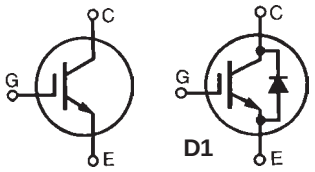
HiPerFAST™ IGBT ISOPLUS247™

B2-Class High Speed IGBTs (Electrically Isolated Back Surface)

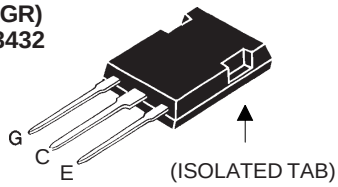
IXGR 60N60B2
IXGR 60N60B2D1

V_{CES}	=	600 V
I_{C25}	=	75 A
$V_{CE(sat)}$	=	2.0 V
$t_{fi(typ)}$	=	100 ns



Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	600	V
V_{CGR}	T_J = 25°C to 150°C; R_{GE} = 1 MΩ	600	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C (limited by leads)	75	A
I_{C110}	T_C = 110°C	47	A
I_{CM}	T_C = 25°C, 1 ms	300	A
SSOA (RBSOA)	V_{GE} = 15 V, T_{VJ} = 125°C, R_G = 10 Ω Clamped inductive load @ $V_{CE} \le 600$ V	I_{CM} = 150	A
P_C	T_C = 25°C	250	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
V_{ISOL}	50/60 Hz, RMS, t = 1m	2500	V
Weight		5	g
	Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s	300	°C

PLUS247(IXGR)
E153432



G = Gate C = Collector
E = Emitter

Features

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

Applications

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

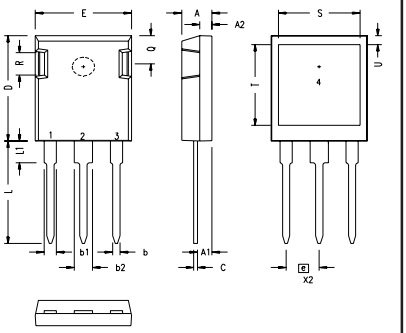
Advantages

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

Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) 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			300	µA
	$V_{CE} = V_{CES}$, V_{GE} = 0 V, T_J = 125°C			5	mA
I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V			±100	nA
$V_{CE(sat)}$	I_C = 50 A, V_{GE} = 15 V Note 1			2.0	V

Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) Min.	Typ.	Max.	
g_{fs}	I_C = 50 A; V_{CE} = 10 V, Note 1	40	58		S
C_{ies}			3900		pF
C_{oes}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		340		pF
C_{res}			100		pF
Q_g			170		nC
Q_{ge}	I_C = 50 A, V_{GE} = 15 V, V_{CE} = 0.5 V_{CES}		25		nC
Q_{gc}			57		nC
$t_{d(on)}$			28		ns
t_{ri}	**Inductive load, T_J = 25°C**		30		ns
$t_{d(off)}$	I_C = 50 A, V_{GE} = 15 V		160	270	ns
t_{fi}	V_{CE} = 400 V, R_G = R_{off} = 3.3 Ω		100	170	ns
E_{off}			1.0	2.5	mJ
$t_{d(on)}$			28		ns
t_{ri}	**Inductive load, T_J = 125°C**		36		ns
E_{on}	I_C = 50 A, V_{GE} = 15 V		1.5		mJ
$t_{d(off)}$	V_{CE} = 400 V, R_G = R_{off} = 2.0 Ω		310		ns
t_{fi}			240		ns
E_{off}			2.8		mJ
R_{thJC}				0.5	K/W
R_{thCK}			0.15		K/W

ISOPLUS 247 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	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
V_F	I_F = 60 A, V_{GE} = 0 V, Note 1	T_J = 150°C		2.1	V
				1.4	V
I_{RM}	I_F = 60 A, V_{GE} = 0 V, -di_F/dt = 100 A/µ V_R = 100 V	T_J = 100°C		8.3	A
t_{rr}	I_F = 1 A; -di/dt = 200 A/ms; V_R = 30 V		35		ns
R_{thJC}				0.85	K/W

Note 1: Pulse test, t ≤ 300 µs, duty cycle ≤ 2 %

Fig. 1. Output Characteristics @ 25 Deg. C

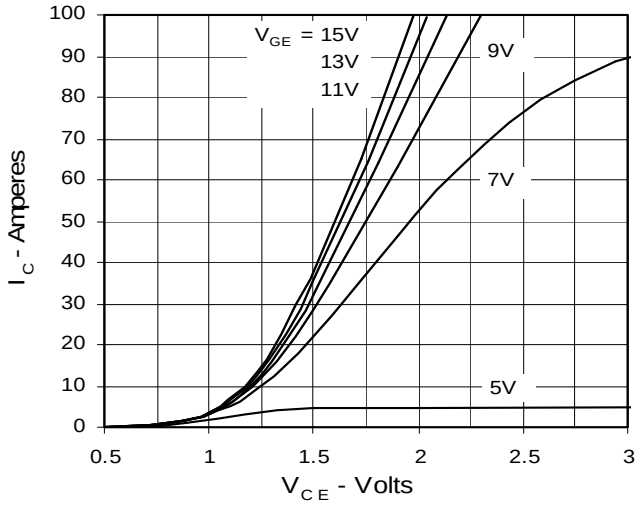


Fig. 2. Extended Output Characteristics @ 25 deg. C

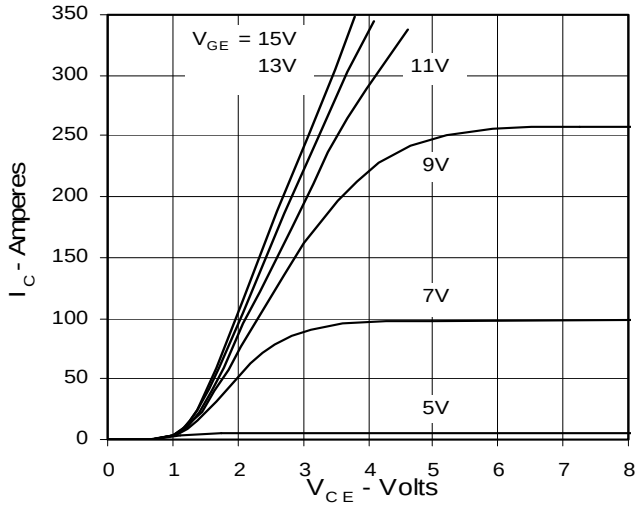


Fig. 3. Output Characteristics @ 125 Deg. C

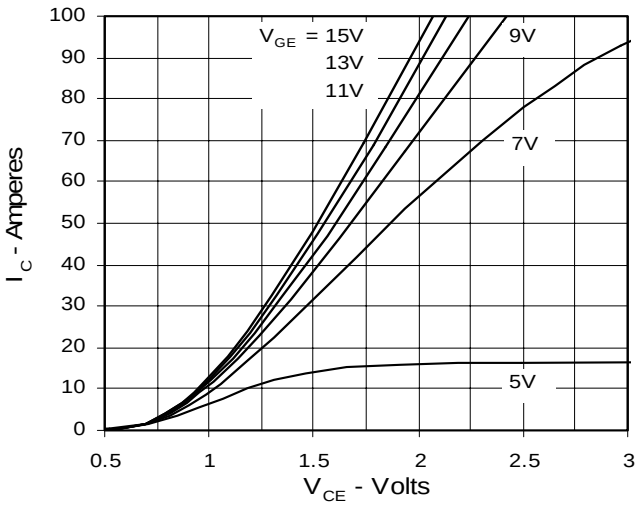


Fig. 4. Dependence of $V_{CE(sat)}$ on Temperature

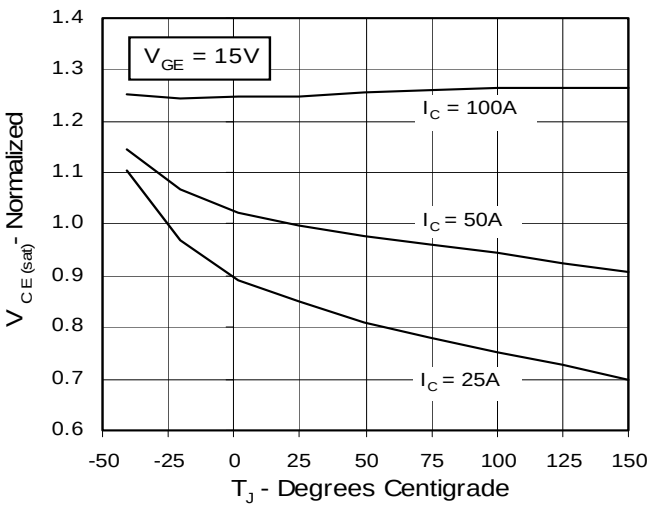


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter voltage

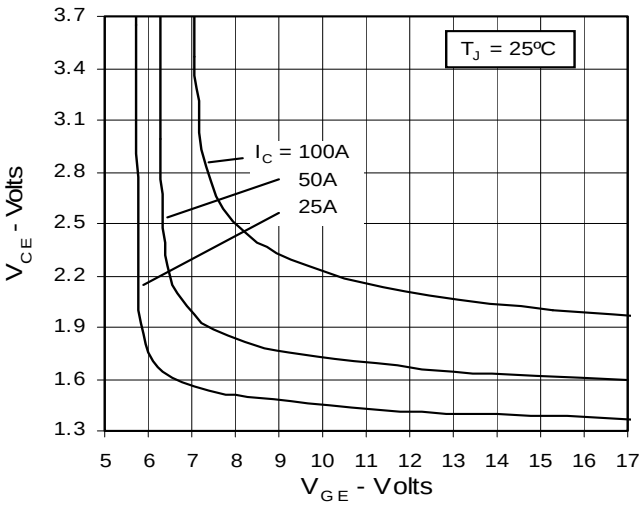


Fig. 6. Input Admittance

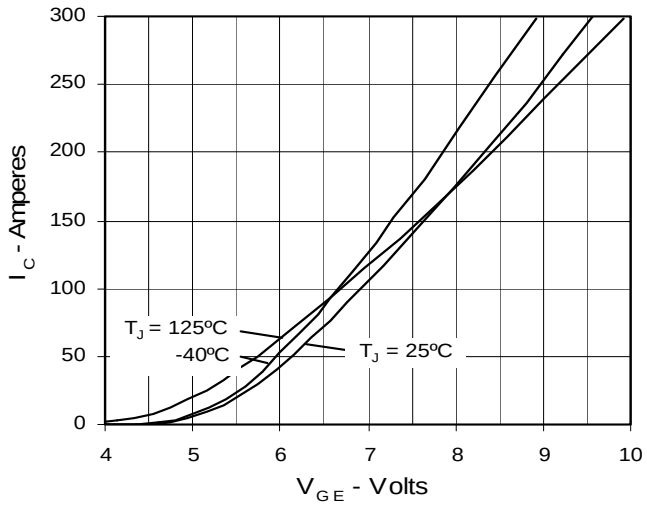


Fig. 7. Transconductance

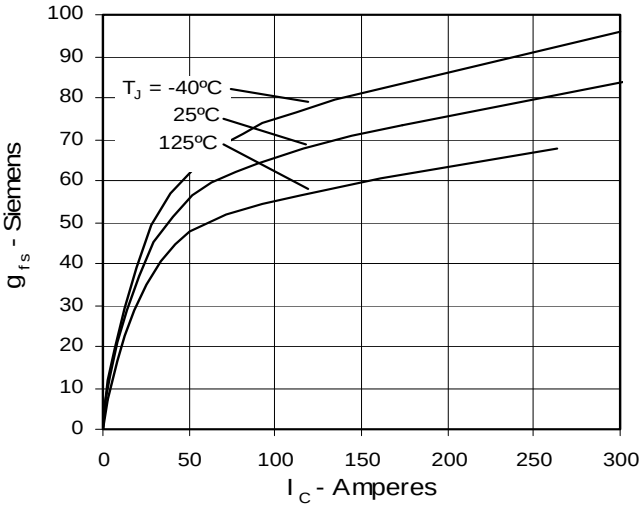


Fig. 8. Dependence of Turn-Off Energy on R_G

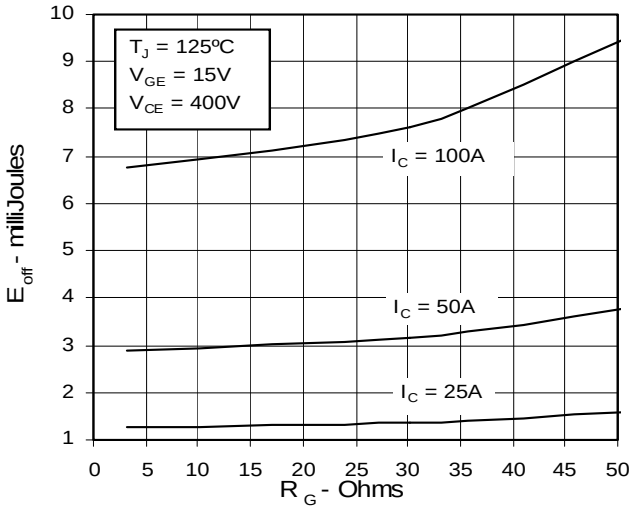


Fig. 9. Dependence of Turn-Off Energy on I_c

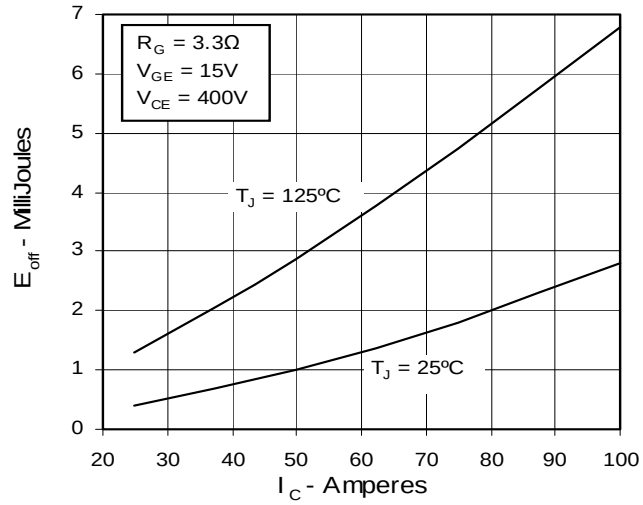


Fig. 10. Dependence of Turn-Off Energy on Temperature

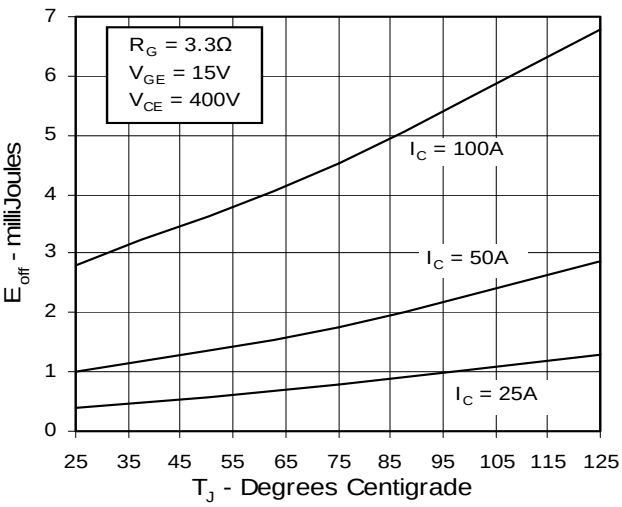


Fig. 11. Dependence of Turn-Off Switching Time on R_G

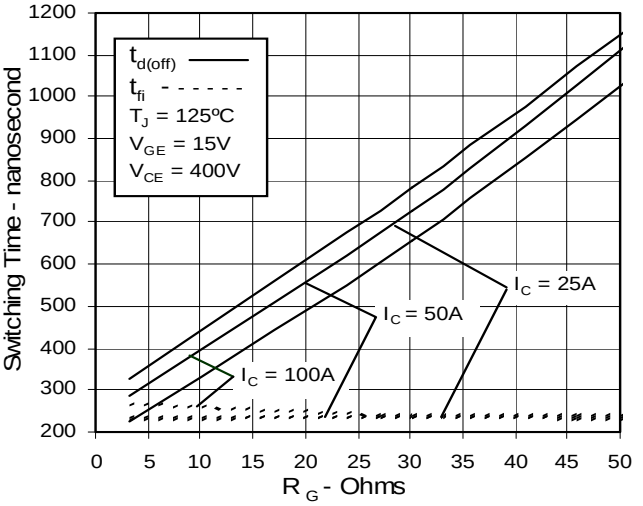


Fig. 12. Dependence of Turn-Off Switching Time on I_c

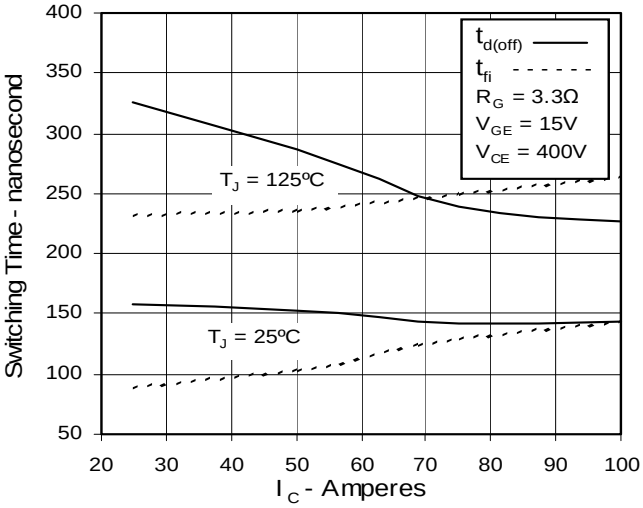


Fig. 13. Dependence of Turn-Off Switching Time on Temperature

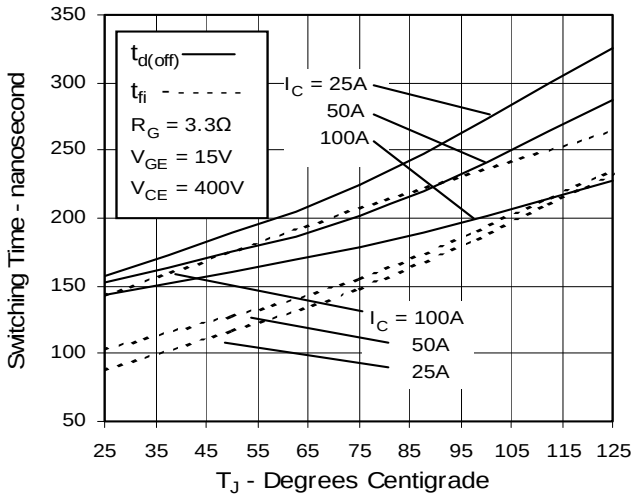


Fig. 14. Gate Charge

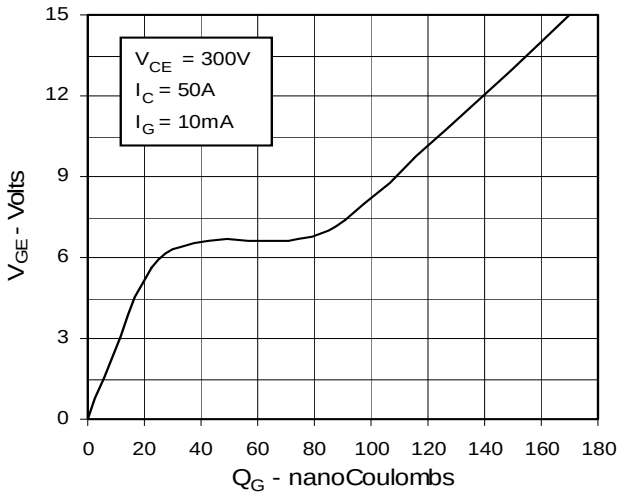


Fig. 15. Capacitance

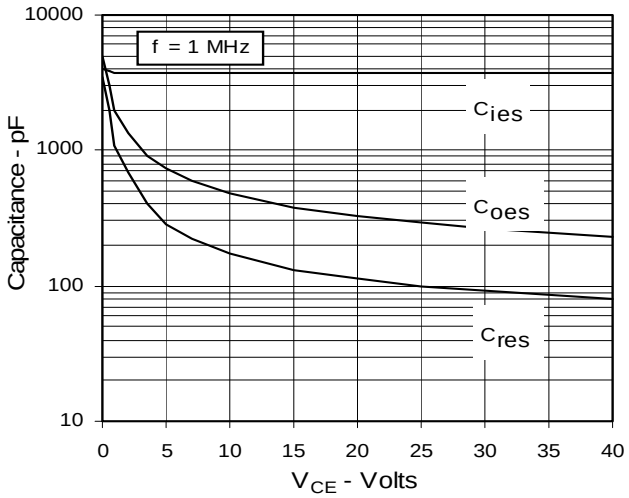
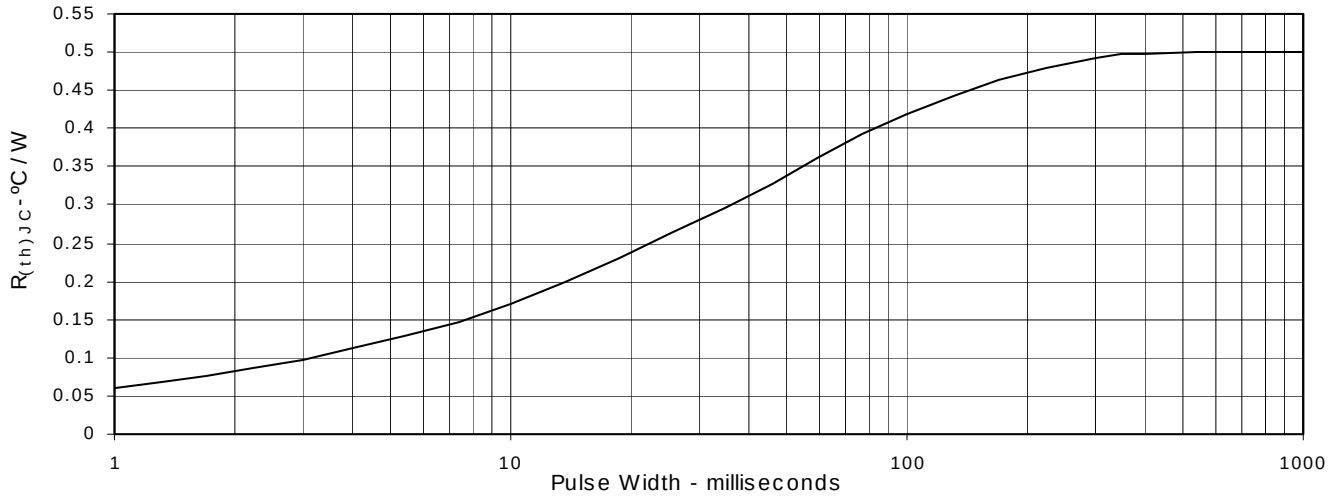


Fig. 13. Maximum Transient Thermal Resistance



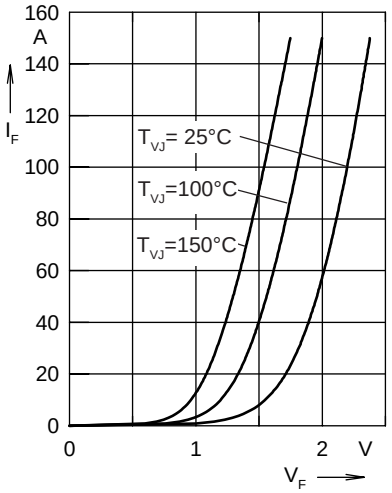


Fig. 17. Forward current I_F versus V_F

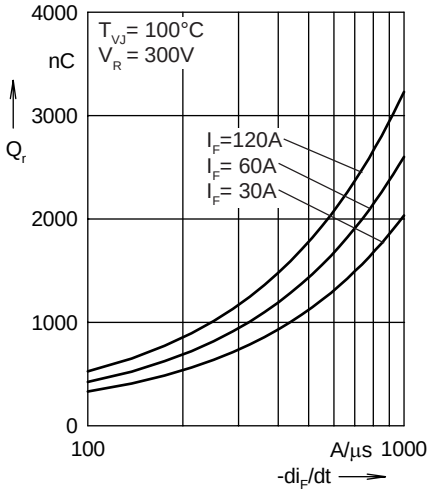


Fig. 18. Reverse recovery charge Q_r versus -di_F/dt

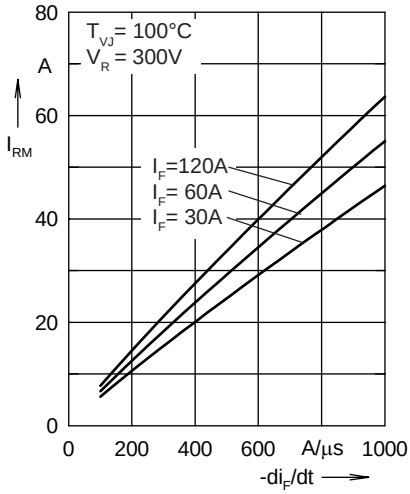


Fig. 19. Peak reverse current I_{RM} versus -di_F/dt

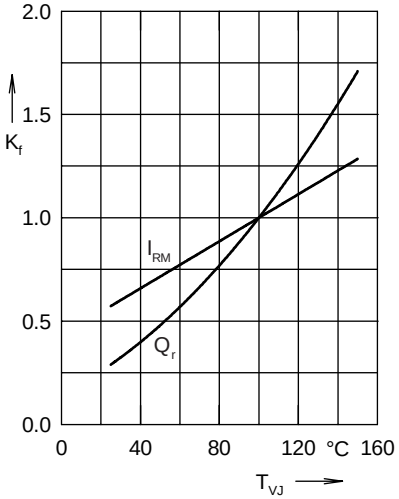


Fig. 20. Dynamic parameters Q_r, I_{RM} versus T_{VJ}

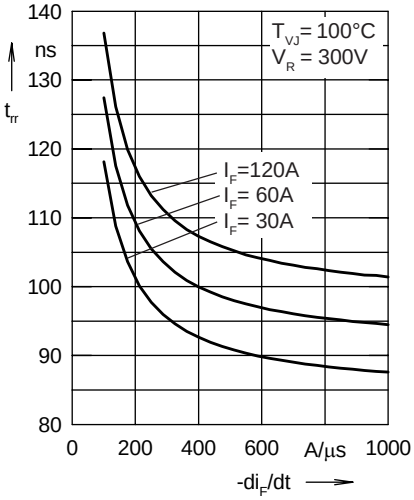


Fig. 21. Recovery time t_{rr} versus -di_F/dt

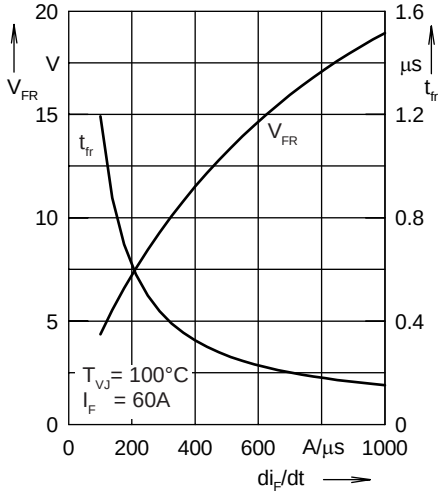


Fig. 22. Peak forward voltage V_{FR} and t_{fr} versus di_F/dt

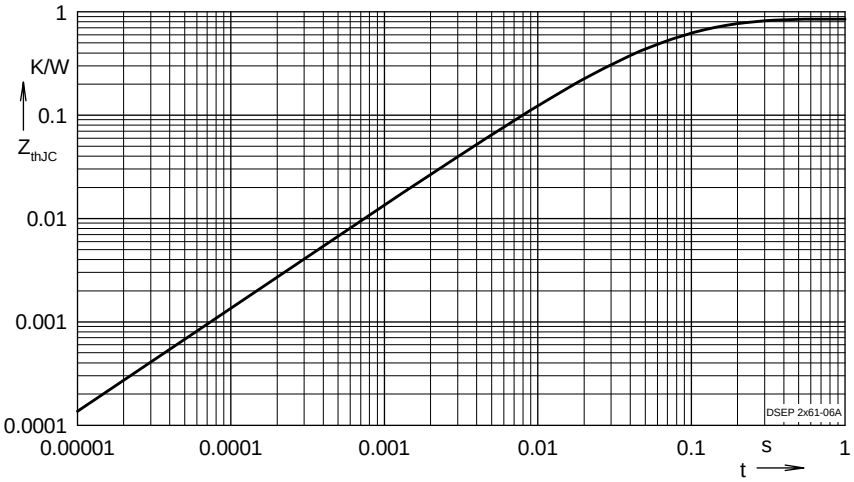


Fig. 23. Transient thermal resistance junction to case

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.3073	0.0055
2	0.3533	0.0092
3	0.0887	0.0007
4	0.1008	0.0399