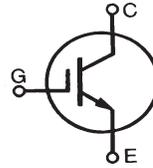


# HiPerFAST™ IGBT

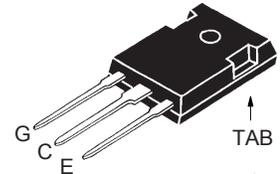
## Short Circuit SOA Capability

IXSH24N60  
IXSH24N60A

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



TO-247 (IXSH)



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

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

### 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

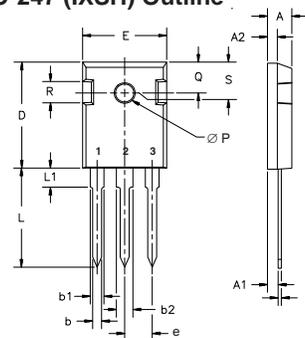
### Advantages

- 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
∅P	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 by one or more of the following U.S. patents:	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
	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	