MF

[6.0 * 3.5 * 1.0 mm]

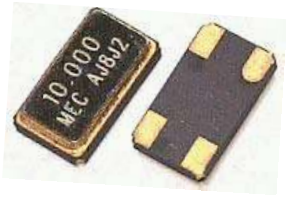
Surface Mount Crystals | **Fund.** | **3rd O.T.** | Min. **8MHz** | Max. **125MHz**

RoHS Compliance

Features

Specifications

- The entire package can be grounded via the top metal lid and the two bottom pads.
- This tight tolerance and tight stability crystal is ideal for telecommunications.
- This crystal package will withstand solder reflow .



General Specifications

Item / Type	**MF** series (6.0 * 3.5 * 1.0 mm)
Frequency Range & Crystal Cut	8.000 ~ 50.000 MHz , AT-cut , Fundamental Mode (see Table 1) 30.000 ~ 125.000 MHz , AT-cut , 3rd overtone (see Table 1)
Load Capacitance	Series or Parallel (8 to 32 pF) resonance
Drive Level	10μ W typica (100μ W max.)
Frequency Tolerance	± 5 ppm , ± 10 ppm , ± 20 ppm or ± 30 ppm at 25°C
Frequency Stability	See Table 2
Aging	△F / F : ±3 ppm / year (max.)
Storage Temperature Range	- 50°C to 105°C

Table 1

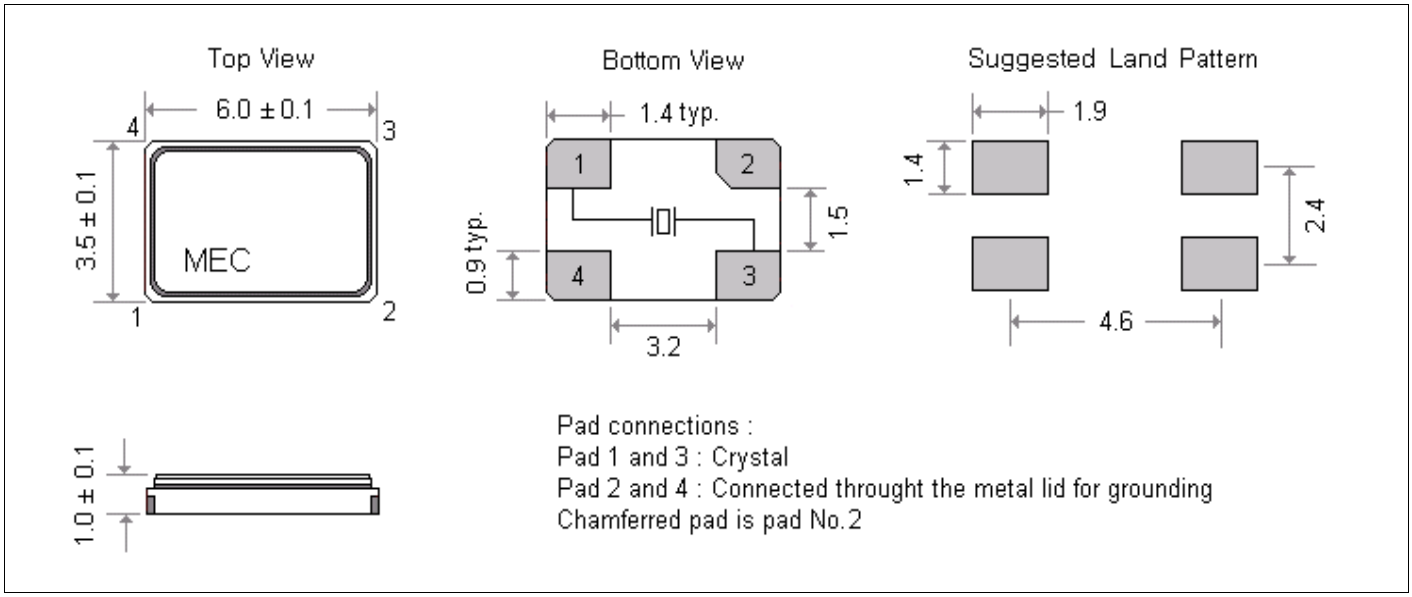
ESR (Equivalent Series Resistance)					
Freq.(MHz)	Osc. Mode	E.S.R.	Freq.(MHz)	Osc. Mode	E.S.R.
8.0 ~ 12.0	AT , Fund.	80 Ω	30.0~ 40.0	AT , 3rd	100 Ω
12.1 ~ 16.0	AT , Fund.	60 Ω	40.1~ 50.0	AT , 3rd	80 Ω
16.1~ 50.0	AT , Fund.	40 Ω	50.1~ 125.0	AT , 3rd	50 Ω

Table 2

Frequency stability vs Operating temperature range							
Stability code	Temp. (ºC) \ ppm	± 5	± 10	± 15	± 20	± 25	± 30
X	-10 to 60°C	○	○	○	○	○	○
Y	-20 to 70°C	▲	○	○	○	○	○
I	-40 to 85°C			○	○	○	○

○ : available ; ▲ : contact Mercury

Outline Dimensions (Unit : mm)



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Part Number Formats and Product Marking Rules

Quartz Crystals

Holder Type

SMD type :	X22	X32	X42	MJ	MF	MQ	M49	ML49	MP5	MP4
Dip type :	H49	49T	H50	H48	HUS	HUSL	U1	U5	T38	T26
Jecket type :	H49MJ	49TMJ	U1MJ	U5MJ	T38MJ	T26MJ				
Gull wing :	H49SM	49TSM	U1SM	U5SM	T38SM	T26SM				

Part Number Format

[1]	[2]		[3]		[4]		[5]		[6]	[7]		[8]
Holder Type	G	–	Center Freq.	–	CL	–	Freq . Tolerance	/	Freq. Stability	Operating Temp. Range Code	/	Special Operating Temp. Range

Example													
	(1)	H49	G	-	40.000A3	-	12						
	(2)	MJ		-	12.000	-	20	-	10	/	10	Y	
	(3)	M49	G	-	24.000	-	18	-	20	/	30		/ -30+75

Ex (1) : H49G - 40.000A3 - 12 [49/U type , RoHS , 40.000MHz , AT-cut 3rd overtone , 12pF , ±30ppm (25°C) , ±30ppm (-10°C to 60°C)]

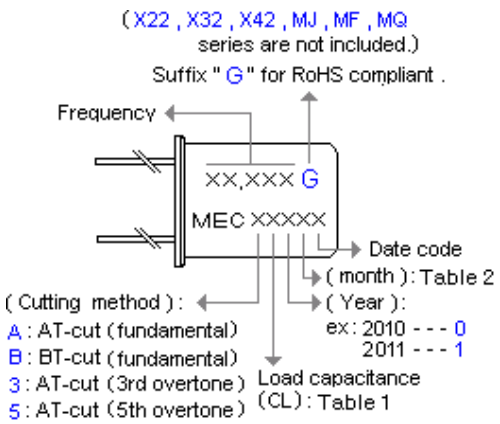
Ex (2) : MJ - 12.000 - 20 - 10 / 10 Y [MJ type , 12.000MHz , 20pF , ±10ppm (25°C) , ±10ppm (-20°C to 70°C)]

Ex (3) : M49G - 24.000 - 18 - 20 / 30 / -30+75 [M49 type , RoHS , 24.000MHz , 18pF , ±20ppm (25°C) , ±30ppm (-30°C to 75°C)]

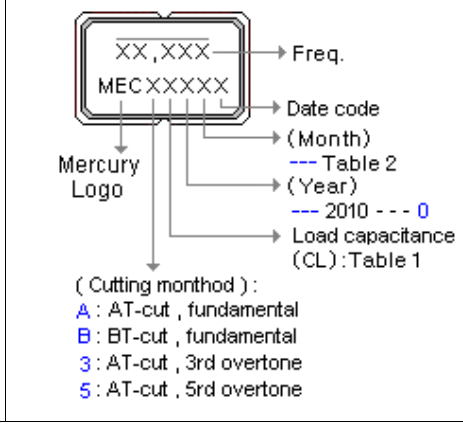
[1]	Holder Type
[2]	Please add " G " after the " type code " for RoHS compliant (Does not apply to X22 , X32 , X42 , MJ , MF , MQ series)
[3]	Center frequency . Please add " A3 , A5 or B " after the " Freq. in MHz " for the quartz cut other options .
	Blank : AT-cut fund. mode ; A3 : AT-cut 3rd overtone ; A5 : AT-cut 5th overtone ; B : BT-cut fund. mode
[4]	Load Capacitance (CL) : series (spec. code is " S ") or
	Parallel (If parallel , please specify CL value , typical CL ranges from 8 to 32 pF)
	Available Options " V " = Vinyl sleeve around holder , " K " = 3rd lead at bottom center , " R " = On reel
	" G " = 3rd lead at top center , " I " = Teflon insulator at bottom
[5]	Calibration tolerance value : freq. tolerance value (at 25°C) , industrial temp. range
[6]	Frequency Stability , industrial temp. range
[7]	industrial temp. range --- X : -10°C to 60°C ; Y : -20°C to 70°C ; I : -40°C to 85°C
[8]	If non-standard please enter the desired temp. range after " / " , for example " / -30+70 " : -30°C to 70°C

Production Marking Rules

General X'tal package type marking rules



MQ , MF , MJ , X42 marking rules



X22 , X32 marking rules

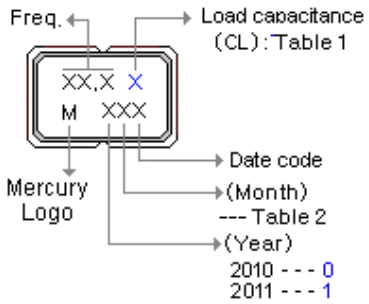
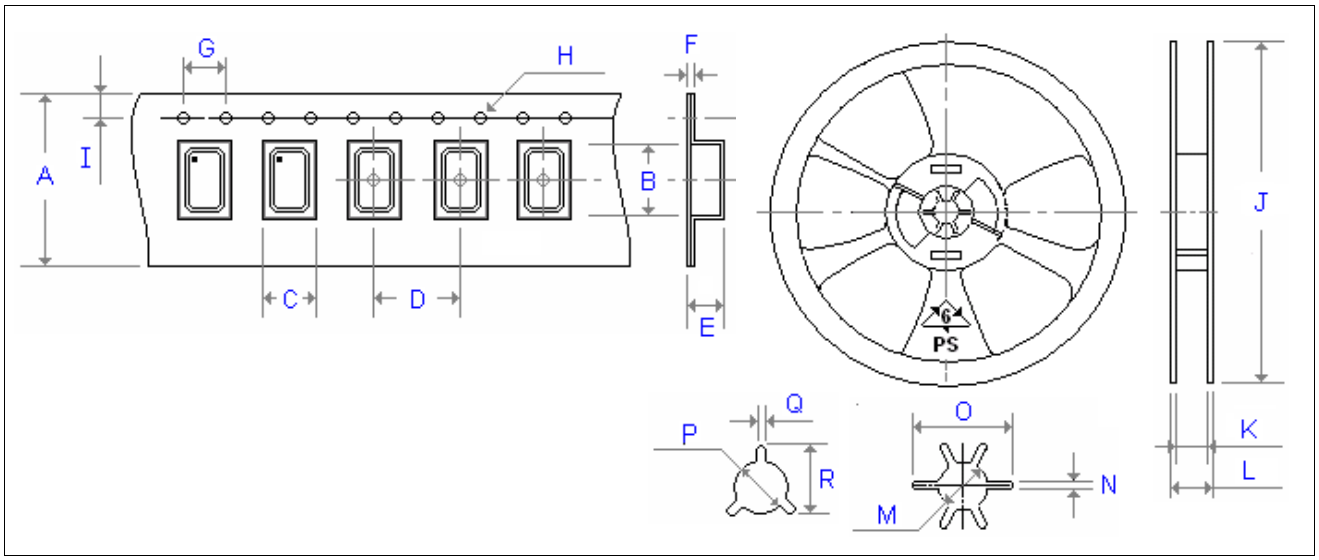


Table 1	CL	< 10	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	>34	Series
	Code	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	a	b

Table 2	Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
	Code	A	B	C	D	E	F	G	H	I	J	K	L

Emboss Taping and Reel Specifications

[Crystal Units] | **[M . C . F . Units]**



Carrier Type Dimensions (unit : mm)

	A	B	C	D	E	F	G	H	I	pcs / reel
X22	8	2.7	2.3	4.0	1.2	0.3	4.0	Ø1.5	1.7	3000
X32	8 or 12	3.3	2.7	4.0	1.4	0.3	4.0	Ø1.5	1.7	3000
X42	12	4.3	2.7	8.0	1.3	0.3	4.0	Ø1.5	1.7	1000
MJ	16	5.4	3.6	8.0	1.6	0.3	4.0	Ø1.5	1.8	1000
MF	16	6.3	3.8	8.0	2.0	0.4	4.0	Ø1.5	1.7	1000
MQ	16	8.0	5.5	8.0	2.0	0.3	4.0	Ø1.4	1.8	1000
M49	24	14.0	5.6	8.0	4.5	0.4	4.0	Ø1.4	1.8	1000
ML49	24	14.0	5.6	8.0	3.7	0.4	4.0	Ø1.4	1.7	1000
MP4	24	13.0	5.6	8.0	5.5	0.5	4.0	Ø1.45	1.7	1000
MP5	24	13.0	5.6	8.0	5.5	0.5	4.0	Ø1.45	1.7	1000

Reel Dimensions (unit : mm)

	J	K	L	M	N	O	P	Q	R	pcs / reel
X22	180	11.5	8.5	13	2.2	22	-	-	-	3000
X32	180	18.5	12.5	13	2.2	22	-	-	-	3000
X42	180	18.5	12.5	13	2.2	22	-	-	-	1000
MJ	180	19.6	16.5	-	-	-	13.5	2.5	19.5	1000
MF	180	19.6	16.5	-	-	-	13.5	2.5	19.5	1000
MQ	180	19.6	16.5	-	-	-	13.5	2.5	19.5	1000
M49	330	30.0	25.0	-	-	-	13.5	2.5	19.5	1000
ML49	330	30.0	25.0	-	-	-	13.5	2.5	19.5	1000
MP4	330	30.0	25.0	-	-	-	13.5	2.5	19.5	1000
MP5	330	30.0	25.0	-	-	-	13.5	2.5	19.5	1000

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Mercury Green Program

Common points for all crystal products

Mercury Green Program

Mercury's Green Program is implemented in accordance with the European Union's directive on "Restriction of the use of certain Hazardous Substance(RoHS)".Mercury's Lead-Free and RoHS Compliant products follow the EU directive (2002/95/EC) and include test reports issued by SGS Group on hazardous substances levels for the six substances:lead(pb),cadmium(cd),mercury (Hg),hexavalent chromium(Cr+6), polybrominated biphenyl(PBB),and polybrominated diphenyl ether (PBDE).

- Crystal Green Program-Crystals
- Crystal Oscillator Green Program-XO、VCXO、VCTCXO、TCXO、OCXO
- Crystal Filter Green Program-Filters

RoHS Compliant Product by Mercury

Soldering conditions

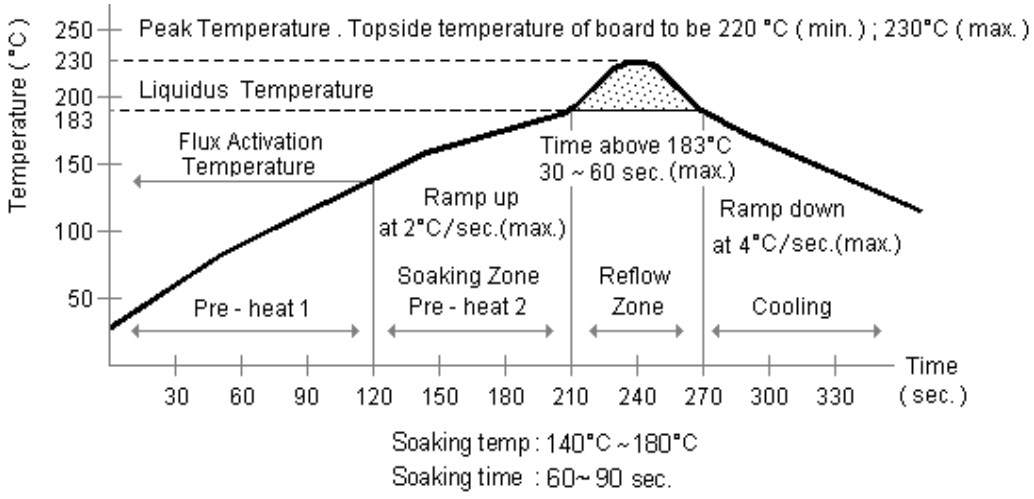
(1) Lead wires should be soldered within 3 seconds with the iron heated to a temperature of 380°C (max.) .

(2) In solder-dip mounting , it should be within 10 seconds with a temperature of 260°C (max.) .
Heating the whole crystal unit in the dip mounting process should be avoided .
Upright mounting is recommended (to prevent applying heat directly to the body of a crystal unit) .

(3)Heating the whole body of the crystal unit , for example , in a reflow oven may affect the performance.
The holder is small and is sealed by solder material by press sealing , so that such a reflow process is not allowed to be applied .

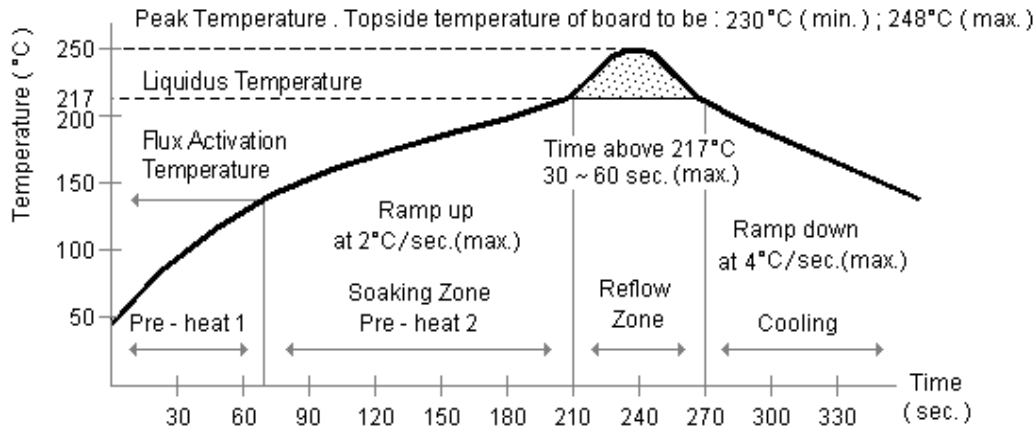
Suggested Reflow Profile [SMD type products]

(1) Low temperature solder reflow : For Sn62 , Pb36 , Ag2 , Sn63 , Pb37 alloy .



Soaking temp : 140°C ~ 180°C
Soaking time : 60~ 90 sec.

(2) High temperature solder reflow : For Sn96.5% , Ag3.5% , Cu0.5% alloy .



Soaking temp : 140°C 200°C
Soaking time : 90 ~120 sec.