



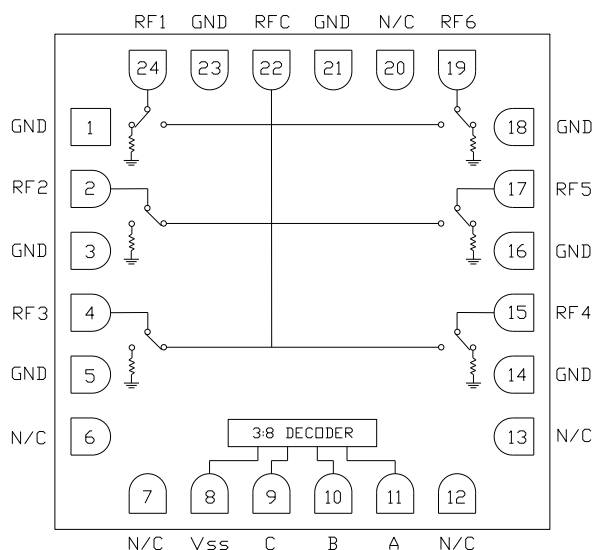
# CMD236C4

## DC-18 GHz SP6T Non-reflective Switch

### Product Overview

The CMD236C4 is a broadband MMIC SP6T switch housed in a leadless 4x4 mm surface mount package. The CMD236C4 covers DC to 18 GHz and offers a low insertion loss of 2.5 dB and high isolation of 42 dB at 10 GHz. The switch also includes an on board binary decoder circuit which reduces the number of required logic control lines from five to three. The CMD236C4 operates using complementary control voltage logic lines of 0/-5 V and consumes little DC current.

### Functional Block Diagram



### Key Features

- Low Loss Broadband Performance
- High Isolation
- Non-Reflective Design
- Integrated 3:8 TTL Decoder
- Pb-Free RoHs Compliant 4x4 SMT Package

### Ordering Information

Part No.	Description
CMD236C4	250 Piece 7" Reel
CMD236C4-EVB	1 Piece Bag

### Electrical Performance ( $V_{ctl} = 0/-5$ V, $V_{ss} = -5$ V, $T_A = 25^\circ$ C, $F = 10$ GHz)

Parameter	Min	Typ	Max	Units
Frequency Range		DC - 18		GHz
Insertion Loss		2.5		dB
Isolation		42		dB
Return Loss - On State		9		dB
Return Loss RF1, 2, 3, 4, 5, 6 - Off State		9		dB
Input P0.1dB		18		dBm
Switching Speed		60		ns

## Absolute Maximum Ratings

Parameter	Rating
RF Input Power	+27 dBm
Bias Voltage ( $V_{SS}$ )	-7 V
Control Voltage Range (A, B)	+0.5 V to -7.5 V
Channel Temperature, $T_{ch}$	150° C
Thermal Resistance, $Q_{JC}$	64.1° C/W
Operating Temperature	-40 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.

## Bias Voltage & Current

<b><math>V_{SS}</math> Range = -5.0V <math>\pm</math> 10%</b>		
$V_{SS}$ (V)	$I_{SS}$ (Typ) (mA)	$I_{SS}$ (Max) (mA)
-5	9	18

## TTL/CMOS Control Voltages

State	Bias Condition
Low	-1V to 0V @ 1 mA Typ
High	-7V to -3V @ 1 uA Typ

## Truth Table

Control Input			Signal Path State
A	B	C	RFC to:
High	High	High	RF1
Low	High	High	RF2
High	Low	High	RF3
Low	Low	High	RF4
High	High	Low	RF5
Low	High	Low	RF6
Low	Low	Low	All OFF *

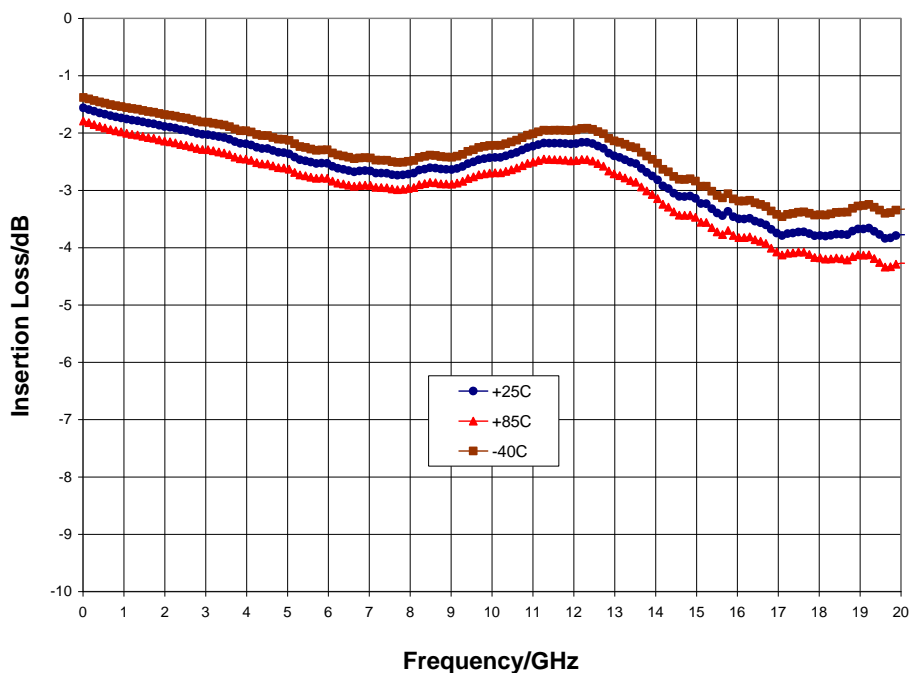
\* RFC is reflective in All Off state

## Electrical Specifications ( $V_{ctl} = 0/-5$ V, $V_{SS} = -5$ V $T_A = 25^\circ$ C)

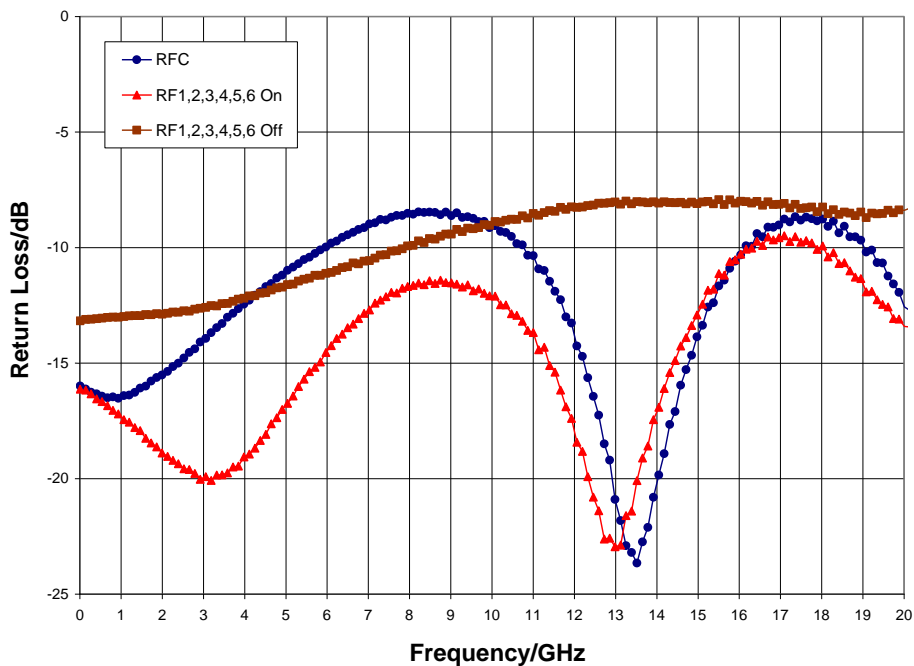
Parameter	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range		DC - 6			DC - 14			DC - 18		GHz
Insertion Loss		2.5	3		2.8	3.3		3.5	4.3	dB
Isolation	42	47		31	36		29	35		dB
Return Loss - On State		12			9			10		dB
Return Loss - Off State		12			9			8		dB
Input P0.1dB		16			16			16		dBm
Input IP3		34			34			34		dBm
Switching Speed		60			60			60		ns

## Typical Performance

Insertion Loss vs. Temperature

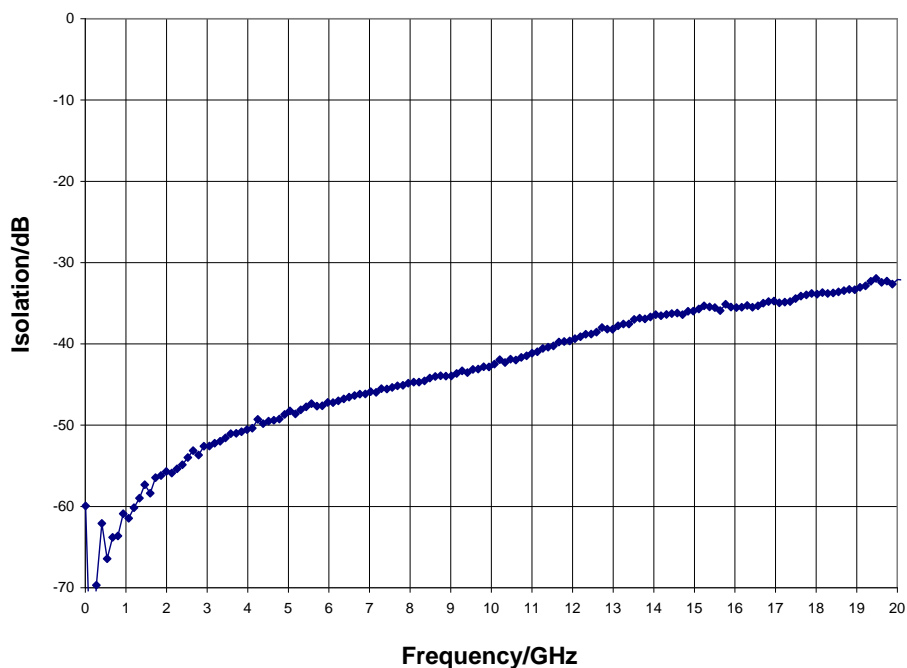


Return Loss

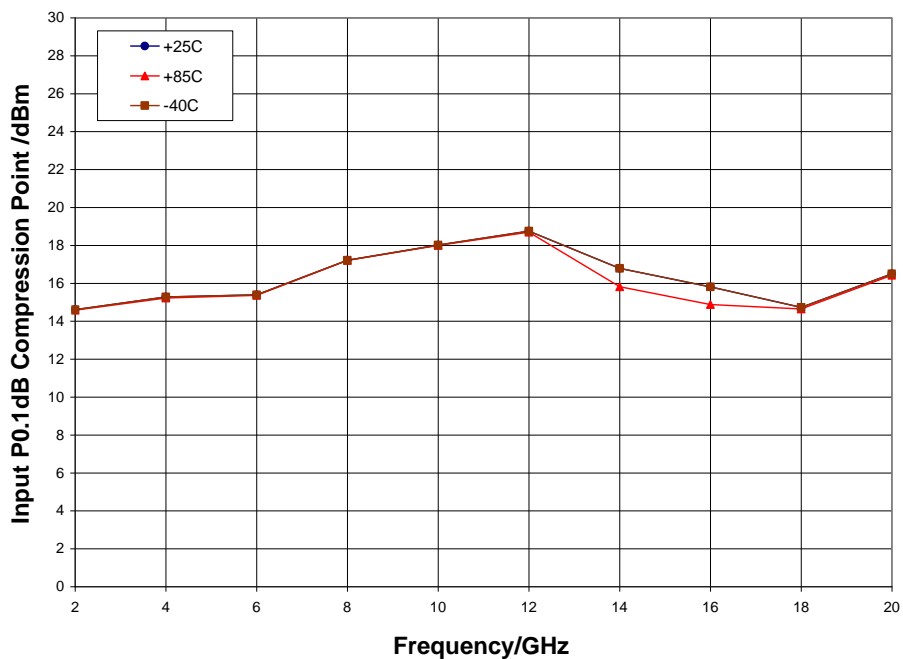


## Typical Performance

Isolation Between Ports RFC and RF1/RF2/RF3/RF4/RF5/RF6

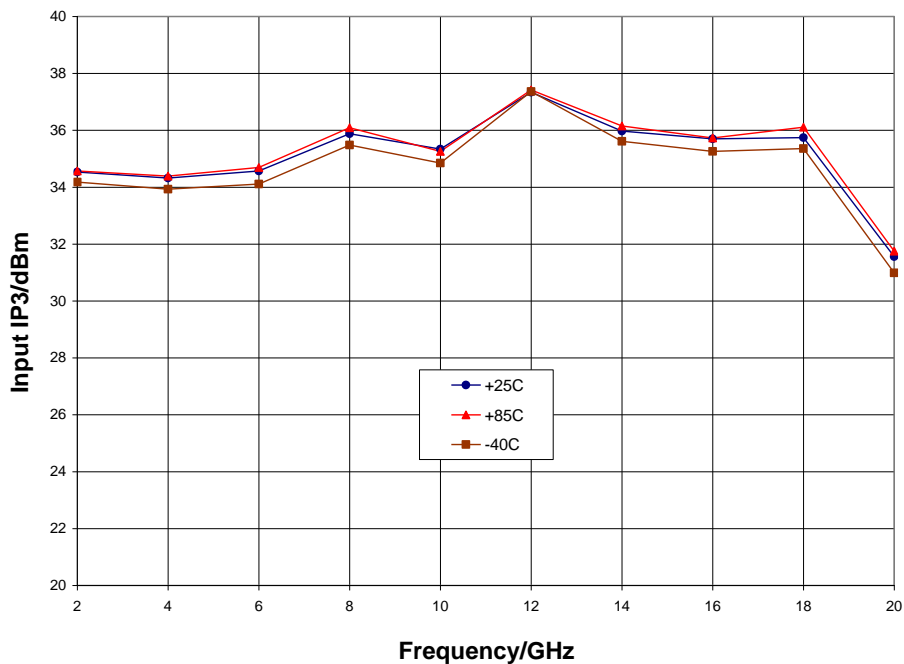


Input P0.1dB Compression Point vs. Temperature

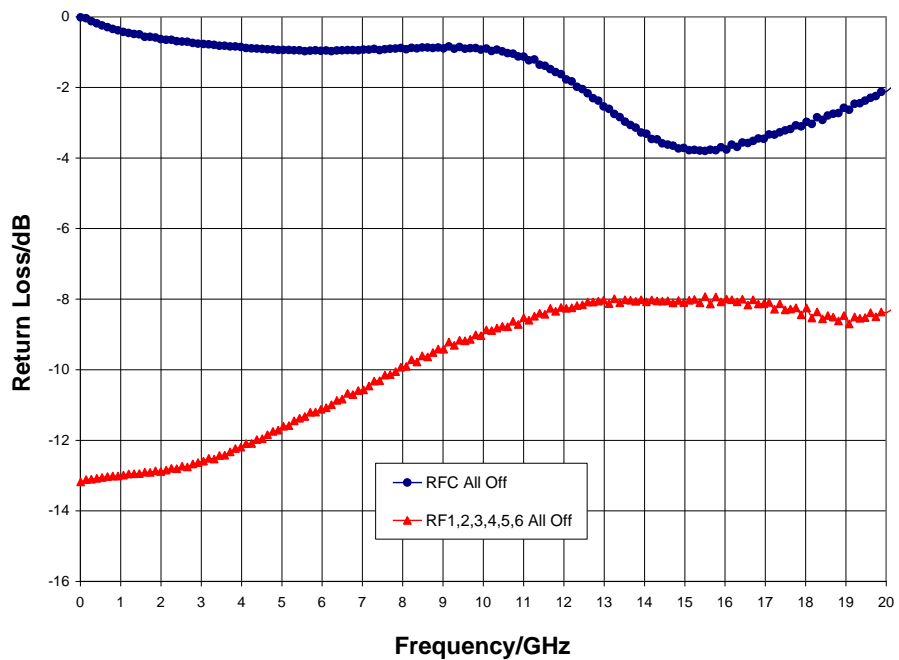


## Typical Performance

Input Third Order Intercept Point vs. Temperature

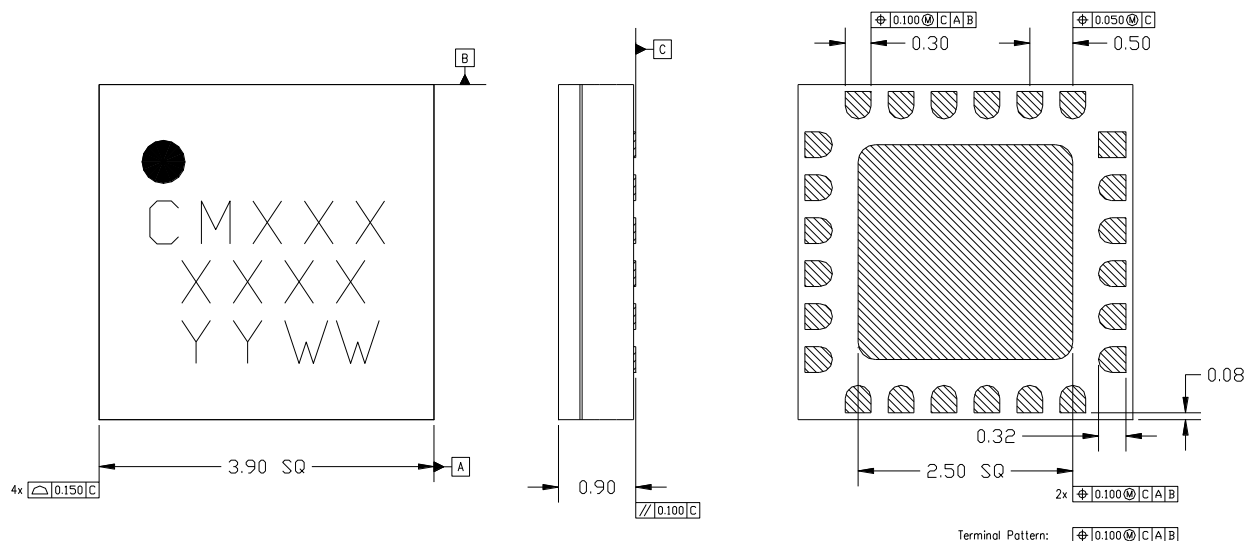


Return Loss, All Off State



## Mechanical Information

### Package Information and Dimensions



#### Notes:

1. All dimensions shown in mm.
2. Material: Black alumina
3. Lead finish:
  - 3.1. Ni: 8.89um max 1.27um min
  - 3.2. Pd: 0.17um max, 0.07um min
  - 3.3. Au: 0.254um max, 0.03um min
4. Marking
  - 4.1. Line 1: Part number
    - 4.1.1. Example: CMD191C4 shall be marked as CM191
  - 4.2. Line 2: Lot number
  - 4.3. Line 3: Date code - Last 2 digits of the year of manufacture followed by a 2 digit week code
5. Alternate pin #1 identifier is a single square pad
6. Alternate die paddle may have chamfered corners

### Recommended PCB Land Pattern

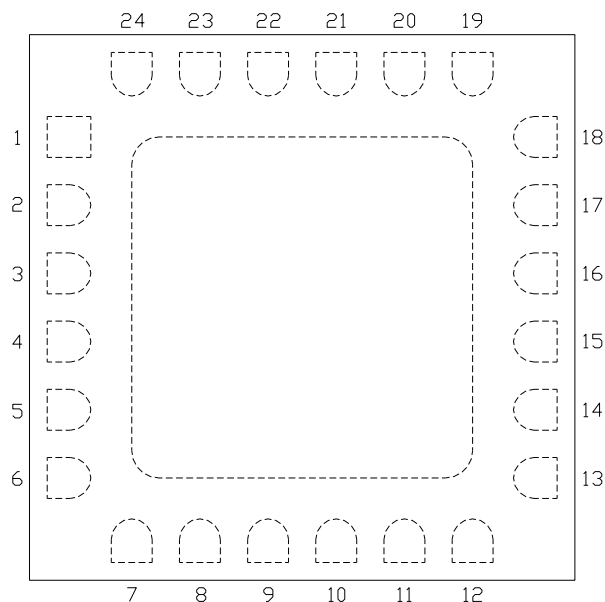
Qorvo recommends that the user develop the land pattern that will provide the best design for proper solder reflow and device attach for their specific application. Please review Qorvo Application Note AN 105 for a recommended land pattern approach.

### Recommended Solder Reflow Profile

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

## Pin Description

### Pin Diagram



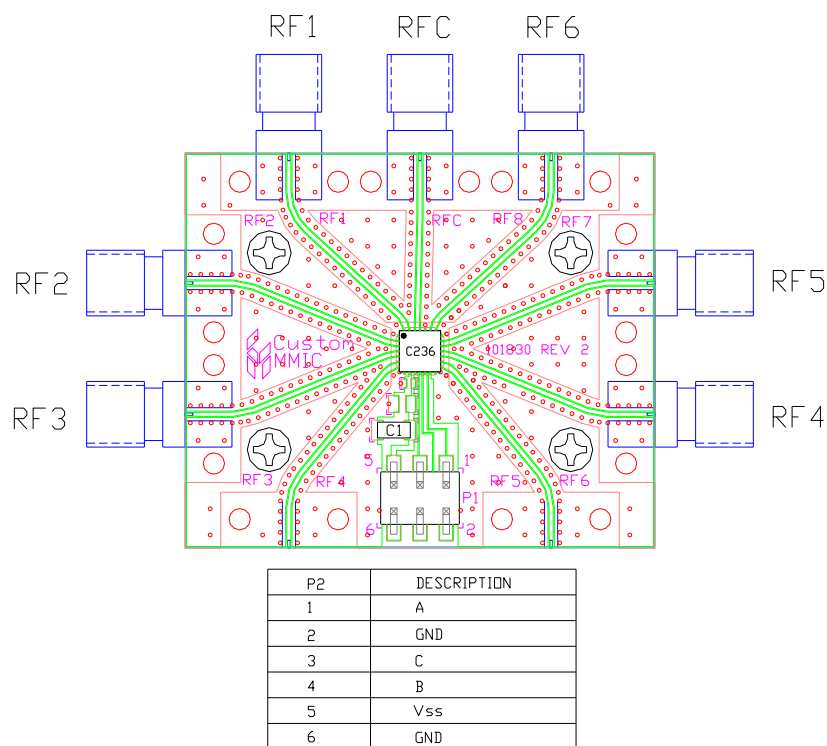
### Functional Description

Pin	Function	Description	Schematic
1, 3, 5, 14, 16, 18, 21, 23 and die paddle	Ground	Connect to RF / DC ground	
6, 7, 12, 13, 20	N/C	No connection required These pins may be connected to RF / DC ground	
2, 4, 15, 17, 19, 22, 24	RF2, RF3, RF4, RF5, RF6, RFC, RF1	These pins are DC coupled and matched to 50 ohm Blocking capacitors are required if RF line potential is not equal to 0 V	
8	V <sub>SS</sub>	Power supply voltage	
9	CTLC	See truth table and control voltage table	
10	CTLB	See truth table and control voltage table	
11	CTLA	See truth table and control voltage table	

## Applications Information

### Evaluation Board

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.



### Bill of Material

Designator	Value	Description
J1 - J7		SMA End Launch Connector
P1		6 Pin Header
C1	0.33 $\mu$ F	Capacitor, Tantalum
U1		CMD236C4 SP6T Switch
PCB		101830 Evaluation PCB

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



## Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	Class 1A	ESDA / JEDEC JS-001-2012
MSL – Moisture Sensitivity Level	Level 1	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
- Antimony Free
- TBBP-A (C<sub>15</sub>H<sub>12</sub>Br<sub>4</sub>O<sub>2</sub>) Free
- SVHC Free
- Halogen Free
- PFOS Free

## Contact Information

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

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