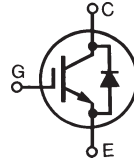




1200V XPT™ IGBT GenX3™ w/ Diode

IXYH40N120C3D1

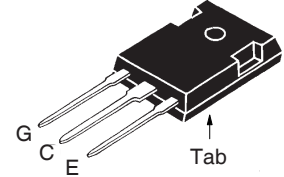


High-Speed IGBT
for 20-50 kHz Switching

$$\begin{aligned} V_{CES} &= 1200V \\ I_{C90} &= 40A \\ V_{CE(sat)} &\leq 3.5V \\ t_{fi(typ)} &= 50ns \end{aligned}$$

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^\circ\text{C}$ to 150°C	1200	V
V_{CGR}	$T_J = 25^\circ\text{C}$ to 150°C , $R_{GE} = 1M\Omega$	1200	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ\text{C}$ (Chip Capability)	80	A
I_{C90}	$T_C = 90^\circ\text{C}$	40	A
I_{F110}	$T_C = 110^\circ\text{C}$	25	A
I_{CM}	$T_C = 25^\circ\text{C}$, 1ms	160	A
I_A	$T_C = 25^\circ\text{C}$	20	A
E_{AS}	$T_C = 25^\circ\text{C}$	400	mJ
SSOA (RBSOA)	$V_{GE} = 15V$, $T_{VJ} = 150^\circ\text{C}$, $R_G = 10\Omega$ Clamped Inductive Load	$I_{CM} = 80$ @ $V_{CE} \leq V_{CES}$	A
P_C	$T_C = 25^\circ\text{C}$	480	W
T_J		-55 ... +150	$^\circ\text{C}$
T_{JM}		150	$^\circ\text{C}$
T_{stg}		-55 ... +150	$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering	300	$^\circ\text{C}$
T_{SOLD}	1.6 mm (0.062in.) from Case for 10s	260	$^\circ\text{C}$
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 $V_{ce(sat)}$
- Anti-Parallel Ultra Fast Diode
- Avalanche Rated
- 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 ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
BV_{CES}	$I_C = 250\mu\text{A}$, $V_{GE} = 0V$	1200		V
$V_{GE(th)}$	$I_C = 250\mu\text{A}$, $V_{CE} = V_{GE}$	3.0		5.0 V
I_{CES}	$V_{CE} = V_{CES}$, $V_{GE} = 0V$ $T_J = 125^\circ\text{C}$			25 μA 750 μA
I_{GES}	$V_{CE} = 0V$, $V_{GE} = \pm 20V$			± 100 nA
$V_{CE(sat)}$	$I_C = 40A$, $V_{GE} = 15V$, Note 1 $T_J = 150^\circ\text{C}$		2.9 3.7	3.5 V V

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	11	18	S
C_{ies}	V _{CE} = 25V, V _{GE} = 0V, f = 1MHz		1870	pF
C_{oes}			107	pF
C_{res}			38	pF
Q_{g(on)}	I _C = 40A, V _{GE} = 15V, V _{CE} = 0.5 • V _{CES}		80	nC
Q_{ge}			14	nC
Q_{gc}			37	nC
t_{d(on)}	Inductive load, T_J = 25°C I _C = 40A, V _{GE} = 15V V _{CE} = 0.5 • V _{CES} , R _G = 10Ω Note 2		18	ns
t_{ri}			64	ns
E_{on}			3.8	mJ
t_{d(off)}			133	ns
t_{fi}			50	ns
E_{off}			1.1	mJ
t_{d(on)}	Inductive load, T_J = 150°C I _C = 40A, V _{GE} = 15V V _{CE} = 0.5 • V _{CES} , R _G = 10Ω Note 2		22	ns
t_{ri}			73	ns
E_{on}			6.6	mJ
t_{d(off)}			160	ns
t_{fi}			143	ns
E_{off}			2.1	mJ
R_{thJC}				0.26 °C/W
R_{thCS}		0.21		°C/W

Reverse Diode (FRED)

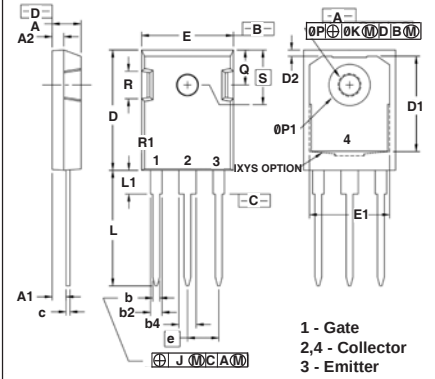
(T_J = 25°C, Unless Otherwise Specified)

		Characteristic Value		
Symbol	Test Conditions	Min.	Typ.	Max.
V_F	I _F = 30A, V _{GE} = 0V, Note 1 T _J = 150°C		1.75	3.00 V
I_{RM}	I _F = 30A, V _{GE} = 0V, -di _F /dt = 100A/μs, T _J = 100°C V _R = 600V		195	9 A
t_{rr}				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.

TO-247 (IXYH) Outline



SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.190	.205	4.83	5.21
A1	.090	.100	2.29	2.54
A2	.075	.085	1.91	2.16
b	.045	.055	1.14	1.40
b2	.075	.087	1.91	2.20
b4	.115	.126	2.92	3.20
C	.024	.031	0.61	0.80
D	.819	.840	20.80	21.34
D1	.650	.690	16.51	17.53
D2	.035	.050	0.89	1.27
E	.620	.635	15.75	16.13
E1	.545	.565	13.84	14.35
e	.215 BSC		5.45 BSC	
J	--	.010	--	0.25
K	--	.025	--	0.64
L	.780	.810	19.81	20.57
L1	.150	.170	3.81	4.32
øP	.140	.144	3.55	3.65
øP1	.275	.290	6.99	7.37
Q	.220	.244	5.59	6.20
R	.170	.190	4.32	4.83
S	.242 BSC		6.15 BSC	

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	4,931,844	5,049,961	5,237,481	6,162,665	6,404,065 B1	6,683,344	6,727,585	7,005,734 B2	7,157,338B2
	4,860,072	5,017,508	5,063,307	5,381,025	6,259,123 B1	6,534,343	6,710,405 B2	6,759,692	7,063,975 B2	
	4,881,106	5,034,796	5,187,117	5,486,715	6,306,728 B1	6,583,505	6,710,463	6,771,478 B2	7,071,537	

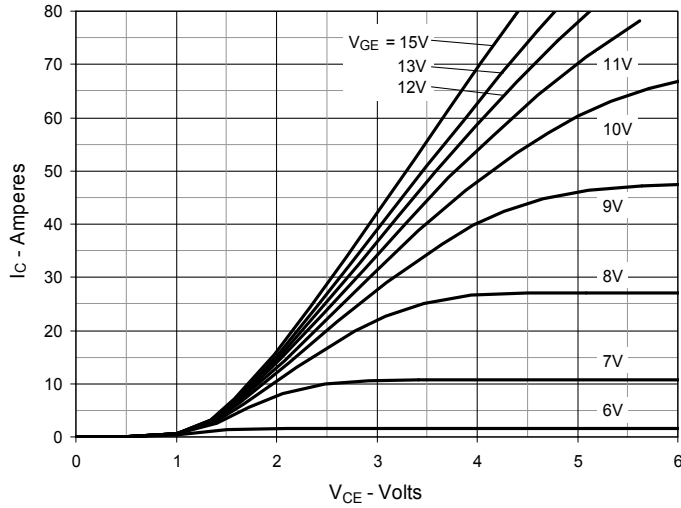
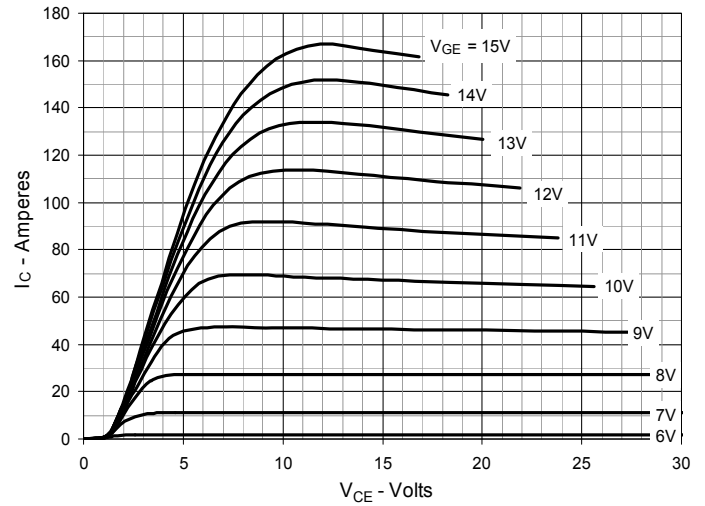
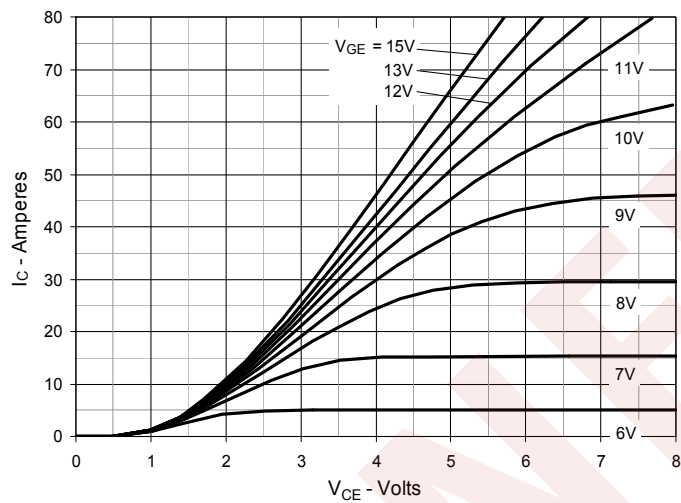
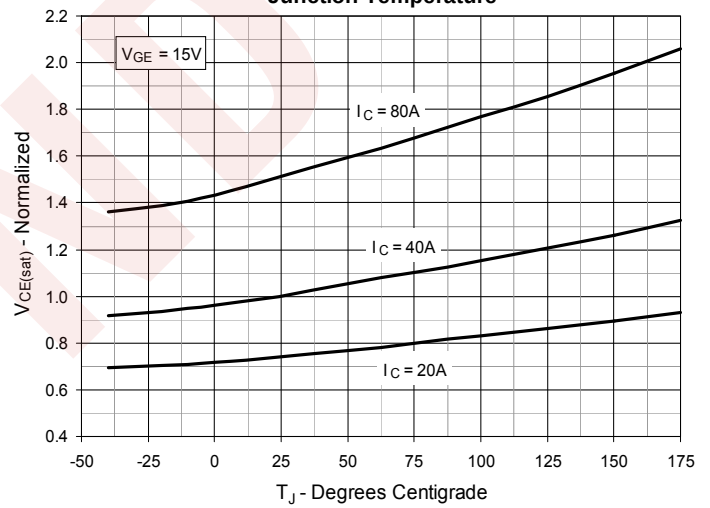
Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$ Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$ Fig. 3. Output Characteristics @ $T_J = 150^\circ\text{C}$ Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

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

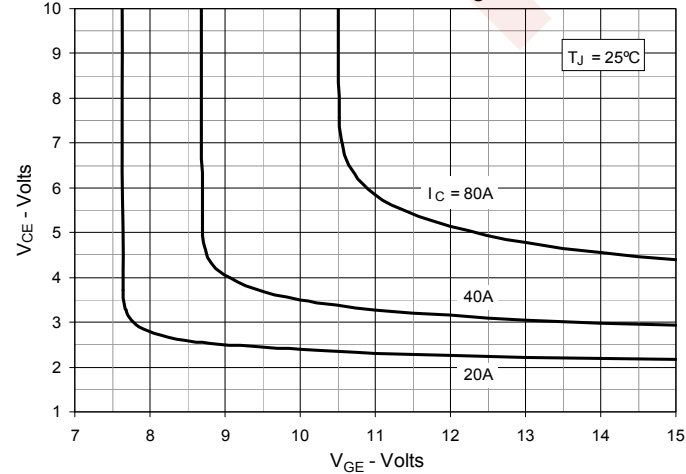


Fig. 6. Input Admittance

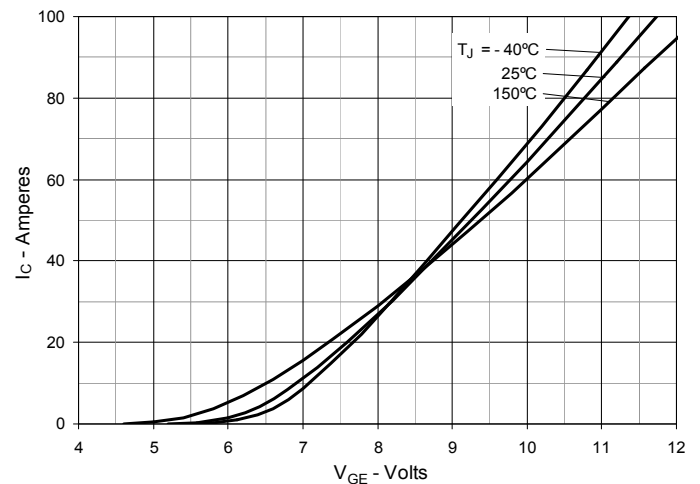


Fig. 7. Transconductance

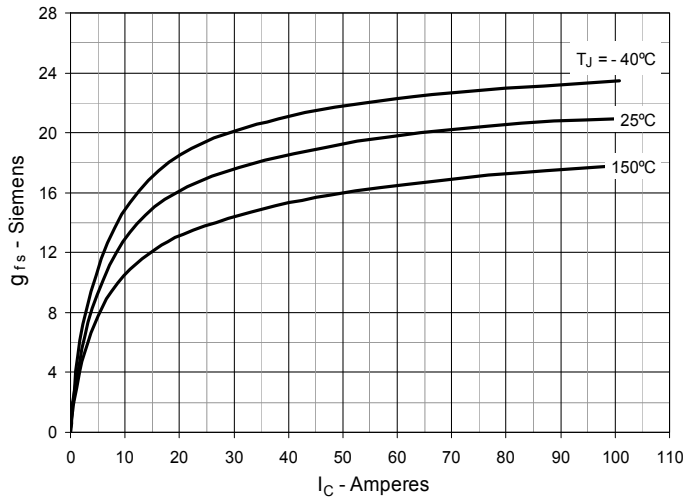


Fig. 8. Gate Charge

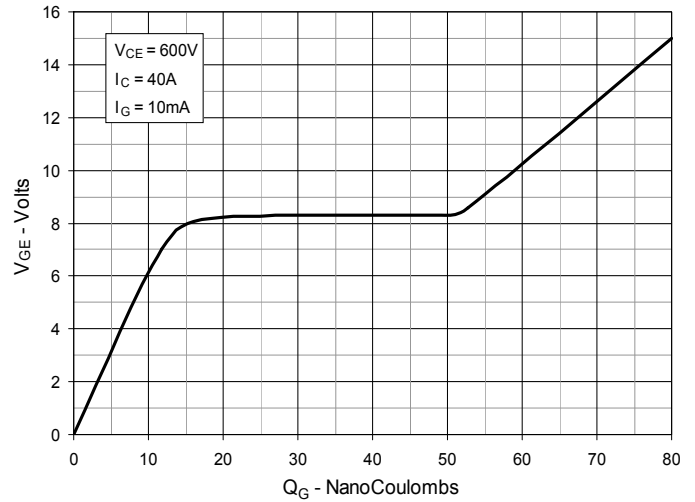


Fig. 9. Capacitance

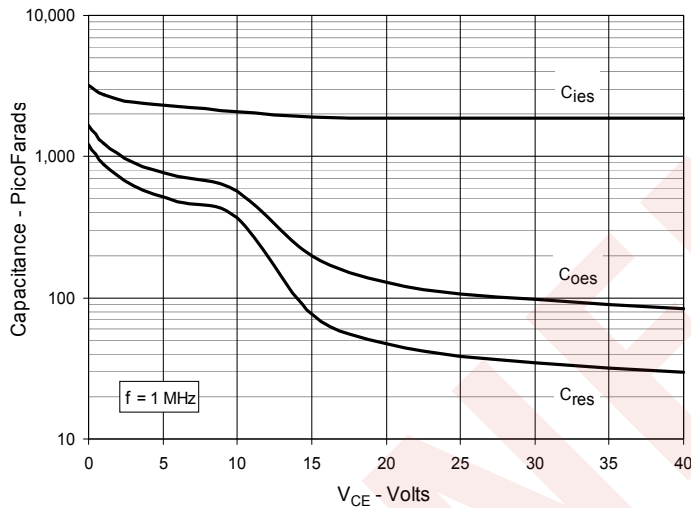


Fig. 10. Reverse-Bias Safe Operating Area

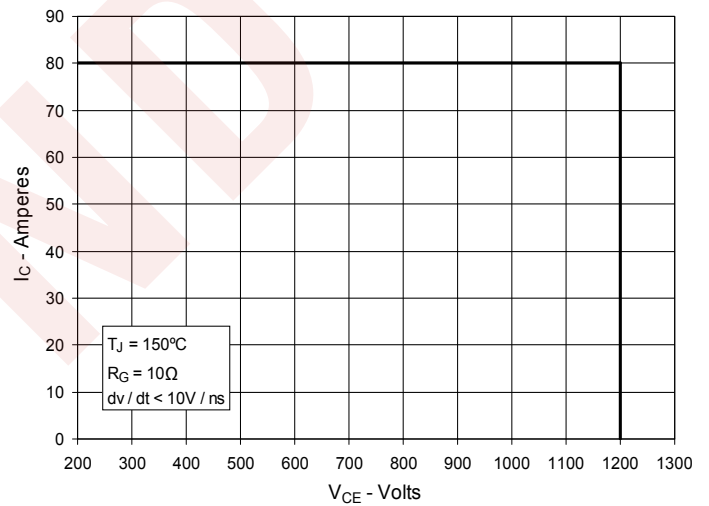


Fig. 11. Maximum Transient Thermal Impedance

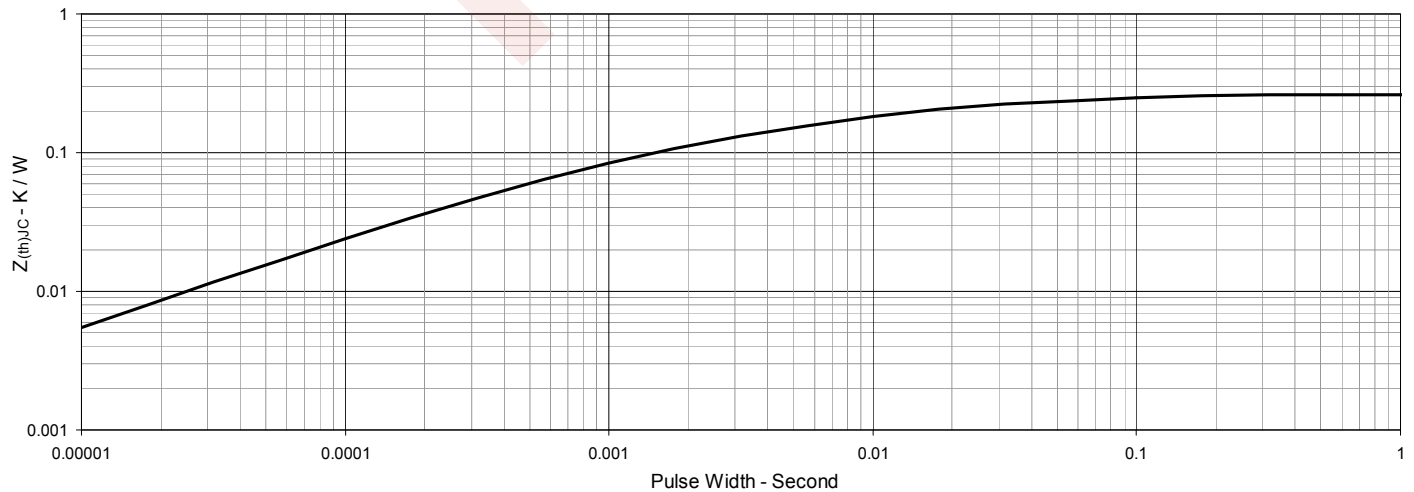


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

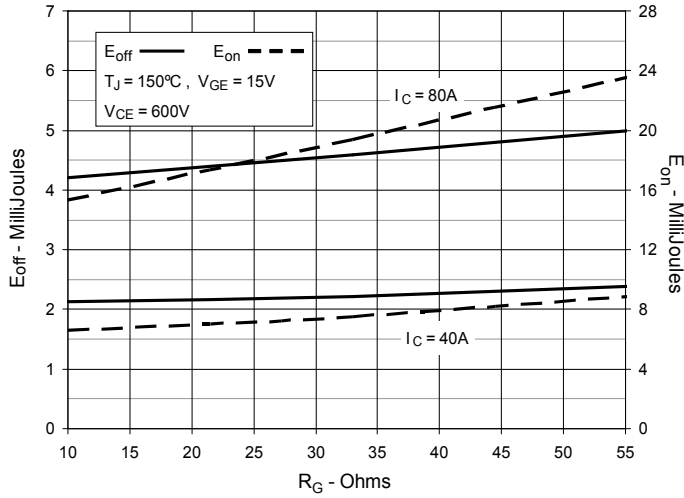


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

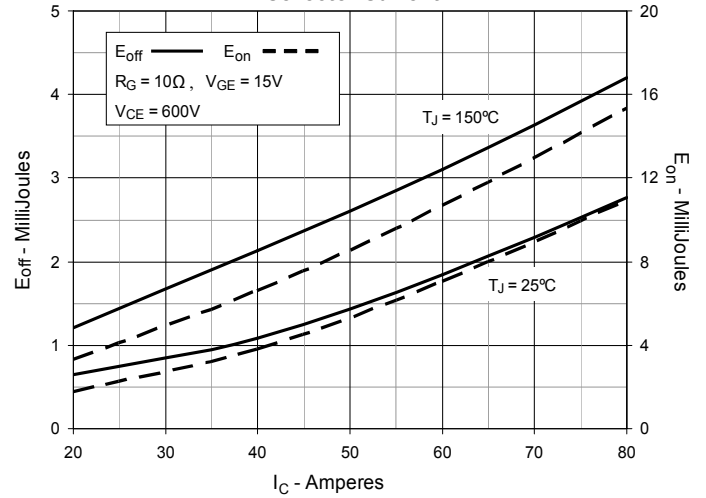


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

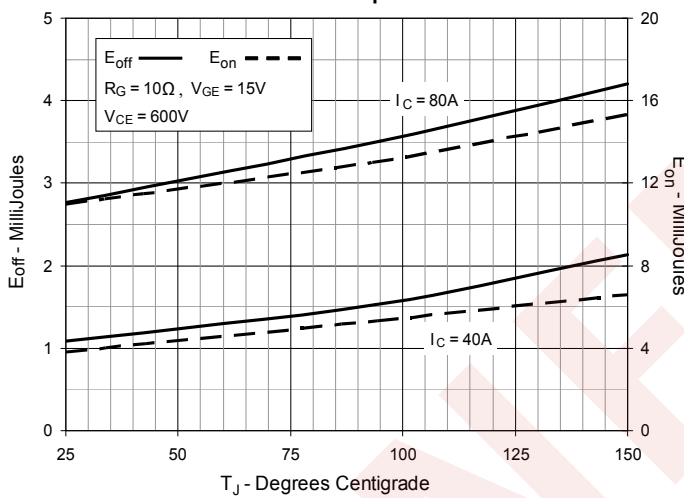


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

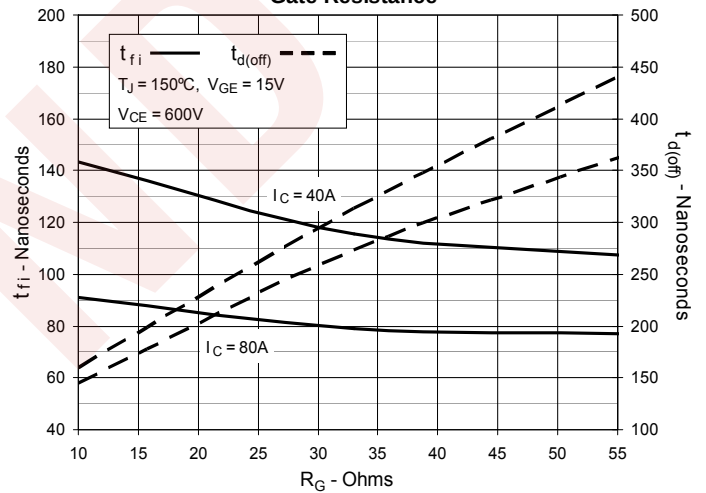


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

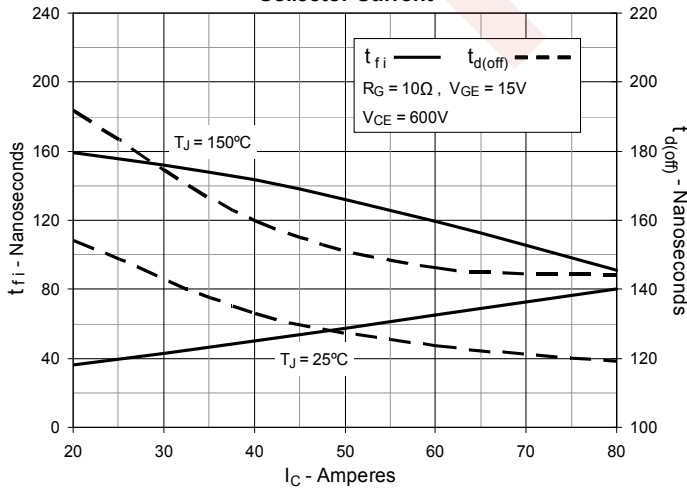


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

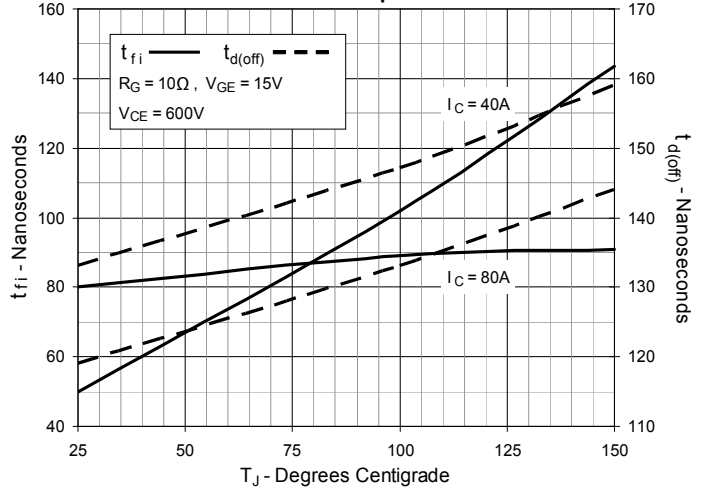


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

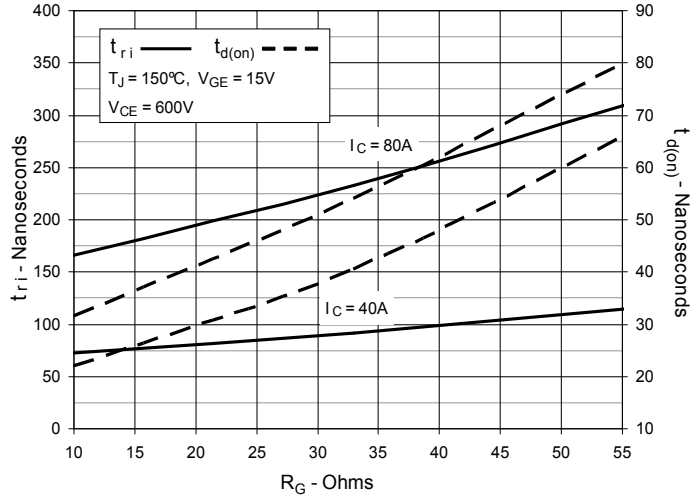


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

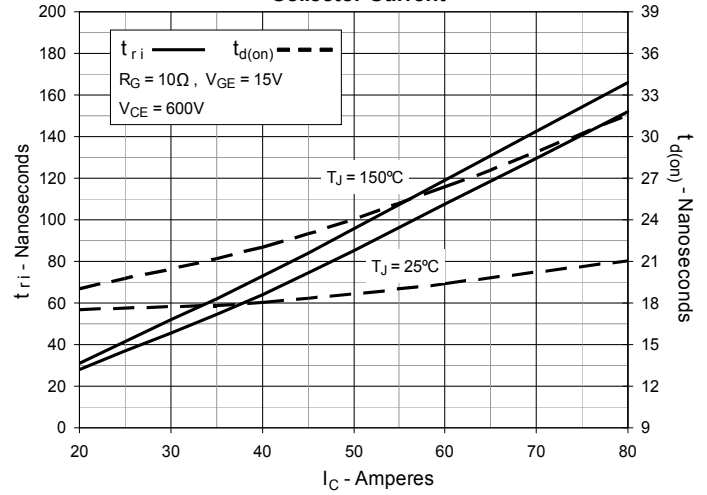


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature

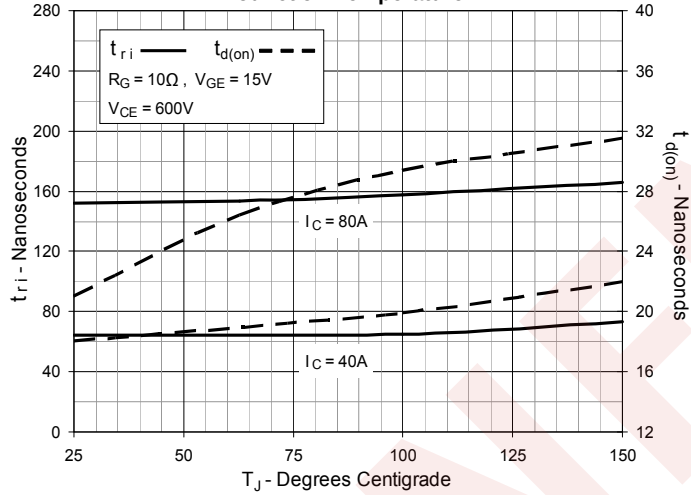


Fig. 21. Maximum Transient Thermal Impedance (Diode)

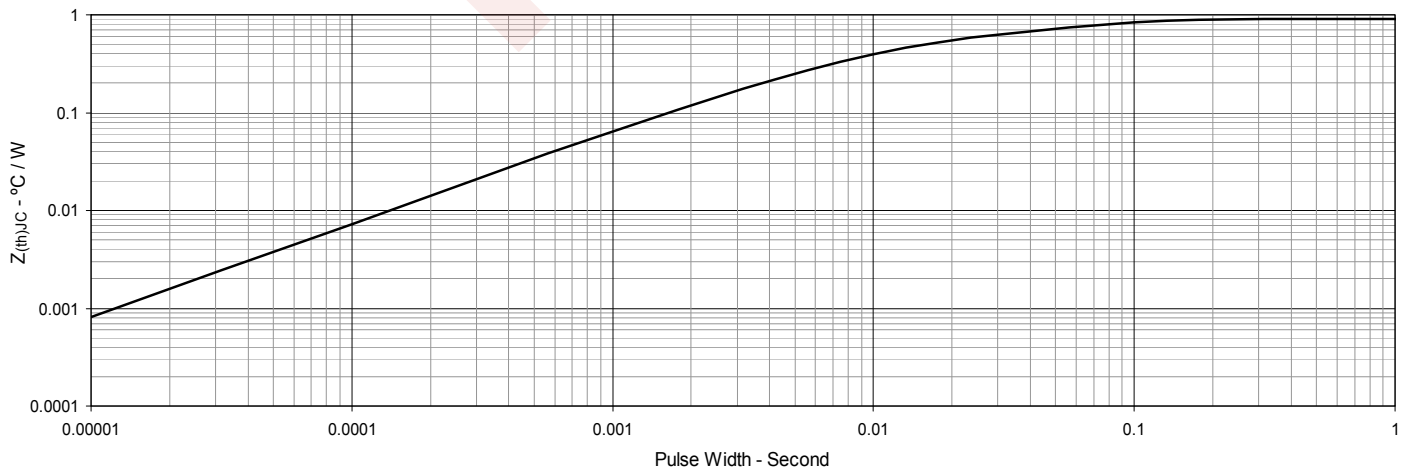
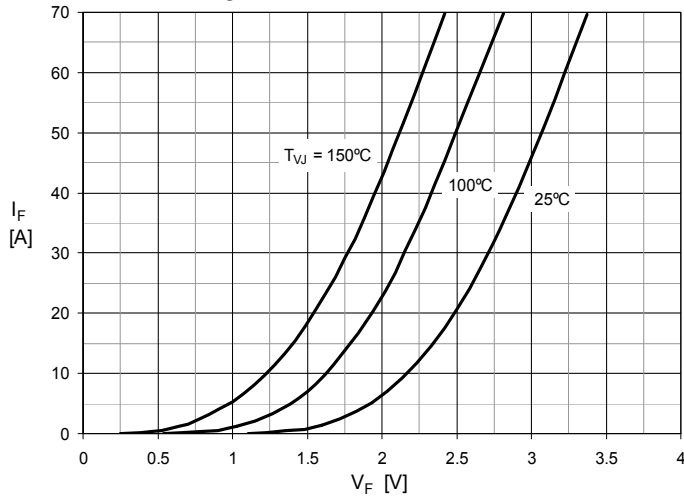
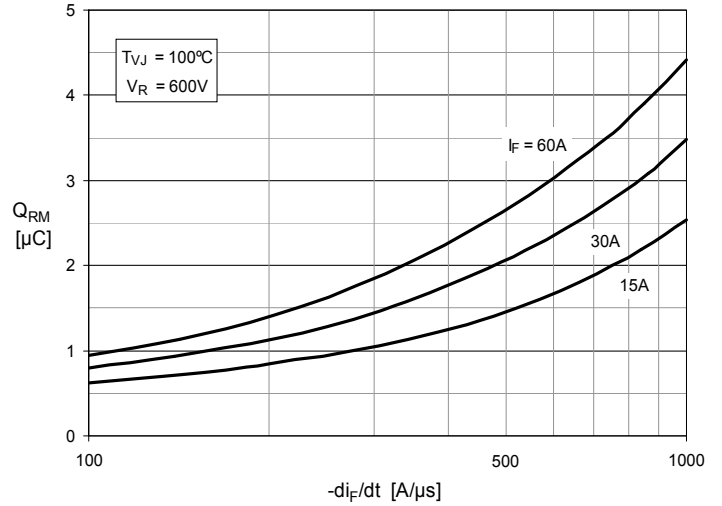
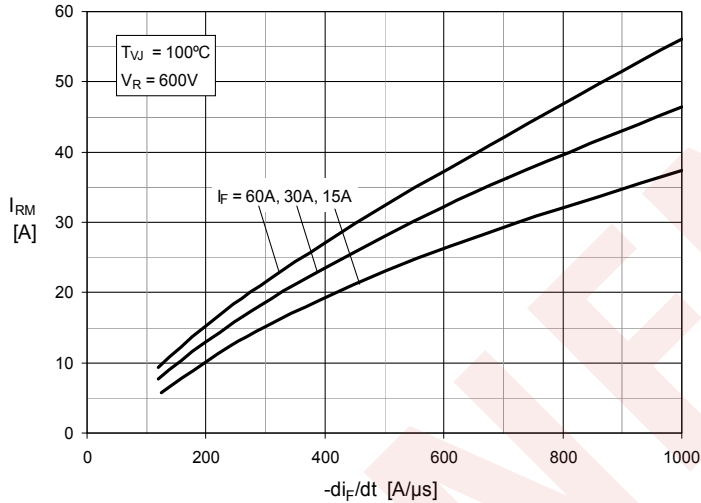
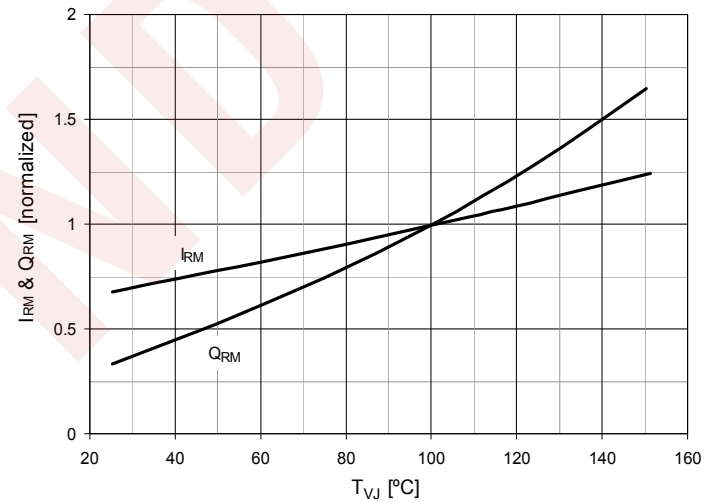
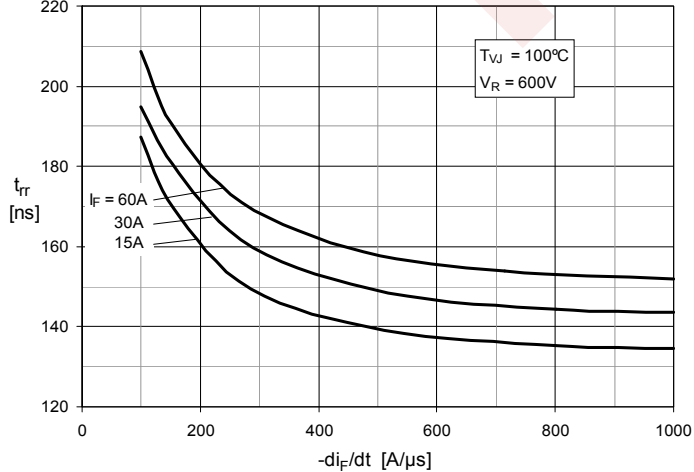
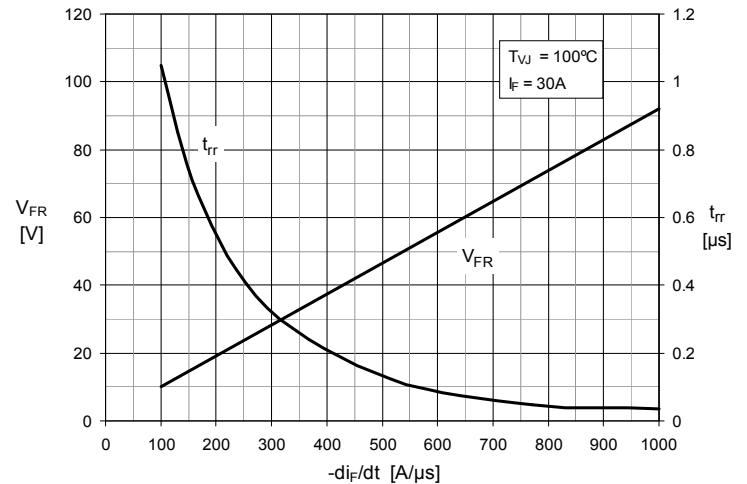


Fig. 22. Forward Current I_F vs V_F Fig. 23. Reverse Recovery Charge Q_{RM} vs. $-di_F/dt$ Fig. 24. Peak Reverse Current I_{RM} vs. $-di_F/dt$ Fig. 25. Dynamic Parameters Q_{RM} , I_{RM} vs. T_{VJ} Fig. 26. Recovery Time t_{rr} vs. $-di_F/dt$ Fig. 27. Peak Forward Voltage V_{FR} , t_{rr} vs $-di_F/dt$ 

NOT FOR NEW DESIGN

NEW



IXYS
A Littelfuse Technology

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.