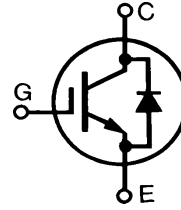


# HiPerFAST™ IGBT with Diode

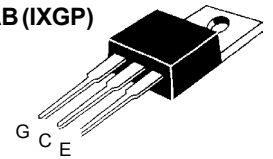
**IXGA 7N60BD1**  
**IXGP 7N60BD1**

$V_{CES} = 600 \text{ V}$   
 $I_{C25} = 14 \text{ A}$   
 $V_{CE(sat)} = 2.0 \text{ V}$   
 $t_{fi} = 150 \text{ ns}$

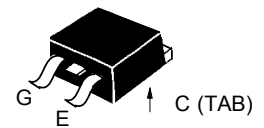


Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_J = 25^\circ\text{C to } 150^\circ\text{C}$	600	V
$V_{CGR}$	$T_J = 25^\circ\text{C to } 150^\circ\text{C}; R_{GE} = 1 \text{ M}\Omega$	600	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^\circ\text{C}$	14	A
$I_{C90}$	$T_C = 90^\circ\text{C}$	7	A
$I_{CM}$	$T_C = 25^\circ\text{C}, 1 \text{ ms}$	56	A
<b>SSOA (RBSOA)</b>	$V_{GE} = 15 \text{ V}, T_{VJ} = 125^\circ\text{C}, R_G = 18 \Omega$ Clamped inductive load @ $0.8 V_{CES}$	$I_{CM} = 14$	A
$P_C$	$T_C = 25^\circ\text{C}$	80	W
$T_J$		-55 ... +150	$^\circ\text{C}$
$T_{JM}$		150	$^\circ\text{C}$
$T_{stg}$		-55 ... +150	$^\circ\text{C}$
Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	$^\circ\text{C}$
$M_d$	Mounting torque, (TO-220)	M3 M3.5	0.45/4 Nm/lb.in. 0.55/5 Nm/lb.in.
<b>Weight</b>	TO-220		4 g
	TO-263		2 g

TO-220AB (IXGP)



TO-263 AA (IXGA)



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

## Features

- International standard packages JEDEC TO-263 surface mountable and JEDEC TO-220 AB
- High current handling capability
- HiPerFAST™ HDMOS™ process
- MOS Gate turn-on - drive simplicity

## Applications

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

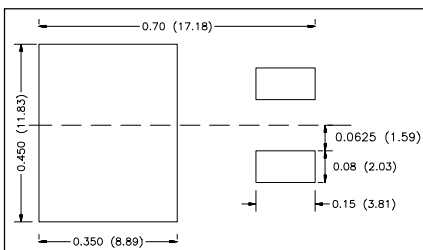
## Advantages

- High power density
- Suitable for surface mounting

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$BV_{CES}$	$I_C = 250 \mu\text{A}, V_{GE} = 0 \text{ V}$	600		V
$V_{GE(th)}$	$I_C = 250 \mu\text{A}, V_{CE} = V_{GE}$	2.5		5.5 V
$I_{CES}$	$V_{CE} = 0.8 \cdot V_{CES}$ $V_{GE} = 0 \text{ V}$			$T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$ 100 $\mu\text{A}$ 750 $\mu\text{A}$
$I_{GES}$	$V_{CE} = 0 \text{ V}, V_{GE} = \pm 20 \text{ V}$			$\pm 100 \text{ nA}$
$V_{CE(sat)}$	$I_C = I_{C90}, V_{GE} = 15 \text{ V}$	1.8	2.0	V

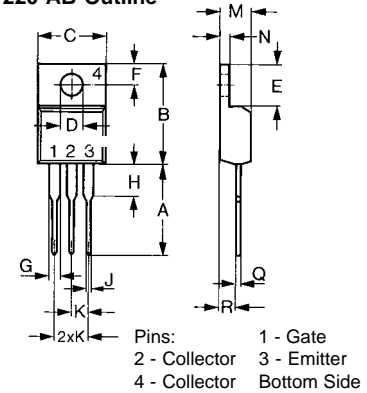
Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)			
		min.	typ.	max.	
$g_{fs}$	$I_C = I_{C90}$ ; $V_{CE} = 10\text{ V}$ , Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $\leq 2\%$	3	7	S	
$C_{ies}$	$V_{CE} = 25\text{ V}$ , $V_{GE} = 0\text{ V}$ , $f = 1\text{ MHz}$		500	pF	
$C_{oes}$			50	pF	
$C_{res}$			17	pF	
$Q_g$	$I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$ , $V_{CE} = 0.5 V_{CES}$		25	nC	
$Q_{ge}$			15	nC	
$Q_{gc}$			10	nC	
$t_{d(on)}$	<b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b> $I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$ $V_{CE} = 0.8 \cdot V_{CES}$ , $R_G = R_{off} = 18\ \Omega$ Remarks: Switching times may increase for $V_{CE}$ (Clamp) $> 0.8 \cdot V_{CES}$ , higher $T_J$ or increased $R_G$		10	ns	
$t_{ri}$			10	ns	
$t_{d(off)}$			100	200	ns
$t_{fi}$			150	250	ns
$E_{off}$			0.3	0.6	mJ
$t_{d(on)}$	<b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b> $I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$ $V_{CE} = 0.8 \cdot V_{CES}$ , $R_G = R_{off} = 18\ \Omega$ Remarks: Switching times may increase for $V_{CE}$ (Clamp) $> 0.8 \cdot V_{CES}$ , higher $T_J$ or increased $R_G$		10	ns	
$t_{ri}$			15	ns	
$E_{on}$			0.15	mJ	
$t_{d(off)}$			200	ns	
$t_{fi}$			250	ns	
$E_{off}$		0.6	mJ		
$R_{thJC}$	IGBT			1.56	K/W
$R_{thCK}$		0.50			K/W

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)				
		min.	typ.	max.		
$V_F$	$I_F = 10\text{ A}$ ; $T_{VJ} = 150^\circ\text{C}$ $T_{VJ} = 25^\circ\text{C}$			1.96	V	
				2.95	V	
$I_{RM}$	$V_R = 100\text{ V}$ ; $I_F = 25\text{ A}$ ; $-di_F/dt = 100\text{ A}/\mu\text{s}$ $L < 0.05\ \mu\text{H}$ ; $T_{VJ} = 100^\circ\text{C}$		2	2.5	V	
$t_{rr}$	$I_F = 1\text{ A}$ ; $-di_F/dt = 50\text{ A}/\mu\text{s}$ ; $V_R = 30\text{ V}$ $T_J = 25^\circ\text{C}$		35		ns	
$R_{thJC}$	Diode				1.6	K/W



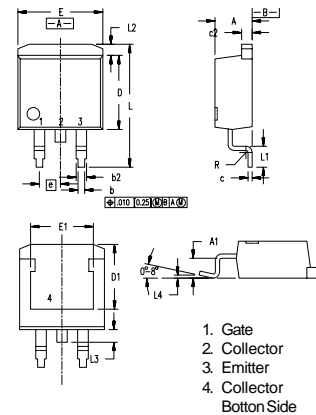
**Min. Recommended Footprint**  
(Dimensions in inches and mm)

### TO-220 AB Outline



Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	12.70	13.97	0.500	0.550
B	14.73	16.00	0.580	0.630
C	9.91	10.66	0.390	0.420
D	3.54	4.08	0.139	0.161
E	5.85	6.85	0.230	0.270
F	2.54	3.18	0.100	0.125
G	1.15	1.65	0.045	0.065
H	2.79	5.84	0.110	0.230
J	0.64	1.01	0.025	0.040
K	2.54	BSC	0.100	BSC
M	4.32	4.82	0.170	0.190
N	1.14	1.39	0.045	0.055
Q	0.35	0.56	0.014	0.022
R	2.29	2.79	0.090	0.110

### TO-263 AA Outline



Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.06	4.83	.160	.190
A1	2.03	2.79	.080	.110
b	0.51	0.99	.020	.039
b2	1.14	1.40	.045	.055
c	0.46	0.74	.018	.029
c2	1.14	1.40	.045	.055
D	8.64	9.65	.340	.380
D1	7.11	8.13	.280	.320
E	9.65	10.29	.380	.405
E1	6.86	8.13	.270	.320
e	2.54	BSC	.100	BSC
L	14.61	15.88	.575	.625
L1	2.29	2.79	.090	.110
L2	1.02	1.40	.040	.055
L3	1.27	1.78	.050	.070
L4	0	0.38	0	.015
R	0.46	0.74	.018	.029

IXYS reserves the right to change limits, test conditions, and dimensions.

IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

4,835,592	4,881,106	5,017,508	5,049,961	5,187,117	5,486,715	6,306,728B1
4,850,072	4,931,844	5,034,796	5,063,307	5,237,481	5,381,025	