

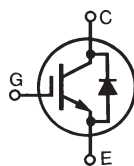
GenX3™ B3-Class IGBT w/Diode

IXGR72N60B3D1*

*Obsolete Part Number

(Electrically Isolated Back Surface)

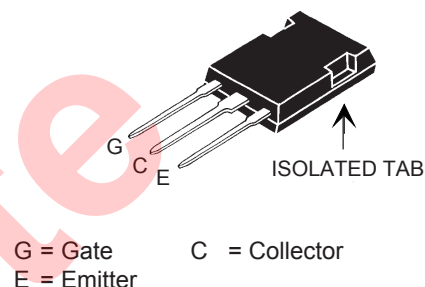
Medium Speed Low Vsat PT IGBTs
for 5-40 kHz Switching



$$\begin{aligned} V_{CES} &= 600V \\ I_{C110} &= 40A \\ V_{CE(sat)} &\leq 1.80V \\ t_{fi(typ)} &= 90ns \end{aligned}$$

ISOPLUS 247™

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^\circ\text{C to } 150^\circ\text{C}$	600	V
V_{CGR}	$T_J = 25^\circ\text{C to } 150^\circ\text{C}, R_{GE} = 1M\Omega$	600	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ\text{C}$ (Limited by Leads)	75	A
I_{C110}	$T_C = 110^\circ\text{C}$	40	A
I_{F110}	$T_C = 110^\circ\text{C}$	36	A
I_{CM}	$T_C = 25^\circ\text{C}, 1\text{ms}$	360	A
I_A	$T_C = 25^\circ\text{C}$	20	A
E_{AS}	$T_C = 25^\circ\text{C}$	220	mJ
SSOA (RBSOA)	$V_{GE} = 15V, T_{VJ} = 125^\circ\text{C}, R_G = 3\Omega$ Clamped Inductive Load	$I_{CM} = 240$ $V_{CE} \leq 600$	A V
P_C	$T_C = 25^\circ\text{C}$	200	W
T_J		-55 ... +150	$^\circ\text{C}$
T_{JM}		150	$^\circ\text{C}$
T_{stg}		-55 ... +150	$^\circ\text{C}$
V_{ISOL}	50/60 Hz, RMS, $t = 1\text{Minute}$ $I_{ISOL} < 1\text{mA}$ $t = 20\text{Seconds}$	2500 3000	V~ V~
F_C	Mounting Force	20..120/4.5..27	N/lb
T_L	Maximum Lead Temperature for Soldering	300	$^\circ\text{C}$
T_{SOLD}	1.6mm (0.062 in.) from Case for 10s	260	$^\circ\text{C}$
Weight		5	g



Features

- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Mounting Surface
- Avalanche Rated
- Anti-Parallel Ultra Fast Diode
- 2500V Electrical Isolation

Advantages

- High Power Density
- Low Gate Drive Requirement

Applications

- Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Battery Chargers
- Welding Machines
- Lamp Ballasts

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}	$V_{CE} = V_{CES}, V_{GE} = 0V$ $T_J = 125^\circ\text{C}$			300 μA 5 mA
I_{GES}	$V_{CE} = 0V, V_{GE} = \pm 20V$			± 100 nA
$V_{CE(sat)}$	$I_C = 60A, V_{GE} = 15V$, Note 1 $T_J = 125^\circ\text{C}$		1.50 1.75	1.80 V V

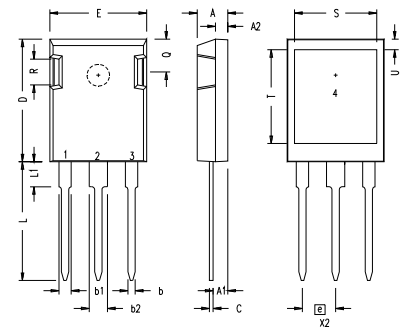
Symbol	Test Conditions	Characteristic Values		
		Min.	Typ.	Max.
g_{fs}	$I_C = 60A, V_{CE} = 10V$, Note 1	50	83	S
C_{ies}	$V_{CE} = 25V, V_{GE} = 0V, f = 1MHz$			6800 pF
C_{oes}				575 pF
C_{res}				80 pF
Q_g	$I_C = 60A, V_{GE} = 15V, V_{CE} = 0.5 \cdot V_{CES}$			225 nC
Q_{ge}				40 nC
Q_{gc}				82 nC
$t_{d(on)}$	Inductive load, $T_J = 25^\circ C$ $I_C = 50A, V_{GE} = 15V$ $V_{CE} = 480V, R_G = 3\Omega$			31 ns
t_{ri}				33 ns
E_{on}				1.38 mJ
$t_{d(off)}$				150 ns
t_{fi}				90 ns
E_{off}				2.20 mJ
$t_{d(on)}$	Inductive load, $T_J = 125^\circ C$ $I_C = 50A, V_{GE} = 15V$ $V_{CE} = 480V, R_G = 3\Omega$			29 ns
t_{ri}				34 ns
E_{on}				2.70 mJ
$t_{d(off)}$				228 ns
t_{fi}				142 ns
E_{off}				2.20 mJ
R_{thJC}				0.62 $^\circ C/W$
R_{thCS}				0.15 $^\circ C/W$

Reverse Diode (FRED)

Symbol	Test Conditions	Characteristic Values		
		Min.	Typ.	Max.
V_F	$I_F = 60A, V_{GE} = 0V$, Note 1 $T_J = 150^\circ C$		1.4	2.1 V
I_{RM}	$I_F = 60A, V_{GE} = 0V$, $-di_F/dt = 100A/\mu s, V_R = 100V$ $T_J = 100^\circ C$		8.3	A
t_{rr}	$I_F = 1A, -di/dt = 200A/\mu s, V_R = 30V$		35	ns
R_{thJC}				0.85 $^\circ C/W$

Note 1. Pulse Test, $t \leq 300\mu s$; Duty Cycle, $d \leq 2\%$.

ISOPLUS247 (IXGR) Outline



SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.190	.205	4.83	5.21
A1	.090	.100	2.29	2.54
A2	.075	.085	1.91	2.16
b	.045	.055	1.14	1.40
b1	.075	.084	1.91	2.13
b2	.115	.123	2.92	3.12
C	.024	.031	0.61	0.80
D	.819	.840	20.80	21.34
E	.620	.635	15.75	16.13
e	.215 BSC		5.45 BSC	
L	.780	.800	19.81	20.32
L1	.150	.170	3.81	4.32
Q	.220	.244	5.59	6.20
R	.170	.190	4.32	4.83
S	.520	.540	13.21	13.72
T	.620	.640	15.75	16.26
U	.065	.080	1.65	2.03

- 1 - GATE
- 2 - DRAIN (COLLECTOR)
- 3 - SOURCE (EMITTER)
- 4 - NO CONNECTION

NOTE: This drawing will meet all dimensions requirement of JEDEC outline TO-247AD except screw hole.

PRELIMINARY TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from data gathered during objective characterizations of preliminary engineering lots; but also may yet contain some information supplied during a pre-production design evaluation. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

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	7,005,734 B2	7,157,338B2
	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	7,063,975 B2	
	4,881,106	5,034,796	5,187,117	5,486,715	6,306,728 B1	6,583,505	6,710,463	6,771,478 B2	7,071,537	

Fig. 1. Output Characteristics
@ 25°C

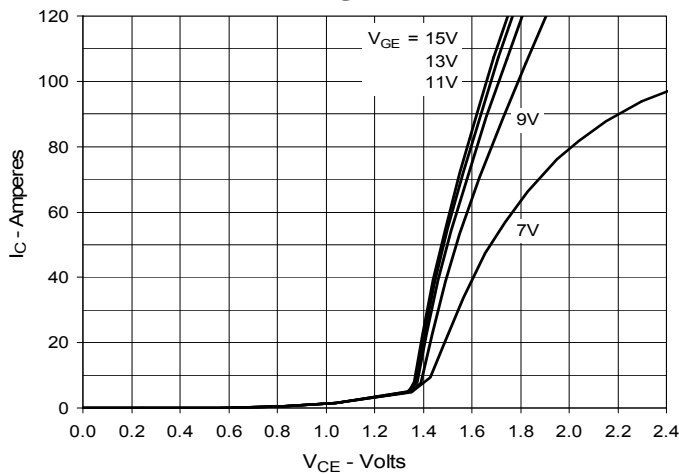


Fig. 2. Extended Output Characteristics
@ 25°C

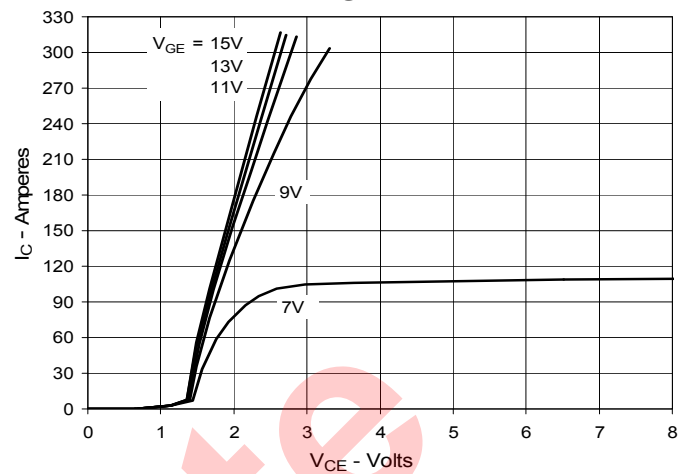


Fig. 3. Output Characteristics
@ 125°C

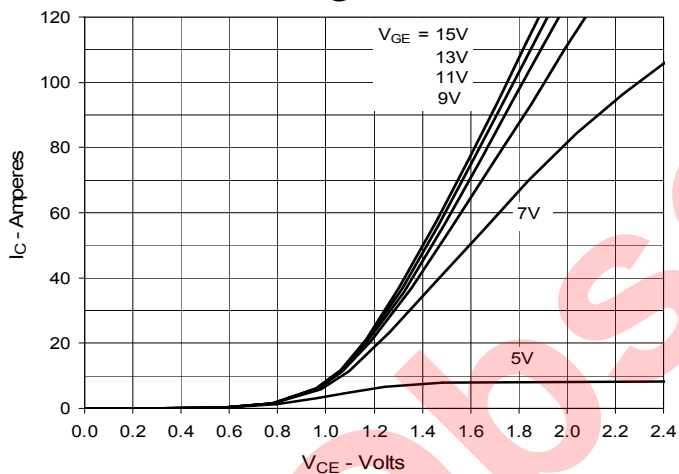


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

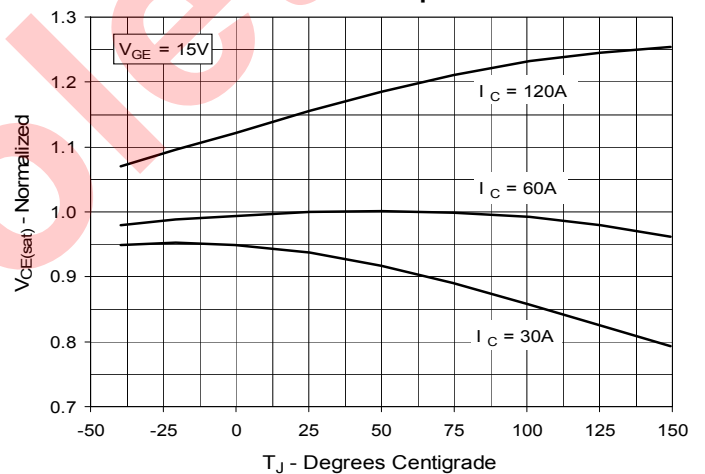


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

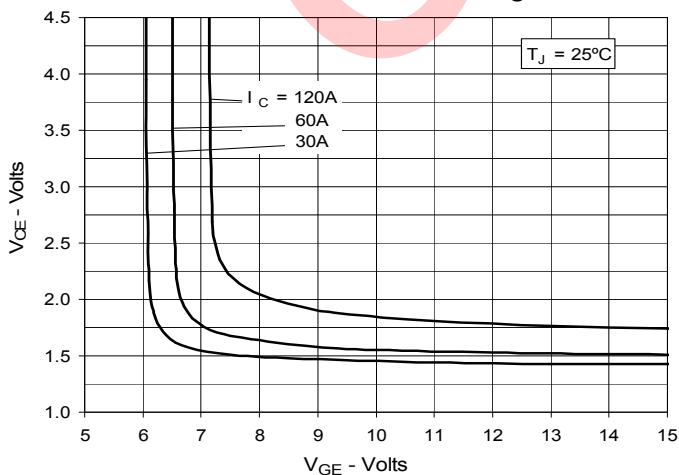


Fig. 6. Input Admittance

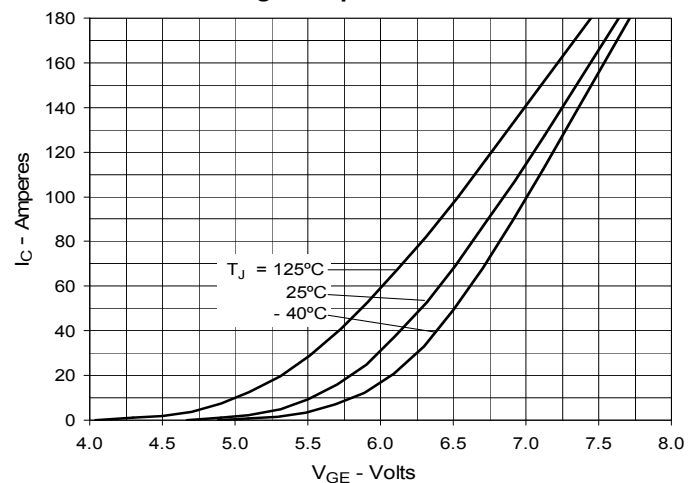


Fig. 7. Transconductance

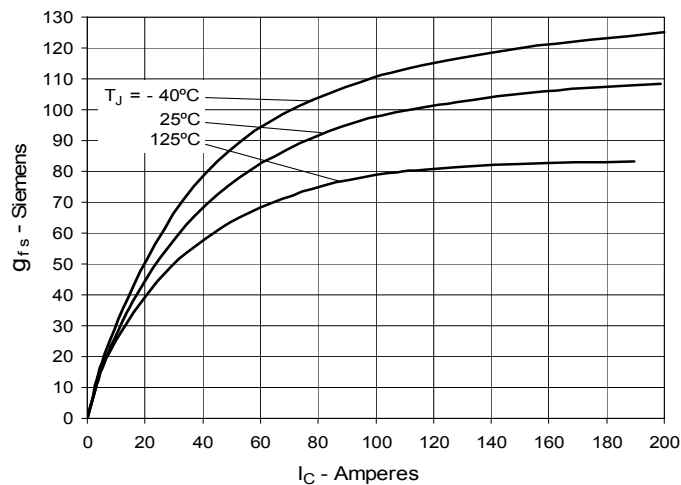


Fig. 8. Gate Charge

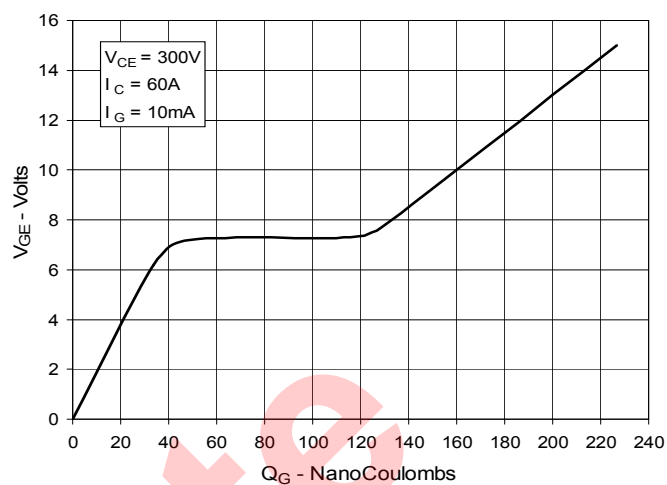


Fig. 9. Capacitance

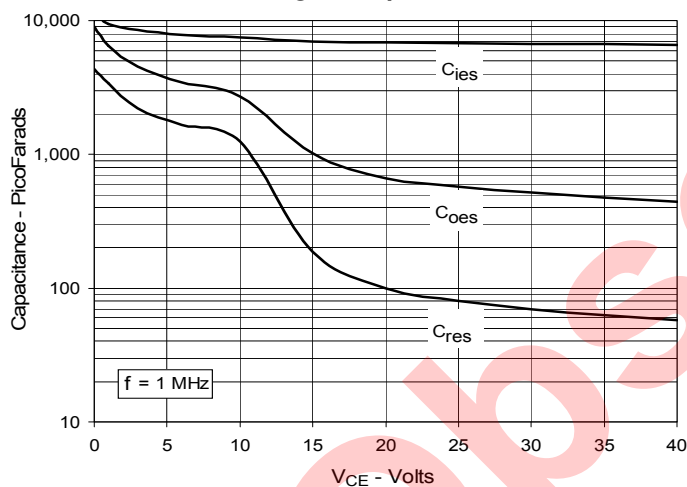


Fig. 10. Reverse-Bias Safe Operating Area

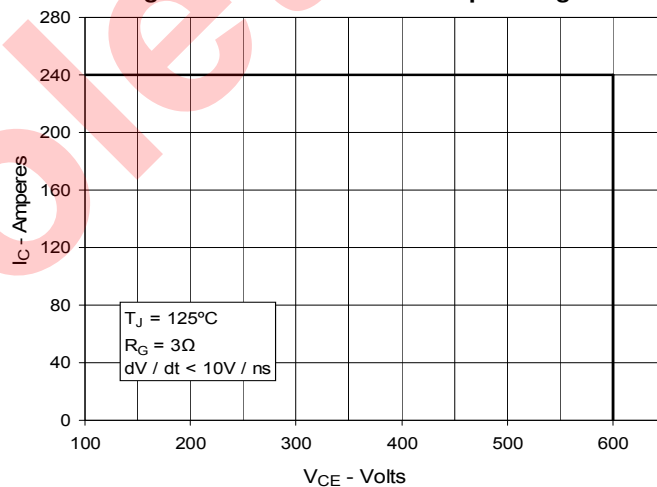
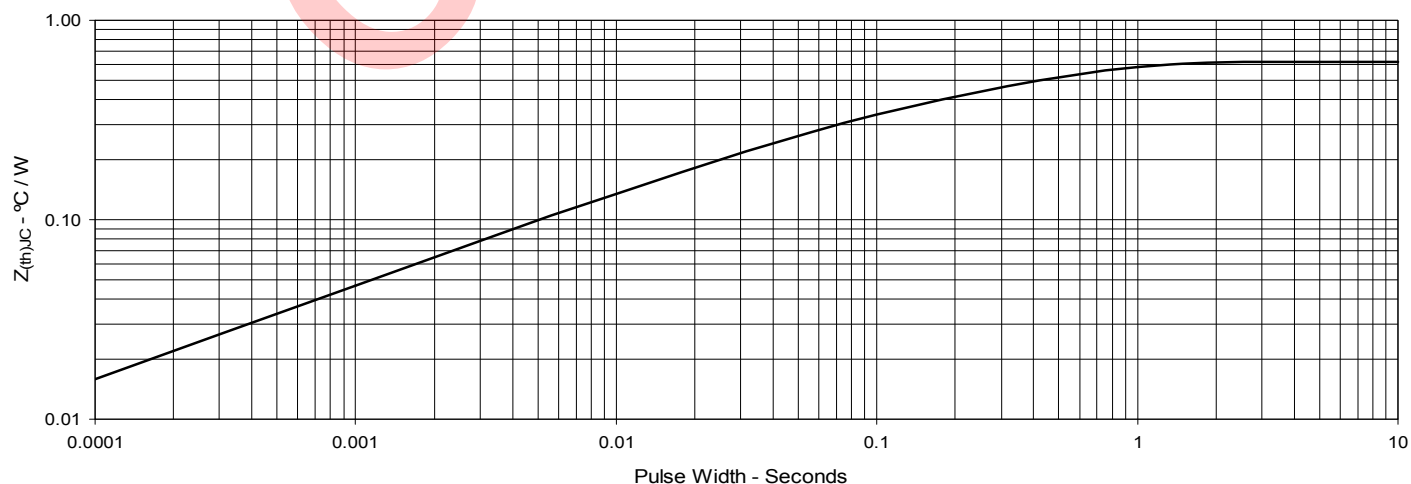
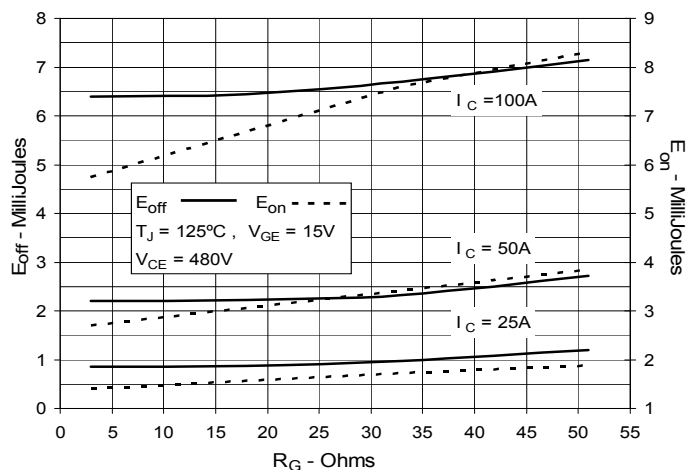


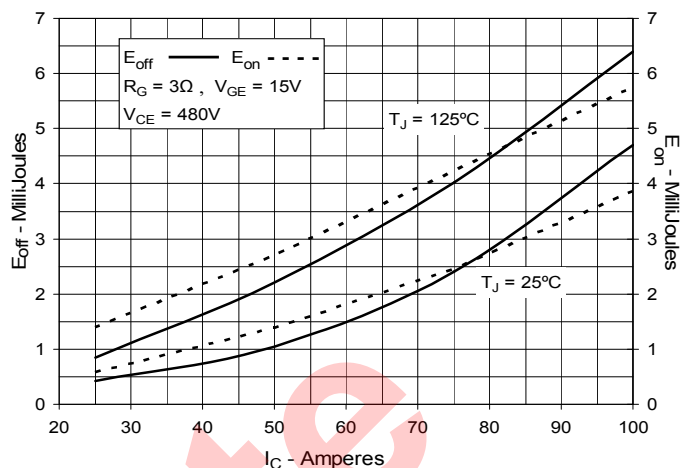
Fig. 11. Maximum Transient Thermal Impedance



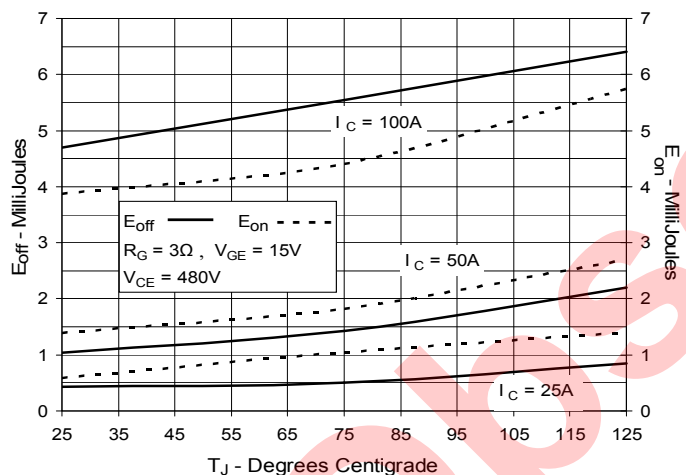
**Fig. 12. Inductive Switching
Energy Loss vs. Gate Resistance**



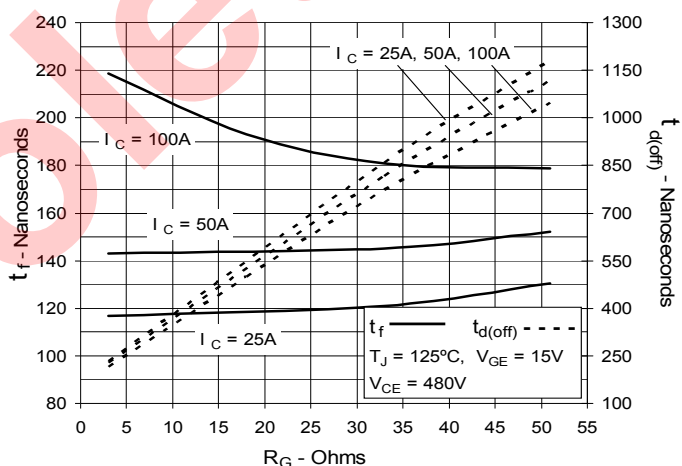
**Fig. 13. Inductive Switching
Energy Loss vs. Collector Current**



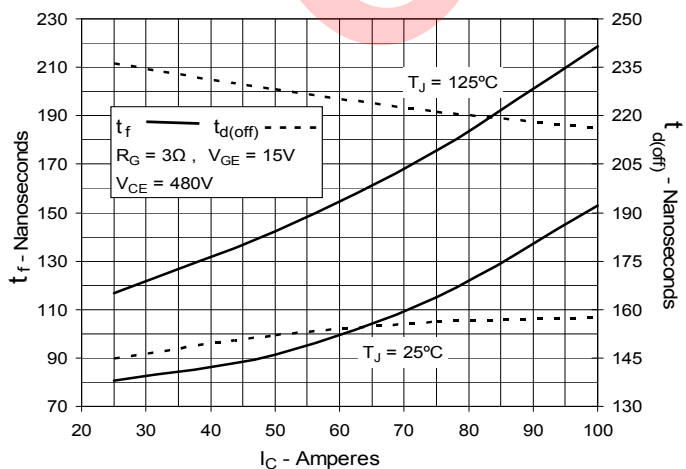
**Fig. 14. Inductive Switching
Energy Loss vs. Junction Temperature**



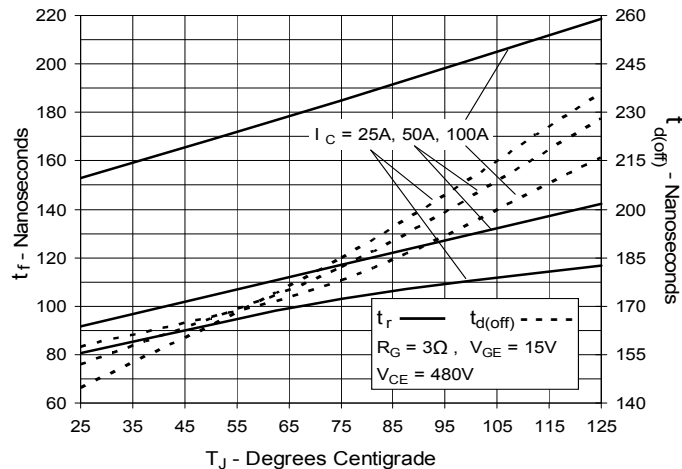
**Fig. 15. Inductive Turn-off
Switching Times vs. Gate Resistance**



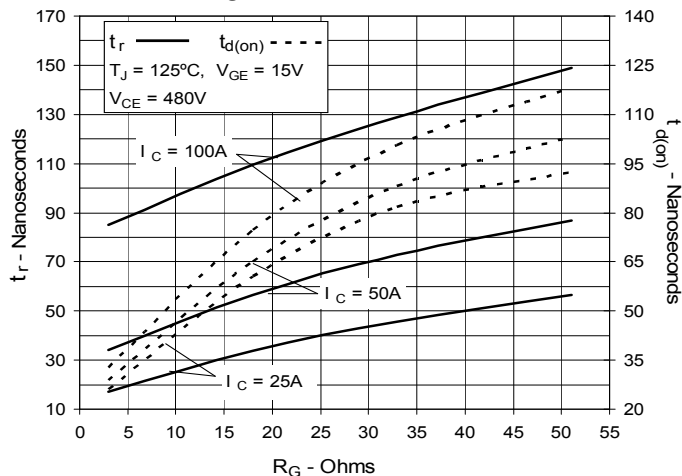
**Fig. 16. Inductive Turn-off
Switching Times vs. Collector Current**



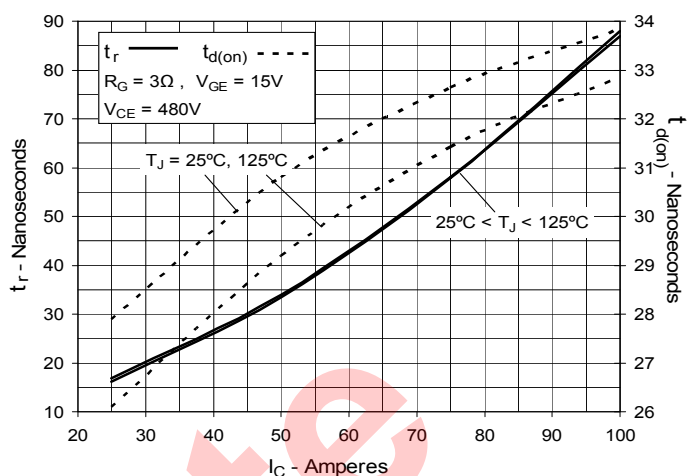
**Fig. 17. Inductive Turn-off
Switching Times vs. Junction Temperature**



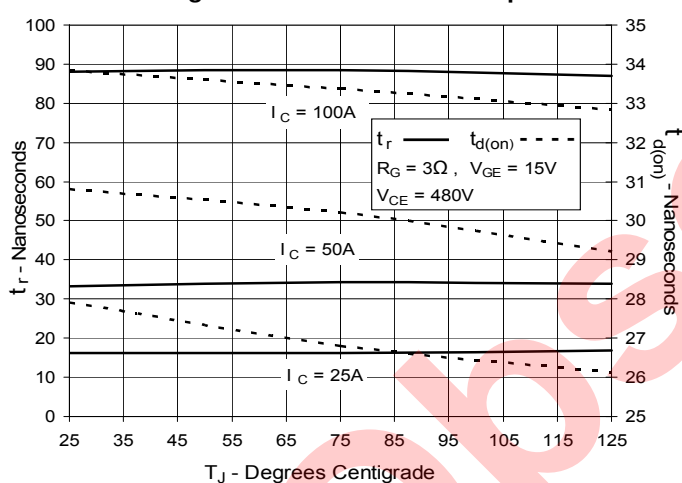
**Fig. 18. Inductive Turn-on
Switching Times vs. Gate Resistance**



**Fig. 19. Inductive Turn-on
Switching Times vs. Collector Current**



**Fig. 20. Inductive Turn-on
Switching Times vs. Junction Temperature**



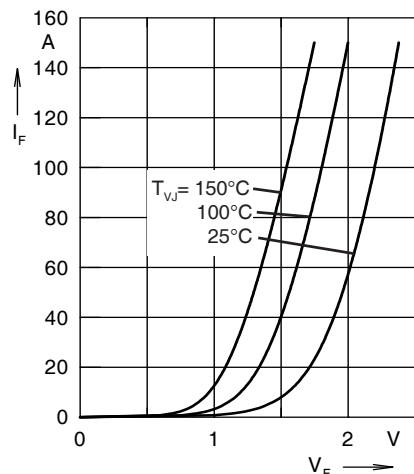


Fig. 21. Forward Current I_F Versus V_F

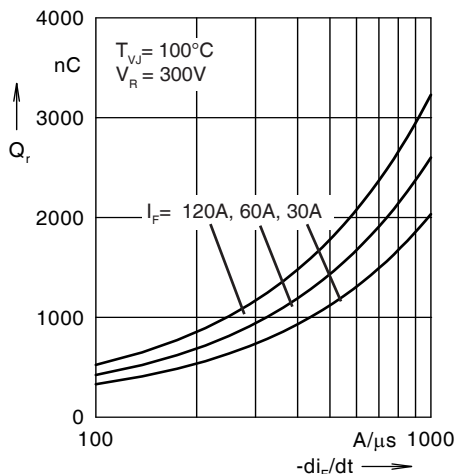


Fig. 22. Reverse Recovery Charge Q_r Versus $-di_F/dt$

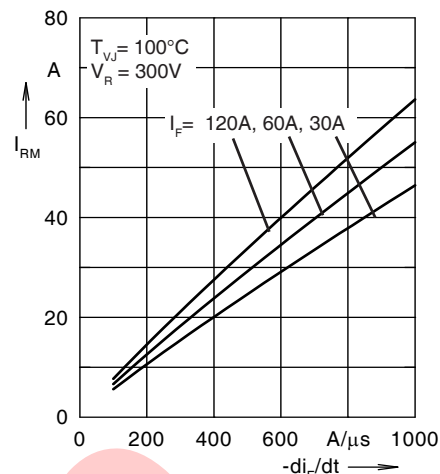


Fig. 23. Peak Reverse Current I_{RM} Versus $-di_F/dt$

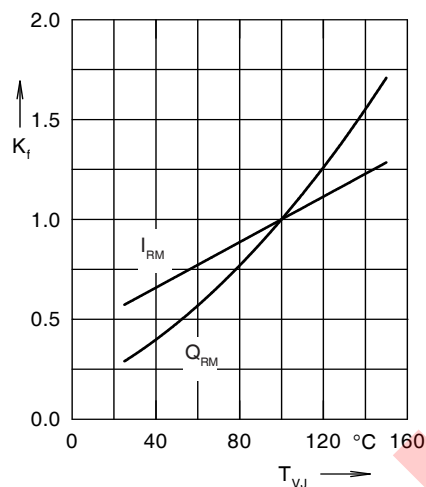


Fig. 24. Dynamic Parameters Q_r, I_{RM} Versus T_{VJ}

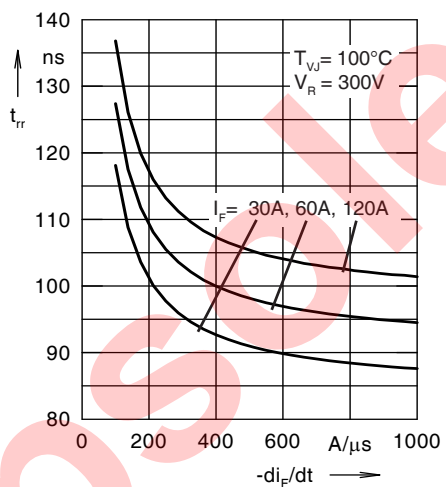


Fig. 25. Recovery Time t_{rr} Versus $-di_F/dt$

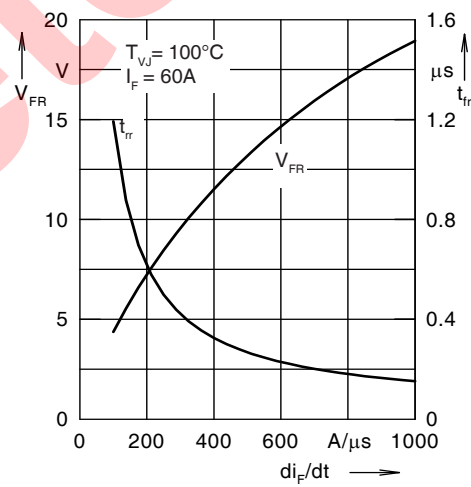


Fig. 26. Peak Forward Voltage V_{RM} and t_{rr} Versus $-di_F/dt$

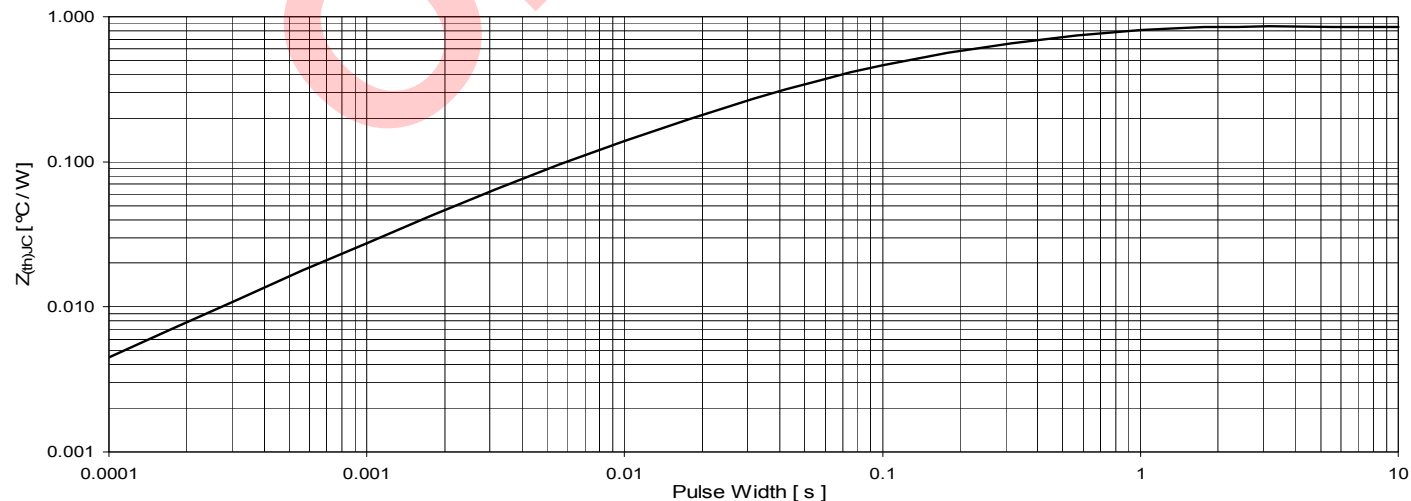


Fig. 27. Maximum Transient Thermal Impedance Junction to Case (for Diode)

Obsolete



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