



32.768kHz Family

WTF SERIES -

32.768KHZ

Part No.	P/N	38WTF327	26WTF327	145WTF327
Holder type		3 × 8mm	2 × 6mm	1.4 × 5mm
Nominal frequency at +25°C	F	32.768 kHz		
Frequency tolerance	$\Delta f/F$	A: ± 15 ppm	B: ± 20 ppm	C: ± 30 ppm
Load capacitance	C_L	12.5pF, Typical		
Series resistance	R_S	35k Ω max.	35k Ω max.	40k Ω max.
Drive level	P	1 μ W max.		
Quality factor	Q	50000min.	50000min.	40000min.
Turnover temperature	T_T	+24°C ± 4 °C		
Parabolic curvature constant	K	-0.035ppm/°C ² , Typical		
Shunt capacitance	C_O	1.6pF, Typical	1.35 pF, Typical	1pF, Typical
Capacitance ratio	C_O/C_1	460, Typical	450, Typical	400, Typical
Motional capacitance	C_1	0.0035pF, Typical	0.003pF, Typical	0.0025pF, Typical
Aging	$\Delta f/F$	First year: 3ppm max, at +25°C		
Operating temperature range	T_O	-10°C to +60°C		
Storage temperature range	T_S	-30°C to +70°C		
Shock *	$\Delta f/F$	3ppm max.		
Vibration	$\Delta f/F$	3ppm max.		

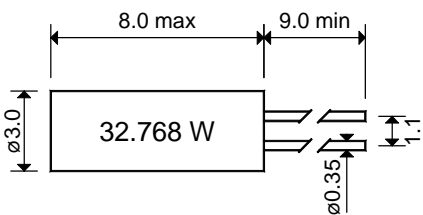
(*) Shock is defined as “Three drops from a height of 75cm onto hardwood.”

WTF

32.768kHz

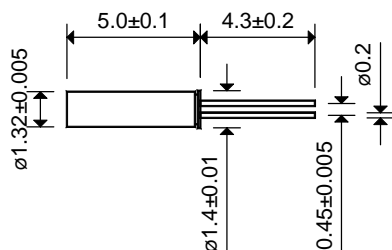
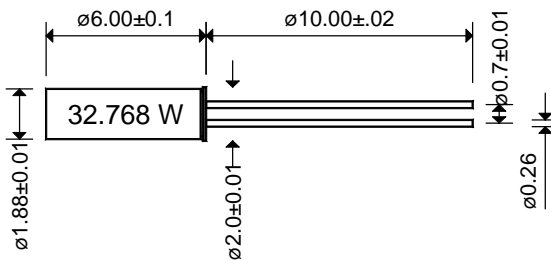
3 X 8 mm

WTL P/N: 38WTF327



2 X 6 mm

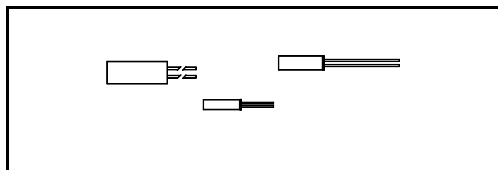
WTL P/N: 26WTF327



1.4 X 5 mm

WTL P/N: 145WTF327

Enlarged View



Actual Size Shown Above 1=1

WTF SERIES -

Technical Data: Quartz Crystals

32.768kHz

QUARTZ CRYSTAL SPECIFICATIONS

Ref No. _____

Date _____

Page: _____ of _____

Customer _____

Part No. _____

Part No. _____

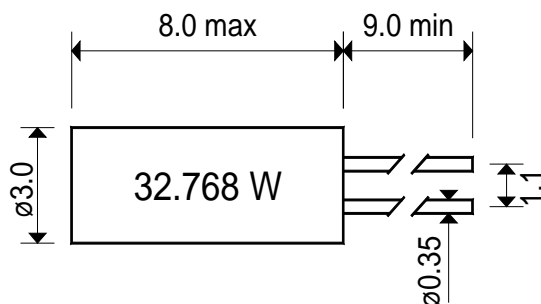
Spec. No. _____

Dwg. or Spec. No.: _____

Rev. _____

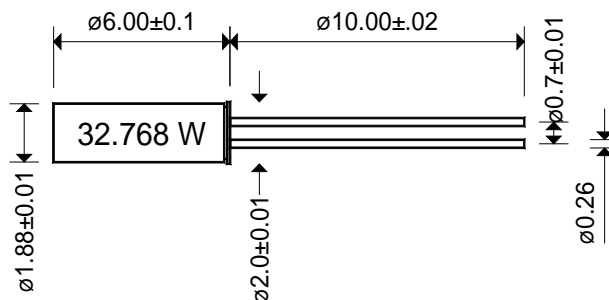
3 X 8 mm

WTL P/N: 38WTF327



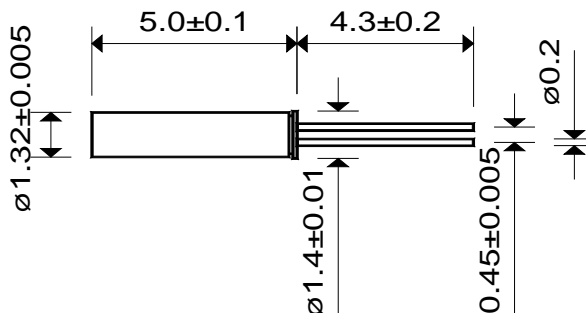
2 X 6 mm

WTL P/N: 26WTF327



1.4 X 5 mm

WTL P/N: 145WTF327



39M SERIES -

Technical Data: Quartz Crystals

3 X 9mm

QUARTZ CRYSTAL SPECIFICATIONS

Ref No. _____
 Date _____
 Page: _____ of _____

Customer _____
 Part No. _____ Part No. _____
 Spec. No. _____ Dwg. or Spec. No.: _____ Rev. _____

ELECTRICAL

- 1.0 Operating Temperature Range _____°C to _____°C
- 2.0 Frequency Temperature Stability = ± _____% over _____°C to _____°C.

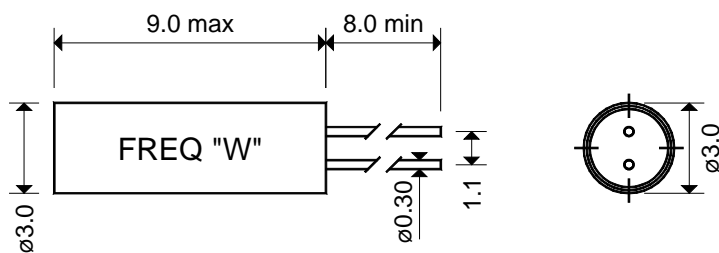
3.0 Specifications at 25°C ± 2°C:	Value	Units
3.1 Frequency		MHz
3.2 Frequency Calibration Tolerance		± %
3.3 Pullability		
3.4 Load Capacitance		pF
3.5 Effective Series Resistance		Ohms, Max.
3.6 Drive level-correlation/operating		mW
3.7 Shunt Capacitance		pF, Max.
3.8 Oscillation Mode		
3.9 Aging Rate		ppm/yr
3.10 Test Circuit	Saunders 150C	

MECHANICAL

- 4.0 Holder Type: 3 X 9mm
- 4.1 Marking: One line on side.

OTHER SPECS

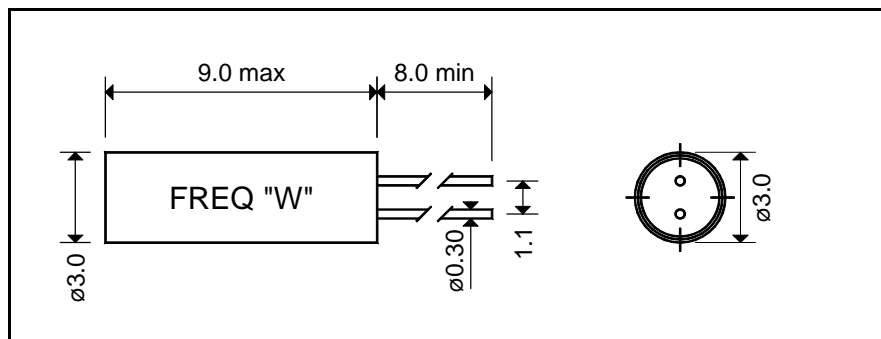
3 X 9mm



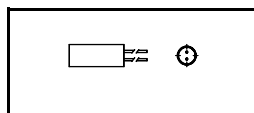


39M SERIES -

3 X 9mm



Enlarged View



Actual Size Shown Above 1=1

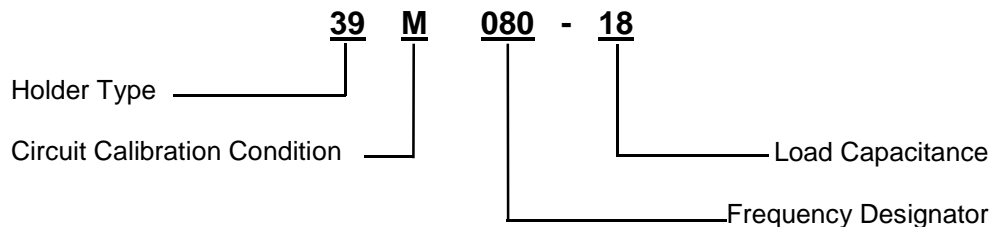


STANDARD SPECIFICATIONS

NOTES

- | | | |
|-------------------------------------|---------------------------------------|--|
| 1. Holder type | 3 × 9mm | |
| 2. Frequency range | 3.579545 MHz to 75.000000 MHz | |
| 3. Calibration tolerance* | ±30 ppm (±0.003%) at + 25°C | |
| 4. Temperature stability tolerance* | ±50 ppm (±0.005%) over -20°C to +70°C | |
| 5. Shunt capacitance | 7 pF max. | |
| 6. Drive Level | 0.5 mW max. | |
| 7. Cut | AT-Cut | |
| 8. Marking | WTL Part No., Frequency, Date Code. | |

PART NUMBERING GUIDE



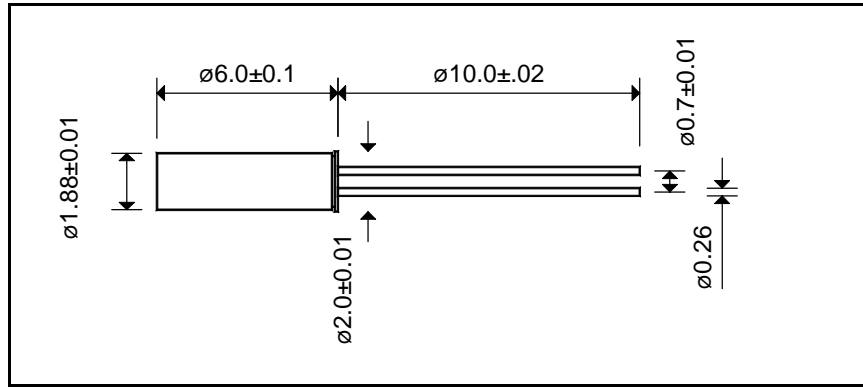
EXAMPLE

CIRCUIT CALIBRATION CONDITION	FREQUENCY	Holder Type	PART NO.
Parallel Resonance C _L =18pF	8.000000 MHz	3 × 9mm	39M080-18
Series Resonance=S	8.000000 MHz	3 × 9mm	39S080

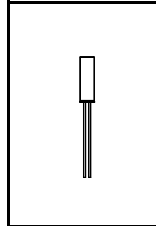
*NOTE: Call factory for tighter “tolerance/stability” specification.



26M SERIES - 2 X 6mm Family



Enlarged View



Actual Size Shown Above 1=1



3 × 9mm Family (AT-Cut)

39M SERIES - 3 X 9mm Family

FREQUENCY MHZ	FREQUENCY DESIGNATOR	MAXIMUM EQUIVALENT SERIES RESISTANCE OHMS
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3.276800	032	200
3.579545	035	200
3.686400	0368	200
3.840000	038	200
3.932160	039	200
3.932200	03932	200
4.000000	040	150
4.032000	0403	150
4.096000	0409	150
4.194304	041	150
4.340198	0434	150
4.433000	04433	150
4.433619	044	150
4.608000	046	150
4.915200	049	150
5.000000	050	120
5.033000	0503	120
5.068800	0506	120
5.980000	0597	120
6.000000	060	100
6.080000	0608	100
6.144000	061	100
6.500000	065	100
7.159090	07159	80
7.250000	072	80
7.372800	073	80
7.680000	0768	80
7.864320	078	80
8.000000	080	80
8.002000	08002	80
8.192000	081	80
8.867238	088	80
9.000000	090	60
9.216000	092	60
9.600000	096	60
9.830400	098	60
10.000000	100	60
10.185000	1018	60
10.240000	1024	60
10.245000	10245	60
10.700000	107	60
10.738635	10738	60
10.752000	1075	60
11.000000	110	60
11.059200	1105	60
11.868000	1186	60
11.980800	1198	60
12.000000	120	60
12.059200	12059	60
12.096000	1209	60
12.272700	12272	60

FREQUENCY MHZ	FREQUENCY DESIGNATOR	MAXIMUM EQUIVALENT SERIES RESISTANCE OHMS
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12.288000	12288	60
12.296000	1229	60
12.800000	128	60
13.000000	130	50
13.500000	135	50
13.700000	137	50
14.000000	140	50
14.318180	143	50
14.745600	147	50
14.985500	14985	50
15.000000	150	50
15.360000	153	50
16.000000	160	50
16.044000	1604	50
16.257000	162	50
16.384000	163	50
16.670000	1667	50
16.934400	169	50
17.600000	176	50
18.432000	184	50
18.600000	186	50
18.867000	188	50
19.069929	19069	50
19.164000	1916	50
19.200000	192	50
19.660800	196	50
19.800000	198	50
20.000000	200	40
22.118400	221	40
22.190000	2219	40
22.500000	225	40
23.347200	23347	40
24.000000	240	40
24.576000	245	40
25.000000	250	40
25.175000	25175	40
25.750000	2575	40
27.000000	270	40
28.322000	28322	40
29.491200	29491	40
30.000000	300	100 3OT
32.000000	320	100 3OT
32.424000	32424	100 3OT
36.000000	360	100 3OT
38.400000	384	100 3OT
40.000000	400	100 3OT
48.000000	480	100 3OT
50.000000	500	100 3OT
57.600000	576	100 3OT
60.000000	600	100 3OT
70.000000	700	100 3OT
75.000000	750	100 3OT

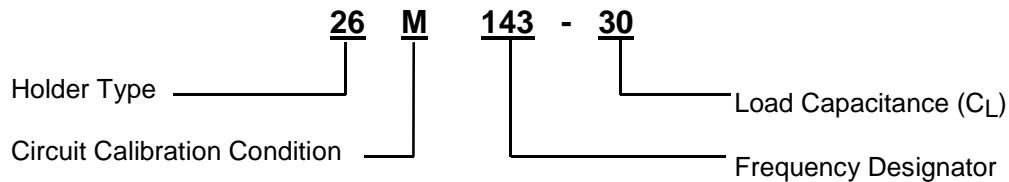
Note: Special frequencies and specifications are available upon request.

STANDARD SPECIFICATIONS

NOTES

- | | |
|------------------------------------|---------------------------------------|
| 1. Holder type | 2 × 6mm |
| 2. Frequency range | 10.000000 MHz to 25.000000 MHz |
| 3. Calibration tolerance | ±50 ppm (±0.005%) at + 25°C |
| 4. Temperature stability tolerance | ±50 ppm (±0.005%) over -20°C to +70°C |
| 5. Shunt capacitance | 7 pF max. |
| 6. Drive Level | 0.5 mW max. |
| 7. Cut | AT-Cut |
| 8. Marking | WTL Part No., Frequency |

PART NUMBERING GUIDE

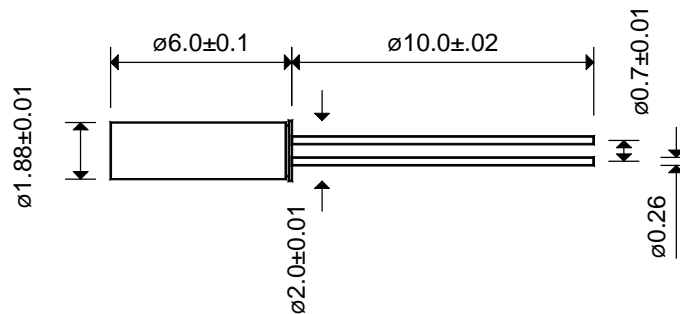


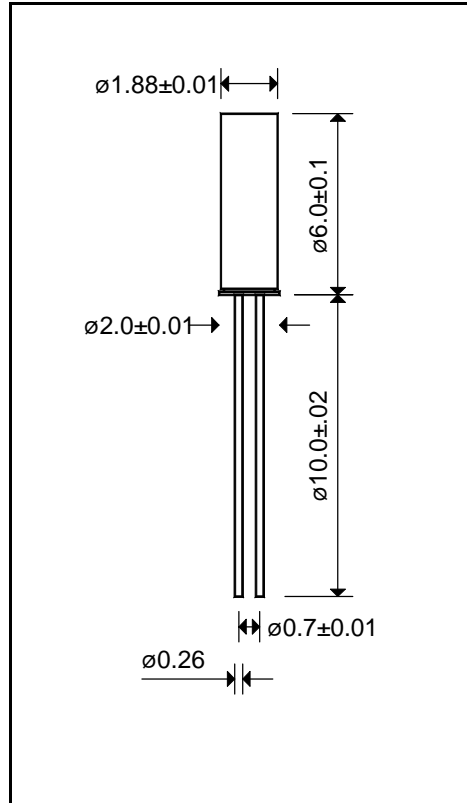
EXAMPLE

CIRCUIT CALIBRATION CONDITION	FREQUENCY	PART NO.
Parallel Resonance=M CL=30pF	14.318180 MHz	26M143.30
Series Resonance=S	14.318180 MHz	26S143

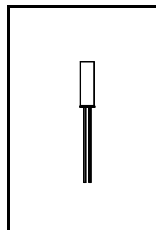
2 × 6mm STANDARD FREQUENCIES

FREQUENCY MHZ	FREQUENCY DESIGNATOR	MAXIMUM EQUIVALENT SERIES RESISTANCE OHMS
12.800000	128	50
14.218750	142	50
14.318180	143	50
16.000000	160	50
17.734475	177	50
20.000000	200	50
24.000000	240	50





Enlarged View



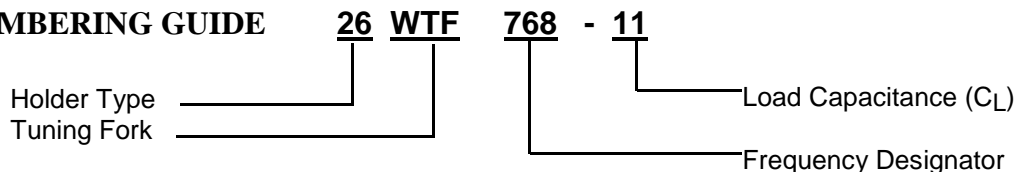
Actual Size Shown Above 1=1

STANDARD SPECIFICATIONS

NOTES

- | | |
|--|-----------------------------|
| 1. Holder type | 2 × 6mm |
| 2. Frequency range | 24.000 kHz to 1,000.000 kHz |
| 3. Calibration tolerance | ±50 ppm (±0.01%) at + 25°C |
| 4. Load capacitance (C _L) | 11 pF, Typical |
| 5. Shunt capacitance (C _O) | 1 pF, Typical |
| 6. Drive Level | 1.0 μW max. |
| 7. Operating temperature range | -10°C to +60°C |
| 8. Cut | X-Cut |
| 9. Marking | WTL Part No., Frequency |

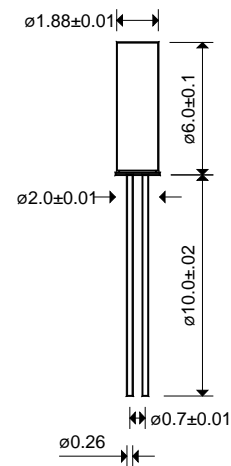
PART NUMBERING GUIDE



EXAMPLE

CIRCUIT CALIBRATION CONDITION	FREQUENCY	PART NO.
Parallel Resonance=M C _L =11pF	76.800 kHz	26STF768-11
Parallel Resonance=M C _L =11pF	100.000 kHz	26STF100.0-11

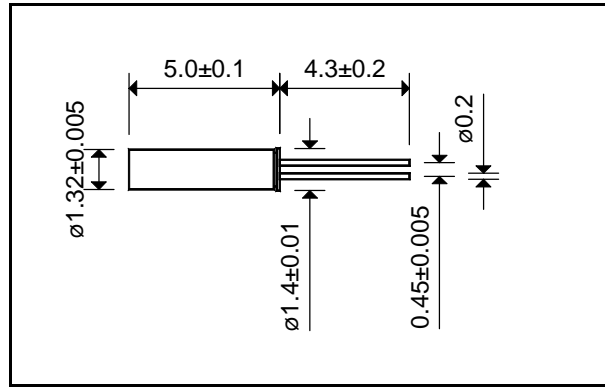
FREQ. KHZ	FREQUENCY DESIGNATOR	MAXIMUM EQUIVALENT SERIES RESISTANCE OHMS	FREQ. KHZ	FREQUENCY DESIGNATOR	MAXIMUM EQUIVALENT SERIES RESISTANCE OHMS
24.0000	240	40	96.0060	96006	30
25.6000	256	40	99.6600	996	30
31.2000	312	40	100.0000	100.0	20
31.2500	3125	40	120.8475	120.8	20
31.5000	315	40	130.0000	130.0	20
32.0000	320	40	131.0720	131.0	20
38.4000	384	40	153.6000	153.6	20
40.0000	400	30	242.6720	242.6	10
49.7100	497	30	262.1440	262.1	10
50.0000	500	30	287.5000	287.5	10
59.7870	597	30	288.0000	288.0	10
60.0000	600	30	300.0000	300.0	10
60.0040	60004	30	301.0000	301.0	10
65.5360	655	30	302.0000	302.0	10
75.0000	750	30	307.2000	307.2	10
76.8000	768	30	600.0000	600.0	10
77.2870	772	30	768.0000	768.0	5
77.5030	775	30	1,000.0000	010	3
96.0000	960	30			



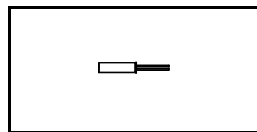
Note: Special Frequencies and specifications are available upon request.



145W SERIES - X 5mm Family



Enlarged View



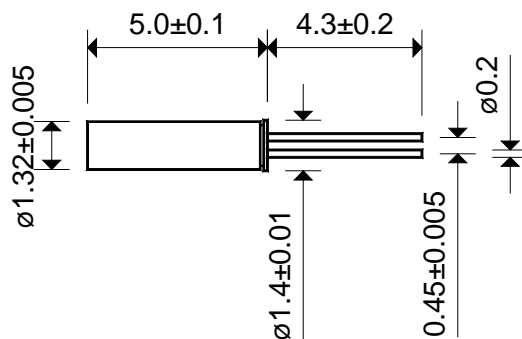
Actual Size Shown Above 1=1

STANDARD SPECIFICATIONS

NOTES

1. Holder type	1.4 × 5mm
2. Frequency range* & Tolerance**	144.000 KHz to 1,008.000 KHz
4. Load capacitance (C _L)	12.5 pF, Typical
5. Shunt capacitance (C _O)	1.0 pF, Typical
6. Drive Level	1.0 μW max.
7. Operating temperature range	-10°C to +60°C
8. Cut	X-Cut
9. Marking	N/A

FREQUENCY* KHZ	PART NUMBER	FREQUENCY TOLERANCE** PPM	MAXIMUM EQUIVALENT SERIES RESISTANCE KOHMS
144.000	145W144.0	±50	10
149.000	145W149.0	±50	10
200.000	145W200.0	±50	5
910.000	145W910.0	±3000	3
920.000	145W920.0	±3000	3
1,000.000	145W01000	±3000	3
1,008.000	145W01008	±3000	3





QUARTZ CRYSTAL TUBULAR TYPE SPECIFICATION RFQ FORM

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 Crystals

Please provide the following information concerning your crystal requirements

- 1. Holder Type _____
2. Nominal Frequency _____ MHz or _____ KHz
3. Frequency Calibration Tolerance (at +25°C) _____ ppm
4. Load Capacitance (CL) _____ pf
5. Temperature Stability Tolerance _____ ppm
6. Operating Temperature Range _____ °C to _____ °C
7. Equivalent Series Resistance (RS) _____ Ω max.
8. Shunt Capacitance (CO) _____ pF max.
9. Drive Level (P) _____ mW max.
10. Harmonic Mode _____ Fundamental or _____ Overtone
11. Quantity pcs. 1st yr. _____ 2nd yr. _____
12. Additional specifications, if any: _____