

AGN922 Data Sheet

1.2 GHz GaN Power Doubler MMIC

1. Product Overview

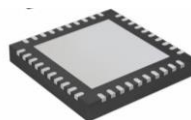
1.1 Features

- 50 ~ 1200 MHz Bandwidth
- 22.5 dB Gain at 500 MHz
- CSO : 67 dBc, CTB : 60 dBc @ Pout = 118 dB μ V, CENELEC 42 channels flat
- 111 dB μ V Pout @ BER < 1E-9, 121 channels flat, 256 QAM
- 115 dB μ V Pout @ BER < 1E-9, 138 channels 22 dB slope, 256 QAM
- Robust under Hard Operating Conditions
- +24 V, 485 mA Supply

1.2 Applications

- CATV Line Amplifiers
- HFC Nodes
- Head End Equipment

1.3 Package Profile & RoHS Compliance



QFN40, 6.0x6.0x0.75 mm³,
surface mount



RoHS-compliant

2. Summary on Product Performances

2.1 Typical Performance

Supply voltage = +24 V, $T_A = +25\text{ }^{\circ}\text{C}$, $Z_0 = 75\text{ }\Omega$.

Parameter	Typical			Unit
Frequency	50	500	1200	MHz
Gain	22.4	22.5	22.6	dB
S11	-19	-14	-15	dB
S22	-19	-16	-14	dB
Output IP3 ¹⁾	52	54	43	dBm
Output IP2 ^{1),2)}	76			dBm
Noise figure	4.0	3.8	5.3	dB
CSO / CTB	67 / 60 ³⁾			dBc
Pout	111 ⁴⁾ , 115 ⁵⁾			dB μ V
Current	485			mA
Device Voltage	+24			V

1) OIP3 and OIP2 are measured with two tones at an output power of +21 dBm/tone separated by 6 MHz.

2) OIP2 is measured at F1+F2 Frequency. (F1 = 400 MHz, F2 = 450 MHz)

3) CSO & CTB measured at Pout = 118 dB μ V, CENELEC 42 channels flat.

4) BER < 1E-9 for 121 channels flat, 256 QAM.

5) BER < 1E-9 for 138 channels 22 dB slop, 256 QAM.

2.2 Product Specification

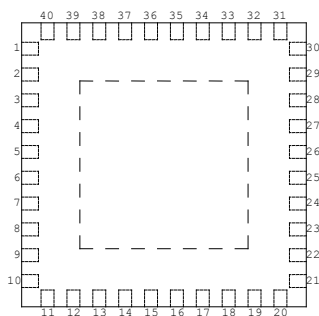
Supply voltage = +24 V, $T_A = +25\text{ }^{\circ}\text{C}$, $Z_0 = 75\text{ }\Omega$.

Parameter	Min	Typ	Max	Unit
Frequency		500		MHz
Gain		22.5		dB
S11		-14		dB
S22		-16		dB
Output IP3 ¹⁾		54		dBm
Output IP2 ^{1),2)}		76		dBm
Noise figure		3.8		dB
Current		485		mA
Device Voltage		+24		V

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2.3 Pin Configuration

Pin	Description	Simplified Outline
1, 2, 9, 10	RF_IN	
3	V _{lin} Adjustable	
5, 6	Common source node	
7, 8	V _{bias} Adjustable	
25, 26	V _{cg} Adjustable	
22, 31	Feedback input	
21, 22, 29, 30	RF_OUT	
39	Test purpose only (Must be NC.)	
Others	NC or GND	

Note: Backside metal paddle is RF and DC ground.

2.4 Absolute Maximum Ratings

Parameters	Max. Ratings
Operation Case Temperature	-40 to +100 °C
Storage Temperature	-40 to +150 °C
Device Voltage	+26 V
Maximum Current	550 mA
Operation Junction Temperature	+150 °C
Input RF Power (CW, 75 Ω matched)	+25 dBm

The operation of this device in excess of any of these limits may cause permanent damage.

* Refer to the max. input RF power data at http://www.asb.co.kr/pdf/Maximum_Input_Power_Analysis.pdf. The max. input RF power, in principle, depends upon application frequency, matching circuit, and device voltage.

2.5 Thermal Resistance

Symbol	Description	Typ	Unit
R _{th}	Thermal resistance from junction to lead	4.5	°C/W

2.6 ESD Classification & Moisture Sensitivity Level

ESD Classification

HBM	TBD
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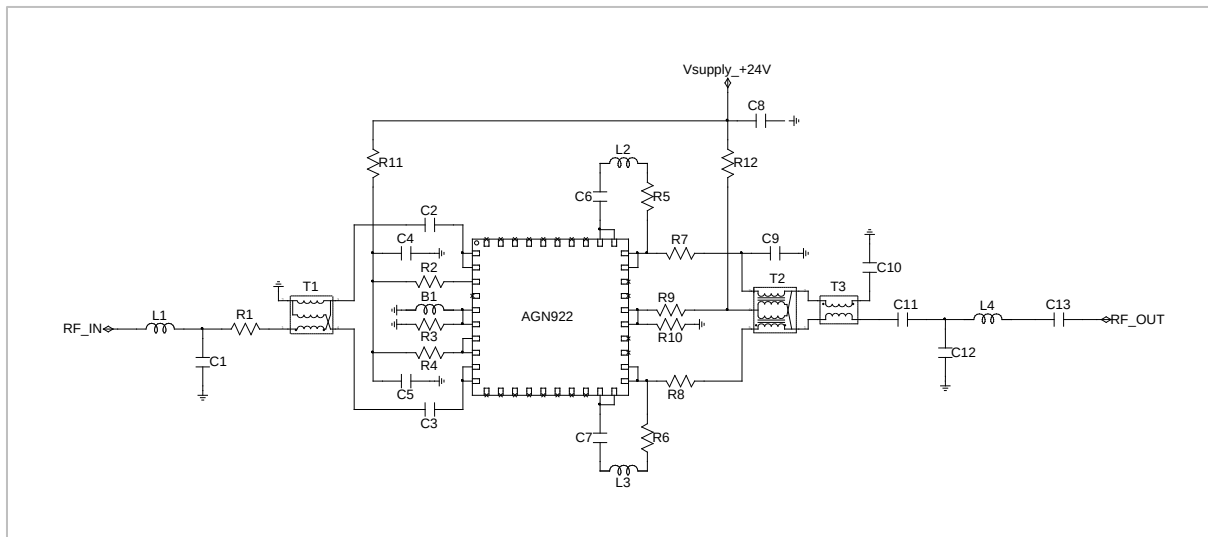
CAUTION: Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

Moisture Sensitivity Level

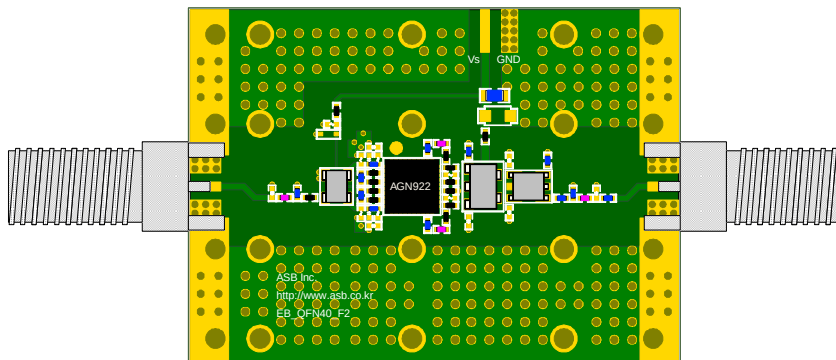
MSL 3 at 260 °C reflow

3. Application: 50 ~ 1200 MHz ($75\ \Omega$, $V_{\text{supply}} = +24\ \text{V}$)

3.1 Application Circuit & Evaluation Board



* Backside paddle is RF/ DC ground.



PCB Information

Material	FR4
Thickness (mm)	0.8
Size (mm)	40x53
EB No.	EB-QFN40-F2

(Intentionally Blanked)

Bill of Material

Symbol	Value	Size	Description	Manufacturer
AGN922	-	-	MMIC Amplifier	ASB
C1	1.3 pF	0402	Matching capacitor	Murata
C2, C3, C11, C13	1 nF	0402	DC blocking capacitor	Murata
C4, C5	1 μ F	0402	Decoupling capacitor	Murata
C6, C7	10 nF	0402	Feedback capacitor	Murata
C8	10 μ F	0805	Decoupling capacitor	Murata
C9	0.2 pF	0402	Matching capacitor	Murata
C10	4.7 nF	0402	DC blocking capacitor	Murata
C12	1.1 pF	0402	Matching capacitor	Murata
L1, L4	7.5 nH	0402	Matching inductor	Murata
L2, L3	22 nH	0402	Feedback inductor	Murata
R1, R3	10 Ω	0402	Matching resistor	Samsung
R2	10 k Ω	0402	V _{lin} adjust resistor	Samsung
R4	10 k Ω	0402	V _{bias} adjust resistor	Samsung
R5, R6	1 k Ω	0402	Feedback resistor	Samsung
R7, R8	0 Ω	0402	Matching resistor	Samsung
R9	68 k Ω	0402	V _{cg} adjust resistor	Samsung
R10	5.1 k Ω	0402	V _{cg} adjust resistor	Samsung
R11, R12	0 Ω	0402	Bias resistor	Samsung
B1	220 Ω	0402	DC ground bead, 700 mA	Murata
T1	1:1	-	Transformer(RFXF0006)	Qorvo
T2	2.78:1	-	Transformer(RFXF0008)	Qorvo
T3	1:1	-	Transformer(MABA-007159)	MACOM

(Intentionally Blanked)

3.2 Performance Table

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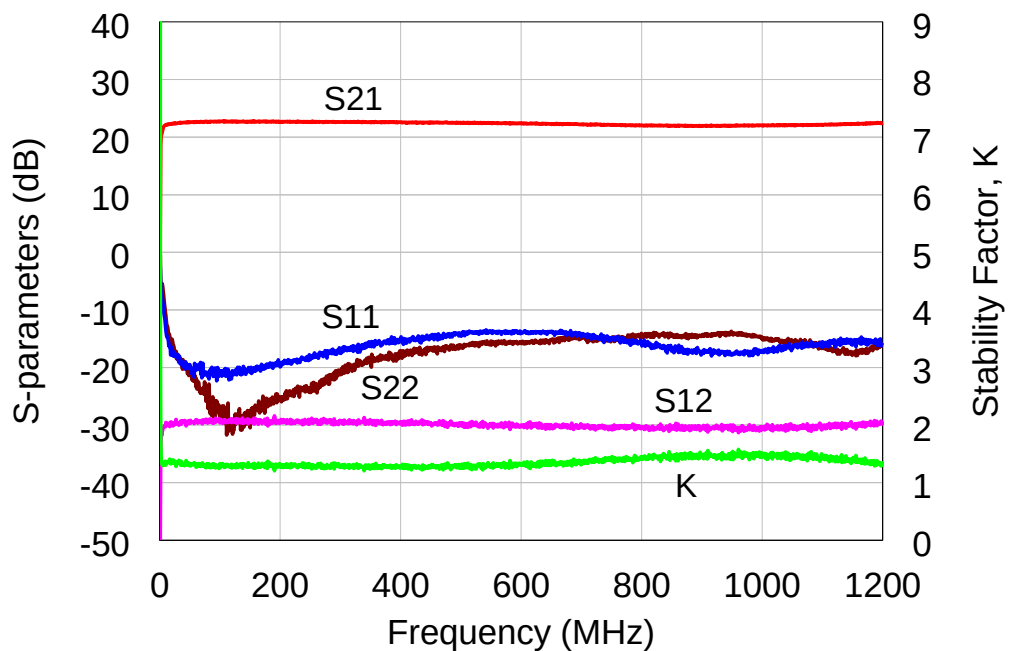
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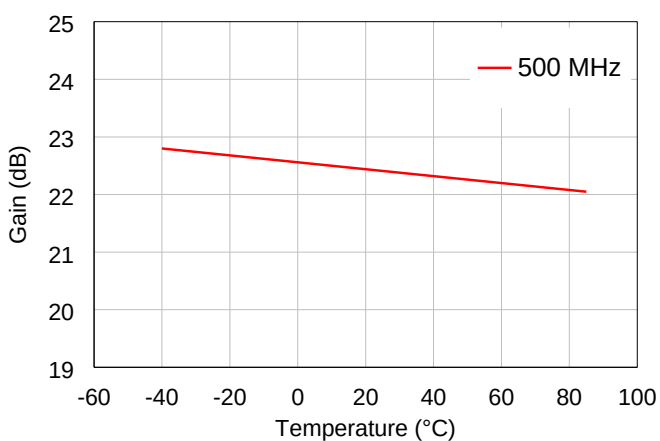
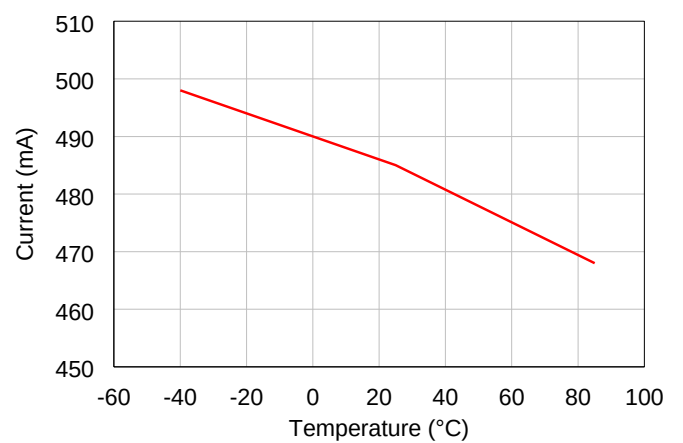
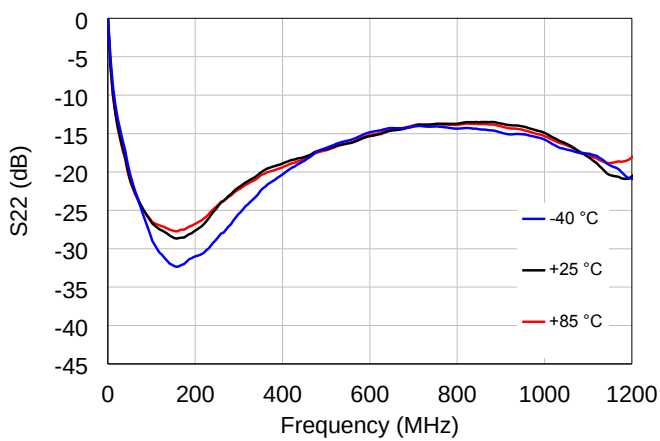
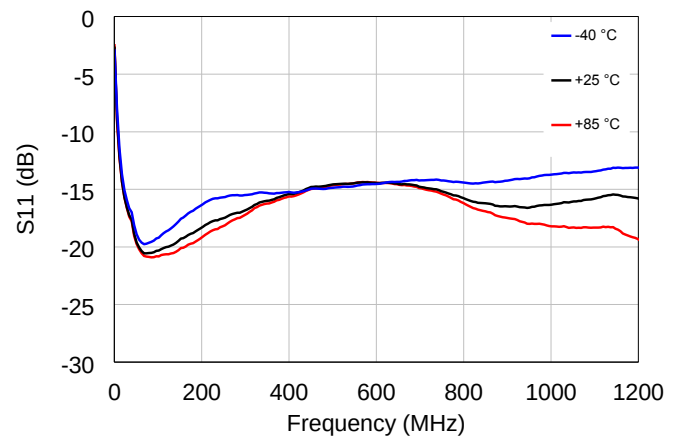
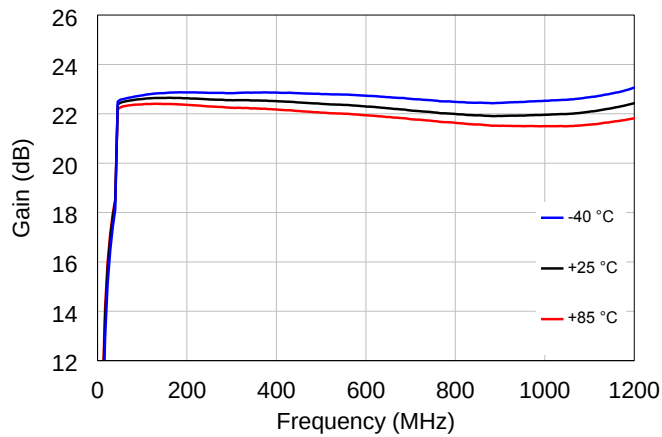
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5) BER < 1E-9 for 138 channels 22 dB slop, 256 QAM.

3.3 Plot of S-parameter & Stability Factor



3.4 Plots of Performances with Temperature



SYMBOL	DIMENSION (MM)			DIMENSION (MIL)		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.70	0.75	0.80	27.56	29.53	31.50
A1	0	0.02	0.05	0	0.79	1.97
A3	0.203 REF			8.00 REF		
b	0.18	0.25	0.30	7.09	9.84	11.81
D	6.00 BSC			236 BSC		
D2	4.35	4.50	4.65	171.26	177.17	183.07
E	6.00 BSC			236 BSC		
E2	4.35	4.50	4.65	171.26	177.17	183.07
e	0.50 BSC			19.69 BSC		
L	0.30	0.40	0.50	11.81	15.75	19.69
y	0.08			3.15		

