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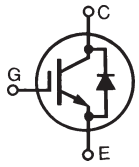
IXYS

1200V XPT™ IGBT GenX3™ w/ Diode

IXYH50N120C3D1

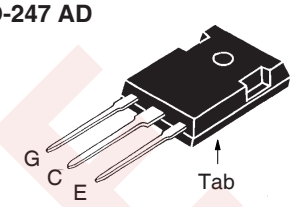
V_{CES} = 1200V
I_{C100} = 50A
$V_{CE(sat)}$ ≤ 3.5V
$t_{fi(typ)}$ = 43ns

High-Speed IGBT
for 20-50 kHz Switching



Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	1200	V
V_{CGR}	T_J = 25°C to 150°C, R_{GE} = 1MΩ	1200	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C (Chip Capability)	90	A
I_{C100}	T_C = 100°C	50	A
I_{F110}	T_C = 110°C	25	A
I_{CM}	T_C = 25°C, 1ms	210	A
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 5Ω Clamped Inductive Load	I_{CM} = 100 @$V_{CE} \leq V_{CES}$	A
P_C	T_C = 25°C	625	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°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

TO-247 AD



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

Features

- Optimized for Low Switching Losses
- Square RBSOA
- Positive Thermal Coefficient of Vce(sat)
- Anti-Parallel Ultra Fast Diode
- High Current Handling Capability
- International Standard Package

Advantages

- High Power Density
- Low Gate Drive Requirement

Applications

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

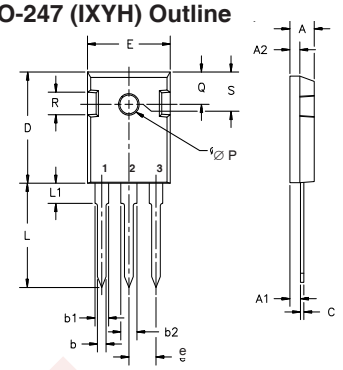
Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
BV_{CES}	I_C = 250μA, V_{GE} = 0V	1200			V
$V_{GE(th)}$	I_C = 250μA, V_{CE} = V_{GE}	3.0		5.0	V
I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0V			50	μA
	T_J = 125°C			500	μA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±100	nA
$V_{CE(sat)}$	I_C = 50A, V_{GE} = 15V, Note 1			3.5	V
	T_J = 150°C		4.2		V

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IXYS IXYH50N120C3D1

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	I_C = 50A, V_{CE} = 10V, Note 1	20	32		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		3100		pF
C_{oes}			230		pF
C_{res}			66		pF
$Q_{g(on)}$	I_C = 50A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		142		nC
Q_{ge}			23		nC
Q_{gc}			60		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		28		ns
t_{ri}	I_C = 50A, V_{GE} = 15V		62		ns
E_{on}	V_{CE} = 0.5 • V_{CES}, R_G = 5Ω		3.0		mJ
$t_{d(off)}$	Note 2		133		ns
t_{fi}			43		ns
E_{off}			1.0	1.7	mJ
$t_{d(on)}$	**Inductive load, T_J = 150°C**		28		ns
t_{ri}	I_C = 50A, V_{GE} = 15V		68		ns
E_{on}	V_{CE} = 0.5 • V_{CES}, R_G = 5Ω		6.0		mJ
$t_{d(off)}$	Note 2		160		ns
t_{fi}			60		ns
E_{off}			1.4		mJ
R_{thJC}				0.20	°C/W
R_{thCS}			0.21		°C/W

TO-247 (IXYH) Outline



Terminals: 1 - Gate 2 - Collector
3 - Emitter

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 Value Min.	Typ.	Max.	
V_F	I_F = 30A, V_{GE} = 0V, Note 1			3.00	V
		T_J = 150°C	1.75		V
I_{RM}	I_F = 30A, V_{GE} = 0V, $-di_F/dt$ = 100A/µs,	T_J = 100°C		9	A
t_{rr}	V_R = 600V	T_J = 100°C	195		ns
R_{thJC}				0.90	°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.

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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

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Fig. 1. Output Characteristics @ T_J = 25ºC

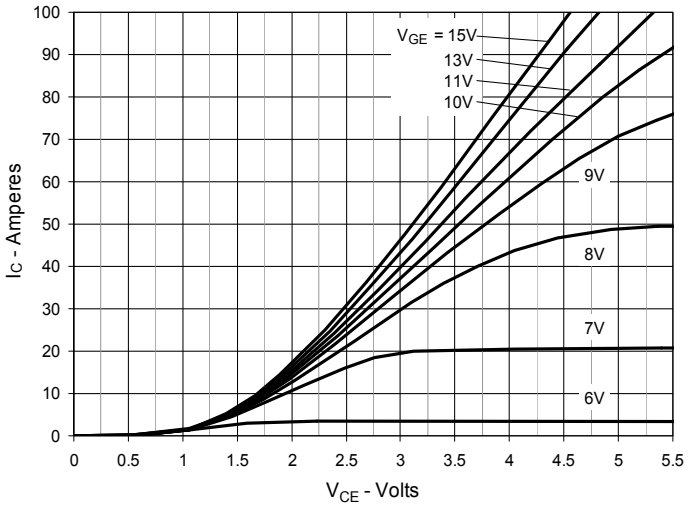


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

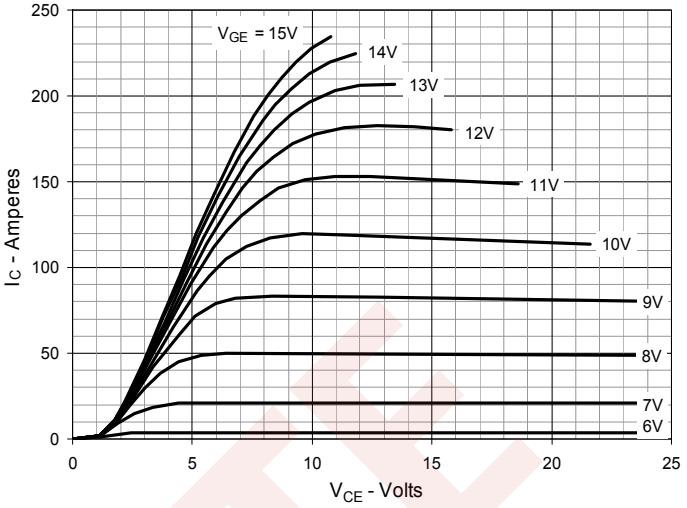


Fig. 3. Output Characteristics @ T_J = 150ºC

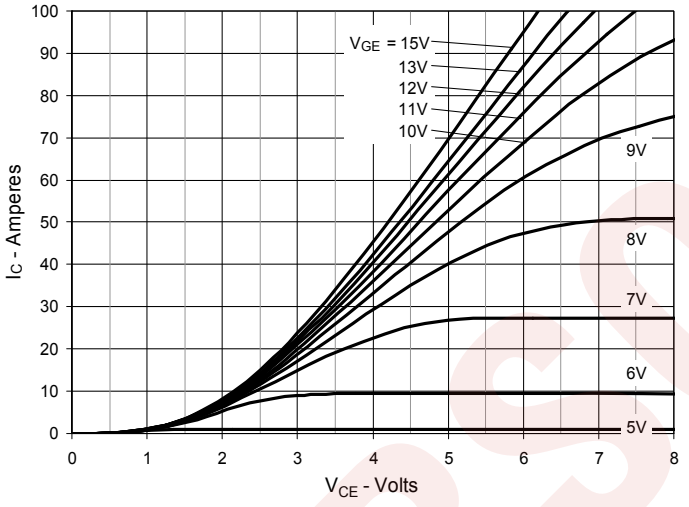


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

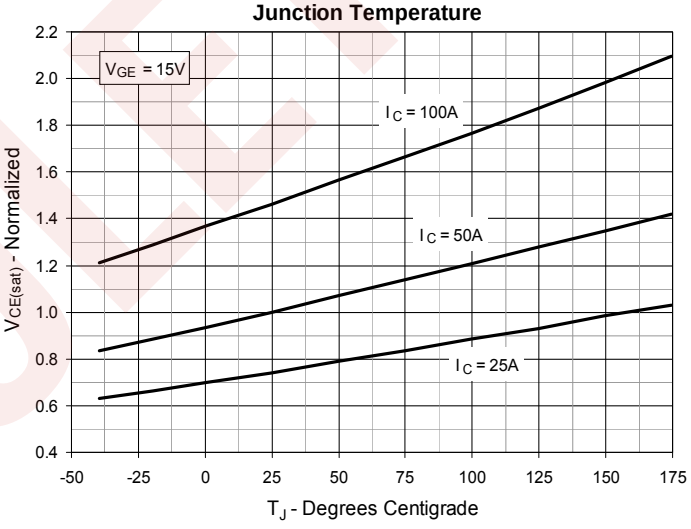


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

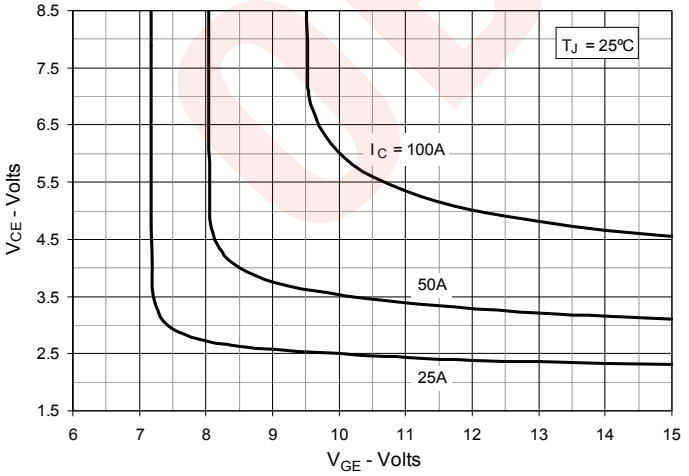
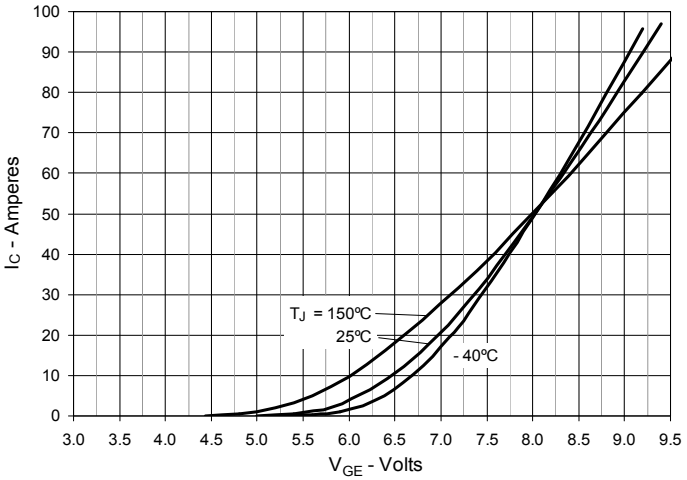


Fig. 6. Input Admittance



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Fig. 7. Transconductance

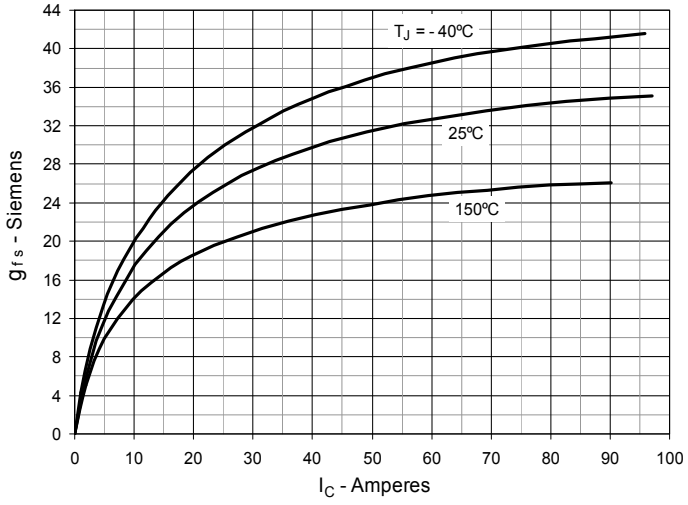


Fig. 8. Gate Charge

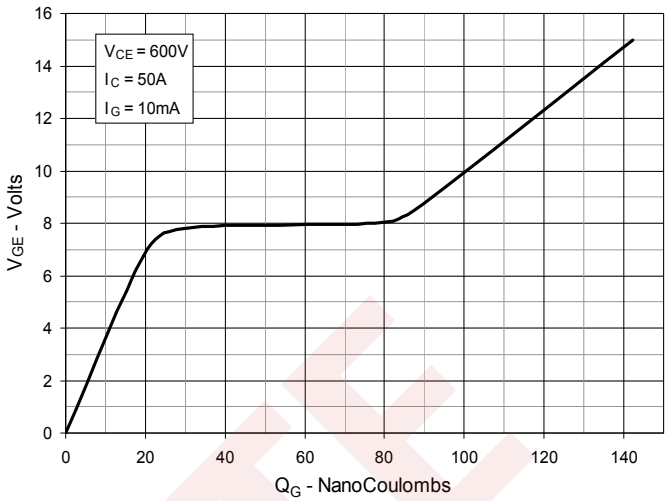


Fig. 9. Capacitance

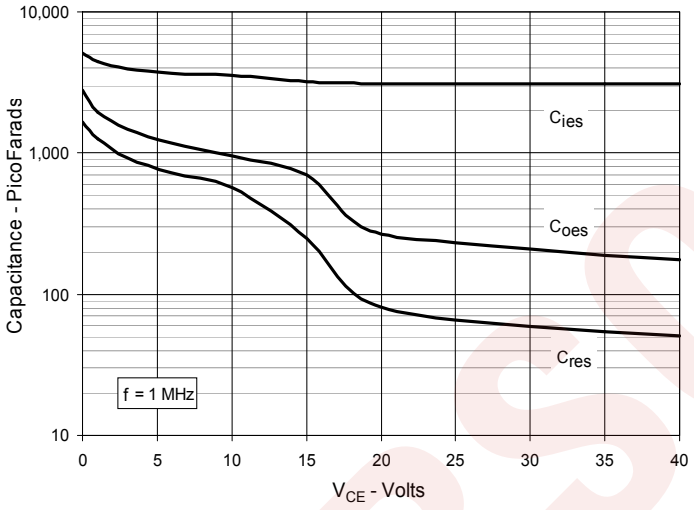


Fig. 10. Reverse-Bias Safe Operating Area

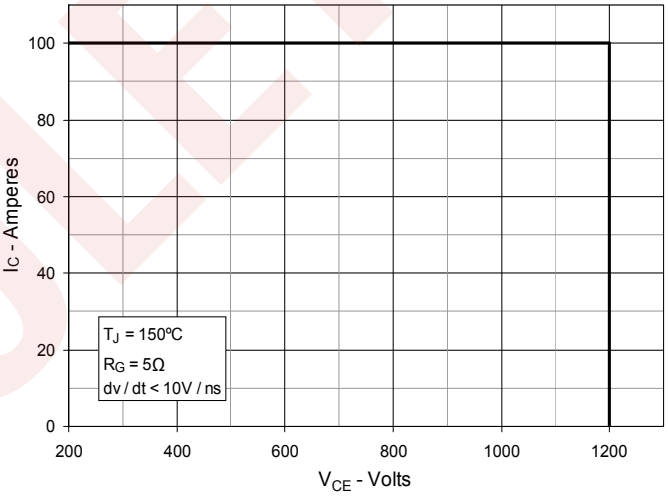
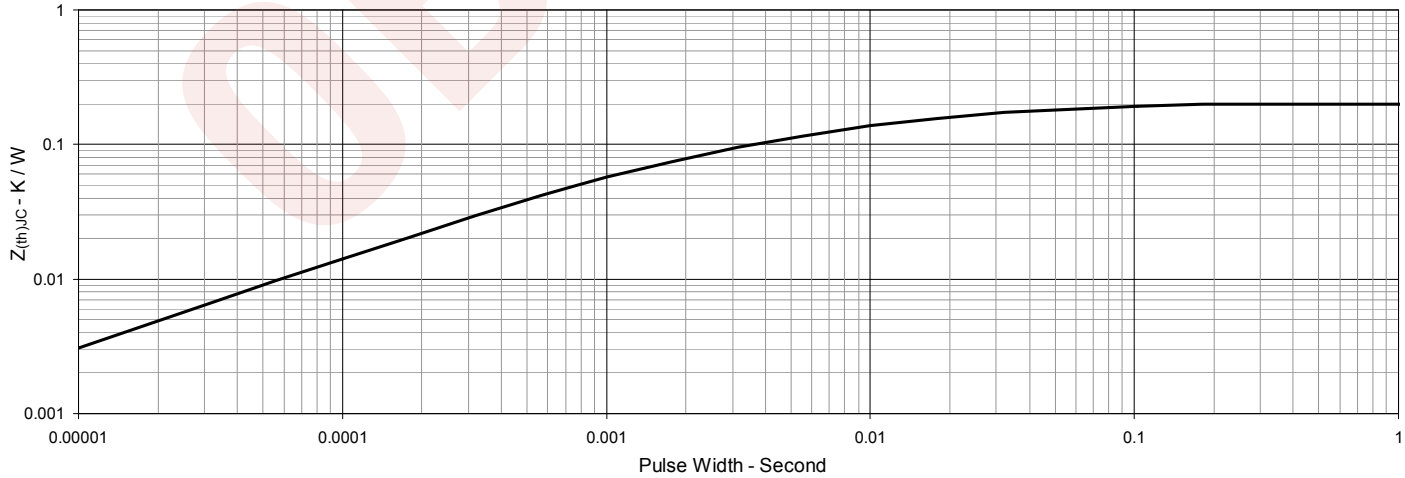


Fig. 11. Maximum Transient Thermal Impedance



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

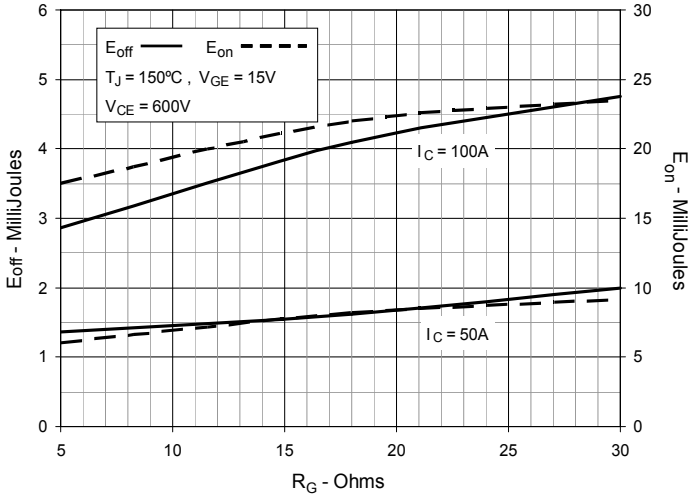


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

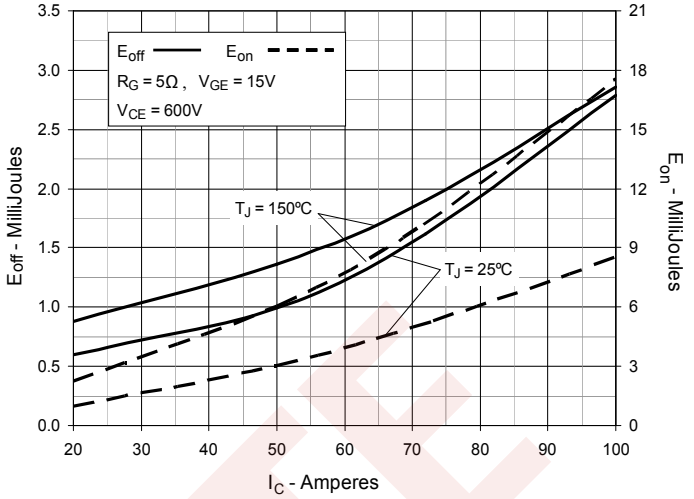


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

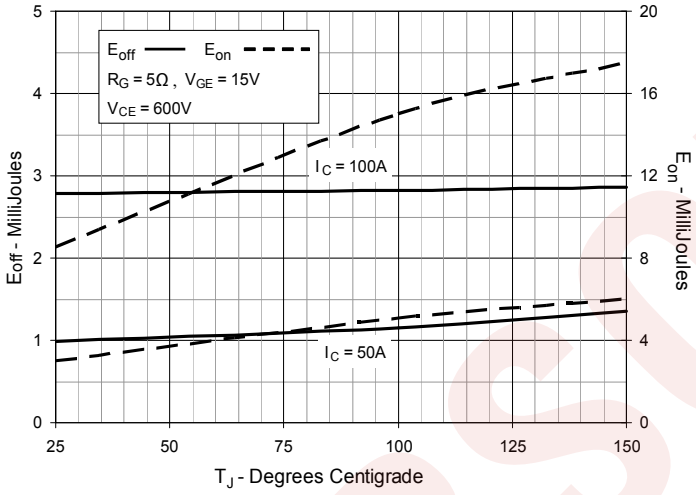


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

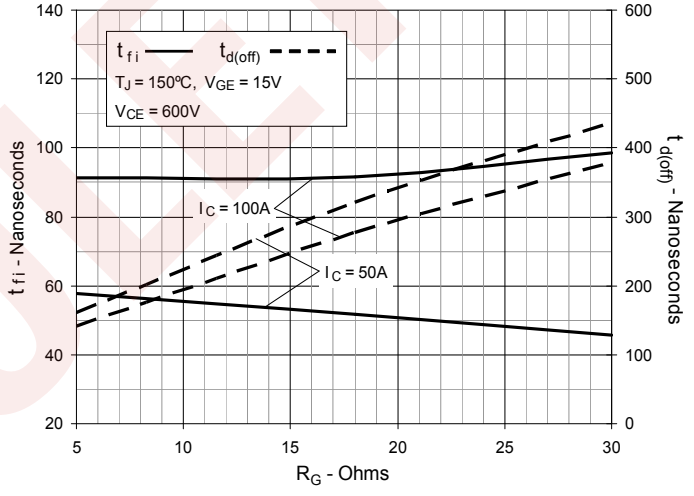


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

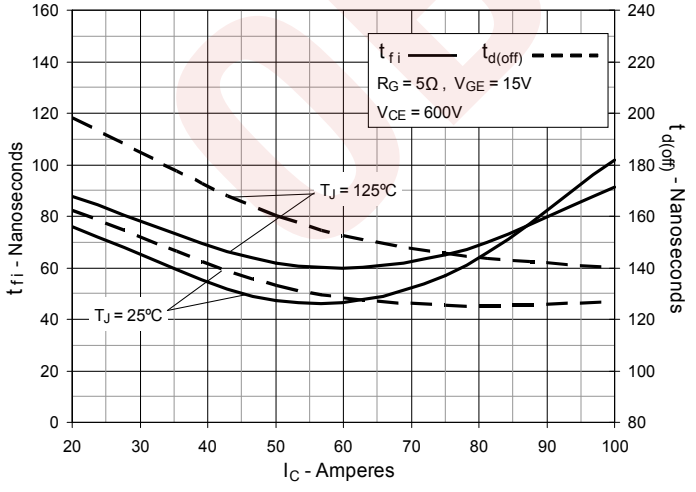
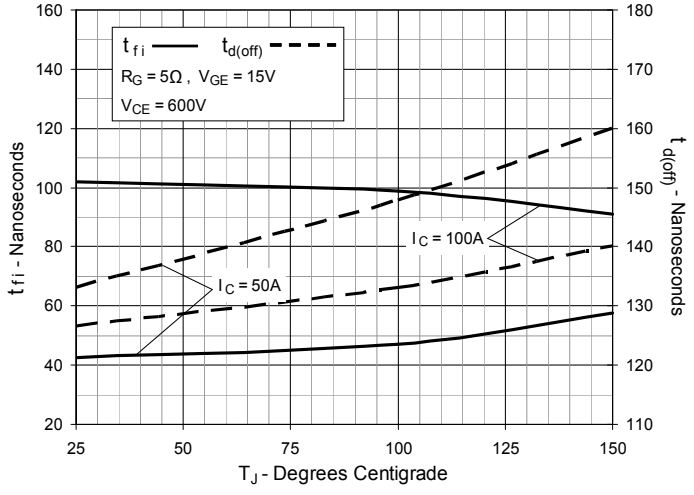


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature



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

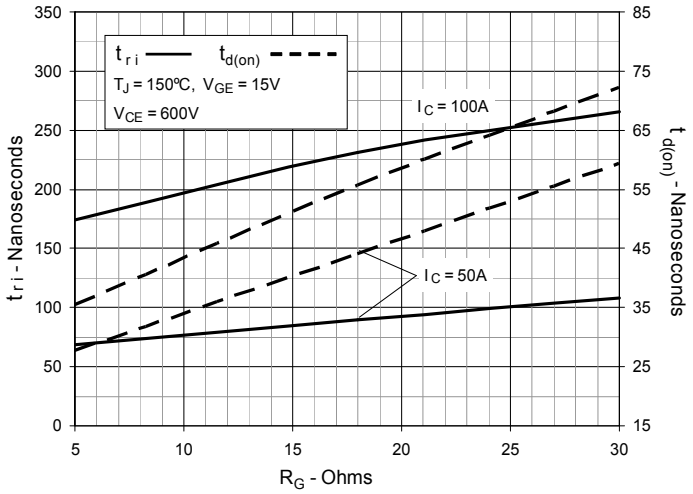


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

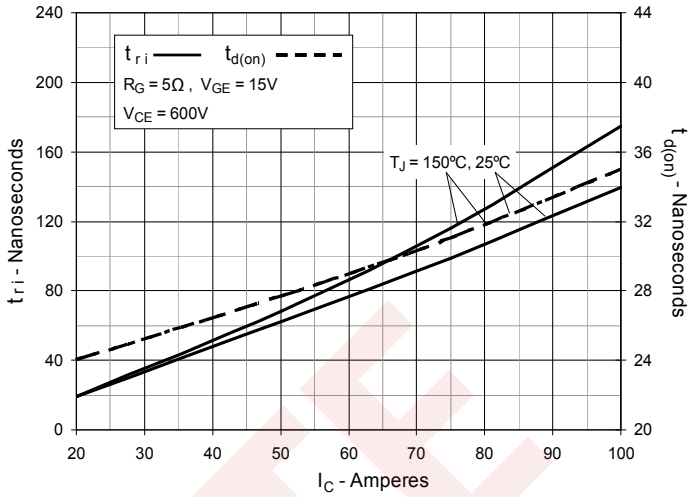


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature

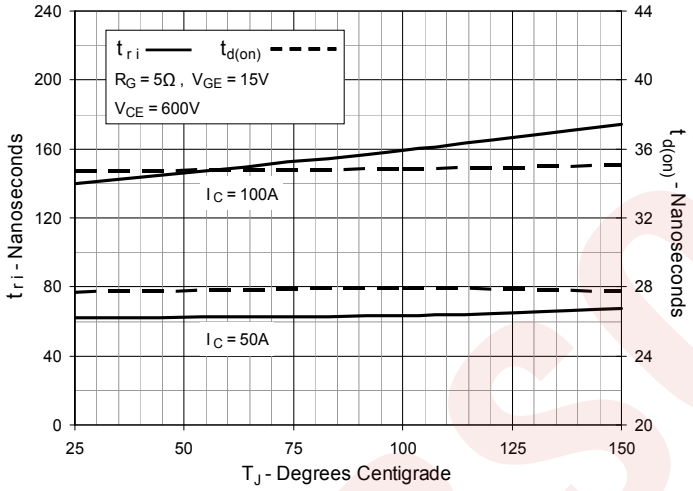
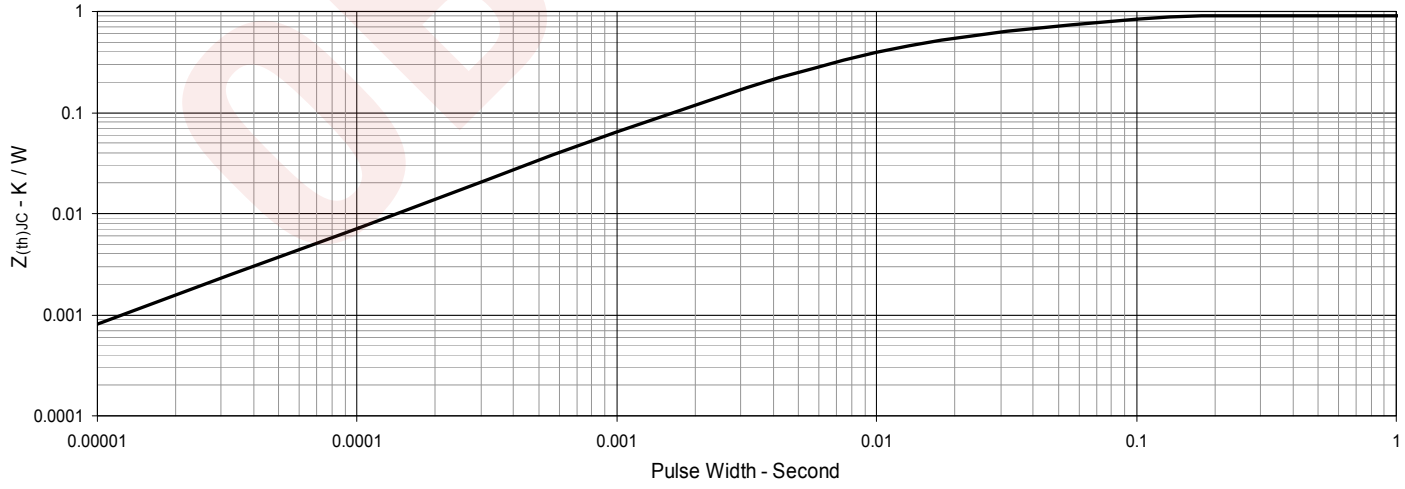


Fig. 21. Maximum Transient Thermal Impedance (Diode)



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Fig. 22. Forward Current I_F vs V_F

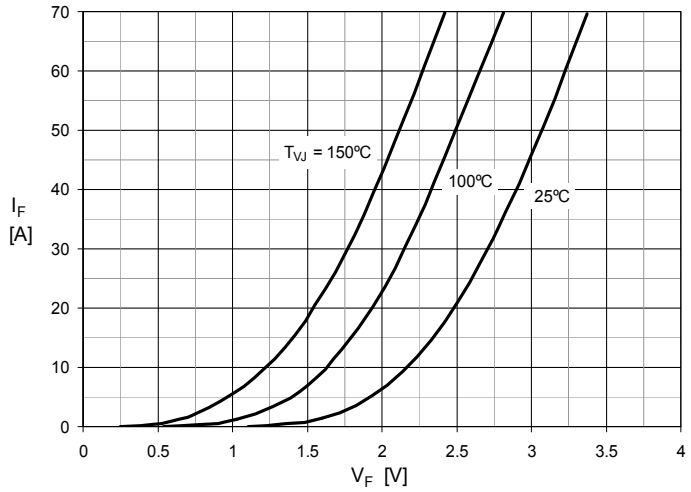


Fig. 23. Reverse Recovery Charge Q_{RM} vs. $-di_F/dt$

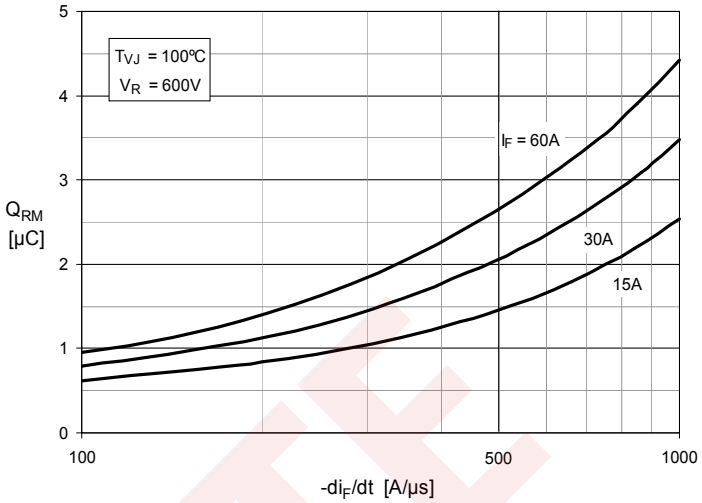


Fig. 24. Peak Reverse Current I_{RM} vs. $-di_F/dt$

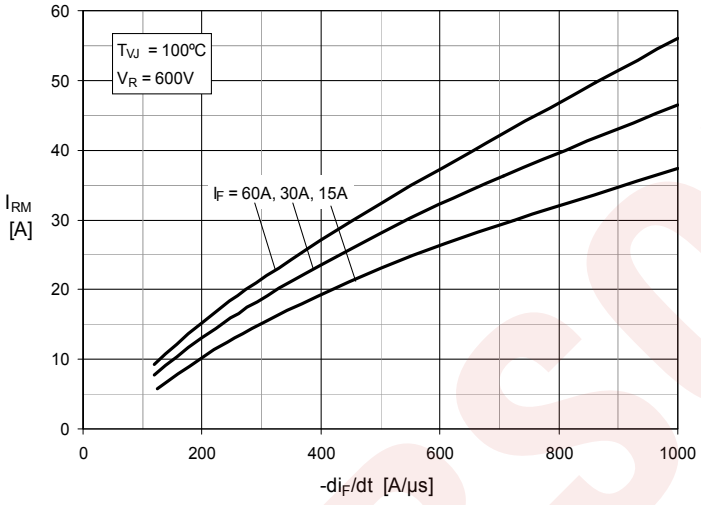


Fig. 25. Dynamic Parameters Q_{RM}, I_{RM} vs. T_{VJ}

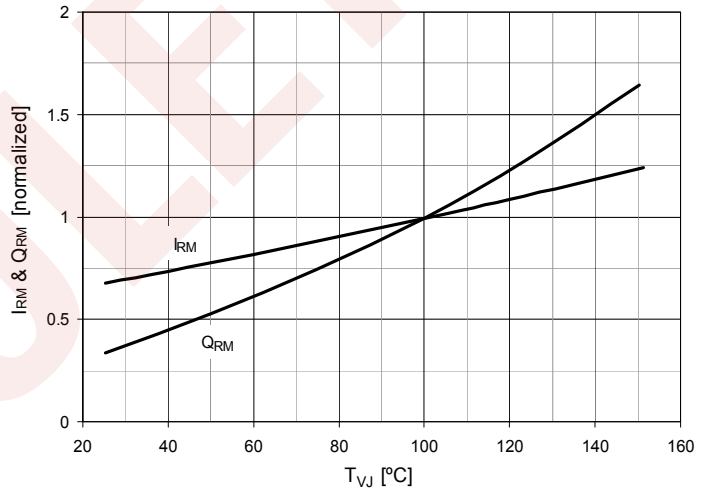


Fig. 26. Recovery Time t_{rr} vs. $-di_F/dt$

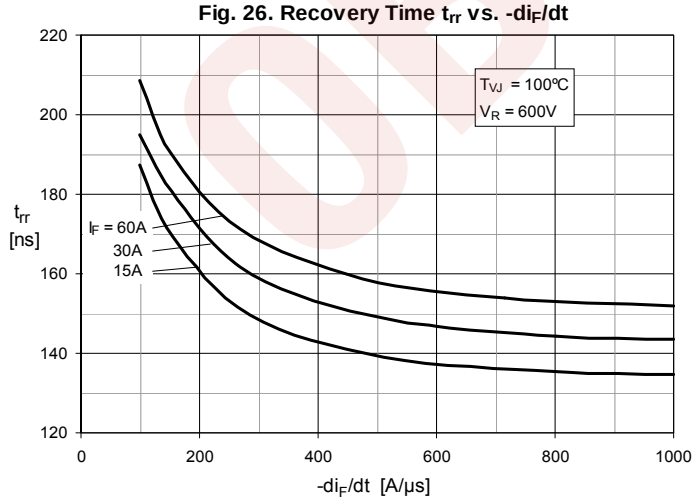
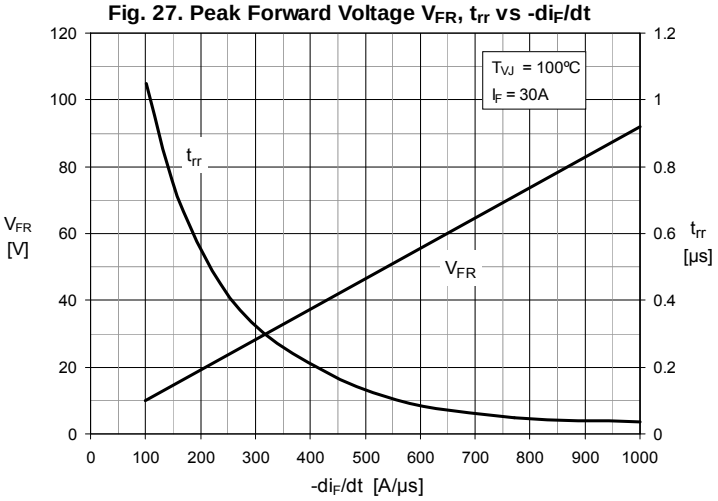


Fig. 27. Peak Forward Voltage V_{FR}, t_{rr} vs $-di_F/dt$



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