

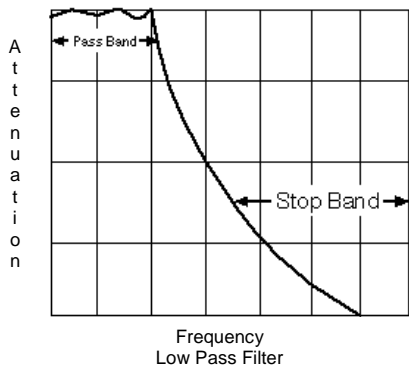


### Monolithic Quartz Crystal Filters (MCF)

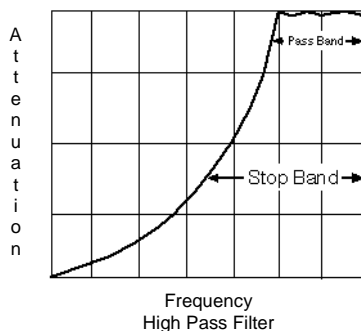
Monolithic Quartz Crystal Filters (MCF) - Represents the ideal low-insertion loss passband featuring sharp selectability within a narrow passband. Possessing moreover outstanding ambient capabilities (temperature, aging). It is widely used in mobile radio communications, cellular telephones, GPS, cordless telephones, Pagers, measuring equipment, broadcasting equipment, etc.

### TYPES OF FILTERS: There are four basic categories of filter types

**Lowpass Filter** - These are filters which pass the lower frequencies from DC to some defined cut-off frequency and reject the high frequencies.

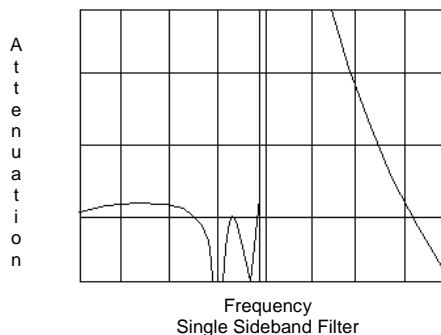
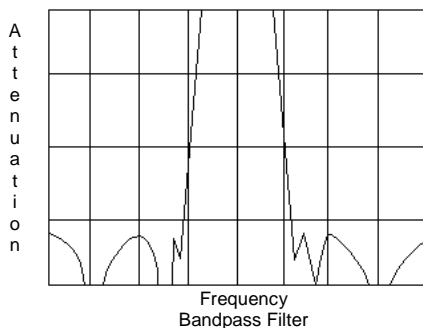


**Highpass Filter** - Highpass filter will pass the higher frequencies above a defined cut-off frequency and reject the lower frequencies.



**Bandpass Filter** - Bandpass filters will pass a band of frequencies and attenuate other bands of frequencies both above and below the passband.

**Single Sideband Filter** - Single sideband filters are bandpass designs but they form such an important sub-set that they are often given their own classification.

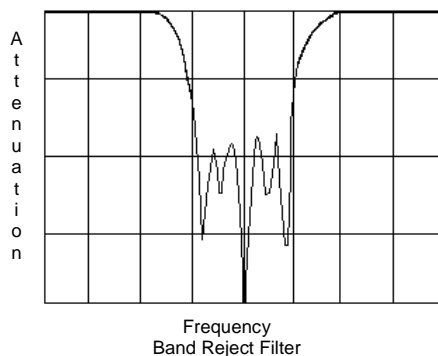




## Monolithic Quartz Crystal Filters (MCF)

### TYPES OF FILTERS:

**Band Reject** - Band reject filters attenuate a specified band of frequencies while passing a broad range of frequencies adjacent to the rejected band.



### CRYSTAL FILTER DEFINITIONS AND TERMS:

**Nominal Frequency** - A frequency given in the specifications to which other frequencies may be referred. Normally, the nominal frequency indicates the center frequency in the passband.

**Pass Bandwidth** - The pass bandwidth in which the attenuation is equal to or less than a specified value insertion loss.

**Stop Bandwidth** - The stop bandwidth in which the attenuations are equal to or greater than specified values stop band attenuation.

**Insertion Loss** - The logarithmic ratio of the power delivered to the load impedance before insertion of the filter to the power delivered to the load impedance after insertion of the filter.

**Ripple** - The wavelike response in the passband of a filter (expressed in dB), unless otherwise specified the maximum ripple will be that excursion from the highest peak to the lowest valley.

**Attenuation** - Reduction of signal in transmission through a filter. Attenuation is normally expressed in decibels (dB).

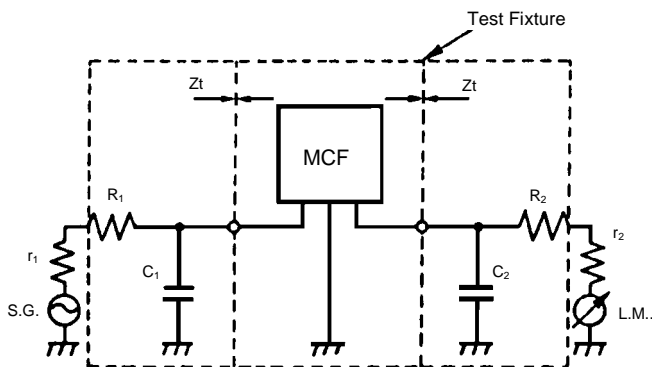
**Spurious Response** - Minimum attenuation caused by extraordinary response in the stopband. Spurious response usually appears at a frequency higher than the center frequency.

**Group Delay Distortion** - Is the difference between the maximum and minimum group delay within pass bandwidth.

**Terminal Impedance** - Either of the impedance's presented to the filter by the source or by the load and described the resistive portion ( $R_t$ ) and the parallel capacitive portion ( $C_t$ ) including stray capacitance.

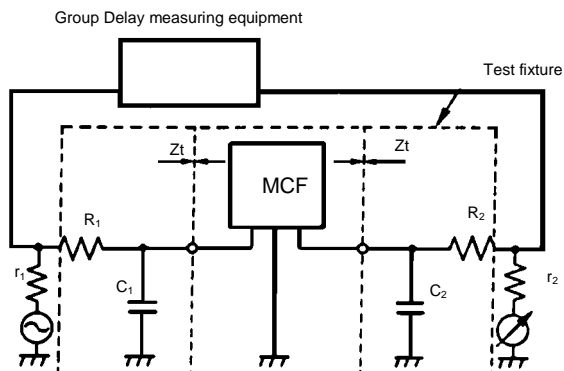
TEST CIRCUITS AND GRAPHS

Attenuation Measurement:



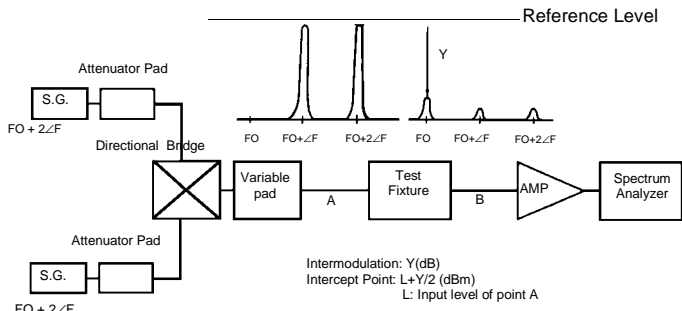
Zt: Terminating Impedance  $r_1 + R_1 + r_2 + R_2 // C_1 + C_2$

Group Delay Measurement:



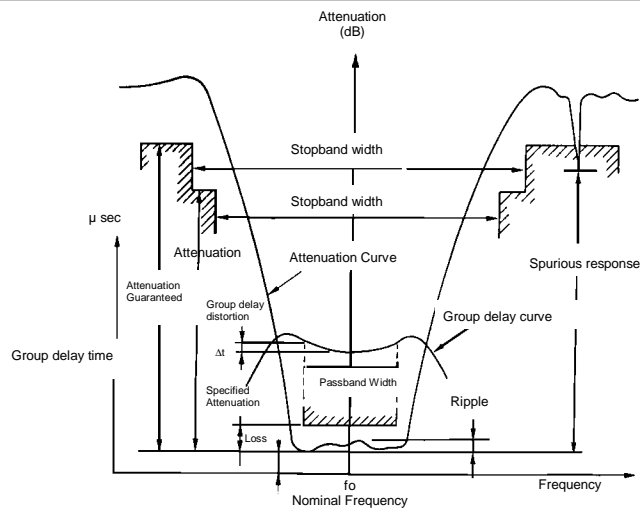
Zt: Terminating impedance  $r_1 + R_1 = R_2 // C_1 = C_2$

Intermodulation Measurement:

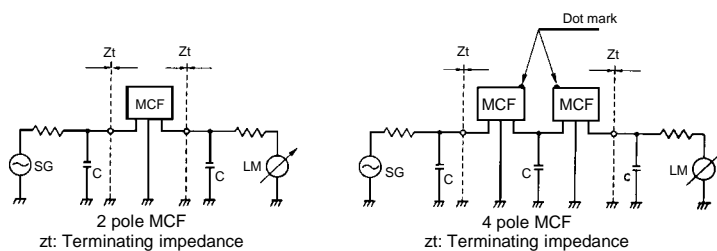


TEST CIRCUITS AND GRAPHS

MCF Characteristics Curve:



MCF Test Circuit:





## MONOLITHIC CRYSTAL FILTER

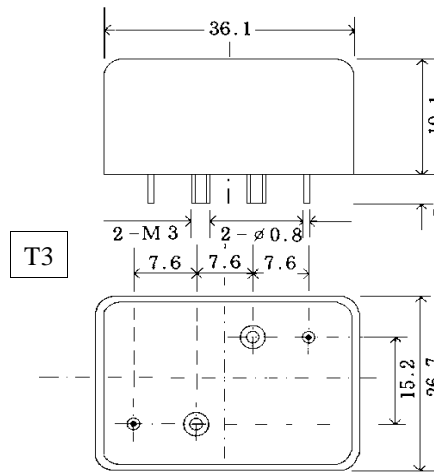
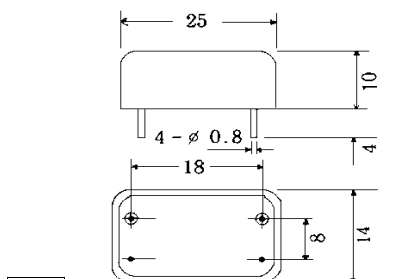
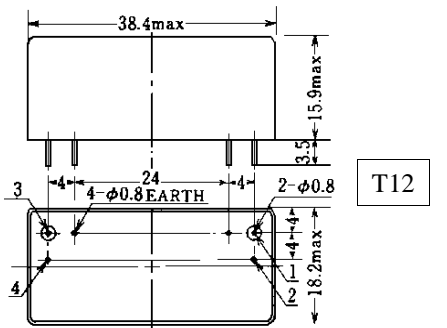
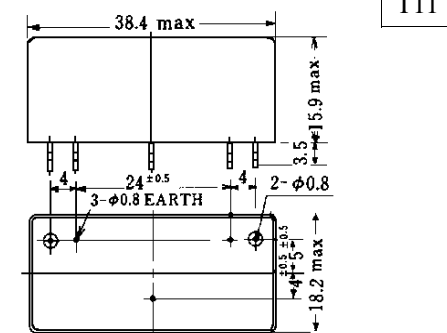
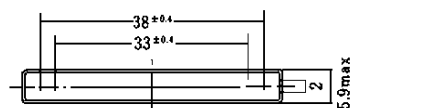
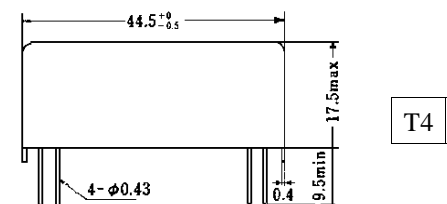
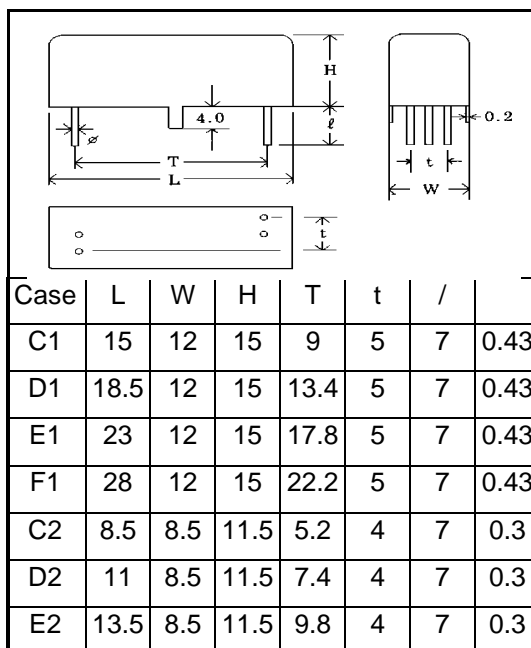
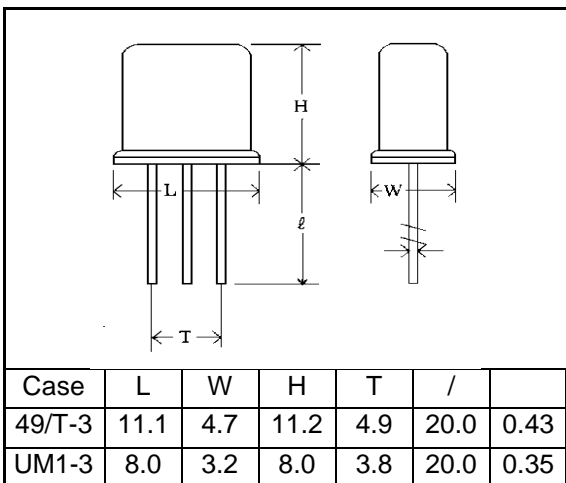
## 10.7MHz Series

WTL Part No.	Nominal Frequency (MHz)	No. of Pole	Pass band Width (dB/kHz)	Stop Band Width		Ripple (dB)	Insertion Loss (dB)	Terminating Imp. ( $\Omega$ / pF)	Case
				(dB) (kHz)	(dB) (kHz)				
WF 10UA7.5	10.7	2	3 $\pm$ 3.75	18 $\pm$ 15		0.5	2	1.5k/5	49/T-3
WF 10UB7.5	10.7	4	3 $\pm$ 3.75	40 $\pm$ 12.5		1	2.5	1.5k/3 Cc-15pF	49/T-3 (x2)
WF 10UA12	10.7	2	3 $\pm$ 6	18 $\pm$ 23		0.05	2	3k/2	49/T-3
WF 10UB12	10.7	4	3 $\pm$ 6	40 $\pm$ 20		1	2.5	3k-1 Cc-15pF	49/T-3 (x2)
WF 10F01	10.7	10	3 $\pm$ 7	75 $\pm$ 12.5		2	5	3k	E1
WF 10UA15	10.7	2	3 $\pm$ 7.5	18 $\pm$ 25		0.05	2	3k/2	49/T-3
WF 10UB15	10.7	4	3 $\pm$ 7.5	40 $\pm$ 25		1	2.5	3k Cc-5pF	49/T-3 (x2)
WF 10F02	10.7	6	6 $\pm$ 7.5	60 $\pm$ 22.5	80 $\pm$ 7.5	2	3	3k	C1
WF 10F03	10.7	8	6 $\pm$ 7.5	60 $\pm$ 15	90 $\pm$ 17.5	2	4	3k	D1
WF 10F04	10.7	10	6 $\pm$ 7.5	75 $\pm$ 15	90 $\pm$ 14	2	5	3k	E1
WF 10F05	10.7	12	6 $\pm$ 7.5	75 $\pm$ 12.5		2	5	3k	F1
WF 10UA20	10.7	2	3 $\pm$ 10	18 $\pm$ 34		0.5	2	3.9k	49/T-3
WF 10UB20	10.7	4	3 $\pm$ 10	40 $\pm$ 34		1	2.5	3.9k Cc-1.5pF	49/T-3 (x2)
WF 10F06	10.7	6	6 $\pm$ 10	60 $\pm$ 30	80 $\pm$ 27	2	3	3.9k	C1
WF 10F07	10.7	8	6 $\pm$ 10	60 $\pm$ 20	90 $\pm$ 24	2	4	3.9k	D1
WF 10F08	10.7	10	6 $\pm$ 10	75 $\pm$ 20		2	5	3.9k	E1
WF 10UA30	10.7	2	3 $\pm$ 15	18 $\pm$ 50		0.5	2	5k/-1.5	49/T-3
WF 10UB30	10.7	4	3 $\pm$ 15	40 $\pm$ 50		1	2.5	5k/-1.5 Cc-OpF	49/T-3 (x2)
WF 10F09	10.7	6	6 $\pm$ 15	60 $\pm$ 45	80 $\pm$ 40	2	2.5	5k/-1.5	C1
WF 10F10	10.7	8	6 $\pm$ 15	60 $\pm$ 30	90 $\pm$ 35	2	3	5k/-1.5	D1
WF 10F11	10.7	10	6 $\pm$ 15	70 $\pm$ 30	65 $\pm$ 12.5	2	4	5k/-1.5	E1
WF 10F12	10.7	6	3 $\pm$ 3.75	50 $\pm$ 8.75	65 $\pm$ 20	2	3	3.3k	C1
WF 10F13	10.7	6	3 $\pm$ 6	50 $\pm$ 14	65 $\pm$ 25	2	2.5	3.3k	C1
WF 10F14	10.7	6	3 $\pm$ 7.5	50 $\pm$ 17.5	65 $\pm$ 50	2	2.5	3.3k	C1
WF 10F15	10.7	6	3 $\pm$ 15	45 $\pm$ 35	90 $\pm$ 12.5	2	2	5.6k/-1.5	C1
WF 10F16	10.7	8	3 $\pm$ 3.75	65 $\pm$ 8.75	90 $\pm$ 20	2	4	3.3k	D1
WF 10F17	10.7	8	3 $\pm$ 6	65 $\pm$ 14	90 $\pm$ 25	2	3.5	3.3k	D1
WF 10F18	10.7	8	3 $\pm$ 7.5	65 $\pm$ 17.5	80 $\pm$ 50	2	3.5	3.3k	D1
WF 10F19	10.7	8	3 $\pm$ 15	60 $\pm$ 35		2	3.5	5.6k/-1.5	D1
WF 10F20	10.7	10	3 $\pm$ 3.75	90 $\pm$ 8.75		2	5.5	3.3k	E1
WF 10F21	10.7	10	3 $\pm$ 6	90 $\pm$ 14		2	4	3.3k	E1
WF 10F22	10.7	10	3 $\pm$ 7.5	90 $\pm$ 17.5		2	4	3.3k	E1
WF 10F23	10.7	10	3 $\pm$ 15	90 $\pm$ 35		2	4	5.6k/-1.5	E1

(Operating Temperature Range: -20 ~ +70°C)

MONOLITHIC CRYSTAL FILTER

10.7MHz Series





## MONOLITHIC CRYSTAL FILTER

## 21.4MHz Series

WTL Part No.	Nominal Frequency (MHz)	No. of Pole	Pass band Width (dB/kHz)	Stop Band Width		Ripple (dB)	Insertion Loss (dB)	Terminating Imp. ( $\Omega$ / pF)	Case
				(dB) (kHz)	(dB) (kHz)				
WF 21MA7.5	21.4	2	3 $\pm$ 3.75	18 $\pm$ 18	---	0.5	2	850/6	UM1-3
WF 21MB7.5	21.4	4	3 $\pm$ 3.75	40 $\pm$ 14	---	1	2.5	850/3 Cc-16pF	UM1-3 (x2)
WF 21MA12	21.4	2	3 $\pm$ 6	18 $\pm$ 22	---	0.5	2	910/5	UM1-3
WF 21MB12	21.4	4	3 $\pm$ 6	40 $\pm$ 20	---	1	2.5	910/5 Cc-13pF	UM1-3 (x2)
WF 21MA15	21.4	2	3 $\pm$ 7.5	18 $\pm$ 30	---	0.5	2	1.6k/1	UM1-3
WF 21MB15	21.4	4	3 $\pm$ 7.5	40 $\pm$ 25	---	1	2	1.6k/1 Cc-7pF	UM1-3 (x2)
WF 21MA20	21.4	2	3 $\pm$ 7.5	18 $\pm$ 34	---	0.5	2	1.6k/1	UM1-3
WF 21MB20	21.4	4	3 $\pm$ 10	40 $\pm$ 34	---	1	2.5	1.6k/1 Cc-4pF	UM1-3 (x2)
WF 21MA30	21.4	2	3 $\pm$ 10	18 $\pm$ 15	---	0.5	2	2.3k/-2	UM1-3
WF 21MB30	21.4	4	3 $\pm$ 15	40 $\pm$ 50	---	1	2.5	2.3k/-2 Cc-2pF	UM1-3 (x2)
WF 21M01	21.4	6	3 $\pm$ 15	60 $\pm$ 22.5	---	2	3	1k/1	C-2
WF 21M02	21.4	8	6 $\pm$ 7.5	60 $\pm$ 15	80 $\pm$ 20	2	4	1k/1	D-2
WF 21M03	21.4	10	6 $\pm$ 7.5	65 $\pm$ 15	80 $\pm$ 17.5	2	5	1k/1	E-2
WF 21M04	21.4	6	6 $\pm$ 7.5	45 $\pm$ 8.75	65 $\pm$ 12.5	2	3.5	910/3	C-2
WF 21M05	21.4	6	3 $\pm$ 3.75	45 $\pm$ 8.75	65 $\pm$ 12.5	2	3.5	1.6k/1	C-2
WF 21M06	21.4	6	3 $\pm$ 6	45 $\pm$ 14	65 $\pm$ 20	2	2.5	1.6k/1	C-2
WF 21M07	21.4	6	3 $\pm$ 7.5	45 $\pm$ 17.5	65 $\pm$ 25	2	2.5	1.6k/1	C-2
WF 21M08	21.4	6	3 $\pm$ 15	45 $\pm$ 35	65 $\pm$ 50	2	2.5	2.3k/-2	C-2
WF 21M09	21.4	6	3 $\pm$ 3.75	45 $\pm$ 8.75	65 $\pm$ 12.5	2	3.5	750/3	C-2
WF 21M10	21.4	6	3 $\pm$ 6	45 $\pm$ 14	65 $\pm$ 20	2	2.5	1.2k	C-2
WF 21M11	21.4	6	3 $\pm$ 7.5	45 $\pm$ 17.5	65 $\pm$ 25	2	2.5	1.5k	C-2
WF 21M12	21.4	8	3 $\pm$ 3.75	65 $\pm$ 9	85 $\pm$ 12.5	2	4	910/3	D-2
WF 21M13	21.4	8	3 $\pm$ 3.75	65 $\pm$ 9	90 $\pm$ 12.5	2	4	1.6k/1	D-2
WF 21M14	21.4	8	3 $\pm$ 6	65 $\pm$ 14	9 $\pm$ 20	2	3	1.6k/1	D-2
WF 21M15	21.4	8	3 $\pm$ 7.5	65 $\pm$ 17.5	90 $\pm$ 25	2	3	1.6k/1	D-2
WF 21M16	21.4	8	3 $\pm$ 15	65 $\pm$ 35	85 $\pm$ 50	2	3	2.3k/-2	D-2
WF 21M17	21.4	8	3 $\pm$ 3.75	65 $\pm$ 9	90 $\pm$ 12.5	2	4	750/3	D-2
WF 21M18	21.4	8	3 $\pm$ 6	65 $\pm$ 14	90 $\pm$ 20	2	3	1.2k	D-2
WF 21M19	21.4	8	3 $\pm$ 7.5	65 $\pm$ 17.5	90 $\pm$ 25	2	3	1.5k	D-2

\*Specifications subject to change without notice.

(Operating Temperature Range: -20 ~ +70°C)



## MONOLITHIC CRYSTAL FILTER

## 11.5MHz/16.9MHz/21.4MHz Series

WTL Part No.	Nominal Frequency (MHz)	No. of Pole	Pass band Width (dB/kHz)	Stop Band Width		Ripple (dB)	Insertion Loss (dB)	Terminating Imp. ( $\Omega$ /pF)	Case
				(dB) (kHz)	(dB) (kHz)				
WF 11UA15	11.5	2	3 $\pm$ 3.75	18 $\pm$ 25	---	0.5	2	2.4k/2	49/T-3
WF 11UB15	11.5	4	3 $\pm$ 3.75	40 $\pm$ 25	---	1	2.5	2.4k/2 Cc-5pF	49/T-3 (x2)
WF 11F01	11.5	6	6 $\pm$ 7.5	60 $\pm$ 22.5	---	2	3	2.4k	C1
WF 11F02	11.5	8	6 $\pm$ 7.5	60 $\pm$ 15	80 $\pm$ 20	2	4	2.4k	D1
WF 11F03	11.5	10	6 $\pm$ 7.5	75 $\pm$ 15	90 $\pm$ 17.5	2	4	2.4k	E1
WF 11UA30	11.5	2	3 $\pm$ 15	18 $\pm$ 50	---	0.5	2	5.5k/-1.5	49/T-3
WF 11UB30	11.5	4	3 $\pm$ 15	40 $\pm$ 50	---	1	2.5	5.5k/-1.5 Cc-0pF	49/T-3 (x2)
WF 11F04	11.5	6	6 $\pm$ 15	60 $\pm$ 45	---	2	2.5	5.5k/-1.5	C1
WF 11F05	11.5	8	6 $\pm$ 15	70 $\pm$ 35	80 $\pm$ 20	2	4	5.5k/-1.5	D1
WF 16UA15	16.9	2	3 $\pm$ 7.5	18 $\pm$ 28	---	0.5	2	1.2k/4	49/T-3
WF 16UB15	16.9	4	3 $\pm$ 7.5	40 $\pm$ 25	---	1	2.5	1.2k/1 Cc-11.5pF	49/T-3 (x2)
WF 16F01	16.9	6	6 $\pm$ 7.5	60 $\pm$ 22.5	---	2	3	1.2k	C1
WF 16F02	16.9	8	6 $\pm$ 7.5	60 $\pm$ 15	80 $\pm$ 20	2	4	1.2k	D1
WF 16UA320	16.9	2	3 $\pm$ 10	18 $\pm$ 34	---	0.5	2	1.5k	49/T-3
WF 16UB20	16.9	4	3 $\pm$ 10	35 $\pm$ 34	---	1	2	1.5k Cc-6pF	49/T-3 (x2)
WF 21UA15	21.4	2	3 $\pm$ 7.5	18 $\pm$ 30	---	0.5	2	1k/3	49/T-3
WF 21UB15	21.4	4	3 $\pm$ 7.5	40 $\pm$ 25	---	1	2.5	1k/1 Cc-9pF	49/T-3 (x2)
WF 21F01	21.4	6	6 $\pm$ 7.5	60 $\pm$ 22.5	---	2	3	1k/1	C1
WF 21F02	21.4	8	6 $\pm$ 7.5	60 $\pm$ 15	65 $\pm$ 20	2	4	1k/1	D1
WF 21F03	21.4	10	6 $\pm$ 7.5	75 $\pm$ 15	90 $\pm$ 17.5	2	5	1k/1	E1
WF 21F04	21.4	12	6 $\pm$ 7.5	75 $\pm$ 12.5	90 $\pm$ 14	2	5	1k/1	F1
WF 21UA20	21.4	2	3 $\pm$ 10	18 $\pm$ 35	---	0.5	2	1k/2	49/T-3
WF 21UB20	21.4	4	3 $\pm$ 10	40 $\pm$ 35	---	1	2.5	1k Cc-4pF	49/T-3 (x2)
WF 21UA30	21.4	2	3 $\pm$ 15	18 $\pm$ 50	---	0.5	2	1.5k	49/T-3
WF 21UB30	21.4	4	3 $\pm$ 15	40 $\pm$ 50	---	1	2.5	1.5k Cc-3pF	49/T-3 (x2)
WF 21F05	21.4	6	3 $\pm$ 3.75	45 $\pm$ 8.75	65 $\pm$ 12.5	2	3	910/3	C1
WF 21F06	21.4	6	3 $\pm$ 3.75	45 $\pm$ 8.75	65 $\pm$ 12.5	2	3	1.6k//1	C1
WF 21F07	21.4	6	3 $\pm$ 6	45 $\pm$ 14	65 $\pm$ 20	2	2.5	1.6k/1	C1
WF 21F08	21.4	6	3 $\pm$ 7.5	45 $\pm$ 17.5	65 $\pm$ 25	2	2.5	1.6k/1	C1
WF 21F09	21.4	6	3 $\pm$ 15	45 $\pm$ 35	65 $\pm$ 50	2	2.5	2.3k/2	C1
WF 21F10	21.4	8	3 $\pm$ 3.75	65 $\pm$ 9	90 $\pm$ 12.5	2	4	910/3	D1
WF 21F11	21.4	8	3 $\pm$ 3.75	65 $\pm$ 9	90 $\pm$ 12.5	2	4	1.6k/1	D1
WF 21F12	21.4	8	3 $\pm$ 6	65 $\pm$ 14	90 $\pm$ 20	2	3	1.6k/1	D1
WF 21F13	21.4	8	3 $\pm$ 7.5	65 $\pm$ 17.5	90 $\pm$ 2.5	2	3	1.6k/1	D1

(Operating Temperature Range: -20 ~ +70°C)



## MONOLITHIC CRYSTAL FILTER

## MCF with Transformers

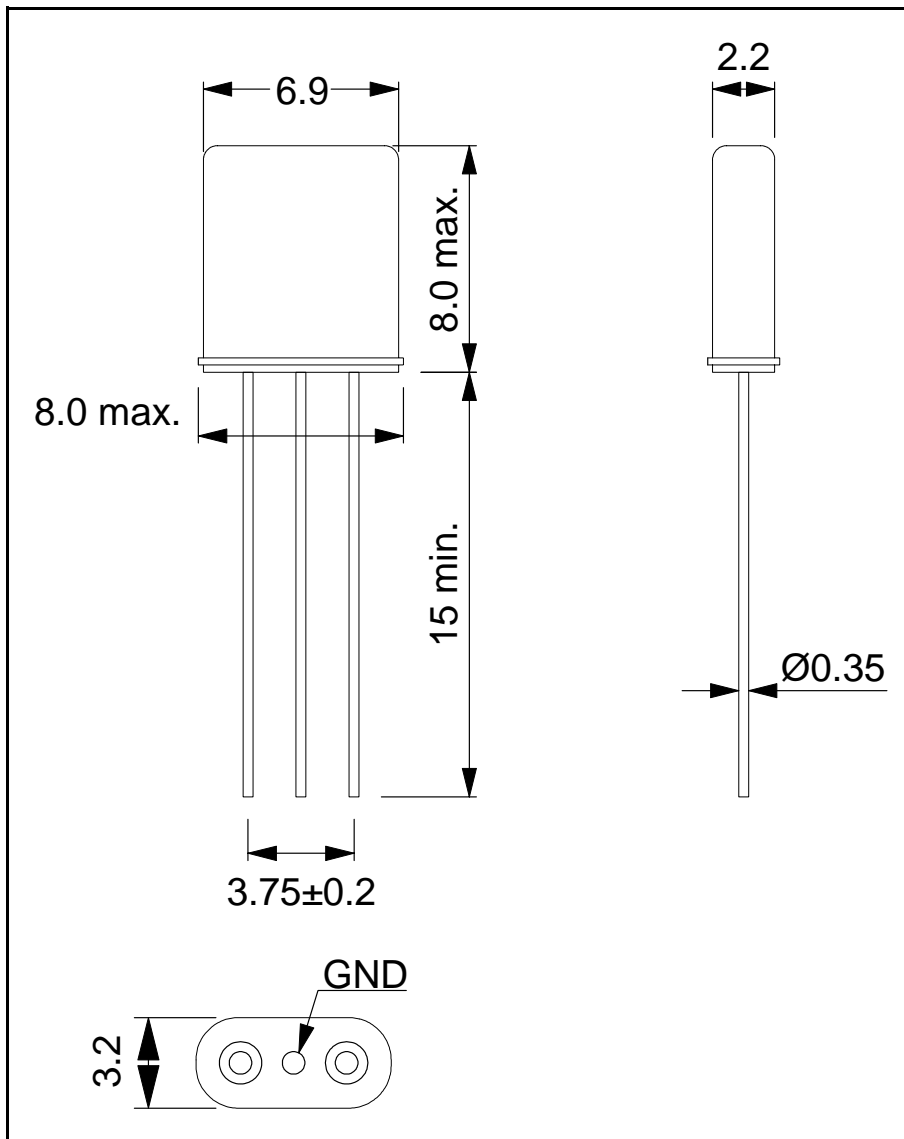
WTL Part No.	Nominal Frequency (MHz)	No. of Pole	Pass band Width (dB/kHz)	Stop Band Width		Ripple (dB)	Insertion Loss (dB)	Terminating Imp. ( $\Omega$ /pF)	Case
				(dB) (kHz)	(dB) (kHz)				
WF 10A01	10.7	6	3 $\pm$ 3.75	45 $\pm$ 8.75	65 $\pm$ 12.5	2	3.5	910/25	T12
WF 10A02	10.7	6	3 $\pm$ 6	45 $\pm$ 14	65 $\pm$ 20	2	3	910/25	T12
WF 10A03	10.7	6	3 $\pm$ 7.5	45 $\pm$ 17.5	65 $\pm$ 25	2	3	910/25	T12
WF 10A04	10.7	6	3 $\pm$ 15	45 $\pm$ 35	65 $\pm$ 50	2	3	910/25	T12
WF 10A05	10.7	8	3 $\pm$ 3.75	70 $\pm$ 8.75	90 $\pm$ 12.5	2	4	910/25	T12
WF 10A06	10.7	8	3 $\pm$ 6	70 $\pm$ 14	90 $\pm$ 20	2	3.5	910/25	T12
WF 10A07	10.7	8	3 $\pm$ 7.5	70 $\pm$ 17.5	90 $\pm$ 25	2	3.5	910/25	T12
WF 10A08	10.7	8	3 $\pm$ 15	70 $\pm$ 35	80 $\pm$ 50	2	3.5	910/25	T12
WF 10B01	10.7	8	3 $\pm$ 3.75	70 $\pm$ 8.75	90 $\pm$ 12.5	2	4	910/25	T11
WF 10B02	10.7	8	3 $\pm$ 6	70 $\pm$ 14	90 $\pm$ 20	2	3.5	910/25	T11
WF 10B03	10.7	8	3 $\pm$ 7.5	70 $\pm$ 17.5	90 $\pm$ 25	2	3.5	910/25	T11
WF 10B04	10.7	8	3 $\pm$ 15	70 $\pm$ 35	80 $\pm$ 50	2	3.5	910/25	T11
WF 10P01	10.7	8	3 $\pm$ 3.75	70 $\pm$ 8.75	90 $\pm$ 12.5	2	4	910/25	T3
WF 10P02	10.7	8	3 $\pm$ 6	70 $\pm$ 14	90 $\pm$ 20	2	3.5	910/25	T3
WF 10P03	10.7	8	3 $\pm$ 7.5	70 $\pm$ 17.5	90 $\pm$ 25	2	3.5	910/25	T3
WF 10P04	10.7	8	3 $\pm$ 15	70 $\pm$ 35	80 $\pm$ 50	2	3.5	910/25	T3
WF 21A01	21.4	6	3 $\pm$ 3.75	45 $\pm$ 8.75	65 $\pm$ 12.5	2	4.5	910/15	T12
WF 21A02	21.4	6	3 $\pm$ 6	45 $\pm$ 14	65 $\pm$ 20	2	3.5	910/15	T12
WF 21A03	21.4	6	3 $\pm$ 7.5	45 $\pm$ 17.5	65 $\pm$ 20	2	3.5	910/15	T12
WF 21A04	21.4	6	3 $\pm$ 15	45 $\pm$ 35	65 $\pm$ 50	2	3.5	910/15	T12
WF 21A05	21.4	8	3 $\pm$ 3.75	70 $\pm$ 9	90 $\pm$ 12.5	2	5	910/15	T12
WF 21A06	21.4	8	3 $\pm$ 6	70 $\pm$ 14	90 $\pm$ 20	2	4	910/15	T12
WF 21A07	21.4	8	3 $\pm$ 7.5	70 $\pm$ 17.5	90 $\pm$ 25	2	4	910/15	T12
WF 21A08	21.4	8	3 $\pm$ 15	70 $\pm$ 35	80 $\pm$ 50	2	4	910/15	T12
WF 21P01	21.4	8	3 $\pm$ 3.75	70 $\pm$ 9	90 $\pm$ 12.5	2	5	910/25	T3
WF 21P02	21.4	8	3 $\pm$ 6	70 $\pm$ 14	90 $\pm$ 20	2	4	910/25	T3
WF 21P03	21.4	8	3 $\pm$ 7.5	70 $\pm$ 17.5	90 $\pm$ 25	2	4	910/25	T3
WF 21P04	21.4	8	3 $\pm$ 7.515	70 $\pm$ 35	80 $\pm$ 50	2	4	910/25	T3
WF 21C01	21.4	8	3 $\pm$ 3.75	65 $\pm$ 9	90 $\pm$ 12.5	2	4.5	470/15	T2
WF 21C02	21.4	8	3 $\pm$ 6	65 $\pm$ 14	90 $\pm$ 20	2	4	470/15	T2
WF 21C03	21.4	8	3 $\pm$ 7.5	65 $\pm$ 17.5	90 $\pm$ 25	2	4	470/15	T2
WF 21C04	21.4	8	3 $\pm$ 15	65 $\pm$ 35	80 $\pm$ 50	2	4	470/15	T2

(Operating Temperature Range: -20 ~ +70°C)

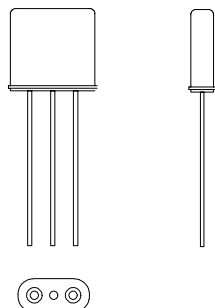


MONOLITHIC CRYSTAL FILTER

### MCF 45 MHz (FUNDAMENTAL)



Enlarged View



Actual Size Above 1=1

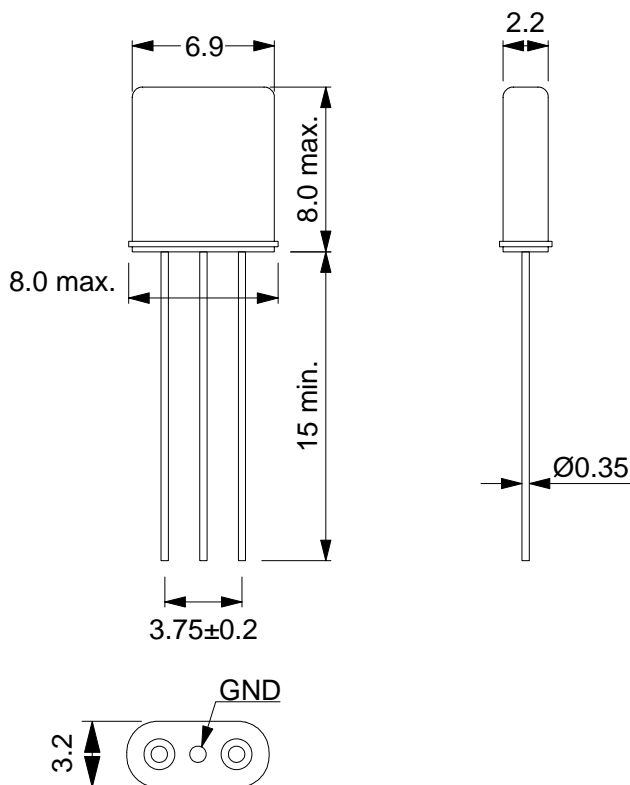


**MONOLITHIC CRYSTAL FILTER**

**For UHF Communication (FUNDAMENTAL)**

WTL Part No.	Nominal Frequency (MHz)	No. of Pole	Pass band Width (dB/kHz)	Stop Band Width		Ripple (dB)	Insertion Loss (dB)	Terminating Imp. (Ω /pF)	Case
				(dB) (kHz)	(dB) (kHz)				
WF 45F15A	45	2	3/ ± 7.5	18/ ± 28	--	1.0	2.0	600/1.5	UM1-3
WF 45F15B	45	4	3/ ± 7.5	40/ ± 30	--	1.0	3.0	600/1.5	UM1-3 (x2)
WF 45F15C	45	6	3/ ± 7.5	65/ ± 25	--	2.0	5.0	600/1.5	D2
WF 45F20A	45	2	3/ ± 10	15/ ± 30	--	1.0	2.0	910/2.5	UM1-3
WF 45F20B	45	4	3/ ± 10	35/ ± 40	--	1.0	3.0	910/2.5	UM1-3 (x2)
WF 45F20C	45	6	3/ ± 10	65/ ± 35	--	2.0	5.0	910/2.5	D2
WF 45F30A	45	2	3/ ± 15	15/ ± 50	--	1.0	2.0	1200/1.5	UM1-3
WF 45F30B	45	4	3/ ± 15	35/ ± 50	--	1.0	3.0	1200/1.5	UM1-3 (x2)
WF 55F20A	45	2	3/ ± 15	15/ ± 30	--	1.0	2.5	700/1.5	UM1-3
WF 55F30A	45	2	3/ ± 15	15/ ± 50	--	1.0	2.5	1000/1.5	UM1-3 (x2)

**UM-1**



(Operating Temperature Range: -20 ~ +70°C)

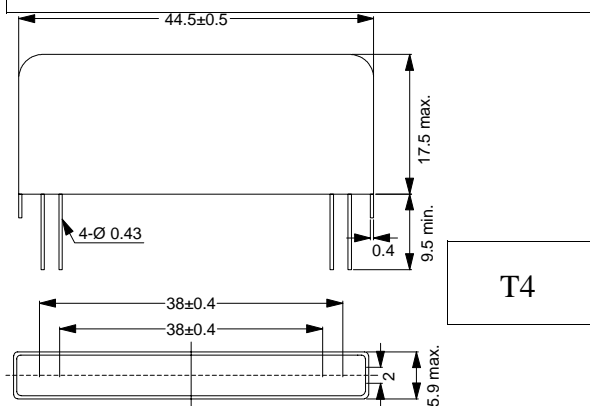
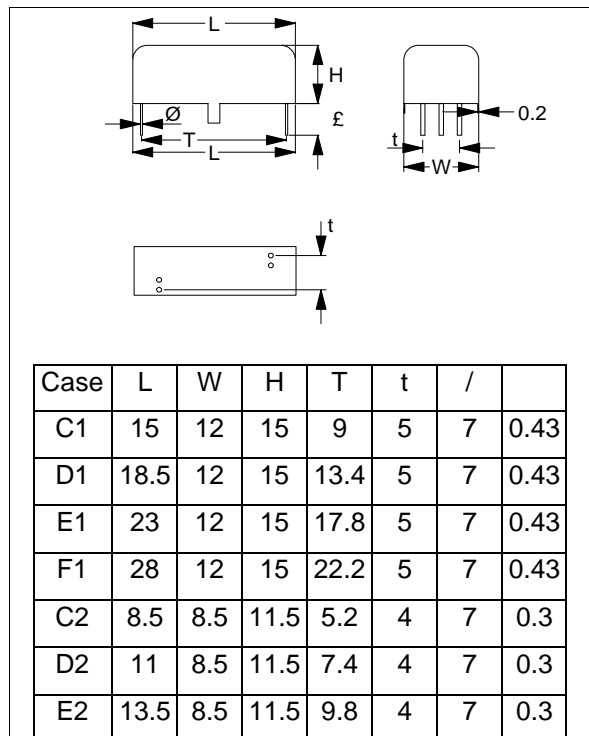
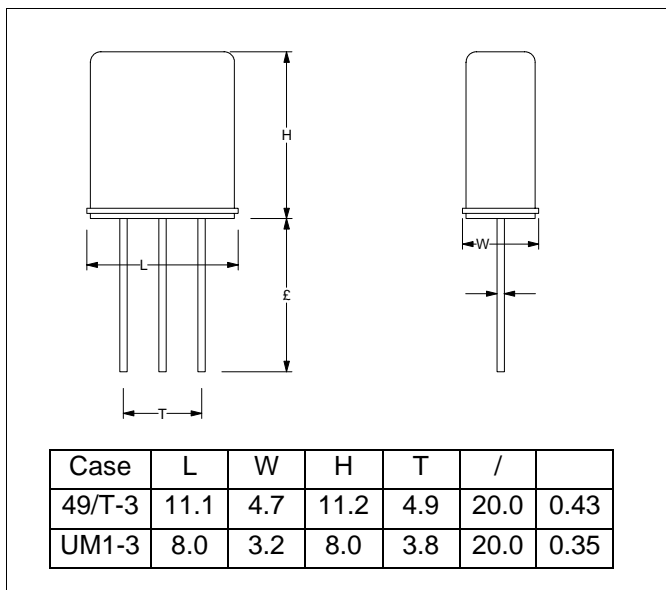
**MONOLITHIC CRYSTAL FILTER****For UHF Communication (3RD OVERTONE)**

WTL Part No.	Nominal Frequency (MHz)	No. of Pole	Pass band Width (dB/kHz)	Stop Band Width		Ripple (dB)	Insertion Loss (dB)	Terminating Imp. ( /pF)	Case
				(dB) (kHz)	(dB) (kHz)				
WF 45MA15	45	2	3/ ± 7.5	15/ ± 22	40/-200	0.5	1.5	3k/-1	UM1-3
WF 45MB15	45	4	3/ ± 7.5	25/ ± 22	80/-200	1.0	3.0	3k/-1	UM1-3 (x2)
WF 45MA20	45	2	3/ ± 10	15/ ± 30	40/-200	0.5	1.5	3k/-1	UM1-3
WF 45MB20	45	4	3/ ± 10	25/ ± 25	80/-200	3.0	3.0	3k/-1	UM1-3 (x2)
WF 45MA7.5	45	2	3/ ± 3.75	18/ ± 18		2.0	2.0	3k/-0.5	UM1-3
WF 45MB7.5	45	4	3/ ± 3.75	40/ ± 15		4.0	4.0	3k/-0.5	UM1-3 (x2)
WF 45MBA14	45	4	3/ ± 7.0	40/ ± 25		3.0	3.0	4k/-1	UM1-3 (x2)
WF 55MA20	55	2	3/ ± 10	15/ ± 30		2.0	2.0	3k/-1.0	UM1-3
WF 55MB20	55	4	3/ ± 10	40/ ± 50		3.0	3.0	3k/-1.0	UM1-3 (x2)
WF 58MA15	58.1125	2	3/ ± 7.5	18/ ± 28		2.0	2.0	3k/-1.0	UM1-3
WF 58MB15	58.1125	4	3/ ± 7.5	30/ ± 25		3.0	3.0	3k/-1.0	UM1-3 (x2)
WF 58MA20	58.1125	2	3/ ± 10	15/ ± 30		2.0	2.0	3k/-1.0	UM1-3
WF 58MB20	58.1125	4	3/ ± 10	40/ ± 50		3.0	3.0	3k/-1.0	UM1-3 (x2)
WF 70MA15	70	2	3/ ± 7.5	15/ ± 25		2.0	2.0	2k/-1.0	UM1-3
WF 70MB15	70	4	3/ ± 7.5	40/ ± 35		4.0	4.0	2k/-1.0	UM1-3 (x2)
WF 70MA20	70	2	3/ ± 10	15/ ± 28		2.0	2.0	2.5k/-1.0	UM1-3
WF 70MB20	70	4	3/ ± 10	35/ ± 40		4.0	4.0	2.5k/-1.0	UM1-3 (x2)
WF 90MA15	90	2	3/ ± 7.5	18/ ± 28		2.0	2.0	2k/-1.0	UM1-3
WF 90MB15	90	4	3/ ± 7.5	40/ ± 30		3.0	3.0	2k/-1.0	UM1-3 (x2)
WF 90MA20	90	2	3/ ± 10	15/ ± 30		2.0	2.0	2.5k/-1.0	UM1-3
WF 90MB20	90	4	3/ ± 10	35/ ± 40		3.0	3.0	2.5k/-1.0	UM1-3 (x2)

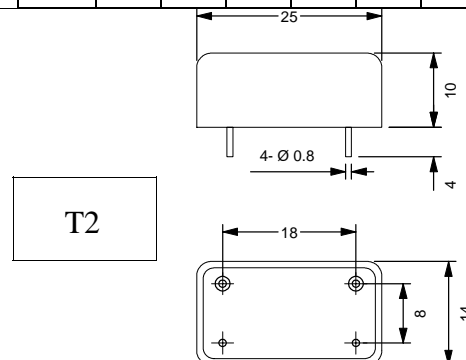
NOTE: Please reference drawing on previous page, 4-11.

MONOLITHIC CRYSTAL FILTER

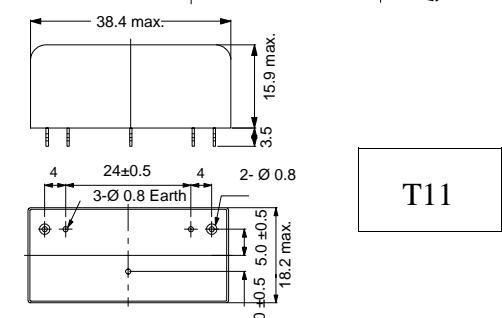
10.7MHz Series



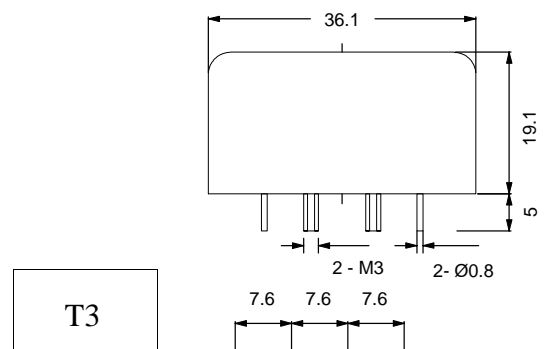
T4



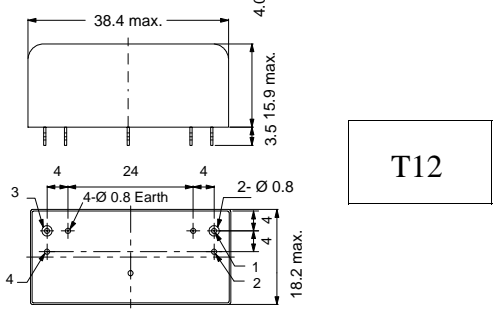
T2



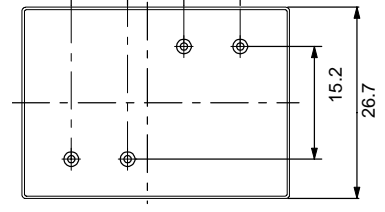
T11



T3



T12

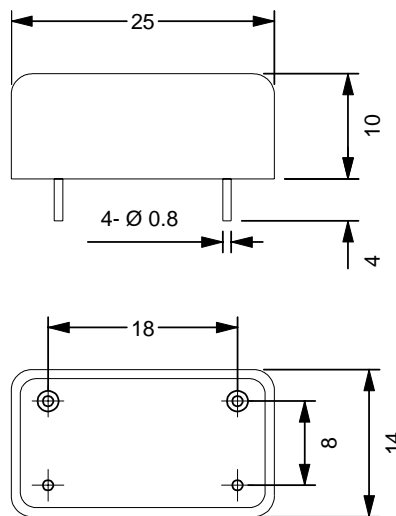




MONOLITHIC CRYSTAL FILTER

10.7MHz Series

T2

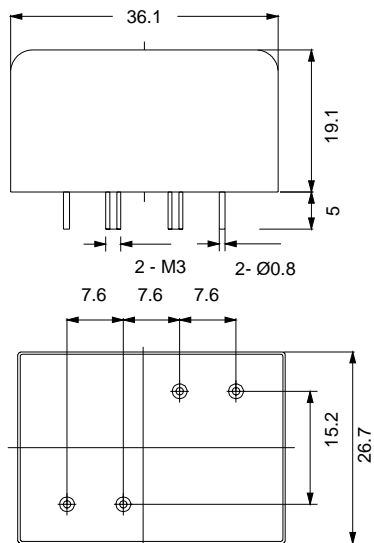




MONOLITHIC CRYSTAL FILTER

10.7MHz Series

T3

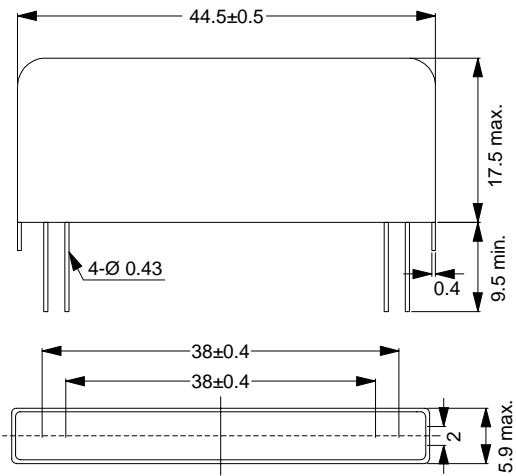




MONOLITHIC CRYSTAL FILTER

10.7MHz Series

T4

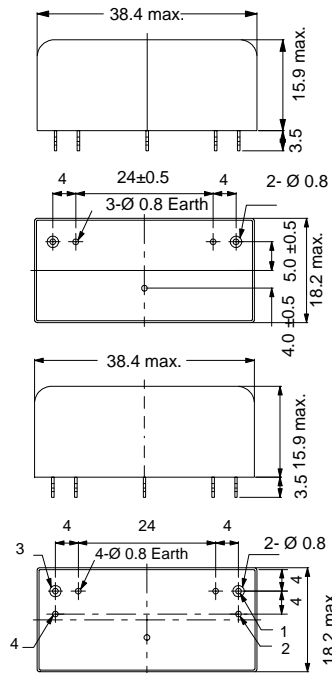




MONOLITHIC CRYSTAL FILTER

10.7MHz Series

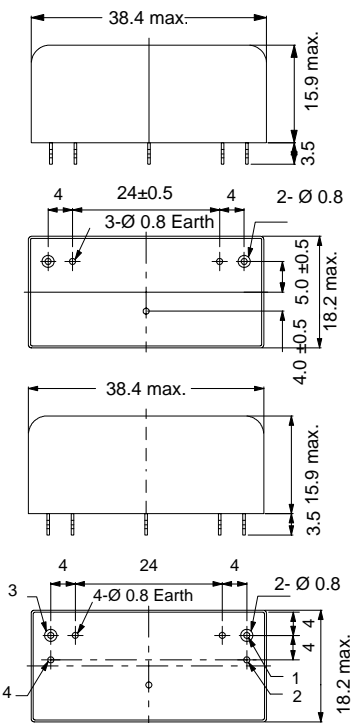
T11



MONOLITHIC CRYSTAL FILTER

10.7MHz Series

T12





**MONOLITHIC CRYSTAL FILTER**

**MCF 45MHz (FUNDAMENTAL)**

**UM-1**

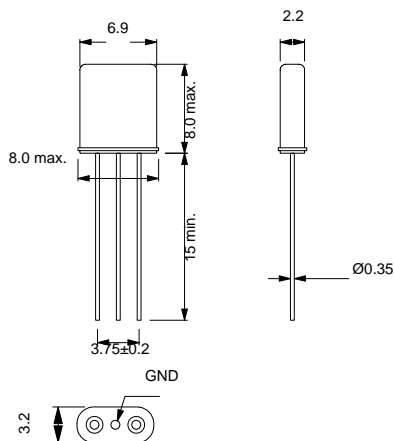
WTL Part No.	No. of Pole	PASS BAND (dB) (kHz)	Attenuation (dB) (kHz)	Ripple (dB)	Insertion Loss (dB)	Guaranteed Attenuation (fo-910kHz) (dB)	Impedance Case
WF 45FA7.5	2	3 ± 3.75	15 ± 30	0.5	2.0	30	350 / 5
WF 45FB7.5	4	3 ± 3.75	40 ± 20	1.0	4.0	60	350 / 5
WF 45FA15	2	3 ± 7.5	15 ± 30	0.5	2.0	40	800 / 2
WF 45FBD15	4	3 ± 7.5	25 ± 22	1.0	3.0	80	800 / 2
WF 45FA20	2	3 ± 10	15 ± 40	0.5	2.0	40	800 / 2
WF 45FBD20	4	3 ± 10	25 ± 25	1.0	3.0	80	800 / 2
WF 45FA30	2	3 ± 15	15 ± 50	1.0	2.0	30	800 / 2
WF 45FBD30	4	3 ± 15	35 ± 50	1.0	3.0	60	800 / 2

(-20 ~ +70°C)

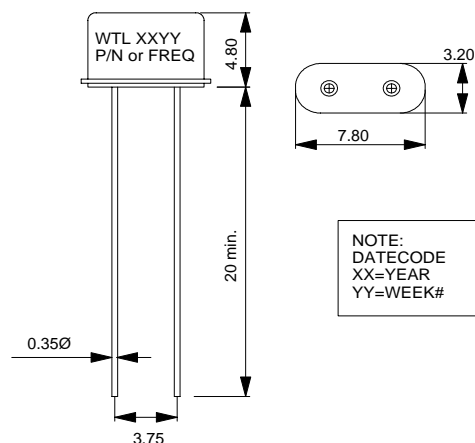
**UM-4**

WTL Part No.	No. of Pole	PASS BAND (dB) (kHz)	Attenuation (dB) (kHz)	Ripple (dB)	Insertion Loss (dB)	Guaranteed Attenuation (fo-910kHz) (dB)	Impedance Case
WF 45Y7.5	2	3 ± 3.75	15 ± 30	0.5	2.0	30	350 / 5
WF 45YBA7.5	4	3 ± 3.75	40 ± 20	1.0	4.0	60	350 / 5
WF 45YA15	2	3 ± 7.5	15 ± 30	0.5	2.0	40	800 / 2
WF 45YBD15	4	3 ± 7.5	25 ± 22	1.0	3.0	80	800 / 2
WF 45YA20	2	3 ± 10	15 ± 40	0.5	2.0	40	800 / 2
WF 45YBD20	4	3 ± 10	25 ± 25	1.0	3.0	80	800 / 2
WF 45YA30	2	3 ± 15	15 ± 50	1.0	2.0	30	800 / 2
WF 45YBD30	4	3 ± 15	35 ± 50	1.0	3.0	60	800 / 2

**UM-1**



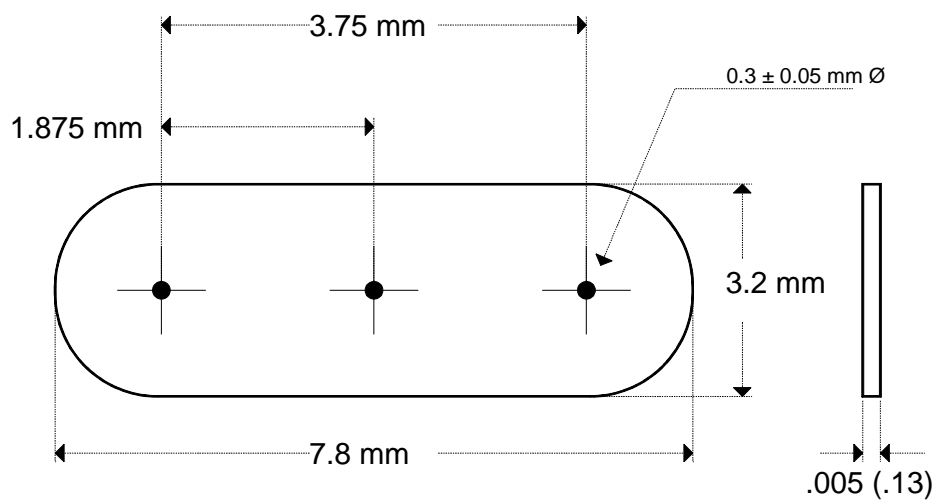
**UM-4**



NOTE:  
DATECODE  
XX=YEAR  
YY=WEEK#



UM CRYSTAL SERIES BASE INSULATOR



PART NUMBER: WTL-7.8/3 BI  
MATERIAL: MYLAR



MONOLITHIC QUARTZ CRYSTAL FILTERS

Supply the Specifications and Fax WTL with your Information

NAME: \_\_\_\_\_ TITLE: \_\_\_\_\_ COMPANY: \_\_\_\_\_  
 ADDRESS: \_\_\_\_\_ PHONE: \_\_\_\_\_ FAX NO: \_\_\_\_\_  
 CITY: \_\_\_\_\_ STATE: \_\_\_\_\_ ZIP: \_\_\_\_\_ EMAIL: \_\_\_\_\_  
 MAIL STOP: \_\_\_\_\_

Quantity Needed

IMMEDIATE: \_\_\_\_\_ DELIVERY REQUIRED: \_\_\_\_\_  
 FUTURE NEEDS: \_\_\_\_\_ APPROX. DELIVERY DATE: \_\_\_\_\_  
 CUSTOMER SPEC. DRAWING NO: \_\_\_\_\_ TARGET PRICE: \_\_\_\_\_ PER \_\_\_\_\_  
 DEVICE TYPE & APPLICATION: \_\_\_\_\_  
 PROJECT DESCRIPTION OR NO.: \_\_\_\_\_

How to Order Custom-Designed WTL Monolithic Crystal Filters

Please provide the following information concerning your crystal requirements

	MHz
1. Nominal Frequency	_____
2. Number of Poles	_____
3. Passband With KHz	_____
4. Passband With dB	_____
5. Ripple Max. dB	_____
6. Insertion Loss Max. dB	_____
7. Stopband With KHz	_____
8. Stopband with dB	_____
9. Attenuation Min. dB	_____
10. Terminal Impedence	_____
11. Operating Temperature Range	_____
12. Case/Holder Size Type	_____
13. Additional specifications, if any:	_____
	_____
	_____