>	
Acceleration	75 g
Duration	3±1 ms
<b>Humidity @ 25 °C</b>	98%
<b>Storage temperature range</b>	-55...+85 °C

Short term stability (Allan deviation) per 1 sec, for 10 MHz	$< 5 \times 10^{-12}$
Option*	$< 2 \times 10^{-12}$
Frequency stability vs. load changes (±5%)	$< \pm 5 \times 10^{-10}$
Frequency stability vs. power supply changes (±5%)	$< \pm 2 \times 10^{-10}$
Warm-up time within accuracy of $\pm 2 \times 10^{-8}$ @ 25 °C	<3 min
Optional*, within accuracy of $\pm 1 \times 10^{-7}$ @ 25 °C	<1 min

Power supply (Us)	12V±5%	5V±5%
Steady state current consumption @ 25°C	<150 mA	<400 mA
Peak current consumption during warm-up (for "D" temp. range)	<400 mA	<1000 mA
Frequency pulling range (for 10 MHz)	$> \pm 4.0 \times 10^{-7}$	
Control voltage range (Uin)	0...5 V	0...4.5V
Reference voltage (Uref)	+5 V	+4.5 V

Output	HCMOS	SIN
Level	"0" <0.5V "1" >4.0V	>300 mV
Load	10kOhm/30pF	50 Ohm±5%
Rise/Fall time	<6 ns (<3 ns optional)	-
Harmonics	-	>30 dBc

## Additional notes:

- Please consult factory for daily aging values. Normally typical correspondence of daily to aging per year is as following:  
 $\pm 1 \times 10^{-7}$ /year –  $\pm 1 \times 10^{-9}$ /day;  $\pm 5 \times 10^{-8}$ /year –  $\pm 5 \times 10^{-10}$ /day;  $\pm 3 \times 10^{-8}$ /year –  $\pm 3 \times 10^{-10}$ /day
- Please mention RoHS requirement (if any) while requesting for quote or while placing PO.
- For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit), °C:

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85

# LOW PROFILE PRECISION OCXO MV200

## Features:

- Package height from 19 mm down to 10 mm
- 5V or 12V power supply
- High stability vs. temperature - up to  $\pm 2 \times 10^{-10}$
- Frequency range 10.0 – 40.0 MHz

Power supply	Output
5V	SIN
12V	HCMOS

Package type	
50.8x50.8x19 mm	Z19
50.8x50.8x16 mm	Z16
50.8x50.8x12.7 mm	Z12.7
50.8x50.8x10 mm	Z10

## ORDERING GUIDE: MV200 – C 2 F – 12V – SIN – Z19 – 10.0 MHz – LN

Availability of certain stability vs. operating temperature range (for 5 and 10 MHz)*		$\pm 5 \times 10^{-9}$	$\pm 3 \times 10^{-9}$	$\pm 2 \times 10^{-9}$	$\pm 1 \times 10^{-9}$	$\pm 5 \times 10^{-10}$	$\pm 2 \times 10^{-10}$
A	0...+55 °C	A	A	A	A	A	A
B	-10...+60 °C	A	A	A	A	A	C
C	-20...+70 °C	A	A	A	A	A	C
D	-40...+70 °C	A	A	A	A	A	C
EX	-40...+85 °C	A	A	A	A	C	NA

A – available, NA – not available, C – consult factory

\* for 10 mm height - consult factory

For other temperature ranges see designation at the end of Data Sheet.

Availability of certain aging values for certain frequencies		Standard frequencies							
		5.0 MHz (5.0 x k) MHz (for Z16)	8.192 MHz (8.192 x k) MHz	10.0 MHz (10.0 x k) MHz	12.8 MHz (12.8 x k) MHz	13.0 MHz (13.0 x k) MHz	16.384 MHz (16.384 x k) MHz	20.0 MHz (20.0 x k) MHz	
H	$\pm 2 \times 10^{-7}$ /year	A	A	A	A	A	A	A	A
G	$\pm 1 \times 10^{-7}$ /year	A	A	A	A	A	A	C	C
F	$\pm 5 \times 10^{-8}$ /year	A	A	A	A	A	C	NA	NA
E	$\pm 3 \times 10^{-8}$ /year	A	A	A	C	C	NA	NA	NA
D*	$\pm 2 \times 10^{-8}$ /year	A	C	C	NA	NA	NA	NA	NA

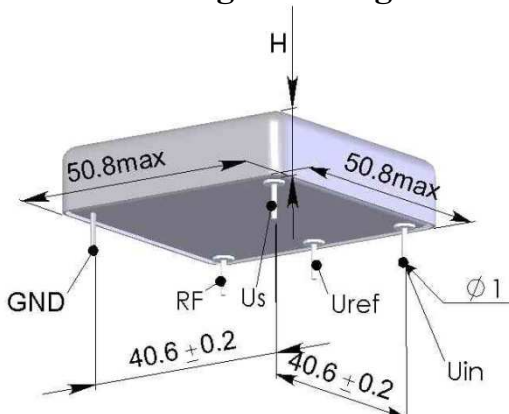
A – available, NA – not available, C – consult factory

\*for Z16

Phase noise, dBc/Hz, for 10 MHz	-	LN	ILN	ULN*
For 12 V, SIN				
1 Hz	<-95	<-100	<-103	<-108
10 Hz	<-125	<-130	<-133	<-137
100 Hz	<-145	<-153	<-155	<-157
1000 Hz	<-150	<-158	<-160	<-161
10000 Hz	<-155	<-160	<-161	<-162

\* for Z16

## Package drawing:



H=19 mm for Z19; H=16 mm for Z16;  
H=12.7 mm for Z12.7; H=10 mm for Z10.

Vibrations:	
Frequency range	10-200 Hz
Acceleration	5g
Shock:	
Acceleration	75 g
Duration	3±1 ms
Storage temperature range	-55...+85 °C

Short term stability (Allan deviation) per 1 sec (for 10MHz)	< $5 \times 10^{-12}$ ; opt. < $1 \times 10^{-12}$	
Frequency stability vs. load changes	< $\pm 5 \times 10^{-10}$ ; opt. < $\pm 2 \times 10^{-10}$	
Frequency stability vs. power supply changes	< $\pm 5 \times 10^{-10}$ ; opt. < $\pm 2 \times 10^{-10}$	
Warm-up time within accuracy of $\pm 2 \times 10^{-8}$ @ 25°C	<3 min	
Power supply (Us)	12V±5%	5V±5%
Steady state current consumption @ 25°C	<200mA	<500mA
Peak current consumption during warm-up (for "D" temp. range)	<500mA	<1200mA
Frequency pulling range	> $\pm 4 \times 10^{-7}$	
with external voltage range (Uin)	0...5V	0...4.5V
with external potentiometer	20 kOhm	
Reference voltage (Uref)	+5 V	+4.5 V

Output	HCMOS	SIN
Level	<0.5V... >4.0V	>300 mV (up to 9±0.5dBm - optional for 12V power supply)
Load	10kOhm/30pF	50 Ohm±5%
Rise/Fall time	<6 ns (<3 ns optional)	-
Harmonic suppression	-	>30dBc (>50dBc optional)

## Additional notes:

- Please consult factory for daily aging values. Normally typical correspondence of daily aging per day to aging per year is as following:  $\pm 1 \times 10^{-7}$ /year -  $\pm 1 \times 10^{-9}$ /day;  $\pm 5 \times 10^{-8}$ /year -  $\pm 5 \times 10^{-10}$ /day;  $\pm 3 \times 10^{-8}$ /year -  $\pm 3 \times 10^{-10}$ /day.
- Please mention RoHS requirement (if any) while requesting for quote or while placing PO.
- For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit), °C:

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85

# LOW PROFILE PRECISION OCXO MV201

## Features:

- Replacement of MV62 OCXO
- Package height from 19 mm down to 12.7 mm
- 5V or 12V power supply
- High stability vs. temperature - up to  $\pm 5 \times 10^{-10}$
- Frequency range 10.0 – 40.0 MHz

Power supply	Output	Package type	
5V	SIN	51x41x12.7 mm	Y12.7
12V	HCMOS	51x41x16 mm	Y16
		51x41x19 mm	Y19

**ORDERING GUIDE: MV201 – B 1 F – 12V – SIN – Y16 – 10.0 MHz – LN**

Availability of certain stability vs. operating temperature range (for 5 and 10 MHz)		$\pm 5 \times 10^{-9}$	$\pm 3 \times 10^{-9}$	$\pm 2 \times 10^{-9}$	$\pm 1 \times 10^{-9}$	$\pm 7.5 \times 10^{-10}$	$\pm 5 \times 10^{-10}$
		5	3	2	1	07	05
A	0...+55 °C	A	A	A	A	A	A
B	-10...+60 °C	A	A	A	A	A	C
C	-20...+70 °C	A	A	A	C	C	C
D	-40...+70 °C	A	A	C	C	NA	NA
EX	-40...+85 °C	A	A	C	C	NA	NA

A – available, NA – not available, C – consult factory  
For other temperature ranges see designation at the end of Data Sheet.

Availability of certain aging values for certain frequencies		Standard frequencies							
		5.0 MHz (5.0xk) MHz (for Z16)	8.192 MHz (8.192xk) MHz	10.0 MHz (10.0xk) MHz	12.8 MHz (12.8xk) MHz	13.0 MHz (13.0xk) MHz	16.384 MHz (16.384xk) MHz	20.0 MHz (20.0xk) MHz	
H	$\pm 2 \times 10^{-7}$ /year	A	A	A	A	A	A	A	
G	$\pm 1 \times 10^{-7}$ /year	A	A	A	A	A	A	C	
F	$\pm 5 \times 10^{-8}$ /year	A	A	A	A	A	C	NA	
E	$\pm 3 \times 10^{-8}$ /year	A	A	A	C	C	NA	NA	
D	$\pm 2 \times 10^{-8}$ /year	A	C	C	NA	NA	NA	NA	

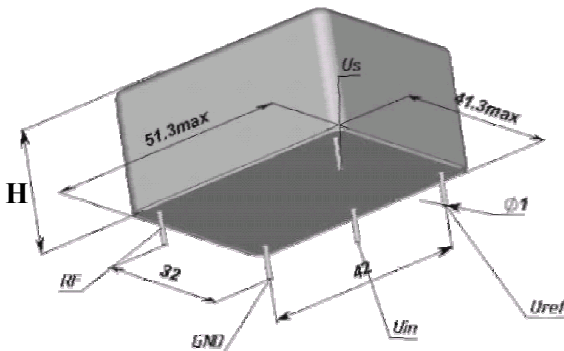
A – available, NA – not available, C – consult factory

Phase noise, dBc/Hz, 10 MHz	-	LN
		For 12 V, SIN
1 Hz	<-95	<-100
10 Hz	<-125	<-130
100 Hz	<-145	<-153
1000 Hz	<-150	<-158
10000 Hz	<-155	<-160

Short term stability (Allan deviation) per 1 sec (for 10MHz)	< $5 \times 10^{-12}$ ; opt. < $2 \times 10^{-12}$	
Frequency stability vs. load changes	< $\pm 5 \times 10^{-10}$ ; opt. < $\pm 2 \times 10^{-10}$	
Frequency stability vs. power supply changes	< $\pm 5 \times 10^{-10}$ ; opt. < $\pm 2 \times 10^{-10}$	
Warm-up time with accuracy of $\pm 2 \times 10^{-8}$ @ 25°C	<3 min	
Power supply (Us)	12V $\pm 5\%$	5V $\pm 5\%$
Steady state current consumption @ 25°C	<200mA	<500mA
Peak current consumption during warm-up (for "D" temp. range)	<500mA	<1200mA
Frequency pulling range (for 10 MHz)	> $\pm 4 \times 10^{-7}$	
with external voltage range (Uin)	0...5 V	0...4.5 V
with external potentiometer	20 kOhm	
Reference voltage (Uref)	+5 V	+4.5 V

Output	HCMOS	SIN
Level	<0.5V... >4.0V	>300 mV (9 $\pm 0.5$ dBm - optional for 12V power supply)
Load	10kOhm/30pF	50 Ohm $\pm 5\%$
Rise/Fall time	<6 ns (<3 ns optional)	-
Harmonic suppression	-	>30dBc (>50dBc optional)

## Package drawing:



H=19 mm for Y19; H=16 mm for Y16;  
H=12.7 mm for Y12.7.

Vibrations:	
Frequency range	10-200 Hz
Acceleration	5g
Shock:	
Acceleration	75 g
Duration	3 $\pm 1$ ms
Storage temperature range	-55...+85 °C

## Additional notes:

- Please consult factory for daily aging values. Normally typical correspondence of daily aging per day to aging per year is as following:  $\pm 1 \times 10^{-7}$ /year -  $\pm 1 \times 10^{-9}$ /day;  $\pm 5 \times 10^{-8}$ /year -  $\pm 5 \times 10^{-10}$ /day;  $\pm 3 \times 10^{-8}$ /year -  $\pm 3 \times 10^{-10}$ /day.
- Please mention RoHS requirement (if any) while requesting for quote or while placing PO.
- For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit), °C:

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85

# MINIATURE PRECISION OCXO MV205

## PRELIMINARY INFORMATION

### Features:

- Package height from 16 mm, down to 10 mm
- High stability vs. temperature: up to  $\pm 1 \times 10^{-9}$
- Long term stability up to  $\pm 2 \times 10^{-8}$ /year
- Fast warm-up time up to 1 min
- Available as RoHS
- Frequency range: 16.384 ... 40.0 MHz

Power supply	Output	Package type	
12V	SIN	36x27x16.0 mm *	B16
5V	HCMOS	36x27x12.7 mm	B12.7
		36x27x10.0 mm	B10

\* - package is available by customer's request

## ORDERING GUIDE: MV205 - C 3 G - 12V - SIN - B12.7 - 20.0 MHz

Availability of certain stability vs. operating temperature range		$\pm 5 \times 10^{-9}$	$\pm 3 \times 10^{-9}$	$\pm 2 \times 10^{-9}$	$\pm 1 \times 10^{-9}$
		5	3	2	1
A	0...+55 °C	A	A	A	A
B	-10...+60 °C	A	A	A	A
C	-20...+70 °C	A	A	A	A
D	-40...+70 °C	A	A	A	C
EX	-40...+85 °C	A	C	C	C

A – available, NA – not available, C – consult factory

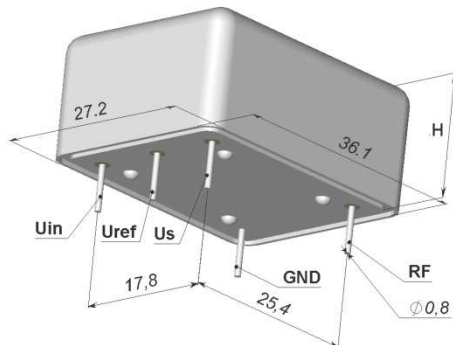
For other temperature ranges see designation at the end of Data Sheet.

Availability of certain aging values for certain frequencies		Standard frequencies					
		16.384MHz (8.192x2)	20.0MHz (10.0x2)	25.6MHz (12.8x2)	26.0MHz (13.0x2)	32.768MHz (16.384x2)	40.0 MHz (20.0x2)
H	$\pm 2 \times 10^{-7}$ /year	A	A	A	A	A	A
G	$\pm 1 \times 10^{-7}$ /year	A	A	A	A	C	C
F	$\pm 5 \times 10^{-8}$ /year	A	A	A	C	NA	NA
E	$\pm 3 \times 10^{-8}$ /year	A	C	C	NA	NA	NA
D	$\pm 2 \times 10^{-8}$ /year	A	C	NA	NA	NA	NA

### Phase noise, dBc/Hz, for 20MHz(10MHz x 2), SIN

1 Hz	<-90
10 Hz	<-120
100 Hz	<-140
1000 Hz	<-145
10000 Hz	<-150

### Package drawings:



For "H" definition please see package type

Vibrations:	
Frequency range	10-200 Hz
Acceleration	5 g

Shock:	
Acceleration	75 g
Duration	3±1 ms

Humidity @ 25 °C	98%
Storage temperature range	-55...+85 °C

Short term stability (Allan deviation) per 1 sec, for 20 MHz (10MHz x 2)	$< 5 \times 10^{-12}$
Optional	$< 2 \times 10^{-12}$
Frequency stability vs. load changes ( $\pm 5\%$ )	$< \pm 5 \times 10^{-10}$
Frequency stability vs. power supply changes ( $\pm 5\%$ )	$< \pm 5 \times 10^{-10}$
Warm-up time within accuracy of $< \pm 2 \times 10^{-8}$ @ 25°C	<3 min
Optional, within accuracy of $< \pm 1 \times 10^{-7}$ @ 25°C	<1 min

Power supply (Us)	12V $\pm 5\%$	5V $\pm 5\%$
Steady state current consumption @ +25°C	<150 mA	<400 mA
Peak current consumption during warm-up (for "D" temp. range)	<400 mA	<1000 mA
Frequency pulling range	$> \pm 4.0 \times 10^{-7}$	
Control voltage range (Uin)	0...5 V	0...4.5V
Reference voltage (Uref)	+5 V	+4.5 V

Output	HCMOS		SIN
Level	"0"	<0.5V	>300 mV
	"1"	>4.0V	
Load	10kOhm/30pF		50 Ohm $\pm 5\%$
Harmonics	-		<-30 dBc

### Additional notes:

- Please consult factory for daily aging values. Normally typical correspondence of daily to aging per year is as following:  
 $\pm 1 \times 10^{-7}$ /year –  $\pm 1 \times 10^{-9}$ /day;  $\pm 5 \times 10^{-8}$ /year –  $\pm 5 \times 10^{-10}$ /day;  $\pm 3 \times 10^{-8}$ /year –  $\pm 3 \times 10^{-10}$ /day
- Please mention RoHS requirement (if any) while requesting for quote or while placing PO.
- For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit), °C:

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85

# PRECISION LOW G-SENSITIVITY OCXO MV207

## Features:

- Low G - sensitivity up to:  $1.0 \times 10^{-9}$  /g
- Long term stability up to  $\pm 2 \times 10^{-8}$  /year
- High stability vs. temperature: up to  $\pm 7.5 \times 10^{-10}$
- Power supply 5V and 12V
- Package height - down to 12.7 mm
- Frequency range: 5.0 – 20.0 MHz
- Low phase noise option

Power supply
12V
5V

Package type	
36x27x16 mm	B16
36x27x12.7 mm	B12.7

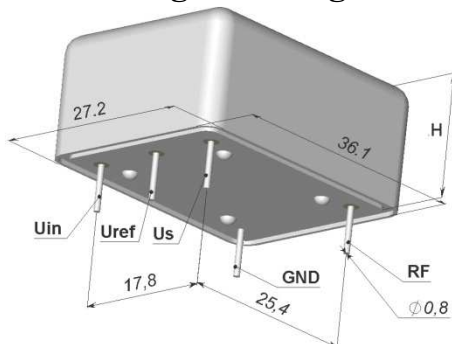
## ORDERING GUIDE: MV207- C 3 F - 12V - B12.7 - LN - 10.0 MHz

Availability of certain stability vs. operating temperature range (for 10 MHz)		$\pm 5 \times 10^{-9}$	$\pm 3 \times 10^{-9}$	$\pm 2 \times 10^{-9}$	$\pm 1 \times 10^{-9}$	$\pm 7.5 \times 10^{-10}$
		5	3	2	1	075
A	0...+55 °C	A	A	A	A	A
B	- 10...+60 °C	A	A	A	A	C
C	- 20...+70 °C	A	A	A	C	NA
D	- 40...+70 °C	A	A	A	C	NA
EX	- 40...+85 °C	A	A	C	C	NA

Availability of certain aging values for certain frequencies		Standard frequencies					
		5.0 MHz	10.0 MHz	12.8 MHz	13.0 MHz	16.384 MHz	20.0 MHz
H	$\pm 2 \times 10^{-7}$ / year	A	A	A	A	A	A
G	$\pm 1 \times 10^{-7}$ / year	A	A	A	A	A	C
F	$\pm 5 \times 10^{-8}$ / year	A	A	A	A	C	NA
E	$\pm 3 \times 10^{-8}$ / year	A	A	C	C	NA	NA
D	$\pm 2 \times 10^{-8}$ / year	A	C	NA	NA	NA	NA

A – available, NA – not available, C – consult factory

## Package drawings:



For “H” definition please see package type

Phase noise, dBc/Hz, for 10MHz	-	LN
		For 12V
1 Hz	<-95	<-100
10 Hz	<-125	<-130
100 Hz	<-145	<-153
1000 Hz	<-150	<-158
10000 Hz	<-155	<-160

Vibrations:	
Frequency range	10-200 Hz
Acceleration	5 g
Shock:	
Acceleration	75 g $\pm 3$ ms
Humidity @ 25 °C	98%
Storage temperature range	-55...+85 °C

\* - for the oscillators with the lower operating temperatures  $> -20^\circ$ .

Short term stability (Allan deviation) per 1 sec, for 10 MHz	$< 5 \times 10^{-12}$
Optional	$< 2 \times 10^{-12}$
G-sensitivity (in frequency range 0-500 Hz)	$< 1.5 \times 10^{-9}$ /g
Optional	$< 1 \times 10^{-9}$ /g
Frequency stability vs. load changes ( $\pm 5\%$ )	$< \pm 5 \times 10^{-10}$
Frequency stability vs. power supply changes ( $\pm 5\%$ )	$< \pm 5 \times 10^{-10}$
Warm-up time within accuracy of $\leq \pm 2 \times 10^{-8}$ @ 25°C	<5 min

Power supply (Us)	12V $\pm 5\%$	5V $\pm 5\%$
Steady state current consumption @ +25°C (for 10 MHz)	<150 mA	<400 mA
Peak current consumption during warm-up *	<400 mA	<1000 mA
Frequency pulling range (for 10 MHz)	$> \pm 4.0 \times 10^{-7}$	
Control voltage range (Uin)	0...5 V	0...4.5V
Reference voltage (Uref)	+5 V	+4.5 V

Output	SIN
Level	>300 mV
Load	50 Ohm $\pm 5\%$
Harmonics	>30 dBc

## Additional notes:

- For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit), °C:

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85



# MINIATURE DOUBLE OVEN ULTRA PRECISION OCXO MV209

## Features:

- Low sensitivity to rapid changes of ambient temperature
- Stability vs. temperature – up to  $\pm 2 \times 10^{-10}$
- Short term stability – up to  $2 \times 10^{-12}$  per 1 sec
- Aging – up to  $\pm 2 \times 10^{-8}$ /year
- Standard CO-08 package with size of 36x27x19 mm

## ORDERING GUIDE: MV209 – B 05 E – 10.0 MHz- LN

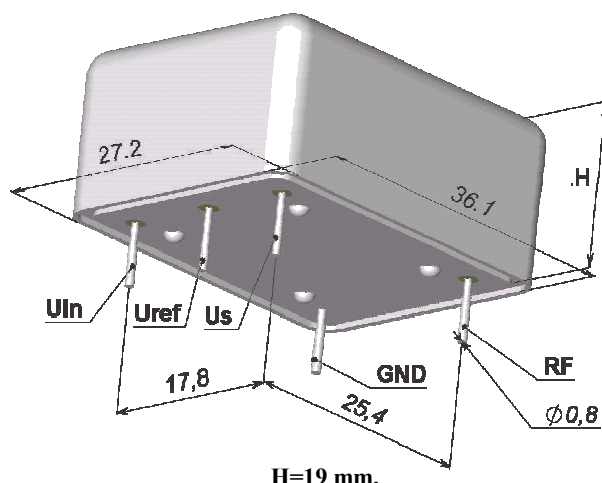
Availability of certain stability vs. operating temperature		$\pm 5 \times 10^{-10}$	$\pm 3 \times 10^{-10}$	$\pm 2 \times 10^{-10}$
		05	03	02
A	0...+55 °C	A	A	A
B	- 10...+60 °C	A	A	C
C	- 20...+70 °C	A	C	C
D	- 40...+70 °C	C	C	C

For other temperature ranges see designation at the end of Data Sheet

Availability of certain aging values for certain frequencies		Standard frequencies		
		5.0 MHz	8.192 MHz	10.0 MHz
F	$\pm 5 \times 10^{-8}$ /year	A	A	A
E	$\pm 3 \times 10^{-8}$ /year	A	A	C
D	$\pm 2 \times 10^{-8}$ /year	A	C	C

A – available, NA – not available, C – consult factory

## Package drawing:



Phase noise, dBc/Hz, for 10MHz	-	LN
1 Hz	<-95	<-100
10 Hz	<-125	<-130
100 Hz	<-143	<-148
1000 Hz	<-152	<-155
10000 Hz	<-158	<-160

Short term stability (Allan deviation) per 1 sec, typical	$< 5 \times 10^{-12}$
Optional:	$< 2 \times 10^{-12}$
Frequency stability vs. load changes	$< \pm 1 \times 10^{-10}$
Frequency stability vs. power supply changes	$< \pm 1 \times 10^{-10}$
Warm-up time within accuracy of $\pm 5 \times 10^{-8}$ @ 25°C	<10 min
Power supply (Us)	12V $\pm$ 5%
Steady state current consumption @ 25°C (still air)	< 150 mA
Peak current consumption during warm-up @ 25°C	<700 mA
Frequency pulling range	$> \pm 4 \times 10^{-7}$
with external control voltage range (Uin)	0...+5 V
Reference voltage (Uref)	+5V
Output	SIN
Level	> 400 mV
Load	50 Ohm $\pm$ 5%
Harmonic suppression	>30dBc

Vibrations:	
Frequency range	10-500 Hz
Acceleration	10g
Shock:	
Acceleration	150 g
Duration	3 $\pm$ 1 ms
Storage temperature range	-55...+80 °C

## ADDITIONAL NOTES:

- Showed values of frequency stability vs. temperature usually are tested in Still Air test conditions. Please inform factory about different conditions in operation to provide appropriate tests.
- Please consult factory for daily aging values. Normally typical correspondence of daily aging per day to aging per year is as following:  $\pm 5 \times 10^{-8}$ /year -  $\pm 5 \times 10^{-10}$ /day;  $\pm 3 \times 10^{-8}$ /year -  $\pm 3 \times 10^{-10}$ /day;  $\pm 2 \times 10^{-8}$ /year -  $\pm 2 \times 10^{-10}$ /day.
- For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit), °C:

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85



# DOUBLE OVEN ULTRA PRECISION OCXO MV216

## Features:

- Overall stability up to  $\pm 3 \times 10^{-8}$  / 10 years
- Not sensitive for rapid changes of ambient temperature
- Ultra low aging up to  $\pm 5 \times 10^{-9}$  / year
- Ultra high stability vs. temperature - up to  $\pm 5 \times 10^{-11}$
- Standard frequencies 5 MHz & 10.0 MHz

## Typical Applications:

- 3G Communication systems
- Test & Measurement
- Telecom synchronization modules
- GPS/GLONASS Timing & Navigation equipment
- Rubidium replacement

## ORDERING GUIDE: MV216 – B 01 C – 10.0 MHz

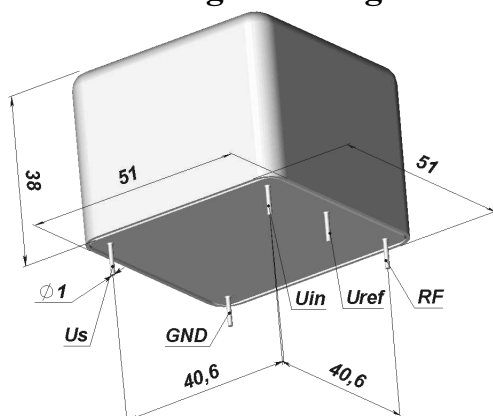
Availability of certain stability vs. operating temperature range		$\pm 2 \times 10^{-10}$	$\pm 1 \times 10^{-10}$	$\pm 5 \times 10^{-11}$
		02	01	005
A	0...+55 °C	A	A	A
B	- 10...+60 °C	A	A	A
C	- 20...+70 °C	A	A	C
D	-40...+70 °C	A	A	C

A – available, NA – not available, C – consult factory

For other temperature ranges see designation at the end of Data Sheet

	Overall stability for 10 years of operation	Overall stability for 1 year of operation
D	$\pm 1 \times 10^{-7}$	$\pm 1.5 \times 10^{-8}$
C	$\pm 5 \times 10^{-8}$	$\pm 1 \times 10^{-8}$
B	$\pm 3 \times 10^{-8}$	$\pm 5 \times 10^{-9}$

## Package drawing:



## Mechanical characteristics:

Vibrations:	
Frequency range	1-200 Hz
Acceleration	5g
Shock:	
Acceleration	150 g
Duration	3±1 ms
Storage temperature range	-55...+80 °C

Short term stability (Allan deviation) per 1 sec	$< 2 \times 10^{-12}$
Frequency stability vs. load changes	$< \pm 5 \times 10^{-11}$
Frequency stability vs. power supply changes	$< \pm 5 \times 10^{-11}$
Warm-up time within accuracy of $< \pm 5 \times 10^{-8}$	$< 15$ min
Power supply (Us)	12V±5%
Steady state current consumption @ 25°C (still air)	$< 350$ mA
Peak current consumption during warm-up	$< 1.5$ A
Option for - 10...+60 °C	$< 1.0$ A
Frequency pulling range	$> \pm 2.5 \times 10^{-7}$
with external control voltage range (Uin)	0...+5 V
Reference voltage (Uref)	+5V

Output	SIN
Level	+7 ±2 dBm
Load	50 Ohm±5%
Subharmonics (for 10.0 MHz)	$< -40$ dBc
Harmonic suppression	$> 30$ dBc
Phase noise (for 5 MHz)	
1 Hz	$< -105$ dBc/Hz
10 Hz	$< -130$ dBc/Hz
100 Hz	$< -145$ dBc/Hz
1000 Hz	$< -150$ dBc/Hz
10000 Hz	$< -155$ dBc/Hz

## ADDITIONAL NOTES:

- Showed values of frequency stability vs. temperature usually are tested in Still Air test conditions. Please inform factory about different conditions in operation to provide appropriate tests.
- For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit):

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85

# MINIATURE HIGH FREQUENCY PRECISION LOW PHASE NOISE OCXO MV218

## Features:

- Small package size of 25x25x10 mm
- Low Phase Noise – floor of  $<-170$  dBc/Hz
- Wide temperature range
- Very short warm-up time – less than 60 seconds

**Frequency range: 48.0-1000.0 MHz**

**Standard Frequency: 50,0; 84,0;  
98,304; 100,0; 160,0 MHz**

## Power Supply

**5 V**

**12 V**

## Package type (max)

**25.8x25.8x10 mm A10**

**25.8x25.8x13,3 mm A13.3**

**25.8x25.8x13.3 mm (with SMA connector) N**

## ORDERING GUIDE: MV218-B 300 J-12V-3-100.0 MHz-A10

Availability of certain stability vs. operating temperature range		$\pm 5 \times 10^{-7}$	$\pm 3 \times 10^{-7}$	$\pm 1 \times 10^{-7}$	$\pm 7.5 \times 10^{-8}$	$\pm 5 \times 10^{-8}$
		500	300	100	75	50
A	0...+55 °C	A	A	A	A	A
B	-10...+60 °C	A	A	A	A	C
C	-20...+70 °C	A	A	A	C	NA
D	-40...+70 °C	A	A	C	NA	NA

A – available, NA – not available, C – consult factory

For other temperature ranges see designation at the end of Data Sheet.

Aging		Package type		
		A10	A13.3	N
K	$\pm 1 \times 10^{-6}$ /year	+	+	+
J	$\pm 5 \times 10^{-7}$ /year	C	+	C
I	$\pm 3 \times 10^{-7}$ /year	-	+	-

Phase noise, dBc/Hz (for 100.0 & 500.0 MHz, for power supply 12V)								
Option	1	2	3	4	5			
Frequency	100	500	100	500	100	500	100	100
10 Hz	-85	-70	-90	-75	-95	-80	-97	-97
100 Hz	-115	-100	-120	-105	-125	-110	-127	-127
1000 Hz	-140	-125	-145	-130	-150	-135	-152	-152
10000 Hz	-160	-140	-162	-142	-165	-145	-167	-167
100000 Hz	-160	-140	-162	-142	-165	-145	-167	-170

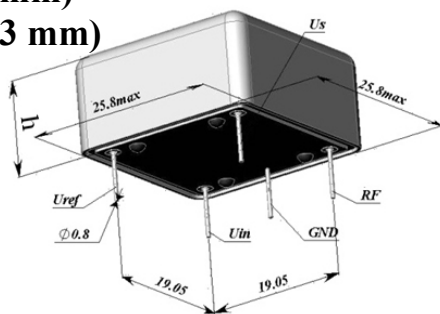
  

Phase noise, dBc/Hz (for 100.0 & 500.0 MHz, for power supply 5V)								
Option	1	2	3	4				
Frequency	100	500	100	500	100	500	100	100
10 Hz	-85	-70	-90	-75	-95	-80	-97	-97
100 Hz	-115	-100	-120	-105	-125	-110	-127	-127
1000 Hz	-140	-125	-145	-130	-147	-132	-150	-150
10000 Hz	-152	-140	-155	-140	-157	-140	-160	-160
100000 Hz	-160	-140	-160	-140	-162	-140	-165	-165

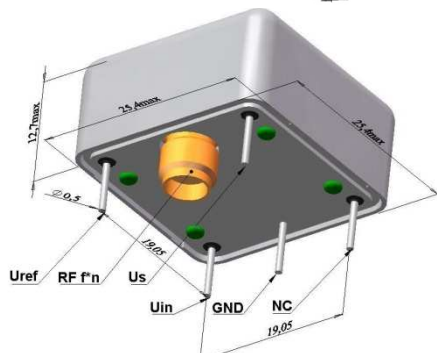
## Package drawings:

A10 (h=10,0 mm)

A13.3 (h=13,3 mm)



N:



Frequency stability vs. load changes	$< \pm 2 \times 10^{-8}$	
Frequency stability vs. power supply changes	$< \pm 1 \times 10^{-7}$	
Warm-up time within accuracy of $< \pm 2 \times 10^{-7}$ @ 25°C	<60 sec.	
Power supply (Us)	12V $\pm$ 10%	5V $\pm$ 10%
Steady state current consumption @ 25°C	< 115 mA	<250 mA
Peak current consumption during warm-up @ 25°C	< 370 mA	< 700 mA
Reference voltage output (Uref)	+10V	+4V
with external control voltage range (Uin)	0...+10 V	0...+4V
Frequency pulling range	$> \pm 3 \times 10^{-6}$	

Output	SIN
Level	>400 mV
Load	50 Ohm $\pm$ 10%
Harmonics	<-25 dBc
Vibrations	10-500 Hz, 5g
Storage temperature range	-55...+80 °C

## Additional notes:

- For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit), °C:

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85

# LOW PHASE NOISE PRECISION OCXO MV220

## Features:

- Package height from 19 mm down to 10 mm
- 12V power supply
- Ultra low phase noise
- High stability vs. temperature - up to  $\pm 2 \times 10^{-10}$
- Standard frequency 10.0 MHz

## Package type

50.8x50.8x19 mm *	Z19
50.8x50.8x16 mm *	Z16
50.8x50.8x12.7 mm	Z12.7
50.8x50.8x10 mm	Z10 **

\* - package is available by customer's request

\*\* - consult factory

## ORDERING GUIDE: MV220 – C 2 F – Z12.7 – 10.0 MHz – LN

Availability of certain stability vs. operating temperature range		$\pm 5 \times 10^{-9}$	$\pm 3 \times 10^{-9}$	$\pm 2 \times 10^{-9}$	$\pm 1 \times 10^{-9}$	$\pm 5 \times 10^{-10}$	$\pm 2 \times 10^{-10}$
		5	3	2	1	05	02
A	0...+55 °C	A	A	A	A	A	A
B	- 10...+60 °C	A	A	A	A	A	C
C	- 20...+70 °C	A	A	A	A	A	C
D	- 40...+70 °C	A	A	A	A	C	C
EX	- 40...+85 °C	A	A	A	C	C	NA

A – available, NA – not available, C – consult factory

For 10 mm height - consult factory

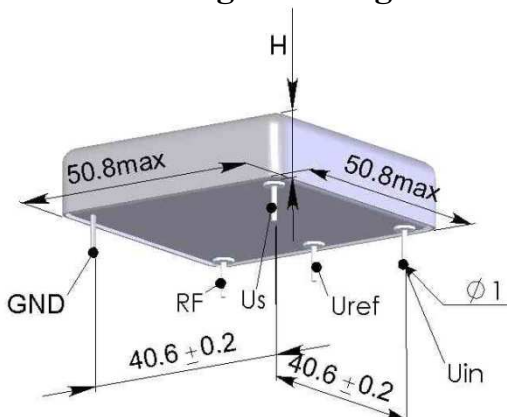
For other temperature ranges see designation at the end of Data Sheet.

Availability of certain aging values for certain frequencies		Standard frequency 10 MHz
G	$\pm 1 \times 10^{-7}$ /year	A
F	$\pm 5 \times 10^{-8}$ /year	A
E	$\pm 3 \times 10^{-8}$ /year	A

A – available, NA – not available, C – consult factory

Phase noise, dBc/Hz, for 10 MHz, SIN	-	LN	ULN
1 Hz	<-90	<-90	<-100
10 Hz	<-120	<-120	<-133
100 Hz	<-153	<-153	<-158
1000 Hz	<-162	<-163	<-163
10000 Hz	<-165	<-168	<-168

## Package drawing:



H=19 mm for Z19; H=16 mm for Z16;  
H=12.7 mm for Z12.7; H=10 mm for Z10.

Short-term stability (Allan deviation) per 1 sec (for 10 MHz)	$< 5 \times 10^{-12}$
Frequency stability vs. load changes	$< \pm 3 \times 10^{-10}$
Frequency stability vs. power supply changes	$< \pm 2 \times 10^{-10}$
Warm-up time within accuracy of $< \pm 2 \times 10^{-8}$ @ 25°C	<3 min
Power supply (Us)	12V $\pm$ 5%
Steady state current consumption @ 25°C	<200mA
Peak current consumption during warm-up (for "D" temp. range)	<500mA
Frequency pulling range	$> \pm 4 \times 10^{-7}$
with external voltage range (Uin)	0...+5V
Reference voltage (Uref)	+5 V

Vibrations:	
Frequency range	10-200 Hz
Acceleration	5g
Shock:	
Acceleration	75 g
Duration	3 $\pm$ 1 ms
Storage temperature range	-55...+85 °C

Output	SIN
Level	>800 mV
Load	50 Ohm $\pm$ 5%
Harmonic suppression	>30dBc

## Additional notes:

- Please consult factory for daily aging values. Normally typical correspondence of daily aging per day to aging per year is as following:  $\pm 1 \times 10^{-9}$ /year -  $\pm 1 \times 10^{-9}$ /day;  $\pm 5 \times 10^{-8}$ /year -  $\pm 5 \times 10^{-10}$ /day;  $\pm 3 \times 10^{-8}$ /year -  $\pm 3 \times 10^{-10}$ /day.
- Please mention RoHS requirement (if any) while requesting for quote or while placing PO.
- For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit), °C:

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85

# LOW PHASE NOISE PRECISION OCXO MV267

## Features:

- High stability vs. temperature - up to  $\pm 5 \times 10^{-10}$
- 12V power supply
- Ultra low phase noise
- Output frequency 5,0; 10 MHz

## ORDERING GUIDE: MV267 - C 1 F - 5 MHz - LN

Availability of certain stability vs. operating temperature range (5 MHz)		$\pm 3 \times 10^{-9}$	$\pm 2 \times 10^{-9}$	$\pm 1 \times 10^{-9}$	$\pm 5 \times 10^{-10}$
		3	2	1	05
A	0...+55 °C	A	A	A	A
B	- 10...+60 °C	A	A	A	A
C	- 20...+70 °C	A	A	A	C
D	- 40...+70 °C	A	A	C	C
EX	- 40...+85 °C	A	C	C	NA

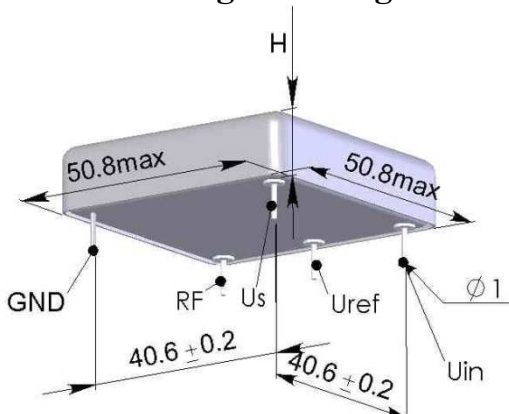
A – available, NA – not available, C – consult factory  
+75°, +80°, +85°C upper temperature limits may be available on a separate request. For other temperature ranges see designation at the end of Data Sheet.

Availability of certain aging values for certain frequencies		Standard frequency	
		5 MHz	10 MHz
F	$\pm 5 \times 10^{-8}$ /year	A	A
E	$\pm 3 \times 10^{-8}$ /year	A	A
D	$\pm 2 \times 10^{-8}$ /year	A	A
C	$\pm 1 \times 10^{-8}$ /year	C	NA

A – available, NA – not available, C – consult factory

Phase noise, dBc/Hz	5 MHz			10 MHz		
	-	LN	ULN	-	LN	ULN
1 Hz	<-110	<-115	<-118	<-102	<-107	<-112
10 Hz	<-140	<-145	<-148	<-130	<-134	<-138
100 Hz	<-150	<-153	<-155	<-135	<-140	<-145
1000 Hz	<-158	<-160	<-160	<-145	<-145	<-150
10000 Hz	<-160	<-161	<-161	<-145	<-145	<-150

## Package drawing:



H=16 mm

Short-term stability (Allan deviation) per 1 s	$< 2 \times 10^{-12}$
Optional:	$< 7 \times 10^{-13}$
Frequency stability vs. load changes	$< \pm 2 \times 10^{-10}$
Frequency stability vs. power supply changes	$< \pm 2 \times 10^{-10}$
Warm-up time within accuracy of $< \pm 2 \times 10^{-8}$ @ 25°C	<5 min
Power supply (Us)	12V $\pm$ 5%
Steady state current consumption @ 25°C	<250mA
Peak current consumption during warm-up	<500mA
Frequency pulling range	$> \pm 3 \times 10^{-7}$
with external voltage range (Uin)	0...5V
Reference voltage (Uref)	+5 V

Vibrations:	
Frequency range	10-200 Hz
Acceleration	5g
Shock:	
Acceleration	75 g
Duration	3 $\pm$ 1 ms
Storage temperature range	-55...+85 °C

Output	SIN
Level	>500 mV
Load	50 Ohm $\pm$ 5%
Harmonic suppression	>30dBc

## Additional notes:

- For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit), °C:

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85





# ULTRA HIGH PERFORMANCE OCXO MV272

## Preliminary

### Features:

- *Standard frequencies : 5.0; 10.0 MHz*
- *High stability vs. temperature: up to  $\pm 1 \times 10^{-9}$*
- *Long term stability up to  $\pm 2 \times 10^{-8}$ /year*
- *Low G - sensitivity*
- *ON/OFF function*
- *Low phase noise options*

G-sensitivity (in frequency range 0-500 Hz)	
-	Not specified
1	$< 1.0 \times 10^{-9}/g$
2	$< 1.5 \times 10^{-9}/g$

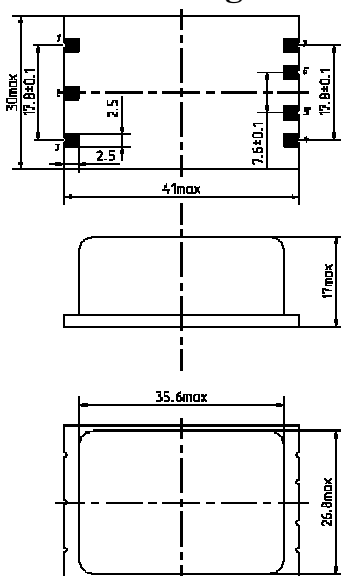
### ORDERING GUIDE: MV272- C 3 F-ULN - 10.0 MHz - 2

Availability of certain stability vs. operating temperature range (for 10 MHz)		$\pm 5 \times 10^{-9}$	$\pm 3 \times 10^{-9}$	$\pm 2 \times 10^{-9}$	$\pm 1 \times 10^{-9}$
		5	3	2	1
A	0...+55 °C	A	A	A	A
B	- 10...+60 °C	A	A	A	A
C	- 20...+70 °C	A	A	A	A
EX	-40...+85 °C	A	A	A	NA

A – available, NA – not available, C – consult factory

Availability of certain aging values for certain frequencies		Standard frequencies	
		5.0 MHz	10.0 MHz
G	$\pm 1 \times 10^{-7}/\text{year}$	A	A
F	$\pm 5 \times 10^{-8}/\text{year}$	A	A
E	$\pm 3 \times 10^{-8}/\text{year}$	A	A
D	$\pm 2 \times 10^{-8}/\text{year}$	A	C

### Package drawings:



Pin	Designation
1	GND
2	NC
3	RF
4	Us
5	ON OFF
6	U in
7	U ref

Phase noise, dBc/Hz, for 10 MHz	-	LN	ULN*
1 Hz	<-95	<-105	<-110
10 Hz	<-125	<-135	<-140
100 Hz	<-145	<-155	<-157
1000 Hz	<-155	<-160	<-161
10000 Hz	<-158	<-161	<-162

\* measured values

<b>Vibrations:</b>	
Frequency range	10-500 Hz
Option	10-2000 Hz
Acceleration	10 g
<b>Shock:</b>	
Acceleration	100 g $\pm 3\text{ms}$
<b>Humidity @ 25 °C</b>	
98%	
<b>Storage temperature range</b>	
-40...85 °C	

Short term stability (Allan deviation) per 1 sec, for 10 MHz	$< 5 \times 10^{-12}$
LN, ULN option	$< 2 \times 10^{-12}$
Frequency stability vs. load changes ( $\pm 5\%$ )	$< \pm 5 \times 10^{-10}$
Optional	$< \pm 2 \times 10^{-10}$
Frequency stability vs. power supply changes ( $\pm 5\%$ )	$< \pm 5 \times 10^{-10}$
Optional	$< \pm 2 \times 10^{-10}$
Warm-up time within accuracy of $< \pm 2 \times 10^{-8}$ @ 25 °C	<5 min
Power supply (Us)	12V $\pm 5\%$
Option	10.6...12.6V
Steady state current consumption @ +25 °C (for 10 MHz)	<150 mA
Peak current consumption during warm-up *	<400 mA
Frequency pulling range (for 10 MHz)	$> \pm 4.0 \times 10^{-7}$
Control voltage range (Uin)	0...5 V
Reference voltage (Uref)	+5 V
Output	SIN
Level	>400 mV
Load	50 Ohm $\pm 5\%$
Harmonics	>30 dBc

\* - for the oscillators with the lower operating temperatures  $> -20^\circ$ .

### Additional notes:

- For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit), °C:

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85



# HIGH STABILITY MINIATURE OCXO MV285

## PRELIMINARY INFORMATION

### Features:

- **Small package** – 1"x1"x0.5" (25x25x12.7 mm)
- **High stability vs. temperature:** up to  $\pm 1 \times 10^{-9}$
- **Long term stability** up to  $\pm 3 \times 10^{-8}$ /year
- **Available as RoHS**
- **Frequency range:** 8.192 – 20.0 MHz

Power supply	Output
12V	SIN
5V	HCMOS

## ORDERING GUIDE: MV285 – C 3 F – 12V – SIN – 10.0 MHz – LN

Availability of certain stability vs. operating temperature range		$\pm 5 \times 10^{-9}$	$\pm 3 \times 10^{-9}$	$\pm 2 \times 10^{-9}$	$\pm 1 \times 10^{-9}$
		5	3	2	1
A	0...+55 °C	A	A	A	A
B	- 10...+60 °C	A	A	A	A
C	- 20...+70 °C	A	A	A	C
D	- 40...+70 °C	A	A	A	C
EX	- 40...+85 °C	A	A	C	C

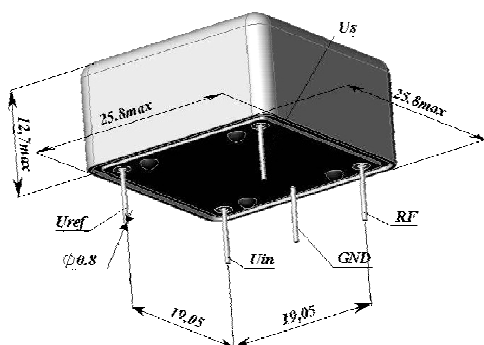
A – available, NA – not available, C – consult factory

For other temperature ranges see designation at the end of Data Sheet.

Availability of certain aging values for certain frequencies		Standard frequencies				
		10.0 MHz	12.8 MHz	13.0 MHz	16.384 MHz	20.0 MHz
H	$\pm 2 \times 10^{-7}$ / year	A	A	A	A	A
G	$\pm 1 \times 10^{-7}$ / year	A	A	A	A	C
F	$\pm 5 \times 10^{-8}$ / year	A	A	A	C	NA
E	$\pm 3 \times 10^{-8}$ / year	A	C	C	NA	NA

A – available, NA – not available, C – consult factory

### Package drawing:



Phase noise, dBc/Hz, for 10MHz, SIN	-	LN
		For 12V, SIN
1 Hz	<-95	<-100
10 Hz	<-125	<-130
100 Hz	<-145	<-150
1000 Hz	<-150	<-157
10000 Hz	<-155	<-159

<b>Vibrations:</b>	
Frequency range	10-200 Hz
Acceleration	5 g

<b>Shock:</b>	
Acceleration	75 g
Duration	3±1 ms

Humidity @ 25 °C	98%
Storage temperature range	-55...+85 °C

Short term stability (Allan deviation) per 1 sec, for 10 MHz	$< 5 \times 10^{-12}$
Option*	$< 2 \times 10^{-12}$
Frequency stability vs. load changes (±5%)	$< \pm 5 \times 10^{-10}$
Frequency stability vs. power supply changes (±5%)	$< \pm 2 \times 10^{-10}$
Warm-up time within accuracy of $\pm 2 \times 10^{-8}$ @ 25 °C	<3 min
Optional*, within accuracy of $\pm 1 \times 10^{-7}$ @ 25 °C	<1 min

Power supply (Us)	12V±5%	5V±5%
Steady state current consumption @ 25°C	<170 mA	<400 mA
Peak current consumption during warm-up (for "D" temp. range)	<400 mA	<1000 mA
Frequency pulling range (for 10 MHz)	$> \pm 4.0 \times 10^{-7}$	
Control voltage range (Uin)	0...5 V	0...4.5V
Reference voltage (Uref)	+5 V	+4.5 V

Output	HCMOS	SIN
Level	"0" <0.5V "1" >4.0V	>300 mV
Load	10kOhm/30pF	50 Ohm±5%
Rise/Fall time	<6 ns (<3 ns optional)	-
Harmonics	-	>30 dBc

### Additional notes:

- Please consult factory for daily aging values. Normally typical correspondence of daily to aging per year is as following:  
 $\pm 1 \times 10^{-7}$ /year –  $\pm 1 \times 10^{-9}$ /day;  $\pm 5 \times 10^{-8}$ /year –  $\pm 5 \times 10^{-10}$ /day;  $\pm 3 \times 10^{-8}$ /year –  $\pm 3 \times 10^{-10}$ /day
- Please mention RoHS requirement (if any) while requesting for quote or while placing PO.
- For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit), °C:

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85

# LOW POWER CONSUMPTION TCXO MV88

## Features:

- Excellent frequency stability vs. temperature
- Wide operating temperature range
- Frequency range 9.6-20.0 MHz

## ORDERING GUIDE: MV88 – B – 1000 – K – HCMOS – 10.0 MHz

Availability of certain stability vs. operating temperature range		$\pm 2 \times 10^{-6}$	$\pm 1 \times 10^{-6}$	$\pm 5 \times 10^{-7}$
		2000	1000	500
A	0...+55 °C	A	A	A
B	-10...+60 °C	A	A	A
C	-20...+70 °C	A	A	C
D	-40...+70 °C	A	A	NA

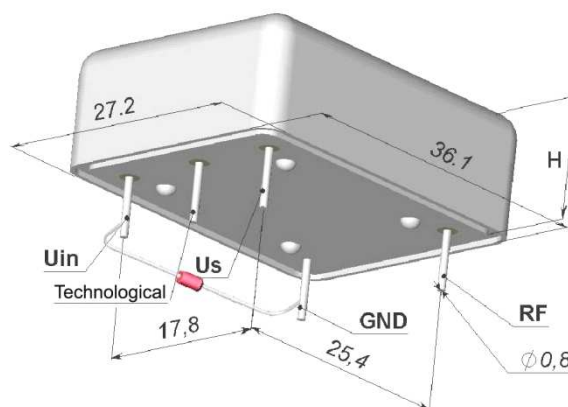
For other temperature ranges see designation at the end of Data Sheet

Availability of certain aging values for certain frequencies		Standard frequencies		
		10.0 MHz	12.8 MHz	20.0 MHz
L	$\pm 2 \times 10^{-6}$ /year	A	A	A
K	$\pm 1 \times 10^{-6}$ /year	A	C	NA

A – available, NA – not available, C – consult factory

Output type
SIN
HCMOS

## Package drawing:



H=10.1 mm

\* for 20 MHz package height is 8.2 mm max

Frequency stability vs. load changes	$< \pm 2 \times 10^{-7}$	
Frequency stability vs. power supply changes	$< \pm 2 \times 10^{-7}$	
Power supply (Us)	12V $\pm$ 25%	
Current consumption	SIN	HCMOS
	<4 mA	<7 mA
Frequency pulling range	$> \pm 3.5 \times 10^{-6}$	
Storage temperature range	-50...+70 °C	
Vibrations	1...500 Hz, 10 g	
Shock	500 g, 2 ms	

Output type	SIN	HCMOS
Level	325±100 mV	≤ 0,4 ; ≥ 4,0 V
Load	50 Ohm	
Phase noise at offset (for 10.0 MHz), dBc/Hz: 1 Hz	-60	-55
10 Hz	-90	-85
100 Hz	-115	-110
1000 Hz	-135	-125
10000 Hz	-140	-130

## Additional notes:

For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit), °C:

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85

# SMALL SIZE HIGH STABILITY TCXO MV120

## Features:

- Excellent frequency stability vs. temperature
- Wide operating temperature range
- Frequency range 9.6-20.0 MHz

## ORDERING GUIDE: MV120 – B – 1500 – K – LN – 10.0 MHz

Availability of certain stability vs. operating temperature range		$\pm 2 \times 10^{-6}$	$\pm 1.5 \times 10^{-6}$	$\pm 1.0 \times 10^{-6}$	$\pm 7.0 \times 10^{-7}$
		2000	1500	1000	700
A	0...+55 °C	A	A	A	A
B	- 10...+60 °C	A	A	A	C
C	- 20...+70 °C	A	A	A	NA
D	-40...+70 °C	A	A	C	NA

For other temperature ranges see designation at the end of Data Sheet

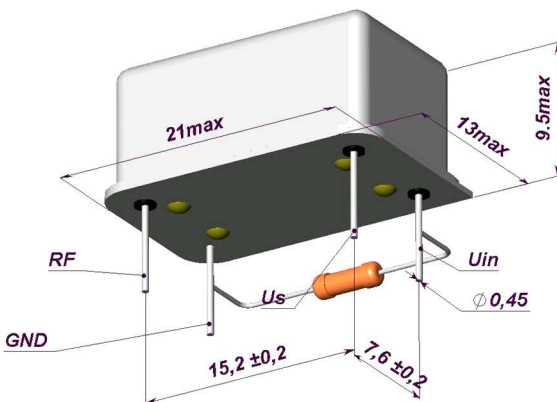
Availability of certain aging values for certain frequencies		Standard frequencies		
		9.8304 MHz	10.0 MHz	12.8 MHz
M	$\pm 3 \times 10^{-6}$ /year	A	A	A
L	$\pm 2 \times 10^{-6}$ /year	A	A	A
K	$\pm 1 \times 10^{-6}$ /year	A	A	A

A – available, NA – not available, C – consult factory

## Package drawing and pin designation

1. Frequency adjustment
2. GND
3. RF-output
4. Power supply

Pins #1 and #2 are connected by technological resistor to adjust the frequency. This resistor can be removed in time of installation of the oscillator to an electronic device providing the same resistance between the pins #1 and #2.



Output	SIN	
Level	200... 350 mV	
Load	500 Ohm $\pm 10\%$	
Phase noise (dBc/Hz) at offset (for 10 MHz): 1 Hz	-	LN*
10 Hz	-60	-65
100 Hz	-90	-95
1000 Hz	-120	-120
	-140	-140

\* For frequencies 9.6 - 12.8 MHz

Short term stability (Allan deviation) per 1 s	$< 1.0 \times 10^{-9}$
Frequency stability vs. load changes	$< \pm 3.0 \times 10^{-7}$
Frequency stability vs. power supply changes	$< \pm 2.0 \times 10^{-7}$
Power supply (Us)	12 V (+5%, -30%)
Current consumption	$< 5$ mA
Start-up time	$< 1$ s
Frequency pulling range	$> \pm 8.5 \times 10^{-6}$
Harmonics suppression	$> 30$ dB

Storage temperature range	-50...+70 °C
Vibrations	1-500 Hz, 10 g
Shock	500 g, 2 ms
Sealing	hermetical
Humidity @ +25 °C	98%

## Additional notes:

For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit), °C:

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85

# LOW PHASE NOISE HIGH STABILITY SMALL SIZE TCXO MV121

## Features:

- Excellent phase noise performance
- High frequency stability vs. temperature – up to  $\pm 5 \times 10^{-7}$
- Small size 20x20x10 mm
- Frequency range 9.8 – 20.0 MHz

## ORDERING GUIDE: MV121 – C 2000 L – 5V – 10.0 MHz

Availability of certain stability vs. operating temperature range		$\pm 2 \times 10^{-6}$	$\pm 1.5 \times 10^{-6}$	$\pm 8 \times 10^{-7}$	$\pm 5 \times 10^{-7}$
		2000	1500	800	500
A	0...+55 °C	A	A	A	A
B	-10...+60 °C	A	A	A	NA
C	-20...+70 °C	A	A	NA	NA
D	-40...+70 °C	A	NA	NA	NA

For other temperature ranges see designation at the end of Data Sheet

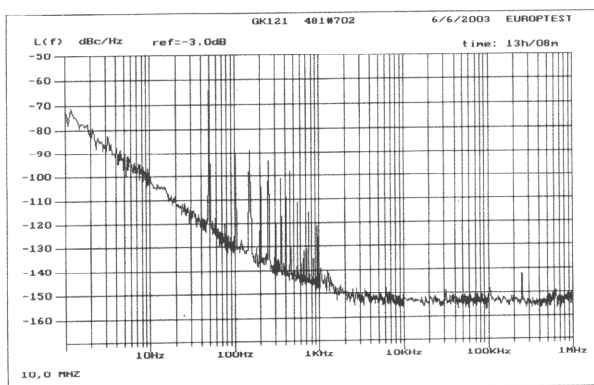
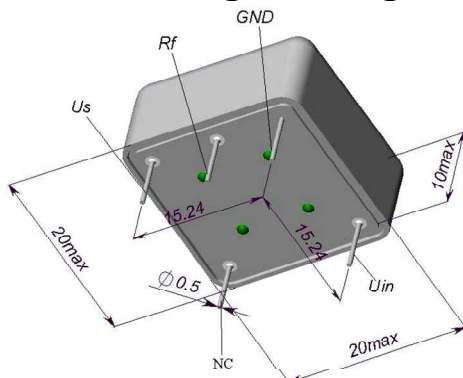
### Power supply

5V  
12V

Availability of certain aging values for certain frequencies		10.0 MHz	20.0 MHz
L	$\pm 2 \times 10^{-6}/\text{year}$	A	A
K	$\pm 1 \times 10^{-6}/\text{year}$	A	NA

A – available, NA – not available

## Package drawing:



Short term stability (Allan deviation) per 1 s	$< 1 \times 10^{-9}$	
Frequency stability vs. load changes	$< \pm 2 \times 10^{-7}$	
Frequency stability vs. power supply changes	$< \pm 3 \times 10^{-7}$	
Power supply (Us)	5V	12V
Current consumption 25°C	$< 15\text{mA}$	$< 6\text{mA}$
Output	SIN	
Level	300-500 mV	500-800 mV
Load	2 kOhm $\pm 10\%$	
Harmonic suppression	$> 30\text{ dB}$	
Phase noise at offset, dBc/Hz	For 10 – 12.8 MHz	For 13 – 20.0 MHz
1 Hz	-65	-
10 Hz	-95	-
100 Hz	-125	-115
1000 Hz	-145	-140
10000 Hz	-155	-145
Frequency pulling range	$> \pm 8.5 \times 10^{-6}$	
Vibrations	1-500 Hz, 10g	
Shock	500g, 2 ms	

## Additional notes:

- For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit), °C:

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85

# SMALL SIZE ULTRA PRECISION TCXO WITH OCXO STABILITY MV202

## Features:

- Frequency range 9.8304 – 20. MHz
- Standard frequencies 12.288; 12.8 MHz
- Low current consumption – < 14 mA
- 5V Power supply
- Stability vs. temperature – up to  $\pm 1.5 \times 10^{-7}$
- Aging – up to  $\pm 1.5 \times 10^{-7}$ /year

Phase noise, dBc/Hz	-	S1
10 Hz	-	<-90
100 Hz	<-110	<-120
1000 Hz	<-130	<-140
10000 Hz	<-140	<-145

## ORDERING GUIDE: MV202 - B 300 H – 12.8 MHz – S1

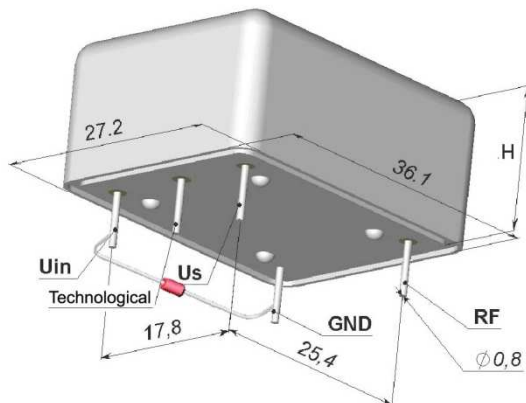
Availability of certain stability vs. operating temperature range		$\pm 5 \times 10^{-7}$	$\pm 3 \times 10^{-7}$	$\pm 2 \times 10^{-7}$	$\pm 1.5 \times 10^{-7}$
		500	300	200	150
A	0...+55 °C	A	A	A	C
B	- 10...+60 °C	A	A	A	C
C	- 20...+70 °C	A	A	A	C
D	- 40...+70 °C	A	A	C	C

A – available , NA – not available, C – consult factory

Availability of certain aging values for certain frequencies			Standard frequencies	
			10.0 MHz	12.8 MHz
J	$\pm 5 \times 10^{-7}$ /year	$\pm 5 \times 10^{-9}$ /day	A	A
I	$\pm 3 \times 10^{-7}$ /year	$\pm 3 \times 10^{-9}$ /day	A	A
H	$\pm 2 \times 10^{-7}$ /year	$\pm 2 \times 10^{-9}$ /day	A	C
G	$\pm 1.5 \times 10^{-7}$ /year	$\pm 1.5 \times 10^{-9}$ /day	C	NA

A – available , NA – not available, C – consult factory

## Package drawing:



H=12.7 mm

Pins Uin and GND are connected by technological resistor (18±6 kOhm) to adjust the frequency. This resistor can be removed in time of installation of the oscillator to an electronic device providing the same resistance between the pins Uin and GND.

Frequency stability vs. power supply changes	$< \pm 2 \times 10^{-8}$
Frequency stability vs. load changes	$< \pm 5 \times 10^{-8}$
Power supply (Us)	5V±10%
Steady state current consumption @ 25°C	< 14 mA
Output	SIN
Level	> 250 mV
Load	50 Ohm ±5%
Harmonic suppression	> 20 dB
Warm-up time within accuracy of $< \pm 5 \times 10^{-7}$	< 2 s
Frequency pulling range	$> \pm 5 \times 10^{-7}$

## Mechanical characteristics

Vibrations:	
Frequency range	10-500 Hz
Acceleration	6 g
Shock:	
Acceleration	500 g/ (0,2...2) ms
Duration	100 g/ (1...5) ms

## Additional notes:

- For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit), °C:

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85



# SMALL SIZE ULTRA PRECISION TCXO WITH OCXO STABILITY MV203

## Features:

- *Small size – 36x27x10.5 mm*
- *Frequency range 9.8304 – 20.MHz*
- *Standard frequencies 9.8304, 10.0, 12.288, 12.8 MHz*
- *Low current consumption – < 11 mA*
- *12 V Power supply*
- *Stability vs. temperature – up to  $\pm 5 \times 10^{-8}$*
- *Aging – up to  $\pm 1.5 \times 10^{-7}$ /year*

Option		S1	S2
Warm-up time within accuracy of $< \pm 2.5 \times 10^{-7}$		< 3 s	< 5 s
Phase noise, typical, dBc/Hz	10 Hz	< -90	-
	100 Hz	< -110	< -110
	1000 Hz	< -130	< -130
	10000 Hz	< -140	< -140

## ORDERING GUIDE: MV203 - B 300 H – 10 MHz – S2

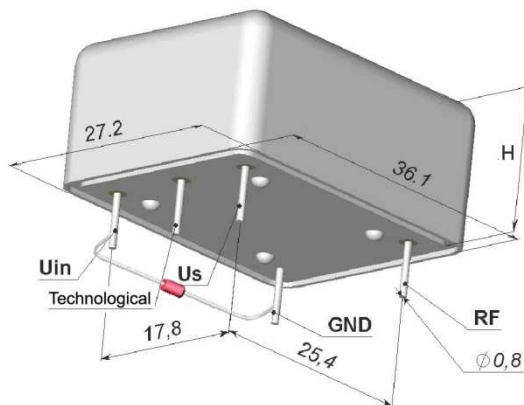
Availability of certain stability vs. operating temperature range		$\pm 2 \times 10^{-7}$	$\pm 1.5 \times 10^{-7}$	$\pm 1 \times 10^{-7}$	$\pm 7.5 \times 10^{-8}$	$\pm 5 \times 10^{-8}$
		200	150	100	75	50
A	0...+55 °C	A	A	A	A	C
B	- 10...+60 °C	A	A	A	A	C
C	- 20...+70 °C	A	A	A	C	C
D	- 40...+70 °C	A	A	C	C	C

A – available , NA – not available, C – consult factory

Availability of certain aging values for certain frequencies			Standard frequencies	
			10.0 MHz	12.8 MHz
I	$\pm 3 \times 10^{-7}$ /year	$\pm 3 \times 10^{-9}$ /day	A	A
H	$\pm 2 \times 10^{-7}$ /year	$\pm 2 \times 10^{-9}$ /day	A	C
G	$\pm 1.5 \times 10^{-7}$ /year	$\pm 1.5 \times 10^{-9}$ /day	C	NA

A – available , NA – not available, C – consult factory

## Package drawing:



H= 10.5 mm

Pins Uin and GND are connected by technological resistor ( $18 \pm 6$  kOhm) to adjust the frequency. This resistor can be removed in time of installation of the oscillator to an electronic device providing the same resistance between the pins Uin and GND.

## Additional notes:

- For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit), °C:

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85

# MINIATURE HIGH FREQUENCY LOW PHASE NOISE VOLTAGE CONTROLLED CRYSTAL OSCILLATOR MV217

## Features:

- Small package size 20x20x10 mm
- Frequency range: 80.0 – 170.0 MHz
- Low Phase Noise

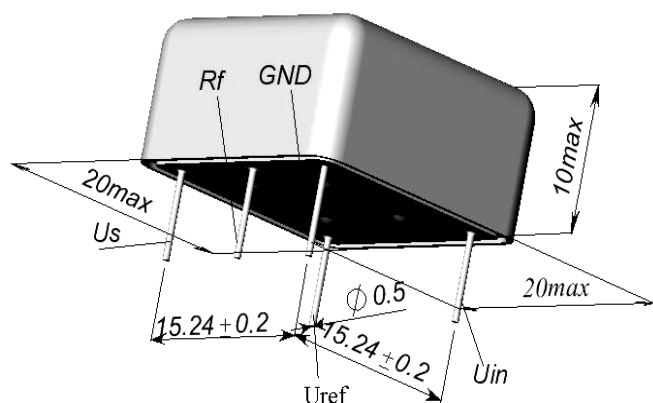
## ORDERING GUIDE: MV217-A 8000 - 2 - 100.0 MHz

Availability of certain stability vs. operating temperature		$\pm 10 \times 10^{-6}$	$\pm 8 \times 10^{-6}$
		10000	8000
A	0...+55 °C	A	A
B	-10...+60 °C	A	A

A – available, NA – not available, C – consult factory

For other temperature ranges see designation at the end of Data Sheet.

## Package drawing:



Frequency range: 80-170.0 MHz

Phase noise, dBc/Hz (for 100 MHz)			
	1	2	3
100 Hz	-95	-105	-110
1 kHz	-125	-130	-135
10 kHz	-140	-145	-150
100 kHz-1MHz	-155	-160	-160

Long term stability (aging) per 1 <sup>st</sup> year	$< \pm 2 \times 10^{-6}$
Long term stability (aging) per 10 years	$< \pm 10 \times 10^{-6}$
Frequency stability vs. power supply changes by $\pm 5\%$	$< \pm 2 \times 10^{-6}$
Frequency stability vs. load changes by $\pm 10\%$	$< \pm 5 \times 10^{-7}$
Power supply (Us)	5V $\pm 5\%$
Current consumption	< 30 mA
Output	SIN
Load	50 Ohm
Level	> 300 mV
With external voltage range (Uin)	0...+4 V
Frequency pulling range	$> \pm 22 \times 10^{-6}$
Reference voltage output (Uref)	+ 4 V
Harmonic suppression	> 20 dBc

Vibrations:	
Frequency range	5-300 Hz
Acceleration	5g

Shock:	
Acceleration	15 g
Duration	6 ms
Storage temperature range	-60...+90 °C

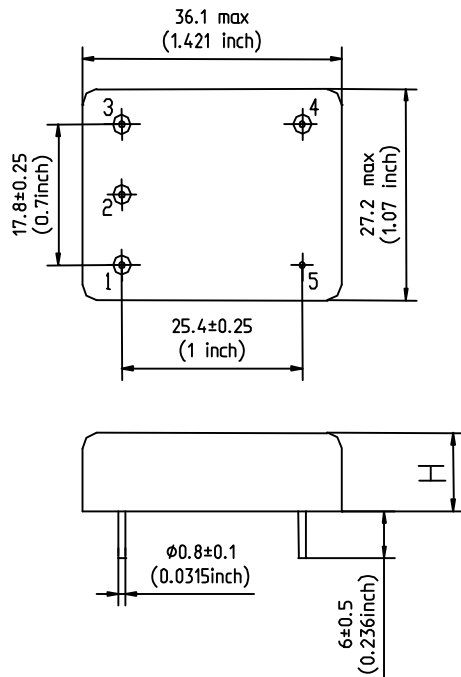
## Additional notes:

- For non standard operating temperature ranges please use the following two letters designations (first letter for the lower limit, second letter for the upper limit), °C:

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
-60	-55	-50	-45	-40	-30	-20	-10	0	+10	+30	+40	+45	+50	+55	+60	+65	+70	+75	+80	+85

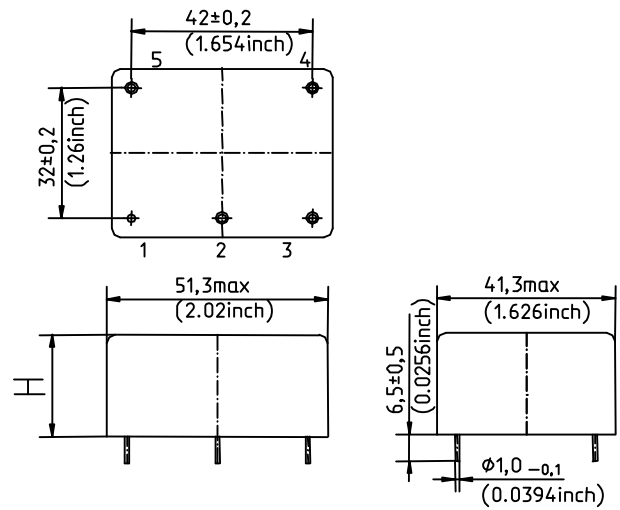
# DRAWINGS OF PACKAGES OF OCXOs

**Package B:**  
MV103, MV197, MV136, etc.



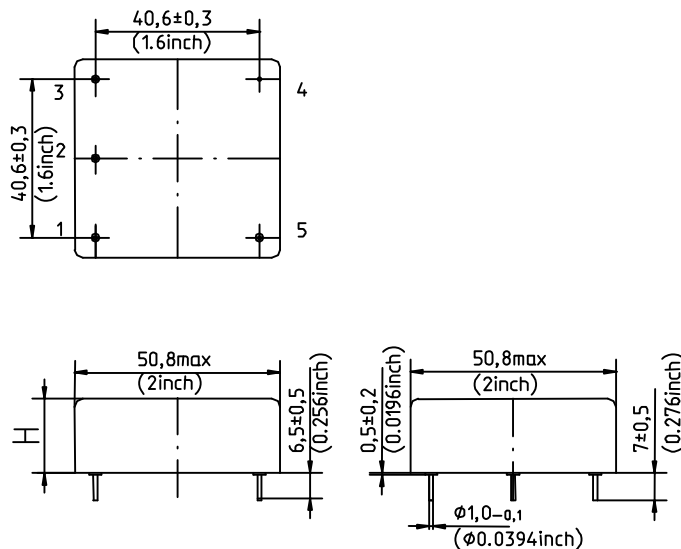
**H = 19 ... 10 mm**  
(for different models)

**Package Y:**  
MV201, MV180, MV62, etc.



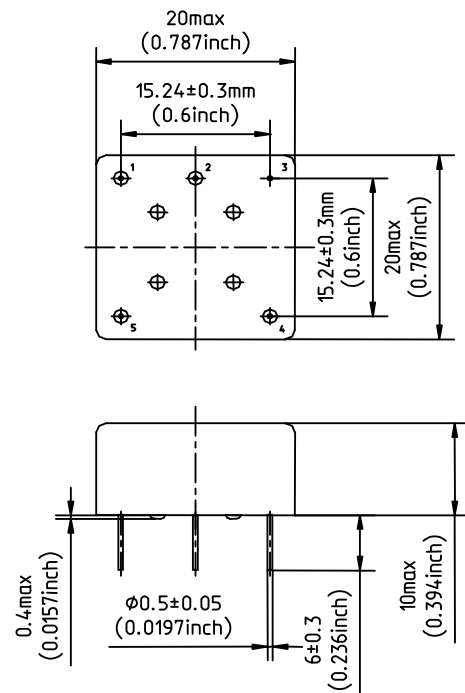
**H = 15 ... 12.7 mm**  
(for different models)

**Package Z:**  
MV200, MV180, MV220, etc.



**H = 15 ... 10 mm**  
(for different models)

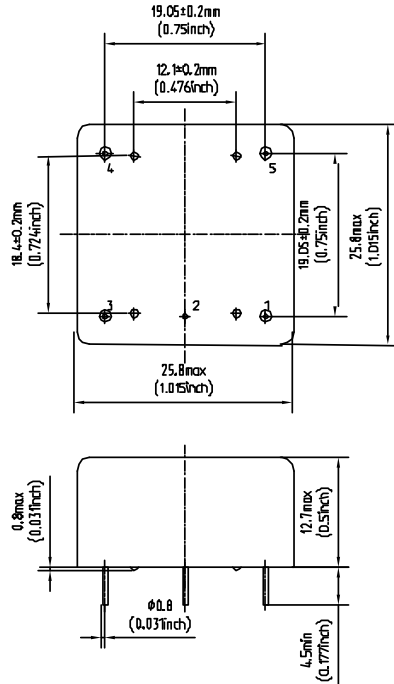
**Package D:**  
MV118, MV199, etc.



**H = 12.7 ... 10 mm**  
(for different models)

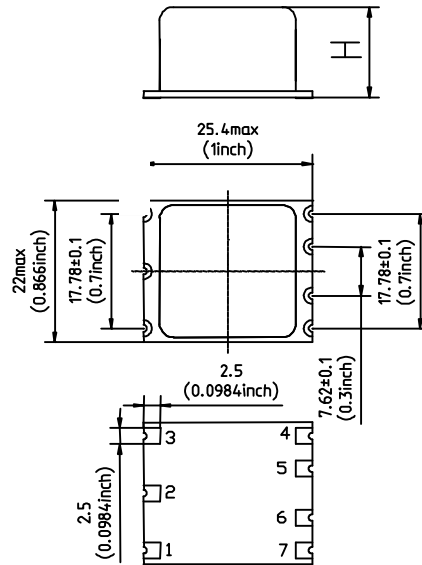
# DRAWINGS OF PACKAGES OF OCXOs

**Package A, N (with SMA):**  
MV85, MV218, etc.



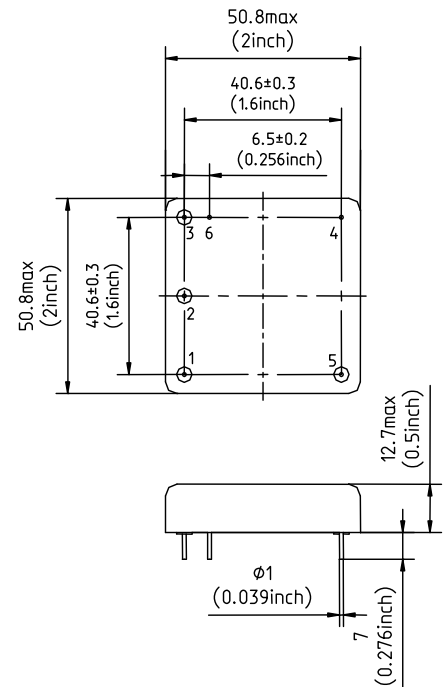
**H = 12.7 ... 10 mm**  
(for different models)

**Package C:**  
MV115, MV140, etc.



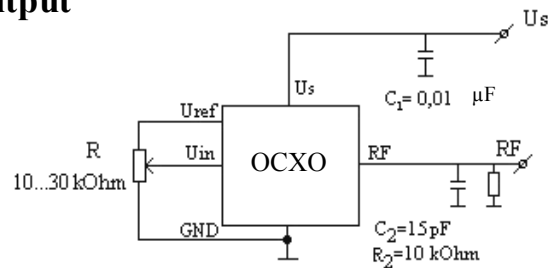
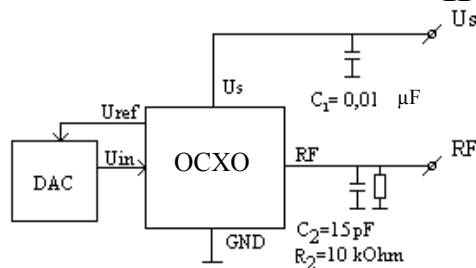
**H = 16 ... 12.5 mm**  
(for different models)

**Package F:**  
MV87, etc.

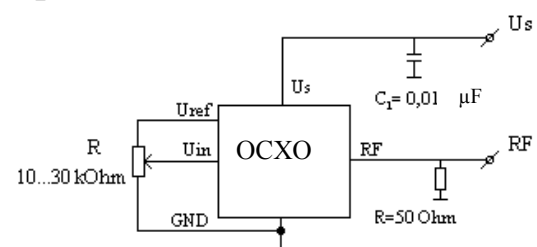
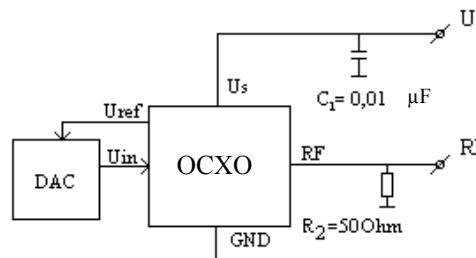


## OCXO TYPICAL TEST / CONNECTION CIRCUITS

### HCMOS Output



### Sine wave Output



Interchangeable pin name		Pin function
Uin, or →	Vcontrol	Control voltage input
Uref, or →	Vref	Reference voltage output
RF, or →	Vout	RF output
GND, or →	GND	Ground (usually – case)
Us, or →	Vs	Power supply