



## **MXD8011H**

# **LTE Low Noise Amplifier with Bypass Mode**

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## General Description

MXD8011H high gain, low noise amplifier (LNA) is dedicated to LTE middle band and high band receive. This product has two operation modes, low noise mode and bypass mode.

MXD8011H works under a 1.6V to 3.0V single power supply while consumes 7 mA current in low noise mode, in bypass mode, the power consumption will be reduced to less than 1uA.

MXD8011H uses a small 1.1mmx0.7mmx0.45mm LGA 6-pin package.

## Applications

LTE DRX  
Cell Phone with LTE  
MID/PAD with LTE

## Features

- Frequency range from 1.8GHz to 2.7GHz
- Two operation modes
  - Low noise mode:
    - 14dB gain, 0.8dB noise figure at 1800MHz to 2200MHz;
    - 13dB gain, 0.9dB noise figure at 2300MHz to 2700MHz
  - Bypass mode: 2 dB insertion loss, 15dBm input P1dB
- Low noise mode current 7 mA & bypass mode current less than 1uA
- Single supply voltage range 1.6V to 3.0V
- Small package 1.1mmx0.7mmx0.45mm
- Low cost BOM
- Lead-Free and RoHS-Compliant

## Pin Configuration/Application Diagram (Top view)

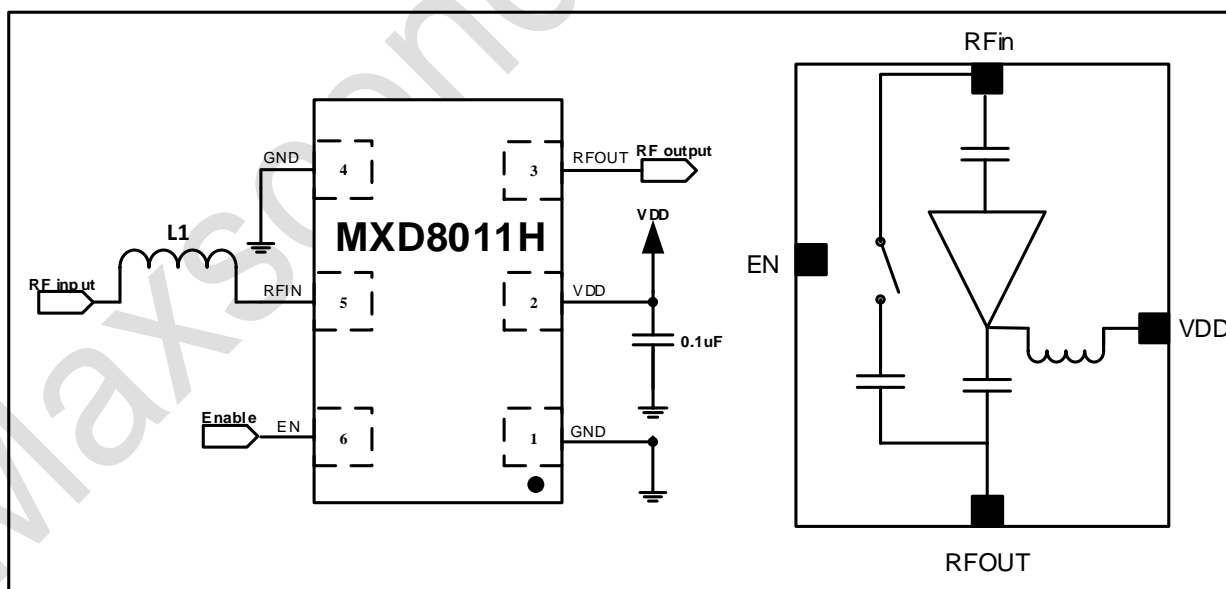


Figure 1 MXD8011H application circuit

## Absolute Maximum Ratings

Table 1.

Parameters	Range	Units
Power supply	-0.3 ~ 3	V
Other Pin to GND	-0.3~VDD+0.3	V
Maximum RF Input Power	10	dBm
Operation Temperature Range	-40~85	°C
Junction Temperature	150	°C
Storage temperature Range	-65~160	°C
Lead Temperature (soldering)	260	°C
Soldering Temperature (reflow)	260	°C
Human Body Mode ESD	-1500~+1500	V
Machine Mode ESD	-100~+100	V
Charge Device Mode ESD	-500~+500	V

## Specifications

### DC Characteristics

Typically  $T_A=25^{\circ}\text{C}$  VDD=2.8V, unless otherwise noted

Table 2.

Parameters	Condition	Min	Typ	Max	Units
Supply Voltage		1.6	2.8	3.0	V
Supply Current	EN=High		7		mA
	EN=Low		1		uA
EN Input High		0.8			V
EN Input Low				0.6	V

## AC Characteristics

All AC characteristics are measured on Maxscend's EVB, unless otherwise noted. Typically  $T_A=25^{\circ}\text{C}$   
 $V_{DD}=2.8\text{V}$

### Low noise mode characteristics

**Table 3 Middle Band Specifications**

EN = high, low noise mode. L1 = 4.3nH, input matching to Middle band only

Parameters	Conditions	Min	Typ	Max	Units
RF Frequency Range	None	1800		2200	MHz
Operation current			7		mA
Power Gain			14		dB
Noise Figure			0.8		dB
Input Return Loss		-6	-10		dB
Output Return Loss		-6	-10		dB
Reverse Isolation			-25		dB
VSWR			1.7		
Stability		1.5			dB
Input Power 1-dB Compression Point			-3		dBm
In-band Input 3 <sup>rd</sup> order intercept point	Note1		2		dBm
	Note2		2		
	Note3		3		
Out-of band Input 3 <sup>rd</sup> order intermodulation	Note4		-68		dBm
Input 2 <sup>nd</sup> order intercept intermodulation	Note5		-37		dBm

**Note1:** F1=1843MHz, F2=1844MHz, two tone input power -25dBm

**Note2:** F1=1960MHz, F2=1961MHz, two tone input power -25dBm

**Note3:** F1=2140MHz, F2=2141MHz, two tone input power -25dBm

**Note4:** F1=2700MHz, F2=2400MHz, two tone input power -25dBm, measure 3<sup>rd</sup> order intermodulation at 2100MHz

**Note5:** F1=2650MHz, F2=950MHz, two tone input power -25dBm, measure 2<sup>nd</sup> order intermodulation at 1700MHz

**Table 4 High Band Specifications**

EN = high, low noise mode. L1 = 3.9nH, input matching to High band only

Parameters	Conditions	Min	Typ	Max	Units
RF Frequency Range	None	2300		2700	MHz
Operation current			7		mA
Power Gain			13		dB
Noise Figure			0.9		dB
Input Return Loss		-6	-10		dB
Output Return Loss		-6	-10		dB
Reverse Isolation			-25		dB
VSWR			1.7		
Stability		1.5			dB
Input Power 1-dB Compression Point			0		dBm
In-band Input 3 <sup>rd</sup> order intercept point	Note6		3		dBm
	Note7		2		
Out-of band Input 3 <sup>rd</sup> order intermodulation	Note8		-67		dBm
Input 2 <sup>nd</sup> order intercept intermodulation	Note9		-38		dBm

**Note6:** F1=2350MHz, F2=2351MHz, two tone input power -25dBm

**Note7:** F1=2655MHz, F2=2656MHz, two tone input power -25dBm

**Note8:** F1=2100MHz, F2=2400MHz, two tone input power -25dBm, measure 3<sup>rd</sup> order intermodulation at 2700MHz

**Note9:** F1=950MHz, F2=1700MHz, two tone input power -25dBm, measure 2<sup>nd</sup> order intermodulation at 2650MHz

**Bypass mode AC characteristics**
**Table 5 Middle Band Specifications**

EN = low, low noise mode. L1 = 4.3nH, input matching to Middle band only

Parameters	Conditions	Min	Typ	Max	Units
RF Frequency Range	None	1800		2200	MHz
Operation current			1		uA
Insertion loss			2		dB
Input Return Loss			-15		dB
Output Return Loss			-10		dB
Input Power 1-dB Compression Point			+15		dBm

**Table 6 High Band Specifications**

EN = low, low noise mode. L1 = 3.9nH, input matching to High band only

Parameters	Conditions	Min	Typ	Max	Units
RF Frequency Range	None	2300		2700	MHz
Operation current			1		uA
Insertion loss			2		dB
Input Return Loss		-7	-10		dB
Output Return Loss		-8	-10		dB
Input Power 1-dB Compression Point			+14		dBm

**Pin Descriptions**
**Table 7**

Pin	Pin Name	I/O	Pin Description
1	GND	AG	Analog VSS
2	VDD	AP	Power supply, 1.6~3.0V
3	RFOUT	AO	LNA output
4	GND	AG	Analog VSS
5	RFIN	AI	LNA input from antenna
6	EN	DI	Pull high into low noise mode, pull low into bypass mode

**Note:** DI (digital input), DO (digital output), DIO (digital bidirectional), AI (analog input), AO (analog output), AIO (analog bidirectional), AP (analog power), AG (analog ground)

Outline Dimensions

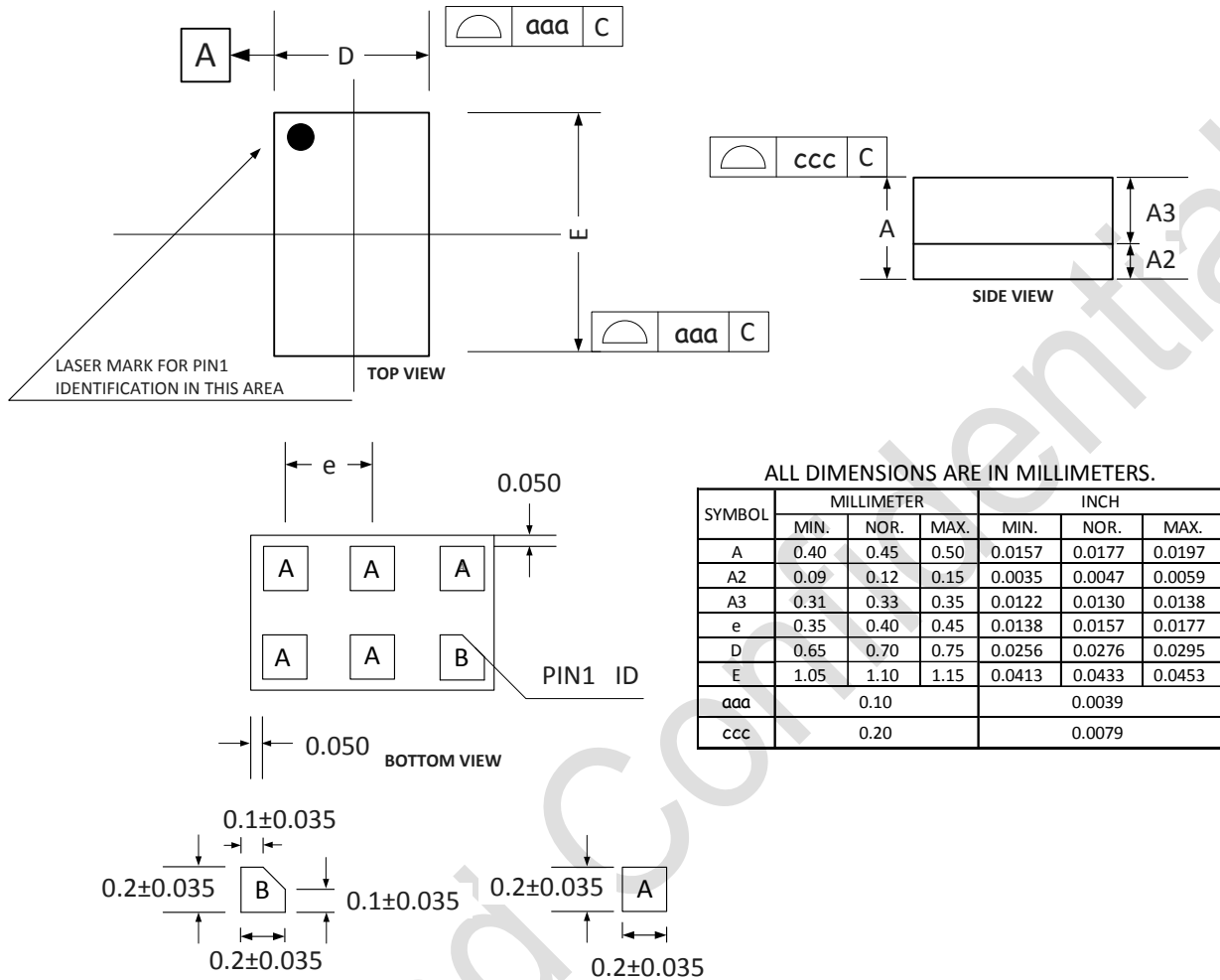


Figure 2 MXD8011H outline dimension

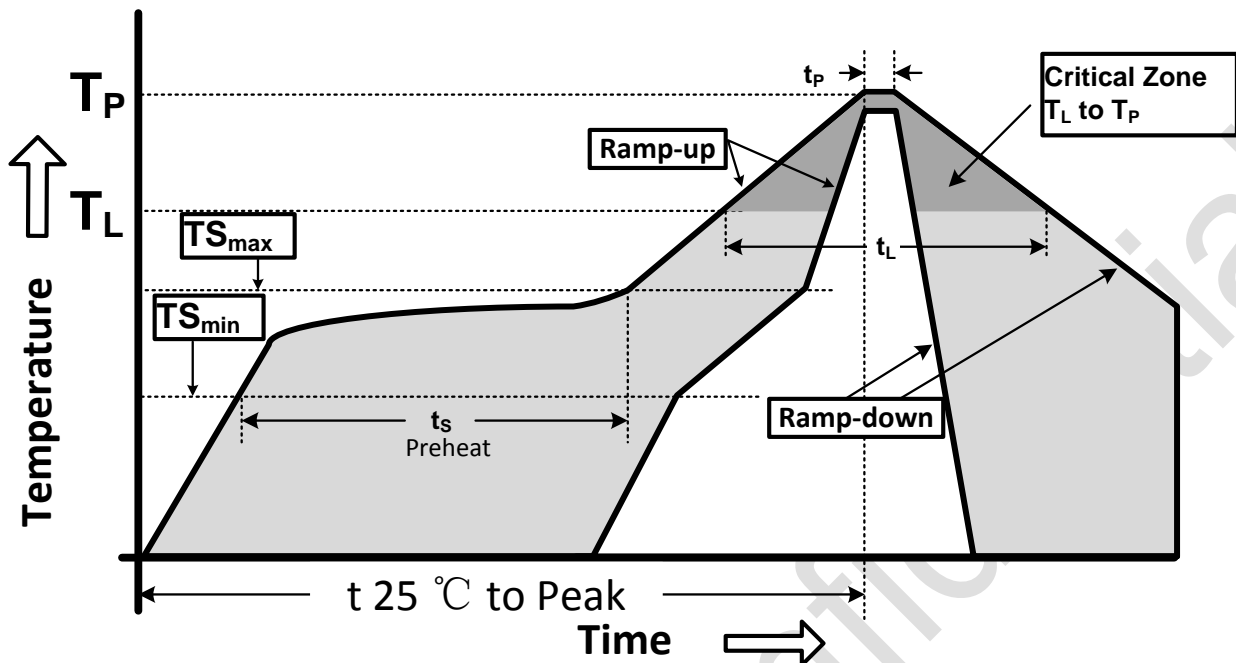
**Reflow Chart**


Figure 3 Recommended Lead-Free Reflow Profile

**Table 8 Reflow condition**

Profile Parameter	Lead-Free Assembly, Convection, IR/Convection
Ramp-up rate (TS <sub>max</sub> to T <sub>p</sub> )	3°C/second max.
Preheat temperature (TS <sub>min</sub> to TS <sub>max</sub> )	150°C to 200°C
Preheat time (t <sub>s</sub> )	60 - 180 seconds
Time above TL, 217°C (t <sub>L</sub> )	60 - 150 seconds
Peak temperature (T <sub>p</sub> )	260°C
Time within 5°C of peak temperature(t <sub>p</sub> )	20 - 40 seconds
Ramp-down rate	6°C/second max.
Time 25°C to peak temperature	8 minutes max.

**ESD Sensitivity**

Integrated circuits are ESD sensitive and can be damaged by static electric charge. Proper ESD protection techniques should be used when handling these devices.

**RoHS Compliant**

This product does not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE), and are considered RoHS compliant.

1.3.2

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