

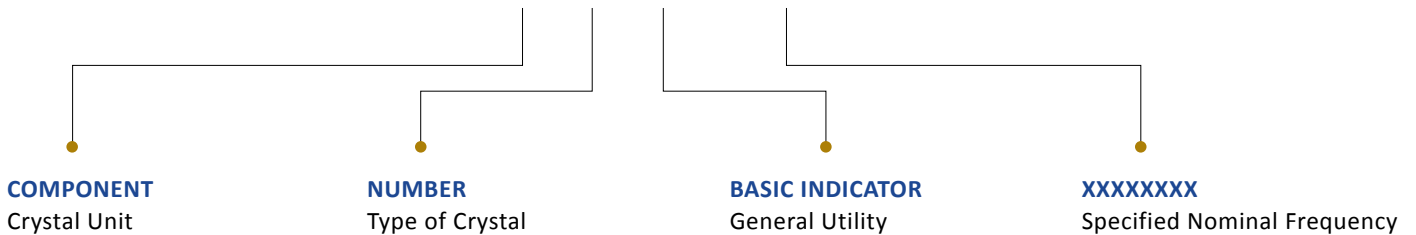
# CR157/U-Series Specifications



**19.23L x 8.95W x 19.70H (mm)**

PDI *HC-51 Series* MIL-PRF-3098 Qualified Product List (QPL) crystal is available in standard or custom frequencies. PDI provides quick-turn sampling for your proto-typing needs, mass production capability, and competitive pricing.

ex) **CR-157-U-7M000000**



Parameter		Frequency Range		Units	
		2.250000 to 20.000000		MHz	
Frequency Tolerance		±50.0		ppm	
Oscillation Mode	Fundamental				
Operating Temperature Range		-55 to +105		°C	
Drive Level	(Max.)	1.0		mW	
Shunt Capacitance (Co)	(Max.)	7.0		pF	
Aging	Per Year	±5.0		ppm	
Shock	Frequency	0.8 MHz to 2.0 MHz	>2.0 MHz to 20.0 MHz	ppm	
	Resistance	±10.0	±5.0	%	
Vibration — Method 201, MIL-STD-202	Frequency	±10.0	±5.0	ppm	
	Resistance	±15.0	±10.0	%	
Temperature Cycling	Frequency	±10.0	±5.0	ppm	
	Resistance	±15.0	±10.0	%	
Frequencies – MHz	Series Resistance – Max.	Units	Frequencies – MHz	Series Resistance – Max.	Units
0.800000 – 0.850000	520	Ohms	>2.120000 – 2.250000	150	Ohms
>0.850000 – 0.900000	480		>2.250000 – 2.600000	130	
>0.900000 – 1.000000	440		>2.600000 – 3.000000	90	
>1.000000 – 1.120000	400		>3.000000 – 3.400000	70	
>1.120000 – 1.250000	380		>3.400000 – 3.750000	52	
>1.250000 – 1.370000	340		>3.750000 – 4.000000	45	
>1.370000 – 1.500000	300		>4.000000 – 5.000000	37	
>1.500000 – 1.620000	280		>5.000000 – 7.000000	25	
>1.620000 – 1.750000	250		>7.000000 – 10.000000	20	
>1.750000 – 1.870000	220		>10.000000 – 15.000000	18	
>1.870000 – 2.000000	190		>15.000000 – 20.000000	15	
>2.000000 – 2.120000	170				

**MIL-PRF-3098 w/Amendment 1 Table I, Screening (100%)**

Test Inspection	Product Level <b>S</b> Method Condition	Product Level <b>B</b> Method Condition
Pre-seal visual examination	4.10.2.2	4.10.2.2
PIND	4.10.16	N/A
Thermal frequency repeatability	4.10.15, 10 cycles	N/A
Frequency	4.10.6; Frequency and resistance shall be measured at the specified reference temperature.	4.10.18
Unwanted modes	4.10.9	N/A
Capacitance	4.10.7	N/A
Shunt	4.10.7.1	N/A
Motional	4.10.7.2	N/A
Quality factor	4.10.8	N/A
Aging	4.10.27.3, 30 days at 85°C, $\Delta f/f \leq 2$ ppm	N/A
Drive sensitivity (Frequency, resistance)	4.10.11, $\Delta f/f \leq 2$ ppm; $R \leq \pm 10\%$ or $\pm 3 \Omega$ whichever is greater	N/A
Vibration	4.10.14, $\Delta f/f \leq 1$ ppm	N/A
Thermal shock	4.10.19.2, $\Delta f/f \leq 1$ ppm	N/A
Insulation resistance	4.10.10	N/A
Coupled modes	4.10.6.2; Resistance shall not exceed the maximum value specified and the frequency shall not deviate from a fourth order equation curve best fit by more than: a) 1 ppm when accompanied by a reversal of slope. b) 1.5 ppm when not accompanied by a reversal of slope.	N/A
Frequency and equivalent resistance at reference temperature	4.10.6; Frequency and resistance shall be measured at the specified reference temperature.	N/A
Frequency and resistance verses temperature (Static)	4.10.6.1	N/A
Seal	4.10.26	4.10.26
Radiographic inspection (When specified)	Per <u>MSFC-STD-355</u>	N/A
Visual (External) and mechanical inspection	4.10.2.1	4.10.2.1

MIL-PRF-3098 w/Amendment 1		Table III, Group A Inspection for Product Level S Crystals	
Inspection	Requirement Paragraph	Method Paragraph	
<b>Subgroup I</b>			
Visual and mechanical inspection (External) 1/	3.5, 3.6, 3.35	4.10.2.2	
Low temperature storage	3.22.3	4.10.18.4	
Reduce drive level 2/	3.18	4.10.17	
Frequency and resistance	3.22	4.10.18	
Frequency stability (Controlled)	3.22.1	4.10.18.2	
Operable temperature range (Controlled)	3.22.2	4.10.18.3	
Capacitance, shunt (When specified)	3.11.1	4.10.7.1	
Unwanted modes	3.13	4.10.9	
Seal	3.24	4.10.26	
<b>Subgroup II</b>			
Accelerated aging	3.29.1	4.10.27.2	
1/ Two sample units only for external dimensions.    2/ Applicable to overtone units and, when specified, fundamental units.			

MIL-PRF-3098 w/Amendment 1		Table III-A, Group A Inspection for Product Level S Crystals	
Inspection	Requirement Paragraph	Method Paragraph	
<b>Subgroup I</b>			
Visual (External) and mechanical	3.5, 3.6, 3.35	4.10.2.2	
Shock	3.17	4.10.13	
Frequency and resistance	3.10	4.10.6	
Resistance vs temperature (R vs T)	3.10.1	4.10.6.1	
Frequency vs temperature (Static temperature run)	3.10.2	4.10.6.1	
Coupled modes (Frequency-resistance anomalies)	3.10.3	4.10.6.2	
Internal gas analysis	3.16	4.10.12	
Unwanted modes	3.13	4.10.9	
Capacitance	3.11	4.10.7	
Capacitance, shunt (When specified)	3.11.1	4.10.7.1	
Capacitance, motional (When specified)	3.11.2	4.10.7.2	
Quality factor ("Q") (When specified)	3.12	4.10.8	
Seal	3.24	4.10.26	
<b>Subgroup II</b>			
Accelerated aging	3.29.1	4.10.27.4	
Drive sensitivity (Of frequency and resistance)	3.15	4.10.11	
1/ Two sample units only for external dimensions.    2/ Applicable to overtone units and, when specified, fundamental units.			

**MIL-PRF-3098 w/Amendment 1      Table VI, Group B Inspection for Product Level S Crystals**

<b>MIL-PRF-3098 w/Amendment 1      Table VI, Group B Inspection for Product Level S Crystals</b>		
<b>Subgroup I 1/</b>		
Solderability	3.7	4.10.3
Resistance to solvents (4 sample units)	3.8	4.10.4
Shock (Specified pulse)	3.1.7	4.10.13
Vibration	3.19.1	4.10.15.1
Thermal shock	3.23	4.10.19.1
Seal	3.24	4.10.26
Salt atmosphere (Corrosion)	3.27	4.10.21
Moisture resistance	3.28	4.10.22
Terminal strength 2/	3.30	4.10.23
Visual and mechanical examination (Internal) 2/	3.5, 3.6, 3.35	4.10.2.2
Bond strength (When specified) 2/	3.31	4.10.24
<b>Subgroup II 3/</b>		
Insulation resistance	3.14	4.10.10
Aging	3.29	4.10.27.1
<p>1/ If the contractor can demonstrate that any of these tests have been performed for three consecutive periods with zero failures, the frequency of this test, with the approval of the qualifying activity, can be performed every 36 months. If the design, material, construction, or processing of the crystal units change, or if there are any quality problems or failures, the qualifying activity may require resumption of the original test frequency.</p> <p>2/ Only two units are required. These two samples units shall be subjected to terminal strength, visual and mechanical (Internal), and bond strength (When specified see 3.1).</p> <p>3/ If the contractor can demonstrate that any of these tests have been performed for six consecutive periods with zero failures, the frequency of this test, with the approval of the qualifying activity, can be performed every 36 months. If the design, material, construction, or processing of the crystal units change, or if there are any quality problems or failures, the qualifying activity may require resumption of the original test frequency.</p>		

**MIL-PRF-3098 w/Amendment 1      Table VI-A, Group B Inspection for Product Level S Crystals**

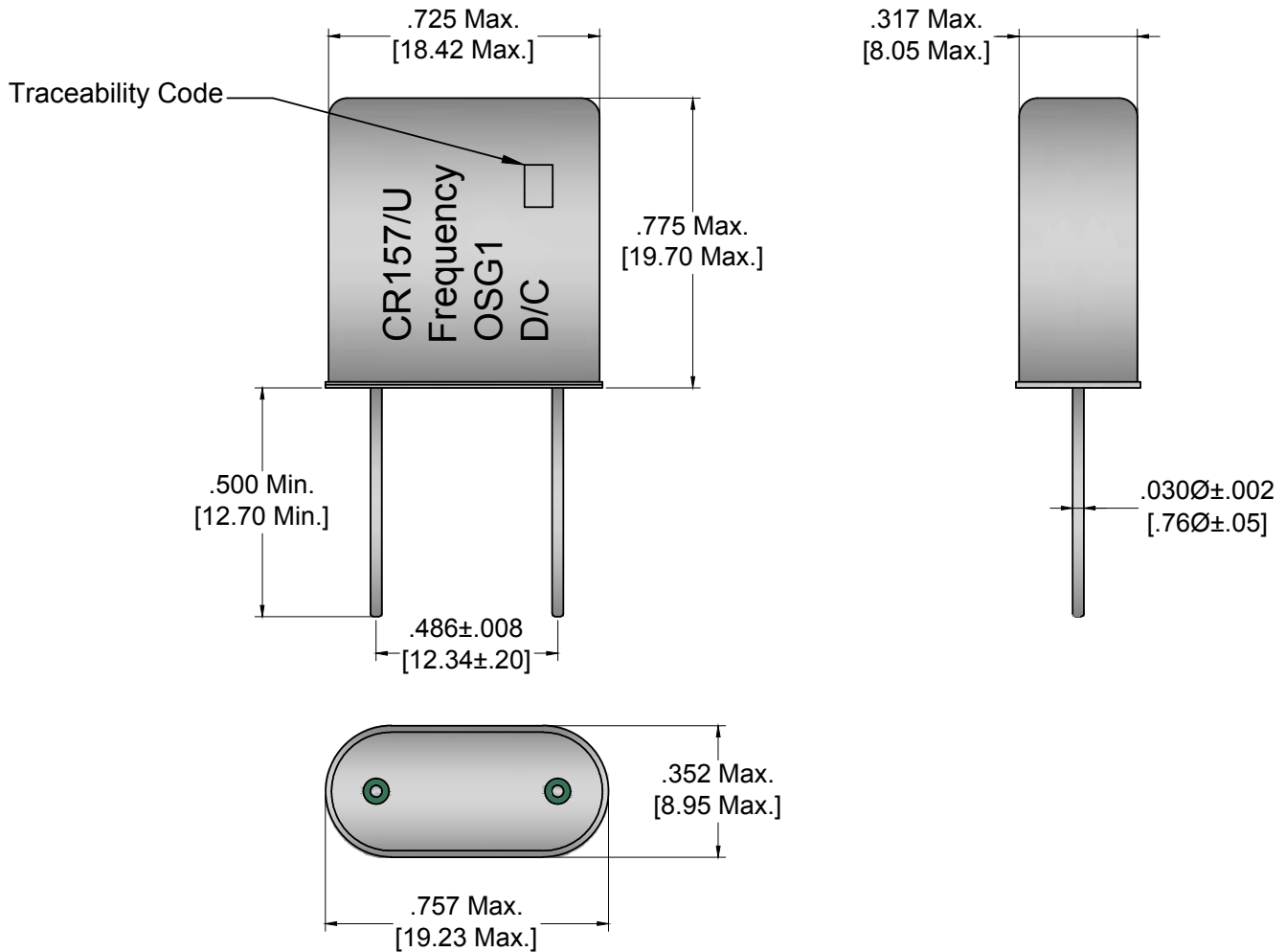
<b>Subgroup I</b>		
Solderability or lead attachment 1/	3.7	4.10.3
Ceramic package (When applicable)	3.7.1	4.10.3.1
Resistance to solvents (4 sample units)	3.8	4.10.4
Vibration, acceleration, and acoustical noise	3.19	4.10.14
Vibration (Frequency and resistance offset) (When specified)	3.19.1	4.10.14.1
Acceleration sensitivity (Vibration) (When specified)	3.19.2	4.10.14.2
Frequency and resistance offset (Steady state acceleration) (When specified)	3.19.3	4.10.14.3
Acceleration sensitivity (Steady state) (When specified)	3.19.4	4.10.14.4
Acoustical noise (When specified)	3.19.5	4.10.14.5
Thermal shock	3.23	4.10.19.2
Thermal time constant (When specified)	3.25	4.10.20
Frequency overshoot	3.25.1	4.10.20.1
Thermal frequency repeatability (When specified)	3.20	4.10.15
Thermal frequency hysteresis	3.20.1	4.10.15.2
Resistance to soldering heat	3.9	4.10.5
Moisture resistance	3.28	4.10.22
Salt atmosphere (Corrosion)	3.27	4.10.21
Particle impact noise detection (PIND) (When specified)	3.21	4.10.16
Terminal strength (Two sample units)	3.30	4.10.23
Terminal pull (When applicable)	3.30.1	4.10.23.1
Terminal bend (When applicable)	3.30.2	4.10.23.2
Wire-lead bend (When applicable)	3.30.3	4.10.23.3
Wire-lead twist (When applicable)	3.30.4	4.10.23.4
Visual (Internal) 1/	3.5, 3.6, 3.35	4.10.2.2
<b>Subgroup II</b>		
Insulation resistance	3.14	4.10.10
Aging	3.29	4.10.27.3
Radiation hardness	3.32	4.10.28
Total dose (When specified)	3.32.1	4.10.28.1
Dose rate (When specified)	3.32.2	4.10.28.2
Neutrons (When specified)	3.32.3	4.10.28.3
Accumulated time error (When specified)	3.32.4	4.10.28.4

1/ Six sample units other than those from terminal strength.

# CR157/U-Series 19.23 x 8.95 x 19.70 (mm)



PDI HC-51 Series MIL-PRF-3098 Qualified Product List (QPL) crystal is available in standard or custom frequencies. PDI provides quick-turn sampling for your proto-typing needs, mass production capability, and competitive pricing.



**NOTES:**

The product described in this spec. consist of this specification and MIL-PRF-3098.

Decimal XXX =  $\pm .008$ , XX =  $\pm .020$  Metric [XXX =  $\pm .20$ ], [XX =  $\pm .50$ ]

Specifications subject to change without notice, last updated 4/1/13.