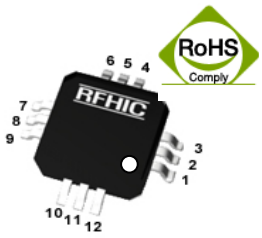
MMIC AP2221

Product Features

- Small size
- SMD Type Package
- NO matching circuit needed
- High efficiency
- Dual supply voltage
- Higher linearity
- 12 pin Air cavity package
- Higher productivity
- Lower manufacturing cost
- GaAs MMIC
- 30 – 870MHz
- -60dBc CSO 135 Channels@ output Level +37dBmV
- -65dBc CTB 135 Channels@ output Level +37dBmV

Application

- Satellite
- Converter
- CATV



Package : SP12

Description

The power amplifier is designed for base stations and repeater systems.
GaAs MMIC is used and attached on a copper carrier of 12 pin air cavity package with dual supply voltage.

Operating Ranges

PARAMETER	UNIT	MIN	TYP	MAX
Operating Frequency	MHz	30		1000
Device Voltage	VDC	+6	+7	+12
Case Temperature	℃	-40	-	+85
RF Input Power	dBm	-		+15

Specifications

T=25℃, Vdd=6.0, 75Ω system

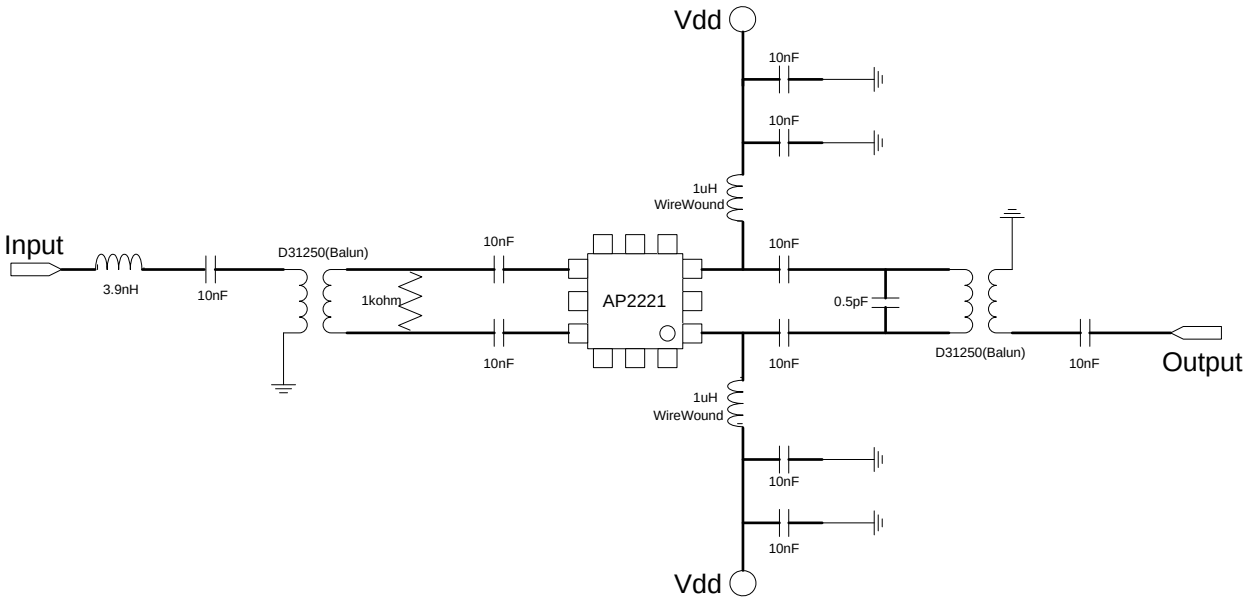
Parameter		Units	Minimum	Typical	Maximu	Condition
Frequency Range		MHz		30~870MHz		
Supply Voltage		V		**6**		**Vdd=6V**
Single Ended CATV Evaluation						
Current		mA	190	230	270	
S21-Gain		dB	12	12.6		30MHz
S21-Gain		dB	12	12.3		870MHz
S11-Input Return Loss		dB		-20	-10	
S22-Output Return Loss		dB		-20	-10	
OIP3		dBm		43		
OIP1		dBm	21	24		
Noise Figure		dB		3.5	5	
CSO	30 - 870MHz	dBc		-60	-55	135 channels,+37dBmV/ch
CTB		dBc		-65	-60	135 channels,+37dBmV/ch
XMD		dBc		-60	-55	135 channels,+37dBmV/ch

T=25℃, Vdd=7.0, 75Ω system

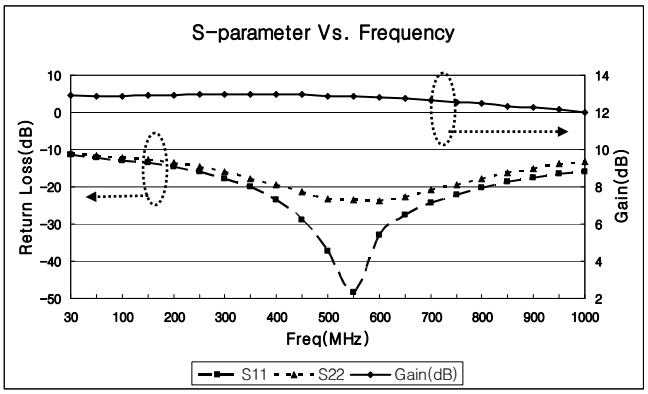
Parameter		Units	Minimum	Typical	Maximu	Condition
Frequency Range		MHz		30~870MHz		
Supply Voltage		V		**7**		**Vdd=7V**
Single Ended CATV Evaluation						
Current		mA	190	230	270	
S21-Gain		dB	12	12.6		30MHz
S21-Gain		dB	12	12.3		870MHz
S11-Input Return Loss		dB		-19	-10	
S22-Output Return Loss		dB		-19	-10	
OIP3		dBm		43		
OIP1		dBm	22	25		
Noise Figure		dB		3.6	5.1	
CSO	30 - 870MHz	dBc		-60	-55	135 channels,+37dBmV/ch
CTB		dBc		-65	-60	135 channels,+37dBmV/ch
XMD		dBc		-60	-55	135 channels,+37dBmV/ch

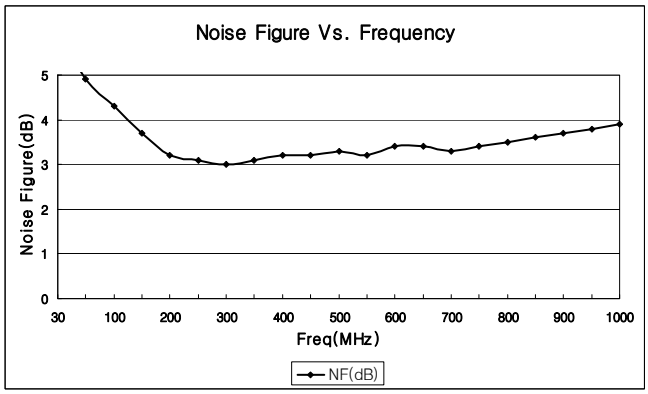
NOTE
1. OIP3 measured with 2 tones at an output power of +10dBm/tone separated by 1MHz

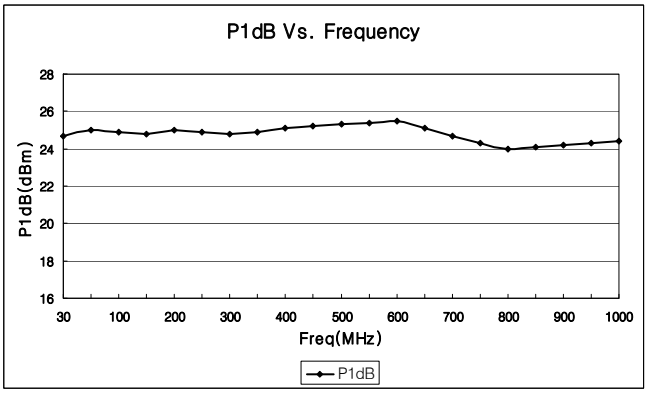
Application Circuit: Forward (30MHz ~ 870MHz)

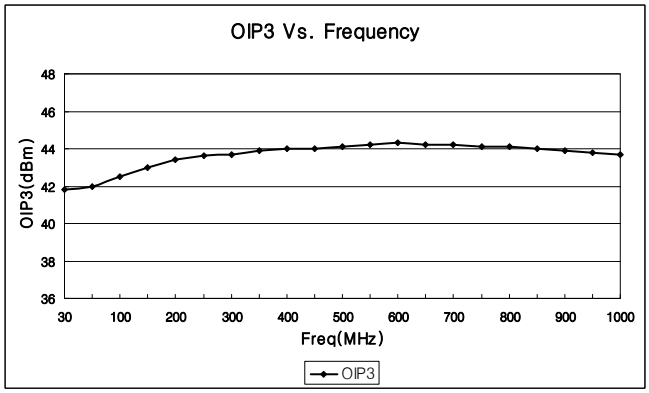


Performance Charts (V_{dc}=7V, I_d=220mA, T_c=25℃)









Multi-Tone Test 135ch@+30dBmV (V_{dd} +6V)

Level: +30dBmV	Tilt: 135CH_FLAT									
FRQ	XMD(NCTA)	CTB_RAW	CTB_COR	N-FLR	CSU_RAW	CSU_COR	CSU_FRQ	CSL_RAW	CSL_COR	CSL_FRQ
55.25	76.6	75.6	79.9	76.4	76.1	80.4	55.99	69.9	71	53.99
77.25	76.7	76	80.3	76.6	71.2	72.6	77.99	76.4	80.8	76.41
109.25	77.1	76.1	80.5	77.2	76.8	81.1	109.99	72.8	74.7	107.99
211.25	77.7	76.4	80.7	77.3	76.1	80.4	212.5	74.5	77.5	209.99
331.25	78.6	74.9	79.2	76.1	74.5	78.8	332.49	74.2	78.5	329.98
445.25	78.9	76	80.3	76.5	75.3	79.6	446.5	75.5	79.9	443.99
547.25	80.3	74.2	78.5	74.7	73.7	78	548.49	73.9	78.3	545.99
637.25	80.3	74.6	78.9	75.1	73.9	78.2	638.49	74.6	79	635.98
745.25	80.4	74.2	78.5	74.8	73	77.3	746.49	74.3	78.6	743.98
859.25	80.1	72.3	76.7	72.6	70.6	74.9	860.49	72.4	76.8	858.11
Min	76.6	72.3	76.7	72.6	70.6	72.6	55.99	69.9	71	53.99
Max	80.4	76.4	80.7	77.3	76.8	81.1	860.49	76.4	80.8	858.11

Multi-Tone Test 135ch@+30dBmV (V_{dd} +7V)

Level: +30dBmV	Tilt: 135CH_FLAT									
FRQ	XMD(NCTA)	CTB_RAW	CTB_COR	N-FLR	CSU_RAW	CSU_COR	CSU_FRQ	CSL_RAW	CSL_COR	CSL_FRQ
55.25	76.7	76	80.4	76.8	76.3	80.7	55.99	70.1	71	53.99
77.25	77.4	76.3	80.6	76.8	71.4	72.8	78	76.6	80.9	76.21
109.25	78	76.6	80.9	77.4	77	81.3	109.99	72.7	74.3	107.99
211.25	77.9	76.2	80.6	77.1	75.7	80.1	212.5	74	77.1	209.99
331.25	78.8	75.2	79.5	75.9	74.4	78.8	332.49	74.2	78.5	329.98
445.25	79.3	76.1	80.4	76.9	75.3	79.6	446.49	75.4	79.7	443.98
547.25	81.7	74.3	78.6	74.7	73.7	78	548.49	73.9	78.2	545.98
637.25	80.1	74.7	79	75.1	73.9	78.2	638.49	74.6	79	635.97
745.25	80.1	73.9	78.2	74.4	73	77.3	746.48	74	78.3	744
859.25	80.7	72.5	76.8	72.8	70.9	75.3	860.49	72.6	76.9	858.21
Min	76.7	72.5	76.8	72.8	70.9	72.8	55.99	70.1	71	53.99
Max	81.7	76.6	80.9	77.4	77	81.3	860.49	76.6	80.9	858.21

Multi-Tone Test 135ch@+37dBmV (V_{dd} +6V)

Level: +37dBmV	Tilt: 135									
FRQ	XMD(NCTA)	CTB_RAW	CTB_COR	N-FLR	CSU_RAW	CSU_COR	CSU_FRQ	CSL_RAW	CSL_COR	CSL_FRQ
55.25	61.9	68.4	68.6	83.4	78.4	80.1	56	63.4	63.4	53.99
77.25	61.9	69.8	70	83.5	65.5	65.5	78	83	87.3	75.9
109.25	62.5	68.3	68.4	84	78.4	79.8	109.99	67.2	67.3	107.99
211.25	62.5	68.8	68.9	84	74.4	75	212.49	70.1	70.3	209.98
331.25	63.7	68.5	68.6	82.4	72.4	72.9	332.49	72	72.4	329.99
445.25	64.1	69.2	69.3	83.5	73.1	73.5	446.49	73.9	74.4	443.99
547.25	65.7	70.1	70.4	81.5	72.6	73.2	548.5	74.9	76	545.98
637.25	65.7	69.8	70.1	82	72.7	73.3	638.49	76.9	78.6	635.98
745.25	65.4	70.7	71.2	81.4	70.2	70.6	746.49	77.5	79.7	743.99
859.25	65.3	71.7	72.5	79.7	67.3	67.6	860.49	78	82.4	858.49
Min	61.9	68.3	68.4	79.7	65.5	65.5	56	63.4	63.4	53.99
Max	65.7	71.7	72.5	84	78.4	80.1	860.49	83	87.3	858.49

Multi-Tone Test 135ch@+37dBmV (V_{dd} +7V)

Level: +37dBm	Tilt: 135CH_FLAT									
FRQ	XMD(NCTA)	CTB_RAW	CTB_COR	N-FLR	CSU_RAW	CSU_COR	CSU_FRQ	CSL_RAW	CSL_COR	CSL_FRQ
55.25	62.2	69	69.1	83.4	78.5	80.4	55.99	63.4	63.4	53.99
77.25	62.5	70.8	71.1	83.4	65.5	65.5	77.99	83	87.4	75.94
109.25	63.2	69.3	69.4	83.8	78.6	80.2	109.99	67.2	67.3	107.99
211.25	63.2	69.8	70	84	74.1	74.5	212.49	69.8	70	209.99
331.25	64.4	69.2	69.4	82.7	72.6	73	332.5	71.9	72.3	329.99
445.25	64.8	70.1	70.3	83.6	73.3	73.8	446.49	73.8	74.3	443.99
547.25	66.5	71.2	71.6	81.5	73.2	73.9	548.49	74.8	75.9	545.99
637.25	66.4	71	71.4	82.1	73.1	73.6	638.49	76.4	77.9	635.98
745.25	66.3	72	72.6	81.6	71	71.4	746.49	77	78.9	743.99
859.25	66.4	72.5	73.5	79.6	67.9	68.2	860.49	77.9	82.2	858.5
Min	62.2	69	69.1	79.6	65.5	65.5	55.99	63.4	63.4	53.99
Max	66.5	72.5	73.5	84	78.6	80.4	860.49	83	87.4	858.5

Multi-Tone Test 135ch@+40dBmV (V_{dd} +6V)

Level: +40dBmV Tilt: 135CH_FLAT

FRQ	XMD(NCTA)	CTB_RAW	CTB_COR	N-FLR	CSU_RAW	CSU_COR	CSU_FRQ	CSL_RAW	CSL_COR	CSL_FRQ
55.25	54.3	60.3	60.3	86.2	75.9	76.4	55.99	59.9	59.9	53.99
77.25	54.7	61.6	61.6	86.3	61.8	61.8	77.99	85.8	90.1	76.62
109.25	55.1	60	60	87.1	75.3	75.7	109.99	64	64	107.99
211.25	55.3	60.9	60.9	86.8	70.7	70.8	212.49	66.6	66.6	209.99
331.25	56.3	60.1	60.1	85.5	68.7	68.8	332.49	68.3	68.3	329.99
445.25	56.9	61.2	61.2	86.4	68.8	68.8	446.49	71	71.1	443.99
547.25	58.2	61.8	61.8	84.4	68.8	68.9	548.49	71.4	71.7	545.99
637.25	58.4	61.5	61.5	84.6	69	69.1	638.49	74.4	74.9	635.98
745.25	58	62.5	62.5	84.4	66.7	66.7	746.49	75.6	76.3	743.99
859.25	57.6	63.5	63.5	82.5	63.3	63.3	860.49	76.7	78.1	858.49
Min	54.3	60	60	82.5	61.8	61.8	55.99	59.9	59.9	53.99
Max	58.4	63.5	63.5	87.1	75.9	76.4	860.49	85.8	90.1	858.49

Multi-Tone Test 135ch@+40dBmV (V_{dd} +7V)

Level: +40dBmV Tilt: 135CH_FLAT

FRQ	XMD(NCTA)	CTB_RAW	CTB_COR	N-FLR	CSU_RAW	CSU_COR	CSU_FRQ	CSL_RAW	CSL_COR	CSL_FRQ
55.25	55.3	61.5	61.5	86.2	76.1	76.5	56	60.1	60.1	53.99
77.25	55.2	62.9	62.9	86.4	61.7	61.7	78	85.9	90.2	76.06
109.25	56.1	61.2	61.2	86.9	75.4	75.8	109.99	63.9	63.9	108
211.25	56.3	62.3	62.3	86.9	71.4	71.5	212.5	66.4	66.4	209.99
331.25	57.4	61.1	61.1	85.4	69	69.1	332.5	68.3	68.3	329.99
445.25	57.8	62.3	62.3	86.4	69.6	69.7	446.49	70.7	70.8	443.99
547.25	59.6	62.8	62.8	84.4	69.4	69.5	548.49	71.9	72.2	545.99
637.25	59.1	63.1	63.1	85.1	69.5	69.6	638.49	73.9	74.3	635.98
745.25	59	63.9	63.9	84.4	66.8	66.8	746.49	74.4	74.9	743.99
859.25	59.5	65.3	65.3	82.5	63.6	63.6	860.49	77.9	79.8	858.49
Min	55.2	61.1	61.1	82.5	61.7	61.7	56	60.1	60.1	53.99
Max	59.6	65.3	65.3	86.9	76.1	76.5	860.49	85.9	90.2	858.49

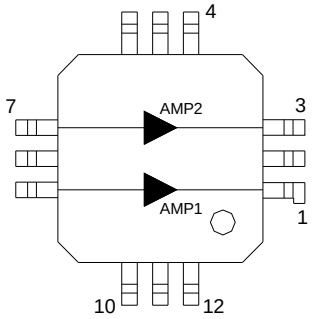
ESD PROTECTION

Although much stronger to electrostatic discharge (ESD) than GaAs or Silicon technology, to be safe on all situations, it is recommended to have proper ESD control techniques when handling these devices. Some of the precautions recommended are;

- Person at a workbench should be earthed via a wrist strap and a resistor.
- All mains-powered equipment should be connected to the mains via an earth-leakage switch.
- Equipment cases should be grounded.
- Relative humidity should be maintained between 40% and 50%.
- An ionizer is recommended.
- Keep static materials, such as plastic envelopes and plastic trays etc. away from the workbench

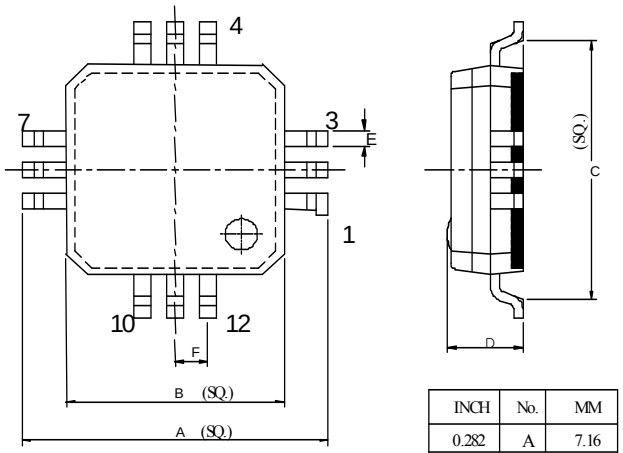
Dimension : PMBG-SQFP-12

Block Diagram



Function	Pin No.
Input	7, 9
Output , Bias	1, 3
Ground	2,4, 5, 6,8, 10, 11, 12 Backside Copper

Outline Drawing



INCH	No.	MM
0.282	A	7.16
0.2	B	5.08
0.246	C	6.25
0.069	D	1.75
0.015	E	0.38
0.03	F	0.76
0.2	G	0.51
0.4	H	1.02
0.14	J	0.36
0.83	K	2.1
0.32	M	0.8

Land Pattern