

## ASL51T8 Data Sheet

*High Gain, Low Noise Amplifier*

### 1. Product Overview

#### 1.1 General Description

ASL51T8, a wideband linear low noise amplifier MMIC, has low noise and high linearity, being suitable for use in both receiver and transmitter of telecommunication systems about 500 ~ 3000 MHz. The amplifier is available in a TDFN8 package and passes through the stringent DC, RF and reliability tests.

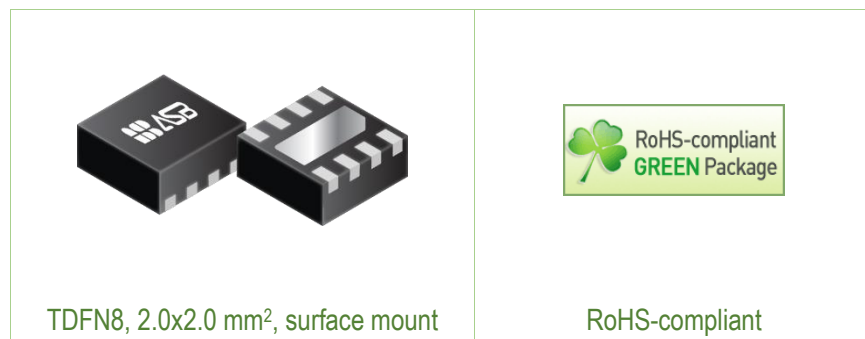
#### 1.2 Features

- 18 dB Gain at 900 MHz
- 21 dBm P1dB at 900 MHz
- 38 dBm Output IP3 at 900 MHz
- 0.37 dB NF at 900 MHz
- Current adjustable with R2 (in application circuit 3.1)
- MTTF > 100 Years
- Single Supply: +3 ~ +5 V

#### 1.3 Applications

- Low Noise Amplifier for LTE, GSM, CDMA, GPS, PCS, and WCDMA
- Other Low Noise Application

#### 1.4 Package Profile & RoHS Compliance



## 2. Summary on Product Performances

### 2.1 Typical Performance

Supply voltage = +5 V, T<sub>A</sub> = +25 °C, Z<sub>O</sub> = 50 Ω.

Parameter	Typical									Unit
Frequency	500	600	700	900	1000	1200	1500	1800	2000	MHz
Noise Figure	0.50	0.45	0.35	0.37	0.45	0.55	0.65	0.80	1.00	dB
Gain	22.5	21.2	20.0	18.0	17.5	16.0	14.5	13.0	12.4	dB
S11	-15.0	-18.0	-20.0	-18.0	-17.0	-17.0	-18.0	-20.0	-20.0	dB
S22	-18.0	-20.0	-20.0	-20.0	-20.0	-20.0	-20.0	-20.0	-20.0	dB
Output IP3 <sup>1)</sup>	33.0	35.0	37.0	38.0	37.0	34.0	32.0	32.0	31.0	dBm
Output P1dB	21.0	21.0	21.0	21.0	21.0	21.0	20.0	18.0	17.0	dBm
Current	57									mA
Device Voltage	+4.5									V

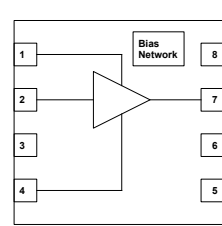
1) OIP3 is measured with two tones at the output power of +4 dBm/tone separated by 1 MHz.

### 2.2 Product Specification

Supply voltage = +5 V, T<sub>A</sub> = +25 °C, Z<sub>O</sub> = 50 Ω.

Parameter	Min	Typ	Max	Unit
Frequency		900		MHz
Noise Figure		0.37	0.50	dB
Gain	17.0	18.0		dB
S11	-16	-18		dB
S22	-16	-18		dB
Output IP3	36	38		dBm
Output P1dB	20	21		dBm
Current	50	57	65	mA
Device Voltage		+4.5		V

### 2.3 Pin Configuration

Pin	Description	Simplified Outline
1	Bias	
2	RF_IN	
7	RF_OUT	
3,4,5,6,8	NC or GND	
Backside paddle	GND	

## 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	+150 °C
Input RF Power (CW, 50 Ω matched)	+24 dBm

## 2.5 Thermal Resistance

Symbol	Description	Typ	Unit
R <sub>th</sub>	Thermal resistance from junction to lead	80	°C/W

## 2.6 ESD Classification & Moisture Sensitivity Level

### ESD Classification

HBM	Class 1A	Voltage Level: 400 V
MM	Class A	Voltage Level: 50 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.

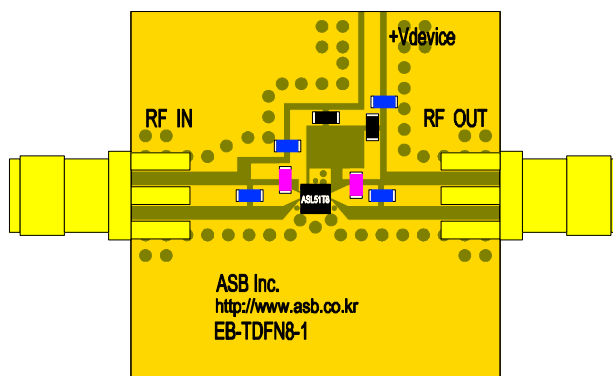
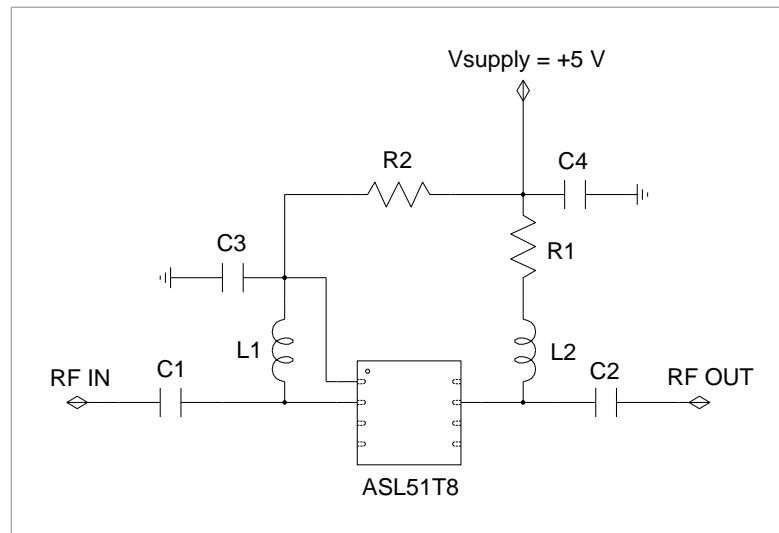
### Moisture Sensitivity Level

MSL 3 at 260 °C reflow
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*(Intentionally Blanked)*

## 3. Application: 500 ~ 2000 MHz ( $V_{supply} = +5 V$ )

### 3.1 Application Circuit & Evaluation Board



PCB Information	
Material	FR4
Thickness (mm)	0.8
Size (mm)	25x25
EB No.	EB-TDFN8-1

#### Bill of Material

Symbol	Value	Size	Description	Manufacturer
ASL51T8	-	-	MMIC Amplifier	ASB
C1, C2	100 pF	0603	DC blocking capacitor	Murata
C3	100 pF	0603	Decoupling capacitor	Murata
C4	1 $\mu$ F	0603	Decoupling capacitor	Murata
L1	18 nH	0603	RF choke inductor	Murata
L2	27 nH	0603	RF choke inductor	Murata
R1	10 $\Omega$	0603	Bias resistor	Samsung
R2	6.2 k $\Omega$	0603	Current adjust resistor	Samsung

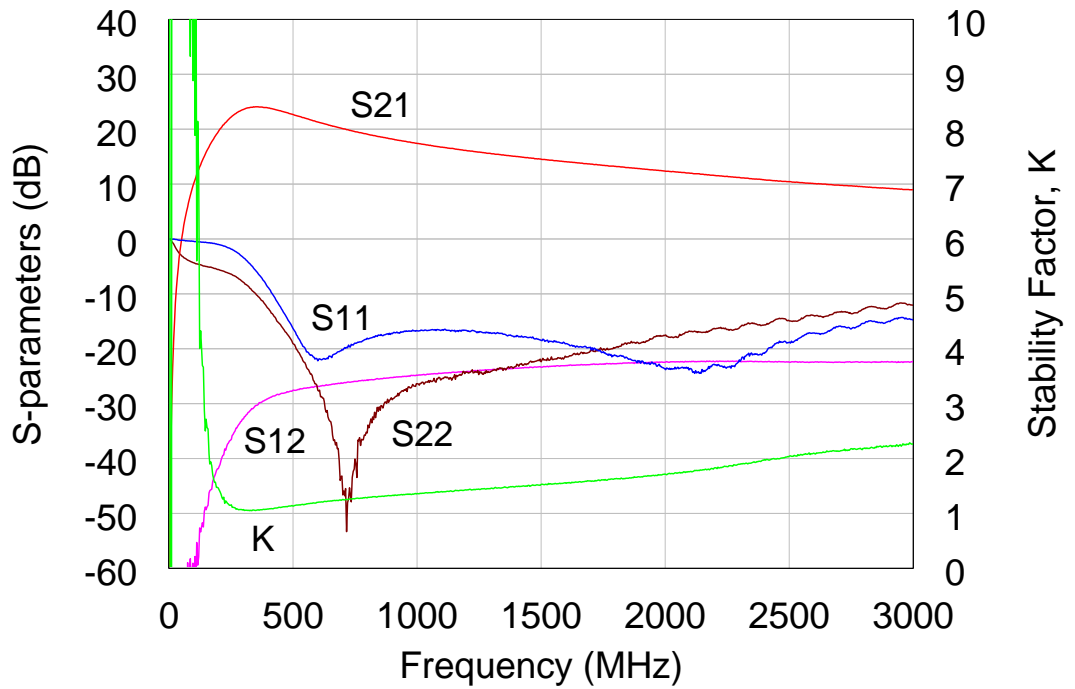
### 3.2 Performance Table

Supply voltage = +5 V, T<sub>A</sub> = +25 °C, Z<sub>O</sub> = 50 Ω.

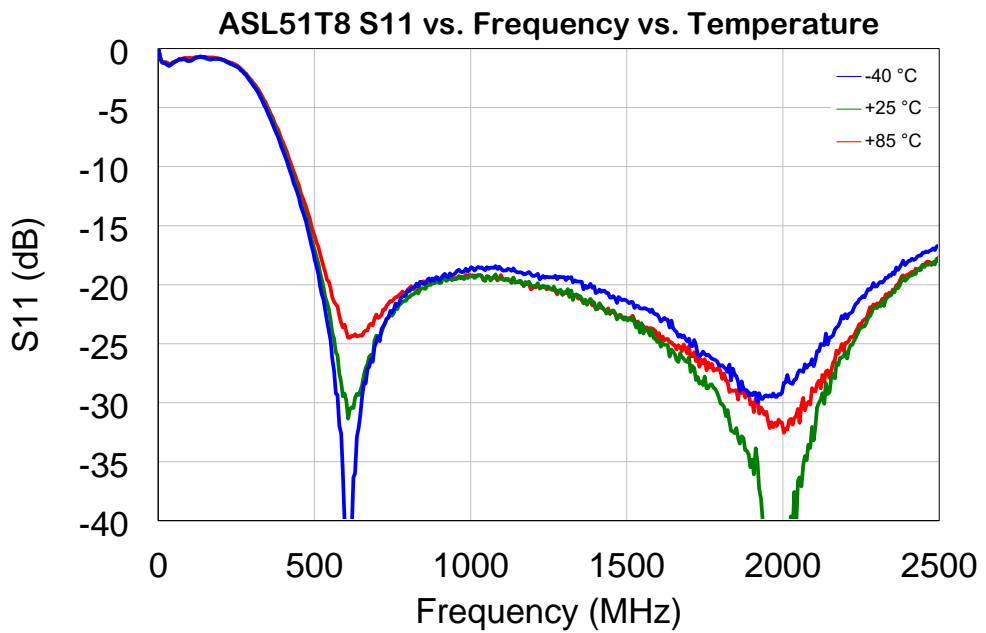
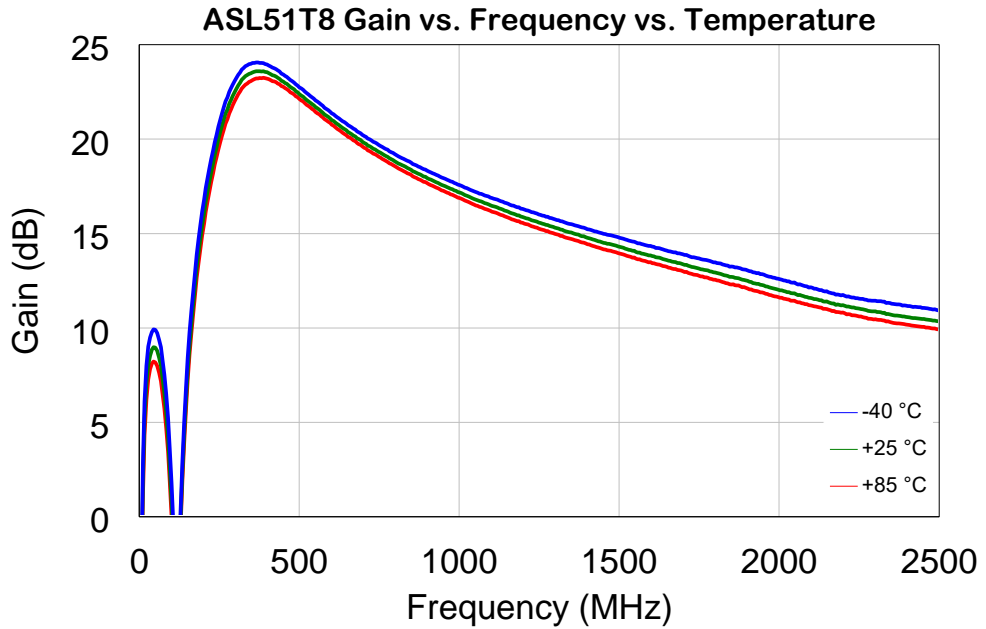
Parameter	Typical										Unit
Frequency	500	600	700	900	1000	1200	1500	1800	2000		MHz
Noise Figure	0.50	0.45	0.35	0.37	0.45	0.55	0.65	0.80	1.00		dB
Gain	22.5	21.2	20.0	18.0	17.5	16.0	14.5	13.0	12.4		dB
S11	-15.0	-18.0	-20.0	-18.0	-17.0	-17.0	-18.0	-20.0	-20.0		dB
S22	-18.0	-20.0	-20.0	-20.0	-20.0	-20.0	-20.0	-20.0	-20.0		dB
Output IP3 <sup>1)</sup>	33.0	35.0	37.0	38.0	37.0	34.0	32.0	32.0	31.0		dBm
Output P1dB	21.0	21.0	21.0	21.0	21.0	21.0	20.0	18.0	17.0		dBm
Current	57										mA
Device Voltage	+4.5										V

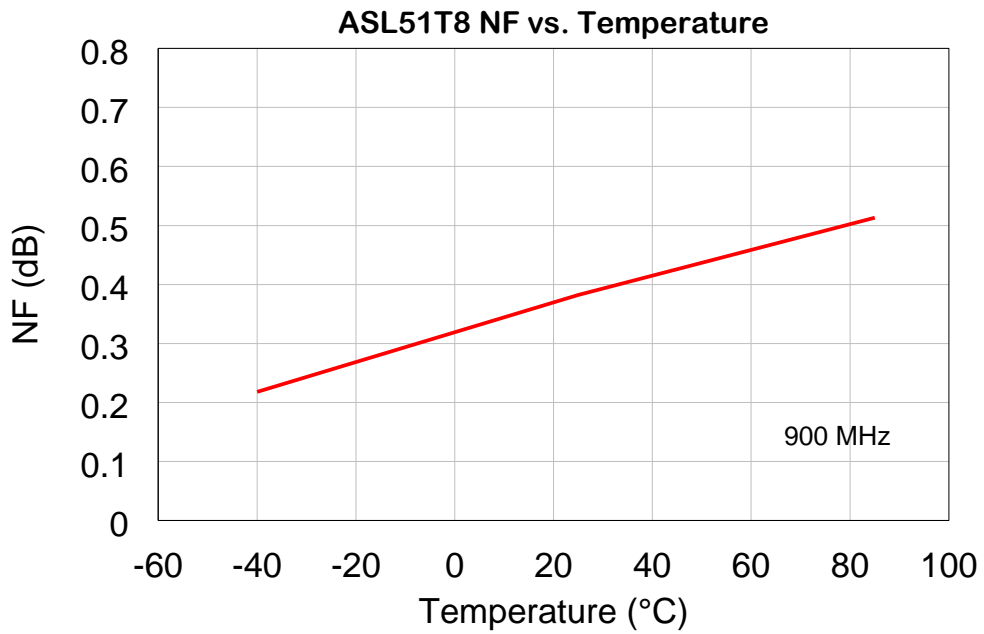
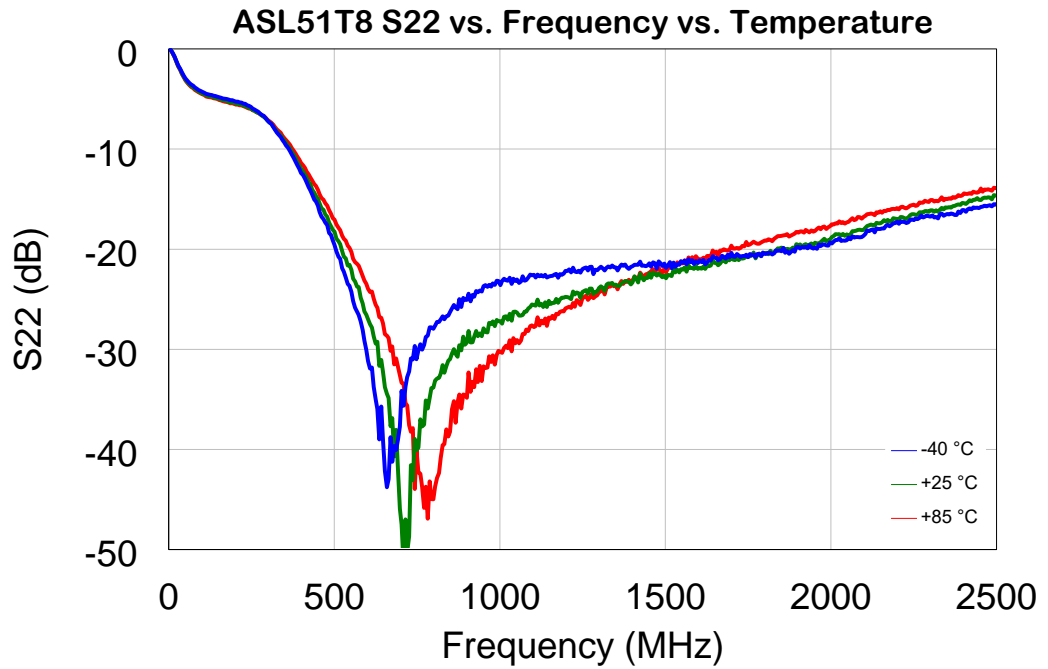
1) OIP3 is measured with two tones at the output power of +4 dBm/tone separated by 1 MHz.

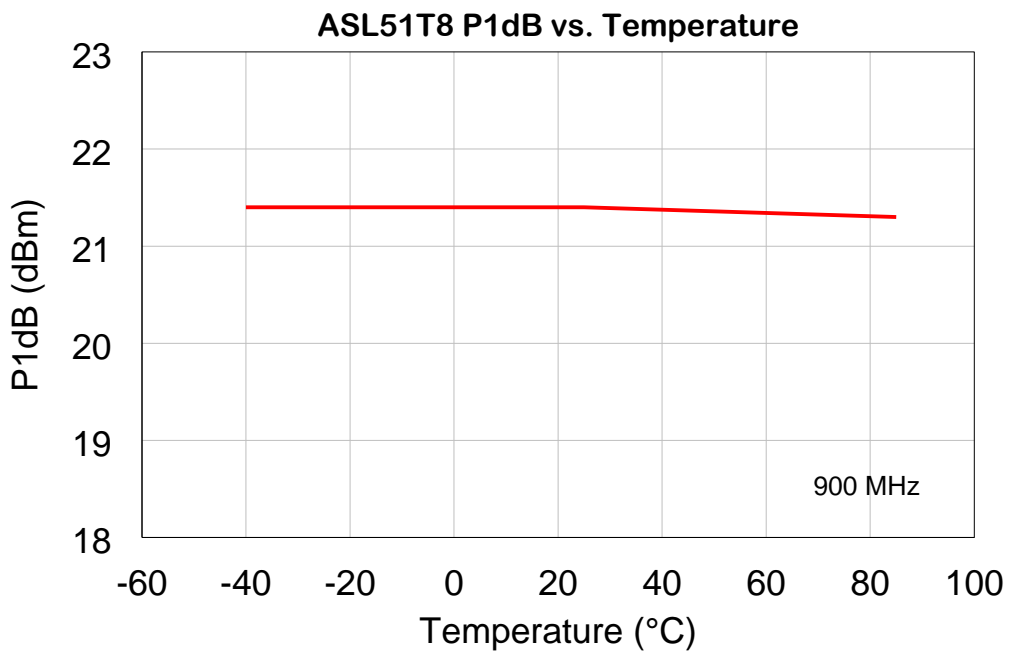
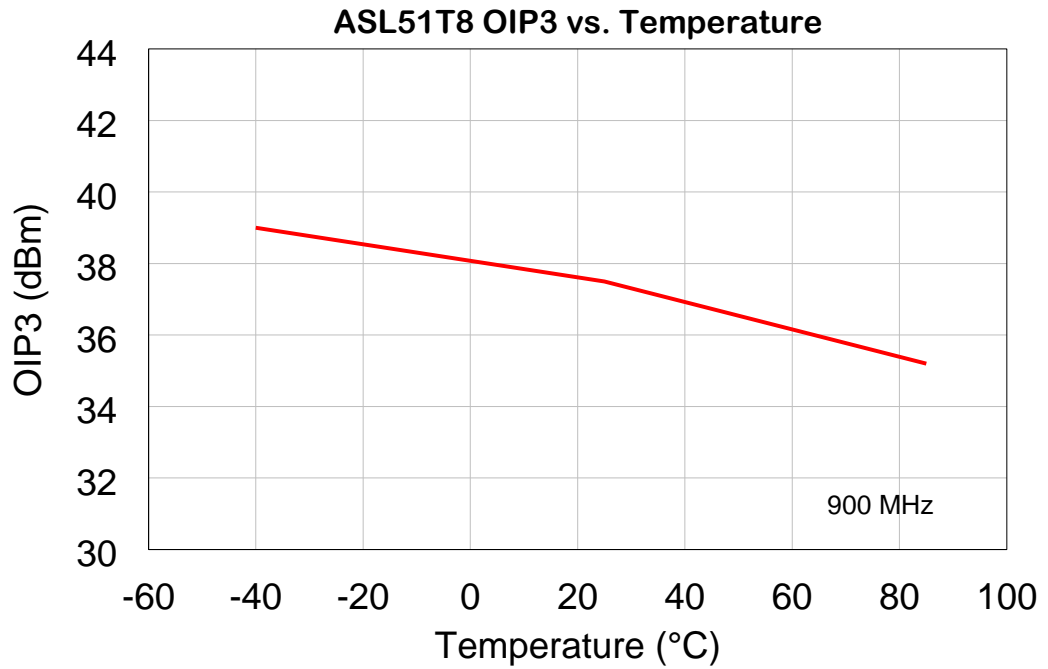
### 3.3 Plot of S-parameter & Stability Factor



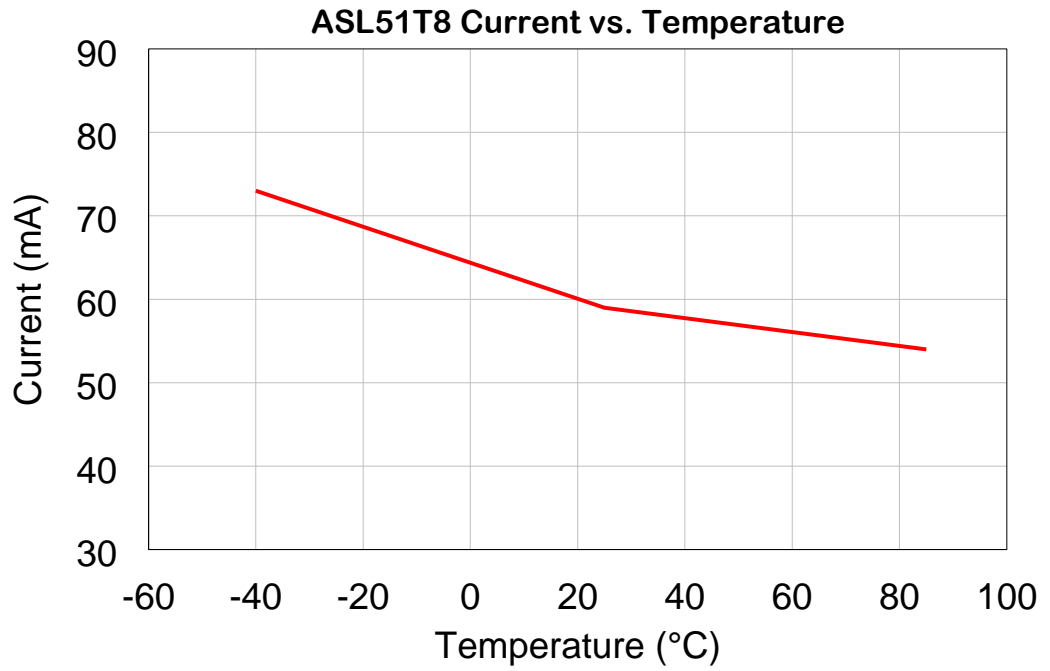
### 3.4 Plot of Noise Figure and Performance with Temperature





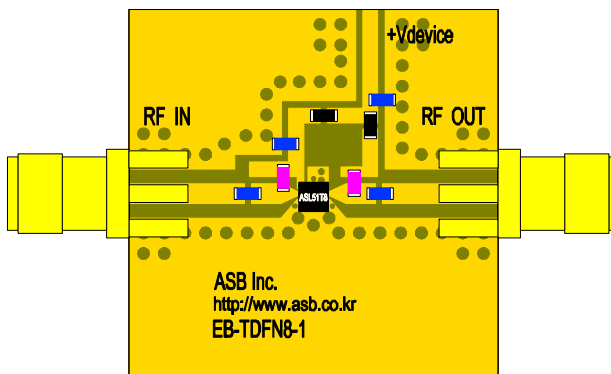
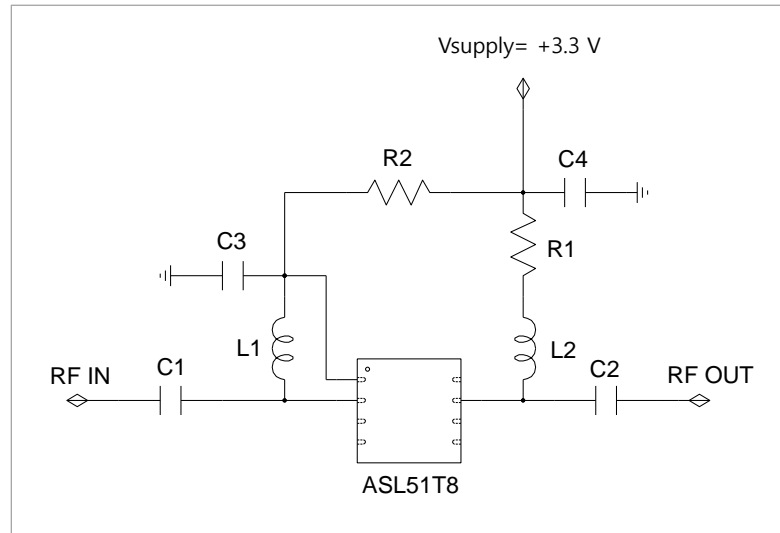






## 4. Application: 500 ~ 2000 MHz ( $V_{supply} = +3.3\text{ V}$ )

### 4.1 Application Circuit & Evaluation Board



PCB Information	
Material	FR4
Thickness (mm)	0.8
Size (mm)	25x25
EB No.	EB-TDFN8-1

#### Bill of Material

Symbol	Value	Size	Description	Manufacturer
ASL51T8	-	-	MMIC Amplifier	ASB
C1, C2	100 pF	0603	DC blocking capacitor	Murata
C3	100 pF	0603	Decoupling capacitor	Murata
C4	1 $\mu$ F	0603	Decoupling capacitor	Murata
L1	18 nH	0603	RF choke inductor	Murata
L2	27 nH	0603	RF choke inductor	Murata
R1	10 $\Omega$	0603	Bias resistor	Samsung
R2	3.6 k $\Omega$	0603	Current adjust resistor	Samsung

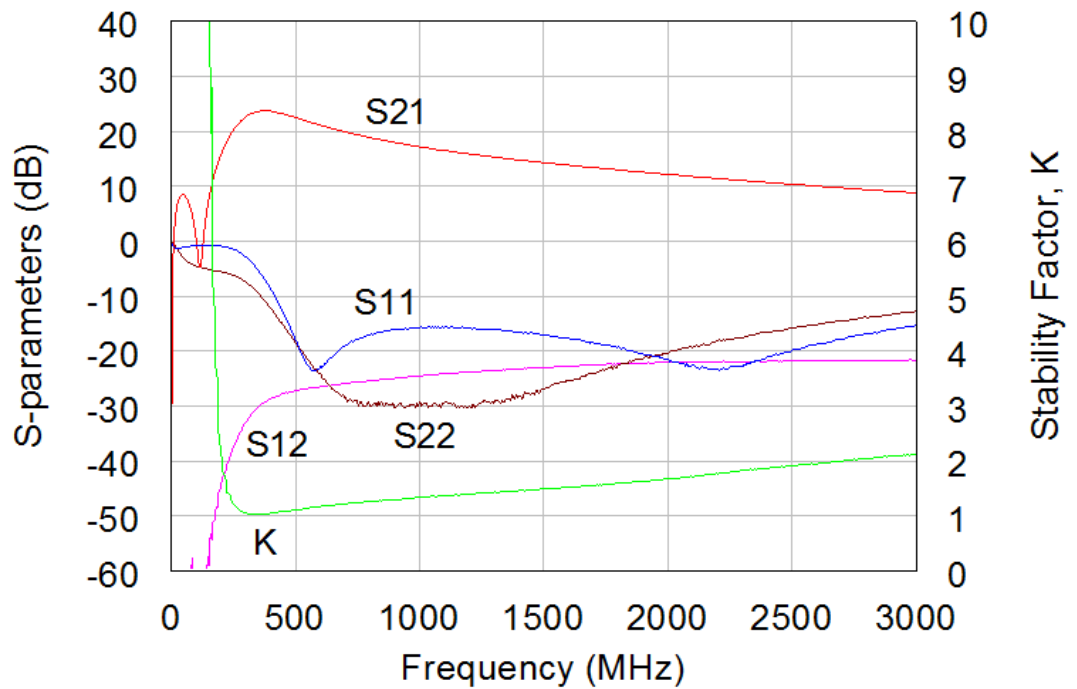
## 4.2 Performance Table

Supply voltage = +3.3 V,  $T_A = +25\text{ }^\circ\text{C}$ ,  $Z_0 = 50\ \Omega$ .

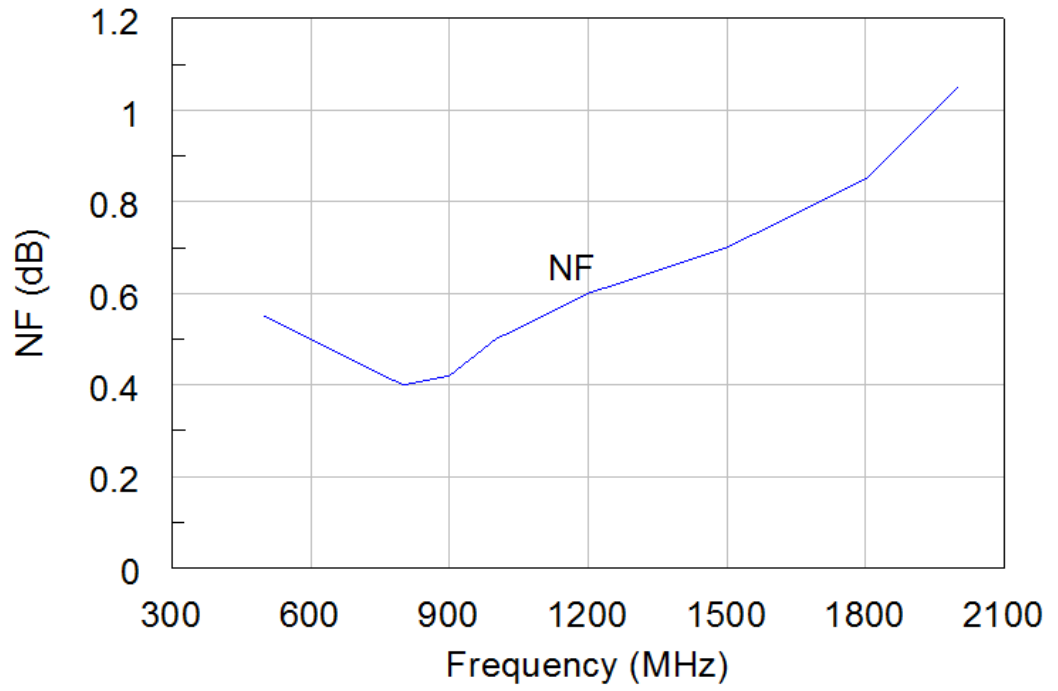
Parameter	Typical										Unit
Frequency	500	600	700	900	1000	1200	1500	1800	2000		MHz
Noise Figure	0.55	0.50	0.40	0.42	0.45	0.60	0.70	0.85	1.05		dB
Gain	22.5	21.2	20.0	18.0	17.2	15.9	14.3	13.0	12.2		dB
S11	-17.0	-20.0	-18.0	-15.0	-15.0	-15.0	-15.0	-18.0	-20.0		dB
S22	-17.0	-20.0	-20.0	-20.0	-20.0	-20.0	-20.0	-20.0	-18.0		dB
Output IP3 <sup>1)</sup>	33.0	35.0	36.0	36.0	34.0	31.0	28.0	27.0	26.0		dBm
Output P1dB	17.0	17.0	17.0	17.0	17.0	17.0	16.0	15.0	14.0		dBm
Current	54										mA
Device Voltage	+2.7										V

1) OIP3 is measured with two tones at the output power of +0 dBm/tone separated by 1 MHz.

## 4.3 Plot of S-parameter & Stability Factor

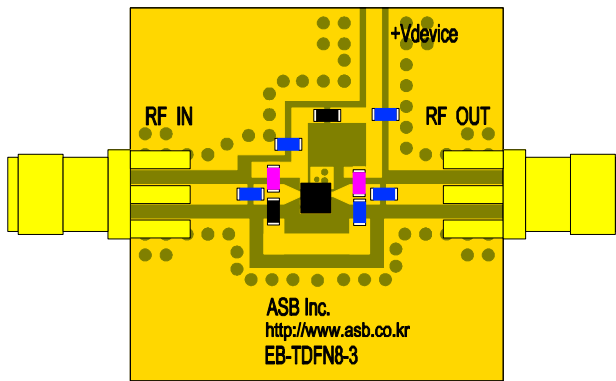
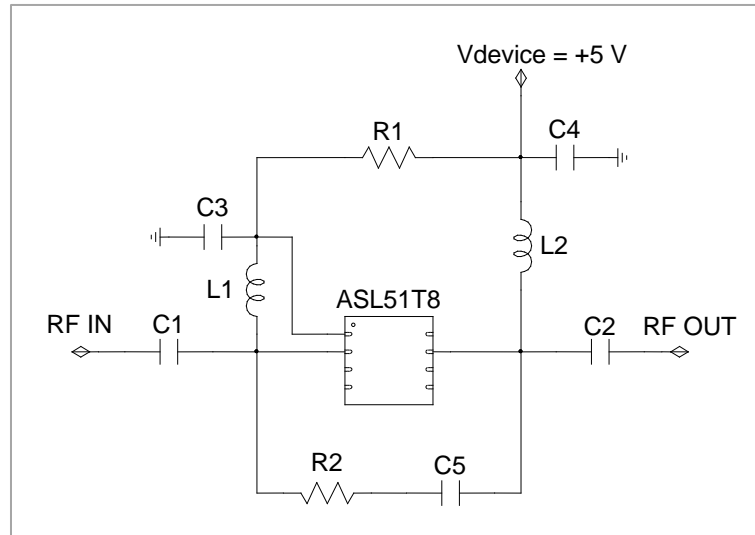


#### 4.4 Plot of Noise Figure



## 5. Application: 50 ~ 950 MHz ( $V_{\text{supply}} = +5.0 \text{ V}$ )

### 5.1 Application Circuit & Evaluation Board



PCB Information	
Material	FR4
Thickness (mm)	0.8
Size (mm)	25x25
EB No.	EB-TDFN8-1

#### Bill of Material

Symbol	Value	Size	Description	Manufacturer
ASL51T8	-	-	MMIC Amplifier	ASB
C1, C2	1 nF	0603	DC blocking capacitor	Murata
C3	100 pF	0603	Decoupling capacitor	Murata
C4	1 $\mu$ F	0603	Decoupling capacitor	Murata
L1	220 nH	0603	RF choke inductor	Murata
L2	220 nH	0603	RF choke inductor	Murata
R1	7.5 k $\Omega$	0603	Current adjust resistor	Samsung
R2	820 $\Omega$	0603	Current adjust resistor	Samsung

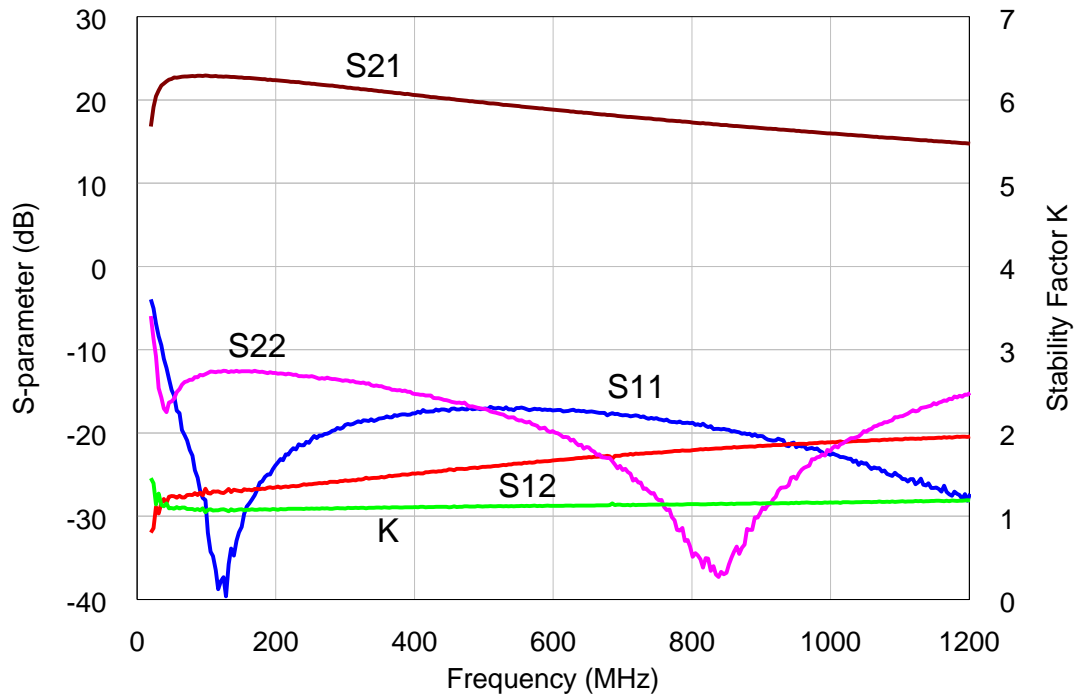
## 5.2 Performance Table

Supply voltage = +5 V,  $T_A = +25\text{ }^\circ\text{C}$ ,  $Z_0 = 50\ \Omega$ .

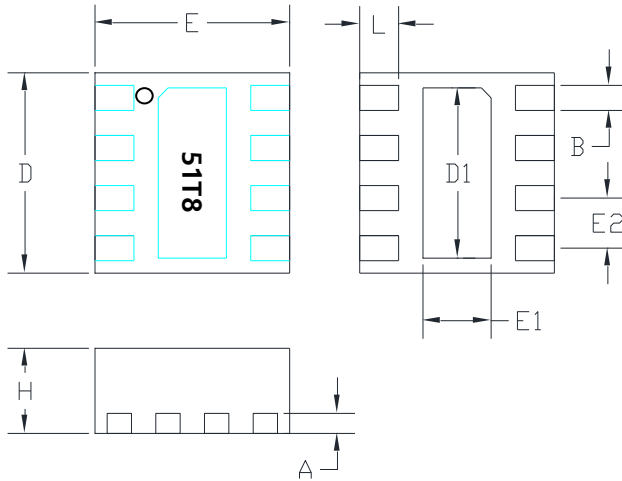
Parameter	Typical			Unit
Frequency	60	500	950	MHz
Noise Figure	1.0	0.85	0.75	dB
Gain	22.6	19.6	16.2	dB
S11	-18.0	-15.0	-18.0	dB
S22	-10.0	-15.0	-18.0	dB
Output IP3 <sup>1)</sup>	27.0	29.0	31.0	dBm
Output P1dB	19.0	20.0	21.0	dBm
Current	51			mA
Device Voltage	+5.0			V

1) OIP3 is measured with two tones at the output power of +0 dBm/tone separated by 1 MHz.

## 5.3 Plot of S-parameter & Stability Factor

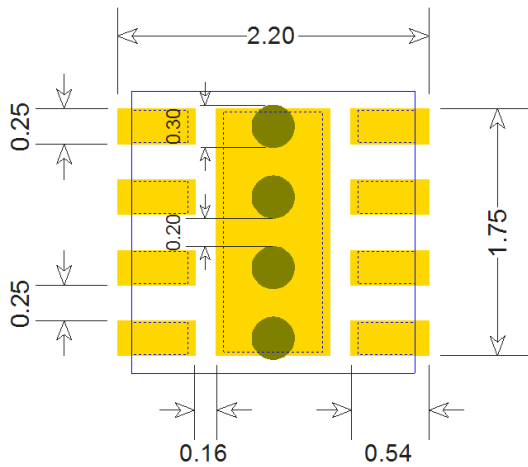


## 6. Package Outline (TDFN8)



Symbols	Dimensions (In mm)		
	MIN	NOM	MAX
A	-	0.20REF	-
B	0.18	0.23	0.28
D	1.95	2.00	2.03
D1	-	1.7BSC	-
E	1.95	2.00	2.03
E1	-	0.7BSC	-
E2	-	0.5BSC	-
L	0.35	0.40	0.45
H	0.80	0.85	0.90

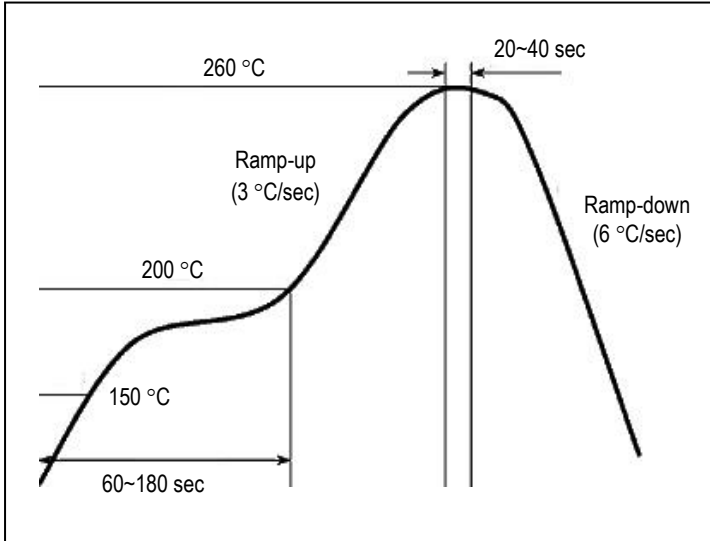
## 7. Surface Mount Recommendation (In mm)



### NOTE

1. We recommend that the ground via holes be placed on the bottom of exposed pad of the device for better RF and thermal performance, as shown in the drawing at the left side.

## 8. Recommended Soldering Reflow Profile



*(End of Datasheet)*

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