

# High Speed IGBT

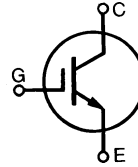
**IXSH 40N60B**  
**IXST 40N60B**

**V<sub>CES</sub> = 600V**  
**I<sub>C25</sub> = 75A**  
**V<sub>CE(sat)</sub> = 2.2V**

**t<sub>fi typ</sub> = 100 ns**

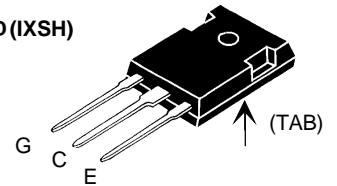
## Short Circuit SOA Capability

Preliminary data

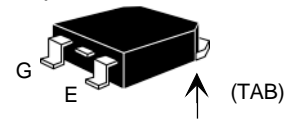


Symbol	Test Conditions	Maximum Ratings	
V <sub>CES</sub>	T <sub>J</sub> = 25°C to 150°C	600	V
V <sub>CGR</sub>	T <sub>J</sub> = 25°C to 150°C; R <sub>GE</sub> = 1 MΩ	600	V
V <sub>GES</sub>	Continuous	±20	V
V <sub>GEM</sub>	Transient	±30	V
I <sub>C25</sub>	T <sub>C</sub> = 25°C	75	A
I <sub>C90</sub>	T <sub>C</sub> = 90°C	40	A
I <sub>CM</sub>	T <sub>C</sub> = 25°C, 1 ms	150	A
<b>SSOA (RBSOA)</b>	V <sub>GE</sub> = 15 V, T <sub>J</sub> = 125°C, R <sub>G</sub> = 2.7 Ω Clamped inductive load, V <sub>CC</sub> = 0.8 V <sub>CES</sub>	I <sub>CM</sub> = 80 @ 0.8 V <sub>CES</sub>	A
<b>t<sub>SC</sub> (SCSOA)</b>	V <sub>GE</sub> = 15 V, V <sub>CE</sub> = 360 V, T <sub>J</sub> = 125°C R <sub>G</sub> = 22 Ω, non repetitive	10	μs
P <sub>C</sub>	T <sub>C</sub> = 25°C	280	W
T <sub>J</sub>		-55 ... +150	°C
T <sub>JM</sub>		150	°C
T <sub>stg</sub>		-55 ... +150	°C
M <sub>d</sub>	Mounting torque	1.13/10	Nm/lb.in.
<b>Weight</b>		6	g
Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	°C

TO-247 AD (IXSH)



TO-268 (D3) (IXST)



G = Gate  
E = Emitter

TAB = Collector

### Features

- International standard packages
- Guaranteed Short Circuit SOA capability
- Low V<sub>CE(sat)</sub>  
- for low on-state conduction losses
- High current handling capability
- MOS Gate turn-on  
- drive simplicity
- Fast Fall Time for switching speeds up to 50 kHz

### Applications

- AC and DC motor speed control
- Uninterruptible power supplies (UPS)
- Welding

### Advantages

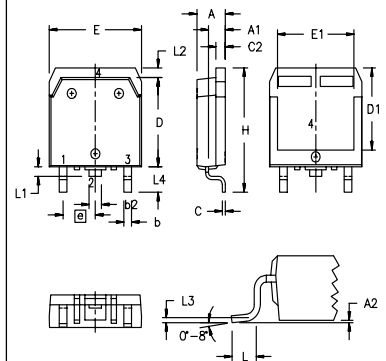
- Easy to mount with 1 screw (TO-247) (isolated mounting screw hole)
- High power density

Symbol	Test Conditions	Characteristic Values (T <sub>J</sub> = 25°C, unless otherwise specified)		
		min.	typ.	max.
BV <sub>CES</sub>	I <sub>C</sub> = 250 μA, V <sub>GE</sub> = 0 V	600		V
V <sub>GE(th)</sub>	I <sub>C</sub> = 4 mA, V <sub>CE</sub> = V <sub>GE</sub>	4		V
I <sub>CES</sub>	V <sub>CE</sub> = 0.8 • V <sub>CES</sub> V <sub>GE</sub> = 0 V			T <sub>J</sub> = 25°C 25 μA T <sub>J</sub> = 125°C 1 mA
I <sub>GES</sub>	V <sub>CE</sub> = 0 V, V <sub>GE</sub> = ±20 V			±100 nA
V <sub>CE(sat)</sub>	I <sub>C</sub> = I <sub>C90</sub> , V <sub>GE</sub> = 15 V			2.2 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 $\leq 2\%$	16	23	S	
$C_{ies}$	$V_{CE} = 25\text{ V}$ , $V_{GE} = 0\text{ V}$ , $f = 1\text{ MHz}$		3700	pF	
$C_{oes}$			280	pF	
$C_{res}$			80	pF	
$Q_g$	$I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$ , $V_{CE} = 0.5 V_{CES}$		190	nC	
$Q_{ge}$			45	nC	
$Q_{gc}$			90	nC	
$t_{d(on)}$	<b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b> $I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$ , $L = 100\ \mu\text{H}$ $V_{CE} = 0.8 V_{CES}$ , $R_G = 2.7\ \Omega$		50	ns	
$t_{ri}$			50	ns	
$t_{d(off)}$			110	200	ns
$t_{fi}$			120	200	ns
$E_{off}$			1.8	2.6	mJ
$t_{d(on)}$	<b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b> $I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$ , $V_{CE} = 0.8 V_{CES}$ , $R_G = 2.7\ \Omega$		55	ns	
$t_{ri}$			170	ns	
$E_{on}$			1.7	mJ	
$t_{d(off)}$			190	ns	
$t_{fi}$			180	ns	
$E_{off}$		2.0	mJ		
$R_{thJC}$	(IXSH40N60B)			0.45 K/W	
$R_{thCK}$			0.25	K/W	

**TO-247 AD (IXSH) Outline**


Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	19.81	20.32	0.780	0.800
B	20.80	21.46	0.819	0.845
C	15.75	16.26	0.610	0.640
D	3.55	3.65	0.140	0.144
E	4.32	5.49	0.170	0.216
F	5.4	6.2	0.212	0.244
G	1.65	2.13	0.065	0.084
H	-	4.5	-	0.177
J	1.0	1.4	0.040	0.055
K	10.8	11.0	0.426	0.433
L	4.7	5.3	0.185	0.209
M	0.4	0.8	0.016	0.031
N	1.5	2.49	0.087	0.102

**TO-268AA (D<sup>3</sup> PAK)**


Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.9	5.1	.193	.201
A <sub>1</sub>	2.7	2.9	.106	.114
A <sub>2</sub>	.02	.25	.001	.010
b	1.15	1.45	.045	.057
b <sub>2</sub>	1.9	2.1	.75	.83
C	.4	.65	.016	.026
D	13.80	14.00	.543	.551
E	15.85	16.05	.624	.632
E <sub>1</sub>	13.3	13.6	.524	.535
e	5.45 BSC		.215 BSC	
H	18.70	19.10	.736	.752
L	2.40	2.70	.094	.106
L <sub>1</sub>	1.20	1.40	.047	.055
L <sub>2</sub>	1.00	1.15	.039	.045
L <sub>3</sub>	0.25 BSC		.010 BSC	
L <sub>4</sub>	3.80	4.10	.150	.161

**Min. Recommended Footprint**
