

# Cavity Bandpass Filters

50Ω DC to 15 GHz

## The Big Deal

- Very low insertion loss with excellent power handling
- Very fast roll-off with wide stopband
- Passbands up to 15 GHz
- Stopbands up to 20 GHz



## Product Overview

Mini-Circuits' cavity filters are designed by implementing resonant structures with very high Q and are ideal for narrow-band, high-selectivity applications. These designs can provide bandwidths as narrow as 1% with very high selectivity and excellent low noise floor. Low insertion loss combined with excellent power handling makes them well-suited for transmitter and receiver front end. Advanced filter design and construction enables stopband width greater than 3x the center frequency.

Mini-Circuits' cavity filters feature a special protective assembly to prevent accidental de-tuning that would otherwise require expensive replacement or return to factory for re-tuning. Custom integrated assembly with LNA and bias tees results in greatly simplifying system integration. Precise machining allows realization of cavity filters with small form factors for applications where size is critical. Excellent repeatability across units is achieved through precise tuning and process control.

## Key Features

Feature	Advantages
Low insertion loss	Low signal loss results in better SNR in receiver front end and better power delivery to antenna in transmitter
Fast roll-off	Higher selectivity results in better adjacent channel rejection and dynamic range
Wide stopband	Wide spur free band results in better receiver sensitivity
High power handling	Well suited for transmitter application
Protective assembly	Prevents accidental de-tuning of precisely tuned resonant circuit

### 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)



# Cavity Bandpass Filter

## ZVBP-4000-S+

50Ω 4000 MHz



Generic photo used for illustration purposes only  
CASE STYLE: RW2359

Connectors Model  
SMA-F ZVBP-4000-S+

### Features

- Narrow band width
- Good VSWR, 1.3:1 typical
- High rejection
- Fast roll-off

### Applications

- Fixed and mobile communication network
- Satellite communication
- Radio Astronomy

### Electrical Specifications at 25°C

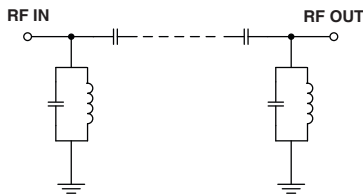
Parameter	F#	Frequency (MHz)	Min.	Typ.	Max.	Unit	
<b>Pass Band</b>	Center Frequency	-	-	4000	-	MHz	
	1 dB Bandwidth	-	-	6.0	-	MHz	
	Insertion Loss	F1	4000	-	4.5	6.5	dB
	VSWR	F1	4000	-	1.3	1.5	:1
<b>Stop Band, Lower</b>	Insertion Loss	DC-F2	DC - 3800	70	90	dB	
	VSWR	DC-F2	DC - 3800	-	20	-	:1
<b>Stop Band, Upper</b>	Insertion Loss	F3-F4	4200-6000	70	90	dB	
	VSWR	F3-F4	4200-6000	-	20	-	:1

### Maximum Ratings

Operating Temperature	0°C to 50°C
Storage Temperature	-55°C to 100°C
RF Power Input	1W Max.

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

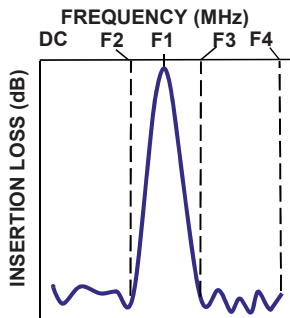
### Functional Schematic



### Typical Performance Data at 25°C

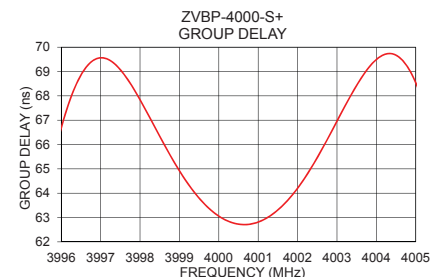
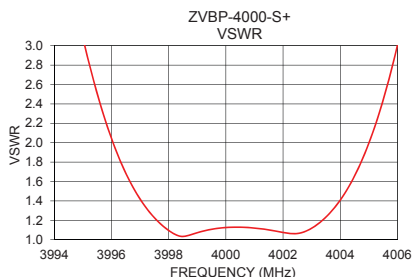
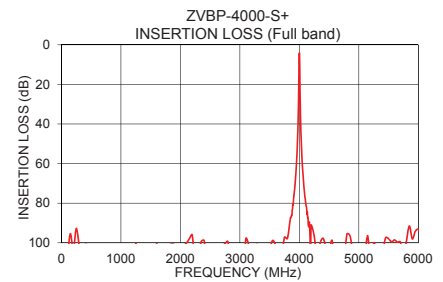
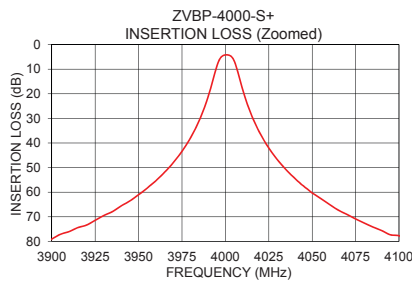
Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (nsec)
10	85.73	4587.09	3999.0	64.92
100	107.52	35803.34	3999.2	64.43
1000	106.17	758.06	3999.3	64.20
3800	97.81	117.19	3999.4	63.99
3900	79.08	106.81	3999.5	63.80
3950	61.02	88.35	3999.6	63.62
3985	30.78	28.39	3999.7	63.45
3990	21.31	13.95	3999.8	63.30
3997	5.59	1.42	3999.9	63.17
3999	4.40	1.07	4000.0	63.06
4000	4.22	1.13	4000.1	62.96
4001	4.19	1.12	4000.2	62.88
4003	4.63	1.12	4000.3	62.81
4011	20.71	14.69	4000.4	62.76
4016	30.32	31.00	4000.5	62.73
4050	60.31	93.56	4000.6	62.71
4100	77.71	107.79	4000.7	62.71
4200	90.99	109.73	4000.8	62.73
5000	109.33	91.25	4000.9	62.76
6000	93.30	59.12	4001.0	62.81

### Typical Frequency Response



**+RoHS Compliant**

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



### Notes

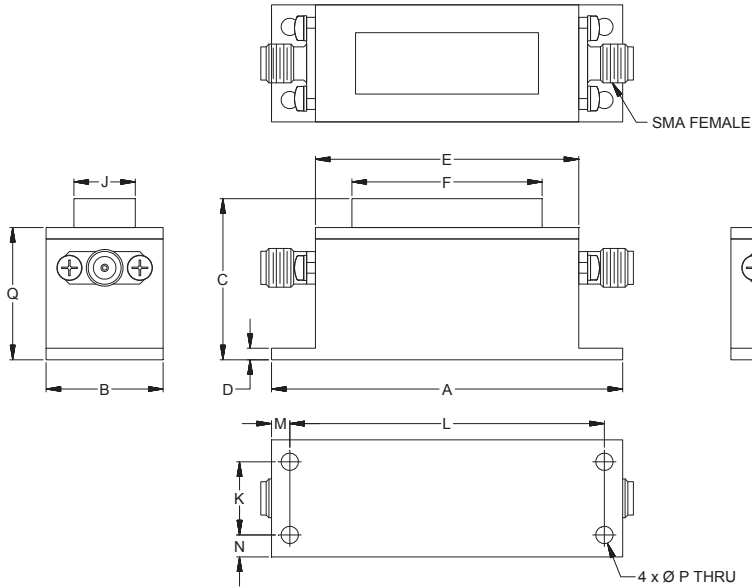
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## Coaxial Connections

PORT-1	SMA-FEMALE
PORT-2	SMA-FEMALE

## Outline Drawing



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

A	B	C	D	E	F	G	H	J
<b>2.40</b>	<b>.80</b>	<b>1.10</b>	<b>.08</b>	<b>1.80</b>	<b>1.30</b>	<b>.40</b>	<b>.63</b>	<b>.42</b>
60.96	20.32	27.96	2.00	45.72	33.02	10.16	15.96	10.67
K	L	M	N	P	Q	Wt.		
<b>.500</b>	<b>2.150</b>	<b>.13</b>	<b>.15</b>	<b>.118</b>	<b>.90</b>	grams		
12.70	54.61	3.18	3.81	3.00	22.96	54		

Note: Please refer to case style drawing for details

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# Cavity Band Pass Filter

# ZVBP-4000-S+

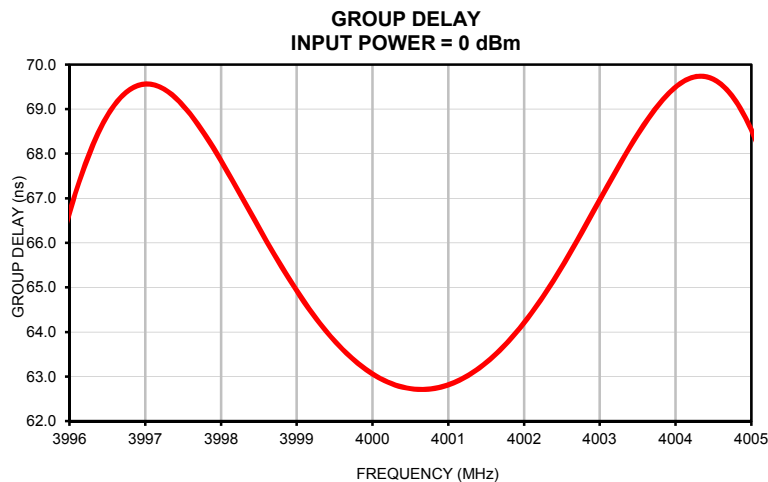
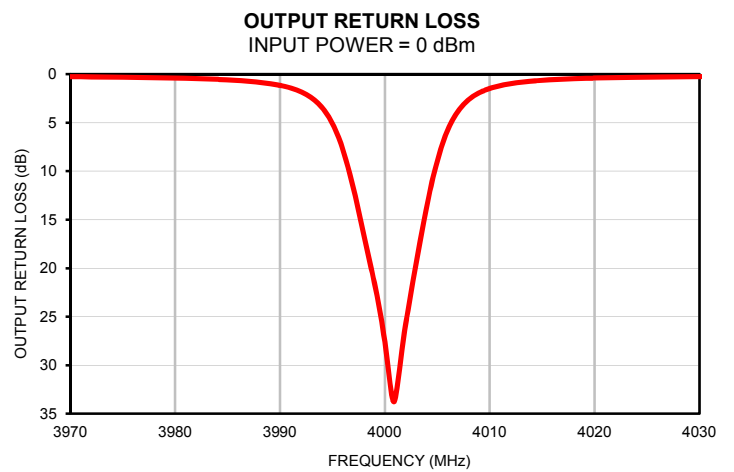
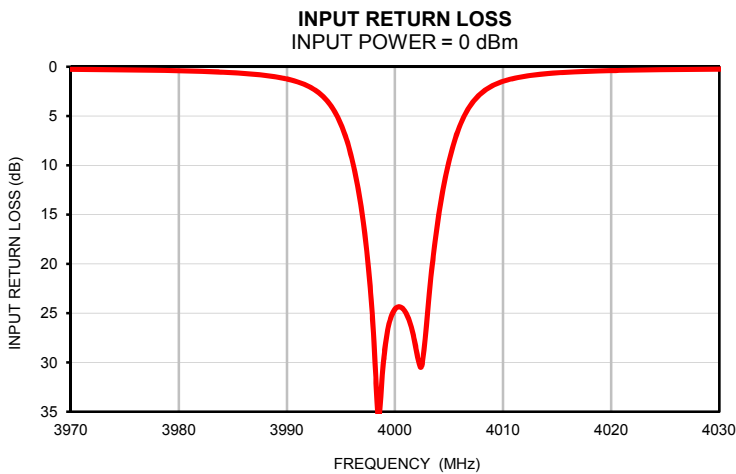
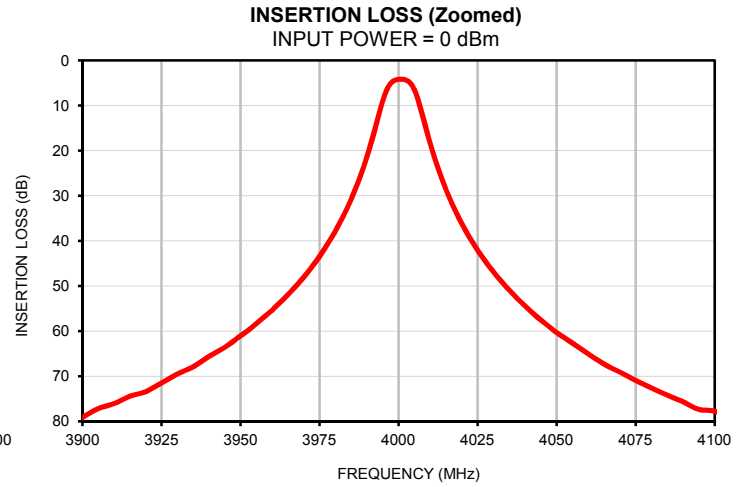
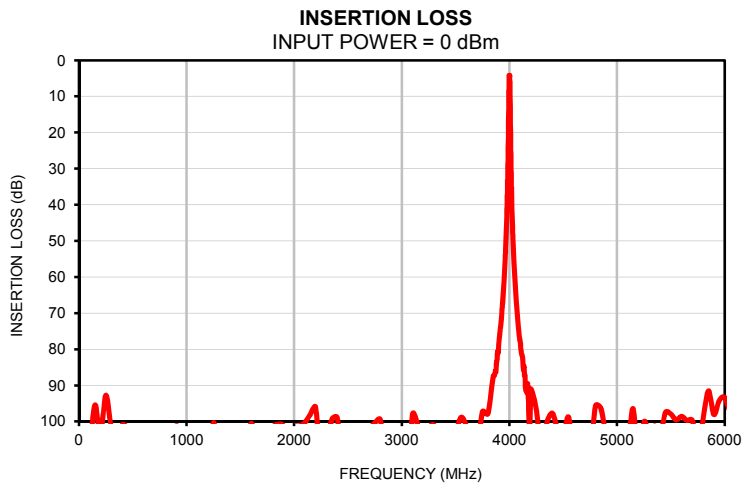
## Typical Performance Data

FREQ.	INSERTION LOSS	INPUT RETURN LOSS	OUTPUT RETURN LOSS
(MHz)	(dB)	(dB)	(dB)
10	85.73	0.00	0.00
50	80.75	0.01	0.00
100	107.52	0.00	0.00
500	107.08	0.01	0.01
1000	106.17	0.02	0.02
2000	101.44	0.06	0.05
3000	101.66	0.11	0.10
3500	103.50	0.13	0.13
3800	97.81	0.15	0.15
3910	76.03	0.17	0.16
3920	73.39	0.17	0.17
3930	69.48	0.17	0.17
3940	65.58	0.18	0.18
3950	61.02	0.20	0.19
3960	55.37	0.22	0.21
3970	48.00	0.27	0.26
3980	37.83	0.41	0.40
3985	30.78	0.61	0.58
3990	21.31	1.25	1.16
3995	8.99	5.85	5.08
3997	5.59	15.22	11.74
3998	4.79	26.87	16.57
3999	4.40	29.21	21.50
4000	4.22	24.59	27.61
4001	4.19	24.95	33.41
4002	4.31	28.91	25.69
4003	4.63	25.08	19.40
4005	6.53	9.57	8.93
4010	18.38	1.49	1.47
4011	20.71	1.18	1.18
4012	22.90	0.98	0.97
4013	24.94	0.83	0.83
4014	26.85	0.71	0.72
4015	28.63	0.63	0.63
4016	30.32	0.56	0.56
4017	31.90	0.51	0.51
4018	33.41	0.46	0.47
4020	36.16	0.40	0.40
4025	42.03	0.30	0.30
4030	46.86	0.25	0.25
4040	54.37	0.21	0.21
4050	60.31	0.19	0.18
4060	65.02	0.18	0.17
4070	69.04	0.17	0.17
4080	72.57	0.16	0.16
4090	75.60	0.16	0.16
4100	77.71	0.16	0.16
4200	90.99	0.16	0.16
4400	97.74	0.17	0.16
4500	104.01	0.17	0.16
4600	109.96	0.18	0.16
4800	95.66	0.18	0.15
5000	109.33	0.19	0.15
5200	112.01	0.20	0.14
5400	104.07	0.22	0.13
5500	97.93	0.23	0.13
5600	98.58	0.23	0.12
5700	99.70	0.25	0.12
5800	99.21	0.26	0.11
6000	93.30	0.29	0.10

FREQ.	GROUP DELAY
(MHz)	(ns)
3997.0	69.56
3997.2	69.49
3997.3	69.39
3997.4	69.25
3997.5	69.08
3997.6	68.87
3997.7	68.65
3997.8	68.40
3997.9	68.13
3998.0	67.85
3998.1	67.55
3998.2	67.25
3998.3	66.95
3998.4	66.65
3998.5	66.34
3998.6	66.04
3998.7	65.75
3998.8	65.46
3998.9	65.19
3999.0	64.92
3999.1	64.67
3999.2	64.43
3999.3	64.20
3999.4	63.99
3999.5	63.80
3999.6	63.62
3999.7	63.45
3999.8	63.30
3999.9	63.17
4000.0	63.06
4000.1	62.96
4000.2	62.88
4000.3	62.81
4000.4	62.76
4000.5	62.73
4000.6	62.71
4000.7	62.71
4000.8	62.73
4000.9	62.76
4001.0	62.81
4001.1	62.88
4001.2	62.96
4001.3	63.06
4001.4	63.18
4001.5	63.31
4001.6	63.46
4001.7	63.62
4001.8	63.80
4001.9	63.99
4002.0	64.20
4002.1	64.43
4002.2	64.67
4002.3	64.92
4002.4	65.18
4002.5	65.46
4002.6	65.75
4002.7	66.04
4002.8	66.35
4002.9	66.65
4003.0	66.96



## Typical Performance Curves

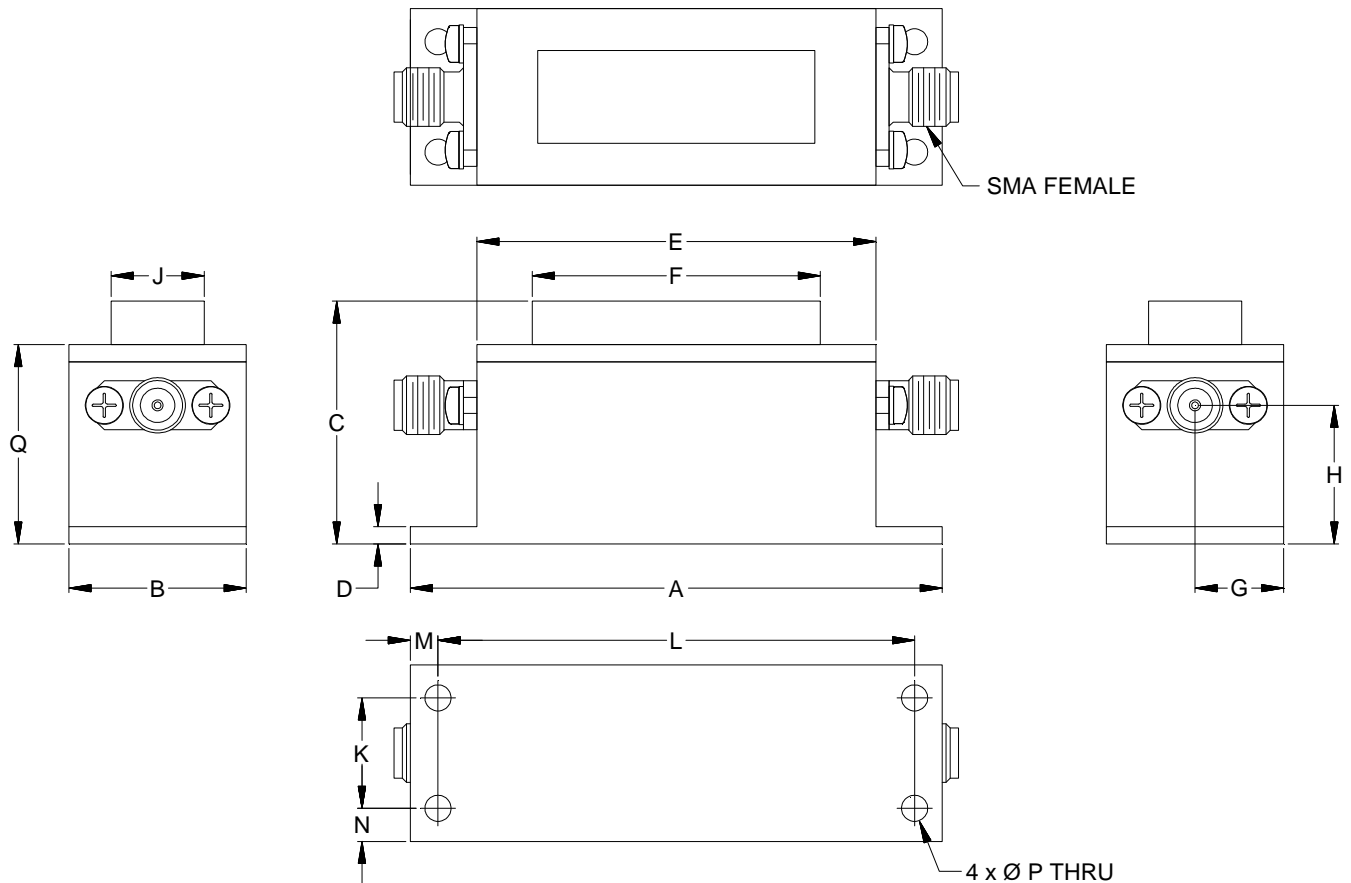


# Case Style

# RW

## Outline Dimensions

## RW2359



CASE#	A	B	C	D	E	F	G	H
RW2359	2.40 (60.96)	.80 (20.32)	1.10 (27.96)	.08 (2.00)	1.80 (45.72)	1.30 (33.02)	.40 (10.16)	.63 (15.96)

CASE#	J	K	L	M	N	P	Q	WT.GRAMS
RW2359	.42 (10.67)	.500 (12.70)	2.150 (54.61)	.13 (3.18)	.15 (3.81)	.118 (3.00)	.90 (22.96)	54

Dimensions are in inches (mm). Tolerances: 2 Pl.  $\pm .100$ ; 3 Pl.  $\pm .015$

### Notes:

1. Case material: Aluminum alloy.
2. Case finish: Powder coated.
3. Refer to the individual model data sheet 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



The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

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