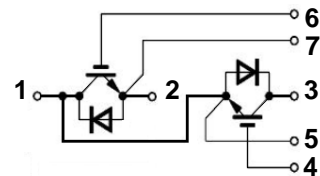


### General Description

TRinno IGBT power module provides low conduction and switching losses as well as short circuit ruggedness. It is designed for applications such as Motor Driver, IH , Rectifier and Welder.

### Features

- 1200V NPT Trench IGBT Technology
- Fast & Soft Recovery Diodes
- Positive Temperature Coefficient
- Short Circuit Withstanding Time : 10 $\mu$ s



### Applications

Motor driver, IH(Induction heating), Rectifier, Welder

### Absolute Maximum Ratings

Parameter	Symbol	Value	Unit	
Collector-Emitter Voltage	$V_{CES}$	1200	V	
Gate-Emitter Voltage	$V_{GES}$	$\pm 20$	V	
Continuous Collector Current	$I_C$	$T_C = 25\text{ }^\circ\text{C}$	600	A
		$T_C = 100\text{ }^\circ\text{C}$	300	A
Pulsed Collector Current (Note 1)	$I_{CM}$	600	A	
Diode Continuous Forward Current	$I_F$	300	A	
Power Dissipation	$P_D$	$T_C = 25\text{ }^\circ\text{C}$	1389	W
		$T_C = 100\text{ }^\circ\text{C}$	556	W
Operating Junction Temperature	$T_{vj}$	-40 ~ 150	$^\circ\text{C}$	
Storage Temperature Range	$T_{STG}$	-40 ~ 150	$^\circ\text{C}$	

Notes :

(1) Repetitive rating : Pulse width limited by maximum junction temperature

### Thermal Characteristics

Parameter	Symbol	Value	Unit
Typical Thermal resistance, Junction-to-Case (Per 1/2 Module)	$R_{\theta JC}$ (IGBT)	0.09	K/W
Typical Thermal resistance, Junction-to-Case (Per 1/2 Module)	$R_{\theta JC}$ (DIODE)	0.15	K/W

### Electrical Characteristics of the IGBT $T_{vj}=25^{\circ}\text{C}$ , unless otherwise noted

Parameter	Symbol	Test condition	Min.	Typ.	Max.	Unit
<b>OFF</b>						
Collector – Emitter Breakdown Voltage	$BV_{CES}$	$V_{GE} = 0V, I_C = 1mA$	1200	--	--	V
Zero Gate Voltage Collector Current	$I_{CES}$	$V_{CE} = 1200V, V_{GE} = 0V$	--	--	2	mA
Gate – Emitter Leakage Current	$I_{GES}$	$V_{CE} = 0V, V_{GE} = \pm 20V$	--	--	$\pm 200$	nA
<b>ON</b>						
Gate – Emitter Threshold Voltage	$V_{GE(TH)}$	$V_{GE} = V_{CE}, I_C = 250\mu A$	4.0	--	7.5	V
		$V_{GE} = V_{CE}, I_C = 300mA$	5.0	--	8.5	V
Collector – Emitter Saturation Voltage	$V_{CE(SAT)}$	$V_{GE} = 15V, I_C = 300A, T_{vj} = 25^{\circ}\text{C}$	--	2.30	2.80	V
		$V_{GE} = 15V, I_C = 300A, T_{vj} = 125^{\circ}\text{C}$	--	2.40	3.10	V
<b>DYNAMIC</b>						
Internal Gate Resistor	$R_{Gint}$	$T_{vj} = 25^{\circ}\text{C}$	--	3.3	--	$\Omega$
Input Capacitance	$C_{IES}$	$V_{CE} = 25V,$ $V_{GE} = 0V$ $f = 1MHz$	--	35	--	nF
Output Capacitance	$C_{OES}$		--	2170	--	pF
Reverse Transfer Capacitance	$C_{RES}$		--	1025	--	pF
<b>SWITCHING</b>						
Turn-On Delay Time	$t_{d(on)}$	$V_{CC} = 600V, I_C = 300A$ $R_{Gext} = 2\Omega, V_{GE} = \pm 15V$ Inductive Load, $T_{vj} = 25^{\circ}\text{C}$	--	375	--	ns
Rise Time	$t_r$		--	120	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	620	--	ns
Fall Time	$t_f$		--	80	--	ns
Turn-On Switching Loss	$E_{ON}$		--	11.6	--	mJ
Turn-Off Switching Loss	$E_{OFF}$		--	16.9	--	mJ
Total Switching Loss	$E_{TS}$		--	28.5	--	mJ
Turn-On Delay Time	$t_{d(on)}$	$V_{CC} = 600V, I_C = 300A$ $R_{Gext} = 2\Omega, V_{GE} = \pm 15V$ Inductive Load, $T_{vj} = 125^{\circ}\text{C}$	--	500	--	ns
Rise Time	$t_r$		--	140	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	950	--	ns
Fall Time	$t_f$		--	90	--	ns
Turn-On Switching Loss	$E_{ON}$		--	21.7	--	mJ
Turn-Off Switching Loss	$E_{OFF}$		--	20.7	--	mJ
Total Switching Loss	$E_{TS}$		--	44.5	--	mJ
Total Gate Charge	$Q_g$	$V_{CC} = 600V, I_C = 300A$ $V_{GE} = 15V$	--	2540	--	nC
Gate-Emitter Charge	$Q_{ge}$		--	440	--	nC
Gate-Collector Charge	$Q_{gc}$		--	1140	--	nC
Short Circuit Withstanding Time	$t_{sc}$	$V_{CC} = 600V, V_{GE} = 15V, T_{vj} = 125^{\circ}\text{C}$	10	--	--	$\mu s$

**Electrical Characteristics of the DIODE**  $T_{vj}=25^{\circ}\text{C}$ , unless otherwise noted

Parameter	Symbol	Test condition	Min.	Typ.	Max.	Unit	
Diode Forward Voltage	$V_{FM}$	$I_F = 300\text{A}$	$T_{vj} = 25^{\circ}\text{C}$	--	1.70	2.50	V
			$T_{vj} = 125^{\circ}\text{C}$	--	1.70	2.50	
Reverse Recovery Current	$I_{rr}$	$V_{CC} = 600\text{V}, I_F = 300\text{A}$ $R_{Gext} = 2\Omega, V_{GE} = \pm 15\text{V}$ Inductive Load	$T_{vj} = 25^{\circ}\text{C}$	--	135	--	A
			$T_{vj} = 125^{\circ}\text{C}$	--	183	--	
Reverse Recovery Charge	$Q_{rr}$	$V_{CC} = 600\text{V}, I_F = 300\text{A}$ $R_{Gext} = 2\Omega, V_{GE} = \pm 15\text{V}$ Inductive Load	$T_{vj} = 25^{\circ}\text{C}$	--	10.5	--	$\mu\text{C}$
			$T_{vj} = 125^{\circ}\text{C}$	--	12.9	--	
Reverse Recovery Time	$t_{rr}$	$V_{CC} = 600\text{V}, I_F = 300\text{A}$ $R_{Gext} = 2\Omega, V_{GE} = \pm 15\text{V}$ Inductive Load	$T_{vj} = 25^{\circ}\text{C}$	--	115	--	ns
			$T_{vj} = 125^{\circ}\text{C}$	--	140	--	

**Characteristics of the Module**

Parameter	Symbol	Test condition	Min.	Typ.	Max.	Unit
Isolation Voltage	$V_{ISO}$	RMS, $f=50\text{Hz}$ , $t=1$ minutes	--	2.5	--	kV
Terminal mounting torque (M5)	--		--	3.5	--	N.m
Weight	--		--	290	--	g

# IGBT Characteristics

Fig. 1 Output characteristics

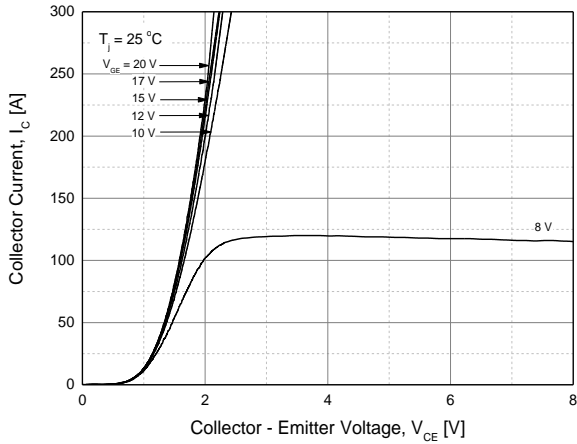


Fig. 2 Saturation voltage characteristics

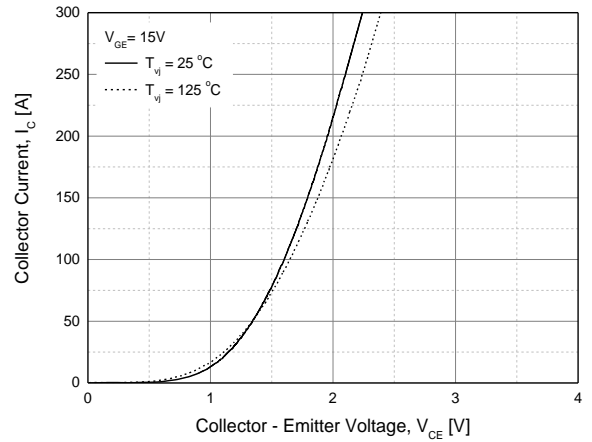


Fig. 3 Turn-on time vs. gate resistor

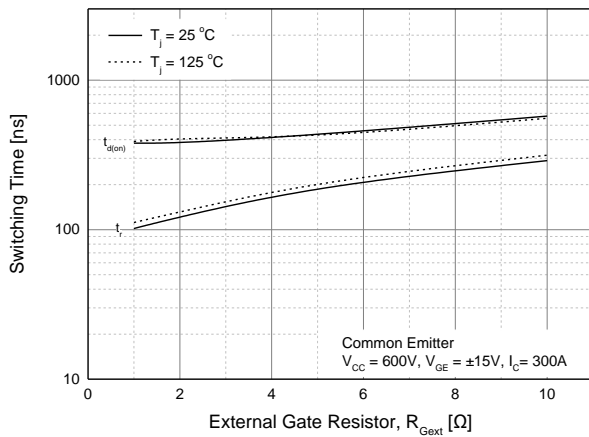


Fig. 4 Turn-off time vs. gate resistor

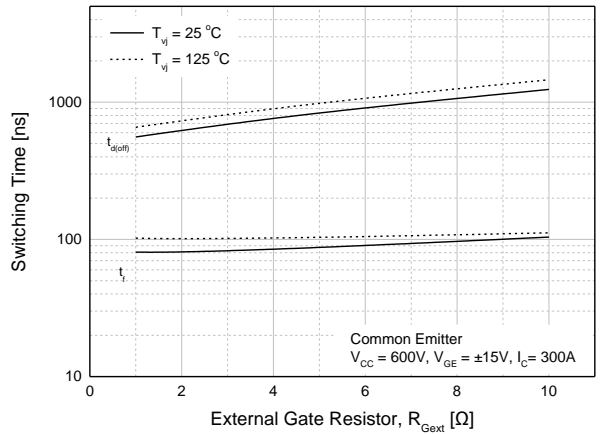


Fig. 5 Switching loss vs. gate resistor

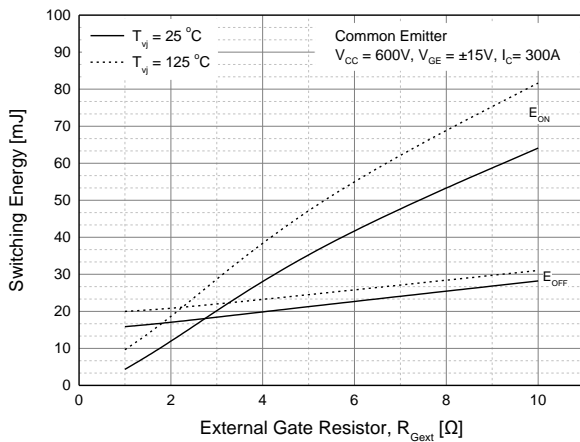
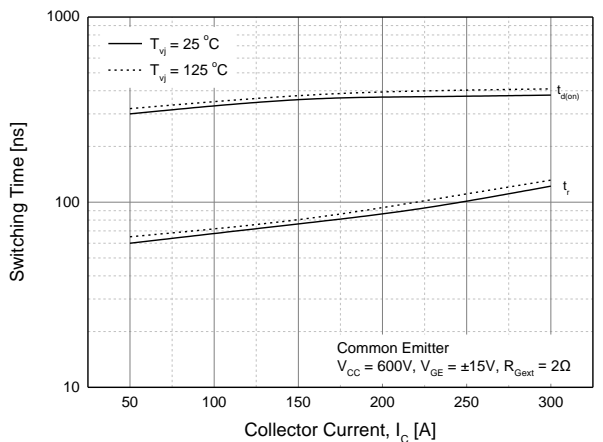


Fig. 6 Turn-on time vs. collector current



### IGBT Characteristics

Fig. 7 Turn-off time vs. collector current

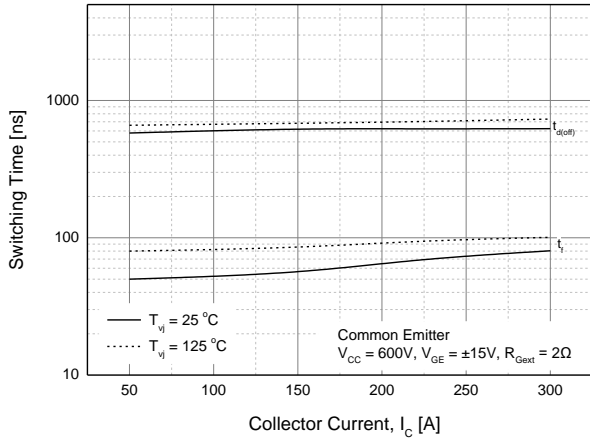


Fig. 8 Switching loss vs. collector current

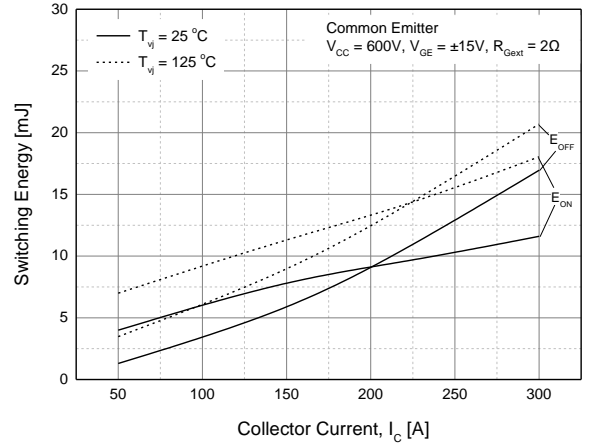


Fig. 9 Gate charge characteristics

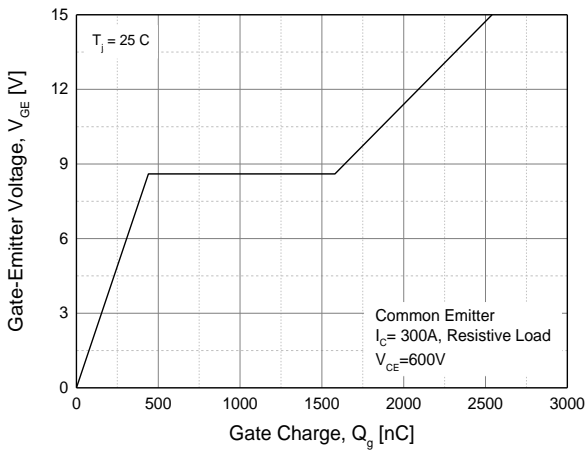


Fig. 10 Transient thermal impedance of IGBT

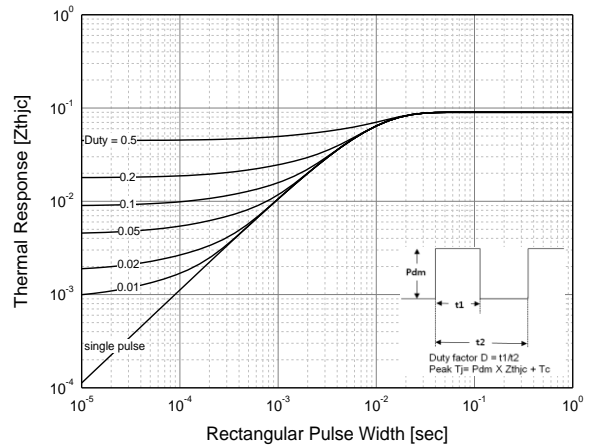


Fig. 11 SOA

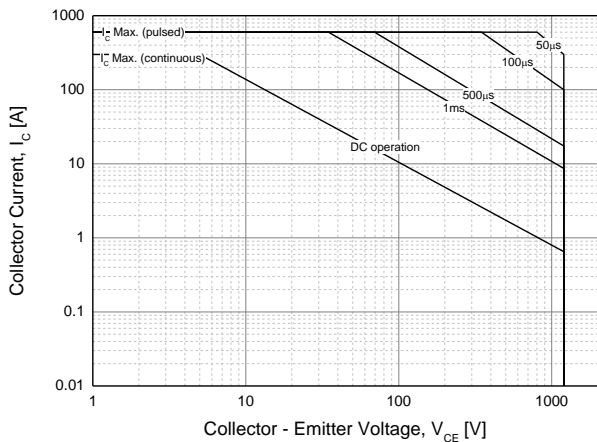
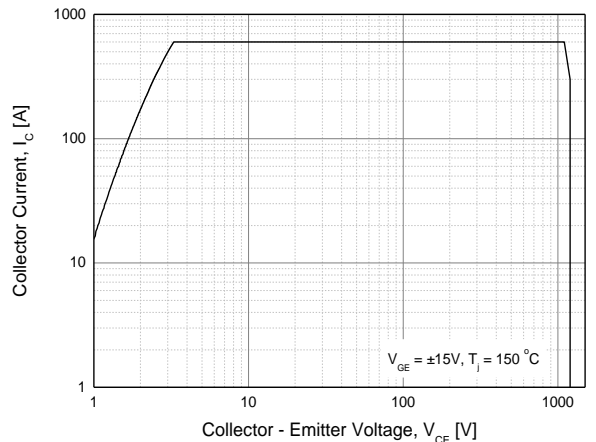
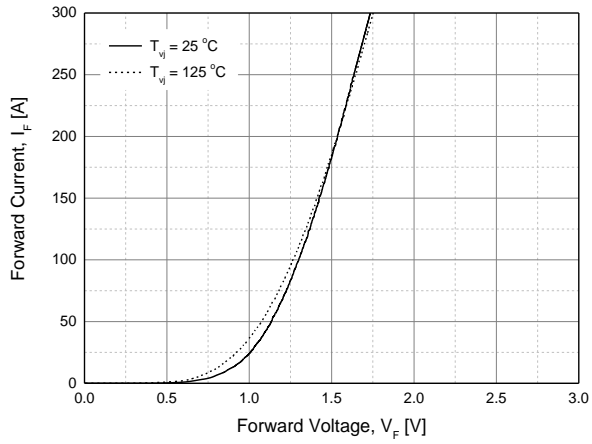


Fig. 12 RBSOA

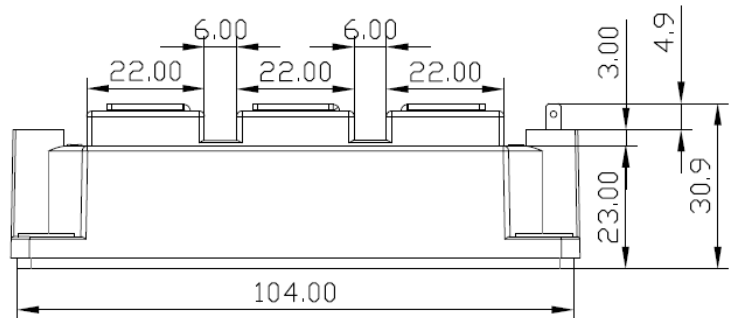
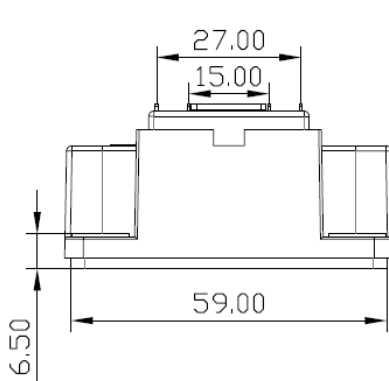
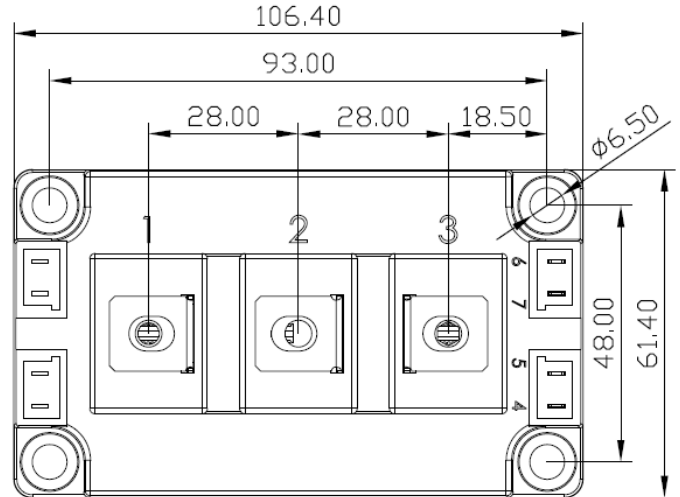


## Diode Characteristics

Fig. 13 Conduction characteristics of Diode



**Package Outline (Dimension in mm)**



**Disclaimer**

TRinno technology reserves the right to make changes without notice to products herein to improve reliability, performance, or design. The information given in this document is believed to be accurate and reliable. However, it shall in no event be regarded as a guarantee of conditions and characteristics. With respect to any information regarding the application of the device, TRinno technology hereby disclaims any and all warranties and liabilities of any kind, including without limitation, warranties of non-infringement of patent rights of any third party.