



## BLUETOOTH & 2.4 GHz WLAN GaAs MMIC TRANSCEIVER

### Typical Applications

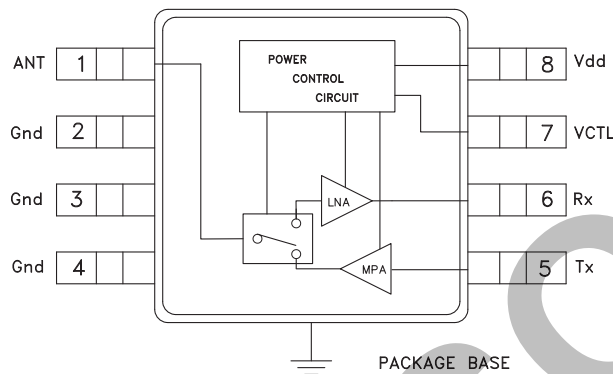
Transmit & Receive  
Switch for 2.4 GHz Applications:

- Bluetooth
- HomeRF
- WLAN Radios

### Features

Tx Gain: 15 dB, Rx Gain: 13 dB  
Tx 1 dB Compression Point: 5 dBm  
Rx Noise Figure: 3 dB @ 2.4 GHz  
Single Positive Supply: +3V  
No External Matching Required

### Functional Diagram



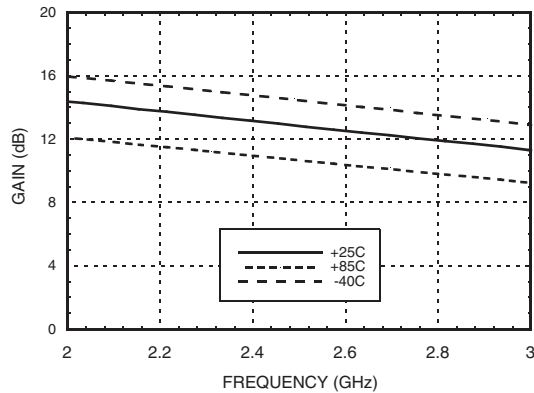
### General Description

The HMC310MS8G & HMC310MS8GE are multi-function RFICs that incorporate a power amplifier (PA) and low noise amplifier (LNA) with a transmit/receive switch. These RFICs offer 15 dB gain and +5 dBm P1dB in the transmit mode and 13 dB of gain with an overall noise figure of 3 dB when in receive mode. Transmit and receive performance levels have been selected to meet the BLUETOOTH Class 2 & 3 requirements when used in conjunction with 2.4 GHz ASICs such as National Semiconductor's LMX3162. This low current and low cost transceiver requires no external circuitry to operate the amplifier power down features, and is available in the industry standard MSOP8G package, which is 0.118" x 0.190" (3.0mm x 4.9mm).

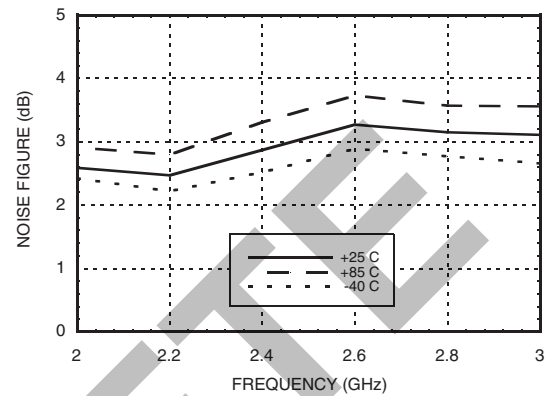
### Electrical Specifications, $T_A = +25^\circ\text{C}$ , $V_{DD} = +3\text{V}$

| Parameter                                | Receive Mode |         |      | Transmit Mode |         |      | Units |
|------------------------------------------|--------------|---------|------|---------------|---------|------|-------|
|                                          | Min.         | Rx Typ. | Max. | Min.          | Tx Typ. | Max. |       |
| Frequency Range                          | 2.4 - 2.5    |         |      | 2.4 - 2.5     |         |      | GHz   |
| Gain                                     | 8            | 13      | 15   | 12            | 15      | 17   | dB    |
| Gain Variation over Temperature          |              | 0.03    | 0.04 |               | 0.03    | 0.04 | dB/°C |
| Noise Figure                             |              | 3.0     | 4.0  |               |         |      | dB    |
| Input Return Loss                        | 4            | 6       |      | 4             | 7       |      | dB    |
| Output Return Loss                       | 9            | 12      |      | 10            | 13      |      | dB    |
| Output Power for 1 dB Compression (P1dB) | -7           | -4      |      | 1             | 5       |      | dBm   |
| Saturated Output Power (Psat)            | -5           | 0       |      | 3             | 7       |      | dBm   |
| Output Third Order Intercept (IP3)       | 3            | 6       |      | 3             | 10      |      | dBm   |
| Supply Current (Idd)                     |              | 12      |      |               | 24      |      | mA    |

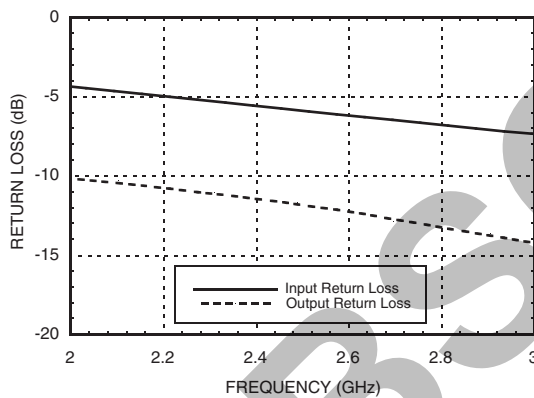
**Rx Gain**



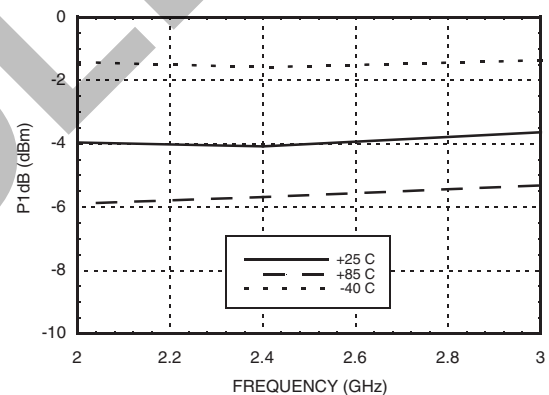
**Rx Noise Figure**



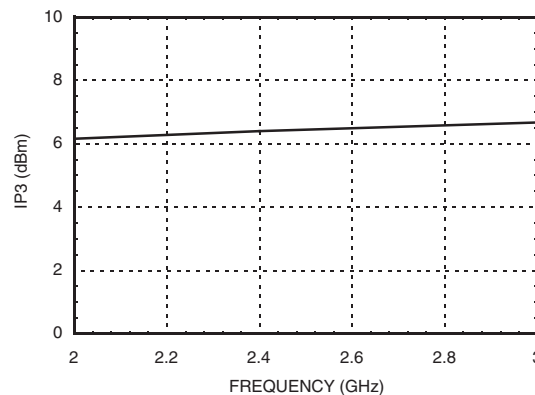
**Rx Return Loss**



**Rx 1dB Compression Point**



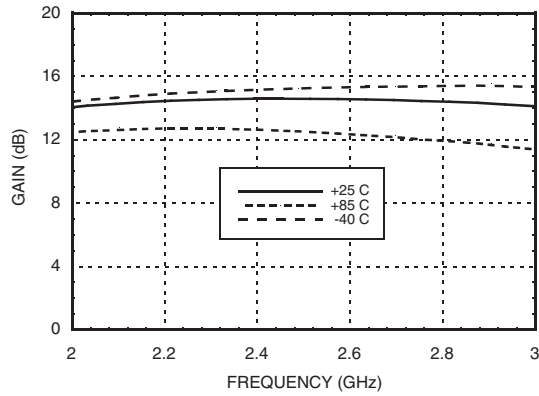
**Rx Output Third Order Intercept Point**



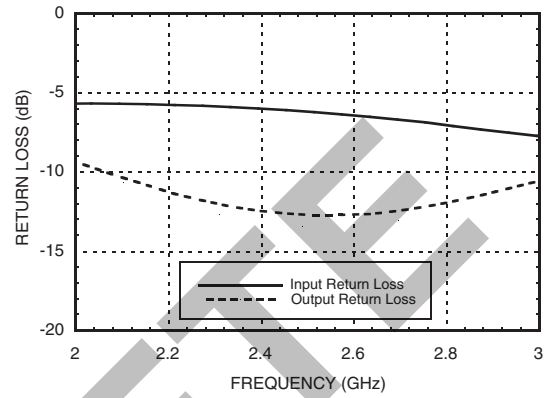


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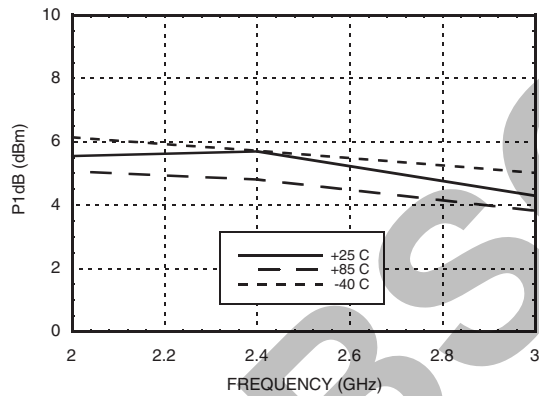
**Tx Gain**



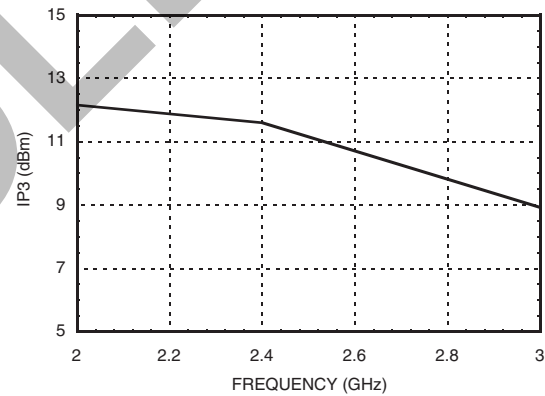
**Tx Return Loss**



**Tx 1dB Compression Point**



**Tx Output Third Order Intercept Point**



### Absolute Maximum Ratings

|                                                                          |                |
|--------------------------------------------------------------------------|----------------|
| Drain Bias Voltage (Vdd)                                                 | +7.0 Vdc       |
| Control Voltage Range (Vctl)                                             | -0.2 to Vdd    |
| RF Input Power (Vdd = +3.0 Vdc)                                          | 0 dBm          |
| Channel Temperature                                                      | 150 °C         |
| Continuous P <sub>diss</sub> (T = 85 °C)<br>(derate 5 mW/°C above 85 °C) | 0.325 W        |
| Thermal Resistance<br>(channel to ground paddle)                         | 200 °C/W       |
| Storage Temperature                                                      | -65 to +150 °C |
| Operating Temperature                                                    | -40 to +85 °C  |

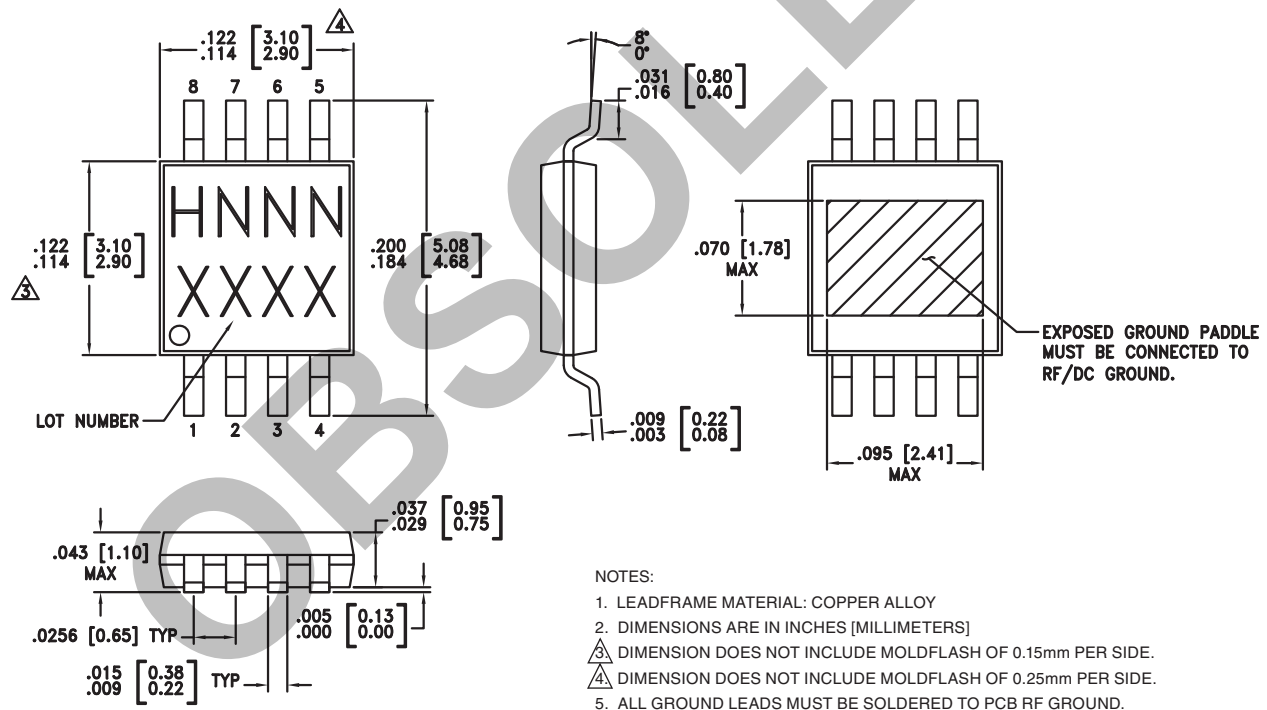
### Truth Table

|                   |            |
|-------------------|------------|
| Tx Section Active | VCTL = Vdd |
| Rx Section Active | VCTL = 0V  |



**ELECTROSTATIC SENSITIVE DEVICE  
OBSERVE HANDLING PRECAUTIONS**

### Outline Drawing



### Package Information

| Part Number | Package Body Material                              | Lead Finish   | MSL Rating          | Package Marking <sup>[3]</sup> |
|-------------|----------------------------------------------------|---------------|---------------------|--------------------------------|
| HMC310MS8G  | Low Stress Injection Molded Plastic                | Sn/Pb Solder  | MSL1 <sup>[1]</sup> | H310<br>XXXX                   |
| HMC310MS8GE | RoHS-compliant Low Stress Injection Molded Plastic | 100% matte Sn | MSL1 <sup>[2]</sup> | H310<br>XXXX                   |

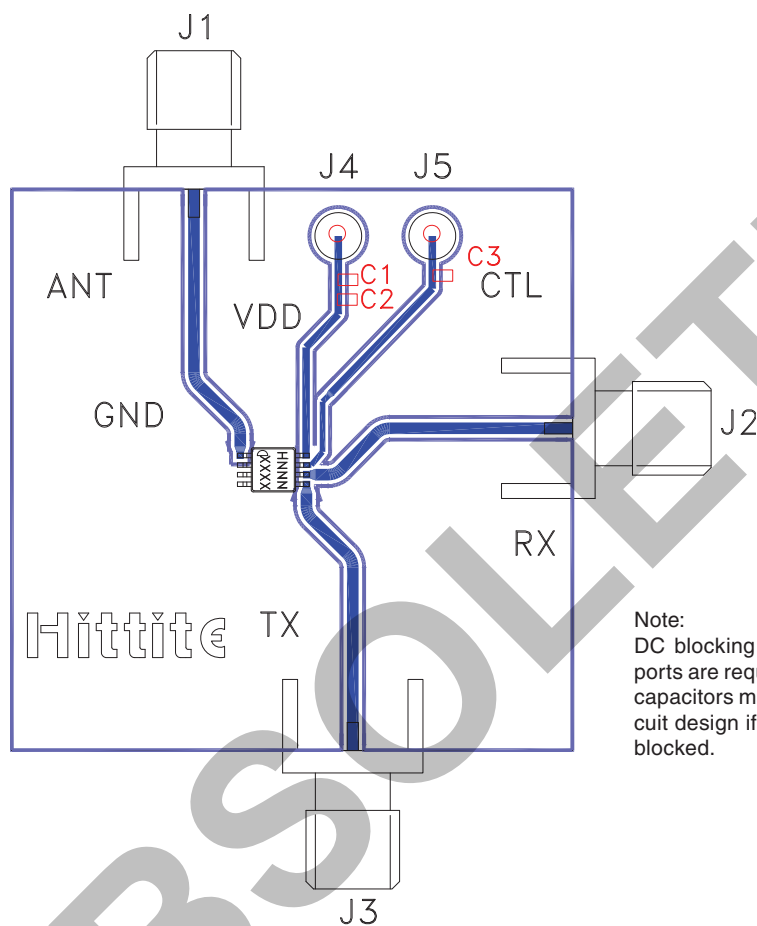
[1] Max peak reflow temperature of 235 °C

[2] Max peak reflow temperature of 260 °C

[3] 4-Digit lot number XXXX



**Evaluation PCB**



Note:  
DC blocking capacitors on the Tx and ANT ports are required to evaluate this part. These capacitors may not be required in the final circuit design if interfacing components are DC blocked.

**List of Materials for Evaluation PCB 103339 <sup>[1]</sup>**

| Item               | Description                          |
|--------------------|--------------------------------------|
| J1, J2, J3         | PCB Mount SMA Connector              |
| J4, J5             | DC Pins                              |
| C1                 | .01 $\mu$ F Capacitor, 0603 Pkg.     |
| C2, C3             | 100 pF Capacitor, 0603 Pkg.          |
| U1                 | HMC310MS8G / HMC310MS8GE Transceiver |
| PCB <sup>[2]</sup> | Evaluation Board 1.5" x 1.55"        |

[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 and backside ground slug 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 shown is available from Hittite upon request.

**Notes:**

OBSOLETE

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[HMC310MS8GE](#) [HMC310MS8GETR](#)