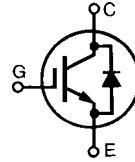


# HiPerFAST™ IGBT with Diode

## IXGX 40N60BD1

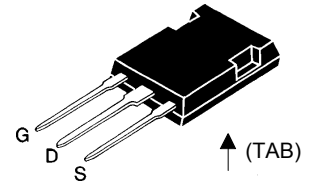
$V_{CES} = 600 \text{ V}$   
 $I_{C25} = 75 \text{ A}$   
 $V_{CE(sat)} = 2.1 \text{ V}$   
 $t_{fi(typ)} = 180 \text{ ns}$

Preliminary Data



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
$I_{C25}$	$T_C = 25^\circ\text{C}$	75	A
$I_{C110}$	$T_C = 110^\circ\text{C}$	40	A
$I_{CM}$	$T_C = 25^\circ\text{C}, 1 \text{ ms}$	150	A
<b>SSOA</b> <b>(RBSOA)</b>	$V_{GE} = 15 \text{ V}, T_{VJ} = 125^\circ\text{C}, R_G = 10 \Omega$ Clamped inductive load	$I_{CM} = 80$ @ $0.8 V_{CES}$	A
$P_C$	$T_C = 25^\circ\text{C}$	250	W
$T_J$		-55 ... +150	$^\circ\text{C}$
$T_{JM}$		150	$^\circ\text{C}$
$T_{stg}$		-55 ... +150	$^\circ\text{C}$
$M_d$	Mounting torque, TO-264	1.13/10	Nm/lb.in.
<b>Weight</b>		5	g
Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	$^\circ\text{C}$

PLUS247  
(IXGX)



G = Gate      C = Collector  
E = Emitter    Tab = Collector

### Features

- International standard package PLUS247 (hole-less TO-247)
- High frequency IGBT and antiparallel FRED in one package
- New generation HDMOST™ process
- High current handling capability
- MOS Gate turn-on for drive simplicity
- Fast Recovery Epitaxial Diode (FRED) with soft recovery and 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

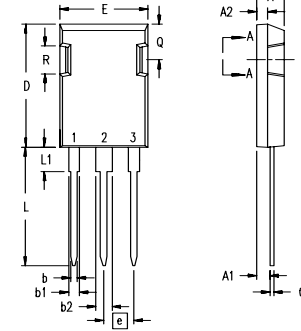
### Advantages

- Space savings (two devices on one package)
- Easy to mount with 1 screw
- Easy spring clip assembly

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
$V_{GE(th)}$	$I_C = 500 \mu\text{A}, V_{CE} = V_{GE}$	2.5		5.0 V
$I_{CES}$	$V_{CE} = 0.8 \cdot V_{CES}$ $V_{GE} = 0 \text{ V}$			650 $\mu\text{A}$ 3 mA
$I_{GES}$	$V_{CE} = 0 \text{ V}, V_{GE} = \pm 20 \text{ V}$			$\pm 100 \text{ nA}$
$V_{CE(sat)}$	$I_C = I_{C90}, V_{GE} = 15 \text{ V}$ Pulse test, $t < 300 \mu\text{s}$ , duty cycle $< 2\%$	1.6	2.1	V

Symbol	Test Conditions	Characteristic Values			
		(T <sub>J</sub> = 25°C, unless otherwise specified)			
		Min.	Typ.	Max.	
<b>g<sub>fs</sub></b>	I <sub>C</sub> = I <sub>C90</sub> ; V <sub>CE</sub> = 10 V, Pulse test, t ≤ 300 μs, duty cycle ≤ 2 %	30	42	S	
<b>C<sub>ies</sub></b>	V <sub>CE</sub> = 25 V, V <sub>GE</sub> = 0 V, f = 1 MHz		3300	pF	
<b>C<sub>oes</sub></b>			370	pF	
<b>C<sub>res</sub></b>			65	pF	
<b>Q<sub>g</sub></b>	I <sub>C</sub> = I <sub>C90</sub> , V <sub>GE</sub> = 15 V, V <sub>CE</sub> = 0.5 V <sub>CES</sub>		116	nC	
<b>Q<sub>ge</sub></b>			23	nC	
<b>Q<sub>gc</sub></b>			65	nC	
<b>t<sub>d(on)</sub></b>	<b>Inductive load, T<sub>J</sub> = 25°C</b> I <sub>C</sub> = I <sub>C90</sub> , V <sub>GE</sub> = 15 V V <sub>CE</sub> = 0.8 V <sub>CES</sub> , R <sub>G</sub> = R <sub>off</sub> = 4.7 Ω Remarks: Switching times may increase for V <sub>CE</sub> (Clamp) > 0.8 • V <sub>CES</sub> , higher T <sub>J</sub> or increased R <sub>G</sub>		25	ns	
<b>t<sub>ri</sub></b>			30	ns	
<b>t<sub>d(off)</sub></b>			180	300	ns
<b>t<sub>fi</sub></b>			180	270	ns
<b>E<sub>off</sub></b>			2.7	6.0	mJ
<b>t<sub>d(on)</sub></b>	<b>Inductive load, T<sub>J</sub> = 125°C</b> I <sub>C</sub> = I <sub>C90</sub> , V <sub>GE</sub> = 15 V V <sub>CE</sub> = 0.8 V <sub>CES</sub> , R <sub>G</sub> = R <sub>off</sub> = 4.7 Ω Remarks: Switching times may increase for V <sub>CE</sub> (Clamp) > 0.8 • V <sub>CES</sub> , higher T <sub>J</sub> or increased R <sub>G</sub>		25	ns	
<b>t<sub>ri</sub></b>			30	ns	
<b>E<sub>on</sub></b>			1.2	mJ	
<b>t<sub>d(off)</sub></b>			300	ns	
<b>t<sub>fi</sub></b>			270	ns	
<b>E<sub>off</sub></b>		4.0	mJ		
<b>R<sub>thJC</sub></b>				0.50 K/W	
<b>R<sub>thCK</sub></b>		0.15		K/W	

### PLUS247 Outline



- Terminals: 1 - Gate  
2 - Drain (Collector)  
3 - Source (Emitter)  
4 - Drain (Collector)

Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.83	5.21	.190	.205
A <sub>1</sub>	2.29	2.54	.090	.100
A <sub>2</sub>	1.91	2.16	.075	.085
b	1.14	1.40	.045	.055
b <sub>1</sub>	1.91	2.13	.075	.084
b <sub>2</sub>	2.92	3.12	.115	.123
C	0.61	0.80	.024	.031
D	20.80	21.34	.819	.840
E	15.75	16.13	.620	.635
e	5.45 BSC		.215 BSC	
L	19.81	20.32	.780	.800
L1	3.81	4.32	.150	.170
Q	5.59	6.20	.220	0.244
R	4.32	4.83	.170	.190

### Reverse Diode (FRED)

Symbol	Test Conditions	Characteristic Values		
		(T <sub>J</sub> = 25°C, unless otherwise specified)		
		min.	typ.	max.
<b>V<sub>F</sub></b>	I <sub>F</sub> = I <sub>C90</sub> , V <sub>GE</sub> = 0 V, T <sub>J</sub> = 150°C Pulse test, t ≤ 300 ms, duty cycle d 22 %			1.3 V 1.8 V
<b>I<sub>RM</sub></b>	I <sub>F</sub> = I <sub>C90</sub> , V <sub>GE</sub> = 0 V, -di <sub>F</sub> /dt = 100 A/μs, V <sub>R</sub> = 100 V			7.5 A
<b>t<sub>rr</sub></b>	I <sub>F</sub> = 1 A; -di/dt = 100 A/μs; V <sub>R</sub> = 30 V		35	ns
<b>R<sub>thJC</sub></b>				0.65 K/W

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