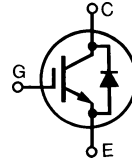


HiPerFAST™ IGBT with Diode

Short Circuit SOA Capability

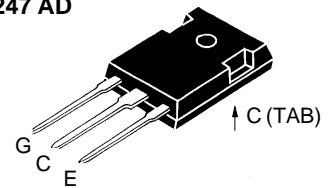
IXSH 24N60U1
IXSH24N60AU1

V_{CES}	I_{C25}	$V_{CE(sat)}$
600 V	48 A	2.2 V
600 V	48 A	2.7 V



Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^\circ\text{C to } 150^\circ\text{C} \times 600$	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	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ\text{C}$	48	A
I_{C90}	$T_C = 90^\circ\text{C}$	24	A
I_{CM}	$T_C = 25^\circ\text{C}, 1 \text{ ms}$	96	A
SSOA (RBSOA)	$V_{GE} = 15 \text{ V}, T_{VJ} = 125^\circ\text{C}, R_G = 10 \Omega$ Clamped inductive load, $L = 100 \mu\text{H}$	$I_{CM} = 48$ @ $0.8 V_{CES}$	A
t_{SC} (SCSOA)	$V_{GE} = 15 \text{ V}, V_{CE} = 360 \text{ V}, T_J = 125^\circ\text{C},$ $R_G = 82 \Omega$, non-repetitive	10	μs
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	$^\circ\text{C}$
Maximum Lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	$^\circ\text{C}$
Maximum Tab temperature for soldering SMD devices for 10 s		260	$^\circ\text{C}$
M_d	Mounting torque, TO-247	1.13/10 Nm/lb.in.	
Weight	TO-247 AD	6	g

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

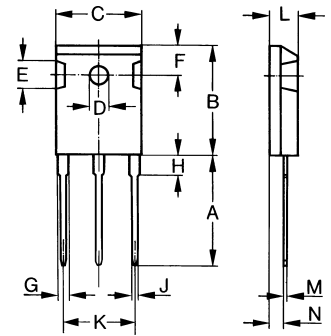
- AC motor speed control
- DC servo and robot drives
- DC choppers
- Uninterruptible power supplies (UPS)
- Switch-mode and resonant-mode power supplies

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 ($T_J = 25^\circ\text{C}$, unless otherwise specified)		
		min.	typ.	max.
BV_{CES}	$I_C = 750 \mu\text{A}, V_{GE} = 0 \text{ V}$	600		V
$V_{GE(th)}$	$I_C = 1.5 \text{ mA}, V_{CE} = V_{GE}$	3.5		6.5 V
I_{CES}	$V_{CE} = 0.8 \cdot V_{CES}$ $V_{GE} = 0 \text{ V}$			500 μA 8 mA
I_{GES}	$V_{CE} = 0 \text{ V}, V_{GE} = \pm 20 \text{ V}$			$\pm 100 \text{ nA}$
$V_{CE(sat)}$	$I_C = I_{C90}, V_{GE} = 15 \text{ V}$	IXSH 24N60U1 IXSH 24N60AU1		2.2 V 2.7 V

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} C_{oes} C_{res}	V _{CE} = 25 V, V _{GE} = 0 V, f = 1 MHz		1800	pF	
			200	pF	
			45	pF	
Q_g Q_{ge} Q_{gc}	I _C = I _{C90} , V _{GE} = 15 V, V _{CE} = 0.5 V _{CES}		75	nC	
			20	nC	
			35	nC	
t_{d(on)} t_{ri} t_{d(off)} t_{fi}	Inductive load, T_J = 25°C I _C = I _{C90} , V _{GE} = 15 V, L = 100 μH, V _{CE} = 0.8 V _{CES} , R _G = R _{off} = 10 Ω Remarks: Switching times may increase for V _{CE} (Clamp) > 0.8 • V _{CES} , higher T _J or increased R _G		100	ns	
				200	ns
				450	ns
			24N60U1	500	ns
			24N60AU1	275	ns
E_{off}		24N60AU1	2	mJ	
t_{d(on)} t_{ri} E_{on} t_{d(off)} t_{fi}	Inductive load, T_J = 125°C I _C = I _{C90} , V _{GE} = 15 V, L = 100 μH, V _{CE} = 0.8 V _{CES} , R _G = R _{off} = 10 Ω Remarks: Switching times may increase for V _{CE} (Clamp) > 0.8 • V _{CES} , higher T _J or increased R _G		100	ns	
				200	ns
				1.8	mJ
				475	ns
			24N60U1	600	ns
		24N60AU1	450	ns	
E_{off}		24N60U1	4	mJ	
		24N60AU1	3	mJ	
R_{thJC} R_{thCK}			0.83	K/W	
			0.25	K/W	

TO-247 AD (IXSH) Outline


Dim.	Millimeter		Inches	
	Min.	Max.	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

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} t_{rr}	I _F = I _{C90} , V _{GE} = 0 V, -di _F /dt = 240 A/μs V _R = 360 V I _F = 1 A; -di/dt = 100 A/μs; V _R = 30 V		10	15 A	
				150	ns
				35	50 ns
R_{thJC}				1 K/W	