

# Coaxial Bandpass Filter

## ZBPF-98-S+

50Ω 88 to 108 MHz

### The Big Deal

- Fast roll-off with excellent passband insertion loss
- Compact connectorized package



Generic photo used for illustration purposes only  
CASE STYLE: FM587-1

### Product Overview

ZBPF-98-S+ is a 50Ω bandpass filter into a rugged shielded case of (2.0" x 1.24" x 0.75") size. The passband range for this is 88 MHz to 108 MHz. The model has excellent passband IL and fast roll-off . This will find its application in FM transmission and reception systems.

### Key Features

Feature	Advantages
Fast roll-off with excellent pass-band insertion loss	Low insertion loss helps in achieving good dynamic range. Fast roll-off will attenuate frequencies closer to the passband with good rejection.
Connectorized package	The connectorized packages are easily to interface with other devices and well suited for test set-ups.

#### Notes

- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.  
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.  
C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/MCLStore/terms.jsp](http://www.minicircuits.com/MCLStore/terms.jsp)



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## ZBPF-98-S+

50Ω 88 to 108 MHz



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CASE STYLE: FM587-1  
Connectors Model  
SMA-M/F ZBPF-98-S+

### Features

- Excellent passband IL of 1 dB typ.
- Fast roll-off with rejection at >10dB at 9 MHz from bandedge
- Rugged shielded case

### Applications

- FM Transmission and Reception
- Harmonic and sub-harmonic Rejection
- Lab Use

### Electrical Specifications at 25°C

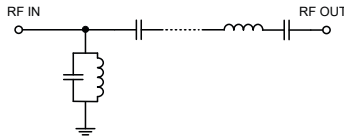
Parameter	F#	Frequency (MHz)	Min.	Typ.	Max.	Unit	
Pass Band	Insertion Loss	F1-F2	88 - 108	—	1.0	1.5	dB
	Return Loss	F1-F2	88 - 108	11.7	17.7	-	dB
Stop Band, Lower	Insertion Loss	DC-F3	DC - 55	18	—	—	dB
		F3-F4	55 - 66	13	—	—	dB
		F5	79	—	10	—	dB
Stop Band, Upper	Insertion Loss	F6	117	—	10	—	dB
		F6-F7	143 - 175	13	—	—	dB
		F7-F8	175 - 400	18	—	—	dB
		F8-F9	400 - 1000	—	40	—	dB

### Maximum Ratings

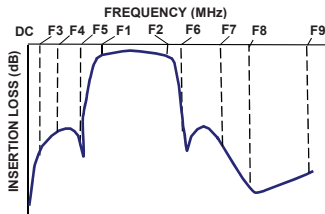
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	0.25W

Permanent damage may occur if any of these limits are exceeded.

### Functional Schematic



### Typical Frequency Response

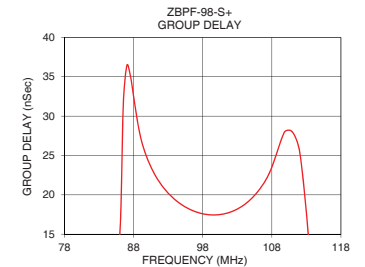
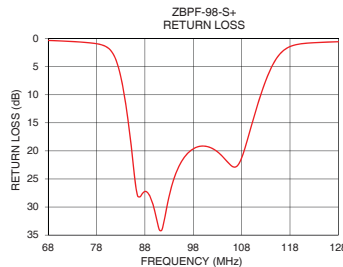
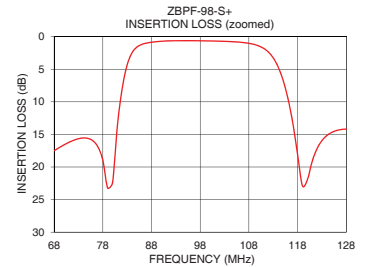
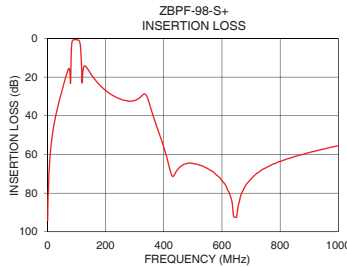


### Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	Return Loss (dB)	Frequency (MHz)	Group Delay (nsec)
1	94.17	0.01	88	32.45
10	59.50	0.02	89	27.34
40	32.76	0.07	90	24.55
55	24.37	0.13	91	22.67
66	18.49	0.27	92	21.27
79	23.24	1.08	93	20.21
84	2.48	11.44	94	19.37
88	0.86	27.23	95	18.72
90	0.71	30.61	96	18.21
98	0.64	19.63	97	17.84
100	0.67	19.13	98	17.59
108	1.02	21.27	99	17.46
113	3.25	7.46	100	17.45
117	13.14	1.89	101	17.56
143	16.87	0.28	102	17.81
175	23.35	0.15	103	18.19
400	56.26	0.26	104	18.74
500	64.68	0.14	105	19.48
800	63.64	0.15	106	20.45
1000	55.37	0.17	108	23.52

### +RoHS Compliant

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



### Notes

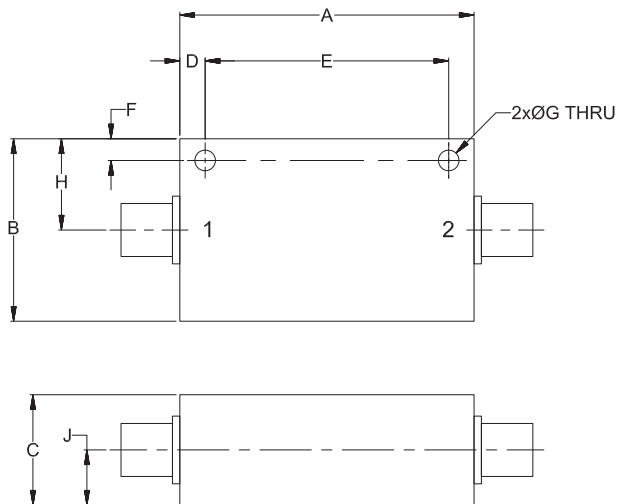
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## Coaxial Connections

PORT - 1	SMA-Male
PORT - 2	SMA-Female

## Outline Drawing



## Outline Dimensions ( $\frac{\text{inch}}$ / $\text{mm}$ )

A	B	C	D	E	F	G	H	J	Wt.
2.00	1.24	.75	.17	1.656	.15	.140	.62	.38	grams
50.80	31.50	19.05	4.32	42.06	3.81	3.56	15.75	9.65	57

Note: Please refer to case style drawing for details

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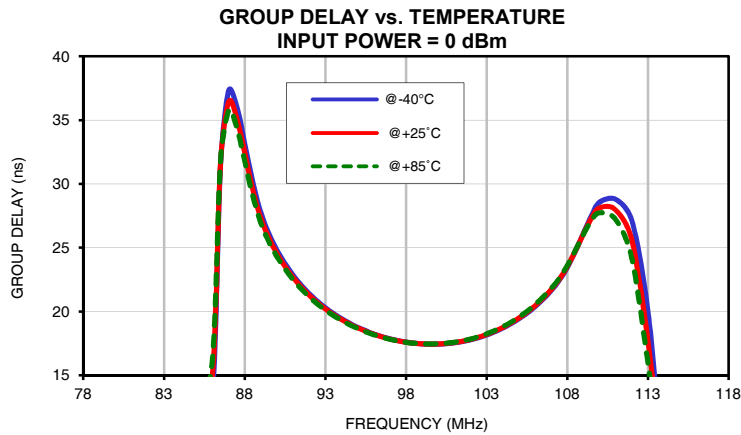
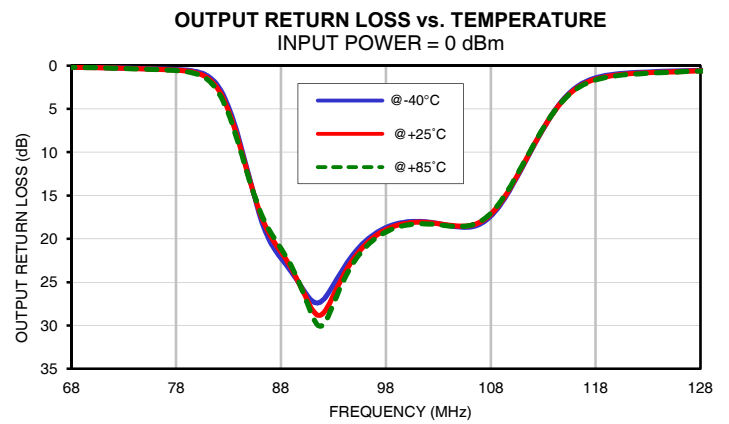
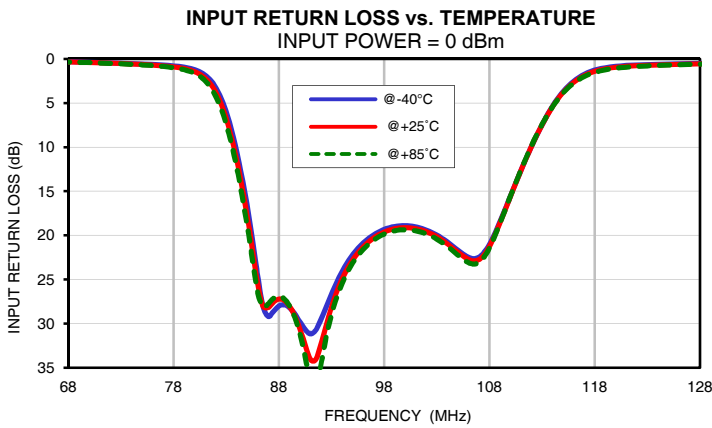
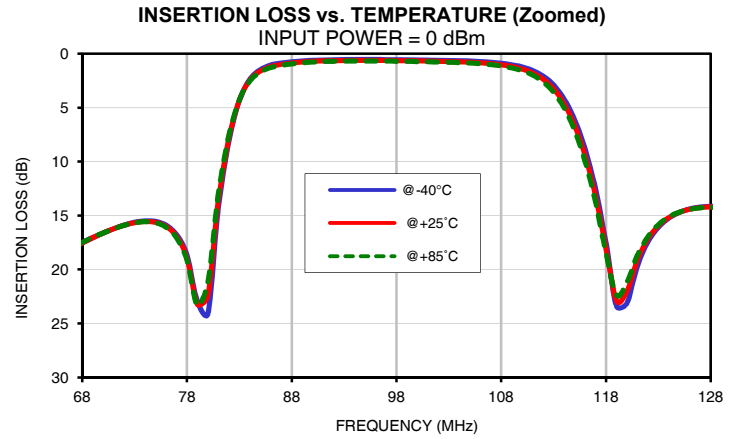
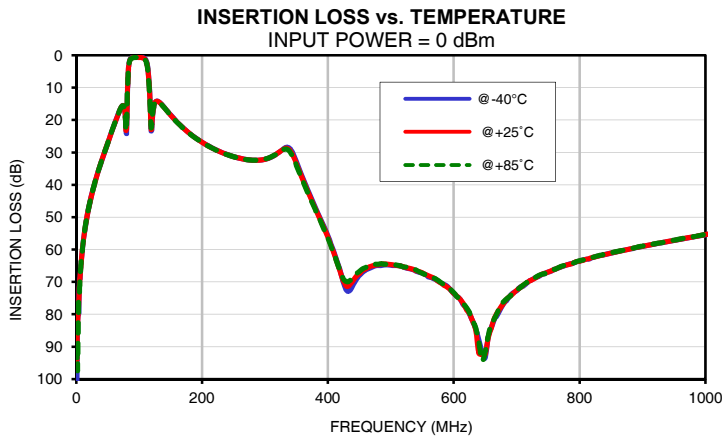
*Typical Performance Data*

FREQ.  (MHz)	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
	(dB)			(dB)			(dB)		
	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C
1	101.92	94.17	90.26	0.01	0.01	0.01	0.00	0.00	0.00
3	80.17	80.09	85.10	0.01	0.01	0.02	0.00	0.00	0.00
7	66.03	66.44	65.47	0.02	0.02	0.02	0.00	0.00	0.00
10	59.50	59.50	59.48	0.02	0.02	0.03	0.00	0.00	0.00
14	53.51	53.48	53.46	0.02	0.03	0.03	0.00	0.00	0.00
18	48.94	48.91	48.88	0.03	0.04	0.04	0.00	0.00	0.00
22	45.20	45.18	45.15	0.03	0.04	0.04	0.00	0.00	0.00
25	42.73	42.70	42.69	0.04	0.05	0.05	0.00	0.00	0.00
28	40.47	40.46	40.43	0.04	0.05	0.05	0.00	0.00	0.00
32	37.73	37.71	37.69	0.05	0.06	0.06	0.00	0.01	0.01
35	35.80	35.79	35.76	0.05	0.06	0.07	0.01	0.01	0.01
38	33.97	33.95	33.92	0.06	0.07	0.07	0.01	0.01	0.01
40	32.78	32.76	32.73	0.06	0.07	0.08	0.01	0.01	0.01
43	31.04	31.03	31.00	0.07	0.08	0.08	0.01	0.02	0.02
46	29.34	29.33	29.30	0.07	0.09	0.09	0.02	0.02	0.02
50	27.13	27.11	27.08	0.09	0.10	0.11	0.03	0.03	0.03
55	24.39	24.37	24.34	0.11	0.13	0.14	0.04	0.05	0.05
59	22.21	22.20	22.17	0.15	0.17	0.18	0.06	0.07	0.08
62	20.60	20.58	20.55	0.18	0.20	0.22	0.09	0.10	0.11
66	18.50	18.49	18.47	0.24	0.27	0.29	0.13	0.15	0.16
70	16.62	16.62	16.61	0.35	0.38	0.41	0.21	0.23	0.24
75	15.55	15.62	15.67	0.56	0.62	0.67	0.34	0.38	0.41
79	23.01	23.24	23.33	0.93	1.08	1.22	0.54	0.64	0.72
84	2.38	2.48	2.54	10.47	11.44	12.30	8.50	8.90	9.23
88	0.75	0.86	0.94	28.02	27.23	26.91	22.21	21.51	21.12
90	0.62	0.71	0.78	29.80	30.61	31.16	25.65	25.78	25.86
92	0.56	0.64	0.70	29.59	32.38	34.67	27.06	28.62	29.94
94	0.54	0.62	0.68	24.11	24.98	25.48	23.31	24.10	24.73
96	0.54	0.62	0.68	20.89	21.33	21.61	20.33	20.72	21.06
98	0.56	0.64	0.70	19.33	19.63	19.86	18.71	18.94	19.20
100	0.58	0.67	0.73	18.90	19.13	19.36	18.05	18.20	18.40
102	0.61	0.70	0.77	19.40	19.59	19.84	18.05	18.12	18.28
104	0.65	0.75	0.83	20.75	20.94	21.24	18.46	18.42	18.51
106	0.72	0.84	0.93	22.48	22.72	23.09	18.65	18.48	18.46
108	0.88	1.02	1.14	21.05	21.27	21.44	17.39	17.16	17.05
113	2.90	3.25	3.56	7.44	7.46	7.42	7.31	7.28	7.22
117	12.50	13.14	13.71	1.74	1.89	1.98	1.89	2.04	2.13
119	23.37	22.88	22.36	0.99	1.13	1.23	1.14	1.28	1.37
125	14.71	14.70	14.68	0.57	0.64	0.69	0.66	0.73	0.78
130	14.21	14.27	14.32	0.45	0.50	0.53	0.50	0.55	0.57
140	16.10	16.17	16.22	0.28	0.32	0.34	0.29	0.32	0.33
143	16.80	16.87	16.92	0.25	0.28	0.30	0.25	0.27	0.29
160	20.56	20.62	20.66	0.15	0.18	0.19	0.12	0.14	0.15
175	23.30	23.35	23.38	0.12	0.15	0.16	0.08	0.09	0.10
200	26.86	26.90	26.92	0.12	0.14	0.15	0.04	0.06	0.07
250	31.33	31.34	31.34	0.16	0.19	0.20	0.02	0.03	0.04
300	32.12	32.10	32.06	0.46	0.56	0.64	0.01	0.03	0.04
350	32.83	33.44	33.96	2.58	2.74	2.84	0.01	0.03	0.04
400	55.83	56.26	56.55	0.22	0.26	0.27	0.00	0.03	0.03
450	67.99	67.45	66.77	0.13	0.16	0.16	0.00	0.03	0.04
500	64.85	64.68	64.61	0.11	0.14	0.14	0.00	0.03	0.04
550	67.31	67.20	67.34	0.11	0.14	0.14	0.01	0.03	0.04
600	73.57	73.54	73.28	0.11	0.14	0.14	0.01	0.04	0.05
650	93.44	92.46	91.76	0.11	0.14	0.15	0.01	0.04	0.05
700	72.74	72.58	72.44	0.11	0.15	0.15	0.01	0.05	0.06
750	67.00	66.95	66.74	0.12	0.15	0.16	0.01	0.05	0.06
800	63.58	63.64	63.45	0.12	0.15	0.16	0.02	0.06	0.07
850	61.08	61.07	61.00	0.12	0.16	0.16	0.02	0.06	0.07
900	59.02	58.99	58.96	0.13	0.17	0.17	0.02	0.06	0.08
1000	55.47	55.37	55.36	0.13	0.17	0.18	0.02	0.07	0.09

## Typical Performance Data

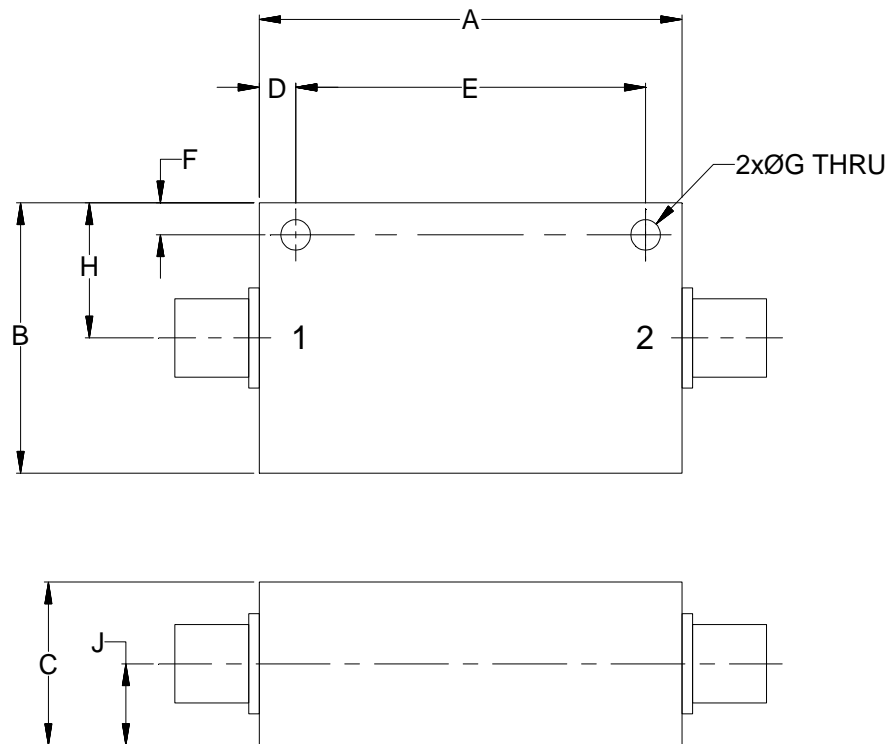
FREQ.  (MHz)	GROUP DELAY		
	(ns)		
	@-40°C	@+25°C	@+85°C
85.0	9.66	10.09	10.51
86.0	13.48	14.92	16.27
86.5	31.31	31.59	31.75
87.0	37.27	36.39	35.72
87.5	36.12	35.23	34.50
88.0	33.23	32.45	31.81
88.5	30.17	29.59	29.09
89.0	27.77	27.34	26.96
89.5	26.09	25.75	25.46
90.0	24.82	24.55	24.31
90.5	23.75	23.54	23.34
91.0	22.85	22.67	22.50
91.5	22.07	21.92	21.78
92.0	21.40	21.27	21.15
92.5	20.81	20.71	20.60
93.0	20.30	20.21	20.12
93.5	19.84	19.77	19.69
94.0	19.44	19.37	19.31
94.5	19.08	19.03	18.97
95.0	18.76	18.72	18.67
95.5	18.49	18.45	18.41
96.0	18.24	18.21	18.18
96.5	18.04	18.01	17.99
97.0	17.86	17.84	17.82
97.5	17.71	17.70	17.69
98.0	17.60	17.59	17.58
98.5	17.52	17.51	17.51
99.0	17.46	17.46	17.47
99.5	17.43	17.44	17.45
100.0	17.44	17.45	17.47
100.5	17.48	17.49	17.51
101.0	17.54	17.56	17.59
101.5	17.64	17.67	17.70
102.0	17.78	17.81	17.84
102.5	17.95	17.98	18.02
103.0	18.15	18.19	18.24
103.5	18.40	18.45	18.50
104.0	18.69	18.74	18.80
104.5	19.03	19.08	19.15
105.0	19.42	19.48	19.55
105.5	19.86	19.93	20.01
106.0	20.37	20.45	20.53
106.5	20.96	21.04	21.13
107.0	21.62	21.70	21.80
107.5	22.42	22.51	22.60
108.0	23.45	23.52	23.61
108.5	24.71	24.74	24.79
109.0	26.12	26.07	26.04
109.5	27.51	27.31	27.14
110.0	28.56	28.12	27.73
111.0	28.79	27.97	27.21

## Typical Performance Curves



## Outline Dimensions

FM587-1



CASE #.	A	B	C	D	E	F	G	H	J	WT, GRAM
FM587-1	2.00 (50.80)	1.24 (31.50)	.75 (19.05)	.17 (4.32)	1.656 (42.06)	.15 (3.81)	.140 (3.56)	.62 (15.75)	.38 (9.65)	57

Dimensions are in inches (mm). Tolerances: 2Pl.  $\pm .03$ ; 3Pl.  $\pm .015$

### Notes:

1. Case material: Aluminum alloy.
2. Case finish:  
For RoHS Case Styles: Clear chemical conversion coating, non-chrome or trivalent chrome based.
3. Refer to the individual model datasheet for the type of connectors available.



P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



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RF/IF MICROWAVE COMPONENTS

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	-55° to 100°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Humidity	90 to 95% RH, 40°C, 96 hours; Units may require bake-out after humidity to restore full performance.	MIL-STD-202, Method 103, Condition B
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Vibration (High Frequency)	20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36)	MIL-STD-202, Method 204, Condition D
Mechanical Shock	50g, 11ms half-sine, 3 shocks each direction 3 axes (total 18)	MIL-STD-202, Method 213, Condition A