

**DATA SHEET**

# LXK6601E: 1.8~2.7 GHz Linear Power Amplifier

## Applications

- Small Cells/Repeaters/DAS
- Wireless Infrastructure
- 1.8G/2.0G/2.3/2.6GHz LTE Applications

## Features

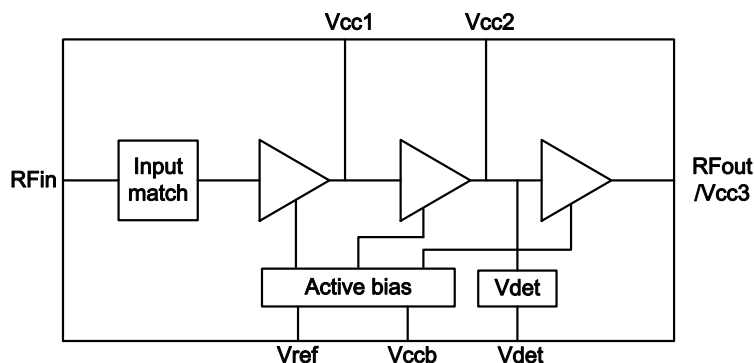
- Frequency band: 1.8 to 2.7GHz
- 3~5V Single Supply Voltage
- 28dBm, EVM<4%, 1.89/2.35/2.6GHz, TDD-LTE-20MHz  
\_1.7\_64QAM at 5V supply
- Small signal gain: 35 dB
- 50 Ohm input internally matched
- Active bias circuit
- Temperature compensation
- QFN (16-pin, 3mm x 3mm x 0.75mm), MSL3

## Product Description

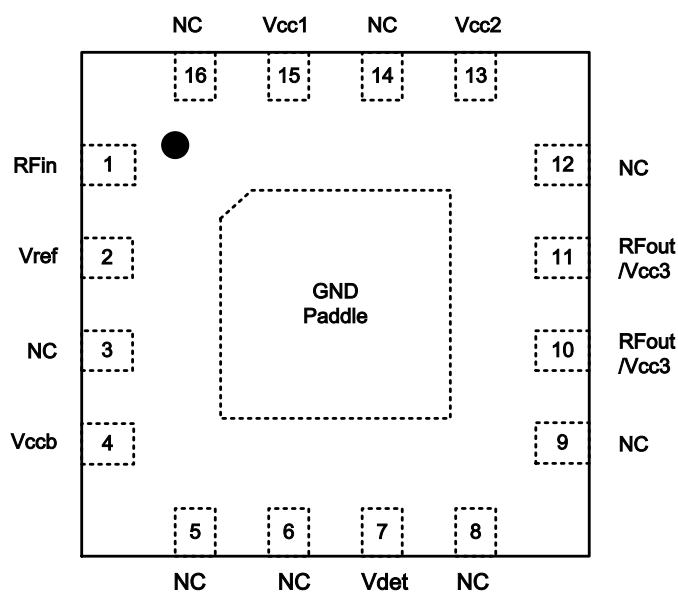
The LXK6601E is a high-power, high-gain linear power amplifier for 1.8~2.7GHz frequency band. For 1.8GHz、2.0GHz、2.3GHz and 2.6GHz LTE application, the device provides a typical 28dBm linear output power @ EVM<4%. The device is internally matched to 50 Ohms at the input and the output can be easily matched to obtain optimum power.

The LXK6601E is housed in a miniature 16-pin, 3mm x 3mm x 0.75mm QFN package. A power detector is also included on-chip.

A functional block diagram of LXK6601E is shown in Figure 1. The 16-pin, 3x3 QFN package and pin-out are provided in Figure 2. Signal pin assignments and functional pin descriptions are provided in Table 1.



**Figure 1. LXK6601E Functional Block Diagram**



**Figure 2. L XK6601E Pinout - 16 Pin 3x3 QFN (Top View)**

**Table 1. L XK6601E Pin Names and Descriptions**

Pin	Name	Description
1	RFin	RF input
2	Vref	Reference voltage for bias of stage-1, 2 & 3
3	NC	Not connected
4	Vccb	Power supply for bias circuit
5	NC	Not connected
6	NC	Not connected
7	Vdet	Power detector output
8	NC	Not connected
9	NC	Not connected
10	RFout	RF output and power supply for stage-3
11	RFout	RF output and power supply for stage-3
12	NC	Not connected
13	Vcc2	Power supply for stage-2
14	NC	Not connected
15	Vcc1	Power supply for stage-1
16	NC	Not connected

**Table 2. Absolute Maximum Ratings**

**Caution:** This device is ESD sensitive. Handling and assembling of this device should be at ESD protected workstations.

Symbol	Parameter	Min.	Max.	Units
Pin	RF input power (CW)		15	dBm
$V_{CC1}, V_{CC2}, V_{CC3}$	Supply voltage for stage-1,2&3		6.0	V
Vccb	Supply voltage for bias circuit		6.0	V
Vref	Reference voltage for bias circuit		3.5	V
$I_{CC}$	Total Supply Current		1.5	A
$T_{STG}$	Storage temperature	-40	125	°C
$T_A$	Operating temperature	-40	85	°C
$T_J$	Junction temperature		150	°C
$\Theta_{JC}$	Thermal resistance		10	°C/W
ESD	ESD Rating – Human Body Model		Class 1C	

**Table 3. Recommended Operating Conditions**

Symbol	Parameter	Min.	Typ.	Max.	Units
f	Operating frequency	1800		2700	MHz
$V_{CC1}, V_{CC2}, V_{CC3}$	Supply voltage for stage-1,2&3	4.75	5.0	5.25	V
Vref	Reference voltage for bias circuit	2.8	2.9	3.0	V
Vccb	Supply voltage for bias circuit	4.5	5.0	5.5	V
$T_A$	Operating temperature	-40	25	85	°C

**Table 4. DC Electrical Specifications**

( $T=25^{\circ}\text{C}$ ,  $V_{CC}=V_{CCB}=5\text{V}$ ,  $V_{REF}=2.9\text{V}$ )

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
Vcc1	Supply voltage for stage-1		4.75	5	5.25	V
Vcc2	Supply voltage for stage-2		4.75	5	5.25	V
Vcc3	Supply voltage for stage-3		4.75	5	5.25	V
Vccb	Supply voltage for bias circuit		4.75	5	5.25	V
Vref	Reference voltage for bias circuit		2.8	2.9	3.0	V
$I_{CC}$	Total collector supply current for PA	Quiescent(No RF) Pout=28dBm		240 400		mA
Iref	Reference current for bias circuit	Quiescent(No RF)		7		mA

**Table 5. RF Electrical Specifications**

(T=25°C, Vcc=Vccb=5V, Vref=2.9V, f=1890MHz, Unless Otherwise Noted)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
f	Frequency	-	1880		1900	MHz
P1dB	1dB gain compression point	1dB gain compression		33		dBm
S21	Small signal gain	Pin=-20dBm		34		dB
$\Delta$ S21	Small signal gain variation	Gain variation over band		0.7		dB
S11	Input return loss	-			-8	dB
Pout	Output power for TDD-LTE	TDD-LTE-20MHz_1.7_64QAM, EVM<4%		28		dBm

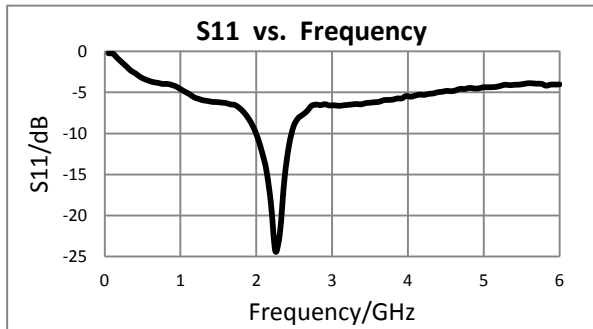


Figure3.S11 vs Freq

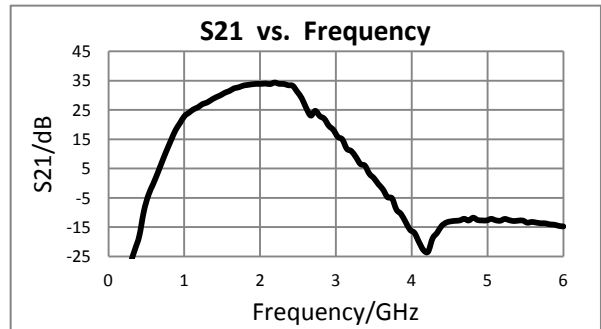


Figure4.S21 vs Freq

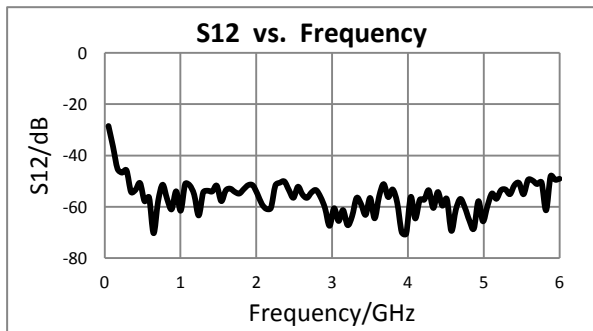


Figure5.S12 vs Freq

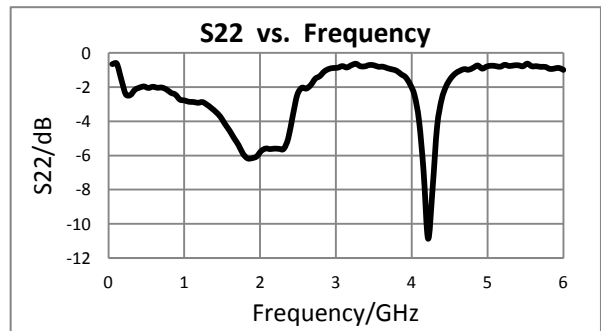


Figure6.S22 vs Freq

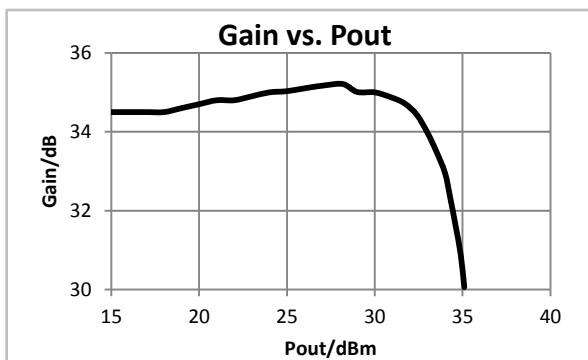


Figure7.Po vs Gain (CW signal)

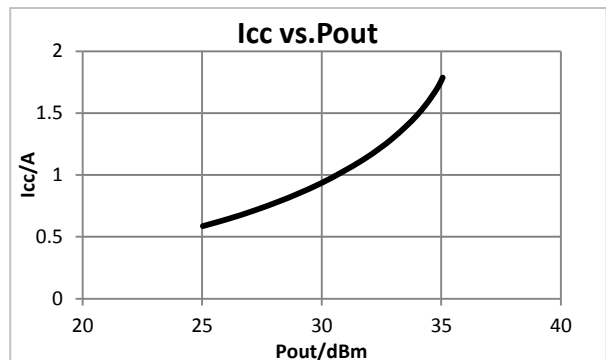


Figure8.Po vs Icc (CW signal)

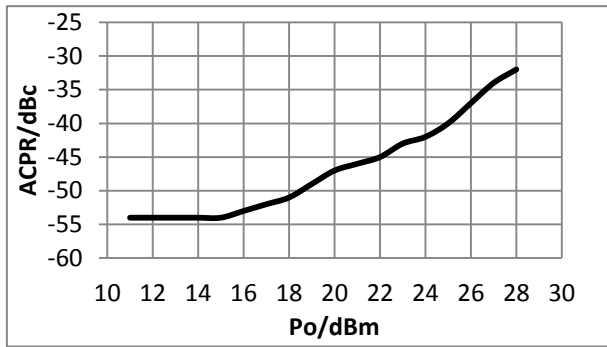


Figure9.Po vs ACPR  
(TDD-LTE-20MHz\_1.7\_64QAM)

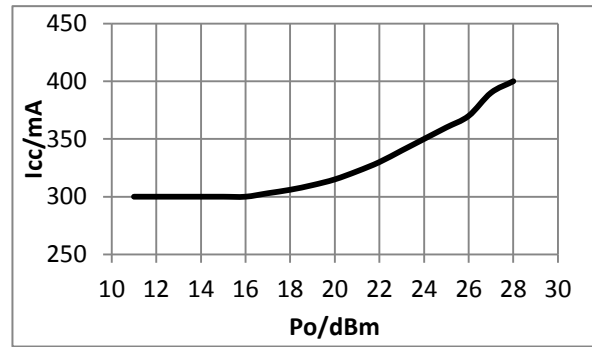


Figure10.Po vs Icc  
(TDD-LTE-20MHz\_1.7\_64QAM)

**Table 6. RF Electrical Specifications**

(T=25°C, Vcc=Vccb=5V, Vref=2.9V, f=2015MHz, Unless Otherwise Noted)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
f	Frequency	-	2010		2025	MHz
P1dB	1dB gain compression point	1dB gain compression		34		dBm
S21	Small signal gain	Pin=-20dBm		35		dB
ΔS21	Small signal gain variation	Gain variation over band		0.7		dB
S11	Input return loss	-			-9	dB
Pout	Output power for TDD-LTE	TDD-LTE-15MHz_1.7_64QAM, EVM<4%		28		dBm

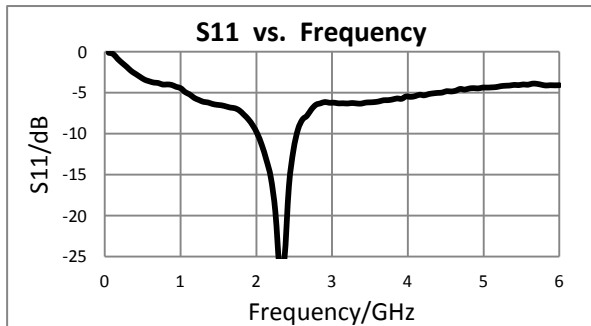


Figure11.S11 vs Freq

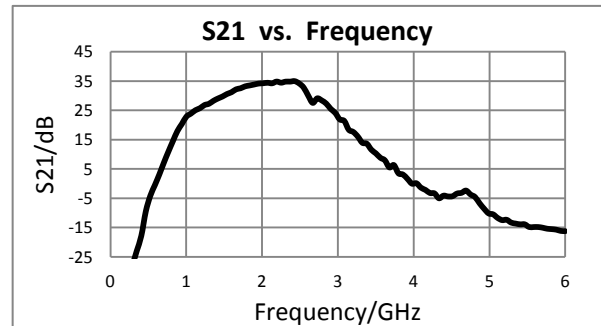


Figure12.S21 vs Freq

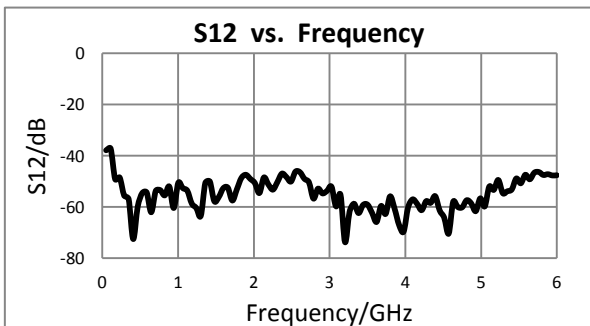


Figure13.S12 vs Freq

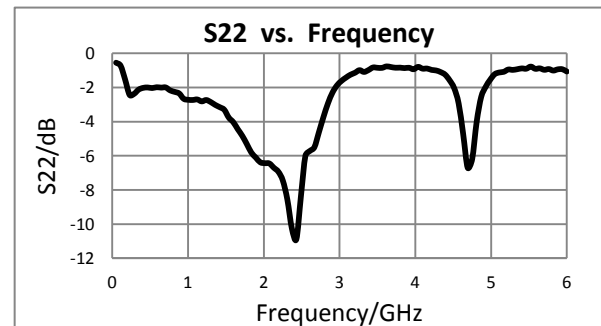


Figure14.S22 vs Freq

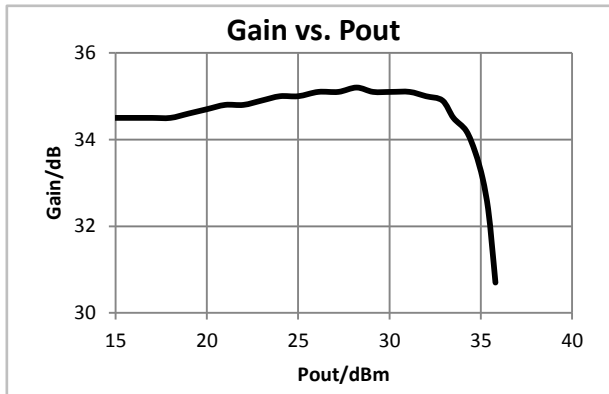


Figure15.Po vs Gain (CW signal)

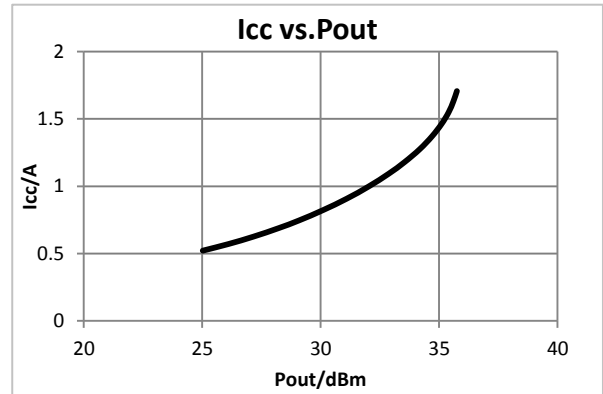


Figure16.Po vs Icc (CW signal)

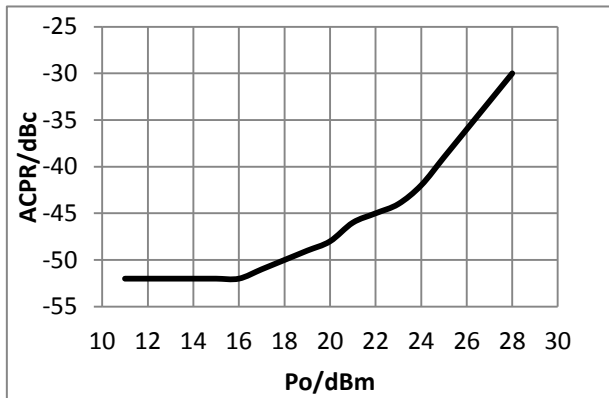


Figure17.Po vs ACPR  
(TDD-LTE-20MHz\_1.7\_64QAM)

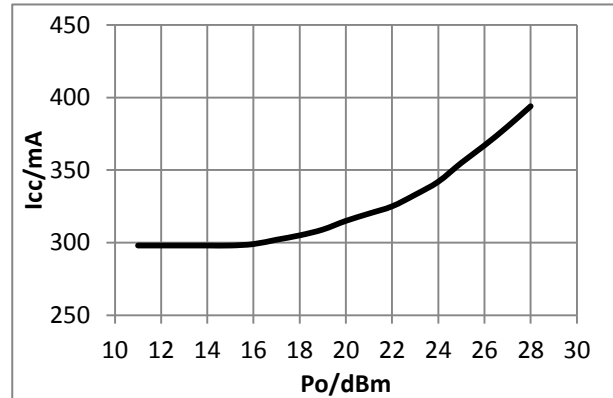


Figure18.Po vs Icc  
(TDD-LTE-20MHz\_1.7\_64QAM)

**Table 7. RF Electrical Specifications**

(T=25°C, Vcc=Vccb=5V, Vref=2.9V, f=2350MHz, Unless Otherwise Noted)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
f	Frequency	-	2320		2370	MHz
P1dB	1dB gain compression point	1dB gain compression		34		dBm
S21	Small signal gain	Pin=-20dBm		35		dB
ΔS21	Small signal gain variation	Gain variation over band		0.5		dB
S11	Input return loss	-			-10	dB
Pout	Output power for TDD-LTE	TDD-LTE-20MHz_1.7_64QAM, EVM<4%		28		dBm

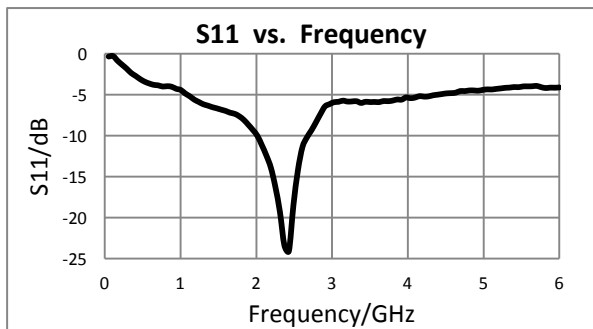


Figure19.S11 vs Freq

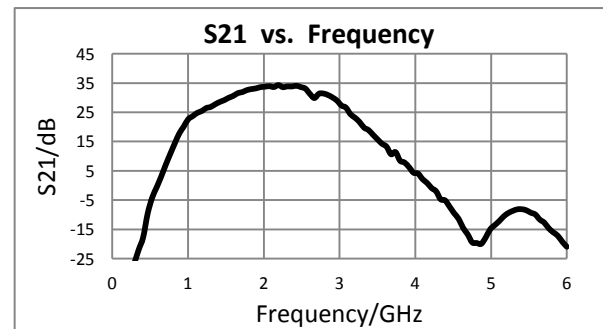


Figure20.S21 vs Freq

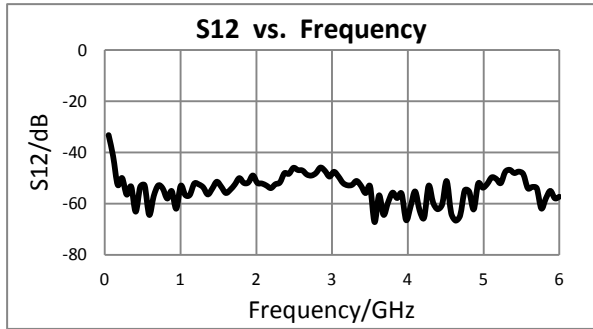


Figure21.S12 vs Freq

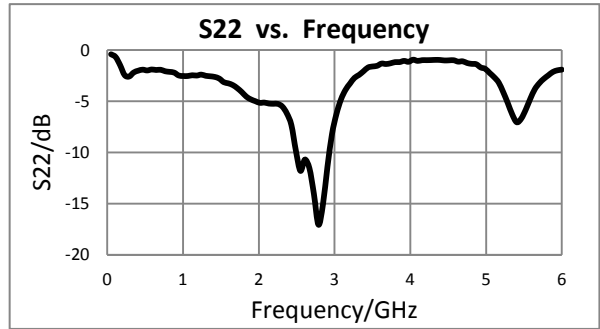


Figure22.S22 vs Freq

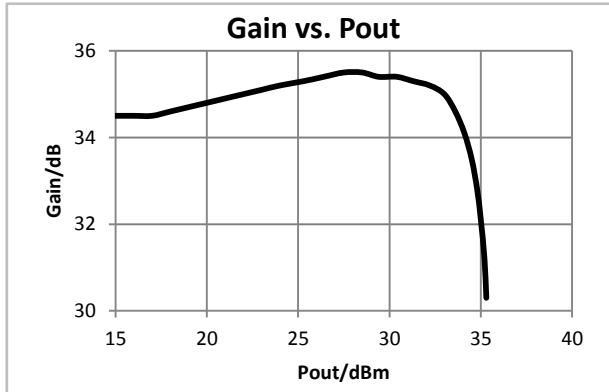


Figure23.Po vs Gain (CW signal)

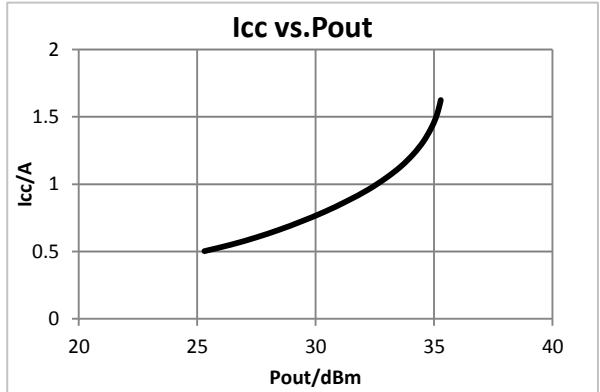


Figure24.Po vs Icc (CW signal)

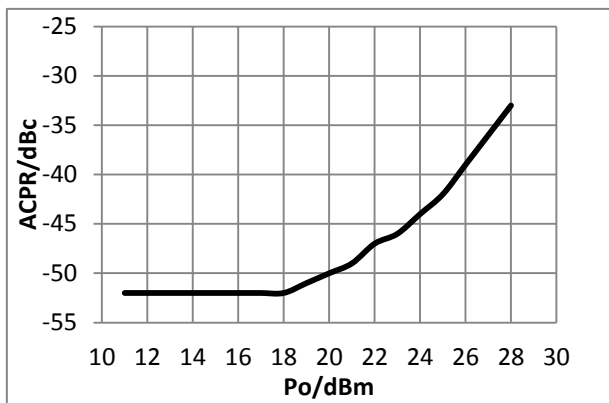


Figure25.Po vs ACPR  
(TDD-LTE-20MHz\_1.7\_64QAM)

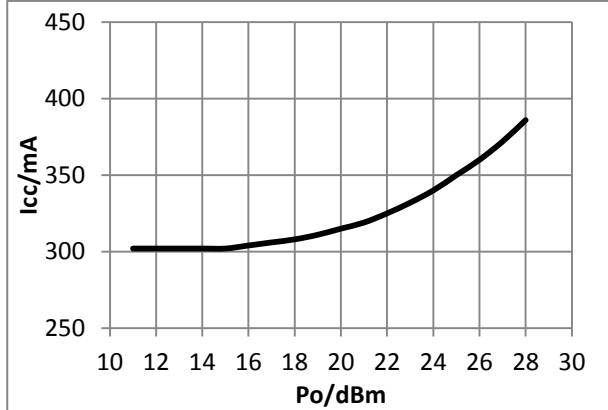


Figure26.Po vs Icc  
(TDD-LTE-20MHz\_1.7\_64QAM)

**Table 8. RF Electrical Specifications**

(T=25°C, Vcc=Vccb=5V, Vref=2.9V, f=2600MHz, Unless Otherwise Noted)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
f	Frequency	-	2575		2635	MHz
P1dB	1dB gain compression point	1dB gain compression		33		dBm
S21	Small signal gain	Pin=-20dBm		34		dB
ΔS21	Small signal gain variation	Gain variation over band		0.5		dB
S11	Input return loss	-			-10	dB
Pout	Output power for TDD-LTE	TDD-LTE-20MHz_1.7_64QAM, EVM<4%		28		dBm

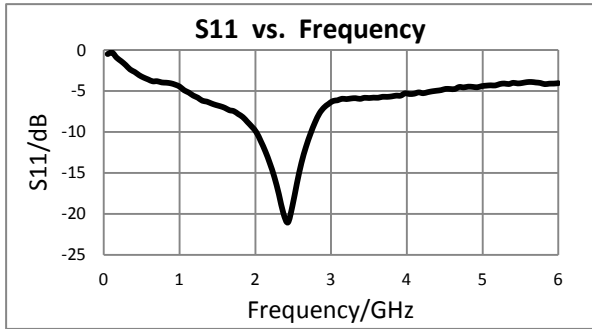


Figure27.S11 vs Freq

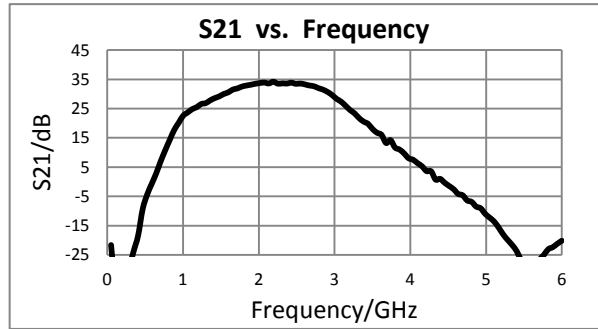


Figure28.S21 vs Freq

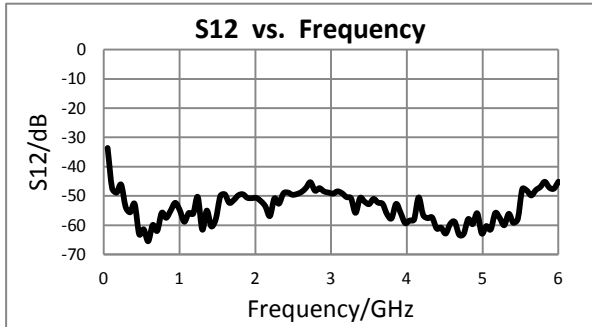


Figure29.S12vs Freq

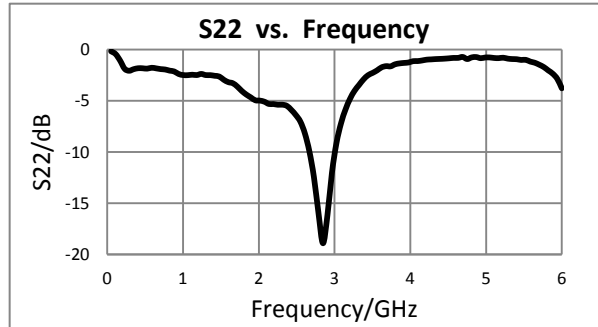


Figure30.S22 vs Freq

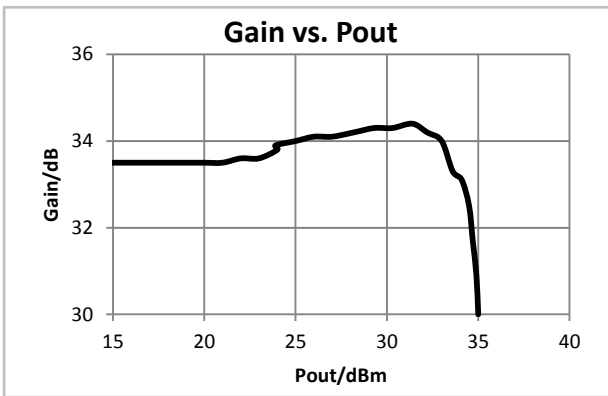


Figure31.Po vs Gain (CW signal)

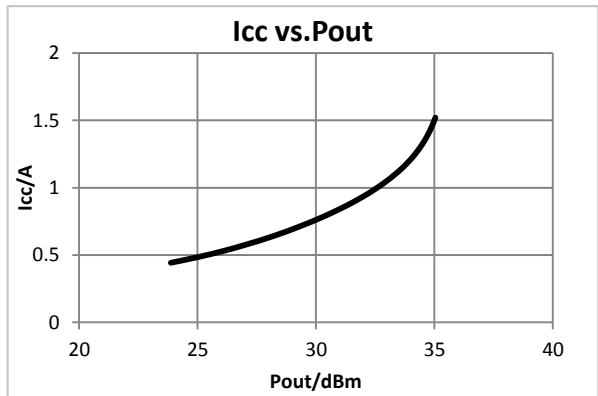


Figure32.Po vs Icc (CW signal)

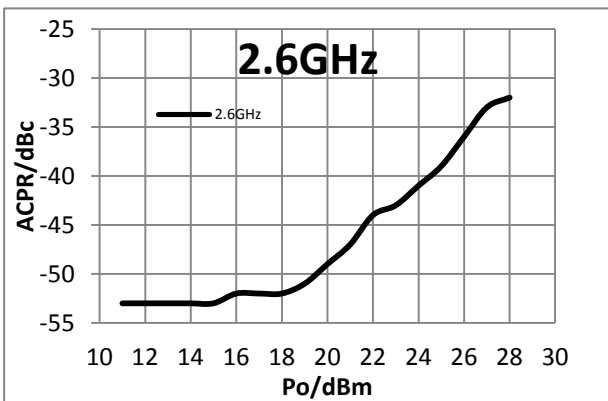


Figure33.Po vs ACPR  
(TDD-LTE-20MHz\_1.7\_64QAM)

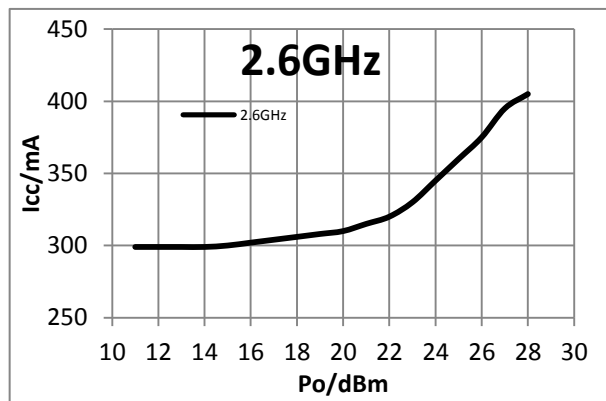
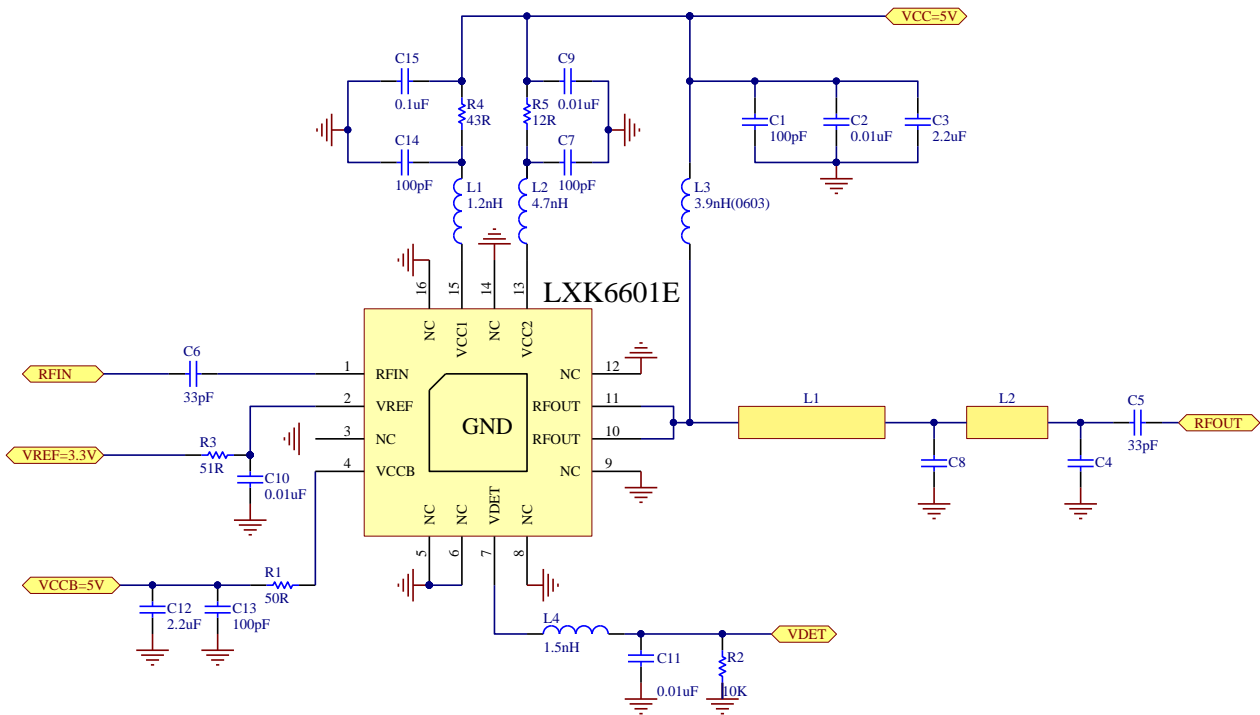


Figure34.Po vs Icc  
(TDD-LTE-20MHz\_1.7\_64QAM)



Application Schematic



L1	50 $\Omega$ ,68mil, edge of RFOUT pin to center of capacitor C8	
L2	50 $\Omega$ , 68mil, center of capacitor C8 to center of capacitor C4	
C4	1880~1900MHz	2.2pF
	2010~2025MHz	2.2 pF
	2320~2370MHz	1.2 pF
	2575~2635MHz	1.2 pF
C8	1880~1900MHz	3.6 pF
	2010~2025MHz	2.7 pF
	2320~2370MHz	2.2 pF
	2575~2635MHz	1.8 pF

PCB Material: Rogers 4350B,H=10 mil

Figure 35. LXK6601E Application Schematic.

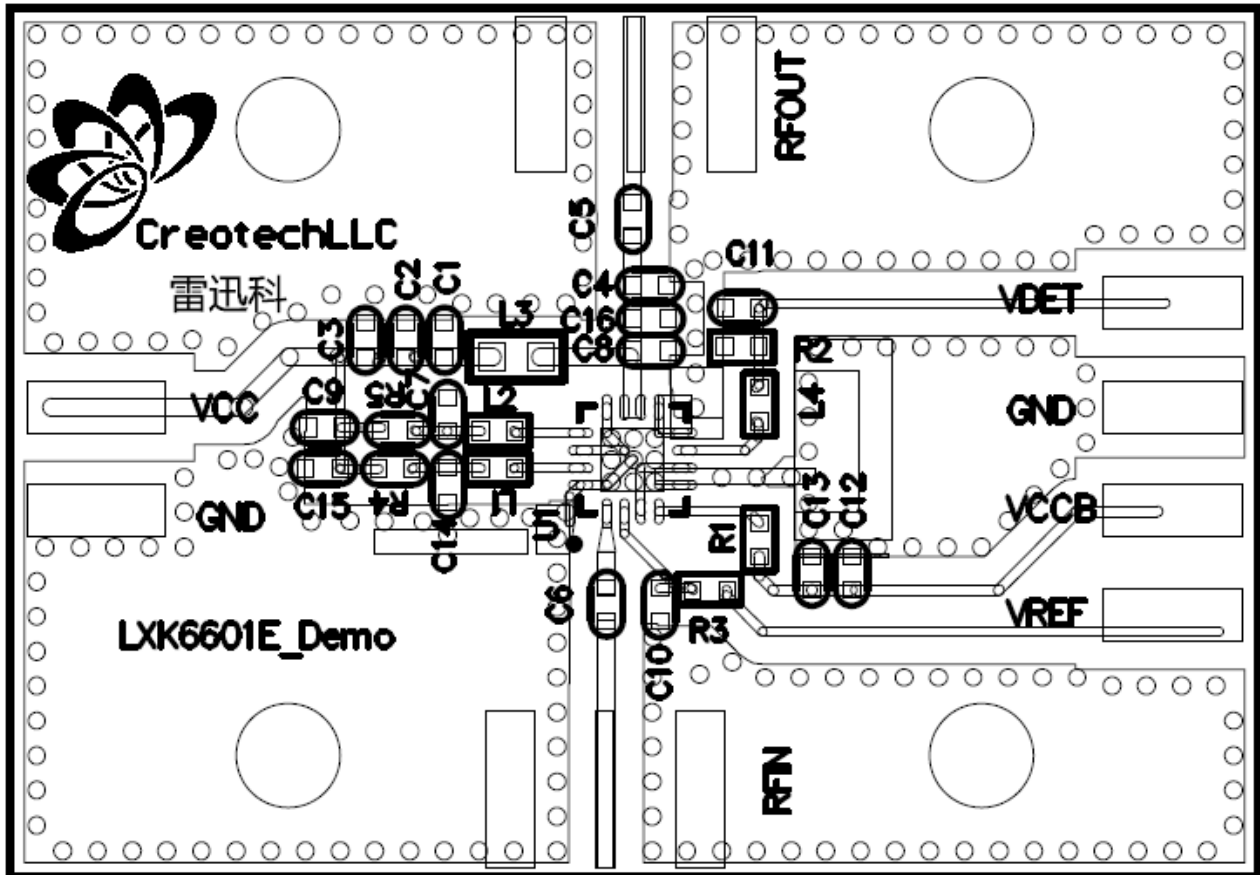
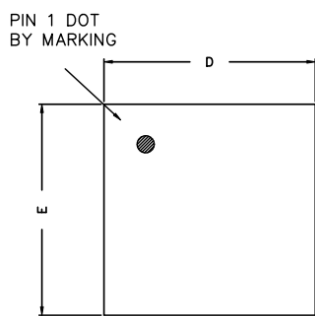
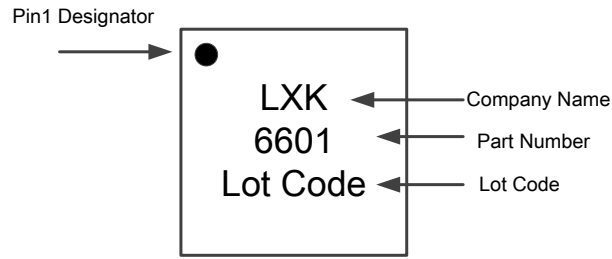
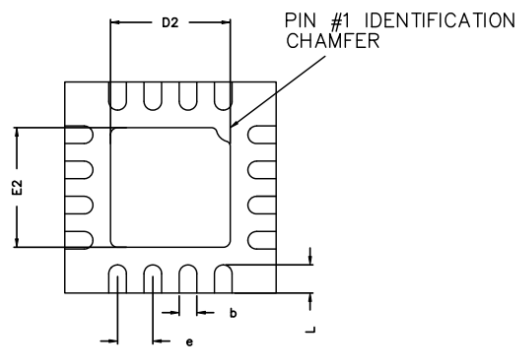


Figure 36. L XK6601E Evaluation Board Assembly Drawing

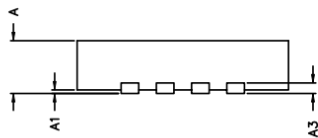
**Package Diagram:**



TOP VIEW



BOTTOM VIEW



SIDE VIEW

COMMON DIMENSIONS(MM)			
REF.	MIN.	NOM.	MAX
A	0.70	0.75	0.80
A1	0.00	-	0.05
A3	0.2 REF		
D	2.95	3.00	3.05
E	2.95	3.00	3.05
b	0.18	0.25	0.30
L	0.30	0.40	0.50
D2	1.55	1.70	1.80
E2	1.55	1.70	1.80
e	0.5 BSC		

**Ordering Information**

Model Name	Manufacturing Part Number	Evaluation Board Part Number
LXX6601E PA	LXX6601E	EVB-LXX6601E-01

**Document Change History**

Revision	Date	Notes
1.0	Jul. 29, 2014	Created
2.0	Nov. 26, 2014	update
3.0	May. 28, 2015	update
4.0	Aug. 5, 2015	update
4.0	Jun. 2, 2016	update

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