



# **MXDLN16TP**

**SiGe Low Noise Amplifier**

**for Global Navigation Satellite System (GNSS)**

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### General Description

MXDLN16TP high gain, low noise amplifier (LNA) is dedicated to GPS, GLONASS Galileo and Beidou standards. This product has an extremely low noise figure of 0.5dB, 18dB gain and excellent linearity.

MXDLN16TP works under a 1.6V to 3.6V single power supply while consumes 3 mA current, in power down (PD) mode, the power consumption will be reduced to less than 1uA.

MXDLN16TP uses a small 1.1mm x 0.7mm x 0.45mm LGA 6-pin package.

### Applications

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

### Features

- High Gain: 18dB
- Low noise figure 0.5dB @ 1575.42MHz
- Low operation current 3mA & PD current less than 1uA
- Single supply voltage range 1.6V to 3.6V
- Small package 1.1mmx0.7mmx0.45mm , MSL1
- 240GHz transit frequency - SiGe technology
- Low cost BOM
- Lead-Free and RoHS-Compliant

### Pin Configuration/Application Diagram (Top view)

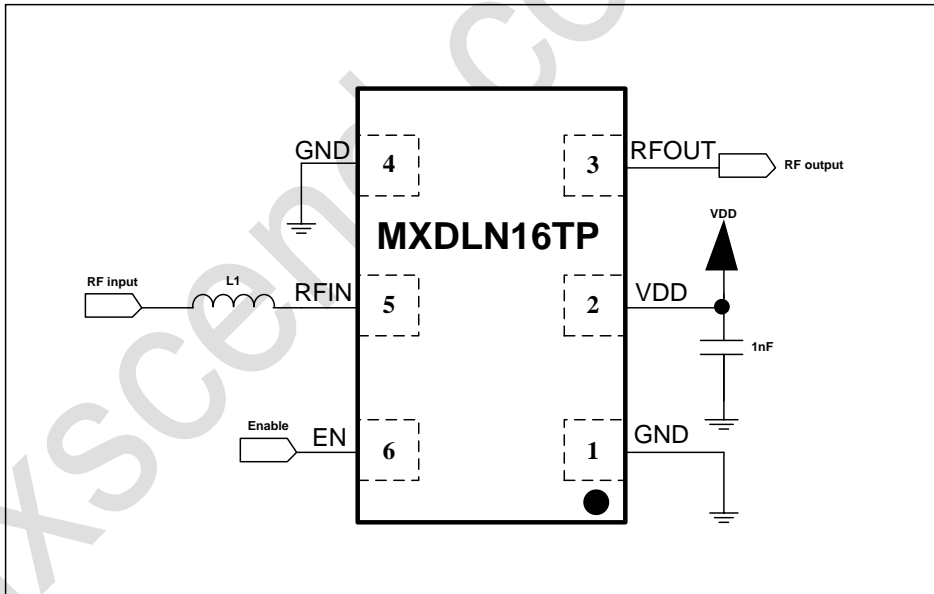


Figure 1.MXDLN16TP application circuit

Table 1.

Component	Vendor	Type	Part Number & value
L1	Murata	Wired inductor, high Q	LQW15AN7N3, 7.3nH
	various	Ceramic inductor, low Q	6.8nH

## Absolute Maximum Ratings

**Table 2.**

Parameters	Range	Units
Power supply	-0.3 ~ 4.0	V
Other Pin to GND	-0.3~VDD+0.3	V
Maximum RF Input Power	20	dBm
Operation Temperature Range	-40~90	°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	-2000~+2000	V
Machine Mode ESD	-150~+150	V
Charge Device Mode ESD	-500~+500	V

## Specifications

### DC Characteristics

$T_A = -40 \sim +90^\circ\text{C}$ , Typically  $T_A = 25^\circ\text{C}$  VDD=2.8V, unless otherwise noted

**Table 3.**

Parameters	Condition	Min	Typ	Max	Units
Supply Voltage		1.6	2.8	3.6	V
Supply Current	VDD=1.6~3.6V EN=High,	2.5	3.0	4.3	mA
	EN=Low	0	0.01	1	uA
EN Input High		1.0	1.8	VDD	V
EN Input Low		0	0	0.3	V

**AC Characteristics**

 T<sub>A</sub>=-40~+90°C, typically T<sub>A</sub>=25°C VDD=2.8V, all data measured on Maxscend's EVB, unless otherwise noted

**Table 4.**

Parameters	Conditions	Min	Typ	Max	Units
RF Frequency Range	None	-	1575.42	-	MHz
Power Gain		16.5	18	19.5	dB
	Note6	16.5	18	19.5	
Noise Figure		-	0.5	1	dB
	Note6	-	0.55	1.05	
Input Return Loss	Note1	-	-10	-8	dB
	Note6	-	-10	-8	
Output Return Loss	Note1	-	-10	-8	dB
	Note6	-	-12	-8	
Reverse Isolation	Note1	-	-27	-22	dB
Desense	Note2	-	0.25	0.5	dB
Stability	Note3	1.5	-	-	
Input Power 1-dB Compression Point	1575MHz	-10	-7	-	dBm
Input In-Band IP3	Note4	-3	1	-	dBm
Input Out-Band IP3	Note5	2	6	-	dBm

 T<sub>A</sub>=-40~+90°C, typically T<sub>A</sub>=25°C VDD=1.8V, all data measured on Maxscend's EVB, unless otherwise noted

**Table 5.**

Parameters	Conditions	Min	Typ	Max	Units
RF Frequency Range	None	-	1575.42	-	MHz
Power Gain		16.5	18	19.5	dB
	Note6	16.5	18	19.5	
Noise Figure		-	0.5	1	dB
	Note6	-	0.55	1.05	
Input Return Loss	Note1	-	-10	-8	dB
	Note6	-	-10	-6	
Output Return Loss	Note1	-	-10	-8	dB
	Note6	-	-12	-8	
Reverse Isolation	Note1	-	-27	-22	dB
Desense	Note2	-	0.25	0.5	dB
Stability	Note3	1.5	-	-	
Input Power 1-dB Compression Point	1575MHz	-12	-9	-	dBm
Input In-Band IP3	Note4	-5	-1	-	dBm
Input Out-Band IP3	Note5	0	4	-	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, -30dBm

**Note5:** f1 = 1712.7 MHz, -20dBm, f2 = 1850 MHz, -65dBm, IP3= (2\*P1+P2+ Gain<sub>1575MHz</sub> -IM3)/2

**Note6:** Beidou frequency range B1: 1559.052MHz---1591.788MHz

## Pin Descriptions

Table 6.

Pin	Pin 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 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),

## Outline Dimensions

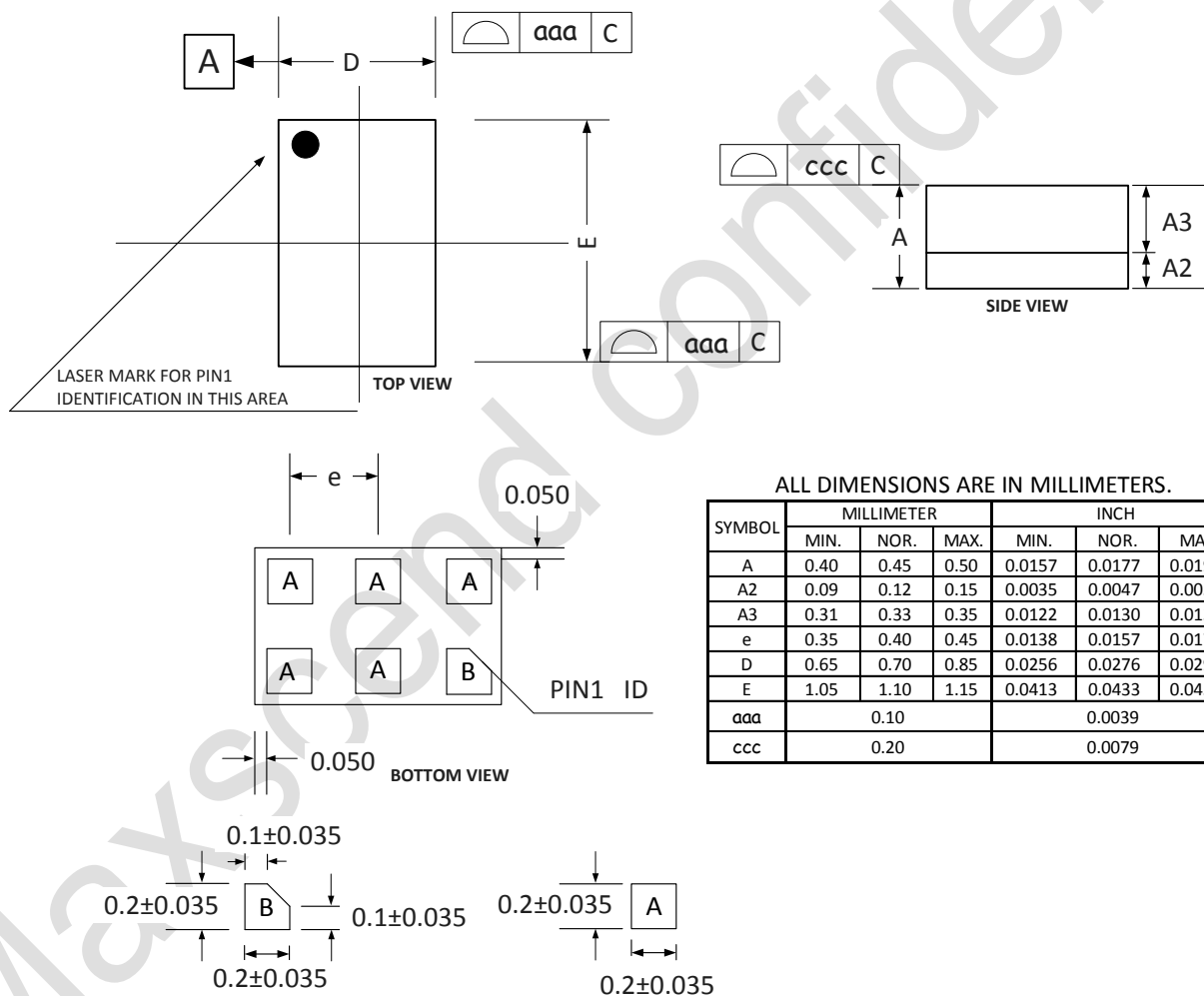


Figure 2. MXDLN16TP outline dimension

### Marking Specification

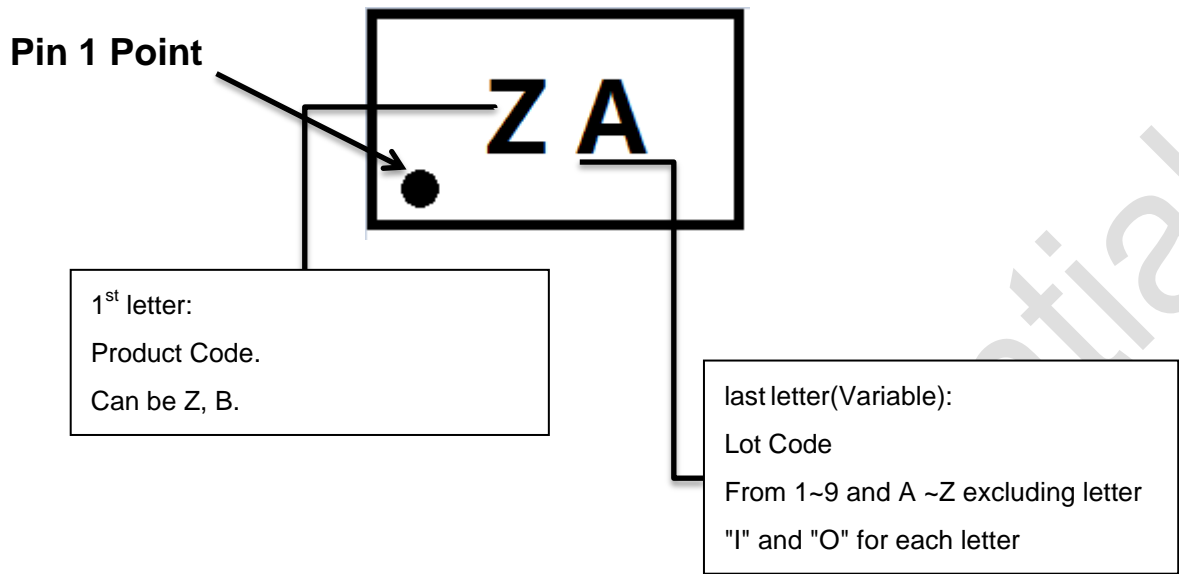
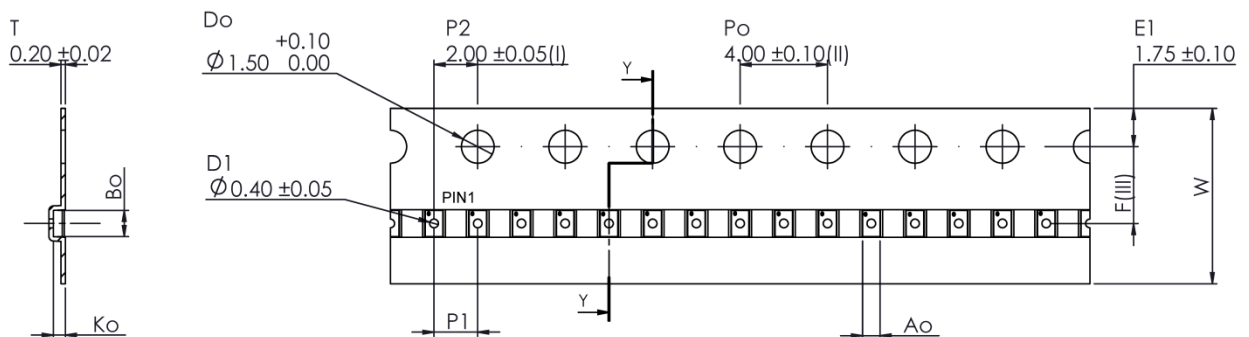
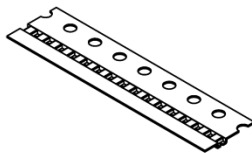


Figure 3. Marking specification (Top View)

### Tape and Reel Dimensions



SECTION Y-Y



Ao	0.80	+/- 0.05
Bo	1.20	+/- 0.05
Ko	0.55	+/- 0.05
F	3.50	+/- 0.05
P1	2.00	+/- 0.10
W	8.00	+/- 0.10

- (I) Measured from centreline of sprocket hole to centreline of pocket.
- (II) Cumulative tolerance of 10 sprocket holes is  $\pm 0.20$ .
- (III) Measured from centreline of sprocket hole to centreline of pocket.
- (IV) Other material available.

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.

Figure 4. Tape and reel dimensions

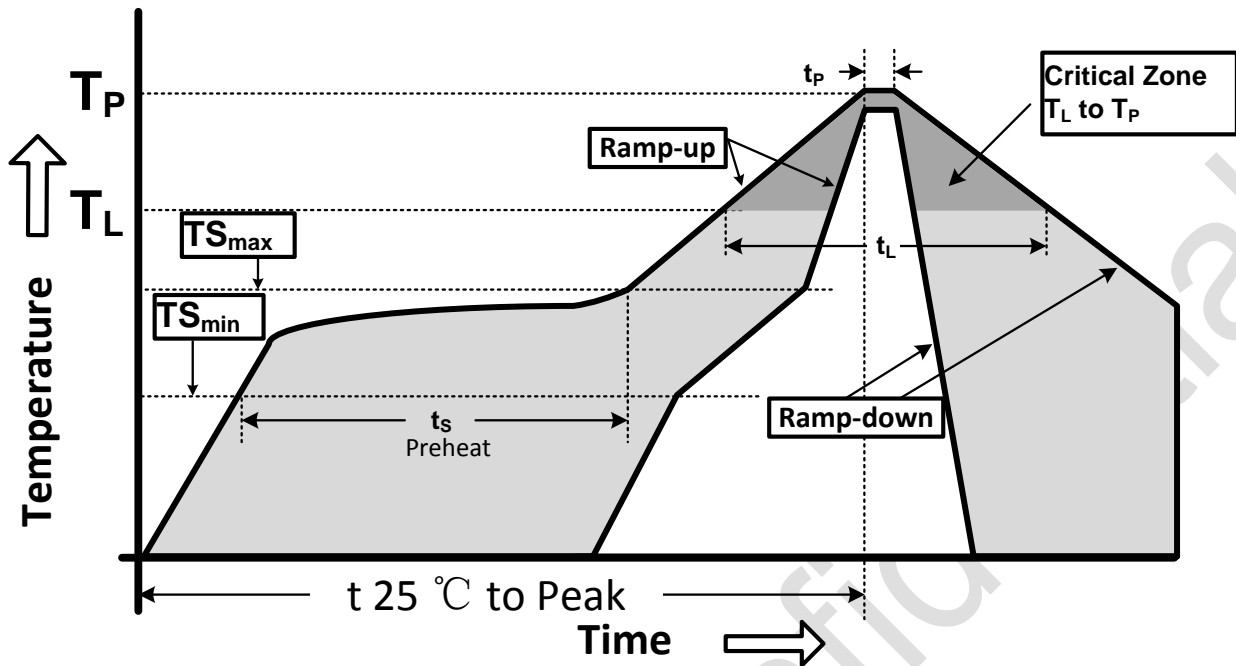
**Reflow Chart**


Figure 5. Recommended Lead-Free Reflow Profile

Table 7.

Profile Parameter	Lead-Free Assembly, Convection, IR/Convection
Ramp-up rate ( $T_{S_{max}}$ to $T_P$ )	$3^\circ\text{C}/\text{second}$ max.
Preheat temperature ( $T_{S_{min}}$ to $T_{S_{max}}$ )	$150^\circ\text{C}$ to $200^\circ\text{C}$
Preheat time ( $t_s$ )	60 - 180 seconds
Time above $T_L$ , $217^\circ\text{C}$ ( $t_L$ )	60 - 150 seconds
Peak temperature ( $T_P$ )	$260^\circ\text{C}$
Time within $5^\circ\text{C}$ of peak temperature ( $t_p$ )	20 - 40 seconds
Ramp-down rate	$6^\circ\text{C}/\text{second}$ max.
Time $25^\circ\text{C}$ 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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