GaAS MMIC MSOP8 SPDT SWITCH DC - 3 GHz

FEBRUARY 2001

v01.0700

Features

LOW INSERTION LOSS: 0.4 dB

ULTRA SMALL PACKAGE: MSOP8

HIGH INPUT IP3 : +50 dBm

POSITIVE CONTROL: 0/+3V @ 10 µA

General Description

The HMC190MS8 is a low cost SPDT switch in an 8-lead MSOP package. The switch can control signals from DC to 3.0 GHz. It is especially suited for low and medium power applications using positive control voltages. The two control voltages require a minimal amount of DC current, which is optimal for battery powered radio systems at 0.9, 1.9, and 2.4 GHz.

The HMC190MS8 design provides exceptional third order intermodulation performance of +50 dBm. The design has been optimized for the small MSOP package, and maintains a VSWR of better than 1.2:1 up to 2 GHz. This device is the positive control MSOP8 packaged version of our HMC239S8 negative control device.

Guaranteed Performance *Vctl = 0/+3 to +8 Vdc, -40 to +85 deg C*

Parameter	Frequency	Min.	Typ.	Max.	Units
Insertion Loss	DC - 1.0 GHz DC - 2.0 GHz DC - 2.5 GHz DC - 3.0 GHz		0.4 0.4 0.5 0.7	0.6 0.6 0.8 1.0	dB dB dB dB
Isolation	DC - 1.0 GHz DC - 2.0 GHz DC - 2.5 GHz DC - 3.0 GHz	23 23 22 19	27 27 26 22		dB dB dB dB
Return Loss	DC - 1.0 GHz DC - 2.0 GHz DC - 2.5 GHz DC - 3.0 GHz	24 20 15 10	28 28 20 16		dB dB dB dB
Input Power for 1dB Compression (Vctl = 0/+5V)	0.5 - 1.0 GHz 0.5 - 3.0 GHz	25 23	30 29		dBm dBm
Input Third Order Intercept (Vctl = 0/+5V, +7 dBm Each Tone)	0.5 - 1.0 GHz 0.5 - 3.0 GHz	45 44	50 49		dBm dBm
Switching Characteristics tRISE / tFALL (10/90% RF / 90/10% RF) tON / tOFF (50% CTL to 10/90% RF)	DC - 3.0 GHz		 3 10		 nS nS

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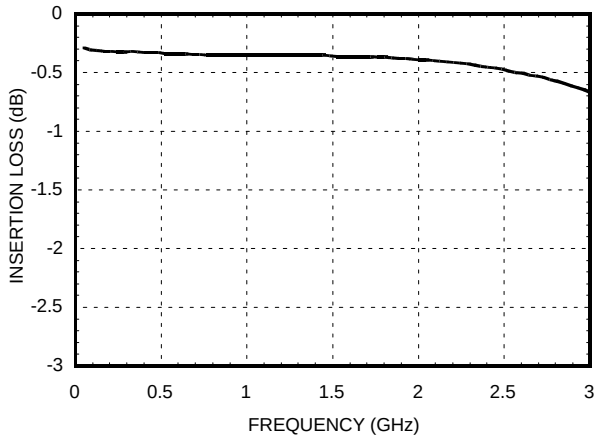
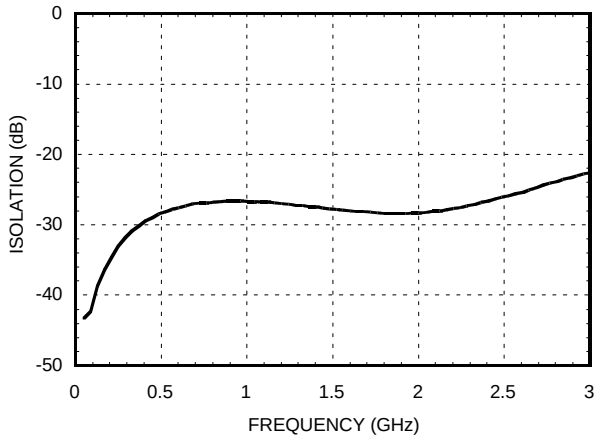
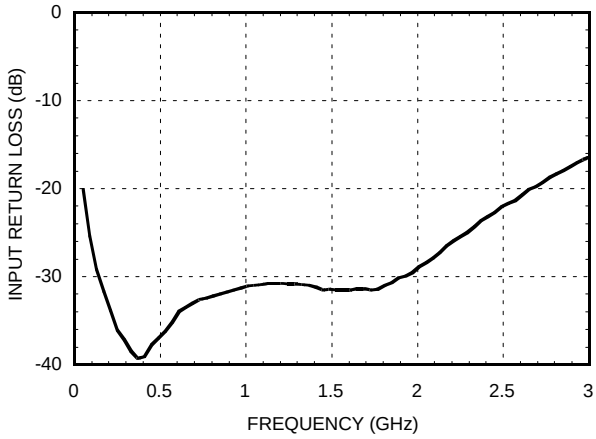
Insertion Loss



Isolation



Return Loss



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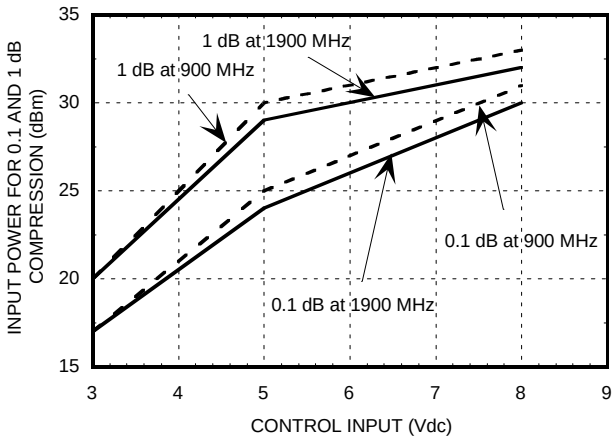
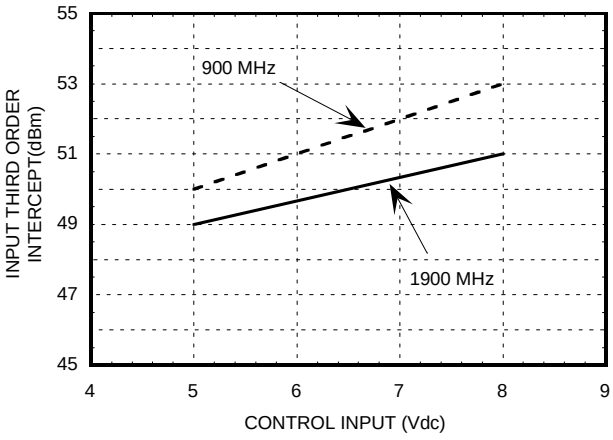
Input 0.1 and 1.0 dB Compression vs Control Voltage



Input Third Order Intercept Point vs Control Voltage



Compression vs Control Voltage

	Carrier at 900MHz		Carrier at 1900MHz	
Control Input	Input Power for 0.1dB Compression	Input Power for 1dB Compression	Input Power for 0.1dB Compression	Input Power for 1dB Compression
(Vdc)	(dBm)	(dBm)	(dBm)	(dBm)
+3	17	20	17	20
+5	25	30	24	29
+8	31	33	30	32

Caution: Do not operate in 1dB compression at power levels above +31 dBm (Vctl=+5 Vdc) and do not 'hot switch' power levels greater than +20dBm (V_{CTL} = +5Vdc).

DC blocks are required at ports RFC, RF1 and RF2.

Distortion vs Control Voltage

Control Input	Third Order Intercept (dBm) +7 dBm Each Tone	
(Vdc)	900 MHz	1900 MHz
+5	50	49
+8	53	51

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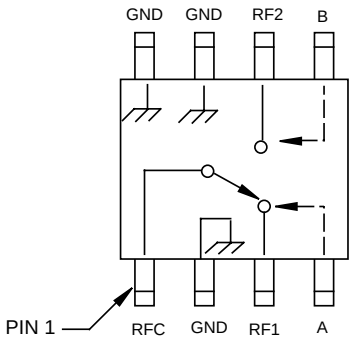
Functional Diagram



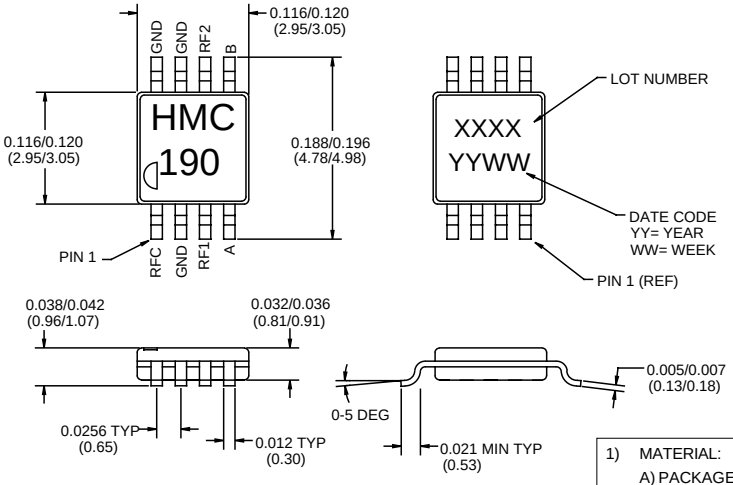
Truth Table **Control Input Tolerances are +/- 0.2 Vdc*

Control Input *		Control Current		Signal Path	
A (Vdc)	B (Vdc)	Ia (uA)	Ib (uA)	RF to RF1	RF to RF2
0	+3	-10	10	On	Off
+3	0	10	-10	Off	On
0	+5	-55	55	On	Off
+5	0	55	-55	Off	On
0	+7	-210	210	On	Off
+7	0	210	-210	Off	On
0	+8	-280	280	On	Off
+8	0	280	-280	Off	On

Absolute Maximum Ratings

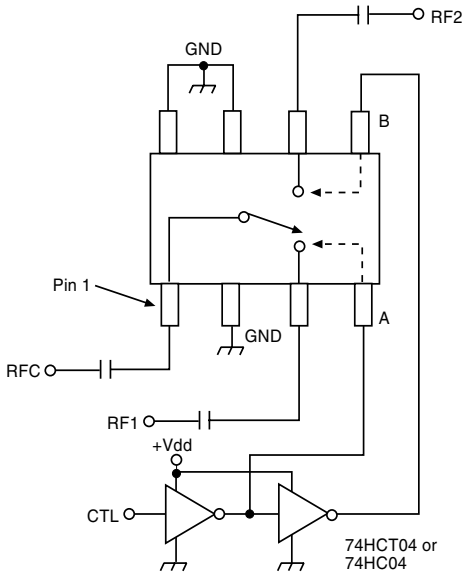
Max. Input Power 0.05 GHz V_{CTL} = 0/+8V 0.5-2 GHz	+27 dBm +34 dBm
Control Voltage Range (A & B)	-0.2 to +12Vdc
Storage Temperature	-65 to +150 deg. C
Operating Temperature	-40 to +85 deg. C

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)

Typical Application Circuit



Notes:

1. Set logic gate and switch Vdd = +3V to +5V and use HCT series logic to provide a TTL driver interface.
2. Control inputs A/B can be driven directly with CMOS logic (HC) with Vdd of 5 to 8 Volts applied to the CMOS logic gates.
3. DC Blocking capacitors are required for each RF port as shown. Capacitor value determines lowest frequency of operation.
4. Highest RF signal power capability is achieved with Vdd = +8V and A/B set to 0/+8V.

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NOTES: