

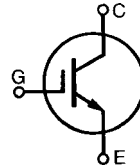
# High Speed IGBT

## IXSP 24N60B

$V_{CES} = 600 \text{ V}$   
 $I_{C25} = 48 \text{ A}$   
 $V_{CE(sat)} = 2.5 \text{ V}$   
 $t_{fi \text{ typ}} = 170 \text{ ns}$

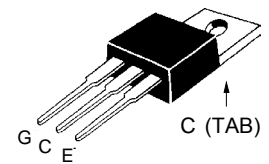
### Short Circuit SOA Capability

### Preliminary Data Sheet



Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$	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	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	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 ms	96	A
<b>SSOA (RBSOA)</b>	$V_{GE} = 15 \text{ V}$ , $T_J = 125^\circ\text{C}$ , $R_G = 33 \Omega$ Clamped inductive load, $V_{CC} = 0.8 V_{CES}$	$I_{CM} = 48$ @ $0.8 V_{CES}$	A
<b><math>t_{SC}</math> (SCSOA)</b>	$V_{GE} = 15 \text{ V}$ , $V_{CE} = 360 \text{ V}$ , $T_J = 125^\circ\text{C}$ $R_G = 33 \Omega$ , non repetitive	10	$\mu\text{s}$
$P_c$	$T_C = 25^\circ\text{C}$	150	W
$T_J$		-55 ... +150	$^\circ\text{C}$
$T_{JM}$		150	$^\circ\text{C}$
$T_{stg}$		-55 ... +150	$^\circ\text{C}$
<b>Weight</b>		2	g
Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	$^\circ\text{C}$

### TO-220 (IXSP)



G = Gate  
E = Emitter

TAB = Collector

### Features

- International standard packages
- 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 50 kHz

### Applications

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

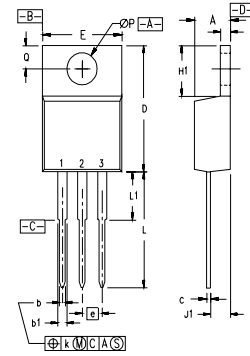
### Advantages

- Easy to mount with 1 screw
- 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
$V_{GE(th)}$	$I_C = 1.5 \text{ mA}$ , $V_{CE} = V_{GE}$	3.5		V
$I_{CES}$	$V_{CE} = 0.8 \cdot V_{CES}$ $V_{GE} = 0 \text{ V}$			25 $\mu\text{A}$ 1 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, $t \leq 300\ \mu\text{s}$ , duty cycle $\leq 2\%$	9	13	S	
$C_{ies}$	$V_{CE} = 25\text{ V}$ , $V_{GE} = 0\text{ V}$ , $f = 1\text{ MHz}$		1450	pF	
$C_{oes}$			130	pF	
$C_{res}$			37	pF	
$Q_g$	$I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$ , $V_{CE} = 0.5 V_{CES}$		41	nC	
$Q_{ge}$			18	nC	
$Q_{gc}$			18	nC	
$t_{d(on)}$	<b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b> $I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$ , $L = 100\ \mu\text{H}$ $V_{CE} = 0.8 V_{CES}$ , $R_G = 33\ \Omega$		50	ns	
$t_{ri}$			50	ns	
$t_{d(off)}$			150	250	ns
$t_{fi}$			170	300	ns
$E_{off}$			1.3	2.6	mJ
$t_{d(on)}$	<b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b> $I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$ , $V_{CE} = 0.8 V_{CES}$ , $R_G = 33\ \Omega$		55	ns	
$t_{ri}$			75	ns	
$E_{on}$			1.2	mJ	
$t_{d(off)}$			190	ns	
$t_{fi}$			280	ns	
$E_{off}$		2.4	mJ		
$R_{thJC}$			0.83	K/W	
$R_{thCK}$		0.25		K/W	

### TO-220 Outline



Pins: 1 - Gate      2 - Drain  
3 - Source      4 - Drain

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

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 6,306,728B1 6,259,123B1 6,306,728B1  
4,850,072 4,931,844 5,034,796 5,063,307 5,237,481 5,381,025 6,404,065B1 6,162,665 6,534,343