

# Coaxial Reflectionless Low Pass Filter

## ZXLF-Series

50Ω DC to 20 GHz

### The Big Deal

- Patented design terminates stopband signal internally
- Stopband performance up to 40 GHz
- Small In-line package size of 0.80" x 0.56"



CASE STYLE: RA2937

### Product Overview

Mini-Circuits' ZXLF Series of reflectionless filters employ a novel filter topology which absorbs and terminates stop band signals internally rather than reflecting them back to the source. Reflectionless filters minimize the stopband reflections, thereby allowing them to be paired with sensitive devices and be used in applications that otherwise require circuits such as isolation amplifiers or attenuators. This is developed in a new broadband connectorized package that delivers stable performance over temperature.

### Key Features

Feature	Advantages
Easy integration with sensitive reflective components, e.g. mixers, multipliers	Reflectionless filters absorb unwanted signals, preventing reflections back to the source. This reduces generation of additional unwanted signals without the need for extra components like attenuators, improving system dynamic range.
Cascadable	Reflectionless filters can be cascaded in multiple sections to provide sharper and higher attenuation, while also preventing any standing waves that could affect pass band signals.
Excellent stability over temperature	Ensures minimal variation in electrical performance across temperature.
Wide Operating temperature from -40 to +85°C	Suitable for use in wide temperature range applications.
Broadband connectorized package	The connectorized package works well even in high frequencies and easy to interface with other devices. This is well suited for test setups.



# Coaxial Reflectionless Low Pass Filter

50Ω DC to 9.6 GHz

## ZXLF-K962+



Generic photo used for illustration purposes only

CASE STYLE: RA2937  
 Connectors Model  
 2.92mm-F to 2.92mm-M ZXLF-K962+

**+RoHS Compliant**

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

### Features

- Match to 50Ω in the stop band, eliminates undesired reflections
- Cascadable
- Temperature stable, up to 85°C
- Protected by US Patent No. 8,392,495

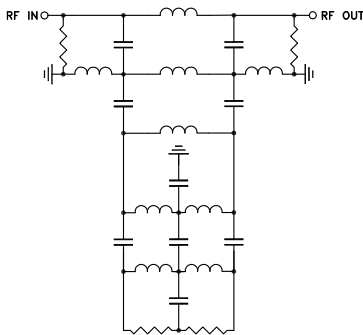
### Applications

- Harmonics Rejection
- Satellite
- Radar
- Military & Space

### Electrical Specifications at 25°C

Parameter	F#	Frequency (MHz)	Min.	Typ.	Max.	Unit	
Pass Band	Insertion Loss	DC-F1	DC-9600		1.45	2.2	dB
	Freq. Cut-off	F2	12000		3.0		dB
	VSWR	DC-F1	DC-9600		1.4		:1
Stop Band	Rejection	F3-F4	14800-16000	16.0	20.0		dB
		F4-F5	16000-25200		23.0		dB
	VSWR	F3-F4	14800-16000		1.4		:1
		F4-F5	16000-25200		2.4		:1

### Functional Schematic



### Absolute Maximum Ratings<sup>3</sup>

Operating Temperature	-40°C to +85°C
Storage Temperature	-55°C to +100°C
RF Power Input, Passband (DC-F1) <sup>1</sup>	2W at 25°C
RF Power Input, Stopband (F2-F5) <sup>2</sup>	80mW at 25°C

<sup>1</sup> Passband rating derates linearly to 1W at 85°C ambient

<sup>2</sup> Stopband rating derates linearly to 40mW at 85°C ambient

<sup>3</sup> Permanent damage may occur if any of these limits are exceeded

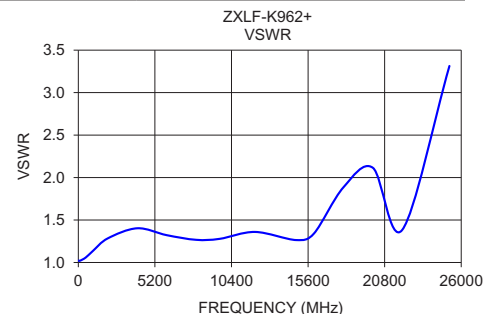
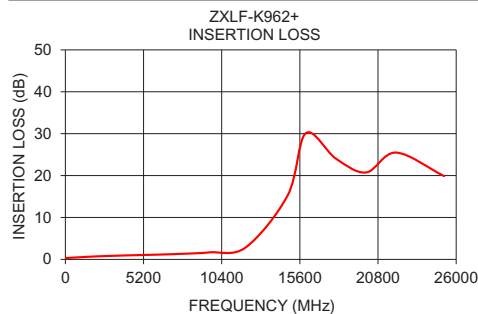
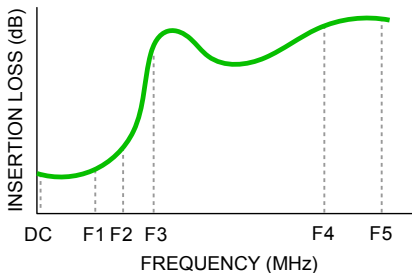
### ESD rating

Human Body Model (HBM): Class 1A (250 to <500V) in accordance with ANSI/ESD 5.1 - 2001

### Typical Performance Data at 25°C

Frequency (GHz)	Insertion Loss (dB)	VSWR (:1)
10	0.32	1.02
100	0.34	1.02
500	0.42	1.06
1000	0.52	1.14
2000	0.71	1.28
4000	0.95	1.40
6000	1.13	1.32
8000	1.37	1.27
9600	1.68	1.28
12000	2.86	1.36
14800	15.35	1.26
16000	30.12	1.34
18000	24.04	1.88
20000	20.75	2.11
22000	25.50	1.39
25200	19.88	3.31

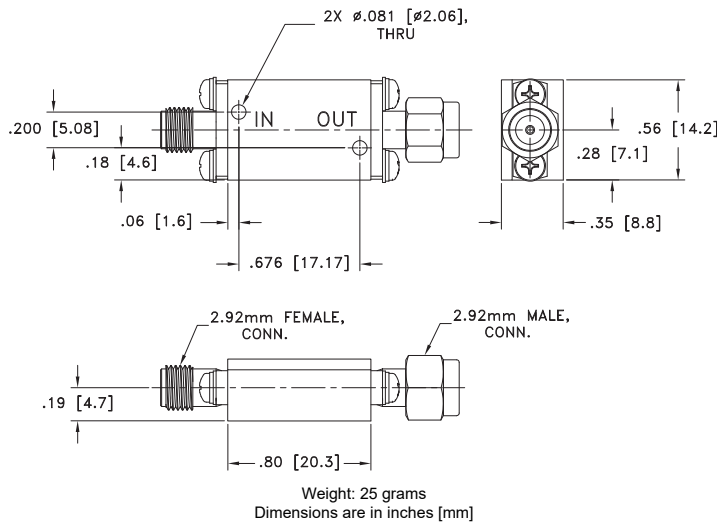
### Specification Definition



## Coaxial Connections

PORT - IN	2.92mm-Fem
PORT - OUT	2.92mm-Male

## Outline Drawing



## Additional Notes

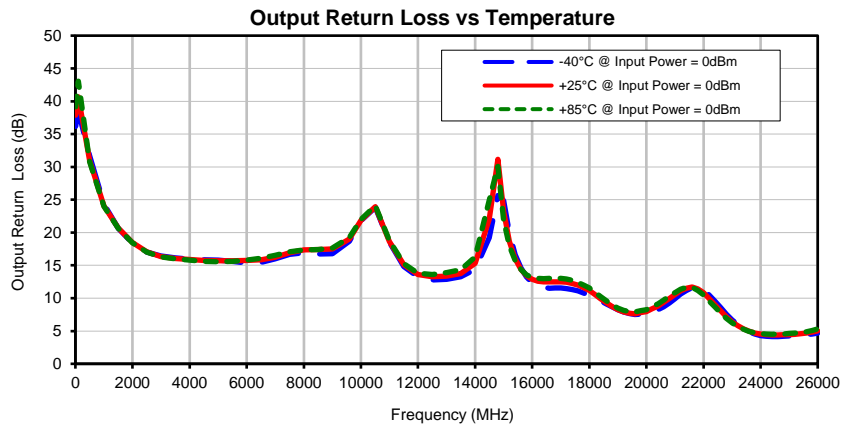
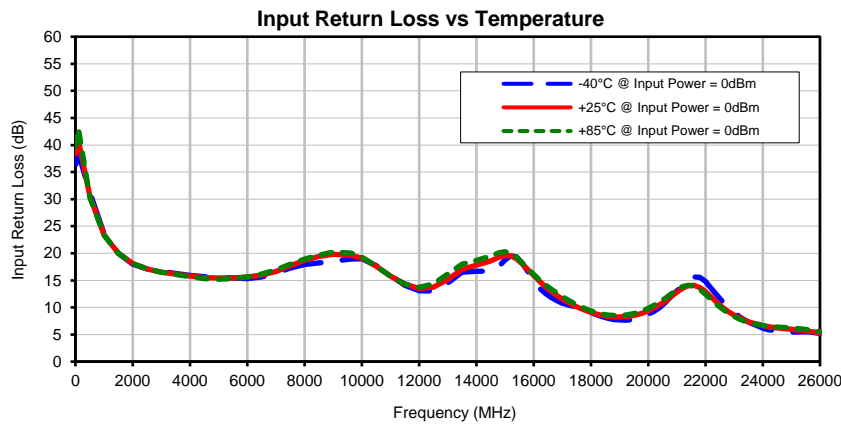
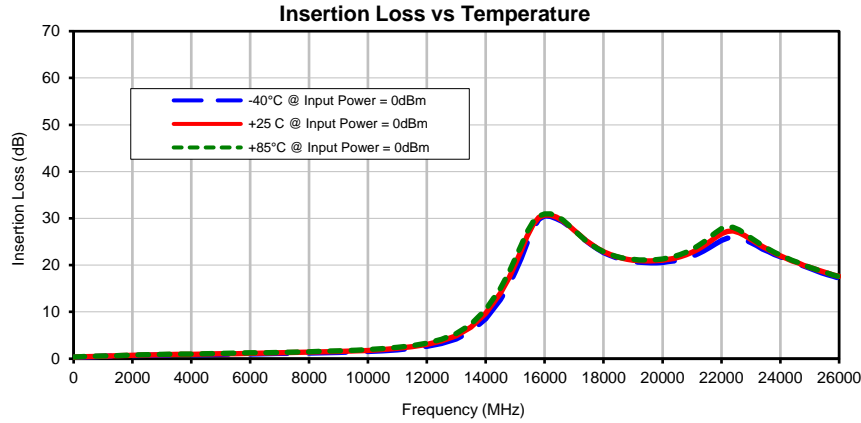
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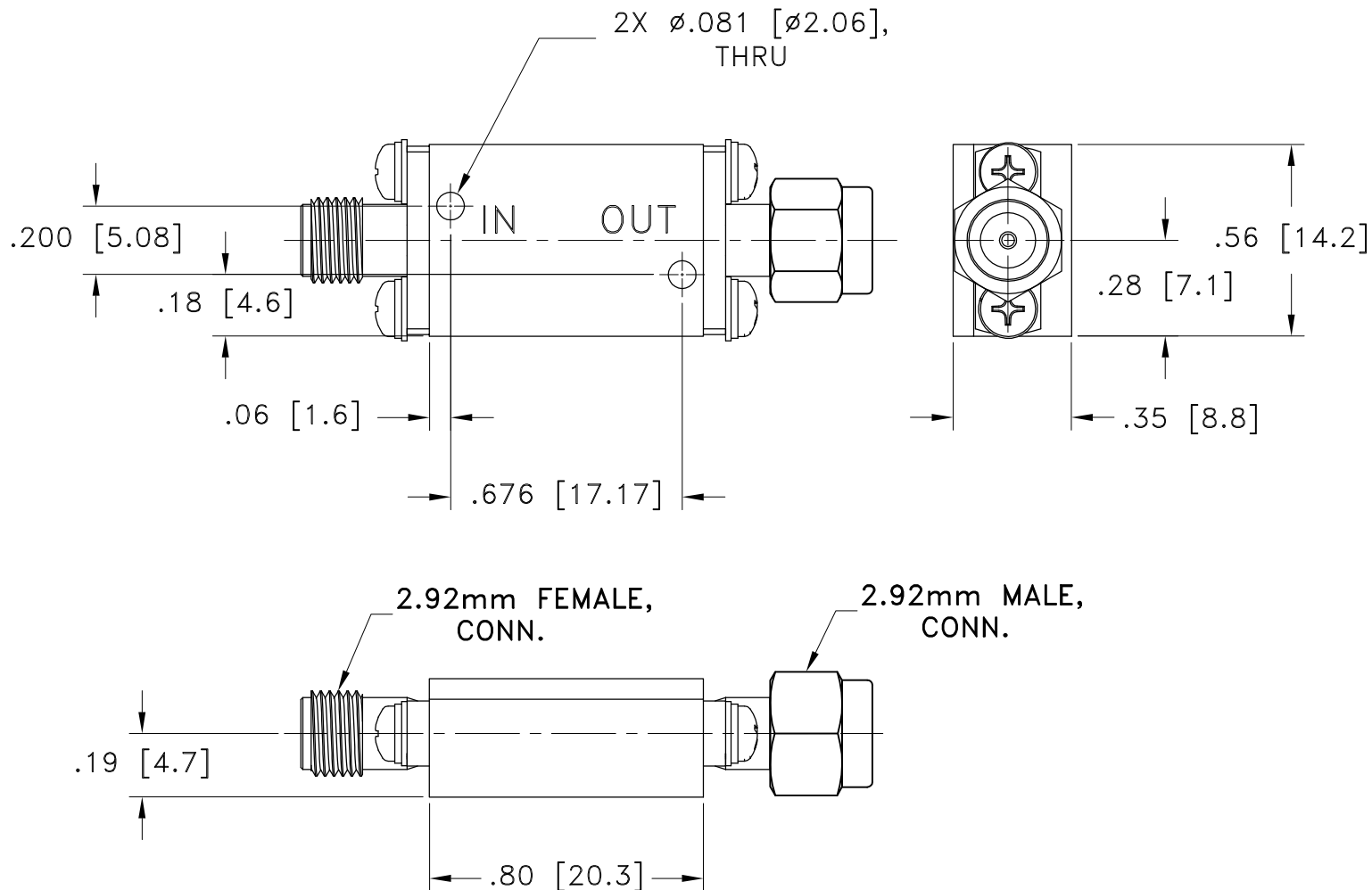
Typical Performance Data

FREQUENCY (MHz)	INSERTION LOSS (dB)			INPUT RETURN LOSS (dB)			OUTPUT RETURN LOSS (dB)		
	@ -40°C	@ +25°C	@ +85°C	@ -40°C	@ +25°C	@ +85°C	@ -40°C	@ +25°C	@ +85°C
10	0.31	0.32	0.35	36.36	38.45	39.67	36.17	37.86	39.16
50	0.32	0.34	0.36	37.67	39.53	41.20	37.50	39.03	40.91
100	0.34	0.36	0.38	38.53	40.94	43.00	38.46	40.68	43.06
500	0.41	0.46	0.49	31.25	30.51	30.34	31.76	31.03	30.84
1000	0.49	0.55	0.59	23.67	23.41	23.35	24.32	24.05	23.97
1500	0.58	0.64	0.69	19.97	20.01	20.01	20.63	20.65	20.65
2000	0.66	0.73	0.77	17.99	18.11	18.09	18.40	18.47	18.43
2500	0.73	0.80	0.85	17.08	17.10	17.08	17.04	17.05	17.00
3000	0.77	0.85	0.91	16.67	16.53	16.49	16.42	16.32	16.26
3500	0.82	0.91	0.97	16.30	16.14	16.07	16.13	16.06	15.99
4000	0.85	0.95	1.02	15.92	15.79	15.66	15.94	15.89	15.80
4500	0.89	1.00	1.08	15.66	15.51	15.34	15.83	15.75	15.63
5000	0.93	1.05	1.13	15.58	15.43	15.22	15.81	15.71	15.57
5500	0.97	1.10	1.19	15.43	15.46	15.30	15.60	15.70	15.60
6000	1.03	1.15	1.24	15.32	15.61	15.61	15.37	15.73	15.81
6500	1.08	1.21	1.30	15.62	15.99	16.17	15.46	15.86	16.09
7000	1.12	1.27	1.36	16.35	16.66	16.95	15.99	16.26	16.51
7500	1.17	1.33	1.43	17.28	17.70	18.00	16.69	16.92	17.09
8000	1.21	1.39	1.50	17.95	18.71	18.91	16.95	17.38	17.38
8500	1.28	1.46	1.58	18.24	19.43	19.66	16.75	17.43	17.43
9000	1.34	1.53	1.67	18.52	19.82	20.21	16.79	17.50	17.64
9600	1.45	1.67	1.82	18.96	19.66	20.03	18.67	19.03	19.25
10000	1.54	1.78	1.95	18.97	19.14	19.29	21.82	21.86	21.99
10500	1.68	1.95	2.14	17.75	17.66	17.66	23.84	23.94	24.08
11000	1.89	2.21	2.42	15.93	15.83	15.80	18.55	18.64	18.77
11500	2.21	2.56	2.81	14.09	14.31	14.35	14.83	15.11	15.26
12000	2.65	3.06	3.36	13.06	13.52	13.72	13.25	13.60	13.82
12500	3.28	3.78	4.15	13.01	13.74	14.32	12.76	13.25	13.61
13000	4.25	4.90	5.38	14.49	15.17	16.17	12.90	13.38	13.90
13500	5.87	6.74	7.38	16.51	17.02	18.02	13.28	13.76	14.35
14000	8.56	9.66	10.50	16.69	17.81	18.69	14.40	15.29	16.28
14500	12.60	13.97	15.04	16.70	18.60	19.45	19.23	22.05	24.94
14800	15.88	17.43	18.62	17.66	19.32	20.12	25.64	31.17	30.07
15000	18.50	20.14	21.37	18.75	19.61	20.30	24.86	23.25	21.88
15200	21.47	23.11	24.27	19.53	19.53	20.00	19.90	18.61	17.96
15400	24.69	26.12	27.06	19.35	18.99	19.27	16.61	15.98	15.74
15600	27.71	28.65	29.23	18.16	18.02	18.21	14.62	14.41	14.37
15800	29.80	30.18	30.48	16.61	16.97	17.11	13.24	13.45	13.58
16000	30.54	30.72	30.95	14.89	15.89	16.08	12.33	12.87	13.17
16200	30.44	30.66	30.93	13.54	14.84	15.10	11.90	12.60	13.00
16400	29.96	30.25	30.50	12.67	13.92	14.26	11.65	12.50	12.98
16600	29.28	29.54	29.69	11.93	13.03	13.45	11.52	12.48	13.04
16800	28.40	28.58	28.63	11.30	12.28	12.72	11.54	12.47	13.03
17000	27.35	27.46	27.44	10.79	11.56	12.02	11.57	12.47	13.00
17200	26.27	26.35	26.29	10.50	10.93	11.36	11.48	12.42	12.94
17400	25.21	25.30	25.23	10.18	10.38	10.78	11.32	12.24	12.72
17600	24.26	24.37	24.32	9.76	9.88	10.23	11.11	11.99	12.41
17800	23.42	23.55	23.53	9.37	9.45	9.76	10.76	11.61	12.01
18000	22.70	22.87	22.87	9.02	9.08	9.36	10.43	11.16	11.54
18200	22.11	22.31	22.35	8.66	8.78	9.03	10.02	10.53	10.86
18400	21.63	21.87	21.93	8.27	8.53	8.78	9.60	9.93	10.23
18600	21.25	21.51	21.61	7.98	8.38	8.60	9.11	9.30	9.59
18800	20.95	21.25	21.37	7.77	8.26	8.51	8.67	8.73	9.00
19000	20.72	21.06	21.21	7.73	8.26	8.52	8.22	8.22	8.47
19200	20.60	20.94	21.12	7.64	8.30	8.59	7.88	7.90	8.15
19400	20.53	20.90	21.10	7.71	8.43	8.76	7.65	7.70	7.97
19600	20.48	20.87	21.11	7.94	8.64	9.01	7.52	7.62	7.89
19800	20.52	20.94	21.21	8.30	8.95	9.35	7.56	7.79	8.08
20000	20.57	21.03	21.33	8.77	9.36	9.81	7.60	7.94	8.27
20200	20.75	21.25	21.59	9.25	9.87	10.36	7.96	8.39	8.73
20400	20.91	21.46	21.86	9.96	10.48	11.00	8.25	8.77	9.12
20600	21.17	21.81	22.26	10.89	11.16	11.69	8.71	9.35	9.71
20800	21.49	22.23	22.76	12.02	12.00	12.48	9.29	9.96	10.33
21000	21.89	22.73	23.35	13.02	12.81	13.23	9.92	10.52	10.84
21200	22.42	23.38	24.10	14.12	13.59	13.83	10.63	11.14	11.37
21400	23.04	24.14	24.97	14.94	14.04	14.08	11.16	11.53	11.64
21600	23.80	25.04	25.99	15.63	14.12	13.88	11.63	11.72	11.66
21800	24.51	25.88	26.93	15.58	13.70	13.30	11.68	11.42	11.18
22000	25.27	26.71	27.79	14.80	12.93	12.46	11.32	10.84	10.49
22200	25.76	27.18	28.17	13.53	11.96	11.51	10.49	9.95	9.57
22400	26.02	27.31	28.12	12.30	10.98	10.57	9.58	9.04	8.69
22600	25.83	26.92	27.52	11.10	10.04	9.70	8.57	8.08	7.76
22800	25.41	26.31	26.75	10.15	9.27	8.97	7.57	7.17	6.91
23000	24.79	25.52	25.84	9.10	8.59	8.36	6.66	6.41	6.23
23200	24.16	24.75	25.00	8.24	8.04	7.86	5.94	5.80	5.68
23400	23.46	23.95	24.16	7.58	7.57	7.44	5.36	5.34	5.26
23600	22.89	23.28	23.46	7.05	7.19	7.10	4.87	4.97	4.93
23800	22.28	22.59	22.75	6.62	6.91	6.87	4.53	4.71	4.73
24000	21.80	22.03	22.16	6.17	6.65	6.67	4.31	4.53	4.58
24200	21.27	21.45	21.56	5.90	6.47	6.53	4.22	4.45	4.53
24400	20.76	20.93	21.02	5.74	6.32	6.43	4.15	4.41	4.51
24600	20.29	20.46	20.53	5.65	6.20	6.35	4.15	4.40	4.53
24800	19.79	19.97	20.02	5.50	6.07	6.28	4.19	4.42	4.56
25000	19.33	19.53	19.56	5.43	5.97	6.20	4.24	4.46	4.62
25200	18.86	19.10	19.11	5.44	5.84	6.10	4.27	4.51	4.69
25400	18.38	18.69	18.69	5.51	5.73	5.98	4.34	4.57	4.77
25600	17.95	18.30	18.30	5.45	5.61	5.86	4.45	4.68	4.89
25800	17.59	17.93	17.92	5.32	5.45	5.70	4.53	4.81	5.05
26000	17.24	17.59	17.58	5.22	5.30	5.53	4.68	5.03	5.32



## Typical Performance Curves





Weight: 25 grams

Dimensions are in inches (mm). Tolerances: 2 Pl.  $\pm .015$ ; 3 Pl.  $\pm .005$

Notes:

1. Case material: Brass.
2. Case Finish: Gold plate.



All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-40° to 85° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C