

### Features

- 26.3 dB Gain at 150 MHz
- 20.5 dBm P1dB at 150 MHz
- 41 dBm Output IP3 at 150 MHz
- 3.0 dB NF at 150 MHz
- MTTF > 100 Years
- Single Supply

### Description

The ASF240, a IF gain block 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 1 GHz. The amplifier is available in a SOT89 package and passes through the stringent DC, RF, and reliability tests.



Package Style: SOT89

### Typical Performance

 (Supply Voltage = +5 V, T<sub>A</sub> = +25 °C, Z<sub>0</sub> = 50 Ω)

Parameters	Units	Typical			
Frequency	MHz	70	150	300	450
Gain	dB	26.4	26.3	26.0	25.6
S11	dB	-14	-15	-15	-15
S22	dB	-10	-11	-10	-9
Output IP3 <sup>1)</sup>	dBm	40.5	41.0	38.0	34.5
Noise Figure	dB	3.0	3.0	3.1	3.1
Output P1dB	dBm	20.0	20.5	20.5	20.0
Current	mA	114	114	114	114
Device Voltage	V	+4.9	+4.9	+4.9	+4.9

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

### Application Circuit

- IF (50 ~ 500 MHz)
- IF (5 ~ 30 MHz)
- 50 ~ 1000 MHz (75 Ω)
- 5 ~ 300 MHz (75 Ω)

### Product Specifications

Parameters	Units	Min	Typ	Max
Testing Frequency	MHz		150	
Gain	dB	25.0	26.3	
S11	dB	-12	-15	
S22	dB	-9	-11	
Output IP3	dBm	38	41	
Noise Figure	dB		3.0	3.3
Output P1dB	dBm	19.5	20.5	
Current	mA	102	114	125
Device Voltage	V		+4.9	

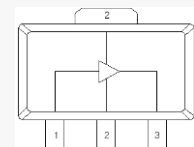
### Absolute Maximum Ratings

Parameters	Rating
Operating Case Temperature	-40 to +85 °C
Storage Temperature	-40 to +150 °C
Device Voltage	+5.5 V
Operating Junction Temperature	+150 °C
Input RF Power (Continuous) <sup>1)</sup>	+22 dBm

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

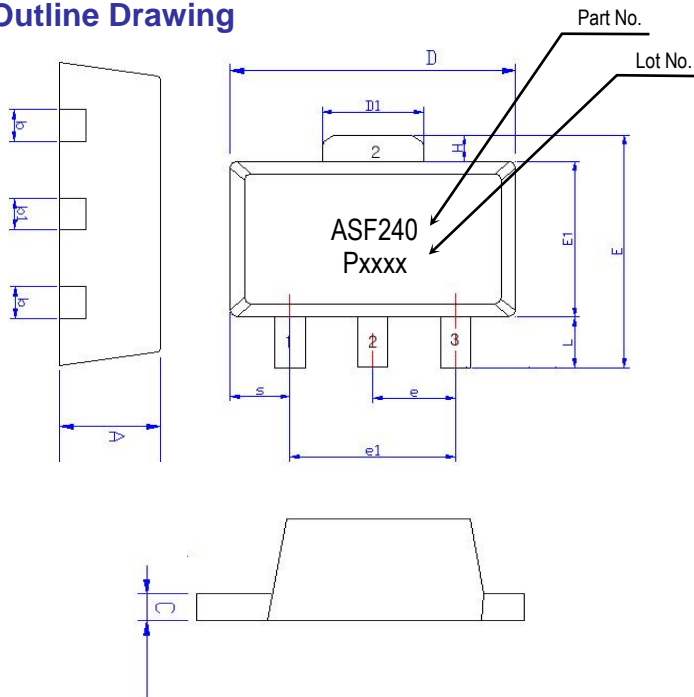
\* Refer to the max. input RF power data at [http://www.asb.co.kr/pdf/Maximum\\_Input\\_Power\\_Analysis.pdf](http://www.asb.co.kr/pdf/Maximum_Input_Power_Analysis.pdf).  
The max. input RF power, in principle, depends upon application frequency, matching circuit, and device voltage.

### Pin Configuration



Pin No.	Function
1	RF IN
2	GND
3	RF OUT & Bias

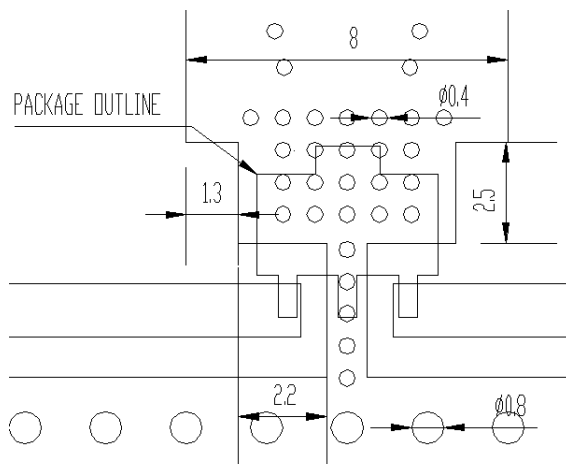
### Outline Drawing



Symbols	Dimensions (In mm)		
	MIN	NOM	MAX
A	1.40	1.50	1.60
L	0.89	1.04	1.20
b	0.36	0.42	0.48
b1	0.41	0.47	0.53
C	0.38	0.40	0.43
D	4.40	4.50	4.60
D1	1.40	1.60	1.75
E	3.64	---	4.25
E1	2.40	2.50	2.60
e1	2.90	3.00	3.10
H	0.35	0.40	0.45
S	0.65	0.75	0.85
e	1.40	1.50	1.60

Pin No.	Function
1	RF IN
2	GND
3	RF OUT & Bias

### Mounting Recommendation (In mm)



- Note:**
1. The number and size of ground via holes in a circuit board is critical for thermal and RF grounding considerations.
  2. We recommend that the ground via holes be placed on the bottom of the lead pin 2 and exposed pad of the device for better RF and thermal performance, as shown in the drawing at the left side.

### ESD Classification & Moisture Sensitivity Level

#### 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

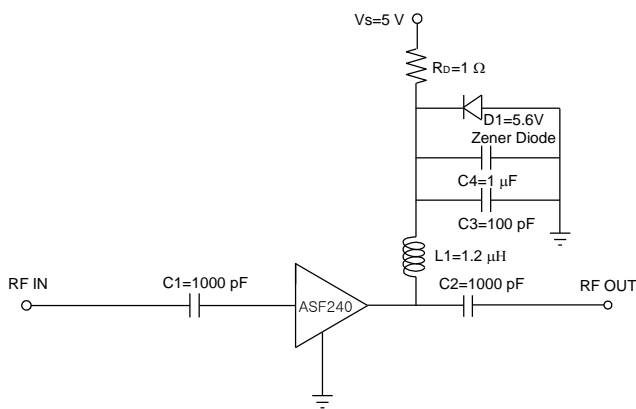
### APPLICATION CIRCUIT

IF  
50 ~ 500 MHz  
+5 V

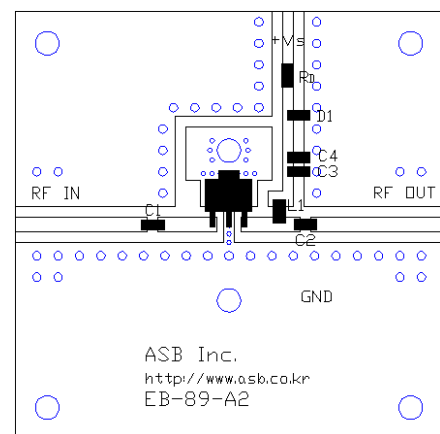
Frequency (MHz)	70	150	300	450
Magnitude S21 (dB)	26.4	26.3	26.0	25.6
Magnitude S11 (dB)	-14	-15	-15	-15
Magnitude S22 (dB)	-10	-11	-10	-9
Output P1dB (dBm)	20.0	20.5	20.5	20.0
Output IP3 <sup>1)</sup> (dBm)	40.5	41.0	38.0	34.5
Noise Figure (dB)	3.0	3.0	3.1	3.1
Device Voltage (V)	+4.9	+4.9	+4.9	+4.9
Current (mA)	114	114	114	114

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

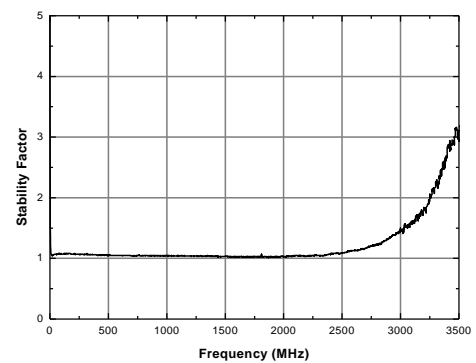
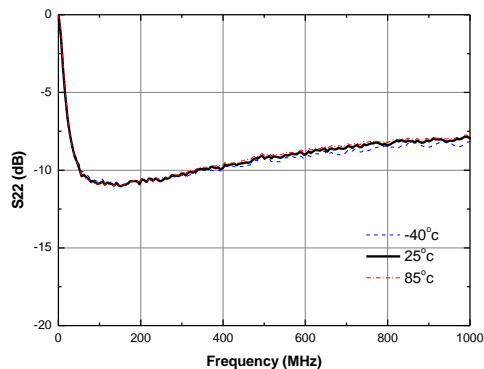
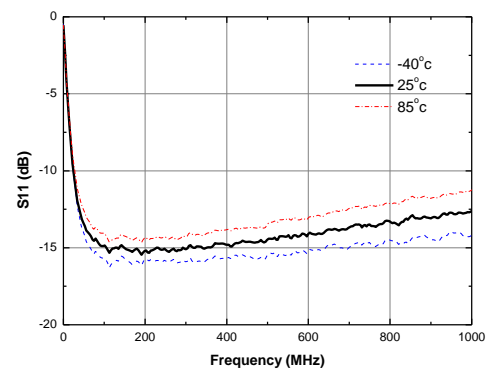
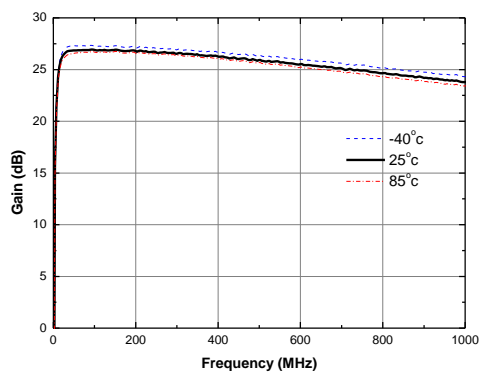
### Schematic



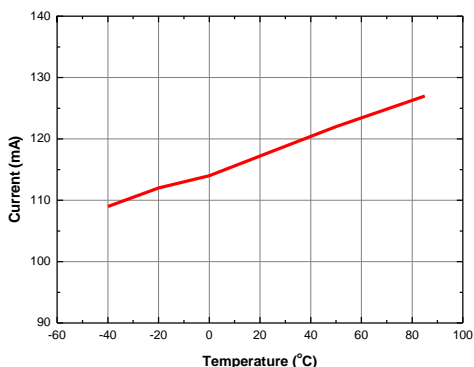
### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



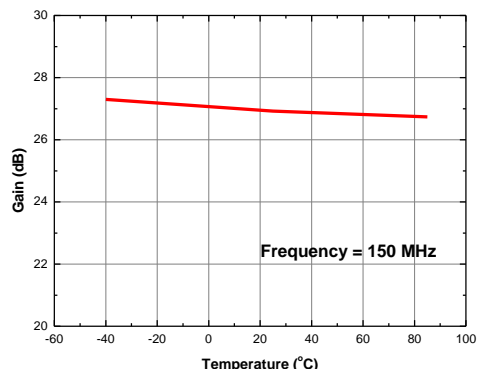
### S-parameters & K-factor



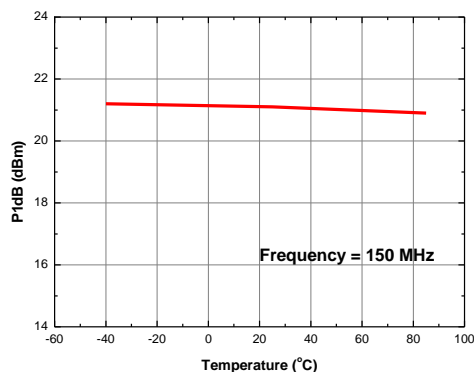
### Current vs. Temperature



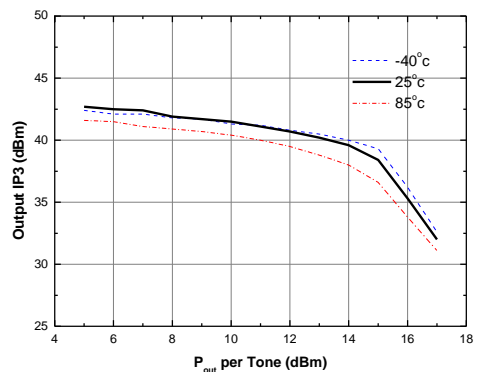
### Gain vs. Temperature



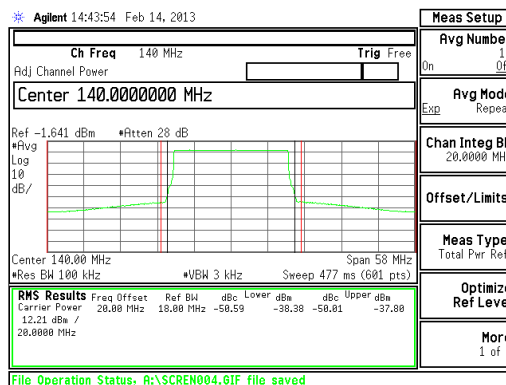
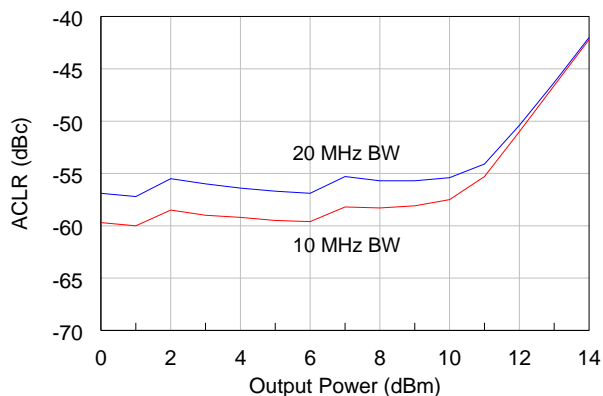
### P1dB vs. Temperature



### Output IP3 vs. Tone Power (Frequency = 150 MHz)



### ACLR (LTE)



Note that ACLR test conditions are as follows;

- 1) Test Source: LTE\_FDD\_test model 3.1, BW: 10 MHz & 20 MHz, Test Frequency: 140 MHz
- 2) Test Source: LTE\_FDD\_test model 3.1, BW: 20 MHz, Test Frequency: 140 MHz

### APPLICATION CIRCUIT

IF

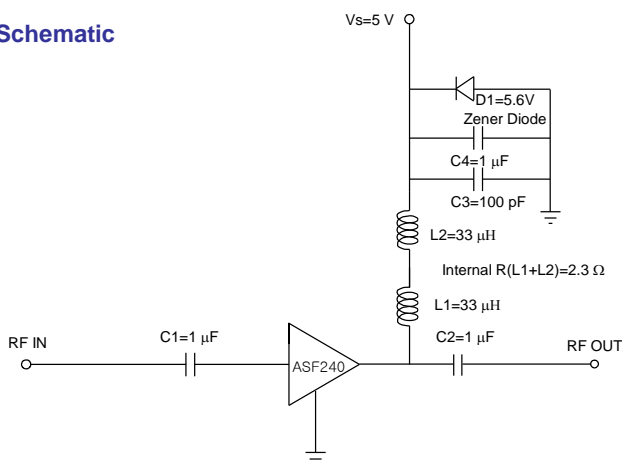
5 ~ 30 MHz

+5 V

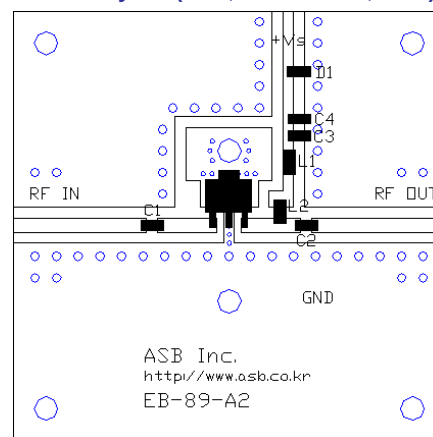
Frequency (MHz)	5	30
Magnitude S21 (dB)	26.5	26.5
Magnitude S11 (dB)	-14	-15
Magnitude S22 (dB)	-8	-9
Output P1dB (dBm)	20	20
Output IP3 <sup>1)</sup> (dBm)	40	40
Noise Figure (dB)	-	3.0
Device Voltage (V)	+4.75	+4.75
Current (mA)	108	108

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

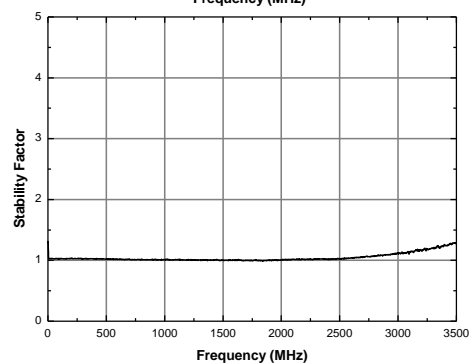
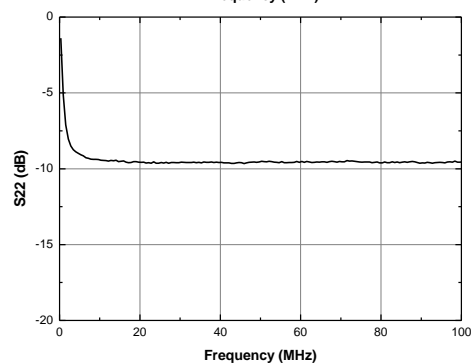
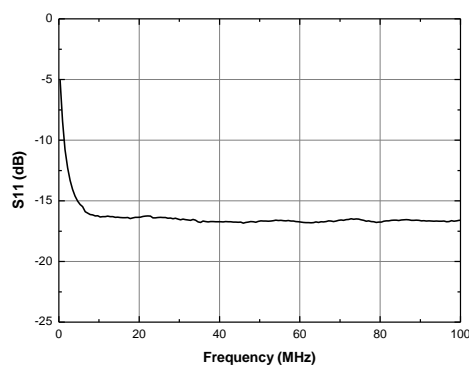
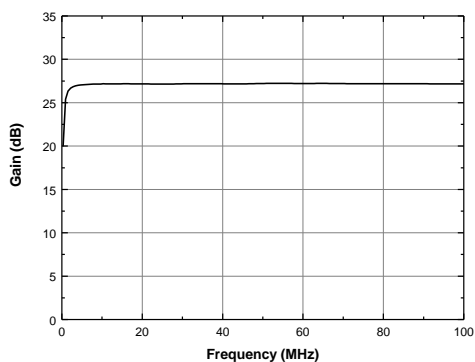
### Schematic



### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



### S-parameters & K-factor



**APPLICATION CIRCUIT**

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**CATV (75 Ω)**

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**50 ~ 1000 MHz**

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**+5 V**

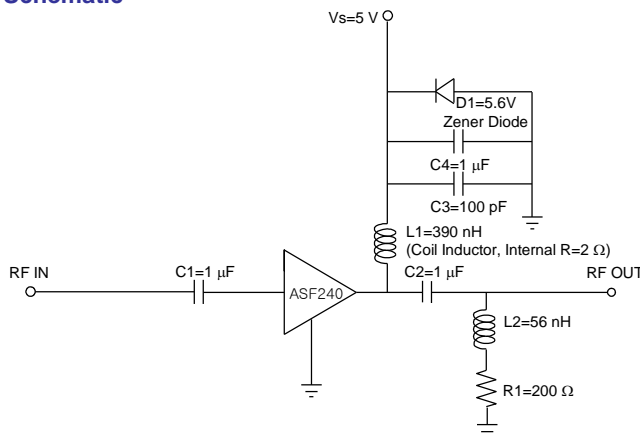
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Frequency (MHz)	50	500	860
Magnitude S21 (dB)	25.4	25.3	24.2
Magnitude S11 (dB)	-14	-14	-14
Magnitude S22 (dB)	-10	-11	-9
Output P1dB (dBm)	20.0	19.0	16.5
Output IP3 <sup>1)</sup> (dBm)	37.0	32.0	27.5
Output IP2 <sup>1),2)</sup> (dBm)	44	46	36
Noise Figure (dB)	2.8	2.9	3.1
Device Voltage (V)	+4.8	+4.8	+4.8
Current (mA)	107	107	107

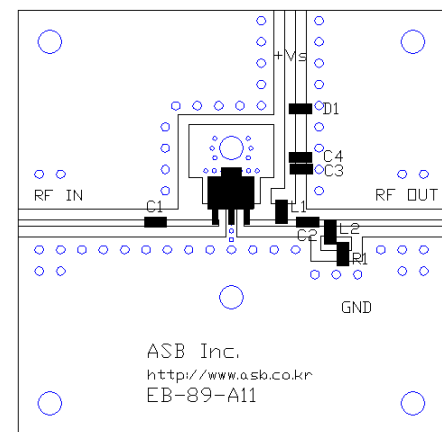
1) OIP3 and OIP2 are measured with two tones at an output power of +5 dBm/tone separated by 6 MHz.

2) OIP2 is measured at F1+F2 Frequency.

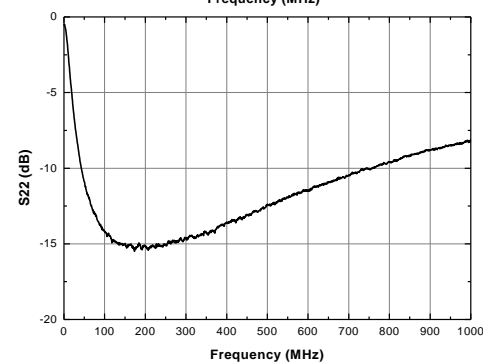
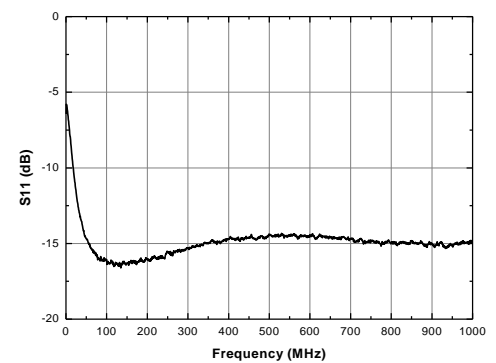
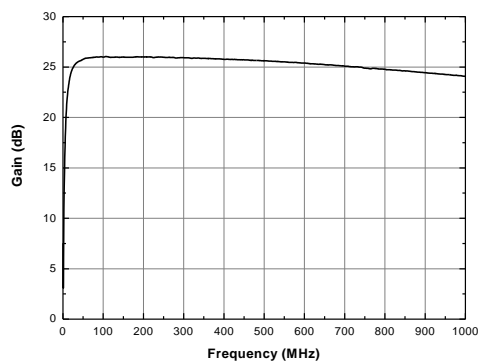
### Schematic



### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



### S-parameters



### APPLICATION CIRCUIT

CATV (75  $\Omega$ )

5 ~ 300 MHz

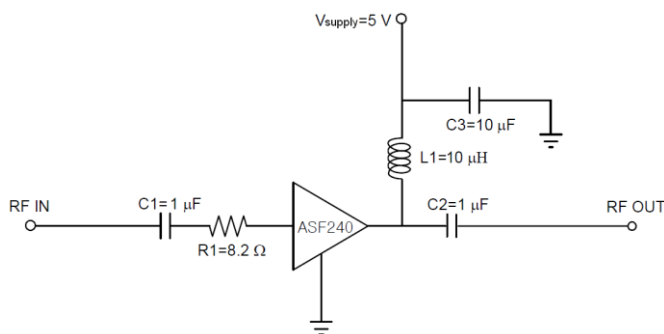
+5 V

Frequency (MHz)	5	50	200	300
Magnitude S21 (dB)	26.3	26.3	26.0	25.8
Magnitude S11 (dB)	-15	-16	-17	-19
Magnitude S22 (dB)	-17	-21	-12	-9
Output P1dB (dBm)	19.5	19.5	19.5	19.5
Output IP3 <sup>1)</sup> (dBm)	44.0	41.5	36	34.5
Output IP2 <sup>1),2)</sup> (dBm)	54	56	56	51
Noise Figure (dB)	-	3.6	3.6	3.7
Device Voltage (V)	+4.9	+4.9	+4.9	+4.9
Current (mA)	114	114	114	114

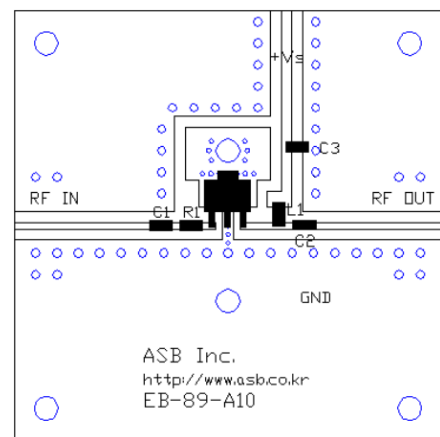
1) OIP3 and OIP2 are measured with two tones at an output power of +8 dBm/tone separated by 6 MHz.

2) OIP2 is measured at F1+F2 Frequency.

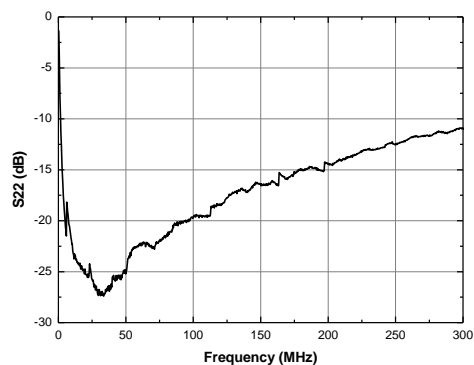
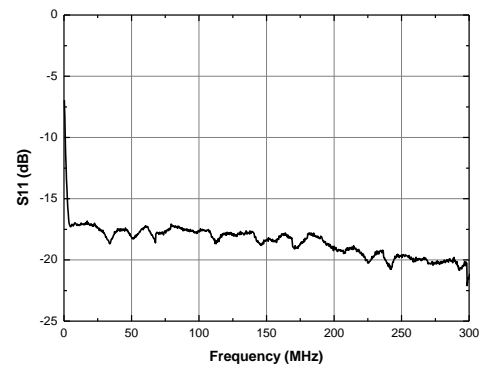
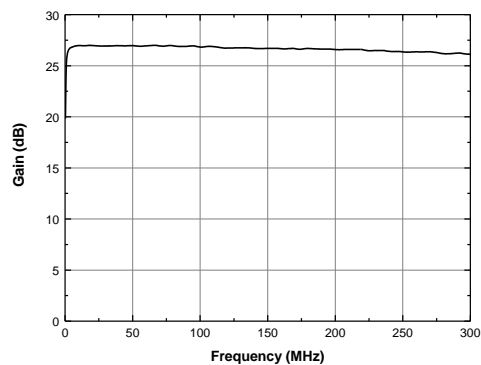
### Schematic



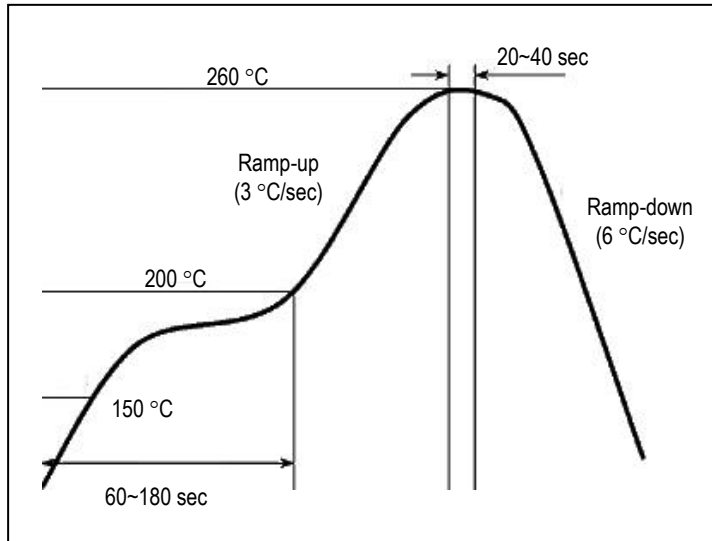
### Board Layout (FR4, 40x40 mm<sup>2</sup>, 0.8T)



### S-parameters



### Recommended Soldering Reflow Profile



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