



# High Speed IGBT

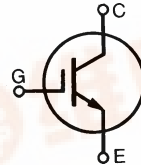
**IXSH 40N60B**  
**IXST 40N60B**

$V_{CES} = 600V$   
 $I_{C25} = 75A$   
 $V_{CE(sat)} = 2.2V$

Short Circuit SOA Capability

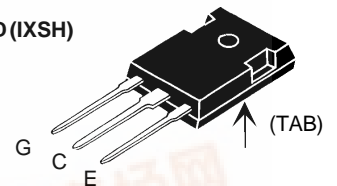
$t_{fi\ typ} = 100\ ns$

Preliminary data

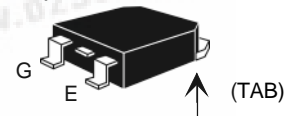


Symbol	Test Conditions	Maximum Ratings
$V_{CES}$	$T_J = 25^\circ C$ to $150^\circ C$	600 V
$V_{CGR}$	$T_J = 25^\circ C$ to $150^\circ C$ ; $R_{GE} = 1\ M\Omega$	600 V
$V_{GES}$	Continuous	$\pm 20$ V
$V_{GEM}$	Transient	$\pm 30$ V
$I_{C25}$	$T_C = 25^\circ C$	75 A
$I_{C90}$	$T_C = 90^\circ C$	40 A
$I_{CM}$	$T_C = 25^\circ C$ , 1 ms	150 A
<b>SSOA (RBSOA)</b>	$V_{GE} = 15\ V$ , $T_J = 125^\circ C$ , $R_G = 2.7\ \Omega$ Clamped inductive load, $V_{CC} = 0.8\ V_{CES}$	$I_{CM} = 80$ @ $0.8\ V_{CES}$ A
<b><math>t_{SC}</math> (SCSOA)</b>	$V_{GE} = 15\ V$ , $V_{CE} = 360\ V$ , $T_J = 125^\circ C$ $R_G = 22\ \Omega$ , non repetitive	10 $\mu s$
$P_C$	$T_C = 25^\circ C$	280 W
$T_J$		-55 ... +150 $^\circ C$
$T_{JM}$		150 $^\circ C$
$T_{stg}$		-55 ... +150 $^\circ C$
$M_d$	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 $^\circ C$

TO-247 AD (IXSH)



TO-268 (D3) (IXST)



G = Gate  
E = Emitter

TAB = Collector

## Features

- International standard packages
- Guaranteed Short Circuit SOA capability
- Low  $V_{CE(sat)}$ 
  - 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

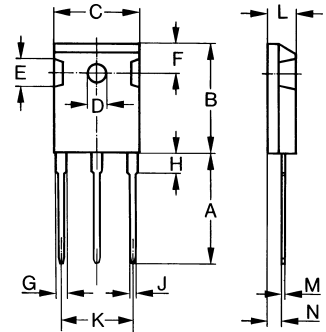
## Advantages

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

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ C$ , unless otherwise specified)		
		min.	typ.	max.
$BV_{CES}$	$I_C = 250\ \mu A$ , $V_{GE} = 0\ V$	600		V
$V_{GE(th)}$	$I_C = 4\ mA$ , $V_{CE} = V_{GE}$	4		V
$I_{CES}$	$V_{CE} = 0.8 \cdot V_{CES}$ $V_{GE} = 0\ V$		$T_J = 25^\circ C$ $T_J = 125^\circ C$	25 $\mu A$ 1 mA
$I_{GES}$	$V_{CE} = 0\ V$ , $V_{GE} = \pm 20\ V$			$\pm 100$ nA
$V_{CE(sat)}$	$I_C = I_{C90}$ , $V_{GE} = 15\ V$			2.2 V

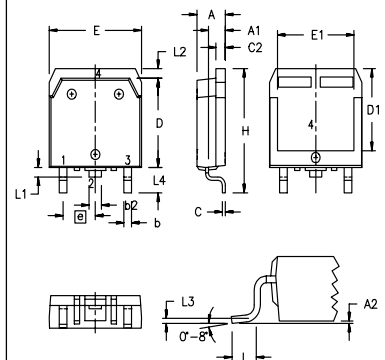
Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)			
		min.	typ.	max.	
$g_{fs}$	$I_C = I_{C90}$ ; $V_{CE} = 10\text{ V}$ , Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $\leq 2\%$	16	23	S	
$C_{ies}$	$V_{CE} = 25\text{ V}$ , $V_{GE} = 0\text{ V}$ , $f = 1\text{ MHz}$		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

