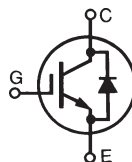


XPT™ 600V IGBT GenX3™ w/ Diode

(Electrically Isolated Tab)

Extreme Light Punch Through
IGBT for 10-30kHz Switching

MMIX1X100N60B3H1

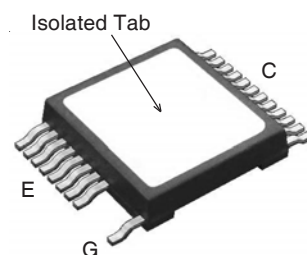
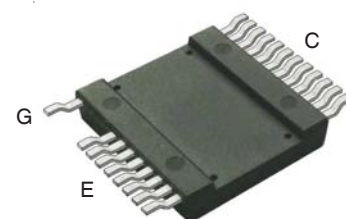


$$V_{CES} = 600V$$

$$I_{C110} = 68A$$

$$V_{CE(sat)} \leq 1.80V$$

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^{\circ}C$ to $150^{\circ}C$	600	V
V_{CGR}	$T_J = 25^{\circ}C$ to $150^{\circ}C$, $R_{GE} = 1M\Omega$	600	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^{\circ}C$ (Chip Capability)	145	A
I_{C110}	$T_C = 110^{\circ}C$	68	A
I_{F90}	$T_C = 90^{\circ}C$	54	A
I_{CM}	$T_C = 25^{\circ}C$, 1ms	440	A
I_A	$T_C = 25^{\circ}C$	50	A
E_{AS}	$T_C = 25^{\circ}C$	600	mJ
SSOA (RBSOA)	$V_{GE} = 15V$, $T_{VJ} = 150^{\circ}C$, $R_G = 2\Omega$ Clamped Inductive Load	$I_{CM} = 200$ $V_{CE} \leq V_{CES}$	A
t_{sc} (SCSOA)	$V_{GE} = 15V$, $V_{CE} = 360V$, $T_J = 150^{\circ}C$ $R_G = 10\Omega$, Non Repetitive	10	μs
P_C	$T_C = 25^{\circ}C$	400	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 (0.062 in.) from Case for 10s	260	$^{\circ}C$
V_{ISOL}	50/60Hz, 1 minute	2500	V~
F_C	Mounting Force	50..200/11..45	N/lb.
Weight		8	g



G = Gate
C = Collector

E = Emitter

Features

- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Mounting Surface
- 2500V~ Electrical Isolation
- Optimized for 10-30kHz Switching
- Square RBSOA
- FBSOA
- Avalanche Rated
- Short Circuit Capability
- Anti-Parallel Ultra Fast Diode
- High Current Handling Capability

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 ($T_J = 25^{\circ}C$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
BV_{CES}	$I_C = 250\mu A$, $V_{GE} = 0V$	600		V
$V_{GE(th)}$	$I_C = 250\mu A$, $V_{CE} = V_{GE}$	3.0		5.5 V
I_{CES}	$V_{CE} = V_{CES}$, $V_{GE} = 0V$ $T_J = 125^{\circ}C$			50 μA 4 mA
I_{GES}	$V_{CE} = 0V$, $V_{GE} = \pm 20V$			± 100 nA
$V_{CE(sat)}$	$I_C = 70A$, $V_{GE} = 15V$, Note 1 $T_J = 150^{\circ}C$		1.50 1.77	1.80 V V

Symbol Test Conditions(T_J = 25°C Unless Otherwise Specified)**Characteristic Values****Min. Typ. Max.**

g_{fs}	I _C = 60A, V _{CE} = 10V, Note 1	22	40	S
C_{ies}	V _{CE} = 25V, V _{GE} = 0V, f = 1MHz		4860	pF
C_{oes}			475	pF
C_{res}			83	pF
Q_{g(on)}	I _C = 70A, V _{GE} = 15V, V _{CE} = 0.5 • V _{CES}		143	nC
Q_{ge}			37	nC
Q_{gc}			60	nC
t_{d(on)}	Inductive load, T_J = 25°C I _C = 70A, V _{GE} = 15V V _{CE} = 360V, R _G = 2Ω Note 2		30	ns
t_{ri}			70	ns
E_{on}			1.9	mJ
t_{d(off)}			120	ns
t_{fi}			150	ns
E_{off}			2.0	2.8 mJ
t_{d(on)}	Inductive load, T_J = 150°C I _C = 70A, V _{GE} = 15V V _{CE} = 360V, R _G = 2Ω Note 2		32	ns
t_{ri}			60	ns
E_{on}			2.3	mJ
t_{d(off)}			150	ns
t_{fi}			200	ns
E_{off}			2.8	mJ
R_{thJC}				0.31 °C/W
R_{thCS}			0.05	°C/W

Reverse Diode (FRED)**Symbol Test Conditions**(T_J = 25°C Unless Otherwise Specified)**Characteristic Values****Min. Typ. Max.**

V_F	I _F = 60A, V _{GE} = 0V, Note 1	T _J = 150°C	1.6	2.5	V
			1.4	1.8	V
I_{RM}	I _F = 60A, V _{GE} = 0V, -di _F /dt = 200A/μs, V _R = 300V	T _J = 100°C	8.3		A
t_{rr}			140		ns
R_{thJC}				0.62 °C/W	

Notes:

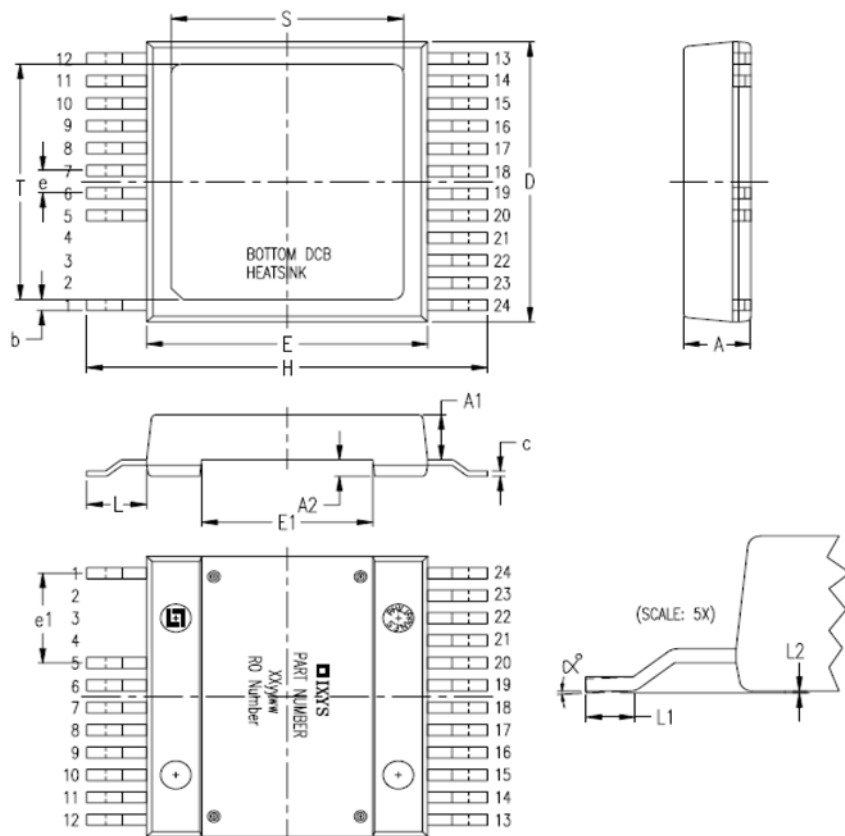
1. Pulse test, t ≤ 300μs, duty cycle, d ≤ 2%.
2. Switching times & energy losses may increase for higher V_{CE}(clamp), T_J or R_G.

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	4,931,844	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	

Package Outline



SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.209	.224	5.30	5.70
A1	.154	.161	3.90	4.10
A2	.055	.063	1.40	1.60
b	.035	.045	0.90	1.15
c	.018	.026	0.45	0.65
D	.976	.994	24.80	25.25
E	.898	.915	22.80	23.25
E1	.543	.559	13.80	14.20
e	.079 BSC		2.00 BSC	
e1	.315 BSC		8.00 BSC	
H	1.272	1.311	32.30	33.30
L	.181	.209	4.60	5.30
L1	.051	.067	1.30	1.70
L2	.000	.006	0.00	0.15
S	.736	.760	18.70	19.30
T	.815	.839	20.70	21.30
α	0	4°	0	4°

PIN: 1 = Gate
 5-12 = Emitter
 13-24 = Collector

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

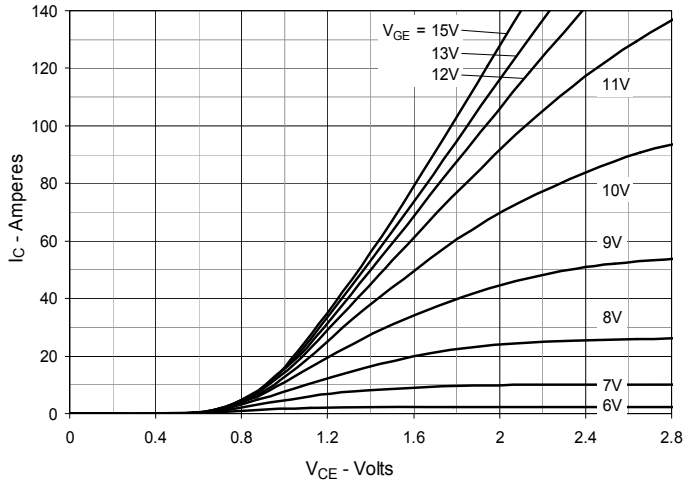


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

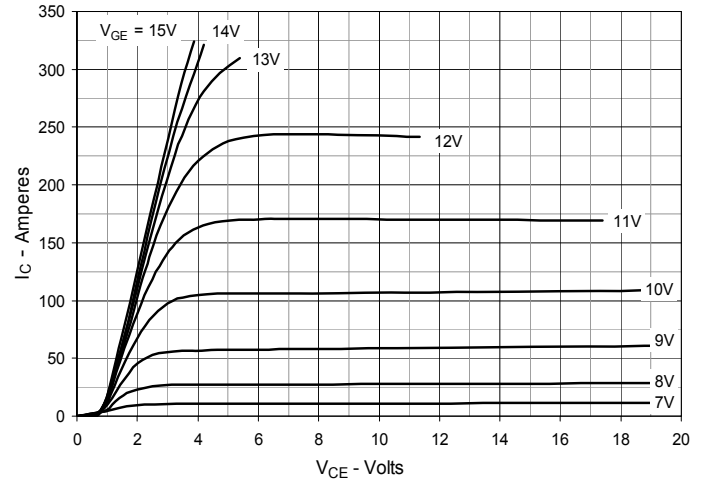


Fig. 3. Output Characteristics @ $T_J = 150^\circ\text{C}$

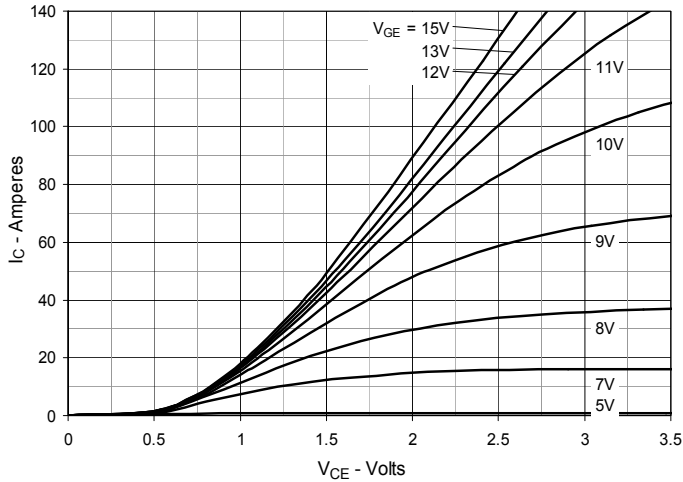


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

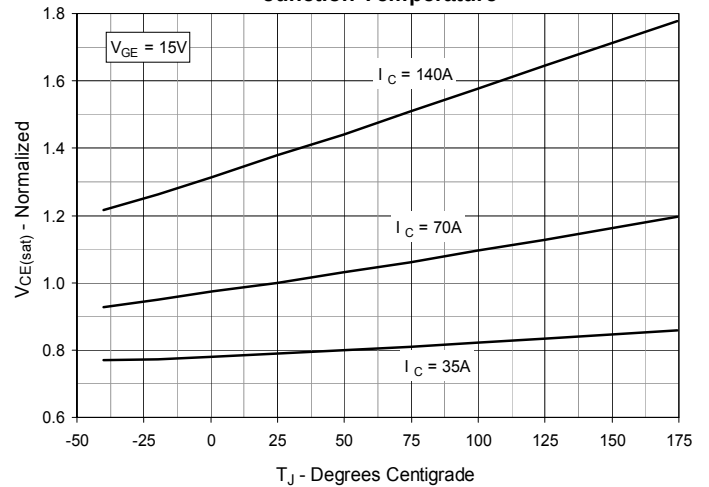


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

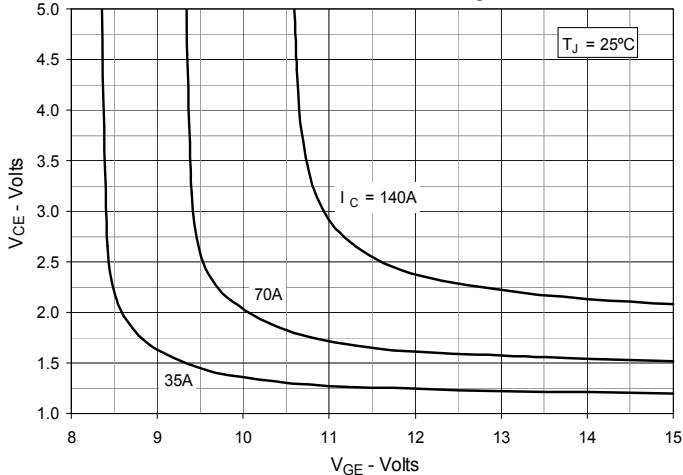


Fig. 6. Input Admittance

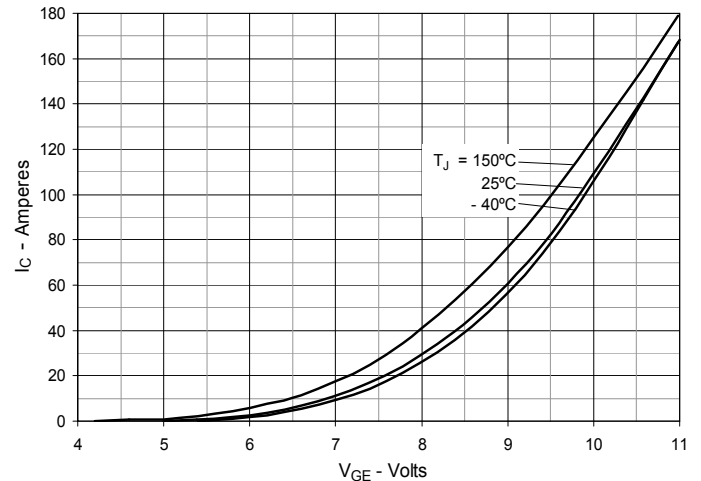


Fig. 7. Transconductance

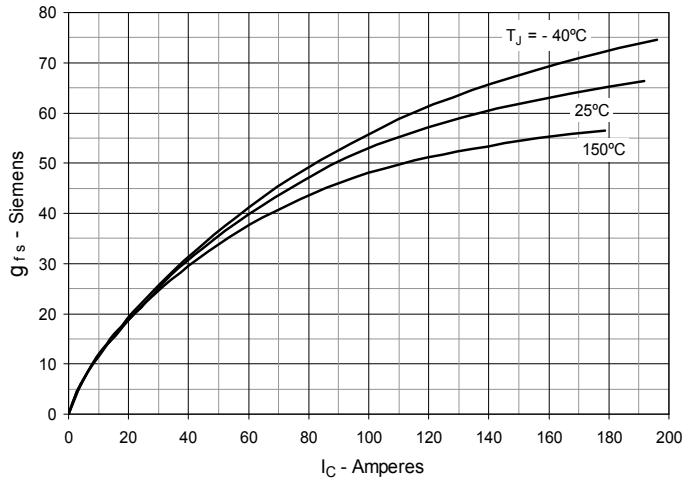


Fig. 8. Gate Charge

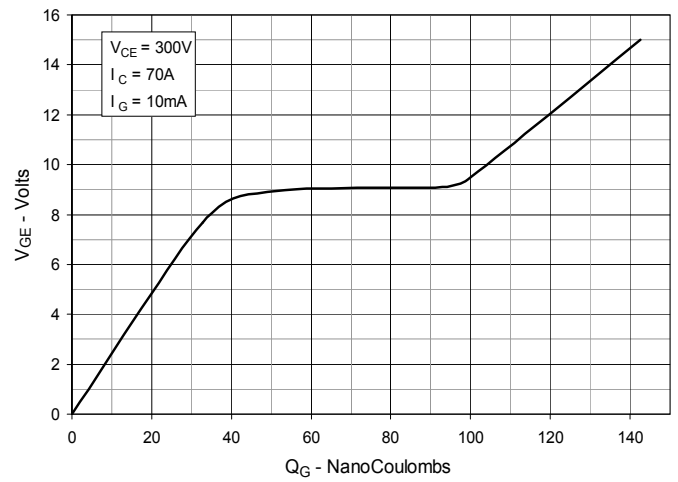


Fig. 9. Capacitance

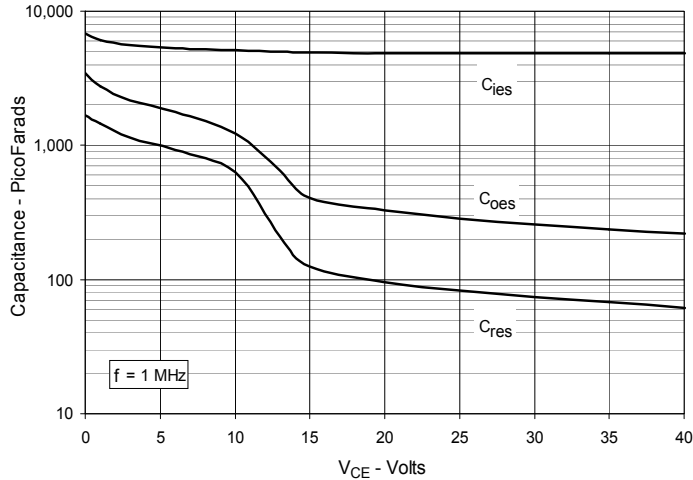


Fig. 10. Reverse-Bias Safe Operating Area

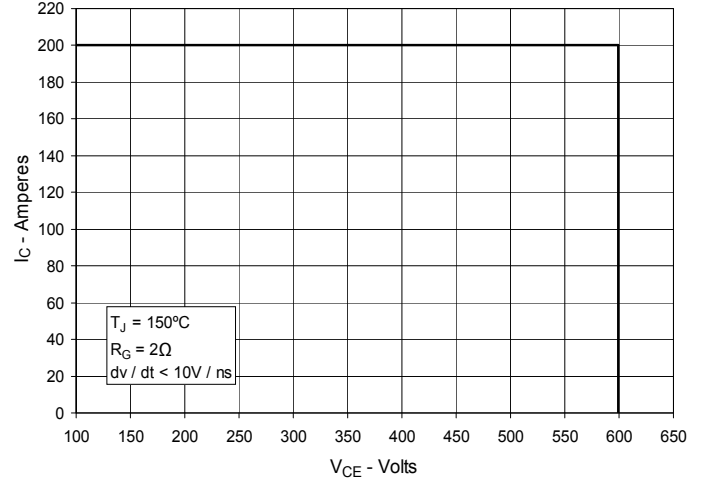


Fig. 11. Forward-Bias Safe Operating Area

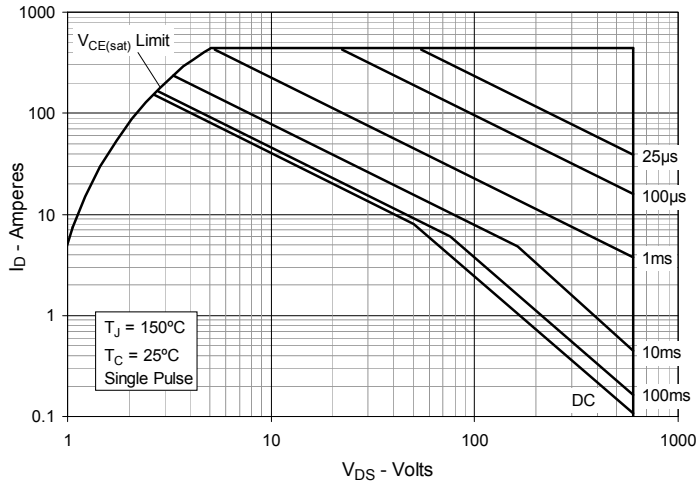


Fig. 12. Maximum Transient Thermal Impedance

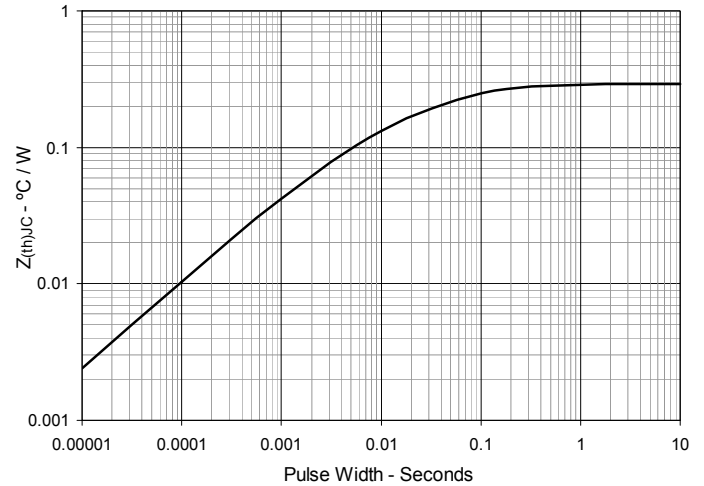


Fig. 13. Inductive Switching Energy Loss vs. Gate Resistance

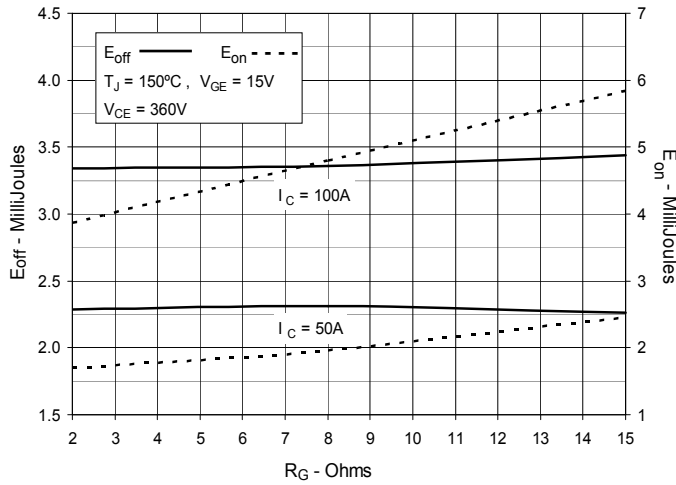


Fig. 14. Inductive Switching Energy Loss vs. Collector Current

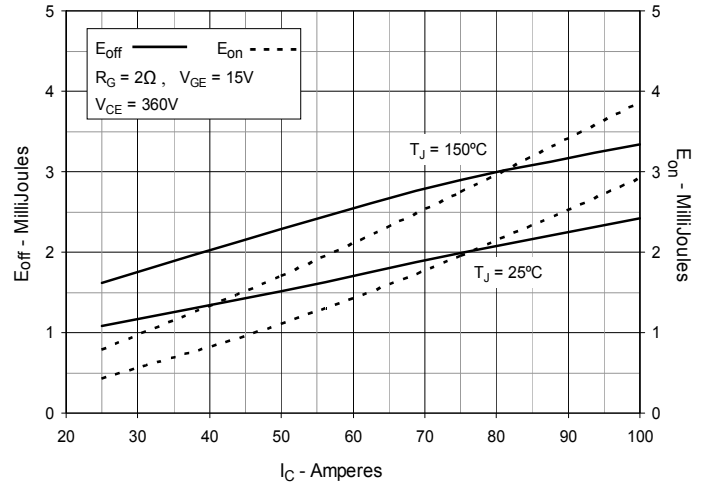


Fig. 15. Inductive Switching Energy Loss vs. Junction Temperature

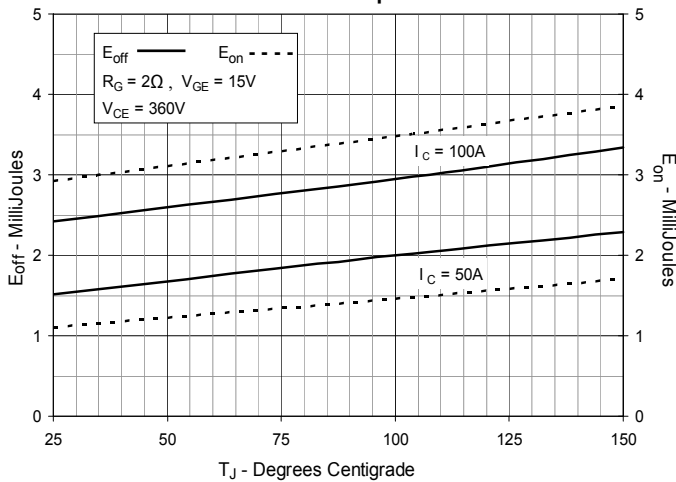


Fig. 16. Inductive Turn-off Switching Times vs. Gate Resistance

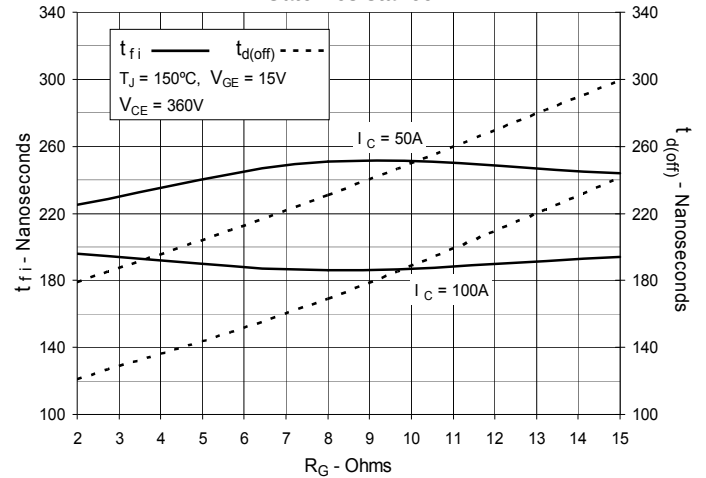


Fig. 17. Inductive Turn-off Switching Times vs. Collector Current

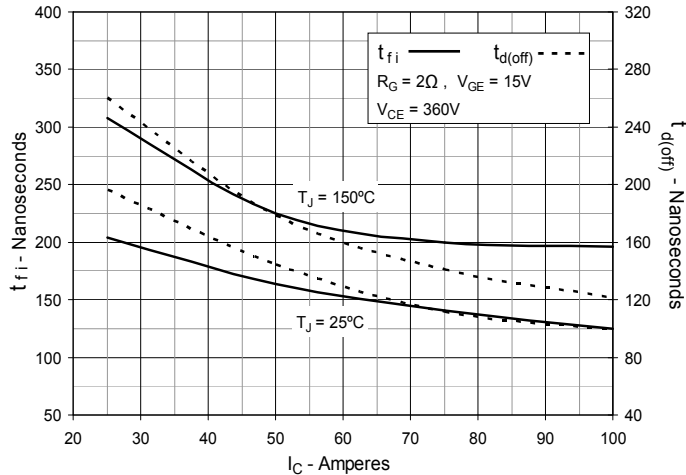


Fig. 18. Inductive Turn-off Switching Times vs. Junction Temperature

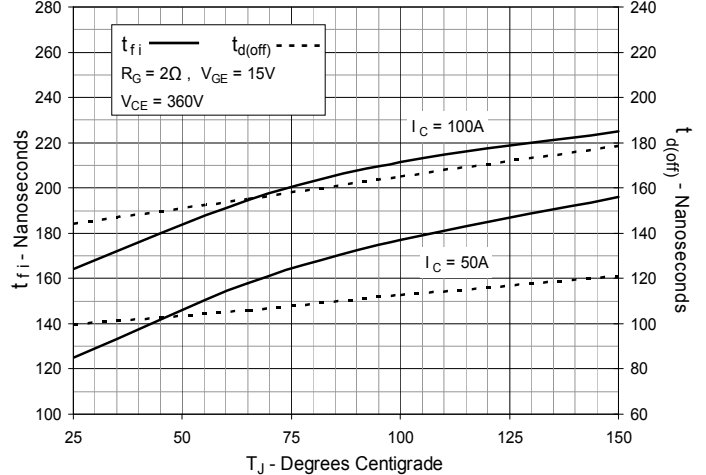


Fig. 19. Inductive Turn-on Switching Times vs. Gate Resistance

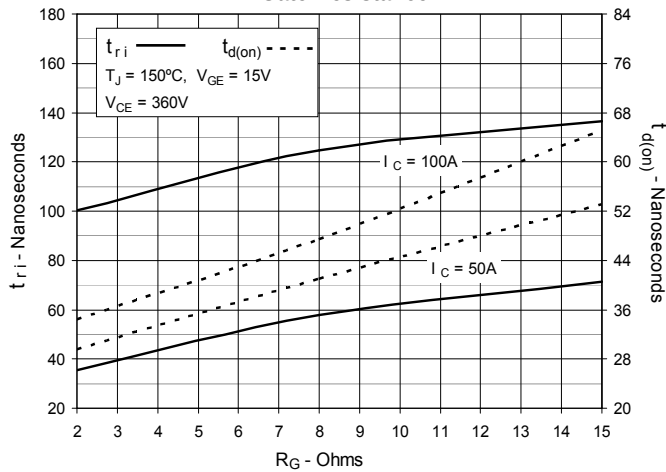


Fig. 20. Inductive Turn-on Switching Times vs. Collector Current

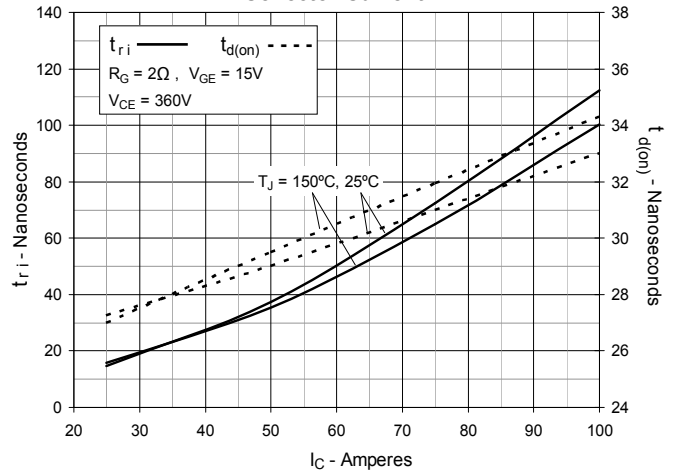
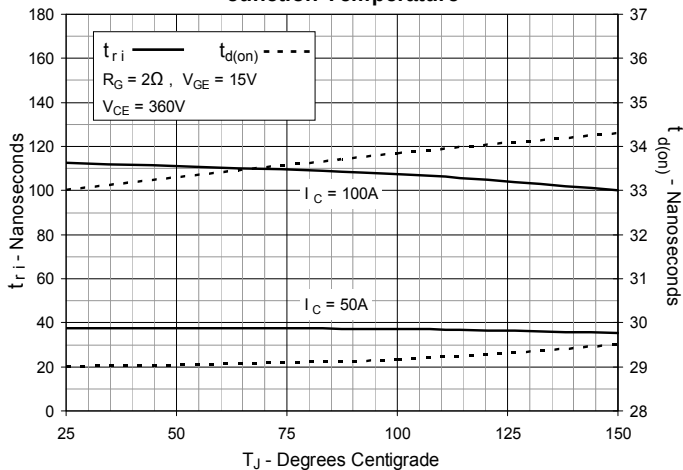
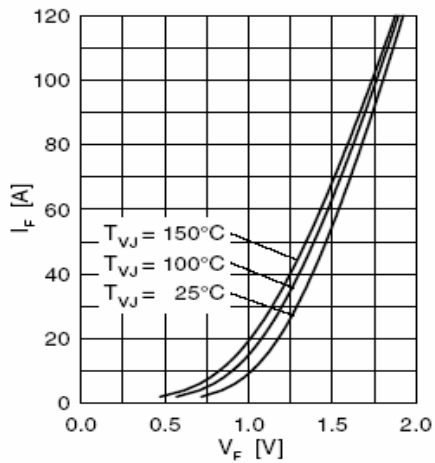
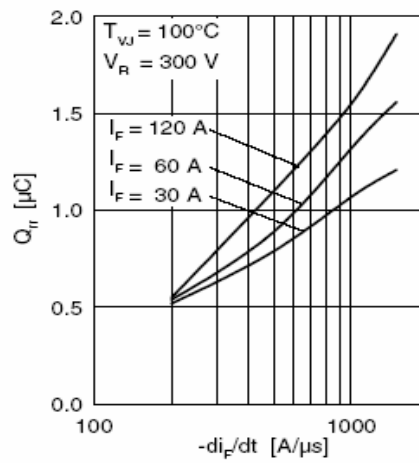
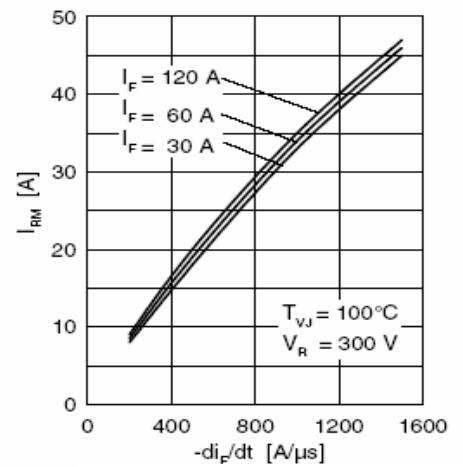
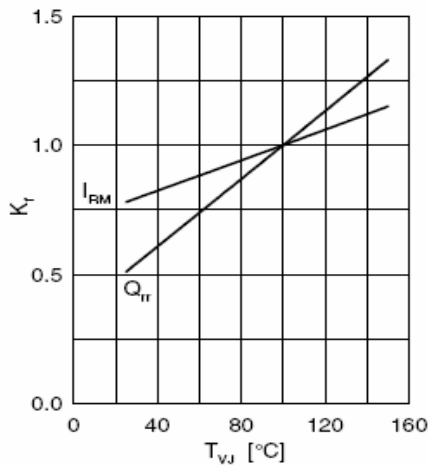
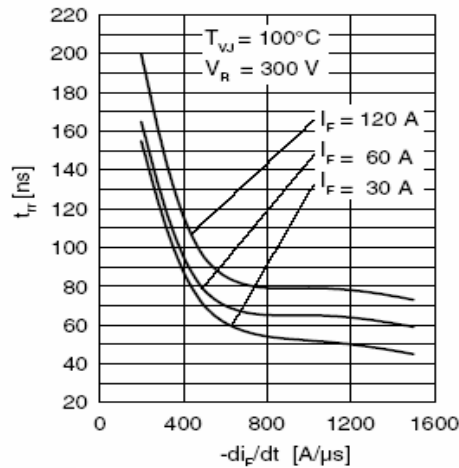
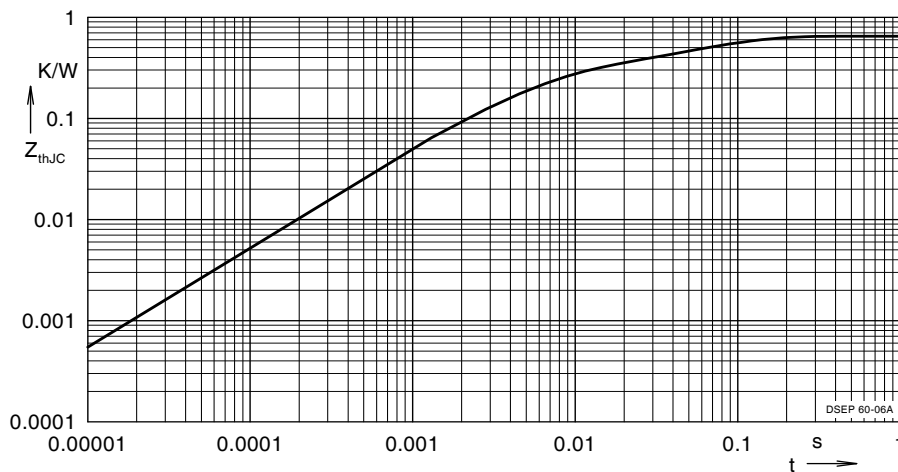


Fig. 21. Inductive Turn-on Switching Times vs. Junction Temperature




Fig. 22 Forward Current I_F vs. V_F

Fig. 23 Typ. Reverse Recovery Charge Q_{rr}

Fig. 24 Typ. Peak Reverse Current I_{RM}

Fig. 25 Typ. Dynamic Parameters Q_{rr} , I_{RM}

Fig. 26 Typ. Recovery Time t_{rr}

Fig. 27. Maximum Transient Thermal Impedance