

**1200V XPT™ IGBT
GenX3™ w/ Diode**
IXYH50N120C3D1

 High-Speed IGBT
for 20-50 kHz Switching

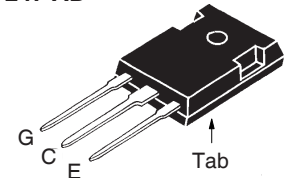

$$V_{CES} = 1200V$$

$$I_{C110} = 50A$$

$$V_{CE(sat)} \leq 3.0V$$

$$t_{fi(typ)} = 57ns$$

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^\circ C$ to $150^\circ C$	1200	V
V_{CGR}	$T_J = 25^\circ C$ to $150^\circ C$, $R_{GE} = 1M\Omega$	1200	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ C$	105	A
I_{C110}	$T_C = 110^\circ C$	50	A
I_{F110}	$T_C = 110^\circ C$	25	A
I_{CM}	$T_C = 25^\circ C$, 1ms	230	A
I_A	$T_C = 25^\circ C$	40	A
E_{AS}	$T_C = 25^\circ C$	750	mJ
SSOA (RBSOA)	$V_{GE} = 15V$, $T_{VJ} = 125^\circ C$, $R_G = 5\Omega$ Clamped Inductive Load	$I_{CM} = 100$ $@V_{CE} \leq V_{CES}$	A
P_C	$T_C = 25^\circ C$	625	W
T_J		-55 ... +150	$^\circ C$
T_{JM}		150	$^\circ C$
T_{stg}		-55 ... +150	$^\circ C$
T_L	Maximum Lead Temperature for Soldering	300	$^\circ C$
T_{SOLD}	1.6 mm (0.062in.) from Case for 10s	260	$^\circ C$
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

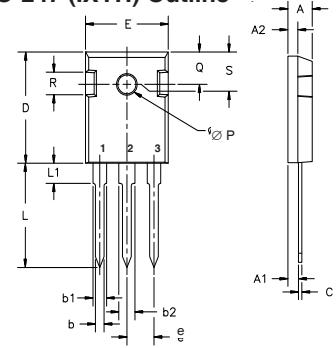
Applications

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

Symbol	Test Conditions ($T_J = 25^\circ C$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
BV_{CES}	$I_C = 250\mu A$, $V_{GE} = 0V$	1200		V
$V_{GE(th)}$	$I_C = 250\mu A$, $V_{CE} = V_{GE}$	3.0		V
I_{CES}	$V_{CE} = V_{CES}$, $V_{GE} = 0V$ $T_J = 125^\circ C$			50 μA 500 μA
I_{GES}	$V_{CE} = 0V$, $V_{GE} = \pm 20V$			± 100 nA
$V_{CE(sat)}$	$I_C = 50A$, $V_{GE} = 15V$, Note 1 $T_J = 125^\circ C$		2.5 3.2	V V

Symbol Test Conditions		Characteristic Values		
(T _J = 25°C Unless Otherwise Specified)		Min.	Typ.	Max.
g_{fs}	I _C = 40A, V _{CE} = 10V, Note 1	22	37	S
C_{ies}	V _{CE} = 25V, V _{GE} = 0V, f = 1MHz		2770	pF
C_{oes}			195	pF
C_{res}			83	pF
Q_{g(on)}	I _C = 50A, V _{GE} = 15V, V _{CE} = 0.5 • V _{CES}		143	nC
Q_{ge}			17	nC
Q_{gc}			60	nC
t_{d(on)}	Inductive load, T_J = 25°C I _C = 40A, V _{GE} = 15V V _{CE} = 0.5 • V _{CES} , R _G = 5Ω Note 2		24	ns
t_{ri}			50	ns
E_{on}			2.58	mJ
t_{d(off)}			240	ns
t_{fi}			57	ns
E_{off}			1.20	2.00 mJ
t_{d(on)}	Inductive load, T_J = 125°C I _C = 40A, V _{GE} = 15V V _{CE} = 0.5 • V _{CES} , R _G = 5Ω Note 2		25	ns
t_{ri}			57	ns
E_{on}			5.14	mJ
t_{d(off)}			274	ns
t_{fi}			98	ns
E_{off}			1.47	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		Inches	
	Min.	Max.	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		Characteristic Value		
(T _J = 25°C, Unless Otherwise Specified)		Min.	Typ.	Max.
V_F	I _F = 30A, V _{GE} = 0V, Note 1 T _J = 150°C		1.6	2.8 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	
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.

ADVANCE TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

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
	4,850,072	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	

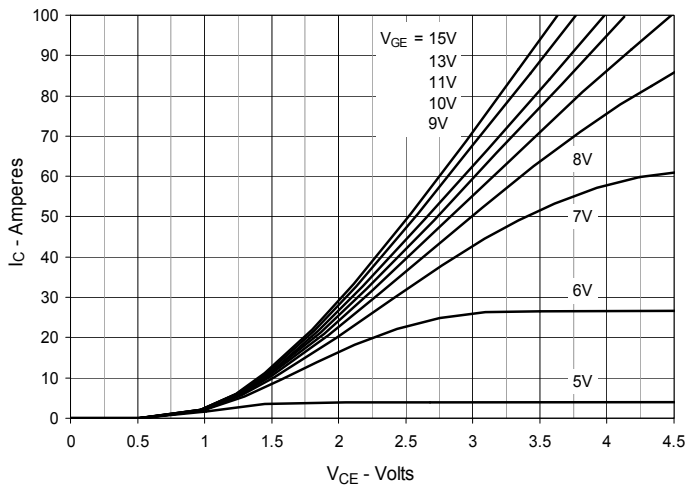
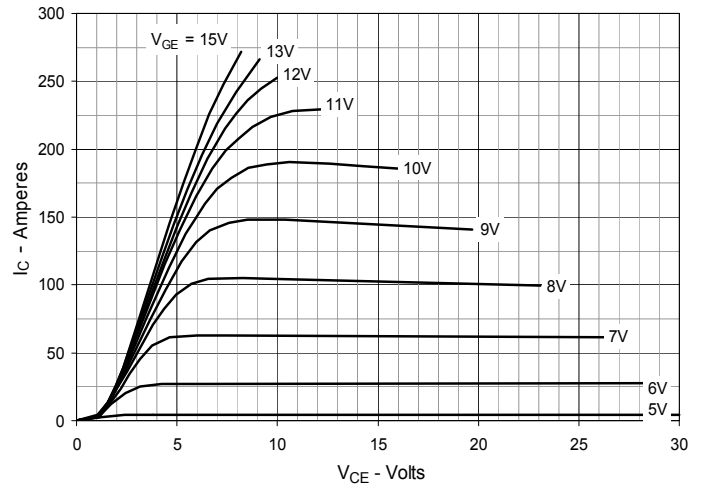
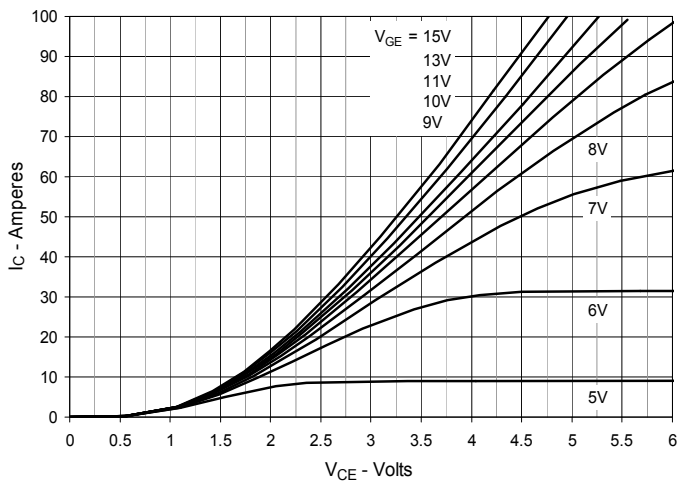
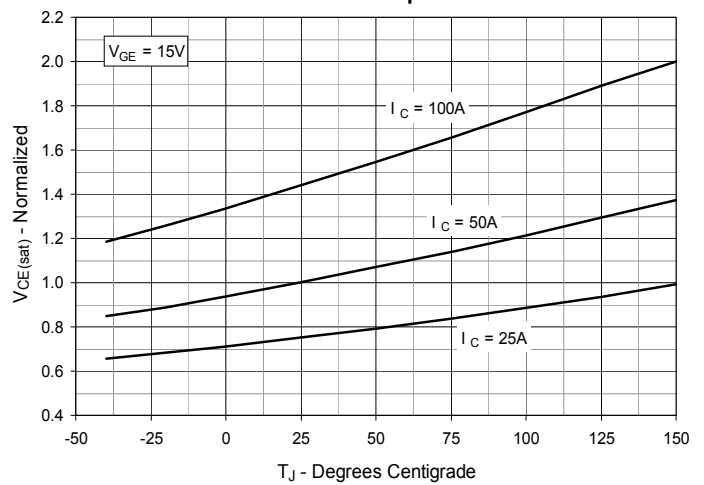
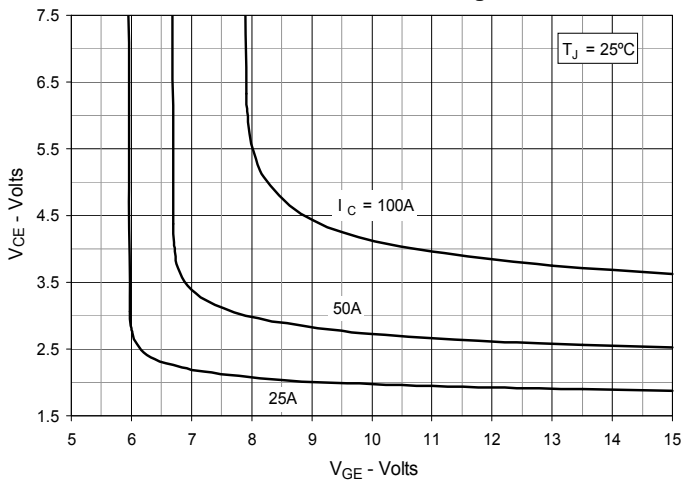
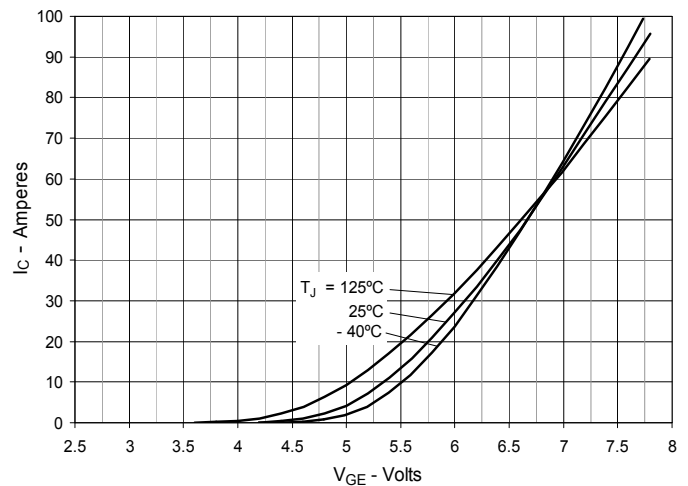
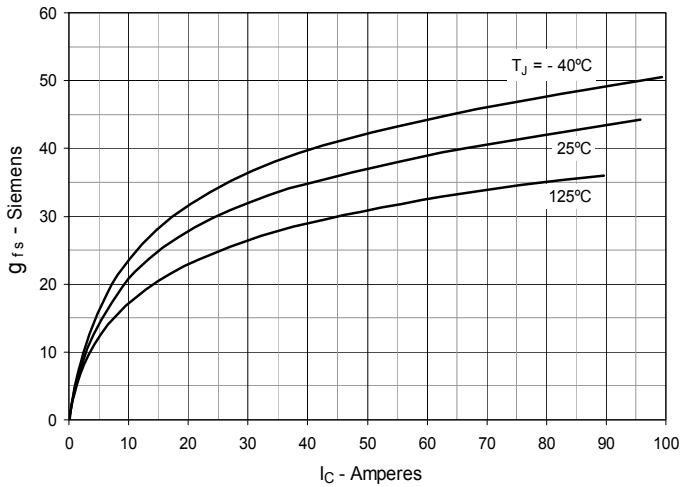
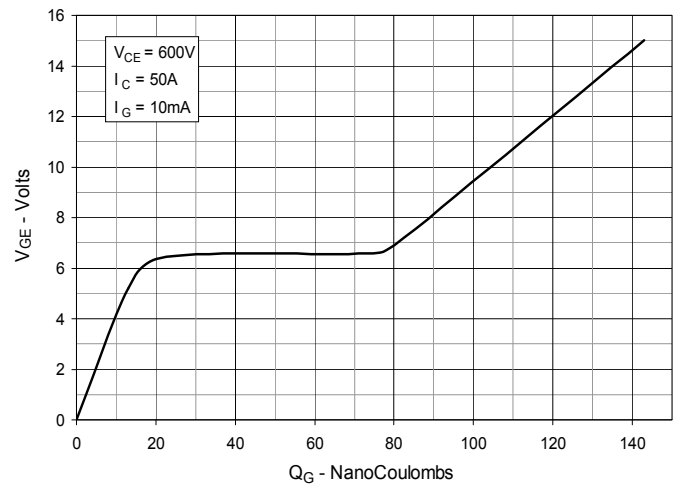
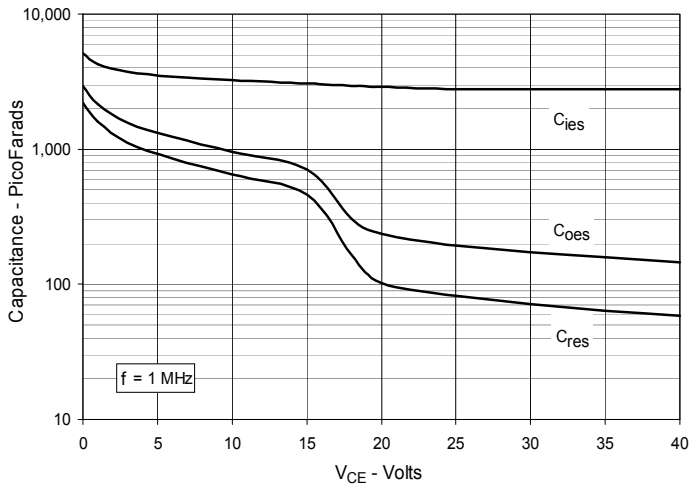
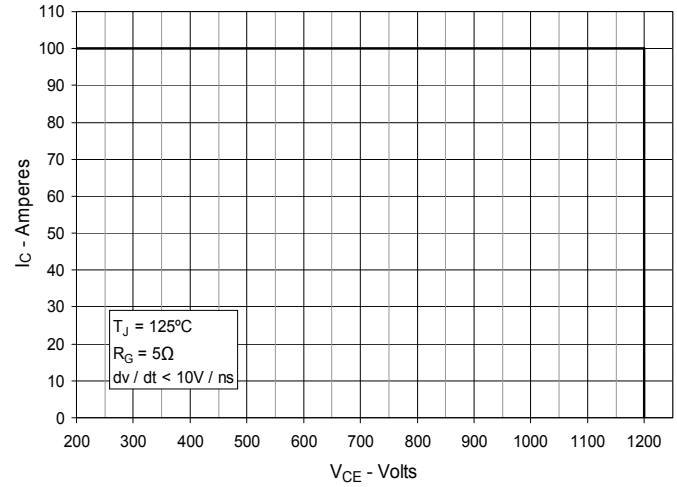
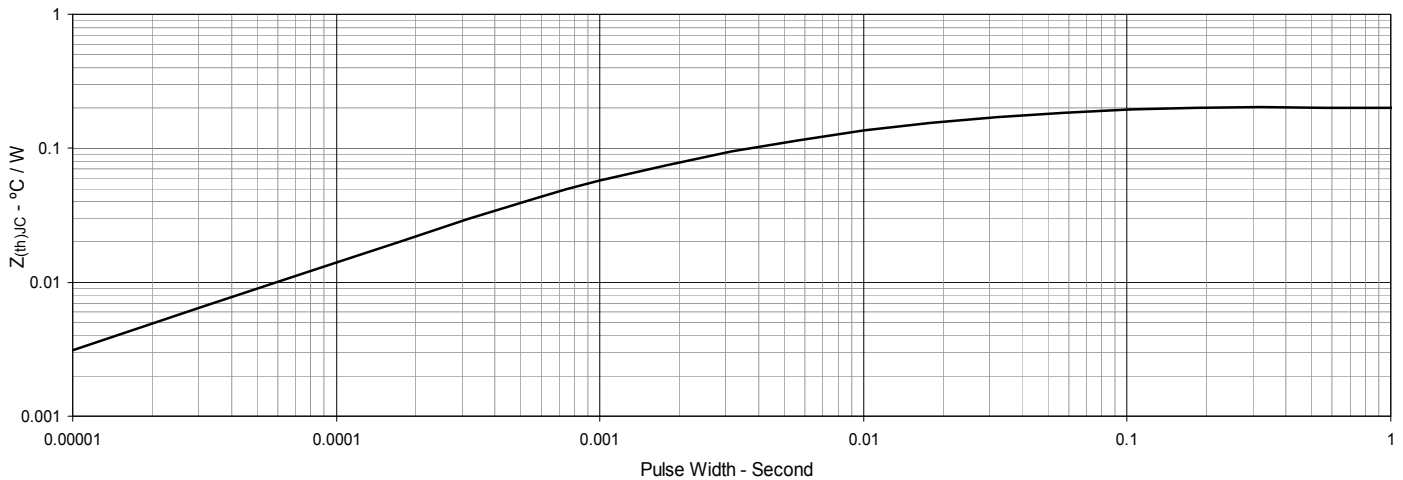
Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$

Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

Fig. 3. Output Characteristics @ $T_J = 125^\circ\text{C}$

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


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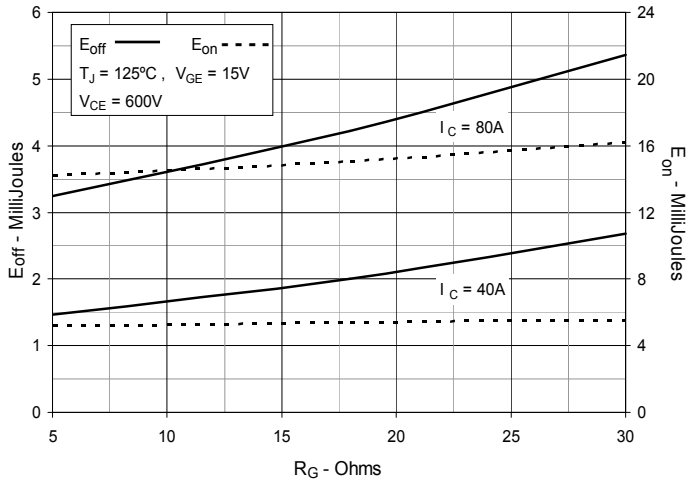
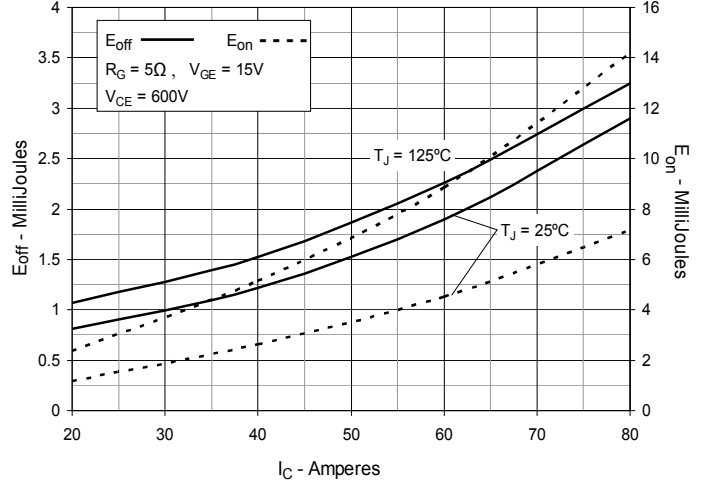
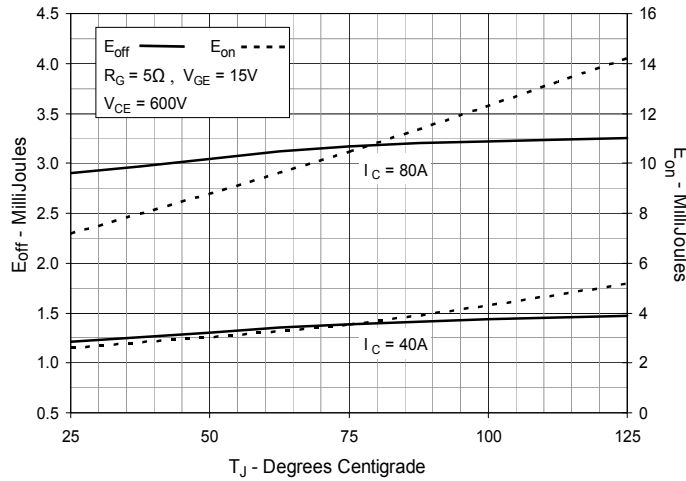
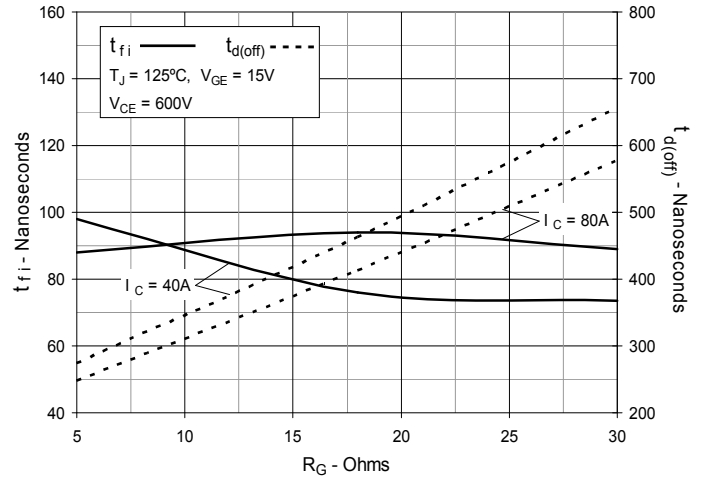
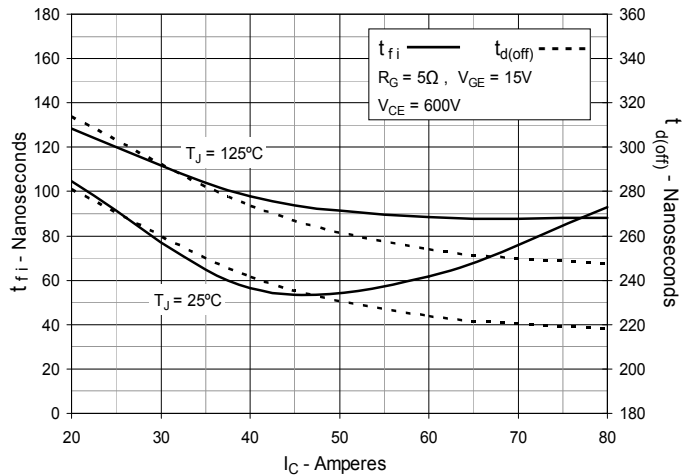
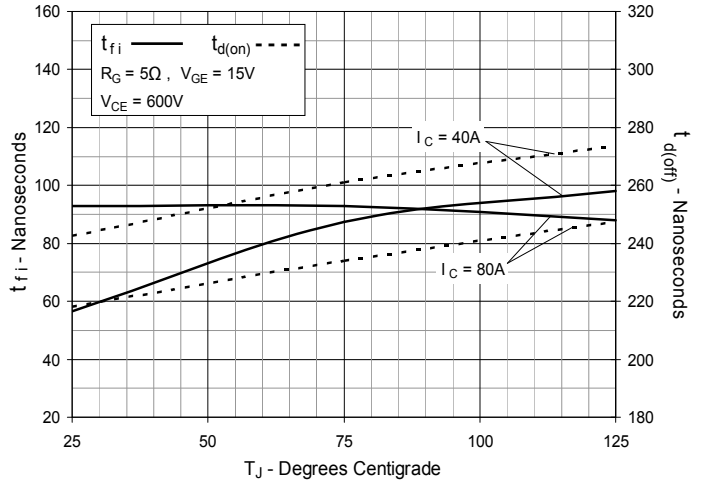
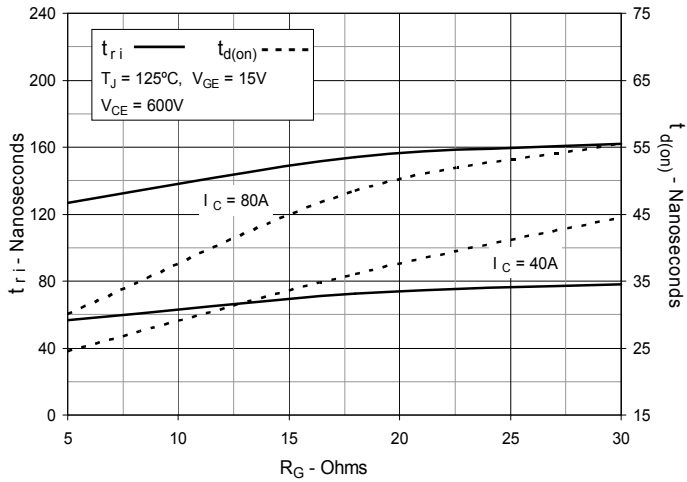
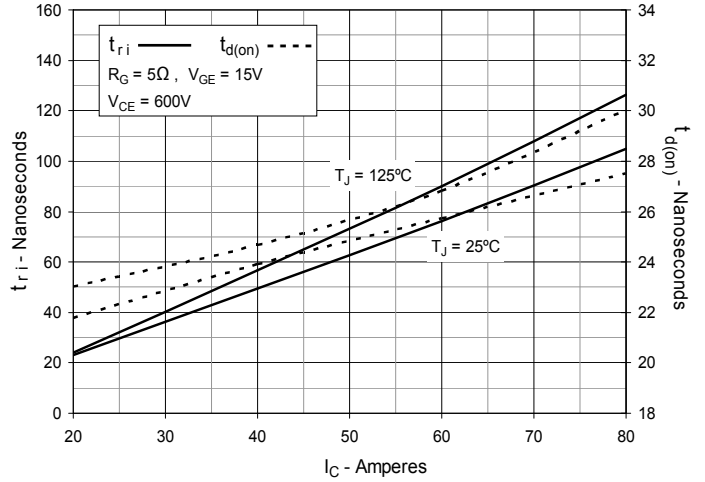
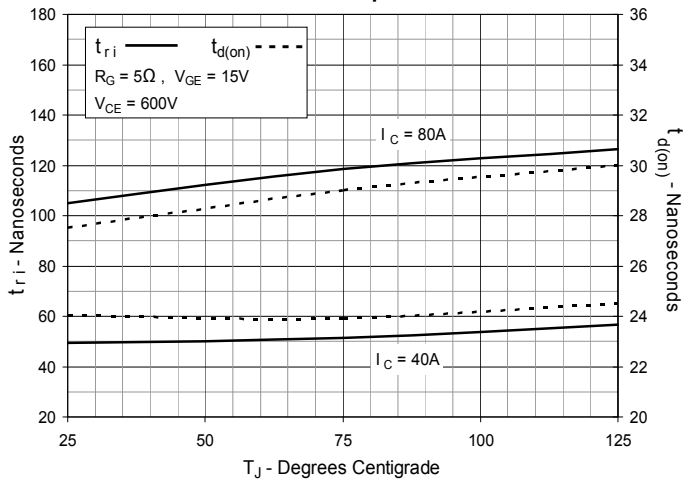
Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

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


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


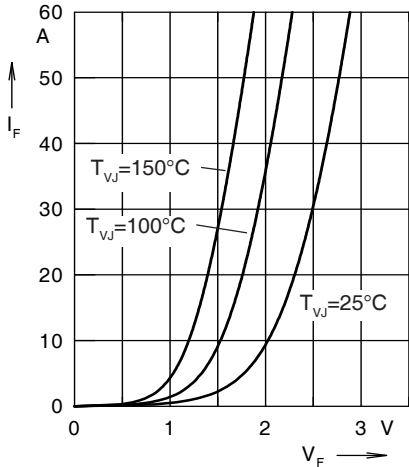
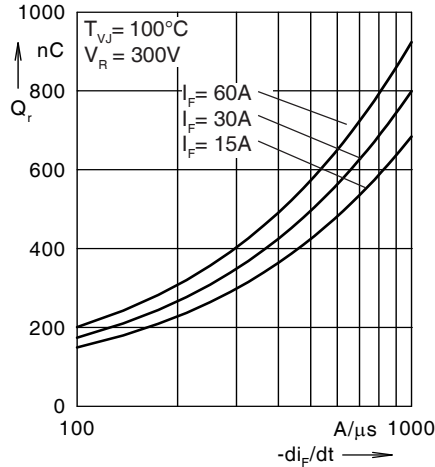
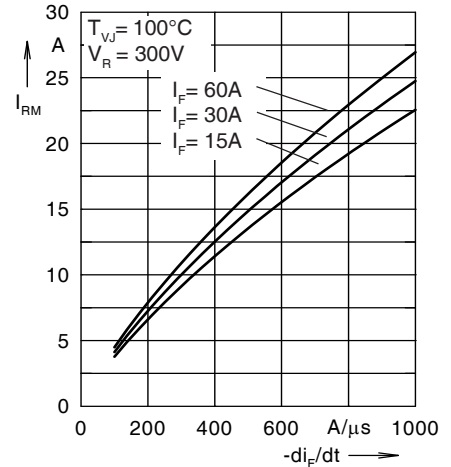
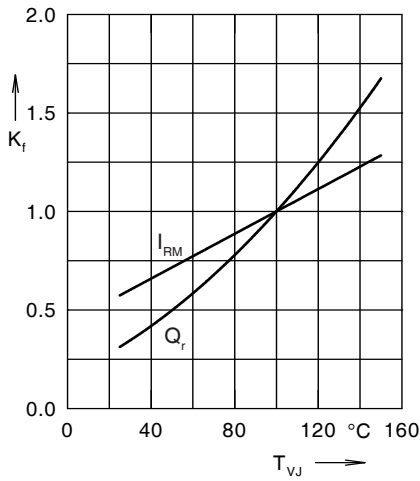
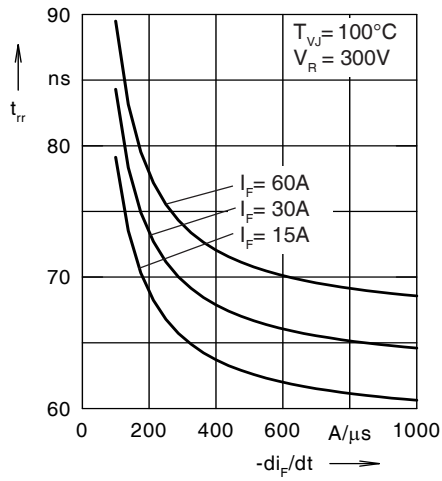
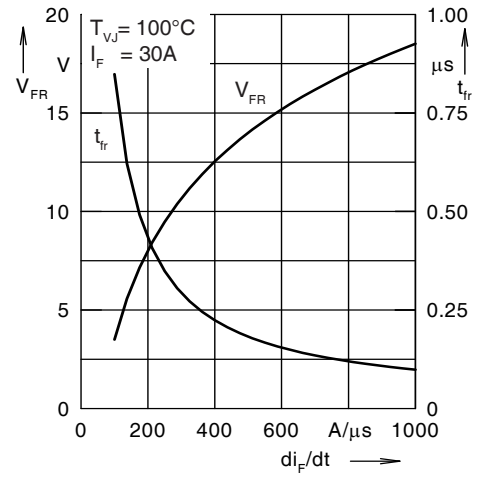
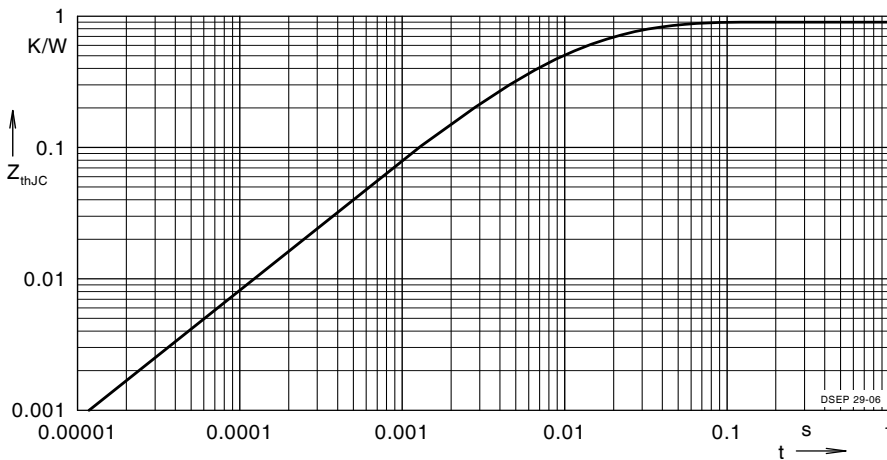

 Fig. 21. Forward Current I_F Versus V_F

 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