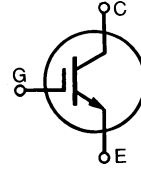


# HiPerFAST™ IGBT

Surface Mountable

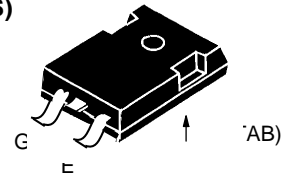
**IXGH50N60A**  
**IXGH50N60AS**

$V_{CES} = 600\text{ V}$   
 $I_{C25} = 75\text{ A}$   
 $V_{CE(sat)} = 2.7\text{ V}$   
 $t_{fi} = 275\text{ ns}$

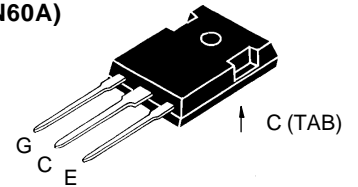


Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_J = 25^\circ\text{C to } 150^\circ\text{C}$	600	V
$V_{CGR}$	$T_J = 25^\circ\text{C to } 150^\circ\text{C}; R_{GE} = 1\text{ M}\Omega$	600	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^\circ\text{C}$	75	A
$I_{C90}$	$T_C = 90^\circ\text{C}$	50	A
$I_{CM}$	$T_C = 25^\circ\text{C}, 1\text{ ms}$	200	A
<b>SSOA</b> <b>(RBSOA)</b>	$V_{GE} = 15\text{ V}, T_{VJ} = 125^\circ\text{C}, R_G = 10\ \Omega$ Clamped inductive load, $L = 30\ \mu\text{H}$	$I_{CM} = 100$ @ $0.8 V_{CES}$	A
$P_C$	$T_C = 25^\circ\text{C}$	250	W
$T_J$		-55 ... +150	$^\circ\text{C}$
$T_{JM}$		150	$^\circ\text{C}$
$T_{stg}$		-55 ... +150	$^\circ\text{C}$
Maximum Lead and Tab temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	$^\circ\text{C}$
$M_d$	Mounting torque, TO-247 AD	1.13/10	Nm/lb.in.
<b>Weight</b>		TO-247 SMD	4 g
		TO-247 AD	6 g

**TO-247 SMD**  
**(50N60AS)**



**TO-247 AD**  
**(50N60A)**



G = Gate, C = Collector,  
E = Emitter, TAB = Collector

### Features

- International standard packages JEDEC TO-247 SMD surface mountable and JEDEC TO-247 AD
- High frequency IGBT
- High current handling capability
- 2nd generation HDMOS™ process
- MOS Gate turn-on - drive simplicity

### Applications

- AC motor speed control
- DC servo and robot drives
- DC choppers
- Uninterruptible power supplies (UPS)
- Switch-mode and resonant-mode power supplies

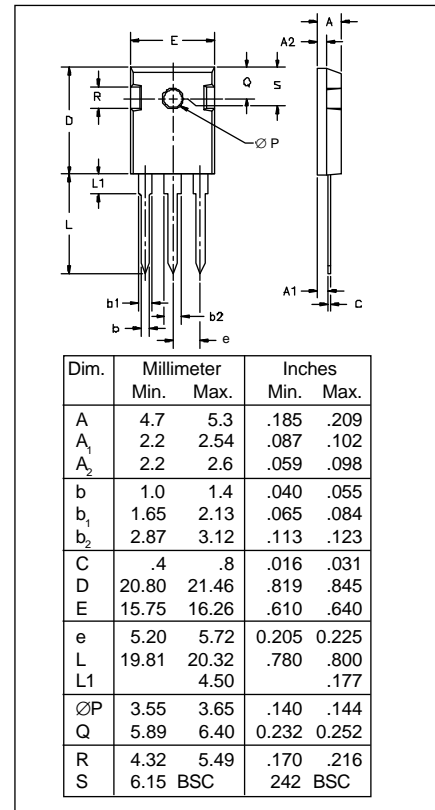
### Advantages

- High power density
- Suitable for surface mounting
- Switching speed for high frequency applications
- Easy to mount with 1 screw, TO-247 (insulated mounting screw hole)

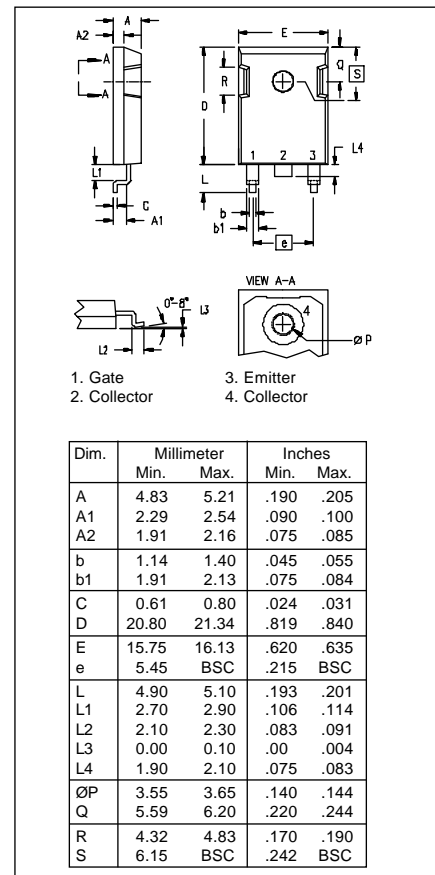
Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$BV_{CES}$	$I_C = 250\ \mu\text{A}, V_{GE} = 0\text{ V}$	600		V
$V_{GE(th)}$	$I_C = 250\ \mu\text{A}, V_{CE} = V_{GE}$	2.5		5 V
$I_{CES}$	$V_{CE} = 0.8 \cdot V_{CES}$ $V_{GE} = 0\text{ V}$			$T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$ 200 $\mu\text{A}$ 1 mA
$I_{GES}$	$V_{CE} = 0\text{ V}, V_{GE} = \pm 20\text{ V}$			$\pm 100\text{ nA}$
$V_{CE(sat)}$	$I_C = I_{C90}, V_{GE} = 15\text{ V}$			2.7 V

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$g_{fs}$	$I_C = I_{C90}$ ; $V_{CE} = 10\text{ V}$ , Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $\leq 2\%$	25	35	S
$C_{ies}$	$V_{CE} = 25\text{ V}$ , $V_{GE} = 0\text{ V}$ , $f = 1\text{ MHz}$		4000	pF
$C_{oes}$			430	pF
$C_{res}$			100	pF
$Q_g$	$I_C = I_{C90}$ ; $V_{GE} = 15\text{ V}$ , $V_{CE} = 0.5 V_{CES}$		200	250 nC
$Q_{ge}$			35	50 nC
$Q_{gc}$			80	100 nC
$t_{d(on)}$	<b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b> $I_C = I_{C90}$ ; $V_{GE} = 15\text{ V}$ , $L = 30\ \mu\text{H}$ , $V_{CE} = 0.8 V_{CES}$ ; $R_G = R_{off} = 2.7\ \Omega$ Remarks: Switching times may increase for $V_{CE}$ (Clamp) $> 0.8 \cdot V_{CES}$ , higher $T_J$ or increased $R_G$		50	ns
$t_{ri}$			210	ns
$t_{d(off)}$			200	ns
$t_{fi}$			275	400 ns
$E_{off}$			4.8	mJ
$t_{d(on)}$	<b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b> $I_C = I_{C90}$ ; $V_{GE} = 15\text{ V}$ , $L = 30\ \mu\text{H}$ , $V_{CE} = 0.8 V_{CES}$ ; $R_G = R_{off} = 2.7\ \Omega$ Remarks: Switching times may increase for $V_{CE}$ (Clamp) $> 0.8 \cdot V_{CES}$ , higher $T_J$ or increased $R_G$		50	ns
$t_{ri}$			240	ns
$E_{on}$			3	mJ
$t_{d(off)}$			280	ns
$t_{fi}$			600	ns
$E_{off}$			9.6	mJ
$R_{thJC}$				0.50 K/W
$R_{thCK}$		0.25		K/W

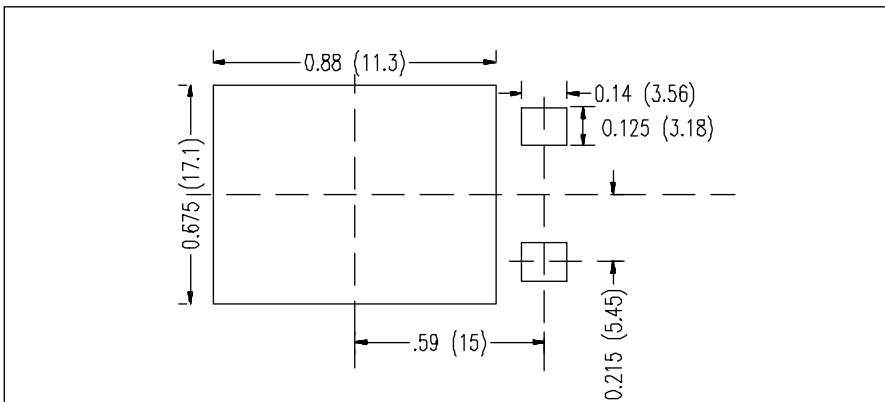
### TO-247 AD Outline



### TO-247 SMD Outline



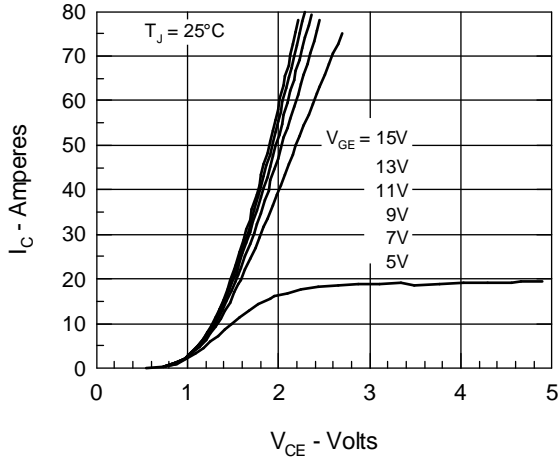
### Min. Recommended Footprint (Dimensions in inches and (mm))



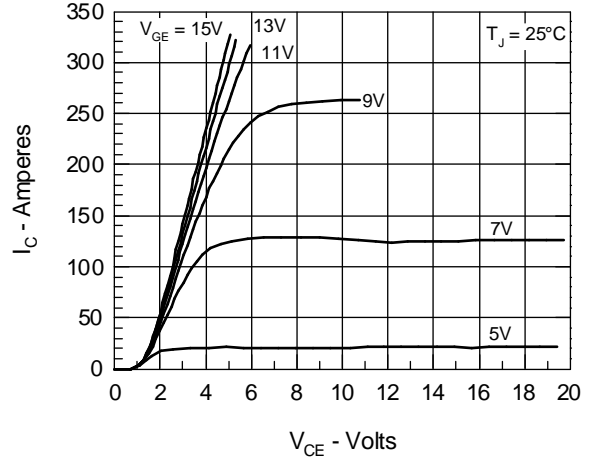
IXYS reserves the right to change limits, test conditions, and dimensions.

IXYS MOSFETS and IGBTs are covered by one or more of the following U.S. patents: 4,835,592 4,881,106 5,017,508 5,049,961 5,187,117 5,486,715  
4,850,072 4,931,844 5,034,796 5,063,307 5,237,481 5,381,025

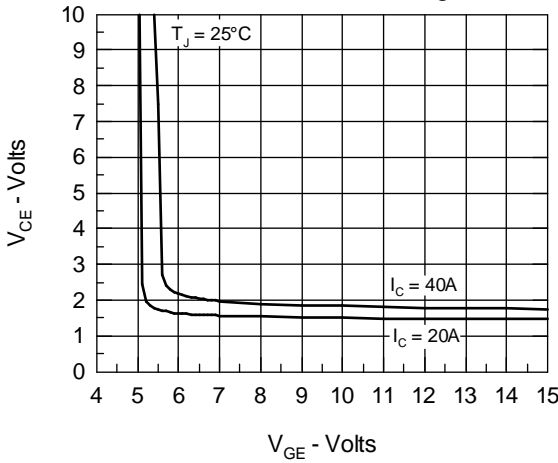
**Fig. 1 Saturation Characteristics**



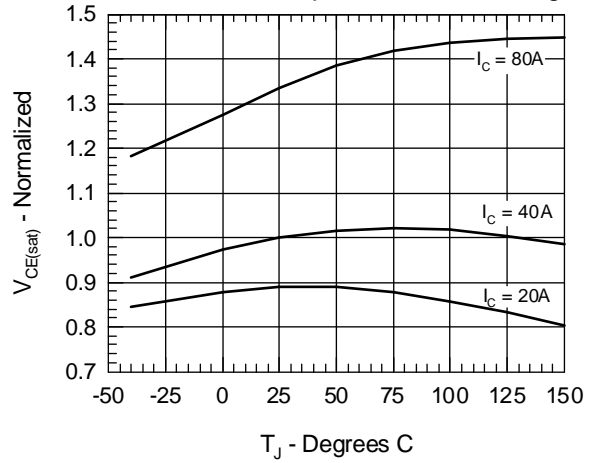
**Fig. 2 Output Characteristics**



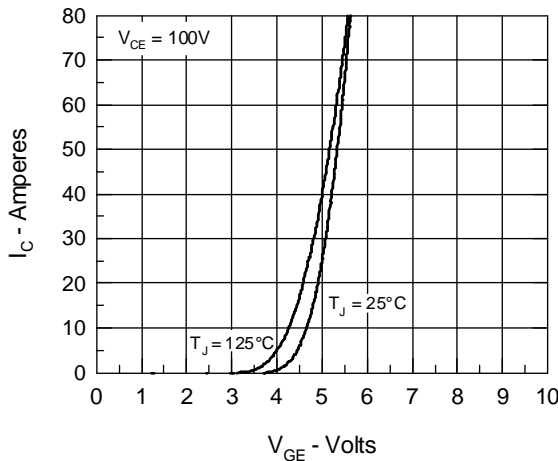
**Fig. 3 Collector-Emitter Voltage vs. Gate-Emitter Voltage**



**Fig. 4 Temperature Dependence of Output Saturation Voltage**



**Fig. 5 Input Admittance**



**Fig. 6 Temperature Dependence of Breakdown and Threshold Voltage**

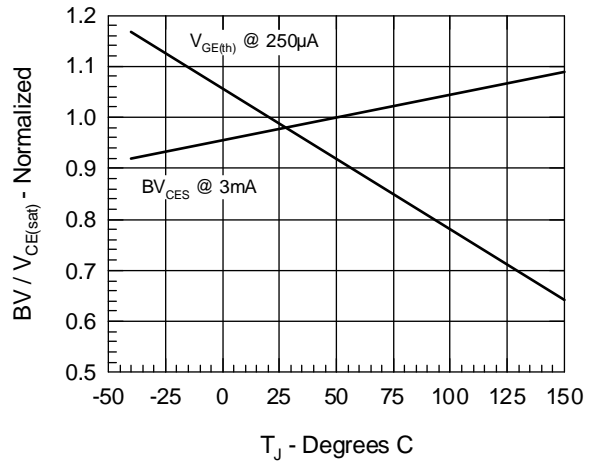


Fig.7 Gate Charge

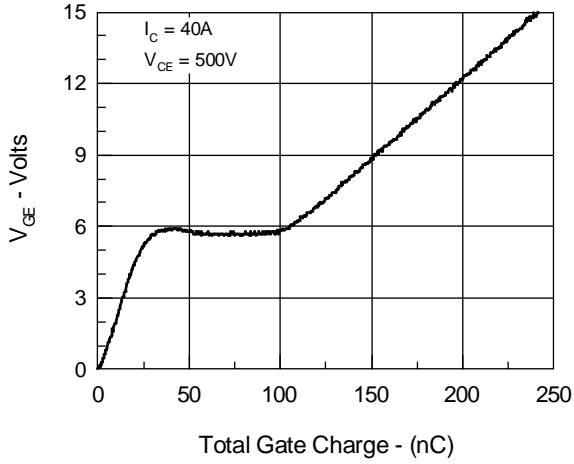


Fig.8 Turn-Off Safe Operating Area

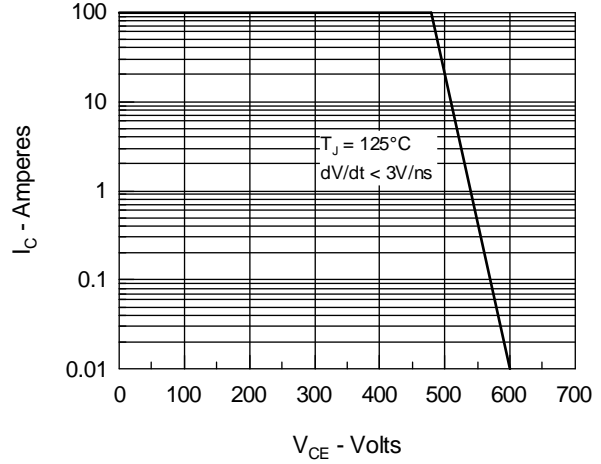


Fig.9 Capacitance Curves

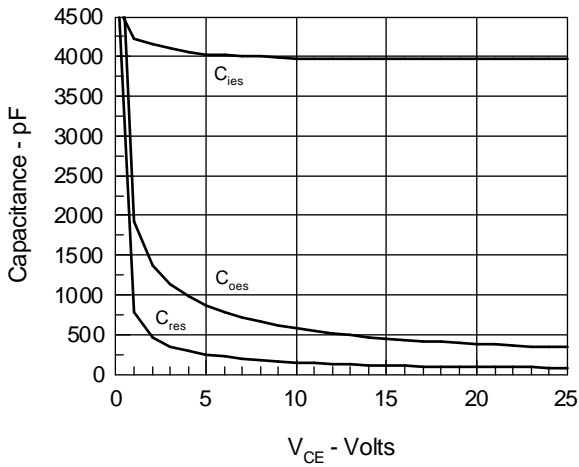
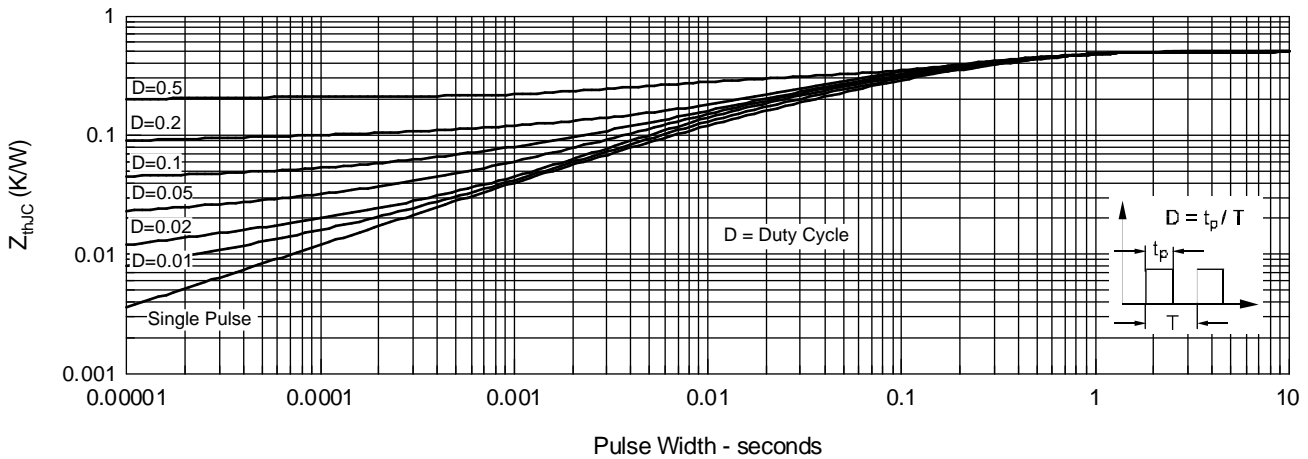


Fig.10 Transient Thermal Impedance



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4,850,072 4,931,844 5,034,796 5,063,307 5,237,481 5,381,025