IXYS

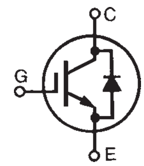
Advance Technical Information

Polar™ IGBT

IXGQ 100N60PBD1

V_{CES} = 600 V
I_{C25} = 100 A

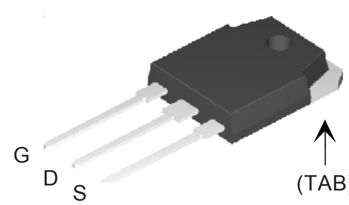
With Anti-Parallel Diode
For PDP Applications



Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	600	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C, IGBT chip capability	100	A
I_{C90}	T_C = 90°C	75	A
I_{CM}	T_J ≤ 150°C, tp < 300 µs	188	A
$I_{C(RMS)}$	Lead current limit	75	A
SSOA (RBSOA)	V_{GE} = 15 V, T_{VJ} = 150°C, R_G = 20 Ω Clamped inductive load, V_{CE} < 600 V	I_{CM} = 100	A
P_C	T_C = 25°C	340	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
M_d	Mounting torque	1.3/10	Nm/lb.in.
Weight g	TO-247	6.0	

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}	T_J = 25°C			1	µA
	V_{GE} = 0 V	T_J = 125°C			200	µA
I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V				±100	nA
$V_{CE(sat)}$	V_{GE} = 15V, I_C = 50 A			1.30	1.50	V
		T_J = 125°C		1.31		V
	I_C = 100 A			1.63	1.80	V
		T_J = 125°C		1.77		V

TO-3P (IXTQ)

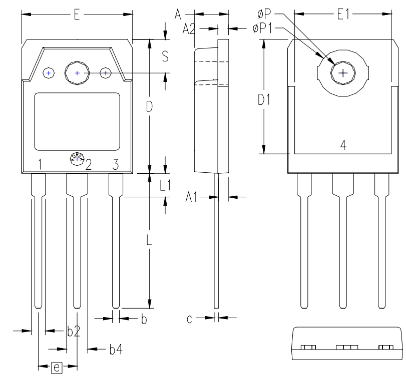


Features
- International standard package
- Low $V_{CE(sat)}$
  - for minimum on-state conduction losses
- MOS Gate turn-on
  - drive simplicity

Applications
- PDP Screen Drivers
- AC motor speed control
- DC servo and robot drives
- DC choppers
- Uninterruptible power supplies (UPS)
- Switch-mode and resonant-mode power supplies
- Capacitor discharge

Symbol	Test Conditions (T_J = 25°C, unless otherwise specified)	Min.	Typ.	Max.	
g_{fs}	I_C = 50 A V_{CE} = 10 V Pulse test, t ≤ 300 µs, duty cycle ≤ 2 %	32	48		S
C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		2500		pF
C_{oes}			190		pF
C_{res}			69		pF
Q_g	I_C = 50 A, V_{GE} = 15 V, V_{CE} = 0.5 V_{CES}		160		nC
Q_{ge}			24		nC
Q_{gc}			93		nC
$t_{d(on)}$	**Resistive load, T_J = 25°C** I_C = 50 A, V_{GE} = 15 V V_{CE} = 480 V, R_G = R_{off} = 5 Ω		45		ns
t_{ri}			142		ns
$t_{d(off)}$			147		ns
t_{fi}			217		ns
$t_{d(on)}$	**Inductive load, T_J = 125°C** I_C = 50 A, V_{GE} = 15 V V_{CE} = 480 V, R_G = R_{off} = 5 Ω		41		ns
t_{ri}			148		ns
$t_{d(off)}$			153		ns
t_{fi}			363		ns
R_{thJC}				0.37	K/W
R_{thCK}			0.25		K/W

TO-3P (IXTQ) Outline



1 - GATE
2 - DRAIN (COLLECTOR)
3 - SOURCE (EMITTER)
4 - DRAIN (COLLECTOR)

SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.185	.193	4.70	4.90
A1	.051	.059	1.30	1.50
A2	.057	.065	1.45	1.65
b	.035	.045	0.90	1.15
b2	.075	.087	1.90	2.20
b4	.114	.126	2.90	3.20
c	.022	.031	0.55	0.80
D	.780	.791	19.80	20.10
D1	.665	.677	16.90	17.20
E	.610	.622	15.50	15.80
E1	.531	.539	13.50	13.70
e	.215 BSC		5.45 BSC	
L	.779	.795	19.80	20.20
L1	.134	.142	3.40	3.60
øP	.126	.134	3.20	3.40
øP1	.272	.280	6.90	7.10
S	.193	.201	4.90	5.10

All metal area are tin plated.

Reverse Diode

Symbol	Test Conditions (Characteristic Values, T_J = 25°C, unless otherwise specified)	min.	typ.	max.	
V_F	I_F = 20 A, V_{GE} = 0 V			2.0	V
R_{thJC}				2.5	K/W

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

Fig. 1. Output Characteristics @ 25 ºC

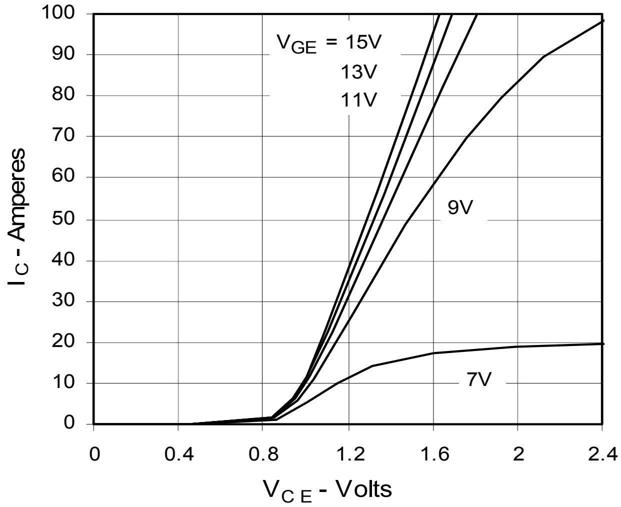


Fig. 2. Extended Output Characteristics @ 25 ºC

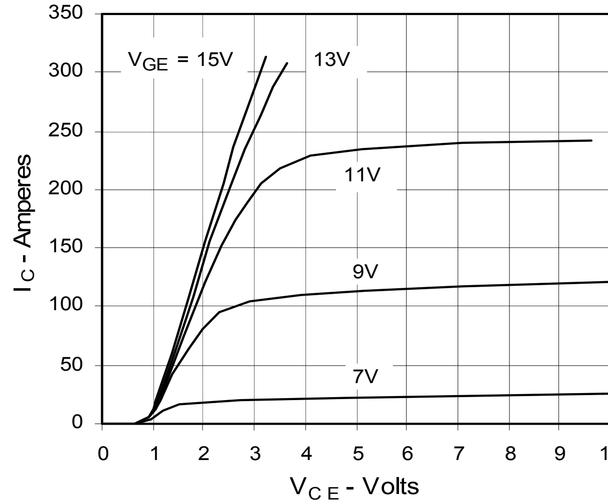


Fig. 3. Output Characteristics @ 125 ºC

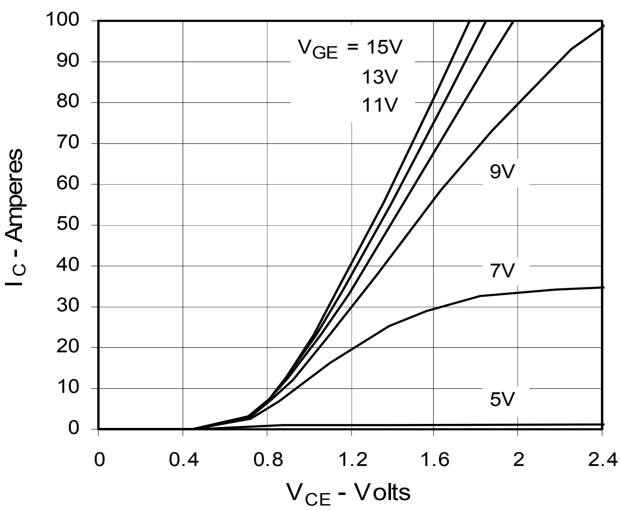


Fig. 4. Dependence of $V_{CE(sat)}$ on Temperature

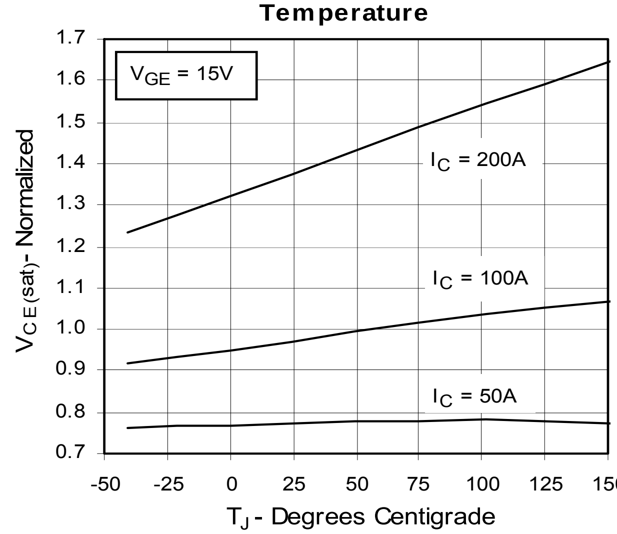


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter voltage

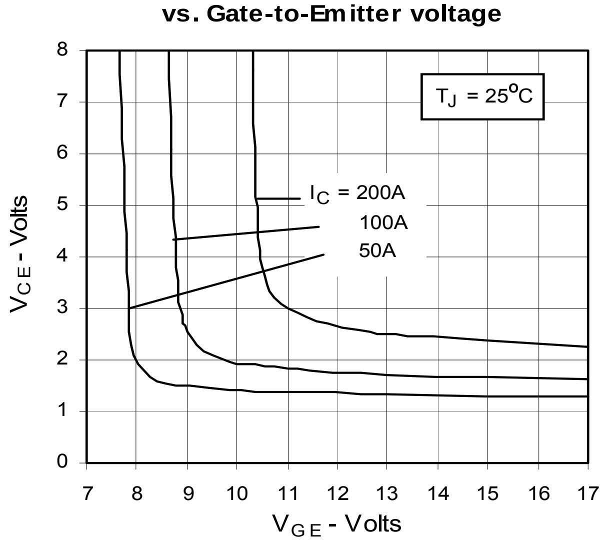


Fig. 6. Input Admittance

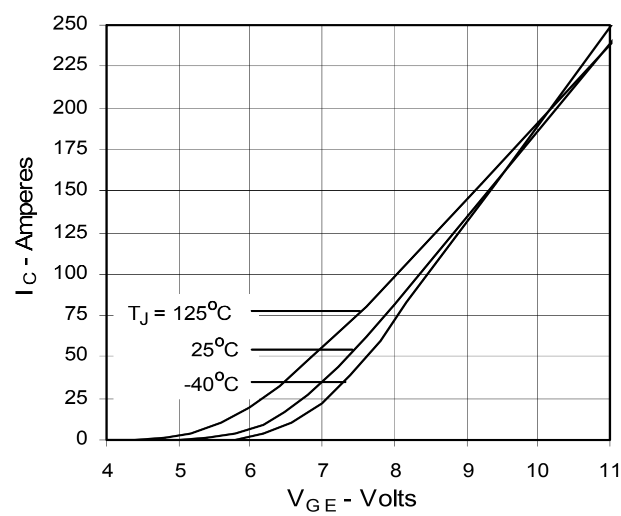


Fig. 7. Transconductance

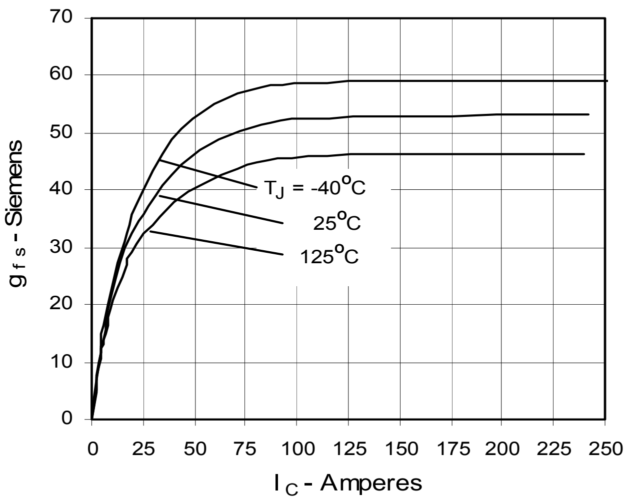


Fig. 8. Resistive Turn-On Rise Time vs. Junction Temperature

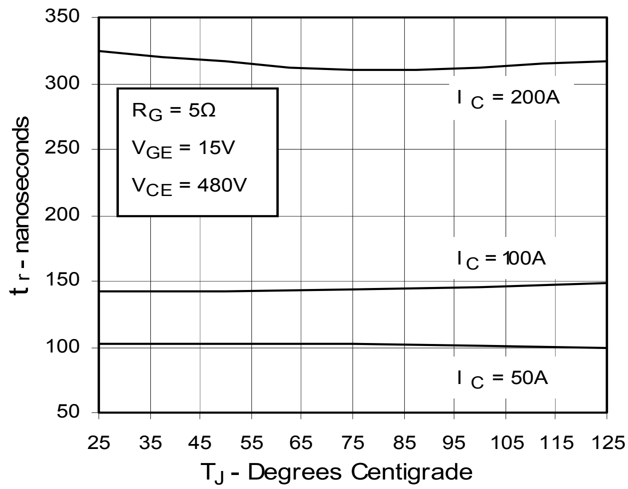


Fig. 9. Resistive Turn-On Rise Time vs. Collector Current

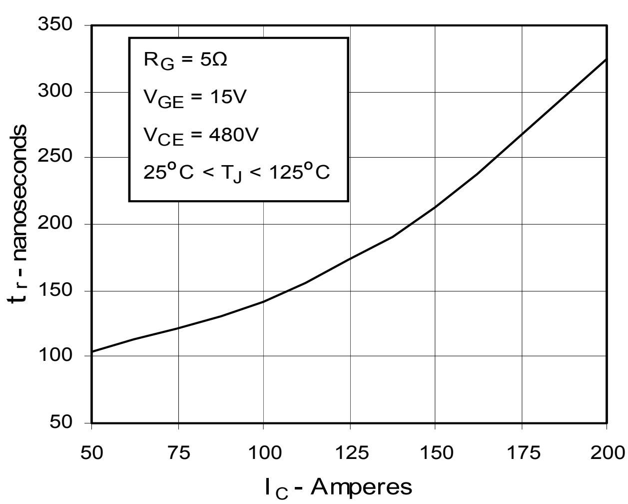


Fig. 10. Resistive Turn-On Rise Time vs. Gate Resistance

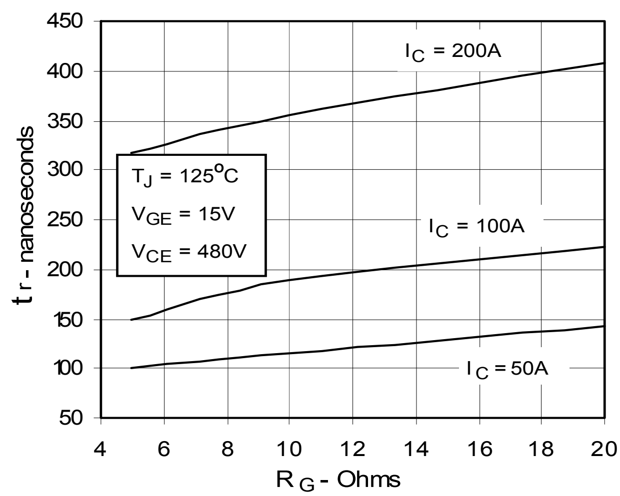


Fig. 11. Resistive Turn-On Delay Time vs. Gate Resistance

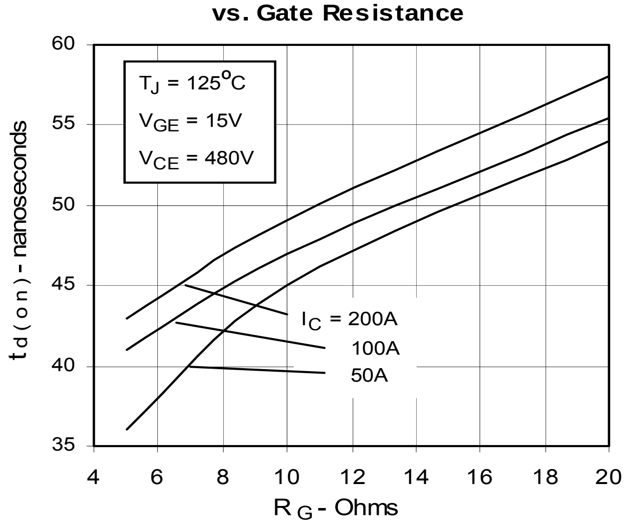


Fig. 12. Resistive Turn-Off Switching Time vs. Junction Temperature

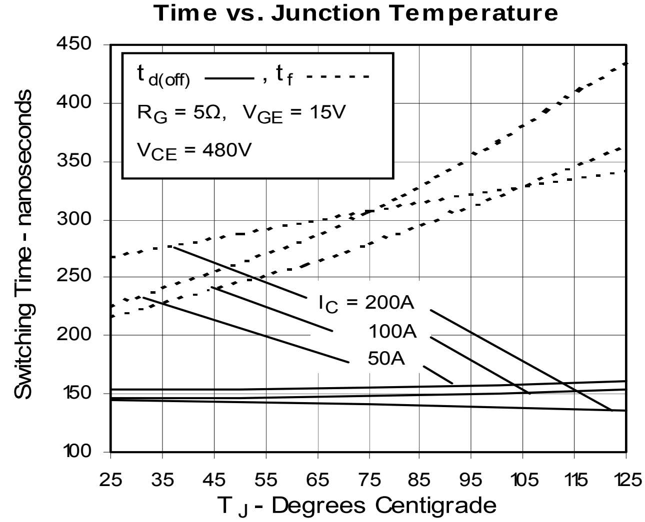


Fig. 13. Resistive Turn-Off Switching Time vs. Collector Current

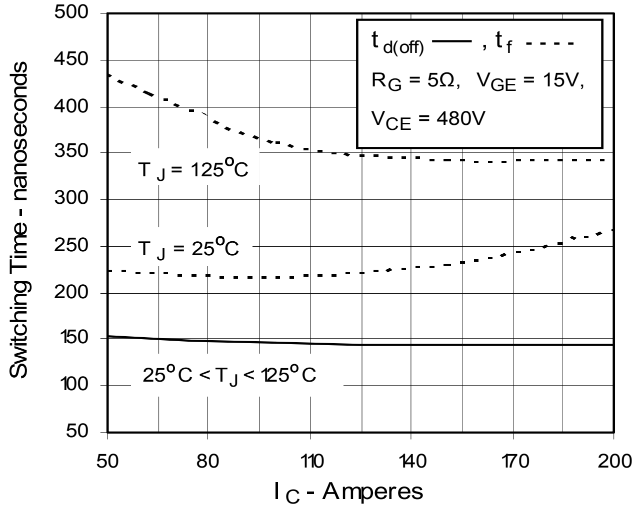


Fig. 14. Resistive Turn-off Switching Time vs. Gate Resistance

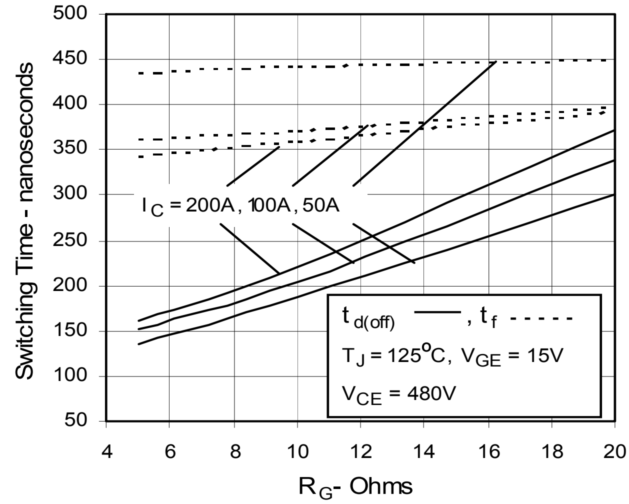


Fig. 15. Reverse-Bias Safe Operating Area

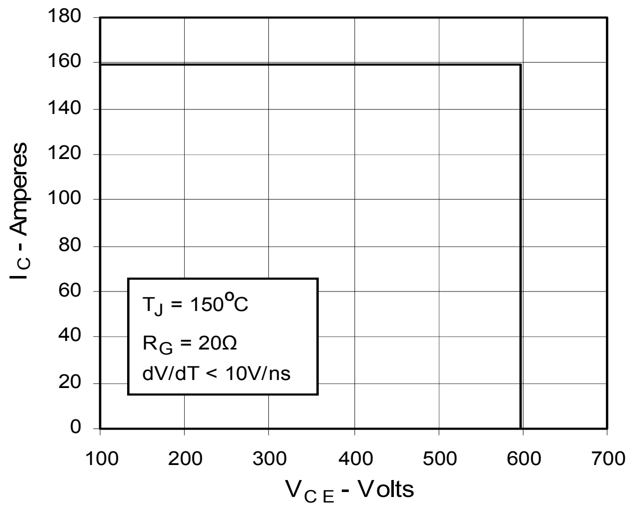


Fig. 16. Gate Charge

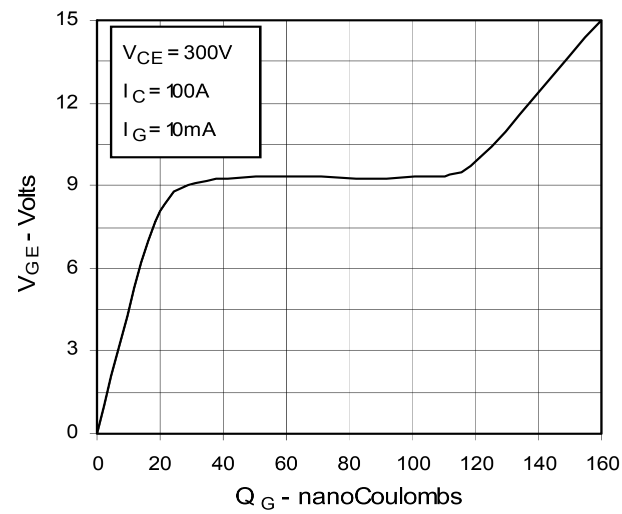


Fig. 17. Capacitance

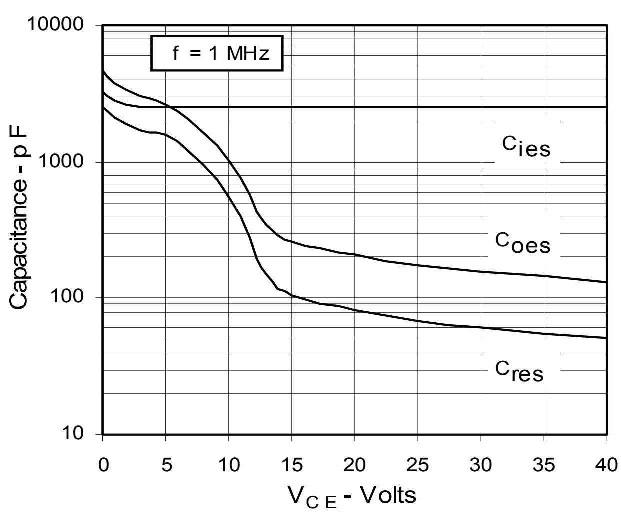


Fig. 18. Maximum Transient Thermal Resistance

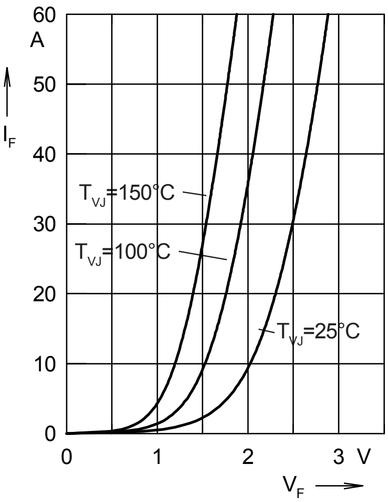


Fig. 19. Forward current I_F versus V_F

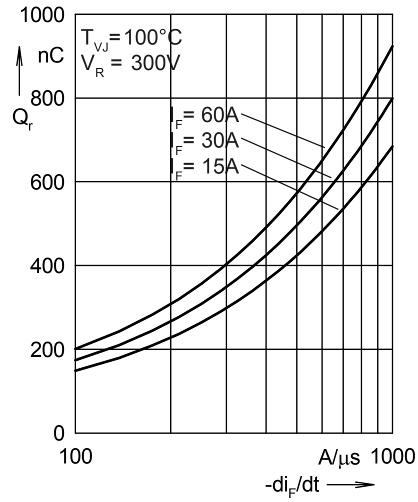


Fig. 20. Reverse recovery charge Q_r versus $-di_F/dt$

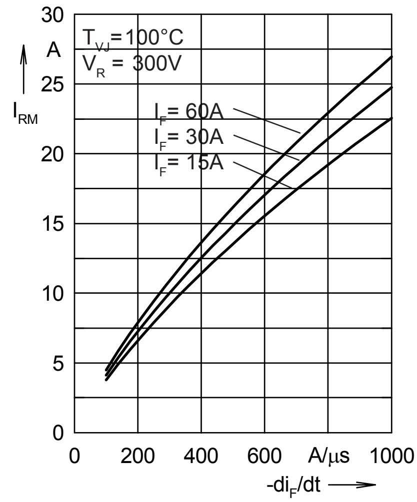


Fig. 21. Peak reverse current I_{RM} versus $-di_F/dt$

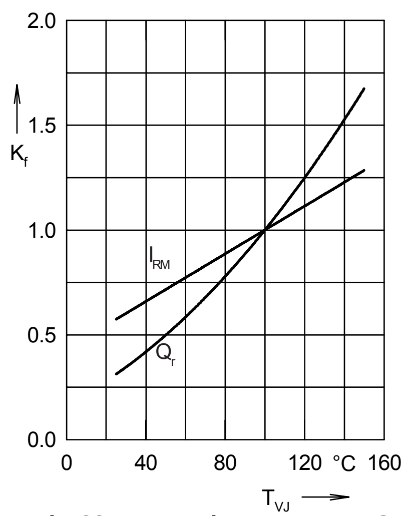


Fig. 22. Dynamic parameters Q_r, I_{RM} versus T_{VJ}

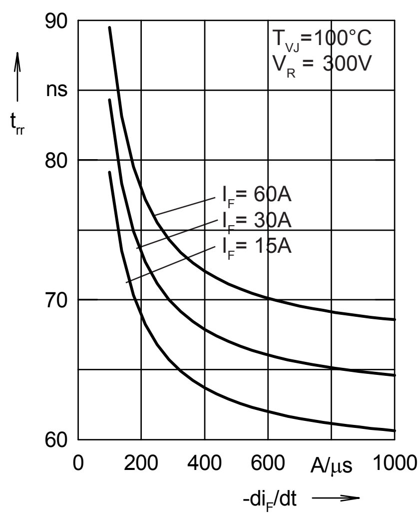


Fig. 23. Recovery time t_{rr} versus $-di_F/dt$

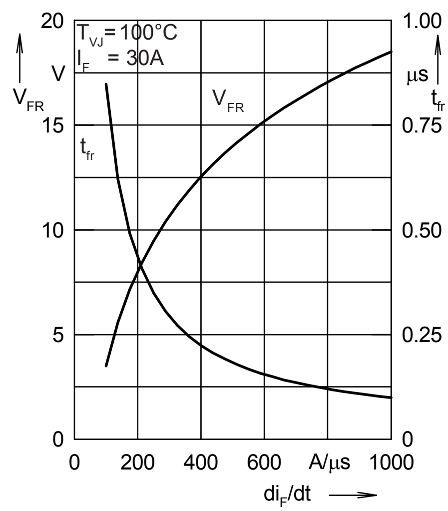


Fig. 24. Peak forward voltage V_{FR} and t_{fr} versus di_F/dt

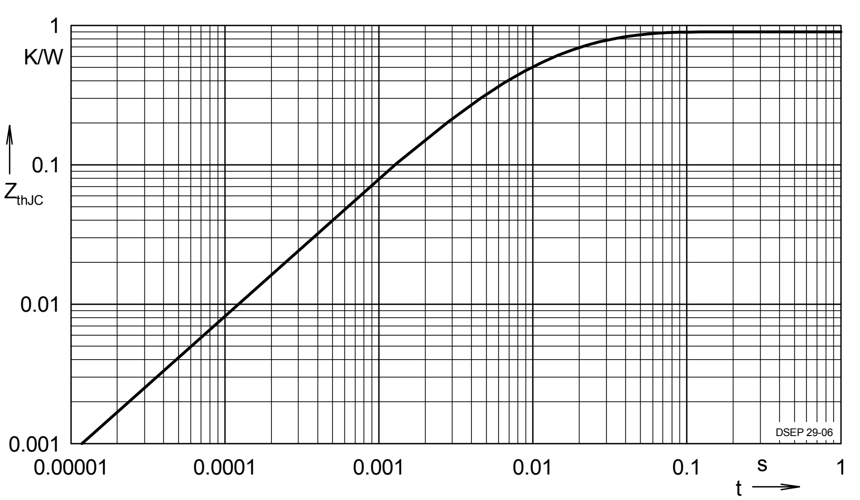


Fig. 25. Transient thermal resistance junction to case

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.502	0.0052
2	0.193	0.0003
3	0.205	0.0162