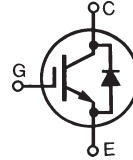


High-Gain IGBT w/ Diode

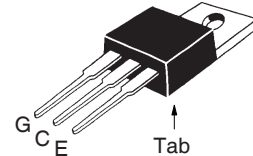
IXGP24N60C4D1

High-Speed PT Trench IGBT



$$\begin{aligned} V_{CES} &= 600V \\ I_{C110} &= 24A \\ V_{CE(sat)} &\leq 2.70V \\ t_{fi(typ)} &= 44ns \end{aligned}$$

TO-220



G = Gate C = Collector
E = Emitter Tab = Collector

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 , $R_{GE} = 1M\Omega$	600	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ\text{C}$	56	A
I_{C110}	$T_C = 110^\circ\text{C}$	24	A
I_{F110}	$T_C = 110^\circ\text{C}$	30	A
I_{CM}	$T_C = 25^\circ\text{C}$, 1ms	130	A
SSOA (RBSOA)	$V_{GE} = 15V$, $T_{VJ} = 125^\circ\text{C}$, $R_G = 10\Omega$ Clamped Inductive Load	$I_{CM} = 48$ @ $\leq V_{CES}$	A
P_C	$T_C = 25^\circ\text{C}$	190	W
T_J		-55 ... +150	$^\circ\text{C}$
T_{JM}		150	$^\circ\text{C}$
T_{stg}		-55 ... +150	$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering	300	$^\circ\text{C}$
T_{SOLD}	1.6 mm (0.062in.) from Case for 10s	260	$^\circ\text{C}$
M_d	Mounting Torque	1.13/10	Nm/lb.in.
Weight		3	g

Features

- Optimized for Low Switching Losses
- Square RBSOA
- Anti-Parallel Ultra Fast Diode
- International Standard Package

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 ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$V_{GE(th)}$	$I_C = 250\mu\text{A}$, $V_{CE} = V_{GE}$	4.0		6.5 V
I_{CES}	$V_{CE} = V_{CES}$, $V_{GE} = 0V$ $T_J = 125^\circ\text{C}$			10 μA 1.5 mA
I_{GES}	$V_{CE} = 0V$, $V_{GE} = \pm 20V$			± 100 nA
$V_{CE(sat)}$	$I_C = I_{C110}$, $V_{GE} = 15V$, Note 1 $T_J = 125^\circ\text{C}$		2.10 1.95	2.70 V V

Symbol Test Conditions

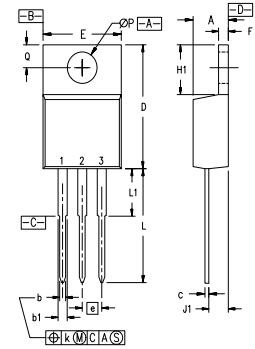
($T_J = 25^\circ\text{C}$ Unless Otherwise Specified)

Characteristic Values

Min. Typ. Max.

g_{fs}	$I_C = I_{C110}, V_{CE} = 10V, \text{Note 1}$	10	17	S
C_{ies}	$V_{CE} = 25V, V_{GE} = 0V, f = 1\text{MHz}$		875	pF
C_{oes}			62	pF
C_{res}			28	pF
Q_g	$I_C = I_{C110}, V_{GE} = 15V, V_{CE} = 0.5 \cdot V_{CES}$		64	nC
Q_{ge}			7	nC
Q_{gc}			28	nC
$t_{d(on)}$	Inductive Load, $T_J = 25^\circ\text{C}$ $I_C = I_{C110}, V_{GE} = 15V$ $V_{CE} = 360V, R_G = 10\Omega$ Note 2		22	ns
t_{ri}			43	ns
E_{on}			0.35	mJ
$t_{d(off)}$			192	ns
t_{fi}			44	ns
E_{off}			0.34	mJ
$t_{d(on)}$	Inductive Load, $T_J = 125^\circ\text{C}$ $I_C = I_{C110}, V_{GE} = 15V$ $V_{CE} = 360V, R_G = 10\Omega$ Note 2		20	ns
t_{ri}			32	ns
E_{on}			0.37	mJ
$t_{d(off)}$			148	ns
t_{fi}			115	ns
E_{off}			0.52	mJ
R_{thJC}				0.65 $^\circ\text{C/W}$
R_{thCS}		0.21		$^\circ\text{C/W}$

TO-220 (IXGP) Outline



Pins: 1 - Gate 2 - Collector
3 - Emitter

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

($T_J = 25^\circ\text{C}$, Unless Otherwise Specified)

Characteristic Values

Min. Typ. Max.

V_F	$I_F = 10A, V_{GE} = 0V, \text{Note 1}$		3.0	V
I_{RM}	$I_F = 12A, V_{GE} = 0V,$ $-di_F/dt = 100A/\mu s, V_R = 100V, T_J = 125^\circ\text{C}$		2.5	A
t_{rr}			110	ns
t_{rr}	$I_F = 1A, V_{GE} = 0V, -di_F/dt = 100A/\mu s, V_R = 30V$		30	ns
R_{thJC}				2.5 $^\circ\text{C/W}$

Notes:

1. Pulse test, $t \leq 300\mu s$, 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.

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by one or more of the following U.S. patents: 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
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