SAC3603

GaAs MMIC Multi-Function Chip
5.0GHz～6.0GHz

Rev 2.1

Features

- Frequency：5.0GHz~6.0GHz
- RMS of Phase Accuracy：2.5°
- RMS of Attenuation Accuracy：0.3dB
- Gain：10.5dB
- Die Size：5.0mm×3.5mm×0.1mm

Typical Applications

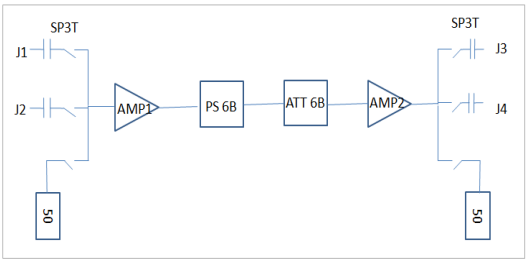
- EW
- Military Radar and Weather Radar
- SATCOM
- Beamforming
- Phase Shift

General Description

SAC3603 is a high performance GaAs MMIC core chip operating in C-band. It includes a 6-bit phase shifter, a 6-bit attenuator and a switch and two amplifiers. It has 10.5dB gain, 2.5°of RMS of Phase Accuracy and 0.3dB of RMS of Attenuation Accuracy.

The die is manufactured using 0.5 um gate length PHEMT Technology. The MMIC uses gold bonding pads and backside metallization. It is fully protected with BCB passivation to achieve the highest level of reliability.

Functional Diagram



Electrical Performance (T_A=25℃, V_D=+5V, V_E=-5V, Logic=0/+5V, Z_O=50Ω)

Parameter	Min.	Typ.	Max.	Units
Frequency Range		5.0~6.0		GHz
Gain	—	10.5	—	dB
Output P_{-1}dB	—	14	—	dBm
Noise Figure	—	4.7	—	dB
Isolation	—	-52	—	dB
P_{HASE}-Input VSWR	—	—	1.6	: 1
P_{HASE}-Output VSWR	—	—	1.2	: 1
P_{HASE}-Amplitude Error	—	—	±0.5	dB
Phase Accuracy	-5	—	4	°
RMS of Phase Accuracy	—	—	2.5	°
A_{TT}-Input VSWR	—	—	1.6	: 1
A_{TT}-Output VSWR	—	1.3	—	: 1
A_{TT}- Phase Error	—	—	4	°
Attenuation Accuracy	-0.8	—	0.4	dB
RMS of Attenuation Accuracy	—	0.3	—	dB

Absolute Maximum Ratings

Maximum Input Power	+23dBm	Operating Temperature	-55°C~+85°C
Maximum Supply Voltage	+8V	Storage Temperature	-65°C~+150°C

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Phase Shift Truth Table (0 : 0V , 1 : +5V)

Phase State	PC1	PC2	PC3	PC4	PC5	PC6
REF	0	0	0	0	0	0
-5.625°	1	0	0	0	0	0
-11.25°	0	1	0	0	0	0
-22.5°	0	0	1	0	0	0
-45°	0	0	0	1	0	0
-90°	0	0	0	0	1	0
-180°	0	0	0	0	0	1
-354.375°	1	1	1	1	1	1

Attenuation Truth Table (0 : 0V , 1 : +5V)

Attenuation State	AC1	AC2	AC3	AC4	AC5	AC6
REF	0	0	0	0	0	0
0.5dB	1	0	0	0	0	0
1dB	0	1	0	0	0	0
2dB	0	0	1	0	0	0
4dB	0	0	0	1	0	0
8dB	0	0	0	0	1	0
16dB	0	0	0	0	0	1
31.5dB	1	1	1	1	1	1

Control Voltages

State	Bias Condition
0	0~0.2V
1	4.5~5.5V

Bias Voltage & Current

V_D	I_D	V_E	I_E
5V	90mA	-5V	18mA

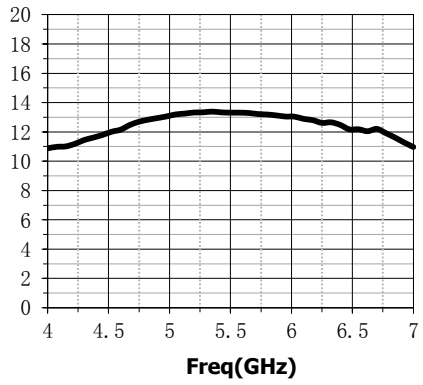
Switch Truth Table (0 : 0V , 1 : +5V)

S1	S2	S3	State
0	0	0	J2-J3 ON
0	0	1	J2-J4 ON
0	1	0	J1-J3 ON
0	1	1	J1-J4 ON
1	0	0	Both of switches are OFF with non-reflective state.

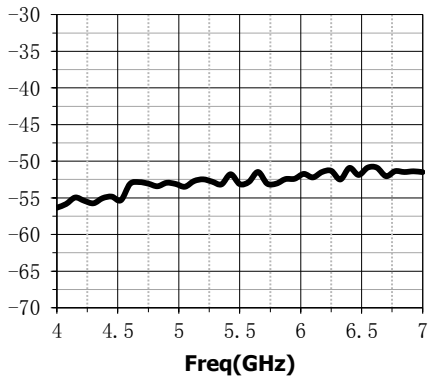
Typical Performance Curve

(ON WAFER MEASUREMENTS)

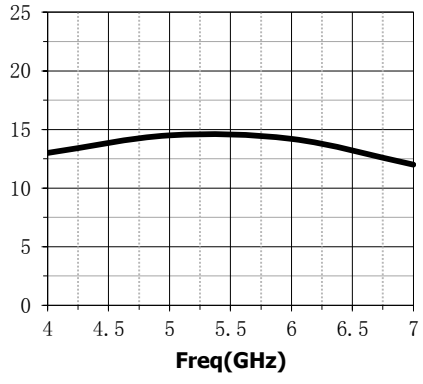
Reference State Gain(dB)



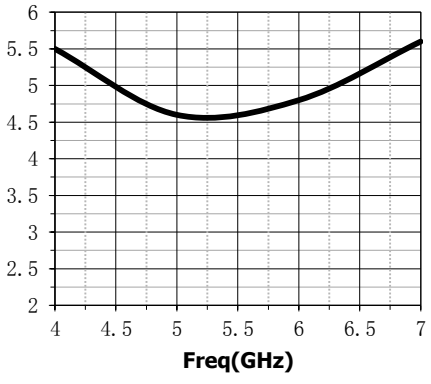
Isolation(dB)



Output P_{-1}dB(dBm)

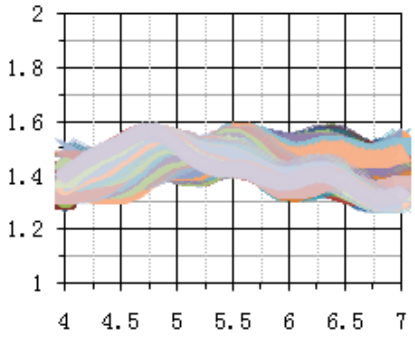


Noise Figure (dB)

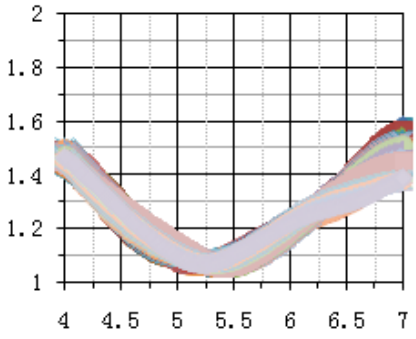


1）Measured on phase shifter states

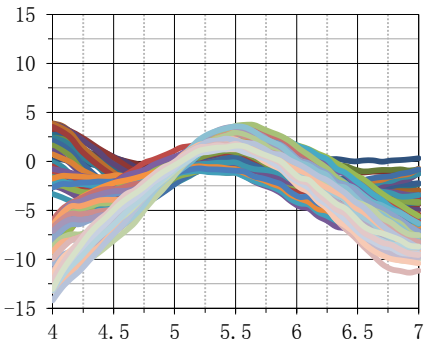
Input VSWR(:1)



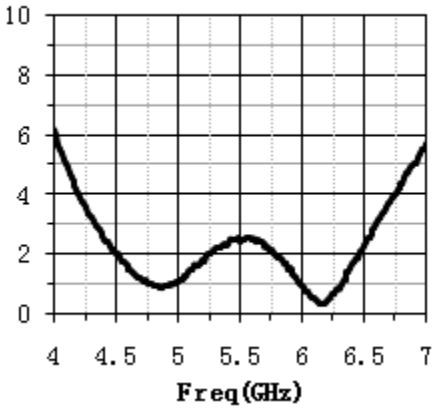
Output VSWR(:)



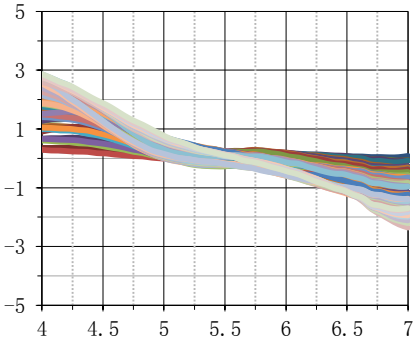
Phase Accuracy (°)



RMS of Phase Accuracy (°)

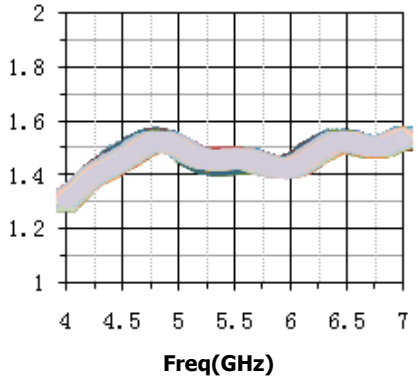


P_{HASE}-Amplitude Error(dB)

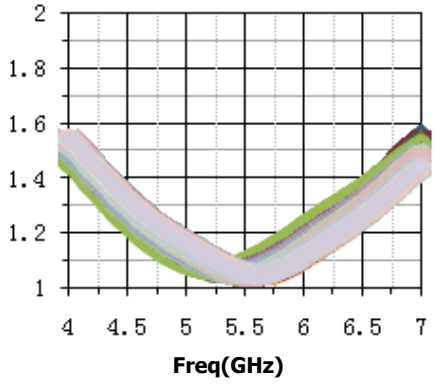


2）Measured on Attenuator states

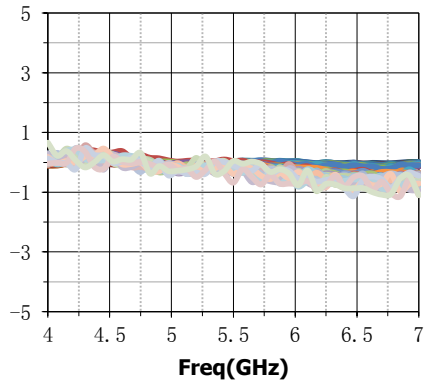
Input VSWR(:1)



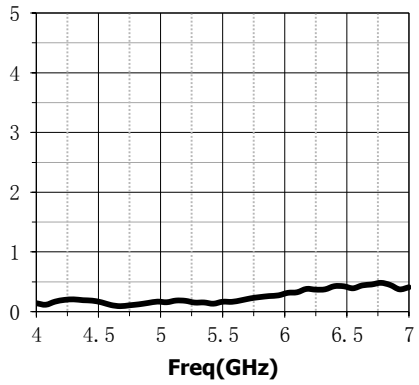
Output VSWR(:1)



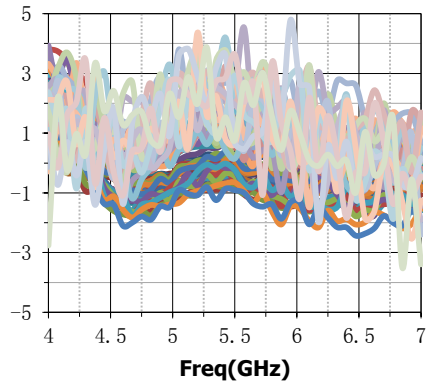
Attenuation Accuracy(dB)



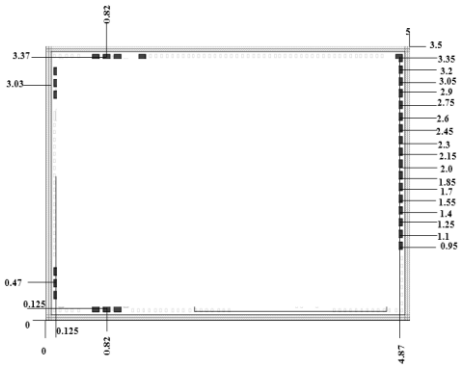
RMS of Attenuation Accuracy(dB)



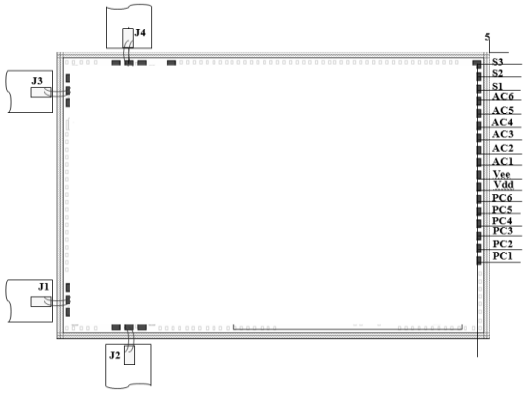
A_{TT}-Phase Error(dB)



Die Outline
(all dimensions in mm)



Assembly Diagram



Attention:

GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.