

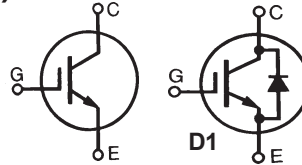
HiPerFAST™ IGBT ISOPLUS247™

IXGR 40N60B2
IXGR 40N60B2D1

C2-Class High Speed IGBTs (Electrically Isolated Back Surface)

Optimized for 10-25 KHz hard switching
and up to 150 KHz resonant switching

Preliminary Data Sheet

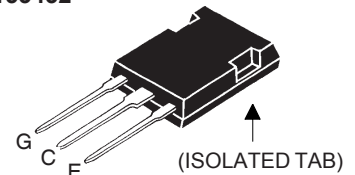


$$\begin{aligned} V_{CES} &= 600 \text{ V} \\ I_{C25} &= 75 \text{ A} \\ V_{CE(sat)} &= 1.9 \text{ V} \\ t_{fi typ} &= 82 \text{ ns} \end{aligned}$$

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Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^\circ\text{C to } 150^\circ\text{C}$	600	V
V_{CGR}	$T_J = 25^\circ\text{C to } 150^\circ\text{C}; R_{GE} = 1 \text{ M}\Omega$	600	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ\text{C}$	60	A
I_{C110}	$T_C = 110^\circ\text{C}$	33	A
I_{F110}	$T_C = 110^\circ\text{C}$ (IXGR40N60B2D1)	25	A
I_{CM}	$T_C = 25^\circ\text{C}, 1 \text{ ms}$	200	A
SSOA (RBSOA)	$V_{GE} = 15 \text{ V}, T_{VJ} = 125^\circ\text{C}, R_G = 10 \Omega$ Clamped inductive load @ $\leq 600 \text{ V}$	$I_{CM} = 80$	A
P_C	$T_C = 25^\circ\text{C}$	167	W
T_J		-55 ... +150	$^\circ\text{C}$
T_{JM}		150	$^\circ\text{C}$
T_{stg}		-55 ... +150	$^\circ\text{C}$
V_{ISOL}	50/60 Hz RMS, $t = 1 \text{ m}$	2500	V
	Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s	300	$^\circ\text{C}$
Weight		6	g

ISOPLUS247 (IXGR)
E153432



G = Gate,
E = Emitter

C = 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

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

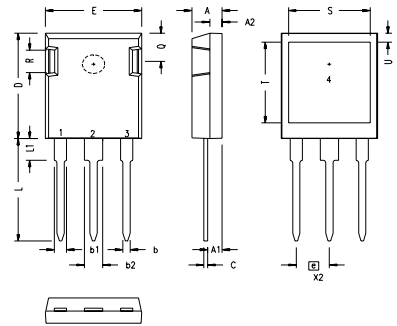
Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified)		
		min.	typ.	max.
$V_{GE(th)}$	$I_C = 250 \mu\text{A}, V_{CE} = V_{GE}$	3.0		5.0 V
I_{CES}	$V_{CE} = V_{CES}$ $V_{GE} = 0 \text{ V}$ $T_J = 25^\circ\text{C}$ $T_J = 150^\circ\text{C}$			50 μA 1 mA
I_{GES}	$V_{CE} = 0 \text{ V}, V_{GE} = \pm 20 \text{ V}$			$\pm 100 \text{ nA}$
$V_{CE(sat)}$	$I_C = 30 \text{ A}, V_{GE} = 15 \text{ V}$ $T_J = 25^\circ\text{C}$			1.9 V

Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified)		
		min.	typ.	max.
g_{fs}	$I_C = 30\text{ A}$; $V_{CE} = 10\text{ V}$, Pulse test, $t \leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$	20	36	S
C_{ies}	$V_{CE} = 25\text{ V}$, $V_{GE} = 0\text{ V}$, $f = 1\text{ MHz}$		2560	pF
C_{oes}			210	pF
C_{res}			54	pF
Q_g	$I_C = 30\text{ A}$, $V_{GE} = 15\text{ V}$, $V_{CE} = 300\text{ V}$		100	nC
Q_{ge}			15	nC
Q_{gc}			36	nC
$t_{d(on)}$	Inductive load, $T_J = 25^\circ\text{C}$ $I_C = 30\text{ A}$, $V_{GE} = 15\text{ V}$ $V_{CE} = 400\text{ V}$, $R_G = 3.3\text{ }\Omega$		18	ns
t_{ri}			20	ns
$t_{d(off)}$			130	200 ns
t_{fi}			82	150 ns
E_{off}			0.4	0.8 mJ
$t_{d(on)}$	Inductive load, $T_J = 125^\circ\text{C}$ $I_C = 30\text{ A}$, $V_{GE} = 15\text{ V}$ $V_{CE} = 400\text{ V}$, $R_G = 3.3\text{ }\Omega$		18	ns
t_{ri}			20	ns
E_{on}			0.3	mJ
$t_{d(off)}$			240	ns
t_{fi}			150	ns
E_{off}			1.10	mJ
R_{thJC}				0.75 K/W
R_{thCK}			0.15	K/W

Reverse Diode (FRED)

Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified)		
		min.	typ.	max.
V_F	$I_F = 30\text{ A}$, $V_{GE} = 0\text{ V}$, Pulse test $t \leq 300\text{ }\mu\text{s}$, duty cycle $d \leq 2\%$	$T_J = 150^\circ\text{C}$		1.6 V 2.5 V
I_{RM}	$I_F = 30\text{ A}$, $V_{GE} = 0\text{ V}$, $-di_F/dt = 100\text{ A}/\mu\text{s}$, $T_J = 100^\circ\text{C}$ $V_R = 100\text{ V}$ $I_F = 1\text{ A}$; $-di/dt = 100\text{ A}/\mu\text{s}$; $V_R = 30\text{ V}$	$T_J = 100^\circ\text{C}$		4 A
t_{rr}			100 25	ns ns
R_{thJC}			0.9	1.1 K/W

ISOPLUS 247 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.

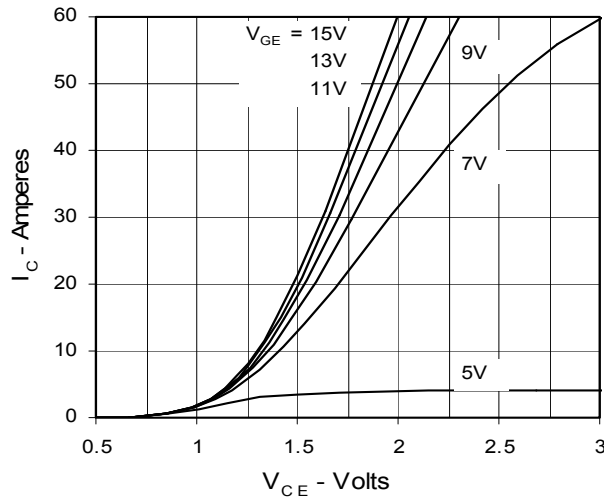
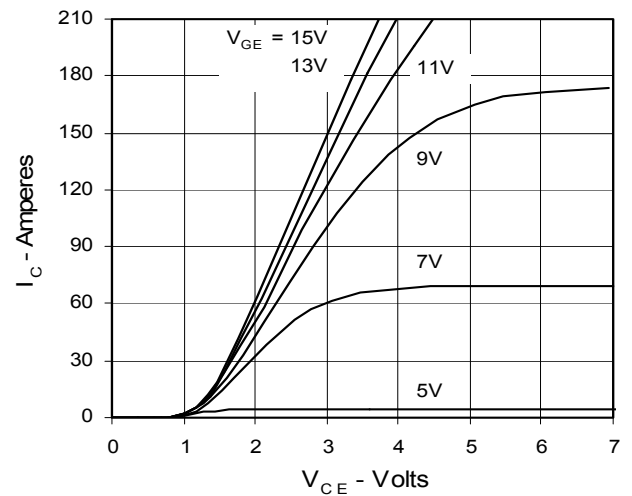
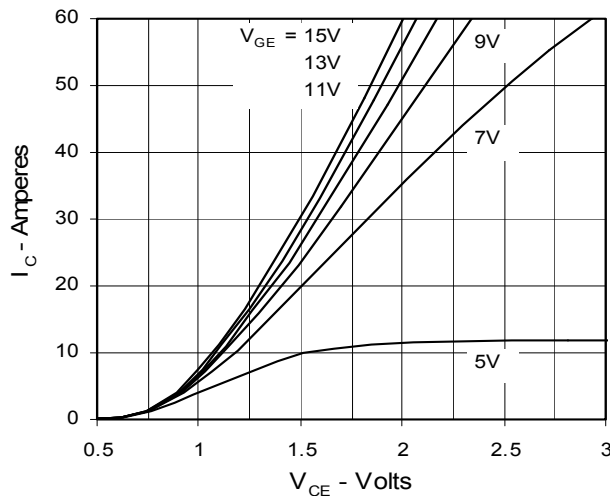
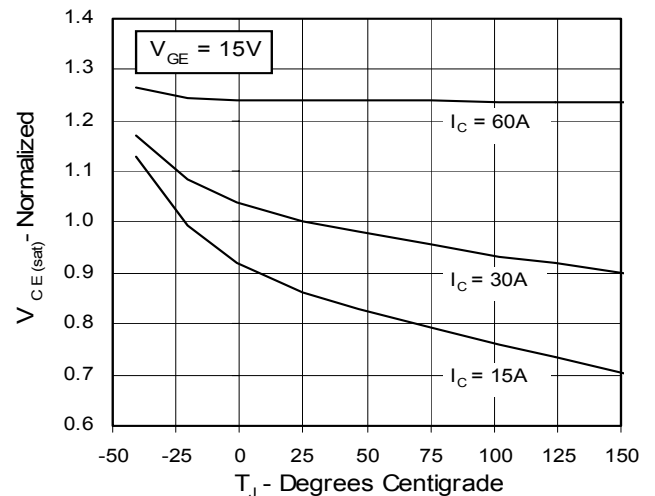
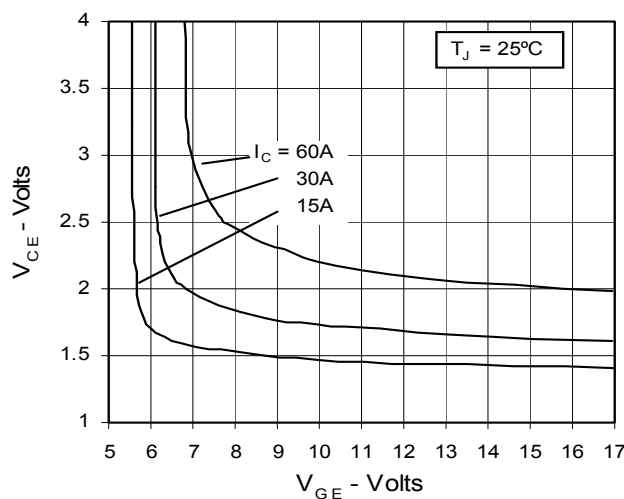
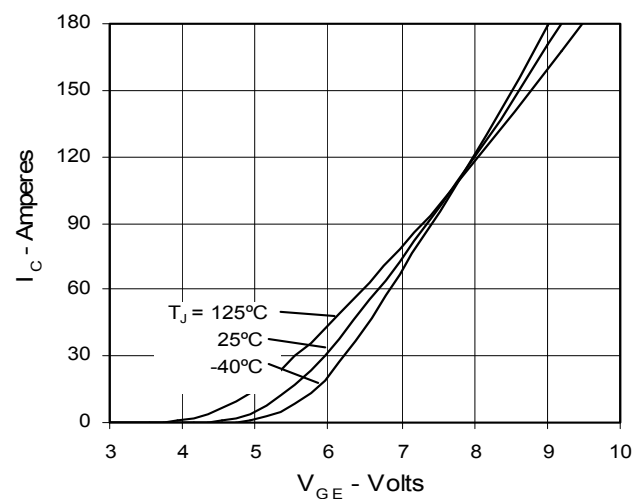
Fig. 1. Output Characteristics
@ 25 Deg. C

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

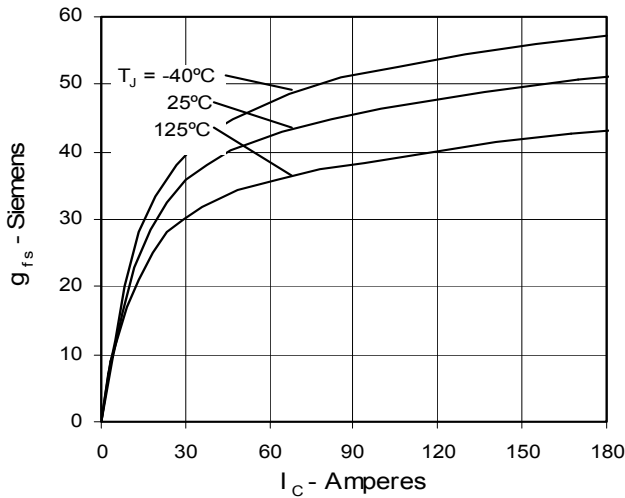


Fig. 8. Dependence of Turn-Off Energy on R_G

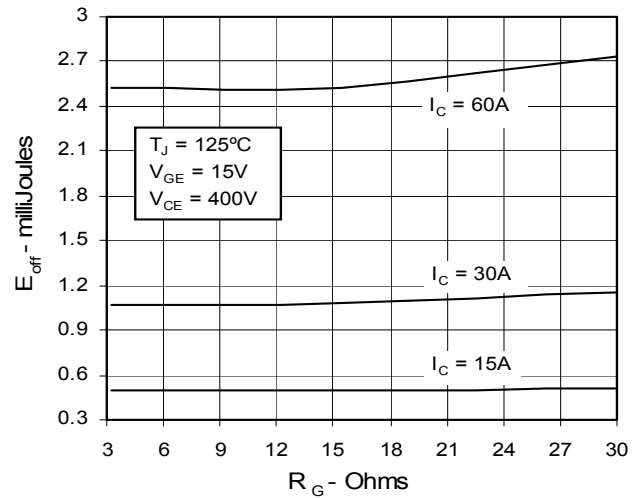


Fig. 9. Dependence of Turn-Off Energy on I_C

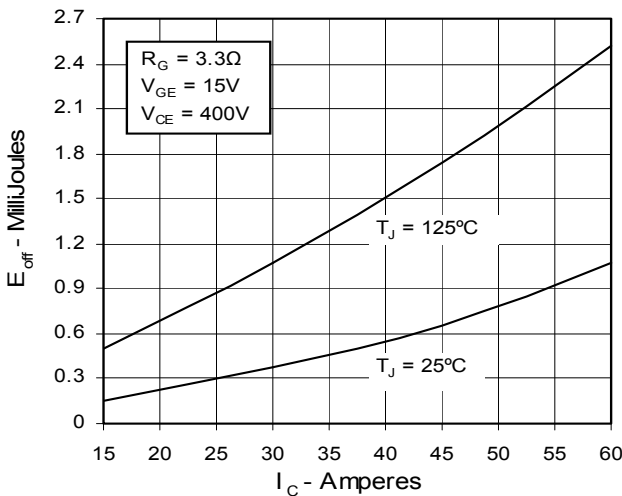


Fig. 10. Dependence of Turn-Off Energy on Temperature

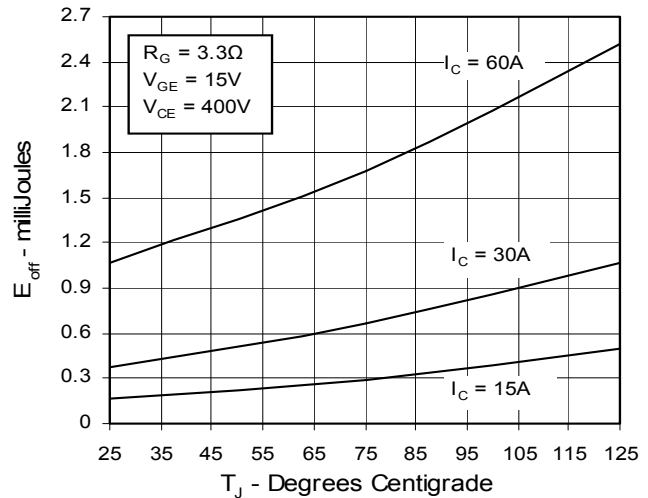


Fig. 11. Dependence of Turn-Off Switching Time on R_G

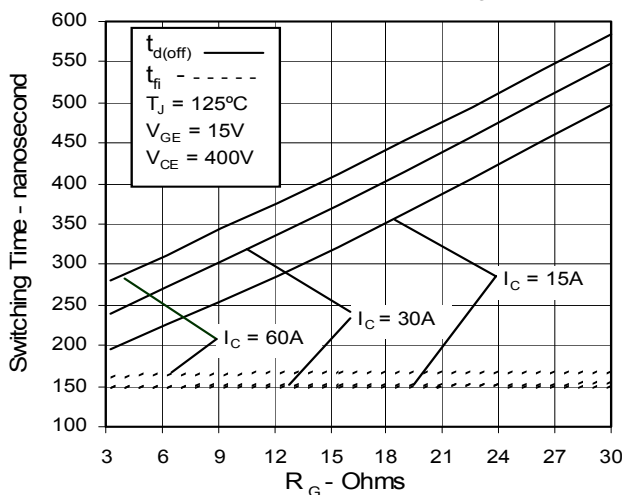


Fig. 12. Dependence of Turn-Off Switching Time on I_C

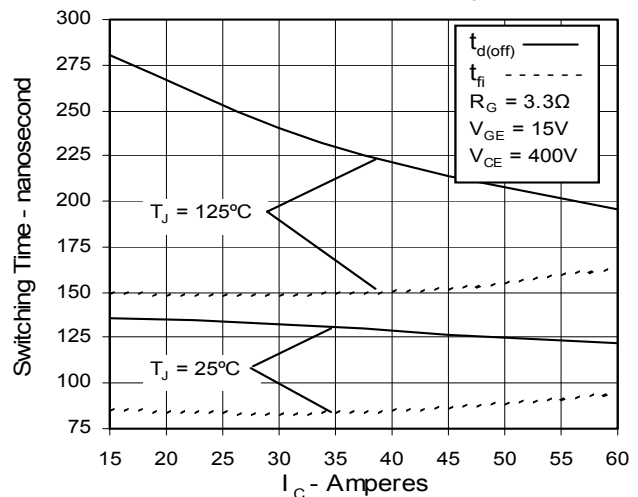


Fig. 13. Dependence of Turn-Off Switching Time on Temperature

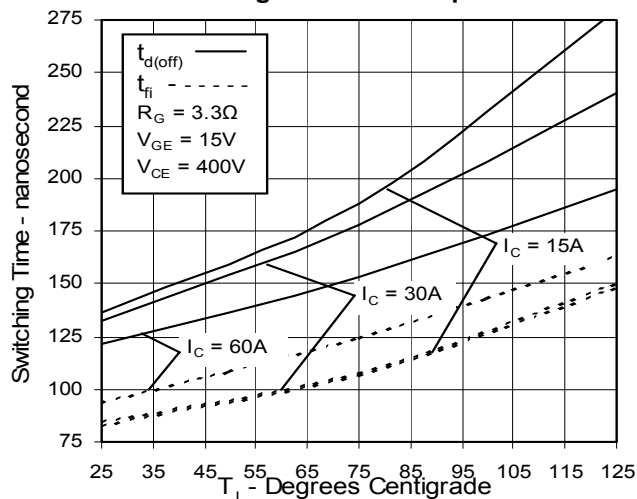


Fig. 14. Gate Charge

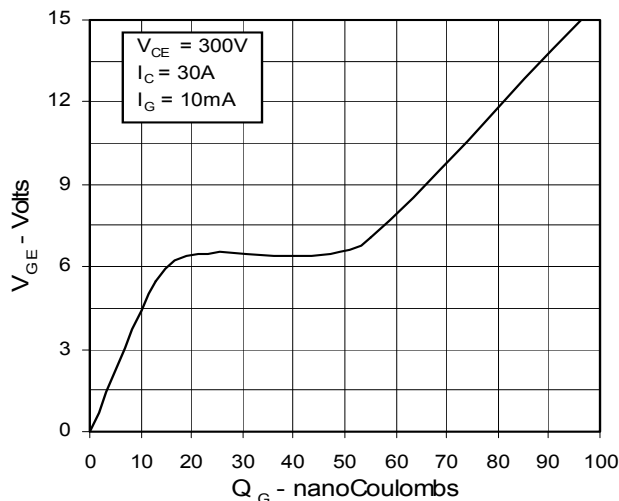


Fig. 15. Capacitance

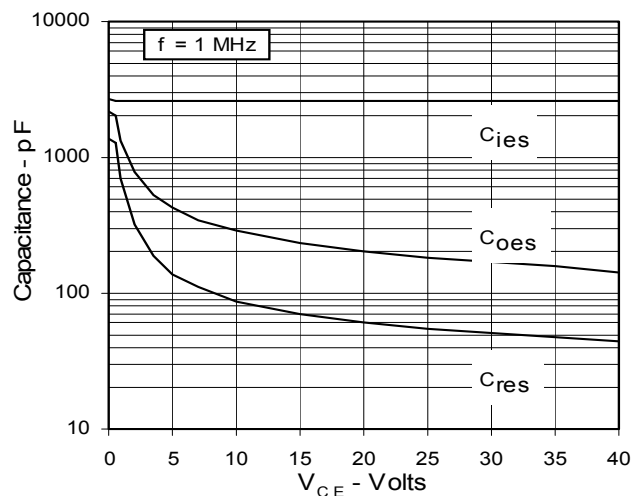
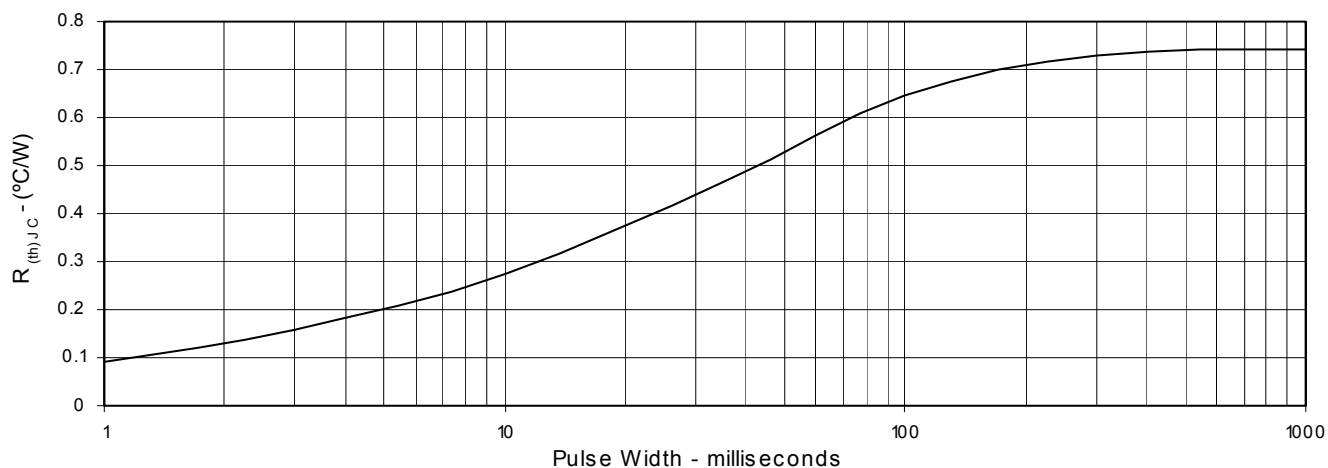


Fig. 13. Maximum Transient Thermal Resistance



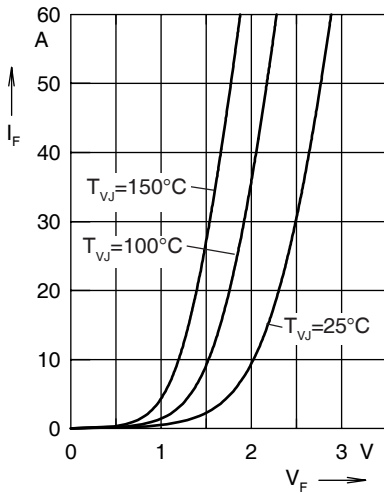


Fig. 17 Forward current I_F versus V_F

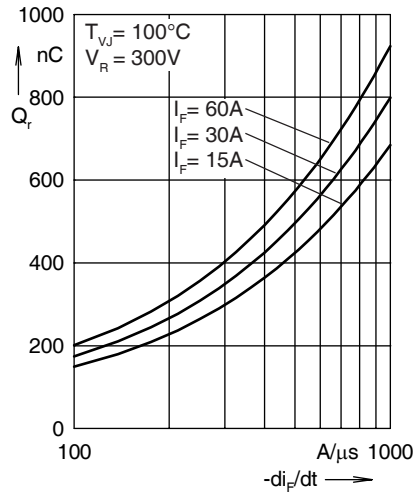


Fig. 18 Reverse recovery charge Q_r versus $-di_F/dt$

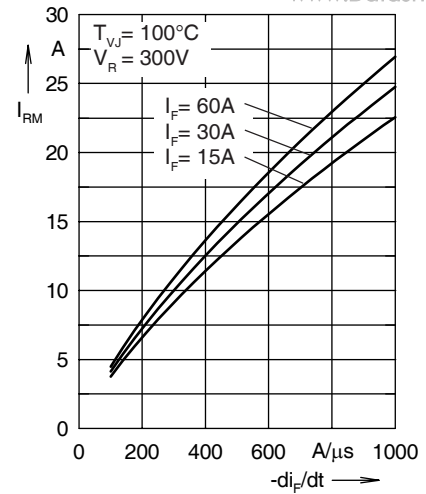


Fig. 19 Peak reverse current I_{RM} versus $-di_F/dt$

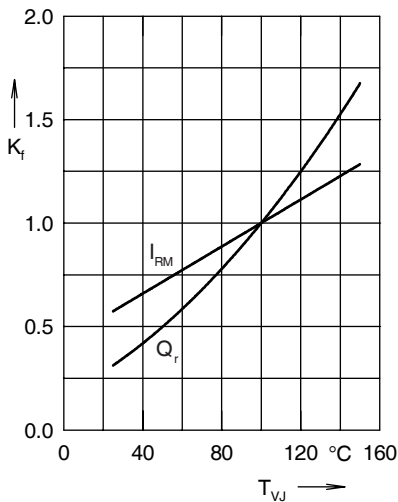


Fig. 20 Dynamic parameters Q_r , I_{RM} versus T_{VJ}

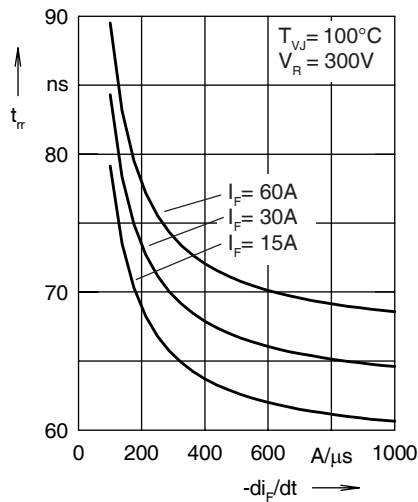


Fig. 21 Recovery time t_{tr} versus $-di_F/dt$

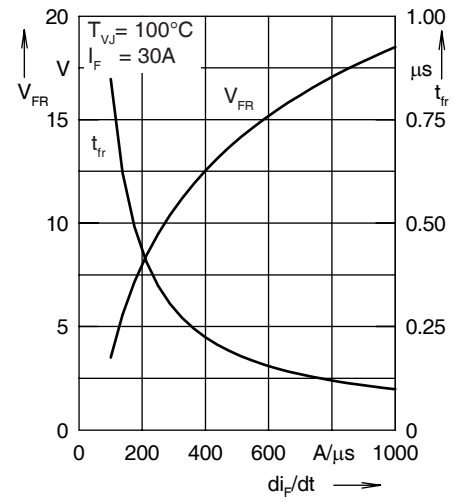


Fig. 22 Peak forward voltage V_{FR} and t_{fr} versus di_F/dt

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.436	0.0055
2	0.482	0.0092
3	0.117	0.0007
4	0.115	0.0418

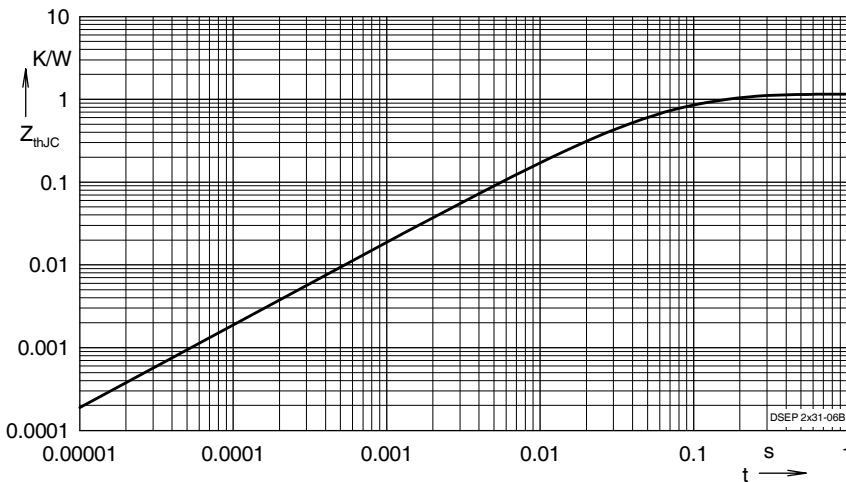


Fig. 23 Transient thermal resistance junction to case