

High Voltage XPT™ IGBT w/ Diode

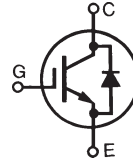
IXYH12N250CV1HV

$$V_{CES} = 2500V$$

$$I_{C110} = 12A$$

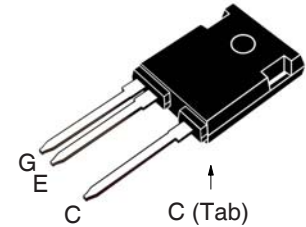
$$V_{CE(sat)} \leq 4.50V$$

$$t_{fi(typ)} = 136ns$$



Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^\circ C$ to $175^\circ C$	2500	V
V_{CGR}	$T_J = 25^\circ C$ to $175^\circ C$, $R_{GE} = 1M\Omega$	2500	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ C$	28	A
I_{C110}	$T_C = 110^\circ C$	12	A
I_{F110}	$T_C = 110^\circ C$	14	A
I_{CM}	$T_C = 25^\circ C$, 1ms	80	A
SSOA (RBSOA)	$V_{GE} = 15V$, $T_{VJ} = 150^\circ C$, $R_G = 10\Omega$ Clamped Inductive Load	$I_{CM} = 48$ 1500	A V
P_C	$T_C = 25^\circ C$	310	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	1.13/10	Nm/lb.in.
Weight		6	g

TO-247HV (IXYH)



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

Features

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

Advantages

- Low Gate Drive Requirement
- High Power Density

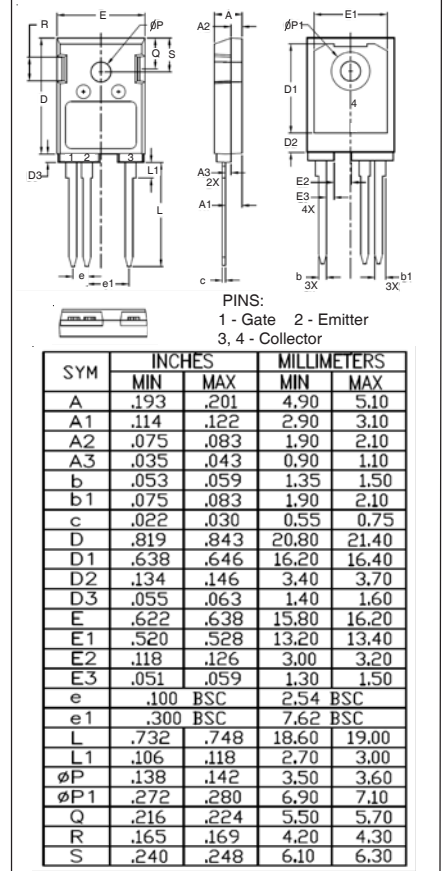
Applications

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

Symbol	Test Conditions ($T_J = 25^\circ C$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
BV_{CES}	$I_C = 250\mu A$, $V_{GE} = 0V$	2500		V
$V_{GE(th)}$	$I_C = 250\mu A$, $V_{CE} = V_{GE}$	3.0		5.0 V
I_{CES}	$V_{CE} = V_{CES}$, $V_{GE} = 0V$ $V_{CE} = 0.8 \cdot V_{CES}$, $V_{GE} = 0V$ $T_J = 150^\circ C$			25 μA 3.5 mA
I_{GES}	$V_{CE} = 0V$, $V_{GE} = \pm 20V$			± 100 nA
$V_{CE(sat)}$	$I_C = 12A$, $V_{GE} = 15V$, Note 1 $T_J = 150^\circ C$		3.70 5.55	V V

Symbol Test Conditions ($T_J = 25^\circ\text{C}$ Unless Otherwise Specified)		Characteristic Values		
		Min.	Typ.	Max.
g_{fs}	$I_C = 12\text{A}, V_{CE} = 10\text{V}$, Note 1	7	12	S
R_{Gi}	Gate Input Resistance		7.5	Ω
C_{ies}	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$		1370	pF
C_{oes}			65	pF
C_{res}			16	pF
$Q_{g(on)}$	$I_C = 12\text{A}, V_{GE} = 15\text{V}, V_{CE} = 0.5 \cdot V_{CES}$		56	nC
Q_{ge}			6	nC
Q_{gc}			28	nC
$t_{d(on)}$	Inductive load, $T_J = 25^\circ\text{C}$ $I_C = 12\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 0.5 \cdot V_{CES}, R_G = 10\Omega$ Note 2		12	ns
t_{ri}			16	ns
E_{on}			3.56	mJ
$t_{d(off)}$			167	ns
t_{fi}			136	ns
E_{off}			1.70	mJ
$t_{d(on)}$	Inductive load, $T_J = 150^\circ\text{C}$ $I_C = 12\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 0.5 \cdot V_{CES}, R_G = 10\Omega$ Note 2		12	ns
t_{ri}			20	ns
E_{on}			4.78	mJ
$t_{d(off)}$			195	ns
t_{fi}			138	ns
E_{off}			1.95	mJ
R_{thJC}			0.48	$^\circ\text{C/W}$
R_{thCS}		0.21		$^\circ\text{C/W}$

TO-247HV Outline



Reverse Diode (FRED)

Symbol Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified)		Characteristic Value		
		Min.	Typ.	Max.
V_F	$I_F = 12\text{A}, V_{GE} = 0\text{V}$, Note 1 $T_J = 150^\circ\text{C}$		4.2	4.5 V
I_{RM}	$I_F = 12\text{A}, V_{GE} = 0\text{V}, -di_F/dt = 500\text{A}/\mu\text{s}$ $V_R = 1200\text{V}, T_J = 150^\circ\text{C}$		22	A
t_{rr}			165	ns
R_{thJC}				0.80 $^\circ\text{C/W}$

Notes:

1. Pulse test, $t \leq 300\mu\text{s}$, 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.

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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 @ $T_J = 25^\circ\text{C}$

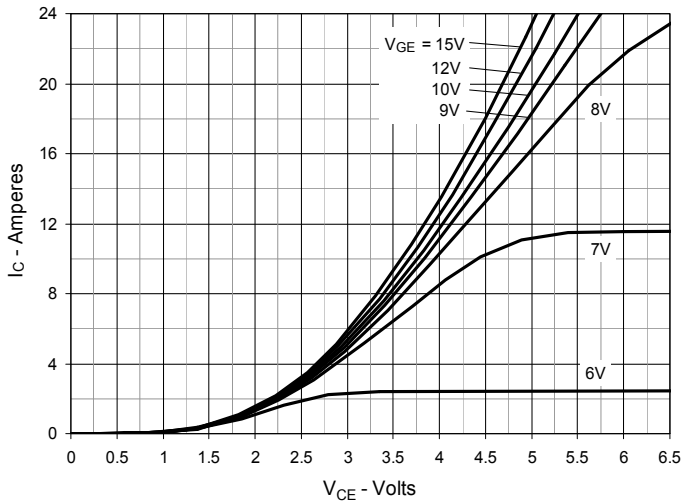


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

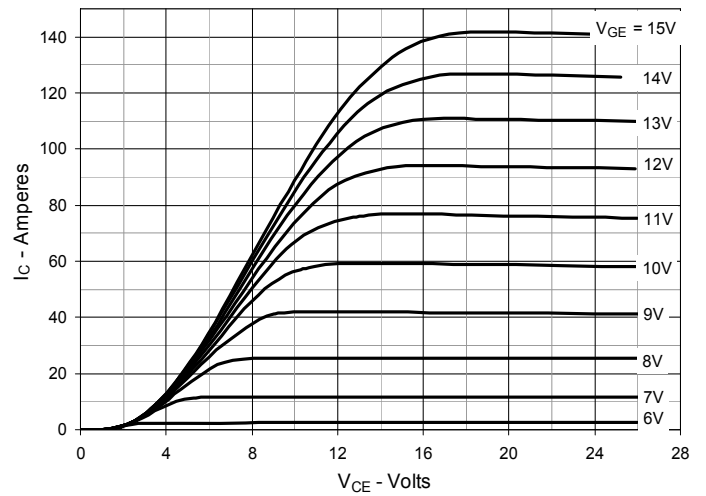


Fig. 3. Output Characteristics @ $T_J = 150^\circ\text{C}$

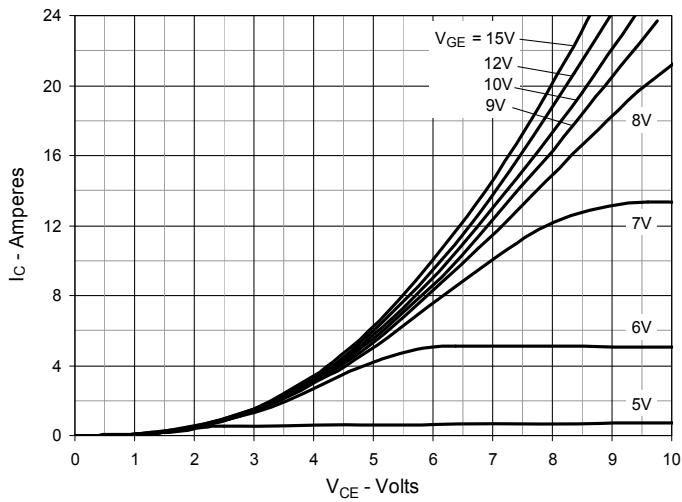


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

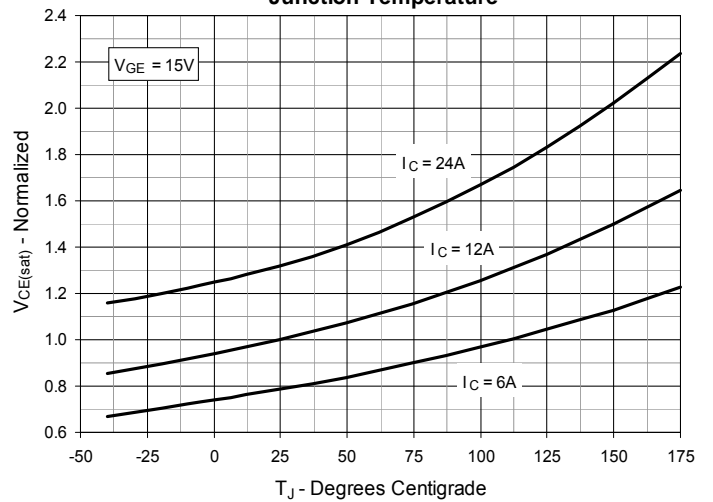


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

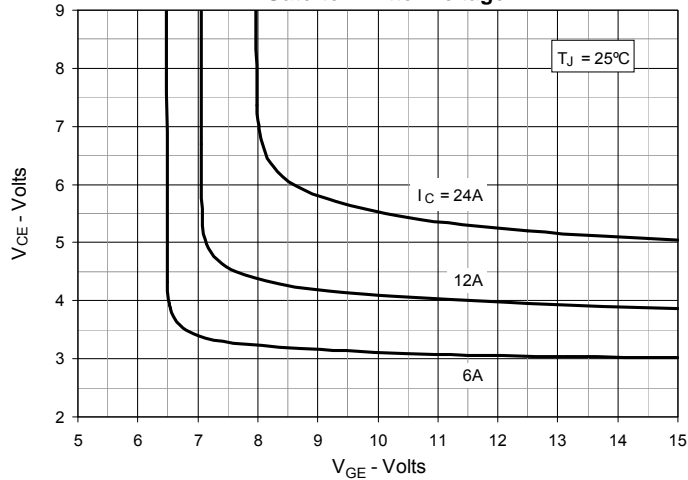


Fig. 6. Input Admittance

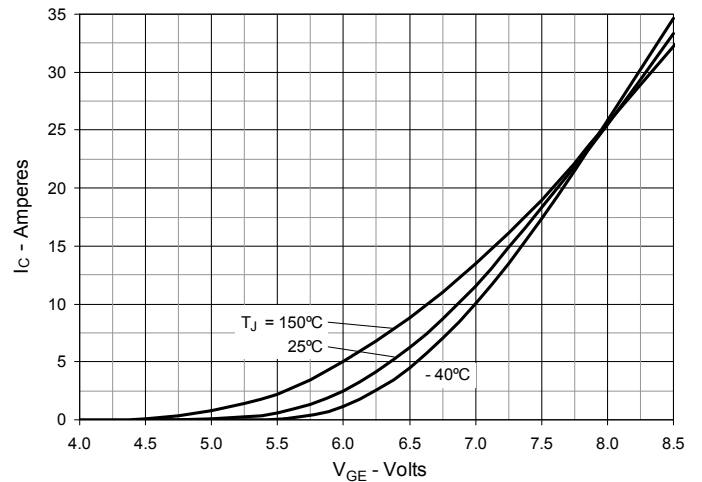


Fig. 7. Transconductance

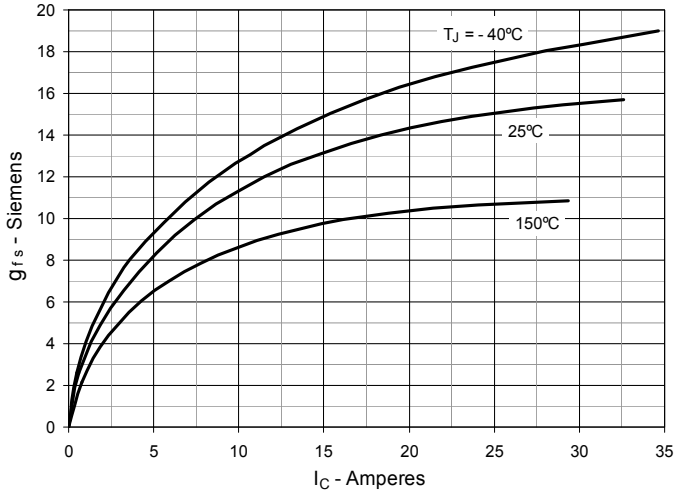


Fig. 8. Gate Charge

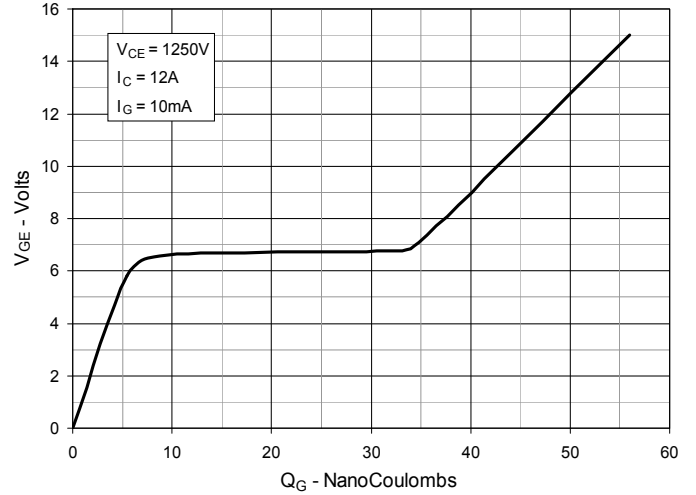


Fig. 9. Capacitance

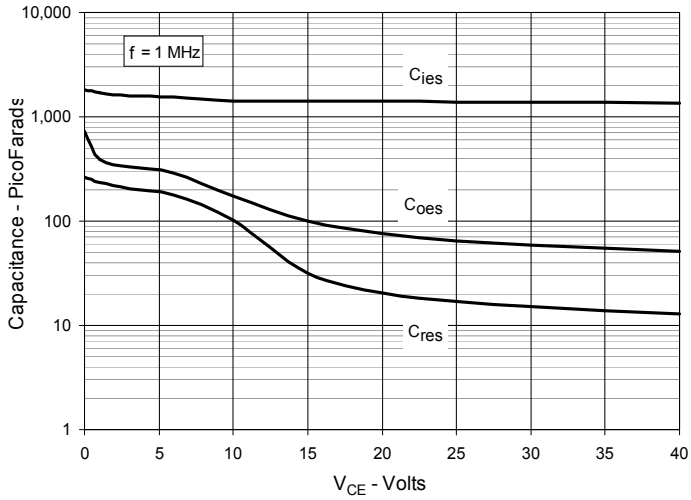


Fig. 10. Reverse-Bias Safe Operating Area

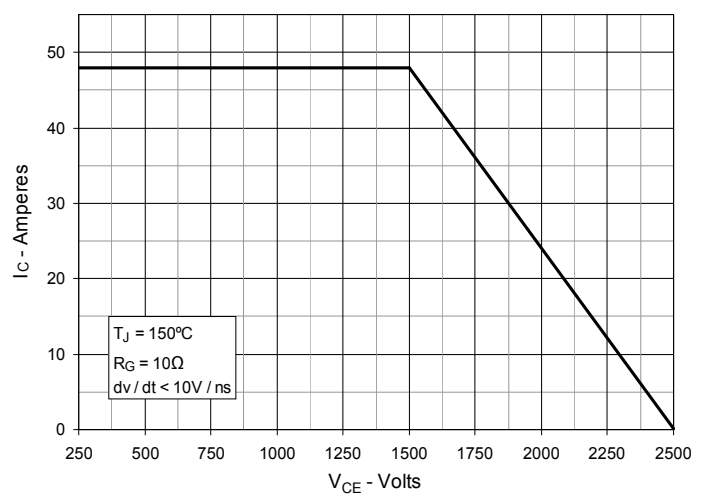


Fig. 11. Maximum Transient Thermal Impedance (IGBT)

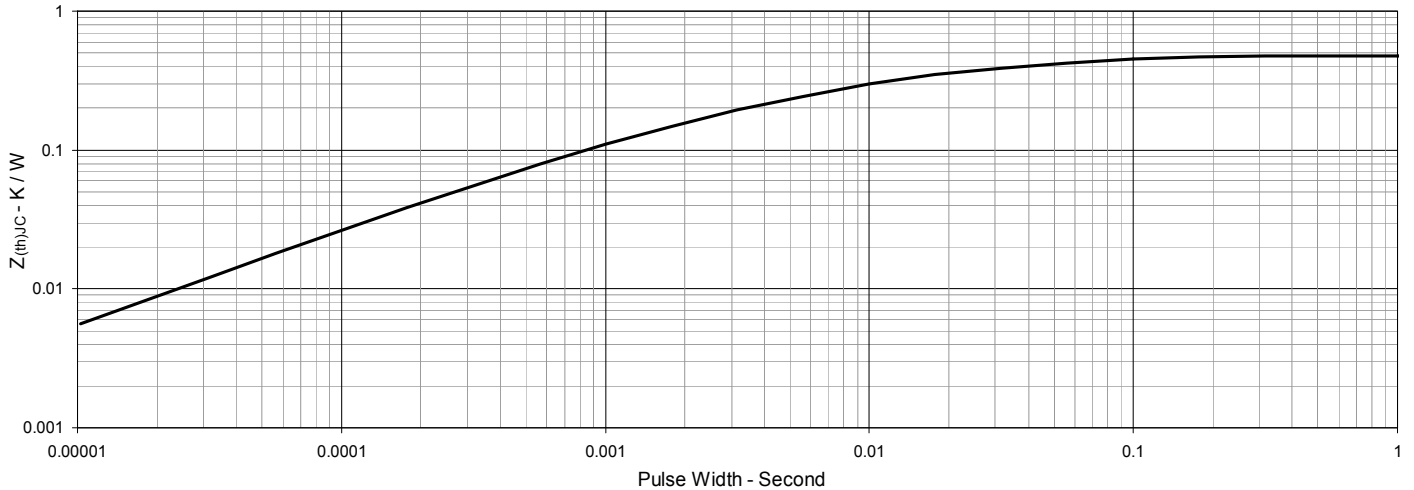


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

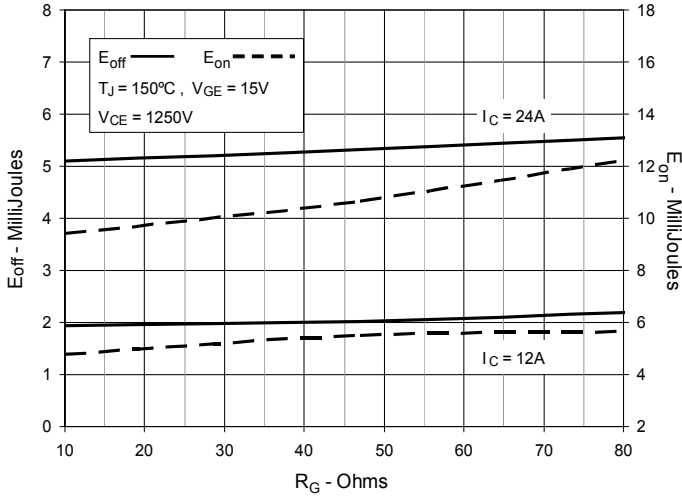


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

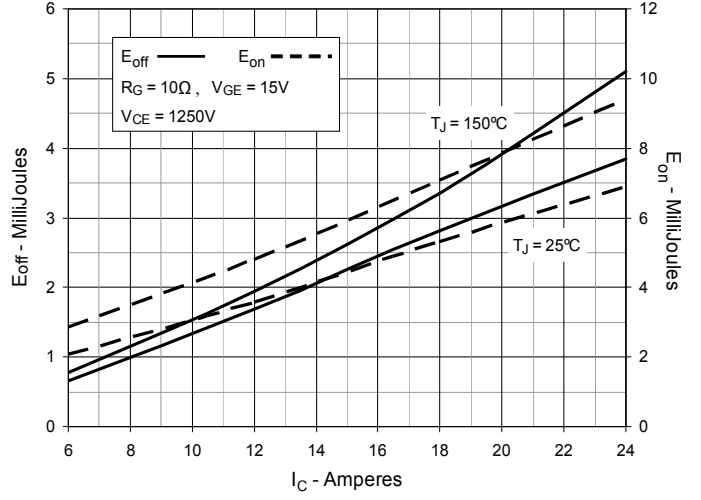


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

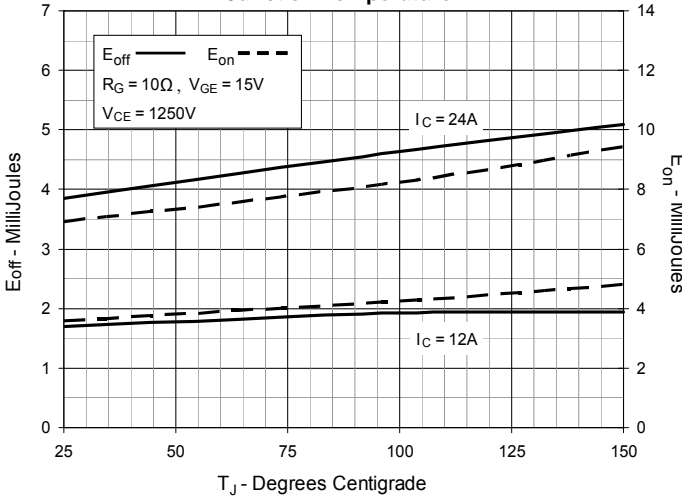


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

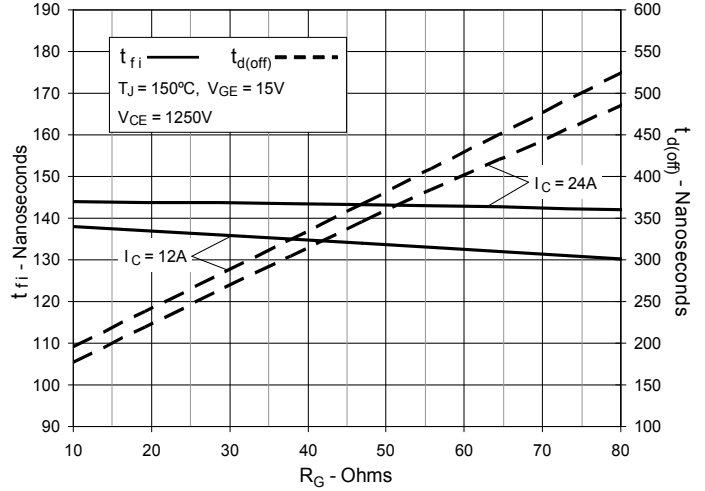


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

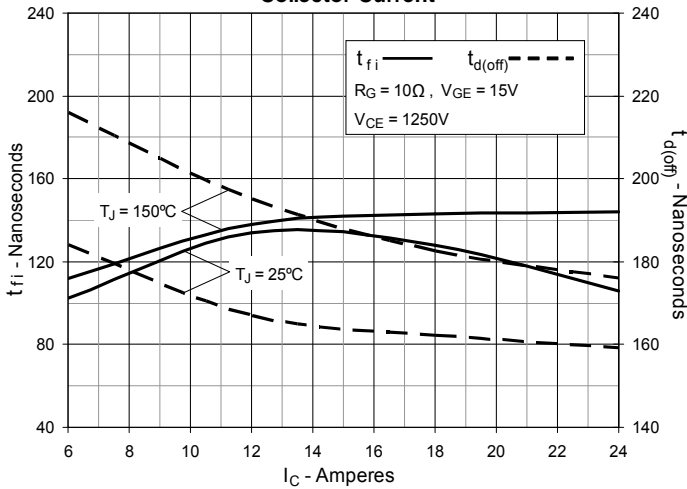


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

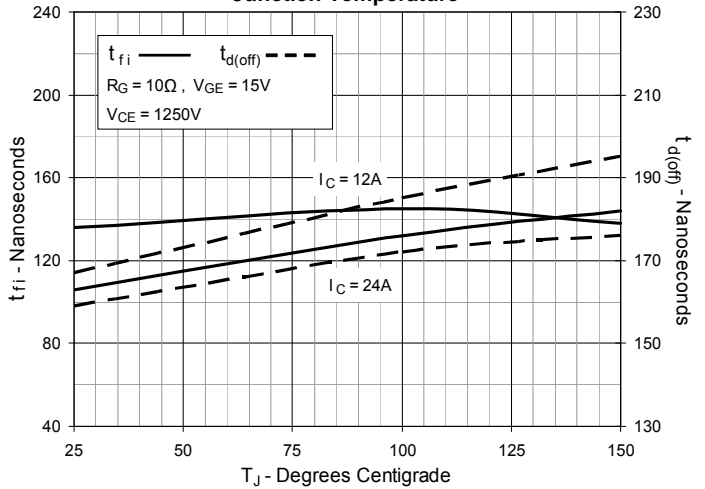


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

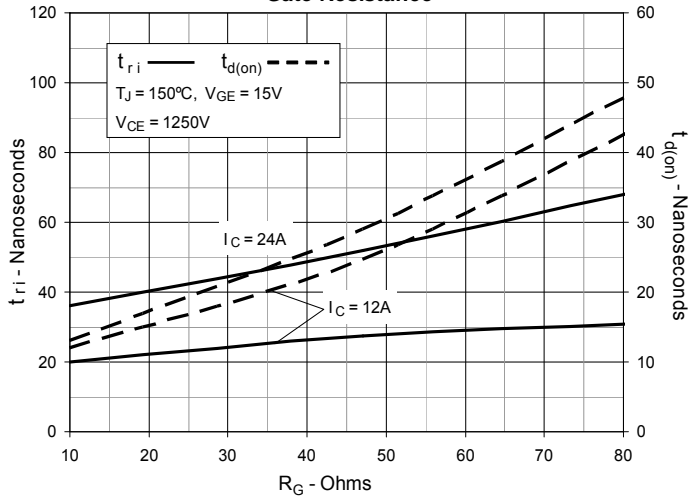


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

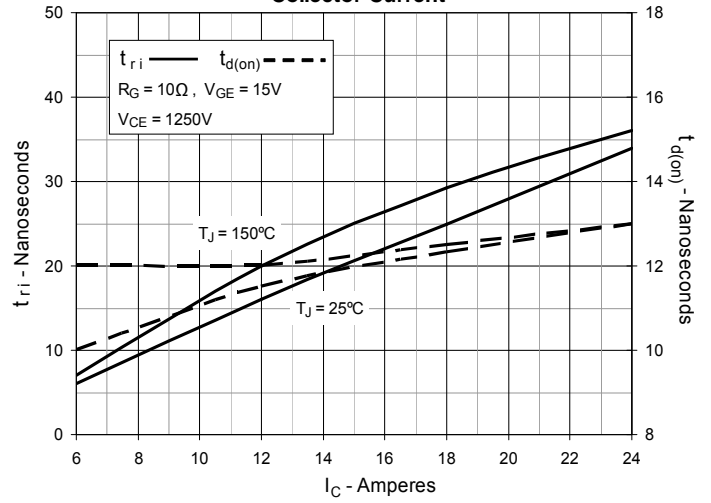


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature

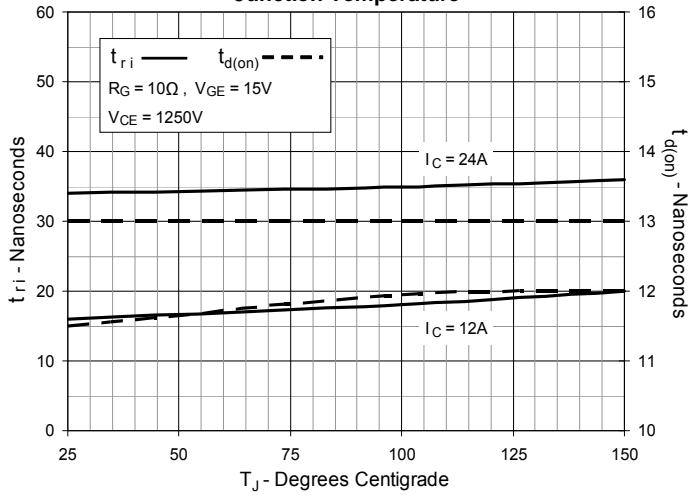
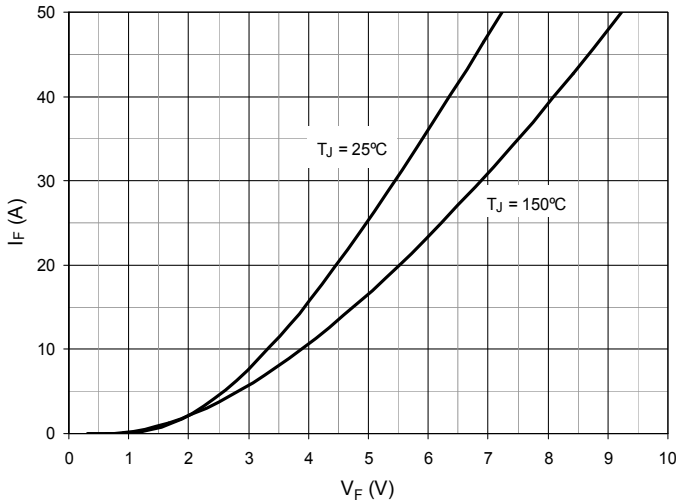
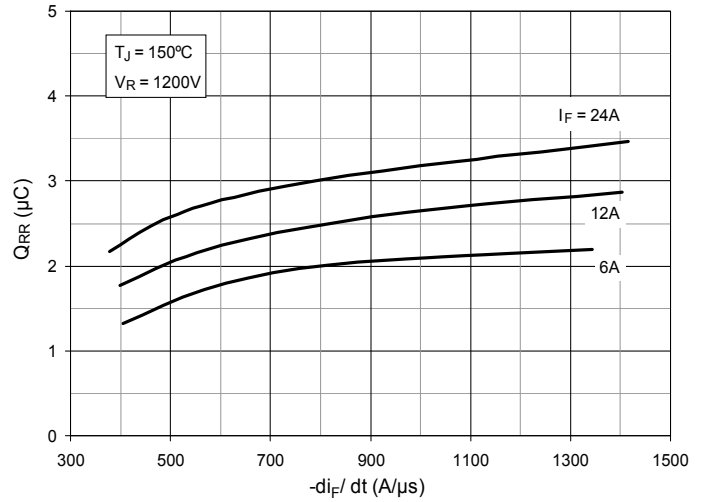
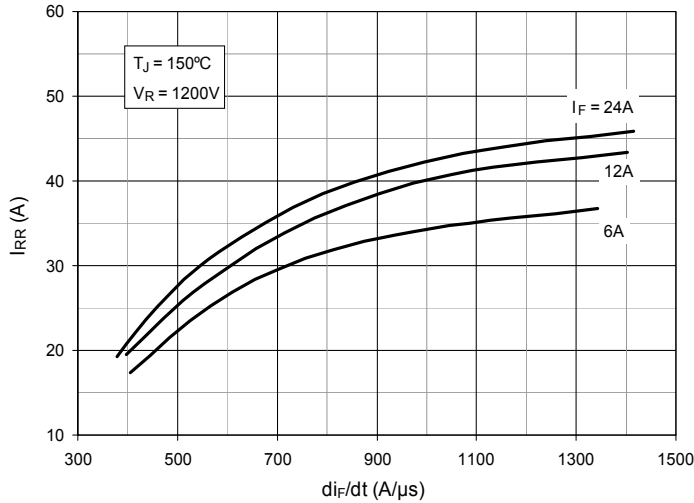
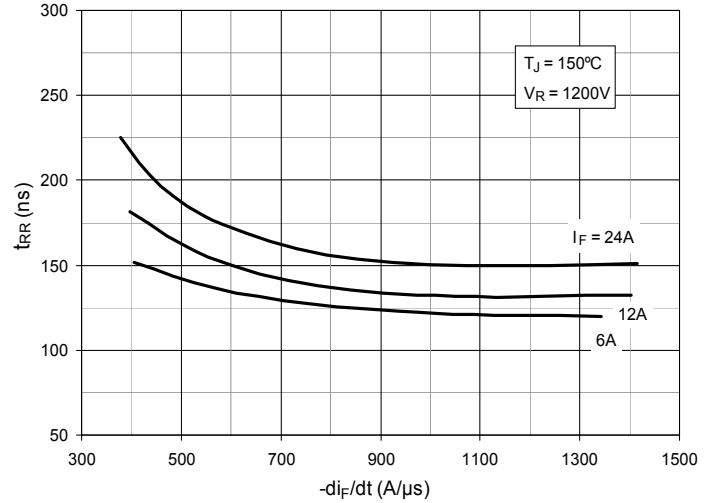
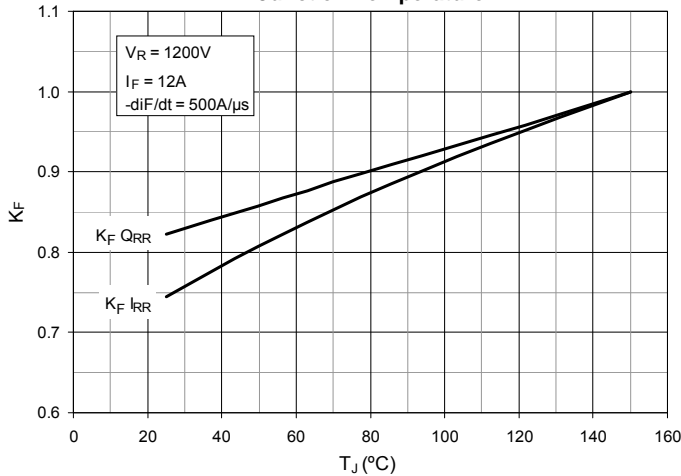


Fig. 21. Diode Forward Characteristics

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)
