



## **MXDLF16GC**

**Fully-integrated Low Noise Amplifier Front-End Module with  
BDS/GPS/GNSS Pre-Filter**

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### General Description

MXDLF16GC is a front-end module (FEM) with a fully-integrated low-noise amplifier and pre-filter designed for Beidou/GPS/GNSS receiver applications. This product has an extremely low noise figure, high gain, excellent linearity and high out-band rejection.

MXDLF16GC works under a 1.5V to 3.3V single power supply while consumes 5.5 mA current, in power down (PD) mode, the power consumption will be reduced to less than 1uA.

MXDLF16GC uses a small 1.5mm x 1.0mm x 0.75mm LGA 6-pin package, and requires no external matching component.

### Applications

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

### Features

- High Gain: 18dB
- Low noise figure 1.3dB @ 1575.42MHz
- Low operation current 5.5mA & PD current less than 1uA
- High out-band rejection
- Single supply voltage range 1.5V to 3.3V
- Small package 1.5mmx1.0mmx0.75mm, MSL1
- Input/output impedance internally matched to 50Ω and do not need any matching component
- Lead-Free and RoHS-Compliant

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

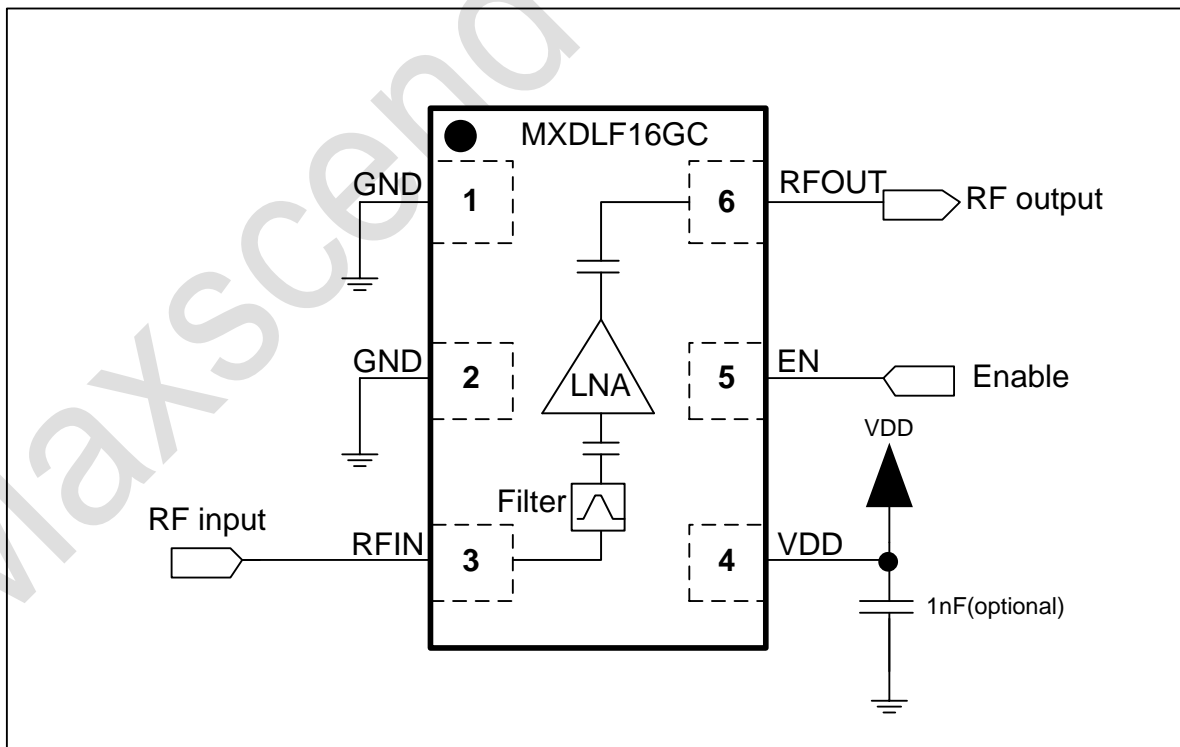


Figure 1.MXDLF16GC application circuit

## Pin Descriptions

Table 1.

Pin	Pin Name	I/O	Pin Description
1	GND	AG	Analog VSS
2	VDD	AP	Power supply
3	RFOUT	AO	Module output
4	GND	AG	Analog VSS
5	RFIN	AI	Module 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),

## Absolute Maximum Ratings

Table 2.

Parameters	Range	Units
Power supply	-0.3 ~ 3.6	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
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		1.5	2.8	3.3	V
Supply Current	EN=High, VDD=2.8V	4.5	5.5	8.5	mA
	EN=High, VDD=1.8V	2.8	3.6	5.5	
	EN=Low	0	0.05	1	uA
EN Input High	On state	1.0	1.8	VDD	V
EN Input Low	Off state	0	0	0.3	V

## Specifications

### 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			1575.42		MHz
Power Gain			18		dB
	Note6		18		
Noise Figure			1.3		dB
	Note6		1.3		
Input Return Loss	Note1		-15	-10	dB
	Note6		-15	-10	
Output Return Loss	Note1		-12	-8	dB
	Note6		-11	-8	
Reverse Isolation	Note1		-27		dB
Desense	Note2		0.25		dB
Stability	Note3	1.4			
Input Power 1-dB Compression Point (In-band Gain 1dB compression)	1575MHz		-8		dBm
	900MHz		12		
	2450MHz		17		
Input Out-Band IP3	Note4		5		dBm
Input Out-Band IP2	Note5		55		dBm
Input referred 2 <sup>nd</sup> Harmonics	Note7		-80		dBm
Turn on time	EN on to 90%RF			2	us
Turn off time	EN off to 10%RF			1	us

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

**Note2:** jammed signal @ 850MHz, -20dBm

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

**Note4:** f1 = 1712.7 MHz, -20dBm, f2 = 1850 MHz, -65dBm, IIP3= (2\*P1+P2+ Gain<sub>1575MHz</sub> -IM3)/2

**Note5:** f1 = 874.6 MHz, -25dBm, f2 = 2450 MHz, -32dBm, IIP2 = P1+P2-(IM2-Gain<sub>1575MHz</sub>)

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

**Note7:** f=787.76MHz, -25dBm, IHD2 = OHD2 - Gain<sub>1575MHz</sub>

## Specifications

### AC Characteristics

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			1575.42		MHz
Power Gain			16.5		dB
	Note6		16.5		
Noise Figure			1.4		dB
	Note6		1.4		
Input Return Loss	Note1		-13	-10	dB
	Note6		-13	-10	
Output Return Loss	Note1		-10	-8	dB
	Note6		-10	-8	
Reverse Isolation	Note1		-27		dB
Desense	Note2		0.25		dB
Stability	Note3	1.4			
Input Power 1-dB Compression Point (In-band Gain 1dB compression)	1575MHz		-9		dBm
	900MHz		11		
	2450MHz		16		
Input Out-Band IP3	Note4		4		dBm
Input Out-Band IP2	Note5		52		dBm
Input referred 2 <sup>nd</sup> Harmonics	Note7		-79		dBm
Turn on time	EN on to 90%RF			2	us
Turn off time	EN off to 10%RF			1	us

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

**Note2:** jammed signal @ 850MHz, -20dBm

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

**Note4:** f1 = 1712.7 MHz, -20dBm, f2 = 1850 MHz, -65dBm, IIP3= (2\*P1+P2+ Gain<sub>1575MHz</sub> -IM3)/2

**Note5:** f1 = 824.6 MHz, -25dBm, f2 = 2400 MHz, -32dBm, IIP2 = P1+P2-(IM2-Gain<sub>1575MHz</sub>)

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

**Note7:** f=787.76MHz, -25dBm, IHD2 = OHD2 - Gain<sub>1575MHz</sub>

**S-Parameter**

AC Characteristics

$T_A = -40 \sim +90^\circ\text{C}$ , typically  $T_A = 25^\circ\text{C}$   $V_{DD} = 2.8\text{V}$ , all data measured on Maxscend's EVB, unless otherwise noted

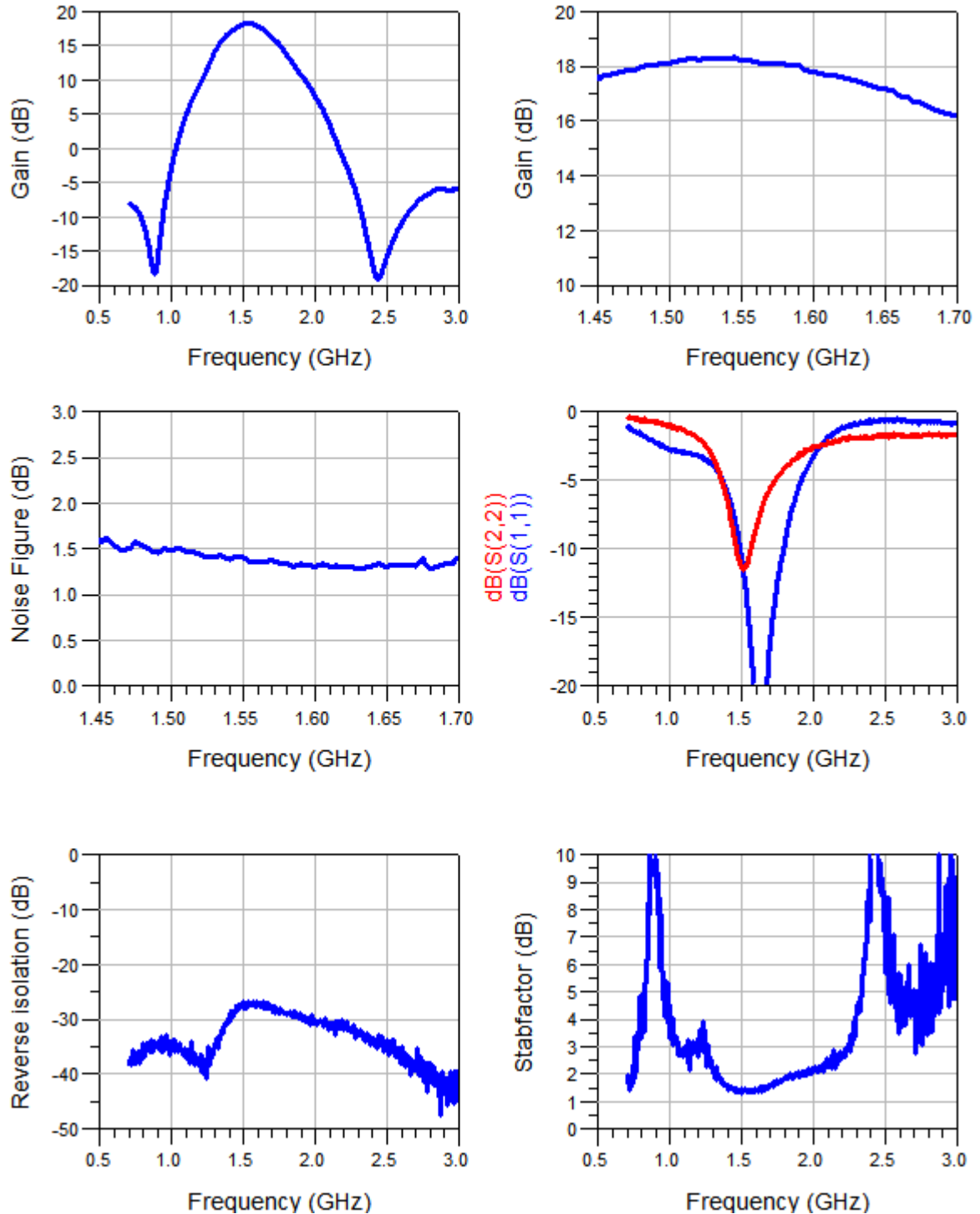


Figure 2. S-Parameter plot

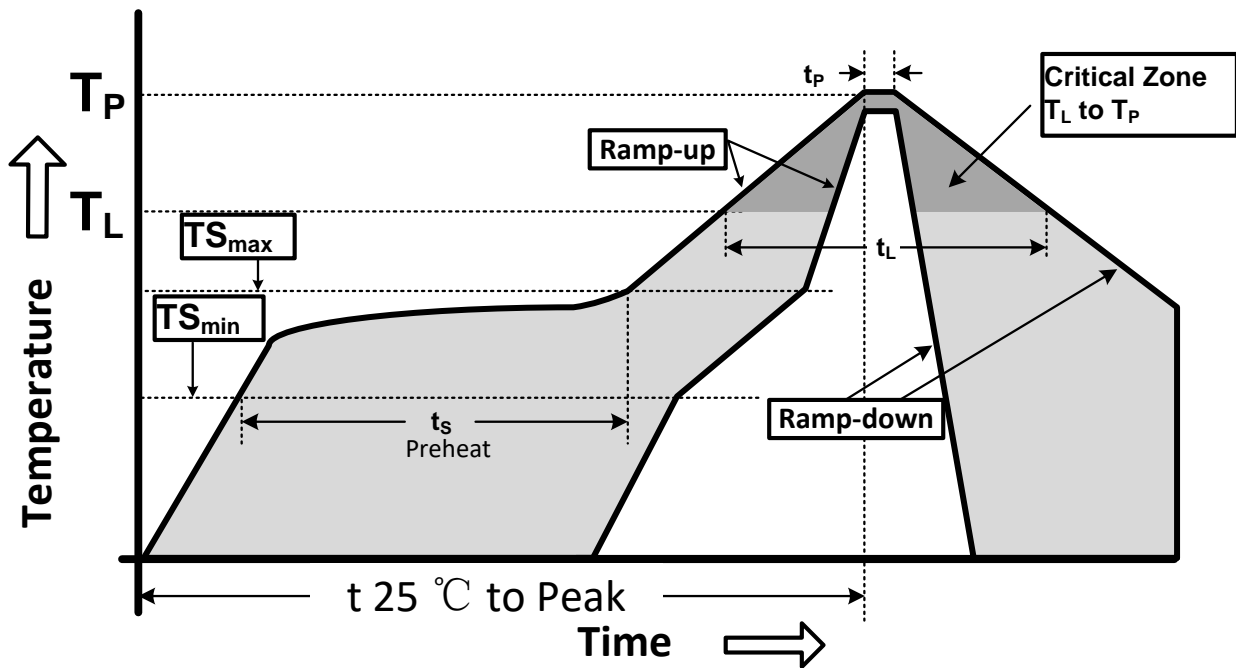
**Reflow Chart**


Figure 4. Recommended Lead-Free Reflow Profile

Table 6.

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