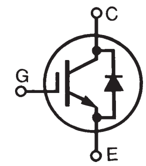
HiPerFAST™ IGBT with Fast Diode

IXGR 50N90B2D1

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

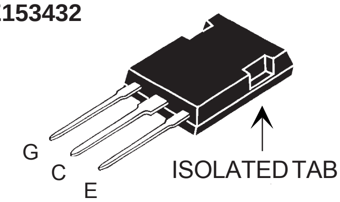
B2-Class High Speed IGBT with Fast Diode

(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

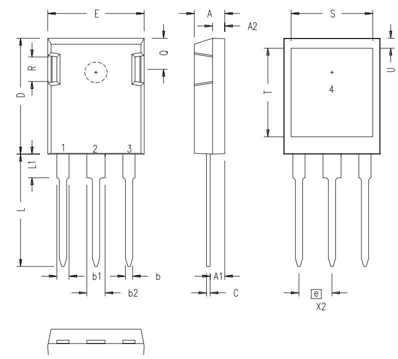
Applications

- 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

Symbol	Test Conditions (T_J = 25°C unless otherwise specified)	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)	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

Fig. 1. Output Characteristics @ 25 ºC

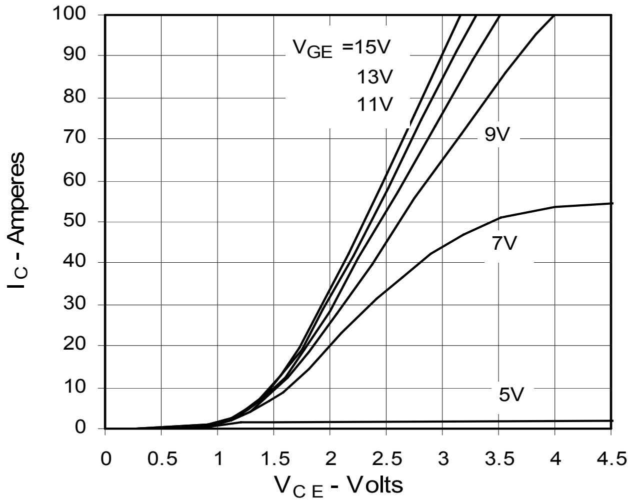


Fig. 2. Extended Output Characteristics @ 25 ºC

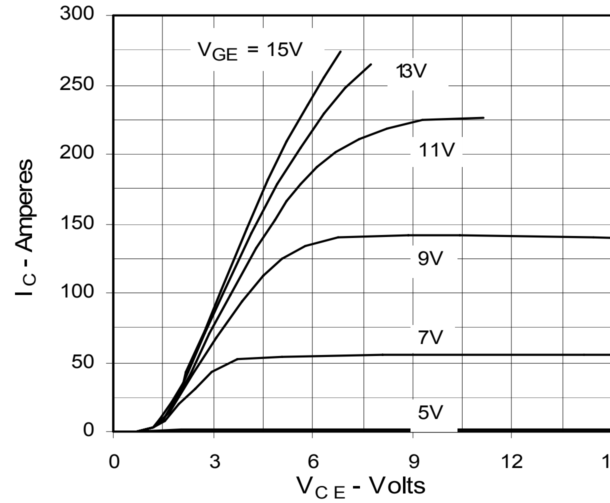


Fig. 3. Output Characteristics @ 125 ºC

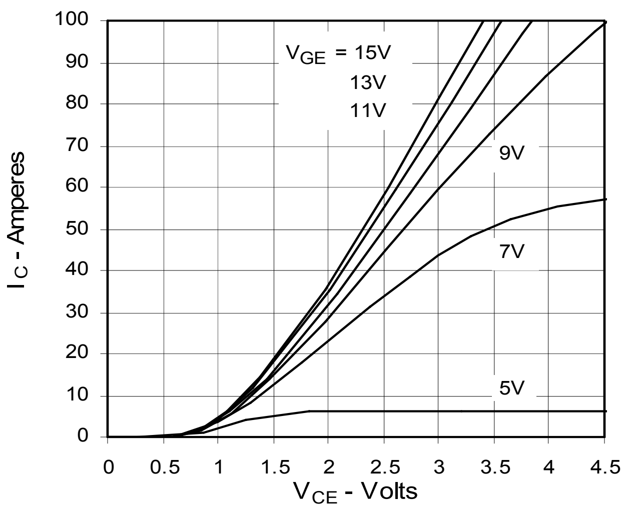


Fig. 4. Dependence of $V_{CE(sat)}$ on Temperature

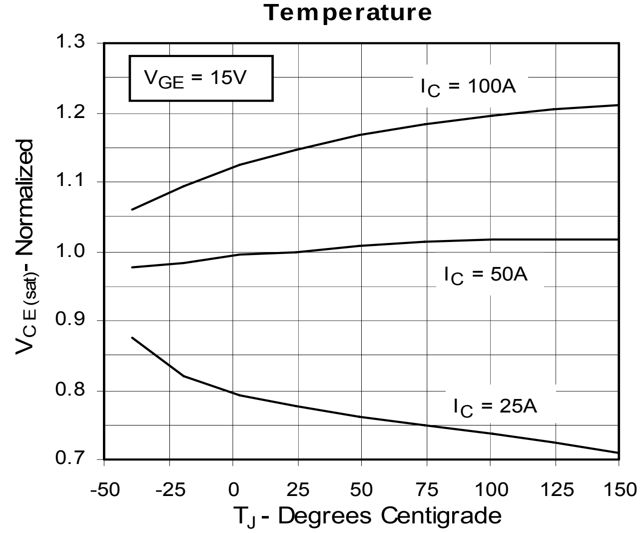


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter voltage

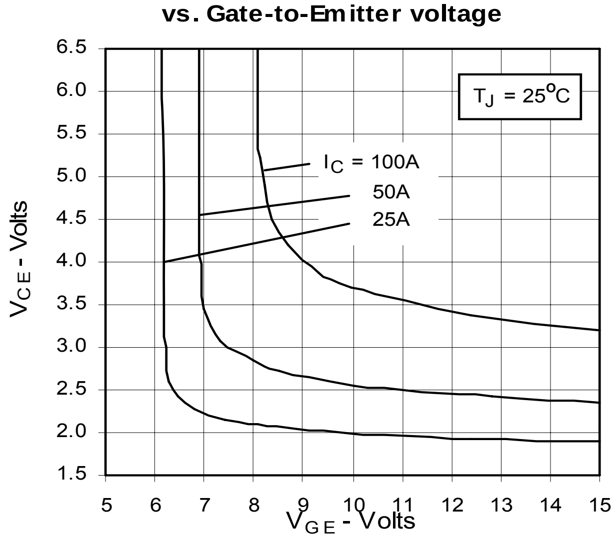


Fig. 6. Input Admittance

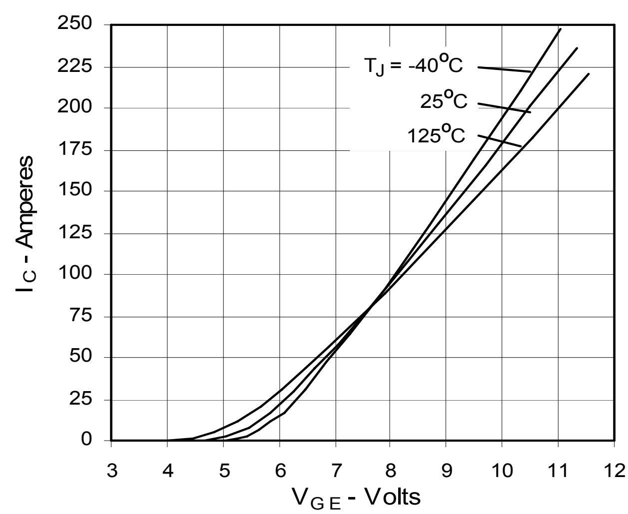


Fig. 7. Transconductance

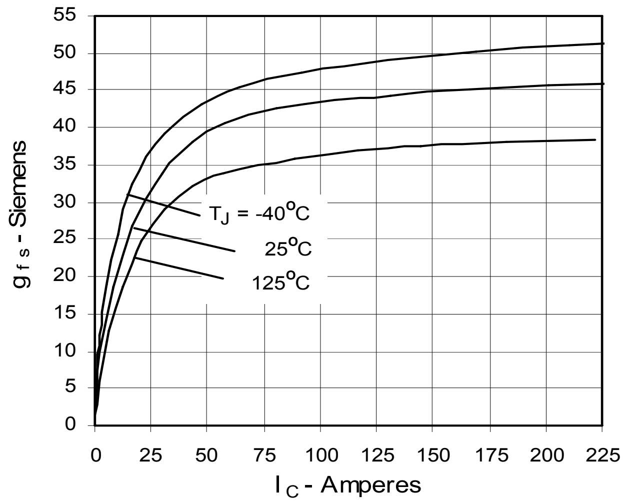


Fig. 8. Dependence of Turn-off Energy Loss on R_G

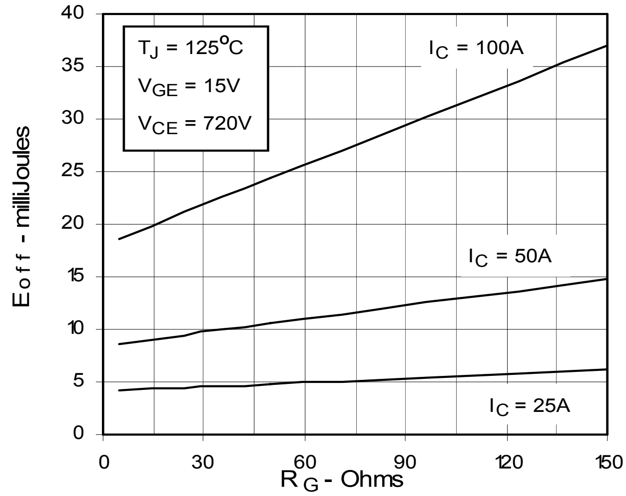


Fig. 9. Dependence of Turn-Off Energy Loss on I_C

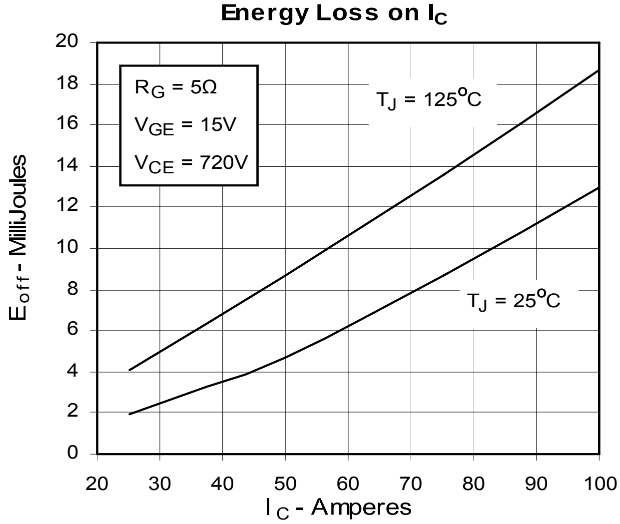


Fig. 10. Dependence of Turn-off Energy Loss on Temperature

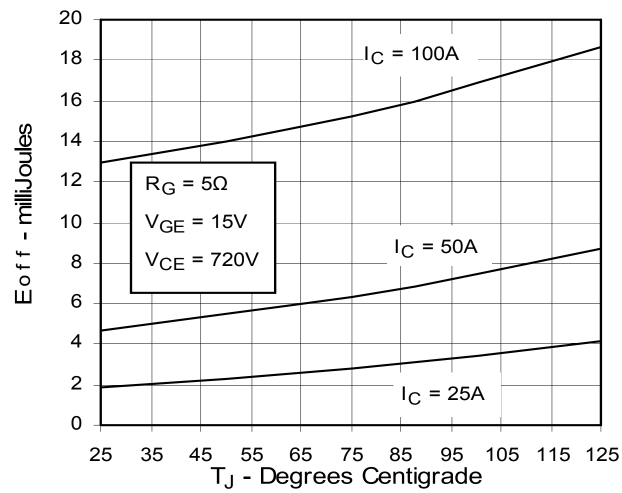


Fig. 11. Dependence of Turn-off Switching Time on R_G

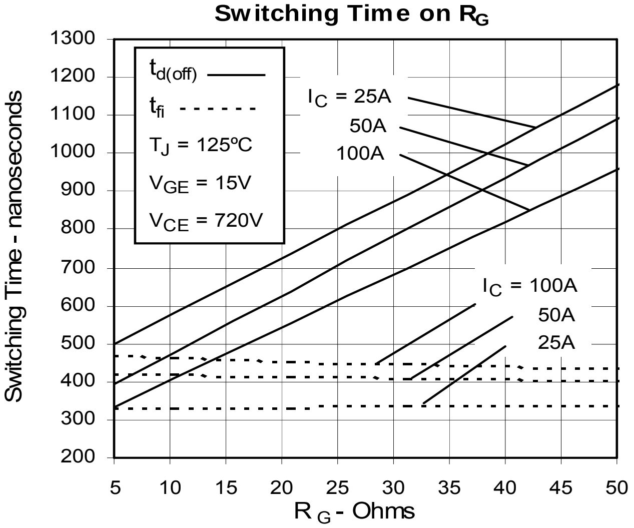


Fig. 12. Dependence of Turn-off Switching Time on I_C

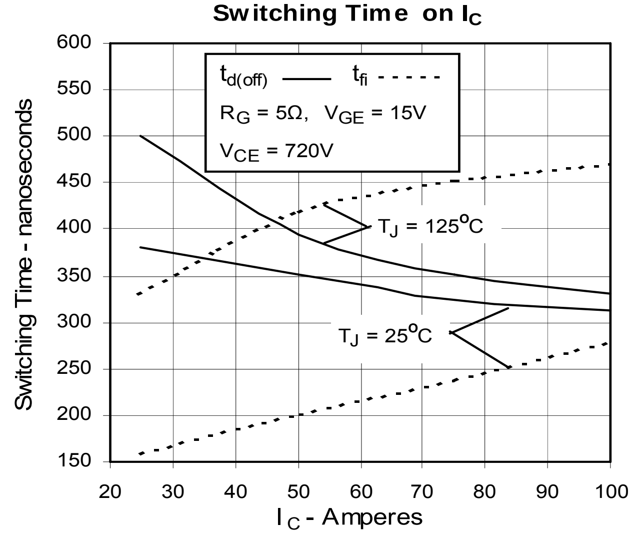


Fig. 13. Dependence of Turn-off Switching Time on Temperature

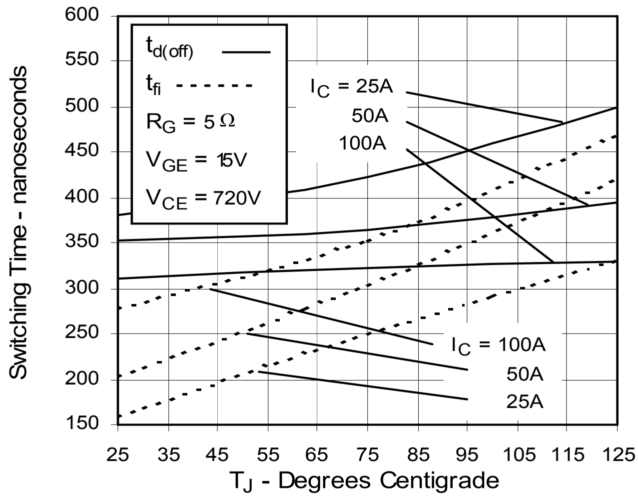


Fig. 14. Gate Charge

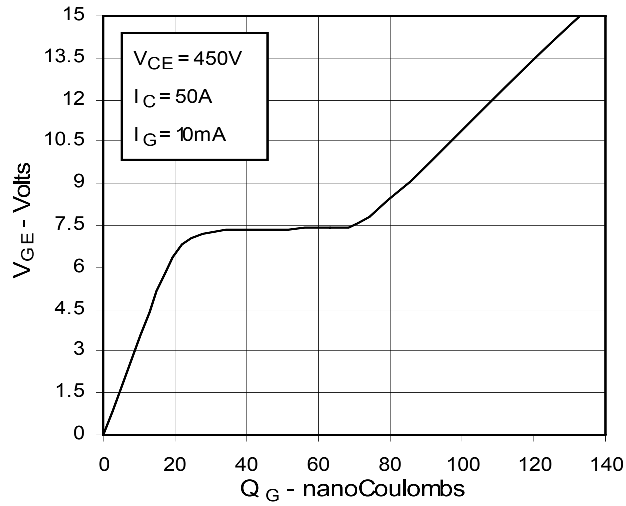


Fig. 15. Capacitance

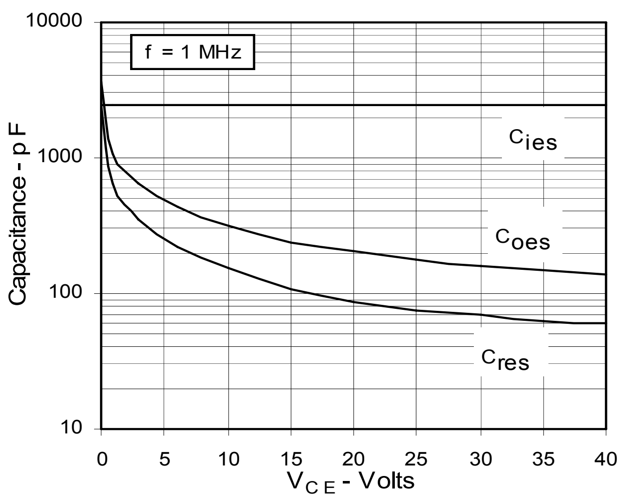


Fig. 16. Reverse-Bias Safe Operating Area

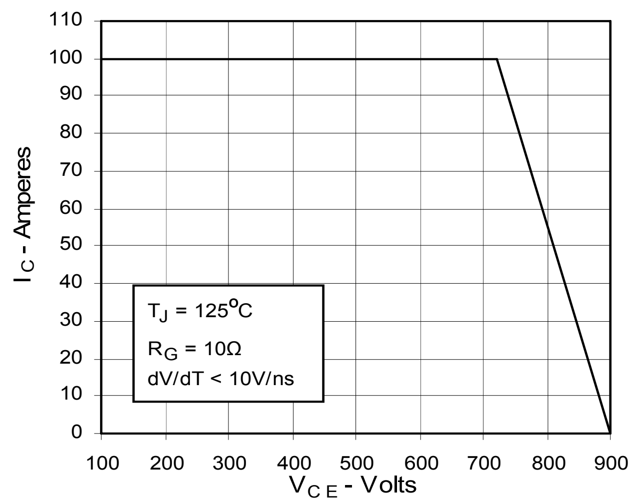
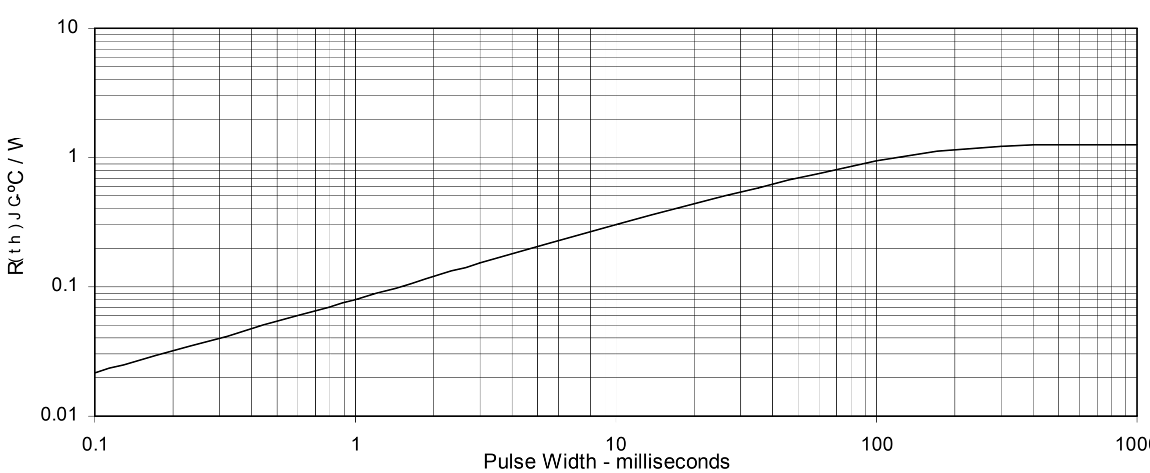


Fig. 17. Maximum Transient Thermal Resistance



Diode Curves

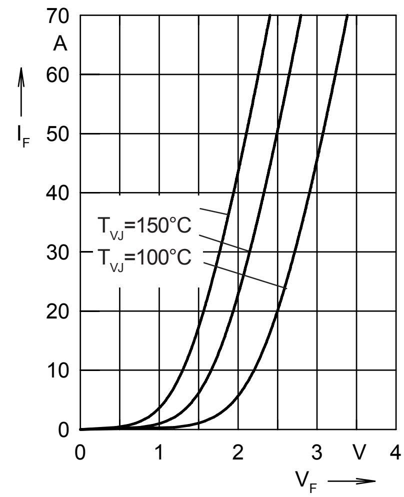


Fig. 18. Forward current I_F versus V_F

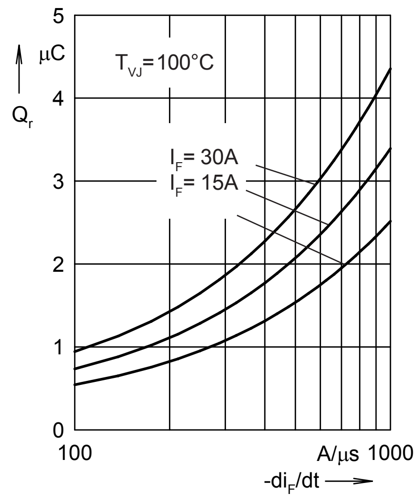


Fig. 19. Reverse recovery charge Q_r

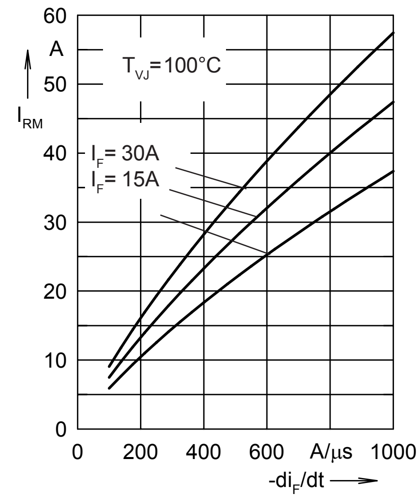


Fig. 20. Peak reverse current I_{RM}

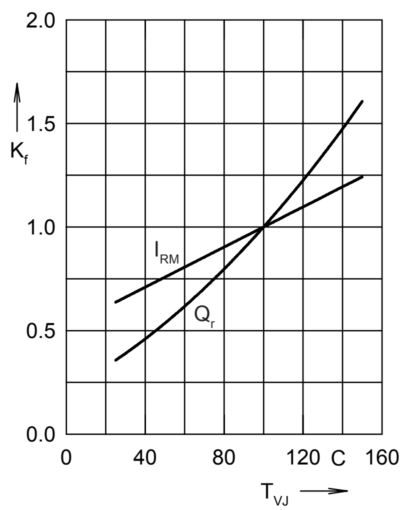


Fig. 21. Dynamic parameters Q_r, I_{RM}

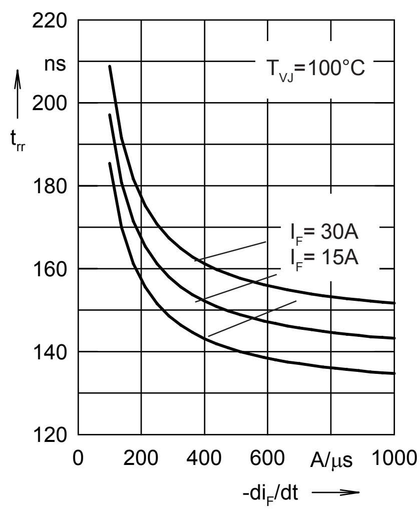


Fig. 22. Recovery time t_{rr} versus $-di_F/dt$

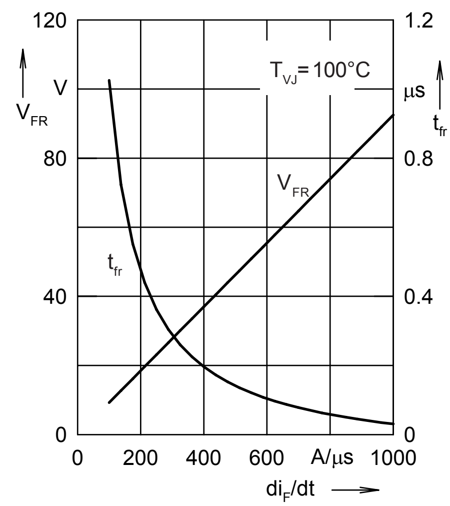


Fig. 23. Peak forward voltage V_{FR} and

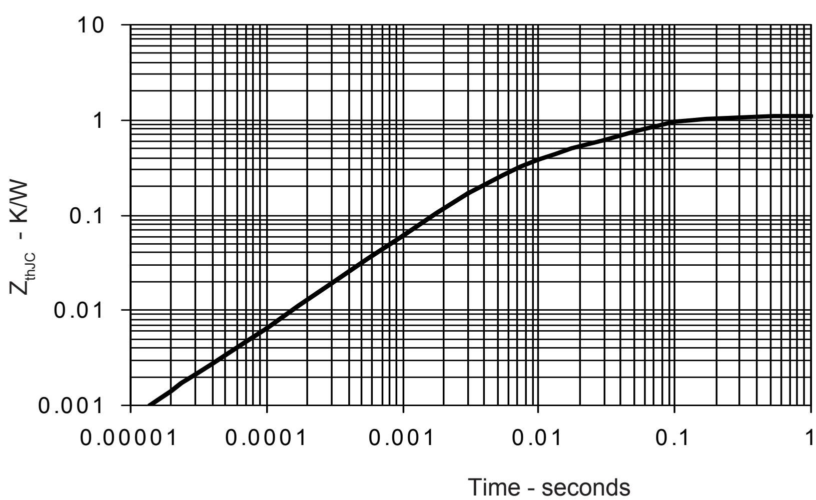


Fig. 24. Transient thermal resistance junction to case