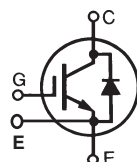


# XPT™ 650V IGBT GenX3™ w/ Diode

## IXYN75N65C3D1

Extreme Light Punch through  
IGBT for 20-60kHz Switching

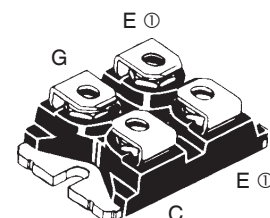


$$\begin{aligned} V_{CES} &= 650V \\ I_{C110} &= 75A \\ V_{CE(sat)} &\leq 2.3V \\ t_{fi(typ)} &= 60ns \end{aligned}$$

Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_J = 25^\circ\text{C to } 175^\circ\text{C}$	650	V
$V_{CGR}$	$T_J = 25^\circ\text{C to } 175^\circ\text{C}, R_{GE} = 1M\Omega$	650	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^\circ\text{C}$ (Chip Capability)	150	A
$I_{C110}$	$T_C = 110^\circ\text{C}$	75	A
$I_{F110}$	$T_C = 110^\circ\text{C}$	60	A
$I_{CM}$	$T_C = 25^\circ\text{C}, 1\text{ms}$	360	A
$I_A$	$T_C = 25^\circ\text{C}$	30	A
$E_{AS}$	$T_C = 25^\circ\text{C}$	300	mJ
<b>SSOA</b> <b>(RBSOA)</b>	$V_{GE} = 15V, T_{VJ} = 150^\circ\text{C}, R_G = 3\Omega$ Clamped Inductive Load	$I_{CM} = 150$ $V_{CE} \leq V_{CES}$	A
$t_{sc}$ <b>(SCSOA)</b>	$V_{GE} = 15V, V_{CE} = 360V, T_J = 150^\circ\text{C}$ $R_G = 82\Omega$ , Non Repetitive	8	$\mu\text{s}$
$P_C$	$T_C = 25^\circ\text{C}$	600	W
$T_J$		-55 ... +175	$^\circ\text{C}$
$T_{JM}$		175	$^\circ\text{C}$
$T_{stg}$		-55 ... +175	$^\circ\text{C}$
$TV_{ISOL}$	50/60Hz $I_{ISOL} \leq 1\text{mA}$	$t = 1\text{min}$ $t = 1\text{s}$	2500 3000 V~ V~
$M_d$	Mounting Torque Terminal Connection Torque	1.5/13 1.3/11.5	Nm/lb.in Nm/lb.in
<b>Weight</b>		30	g

SOT-227B, miniBLOC

E153432



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

### Features

- International Standard Package
- miniBLOC, with Aluminium Nitride Isolation
- 2500V~ Isolation Voltage
- Optimized for 20-60kHz Switching
- Square RBSOA
- Avalanche Rated
- Short Circuit Capability
- High Current Handling Capability
- Anti-Parallel Fast Diode

### Advantages

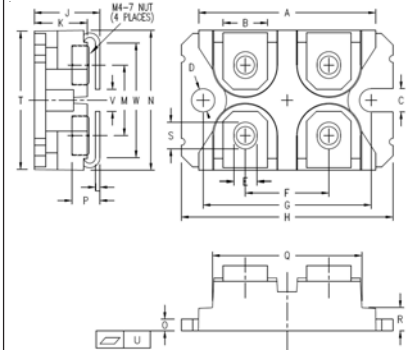
- High Power Density
- Low Gate Drive Requirement

### Applications

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

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$BV_{CES}$	$I_C = 250\mu\text{A}, V_{GE} = 0V$	650		V
$V_{GE(th)}$	$I_C = 250\mu\text{A}, V_{CE} = V_{GE}$	3.5		6.0 V
$I_{CES}$	$V_{CE} = V_{CES}, V_{GE} = 0V$ $T_J = 150^\circ\text{C}$			25 $\mu\text{A}$ 3 mA
$I_{GES}$	$V_{CE} = 0V, V_{GE} = \pm 20V$			$\pm 100$ nA
$V_{CE(sat)}$	$I_C = 60A, V_{GE} = 15V$ , Note 1 $T_J = 150^\circ\text{C}$		1.8 2.2	2.3 V V

Symbol Test Conditions ( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)		Characteristic Values		
		Min.	Typ.	Max.
$g_{fs}$	$I_C = 60\text{A}, V_{CE} = 10\text{V}$ , Note 1	25	44	S
$C_{ies}$	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$		3410	pF
$C_{oes}$			330	pF
$C_{res}$			73	pF
$Q_{g(on)}$	$I_C = 60\text{A}, V_{GE} = 15\text{V}, V_{CE} = 0.5 \cdot V_{CES}$		122	nC
$Q_{ge}$			22	nC
$Q_{gc}$			60	nC
$t_{d(on)}$	<b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b> $I_C = 60\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 400\text{V}, R_G = 3\Omega$ Note 2		26	ns
$t_{ri}$			65	ns
$E_{on}$			2.00	mJ
$t_{d(off)}$			93	ns
$t_{fi}$			60	ns
$E_{off}$			0.95	mJ
$t_{d(on)}$	<b>Inductive load, <math>T_J = 150^\circ\text{C}</math></b> $I_C = 60\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 400\text{V}, R_G = 3\Omega$ Note 2		26	ns
$t_{ri}$			64	ns
$E_{on}$			3.40	mJ
$t_{d(off)}$			115	ns
$t_{fi}$			64	ns
$E_{off}$			1.30	mJ
$R_{thJC}$			0.25	$^\circ\text{C}/\text{W}$
$R_{thCS}$		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)**

Symbol Test Conditions ( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)		Characteristic Values		
		Min.	Typ.	Max.
$V_F$	$I_F = 50\text{A}, V_{GE} = 0\text{V}$ , Note 1			2.50 V
		$T_J = 150^\circ\text{C}$	1.45	V
$I_{rr}$	$I_F = 50\text{A}, V_{GE} = 0\text{V}, -di_F/dt = 700\text{A}/\mu\text{s}, V_R = 400\text{V}$	$T_J = 150^\circ\text{C}$	30	A
$t_{rr}$		$T_J = 150^\circ\text{C}$	135	ns
$R_{thJC}$				0.52 $^\circ\text{C}/\text{W}$

**Notes:**

1. Pulse test,  $t \leq 300\mu\text{s}$ , duty cycle,  $d \leq 2\%$ .
2. Switching times & energy losses may increase for higher  $V_{CE}(\text{clamp})$ ,  $T_J$  or  $R_G$ .

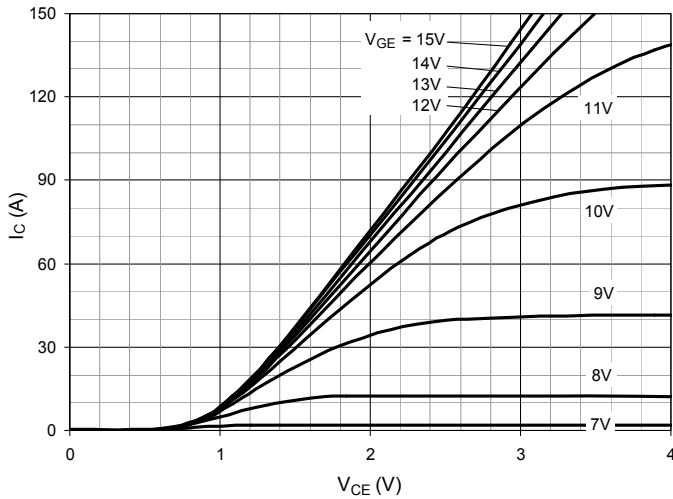
**ADVANCE TECHNICAL INFORMATION**

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.

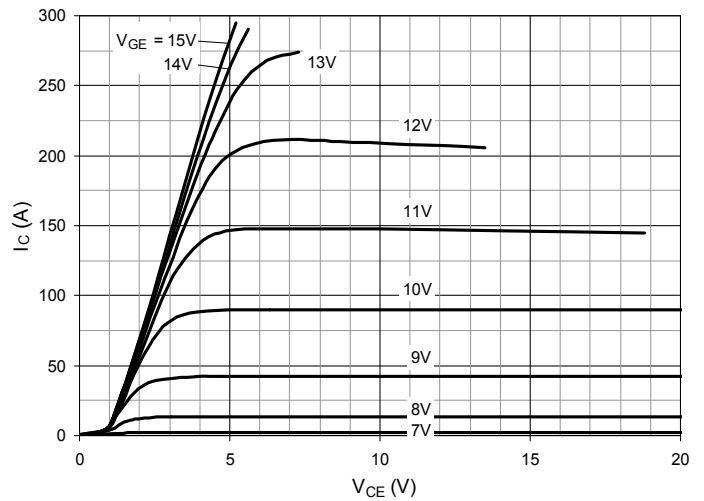
**IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.**

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	

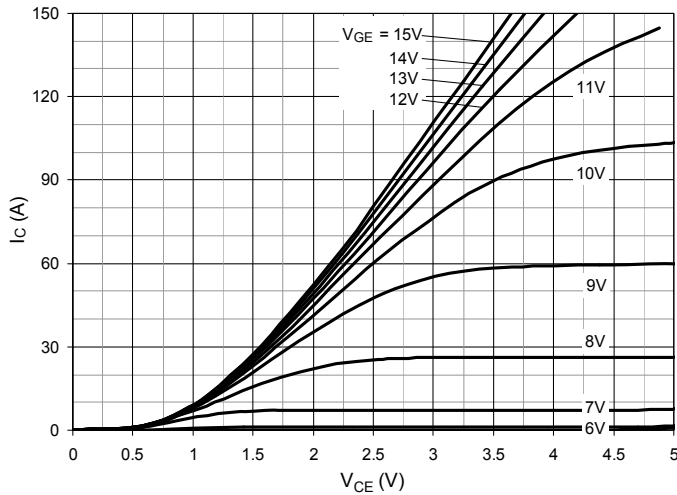
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



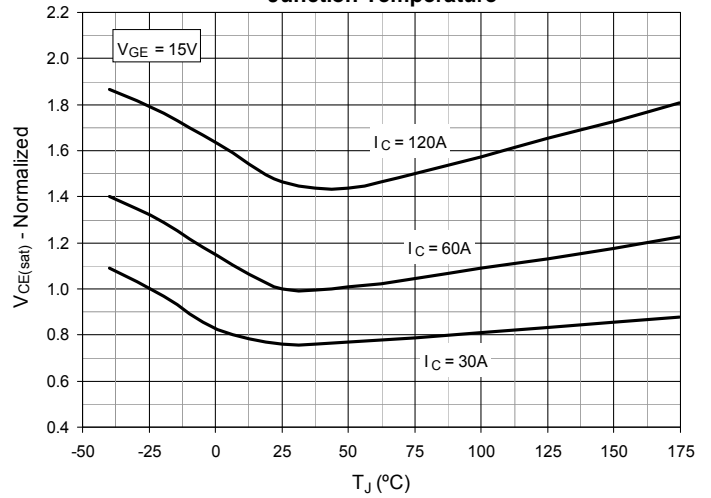
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



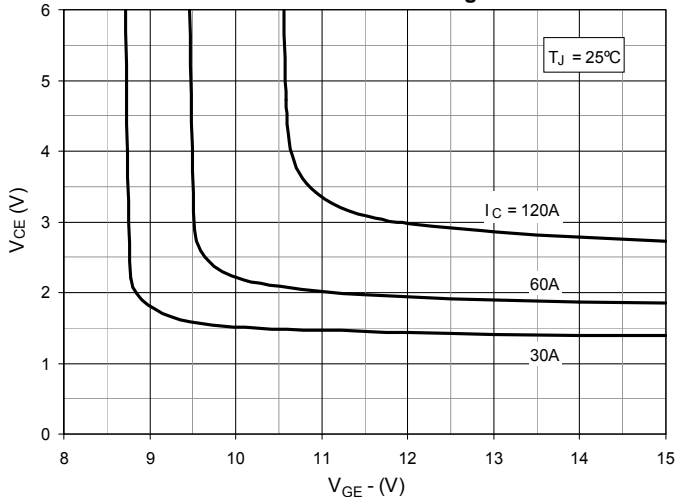
**Fig. 3. Output Characteristics @  $T_J = 150^\circ\text{C}$**



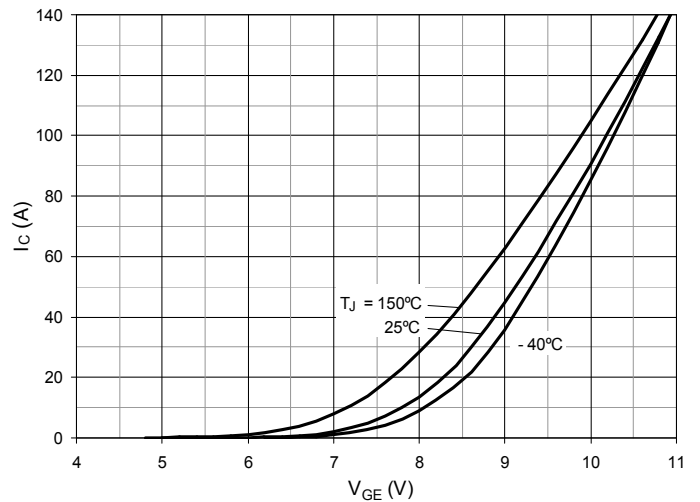
**Fig. 4. Dependence of  $V_{CE(sat)}$  on Junction Temperature**

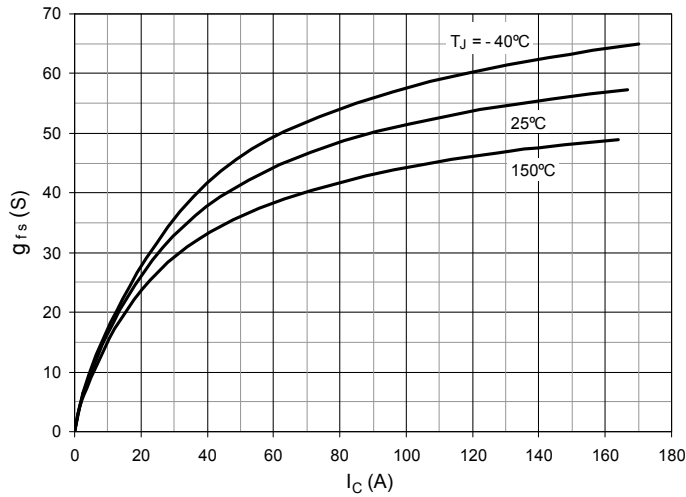
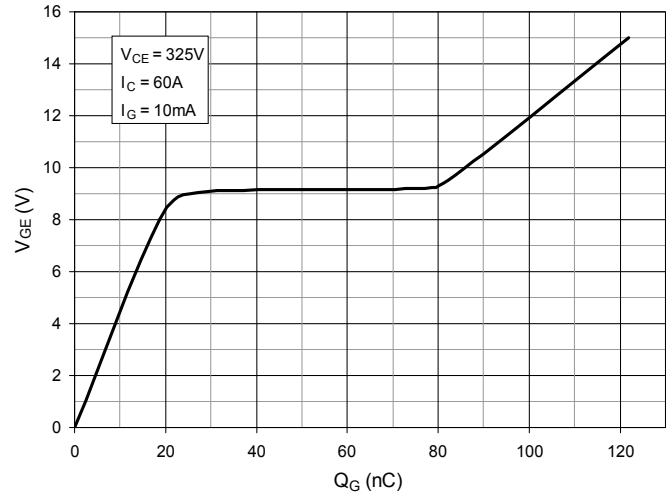
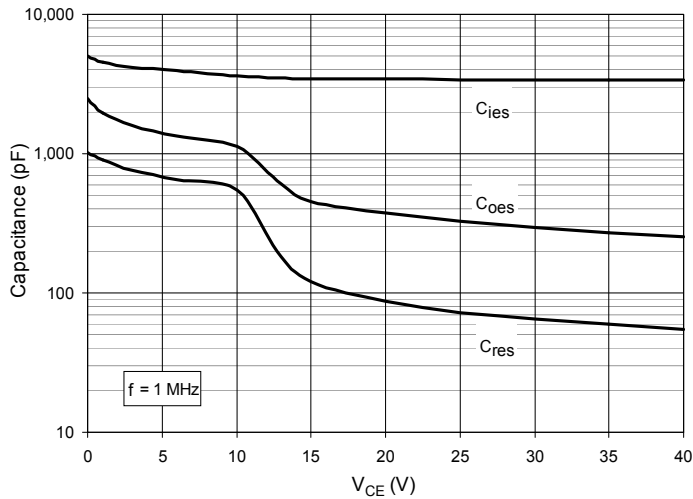
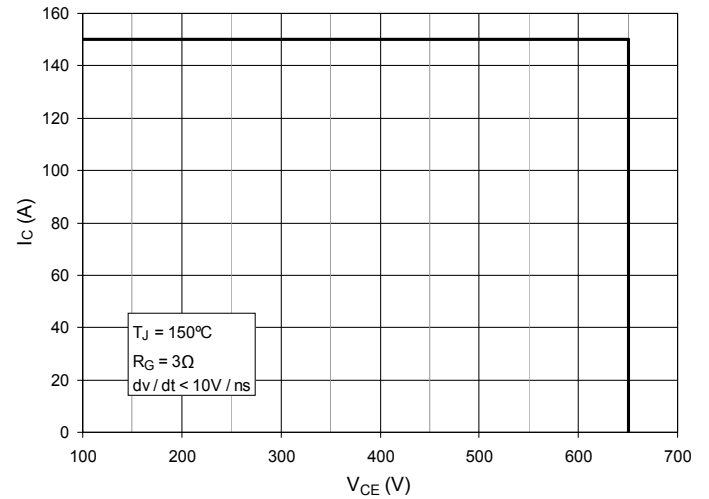
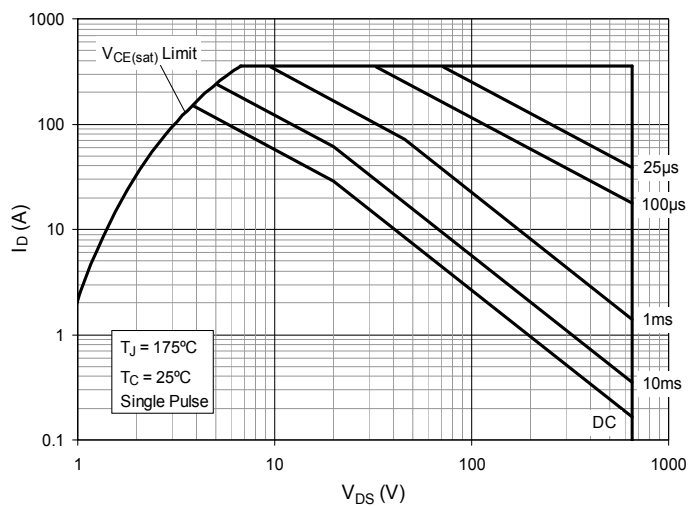
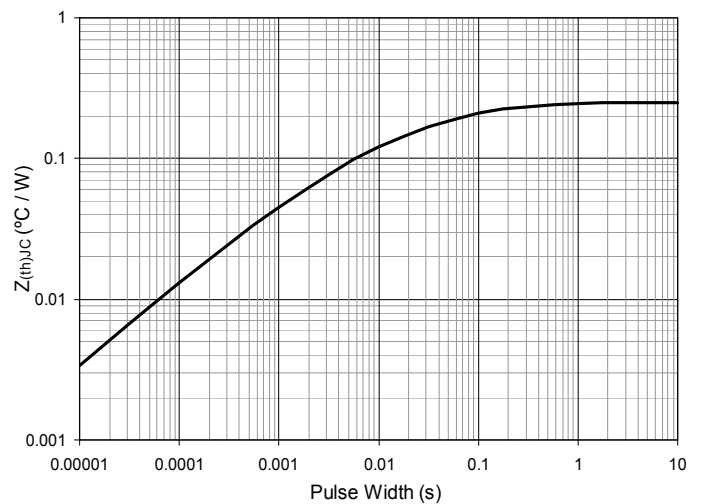


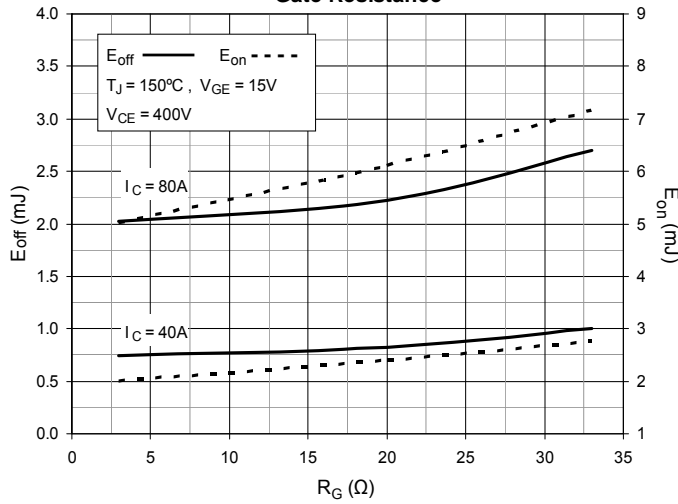
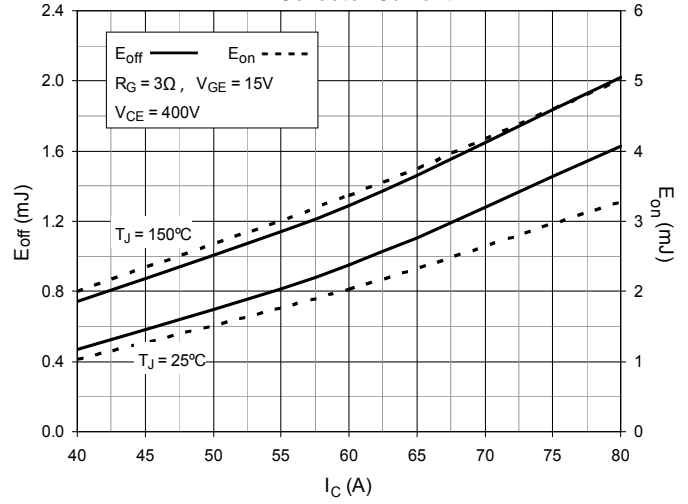
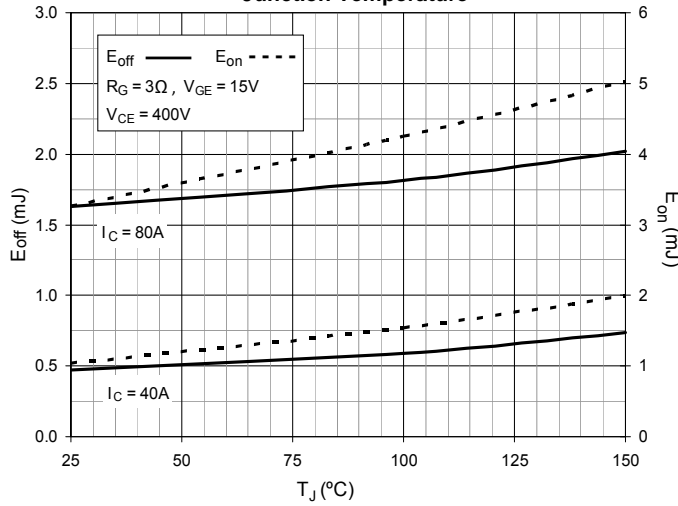
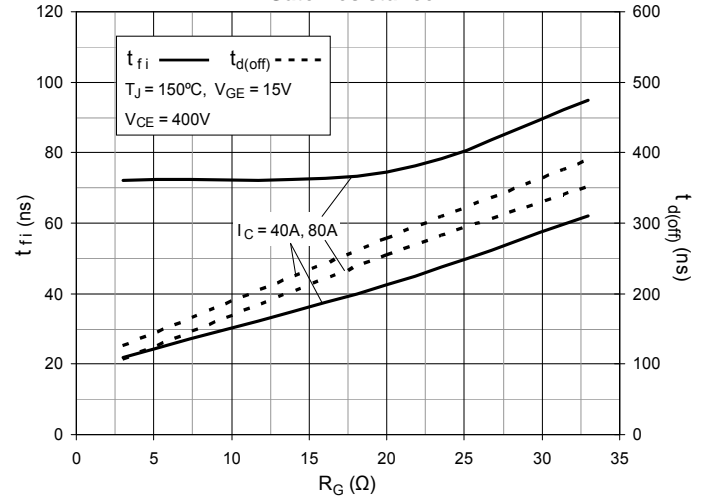
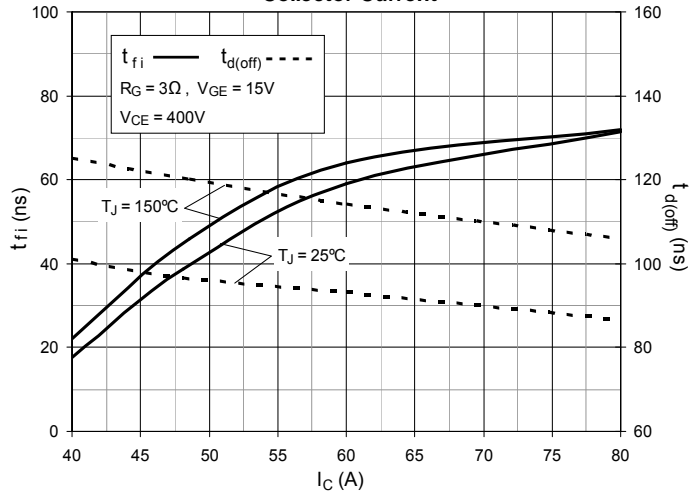
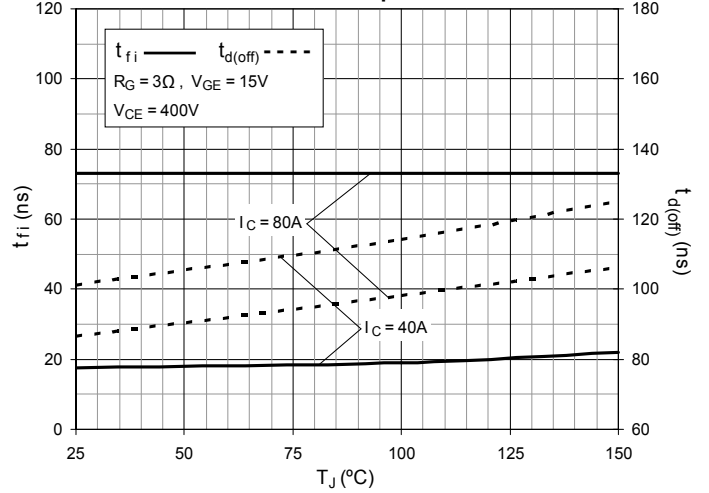
**Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage**

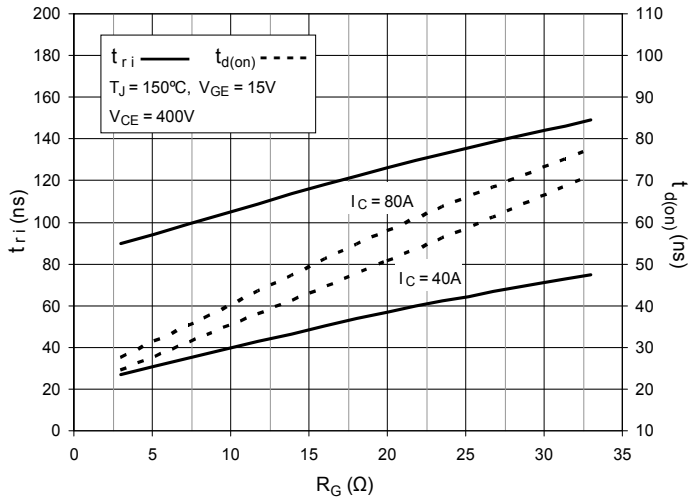
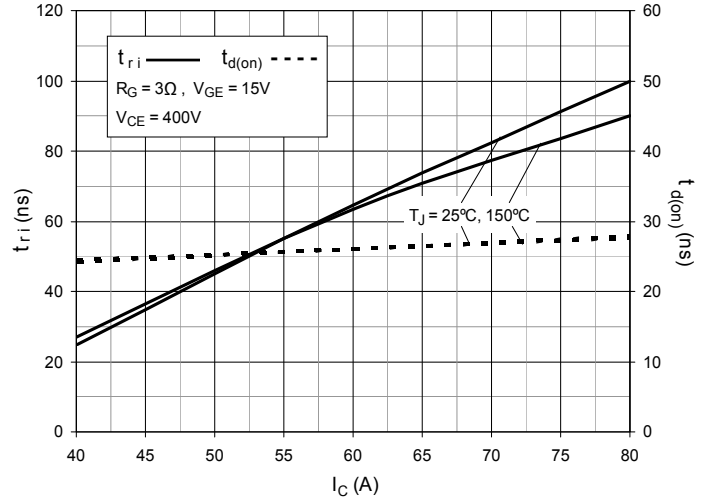
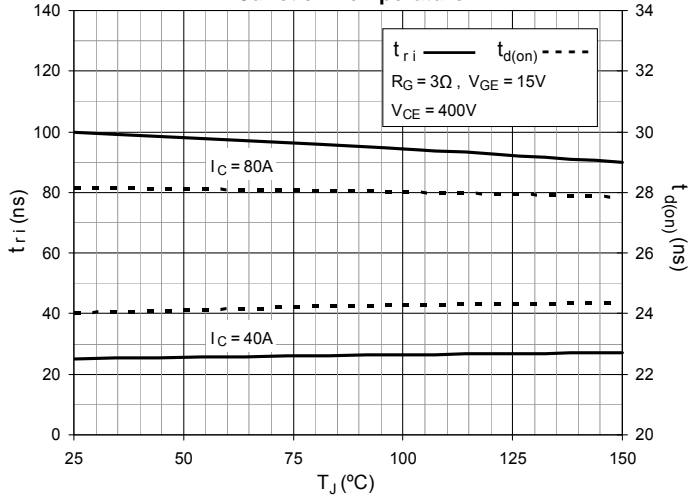
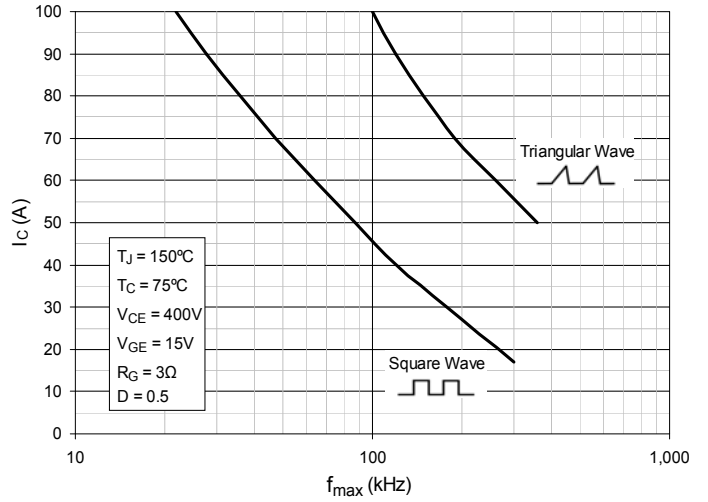


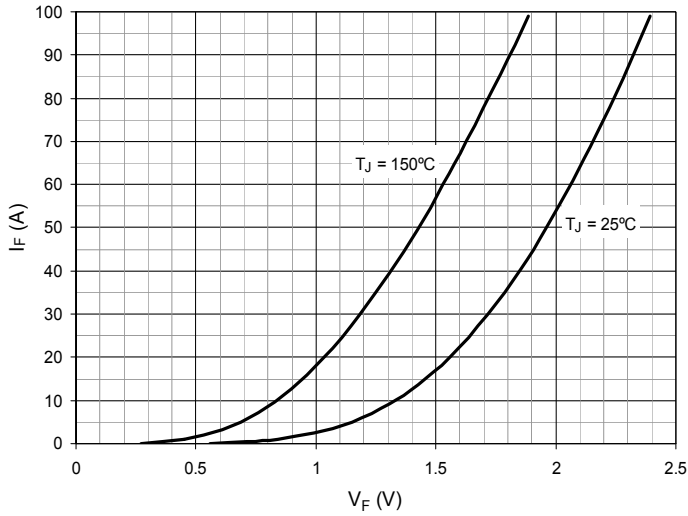
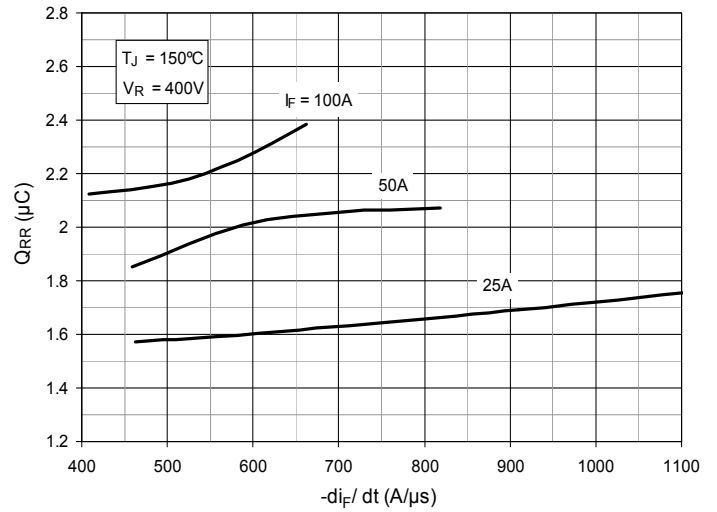
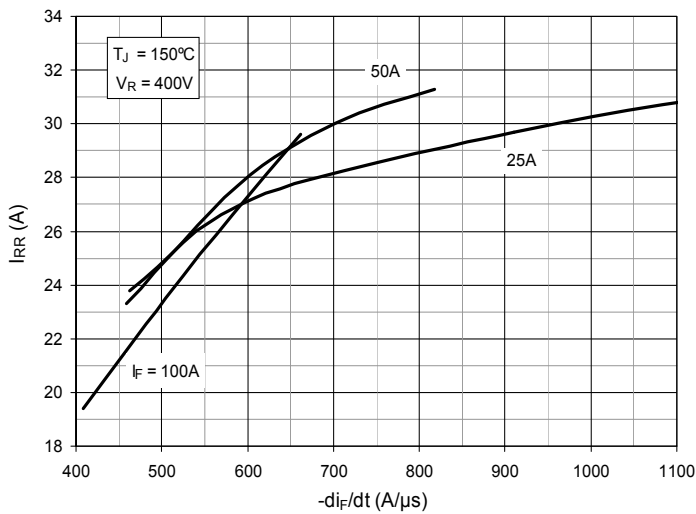
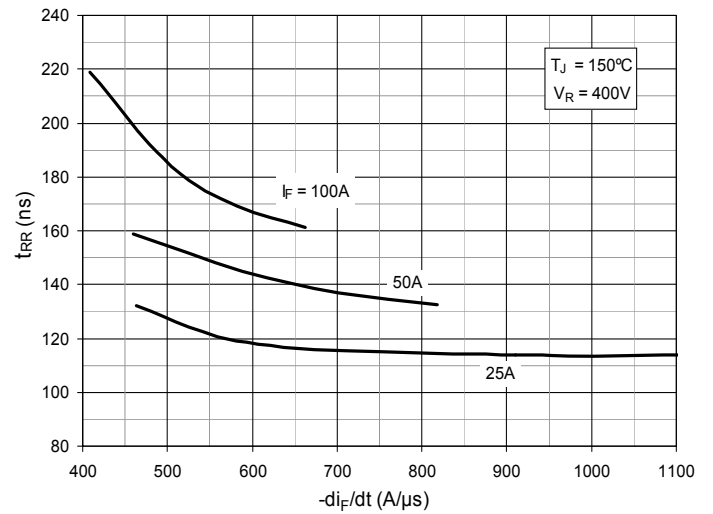
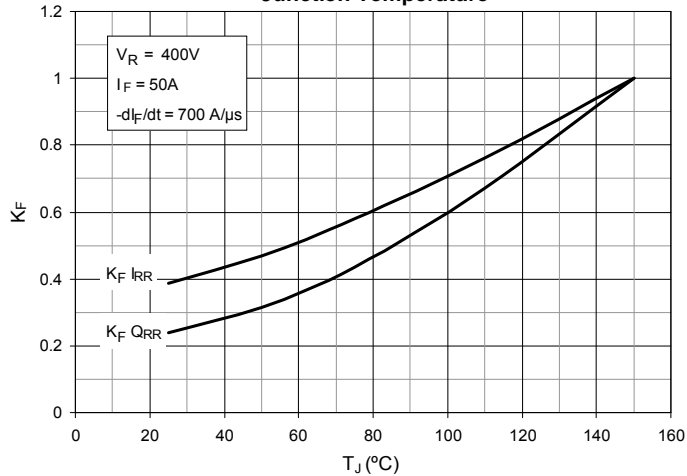
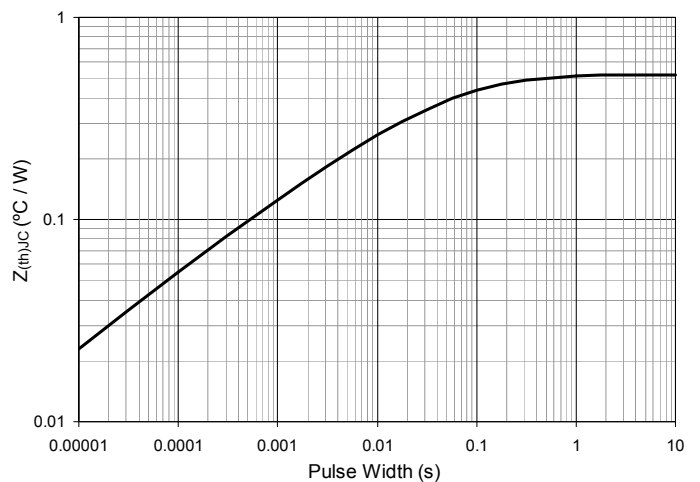
**Fig. 6. Input Admittance**



**Fig. 7. Transconductance**

**Fig. 8. Gate Charge**

**Fig. 9. Capacitance**

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

**Fig. 11. Forward-Bias Safe Operating Area**

**Fig. 12. Maximum Transient Thermal Impedance (IGBT)**


**Fig. 13. Inductive Switching Energy Loss vs. Gate Resistance**

**Fig. 14. Inductive Switching Energy Loss vs. Collector Current**

**Fig. 15. Inductive Switching Energy Loss vs. Junction Temperature**

**Fig. 16. Inductive Turn-off Switching Times vs. Gate Resistance**

**Fig. 17. Inductive Turn-off Switching Times vs. Collector Current**

**Fig. 18. Inductive Turn-off Switching Times vs. Junction Temperature**


**Fig. 19. Inductive Turn-on Switching Times vs. Gate Resistance**

**Fig. 20. Inductive Turn-on Switching Times vs. Collector Current**

**Fig. 21. Inductive Turn-on Switching Times vs. Junction Temperature**

**Fig. 22. Maximum Peak Load Current vs. Frequency**


**Fig. 23. Diode Forward Characteristics**

**Fig. 24. Reverse Recovery Charge vs.  $-di_F/dt$** 

**Fig. 25. Reverse Recovery Current vs.  $-di_F/dt$** 

**Fig. 26. Reverse Recovery Time vs.  $-di_F/dt$** 

**Fig. 27. Dynamic Parameters  $Q_{RR}$ ,  $I_{RR}$  vs. Junction Temperature**

**Fig. 28. Maximum Transient Thermal Impedance (Diode)**




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