

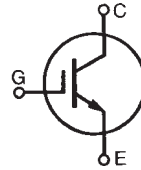
# IGBT

Optimized for  
switching up to 35 KHz

**IXGA 14N120B**  
**IXGP 14N120B**

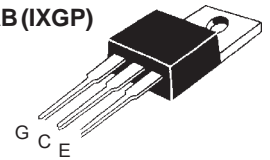
$V_{CES} = 1200 \text{ V}$   
 $I_{C25} = 28 \text{ A}$   
 $V_{CE(sat)} = 3.3 \text{ V}$

Preliminary data sheet

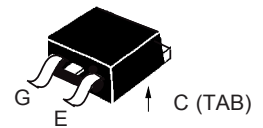


Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_J = 25^\circ\text{C to } 150^\circ\text{C}$	1200	V
$V_{CGR}$	$T_J = 25^\circ\text{C to } 150^\circ\text{C}; R_{GE} = 1 \text{ M}\Omega$	1200	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^\circ\text{C}$	28	A
$I_{C110}$	$T_C = 110^\circ\text{C}$	14	A
$I_{CM}$	$T_C = 25^\circ\text{C}, 1 \text{ ms}$	56	A
<b>SSOA</b> <b>(RBSOA)</b>	$V_{GE} = 15 \text{ V}, T_{VJ} = 125^\circ\text{C}, R_G = 100 \Omega$ Clamped inductive load	$I_{CM} = 28$ @ $0.8 V_{CES}$	A
$P_C$	$T_C = 25^\circ\text{C}$	150	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	$^\circ\text{C}$
$M_d$	Mounting torque with screw M3 Mounting torque with screw M3.5	0.45/4 Nm/lb.in. 0.55/5 Nm/lb.in.	
<b>Weight</b>	TO-220	4	g
	TO-263	2	g

TO-220AB (IXGP)



TO-263 AA (IXGA)



## Features

- International standard packages  
JEDEC TO-220AB and TO-263AA
- Low  $V_{CE(sat)}$   
- for minimum on-state conduction losses
- MOS Gate turn-on  
- drive simplicity

## Applications

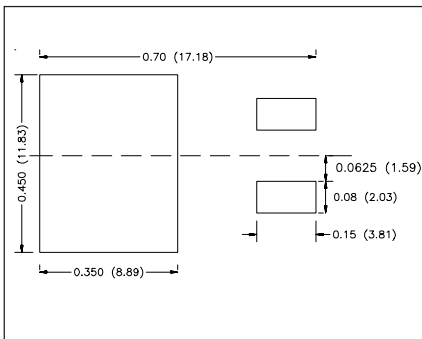
- AC motor speed control
- DC servo and robot drives
- DC choppers
- Uninterruptible power supplies (UPS)
- Switch-mode and resonant-mode power supplies
- Capacitor discharge

## Advantages

- Easy to mount with one screw
- Reduces assembly time and cost
- High power density

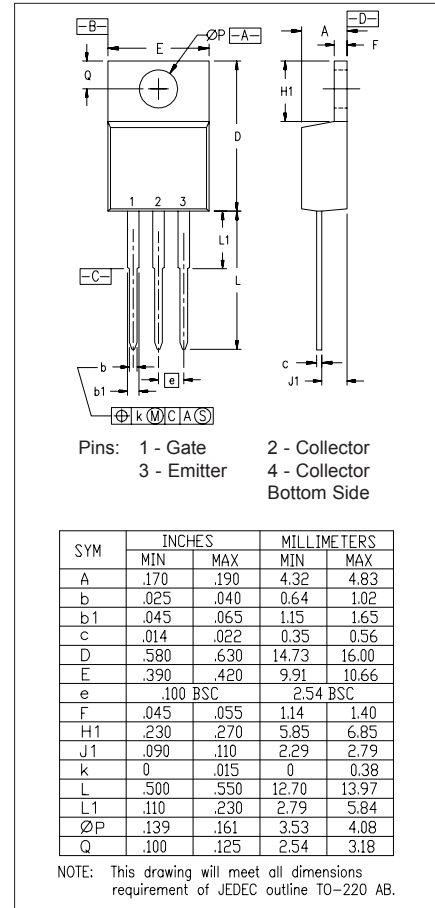
Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
$V_{GE(th)}$	$I_C = 250 \mu\text{A}, V_{CE} = V_{GE}$	3.0		5.0 V
$I_{CES}$	$V_{CE} = V_{CES}$ $V_{GE} = 0 \text{ V}$			25 $\mu\text{A}$
	$T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$			250 $\mu\text{A}$
$I_{GES}$	$V_{CE} = 0 \text{ V}, V_{GE} = \pm 20 \text{ V}$			$\pm 100 \text{ nA}$
$V_{CE(sat)}$	$I_C = I_{C90}, V_{GE} = 15 \text{ V}$		2.7	3.3 V

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)	Characteristic Values			
		Min.	Typ.	Max.	
$g_{fs}$	$I_C = I_{C110}$ , $V_{CE} = 10\text{ V}$ Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $\leq 2\%$	5.0	9.0	S	
$I_{C(on)}$	$V_{GE} = 10\text{ V}$ , $V_{CE} = 10\text{ V}$		35	A	
$C_{ies}$	$V_{CE} = 25\text{ V}$ , $V_{GE} = 0\text{ V}$ , $f = 1\text{ MHz}$		535	pF	
$C_{oes}$			36	pF	
$C_{res}$			14	pF	
$Q_g$	$I_C = I_{C110}$ , $V_{GE} = 15\text{ V}$ , $V_{CE} = 0.5 V_{CES}$		30	nC	
$Q_{ge}$			6.0	nC	
$Q_{gc}$			12	nC	
$t_{d(on)}$	<b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b> $I_C = I_{C110}$ , $V_{GE} = 15\text{ V}$ $V_{CE} = 960\text{ V}$ , $R_G = R_{off} = 120\ \Omega$ Remarks: Switching times may increase for $V_{CE}$ (Clamp) $> 0.8 V_{CES}$ , higher $T_J$ or increased $R_G$		15	ns	
$t_{ri}$			30	ns	
$t_{d(off)}$			500	750	ns
$t_{fi}$			330	500	ns
$E_{off}$			2.6	4.0	mJ
$t_{d(on)}$	<b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b> $I_C = I_{C110}$ , $V_{GE} = 15\text{ V}$ $V_{CE} = 960\text{ V}$ , $R_G = R_{off} = 120\ \Omega$ Remarks: Switching times may increase for $V_{CE}$ (Clamp) $> 0.8 V_{CES}$ , higher $T_J$ or increased $R_G$		15	ns	
$t_{ri}$			30	ns	
$E_{on}$			0.8	mJ	
$t_{d(off)}$			610	ns	
$t_{fi}$			600	ns	
$E_{off}$		4.85	mJ		
$R_{thJC}$	TO-220		0.83	K/W	
$R_{thCK}$			0.5	K/W	

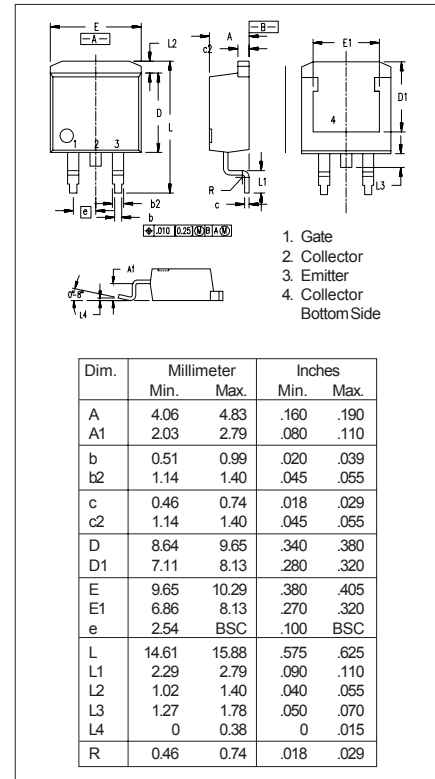


**Min. Recommended Footprint**  
(Dimensions in inches and mm)

### TO-220 AB Dimensions



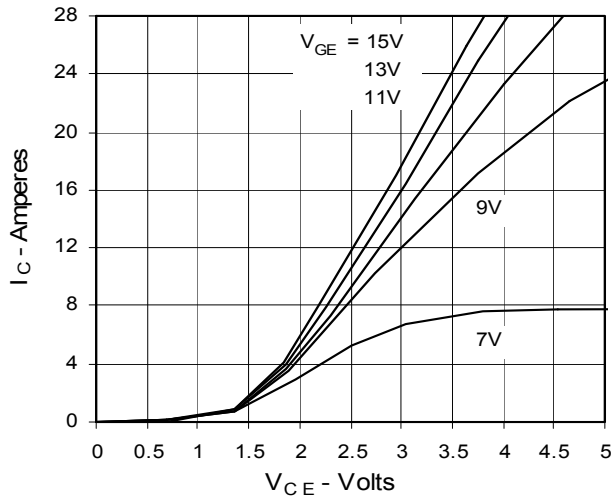
### TO-263 AA Outline



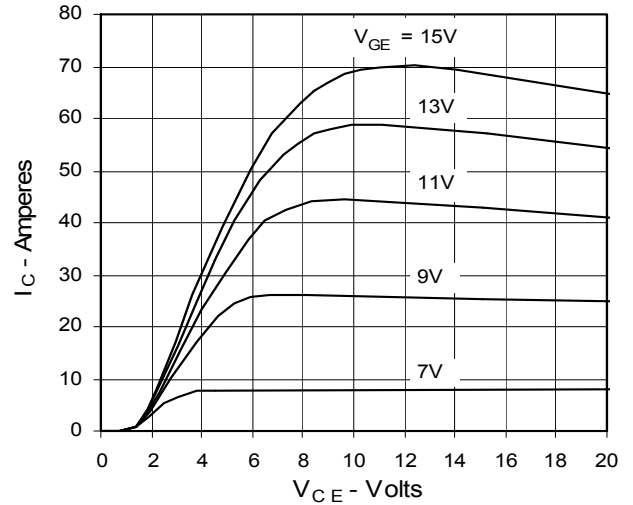
IXYS reserves the right to change limits, test conditions, and dimensions.

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	

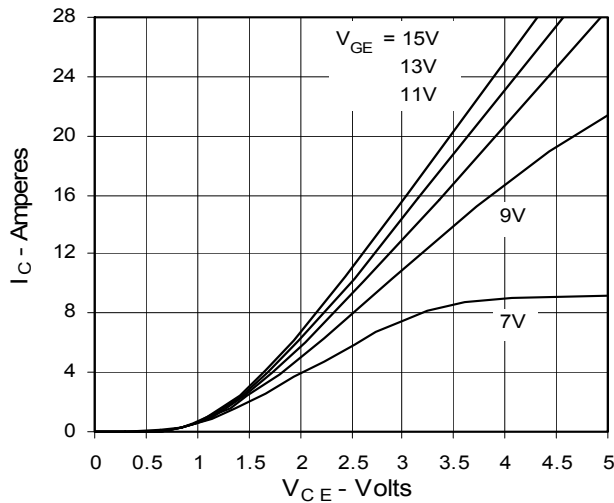
**Fig. 1. Output Characteristics**  
**@ 25°C**



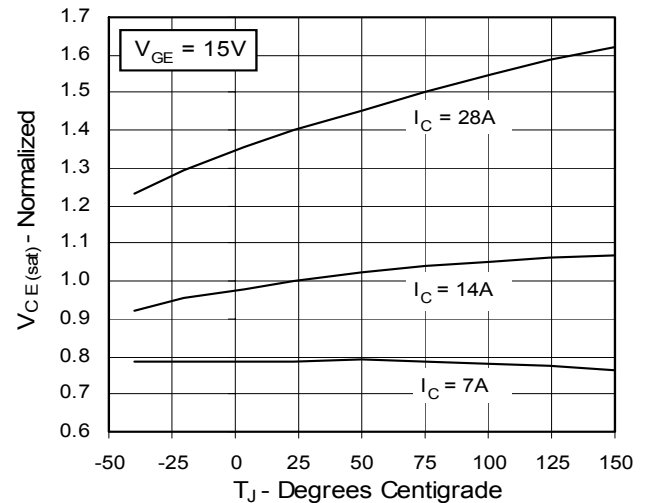
**Fig. 2. Extended Output Characteristics**  
**@ 25°C**



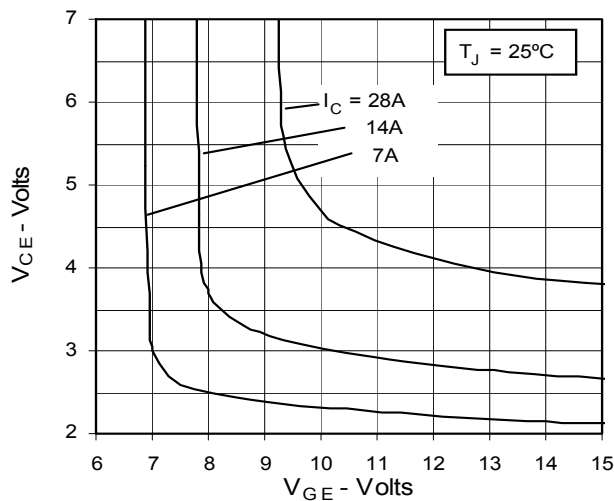
**Fig. 3. Output Characteristics**  
**@ 125°C**



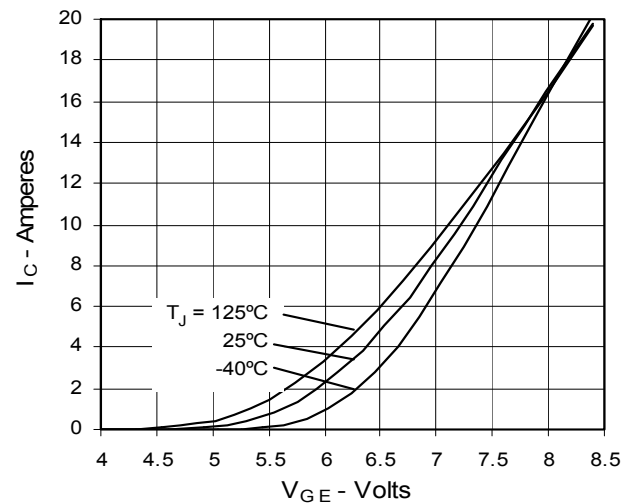
**Fig. 4. Dependence of  $V_{CE(sat)}$  on Temperature**



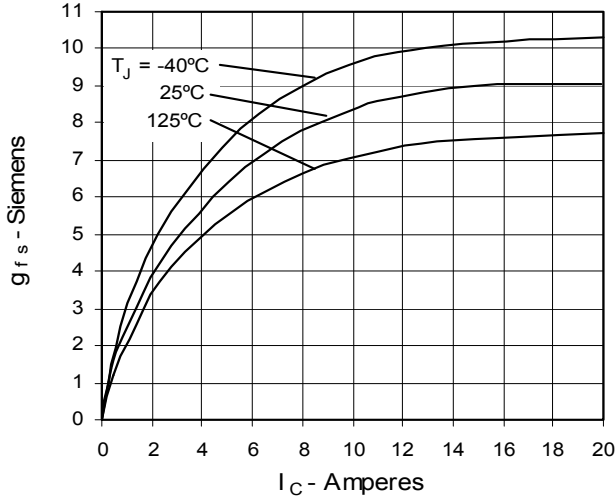
**Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter voltage**



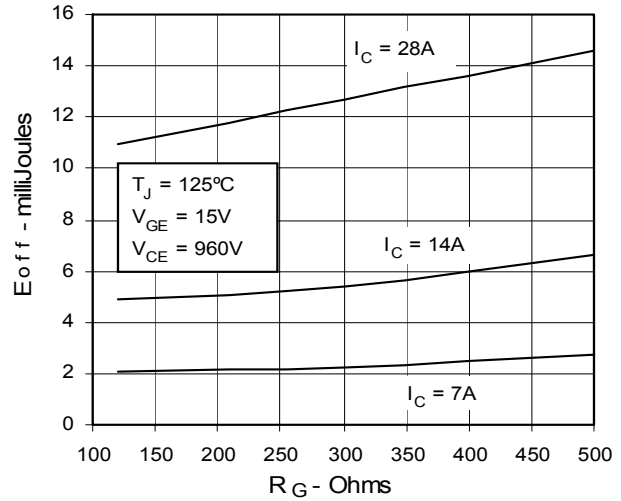
**Fig. 6. Input Admittance**



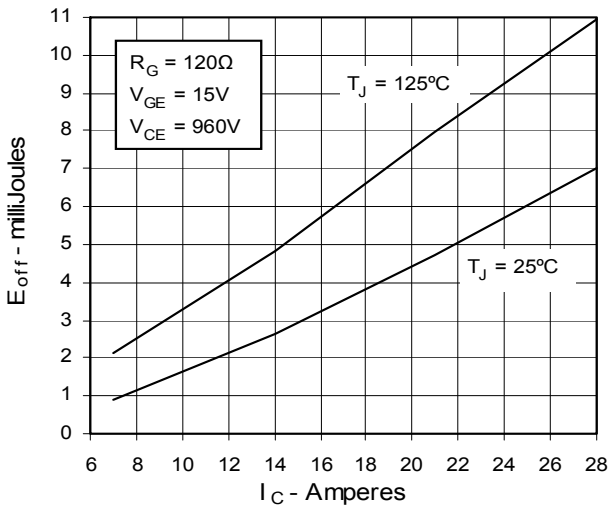
**Fig. 7. Transconductance**



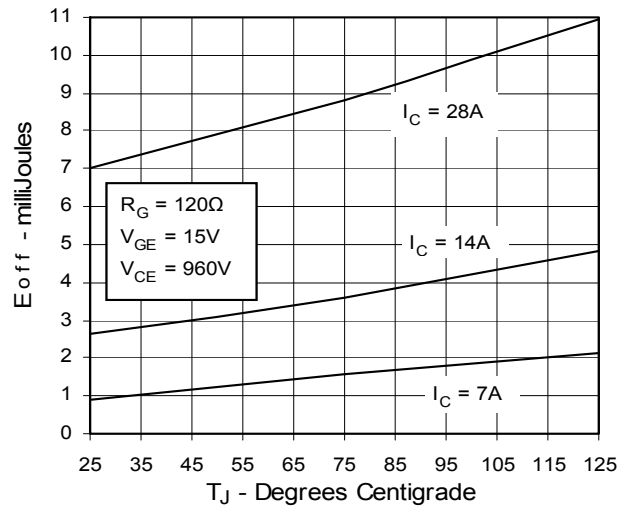
**Fig. 8. Dependence of Turn-Off Energy on  $R_G$**



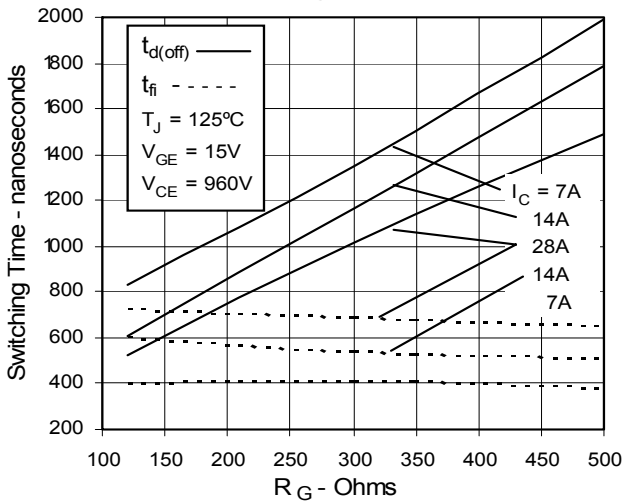
**Fig. 9. Dependence of Turn-Off Energy on  $I_C$**



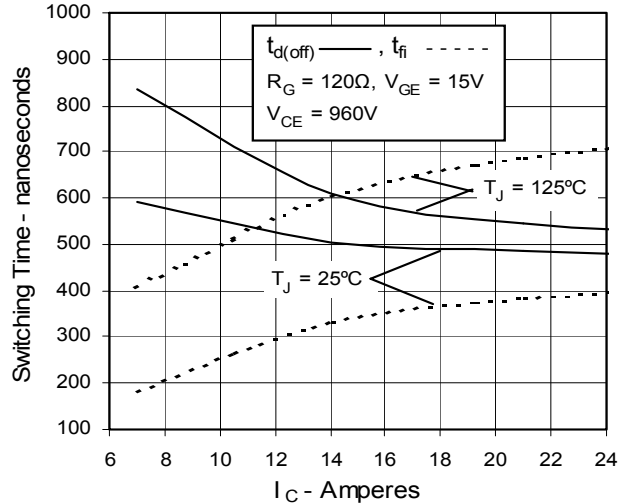
**Fig. 10. Dependence of Turn-Off Energy on Temperature**



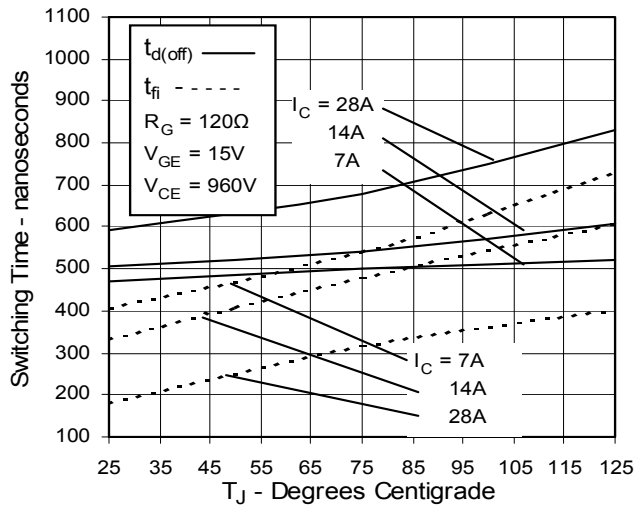
**Fig. 11. Dependence of Turn-Off Switching Time on  $R_G$**



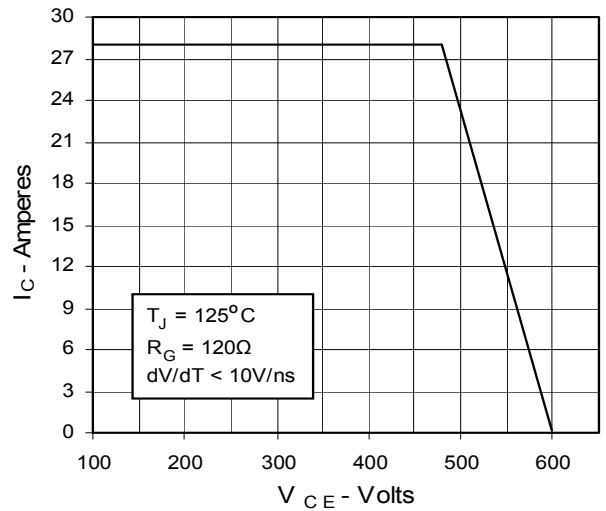
**Fig. 12. Dependence of Turn-Off Switching Time on  $I_C$**



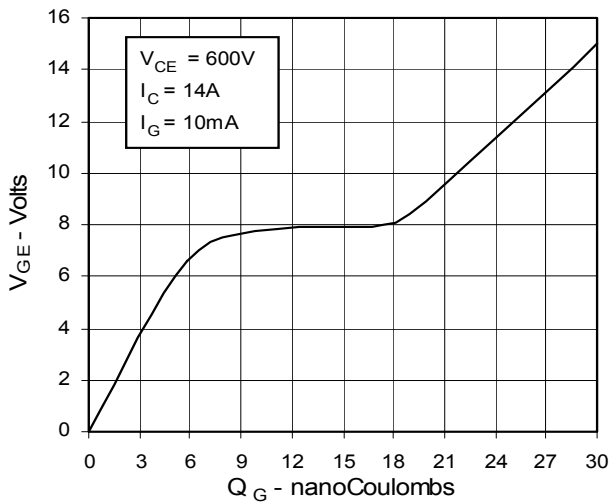
**Fig. 13. Dependence of Turn-Off Switching Time on Temperature**



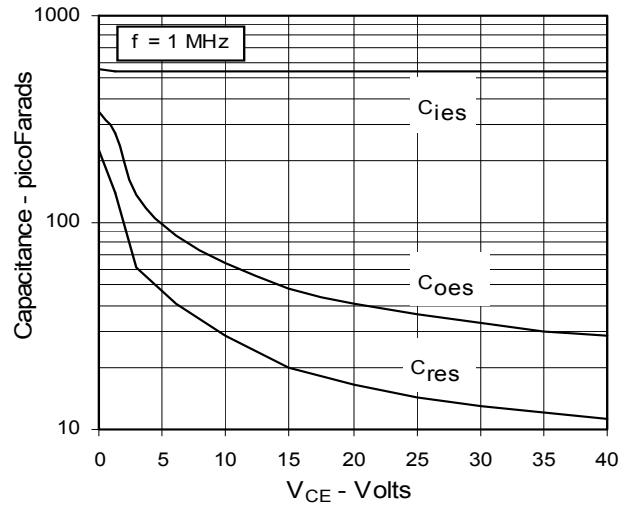
**Fig. 14. Reverse-Bias Safe Operating Area**



**Fig. 15. Gate Charge**



**Fig. 16. Capacitance**



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

