



MXDLN16GX

GPS Low Noise Amplifier



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General Description

MXDLN16GX high gain, low noise amplifier (LNA) is dedicated to GPS, GLONASS Galileo and Beidou standards. This product has an extremely low noise figure of 0.6dB, 19dB gain and excellent linearity.

MXDLN16GX works under a 1.1V to 2.85V single power supply while consumes 7.5 mA current, in power down (PD) mode, the power consumption will be reduced to less than 1uA.

MXDLN16GX uses a small 1mmx1.5mmx0.75mm DFN 6-pin package.

Applications

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

Features

- High Gain: 19dB
- Low noise figure 0.6dB @ 1575.42MHz
- Low operation current 6mA & PD current less than 1uA
- 3.5mA current under 1.2V power supply
- Single supply voltage range 1.1V to 2.85V
- Small package 1mmx1.5mmx0.75mm
- Low cost BOM
- Lead-Free and RoHS-Compliant

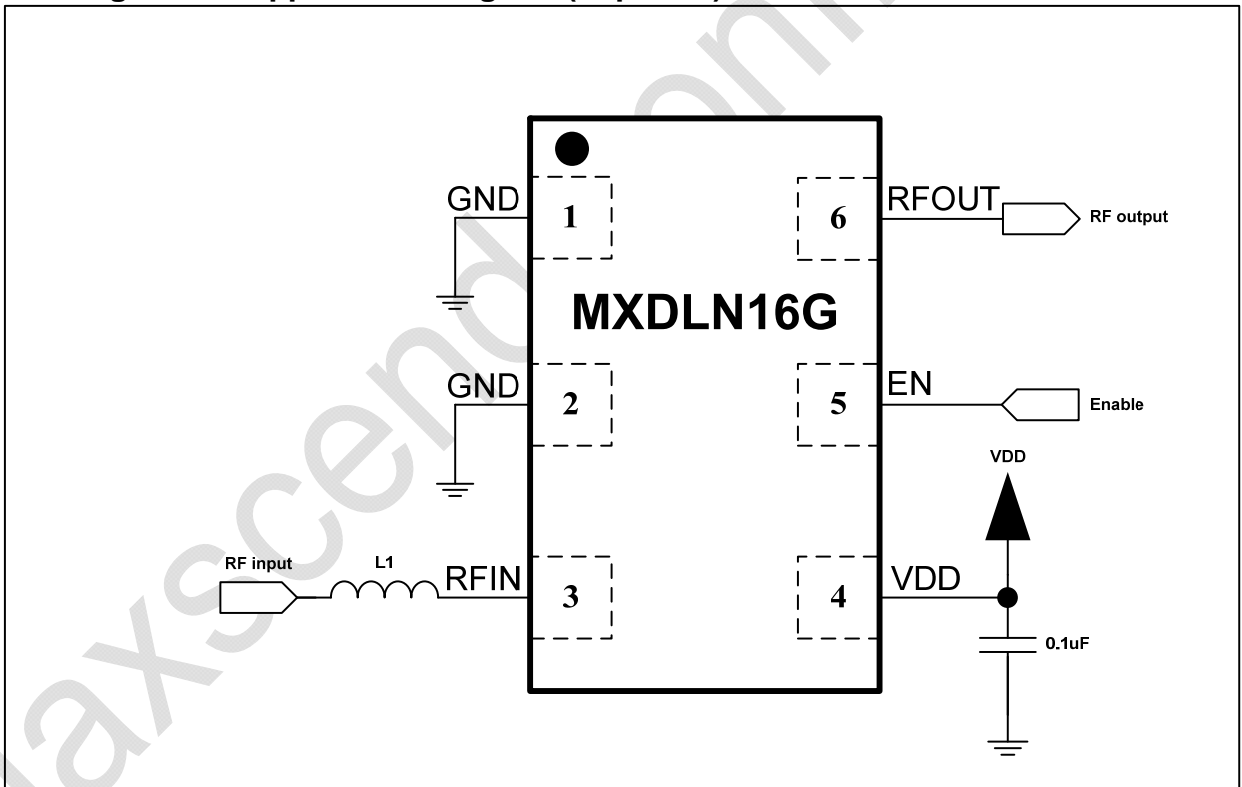
Pin Configuration/Application Diagram (Top view)


Figure 1 MXDLN16GX application circuit

Table 1.

Component	Vendor	Type	Part Number & value
L1	Murata	Wired inductor, high Q	LQW15AN12N, 10nH
	various	Ceramic inductor, low Q	10nH

Absolute Maximum Ratings
Table 2.

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	-2000~+2000	V
Machine Mode ESD	-100~+100	V
Charge Device Mode ESD	-500~+500	V

DC Characteristics

T_A=-40~+85°C, Typically T_A=25°C VDD=2.8V, unless otherwise noted

Table 3.

Parameters	Condition	Min	Typ	Max	Units
Supply Voltage		1.1	2.8	2.85	V
Supply Current	EN=High		6		mA
	VDD = 1.2V		3.5		
	EN=Low			1	µA
EN Input High		0.8			V
EN Input Low				0.6	V

AC Characteristics

T_A=-40~+85°C, typically T_A=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			19		dB
	Note7		19		
Noise Figure			0.6		dB
	Note7		0.8		
Input Return Loss	Note1		-12		dB
	Note7		-10		
Output Return Loss	Note1		-12		dB
	Note7		-11		
Reverse Isolation	Note1		-28		dB
VSWR	Note1		1.7		
Jammed Noise Figure	Note2		0.85		dB
Stability	Note3	1.5			
Input Power 1-dB Compression Point	1575MHz		-9		dBm
	1575MHz, 1.2V		-12		
	900MHz		-10		
	2400MHz		-5		
Input In-Band IP3	Note4		-1		dBm
Input Out-Band IP3	Note5		+15		dBm
Input IP2	Note6		43		dBm

Note1: sweep power -30dBm, 1575.42MHz

Note2: jammed signal @ 1.8GHz & 950MHz, -30dBm

Note3: frequency range 500MHz-5GHz

Note4: f1 = 1574.5 MHz, f2 = 1575.5 MHz, -30dBm

Note5: f1 = 2400 MHz, f2 = 2000 MHz, -30dBm IP3 = pin-(IM3- Gain_{1575MHz})/2

Note6: f1 = 2475 MHz, f2 = 900 MHz, -30dBm, IP2 = pin-(IM2-Gain_{1575MHz}), IMD2 referred to input port.

Note7: Beidou frequency range B1: 1559.052MHz---1591.788MHz

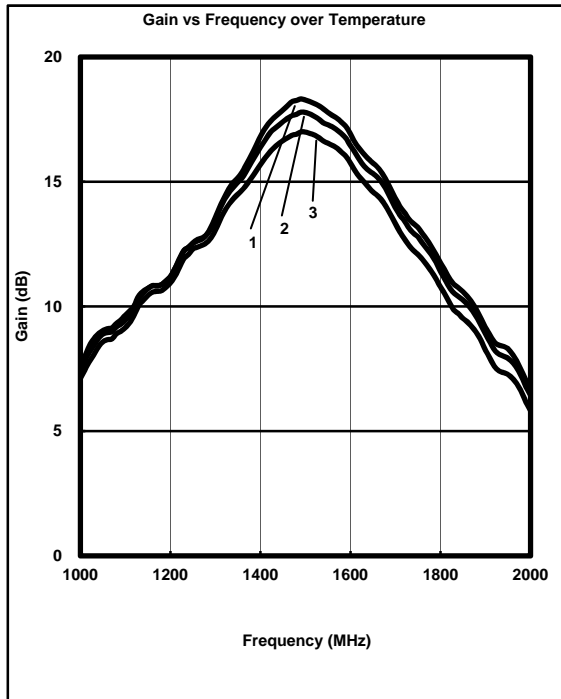


Figure 2. Gain vs Frequency over Temperature

VDD = 1.2V

- 1. -40°C
- 2. +25°C
- 3. +85°C

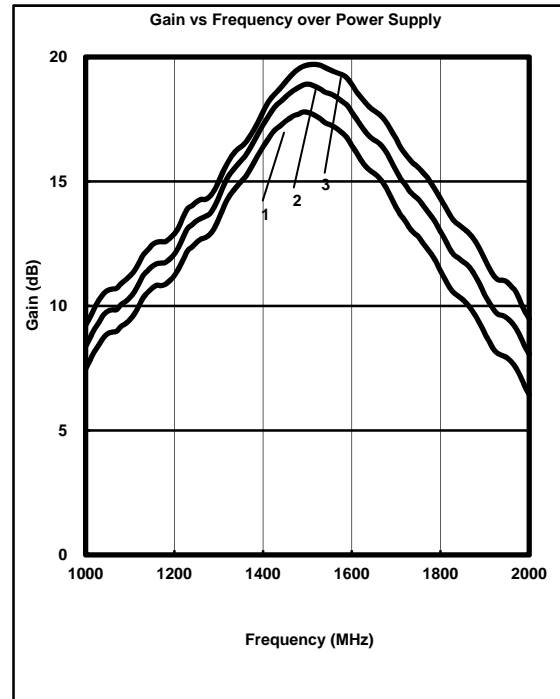


Figure 3. Gain vs Frequency over Power Supply

Ta = 25°C

- 1. 1.2V
- 2. 1.8V
- 3. 2.8V

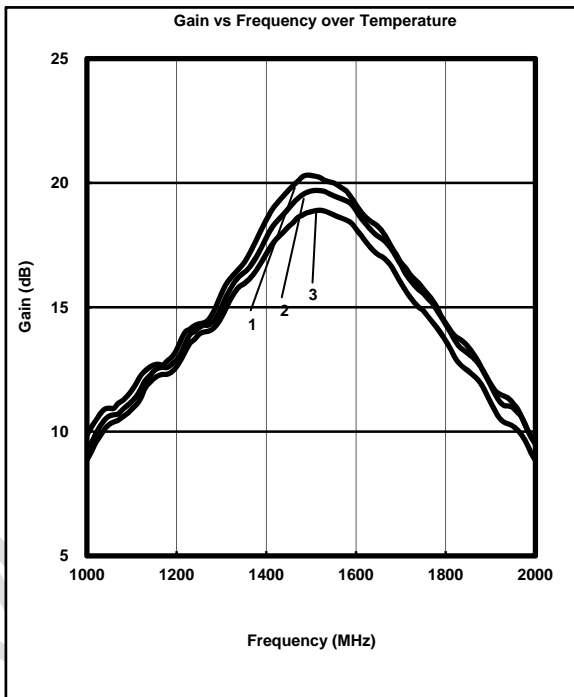


Figure 4. Gain vs Frequency over Temperature

VDD = 2.8V

- 1. -40°C
- 2. +25°C
- 3. +85°C

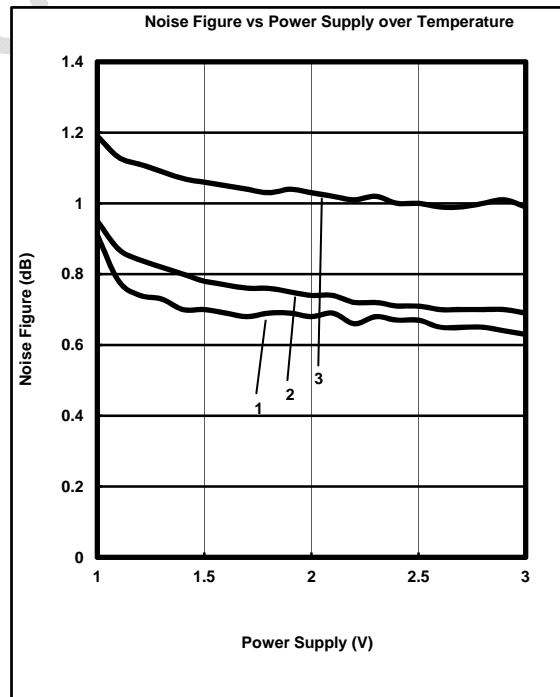


Figure 5. Noise Figure vs Input Power over Temperature

VDD = 2.8V

- 1. -40°C
- 2. +25°C
- 3. +85°C

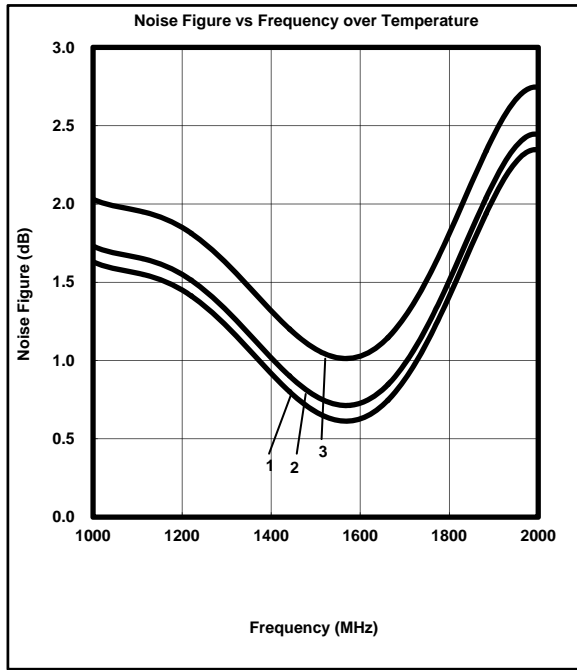


Figure 6. Noise Figure vs Frequency over Temperature

VDD = 2.8V
 1. -40°C
 2. +25°C
 3. +85°C

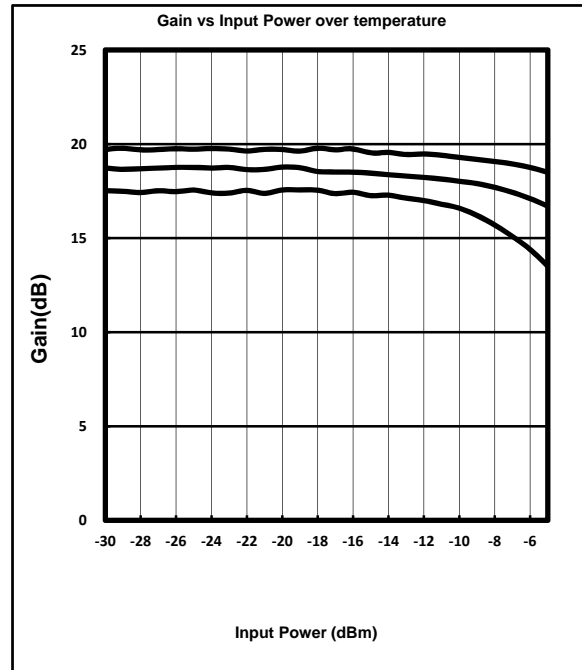


Figure 7. Gain vs Input Power over Temperature

VDD = 2.8V
 1. -40°C
 2. +25°C
 3. +85°C

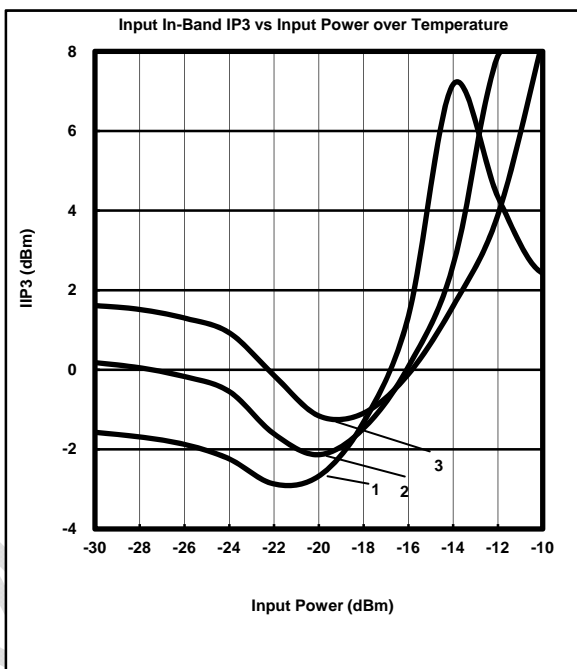


Figure 8. In-Band IIP3 vs Input Power over Temperature

f1 = 1574.5 MHz, f2 = 1575.5 MHz
 VDD = 2.8V
 1. -40°C
 2. +25°C
 3. +85°C

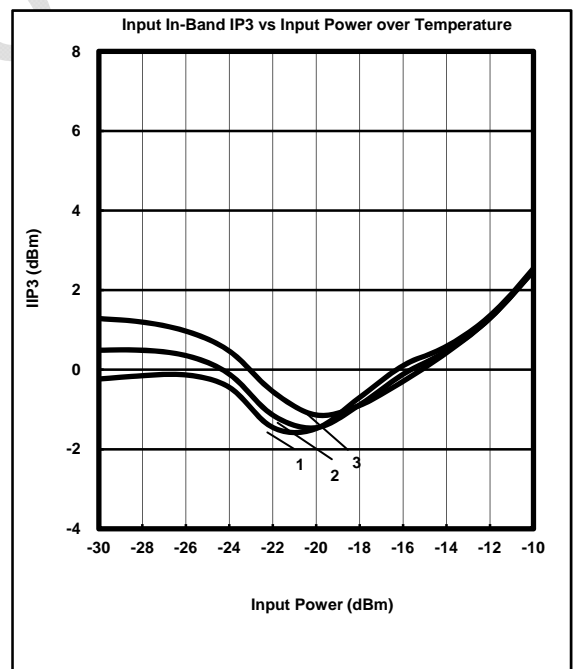
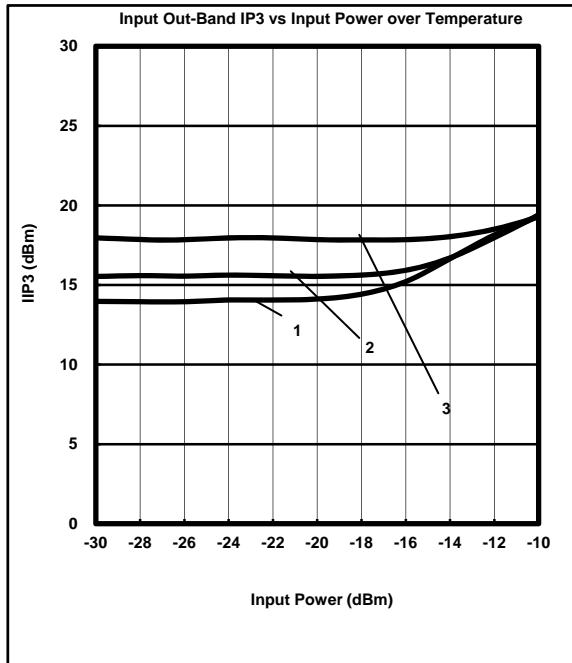
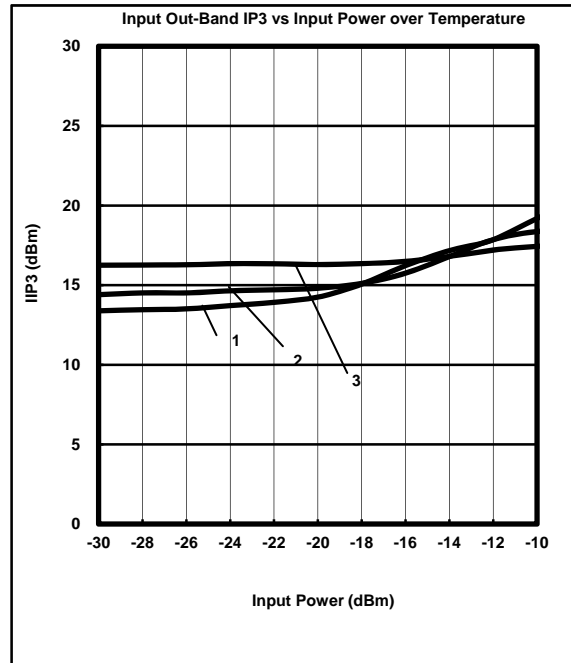


Figure 9. In-Band IIP3 vs Input Power over Temperature

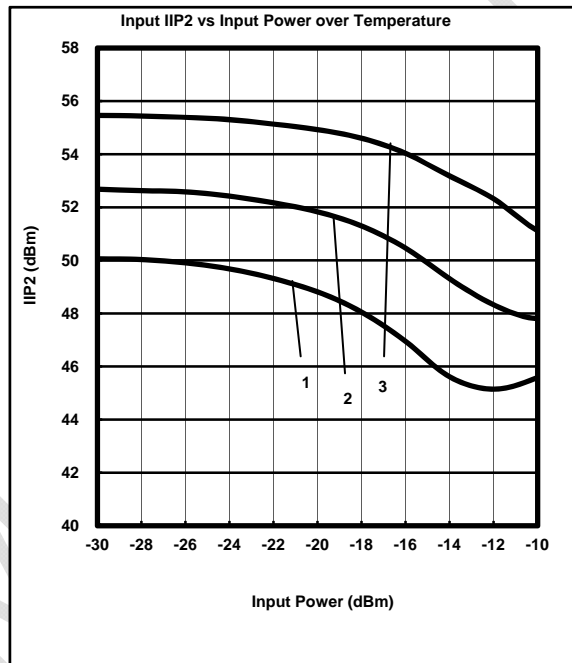
f1 = 1574.5 MHz, f2 = 1575.5 MHz
 VDD = 1.2V
 1. -40°C
 2. +25°C
 3. +85°C


Figure 10. Out-Band IIP3 vs Input Power over Temperature

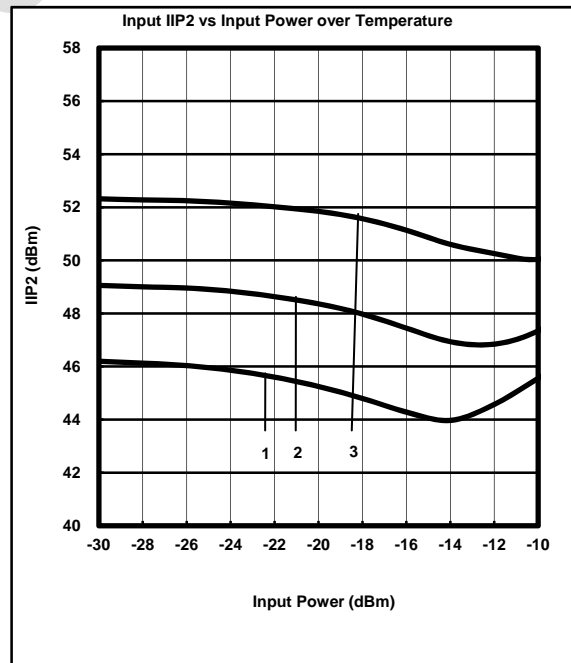
f1 = 2175 MHz, f2 = 1875 MHz
VDD = 2.8V
 1. -40°C
 2. +25°C
 3. +85°C


Figure 11. Out-Band IIP3 vs Input Power over Temperature

f1 = 2175 MHz, f2 = 1875 MHz
VDD = 1.2V
 1. -40°C
 2. +25°C
 3. +85°C


Figure 12. IIP2 vs Input Power over Temperature

f1 = 2475 MHz, f2 = 900 MHz
VDD = 2.8V
 1. -40°C
 2. +25°C
 3. +85°C


Figure 13. IIP2 vs Input Power over Temperature

f1 = 2475 MHz, f2 = 900 MHz
VDD = 1.2V
 1. -40°C
 2. +25°C
 3. +85°C

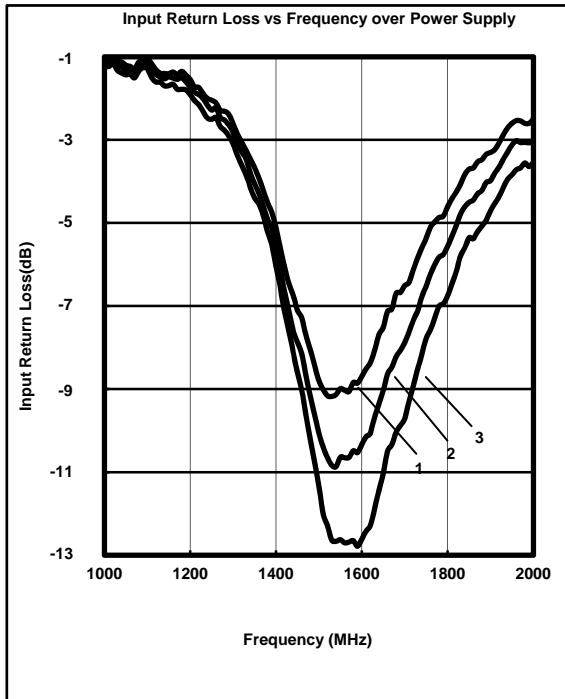


Figure 14. Input Return Loss vs Frequency over Power Supply

Ta = 25°C
 1. 1.2V
 2. 1.8V
 3. 2.8V

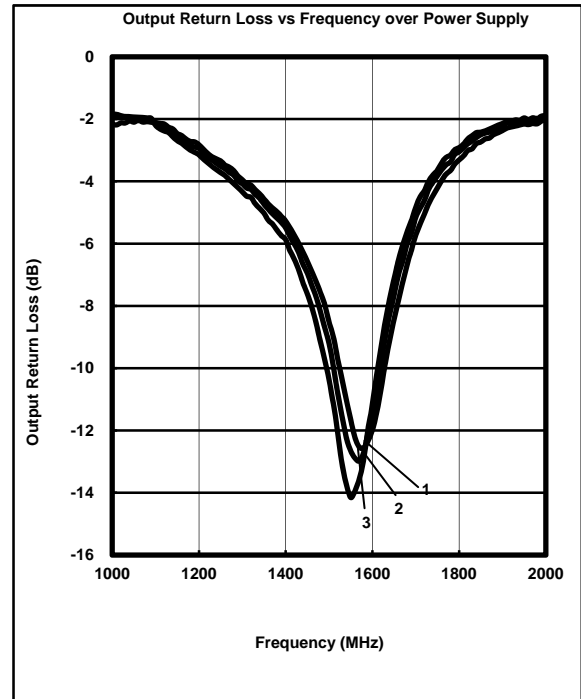


Figure 15. Output Return Loss vs Frequency over Power Supply

Ta = 25°C
 1. 1.2V
 2. 1.8V
 3. 2.8V

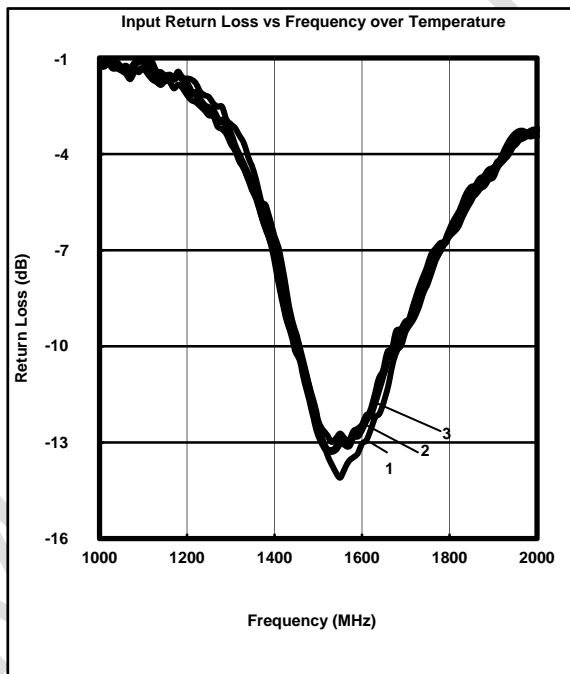


Figure 16. Input Return Loss vs Frequency over Temperature

VDD = 2.8V
 1. -40°C
 2. +25°C
 3. +85°C

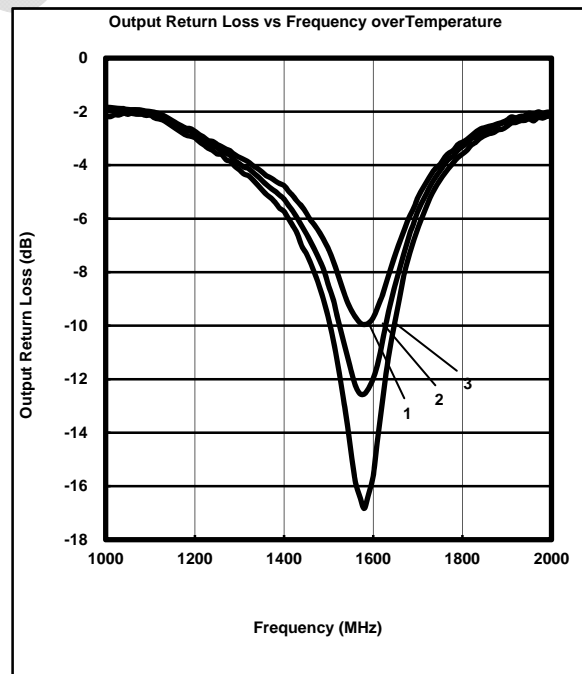


Figure 17. Output Return Loss vs Frequency over Temperature

VDD = 2.8V
 1. -40°C
 2. +25°C
 3. +85°C

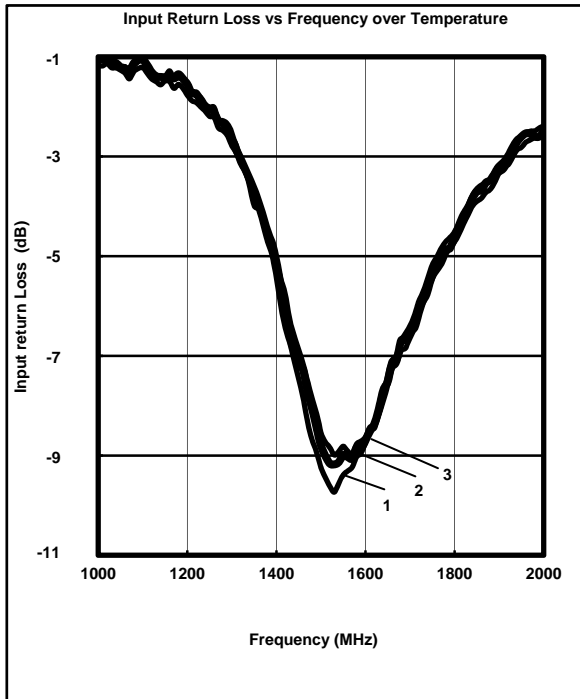


Figure 18. Input Return Loss vs Frequency over Temperature

VDD = 1.2V

- 1. -40 °C
- 2. +25 °C
- 3. +85 °C

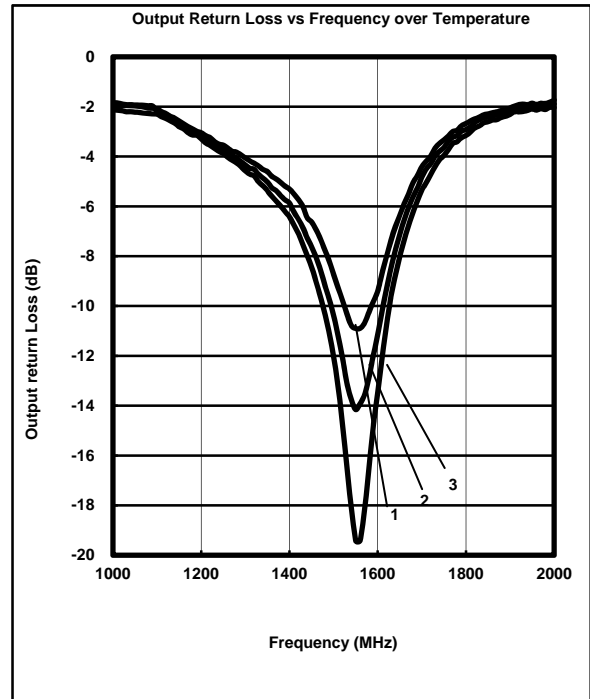


Figure 19. Output Return Loss vs Frequency over Temperature

VDD = 1.2V

- 1. -40 °C
- 2. +25 °C
- 3. +85 °C

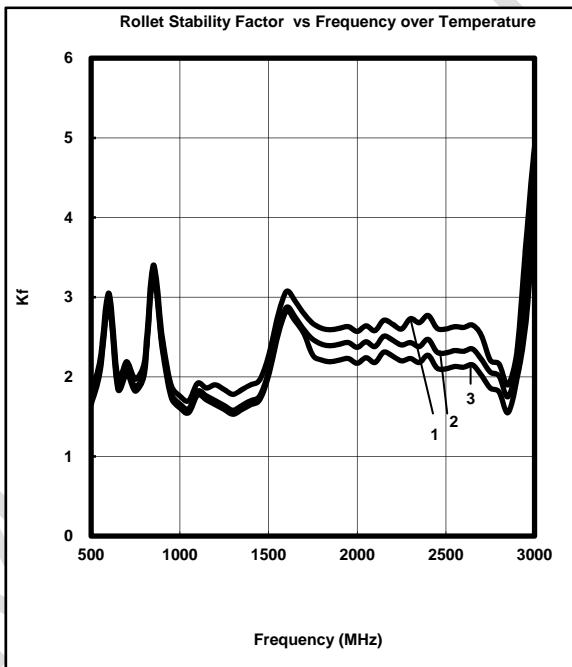


Figure 20. Stability Factor vs Frequency over Temperature

Input power -50dBm

VDD = 2.8V

- 1. -40 °C
- 2. +25 °C
- 3. +85 °C

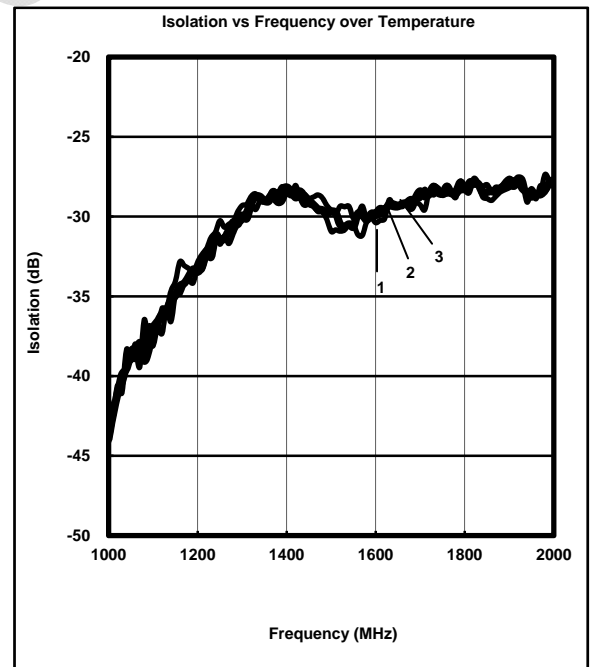


Figure 21. Isolation vs Frequency over Temperature

VDD = 1.2V

- 1. +85 °C
- 2. +25 °C
- 3. -40 °C

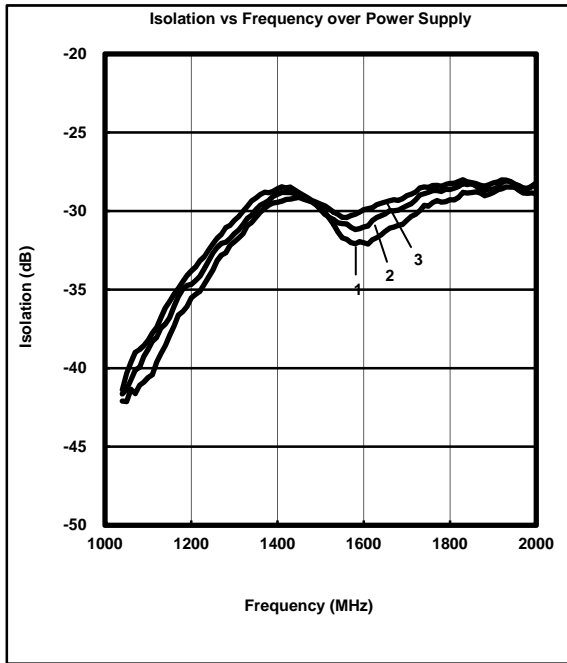


Figure 22. Isolation vs Frequency over Power Supply

Input power -30dBm

Ta = 25°C

- 1. 1.2V
- 2. 1.8V
- 3. 2.8V

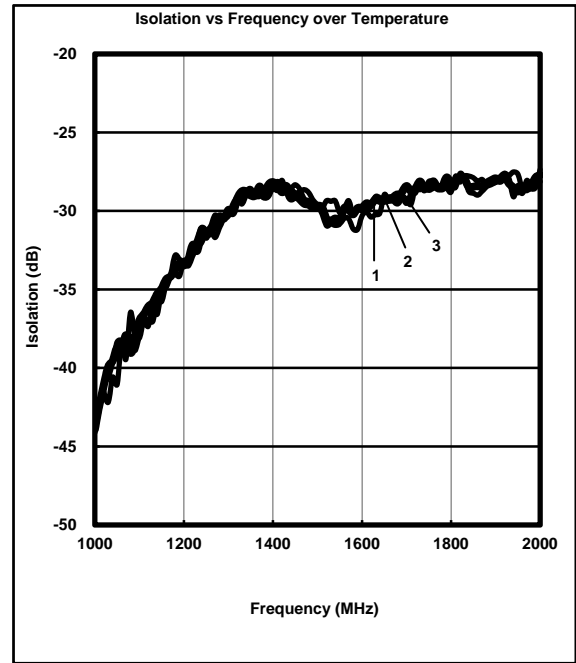


Figure 23. Isolation vs Frequency over Temperature

Input power -30dBm

VDD = 2.8V

- 1. -40°C
- 2. +25°C
- 3. +85°C

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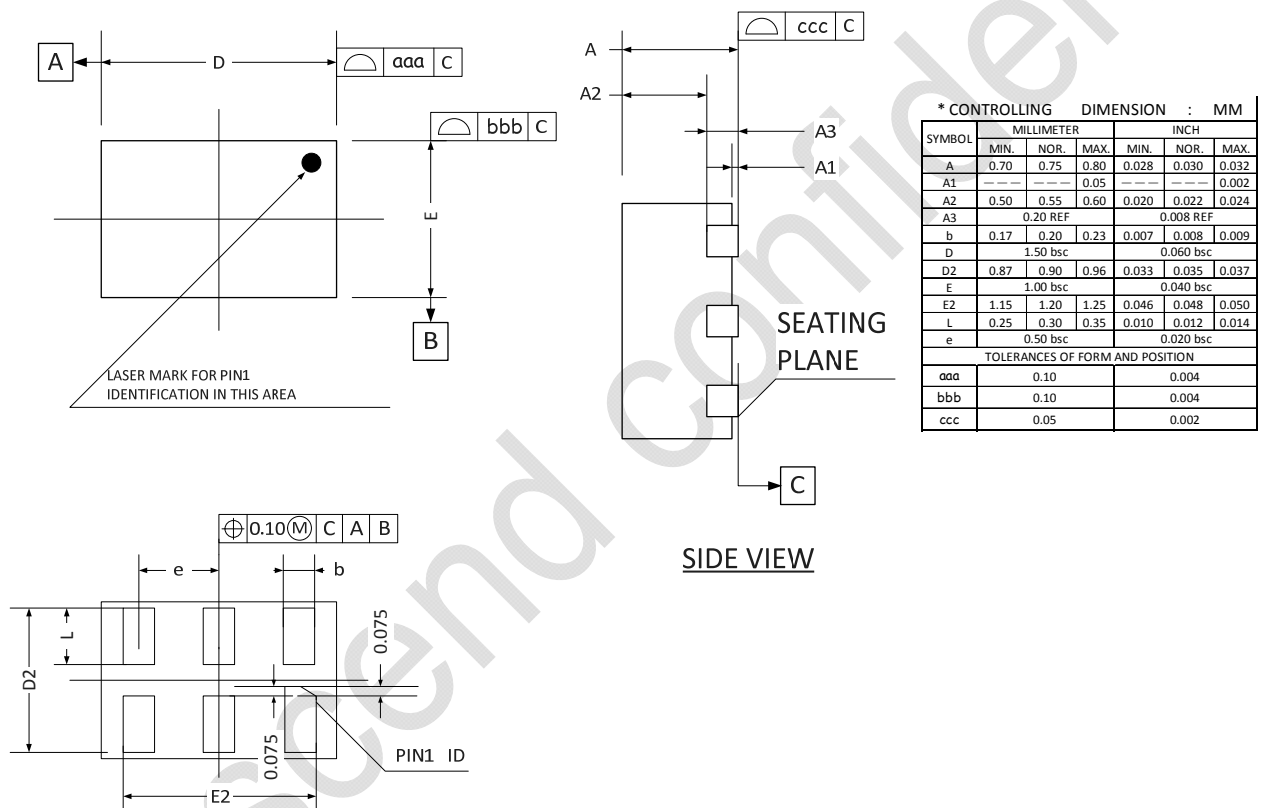
Pin Descriptions

Table 5.

Pin	Pin Name	I/O	Pin Description
1	GND	AG	Analog VSS
2	GND	AG	Analog VSS
3	RFIN	AI	LNA input from antenna
4	VDD	AP	Power supply, 1.1~2.85V
5	EN	DI	Pull high enable, pull low into power down mode
6	RFOUT	AO	LNA output

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 24. MXDLN16GX outline dimension

Reflow Chart

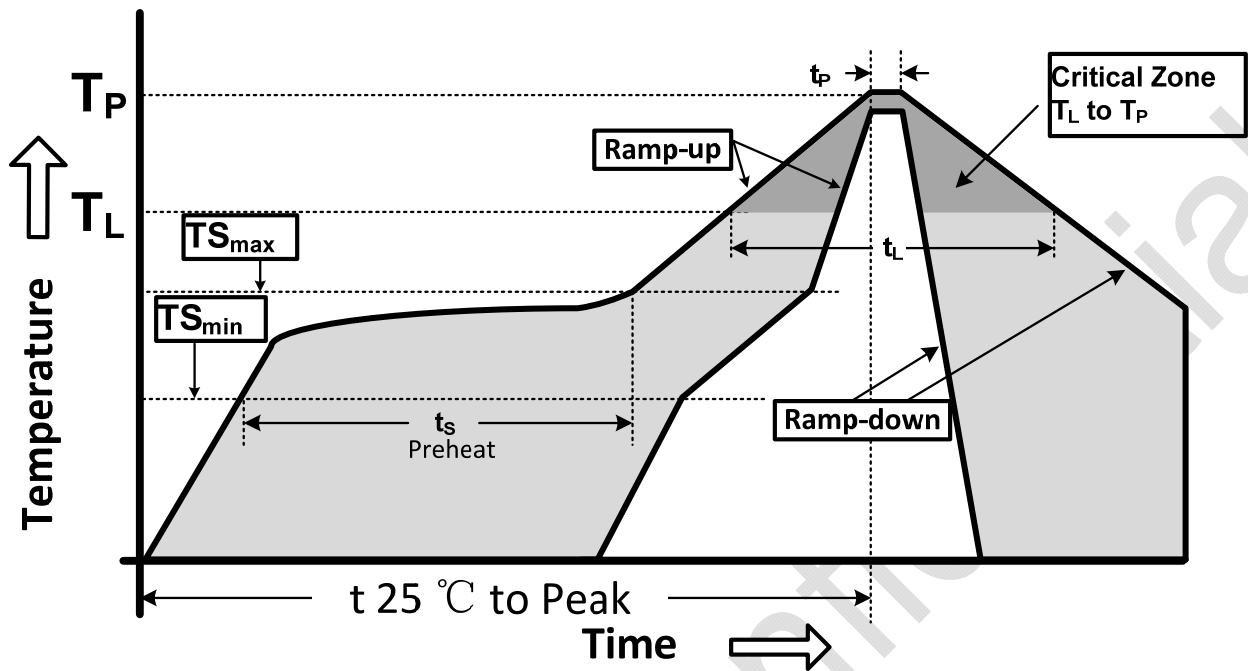


Figure 25. Recommended Lead-Free Reflow Profile

Table 6.

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.