

## SiGe LNA for Global Navigation Satellite System (GNSS)

### Description

MXDLN16TL high gain, low noise amplifier (LNA) is dedicated to GPS, GLONASS Galileo and Beidou standards. This product has an extremely low noise figure of 0.7dB, 17dB gain and excellent linearity.

MXDLN16TL works under a 1.6V to 3.3V single power supply while consumes 0.8 mA current, in power down (PD) mode, the power consumption will be reduced to less than 1uA.

MXDLN16TL use a small 1.1mmx0.7mmx0.45mm LGA 6-pin package.

### Applications

- Automotive Navigation
- Personal Navigation Device (PND)
- Cell Phone with GPS
- MID/PAD with GPS

### Features

- High Gain: 17dB
- Low noise figure 0.7dB @ 1575.42MHz
- Low operation current 0.8mA & PD current less than 1uA
- Single supply voltage range 1.6V to 3.3V
- Small package 1.1mmx0.7mmx0.45mm, MSL1
- Low cost BOM
- Lead-Free and RoHS-Compliant

## Pin Configuration/Application Diagram (Top view)

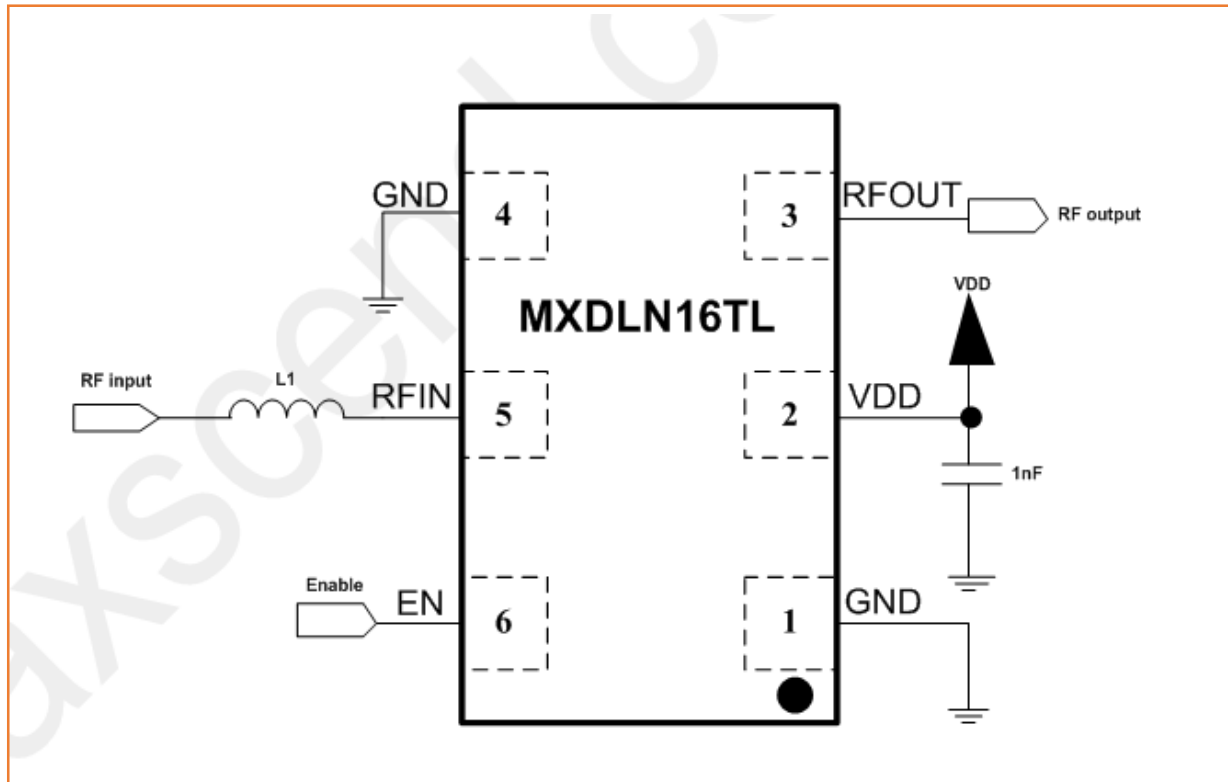


Figure 1 MXDLN16TL application circuit

Table 1 Pin Descriptions

Pin	Pin Name	I/O	Pin Description
1	GND	AG	Analog VSS
2	V <sub>DD</sub>	AP	Power supply
3	R <sub>FOUT</sub>	AO	LNA output
4	GND	AG	Analog VSS
5	R <sub>FIN</sub>	AI	LNA input from antenna
6	EN	DI	Pull high enable, pull low into power down 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 Recommended component value in application circuit

Component	Vendor	Type	Part Number & value
L1	Murata	Wired inductor, high Q	LQW15AN, 15nH
	Various	Ceramic	14nH

## Electrical Characteristics

Table 3 Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
DC Supply Voltage	$V_{DD}$	-0.3	4.0	V
Supply Voltage For other Pin	$V_{IO}$	-0.3	$V_{DD}+0.3$	
Max RF Input Power(RFx to GND)	$P_{IN}$	-	10	dBm
Device Operating Temperature	$T_{OP}$	-40	90	°C
Junction Temperature	$T_{Jun}$	150	-	°C
Device Storage Temperature	$T_{STG}$	-65	150	-
Lead Temperature (soldering)	$T_{LT}$	260	-	-
Soldering Temperature (reflow)	$T_{ST}$	260	-	-
Electrostatic Discharge	$V_{ESD(MM)}$	125	-	V
	$V_{ESD(HBM)}$	2000	-	
	$V_{ESD(CDM)}$	1000	-	

**Notice:** 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.

Table 4 Recommended Operating Conditions

Parameter	Symbol	MIN	TYP	MAX	Unit
Operating Frequency	$F_0$	1559	-	1610	MHz
Supply Current	$I_{DD}$ EN=High	0.6	0.8	1.15	mA
	$I_{DD}$ EN=Low	0	0.01	1	uA
MIPI Logic Voltage(SDATA, SCL) High	$V_{IH}$	1.0	1.8	$V_{DD}$	V
MIPI Logic Voltage(SDATA, SCL) Low	$V_{IL}$	0	0	0.3	

## AC Characteristics

TA=-40~+85°C, typically TA=25°C VDD=2.8V, all data measured on Maxscend's EVB, unless otherwise noted

Table 5 AC Characteristics (VDD=2.8V)

Parameters	Conditions	Min	Typ	Max	Units
RF Frequency Range	None	1559	-	1610	MHz
Power Gain		15	17	19	dB
	Note5	15	17	19	
Noise Figure		-	0.7	1.1	dB
	Note5	-	0.75	1.15	
Input Return Loss	Note1	-	-8	-5	dB
	Note5	-	-8	-5	
Output Return Loss	Note1	-	-20	-15	dB
	Note5	-	-20	-15	
Reverse Isolation	Note1	-	-30	-24	dB
Desense	Note2	-	0.25	0.75	dB
Stability	Note3	1.5	-	-	-
Input Power 1-dB Compression Point	1575MHz	-25	-18	-	dBm
Input In-Band IP3	Note4	-13	-8	-	dBm

**Note1:** sweep power -30dBm, 1575.42MHz

**Note2:** jammed signal @ 1463MHz & 1712MHz, -20dBm

**Note3:** frequency range 500MHz-5GHz

**Note4:** f1 = 1574.5 MHz, f2 = 1575.5 MHz, -20dBm

**Note5:** Beidou frequency range B1: 1559.052MHz---1591.788MHz

TA=-40~+85°C, typically TA=25°C VDD=1.8V, all data measured on Maxscend's EVB, unless otherwise noted

Table 6 AC Characteristics (VDD=1.8V)

Parameters	Conditions	Min	Typ	Max	Units
RF Frequency Range	None	1559	-	1610	MHz
Power Gain		14.8	16.8	18.8	dB
	Note5	14.8	16.8	18.8	
Noise Figure		-	0.7	1.1	dB
	Note5	-	0.75	1.15	
Input Return Loss	Note1	-	-8	-5	dB
	Note5	-	-8	-5	
Output Return Loss	Note1	-	-20	-15	dB
	Note5	-	-20	-15	
Reverse Isolation	Note1	-	-30	-24	dB
Desense	Note2	-	0.25	0.75	dB
Stability	Note3	1.5	-	-	-
Input Power 1-dB Compression Point	1575MHz	-26	-19	-	dBm
Input In-Band IP3	Note4	-14	-9	-	dBm

**Note1:** sweep power -30dBm, 1575.42MHz

**Note2:** jammed signal @ 1463MHz & 1712MHz, -20dBm

**Note3:** frequency range 500MHz-5GHz

**Note4:** f1 = 1574.5 MHz, f2 = 1575.5 MHz, -20dBm

**Note5:** Beidou frequency range B1: 1559.052MHz---1591.788MHz

## Package Outline Dimensions

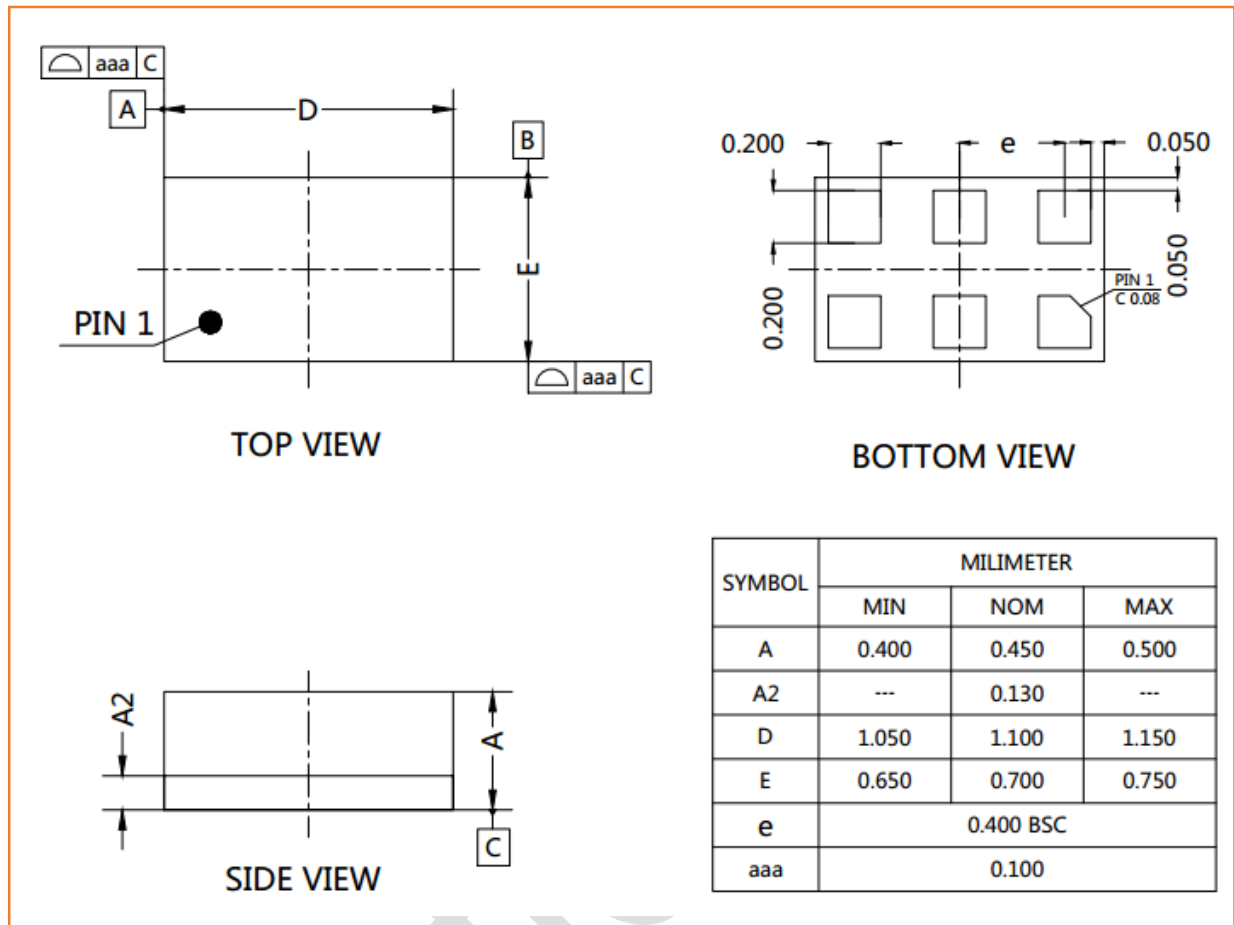


Figure 2 Package Outline Dimensions

## Marking Specifications

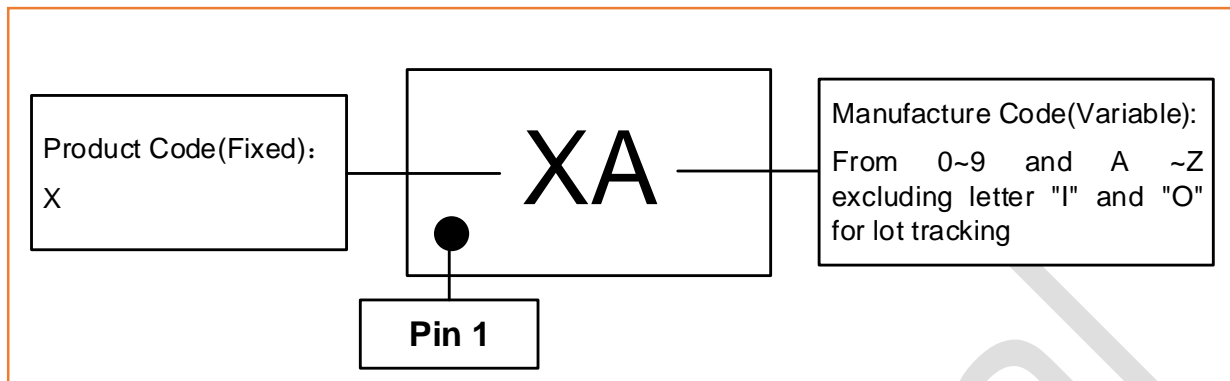


Figure 3 Marking Specification (Top View)

## Tape and Reel Dimensions

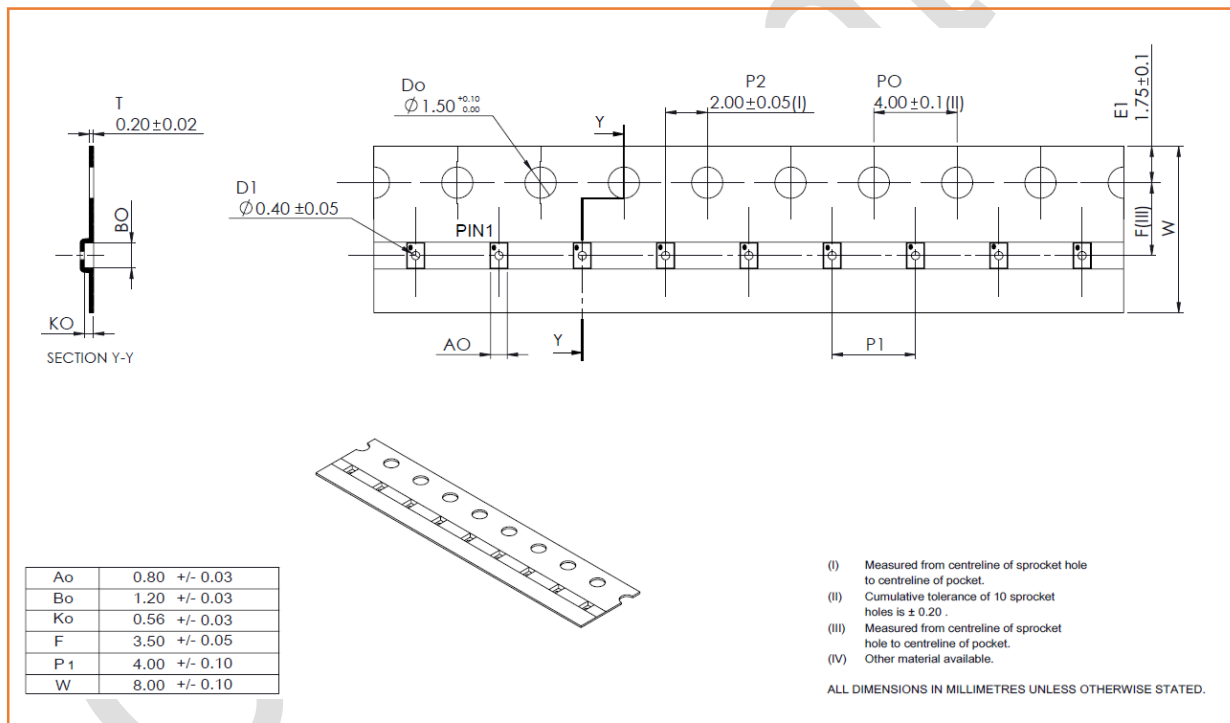


Figure 4 Tape and Reel Dimensions

## Reflow Chart

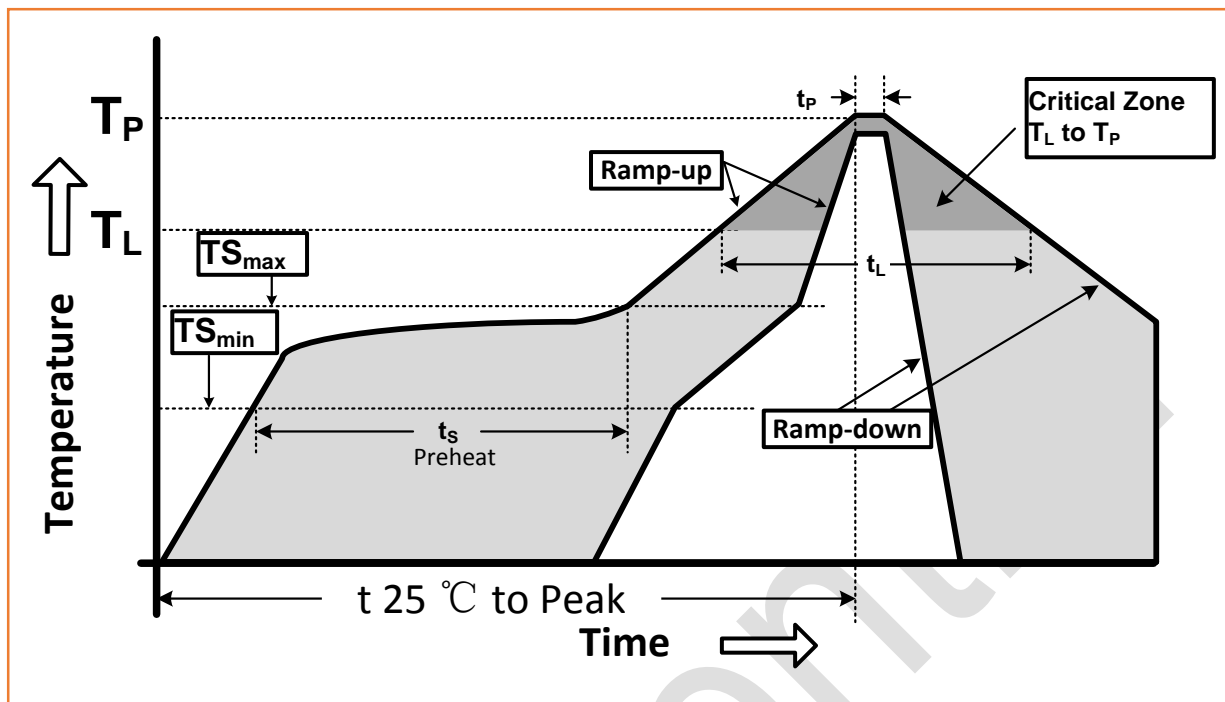


Figure 5 Recommended Lead-Free Reflow Profile

Table 7 Reflow condition

Profile Parameter	Lead-Free Assembly, Convection, IR/Convection
Ramp-up rate ( $T_{Smax}$ to $T_p$ )	3°C/second max.
Preheat temperature ( $T_{Smin}$ to $T_{Smax}$ )	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.



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