

General Description

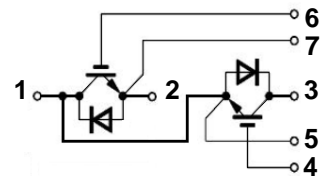
TRinno IGBT power module provides low conduction & switching loss as well as short circuit ruggedness. It is designed for applications such as Motor Driver, IH & Rectifier applications.

Features

- 1200V NPT Trench Technology
- Fast & Soft inverse Diodes
- Positive Temperature Coefficient
- Short Circuit Withstanding Time 10 μ s
- UL certified, file No. E488153

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}	± 20	V	
Continuous Collector Current	I_C	$T_C = 25\text{ }^\circ\text{C}$	400	A
		$T_C = 100\text{ }^\circ\text{C}$	200	A
Pulsed Collector Current (Note 1)	I_{CM}	400	A	
Diode Continuous Forward Current	I_F	135	A	
Power Dissipation	P_D	$T_C = 25\text{ }^\circ\text{C}$	1042	W
		$T_C = 100\text{ }^\circ\text{C}$	417	W
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)	0.12	K/W
Typical Thermal resistance, Junction-to-Case (Per 1/2 Module)	$R_{\theta JC}$ (DIODE)	0.35	K/W

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

Parameter	Symbol	Test condition	Min.	Typ.	Max.	Unit
OFF						
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}	$V_{CE} = 0V, V_{GE} = \pm 20V$	--	--	± 200	nA
ON						
Gate – Emitter Threshold Voltage	$V_{GE(TH)}$	$V_{GE} = V_{CE}, I_C = 250\mu A$	4.0	--	7.5	V
		$V_{GE} = V_{CE}, I_C = 200mA$	5.0	--	8.5	V
Collector – Emitter Saturation Voltage	$V_{CE(SAT)}$	$V_{GE} = 15V, I_C = 200A, T_j = 25\text{ }^\circ\text{C}$	--	2.4	2.9	V
		$V_{GE} = 15V, I_C = 200A, T_j = 150\text{ }^\circ\text{C}$	--	2.7	3.2	V
DYNAMIC						
Input Capacitance	C_{IES}	$V_{CE} = 25V,$ $V_{GE} = 0V$ $f = 1MHz$	--	24	--	nF
Output Capacitance	C_{OES}		--	1520	--	pF
Reverse Transfer Capacitance	C_{RES}		--	785	--	pF
SWITCHING						
Turn-On Delay Time	$t_{d(on)}$	$V_{CC} = 600V, I_C = 200A$ $R_G = 2\Omega, V_{GE} = \pm 15V$ Inductive Load, $T_j = 25\text{ }^\circ\text{C}$	--	65	--	ns
Rise Time	t_r		--	50	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	450	--	ns
Fall Time	t_f		--	45	--	ns
Turn-On Switching Loss	E_{ON}		--	2.8	--	mJ
Turn-Off Switching Loss	E_{OFF}		--	6.7	--	mJ
Total Switching Loss	E_{TS}		--	9.5	--	mJ
Turn-On Delay Time	$t_{d(on)}$	$V_{CC} = 600V, I_C = 200A$ $R_G = 2\Omega, V_{GE} = \pm 15V$ Inductive Load, $T_j = 150\text{ }^\circ\text{C}$	--	95	--	ns
Rise Time	t_r		--	80	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	640	--	ns
Fall Time	t_f		--	70	--	ns
Turn-On Switching Loss	E_{ON}		--	4.6	--	mJ
Turn-Off Switching Loss	E_{OFF}		--	10	--	mJ
Total Switching Loss	E_{TS}		--	14.6	--	mJ
Total Gate Charge	Q_g	$V_{CC} = 600V, I_C = 200A$ $V_{GE} = 15V$	--	1690	--	nC
Gate-Emitter Charge	Q_{ge}		--	290	--	nC
Gate-Collector Charge	Q_{gc}		--	760	--	nC
Short Circuit Withstanding Time	t_{sc}	$V_{CC} = 600V, V_{GE} = 15V, T_j = 150\text{ }^\circ\text{C}$	10	--	--	μs

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}	$I_F = 200A$	$T_j = 25^\circ\text{C}$	--	1.7	2.5	V
			$T_j = 150^\circ\text{C}$	--	1.8	2.6	
Reverse Recovery Current	I_{rr}	$V_{CC} = 600V, I_F = 200A$ $R_G = 2\Omega, V_{GE} = \pm 15V$ Inductive Load	$T_j = 25^\circ\text{C}$	--	105	--	A
			$T_j = 150^\circ\text{C}$	--	135	--	
Reverse Recovery Charge	Q_{rr}	$V_{CC} = 600V, I_F = 200A$ $R_G = 2\Omega, V_{GE} = \pm 15V$ Inductive Load	$T_j = 25^\circ\text{C}$	--	18.5	--	μC
			$T_j = 150^\circ\text{C}$	--	32.0	--	
Reverse Recovery Energy	E_{rr}	$V_{CC} = 600V, I_F = 200A$ $R_G = 2\Omega, V_{GE} = \pm 15V$ Inductive Load	$T_j = 25^\circ\text{C}$	--	5.8	--	mJ
			$T_j = 150^\circ\text{C}$	--	8.5	--	

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)	--		--	4.5	--	N.m
Weight	--		--	320	--	g

IGBT Characteristics

Fig. 1 Output characteristics

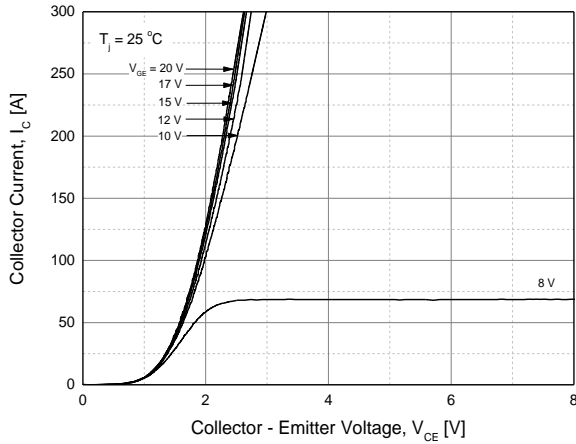


Fig. 2 Saturation voltage characteristics

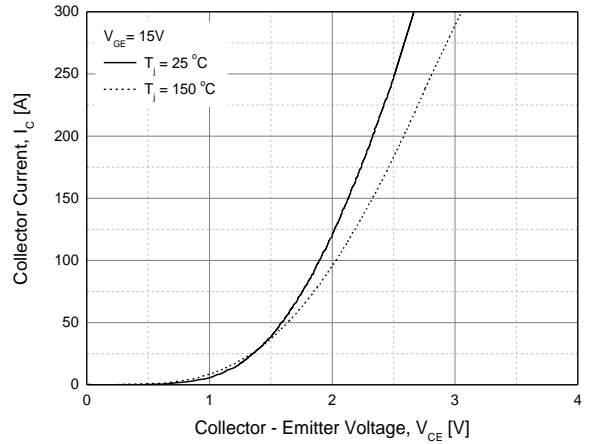


Fig. 3 Turn-on time vs. gate resistor

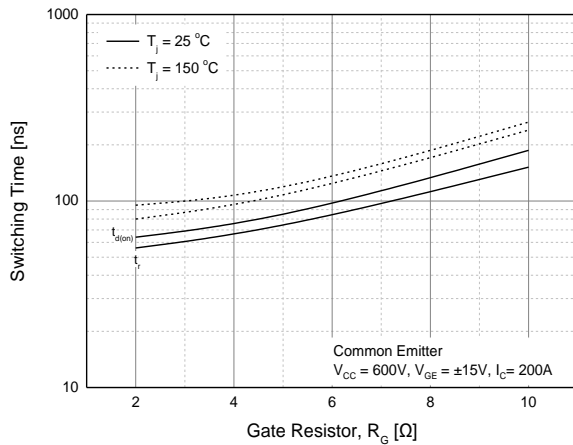


Fig. 4 Turn-off time vs. gate resistor

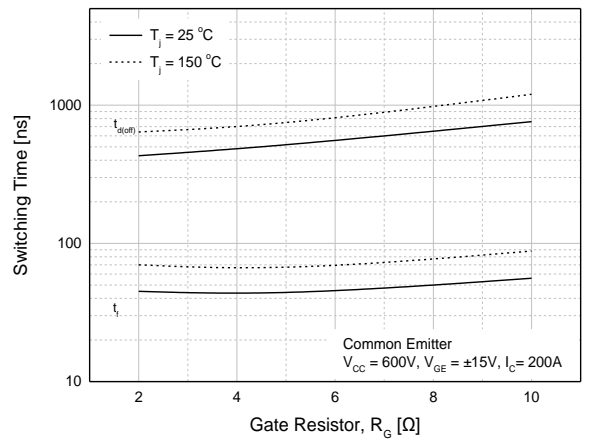


Fig. 5 Switching loss vs. gate resistor

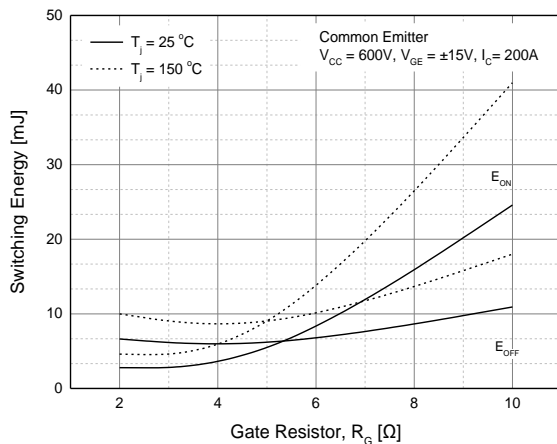
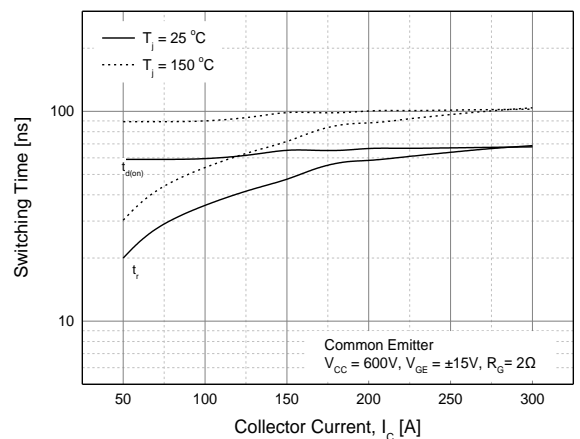


Fig. 6 Turn-on time vs. collector current



IGBT Characteristics

Fig. 7 Turn-off time vs. collector current

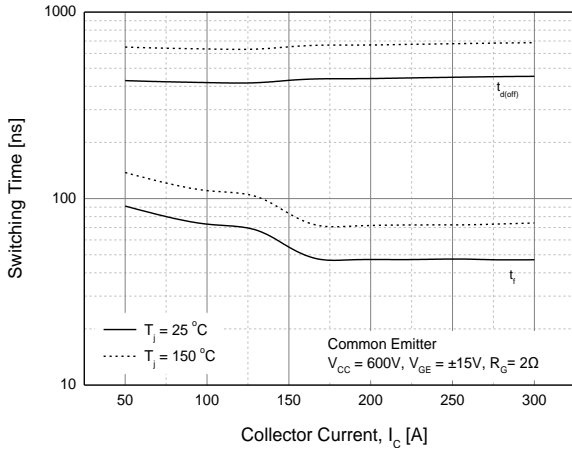


Fig. 8 Switching loss vs. collector current

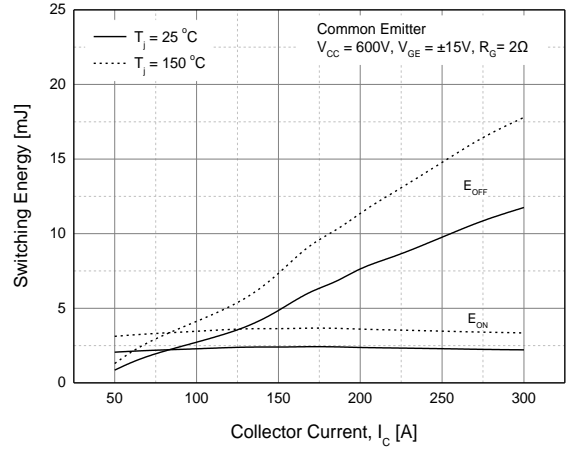


Fig. 9 Gate charge characteristics

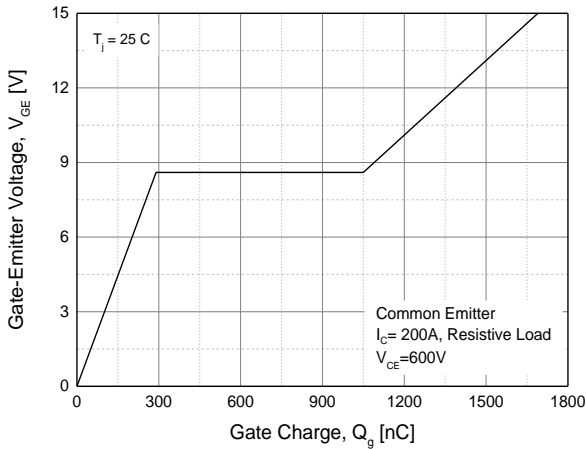


Fig. 10 Transient thermal impedance of IGBT

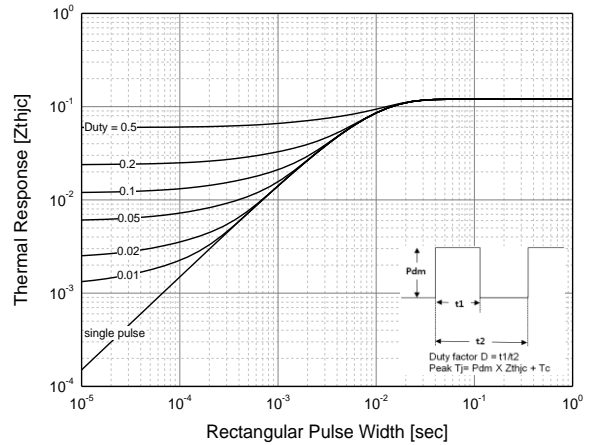


Fig. 11 SOA

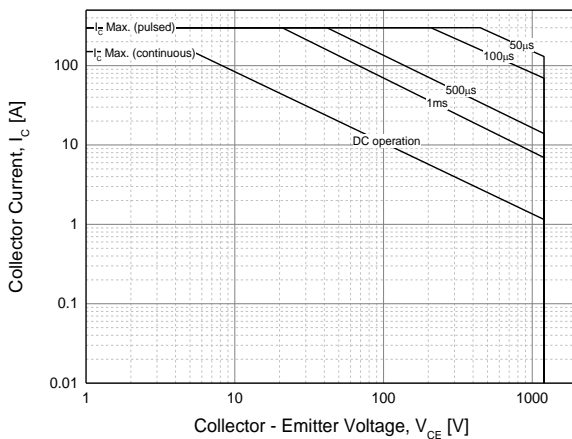
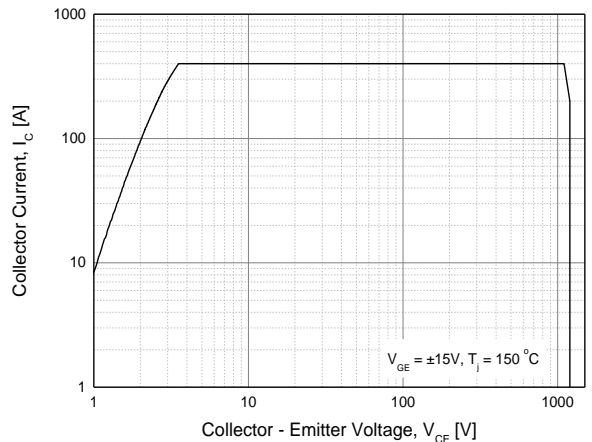
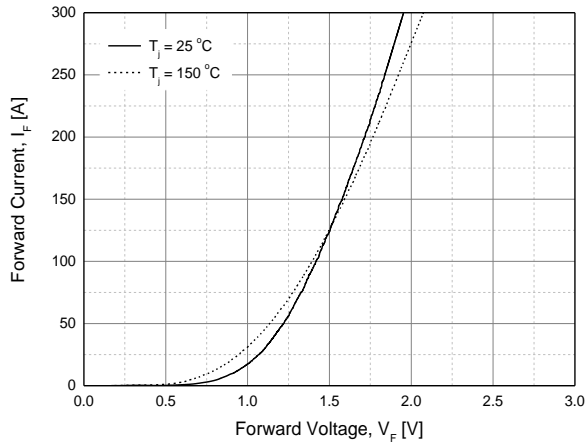


Fig. 12 RBSOA

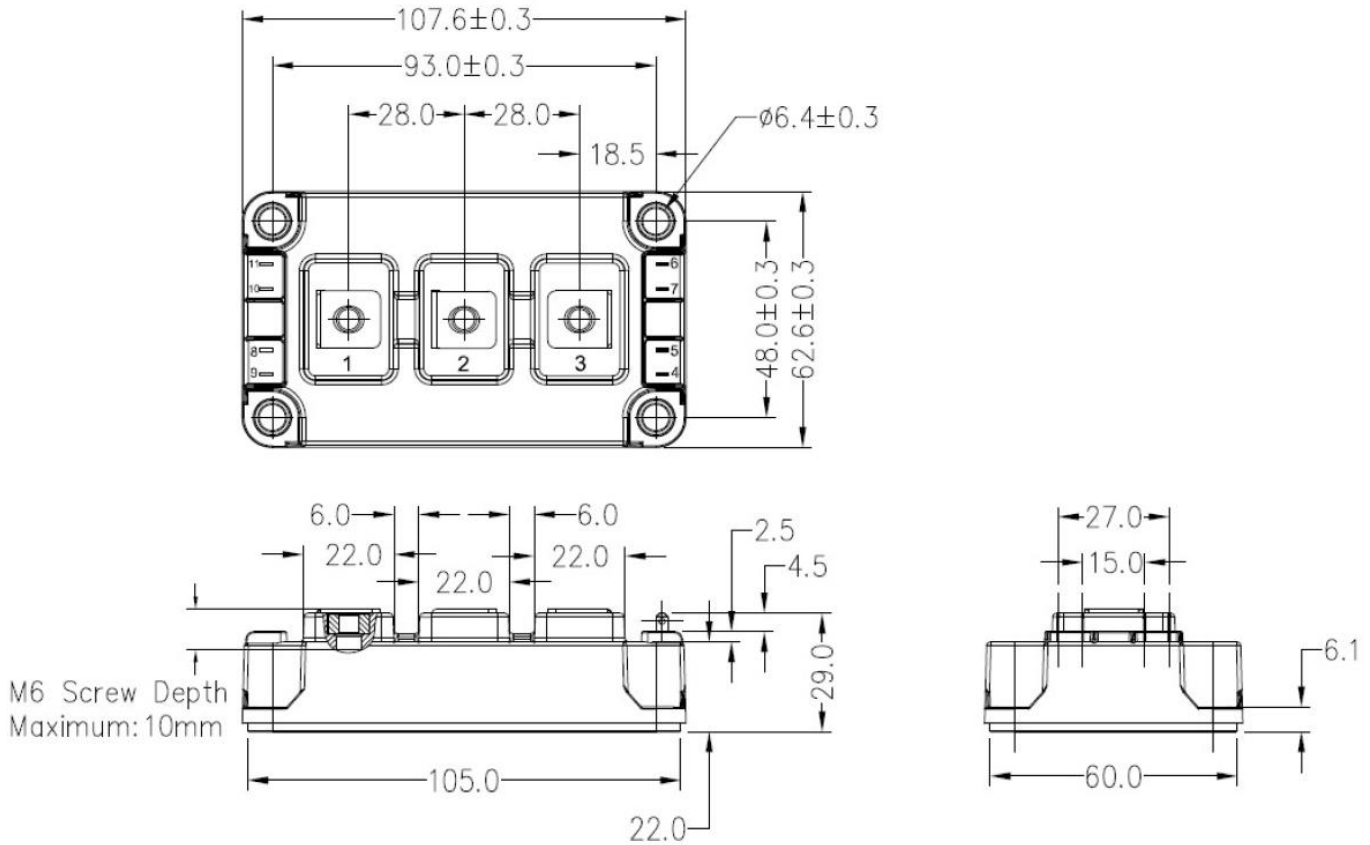


Diode Characteristics

Fig. 13 Conduction characteristics of Diode



Package Outline (Dimension in mm)



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