SAC3110Q6

GaAs MMIC Power Amplifier
13.5GHz～14.75GHz 38dBm

Rev 2.1

Features

- Frequency：13.5GHz~14.75GHz
- Gain：29dB
- Output P_{-1}dB：38dBm
- Supply Voltage：+7V
- ACPR：-29dBc@P_{OUT}=36dBm
- Package Size：6mm×6mm×1.1mm

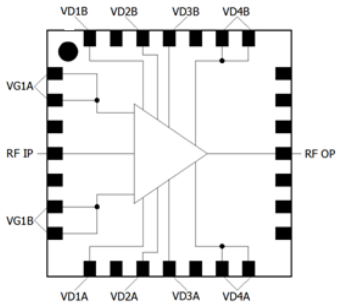
Typical Applications

- SATCOM
- Point-to-Point Radios
- Test and Measurement

General Description

SAC3110Q6 is a GaAs MMIC power amplifier chip being housed in a leadless 6x6 mm surface mount package. It operates between 13.5GHz~14.75GHz. The amplifier provides 29 dB of gain, 38 dBm of output P_{-1}dB and 30% PAE while requiring from a +7V supply.

Functional Diagram



Electrical Performance (T_A=25℃, V_D=+7V, I_D=2.25A, Z_0=50Ω)

Parameter	Condition	Min.	Typ.	Max.	Units
Output Power for 1 dB Compression (OP$_{-1}$dB)	V_D=+7V VGS=-0.8V* f=13.5GHz~14.75GHz Pin=-30dBm	36	38	-	dBm
Gain		26	29	-	dB
Gain Flatness		-	±1.5	-	dB
Drain Current		-	2.6	3.6	A
Drain Voltage(V_D)		7	-	8	V
Input Return Loss		-	-12	-	dB
PAE	P_{OUT}=P_{-1}dB	-	30	-	%
ACPR **	P_{OUT}=36dBm	-	-29.5	-	dBc
	P_{OUT}=36.5dBm		-27	-	dBc
	P_{OUT}=37dBm		-26.5	-	dBc
ACPR ***	P_{OUT}=36dBm	-	-30.5	-	dBc
	P_{OUT}=36.5dBm	-	-27.5	-	dBc
	P_{OUT}=37dBm	-	-27.2	-	dBc
EVM **	P_{OUT}=36dBm	-	6.2	-	%
	P_{OUT}=36.5dBm	-	6.5	-	%
	P_{OUT}=37dBm	-	6.5	-	%
EVM ***	P_{OUT}=36dBm	-	5.5	-	%
	P_{OUT}=36.5dBm	-	6	-	%
	P_{OUT}=37dBm	-	6.4	-	%
Thermal Resistance	Tbase=70℃	-	4.1	-	℃/W

* IDQ=2.25A

** f=14.25GHz, VDS=7V,IDQ=2.25A,8PSK,ρ=0.5,Symbol=2M

*** f=14.25GHz, VDS=7V,IDQ=2.45A,8PSK,ρ=0.5,Symbol=2M

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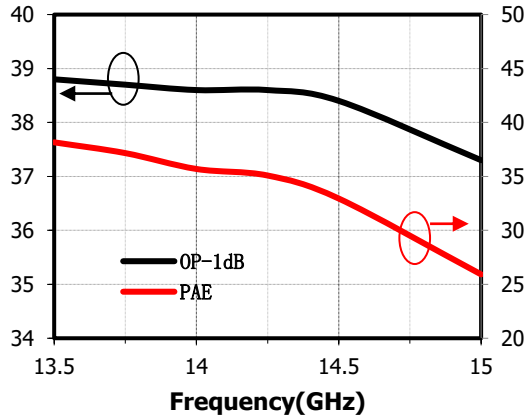
Absolute Maximum Ratings

Maximum Input Power	+20dBm	Operating Temperature	-55℃~+70℃
Channel Temperature	150℃	Storage Temperature	-65℃~+150℃
Maximum V_D	+8.5V	Maximum V_G	-2V
ESD	Class 1A	Output Port Mismatch	3:1

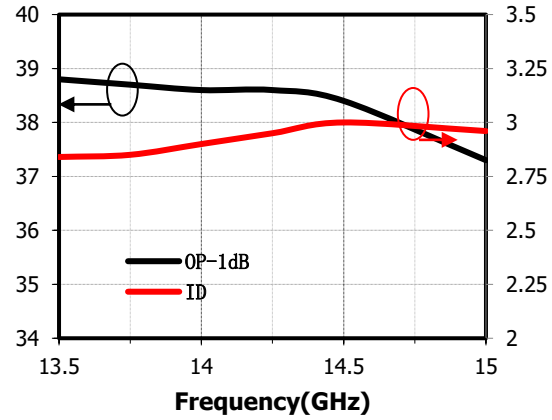
Typical Performance Curve

***Bias Conditions: V_D =7V, I_D =2.25A T_A=25℃ CW Operation**

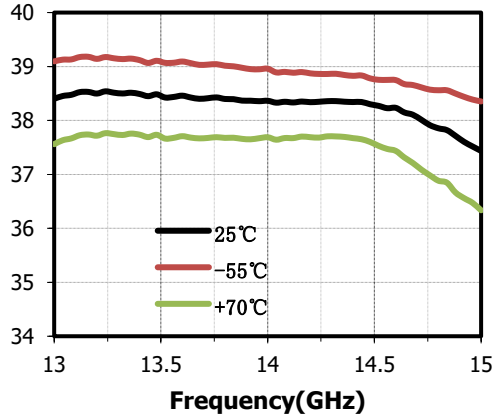
OP$_{-1}$dB(dBm)、PAE(%) vs.Freq



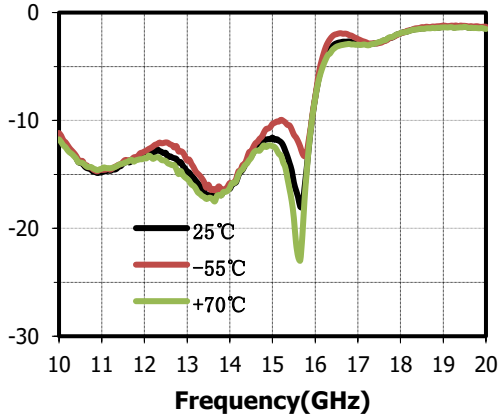
ID(A)vs.Freq@OP$_{-1}$dB(dBm)



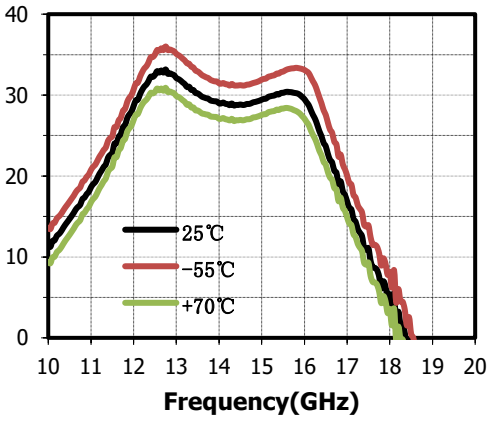
OP$_{-1}$dB(dBm) vs.Temperature



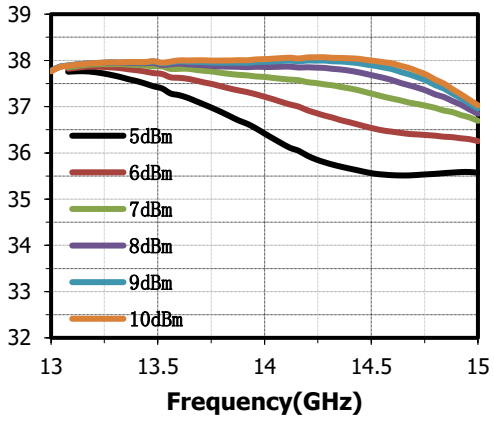
Input Return Loss(dB) vs.Temperature



Small Signal Gain(dB) vs.Temperature

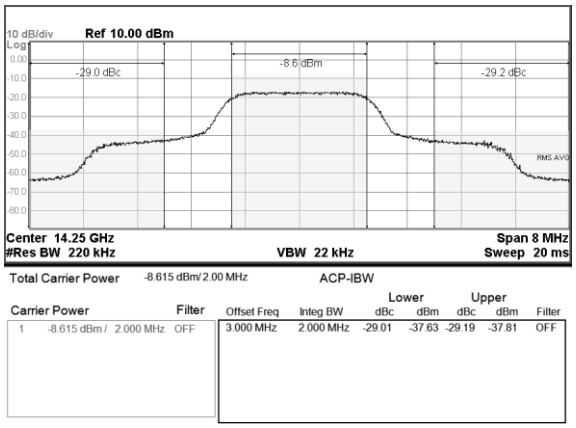


Input Power(dBm)vs.Output Power(dBm)

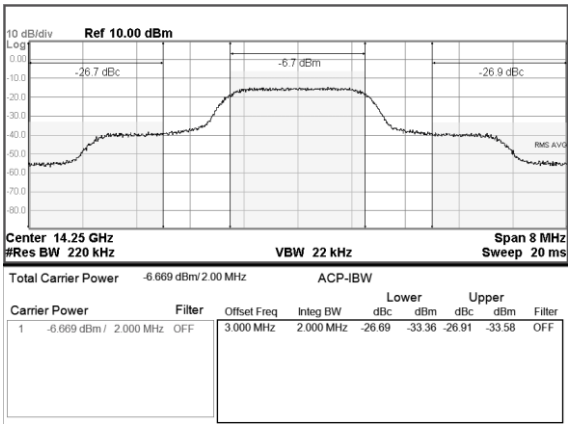


ACPR Performance

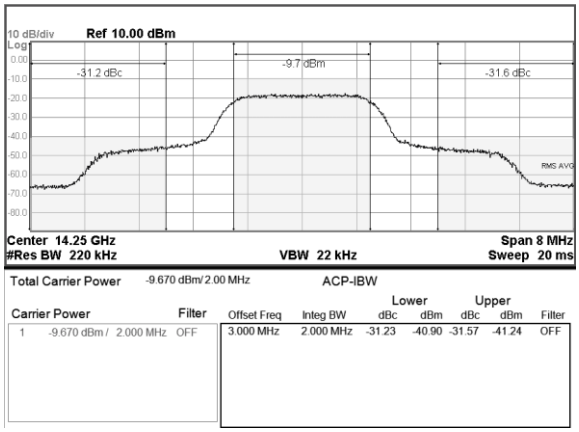
P_{OUT}=36dBm IDQ=2.25A



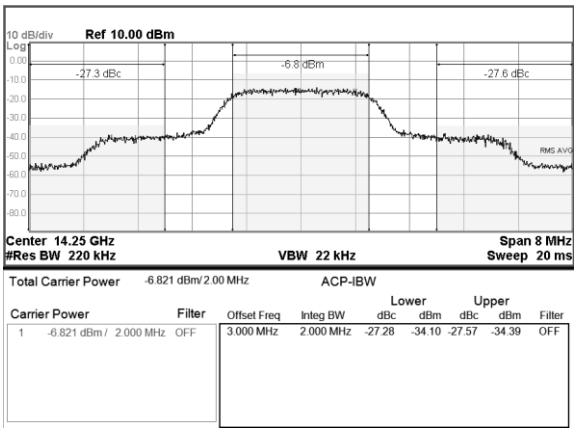
P_{OUT}=37dBm IDQ=2.25A



P_{OUT}=36dBm IDQ=2.45A



P_{OUT}=37dBm IDQ=2.45A



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EVM Performance

P_{OUT}=36.5dBm IDQ=2.25A

EVM	= 6.6896	%rms	17.756	% pk at	sym	849	
Mag Err	= 4.4720	%rms	-14.371	% pk at	sym	576	
Phase Err	= 2.8820	deg	9.2286	deg pk at	sym	849	
Freq Err	= -36.173	Hz	SNR (MER)	= 23.492	dB		
IQ Offset	= -34.873	dB	Amp Droop	= -76.42	udB/sym		
Quad Err	= 27.712	mdeg	Gain Imb	= -0.007	dB		

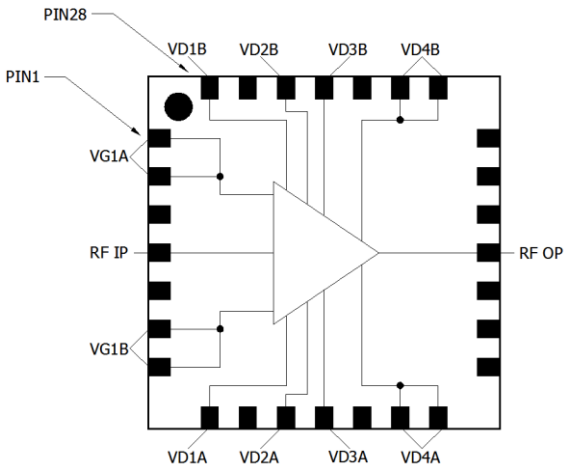
0	01010111	00110101	11011110	11010101	01101000	00000101		
48	01001110	00000110	10110110	10011000	01101111	10100110		
96	10010101	11010101	10000101	11101110	00110001	10011110		
144	01000110	01111111	10100010	01100110	01110100	10000001		
192	00100110	10111110	10110000	10010100	10111110	00011001		
240	10111000	11010101	01000100	11111000	01000001	01011001		
288	11001110	00101111	11111101	10010010	00001100	00010110		

P_{OUT}=36.5dBm IDQ=2.45A

EVM	= 5.9975	%rms	16.463	% pk at	sym	994	
Mag Err	= 4.2154	%rms	-14.947	% pk at	sym	234	
Phase Err	= 2.4684	deg	8.6854	deg pk at	sym	530	
Freq Err	= -34.182	Hz	SNR (MER)	= 24.441	dB		
IQ Offset	= -36.336	dB	Amp Droop	= -29.45	udB/sym		
Quad Err	= -27.011	mdeg	Gain Imb	= 0.056	dB		

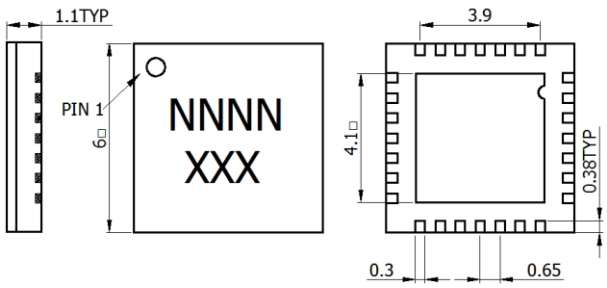
0	10101110	11111010	10100111	10101110	01101001	01010111		
48	10001001	11111001	11111110	10110100	10110000	11000111		
96	00101000	01101100	10110111	00010100	10011001	00011000		
144	11100010	11001011	10010111	00001010	10000111	01011111		
192	01101001	00111111	11110110	11000110	10100110	11101010		
240	11001001	10010011	10110001	00101110	01111110	10010010		
288	10001100	01111100	00110001	11001000	11011011	10101011		

Pin Descriptions

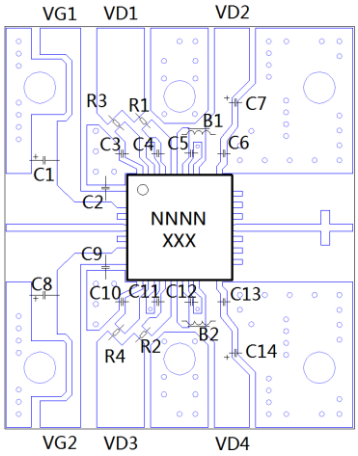


Pin No.	Function	Pin No.	Function	Pin No.	Function	Pin No.	Function
1	VG1A	8	VD1A	15	GND	22	VD4B
2	VG1A	9	GND	16	GND	23	VD4B
3	GND	10	VD2A	17	GND	24	GND
4	RFIP	11	VD3A	18	RFOP	25	VD3B
5	GND	12	GND	19	GND	26	VD2B
6	VG1B	13	VD4A	20	GND	27	GND
7	VG1B	14	VD4A	21	GND	28	VD1B

Outline Drawing
(All dimensions in mm)



Evaluation PCB Assembly Diagram



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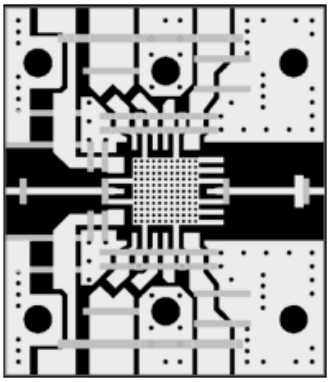
List of Materials for Evaluation PCB

Reference Des.	Manuf.	Part Number	Size
C2~C6、C9~C13	Murata	GRM155R61A225KED95D	0402
C1、C7、C8、C14	AVX	TCJA106M010R0200	1206
PCB	Rogers.	RO4003c t=0.203	—
U1	SAC	SAC3110Q6	QFN6
B1、B2	Murata	BLM18BA100SN1D	0603
R1～R4	—	0R	0603

Evaluation PCB



Notes

SAC3110Q6 is biased with a positive drain voltage supply and negative gate voltage supply when the drain voltage is set to 7 V. The recommended gate voltage is set to -0.6~-0.9 V.

Attention:

1. The moisture resistant grade of products is 2A, the storage environment ≤30° C/60% RH，The surrounding workshop Life is 4 weeks. 2. After un-packing, It is necessary to bake the parts for 6 hours in 125+/-5 degree environment before soldering.

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