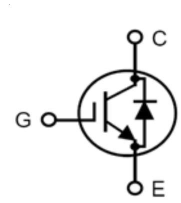
900V XPT™ IGBT
GenX3™ w/ Diode

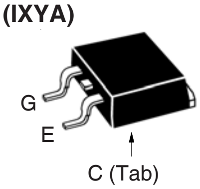
IXYA8N90C3D1
IXYP8N90C3D1

V_{CES}	=	900V
I_{C110}	=	8A
$V_{CE(sat)}$	≤	3.0V
$t_{fi(typ)}$	=	130ns

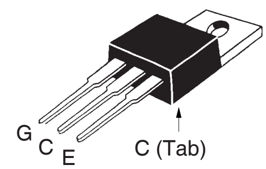
High-Speed IGBT
for 20-50 kHz Switching



TO-263 AA (IXYA)



TO-220AB (IXYP)



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

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 175°C	900	V
V_{CGR}	T_J = 25°C to 175°C, R_{GE} = 1MΩ	900	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	20	A
I_{C110}	T_C = 110°C	8	A
I_{F110}	T_C = 110°C	12	A
I_{CM}	T_C = 25°C, 1ms	48	A
I_A	T_C = 25°C	4	A
E_{AS}	T_C = 25°C	15	mJ
SSOA	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 30Ω	I_{CM} = 16	A
(RBSOA)	Clamped Inductive Load	@$V_{CE} \leq V_{CES}$	
P_C	T_C = 25°C	125	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 (TO-220)	1.13/10	Nm/lb.in.
F_C	Mounting Force (TO-263)	10..65 / 2.2..14.6	N/lb.
Weight	TO-263	2.5	g
	TO-220	3.0	g

Symbol	Test Conditions	Characteristic Values			
(T_J = 25°C, Unless Otherwise Specified)		Min.	Typ.	Max.	
BV_{CES}	I_C = 250μA, V_{GE} = 0V	950			V
$V_{GE(th)}$	I_C = 250μA, V_{CE} = V_{GE}	3.5		6.0	V
I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0V			60	μA
	T_J = 125°C			400	μA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±100	nA
$V_{CE(sat)}$	I_C = 8A, V_{GE} = 15V, Note 1		2.15	3.00	V
	T_J = 125°C		2.60		V

Features

- Optimized for Low Switching Losses
- Square RBSOA
- Positive Thermal Coefficient of Vce(sat)
- Anti-Parallel Ultra Fast Diode
- Avalanche Rated
- International Standard Packages

Advantages

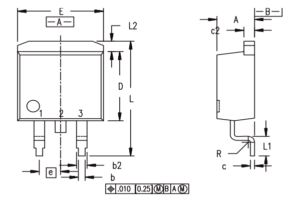
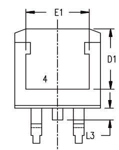
- High Power Density
- Low Gate Drive Requirement

Applications

- High Frequency Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Battery Chargers
- Welding Machines
- Lamp Ballasts

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	I_C = 8A, V_{CE} = 10V, Note 1	2.9	4.8		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		400		pF
C_{oes}			30		pF
C_{res}			7.8		pF
$Q_{g(on)}$	I_C = 8A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		13.3		nC
Q_{ge}			3.4		nC
Q_{gc}			5.8		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		16		ns
t_{ri}	I_C = 8A, V_{GE} = 15V		20		ns
E_{on}	V_{CE} = 0.5 • V_{CES}, R_G = 30Ω		0.46		mJ
$t_{d(off)}$	Note 2		40		ns
t_{fi}			130		ns
E_{off}			0.18	0.50	mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**		17		ns
t_{ri}	I_C = 8A, V_{GE} = 15V		22		ns
E_{on}	V_{CE} = 0.5 • V_{CES}, R_G = 30Ω		1.00		mJ
$t_{d(off)}$	Note 2		75		ns
t_{fi}			163		ns
E_{off}			0.22		mJ
R_{thJC}				1.2	°C/W
R_{thCS}	TO-220		0.50		°C/W

TO-263 Outline

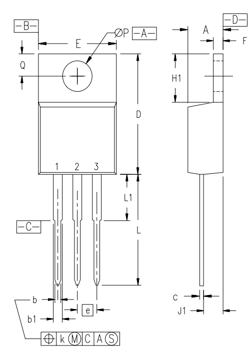
1. Gate
2. Collector
3. Emitter
4. Collector
   Bottom Side

Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	4.06	4.83	.160	.190
b	0.51	0.99	.020	.039
b2	1.14	1.40	.045	.055
c	0.40	0.74	.016	.029
c2	1.14	1.40	.045	.055
D	8.64	9.65	.340	.380
D1	8.00	8.89	.280	.320
E	9.65	10.41	.380	.405
E1	6.22	8.13	.270	.320
e	2.54	BSC	.100	BSC
L	14.61	15.88	.575	.625
L1	2.29	2.79	.090	.110
L2	1.02	1.40	.040	.055
L3	1.27	1.78	.050	.070
L4	0	0.13	0	.005

Reverse Diode (FRED)

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)		Characteristic Value Min.	Typ.	Max.	
V_F	I_F = 10A, V_{GE} = 0V, Note 1				3.0	V
		T_J = 150°C			2.0	V
I_{RM}	I_F = 10A, V_{GE} = 0V, -di_F/dt = 200A/μs,	T_J = 100°C		7.5		A
t_{rr}	V_R = 600V	T_J = 100°C		114		ns
R_{thJC}					2.5	°C/W

TO-220 Outline



Pins: 1 - Gate 2 - Collector
3 - Emitter

SYM	INCHES MIN	MAX	MILLIMETERS MIN	MAX
A	.170	.190	4.32	4.83
b	.025	.040	0.64	1.02
b1	.045	.065	1.15	1.65
c	.014	.022	0.35	0.56
D	.580	.630	14.73	16.00
E	.390	.420	9.91	10.66
e	.100 BSC		2.54 BSC	
F	.045	.055	1.14	1.40
H1	.230	.270	5.85	6.85
J1	.090	.110	2.29	2.79
k	0	.015	0	0.38
L	.500	.550	12.70	13.97
L1	.110	.230	2.79	5.84
ØP	.139	.161	3.53	4.08
Q	.100	.125	2.54	3.18

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

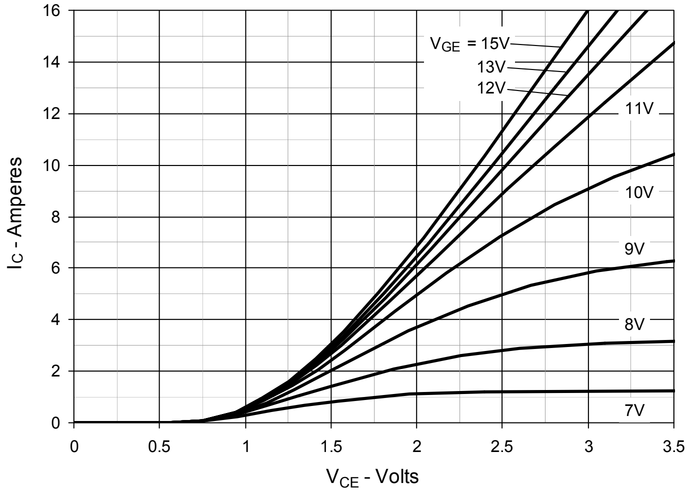


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

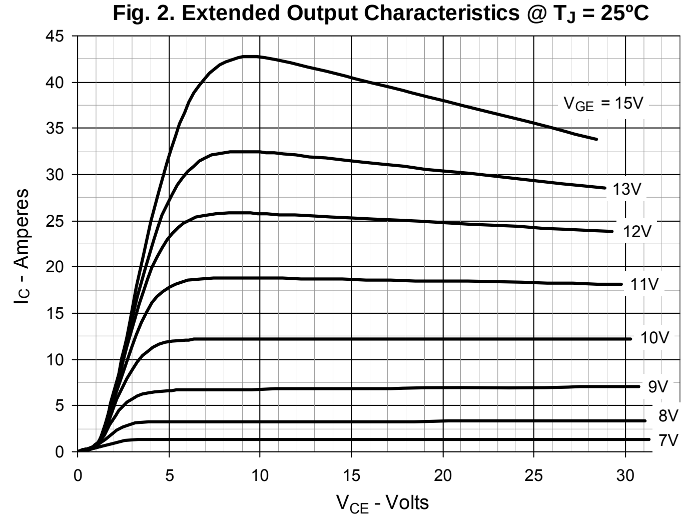


Fig. 3. Output Characteristics @ T_J = 150ºC

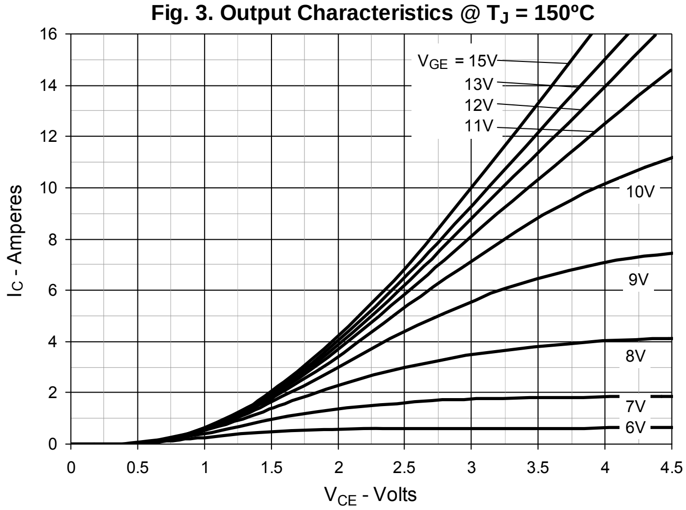


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

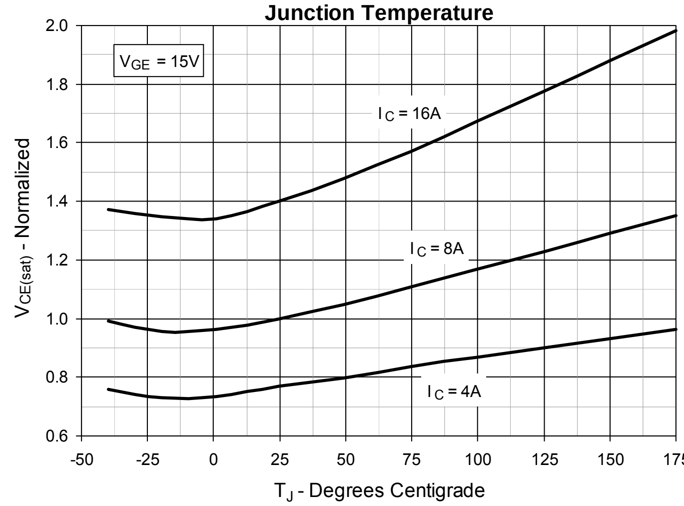


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

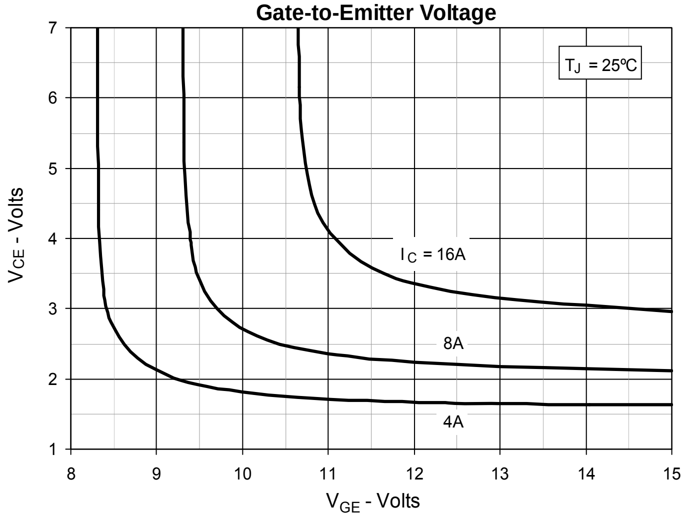


Fig. 6. Input Admittance

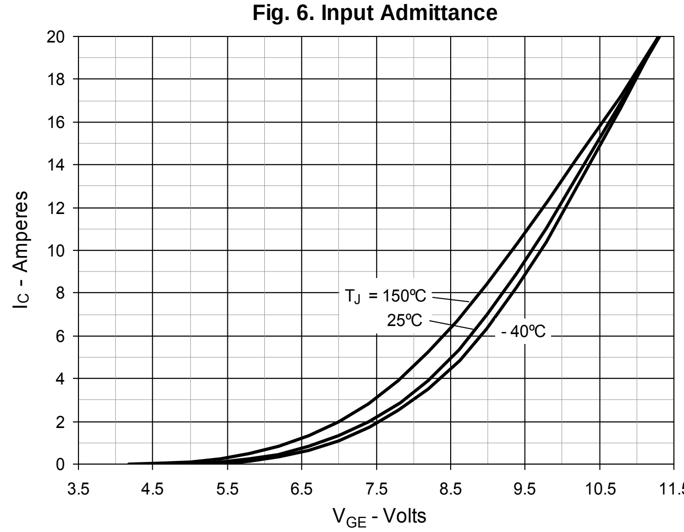


Fig. 7. Transconductance

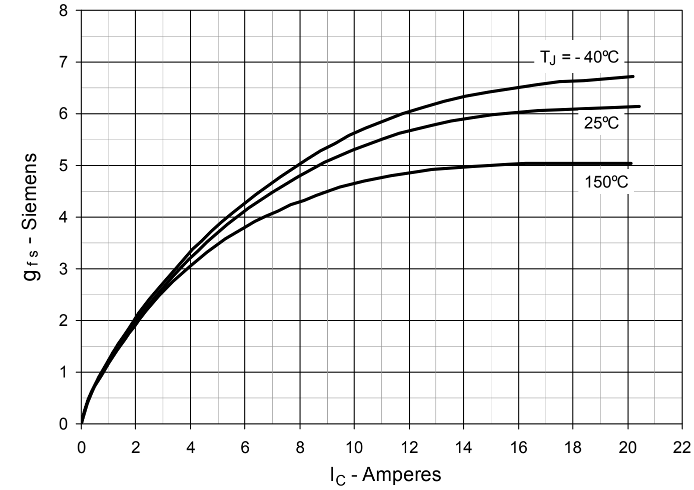


Fig. 8. Gate Charge

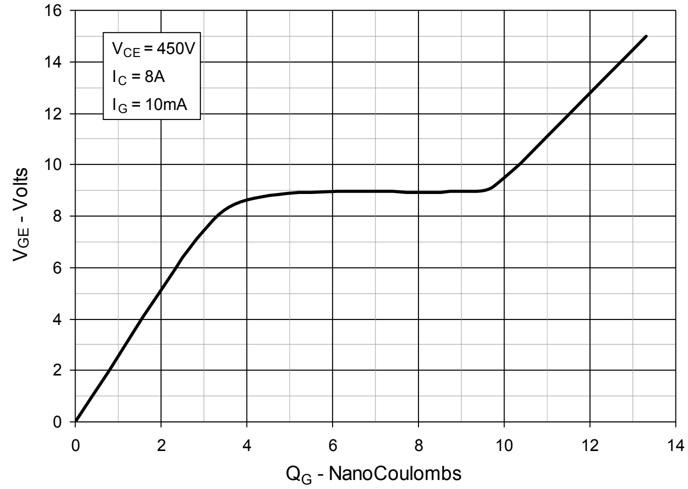


Fig. 9. Capacitance

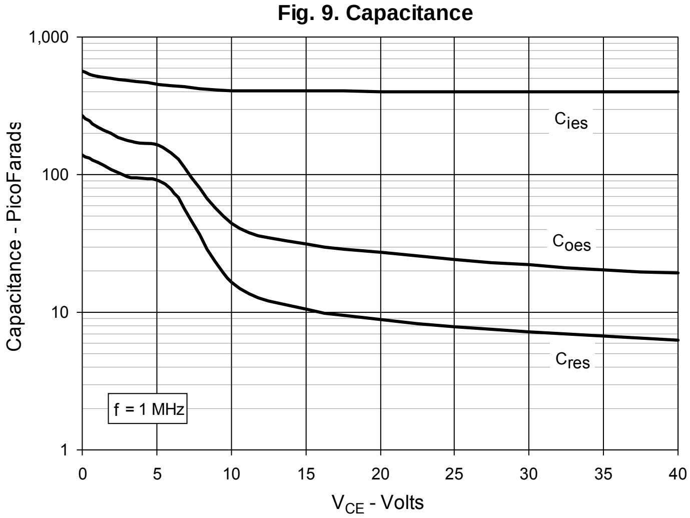


Fig. 10. Reverse-Bias Safe Operating Area

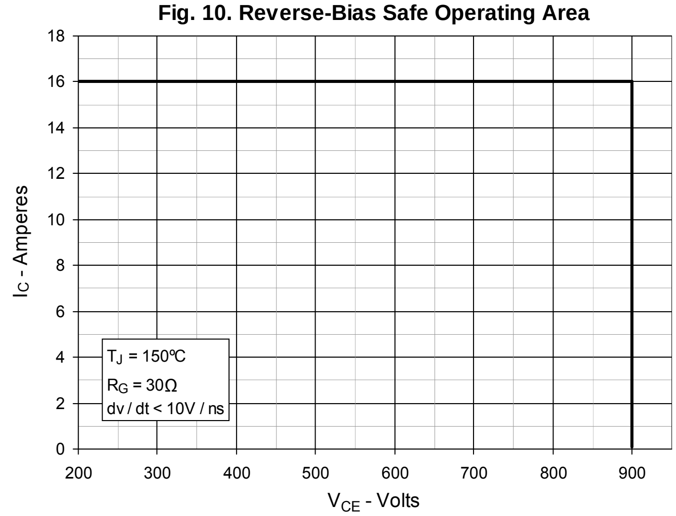


Fig. 11. Maximum Transient Thermal Impedance

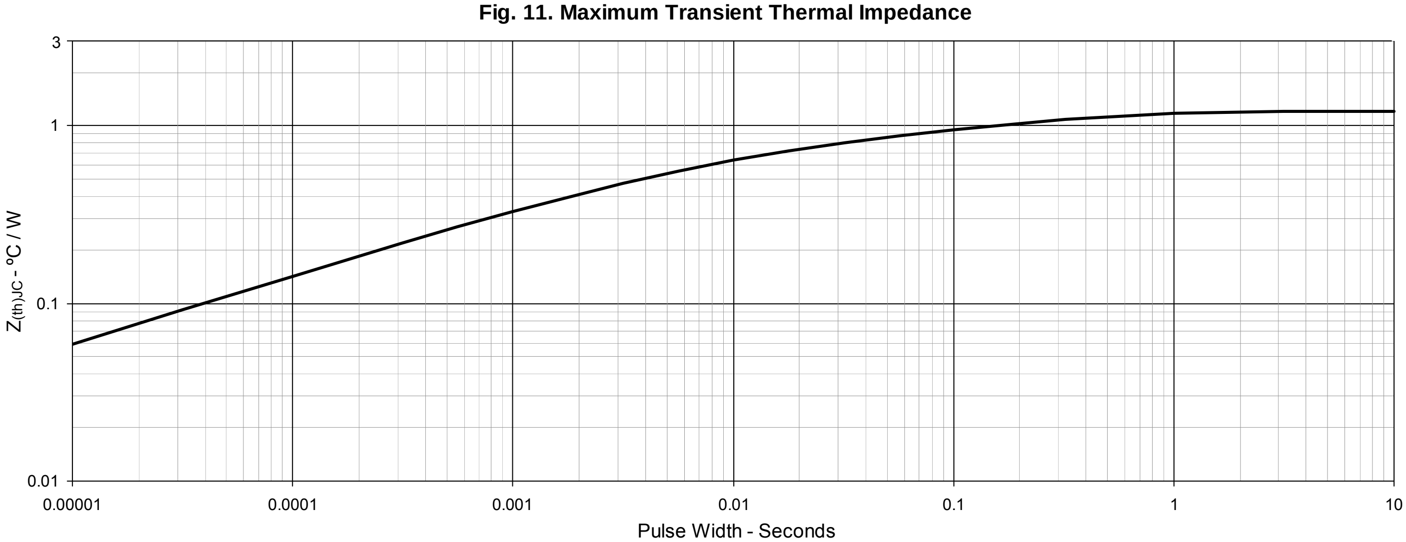


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

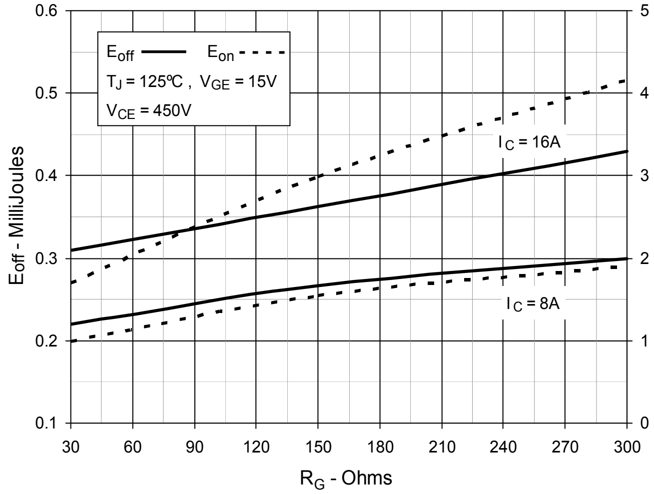


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

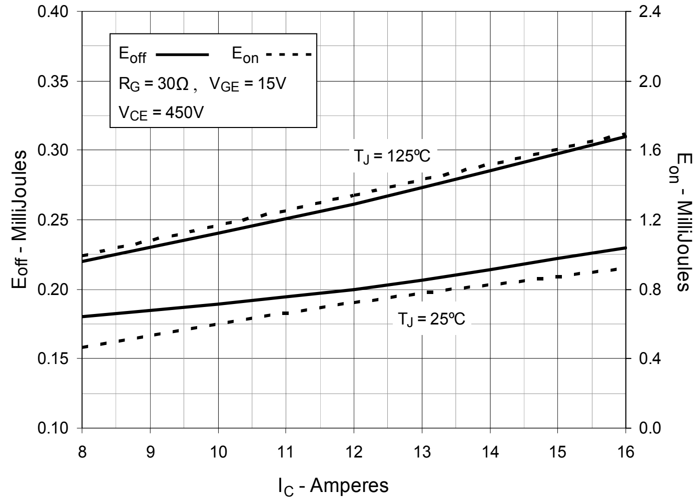


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

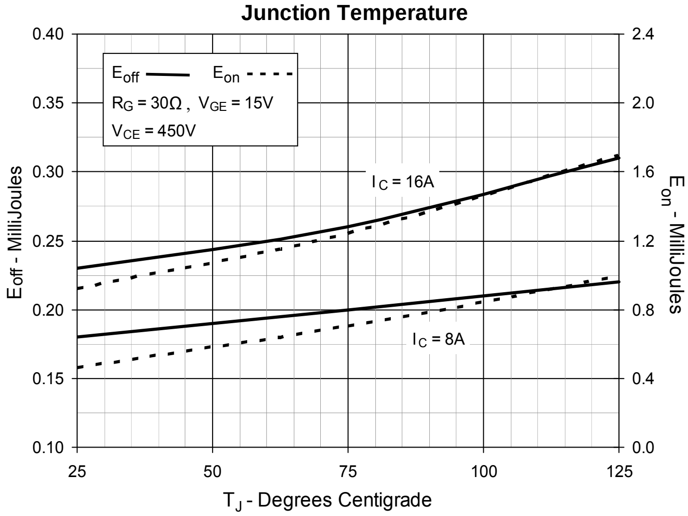


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

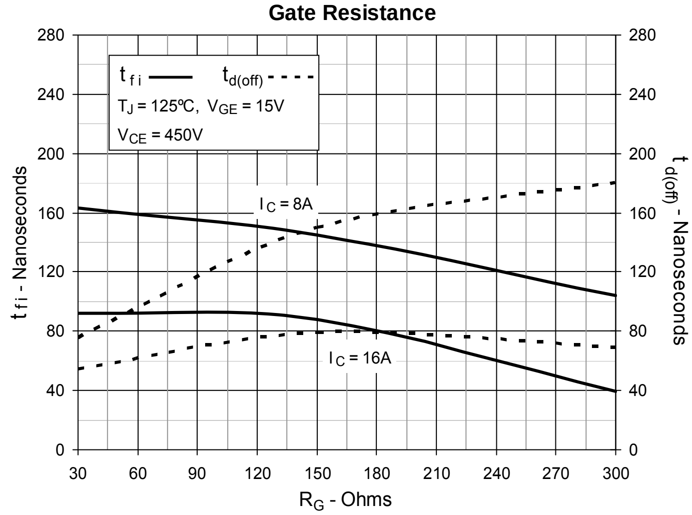


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

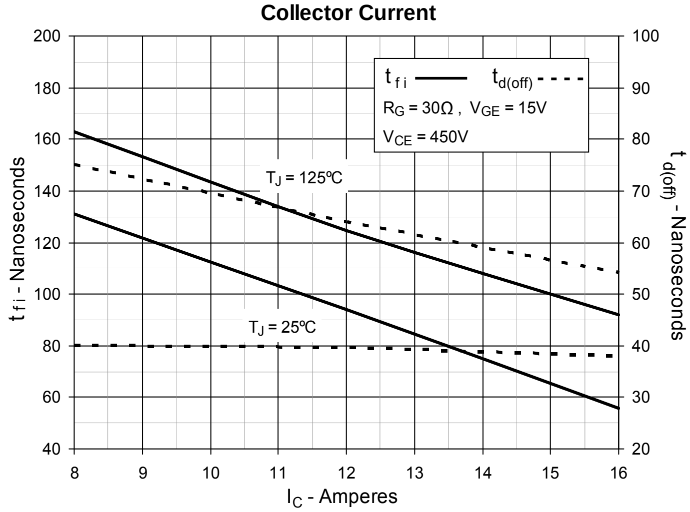


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

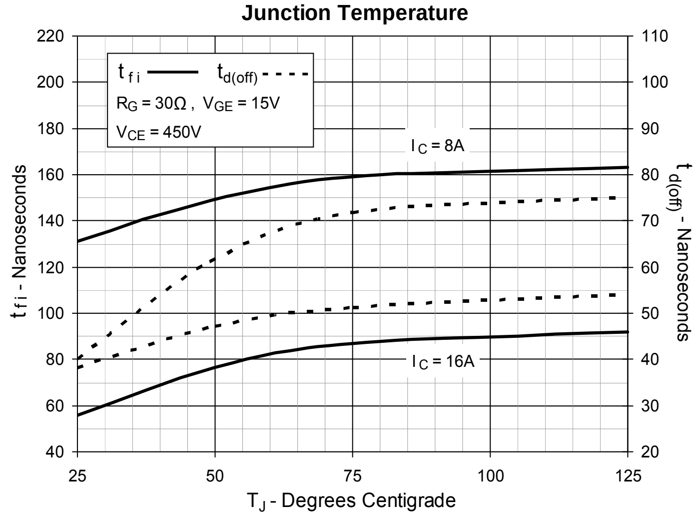


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

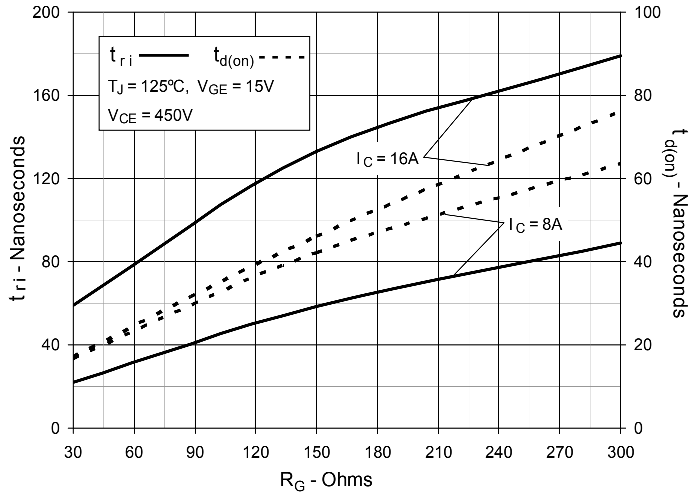


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

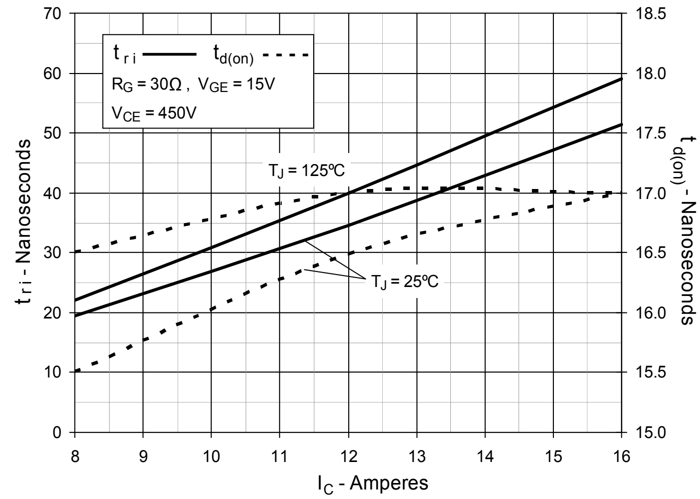
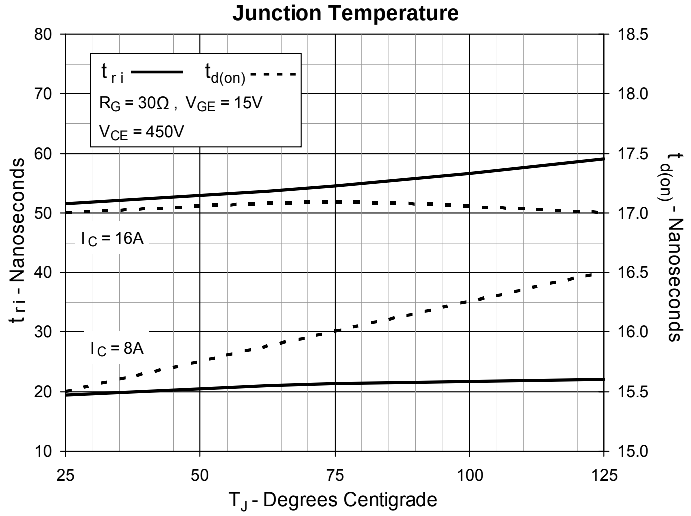


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature



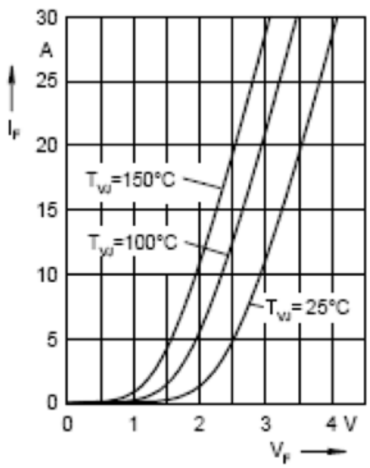


Fig. 21. Forward current I_F vs V_F

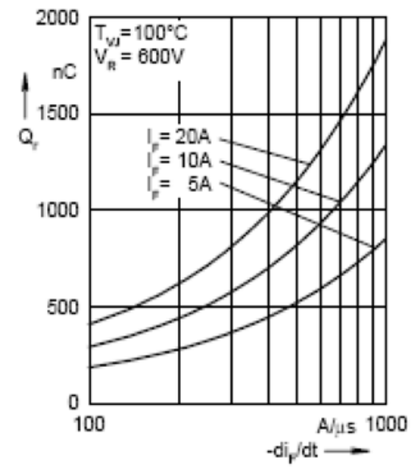


Fig. 22. Reverse recovery charge Q_r versus $-di_F/dt$

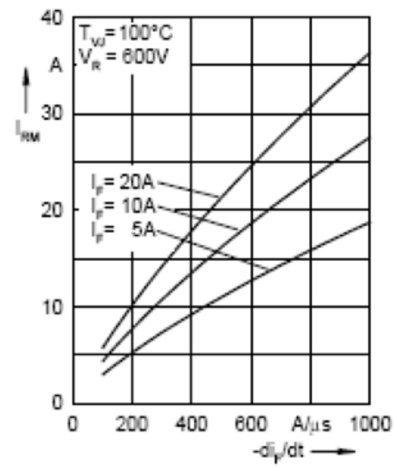


Fig. 23. Peak reverse current I_{RM} versus $-di_F/dt$

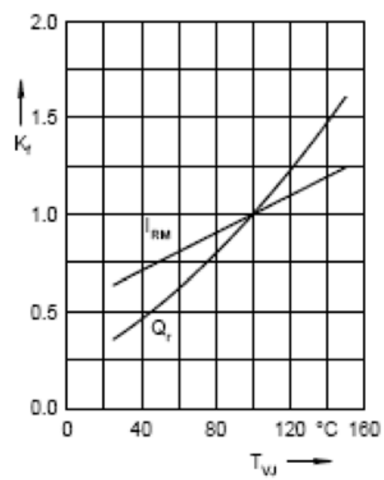


Fig. 24. Dynamic parameters Q_r, I_{RM} versus T_{VJ}

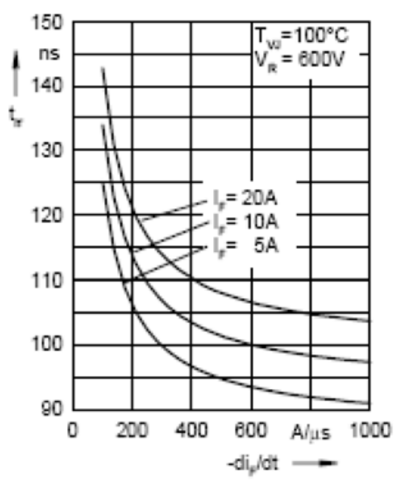


Fig. 25. Recovery time t_{rr} versus $-di_F/dt$

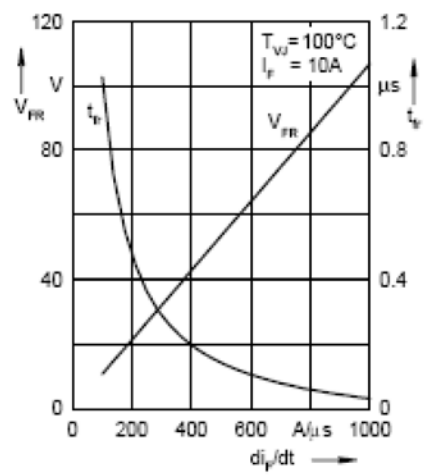


Fig. 26. Peak forward voltage V_{FR} and t_{fr} versus di_F/dt

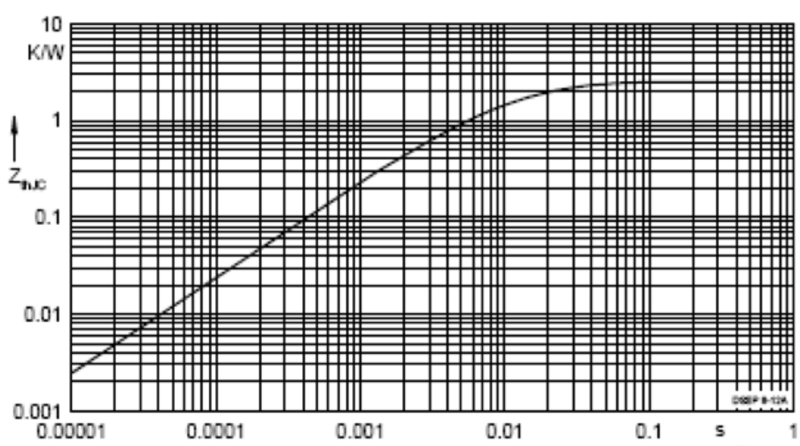


Fig. 27. Transient thermal resistance junction to case