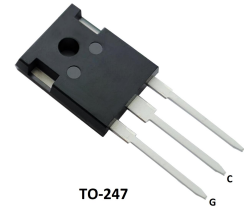


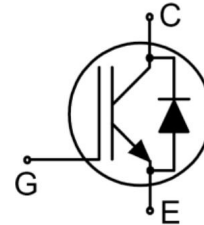
Features

- High Speed Switching & Low Power Loss
- $V_{CE(sat)}=1.95V@I_C=40A$
- $E_{off}=0.35mJ@T_c=25^{\circ}C$
- High Input Impedance
- $T_{rr}=80ns(Typ)@di_F/dt=1000A/us$
- Maximum junction temperature
 $T_{vjmax}=175^{\circ}C$



Applications

- UPS
- PFC
- Welder
- IH Cooker
- PV Inverter



Absolute Ratings($T_c=25^{\circ}C$)

Parameter	Symbol	Value	Unit
Collector-Emitter Voltage	V_{ce}	650	V
Collector Current-continuous	I_C $T=25^{\circ}C$ $T=100^{\circ}C$	80	A
		40	A
Diode forward current	I_F $T=25^{\circ}C$ $T_c=100^{\circ}C$	80	A
		40	A
Collector Current-pulse (note 1)	I_{CM}	160	A
Gate-Emitter Voltage	V_{GES}	± 20	V
Power Dissipation	PD $T_c=25^{\circ}C$ $T_c=100^{\circ}C$	375	W
		188	W
Operating Temperature Range	T_J	$-40 \sim +175$	$^{\circ}C$
Storage Temperature Range	T_{STG}	$-55 \sim +150$	$^{\circ}C$
Short Circuit Withstand Time	t_{sc}	5	us
Maximum Lead Temperature for Soldering Purposes	T_L	300	$^{\circ}C$

Electrical Characteristics

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
Off-Characteristics						
Collector-Emitter Voltage	BV_{CES}	$I_c=2mA, V_{GE}=0V$	650	-	-	V
Zero Gate Voltage Collector Current	I_{CES}	$V_{CE}=650V, V_{GE}=0V, T_c=25^{\circ}C$	-	-	40	μA
		$V_{CE}=650V, V_{GE}=0V, T_c=175^{\circ}C$	-	-	1000	
Gate-body leakage current, forward	I_{GESF}	$V_{CE}=0V, V_{GE}=20V$	-	-	100	nA
Gate-body leakage current, reverse	I_{GESR}	$V_{CE}=0V, V_{GE}=-20V$	-	-	-100	nA
On-Characteristics						
Gate Threshold Voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}, I_c=0.58mA$	4.0	5.0	6.0	V
Collector-Emitter saturation Voltage	V_{CESAT}	$V_{GE}=15V\ I_c=40A\ T_c=25^{\circ}C$	-	1.95	2.4	V
		$V_{GE}=15V\ I_c=40A\ T_c=175^{\circ}C$	-	2.3	-	V
Dynamic Characteristics						
Input capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V, f=1.0MHZ$	-	2818	-	pF
Output capacitance	C_{oes}		-	131	-	pF
Reverse transfer capacitance	C_{res}		-	209	-	pF

Electrical Characteristics

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
Switching Characteristics						
Turn-on delay time	$t_{d(on)}$	$V_{CC}=400V, I_c=40A, R_G=7.9\Omega, V_{GE}=15V, \text{ Inductive Load } T_c=25^{\circ}C$	-	58	-	ns
Turn-On rise time	t_r		-	54	-	ns
Turn-Off delay time	$t_{d(off)}$		-	245	-	ns
Turn-Off Fall time	t_f		-	40	-	ns
Turn-on Loss	E_{on}		-	1.15	-	mJ
Turn-off Loss	E_{off}		-	0.35	-	mJ
Total Loss	E_{ts}		-	1.50	-	mJ
Turn-on delay time	$t_{d(on)}$	$V_{CC}=400V, I_c=40A,$	-	61	-	ns

Turn-On rise time	t _r	R _G =7.9Ω, V _{GE} =15V, Inductive Load T _C =175°C	-	60	-	ns
Turn-Off delay time	td(off)		-	260	-	ns
Turn-Off Fall time	t _f		-	38	-	ns
Turn-on switching Loss	E _{on}		-	1.80	-	mJ
Turn-off switching Loss	E _{off}		-	0.38	-	mJ
Total switching Loss	E _{ts}		-	2.18	-	mJ
Gate Charge	Q _g	V _{CE} =520V,I _c =40A V _{GE} =15V	-	219	-	nC
Gate to Emitter Charge	Q _{ge}		-	26	-	nC
Gate to Collector Charge	Q _{gc}		-	115	-	nC
Anti-Parallel Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Voltage	V _F	I _F =40A(T _J =25°C)	-	1.3	1.9	V
Diode Reverse recovery time	t _{rr}	I _F =40A di _F =/dt=1000A/us T _J =25°C	-	80	-	ns
Diode Reverse recovery charge	Q _{rr}		-	1.0	-	uC
Diode Reverse recovery Current	I _{rr}		-	25	-	A

Thermal Characteristic

Parameter	Symbol	Max	Unit
Thermal Resistance, Junction to Case (IGBT)	$R_{th(j-c)}$	0.4	$^\circ C/W$
Thermal Resistance, Junction to Case (Diode)	$R_{th(j-c)}$	1.2	$^\circ C/W$
Thermal Resistance, Junction to Ambient	$R_{th(j-A)}$	40	$^\circ C/W$

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature

Electrical Characteristics(curves)

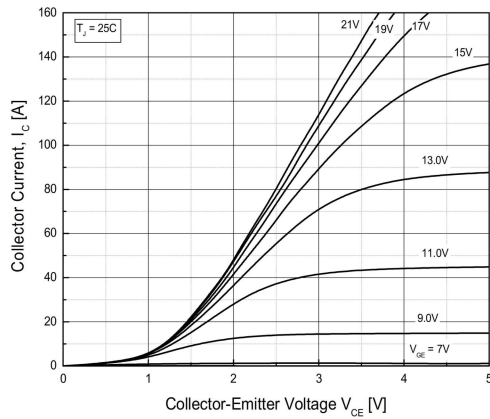


Fig.1 Typical Output Characteristics($T_j=25^\circ\text{C}$)

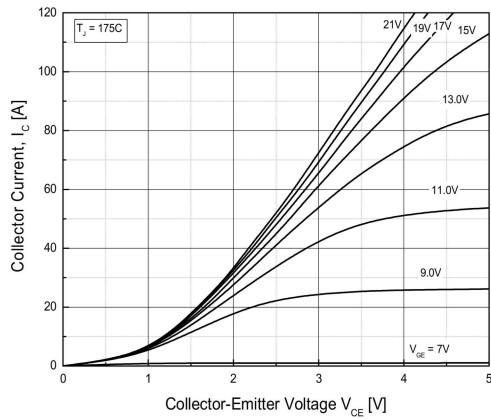


Fig.2 Typical Output Characteristics($T_j=175^\circ\text{C}$)

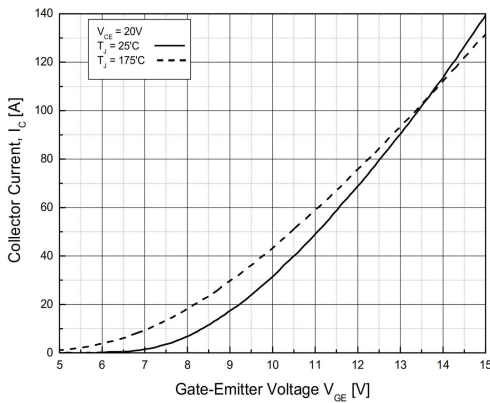


Fig.3 Typical Transfer Characteristics

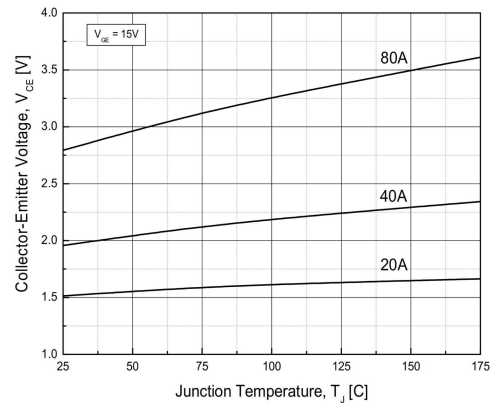


Fig.4 Typical Collector-Emitter Saturation Voltage -Junction Temperature

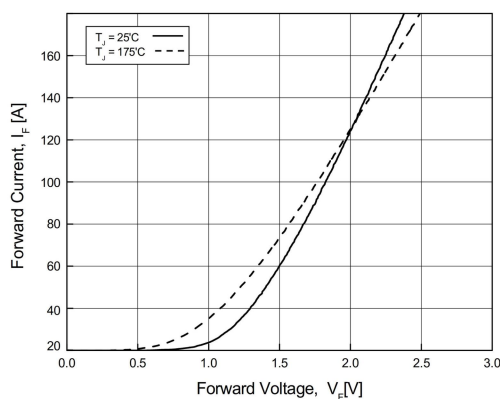


Fig.5 Diode Forward Characteristics

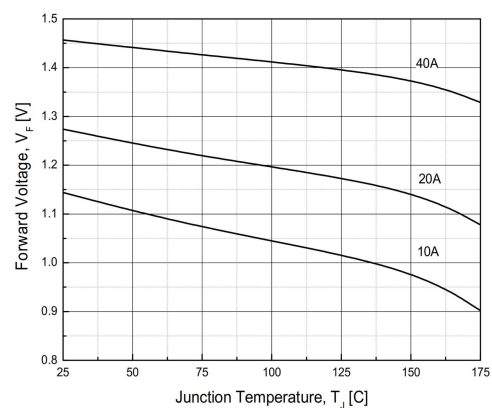


Fig.6 Diode Forward-Junction Temperature

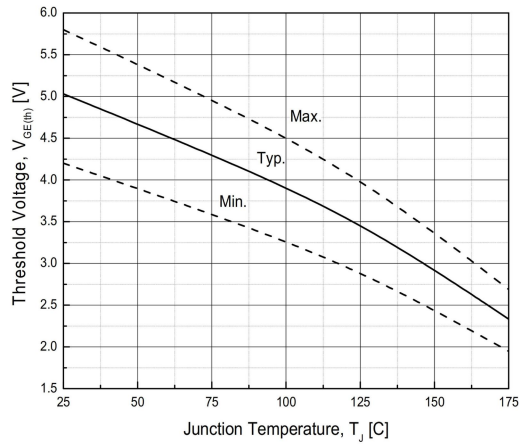


Fig.7 Threshold Voltage-Junction Temperature

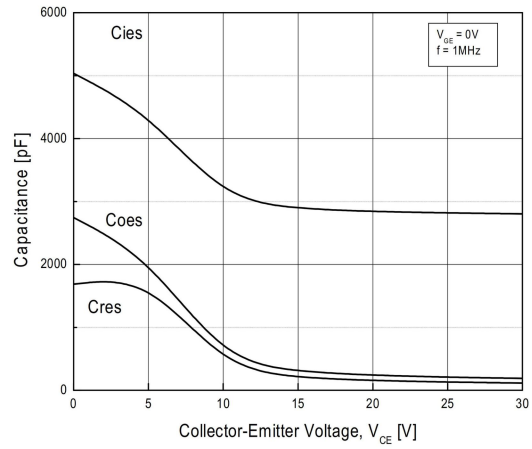


Fig.8 Typical Capacitance

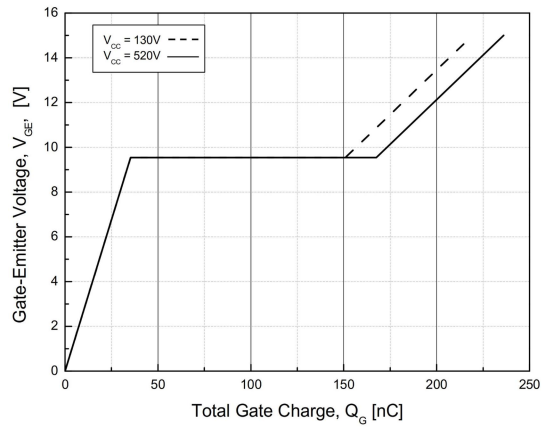


Fig.9 Typical Gate Charge

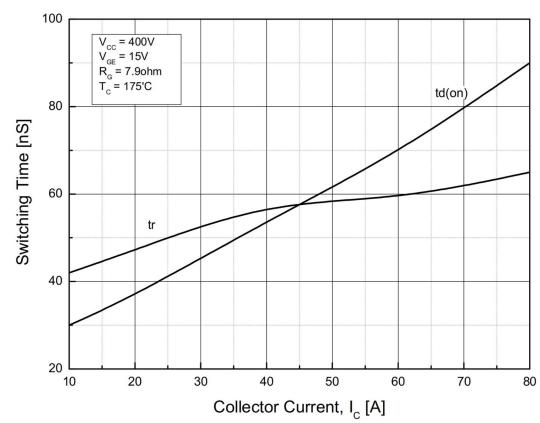


Fig.10 Typical Turn on-Collector Current

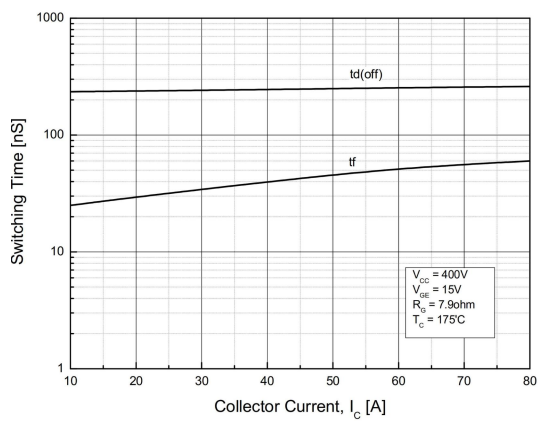


Fig.11 Typical Turn off-Collector Current

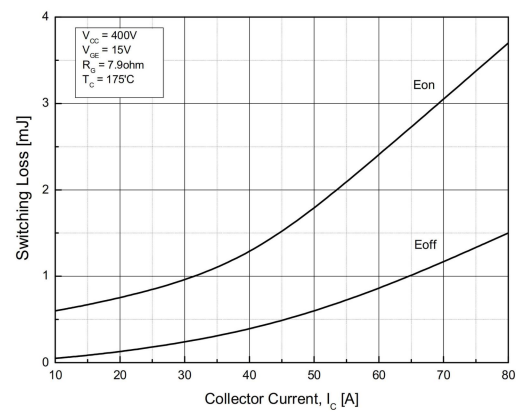


Fig.12 Switching Loss-Collector Current

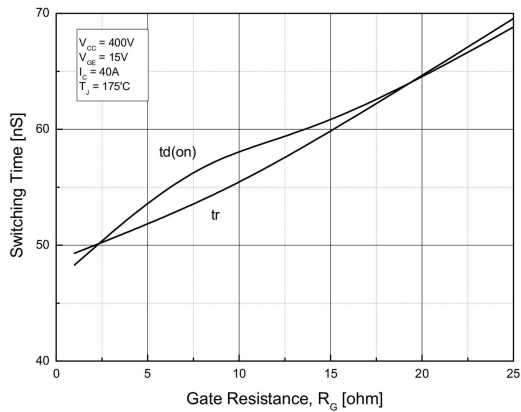


Fig.13 Turn on Characteristics-Gate Resistance

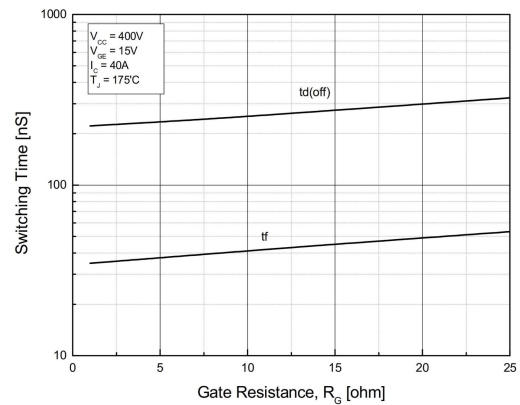


Fig.14 Turn off Characteristics-Gate Resistance

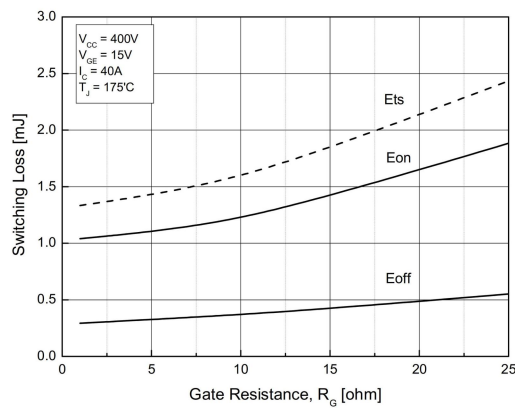


Fig.15 Switching Loss-Gate Resistance

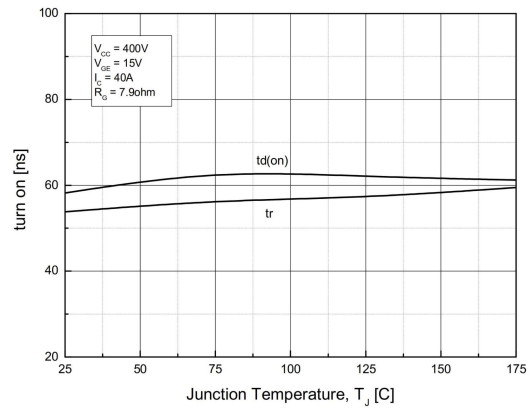


Fig.16 Turn on Characteristics-Junction Temperature

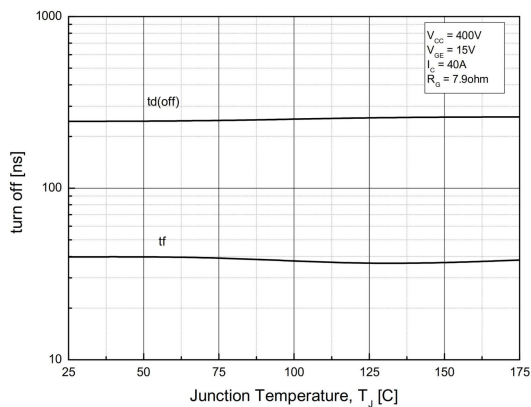


Fig.17 Turn off Characteristics-Junction Temperature

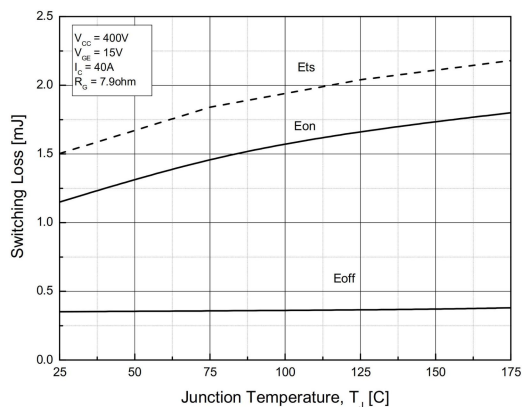


Fig.18 Switching Loss-Junction Temperature

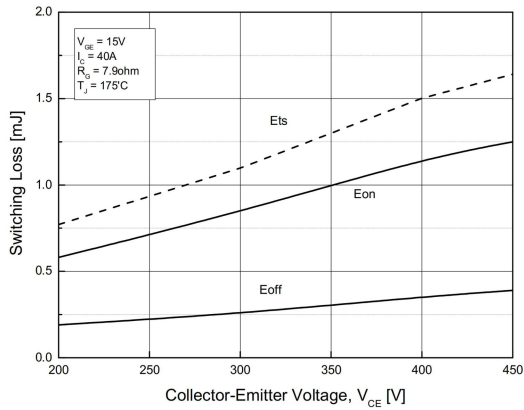


Fig.19 Switching Loss-Collector Emitter Voltage

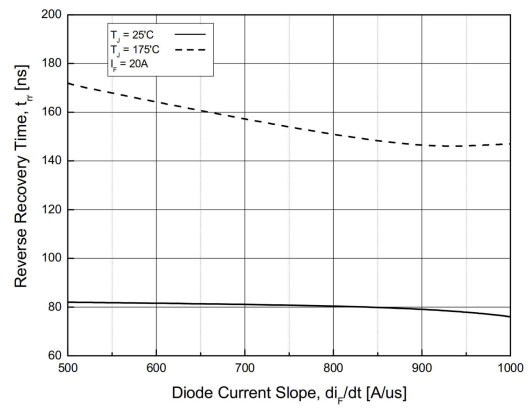


Fig.20 Reverse Recovery Time -Diode current slope

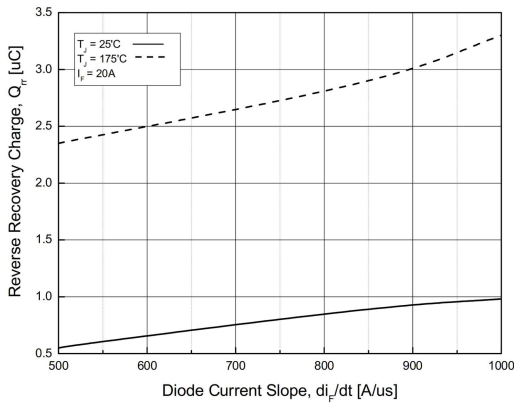


Fig.21 Reverse Recovery Charge -Diode Current Slope

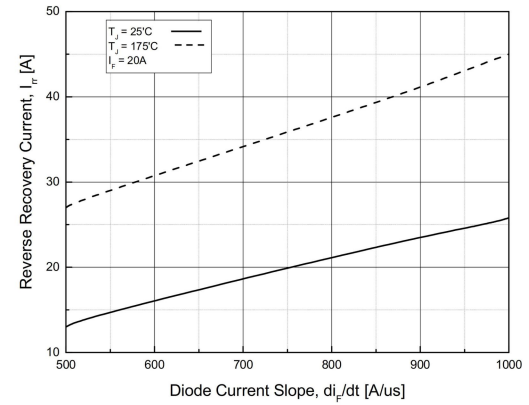


Fig.22 Reverse Recovery Current -Diode current slope

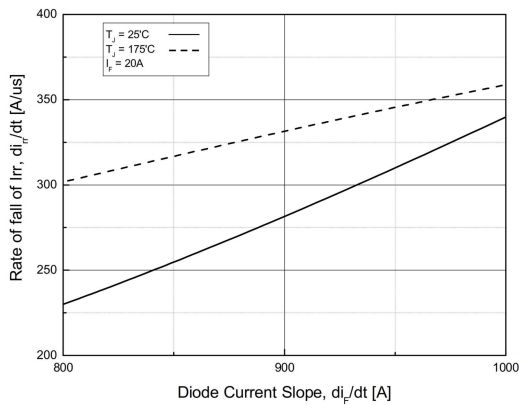


Fig.23 Rate of fall of reverse recovery current -Diode Current Slope

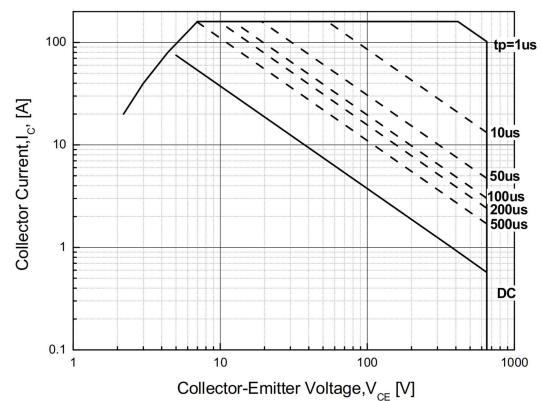


Fig.24 Forward Bias Safe Operating Area

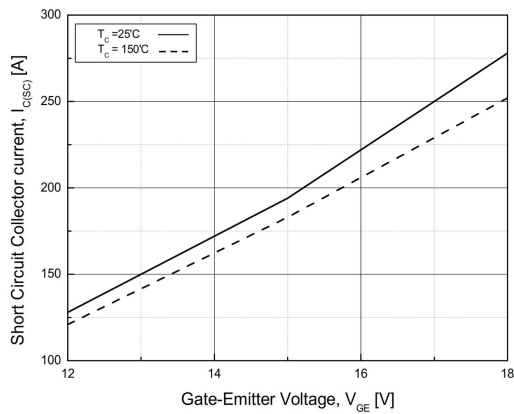


Fig.25 Typical Short Circuit Collector Current

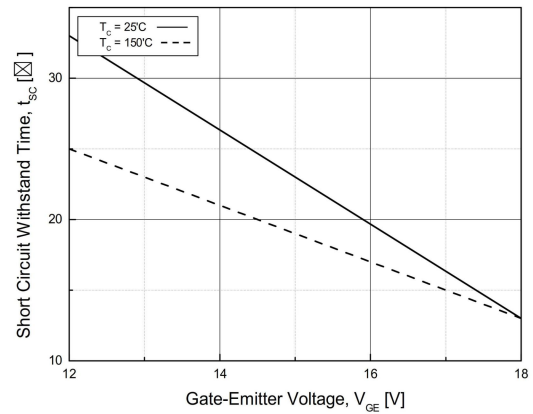


Fig.26 Typical Short Circuit Withstand Time

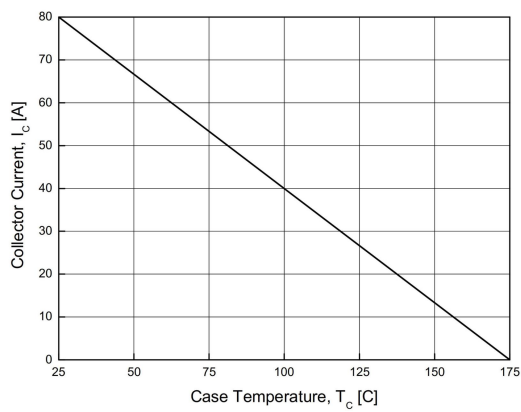


Fig.27 Case Temperature-Collector Current

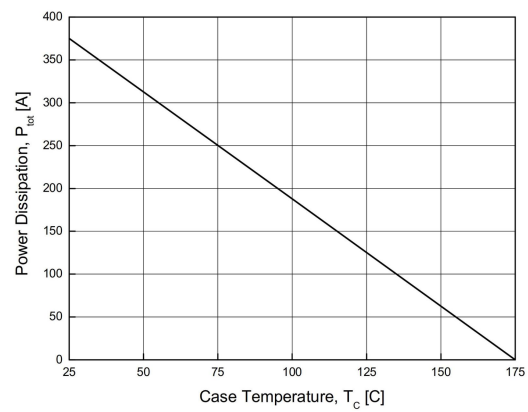


Fig.28 Power Dissipation-Case Temperature

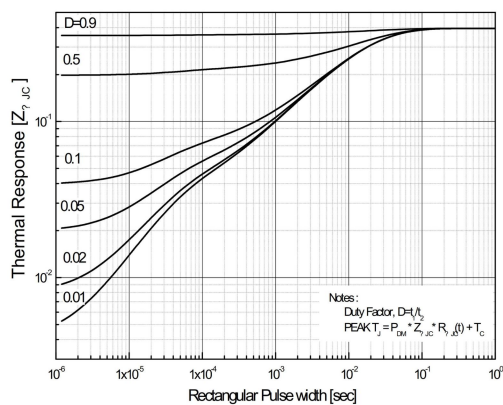


Fig.29 IGBT Transient Thermal Impedance

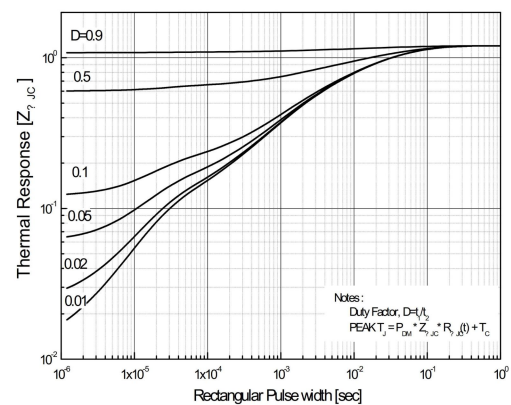


Fig.30 FRD Transient Thermal Impedance

Package Mechanical DATA

