



E502650

## Features

- Low  $V_{CE(sat)}$  With SPT+ Technology
- $V_{CE(sat)}$  With Positive Temperature Coefficient
- Including Fast & Soft Recovery Anti-parallel FWD
- High Short Circuit Capability(10us)
- Low Inductance Module Structure
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

## Applications

- Inverter for Motor Drive
- AC and DC Servo Driver Amplifier
- UPS(Uninterruptible Power Supplies)
- Soft Switching Welding Machine

## Maximum Ratings

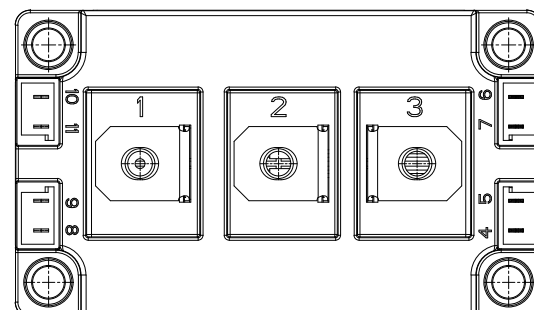
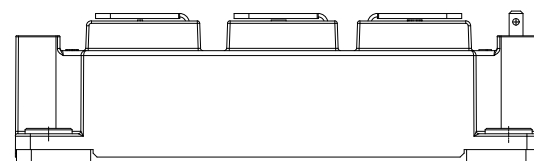
- Maximum Junction Temperature : 175°C
- Operating Junction Temperature Range : -40°C to +150°C
- Storage Temperature Range: -40°C to +125°C
- IGBT Thermal Resistance: 0.065 K/W Junction to Case
- Diode Thermal Resistance: 0.13 K/W Junction to Case
- Type Conductive Grease Applied Thermal Resistance: 0.033K/W Junction to Case-To-Sink

Parameter		Symbol	Rating	Unit
Collector-Emitter Voltage@ $V_{GE}=0V, I_C=1mA, T_{vj}=25^{\circ}C$		$V_{CES}$	1200	V
Continuous Collector Current @ $T_C=100^{\circ}C$		$I_C$	450	A
Peak Collector Current @ $T_p=1ms$		$I_{CRM}$	900	A
Gate-Emitter Voltage@ $T_{vj}=25^{\circ}C$		$V_{GE}$	$\pm 20$	V
Isolation Voltage @ $f=50Hz, t=1min$		$V_{iso}$	2500(Min)	V
Weight of Module		G	315	g
Module Electrodes Torque:M5		$M_t$	3~5	N*m
Module-to-Sink Torque :M6		$M_S$	3~5	N*m
Total Power Dissipation (IGBT-Inverter)	$T_C=25^{\circ}C$	$P_{tot}$	2307	W
	$T_{vjmax}=175^{\circ}C$			

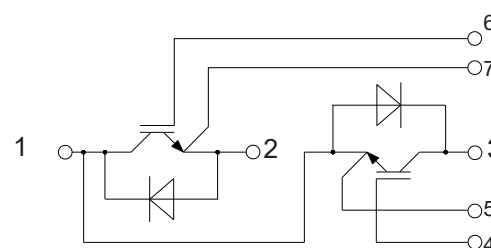
# IGBT Modules

## 1200V 450A

C2



Circuit Diagram



**Electrical Characteristics of IGBT @ 25°C (Unless Otherwise Specified)**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}, I_C=12mA, T_{vj}=25^{\circ}C$	5.2	5.8	6.4	V
Collector-Emitter Cut-off Current	$I_{CES}$	$V_{CE}=1200V, V_{GE}=0V, T_{vj}=25^{\circ}C$			1.0	mA
		$V_{CE}=1200V, V_{GE}=0V, T_{vj}=125^{\circ}C$			5	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=450A, T_{vj}=25^{\circ}C$		1.90	2.35	V
		$V_{GE}=15V, I_C=450A, T_{vj}=125^{\circ}C$		2.30		
Gate Charge	$Q_G$			3.62		uC
Input Capacitance	$C_{ies}$	$V_{CE}=25V, V_{GE}=0V, f=1MHz,$ $T_{vj}=25^{\circ}C$		25		nF
Reverse Transfer Capacitance	$C_{res}$			1.1		
Internal Gate Resistance	$R_{gint}$			0.7		$\Omega$
Gate Emitter Leakage Current	$I_{GES}$	$V_{CE}=0V, V_{GE}=20V, T_{vj}=25^{\circ}C$			400	nA
Turn-On Delay Time	$t_{d(on)}$	$V_{CE}=600V,$ $I_C=450A,$ $V_{GE}=\pm 15V,$ $R_G=1.8\Omega,$ $T_{vj}=25^{\circ}C$		161		ns
Rise Time	$t_r$			52		
Turn-Off Delay Time	$t_{d(off)}$			502		
Fall Time	$T_f$			96		
Energy Dissipation During Turn-on Time	$E_{on}$			23.2		mJ
Energy Dissipation During Turn-off Time	$E_{off}$			28.5		
Turn-On Delay Time	$t_{d(on)}$	$V_{CE}=600V,$ $I_C=450A,$ $V_{GE}=\pm 15V,$ $R_G=1.8\Omega,$ $T_{vj}=125^{\circ}C$		192		ns
Rise Time	$t_r$			63		
Turn-Off Delay Time	$t_{d(off)}$			536		
Fall Time	$T_f$			135		
Energy Dissipation During Turn-on Time	$E_{on}$			31.5		mJ
Energy Dissipation During Turn-off Time	$E_{off}$			44.3		
SC data	$I_{SC}$	$T_P \leq 10us, V_{GE}=15V,$ $T_{vj}=150^{\circ}C, V_{CC}=600, V_{CEM} \leq 1200V$		1800		A

**Electrical Characteristics of DIODE @ 25°C (Unless Otherwise Specified)**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Diode DC Forward Current	$I_F$	$T_C=100^\circ\text{C}$		450		A
Diode Peak Forward Current	$I_{FRM}$	$I_{FRM}=2I_F$		900		A
Forward Voltage	$V_F$	$I_F=450\text{A}, T_{vj}=25^\circ\text{C}$		2.1		V
		$I_F=450\text{A}, T_{vj}=125^\circ\text{C}$		2.15		
Recovered Charge	$Q_{rr}$	$V_R=600\text{V}, I_F=450\text{A},$ $-di_F/dt=6500\text{A/us},$ $T_{vj}=25^\circ\text{C}$		45		$\mu\text{C}$
Peak Reverse Recovery Current	$I_{rr}$			383		A
Reverse Recovery Energy	$E_{rec}$			21.2		mJ
Recovered Charge	$Q_{rr}$	$V_R=600\text{V}, I_F=450\text{A},$ $-di_F/dt=9000\text{A/us},$ $T_{vj}=125^\circ\text{C}$		86		$\mu\text{C}$
Peak Reverse Recovery Current	$I_{rr}$			453		A
Reverse Recovery Energy	$E_{rec}$			37.2		mJ

**Curve Characteristics**

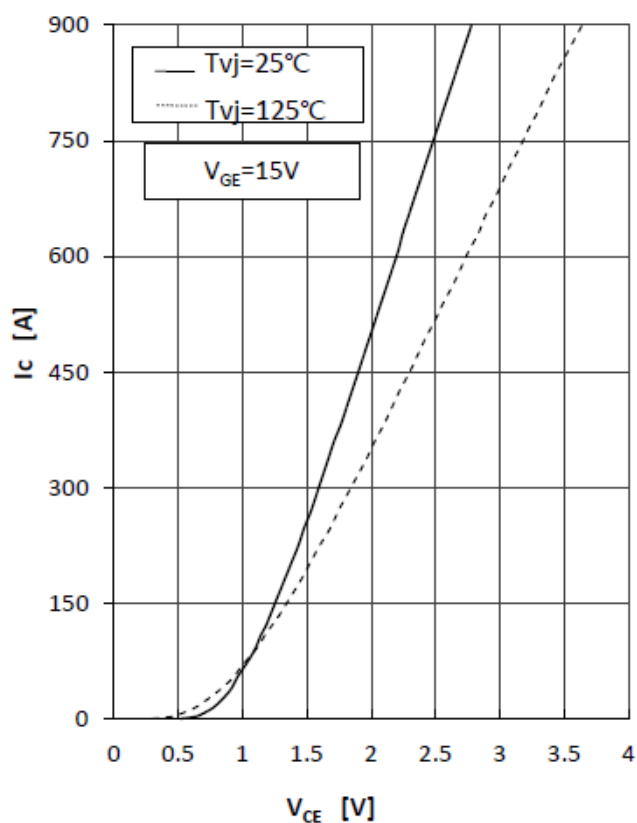


Fig1.IGBT Output Characteristics

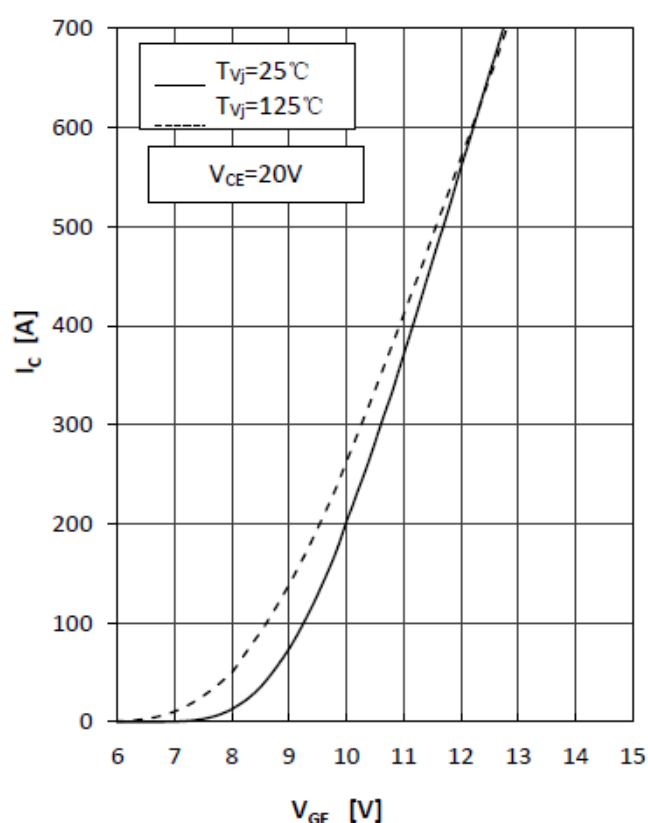


Fig2.IGBT Transfer Characteristics

## Curve Characteristics

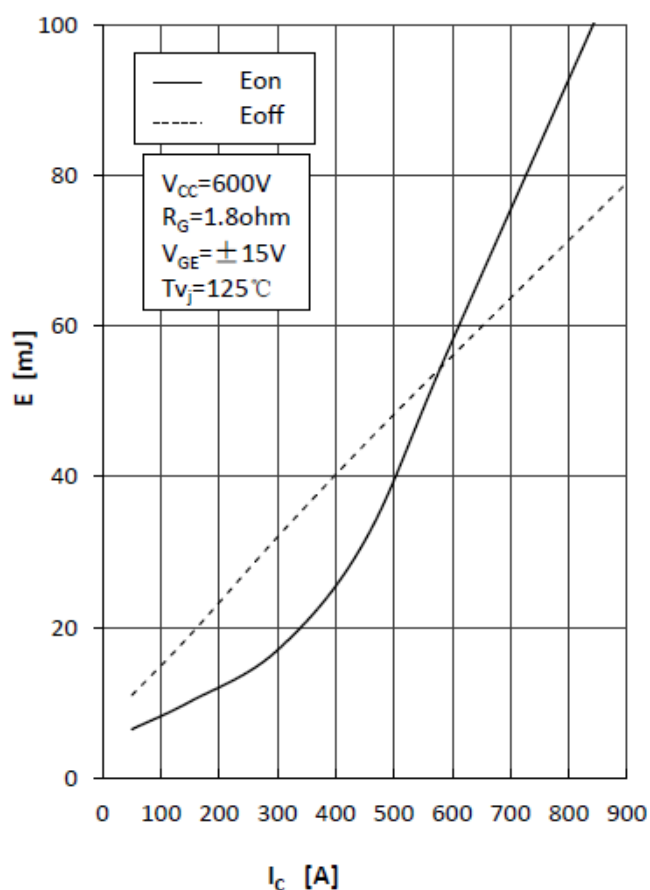


Fig3.IGBT Switching Loss vs.Ic

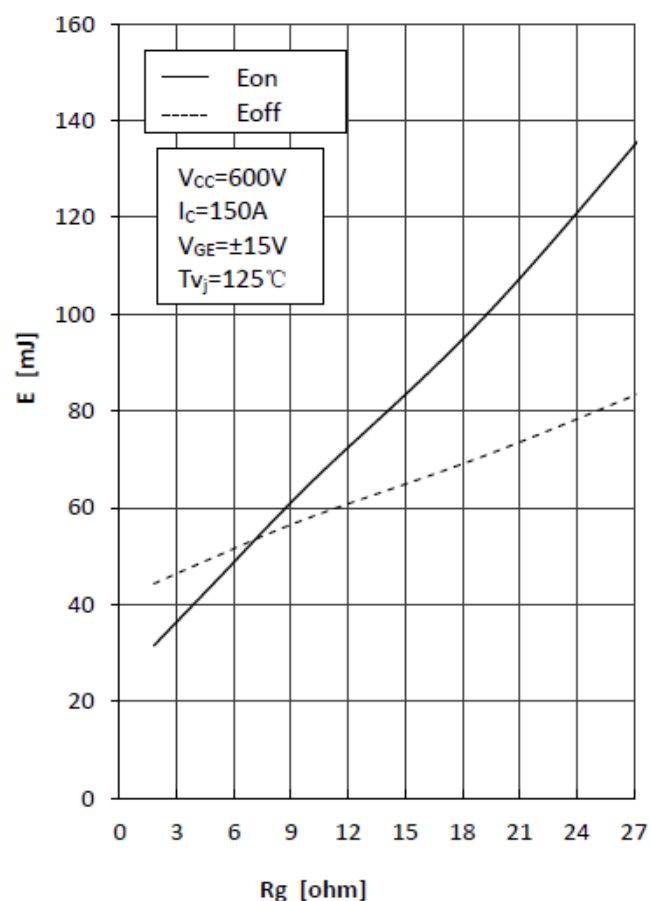


Fig4.IGBT Switching Loss vs.Rg

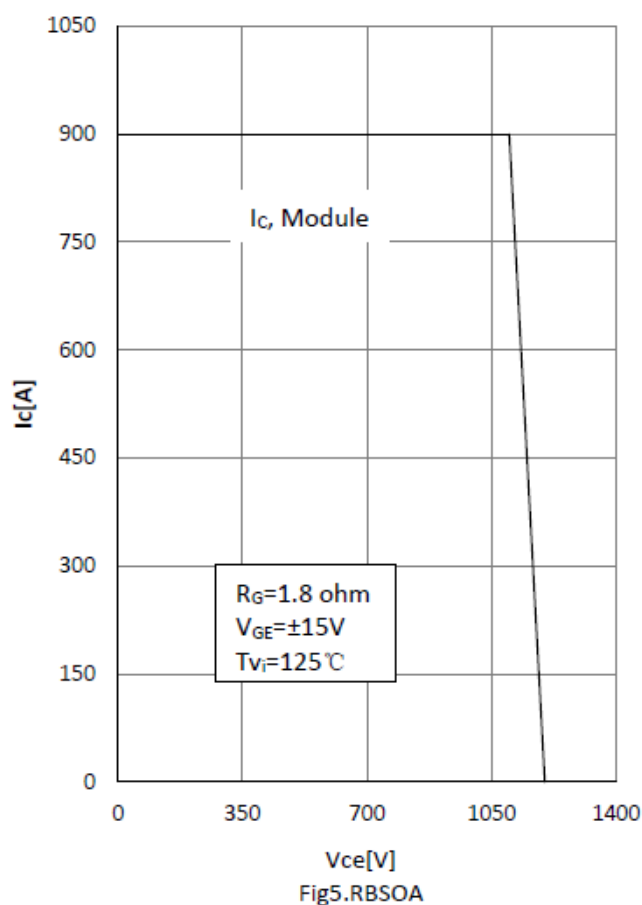


Fig5.RBSOA

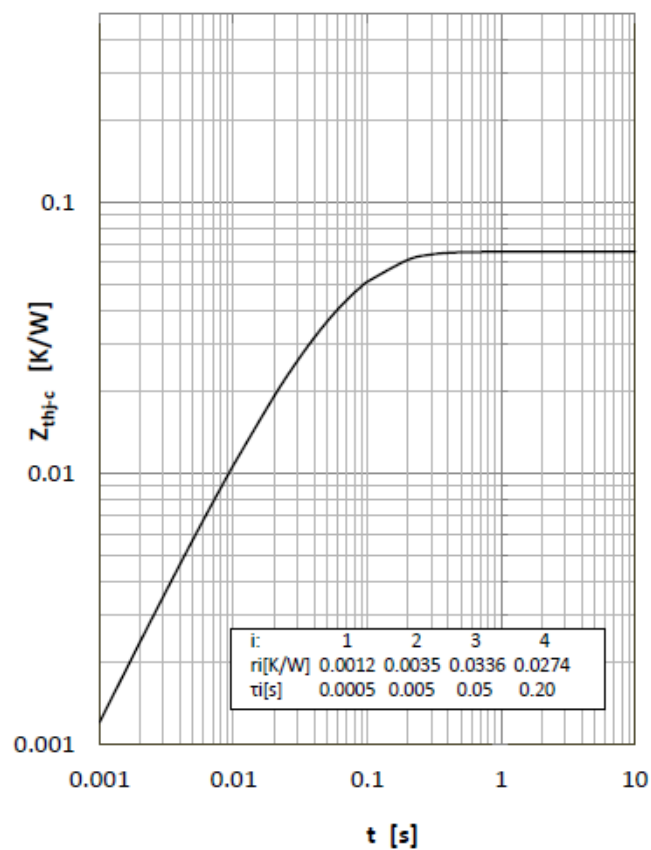


Fig 6. IGBT Transient Thermal Impedance

## Curve Characteristics

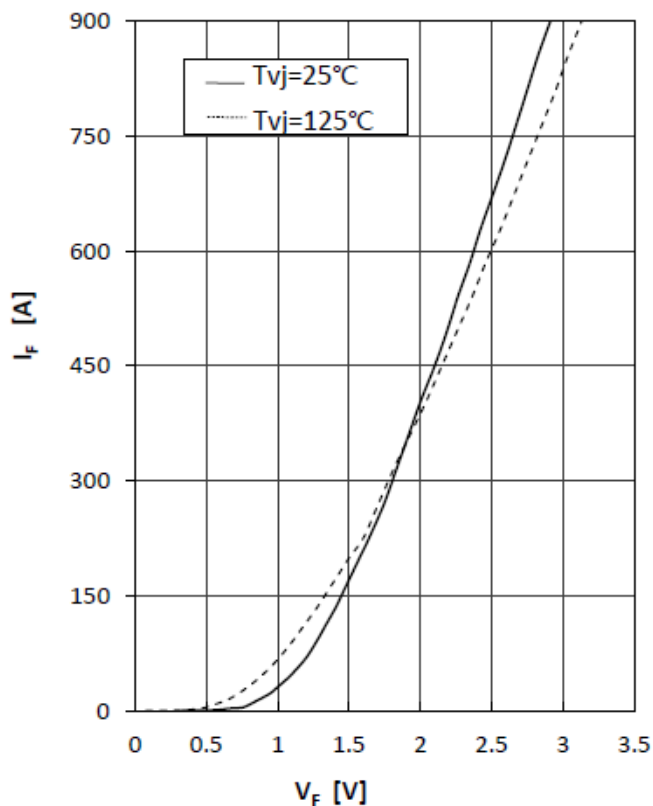


Fig7.Diode Foward Characteristics

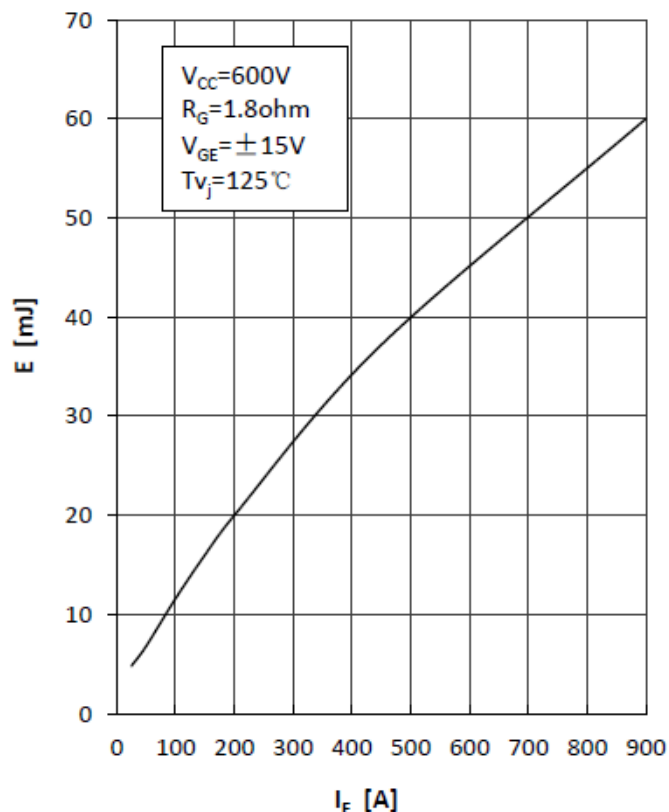


Fig8.Diode Switching Loss(Erec) vs.  $I_F$

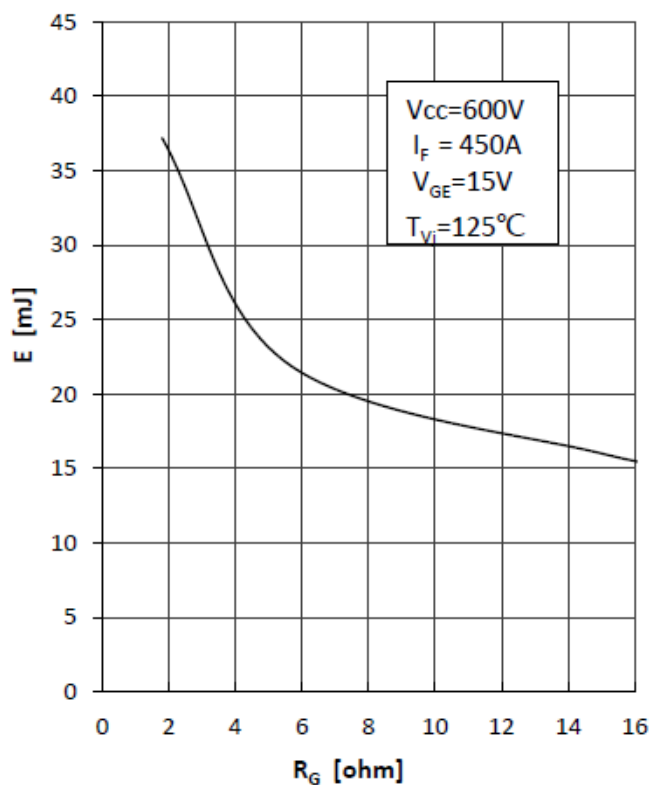


Fig9.Diode Switching Loss(Erec) vs.  $R_G$

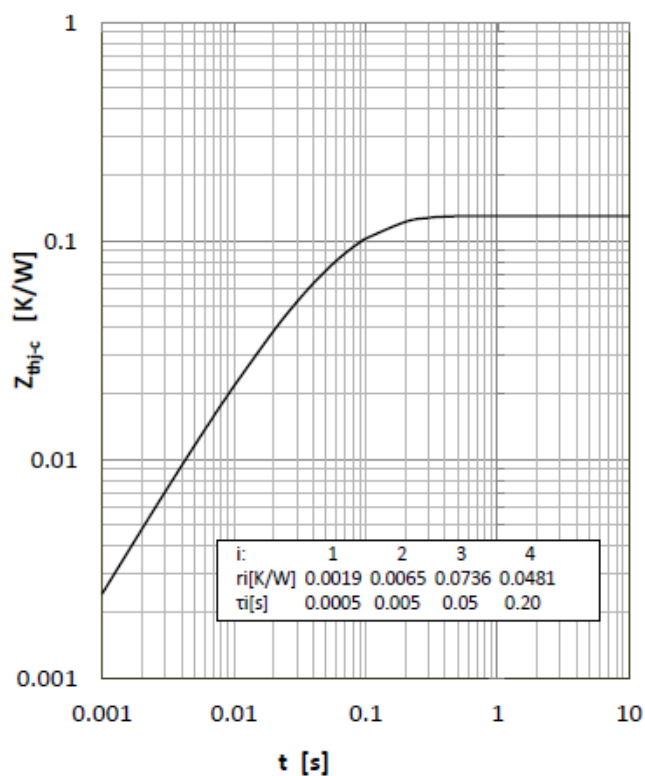
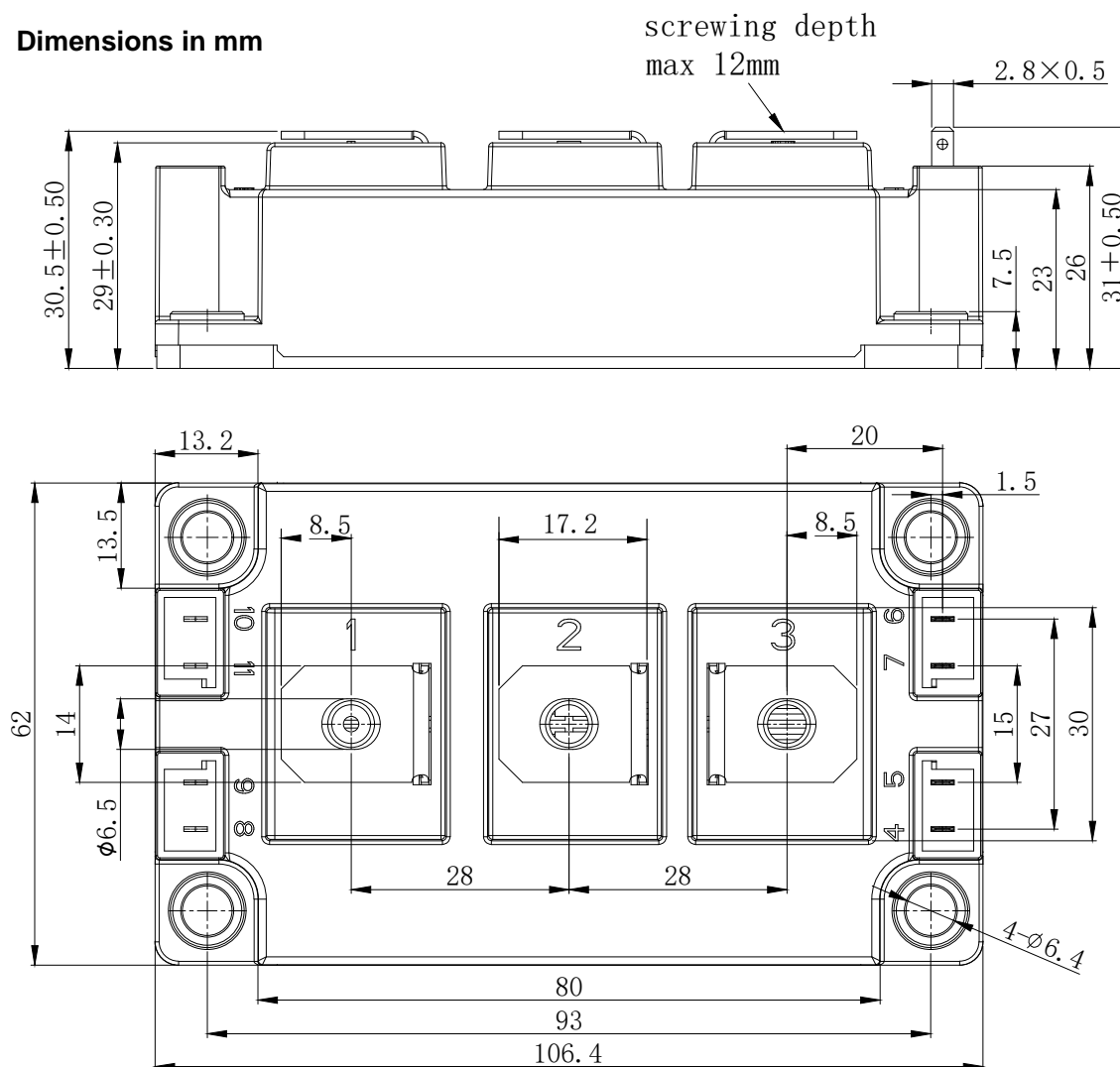


Fig10.Diode Transient Thermal Impedance

## Package Dimensions

# C2

Dimensions in mm



## Ordering Information

Device	Packing
Part Number-BP	Bulk: 6pcs/Box ; 30pcs/Ctn

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