1200V XPT™ IGBT
GenX3™ w/ Diode

IXYH50N120C3D1

High-Speed IGBT
for 20-50 kHz Switching

**Symbol** | **Test Conditions** | **Maximum Ratings**
--- | --- | ---
$V_{CES}$ | $T_J = 25^\circ C$ to $150^\circ C$ | 1200 V
$V_{CEG}$ | $T_J = 25^\circ C$ to $150^\circ C$, $R_{GE} = 1\,\text{M}\Omega$ | 1200 V
$V_{GES}$ | Continuous | ±20 V
$V_{GEM}$ | Transient | ±30 V
$I_{CES}$ | $T_J = 25^\circ C$ (Chip Capability) | 90 A
$I_{C100}$ | $T_J = 100^\circ C$ | 50 A
$I_{T110}$ | $T_J = 110^\circ C$ | 25 A
$I_{CM}$ | $T_J = 25^\circ C$, 1ms | 210 A

SSOA ($V_{GE} = 15V$, $T_J = 150^\circ C$, $R_{DS} = 5\Omega$) | $I_{CM} = 100$ A

(RBSOA) Clamped Inductive Load | $V_{CE} \leq V_{CES}$

$P_c$ | $T_J = 25^\circ C$ | 625 W
$T_J$ | $-55 \ldots +150$ °C
$T_{JM}$ | 150 °C
$T_{sig}$ | $-55 \ldots +150$ °C

$T_L$ | Maximum Lead Temperature for Soldering | 300 °C
$T_{SOLD}$ | 1.6 mm (0.062in.) from Case for 10s | 260 °C

$M_d$ | Mounting Torque | 1.13/10 Nm/lb.in.

Weight | 6 g

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**Features**
- Optimized for Low Switching Losses
- Square RBSOA
- Positive Thermal Coefficient of $V_{CE(sat)}$
- Anti-Parallel Ultra Fast Diode
- High Current Handling Capability
- International Standard Package

**Advantages**
- High Power Density
- Low Gate Drive Requirement

**Applications**
- High Frequency Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Battery Chargers
- Welding Machines
- Lamp Ballasts

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DS100388D(04/16)
Symbol Test Conditions
(TJ = 25°C Unless Otherwise Specified)

Characteristic Values

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Test Conditions</th>
<th>Characteristic Values</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
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<tbody>
<tr>
<td>gfs</td>
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<td>20</td>
<td>32</td>
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<td>3100</td>
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Reverse Diode (FRED)

Symbol Test Conditions
(TJ = 25°C, Unless Otherwise Specified)

Characteristic Value

<table>
<thead>
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<th>Symbol</th>
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<th>Characteristic Value</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
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Notes:
1. Pulse test, t ≤ 300μs, duty cycle, d ≤ 2%.
2. Switching times & energy losses may increase for higher Vce (clamp), TJ or Rg.

IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

IXYS MOSFETs and IGBTs are covered 4,835,592 4,931,844 5,049,961 5,237,481 6,162,665 6,404,065 B1 6,683,344 6,727,585 7,005,734 B2 7,157,338 B2 by one or more of the following U.S. patents: 4,881,106 5,034,796 5,187,117 5,486,715 6,259,123 B1 6,534,343 6,710,405 B2 6,759,692 7,063,975 B2 7,157,338 B2
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Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

E_{off} - E_{on}  
TJ = 150ºC, VGE = 15V, VCE = 600V  
I_C = 100A

E_{off} - E_{on}  
TJ = 150ºC, VGE = 15V, VCE = 600V  
I_C = 50A

Fig. 13. Inductive Switching Energy Loss vs. Collector Current

E_{off} - E_{on}  
R_G = 5Ω, VGE = 15V, VCE = 600V

Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

E_{off} - E_{on}  
R_G = 5Ω, VGE = 15V, VCE = 600V  
I_C = 100A

E_{off} - E_{on}  
R_G = 5Ω, VGE = 15V, VCE = 600V  
I_C = 50A

Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

t_{f(i)} - t_{d(off)}  
TJ = 150ºC, VGE = 15V, VCE = 600V  
I_C = 100A

t_{f(i)} - t_{d(off)}  
TJ = 150ºC, VGE = 15V, VCE = 600V  
I_C = 50A

Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

t_{f(i)} - t_{d(off)}  
R_G = 5Ω, VGE = 15V, VCE = 600V  
TJ = 125ºC

t_{f(i)} - t_{d(off)}  
R_G = 5Ω, VGE = 15V, VCE = 600V  
TJ = 25ºC

Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

t_{f(i)} - t_{d(off)}  
R_G = 5Ω, VGE = 15V, VCE = 600V  
I_C = 100A

t_{f(i)} - t_{d(off)}  
R_G = 5Ω, VGE = 15V, VCE = 600V  
I_C = 50A
Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

- $t_{ri}$ - On Time
- $t_{d(on)}$ - Turn-on Delay

$T_J = 150^\circ C$, $V_{GE} = 15V$
$V_{CE} = 600V$
$I_C = 100A$
$R_G = 5\, \Omega$
$V_{GE} = 15V$
$V_{CE} = 600V$

Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

- $t_{ri}$ - On Time
- $t_{d(on)}$ - Turn-on Delay

$T_J = 150^\circ C$, $25^\circ C$
$V_{CE} = 600V$
$I_C = 100A$
$R_G = 5\, \Omega$
$V_{GE} = 15V$

Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature

- $t_{ri}$ - On Time
- $t_{d(on)}$ - Turn-on Delay

$R_G = 5\, \Omega$, $V_{GE} = 15V$
$V_{CE} = 600V$
$I_C = 100A$

Fig. 21. Maximum Transient Thermal Impedance (Diode)

- $Z_{thJC}$ - Thermal Impedance

$Pulse\, Width$ - Second

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