



MXD8116LE

SP6T LNA LTE RX Module



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General Description

The MXD8116LE is an LTE RX module integrated with a low noise, high gain LNA and low insertion loss SP6T, which is used for multi-input for LTE RX.

The MXD8116LE is compatible with +1.0V control logic, which is a key requirement for most cellular transceivers. This part is packaged in a compact 2mm x 2mm, 14-pin, QFN package which allows for a small solution size with no need for external DC blocking capacitors.

Features

- Operation frequency range: 720 to 970 MHz
- 17dB gain at 720 to 970 MHz
- Low noise figure:
 - 1.0 dB at 720MHz to 970 MHz
- Operation current 6mA
- Compact 2mm x 2mm in QFN-14 package , MSL1
- No DC blocking capacitors required

Applications

- LTE low band receiving

Functional Block Diagram and Pin Function

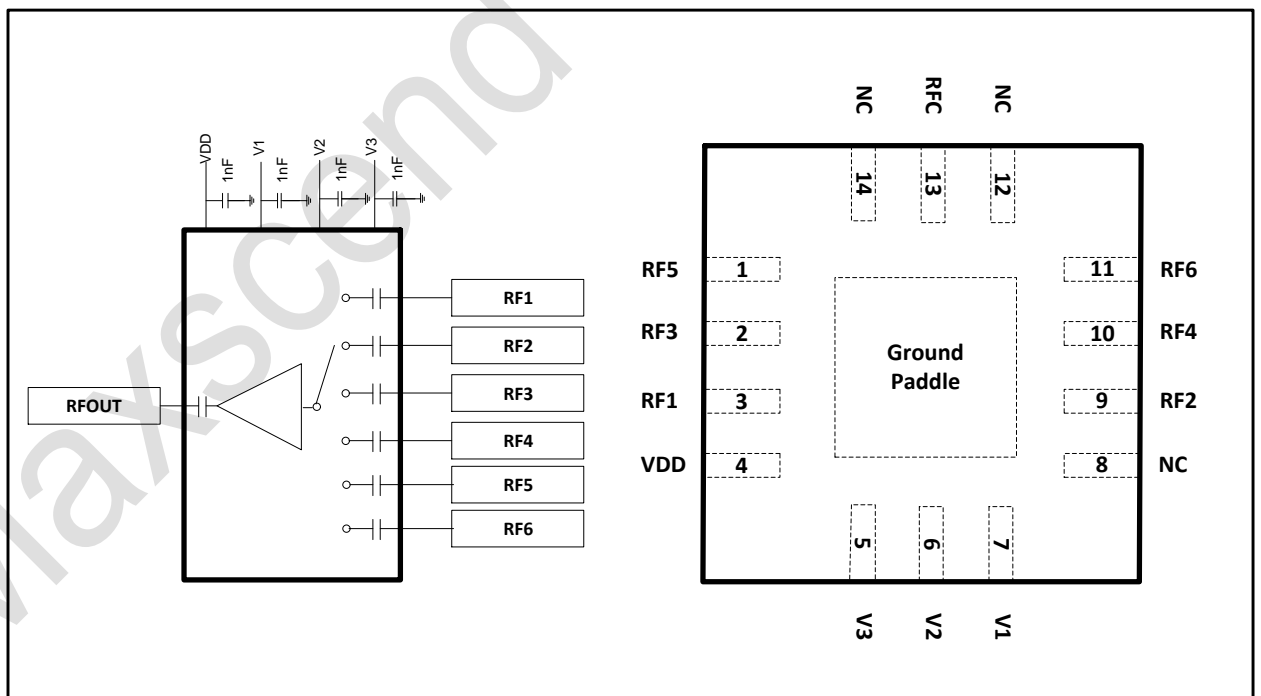


Figure 1 Functional Block Diagram and Pinout (Top View)

Application Circuit

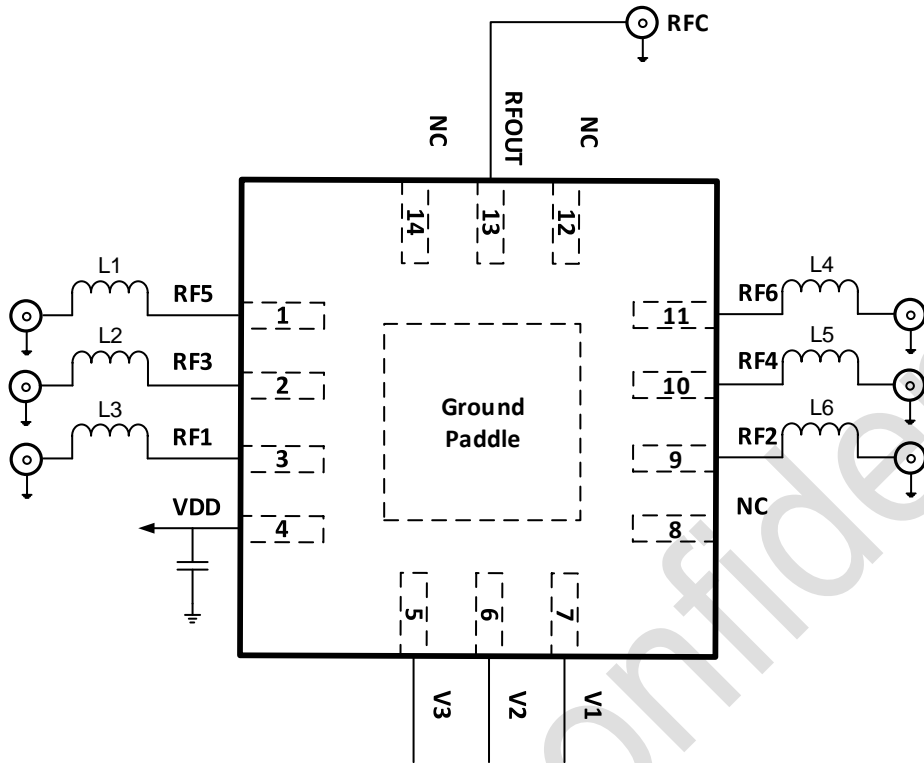


Figure 2 MXD8116LE Evaluation Board Schematic

Table 1. Pin Description

Pin No.	Name	Description	Pin No.	Name	Description
1	RF5	RF port 5	8	NC	No connection
2	RF3	RF port 3	9	RF2	RF port2
3	RF1	RF port 1	10	RF4	RF port4
4	VDD	Power supply	11	RF6	RF port6
5	V3	Digital control 3	12	NC	No connection
6	V2	Digital control 2	13	RFOUT	RF output
7	V1	Digital control 1	14	NC	No connection
Ground Paddle	GND	Ground			

Note: Bottom ground paddles must be connected to ground.

Table 2.

Component	Vendor	Type	Part Number & value
L1,L2,L3,L4,L5,L6	Murata	Wired inductor, high Q	LQW15AN33N, 33nH
	various	Ceramic inductor, low Q	30nH

Truth Table

Table 3.

V1	V2	V3	Active Path
0	0	0	RF1 active
0	0	1	RF2 active
0	1	0	RF3 active

0	1	1	RF4 active
1	0	0	RF5 active
1	0	1	RF6 active
1	1	1	Power down

Note: "1" = 1.0 V to 3.00 V. "0" = -0 V to +0.3 V.

Recommended Operation Range

Table 4.

Parameters	Symbol	Min	Typ	Max	Units
Operation Frequency	f1	720	-	970	MHz
Power supply	V _{DD}	2.5	2.8	3.0	V
Switch Control Voltage High	V _{CTL_H}	1.6	1.8	3.0	V
Switch Control Voltage Low	V _{CTL_L}	0	0	0.3	V

Specifications

Table 5. Electrical Specifications

Parameter	Symbol	Specification			Units	Test Condition
		Min.	Typical	Max.		
DC Specifications						
Control voltage: Low	V _{CTL_L}	0	+1.8	0.3	V	
High	V _{CTL_H}	1.60		3.00	V	
Supply voltage	V _{DD}	2.5	2.8	3.0	V	
Supply current	I _{DD}		6		mA	VDD = 2.8 V
Power down current	I _{PD}		1		uA	
RF Specifications						
Power gain	G	15	17	18.5	dB	720 to 970MHz
Noise figure	NF	-	1.0	1.5	dB	720 to 970MHz
Input Return loss	S11	-	-10	-5	dB	720 to 970MHz
Isolation(Active path gain – off path gain)	ISO	20	25	-	dB	720 to 970MHz
Output Return loss	S22	-	-10	-6	dB	720 to 970MHz
Input Power 1-dB Compression Point		-14	-11	-	dBm	720 to 970MHz
Switching on time		-	2	3	μs	50% VCTL to 10/90% RF
Switching off time		-	2	3	μs	50% VCTL to 90/10% RF
Startup time		-	5	6	μs	Shutdown state to any RF switch state

Absolute Maximum Ratings

Table 6. Maximum ratings

Parameters	Symbol	Minimum	Maximum	Units
Supply voltage	V _{DD}	+2.0	+3.3	V
Control voltage (V1, V2, and V3)	V _{CTL}	0	+3.0	V
RF input power (RF1 to RF6)	P _{IN}		+10	dBm
Operating temperature	T _{OP}	-35	+90	°C
Storage temperature	T _{STG}	-40	+125	°C
Electrostatic Discharge Human body model (HBM), Class 1C Machine Model (MM), Class A Charged device model (CDM), Class III	ESD_HBM ESD_MM ESD_CDM		1000 100 500	V

Note: 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

Package Outline Dimension

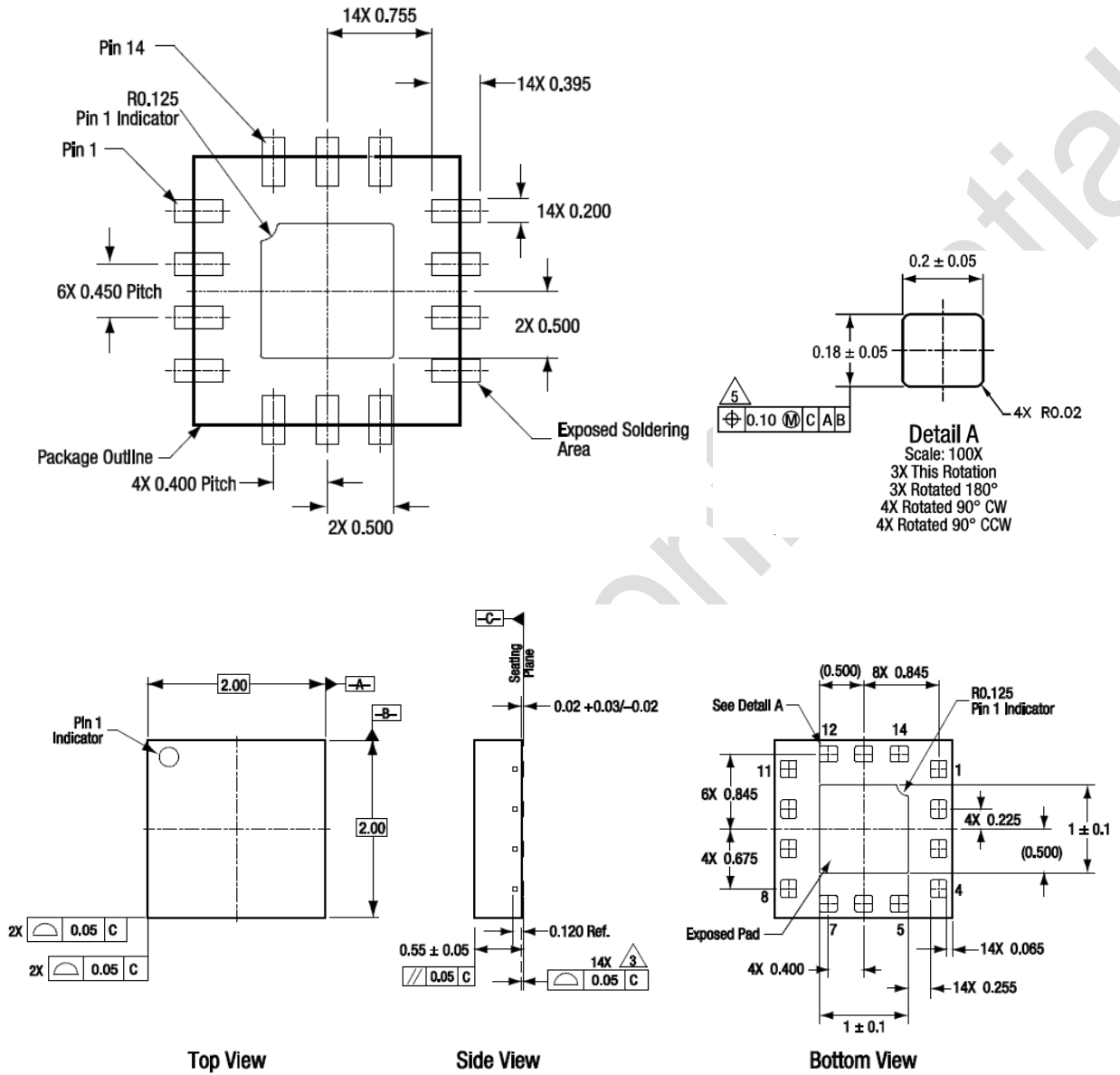


Figure 3 package outline dimension

Marking Specification

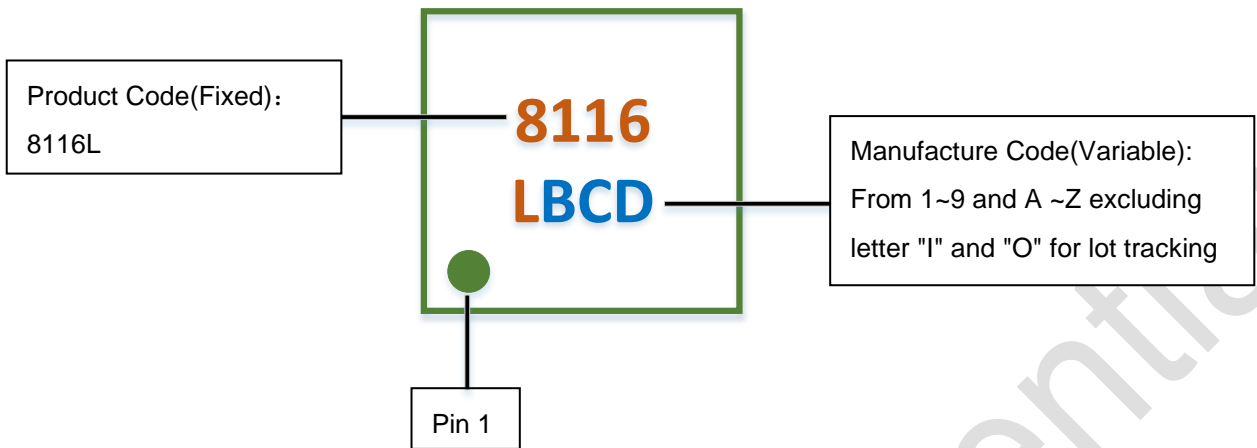


Figure 4 Marking specification (Top View)

Tape and Reel Dimensions

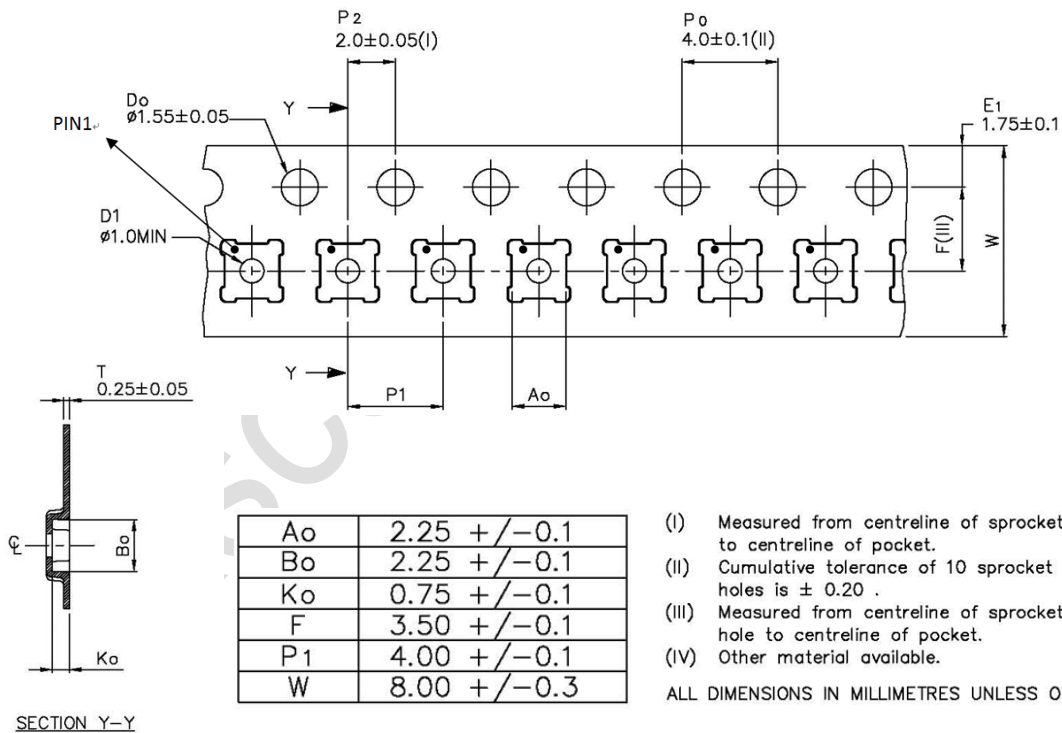


Figure 5 Tape and reel dimensions

Reflow Chart

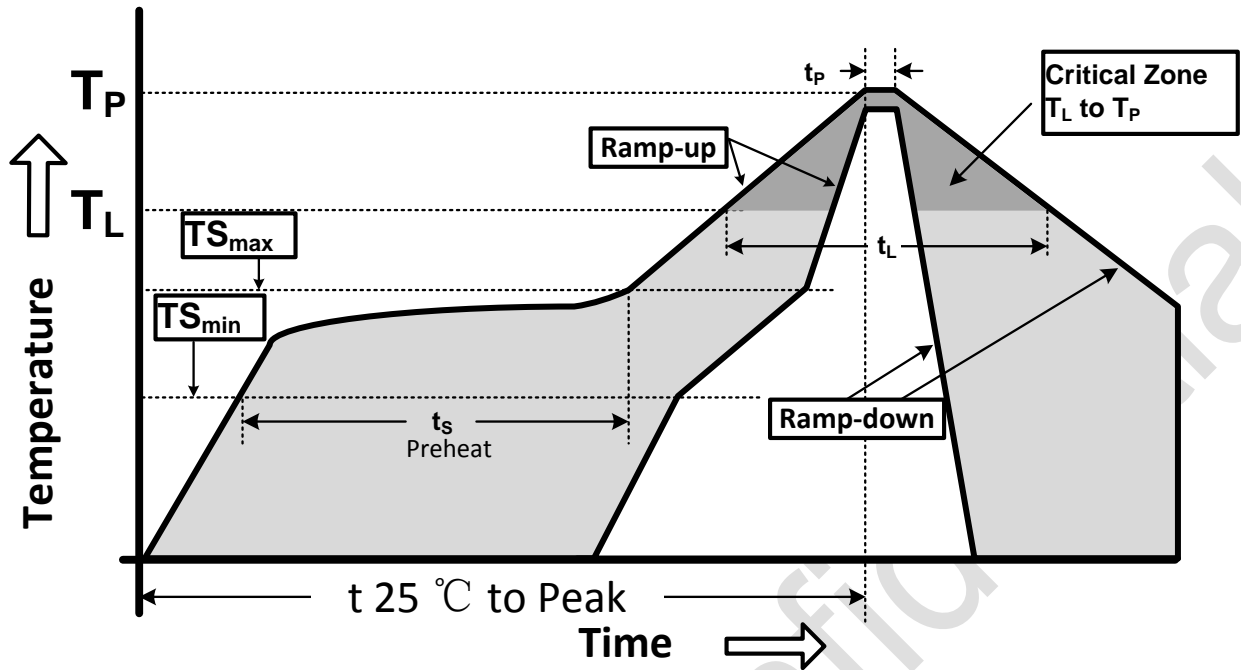


Figure 6 Recommended Lead-Free Reflow Profile

Table 7. Reflow condition

Profile Parameter	Lead-Free Assembly, Convection, IR/Convection
Ramp-up rate (TS_{max} to T_p)	3°C/second max.
Preheat temperature (TS_{min} to TS_{max})	150°C to 200°C
Preheat time (t_s)	60 - 180 seconds
Time above T_L , 217°C (t_L)	60 - 150 seconds
Peak temperature (T_p)	260°C
Time within 5°C of peak temperature(t_p)	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.