

### Typical Applications

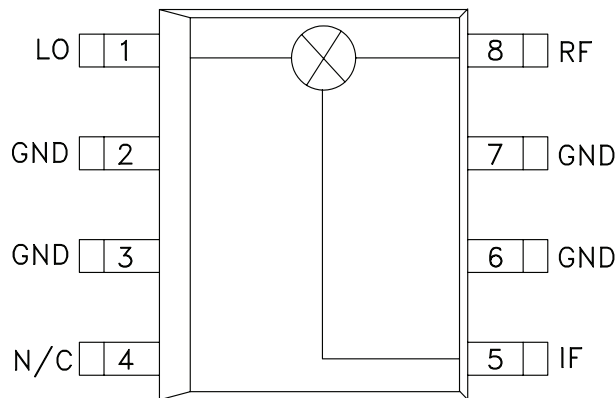
The HMC351S8 / HMC351S8E is ideal for:

- Cellular Basestations
- Cable Modems
- Fixed Wireless Access Systems

### Features

- Conversion Loss: 9.0 dB
- LO/IF Isolation: 35 dB
- LO/RF Isolation: 42 dB
- Input IP3: +25 dBm
- Input IP2: +48 dBm

### Functional Diagram



### General Description

The HMC351S8 & HMC351S8E are double balanced mixers in 8 lead plastic surface mount packages. The passive GaAs schottky diode mixer implements planar on chip baluns and requires no external components. The mixer can be used as an upconverter, down converter, or modulator. The mixer provides 9 dB conversion loss and +25 dBm IIP3 with LO drive levels of +19 dBm. The design was optimized for low cost high volume applications where high converter linearity is required. The high LO suppression of 42 dB yields excellent carrier suppression for modulator applications.

### Electrical Specifications, $T_A = +25^\circ\text{C}$

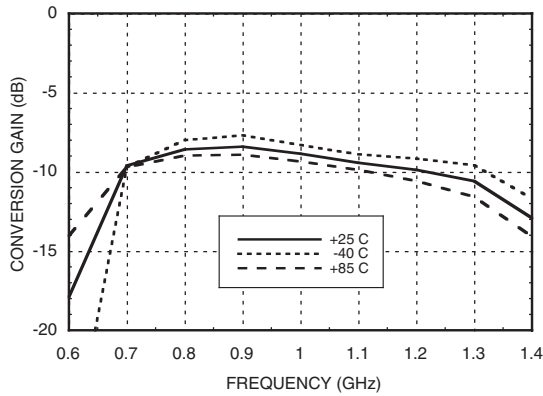
| Parameter                | LO = +19 dBm, IF = 100 MHz |      |      | Units |
|--------------------------|----------------------------|------|------|-------|
|                          | Min.                       | Typ. | Max. |       |
| Frequency Range, RF & LO | 0.7 - 1.2                  |      |      | GHz   |
| Frequency Range, IF      | DC - 0.3                   |      |      | GHz   |
| Conversion Loss          |                            | 9    | 11.5 | dB    |
| Noise Figure (SSB)       |                            | 9    | 11.5 | dB    |
| LO to RF Isolation       | 36                         | 42   |      | dB    |
| LO to IF Isolation       | 31                         | 35   |      | dB    |
| RF to IF Isolation       | 9                          | 13   |      | dB    |
| IP3 (Input)              | 22                         | 25   |      | dBm   |
| IP2 (Input)              | 40                         | 48   |      | dBm   |
| 1 dB Compression (Input) | 12                         | 16   |      | dBm   |

\*Unless otherwise noted, all measurements performed as downconverter, IF= 100 MHz.

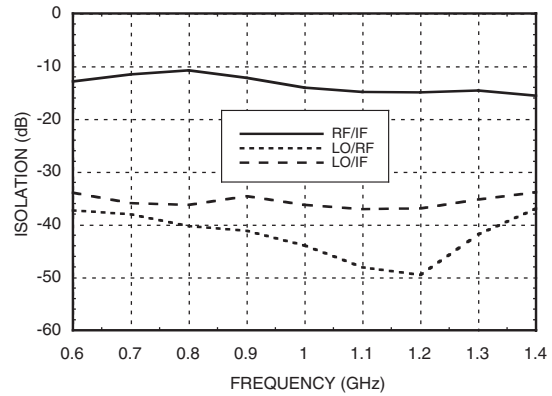


## GaAs MMIC HIGH IP3 DOUBLE-BALANCED MIXER, 0.7 - 1.2 GHz

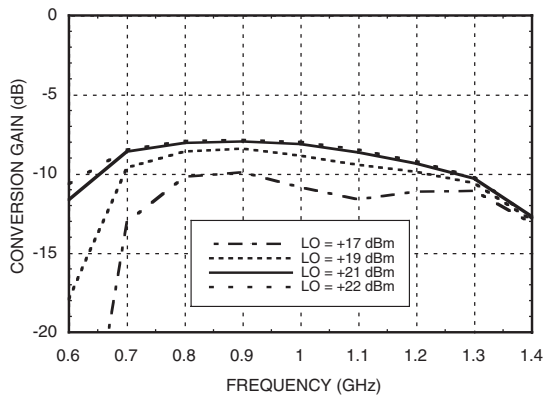
**Conversion Gain vs. Temperature @ LO = +19 dBm**



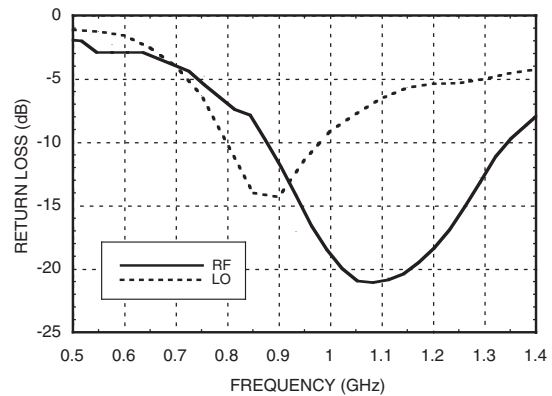
**Isolation @ LO = +19 dBm**



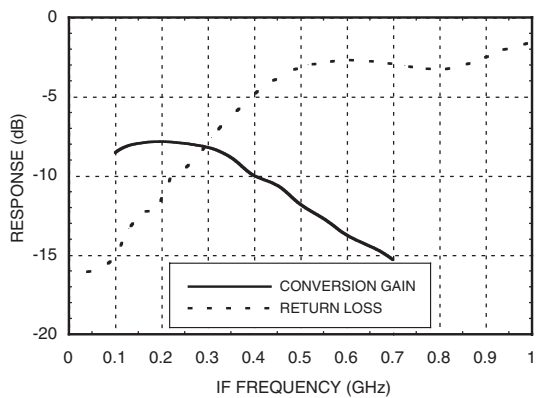
**Conversion Gain vs. LO Drive**



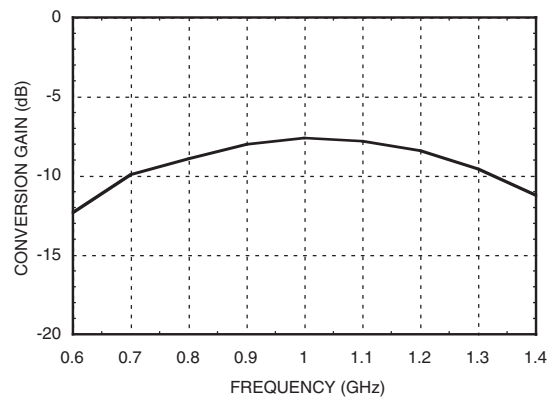
**Return Loss @ LO = +19 dBm**



**IF Bandwidth @ LO = +19 dBm**

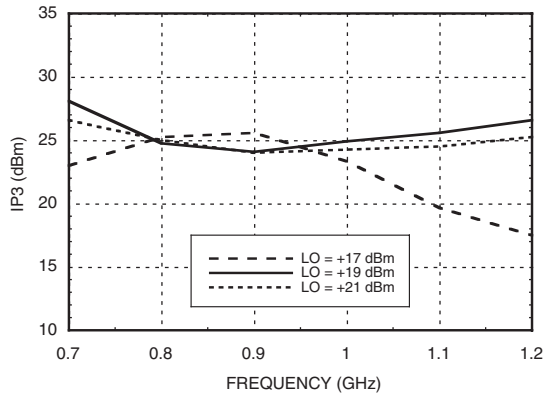


**Upconverter Performance, Conversion Gain @ LO = +19 dBm**

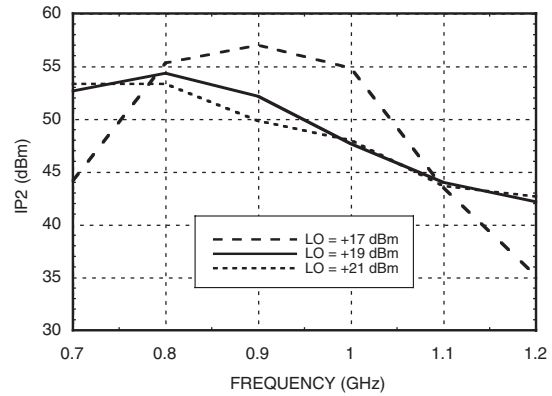


## GaAs MMIC HIGH IP3 DOUBLE-BALANCED MIXER, 0.7 - 1.2 GHz

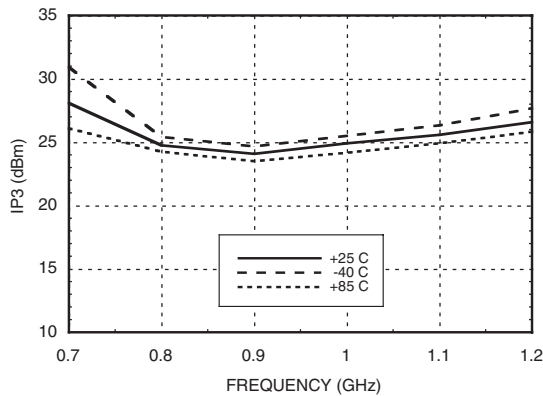
**Input IP3 vs. LO Drive \***



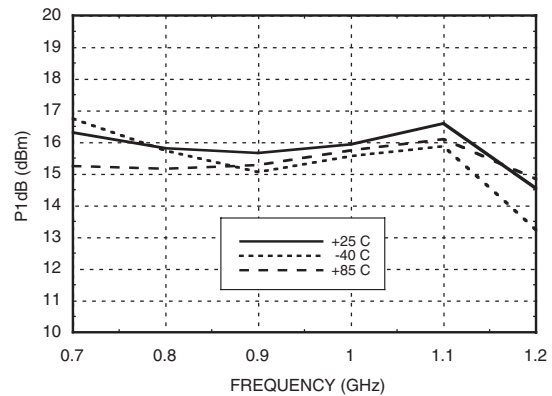
**Input IP2 vs. LO Drive \***



**Input IP3 vs. Temperature \*  
@ LO Drive = +19 dBm**



**P1dB vs. Temperature  
@ LO = +19 dBm**



**MxN Spurious Outputs**

| mRF | nLO |     |     |     |    |
|-----|-----|-----|-----|-----|----|
|     | 0   | 1   | 2   | 3   | 4  |
| 0   | xx  | -2  | 21  | 19  | 40 |
| 1   | 4   | 0   | 19  | 39  | 53 |
| 2   | 69  | 68  | 84  | 76  | 84 |
| 3   | 83  | 93  | 93  | 86  | 89 |
| 4   | >96 | >96 | >96 | >96 | 87 |

RF = 1.0 GHz @ -10 dBm  
LO = 0.9 GHz @ +19 dBm  
All values in dBc relative to the IF output power level.

**Harmonics of LO**

| LO Frequency (GHz) | nLO Spur at RF Port |    |    |    |
|--------------------|---------------------|----|----|----|
|                    | 1                   | 2  | 3  | 4  |
| 0.6                | 37                  | 42 | 65 | 78 |
| 0.75               | 39                  | 50 | 63 | 83 |
| 0.9                | 40                  | 51 | 59 | 69 |
| 1.05               | 45                  | 59 | 55 | 70 |
| 1.2                | 49                  | 70 | 53 | 79 |
| 1.35               | 37                  | 72 | 63 | 73 |

LO = +19 dBm  
Values in dBc below input LO level measured at the RF port.

\* Two-tone input power = 0 dBm each tone, 1 MHz spacing.

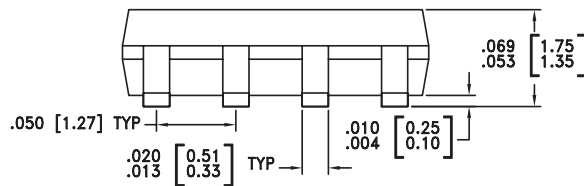
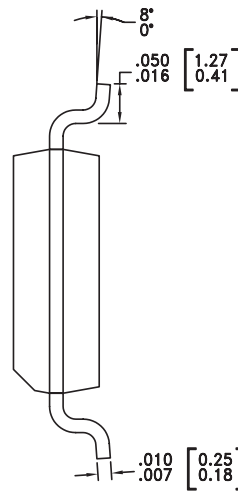
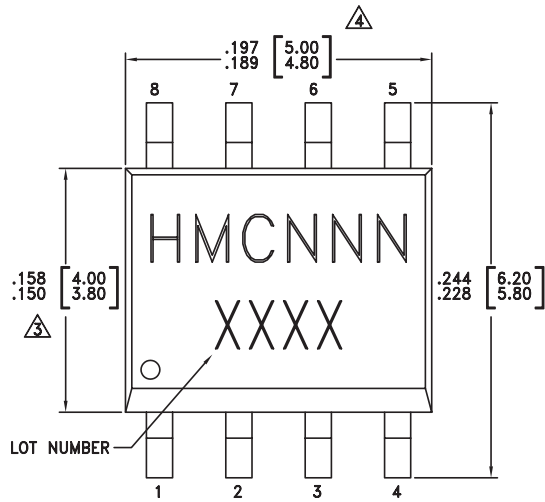
### Absolute Maximum Ratings

|                       |                |
|-----------------------|----------------|
| RF / IF Input         | +27 dBm        |
| LO Drive              | +27 dBm        |
| Storage Temperature   | -65 to +150 °C |
| Operating Temperature | -40 to +85 °C  |
| IF DC Current         | ±26 mA         |
| ESD Sensitivity (HBM) | Class 1A       |



**ELECTROSTATIC SENSITIVE DEVICE  
OBSERVE HANDLING PRECAUTIONS**

### Outline Drawing



**NOTES:**

1. LEADFRAME MATERIAL: COPPER ALLOY
2. DIMENSIONS ARE IN INCHES [MILLIMETERS]
- △ DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
- △ DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.
5. ALL GROUND LEADS MUST BE SOLDERED TO PCB RF GROUND.

### Package Information

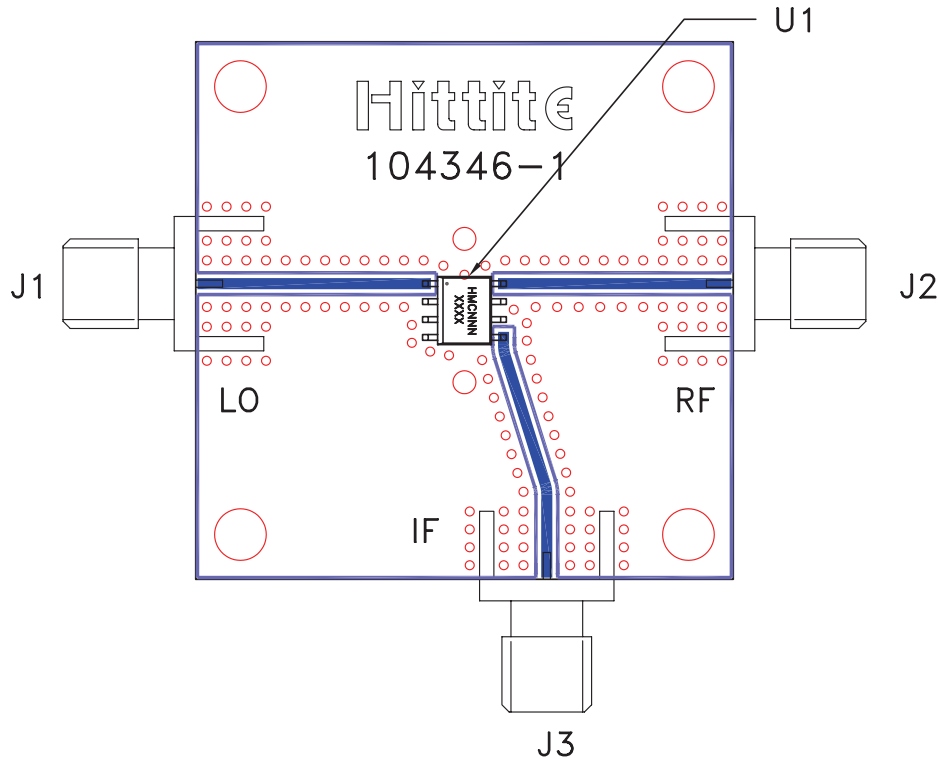
| Part Number | Package Body Material                              | Lead Finish   | MSL Rating          | Package Marking <sup>[3]</sup> |
|-------------|--|---------------|---------------------|--------------------------------|
| HMC351S8    | Low Stress Injection Molded Plastic                | Sn/Pb Solder  | MSL1 <sup>[1]</sup> | HMC351<br>XXXX                 |
| HMC351S8E   | RoHS-compliant Low Stress Injection Molded Plastic | 100% matte Sn | MSL1 <sup>[2]</sup> | <u>HMC351</u><br>XXXX          |

[1] Max peak reflow temperature of 235 °C

[2] Max peak reflow temperature of 260 °C

[3] 4-Digit lot number XXXX

### Evaluation PCB



### List of Materials for Evaluation PCB 104348 [1]

| Item    | Description                |
|---------|----------------------------|
| J1 - J3 | PCB Mount SMA RF Connector |
| U1      | HMC351S8 / HMC351S8E Mixer |
| PCB [2] | 104346 Eval Board          |

[1] Reference this number when ordering complete evaluation PCB

[2] Circuit Board Material: Rogers 4350

The circuit board used in the final application should use RF circuit design techniques. Signal lines should have 50 ohm impedance while the package ground leads should be connected directly to the ground plane similar to that shown. A sufficient number of via holes should be used to connect the top and bottom ground planes. The evaluation circuit board as shown is available from Hittite upon request.



**Notes:**