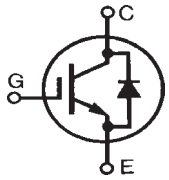
IXYS

HiPerFAST™ IGBT with Diode

C2-Class High Speed IGBTs

IXGH 30N60C2D1
IXGT 30N60C2D1

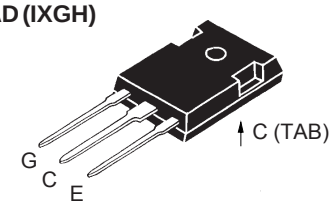
V_{CES} = 600 V
I_{C25} = 70 A
$V_{CE(sat)}$ = 2.7 V
$t_{fi\,typ}$ = 32 ns



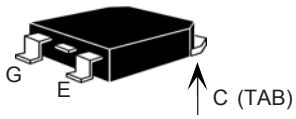
Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	600	V
V_{CGR}	T_J = 25°C to 150°C; R_{GE} = 1 MΩ	600	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C (limited by leads)	70	A
I_{C110}	T_C = 110°C	30	A
I_{CM}	T_C = 25°C, 1 ms	150	A
SSOA (RBSOA)	V_{GE} = 15 V, T_{VJ} = 125°C, R_G = 10 Ω Clamped inductive load @ ≤ 600 V	I_{CM} = 60	A
P_C	T_C = 25°C	190	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
Plastic body for 10s		250	°C
M_d	Mounting torque (TO-247)	1.13/10Nm/lb.in.	
Weight	TO-247	6	g
	TO-268	4	g

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}		2.5		5.0	V
I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0 V	T_J = 25°C			200	μA
		T_J = 125°C			3	mA
I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V				±100	nA
$V_{CE(sat)}$	I_C = 24 A, V_{GE} = 15 V	T_J = 25°C			2.7	V
		T_J = 125°C		1.8		V

TO-247 AD (IXGH)



TO-268 (IXGT)



G = Gate, C = Collector,
E = Emitter, TAB = Collector

Features

- Very high frequency IGBT
- Square RBSOA
- High current handling capability
- MOS Gate turn-on
  - drive simplicity

Applications

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

Advantages

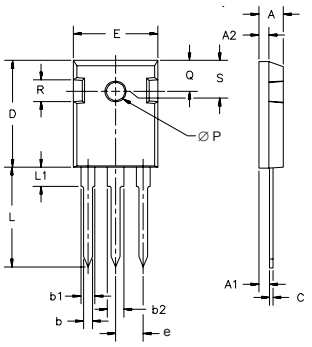
- High power density
- Very fast switching speed for high frequency aaplications
- High power surface mountable package

Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
g_{fs}	I_C = 24 A; V_{CE} = 10 V, Pulse test, t ≤ 300 µs, duty cycle ≤ 2 %	18	28		S
C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		1430		pF
C_{oes}			140		pF
C_{res}			40		pF
Q_g	I_C = 24 A, V_{GE} = 15 V, V_{CE} = 300 V		70		nC
Q_{ge}			10		nC
Q_{gc}			23		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C** I_C = 24 A, V_{GE} = 15 V V_{CE} = 400 V, R_G = 5 Ω		13		ns
t_{ri}			15		ns
$t_{d(off)}$			70	140	ns
t_{fi}			60		ns
E_{off}			0.19	0.30	mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C** I_C = 24 A, V_{GE} = 15 V V_{CE} = 400 V, R_G = 5 Ω		13		ns
t_{ri}			17		ns
E_{on}			0.22		mJ
$t_{d(off)}$			120		ns
t_{fi}			130		ns
E_{off}			0.59		mJ
R_{thJC}				0.65	K/W
R_{thCK}	(TO-247)		0.25		K/W

Reverse Diode (FRED)

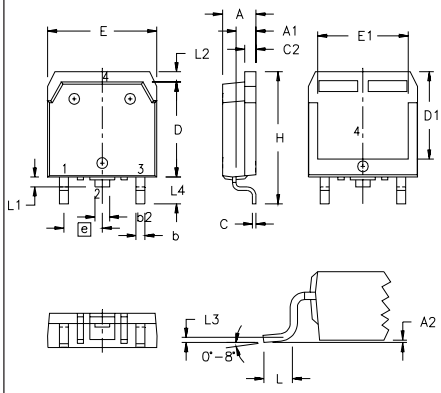
Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
V_F	I_F = 30 A, V_{GE} = 0 V, Pulse test t ≤ 300 µs, duty cycle d ≤ 2 %	T_J = 150°C		1.6	V
				2.5	V
I_{RM}	I_F = 30 A, V_{GE} = 0 V, -di_F/dt = 100 A/µs, T_J = 100°C			4	A
t_{rr}	V_R = 100 V	T_J = 100°C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

TO-247 AD Outline



Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	4.7	5.3	.185	.209
A_1	2.2	2.54	.087	.102
A_2	2.2	2.6	.059	.098
b	1.0	1.4	.040	.055
b_1	1.65	2.13	.065	.084
b_2	2.87	3.12	.113	.123
C	.4	.8	.016	.031
D	20.80	21.46	.819	.845
E	15.75	16.26	.610	.640
e	5.20	5.72	0.205	0.225
L	19.81	20.32	.780	.800
L1		4.50		.177
ØP	3.55	3.65	.140	.144
Q	5.89	6.40	0.232	0.252
R	4.32	5.49	.170	.216
S	6.15 BSC		242 BSC	

TO-268 Outline



SYM	INCHES MIN	MAX	MILLIMETERS MIN	MAX
A	.193	.201	4.90	5.10
A1	.106	.114	2.70	2.90
A2	.001	.010	0.02	0.25
b	.045	.057	1.15	1.45
b2	.075	.083	1.90	2.10
C	.016	.026	0.40	0.65
C2	.057	.063	1.45	1.60
D	.543	.551	13.80	14.00
D1	.488	.500	12.40	12.70
E	.624	.632	15.85	16.05
E1	.524	.535	13.30	13.60
e	.215 BSC		5.45 BSC	
H	.736	.752	18.70	19.10
L	.094	.106	2.40	2.70
L1	.047	.055	1.20	1.40
L2	.039	.045	1.00	1.15
L3	.010 BSC		0.25 BSC	
L4	.150	.161	3.80	4.10

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

Fig. 1. Output Characteristics @ 25 Deg. C

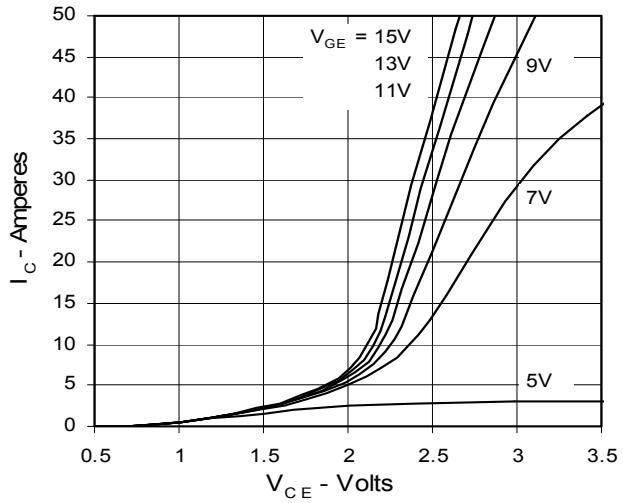


Fig. 2. Extended Output Characteristics @ 25 deg. C

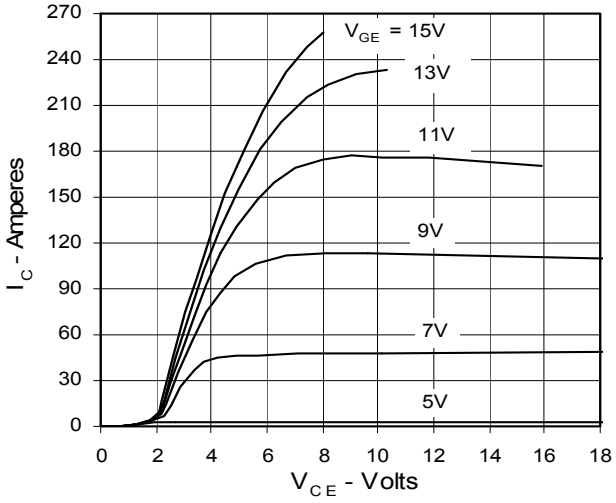


Fig. 3. Output Characteristics @ 125 Deg. C

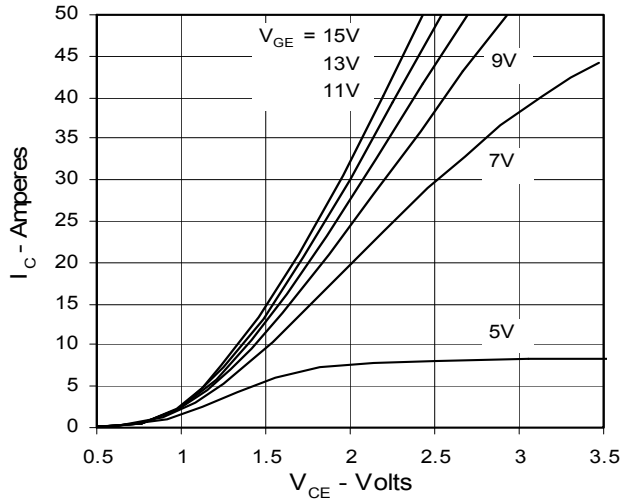


Fig. 4. Dependence of $V_{CE(sat)}$ on Temperature

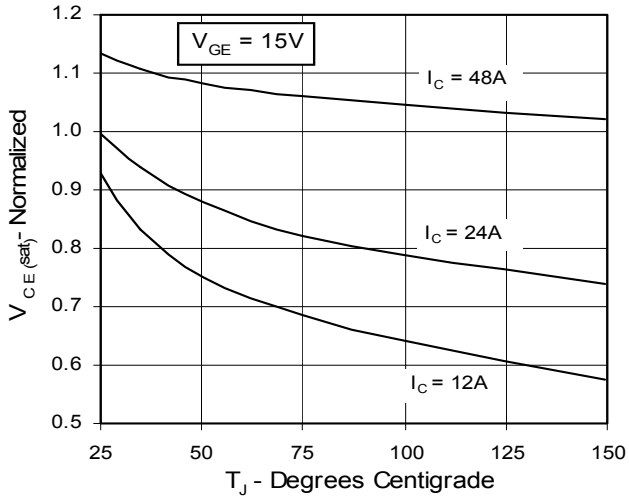


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter voltage

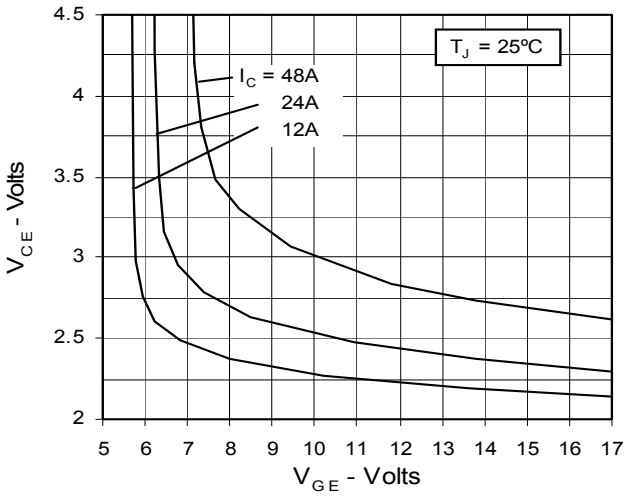


Fig. 6. Input Admittance

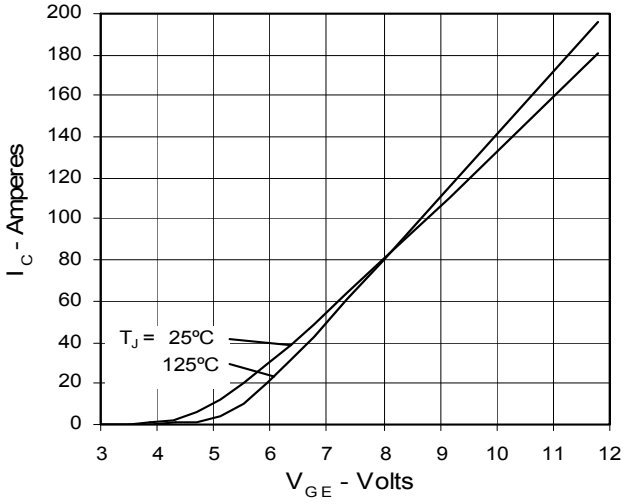


Fig. 7. Transconductance

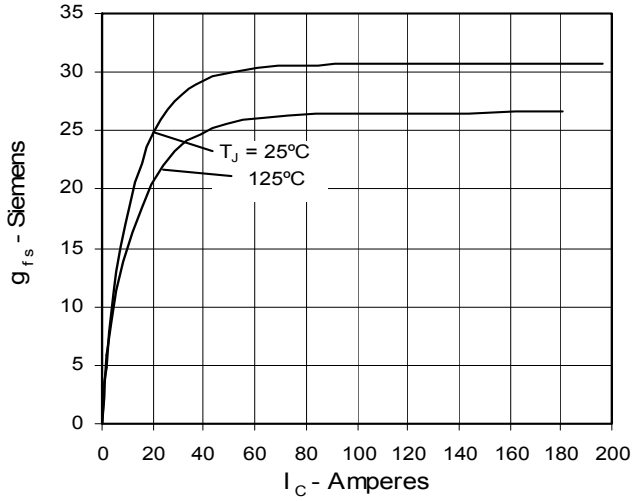


Fig. 8. Dependence of Turn-Off Energy on R_G

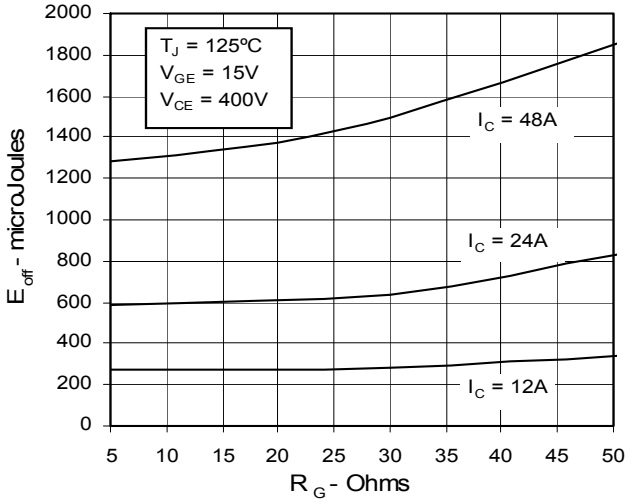


Fig. 9. Dependence of Turn-Off Energy on I_C

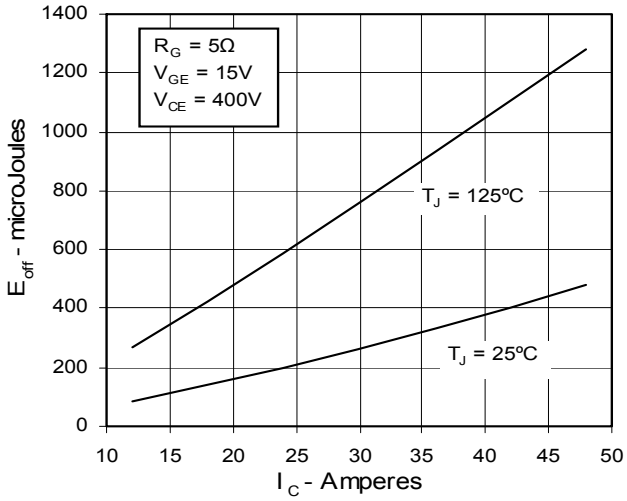


Fig. 10. Dependence of Turn-Off Energy on Temperature

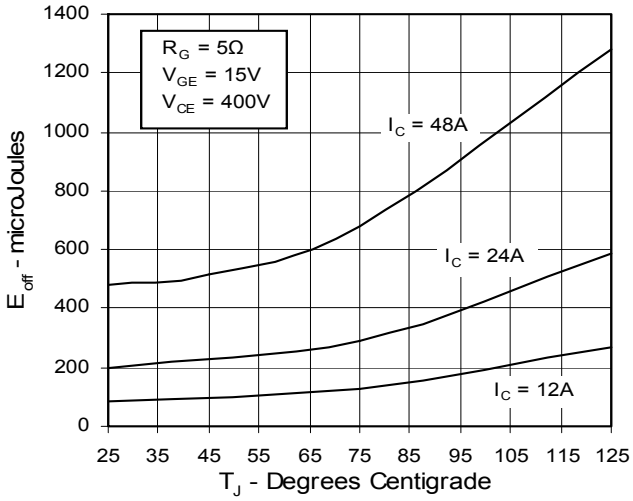


Fig. 11. Dependence of Turn-Off Switching Time on R_G

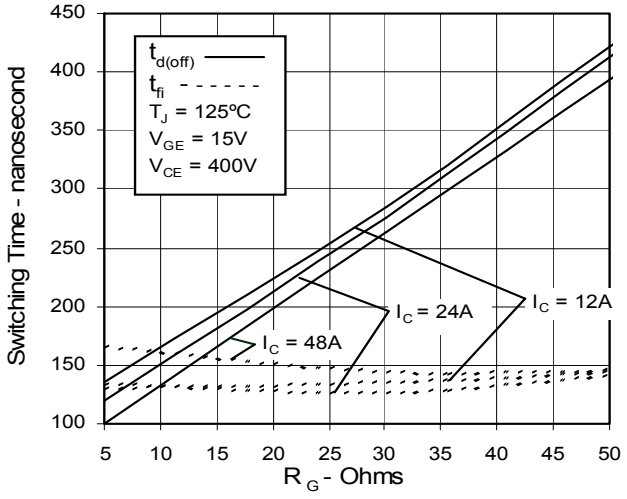


Fig. 12. Dependence of Turn-Off Switching Time on I_C

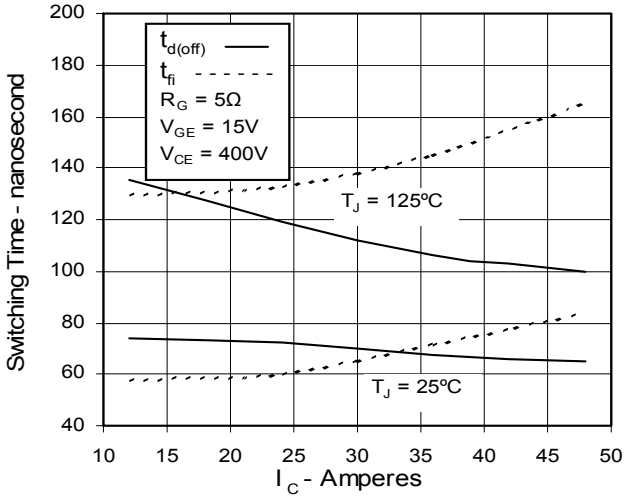


Fig. 13. Dependence of Turn-Off Switching Time on Temperature

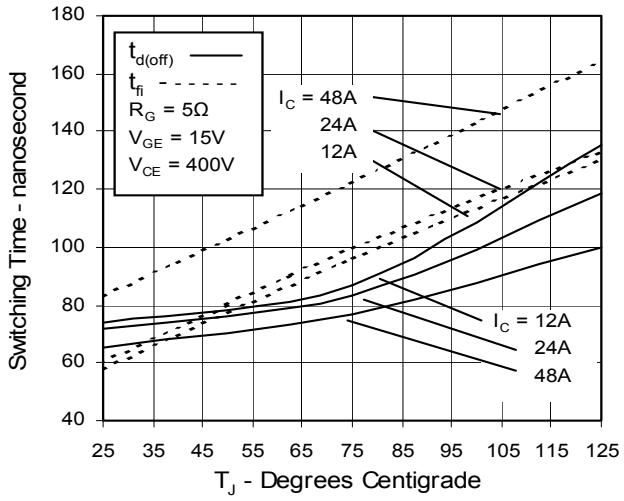


Fig. 14. Gate Charge

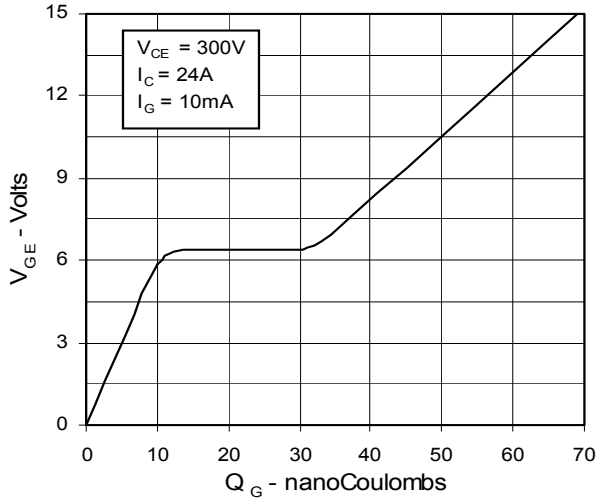


Fig. 15. Capacitance

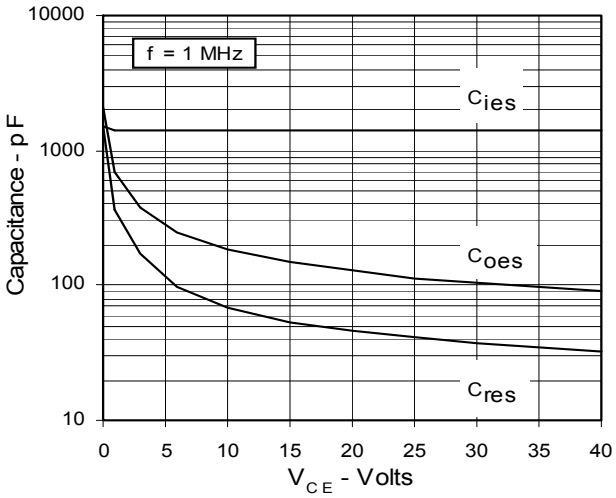
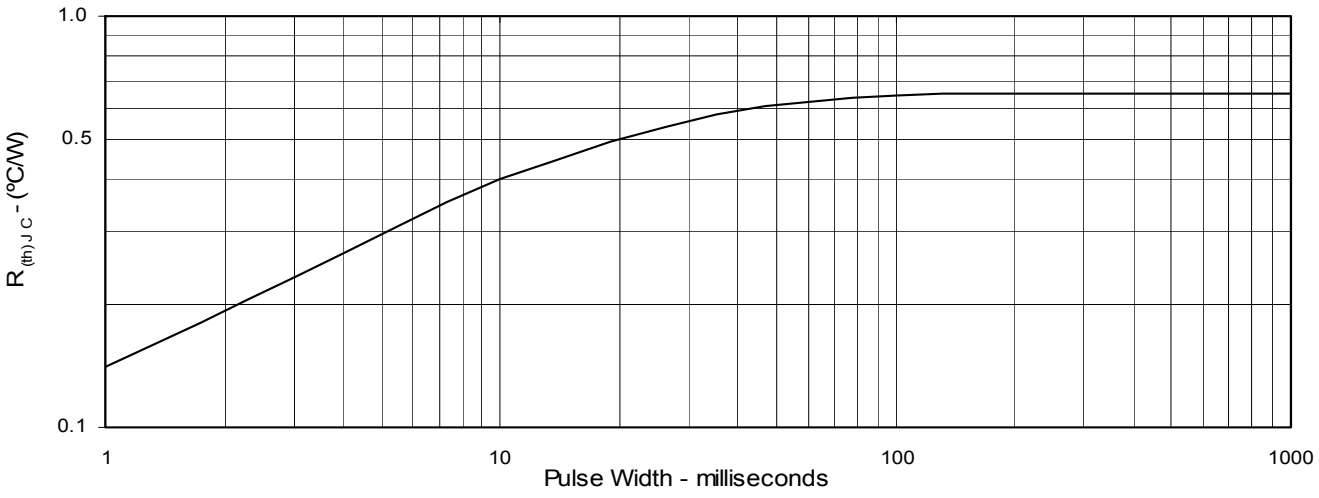


Fig. 16. Maximum Transient Thermal Resistance



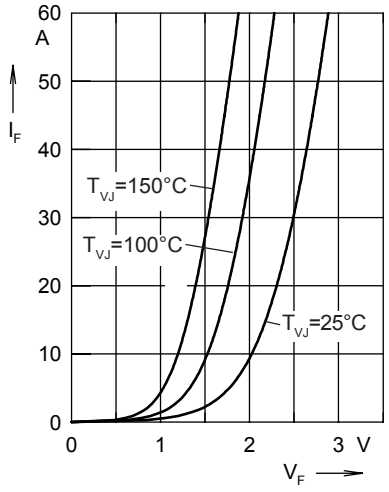


Fig. 17. Forward current I_F versus V_F

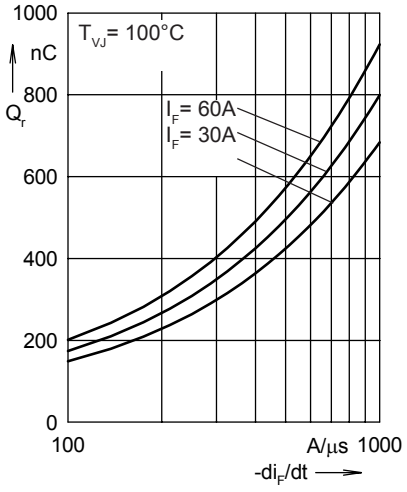


Fig. 18. Reverse recovery charge

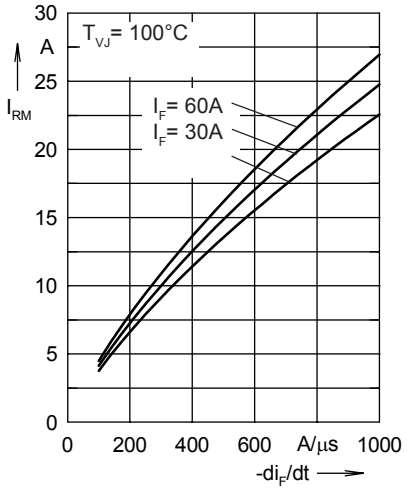


Fig. 19. Peak reverse current I_{RM}

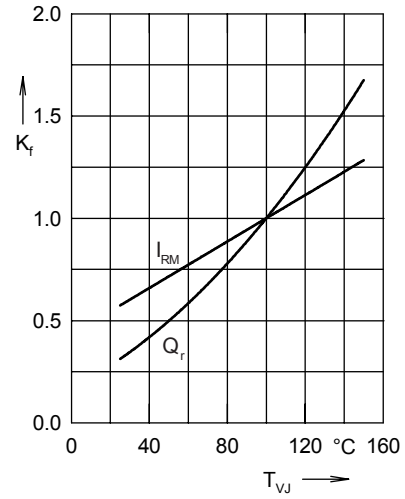


Fig. 20. Dynamic parameters Q_r, I_{RM}

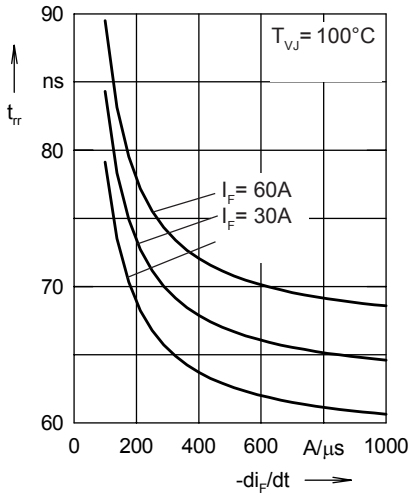


Fig. 21. Recovery time t_{rr} versus

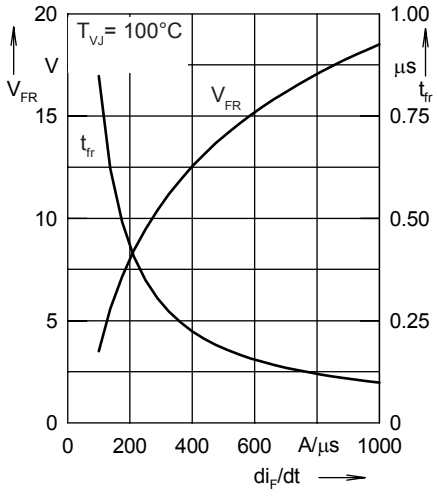


Fig. 22. Peak forward voltage V_{FR}

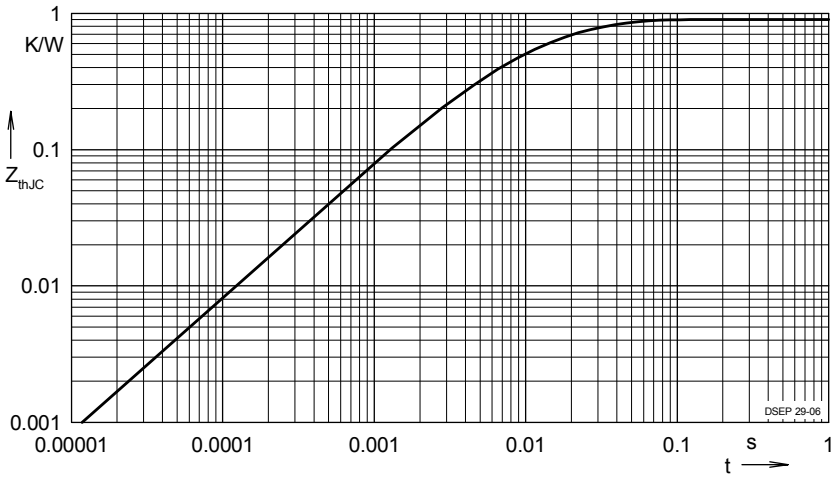


Fig. 23. Transient thermal resistance junction to case

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.502	0.0052
2	0.193	0.0003