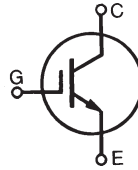


# High Voltage IGBT

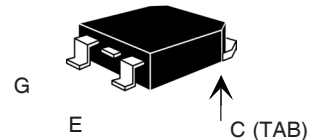
**IXGH 28N120B**  
**IXGT 28N120B**

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

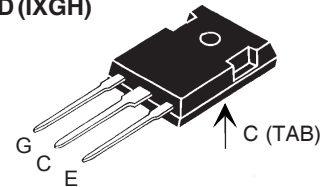


Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_J = 25^\circ\text{C to } 150^\circ\text{C}$	1200	V
$V_{CGR}$	$T_J = 25^\circ\text{C to } 150^\circ\text{C}; R_{GE} = 1 \text{ M}\Omega$	1200	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^\circ\text{C}$	50	A
$I_{C110}$	$T_C = 110^\circ\text{C}$	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

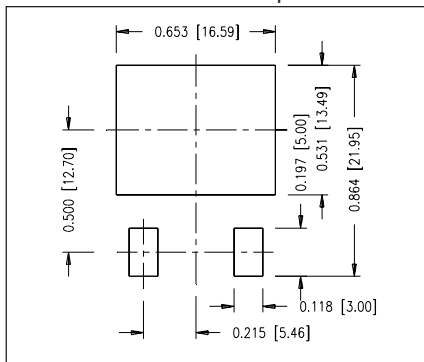
## Advantages

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

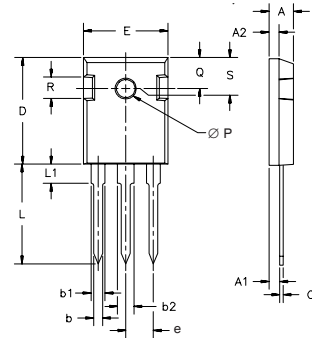
Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$BV_{CES}$	$I_C = 250 \mu\text{A}, V_{GE} = 0 \text{ V}$	1200		V
$V_{GE(th)}$	$I_C = 250 \mu\text{A}, V_{CE} = V_{GE}$	2.5		V
$I_{CES}$	$V_{CE} = V_{CES}, V_{GE} = 0 \text{ V}$ $T_J = 25^\circ\text{C}$			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

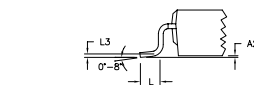
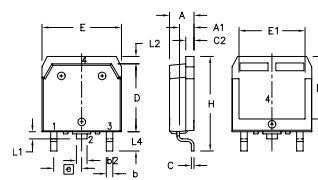


### TO-247 AD Outline



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
L1		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

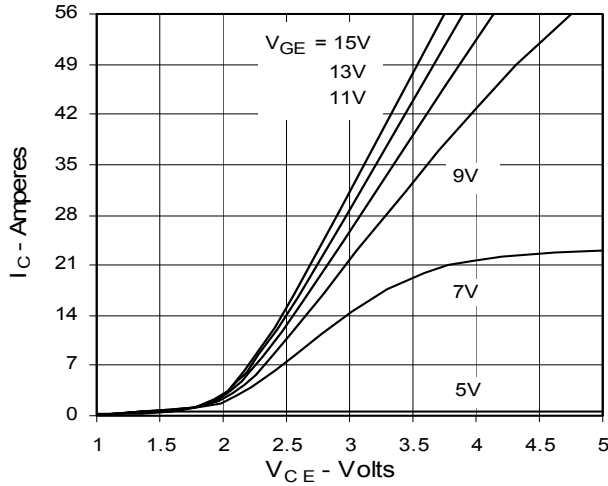
### TO-268 Outline



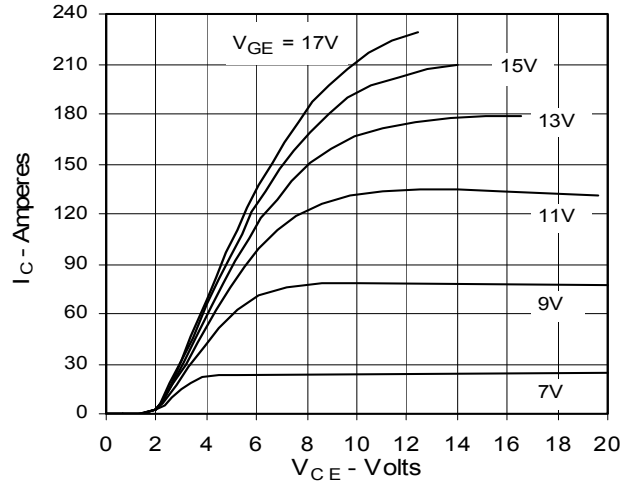
Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.9	5.1	.193	.201
A <sub>1</sub>	2.7	2.9	.106	.114
A <sub>2</sub>	.02	.25	.001	.010
b	1.15	1.45	.045	.057
b <sub>2</sub>	1.9	2.1	.075	.83
C	.4	.65	.016	.026
D	13.80	14.00	.543	.551
E	15.85	16.05	.624	.632
E <sub>1</sub>	13.3	13.6	.524	.535
e	5.45	BSC	.215	BSC
H	18.70	19.10	.736	.752
L	2.40	2.70	.094	.106
L1	1.20	1.40	.047	.055
L2	1.00	1.15	.039	.045
L3	0.25	BSC	.010	BSC
L4	3.80	4.10	.150	.161

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

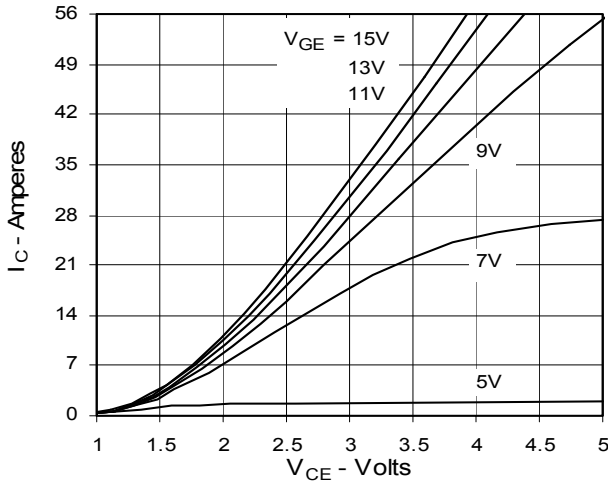
**Fig. 1. Output Characteristics**  
@ 25 °C



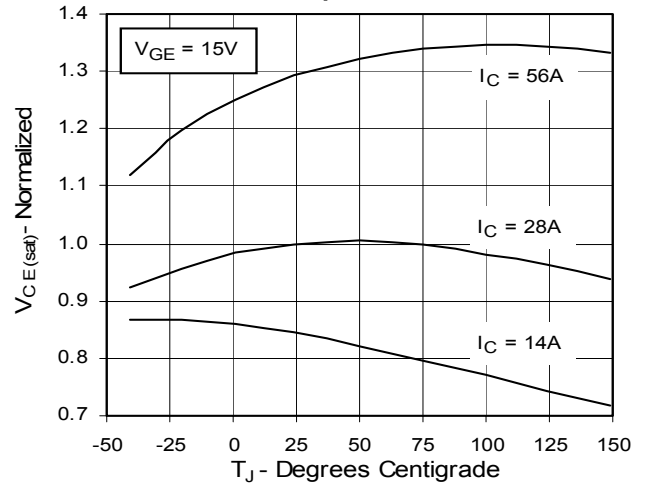
**Fig. 2. Extended Output Characteristics**  
@ 25 °C



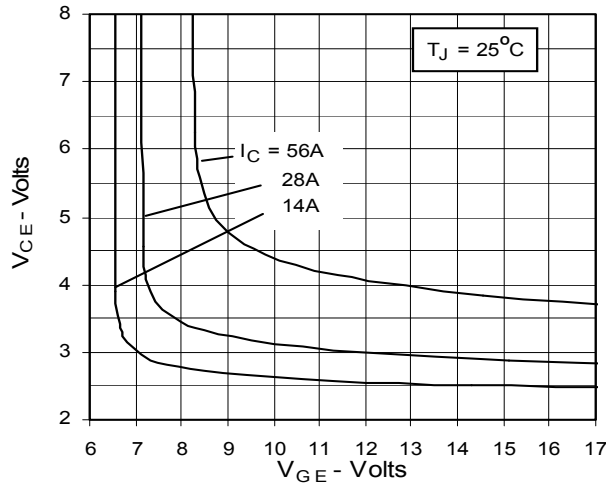
**Fig. 3. Output Characteristics**  
@ 125 °C



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



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



**Fig. 6. Input Admittance**

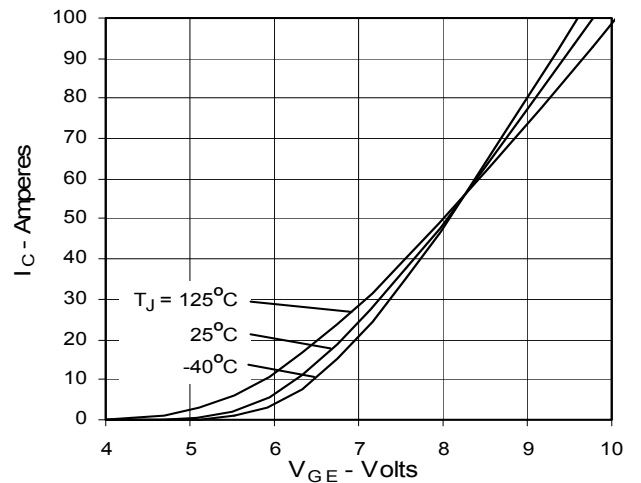


Fig. 7. Transconductance

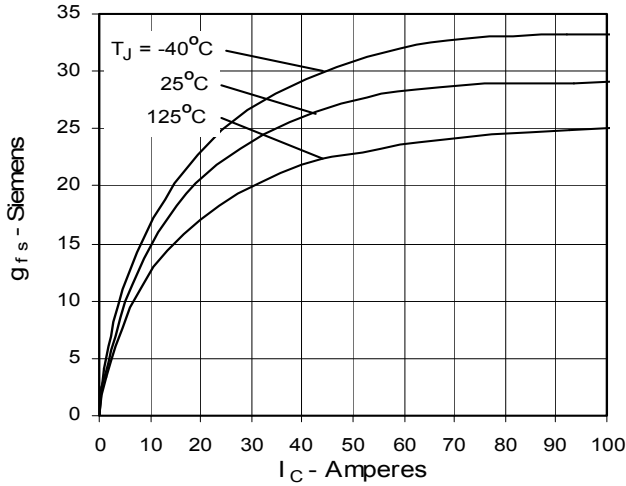


Fig. 8. Dependence of Turn-off Energy Loss on  $R_G$

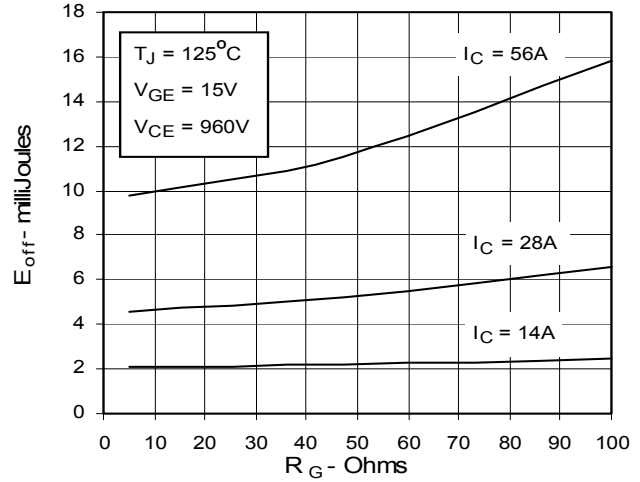


Fig. 9. Dependence of Turn-Off Energy Loss on  $I_C$

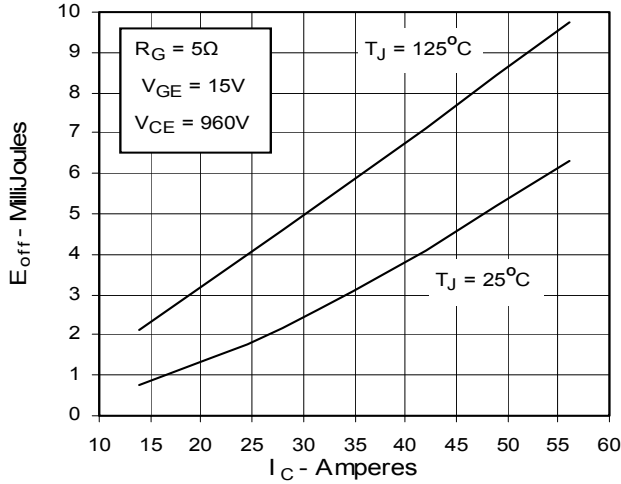


Fig. 10. Dependence of Turn-off Energy Loss on Temperature

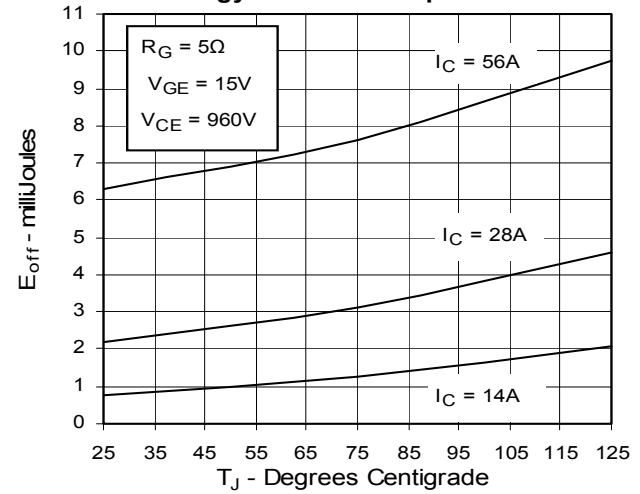


Fig. 11. Dependence of Turn-off Switching Time on  $R_G$

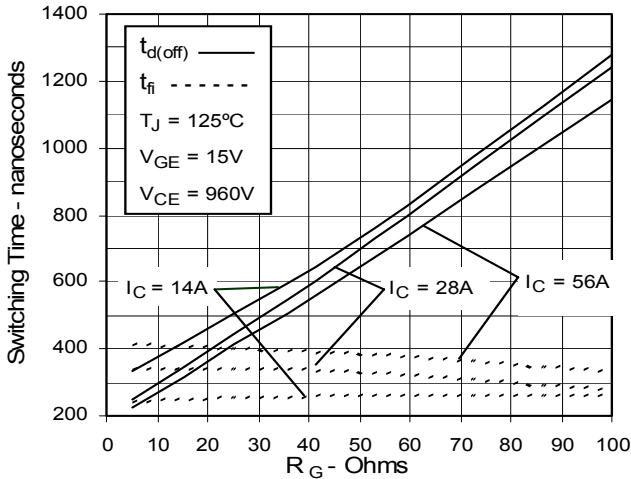
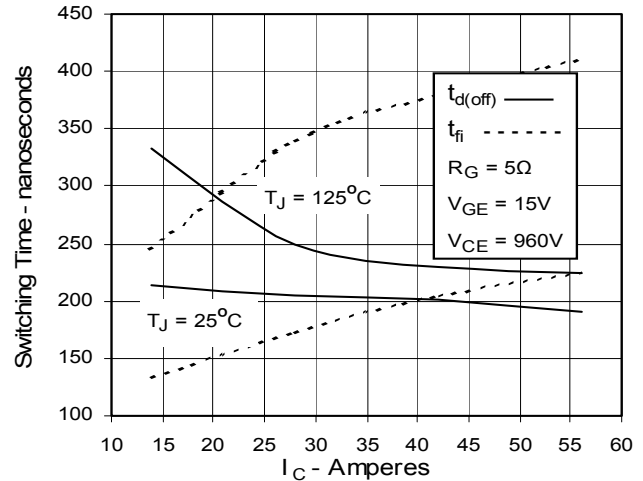


Fig. 12. Dependence of Turn-off Switching Time on  $I_C$

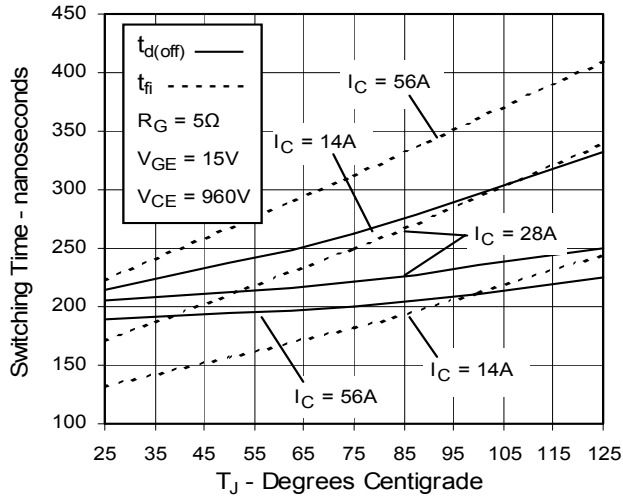


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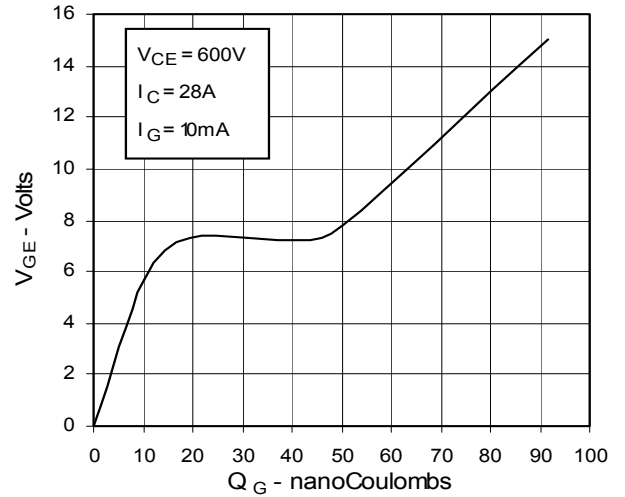
IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

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

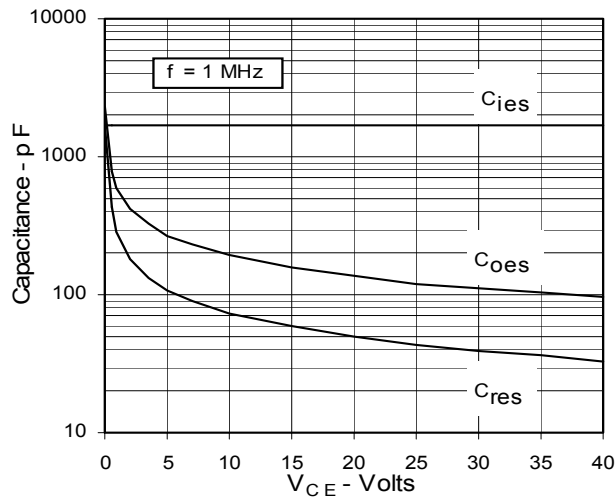
**Fig. 13. Dependence of Turn-off Switching Time on Temperature**



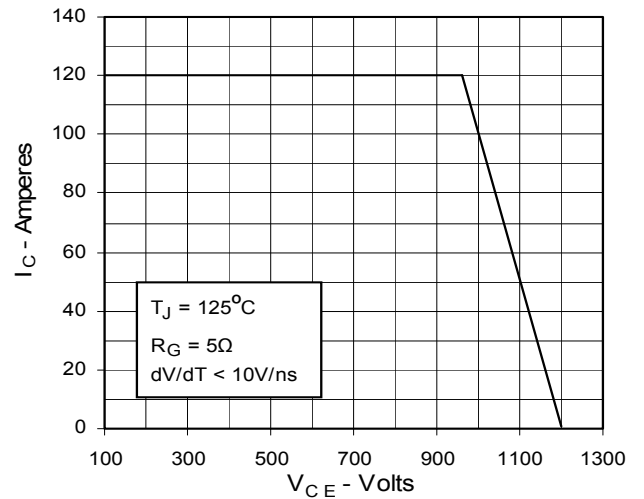
**Fig. 14. Gate Charge**



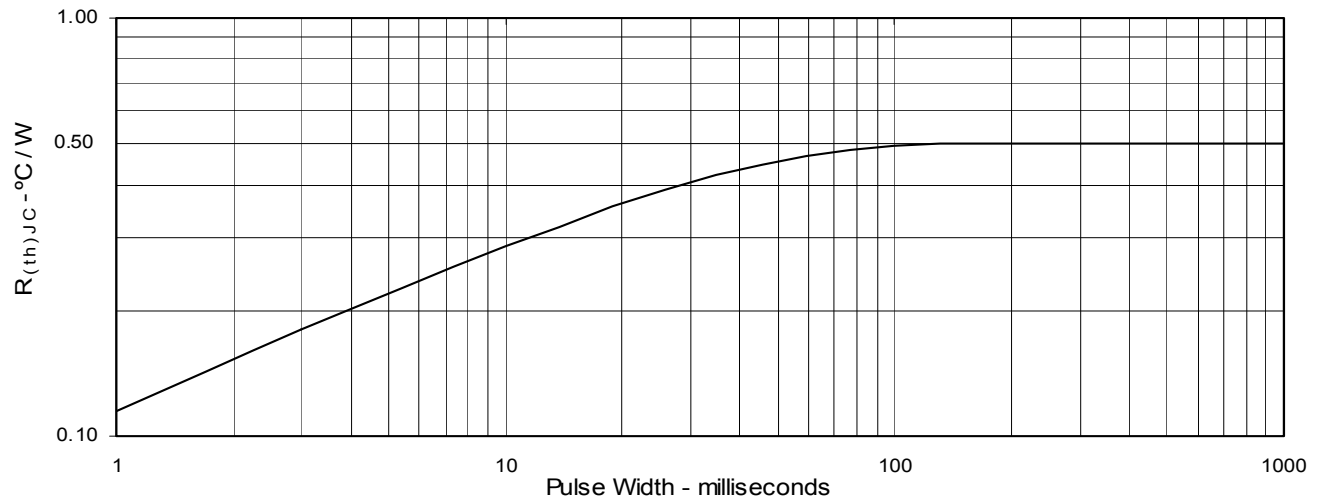
**Fig. 15. Capacitance**



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



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





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