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Typical Applications

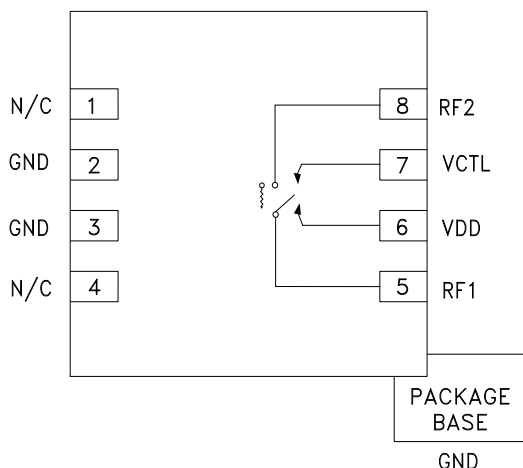
The HMC1055LP2CE is ideal for:

- RFID & Electronic Toll Collection (ETC)
- Tags, Handsets & Portables
- ISM, WLAN, WiMAX & WiBro
- Automotive Telematics
- Test Equipment

Features

- Failsafe Operation - "On" When Unpowered
- Wide Vdd Range: 1.2V to 5V
- Very Low On State Current: 200 nA
- Low Insertion Loss: 0.7 dB
- High IP3: +52 dBm
- Compact SOT26 SMT Package

Functional Diagram



General Description

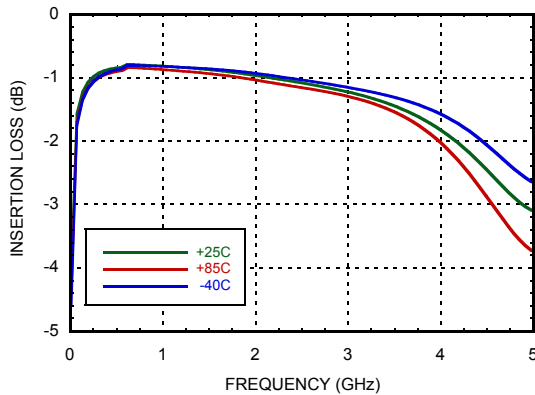
The HMC1055LP2CE is low-cost SPST Failsafe switch in 2x2mm, 8 lead DFN plastic package for use in switching application which require low insertion loss and very low current consumption. With 0.7 dB typical loss, these devices can control signals from DC to 4 GHz and are especially suited for IF and RF applications including RFID, ISM, automotive and battery powered tags and portables. RF1 is reflective open while RF2 is terminated in 50 OHMs when "Off". The switch requires a minimal amount of DC current in the "On" state, and offers compatibility with CMOS and some TTL logic families. The failsafe topology results in the switch being normally "On", i.e. low insertion loss from RF1 to RF2, when no DC bias is applied.

Electrical Specifications

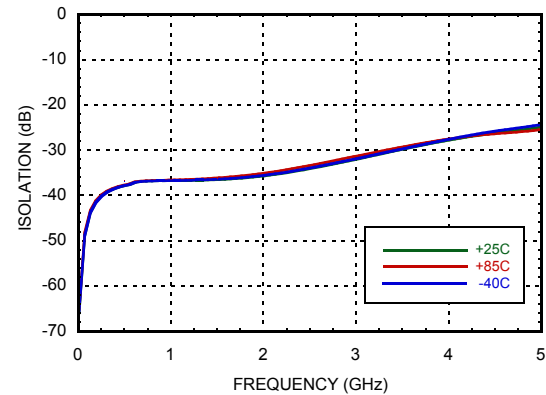
$T_A = +25^\circ \text{C}$, $V_{dd} = +3.3 \text{ Vdc}$, $V_{ctl} = 0/+3.3 \text{ Vdc}$ (Unless Otherwise Stated), 50 Ohm System

| Parameter | Frequency | Min. | Typ. | Max. | Units |
|---|------------------------------|------|------------|------|-------|
| Insertion Loss | DC - 3.0 GHz DC - 4.0 GHz | | 0.6 1.8 | | dB |
| Isolation | DC - 2.0 GHz DC - 4.0 GHz | | 36 28 | | dB |
| Return Loss | DC - 4.0 GHz | | 25 | | dB |
| Input Power for 0.1 dB Compression $V_{ctl} = 0/+3.3 \text{ V}$ | 0.5 - 4.0 GHz | | 28 | | dBm |
| Input Third Order Intercept (Two-tone Input Power = +15 dBm Each Tone) $V_{ctl} = 0/+3.3 \text{ V}$ | 0.5 - 4.0 GHz | | 63 | | dBm |
| Switching Characteristics | DC - 4.0 GHz | | | | |
| t_{RISE} , t_{FALL} (10/90% RF) | | | 40 | | ns |
| t_{ON} , t_{OFF} (50% CTL to 10/90% RF) | | | 50 | | ns |

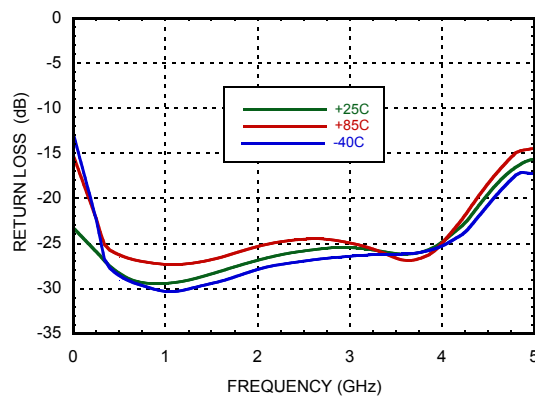
Insertion Loss $V_{ctl}=3V$ $V_{DD}=3V$



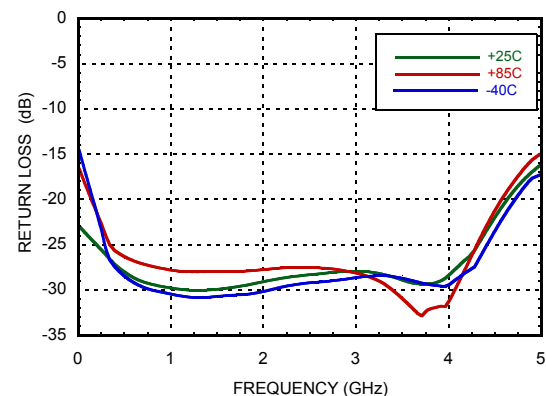
Isolation $V_{ctl}=3V$ $V_{DD}=3V$



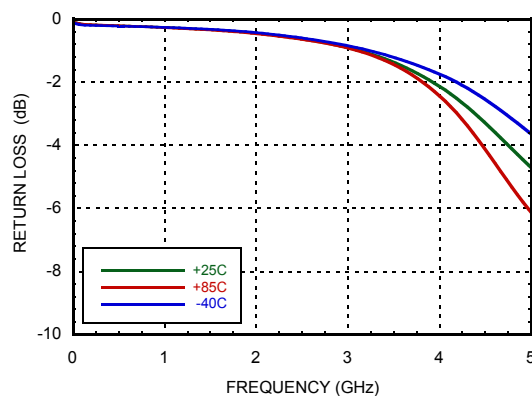
Return Loss $V_{ctl}=3V$ RF1



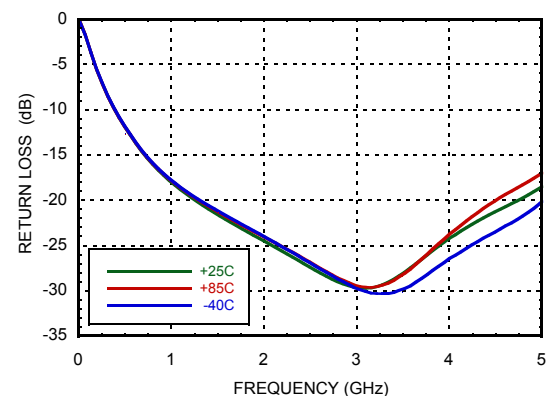
Return Loss $V_{ctl}=3V$ RF2



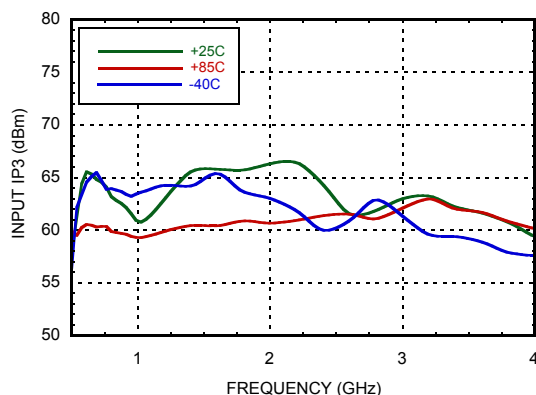
Return Loss $V_{ctl}=0V$ RF1



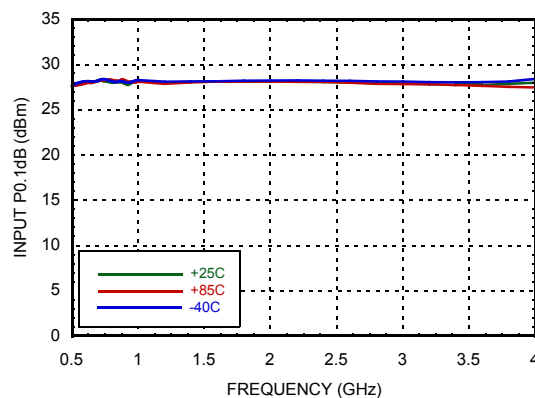
Return Loss $V_{ctl}=0V$ RF2



Input IP3 vs. Temperature



Input P0.1dB vs. Temperature



Operating Conditions

Vdd & Vctl = 0 Vdc to +3 Vdc; Vctl_max = Vdd + 0.2 Vdc; Idd & Ictl = 0.1 μ A, Typical

| Conditions | Vdd - Vctl \geq + 1.2 Vdc | -0.2 Vdc < Vdd - Vctl < +0.4 Vdc |
|------------|-----------------------------|----------------------------------|
| RF1 - RF2 | OFF | ON |

Absolute Maximum Ratings

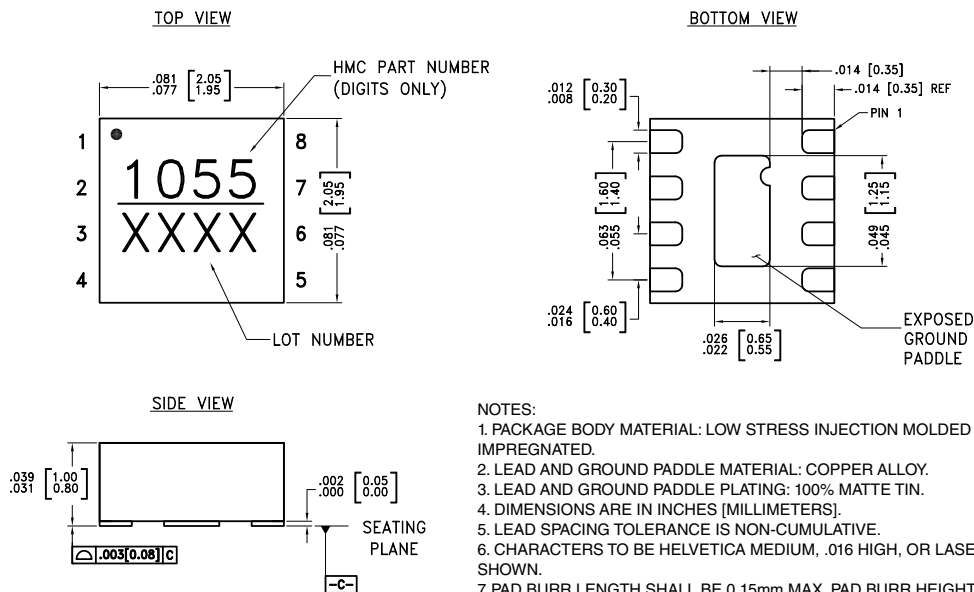
| | |
|--|--------------------------|
| RF Input Power (Vctl = 0/+3.3V) | +34 dBm |
| Supply Voltage (Vdd) | +6.0 Vdc |
| Control Voltage Range (Vctl) | -0.2 to +(Vdd + 0.2) Vdc |
| Channel Temperature | 150 °C |
| Continuous P _{diss} (T= 85 °C) (derate 6.67 mW/ °C above 85°C) | 0.88 W |
| Thermal Resistance | 74 °C/W |
| Storage Temperature | -65 to +150 °C |
| Operating Temperature | -40 to +85 °C |
| ESD Sensitivity (HBM) | Class 1A |

DC blocks are required at ports RF1 and RF2.



**ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS**

Outline Drawing


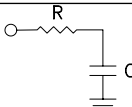


Package Information

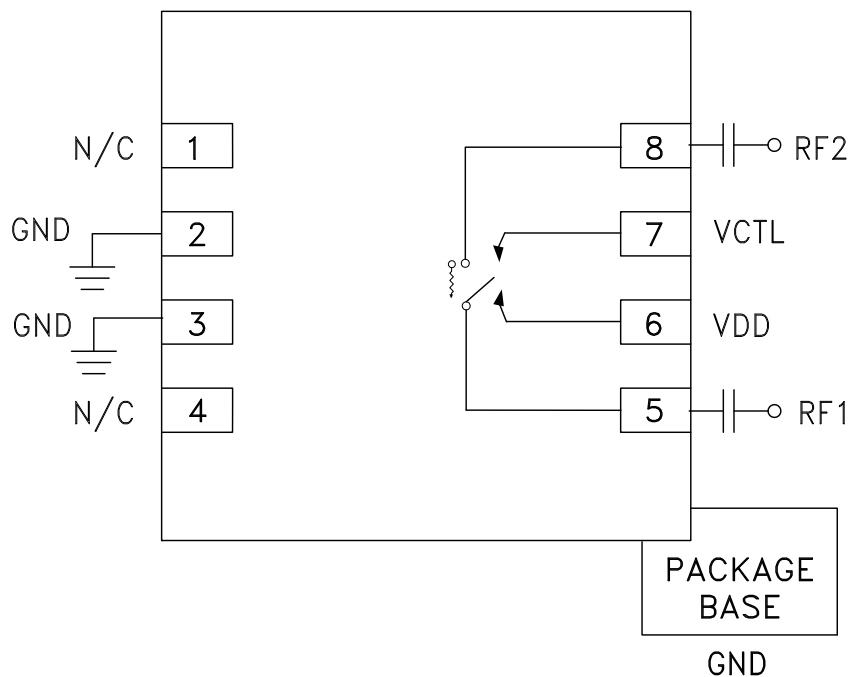
| Part Number | Package Body Material | Lead Finish | MSL Rating | Package Marking |
|-------------|--|---------------|---------------------|-----------------|
| HMC1055 | RoHS-compliant Low Stress Injection Molded Plastic | 100% matte Sn | MSL1 ^[1] | 1055 |

[[1] Max peak reflow temperature of 260 °C

Pin Descriptions

| Pin Number | Function | Description | Interface Schematic |
|------------|----------|---|---|
| 1, 4 | N/C | | |
| 2, 3 | GND | These pins and the exposed ground paddle must be connected to RF ground. |  |
| 5, 8 | RF1, RF2 | These pins are DC coupled and matched to 50 Ohms. Blocking capacitors are required. | |
| 6 | Vdd | Supply Voltage | |
| 7 | Vctl | See truth and control voltage tables. |  |

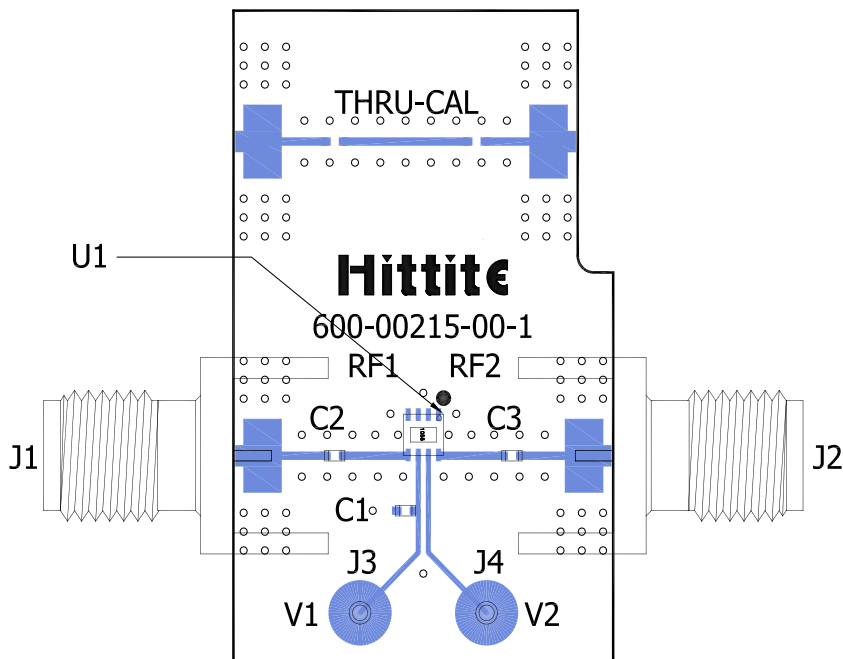
Typical Application Circuit



Note:

1. DC Blocking capacitors are required for each RF port as shown. Capacitor value determines lowest frequency of operation.

Evaluation PCB



List of Materials for Evaluation EVAL01-HMC1055LP2C

| Item | Description |
|---------|-------------------------------|
| J1 - J2 | PCB Mount SMA RF Connector |
| J3 - J4 | DC Pin |
| C1 | 1,000 pF Capacitor, 0402 Pkg. |
| C2 - C3 | 330 pF capacitor, 0402 Pkg. |
| U1 | HMC1055LP2CE SPST Switch |
| PCB [2] | 600-00215-00 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 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.

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Contact Us :

➤ Address :

401 Building No.5, JiuGe Business Center, Lane 2301, Yishan Rd
Minhang District, Shanghai , China

➤ Sales :

Direct +86 (21) 6401-6692

Email amall@ameya360.com

QQ 800077892

Skype ameyasales1 ameyasales2

➤ Customer Service :

Email service@ameya360.com

➤ Partnership :

Tel +86 (21) 64016692-8333

Email mkt@ameya360.com