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HMC233G8

GaAs MMIC HIGH ISOLATION SMT SPDT SWITCH, DC - 6.0 GHz

Typical Applications

The HMC233G8 is ideal for:

- Telecom Infrastructure
- Microwave Radio & VSAT
- Military Radios, Radar & ECM
- Space Systems
- Test Instrumentation

Features

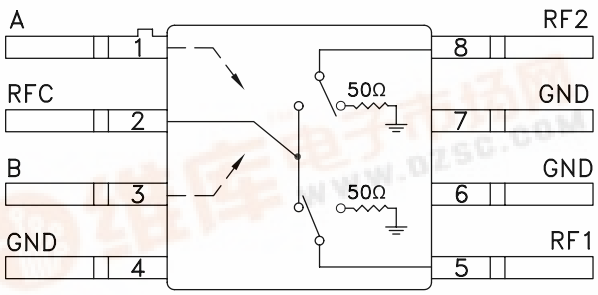
Isolation: 44 dB @ 2.0 GHz
31 dB @ 6.0 GHz

Insertion Loss: 1.5 dB Typical @ 4.0 GHz

Non-Reflective Design

Hermetic Surface Mount Package

Functional Diagram



General Description

The HMC233G8 is a broadband high isolation non-reflective GaAs MESFET SPDT switch in a hermetic surface mount package. Covering DC to 6.0 GHz, the switch features >44 dB isolation up to 2 GHz and >31 dB isolation up to 6.0 GHz. The switch operates using complementary negative control voltage logic lines of -5/0V and requires no bias supply.

Electrical Specifications, T_A = +25° C, With 0/-5V Control, 50 Ohm System

Parameter	Frequency	Min.	Typ.	Max.	Units
Insertion Loss	DC - 2.0 GHz DC - 4.0 GHz DC - 6.0 GHz		1.3 1.5 1.8	1.6 1.8 2.2	dB dB dB
Isolation	DC - 2.0 GHz DC - 4.0 GHz DC - 6.0 GHz	39 30 26	44 35 31		dB dB dB
Return Loss "On State"	DC - 5.0 GHz DC - 6.0 GHz		17 14		dB dB
Return Loss RF1, RF2 "Off State"	DC - 4.0 GHz DC - 6.0 GHz		12 8		dB dB
Input Power for 1 dB Compression	0.5 - 6.0 GHz	22	27		dBm
Input Third Order Intercept (Two-Tone Input Power= +7 dBm Each Tone, 1 MHz Tone Separation)	0.5 - 6.0 GHz		46		dBm
Switching Characteristics tRISE, tFALL (10/90% RF) tON, tOFF (50% CTL to 10/90% RF)	DC - 6.0 GHz		 3 6		 ns ns

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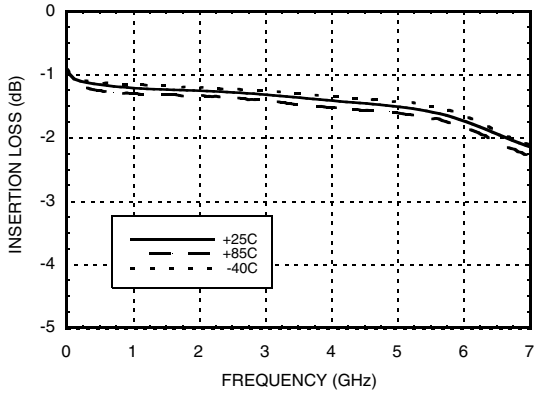
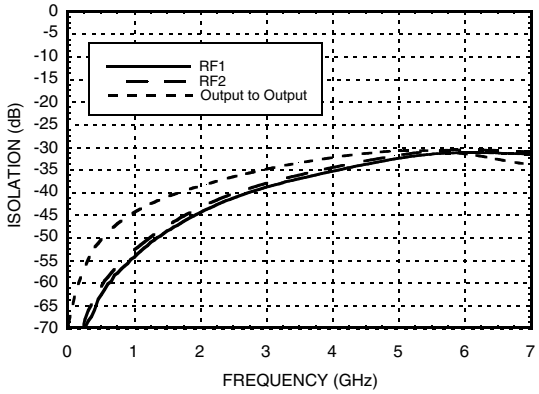
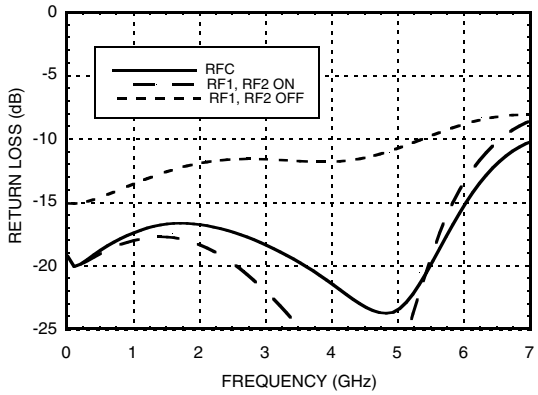
Insertion Loss



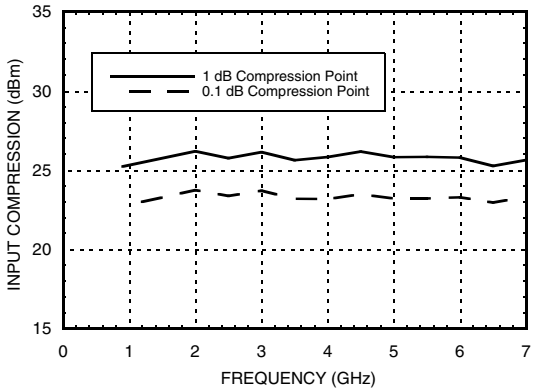
Isolation



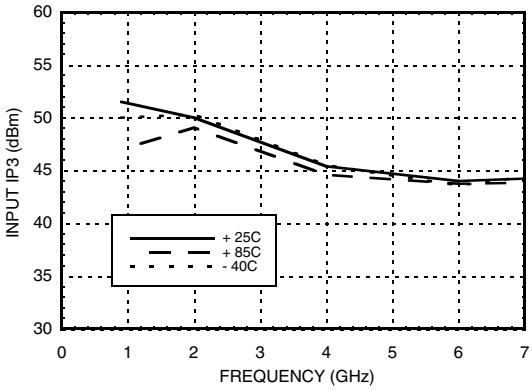
Return Loss



0.1 and 1 dB Input Compression Point



Input Third Order Intercept Point



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Absolute Maximum Ratings

RF Input Power (Vctl= -5V) (0.5 - 6 GHz)	+30 dBm (@ +85 °C)
Control Voltage Range (A & B)	+1.0V to -7.5 Vdc
Hot Switch Power Level	+27 dBm
Channel Temperature	150 °C
Continuous Pdiss (T = 85 °C) (derate 4 mW/°C above 85 °C)	0.25 W
Thermal Resistance (Insertion Loss Path)	148 °C/W
Thermal Resistance (Terminated Path)	260 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C

Control Voltages

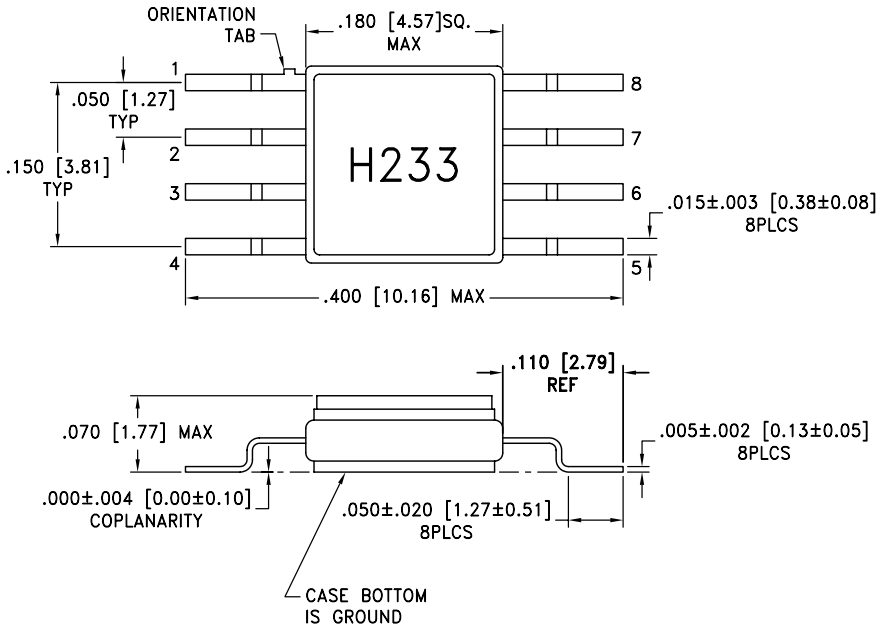
State	Bias Condition
Low	0 to -0.2V @ 10 uA Max.
High	-5V @ 10 uA Typ. to -7V @ 45 uA Typ.

Truth Table

Control Input		Signal Path State	
A	B	RFC to RF1	RFC to RF2
High	Low	ON	OFF
Low	High	OFF	ON

Caution: Do not "Hot Switch" power levels greater than +27 dBm (Vctl = 0/-5 Vdc).

Outline Drawing



NOTES:
1. PACKAGE MATERIAL: ALUMINA LOADED BOROSILICATE GLASS.
2. LEADS, BASE, COVER MATERIAL: KOVAR™ (#7052 CORNING).
3. PLATING: ELECTROLYTIC GOLD 50 MICROINCHES MIN., OVER ELECTROLYTIC NICKEL 50 MICROINCHES MIN.
4. ALL DIMENSIONS ARE IN INCHES [MILLIMETERS].
5. TOLERANCES: .±005 [0.13] UNLESS OTHERWISE SPECIFIED.
6. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED TO PCB RF GROUND.

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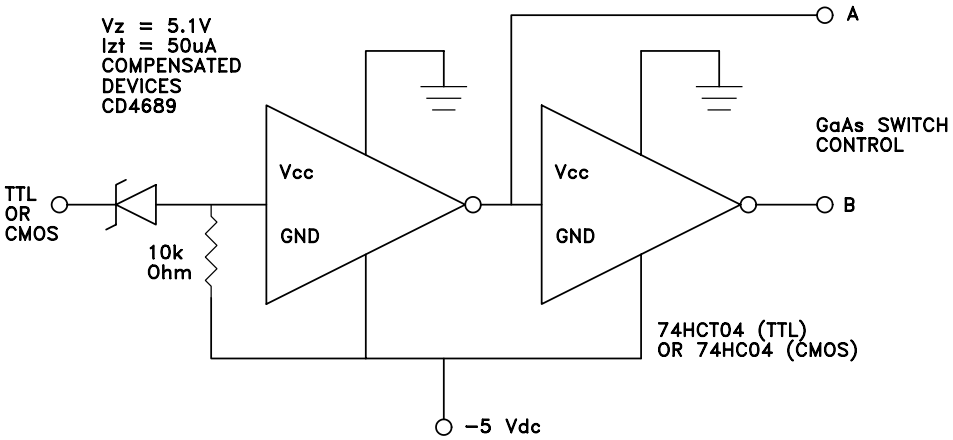
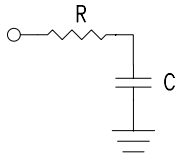
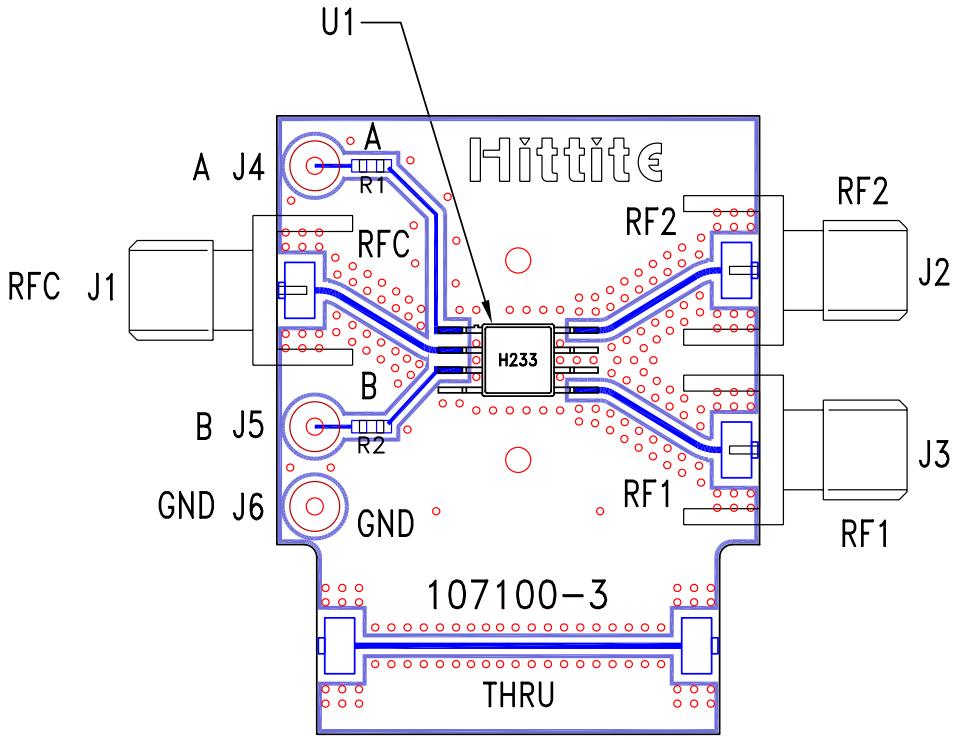
Suggested Driver Circuit



Pin Descriptions

Pin Number	Function	Description	Interface Schematic
1, 3	A, B	See truth table and control voltage table.	
2, 5, 8	RFC, RF1, RF2	These pins are DC coupled and matched to 50 Ohm. Blocking capacitors are required if RF line potential is not equal to 0V.	
4, 6, 7	GND	Package bottom must also be connected to PCB RF ground.	

Evaluation PCB



List of Materials for Evaluation PCB 107183*

Item	Description
J1 - J3	PC Mount SMA RF Connector
J4 - J6	DC Pin
R1, R2	100 Ohm Resistor, 0603 Pkg.
U1	HMC233G8 SPDT Switch
PCB**	107100 Evaluation PCB
** 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 package bottom 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.

** Reference this number when ordering complete evaluation PCB.*

Notes: