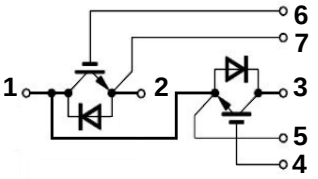
General Description

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

Features

- 1200V Field Stop Trench IGBT Technology
- Fast & Soft Recovery Diodes
- Positive Temperature Coefficient
- Short Circuit Withstanding Time : 10μs



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	T_C = 25 ℃	I_C	900	A
	T_C = 100 ℃		450	A
Pulsed Collector Current (Note 1)		I_{CM}	900	A
Diode Continuous Forward Current	T_C = 100 ℃	I_F	450	A
Power Dissipation	T_C = 25 ℃	P_D	2083	W
	T_C = 100 ℃		833	W
Operating Junction Temperature		T_{vj}	-40 ~ 150	℃
Storage Temperature Range		T_{STG}	-40 ~ 150	℃

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

Thermal Characteristics

Parameter	Symbol	Value	Unit
Typical Thermal resistance, Junction-to-Case (Per ⅓ Module)	$R_{\theta JC}$ (IGBT)	0.06	K/W
Typical Thermal resistance, Junction-to-Case (Per ½ Module)	$R_{\theta JC}$ (DIODE)	0.11	K/W

Electrical Characteristics of the IGBT T_{vj}=25℃, 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	--	--	3	mA
Gate – Emitter Leakage Current	I_{GES}	V_{CE} = 0V, V_{GE} = ± 20V	--	--	±300	nA
ON						
Gate – Emitter Threshold Voltage	$V_{GE(TH)}$	V_{GE} = V_{CE}, I_C = 250μA	3.5	--	7.0	V
		V_{GE} = V_{CE}, I_C = 450mA	5.0	--	8.5	V
Collector – Emitter Saturation Voltage	$V_{CE(SAT)}$	V_{GE} = 15V, I_C = 450A, T_{vj} = 25 ℃	--	1.8	2.2	V
		V_{GE} = 15V, I_C = 450A, T_{vj} = 125 ℃	--	2.0	2.4	V
DYNAMIC						
Internal Gate Resistor	R_{Gint}	T_{vj} = 25 ℃	--	3.3	--	Ω
Input Capacitance	C_{IES}	V_{CE} = 25V, V_{GE} = 0V f = 1MHz	--	60	--	nF
Output Capacitance	C_{OES}		--	3000	--	pF
Reverse Transfer Capacitance	C_{RES}		--	1500	--	pF
SWITCHING						
Turn-On Delay Time	$t_{d(on)}$	V_{CC} = 600V, I_C = 450A R_{Gext} = 2Ω, V_{GE} = ±15V Inductive Load, T_{vj} = 25 ℃	--	400	--	ns
Rise Time	t_r		--	160	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	960	--	ns
Fall Time	t_f		--	130	--	ns
Turn-On Switching Loss	E_{ON}		--	23.9	--	mJ
Turn-Off Switching Loss	E_{OFF}		--	51.7	--	mJ
Total Switching Loss	E_{TS}		--	75.6	--	mJ
Turn-On Delay Time	$t_{d(on)}$	V_{CC} = 600V, I_C = 450A R_{Gext} = 2Ω, V_{GE} = ±15V Inductive Load, T_{vj} = 125 ℃	--	360	--	ns
Rise Time	t_r		--	180	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	1050	--	ns
Fall Time	t_f		--	95	--	ns
Turn-On Switching Loss	E_{ON}		--	48.7	--	mJ
Turn-Off Switching Loss	E_{OFF}		--	56.4	--	mJ
Total Switching Loss	E_{TS}		--	105.1	--	mJ
Total Gate Charge	Q_g	V_{CC} = 600V, I_C = 450A V_{GE} = 15V	--	4250	--	nC
Gate-Emitter Charge	Q_{ge}		--	650	--	nC
Gate-Collector Charge	Q_{gc}		--	2100	--	nC
Short Circuit Withstanding Time	t_{SC}	V_{CC} = 600V, V_{GE} = 15V, T_{vj} = 125 ℃	10	--	--	μs

Electrical Characteristics of the DIODE T_{vj}=25℃, unless otherwise noted

Parameter	Symbol	Test condition		Min.	Typ.	Max.	Unit
Diode Forward Voltage	V_{FM}	I_F = 450A	T_{vj}=25℃	--	1.75	2.55	V
			T_{vj}=125℃	--	1.85	2.65	
Reverse Recovery Current	I_{rr}	V_{CC} = 600V, I_F = 450A R_{Gext} = 2Ω, V_{GE} = ±15V Inductive Load	T_{vj}=25℃	--	260	--	A
			T_{vj}=125℃	--	278	--	
Reverse Recovery Charge	Q_{rr}		T_{vj}=25℃	--	38.0	--	μC
			T_{vj}=125℃	--	46.0	--	
Reverse Recovery Time	t_{rr}		T_{vj}=25℃	--	290	--	ns
			T_{vj}=125℃	--	330	--	

Characteristics of the Module

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

IGBT Characteristics

Fig. 1 Output characteristics

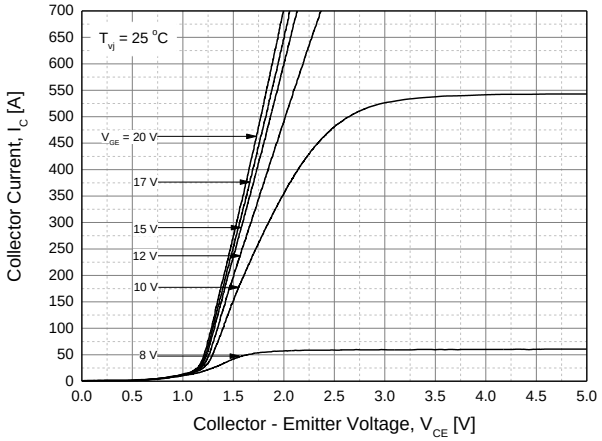


Fig. 2 Saturation voltage characteristics

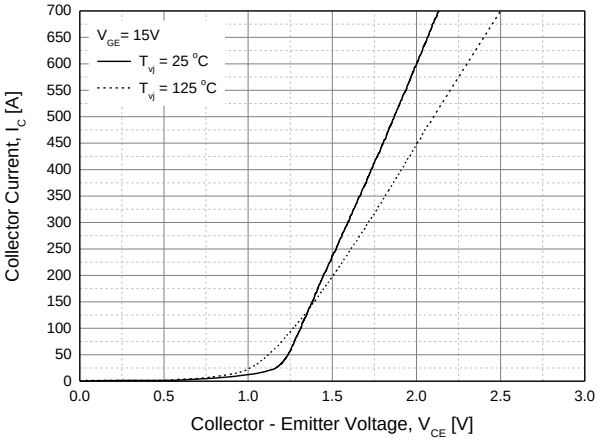


Fig. 3 Turn-on time vs. gate resistor

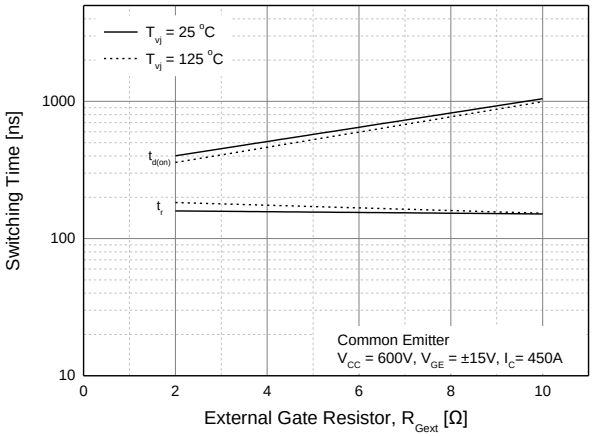


Fig. 4 Turn-off time vs. gate resistor

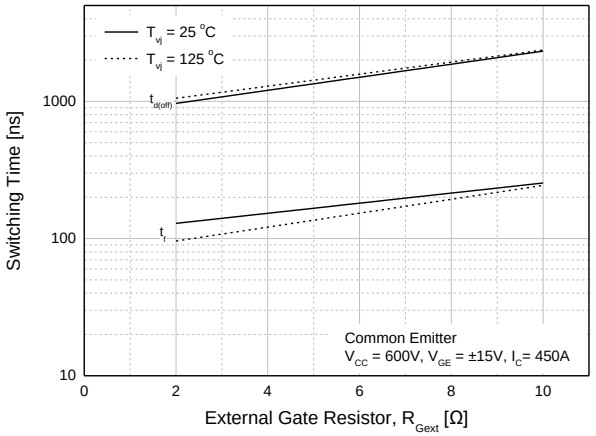


Fig. 5 Switching loss vs. gate resistor

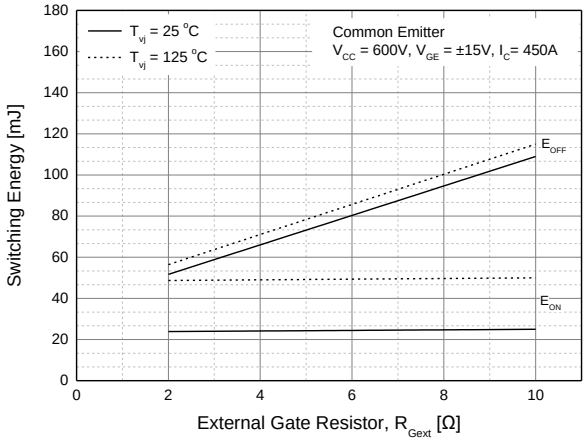
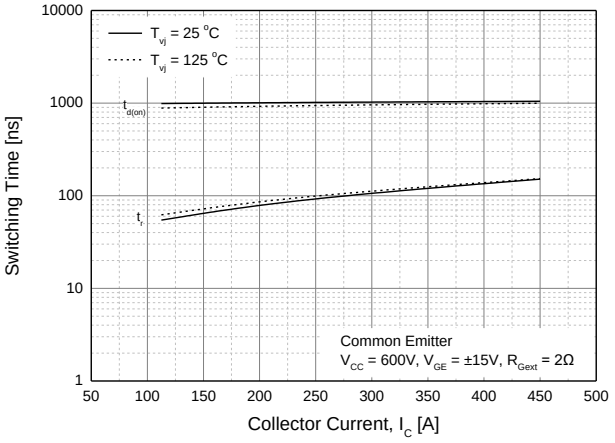


Fig. 6 Turn-on time vs. collector current



IGBT Characteristics

Fig. 7 Turn-off time vs. collector current

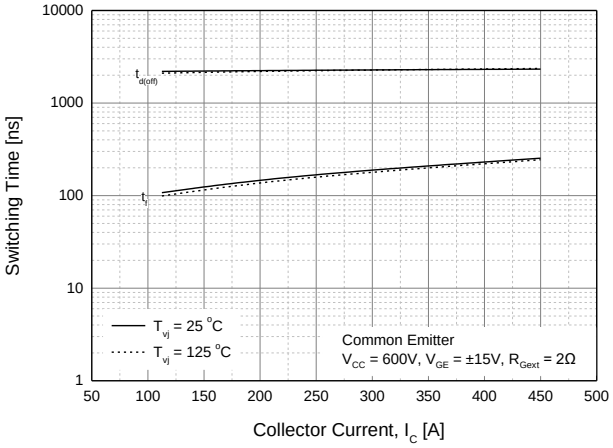


Fig. 8 Switching loss vs. collector current

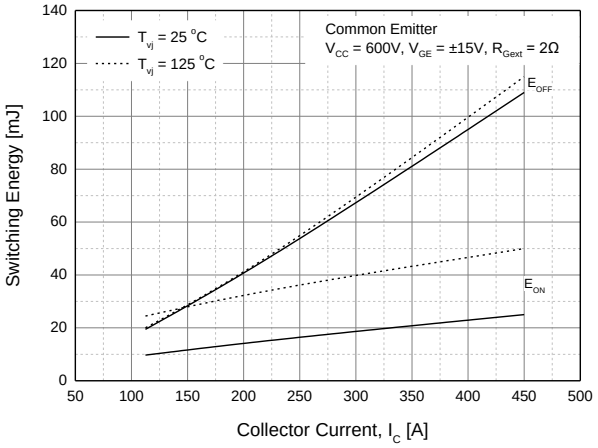


Fig. 9 Gate charge characteristics

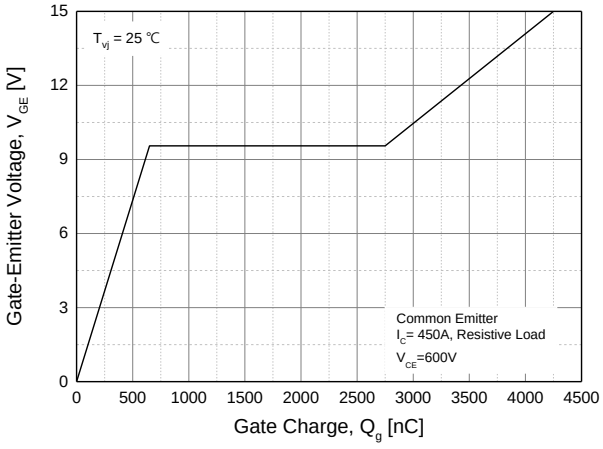


Fig. 10 Transient thermal impedance of IGBT

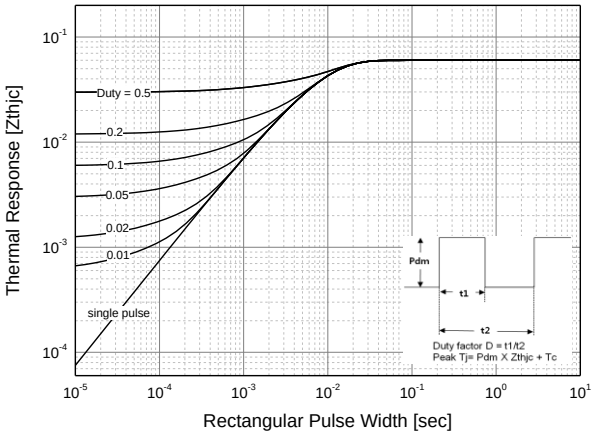


Fig. 11 SOA

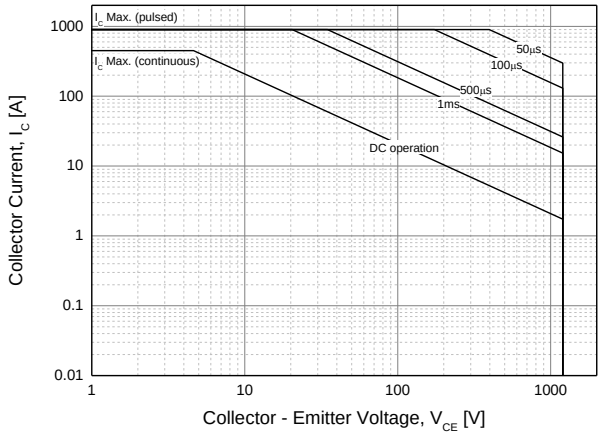
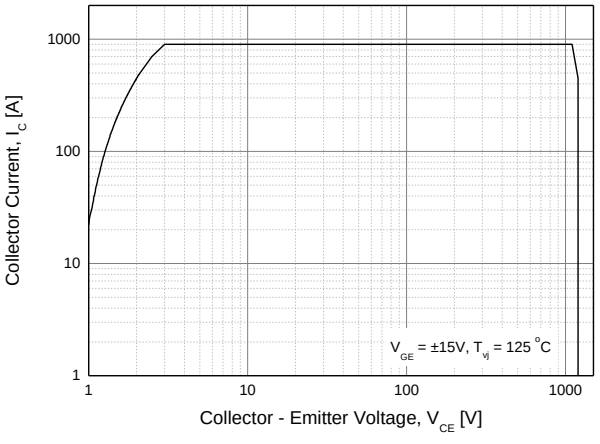
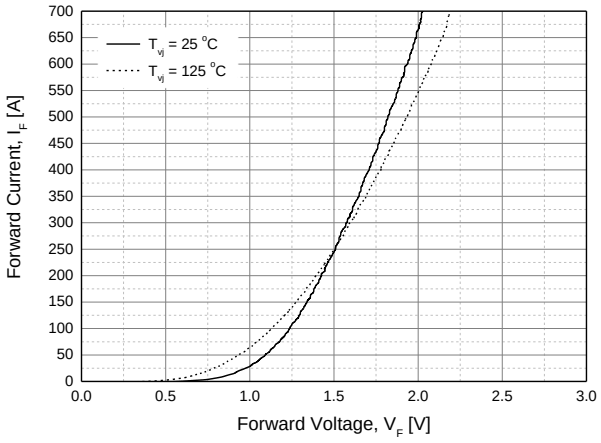


Fig. 12 RBSOA

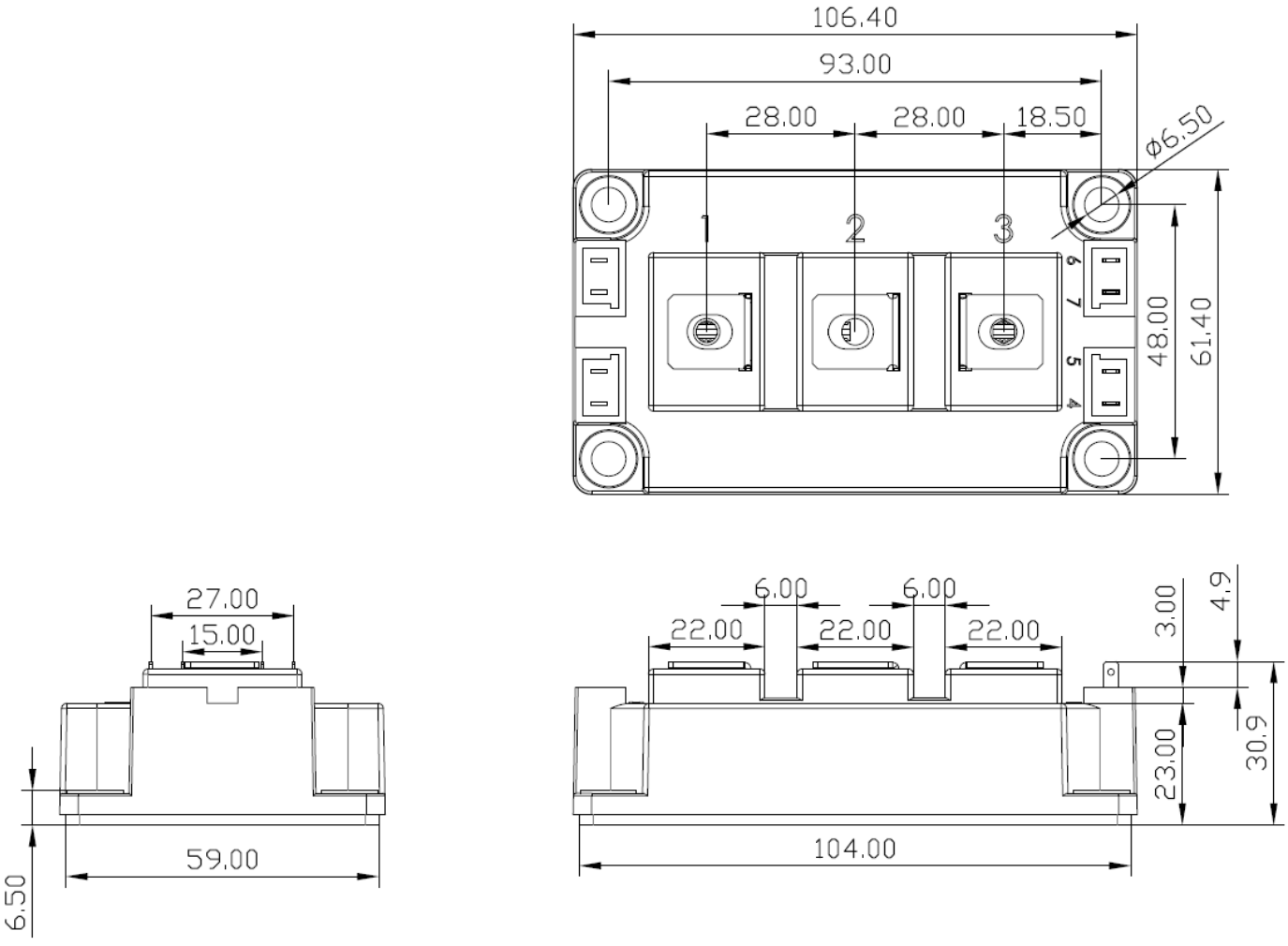


Diode Characteristics

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.