

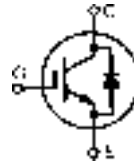
Low $V_{CE(sat)}$ IGBT with Diode

IXSA 12N60AU1

$$\begin{aligned} V_{CES} &= 600 \text{ V} \\ I_{C25} &= 24 \text{ A} \\ V_{CE(sat)} &= 2.5 \text{ V} \end{aligned}$$

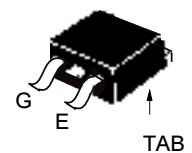
Short Circuit SOA Capability

Preliminary data sheet



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}	$T_C = 25^\circ\text{C}$	24	A
I_{C90}	$T_C = 90^\circ\text{C}$	12	A
I_{CM}	$T_C = 25^\circ\text{C}$, 1 ms	48	A
SSOA (RBSOA)	$V_{GE} = 15 \text{ V}$, $T_J = 125^\circ\text{C}$, $R_G = 150 \Omega$ Clamped inductive load, $L = 300 \mu\text{H}$	$I_{CM} = 24$ @ $0.8 V_{CES}$	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	5	μs
P_C	$T_C = 25^\circ\text{C}$	100	W
T_J		-55 ... +150	$^\circ\text{C}$
T_{JM}		150	$^\circ\text{C}$
T_{stg}		-55 ... +150	$^\circ\text{C}$
Weight		2	g
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 for 10 s		260	$^\circ\text{C}$

TO-263AA



G = Gate,
E = Emitter,

C = Collector,
TAB = Collector

Features

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

Applications

- AC motor speed control
- Brushless motor controls
- Servo & robotic controls

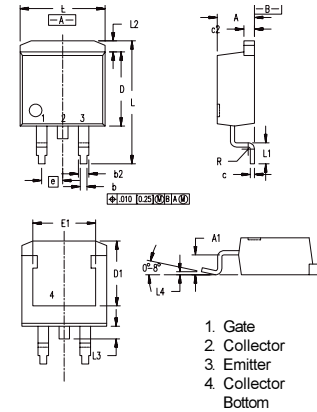
Advantages

- High power density

Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified)		
		min.	typ.	max.
BV_{CES}	$I_C = 250 \mu\text{A}$, $V_{GE} = 0 \text{ V}$	600		V
$V_{GE(th)}$	$I_C = 750 \mu\text{A}$, $V_{CE} = V_{GE}$	3.5		6.5 V
I_{CES}	$V_{CE} = 0.8 \cdot V_{CES}$ $V_{GE} = 0 \text{ V}$			200 μA 2.5 mA
I_{GES}	$V_{CE} = 0 \text{ V}$, $V_{GE} = \pm 20 \text{ V}$			$\pm 100 \text{ nA}$
$V_{CE(sat)}$	$I_C = I_{C90}$, $V_{GE} = 15 \text{ V}$			2.5 V

Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified)		
		min.	typ.	max.
g_{fs}	$I_C = I_{C90}$, $V_{CE} = 10\text{ V}$, Pulse test, $t \leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$	3.3		S
$I_{C(on)}$	$V_{GE} = 15\text{ V}$, $V_{CE} = 10\text{ V}$		TBD	A
C_{ies}	$V_{CE} = 25\text{ V}$, $V_{GE} = 0\text{ V}$, $f = 1\text{ MHz}$		TBD	pF
C_{oes}			TBD	pF
C_{res}			TBD	pF
Q_g	$I_C = I_{C90}$, $V_{GE} = 15\text{ V}$, $V_{CE} = 0.5 V_{CES}$		TBD	nC
Q_{ge}			TBD	nC
Q_{gc}			TBD	nC
$t_{d(on)}$	Inductive load, $T_J = 25^\circ\text{C}$ $I_C = 12\text{ A}$, $V_{GE} = 15\text{ V}$, $L = 300\text{ }\mu\text{H}$ $V_{CE} = 0.8 V_{CES}$, $R_G = 22\text{ }\Omega$ Switching times may increase for $V_{CE}(\text{Clamp}) > 0.8 \cdot V_{CES}$, higher T_J or increased R_G	30		ns
t_{ri}		30		ns
$t_{d(off)}$		100	300	ns
t_{fi}		200	360	ns
E_{off}		1.0	2.0	mJ
$t_{d(on)}$	Inductive load, $T_J = 125^\circ\text{C}$ $I_C = 12\text{ A}$, $V_{GE} = 15\text{ V}$, $L = 300\text{ }\mu\text{H}$ $V_{CE} = 0.8 V_{CES}$, $R_G = 22\text{ }\Omega$ Switching times may increase for $V_{CE}(\text{Clamp}) > 0.8 \cdot V_{CES}$, higher T_J or increased R_G	30		ns
t_{ri}		30		ns
E_{on}		0.5		mJ
$t_{d(off)}$		150		ns
t_{fi}		300		ns
E_{off}		1.5		mJ
R_{thJC}				1.25 KW

TO-263 AA Outline



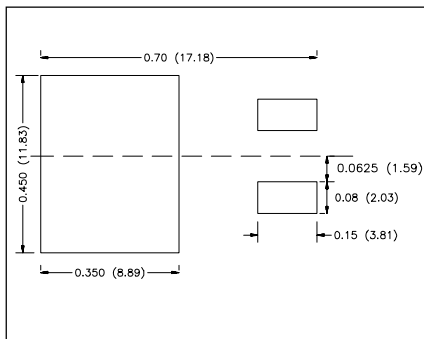
Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.06	4.83	.160	.190
A1	2.03	2.79	.080	.110
b	0.51	0.99	.020	.039
b2	1.14	1.40	.045	.055
c	0.46	0.74	.018	.029
c2	1.14	1.40	.045	.055
D	8.64	9.65	.340	.380
D1	7.11	8.13	.280	.320
E	9.65	10.29	.380	.405
E1	6.86	8.13	.270	.320
e	2.54	BSC	.100	BSC
L	14.61	15.88	.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
R	0.46	0.74	.018	.029

Reverse Diode (FRED)

Characteristic Values

($T_J = 25^\circ\text{C}$, unless otherwise specified)

Symbol	Test Conditions	min.	typ.	max.
V_F	$I_F = I_{C90}$, $V_{GE} = 0\text{ V}$, Pulse test, $t \leq 300\text{ }\mu\text{s}$, duty cycle $d \leq 2\%$			1.75 V
I_{RM}	$I_F = I_{C90}$, $V_{GE} = 0\text{ V}$, $-di_F/dt = 64\text{ A}/\mu\text{s}$ $V_R = 360\text{ V}$ $I_F = 1\text{ A}$; $-di/dt = 50\text{ A}/\mu\text{s}$; $V_R = 30\text{ V}$	2.5		A
t_{rr}		165		ns
		35	50	ns
R_{thJC}				2.5 KW



Min. Recommended Footprint

Dimensions in inch and mm

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
4,850,072	4,931,844	5,034,796	5,063,307	5,237,481	5,381,025