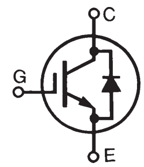
IXYS

XPT™ 600V IGBT GenX3™ w/ Diode

IXXR100N60B3H1

(Electrically Isolated Tab)

Extreme Light Punch Through IGBT for 10-30kHz Switching

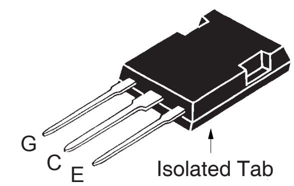


V_{CES} = 600V
I_{C110} = 68A
$V_{CE(sat)}$ ≤ 1.80V
$t_{fi(typ)}$ = 150ns

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	600	V
V_{CGR}	T_J = 25°C to 150°C, R_{GE} = 1MΩ	600	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C(Chip Capability)	145	A
I_{C110}	T_C = 110°C	68	A
I_{F90}	T_C = 90°C	54	A
I_{CM}	T_C = 25°C, 1ms	440	A
I_A	T_C = 25°C	50	A
E_{AS}	T_C = 25°C	600	mJ
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 2Ω Clamped Inductive Load	I_{CM} = 200 @$V_{CE} \leq V_{CES}$	A
t_{sc} (SCSOA)	V_{GE} = 15V, V_{CE} = 360V, T_J = 150°C R_G = 10Ω, Non Repetitive	10	μs
P_C	T_C = 25°C	400	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}	Plastic Body for 10s	260	°C
V_{ISOL}	50/60 Hz, 1 Minute	2500	V~
F_C	Mounting Force	20..120/4.5..27	N/lb.
Weight		5	g

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

ISOPLUS247™



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
- Avalanche Rated
- Short Circuit Capability
- Anti-Parallel Ultra Fast Diode
- High Current Handling Capability

Advantages

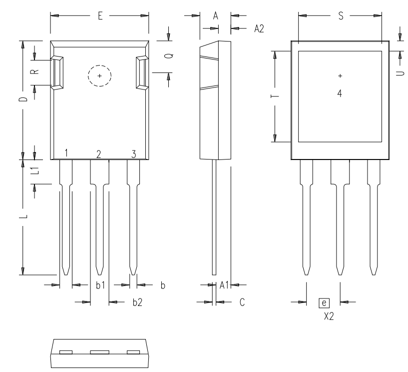
- High Power Density
- Low Gate Drive Requirement

Applications

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

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**		30		ns
t_{ri}	I_C = 70A, V_{GE} = 15V		70		ns
E_{on}	V_{CE} = 360V, R_G = 2Ω		1.9		mJ
$t_{d(off)}$	Note 2		120		ns
t_{fi}			150		ns
E_{off}			2.0	2.8	mJ
$t_{d(on)}$	**Inductive load, T_J = 150°C**		32		ns
t_{ri}	I_C = 70A, V_{GE} = 15V		60		ns
E_{on}	V_{CE} = 360V, R_G = 2Ω		2.3		mJ
$t_{d(off)}$	Note 2		150		ns
t_{fi}			200		ns
E_{off}			2.8		mJ
R_{thJC}				0.31	°C/W
R_{thCS}			0.15		°C/W

ISOPLUS247 (IXXR) Outline



SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS 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
b1	.075	.084	1.91	2.13
b2	.115	.123	2.92	3.12
C	.024	.031	0.61	0.80
D	.819	.840	20.80	21.34
E	.620	.635	15.75	16.13
e	.215 BSC		5.45 BSC	
L	.780	.800	19.81	20.32
L1	.150	.170	3.81	4.32
Q	.220	.244	5.59	6.20
R	.170	.190	4.32	4.83
S	.520	.540	13.21	13.72
T	.620	.640	15.75	16.26
U	.065	.080	1.65	2.03

1 - Gate
2,4 - Collector
3 - Emiiter

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		1.6	2.5	V
	T_J = 150°C		1.4	1.8	V
I_{RM}	I_F = 60A, V_{GE} = 0V, T_J = 100°C		8.3		A
t_{rr}	$-di_F/dt$ = 200A/μs, V_R = 300V		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.

Fig. 1. Output Characteristics @ T_J = 25ºC

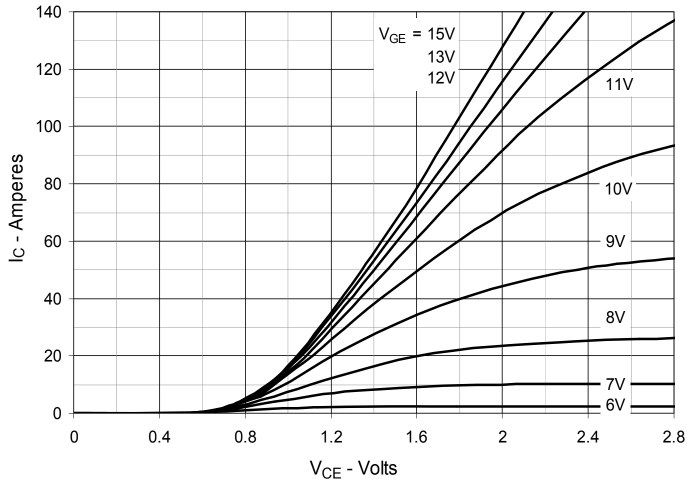


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

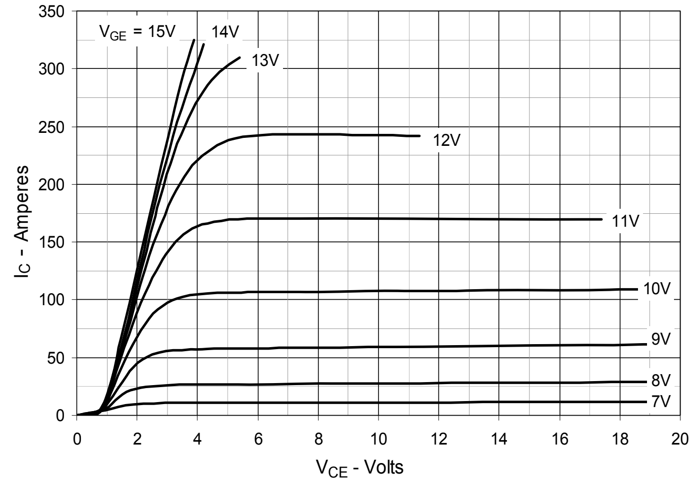


Fig. 3. Output Characteristics @ T_J = 150ºC

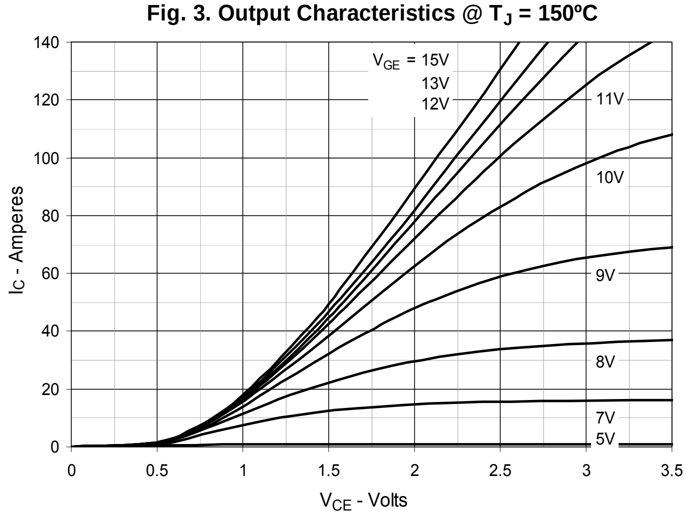


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

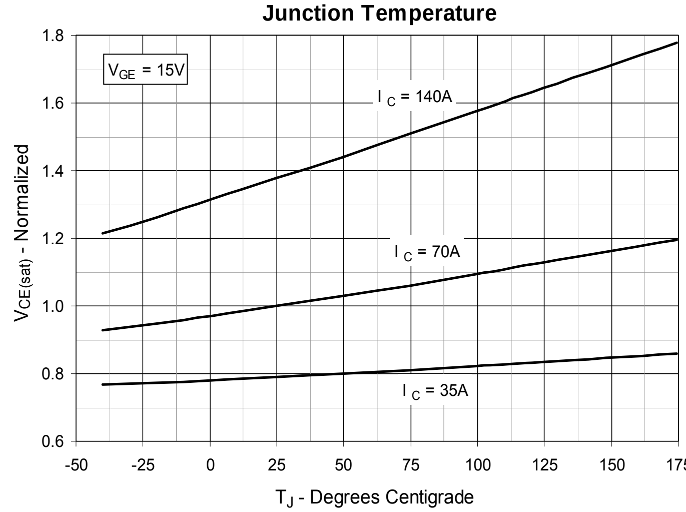


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

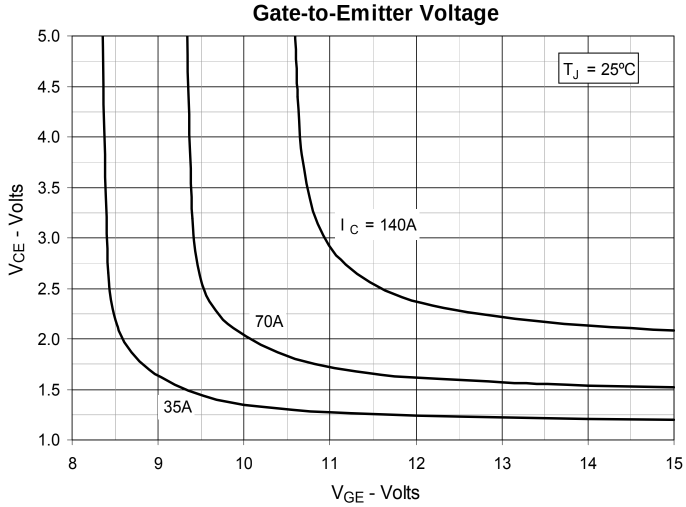
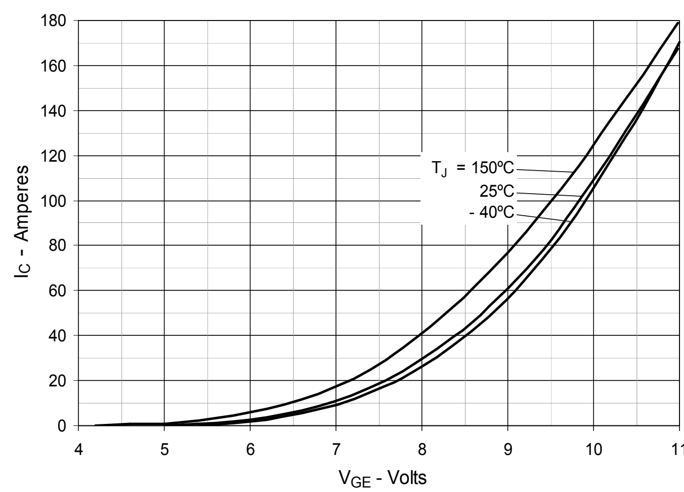


Fig. 6. Input Admittance



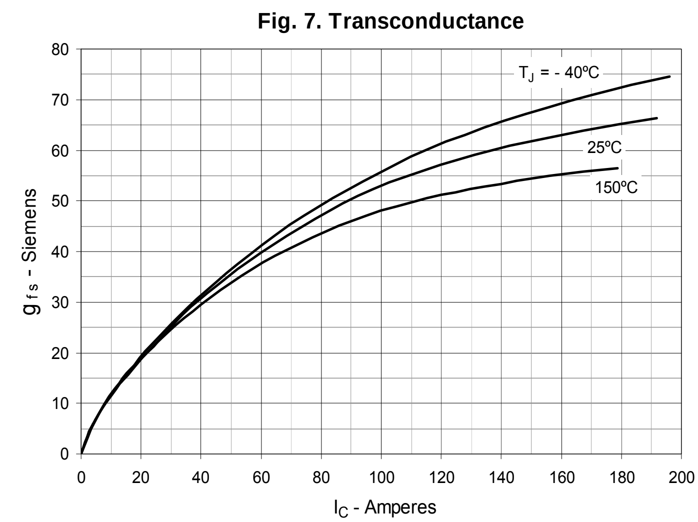


Fig. 7. Transconductance
T_J = - 40ºC
25ºC
150ºC
g_{fs} - Siemens
I_C - Amperes

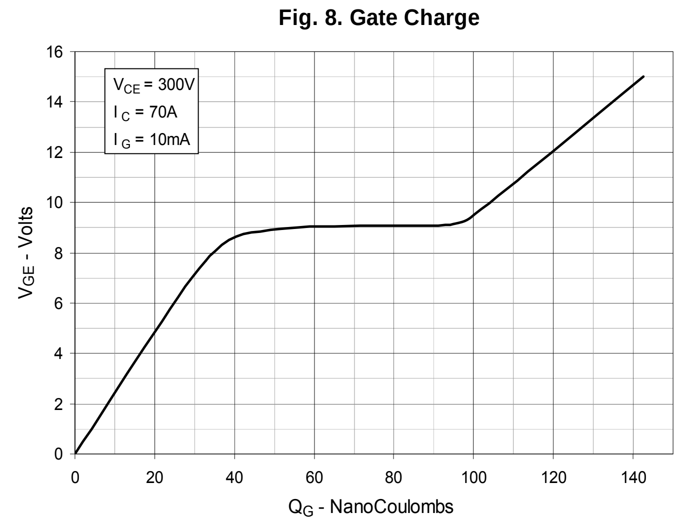


Fig. 8. Gate Charge
V_{CE} = 300V
I_C = 70A
I_G = 10mA
V_{GE} - Volts
Q_G - NanoCoulombs

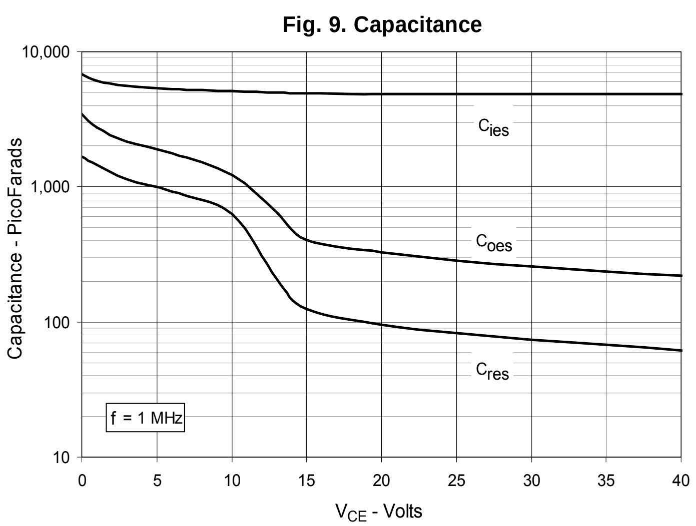


Fig. 9. Capacitance
C_{ies}
C_{oes}
C_{res}
f = 1 MHz
Capacitance - PicoFarads
V_{CE} - Volts

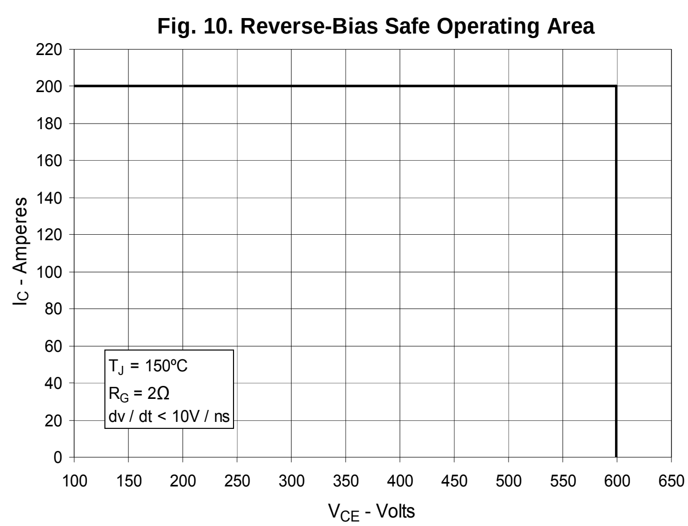


Fig. 10. Reverse-Bias Safe Operating Area
T_J = 150ºC
R_G = 2Ω
dv / dt < 10V / ns
I_C - Amperes
V_{CE} - Volts

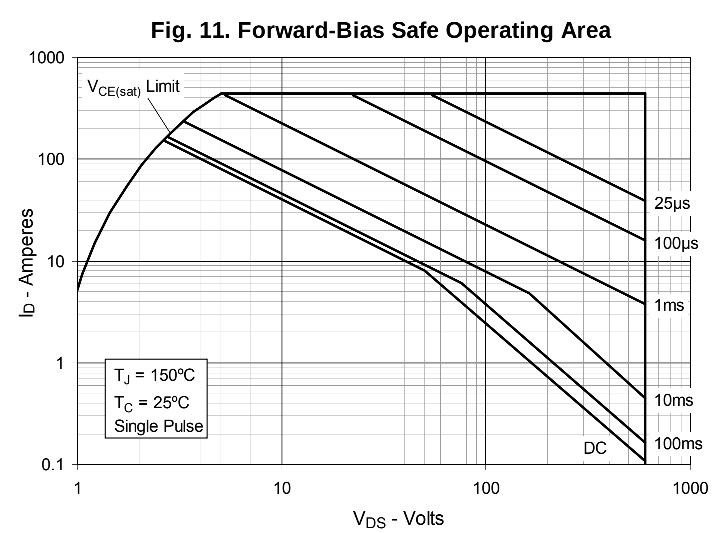


Fig. 11. Forward-Bias Safe Operating Area
$V_{CE(sat)}$ Limit
25µs
100µs
1ms
10ms
100ms
DC
T_J = 150ºC
T_C = 25ºC
Single Pulse
I_D - Amperes
V_{DS} - Volts

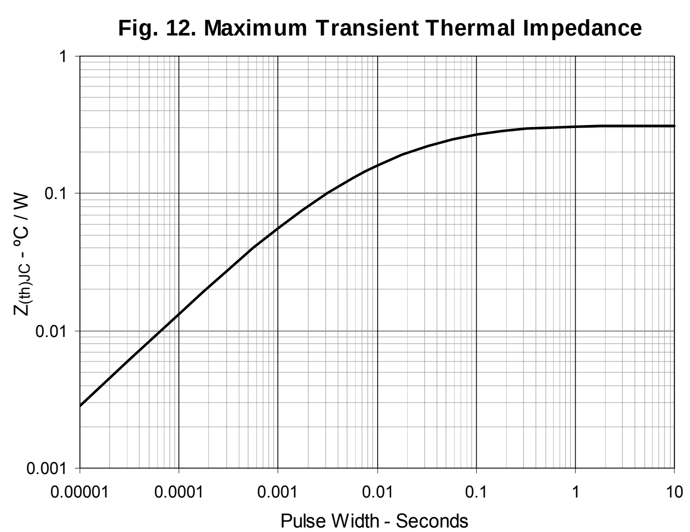


Fig. 12. Maximum Transient Thermal Impedance
$Z_{(th)JC}$ - ºC / W
Pulse Width - Seconds

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

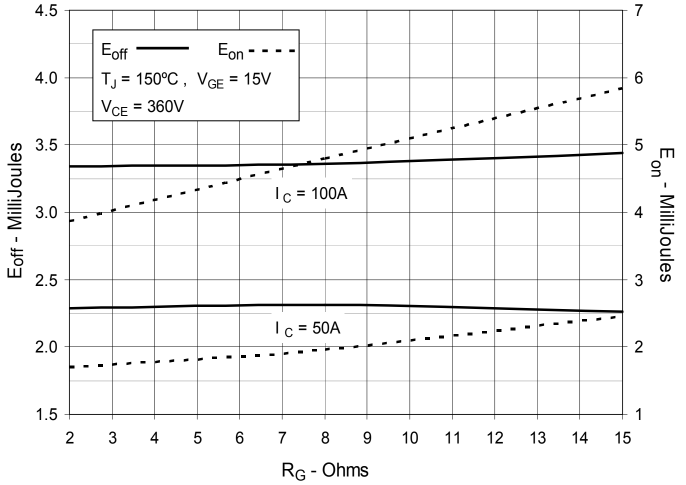


Fig. 14. Inductive Switching Energy Loss vs. Collector Current

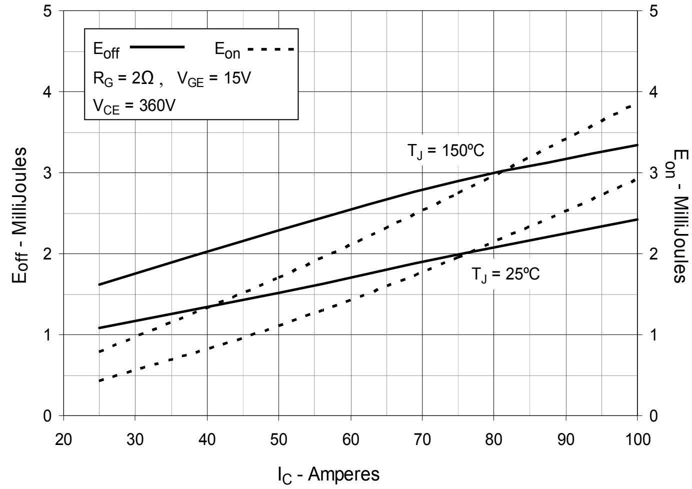


Fig. 15. Inductive Switching Energy Loss vs. Junction Temperature

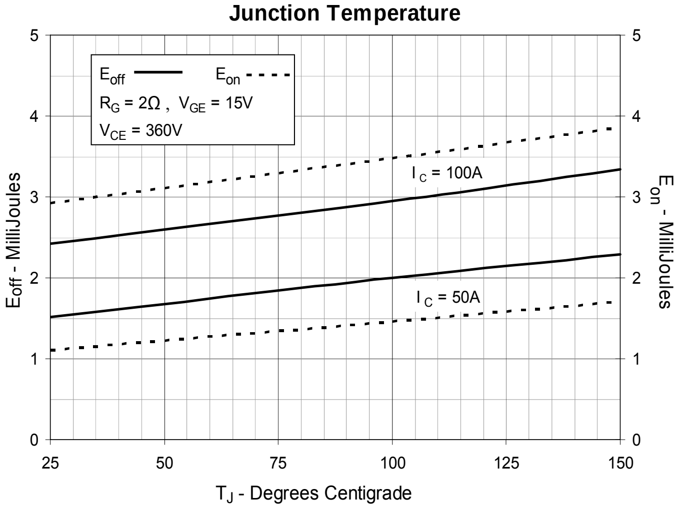


Fig. 16. Inductive Turn-off Switching Times vs. Gate Resistance

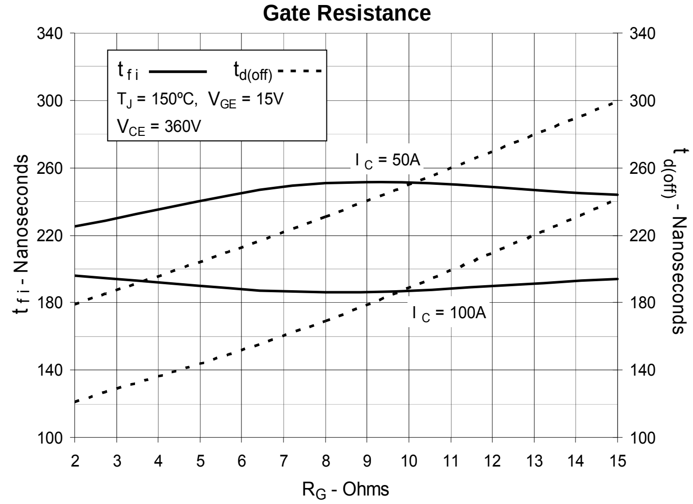


Fig. 17. Inductive Turn-off Switching Times vs. Collector Current

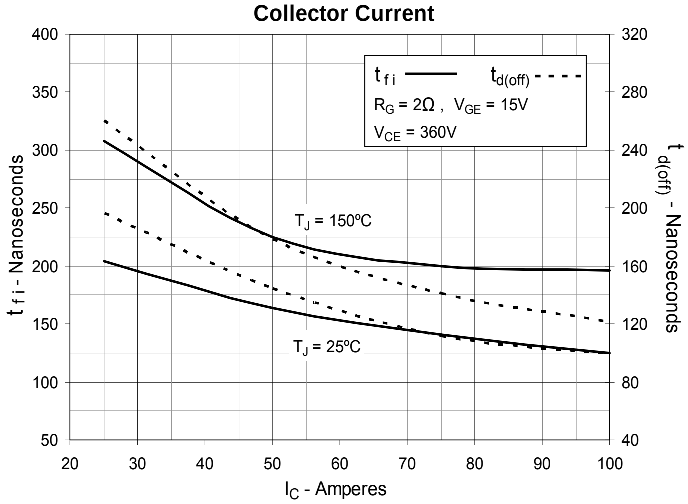


Fig. 18. Inductive Turn-off Switching Times vs. Junction Temperature

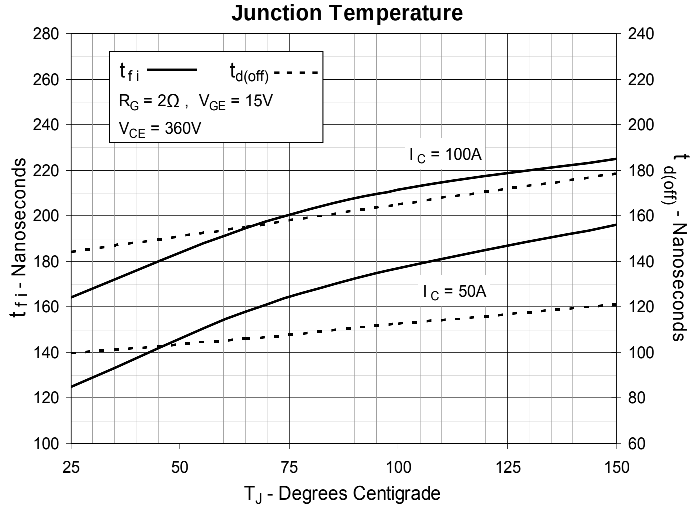


Fig. 19. Inductive Turn-on Switching Times vs. Gate Resistance

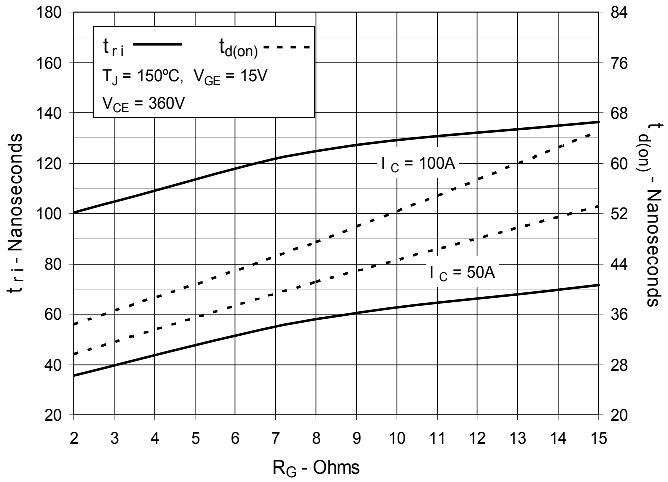


Fig. 20. Inductive Turn-on Switching Times vs. Collector Current

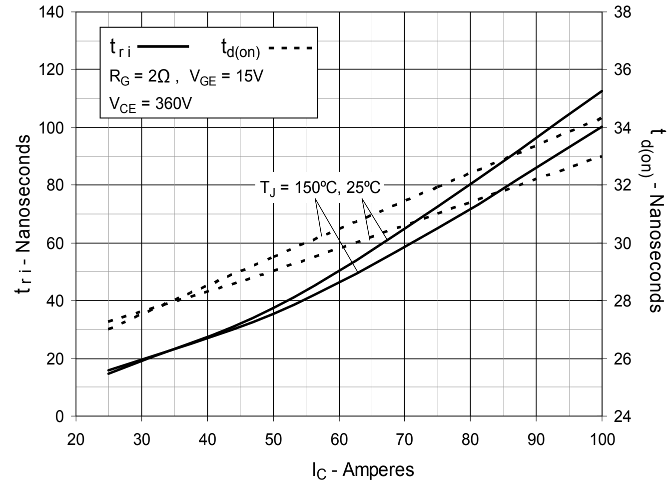
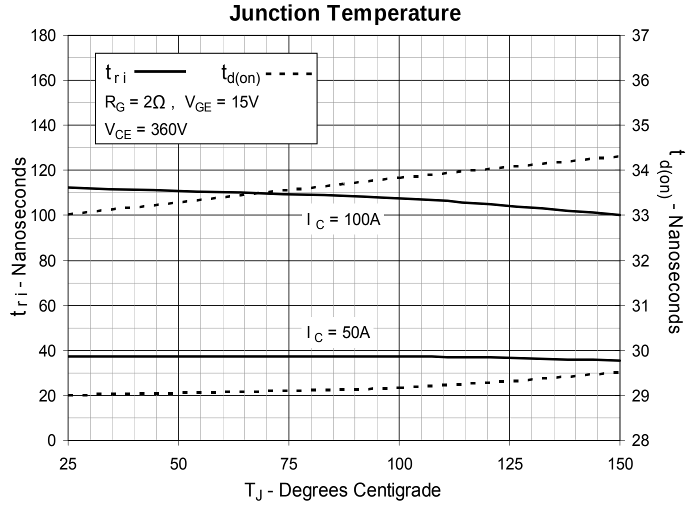


Fig. 21. Inductive Turn-on Switching Times vs. Junction Temperature



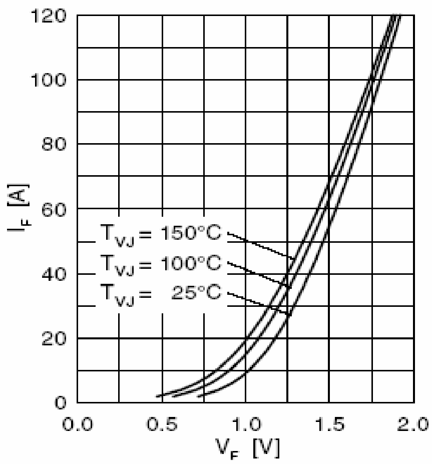


Fig. 22 Forward Current I_F vs. V_F

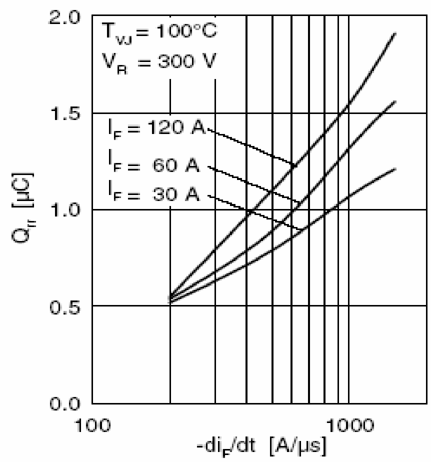


Fig. 23 Typ. Reverse Recovery Charge Q_{rr}

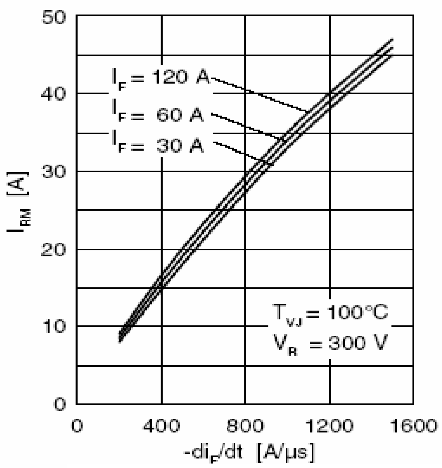


Fig. 24 Typ. Peak Reverse Current I_{RM}

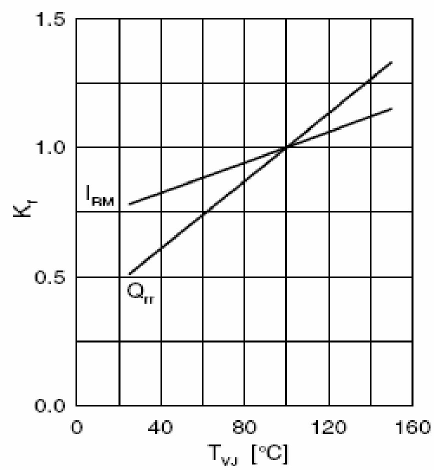


Fig. 25 Typ. Dynamic Parameters Q_{rr}, I_{RM}

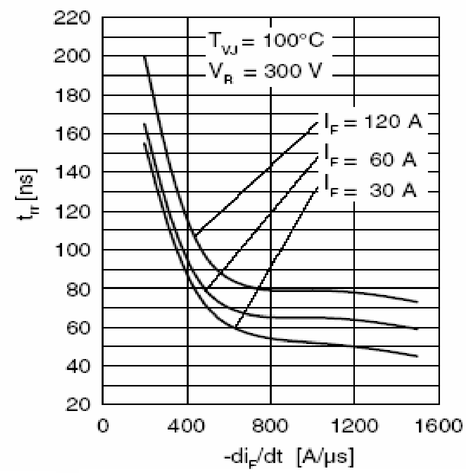


Fig. 26 Typ Recovery Time t_{rr}

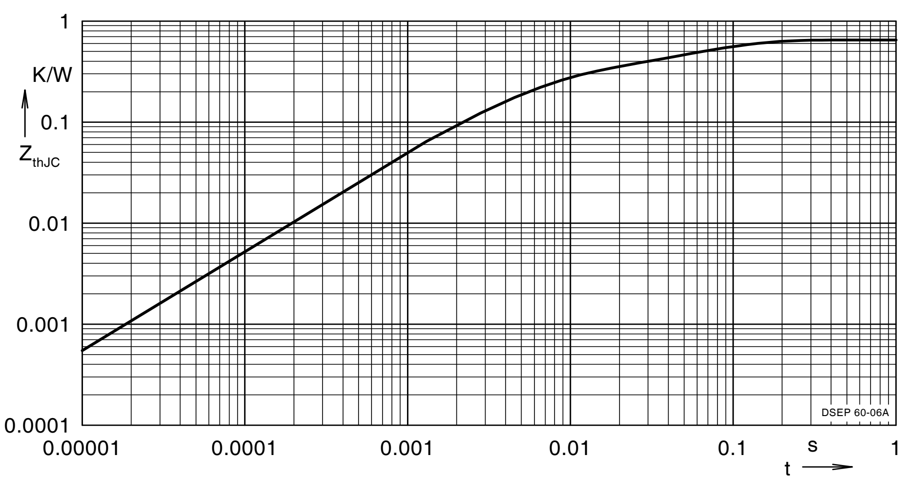


Fig. 27. Maximum Transient Thermal Impedance