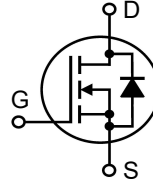


**X3-Class
HiPerFET™
Power MOSFET**

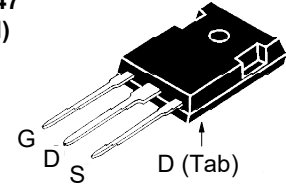
IXFH54N65X3

V_{DSS} = 650V
I_{D25} = 54A
R_{DS(on)} ≤ 59mΩ

N-Channel Enhancement Mode
Avalanche Rated



**TO-247
(IXFH)**



G = Gate D = Drain
S = Source Tab = Drain

| Symbol | Test Conditions | Maximum Ratings | |
|------------------|--|-----------------|----------|
| V _{DSS} | T _J = 25°C to 150°C | 650 | V |
| V _{DGR} | T _J = 25°C to 150°C, R _{GS} = 1MΩ | 650 | V |
| V _{GSS} | Continuous | ±20 | V |
| V _{GSM} | Transient | ±30 | V |
| I _{D25} | T _C = 25°C | 54 | A |
| I _{DM} | T _C = 25°C, Pulse Width Limited by T _{JM} | 70 | A |
| I _A | T _C = 25°C | 10 | A |
| E _{AS} | T _C = 25°C | 1.5 | J |
| dv/dt | I _S ≤ I _{DM} , V _{DD} ≤ V _{DSS} , T _J ≤ 150°C | 50 | V/ns |
| P _D | T _C = 25°C | 625 | W |
| T _J | | -55 ... +150 | °C |
| T _{JM} | | 150 | °C |
| T _{stg} | | -55 ... +150 | °C |
| T _L | Maximum Lead Temperature for Soldering 1.6 mm (0.062 in.) from Case for 10s | 300 | °C |
| M _d | Mounting Torque | 1.13 / 10 | Nm/lb.in |
| Weight | | 6 | g |

Features

- International Standard Package
- Low R_{DS(ON)} and Q_G
- Avalanche Rated
- Low Package Inductance

Advantages

- High Power Density
- Easy to Mount
- Space Savings

Applications

- Switch-Mode and Resonant-Mode Power Supplies
- DC-DC Converters
- PFC Circuits
- AC and DC Motor Drives
- Robotics and Servo Controls

| Symbol | Test Conditions (T _J = 25°C, Unless Otherwise Specified) | Characteristic Values | | |
|---------------------|---|-----------------------|------|---------------|
| | | Min. | Typ. | Max. |
| BV _{DSS} | V _{GS} = 0V, I _D = 1mA | 650 | | V |
| V _{GS(th)} | V _{DS} = V _{GS} , I _D = 4mA | 3.2 | | 5.2 V |
| I _{GSS} | V _{GS} = ±20V, V _{DS} = 0V | | | ±100 nA |
| I _{DSS} | V _{DS} = V _{DSS} , V _{GS} = 0V T _J = 125°C | | | 35 μA 5 mA |
| R _{DS(on)} | V _{GS} = 10V, I _D = 0.5 • I _{D25} , Note 1 | | | 59 mΩ |

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified) | Characteristic Values | | |
|-------------------------------------|---|--|------|-------------------------|
| | | Min. | Typ. | Max |
| g_{fs} | $V_{DS} = 10\text{V}$, $I_D = 0.5 \cdot I_{D25}$, Note 1 | 23 | 38 | S |
| R_{Gi} | Gate Input Resistance | | 3.0 | Ω |
| C_{iss} | $V_{GS} = 0\text{V}$, $V_{DS} = 25\text{V}$, $f = 1\text{MHz}$ | | 3360 | pF |
| C_{oss} | | | 5020 | pF |
| C_{rss} | | | 21 | pF |
| Effective Output Capacitance | | | | |
| $C_{o(er)}$ | Energy related | $V_{GS} = 0\text{V}$ $V_{DS} = 0.8 \cdot V_{DSS}$ | 165 | pF |
| $C_{o(tr)}$ | Time related | | 720 | pF |
| Resistive Switching Times | | | | |
| $t_{d(on)}$ | $V_{GS} = 10\text{V}$, $V_{DS} = 0.5 \cdot V_{DSS}$, $I_D = 0.5 \cdot I_{D25}$ $R_G = 10\Omega$ (External) | | 23 | ns |
| t_r | | | 10 | ns |
| $t_{d(off)}$ | | | 56 | ns |
| t_f | | | 7 | ns |
| $Q_{g(on)}$ | $V_{GS} = 10\text{V}$, $V_{DS} = 0.5 \cdot V_{DSS}$, $I_D = 0.5 \cdot I_{D25}$ | | 49 | nC |
| Q_{gs} | | | 17 | nC |
| Q_{gd} | | | 16 | nC |
| R_{thJC} | | | | 0.20 $^\circ\text{C/W}$ |
| R_{thCS} | | 0.21 | | $^\circ\text{C/W}$ |

Source-Drain Diode

| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified) | Characteristic Values | | |
|----------|--|-----------------------|------|-------|
| | | Min. | Typ. | Max |
| I_S | $V_{GS} = 0\text{V}$ | | | 54 A |
| I_{SM} | Repetitive, Pulse Width Limited by T_{JM} | | | 216 A |
| V_{SD} | $I_F = I_S$, $V_{GS} = 0\text{V}$, Note 1 | | | 1.4 V |
| t_{rr} | $I_F = 27\text{A}$, $-di/dt = 100\text{A}/\mu\text{s}$ $V_R = 100\text{V}$ | | 140 | ns |
| Q_{RM} | | | 860 | nC |
| I_{RM} | | | 12.3 | A |

Note 1. Pulse test, $t \leq 300\mu\text{s}$, duty cycle, $d \leq 2\%$.

Littelfuse 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 | 4,931,844 | 5,049,961 | 5,237,481 | 6,162,665 | 6,404,065B1 | 6,683,344 | 6,727,585 | 7,005,734B2 | 7,157,338B2 |
| | 4,860,072 | 5,017,508 | 5,063,307 | 5,381,025 | 6,259,123B1 | 6,534,343 | 6,710,405B2 | 6,759,692 | 7,063,975B2 | |
| | 4,881,106 | 5,034,796 | 5,187,117 | 5,486,715 | 6,306,728B1 | 6,583,505 | 6,710,463 | 6,771,478B2 | 7,071,537 | |

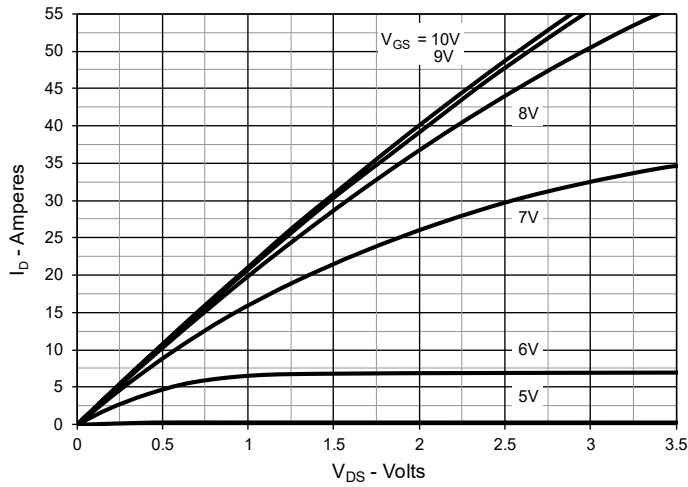
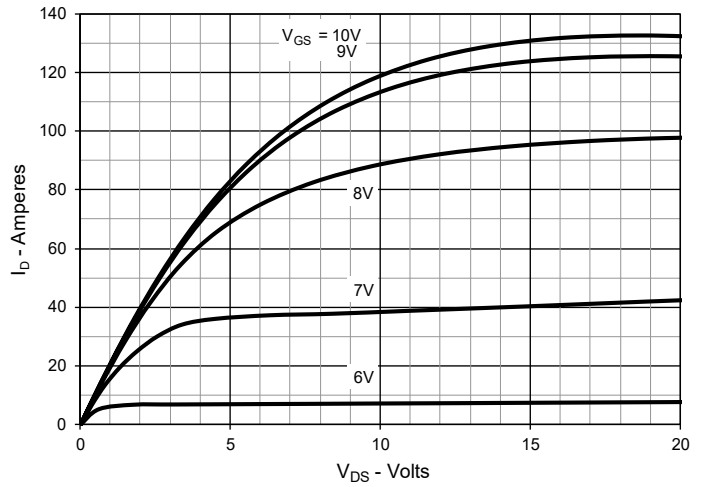
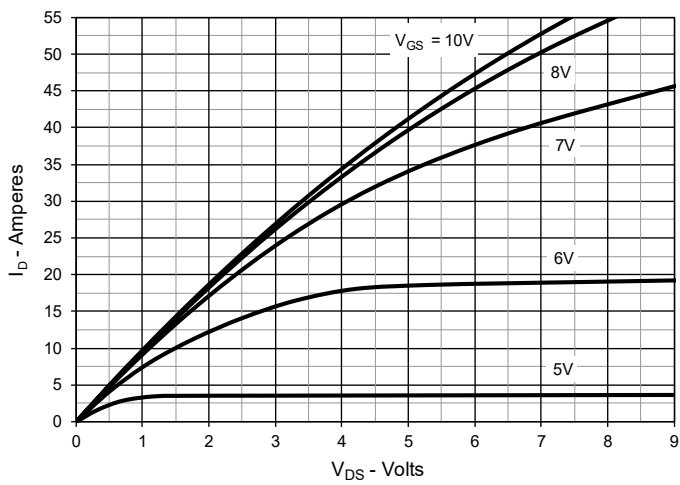
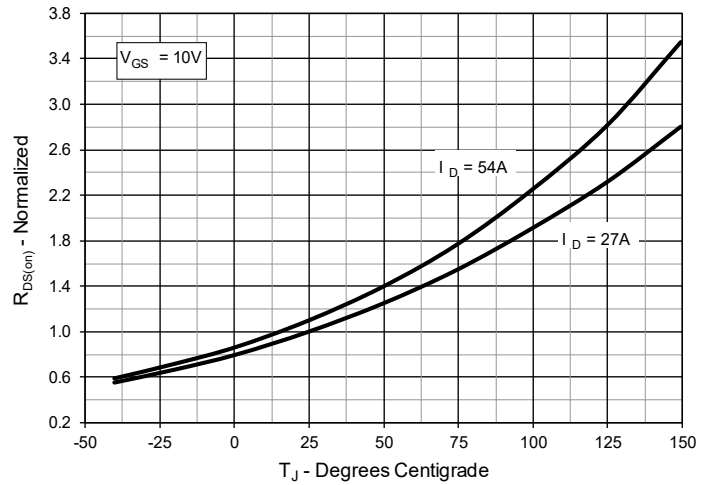
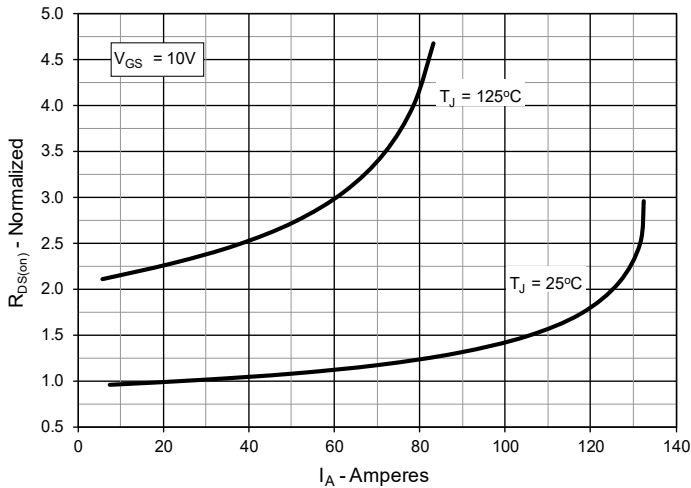
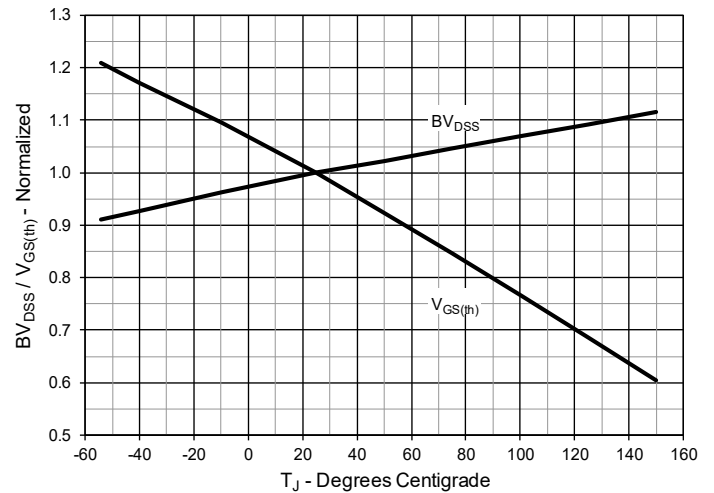
Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$

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

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

Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 27\text{A}$ Value vs. Junction Temperature

Fig. 5. $R_{DS(on)}$ Normalized to $I_D = 27\text{A}$ Value vs. Drain Current

Fig. 6. Normalized Breakdown & Threshold Voltages vs. Junction Temperature


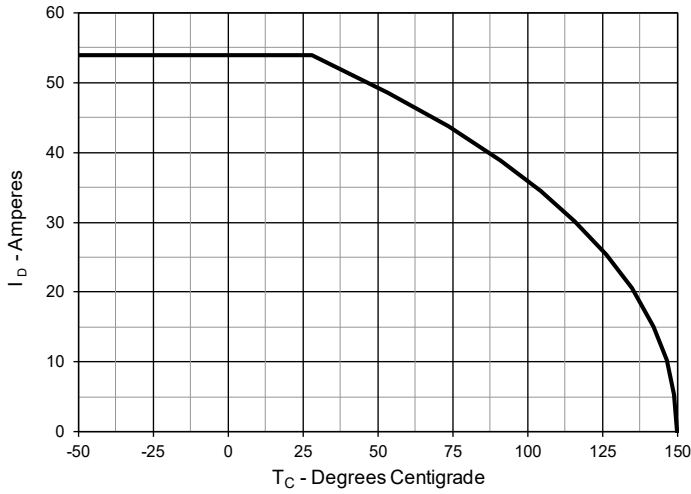
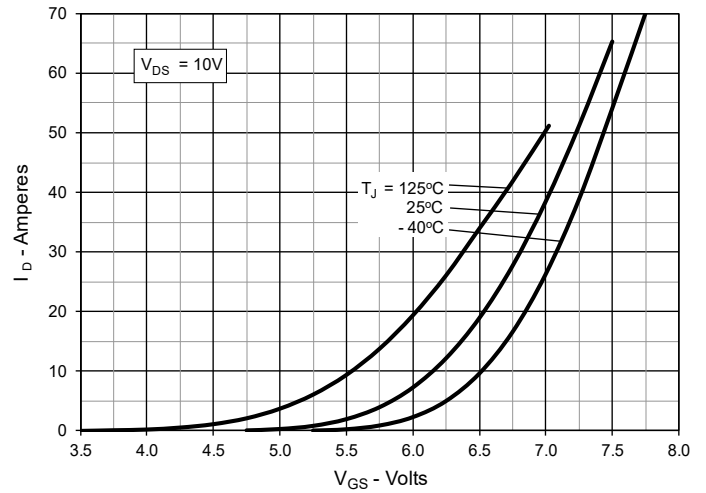
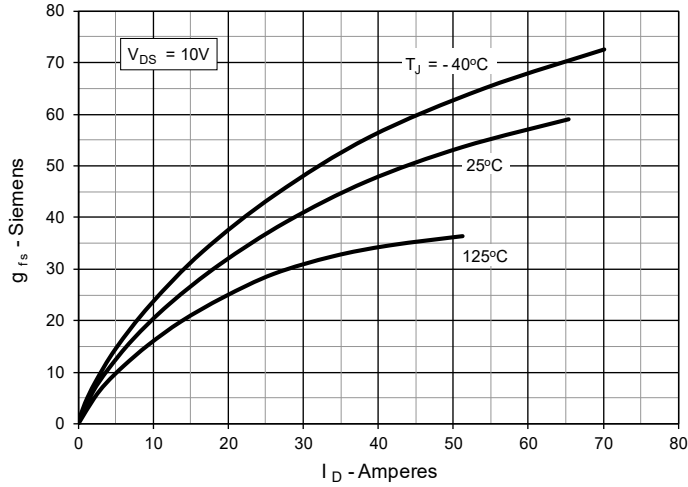
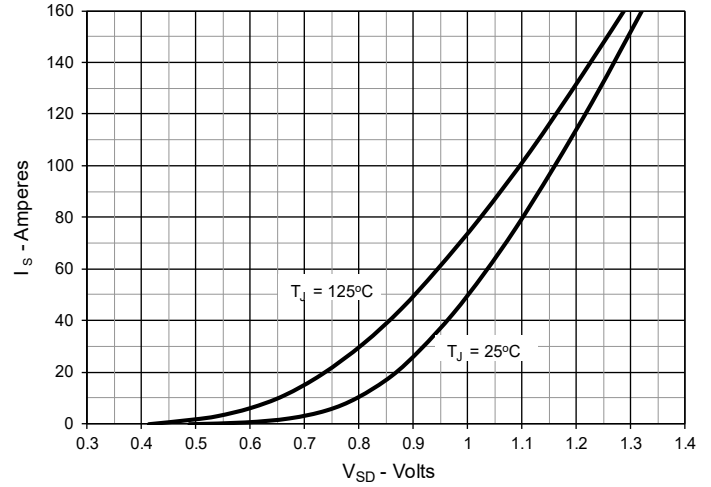
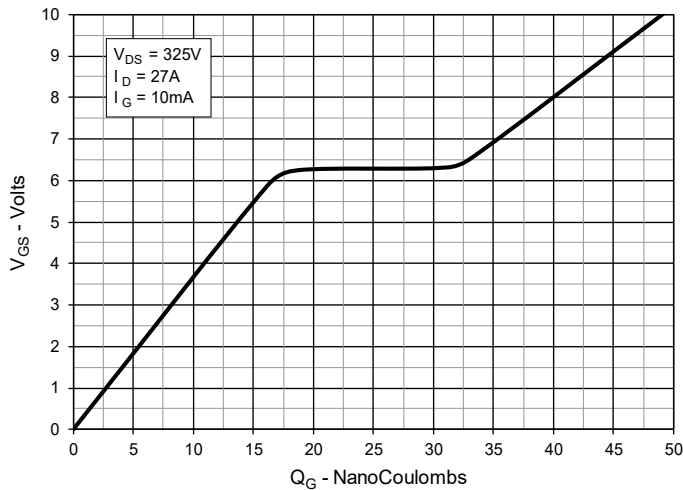
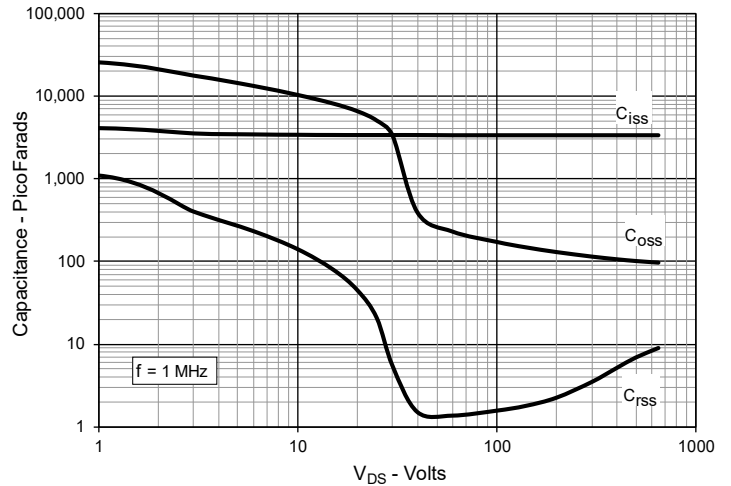
Fig. 7. Maximum Drain Current vs. Case Temperature

Fig. 8. Input Admittance

Fig. 9. Transconductance

Fig. 10. Forward Voltage Drop of Intrinsic Diode

Fig. 11. Gate Charge

Fig. 12. Capacitance


Fig. 13. Output Capacitance Stored Energy

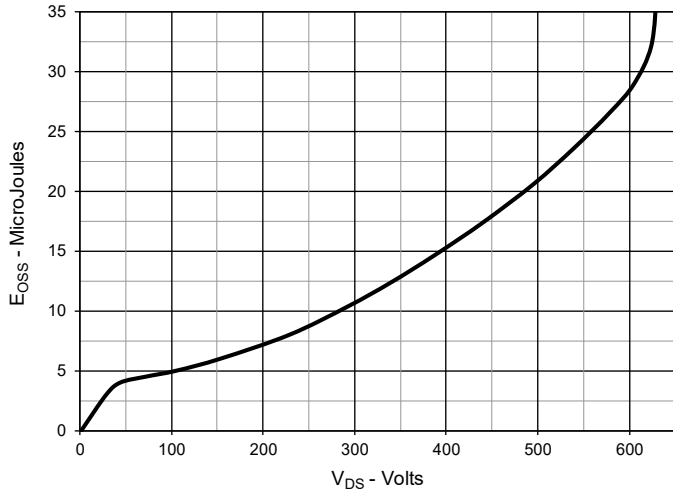


Fig. 14. Forward-Bias Safe Operating Area

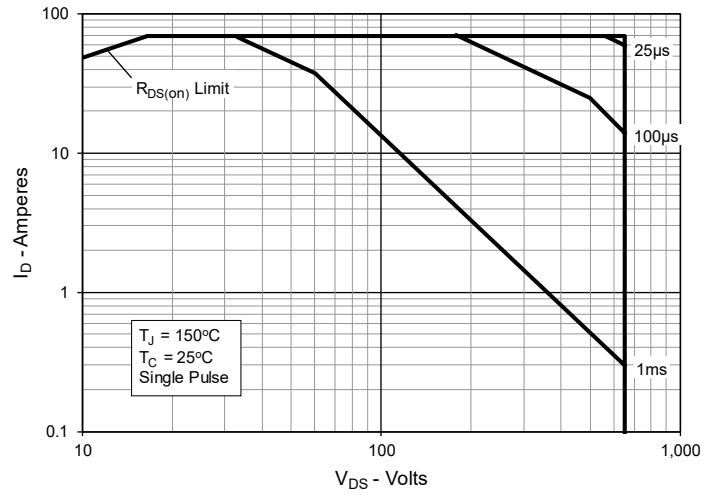


Fig. 15. Maximum Transient Thermal Impedance

