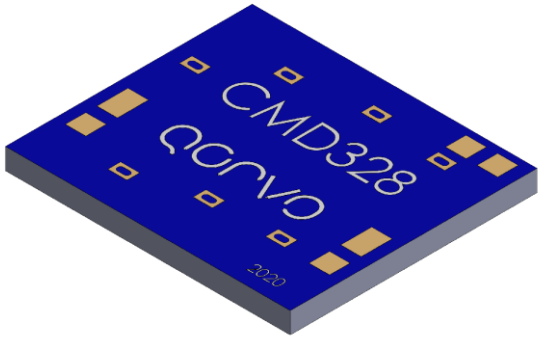
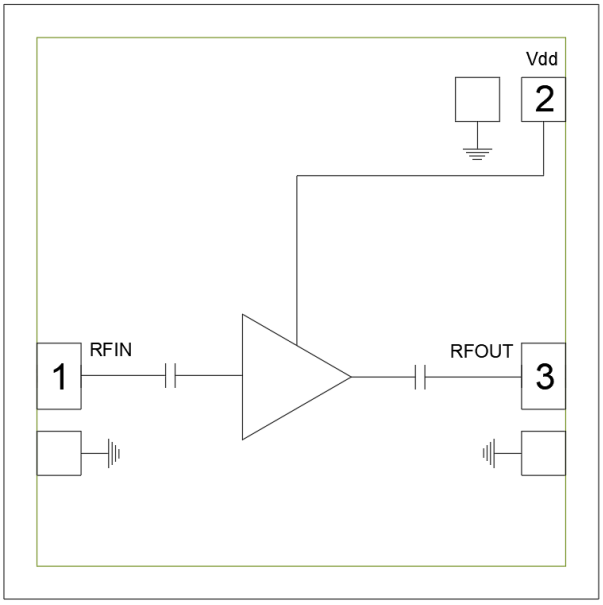
CMD328
6-18 GHz Low Noise Amplifier

Product Overview

Qorvo's CMD328 is a broadband MMIC low noise amplifier in die form operating over the 6 to 18 GHz bandwidth. The CMD328 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 CMD328 is a 50 Ohm matched design thereby eliminating the need for external DC blocks and RF port matching. The CMD328 amplifier is the perfect alternative to costly hybrid amplifiers.



Functional Block Diagram



Key Features

- Ultra low noise figure
- High gain broadband performance
- Single supply voltage: +3.0V @ 52 mA
- Small die size

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

Applications

- EW systems
- Communications systems
- Low noise receiver systems

Ordering Information

Part No.	Description
CMD328	Low noise amplifier die
CMD328S2	Sample, 2 pieces

Absolute Maximum Ratings

Parameter	Rating
Drain Voltage, Vdd	5 V
RF Input Power	+20 dBm
Channel Temperate, Tch	150 °C
Power Dissipation, Pdiss	490 mW
Operating Temperature	-55 to 85 °C
Storage Temperature	-55 to 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.

Recommended Operating Conditions

Parameter	Min	Typ.	Max	Units
Vdd	2	3	4.5	V
Idd		52		mA
Temperature Range	-55	+25	+85	°C

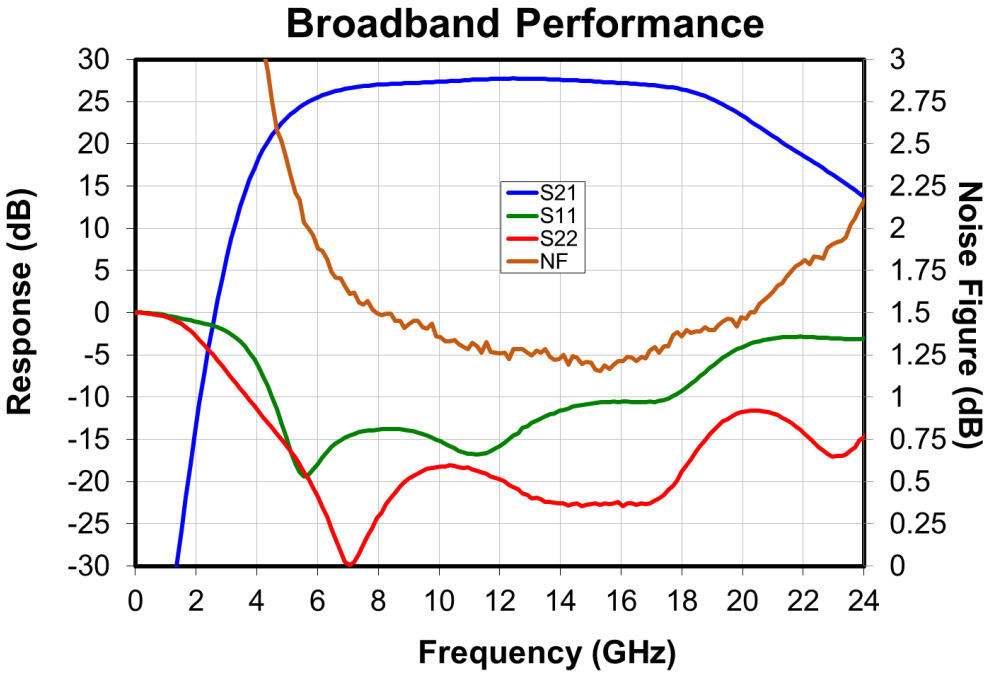
Electrical specifications are measured at specified test conditions. Specifications are not guaranteed over all recommended operating conditions.

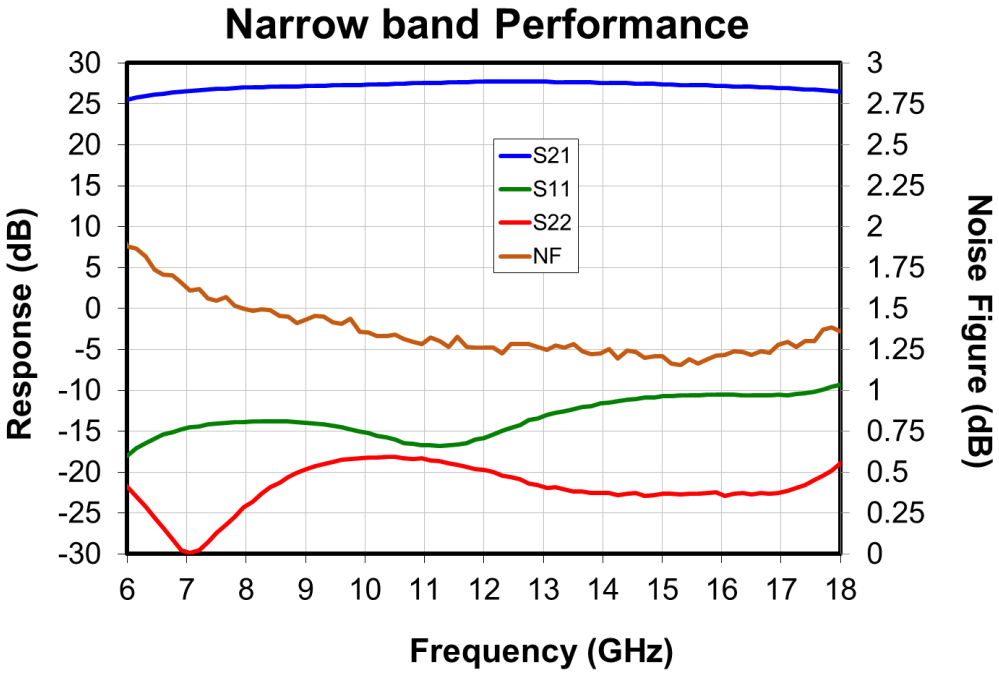
Electrical Specifications

Test conditions unless otherwise noted: Vdd = 3V, T_A = 25 °C,

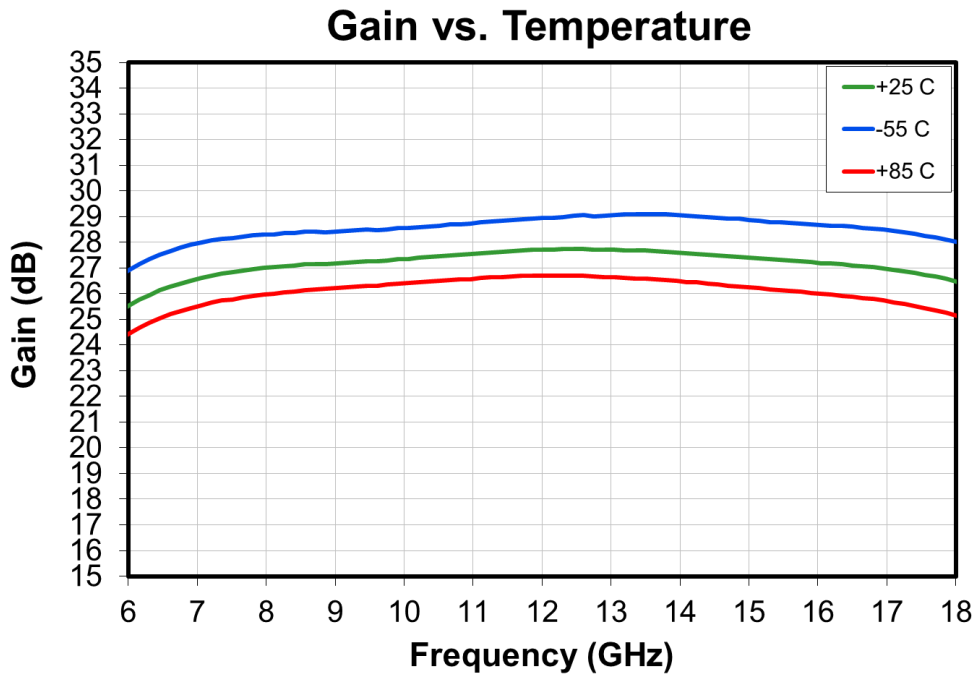
Parameter		Min	Typ.	Max	Units
RF Operational Frequency Range		6	–	18	GHz
Gain	Frequency = 6 – 9 GHz	24	26	–	dB
	Frequency = 9 – 18 GHz	24	27	–	
Noise Figure	Frequency = 6 – 9 GHz	–	2.00	2.60	dB
	Frequency = 9 – 15 GHz	–	1.25	1.78	
	Frequency = 15 – 18 GHz	–	1.60	2.00	
Input Return Loss	Frequency = 6 – 9 GHz	–	15	–	dB
	Frequency = 9 – 18 GHz	–	10	–	
Output Return Loss	Frequency = 6 – 9 GHz	–	20	–	dB
	Frequency = 9 – 18 GHz	–	17	–	
Output Power (P_{1dB})			12	–	dBm
Output IP3			24		dBm
Supply Current		-	52	-	mA
Gain Temperature Coefficient			-0.025		dB/°C
Noise Figure Temperature Coefficient			0.008		dB/°C

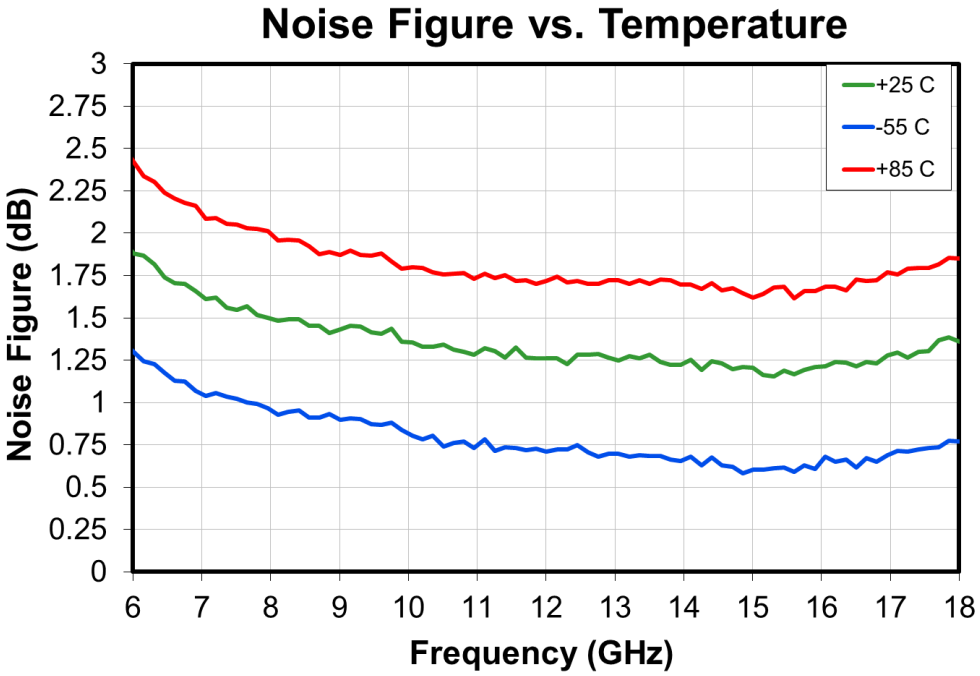
Typical Performance – Vdd = 3 V, T_A = 25 °C



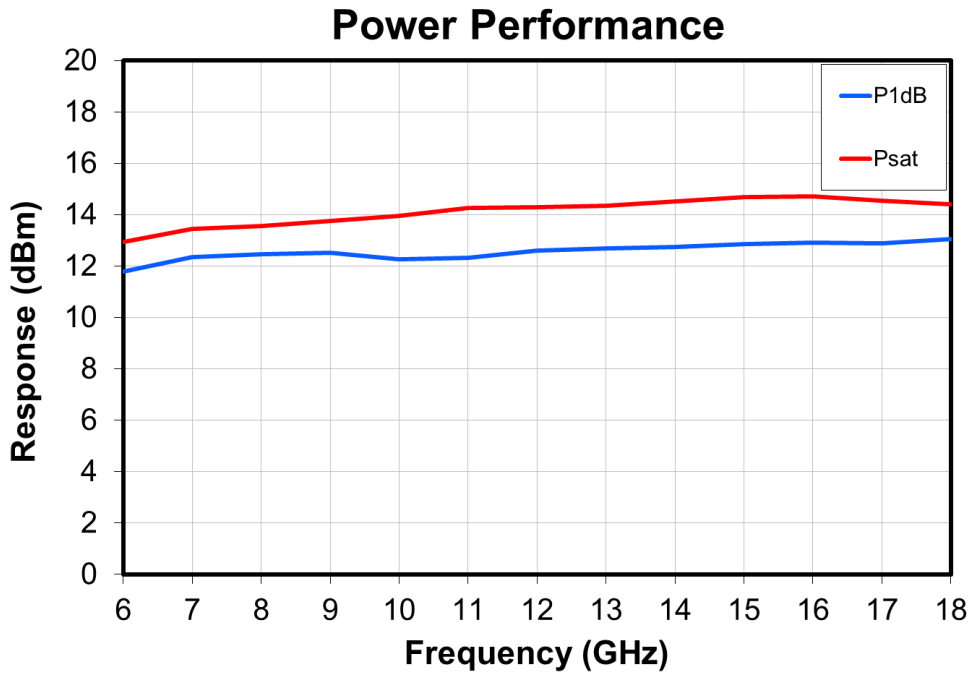


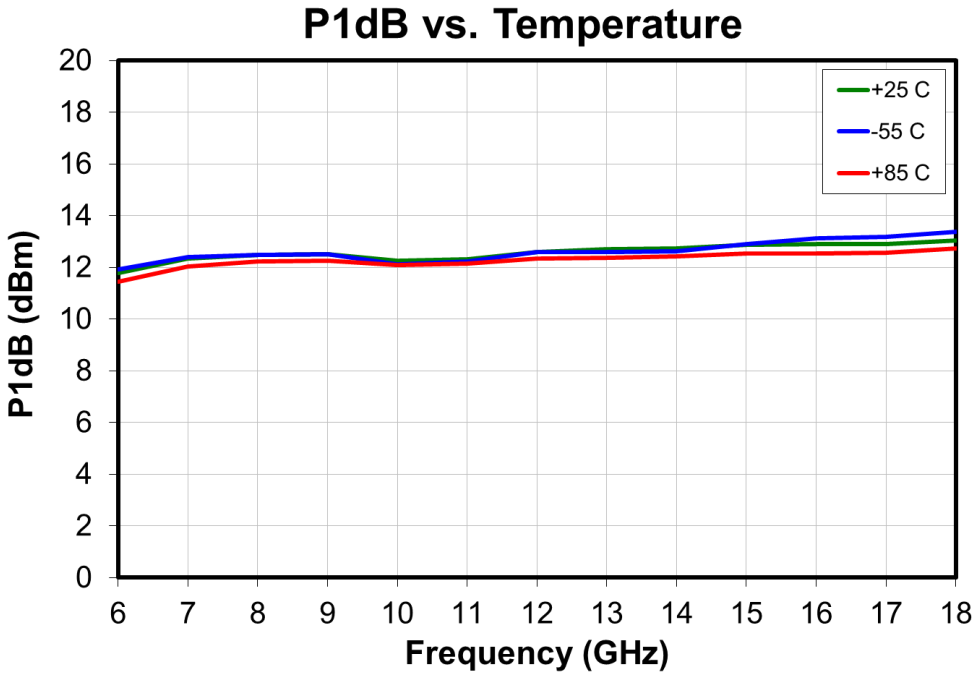
Typical Performance – Vdd = 3 V



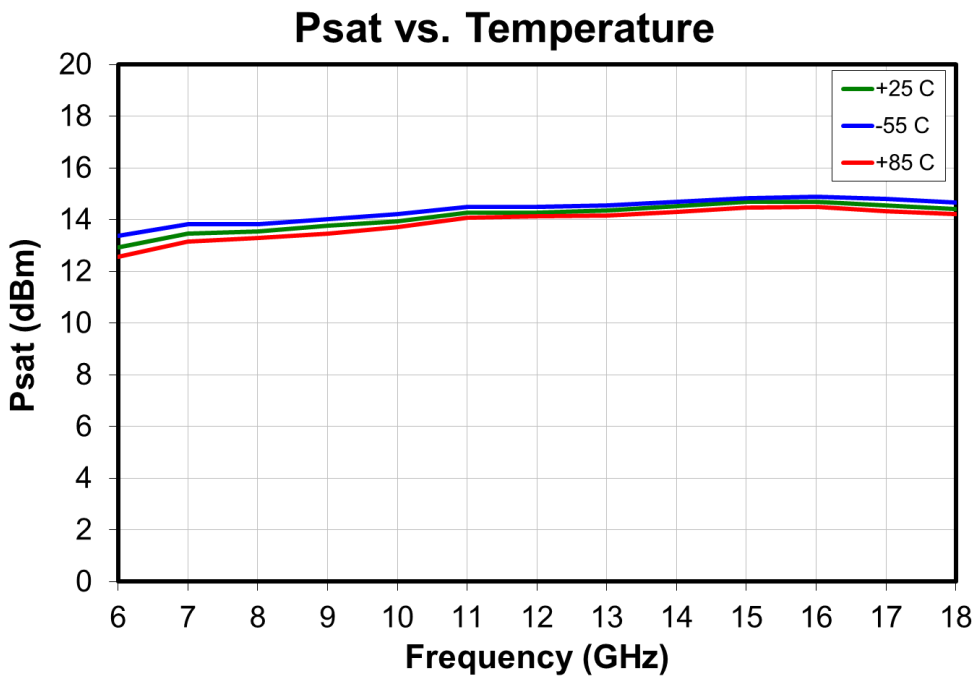


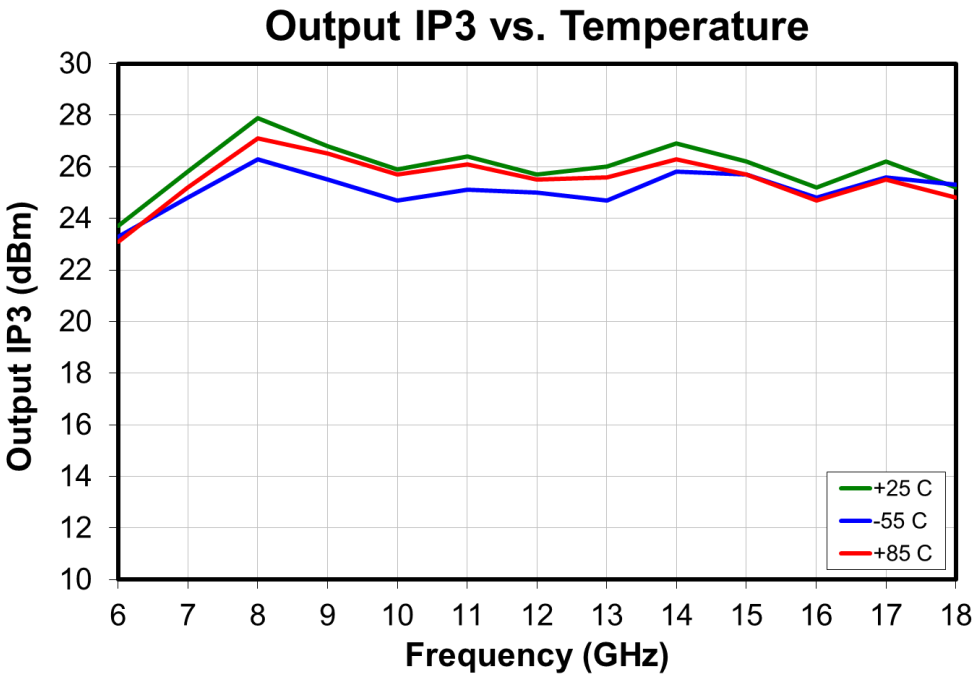
Typical Performance – Vdd = 3 V





Typical Performance – Vdd = 3 V



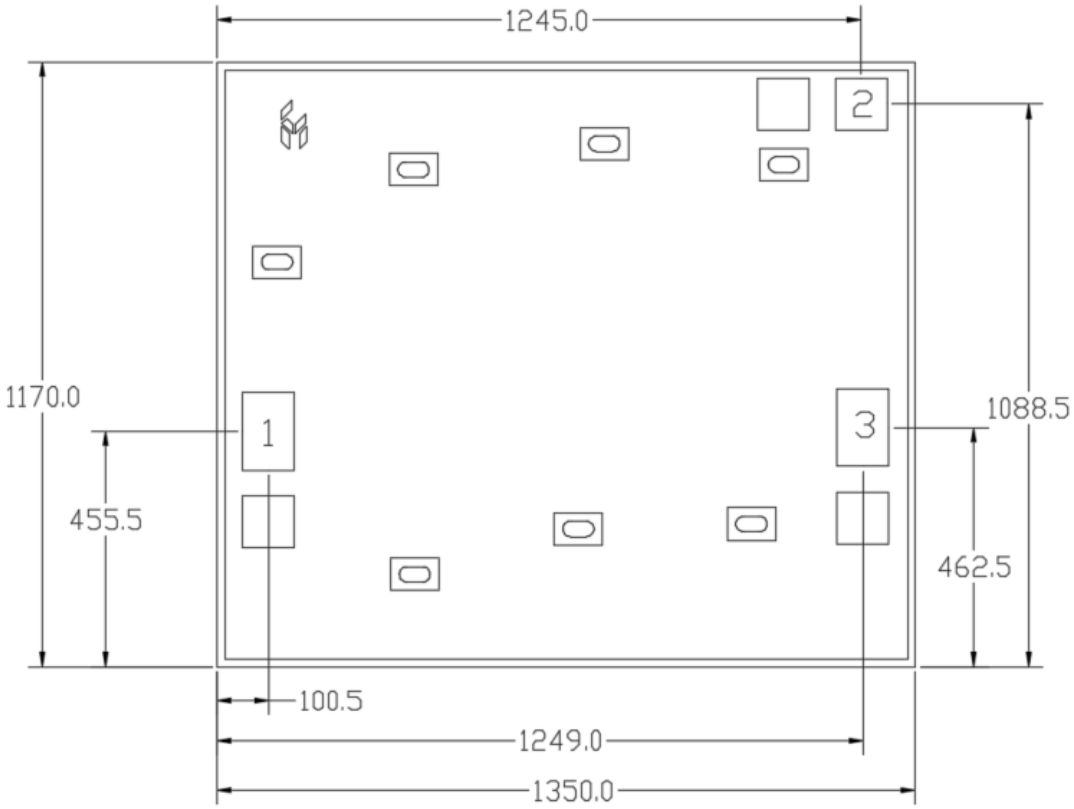


Thermal and Reliability Information

Parameter	Test Conditions	Value	Units
Thermal Resistance (θ_{JC}) (1)	T_{BASE} = 85 °C, CW P_{DISS} = 0.158 W	158.8	ºC/W
Channel Temperature (T_{CH}) (1)		110	°C
Median Lifetime (T_M)		3.87E7	Hrs

Notes:
1. Referenced to the back of the die.

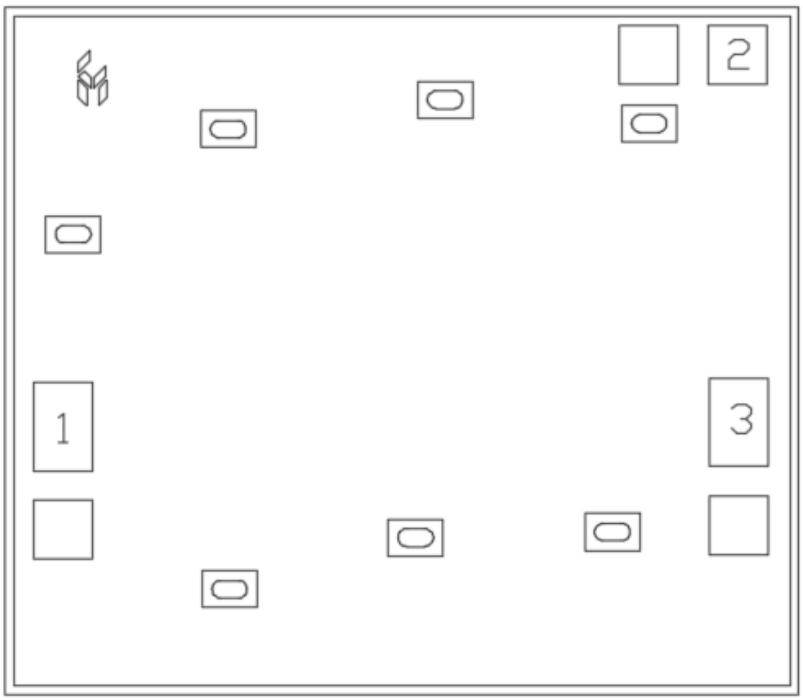
Mechanical Information



Notes:

1. All dimensions in microns.
2. No connection required for unlabeled grounds
3. Backside is RF and DC ground.
4. Backside and bond pad metal: Gold.
5. Die is 100 um thick.
6. Bond pads (1) and (3) are 150 x 100 um, bond pad (2) is 100 x 100 um.

Pin Diagram



Bond Pad Description

Pad No.	Symbol	Pad Size (um)	Description
1	RF in	100 x 150	This pin is AC coupled and matched to 50 Ohms.
2	Vdd	100 x 100	Power supply voltage. Decoupling and bypass capacitors required.
3	RF out	100 x 150	This pin is AC coupled and matched to 50 Ohms.
Backside	Ground		Connect to RF / DC ground

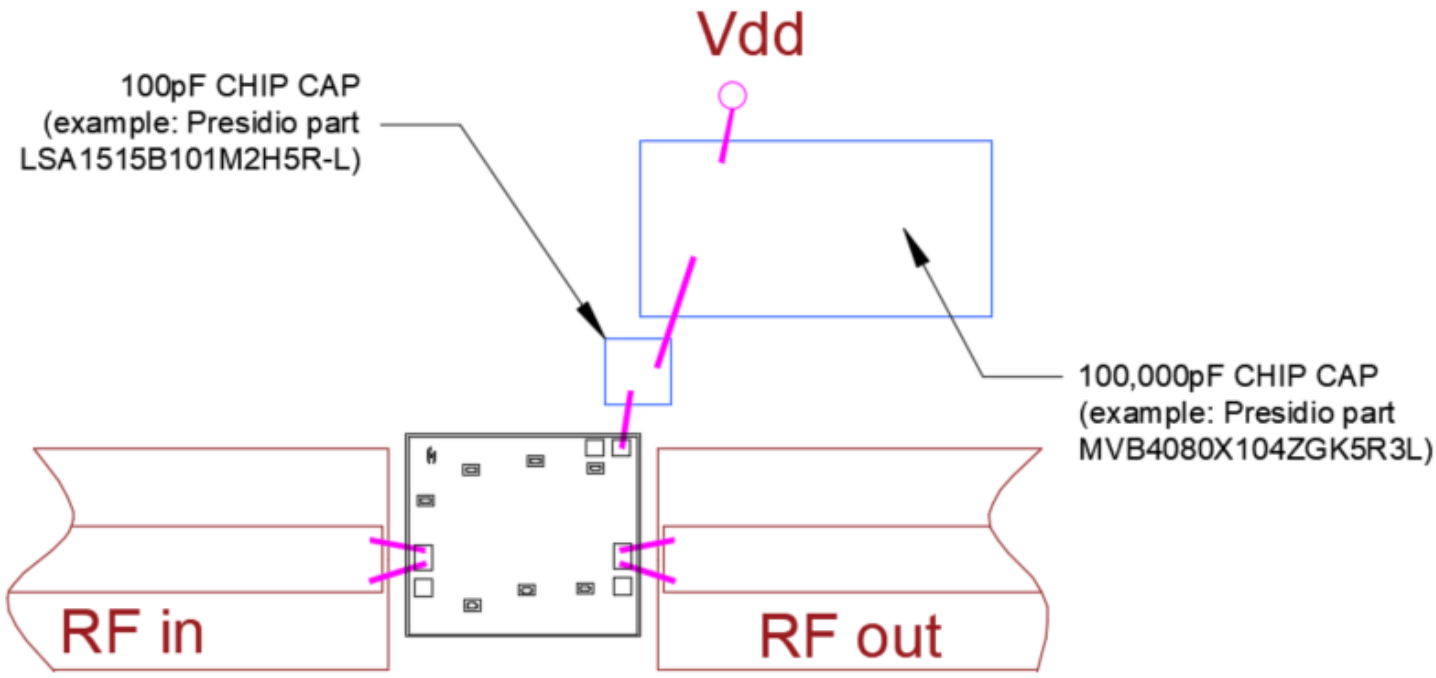
Assembly Guidelines

The backside of the CMD328 is RF ground. Die attach should be accomplished with electrically and thermally conductive epoxy only. Eutectic attach is not recommended. Standard assembly procedures should be followed for high frequency devices. The top surface of the semiconductor should be made planar to the adjacent RF transmission lines.

RF connections should be made as short as possible to reduce the inductive effect of the bond wire. Use of a 0.8 mil thermosonic wedge bonding is highly recommended as the loop height will be minimized.

The semiconductor is 100 µm thick and should be handled by the sides of the die or with a custom collet. Do not make contact directly with the die surface as this will damage the monolithic circuitry. Handle with care.

Assembly Diagram



Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	TBD	ESDA / JEDEC JS-001-2012
MSL – Convection Reflow 235 °C	N/A	JEDEC standard 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 Free
- SVHC Free

Contact Information

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

Web: www.qorvo.com
Tel: 1-844-890-8163
Email: customer.support@qorvo.com

Important Notice

The information contained in this Data Sheet and any associated documents ("Data Sheet Information") is believed to be reliable; however, Qorvo makes no warranties regarding the Data Sheet Information and assumes no responsibility or liability whatsoever for the use of said information. All Data Sheet Information is subject to change without notice. Customers should obtain and verify the latest relevant Data Sheet Information before placing orders for Qorvo® products. Data Sheet Information or the use thereof does not grant, explicitly, implicitly or otherwise any rights or licenses to any third party with respect to patents or any other intellectual property whether with regard to such Data Sheet Information itself or anything described by such information.

DATA SHEET INFORMATION DOES NOT CONSTITUTE A WARRANTY WITH RESPECT TO THE PRODUCTS DESCRIBED HEREIN, AND QORVO HEREBY DISCLAIMS ANY AND ALL WARRANTIES WITH RESPECT TO SUCH PRODUCTS WHETHER EXPRESS OR IMPLIED BY LAW, COURSE OF DEALING, COURSE OF PERFORMANCE, USAGE OF TRADE OR OTHERWISE, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Without limiting the generality of the foregoing, Qorvo® products are not warranted or authorized for use as critical components in medical, life-saving, or life-sustaining applications, or other applications where a failure would reasonably be expected to cause severe personal injury or death. Applications described in the Data Sheet Information are for illustrative purposes only. Customers are responsible for validating that a particular product described in the Data Sheet Information is suitable for use in a particular application.