

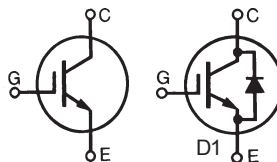
Advance Technical Information

HiPerFAST™ IGBT

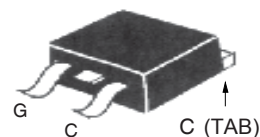
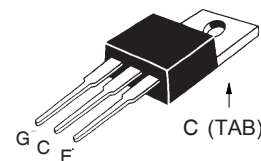
C2-Class High Speed IGBT

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

$$\begin{aligned} V_{CES} &= 600 \text{ V} \\ I_{C25} &= 40 \text{ A} \\ V_{CE(sat)} &= 3.0 \text{ V} \\ t_{fi(typ)} &= 35 \text{ ns} \end{aligned}$$



Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^\circ\text{C}$ to 150°C	600	V
V_{CGR}	$T_J = 25^\circ\text{C}$ to 150°C ; $R_{GE} = 1 \text{ M}\Omega$	600	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 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 ms	100	A
SSOA (RBSOA)	$V_{GE} = 15 \text{ V}$, $T_J = 125^\circ\text{C}$, $R_G = 22 \Omega$ 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	$^\circ\text{C}$
Weight	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

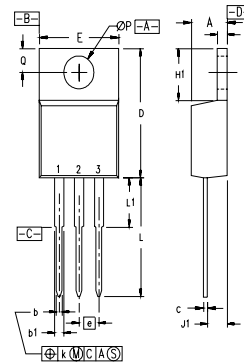
Advantages

- 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 μA
	$V_{GE} = 0 \text{ V}$			50 μA
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

Symbol	Test Conditions	Characteristic Values		
		(T _J = 25°C, unless otherwise specified)		
		min.	typ.	max.
g_{fs}	I _C = 12A; V _{CE} = 10 V, Note 2.	8	12	S
C_{ies}	V _{CE} = 25 V, V _{GE} = 0 V, f = 1 MHz		720	pF
C_{oes}			55	pF
	16N60C2		65	pF
	16N60C2D1			
C_{res}			19	pF
Q_g	I _C = 20A, V _{GE} = 15 V, V _{CE} = 0.5 V _{CES}		32	nC
Q_{ge}			6	nC
Q_{gc}			10	nC
t_{d(on)}	Inductive load, T_J = 25°C		25	ns
t_{ri}	I _C = 12 A; V _{GE} = 15 V		15	ns
t_{d(off)}	V _{CE} = 400 V; R _G = R _{off} = 22 Ω		60	120 ns
t_{fi}	Note 1.		35	ns
E_{off}			60	100 μJ
t_{d(on)}	Inductive load, T_J = 125°C		25	ns
t_{ri}	I _C = 12A; V _{GE} = 15 V		18	ns
E_{on}	V _{CE} = 400 V; R _G = R _{off} = 22 Ω	16N60C2D1	0.38	mJ
t_{d(off)}	Note 1		120	ns
t_{fi}			70	ns
E_{off}			150	μJ
R_{thJC}				0.83 K/W
R_{thCK}	(IXGP)		0.5	K/W

TO-220 Outline



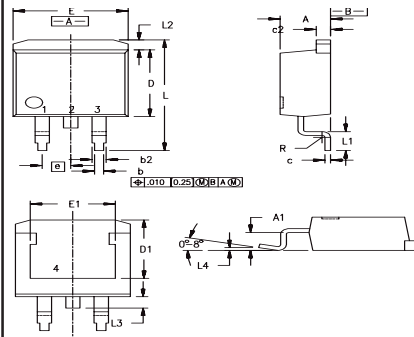
Pins: 1 - Gate 2 - Collector
3 - Emitter 4 - Collector

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)		Characteristic Values		
		(T _J = 25°C, unless otherwise specified)		
Symbol	Test Conditions	min.	typ.	max.
V_F	I _F = 10 A, V _{GE} = 0 V T _J = 125 °C			2.66 V 1.66
I_{RM}	I _F = 12 A; -di _F /dt = 100 A/μs, V _R = 100 V		2.5	A
t_{rr}	V _{GE} = 0 V; T _J = 125 °C		110	ns
t_{rr}	I _F = 1 A; -di _F /dt = 100 A/μs; V _R = 30 V, V _{GE} = 0 V		30	ns
R_{thJC}				2.5 K/W

Notes: 1. Switching times may increase for V_{CE} (Clamp) > 0.8 • V_{CES}, higher T_J, or increased R_G.
 2. Pulse test, t ≤ 300 μs, duty cycle d ≤ 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