## LinearL2™ Power MOSFET w/ Extended FBSOA

**IXTH110N10L2**

- **N-Channel Enhancement Mode**
- **Guaranteed FBSOA**
- **Avalanche Rated**

### Symbol Test Conditions

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Test Conditions</th>
<th>Maximum Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{DSS}$</td>
<td>$T_J = 25°C$ to $150°C$</td>
<td>100 V</td>
</tr>
<tr>
<td>$V_{DGR}$</td>
<td>$T_J = 25°C$ to $150°C$, $R_{GS} = 1M\Omega$</td>
<td>100 V</td>
</tr>
<tr>
<td>$V_{GSS}$</td>
<td>Continuous</td>
<td>±20 V</td>
</tr>
<tr>
<td>$V_{GSM}$</td>
<td>Transient</td>
<td>±30 V</td>
</tr>
<tr>
<td>$I_{D25}$</td>
<td>$T_C = 25°C$</td>
<td>110 A</td>
</tr>
<tr>
<td>$I_{DM}$</td>
<td>$T_C = 25°C$, Pulse Width Limited by $T_{JM}$</td>
<td>300 A</td>
</tr>
<tr>
<td>$I_A$</td>
<td>$T_C = 25°C$</td>
<td>110 A</td>
</tr>
<tr>
<td>$E_{AS}$</td>
<td>$T_C = 25°C$</td>
<td>3 J</td>
</tr>
<tr>
<td>$P_D$</td>
<td>$T_C = 25°C$</td>
<td>600 W</td>
</tr>
<tr>
<td>$T_J$</td>
<td>-55 to $+150°C$</td>
<td>°C</td>
</tr>
<tr>
<td>$T_{JM}$</td>
<td>$+150°C$</td>
<td>°C</td>
</tr>
<tr>
<td>$T_{STG}$</td>
<td>-55 to $+150°C$</td>
<td>°C</td>
</tr>
<tr>
<td>$T_L$</td>
<td>1.6mm (0.063in) from Case for 10s</td>
<td>300 °C</td>
</tr>
<tr>
<td>$T_{SOLD}$</td>
<td>Plastic Body for 10s</td>
<td>260 °C</td>
</tr>
<tr>
<td>$M_d$</td>
<td>Mounting Torque (TO-247)</td>
<td>1.13/10 Nm/lb.in.</td>
</tr>
<tr>
<td>Weight</td>
<td>TO-247</td>
<td>6.0 g</td>
</tr>
<tr>
<td></td>
<td>TO-268</td>
<td>4.0 g</td>
</tr>
</tbody>
</table>

### Characteristic Values

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Test Conditions</th>
<th>Characteristic Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>$B V_{DSS}$</td>
<td>$V_GS = 0V$, $I_D = 250\mu A$</td>
<td>100 V</td>
</tr>
<tr>
<td>$V_{GS(th)}$</td>
<td>$V_GS = V_DS$, $I_D = 250\mu A$</td>
<td>2.5 V</td>
</tr>
<tr>
<td>$I_{GSS}$</td>
<td>$V_GS = \pm 20V$, $V_DS = 0V$</td>
<td>±100 nA</td>
</tr>
<tr>
<td>$I_{DSS}$</td>
<td>$V_DS = V_{DSS}$, $V_GS = 0V$</td>
<td>5 μA</td>
</tr>
<tr>
<td>$R_{DS(on)}$</td>
<td>$V_GS = 10V$, $I_D = 0.5 \times I_{D25}$, Note 1</td>
<td>18 mΩ</td>
</tr>
</tbody>
</table>

### Features

- Designed for Linear Operation
- International Standard Packages
- Avalanche Rated
- Integrated Gate Resistor for Easy Paralleling
- Guaranteed FBSOA at 75°C

### Advantages

- Easy to Mount
- Space Savings
- High Power Density

### Applications

- Solid State Circuit Breakers
- Soft Start Controls
- Linear Amplifiers
- Programmable Loads
- Current Regulators

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DS100235(01/10)
Symbol | Test Conditions (T<sub>j</sub> = 25°C, Unless Otherwise Specified) | Characteristic Values
--- | --- | ---
| | | Min. | Typ. | Max.
g<sub>s</sub> | V<sub>DS</sub> = 10V, I<sub>D</sub> = 0.5 • I<sub>DS</sub>, Note 1 | 45 | 55 | 65 S
C<sub>gs</sub> | V<sub>GS</sub> = 0V, V<sub>DS</sub> = 25V, f = 1MHz | 10.5 nF
C<sub>oss</sub> | | 1585 pF
C<sub>rss</sub> | | 420 pF
R<sub>Gi</sub> | Gate Input Resistance | 1.8 Ω
t<sub>δ(on)</sub> | Resistive Switching Times | 28 ns
t<sub>r</sub> | | 130 ns
t<sub>r(fast)</sub> | R<sub>G</sub> = 2.2Ω (External) | 99 ns
t<sub>r</sub> | | 24 ns
Q<sub>g(on)</sub> | V<sub>GS</sub> = 10V, V<sub>DS</sub> = 0.5 • V<sub>DS</sub>, I<sub>D</sub> = 0.5 • I<sub>DS</sub> | 260 nC
Q<sub>gs</sub> | | 52 nC
Q<sub>gd</sub> | | 106 nC
R<sub>thJC</sub> | TO-247 | 0.21 °C/W
R<sub>thCS</sub> | TO-247 | 0.21 °C/W

Safe Operating Area Specification
Symbol | Test Conditions | Characteristic Values
--- | --- | ---
| | | Min. | Typ. | Max.
SOA | V<sub>DS</sub> = 80V, I<sub>D</sub> = 3.6A, T<sub>C</sub> = 75°C, t<sub>p</sub> = 5s | 360 W

Source-Drain Diode
Symbol | Test Conditions (T<sub>j</sub> = 25°C, Unless Otherwise Specified) | Characteristic Values
--- | --- | ---
I<sub>S</sub> | V<sub>GS</sub> = 0V | 110 A
I<sub>SM</sub> | Repetitive, Pulse Width Limited by T<sub>jam</sub> | 440 A
V<sub>SD</sub> | I<sub>F</sub> = I<sub>S</sub>, V<sub>GS</sub> = 0V, Note 1 | 1.4 V
t<sub>r</sub> | | 230 ns
I<sub>SM</sub> | I<sub>F</sub> = 55A, -di/dt = 100A/μs, | 19.4 A
Q<sub>SM</sub> | V<sub>R</sub> = 50V, V<sub>GS</sub> = 0V | 2.2 μC

Note 1. Pulse test, t ≤ 300μs; duty cycle, d ≤ 2%.

ADVANCE TECHNICAL INFORMATION
The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.
Fig. 1. Output Characteristics @ $T_J = 25^\circ$C

![Graph of output characteristics showing $V_{DS}$ vs. $I_D$ for different values of $V_{GS}$ at $T_J = 25^\circ$C.]

Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ$C

![Graph of extended output characteristics showing $V_{DS}$ vs. $I_D$ for different values of $V_{GS}$ at $T_J = 25^\circ$C.]

Fig. 3. Output Characteristics @ $T_J = 125^\circ$C

![Graph of output characteristics showing $V_{DS}$ vs. $I_D$ for different values of $V_{GS}$ at $T_J = 125^\circ$C.]

Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 55$A Value vs. Junction Temperature

![Graph of $R_{DS(on)}$ normalized vs. $T_J$ for $I_D = 55$A.]

Fig. 5. $R_{DS(on)}$ Normalized to $I_D = 55$A Value vs. Drain Current

![Graph of $R_{DS(on)}$ normalized vs. $I_D$ for $V_{GS} = 10$V at $T_J = 125^\circ$C and $T_J = 25^\circ$C.]

Fig. 6. Maximum Drain Current vs. Case Temperature

![Graph of maximum drain current vs. case temperature.]

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Fig. 7. Input Admittance

Fig. 8. Transconductance

Fig. 9. Forward Voltage Drop of Intrinsic Diode

Fig. 10. Gate Charge

Fig. 11. Capacitance

Fig. 12. Maximum Transient Thermal Impedance
Fig. 13. Forward-Bias Safe Operating Area
@ $T_C = 25^\circ C$

- $V_{DS}$ - Volts
- $I_D$ - Amperes
- $R_{DSS}$ Limit
- $T_J = 150^\circ C$
- $T_C = 25^\circ C$
- Single Pulse
- $25\mu s$, $100\mu s$, $10ms$, $100ms$, DC

Fig. 14. Forward-Bias Safe Operating Area
@ $T_C = 75^\circ C$

- $V_{DS}$ - Volts
- $I_D$ - Amperes
- $R_{DSS}$ Limit
- $T_J = 150^\circ C$
- $T_C = 75^\circ C$
- Single Pulse
- $25\mu s$, $100\mu s$, $10ms$, $100ms$, DC