

## Product Description

The GSR2401C is an integrated front end module (FEM) designed for 2.4GHz Bluetooth, 802.11b/g/n/ax systems. The device provides all the functionality of a fully matched power amplifier (PA), power detector, low-noise amplifier (LNA), and two single-pole, triple-throw (SP3T) switches.

The GSR2401C provides a complete 2.4 GHz WLAN RF solution from the output of the transceiver to the antenna, and from the antenna to the input of the transceiver. The LNA increases the receive sensitivity of embedded solutions to improve range or to overcome the insertion loss of cellular filters (often included for mobile applications).

The GSR2401C also includes a transmitter power detector with 20 dB dynamic range, and a digital enable control for transmitter power ramp on/off control.

The device is provided in a compact, 16-pin 2.3 x 2.3 mm Quad Flat No-Lead (QFN) package. Pin map is shown in Figure 1. A functional block diagram is shown in Figure 2.

## Pin Map

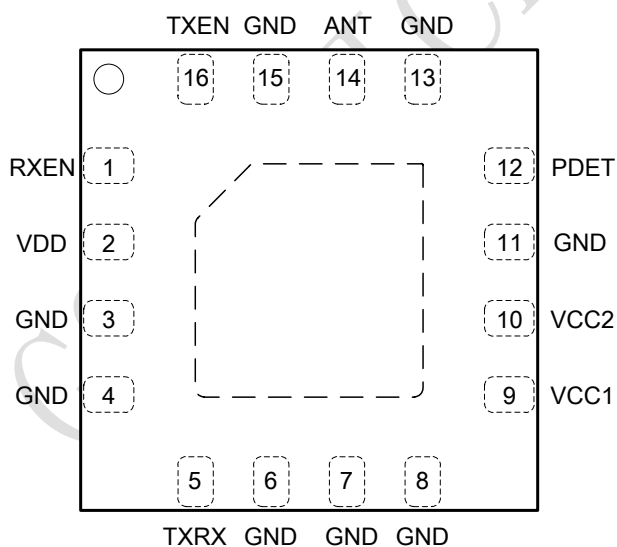


Figure 1 GSR2401C Pin Map (Top View)

## Functional Block Diagram

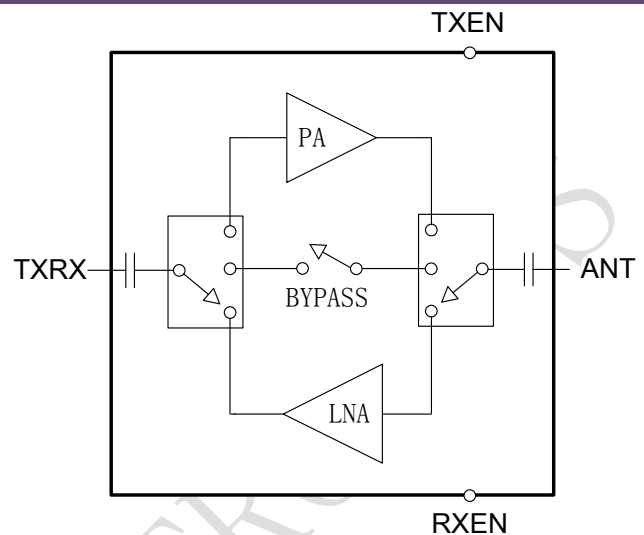


Figure 2 Block Diagram

## Key Features

- 3.3V nominal power supply
- Saturated output power: 27 dBm
- Pout = +16.5 dBm @ -43 dB EVM, HE40 MCS11
- Pout = +17.5 dBm @ -40 dB EVM, HE40 MCS11
- Pout = +20 dBm @ -30 dB EVM, HT20 MCS7
- Transmit gain: 28 dB
- High efficiency
- Integrated positive slope power detector
- Receive gain: 13 dB
- 2.0 dB LNA Noise Figure
- Input and output matched to 50 ohm
- High Impedance Control Pin

## Applications

- Mobile Access Points
- Mobile Phones
- Consumer Electronics
- Customer Premise Equipment
- Internet of Things

## Pin Description

Pin	Name	Description
1	RXEN	Control voltage for the LNA
2	VDD	Supply voltage for LNA and PA bias circuit
3	GND	Ground
4	GND	Ground
5	TXRX	RF signal to/from the transceiver
6	GND	Ground
7	GND	Ground
8	GND	Ground
9	VCC1	Supply voltage for PA first stage
10	VCC2	Supply voltage for PA second stage
11	GND	Ground
12	PDET	Power Detector voltage for the TX path.
13	GND	Ground
14	ANT	RF bidirectional antenna port
15	GND	Ground
16	TXEN	Control voltage for the PA

## Absolute Maximum Ratings

Parameter	Conditions	Rating
DC Supply Voltage		-0.5 to +6 V
Control Voltage (TXEN, RXEN,)		-0.5 to +3.6 V
Storage Temperature		-40 to 150 °C
Junction Temperature		Max 150 °C
RF Input Power at TXRX	ANT connect 50 $\Omega$ Load	+10 dBm
RF Input Power at ANT	RX connect 50 $\Omega$ Load, LNA active	+10 dBm
Electrostatic discharge: Human Body Model (HBM)		750 V

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability.

## Recommended Operating Conditions

## 2.4 GHz Front End Module

Parameter	Min	Typ	Max	Units
Operating Frequency	2400	-	2500	MHz
DC Supply Voltage	3.1	3.3	3.6	V
Control Voltage – High	2.8	-	VDD	V
Control Voltage – Low	0	-	0.3	V
Operating temperature	-40	25	85	°C

## Logic Truth Table

Mode	TXEN	RXEN
Transmit Mode	High	Low
Receive Mode	Low	High
Bypass Mode	Low	Low

## Electrical Specifications

Parameter	Conditions	Min	Typ	Max	Units
Transmit Mode	Unless otherwise noted: VCC1, VCC2, VDD=3.3 V, Temp=+25°C, PEN=3.3 V, LEN=0 V				
Saturated output power			27		dBm
11n HT20 Output Power	MCS7 64QAM		20		dBm
Dynamic EVM			-30		dB
11ax HE40 Output Power	MCS11 1024QAM		17.5		dBm
Dynamic EVM			-40		dB
11ax HE40 Output Power	MCS11 1024QAM		16.5		dBm
Dynamic EVM			-43		dB
Small signal gain			28		dB
TXRX Port Return Loss			13		dB
ANT Port Return Loss			8		dB
Quiescent Current	RF OFF		120		mA
Operating Current	Pout=20 dBm		210		mA
	Pout=25 dBm		340		mA
PEN Current	PEN=High		0.35		mA
Switching Time	RX or Bypass Mode to Transmit Mode		400		nS
Roughness	Rated power = 25 dBm, load VSWR 10:1	No damage			
Receive Mode	Unless otherwise noted: VCC1, VCC2, VDD=3.3 V, Temp=+25°C, PEN=0 V, LEN=3.3 V				

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Noise Figure			2.0		dB
Gain			13		dB
Out of Band Gain	f = 5000 ~ 6000 MHz		2		dB
RX Port Return Loss			8		dB
ANT Port Return Loss			9		dB
Quiescent Current			14		mA
Input P1dB			-4		dBm
Switching Time	Transmit or Bypass to Receive Mode		400		nS
Bypass Mode	Unless otherwise noted: VCC1, VCC2, VDD= 3.3 V, Temp=+25°C, PEN=0 V, LEN=0 V				
Gain			-3.3		dB
RX Port Return Loss			8		dB
ANT Port Return Loss			9		dB
Quiescent Current	RF OFF		15		uA
Switching Time	Transmit or Receive to Bypass Mode		400		nS

**Application Schematic**

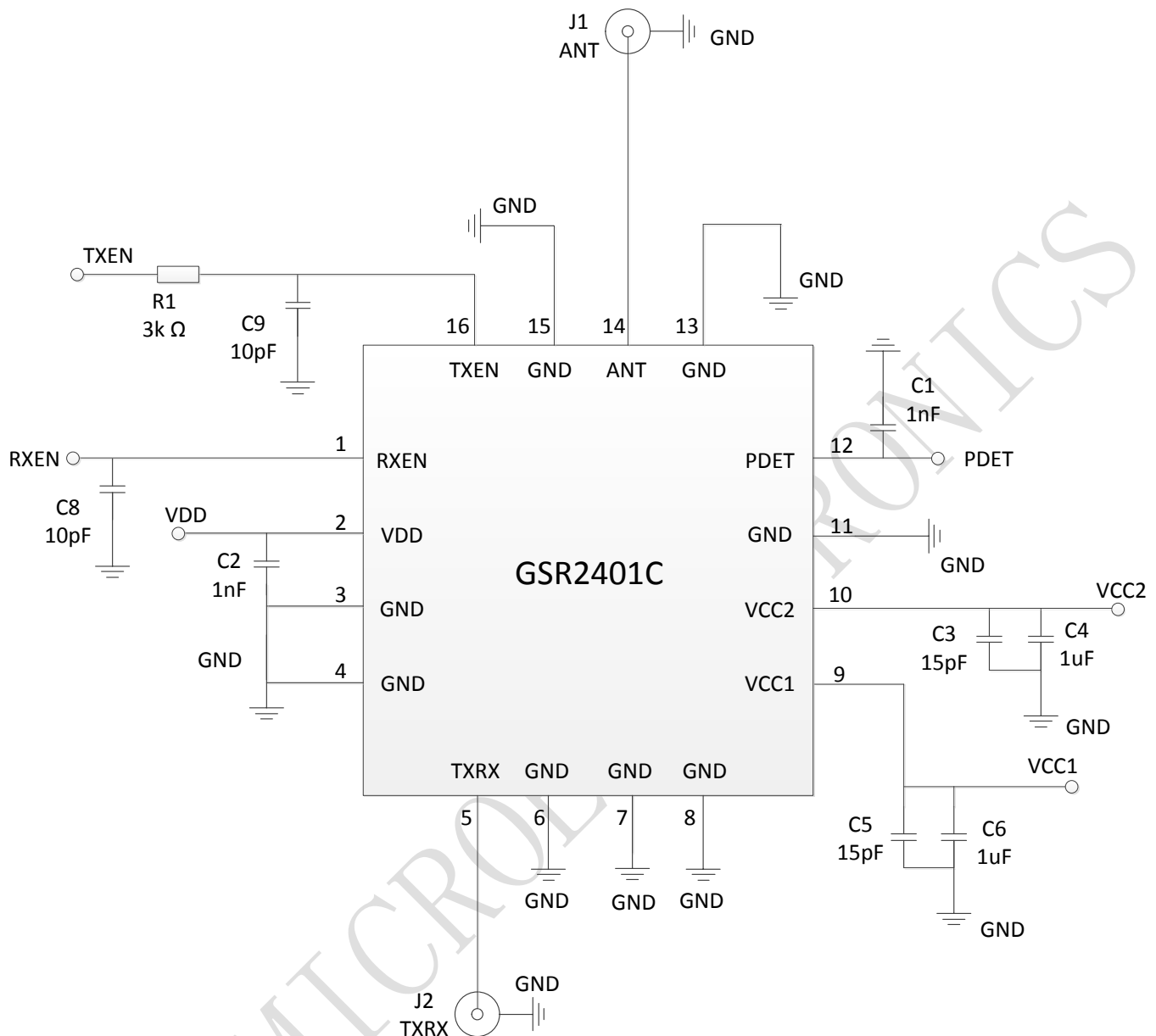


Figure 3 GSR2401C Application Schematic

## Application Suggestion for Low Power Mode

If low current consumption is needed using transmit mode, a new application circuit shown in Figure 4 can be used.

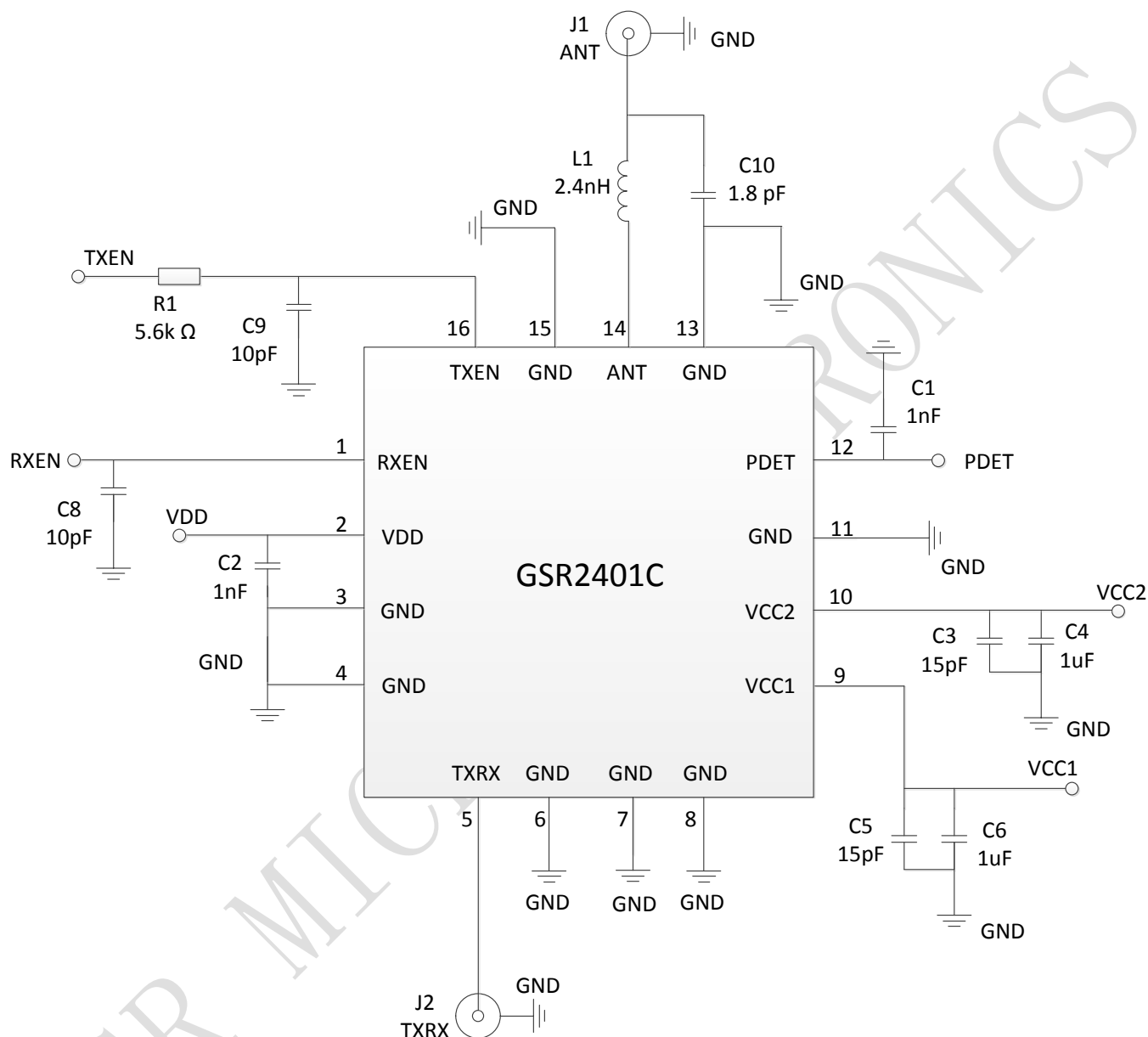


Figure 4 GSR2401C Application Schematic for Low Power Mode

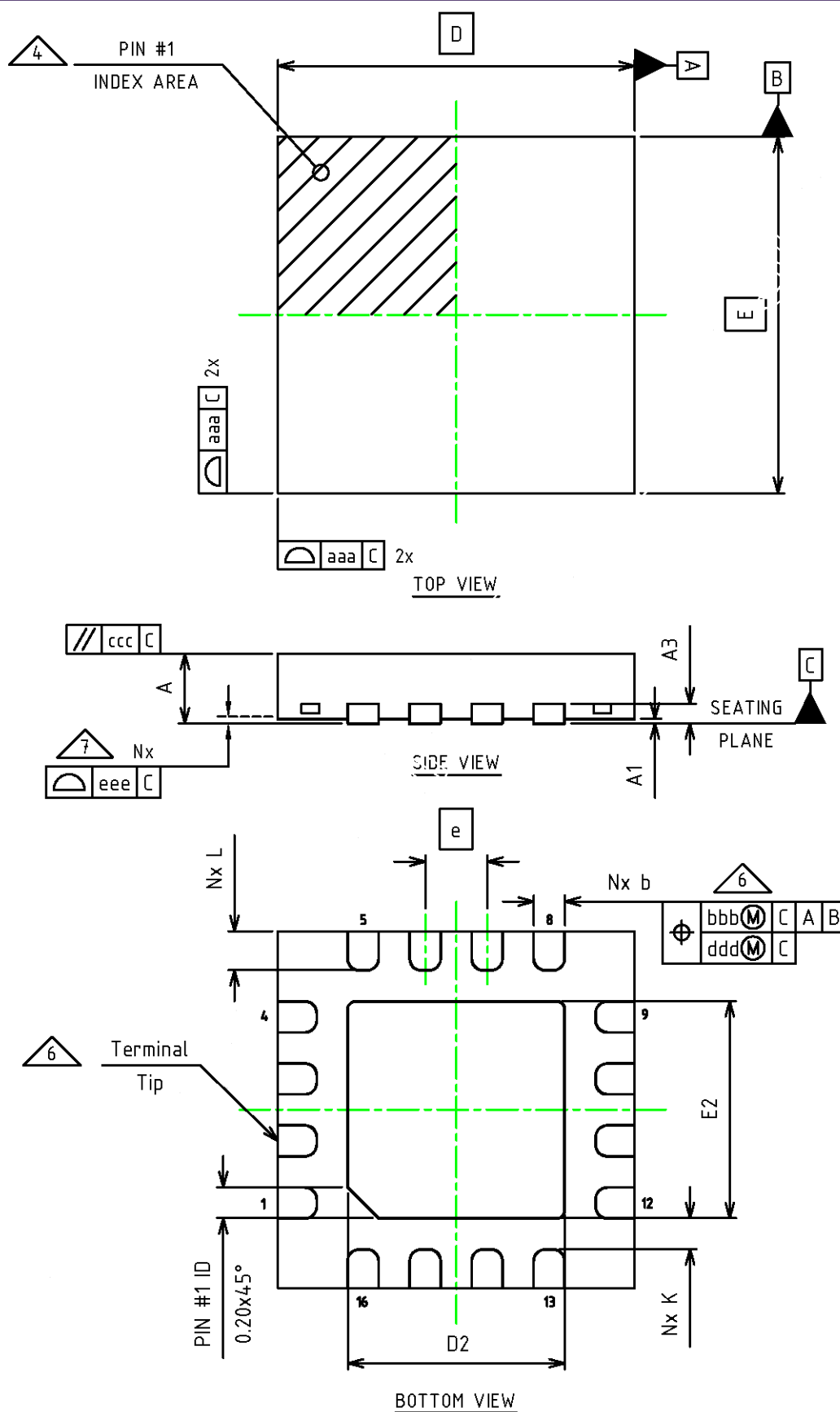
### Key Electrical Specifications using above application schematic:

Parameter	Conditions	Min	Typ	Max	Units
Transmit Mode	Unless otherwise noted: VCC1, VCC2, VDD=3.3 V, Temp=+25°C, PEN=3.3 V, LEN=0 V				
Saturated output power			23		dBm
Small signal gain			28		dB
Operating Current	Pout=18 dBm		130		
	Pout=20 dBm		150		mA

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	Pout=22 dBm		180		mA
Receive Mode	Unless otherwise noted: VCC1, VCC2, VDD=3.3 V, Temp=+25°C, PEN=0 V, LEN=3.3 V				
Noise Figure			3.0		dB
Gain			11		dB
Bypass Mode	Unless otherwise noted: VCC1, VCC2, VDD= 3.3 V, Temp=+25°C, PEN=0 V, LEN=0 V				
Gain			-2.8		dB

**Package Outline**







Dimension Table				
	MINIMUM	NOMINAL	MAXIMUM	NOTE
A	0.31	0.38	0.4	
b	0.15	0.20	0.25	
D		2.3		
E		2.3		
e		0.4		
D2	1.25	1.40	1.50	
E2	1.25	1.40	1.50	
K	0.15			
L	0.15	0.25	0.35	
N		16		

Notes: All dimensions are in millimeters.

## Contact Information

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