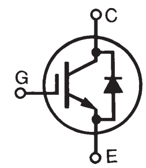
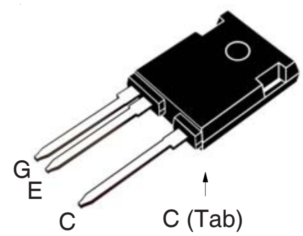
High Voltage XPT™ IGBT w/ Diode

IXYH16N250CV1HV

V_{CES} = 2500V
I_{C110} = 16A
$V_{CE(sat)}$ ≤ 4.0V
$t_{fi(typ)}$ = 250ns



TO-247HV (IXYH)



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

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 175°C	2500	V
V_{CGR}	T_J = 25°C to 175°C, R_{GE} = 1MΩ	2500	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	38	A
I_{C110}	T_C = 110°C	16	A
I_{F110}	T_C = 110°C	14	A
I_{CM}	T_C = 25°C, 1ms	126	A
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 10Ω Clamped Inductive Load	I_{CM} = 64 1500	A V
P_C	T_C = 25°C	500	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

Features

- High Voltage Package
- High Blocking Voltage
- High Peak Current Capability
- Low Saturation Voltage

Advantages

- Low Gate Drive Requirement
- High Power Density

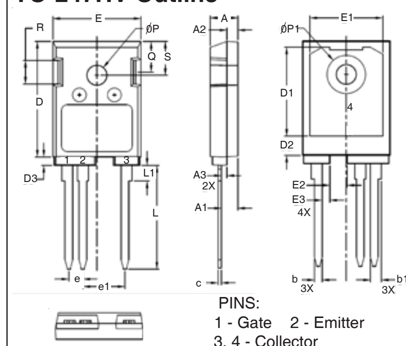
Applications

- 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.	
BV_{CES}	I_C = 250μA, V_{GE} = 0V	2500			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			50	μA
	V_{CE} = 0.8 • V_{CES}, V_{GE} = 0V T_J = 150°C			4	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±100	nA
$V_{CE(sat)}$	I_C = 16A, V_{GE} = 15V, Note 1		3.30	4.00	V
	T_J = 150°C		4.75		V

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.
g_{fs}	I_C = 16A, V_{CE} = 10V, Note 1	11	18	S
R_{Gi}	Gate Input Resistance		5.8	Ω
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		1980	pF
C_{oes}			94	pF
C_{res}			28	pF
$Q_{g(on)}$	I_C = 16A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		97	nC
Q_{ge}			13	nC
Q_{gc}			43	nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		14	ns
t_{ri}	I_C = 16A, V_{GE} = 15V		19	ns
E_{on}	V_{CE} = 0.5 • V_{CES}, R_G = 10Ω		4.75	mJ
$t_{d(off)}$	Note 2		260	ns
t_{fi}			250	ns
E_{off}			3.90	mJ
$t_{d(on)}$	**Inductive load, T_J = 150°C**		15	ns
t_{ri}	I_C = 16A, V_{GE} = 15V		24	ns
E_{on}	V_{CE} = 0.5 • V_{CES}, R_G = 10Ω		5.80	mJ
$t_{d(off)}$	Note 2		305	ns
t_{fi}			236	ns
E_{off}			4.40	mJ
R_{thJC}				0.30 °C/W
R_{thCS}			0.21	°C/W

TO-247HV Outline



PINS:
1 - Gate 2 - Emitter
3, 4 - Collector

SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	.193	.201	4.90	5.10
A1	.114	.122	2.90	3.10
A2	.075	.083	1.90	2.10
A3	.035	.043	0.90	1.10
b	.053	.059	1.35	1.50
b1	.075	.083	1.90	2.10
c	.022	.030	0.55	0.75
D	.819	.843	20.80	21.40
D1	.638	.646	16.20	16.40
D2	.134	.146	3.40	3.70
D3	.055	.063	1.40	1.60
E	.622	.638	15.80	16.20
E1	.520	.528	13.20	13.40
E2	.118	.126	3.00	3.20
E3	.051	.059	1.30	1.50
e	.100 BSC		2.54 BSC	
e1	.300 BSC		7.62 BSC	
L	.732	.748	18.60	19.00
L1	.106	.118	2.70	3.00
øP	.138	.142	3.50	3.60
øP1	.272	.280	6.90	7.10
Q	.216	.224	5.50	5.70
R	.165	.169	4.20	4.30
S	.240	.248	6.10	6.30

Reverse Diode (FRED)

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Value Min.	Typ.	Max.	
V_F	I_F = 16A, V_{GE} = 0V, Note 1			5.0	V
	T_J = 150°C		4.8		V
I_{RM}	I_F = 16A, V_{GE} = 0V, $-di_F/dt$ = 500A/μs,		28		A
t_{rr}	V_R = 1200V, T_J = 150°C		165		ns
R_{thJC}				0.80	°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.

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

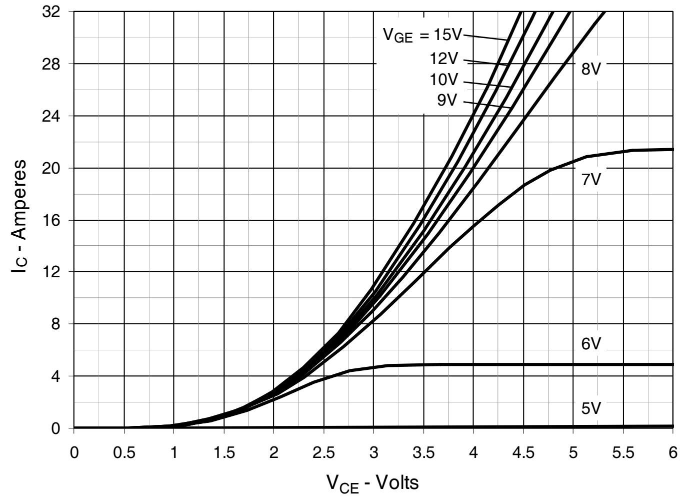


Fig. 2. Extended Output Characteristics @ $T_J = 25^oC$

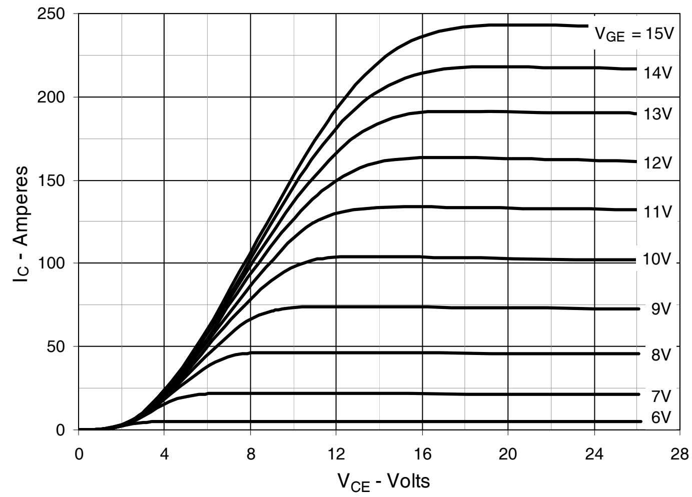


Fig. 3. Output Characteristics @ $T_J = 150^oC$

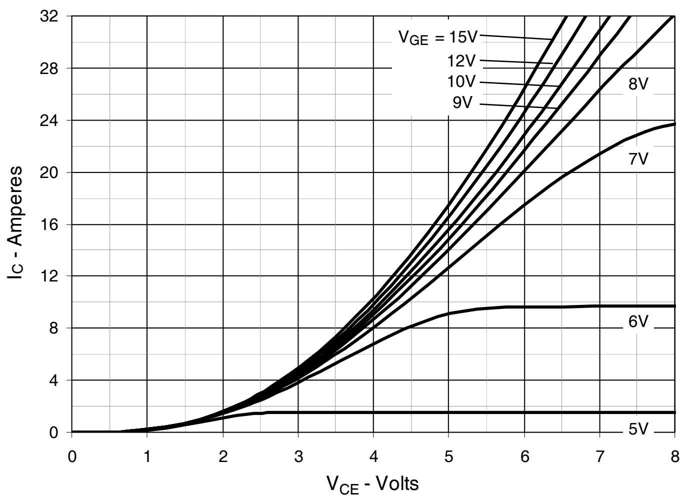


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

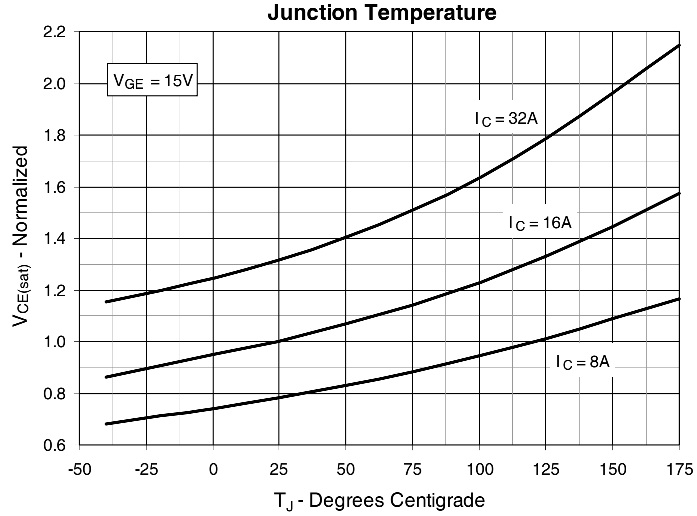


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

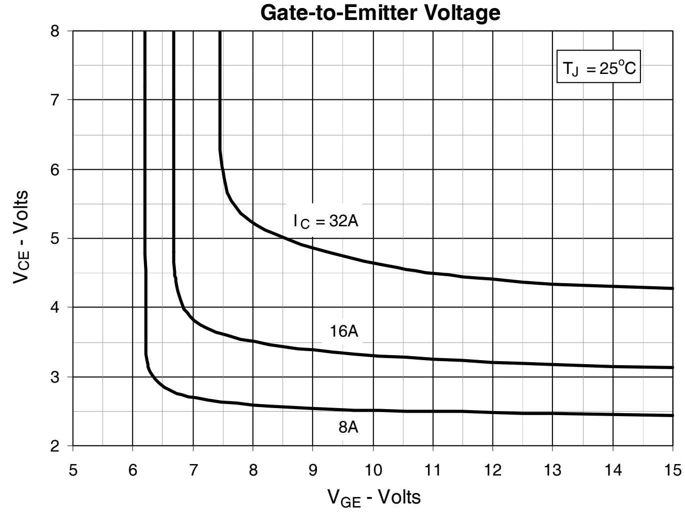


Fig. 6. Input Admittance

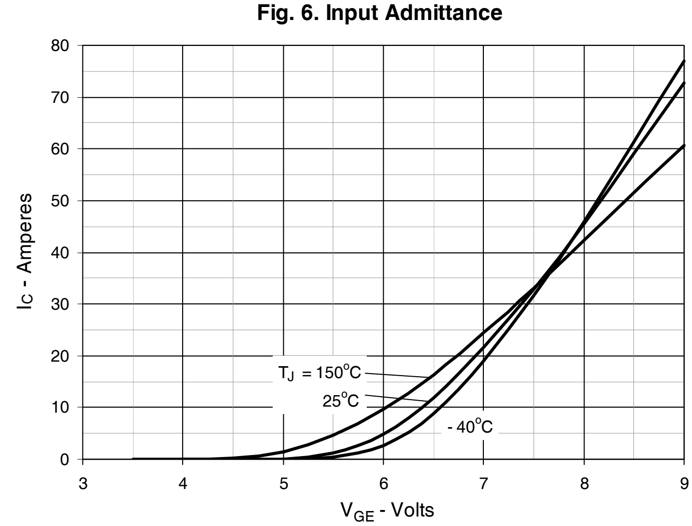


Fig. 7. Transconductance

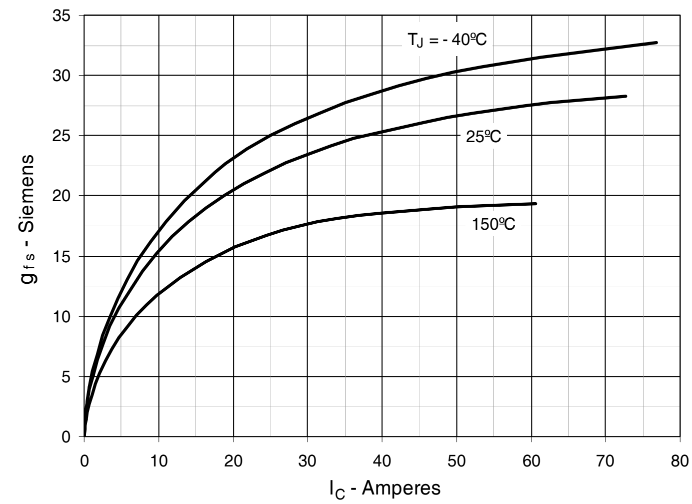


Fig. 8. Gate Charge

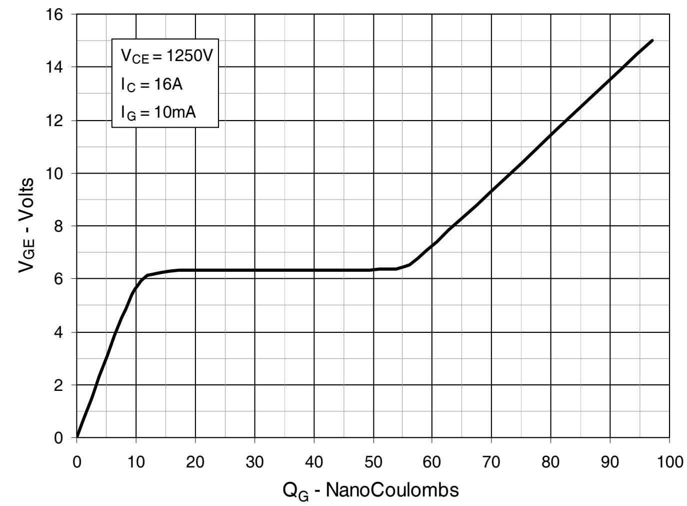


Fig. 9. Capacitance

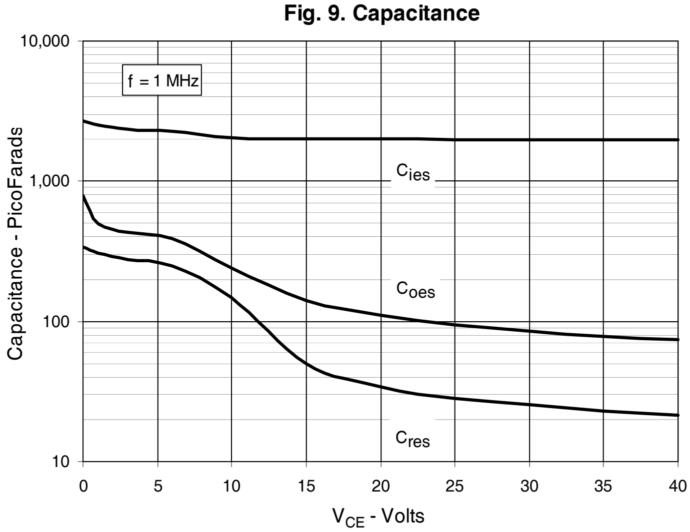


Fig. 10. Reverse-Bias Safe Operating Area

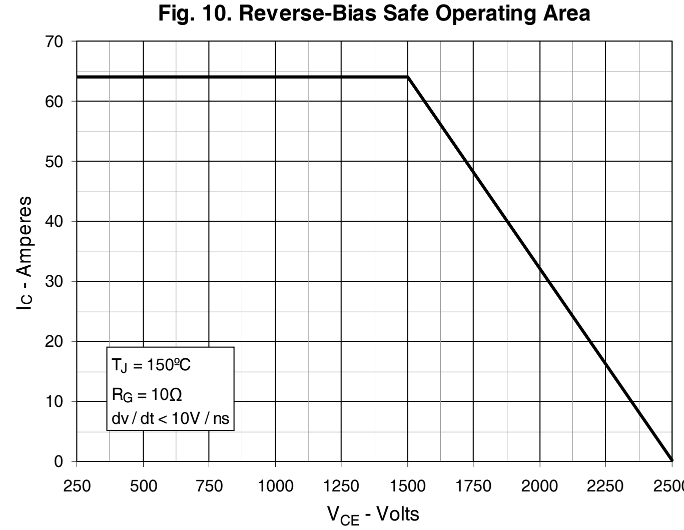


Fig. 11. Maximum Transient Thermal Impedance (IGBT)

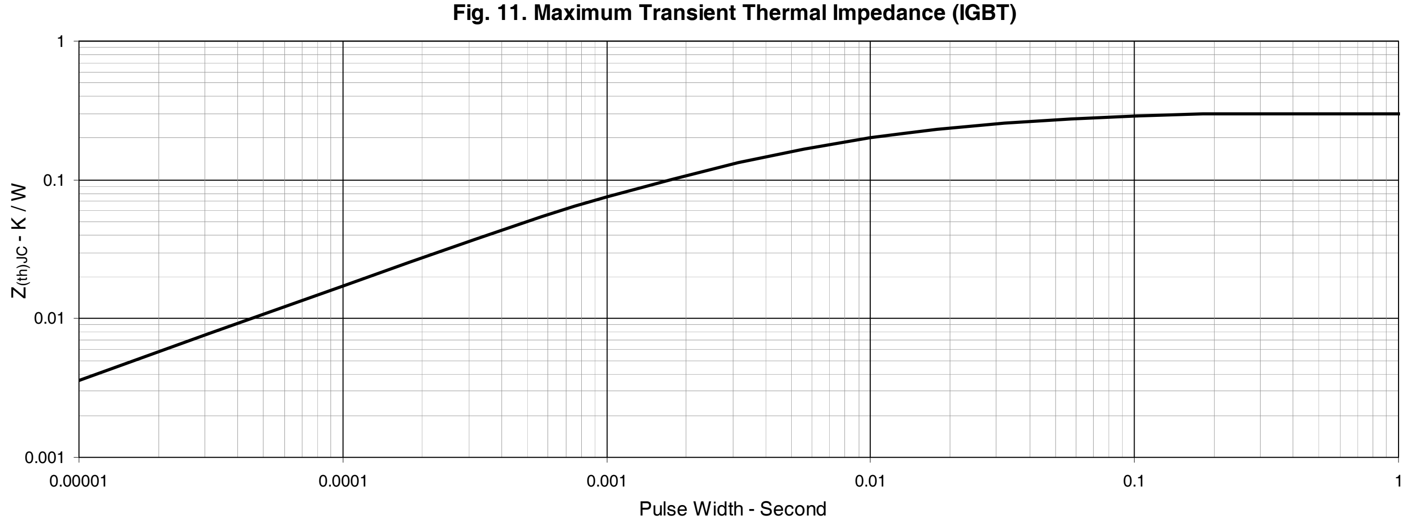


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

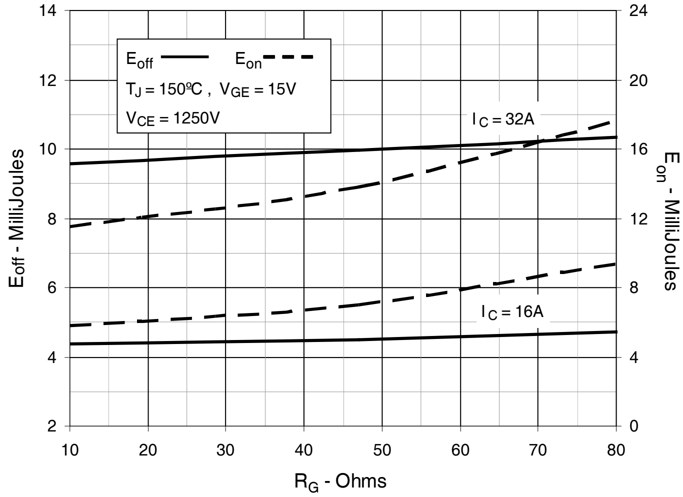


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

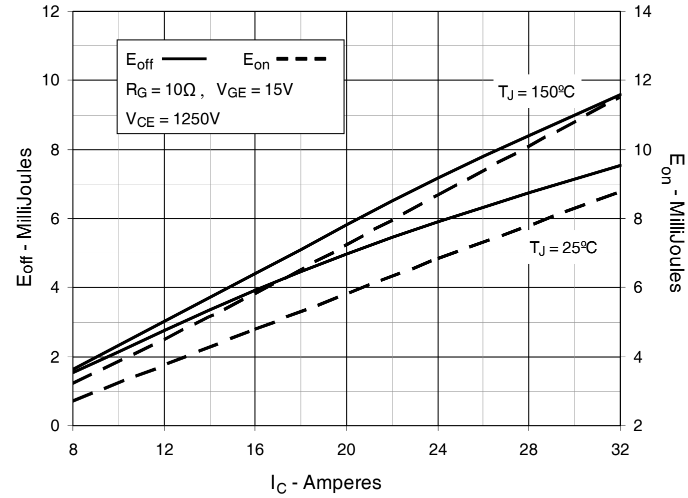


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

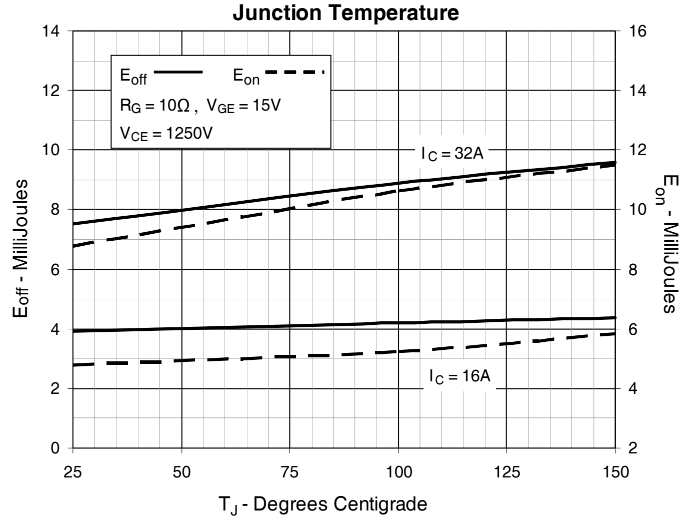


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

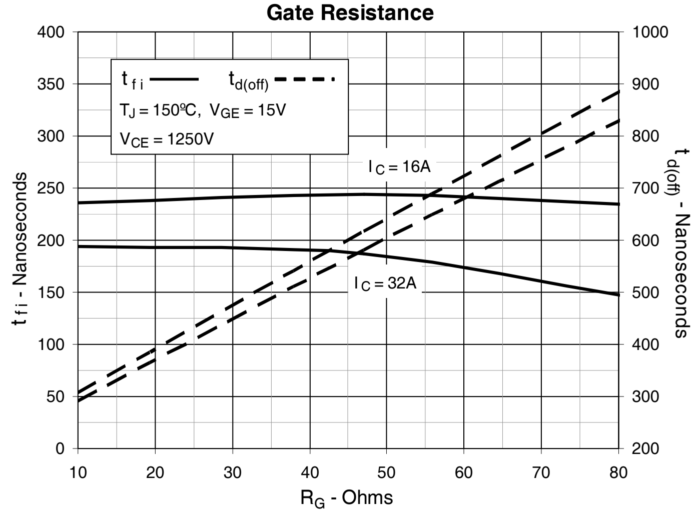


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

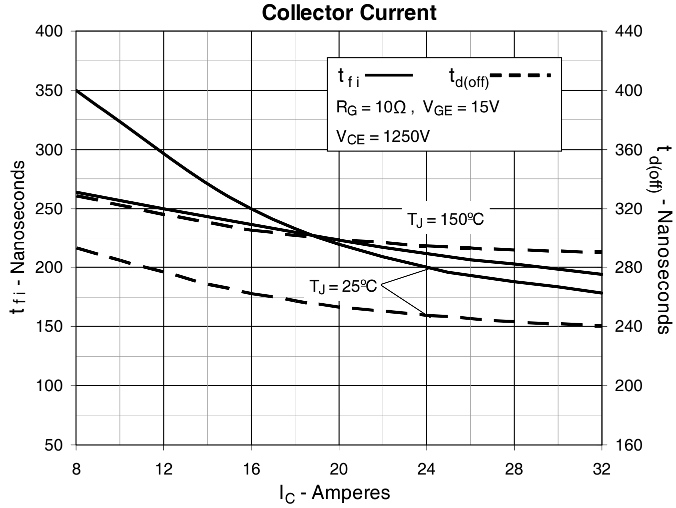


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

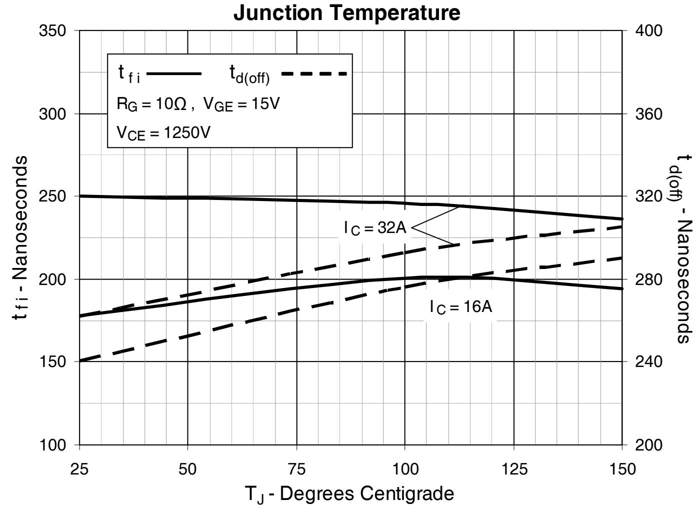


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

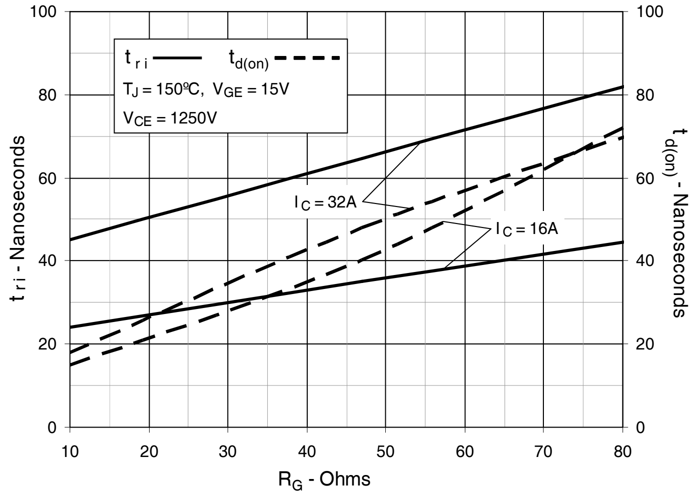


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

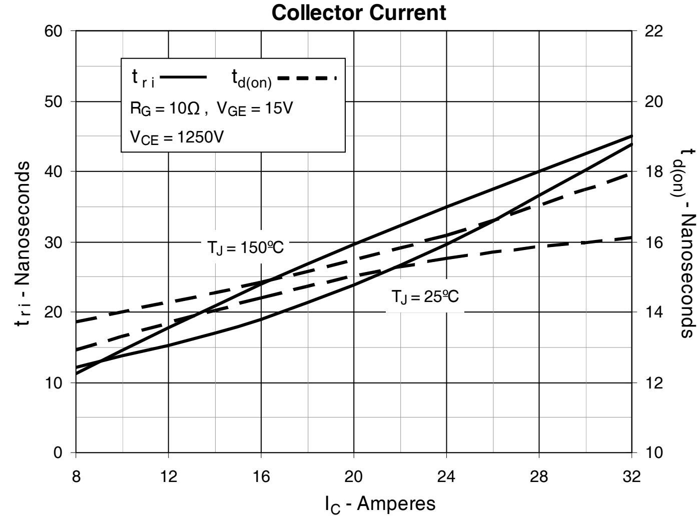


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature

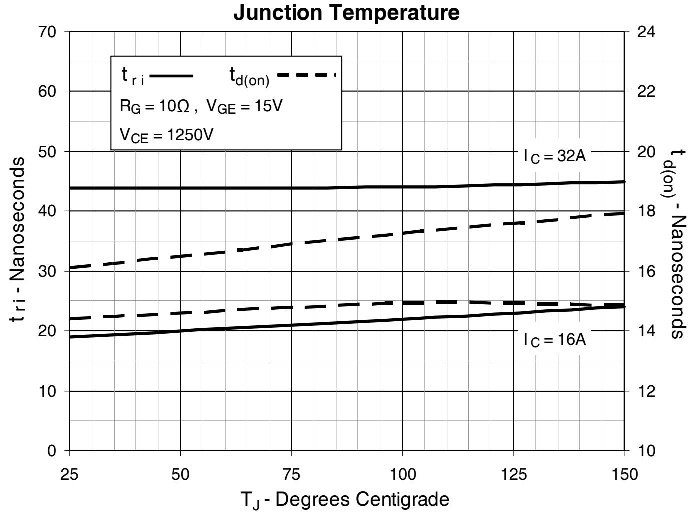


Fig. 21. Diode Forward Characteristics

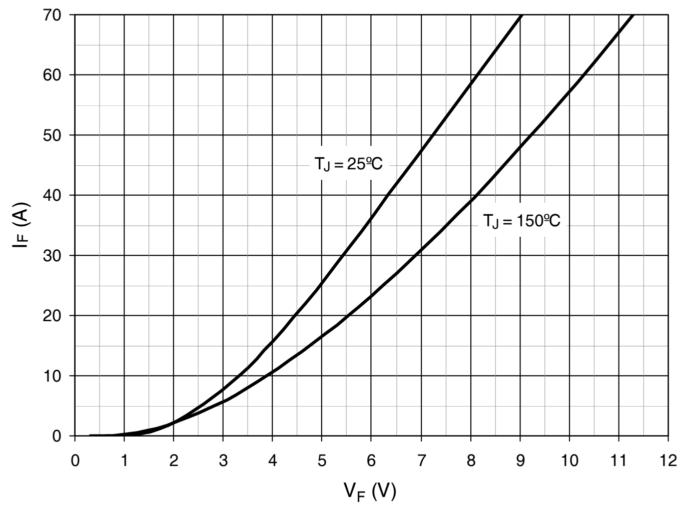


Fig. 22. Reverse Recovery Charge vs. -diF/dt

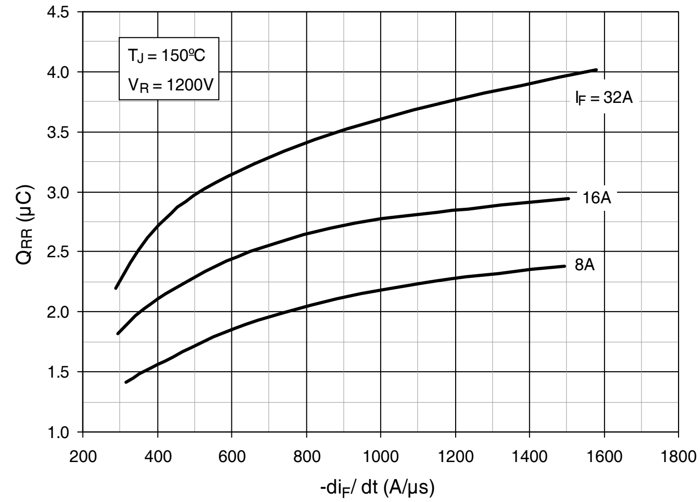


Fig. 23 Reverse Recovery Current vs. -diF/dt

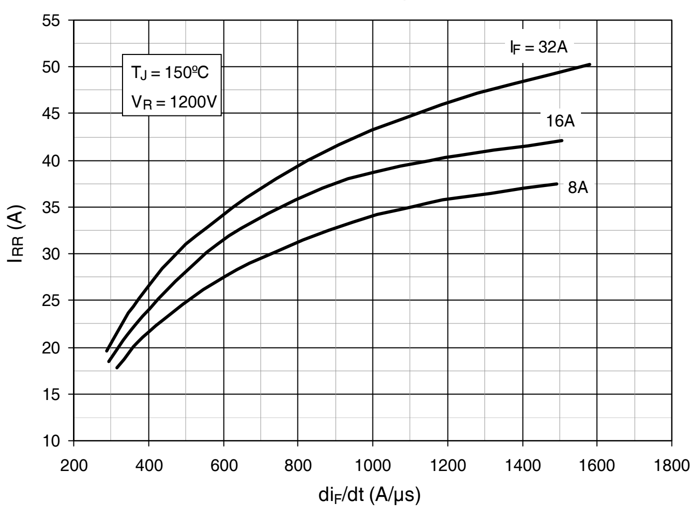


Fig. 24. Reverse Recovery Time vs. -diF/dt

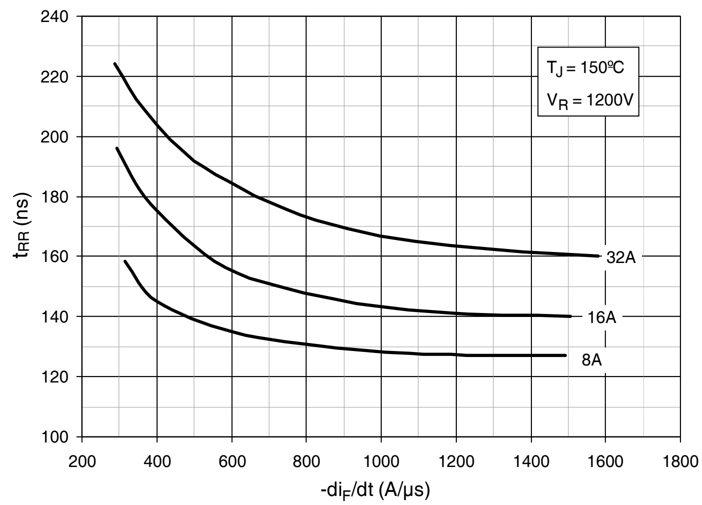


Fig. 25. Dynamic Parameters QRR, IRR vs. Junction Temperature

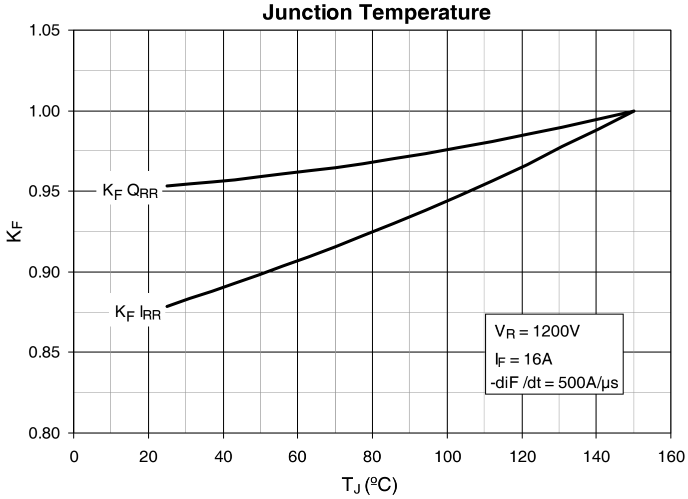


Fig. 26. Maximum Transient Thermal Impedance (Diode)