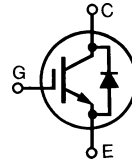


**Low  $V_{CE(sat)}$  IGBT with Diode**  
**High Speed IGBT with Diode**

**IXGH/IXGT 15N120BD1**  
**IXGH/IXGT 15N120CD1**

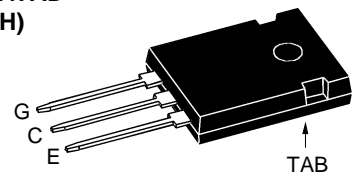
$V_{DSS}$	$I_{C25}$	$V_{CE(sat)}$
1200 V	30 A	3.2 V
1200 V	30 A	3.8 V

Preliminary data

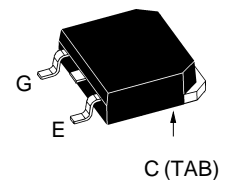


Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_J = 25^\circ\text{C to } 150^\circ\text{C}$	1200	V
$V_{CGR}$	$T_J = 25^\circ\text{C to } 150^\circ\text{C}; R_{GE} = 1\text{ M}\Omega$	1200	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^\circ\text{C}$	30	A
$I_{C90}$	$T_C = 90^\circ\text{C}$	15	A
$I_{CM}$	$T_C = 25^\circ\text{C}, 1\text{ ms}$	60	A
<b>SSOA</b> <b>(RBSOA)</b>	$V_{GE} = 15\text{ V}, T_J = 125^\circ\text{C}, R_G = 10\ \Omega$ Clamped inductive load	$I_{CM} = 40$ @ $0.8 V_{CES}$	A
$P_C$	$T_C = 25^\circ\text{C}$	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.
Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	$^\circ\text{C}$
Maximum tab temperature soldering SMD devices for 10s		260	$^\circ\text{C}$
<b>Weight</b>	TO-247AD/TO-268	6/4	g

**TO-247AD**  
**(IXGH)**



**TO-268**  
**(IXGT)**



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

**Features**

- International standard packages: JEDEC TO-247AD & TO-268
- IGBT and anti-parallel FRED in one package
- MOS Gate turn-on
  - drive simplicity
- Fast Recovery Exipitaxial Diode (FRED)
  - soft recovery with low  $I_{RM}$

**Applications**

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

**Advantages**

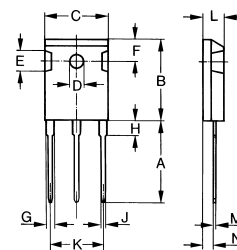
- Saves space (two devices in one package)
- Easy to mount with 1 screw (isolated mounting screw hole)
- Reduces assembly time and cost

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$BV_{CES}$	$I_C = 1\text{ A}, V_{GE} = 0\text{ V}$	1200		V
$V_{GE(th)}$	$I_C = 250\ \mu\text{A}, V_{CE} = V_{GE}$	2.5		5.0 V
$I_{CES}$	$V_{CE} = V_{CES}$ $V_{GE} = 0\text{ V}$		2	500 $\mu\text{A}$ mA
$I_{GES}$	$V_{CE} = 0\text{ V}, V_{GE} = \pm 20\text{ V}$			$\pm 100\text{ nA}$
$V_{CE(sat)}$	$I_C = I_{C90}, V_{GE} = 15\text{ V}$ Note 2	15N120BD1 15N120CD1		3.2 V 3.8 V

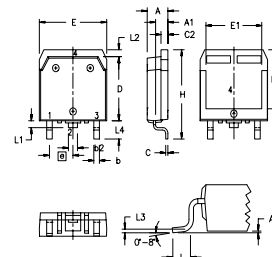
Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)			
		min.	typ.	max.	
$g_{fs}$	$I_C = I_{C90}$ ; $V_{CE} = 10\text{ V}$ , Note 2.	12	15	S	
$C_{ies}$			1700	pF	
$C_{oes}$	$V_{CE} = 25\text{ V}$ , $V_{GE} = 0\text{ V}$ , $f = 1\text{ MHz}$		155	pF	
$C_{res}$			38	pF	
$Q_g$			69	nC	
$Q_{ge}$	$I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$ , $V_{CE} = 0.5 V_{CES}$		13	nC	
$Q_{gc}$			26	nC	
$t_{d(on)}$	<b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b>		25	ns	
$t_{ri}$			15	ns	
$t_{d(off)}$		$I_C = I_{C90}$ ; $V_{GE} = 15\text{ V}$		150	280 ns
$t_{fi}$		$V_{CE} = 0.8 V_{CES}$ ; $R_G = R_{off} = 10\ \Omega$ Note 1.	15N120BD1 15N120CD1	160 115	320 ns 190 ns
$E_{off}$		15N120BD1 15N120CD1	1.75 1.05	3.0 mJ 1.6 mJ	
$t_{d(on)}$	<b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b>		25	ns	
$t_{ri}$			18	ns	
$E_{on}$		$I_C = I_{C90}$ ; $V_{GE} = 15\text{ V}$		1.5	mJ
$t_{d(off)}$		$V_{CE} = 0.8 V_{CES}$ ; $R_G = R_{off} = 10\ \Omega$	15N120BD1 15N120CD1	360 250	ns mJ
$t_{fi}$	Note 1	15N120BD1 15N120CD1	3.5 2.1	mJ mJ	
$E_{off}$		15N120BD1 15N120CD1	2.1	mJ	
$R_{thJC}$	TO-247			0.83 K/W	
$R_{thCK}$			0.25	K/W	

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$V_F$	$I_F = 20\text{ A}$ , $V_{GE} = 0\text{ V}$ $I_F = 20\text{ A}$ , $V_{GE} = 0\text{ V}$ , $T_J = 125^\circ\text{C}$		2.6 2.1	2.8 V V
$I_F$	$T_C = 25^\circ\text{C}$ $T_C = 90^\circ\text{C}$			33 V 20 V
$I_{RM}$	$I_F = 20\text{ A}$ ; $-di_F/dt = 400\text{ A}/\mu\text{s}$ , $V_R = 600\text{ V}$		15	A
$t_{rr}$	$V_{GE} = 0\text{ V}$ ; $T_J = 125^\circ\text{C}$		200	ns
$t_{rr}$	$I_F = 1\text{ A}$ ; $-di_F/dt = 100\text{ A}/\mu\text{s}$ ; $V_R = 30\text{ V}$ , $V_{GE} = 0\text{ V}$		40	ns
$R_{thJC}$				1.6 K/W

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

**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

**TO-268AA (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
L <sub>1</sub>	1.20	1.40	.047	.055
L <sub>2</sub>	1.00	1.15	.039	.045
L <sub>3</sub>	0.25 BSC		.010 BSC	
L <sub>4</sub>	3.80	4.10	.150	.161

Min.  
Recommended  
Footprint

