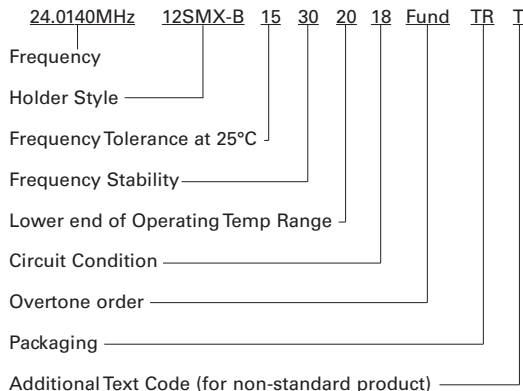


SPECIFYING SURFACE MOUNT QUARTZ CRYSTALS

A typical surface mount quartz crystal specification reads like this:



The following notes define each element of the specification.

Frequency

Frequency is normally specified in kilohertz (kHz) up to 999.999kHz and in megahertz (MHz) from 1.0MHz. All our computer-generated transaction documents follow this standard convention automatically.

The frequency should be described to seven significant figures. If seven significant figures are not used, we assume that any figure that might follow those given may be taken as zero. Thus a frequency given as 16.6MHz will be taken as 16.60, not 16.66667.

Some specifiers extend the use of kHz to all crystals operating in fundamental mode, reserving MHz for overtones. To minimise the possibility of misunderstanding it is best to use the standard method and specify fundamental or overtone mode separately.

Please contact the sales office for details of developed frequencies.

Holder Style

Before manufacture of the crystal can start, the holder style must be defined. Each holder style covers a frequency range which is defined in the relevant specification.

Frequency Tolerance

The cost of manufacture depends partly on the accuracy required at reference temperature (which in the case of the AT-cut crystal, is usually 25°C).

Where high initial accuracy is important the additional manufacturing cost should be weighed against the cost of including a frequency trimming facility within the oscillator.

Frequency Stability

Frequency stability is normally specified as a frequency tolerance over a defined operating temperature range with respect to the frequency at reference temperature. The temperature ranges are defined for each crystal in the relevant data sheet. However the majority of crystals will continue to operate quite satisfactorily outside the temperature range for which they are specified, but with a possible degradation in the value of frequency stability. Under normal conditions this will not damage the crystal.

A crystal designed for operation over a restricted operating temperature range, (such as from 0 to 50°C) has a better frequency stability over that range than one designed for operation over a wide operating temperature range. Therefore it is important not to over specify the temperature range, as doing so will result in inferior performance for the same or greater cost; or greater cost for the same or inferior performance.

Operating Temperature Ranges

The standard operating temperature ranges for a crystal are:

- 0 to 50°C -40 to 90°C
- 10 to 60°C -55 to 105°C
- 20 to 70°C -55 to 125°C
- 30 to 80°C

When the required temperature range is symmetrical about 25°C, it is indicated in the specification by the lower figure, ie: -20 to 70°C would read '20' as shown in the example. If the required temperature range is not symmetrical about 25°C, both figures are used, ie: -55 to 85°C and appear in the additional text code section (T).

Circuit condition

The characters 'SR' are used to denote calibration of the crystal at series resonance. If it is to be calibrated at load resonance the characters represent the circuit load capacitance in pF.

Packaging Codes

Tray packaging is available as an option for CX-1 products outlined in the SM Quartz Crystal chapter.

Unless individual data sheets state Bulk packaging, items will be Tape & Reel packed. Please note: only complete reels are sold.

- BU = Bulk packed ■ TR = Tape & Reel packed
- TY = Tray packed

Additional Text Code

If the product is non-standard, the letter 'T' will appear at the end of the product specification. This refers to additional text on the quotation/sales order to identify the special requirements.

Outline Drawings

Dimensions on the crystal outline drawings are shown only as a guide. Precise dimensions of crystal holders are available from our Factory upon request. All dimensions are shown in mm and are nominal unless otherwise stated.

Standard Frequency Tolerances and Stabilities

- $\pm 10\text{ppm}$, $\pm 15\text{ppm}$, $\pm 20\text{ppm}$, $\pm 30\text{ppm}$, $\pm 50\text{ppm}$, $\pm 100\text{ppm}$

Soldering Conditions

Recommended solder pad layouts are shown on each data sheet. For typical soldering conditions, please see the relevant page in Application Notes.

Marking

Where possible the frequency of operation will be marked in full on the crystal. On the smaller types the full frequency may not fit in the available space and will therefore be truncated. Please refer to the despatch packaging for the relevant crystal to see the frequency in full.

Ordering Information

- See individual data sheets

Stability Conversion Chart

10^x	PPM	%
10^{-3}	1000	0.1
10^{-4}	100	0.01
10^{-5}	10	0.001
10^{-6}	1	0.0001
10^{-7}	0.1	0.00001
10^{-8}	0.01	0.000001
10^{-9}	0.001	0.0000001
10^{-10}	0.0001	0.00000001

STOCK SURFACE MOUNT QUARTZ CRYSTALS

90SMX CRYSTALS

Frequency	Specification	Stock No.	Alpha Code	Packaging
32.7680kHz	20/-/-/6	XTAL015822	A103L	Bulk
32.7680kHz	20/-/-/6	XTAL013015	A103M	T & R
32.7680kHz	20/-/-/12.5	XTAL003004	A103S	Bulk
32.7680kHz	20/-/-/12.5	XTAL002998	A103D	T & R

91SMX CRYSTALS

Frequency	Specification	Stock No.	Alpha Code	Packaging
32.7680kHz	20/-/-/6	XTAL010193	A103R	Bulk
32.7680kHz	20/-/-/6	XTAL003001	A103G	T & R
32.7680kHz	20/-/-/12.5	XTAL003003	A103N	Bulk
32.7680kHz	20/-/-/12.5	XTAL002999	A103E	T & R

85SMX CRYSTALS

Frequency	Specification	Stock No.	Alpha Code	Packaging
32.7680kHz	20/-/-/6	XTAL016178	A103W	Bulk
32.7680kHz	20/-/-/6	XTAL017503	A103K	T & R
32.7680kHz	20/-/-/12.5	XTAL003000	A103F	Bulk
32.7680kHz	20/-/-/12.5	XTAL016207	A103J	T & R

86SMX CRYSTALS

Frequency	Specification	Stock No.	Alpha Code	Packaging
3.579545MHz	50/100/20/20	XTAL003057	A119D	Bulk
3.579545MHz	50/100/20/20	XTAL015056	A119I	T & R
3.68640MHz	50/100/20/16	XTAL003258	A169B	Bulk
3.68640MHz	50/100/20/16	XTAL010683	A169I	T & R
4.0MHz	50/100/20/30	XTAL003069	A120C	Bulk
4.0MHz	50/100/20/30	XTAL012280	A120I	T & R
4.19430MHz	50/100/20/12	XTAL003088	A123C	Bulk
4.91520MHz	50/100/20/16	XTAL003112	A127C	Bulk
4.91520MHz	50/100/20/16	XTAL000006	A127R	T & R
6.0MHz	50/100/20/30	XTAL003129	A132C	Bulk
7.37280MHz	50/100/20/16	XTAL0003331	A194C	Bulk
8.0MHz	50/100/20/16	XTAL0003149	A140C	Bulk
8.0MHz	50/100/20/16	XTAL0000007	A140R	T & R
10.0MHz	50/100/20/20	XTAL0003163	A143C	Bulk
11.05920MHz	50/100/20/20	XTAL0003516	L108B	Bulk
12.0MHz	50/100/20/216	XTAL0003209	A158D	Bulk
12.0MHz	50/100/20/216	XTAL010940	A158I	T & R

Frequency	Specification	Stock No.	Alpha Code	Packaging
14.318180MHz	50/100/20/16	XTAL003196	A153C	Bulk
14.318180MHz	50/100/20/16	XTAL014422	A153I	T & R
14.74560MHz	50/100/20/16	XTAL003220	A159C	Bulk
16.0MHz	50/100/20/16	XTAL003232	A161B	Bulk
16.0MHz	50/100/20/16	XTAL010356	A161I	T & R
16.0MHz	50/100/20/20	XTAL003234	A161D	Bulk
16.0MHz	50/100/20/SR	XTAL003235	A161E	Bulk
16.0MHz	50/100/20/SR	XTAL0144558	A161W	T & R
17.34470MHz	50/100/20/16	XTAL003300	A180C	Bulk
18.4320MHz	50/100/20/20	XTAL003175	A146C	Bulk
20.0MHz	50/100/20/16	XTAL003178	A147B	Bulk
20.0MHz	50/100/20/16	XTAL011457	A147I	T & R
24.0MHz	50/100/20/16	XTAL003321	A189C	Bulk
24.0MHz	50/100/20/16	XTAL012430	A189I	T & R

12SMX (B) CRYSTALS

Frequency	Specification	Stock No.	Alpha Code	Packaging
8.0MHz	30/50/20/16	XTAL026380	A140W	Bulk
8.0MHz	30/50/20/16	XTAL026381	A140X	T & R
11.05920MHz	30/50/20/16	XTAL026382	A320D	Bulk
11.05920MHz	30/50/20/16	XTAL026383	A320E	T & R
12.0MHz	30/50/20/16	XTAL026384	A158W	Bulk
12.0MHz	30/50/20/16	XTAL026385	A158X	T & R
14.318180MHz	30/50/20/16	XTAL026386	A153U	Bulk
14.318180MHz	30/50/20/16	XTAL026387	A153V	T & R
14.74560MHz	30/50/20/16	XTAL026388	A159W	Bulk
14.74560MHz	30/50/20/16	XTAL026389	A159X	T & R
15.360MHz	30/50/20/16	XTAL026390	A451D	Bulk
15.360MHz	30/50/20/16	XTAL026391	A451E	T & R
16.0MHz	30/50/20/16	XTAL026392	A161Z	Bulk
16.0MHz	30/50/20/16	XTAL026393	A161X	T & R
20.0MHz	30/50/20/16	XTAL026394	A147U	Bulk
20.0MHz	30/50/20/16	XTAL026395	A147V	T & R
24.5760MHz	30/50/20/16	XTAL026396	A223F	Bulk
24.5760MHz	30/50/20/16	XTAL026397	A223G	T & R

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Website: www.cmac.com

HC49/4HSMX CRYSTALS

Frequency	Specification	Stock No.	Alpha Code	Packaging
3.579545MHz	30/50/10/16	XTAL003058	A119E	Bulk
3.579545MHz	30/50/10/16	XTAL010218	A119W	T & R
3.68640MHz	30/50/10/16	XTAL003260	A169E	Bulk
3.68640MHz	30/50/10/16	XTAL003265	A169N	T & R
4.0MHz	30/50/10/16	XTAL003071	A120E	Bulk
4.0MHz	30/50/10/16	XTAL003078	A120R	T & R
4.0MHz	30/50/10/30	XTAL011300	A120S	Bulk
4.0MHz	30/50/10/30	XTAL013676	A120H	T & R
4.91520MHz	30/50/10/16	XTAL003113	A127E	Bulk
4.91520MHz	30/50/10/16	XTAL018153	A127J	T & R
5.0MHz	20/50/10/16	XTAL026897	A128P	Bulk
5.0MHz	20/50/10/16	XTAL026898	A128R	T & R
5.0MHz	30/50/10/30	XTAL012312	A128S	Bulk
5.0MHz	30/50/10/30	XTAL012246	A128L	T & R
6.0MHz	20/50/10/16	XTAL026900	A132P	Bulk
6.0MHz	20/50/10/16	XTAL026901	A132R	T & R
7.37280MHz	30/50/10/16	XTAL003334	A194F	Bulk
7.37280MHz	30/50/10/16	XTAL015104	A194R	T & R
7.37280MHz	30/50/10/30	XTAL010689	A194S	Bulk
7.37280MHz	30/50/10/30	XTAL010386	A194G	T & R
8.0MHz	30/50/10/16	XTAL003151	A140E	Bulk
8.0MHz	30/50/10/16	XTAL010702	A140I	T & R
8.0MHz	30/50/10/30	XTAL011301	A140S	Bulk
8.0MHz	30/50/10/30	XTAL013919	A140L	T & R
8.1920MHz	20/50/10/16	XTAL026902	A170W	Bulk
8.1920MHz	20/50/10/16	XTAL026903	A170x	T & R
9.83040MHz	20/50/10/16	XTAL026904	A173P	Bulk
9.83040MHz	20/50/10/16	XTAL026905	A173R	T & R
9.83040MHz	30/50/10/30	XTAL017048	A173S	Bulk
10.0MHz	30/50/10/16	XTAL003166	A143G	Bulk
10.0MHz	30/50/10/16	XTAL011400	A143I	T & R
10.0MHz	30/50/10/30	XTAL017145	A143S	Bulk
10.0MHz	30/50/10/30	XTAL013493	A143L	T & R
11.05920MHz	30/50/10/16	XTAL003519	L108E	Bulk
11.05920MHz	30/50/10/16	XTAL010880	L108I	T & R
12.0MHz	30/50/10/16	XTAL003210	A158E	Bulk
12.0MHz	30/50/10/16	XTAL010430	A158R	T & R
12.0MHz	30/50/10/30	XTAL010043	A158S	Bulk
12.0MHz	30/50/10/30	XTAL005214	A158M	T & R

Frequency	Specification	Stock No.	Alpha Code	Packaging
14.318180MHz	20/50/10/16	XTAL026906	A153P	Bulk
14.318180MHz	20/50/10/16	XTAL026907	A153R	T & R
14.318180MHz	30/50/10/30	XTAL011650	A153S	Bulk
14.318180MHz	30/50/10/30	XTAL016724	A153N	T & R
14.74560MHz	20/50/10/16	XTAL026908	A321P	Bulk
14.74560MHz	20/50/10/16	XTAL026909	A321R	T & R
14.74560MHz	30/50/10/30	XTAL012313	A159L	Bulk
14.74560MHz	30/50/10/30	XTAL010878	A159G	T & R
16.0MHz	30/50/10/16	XTAL003237	A161G	Bulk
16.0MHz	30/50/10/16	XTAL013322	A161V	T & R
18.4320MHz	20/50/10/16	XTAL026911	A146W	Bulk
18.4320MHz	20/50/10/16	XTAL026912	A146X	T & R
19.66080MHz	20/50/10/16	XTAL026913	A182W	Bulk
19.66080MHz	20/50/10/16	XTAL026914	A182x	T & R
20.0MHz	30/50/10/16	XTAL003181	A147E	Bulk
20.0MHz	30/50/10/16	XTAL003187	A147R	T & R
20.0MHz	30/50/10/30	XTAL017146	A147S	Bulk
20.0MHz	30/50/10/30	XTAL017162	A147G	T & R
24.0MHz	30/50/10/16	XTAL012504	A189N	Bulk
24.0MHz	30/50/10/16	XTAL019814	A189R	T & R
24.5760MHz	30/50/10/20	XTAL003387	A223E	Bulk
24.5760MHz	30/50/10/20	XTAL018142	A223R	T & R
25.0MHz	30/50/10/16	XTAL010595	A187D	Bulk
25.0MHz	30/50/10/16	XTAL022668	A187E	T & R
28.2240MHz	30/50/10/16	XTAL026915	A224D	Bulk
29.49120MHz	30/50/10/16	XTAL026916	A331D	Bulk

CFPX-56 CRYSTALS

Frequency	Specification	Stock No.	Alpha Code	Packaging
32.768000kHz	20/-/12.5	XTAL008231	A103 X	Bulk
32.768000kHz	20/-/12.5	XTAL025159	A103Y	T & R

CFPX-157C CRYSTALS

Frequency	Specification	Stock No.	Alpha Code	Packaging
32.768000kHz	20/-/12.5	XTAL009501	A102C	Bulk
32.768000kHz	20/-/12.5	XTAL009502	A102D	T & R

SURFACE MOUNT
QUARTZ CRYSTALS

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