IXYS

HiPerFAST™ IGBT ISOPLUS247™

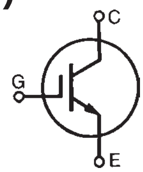
C2-Class High Speed IGBTs (Electrically Isolated Back Surface)

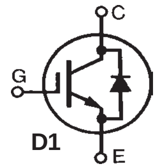
Optimized for 10-25 KHz hard switching and up to 150 KHz resonant switching

Preliminary Data Sheet

IXGR 40N60B2
IXGR 40N60B2D1

V_{CES}	=	600 V
I_{C25}	=	75 A
$V_{CE(sat)}$	=	1.9 V
$t_{fi\,typ}$	=	82 ns

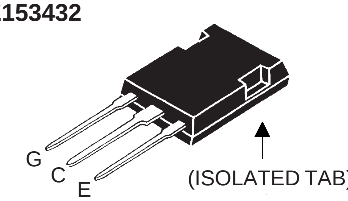




Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	600	V
V_{CGR}	T_J = 25°C to 150°C; R_{GE} = 1 MΩ	600	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	60	A
I_{C110}	T_C = 110°C	33	A
I_{F110}	T_C = 110°C (IXGR40N60B2D1)	25	A
I_{CM}	T_C = 25°C, 1 ms	200	A
SSOA (RBSOA)	V_{GE}= 15 V, T_{VJ} = 125°C, R_G = 10 Ω Clamped inductive load @ ≤ 600 V	I_{CM} = 80	A
P_C	T_C = 25°C	167	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
	Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s	300	°C
Weight		6	g

ISOPLUS247 (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

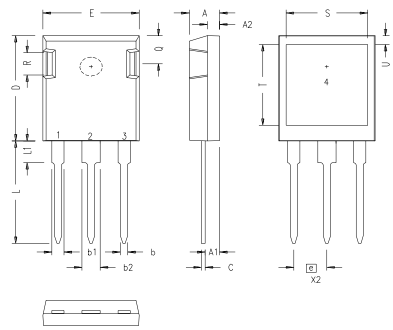
Advantages

- 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	T_J = 25°C 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 = 30 A, V_{GE} = 15 V	T_J = 25°C			1.9	V

Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
g_{fs}	I_C = 30 A; V_{CE} = 10 V, Pulse test, t ≤ 300 µs, duty cycle ≤ 2 %	20	36		S
C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		2560		pF
C_{oes}			210		pF
C_{res}			54		pF
Q_g	I_C = 30 A, V_{GE} = 15 V, V_{CE} = 300 V		100		nC
Q_{ge}			15		nC
Q_{gc}			36		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		18		ns
t_{ri}	I_C = 30 A, V_{GE} = 15 V		20		ns
$t_{d(off)}$	V_{CE} = 400 V, R_G = 3.3 Ω		130	200	ns
t_{fi}			82	150	ns
E_{off}			0.4	0.8	mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**		18		ns
t_{ri}	I_C = 30 A, V_{GE} = 15 V		20		ns
E_{on}	V_{CE} = 400 V, R_G = 3.3 Ω		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

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 = 30 A, V_{GE} = 0 V, Pulse test T_J =150°C			1.6	V
	t ≤ 300 µs, duty cycle d ≤ 2 %			2.5	V
I_{RM}	I_F = 30 A, V_{GE} = 0 V, -di$_F$/dt =100 A/µs, T_J = 100°C			4	A
t_{rr}	V_R = 100 V T_J = 100°C		100		ns
	I_F = 1 A; -di/dt = 100 A/µs; V_R = 30 V		25		ns
R_{thJC}			0.9	1.1	K/W

Fig. 1. Output Characteristics @ 25 Deg. C

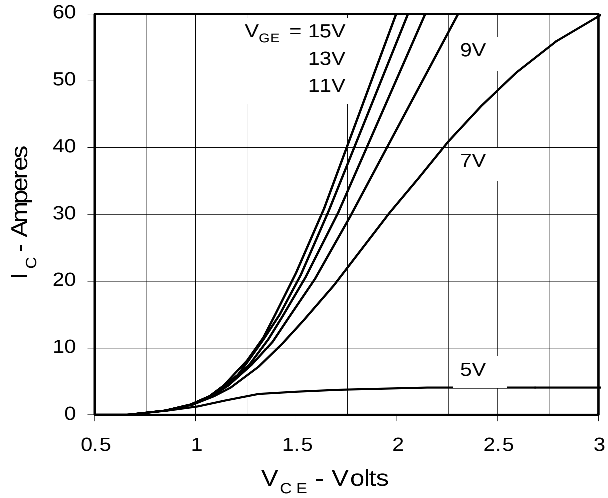


Fig. 2. Extended Output Characteristics @ 25 deg. C

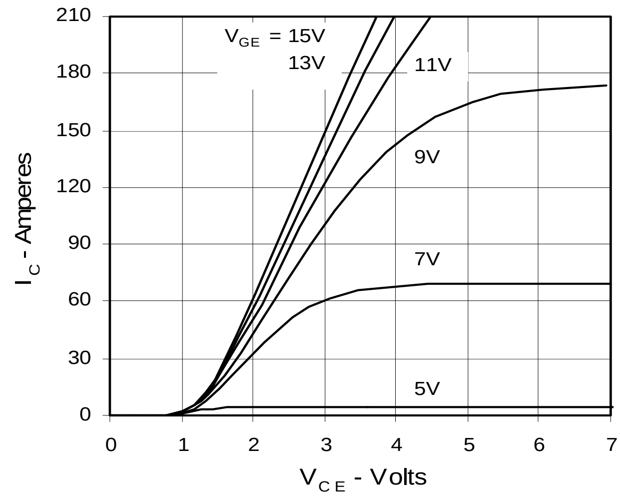


Fig. 3. Output Characteristics @ 125 Deg. C

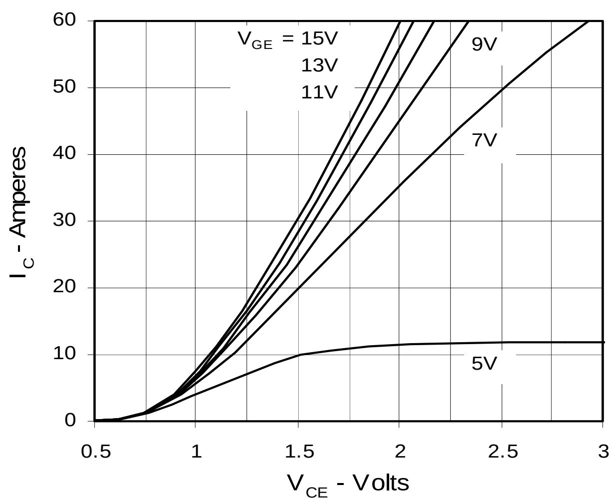


Fig. 4. Dependence of $V_{CE(sat)}$ on Temperature

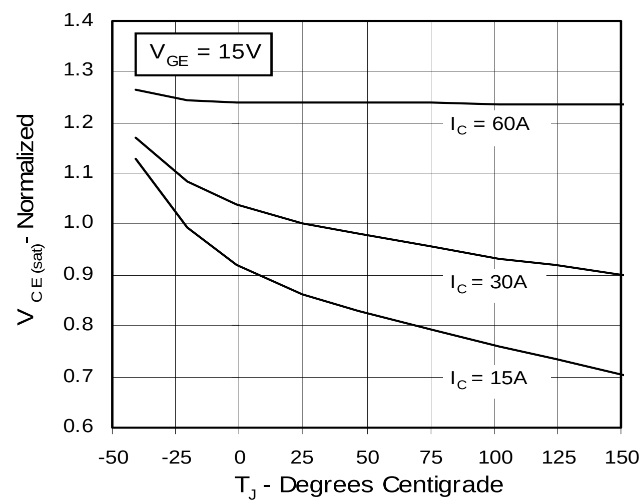


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter voltage

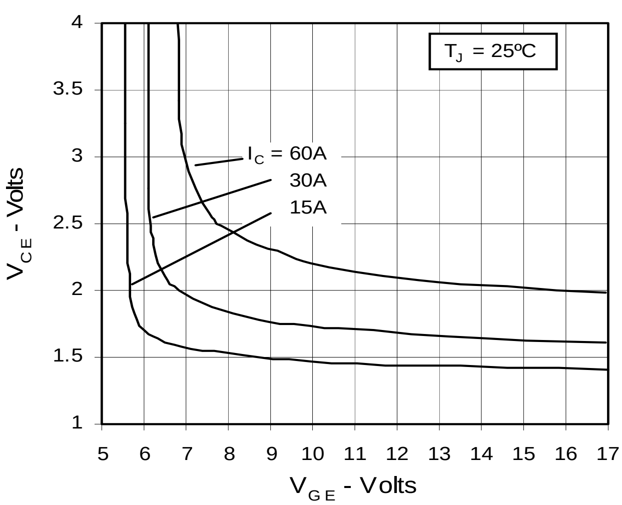


Fig. 6. Input Admittance

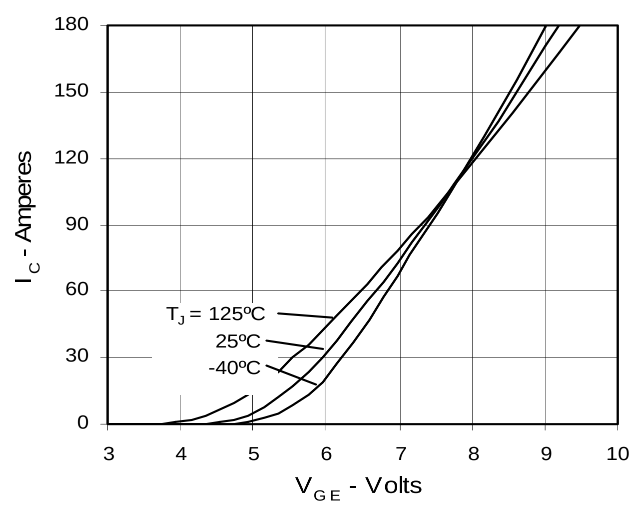


Fig. 7. Transconductance

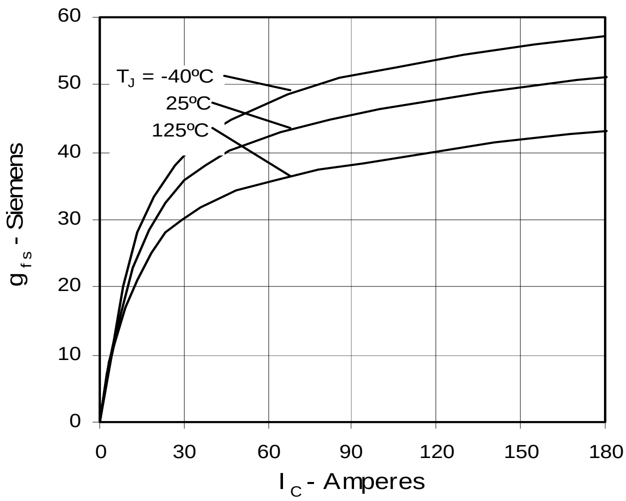


Fig. 8. Dependence of Turn-Off Energy on R_G

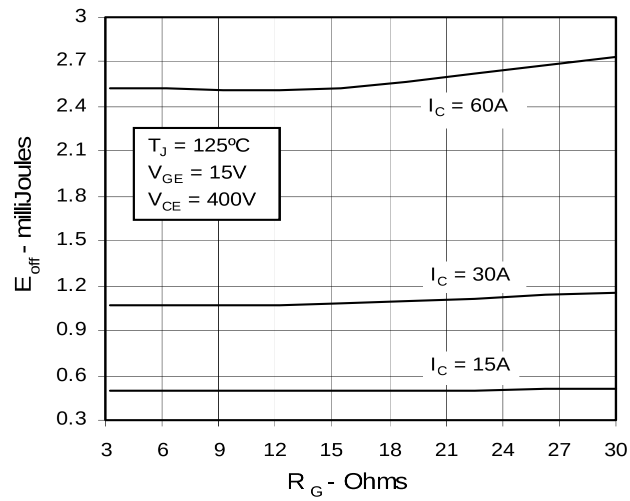


Fig. 9. Dependence of Turn-Off Energy on I_c

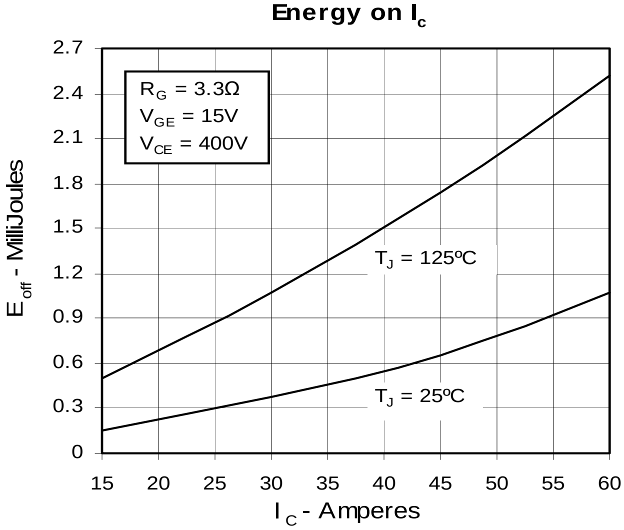


Fig. 10. Dependence of Turn-Off Energy on Temperature

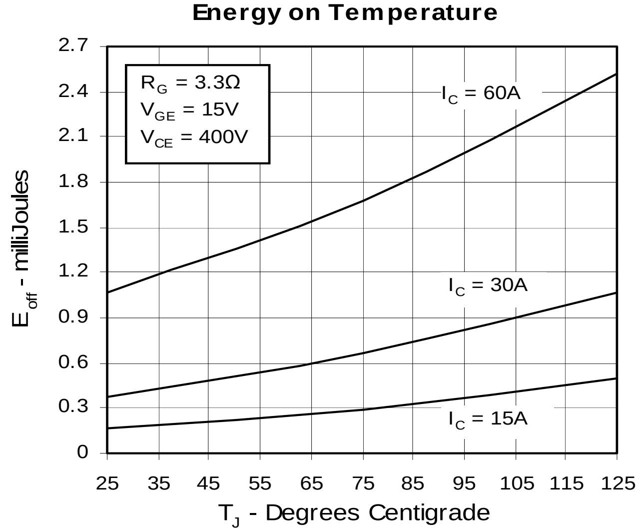


Fig. 11. Dependence of Turn-Off Switching Time on R_G

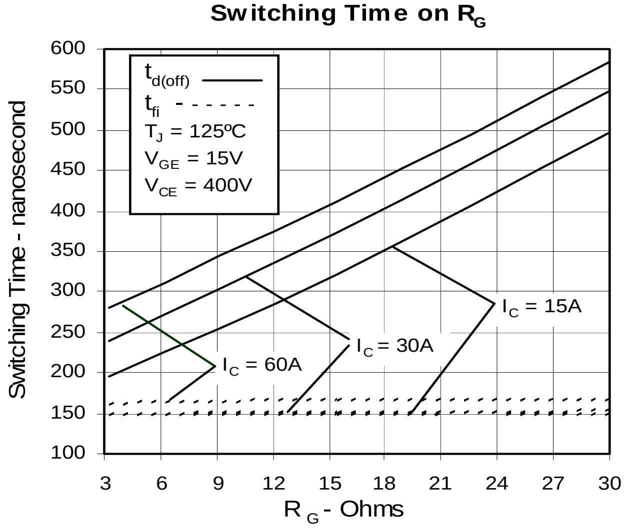


Fig. 12. Dependence of Turn-Off Switching Time on I_c

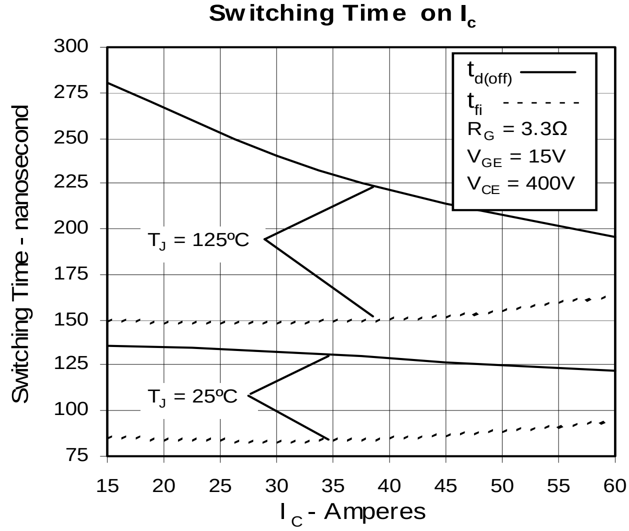


Fig. 13. Dependence of Turn-Off Switching Time on Temperature

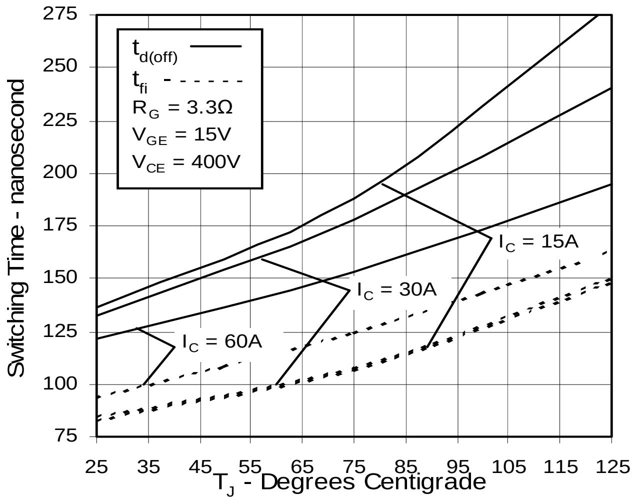


Fig. 14. Gate Charge

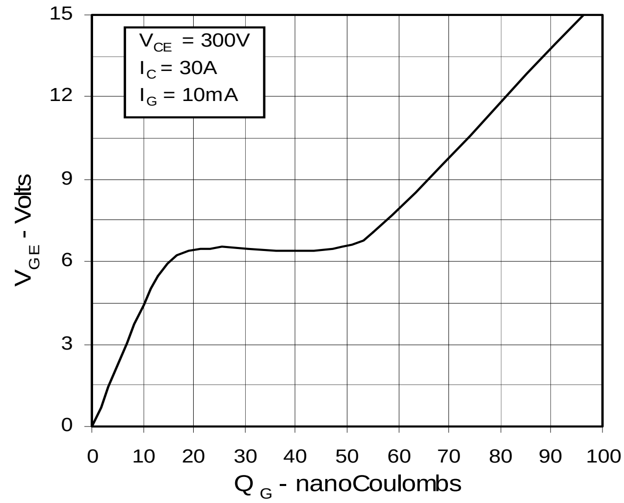


Fig. 15. Capacitance

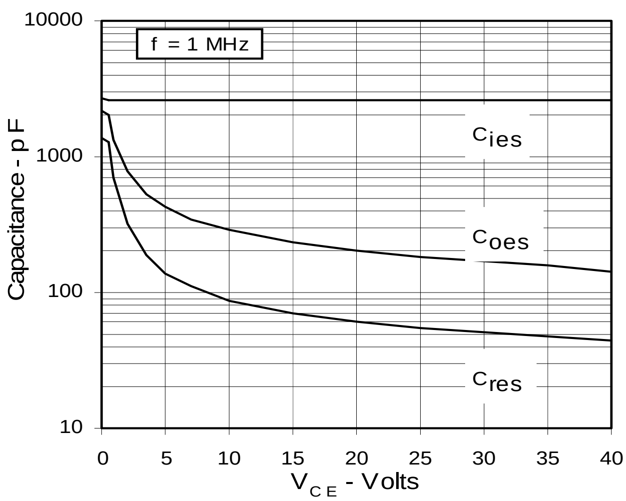
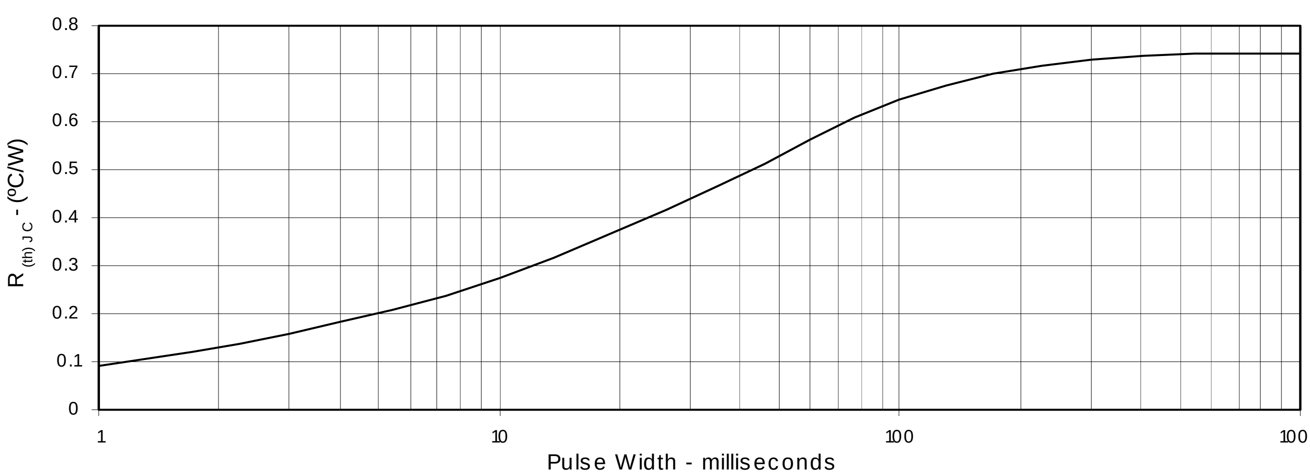


Fig. 13. Maximum Transient Thermal Resistance



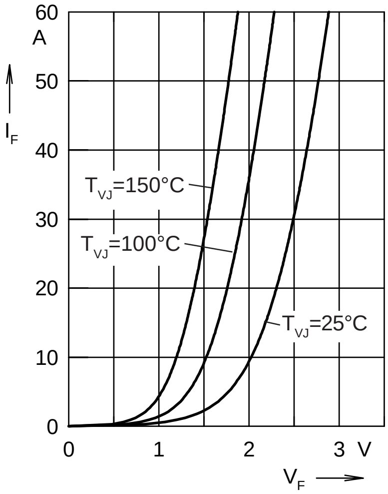


Fig. 17 Forward current I_F versus V_F

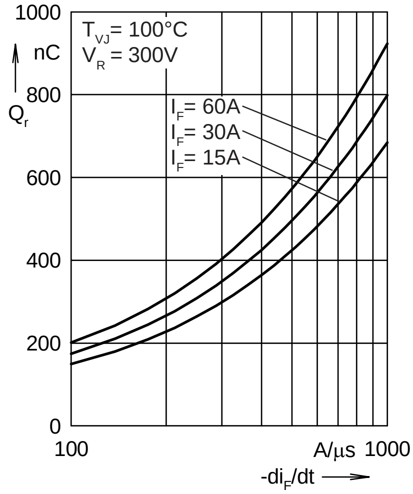


Fig. 18 Reverse recovery charge Q_r versus $-di_F/dt$

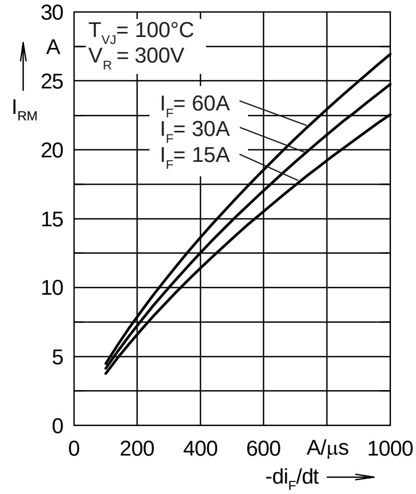


Fig. 19 Peak reverse current I_{RM} versus $-di_F/dt$

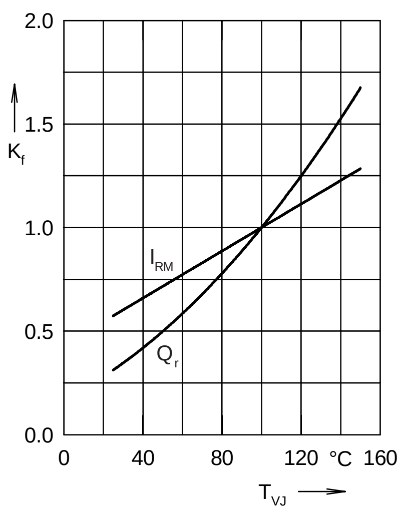


Fig. 20 Dynamic parameters Q_r, I_{RM} versus T_{VJ}

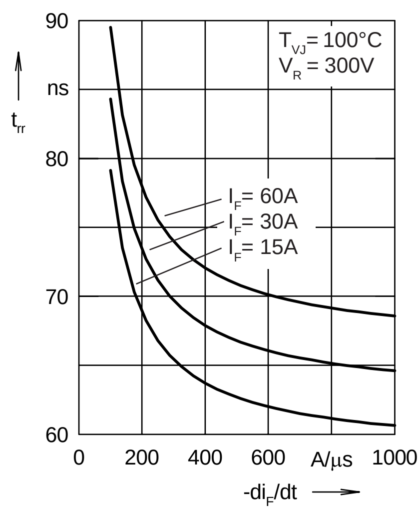


Fig. 21 Recovery time t_{rr} versus $-di_F/dt$

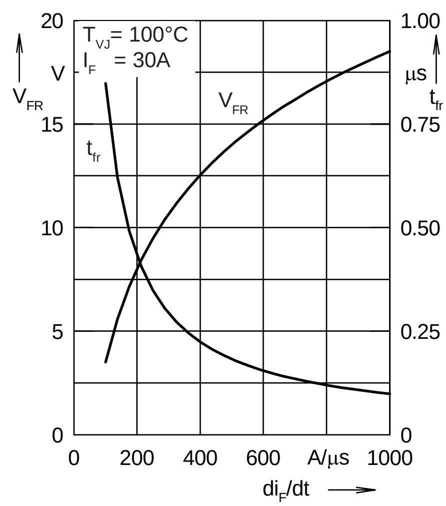


Fig. 22 Peak forward voltage V_{FR} and t_{fr} versus di_F/dt

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

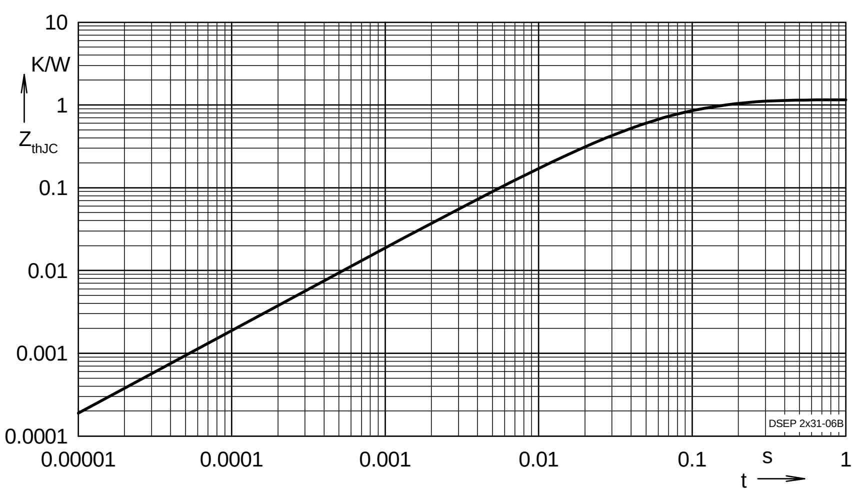


Fig. 23 Transient thermal resistance junction to case

IXYS reserves the right to change limits, test conditions, and dimensions.