GaAs MMIC HIGH ISOLATION TRANSFER SWITCH DC - 10 GHz

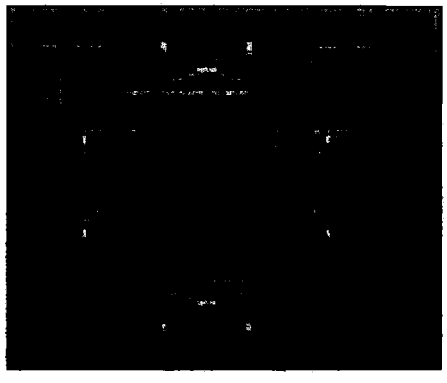
FEBRUARY 1998

Features

BAND WIDTH: DC - 10GHz

INSERTION LOSS: 2.0 dB

ISOLATION: > 50 dB



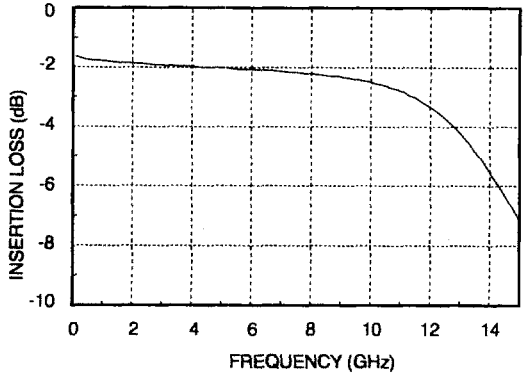
General Description

The HMC150 is a transfer switch which provides high isolation over a DC to 10GHz frequency range. The device can be used to switch additional gain (or attenuation) in series with the signal path. Alternatively, the device can be used to reverse the signal path through any two port device. Switch control is via complementary logic paths A and B located in several locations along the periphery of the MMIC.

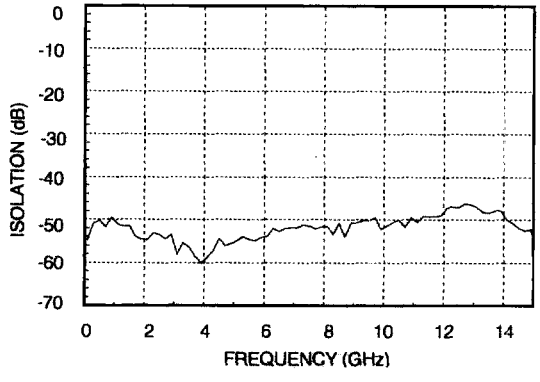
Electrical Performance *With 0/-5V Control, 50 Ohm System, -55 to +85 deg C*

Parameter	Frequency	Min.	Typ.	Max.	Units
Insertion Loss	DC - 5GHz DC - 10 GHz		2.0 2.6	2.5 3.1	dB dB
Isolation	DC - 10 GHz	45	50		dB
Return Loss	DC - 5 GHz DC - 10 GHz	14 10	18 14		dB dB
Phase Balance	DC - 10GHz		1		Deg
Input Power for 1dB Compression (0/-5V Ctl)	0.5 - 10 GHz	+22	+27		dBm
Input Third Order Intercept	0.5 - 10 GHz	+38	+42		dBm
Switching Characteristics tRISE, tFALL (10/90% RF) tON, tOFF (50% CTL to 10/90% RF)	DC - 10 GHz		 3 6		 ns ns

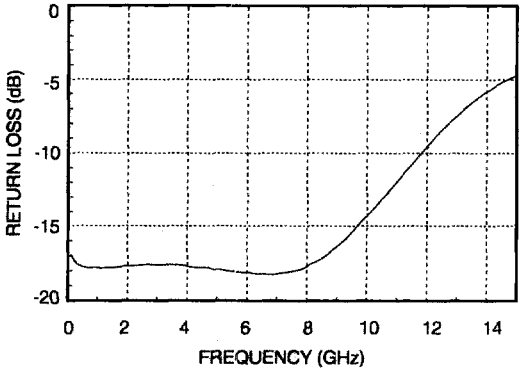
Insertion Loss



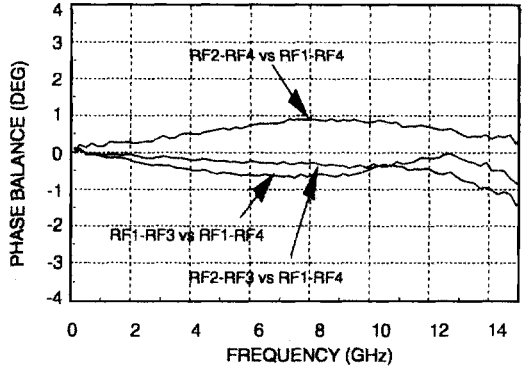
Isolation



Return Loss



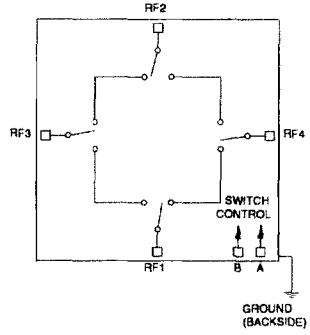
Phase Balance



GaAs MMIC HIGH ISOLATION TRANSFER SWITCH DC - 10 GHz

FEBRUARY 1998

Schematic



Truth Table

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

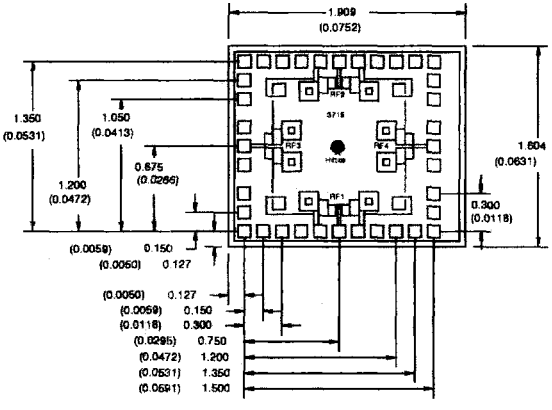
Control Voltages

State	Bias Condition
Low	0 to -0.2V @ 20uA Max.
High	-5V@200uA Typ to -7V@600uA Max

Absolute Maximum Ratings

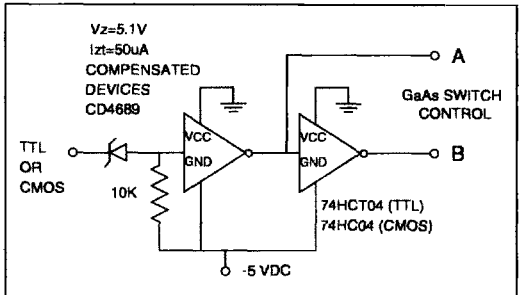
Control Voltage Range	+0.5 to -7.5 Vdc
Storage Temperature	-65 to +150 deg C
Operating Temperature	-55 to +125 deg C

Outline



ALL DIMENSION IN MILLIMETERS (INCHES)
ALL TOLERANCES ARE ±0.025 (0.001)
DIE THICKNESS IS 100(0.004), BACKSIDE IS GROUND
BOND PADS ARE 100(0.004), SQUARE
BOND PAD METALLIZATION: GOLD
BACKSIDE METALLIZATION: GOLD

Suggested Driver Circuit



Simple driver using inexpensive standard logic ICs provides fast switching using minimum DC current.

7 Switches

Handling Precautions

Follow these precautions to avoid permanent damage:
Cleanliness: Handle the chips in a clean environment. DO NOT attempt to clean the chip using liquid cleaning systems.
Static Sensitivity: Follow ESD precautions to protect against ≥ ±250V ESD strikes (*see page 8 - 2*).
Transients: Suppress instrument and bias supply transients while bias is applied. Use shielded signal and bias cables to minimize inductive pick-up.
General Handling: Handle the chip along the edges with a vacuum collet or with a sharp pair of bent tweezers. The surface of the chip has fragile air bridges and should not be touched with vacuum collet, tweezers, or fingers.

Mounting

The chip is back-metallized and can be die mounted with AuSn eutectic preforms or with electrically conductive epoxy. The mounting surface should be clean and flat.

Eutectic Die Attach:
A 80/20 gold tin preform is recommended with a work surface temperature of 255 deg. C and a tool temperature of 265 deg. C. When hot 90/10 nitrogen/hydrogen gas is applied, tool tip temperature should be 290 deg. C.
DO NOT expose the chip to a temperature greater than 320 deg. C for more than 20 seconds. No more than 3 seconds of scrubbing should be required for attachment.

Epoxy Die Attach:
Apply a minimum amount of epoxy to the mounting surface so that a thin epoxy fillet is observed around the perimeter of the chip once it is placed into position.
Cure epoxy per the manufacturer's schedule.

Wire Bonding

Ball or wedge bond with 1.0 diameter pure gold wire. Thermosonic wirebonding with a nominal stage temperature of 150 deg. C and a ball bonding force of 40 to 50 grams or wedge bonding force of 18 to 22 grams is recommended. Use the minimum level of ultrasonic energy to achieve reliable wirebonds. Wirebonds should be started on the chip and terminated on the package. RF bonds should be as short as possible.