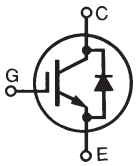
HiPerFAST™ IGBT with Fast Diode

IXGR 50N90B2D1

V_{CES} = 900 V
I_{C25} = 40 A
$V_{CE(sat)}$ = 2.9 V
$t_{fi\,typ}$ = 200 ns

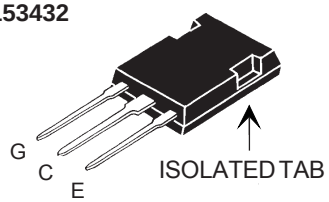
B2-Class High Speed IGBT with Fast Diode

(Electrically Isolated Back Surface)



Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	900	V
V_{CGR}	T_J = 25°C to 150°C; R_{GE} = 1 MΩ	900	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	T_C = 25°C	40	A
I_{C110}	T_C = 110°C (IGBT)	19	A
I_{F110}	T_C = 110°C (diode)	22	A
I_{CM}	T_C = 25°C, 1 ms	200	A
SSOA (RBSOA)	V_{GE} = 15 V, T_{VJ} = 125°C, R_G = 10 Ω Clamped inductive load @ ≤ 720V	I_{CM} = 100	A
P_C	T_C = 25°C	100	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	°C
V_{ISOL}	50/60 Hz, RMS, t = 1ms	2500	V
F_C	Mounting force (PLUS247)	20..120 / 4.5..25	N/lb
Weight		ISOPLUS247 5	g

ISOPLUS247 (IXGR)
E153432



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

Features

- Electrically isolated tab
- International standard package outline
- High current handling capability
- MOS Gate turn-on
- Drive simplicity
- Rugged NPT structure
- UL recognized
- Molding epoxies meet UL 94 V-0 flammability classification

Applications

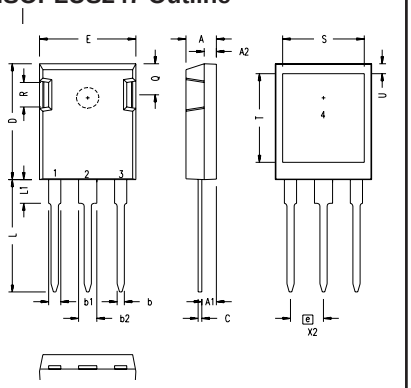
- Capacitor discharge & pulser circuits
- AC motor speed control
- DC servo and robot drives
- DC choppers
- Uninterruptible power supplies (UPS)
- Switched-mode and resonant-mode power supplies

Symbol	Test Conditions (T_J = 25°C unless otherwise specified)	Characteristic Values Min.	Typ.	Max.	
$V_{GE(th)}$	I_C = 250 μA, V_{CE} = V_{GE}	3.0		5.0	V
I_{CES}	V_{CE} = V_{CES} V_{GE} = 0 V T_J = 150°C			50 1	μA mA
I_{GES}	V_{CE} = 0 V, V_{GE} = ± 20 V			± 100	nA
$V_{CE(sat)}$	I_C = I_T, V_{GE} = 15 V, Note 1, 2 T_J = 125°C		2.2	2.9	V

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Symbol	Test Conditions (T_J = 25°C unless otherwise specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	$I_C = I_T$; V_{CE} = 10 V, Note 1, 2	25	40		S
C_{ies}			2500		pF
C_{oes}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		180		pF
C_{res}			75		pF
Q_g			135		nC
Q_{ge}	$I_C = I_T$, V_{GE} = 15 V, V_{CE} = 0.5 V_{CES}		23		nC
Q_{gc}			50		nC
$t_{d(on)}$	**Inductive load**		20		ns
t_{ri}	$I_C = I_T$, V_{GE} = 15 V		28		ns
$t_{d(off)}$	V_{CE} = 720 V, $R_G = R_{off}$ = 5 Ω		350	500	ns
t_{fi}	Note 2		200		ns
E_{off}			4.7	7.5	mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**		20		ns
t_{ri}	$I_C = I_T$, V_{GE} = 15 V		28		ns
E_{on}	V_{CE} = 720 V, $R_G = R_{off}$ = 5 Ω,		1.5		mJ
$t_{d(off)}$	Note 2		400		ns
t_{fi}			420		ns
E_{off}			8.7		mJ
R_{thJC}				1.25	K/W
R_{thCH}			0.21		K/W

ISOPLUS247 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.

Diode

Symbol	Conditions (T_J = 25°C unless otherwise specified)	Characteristic Values Min.	Typ.	Max.	
V_F	I_F = 30 A; Note 1		2.5	2.75	V
	T_{VJ} = 150°C		1.8		V
I_{RM}	$I_F = I_T$, di_F/dt = -100 A/µs; T_{VJ} = 100°C		5.5	11.5	A
t_{rr}	V_R = 100 V; V_{GE} = 0 V		200		ns
R_{thJC}				1.1	K/W
R_{thCH}	with heat transfer paste		0.25		K/W

Note 1: Pulse test, t ≤ 300 µs, duty cycle ≤ 2 %
Note 2: Test Current I_T = 50A

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 6,710,405B2 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 6771478 B2

Fig. 1. Output Characteristics @ 25 ºC

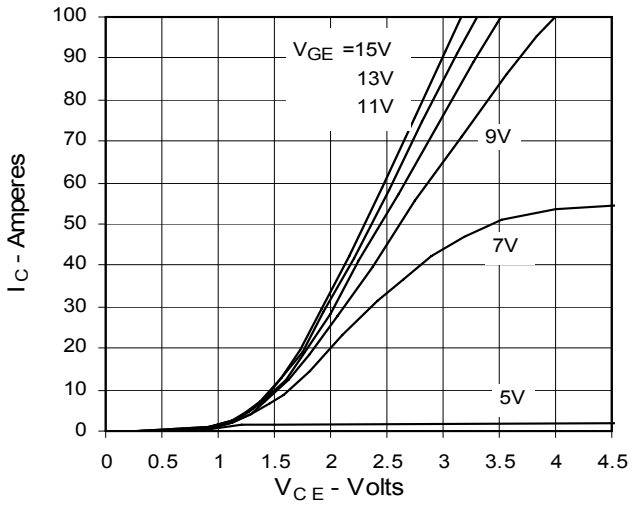


Fig. 2. Extended Output Characteristics @ 25 ºC

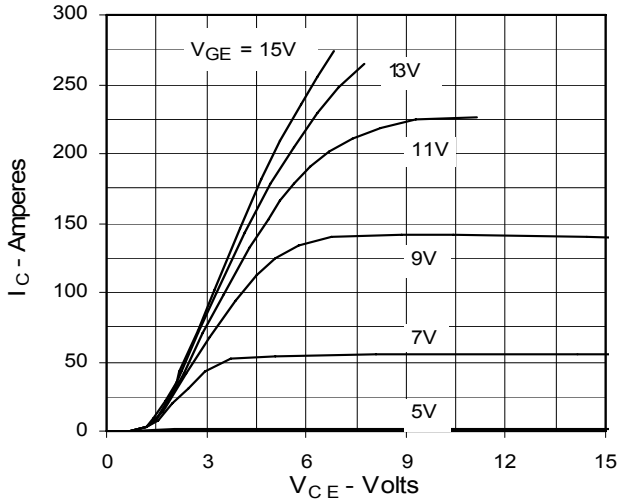


Fig. 3. Output Characteristics @ 125 ºC

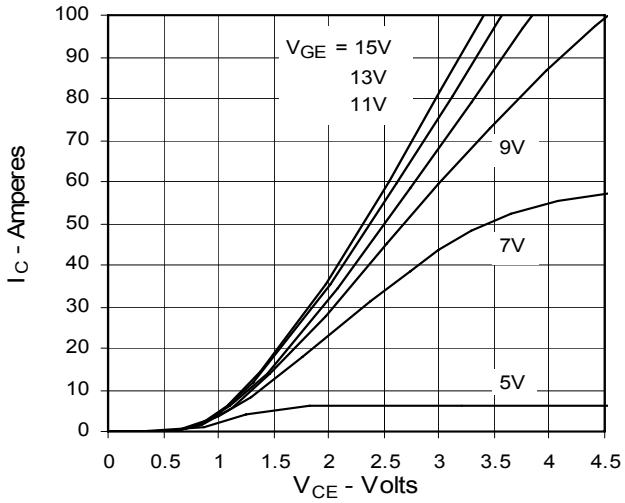


Fig. 4. Dependence of $V_{CE(sat)}$ on Temperature

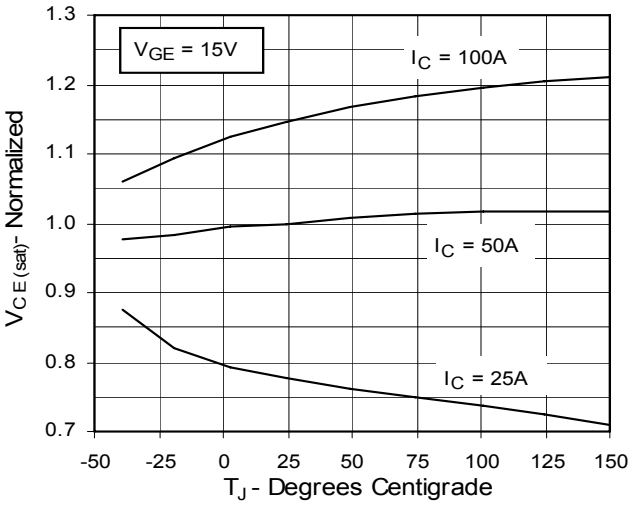


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter voltage

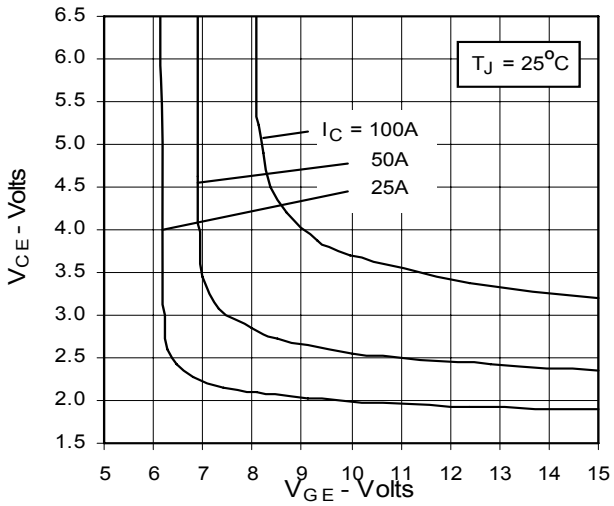
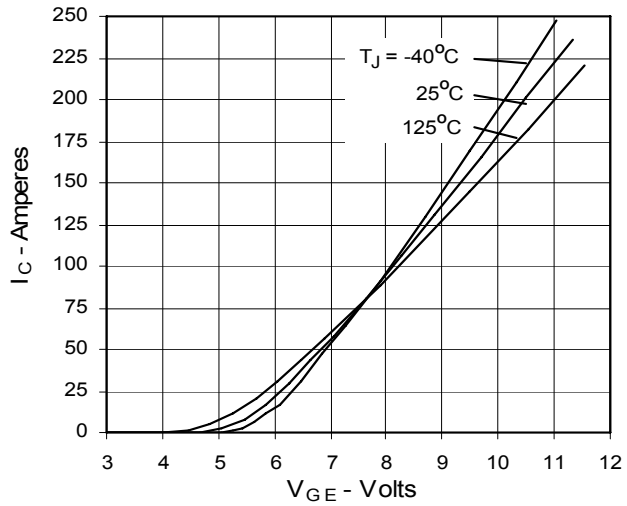


Fig. 6. Input Admittance



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Fig. 7. Transconductance

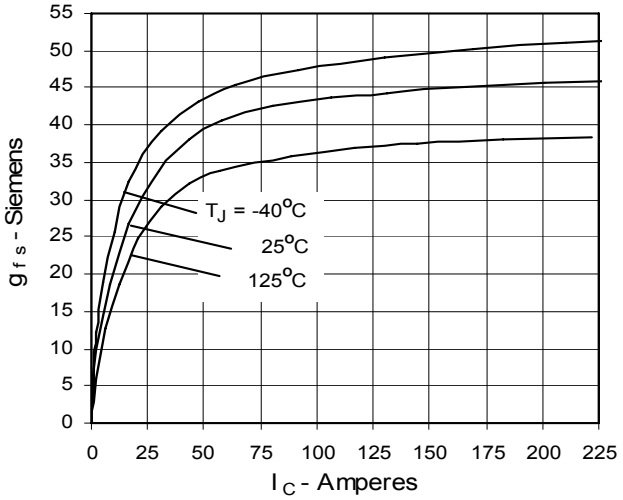


Fig. 8. Dependence of Turn-off Energy Loss on R_G

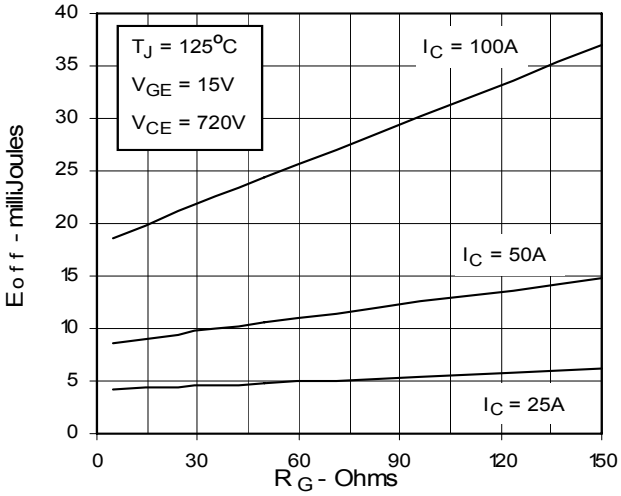


Fig. 9. Dependence of Turn-Off Energy Loss on I_C

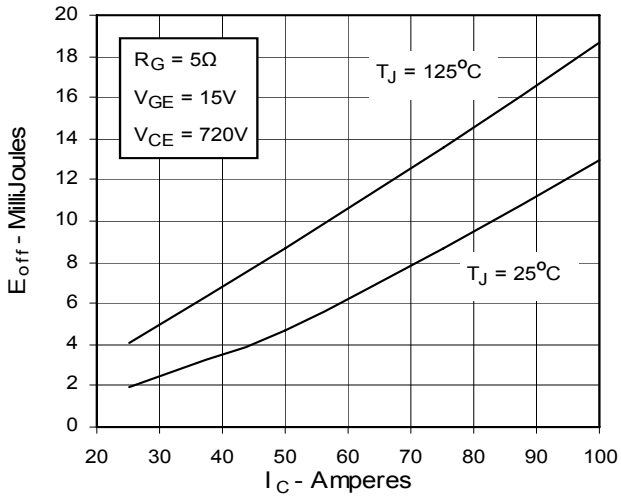


Fig. 10. Dependence of Turn-off Energy Loss on Temperature

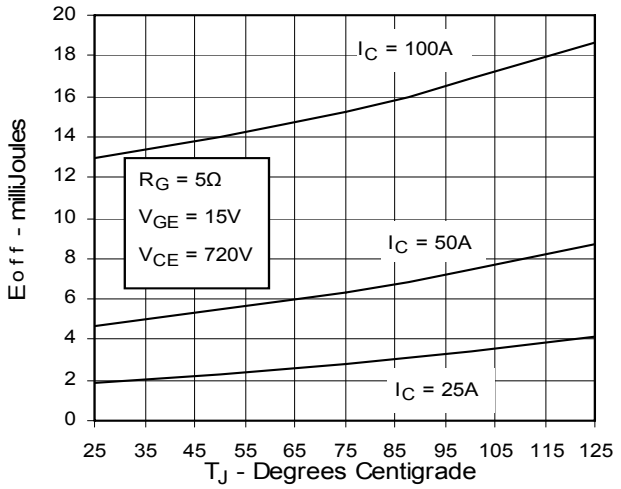


Fig. 11. Dependence of Turn-off Switching Time on R_G

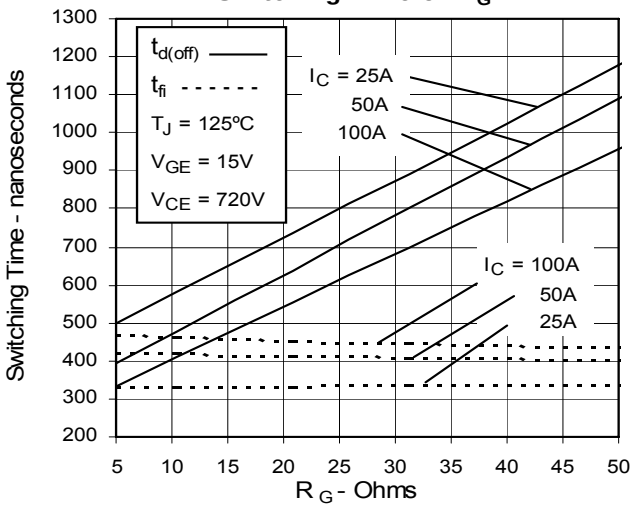
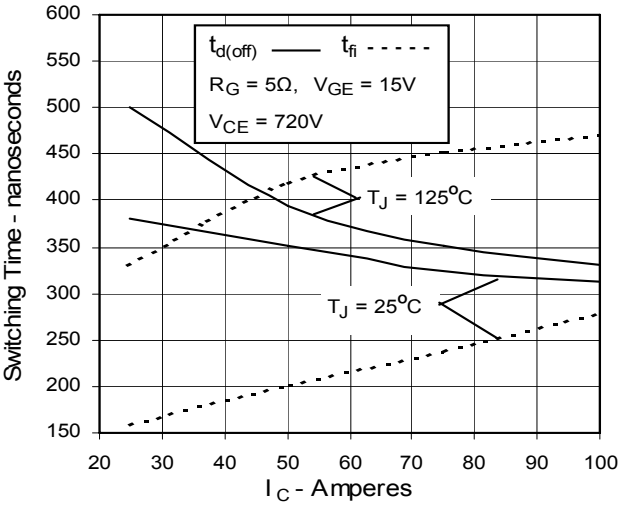


Fig. 12. Dependence of Turn-off Switching Time on I_C



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

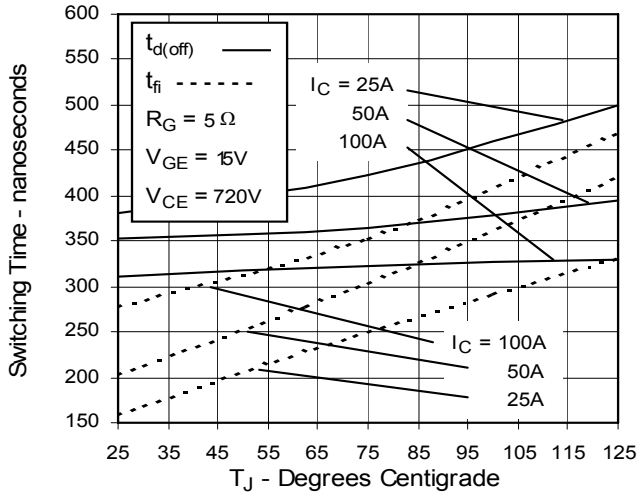


Fig. 14. Gate Charge

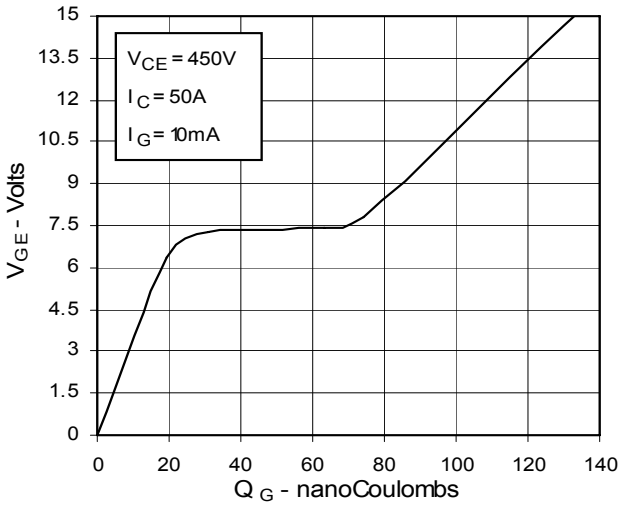


Fig. 15. Capacitance

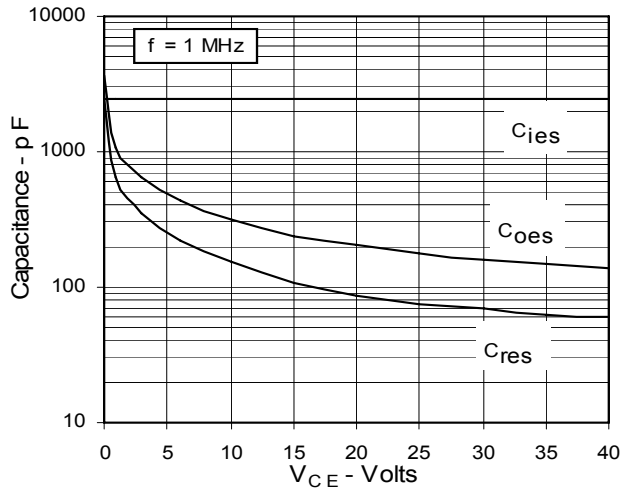


Fig. 16. Reverse-Bias Safe Operating Area

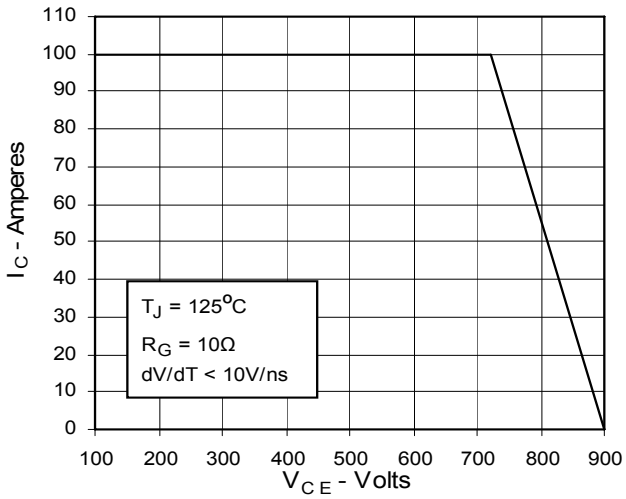
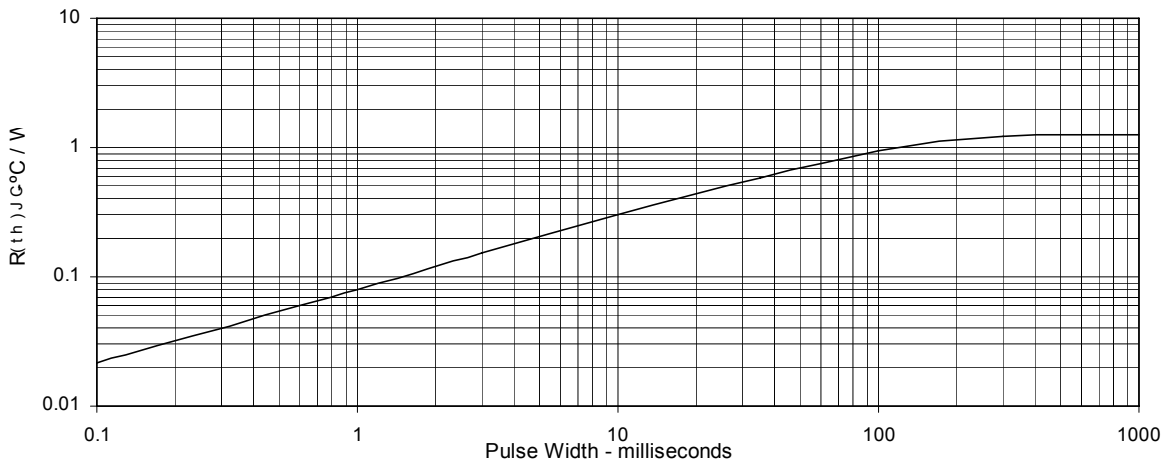


Fig. 17. Maximum Transient Thermal Resistance



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Diode Curves

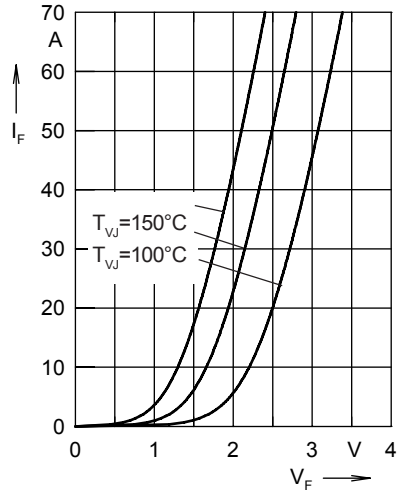


Fig. 18. Forward current I_F versus V_F

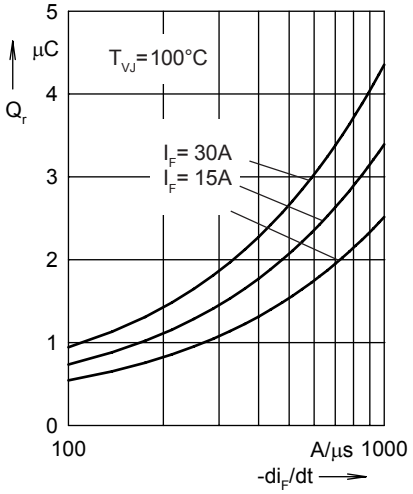


Fig. 19. Reverse recovery charge Q_r

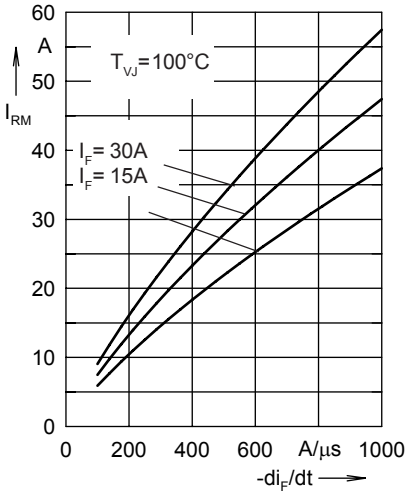


Fig. 20. Peak reverse current I_{RM}

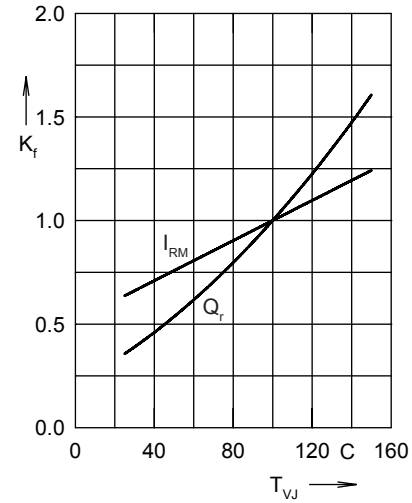


Fig. 21. Dynamic parameters Q_r, I_{RM}

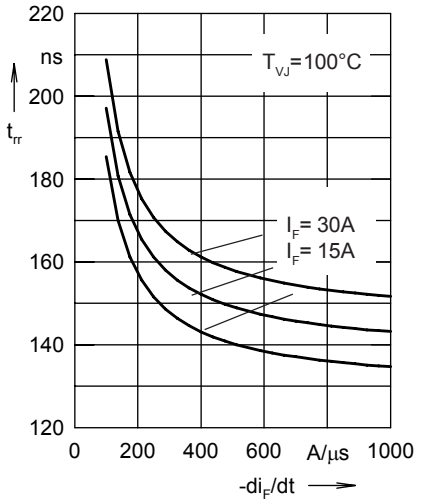


Fig. 22. Recovery time t_{rr} versus $-di_F/dt$

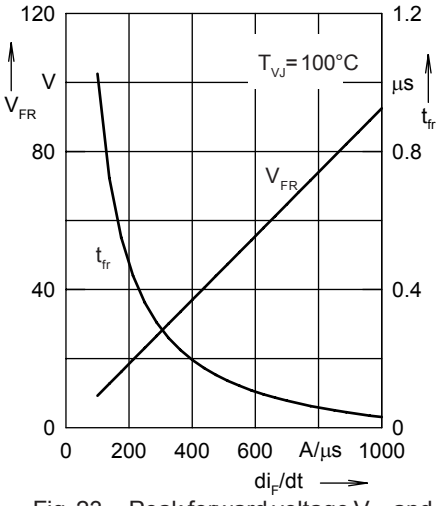


Fig. 23. Peak forward voltage V_{FR} and

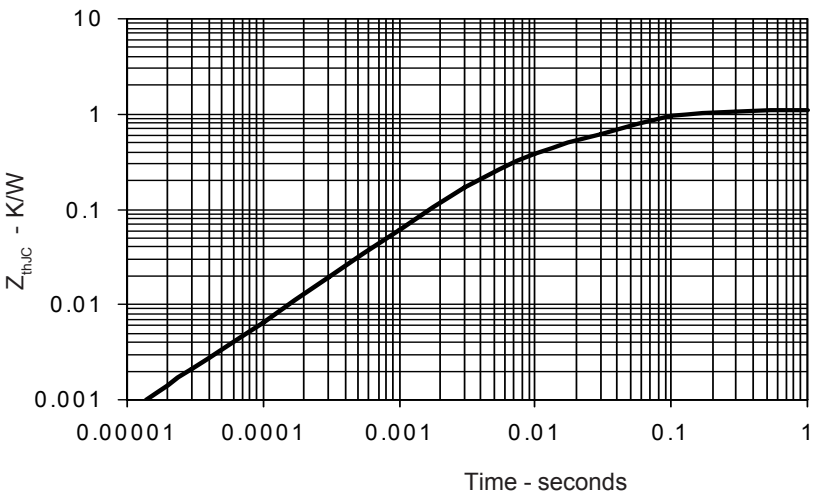


Fig. 24. Transient thermal resistance junction to case

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