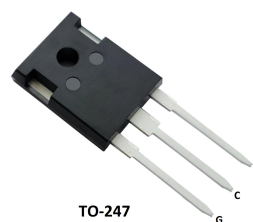


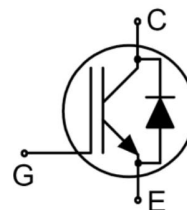
Features

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



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 current	$T_C = 25^\circ C$	I_C	80	A
	$T_C = 100^\circ C$		40	
Pulsed collector current, pulse time limited by T_{jmax}		I_{CM}	120	
Diode forward current @ $T_C = 100^\circ C$		I_F	40	
Diode pulsed current, Pulse time limited by T_{jmax}		I_{FM}	120	
Power dissipation	$T_C = 25^\circ C$	P_D	375	W
Operating Junction and storage temperature rang		T_J	-55 to 175	$^\circ C$
		T_{stg}	-55 to 175	

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 $T_{J(MAX)} = 175^\circ C$.

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 ($T_C = 25^\circ C$ unless otherwise specified)

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

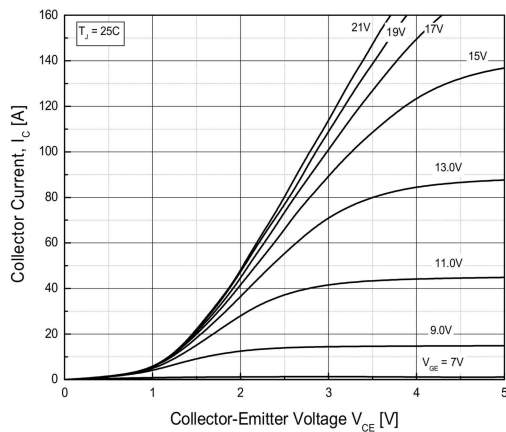
Collector-emitter saturation voltage	V _{CE(sat)}	I _C = 30A V _{GE} = 15V T _C = 25°C	-	1.7	-	V
Dynamic and Switching Characteristics						
Total gate charge	Q _g	V _{CE} = 520V, I _C = 40A, V _{GE} = 15V	-	219	-	nC
Gate emitter charge	Q _{ge}		-	26	-	nC
Gate Collector Charge	Q _{gc}		-	115	-	nC
Input capacitance	C _{ies}	V _{CE} = 25V, V _{GE} = 0V, f = 1MHz	-	2900	-	pF
Reverse transfer capacitance	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 time	t _r		-	54	-	
Turn-off delay time	t _{d(off)}		-	245	-	
Fall time	t _f		-	40	-	
Turn-on switching energy	E _{on}		-	1.15	-	mJ
Turn-off switching energy	E _{off}		-	0.35	-	
Total switching energy	E _{is}		-	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 time	t _r		-	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 energy	E _{off}		-	0.38	-	
Total switching energy	E _{ts}		-	2.18	-	
Diode Characteristics (T _C =25°C unless otherwise specified)						
Forward voltage	V _F	I _F =20A,T _C =25°C	-	1.4	-	V
Reverse recovery time	t _{rr}	I _F =40A,di/dt=1000A/μs T _C =25°C	-	80	-	ns
Reverse recovery current	I _{rr}		-	25	-	A
Reverse recovery charge	Q _{rr}		-	1	-	uC

Thermal Characteristics

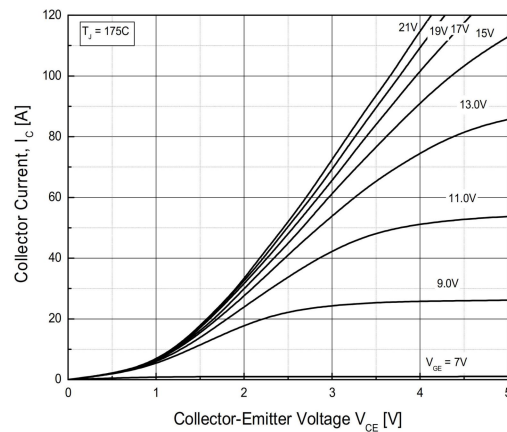
Parameter	Symbol	Value	Unit
Thermal resistance junction-to-ambient	$R_{\theta JA}$	40	$^\circ C/W$
Thermal resistance junction-to-case for IGBT	$R_{\theta JC}$	0.4	
Thermal resistance junction-to-case for Diode	$R_{\theta JC}$	1.2	

Typical Performance Characteristic

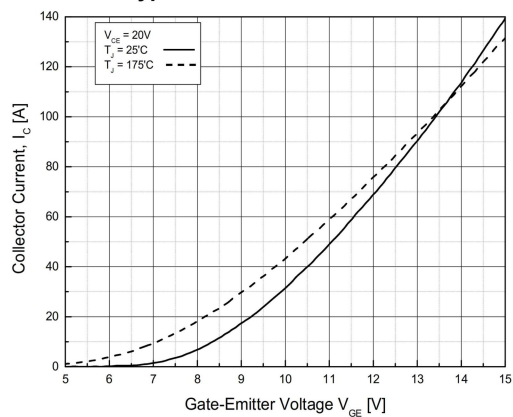
Typical Output Characteristics($T_J=25^\circ\text{C}$)



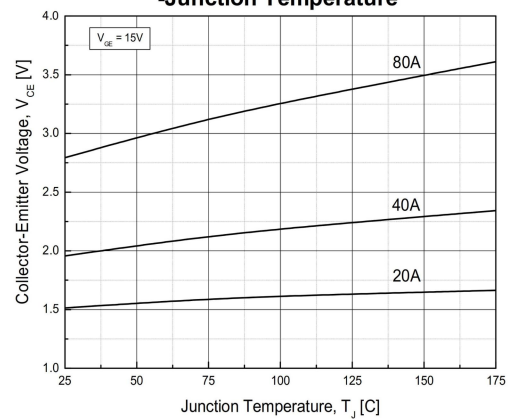
Typical Output Characteristics($T_J=175^\circ\text{C}$)



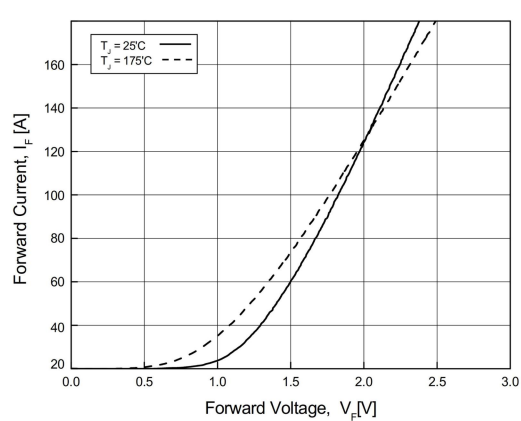
Typical Transfer Characteristics



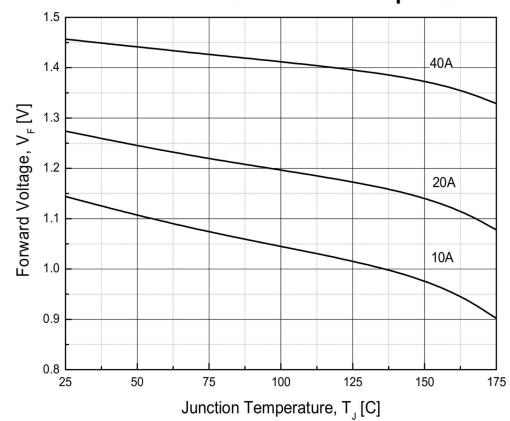
Typical Collector-Emmitter Saturation Voltage -Junction Temperature



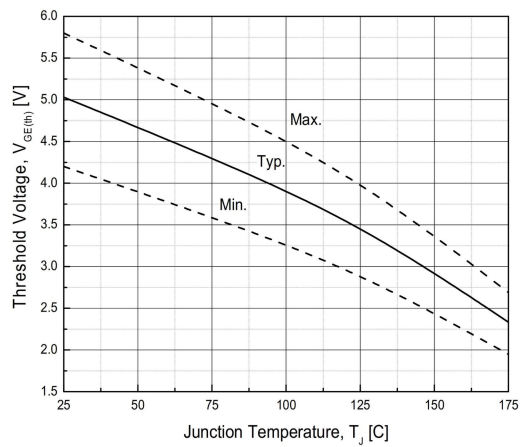
Diode Forward Characteristics



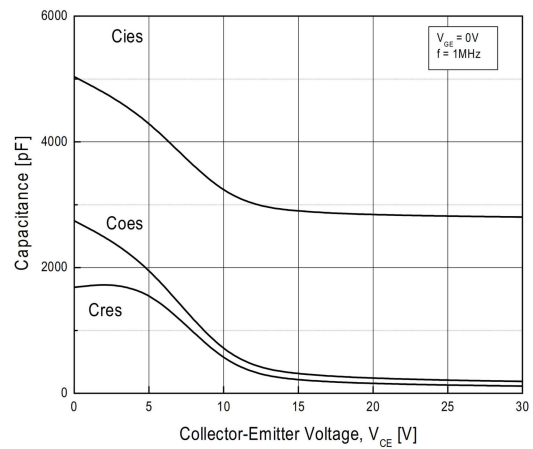
Diode Forward-Junction Temperature



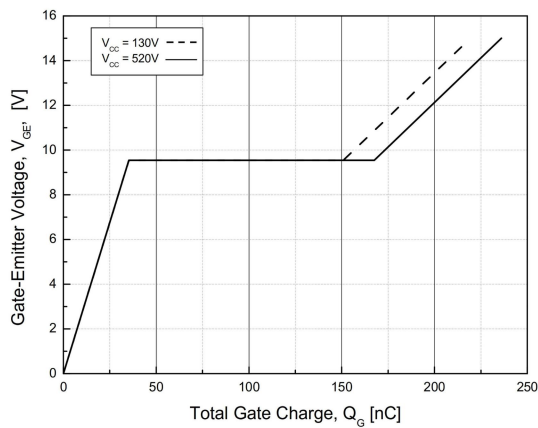
Threshold Voltage-Junction Temperature



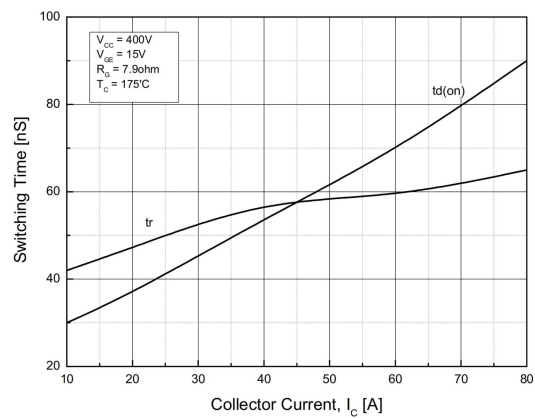
Typical Capacitance



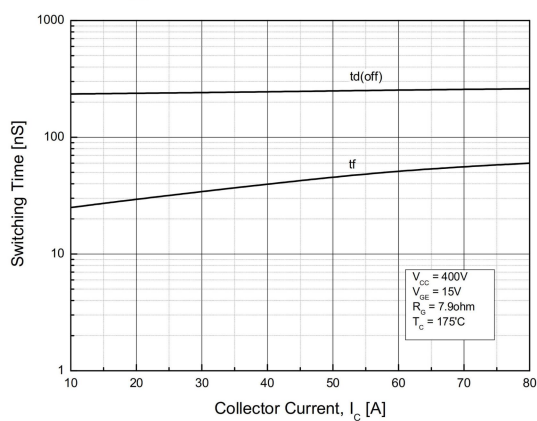
Typical Gate Charge



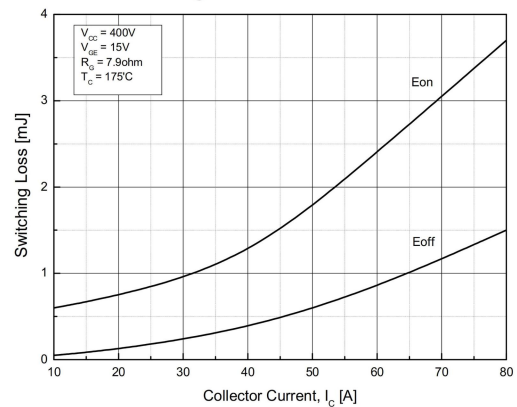
Typical Turn on-Collector Current

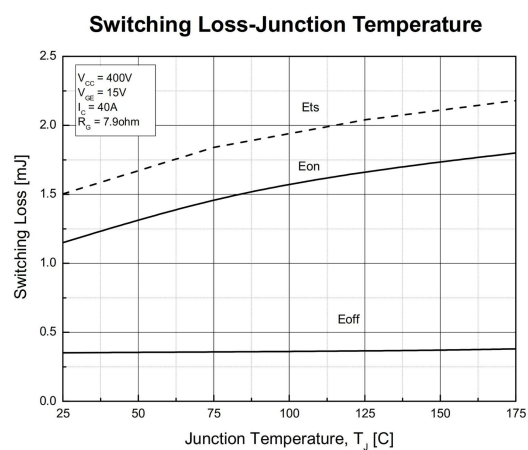
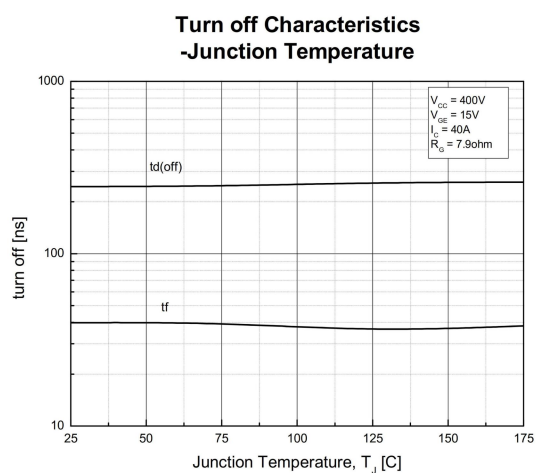
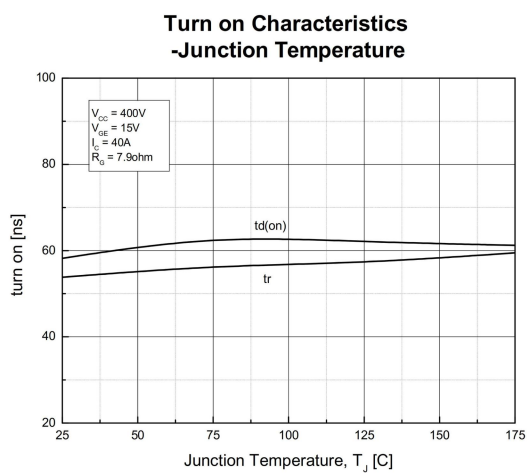
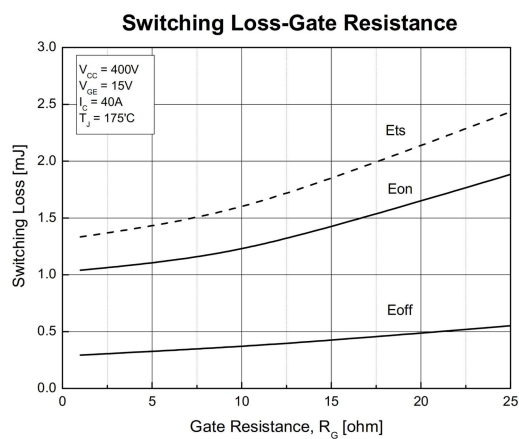
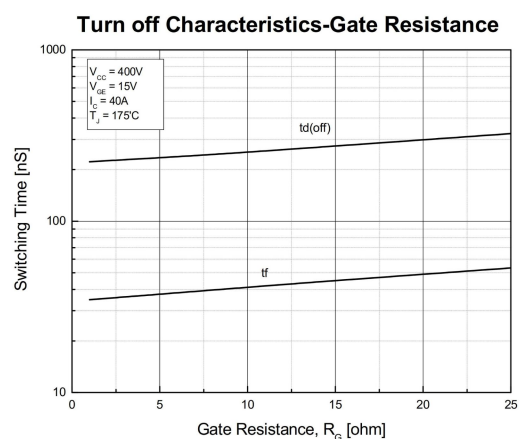
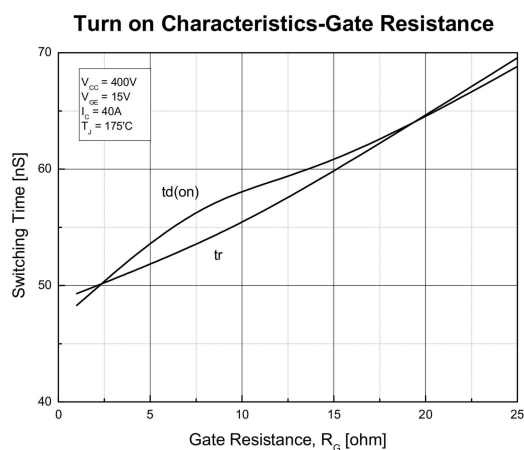


Typical Turn off-Collector Current

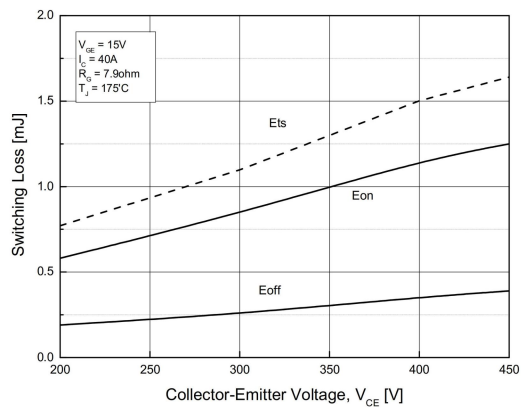


Switching Loss-Collector Current

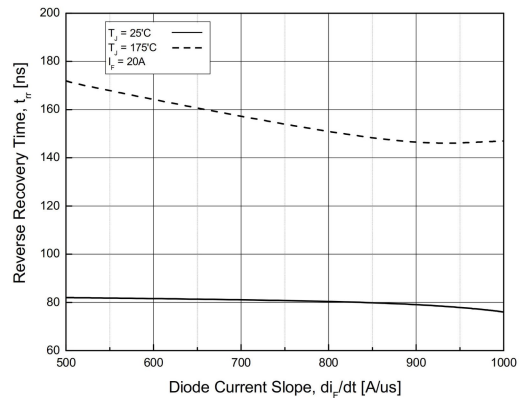




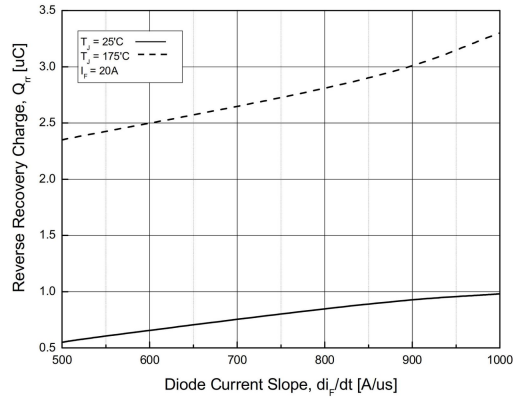
Switching Loss-Collector Emitter Voltage



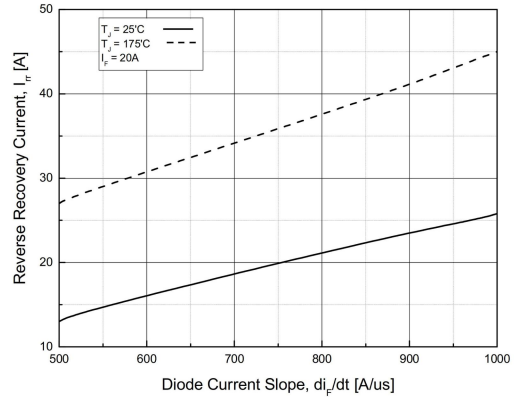
**Reverse Recovery Time
-Diode Current Slope**



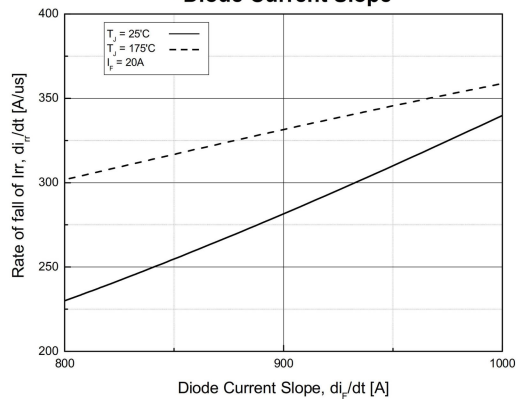
**Reverse Recovery Charge
-Diode Current Slope**



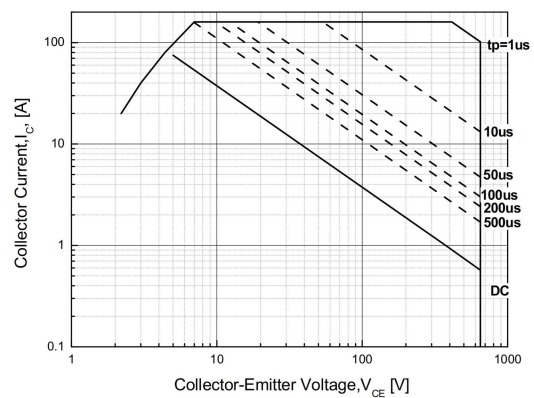
**Reverse Recovery Current
-Diode current slope**



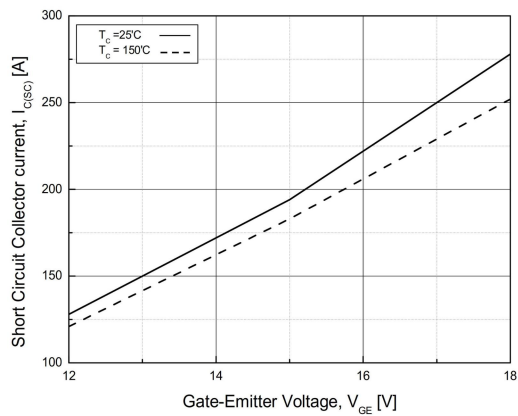
**Rate of fall of reverse recovery current
-Diode Current Slope**



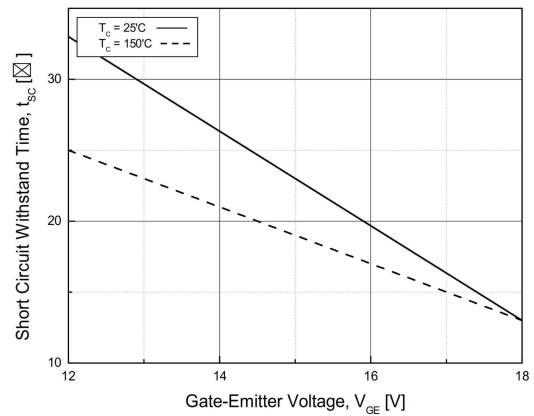
Forward Bias Safe Operating Area



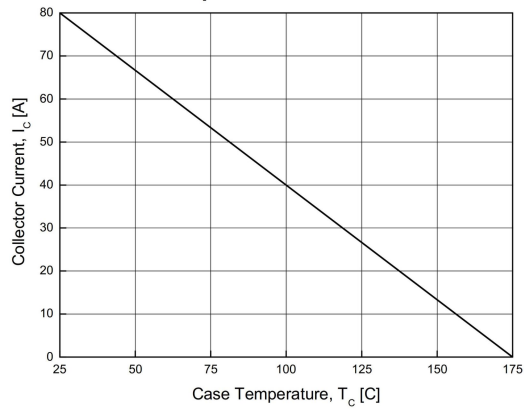
Typical Short Circuit Collector Current



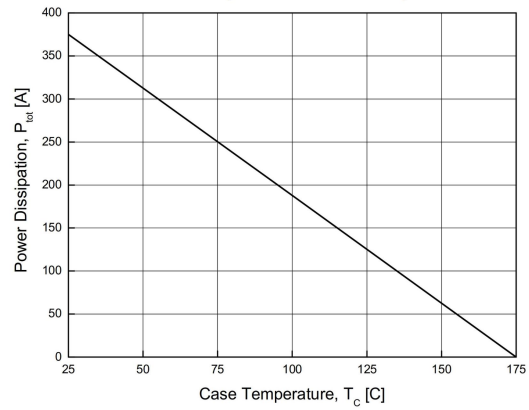
Typical Short Circuit Withstand Time



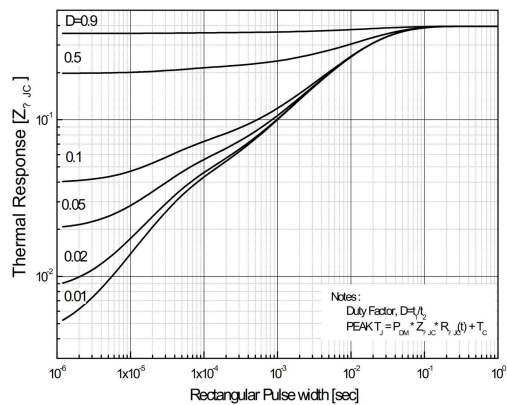
Case Temperature-Collector Current



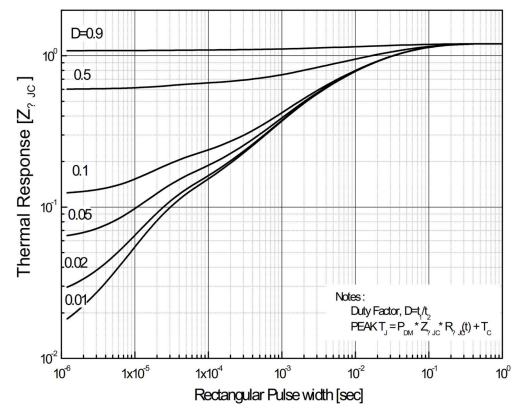
Power Dissipation-Case Temperature



IGBT Transient Thermal Impedance



FRD Transient Thermal Impedance



Package outline dimension

