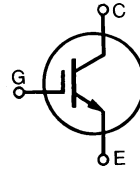


**Low  $V_{CE(sat)}$  IGBT**  
**High speed IGBT**

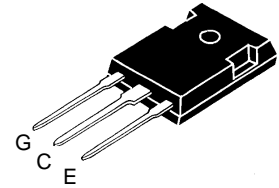
**IXGH/IXGM 20 N60**  
**IXGH/IXGM 20 N60A**

$V_{CES}$	$I_{C25}$	$V_{CE(sat)}$
<b>600 V</b>	<b>40 A</b>	<b>2.5 V</b>
<b>600 V</b>	<b>40 A</b>	<b>3.0 V</b>

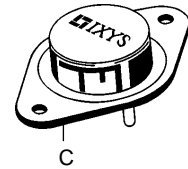


Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$	600	V
$V_{CGR}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GE} = 1\text{ M}\Omega$	600	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^\circ\text{C}$	40	A
$I_{C90}$	$T_C = 90^\circ\text{C}$	20	A
$I_{CM}$	$T_C = 25^\circ\text{C}$ , 1 ms	80	A
<b>SSOA (RBSOA)</b>	$V_{GE} = 15\text{ V}$ , $T_{VJ} = 125^\circ\text{C}$ , $R_G = 82\ \Omega$ Clamped inductive load, $L = 100\ \mu\text{H}$	$I_{CM} = 40$ @ $0.8 V_{CES}$	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 (M3)	1.13/10	Nm/lb.in.
<b>Weight</b>		TO-204 = 18 g, TO-247 = 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 (IXGH)**



**TO-204 AE (IXGM)**



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

**Features**

- International standard packages
- 2nd generation HDMOS™ process
- Low  $V_{CE(sat)}$ 
  - for low on-state conduction losses
- High current handling capability
- MOS Gate turn-on
  - drive simplicity
- Voltage rating guaranteed at high temperature ( $125^\circ\text{C}$ )

**Applications**

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

**Advantages**

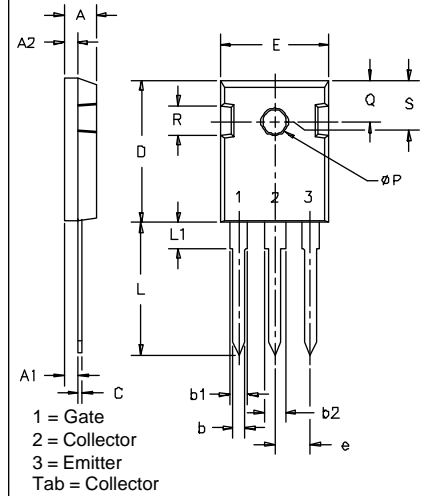
- Easy to mount with 1 screw (TO-247) (isolated mounting screw hole)
- High power density

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 V
$I_{CES}$	$V_{CE} = 0.8 \cdot V_{CES}$ $V_{GE} = 0\text{ V}$			$T_J = 25^\circ\text{C}$ : 200 $\mu\text{A}$ $T_J = 125^\circ\text{C}$ : 1 mA
$I_{GES}$	$V_{CE} = 0\text{ V}$ , $V_{GE} = \pm 20\text{ V}$			$\pm 100\text{ nA}$
$V_{CE(sat)}$	$I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$			20N60: 2.5 V 20N60A: 3.0 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 $\leq 2\%$	6	14	S
$C_{ies}$	$V_{CE} = 25\text{ V}$ , $V_{GE} = 0\text{ V}$ , $f = 1\text{ MHz}$		1500	pF
$C_{oes}$			200	pF
$C_{res}$			40	pF
$Q_g$	$I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$ , $V_{CE} = 0.5 V_{CES}$		100	120 nC
$Q_{ge}$			20	30 nC
$Q_{gc}$			60	90 nC
$t_{d(on)}$	<b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b> $I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$ , $L = 300\ \mu\text{H}$ $V_{CE} = 0.8 V_{CES}$ , $R_G = R_{off} = 82\ \Omega$ Switching times may increase for $V_{CE}$ (Clamp) $> 0.8 \cdot V_{CES}$ , higher $T_J$ or increased $R_G$ 20N60A		100	ns
$t_{ri}$			200	ns
$t_{d(off)}$			600	ns
$t_{fi}$			200	ns
$E_{off}$			1.5	mJ
$t_{d(on)}$	<b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b> $I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$ , $L = 300\ \mu\text{H}$ $V_{CE} = 0.8 V_{CES}$ , $R_G = R_{off} = 82\ \Omega$ Remarks: Switching times may increase for $V_{CE}$ (Clamp) $> 0.8 \cdot V_{CES}$ , higher $T_J$ or increased $R_G$ 20N60A		100	ns
$t_{ri}$			200	ns
$E_{on}$			2	mJ
$t_{d(off)}$			900	1500 ns
$t_{fi}$			530	2000 ns
$E_{off}$		3.2	mJ	
$R_{thJC}$			0.83 K/W	
$R_{thCK}$		0.25	K/W	

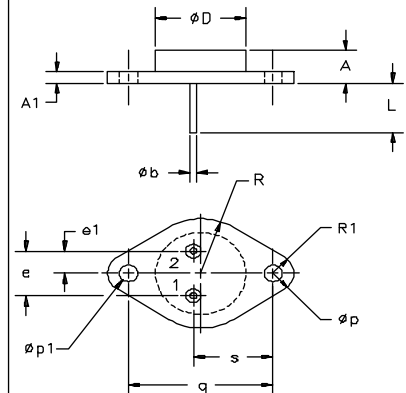
**IXGH 20N60 and IXGH 20N60A characteristic curves are located on the IXGH 20N60U1 and IXGH 20N60AU1 data sheets.**

**TO-247 AD Outline**



SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.185	.209	4.7	5.3
A1	.087	.102	2.2	2.54
A2	.059	.098	2.2	2.6
b	.040	.055	1.0	1.4
b1	.065	.084	1.65	2.13
b2	.113	.123	2.87	3.12
C	.016	.031	.4	.8
D	.819	.845	20.80	21.46
E	.610	.640	15.75	16.26
e	.215 BSC		5.45 BSC	
L	.780	.800	19.81	20.32
L1			.177	
$\phi P$	.140	.144	3.55	3.65
Q	.212	.244	5.4	6.2
R	.170	.216	4.32	5.49
S	.242 BSC		6.15 BSC	

**TO-204AE Outline**



SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.250	.450	6.4	11.4
A1	.080	.135	1.53	3.42
$\phi b$	.057	.063	1.45	1.60
$\phi D$			.875	
e	.420	.440	10.67	11.17
e1	.205	.225	5.21	5.71
L	.440	.480	11.18	12.19
$\phi p$	.151	.165	3.84	4.19
$\phi p1$	.151	.165	3.84	4.19
q	1.187 BSC		30.15 BSC	
R	.495	.525	12.58	13.33
R1	.131	.188	3.33	4.77
s	.655	.675	16.64	17.14

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  
4,850,072 4,931,844 5,034,796 5,063,307 5,237,481 5,381,025