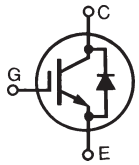
IXYS

1200V XPT™ IGBT GenX3™ w/ Diode

IXYH40N120B3D1

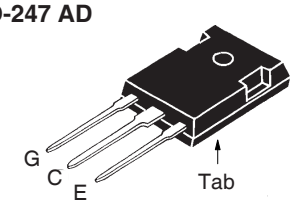
V_{CES} = 1200V
I_{C110} = 40A
$V_{CE(sat)}$ ≤ 2.9V
$t_{fi(typ)}$ = 183ns

Extreme Light Punch Through
IGBT for 5-30 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)	86	A
I_{C110}	T_C = 110°C	40	A
I_{F110}	T_C = 110°C	25	A
I_{CM}	T_C = 25°C, 1ms	180	A
I_A	T_C = 25°C	20	A
E_{AS}	T_C = 25°C	400	mJ
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 10Ω Clamped Inductive Load	I_{CM} = 80 @$V_{CE} \leq V_{CES}$	A
P_C	T_C = 25°C	480	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 5-30kHZ Switching
- Square RBSOA
- Positive Thermal Coefficient of Vce(sat)
- Anti-Parallel Ultra Fast Diode
- Avalanche Rated
- International Standard Package

Advantages

- High Power Density
- Low Gate Drive Requirement

Applications

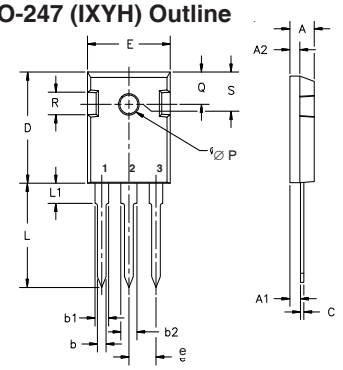
- Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Battery Chargers
- Welding Machines
- Lamp Ballasts

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
BV_{CES}	I_C = 250μA, V_{GE} = 0V	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 = 40A, V_{GE} = 15V, Note 1		2.4	2.9	V
	T_J = 150°C		3.1		V

© 2013 IXYS CORPORATION, All Rights Reserved

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	I_C = 40A, V_{CE} = 10V, Note 1	13	22		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		1690		pF
C_{oes}			157		pF
C_{res}			47		pF
$Q_{g(on)}$	I_C = 40A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		87		nC
Q_{ge}			12		nC
Q_{gc}			38		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		22		ns
t_{ri}	I_C = 40A, V_{GE} = 15V		50		ns
E_{on}	V_{CE} = 0.5 • V_{CES}, R_G = 10Ω		2.70		mJ
$t_{d(off)}$	Note 2		177		ns
t_{fi}			183		ns
E_{off}			1.60	3.00	mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**		24		ns
t_{ri}	I_C = 40A, V_{GE} = 15V		60		ns
E_{on}	V_{CE} = 0.5 • V_{CES}, R_G = 10Ω		5.25		mJ
$t_{d(off)}$	Note 2		205		ns
t_{fi}			206		ns
E_{off}			2.05		mJ
R_{thJC}				0.26	°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			3.0	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 = 300V T_J = 100°C		100		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.

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

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

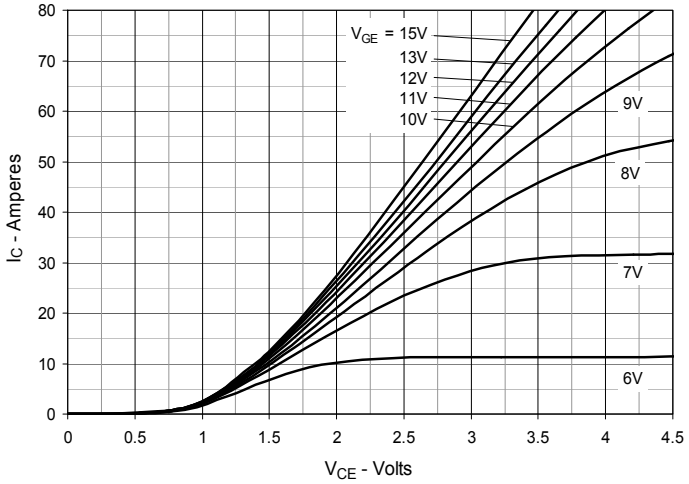


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

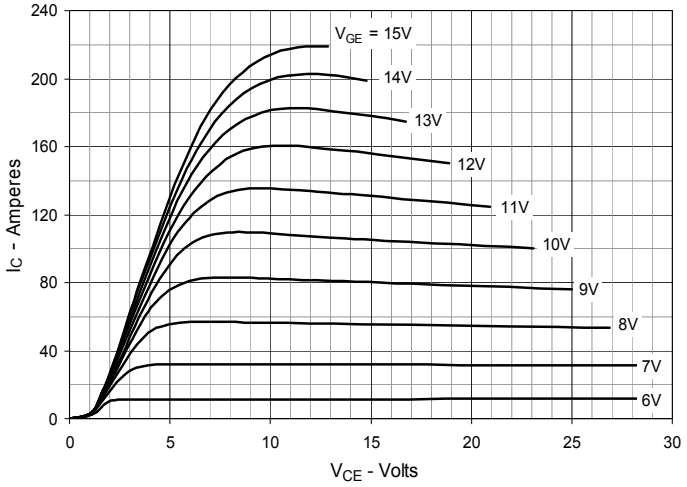


Fig. 3. Output Characteristics @ T_J = 150ºC

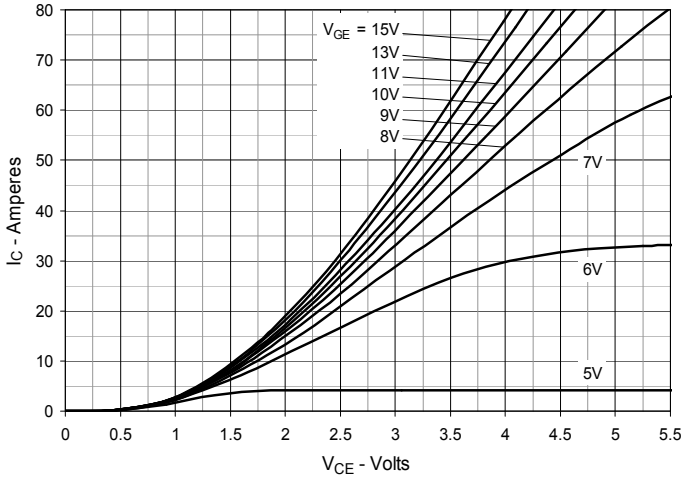


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

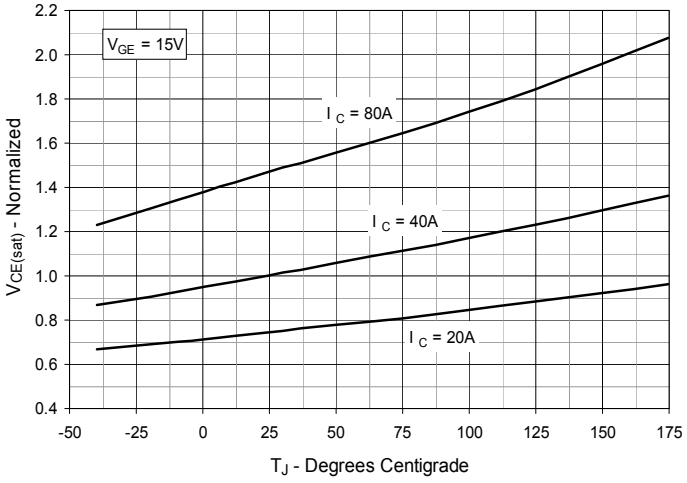


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

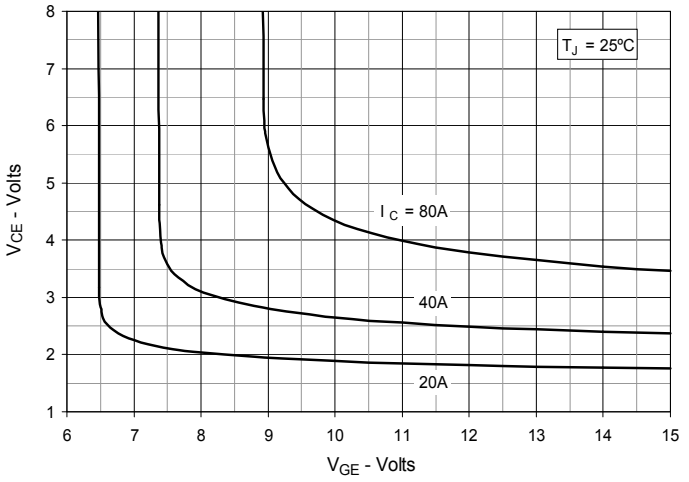
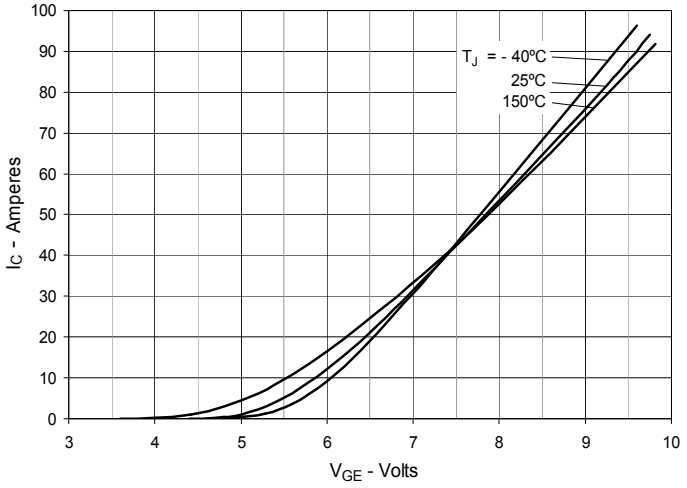


Fig. 6. Input Admittance



© 2013 IXYS CORPORATION, All Rights Reserved

Fig. 7. Transconductance

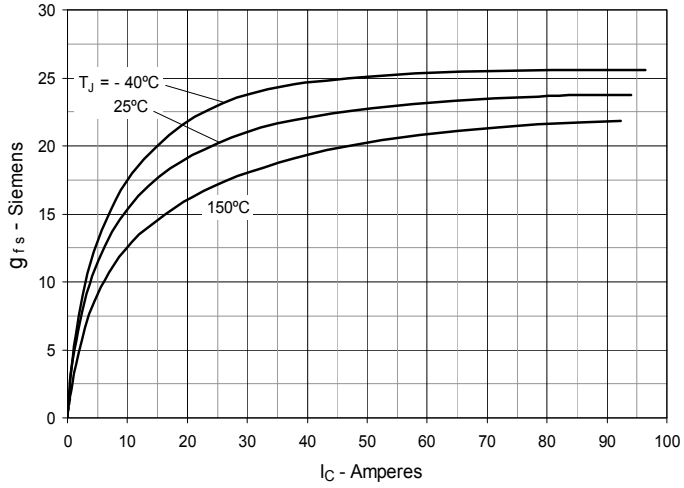


Fig. 8. Gate Charge

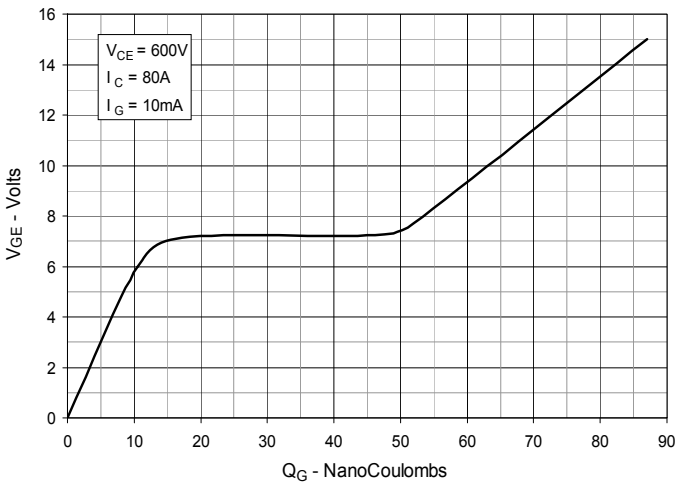


Fig. 9. Capacitance

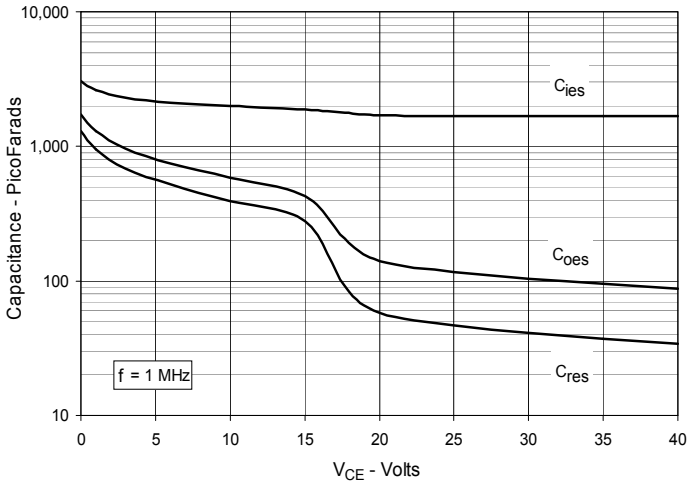


Fig. 10. Reverse-Bias Safe Operating Area

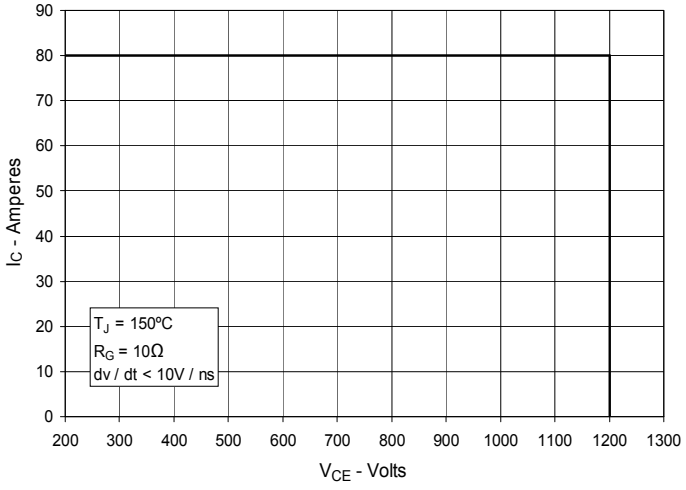
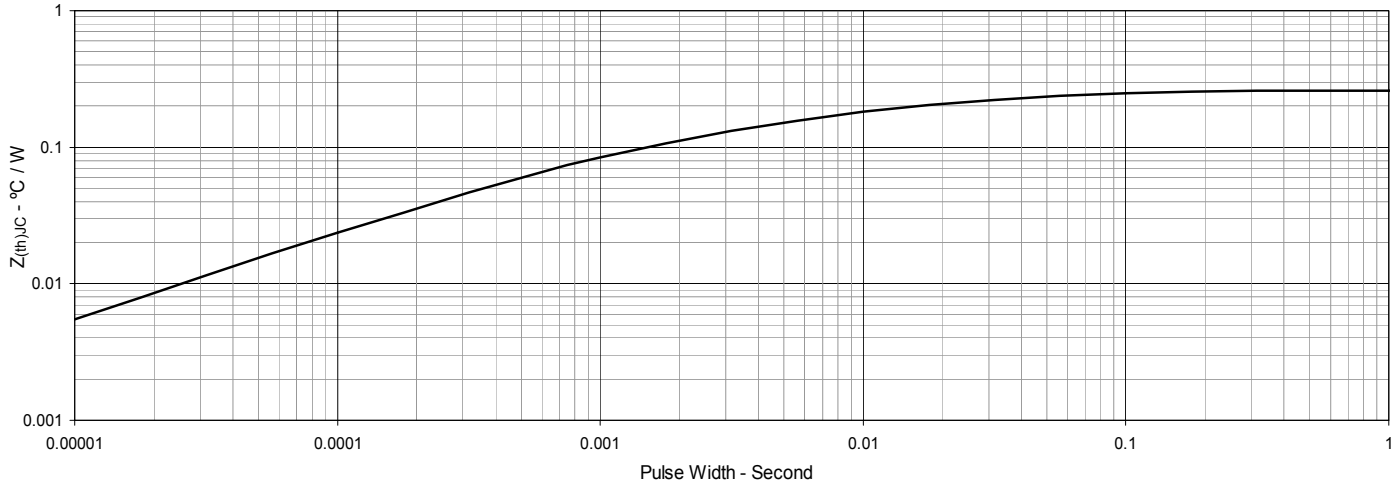


Fig. 11. Maximum Transient Thermal Impedance



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

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

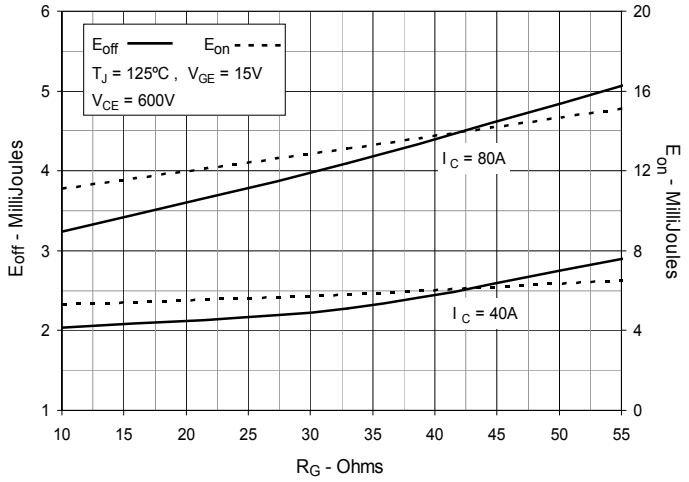


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

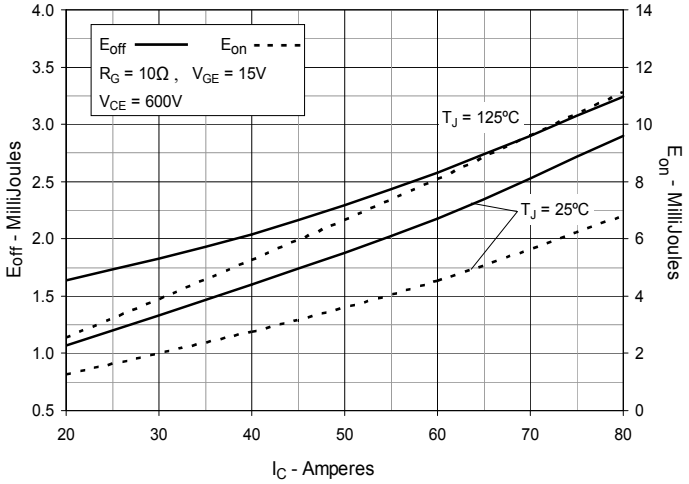


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

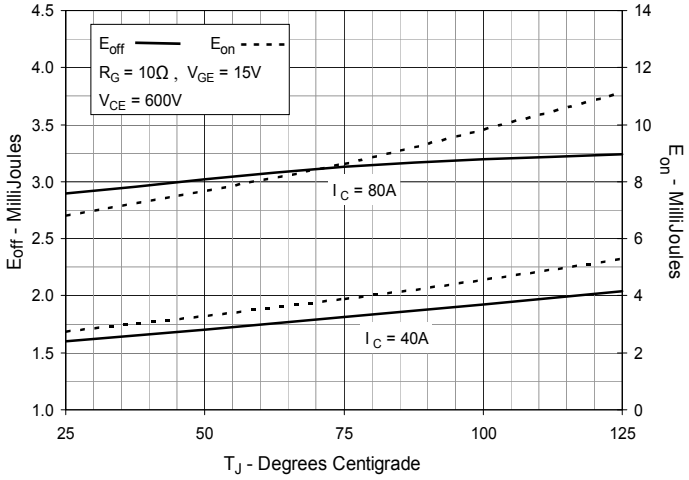


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

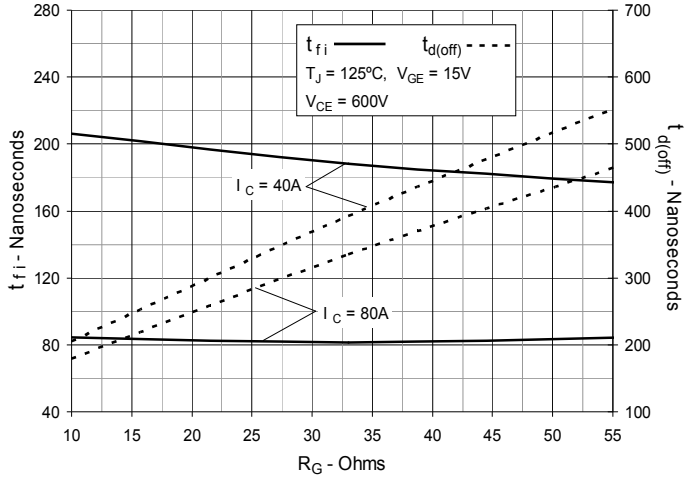


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

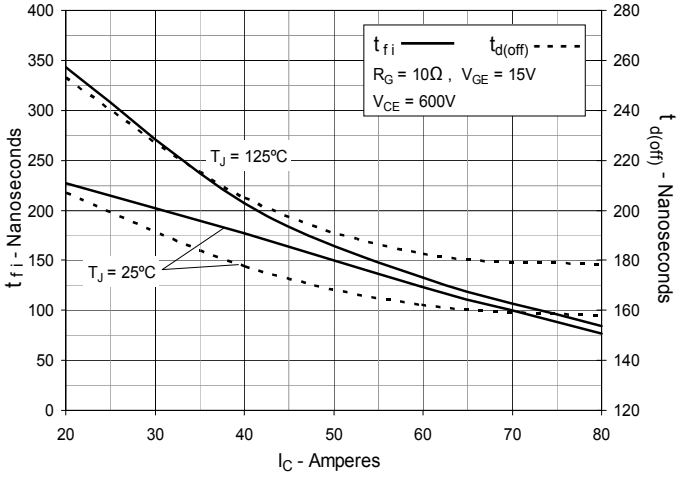
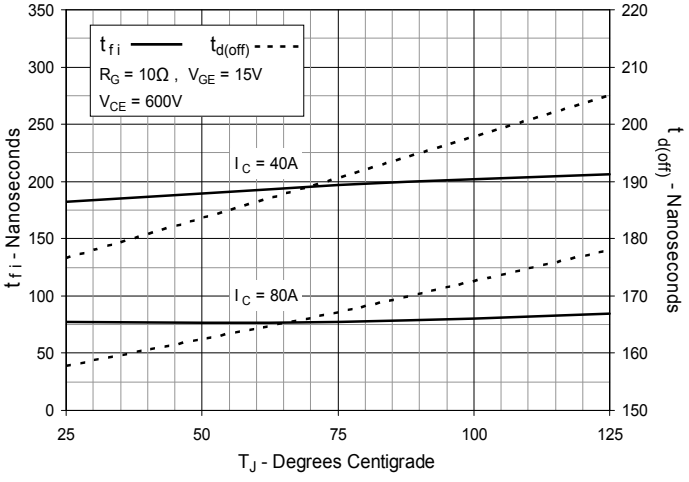


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature



© 2013 IXYS CORPORATION, All Rights Reserved

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

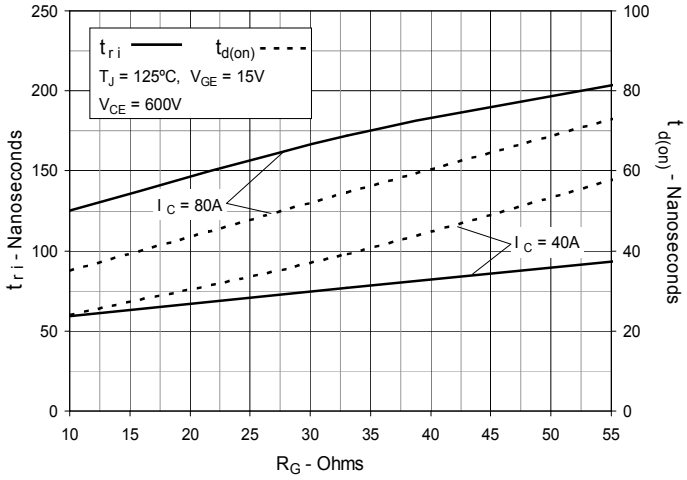


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

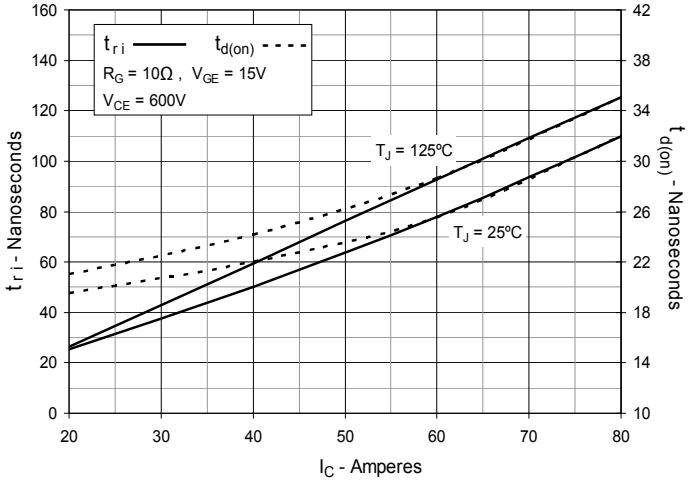
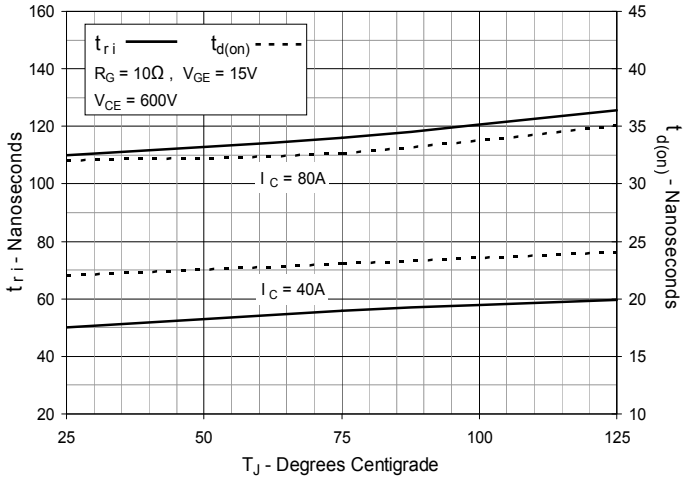


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature



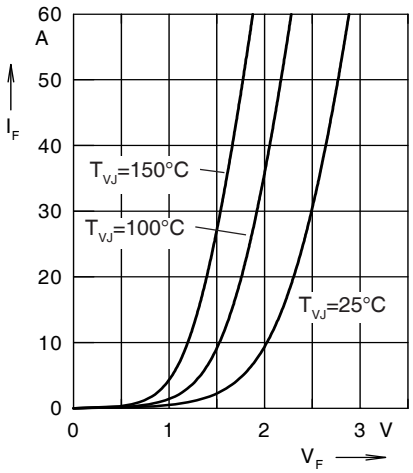


Fig. 21. Forward Current I_F Versus V_F

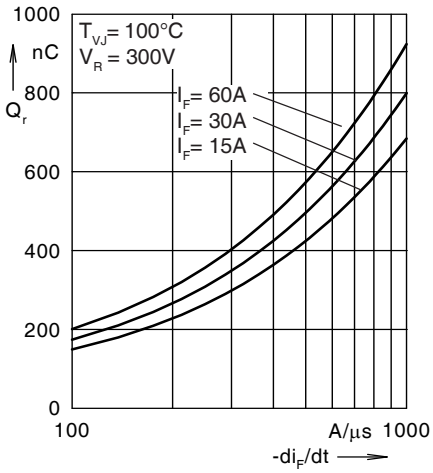


Fig. 22. Reverse Recovery Charge Q_r Versus -di_F/dt

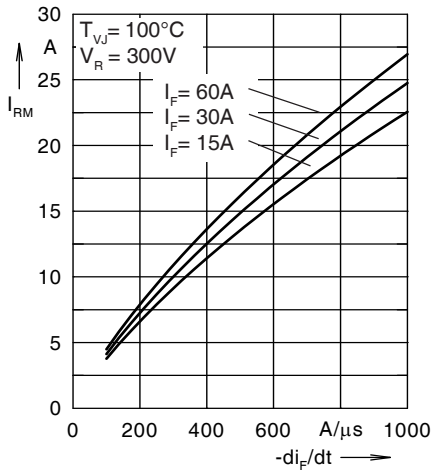


Fig. 23. Peak Reverse Current I_{RM} Versus -di_F/dt

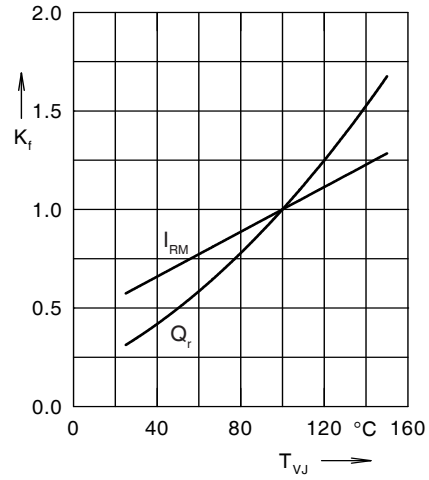


Fig. 24. Dynamic Parameters Q_r, I_{RM} Versus T_{VJ}

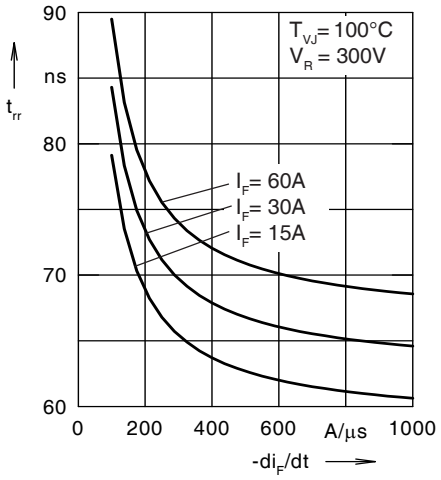


Fig. 25. Recovery Time t_{rr} Versus -di_F/dt

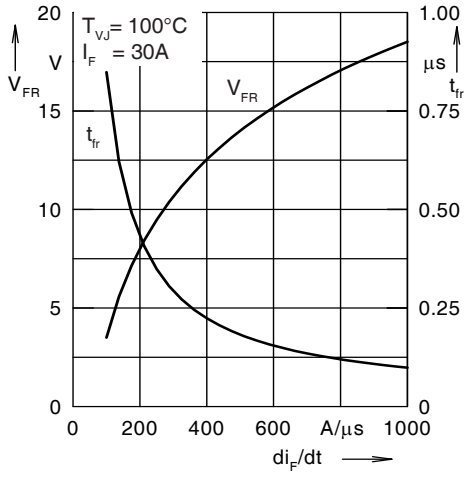


Fig. 26. Peak Forward Voltage V_{FR} and t_{fr} Versus di_F/dt

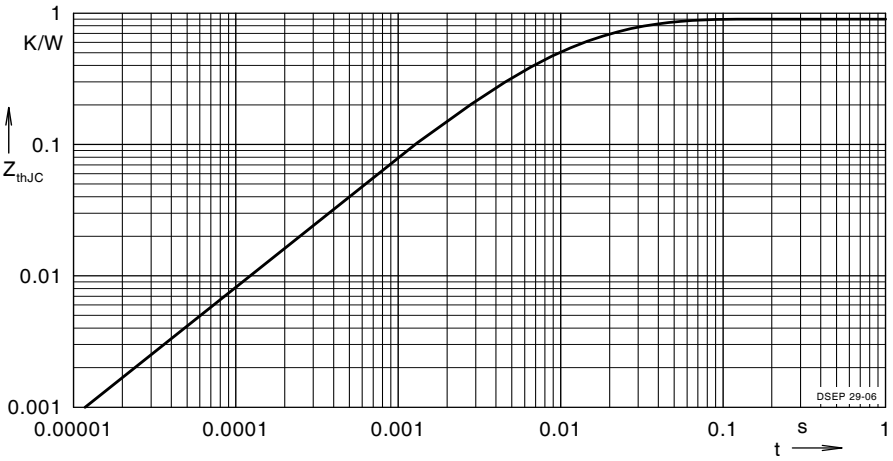


Fig. 27. Transient Thermal Resistance Junction to Case

© 2013 IXYS CORPORATION, All Rights Reserved



Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications.Read complete Disclaimer Notice at www.littelfuse.com/disclaimer-electronics.