

MAS9276

IC for 10.00 – 30.00 MHz VCTCXO

- Very High Control Voltage Sensitivity
- True Sinewave Output
- Electrically Trimmable
- Very Low Phase Noise
- Low Power
- Low Cost

DESCRIPTION

MAS9276 is integrated circuit well suited to build VCTCXO for mobile communications. Temperature calibration is achieved at three calibration temperatures only. The trimming is done through a serial bus and the calibration information is stored in an internal PROM. This means that no rework for trimming is needed.

To build a VCTCXO only a crystal is required in addition to MAS9276. The compensation method is fully analog, working continuously without generating any steps or other interference.

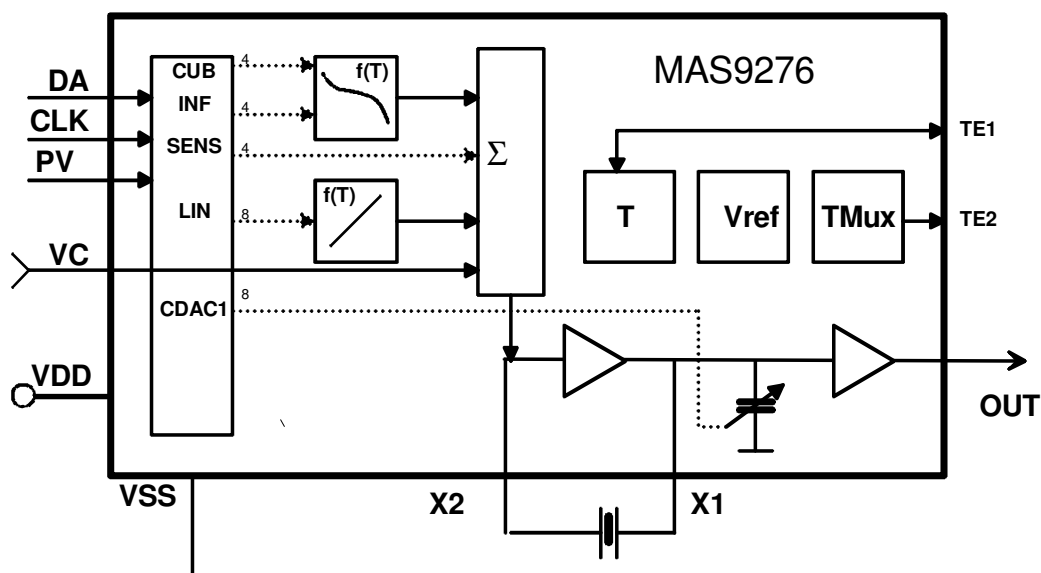
FEATURES

- Very small size
- Minimal current consumption
- Wide operating temperature range
- Phase noise <-120 dBc/Hz at 100 Hz offset
- Programmable Vc sensitivity

APPLICATIONS

- VCTCXO for mobile phones
- VCTCXO for other telecommunications systems

BLOCK DIAGRAM



PIN DESCRIPTION

Pin Description	Symbol	x-coordinate	y-coordinate
Power Supply Voltage	VDD	166	1430
Programming Input	PV	420	1435
Serial Bus Clock Input	CLK	979	1441
Serial Bus Data Input	DA	1234	1441
Temperature Output	TE1	1488	1441
Test Multiplexer Output	TE2	1742	1441
Voltage Control Input	VC	185	153
Crystal Oscillator Output	X1	439	149
Crystal/Varactor Oscillator Input	X2	1357	149
Power Supply Ground	VSS	1790	166
Buffer Output	OUT	2046	153

Note: Because the substrate of the die is internally connected to GND, the die has to be connected to GND or left floating. Please make sure that GND is the first pad to be bonded. Pick-and-place and all component assembly are recommended to be performed in ESD protected area.

Note: Pad coordinates are measured from the left bottom corner of the chip to the center of the pads. The coordinates may vary depending on sawing width and location, however, distances between pads are accurate.

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit	Note
Supply Voltage	$V_{DD} - V_{SS}$	-0.3	6.0	V	
Input Voltage	V_{IN}	$V_{SS} - 0.3$	$V_{DD} + 0.3$	V	1)
Power Dissipation	P_{MAX}		20	mW	
Storage Temperature	T_{ST}	-55	150	°C	

(test conditions)

Note 1: Not valid for programming pin PV

RECOMMENDED OPERATION CONDITIONS

Parameter	Symbol	Conditions	Min	Typ	Max	Unit	Note
Supply Voltage	V_{DD}		2.7	2.8	5.5	V	
Supply Current	I_{CC}	Vdd = 2.8 Volt			1.8	mA	
Operating Temperature	T_C		-30		+85	°C	
Storage Temperature	T_S	Relative humidity = 15%...70%	-5		+40	°C	
Crystal Pulling Sensitivity	S			30		ppm/pF	
Crystal Load Capacitance	C_L			10		pF	

ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Min	Typ	Max	Unit	Note
Frequency Range	f_o	10.00		30.00	MHz	
Voltage Control Range	V_C	0		Vdd		
Frequency vs. Supply Voltage	df_o			± 0.2	ppm	1)
Frequency vs. Load Change	df_o			± 0.2	ppm	2)
Voltage Control Sensitivity (VCR = 0)	V_{CSSENS}	11		25	ppm/V	3)
Voltage Control Sensitivity (VCR = 1)	V_{CSSENS}	5		11	ppm/V	
Output Voltage (10k Ω // 10 pF)	V_{out}		1.0		Vpp	
Compensation Range ± 2.5 ppm	T_C	-30		85	$^{\circ}C$	
Compensation Range ± 2.0 ppm	T_C	-25		75	$^{\circ}C$	
Compensation Range Linear Part	a1	-0.7		0.0	ppm/K	
Compensation Inflection Point	INF	25		31	$^{\circ}C$	
Compensation Range Cubic Part	a3		95		ppm ² /K ³	
Compensation CDAC1 (8 Bit)	C_{X1}	C10		C10 + 18	pF	4)
Start up Time	T_{START}		2		ms	

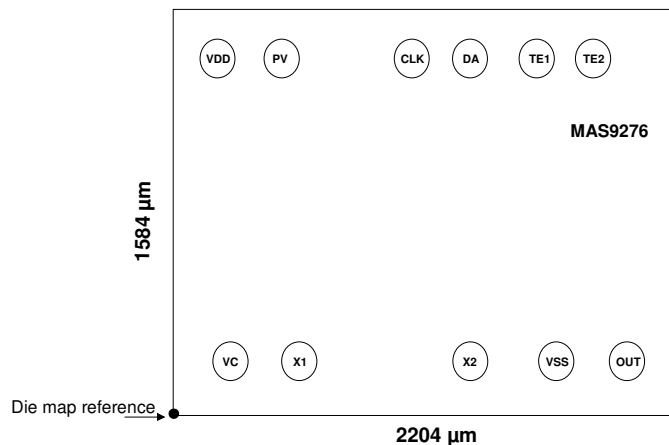
Note 1: VDD within +/- 5%

Note 2: R = 10 kohm +/- 10%, C = 10 pF +/- 10%

Note 3: default

Note 4: typ C10 = 13 pF

IC OUTLINES

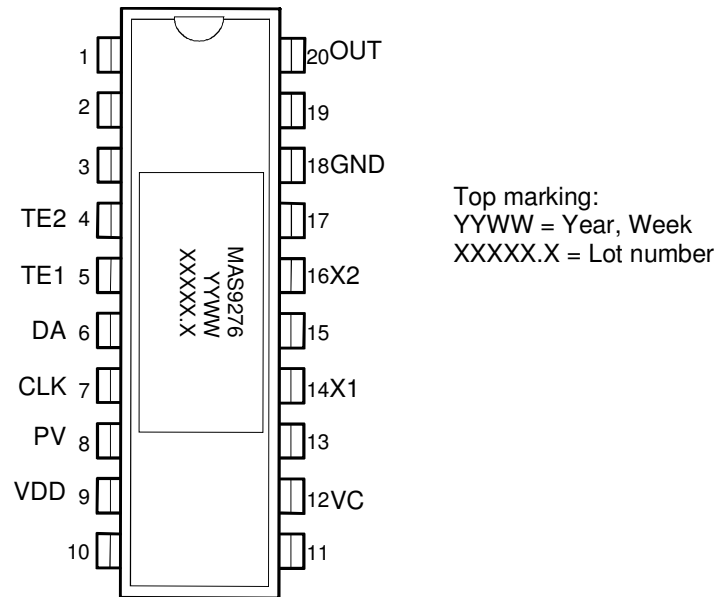


Note 1: MAS9276 pads are round with 80 μm diameter at opening.

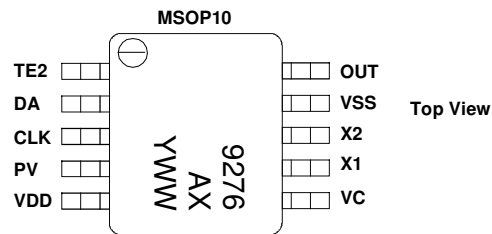
Note 2: Pins CLK and DA can either be connected to VSS or left floating, pin PV can either be connected to VDD or left floating and pin TE1 must be left floating in VCTCXO module end-user application.

Note 3: Die map reference is the actual left bottom corner of the sawn chip.

SAMPLES IN SB20 DIL PACKAGE

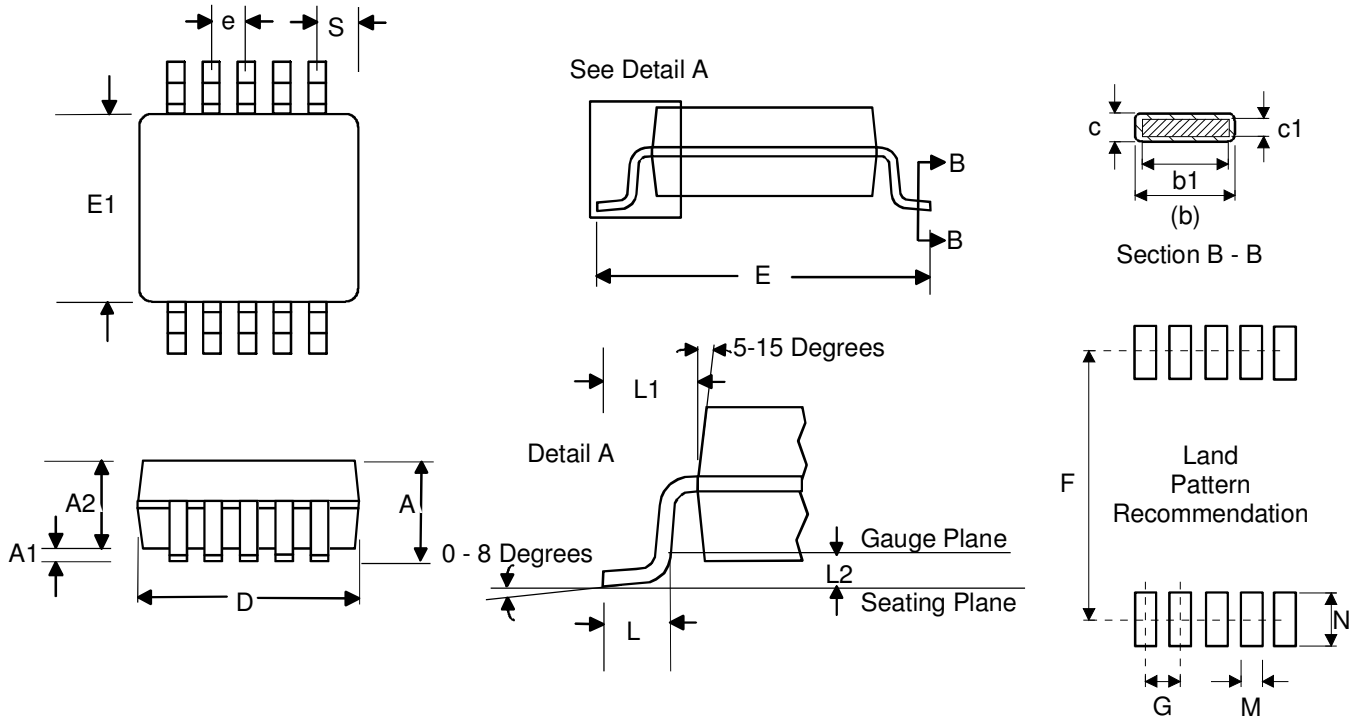


DEVICE OUTLINE CONFIGURATION



A = product version
X = voltage version
Y = year
WW = week

PACKAGE (MSOP-10) OUTLINE



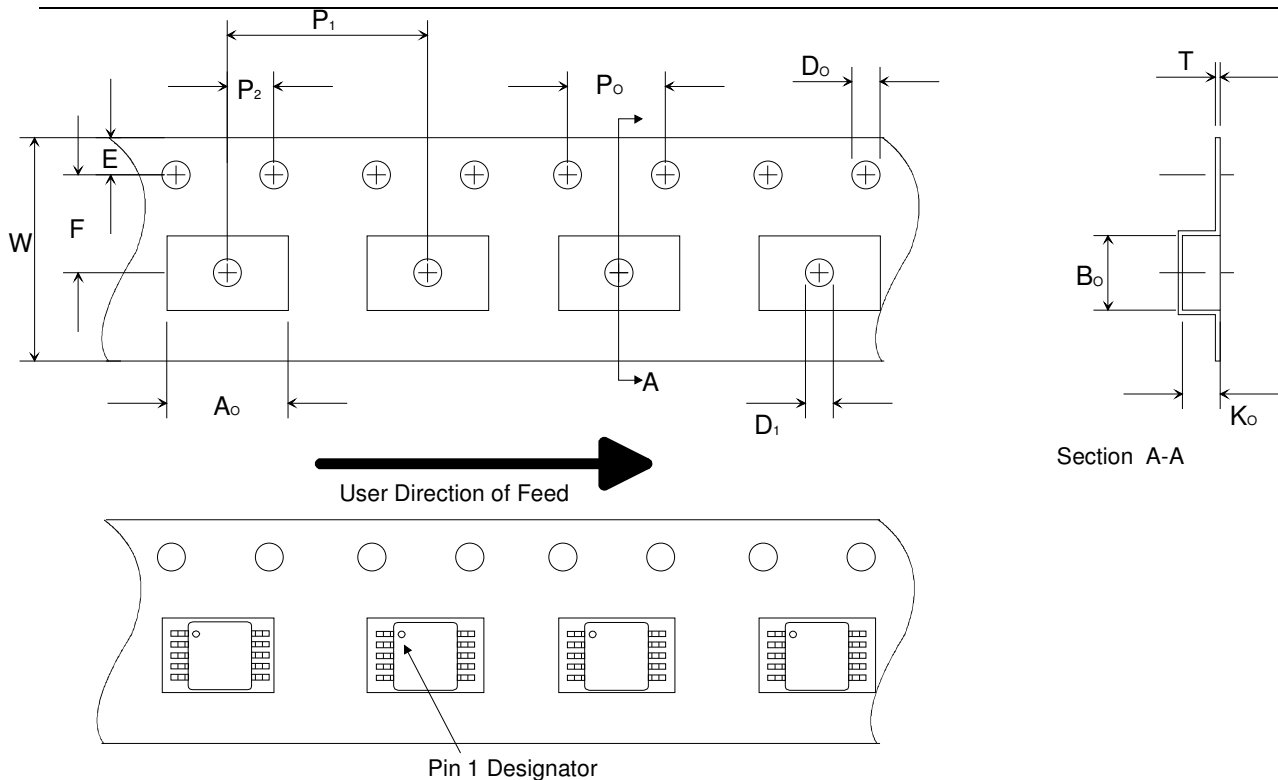
Symbol	Min	Nom	Max	Unit
A	--	--	1.10	mm
A1	0.00	--	0.15	mm
A2	0.75	0.85	0.95	mm
b	0.15	--	0.30	mm
b1	0.15	---	0.25	mm
c	0.08		0.23	mm
c1	0.08		0.18	mm
D		3.00 BSC		mm
E		4.90 BSC		mm
E1		3.00 BSC		mm
e		0.50 BSC		mm
F		4.8		mm
G		0.50		mm
L	0.40	0.60	0.80	mm
(Terminal length for soldering)				
L1		0.95 REF		
L2		0.25 BSC		mm
M		0.41		mm
N		1.02		mm
S		0.50		Mm

Dimensions do not include mold or interlead flash, protrusions or gate burrs.
Reference Standard : JEDEC MO-187 BA.

SOLDERING INFORMATION

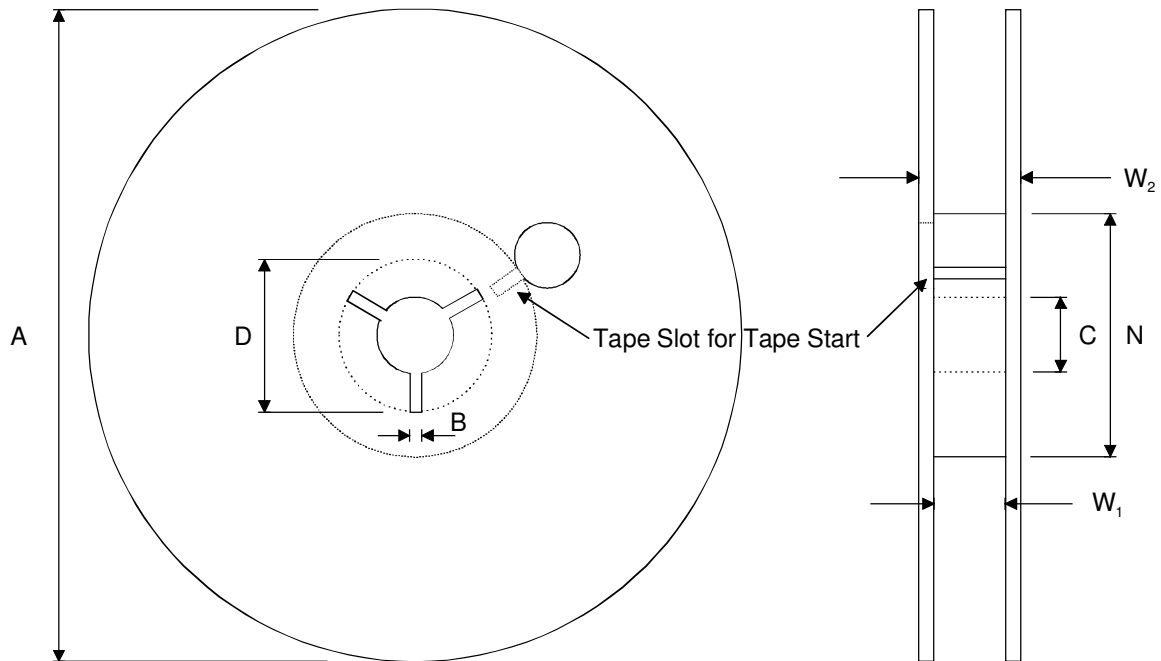
Resistance to Soldering Heat	According to RSH test IEC 68-2-58/20 2*220°C
Maximum Temperature	240°C
Maximum Number of Reflow Cycles	2
Reflow profile	Thermal profile parameters stated in JESD22-A113 should not be exceeded. http://www.jedec.org
Seating Plane Co-planarity	max 0.08 mm
Lead Finish	Solder plate 7.62 - 25.4 μm, material Sn 85% Pb 15%

EMBOSED TAPE SPECIFICATIONS

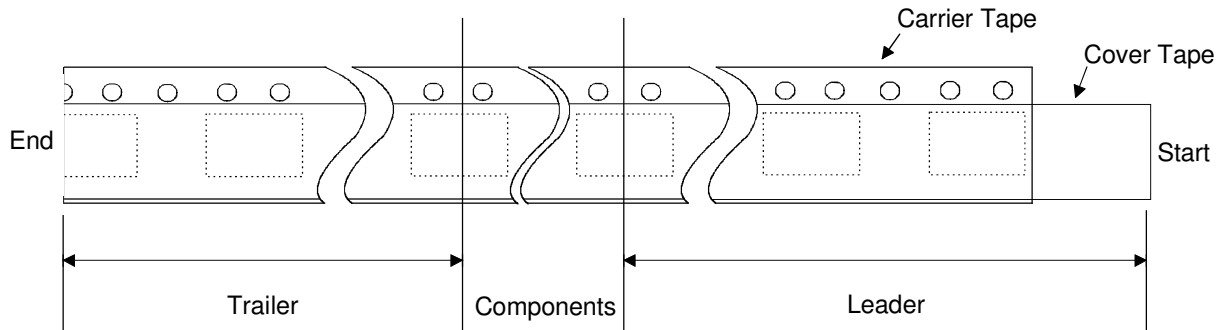


Dimension	Min/Max	Unit
Ao	5.00 ±0.10	mm
Bo	3.20 ±0.10	mm
Do	1.50 +0.1/-0.0	mm
D1	1.50 min	mm
E	1.75	mm
F	5.50 ±0.05	mm
Ko	1.45 ±0.10	mm
Po	4.0	mm
P1	8.0 ±0.10	mm
P2	2.0 ±0.05	mm
T	0.3 ±0.05	mm
W	12.00 +0.30/-0.10	mm

REEL SPECIFICATIONS



5000 Components on Each Reel
 Reel Material: Conductive, Plastic Antistatic or Static Dissipative
 Carrier Tape Material: Conductive
 Cover Tape Material: Static Dissipative



Dimension	Min	Max	Unit
A		330	mm
B	1.5		mm
C	12.80	13.50	mm
D	20.2		mm
N	50		mm
W_1 (measured at hub)	12.4	14.4	mm
W_2 (measured at hub)		18.4	mm
Trailer	160		mm
Leader	390, of which minimum 160 mm of empty carrier tape sealed with cover tape		mm
Weight		1500	g

ORDERING INFORMATION

Product Code	Product	Package	Size
MAS9276A1TG00	IC FOR VCTCXO	EWS Tested wafers 215 µm	Die Size 2.204 x 1.584 mm
MAS9276A1SM06	IC FOR VCTCXO	MSOP-10/Top Marking A1	Tape & Reel, 5.000 pcs/reel

Contact Micro Analog Systems Oy for other wafer thickness options.

LOCAL DISTRIBUTOR

--

MICRO ANALOG SYSTEMS OY CONTACTS

Micro Analog Systems Oy Kamreerintie 2, P.O. Box 51 FIN-02771 Espoo, FINLAND	Tel. +358 9 80 521 Fax +358 9 805 3213 http://www.mas-oy.com
--	--

NOTICE

Micro Analog Systems Oy reserves the right to make changes to the products contained in this data sheet in order to improve the design or performance and to supply the best possible products. Micro Analog Systems Oy assumes no responsibility for the use of any circuits shown in this data sheet, conveys no license under any patent or other rights unless otherwise specified in this data sheet, and makes no claim that the circuits are free from patent infringement. Applications for any devices shown in this data sheet are for illustration only and Micro Analog Systems Oy makes no claim or warranty that such applications will be suitable for the use specified without further testing or modification.