

### General Description

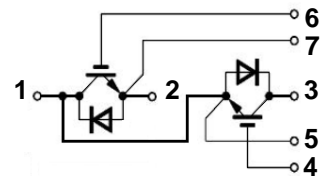
TRinno IGBT power module provides low conduction & switching loss as well as short circuit ruggedness. It is designed for applications such as Motor Driver, IH & Rectifier applications.

### Features

- 1200V NPT Trench Technology
- Fast & Soft inverse Diodes
- Positive Temperature Coefficient
- Short Circuit Withstanding Time 10 $\mu$ s
- UL certified, file No. E490086

### 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	$I_C$	$T_C = 25\text{ }^\circ\text{C}$	150
		$T_C = 100\text{ }^\circ\text{C}$	75
Pulsed Collector Current (Note 1)	$I_{CM}$	150	A
Diode Continuous Forward Current	$I_F$	45	A
Power Dissipation	$P_D$	$T_C = 25\text{ }^\circ\text{C}$	417
		$T_C = 100\text{ }^\circ\text{C}$	166
Operating Junction Temperature	$T_J$	-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)	0.3	K/W
Typical Thermal resistance, Junction-to-Case (Per 1/2 Module)	$R_{\theta JC}$ (DIODE)	1.0	K/W

### Electrical Characteristics of the IGBT $T_C=25^\circ\text{C}$ , 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	$I_{CES}$	$V_{CE} = 1200V, V_{GE} = 0V$	--	--	1	mA
Gate – Emitter Leakage Current	$I_{GES}$	$V_{CE} = 0V, V_{GE} = \pm 20V$	--	--	$\pm 100$	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
		$V_{GE} = V_{CE}, I_C = 75mA$	5.0	--	8.5	V
Collector – Emitter Saturation Voltage	$V_{CE(SAT)}$	$V_{GE} = 15V, I_C = 75A, T_j = 25^\circ\text{C}$	--	2.3	2.8	V
		$V_{GE} = 15V, I_C = 75A, T_j = 150^\circ\text{C}$	--	2.5	3.0	V
<b>DYNAMIC</b>						
Input Capacitance	$C_{IES}$	$V_{CE} = 25V,$ $V_{GE} = 0V$ $f = 1MHz$	--	9.5	--	nF
Output Capacitance	$C_{OES}$		--	530	--	pF
Reverse Transfer Capacitance	$C_{RES}$		--	70	--	pF
<b>SWITCHING</b>						
Turn-On Delay Time	$t_{d(on)}$	$V_{CC} = 600V, I_C = 75A$ $R_G = 2.2\Omega, V_{GE} = \pm 15V$ Inductive Load, $T_j = 25^\circ\text{C}$	--	60	--	ns
Rise Time	$t_r$		--	25	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	260	--	ns
Fall Time	$t_f$		--	50	--	ns
Turn-On Switching Loss	$E_{ON}$		--	1.0	--	mJ
Turn-Off Switching Loss	$E_{OFF}$		--	2.9	--	mJ
Total Switching Loss	$E_{TS}$	--	3.9	--	mJ	
Turn-On Delay Time	$t_{d(on)}$	$V_{CC} = 600V, I_C = 75A$ $R_G = 2.2\Omega, V_{GE} = \pm 15V$ Inductive Load, $T_j = 150^\circ\text{C}$	--	70	--	ns
Rise Time	$t_r$		--	30	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	400	--	ns
Fall Time	$t_f$		--	80	--	ns
Turn-On Switching Loss	$E_{ON}$		--	1.2	--	mJ
Turn-Off Switching Loss	$E_{OFF}$		--	5.2	--	mJ
Total Switching Loss	$E_{TS}$	--	6.4	--	mJ	
Total Gate Charge	$Q_g$	$V_{CC} = 600V, I_C = 75A$ $V_{GE} = 15V$	--	635	--	nC
Gate-Emitter Charge	$Q_{ge}$		--	110	--	nC
Gate-Collector Charge	$Q_{gc}$		--	285	--	nC
Short Circuit Withstanding Time	$t_{sc}$	$V_{CC} = 600V, V_{GE} = 15V, T_j = 150^\circ\text{C}$	10	--	--	$\mu s$

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

Parameter	Symbol	Test condition	Min.	Typ.	Max.	Unit	
Diode Forward Voltage	$V_{FM}$	$I_F = 75\text{A}$	$T_j = 25^\circ\text{C}$	--	1.7	2.5	V
			$T_j = 150^\circ\text{C}$	--	1.8	2.6	
Reverse Recovery Current	$I_{rr}$	$V_{CC} = 600\text{V}, I_F = 75\text{A}$ $R_G = 2.2\Omega, V_{GE} = \pm 15\text{V}$ Inductive Load	$T_j = 25^\circ\text{C}$	--	55	--	A
			$T_j = 150^\circ\text{C}$	--	71	--	
Reverse Recovery Charge	$Q_{rr}$		$T_j = 25^\circ\text{C}$	--	6.5	--	$\mu\text{C}$
			$T_j = 150^\circ\text{C}$	--	12.0	--	
Reverse Recovery Energy	$E_{rr}$		$T_j = 25^\circ\text{C}$	--	1.9	--	mJ
			$T_j = 150^\circ\text{C}$	--	3.0	--	

**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)	--		--	3.0	--	N.m
Weight	--		--	170	--	g

### IGBT Characteristics

Fig. 1 Output characteristics

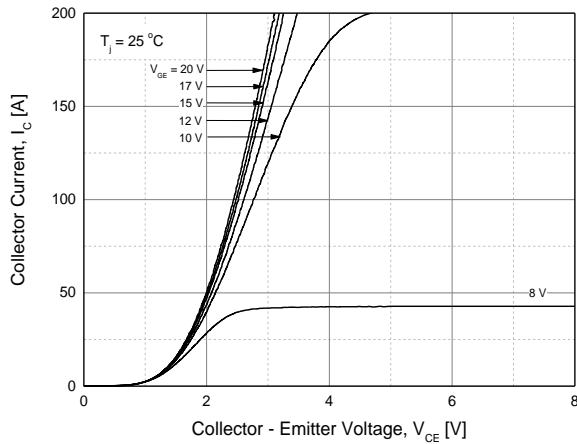


Fig. 2 Saturation voltage characteristics

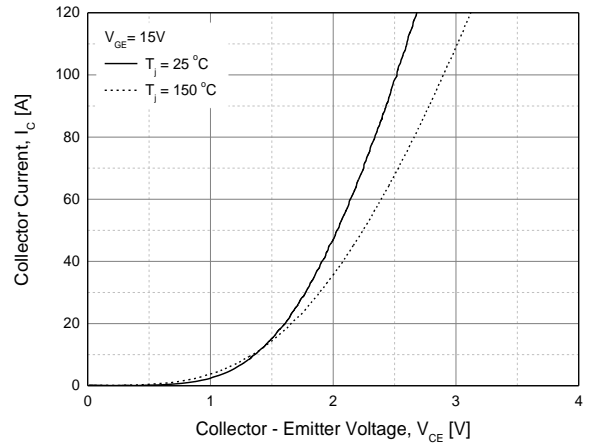


Fig. 3 Turn-on time vs. gate resistor

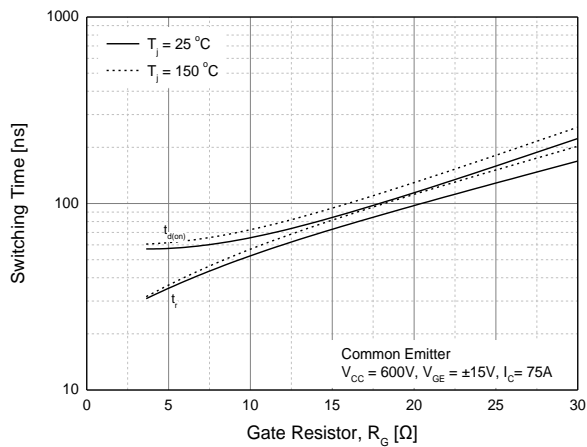


Fig. 4 Turn-off time vs. gate resistor

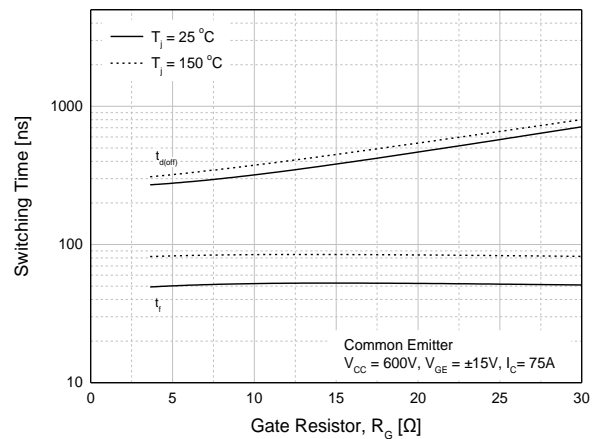


Fig. 5 Switching loss vs. gate resistor

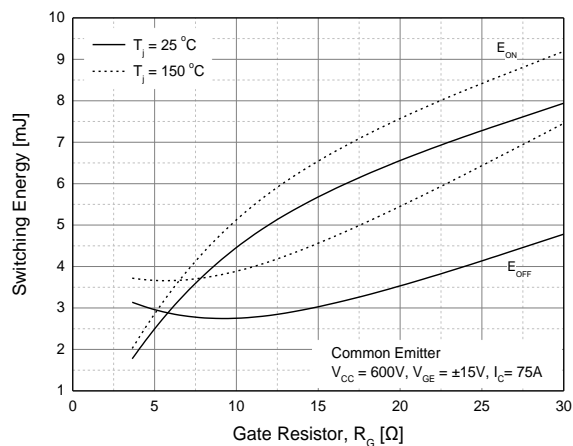
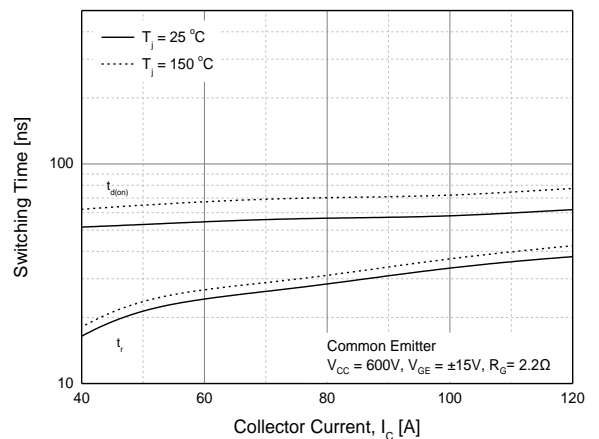


Fig. 6 Turn-on time vs. collector current



**IGBT Characteristics**

Fig. 7 Turn-off time vs. collector current

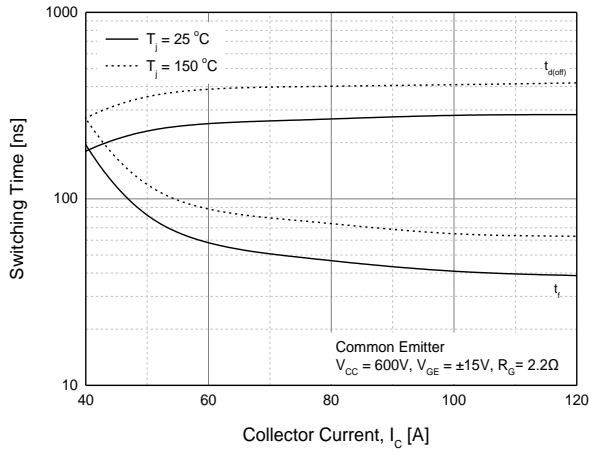


Fig. 8 Switching loss vs. collector current

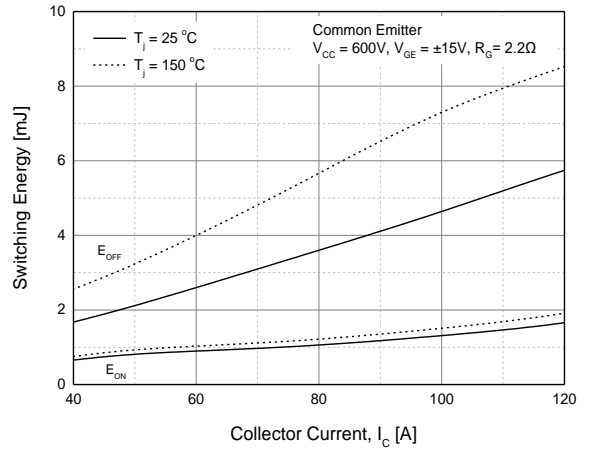


Fig. 9 Gate charge characteristics

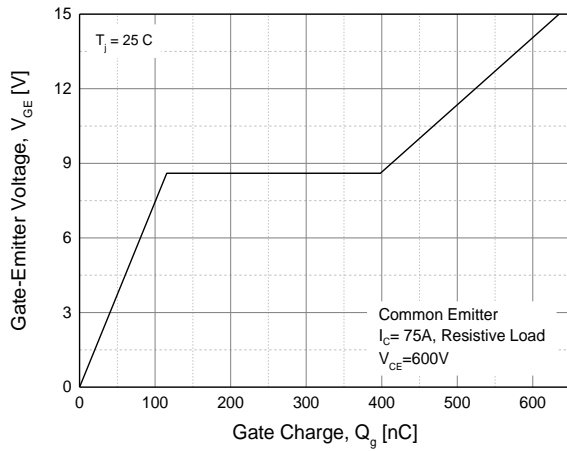


Fig. 10 Transient thermal impedance of IGBT

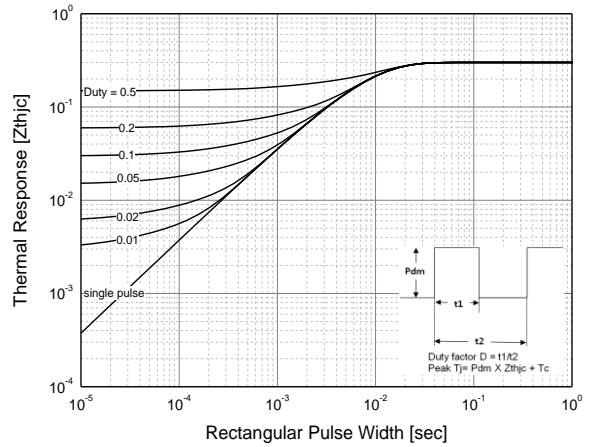


Fig. 11 SOA

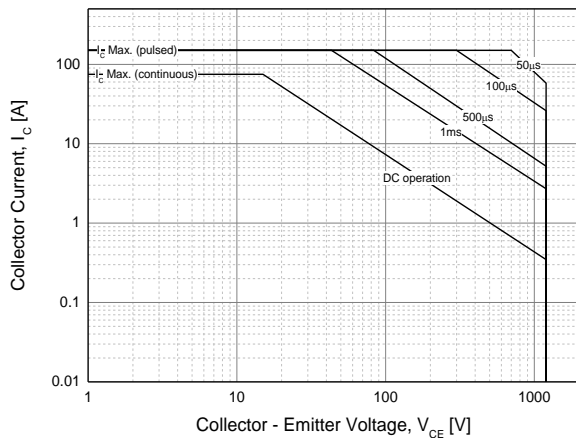
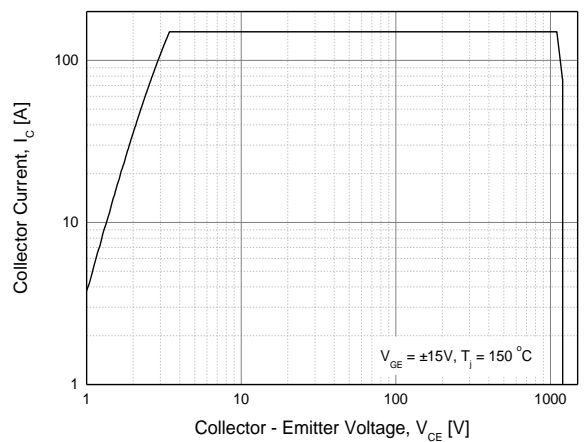
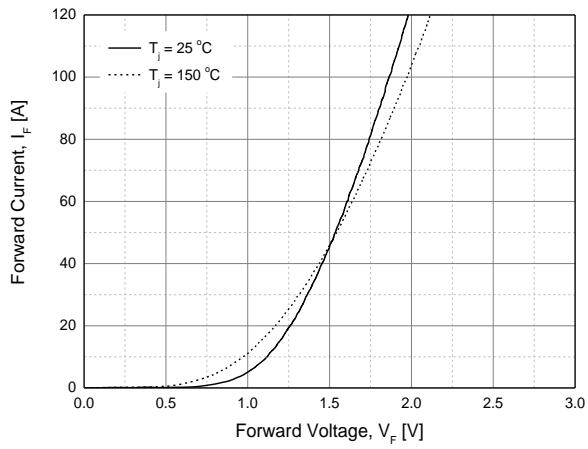


Fig. 12 RBSOA

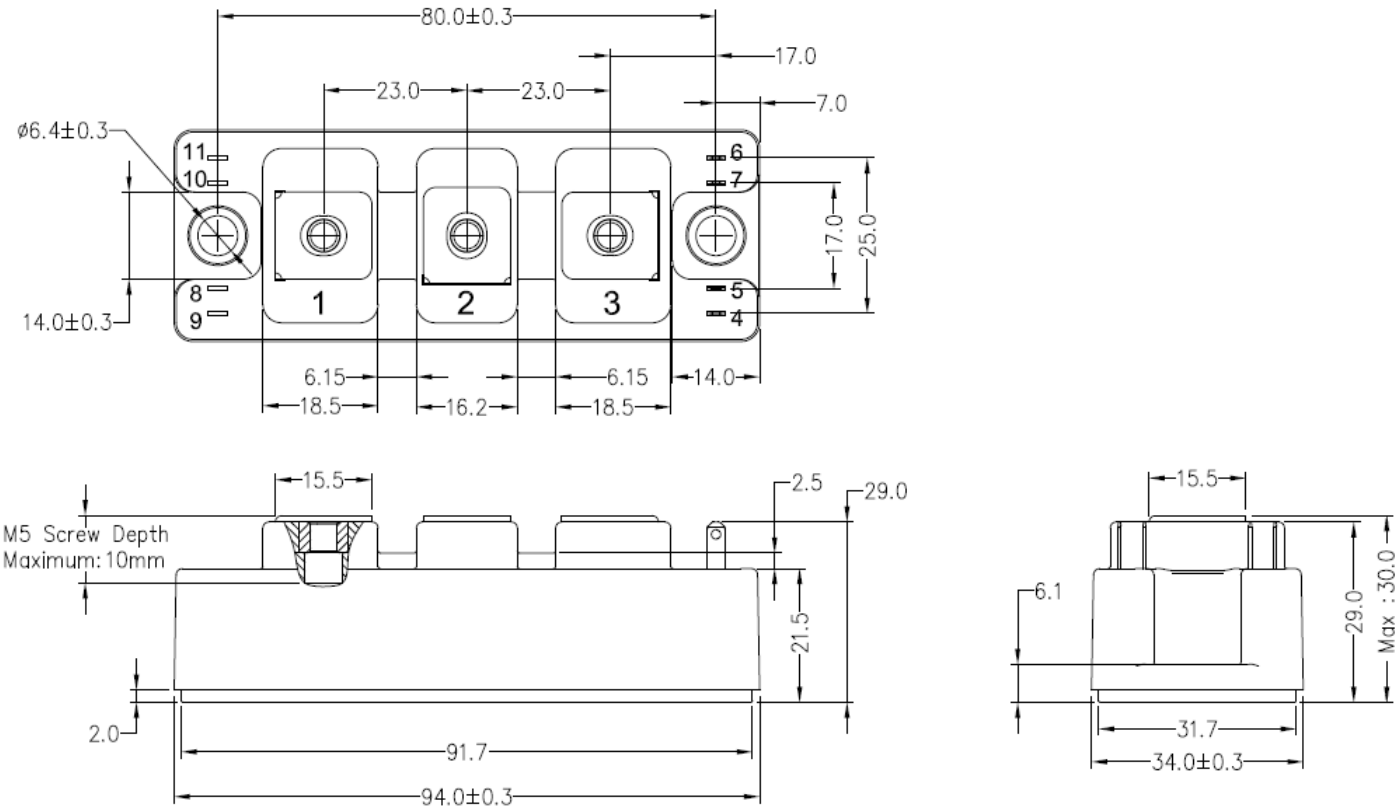


## Diode Characteristics

Fig. 13 Conduction characteristics of Diode



**Package Outline (Dimension in mm)**



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