

# Coaxial High Power Combiner

3 Way-0° 50Ω 100 to 450 MHz

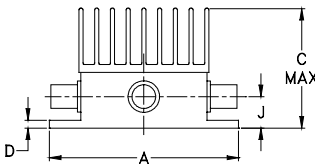
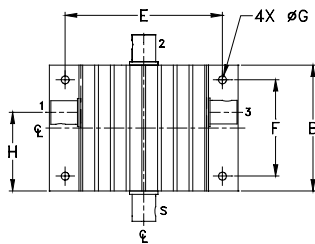
## Maximum Ratings

|                                                                 |                |
|-----------------------------------------------------------------|----------------|
| Operating Temperature                                           | -55°C to 90°C  |
| Storage Temperature                                             | -55°C to 100°C |
| Permanent damage may occur if any of these limits are exceeded. |                |

## Coaxial Connections

|          |   |
|----------|---|
| SUM PORT | S |
| PORT 1   | 1 |
| PORT 2   | 2 |
| PORT 3   | 3 |

## Outline Drawing



## Outline Dimensions (inch/mm)

| A     | B     | C     | D    | E     | F     |
|-------|-------|-------|------|-------|-------|
| 3.00  | 2.00  | 1.92  | .100 | 2.500 | 1.525 |
| 76.20 | 50.80 | 48.77 | 2.54 | 63.50 | 38.74 |

| G    | H     | J     | wt    |
|------|-------|-------|-------|
| .125 | 1.25  | .50   | grams |
| 3.18 | 31.75 | 12.70 | 343   |

## Features

- high power, up to 9W input power
- wideband, 100 to 450 MHz
- low insertion loss, 0.9 dB typ.

## Applications

- VHF/UHF
- communication receivers & transmitters



Generic photo used for illustration purposes only

CASE STYLE: AX255

| Connectors | Model          |
|------------|----------------|
| BNC        | ZA3CS-450-9W   |
| N-TYPE     | ZA3CS-450-9W-N |
| SMA        | ZA3CS-450-9W-S |

## High Power Combiner Electrical Specifications

| FREQ. RANGE (MHz) | ISOLATION (dB) |      | INSERTION LOSS (dB) ABOVE 4.8 dB |      | PHASE UNBALANCE (Degrees) |      | AMPLITUDE UNBALANCE (dB) |      | POWER INPUT <sup>1</sup> (W)  |                  |
|-------------------|----------------|------|----------------------------------|------|---------------------------|------|--------------------------|------|-------------------------------|------------------|
| $f_L$ - $f_U$     | Typ.           | Min. | Typ.                             | Max. | Typ.                      | Max. | Typ.                     | Max. | as combiner <sup>2</sup> Max. | as splitter Max. |
| 100-450           | 22             | 15   | 0.9                              | 1.8  | 2.5                       | 8.0  | 0.2                      | 0.7  | 9                             | 12               |

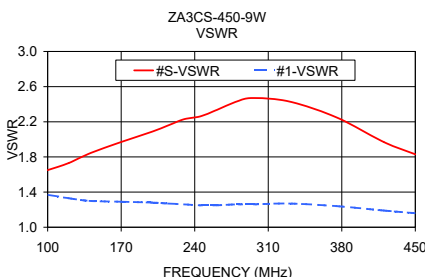
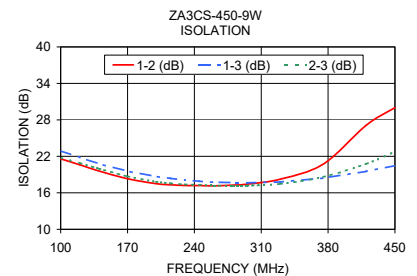
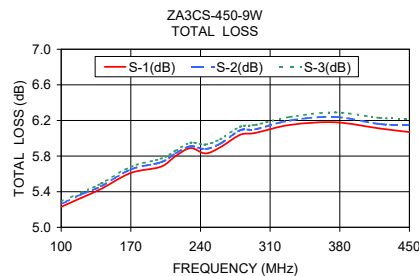
1. Over -55°C to +55°C. Derate linearly to 20% of rating at 90°C

2. As a combiner of non-coherent signals, max. power per port is power rating divided by number of ports.

## Typical Performance Data

| Freq. (MHz) | Total Loss <sup>1</sup> (dB) |      |      | Amp. Unbal. (dB) | Isolation (dB) |       |       | Phase Unbal. (deg.) | VSWR S | VSWR 1 | VSWR 2 | VSWR 3 |
|-------------|------------------------------|------|------|------------------|----------------|-------|-------|---------------------|--------|--------|--------|--------|
|             | S-1                          | S-2  | S-3  |                  | 1-2            | 1-3   | 2-3   |                     |        |        |        |        |
| 100.00      | 5.23                         | 5.26 | 5.29 | 0.07             | 21.59          | 22.92 | 21.77 | 0.48                | 1.65   | 1.37   | 1.34   | 1.36   |
| 120.00      | 5.33                         | 5.37 | 5.39 | 0.05             | 20.61          | 21.81 | 20.89 | 0.69                | 1.73   | 1.33   | 1.29   | 1.30   |
| 140.00      | 5.43                         | 5.46 | 5.49 | 0.07             | 19.60          | 20.78 | 19.99 | 0.79                | 1.84   | 1.30   | 1.26   | 1.28   |
| 170.00      | 5.61                         | 5.65 | 5.68 | 0.07             | 18.32          | 19.56 | 18.71 | 0.93                | 1.97   | 1.29   | 1.24   | 1.26   |
| 200.00      | 5.68                         | 5.73 | 5.77 | 0.08             | 17.50          | 18.69 | 17.82 | 1.03                | 2.09   | 1.28   | 1.25   | 1.25   |
| 215.00      | 5.80                         | 5.83 | 5.86 | 0.06             | 17.32          | 18.38 | 17.56 | 1.07                | 2.16   | 1.27   | 1.25   | 1.25   |
| 230.00      | 5.89                         | 5.91 | 5.95 | 0.06             | 17.21          | 18.10 | 17.39 | 1.16                | 2.23   | 1.26   | 1.26   | 1.26   |
| 245.00      | 5.83                         | 5.88 | 5.93 | 0.10             | 17.19          | 17.91 | 17.32 | 1.44                | 2.26   | 1.25   | 1.27   | 1.27   |
| 260.00      | 5.90                         | 5.94 | 5.99 | 0.09             | 17.15          | 17.74 | 17.19 | 1.48                | 2.33   | 1.25   | 1.28   | 1.29   |
| 280.00      | 6.04                         | 6.09 | 6.13 | 0.09             | 17.27          | 17.68 | 17.16 | 1.47                | 2.43   | 1.26   | 1.31   | 1.33   |
| 295.00      | 6.06                         | 6.10 | 6.15 | 0.09             | 17.42          | 17.65 | 17.17 | 1.71                | 2.47   | 1.26   | 1.32   | 1.36   |
| 330.00      | 6.15                         | 6.20 | 6.24 | 0.10             | 18.25          | 17.79 | 17.48 | 1.89                | 2.43   | 1.27   | 1.36   | 1.41   |
| 375.00      | 6.18                         | 6.24 | 6.29 | 0.11             | 20.73          | 18.43 | 18.62 | 2.20                | 2.25   | 1.24   | 1.36   | 1.37   |
| 420.00      | 6.11                         | 6.16 | 6.23 | 0.12             | 27.12          | 19.54 | 20.78 | 2.79                | 1.97   | 1.19   | 1.31   | 1.29   |
| 450.00      | 6.07                         | 6.15 | 6.22 | 0.14             | 30.02          | 20.48 | 22.77 | 3.26                | 1.83   | 1.16   | 1.25   | 1.25   |

1. Total Loss = Insertion Loss + 4.8dB splitter loss.



## electrical schematic



## 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.  
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# 3 Way-0° Power Splitter/Combiner

ZA3CS-450-9W

## Typical Performance Data

| FREQ.<br>(MHz) | TOTAL LOSS <sup>1</sup><br>(dB) |      |      | AMP.<br>UNBAL.<br>(dB) | ISOLATION<br>(dB) |       |       | PHASE<br>UNBAL.<br>(deg.) | FREQ.<br>(MHz) | VSWR<br>(:1) |      |      |      |
|----------------|---------------------------------|------|------|------------------------|-------------------|-------|-------|---------------------------|----------------|--------------|------|------|------|
|                | S-1                             | S-2  | S-3  |                        | 1-2               | 1-3   | 2-3   |                           |                | S            | 1    | 2    | 3    |
| 100.0          | 5.23                            | 5.26 | 5.29 | 0.07                   | 21.59             | 22.92 | 21.77 | 0.48                      | 100.0          | 1.65         | 1.37 | 1.34 | 1.36 |
| 110.0          | 5.29                            | 5.29 | 5.33 | 0.04                   | 21.09             | 22.38 | 21.33 | 0.60                      | 110.0          | 1.69         | 1.34 | 1.31 | 1.33 |
| 120.0          | 5.33                            | 5.37 | 5.39 | 0.05                   | 20.61             | 21.81 | 20.89 | 0.69                      | 120.0          | 1.73         | 1.33 | 1.29 | 1.30 |
| 130.0          | 5.39                            | 5.43 | 5.45 | 0.07                   | 20.09             | 21.27 | 20.45 | 0.65                      | 130.0          | 1.78         | 1.31 | 1.27 | 1.29 |
| 140.0          | 5.43                            | 5.46 | 5.49 | 0.07                   | 19.60             | 20.78 | 19.99 | 0.79                      | 140.0          | 1.84         | 1.30 | 1.26 | 1.28 |
| 150.0          | 5.44                            | 5.47 | 5.49 | 0.06                   | 19.18             | 20.36 | 19.56 | 0.79                      | 150.0          | 1.89         | 1.30 | 1.25 | 1.27 |
| 160.0          | 5.49                            | 5.54 | 5.57 | 0.08                   | 18.72             | 19.94 | 19.13 | 0.93                      | 160.0          | 1.92         | 1.29 | 1.25 | 1.26 |
| 170.0          | 5.61                            | 5.65 | 5.68 | 0.07                   | 18.32             | 19.56 | 18.71 | 0.93                      | 170.0          | 1.97         | 1.29 | 1.24 | 1.26 |
| 180.0          | 5.65                            | 5.69 | 5.72 | 0.07                   | 18.02             | 19.27 | 18.38 | 0.97                      | 180.0          | 2.02         | 1.29 | 1.24 | 1.26 |
| 190.0          | 5.65                            | 5.68 | 5.70 | 0.05                   | 17.74             | 18.97 | 18.06 | 1.01                      | 190.0          | 2.06         | 1.29 | 1.25 | 1.26 |
| 200.0          | 5.68                            | 5.73 | 5.77 | 0.08                   | 17.50             | 18.69 | 17.82 | 1.03                      | 200.0          | 2.09         | 1.28 | 1.25 | 1.25 |
| 205.0          | 5.71                            | 5.76 | 5.80 | 0.09                   | 17.43             | 18.57 | 17.74 | 1.16                      | 205.0          | 2.11         | 1.28 | 1.25 | 1.25 |
| 210.0          | 5.75                            | 5.80 | 5.83 | 0.08                   | 17.37             | 18.47 | 17.64 | 1.09                      | 210.0          | 2.13         | 1.28 | 1.25 | 1.25 |
| 215.0          | 5.80                            | 5.83 | 5.86 | 0.06                   | 17.32             | 18.38 | 17.56 | 1.07                      | 215.0          | 2.16         | 1.27 | 1.25 | 1.25 |
| 220.0          | 5.83                            | 5.86 | 5.88 | 0.06                   | 17.29             | 18.28 | 17.49 | 1.26                      | 220.0          | 2.19         | 1.27 | 1.26 | 1.25 |
| 225.0          | 5.87                            | 5.89 | 5.92 | 0.05                   | 17.24             | 18.20 | 17.43 | 1.22                      | 225.0          | 2.21         | 1.26 | 1.26 | 1.26 |
| 230.0          | 5.89                            | 5.91 | 5.95 | 0.06                   | 17.21             | 18.10 | 17.39 | 1.16                      | 230.0          | 2.23         | 1.26 | 1.26 | 1.26 |
| 235.0          | 5.87                            | 5.93 | 5.96 | 0.09                   | 17.20             | 18.02 | 17.36 | 1.36                      | 235.0          | 2.24         | 1.26 | 1.26 | 1.26 |
| 240.0          | 5.86                            | 5.91 | 5.95 | 0.09                   | 17.18             | 17.96 | 17.33 | 1.35                      | 240.0          | 2.25         | 1.26 | 1.26 | 1.27 |
| 245.0          | 5.83                            | 5.88 | 5.93 | 0.10                   | 17.19             | 17.91 | 17.32 | 1.44                      | 245.0          | 2.26         | 1.25 | 1.27 | 1.27 |
| 250.0          | 5.83                            | 5.88 | 5.92 | 0.10                   | 17.17             | 17.85 | 17.28 | 1.33                      | 250.0          | 2.28         | 1.25 | 1.27 | 1.28 |
| 255.0          | 5.85                            | 5.90 | 5.95 | 0.09                   | 17.16             | 17.79 | 17.23 | 1.41                      | 255.0          | 2.30         | 1.25 | 1.28 | 1.29 |
| 260.0          | 5.90                            | 5.94 | 5.99 | 0.09                   | 17.15             | 17.74 | 17.19 | 1.48                      | 260.0          | 2.33         | 1.25 | 1.28 | 1.29 |
| 265.0          | 5.95                            | 6.00 | 6.05 | 0.09                   | 17.17             | 17.71 | 17.16 | 1.43                      | 265.0          | 2.36         | 1.25 | 1.29 | 1.30 |
| 270.0          | 6.02                            | 6.06 | 6.09 | 0.07                   | 17.20             | 17.69 | 17.16 | 1.45                      | 270.0          | 2.39         | 1.25 | 1.29 | 1.31 |
| 280.0          | 6.04                            | 6.09 | 6.13 | 0.09                   | 17.27             | 17.68 | 17.16 | 1.47                      | 280.0          | 2.43         | 1.26 | 1.31 | 1.33 |
| 285.0          | 6.03                            | 6.09 | 6.13 | 0.09                   | 17.30             | 17.66 | 17.15 | 1.49                      | 285.0          | 2.44         | 1.26 | 1.31 | 1.34 |
| 290.0          | 6.04                            | 6.09 | 6.15 | 0.11                   | 17.35             | 17.64 | 17.15 | 1.62                      | 290.0          | 2.46         | 1.26 | 1.32 | 1.35 |
| 295.0          | 6.06                            | 6.10 | 6.15 | 0.09                   | 17.42             | 17.65 | 17.17 | 1.71                      | 295.0          | 2.47         | 1.26 | 1.32 | 1.36 |
| 300.0          | 6.09                            | 6.14 | 6.19 | 0.10                   | 17.50             | 17.65 | 17.20 | 1.55                      | 300.0          | 2.47         | 1.26 | 1.33 | 1.37 |
| 315.0          | 6.14                            | 6.19 | 6.24 | 0.10                   | 17.81             | 17.69 | 17.31 | 1.77                      | 315.0          | 2.46         | 1.27 | 1.35 | 1.39 |
| 330.0          | 6.15                            | 6.20 | 6.24 | 0.10                   | 18.25             | 17.79 | 17.48 | 1.89                      | 330.0          | 2.43         | 1.27 | 1.36 | 1.41 |
| 345.0          | 6.14                            | 6.19 | 6.26 | 0.12                   | 18.90             | 17.96 | 17.81 | 1.94                      | 345.0          | 2.41         | 1.27 | 1.37 | 1.41 |
| 360.0          | 6.18                            | 6.22 | 6.28 | 0.10                   | 19.67             | 18.14 | 18.14 | 2.15                      | 360.0          | 2.34         | 1.25 | 1.37 | 1.39 |
| 375.0          | 6.18                            | 6.24 | 6.29 | 0.11                   | 20.73             | 18.43 | 18.62 | 2.20                      | 375.0          | 2.25         | 1.24 | 1.36 | 1.37 |
| 390.0          | 6.10                            | 6.17 | 6.23 | 0.13                   | 22.13             | 18.73 | 19.17 | 2.41                      | 390.0          | 2.18         | 1.22 | 1.35 | 1.34 |
| 405.0          | 6.10                            | 6.14 | 6.21 | 0.11                   | 24.17             | 19.13 | 19.88 | 2.55                      | 405.0          | 2.08         | 1.20 | 1.33 | 1.31 |
| 420.0          | 6.11                            | 6.16 | 6.23 | 0.12                   | 27.12             | 19.54 | 20.78 | 2.79                      | 420.0          | 1.97         | 1.19 | 1.31 | 1.29 |
| 435.0          | 6.10                            | 6.15 | 6.22 | 0.12                   | 30.73             | 20.01 | 21.81 | 3.05                      | 435.0          | 1.91         | 1.18 | 1.28 | 1.27 |
| 450.0          | 6.07                            | 6.15 | 6.22 | 0.14                   | 30.02             | 20.48 | 22.77 | 3.26                      | 450.0          | 1.83         | 1.16 | 1.25 | 1.25 |

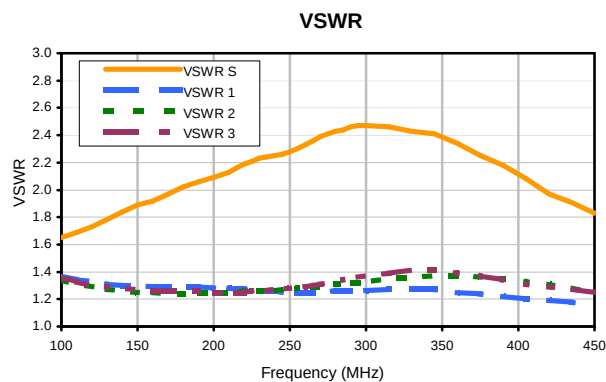
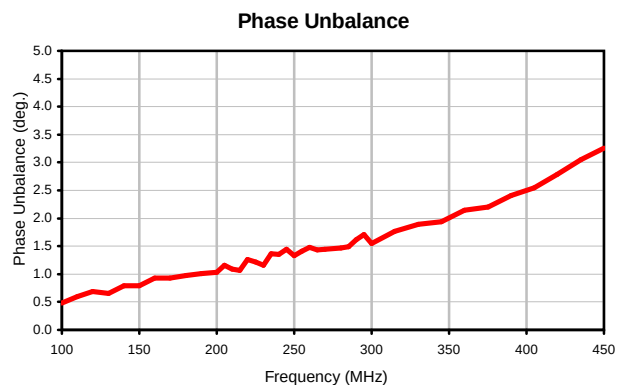
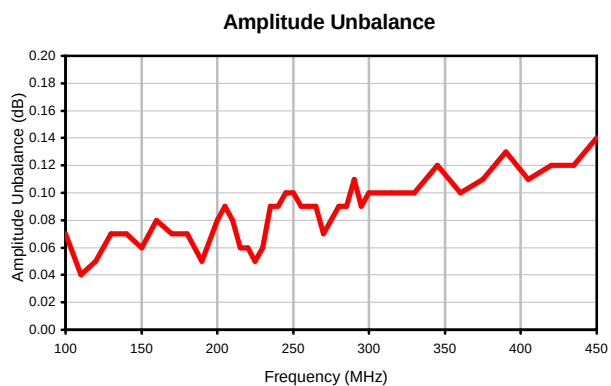
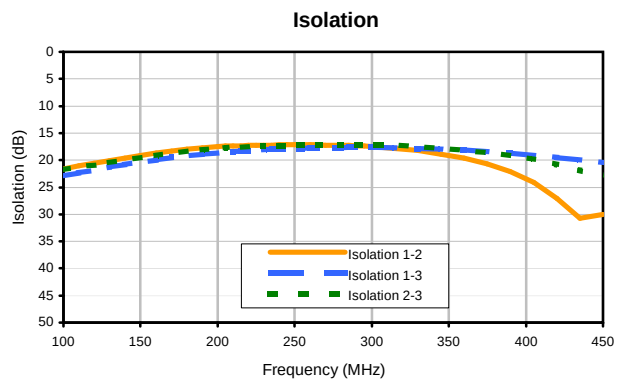
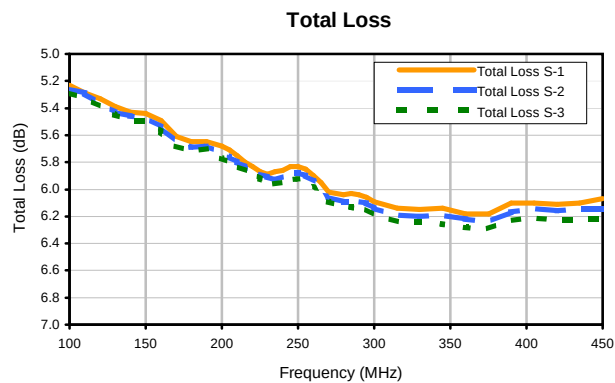
<sup>1</sup> Total Loss = Insertion Loss+ 4.8dB Splitter Loss

REV. X2  
ZA3CS-450-9W  
100627  
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# 3 Way-0° Power Splitter/Combiner

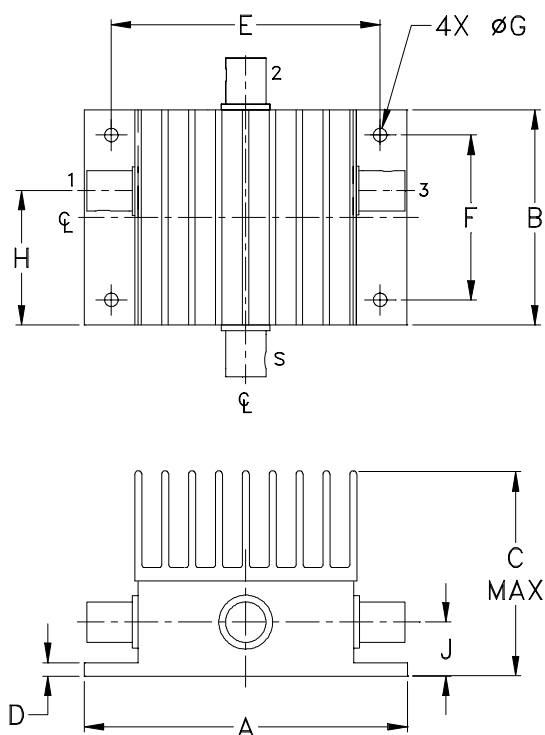
ZA3CS-450-9W

## Typical Performance Curves



REV. X2  
ZA3CS-450-9W  
100627  
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### Outline Dimensions



| CASE # | A               | B               | C               | D              | E                | F                | G              | H               | J              | WT. GRAM |
|--------|-----------------|-----------------|-----------------|----------------|------------------|------------------|----------------|-----------------|----------------|----------|
| AX255  | 3.00<br>(76.20) | 2.00<br>(50.80) | 1.92<br>(48.77) | .100<br>(2.54) | 2.500<br>(63.50) | 1.525<br>(38.74) | .125<br>(3.18) | 1.25<br>(31.75) | .50<br>(12.70) | 343      |

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

#### Notes:

- Case material: Aluminum alloy.
- Case Finish:  
For RoHS Case Styles: Clear chemical conversion coating, non-chrome or trivalent chrome based.
- Heat sink finish: Black anodize.



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 90° C<br>Ambient Environment                                                   | Individual Model Data Sheet          |
| Storage Temperature        | -55° to 100° C<br>Ambient Environment                                                  | Individual Model Data Sheet          |
| Barometric Pressure        | 100,000 Feet                                                                           | MIL-STD-202, Method 105, Condition D |
| Humidity                   | 90% RH, 65°C<br>Units may require bake-out after humidity to restore full performance. | MIL-STD-202, Method 103              |
| Thermal Shock              | -65° to 125°C, 5 cycles                                                                | MIL-STD-202, Method 107, Condition B |
| 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           | 100g, 6ms sawtooth, 3 shocks each direction 3 axes (total 18)                          | MIL-STD-202, Method 213, Condition I |