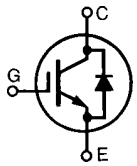
IXYS

HiPerFAST™ IGBT with Diode

Short Circuit SOA Capability

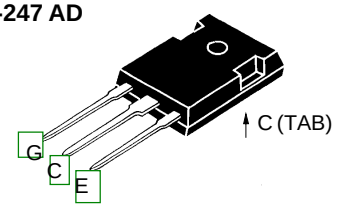
	V_{CES}	I_{C25}	$V_{CE(sat)}$
IXSH 24N60U1	**600 V**	**48 A**	**2.2 V**
IXSH 24N60AU1	**600 V**	**48 A**	**2.7 V**



Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C600	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	48	A
I_{C90}	T_C = 90°C	24	A
I_{CM}	T_C = 25°C, 1 ms	96	A
SSOA (RBSOA)	V_{GE}= 15 V, T_{VJ} = 125°C, R_G = 10 Ω Clamped inductive load, L = 100 µH	I_{CM} = 48 @ 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	10	µs
P_C	T_C = 25°C	150	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
Maximum Lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	°C
Maximum Tab temperature for soldering SMD devices for 10 s		260	°C
M_d	Mounting torque, TO-247	1.13/10	Nm/lb.in.
Weight	TO-247 AD	6	g

Symbol	Test Conditions		Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
BV_{CES}	I_C = 750 µA, V_{GE} = 0 V		600			V
$V_{GE(th)}$	I_C = 1.5 mA, V_{CE} = V_{GE}		3.5		6.5	V
I_{CES}	V_{CE} = 0.8 • V_{CES}	T_J = 25°C			500	µA
	V_{GE} = 0 V	T_J = 125°C			8	mA
I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V				±100	nA
$V_{CE(sat)}$	I_C = I_{C90}, V_{GE} = 15 V	IXSH 24N60U1			2.2	V
		IXSH 24N60AU1			2.7	V

TO-247 AD



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

Features

- International standard package JEDEC TO-247 AD
- High frequency IGBT and anti-parallel FRED in one package
- 2nd generation HDMOS™ process
- Low $V_{CE(sat)}$
  - for minimum on-state conduction losses
- MOS Gate turn-on
  - drive simplicity
- Fast Recovery Epitaxial Diode (FRED)
  - soft recovery with low I_{RM}

Applications

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

Advantages

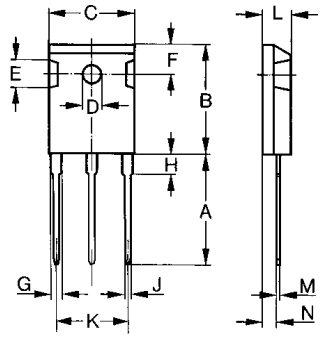
- Space savings (two devices in one package)
- Suitable for surface mounting
- Easy to mount with 1 screw, TO-247 (isolated mounting screw hole)
- Reduces assembly time and cost

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 %		9	13		S
$I_{C(on)}$	V_{GE} = 15 V, V_{CE} = 10 V			65		A
C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz			1800		pF
C_{oes}				200		pF
C_{res}				45		pF
Q_g	$I_C = I_{C90}$, V_{GE} = 15 V, V_{CE} = 0.5 V_{CES}			75	90	nC
Q_{ge}				20	30	nC
Q_{gc}				35	50	nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**			100		ns
t_{ri}	$I_C = I_{C90}$, V_{GE} = 15 V, L = 100 µH,			200		ns
$t_{d(off)}$	V_{CE} = 0.8 V_{CES}, $R_G = R_{off}$ = 10 Ω			450		ns
t_{fi}	Remarks: Switching times may	24N60U1		500		ns
	increase for V_{CE} (Clamp) > 0.8 • V_{CES},	24N60AU1		275		ns
E_{off}	higher T_J or increased R_G	24N60AU1		2		mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**			100		ns
t_{ri}	$I_C = I_{C90}$, V_{GE} = 15 V, L = 100 µH			200		ns
E_{on}	V_{CE} = 0.8 V_{CES}, $R_G = R_{off}$ = 10 Ω			1.8		mJ
$t_{d(off)}$	Remarks: Switching times may			475		ns
t_{fi}	increase for V_{CE} (Clamp) > 0.8 • V_{CES},	24N60U1		600		ns
	higher T_J or increased R_G	24N60AU1		450		ns
E_{off}		24N60U1		4		mJ
		24N60AU1		3		mJ
R_{thJC}					0.83	K/W
R_{thCK}				0.25		K/W

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 %				1.6	V
I_{RM}	$I_F = I_{C90}$, V_{GE} = 0 V, -di_F/dt = 240 A/µs			10	15	A
t_{rr}	V_R = 360 V	T_J = 125°C		150		ns
	I_F = 1 A; -di/dt = 100 A/µs; V_R = 30 V	T_J = 25°C		35	50	ns
R_{thJC}					1	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