



v02.0505

HMC190MS8 / 190MS8E

GaAs MMIC SPDT SWITCH DC - 3 GHz

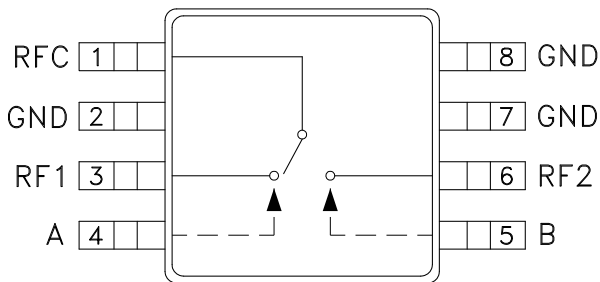


Typical Applications

The HMC190MS8 / HMC190MS8E is ideal for:

- MMDS & WirelessLAN
- Portable Wireless

Functional Diagram



Features

- Low Insertion Loss: 0.4dB
- Ultra Small Package: MSOP8
- High Input IP3: +50 dBm
- Positive Control: 0/+3V @ 10 uA

General Description

The HMC190MS8 & HMC190MS8E are low cost SPDT switches in 8-lead MSOP packages. The switch can control signals from DC to 3 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(E) designs 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.

Electrical Specifications, $T_A = +25^\circ \text{C}$, $V_{ctl} = 0/+3 \text{ to } +8 \text{ Vdc}$

| Parameter | Frequency | Min. | Typ. | Max. | Units |
|------------------------------------------------------------------------------------------------------|---------------|------------------------------------------|------|------|-------|
| Insertion Loss | DC - 1.0 GHz | | 0.4 | 0.6 | dB |
| | DC - 2.0 GHz | | 0.4 | 0.6 | dB |
| | DC - 2.5 GHz | | 0.5 | 0.8 | dB |
| | DC - 3.0 GHz | | 0.7 | 1.0 | dB |
| Isolation | DC - 1.0 GHz | 23 | 27 | | dB |
| | DC - 2.0 GHz | 23 | 27 | | dB |
| | DC - 2.5 GHz | 22 | 26 | | dB |
| | DC - 3.0 GHz | 19 | 22 | | dB |
| Return Loss | DC - 1.0 GHz | 24 | 28 | | dB |
| | DC - 2.0 GHz | 20 | 28 | | dB |
| | DC - 2.5 GHz | 15 | 20 | | dB |
| | DC - 3.0 GHz | 10 | 16 | | dB |
| Input Power for 1 dB Compression ($V_{ctl} = 0/+5\text{V}$) | 0.5 - 1.0 GHz | 25 | 30 | | dBm |
| | 0.5 - 3.0 GHz | 23 | 29 | | dBm |
| Input Third Order Intercept ($V_{ctl} = 0/+5\text{V}$)(Two-tone Input Power = +7 dBm Each Tone) | 0.5 - 1.0 GHz | 45 | 50 | | dBm |
| | 0.5 - 3.0 GHz | 44 | 49 | | dBm |
| Switching Characteristics | DC - 3.0 GHz | | | | |
| | | t_{RISE}, t_{FALL} (10/90% RF) | | 3 | ns |
| | | t_{ON}, t_{OFF} (50% CTL to 10/90% RF) | | 10 | ns |

For price, delivery, and to place orders, please contact Hittite Microwave Corporation:
20 Alpha Road, Chelmsford, MA 01824 Phone: 978-250-3343 Fax: 978-250-3373

Order On-line at www.hittite.com

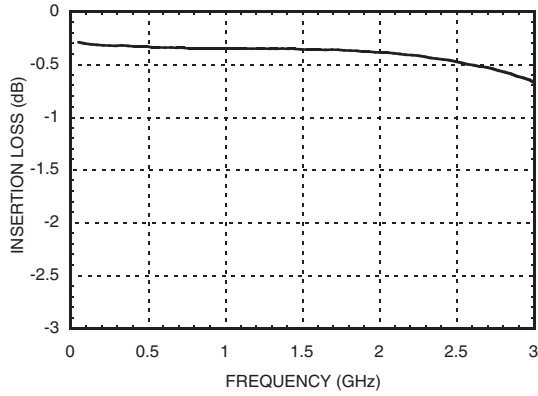
SUNSTAR射频通信 <http://www.rfoe.net/> TEL:0755-83397033 FAX:0755-83376182 E-MAIL: szss20@163.com



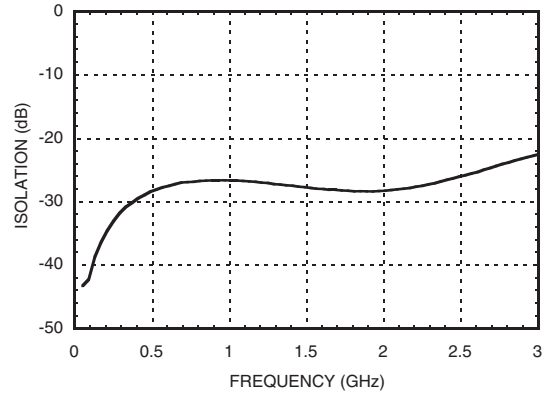
HMC190MS8 / 190MS8E

GaAs MMIC SPDT SWITCH DC - 3 GHz

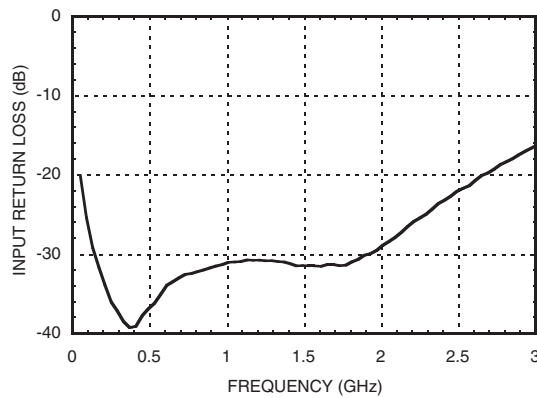
Insertion Loss



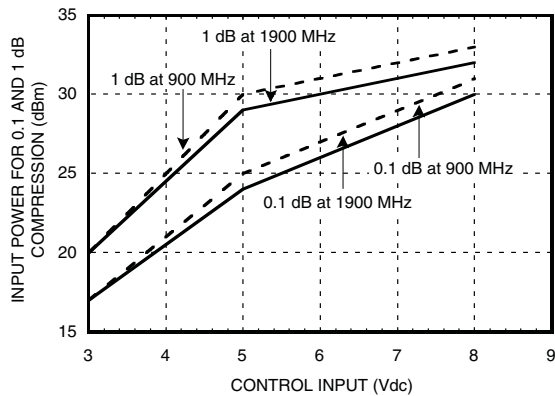
Isolation



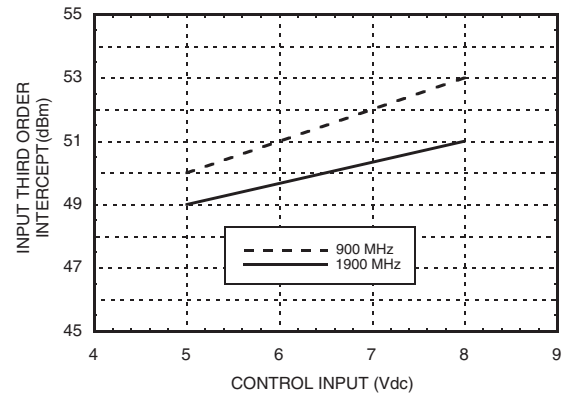
Return Loss



Input 0.1 and 1.0 dB Compression vs. Control Voltage



Input Third Order Intercept Point vs. Control Voltage



For price, delivery, and to place orders, please contact Hittite Microwave Corporation:
20 Alpha Road, Chelmsford, MA 01824 Phone: 978-250-3343 Fax: 978-250-3373

Order On-line at www.hittite.com



MICROWAVE CORPORATION v02.0505

**HMC190MS8 / 190MS8E****GaAs MMIC SPDT SWITCH
DC - 3 GHz****Distortion vs. Control Voltage**

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

Compression vs. Control Voltage

| Control Input (Volts) | Carrier at 900 MHz | | Carrier at 1900 MHz | |
|--------------------------|---------------------------------------------------|---------------------------------------------------|---------------------------------------------------|---------------------------------------------------|
| | Input Power for 0.1 dB Compression (dBm) | Input Power for 1.0 dB Compression (dBm) | Input Power for 0.1 dB Compression (dBm) | Input Power for 1.0 dB Compression (dBm) |
| +3 | 17 | 20 | 17 | 20 |
| +5 | 25 | 30 | 24 | 29 |
| +8 | 31 | 33 | 30 | 32 |

Truth Table*Control Input Voltage Tolerances are ± 0.2 Vdc.

| Control Input* | | Control Current | | Signal Path State | |
|----------------|------------|-----------------|------------|-------------------|-----------|
| 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 |

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

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

For price, delivery, and to place orders, please contact Hittite Microwave Corporation:
20 Alpha Road, Chelmsford, MA 01824 Phone: 978-250-3343 Fax: 978-250-3373

Order On-line at www.hittite.com
SUNSTAR射频通信 <http://www.rfoe.net/> TEL:0755-83397033 FAX:0755-83376182 E-MAIL: szss20@163.com



v02.0505

HMC190MS8 / 190MS8E

GaAs MMIC SPDT SWITCH DC - 3 GHz



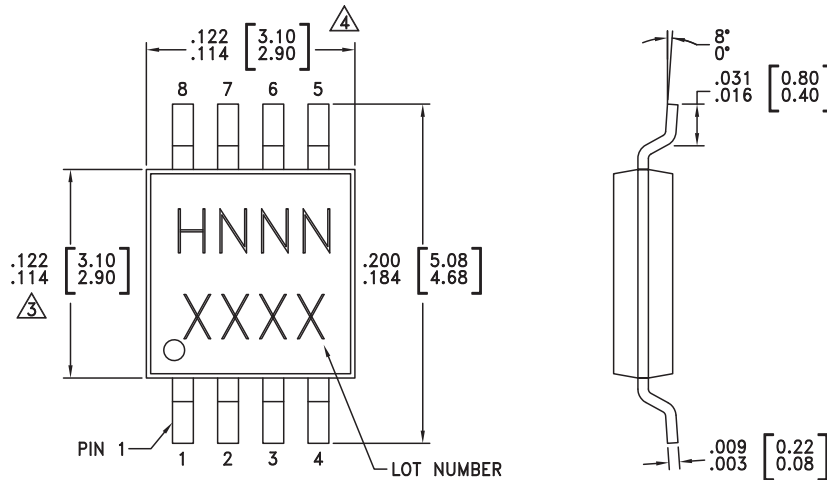
Absolute Maximum Ratings

| | | |
|-------------------------------|-------------|-----------------|
| Max. Input Power | 0.5 GHz | +27 dBm |
| $V_{CTL} = 0/+8V$ | 0.5 - 2 GHz | +34 dBm |
| Control Voltage Range (A & B) | | -0.2 to +12 Vdc |
| Storage Temperature | | -65 to +150 °C |
| Operating Temperature | | -40 to +85 °C |
| ESD Sensitivity (HBM) | | Class 1A |



ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

Outline Drawing



NOTES:

- LEADFRAME MATERIAL: COPPER ALLOY
- DIMENSIONS ARE IN INCHES [MILLIMETERS].
- DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
- DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.
- ALL GROUND LEADS MUST BE SOLDERED TO PCB RF GROUND.

Package Information

| Part Number | Package Body Material | Lead Finish | MSL Rating | Package Marking ^[3] |
|-------------|----------------------------------------------------|---------------|---------------------|--------------------------------|
| HMC190MS8 | Low Stress Injection Molded Plastic | Sn/Pb Solder | MSL1 ^[1] | H190 XXXX |
| HMC190MS8E | RoHS-compliant Low Stress Injection Molded Plastic | 100% matte Sn | MSL1 ^[2] | H190 XXXX |

[1] Max peak reflow temperature of 235 °C

[2] Max peak reflow temperature of 260 °C

[3] 4-Digit lot number XXXX

For price, delivery, and to place orders, please contact Hittite Microwave Corporation:
20 Alpha Road, Chelmsford, MA 01824 Phone: 978-250-3343 Fax: 978-250-3373

Order On-line at www.hittite.com

SUNSTAR射频通信 <http://www.rfoe.net/> TEL:0755-83397033 FAX:0755-83376182 E-MAIL: szss20@163.com

10

SWITCHES - SMT



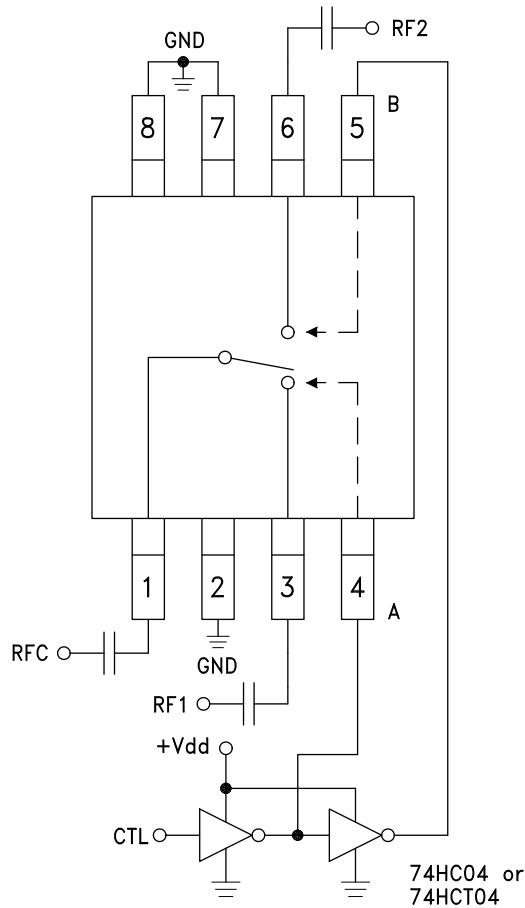
v02.0505

HMC190MS8 / 190MS8E

GaAs MMIC SPDT SWITCH
DC - 3 GHz



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.

10

SWITCHES - SMT

For price, delivery, and to place orders, please contact Hittite Microwave Corporation:
20 Alpha Road, Chelmsford, MA 01824 Phone: 978-250-3343 Fax: 978-250-3373

Order On-line at www.hittite.com

SUNSTAR射频通信 <http://www.rfoe.net/> TEL:0755-83397033 FAX:0755-83376182 E-MAIL: szss20@163.com



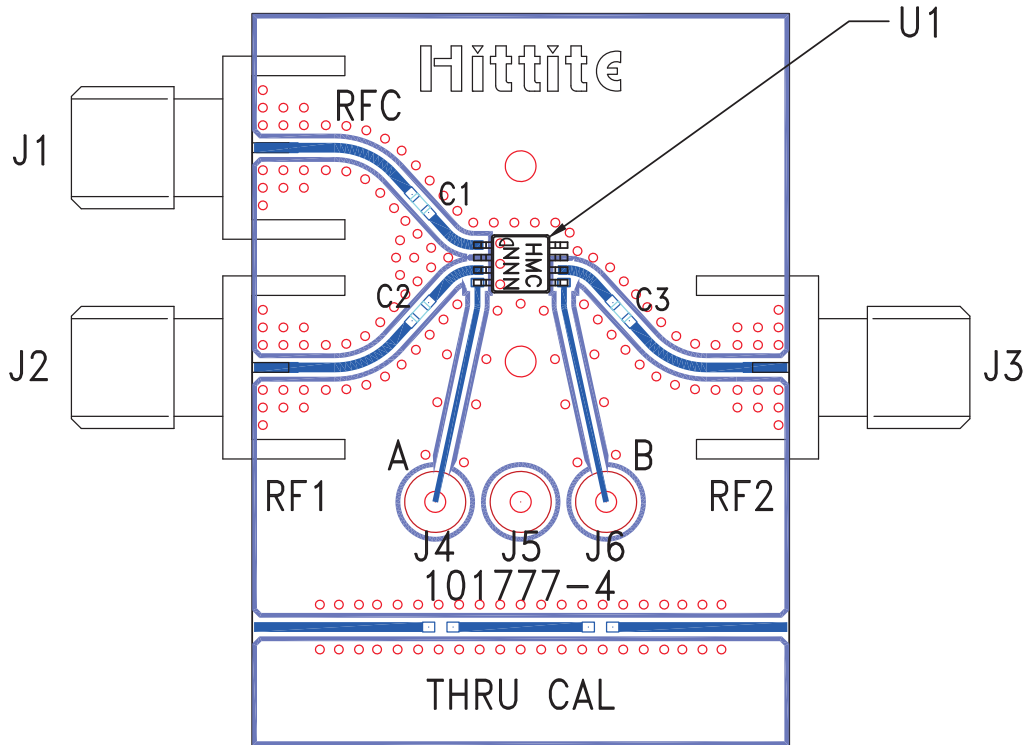
v02.0505

HMC190MS8 / 190MS8E

GaAs MMIC SPDT SWITCH
DC - 3 GHz



Evaluation Circuit Board



10

SWITCHES - SMT

List of Materials for Evaluation PCB 101779 [1]

| Item | Description |
|---------|------------------------------------|
| J1 - J3 | PCB Mount SMA RF Connector |
| J4 - J6 | DC Pin |
| C1 - C3 | 330 pF capacitor, 0402 Pkg. |
| U1 | HMC190MS8 / HMC190MS8E SPDT Switch |
| PCB [2] | 101777 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 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.

For price, delivery, and to place orders, please contact Hittite Microwave Corporation:
20 Alpha Road, Chelmsford, MA 01824 Phone: 978-250-3343 Fax: 978-250-3373

Order On-line at www.hittite.com
SUNSTAR射频通信 <http://www.rfoe.net/> TEL:0755-83397033 FAX:0755-83376182 E-MAIL: szss20@163.com