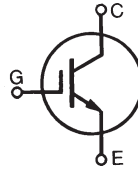


# High Voltage IGBT

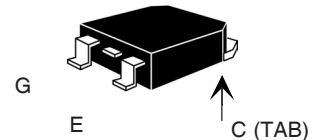
**IXGH 28N120B**  
**IXGT 28N120B**

$V_{CES} = 1200 \text{ V}$   
 $I_{C25} = 50 \text{ A}$   
 $V_{CE(sat)} = 3.5 \text{ V}$   
 $t_{fi(typ)} = 160 \text{ ns}$

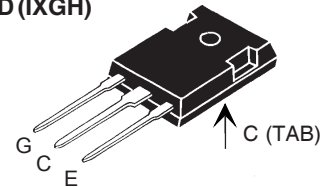


Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_J = 25^\circ\text{C to } 150^\circ\text{C}$	1200	V
$V_{CGR}$	$T_J = 25^\circ\text{C to } 150^\circ\text{C}; R_{GE} = 1 \text{ M}\Omega$	1200	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^\circ\text{C}$	50	A
$I_{C110}$	$T_C = 110^\circ\text{C}$	28	A
$I_{CM}$	$T_C = 25^\circ\text{C}, 1 \text{ ms}$	150	A
<b>SSOA (RBSOA)</b>	$V_{GE} = 15 \text{ V}, T_{VJ} = 125^\circ\text{C}, R_G = 5 \Omega$ Clamped inductive load	$I_{CM} = 120$ @ $0.8 V_{CES}$	A
$P_C$	$T_C = 25^\circ\text{C}$	250	W
$T_J$		-55 ... +150	$^\circ\text{C}$
$T_{JM}$		150	$^\circ\text{C}$
$T_{stg}$		-55 ... +150	$^\circ\text{C}$
Maximum Lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	$^\circ\text{C}$
Maximum Tab temperature for soldering SMD devices for 10 s		260	$^\circ\text{C}$
$M_d$	Mounting torque (M3) (TO-247)	1.13/10Nm/lb.in.	
<b>Weight</b>		TO-247 AD	6 g
		TO-268	4 g

## TO-268 (IXGT)



## TO-247 AD (IXGH)



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

## Features

- High Voltage IGBT for resonant power supplies
  - Induction heating
  - Rice cookers
- International standard packages  
JEDEC TO-268 and  
JEDEC TO-247 AD
- Low switching losses, low  $V_{(sat)}$
- MOS Gate turn-on
  - drive simplicity

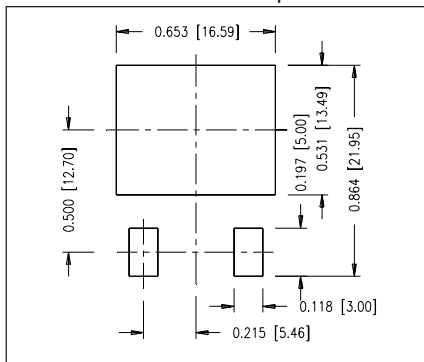
## Advantages

- High power density
- Suitable for surface mounting
- Easy to mount with 1 screw,  
(isolated mounting screw hole)

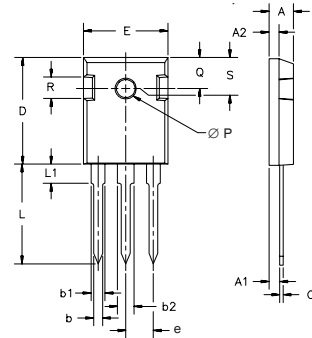
Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$BV_{CES}$	$I_C = 250 \mu\text{A}, V_{GE} = 0 \text{ V}$	1200		V
$V_{GE(th)}$	$I_C = 250 \mu\text{A}, V_{CE} = V_{GE}$	2.5		V
$I_{CES}$	$V_{CE} = V_{CES}, V_{GE} = 0 \text{ V}$ $T_J = 25^\circ\text{C}$			25 $\mu\text{A}$
$I_{GES}$	$V_{CE} = 0 \text{ V}, V_{GE} = \pm 20 \text{ V}$			$\pm 100 \text{ nA}$
$V_{CE(sat)}$	$I_C = 28 \text{ A}, V_{GE} = 15 \text{ V}$ $T_J = 125^\circ\text{C}$	2.8 2.75	3.5	V V

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)			
		min.	typ.	max.	
$g_{fs}$	$I_C = 28\text{A}; V_{CE} = 10\text{V}$ , Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $\leq 2\%$	15	23	S	
$C_{ies}$	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$		1700	pF	
$C_{oes}$			120	pF	
$C_{res}$			45	pF	
$Q_g$	$I_C = 28\text{A}, V_{GE} = 15\text{V}, V_{CE} = 0.5 V_{CES}$		92	nC	
$Q_{ge}$			13	nC	
$Q_{gc}$			35	nC	
$t_{d(on)}$	<b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b> $I_C = 28\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 0.8 V_{CES}, R_G = R_{off} = 5\ \Omega$		30	ns	
$t_{ri}$			20	ns	
$t_{d(off)}$			210	280	ns
$t_{fi}$			170	320	ns
$E_{off}$			2.2	5.0	mJ
$t_{d(on)}$	<b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b> $I_C = 28\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 0.8 V_{CES}, R_G = R_{off} = 5\ \Omega$		35	ns	
$t_{ri}$			28	ns	
$E_{on}$		28N120B	0.3	mJ	
		28N120BD1	1.4	mJ	
$t_{d(off)}$			250	ns	
$t_{fi}$		340	ns		
$E_{off}$		4.6	mJ		
$R_{thJC}$				0.5	KW
$R_{thCK}$	(TO-247)		0.25		KW

### Min Recommended Footprint

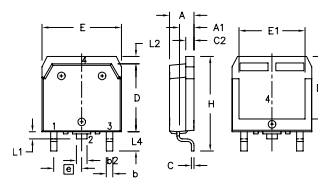


### TO-247 AD Outline



Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.7	5.3	.185	.209
A <sub>1</sub>	2.2	2.54	.087	.102
A <sub>2</sub>	2.2	2.6	.059	.098
b	1.0	1.4	.040	.055
b <sub>1</sub>	1.65	2.13	.065	.084
b <sub>2</sub>	2.87	3.12	.113	.123
C	.4	.8	.016	.031
D	20.80	21.46	.819	.845
E	15.75	16.26	.610	.640
e	5.20	5.72	0.205	0.225
L	19.81	20.32	.780	.800
L <sub>1</sub>		4.50		.177
∅P	3.55	3.65	.140	.144
Q	5.89	6.40	0.232	0.252
R	4.32	5.49	.170	.216
S	6.15	BSC	.242	BSC

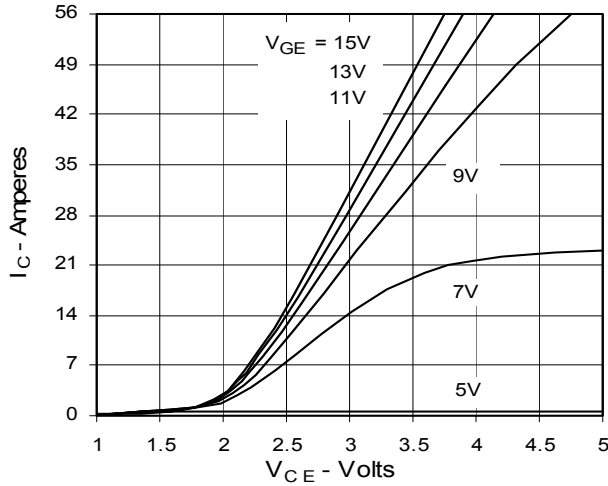
### TO-268 Outline



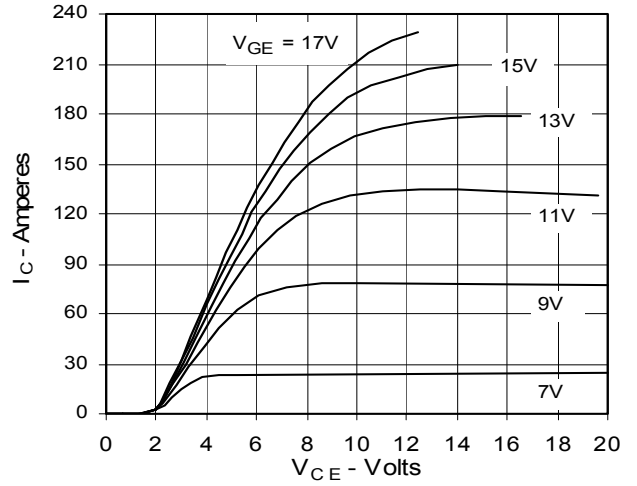
Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.9	5.1	.193	.201
A <sub>1</sub>	2.7	2.9	.106	.114
A <sub>2</sub>	.02	.25	.001	.010
b	1.15	1.45	.045	.057
b <sub>2</sub>	1.9	2.1	.075	.83
C	.4	.65	.016	.026
D	13.80	14.00	.543	.551
E	15.85	16.05	.624	.632
E <sub>1</sub>	13.3	13.6	.524	.535
e	5.45	BSC	.215	BSC
H	18.70	19.10	.736	.752
L	2.40	2.70	.094	.106
L <sub>1</sub>	1.20	1.40	.047	.055
L <sub>2</sub>	1.00	1.15	.039	.045
L <sub>3</sub>	0.25	BSC	.010	BSC
L <sub>4</sub>	3.80	4.10	.150	.161

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

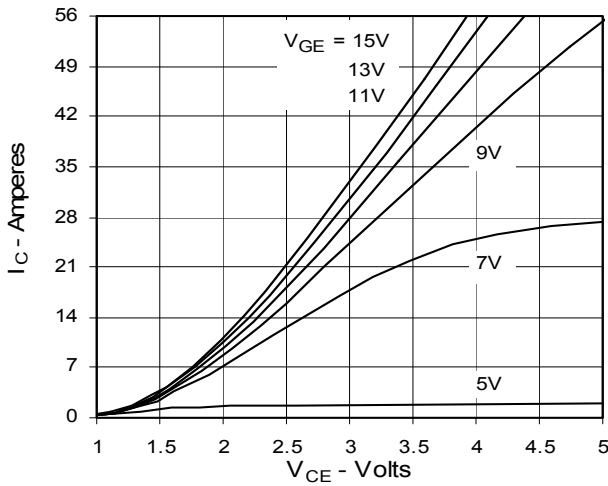
**Fig. 1. Output Characteristics**  
@ 25 °C



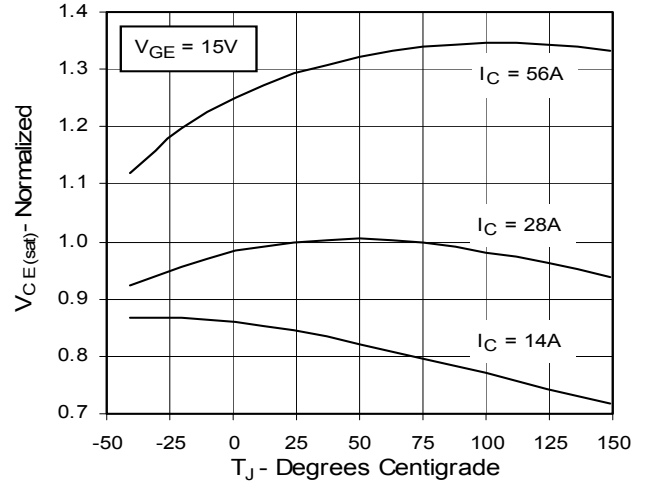
**Fig. 2. Extended Output Characteristics**  
@ 25 °C



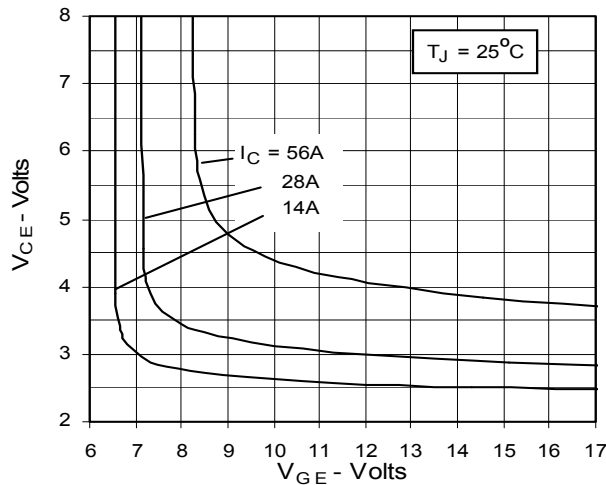
**Fig. 3. Output Characteristics**  
@ 125 °C



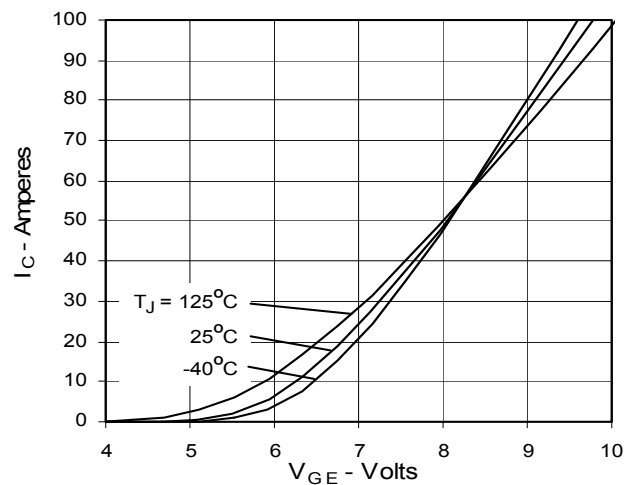
**Fig. 4. Dependence of  $V_{CE(sat)}$  on Temperature**



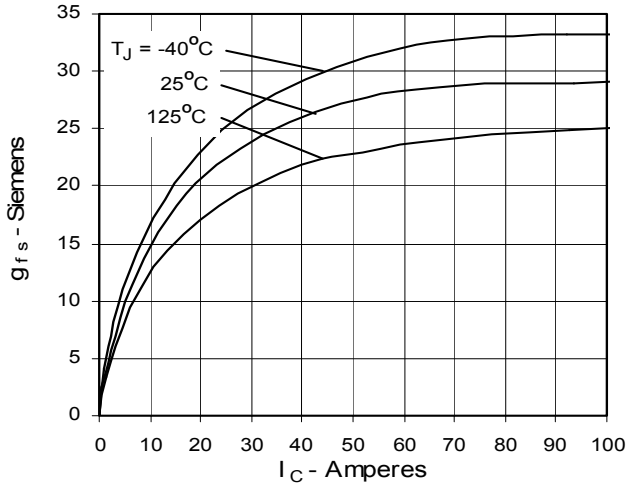
**Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter voltage**



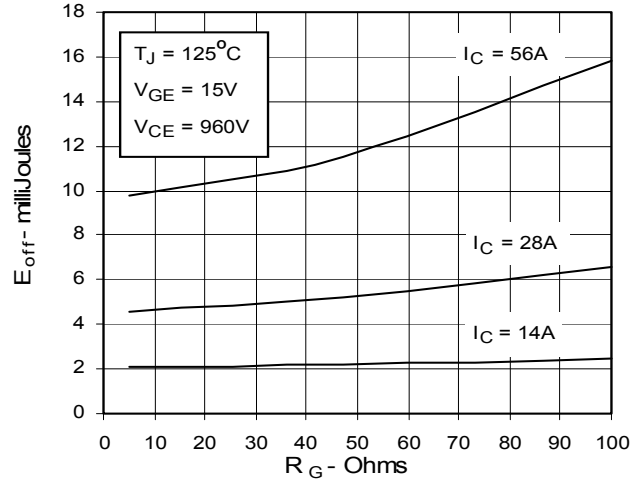
**Fig. 6. Input Admittance**



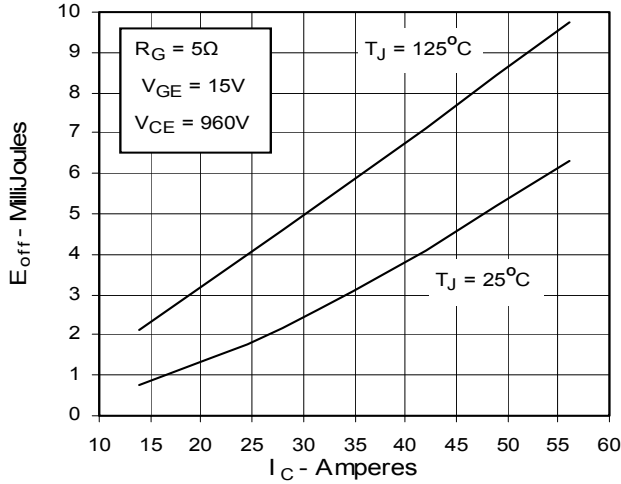
**Fig. 7. Transconductance**



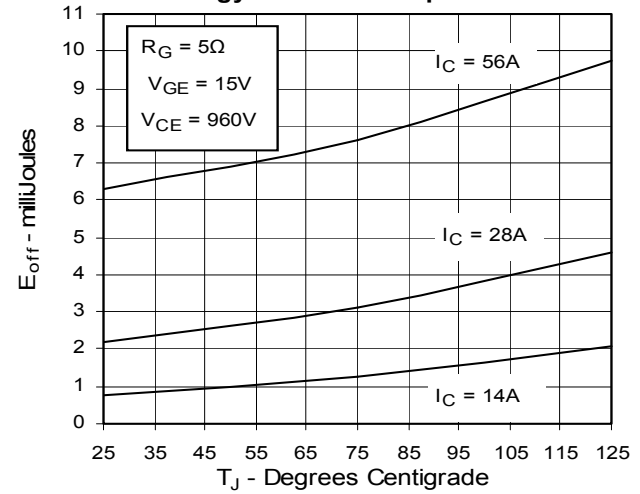
**Fig. 8. Dependence of Turn-off Energy Loss on  $R_G$**



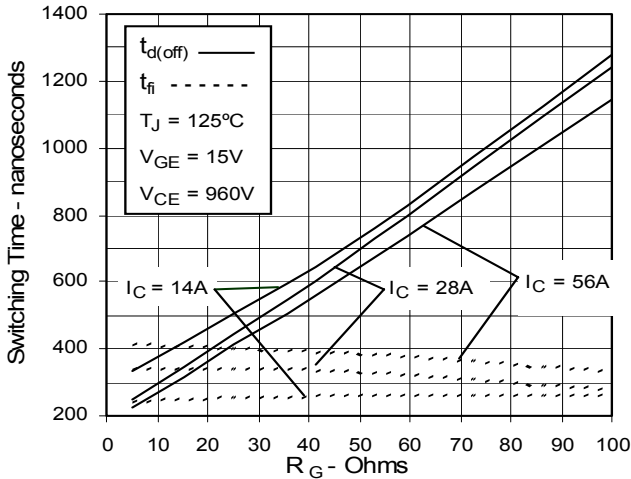
**Fig. 9. Dependence of Turn-Off Energy Loss on  $I_C$**



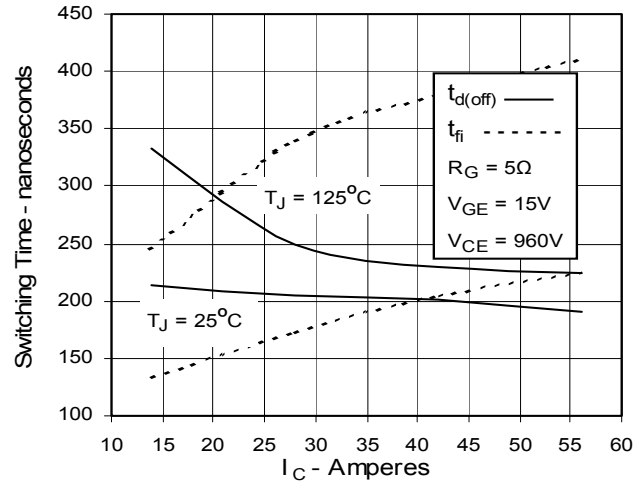
**Fig. 10. Dependence of Turn-off Energy Loss on Temperature**



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



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

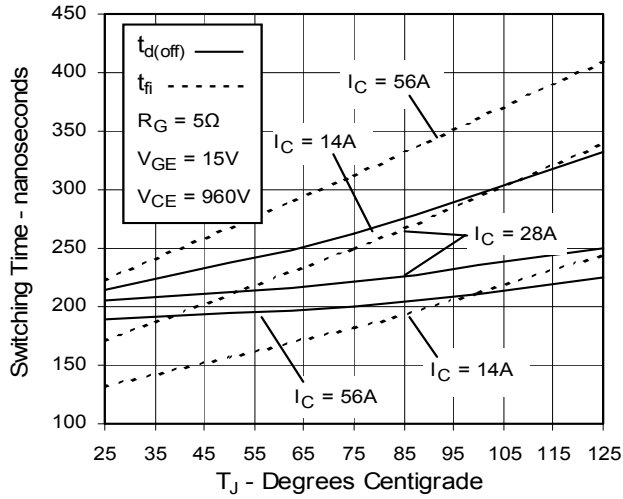


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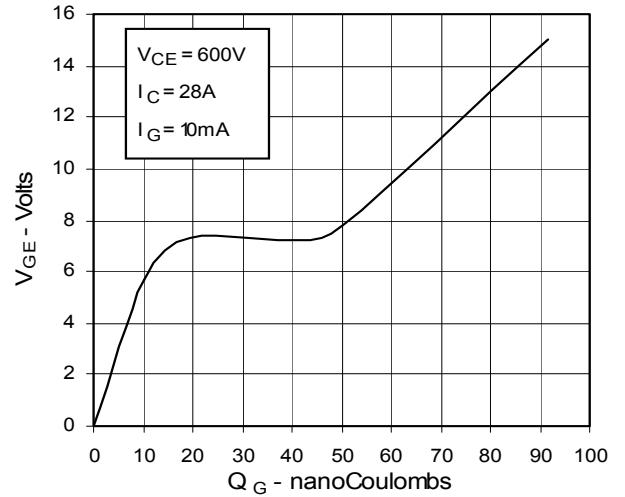
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

4,850,072	4,931,844	5,034,796	5,063,307	5,237,481	5,381,025	6,404,065B1	6,162,665	6,534,343	6,583,505
4,835,592	4,881,106	5,017,508	5,049,961	5,187,117	5,486,715	6,306,728B1	6,259,123B1	6,306,728B1	6,683,344

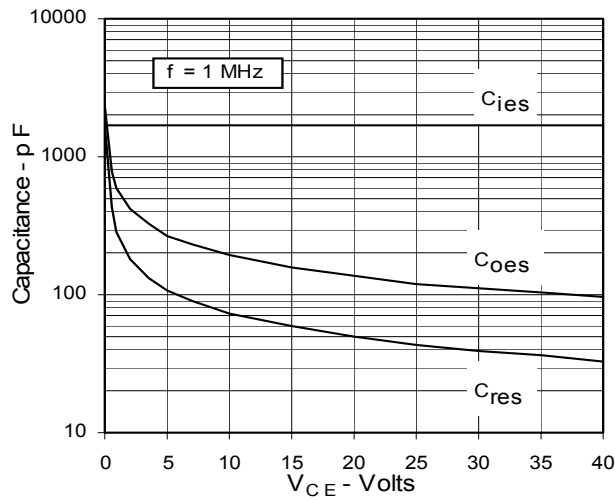
**Fig. 13. Dependence of Turn-off Switching Time on Temperature**



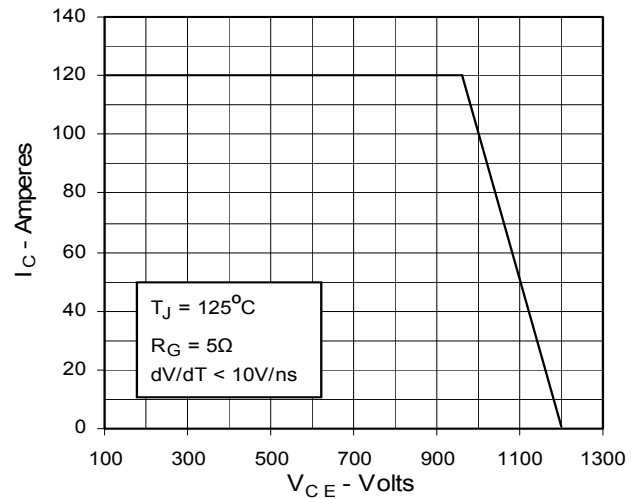
**Fig. 14. Gate Charge**



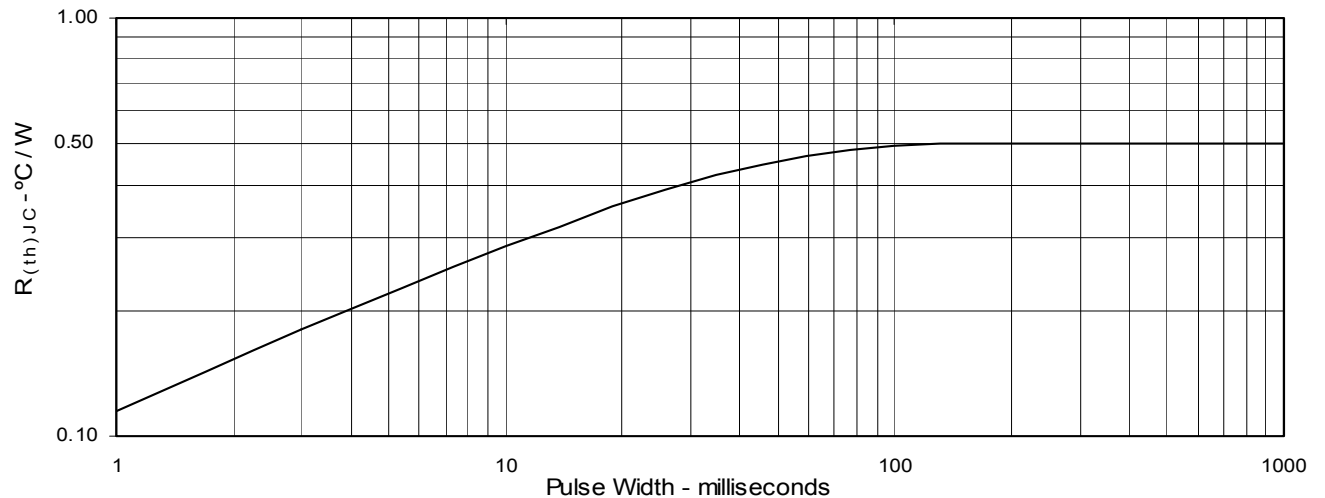
**Fig. 15. Capacitance**



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



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





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