IXYS

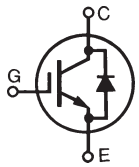
Preliminary Technical Information

GenX3™ 600V IGBT with Diode

IXGH36N60A3D4

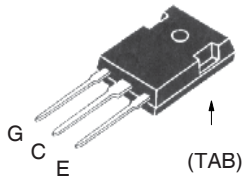
V_{CES} = 600V
I_{C110} = 36A
$V_{CE(sat)}$ ≤ 1.4V

Ultra Low Vsat PT IGBT for
up to 5kHz switching



Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_C = 25°C to 150°C	600	V
V_{CGR}	T_J = 25°C to 150°C, R_{GE} = 1MΩ	600	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C110}	T_C = 110°C	36	A
I_{F110}	T_C = 110°C	10	A
I_{CM}	T_C = 25°C, 1ms	200	A
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 125°C, R_G = 5Ω Clamped inductive load @ ≤ 600V	I_{CM} = 60	A
P_C	T_C = 25°C	220	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
T_L	1.6mm (0.062 in.) from case for 10s	300	°C
T_{SOLD}	Plastic body for 10 seconds	260	°C
M_d	Mounting torque	1.13/10	Nm/lb.in.
Weight		6.0	g

TO-247 (IXGH)



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

Features

- Optimized for low conduction losses
- Square RBSOA
- Anti-parallel ultra fast diode
- International standard package

Advantages

- High power density
- Low gate drive requirement

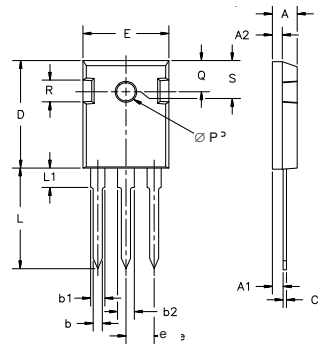
Applications

- Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Battery Chargers
- Welding Machines
- Lamp Ballasts
- Inrush Current Protection Circuits

Symbol	Test Conditions (T_J = 25°C unless otherwise specified)	Characteristic Values Min.	Typ.	Max.	
$V_{GE(th)}$	I_C = 250μA, V_{CE} = V_{GE}	3.0		5.0	V
I_{CES}	V_{CE} = 0.8 • V_{CES}			75	μA
	V_{GE} = 0V T_J = 125°C			500	μA
I_{GES}	V_{CE} = 0V, V_{GE} = ± 20V			±100	nA
$V_{CE(sat)}$	I_C = 30A, V_{GE} = 15V, Note 1			1.4	V

Symbol	Test Conditions (T_J = 25°C unless otherwise specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	I_C = 30A, V_{CE} = 10V, Note 1	25	42		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		2380		pF
C_{oes}			115		pF
C_{res}			30		pF
Q_g	I_C = 30A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		80		nC
Q_{ge}			12		nC
Q_{gc}			36		nC
$t_{d(on)}$	**Inductive Load, T_J = 25°C** I_C = 30A, V_{GE} = 15V V_{CE} = 400V, R_G = 5Ω		18		ns
t_{ri}			23		ns
E_{on}			0.74		mJ
$t_{d(off)}$			330		ns
t_{fi}			325		ns
E_{off}			3.00		mJ
$t_{d(on)}$	**Inductive Load, T_J = 25°C** I_C = 30A, V_{GE} = 15V V_{CE} = 400V, R_G = 5Ω		18		ns
t_{ri}			25		ns
E_{on}			1.50		mJ
$t_{d(off)}$			500		ns
t_{fi}			500		ns
E_{off}			5.30		mJ
R_{thJC}				0.56	°C/W
R_{thCS}			0.21		°C/W

TO-247 (IXGH) 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
∅P	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

Reverse Diode (FRED)

Symbol	Test Conditions (T_J = 25°C, unless otherwise specified)		Characteristic Values Min.	Typ.	Max.	
V_F	I_F = 10A, V_{GE} = 0V, Note 1				3.0	V
		T_J = 150°C		1.7		V
I_{RM}	I_F = 10A, $-di_F/dt$ = 200A/μs V_R = 300V	T_J = 100°C		60		ns
t_{rr}		T_J = 25°C			3	A
		T_J = 100°C			4	A
R_{thJC}					2.5	°C/W

Note 1: Pulse test, t ≤ 300μs; duty cycle, d ≤ 2%.

PRELIMINARY TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from data gathered during objective characterizations of preliminary engineering lots; but also may yet contain some information supplied during a pre-production design evaluation. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

Fig. 1. Output Characteristics @ 25ºC

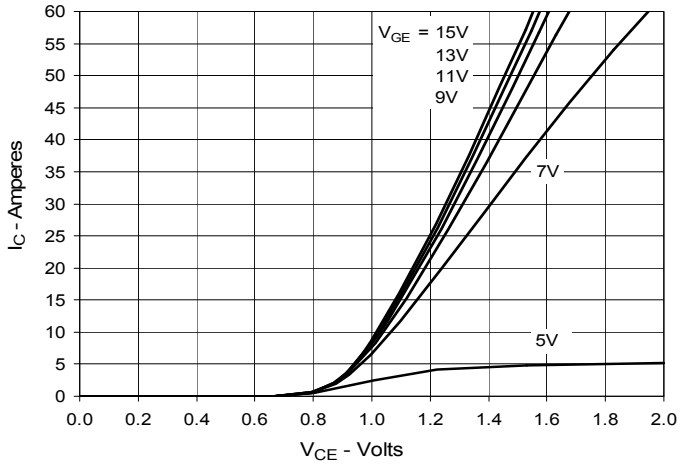


Fig. 2. Extended Output Characteristics @ 25ºC

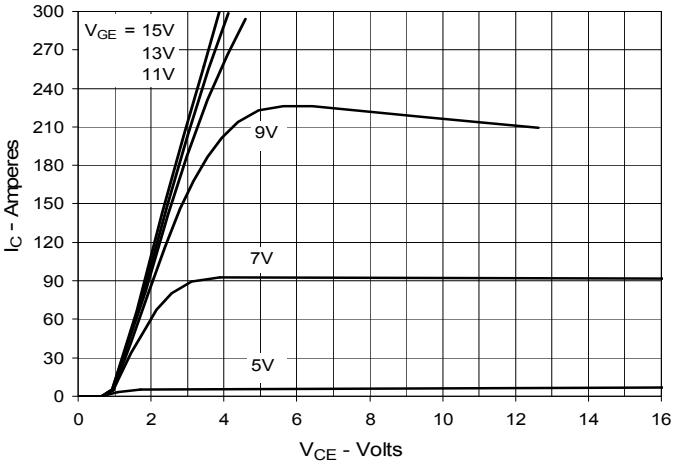


Fig. 3. Output Characteristics @ 125ºC

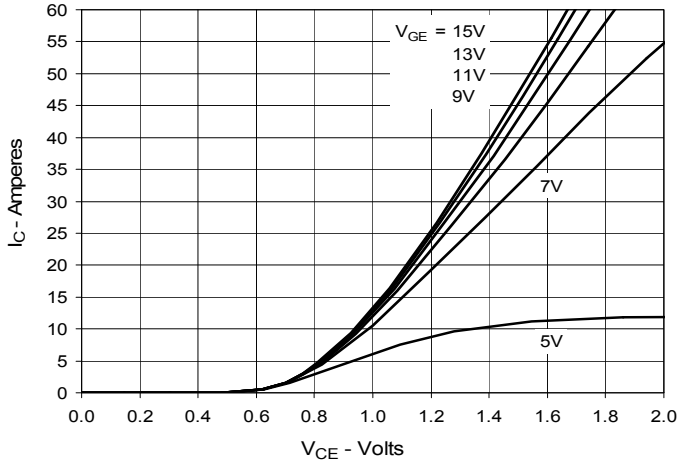


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

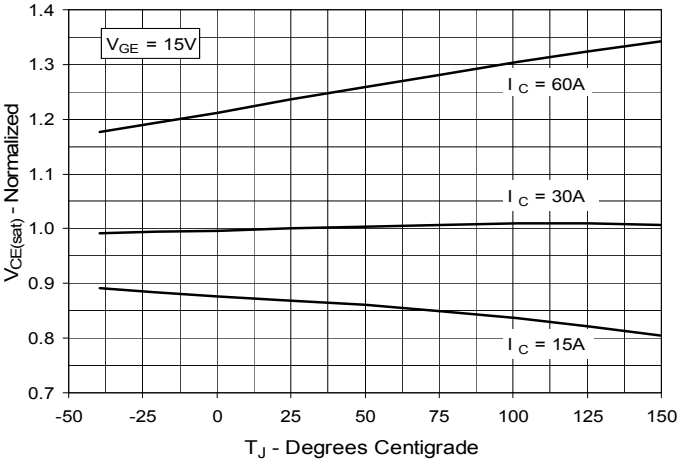


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

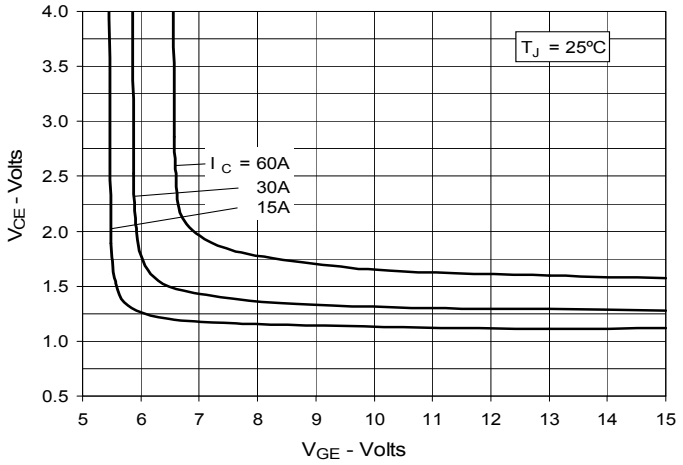


Fig. 6. Input Admittance

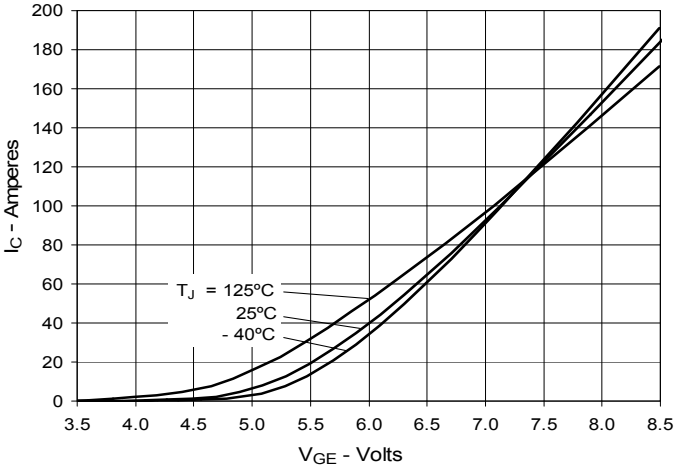


Fig. 7. Transconductance

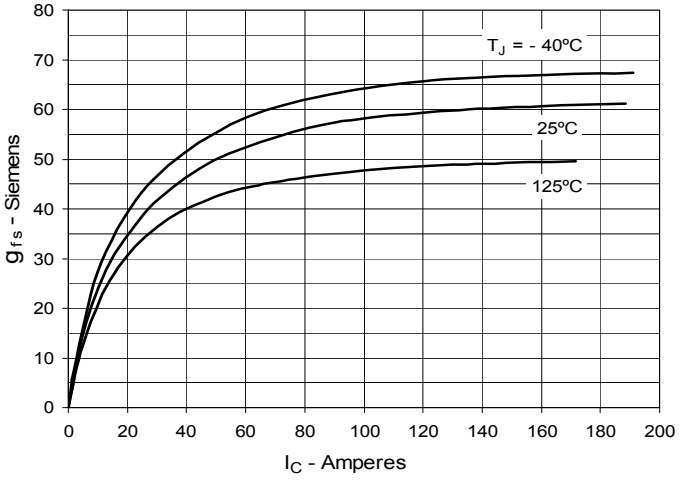


Fig. 17. Gate Charge

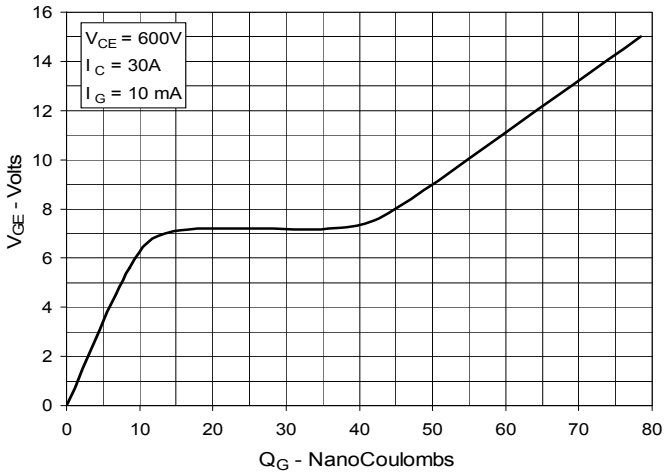


Fig. 19. Reverse-Bias Safe Operating Area

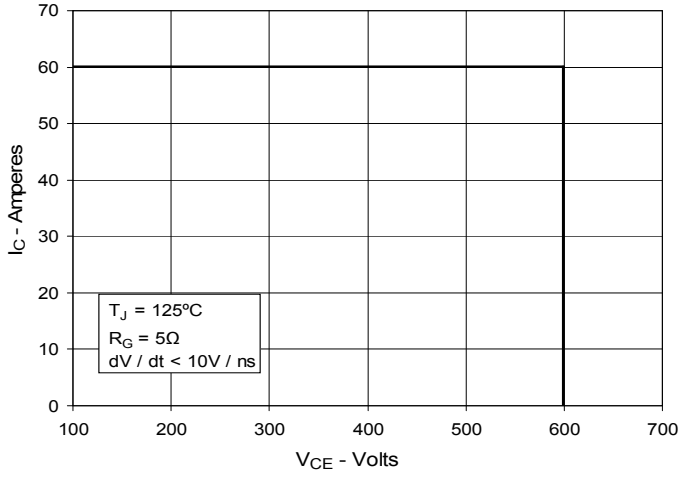


Fig. 18. Capacitance

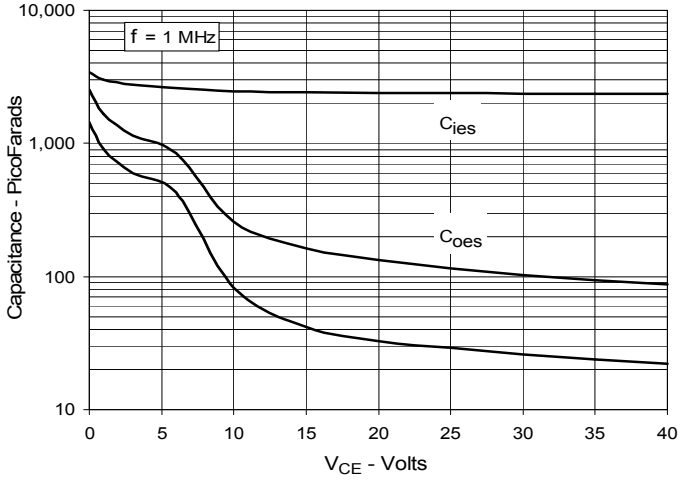


Fig. 11. Maximum Transient Thermal Impedance

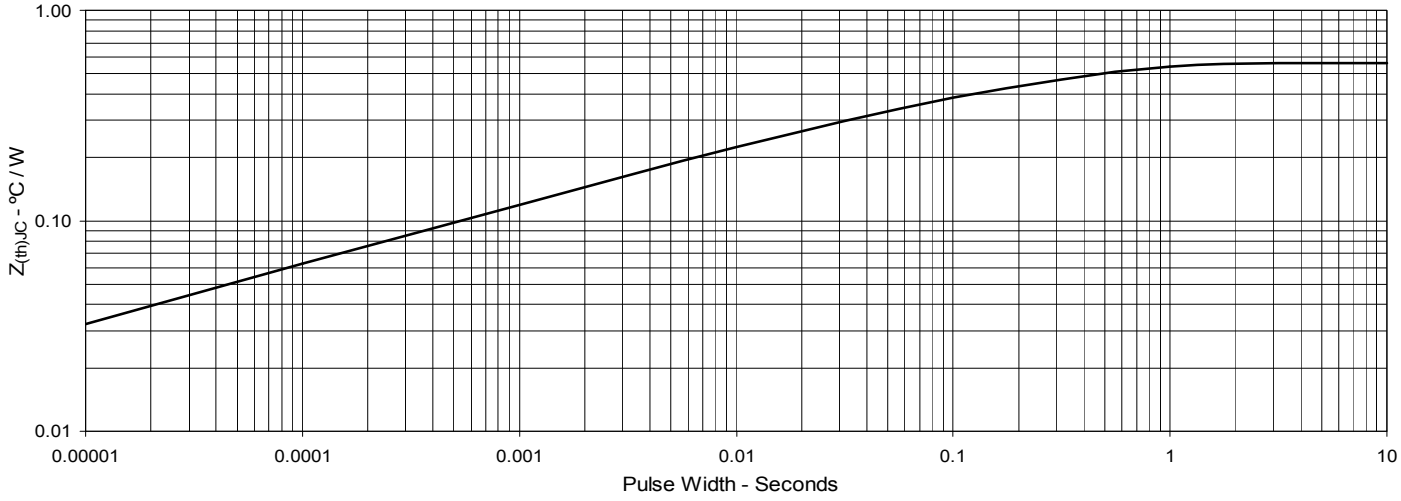


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

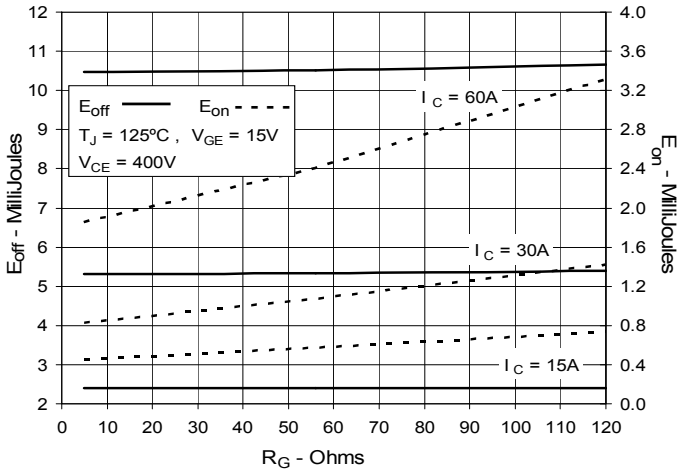


Fig. 13. Inductive Switching Energy Loss vs. Junction Temperature

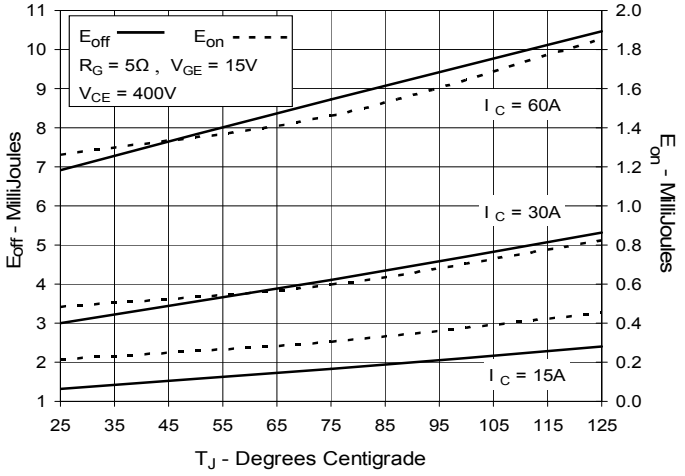


Fig. 14. Inductive Switching Energy Loss vs. Collector Current

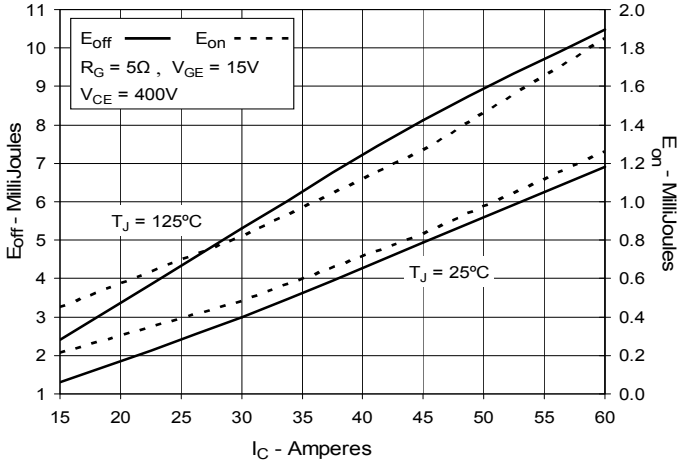


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

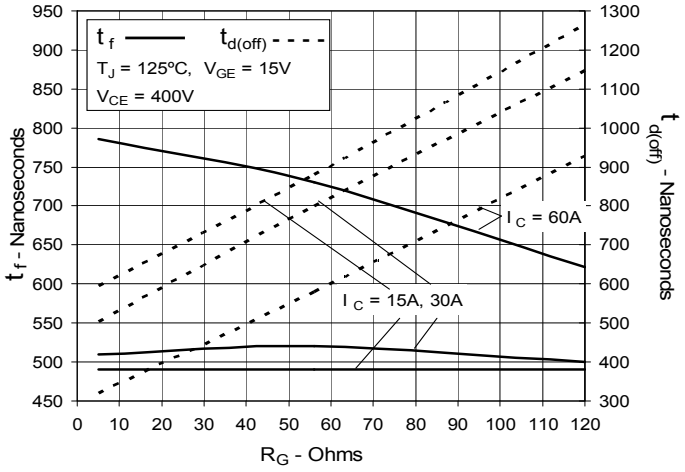


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

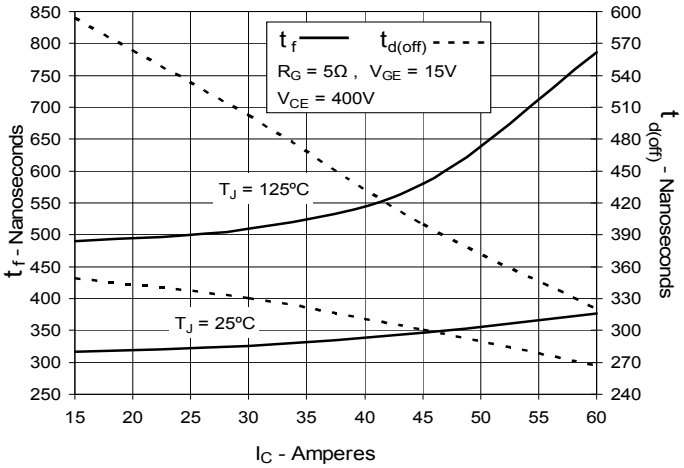


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

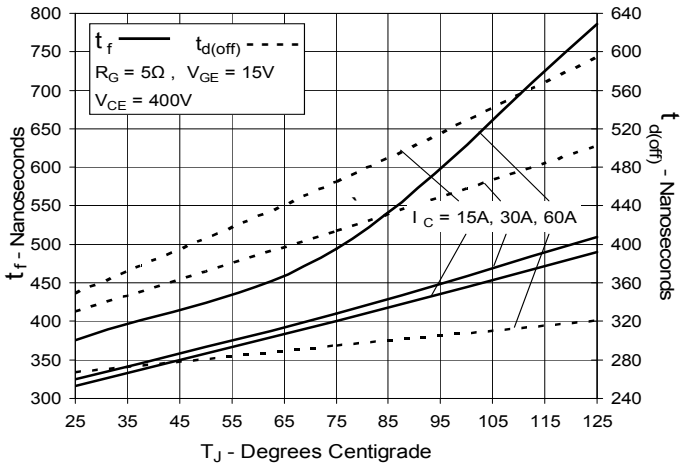


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

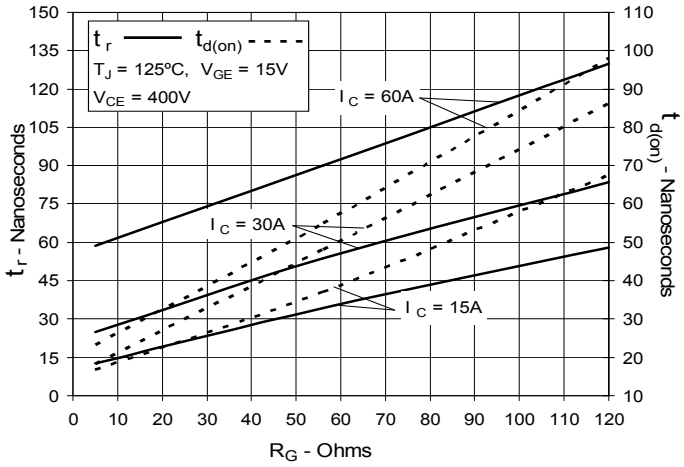


Fig. 19. Inductive Turn-on Switching Times vs. Junction Temperature

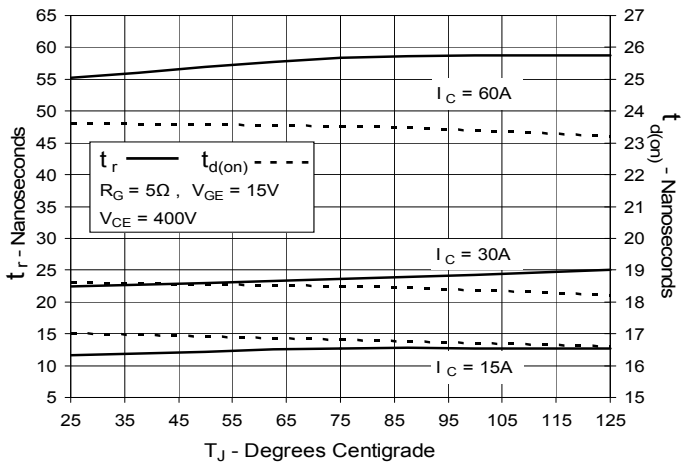
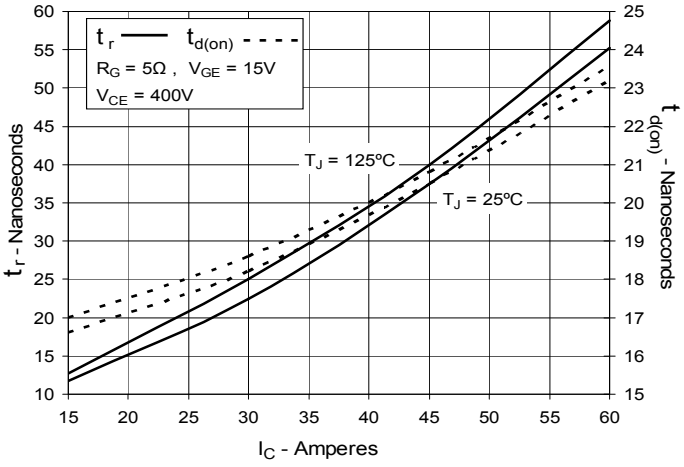


Fig. 20. Inductive Turn-on Switching Times vs. Collector Current



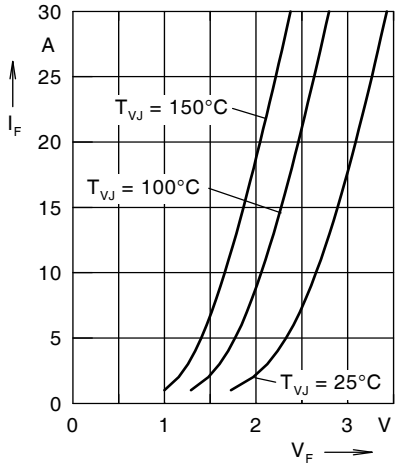


Fig. 21. Forward current I_F versus V_F

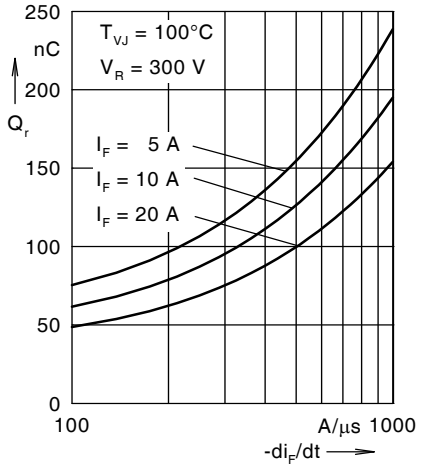


Fig. 22. Reverse recovery charge Q_r

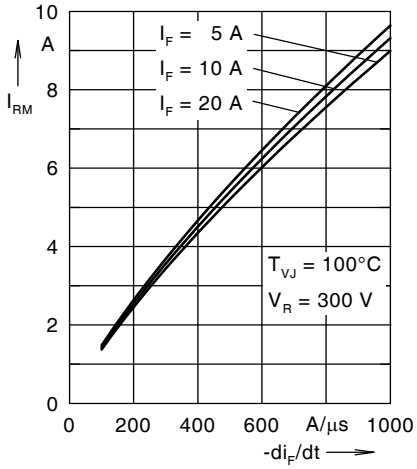


Fig. 23. Peak reverse current I_{RM}

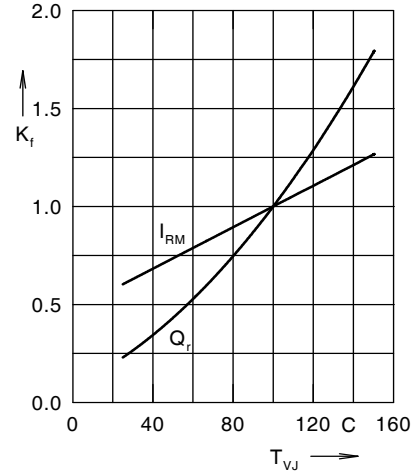


Fig. 24. Dynamic parameters Q_r, I_{RM}

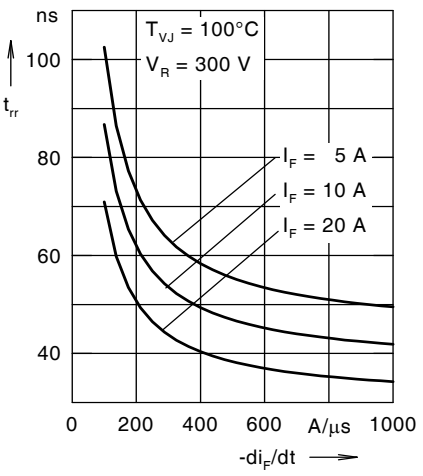


Fig. 25. Recovery time t_{rr} versus $-di_F/dt$

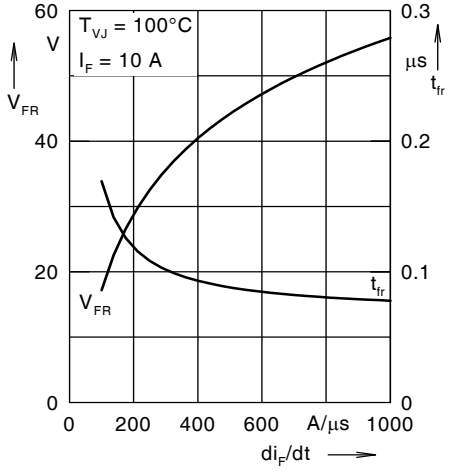


Fig. 26. Peak forward voltage V_{FR} and

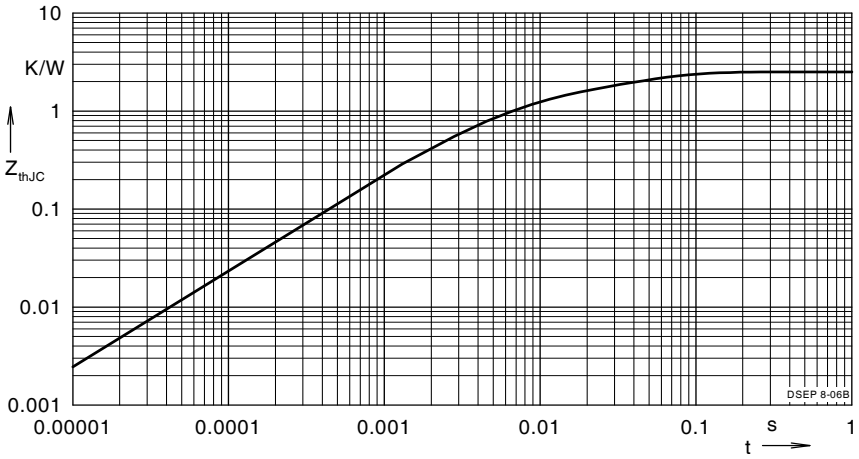


Fig. 27. Transient thermal resistance junction-to-case

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	1.449	0.0052
2	0.5578	0.0003

NOTE: Fig. 2 to Fig. 6 shows typical values