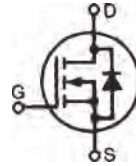


# HiPerFAST™ IGBT

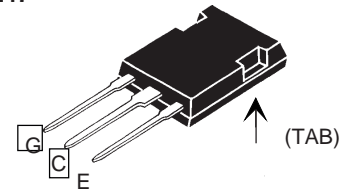
**IXGK 120N60B**  
**IXGX 120N60B**

$V_{CES} = 600 \text{ V}$   
 $I_{C25} = 200 \text{ A}$   
 $V_{CE(sat)} = 2.1 \text{ V}$

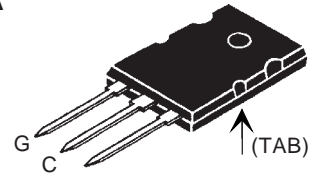


Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$	600	V
$V_{CGR}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GS} = 1 \text{ M}\Omega$	600	V
$V_{CES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^\circ\text{C}$	200	A
$I_{C90}$	$T_C = 90^\circ\text{C}$	120	A
$I_{L(RMS)}$	External lead limit	76	A
$I_{CM}$	$T_C = 25^\circ\text{C}$ , 1 ms	300	A
<b>SSOA</b> <b>(RBSOA)</b>	$V_{GE} = 15 \text{ V}$ , $T_{VJ} = 125^\circ\text{C}$ , $R_G = 2.4 \Omega$ Clamped inductive load	$I_{CM} = 200$ @ $0.8 V_{CES}$	A
$P_C$	$T_C = 25^\circ\text{C}$	660	W
$T_J$		-55 ... +150	$^\circ\text{C}$
$T_{JM}$		150	$^\circ\text{C}$
$T_{stg}$		-55 ... +150	$^\circ\text{C}$
$T_L$	1.6 mm (0.063 in.) from case for 10 s	300	$^\circ\text{C}$
$M_d$	Mounting torque	TO-264	0.4/6 Nm/lb.in.
<b>Weight</b>		PLUS 247	6 g
		TO-264	10 g

**PLUS 247™**  
**(IXGX)**



**TO-264 AA**  
**(IXGK)**



G = Gate                      E = Emitter  
C = Collector                TAB = Collector

## Features

- International standard packages
- Very high current, fast switching IGBT
- Low  $V_{CE(sat)}$ 
  - for minimum on-state conduction losses
- MOS Gate turn-on
  - drive simplicity

## Applications

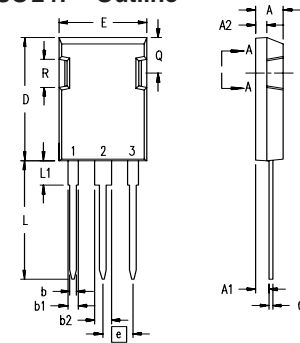
- AC motor speed control
- DC servo and robot drives
- DC choppers
- Uninterruptible power supplies (UPS)
- Switch-mode and resonant-mode power supplies

## Advantages

- PLUS 247™ package for clip or spring mounting
- Space savings
- High power density

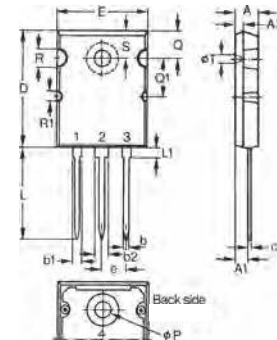
Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$BV_{CES}$	$I_C = 1 \text{ mA}$ , $V_{GE} = 0 \text{ V}$	600		V
$V_{GE(th)}$	$I_C = 1 \text{ mA}$ , $V_{CE} = V_{GE}$	2.5		5.5 V
$I_{CES}$	$V_{CE} = V_{CES}$ , $V_{GE} = 0 \text{ V}$			200 $\mu\text{A}$ 2 mA
	$T_J = 25^\circ\text{C}$			
	$T_J = 125^\circ\text{C}$			
$I_{GES}$	$V_{CE} = 0 \text{ V}$ , $V_{GE} = \pm 20 \text{ V}$			$\pm 400 \text{ nA}$
$V_{CE(sat)}$	$I_C = I_{C90}$ , $V_{GE} = 15 \text{ V}$			2.1 V

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$g_{fs}$	$I_C = 60\text{ A}; V_{CE} = 10\text{ V}$ , Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $\leq 2\%$	50	75	S
$C_{ies}$	$V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 1\text{ MHz}$		11000	pF
$C_{oes}$			680	pF
$C_{res}$			190	pF
$Q_g$	$I_C = I_{C90}, V_{GE} = 15\text{ V}, V_{CE} = 0.5 V_{CES}$		350	nC
$Q_{ge}$			72	nC
$Q_{gc}$			131	nC
$t_{d(on)}$	<b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b> $I_C = 100\text{ A}, V_{GE} = 15\text{ V}$ $V_{CE} = 0.8 V_{CES}, R_G = R_{off} = 2.4\ \Omega$ Remarks: Switching times may increase for $V_{CE}(\text{Clamp}) > 0.8 \cdot V_{CES}$ , higher $T_J$ or increased $R_G$		60	ns
$t_{ri}$			45	ns
$E_{on}$			2.4	mJ
$t_{d(off)}$			200	360 ns
$t_{fi}$			160	280 ns
$E_{off}$			5.5	9.6 mJ
$t_{d(on)}$	<b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b> $I_C = 100\text{ A}, V_{GE} = 15\text{ V}$ $V_{CE} = 0.8 V_{CES}, R_G = R_{off} = 2.4\ \Omega$ Remarks: Switching times may increase for $V_{CE}(\text{Clamp}) > 0.8 \cdot V_{CES}$ , higher $T_J$ or increased $R_G$		60	ns
$t_{ri}$			60	ns
$E_{on}$			4.8	mJ
$t_{d(off)}$			290	ns
$t_{fi}$			250	ns
$E_{off}$			8.7	mJ
$R_{thJC}$			0.19	K/W
$R_{thCK}$		0.15		K/W

**PLUS 247™ Outline**


Terminals: 1 - Gate  
2 - Drain (Collector)  
3 - Source (Emitter)  
4 - Drain (Collector)

Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.83	5.21	.190	.205
A <sub>1</sub>	2.29	2.54	.090	.100
A <sub>2</sub>	1.91	2.16	.075	.085
b	1.14	1.40	.045	.055
b <sub>1</sub>	1.91	2.13	.075	.084
b <sub>2</sub>	2.92	3.12	.115	.123
C	0.61	0.80	.024	.031
D	20.80	21.34	.819	.840
E	15.75	16.13	.620	.635
e	5.45 BSC		.215 BSC	
L	19.81	20.32	.780	.800
L1	3.81	4.32	.150	.170
Q	5.59	6.20	.220	0.244
R	4.32	4.83	.170	.190

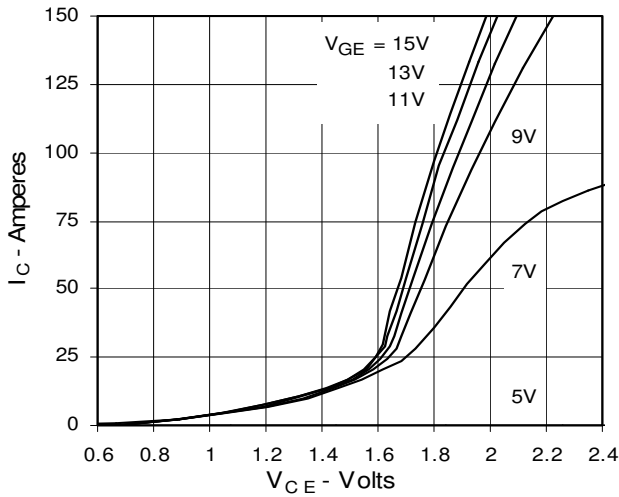
**TO-264 AA Outline**


Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.82	5.13	.190	.202
A1	2.54	2.89	.100	.114
A2	2.00	2.10	.079	.083
b	1.12	1.42	.044	.056
b1	2.39	2.69	.094	.106
b2	2.90	3.09	.114	.122
c	0.53	0.83	.021	.033
D	25.91	26.16	1.020	1.030
E	19.81	19.96	.780	.786
e	5.46 BSC		.215 BSC	
J	0.00	0.25	.000	.010
K	0.00	0.25	.000	.010
L	20.32	20.83	.800	.820
L1	2.29	2.59	.090	.102
P	3.17	3.66	.125	.144
Q	6.07	6.27	.239	.247
Q1	8.38	8.69	.330	.342
R	3.81	4.32	.150	.170
R1	1.78	2.29	.070	.090
S	6.04	6.30	.238	.248
T	1.57	1.83	.062	.072

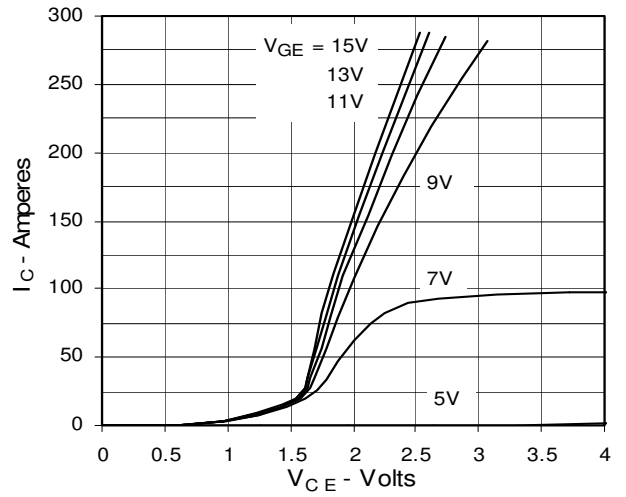
IXYS reserves the right to change limits, test conditions, and dimensions.

IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:	4,835,592	4,931,844	5,049,961	5,237,481	6,162,665	6,404,065 B1	6,683,344	6,727,585
	4,850,072	5,017,508	5,063,307	5,381,025	6,259,123 B1	6,534,343	6,710,405 B2	6,759,692
	4,881,106	5,034,796	5,187,117	5,486,715	6,306,728 B1	6,583,505	6,710,463	

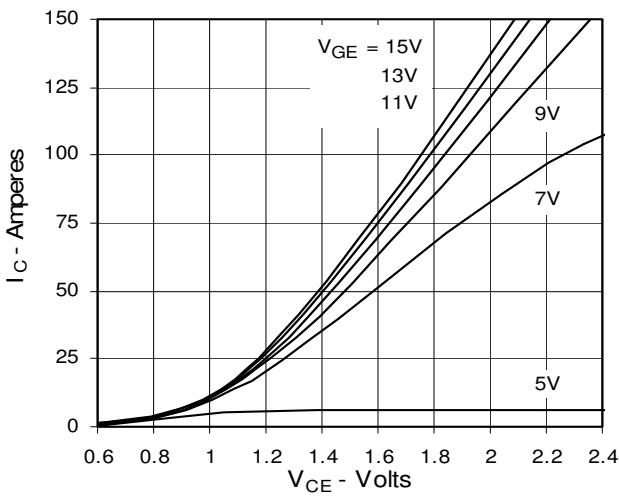
**Fig. 1. Output Characteristics**  
 @ 25 °C



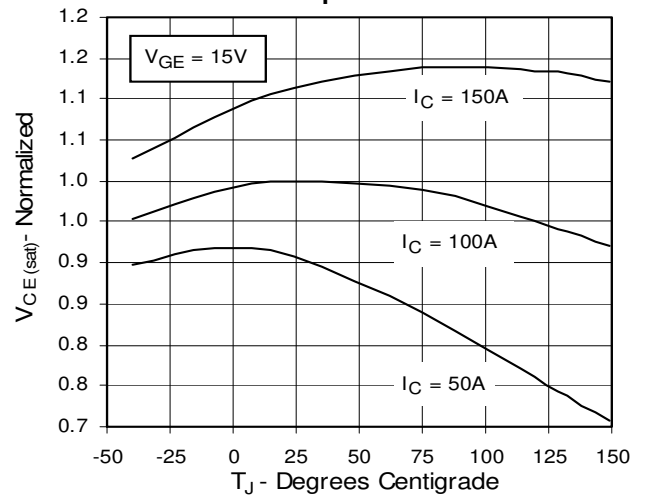
**Fig. 2. Extended Output Characteristics**  
 @ 25 °C



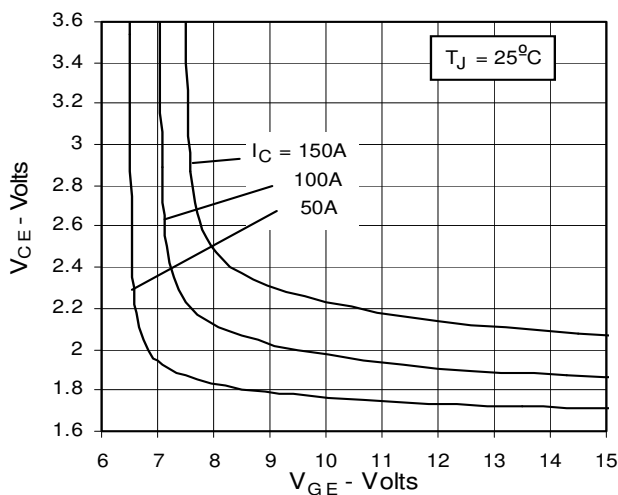
**Fig. 3. Output Characteristics**  
 @ 125 °C



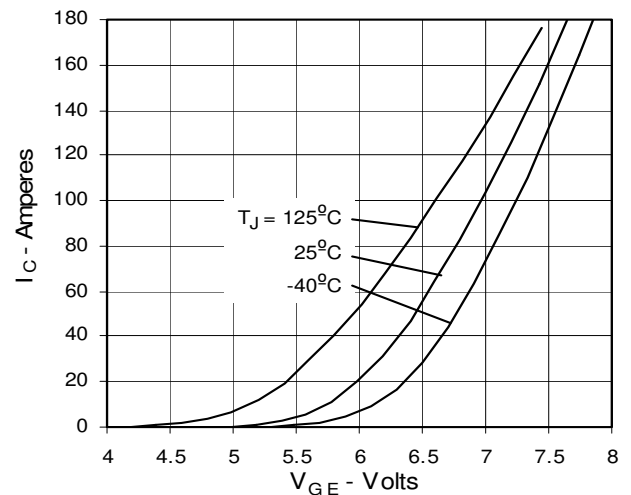
**Fig. 4. Dependence of  $V_{CE(sat)}$  on Temperature**



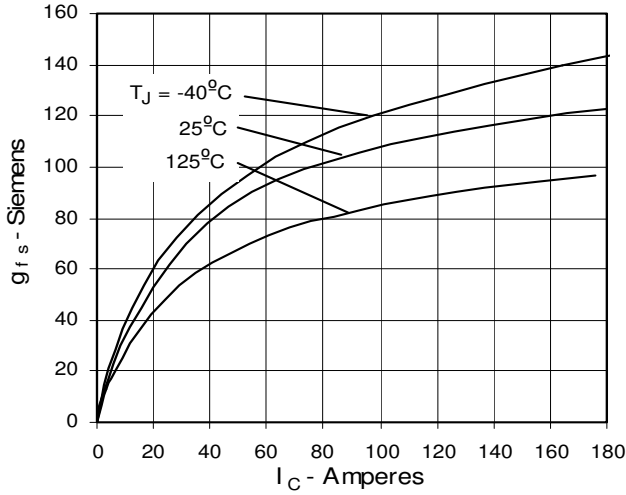
**Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter voltage**



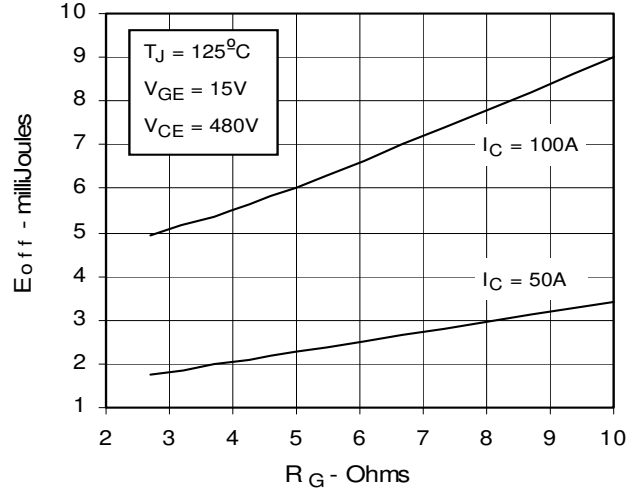
**Fig. 6. Input Admittance**



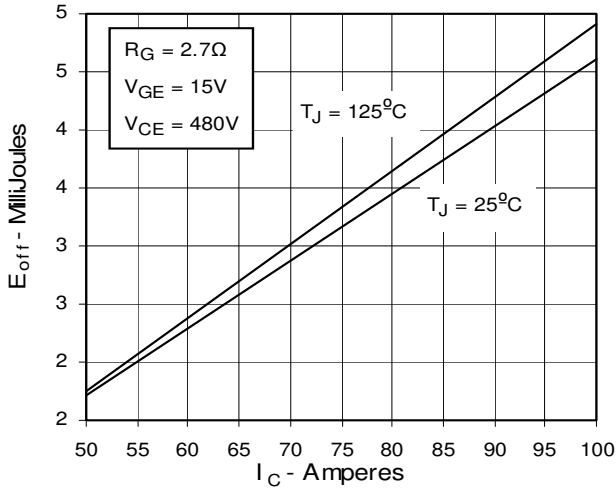
**Fig. 7. Transconductance**



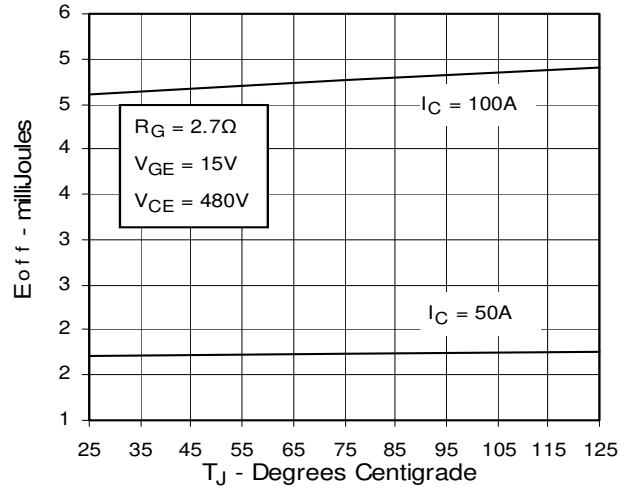
**Fig. 8. Dependence of Turn-off Energy Loss on  $R_G$**



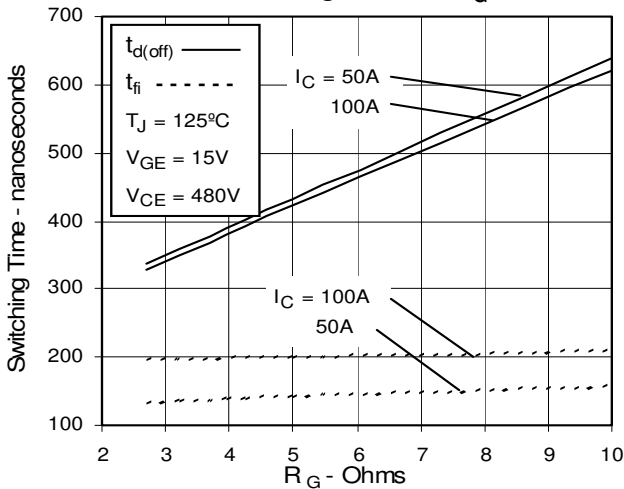
**Fig. 9. Dependence of Turn-Off Energy Loss on  $I_C$**



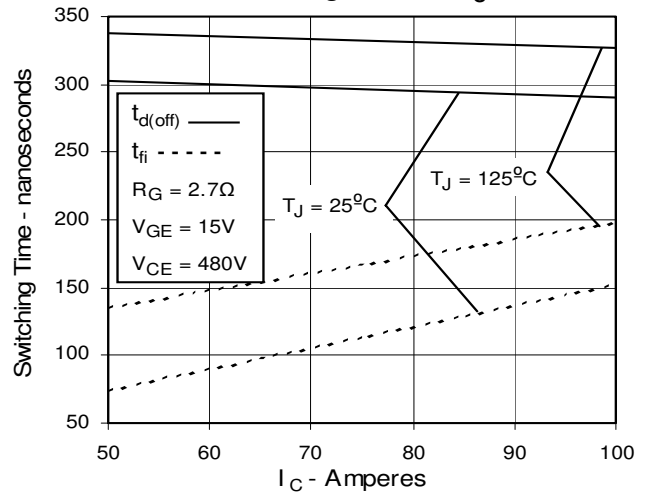
**Fig. 10. Dependence of Turn-off Energy Loss on Temperature**



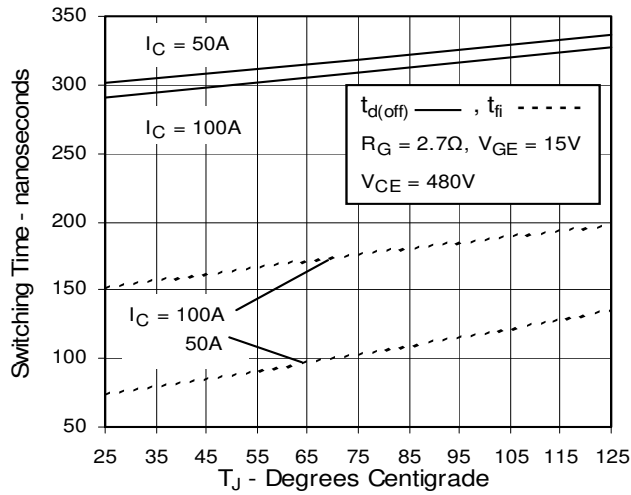
**Fig. 11. Dependence of Turn-off Switching Time on  $R_G$**



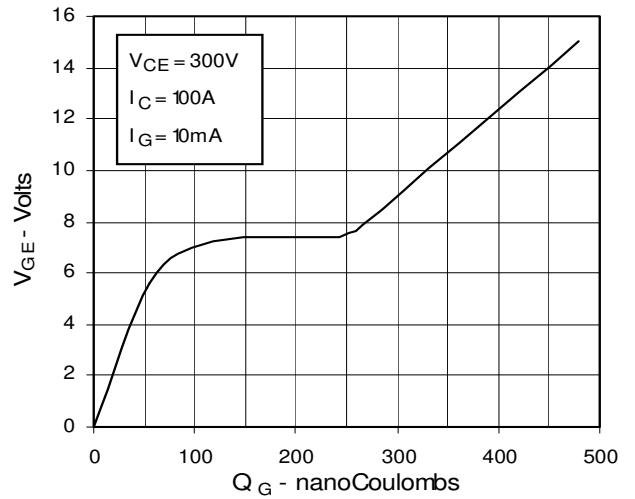
**Fig. 12. Dependence of Turn-off Switching Time on  $I_C$**



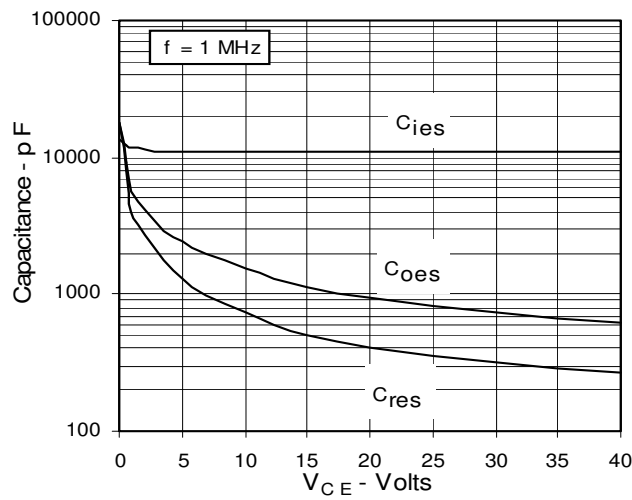
**Fig. 13. Dependence of Turn-off Switching Time on Temperature**



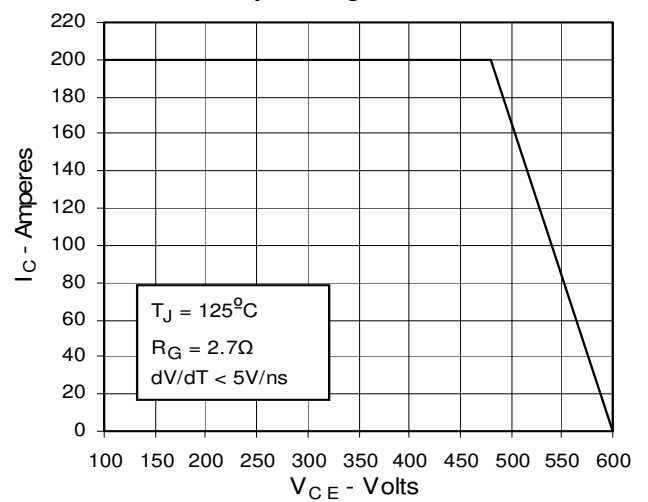
**Fig. 14. Gate Charge**



**Fig. 15. Capacitance**



**Fig. 16. Reverse-Bias Safe Operating Area**



**Fig. 17. Maximum Transient Thermal Resistance**

