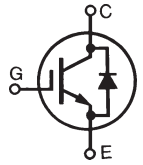
IXYS

Preliminary Technical Information

GenX3™ 1200V IGBT IXGR24N120C3D1

V_{CES} = 1200V
I_{C25} = 48A
$V_{CE(sat)}$ ≤ 4.2V
$t_{fi(typ)}$ = 110ns

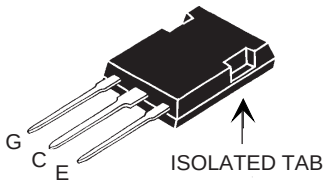
High speed PT IGBTs for 20-50kHz Switching



Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	1200	V
V_{CGR}	T_J = 25°C to 150°C, R_{GE} = 1MΩ	1200	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	48	A
I_{C100}	T_C = 100°C	24	A
I_{CM}	T_C = 25°C, 1ms	96	A
I_A	T_C = 25°C	20	A
E_{AS}	T_C = 25°C	250	mJ
SSOA (RBSOA)	V_{GE} = 15V, T_J = 125°C, R_G = 5Ω Clamped inductive load @V_{CE} ≤ 1200V	I_{CM} = 48	A
P_C	T_C = 25°C	200	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
F_C	Mounting force	20..120/4.5..27	N/lb.
T_L	Maximum lead temperature for soldering	300	°C
T_{SOLD}	1.6mm (0.062 in.) from case for 10s	260	°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°C, unless otherwise specified)	Characteristic Values Min.	Typ.	Max.	
BV_{CES}	I_C = 250μA, V_{GE} = 0V	1200			V
$V_{GE(th)}$	I_C = 250μA, V_{CE} = V_{GE}	2.5		5.0	V
I_{CES}	V_{CE} = V_{CES}			100	μA
	V_{GE} = 0V, T_J = 125°C			1.5	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±100	nA
$V_{CE(sat)}$	I_C = 20A, V_{GE} = 15V, Note 2		3.6	4.2	V
	T_J = 125°C		3.1		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

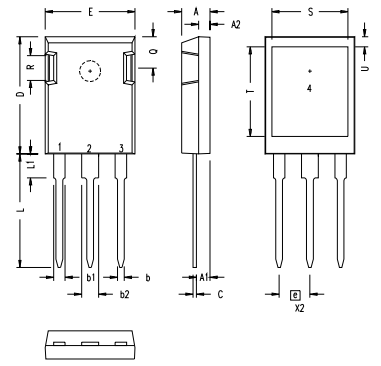
Applications
- Switch-mode and resonant-mode power supplies
- Uninterruptible power supplies (UPS)
- DC choppers
- AC motor speed control
- DC servo and robot drives

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

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Symbol	Test Conditions (T_J = 25°C, unless otherwise specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	I_C = 24A, V_{CE} = 10V, Note 2	10	17		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		1620		pF
C_{oes}			179		pF
C_{res}			52		pF
Q_g	I_C = 24A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		79		nC
Q_{ge}			12		nC
Q_{gc}			36		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		16		ns
t_{ri}	I_C = 20A, V_{GE} = 15V		26		ns
E_{on}	V_{CE} = 600V, R_G = 5Ω		1.37		mJ
$t_{d(off)}$	Note 1		93		ns
t_{fi}			110		ns
E_{off}			0.47	0.85	mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**		17		ns
t_{ri}	I_C = 20A, V_{GE} = 15V		37		ns
E_{on}	V_{CE} = 600V, R_G = 5Ω		2.90		mJ
$t_{d(off)}$	Note 1		125		ns
t_{fi}			305		ns
E_{off}			1.18	2.00	mJ
R_{thJC}				1.00	°C/W
R_{thCK}			0.15		°C/W

ISOPLUS247 (IXGR) Outline



SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS 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.

Reverse Diode (FRED)

Symbol	Test Conditions (T_J = 25°C, unless otherwise specified)	Characteristic Values Min.	Typ.	Max.	
V_F	I_F = 30A, V_{GE} = 0V			2.75	V
	I_F = 30A, V_{GE} = 0V, T_J = 125°C			1.80	V
I_{RM}	I_F = 50A, -di$_F$/dt = 100A/μs, V_R = 600V		5.5	11	A
t_{rr}	V_{GE} = 0V, T_J = 100°C		220		ns
R_{thJC}				1.5	°C/W

Notes: 1. Switching times may increase for V_{CE} (Clamp) > 0.8 • V_{CES}, higher T_J or increased R_G.
2. Pulse test, t ≤ 300μs; duty cycle, d ≤ 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.

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 4,850,072 4,881,106 4,931,844 5,017,508 5,034,796 5,049,961 5,063,307 5,187,117 5,237,481 5,381,025 5,486,715 6,162,665 6,259,123 B1 6,306,728 B1 6,404,065 B1 6,534,343 6,583,505 6,683,344 6,710,405 B2 6,710,463 6,727,585 6,759,692 6,771,478 B2 7,005,734 B2 7,063,975 B2 7,071,537 7,157,338B2

Fig. 1. Output Characteristics @ 25ºC

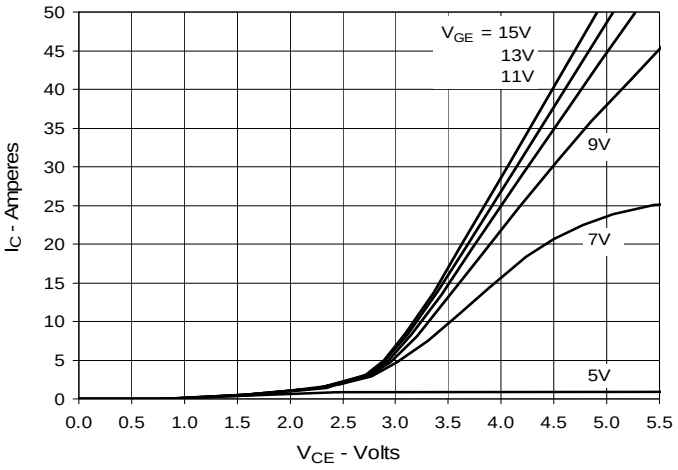


Fig. 2. Extended Output Characteristics @ 25ºC

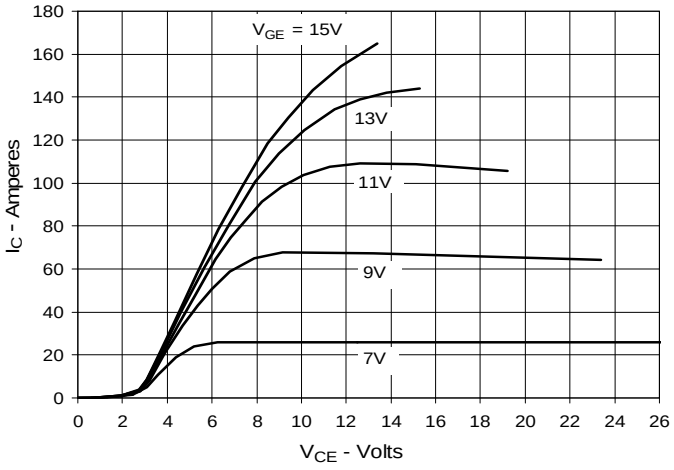


Fig. 3. Output Characteristics @ 125ºC

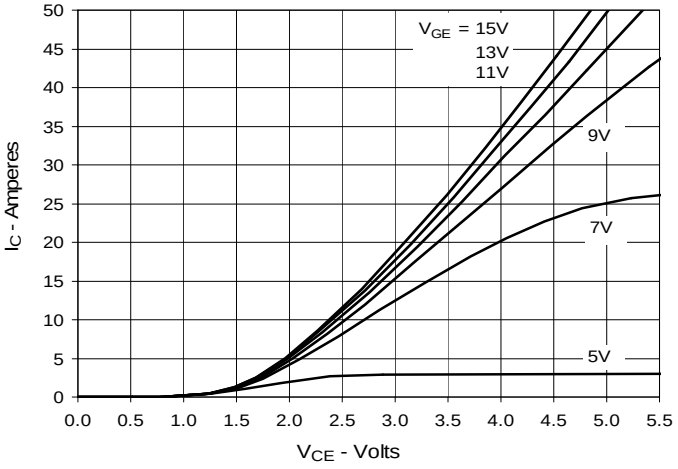


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

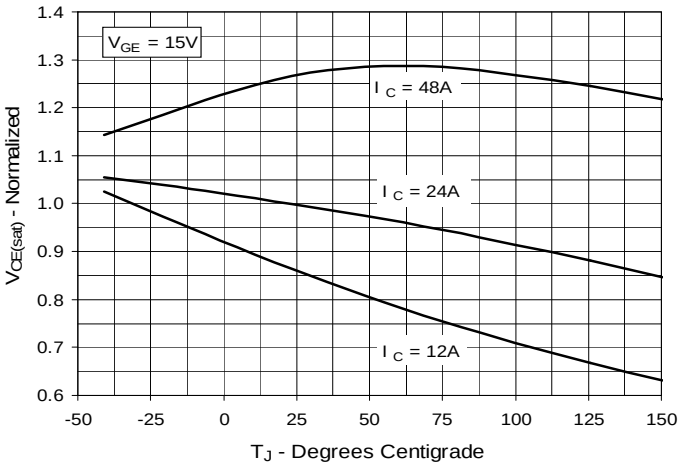


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

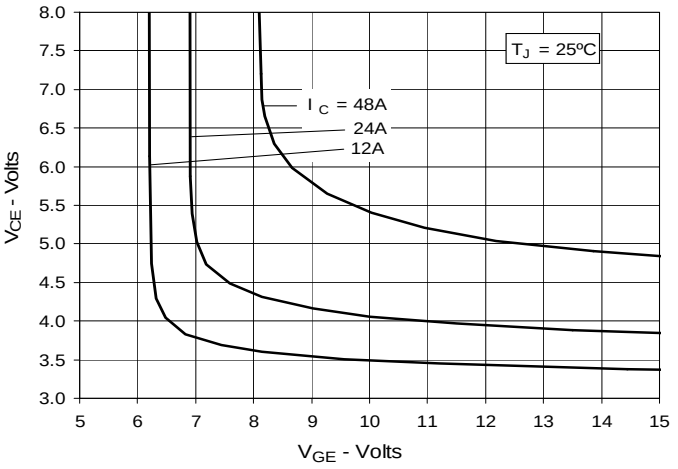
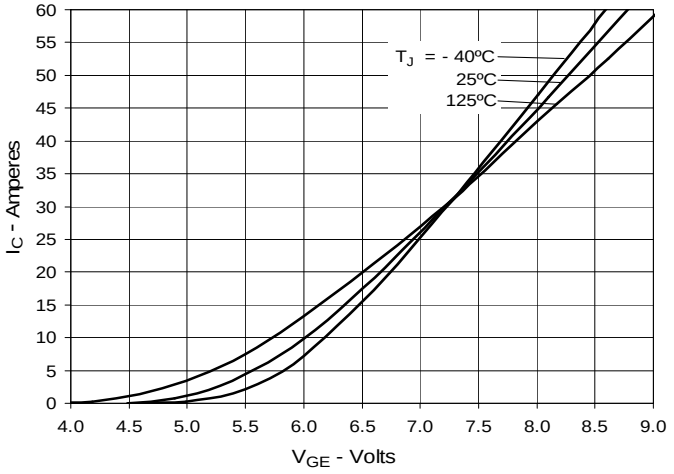


Fig. 6. Input Admittance



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Fig. 7. Transconductance

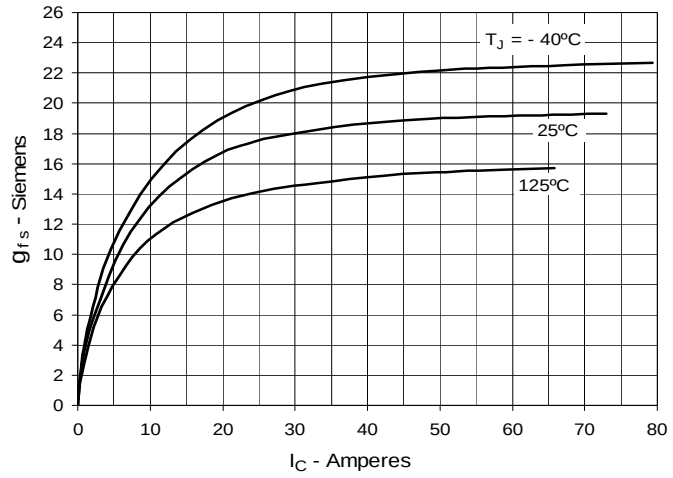


Fig. 8. Gate Charge

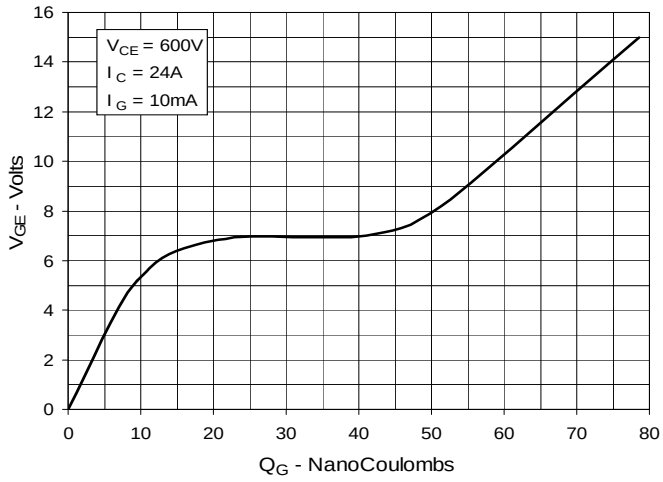


Fig. 9. Capacitance

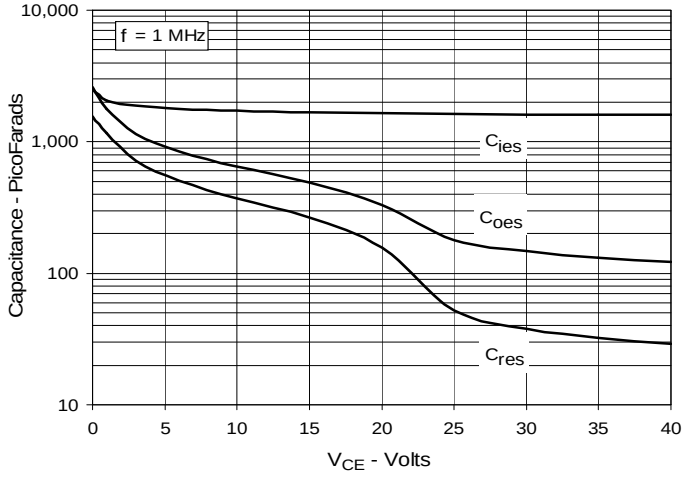


Fig. 10. Reverse-Bias Safe Operating Area

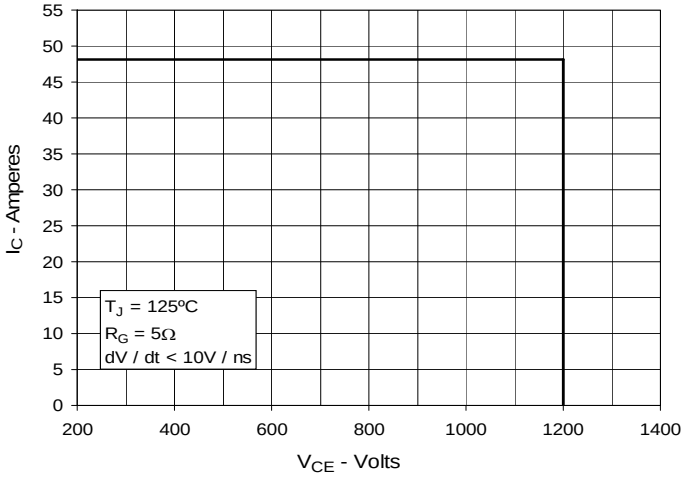
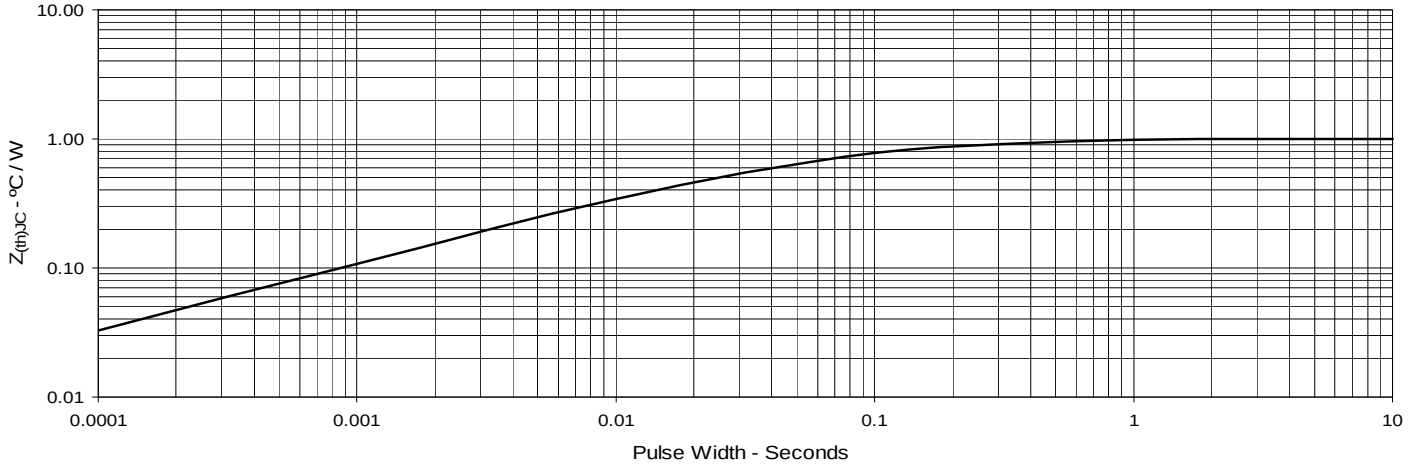


Fig. 11. Maximum Transient Thermal Impedance



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

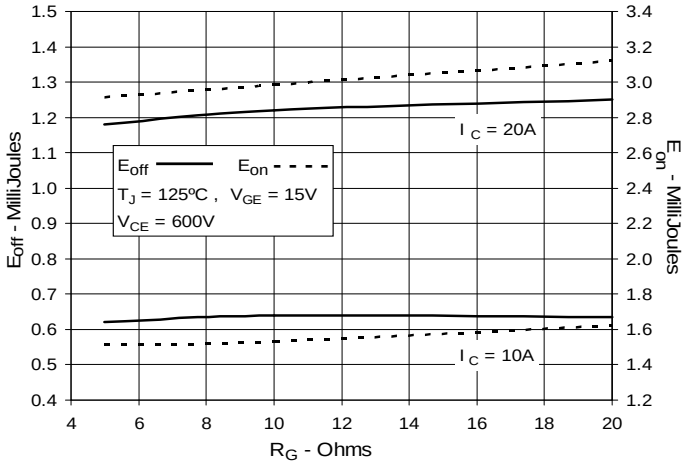


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

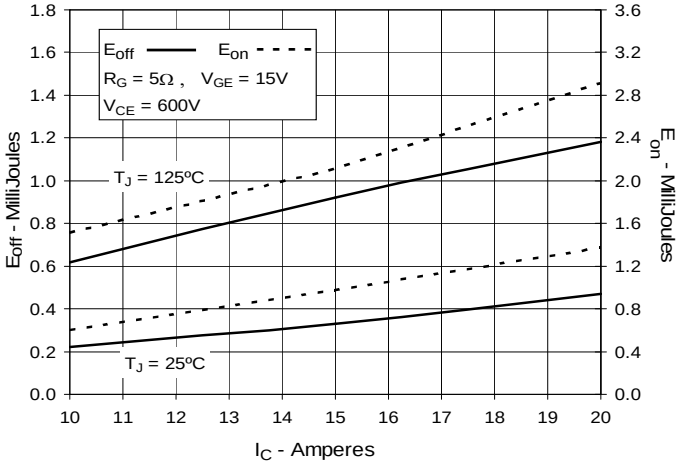


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

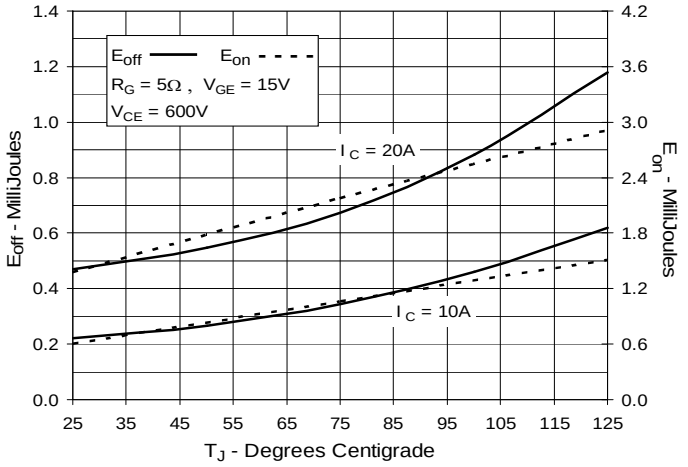


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

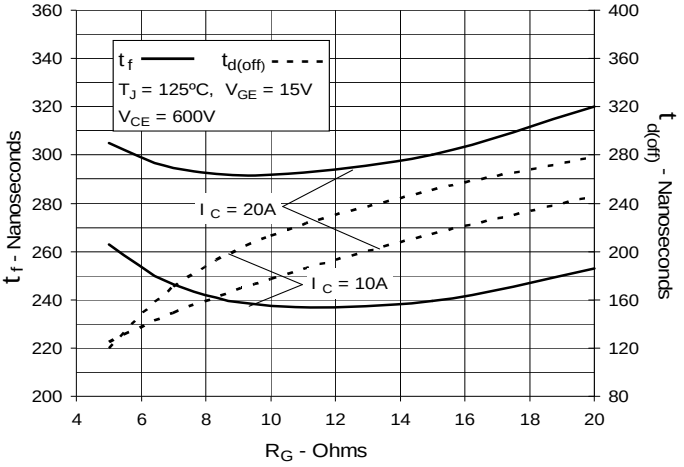


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

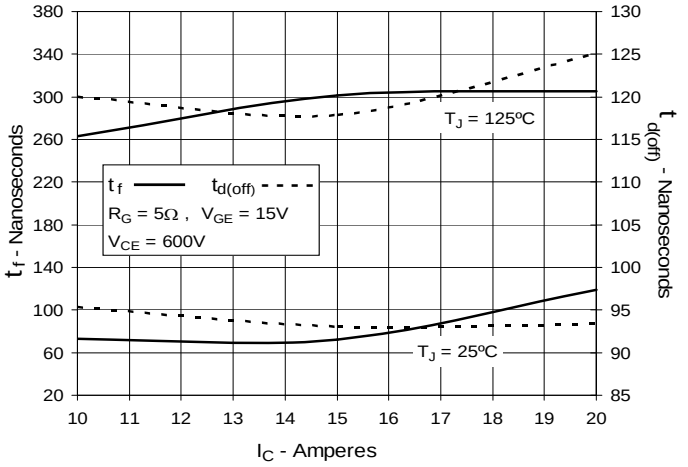
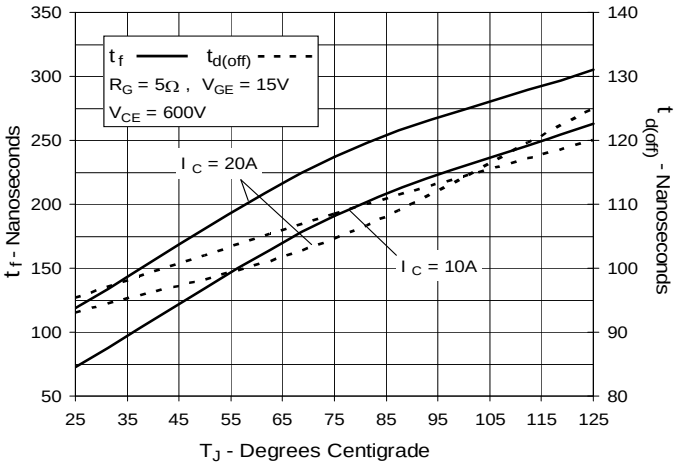


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature



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

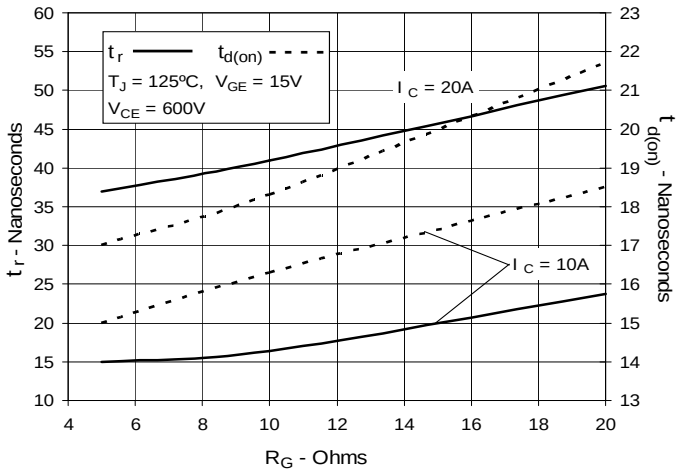


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

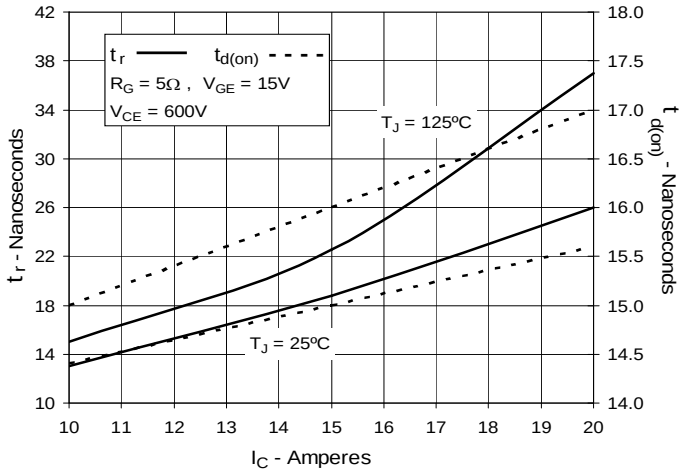
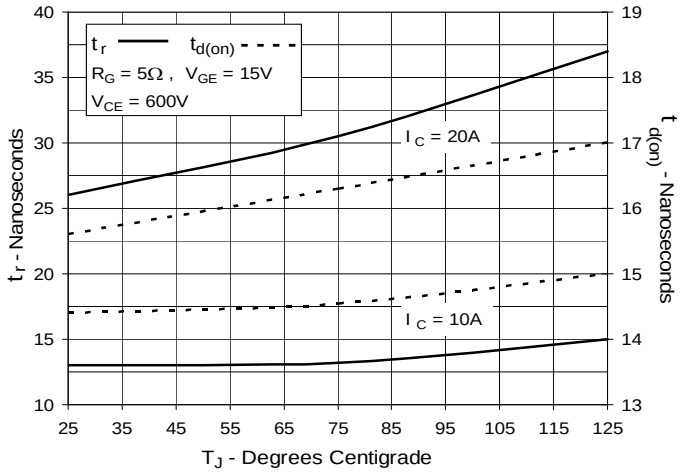


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature



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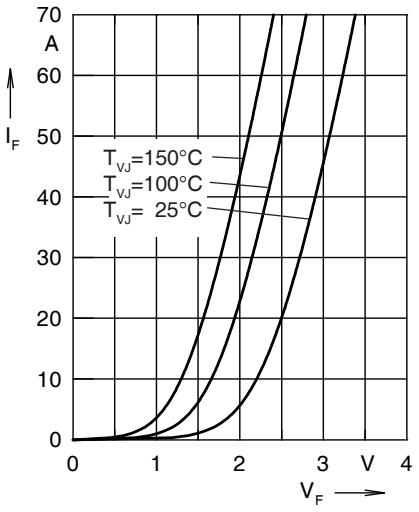


Fig. 21. Forward current I_F versus V_F

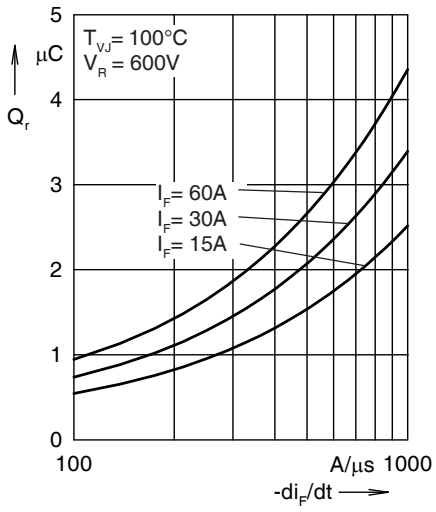


Fig. 22. Reverse recovery charge Q_r

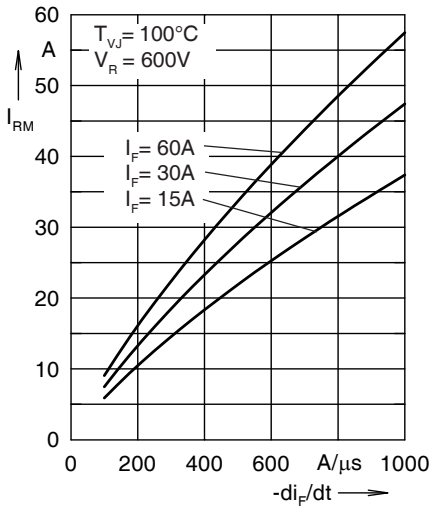


Fig. 23. Peak reverse current I_{RM}

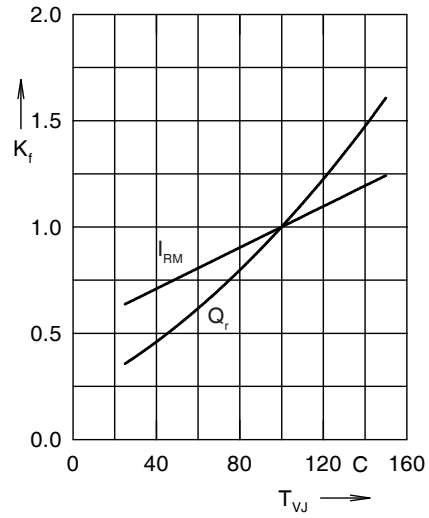


Fig. 24. Dynamic Parameters Q_r, I_{RM}

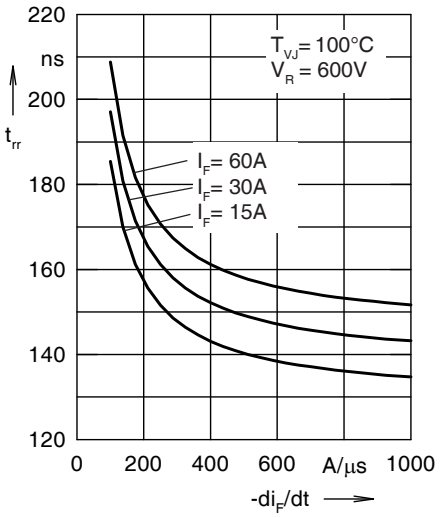


Fig. 25. Recovery time t_{rr} versus $-di_F/dt$

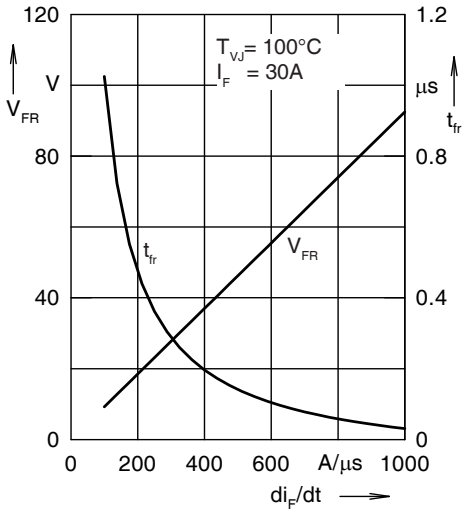


Fig. 26. Peak forward voltage V_{FR} and

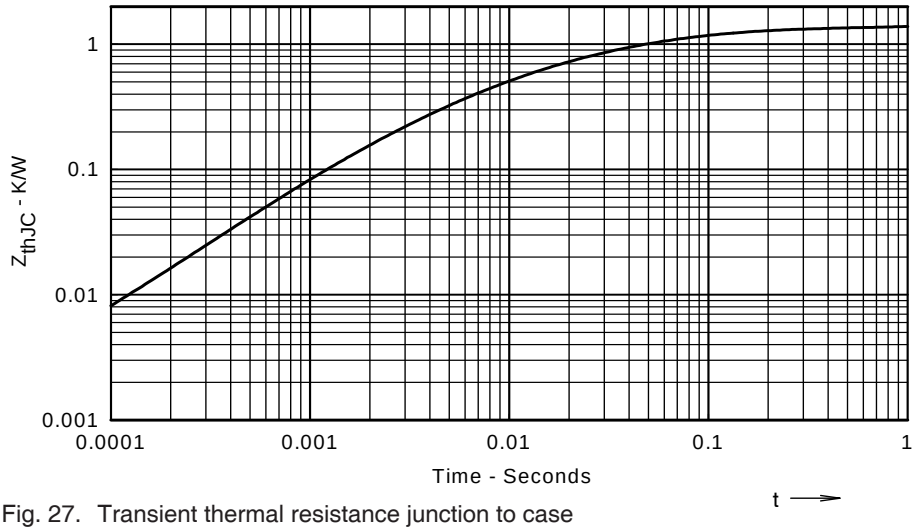


Fig. 27. Transient thermal resistance junction to case

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