MXD8011HF

LNA with Bypass Mode for LTE Mid-High Band

Description

MXD8011HF high gain, low noise amplifier (LNA) is dedicated to LTE middle band and high band receive using advanced RFCMOS process. This product has two operation modes, low noise mode and bypass mode.

MXD8011HF works under a 1.6V to 3.0V single power supply while consumes 7.5 mA current in low noise mode, in bypass mode, the power consumption will be reduced to less than 1uA.

MXD8011HF uses a small 1.1mm×0.7mm×0.45mm LGA 6-pin package.

Applications

- LTE high-mid band receiving

Features

- Broadband frequency range: 1.8 to 2.7 GHz
- High Gain
- 14.0 dB gain at 1.8GHz to 2.2GHz
- 13.0 dB gain at 2.3GHz to 2.7GHz
- Low noise figure
- 0.8 dB noise figure at 1.8GHz to 2.2GHz
- 0.9 dB noise figure at 2.3GHz to 2.7GHz
- Operation current 7.5 mA
- Small, LGA (6-pin, 1.1mm x 0.7mm x 0.45mm) package ，MSL1
- No DC blocking capacitors required.

Pin Configuration/Application Diagram

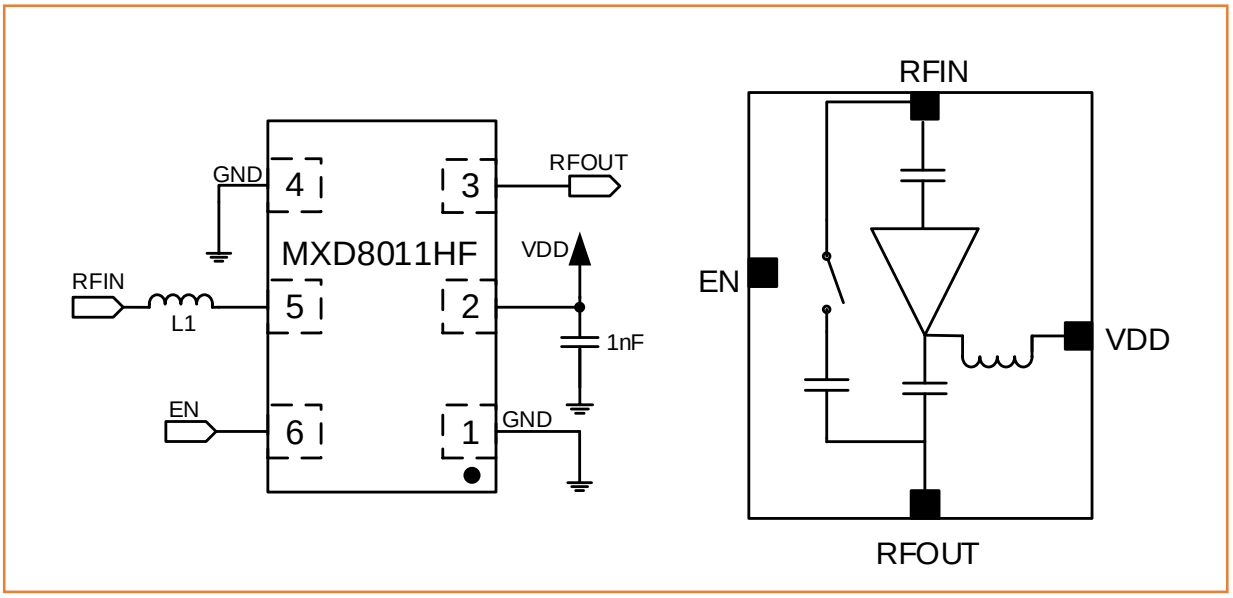


Figure 1 Pin Configuration/Application Diagram (Top View)

Table 1 Pin Descriptions

Pin No.	Name	I/O	Pin Description
1	GND	AG	Analog VSS
2	VDD	AP	Power supply
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),*

Table 2 Input matching inductance

Component	Matching Band	Vendor	Type	Part Number & value
L1	1800MHz – 2200MHz	Murata	Wired inductor, high Q	LQW15AN4N7, 4.7nH
		various	Ceramic inductor, low Q	4.3nH
	2300MHz – 2700MHz	Murata	Wired inductor, high Q	LQW15AN3N9, 3.9nH
		various	Ceramic inductor, low Q	3.6nH

Absolute Maximum Ratings

Table 3 Absolute Maximum Ratings

Parameters	Symbol	Ranges	Units
Supply voltage	V_{DD}	-0.3～+3.3	V
Digital control voltage	V_{CTL}	-0.3～VDD+0.3, Max:3.3	V
RF input power	P_{IN}	+22	dBm
Operating temperature	T_{OP}	-40～+90	℃
Storage temperature	T_{STG}	-65～+150	℃
Human Body Mode ESD	$ESD_{\_HBM}$	1500	V
Charge Device Mode ESD	$ESD_{\_CDM}$	1000	V

Note1: *Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to device with only one parameter set at the limit and all other parameters set at or below their nominal value. Exceeding any of the limits listed here may result in permanent damage to the device.*

Note2: *According to ESDA/JEDECJS-001-2014*

Note3: *According to ESDA/JEDECJS-002-2014*

DC Characteristics

Table 4 DC Electrical Specifications

Parameter	Symbol	Specification			Units	Test Condition
		Min.	Typ.	Max.		
Power supply	V_{DD}	1.6	2.8	3.0	V	
Supply current	I_{DD_HG}	5.5	7.5	11.0	mA	High Gain Mode VDD = 2.8V, VEN=high
Supply current	I_{DD_BY}	-	0.05	1.0	uA	Bypass Mode VDD = 2.8 V, VEN=low
Control Voltage High	V_{CTL_H}	1.0	1.8	VDD	V	
Control Voltage Low	V_{CTL_L}	0.0	0.0	0.3	V	

AC Characteristics

Typically TA=25℃ VDD=2.8V, All data measured on Maxscend’s EVB, unless otherwise noted

Table 5 High Gain mode Electrical Specifications

Parameter	Symbol	Specification			Units	Test Condition
		Min.	Typ.	Max.		
DC Specifications		1800	-	2700	MHz	
Power gain	G	12.5 11.5	14.0 13.0	15.5 14.5	dB dB	1800-2200MHz 2300-2700MHz
Noise figure	NF	-	0.8 0.9	1.4 1.5	dB dB	1800-2200MHz 2300-2700MHz
Input Return loss	|S11|	-	-10	-5	dB	1800 to 2700MHz
Output Return loss	|S22|	-	-10	-6	dB	1800 to 2700MHz
Stability factor	Kf	1.2	-	-		
Input 1 dB compression point	P1dB	-8 -4	-3 0	-	dBm dBm	1800 to 2200MHz 2300 to 2700MHz
Input IP3	IIP3	-2 -3 -3	3 2 2	-	dBm dBm dBm	Note1 Note2 Note3
Out-of band Input 3rd order intermodulation		-62 -61	-68 -67		dBm dBm	Note4 Note5
Input 2nd order intercept intermodulation		-32 -33	-37 -38		dBm dBm	Note6 Note7
Startup time		-	-	1	μs	Shutdown state to power on state

Note1: *Pin=Pin2=-25dBm, F1=1960MHz, F2=1961MHz*

Note2: *Pin=Pin2=-25dBm, F1=2100MHz, F2=2101MHz*

Note3: *Pin=Pin2=-25dBm, F1=2600MHz, F2=2601MHz*

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

Note5: *F1=2100MHz, F2=2400MHz, two tone input power -25dBm, measure 3rd order intermodulation at 2700MHz*

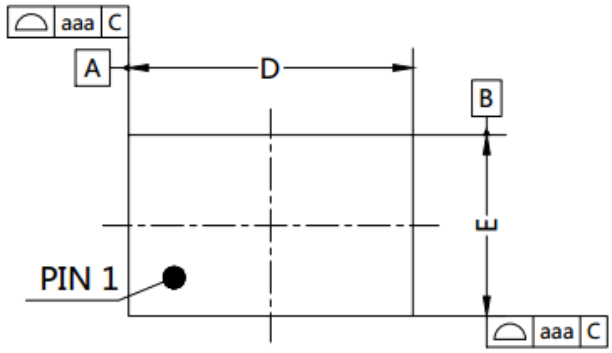
Note6: *F1=2650MHz, F2=950MHz, two tone input power -25dBm, measure 2nd order intermodulation at 1700MHz*

Note7: *F1=950MHz, F2=1700MHz, two tone input power -25dBm, measure 2nd order intermodulation at 2650MHz*

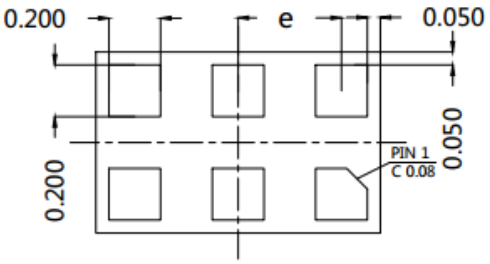
Table 6 Bypass Mode Electrical Specifications

Parameter	Symbol	Specification			Units	Test Condition
		Min.	Typ.	Max.		
Insertion loss	IL	-5	-2	-	dB	1800 to 2700MHz
Input Return loss	|S11|	-	-10	-6	dB	1800 to 2700MHz
Output Return loss	|S22|	-	-10	-6	dB	1800 to 2700MHz
Input 1 dB compression point	P1dB	10	15	-	dBm	1800 to 2700MHz

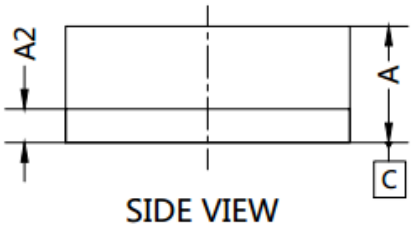
Package Outline Dimensions



TOP VIEW



BOTTOM VIEW



SIDE VIEW

SYMBOL	MILIMETER		
	MIN	NOM	MAX
A	0.400	0.450	0.500
A2	---	0.130	---
D	1.050	1.100	1.150
E	0.650	0.700	0.750
e	0.400 BSC		
aaa	0.100		

Figure 2 Package outline dimension

Marking Specifications

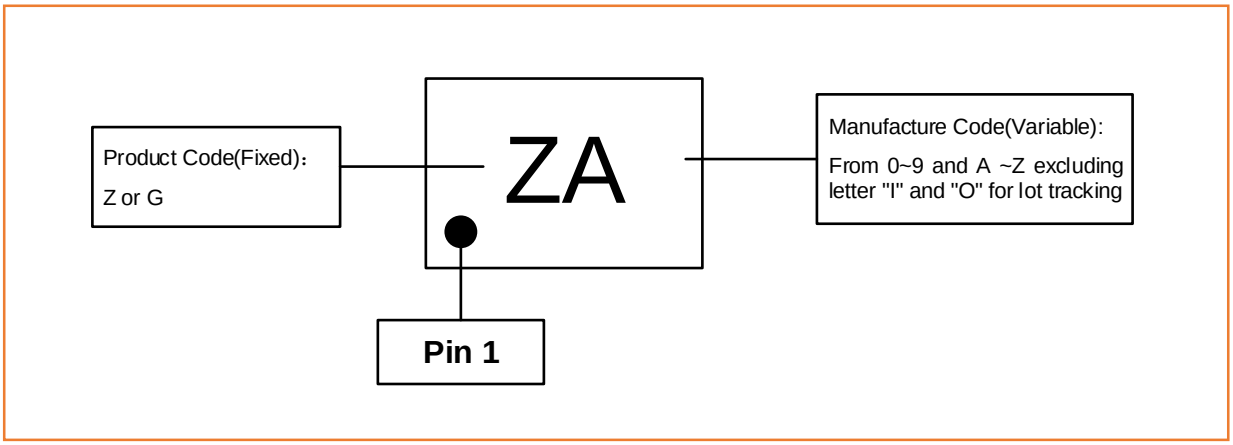
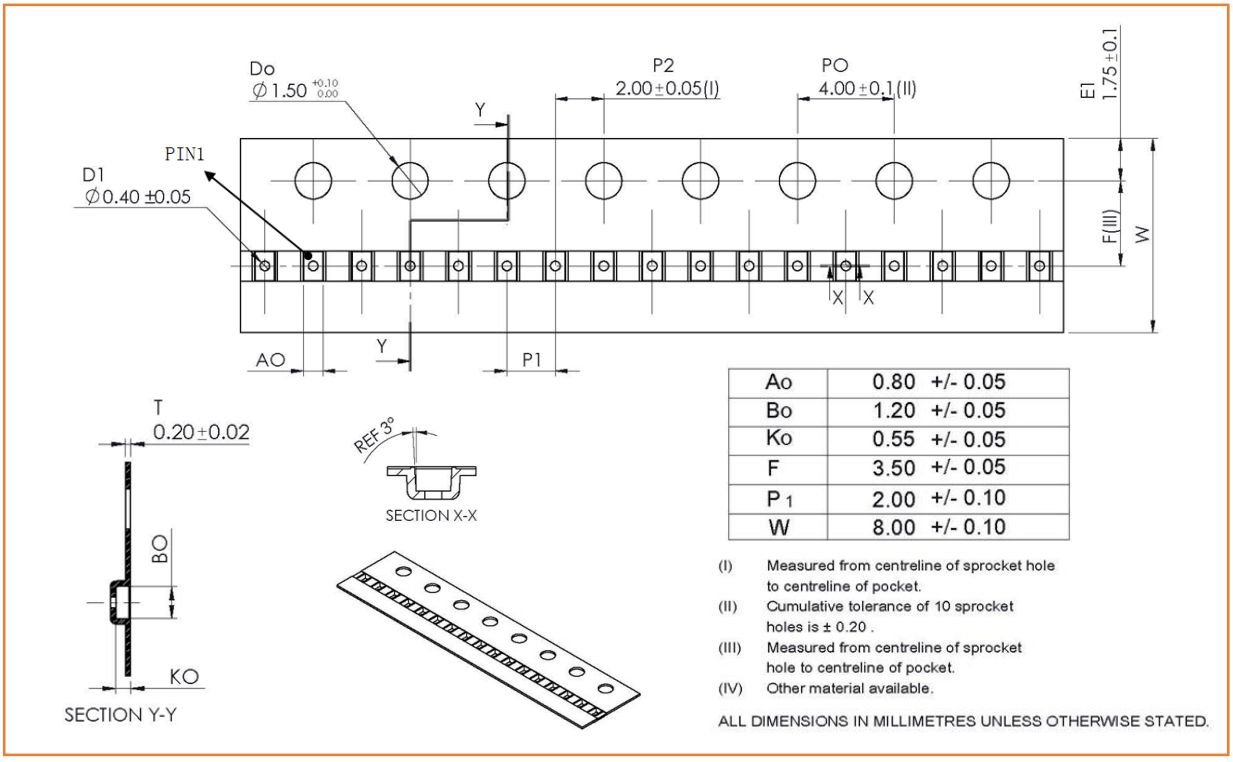


Figure 3 Marking Specification (Top View)

Tape and Reel Dimensions



Ao	0.80 +/- 0.05
Bo	1.20 +/- 0.05
Ko	0.55 +/- 0.05
F	3.50 +/- 0.05
P 1	2.00 +/- 0.10
W	8.00 +/- 0.10

Figure 4 **Tape and Reel Dimensions**

Reflow Chart

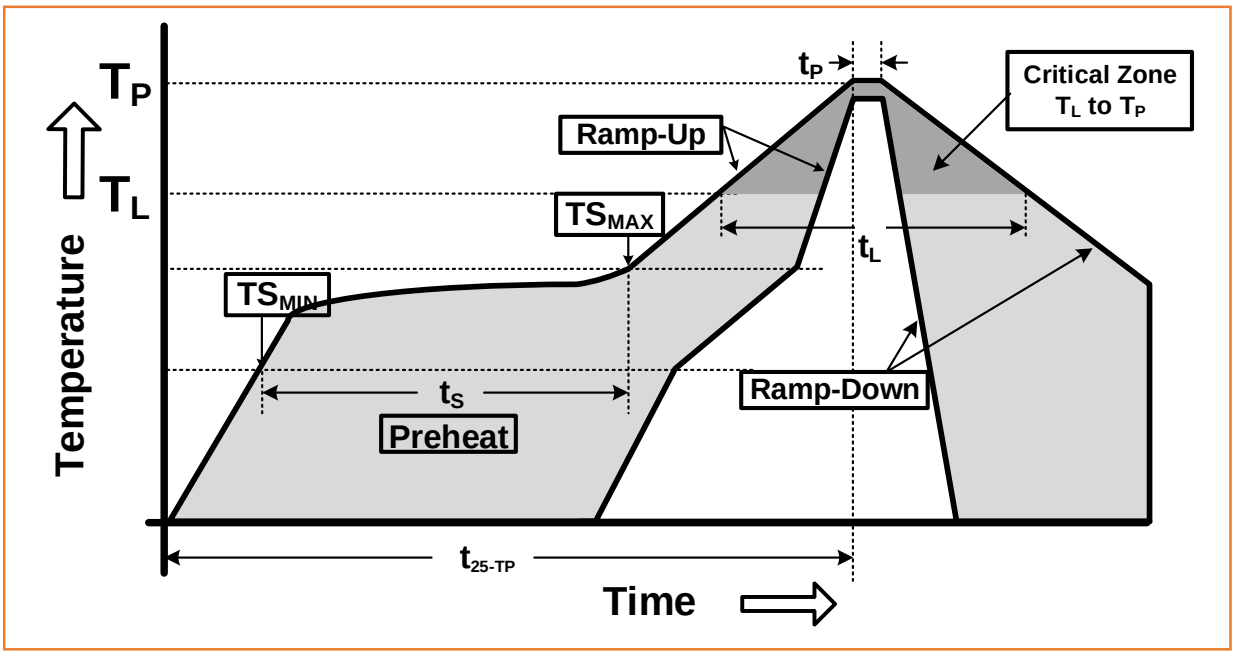


Figure 5 Recommended Lead-Free Reflow Profile

Table 7 Reflow Chart Parameters

Reflow Profile	Parameter
Preheat Temperature(TS_{MIN} to TS_{MAX})	150℃ to 200℃
Preheat Time(t_s)	60 to180 Seconds
Ramp-Up Rate(TS_{MAX} to T_P)	3℃/s MAX
Time Above T_L 217℃(t_L)	60 to 150 Seconds
Peak Temperature (T_P)	260℃
Time within 5℃ of Peak Temperature(t_P)	20 to 40 Seconds
Ramp-Down Rate(TS_{MAX} to T_P)	6℃/s MAX
Time for 25℃ to Peak Temperature($t_{25\text{-}TP}$)	8 Minutes MAX

ESD Sensitivity

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

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.