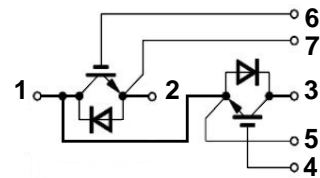


General Description

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 Field Stop Trench IGBT Technology
- Fast & Soft Recovery Diodes
- Positive Temperature Coefficient
- Short Circuit Withstanding Time : 10 μ 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}	± 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	$T_C = 25\text{ }^\circ\text{C}$	1042	W
		$T_C = 100\text{ }^\circ\text{C}$	417	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
Maximum Thermal resistance, Junction-to-Case (Per 1/2 Module)	$R_{\theta JC}$ (IGBT)	0.12	K/W
Maximum 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
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	$V_{GE(TH)}$	$V_{GE} = V_{CE}, I_C = 200mA$	5.0	--	8.0	V
Collector – Emitter Saturation Voltage	$V_{CE(SAT)}$	$V_{GE} = 15V, I_C = 200A, T_{vj} = 25^{\circ}\text{C}$	--	2.0	2.5	V
		$V_{GE} = 15V, I_C = 200A, T_{vj} = 125^{\circ}\text{C}$	--	2.3		V
DYNAMIC						
Input Capacitance	C_{IES}	$V_{CE} = 25V,$ $V_{GE} = 0V$ $f = 1MHz$	--	36	--	nF
Output Capacitance	C_{OES}		--	1520	--	pF
Reverse Transfer Capacitance	C_{RES}		--	780	--	pF
SWITCHING						
Turn-On Delay Time	$t_{d(on)}$	$V_{CC} = 600V, I_C = 300A$ $R_G = 2\Omega, V_{GE} = \pm 15V$ Inductive Load, $T_{vj} = 25^{\circ}\text{C}$	--	68	--	ns
Rise Time	t_r		--	200	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	288	--	ns
Fall Time	t_f		--	90	--	ns
Turn-On Switching Loss	E_{ON}		--	34.2	--	mJ
Turn-Off Switching Loss	E_{OFF}		--	19.0	--	mJ
Total Switching Loss	E_{TS}		--	53.2	--	mJ
Turn-On Delay Time	$t_{d(on)}$	$V_{CC} = 600V, I_C = 300A$ $R_G = 2\Omega, V_{GE} = \pm 15V$ Inductive Load, $T_{vj} = 125^{\circ}\text{C}$	--	82	--	ns
Rise Time	t_r		--	205	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	310	--	ns
Fall Time	t_f		--	99	--	ns
Turn-On Switching Loss	E_{ON}		--	38.2	--	mJ
Turn-Off Switching Loss	E_{OFF}		--	22.8	--	mJ
Total Switching Loss	E_{TS}		--	60.1	--	mJ
Total Gate Charge	Q_g	$V_{CC} = 600V, I_C = 300A$ $V_{GE} = 15V$	--	1745	--	nC
Gate-Emitter Charge	Q_{ge}		--	315	--	nC
Gate-Collector Charge	Q_{gc}		--	810	--	nC
Short Circuit Withstanding Time	t_{SC}	$V_{CC} = 600V, V_{GE} = 15V, T_{vj} = 125^{\circ}\text{C}$	10	--	--	μs

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}	$I_F = 300\text{A}$	$T_{vj} = 25^{\circ}\text{C}$	--	2.3	2.8	V
			$T_{vj} = 125^{\circ}\text{C}$	--	2.2	2.7	
Reverse Recovery Current	I_{rr}	$V_{CC} = 600\text{V}$, $I_F = 300\text{A}$ $R_G = 2\Omega$, $V_{GE} = \pm 15\text{V}$ Inductive Load	$T_{vj} = 25^{\circ}\text{C}$	--	136	--	A
			$T_{vj} = 125^{\circ}\text{C}$	--	168	--	
Reverse Recovery Charge	Q_{rr}		$T_{vj} = 25^{\circ}\text{C}$	--	12.7	--	μC
			$T_{vj} = 125^{\circ}\text{C}$	--	14.9	--	
Reverse Recovery Time	t_{rr}		$T_{vj} = 25^{\circ}\text{C}$	--	217	--	ns
			$T_{vj} = 125^{\circ}\text{C}$	--	246	--	

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)	--		2.5	--	5.0	N.m
Weight	--		--	155	--	g

IGBT Characteristics

Fig. 1 Output characteristics

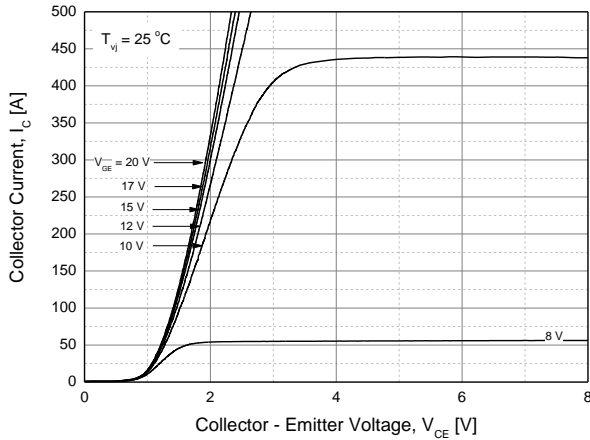


Fig. 2 Saturation voltage characteristics

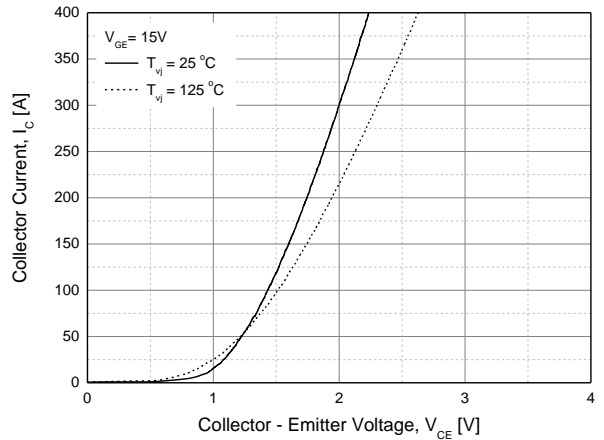


Fig. 3 Switching loss vs. gate resistor

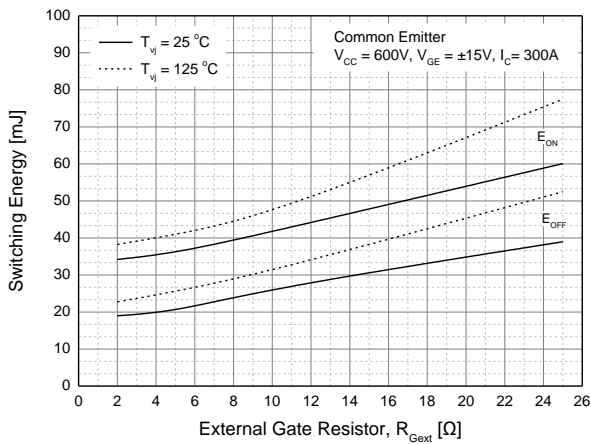


Fig. 4 Switching loss vs. collector current

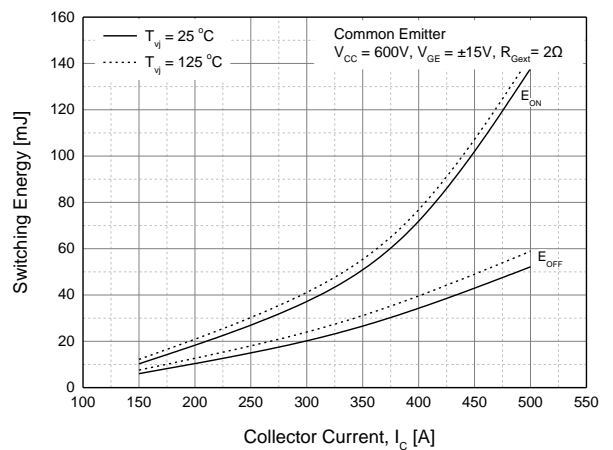


Fig. 5 Transient thermal impedance of IGBT

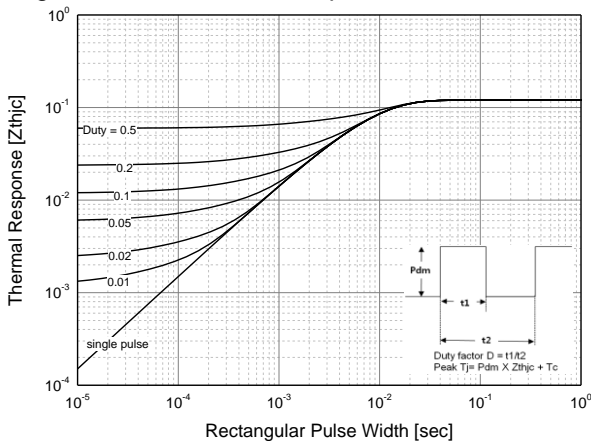
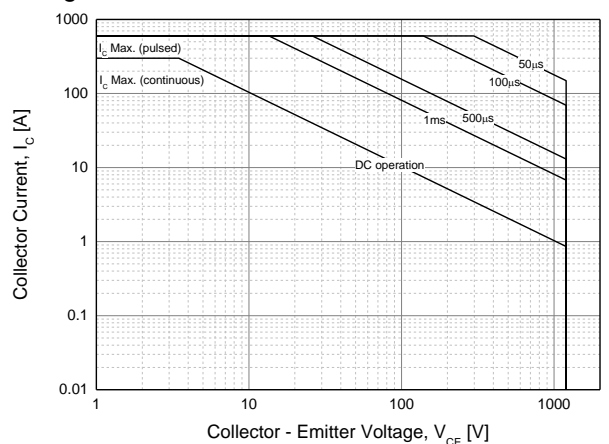


Fig. 6 SOA



IGBT Characteristics

Fig. 7 RBSOA

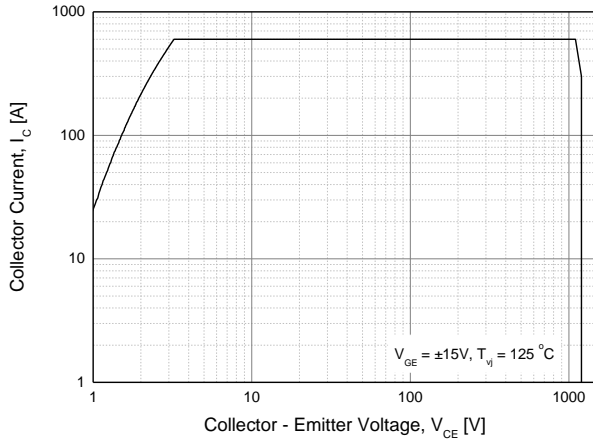


Fig. 8 Load current vs. frequency

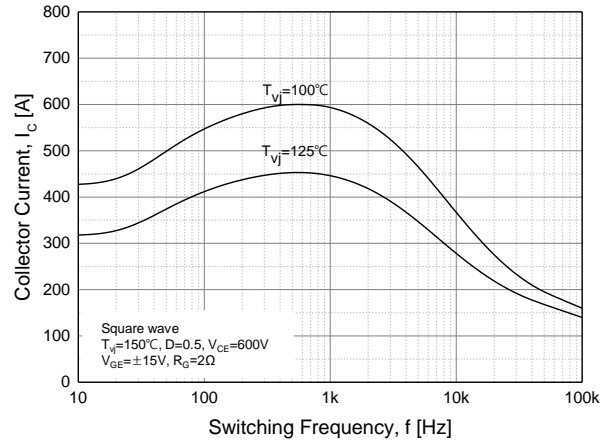


Fig. 9 Conduction characteristics of diode

