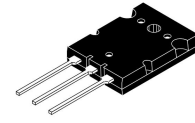


## Features

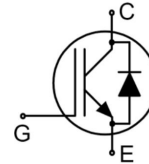
- Extremely Efficient Trench with Field Stop Technology
- $T_{Jmax} = 175^{\circ}C$
- Soft Fast Reverse Recovery Diode
- Optimized for High Speed Switching
- 10 $\mu$ s Short Circuit Capability



TO-264

## Applications

- Solar Inverter
- UPS



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

Parameter	Symbol	Value	Unit
Collector-Emmitter Voltage	$V_{CES}$	1200	V
Collector Current-continuous	$I_c$ $T=25^{\circ}C$ $T=100^{\circ}C$	100	A
		50	A
Collector Current-pulse(note 1)	$I_{CM}$	200	A
Diode Continuous forward current	$I_F$ $T=100^{\circ}C$	50	A
Diode Maximum Forward Current (Note 1)	$I_{FM}$	200	A
Gate-Emmitter Voltage	$V_{GES}$	$\pm 20$	V
Short Circuit Withstand Time	tsc	10	us
Power Dissipation( $T_c=25^{\circ}C$ )	$P_D$ $T_c=25^{\circ}C$ $T_c=100^{\circ}C$	535	W
Power Dissipation( $T_c=100^{\circ}C$ )		267	W
Operating Temperature Range	$T_J$	-55~+175	$^{\circ}C$
Storage Temperature Range	$T_{STG}$	-55~+175	$^{\circ}C$
Maximum Lead Temperature for Soldering Purposes	$T_L$	260	$^{\circ}C$

## Electrical Characteristic ( $T_C=25^{\circ}C$ unless otherwise noted )

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
<b>Off-Characteristics</b>						
Collector-Emmitter Voltage	$BV_{CES}$	$I_c=500\mu A, V_{GE}=0V$	1200	-	-	V

Zero Gate Voltage Collector Current	$I_{CES}$	$V_{CE}=1200V, V_{GE}=0V$	-	-	0.1	mA	
		$T_C=175^{\circ}C$			2.0	mA	
Gate-body leakage current	$I_{GES}$	$V_{CE}=0V, V_{GE}=\pm 20V$	-	-	$\pm 200$	nA	
<b>On-Characteristics</b>							
Gate-Emmitter Threshold Voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}, I_C=250\mu A$	4.5	5.5	6.5	V	
Collector-Emmitter saturation Voltage	$V_{CESAT}$	$V_{GE}=15V, I_C=50A,$ $V_{GE}=15V, I_C=50A,$ $T_J=175^{\circ}C$	-	2.20	2.40	V	
				2.60			
<b>Dynamic Characteristics</b>							
Input capacitance	$C_{ies}$	$V_{CE}=20V,$ $V_{GE}=0V,$ $f=1.0MHz,$ $T_C=25^{\circ}C$	-	7383	-	pF	
Output capacitance	$C_{oes}$		-	233	-	pF	
Reverse transfer capacitance	$C_{res}$		-	139	-	pF	
Total Gate Charge	$Q_g$	$V_{CE}=600V, I_C=50A,$ $V_{GE}=15V, T_C=25^{\circ}C$	-	311	-	nC	
Gate to emitter charge	$Q_{ge}$		-	64	-		
Gate to collector charge	$Q_{gc}$		-	155	-		
<b>Switching Characteristics</b>							
Turn-On delay time	$t_d(on)$	$V_{CC}=600V, I_C=50A,$ $R_G=10\Omega, V_{GE}=15V$ Inductive load $T_C=25^{\circ}C$	-	118	-	ns	
Turn-On rise time	$t_r$		-	48	-	ns	
Turn-off delay time	$t_d(off)$		-	282	-	ns	
Turn-off Fall time	$t_f$		-	113	-	ns	
Turn-on switching loss	$E_{on}$		-	4.40	-	mJ	
Turn-off switching loss	$E_{off}$		-	1.40	-	mJ	
Total switching loss	$E_{ts}$		-	5.80	-	mJ	
Turn-On delay time	$t_d(on)$		$V_{CC}=600V, I_C=50A,$ $R_G=10\Omega, V_{GE}=15V$ Inductive load $T_C=175^{\circ}C$	-	114	-	ns
Turn-On rise time	$t_r$			-	49	-	ns
Turn-off delay time	$t_d(off)$			-	298	-	ns
Turn-off Fall time	$t_f$	-		243	-	ns	
Turn-on switching loss	$E_{on}$	-		5.65	-	mJ	
Turn-off switching loss	$E_{off}$	-		3.26	-	mJ	
Total switching loss	$E_{ts}$	-		8.91	-	mJ	
<b>Anti-Paraller Diode Characteristics and Maximum Ratings</b>							
Diode Forward Voltage	$V_F$	$V_{GE}=0V, I_F=50A.$	-	2.00	2.60	V	
		$T_J=175^{\circ}C$		2.55			

Diode Reverse recovery time	$t_{rr}$	$V_R=400V, I_F=50A$ $di_F/dt=200A/us$ $T_J=25^\circ C$	-	256	-	ns
Reverse recovery charge	$Q_{rr}$		-	2.7	-	$\mu C$
Diode Reverse recovery Current	$I_{rrm}$		-	19	-	A
Diode Reverse recovery time	$t_{rr}$	$V_R=400V, I_F=50A$ $di_F/dt=200A/us$ $T_J=175^\circ C$	-	400	-	ns
Reverse recovery charge	$Q_{rr}$		-	5.75	-	$\mu C$
Diode Reverse recovery Current	$I_{rrm}$		-	27	-	A

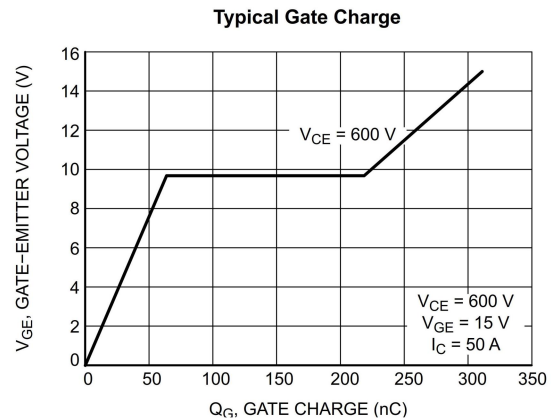
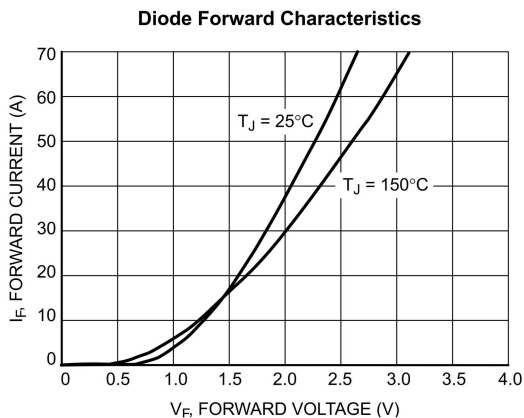
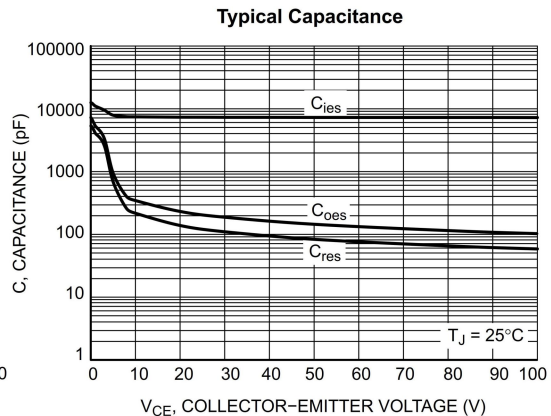
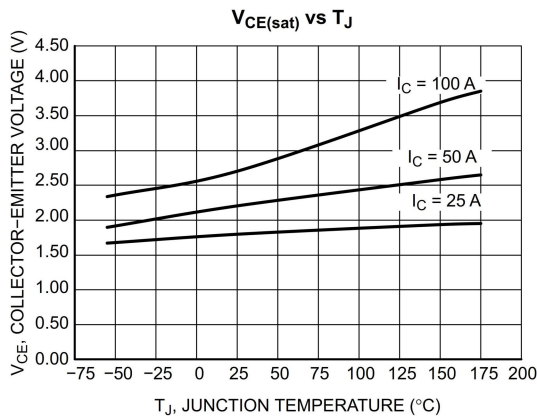
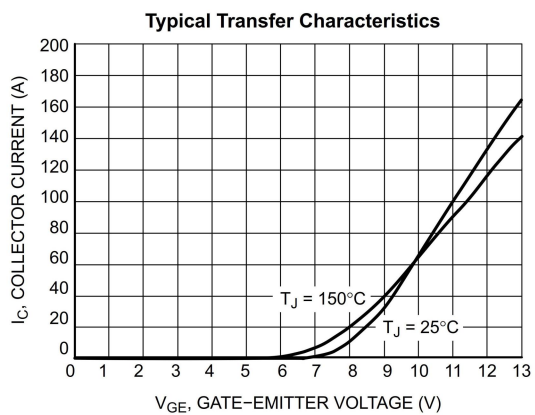
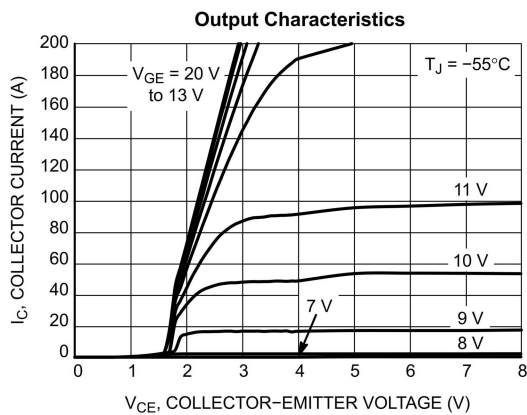
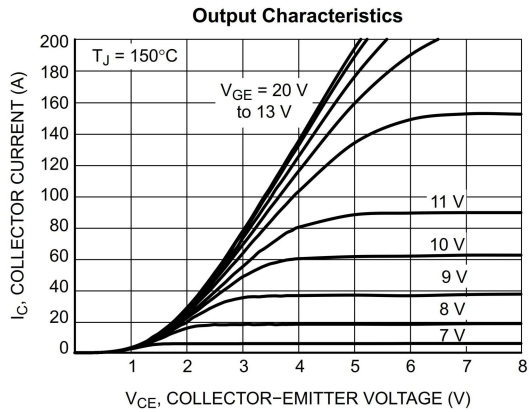
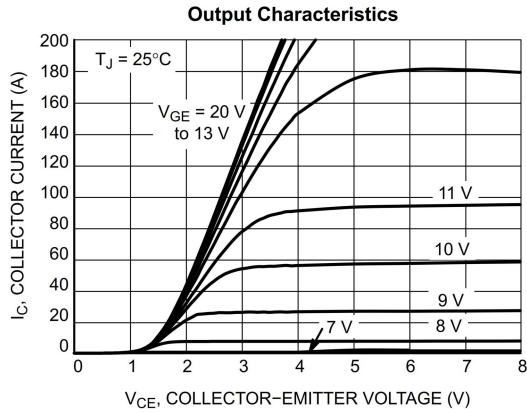
## Thermal Characteristics

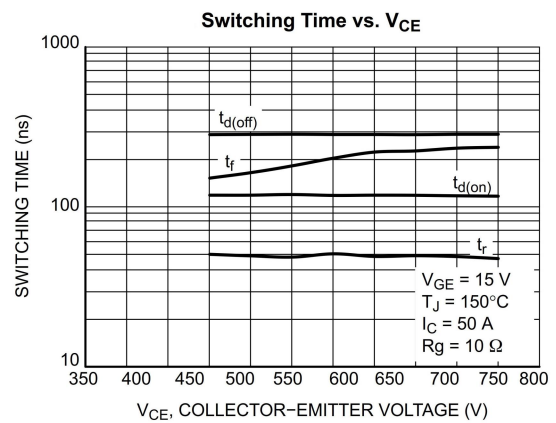
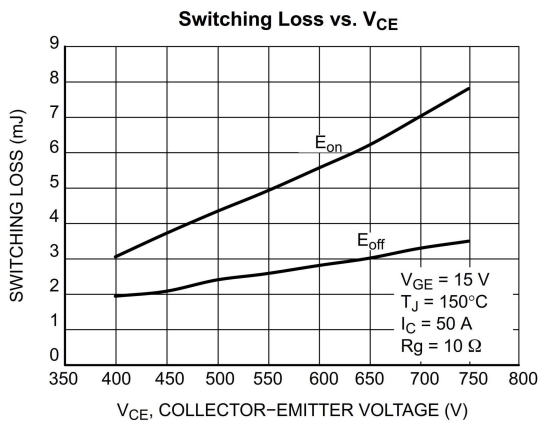
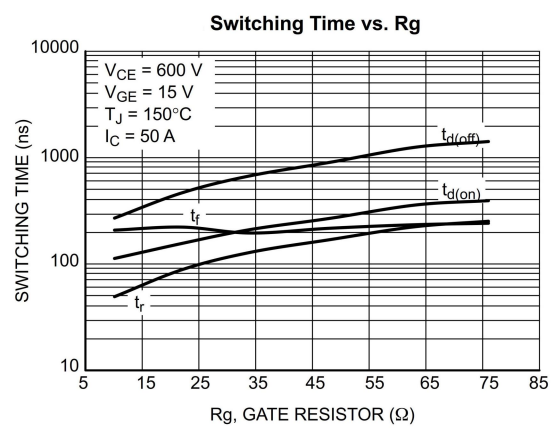
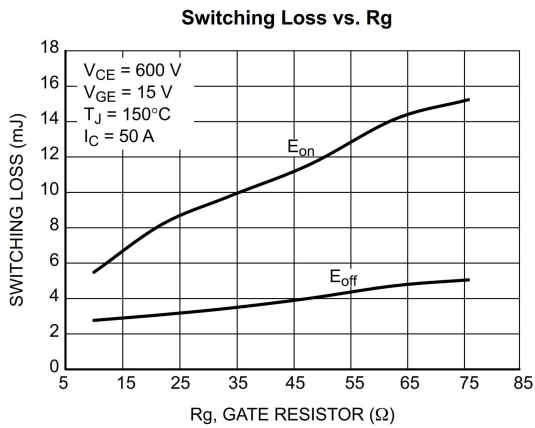
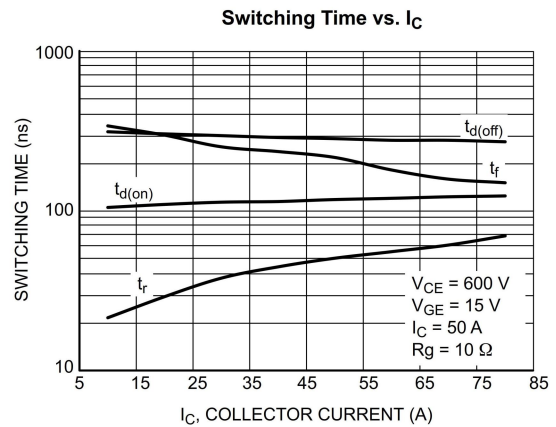
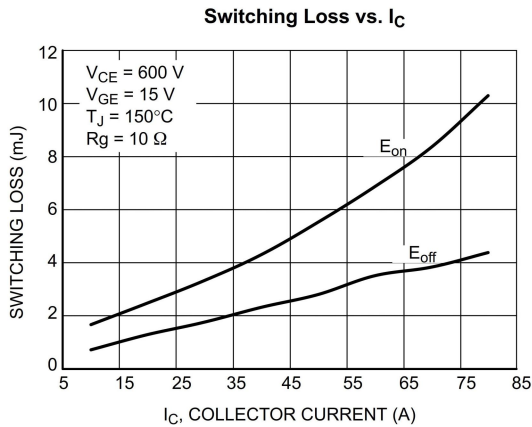
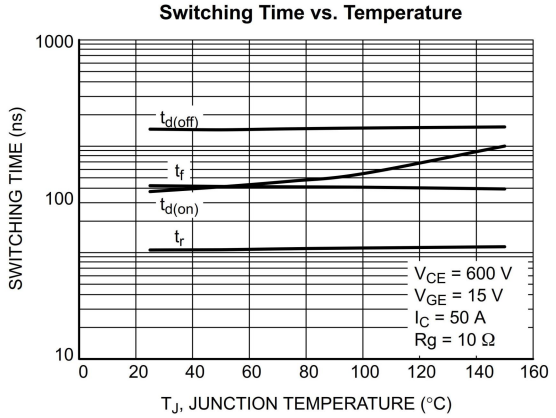
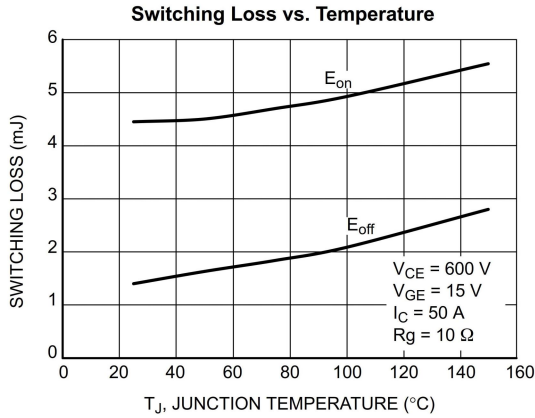
Symbol	Parameter	Max	Units
$R_{th\ j-c}$	Thermal Resistance, Junction to case for IGBT	0.28	$^\circ C/W$
$R_{th\ j-c}$	Thermal Resistance, Junction to case for Diode	0.5	$^\circ C/W$
$R_{th\ j-a}$	Thermal Resistance, Junction to Ambient	40	$^\circ C/W$

Notes:

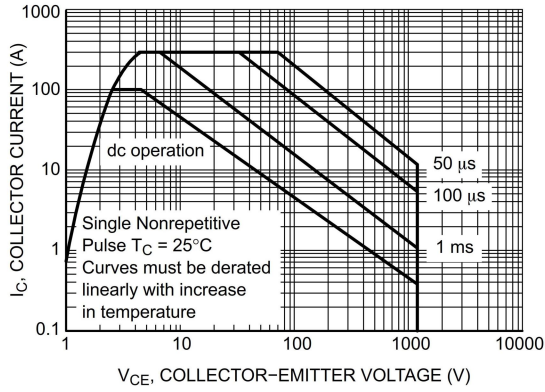
1: . Repetitive Rating: Pulse width limited by maximum junction temperature

## Electrical Characteristics (curves)

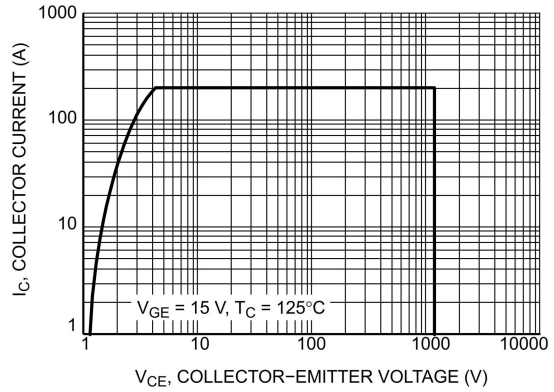




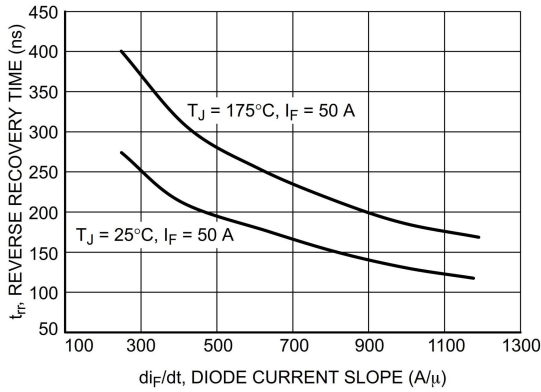
**Safe Operating Area**



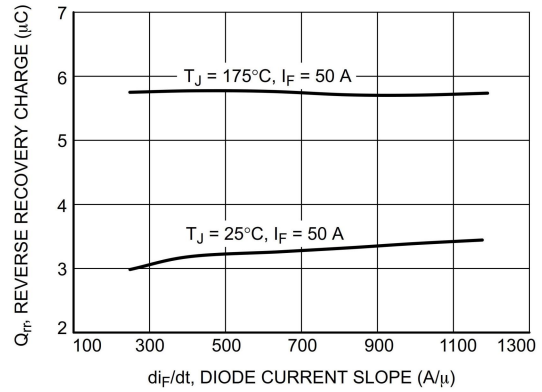
**Reverse Bias Safe Operating Area**



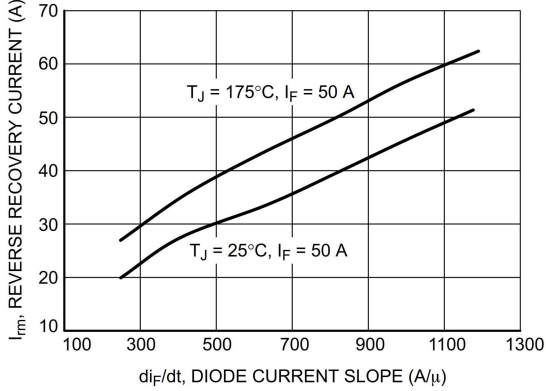
**$t_{rr}$  vs.  $di_F/dt$  ( $V_R = 400\text{ V}$ )**



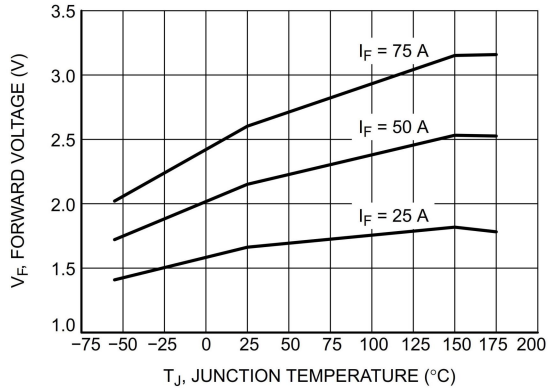
**$Q_{rr}$  vs.  $di_F/dt$  ( $V_R = 400\text{ V}$ )**



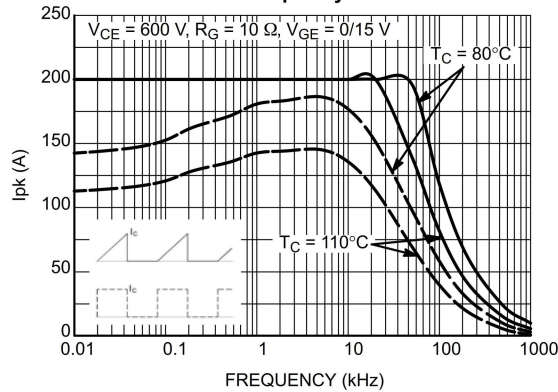
**$I_{rm}$  vs.  $di_F/dt$  ( $V_R = 400\text{ V}$ )**



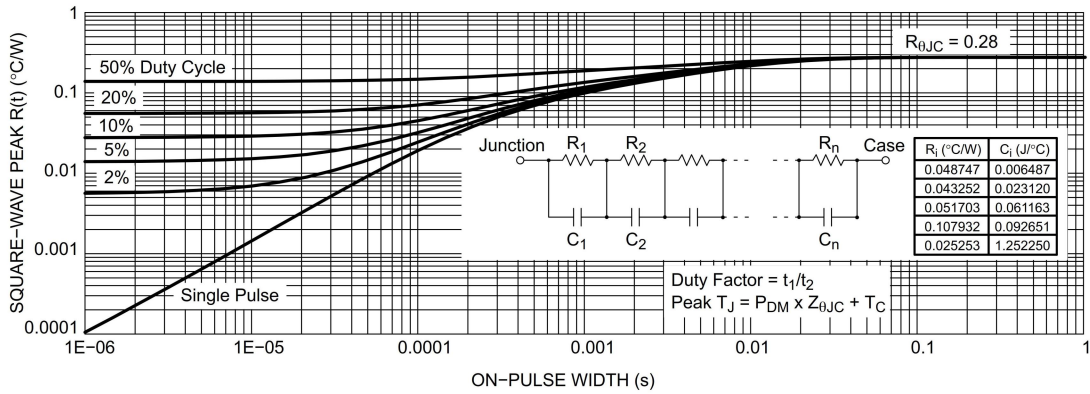
**$V_F$  vs.  $T_J$**



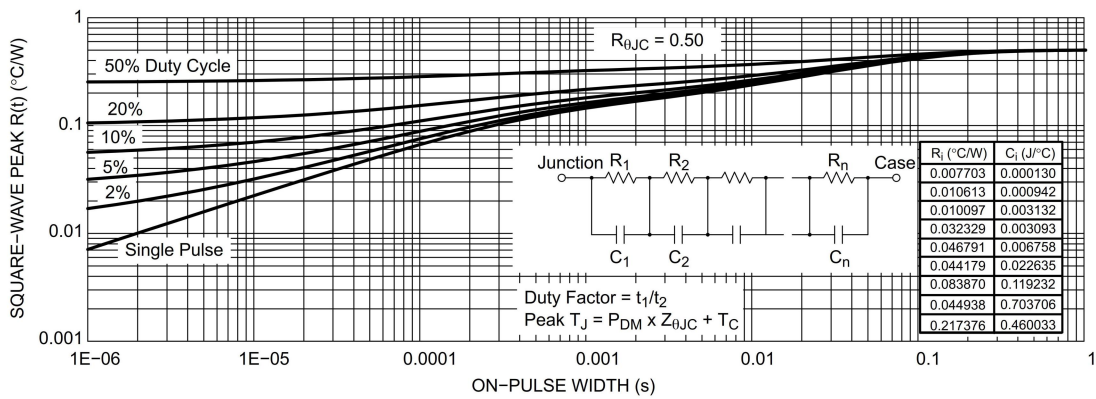
**Collector Current vs. Switching Frequency**



### IGBT Transient Thermal Impedance



### Diode Transient Thermal Impedance



## Package Mechanical DATA

