

Description

The DM5001 is a SiGe BiCMOS die, purposely designed for accurate Phase shift and gain control of beamforming antennas operating in the 10.7GHz to 14.5 GHz.

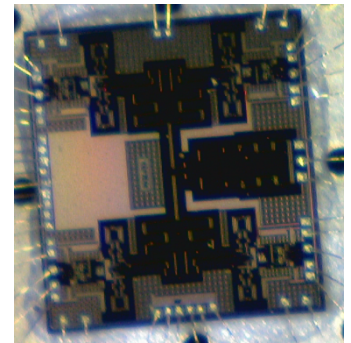
The MMIC die embeds a 1to 4 Wilkinson Power Splitter and 4 RF Arms with independent gain and phase shift controls.

The phase shifting range is 360 degrees at all operating frequencies, with a resolution of 5.625 degrees. (6 bit phase control). The VGA control range is 16 dB with a linear in dB controlled by 5 bits

The BF RF Array coefficients (phase and gain) can be conveniently controlled via a standard serial SPI interface.

Features

- ◆ Operating Frequencies 10.7GHz to 14.5 GHz
- ◆ Nominal Maximum Gain 7dB
- ◆ Nominal Minimum Gain -9dB
- ◆ -17 dBm 1dB compression point
- ◆ 50 ohm AC coupled Single Ended RF input and output
- ◆ Input and output return loss >15 dB
- ◆ Power Supplies : 3.3V Analog and 2.5V Digital
- ◆ Low power consumption:700 mW
- ◆ LVCMOS SPI compliant interface



Absolute Maximum Ratings

Symbol	Parameters / Conditions	Min.	Max.	Units
VDC	Power Supply Voltage	0,50	3,50	V
VDD	Digital Supply Voltage	0,50	2,80	V
Vin	RF Input		-7,00	dBm
Tstg	Storage Temperature	-65,00	150,00	°C

Recommended Operating Conditions

Symbol	Parameters / Conditions	Min.	Typ.	Max.	Units
VDC	Power Supply Voltage	3,125	3,3	3,45	V
VDD	Digital Power Supply Voltage	2,25	2,5	2,65	V
IDC	Total Bias Supply Current		180		mA
IDD	Total Bias Supply Current		10		mA
VIL	Input		-21		dBm



DM5001

10.7-14.5 GHz TX BFN Front End MMIC

(Advanced Information)

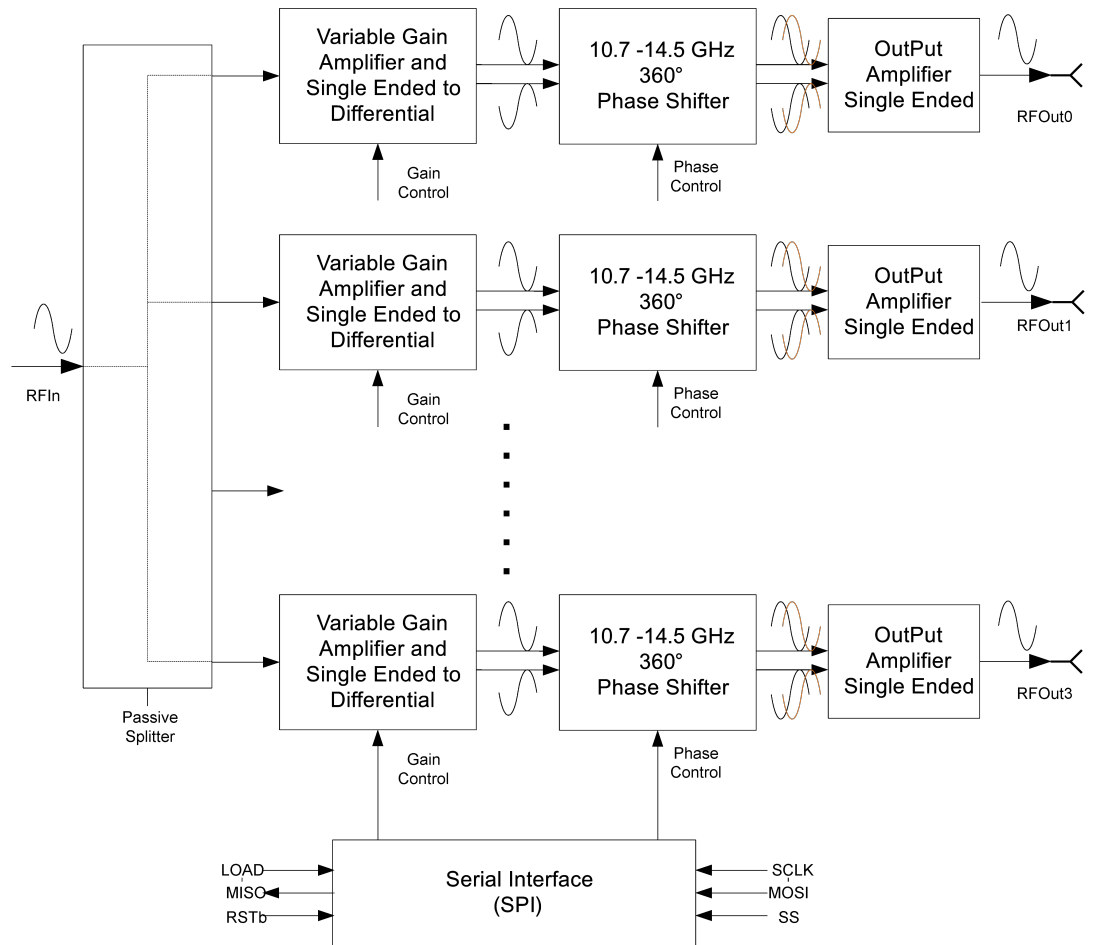
Electrical Characteristics
(at 25 °C) 50 Ohm system, VDC = 3.3V, Quiescent current (IDC)=220 mA

Symbol	Parameters / Conditions	Min.	Typ.	Max.	Units
Fin	Input frequency	10,70		14,50	GHz
Vin	RF Input		-20,00		dBm
Vout	RF Output		-13,00		dBm
1dB	1dB Compression Point		-17,00		dBm
Gain	input to each output Arm		7,00		dBm
IIP3	Third Order Intercept		-4,00		dBm
RLin	Input Return Loss up to 15 GHz		15,00		dB
RLout	Output Return Loss up to 15GHz		15,00		dB
I	Isolation Between Channel (Phase RMS Increase)		0,30		deg
PhStep	Nominal Phase Resolution		5,63		deg
GainStep	Nominal Gain Resolution		0,50		dB
PhErr	RMS Phase Error		2,70		deg
GainErr	RMS Gain Error		0,32		dB

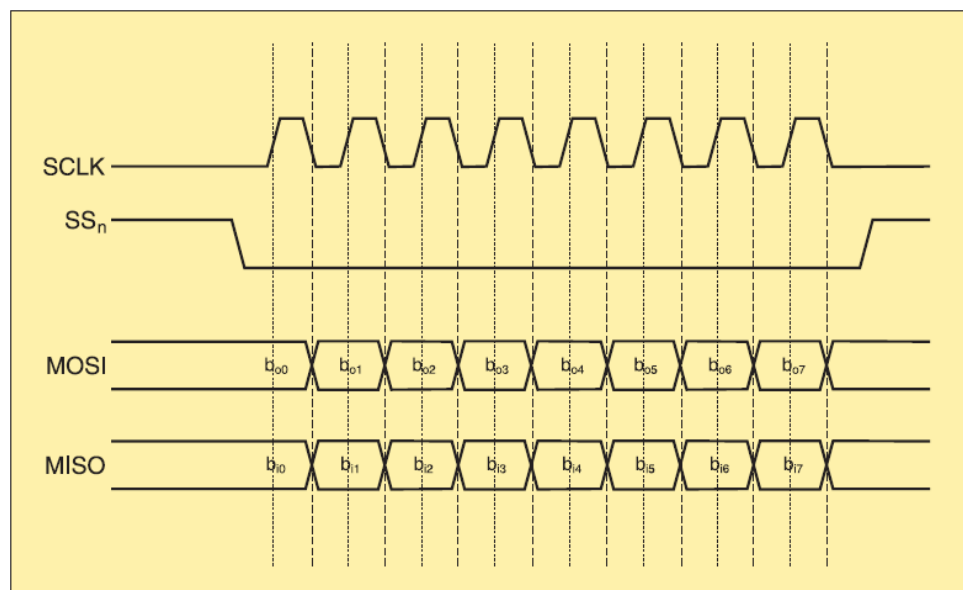
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Functional Diagram



Timing Diagram





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(Advanced Information)

Application Information

CAUTION: THIS IS AN ESD SENSITIVE DEVICE

Chip carrier material should be selected to have SiGe compatible thermal coefficient of expansion and high thermal conductivity such as copper molybdenum or copper tungsten. The chip carrier should be machined, finished flat, plated with gold over nickel and should be capable of withstanding 325°C for 15 minutes.

Die attachment for power devices should utilize Gold/Tin (80/20) eutectic alloy solder and should avoid hydrogen environment for HBT devices. Note that the backside of the chip is gold plated and it is connected to RF and DC Ground.

These SiGe devices should be handled with care and stored in dry nitrogen environment to prevent contamination of bonding surfaces. These are ESD sensitive devices and should be handled with appropriate precaution including the use of wrist-grounding straps. All die attach and wire/ribbon bond equipment must be well grounded to prevent static discharges through the device.

Recommended wire bonding: for Signal input / output connections, use either 3 mils wide and 0.5 mil thick gold ribbon or a pair of 1mil diameter wires with lengths as short as practical allowing for appropriate stress relief (typically 400 +/- 100 um long). For all other connections, a single 1 mil dia wire of appropriate minimum length may be used.

Product Status Definitions

Datasheet Identification	Product Status	Definition
Advanced Information	Formative or or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data will be published at a later date. DIGIMIMIC reserves the right to make changes at any time without notice in order to improve design.
No Identification Needed	Full Production	This datasheet contains final specifications. DIGIMIMIC reserves the right to make changes at any time without notice in order to improve design.
Obsolete	Not in Production	This datasheet contains specifications on a product that has been discontinued by DIGIMIMIC. The datasheet is printed for reference information only.