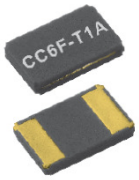
Quartz Crystals in SMD Ceramic Packages 100% Lead free



Features:

- Fundamental mode up to 250MHz
- Inverted Mesa Technology
- High Shock & Vibration resistance
- Extremely wide temperature range
- High stability & low aging
- Small SMT Ceramic Package
- Customer specification on request

Application:

- Animal Tracking Transmitters
- Avionic
- Downhole, Well drilling
- Implantable Medical Devices
- Optical Network
- Satellite communication
- TCXO , VCTCXO and VCXO

Crystal Type		AT				Inverted Mesa		High Temperature			Units
			NEW	NEW				NEW	NEW	NEW	
Product Type		CC1A	CC3A	CC6A	CC7A	CC1F	CC6F	CC1A	CC3A	CC6A	
		T1A						T1AH			
Frequency Range	F_L	8 - 30	10 - 70	16 - 70	24 - 50	30 - 250	70 - 250	8 - 24	10 - 40	16 - 40	MHz
Dimensions L x W Heigt	Typ	8.0 x 3.7 1.75	5.0 x 3.2 1.2	3.5 x 2.2 0.9	3.2 x 1.5 0.9	8.0 x 3.7 1.75	3.5 x 2.2 0.8	8.0 x 3.7 1.75	5.0 x 3.2 1.2	3.5 x 2.2 0.9	mm
Lid Material		Ceramic									

Operating Temp. Range	OTR	B: -40 to +85 C: -55 to +125						D: -55 to +175 G: -55 to +200			℃
Freq. vs. TRange B [3]	ΔF/F	≤ ± 50				≤ ± 30		N/A			ppm
Freq. vs. TRange C [3]	ΔF/F	≤ ± 100				≤ ± 100		N/A			ppm
Freq. vs. TRange D [3]	ΔF/F	N/A						≤ ± 150			ppm
Freq. vs. TRange G [3]	ΔF/F	N/A						≤ ± 250			ppm

Frequency Example	F_L	16.0	12.0	26.0	27.0	155.52	155.52	12.0	12.0	20.0	MHz
Std Load Capacitance [1]	C_L	20	20	20	3 / 9 / 16	10 or ∞	10 or ∞	20	20	20	pF
Freq. Tol. @ 25℃ [2]	ΔF/F	≤ ± 50									ppm
Series Res. vs OTR	R_S	< 60	< 100	< 50	< 100	< 35	< 35	< 120	< 150	< 120	Ω
Motional Cap. Typ.	C_1	9.0	4.0	5.0	2.0	5.6	5.6	7.0	4.0	3.0	fF
Static Cap. Typ.	C_0	2.8	2.0	2.5	0.7	2.9	2.9	2.5	2.0	2.0	pF
Drive Level Typ	P	100									µW
Aging 1st year @ 25℃	ΔF/F	≤ ± 3									ppm
Storage Temperature		-55 to +125									℃
Vibration resistance		10 to 2000Hz / 20g						10 to 2000Hz / 40g			
Shock resistance		5000g, 0.3ms 1/2 sine						10000g, 0.3ms 1/2 sine			
Delivery Form		Tray or Tape & Reel									

1) Other load capacitances on request 2) Tighter and wider frequency tolerances on request 3) Tighter themal stability on request

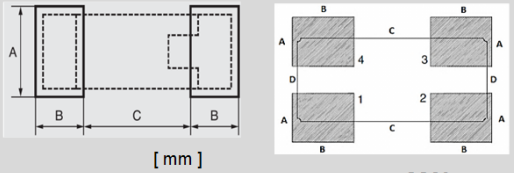
Quartz Crystal for Filter:	CC6F-T1A	Frequency 70 - 250 MHz	Contact factory for specification

Ordering Information Example

CC6A -T1AH 160 MHz 10pF ± 50ppm TC

- Crystal Type
- Package size [mm]: 1 = 8.0 x 3.7; 3 = 5.0 x 3.2; 6 = 3.5 x 0.8; 7 = 3.2 x 0.9
- Crystal Version: T1A = Std version; H = High Temperature
- Frequency F_L
- Load C_L Capacitance
- Frequency Tolerance
- Temperature Range: B = -40 to +85℃; C = -55 to +125℃; D = -55 to +175℃; G = -55 to +200℃

Recommended Solder Pad Layout



[mm]

CC1F CC1A	CC3A	CC6F	CC7A	CC6A
A 4.2	A 3.5	A 2.5	A 1.8	A: 0.80
B 2.3	B 1.8	B 1.2	B 1.0	B: 1.20
C 4.0	C 2.1	C 1.5	C 1.5	C: 1.30
				D: 0.90

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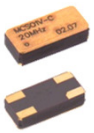
Clock Oscillators in SMD Ceramic Packages 100% Lead free



Features:
- Excellent Shock and Vibration Stability
- Wide Temperature Range (-55°C up to 230°C)
- Optimal for use in adverse conditions

Applications:
- Avionics
- Downhole and Well Drilling
- Airborne and Military equipments
- Radio Transceiver
- Burn-in Board

		Standard				High Temperature [E]			
Product Type		**MCSO**	**MCSO1**	**MCS02**	**MCSO6**	**MCSO1E**	**MCSO2E**	**MCSO6E**	**Units**
				NEW	*NEW*		*NEW*	*NEW*	
Dimensions L x W	Typ	14.1 x 9.3	8.1 x 3.8	5.0 x 3.2	3.5 x 2.2	8.1 x 3.8	5.0 x 3.2	3.5 x 2.2	mm
Dimensions H	Typ	2.4 (3.8)	2.0	1.6	1.2	2.0	1.6	1.2	mm
Supply Voltage	Vdd	5.0 V ± 5% V : 3.3 V ± 5% W : 2.5 V ± 5% Z : 1.8 V ± 5%							V
Input Current [2]	I_C	from 0.4 to 50							mA
Frequency Range	F_L	10 KHz to 20 MHz				32 KHz to 20 MHz			
Frequency Range [H]	F_L	H : 20 MHz to 225 MHz				H : 20 MHz to 100 MHz			
Operating Temp. Range	OTR	A: 0 to +70 B: -40 to +85 C: -55 to +125				D: -55 to +175 G: -55 to +210			℃
Overall Frequency Stability Including		Over Temperature Range, Adjustment @25℃, Aging, Supply Voltage & Load Change							
Option [T] [1]	ΔF/F	T : ≤ ± 50 ppm				N / A			ppm
Standard	ΔF/F	≤ ± 100 ppm							ppm
OTR -55 to +175℃ D [1]	ΔF/F	N / A				D : ≤ ± 300 ppm			ppm
OTR -55 to +210℃ G [1]	ΔF/F					G : ≤ ± 400 ppm			ppm
Output Signal									
Symmetry		40/60 @Vdd/2							%
Rise & Fall Time [2]		< 7							ηs
Rise & Fall Time [H]		H : < 3							ηs
Start up time		< 5							ms
RMS Jitter		< 30							ρs
Low RMS Jitter [F] [3]		F : < 3							ρs
Option1 Enable / Disable	Opt 1	E/D							
Option 2 J / Leads	Opt 2	J/L							
Environment									
Storage Temperature		-55 to +125							℃
Vibration resistance		10 to 2000Hz / 20g				10 to 2000Hz / 40g			
Shock resistance		5000g, 0.3ms 1/2 sine				10000g, 0.3ms 1/2 sine			

1) Tighter themal stability on request

2) Value depend of the Supply Voltage and Frequency, see detail specification

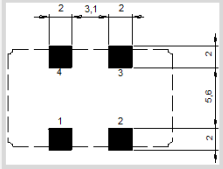
3) Excluding Vdd 5.0V

Ordering Information Example

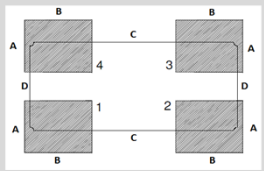
MCSO2EHW - D 40.96MHz E/D J/L XXXX01

- **Oscillator Type**
- **Package size [mm]**: blank = 14.1 x 9.3; 1 = 8.1 x 3.8; 2 = 5.0 x 3.2; 6 = 3.5 x 2.2
- E= High Temp.; H= Frequency > 20MHz
- blank = 5.0V ± 5%; V = 3.3V ± 5%; W = 2.5V ± 5%; Z = 1.8V ± 5%
- Output Frequency
- **Temperature Range**: A = 0 to +70℃; B = -40 to +85℃; C = -55 to +125℃; D = -55 to +175℃; G = -55 to +210℃; X = Custom Trange
- E/D Option 1
- J/L Option 2
- XXXX01 Customer Spec #

Recommended Solder Pad Layout



MCSO



MCSO1	MCSO2	MCSO6
A: 2.12	A: 1.0	A: 0.8
B: 2.54	B: 1.5	B: 1.3
C: 3.18	C: 2.7	C: 1.3
D: 1.16	D: 1.6	D: 0.9

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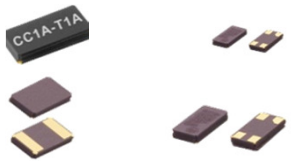
Frequency source for High Temperature Applications



Product Type							
		Quart Crystal			Clock Oscillator		
		NEW	NEW	NEW		NEW	NEW
		CC1A-T1AH	CC3A-T1AH	CC6A-T1AH	MCSO1E	MCSO2E	MCSO6E
Dimensions L x W Height	Typ [mm]	8.0 x 3.7 1.75	5.0 x 3.2 1.2	3.5 x 2.2 0.9	8.1 x 3.7 2.0	5.0 x 3.2 1.6	3.5 x 2.2 1.2
Frequency Range	F_L	8 - 24MHz	10 - 40MHz	16 - 40MHz	32 KHz to 20 MHz		
Frequency Range [H]	F_L	NA			H : >20 MHz to 100 MHz		

Operating Temp. Range			
OTR		D: -55℃ to +175℃ G: -55℃ to +200℃	D: -55℃ to +175℃ G: -55℃ to +210℃
Overall Frequency Stability Including		Over Temperature Range, Adjustment @25℃, Aging, Supply Voltage & Load Change	
Freq. vs. TRange D [4]	ΔF/F	≤ ± 150ppm	≤ ± 300ppm
Freq. vs. TRange G [4]	ΔF/F	≤ ± 250ppm	≤ ± 400ppm

Frequency Example	F_L	12.0MHz	12.0MHz	20MHz
Std Load Capacitance [1]	C_L	20pF	20	20pF
Freq. Tol. @ 25℃ [2]	ΔF/F	< ±50 ppm		
Series Res. vs OTR	R_S	< 120Ω	< 150Ω	< 120Ω
Motional Cap. Typ.	C_1	7.0 fF	4.0 fF	3.0 fF
Static Cap. Typ.	C_0	2.5 pF	2.0 pF	2.0 pF
Drive Level Typ	P	0.1W		

1) Other load capacitances on request

2) Tighter and frequency tolerances on request

3) Input Current depend of the Supply Voltage and Frequency, see detail specification

4) Tighter frequency tolerances on request

Supply Voltage [Vdd]
5.0 V ± 5%
V : 3.3 V ± 5%
W : 2.5 V ± 5%
[3] Input Current from 0.3 to 50mA
Output Signal
40/60 @Vdd/1
Rise & Fall Time < 7ns
Rise & Fall Time H : < 3ns
Start up time < 5ms
RMS Jitter < 30ps
Opt 1 Enable / Disable

Environment	
Storage Temperature	-55℃ to +125℃
Vibration resistance	10 to 2000Hz / 40g
Shock resistance	10000g, 0.3ms 1/2 sine

Quartz Crystal Ordering Information Example

CC6A -T1AH — 16 MHz — 10pF — ± 50ppm — TC

- **Crystal Type**
- **Package size [mm]**
  - 1 = 8.0 x 3.7
  - 3 = 5.0 x 3.2
  - 6 = 3.5 x 0.9
- Frequency F_L
- Load C_L Capacitance
- Frequency Tolerance
- **Temperature Range**
  - D = -55 to +175℃
  - G = -55 to +200℃

Clock Oscillator Ordering Information Example

MCSO2EHW - G — 40.96MHz — E/D — XXXX02

- **Oscillator Type**
- **Package size [mm]**
  - 1 = 8.0 x 3.7
  - 2 = 5.0 x 3.2
  - 6 = 3.5 x 2.2
- E= High Temp.
- H= Frequency > 20MHz
- Output Frequency
- E/D: Option 1
- XXXX02: Customer Spec #
- **Temperature Range**
  - D = -55 to +175℃
  - G = -55 to +210℃
  - X = Custom Trange
- **Supply Voltage**
  - = 5.0V ± 5%
  - V = 3.3V ± 5%
  - W = 2.5V ± 5%
  - Z = 1.8V ± 5% (Consult factory)

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MODEL	OCXOW OCXOWT SCOCXOWT	OCXOV / OCXOVT / SCOCXOVT	OCXO / OCXOT / SCOCXOT
Power Supply Voltage	**3.3 V**	**5.0 V**	**12.0 V**
Input current @ +25°C	< 120 mA	< 80 mA	< 50 mA
Input current @ -20°C	< 170 mA	< 120 mA	< 80 mA
Warm-up current	**< 250 mA**	**< 250 mA**	**< 250 mA**
Duration	**30s**	**10s**	**10s**
Frequency Range	From 10KHz up to 54 MHz	From 10KHz up to 54 MHz	From 10KHz up to 54 MHz

Long Term stability	OCXOW	OCXOWT OCXOWS	SCOCXOW	SCOCXOWT SCOCXOWS
1st year	< ± 0.7 ppm		< ± 0.3 ppm	
10 Years	< ± 4.0 ppm		< ± 2.5 ppm	

Long Term stability	OCXOV	OCXOVT OCXOVS	SCOCXOV	SCOCXOVT SCOCXOVS
1st year	< ± 0.7 ppm		< ± 0.3 ppm	
10 Years	< ± 4.0 ppm		< ± 2.5 ppm	

Long Term stability	OCXO	OCXOT OCXOS	SCOCXO	SCOCXOT SCOCXOS
1st year	< ± 0.7 ppm		< ± 0.3 ppm	
10 Years	< ± 4.0 ppm		< ± 2.5 ppm	

Temperature Range	
A :	0°C to +60°C
B :	-20°C to +70°C
C :	-40°C to +85°C

Temperature Range	
A :	0°C to +60°C
B :	-20°C to +70°C
C :	-40°C to +85°C
E :	-55°C to +85°C

Temperature Range	
A :	0°C to +60°C
B :	-20°C to +70°C
C :	-40°C to +85°C
E :	-55°C to +85°C

Stabilty vs Trange [ppb]	OCXOW	OCXOWT OCXOWS	SCOCXOW	SCOCXOWT SCOCXOWS
Refer to 25°C **A :**	≤ ± 200	≤ ± 75	≤ ± 75	≤ ± 50
B :	≤ ± 300	≤ ± 150	≤ ± 150	≤ ± 75
C :	≤ ± 500	≤ ± 250	≤ ± 250	≤ ± 100
E :	**NA**	**NA**	**NA**	**NA**

Stabilty vs Trange [ppb]	OCXOV	OCXOVT OCXOVS	SCOCXOV	SCOCXOVT SCOCXOVS
A :	≤ ± 200	≤ ± 75	≤ ± 50	≤ ± 25
B :	≤ ± 300	≤ ± 150	≤ ± 150	≤ ± 50
C :	≤ ± 500	≤ ± 250	≤ ± 150	≤ ± 100
E :	≤ ± 700	≤ ± 350	≤ ± 400	≤ ± 200

Stabilty vs Trange [ppb]	OCXO	OCXOT OCXOS	SCOCXO	SCOCXOT SCOCXOS
A :	≤ ± 200	≤ ± 50	≤ ± 50	≤ ± 25
B :	≤ ± 300	≤ ± 100	≤ ± 100	≤ ± 50
C :	≤ ± 500	≤ ± 200	≤ ± 150	≤ ± 100
E :	≤ ± 700	≤ ± 300	≤ ± 400	≤ ± 200

Output Signal		
H :	HC-MOS compatible	
S :	**< 20 MHz**	> 4 dBm / 50Ω
S :	**≥ 20 MHz**	> 0 dBm / 50Ω

Output Signal		
H :	HC-MOS compatible	
S :	**< 20 MHz**	> 4 dBm / 50Ω
S :	**≥ 20 MHz**	> 0 dBm / 50Ω

Output Signal	
H :	HC-MOS compatible
S :	**Clipped Sine Wave** 1 KΩ // 5pF > 1 Vpp < 2 Vpp

Frequency Control	OCXOW	OCXOWT OCXOWS	SCOCXOW	SCOCXOWT SCOCXOWS
R1 : 0 to 10KΩ	**R1:**			
V3 : 0 to 3.3 V	**V3**	> ± 4 ppm	> ± 2.5 ppm	
V5 : 0.5 to 5.0 V				

Frequency Control	OCXOV	OCXOVT OCXOVS	SCOCXOV	SCOCXOVT SCOCXOVS
R1:				
V5:	> ± 4 ppm		> ± 2.5 ppm	

Frequency Control	OCXO	OCXOT OCXOS	SCOCXO	SCOCXOT SCOCXOS
R1:				
V5:	> ± 4 ppm		> ± 2.5 ppm	

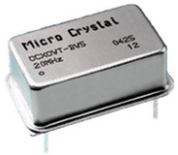
Phase Noise (BW = 1Hz)	Typical @ 10MHz in static conditions	
Output Signal	**H**	**S**
10Hz	-100 dBc / Hz	-110 dBc / Hz
100Hz	-130 dBc / Hz	-135 dBc / Hz
1KHz	-140 dBc / Hz	-145 dBc / Hz
10KHz	-145 dBc / Hz	-150 dBc / Hz
Short Term Stability	0.1s to 30s < 5 E^{-10}	
	Typical @ 1s 5 E^{-11}	

Phase Noise (BW = 1Hz)	Typical @ 10MHz in static conditions	
Output Signal	**H**	**S**
10Hz	-100 dBc / Hz	-110 dBc / Hz
100Hz	-130 dBc / Hz	-135 dBc / Hz
1KHz	-140 dBc / Hz	-145 dBc / Hz
10KHz	-145 dBc / Hz	-150 dBc / Hz
0.1s to 30s < 5 E^{-10}		
Typical @ 1s 5 E^{-11}		

Phase Noise (BW = 1Hz)	Typical @ 10MHz in static conditions	
Output Signal	**H**	**S**
10Hz	-90 dBc / Hz	-110 dBc / Hz
100Hz	-120 dBc / Hz	-135 dBc / Hz
1KHz	-130 dBc / Hz	-145 dBc / Hz
10KHz	-145 dBc / Hz	-150 dBc / Hz
0.1s to 30s < 5 E^{-10}		
Typical @ 1s 5 E^{-11}		

Customer's specification on request

05.12.2012



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MODEL	Stratum 3 OCXOWST	Stratum 3 OCXOVST
Power Supply Voltage Vcc	**3.3V**	**5.0V**
Input current @ +30°C	< 110 mA	< 80 mA
Input current @ -20°C	< 160 mA	< 120 mA
Warm-up current	**< 250 mA**	**< 250 mA**
Duration	**10s**	**10s**
Frequency Range	up to 20 MHz	up to 54 MHz
Frequency Stability		
Overall included 15 Years Aging	**< ± 4.6 ppm**	
Holdover Stability During 24 hours Including Load, Supply Voltage, Temperature variation	**< ± 0.28 ppm**	
Temperature Range	**D :** 0°C to +70°C **C :** -40°C to +85°C	
Output Signal HC-MOS compatible		
Symmetry	45% - 55% @Vcc/2	
Rise and Fall Time	< 7 ns	
Level 0 and 1	V_{OL} <10% Vcc VOH >90% Vcc	
Fan Out (Load)	10LS or 47pF max.	
Frequency Control (Not applicable)	Pin 1 must be connected to ground *	
Frequency Internal Calibration @25°C	< ± 1ppm *	
Phase Noise (BW = 1Hz)	Typical @ 10MHz, static conditions	
10Hz	-100 dBc / Hz	
100Hz	-130 dBc / Hz	
1KHz	-140 dBc / Hz	
10KHz	-140 dBc / Hz	
Short Term Stability		
0.1s to 30s	< 5 E^{-10}	
Typical @ 1s	5 E^{-11}	

MODEL	Cospass Sarsat OCXOVT-SAR	Cospass Sarsat OCXOT-SAR
Power Supply Voltage Vcc	**5.0V**	**12.0V**
Input current @ +55°C	< 10 mA	< 10 mA
Input current @ +25°C	< 35 mA	< 30 mA
Input current @ -20°C	< 70 mA	< 55 mA
Warm-up current	**< 330 mA**	**< 250 mA**
Duration	**10s**	**10s**
Frequency Range	up to 40 MHz	up to 40 MHz
Frequency Stability		
Stability over Temperature Range -40°C to +55°C After 15mn Switch ON slope of 5°C/h	**< ± 3 E-9 / 50s**	
Overall Stability Including 5 years aging and calibration	**< ± 4.5 ppm**	
Supply Voltage change ± 0.2V	**< ± 0.1 ppm**	
Output Signal Clipped Sine Wave *		
Level	> 1Vpp	
Load	1KΩ // 10pF ±10%	
Frequency Control (Not applicable)	Pin 1 must be connected to ground *	
Frequency Internal Calibration @25°C	< ± 1ppm *	
Phase Noise (BW = 1Hz)	Typical @ 10MHz, static conditions	
10Hz	-90 dBc / Hz	
100Hz	-120 dBc / Hz	
1KHz	-130 dBc / Hz	
10KHz	-130 dBc / Hz	
Short Term Stability		
0.1s to 30s	< 5 E^{-10}	
Typical @ 1s	5 E^{-11}	

*** Customer's specification on request**

05.12.2012