

High selectivity low loss precision quartz filters

- # Monolithic designs
- # Small size
- # Low insertion loss
- # Sharp selectivity
- # Standard and custom designs

Introduction

Sharp selectivity, small insertion loss and very high reliability characterise TFC monolithic quartz filters.

The range includes standard 10.70MHz, 21.40MHz, 45MHz fundamental and third overtone designs. Also six and eight pole block filters with the option of matching transformers.

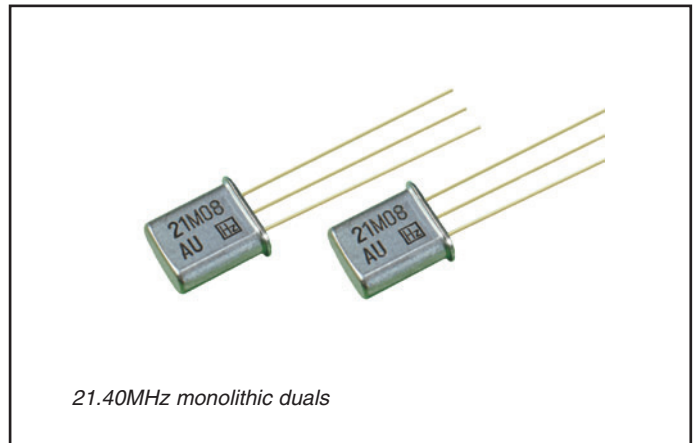
Quartz is the ideal resonator for selective narrow band filters providing a temperature stable, high Q resonant source together with a low mass and small size.

The TFC data includes a general range of filters available for applications with channel spacing requirements of between $\pm 12.5\text{kHz}$ and $\pm 50\text{kHz}$ complemented by single sideband filters and custom designs available for special applications.

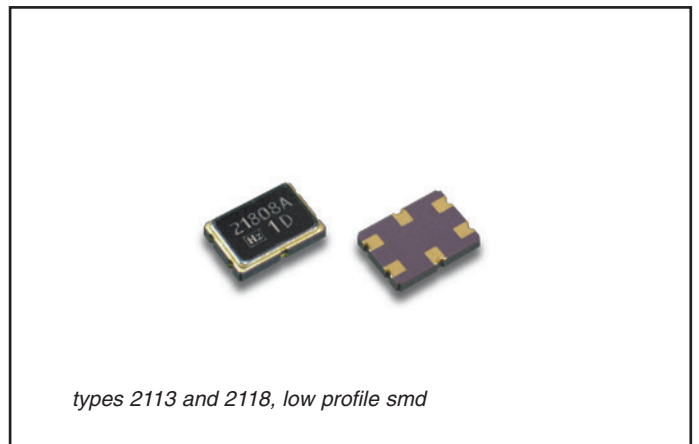
The correct termination of quartz filters is of prime importance to realise the high performance for each design. TFC crystal filters are 100% tested and for custom manufactured product a test fixture, representing the correct load, is available for verification by the customer of the load conditions by goods inwards inspection or for engineering development to correctly correlate the load conditions. Selected pairs of filters are available and also an extended working temperature range for certain filters to special order.



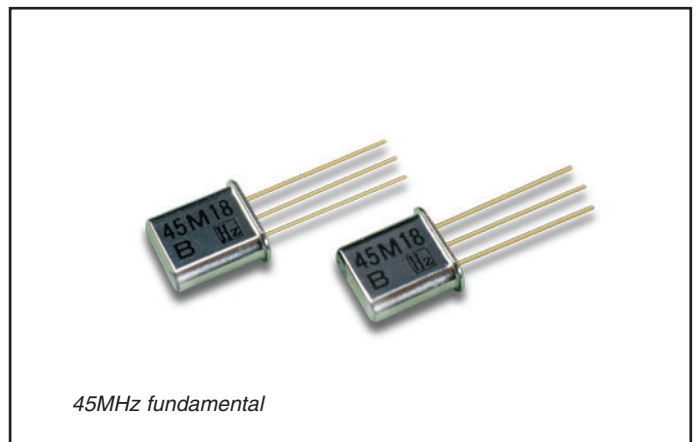
packaged tandem



21.40MHz monolithic duals



types 2113 and 2118, low profile smd



45MHz fundamental

Terms and definitions

The following generalised definitions apply to the specification of a crystal filter with each parameter shown in Figure 1.

Centre frequency

The geometric mean of the cut-off frequency, (f_o) for standard filters or (f_c) for the carrier frequency in SSB filters.

Cut off frequency

The frequency in the pass band at which the relative pass band is specified, usually at the 3dB or 6dB points.

Pass band

The frequency band at which the relative attenuation is \leq the specified attenuation.

Pass band width

A frequency range over which the relative attenuation is equal to the specified attenuation.

Stop band

The frequency band at which the relative attenuation is \geq the specified attenuation.

Stop band width

A frequency range over which the relative attenuation is equal to the specified attenuation.

Insertion loss

The logarithmic ratio of the power supplied to the load impedance before insertion of the filter to the power supplied to the load impedance after the insertion of the filter expressed in decibels (dB).

Ripple

The maximum difference between the maximum and minimum attenuation values within the guaranteed pass band.

Guaranteed pass band

The guaranteed frequency band width over which the relative attenuation is not more than the specified value within the pass band.

Relative attenuation

The difference in attenuation between the attenuation at any specified frequency and the minimum attenuation within the pass band.

Guaranteed attenuation

The maximum guaranteed relative attenuation within the attenuation band.

Spurious response attenuation

The minimum guaranteed attenuation for any spurious response within a defined frequency range relative to the stop band. Spurious responses usually occur at frequencies higher than f_o .

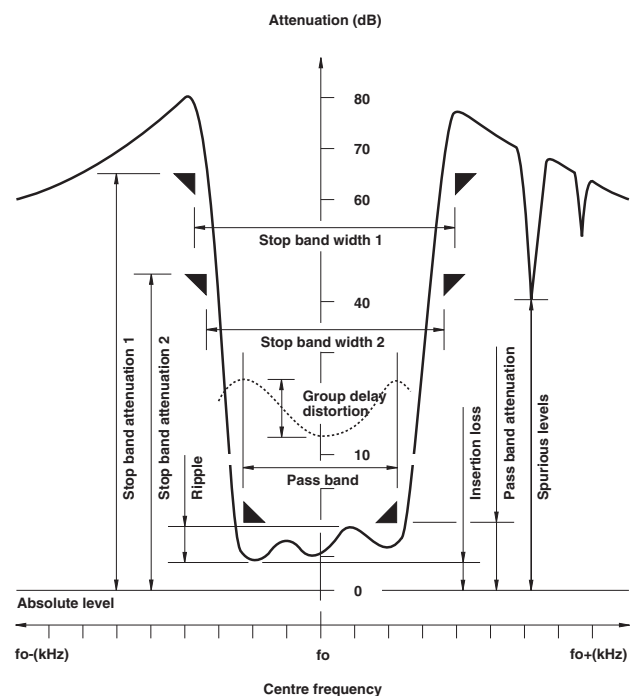
Input/output impedance

The impedance (Z_i) at the centre frequency presented by the filter when correctly terminated.

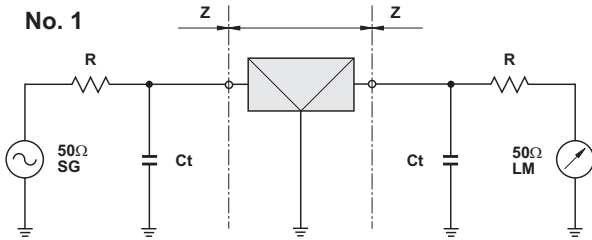
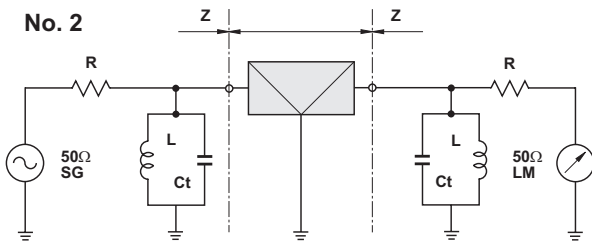
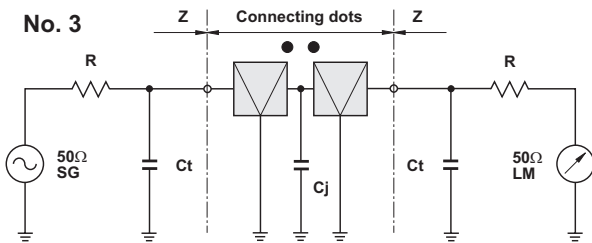
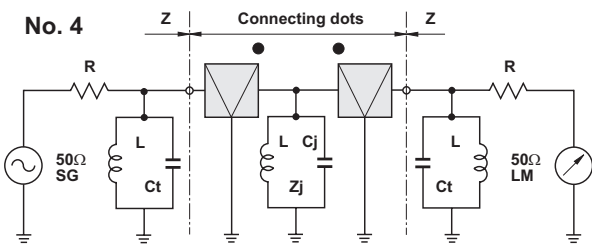
Group delay distortion

The difference between the maximum and the minimum group delay within the specified pass band.

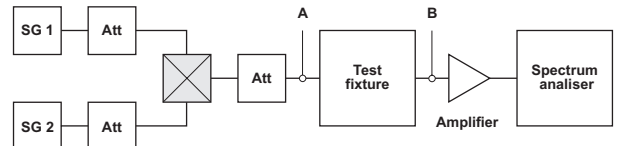
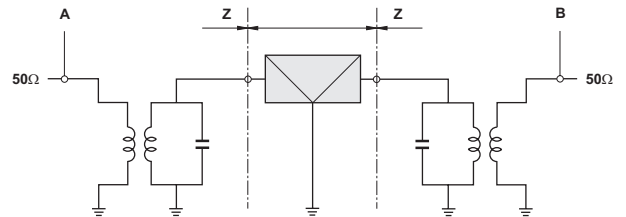
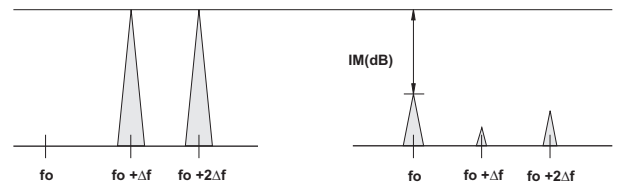
Figure 1 Filter response curve



Test Circuits

No. 1

No. 2

No. 3

No. 4


Intermodulation measurement


TEST FIXTURE

R.F. reference level (dBm)


Junction capacitance(Cj)

| Part No. | C _j (pF) | Part No. | C _j (pF) |
|----------|---------------------|----------|---------------------|
| 10M08B | 15 | 16M08BU | 18 |
| 10M08BM | 15 | 16M13B | 9 |
| 10M12B | 8 | 16M15B | 7 |
| 10M15B | 5 | 16M15BU | 7 |
| 10M15BM | 5 | 45M08B1 | 18 |
| 10M15CM | 5 | 45M10B1 | 22 |
| 10M20B | 2 | 45M12B1 | 18 |
| 10M30B | 1 | 45M13B1 | 18 |
| 22011B1 | 7 | 45M15B1 | 15 |
| 44211B1 | 16 | 45M18B1 | 12 |
| 21M08B | 11 | 45M35B1 | 5 |
| 21M08BU | 18 | 47M20B1 | 11 |
| 21M8LBU | 8 | | |
| 21M12BU | 9 | | |
| 21M15BU | 7 | | |
| 21M15BU1 | 12 | | |
| 21M15B5 | 7 | | |
| 21M15B | 12 | | |
| 21M20BU | 6 | | |
| 21M20B | 9 | | |

Custom specification sheet
Centre frequency f_0 _____ MHz _____ \pm Hz

Bandwidth \pm _____ kHz min. at _____ dB

Ripple max. _____ dB in the range from \pm _____ kHz

Insertion loss max. _____ dB _____

Attenuation _____ dB max. at $f_0 \pm$ _____ kHz

 _____ dB min. at $f_0 \pm$ _____ kHz

 _____ dB max. at $f_0 \pm$ _____ kHz

 _____ dB min. at $f_0 \pm$ _____ kHz

Shape factor _____

Ultimate attenuation _____ dB min., $f_0 \pm$ (~) Hz

 _____ dB min., $f_0 \pm$ (~) Hz

Spurious response _____ dB min., $f_0 \pm$ (~) Hz

 _____ dB min., $f_0 \pm$ (~) Hz

Group delay distortion T_g _____ μ s max., $f_0 \pm$ (~) kHz

 _____ μ s max., $f_0 \pm$ (~) kHz

Level linearity _____

Intermodulation Input power P_o _____ dBm, f_1 _____ kHz, f_2 _____ kHz

IM distortion _____ dB _____ IP3 _____ dBm

Termination impedance Input _____ $\Omega \pm$ _____ %, // _____ pF \pm _____ pF

 Output _____ $\Omega \pm$ _____ %, // _____ pF \pm _____ pF

Working temp. range (~) $^{\circ}$ C

Operable temp. range (~) $^{\circ}$ C

Storage temp. range (~) $^{\circ}$ C

Environmental conditions Shock _____

Vibration _____

Marking _____

Case style _____

Additional data _____

| | | | |
|---|--|--|--|
| Issue _____ _____ _____ | Date _____ _____ _____ | Name _____ _____ _____ | Customer _____ _____ Equipment _____ Customer ref. _____ |
|---|--|--|--|