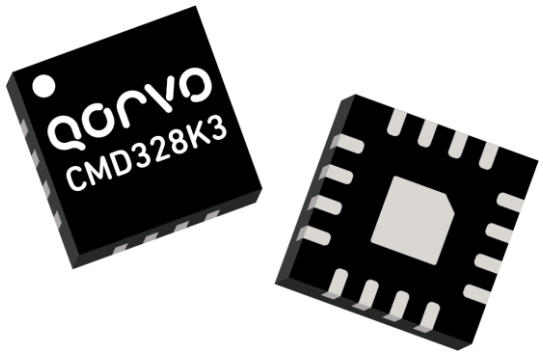
CMD328K3

6-18 GHz Low Noise Amplifier

Product Overview

The CMD328K3 is a broadband MMIC low noise amplifier housed in a leadless 3x3 mm plastic surface mount air cavity package. The CMD328K3 is ideally suited for EW and communications systems where small size and low power consumption are needed. The broadband device delivers greater than 27 dB of gain with a corresponding output 1 dB compression point of +12 dBm and a noise figure of 1.4 dB. The CMD328K3 is a 50 ohm matched design thereby eliminating the need for external DC blocks and RF port matching. The CMD328K3 amplifier is the perfect alternative to costly hybrid amplifiers.

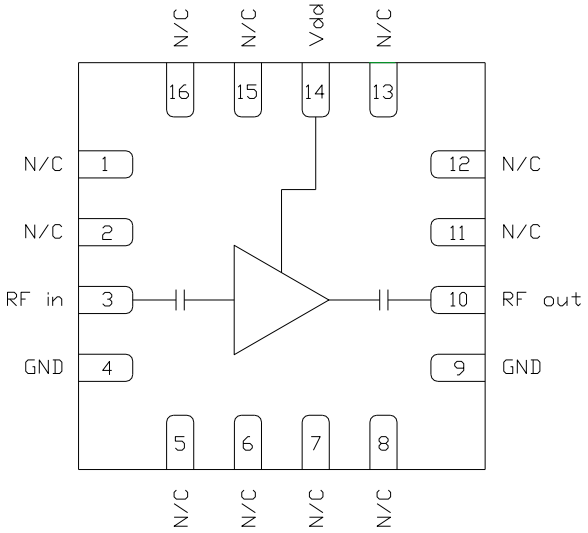


Key Features

- Ultra low noise figure
- High gain broadband performance
- Single supply voltage: +3.0V @ 52 mA
- Compact 3x3 QFN package

Performance is typical across frequency. Please reference electrical specification table and data plots for more details.

Functional Block Diagram



Applications

- EW systems
- Communication systems
- Low noise receiver systems

Ordering Information

Part No.	Description
CMD328K3	Tape & Reel, 7” Reel, Qty: 500
CMD328K3-EVB	CMD328K3 EVB, Qty:1

Absolute Maximum Ratings

Parameter	Min	Max	Units
Drain Voltage, Vdd	-	5	V
RF Input Power	-	20	dBm
Channel Temperate, Tch	-	150	°C
Power Dissipation, Pdiss	-	409	mW
Storage Temperature	-55	150	°C

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.

Thermal and Reliability Information

Parameter	Test Conditions	Value	Units
Thermal Resistance (θ_{JC}) (1)	T_{BASE} = 85 °C Quiescent bias, small signal operations, CW P_{DISS} = 0.156 W	158.8	ºC/W
Channel Temperature (T_{CH}) (1)		110	°C
Median Lifetime (T_M)		3.87E7	Hrs

Notes:
1. Thermal resistance referenced to the back of the package.

Recommended Operating Conditions

Parameter	Min	Typ.	Max	Units
Vdd	2	3	4	V
Idd		52		mA
Temperature Range	-55	+25	+85	°C

Electrical specifications are measured at specified test conditions. Specifications are not guaranteed over all recommended operating conditions.

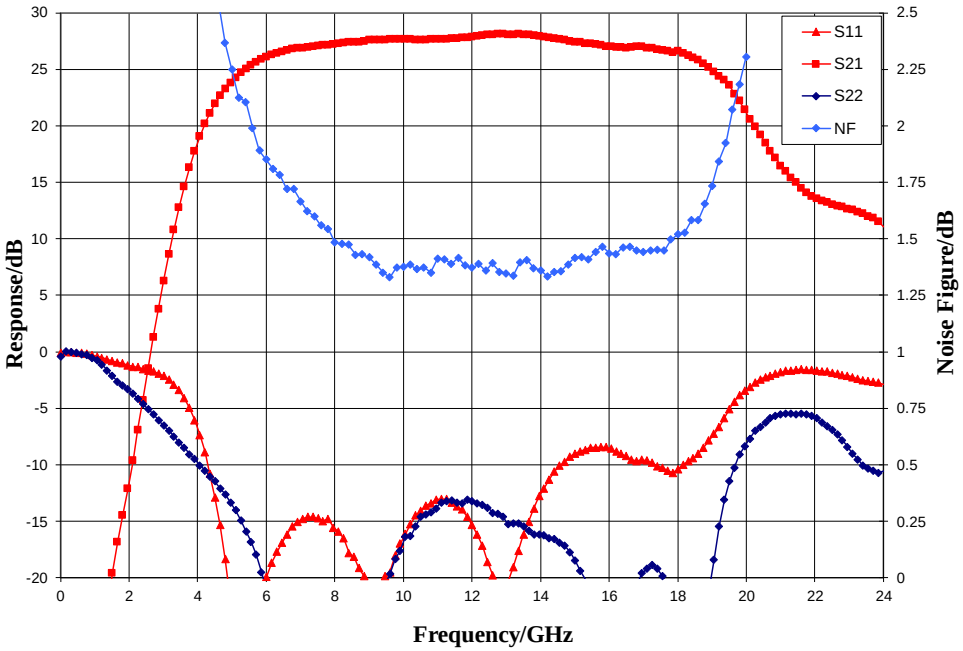
Electrical Specifications

Test conditions unless otherwise noted: Vdd = 3V, T_A = 25 °C
Data de-embedded of fixture losses

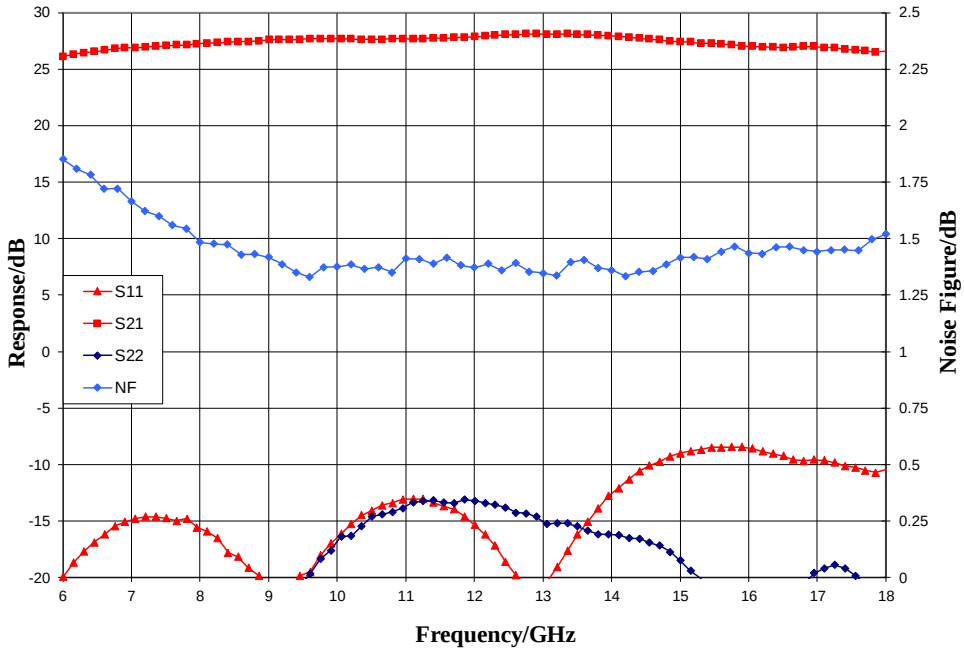
Parameter	Min	Typ.	Max	Units
RF Operational Frequency Range	6	–	18	GHz
Gain	23	26	–	dB
Noise Figure	–	1.8	2.3	dB
Input Return Loss	–	15	–	dB
Output Return Loss	–	20	–	dB
Output Power (P_{1dB})		12	–	dBm
Output IP3		24		dBm
Supply Current	30	52	75	mA
Gain Temperature Coefficient		-0.025		dB/°C
Noise Figure Temperature Coefficient		0.008		dB/°C

Typical Performance – Vdd = 3 V, T_A = 25 °C

Broad Band Performance

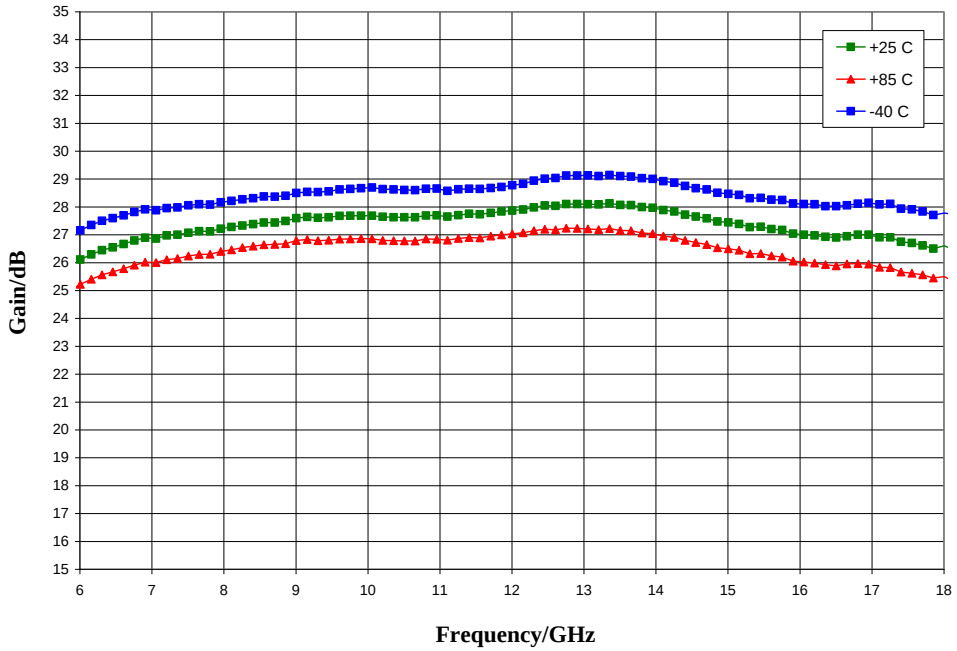


Narrow Band Performance

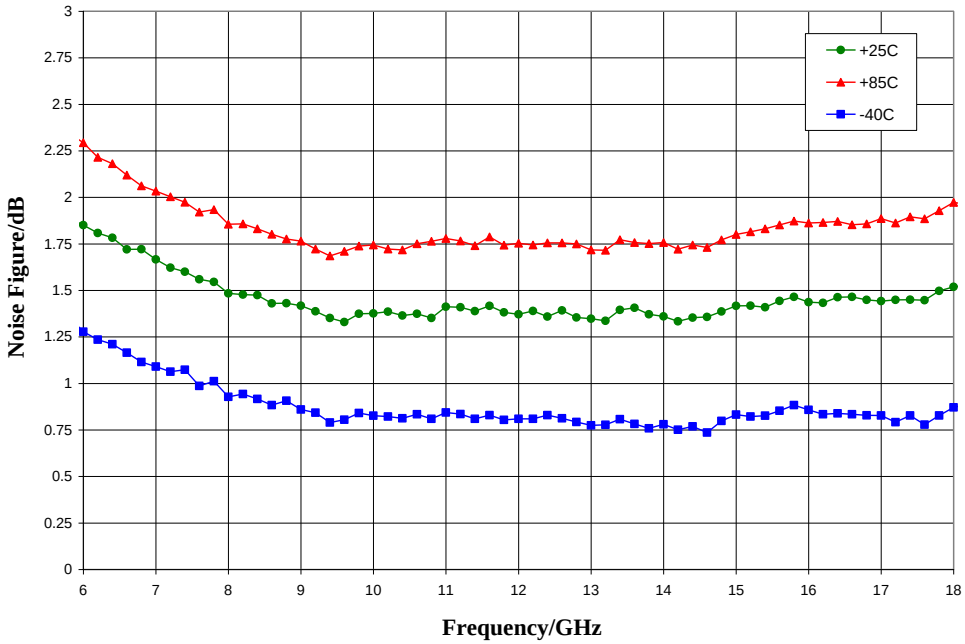


Typical Performance – Vdd = 3 V

Gain vs Temperature

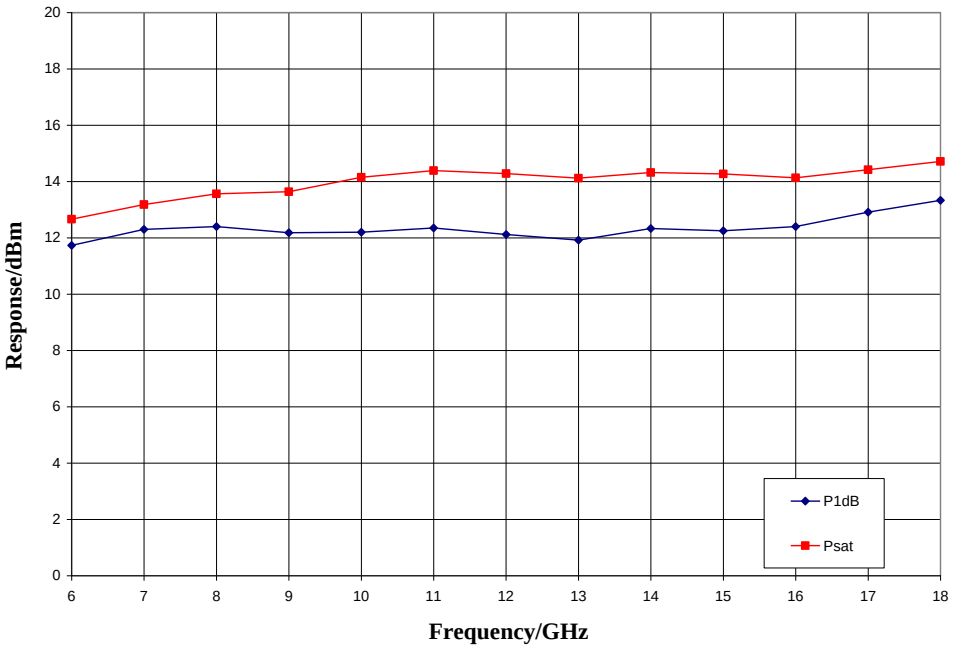


NF vs Temperature

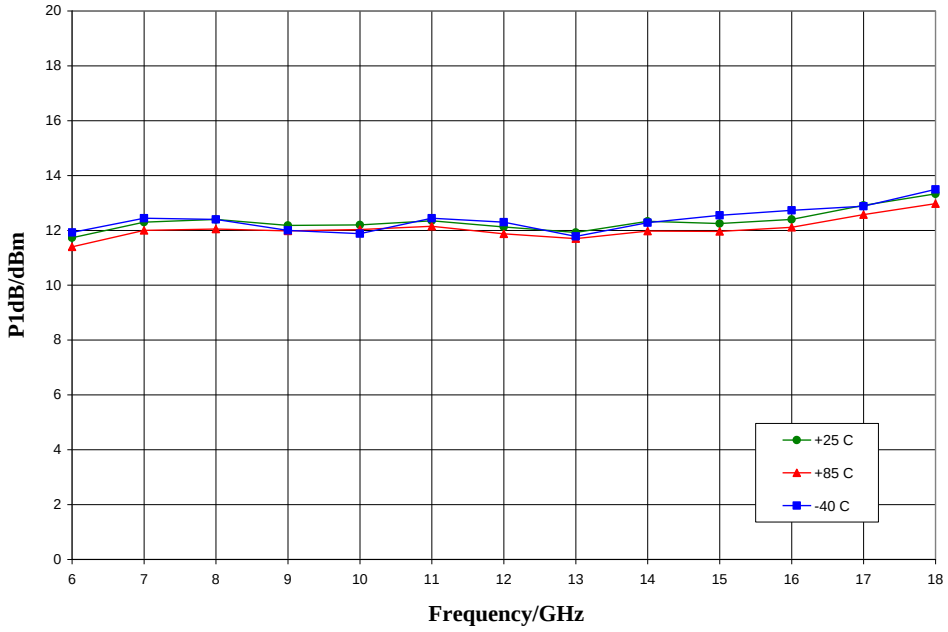


Typical Performance – Vdd = 3 V

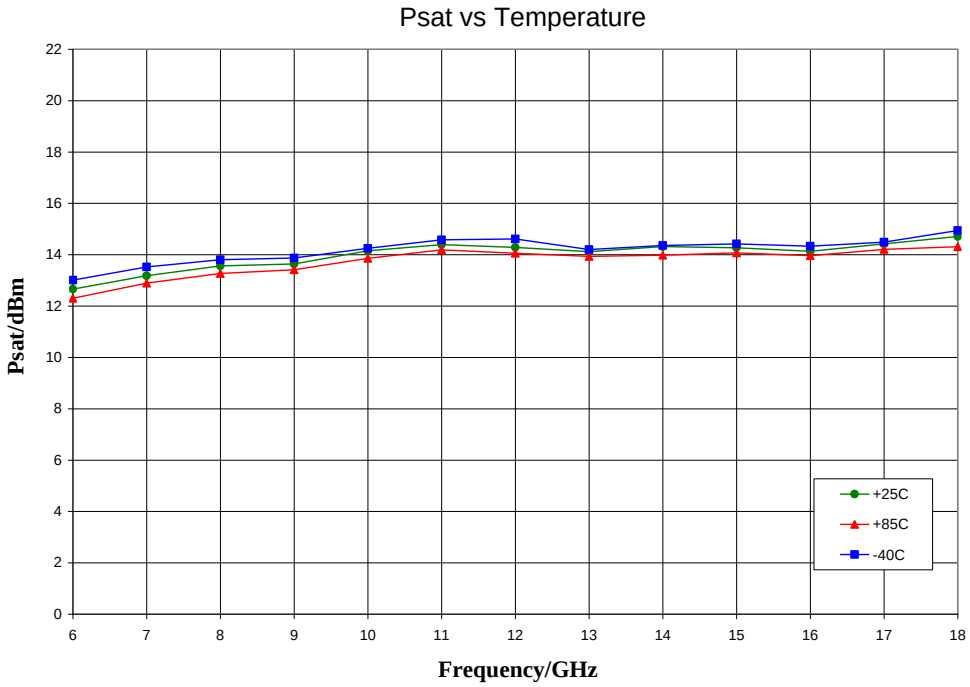
Power Performance

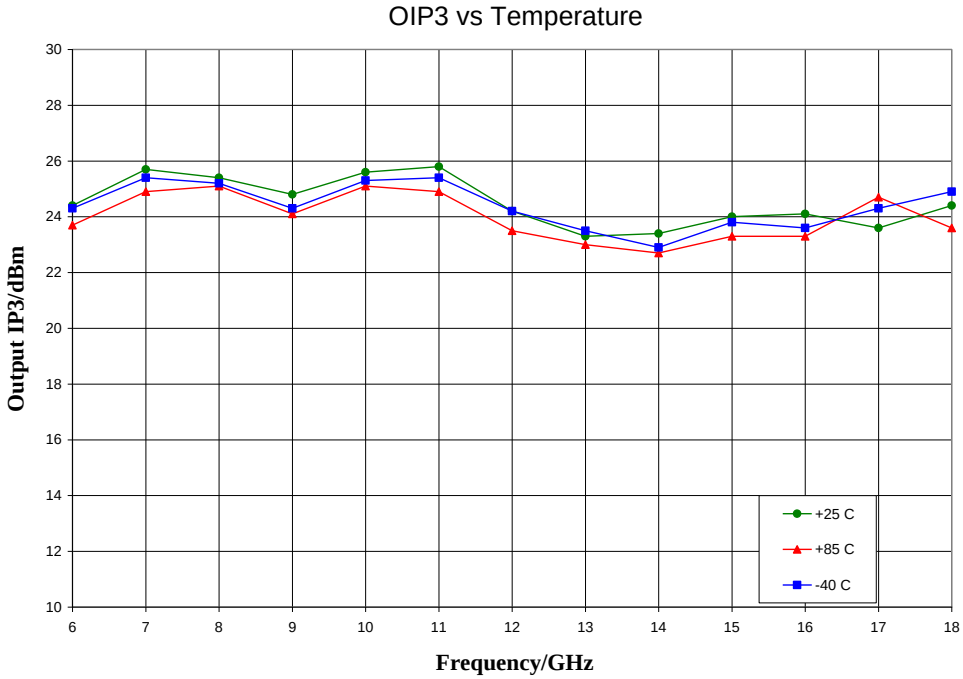


P1dB vs Temperature

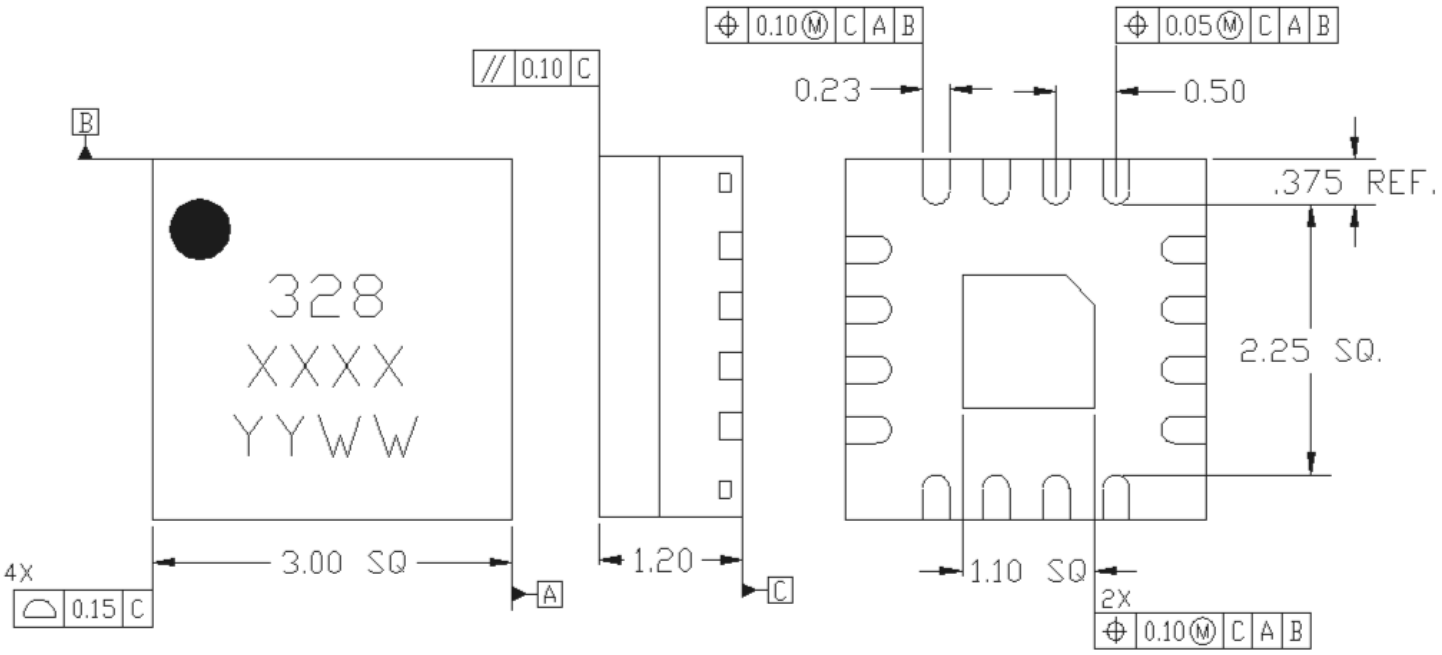


Typical Performance – Vdd = 3 V





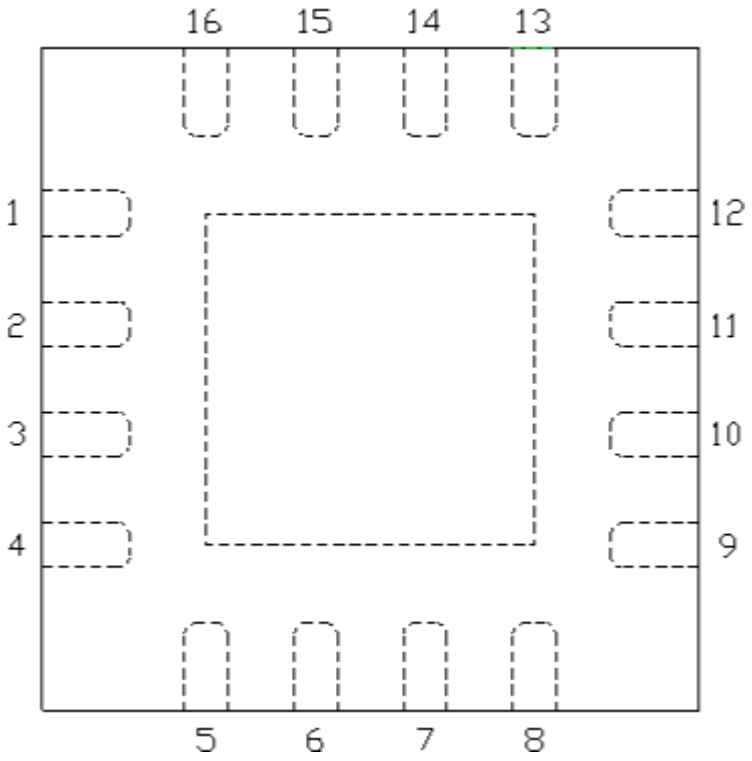
Mechanical Information



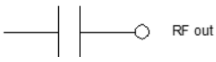
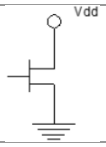
NOTES:
1. ALL DIMENSION SHOWN AS mm. CONTROLLING DIMENSION ARE IN mm.
2. MATERIAL: COPPER ALLOY LEAD FRAME
3. LEAD FINISH: ELECTROLESS NICKEL ELECTROLESS PALLADIUM IMMERSION GOLD (ENEPIG) PLATING.
4. MARKING:
   LINE 1: PART NUMBER AS INDICATED
   LINE 2: LOT NUMBER
   LINE 3: DATE CODE SHALL CONSIST OF THE LAST 2 DIGITS OF THE YEAR OF MANUFACTURE FOLLOWED BY A 2-DIGIT WEEK CODE.
5. ALTERNATE PIN #1 IDENTIFIER WITH CORNER CHAMFER ON GROUND PADDLE IS ACCEPTABLE.

Notes:
Qorvo recommends that the user develop the land pattern that will provide the best design for proper solder reflow and device attach for their specific application. Please refer to Qorvo Application Note AN 105 for a recommended land pattern approach.

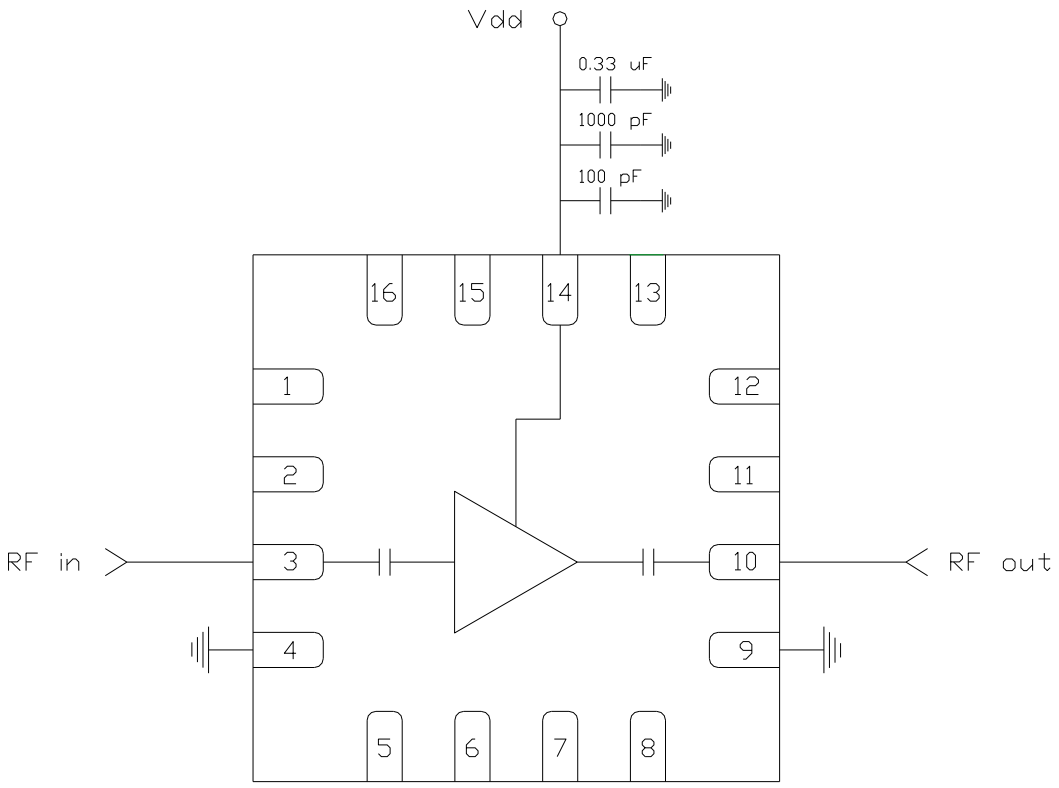
Pin Diagram



Pin Function Descriptions

Pin	Function	Description	Schematic
3	RF in	DC Blocked, 50 Ohm matched	
10	RF out	DC Blocked, 50 Ohm matched	
14	Vdd	Powe supply voltage Decoupling and bypass caps required	
1, 2, 5 - 9, 11 -13, 15, 16	N.C	No internal connections, can be grounded	
4, 9	Ground	Connect to RF/DC ground	
Backside	Ground	Connect to RF/DC ground	

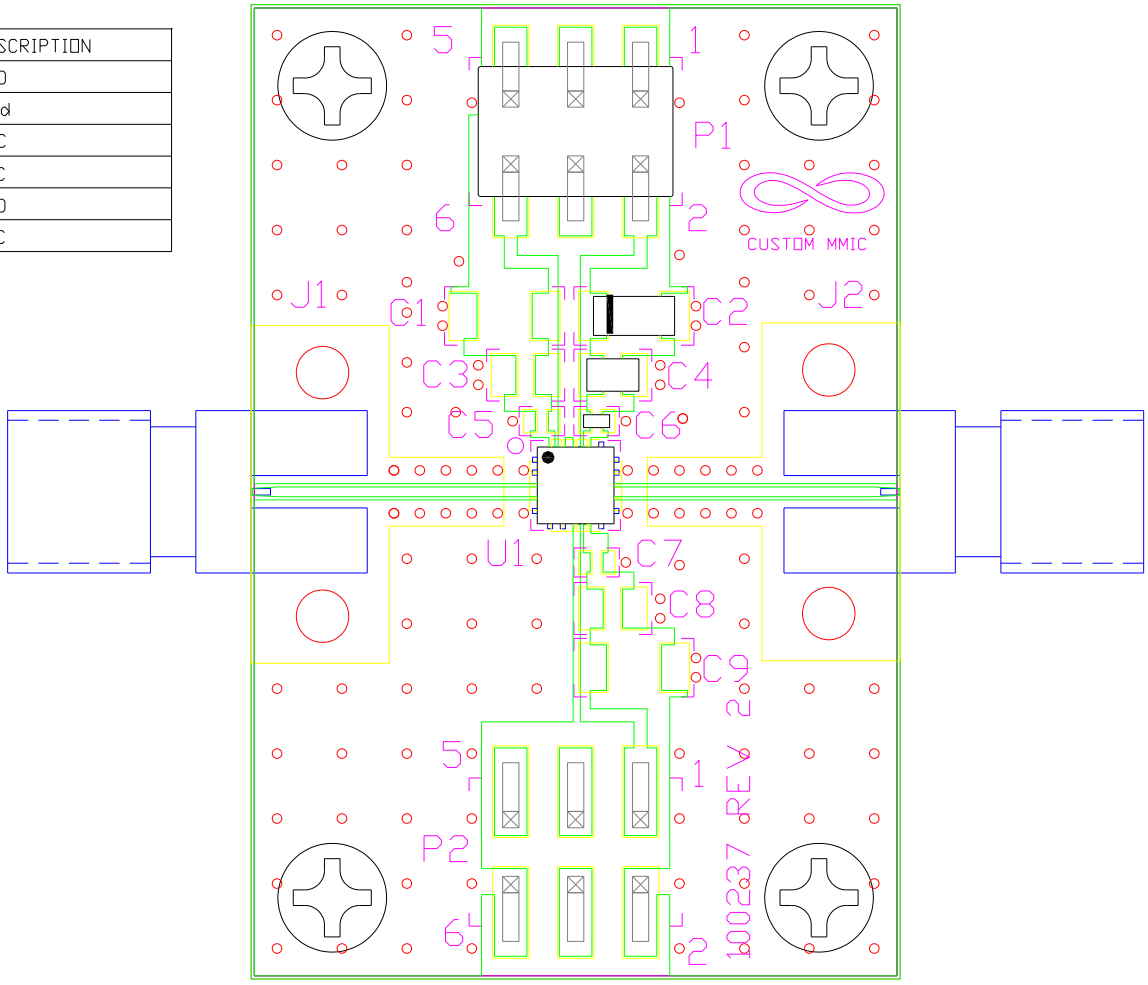
Application Circuit



Biasing and Operation:
The CMD328K3 is biased with a single 3.0V positive drain supply. No bias procedure required, RF can be applied at any time.

Evaluation Board and BOM

P1	DESCRIPTION
1	GND
2	Vdd
3	N/C
4	N/C
5	GND
6	N/C



The circuit board shown has been developed for optimized assembly at Qorvo. A sufficient number of via holes should be used to connect the top and bottom ground planes. As surface mount processes vary, careful process development is recommended.

RF layer is 0.01” thick Rogers Corp. RO4350 (ε_r = 3.48). Metal layers are 0.5 oz. copper.

Bill of Material – Evaluation Board

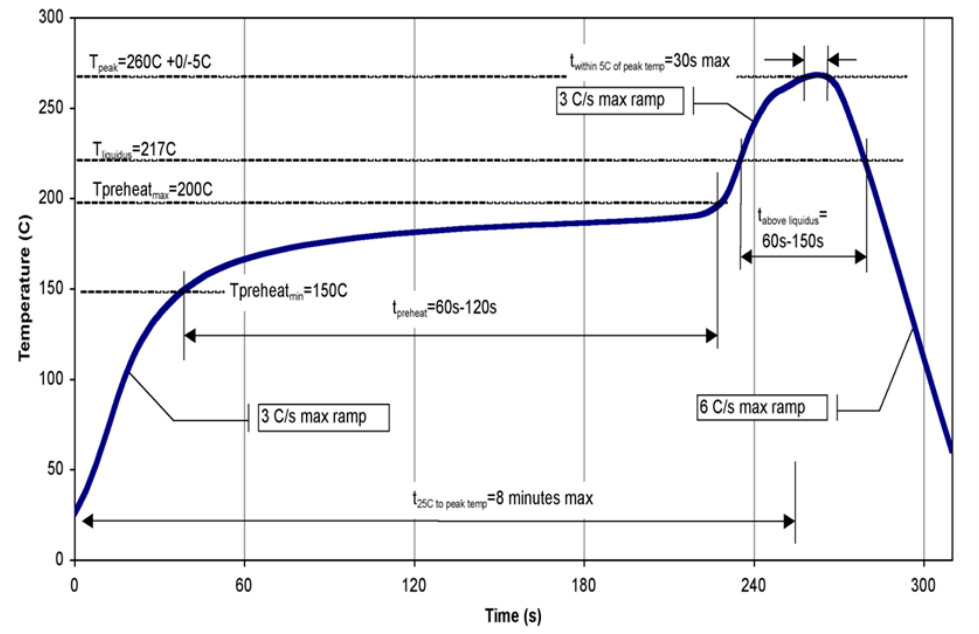
Ref. Des.	Value	Description	Manuf.	Part Number
J1, J2		SMA End Launch Connector	Various	
C2	0.33 uF	CAP, 0.33 uF, 1206, +/- 10%, 16V	Various	
C4	1000 pF	CAP 1000 pF, 0603, +/-10% 16V	Various	
C6	100 pF	CAP, 00pF, 0402, +/- 10%, 16V	Various	

Note: Components (Capacitors, Resistors and Inductors) not shown in the BOM list are not populated.

Solderability

1. Compatible with the latest version of J-STD-020, Lead-free solder, peak reflow temperature: 260 °C.
2. Refer to Qorvo Application Note AN102 for more reflow and assembly details.

Recommended Soldering Temperature Profile



Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	1a	ANSI / ESD / JEDEC JS-001
ESD – Charge Device Model (CDM)	C2b	ANSI / ESD / JEDEC JS-002
MSL – Convection Reflow 235 °C	3	IPC/JEDEC J-STD-020

Caution!
ESD-Sensitive Device

RoHS Compliance

This part is compliant with 2011/65/EU RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment) as amended by Directive 2015/863/EU.

This product also has the following attributes:

- Lead Free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A ($C_{15}H_{12}Br_4O_2$) Free
- PFOS Fre
- SVHC Free

Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations:

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