AWB578 Data Sheet

30 ~ 1200 MHz Wide-band Medium Power Amplifier MMIC

1. Product Overview

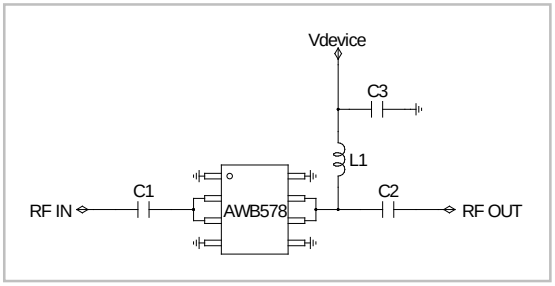
1.1 General Description

AWB578, a medium power amplifier MMIC, has high linearity and high efficiency over a wide range of frequency from 30 MHz to 1200 MHz, being suitable for use in both receiver and transmitter of telecommunication system up to 1.2 GHz. It has an active bias network for stable current over temperature and process variation. The amplifier is available in an SOIC8 package and passes through the stringent DC, RF, and reliability tests.

1.2 Features

- 20.0 dB gain at 500 MHz
- 27.0 dBm P1dB at 500 MHz
- 42.0 dBm OIP3 at 500 MHz
- 50 Ω input & output matching
- MTTF > 100 Years
- Single supply: +8 V

Application circuit



1.3 Applications

- Wide-band amplifier at 30 ~ 1200 MHz
- IF amplifier

1.4 Package Profile & RoHS Compliance

SOIC8, 6.0x4.8 mm², surface mount

RoHS-compliant GREEN Package

RoHS-compliant

2. Summary on Product Performances

2.1 Typical Performance

Supply voltage = +8 V, T_A = +25 °C, Z_O = 50 Ω.

Parameter	Typical						Unit
Frequency	30	250	512	50	500	1200	MHz
Gain	20.8	20.0	19.7	20.2	19.7	18.5	dB
S11	-16.0	-20.0	-20.0	-12.0	-15.0	-11.0	dB
S22	-16.0	-20.0	-20.0	-16.0	-20.0	-11.0	dB
Noise Figure	3.5	3.0	3.0	3.5	3.0	3.0	dB
Output IP3[1)]	43.0	43.5	42.0	42.0	42.0	40.5	dBm
Output P1dB	27.0	27.0	27.0	27.0	27.0	26.0	dBm
Current	176			176			mA
Device Voltage	+8.0			+8.0			V

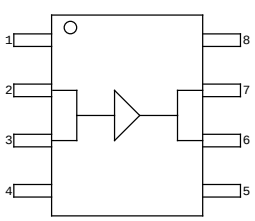
1) OIP3 is measured with two tones at an output power of +12 dBm/tone separated by 1MHz.

2.2 Product Specification

Supply voltage = +8 V, T_A = +25 °C, Z_O = 50 Ω.

Parameter	Min	Typ	Max	Unit
Frequency		500		MHz
Gain		19.7		dB
S11		-20.0		dB
S22		-20.0		dB
Noise Figure		3.0		dB
OIP3		42.0		dBm
P1dB		27.0		dBm
Current		176		mA
Device Voltage		+8.0		V

2.3 Pin Configuration

Pin	Description	Simplified Outline
2, 3	RF_IN	
1, 4, 5, 8	Ground	
6, 7	RF_OUT & Bias	

2.4 Absolute Maximum Ratings

Parameters	Max. Ratings
Operation Case Temperature	-40 to +85 °C
Storage Temperature	-40 to +150 °C
Device Voltage	+10 V
Operation Junction Temperature	+160 °C
Input RF Power (CW @ 30 MHz, 50 Ω matched)	+21 dBm

2.5 Thermal Resistance

Symbol	Description	Typ	Unit
R_{th}	Thermal resistance from junction to lead	30	°C/W

2.6 ESD Classification & Moisture Sensitivity Level

ESD Classification

HBM	Class 1B	Voltage Level: 750 V
MM	Class A	Voltage Level: 100 V

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.

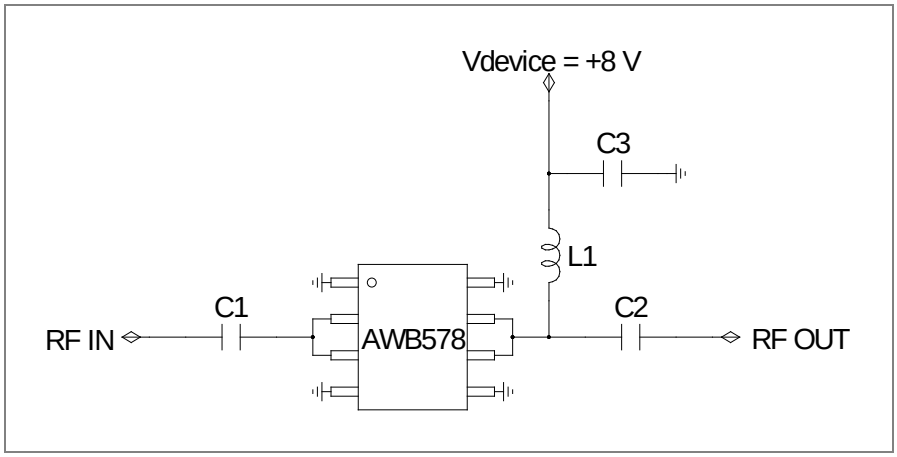
Moisture Sensitivity Level

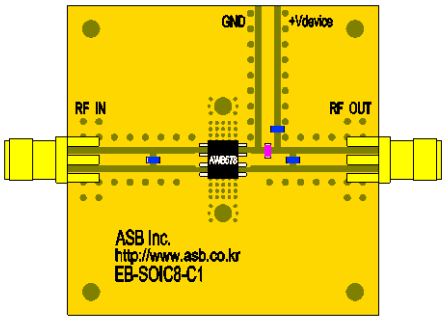
MSL 3 at 260 °C reflow

(Intentionally Blanked)

3. Application: 30 ~ 512 MHz (V_{device} = +8 V)

3.1 Application Circuit & Evaluation Board





PCB Information	
Material	FR4
Thickness (mm)	0.8
Size (mm)	40x40
EB No.	EB-SOIC8-C1

Bill of Material

Symbol	Value	Size	Description	Manufacturer
AWB578	-	-	MMIC Amplifier	ASB
C1, C2	1 μF	0603	DC blocking capacitor	Murata
C3	10 μF	0805	Decoupling capacitor	Murata
L1	470 nH	1206	RF choke inductor	Murata

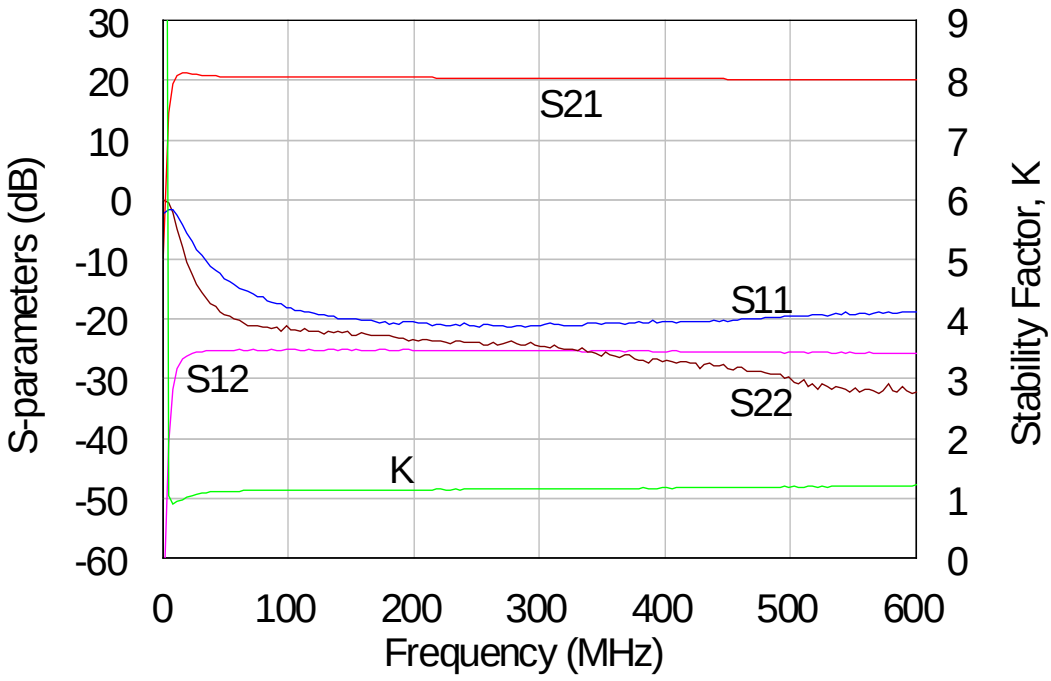
3.2 Performance Table

Supply voltage = +8 V, T_A = +25 °C, Z_O = 50 Ω.

Parameter	Typical			Unit
Frequency	30	250	512	MHz
Gain	20.5	20.0	19.7	dB
S11	-9.0	-18.0	-15.0	dB
S22	-13.0	-20.0	-20.0	dB
Noise Figure	3.5	3.0	3.0	dB
Output IP3[1)]	42.0	43.0	42.0	dBm
Output P1dB	26.5	27.0	27.0	dBm
Current	176			mA
Device Voltage	+8.0			V

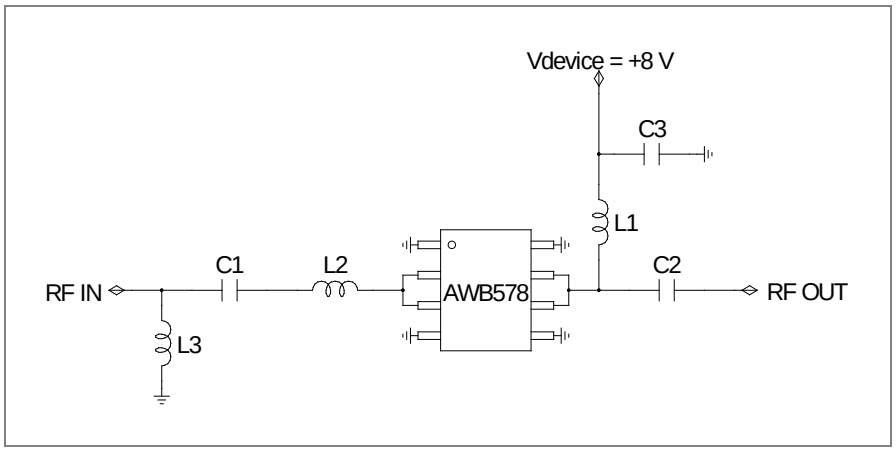
1) OIP3 is measured with two tones at an output power of +12 dBm/tone separated by 1MHz.

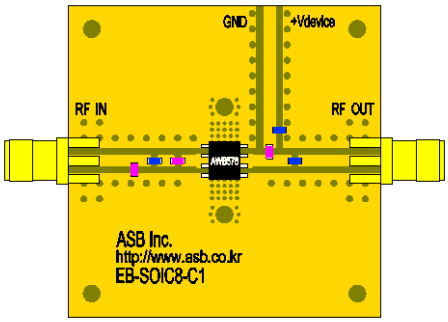
3.3 Plot of S-parameter & Stability Factor



4. Application: 30 ~ 512 MHz (V_{device} = +8 V, Additional Matching)

4.1 Application Circuit & Evaluation Board





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C3	10 μF	0805	Decoupling capacitor	Murata
L1	1 μH	1206	RF choke inductor	Murata
L2	5.6 nH	0603	Matching inductor	Murata
L3	680 nH	0603	Matching inductor	Samsung

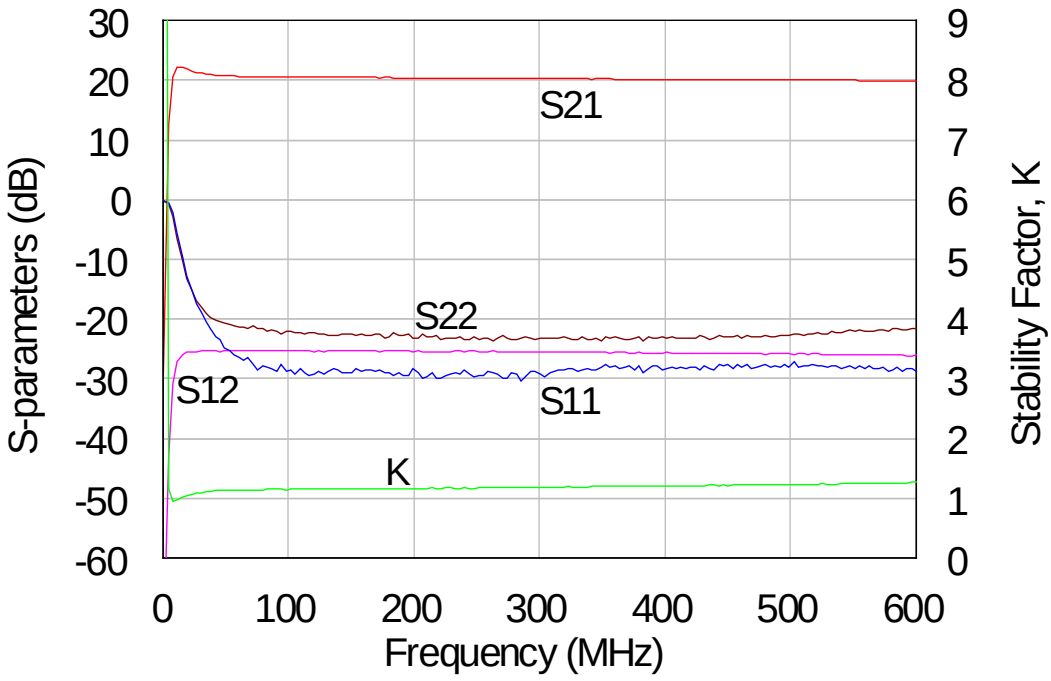
4.2 Performance Table

Supply voltage = +8 V, T_A = +25 °C, Z_O = 50 Ω.

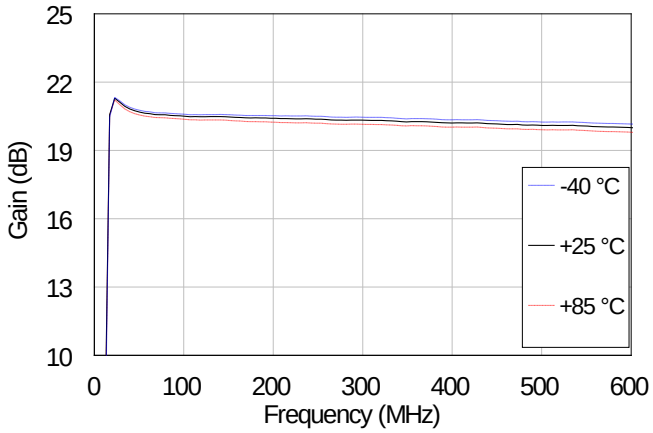
Parameter	Typical			Unit
Frequency	30	250	512	MHz
Gain	20.8	20.0	19.7	dB
S11	-16.0	-20.0	-20.0	dB
S22	-16.0	-20.0	-20.0	dB
Noise Figure	3.5	3.0	3.0	dB
Output IP3[1)]	43.0	43.5	42.0	dBm
Output P1dB	27.0	27.0	27.0	dBm
Current	176			mA
Device Voltage	+8.0			V

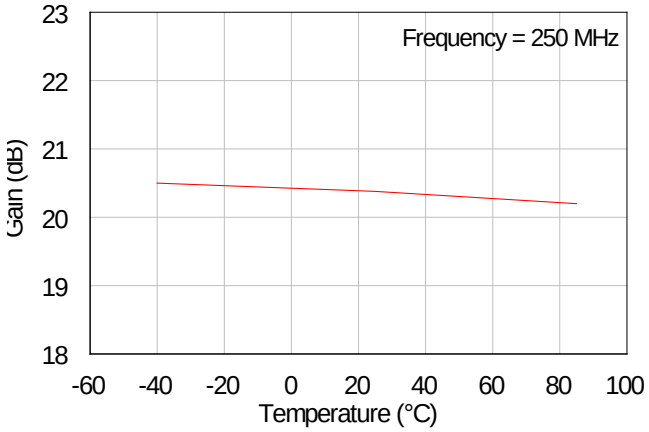
1) OIP3 is measured with two tones at an output power of +12 dBm/tone separated by 1MHz.

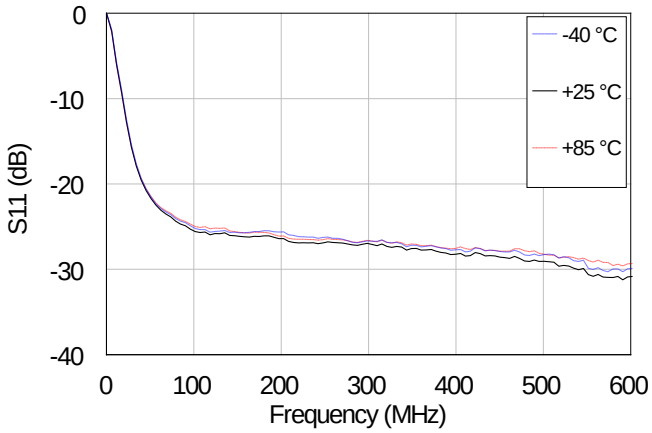
4.3 Plot of S-parameter & Stability Factor

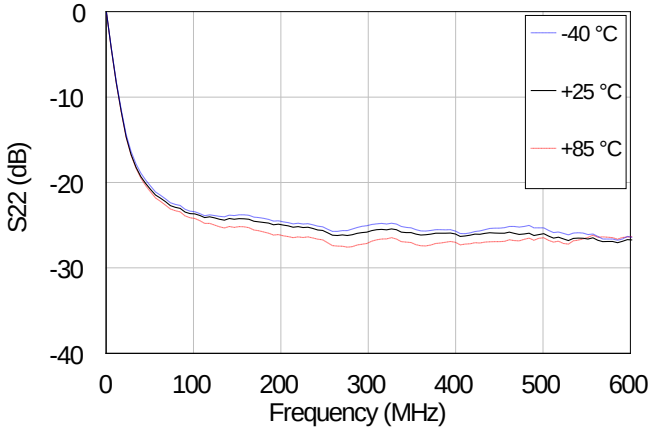


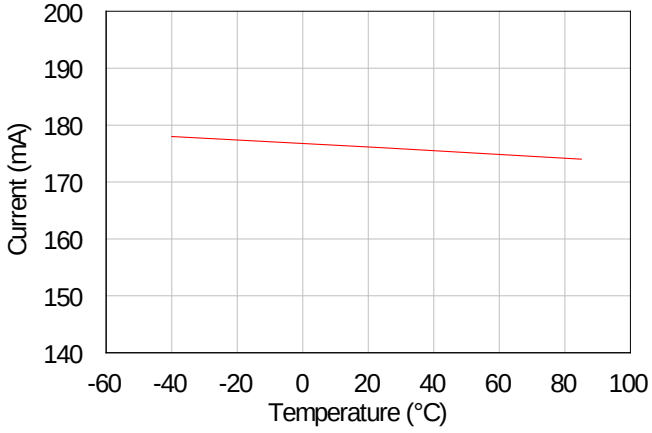
4.4 Plots of Performances with Temperature

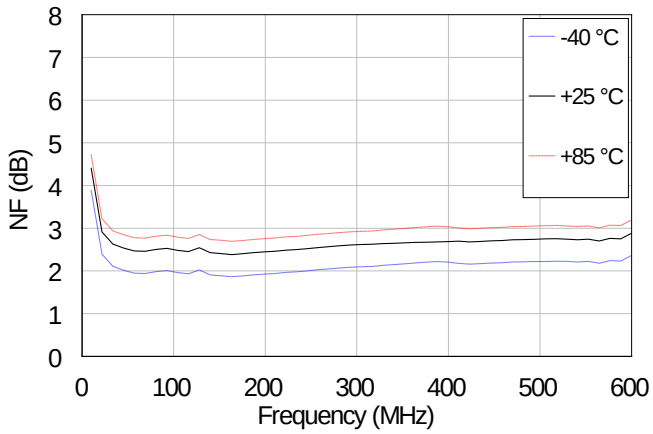


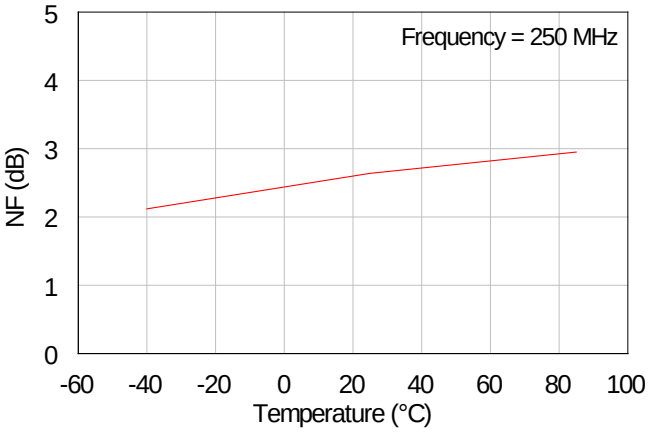


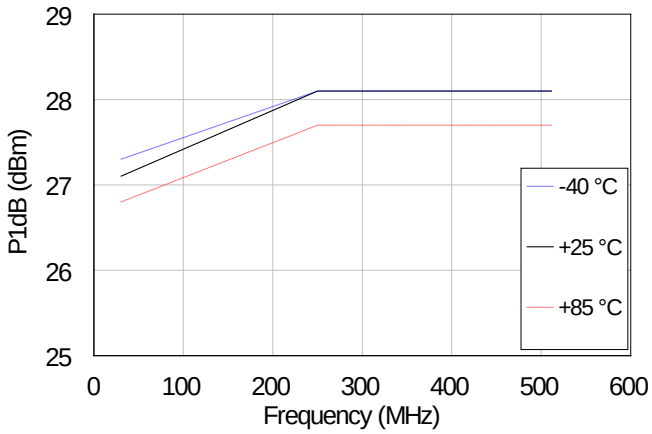


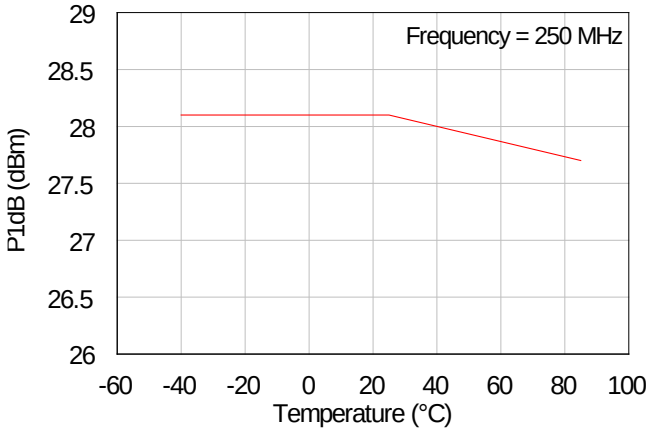





NF (dB)
Frequency (MHz)
-40 °C
+25 °C
+85 °C


NF (dB)
Temperature (°C)
Frequency = 250 MHz


P1dB (dBm)
Frequency (MHz)
-40 °C
+25 °C
+85 °C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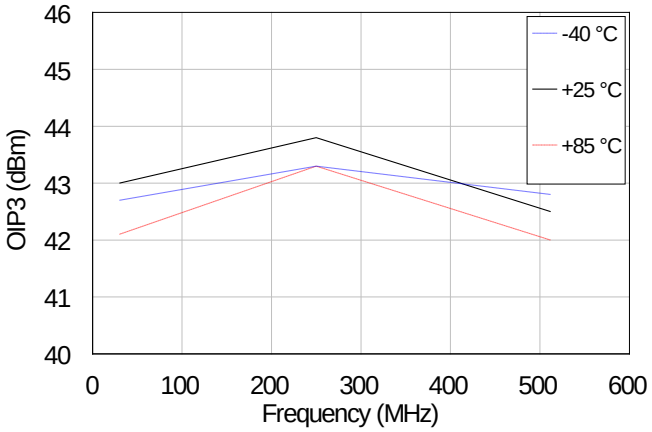
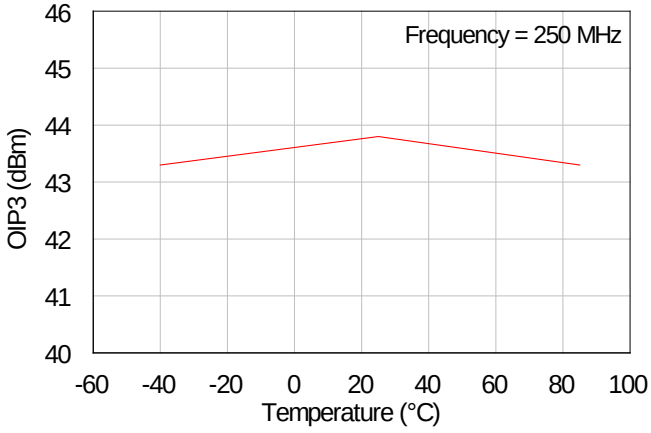
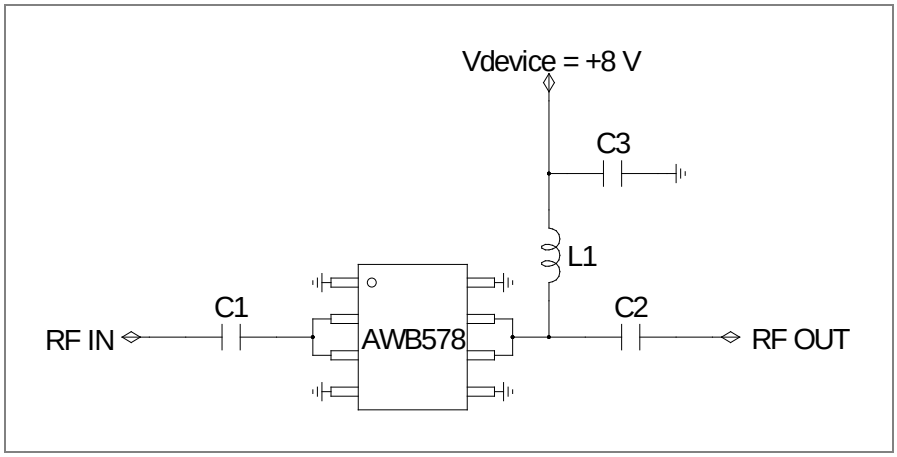
Frequency = 250 MHz

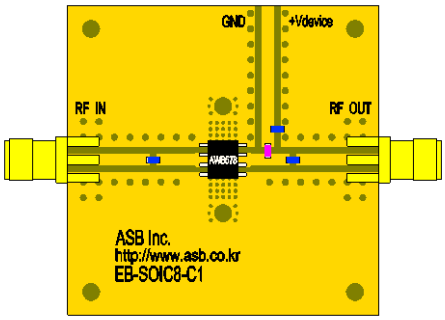

OIP3 (dBm)
Frequency (MHz)
-40 °C
+25 °C
+85 °C


OIP3 (dBm)
Temperature (°C)
Frequency = 250 MHz

5. Application: 50 ~ 1200 MHz (V_{device} = +8 V)

5.1 Application Circuit & Evaluation Board





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C3	10 μF	0805	Decoupling capacitor	Murata
L1	470 nH	1206	RF choke inductor	Murata

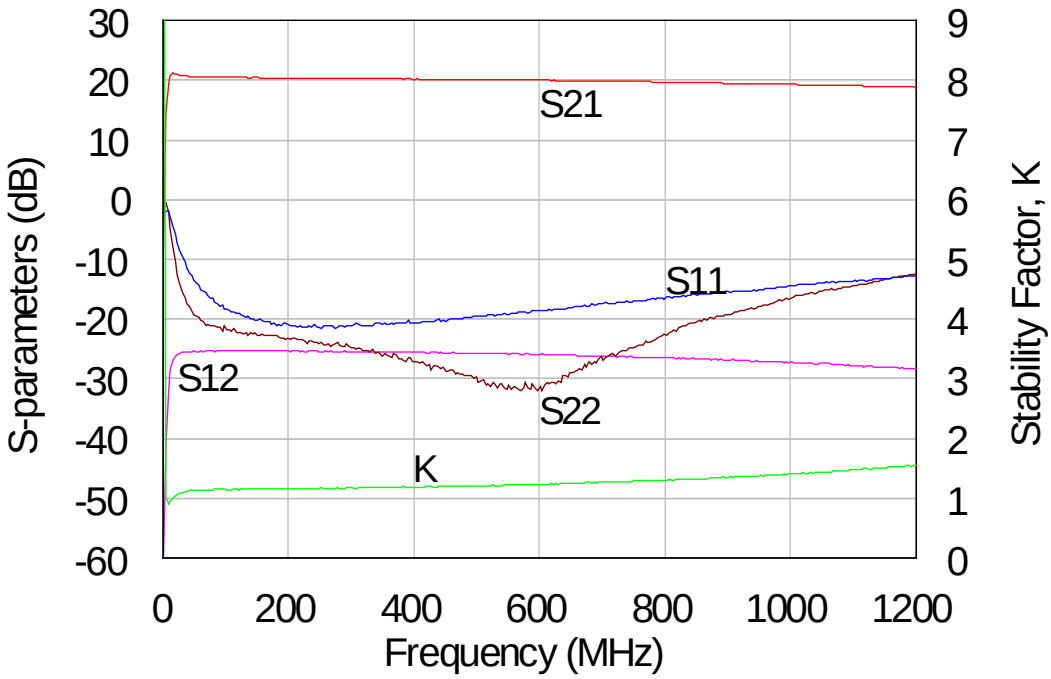
5.2 Performance Table

Supply voltage = +8 V, T_A = +25 °C, Z_O = 50 Ω.

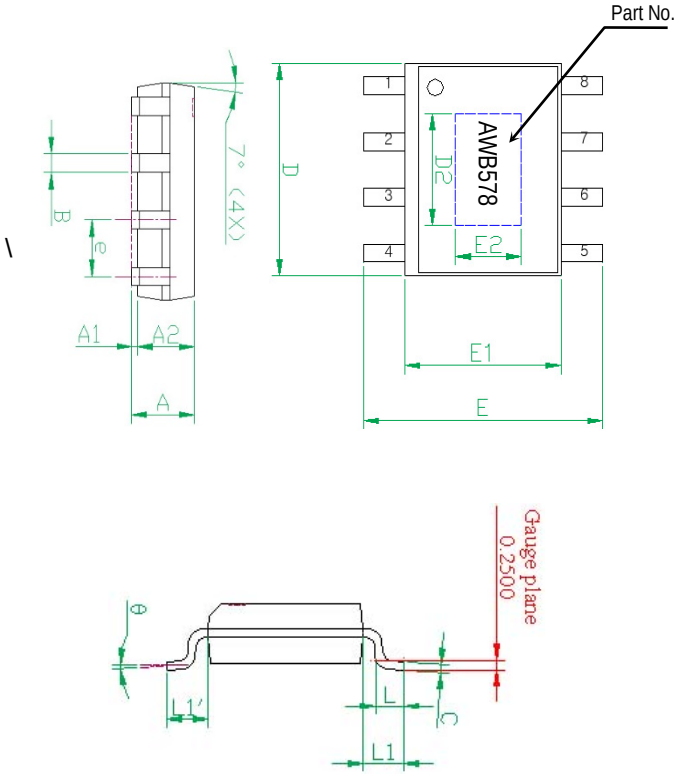
Parameter	Typical			Unit
Frequency	50	500	1200	MHz
Gain	20.2	19.7	18.5	dB
S11	-12.0	-15.0	-11.0	dB
S22	-16.0	-20.0	-11.0	dB
Noise Figure	3.5	3.0	3.0	dB
Output IP3[1)]	42.0	42.0	40.5	dBm
Output P1dB	27.0	27.0	26.0	dBm
Current	176			mA
Device Voltage	+8.0			V

1) OIP3 is measured with two tones at an output power of +12 dBm/tone separated by 1MHz.

5.3 Plot of S-parameter & Stability Factor

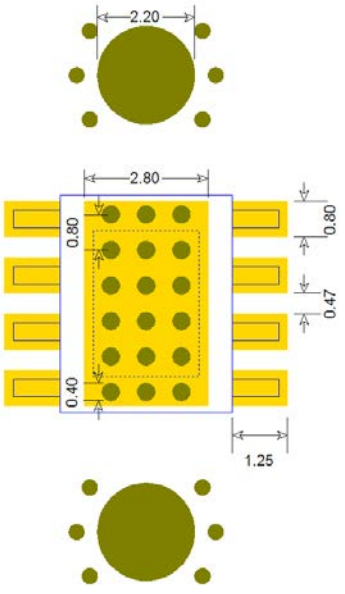


6. Package Outline (SOIC8)



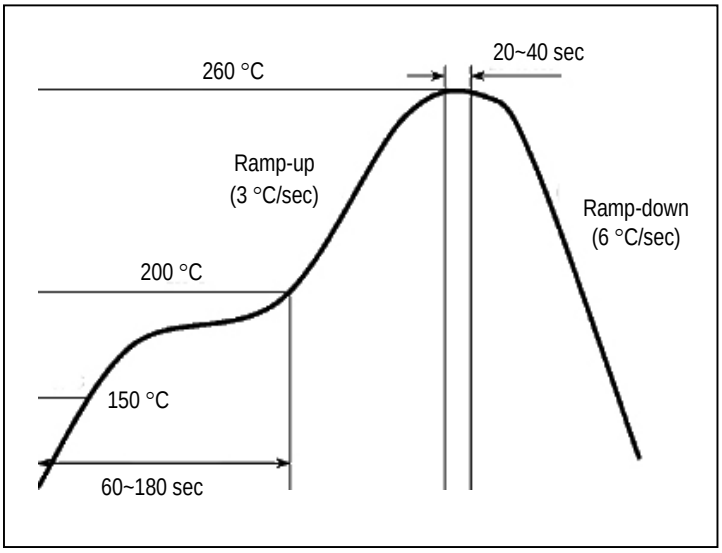
Symbols	Dimensions (In mm)		
	MIN	NOM	MAX
A	1.40	1.50	1.60
A1	0.00	---	0.10
A2	---	1.45	---
B	0.33	---	0.51
C	0.19	---	0.25
D	4.80	---	5.00
D2	3.20	3.30	3.40
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
E2	2.30	2.40	2.50
e	---	1.27	---
L	0.40	---	1.27
y	---	---	0.10
θ	0°	---	8°
|L1-L1'|	---	---	0.12
L1		1.04REF	

7. Surface Mount Recommendation (In mm)



NOTE
1. Add as much copper as possible to inner and outer layers near the part to ensure optimal thermal performance.
2. To ensure reliable operation, device ground paddle-to-ground pad soldering is critical.
3. Add mounting screws near the part to fasten the board to a heat sinker. Ensure that the ground & thermal via region contacts the heat sinker.
4. A proper heat dissipation path underneath the area of the PCB for the mounted device is strictly required for proper thermal operation. Damage to the device can result from inappropriate heat dissipation.

8. Recommended Soldering Reflow Profile



(End of Datasheet)