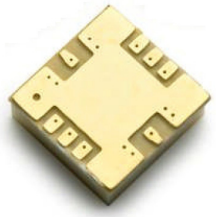
AMMP-6331

18 – 31 GHz 0.2 W Driver Amplifier
in SMT Package

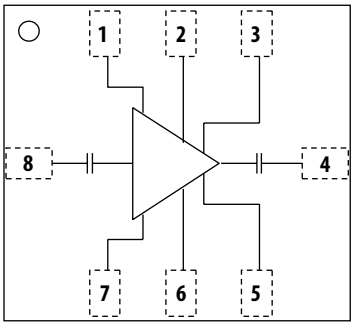
Data Sheet



Description

The AMMP-6331 is a broadband 0.2 W driver amplifier designed for use in transmitters operating in various frequency bands from 18 GHz to 31 GHz. This small, easy to use device provides over 23 dBm of output power (P_{-1dB}) and more than 20 dB of gain at 25 GHz. It was optimized for linear operation with an output power at the third order intercept point (OIP3) of 30dBm. The AMMP-6331 features a temperature compensated RF power detection circuit that enables power detection sensitivity of 0.3 V/W at 25GHz. It is fabricated using Avago Technologies unique 0.25µm E-mode PHEMT technology which eliminates the need for negative gate biasing voltage.

Functional Block Diagram



Pin	Function
1	Vg
2	Vd
3	DET_O
4	RF_out
5	DET_R
6	Vd
7	NC
8	RF_in

RoHS-Exemption

Please refer to hazardous substances table on page 8.

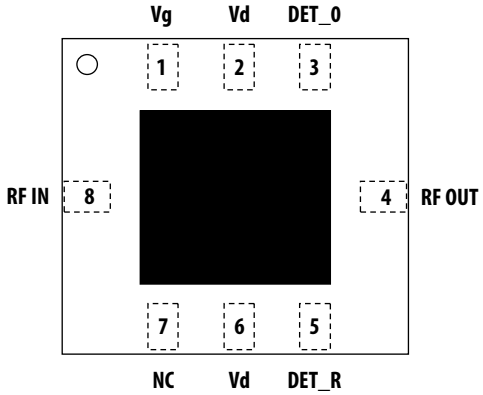
Features

- Frequency range: 18 to 31 GHz
- Small signal gain: 20 dB
- P_{-1dB}: 23dBm
- Return Loss (In/Out): -10 dB

Applications

- Microwave Radio systems
- VSAT

Package Diagram



Attention: Observe precautions for handling electrostatic sensitive devices.
ESD Machine Model (Class A) = 90 V
ESD Human Body Model (Class 1A) = 300 V
Refer to Avago Application Note A004R: Electrostatic Discharge, Damage and Control.

Note: MSL Rating = Level 2A

Electrical Specification

1. All data measured on a 2.4mm connector based evaluation board (Rogers 4350B) at Vd = 5V, Idq = 230mA, Tc = 25 °C, and 50 Ω at all ports.
2. All tested parameters guaranteed with measurement accuracy ±2dB for P-1dB of 17,25 and 31GHz , ±0.5dB for Gain of 17GHz, ±1dB for Gain of 25 and 31GHz.

Table 1. RF Electrical Characteristics

	Performance									Unit
	17 – 20GHz			20 – 30GHz			30 – 31GHz			
Parameter	Min.	Typ	Max.	Min.	Typ	Max.	Min.	Typ	Max.	
Small Signal Gain, G	14	16		19	22		18	20.5		dB
Output power at 1dB Gain compression, P-1dB	18	20.5		22	24.5		21	24		dBm
Output power at 3dB Gain Compression, P-3dB		21.5			24.5			23.5		dBm
Third Order Intercept, OIP3		30			30			30		dBm
Input Return Loss, RLin		10			10			8		dB
Output Return Loss, RLout		10			14			10		dB
Reverse Isolation		45			45			45		dB

Table 2. Recommended Operating Range

		Specifications				
Description	Pin	Min.	Typical	Max.	Unit	Comments
Drain Supply Voltage	Vd		5		V	
Gate Supply Voltage	Vg		1.67		V	
Gate Supply Current, Ig			7		mA	
Drain Supply Current, Id			230		mA	(Vd = 5 V, Vg set for typical Idq – quiescent current)
Frequency Range		18		31	GHz	

Table 3. Thermal Properties

Parameter	Test Conditions	Value
Thermal Resistance, θ_{ch-b}		θ_{ch-b} = 27 °C/W
Channel Temperature ($T_{channel}$)	Vd = 5V, Id = 230mA, Pd = 1.15W Tbaseplate = 85°C	$T_{channel}$ = 116°C
Channel Temperature ($T_{channel}$) Under RF drive	Vd = 5V, Id = 400mA, Pout = 24dBm Pd = 2W, Tbaseplate = 85°C	$T_{channel}$ = 139°C

Absolute Minimum and Maximum Ratings

Table 4. Minimum and Maximum Ratings

		Specifications			
Description	Pin	Min.	Max.	Unit	Comments
Drain Supply Voltage	Vd		5.5	V	
Gate Supply Voltage	Vg	0	2.5	V	
RF Input Power (Pin)	RFIN		20	dBm	CW
Power Dissipation (Pd)			2.5	W	Pd=Vd x Id + Pin - Pout
Channel Temperature			+150	°C	
Storage Temperature		-65	+150	°C	

Notes:

1. Operation in excess of any one of these conditions may result in permanent damage to this device. Functional operation at or near these limitations will significantly reduce the lifetime of the device.
2. When operated at maximum Pd with a base plate temperature of 85 °C, the median time to failure (MTTF) is significantly reduced.

Selected performance plots

All data measured on a 2.4mm connector based evaluation board at Vd = 5V, Idq = 230mA, Ta = 25°C, and 50 Ω at all ports.

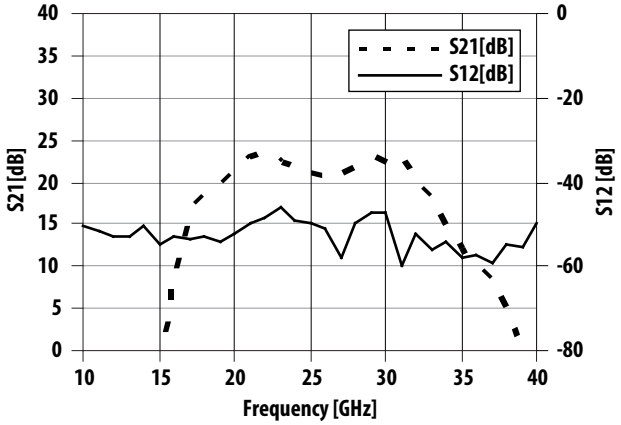


Figure 1. Gain and Reverse Isolation vs Frequency

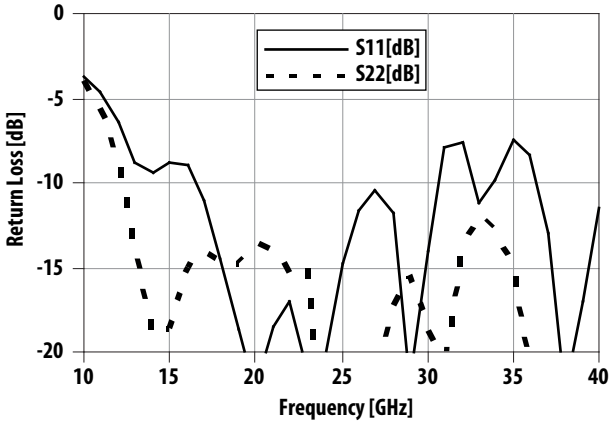


Figure 2. Return Loss vs Frequency

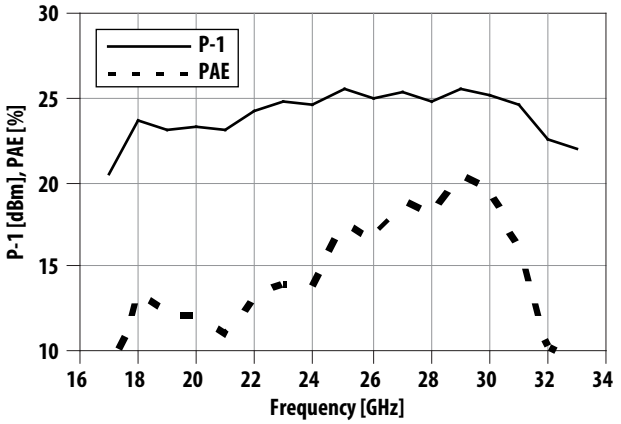


Figure 3. P_{-1dB} and PAE vs Frequency

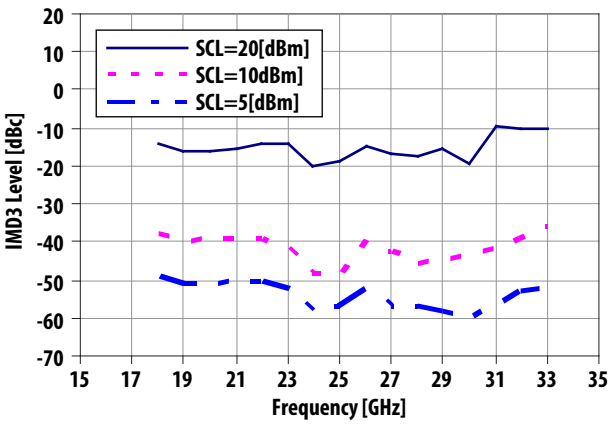


Figure 4. Typical IMD3 vs Frequency (SCL = Single Carrier level)

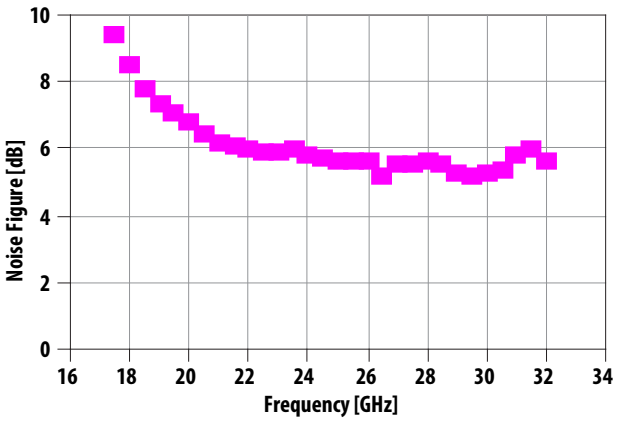


Figure 5. Typical Noise Figure vs Frequency

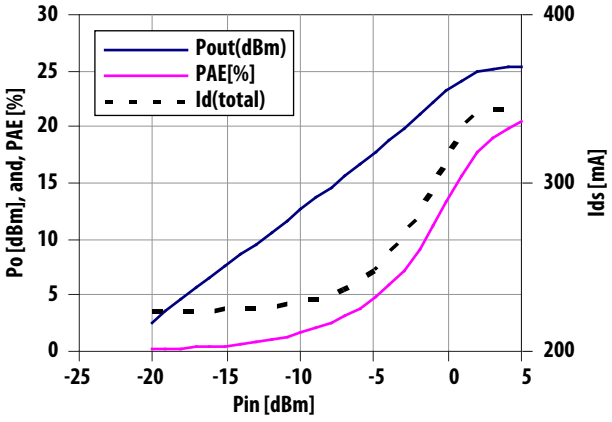


Figure 6. Output Power, PAE, and Drain Current vs Input Power at 30GHz

Over Temperature Performance Plots

All data measured on a 2.4mm connector based evaluation board at Vd = 5V, Idq = 230mA, and 50 Ω at all ports. Id has been maintained at 230mA under different temperature conditions.

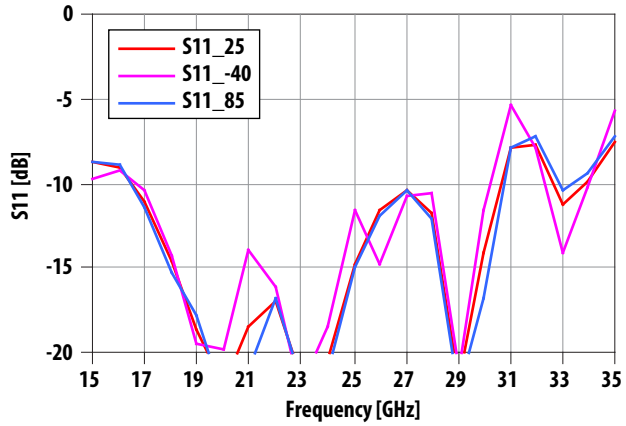


Figure 7. |S11| vs Frequency and Temperature

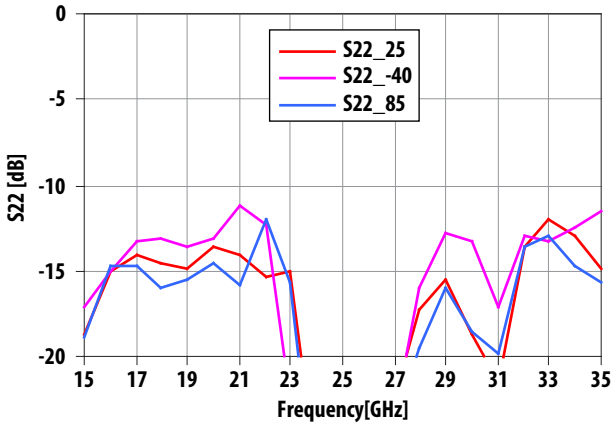


Figure 8. |S22| vs Frequency and Temperature

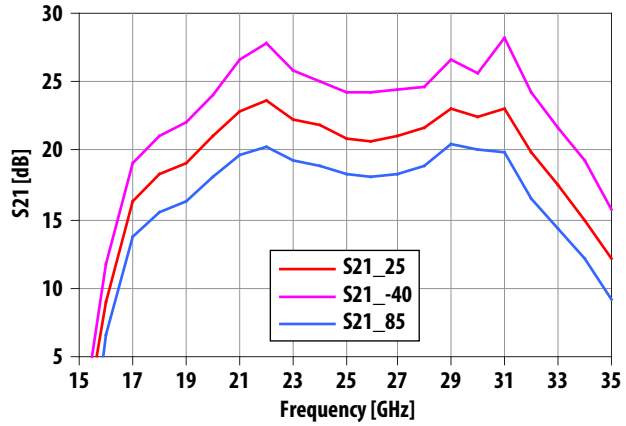


Figure 9. |S21| vs Frequency and Temperature

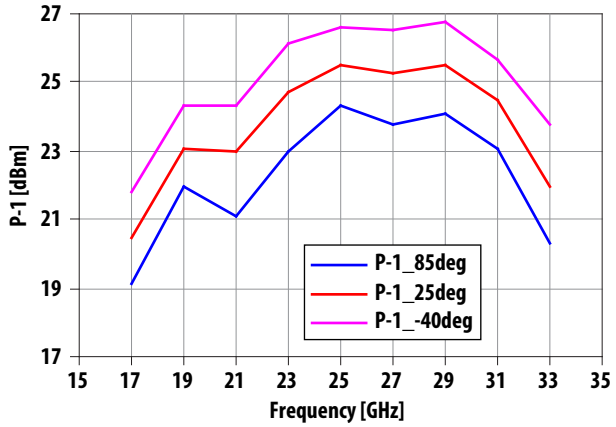


Figure 10. P_{-1dB} vs Frequency and Temperature

Over Voltage plots

All data measured on a 2.4mm connector based evaluation board at Ta = 25 °C, and 50 Ω at all ports.

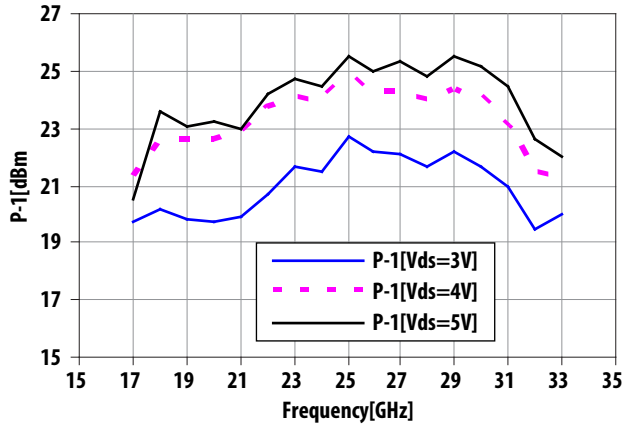


Figure 11. P_{-1dB} vs Frequency and Vds, (I_{dQ}=230mA)

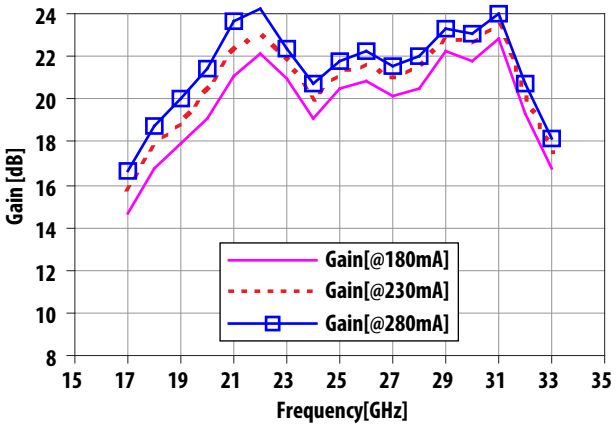


Figure 12. Small signal gain vs Frequency and I_{dQ}, (Vds=5V)

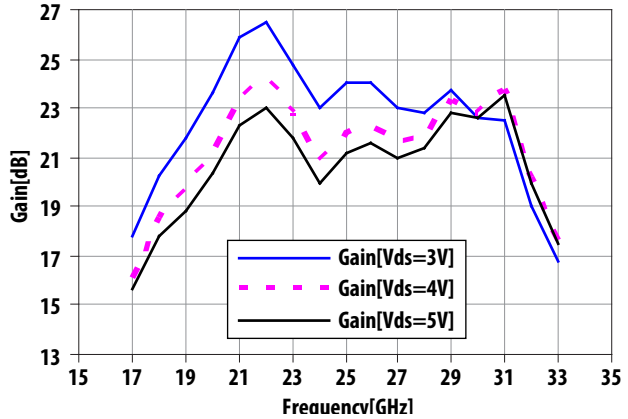


Figure 13. Small signal gain vs Frequency and Vds, (I_{dQ}=230mA)

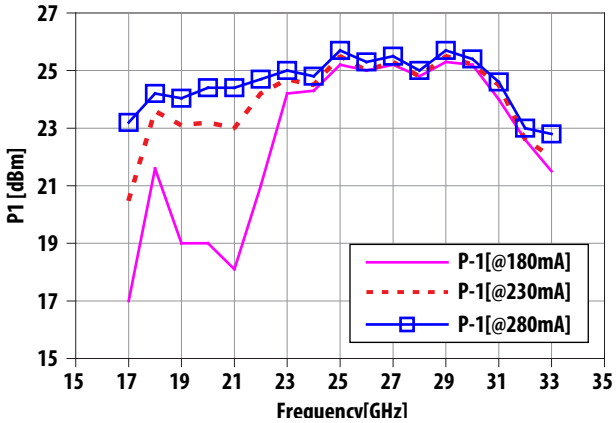
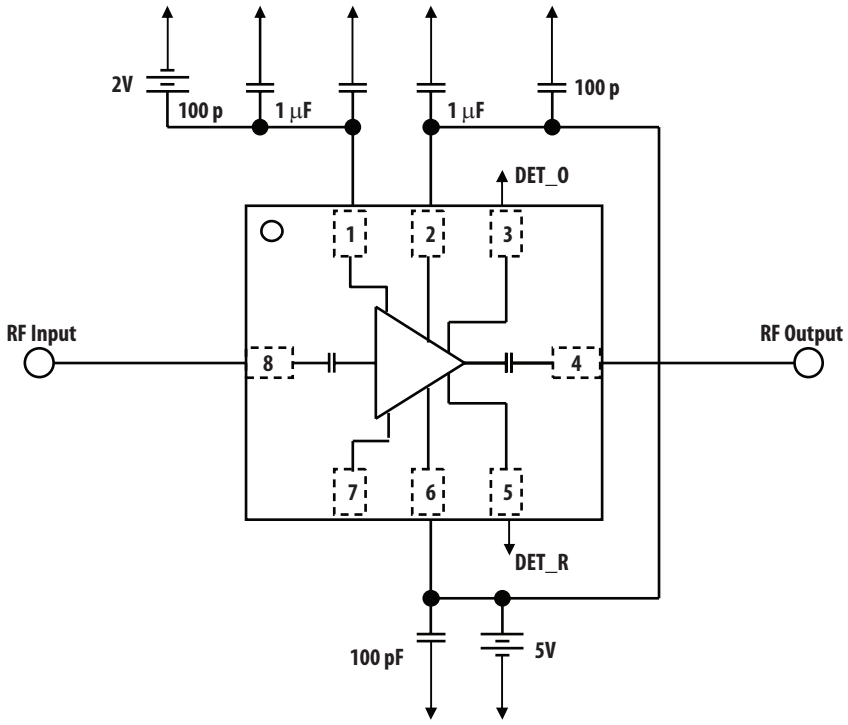


Figure 14. P_{-1dB} vs Frequency and I_{dQ}, (Vds=5V)

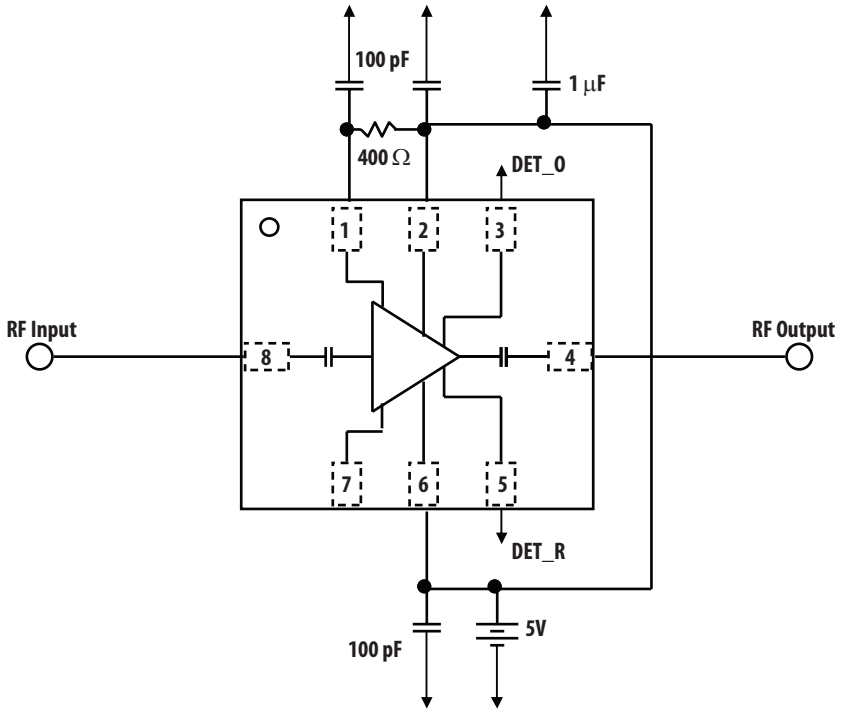
Typical Scattering Parameters

Please refer to <http://www.avagotech.com> for typical scattering parameters data.

Application circuit



1. Dual positive DC power supply



2. Single positive DC power supply

Figure 15. AMMP-6331 biasing circuits. Both sides of the part must be biased.

Package Dimension, PCB Layout and Tape and Reel information

Please refer to Avago Technologies Application Note 5520, AMxP-xxxx production Assembly Process (Land Pattern A)

Ordering Information

Part Number	Devices Per Container	Container
AMMP-6331-BLKG	10	Antistatic bag
AMMP-6331-TR1G	100	7″ Reel
AMMP-6331-TR2G	500	7″ Reel

Names and Contents of the Toxic and Hazardous Substances or Elements in the Products
产品中有毒有害物质或元素的名称及含量

Part Name 部件名称	Toxic and Hazardous Substances or Elements 有毒有害物质或元素					
	Lead (Pb) 铅 (Pb)	Mercury (Hg) 汞 （Hg ）	Cadmium (Cd) 镉 （Cd ）	Hexavalent (Cr(VI)) 六价铬（Cr(VI) ）	Polybrominated biphenyl (PBB) 多溴联苯（PBB ）	Polybrominated diphenylether (PBDE) 多溴二苯醚（PBDE ）
100pF capacitor	×	O	O	O	O	O

O: indicates that the content of the toxic and hazardous substance in all the homogeneous materials of the part is below the concentration limit requirement as described in SJ/T 11363-2006.
×: indicates that the content of the toxic and hazardous substance in at least one homogeneous material of the part exceeds the concentration limit requirement as described in SJ/T 11363-2006.
(The enterprise may further explain the technical reasons for the “x” indicated portion in the table in accordance with the actual situations.)

O：表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T 11363-2006 标准规定的限量要求以下。
×：表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T 11363-2006 标准规定的限量要求。
（企业可在此处，根据实际情况对上表中打“×” 的技术原因进行进一步说明。）

Note: EU RoHS compliant under exemption clause of “lead in electronic ceramic parts (e.g. piezoelectronic devices)”

For product information and a complete list of distributors, please go to our web site: **www.avagotech.com**

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