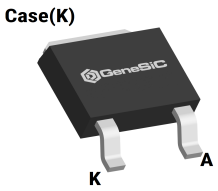
650V 12A SiC Schottky MPS™ Diode

V_{RRM}	=	650 V
I_F	=	12 A
Q_C	=	31 nC

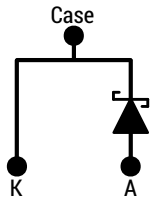
Features

- Gen5 SiC MPS™Technology for Low V_F of 1.22V
- Benchmark Low Built-In Voltage (V_{BI})
- Superior Figure of Merit Q_C * V_F
- Enhanced Surge Current & UIS Robustness
- Low Thermal Resistance
- Zero Reverse Recovery and Zero Forward Recovery
- Excellent dV/dt Ruggedness

Package



TO-252-2



Advantages

- Lowest Conduction Losses Across All Load Conditions
- Increased System Power Density
- Optimal Price Performance
- High System Reliability
- Reduced Cooling Requirements
- Temperature Independent Fast Switching
- Easy to Parallel without Thermal Runaway

Applications

- Switched Mode Power Supply (SMPS)
- Server and Telecom Power Supply
- Solar Microinveter
- Power Factor Correction (PFC)
- Uninterruptible Power Supply (UPS)

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Values	Unit	Note
Repetitive Peak Reverse Voltage	V_{RRM}		650	V	
Continuous Forward Current	I_F	T_C = 25°C, D = 1	38	A	Fig. 4
		T_C = 110°C, D = 1	24		
		T_C = 155°C, D = 1	12		
Non-Repetitive Peak Forward Surge Current, Half Sine Wave	$I_{F,SM}$	T_C = 25°C, t_P = 10 ms	72	A	
		T_C = 150°C, t_P = 10 ms	60		
Repetitive Peak Forward Surge Current, Half Sine Wave	$I_{F,RM}$	T_C = 25°C, t_P = 10 ms	45	A	
		T_C = 150°C, t_P = 10 ms	30		
i^2t Value	$\int i^2dt$	T_C = 25°C, t_P = 10 ms	25	A^2s	
Non-Repetitive Avalanche Energy	E_{AS}	L = 1.1 mH, I_{AS} = 12 A	83	mJ	
Diode Ruggedness	dV/dt	V_R = 0 ~ 520 V	200	V/ns	
Power Dissipation	P_{TOT}	T_C = 25°C	130	W	Fig. 3
Operating and Storage Temperature	T_j , T_{stg}		-55 to 175	°C	

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Electrical Characteristics

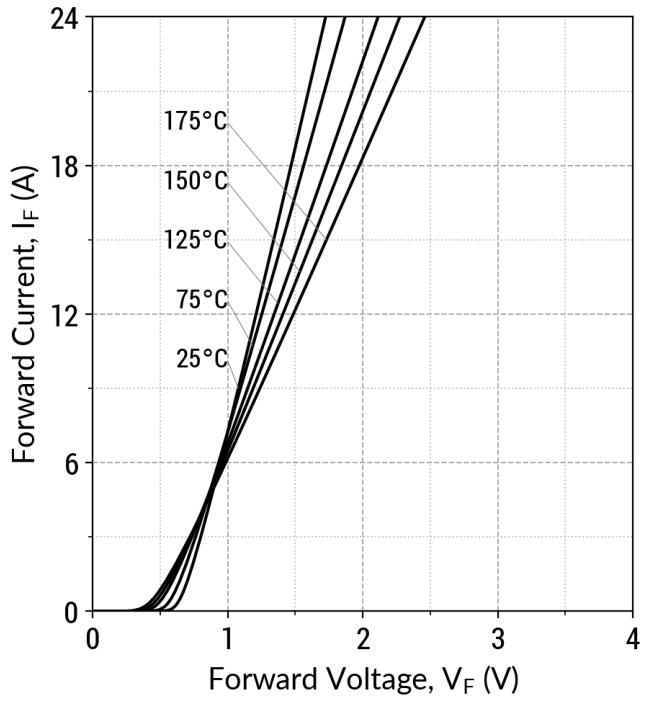
Parameter	Symbol	Conditions		Values Min.	Values Typ.	Values Max.	Unit	Note
Diode Forward Voltage	V_F	I_F = 12 A, T_j = 25°C			1.22	1.45	V	Fig. 1
		I_F = 12 A, T_j = 125°C			1.4			
Reverse Current	I_R	V_R = 650 V, T_j = 25°C			4	200	µA	Fig. 2
		V_R = 650 V, T_j = 125°C			83			
Total Capacitive Charge	Q_C	$I_F \le I_{F,MAX}$ dI_F/dt = 200 A/µs	V_R = 300 V		26		nC	Fig. 7
			V_R = 400 V		31			
Switching Time	t_S		V_R = 300 V		< 10		ns	
			V_R = 400 V					
Total Capacitance	C	V_R = 1 V, f = 1MHz			575		pF	Fig. 6
		V_R = 400 V, f = 1MHz			41			

Thermal/Package Characteristics

Parameter	Symbol	Conditions	Values Min.	Values Typ.	Values Max.	Unit	Note
Thermal Resistance, Junction - Case	R_{thJC}			1.15		°C/W	Fig. 9
Weight	W_T			0.3		g	

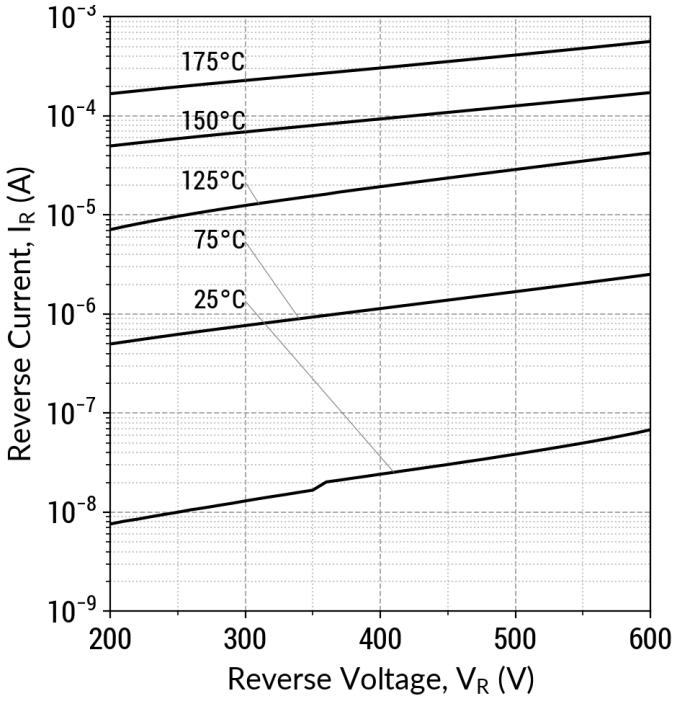
NOTE: This datasheet provides preliminary specifications. Parameters, conditions and values are subject to change.

Figure 1: Typical Forward Characteristics



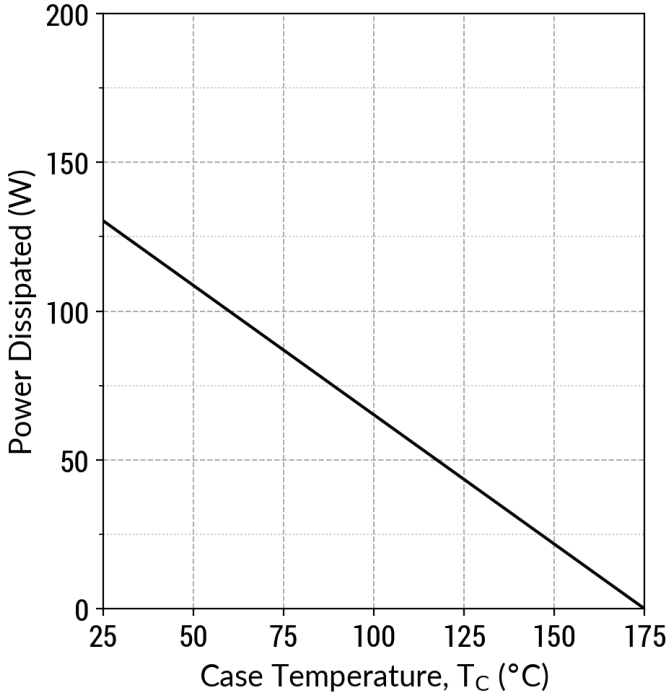
$I_F = f(V_F,T_j)$; $t_P = 250\ \mu s$

Figure 2: Typical Reverse Characteristics



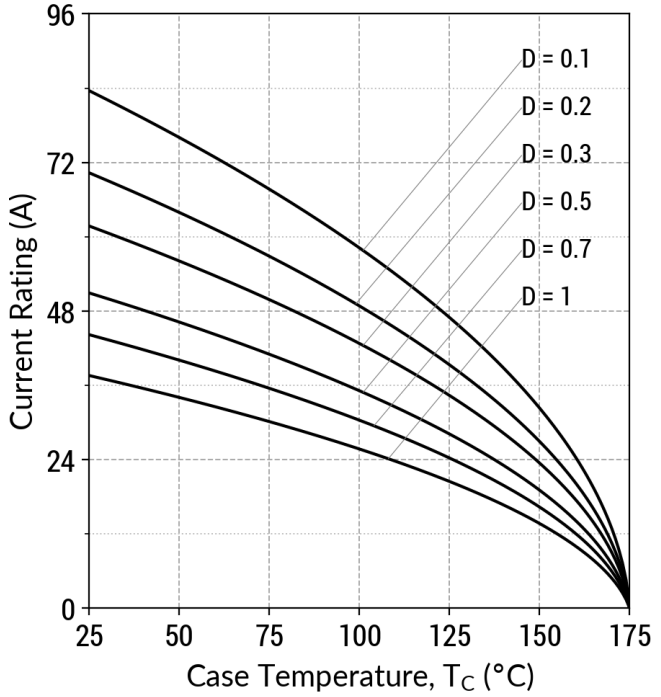
$I_R = f(V_R,T_j)$

Figure 3: Power Derating Curves



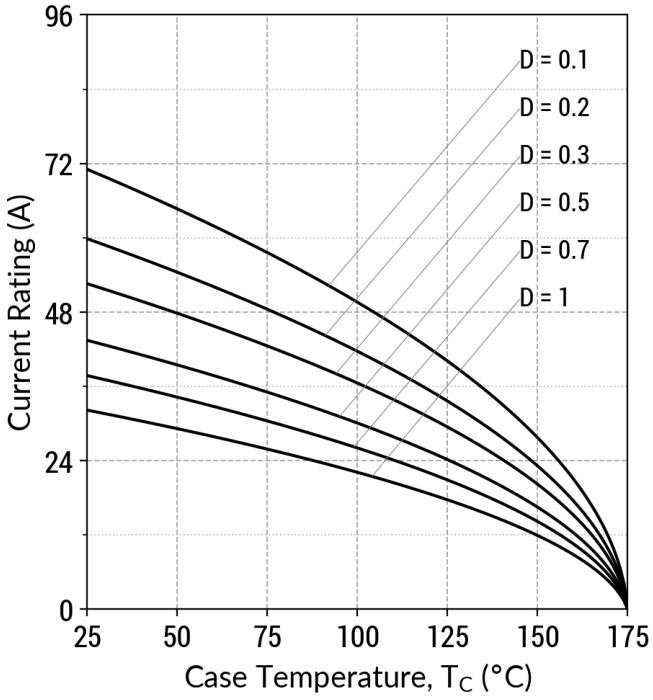
$P_{TOT} = f(T_C)$; $T_j = 175°C$

Figure 4: Current Derating Curves (Typical V_F)



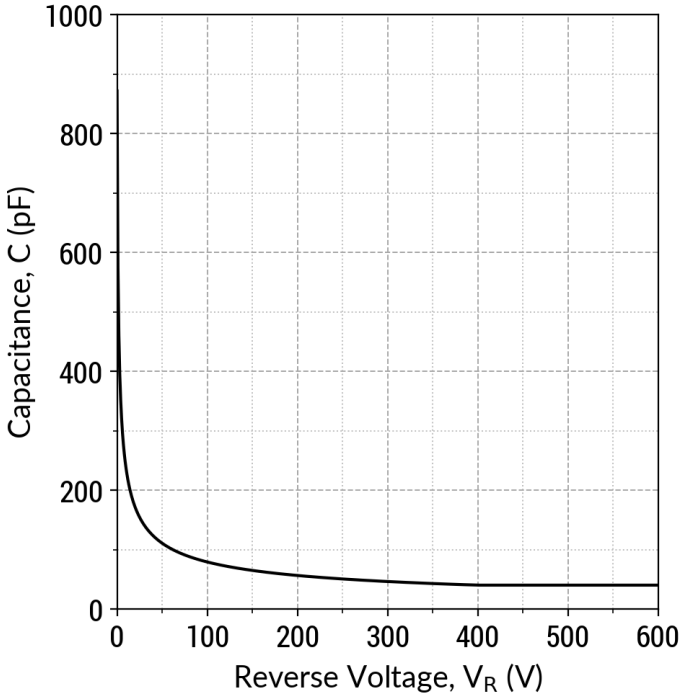
$I_F = f(T_C)$; $D = t_P/T$; $T_j \leq 175°C$; $f_{SW} > 10kHz$

Figure 5: Current Derating Curves (Maximum V_F)



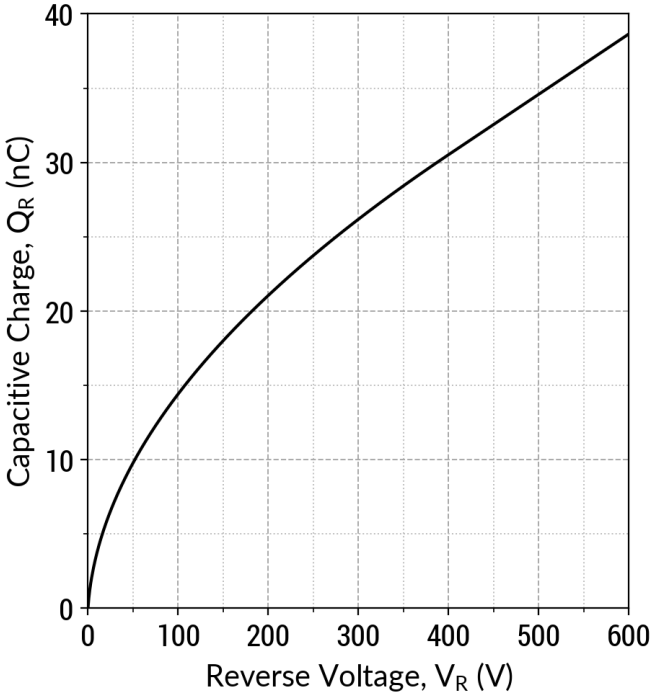
$I_F = f(T_C)$; $D = t_P/T$; $T_j \leq 175°C$; $f_{SW} > 10kHz$

Figure 6: Typical Junction Capacitance vs Reverse Voltage Characteristics



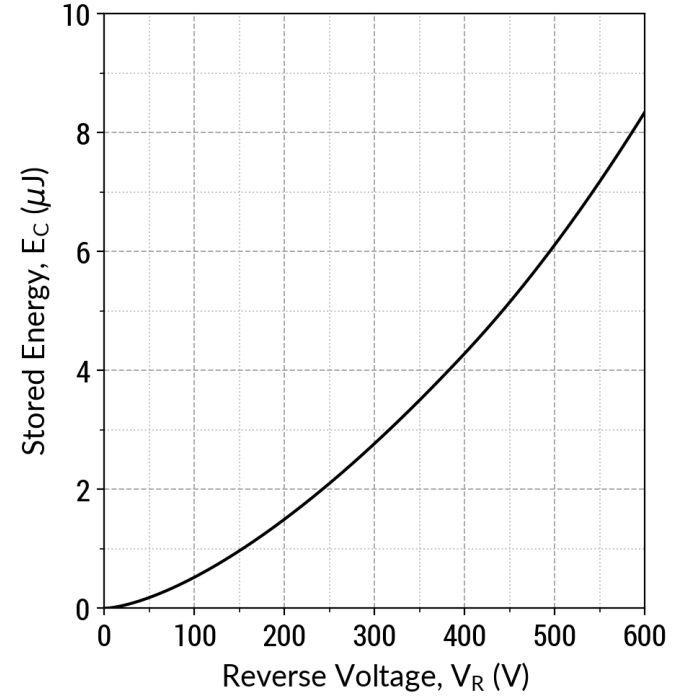
$C = f(V_R)$; $f = 1MHz$

Figure 7: Typical Capacitive Charge vs Reverse Voltage Characteristics



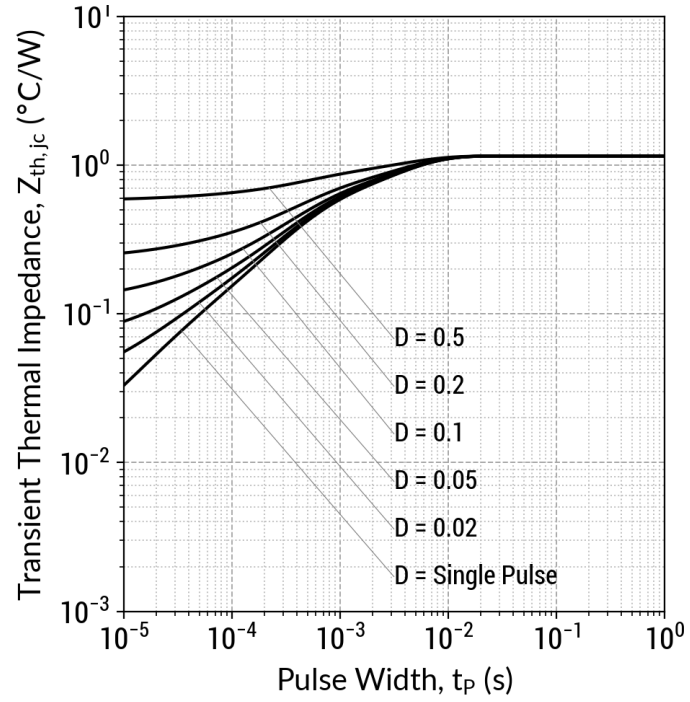
$Q_C = f(V_R)$; $f = 1MHz$

Figure 8: Typical Capacitive Energy vs Reverse Voltage Characteristics



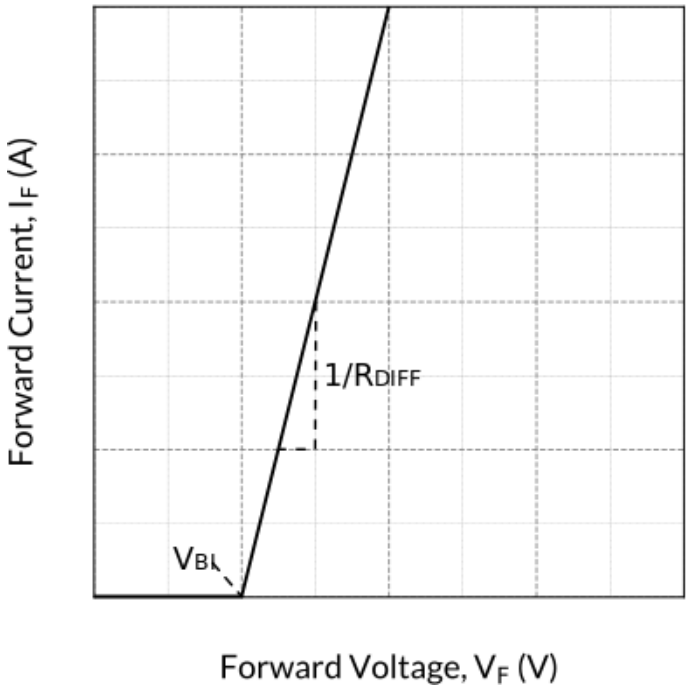
$E_C = f(V_R)$; $f = 1MHz$

Figure 9: Transient Thermal Impedance



$Z_{th,jc} = f(t_P,D)$; $D = t_P/T$

Figure 10: Forward Curve Model



$I_F = f(V_F,T_j)$

Forward Curve Model Equation:

$I_F = (V_F - V_{BI})/R_{DIFF}$ (A)

Built-In Voltage (V_{BI}):

$V_{BI}(T_j) = m \times T_j + n$ (V)

m = -0.00122 (V/°C)

n = 0.724 (V)

Differential Resistance (R_{DIFF}):

$R_{DIFF}(T_j) = a \times T_j^2 + b \times T_j + c$ (Ω)

a = 8.51e-07 (Ω/°C^2)

b = 8.51e-05 (Ω/°C)

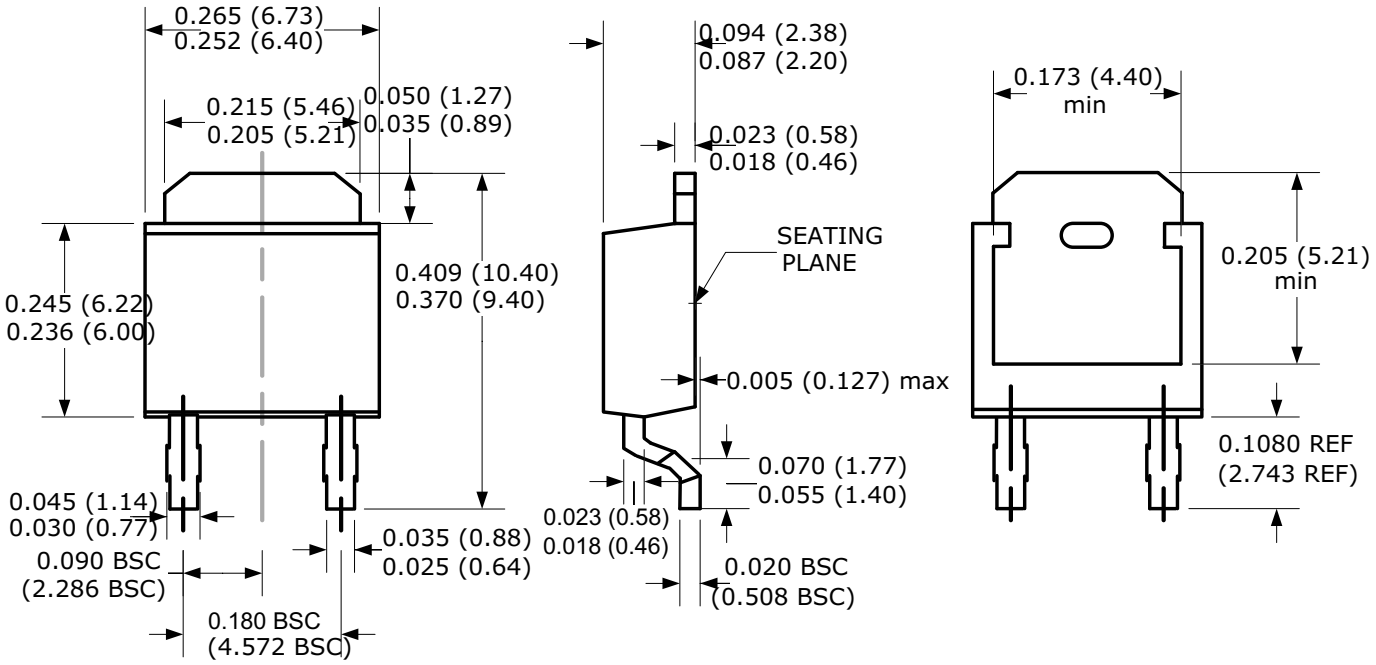
c = 0.0405 (Ω)

Forward Power Loss Equation:

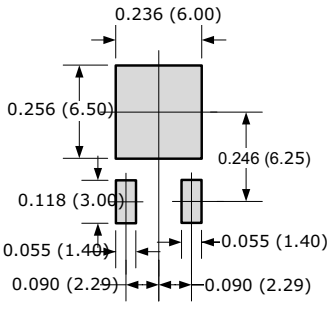
$P_{LOSS} = V_{BI}(T_j) \times I_{AVG} + R_{DIFF}(T_j) \times I_{RMS}^2$

Package Dimensions

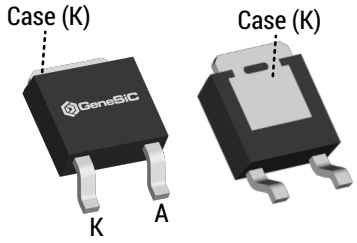
TO-252-2 Package Outline



Recommended Solder Pad Layout



Package View



NOTE

1. CONTROLLED DIMENSION IS MILLIMETER.
2. DIMENSIONS DO NOT INCLUDE END FLASH, MOLD FLASH, MATERIAL PROTRUSIONS.

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RoHS Compliance

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Revision History

- Rev 24/May: Updated with most recent data

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