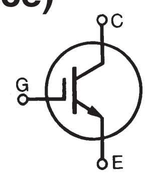
HiPerFAST™ IGBT ISOPLUS247™

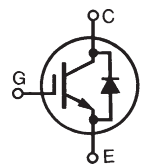
IXGR 50N60B2
IXGR 50N60B2D1

V_{CES}	=	600	V
I_{C25}	=	68	A
$V_{CE(sat)}$	=	2.2	V
$t_{fi(typ)}$	=	65	ns

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

Preliminary Data Sheet



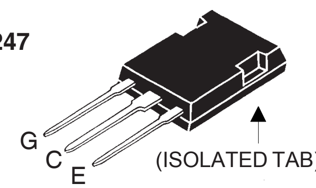


IXGR_B2 IXGR_B2D1

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)	68	A
I_{C110}	T_C = 110°C	36	A
I_{F110}	T_C = 110°C (50N60B2D1 Diode)	39	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} = 100	A
P_C	T_C = 25°C	200	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

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	50N60B2 50N60B2D1			50 650	µA µA
I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V				±100	nA
$V_{CE(sat)}$	I_C = 40 A, V_{GE} = 15 V Note 1	 T_J = 125°C		1.8 1.7	2.2	V V

ISOPLUS247 (IXGR)



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

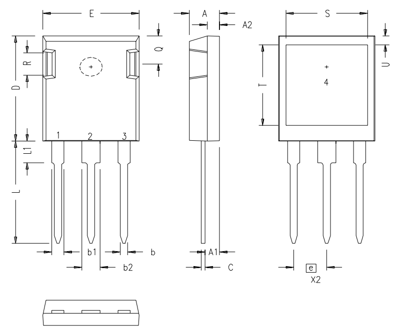
- Uninterruptible power supplies (UPS)
- Switched-mode and resonant-mode power supplies
- AC motor speed control
- DC servo and robot drives
- DC choppers

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.	
g_{fs}	I_C = 40 A; V_{CE} = 10 V, Note 1	40	55		S
C_{ies}			3500		pF
C_{oes}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz	50N60B2	240		pF
		50N60B2D1	280		pF
C_{res}			50		pF
Q_g			140		nC
Q_{ge}	I_C = 40 A, V_{GE} = 15 V, V_{CE} = 0.5 V_{CES}		23		nC
Q_{gc}			44		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		18		ns
t_{ri}	I_C = 40 A, V_{GE} = 15 V		25		ns
$t_{d(off)}$	V_{CE} = 480 V, R_G = R_{off} = 5.0 Ω		190	300	ns
t_{fi}			65		ns
E_{off}			0.55	0.85	mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**		18		ns
t_{ri}	I_C = 40 A, V_{GE} = 15 V		25		ns
E_{on}	V_{CE} = 480 V, R_G = R_{off} = 5.0 Ω		0.9		mJ
$t_{d(off)}$			290		ns
t_{fi}			140		ns
E_{off}			1.55		mJ
$R_{thJ-DCB}$	(Note 2)		0.31		K/W
R_{thJC}	(Note 3)			0.62	K/W
R_{thCS}			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			2.0	V
	T_J = 150°C			1.39	
I_{RM}	I_F = 60 A, V_{GE} = 0 V, -di_F/dt = 100 A/µ T_J = 100°C V_R = 100 V			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

Notes 1: Pulse test, t ≤ 300 µs, duty cycle ≤ 2 %
2: $R_{thJ-DCB}$ is the thermal resistance junction-to-internal side of DCB substrate.
3: R_{thJC} is the thermal resistance junction-to-external side of DCB substrate.

Fig. 1. Output Characteristics @ 25 Deg. C

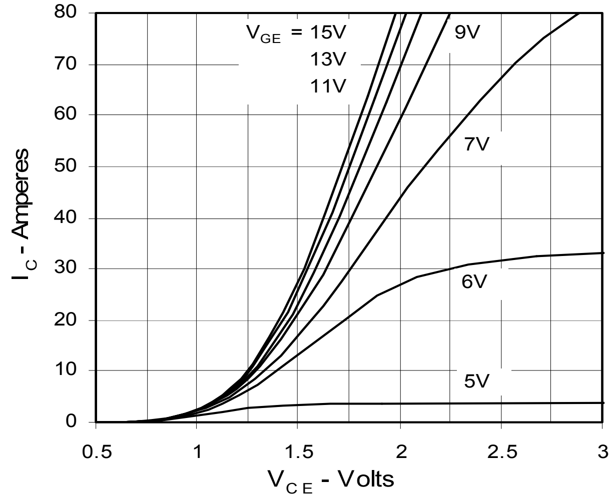


Fig. 2. Extended Output Characteristics @ 25 deg. C

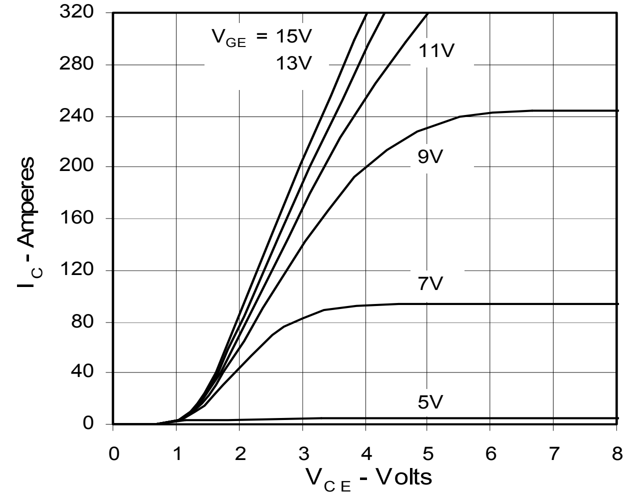


Fig. 3. Output Characteristics @ 125 Deg. C

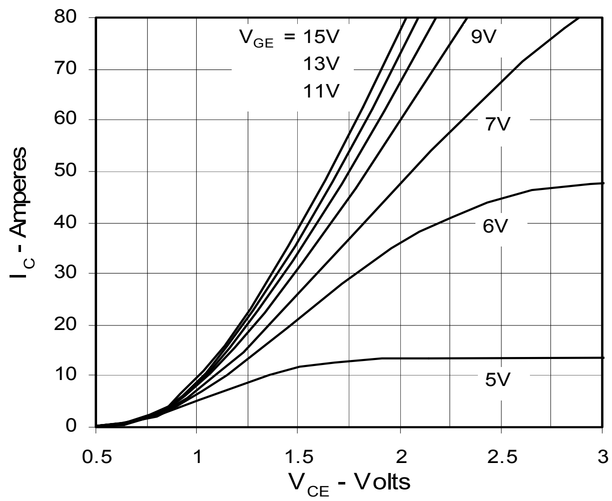


Fig. 4. Dependence of $V_{CE(sat)}$ on Temperature

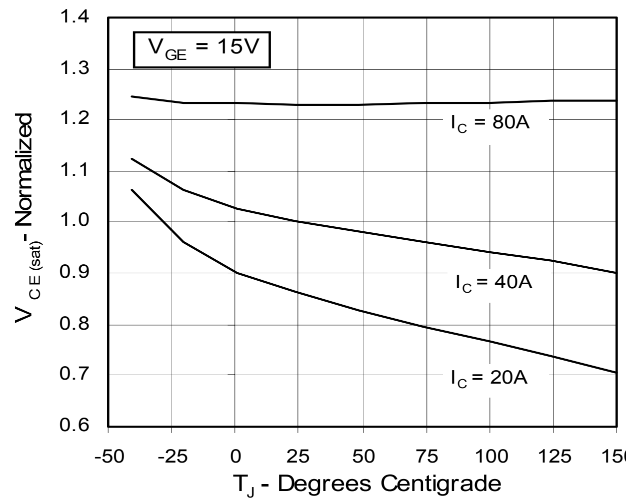


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter voltage

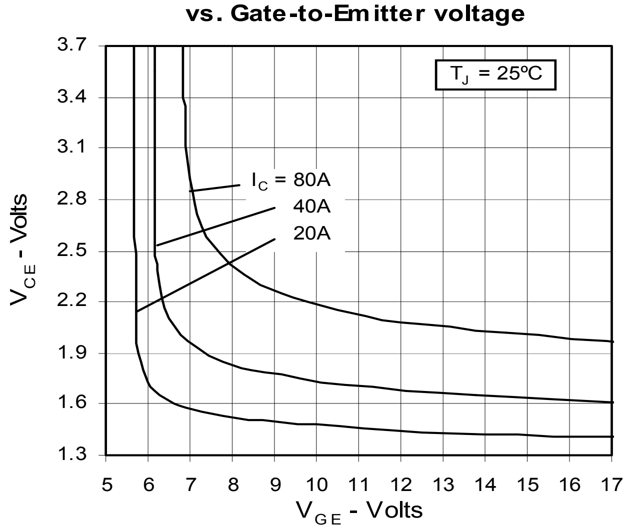


Fig. 6. Input Admittance

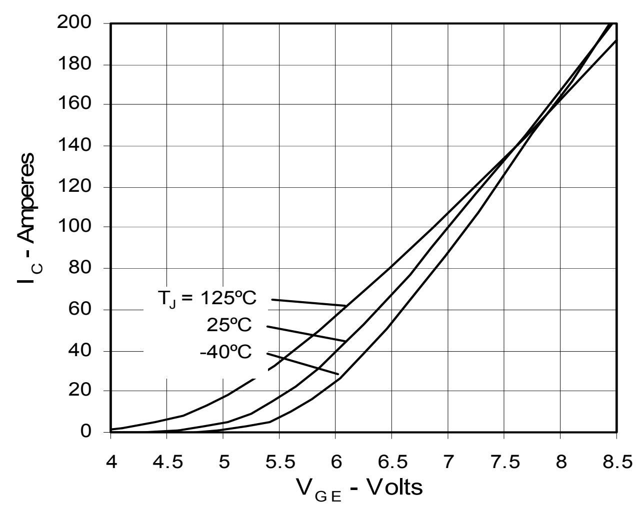


Fig. 7. Transconductance

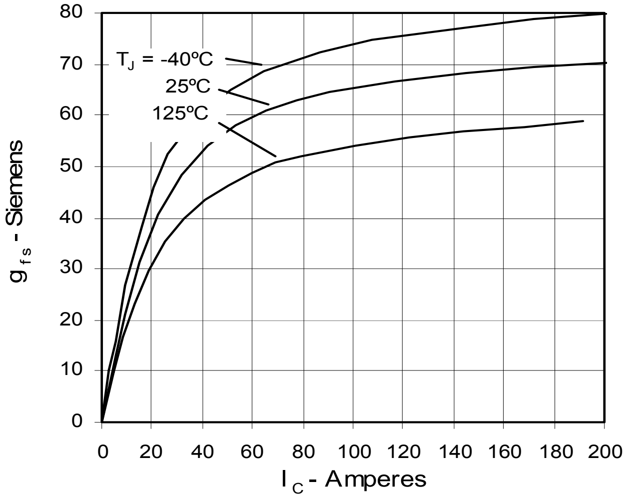


Fig. 8. Dependence of Turn-Off Energy on R_G

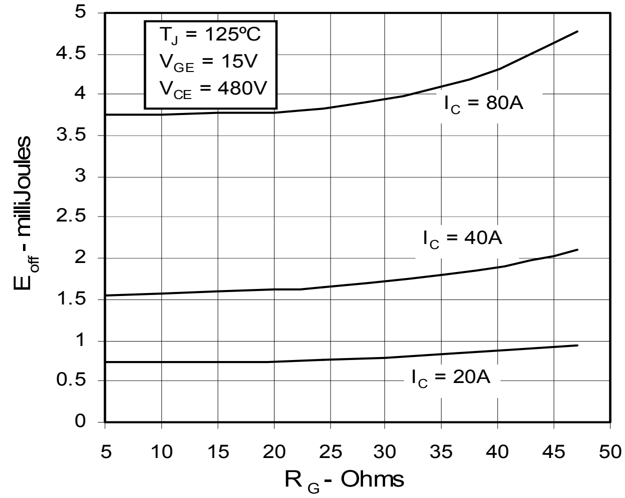


Fig. 9. Dependence of Turn-Off Energy on I_C

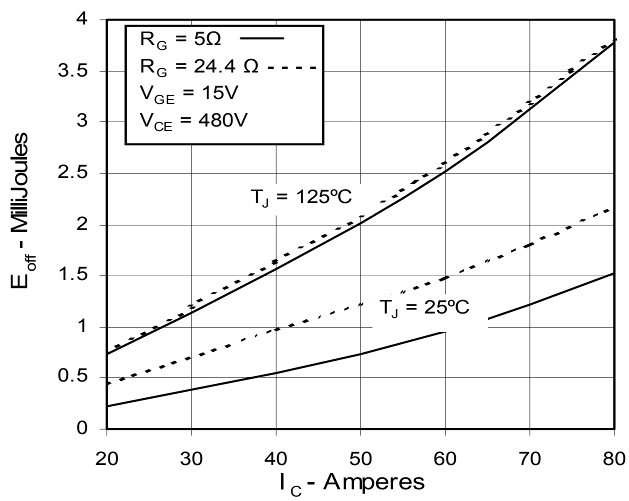


Fig. 10. Dependence of Turn-Off Energy on Temperature

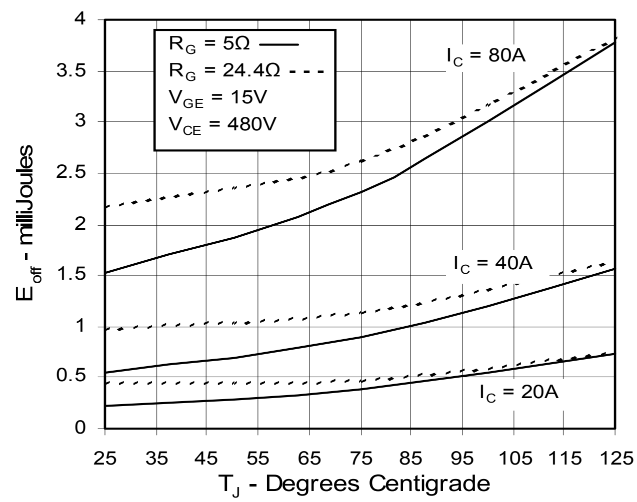


Fig. 11. Dependence of Turn-Off Switching Time on R_G

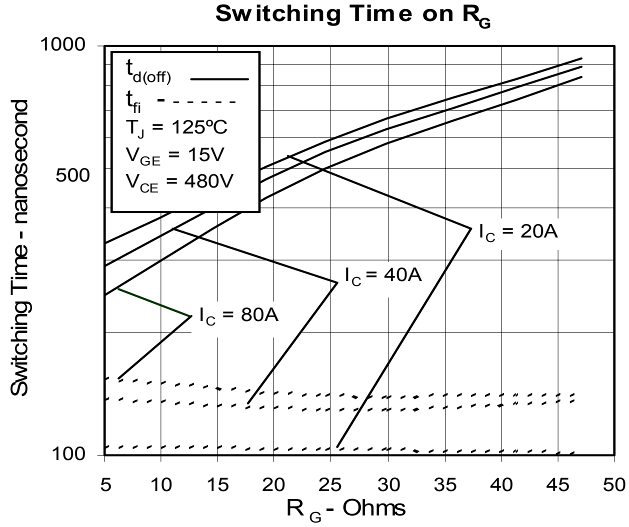


Fig. 12. Dependence of Turn-Off Switching Time on I_C

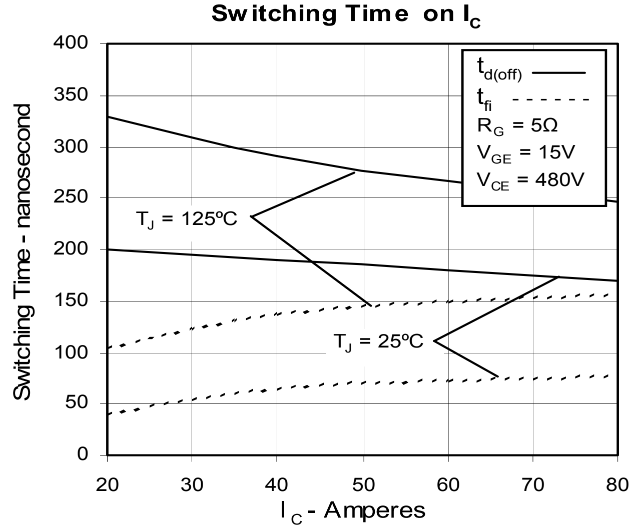


Fig. 13. Dependence of Turn-Off Switching Time on Temperature

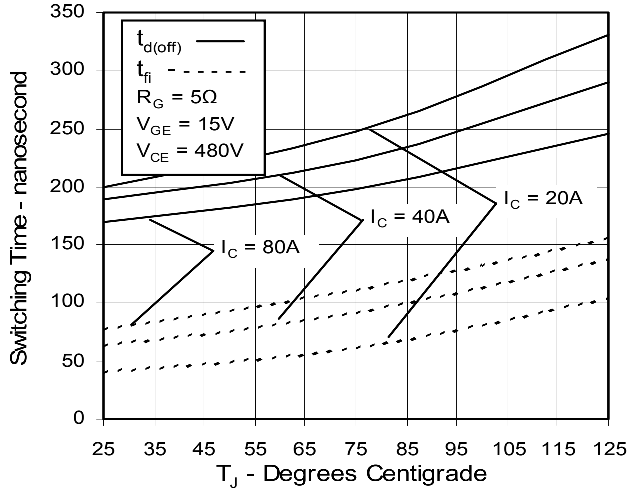


Fig. 14. Reverse-Bias Safe Operating Area

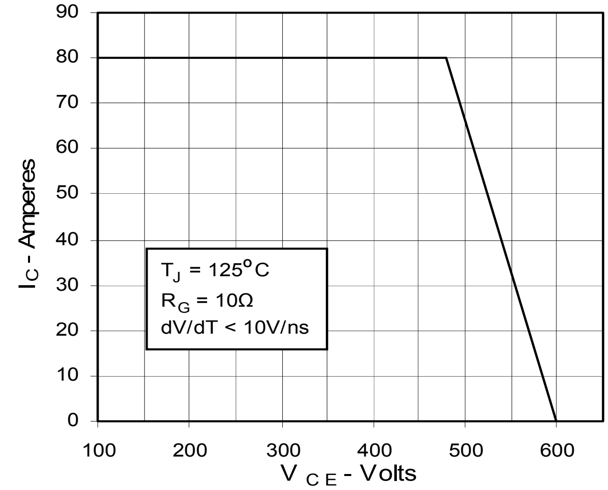


Fig. 15. Gate Charge

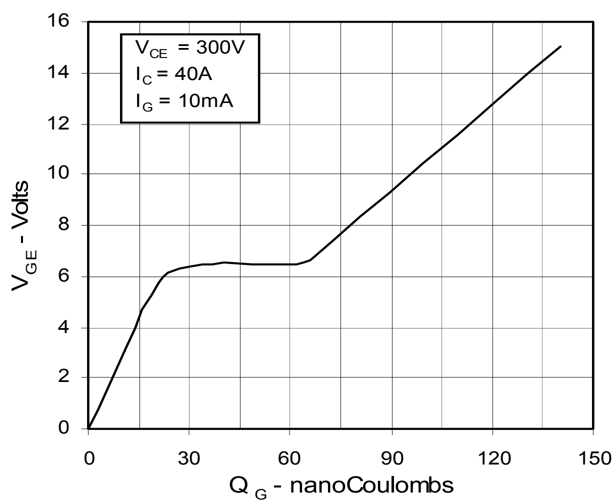


Fig. 16. Capacitance

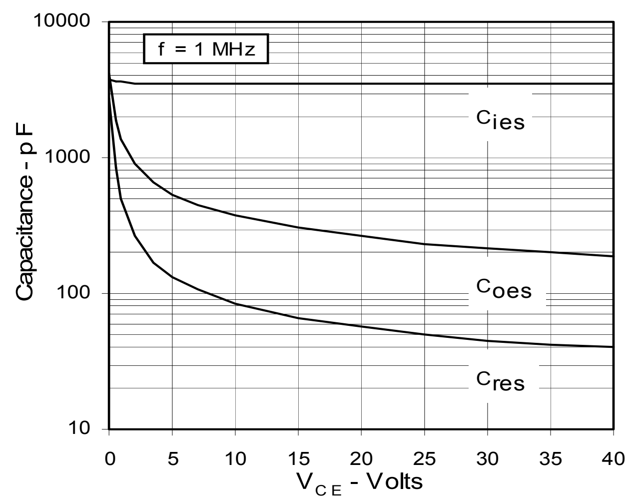


Fig. 17. Maximum Transient Thermal Resistance

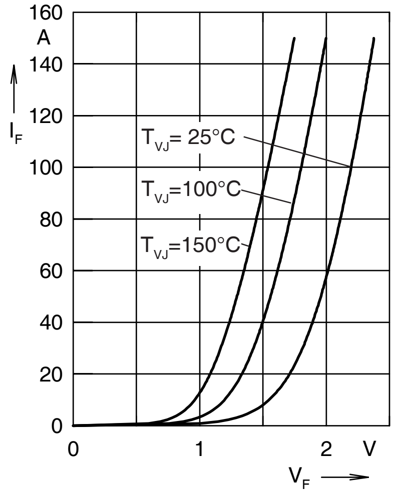


Fig. 18 Forward current I_F versus V_F

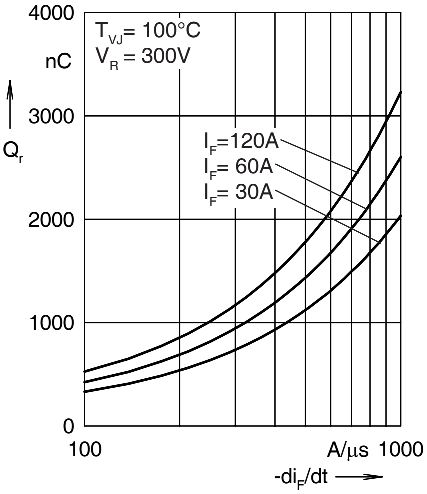


Fig. 19 Reverse recovery charge Q_r versus $-di_F/dt$

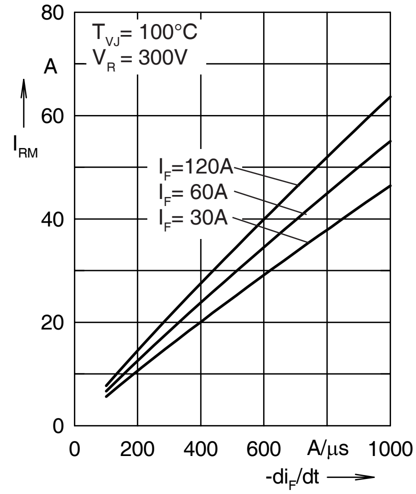


Fig. 20 Peak reverse current I_{RM} versus $-di_F/dt$

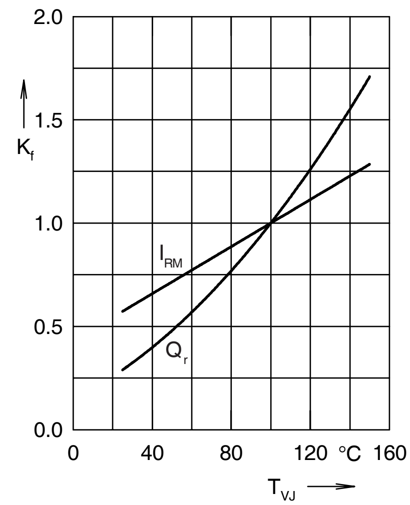


Fig. 21 Dynamic parameters Q_r, I_{RM} versus T_{VJ}

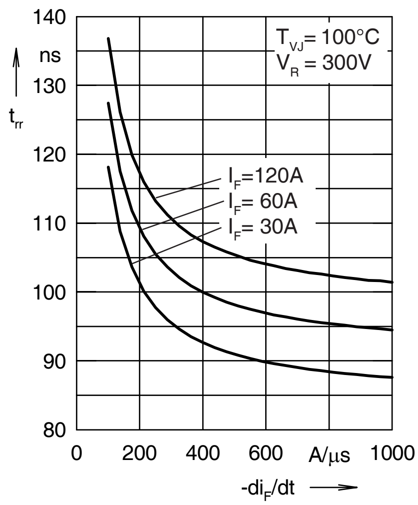


Fig. 22 Recovery time t_{rr} versus $-di_F/dt$

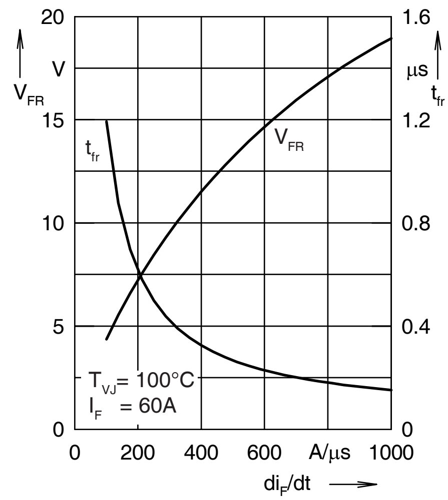


Fig. 23 Peak forward voltage V_{FR} and t_{fr}

versus di_F/dt

Constants for Z_{thJC} calculation:

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

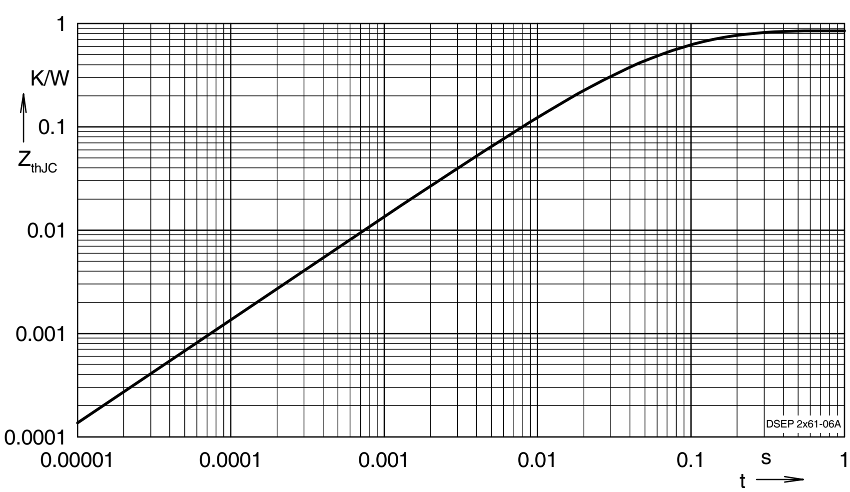


Fig. 24 Transient thermal resistance junction to case

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

IXYS MOSFETs and IGBTs are covered by one or more	4,850,072	4,931,844	5,034,796	5,063,307	5,237,481	5,381,025	6,404,065B1	6,162,665	6,534,343	6,583,505
of the following U.S. patents:	4,835,592	4,881,106	5,017,508	5,049,961	5,187,117	5,486,715	6,306,728B1	6,259,123B1	6,306,728B1	6,683,344