

Features

- 31 dB Gain at 900 MHz
- 33 dBm P1dB at 900 MHz
- 48 dBm Output IP3 at 900 MHz
- MTTF > 100 Years
- Two Power Supplies

Description

The ASX520, a power amplifier MMIC, has a high linearity, high gain, and high efficiency over a wide range of frequency, being suitable for use in both receiver and transmitter of telecommunication systems up to 3 GHz. The amplifier is available in a SOIC package and passes through the stringent DC, RF, and reliability tests.



Package Style: SOIC8

Typical Performance

(Supply Voltage = Device Voltage, $T_A = +25\text{ }^\circ\text{C}$, $Z_0 = 50\ \Omega$)

Parameters	Units	Typical
Frequency	MHz	900
Gain	dB	31.0
S11	dB	-15
S22	dB	-9
Output IP3 ¹⁾	dBm	48
Noise Figure	dB	7.0
Output P1dB	dBm	33
Current	mA	650
Device Voltage	V	+5

1) OIP3 measured with two tones at an output power of +15 dBm/tone separated by 1 MHz.

Application Circuit

- IF (400 ~ 430 MHz)
- LTE (700 ~ 800 MHz)
- CDMA
- GSM
- RFID (USA)
- Others (1250 ~ 1300 MHz)
- Others (950 ~ 1240 MHz)

Product Specifications

Parameters	Units	Min	Typ	Max
Testing Frequency	MHz		900	
Gain	dB	30.0	31.0	
S11	dB		-15	
S22	dB		-9	
Output IP3	dBm	45	48	
Noise Figure	dB		7.0	7.3
Output P1dB	dBm	32	33	
Current	mA	610	650	690
Device Voltage	V		+5	

Absolute Maximum Ratings

Parameters	Rating
Operating Case Temperature	-40 to +85 °C
Storage Temperature	-40 to +150 °C
Device Voltage	+6 V
Operating Junction Temperature	+150 °C
Input RF Power (CW, 50 Ω matched) ¹⁾	+25 dBm
Thermal Resistance	18 °C/W

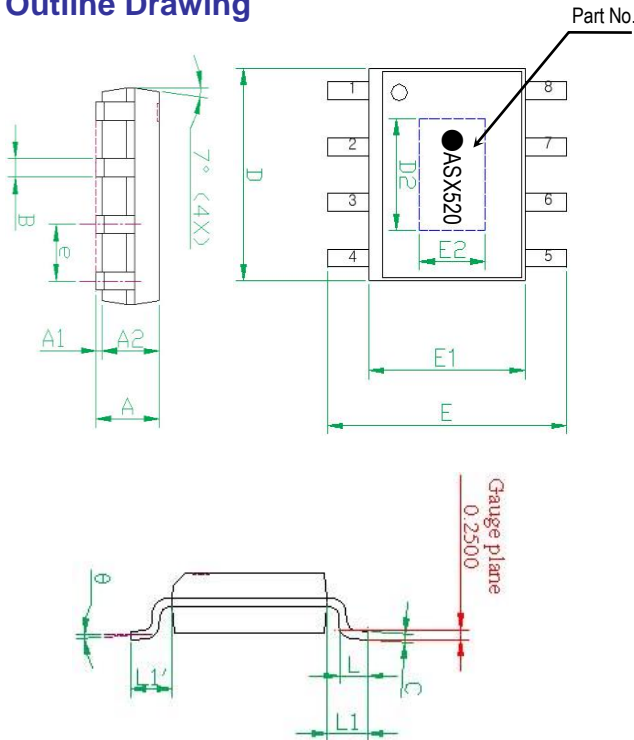
The operation of this device in excess of any of these limits may cause permanent damage.

* 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.

Pin Configuration

Pin No.	Function
1	2nd stage RF IN
2	1st stage RF OUT
3,5,8	GND
4	1st stage RF IN
6,7	2nd stage RF OUT

Outline Drawing

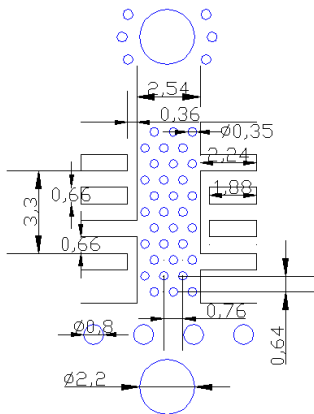


Symbols	Dimensions (In mm)		
	MIN	NOM	MAX
A	1.40	1.50	1.60
A1	0.00	---	0.10
A2	---	1.45	---
B	0.33	---	0.51
C	0.19	---	0.25
D	4.80	---	5.00
D2	3.20	3.30	3.40
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
E2	2.30	2.40	2.50
e	---	1.27	---
L	0.40	---	1.27
y	---	---	0.10
θ	0°	---	8°
L1-L1'	---	---	0.12
L1	1.04REF		

Pin No.	Function	Pin No.	Function.
1	2nd stage RF IN	5	GND
2	1st stage RF OUT	6	2nd stage RF OUT
3	GND	7	2nd stage RF OUT
4	1st stage RF IN	8	GND

Note: 1. Backside metal paddle is RF and DC ground.

Mounting 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.

ESD Classification

HBM	Class 1B Voltage Level: 500 V ~ 1000 V
MM	Class A Voltage Level: < 200 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)

Level 3 at 260 °C reflow

APPLICATION CIRCUIT

IF

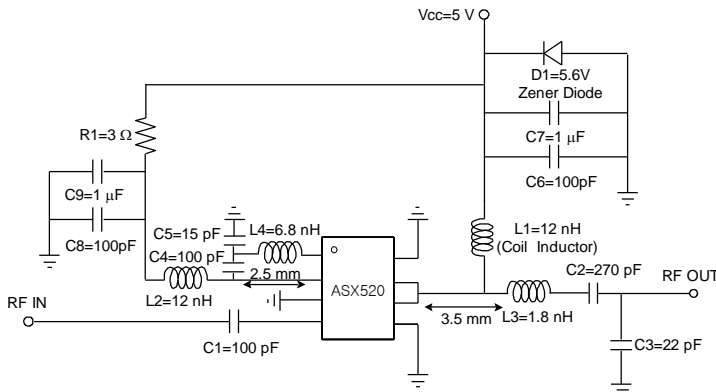
400 ~ 430 MHz

+5 V

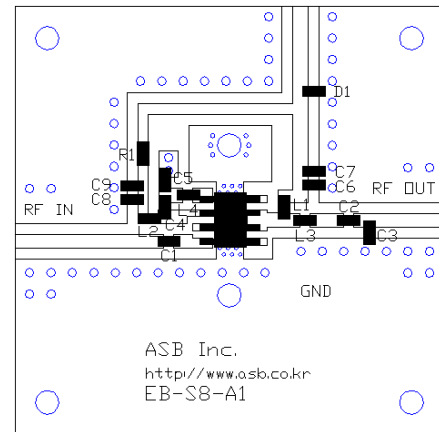
Frequency (MHz)	400 ~ 430	
Magnitude S21 (dB)	37.5	39.0
Magnitude S11 (dB)	-11.0	-12.0
Magnitude S22 (dB)	-2.5	-5.0
Output P1dB (dBm)	30	
Output IP3 ¹⁾ (dBm)	45	
Noise Figure (dB)	8.3	
Device Voltage (V)	+5	
Current (mA)	650	

1) OIP3 is measured with two tones at an output power of +11 dBm/tone separated by 1 MHz.

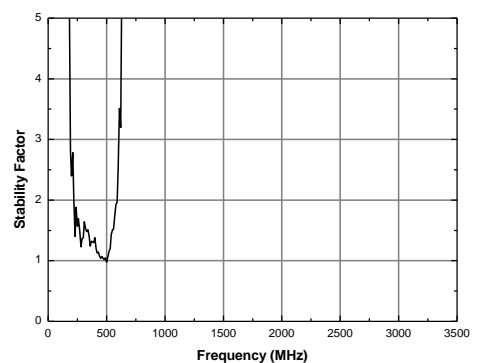
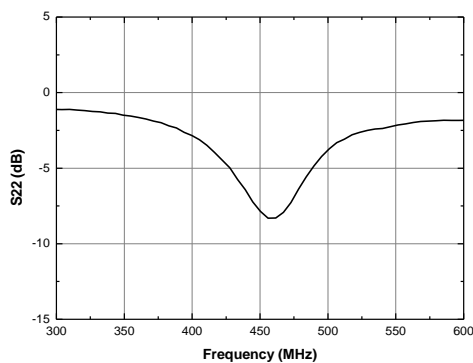
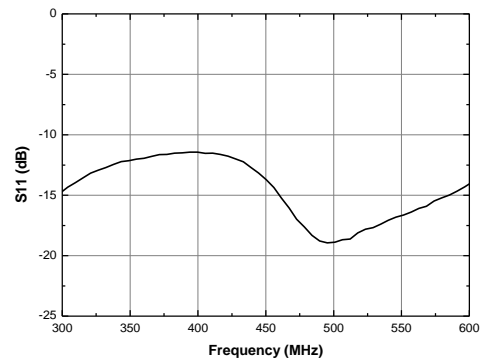
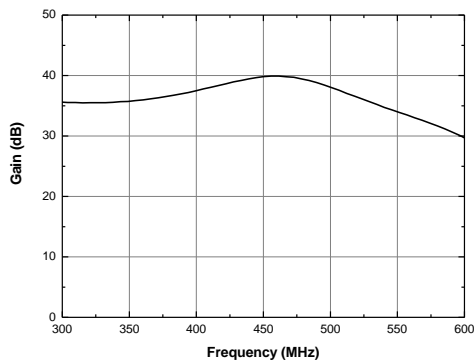
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

LTE

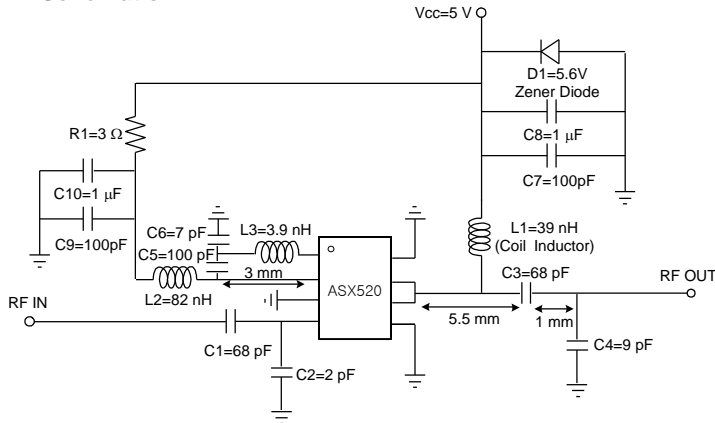
700 ~ 800 MHz

+5 V

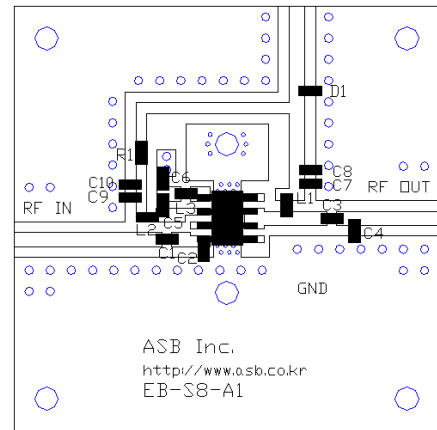
Frequency (MHz)	700 ~ 800	
Magnitude S21 (dB)	36.8	32.3
Magnitude S11 (dB)	-12	-12
Magnitude S22 (dB)	-8	-8
Output P1dB (dBm)	32.5	
Output IP3 ¹⁾ (dBm)	48	
Noise Figure (dB)	6.7	
Device Voltage (V)	+5	
Current (mA)	650	

1) OIP3 is measured with two tones at an output power of +14 dBm/tone separated by 1 MHz.

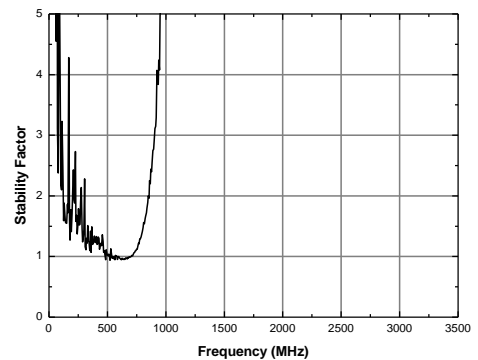
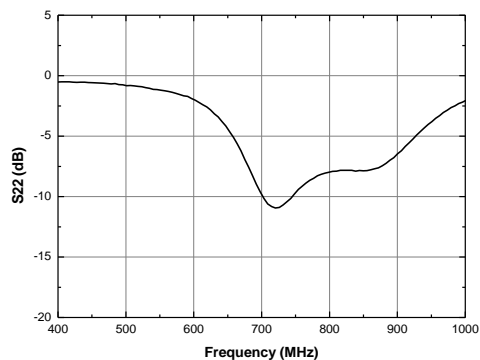
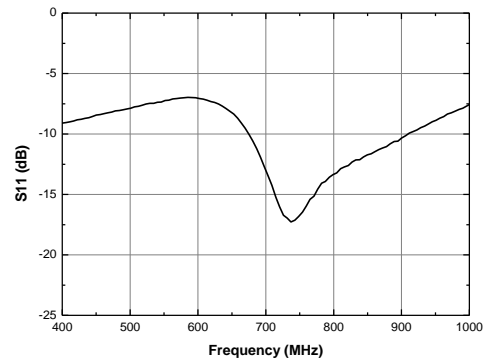
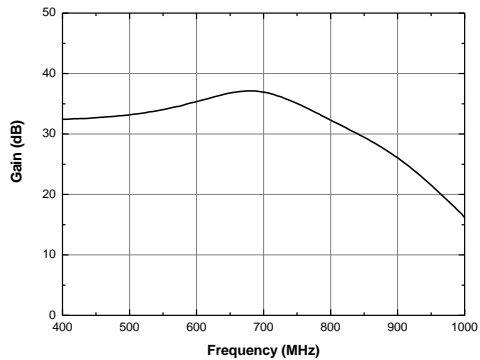
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

CDMA Rx

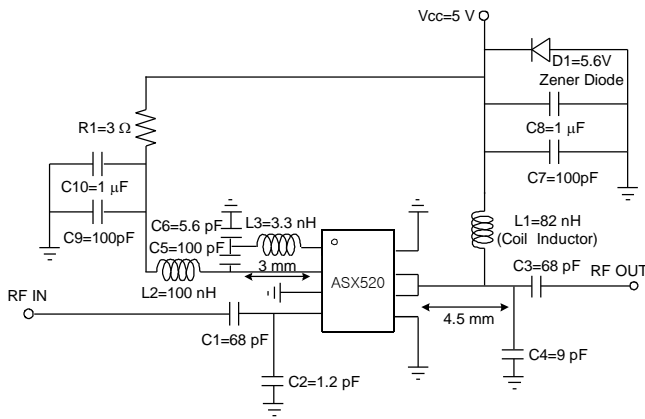
824 ~ 849 MHz

+5 V

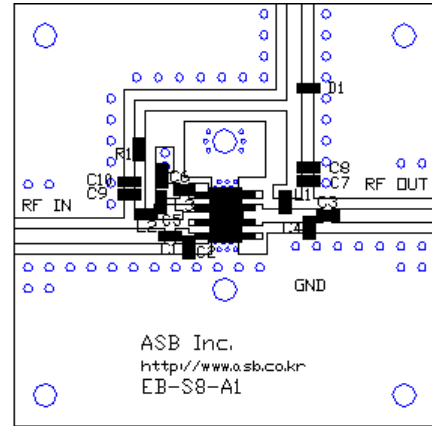
Frequency (MHz)	824 ~ 849
Magnitude S21 (dB)	32.0
Magnitude S11 (dB)	-15
Magnitude S22 (dB)	-8
Output P1dB (dBm)	32
Output IP3 ¹⁾ (dBm)	46.5
Noise Figure (dB)	7.0
Device Voltage (V)	+5
Current (mA)	650

1) OIP3 is measured with two tones at an output power of +15 dBm/tone separated by 1 MHz.

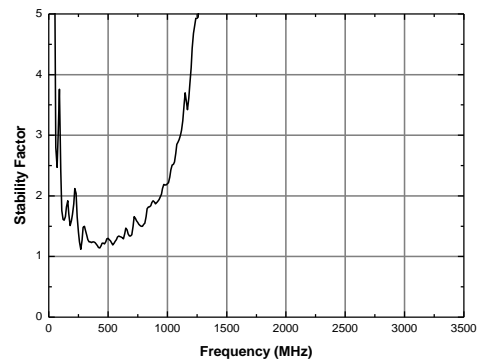
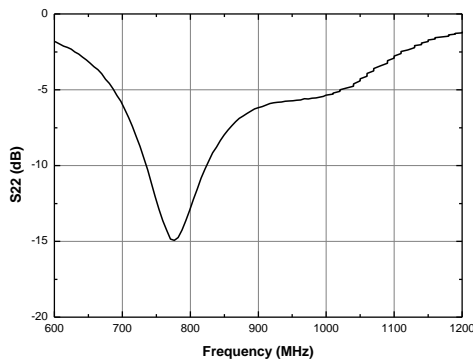
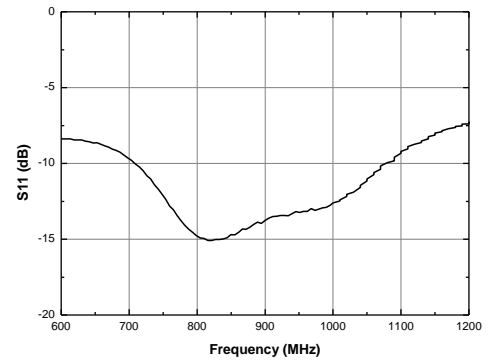
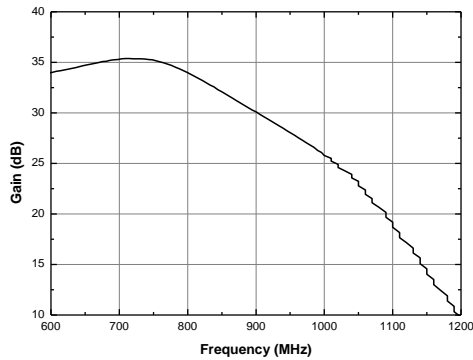
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

CDMA Tx, GSM

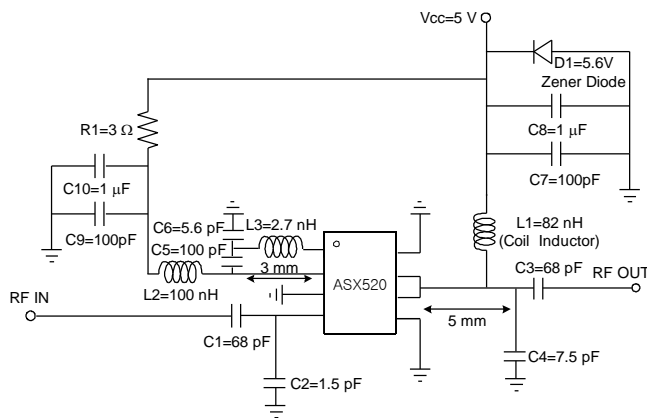
869 ~ 960 MHz

+5 V

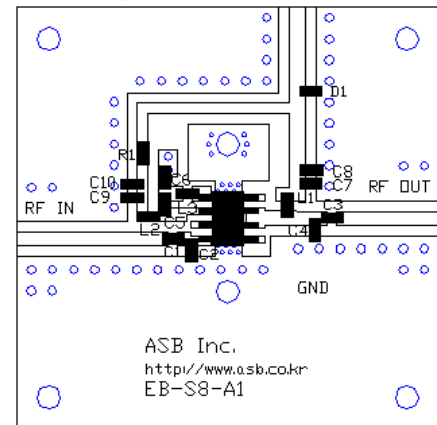
Frequency (MHz)	869 ~ 894	890 ~ 915	935 ~ 960
Magnitude S ₂₁ (dB)	31.5	31.0	29.0
Magnitude S ₁₁ (dB)	-15.0	-15.0	-14.0
Magnitude S ₂₂ (dB)	-10.0	-9.0	-7.5
Output P _{1dB} (dBm)	32.5	33.0	33.0
Output IP ₃ ¹⁾ (dBm)	47	48	48
Noise Figure (dB)	7.5	7.0	7.0
Device Voltage (V)	+5	+5	+5
Current (mA)	650	650	650

1) OIP₃ is measured with two tones at an output power of +15 dBm/tone separated by 1 MHz.

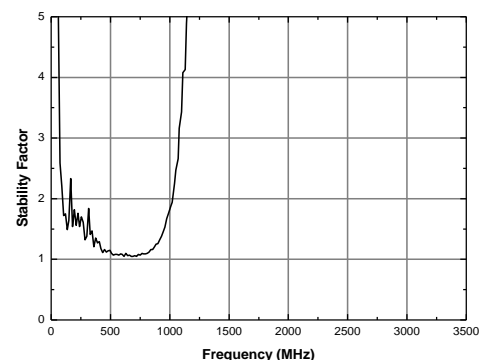
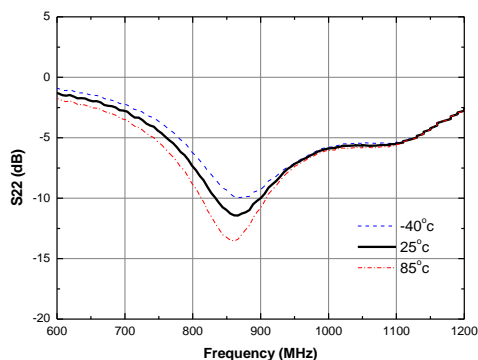
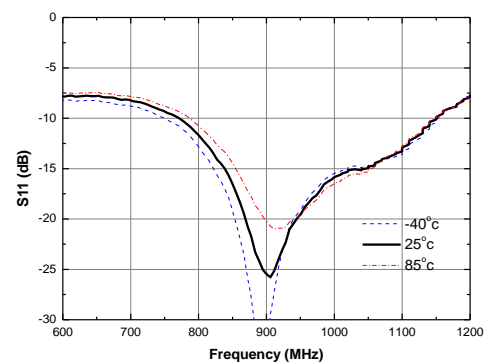
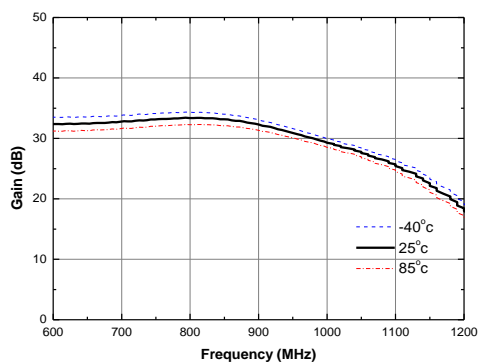
Schematic



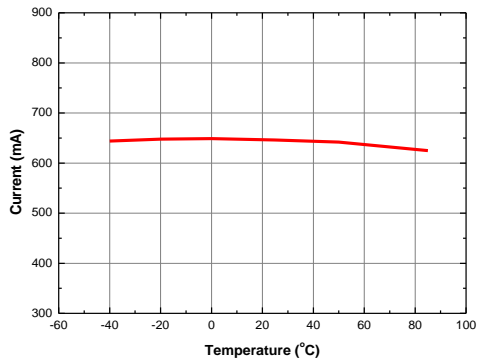
Board Layout (FR4, 40x40 mm², 0.8T)



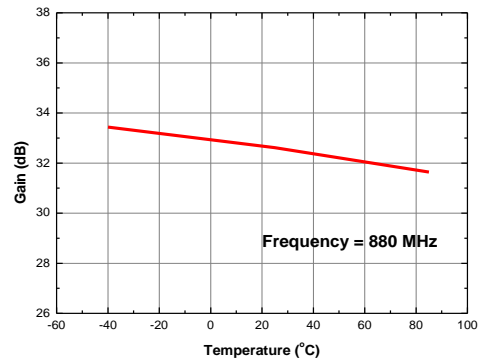
S-parameters & K-factor



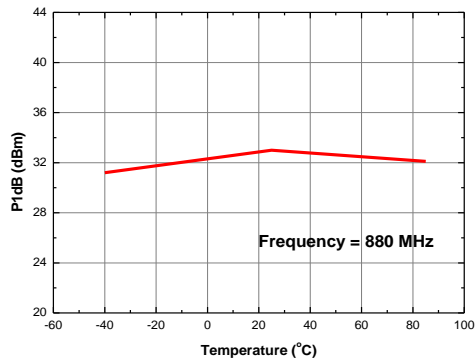
Current vs. Temperature



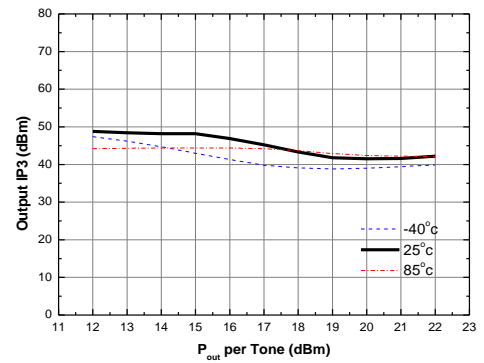
Gain vs. Temperature



P1dB vs. Temperature



Output IP3 vs. Tone Power (Frequency = 880 MHz)



APPLICATION CIRCUIT

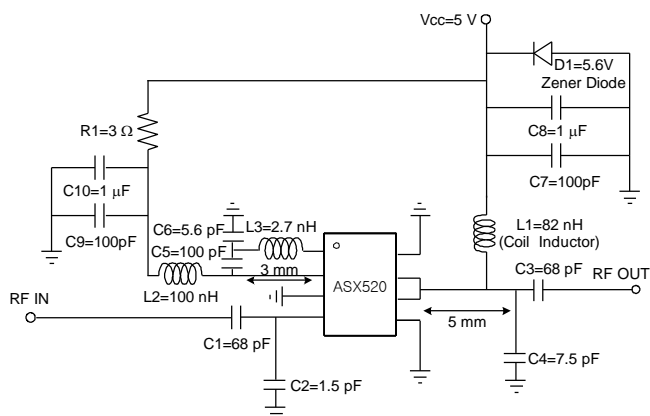
RFID (USA)
902 ~ 928 MHz
+5 V

Country	EU ²⁾	USA	Korea ²⁾	Japan ²⁾
Frequency (MHz)	865.6 ~ 867.6	902 ~ 928	910 ~ 914	950 ~ 956
Magnitude S ₂₁ (dB)	31.0	30.0	31.0	29.0
Magnitude S ₁₁ (dB)	-15.0	-15.0	-15.0	-14.0
Magnitude S ₂₂ (dB)	-10.0	-8.0	-9.0	-7.5
Output P _{1dB} (dBm)	32	33	33	33
Output IP ₃ ¹⁾ (dBm)	47	48	48	48
Noise Figure (dB)	7.4	6.9	6.8	6.9
Device Voltage (V)	+5	+5	+5	+5
Current (mA)	650	650	650	650

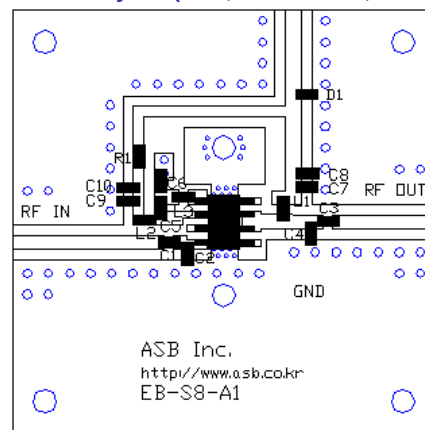
1) OIP₃ is measured with two tones at an output power of +15 dBm/tone separated by 1 MHz.

2) Test Results are measured by CDMA Tx (EU), GSM Rx (Korea), GSM Tx (Japan) Application circuits.

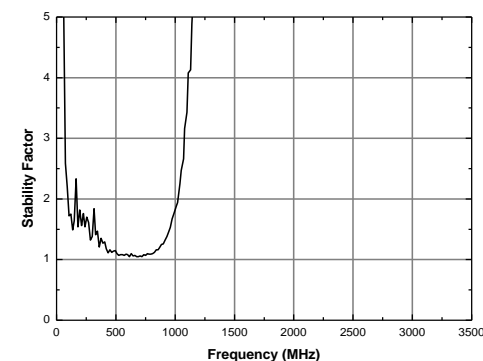
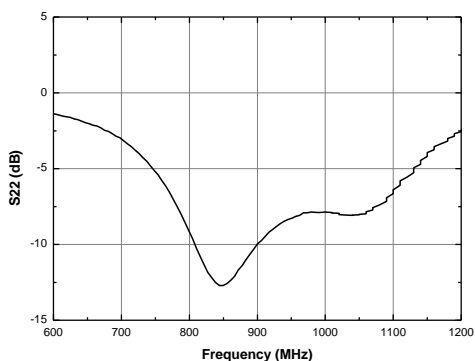
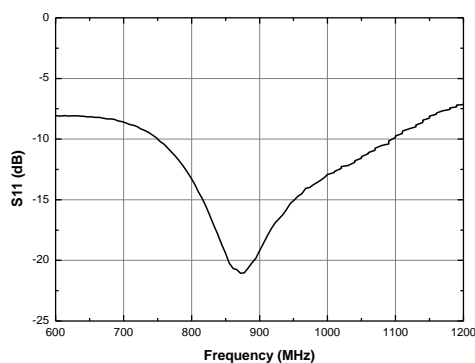
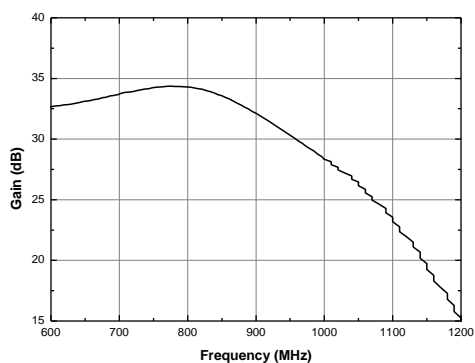
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

Others

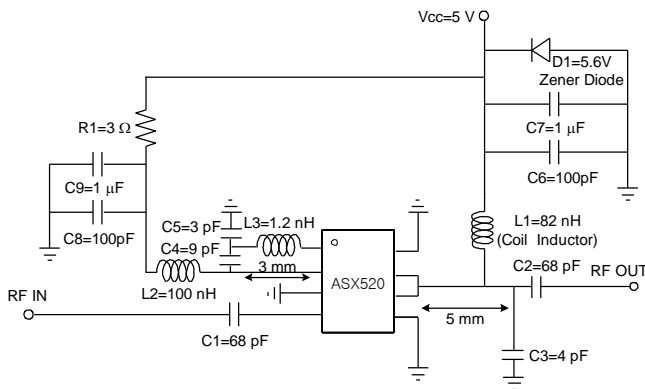
1250 ~ 1300 MHz

+5 V

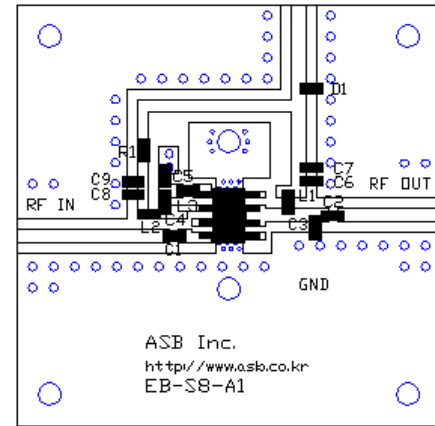
Frequency (MHz)	1250 ~ 1300
Magnitude S21 (dB)	25.0
Magnitude S11 (dB)	-14
Magnitude S22 (dB)	-12
Output P1dB (dBm)	29
Output IP3 ¹⁾ (dBm)	47
Noise Figure (dB)	6.8
Device Voltage (V)	+5
Current (mA)	650

1) OIP3 is measured with two tones at an output power of +14 dBm/tone separated by 1 MHz.

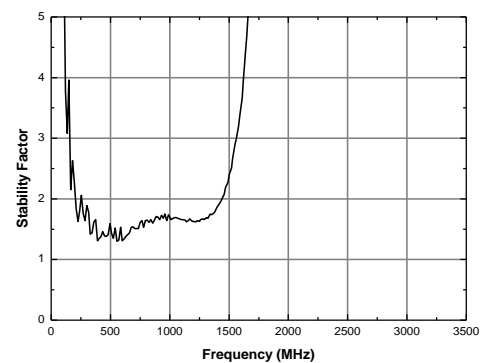
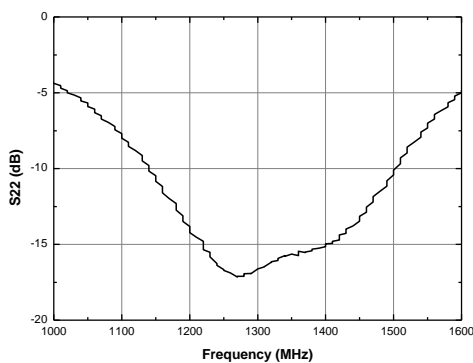
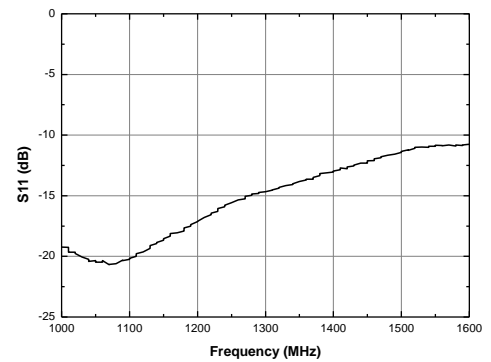
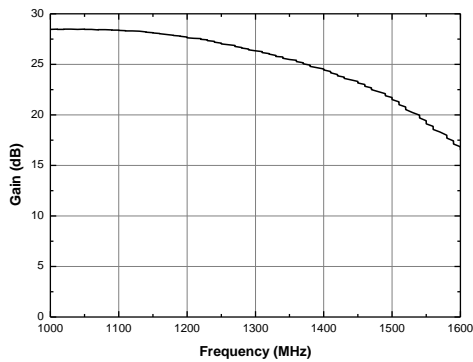
Schematic



Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



APPLICATION CIRCUIT

Others

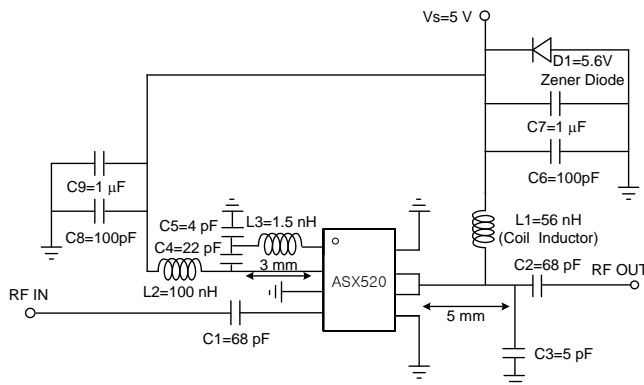
950 ~ 1240 MHz

+5 V

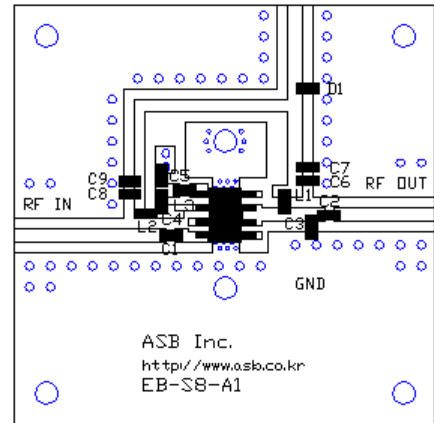
Frequency (MHz)	950	1240
Magnitude S21 (dB)	30.0	26.0
Magnitude S11 (dB)	-18.0	-15.0
Magnitude S22 (dB)	-6.5	-9.0
Output P1dB (dBm)	30	30
Output IP3 ¹⁾ (dBm)	41	42
Noise Figure (dB)	6.9	6.9
Device Voltage (V)	+5	+5
Current (mA)	660	660

1) OIP3 is measured with two tones at an output power of +14 dBm/tone separated by 1 MHz.

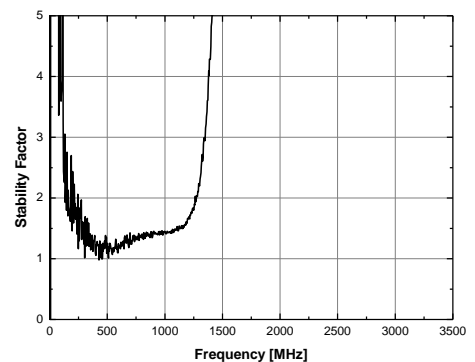
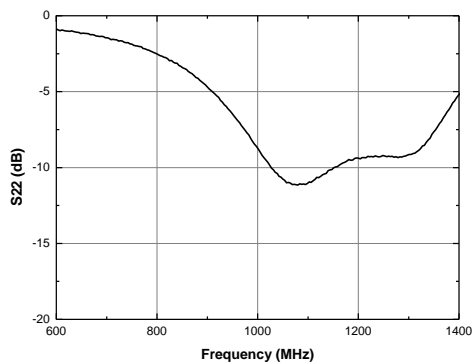
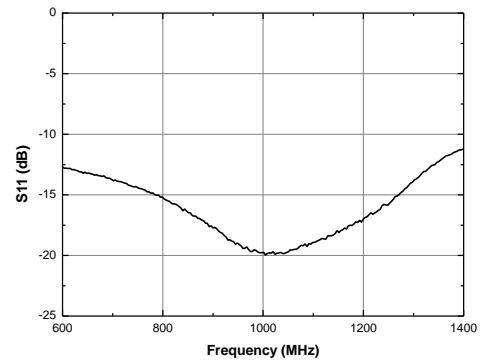
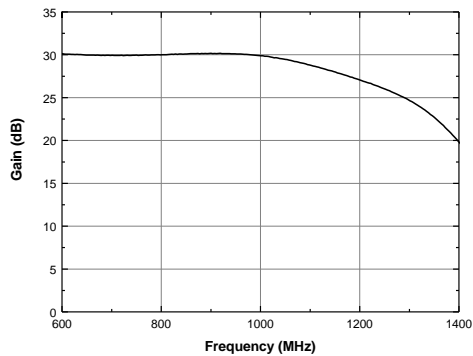
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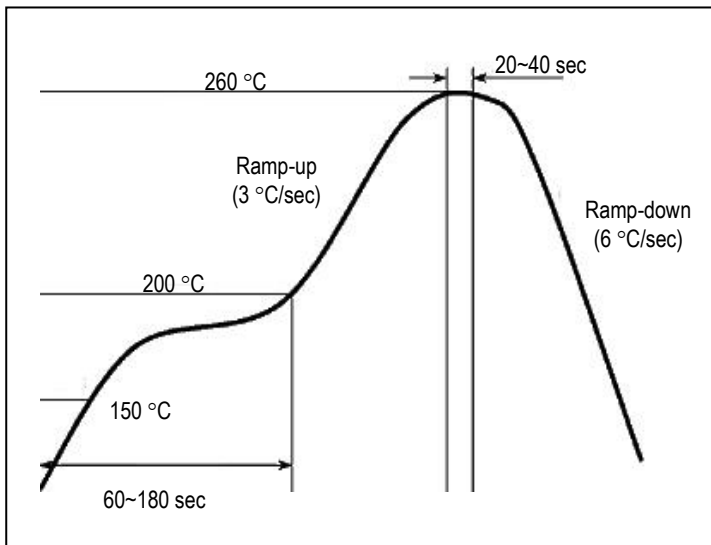


Board Layout (FR4, 40x40 mm², 0.8T)



S-parameters & K-factor



Recommended Soldering Reflow Profile

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