

Excellent Integrated System Limited

Stocking Distributor

Click to view price, real time Inventory, Delivery & Lifecycle Information:

[Analog Devices Inc.](#)
[HMC438MS8GETR](#)

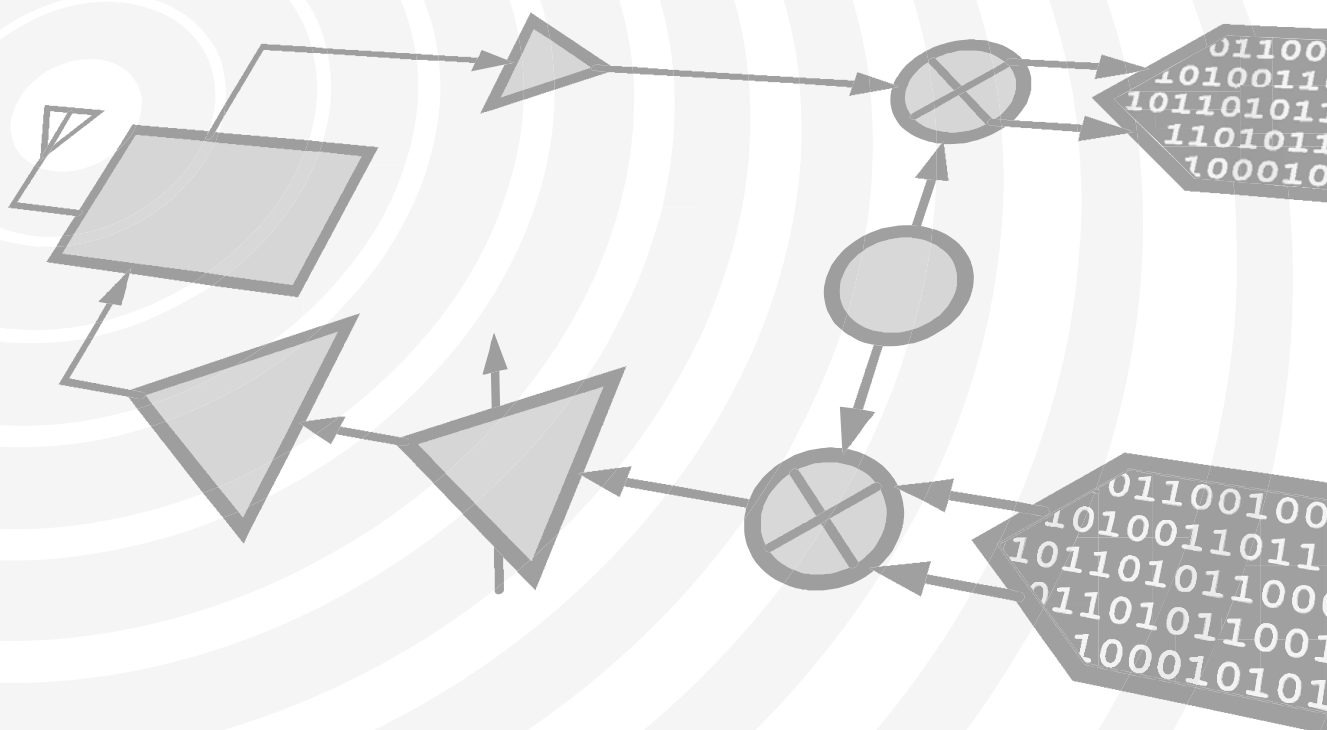
For any questions, you can email us directly:

sales@integrated-circuit.com



Analog Devices Welcomes Hittite Microwave Corporation

NO CONTENT ON THE ATTACHED DOCUMENT HAS CHANGED



THIS PAGE INTENTIONALLY LEFT BLANK

Hittite

v06.0914

HMC438MS8G / 438MS8GE**SMT GaAs HBT MMIC
DIVIDE-BY-5, DC - 7 GHz****Typical Applications**

Prescaler for DC to C Band PLL Applications:

- UNII, Point-to-Point & VSAT Radios
- 802.11a & HiperLAN WLAN
- Fiber Optic
- Cellular / 3G Infrastructure

Features

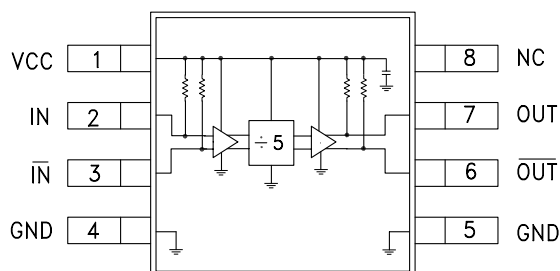
SSB Phase Noise: -153 dBc/Hz @100 kHz

Wide Bandwidth

Output Power: -1 dBm

Single DC Supply: +5V @ 80 mA

MS8G SMT Package

Functional Diagram**General Description**

The HMC438MS8G & HMC438MS8GE are low noise Divide-by-5 Static Dividers utilizing InGaP GaAs HBT technology in low cost 8 lead surface mount plastic packages. This device operates from DC (with a square wave input) to 7 GHz input frequency from a single +5V DC supply. The low additive SSB phase noise of -153 dBc/Hz at 100 kHz offset helps the user maintain good system noise performance.

Electrical Specifications, $T_A = +25^\circ\text{C}$, 50 Ohm System, $V_{cc} = 5V$

Parameter	Conditions	Min.	Typ.	Max.	Units
Maximum Input Frequency		7.0	7.5		GHz
Minimum Input Frequency	Sine Wave Input [1]		0.1		GHz
Input Power Range	$F_{in} = 1$ to 5 GHz	-15		+12	dBm
	$F_{in} = 5$ to 6 GHz	-15		+10	dBm
	$F_{in} = 6$ to 7 GHz	-15		+5	dBm
Output Power		-4	-1		dBm
Reverse Leakage	Both RF Outputs Terminated		-50		dBm
SSB Phase Noise (100 kHz offset)	$P_{in} = 0$ dBm, $F_{in} = 6$ GHz		-153		dBc/Hz
Output Transition Time	$P_{in} = 0$ dBm, $F_{out} = 882$ MHz		100		ps
Supply Current (I_{cc})			80		mA

1. Divider will operate down to DC for square-wave input signal.

For price, delivery and to place orders: Hittite Microwave Corporation, 20 Alpha Road, Chelmsford, MA 01824
Phone: 978-250-3343 Fax: 978-250-3373 Order On-line at www.hittite.com
Application Support: Phone: 978-250-3343 or apps@hittite.com

Hittite

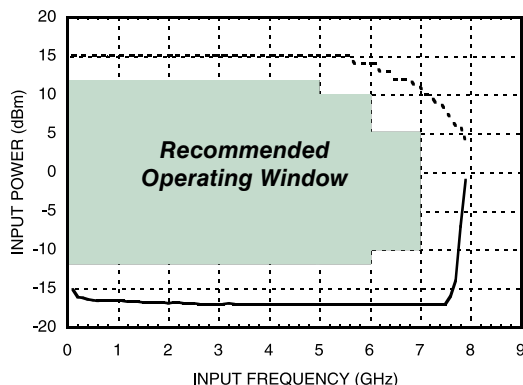
v06.0914



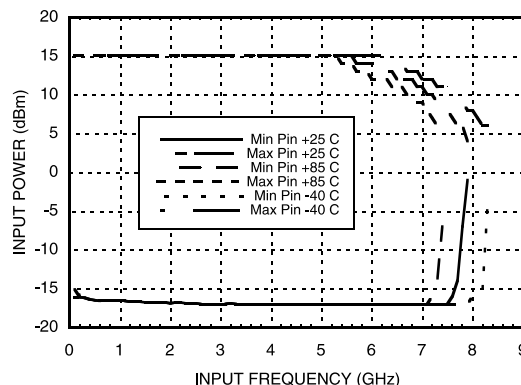
HMC438MS8G / 438MS8GE

SMT GaAs HBT MMIC
DIVIDE-BY-5, DC - 7 GHz

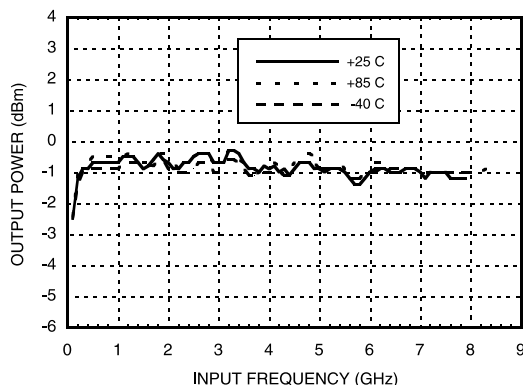
Input Sensitivity Window, $T = 25^\circ\text{C}$



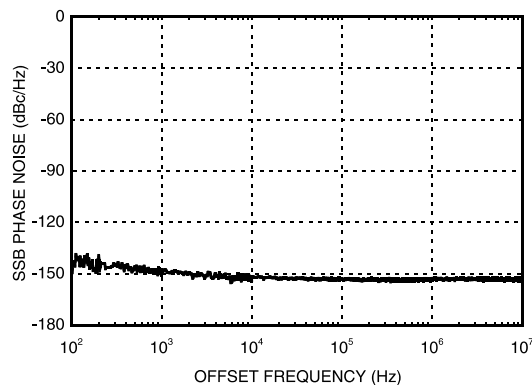
Input Sensitivity Window vs. Temperature



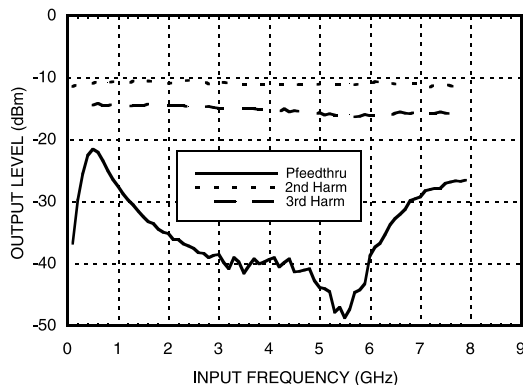
Output Power vs. Temperature



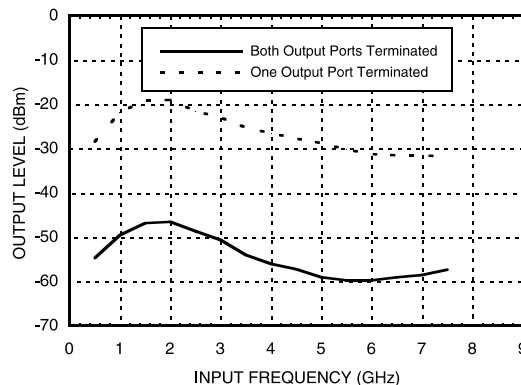
**SSB Phase Noise Performance,
 $P_{in} = 0\text{ dBm}$, $F_{in} = 6\text{ GHz}$, $T = 25^\circ\text{C}$**



Output Harmonic Content, $P_{in} = 0\text{ dBm}$, $T = 25^\circ\text{C}$



Reverse Leakage, $P_{in} = 0\text{ dBm}$, $T = 25^\circ\text{C}$



Hittite

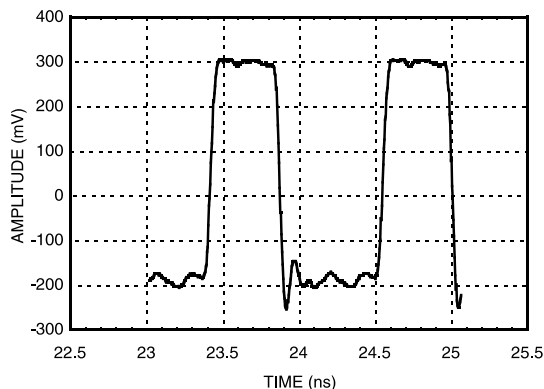
v06.0914



HMC438MS8G / 438MS8GE

SMT GaAs HBT MMIC
DIVIDE-BY-5, DC - 7 GHz

Output Voltage Waveform,
Pin= 0 dBm, Fout= 882 MHz, T= 25 °C



Absolute Maximum Ratings

RF Input Power (Vcc = +5V)	13 dBm
Nominal +5V Supply to GND	-0.3V to +5.5V
Max Peak Flow Temperature	260 °C
Storage Temperature	-65 to +125 °C
ESD Sensitivity (HBM)	Class 1A

Reliability Information

Junction Temperature to Maintain 1 Million Hour MTTF	135 °C
Nominal Junction Temperature (T = 85 °C)	122 °C
Thermal Resistance (Junction to GND Paddle, 5V Supply)	88.5 °C/W
Operating Temperature	-40 to +85 °C

DC blocking capacitors are required at RF input and RF output ports.
 Choose value for lowest frequency of operation.



ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

Typical Supply Current vs. Vcc

Vcc (V)	Icc (mA)
4.75	75
5.0	80
5.25	87

Note: Divider will operate over full voltage range shown above

Hittite

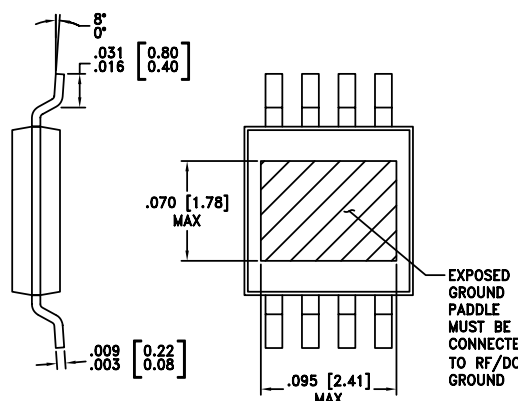
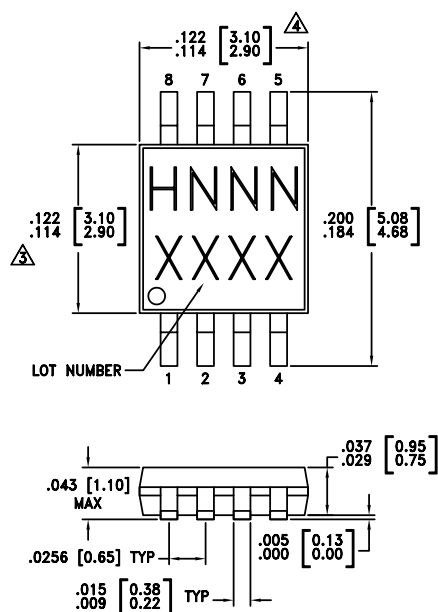
v06.0914



HMC438MS8G / 438MS8GE

SMT GaAs HBT MMIC
DIVIDE-BY-5, DC - 7 GHz

Outline Drawing



NOTES:

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

Package Information

Part Number	Package Body Material	Lead Finish	MSL Rating	Package Marking ^[3]
HMC438MS8G	Low Stress Injection Molded Plastic	Sn/Pb Solder	MSL1 ^[1]	H438 XXXX
HMC438MS8GE	RoHS-compliant Low Stress Injection Molded Plastic	100% matte Sn	MSL1 ^[2]	H438 XXXX

[1] Max peak reflow temperature of 235 °C

[2] Max peak reflow temperature of 260 °C

[3] 4-Digit lot number XXXX

Pin Description

Pin Number	Function	Description	Interface Schematic
1	Vcc	Supply voltage 5V ± 0.25V.	
2	IN	RF input must be DC blocked.	

Hittite

v06.0914



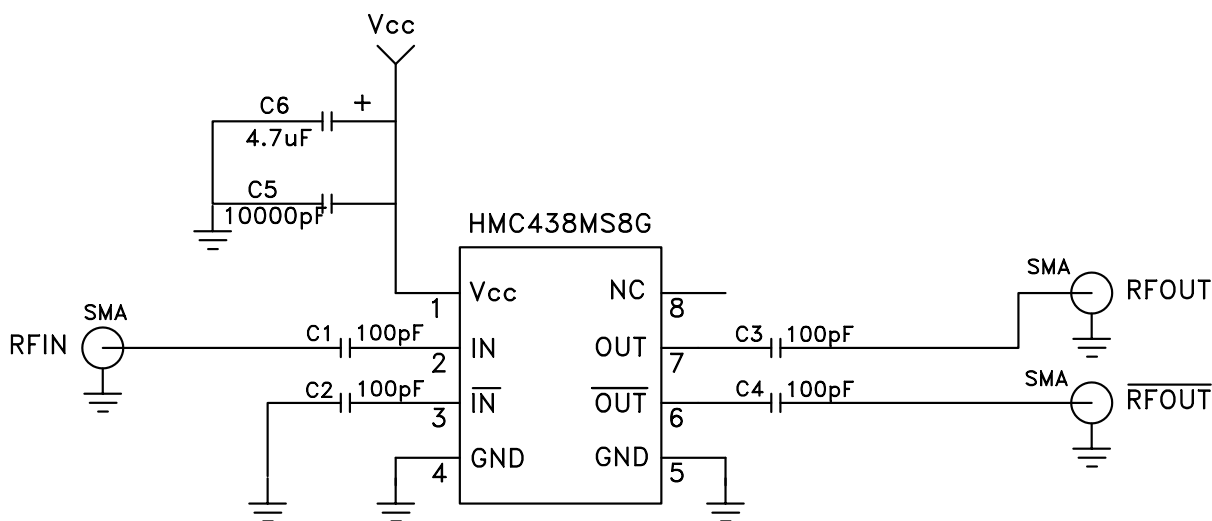
HMC438MS8G / 438MS8GE

SMT GaAs HBT MMIC
DIVIDE-BY-5, DC - 7 GHz

Pin Description (Continued)

Pin Number	Function	Description	Interface Schematic
3	$\overline{\text{IN}}$	RF input 180° out of phase with pin 2 for differential operation. AC ground for single ended operation.	
4, 5	GND	All ground leads and ground paddle must be soldered to PCB RF/DC ground.	
6	$\overline{\text{OUT}}$	Divided output 180° out of phase with pin 7.	
7	OUT	Divided Output.	
8	N/C	The pins are not connected internally; however, all data shown herein was measured with these pins connected to RF/DC ground externally.	

Application Circuit



Hittite

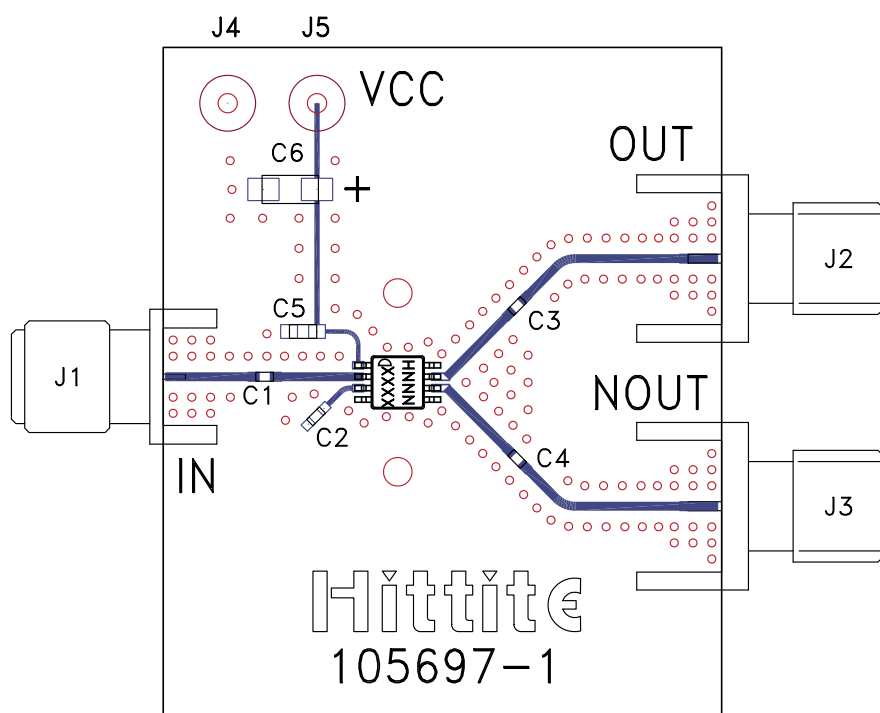
v06.0914



HMC438MS8G / 438MS8GE

SMT GaAs HBT MMIC
DIVIDE-BY-5, DC - 7 GHz

Evaluation PCB



List of Materials for Evaluation PCB 105786 [1]

Item	Description
J1 - J3	PCB Mount SMA RF Connector
J4, J5	DC Pin
C1 - C4	100 pF Capacitor, 0402 Pkg.
C5	10,000 pF Capacitor, 0603 Pkg.
C6	4.7 μ F Tantalum Capacitor
U1	HMC438MS8G / HMC438MS8GE Divide-by-5
PCB [2]	105697 Eval Board

[1] Reference this number when ordering complete evaluation PCB

[2] Circuit Board Material: Rogers 4350

The circuit board used in the application should use RF circuit design techniques. Signal lines should have 50 Ohm impedance while the package ground leads and backside ground slug should be connected directly to the ground plane similar to that shown. A sufficient number of via holes should be used to connect the top and bottom ground planes. The evaluation circuit board shown is available from Hittite upon request. This evaluation board is designed for single ended input testing. J2 and J3 provide differential output signals.