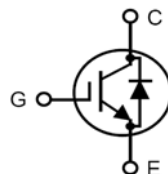


900V XPT™ IGBTs GenX3™ w/ Diode

IXYA8N90C3D1 IXYP8N90C3D1

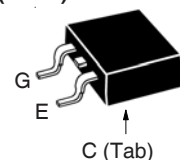
High-Speed IGBT
for 20-50 kHz Switching



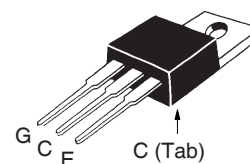
$$\begin{aligned} V_{CES} &= 900V \\ I_{C110} &= 8A \\ V_{CE(sat)} &\leq 2.5V \\ t_{fi(typ)} &= 130ns \end{aligned}$$

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^\circ C$ to $175^\circ C$	900	V
V_{CGR}	$T_J = 25^\circ C$ to $175^\circ C$, $R_{GE} = 1M\Omega$	900	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ C$	20	A
I_{C110}	$T_C = 110^\circ C$	8	A
I_{F110}	$T_C = 110^\circ C$	12	A
I_{CM}	$T_C = 25^\circ C$, 1ms	48	A
I_A	$T_C = 25^\circ C$	4	A
E_{AS}	$T_C = 25^\circ C$	15	mJ
SSOA (RBSOA)	$V_{GE} = 15V$, $T_{VJ} = 150^\circ C$, $R_G = 30\Omega$ Clamped Inductive Load	$I_{CM} = 16$ $@ V_{CE} \leq V_{CES}$	A
P_C	$T_C = 25^\circ C$	125	W
T_J		-55 ... +175	$^\circ C$
T_{JM}		175	$^\circ C$
T_{stg}		-55 ... +175	$^\circ C$
T_L	Maximum Lead Temperature for Soldering	300	$^\circ C$
T_{SOLD}	1.6 mm (0.062in.) from Case for 10s	260	$^\circ C$
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

TO-263 AA (IXYA)



TO-220AB (IXYP)



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

Features

- Optimized for Low Switching Losses
- Square RBSOA
- Positive Thermal Coefficient of $V_{ce(sat)}$
- 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 ($T_J = 25^\circ C$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
BV_{CES}	$I_C = 250\mu A$, $V_{GE} = 0V$	950		V
$V_{GE(th)}$	$I_C = 250\mu A$, $V_{CE} = V_{GE}$	3.5		6.0 V
I_{CES}	$V_{CE} = V_{CES}$, $V_{GE} = 0V$ $T_J = 125^\circ C$			60 μA 400 μA
I_{GES}	$V_{CE} = 0V$, $V_{GE} = \pm 20V$			± 100 nA
$V_{CE(sat)}$	$I_C = 8A$, $V_{GE} = 15V$, Note 1 $T_J = 125^\circ C$	2.15 2.60		V V

Symbol Test Conditions
 $(T_J = 25^\circ\text{C Unless Otherwise Specified})$
Characteristic Values
Min. Typ. Max.

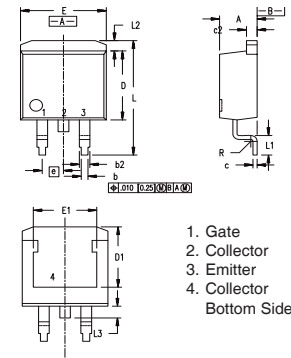
g_{fs}	$I_C = 8A, V_{CE} = 10V, \text{Note 1}$	2.9	4.8	S
C_{ies}	$V_{CE} = 25V, V_{GE} = 0V, f = 1\text{MHz}$	400		pF
C_{oes}		30		pF
C_{res}		7.8		pF
$Q_{g(on)}$	$I_C = 8A, V_{GE} = 15V, V_{CE} = 0.5 \cdot V_{CES}$	13.3		nC
Q_{ge}		3.4		nC
Q_{gc}		5.8		nC
$t_{d(on)}$	Inductive load, $T_J = 25^\circ\text{C}$ $I_C = 8A, V_{GE} = 15V$ $V_{CE} = 0.5 \cdot V_{CES}, R_G = 30\Omega$ Note 2	16		ns
t_{ri}		20		ns
E_{on}		0.46		mJ
$t_{d(off)}$		40		ns
t_{fi}		130		ns
E_{off}		0.18	0.50	mJ
$t_{d(on)}$	Inductive load, $T_J = 125^\circ\text{C}$ $I_C = 8A, V_{GE} = 15V$ $V_{CE} = 0.5 \cdot V_{CES}, R_G = 30\Omega$ Note 2	17		ns
t_{ri}		22		ns
E_{on}		1.00		mJ
$t_{d(off)}$		75		ns
t_{fi}		163		ns
E_{off}		0.22		mJ
R_{thJC}	TO-220		1.2	$^\circ\text{C/W}$
R_{thCS}		0.50		$^\circ\text{C/W}$

Reverse Diode (FRED)
 $(T_J = 25^\circ\text{C, Unless Otherwise Specified})$

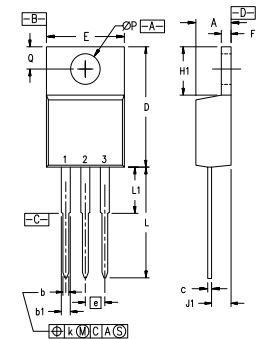
Symbol	Test Conditions	Min.	Typ.	Max.
V_F	$I_F = 10A, V_{GE} = 0V, \text{Note 1}$			3.0 V
	$T_J = 150^\circ\text{C}$			2.0 V
I_{RM}	$I_F = 10A, V_{GE} = 0V, -di_F/dt = 200A/\mu s, T_J = 100^\circ\text{C}$		7.5	A
t_{rr}	$V_R = 600V, T_J = 100^\circ\text{C}$		114	ns
R_{thJC}				2.5 $^\circ\text{C/W}$

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 .

TO-263 Outline


Dim.	Millimeter		Inches	
	Min.	Max.	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

TO-220 Outline


SYM	INCHES		MILLIMETERS	
	MIN	MAX	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

IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:	4,835,592	4,931,844	5,049,961	5,237,481	6,162,665	6,404,065 B1	6,683,344	6,727,585	7,005,734 B2	7,157,338B2
	4,860,072	5,017,508	5,063,307	5,381,025	6,259,123 B1	6,534,343	6,710,405 B2	6,759,692	7,063,975 B2	
	4,881,106	5,034,796	5,187,117	5,486,715	6,306,728 B1	6,583,505	6,710,463	6,771,478 B2	7,071,537	

Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$

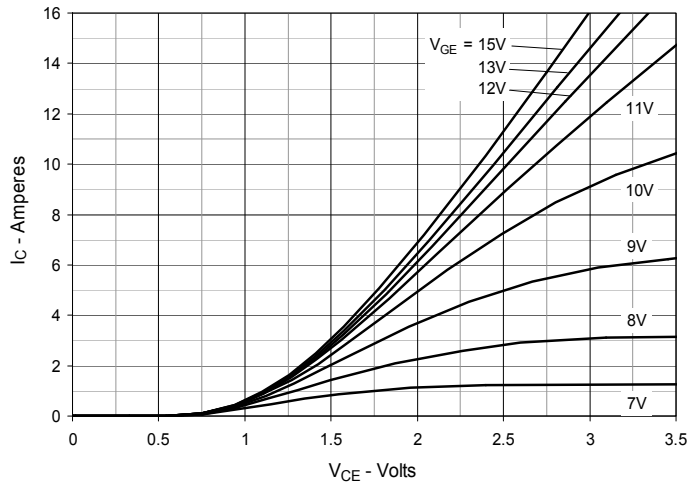


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

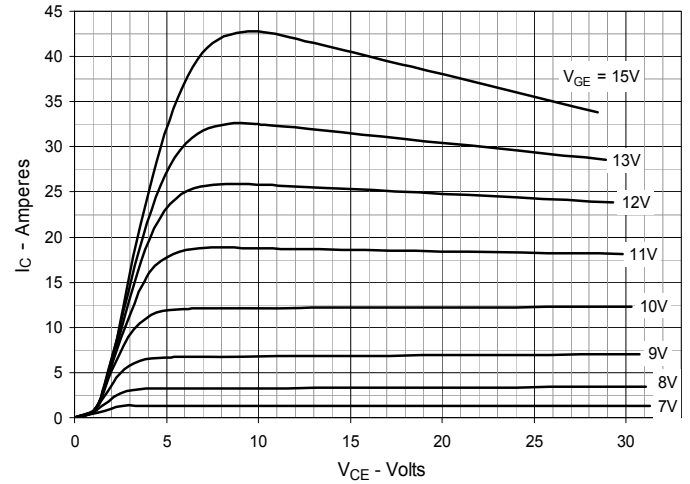


Fig. 3. Output Characteristics @ $T_J = 150^\circ\text{C}$

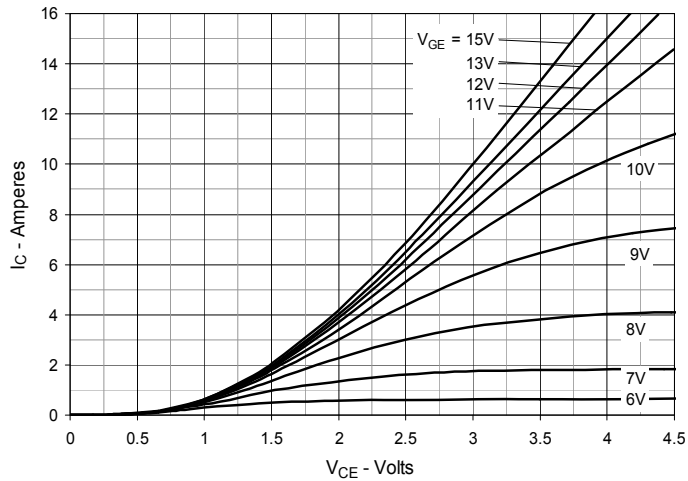


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

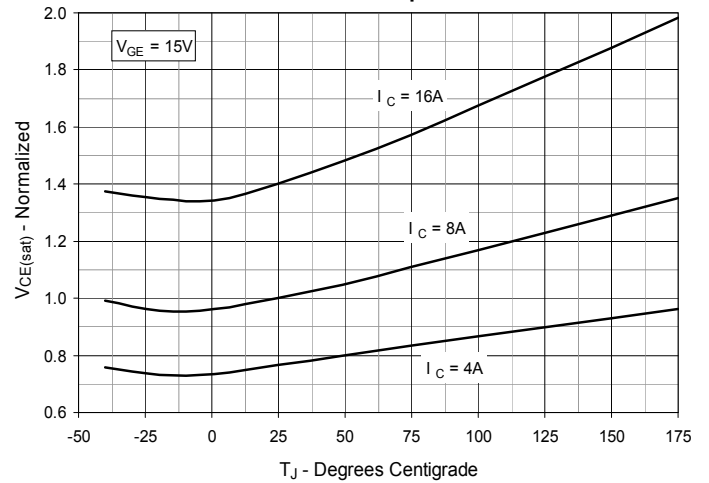


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

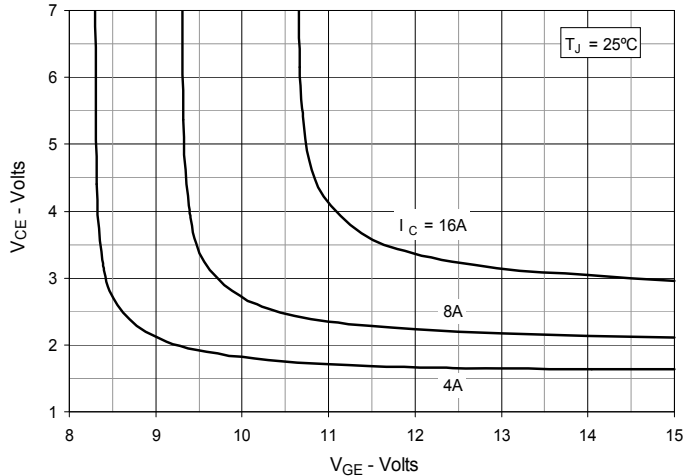


Fig. 6. Input Admittance

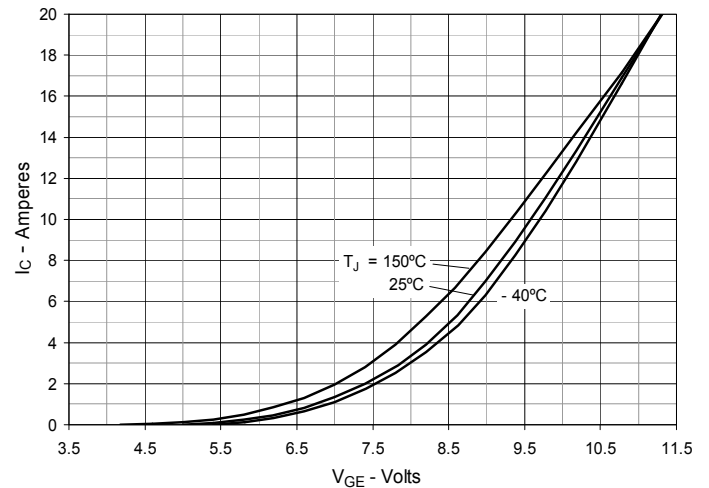


Fig. 7. Transconductance

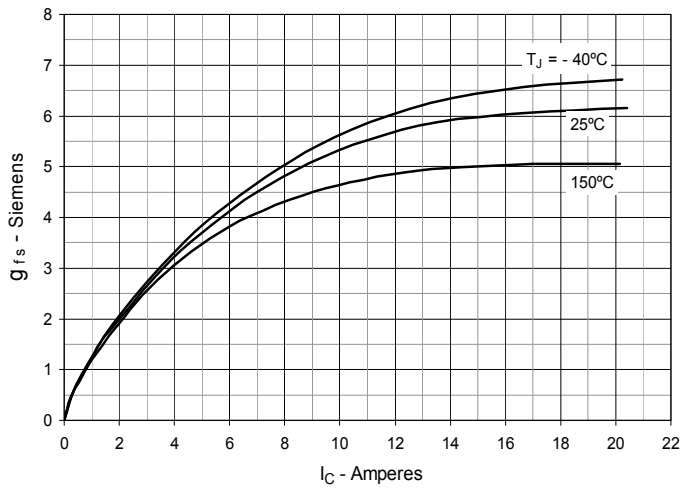


Fig. 8. Gate Charge

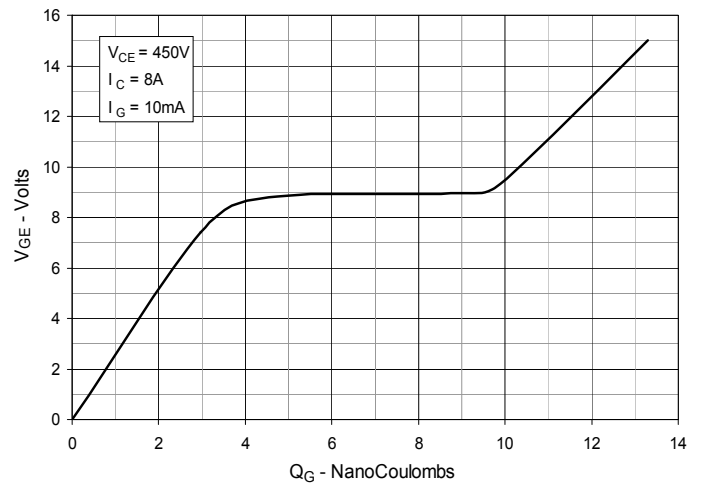


Fig. 9. Capacitance

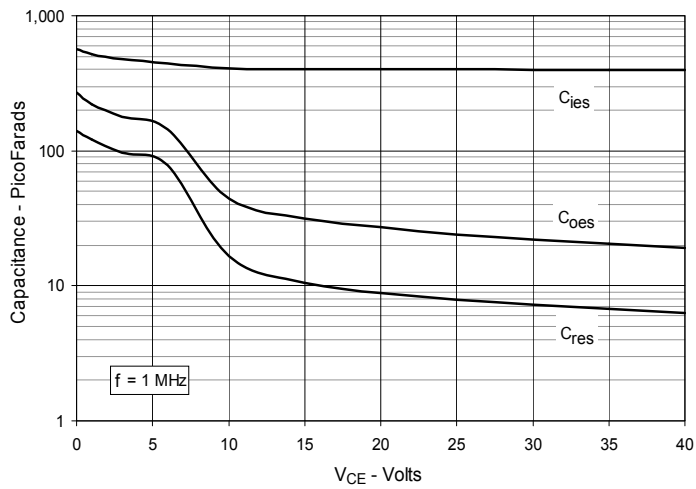


Fig. 10. Reverse-Bias Safe Operating Area

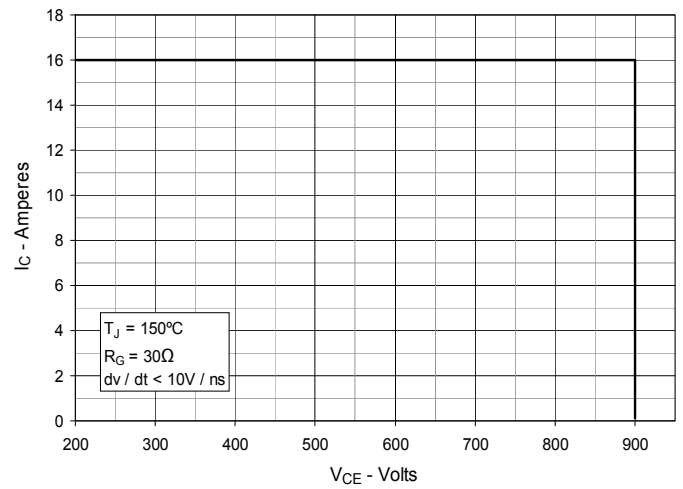


Fig. 11. Maximum Transient Thermal Impedance

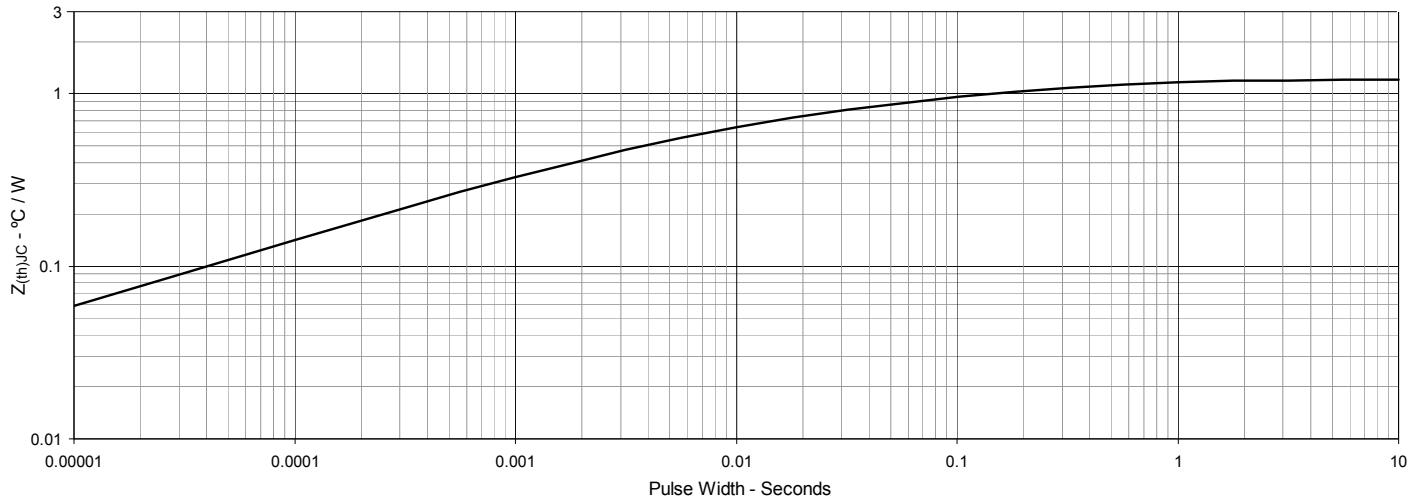


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

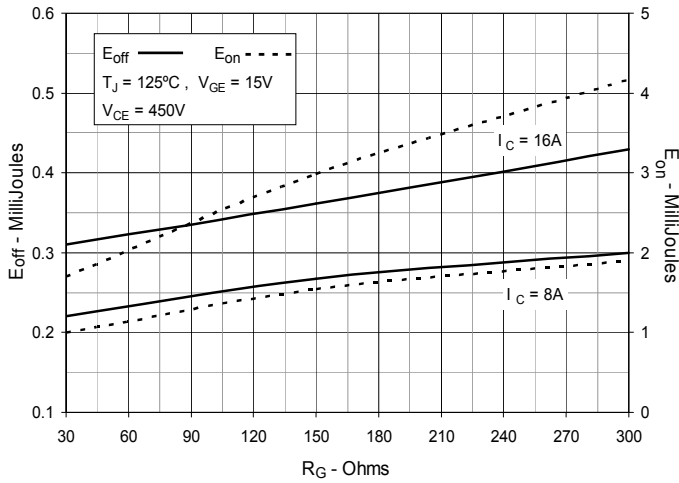


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

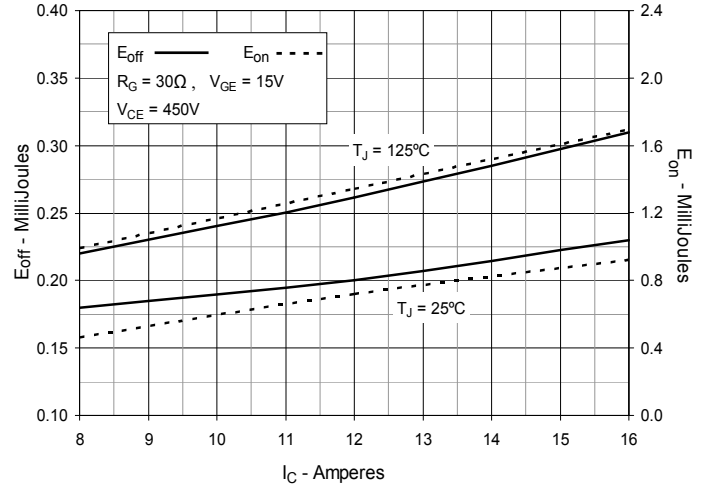


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

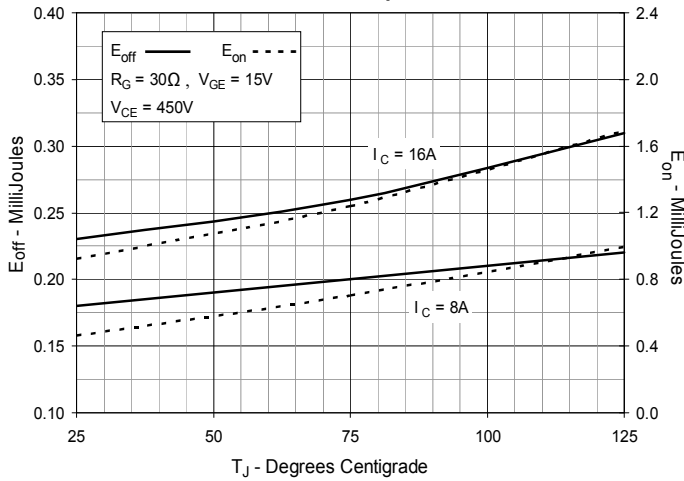


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

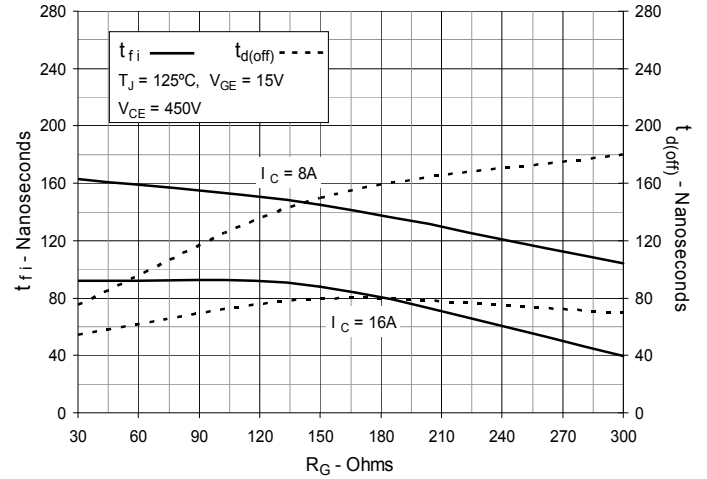


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

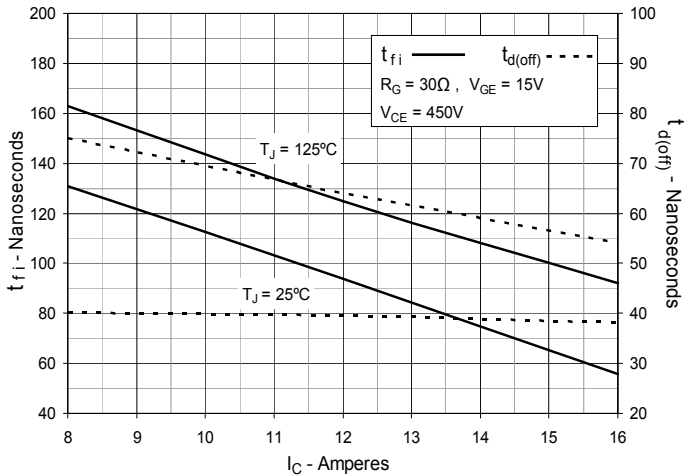


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

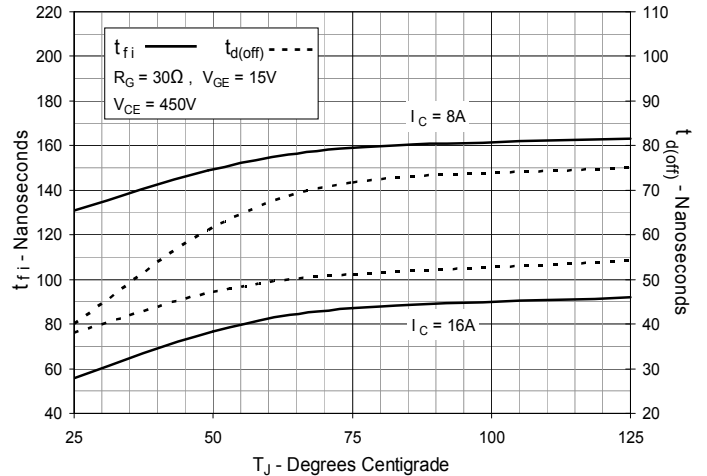


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

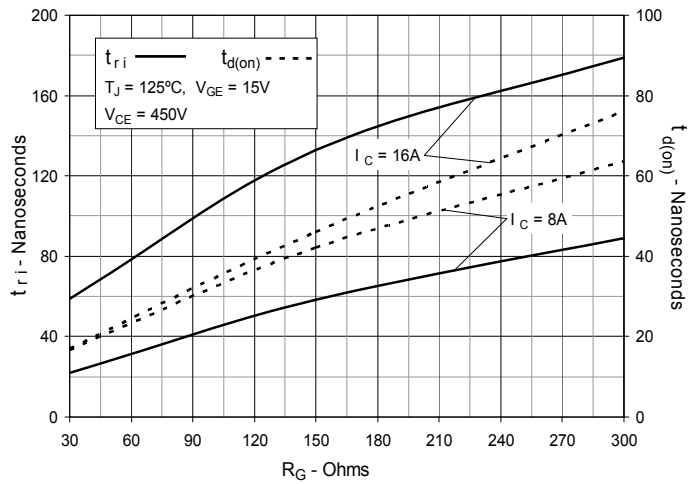


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

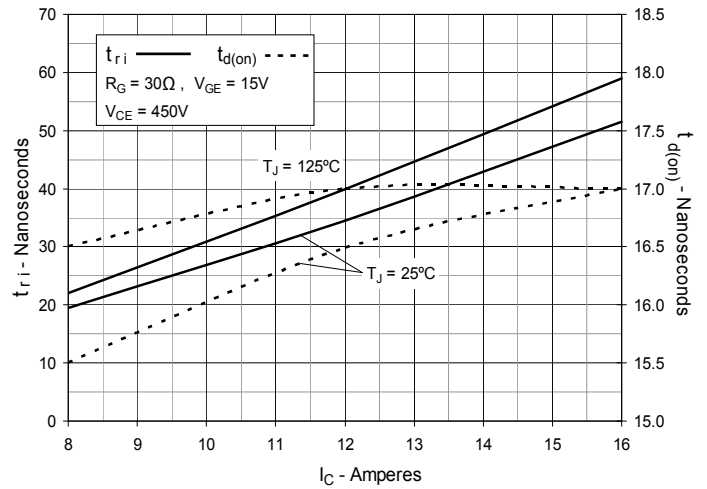
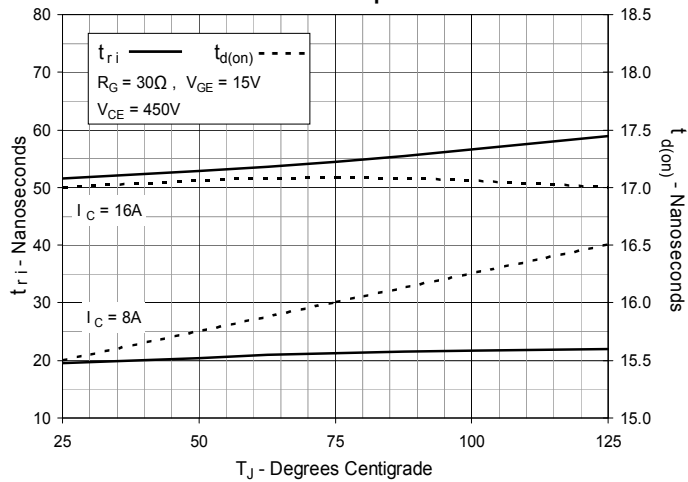


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature



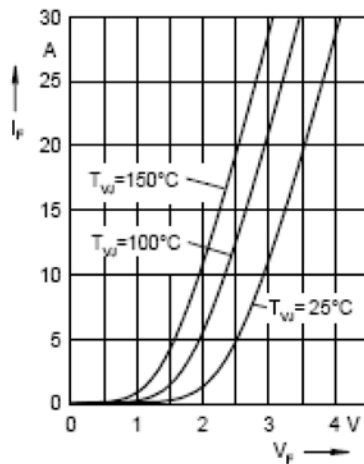
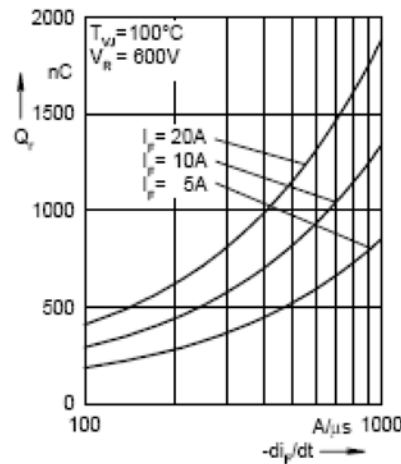
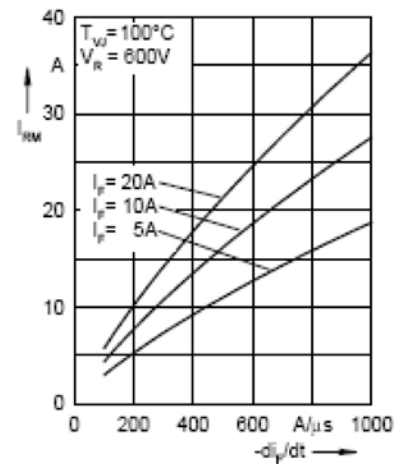
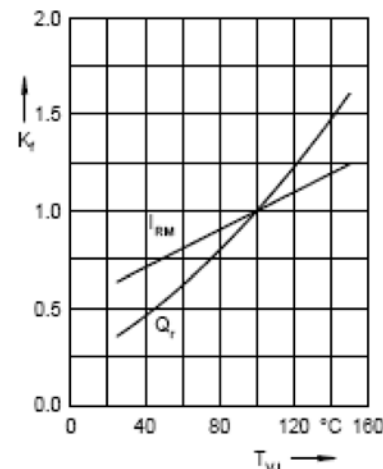
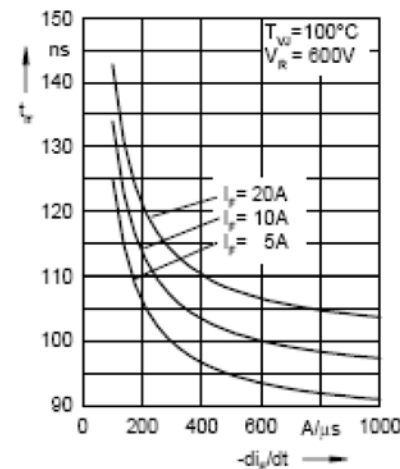
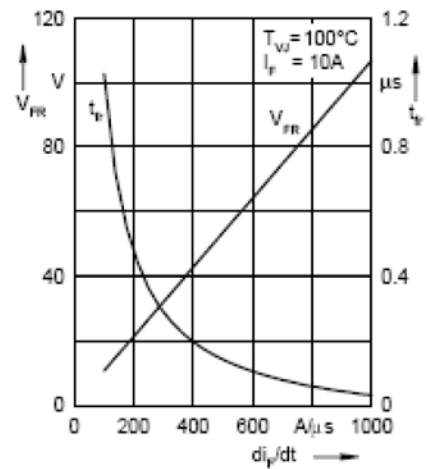
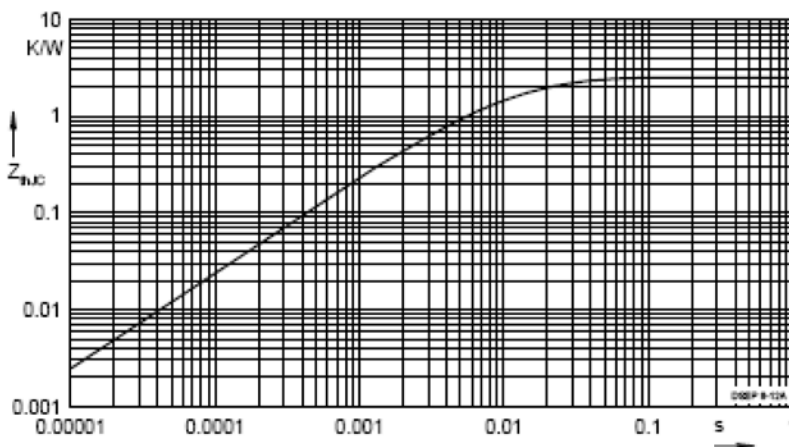

Fig. 21. Forward current I_F vs V_F

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_r 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

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