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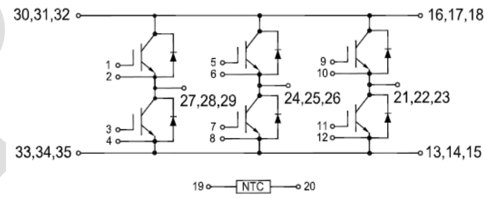
GHIS100A120T2C1

Si IGBT/ SiC SBD Hybrid Module

Features：

- Short Circuit Rated 10μs
- Low Saturation Voltage: $V_{CE\ (sat)}$ = 1.90V @ I_C =100A , T_C=25℃
- Low Switching Loss
- SiC SBD for Freewheeling diode
- 100% RBSOA Tested（2×Ic）
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement



Applications：

- Industrial Inverters
- Servo Applications

IGBT, Inverter

Maximum Rated Values (T_C=25℃Unless otherwise specified)

V_{CES}	Collector-Emitter Blocking Voltage		1200	V
V_{GES}	Gate-Emitter Voltage		±20	V
I_C	Continuous Collector Current	T_C = 80℃	100	A
		T_C = 25℃	195	A
I_{CM}	Repetitive Peak Collector Current	T_J = 175℃	200	A
t_{SC}	Short Circuit Withstand Time		>10	μs
P_D	Maximum Power Dissipation per IGBT	T_C = 25℃ T_{Jmax}=175℃	779	W

Electrical Characteristics of IGBT (T_C=25℃Unless otherwise specified)

Static characteristics

Symbol	Description	Conditions		Min	Typ	Max	Unit
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C = 4 mA, V_{CE} = V_{GE}		5.0	5.8	6.5	V
$V_{CE(sat)}$ (Terminal)	Collector-Emitter Saturation Voltage	I_C = 100A, V_{GE} = 15V	T_J = 25℃		2.00	2.30	V
			T_J = 125℃		2.35		V
			T_J = 150℃		2.40		V
$V_{CE(sat)}$ (Chip)	Collector-Emitter Saturation Voltage	I_C = 100A, V_{GE} = 15V	T_J = 25℃		1.90	2.10	V
			T_J = 125℃		2.20		V
			T_J = 150℃		2.20		V
I_{CES}	Collector-Emitter Leakage Current	V_{GE} = 0V, V_{CE} = V_{CES}, T_J = 25℃				1	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE} = ±20V, V_{CE} = 0V, T_J = 25℃				400	nA
C_{ies}	Input Capacitance	V_{CE} = 25V, V_{GE} = 0V , f =1MHz			13.7		nF
C_{oes}	Output capacitance				0.78		nF

Switching Characteristics

Symbol	Description	Conditions		Min	Typ	Max	Unit
$t_{d(on)}$	Turn-on Delay Time	V_{CC} =600V,I_C = 100A, R_G = 5Ω,V_{GE} = ±15V, Inductive Load	T_J = 25℃		328		ns
			T_J = 125℃		298		
			T_J = 150℃		297		
t_r	Rise Time		T_J = 25℃		75		ns
			T_J = 125℃		72		
			T_J = 150℃		75		
$t_{d(off)}$	Turn-off Delay Time		T_J = 25℃		337		ns
			T_J = 125℃		340		
			T_J = 150℃		343		
t_f	Fall Time		T_J = 25℃		160		ns
			T_J = 125℃		202		
			T_J = 150℃		337		

E_{on}	Turn-on Switching Loss	V_{CC} =600V,I_C = 100A, R_G = 5Ω,V_{GE} = ±15V, Inductive Load	T_J = 25℃		3.2		mJ
			T_J = 125℃		3.4		
			T_J = 150℃		3.4		
E_{off}	Turn-off Switching Loss		T_J = 25℃		4.1		mJ
			T_J = 125℃		6.7		
			T_J = 150℃		7.6		
Q_g	Total Gate Charge		T_J = 25℃		1144		nC
RBSOA	Reverse Bias Safe Operation Area	I_C=200A,V_{CC}=1050V,Vp=1200V, Rg = 5Ω, V_{GE}=+15V to 0V, T_J =150℃		Trapezoid			
SCSOA	Short Circuit Safe Operation Area	V_{CC} = 600V, V_{GE} = 15V, T_J = 150℃		10			μs
$R_{\theta JC}$	IGBT Thermal Resistance: Junction-To-Case				0.192		℃/W

Maximum Rated Values of SiC Diode (T_C=25℃ unless otherwise specified)

Symbol	Description	Conditions	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	T_j=25 °C	1200	V
I_F	Diode Continuous Forward Current	T_C=25 °C, T_j=175 °C	94	A
$I_{F,SM}$	Surge Non-repetitive Forward Current	T_C=25 °C, t_p=8.3 ms sine half wave	240	A
dv/dt	Diode dv/dt Ruggedness	Turn-on slew rate, repetitive	50	V/ns

Electrical Characteristics of Diode (T_C=25℃ unless otherwise specified)

Symbol	Description	Conditions		Min	Typ	Max	Unit
V_R	DC Blocking Voltage	I_R=100 uA		1200			V
V_F(Terminal)	Forward Voltage	I_F = 100A, V_{GE} = 0V	T_J = 25℃		1.6	1.8	V
			T_J = 125℃		2.0		
			T_J = 150℃		2.2		
V_F(Chip)	Forward Voltage	I_F = 100A, V_{GE} = 0V	T_J = 25℃		1.6	1.8	V
			T_J = 125℃		2.0		
			T_J = 150℃		2.2		

I_R	Reverse leakage Current	V_R=1200V	T_J = 25℃		5.0	500	μA
		V_R=1200V	T_J = 175℃		170	1000	
Q_C	Total Capacitive Charge	V_R=1200V	T_J = 25℃		129		nC
C	Total Capacitance	V_R=1V, f=1 MHz			1905		pF
		V_R=600V, f=1 MHz			111		
		V_R=1200V, f=1 MHz			108		
$R_{\theta JC}$	Diode Thermal Resistance: Junction-To-Case				0.405		℃/W

Internal NTC-Thermistor Characteristic

R_{25}	T_C =25℃	5		kΩ
△R/R	T_C =100℃，R_{100} =481Ω		±5	%
P_{25}	T_C =25℃	50		mW
$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$	3380		K
$B_{25/80}$	$R_2=R_{25}\exp[B_{25/80}(1/T_2-1/(298.15K))]$	3440		K

Module

Symbol	Description	Conditions	Min	Typ	Max	Unit
V_{iso}	Isolation Voltage(All Terminals Shorted)	f = 50Hz, 1 minute	2500			V
T_J	Maximum Junction Temperature				175	℃
T_{JOP}	Maximum Operating Junction Temperature Range		-40		+150	℃
T_{stg}	Storage Temperature		-40		+125	℃
$R_{\theta CS}$	Case-To-Sink (Conductive Grease Applied)			0.02		℃/W
T	Mounting Screw:M5		4.0		6.0	N·m
G	Weight			300		g

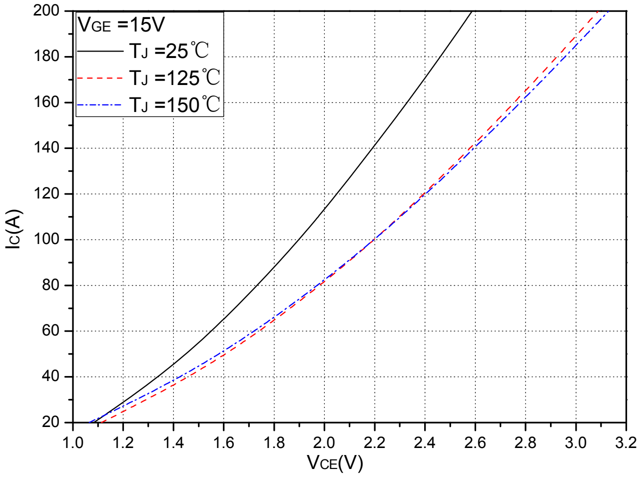


Fig.1Typical Saturation Voltage Characteristics(chip)

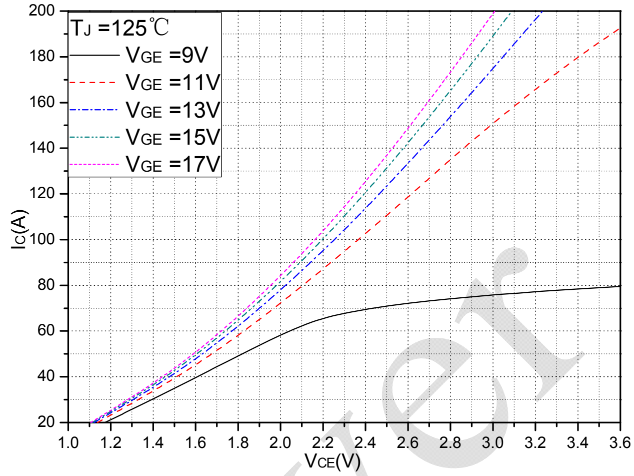


Fig.2 Typical Output Characteristics (chip)

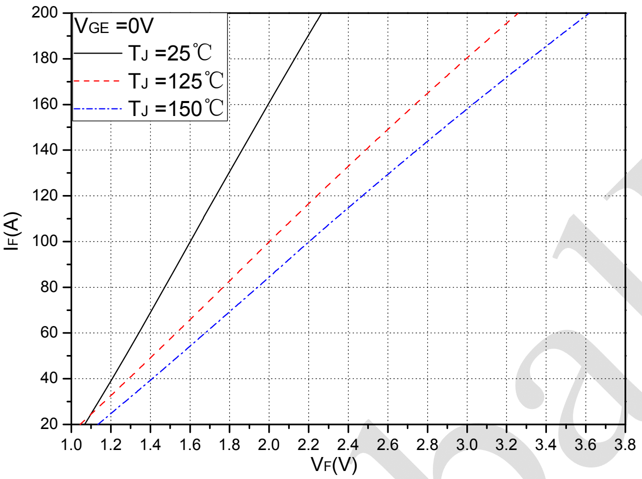


Fig.3 Forward Characteristics of SiC FWD（chip）

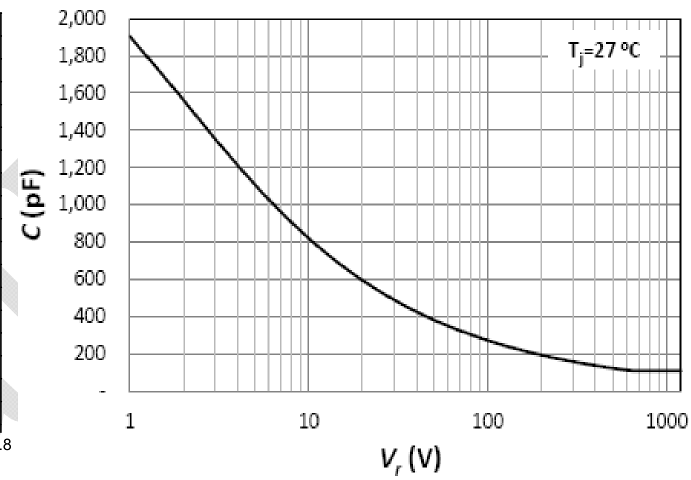


Fig.4 Capacitance Characteristics of SiC FWD (Chip)

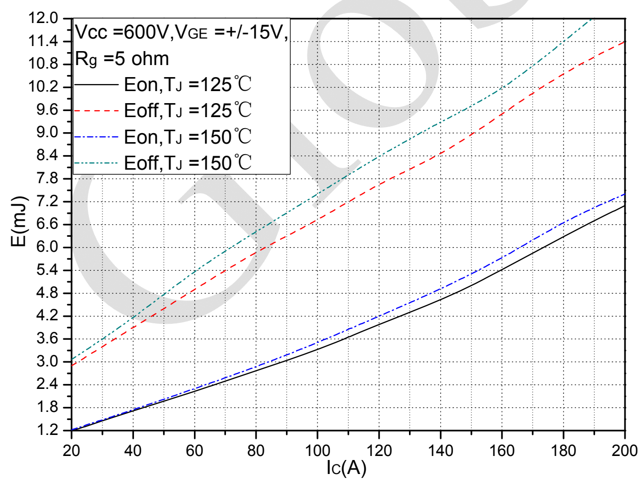


Fig.5Typical Switching Loss vs. Collector Current

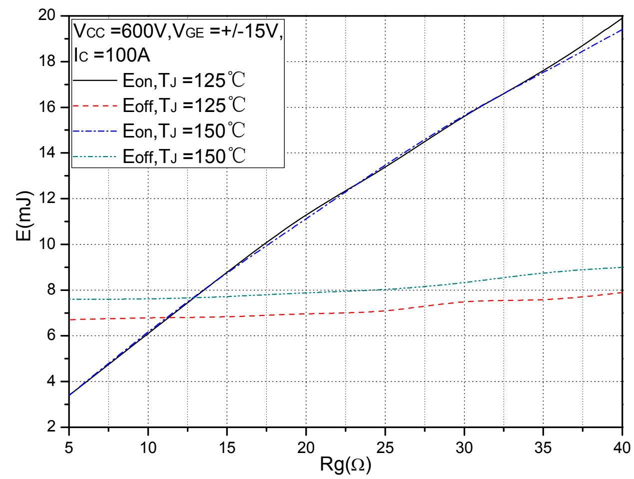


Fig.6Typical Switching Losses vs. Gate Resistance

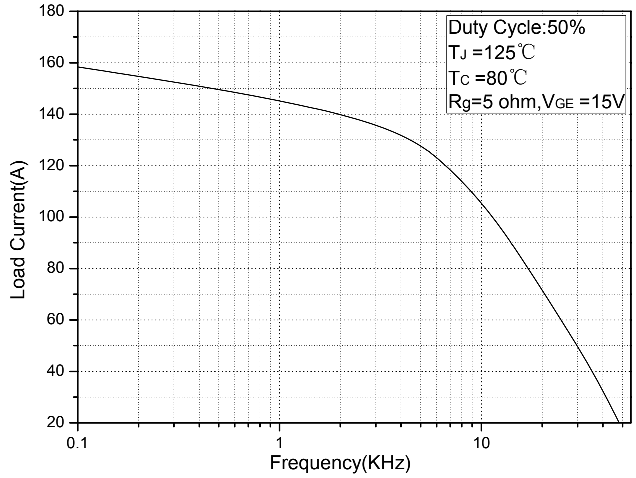


Fig.7Typical Load Current vs. Frequency

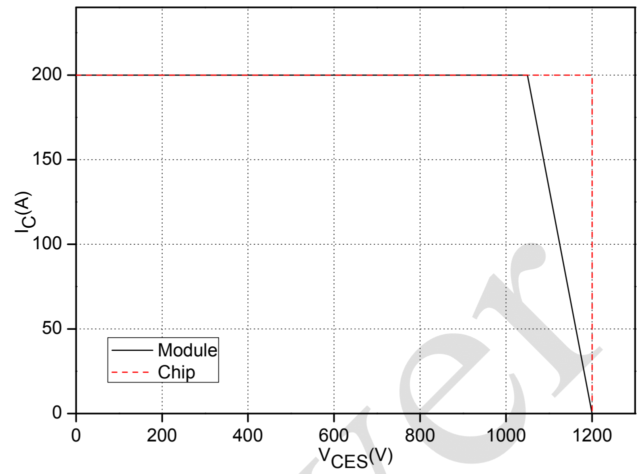


Fig.8 Reverse Bias Safe Operation Area (RBSOA)

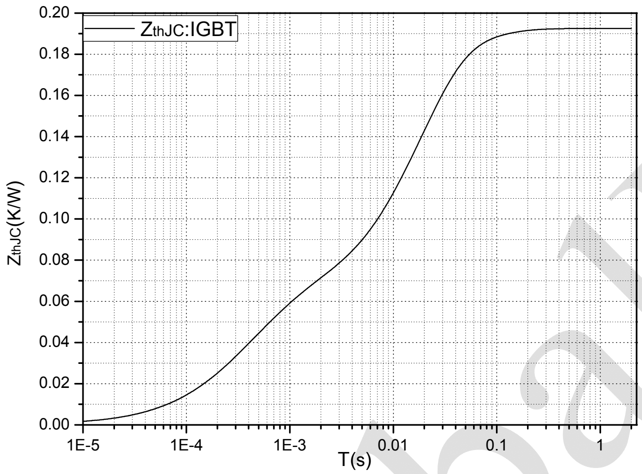


Fig.9Transient thermal impedance (IGBT)

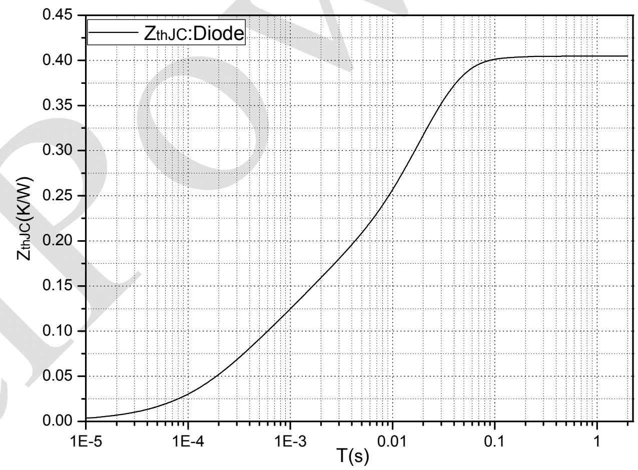


Fig.10Transient thermal impedance (Diode)

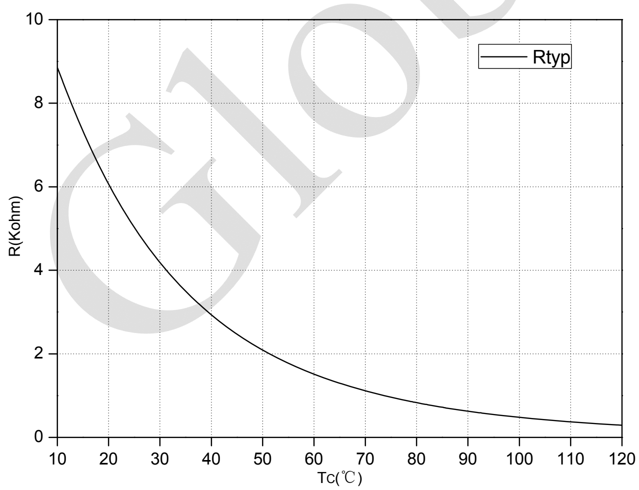


Fig.11 NTC Temperature characteristics

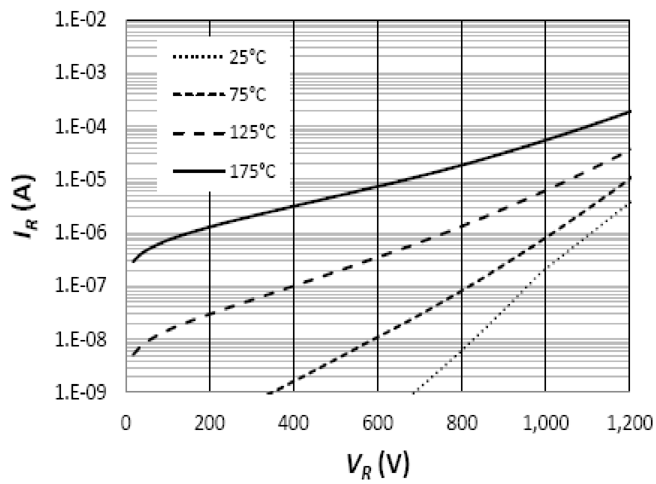
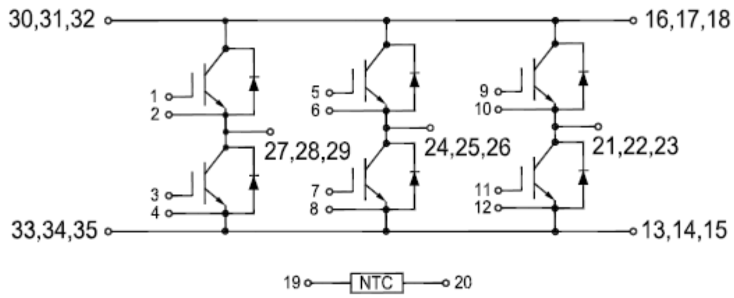
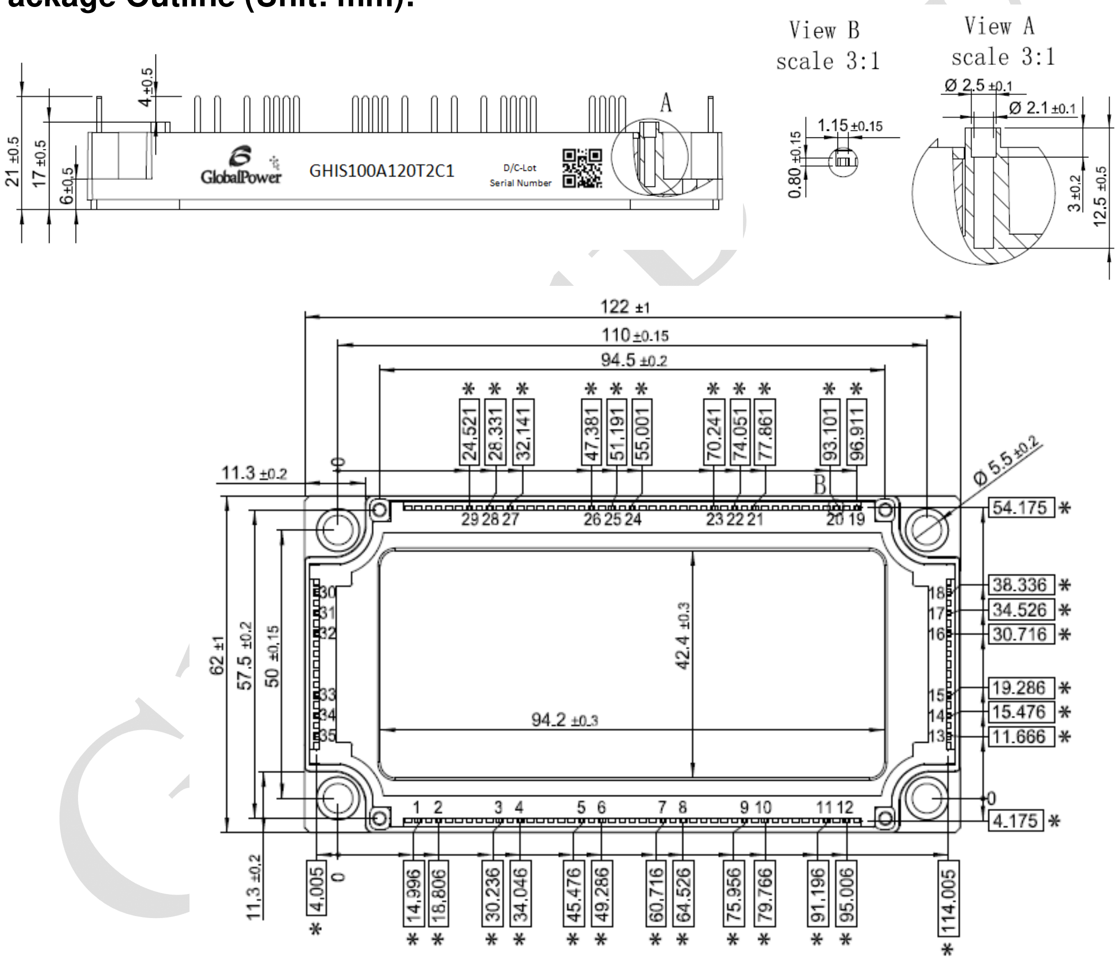


Fig. 12 Diode Leakage Current (Parameterized on T_j)(chip)

Internal Circuit:



Package Outline (Unit: mm):



*=all dimensions with tolerance of ⊕ Ø 0.5

Revision History

Date	Revision	Notes
02/04/2016	1.0	Initial release

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Notes

- **RoHS Compliance**
  The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2011/65/EC (RoHS2), as implemented March, 2013. RoHS Declarations for this product can be obtained from the Product Documentation sections of www.gptechgroup.com.

- **REACh Compliance**
  REACh substances of high concern (SVHCs) information is available for this product. Since the European Chemical Agency (ECHA) has published notice of their intent to frequently revise the SVHC listing for the foreseeable future, please contact our office at GPTG Headquarters in Lake Forest, California to insure you get the most up-to-date REACh SVHC Declaration.
  REACh banned substance information (REACh Article 67) is also available upon request.

- This product has not been designed or tested for use in, and is not intended for use in, applications implanted into the human body nor in applications in which failure of the product could lead to death, personal injury or property damage, including but not limited to equipment used in the operation of nuclear facilities, life-support machines, cardiac defibrillators or similar emergency medical equipment, aircraft navigation or communication or control systems, or air traffic control.

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