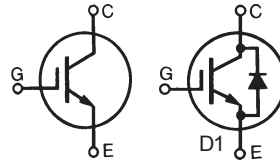


## Advance Technical Information

### HiPerFAST™ IGBT C2-Class High Speed IGBT

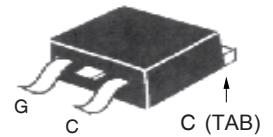
IXGA 16N60C2  
IXGP 16N60C2  
IXGA 16N60C2D1  
IXGP 16N60C2D1

$V_{CES}$  = 600 V  
 $I_{C25}$  = 40 A  
 $V_{CE(sat)}$  = 3.0 V  
 $t_{fi(typ)}$  = 35 ns

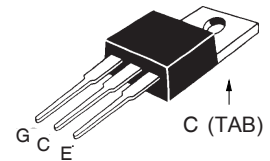


Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_J = 25^\circ\text{C to } 150^\circ\text{C}$	600	V
$V_{CGR}$	$T_J = 25^\circ\text{C to } 150^\circ\text{C}; R_{GE} = 1 \text{ M}\Omega$	600	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^\circ\text{C}$	40	A
$I_{C110}$	$T_C = 110^\circ\text{C}$	16	A
$I_{D110}$	$T_C = 110^\circ\text{C}$ (IXG_16N60C2D1 diode)	11	A
$I_{CM}$	$T_C = 25^\circ\text{C}, 1 \text{ ms}$	100	A
<b>SSOA (RBSOA)</b>	$V_{GE} = 15 \text{ V}, T_J = 125^\circ\text{C}, R_G = 22 \Omega$ Clamped inductive load	$I_{CM} = 32$ @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 (M3.5 screw)	0.55/5 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-220	4	g
	TO-263	2	g

#### TO-263 (IXGA)



#### TO-220 (IXGP)



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

#### Features

- Very high frequency IGBT
- High current handling capability
- MOS Gate turn-on  
- drive simplicity

#### Applications

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

#### Advantages

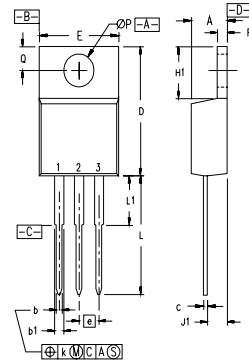
- High power density
- Very fast switching speeds for high frequency applications

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$V_{GE(th)}$	$I_C = 250 \mu\text{A}, V_{CE} = V_{GE}$	2.5		5.0 V
$I_{CES}$	$V_{CE} = V_{CES}$			25 $\mu\text{A}$
	$V_{GE} = 0 \text{ V}$			50 $\mu\text{A}$
$I_{GES}$	$V_{CE} = 0 \text{ V}, V_{GE} = \pm 20 \text{ V}$			$\pm 100 \text{ nA}$
$V_{CE(sat)}$	$I_C = 12 \text{ A}, V_{GE} = 15 \text{ V}$			3.0 V
	Note 2 $T_J = 125^\circ\text{C}$		2.1	V

**IXGP 16N60C2 IXGA 16N60C2D1**  
**IXGA 16N60C2 IXGA 16N60C2D1**

Symbol	Test Conditions	Characteristic Values		
		$(T_J = 25^\circ\text{C}, \text{ unless otherwise specified})$		
		min.	typ.	max.
$g_{fs}$	$I_C = 12\text{A}; V_{CE} = 10\text{V}$ , Note 2.	8	12	S
$C_{ies}$	$V_{CE} = 25\text{V}; V_{GE} = 0\text{V}; f = 1\text{MHz}$		720	pF
$C_{oes}$			55 65	pF pF
				16N60C2 16N60C2D1
$C_{res}$			19	pF
$Q_g$	$I_C = 20\text{A}; V_{GE} = 15\text{V}; V_{CE} = 0.5 V_{CES}$		32	nC
$Q_{ge}$			6	nC
$Q_{gc}$			10	nC
$t_{d(on)}$	<b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b>		25	ns
$t_{ri}$	$I_C = 12\text{A}; V_{GE} = 15\text{V}$		15	ns
$t_{d(off)}$	$V_{CE} = 400\text{V}; R_G = R_{off} = 22\ \Omega$		60	120
$t_{fi}$	Note 1.		35	ns
$E_{off}$			60	100
				$\mu\text{J}$
$t_{d(on)}$	<b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b>		25	ns
$t_{ri}$	$I_C = 12\text{A}; V_{GE} = 15\text{V}$		18	ns
$E_{on}$	$V_{CE} = 400\text{V}; R_G = R_{off} = 22\ \Omega$		0.38	mJ
				16N60C2D1
$t_{d(off)}$	Note 1		120	ns
$t_{fi}$			70	ns
$E_{off}$			150	$\mu\text{J}$
$R_{thJC}$				0.83 K/W
$R_{thCK}$	(IXGP)		0.5	K/W

**TO-220 Outline**



Pins: 1 - Gate 2 - Collector  
3 - Emitter 4 - Collector

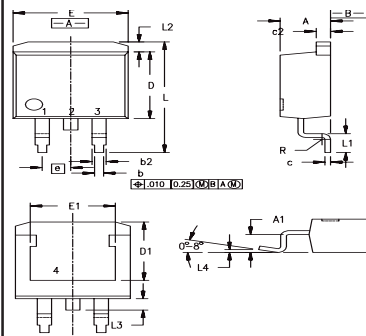
SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.170	.190	4.32	4.83
b	.025	.040	0.64	1.02
b1	.045	.065	1.15	1.65
c	.014	.022	0.35	0.56
D	.580	.630	14.73	16.00
E	.390	.420	9.91	10.66
e	.100 BSC		2.54 BSC	
F	.045	.055	1.14	1.40
H1	.230	.270	5.85	6.85
J1	.090	.110	2.29	2.79
k	0	.015	0	0.38
L	.500	.550	12.70	13.97
L1	.110	.230	2.79	5.84
ØP	.139	.161	3.53	4.08
Q	.100	.125	2.54	3.18

**Reverse Diode (FRED)**

Symbol	Test Conditions	Characteristic Values		
		$(T_J = 25^\circ\text{C}, \text{ unless otherwise specified})$		
		min.	typ.	max.
$V_F$	$I_F = 10\text{A}; V_{GE} = 0\text{V}$ $T_J = 125^\circ\text{C}$			2.66 V 1.66
$I_{RM}$	$I_F = 12\text{A}; -di_F/dt = 100\text{A}/\mu\text{s}; V_R = 100\text{V}$		2.5	A
$t_{rr}$	$V_{GE} = 0\text{V}; T_J = 125^\circ\text{C}$		110	ns
$t_{rr}$	$I_F = 1\text{A}; -di_F/dt = 100\text{A}/\mu\text{s}; V_R = 30\text{V}; V_{GE} = 0\text{V}$		30	ns
$R_{thJC}$				2.5 K/W

- Notes: 1. Switching times may increase for  $V_{CE} (\text{Clamp}) > 0.8 \cdot V_{CES}$ , higher  $T_J$ , or increased  $R_G$ .  
 2. Pulse test,  $t \leq 300\ \mu\text{s}$ , duty cycle  $d \leq 2\%$

**TO-263 Outline**



Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.06	4.83	.160	.190
A1	2.03	2.79	.080	.110
b	0.51	0.99	.020	.039
b2	1.14	1.40	.045	.055
c	0.46	0.74	.018	.029
c2	1.14	1.40	.045	.055
D	8.64	9.65	.340	.380
D1	7.11	8.13	.280	.320
E	9.65	10.29	.380	.405
E1	6.86	8.13	.270	.320
e	2.54	BSC	.100	BSC
L	14.61	15.88	.575	.625
L1	2.29	2.79	.090	.110
L2	1.02	1.40	.040	.055
L3	1.27	1.78	.050	.070
L4	0	0.38	0	.015

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 6,306,728B1 6,259,123B1 6,306,728B1  
 4,850,072 4,931,844 5,034,796 5,063,307 5,237,481 5,381,025 6,404,065B1 6,162,665 6,534,343