

# High Voltage XPT™ IGBT w/ Diode

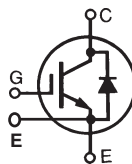
## IXYN30N170CV1

$$V_{CES} = 1700V$$

$$I_{C110} = 30A$$

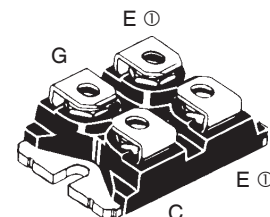
$$V_{CE(sat)} \leq 4.0V$$

$$t_{fi(typ)} = 95ns$$



SOT-227B, miniBLOC

E153432



G = Gate, C = Collector, E = Emitter  
 ① either emitter terminal can be used as Main or Kelvin Emitter

Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_J = 25^\circ C$ to $175^\circ C$	1700	V
$V_{CGR}$	$T_J = 25^\circ C$ to $175^\circ C$ , $R_{GE} = 1M\Omega$	1700	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^\circ C$	80	A
$I_{C110}$	$T_C = 110^\circ C$	30	A
$I_{F110}$	$T_C = 110^\circ C$	33	A
$I_{CM}$	$T_C = 25^\circ C$ , 1ms	270	A
<b>SSOA (RBSOA)</b>	$V_{GE} = 15V$ , $T_{VJ} = 150^\circ C$ , $R_G = 2.7\Omega$ Clamped Inductive Load	$I_{CM} = 120$ 1360	A V
$P_C$	$T_C = 25^\circ C$	680	W
$T_J$		-55 ... +175	$^\circ C$
$T_{JM}$		175	$^\circ C$
$T_{stg}$		-55 ... +175	$^\circ C$
$V_{ISOL}$	50/60Hz	$t = 1min$	2500 V~
	$I_{ISOL} \leq 1mA$	$t = 1s$	3000 V~
$M_d$	Mounting Torque	1.5/13	Nm/lb.in
	Terminal Connection Torque	1.3/11.5	Nm/lb.in
<b>Weight</b>		30	g

### Features

- International Standard Package
- miniBLOC, with Aluminium Nitride Isolation
- 2500V~ Isolation Voltage
- Anti-Parallel Diode
- High Voltage Package
- High Blocking Voltage
- Low Saturation Voltage

### Advantages

- Low Gate Drive Requirement
- High Power Density

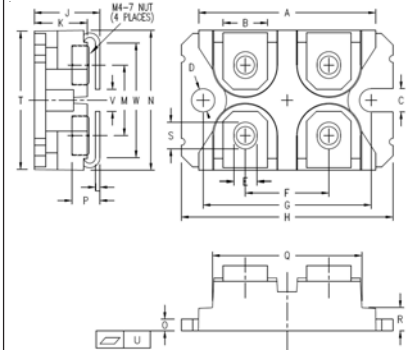
### Applications

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

Symbol	Test Conditions ( $T_J = 25^\circ C$ , Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$BV_{CES}$	$I_C = 250\mu A$ , $V_{GE} = 0V$	1700		V
$V_{GE(th)}$	$I_C = 250\mu A$ , $V_{CE} = V_{GE}$	3.0		5.0 V
$I_{CES}$	$V_{CE} = 0.8 \cdot V_{CES}$ , $V_{GE} = 0V$ $T_J = 125^\circ C$			25 $\mu A$ 4 mA
$I_{GES}$	$V_{CE} = 0V$ , $V_{GE} = \pm 20V$			$\pm 100$ nA
$V_{CE(sat)}$	$I_C = 30A$ , $V_{GE} = 15V$ , Note 1 $T_J = 150^\circ C$	3.5		V
		4.6		V

Symbol Test Conditions ( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)		Characteristic Values			
		Min.	Typ.	Max.	
$g_{fs}$	$I_C = 30\text{A}, V_{CE} = 10\text{V}$ , Note 1	17	28	S	
$R_{Gi}$	Gate Input Resistance		2.8	$\Omega$	
$C_{ies}$	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$		3100	pF	
$C_{oes}$			210	pF	
$C_{res}$			55	pF	
$Q_{g(on)}$	$I_C = 30\text{A}, V_{GE} = 15\text{V}, V_{CE} = 0.5 \cdot V_{CES}$		150	nC	
$Q_{ge}$			15	nC	
$Q_{gc}$			65	nC	
$t_{d(on)}$	<b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b> $I_C = 30\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 0.5 \cdot V_{CES}, R_G = 2.7\Omega$ Note 3		16	ns	
$t_{ri}$			33	ns	
$E_{on}$			3.6	mJ	
$t_{d(off)}$			143	ns	
$t_{fi}$			95	ns	
$E_{off}$			1.8	mJ	
$t_{d(on)}$		<b>Inductive load, <math>T_J = 150^\circ\text{C}</math></b> $I_C = 30\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 0.5 \cdot V_{CES}, R_G = 2.7\Omega$ Note 3		16	ns
$t_{ri}$				33	ns
$E_{on}$			5.5	mJ	
$t_{d(off)}$			193	ns	
$t_{fi}$			134	ns	
$E_{off}$			3.5	mJ	
$R_{thJC}$			0.22	$^\circ\text{C}/\text{W}$	
$R_{thCS}$		0.05		$^\circ\text{C}/\text{W}$	

### SOT-227B miniBLOC (IXYN)



SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	1.240	1.255	31.50	31.88
B	.307	.323	7.80	8.20
C	.161	.169	4.09	4.29
D	.161	.169	4.09	4.29
E	.161	.169	4.09	4.29
F	.587	.595	14.91	15.11
G	1.186	1.193	30.12	30.30
H	1.489	1.505	37.80	38.23
J	.460	.481	11.68	12.22
K	.351	.378	8.92	9.60
L	.030	.033	0.76	0.84
M	.496	.506	12.60	12.85
N	.990	1.001	25.15	25.42
O	.078	.084	1.98	2.13
P	.195	.235	4.95	5.97
Q	1.045	1.059	26.54	26.90
R	.155	.174	3.94	4.42
S	.186	.191	4.72	4.85
T	.968	.987	24.59	25.07
U	-.002	.004	-0.05	0.1
V	.130	.180	3.30	4.57
W	.780	.830	19.81	21.08

### Reverse Diode (FRED)

(T <sub>J</sub> = 25°C, Unless Otherwise Specified)		Characteristic Value		
Symbol	Test Conditions	Min.	Typ.	Max.
$V_F$	$I_F = 30\text{A}, V_{GE} = 0\text{V}$ , Note 1			3.5 V
		$T_J = 150^\circ\text{C}$	3.7	V
$I_{RM}$	$I_F = 30\text{A}, V_{GE} = 0\text{V}, -di_F/dt = 500\text{A}/\mu\text{s}$ $V_R = 1200\text{V}, T_J = 150^\circ\text{C}$		32	A
$t_{rr}$			175	ns
$R_{thJC}$				0.43 $^\circ\text{C}/\text{W}$

#### 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  $R_G$ .

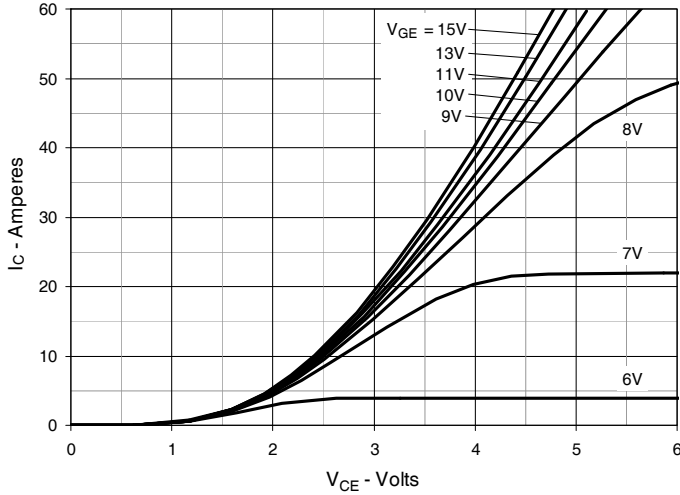
### PRELIMINARY TECHNICAL INFORMATION

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.

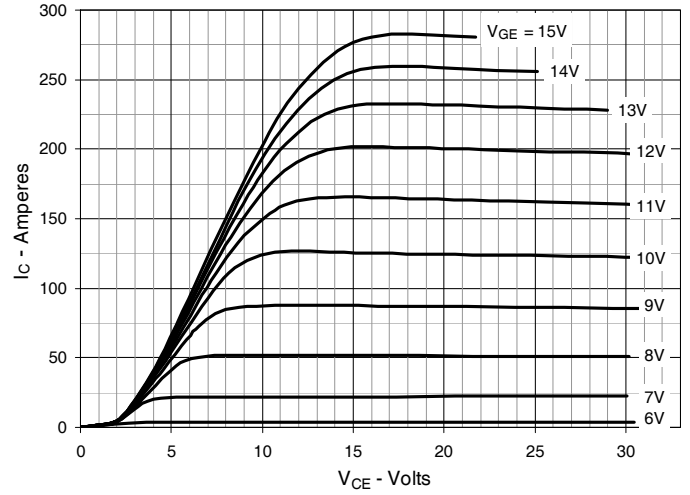
IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

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	

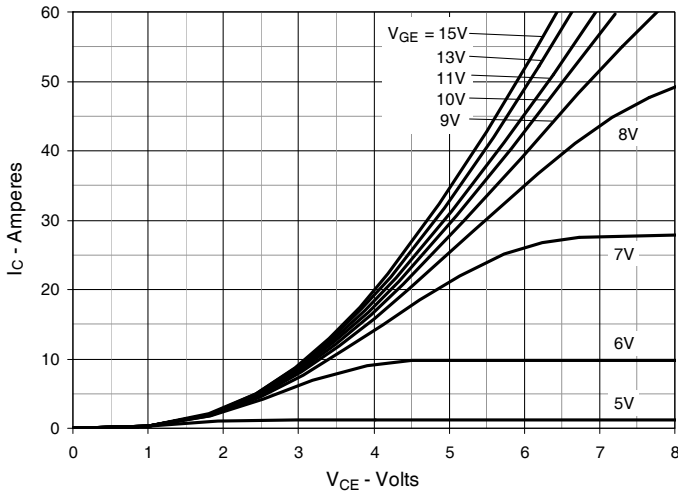
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



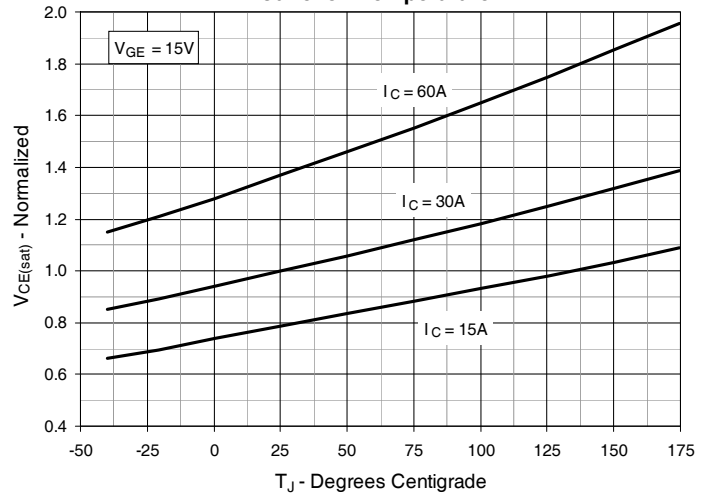
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



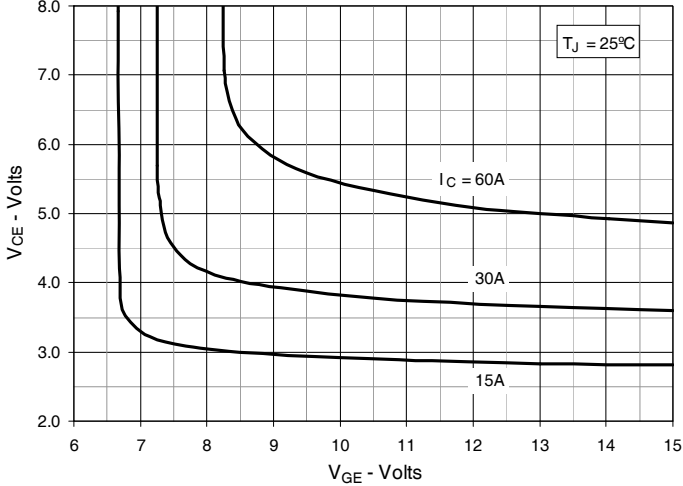
**Fig. 3. Output Characteristics @  $T_J = 150^\circ\text{C}$**



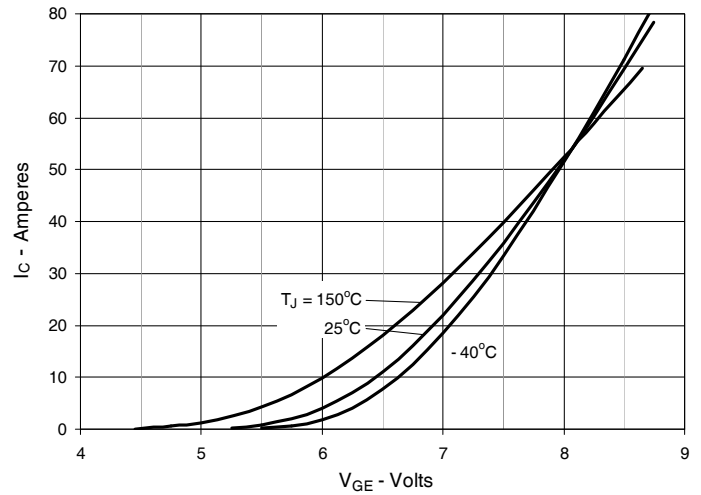
**Fig. 4. Dependence of  $V_{CE(sat)}$  on Junction Temperature**

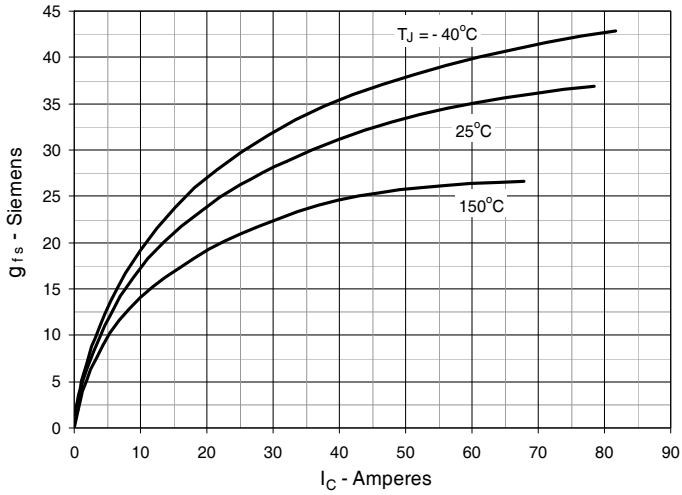
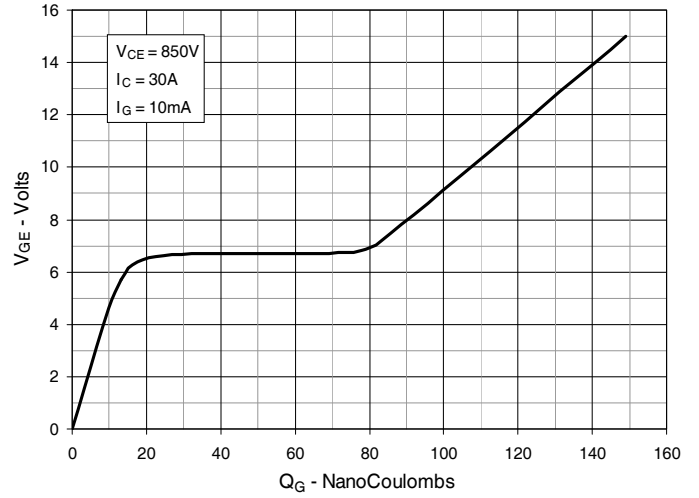
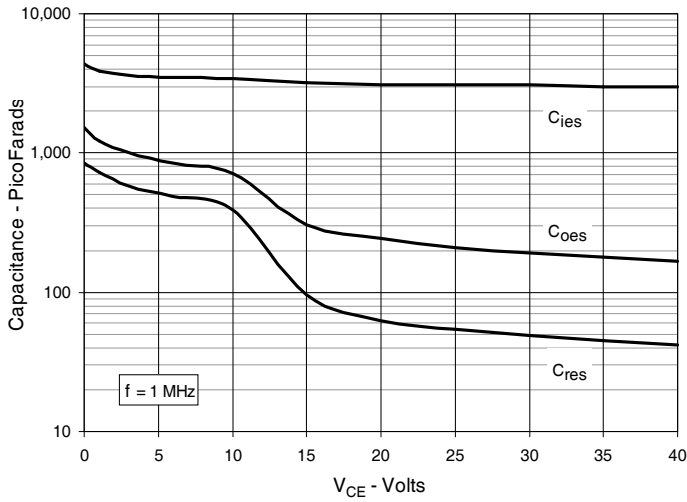
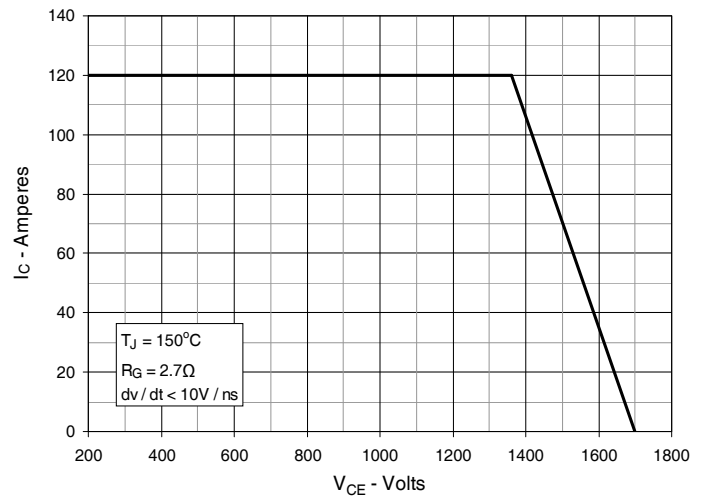
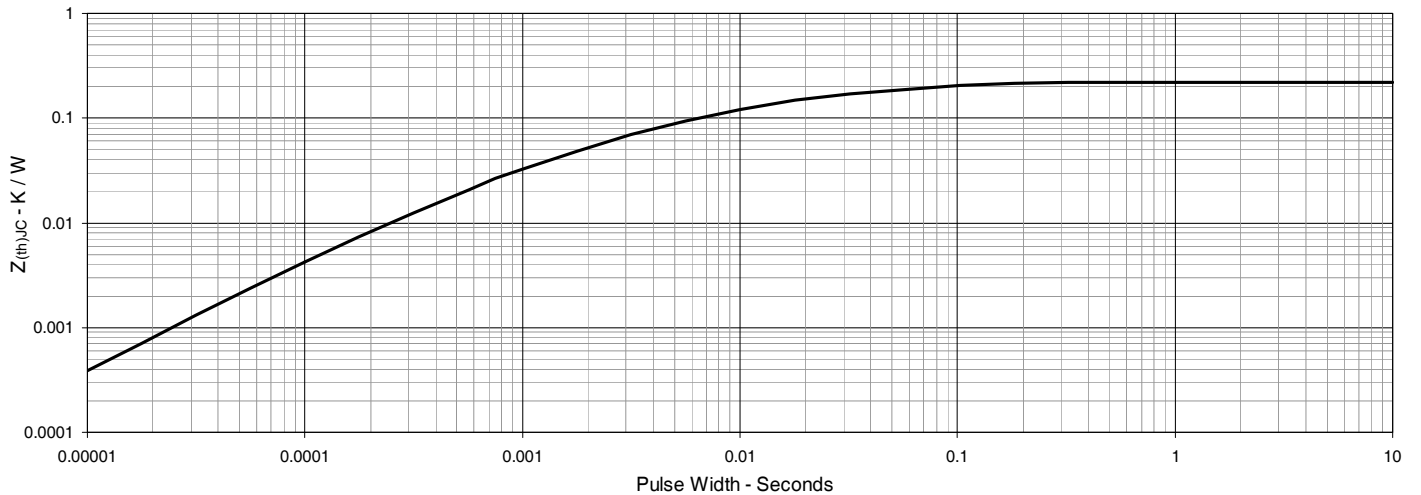


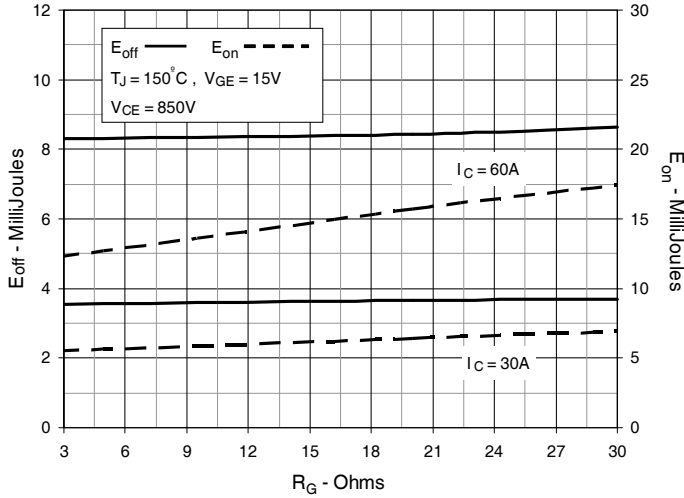
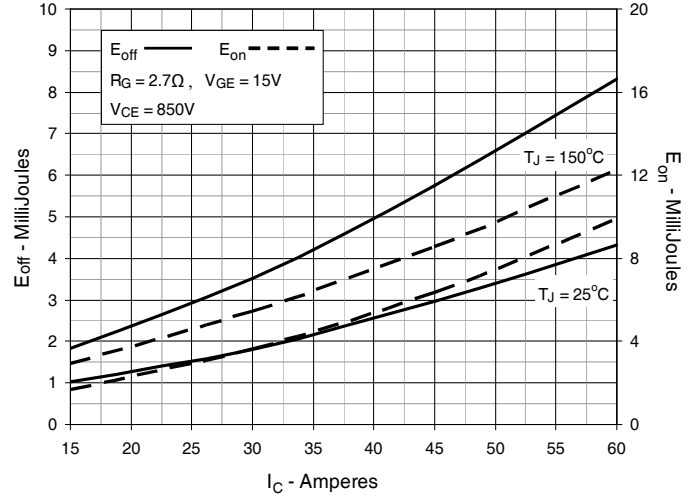
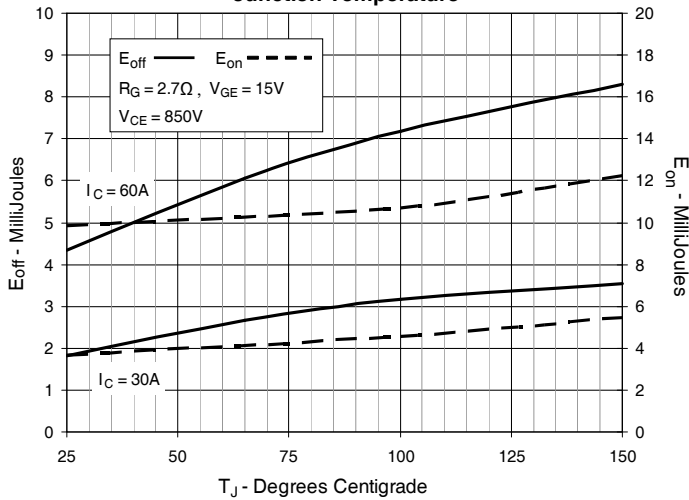
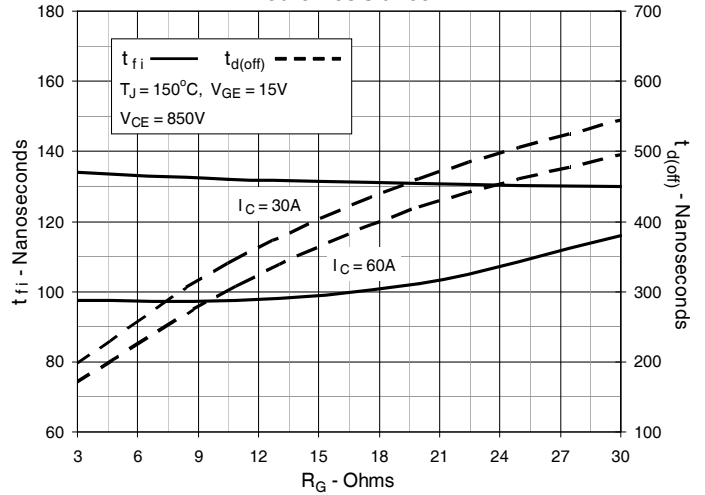
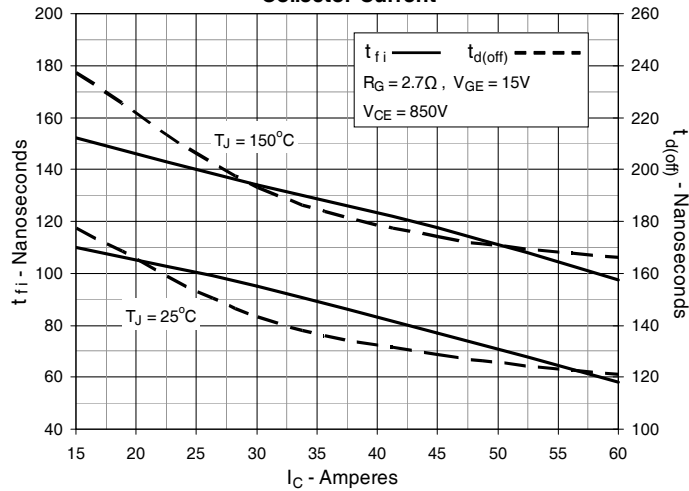
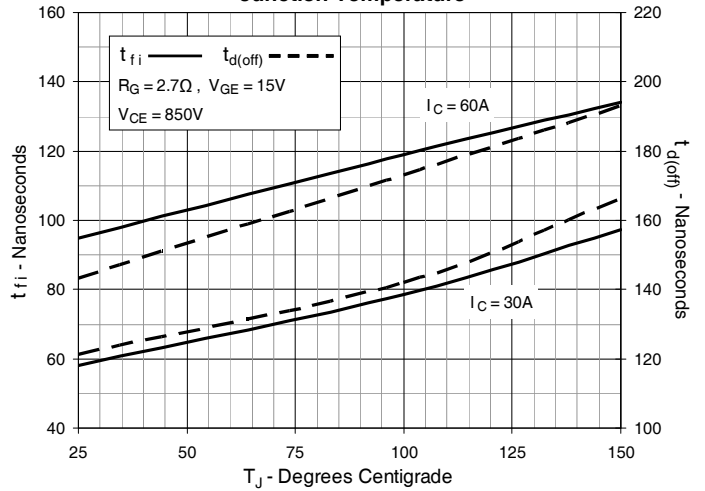
**Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage**



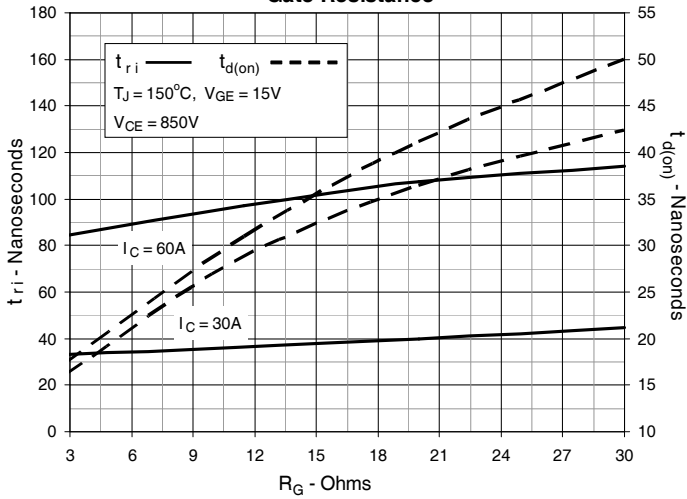
**Fig. 6. Input Admittance**



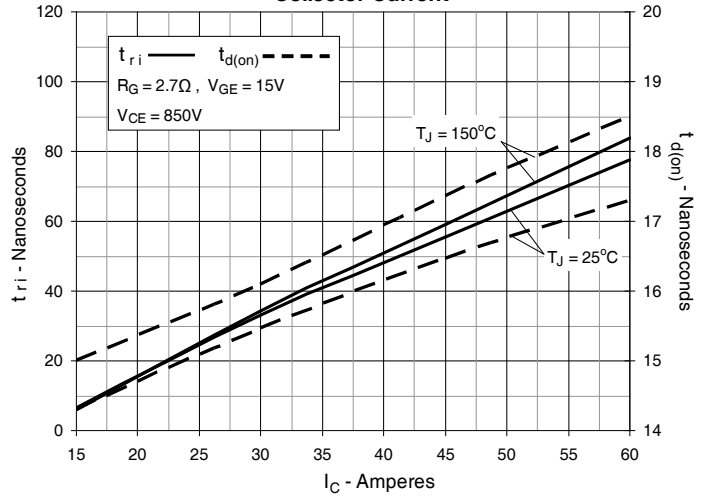
**Fig. 7. Transconductance**

**Fig. 8. Gate Charge**

**Fig. 9. Capacitance**

**Fig. 10. Reverse-Bias Safe Operating Area**

**Fig. 11. Maximum Transient Thermal Impedance (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**


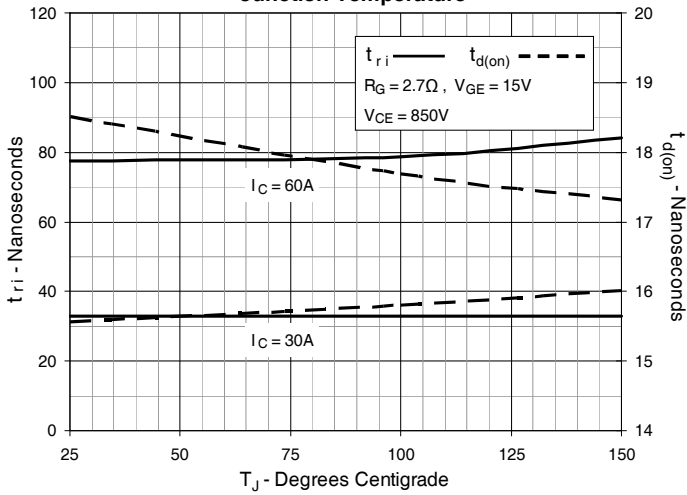
**Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance**

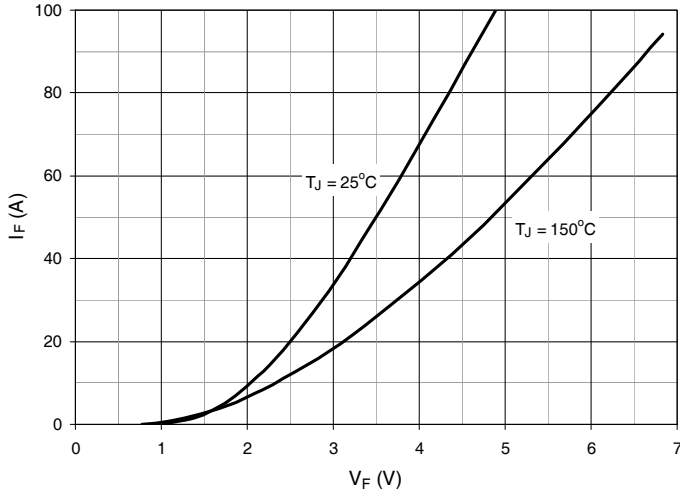
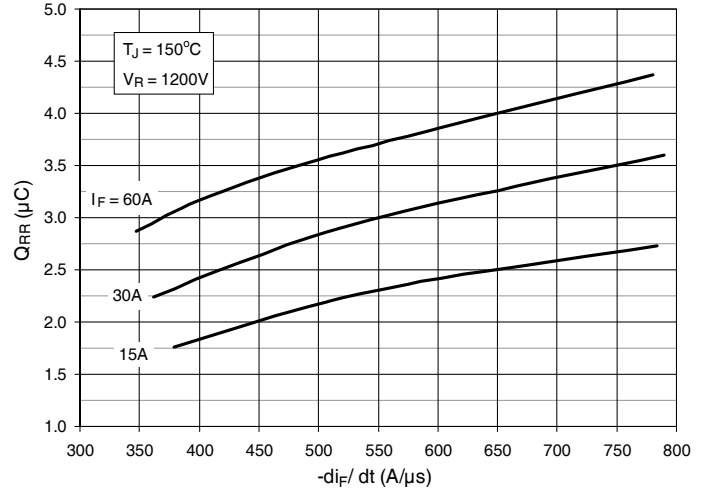
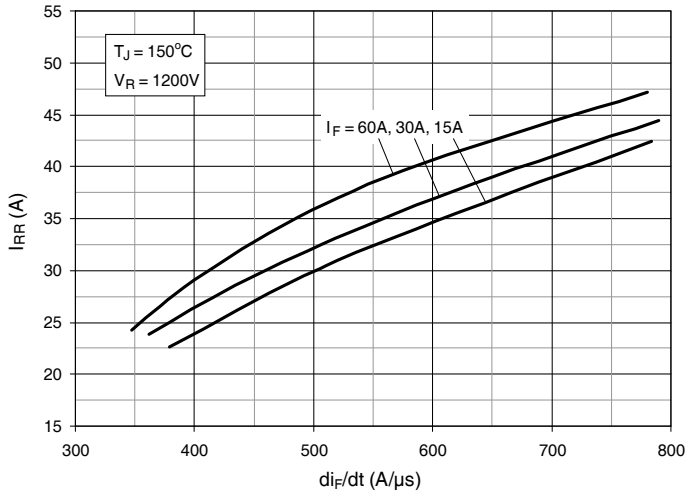
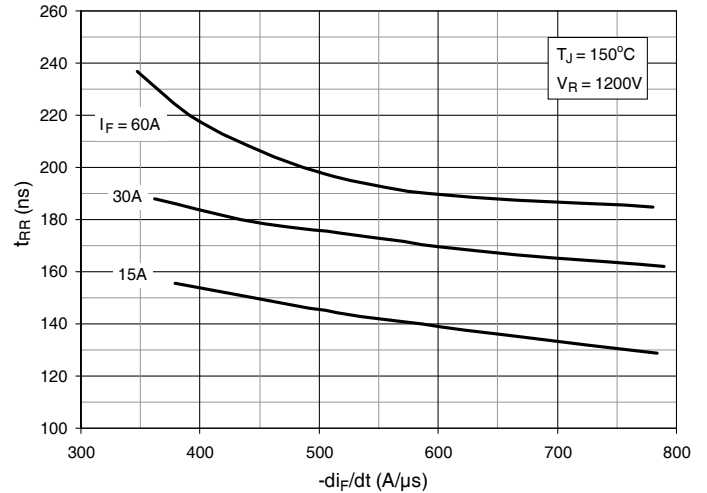
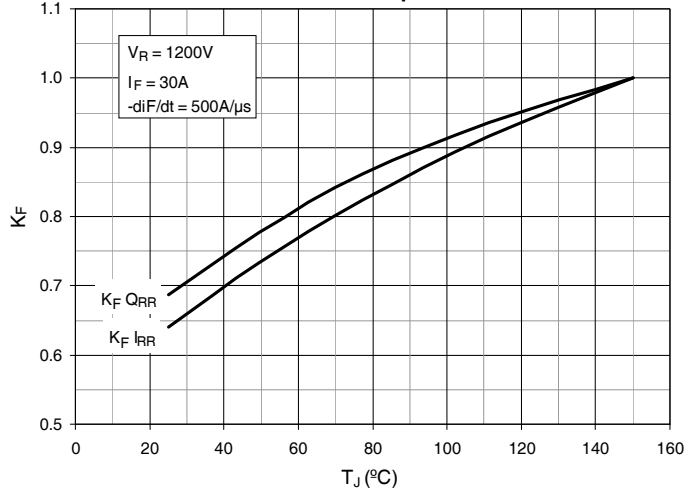
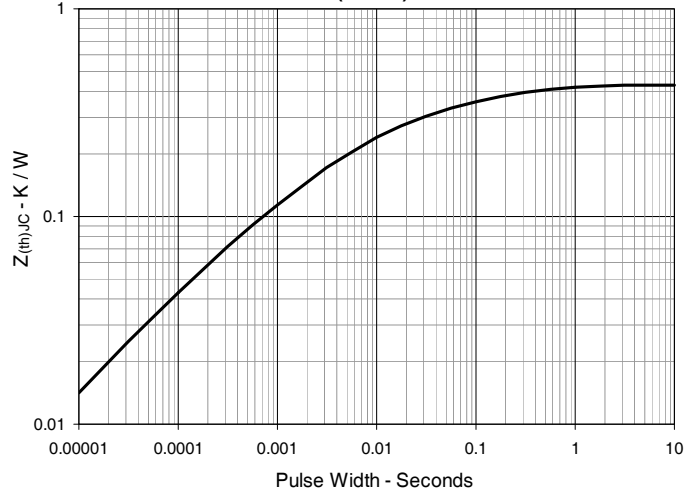


**Fig. 19. Inductive Turn-on Switching Times vs. Collector Current**



**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)**




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