



# CMD328K3

## 6-18 GHz Low Noise Amplifier

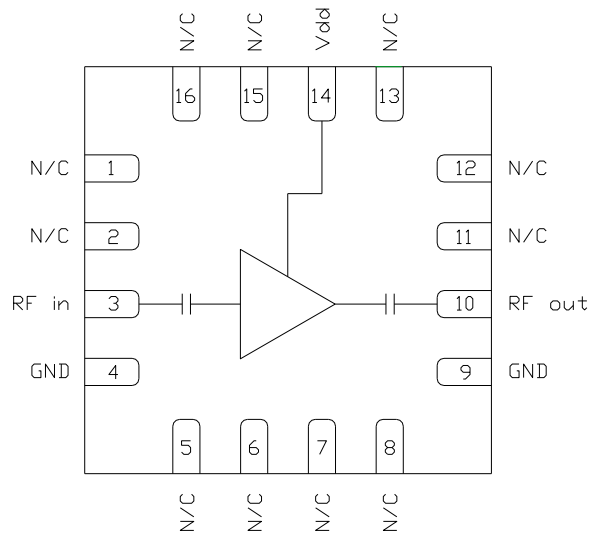
### Features

- ▶ Ultra low noise figure
- ▶ High gain broadband performance
- ▶ Single supply voltage: +3.0 V @ 52 mA
- ▶ Pb-free RoHs compliant 3x3 QFN package

### Description

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.

### Functional Block Diagram



### Electrical Performance – $V_{dd} = 3\text{ V}$ , $T_A = 25\text{ }^\circ\text{C}$ , $F = 10\text{ GHz}$

Parameter	Min	Typ	Max	Units
Frequency Range		6 – 18		GHz
Gain		27		dB
Noise Figure		1.4		dB
Input Return Loss		15		dB
Output Return Loss		15		dB
Output P1dB		12		dBm
Supply Current		52		mA

ver. A 0720



# CMD328K3

## 6-18 GHz Low Noise Amplifier

### Specifications

#### Absolute Maximum Ratings

Parameter	Rating
Drain Voltage, V <sub>dd</sub>	5 V
RF Input Power	+20 dBm
Channel Temperature, T <sub>ch</sub>	150 °C
Power Dissipation, P <sub>diss</sub>	409 mW
Thermal Resistance, $\Theta_{JC}$	158.8 °C/W
Operating Temperature	-40 to 85 °C
Storage Temperature	-55 to 150 °C

#### Recommended Operating Conditions

Parameter	Min	Typ	Max	Units
V <sub>dd</sub>	2	3	4	V
I <sub>dd</sub>		52		mA

Electrical performance is measured at specific test conditions. Electrical specifications are not guaranteed over all recommended operating conditions.

Exceeding any one or combination of the maximum ratings may cause permanent damage to the device.

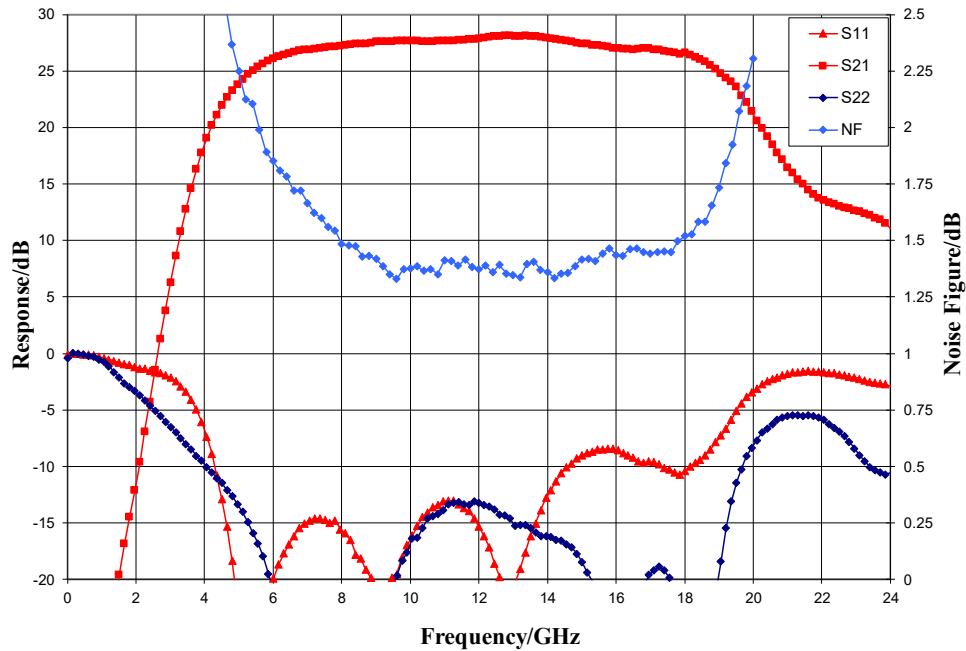
#### Electrical Specifications – V<sub>dd</sub> = 3 V, T<sub>A</sub> = 25 °C

Parameter	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range	6 - 9			9 - 18			GHz
Gain	24	26		24	27		dB
Noise Figure		1.6	2.2		1.5	2.0	dB
Input Return Loss		15			10		dB
Output Return Loss		20			15		dB
Output P1dB		12			12		dBm
Output IP3		24			24		dBm
Supply Current	30	52	75	30	52	75	mA
Gain Temperature Coefficient		0.025			0.025		dB/°C
Noise Figure Temperature Coefficient		0.008			0.008		dB/°C

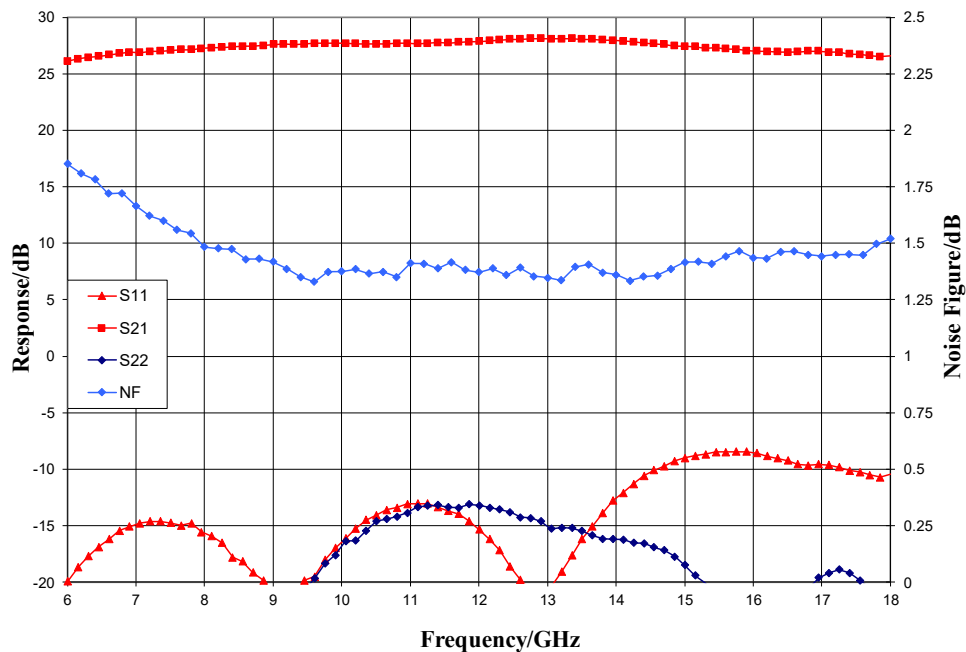
ver. A 0720

### Typical Performance

**Broadband Performance,  $V_{dd}=3\text{ V}$ ,  $T_A = 25\text{ }^\circ\text{C}$**



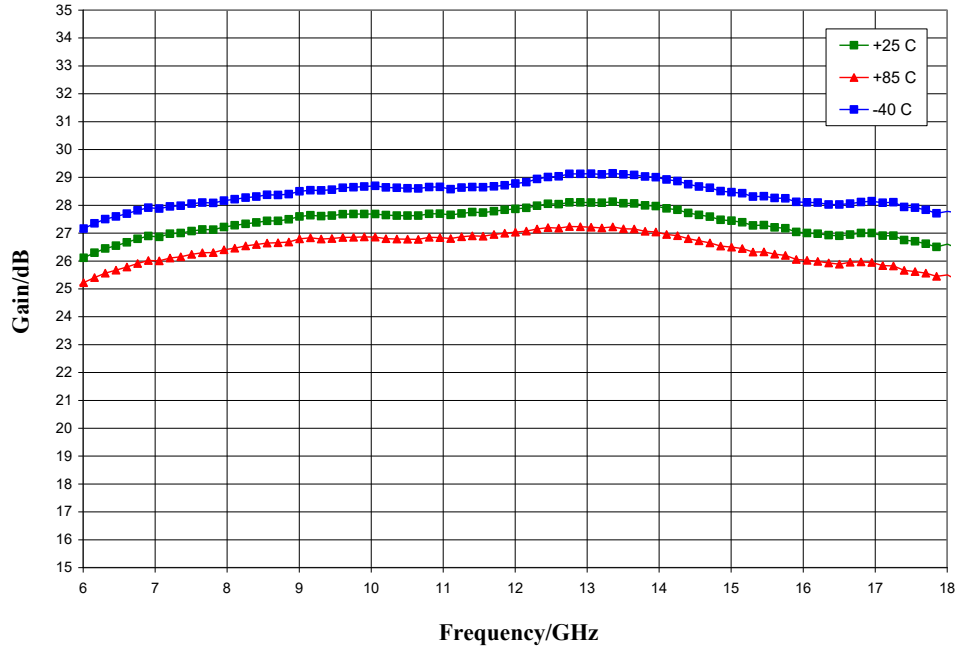
**Narrow-band Performance,  $V_{dd}=3\text{ V}$ ,  $T_A = 25\text{ }^\circ\text{C}$**



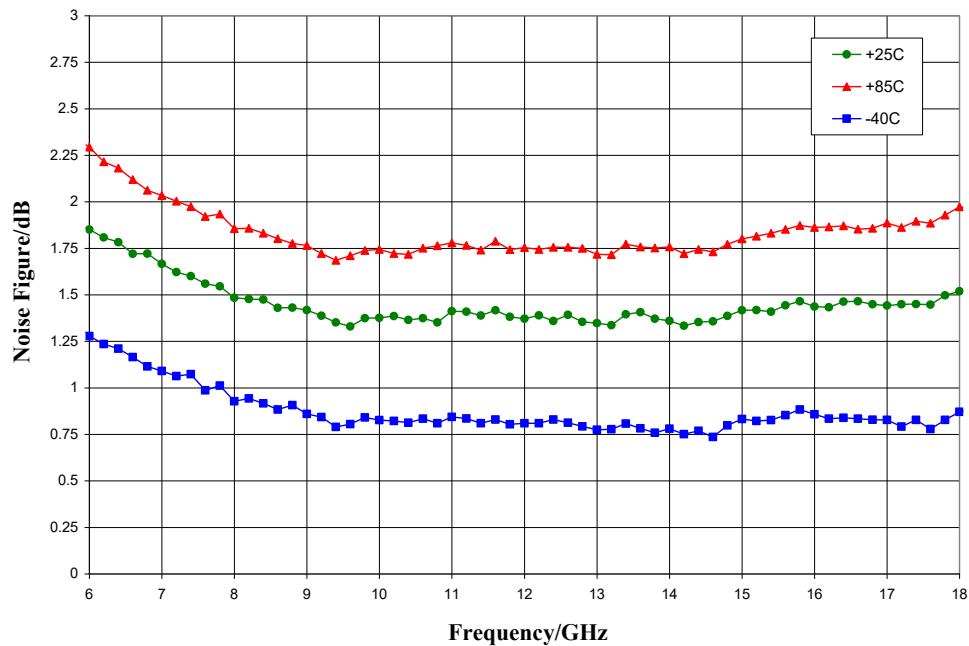
ver. A 0720

### Typical Performance

Gain vs. Temperature,  $V_{dd} = 3\text{ V}$



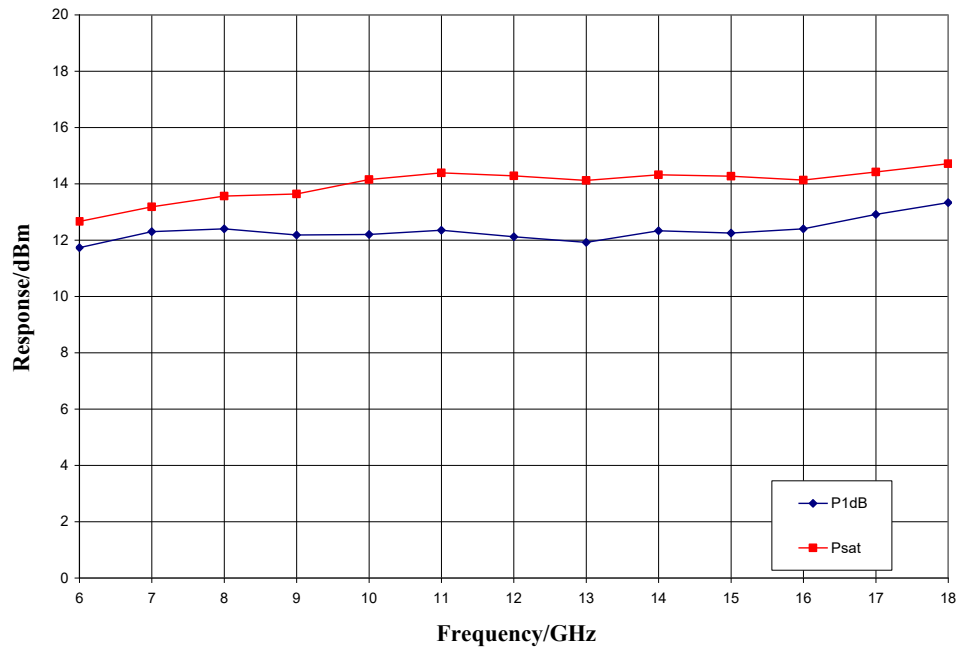
Noise Figure vs. Temperature,  $V_{dd} = 3\text{ V}$



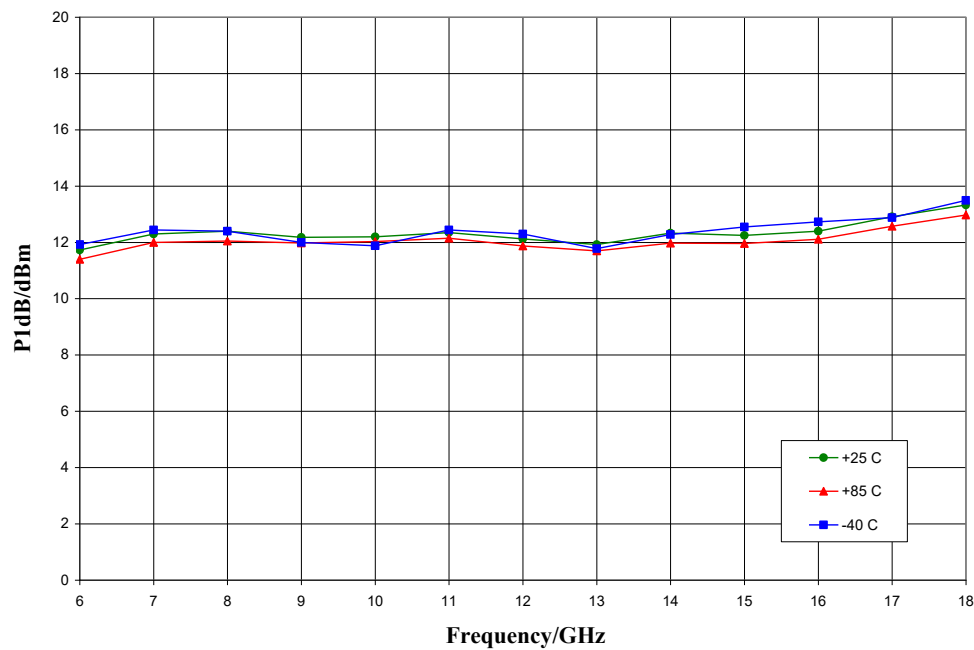
ver. A 0720

### Typical Performance

#### Power Performance, $V_{dd} = 3\text{ V}$



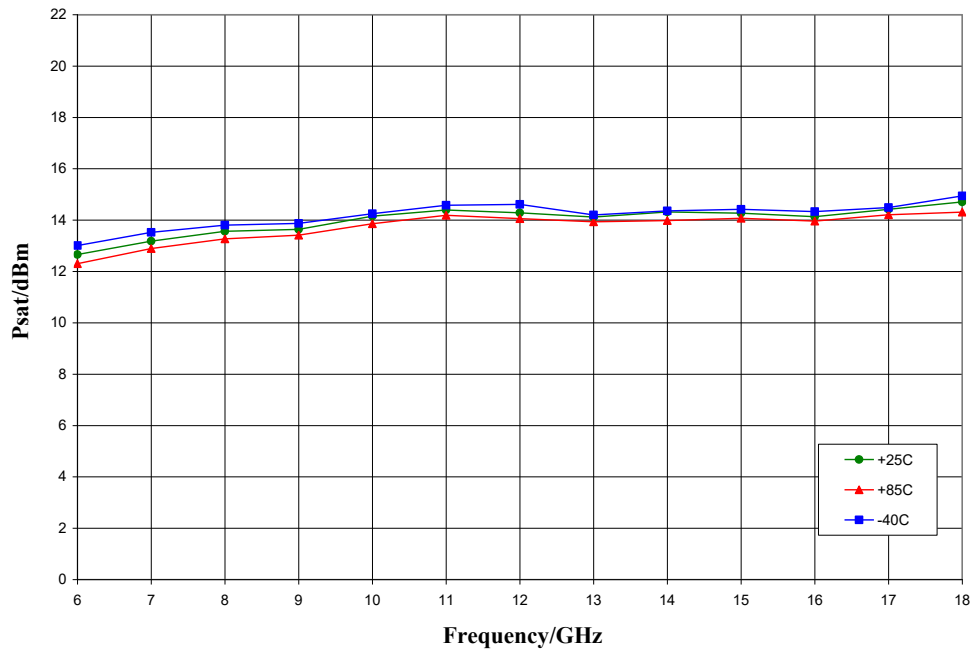
#### P1dB vs. Temperature, $V_{dd} = 3\text{ V}$



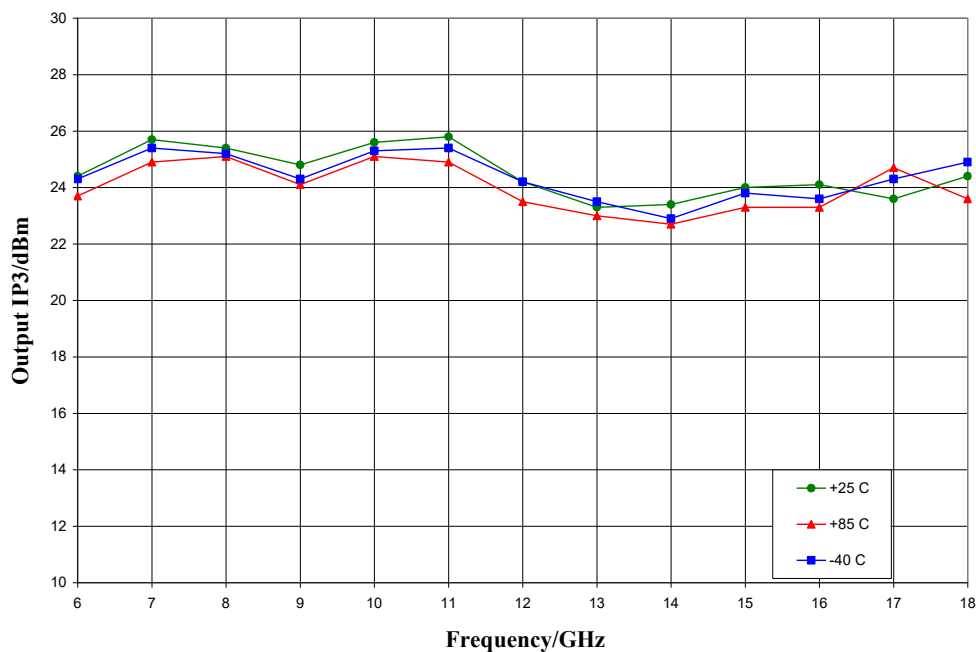
ver. A 0720

### Typical Performance

**Psat vs. Temperature,  $V_{dd}=3\text{ V}$**



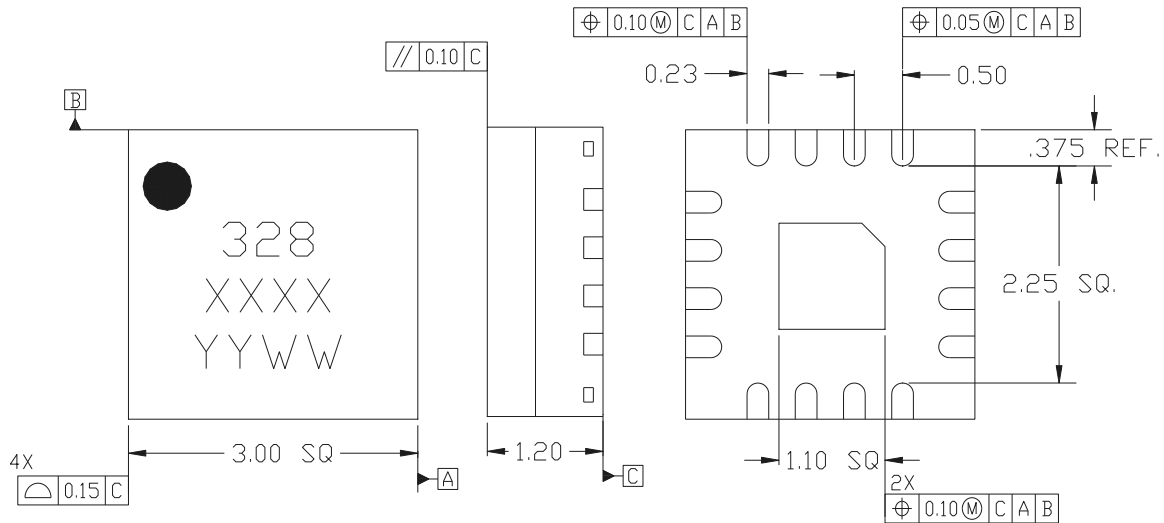
**OIP3 vs. Temperature,  $V_{dd}=3\text{ V}$**



ver. A 0720

### Mechanical Information

#### Package Information and Dimensions



#### 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.

#### Recommended PCB Land Pattern

Custom MMIC Design Services 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 review CMDS Application Note AN 105 for a recommended land pattern approach.

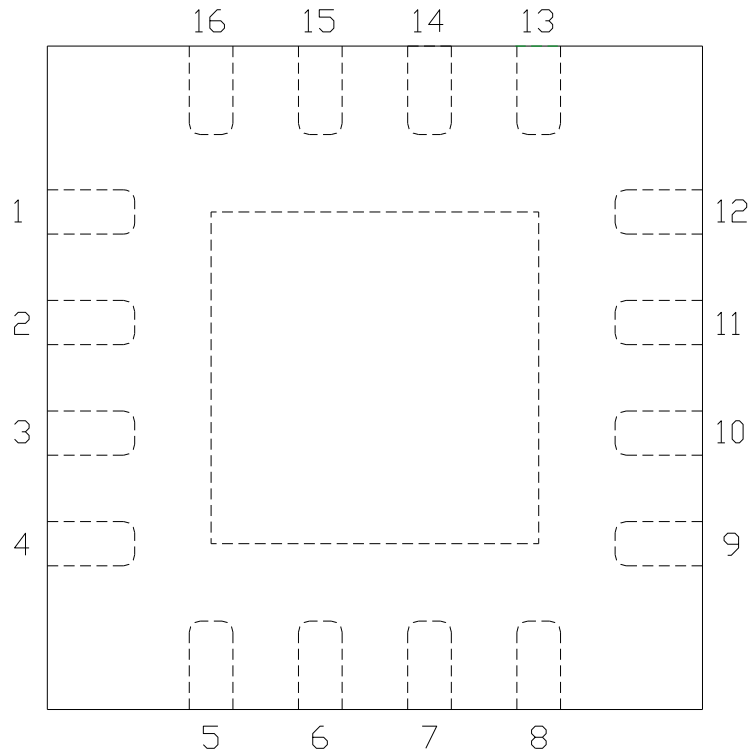
#### Recommended Solder Reflow Profile

Custom MMIC Design Services recommends screen printing with belt furnace reflow to ensure proper solder reflow and device attach. Please review CMDS Application Note AN 102 for a recommended solder reflow profile.



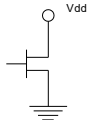

ver. A 0720

### Pin Description

#### Pin Diagram



#### Functional Description

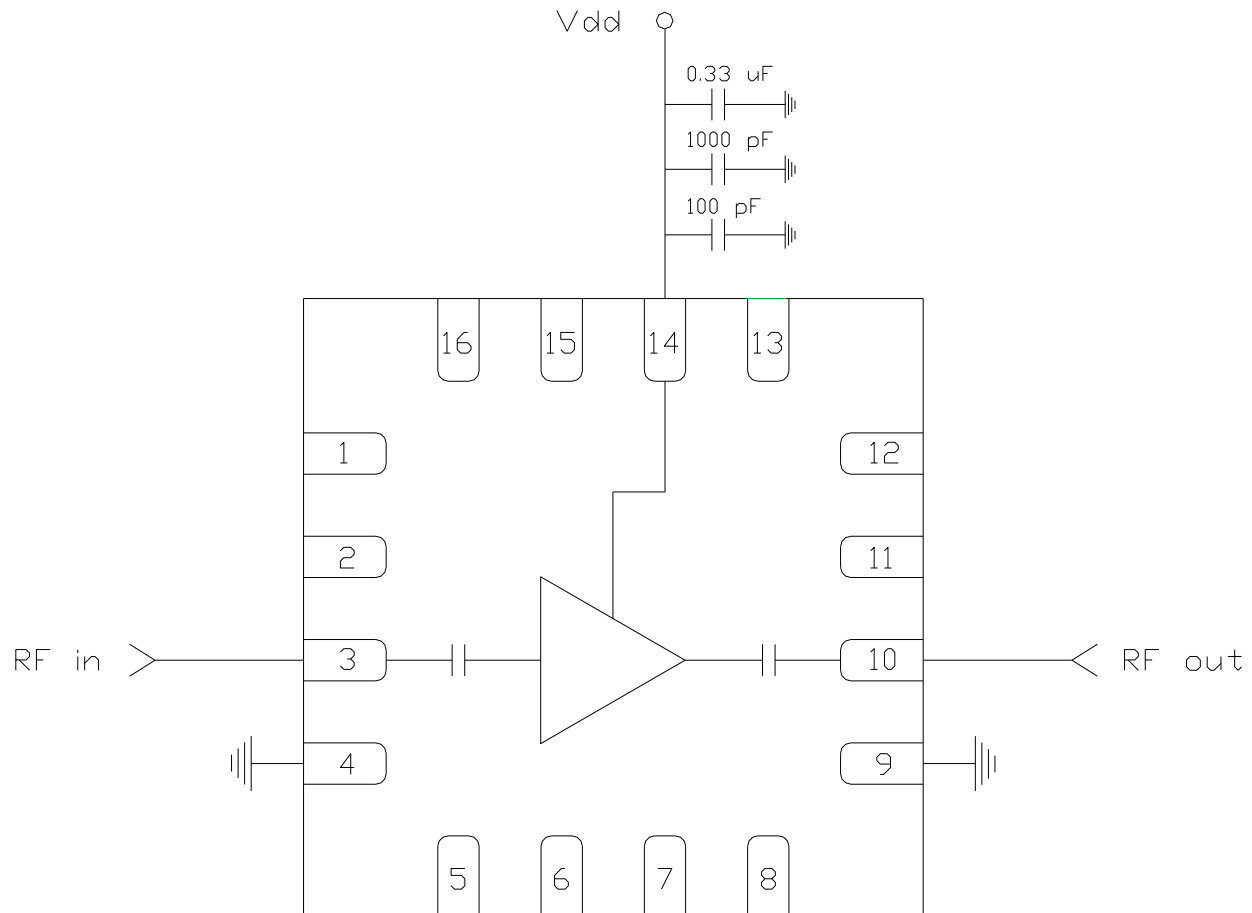
Pin	Function	Description	Schematic
3	RF in	DC blocked and 50 ohm matched	
10	RF out	DC blocked and 50 ohm matched	
14	Vdd	Power supply voltage Decoupling and bypass caps required	
4,9 and die paddle	Ground	Connect to RF / DC ground	

ver. A 0720



### Applications Information

#### Application Circuit



#### Biasing and Operation

The CMD328K3 is biased with a single 3.0 V positive drain supply.

RF power can be applied at any time.

**GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.**

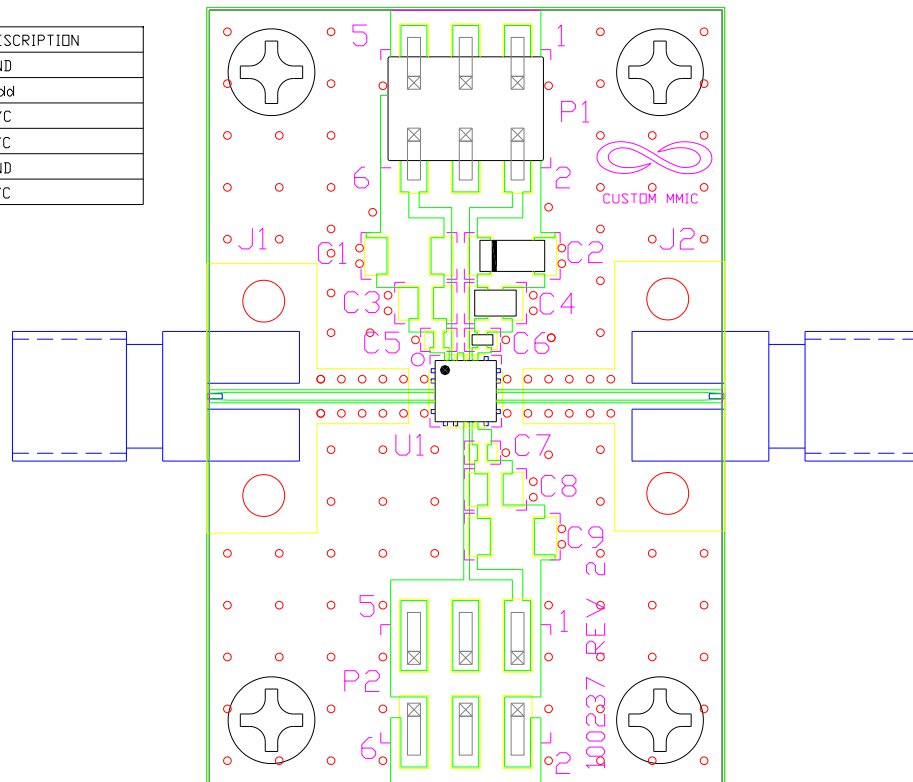
ver. A 0720

### Applications Information

#### Evaluation Board

The circuit board shown has been developed for optimized assembly at CMDS. 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.

P1	DESCRIPTION
1	GND
2	V <sub>dd</sub>
3	N/C
4	N/C
5	GND
6	N/C



Designator	Value	Description
J1, J2		SMA End Launch Connector
P1		6 Pin Header
C2	0.33 $\mu$ F	Capacitor, Tantalum
C4	1000 pF	Capacitor, 0603
C6	100 pF	Capacitor, 0402
U1		CMD328K3 Low Noise Amplifier
PCB		100237 Evaluation PCB

Please note, all information contained in this data sheet is subject to change without notice.

ver. A 0720