Sub-1 GHz, Low Noise Amplifier

PRORODUCT DESCRIPTION

The MS2630 is a Sub-1 GHz, low power dissipation and low noise amplifier (LNA). The chip adopts advanced manufacture technology and is available in SOT23-6 package.

SOT23-6

FEATURES

- Typical Noise Figure: 1.57dB
- Typical Power Gain: 16.3dB
- Typical Output P1dB: -9.2dBm
- Operating Frequency: 100MH ~ 1000MHz (According to the operating frequency band required by user, providing reference application circuit and BOM table)
- Current Consumption: 3.5mA@3V
- Wide Power Supply Range: 1.6V ~ 5.5V
- Sleep Shutdown Function
- 2kV HBM ESD Pin Protection Circuit
- Simple External Circuit

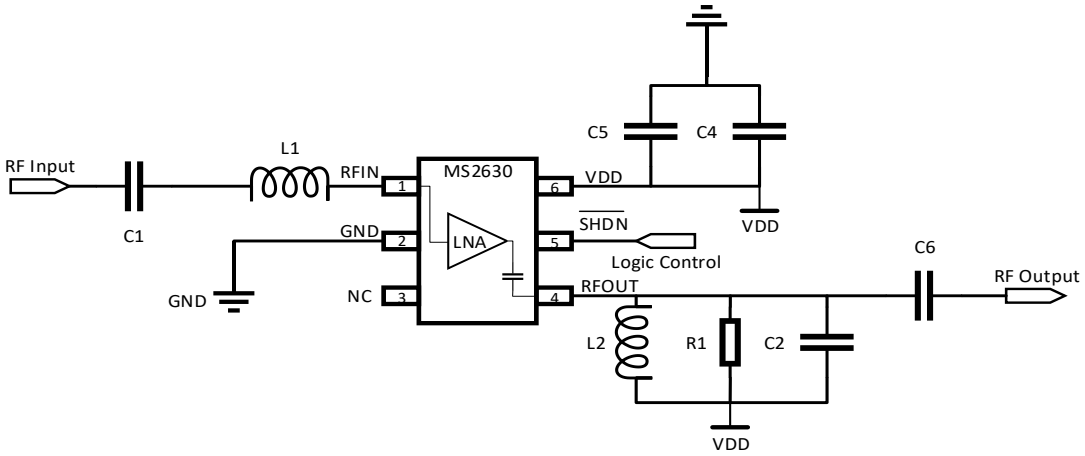
APPLICATIONS

- Wireless Communication and Control
- Remote Keyless Entry (RKE)
- Tire Pressure Monitoring System (TPMS)
- Telemetry Receivers
- Garage Door Openers

PRODUCT SPECIFICATION

Part Number	Package	Marking
MS2630	SOT23-6	2630

PIN CONFIGURATION



PIN DESCRIPTION

Pin	Name	Type	Description
1	RFIN	I	RF Input
2	GND	-	Ground
3	NC	-	Not Connection
4	RFOUT	O	RF Output
5	$\overline{\text{SHDN}}$	I	Operation in High Level, Sleep in Low Level
6	VDD	-	Power Supply

Peripheral Components Description

Symbol	Description
C1	Input DC Blocking Capacitor Murata GRM155R71H471KA01D C0402; 470pF ± 10% 50V X7R
L1	Input Matching Inductance Murata LQG15HS10NJ02D L0402 Lamination; 10nH ± 5%
L2	Murata LQG15HS9N1J02D L0402 Lamination; 9.1nH ± 5%
R1	R0402 1% 300Ω
C2	Murata GRM1555C1H1R5CZ01D C0402; 1.5pF ± 0.25pF 50V C0G
C6	Output DC Blocking Capacitor Murata GRM1555C1H3R0CZ01D C0402; 3pF ± 0.25pF 50V C0G
C4	Power Bypass Capacitor Murata GRM155R71C104KA88D C0402; 100nF ± 10% 16V X7R
C5	Power Bypass Capacitor Murata GRM1555C1H101JZ01D C0402; 100pF ± 5% 16V X7R

ABSOLUTE MAXIMUM RATINGS

Any exceeding absolute maximum rating application causes permanent damage to device. Because long-time absolute operation state affects device reliability. Absolute ratings just conclude from a series of extreme tests. It doesn't represent chip can operate normally in these extreme conditions.

Parameter	Symbol	Ratings	Unit
VDD to GND		-0.3 ~ 6.0	V
RFIN to GND		-0.3 ~ 2.0	V
RFOUT to GND		-0.3 ~ 5.0	V
$\overline{SHDN}$ to GND		-0.3 ~ 5.0	V
RF Input Power	P_{IN}	+20	dBM
Operating Temperature Range	T_{opr}	-40 ~ +120	°C
Lead Temperature (10s)		+260	°C

ELECTRICAL CHARACTERISTICS

DC Electrical Characteristics

At room temperature

Parameter	Condition	Min	Typ	Max	Unit
Power Supply		1.6	3.0	5.5	V
Power Supply Current (Input terminal is grounded through capacitor without additional AC signal)	$\overline{SHDN}$ =1, Power Supply: 3V		3.43		mA
	$\overline{SHDN}$ =1, Power Supply: 1.6V		2.37		mA
	$\overline{SHDN}$ =1, Power Supply: 5.5V		4.38		mA
	$\overline{SHDN}$ =0	0.03	0.54	1	μA
Digital Input Logic High Level		1.2			V
Digital Input Logic Low Level				0.5	V
RFIN DC Bias Voltage	$\overline{SHDN}$ =1	0.8	0.87	0.90	V

Note: Under normal conditions, the chip is in the normal operating state from -40°C to +120°C. If there is no additional AC signal, DC operating current does not exceed the maximum operating value. If this happens, it is necessary to check S parameter to ensure whether the module is in unstable state.

AC Electrical Characteristics

670MHz center frequency, 3V power supply at room temperature

Parameter	Typ			Unit
Operating Frequency	660	670	680	MHz
Input Matching Inductance	10			nH
Power Gain	16.3	16.2	16.1	dB
Noise Figure[1]	1.57	1.58	1.58	dB
Input Return Loss	11.3	11.5	11.6	dB
Output Return Loss	13.6	12.9	12.2	dB
Reverse Isolation	45.6	46.7	44.6	dB
Input IP3[2]	-15.5	-15.5	-15.5	dBm
Input P1dB	-24.5	-24.5	-24.5	dBm

Note:

1. Measured value (including PCB, SMA and other board-level access loss).
2. Adopt two signals with -2MHz and 2MHz deviating from center frequency (670MHz) respectively.

TYPICAL CHARACTERISTICS CURVE

Typical operating conditions: evaluation board test, 25°C temperature, 3V power supply, input center frequency signal, unless otherwise noted.

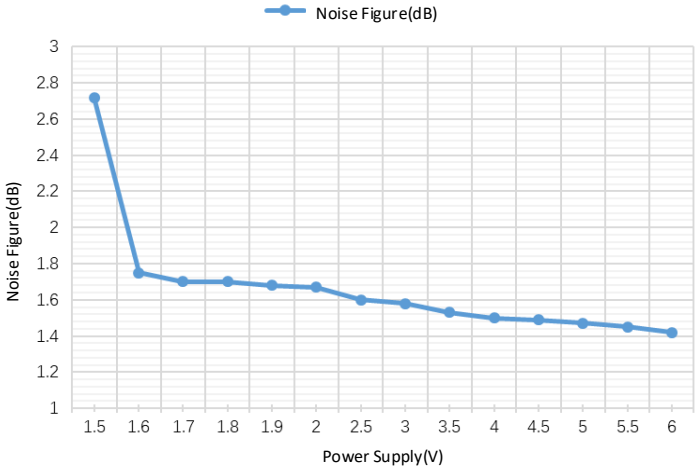


Figure 1. Noise Figure VS. Power Supply

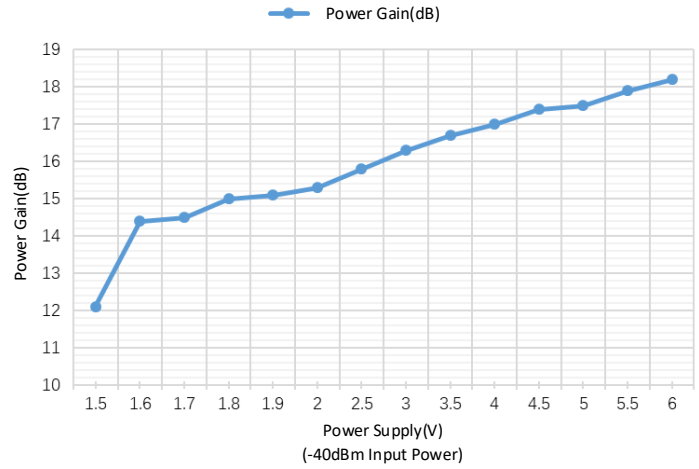


Figure 2. Power Gain VS. Power Supply

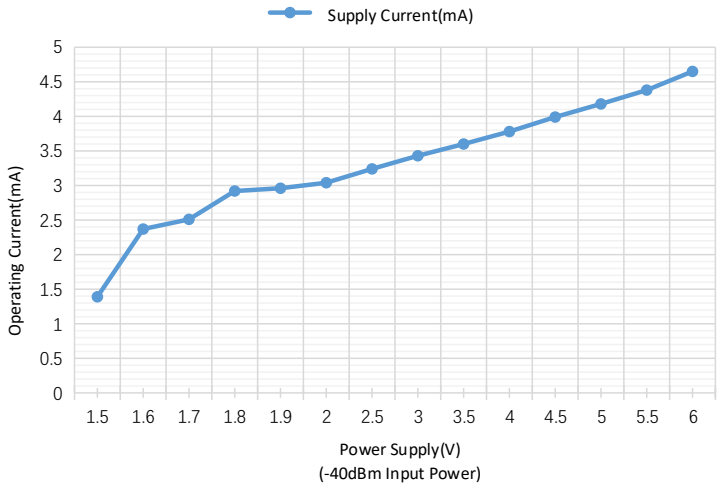
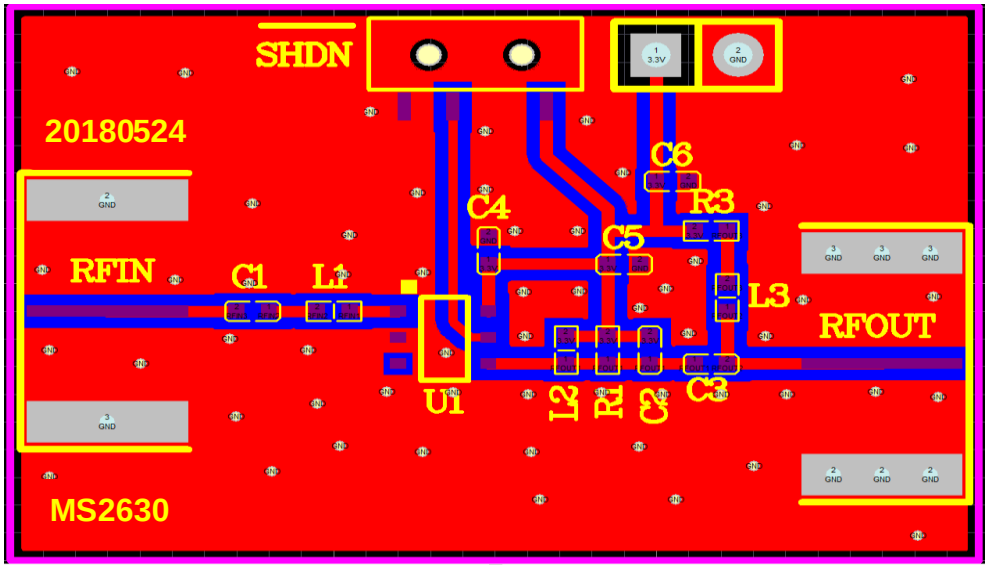


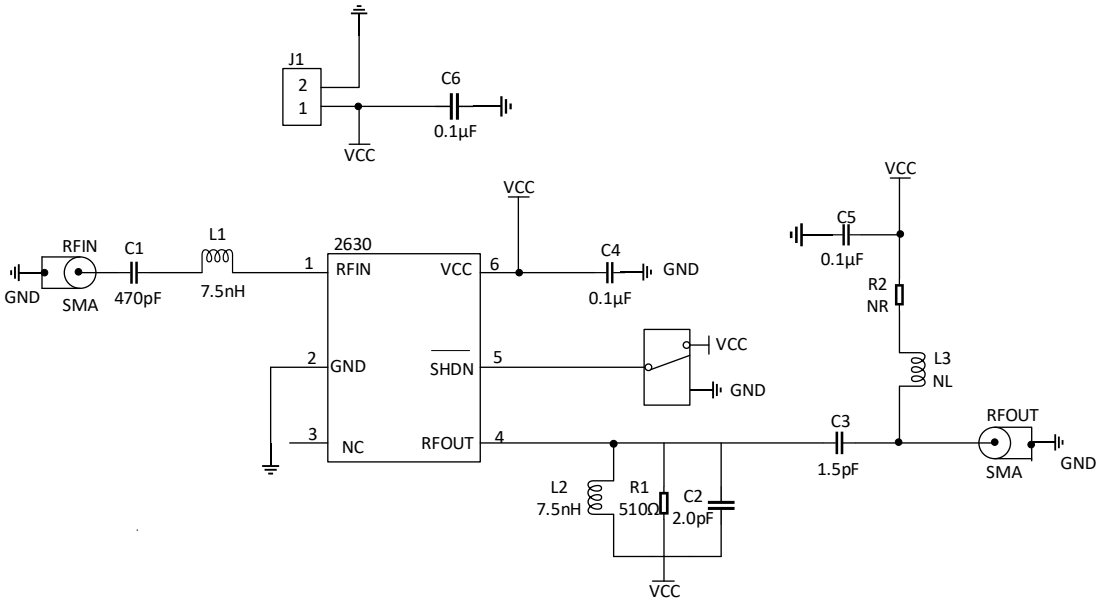
Figure 3. Operating Current VS. Power Supply

EVALUATION TEST BOARD PCBA DESCRIPTION

The evaluation test board of the MS2630 adopts two-layer board made of FR4 material. The thickness is 0.8mm, the average thickness of copper surface of circuit board is 30μm and the area is 30 ×20mm^2. As shown in the figure below, U1 is the test chip MS2630, C1 is the input DC blocking capacitor, L1 is the input matching inductance and C4, C5, C6 are power bypass capacitors (optional). Input terminal RFIN and output terminal RFOUT are accessed with SMA.



The circuit schematic diagram is shown as follows:



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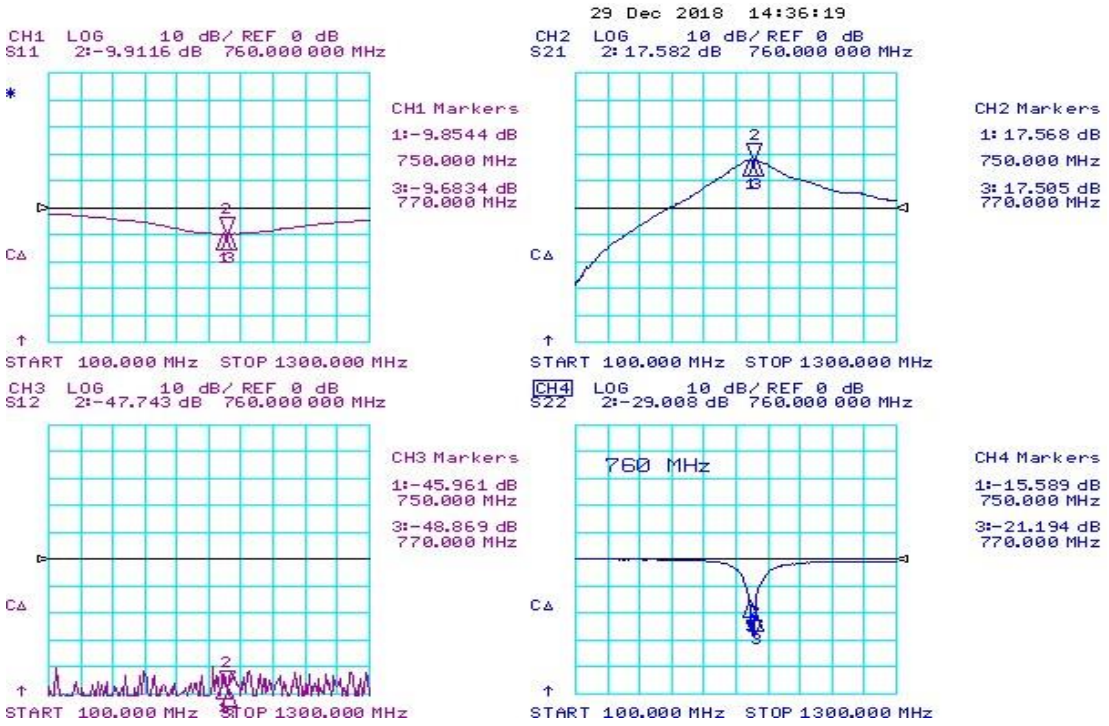
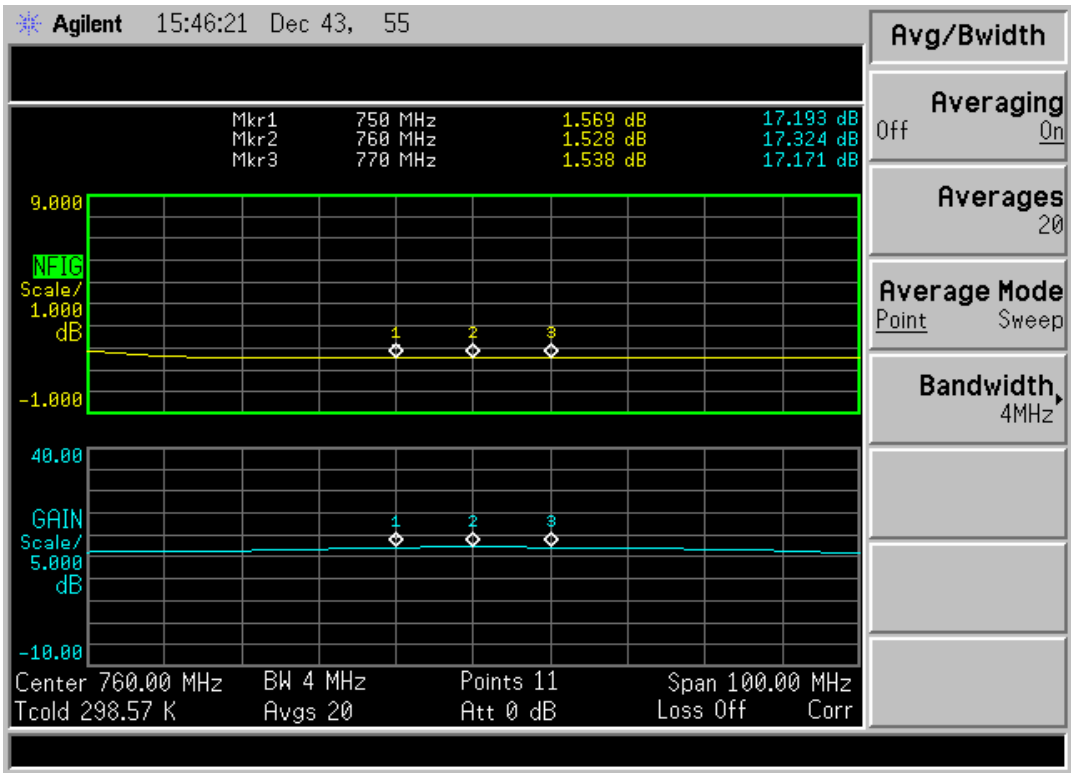
C3	Output DC Blocking Capacitor Murata GRM1555C1H3R0CZ01D C0402; 3pF ± 0.25pF 50V C0G
C4, C5, C6	Power Bypass Capacitors Murata GRM155R71C104KA88D C0402; 100nF ± 10% 16V X7R

The following figures show the measured value of S parameter in 3V power supply and input matching inductance: L1=10nH.

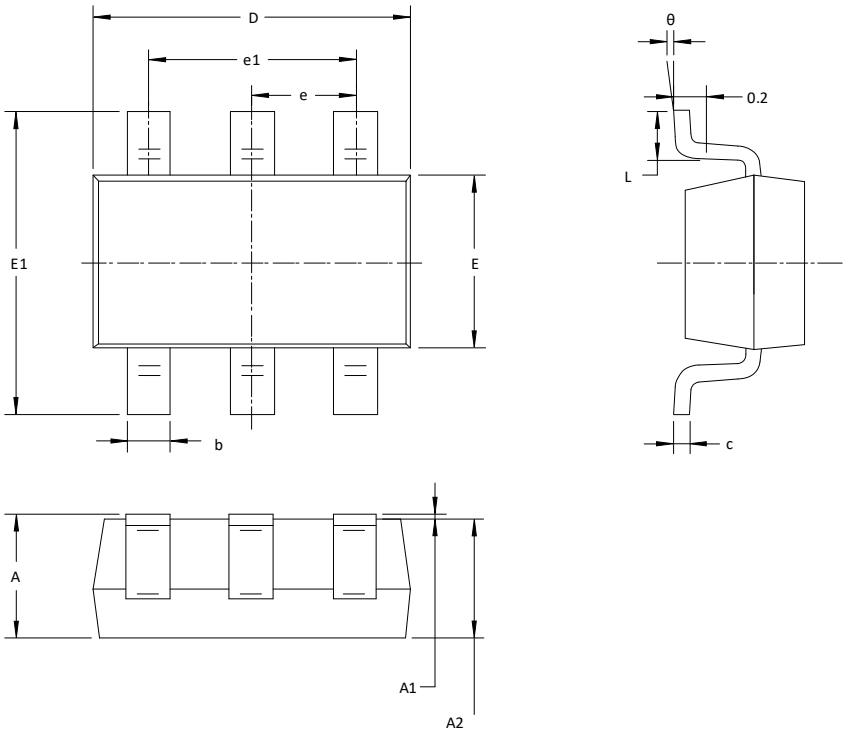


The following figures show the noise figure and the measured value of relevant gain in 3V power supply and input matching inductance: L1=10nH.



PACKAGE OUTLINE DIMENSIONS

SOT23-6



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.900(BSC)		0.075(BSC)	
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

MARKING and PACKAGING SPECIFICATION

1. Marking Drawing Description

Product Name: 2630

Product Code: XXXX

2. Marking Drawing Demand

Laser printing, contents in the middle, font type Arial.

3. Packaging Specification

Device	Package	Piece/Reel	Reel/Box	Piece/Box	Box/Carton	Piece/Carton
MS2630	SOT23-6	3000	10	30000	4	120000

STATEMENT

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- The process of improving product is endless. And our company would sincerely provide more excellent product for customer.

MOS CIRCUIT OPERATION PRECAUTIONS

Static electricity can be generated in many places. The following precautions can be taken to effectively prevent the damage of MOS circuit caused by electrostatic discharge:

1. The operator shall ground through the anti-static wristband.
2. The equipment shell must be grounded.
3. The tools used in the assembly process must be grounded.
4. Must use conductor packaging or anti-static materials packaging or transportation.

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