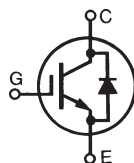


GenX3™ 1200V IGBT

IXGR24N120C3D1

High speed PT IGBTs for
20-50kHz Switching

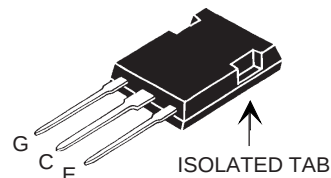


$$\begin{aligned} V_{CES} &= 1200V \\ I_{C25} &= 48A \\ V_{CE(sat)} &\leq 4.2V \\ t_{fi(typ)} &= 110ns \end{aligned}$$

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^\circ C$ to $150^\circ C$	1200	V
V_{CGR}	$T_J = 25^\circ C$ to $150^\circ C$, $R_{GE} = 1M\Omega$	1200	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ C$	48	A
I_{C100}	$T_C = 100^\circ C$	24	A
I_{CM}	$T_C = 25^\circ C$, 1ms	96	A
I_A	$T_C = 25^\circ C$	20	A
E_{AS}	$T_C = 25^\circ C$	250	mJ
SSOA (RBSOA)	$V_{GE} = 15V$, $T_J = 125^\circ C$, $R_G = 5\Omega$ Clamped inductive load @ $V_{CE} \leq 1200V$	$I_{CM} = 48$	A
P_C	$T_C = 25^\circ C$	200	W
T_J		-55 ... +150	$^\circ C$
T_{JM}		150	$^\circ C$
T_{stg}		-55 ... +150	$^\circ C$
F_C	Mounting force	20..120/4.5..27	N/lb.
T_L	Maximum lead temperature for soldering	300	$^\circ C$
T_{SOLD}	1.6mm (0.062 in.) from case for 10s	260	$^\circ C$
V_{ISOL}	50/60 Hz RMS, $t = 1min$	2500	V
	$I_{ISOL} < 1mA$, $t = 20seconds$	3000	V
Weight		5	g

Symbol	Test Conditions ($T_J = 25^\circ C$, unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
BV_{CES}	$I_C = 250\mu A$, $V_{GE} = 0V$	1200		V
$V_{GE(th)}$	$I_C = 250\mu A$, $V_{CE} = V_{GE}$	2.5		V
I_{CES}	$V_{CE} = V_{CES}$ $V_{GE} = 0V$ $T_J = 125^\circ C$			100 μA 1.5 mA
I_{GES}	$V_{CE} = 0V$, $V_{GE} = \pm 20V$			± 100 nA
$V_{CE(sat)}$	$I_C = 20A$, $V_{GE} = 15V$, Note 2 $T_J = 125^\circ C$	3.6 3.1	4.2	V V

ISOPLUS 247™ (IXGR)



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

Features

- DCB Isolated mounting tab
- Meets TO-247AD package outline
- High current handling capability
- Latest generation HDMOS™ process
- MOS Gate turn-on -drive simplicity
- Avalanche Rated

Applications

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

Advantages

- Space savings
- Easy assembly
- High power density
- Very fast switching speeds for high frequency applications

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$, unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
g_{fs}	$I_C = 24\text{A}$, $V_{CE} = 10\text{V}$, Note 2	10	17	S
C_{ies}	$V_{CE} = 25\text{V}$, $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$		1620	pF
C_{oes}			179	pF
C_{res}			52	pF
Q_g	$I_C = 24\text{A}$, $V_{GE} = 15\text{V}$, $V_{CE} = 0.5 \cdot V_{CES}$		79	nC
Q_{ge}			12	nC
Q_{gc}			36	nC
$t_{d(on)}$	Inductive load, $T_J = 25^\circ\text{C}$ $I_C = 20\text{A}$, $V_{GE} = 15\text{V}$ $V_{CE} = 600\text{V}$, $R_G = 5\Omega$ Note 1		16	ns
t_{ri}			26	ns
E_{on}			1.37	mJ
$t_{d(off)}$			93	ns
t_{fi}			110	ns
E_{off}			0.47	mJ
$t_{d(on)}$	Inductive load, $T_J = 125^\circ\text{C}$ $I_C = 20\text{A}$, $V_{GE} = 15\text{V}$ $V_{CE} = 600\text{V}$, $R_G = 5\Omega$ Note 1		17	ns
t_{ri}			37	ns
E_{on}			2.90	mJ
$t_{d(off)}$			125	ns
t_{fi}			305	ns
E_{off}			1.18	mJ
R_{thJC}				1.00 $^\circ\text{C/W}$
R_{thCK}			0.15	$^\circ\text{C/W}$

Reverse Diode (FRED)

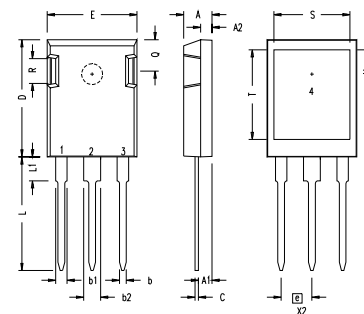
Symbol	Test Conditions ($T_J = 25^\circ\text{C}$, unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
V_F	$I_F = 30\text{A}$, $V_{GE} = 0\text{V}$ $I_F = 30\text{A}$, $V_{GE} = 0\text{V}$ $T_J = 125^\circ\text{C}$			2.75 V 1.80 V
I_{RM}	$I_F = 50\text{A}$, $-di_F/dt = 100\text{A}/\mu\text{s}$, $V_R = 600\text{V}$ $V_{GE} = 0\text{V}$, $T_J = 100^\circ\text{C}$		5.5	A
t_{rr}			220	ns
R_{thJC}				1.5 $^\circ\text{C/W}$

- Notes:
- Switching times may increase for $V_{CE} \text{ (Clamp)} > 0.8 \cdot V_{CES}$, higher T_J or increased R_G .
 - Pulse test, $t \leq 300\mu\text{s}$; duty cycle, $d \leq 2\%$.

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.

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.

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

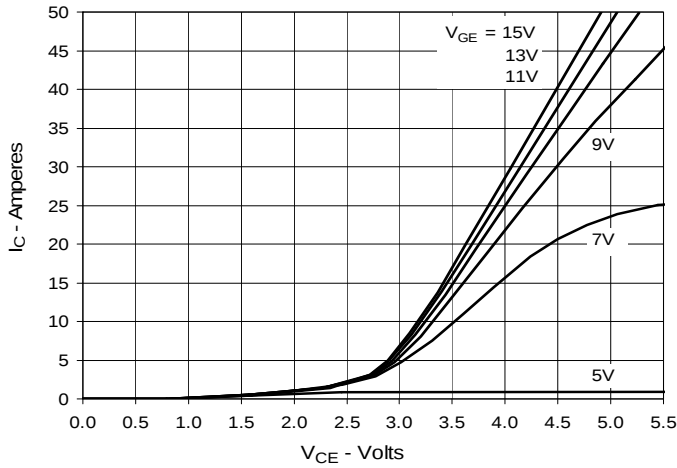


Fig. 2. Extended Output Characteristics
@ 25°C

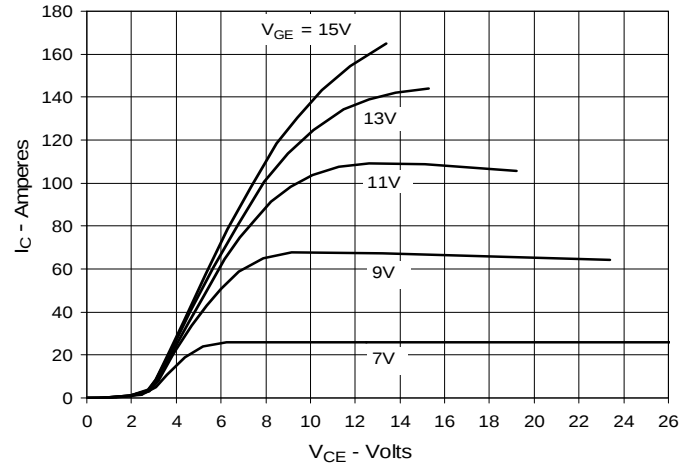


Fig. 3. Output Characteristics
@ 125°C

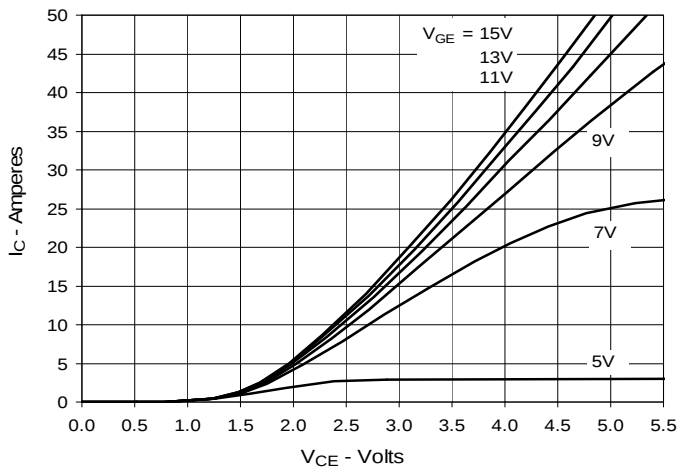


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

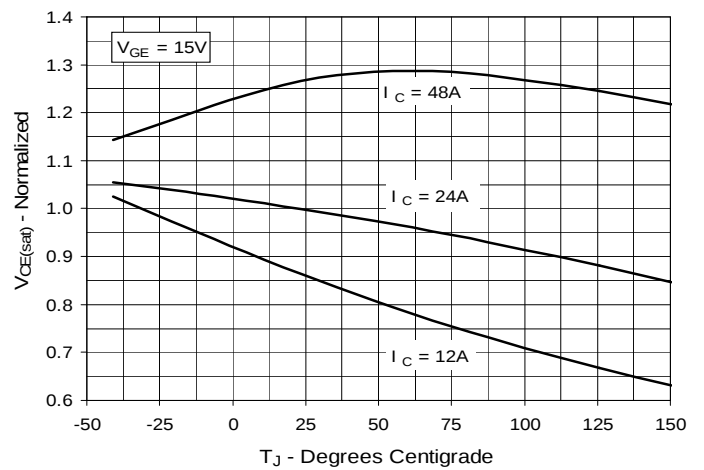


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

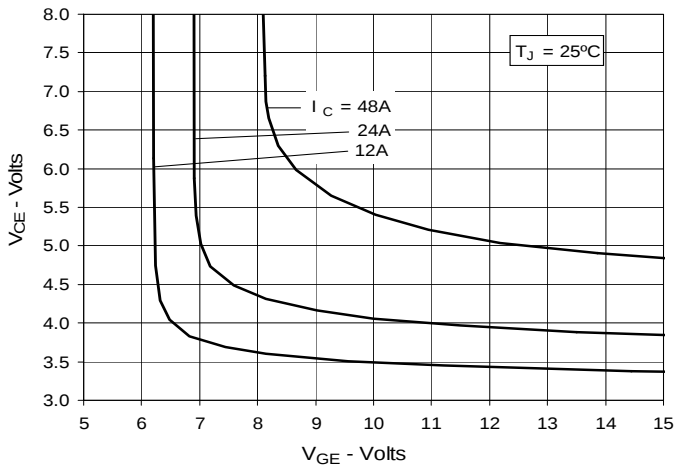


Fig. 6. Input Admittance

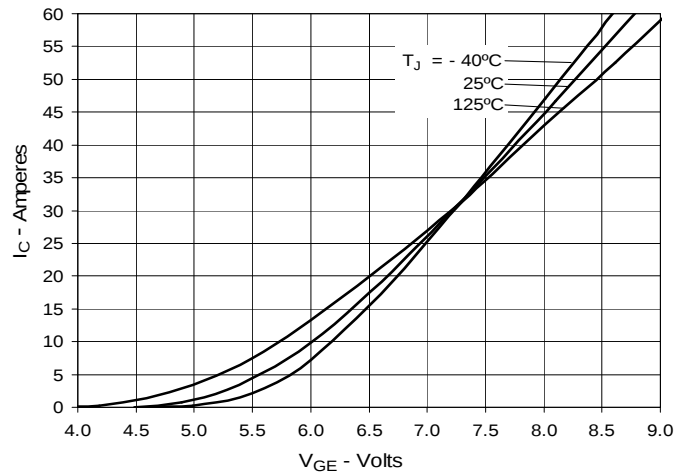


Fig. 7. Transconductance

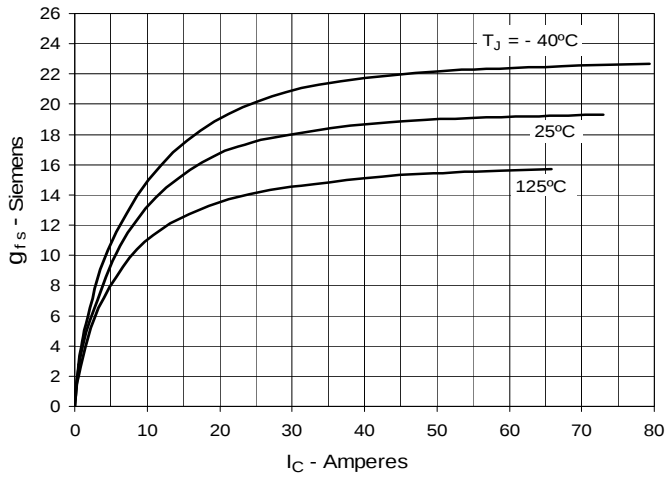


Fig. 8. Gate Charge

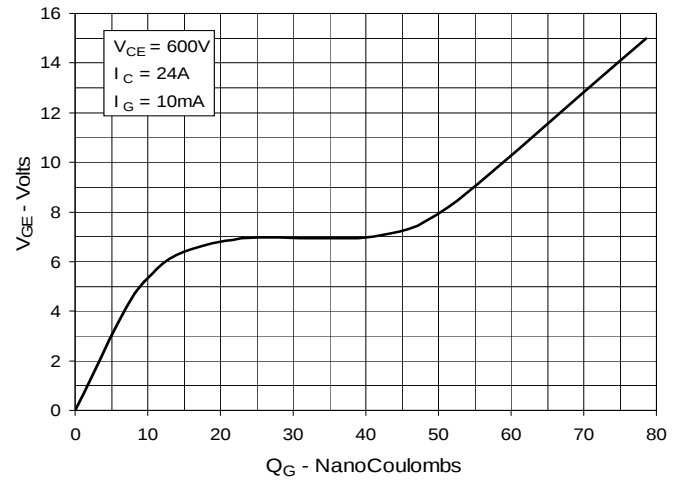


Fig. 9. Capacitance

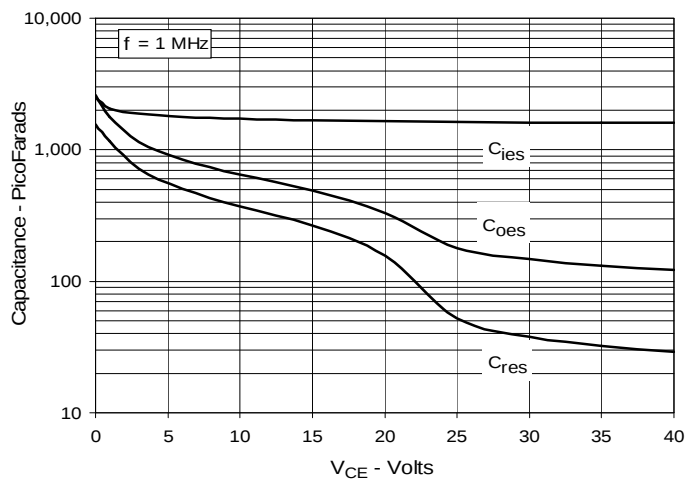


Fig. 10. Reverse-Bias Safe Operating Area

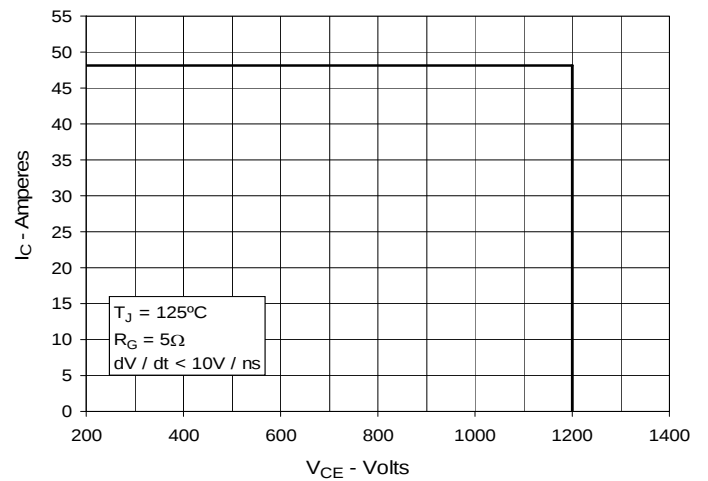
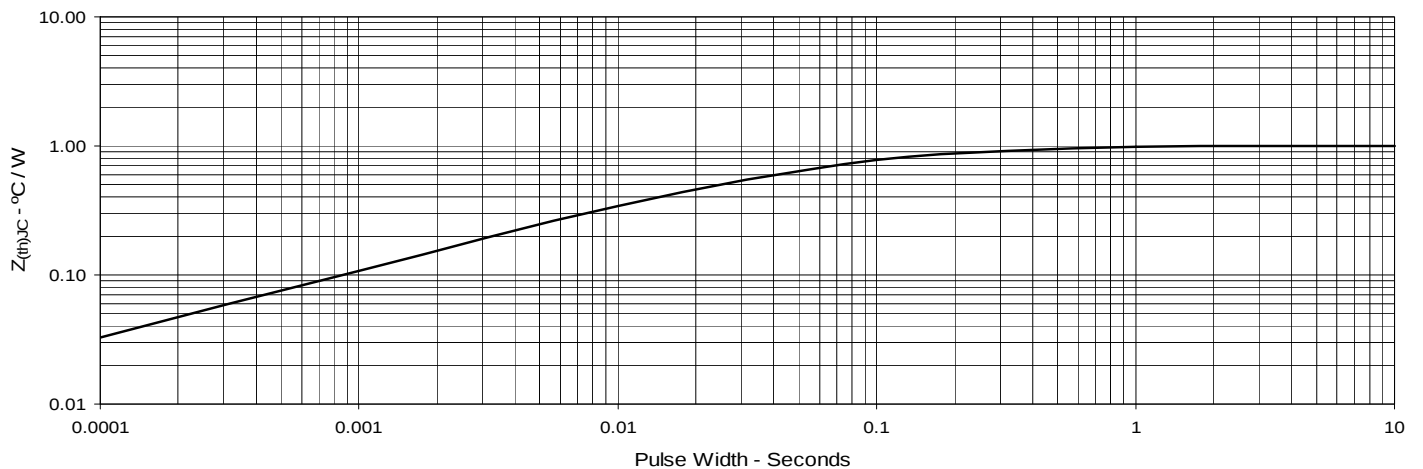
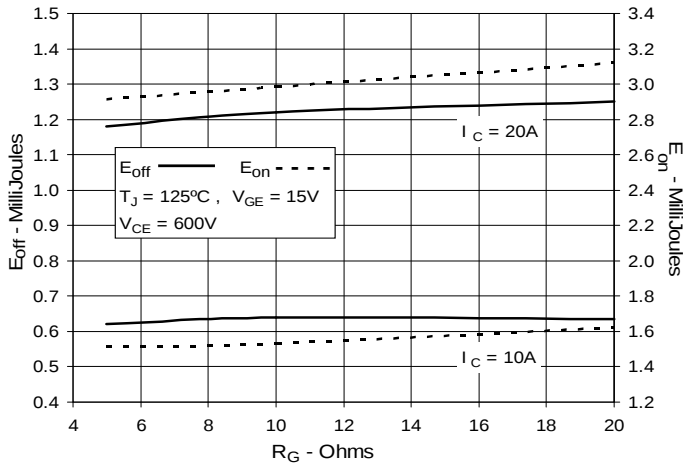


Fig. 11. Maximum Transient Thermal Impedance

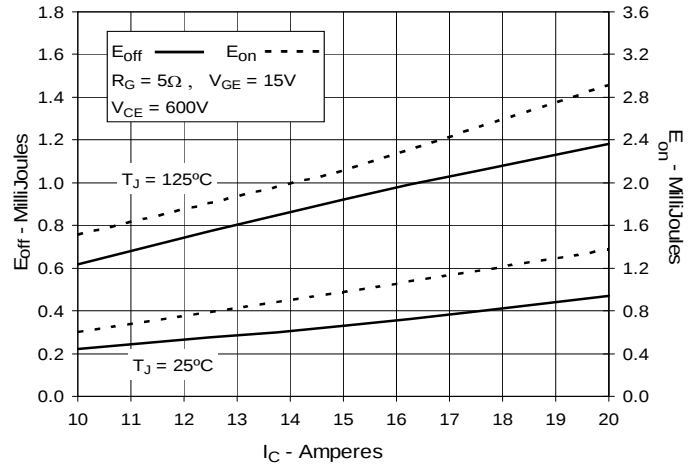


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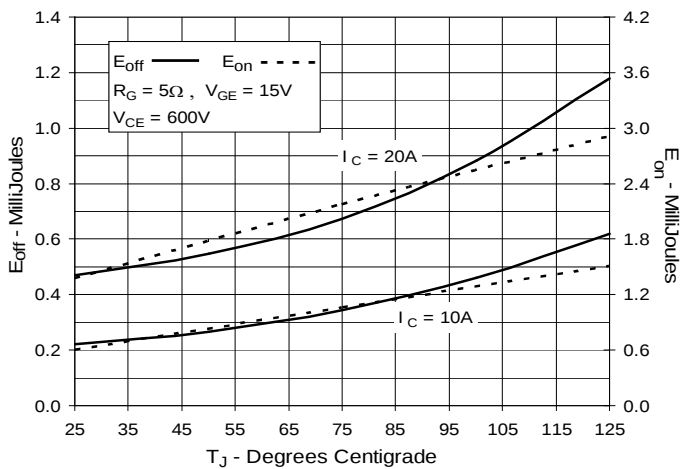
**Fig. 12. Inductive Switching
Energy Loss vs. Gate Resistance**



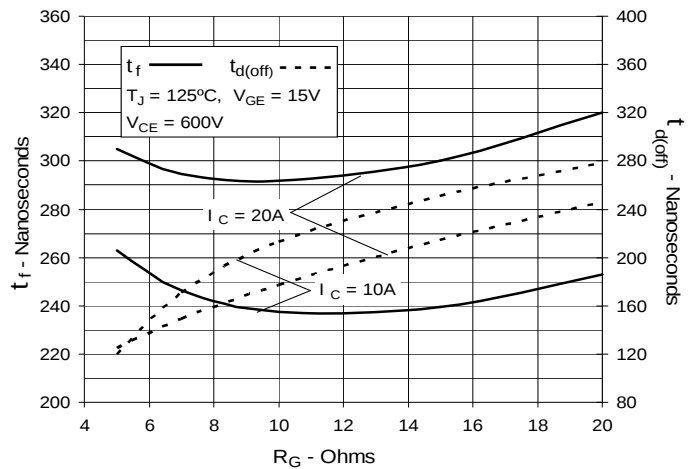
**Fig. 13. Inductive Switching
Energy Loss vs. Collector Current**



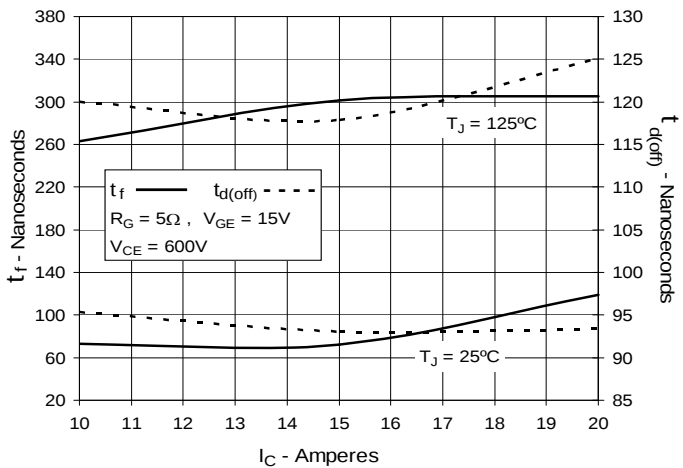
**Fig. 14. Inductive Switching
Energy Loss vs. Junction Temperature**



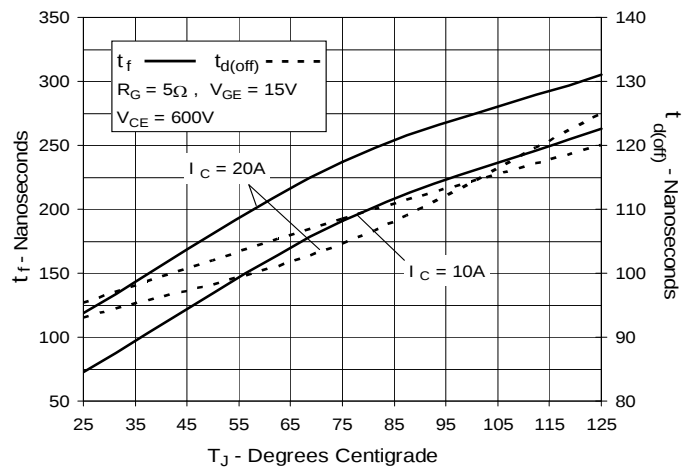
**Fig. 15. Inductive Turn-off
Switching Times vs. Gate Resistance**



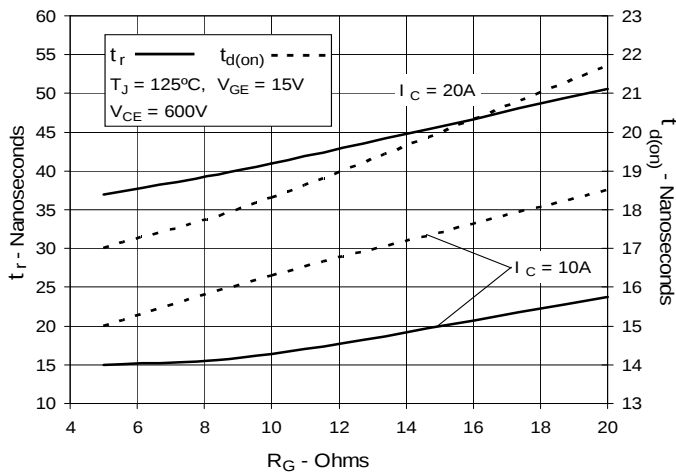
**Fig. 16. Inductive Turn-off
Switching Times vs. Collector Current**



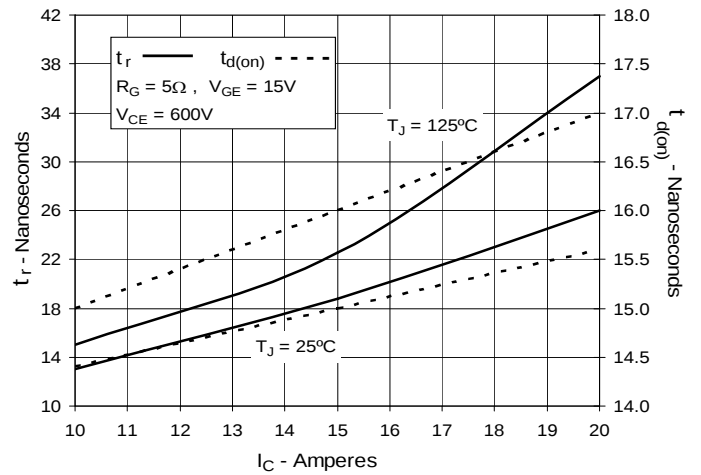
**Fig. 17. Inductive Turn-off
Switching Times vs. Junction Temperature**



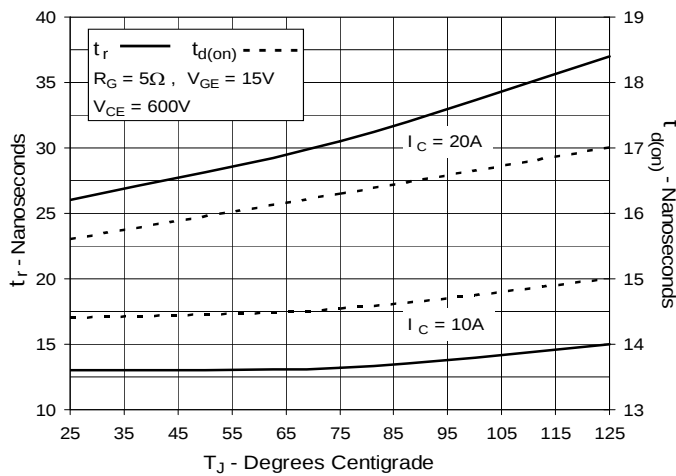
**Fig. 18. Inductive Turn-on
Switching Times vs. Gate Resistance**



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



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



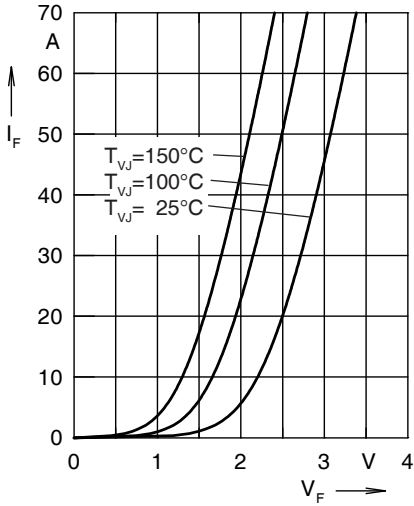


Fig. 21. Forward current I_F versus V_F

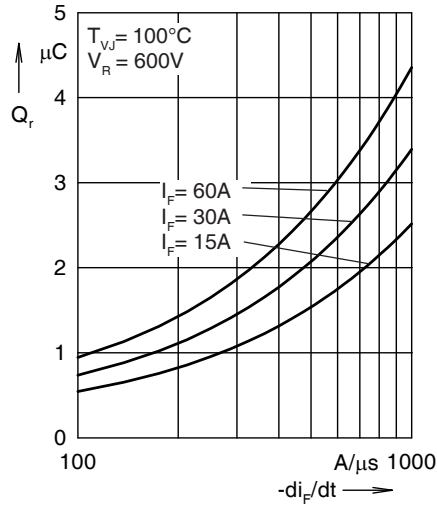


Fig. 22. Reverse recovery charge Q_r

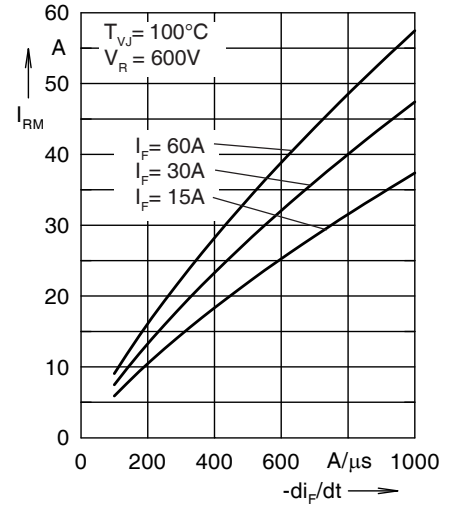


Fig. 23. Peak reverse current I_{RM}

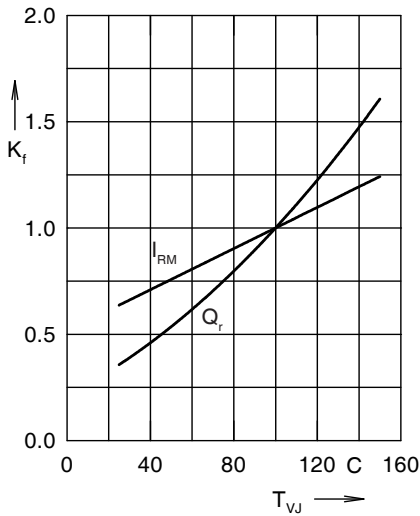


Fig. 24. Dynamic Parameters Q_r , I_{RM}

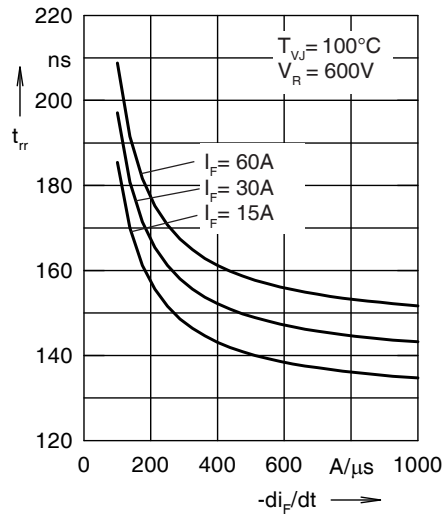


Fig. 25. Recovery time t_{rr} versus $-di_F/dt$

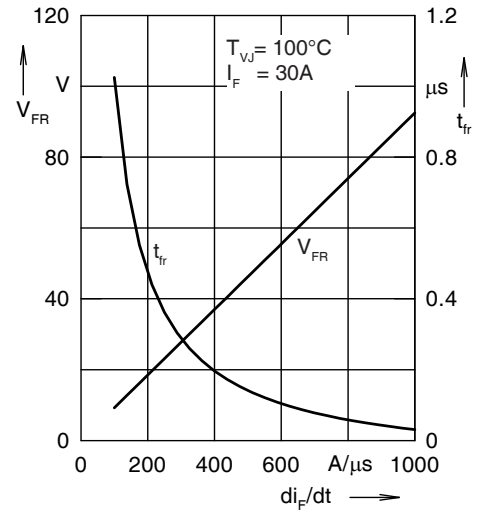


Fig. 26. Peak forward voltage V_{FR} and

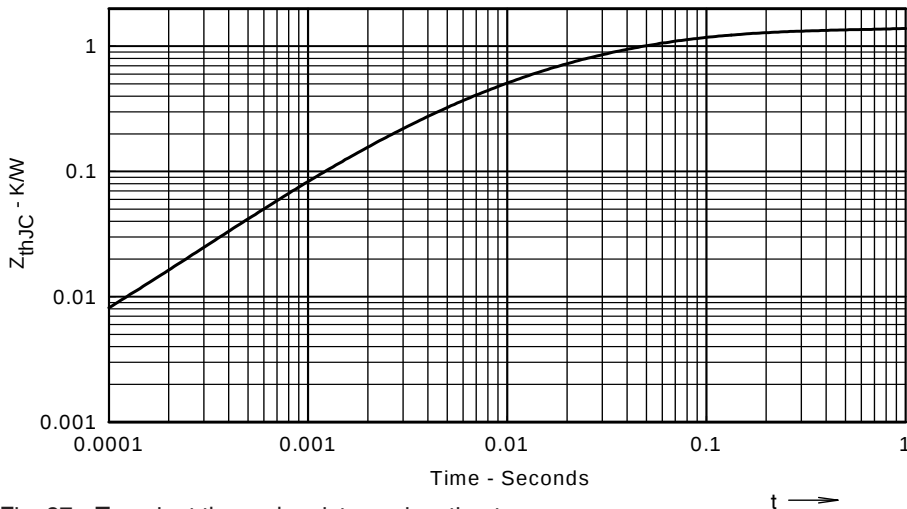


Fig. 27. Transient thermal resistance junction to case