IXYS

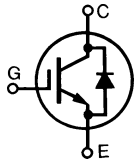
Low $V_{CE(sat)}$ IGBT with Diode

IXSH 16N60U1

V_{CES} = 600V
I_{C25} = 16A
$V_{CE(sat)typ}$ = 1.8V

Short Circuit SOA Capability

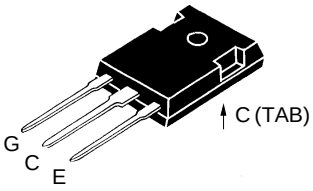
Preliminary data



Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	600	V
V_{CGR}	T_J = 25°C to 150°C; R_{GE} = 1 MΩ	600	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	T_C = 25°C	32	A
I_{C90}	T_C = 90°C	16	A
I_{CM}	T_C = 25°C, 1 ms	52	A
SSOA (RBSOA)	V_{GE}= 15 V, T_J = 125°C, R_G = 150 Ω Clamped inductive load, L = 300 µH	I_{CM} = 32 @ 0.8 V_{CES}	A
t_{SC} **(SCSOA)**	V_{GE}= 15 V, V_{CE} = 360 V, T_J = 125°C R_G = 82 Ω, non repetitive	5	µs
P_C	T_C = 25°C	100	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
Weight		2	g
Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	°C
Maximum tab temperature for soldering for 10s		260	°C

Symbol	Test Conditions		Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
BV_{CES}	I_C = 250 µA, V_{GE} = 0 V		600			V
$V_{GE(th)}$	I_C = 750 µA, V_{CE} = V_{GE}		3.5		6.5	V
I_{CES}	V_{CE} = 0.8 • V_{CES}	T_J = 25°C			200	µA
	V_{GE} = 0 V	T_J = 125°C			1	mA
I_{GES}	V_{CE} = 0 V, V_{GE} = ± 20 V				± 100	nA
$V_{CE(sat)}$	I_C = I_{C90}, V_{GE} = 15 V			1.8	2.3	V

TO-247 AD



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

Features

- Latest generation HDMOS™ process
- International standard package
- Guaranteed Short Circuit SOA capability
- Low $V_{CE(sat)}$
  - for low on-state conduction losses
- High current handling capability
- MOS Gate turn-on
  - drive simplicity
- Fast fall time for switching speeds up to 20 kHz

Applications

- AC motor speed control
- Uninterruptible power supplies (UPS)
- Welding

Advantages

- High power density

IXYS reserves the right to change limits, test conditions, and dimensions.

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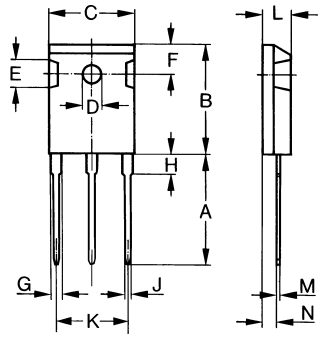
Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
g_{fs}	$I_C = I_{C90}$; V_{CE} = 10 V, Pulse test, t ≤ 300 µs, duty cycle ≤ 2 %	3.3	5.0		S
$I_{C(on)}$	V_{GE} = 15 V, V_{CE} = 10 V		50		A
C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		920		pF
C_{oes}			65		pF
C_{res}			14		pF
Q_g	$I_C = I_{C90}$, V_{GE} = 15 V, V_{CE} = 0.5 V_{CES}		40		nC
Q_{ge}			13		nC
Q_{gc}			18		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		30		ns
t_{ri}	I_C = 16A, V_{GE} = 15 V, L = 300 µH		30		ns
$t_{d(off)}$	V_{CE} = 0.8 V_{CES}, R_G = 22 Ω		100	420	ns
t_{fi}	Switching times may increase for V_{CE} (Clamp) > 0.8 • V_{CES}, higher T_J or increased R_G		310	470	ns
E_{off}			1.9	2.9	mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**		30		ns
t_{ri}	I_C = 16 A, V_{GE} = 15 V, L = 300 µH		30		ns
E_{on}	V_{CE} = 0.8 V_{CES}, R_G = 22 Ω		0.12		mJ
$t_{d(off)}$	Switching times may increase for V_{CE} (Clamp) > 0.8 • V_{CES}, higher T_J or increased R_G		150		ns
t_{fi}			510		ns
E_{off}			3.0		mJ
R_{thJC}				1.25	K/W

TO-247 AD (IXSH) Outline



Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	19.81	20.32	0.780	0.800
B	20.80	21.46	0.819	0.845
C	15.75	16.26	0.610	0.640
D	3.55	3.65	0.140	0.144
E	4.32	5.49	0.170	0.216
F	5.4	6.2	0.212	0.244
G	1.65	2.13	0.065	0.084
H	-	4.5	-	0.177
J	1.0	1.4	0.040	0.055
K	10.8	11.0	0.426	0.433
L	4.7	5.3	0.185	0.209
M	0.4	0.8	0.016	0.031
N	1.5	2.49	0.087	0.102

Reverse Diode (FRED)

Symbol	Test Conditions		Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
V_F	$I_F = I_{C90}$, V_{GE} = 0 V, Pulse test, t ≤ 300 µs, duty cycle d ≤ 2 %				1.75	V
I_{RM}	$I_F = I_{C90}$, V_{GE} = 0 V, -di_F/dt = 64 A/µs			2.5		A
t_{rr}	V_R = 360 V	T_J = 100°C		165		ns
	I_F = 1 A; -di/dt = 50 A/µs; V_R = 30 V	T_J = 25°C		35	50	ns
R_{thJC}					2.5	K/W