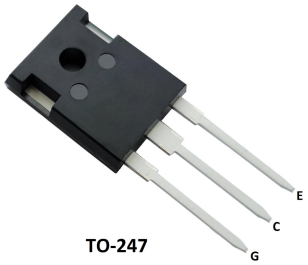
Features

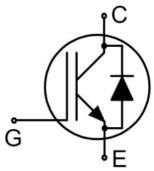
- Fast Switching & Low $V_{CE[sat]}$
- High Input Impedance
- VCE(sat) = 1.7V
- High Input Impedance
- Short circuit withstand time 5 μs



TO-247

Applications

- PFC
- UPS
- Inverter
- Welding Machine



Absolute Maximum Ratings

Parameter		Symbol	Value	Unit
Collector-emitter voltage		V_{CES}	650	V
Gate-emitter voltage		V_{GES}	±20	
Collector curre	T_C=25°C	I_C	80	A
	T_C=100°C		40	
Pulsed collector current, pulse time limited by Tjmax		I_{CM}	120	
Diode forward current @ T_C = 100°C		I_F	40	
Diode pulsed current, Pulse time limited by Tjmax		I_{FM}	120	
Power dissipati	T_C=25°C	P_D	375	W
Operating Junction and storage temperature rang		T_J	-55 to175	°C
		T_{stg}	-55 to175	

① These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heat sink, assuming maximum junction temperature of $T_{J(MAX)}$=175°C.

② The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient.

Electrical Characteristics (Tc =25°C unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static Characteristics						
Collector-emitter breakdown voltag	BV_{CES}	I_C = 500 μ A, V_{GE} = 0V	650	-	-	V
Gate-emitter threshold voltage	$V_{GE(th)}$	V_{CE} = V_{GE}, I_C = 250 μ A	4.0	5.0	6.0	
Zero gate voltage collector current	I_{CES}	V_{CE} = 650V, V_{GE} = 0V	-		1000	uA
Gate-emitter leakage current	I_{GES}	V_{GE} = 20V, V_{CE} = 0V	-	-	±100	nA

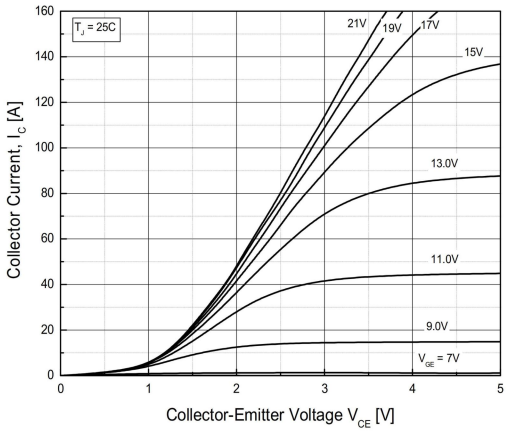
Collector-emitter saturation voltage	$V_{CE(sat)}$	I_C = 30A V_{GE} = 15V T_C = 25°C	-	1.7	-	V
Dynamic and Switching Characteristi						
Total gate charg	Q_g	V_{CE} = 520V, I_C = 40A, V_{GE} = 15V	-	219	-	nC
Gate emitter charge	Qge		-	26	-	nC
Gate Collector Charge	Qgc		-	115	-	nC
Input capacitanc	C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz	-	2900	-	pF
Reverse transfer capacitanc	C_{res}		-	131	-	
Output capacitance	C_{oes}		-	210	-	
Turn-on delay time	$t_{d(on)}$	V_{GE} = 15V, V_{CC} = 400V, I_C = 40A, R_G = 7.9Ω, Inductive Load, T_C = 25°C	-	58	-	nS
Rise tim	t_r		-	54	-	
Turn-off delay time	$t_{d(off)}$		-	245	-	
Fall time	tf		-	40	-	
Turn-on switching energy	E_{on}		-	1.15	-	mJ
Turn-off switching energy	E_{off}		-	0.35	-	
Total switching energ	E_{ts}		-	1.5	-	
Turn-on delay time	$t_{d(on)}$	V_{GE} = 15V, V_{CC} = 400V, I_C = 40A, R_G = 7.9Ω, Inductive Load, T_C = 125°C	-	61	-	nS
Rise tim	tr		-	60	-	
Turn-off delay time	$t_{d(off)}$		-	260	-	
Fall time	t_f		-	38	-	
Turn-on switching energy	E_{on}		-	1.8	-	mJ
Turn-off switching energ	E_{off}		-	0.38	-	
Total switching energ	E_{ts}		-	2.18	-	
Diode Characteristics (Tc =25°C unless otherwise specified)						
Forward voltag	V_F	I_F=20A,T_C=25℃	-	1.4	-	V
Reverse recovery time	t_{rr}	I_F=40A,di/dt=1000A/μS T_C=25℃	-	80	-	nS
Reverse recovery current	I_{rr}		-	25	-	A
Reverse recovery charge	Q_{rr}		-	1	-	uC

Thermal Characteristics

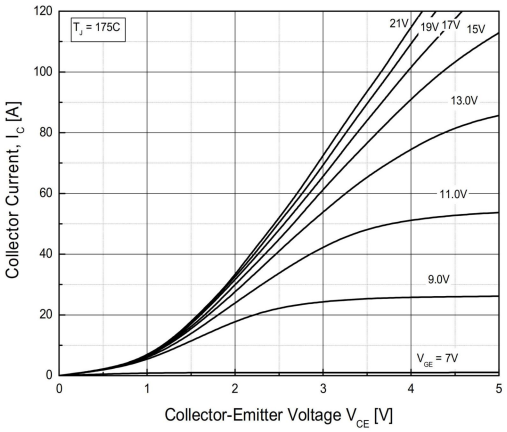
Parameter	Symbol	Value	Unit
Thermal resistance junction-to-ambien	$R_{\theta JA}$	40	°C/W
Thermal resistance junction-to-case for IGBT	$R_{\theta JC}$	0.4	
Thermal resistance junction-to-case for Diod	$R_{\theta JC}$	1.2	

Typical Performance Characteristic

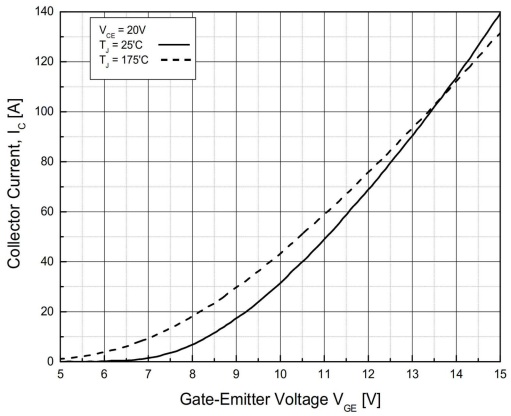
Typical Output Characteristics(T_J=25℃)



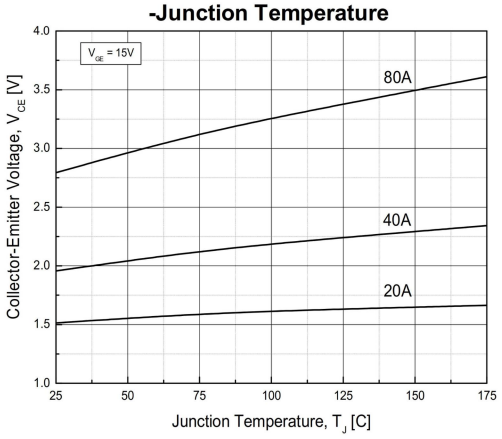
Typical Output Characteristics(T_J=175℃)



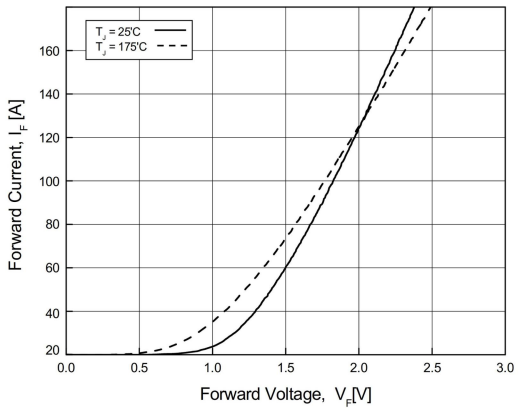
Typical Transfer Characteristics



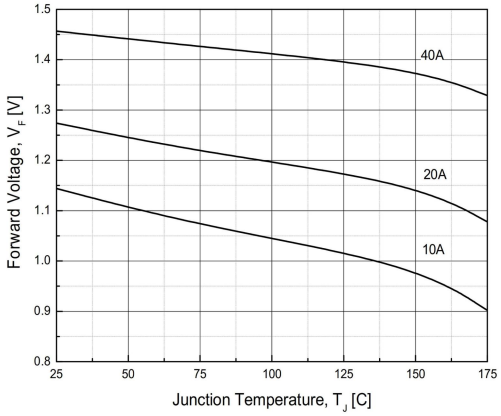
Typical Collector-Emitter Saturation Voltage -Junction Temperature



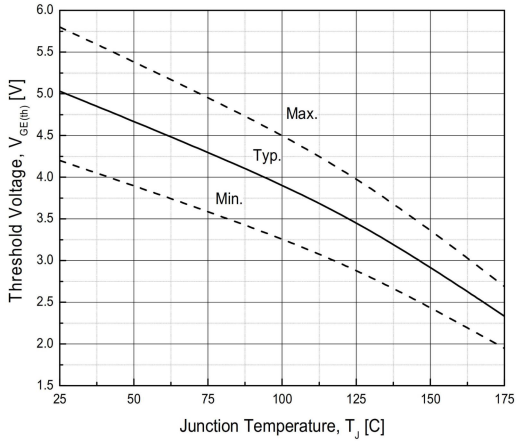
Diode Forward Characteristics



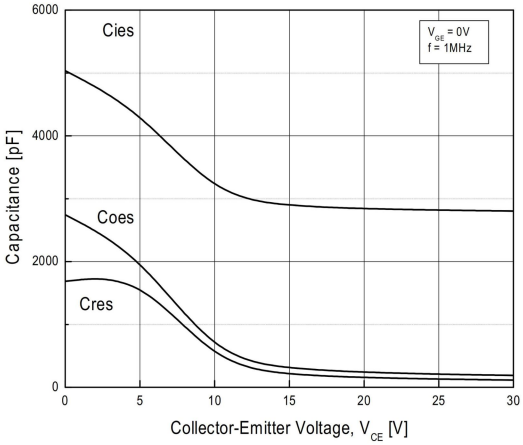
Diode Forward-Junction Temperature



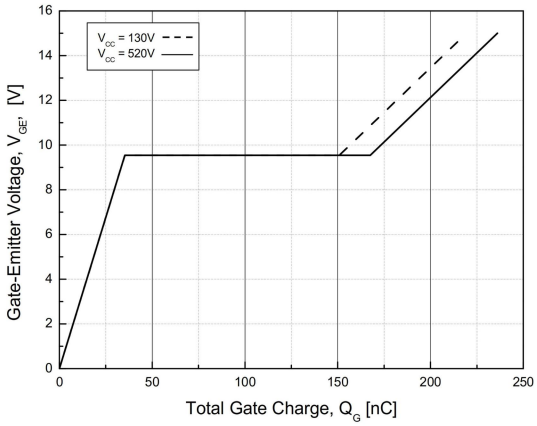
Threshold Voltage-Junction Temperature



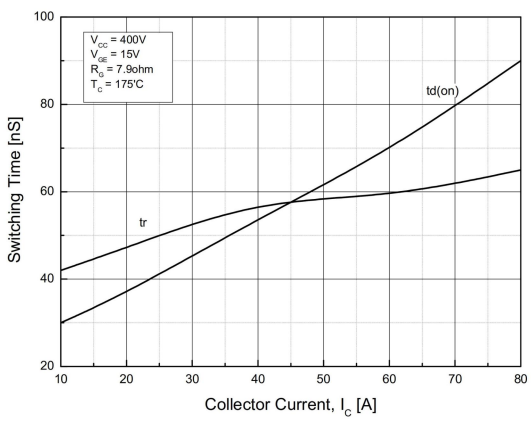
Typical Capacitance



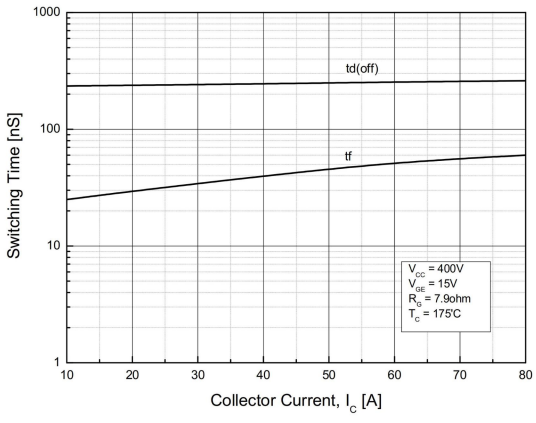
Typical Gate Charge



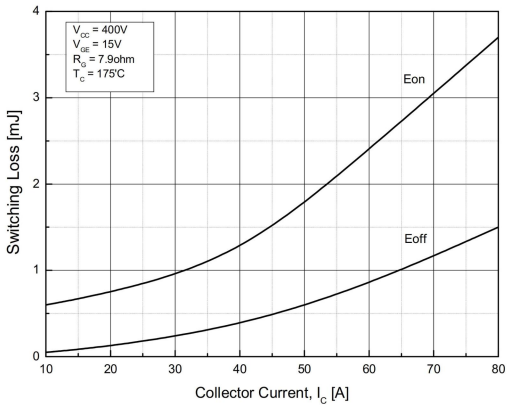
Typical Turn on-Collector Current



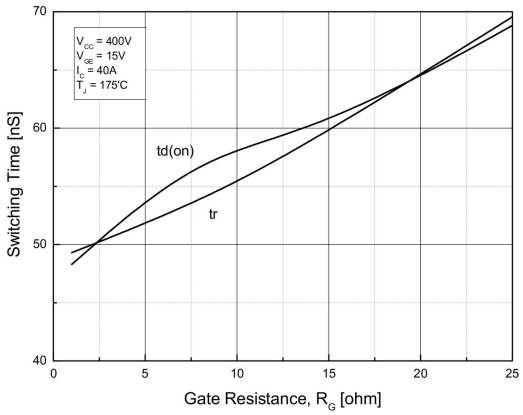
Typical Turn off-Collector Current



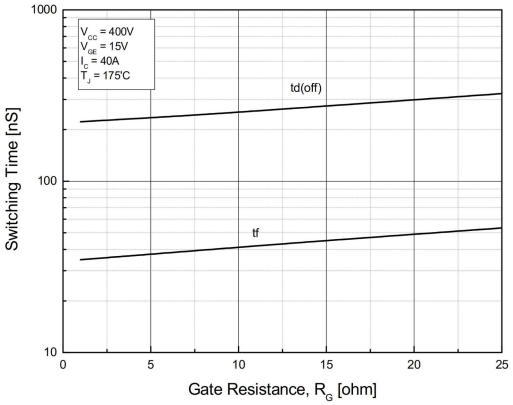
Switching Loss-Collector Current



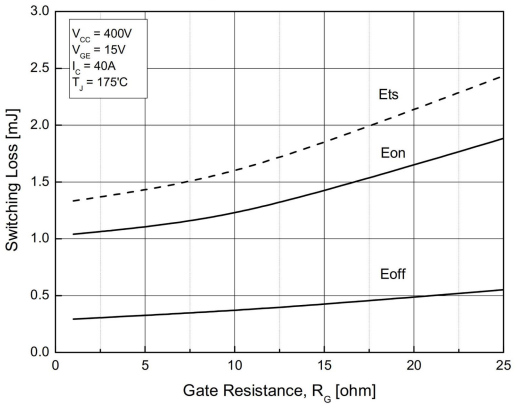
Turn on Characteristics-Gate Resistance



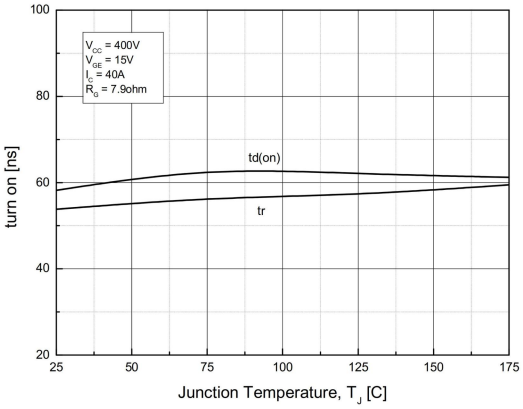
Turn off Characteristics-Gate Resistance



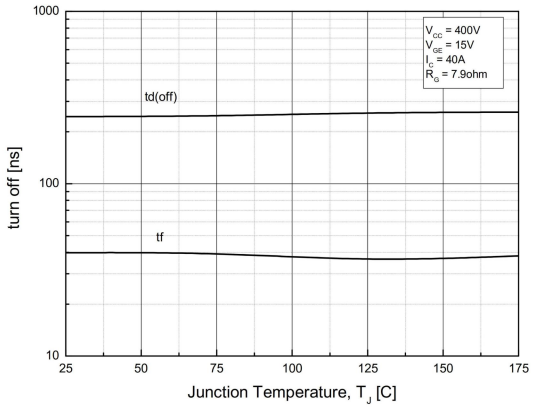
Switching Loss-Gate Resistance



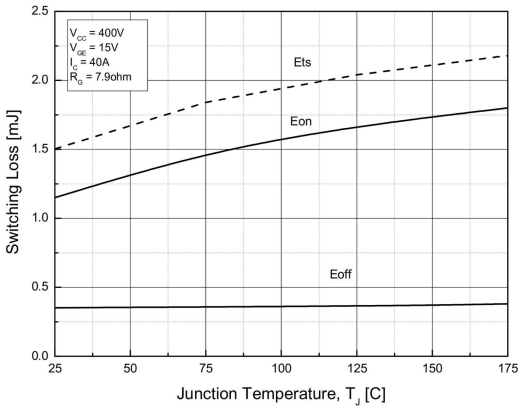
Turn on Characteristics -Junction Temperature



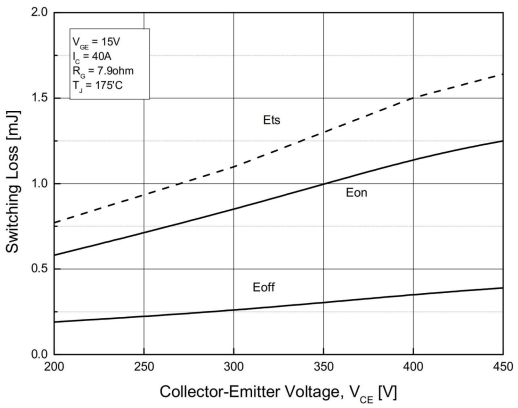
Turn off Characteristics -Junction Temperature



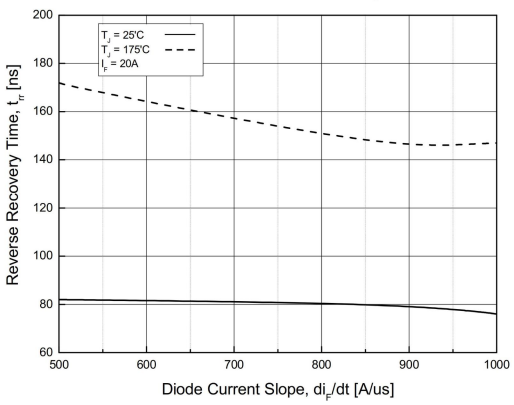
Switching Loss-Junction Temperature



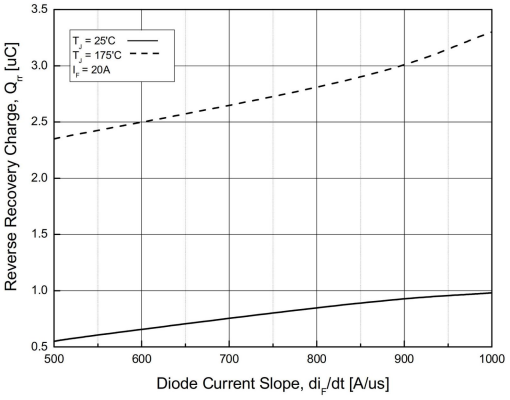
Switching Loss-Collector Emitter Voltage



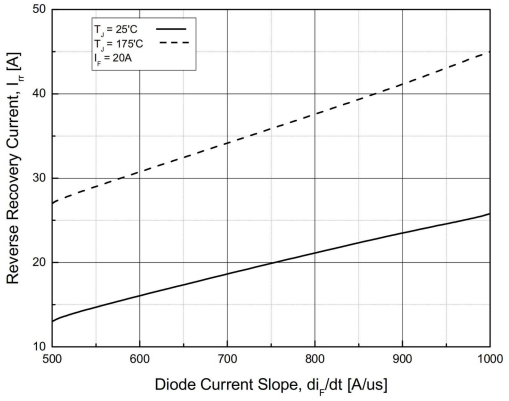
Reverse Recovery Time
-Diode Current Slope



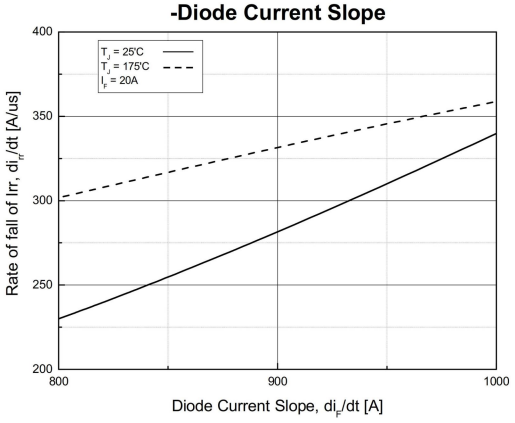
Reverse Recovery Charge
-Diode Current Slope



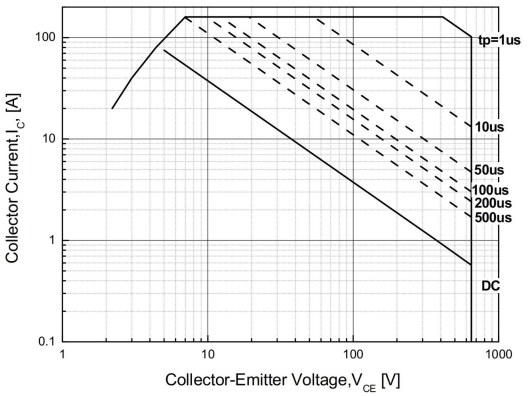
Reverse Recovery Current
-Diode current slope



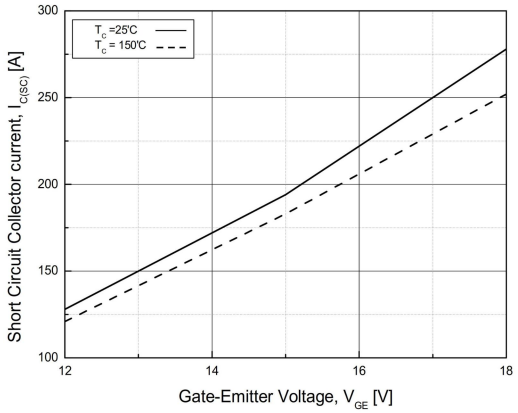
Rate of fall of reverse recovery current
-Diode Current Slope



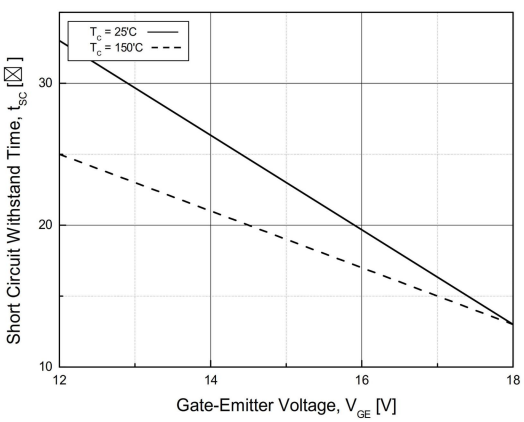
Forward Bias Safe Operating Area



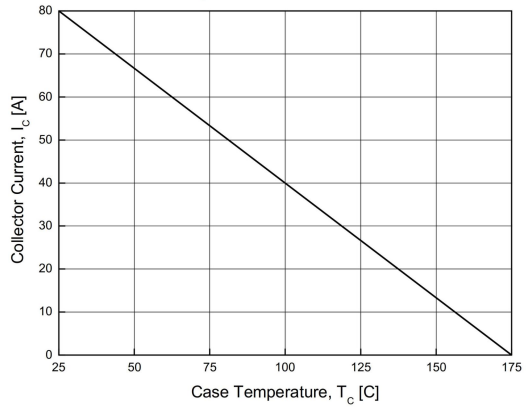
Typical Short Circuit Collector Current



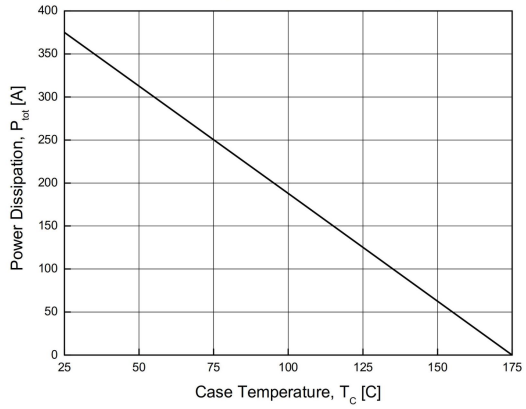
Typical Short Circuit Withstand Time



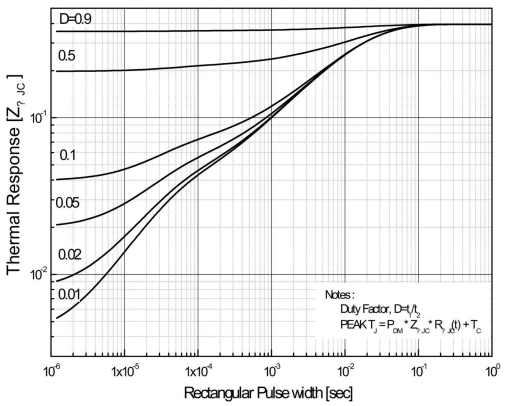
Case Temperature-Collector Current



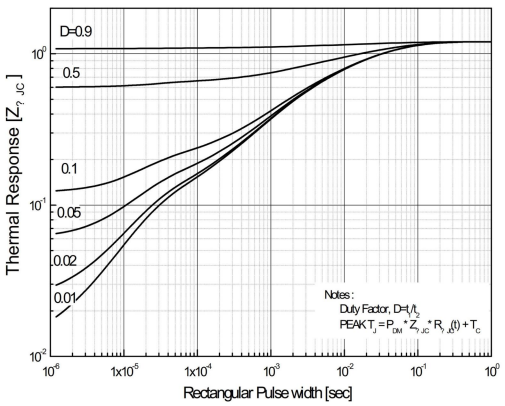
Power Dissipation-Case Temperature



IGBT Transient Thermal Impedance



FRD Transient Thermal Impedance



Package outline dimension