

Reflective

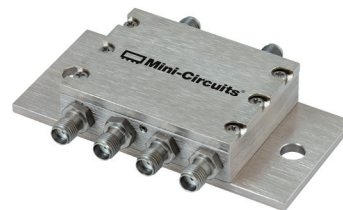
SPDT RF Switch

ZASW-2-50DRA+

50Ω DC² - 5000 MHz

The Big Deal

- Wide bandwidth DC² to 5000 MHz
- High Isolation, 60 dB typ.
- Very fast switching, 20ns typ.
- Low video break thru 45 mVp-p typ.



CASE STYLE: CY353

Product Overview

The ZASW-2-50DRA+ is an excellent high isolation, solid state SPDT, reflective RF switch. With its broad frequency range, fast switching time and excellent RF performance, the ZASW-2-50DRA+ is an excellent replacement for the Mini-Circuits' legacy switch model ZASW-2-50DR+. Refer app note [AN-80-020](#) for more details. The wide bandwidth, high isolation and fast switching characteristics makes this switch a versatile choice for several RF applications & systems.

Key Features

| Feature | Advantages |
|--|---|
| Integrated TTL Driver | -Operates at +5V to -5V -Low control current allows compatibility with a variety of driver circuits -Fast 20 ns typ. Switching time |
| Excellent for a Variety of Applications From Bench to Integrated Systems | -High speed testers -Automated switching networks -Wireless Infrastructure -Military |
| Excellent RF Performance | -Wide bandwidth: DC ² to 5000 MHz -Good Insertion Loss: 2.5 dB Typ -Low video leakage, 45 mVp-p typ. |

2. All RF connections must be blocked or held at 0V DC. Low frequency is determined by value of Coupling capacitors at RF ports.

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



Coaxial

SPDT RF Switch

50Ω DC²-5000 MHz

Reflective RF Switch with Internal Driver
Dual Supply Voltage, +5V to -5V

Product Features

- Wide bandwidth, DC² to 5000 MHz
- Good Insertion loss, 2.5 dB typ.
- Internal TTL driver
- Fast switching, Rise/fall time, 4 ns typ.
- Wide operating temperature, -20°C to +85°C

Typical Applications

- Cellular
- ISM, WCDMA, WIMAX
- PCN
- Automated switching networks
- Military

General Description

The ZASW-2-50DRA+ is a 50Ω reflective, high isolation SPDT RF switch. It is designed for RF/wireless applications covering a broad frequency range from DC² to 5000 MHz with good insertion loss and Isolation. The ZASW-2-50DRA+ operates with a dual supply voltage ±5V. This unit includes an internal driver circuitry which makes it easier to control switching with standard voltage levels.



Generic photo used for illustration purposes only

ZASW-2-50DRA+

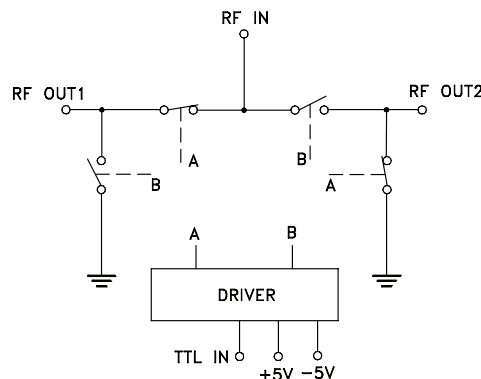
CASE STYLE: CY353

| | |
|------------|---------------|
| Connectors | Model |
| SMA | ZASW-2-50DRA+ |

+RoHS Compliant

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

Schematic and Application Circuit



2. All RF connections must be blocked or held at 0V DC. Low frequency is determined by value of Coupling capacitors at RF ports.

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REV. OR
M168831
ZASW-2-50DRA+
Anish D/CP/AM
200812
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RF Electrical Specifications, DC² - 5000 MHz, T_{AMB}=25°C, Supply Voltage (+V, -V) =+5V, -5V

| Parameter | Condition (MHz) | Min. | Typ. | Max. | Units |
|--|-----------------------|-----------------|------|------|-------------------|
| Frequency Range | | DC ² | | 5000 | MHz |
| Insertion Loss | DC ² -100 | — | 1.3 | 2.0 | dB |
| | 100-1000 | — | 1.7 | 2.5 | |
| | 1000-2000 | — | 1.8 | 3.0 | |
| | 2000-5000 | — | 3.0 | 4.5 | |
| Isolation between Common port and RF1/RF2 Ports | DC ² -100 | 80 | 100 | — | dB |
| | 100-1000 | 75 | 90 | — | |
| | 1000-2000 | 65 | 82 | — | |
| | 2000-5000 | 35 | 60 | — | |
| Return Loss (IN PORT) | DC ² -5000 | — | 14 | — | dB |
| Return Loss @ RF1/RF2 ports (ON STATE) | DC ² -5000 | — | 14.5 | — | dB |
| Input 1dB Compression ⁽¹⁾ | DC ² -100 | — | — | — | dBm |
| | 100-1000 | — | >20 | — | |
| | 1000-2000 | — | >24 | — | |
| | 2000-5000 | — | >23 | — | |
| DC Electrical Specifications | | | | | |
| Supply Voltage (+V) | | — | 5 | — | V |
| Supply Voltage (-V) | | | -5 | | V |
| Positive Supply Current | +V=5V | | 4.6 | | mA |
| Negative Supply Current | -V=-5V | | -8.2 | | mA |
| Control Voltage Low | | 0 | | 0.7 | V |
| Control Voltage High | | 2.1 | | 5 | V |
| Control Current | | — | — | 2 | mA |
| Switching Specifications | | | | | |
| Rise/Fall Time (10 to 90% or 90 to 10% RF) | +V=5V, -V=-5V | — | 5 | — | nSec |
| Switching Time (50% CTRL to 90/10% RF) | +V=5V, -V=-5V | — | 20 | — | nSec |
| Video Feed through (Control 0-5V, Frequency 1 MHz) | +V=5V, -V=-5V | — | 45 | — | mV _{P-P} |

1. At low frequency(<100 MHz), the dynamic range of switch decreases.

Absolute Maximum Ratings

| Parameter | Ratings |
|-----------------------------|---|
| Operating Temperature | -20°C to 85°C |
| Storage Temperature | -55°C to 100°C |
| Supply Voltage (+V & -V) | +5.5V, -5.5V |
| Voltage Control | -0.2V min, +5.5V max |
| RF input power ³ | 31 dBm |
| ESD, HBM | Class 1A (250 to <500V) per JESD22-A114 |

2. All RF connections must be blocked or held at 0V DC. Low frequency is determined by value of Coupling capacitors at RF ports.

3. Frequency range of 500-5000 MHz.

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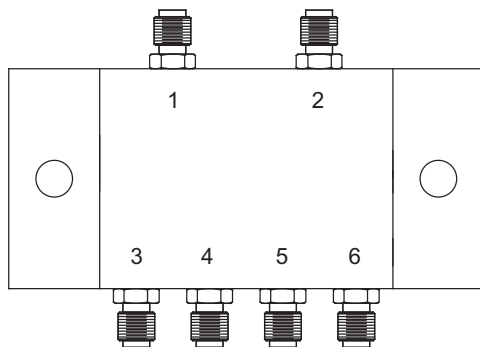
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Truth Table *(State of control voltage selects the desired switch state)*

| State of Control Voltage | Switch State - RF IN to | |
|--|-------------------------|-----|
| | RF1 | RF2 |
| Low | ON | OFF |
| High | OFF | ON |
| ON- low insertion loss state OFF- Isolation State | | |

Coaxial Configuration



Coaxial Connections

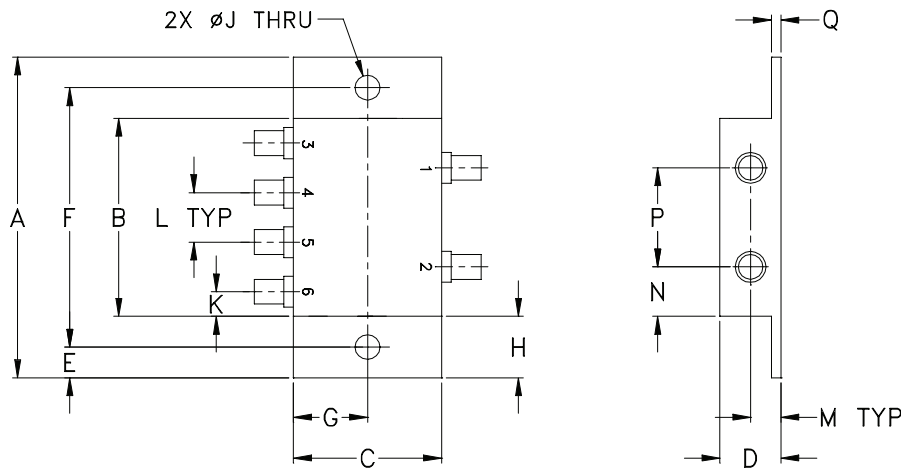
| Function | Port Number | Description |
|----------|-------------|-------------------------|
| RF IN | 1 | RF Common/ SUM Port |
| RF1 | 3 | RF Out #1/In Port #1 |
| RF2 | 6 | RF Out #2/In Port #2 |
| Control | 4 | TTL Control IN |
| +5V | 2 | Positive Supply Voltage |
| -5V | 5 | Negative Supply Voltage |

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Outline Drawing (CY353)



Outline Dimensions (inch/mm)

| | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|
| A | B | C | D | E | F | G | H |
| 3.24 | 2.00 | 1.50 | .62 | .31 | 2.620 | .75 | .62 |
| 82.30 | 50.80 | 38.10 | 15.75 | 7.87 | 66.55 | 19.05 | 15.75 |
| J | K | L | M | N | P | Q | wt |
| .250 | .25 | .50 | .31 | .50 | 1.00 | .13 | grams |
| 6.35 | 6.35 | 12.70 | 7.87 | 12.70 | 25.40 | 3.30 | 65.0 |

Additional Detailed Technical Information

| | |
|---|--|
| Additional information is available on our web site. To access this information enter the model number on our web site home page. | |
| Performance Data | Data Table |
| | Swept Graphs |
| | S-Parameter (S2P Files) Data Set (.zip file) |
| Case Style | CY353 |
| Environmental Ratings | ENV28T16 |

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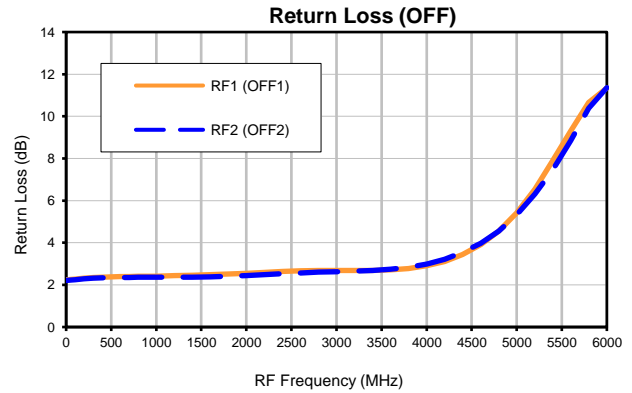
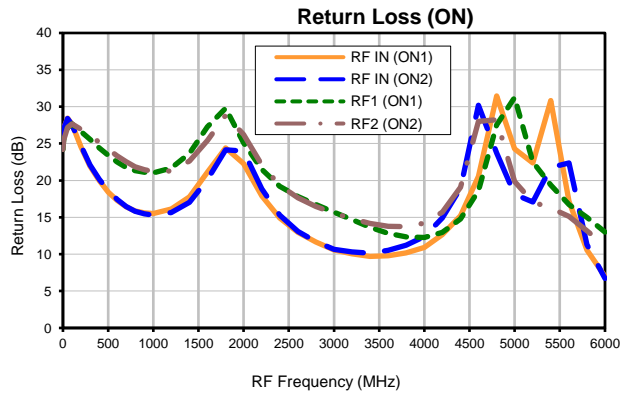
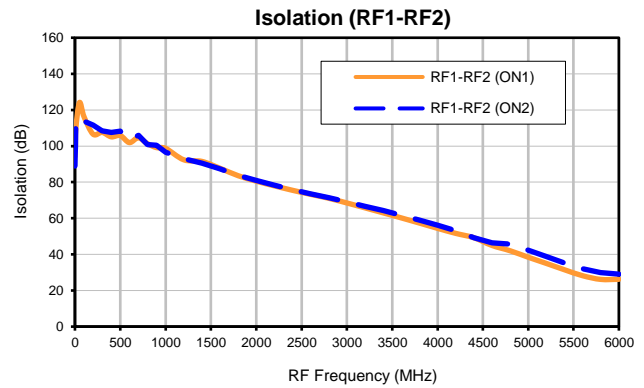
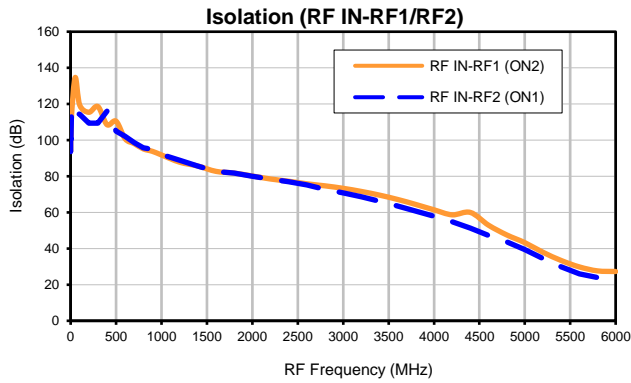
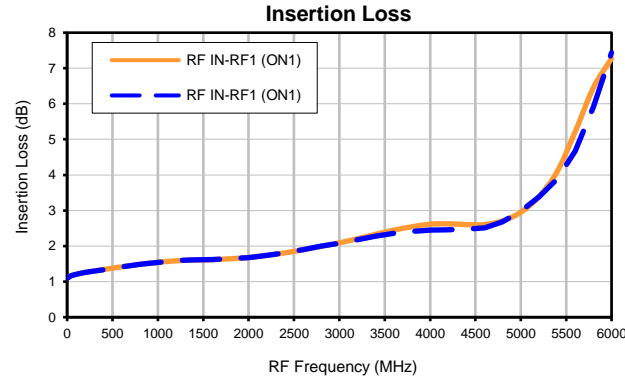


Typical Performance Data

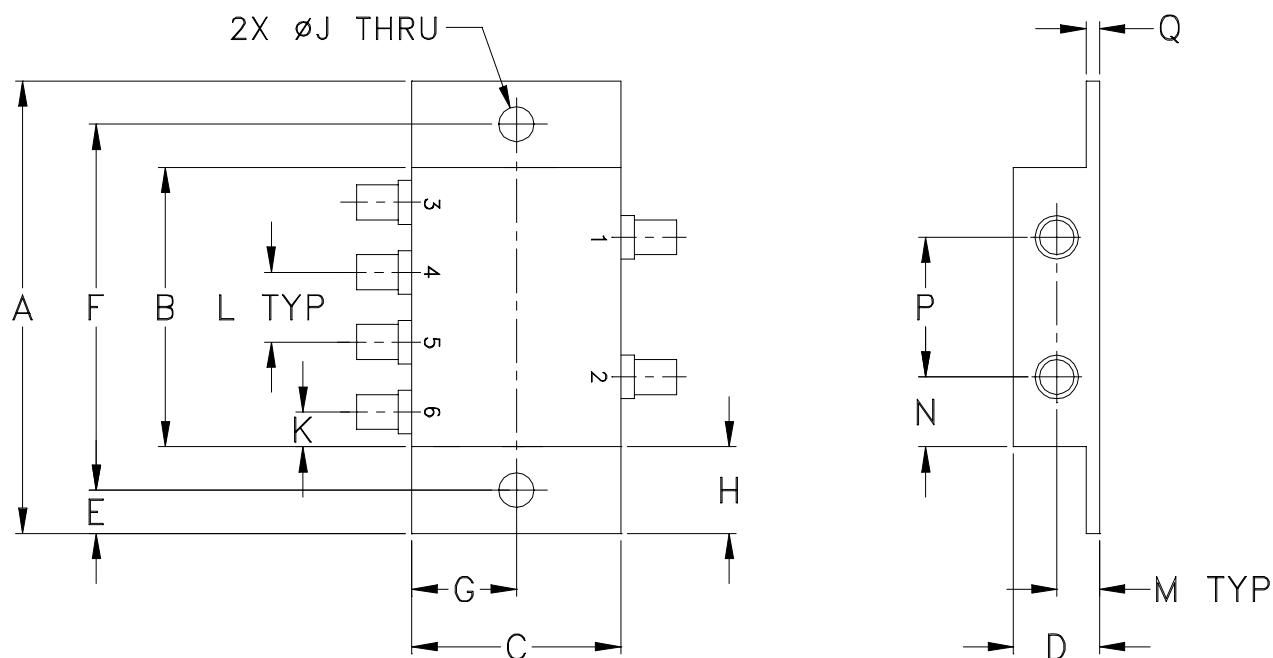
| RF (MHz) | INSERTION LOSS | | ISOLATION | | ISOLATION | | RETURN LOSS | | | | | |
|-------------|--------------------|--------------------|--------------------|--------------------|------------------|------------------|----------------|----------------|--------------|--------------|---------------|---------------|
| | (dB) | | (dB) | | (dB) | | (dB) | | | | | |
| | RF IN-RF1 (ON1) | RF IN-RF2 (ON2) | RF IN-RF1 (ON2) | RF IN-RF2 (ON1) | RF1-RF2 (ON1) | RF1-RF2 (ON2) | RF IN (ON1) | RF IN (ON2) | RF1 (ON1) | RF2 (ON2) | RF1 (OFF1) | RF2 (OFF2) |
| 0.3 | 1.10 | 1.10 | 93.86 | 93.58 | 94.07 | 88.98 | 25.59 | 25.36 | 24.20 | 24.18 | 2.23 | 2.22 |
| 1 | 1.10 | 1.10 | 99.83 | 100.99 | 98.76 | 94.60 | 26.07 | 26.02 | 24.60 | 24.60 | 2.23 | 2.21 |
| 5 | 1.10 | 1.10 | 102.45 | 100.35 | 98.68 | 100.09 | 26.62 | 26.56 | 25.09 | 25.03 | 2.23 | 2.21 |
| 10 | 1.12 | 1.12 | 113.95 | 118.36 | 109.80 | 113.56 | 27.12 | 27.03 | 25.55 | 25.52 | 2.23 | 2.21 |
| 50 | 1.17 | 1.17 | 134.67 | 114.88 | 124.10 | 116.10 | 28.43 | 28.39 | 27.16 | 27.20 | 2.26 | 2.23 |
| 100 | 1.21 | 1.21 | 119.37 | 114.43 | 116.26 | 113.80 | 27.65 | 27.54 | 27.65 | 27.67 | 2.28 | 2.25 |
| 200 | 1.26 | 1.26 | 115.39 | 109.45 | 106.58 | 111.56 | 24.54 | 24.74 | 26.61 | 26.93 | 2.31 | 2.28 |
| 300 | 1.30 | 1.30 | 118.57 | 109.43 | 107.60 | 108.36 | 21.92 | 22.13 | 25.58 | 26.18 | 2.35 | 2.32 |
| 400 | 1.34 | 1.34 | 108.54 | 116.16 | 105.11 | 107.53 | 19.98 | 20.16 | 24.40 | 25.17 | 2.37 | 2.33 |
| 500 | 1.38 | 1.37 | 110.47 | 104.89 | 105.83 | 108.20 | 18.44 | 18.63 | 23.42 | 24.25 | 2.38 | 2.35 |
| 600 | 1.42 | 1.41 | 100.71 | 102.19 | 101.93 | 103.27 | 17.31 | 17.42 | 22.49 | 23.34 | 2.39 | 2.35 |
| 700 | 1.45 | 1.45 | 98.04 | 98.52 | 104.61 | 105.92 | 16.44 | 16.49 | 21.78 | 22.54 | 2.40 | 2.36 |
| 800 | 1.49 | 1.48 | 95.15 | 95.75 | 101.31 | 100.84 | 15.86 | 15.83 | 21.33 | 21.87 | 2.41 | 2.36 |
| 900 | 1.52 | 1.52 | 93.78 | 94.78 | 99.12 | 100.45 | 15.59 | 15.46 | 21.10 | 21.44 | 2.41 | 2.36 |
| 1000 | 1.54 | 1.54 | 91.77 | 91.97 | 98.73 | 96.61 | 15.54 | 15.32 | 21.02 | 21.18 | 2.42 | 2.36 |
| 1200 | 1.59 | 1.59 | 87.78 | 88.84 | 92.39 | 93.10 | 16.10 | 15.66 | 21.68 | 21.30 | 2.44 | 2.36 |
| 1400 | 1.61 | 1.61 | 85.66 | 85.66 | 91.51 | 90.47 | 17.75 | 17.02 | 23.69 | 22.65 | 2.46 | 2.37 |
| 1600 | 1.62 | 1.62 | 82.70 | 82.60 | 87.69 | 87.37 | 21.11 | 20.10 | 27.26 | 25.41 | 2.49 | 2.38 |
| 1800 | 1.64 | 1.64 | 81.76 | 81.83 | 83.60 | 83.82 | 24.41 | 24.16 | 29.78 | 28.84 | 2.52 | 2.41 |
| 2000 | 1.68 | 1.68 | 80.13 | 80.04 | 80.56 | 80.88 | 22.28 | 23.98 | 25.12 | 26.22 | 2.55 | 2.44 |
| 2200 | 1.74 | 1.74 | 78.48 | 78.34 | 77.96 | 78.36 | 17.90 | 18.85 | 21.49 | 22.12 | 2.60 | 2.48 |
| 2400 | 1.81 | 1.81 | 77.24 | 77.02 | 75.49 | 75.79 | 14.90 | 15.31 | 19.23 | 19.35 | 2.64 | 2.53 |
| 2600 | 1.89 | 1.90 | 75.81 | 75.12 | 73.25 | 73.58 | 12.95 | 13.11 | 17.80 | 17.66 | 2.66 | 2.57 |
| 2800 | 1.99 | 2.00 | 74.68 | 72.73 | 71.08 | 71.33 | 11.66 | 11.72 | 16.73 | 16.47 | 2.68 | 2.60 |
| 3000 | 2.09 | 2.08 | 73.32 | 70.71 | 68.48 | 69.03 | 10.55 | 10.67 | 15.70 | 15.54 | 2.68 | 2.63 |
| 3200 | 2.21 | 2.18 | 71.59 | 68.56 | 65.76 | 66.57 | 10.05 | 10.30 | 14.71 | 14.80 | 2.69 | 2.66 |
| 3400 | 2.33 | 2.28 | 69.55 | 66.13 | 63.01 | 64.22 | 9.70 | 10.14 | 13.67 | 14.19 | 2.69 | 2.69 |
| 3600 | 2.45 | 2.36 | 67.15 | 63.50 | 60.21 | 61.64 | 9.80 | 10.51 | 12.82 | 13.78 | 2.71 | 2.75 |
| 3800 | 2.54 | 2.41 | 64.37 | 60.75 | 57.34 | 59.01 | 10.20 | 11.23 | 12.34 | 13.74 | 2.78 | 2.84 |
| 4000 | 2.61 | 2.45 | 61.41 | 57.76 | 54.43 | 56.17 | 10.93 | 12.41 | 12.27 | 14.20 | 2.91 | 2.99 |
| 4200 | 2.63 | 2.46 | 58.65 | 54.87 | 51.64 | 53.22 | 12.64 | 14.89 | 12.96 | 15.71 | 3.11 | 3.22 |
| 4400 | 2.60 | 2.47 | 59.97 | 51.26 | 49.24 | 49.30 | 15.22 | 18.93 | 14.76 | 19.08 | 3.44 | 3.55 |
| 4600 | 2.60 | 2.51 | 52.92 | 47.15 | 44.95 | 46.37 | 20.54 | 30.20 | 18.59 | 28.01 | 3.91 | 3.98 |
| 4800 | 2.71 | 2.68 | 47.55 | 43.66 | 42.02 | 45.69 | 31.46 | 23.71 | 27.55 | 28.22 | 4.55 | 4.55 |
| 5000 | 2.95 | 2.98 | 43.24 | 39.50 | 38.43 | 42.38 | 24.30 | 18.13 | 31.25 | 19.85 | 5.41 | 5.33 |
| 5200 | 3.39 | 3.38 | 37.91 | 34.50 | 34.99 | 38.73 | 22.36 | 17.08 | 22.49 | 17.06 | 6.55 | 6.32 |
| 5400 | 4.09 | 3.89 | 33.38 | 29.88 | 31.49 | 35.27 | 30.85 | 21.75 | 19.37 | 16.27 | 7.91 | 7.46 |
| 5600 | 5.22 | 4.67 | 29.82 | 26.01 | 28.19 | 32.11 | 17.15 | 22.37 | 16.73 | 15.14 | 9.30 | 8.85 |
| 5800 | 6.45 | 5.91 | 27.62 | 23.97 | 26.15 | 29.88 | 10.58 | 11.32 | 14.99 | 13.18 | 10.65 | 10.39 |
| 6000 | 7.27 | 7.44 | 27.28 | 24.58 | 26.20 | 29.06 | 7.00 | 6.72 | 13.01 | 11.15 | 11.34 | 11.36 |



Typical Performance Curves



Outline Dimensions



| CASE# | A | B | C | D | E | F | G | H | J | K | L | M | N |
|-------|-----------------|-----------------|-----------------|----------------|---------------|------------------|----------------|----------------|----------------|---------------|----------------|---------------|----------------|
| CY353 | 3.24 (82.30) | 2.00 (50.80) | 1.50 (38.10) | .62 (15.75) | .31 (7.87) | 2.620 (66.55) | .75 (19.05) | .62 (15.75) | .250 (6.35) | .25 (6.35) | .50 (12.70) | .31 (7.87) | .50 (12.70) |

| CASE# | P | Q | WT. GRAMS |
|-------|-----------------|---------------|-----------|
| CY353 | 1.00 (25.40) | .13 (3.30) | 65.0 |

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

Notes:

- Case material: Aluminum alloy.
- Case finish and mounting bracket finish:
For RoHS Case Styles: Clear chemical conversion coating, non-chrome or trivalent chrome based.



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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 | -20° to 85°C Ambient Environment | Individual Model Data Sheet |
| Storage Temperature | -55° to 100° C Ambient Environment | Individual Model Data Sheet |
| Barometric Pressure | 100,000 Feet | MIL-STD-202, Method 105, Condition D |
| Humidity | 90% RH, 65°C Units may require bake-out after humidity to restore full performance. | MIL-STD-202, Method 103 |
| 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 |