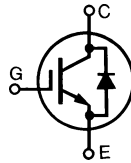


# HiPerFAST™ IGBT

# IXGH 12N60BD1

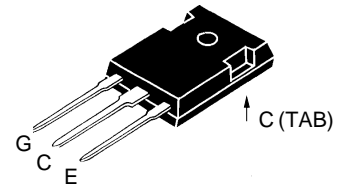
$V_{DSS} = 600 \text{ V}$   
 $I_{D25} = 24 \text{ A}$   
 $V_{CE(sat)} = 2.1 \text{ V}$   
 $t_{fi(typ)} = 120 \text{ ns}$

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
$I_{C25}$	$T_C = 25^\circ\text{C}$	24	A
$I_{C90}$	$T_C = 90^\circ\text{C}$	12	A
$I_{CM}$	$T_C = 25^\circ\text{C}$ , 1 ms	48	A
<b>SSOA (RBSOA)</b>	$V_{GE} = 15 \text{ V}$ , $T_{VJ} = 125^\circ\text{C}$ , $R_G = 33 \Omega$ Clamped inductive load, $L = 300 \mu\text{H}$	$I_{CM} = 24$ @ $0.8 V_{CES}$	A
$P_C$	$T_C = 25^\circ\text{C}$	100	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 with screw M3 Mounting torque with screw M3.5	0.45/4 0.55/5	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-247 AD



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

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
$V_{GE(th)}$	$I_C = 250 \mu\text{A}$ , $V_{GE} = V_{GE}$	2.5		5.0 V
$I_{CES}$	$V_{CE} = 0.8 \cdot V_{CES}$ , $T_J = 25^\circ\text{C}$ $V_{GE} = 0 \text{ V}$ , $T_J = 125^\circ\text{C}$			200 $\mu\text{A}$ 1.5 mA
$I_{GES}$	$V_{CE} = 0 \text{ V}$ , $V_{GE} = \pm 20 \text{ V}$			$\pm 100 \text{ nA}$
$V_{CE(sat)}$	$I_C = I_{C90}$ , $V_{GE} = 15 \text{ V}$			2.1 V

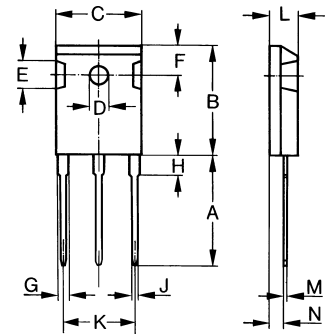
## Features

- Moderate frequency IGBT
- New generation HDMOS™ process
- International standard package JEDEC TO-247
- High peak current handling capability and antiparallel diode in one package

## Applications

- PFC circuit
- AC motor speed control
- DC servo and robot drives
- Switch-mode and resonant-mode power supplies

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 $\leq 2\%$	5	11	S	
$C_{ies}$	$V_{CE} = 25\text{ V}$ , $V_{GE} = 0\text{ V}$ , $f = 1\text{ MHz}$		860	pF	
$C_{oes}$			100	pF	
$C_{res}$			15	pF	
$Q_g$	$I_C = I_{C90}$ ; $V_{GE} = 15\text{ V}$ , $V_{CE} = 0.5 V_{CES}$		32	nC	
$Q_{ge}$			10	nC	
$Q_{gc}$			10	nC	
$t_{d(on)}$	<b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b> $I_C = I_{C90}$ ; $V_{GE} = 15\text{ V}$ , $L = 300\ \mu\text{H}$ $V_{CE} = 0.8 \cdot V_{CES}$ , $R_G = R_{off} = 18\ \Omega$ Remarks: Switching times may increase for $V_{CE}(\text{Clamp}) > 0.8 \cdot V_{CES}$ , higher $T_J$ or increased $R_G$		20	ns	
$t_{ri}$			20	ns	
$t_{d(off)}$			150	250	ns
$t_{fi}$			120	270	ns
$E_{off}$			0.5	0.8	mJ
$t_{d(on)}$	<b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b> $I_C = I_{C90}$ ; $V_{GE} = 15\text{ V}$ , $L = 300\ \mu\text{H}$ $V_{CE} = 0.8 \cdot V_{CES}$ , $R_G = R_{off} = 18\ \Omega$ Remarks: Switching times may increase for $V_{CE}(\text{Clamp}) > 0.8 \cdot V_{CES}$ , higher $T_J$ or increased $R_G$		20	ns	
$t_{ri}$			20	ns	
$E_{on}$			0.5	mJ	
$t_{d(off)}$			200	ns	
$t_{fi}$			200	ns	
$E_{off}$			0.8	mJ	
$R_{thJC}$	IGBT			1.25 K/W	
$R_{thCK}$		0.25		K/W	

**TO-247 AD (IXGH) 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

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$V_F$	$I_F = 15\text{ A}$ ; $T_{VJ} = 150^\circ\text{C}$ $T_{VJ} = 25^\circ\text{C}$		1.3	V
				2.5 V
$I_{RM}$	$V_R = 100\text{ V}$ ; $I_F = 25\text{ A}$ ; $-di_F/dt = 100\text{ A}/\mu\text{s}$ $L \leq 0.05\ \mu\text{H}$ ; $T_{VJ} = 100^\circ\text{C}$		2	2.5 A
$t_{rr}$		$I_F = 1\text{ A}$ ; $-di/dt = 50\text{ A}/\mu\text{s}$ ; $V_R = 30\text{ V}$ $T_J = 25^\circ\text{C}$		35
$R_{thJC}$	Diode			1.6 K/W