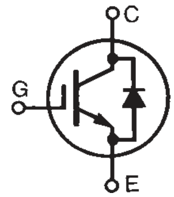
IXYS

GenX3™ 600V IGBT w/ Diode

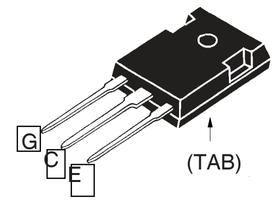
IXGH36N60B3D1

V_{CES} = 600V
I_{C110} = 36A
$V_{CE(sat)}$ ≤ 1.8V

Medium-Speed Low-Vsat PT IGBT
for 5 - 40kHz Switching



TO-247



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

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} = 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	30	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	I_{CM} = 80 $V_{CE} \le V_{CES}$	A
P_C	T_C = 25°C	250	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 10s	260	°C
M_d	Mounting Torque	1.13/10	Nm/lb.in.
Weight		6	g

Features

- Optimized for Low Conduction and Switching 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

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
BV_{CES}	I_C = 250μA, V_{GE}= 0V	600			V
$V_{GE(th)}$	I_C = 250μA, V_{CE} = V_{GE}	3.0		5.0	V
I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0V			300	μA
	T_J =125°C			1.75	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ± 20V			±100	nA
$V_{CE(sat)}$	I_C = 30A, V_{GE} = 15V, Note 1		1.5	1.8	V

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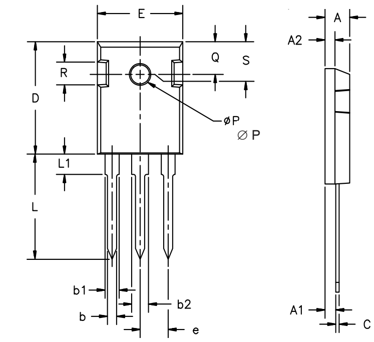
Symbol	Test Conditions ($T_J = 25°C$, Unless Otherwise Specified)	Min.	Typ.	Max.	
g_{fs}	I_C = 30A, V_{CE} = 10V, Note 1	28	42		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		2280		pF
C_{oes}			120		pF
C_{res}			32		pF
Q_g	I_C = 30A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		80		nC
Q_{ge}			12		nC
Q_{gc}			36		nC
$t_{d(on)}$	**Inductive Load, T_J = 25°C** I_C = 30A, V_{GE} = 15V V_{CE} = 400V, R_G = 5Ω		19		ns
t_{ri}			24		ns
E_{on}			0.54		mJ
$t_{d(off)}$			125	200	ns
t_{fi}			100	160	ns
E_{off}			0.8	1.5	mJ
$t_{d(on)}$	**Inductive Load, T_J = 125°C** I_C = 30A, V_{GE} = 15V V_{CE} = 400V, R_G = 5Ω		19		ns
t_{ri}			26		ns
E_{on}			0.9		mJ
$t_{d(off)}$			180		ns
t_{fi}			170		ns
E_{off}			1.5		mJ
R_{thJC}				0.50	°C/W
R_{thCS}			0.21		°C/W

TO-247 Outline (IXGH)



Dim.	Millimeter Min.	Millimeter Max.	Inches Min.	Inches 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)	Min.	Typ.	Max.	
V_F	I_F = 30A, V_{GE} = 0V, Note 1			2.8	V
	T_J = 150°C			1.7	V
I_{RM}	I_F = 30A, V_{GE} = 0V, -di_F/dt = 100A/μs, T_J= 100°C V_R = 100V		6		A
t_{rr}	I_F = 1A, -di_F/dt =100A/μs, V_R = 30V		25		ns
	T_J= 100°C		100		ns
R_{thJC}				0.9	°C/W

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

Fig. 1. Output Characteristics @ 25ºC

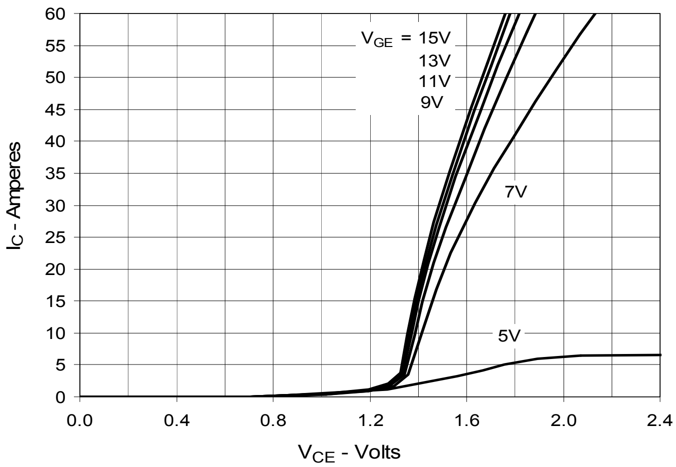


Fig. 2. Extended Output Characteristics @ 25ºC

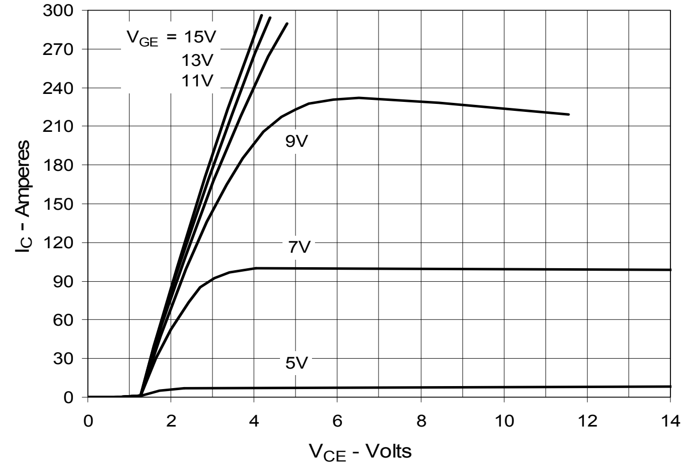


Fig. 3. Output Characteristics @ 125ºC

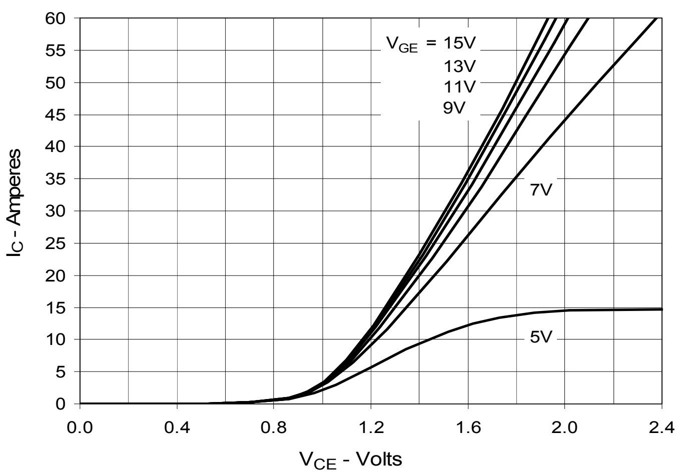


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

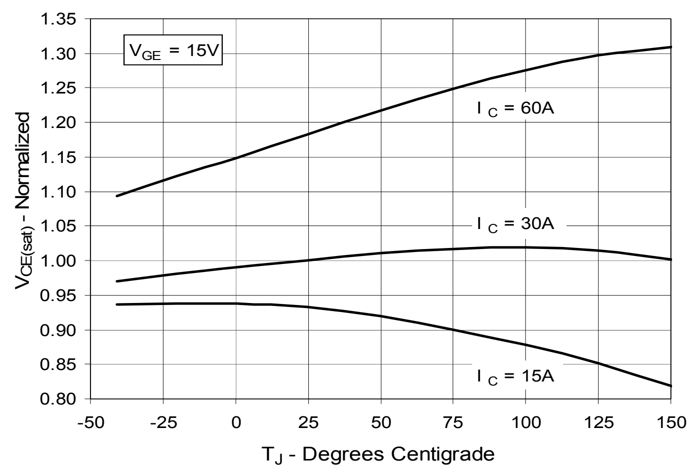


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

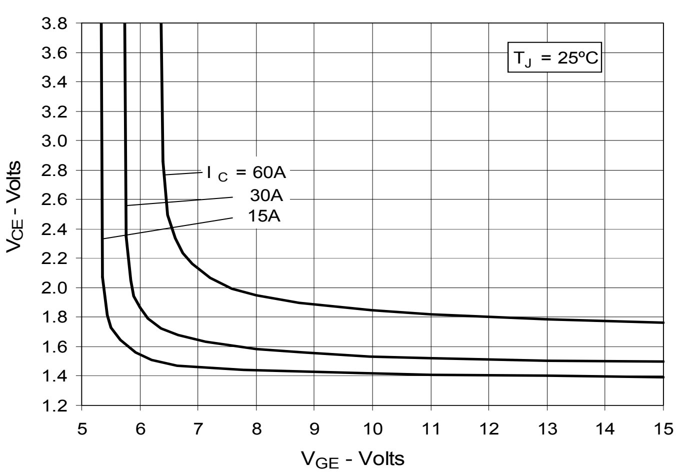


Fig. 6. Input Admittance

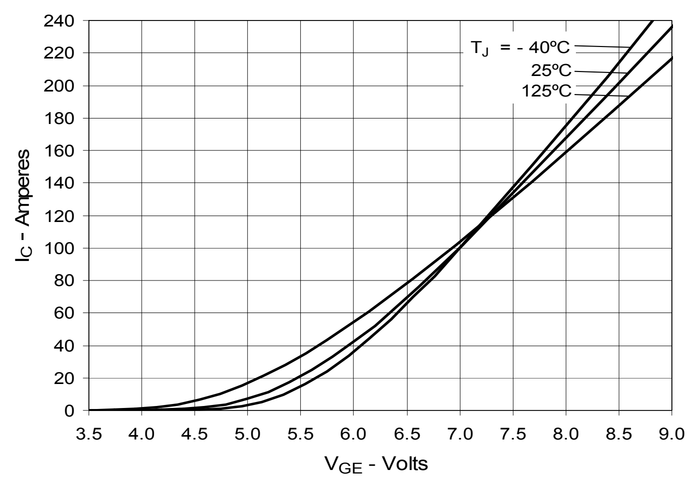


Fig. 7. Transconductance

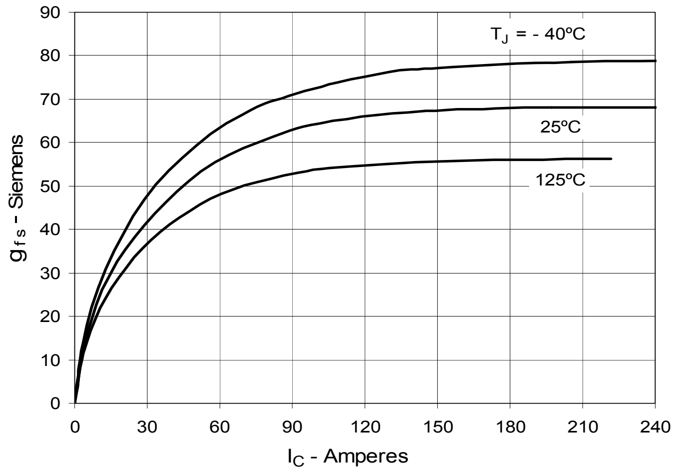


Fig. 8. Gate Charge

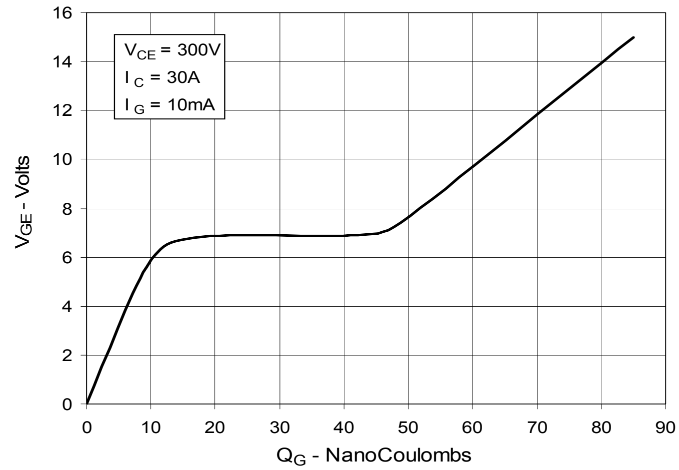


Fig. 9. Capacitance

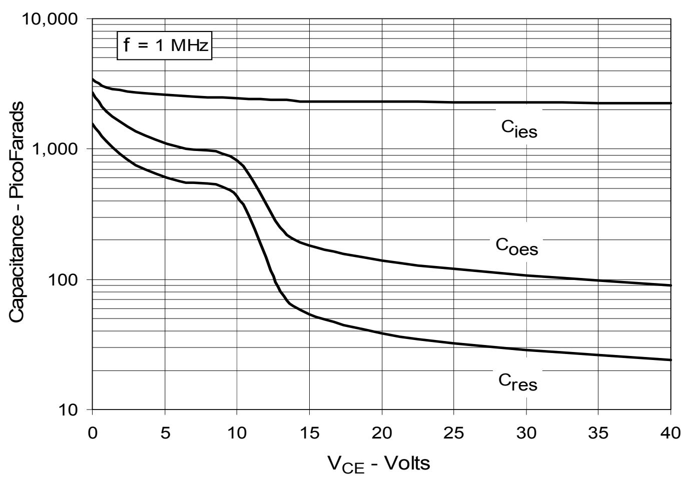


Fig. 10. Reverse-Bias Safe Operating Area

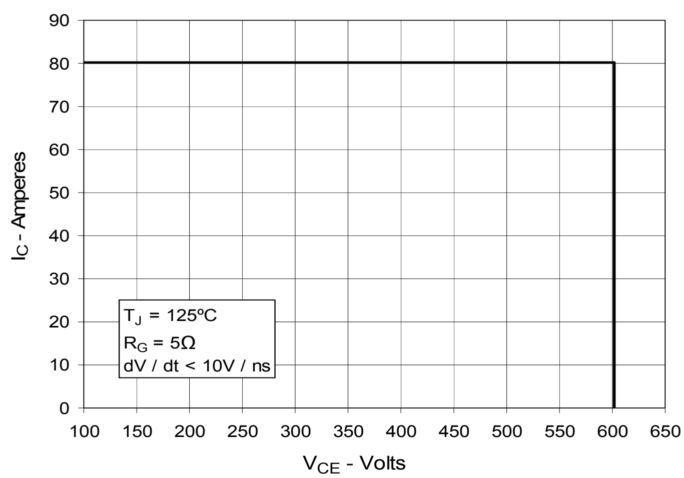
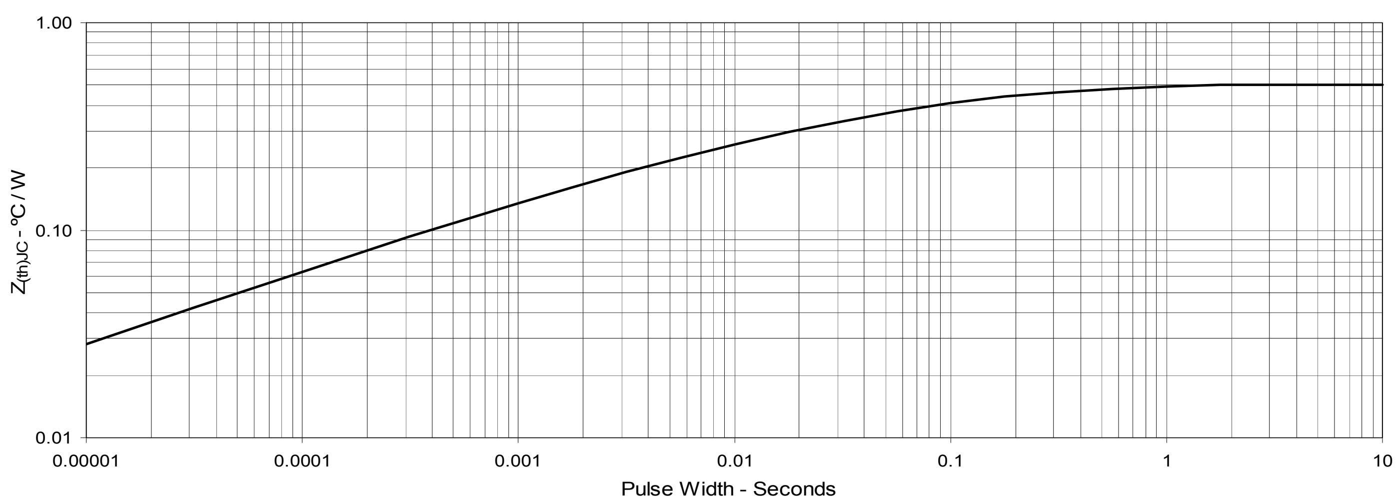


Fig. 11. Maximum Transient Thermal Impedance



IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

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

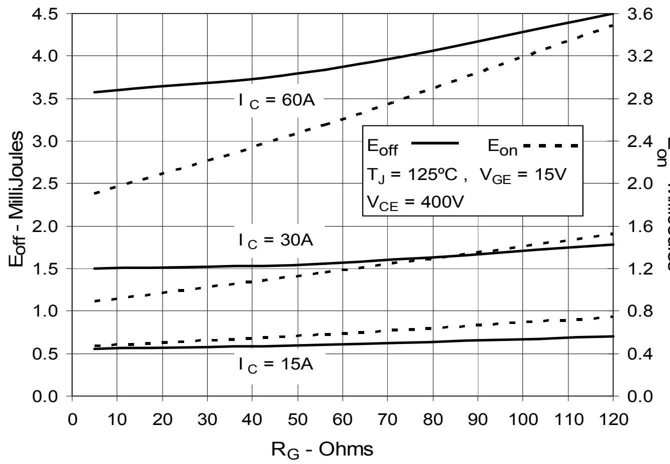


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

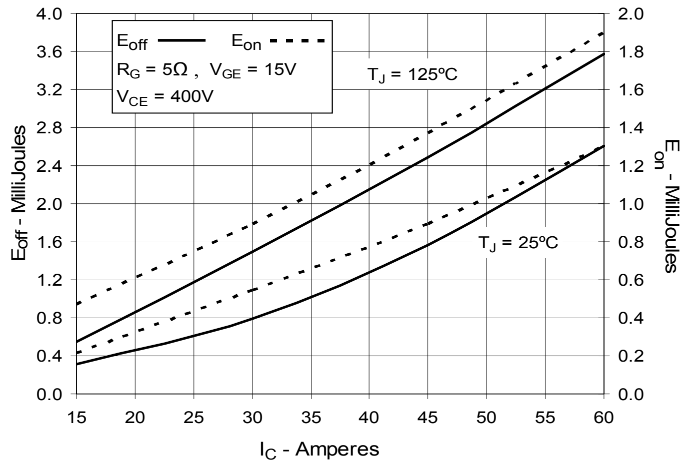


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

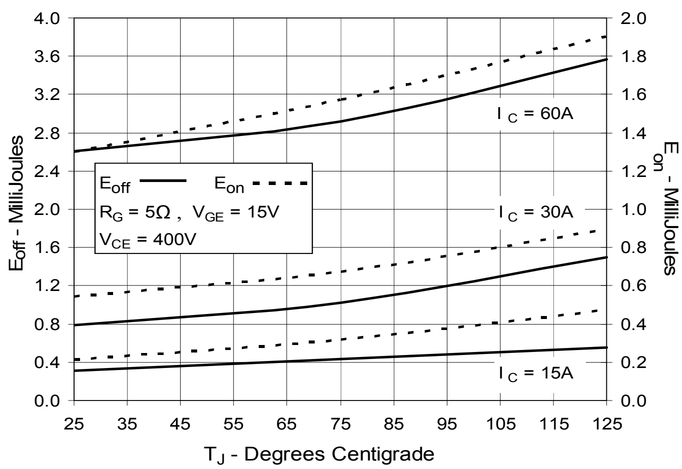


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

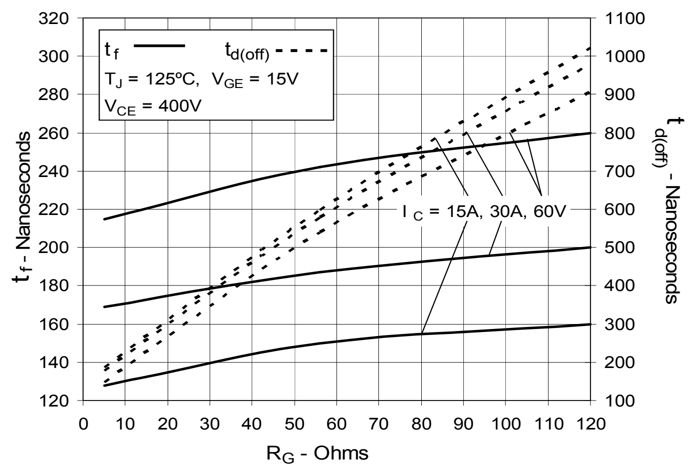


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

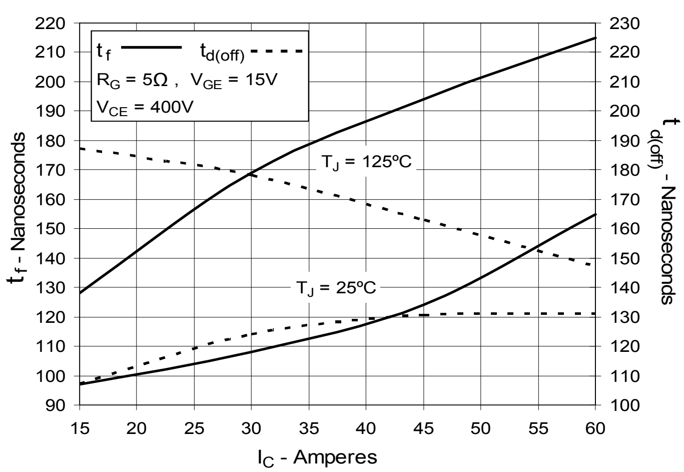


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

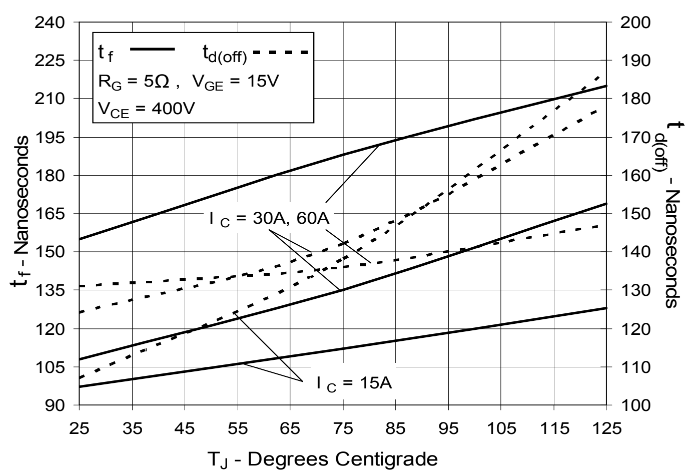


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

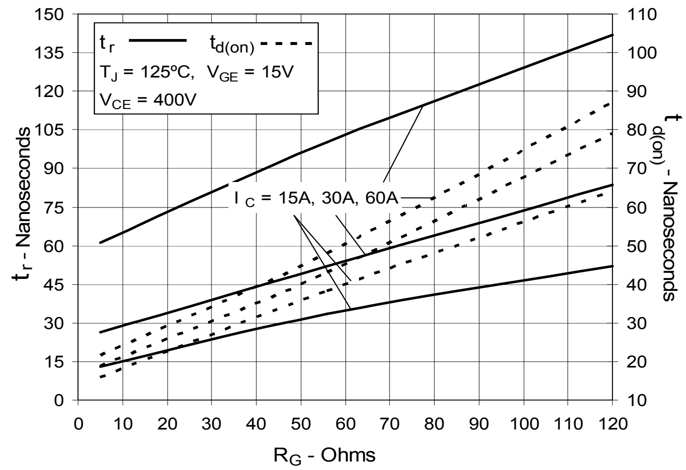


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

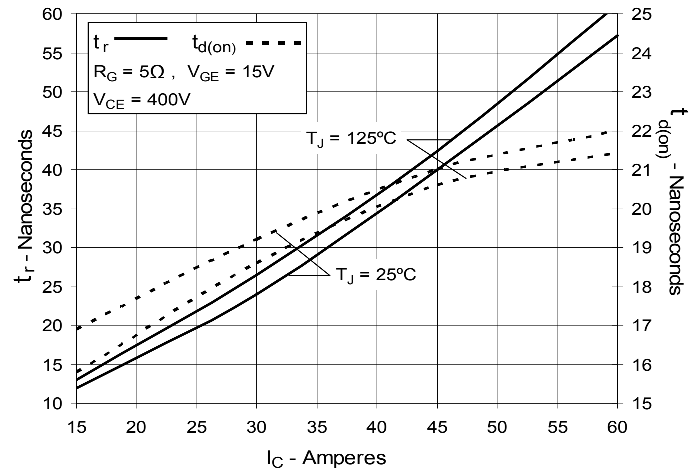
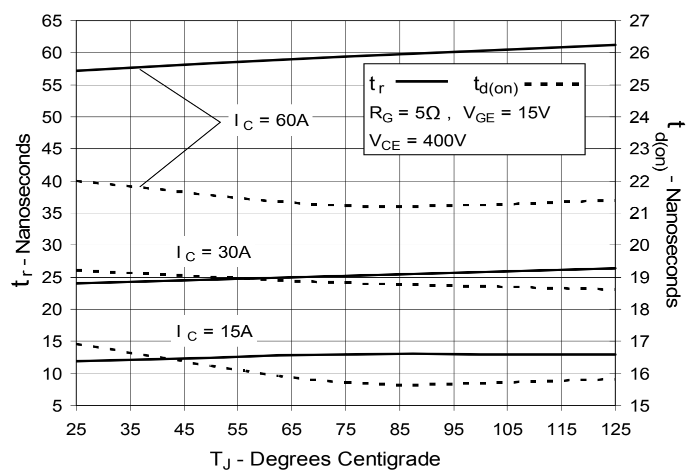


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature



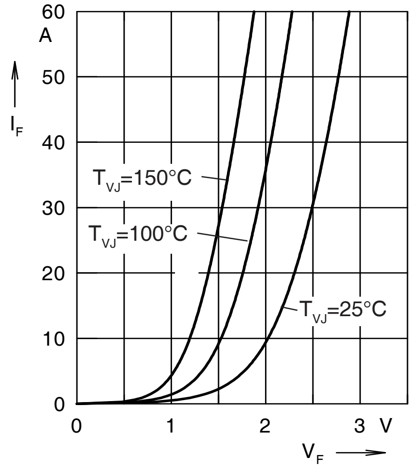


Fig. 21. Forward current I_F versus V_F

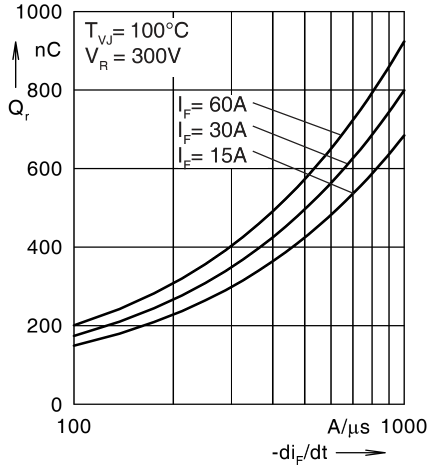


Fig. 22. Reverse recovery charge Q_r versus $-di_F/dt$

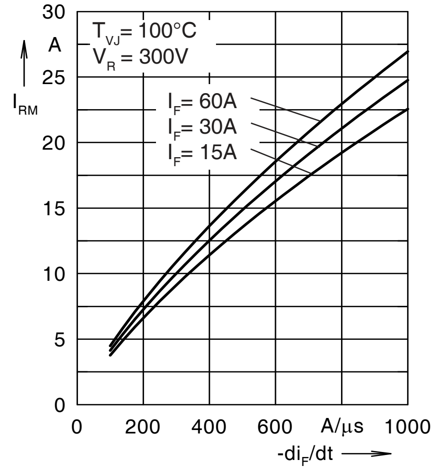


Fig. 23. Peak reverse current I_{RM} versus $-di_F/dt$

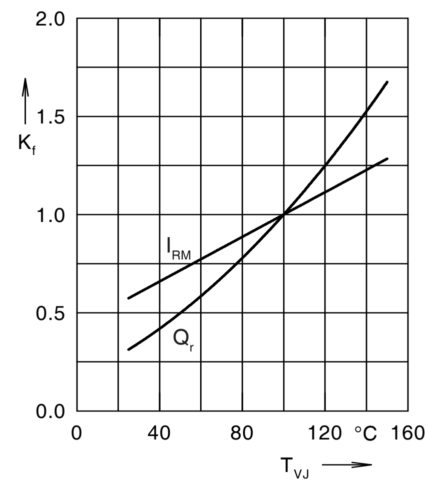


Fig. 24. Dynamic parameters Q_r, I_{RM} versus T_{VJ}

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

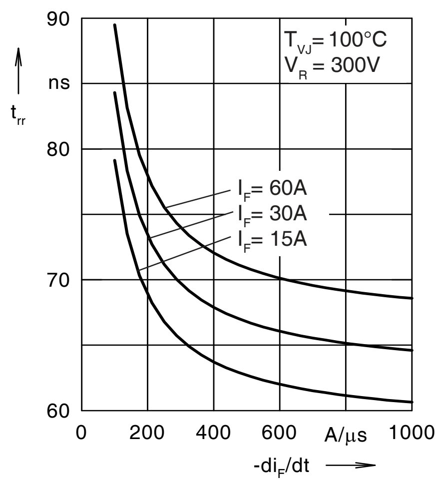


Fig. 25. Recovery time t_{rr} versus $-di_F/dt$

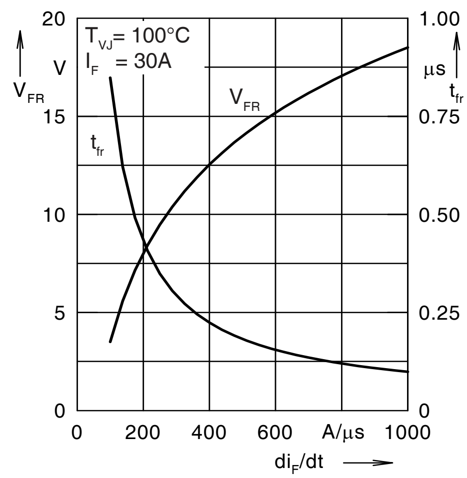


Fig. 26. Peak forward voltage V_{FR} and t_{fr} versus di_F/dt

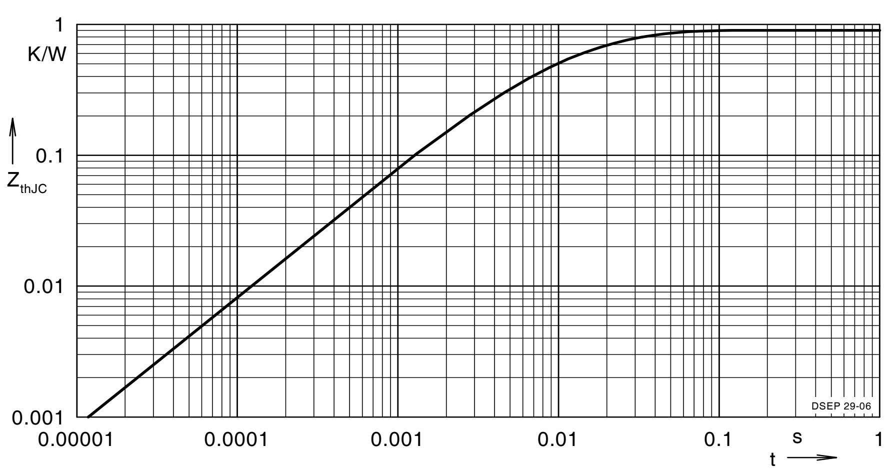


Fig. 27. Transient thermal resistance junction to case

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