HMC154S8

GaAs MMIC SMT LOW DISTORTION T/R SWITCH DC - 2.5 GHz

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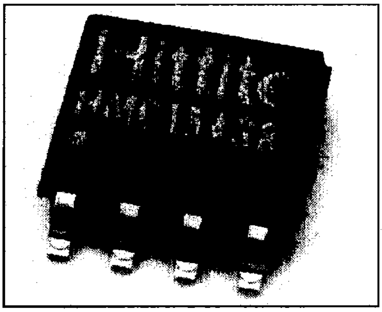
Features

HIGH THIRD ORDER INTERCEPT: +60 dBm

SINGLE POSITIVE SUPPLY: +3 TO +10V

HIGH RF POWER CAPABILITY

TTL/CMOS CONTROL



General Description

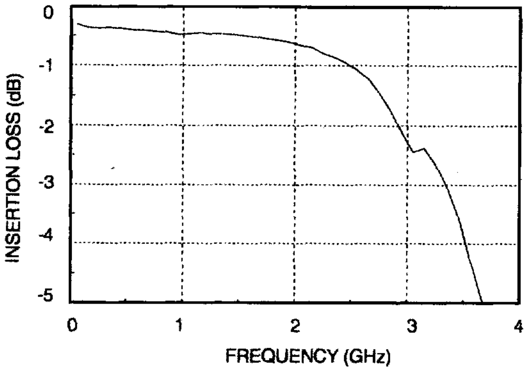
The HMC154S8 is a low-cost SPDT switch in an 8-lead SOIC package for use in transmit-receive applications which require very low distortion at high signal power levels. The device can control signals from DC to 2.5GHz and is especially suited for 900MHz and 1.8-2.2GHz applications. The design provides exceptional intermodulation performance; providing a +60dBm third order intercept at 8 Volt bias. RF1 or RF2 is a reflective short when "Off". On-chip circuitry allows single positive supply operation at very low DC current with control inputs compatible with CMOS and most TTL logic families.

Electrical Performance, *Vdd = +5 Vdc, 50 Ohm System, -40 to +85 deg C*

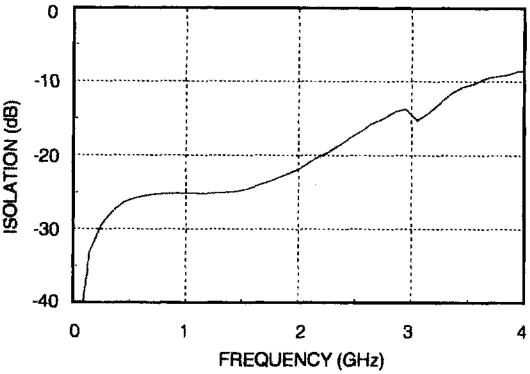
Parameter		Frequency	Min.	Typ.	Max.	Units
Insertion Loss		DC - 1.0GHz DC - 2.0GHz DC - 2.5GHz		0.5 0.7 1.0	0.7 0.9 1.3	dB dB dB
Isolation		DC - 1.0GHz DC - 2.0GHz DC - 2.5GHz	22 19 15	25 22 18		dB dB dB
Return Loss		DC - 1.0GHz DC - 2.0GHz DC - 2.5GHz	20 14 10	30 18 13		dB dB dB
Input Power for 1dB Compression	0/8V Control	0.5 - 1.0GHz 0.5 - 2.0GHz	35 34	39 38		dBm
Input Third Order Intercept	0/8V Control	0.5 - 1.0GHz 0.5 - 2.0GHz	55 54	60 60		dBm
Switching Characteristics		DC - 2.5GHz				
tRISE, tFALL (10/90% RF)				10		ns
tON, tOFF (50% CTL to 10/90% RF)				24		ns

FEBRUARY 1998

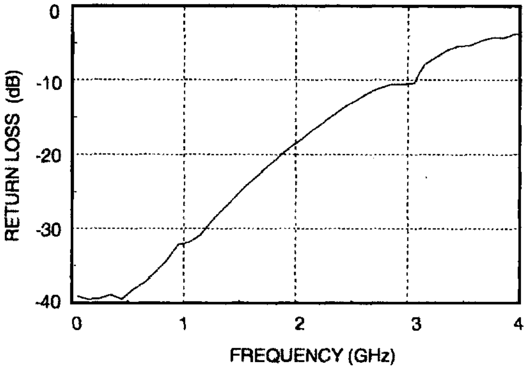
Insertion Loss



Isolation



Return Loss



S - Parameter data is available On-Line at ***www.hittite.com***

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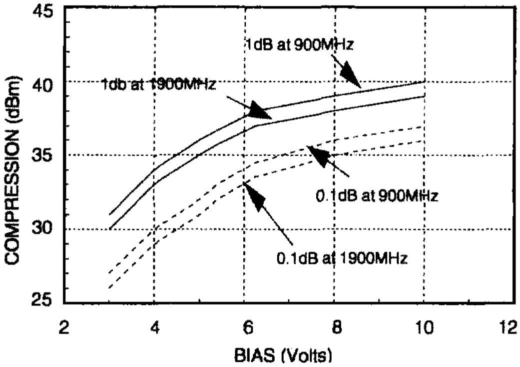
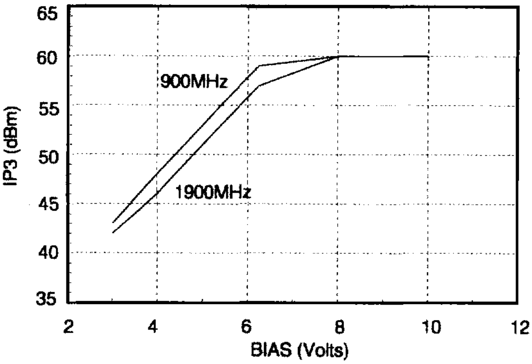
Input Power for 0.1 and 1.0 dB Compression vs Bias Voltage



Input Third Order Intercept vs Bias Voltage



Compression vs Bias Voltage

Bias Vdd (Volts)	Carrier at 900MHz Input Power for 0.1dB Compression (dBm)	Input Power for 1dB Compression (dBm)	Carrier at 1900MHz Input Power for 0.1dB Compression (dBm)	Input Power for 1dB Compression (dBm)
3	27	31	26	30
4	30	34	29	33
5	32	36	31	35
8	36	39	35	38
10	37	40	36	39

Caution: Do not operate in 1dB compression at power levels above +35dBm and do not "hot switch" power levels greater than +23 dBm (Vdd = +5V).

Distortion vs Bias Voltage

Bias Vdd (Volts)	1 Watt Carrier at 900MHz Third Order Intercept (dBm)	Second Order Intercept (dBm)	Second Harmonic (dBc)	1 Watt Carrier at 1900MHz Third Order Intercept (dBm)	Second Order Intercept (dBm)	Second Harmonic (dBc)
3	43	71	45	42	78	55
4	48	85	55	46	88	65
5	53	90	56	51	87	58
8	60	90	58	60	90	59
10	60	90	59	60	90	60

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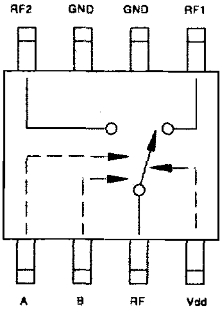
Functional Diagram



Truth Table

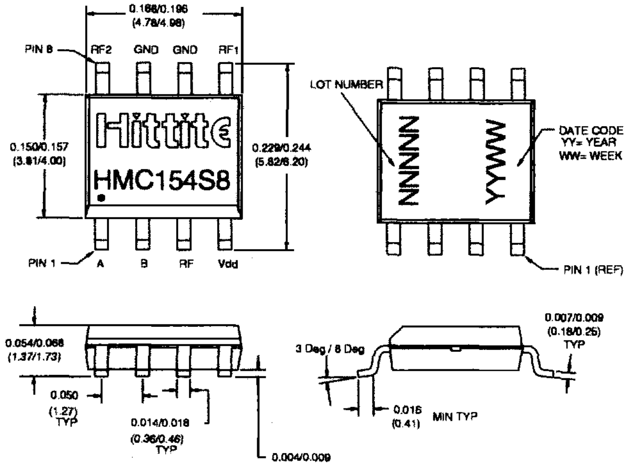
***Control Input Voltage Tolerances are ± 0.2 Vdc**

Bias	Control Input*		Bias Current	Control Current	Control Current	Signal Path State	
Vdd (Vdc)	A (Vdc)	B (Vdc)	Ivdd (µA)	Ia (µA)	Ib (µA)	RF to RF1	RF to RF2
3	0	0	30	-15	-15	OFF	OFF
3	0	Vdd	25	-25	0	ON	OFF
3	Vdd	0	25	0	-25	OFF	ON
5	0	0	110	-55	-55	OFF	OFF
5	0	Vdd	115	-100	-15	ON	OFF
5	Vdd	0	115	-15	-100	OFF	ON
10	0	0	380	-190	-190	OFF	OFF
10	0	Vdd	495	-275	-220	ON	OFF
10	Vdd	0	495	-220	-275	OFF	ON
5	-Vdd	Vdd	600	-600	225	ON	OFF
5	Vdd	-Vdd	600	225	-600	OFF	ON

Absolute Maximum Ratings

Bias Voltage Range (Vdd)	-0.2 to +12 Vdc
Control Voltage Range (A & B)	-0.2 to +Vdd Vdc
Storage Temperature	-65 to +150 deg C
Operating Temperature	-40 to +85 deg C

Outline



1) MATERIAL:
   A) PACKAGE BODY: LOW STRESS INJECTION MOLDED PLASTIC, SILICA & SILICONE IMPREGNATED
   B) LEADFRAME MATERIAL: COPPER ALLOY
2. PLATING: LEAD-TIN SOLDER PLATE
3. DIMENSIONS ARE IN INCHES (MILLIMETERS)
   UNLESS OTHERWISE SPECIFIED TOLERANCE ARE ±0.005 (±0.13)

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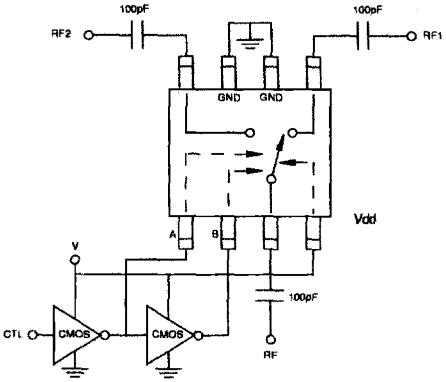
Typical Application Circuit for HMC154S8



Notes:

1. Control inputs A and B can be driven directly with CMOS logic (HC) with V of 3 to 8 Volts applied to the CMOS logic gates and to pin 4 of the RF switch.
2. DC Blocking capacitors are required for each RF port as shown. Capacitor value determines lowest frequency of operation.
3. Highest RF signal power capability is achieved with V set to +10V. However, the switch will operate properly (but at lower RF power capability) at bias voltages down to +3V.
4. Set V to 5 Volts and use HCT series logic to provide a TTL driver interface.