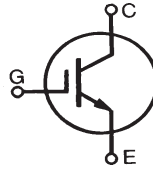


# HiPerFAST™ IGBT

## Short Circuit SOA Capability

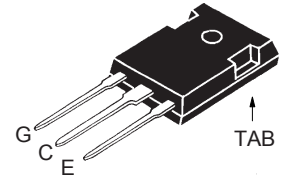
**IXSH24N60**
**IXSH24N60A**

$V_{CES}$	$I_{C90}$	$V_{CE(sat)}$
<b>600V</b>	<b>24A</b>	<b>2.2V</b>
<b>600V</b>	<b>24A</b>	<b>2.7V</b>



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
$I_{C25}$	$T_C = 25^\circ\text{C}$	48	A
$I_{C90}$	$T_C = 90^\circ\text{C}$	24	A
$I_{CM}$	$T_C = 25^\circ\text{C}$ , 1ms	96	A
<b>SSOA</b>	$V_{GE} = 15\text{V}$ , $T_J = 125^\circ\text{C}$ , $R_G = 10\Omega$	$I_{CM} = 48$	A
<b>(RBSOA)</b>	Clamped inductive load	$@0.8 \cdot V_{CES}$	V
$t_{SC}$ <b>(SCSOA)</b>	$V_{GE} = 15\text{V}$ , $V_{CE} = 360\text{V}$ , $T_J = 125^\circ\text{C}$ $R_G = 82\Omega$ , non repetitive	10	$\mu\text{s}$
$P_C$	$T_C = 25^\circ\text{C}$	150	W
$T_J$		-55 ... +150	$^\circ\text{C}$
$T_{JM}$		150	$^\circ\text{C}$
$T_{stg}$		-55 ... +150	$^\circ\text{C}$
$M_d$	Mounting torque	1.13 / 10	Nm/lb.in.
$T_L$	Maximum lead temperature for soldering	300	$^\circ\text{C}$
$T_{SOLD}$	1.6mm (0.062 in.) from case for 10s	260	$^\circ\text{C}$
<b>Weight</b>		6	g

### TO-247 (IXSH)



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

### Features

- International standard package JEDEC TO-247AD
- High frequency IGBT with guaranteed Short Circuit SOA Capability
- 2nd generation HDMOS™ process
- Low  $V_{CE(SAT)}$   
- for low on-state conduction losses
- 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
- Welding

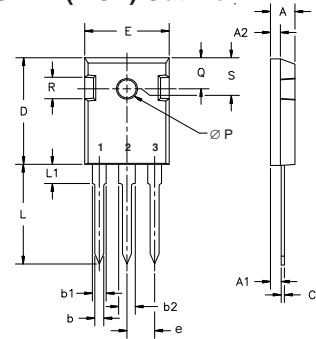
### Advantages

- Easy to mount with 1 screw (isolated mounting screw hole)
- Switching speed for high frequency applications
- High power density

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
$BV_{CES}$	$I_C = 250\mu\text{A}$ , $V_{CE} = V_{GE}$	600		V
$V_{GE(th)}$	$I_C = 1.5\text{mA}$ , $V_{CE} = V_{GE}$	4.0		7.0 V
$I_{CES}$	$V_{CE} = 0.8 \cdot V_{CES}$ $V_{GE} = 0\text{V}$ $T_J = 125^\circ\text{C}$			200 $\mu\text{A}$ 1 mA
$I_{GES}$	$V_{CE} = 0\text{V}$ , $V_{GE} = \pm 20\text{V}$			$\pm 100$ nA
$V_{CE(sat)}$	$I_C = 24\text{A}$ , $V_{GE} = 15\text{V}$ , Note 1	IXSH24N60 IXSH24N60A		2.2 V 2.7 V

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)	Characteristic Values			
		Min.	Typ.	Max.	
$g_{fs}$	$I_C = 24\text{A}$ , $V_{CE} = 10\text{V}$ , Note 1	9	23	S	
$I_{C(ON)}$	$V_{GE} = 15\text{V}$ , $V_{CE} = 10\text{V}$		65	A	
$C_{ies}$	$V_{CE} = 25\text{V}$ , $V_{GE} = 0\text{V}$ , $f = 1\text{MHz}$		1800	pF	
$C_{oes}$			160	pF	
$C_{res}$			45	pF	
$Q_g$	$I_C = 24\text{A}$ , $V_{GE} = 15\text{V}$ , $V_{CE} = 0.5 \cdot V_{CES}$		75	90	nC
$Q_{ge}$			20	30	nC
$Q_{gc}$			35	50	nC
$t_{d(on)}$	<b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b> $I_C = 24\text{A}$ , $V_{GE} = 15\text{V}$ $V_{CE} = 480\text{V}$ , $R_G = 10\Omega$		100	ns	
$t_{ri}$			200	ns	
$t_{d(off)}$			450	ns	
$t_{fi}$		IXSH24N60	500	ns	
$E_{off}$		IXSH24N60A	275	ns	
	IXSH24N60A	2.0	mJ		
$t_{d(on)}$	<b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b> $I_C = 24\text{A}$ , $V_{GE} = 15\text{V}$ $V_{CE} = 480\text{V}$ , $R_G = 10\Omega$		100	ns	
$t_{ri}$			200	ns	
$E_{on}$			1.2	mJ	
$t_{d(off)}$		IXSH24N60	475	ns	
		IXSH24N60A	600	ns	
$t_{fi}$		IXSH24N60	450	ns	
$E_{off}$	IXSH24N60	4.0	mJ		
	IXSH24N60A	3.0	mJ		
$R_{thJC}$			0.83	$^\circ\text{C/W}$	
$R_{thCK}$		0.21		$^\circ\text{C/W}$	

TO-247 (IXSH) Outline



Terminals: 1 - Gate 2 - Drain  
3 - Source Tab - Drain

Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.7	5.3	.185	.209
A <sub>1</sub>	2.2	2.54	.087	.102
A <sub>2</sub>	2.2	2.6	.059	.098
b	1.0	1.4	.040	.055
b <sub>1</sub>	1.65	2.13	.065	.084
b <sub>2</sub>	2.87	3.12	.113	.123
C	.4	.8	.016	.031
D	20.80	21.46	.819	.845
E	15.75	16.26	.610	.640
e	5.20	5.72	0.205	0.225
L	19.81	20.32	.780	.800
L1		4.50		.177
ØP	3.55	3.65	.140	.144
Q	5.89	6.40	0.232	0.252
R	4.32	5.49	.170	.216
S	6.15	BSC	242	BSC

Notes: 1. Pulse test,  $t \leq 300\mu\text{s}$ ; duty cycle,  $d \leq 2\%$ .

### 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.

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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: 4,850,072 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