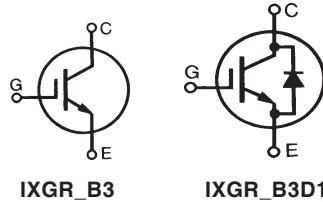


**GenX3™ 600V IGBTs**
**(Electrically Isolated Back Surface)**

 Medium-Speed Low-V<sub>sat</sub> PT IGBTs 5-40 kHz Switching

**IXGR48N60B3  
IXGR48N60B3D1**


$$V_{CES} = 600V$$

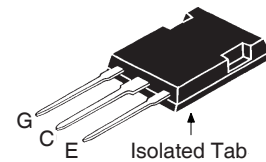
$$I_{C25} = 60A$$

$$V_{CE(sat)} \leq 2.1V$$

$$t_{fi(typ)} = 116ns$$

 ISOPLUS247™  
 E153432

Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_C = 25^\circ C$ to $150^\circ C$	600	V
$V_{CGR}$	$T_J = 25^\circ C$ to $150^\circ C$ , $R_{GE} = 1M\Omega$	600	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^\circ C$	60	A
$I_{C110}$	$T_C = 110^\circ C$	27	A
$I_{F110}$	$T_C = 110^\circ C$ (48N60B3D1)	27	A
$I_{CM}$	$T_C = 25^\circ C$ , 1ms	280	A
<b>SSOA</b>	$V_{GE} = 15V$ , $T_{VJ} = 125^\circ C$ , $R_G = 5\Omega$	$I_{CM} = 120$	A
<b>(RBSOA)</b>	Clamped Inductive Load	@ $\leq V_{CE}$	
$P_C$	$T_C = 25^\circ C$	150	W
$T_J$		-55 ... +150	$^\circ C$
$T_{JM}$		150	$^\circ C$
$T_{stg}$		-55 ... +150	$^\circ C$
$T_L$	1.6mm (0.062 in.) from Case for 10s	300	$^\circ C$
$T_{SOLD}$	Plastic Body for 10 seconds	260	$^\circ C$
$F_C$	Mounting Force	20..120 / 4.5..27	N/lb.
$V_{ISOL}$	50/60 Hz, RM, t = 1min	2500	V~
<b>Weight</b>		5	g


 G = Gate                      E = Emitter  
 C = Collector

**Features**

- Silocon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Mounting Surface
- Optimized for Low Conduction and Switching Losses
- 2500V~ Electrical Isolation
- Anti-Parallel Ultra Fast Diode
- Square RBSOA

**Advantages**

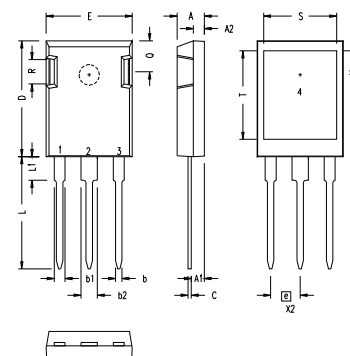
- High Power Density
- Low Gate Drive Requirement

**Applications**

- Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Battery Chargers
- Welding Machines
- Lamp Ballasts

Symbol	Test Conditions ( $T_J = 25^\circ C$ , Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$BV_{CES}$	$I_C = 250\mu A$ , $V_{GE} = 0V$	600		V
$V_{GE(th)}$	$I_C = 250\mu A$ , $V_{CE} = V_{GE}$	3.0		5.5 V
$I_{CES}$	$V_{CE} = V_{CES}$ , $V_{GE} = 0V$	48N60B3		25 $\mu A$
		48N60B3D1		1.75 mA
$I_{GES}$	$V_{CE} = 0V$ , $V_{GE} = \pm 20V$			$\pm 100$ nA
$V_{CE(sat)}$	$I_C = 40A$ , $V_{GE} = 15V$ , Note 1 $T_J = 125^\circ C$		1.77	2.1 V
			1.74	V

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$g_{fs}$	$I_C = 30\text{A}$ , $V_{CE} = 10\text{V}$ , Note 1	20	30	S
$C_{ies}$	$V_{CE} = 25\text{V}$ , $V_{GE} = 0\text{V}$ , $f = 1\text{MHz}$	48N60B3	2980	pF
$C_{oes}$			170	pF
$C_{res}$			48N60B3D1	200
$Q_g$	$I_C = 40\text{A}$ , $V_{GE} = 15\text{V}$ , $V_{CE} = 0.5 \cdot V_{CES}$		115	nC
$Q_{ge}$			21	nC
$Q_{gc}$			40	nC
$t_{d(on)}$	<b>Inductive Load, <math>T_J = 25^\circ\text{C}</math></b> $I_C = 30\text{A}$ , $V_{GE} = 15\text{V}$ $V_{CE} = 480\text{V}$ , $R_G = 5\Omega$ Note 2		22	ns
$t_{ri}$			25	ns
$E_{on}$			0.84	mJ
$t_{d(off)}$			130	200 ns
$t_{fi}$			116	200 ns
$E_{off}$			0.66	1.20 mJ
$t_{d(on)}$	<b>Inductive Load, <math>T_J = 125^\circ\text{C}</math></b> $I_C = 30\text{A}$ , $V_{GE} = 15\text{V}$ $V_{CE} = 480\text{V}$ , $R_G = 5\Omega$ Note 2		19	ns
$t_{ri}$			25	ns
$E_{on}$			1.71	mJ
$t_{d(off)}$			190	ns
$t_{fi}$			157	ns
$E_{off}$			1.30	mJ
$R_{thJC}$			0.83	$^\circ\text{C/W}$
$R_{thCS}$			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) (D1 Version ONLY)**

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$V_F$	$I_F = 30\text{A}$ , $V_{GE} = 0\text{V}$ , Note 1 $T_J = 150^\circ\text{C}$		1.6	2.8 V
$I_{RM}$	$I_F = 30\text{A}$ , $V_{GE} = 0\text{V}$ , $V_R = 100\text{V}$ $-di_F/dt = 100\text{A}/\mu\text{s}$		4	A
$t_{rr}$	$I_F = 1\text{A}$ , $-di/dt = 100\text{A}/\mu\text{s}$ , $V_R = 30\text{V}$ $T_J = 100^\circ\text{C}$		100	ns
$R_{thJC}$				1.5 $^\circ\text{C/W}$
$R_{thCS}$			1.5	$^\circ\text{C/W}$

Notes:

1. Pulse test,  $t \leq 300\mu\text{s}$ , duty cycle,  $d \leq 2\%$ .
2. Switching times & energy losses may increase for higher  $V_{CE}(\text{clamp})$ ,  $T_J$  or  $R_G$ .

**PRELIMINARY TECHNICAL INFORMATION**

The product presented herein is under development. The Technical Specifications offered are derived from data gathered during objective characterizations of preliminary engineering lots; but also may yet contain some information supplied during a pre-production design evaluation. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

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	4,931,844	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	