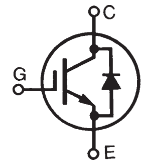
IXYS

Advance Technical Information

High Voltage XPT™ IGBT w/ Diode

IXYF30N170CV1

V_{CES} = 1700V
I_{C110} = 20A
$V_{CE(sat)}$ ≤ 4.0V
$t_{fi(typ)}$ = 95ns

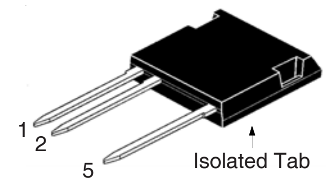


(Electrically Isolated Tab)

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 175°C	1700	V
V_{CGR}	T_J = 25°C to 175°C, R_{GE} = 1MΩ	1700	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	36	A
I_{C110}	T_C = 110°C	20	A
I_{F110}	T_C = 110°C	20	A
I_{CM}	T_C = 25°C, 1ms	260	A
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 2.7Ω Clamped Inductive Load	I_{CM} = 120 1360	A V
P_C	T_C = 25°C	230	W
T_J		-55 ... +175	°C
T_{JM}		175	°C
T_{stg}		-55 ... +175	°C
T_L	Maximum Lead Temperature for Soldering	300	°C
T_{SOLD}	1.6 mm (0.062in.) from Case for 10s	260	°C
F_C	Mounting Force	20..120 / 4.5..27	Nm/lb.in.
V_{ISOL}	50/60Hz, 1 Minute	2500	V~
Weight		8	g

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
BV_{CES}	I_C = 250μA, V_{GE} = 0V	1700			V
$V_{GE(th)}$	I_C = 250μA, V_{CE} = V_{GE}	3.0		5.0	V
I_{CES}	V_{CE} = 0.8 • V_{CES}, V_{GE} = 0V			25	μA
	Note 3, T_J = 125°C			4	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±100	nA
$V_{CE(sat)}$	I_C = 30A, V_{GE} = 15V, Note 1		3.5	4.0	V
	T_J = 150°C		4.6		V

ISOPLUS i4-Pak™



1 = Gate
2 = Emitter
5 = Collector

Features

- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Mounting Surface
- 2500V~ Electrical Isolation
- High Blocking Voltage
- High Peak Current Capability
- Low Saturation Voltage

Advantages

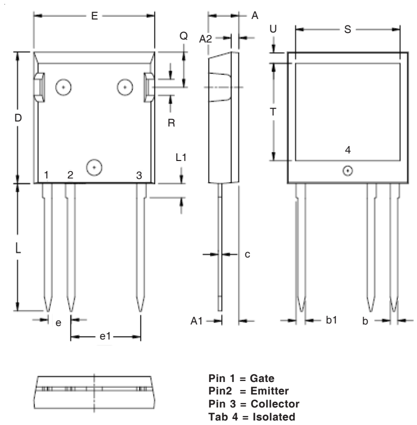
- Low Gate Drive Requirement
- High Power Density

Applications

- Switch-Mode and Resonant-Mode Power Supplies
- Uninterruptible Power Supplies (UPS)
- Laser Generators
- Capacitor Discharge Circuits
- AC Switches

Symbol	Test Conditions ($T_J = 25°C$ Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	$I_C = 30A$, $V_{CE} = 10V$, Note 1	17	28		S
R_{Gi}	Gate Input Resistance		2.8		Ω
C_{ies}	$V_{CE} = 25V$, $V_{GE} = 0V$, f = 1MHz		3100		pF
C_{oes}			210		pF
C_{res}			55		pF
$Q_{g(on)}$	$I_C = 30A$, $V_{GE} = 15V$, $V_{CE} = 0.5 \bullet V_{CES}$		150		nC
Q_{ge}			15		nC
Q_{gc}			65		nC
$t_{d(on)}$	**Inductive load, $T_J = 25°C$**		16		ns
t_{ri}	$I_C = 30A$, $V_{GE} = 15V$		33		ns
E_{on}	$V_{CE} = 0.5 \bullet V_{CES}$, $R_G = 2.7Ω$		3.6		mJ
$t_{d(off)}$	Note 3		143		ns
t_{fi}			95		ns
E_{off}			1.8		mJ
$t_{d(on)}$	**Inductive load, $T_J = 150°C$**		16		ns
t_{ri}	$I_C = 30A$, $V_{GE} = 15V$		33		ns
E_{on}	$V_{CE} = 0.5 \bullet V_{CES}$, $R_G = 2.7Ω$		5.5		mJ
$t_{d(off)}$	Note 3		193		ns
t_{fi}			134		ns
E_{off}			3.5		mJ
R_{thJC}				0.65	°C/W
R_{thCS}			0.15		°C/W

ISOPLUS i4-Pak™ (HV) Outline



SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	.190	.205	4.83	5.21
A1	.102	.118	2.59	3.00
A2	.046	.085	1.17	2.16
b	.045	.055	1.14	1.40
b1	.058	.068	1.47	1.73
C	.020	.029	0.51	0.74
D	.819	.840	20.80	21.34
E	.770	.799	19.56	20.29
e	.150 BSC		3.81 BSC	
e1	.450 BSC		11.43 BSC	
L	.780	.840	19.81	21.34
L1	.083	.102	2.11	2.59
Q	.210	.244	5.33	6.20
R	.100	.180	2.54	4.57
S	.660	.690	16.76	17.53
T	.590	.620	14.99	15.75
U	.065	.080	1.65	2.03

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			3.5	V
	$T_J = 150°C$		3.7		V
I_{RM}	$I_F = 30A$, $V_{GE} = 0V$, $-di_F/dt = 500A/µs$,		32		A
t_{rr}	$V_R = 1200V$, $T_J = 150°C$		175		ns
R_{thJC}				0.86	°C/W

Notes:
1. Pulse test, $t \le 300µs$, duty cycle, $d \le 2\%$.
2. Part must be heatsunk for high-temp Ices measurement.
3. 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.

Fig. 1. Output Characteristics @ $T_J = 25^oC$

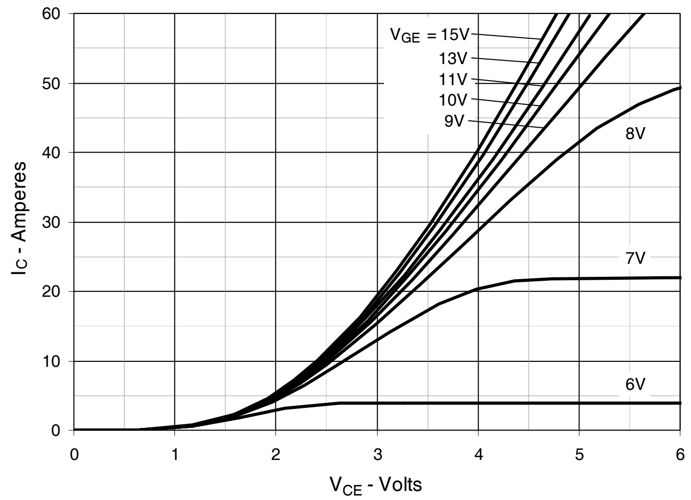


Fig. 2. Extended Output Characteristics @ $T_J = 25^oC$

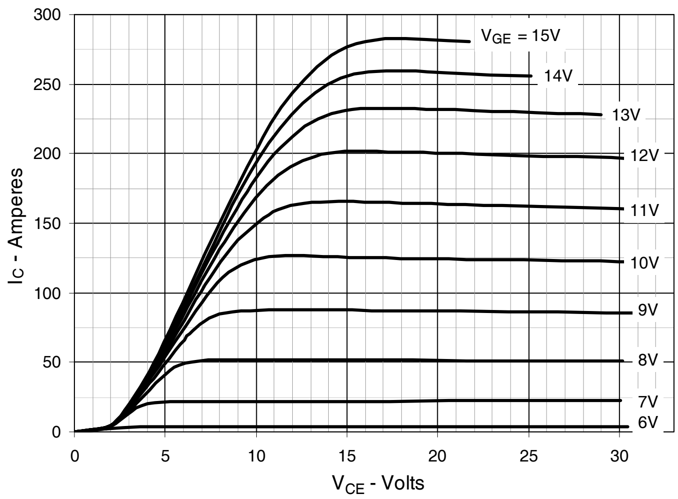


Fig. 3. Output Characteristics @ $T_J = 150^oC$

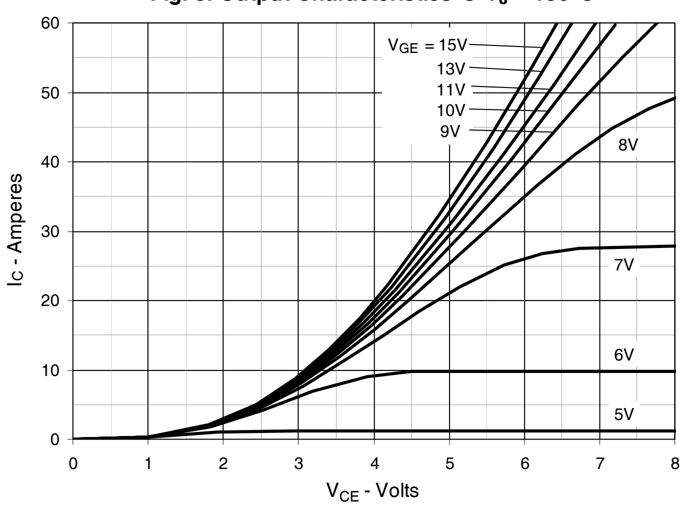


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

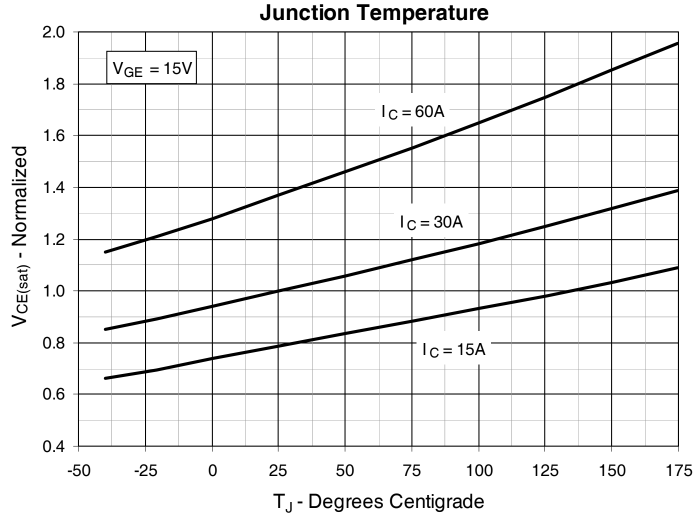


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

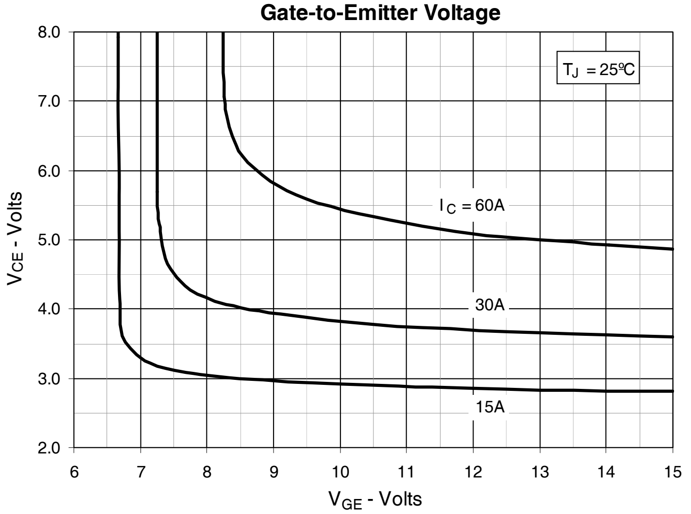


Fig. 6. Input Admittance

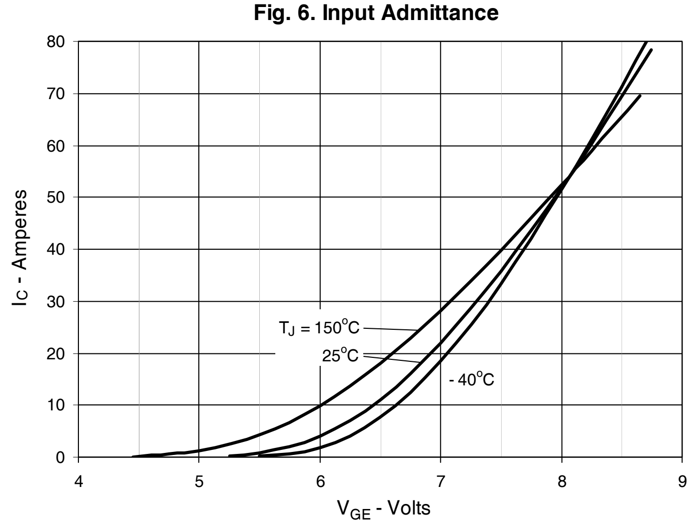


Fig. 7. Transconductance

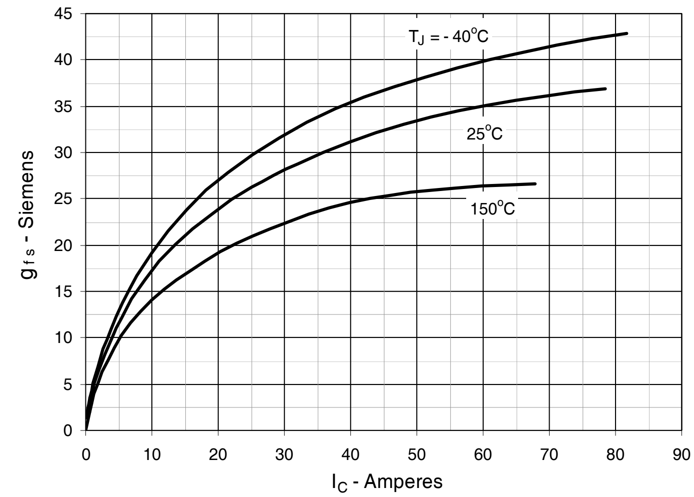


Fig. 8. Gate Charge

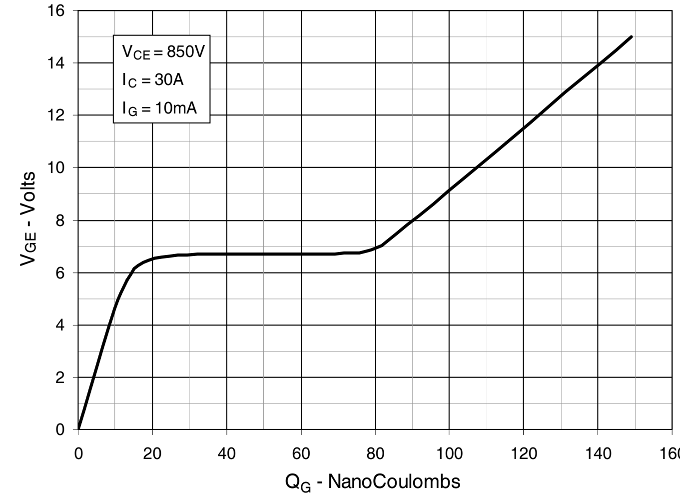


Fig. 9. Capacitance

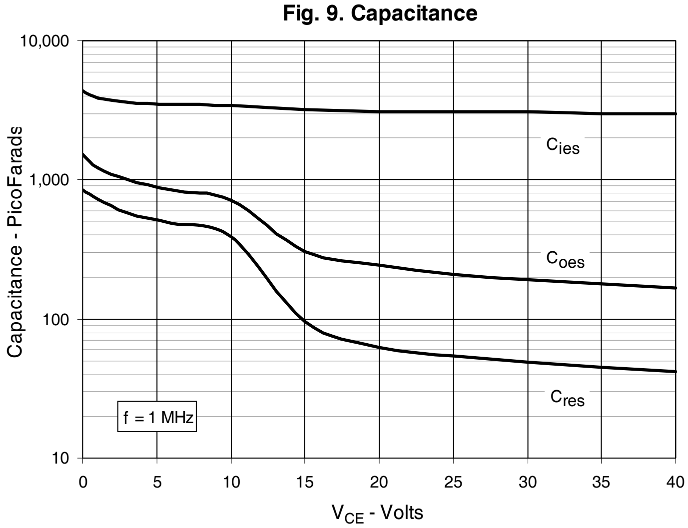


Fig. 10. Reverse-Bias Safe Operating Area

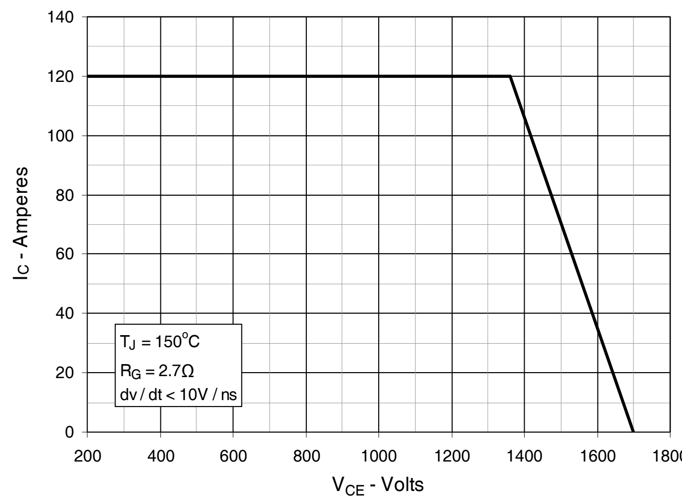


Fig. 11. Maximum Transient Thermal Impedance (IGBT)

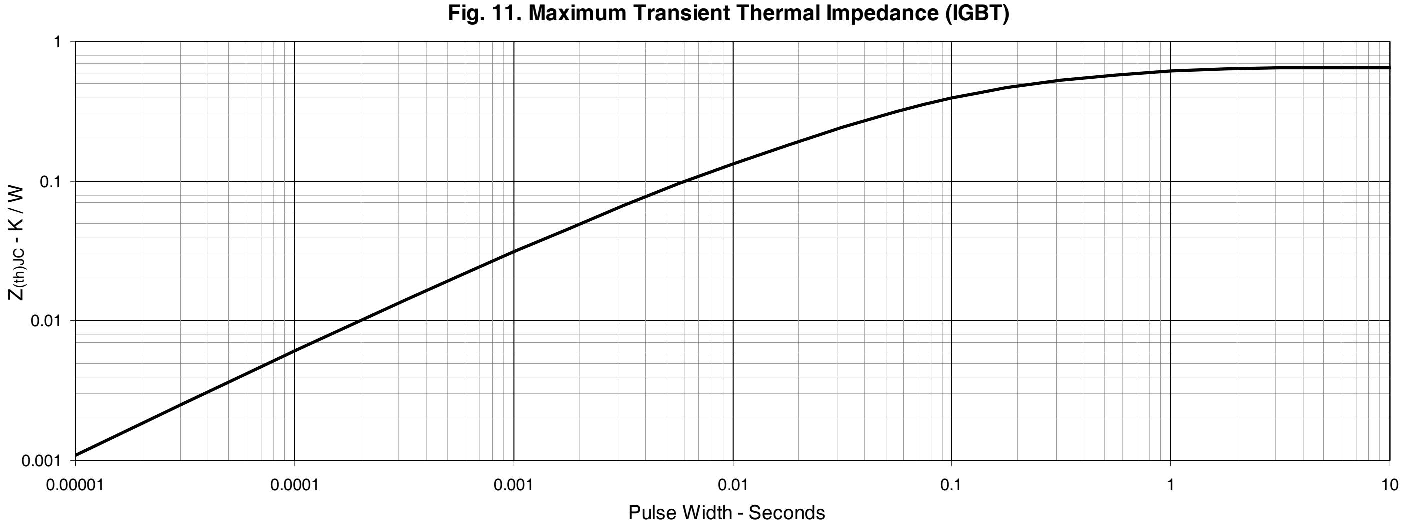


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

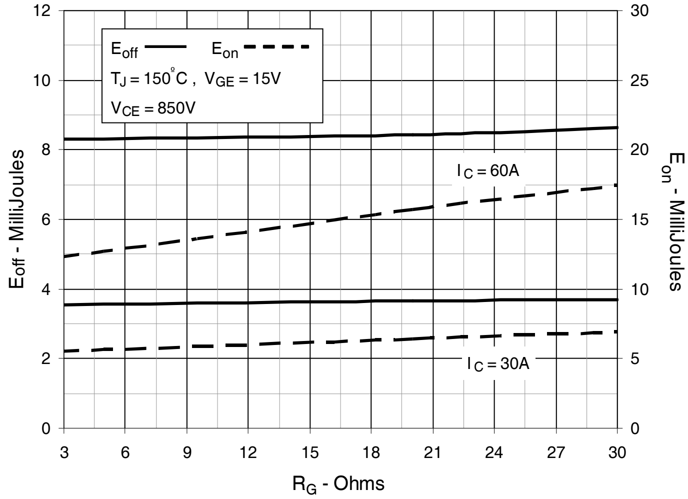


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

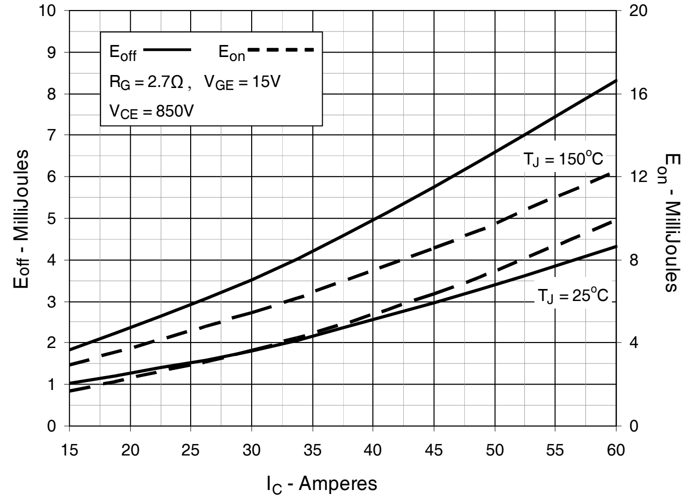


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

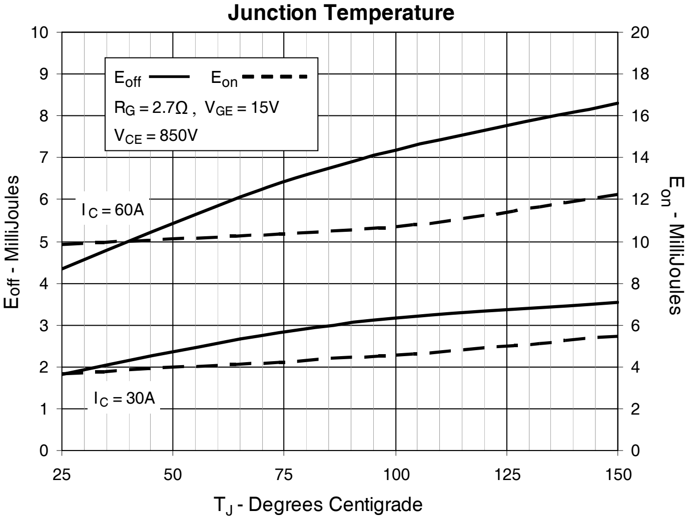


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

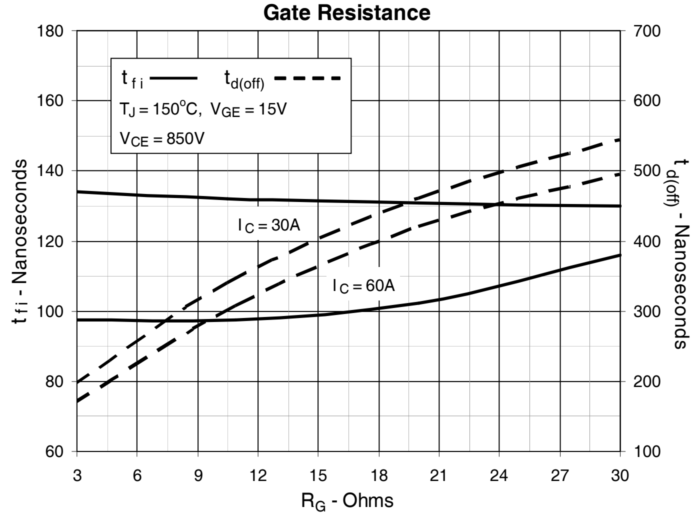


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

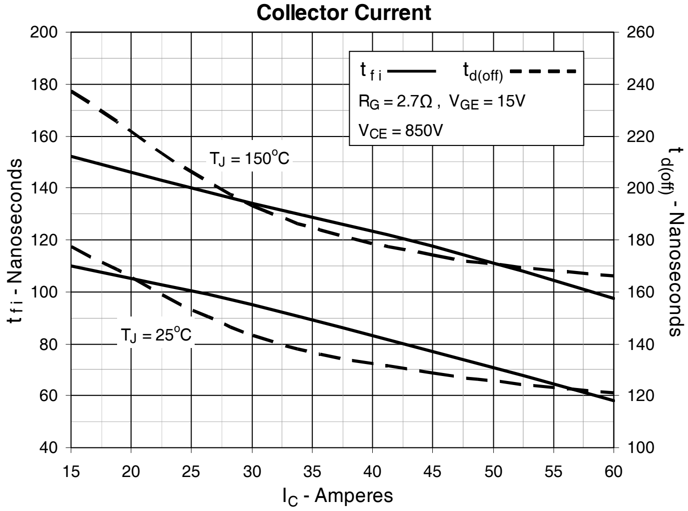


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

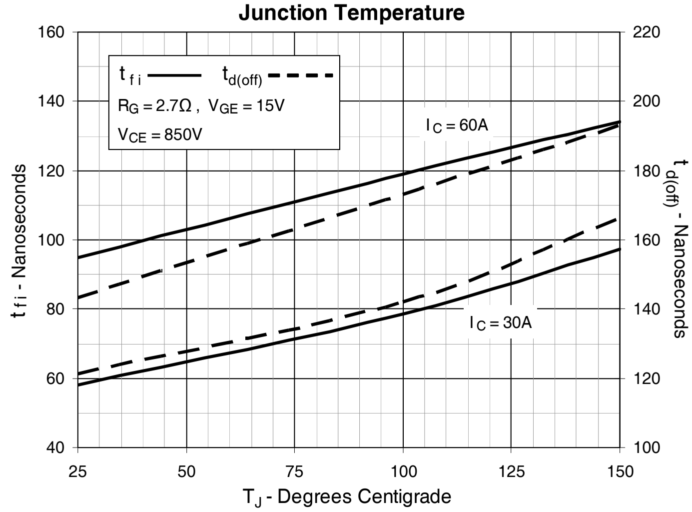


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

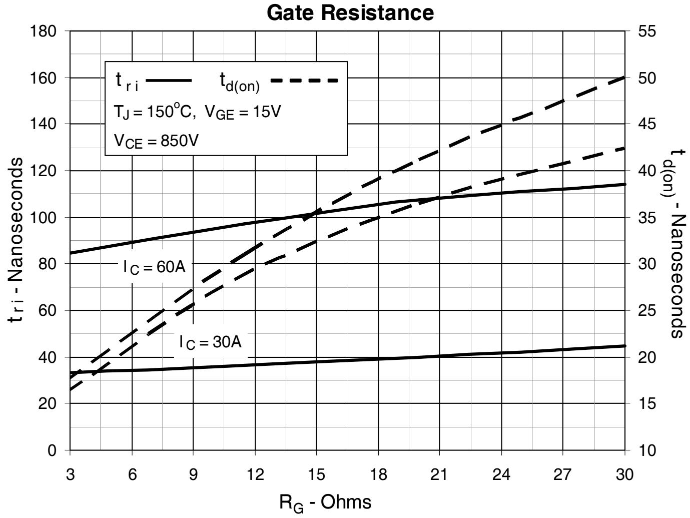


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

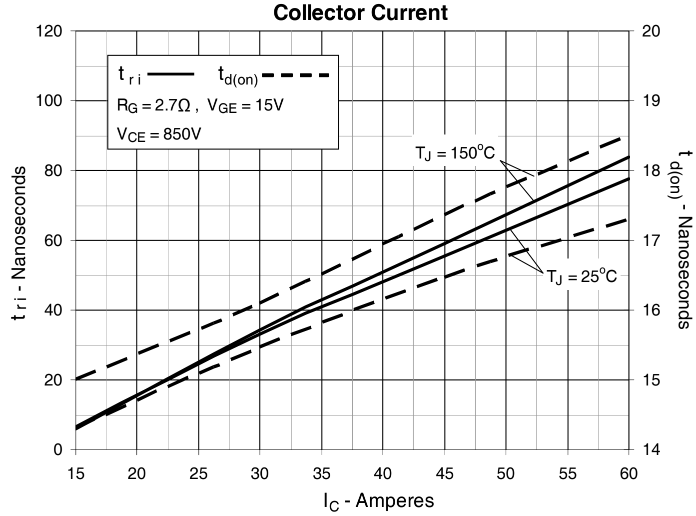


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature

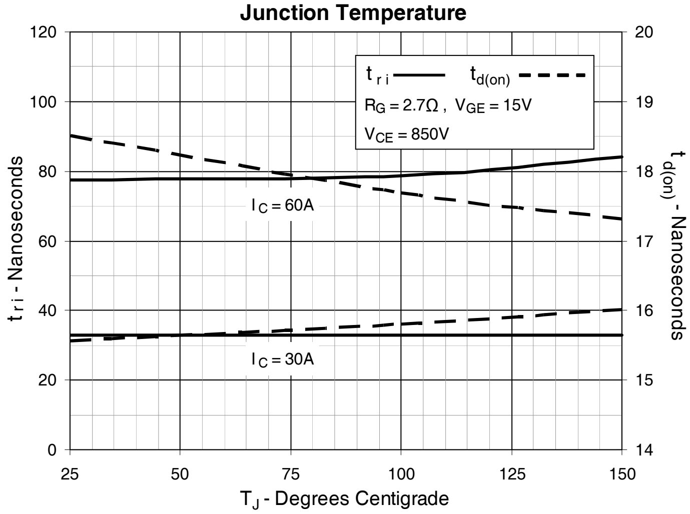


Fig. 21. Diode Forward Characteristics

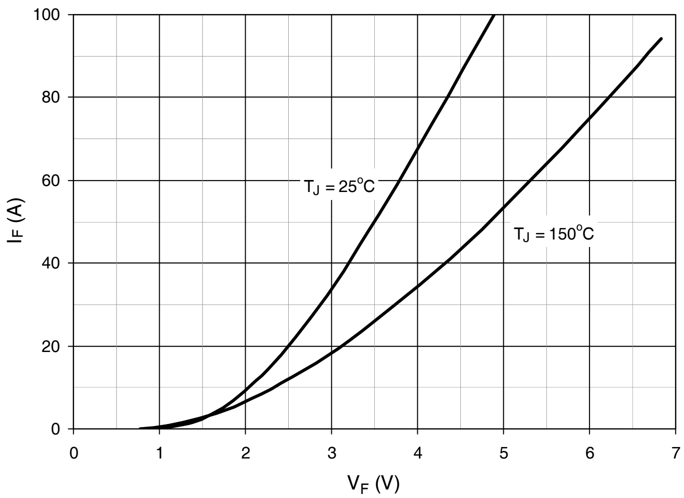


Fig. 22. Reverse Recovery Charge vs. -diF/dt

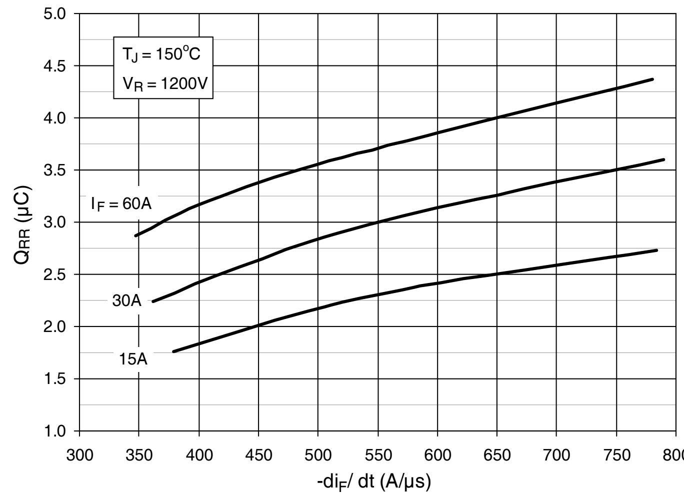


Fig. 23. Reverse Recovery Current vs. -diF/dt

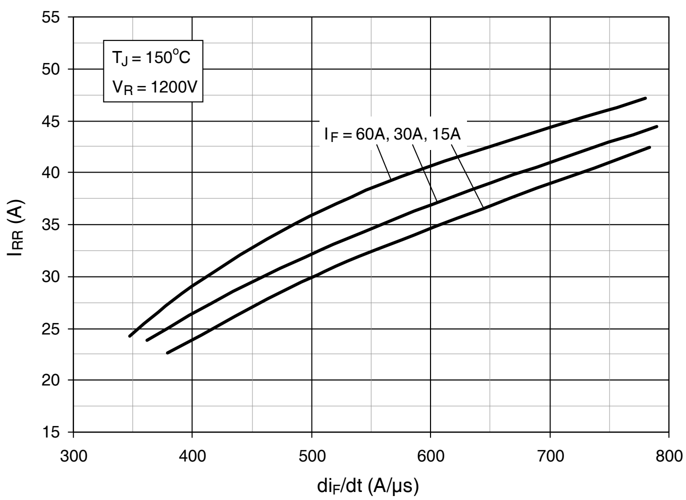


Fig. 24. Reverse Recovery Time vs. -diF/dt

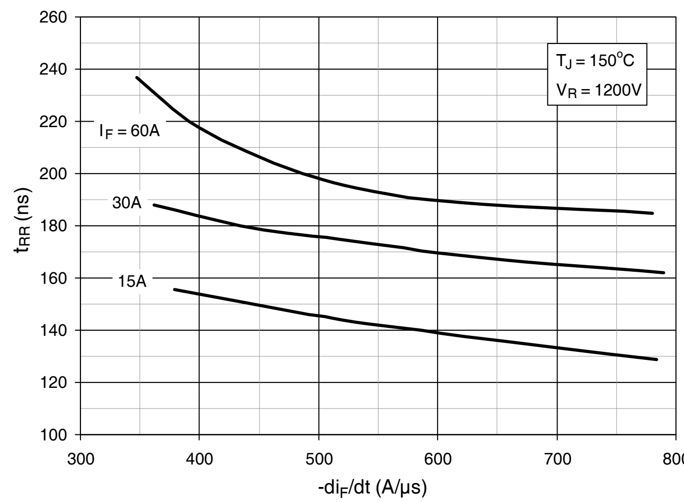


Fig. 25. Dynamic Parameters QRR, IRR vs. Junction Temperature

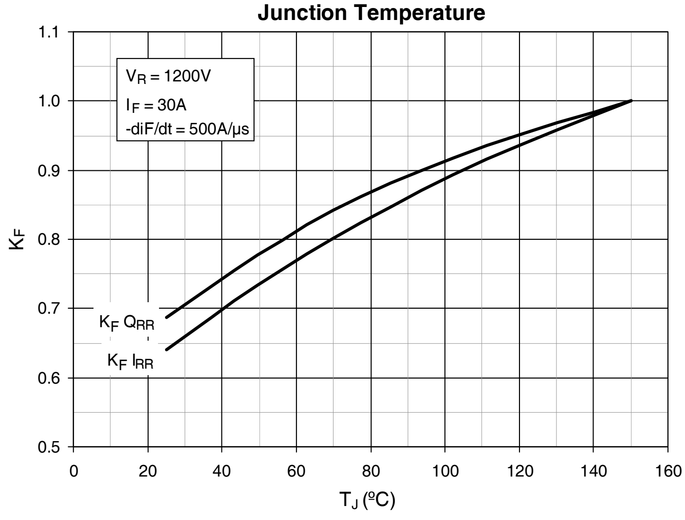


Fig. 26. Maximum Transient Thermal Impedance (Diode)