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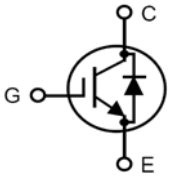
IXYS

XPT™ 600V IGBT GenX3™ w/ Diode

IXXH30N60B3D1

V_{CES} = 600V
I_{C110} = 30A
$V_{CE(sat)}$ ≤ 1.85V
$t_{fi(typ)}$ = 125ns

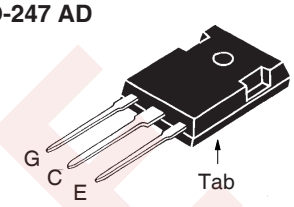
Extreme Light Punch Through
IGBT for 5-30 kHz Switching



Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 175°C	600	V
V_{CGR}	T_J = 25°C to 175°C, R_{GE} = 1MΩ	600	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	60	A
I_{C110}	T_C = 110°C	30	A
I_{F110}	T_C = 110°C	30	A
I_{CM}	T_C = 25°C, 1ms	115	A
I_A	T_C = 25°C	20	A
E_{AS}	T_C = 25°C	250	mJ
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 10Ω Clamped Inductive Load	I_{CM} = 48 @$V_{CE} \leq V_{CES}$	A
t_{sc} (SCSOA)	V_{GE}= 15V, V_{CE} = 360V, T_J = 150°C R_G = 82Ω, Non Repetitive	10	µs
P_C	T_C = 25°C	270	W
T_J		-55 ... +175	°C
T_{JM}		175	°C
T_{stg}		-55 ... +175	°C
T_L	Maximum Lead Temperature for Soldering	300	°C
T_{SOLD}	1.6 mm (0.062in.) from Case for 10s	260	°C
M_d	Mounting Torque	1.13/10	Nm/lb.in
Weight		6	g

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}	3.5		6.0	V
I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0V			100	µA
	T_J = 150°C			1	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±100	nA
$V_{CE(sat)}$	I_C = 24A, V_{GE} = 15V, Note 1		1.66	1.85	V
	T_J = 150°C		1.97		V

TO-247 AD



G = Gate C = Collector
E = Emitter Tab = Collector

Features

- Optimized for 5-30kHz Switching
- Square RBSOA
- Anti-Parallel Ultra Fast Diode
- Avalanche Capability
- Short Circuit Capability
- International Standard Package

Advantages

- High Power Density
- 175°C Rated
- Extremely Rugged
- Low Gate Drive Requirement

Applications

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

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IXYS IXXH30N60B3D1

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	I_C = 24A, V_{CE} = 10V, Note 1	8	14		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		1185		pF
C_{oes}			137		pF
C_{res}			25		pF
$Q_{g(on)}$	I_C = 24A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		39		nC
Q_{ge}			9		nC
Q_{gc}			17		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		23		ns
t_{ri}	I_C = 24A, V_{GE} = 15V		36		ns
E_{on}	V_{CE} = 400V, R_G = 10Ω		0.55		mJ
$t_{d(off)}$	Note 2		97	150	ns
t_{fi}			125		ns
E_{off}			0.50	0.80	mJ
$t_{d(on)}$	**Inductive load, T_J = 150°C**		23		ns
t_{ri}	I_C = 24A, V_{GE} = 15V		34		ns
E_{on}	V_{CE} = 400V, R_G = 10Ω		1.10		mJ
$t_{d(off)}$	Note 2		112		ns
t_{fi}			180		ns
E_{off}			0.70		mJ
R_{thJC}				0.55	°C/W
R_{thCS}			0.21		°C/W

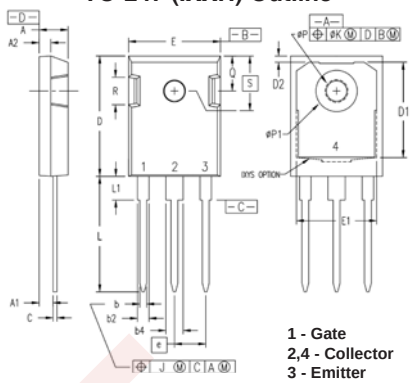
Reverse Diode (FRED)

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
V_F	I_F = 30A, V_{GE} = 0V, Note 1			2.7	V
	T_J = 150°C		1.6		V
I_{RM}	I_F = 30A, V_{GE} = 0V, -di_F/dt = 100A/µs, T_J = 100°C			4	A
t_{rr}	V_R = 100V, T_J = 100°C		100		ns
	I_F = 1A, V_{GE} = 0V, -di_F/dt = 100A/µs, V_R = 30V		25		ns
R_{thJC}				0.9	°C/W

Notes:

1. Pulse test, t ≤ 300µs, duty cycle, d ≤ 2%.
2. Switching times & energy losses may increase for higher V_{CE}(clamp), T_J or R_G.

TO-247 (IXXH) Outline



1 - Gate
2,4 - Collector
3 - Emitter

Dim.	Millimeter min	Millimeter max	Inches min	Inches max
A	4.70	5.30	0.185	0.209
A1	2.21	2.59	0.087	0.102
A2	1.50	2.49	0.059	0.098
b	0.99	1.40	0.039	0.055
b2	1.65	2.39	0.065	0.094
b4	2.59	3.43	0.102	0.135
c	0.38	0.89	0.015	0.035
D	20.79	21.45	0.819	0.845
D1	13.07	-	0.515	-
D2	0.51	1.35	0.020	0.053
E	15.48	16.24	0.610	0.640
E1	13.45	-	0.53	-
E2	4.31	5.48	0.170	0.216
e	5.45 BSC		0.215 BSC	
L	19.80	20.30	0.078	0.800
L1	-	4.49	-	0.177
Ø P	3.55	3.65	0.140	0.144
Ø P1	-	7.39	-	0.290
Q	5.38	6.19	0.212	0.244
S	6.14 BSC		0.242 BSC	

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IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents: 4,835,592 4,860,072 4,881,106 4,931,844 5,017,508 5,034,796 5,049,961 5,063,307 5,187,117 5,237,481 5,381,025 5,486,715 6,162,665 6,259,123 B1 6,306,728 B1 6,404,065 B1 6,534,343 6,583,505 6,683,344 6,710,405 B2 6,710,463 6,727,585 6,759,692 6,771,478 B2 7,005,734 B2 7,063,975 B2 7,071,537 7,157,338B2

Fig. 1. Output Characteristics @ T_J = 25ºC

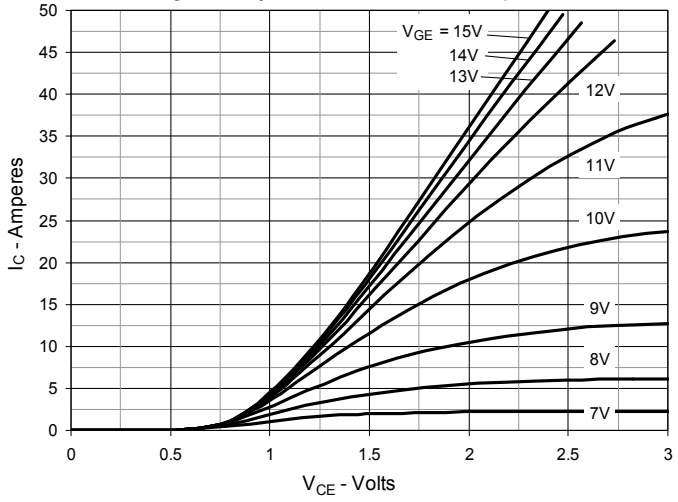


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

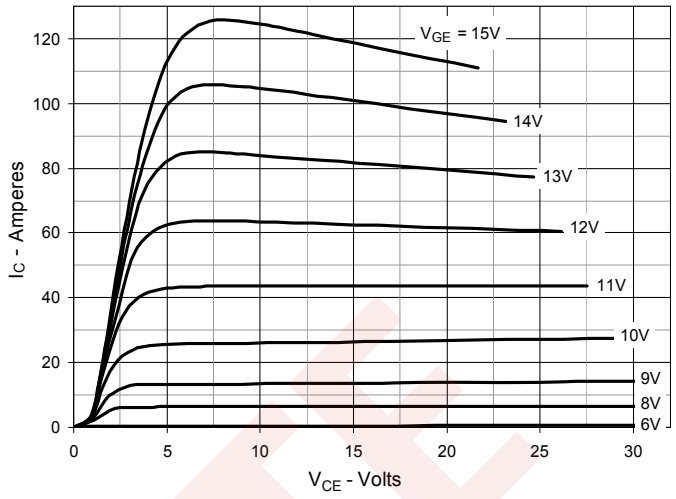


Fig. 3. Output Characteristics @ T_J = 150ºC

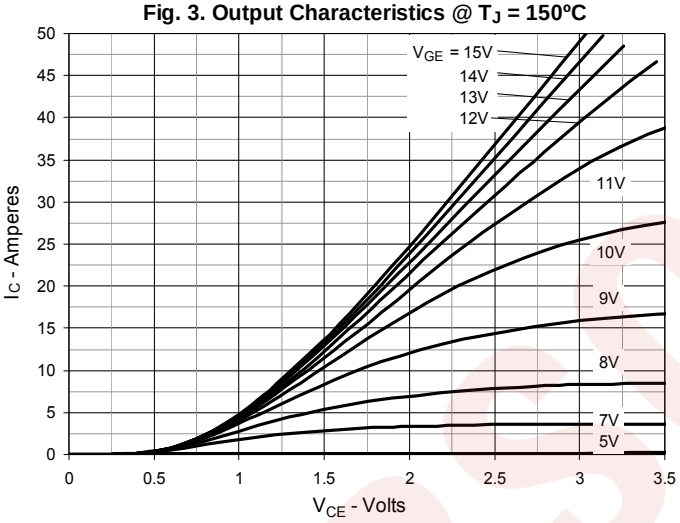


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

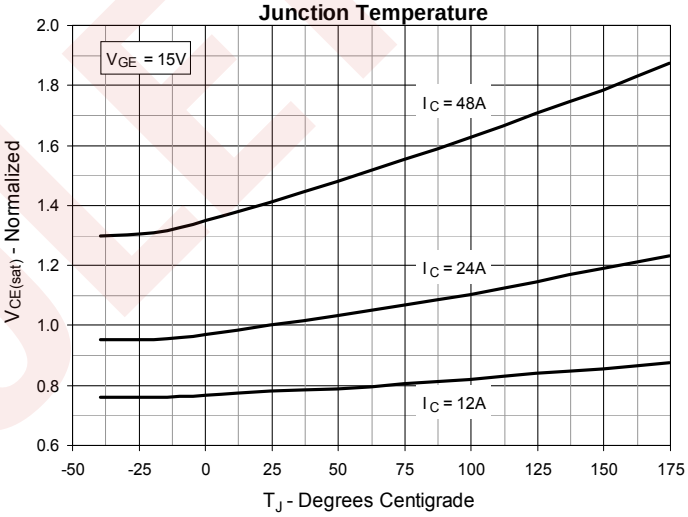


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

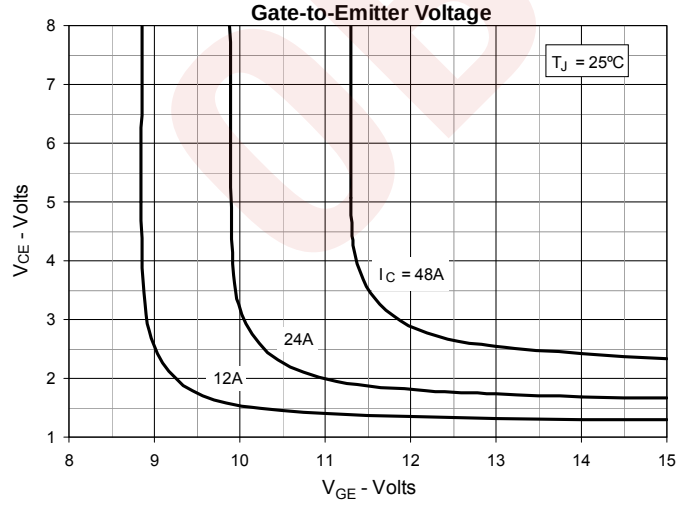
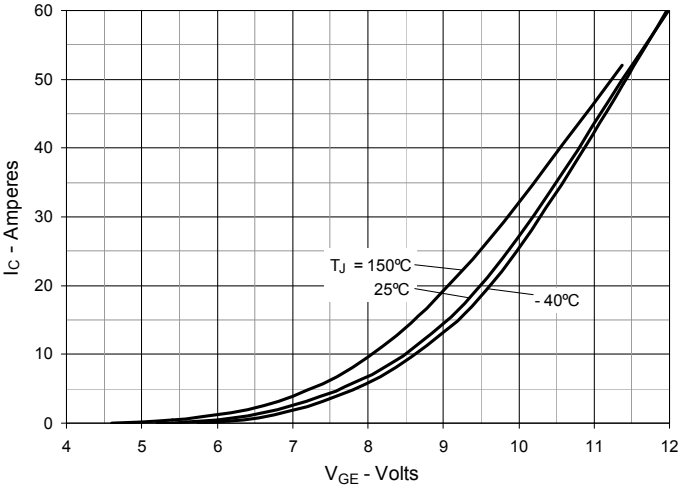


Fig. 6. Input Admittance



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Fig. 7. Transconductance

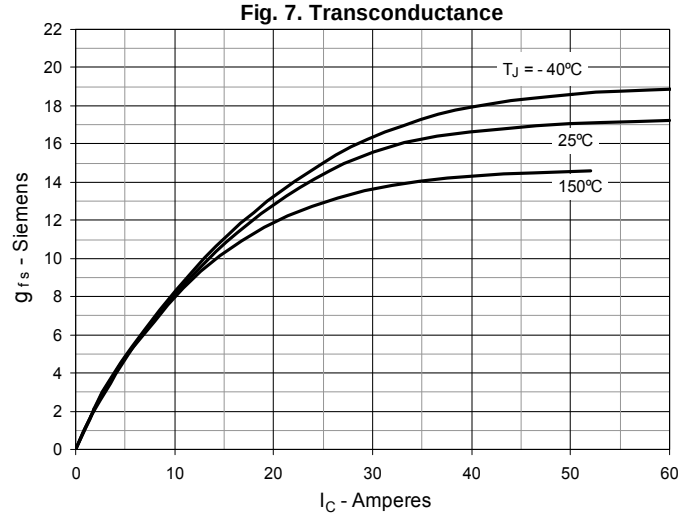


Fig. 8. Gate Charge

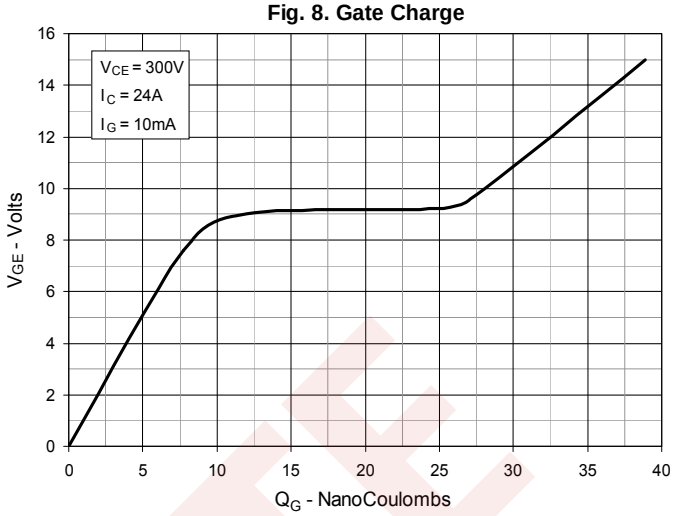


Fig. 9. Capacitance

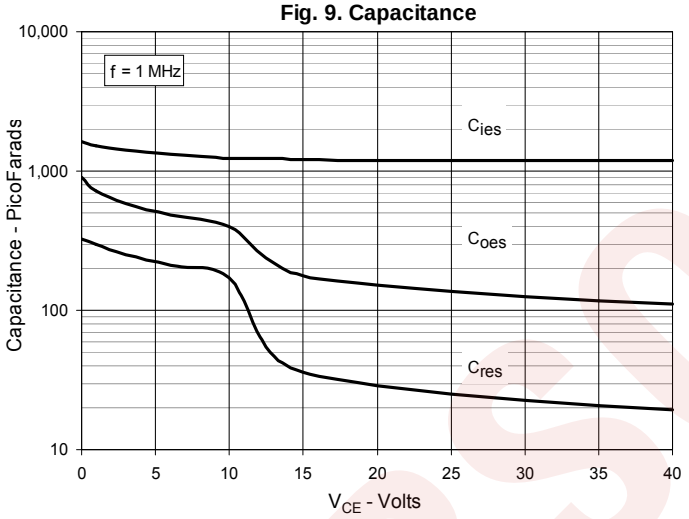


Fig. 10. Reverse-Bias Safe Operating Area

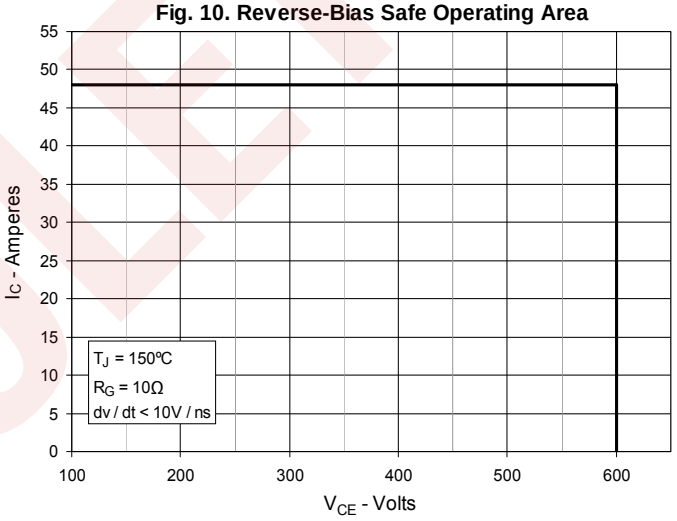


Fig. 11. Forward-Bias Safe Operating Area

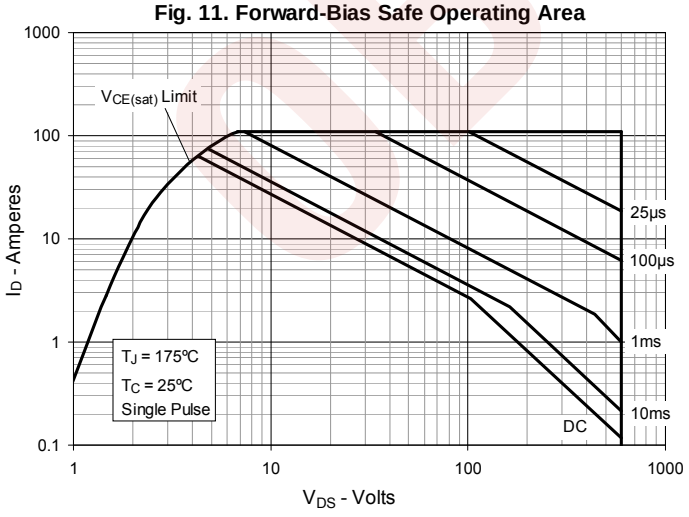
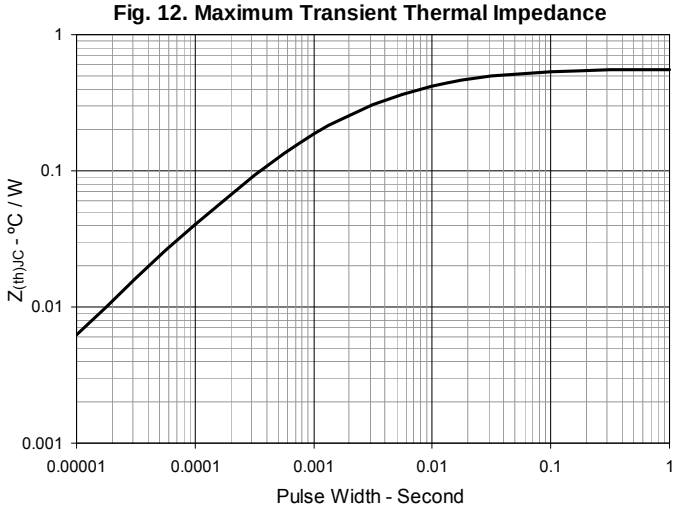


Fig. 12. Maximum Transient Thermal Impedance



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Fig. 13. Inductive Switching Energy Loss vs. Gate Resistance

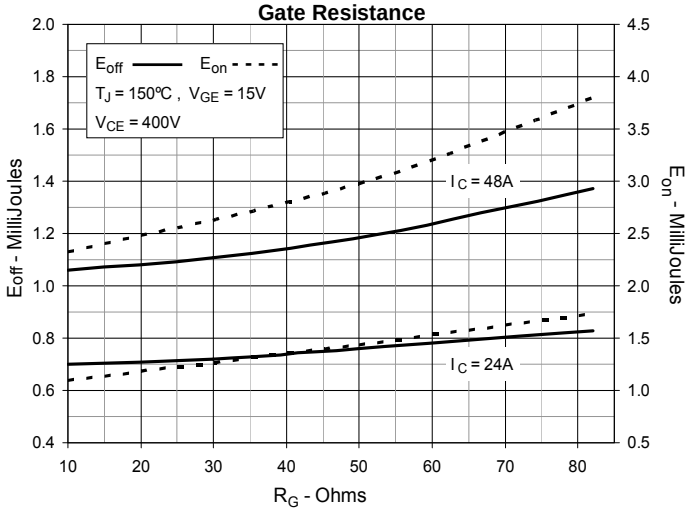


Fig. 14. Inductive Switching Energy Loss vs. Collector Current

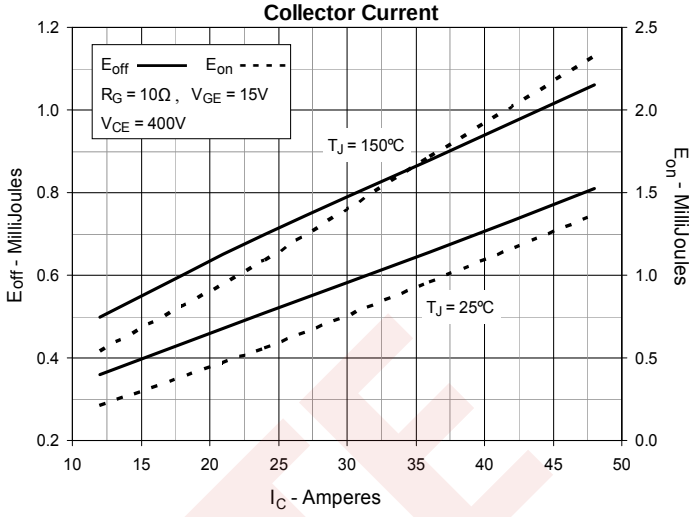


Fig. 15. Inductive Switching Energy Loss vs. Junction Temperature

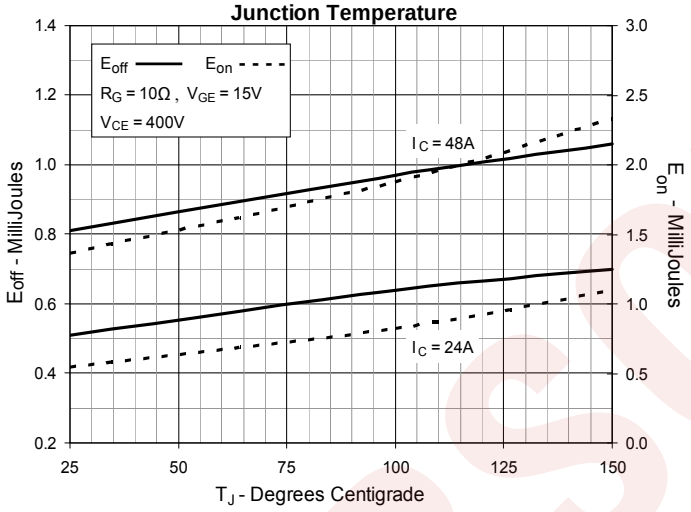


Fig. 16. Inductive Turn-off Switching Times vs. Gate Resistance

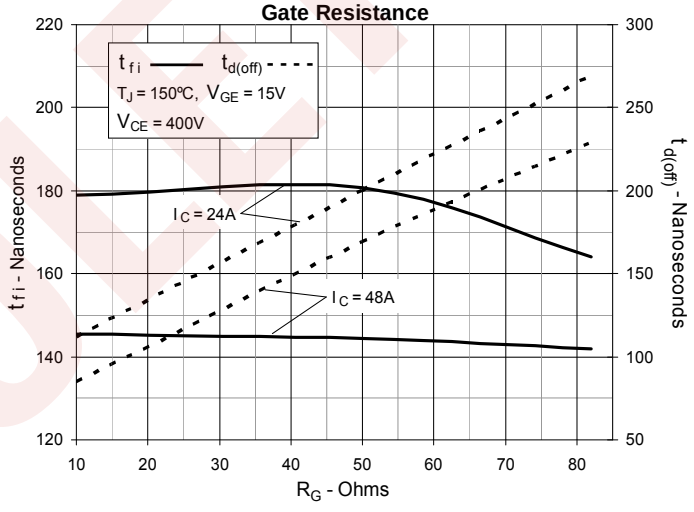


Fig. 17. Inductive Turn-off Switching Times vs. Collector Current

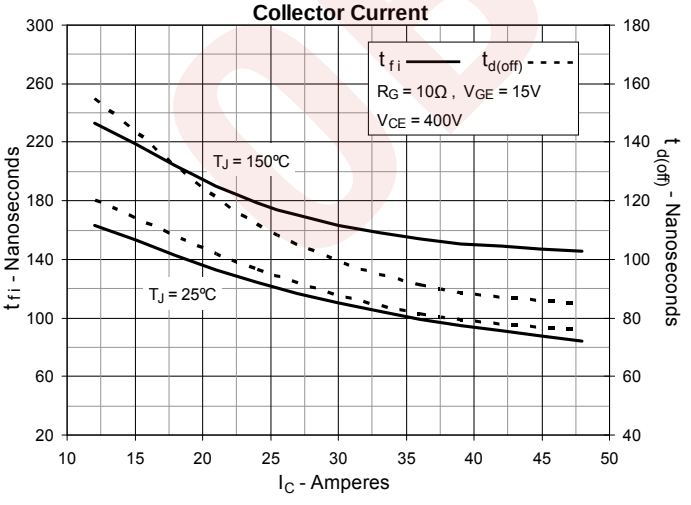
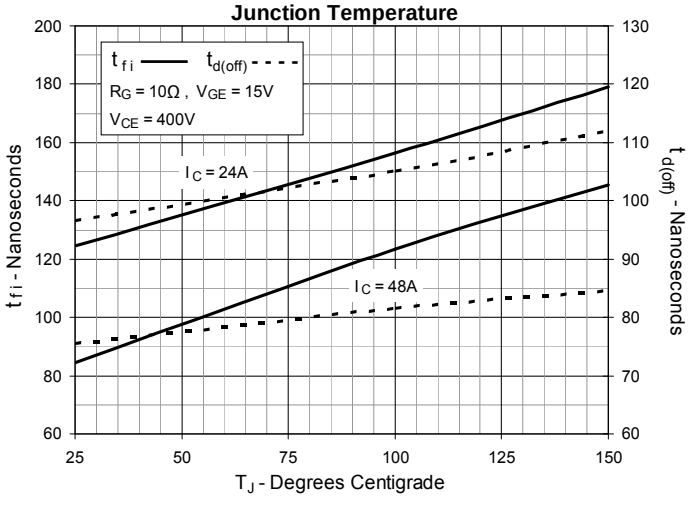


Fig. 18. Inductive Turn-off Switching Times vs. Junction Temperature



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Fig. 19. Inductive Turn-on Switching Times vs. Gate Resistance

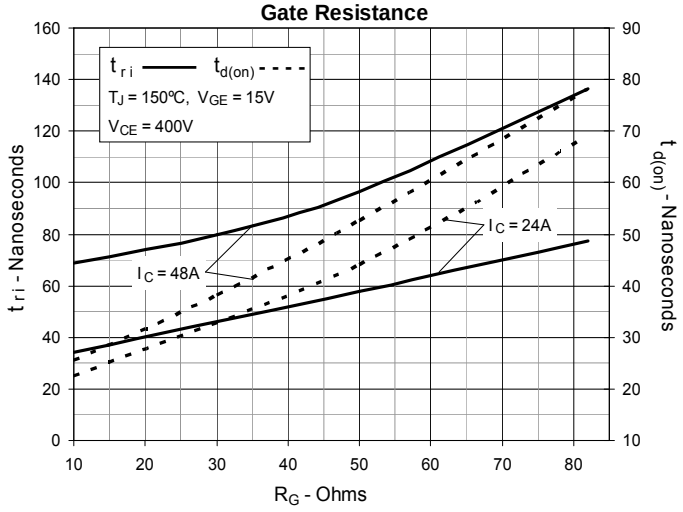


Fig. 20. Inductive Turn-on Switching Times vs. Collector Current

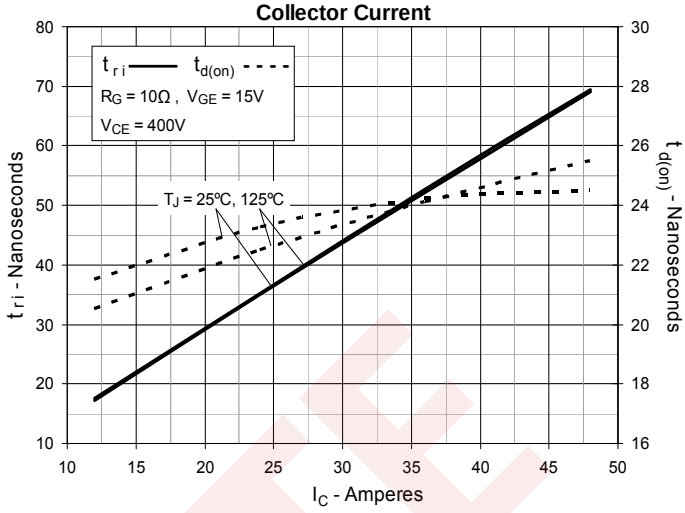
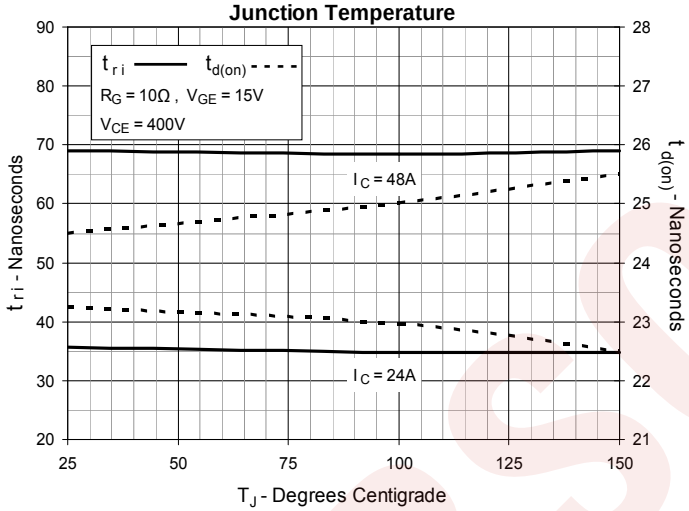


Fig. 21. Inductive Turn-on Switching Times vs. Junction Temperature



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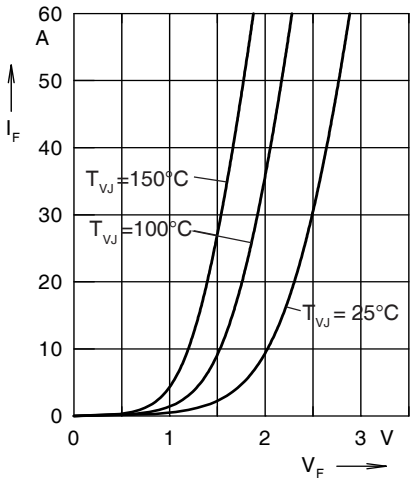


Fig. 22. Forward Current I_F Versus V_F

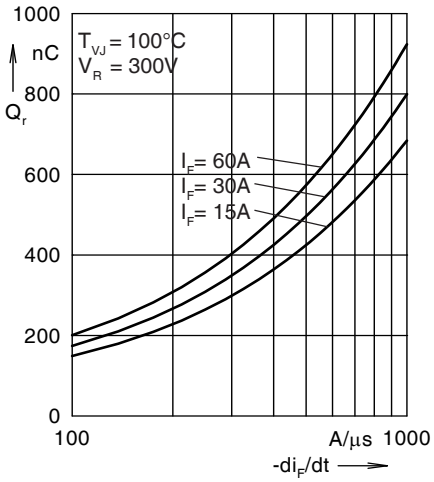


Fig. 23. Reverse Recovery Charge Q_r Versus -di_F/dt

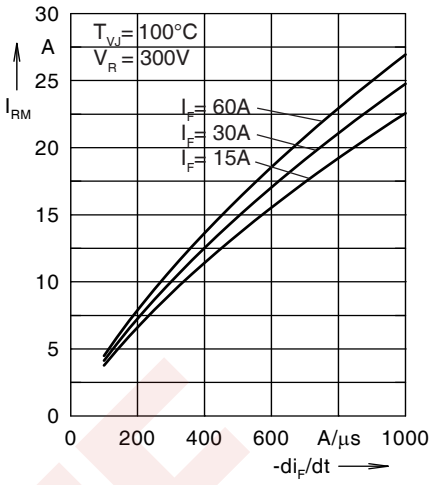


Fig. 24. Peak Reverse Current I_{RM} Versus -di_F/dt

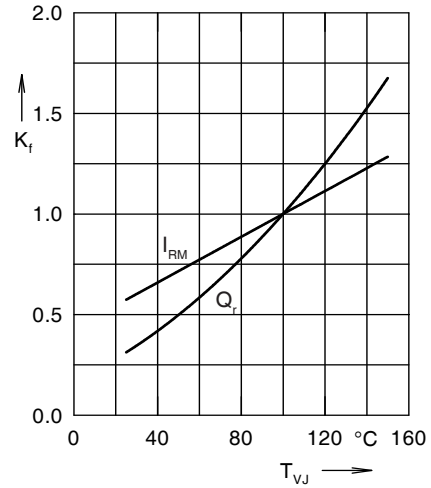


Fig. 25. Dynamic Parameters Q_r, I_{RM} Versus T_{VJ}

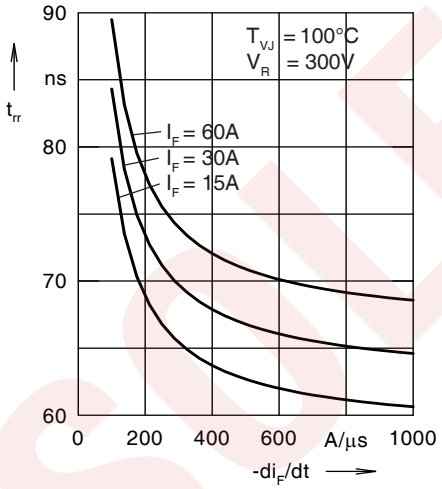


Fig. 26. Recovery Time t_{rr} Versus -di_F/dt

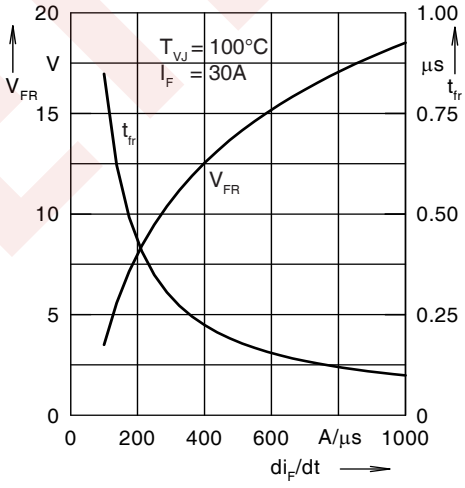


Fig. 28. Peak Forward Voltage V_{FR} and t_{fr} Versus di_F/dt

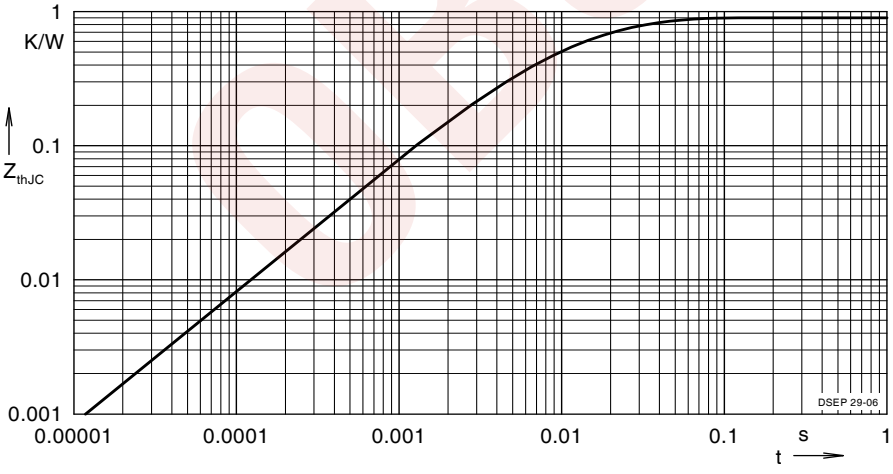


Fig. 28. Transient Thermal Resistance Junction to Case

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