

GHIS100A120T2C1

Si IGBT/ SiC SBD Hybrid Module



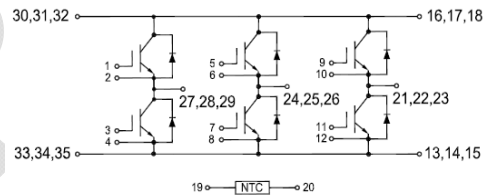
Features:

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



Applications:

- Industrial Inverters
- Servo Applications



IGBT, Inverter

Maximum Rated Values ($T_C = 25^\circ C$ Unless otherwise specified)

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

Electrical Characteristics of IGBT ($T_C=25^\circ\text{C}$ Unless otherwise specified)

Static characteristics

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

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	$V_{CC} = 600\text{V}, I_C = 100\text{A}, R_G = 5\Omega, V_{GE} = \pm 15\text{V},$ Inductive Load	$T_J = 25^\circ\text{C}$	328		ns
			$T_J = 125^\circ\text{C}$	298		
			$T_J = 150^\circ\text{C}$	297		
t_r	Rise Time		$T_J = 25^\circ\text{C}$	75		ns
			$T_J = 125^\circ\text{C}$	72		
			$T_J = 150^\circ\text{C}$	75		
$t_{d(off)}$	Turn-off Delay Time		$T_J = 25^\circ\text{C}$	337		ns
			$T_J = 125^\circ\text{C}$	340		
			$T_J = 150^\circ\text{C}$	343		
t_f	Fall Time	$T_J = 25^\circ\text{C}$	160		ns	
		$T_J = 125^\circ\text{C}$	202			
		$T_J = 150^\circ\text{C}$	337			

E _{on}	Turn-on Switching Loss	V _{CC} = 600V, I _C = 100A, R _G = 5Ω, V _{GE} = ±15V, Inductive Load	T _J = 25°C		3.2		mJ
			T _J = 125°C		3.4		
			T _J = 150°C		3.4		
E _{off}	Turn-off Switching Loss		T _J = 25°C		4.1		mJ
			T _J = 125°C		6.7		
			T _J = 150°C		7.6		
Q _g	Total Gate Charge		T _J = 25°C		1144		nC
RBSOA	Reverse Bias Safe Operation Area	I _C = 200A, V _{CC} = 1050V, V _p = 1200V, R _G = 5Ω, V _{GE} = +15V to 0V, T _J = 150°C		Trapezoid			
SCSOA	Short Circuit Safe Operation Area	V _{CC} = 600V, V _{GE} = 15V, T _J = 150°C		10			μs
R _{θJC}	IGBT Thermal Resistance: Junction-To-Case				0.192		°C/W

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

Symbol	Description	Conditions	Min	Typ	Max	Unit
V _R	DC Blocking Voltage	I _R = 100 μA	1200			V
V _F (Terminal)	Forward Voltage	I _F = 100A, V _{GE} = 0V	T _J = 25°C	1.6	1.8	V
			T _J = 125°C	2.0		
			T _J = 150°C	2.2		
V _F (Chip)	Forward Voltage	I _F = 100A, V _{GE} = 0V	T _J = 25°C	1.6	1.8	V
			T _J = 125°C	2.0		
			T _J = 150°C	2.2		

I _R	Reverse leakage Current	V _R =1200V	T _J = 25°C	5.0	500	μA
		V _R =1200V	T _J = 175°C	170	1000	
Q _C	Total Capacitive Charge	V _R =1200V	T _J = 25°C	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 _{θJC}	Diode Thermal Resistance: Junction-To-Case			0.405		°C/W

Internal NTC-Thermistor Characteristic

R ₂₅	T _C =25°C	5		kΩ
ΔR/R	T _C =100°C, R ₁₀₀ =481Ω		±5	%
P ₂₅	T _C =25°C	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	°C
T _{JOP}	Maximum Operating Junction Temperature Range		-40		+150	°C
T _{stg}	Storage Temperature		-40		+125	°C
R _{θCS}	Case-To-Sink (Conductive Grease Applied)			0.02		°C/W
T	Mounting Screw:M5		4.0		6.0	N·m
G	Weight			300		g

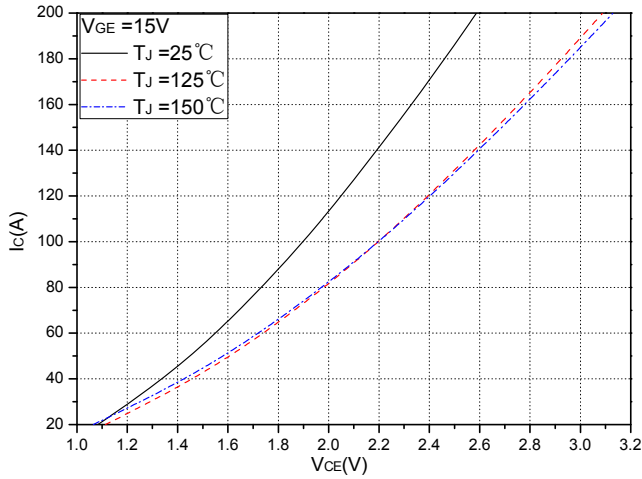


Fig.1 Typical Saturation Voltage Characteristics (chip)

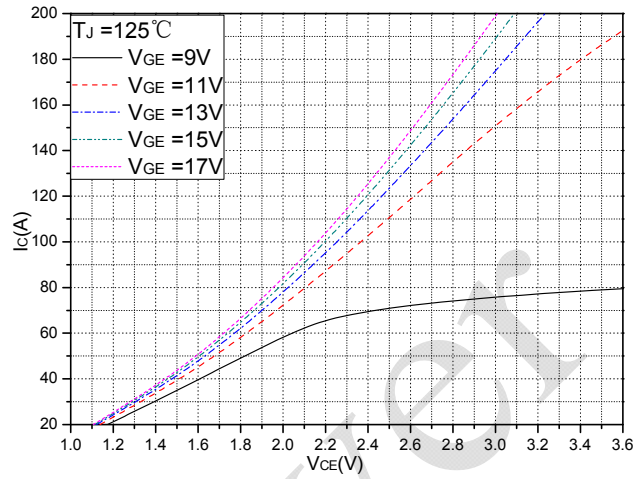


Fig.2 Typical Output Characteristics (chip)

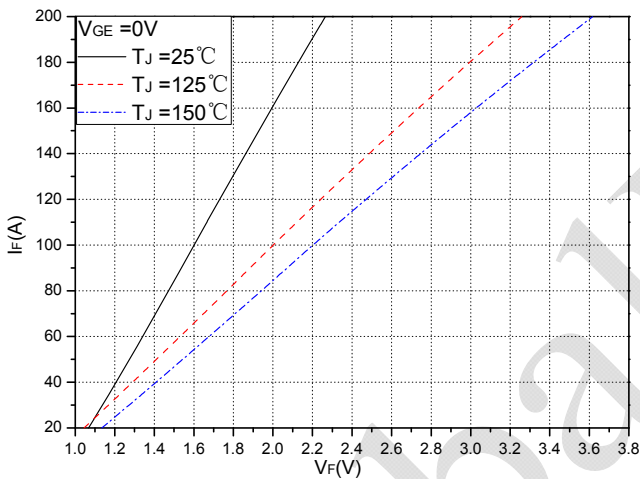


Fig.3 Forward Characteristics of SiC FWD (chip)

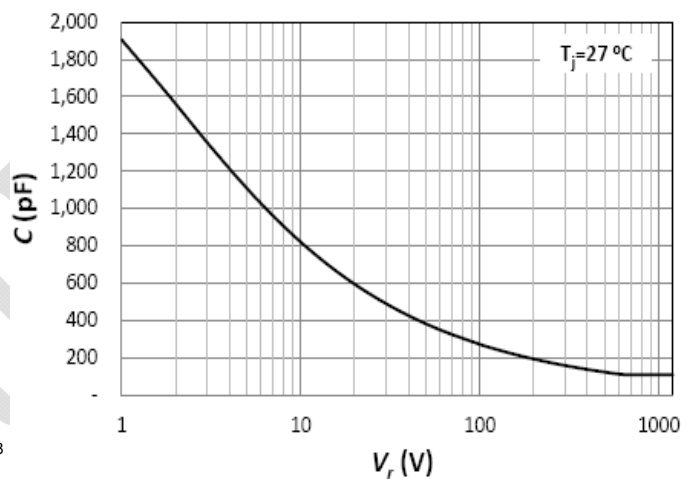


Fig.4 Capacitance Characteristics of SiC FWD (Chip)

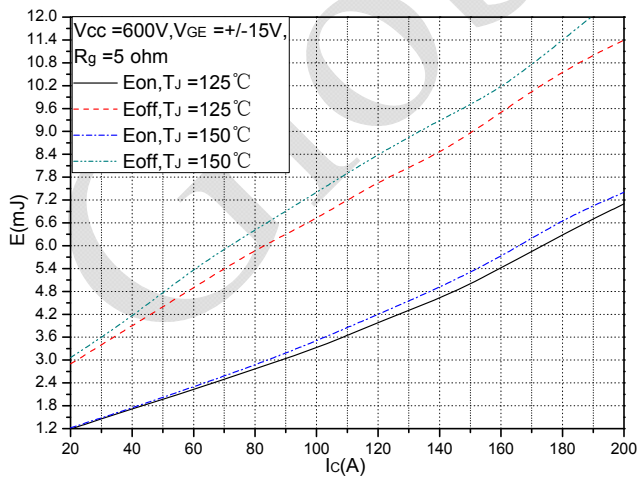


Fig.5 Typical Switching Loss vs. Collector Current

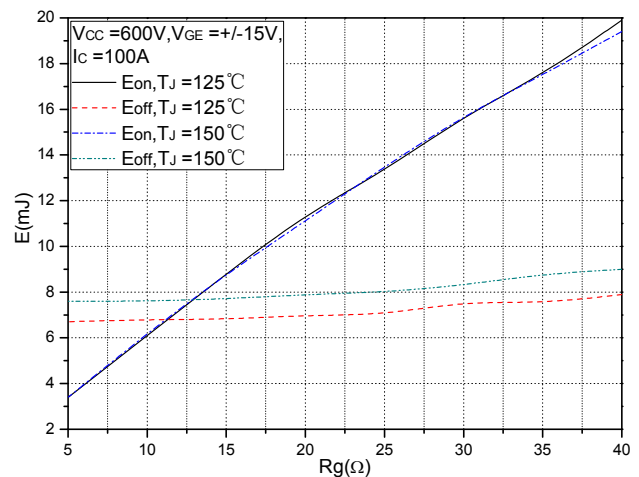


Fig.6 Typical Switching Losses vs. Gate Resistance

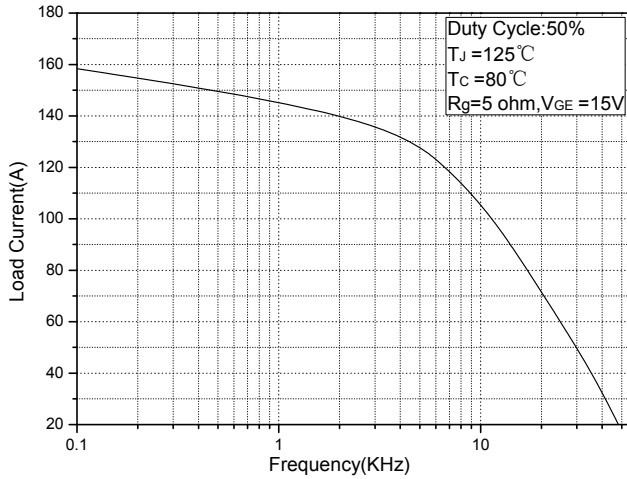


Fig.7 Typical Load Current vs. Frequency

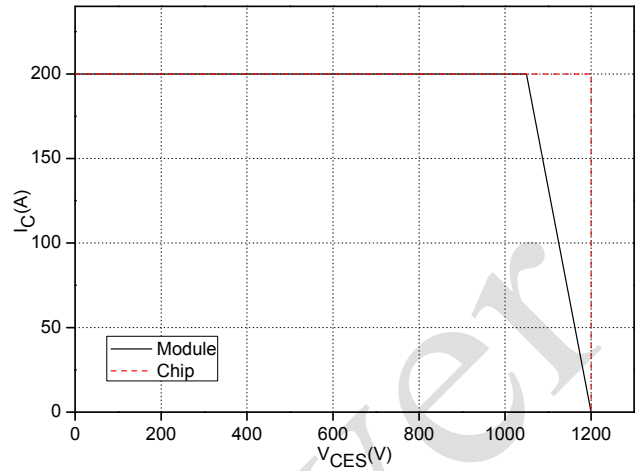


Fig.8 Reverse Bias Safe Operation Area (RBSOA)

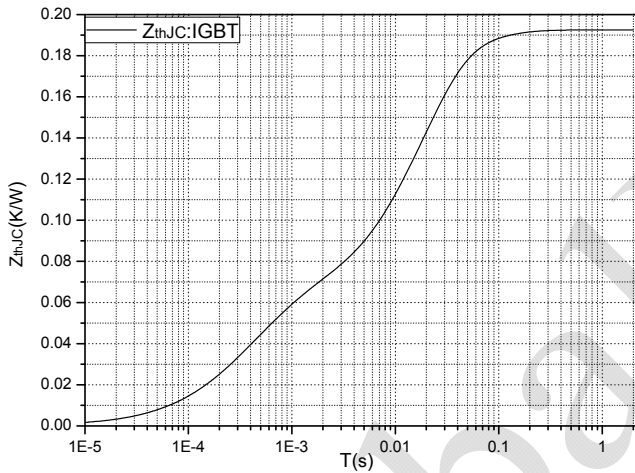


Fig.9 Transient thermal impedance (IGBT)

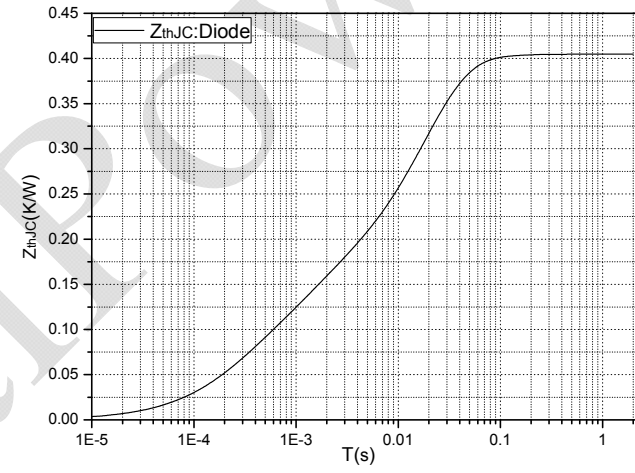


Fig.10 Transient thermal impedance (Diode)

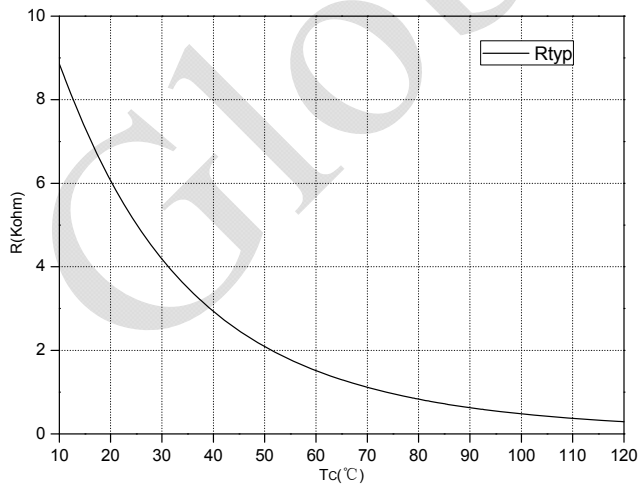


Fig.11 NTC Temperature characteristics

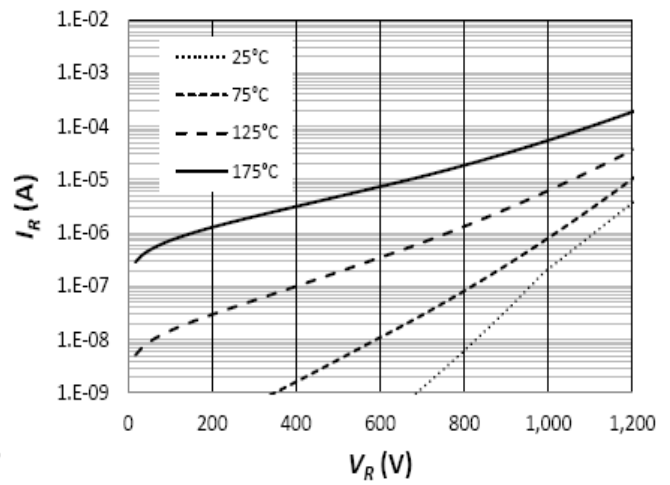
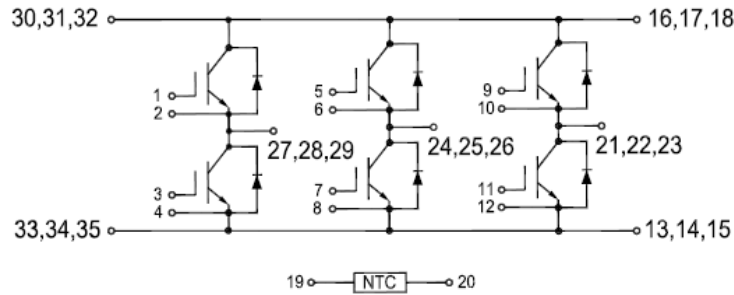
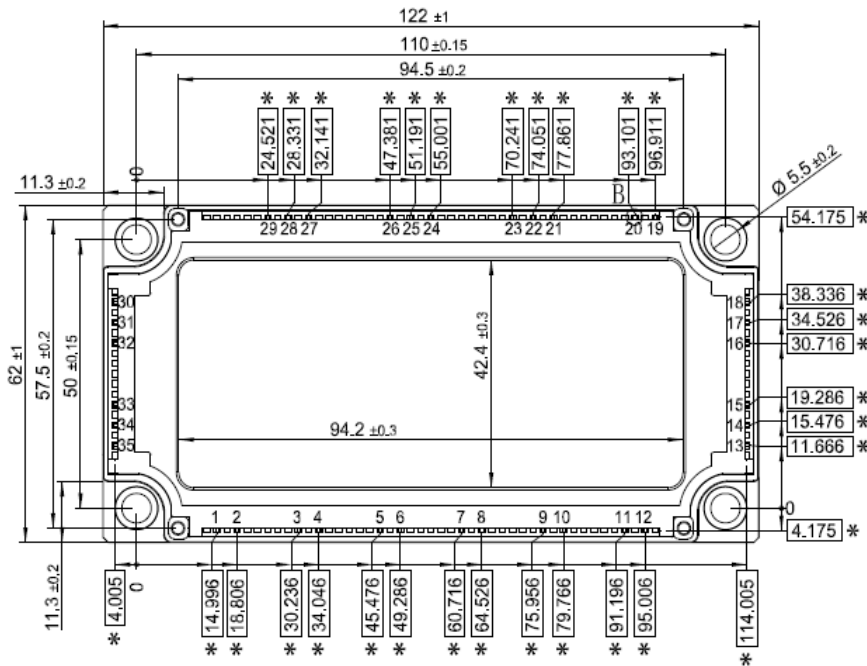
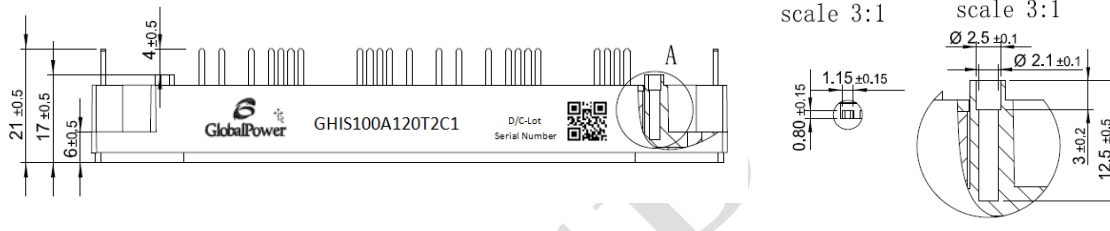


Fig.12 Diode Leakage Current (Parameterized on T_j)(chip)

Internal Circuit:



Package Outline (Unit: mm):



*=all dimensions with tolerance of ± 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.
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