

## High Speed IGBT with Diode

IXSH 30 N60CD1  
IXSK 30 N60CD1  
IXST 30 N60CD1

$$V_{CES} = 600 \text{ V}$$

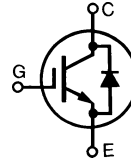
$$I_{C25} = 55 \text{ A}$$

$$V_{CE(sat)} = 2.5 \text{ V}$$

$$t_{fi} = 70 \text{ ns}$$

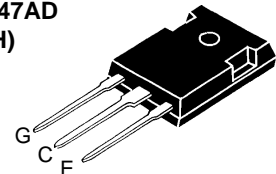
## Short Circuit SOA Capability

Preliminary data

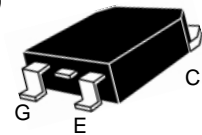


Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$	600	V
$V_{CGR}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GE} = 1 \text{ M}\Omega$	600	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^\circ\text{C}$	55	A
$I_{C90}$	$T_C = 90^\circ\text{C}$	30	A
$I_{CM}$	$T_C = 25^\circ\text{C}$ , 1 ms	110	A
<b>SSOA (RBSOA)</b>	$V_{GE} = 15 \text{ V}$ , $T_J = 125^\circ\text{C}$ , $R_G = 10 \Omega$ Clamped inductive load, $V_{CL} = 0.8 V_{CES}$	$I_{CM} = 60$	A
<b><math>t_{SC}</math> (SCSOA)</b>	$V_{GE} = 15 \text{ V}$ , $V_{CE} = 360 \text{ V}$ , $T_J = 125^\circ\text{C}$ $R_G = 33 \Omega$ , non repetitive	10	$\mu\text{s}$
$P_C$	$T_C = 25^\circ\text{C}$	200	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	1.1/3/10	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	$^\circ\text{C}$

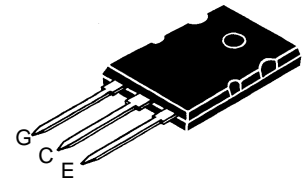
TO-247AD  
(IXSH)



TO-268 (D3)  
(IXST)



TO-264  
(IXSK)



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

### Features

- International standard packages: JEDEC TO-247, TO-264 & TO-268
- Short Circuit SOA capability
- High frequency IGBT and anti-parallel FRED in one package
- New generation HDMOS™ process

### Applications

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

### Advantages

- Space savings (two devices in one package)
- Easy to mount with 1 screw (isolated mounting screw hole)
- Surface mountable, high power case style
- Reduces assembly time and cost
- High power density

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$BV_{CES}$	$I_C = 750 \mu\text{A}$ , $V_{GE} = 0 \text{ V}$	600		V
$V_{GE(th)}$	$I_C = 2.5 \text{ mA}$ , $V_{CE} = V_{GE}$	4		V
$I_{CES}$	$V_{CE} = 0.8 \cdot V_{CES}$ $V_{GE} = 0 \text{ V}$			$T_J = 25^\circ\text{C}$ : 200 $\mu\text{A}$ $T_J = 125^\circ\text{C}$ : 3 mA
$I_{GES}$	$V_{CE} = 0 \text{ V}$ , $V_{GE} = \pm 20 \text{ V}$			$\pm 100 \text{ nA}$
$V_{CE(sat)}$	$V_{GE} = 15 \text{ V}$			$I_C = I_{C90}$ : 2.5 V

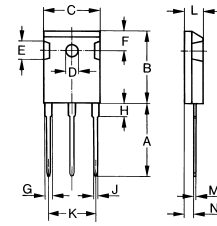
Symbol	Test Conditions	Characteristic Values			
		$(T_J = 25^\circ\text{C}, \text{ unless otherwise specified})$			
		min.	typ.	max.	
$g_{fs}$	$I_C = I_{C90}; V_{CE} = 10\text{ V},$ Pulse test, $t \leq 300\ \mu\text{s}, \text{ duty cycle } \leq 2\%$	10		S	
$C_{ies}$	$V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 1\text{ MHz}$		3100	pF	
$C_{oes}$			240	pF	
$C_{res}$			50	pF	
$Q_g$	$I_C = I_{C90}, V_{GE} = 15\text{ V}, V_{CE} = 0.5 V_{CES}$		100	nC	
$Q_{ge}$			30	nC	
$Q_{gc}$			38	nC	
$t_{d(on)}$	<b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b>		30	ns	
$t_{ri}$	$I_C = I_{C90}; V_{GE} = 15\text{ V}$		30	ns	
$t_{d(off)}$		$V_{CE} = 0.8 V_{CES}; R_G = 4.7\ \Omega$	90	150	ns
$t_{fi}$	Note 1.		70	120	ns
$E_{off}$			0.7	1.2	mJ
$t_{d(on)}$	<b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b>		35	ns	
$t_{ri}$	$I_C = I_{C90}; V_{GE} = 15\text{ V}$		35	ns	
$E_{on}$		$V_{CE} = 0.8 V_{CES}; R_G = 4.7\ \Omega$	0.5		mJ
$t_{d(off)}$	Note 1		150	ns	
$t_{fi}$			140	ns	
$E_{off}$		1.2		mJ	
$R_{thJC}$				0.62 K/W	
$R_{thCK}$	TO-247		0.25	K/W	
$R_{thCK}$	TO-264		0.15	K/W	

Symbol	Test Conditions	Characteristic Values		
		$(T_J = 25^\circ\text{C}, \text{ unless otherwise specified})$		
		min.	typ.	max.
$V_F$	$I_F = I_{C90}; V_{GE} = 0\text{ V}$ Note 2			1.7 V 2.5 V
$I_{RM}$	$I_F = 100\text{ A}; V_{GE} = 0\text{ V}; T_J = 100^\circ\text{C}$ $V_R = 100\text{ V}; -di_F/dt = 100\text{ A}/\mu\text{s}$		2	2.5 A
$t_{rr}$	$I_F = 1\text{ A}; -di/dt = 100\text{ A}/\mu\text{s}; V_R = 30\text{ V}$ $T_J = 25^\circ\text{C}$		35	50 ns
$R_{thJC}$				1.0 K/W

Notes: 1. Switching times may increase for  $V_{CE}(\text{Clamp}) > 0.8 \cdot V_{CES}$ , higher  $T_J$  or increased  $R_G$ .  
2. Pulse test,  $t \leq 300\ \mu\text{s}$ , duty cycle  $d \leq 2\%$

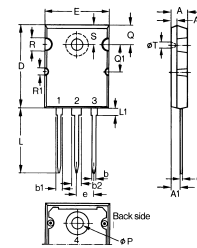
TO-268AA (IXST) (D <sup>3</sup> PAK)				
Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.9	5.1	.193	.201
A <sub>1</sub>	2.7	2.9	.106	.114
A <sub>2</sub>	.02	.25	.001	.010
b	1.15	1.45	.045	.057
b <sub>2</sub>	1.9	2.1	.75	.83
C	.4	.65	.016	.026
D	13.80	14.00	.543	.551
E	15.85	16.05	.624	.632
E <sub>1</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
L1	1.20	1.40	.047	.055
L2	1.00	1.15	.039	.045
L3	0.25 BSC		.010 BSC	
L4	3.80	4.10	.150	.161

### 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-264 AA (IXSK) Outline



Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.82	5.13	.190	.202
A <sub>1</sub>	2.54	2.89	.100	.114
A <sub>2</sub>	2.00	2.10	.079	.083
b	1.12	1.42	.044	.056
b <sub>1</sub>	2.39	2.69	.094	.106
b <sub>2</sub>	2.90	3.09	.114	.122
c	0.53	0.83	.021	.033
D	25.91	26.16	1.020	1.030
E	19.81	19.96	.780	.786
e	5.46 BSC		.215 BSC	
J	0.00	0.25	.000	.010
K	0.00	0.25	.000	.010
L	20.32	20.83	.800	.820
L <sub>1</sub>	2.29	2.59	.090	.102
P	3.17	3.66	.125	.144
Q	6.07	6.27	.239	.247
Q <sub>1</sub>	8.38	8.69	.330	.342
R	3.81	4.32	.150	.170
R <sub>1</sub>	1.78	2.29	.070	.090
S	6.04	6.30	.238	.248
T	1.57	1.83	.062	.072

### Min. Recommended Footprint

