

Analog Devices Welcomes Hittite Microwave Corporation

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Typical Applications

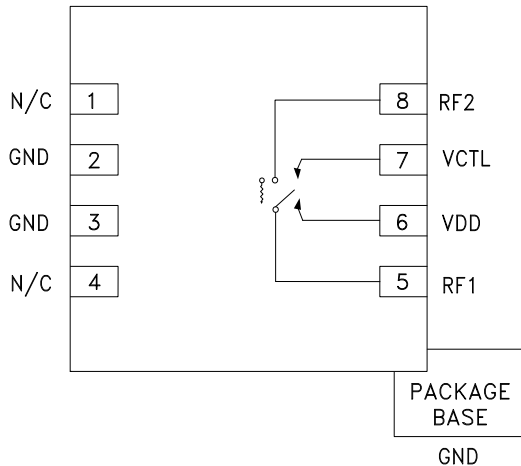
The HMC1055LP2CE is ideal for:

- 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

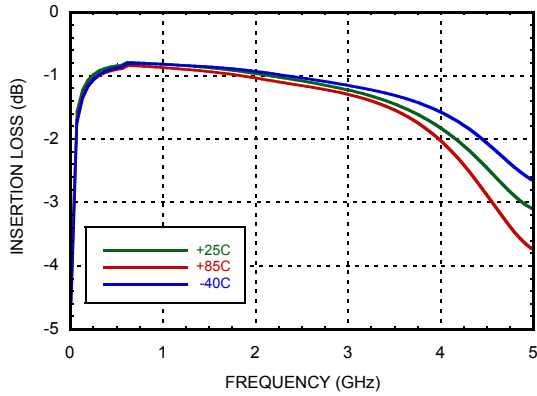
The HMC1055LP2CE is low-cost SPST Failsafe switch in 2x2mm,8 lead DFN plastic package for use in switching application which require low insertion loss and very low current consumption. With 0.7 dB typical loss, these devices can control signals from DC to 4 GHz and are especially suited for IF and RF applications including RFID, ISM, automotive and battery powered tags and portables. RF1 and 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

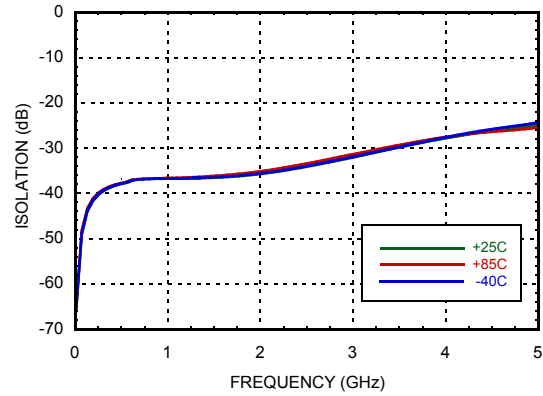
$T_A = +25^\circ \text{C}$, $V_{dd} = +3.3 \text{Vdc}$, $V_{ctl} = 0/+3.3 \text{Vdc}$ (Unless Otherwise Stated), 50 Ohm System

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 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				
	tRISE, tFALL (10/90% RF)		40		ns
	tON, tOFF (50% CTL to 10/90% RF)		50		ns

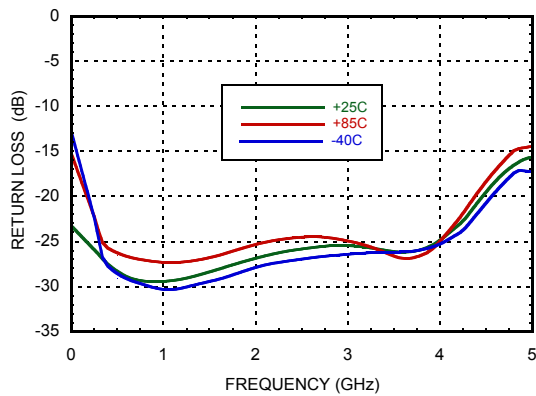
Insertion Loss Vctl=3V VDD=3V



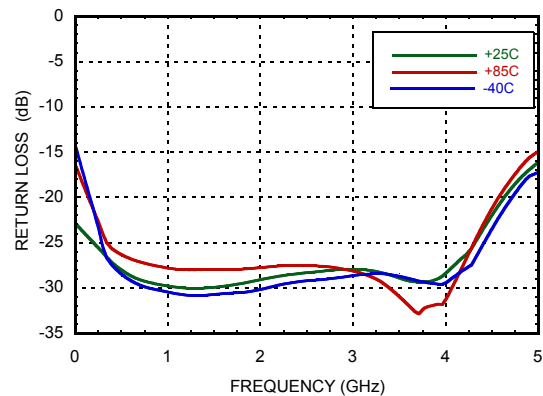
Isolation Vctl=3V VDD=3V



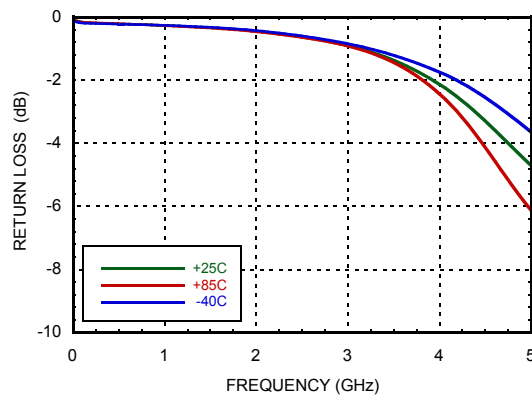
Return Loss Vctl=3V RF1



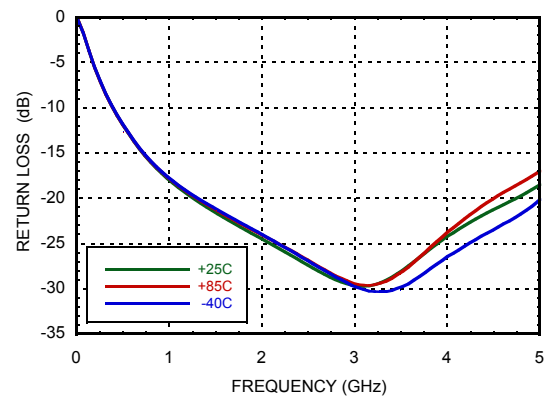
Return Loss Vctl=3V RF2



Return Loss Vctl=0V RF1



Return Loss Vctl=0V RF2

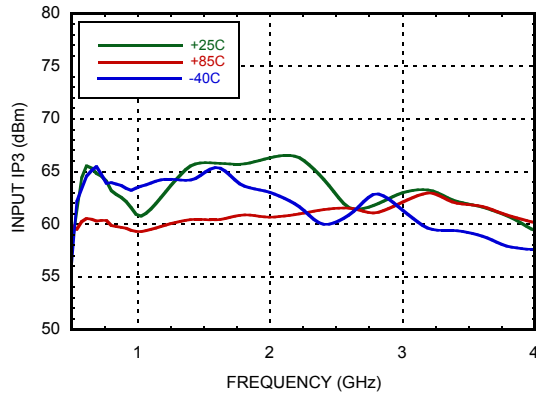




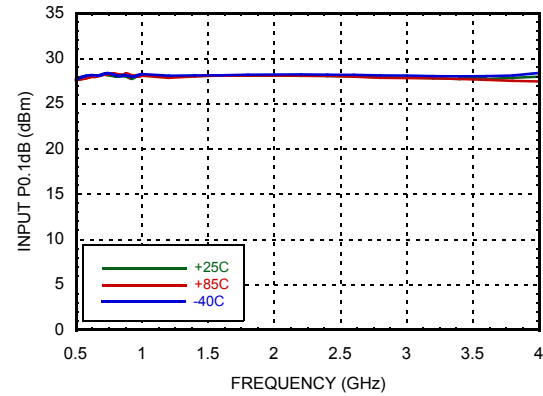
HMC1055LP2CE

**GaAs MMIC SPST
FAILSAFE SWITCH, DC - 4 GHz**

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

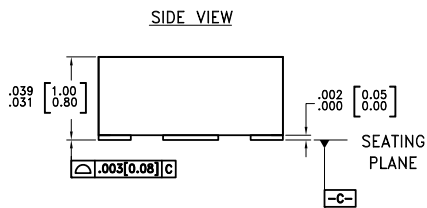
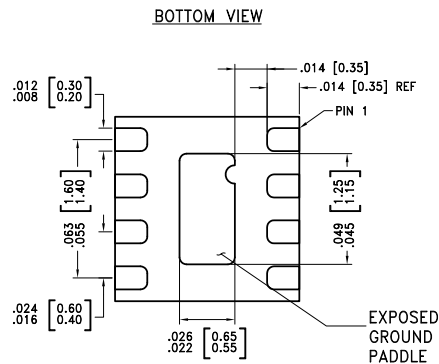
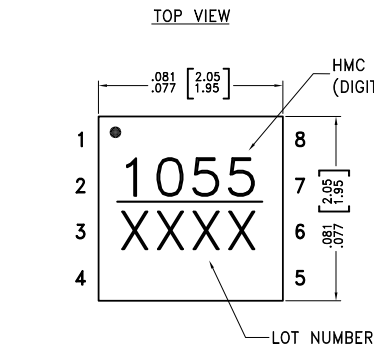
RF Input Power (Vctl = 0/+3.3V)	+34 dBm
Supply Voltage (Vdd)	+6.0 Vdc
Control Voltage Range (Vctl)	-0.2 to +(Vdd + 0.2) Vdc
Channel Temperature	150 °C
Continuous Pdiss (T= 85 °C) (derate 6.67 mW/ °C above 85°C)	0.88 W
Thermal Resistance	74 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-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




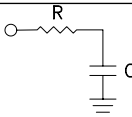
- NOTES:
1. PACKAGE BODY MATERIAL: LOW STRESS INJECTION MOLDED PLASTIC SILICA AND SILICON IMPREGNATED.
 2. LEAD AND GROUND PADDLE MATERIAL: COPPER ALLOY.
 3. LEAD AND GROUND PADDLE PLATING: 100% MATTE TIN.
 4. DIMENSIONS ARE IN INCHES [MILLIMETERS].
 5. LEAD SPACING TOLERANCE IS NON-CUMULATIVE.
 6. CHARACTERS TO BE HELVETICA MEDIUM, .016 HIGH, OR LASER MARK LOCATED APPROX. AS SHOWN.
 7. PAD BURR LENGTH SHALL BE 0.15mm MAX. PAD BURR HEIGHT SHALL BE 0.05mm MAX.
 8. PACKAGE WARP SHALL NOT EXCEED 0.05mm
 9. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED TO PCB RF GROUND.
 10. REFER TO HITTITE APPLICATION NOTE FOR SUGGESTED PCB LAND PATTE

Package Information

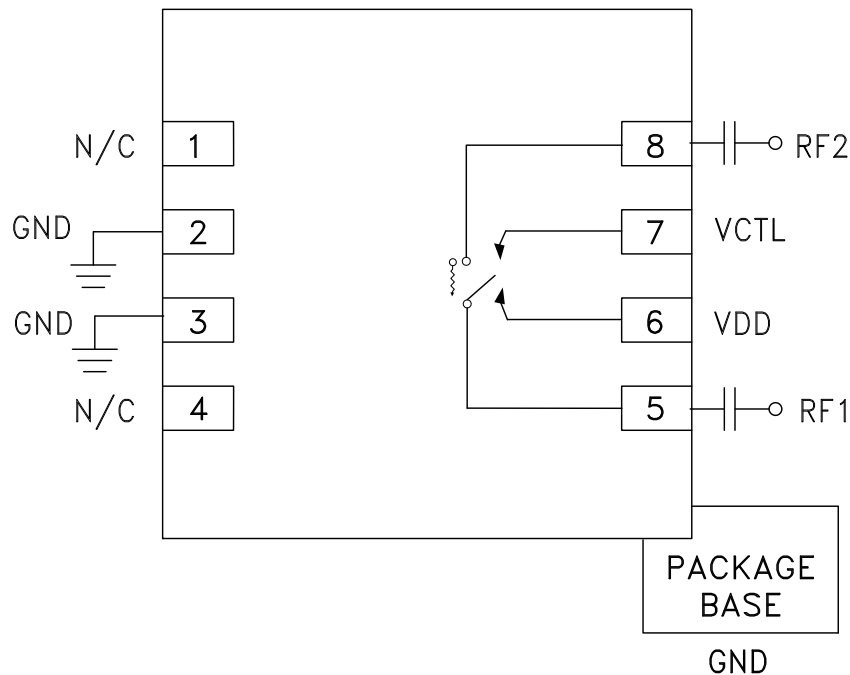
Part Number	Package Body Material	Lead Finish	MSL Rating	Package Marking
HMC1055	RoHS-compliant Low Stress Injection Molded Plastic	100% matte Sn	MSL1 ^[1]	1055

[[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.	

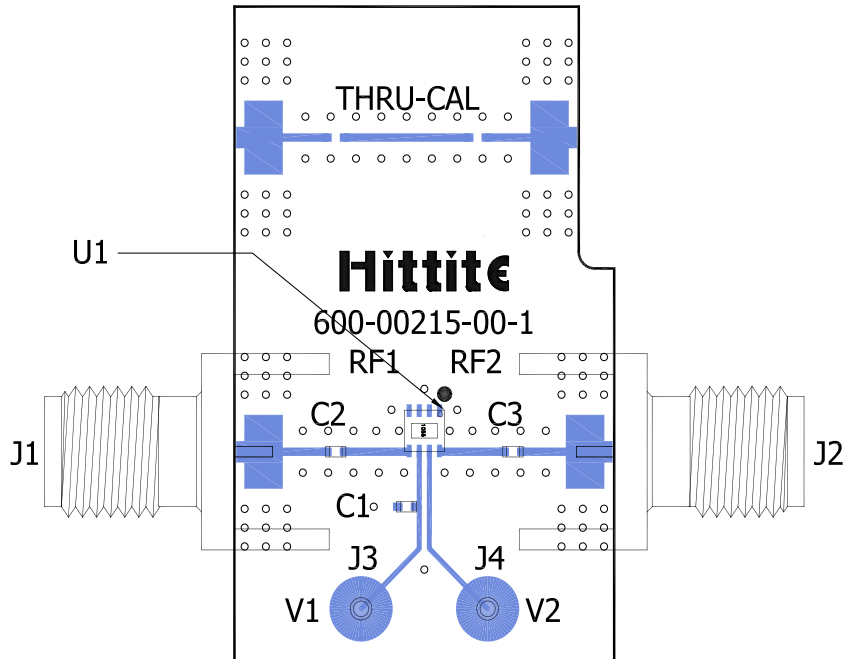
Typical Application Circuit



Note:

- 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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