MICRO ANALOG SYSTEMS

MAS1178

IC FOR 10.00 – 20.00 MHz VCXO

This is preliminary information on a new product under development. Micro Analog Systems Oy reserves the right to make any changes without notice.

Preliminary

- • **Low Power**
- • **Wide Supply Voltage Range**
- • **Square Wave Output**
- • **Very High Level of Integration**
- • **Electrically Trimmable**
- • **Very Low Phase Noise**
- • **Low Cost**

DESCRIPTION

The MAS1178 is an integrated circuit well suited to build VCXO for mobile communication. The trimming is done by a serial bus and the calibration information is stored in an internal PROM.

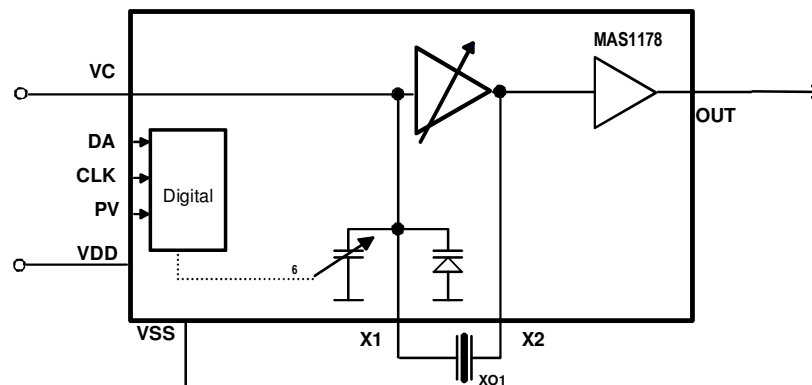To build a VCXO only one additional component, a crystal is needed.

FEATURES

- • Very small size
- • Minor current draw
- • Wide operating temperature range
- • Phase noise <-130 dBc/Hz at 1 kHz offset
- • Square wave output

APPLICATIONS

- • VCXO for mobile phones
- • VCXO for other telecommunications systems

BLOCK DIAGRAM

PIN DESCRIPTION

Pin Description	Symbol	x-coordinate	y-coordinate
Power Supply Voltage	VDD	182	1317
Serial Bus Clock Input	CLK	645	1329
Serial Bus Data Input	DA	418	1329
Programming Input	PV	876	1311
Voltage Control Input	VC	215	213
Crystal Oscillator Output	X2	1053	209
Crystal/Varactor Oscillator Input	X1	434	209
Power Supply Ground	VSS	617	2267
Buffer Output	OUT	1218	1329

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}		100	mW	
Operating Temperature	T_{OP}	-35	85	^{o}C	
Storage Temperature	T_{ST}	-55	150	^{o}C	

Note 1: Not valid for programming pin PV

RECOMMENDED OPERATION CONDITIONS

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Supply Voltage	V_{DD}		2.7	2.8	5.5	V
Supply Current	I_{dd}	Vdd = 2.8 Volt		2.3		mA
Operable Temperature	T_C		-30		+85	^{o}C
Storage Temperature	T_S	Relative humidity = 15%…70%	-5		+40	^{o}C

ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Min	Typ	Max	Unit	Note
Frequency Range	f_o	10.00		20.00	MHz	
Voltage Control Range	V_C	0		Vdd		
Voltage Control Sensitivity	V_{CSENS}		30		ppm/V	1)
Output Voltage (10 pF, Vdd 2.7V)	V_{out}		2.3		Vpp	
Output Voltage (10 pF, Vdd 5.0V)	V_{out}		4.5		Vpp	
Rise and Fall Time (10-50pF)				10	ns	
Output Symmetry			40-60		%	
Trimming CDAC (6 Bit)	C_{X1}	C20		C20 + 12	pF	2)
Startup Time	T_{START}		2		ms	

Note 1: Vc sense is depending on the crystal used.
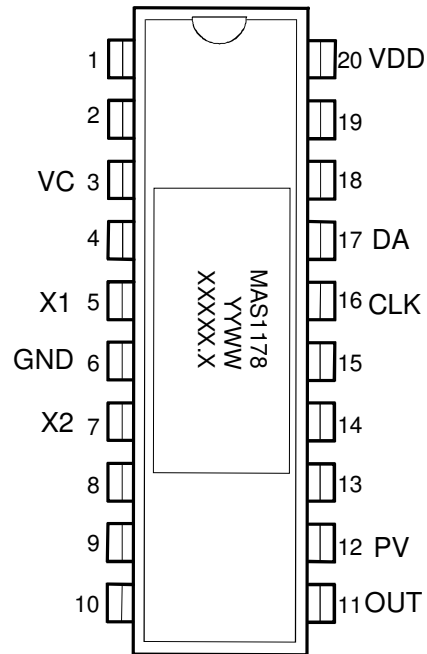**Note 2:** Typ. C20 = 5 pF

IC OUTLINES
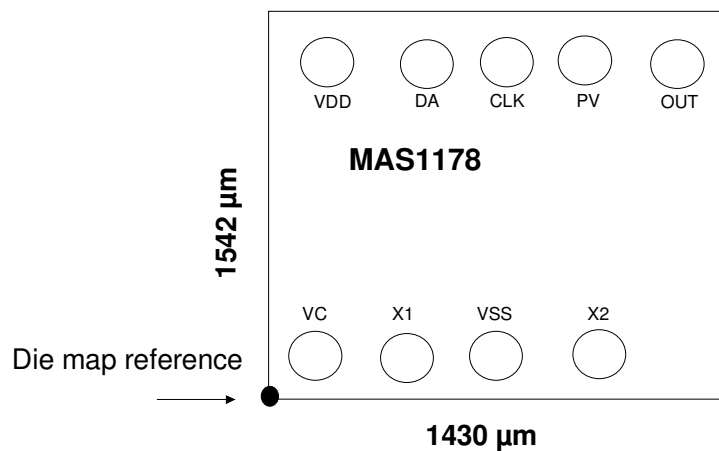
Note 1: MAS1178 pads are round with 80 µm diameter at opening.
Note 2: Pins PV, CLK and DA must not be connected in VCXO module end-user application.

SAMPLES IN SB20 DIL PACKAGE

```
         ┌───────────┐
    1  ──┤           ├──  20  VDD
    2  ──┤           ├──  19
 VC 3  ──┤  ┌─────┐  ├──  18
    4  ──┤  │MAS1178│ ├──  17  DA
 X1 5  ──┤  │ YYWW  │ ├──  16  CLK
GND 6  ──┤  │XXXXX.X│ ├──  15
 X2 7  ──┤  └─────┘  ├──  14
    8  ──┤           ├──  13
    9  ──┤           ├──  12  PV
   10  ──┤           ├──  11  OUT
         └───────────┘
```

Top marking:
YYWW = Year, Week
XXXXX.X = Lot number

ORDERING INFORMATION

Product Code	Product	Package	Comments
MAS1178ATC1	IC FOR VCXO	EWS tested wafers 400 µm	Die size 1430 x 1542 µm
MAS1178ATF1	IC FOR VCXO	EWS tested wafers 254 µm	Die size 1430 x 1542 µm
MAS1178	IC FOR VCXO	SMD Package T.B.D.	

Please contact Micro Analog Systems Oy for other wafer thickness options.

LOCAL DISTRIBUTOR

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