

# High Voltage IGBT with Diode

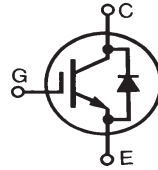
## IXGR50N160H1

$$V_{CES} = 1600V$$

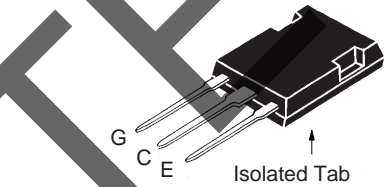
$$I_{C110} = 36A$$

$$V_{CE(sat)} \leq 2.30V$$

( Electrically Isolated Tab )



ISOPLUS247™



G = Gate  
E = Emitter  
C = Collector

Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$	1600	V
$V_{CGR}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ , $R_{GE} = 1M\Omega$	1600	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^\circ\text{C}$ , Lead RMS limit	75	A
$I_{C110}$	$T_C = 110^\circ\text{C}$	36	A
$I_{CM}$	$T_C = 25^\circ\text{C}$ , 1ms	330	A
<b>SSOA</b>	$V_{GE} = 15V$ , $T_{VJ} = 125^\circ\text{C}$ , $R_G = 5\Omega$	$I_{CM} = 100$	A
<b>(RBSOA)</b>	Clamped Inductive Load	@ $0.8 \cdot V_{CES}$	
$P_C$	$T_C = 25^\circ\text{C}$	240	W
$T_J$		-55 ... +150	$^\circ\text{C}$
$T_{JM}$		150	$^\circ\text{C}$
$T_{stg}$		-55 ... +150	$^\circ\text{C}$
$F_C$	Mounting Force	20..120/4.5..27	N/lb.
$T_L$	1.6mm (0.062 in.) from Case for 10s	300	$^\circ\text{C}$
$T_{SOLD}$	Plastic Body for 10s	260	$^\circ\text{C}$
$V_{ISOL}$	50/60Hz, RMS, 1 minute	2500	V~
	$I_{ISOL} \leq 1mA$ $t = 1s$	3000	V~
<b>Weight</b>		6	g

### Features

- International Standard Package
- Molding Epoxies Meet UL 94 V-0 Flammability Classification

### Advantages

- Space Savings
- High Power Density

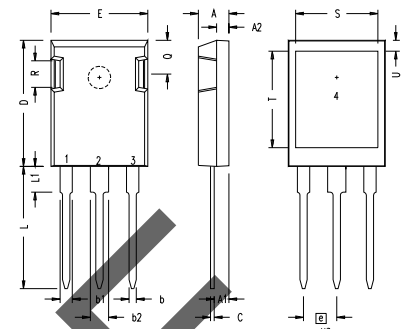
### Applications

- Capacitor Discharge & Pulser Circuits
- AC Motor Speed Drives
- DC Servo and Robot Drives
- DC Choppers
- Uninterruptible Power Supplies (UPS)
- Switch-Mode and Resonant-Mode Power Supplies

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$BV_{CES}$	$I_C = 1mA$ , $V_{GE} = 0V$	1600		V
$V_{GE(th)}$	$I_C = 250\mu A$ , $V_{CE} = V_{GE}$	3.0		5.0 V
$I_{CES}$	$V_{CE} = 0.8 \cdot V_{CES}$ , $V_{GE} = 0V$ Note 1, $T_J = 125^\circ\text{C}$			85 $\mu A$ 6 mA
$I_{GES}$	$V_{CE} = 0V$ , $V_{GE} = \pm 20V$			$\pm 100$ nA
$V_{CE(sat)}$	$I_C = 50A$ , $V_{GE} = 15V$ , Note 2 $T_J = 125^\circ\text{C}$	1.95 2.30		2.30 V

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$g_{fs}$	$I_C = 50\text{A}, V_{CE} = 10\text{V}$ , Note 2	18	30	S
$C_{ies}$	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$		3020	pF
$C_{oes}$			257	pF
$C_{res}$			50	pF
$Q_g$	$I_C = 50\text{A}, V_{GE} = 15\text{V}, V_{CE} = 0.5 \cdot V_{CES}$		137	nC
$Q_{ge}$			24	nC
$Q_{gc}$			57	nC
$t_{d(on)}$	<b>Resistive Switching Times, <math>T_J = 25^\circ\text{C}</math></b> $I_C = 50\text{A}, V_{GE} = 15\text{V}$ $R_G = 5\Omega, V_{CE} = 0.8 \cdot V_{CES}$		53	ns
$t_r$			111	ns
$t_{d(off)}$			235	ns
$t_f$			4400	ns
$t_{d(on)}$	<b>Resistive Switching Times, <math>T_J = 125^\circ\text{C}</math></b> $I_C = 50\text{A}, V_{GE} = 15\text{V}$ $R_G = 5\Omega, V_{CE} = 0.8 \cdot V_{CES}$		52	ns
$t_r$			140	ns
$t_{d(off)}$			240	ns
$t_f$			4600	ns
$R_{thJC}$			0.52	$^\circ\text{C/W}$
$R_{thCS}$		0.15		$^\circ\text{C/W}$

ISOPLUS247™ (IXGR) Outline



SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.190	.205	4.83	5.21
A1	.090	.100	2.29	2.54
A2	.075	.085	1.91	2.16
b	.045	.055	1.14	1.40
b1	.075	.084	1.91	2.13
b2	.115	.123	2.92	3.12
C	.024	.031	0.61	0.80
D	.819	.840	20.80	21.34
E	.620	.635	15.75	16.13
e	.215 BSC		5.45 BSC	
L	.780	.800	19.81	20.32
L1	.150	.170	3.81	4.32
Q	.220	.244	5.59	6.20
R	.170	.190	4.32	4.83
S	.520	.540	13.21	13.72
T	.620	.640	15.75	16.26
U	.065	.080	1.65	2.03

- 1 - GATE
- 2 - DRAIN (COLLECTOR)
- 3 - SOURCE (EMITTER)
- 4 - NO CONNECTION

NOTE: This drawing will meet all dimensions requirement of JEDEC outline TO-247AD except screw hole.

### Reverse Diode (FRED)

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$V_F$	$I_F = 20\text{A}, V_{GE} = 0\text{V}$ , Note 2 $T_J = 150^\circ\text{C}$			2.85 V 2.90 V
$V_T$	For conduction power losses only $T_J = 150^\circ\text{C}$			2.10 V
$r_{FO}$	$T_J = 150^\circ\text{C}$			40 mΩ
$I_{RM}$	$I_F = 20\text{A}, V_{GE} = 0\text{V}, V_R = 1200\text{V}$ $-di/dt = 450\text{A}/\mu\text{s}$ $T_J = 125^\circ\text{C}$		23	A
$t_{rr}$			27	A
			230	ns
			400	ns
$R_{thJC}$				0.80 $^\circ\text{C/W}$

- Notes: 1. Device must be heatsunk for high temperature leakage current measurements to avoid thermal runaway.  
2. Pulse test,  $t \leq 300 \mu\text{s}$ , duty cycle,  $d \leq 2\%$ .

### ADVANCE TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

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IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:	4,835,592	4,931,844	5,049,961	5,237,481	6,162,665	6,404,065 B1	6,683,344	6,727,585	7,005,734 B2	7,157,338B2
	4,850,072	5,017,508	5,063,307	5,381,025	6,259,123 B1	6,534,343	6,710,405 B2	6,759,692	7,063,975 B2	
	4,881,106	5,034,796	5,187,117	5,486,715	6,306,728 B1	6,583,505	6,710,463	6,771,478 B2	7,071,537	