# CMD243

## *26-35 GHz Balanced Driver Amplifier*

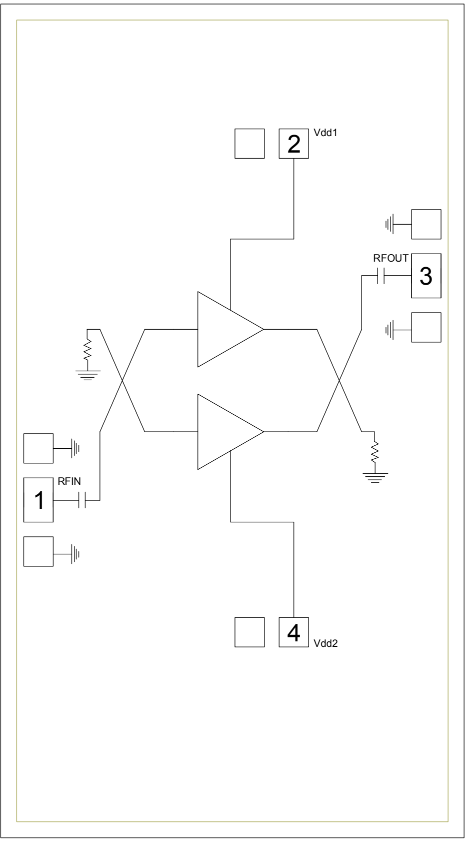
## *Features*

- ► Wide bandwidth
- ► High gain
- ► Low noise and high linearity
- ► Excellent return losses
- ► Small die size

## *Description*

The CMD243 is a wideband GaAs MMIC driver amplifier ideally suited for military, space and communications systems where small size and high linearity are needed. At 30 GHz the device delivers 15.5 dB of gain with a corresponding output 1 dB compression point of +21 dBm and noise figure of 4.4 dB. The CMD243 is a 50 ohm matched design which eliminates the need for external DC blocks and RF port matching. The CMD243 offers full passivation for increased reliability and moisture protection.

## *Functional Block Diagram*




## *Electrical Performance* - $V_{dd1} = V_{dd2} = 5.0$ V, $T_A = 25$ °C, F = 30 GHz

| Parameter | Min | Typ | Max | Units |
|---|---|---|---|---|
| Frequency Range | | 26 - 35 | | GHz |
| Gain | | 15.5 | | dB |
| Noise Figure | | 4.4 | | dB |
| Input Return Loss | | 11 | | dB |
| Output Return Loss | | 11 | | dB |
| Output P1dB | | 21 | | dBm |
| Supply Current ($I_{dd1} + I_{dd2}$) | | 90 | | mA |

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## Specifications

### Absolute Maximum Ratings

| Parameter | Rating |
|---|---|
| Drain Voltage, Vdd1, Vdd2 | 8 V |
| RF Input Power | +20 dBm |
| Channel Temperature, Tch | 150 °C |
| Power Dissipation, Pdiss | 694 mW |
| Thermal Resistance, $\Theta_{JC}$ | 93.7 °C/W |
| Operating Temperature | -55 to 85 °C |
| Storage Temperature | -55 to 150 °C |

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

### Recommended Operating Conditions

| Parameter | Min | Typ | Max | Units |
|---|---|---|---|---|
| Vdd1, Vdd2 | 3.0 | 5.0 | 7.0 | V |
| Idd1 | | 45 | | mA |
| Idd2 | | 45 | | mA |

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

### Electrical Specifications, $V_{dd1} = V_{dd2} = 5.0$ V, $T_A = 25$ °C

| Parameter | Min | Typ | Max | Units |
|---|---|---|---|---|
| Frequency Range | 26 - 35 | | | GHz |
| Gain | 12.5 | 15.5 | | dB |
| Noise Figure | | 4.5 | | dB |
| Input Return Loss | | 11 | | dB |
| Output Return Loss | | 11 | | dB |
| Output P1dB | 18 | 21 | | dBm |
| Output IP3 | | 25 | | dBm |
| Supply Current ($I_{dd1} + I_{dd2}$) | 60 | 90 | 120 | mA |
| Gain Temperature Coefficient | | 0.02 | | dB/°C |
| Noise Figure Temperature Coefficient | | 0.015 | | dB/°C |

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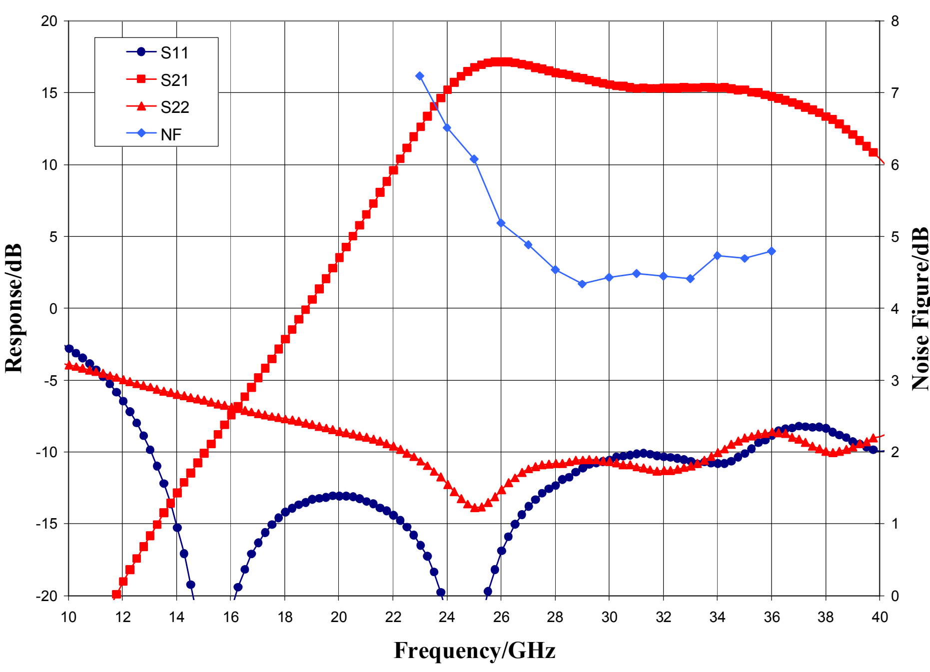
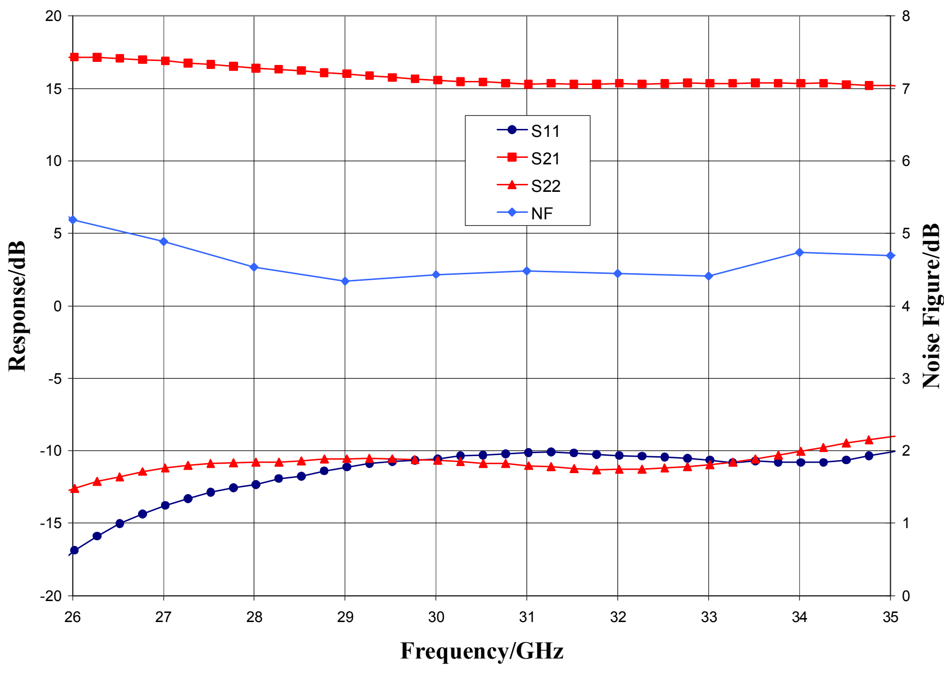
## Typical Performance

**Broadband Performance, $V_{dd1} = V_{dd2} = 5.0$ V, $I_{dd1} = I_{dd2} = 45$ mA, $T_A = 25\ ^oC$**




**Narrow-band Performance, $V_{dd1} = V_{dd2} = 5.0$ V, $I_{dd1} = I_{dd2} = 45$ mA, $T_A = 25\ ^oC$**



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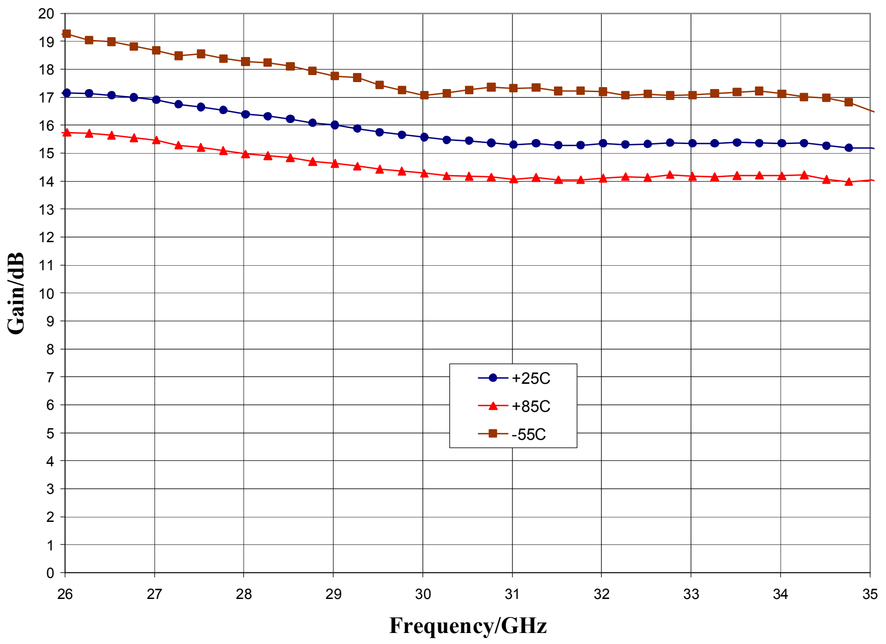
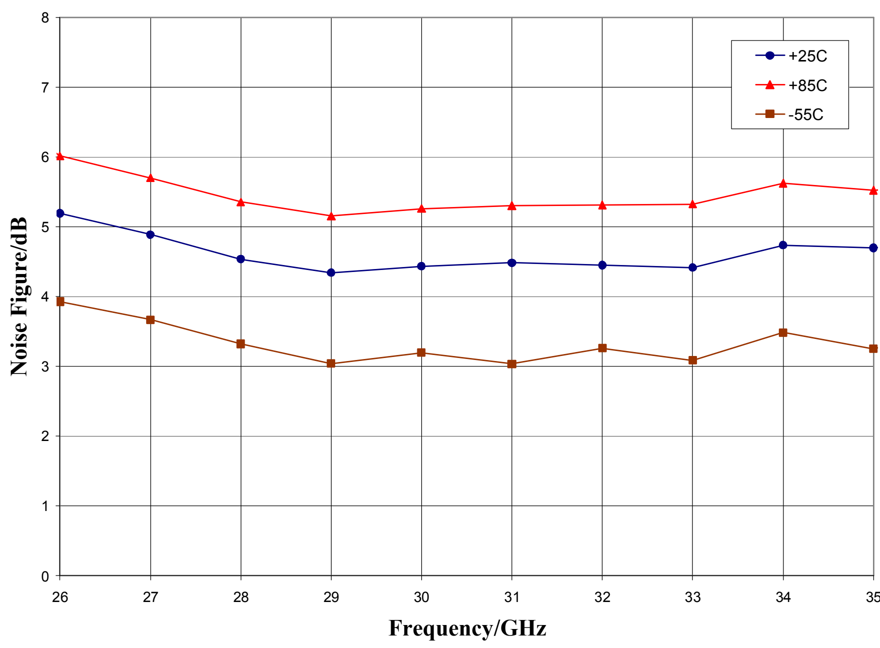
## Typical Performance

### Gain vs. Temperature, $V_{dd1} = V_{dd2} = 5.0$ V




### Noise Figure vs. Temperature, $V_{dd1} = V_{dd2} = 5.0$ V



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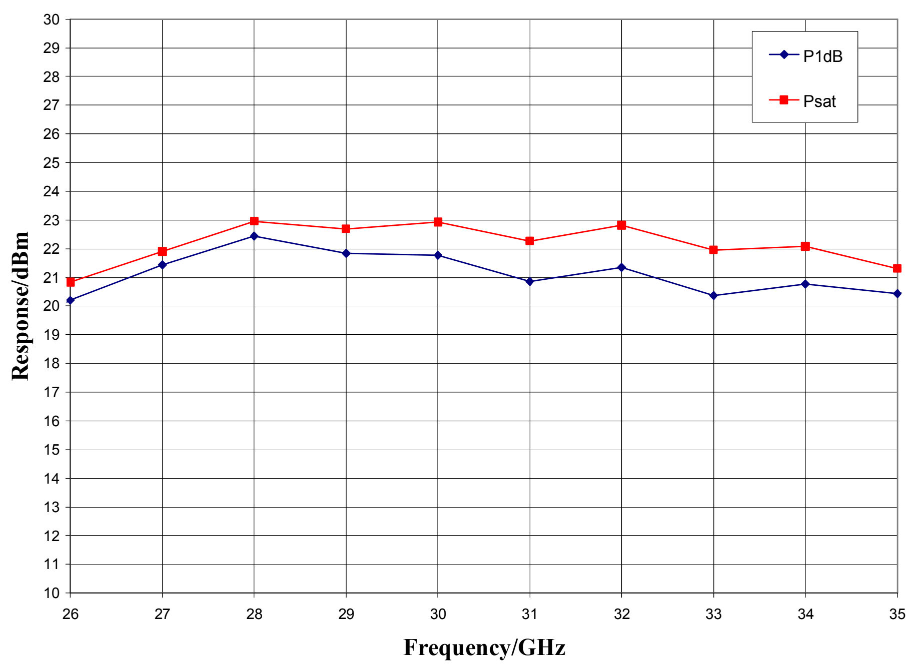
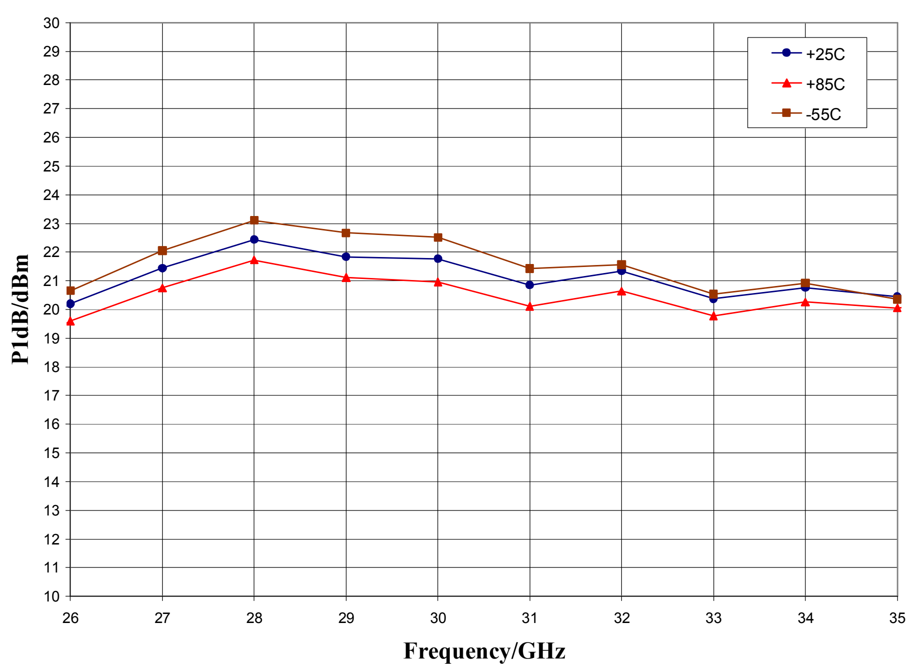
## Typical Performance

### Output Power, $V_{dd1} = V_{dd2} = 5.0$ V, $T_A = 25$ °C




### P1dB vs. Temperature, $V_{dd1} = V_{dd2} = 5.0$ V



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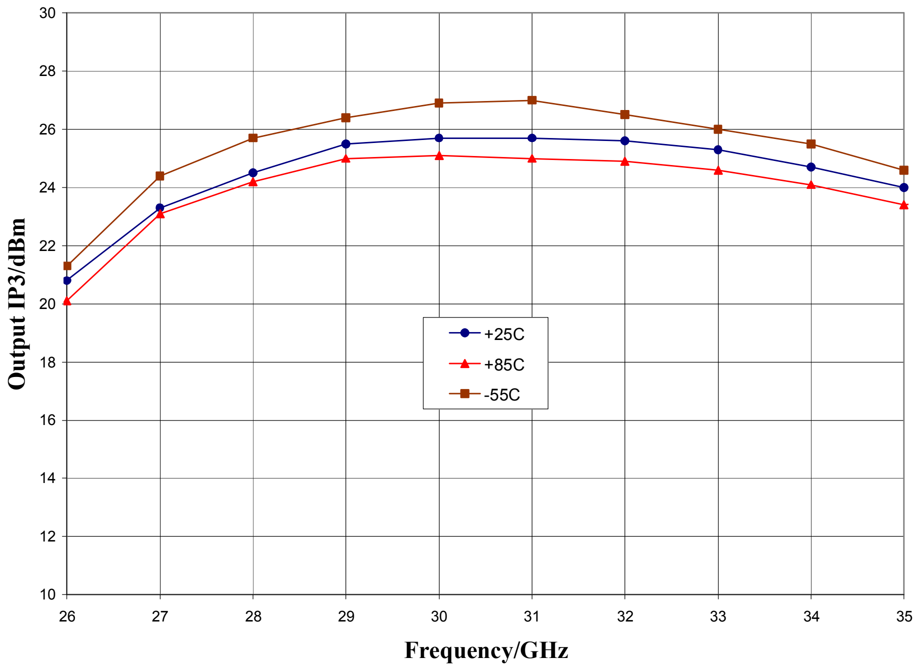
## *Typical Performance*

**Output IP3 vs. Temperature, $V_{dd1} = V_{dd2} = 5.0$ V**







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# CMD243

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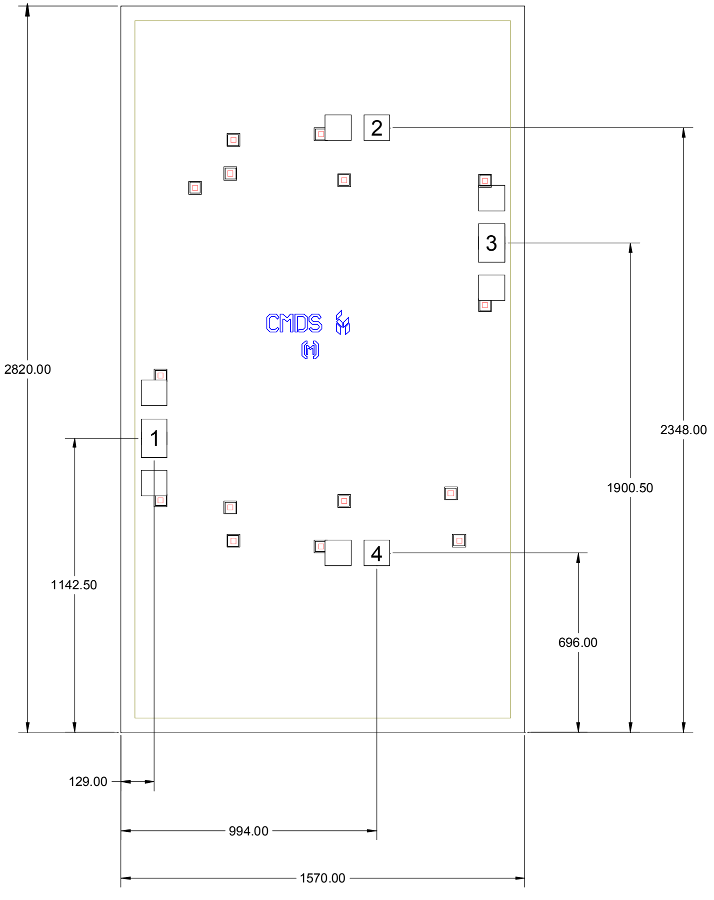
## *Mechanical Information*

**Die Outline (all dimensions in microns)**




Notes:

1. No connection required for unlabeled pads
2. Backside is RF and DC ground
3. Backside and bond pad metal: Gold
4. Die is 70 microns thick
5. DC bond pads (2, 4) are 100 x 100 microns
6. RF bond pads (1, 3) are 100 x 150 microns

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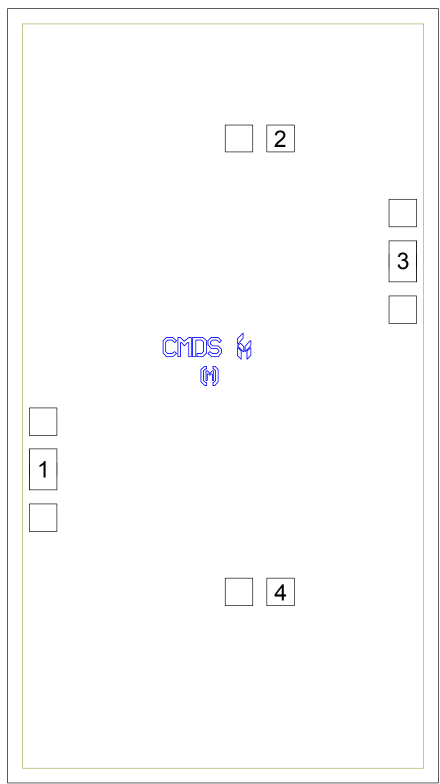
## 26-35 GHz Balanced Driver Amplifier

## *Pad Description*

### Pad Diagram




### Functional Description

| Pad | Function | Description | Schematic |
|---|---|---|---|
| 1 | RF in | DC blocked and 50 ohm matched | RF in |
| 2, 4 | Vdd1, Vdd2 | Power supply voltage<br>Decoupling and bypass caps required | Vdd |
| 3 | RF out | DC blocked and 50 ohm matched | RF out |
| Backside | Ground | Connect to RF / DC ground | GND |

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## *Applications Information*

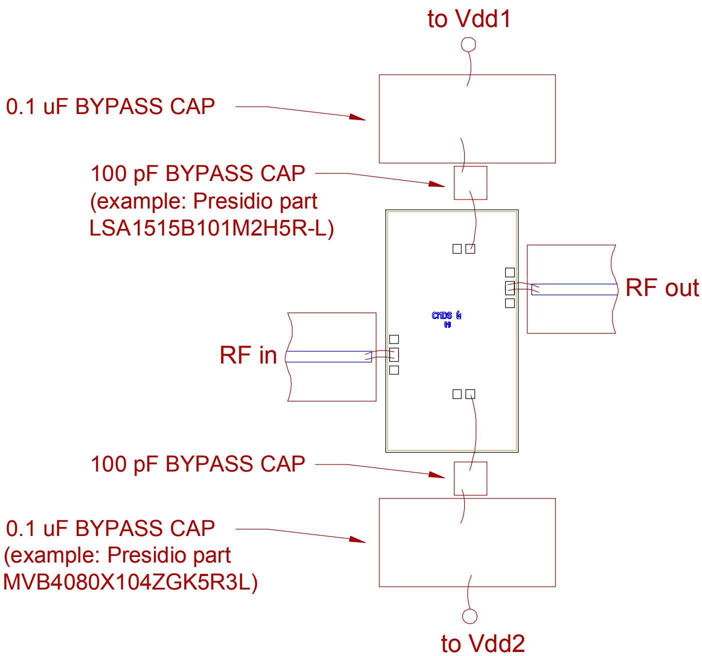
### Assembly Guidelines

The backside of the CMD243 is RF ground. Die attach should be accomplished with electrically and thermally conductive epoxy or eutectic attach. 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, and the RF decoupling capacitors placed in close proximity to the DC connections on chip.

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 RF input and output require a double bond wire as shown.

The semiconductor is 70 um 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




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



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