

Analog Devices Welcomes Hittite Microwave Corporation

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WIDEBAND FIXED ATTENUATOR FAMILY, DC - 25 GHz

HMC652LP2E / HMC653LP2E / HMC654LP2E / HMC655LP2E

Typical Applications

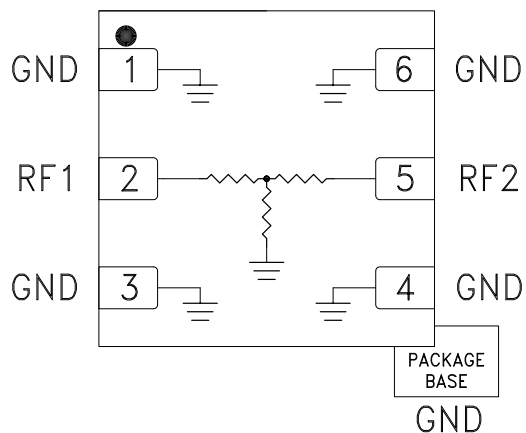
The HMC652LP2E - HMC655LP2E are ideal for:

- Fiber Optics
- Microwave Radio
- Military & Space
- Test & Measurement
- Scientific Instruments
- RF / Microwave Circuit Prototyping

Features

- 4 Attenuator Products:
- 2, 3, 4 & 6 dB Fixed Attenuation Levels
- Wide Bandwidth: DC - 25 GHz
- Excellent Attenuation Accuracy
- Power Handling: +25 dBm
- 6 Lead 2x2 mm SMT Package: 4 mm²

Functional Diagram



General Description

The HMC652LP2E / 653LP2E / 654LP2E / 655LP2E are a line of wideband fixed value SMT 50 Ohm matched attenuators which offer attenuation levels of 2, 3, 4 and 6 dB respectively. These passive attenuators are ideal for military, test equipment, and other wideband applications where extremely flat attenuation, and excellent VSWR vs. frequency are required.

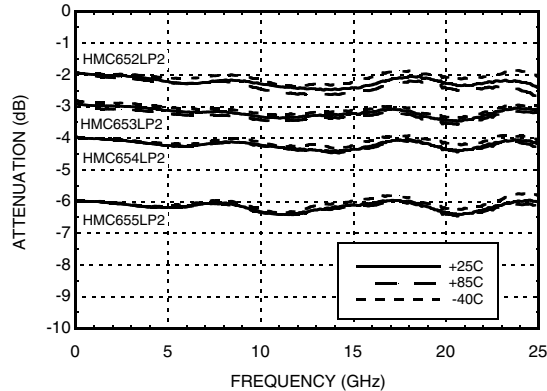
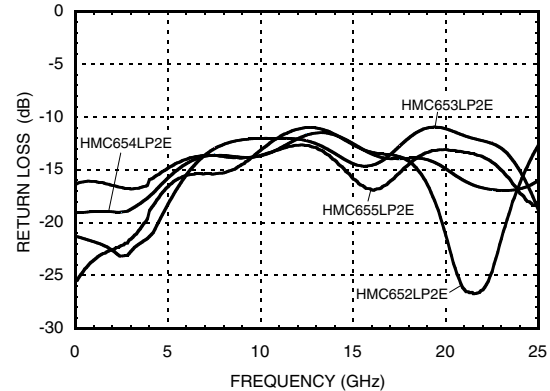
These wideband attenuators handle up to +25 dBm of input power, and are compatible with high volume surface mount manufacturing techniques.

Electrical Specifications, $T_A = +25^\circ\text{C}$, 50 Ohm system

| Part Number | Attenuator Value | Return Loss (Min.) | Return Loss (Typ.) | Attenuation Tolerance [1] | Temperature Coefficient (Typical) [2] | Units |
|-------------|------------------|--------------------|--------------------|---------------------------|---------------------------------------|-------|
| | | | | | | GHz |
| DC - 25 | | | | | | |
| HMC652LP2E | 2 dB | 7.0 | 22.0 | ± 0.5 | 0.0004 | dB |
| HMC653LP2E | 3 dB | 7.0 | 23.0 | ± 0.5 | 0.0006 | dB |
| HMC654LP2E | 4 dB | 7.0 | 20.5 | ± 0.5 | 0.0006 | dB |
| HMC655LP2E | 6 dB | 7.0 | 16.5 | ± 0.5 | 0.0004 | dB |

[1] Attenuation Tolerance is valid over temperature.

[2] Temperature Coefficient Units are dB/°C.

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Attenuation vs. Temperature

Return Loss

Absolute Maximum Ratings

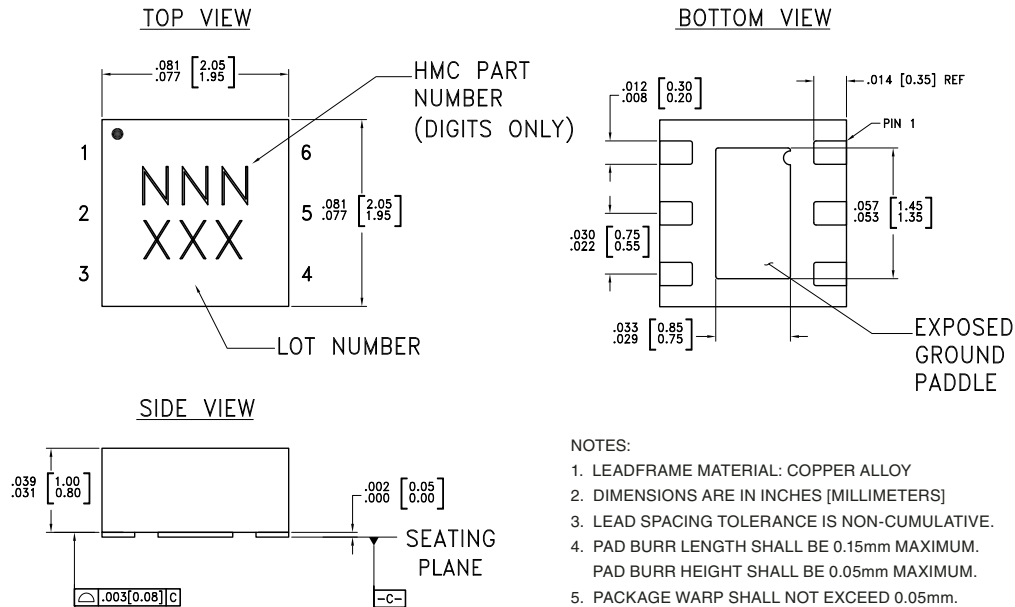
| Part Number | HMC652LP2E | HMC653LP2E | HMC654LP2E | HMC655LP2E | Units |
|-----------------------|-------------|------------|------------|------------|-------|
| RF Input Power (CW) | 27 | 26 | 25 | 26 | dBm |
| DC Voltage Terminated | 5.6 | 5.2 | 4.9 | 5.2 | V |
| DC Voltage Open | 5.6 | 5.1 | 4.6 | 6.0 | V |
| Storage Temperature | -65 to +150 | | | | °C |
| Operating Temperature | -40 to +85 | | | | °C |
| ESD Sensitivity (HBM) | Class 1A | Class 1A | Class 1A | Class 1A | |



ELECTROSTATIC SENSITIVE DEVICE
 OBSERVE HANDLING PRECAUTIONS

WIDEBAND FIXED ATTENUATOR FAMILY, DC - 25 GHz HMC652LP2E / HMC653LP2E / HMC654LP2E / HMC655LP2E

Outline Drawing



NOTES:

1. LEADFRAME MATERIAL: COPPER ALLOY
2. DIMENSIONS ARE IN INCHES [MILLIMETERS]
3. LEAD SPACING TOLERANCE IS NON-CUMULATIVE.
4. PAD BURR LENGTH SHALL BE 0.15mm MAXIMUM.
PAD BURR HEIGHT SHALL BE 0.05mm MAXIMUM.
5. PACKAGE WARP SHALL NOT EXCEED 0.05mm.
6. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED TO PCB RF GROUND.
7. REFER TO HITTITE APPLICATION NOTE FOR SUGGESTED LAND PATTERN.



Package Information

| Part Number | Package Body Material | Lead Finish | MSL Rating | Package Marking ^[1] |
|-------------------------------|--|---------------|---------------------|--------------------------------|
| HMC652LP2E through HMC655LP2E | RoHS-compliant Low Stress Injection Molded Plastic | 100% matte Sn | MSL1 ^[2] | NNN XXX |

[1] 3-Digit lot number XXX

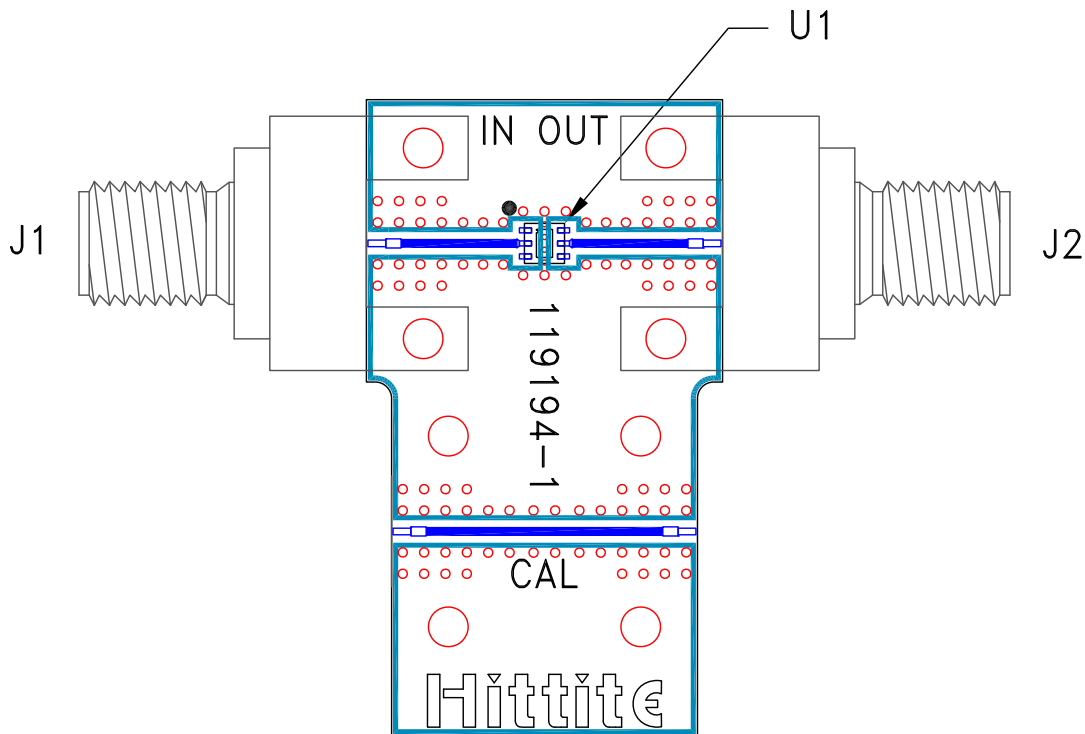
[2] Max peak reflow temperature of 260 °C

Pin Descriptions

| Pin Number | Function | Description | Interface Schematic |
|------------|----------|--|---|
| 1, 3, 4, 6 | GND | Package bottom must be connected to RF/DC ground. |  |
| 2, 5 | RF1, RF2 | This pin is DC coupled and matched to 50 Ohms. Use DC Blocking capacitors if the input / output signals have non-zero DC potential |  |

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Evaluation PCB



List of Materials for Evaluation PCB 119197 [1]

| Item | Description |
|---------|---|
| J1 - J2 | PCB Mount K Connector |
| U1 | HMC652LP2E through HMC655LP2E Passive Attenuators |
| PCB [2] | 119194 Evaluation PCB |

[1] Reference this number when ordering complete evaluation PCB

[2] Circuit Board Material: Rogers 4350

The circuit board used in the final application should be generated with proper RF circuit design techniques. Signal lines at the RF port should have 50 ohm impedance and the package ground leads and exposed paddle should be connected directly to the ground plane similar to that shown above. The evaluation circuit board shown above is available from Hittite Microwave Corporation upon request.