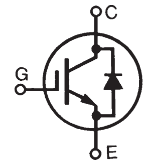
Advance Technical Information

High Voltage XPT™ IGBT w/ Diode

IXYH16N170CV1

V_{CES} = 1700V
I_{C110} = 16A
$V_{CE(sat)}$ ≤ 3.8V
$t_{fi(typ)}$ = 120ns



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	40	A
I_{C110}	T_C = 110°C	16	A
I_{F110}	T_C = 110°C	22	A
I_{CM}	T_C = 25°C, 1ms	100	A
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 10Ω Clamped Inductive Load	I_{CM} = 64 1360	A V
P_C	T_C = 25°C	310	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
M_d	Mounting Torque	1.13/10	Nm/lb.in.
Weight		6	g

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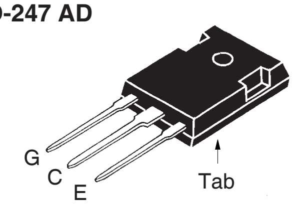


G = Gate   C = Collector
E = Emitter   Tab = Collector

Features

- High Voltage Package
- High Blocking Voltage
- Low Saturation Voltage

Advantages

- Low Gate Drive Requirement
- High Power Density

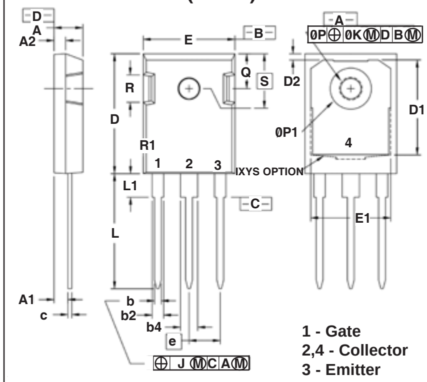
Applications

- 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.	
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} = V_{CES}, V_{GE} = 0V			25	µA
	V_{CE} = 0.8 • V_{CES}, V_{GE} = 0V, T_J = 150°C			5	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±100	nA
$V_{CE(sat)}$	I_C = 16A, V_{GE} = 15V, Note 1		3.2	3.8	V
	T_J = 150°C		4.4		V

Symbol	Test Conditions ($T_J = 25°C$ Unless Otherwise Specified)	Min.	Typ.	Max.	Unit
g_{fs}	$I_C = 16A$, $V_{CE} = 10V$, Note 1	7	12		S
R_{Gi}	Gate Input Resistance		7		Ω
C_{ies}	$V_{CE} = 25V$, $V_{GE} = 0V$, f = 1MHz		1165		pF
C_{oes}			88		pF
C_{res}			23		pF
$Q_{g(on)}$	$I_C = 16A$, $V_{GE} = 15V$, $V_{CE} = 0.5 \cdot V_{CES}$		56		nC
Q_{ge}			7		nC
Q_{gc}			27		nC
$t_{d(on)}$	**Inductive load, $T_J = 25°C$**		11		ns
t_{ri}	$I_C = 16A$, $V_{GE} = 15V$		19		ns
E_{on}	$V_{CE} = 0.5 \cdot V_{CES}$, $R_G = 10\Omega$		2.10		mJ
$t_{d(off)}$	Note 2		140		ns
t_{fi}			120		ns
E_{off}			1.50		mJ
$t_{d(on)}$	**Inductive load, $T_J = 150°C$**		15		ns
t_{ri}	$I_C = 16A$, $V_{GE} = 15V$		20		ns
E_{on}	$V_{CE} = 0.5 \cdot V_{CES}$, $R_G = 10\Omega$		2.90		mJ
$t_{d(off)}$	Note 2		175		ns
t_{fi}			140		ns
E_{off}			1.95		mJ
R_{thJC}				0.48	°C/W
R_{thCS}			0.21		°C/W

TO-247 (IXYH) 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
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	

Reverse Diode (FRED)

Symbol	Test Conditions ($T_J = 25°C$, Unless Otherwise Specified)	Min.	Typ.	Max.	Unit
V_F	$I_F = 16A$, $V_{GE} = 0V$, Note 1			3.3	V
	$T_J = 150°C$		3.0		V
I_{RM}	$I_F = 16A$, $V_{GE} = 0V$, $-di_F/dt = 500A/\mu s$,		22		A
t_{rr}	$V_R = 1200V$, $T_J = 150°C$		150		ns
R_{thJC}				0.70	°C/W

Notes:

1. Pulse test, $t \leq 300\mu s$, duty cycle, $d \leq 2\%$.
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.

Fig. 1. Output Characteristics @ T_J = 25ºC

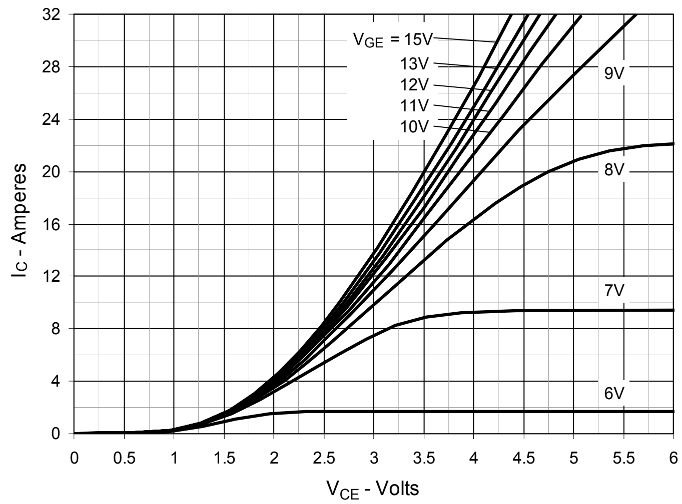


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

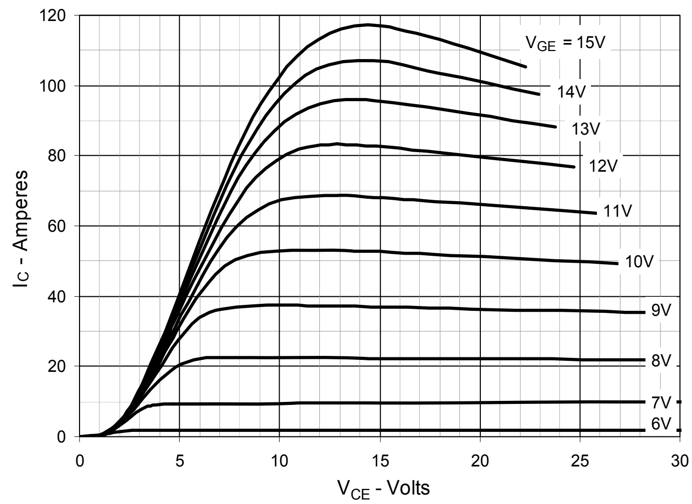


Fig. 3. Output Characteristics @ T_J = 150ºC

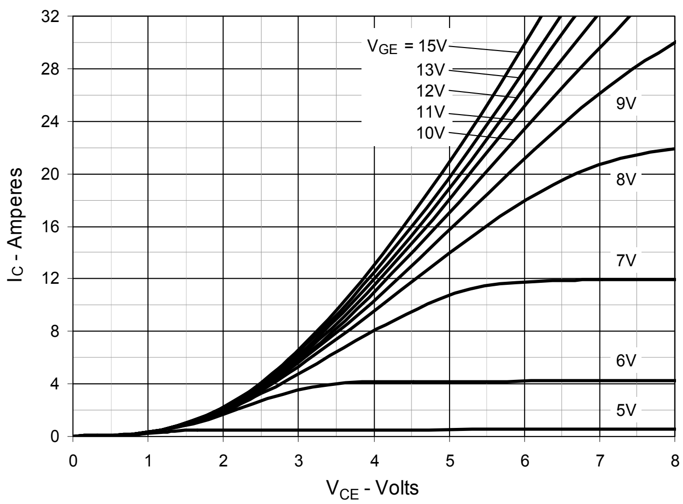


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

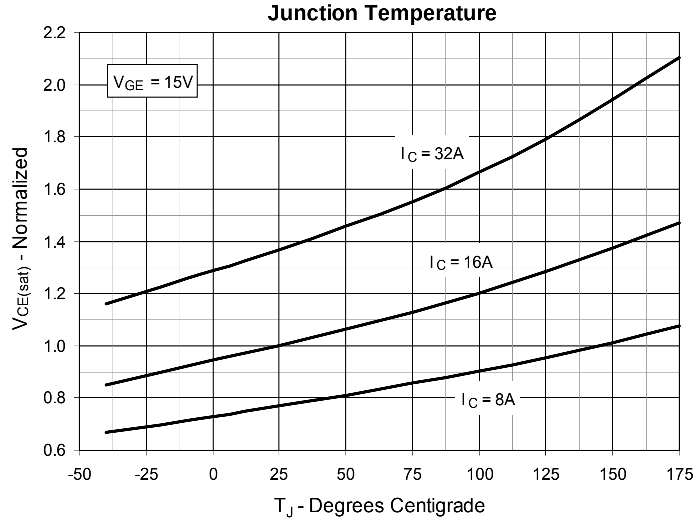


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

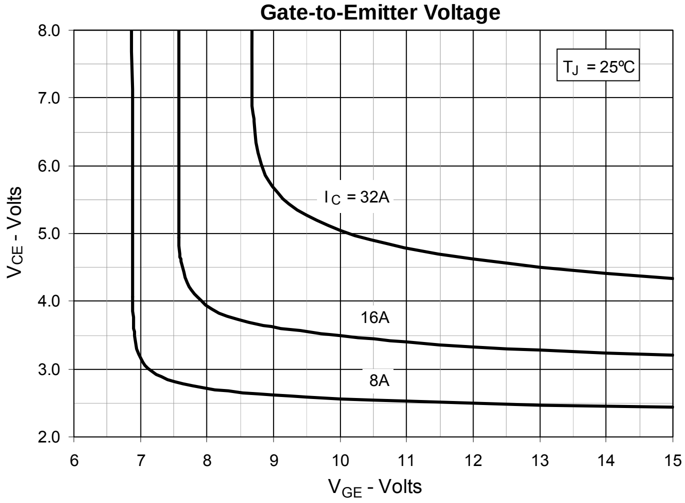


Fig. 6. Input Admittance

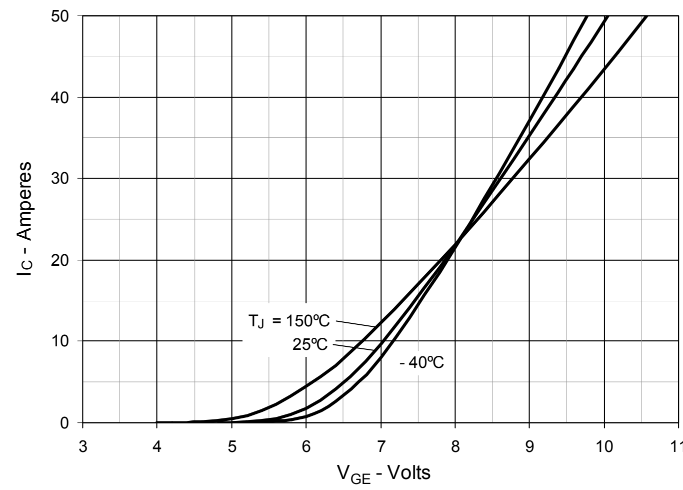


Fig. 7. Transconductance

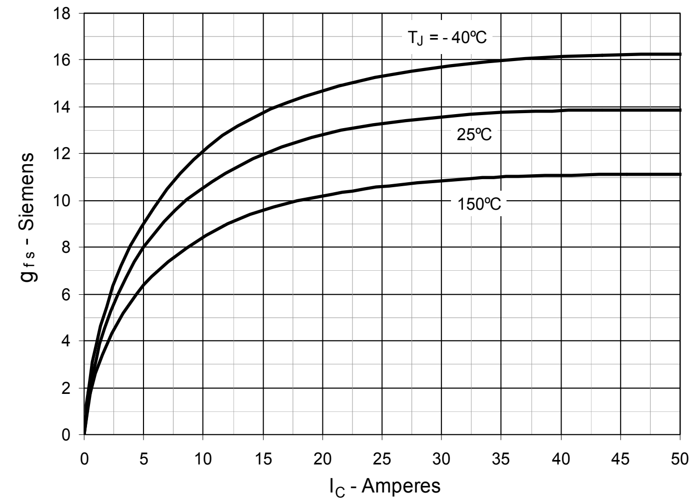


Fig. 8. Gate Charge

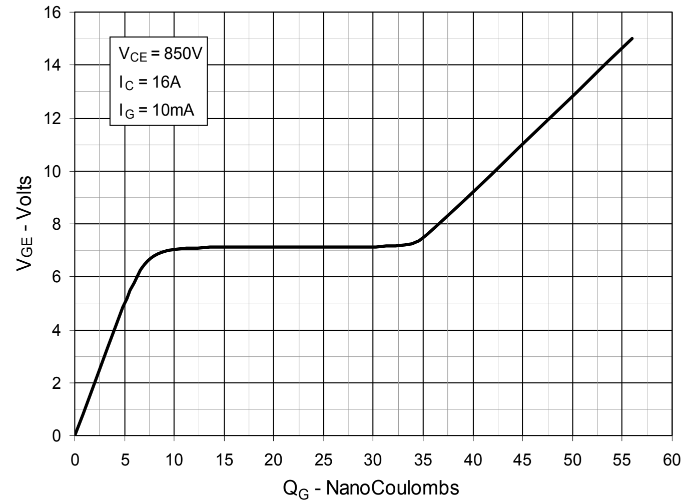


Fig. 9. Capacitance

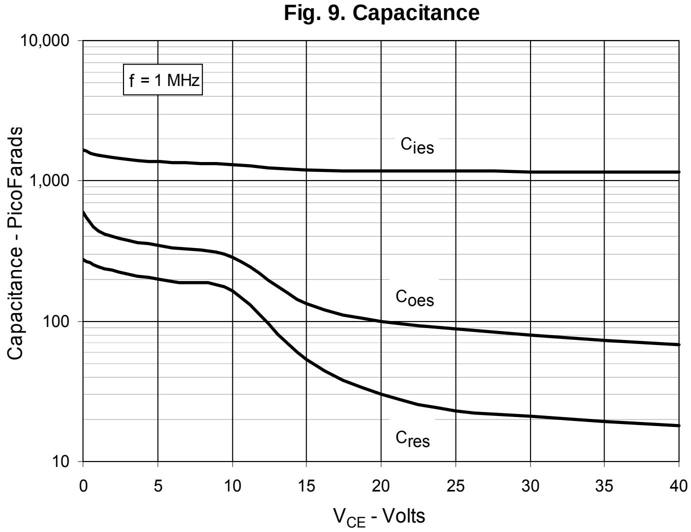


Fig. 10. Reverse-Bias Safe Operating Area

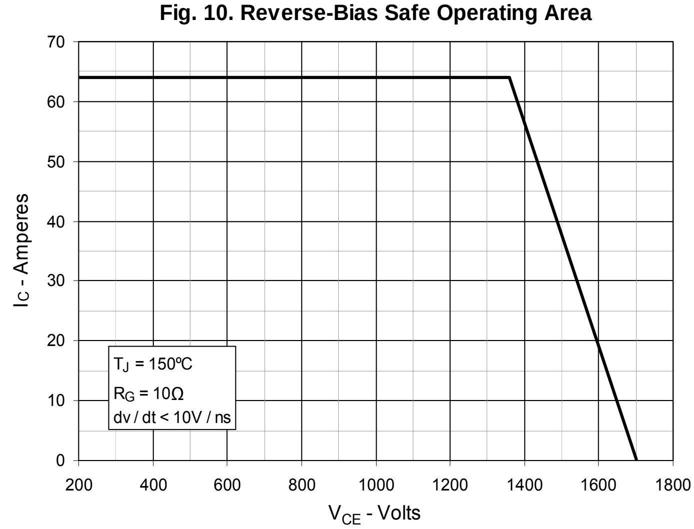


Fig. 11. Maximum Transient Thermal Impedance (IGBT)

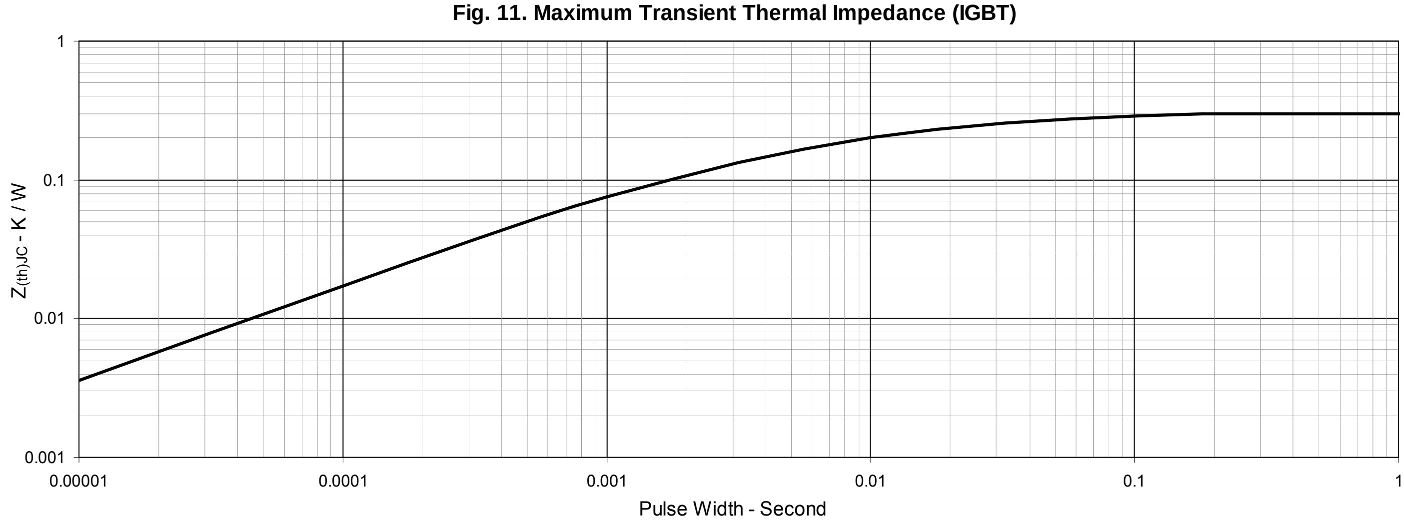


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

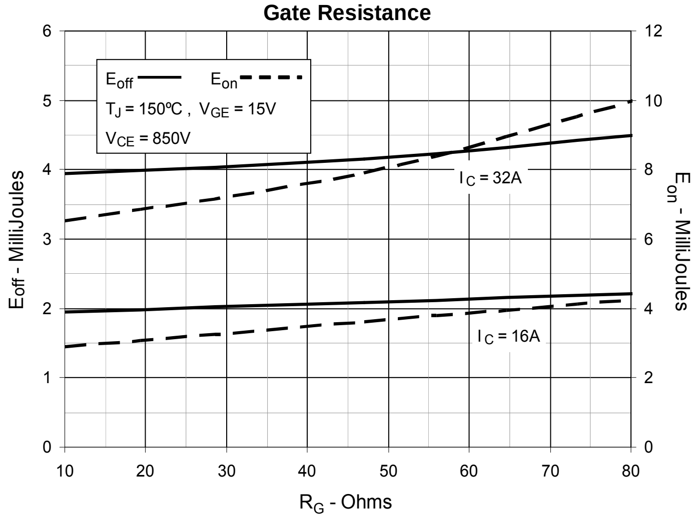


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

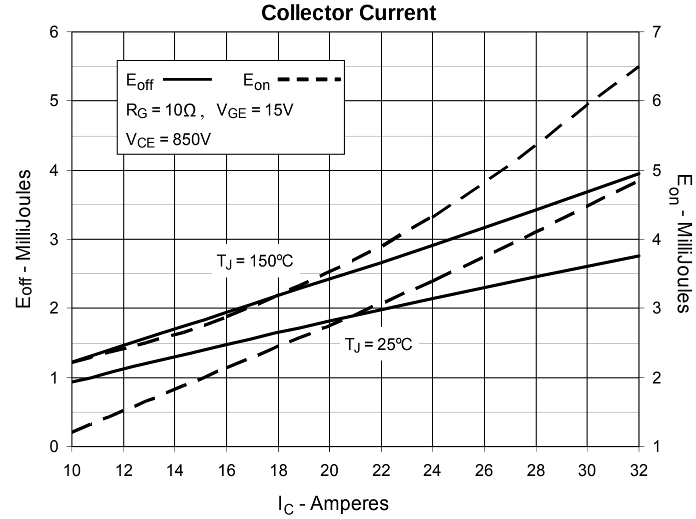


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

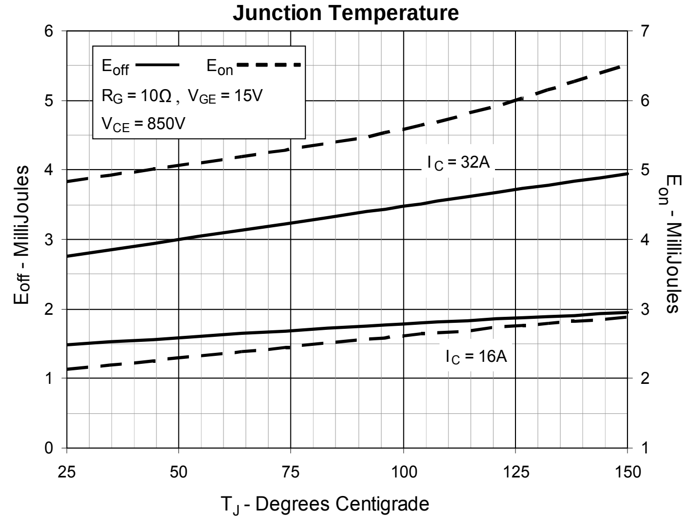


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

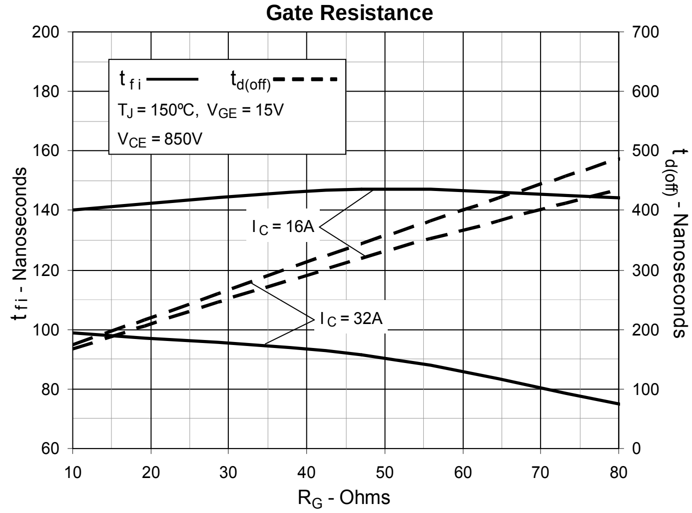


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

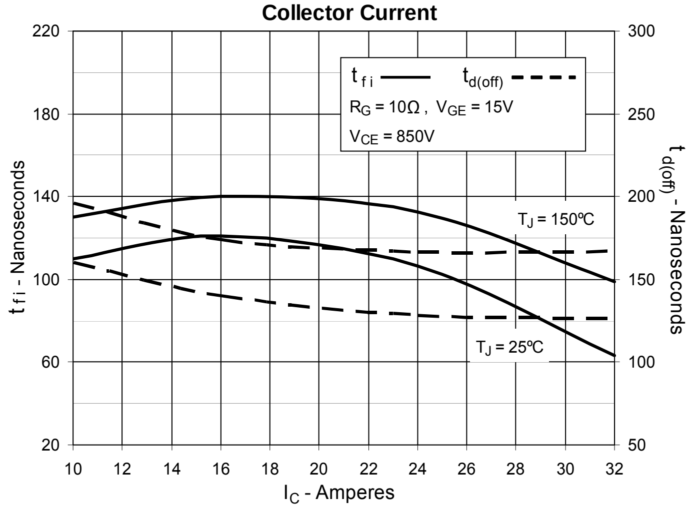


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

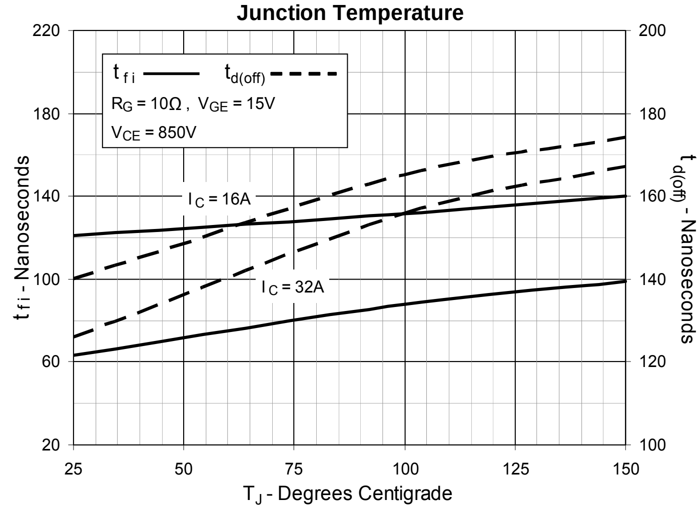


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

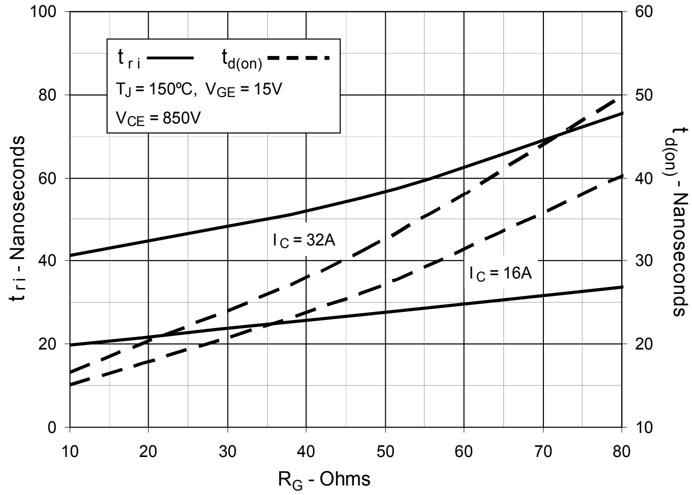


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

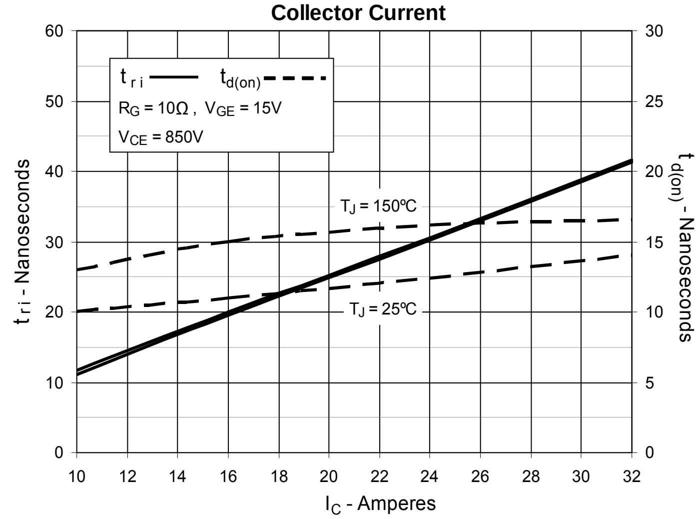


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature

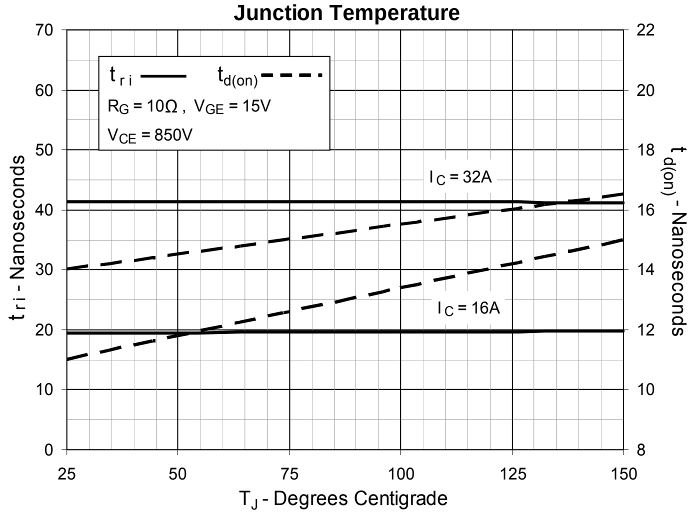


Fig. 21. Diode Forward Characteristics

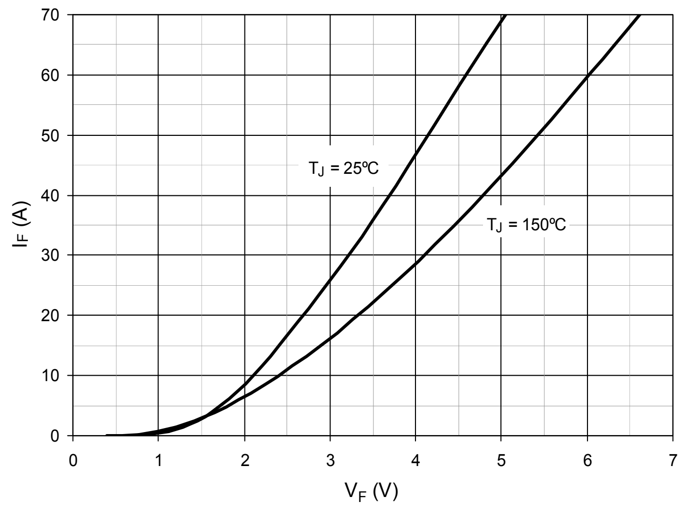


Fig. 22. Reverse Recovery Charge vs. -di_F/dt

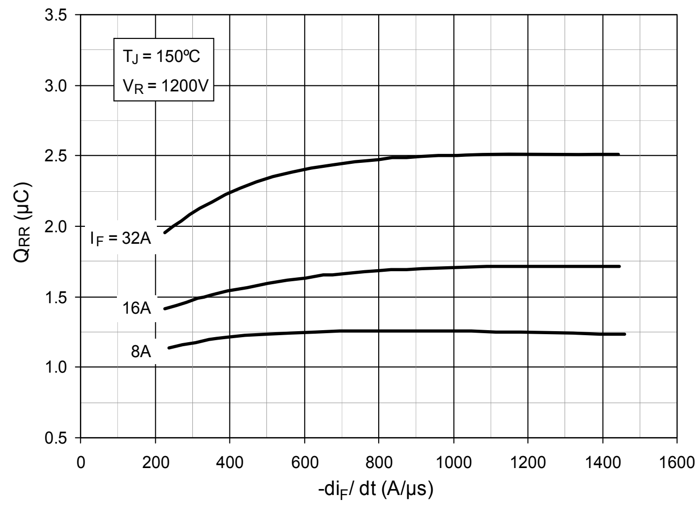


Fig. 23. Reverse Recovery Current vs. -di_F/dt

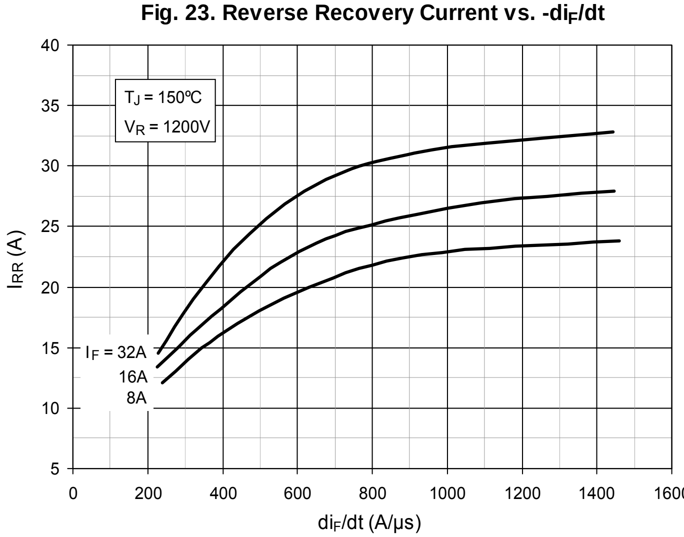


Fig. 24. Reverse Recovery Time vs. -di_F/dt

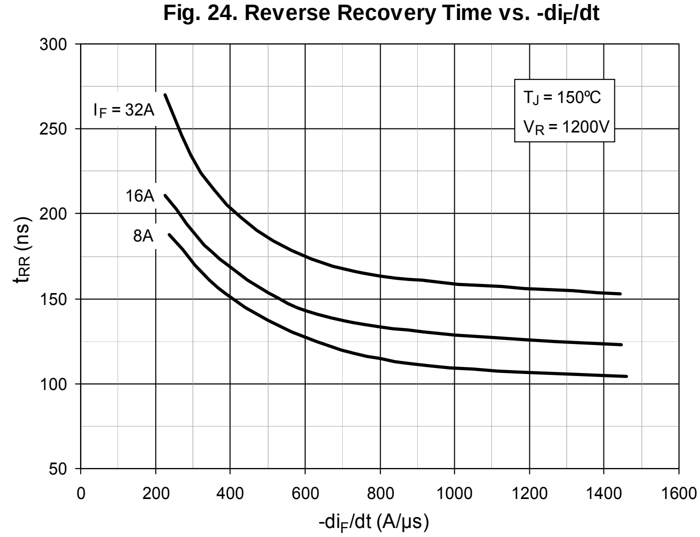


Fig. 25. Dynamic Parameters Q_{RR}, I_{RR} vs. Junction Temperature

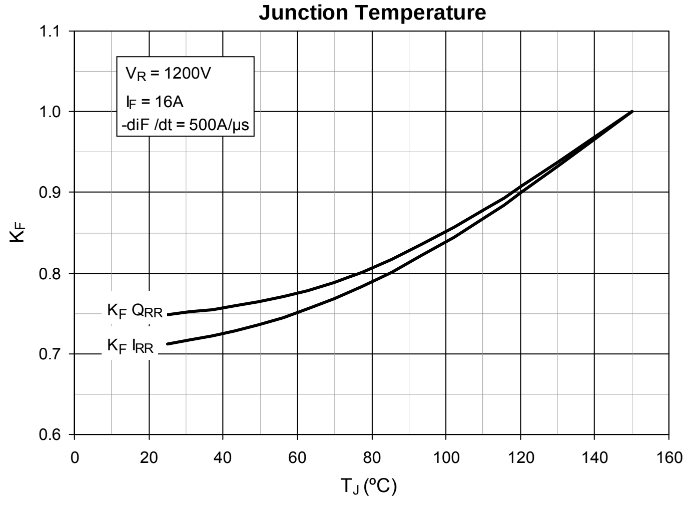


Fig. 26. Maximum Transient Thermal Impedance (Diode)