

Quartz Crystals

X11

1.65 * 1.25 * 0.30

X21

2.05 * 1.65 * 0.50

X22

2.55 * 2.05 * 0.60

X32

3.20 * 2.50 * 0.70

Surface Mount

X11, X21, X22, X32

Fundamental

X22, X32

3rd Overtone

Features

Specifications

- The entire package can be grounded via the top metal lid and the two bottom pads
- Small footprint. Ideal for space constrained applications
- Exhibits extremely low aging with a high shock & vibration resistance

General Specifications

Item / Type	X11	X21	X22	X32
Package Dimensions	(1.65 * 1.25 * 0.30 mm)	(2.05 * 1.65 * 0.50 mm)	(2.55 * 2.05 * 0.60 mm)	(3.20 * 2.50 * 0.70 mm)
Frequency Range	24.0 ~ 96.0 MHz (Fund.)	16.0 ~ 64.0 MHz (Fund.)	12.0 ~ 80.0 MHz (Fund.) 50 ~ 200 MHz (3rd Overtone)	8 ~ 96.0 MHz (Fund.) 50 ~ 200 MHz (3rd Overtone)
Crystal Cut // Load Capacitance	AT - Cut // Series or Parallel (8 to 32 pF) resonance			
Drive Level	10 μ W (typ.) 100 μ W (max.)			
Frequency Tolerance	± 10 ppm , ± 20 ppm or ± 30 ppm (max.) at 25°C			
Aging	$\Delta F / F : \pm 3$ ppm / year (max.)			
Storage Temperature Range	- 50°C to 125°C			

ESR (Equivalent Series Resistance)

X11		X21		X22			X32		
Frequency Range	E. S. R.	Frequency Range	E. S. R.	Frequency Range	E. S. R.	Oscillator Mode	Frequency Range	E. S. R.	Oscillator Mode
24.0 ~ 29.9 MHz	120 Ω max.	16.0 ~ 23.9 MHz	120 Ω max.	12.0 ~ 15.9 MHz	150 Ω max.	Fund. Mode	8.0 ~ 9.9 MHz	500 Ω max.	Fund. Mode
30.0 ~ 39.9 MHz	100 Ω max.	24.0 ~ 29.9 MHz	100 Ω max.	16.0 ~ 29.9 MHz	80 Ω max.		10.0 ~ 11.9 MHz	200 Ω max.	
40.0 ~ 96.0 MHz	80 Ω max.	30.0 ~ 37.9 MHz	80 Ω max.	30.0 ~ 80.0 MHz	60 Ω max.		12.0 ~ 29.9 MHz	80 Ω max.	
		38.0 ~ 64.0 MHz	60 Ω max.	50.0 ~ 200.0 MHz	80 Ω max.	3rd Overtone	30.0 ~ 96.0 MHz	40 Ω max.	
							50.0 ~ 200.0 MHz	60 Ω max.	3rd Overtone

Frequency stability Vs Operating temperature range

Frequency stability Vs Operating temperature range							
Stability code	Temp. (°C) \ 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)

X11			X21		
Top View	Bottom View	Suggested Layout	Top View	Bottom View	Suggested Layout
Pad Connections : Pad 1 and 3 : Crystal ; Pad 2 and 4 : Ground Chamfered pad is pad No. 4			Pad Connections : Pad 1 and 3 : Crystal ; Pad 2 and 4 : Ground Chamfered pad is pad No. 4		
X22			X32		
Top View	Bottom View	Suggested Layout	Top View	Bottom View	Suggested Layout
Pad Connections : Pad 1 and 3 : Crystal ; Pad 2 and 4 : Ground Chamfered pad is pad No. 1			Pad Connections : Pad 1 and 3 : Crystal ; Pad 2 and 4 : Ground Chamfered pad is pad No. 1 or 4		

Quartz Crystals

MJ

5.0 * 3.2 * 0.8

MQ

7.0 * 5.0 * 1.0

Surface Mount

MJ , MQ

Fundamental

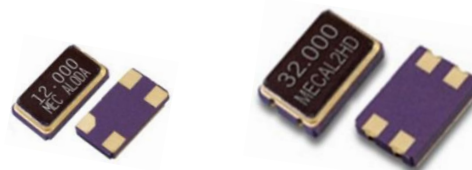
MJ , MQ

3rd Overtone

Features

Specifications

- Exhibits extremely low aging with a high shock and vibration resistance
- The entire package can be grounded via the top metal lid and the two bottom pads
- This low 0.7mm package height is ideal for height constrained applications



General Specifications

Item / Type	MJ series	MQ series
Package Dimensions	(5.0 * 3.2 * 0.8 mm)	(7.0 * 5.0 * 1.0 mm)
Frequency Range	8.0 ~ 52.0 MHz (Fund.) 50.0 ~ 200.0 MHz (3rd)	6.0 ~ 50.0 MHz (Fund.) 45.0 ~ 200.0 MHz (3rd)
Crystal Cut	AT - Cut ; 3rd overtone	
Load Capacitance	Series or Parallel (8 to 32 pF) resonance	
Drive Level	10 μ W (typ.) 100 μ W (max.)	
Frequency Tolerance	± 10 ppm , ± 20 ppm or ± 30 ppm (max.) at 25°C	
Aging	$\Delta F / F : \pm 3$ ppm / year (max.)	
Storage Temp. Range	- 50°C to 125°C	

ESR (Equivalent Series Resistance)

MJ			MQ		
Freq. (MHz)	E.S.R.	Mode	Freq. (MHz)	E.S.R.	Mode
8.0 ~ 9.9	100 Ω	Fund.	6.0 ~ 8.0	80 Ω	Fund.
10.0 ~ 14.9	60 Ω		8.1 ~ 11.0	60 Ω	
15.0 ~ 19.9	50 Ω		11.1 ~ 14.0	50 Ω	
20.0 ~ 52.0	40 Ω		14.1 ~ 50.0	40 Ω	
50.0 ~ 200.0	80 Ω	3rd	40.1 ~ 45.0	60 Ω	3rd
			45.1 ~ 200.0	80 Ω	

Frequency stability Vs Operating temperature range

Frequency stability vs Operating temperature range							
Stability code	Temp. (°C) \ 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)

MJ	MQ
Top View Bottom View Suggested Layout Pad connections : Pad 1 , 3 : Crystal ; Pad 2 , 4 : Ground Chamfered pad is pad No. 1 or 4	Top View Bottom View Suggested Layout Pad connections : Pad 1 , 3 : Crystal ; Pad 2 , 4 : Ground Chamfered pad is pad No. 1 or 4

Part Number Formats and Product Marking Rules

Quartz Crystals

Holder Type

SMD type : X11 X21 X22 X32 MJ MQ M49 ML49 MP5 MP4 MP25 MP24
X2012 X3215
Dip type : H49 HUS HUSL U1 U5 T38 T26

Part Number Format

	[1] Holder Type	-	[2] Center Freq.	-	[3] CL	-	[4] Freq. Tolerance	/	[5] Freq. Stability	[6] Operating Temp. Range Code	/	[7] Special ESR
Example	(1) H49	-	40.000A3	-	12	-	30	/	30	X		
	(2) X32	-	26.000	-	16	-	30	/	30	X	/	20R
	(3) MJ	-	12.000	-	20	-	10	/	10	W		
	(4) M49	-	24.000	-	18	-	20	/	30	H	/	15R

Ex (1) : H49 - 40.000A3 - 12 - 30 / 30 X [49/U type , 40.000MHz , AT-cut 3rd overtone , 12pF , ±30ppm (25°C) , ±30ppm (-10°C to 60°C)]

Ex (2) : X32 - 26.000 - 16 - 30 / 30 X / 20R [X32 type , 26.000MHz , 16pF , ±30ppm (25°C) , ±30ppm (-10°C to 60°C) , 20 Ω]

Ex (3) : MJ - 12.000 - 20 - 10 / 10 W [MJ type , 12.000MHz , 20pF , ±10ppm (25°C) , ±10ppm (0°C to 50°C)]

Ex (4) : M49 - 24.000 - 18 - 20 / 30 H / 15R [M49 type , 24.000MHz , 18pF , ±20ppm (25°C) , ±30ppm (-30°C to 85°C) , 15 Ω]

[1]	Holder Type										
[2]	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 ; SL : SL-cut fund. mode										
[3]	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										
[4]	Calibration tolerance value : freq. tolerance value (at 25°C) , industrial temp. range										
[5]	Frequency Stability , industrial temp. range										
[6]	Temp. Range Options	W	0°C ~ +50°C	X	-10°C ~ +60°C	Y	-20°C ~ +70°C	F	-30°C ~ +70°C	G	-10°C ~ +80°C
		H	-30°C ~ +85°C	I	-40°C ~ +85°C	J	-40°C ~ +90°C	K	-40°C ~ +105°C	M	-55°C ~ +105°C
		N	-55°C ~ +125°C								
	Temp. Range is -10°C to 60°C , for example " X "										
[7]	If non-standard please enter the desired Temp. Range after " / " , for example " -20 + 60 " : -20°C to 60°C										
	If non-standard please enter the desired ESR (Equivalent Series Resistance) after " / " , for example " 20R " : 20Ω										

Production Marking Rules

General X'tal package type marking rules	MQ, MJ marking rules	X22, X32 marking rules
Frequency Lot code (Cutting method) : A : AT-cut (fundamental) B : BT-cut (fundamental) 3 : AT-cut (3rd overtone) 5 : AT-cut (5th overtone) SL : SL-cut (fundamental) (month) : Table 2 ex : 2024 - 4 Load capacitance (CL) : Table 1	Freq. Lot code (Month) --- Table 2 (Year) --- 2020 --- 0 2021 --- 1 Load capacitance (CL) : Table 1 (Cutting method) : A : AT-cut , fundamental B : BT-cut , fundamental 3 : AT-cut , 3rd overtone 5 : AT-cut , 5th overtone	Freq. Load capacitance (CL) : Table 1 lot code : (Month)--- Table 2 (Year) 2020 --- 0 2021 --- 1
X11 marking rules		X21 marking rules
Freq. (Month)--- Table 2 (Year) 2020 --- 0 2021 --- 1		Freq. Load capacitance (CL) : Table 1 (Month)--- Table 2 (Year) 2020 --- 0 2021 --- 1

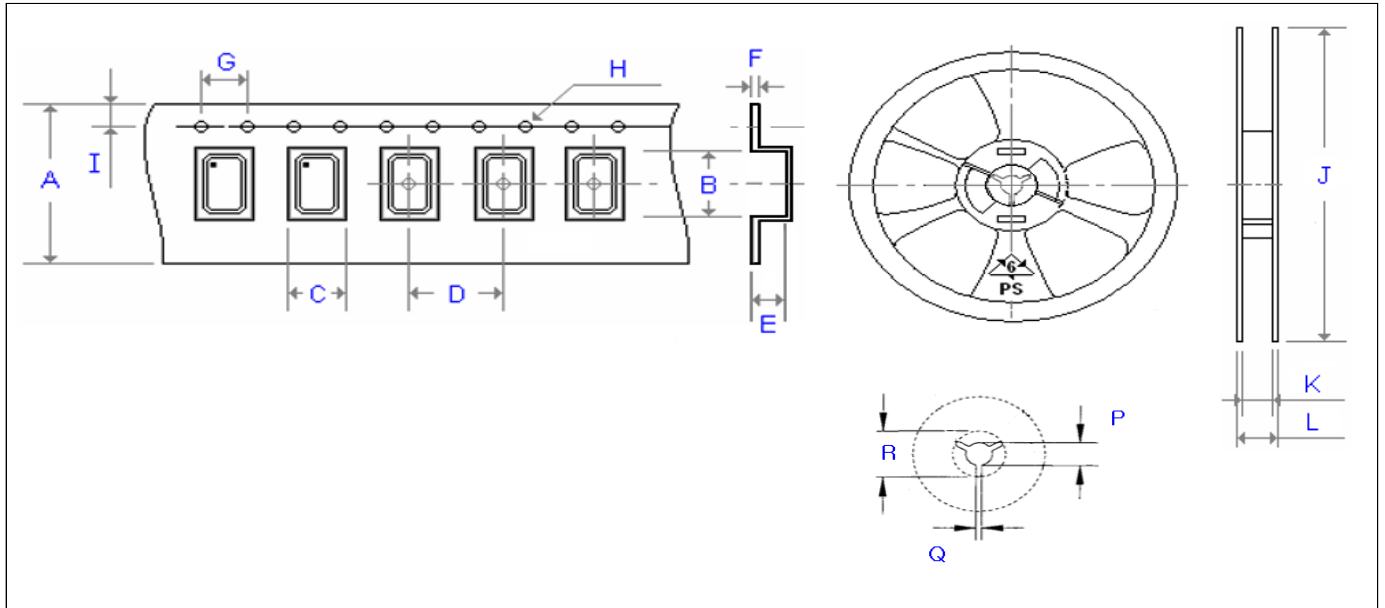
Table 1	CL	< 10	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	>34	Series
	Code	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	a	b

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) ±0.3mm

	A	B	C	D	E	F	G	H	I	pcs / reel
X11	8.00	1.79	1.39	4.00	0.45	0.25	4.00	Ø 1.50	1.75	3000
X21	8.00	2.30	1.90	4.00	0.60	0.20	4.00	Ø 1.50	1.75	3000
X22	8.00	2.80	2.25	4.00	1.10	0.30	4.00	Ø 1.50	1.75	3000
X32	8.00	3.40	2.70	4.00	1.40	0.25	4.00	Ø 1.50	1.75	3000
X2012	8.00	2.25	1.45	4.00	0.75	0.25	4.00	Ø 1.50	1.75	3000
X3215	12.00	3.40	1.70	4.00	1.00	0.30	4.00	Ø 1.50	1.75	3000
MJ	12.00	5.30	3.60	8.00	1.40	0.30	4.00	Ø 1.50	1.75	1000
MQ	16.00	7.20	5.40	8.00	1.80	0.30	4.00	Ø 1.50	1.75	1000
M49	24.00	15.00	5.00	12.00	4.25	0.40	4.00	Ø 1.50	1.75	1000
ML49	24.00	14.80	5.00	12.00	3.50	0.40	4.00	Ø 1.50	1.75	1000
MP4 (24)	24.00	13.30	5.10	12.00	4.20	0.40	4.00	Ø 1.50	1.75	1000
MP5 (25)	24.00	13.40	5.10	12.00	5.20	0.40	4.00	Ø 1.50	1.75	1000

Reel Dimensions (unit : mm) +2.0 / -0.0mm

	J	K	L	P	Q	R	pcs / reel
X11	180.00	9.00	12.00	13.20	2.10	-	3000
X21	180.00	9.00	12.00	13.20	2.10	-	3000
X22	180.00	9.00	12.00	13.20	2.10	-	3000
X32	180.00	9.00	12.00	13.20	2.10	-	3000
X2012	180.00	9.00	12.00	13.20	2.10	-	3000
X3215	180.00	13.00	16.00	13.20	2.50	-	3000
MJ	180.00	13.00	16.00	13.20	2.50	-	1000
MQ	180.00	17.20	19.30	13.30	2.20	22.00	1000
M49	330.00	24.50	29.10	13.00	2.20	17.30	1000
ML49	330.00	24.50	29.10	13.00	2.20	17.30	1000
MP4 (24)	330.00	24.50	29.10	13.00	2.20	17.30	1000
MP5 (25)	330.00	24.50	29.10	13.00	2.20	17.30	1000