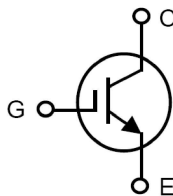


# 1200V XPT™ GenX4™ IGBT

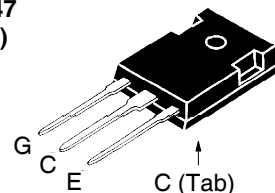
## IXYH55N120A4

Ultra Low-V<sub>sat</sub> PT IGBT for  
up to 5kHz Switching



$V_{CES} = 1200V$   
 $I_{C110} = 55A$   
 $V_{CE(sat)} \leq 1.8V$   
 $t_{fi(typ)} = 270ns$

TO-247  
(IXYH)



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

Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_J = 25^\circ C$ to $175^\circ C$	1200	V
$V_{CGR}$	$T_J = 25^\circ C$ to $175^\circ C$ , $R_{GE} = 1M\Omega$	1200	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^\circ C$	175	A
$I_{C110}$	$T_C = 110^\circ C$	55	A
$I_{CM}$	$T_C = 25^\circ C$ , 1ms	350	A
<b>SSOA</b> <b>(RBSOA)</b>	$V_{GE} = 15V$ , $T_{VJ} = 125^\circ C$ , $R_G = 5\Omega$ Clamped Inductive Load	$I_{CM} = 110$ $V_{CE} \leq 0.8 \cdot V_{CES}$	A
$P_C$	$T_C = 25^\circ C$	650	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 1.6 mm (0.062 in.) from Case for 10s	300	$^\circ C$
$M_d$	Mounting Torque	1.13 / 10	Nm/lb.in
<b>Weight</b>		6	g

### Features

- Optimized for Low Conduction Losses
- Positive Thermal Coefficient of  $V_{ce(sat)}$
- International Standard Package

### Advantages

- High Power Density
- Low Gate Drive Requirement

### Applications

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

Symbol	Test Conditions ( $T_J = 25^\circ C$ , Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$BV_{CES}$	$I_C = 250\mu A$ , $V_{GE} = 0V$	1200		V
$V_{GE(th)}$	$I_C = 250\mu A$ , $V_{CE} = V_{GE}$	4.0		6.5 V
$I_{CES}$	$V_{CE} = V_{CES}$ , $V_{GE} = 0V$ $T_J = 150^\circ C$			5 $\mu A$ 2.5 mA
$I_{GES}$	$V_{CE} = 0V$ , $V_{GE} = \pm 20V$			$\pm 100$ nA
$V_{CE(sat)}$	$I_C = 55A$ , $V_{GE} = 15V$ , Note 1 $T_J = 150^\circ C$		1.5 1.8	V V

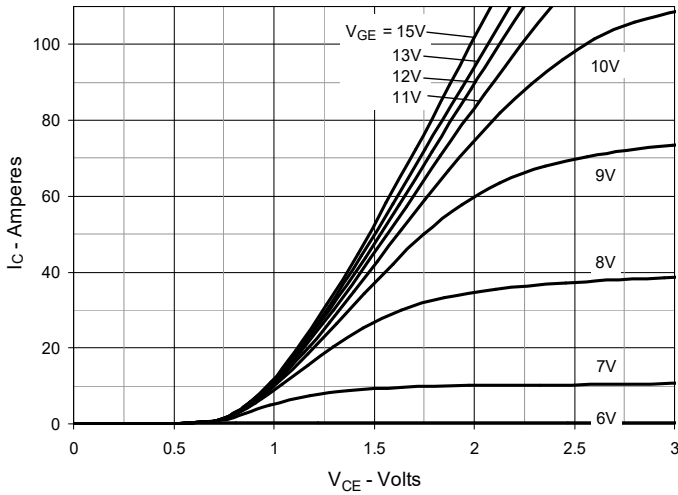
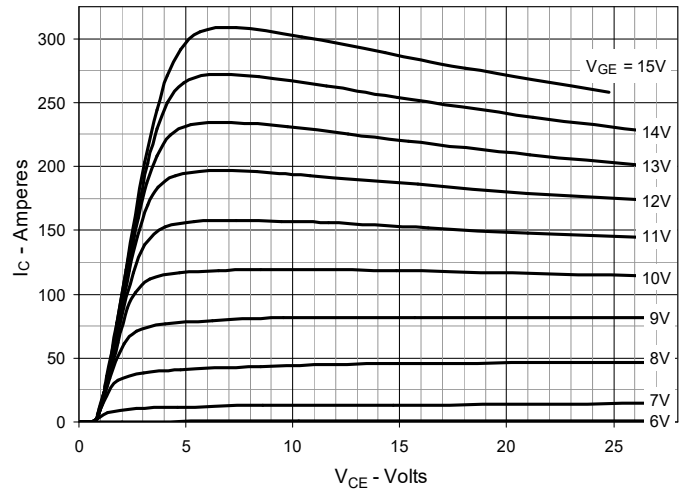
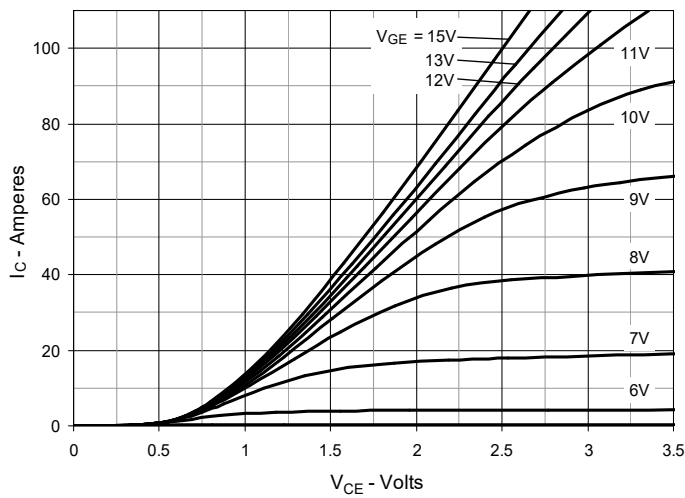
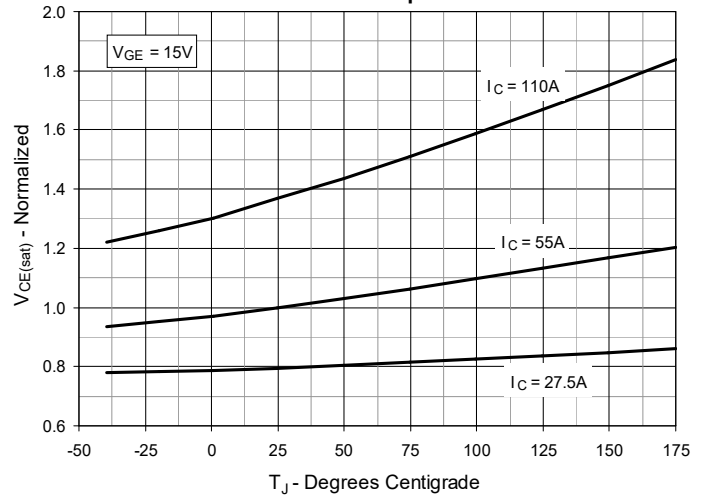
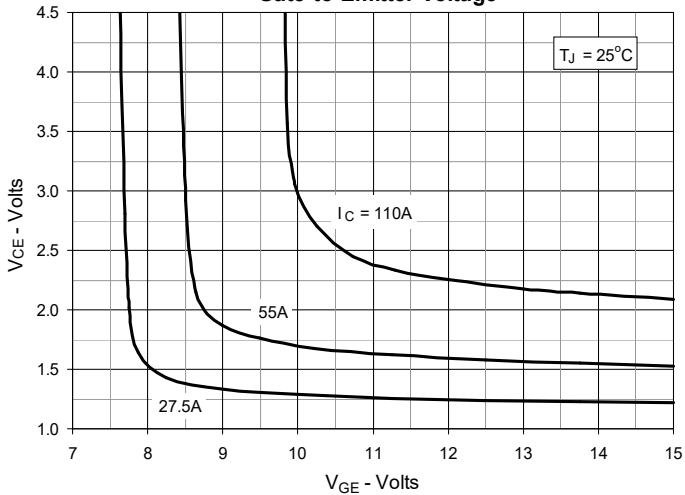
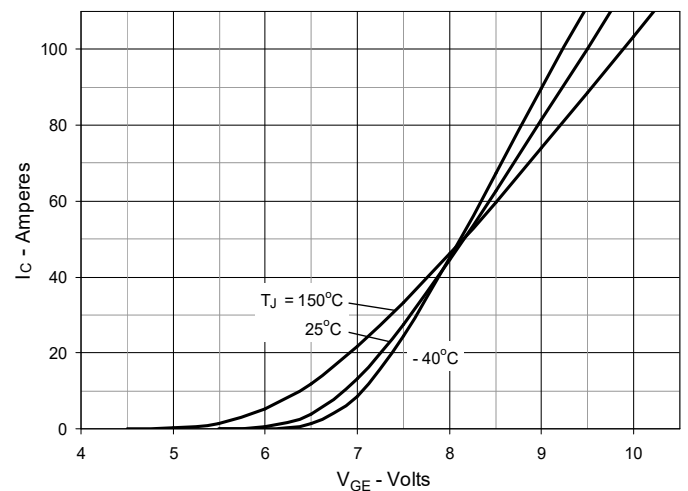
Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$g_{fs}$	$I_C = 55\text{A}, V_{CE} = 10\text{V}$ , Note 1	22	36	S
$C_{ies}$	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$		2150	pF
$C_{oes}$			125	pF
$C_{res}$			80	pF
$Q_{g(on)}$	$I_C = 55\text{A}, V_{GE} = 15\text{V}, V_{CE} = 0.5 \cdot V_{CES}$		110	nC
$Q_{ge}$			17	nC
$Q_{gc}$			56	nC
$t_{d(on)}$	<b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b> $I_C = 40\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 0.5 \cdot V_{CES}, R_G = 5\Omega$ Note 2		23	ns
$t_{ri}$			35	ns
$E_{on}$			2.3	mJ
$t_{d(off)}$			300	ns
$t_{fi}$			270	ns
$E_{off}$			5.3	mJ
$t_{d(on)}$	<b>Inductive load, <math>T_J = 150^\circ\text{C}</math></b> $I_C = 40\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 0.5 \cdot V_{CES}, R_G = 5\Omega$ Note 2		21	ns
$t_{ri}$			33	ns
$E_{on}$			3.8	mJ
$t_{d(off)}$			380	ns
$t_{fi}$			530	ns
$E_{off}$			8.8	mJ
$R_{thJC}$				0.23 $^\circ\text{C/W}$
$R_{thCS}$		0.21		$^\circ\text{C/W}$

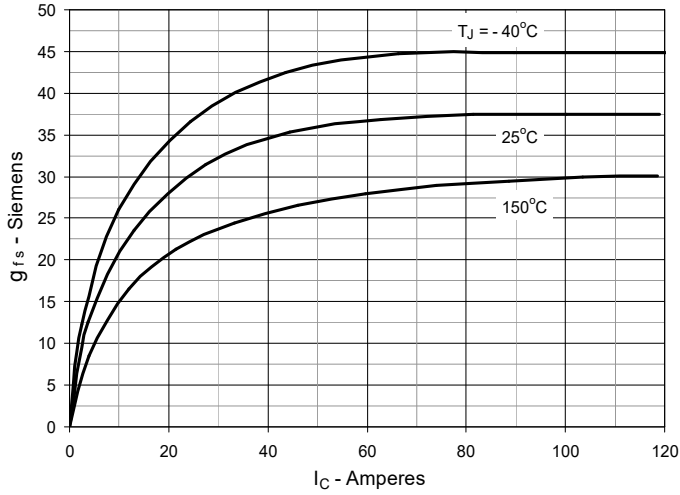
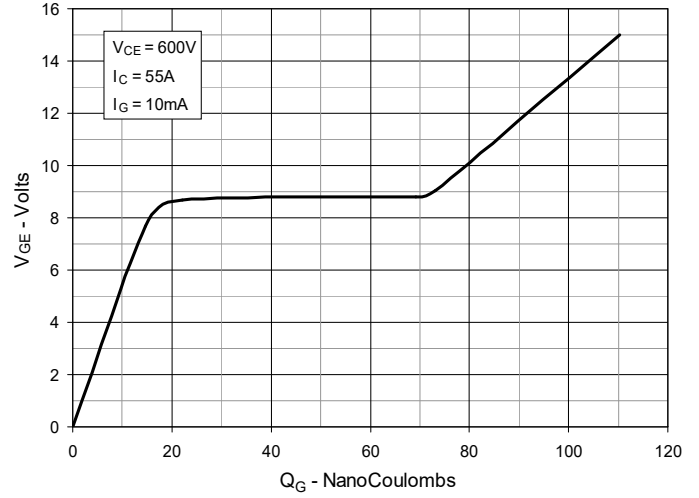
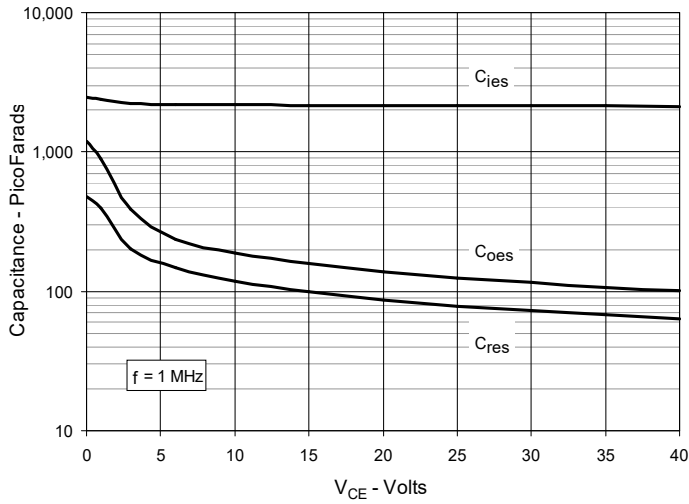
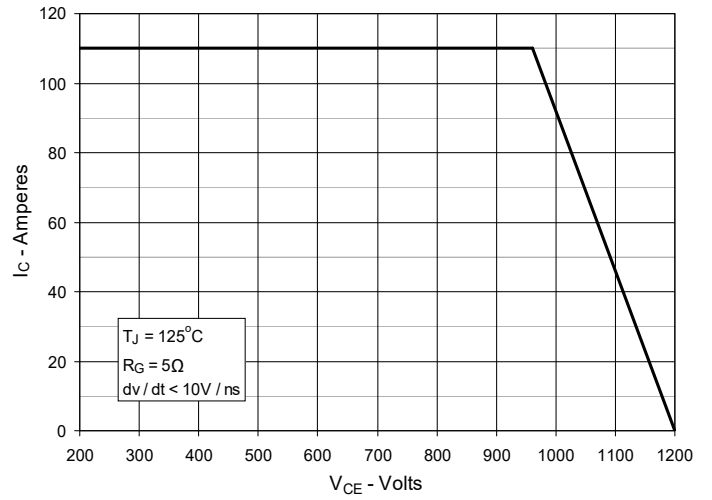
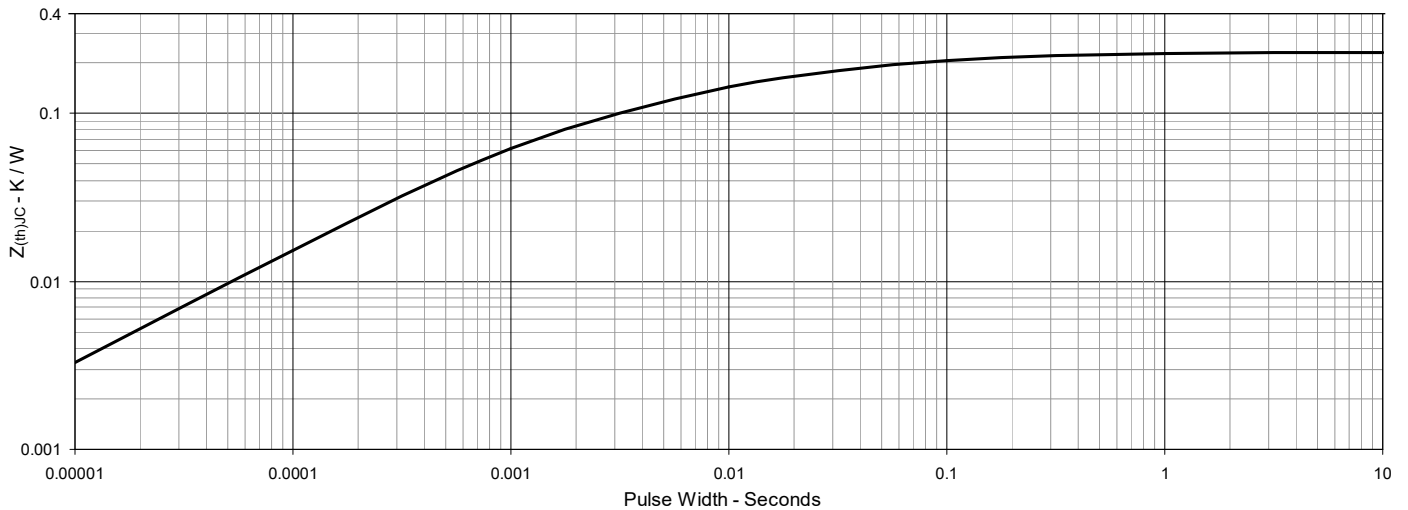
**Notes:**

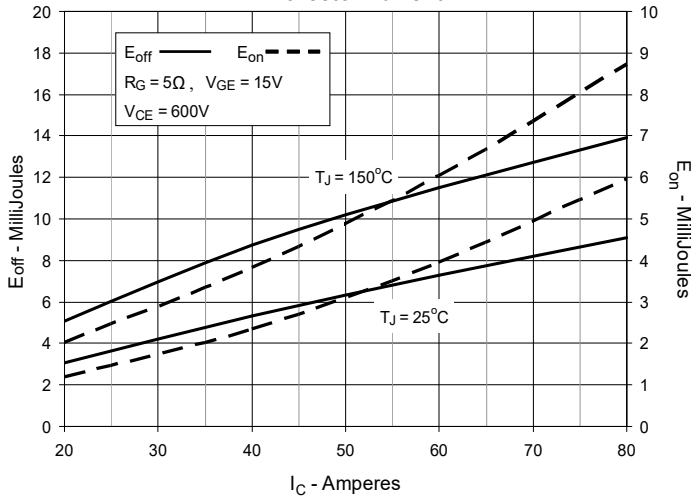
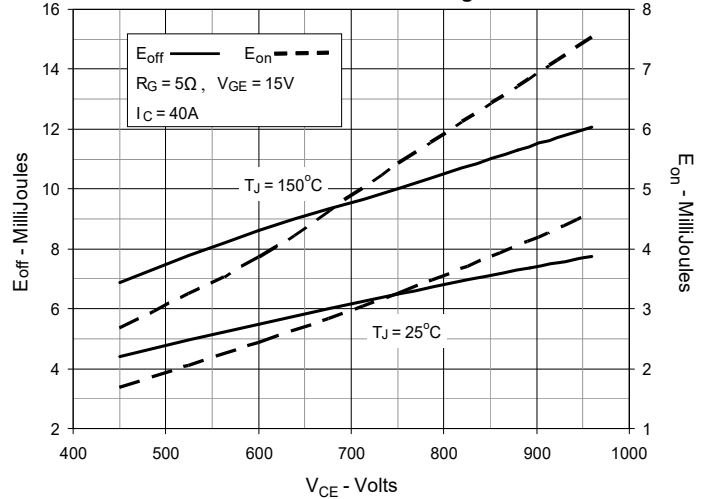
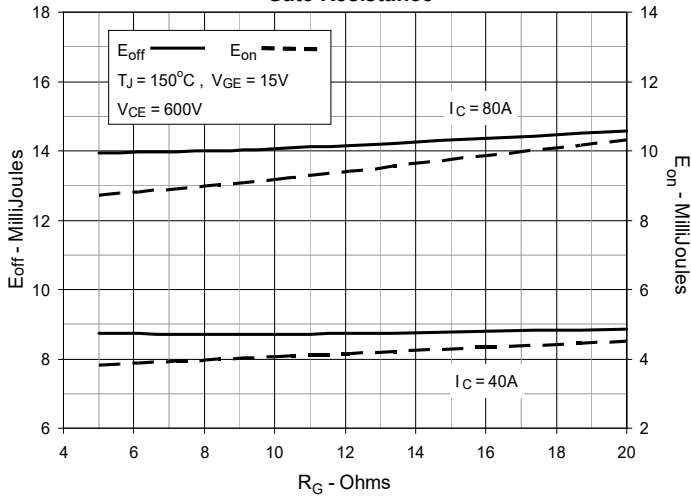
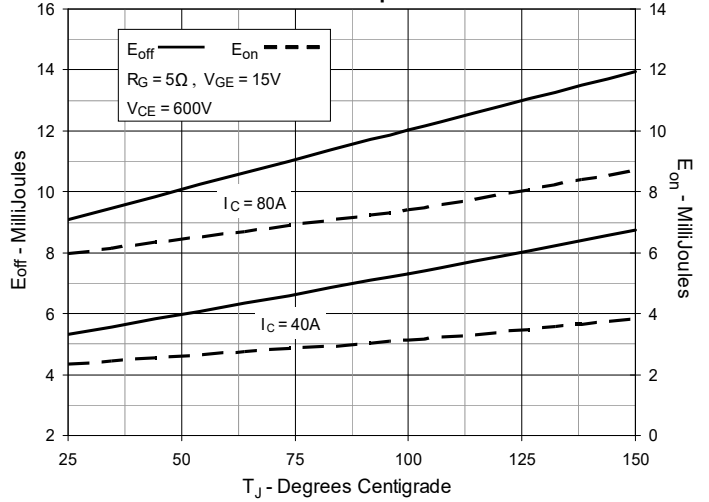
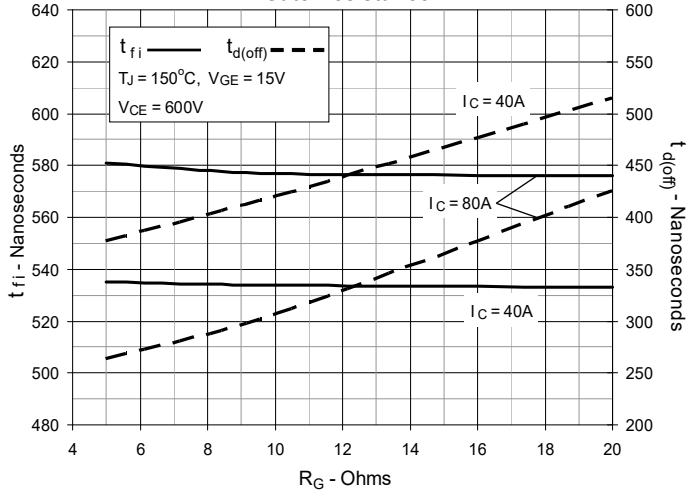
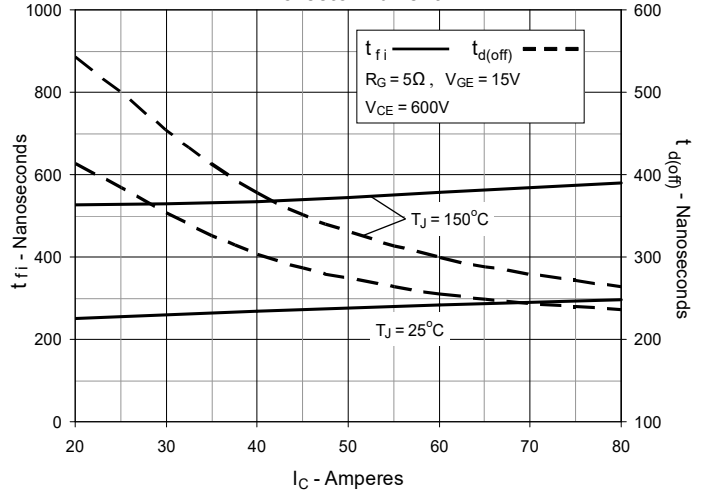
1. Pulse test,  $t \leq 300\mu\text{s}$ , duty cycle,  $d \leq 2\%$ .
2. Switching times & energy losses may increase for higher  $V_{CE}$  (clamp),  $T_J$  or  $R_G$ .

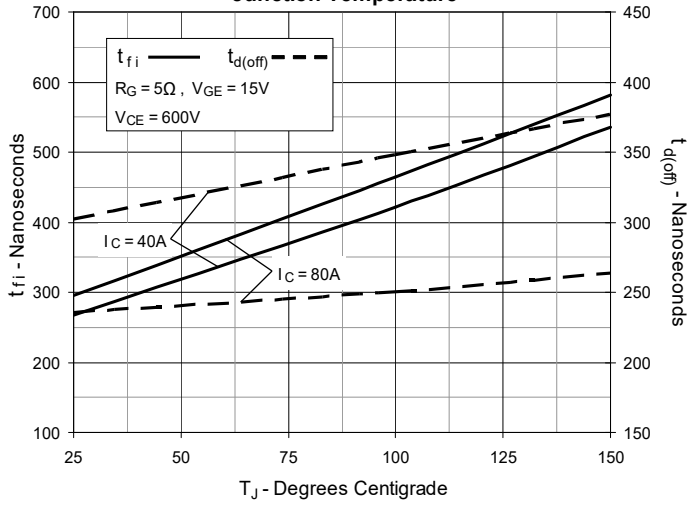
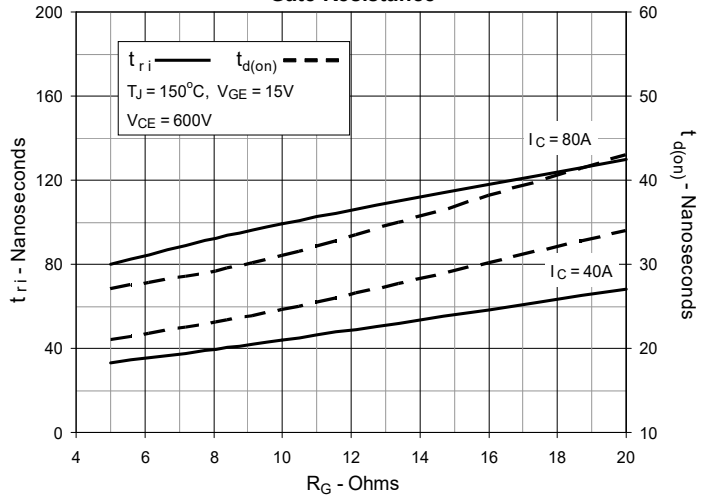
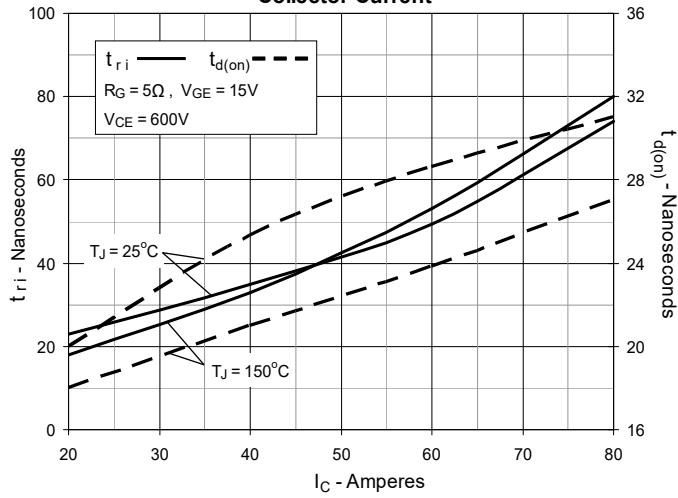
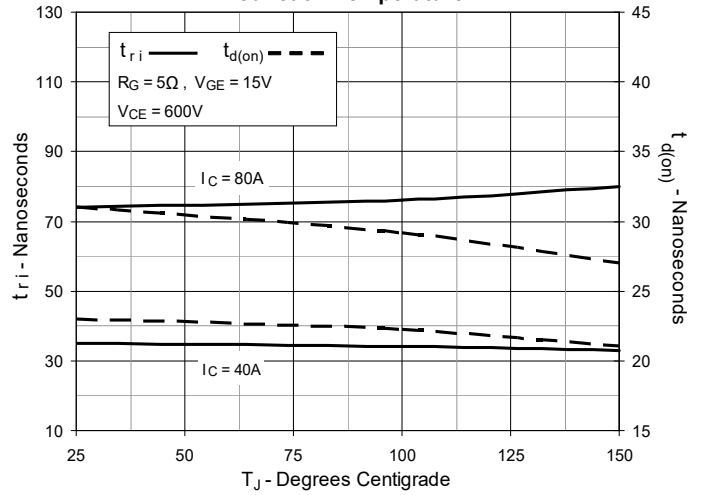
Littelfuse Reserves the Right to Change Limits, Test Conditions, and Dimensions.

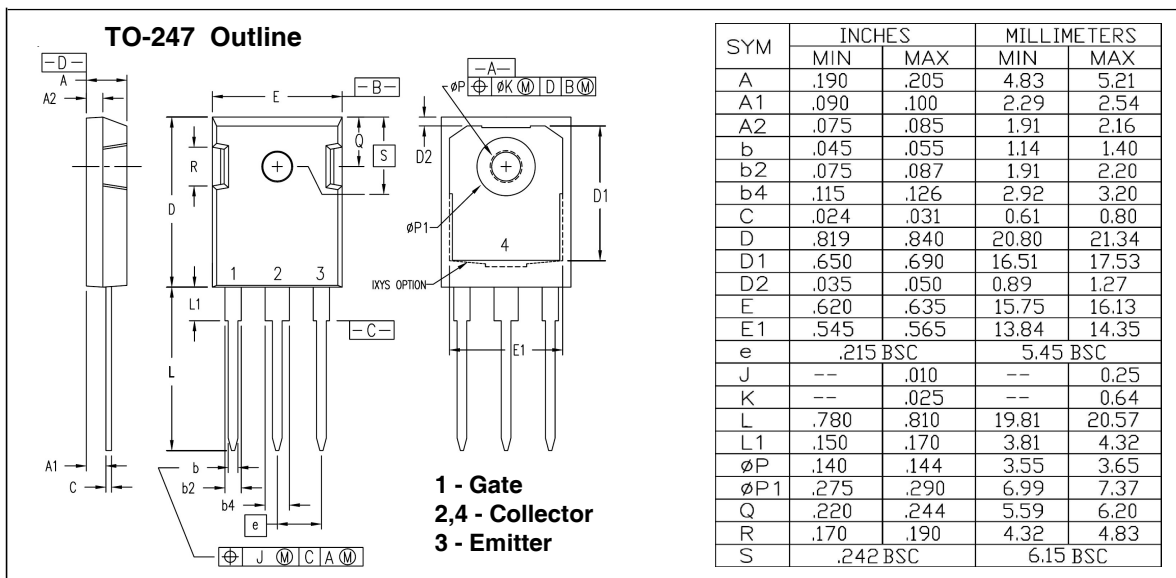
IXYS MOSFETs and IGBTs are covered	4,835,592	4,931,844	5,049,961	5,237,481	6,162,665	6,404,065 B1	6,683,344	6,727,585	7,005,734 B2	7,157,338B2
by one or more of the following U.S. patents:	4,860,072	5,017,508	5,063,307	5,381,025	6,259,123 B1	6,534,343	6,710,405 B2	6,759,692	7,063,975 B2	
	4,881,106	5,034,796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

**Fig. 13. Inductive Switching Energy Loss vs. Collector-Emitter Voltage**

**Fig. 14. Inductive Switching Energy Loss vs. Gate Resistance**

**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**






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