DATA SHEET

LXK6021E: 1.8~2.7GHz Low-Noise Amplifier

Applications

- 802.11b/g/n PC cards NICs, and USB dongles
- 802.11b/g/n tablets
- 802.11b/g/n access point, routers, and gateways
- 2.4 GHz ISM radios
- Microwave Radio & Test Equipment
- 3G & TD_LTE systems
- Beidou systems

Features

- Ultra-low Noise Figure at 2. 5GHz:1.1 dB
- 1.8 GHz to 2.7 GHz operation
- Enable/disable mode
- High IIP3: +14 dBm
- High gain: 14dB
- 2.8 to 5.0 V single-supply operation
- Single, positive DC supply voltage
- DFN (6-pin, 1.6 x 1.6 x 0.55 mm) package

Product Description

The LXK6021E is an ultra Low-Noise Amplifier (LNA) intended for 1.8GHz~2.7GHz wireless receiver applications. Its low Noise Figure (NF), together with high linearity, makes it ideal as a perfect LNA in 802.11b/g/n Wireless Local Area Network radios, Beidou systems and TD_LTE systems.

Operating with a single supply voltage, the LXK6021E consumes only 12 mA of current. The device includes a shutdown mode to save power when the receiver is inactive. The tiny package footprint of the LXK6021E, requiring only a few external components.

The block diagram of the LXK6021E is shown in Figure 1 and the device package and pin out for the 6-pin Dual Flat No-Lead (DFN) are shown in Figure 2.

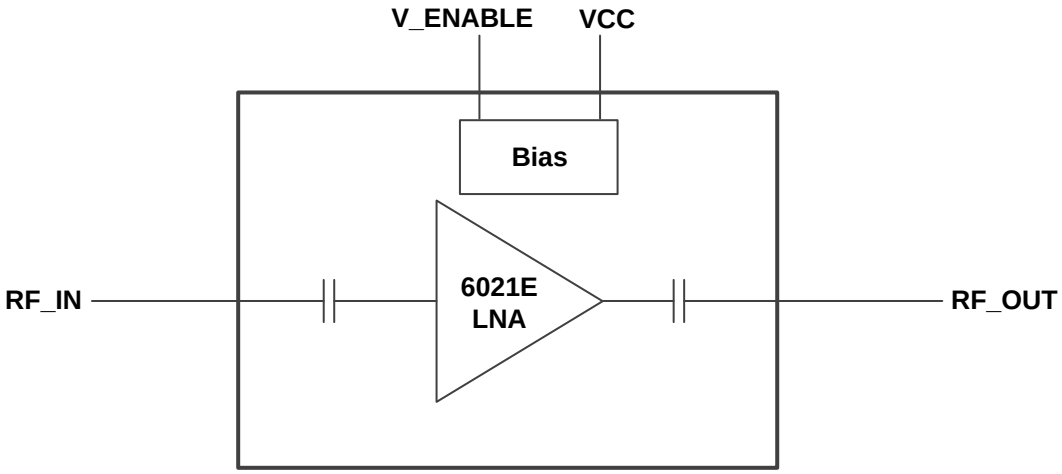


Figure 1. LXK6021E Functional Block Diagram

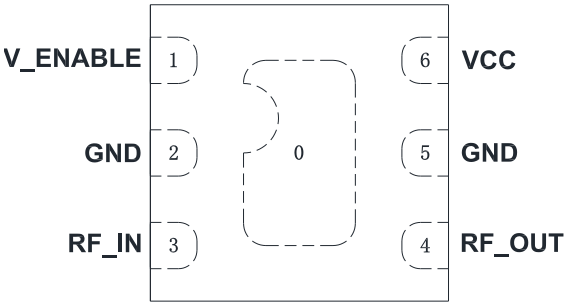


Figure 2. LXK6021E Pinout - 6 Pin 1.6x1.6 DFN (Top View)

Table 1. Names and Descriptions

Pin	Name	Description
1	V_ENABLE	Enable control input
2, 5	GND	Ground
3	RF_IN	LNA input
4	RF_OUT	LNA output
6	VCC	Supply voltage for LNA
0	GND	GND PAD

Technical Description

The LXK6021E is internal matching IC, just requiring only a simple bypass circuit on pin 6 (VCC) and few input components for fine turning. An external resistor on the V_ENABLE signal (pin1) allows a wide range of control voltages to be used. Shutdown mode is achieved by switching the V_ENABLE signal to 0 V.

Package and Handling Information

Since the device package is sensitive to moisture absorption, it is baked and vacuum packed before shipping. Instructions on the shipping container label regarding Exposure to moisture after the container seal is broken must be followed. Otherwise, problems related to moisture absorption may occur when the part is subjected to high temperature during solder assembly. The LXK6021E is rated to Moisture Sensitivity Level 1(MSL1) at 260 ℃. It can be used for lead or lead-free soldering.

Electrical and Mechanical Specifications

Signal pin assignments and functional pin descriptions are described in Table 1. The absolute maximum ratings of the LXK6021E are provided in Table 2. The electrical specifications are provided in Table 3 and the recommended operating conditions are specified in Table 4. Table 5 provides the control logic for the LXK6021E. Performance characteristics for the LXK6021E are illustrated in Chart.1~16. An application schematic diagram for the LXK6021E is shown in Figure 3 and application Circuit PCB Layout is shown in Figure 4.

Table 2. Absolute Maximum Ratings

Parameter	Rating	Units
Max Device Voltage(V_D)	5.5	V
Max RF Input Power	+5	dBm
Storage Temperature	-40 to 125	℃
Operating Temperature	-40 to 75	℃
Junction Temperature	150	℃
Thermal Resistance	105	℃/W
Electrostatic Discharge, Human Body Model	1000	V

Table 3. Typical Electrical Specifications (1.8GHz-2.7GHz)

(Test Conditions: VDD=3.3V, ID=12mA, V_ENABLE=3.3V Typ., OIP3 Tone Spacing=1MHz, Pout per tone=0dBm, TA=25℃, ZS=ZL=50Ω)

Parameter		Specification			Units
		Min.	Typ.	Max.	
Small Signal Gain	1.9GHz		16		dB
	2.4GHz		14		dB
	2.6GHz		14		dB
Output P1dB (In-band)			15		dBm
OIP3			28		dBm
Input Return Loss	1.9GHz		-9		dB
	2.4GHz		-10		dB
	2.6GHz		-11		dB
Output Return Loss	1.9GHz		-8		dB
	2.4GHz		-10		dB
	2.6GHz		-10		dB
Reverse Isolation			22		dB
Noise Figure	1.9GHz		1.5		dB
	2.4GHz		1.1		dB
	2.6GHz		1.2		dB
Device Operating Voltage			+3.3		V
Device Operating Current V_ENABLE=3.3V V_ENABLE=0V			 12 <1		 mA uA
V_ENABLE current			1		mA

Table 4. Recommended Operating Conditions

Symbol	Parameter	Min.	Typ.	Max.	Units
f	Operating frequency	1800		2700	MHz
V_{CC}	Supply voltage for LNA	2.8	3.3	5	V
V_ENABLE	Enable voltage				V
High		2.5	3.3	3.5	
low		0	0	0.2	
T_A	Operating temperature	-40	25	85	℃

Table 5. Mode Control Logic

V_ENABLE Voltage (V)	Description
3.3	LNA is enabled
0	LNA is disabled

Performance Charts (V_{DD} = 3.30 V, I_D = 12 mA, T_A= 25°C)

Typical 1.9GHz 50 ohm system:

Chart.1 Input Return Loss vs Temperature

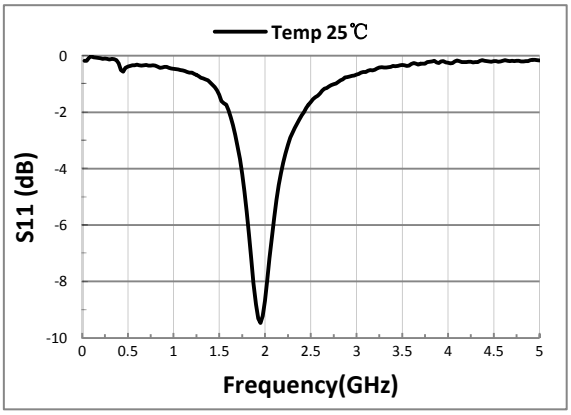


Chart.2 Gain vs Temperature

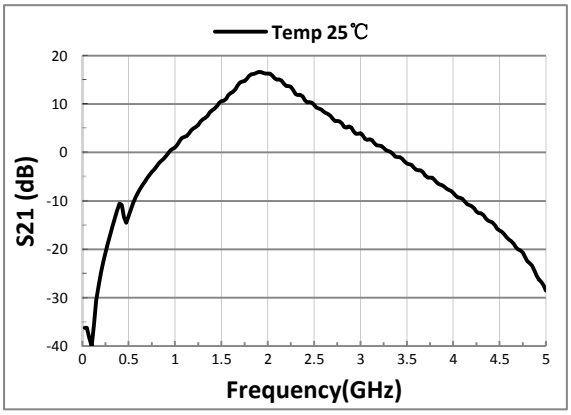


Chart.3 Reverse Isolation vs Temperature

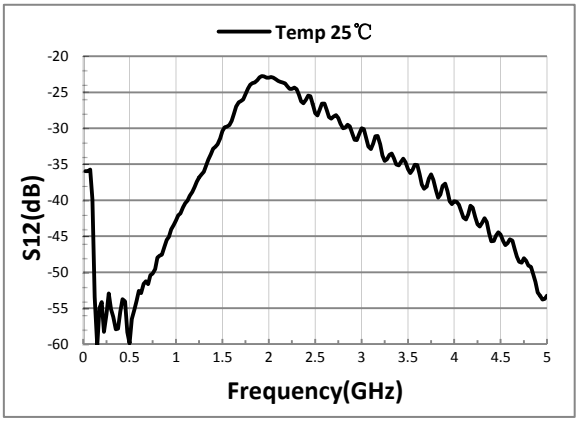


Chart.4 Output Return Loss vs Temperature

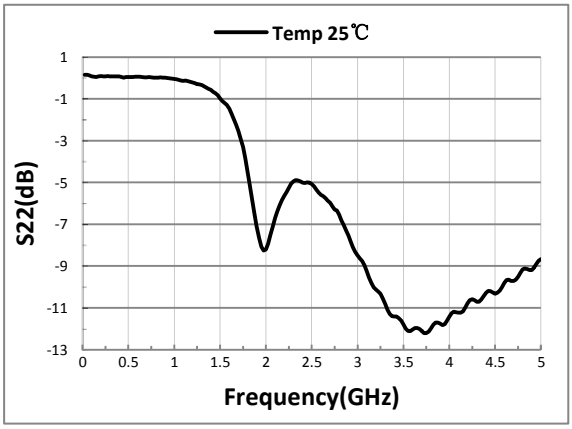
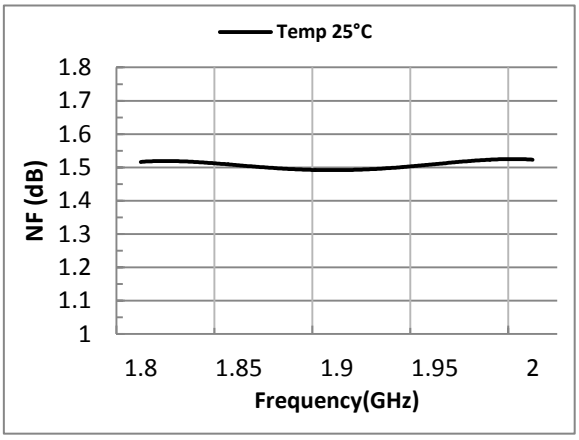


Chart.5 Noise Figure vs Frequency



Typical 2.4GHz 50 ohm system:

Chart.6 Input Return Loss vs Temperature

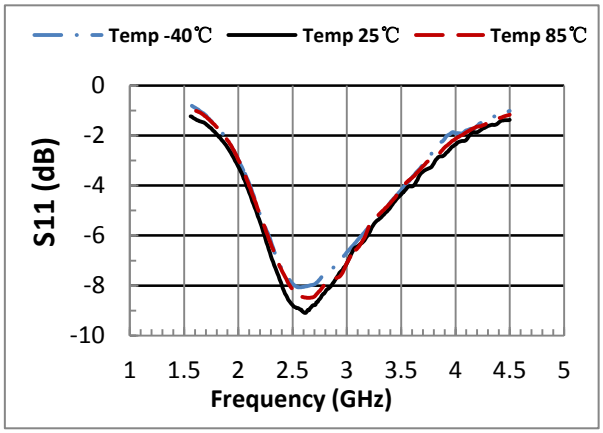


Chart.7 Gain vs Temperature

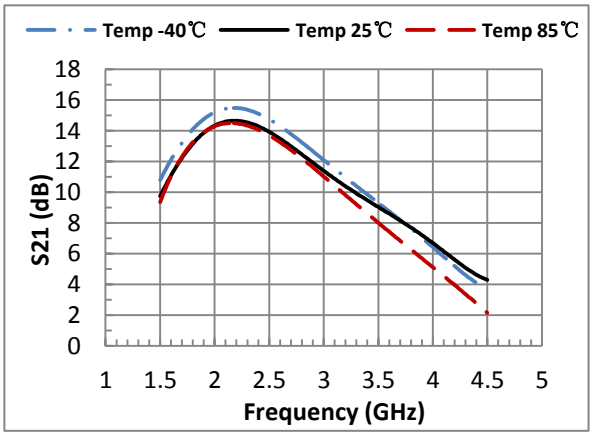


Chart.8 Reverse Isolation vs Temperature

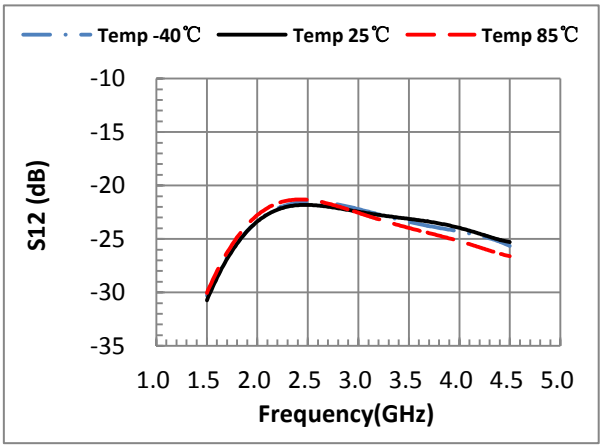


Chart.9 Output Return Loss vs Temperature

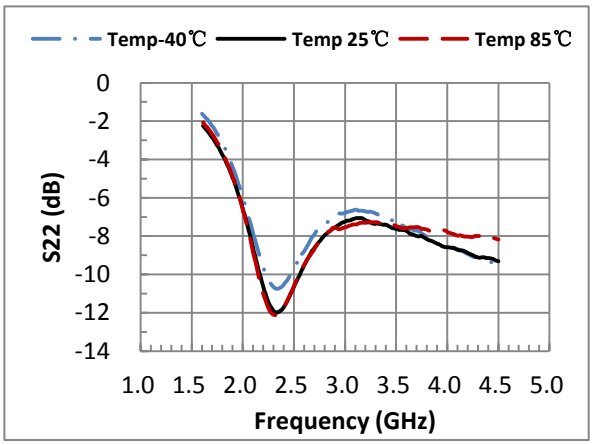


Chart.10 Noise Figure vs Frequency

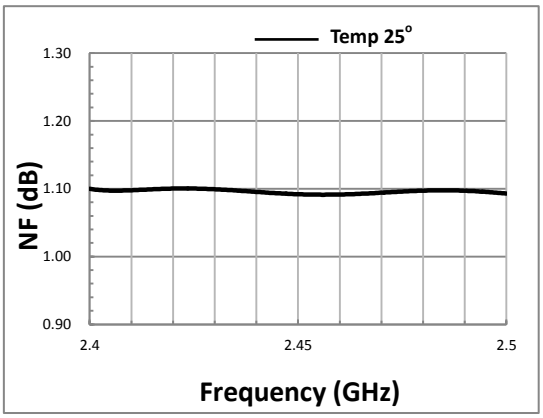
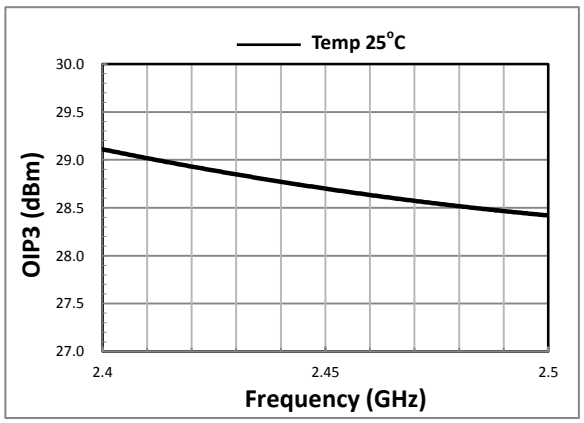


Chart.11 OIP3 vs Frequency



Typical 2.6GHz 50 ohm system:

Chart.12 Input Return Loss vs Temperature

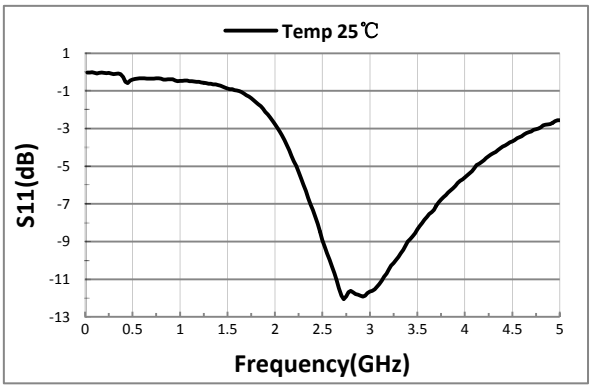


Chart.13 Gain vs Temperature

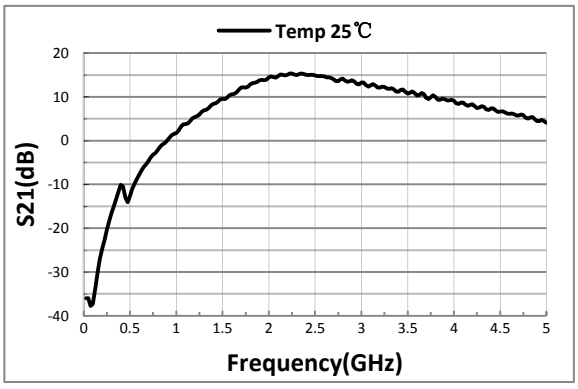


Chart.14 Reverse Isolation vs Temperature

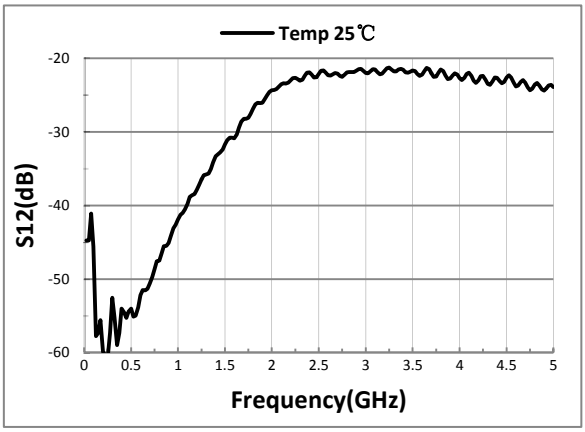


Chart.15 Output Return Loss vs Temperature

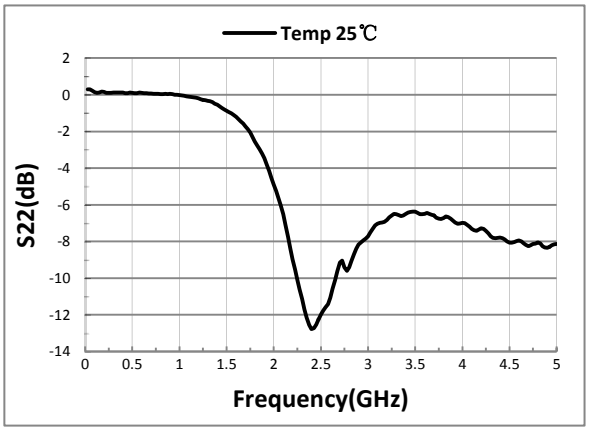
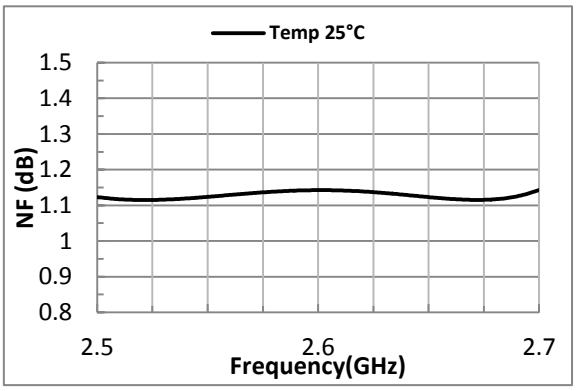


Chart.16 Noise Figure vs Frequency



Application Circuit

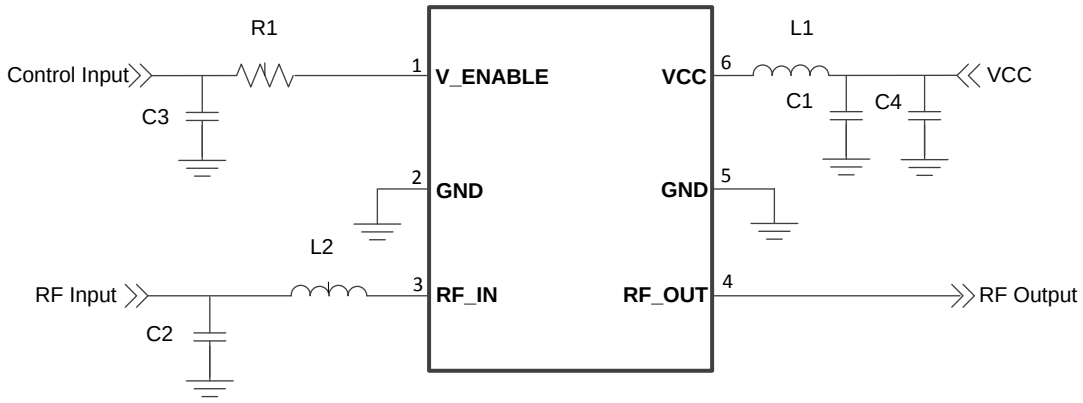


Figure 3. Application Circuit Schematic

Evaluation PCB

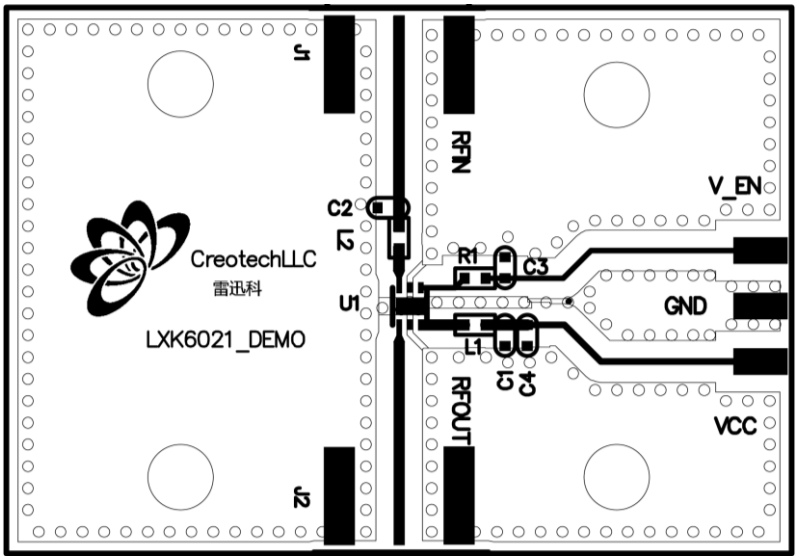
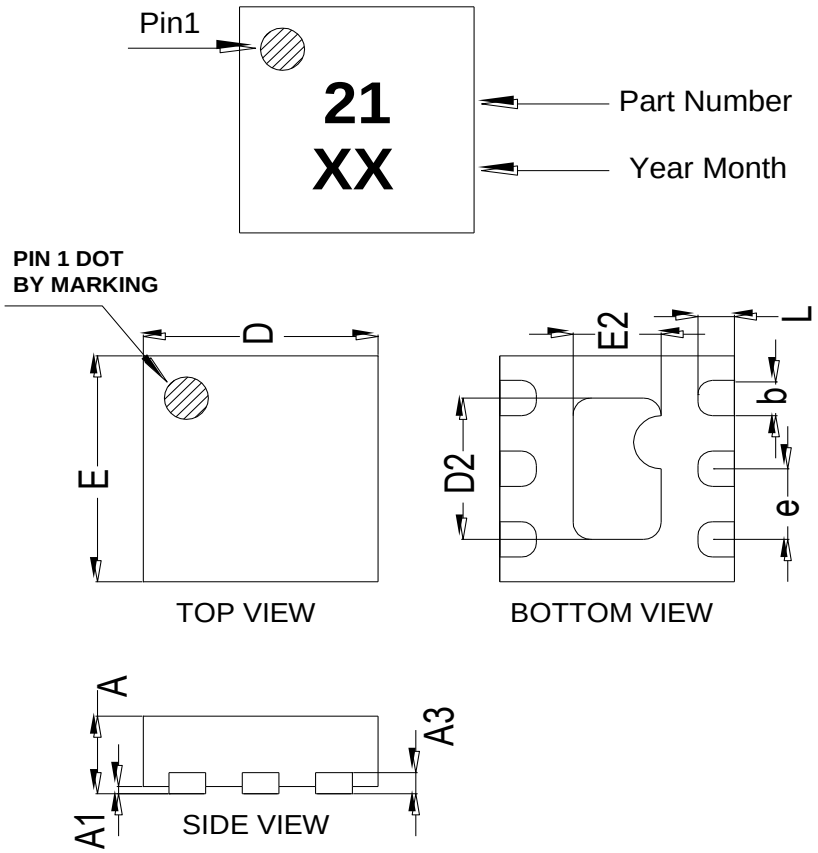


Figure 4. Application Circuit PCB Layout

Recommended Component Values for Key Application Frequencies

Reference Designator	Frequency (MHz)		
	1900	2400-2500	2600
L1	1.6nH	1.6nH	1.6nH
L2	3.9nH	1.8nH	1.3nH
R1	100 Ohm	100 Ohm	100 Ohm
C1	200pF	200pF	200pF
C2	1.8pF	0.5pF	0.5pF
C3,C4	0.1uF	0.1uF	0.1uF

Package Diagram



COMMON DIMENSIONS(MM)			
REF.	MIN.	NOM.	MAX
A	0.50	0.55	0.60
A1	0.00	-	0.05
A3	0.15 REF.		
D	1.55	1.60	1.65
E	1.55	1.60	1.65
D2	0.90	1.00	1.05
E2	0.50	0.60	0.65
L	0.20	0.25	0.30
b	0.20	0.25	0.30
e	0.50 BSC		

Ordering Information

Part No.	Description
LXK6021E	Low-Noise Amplifier

Document Change History

Revision	Date	Notes
1.0	Mar. 16, 2015	Created