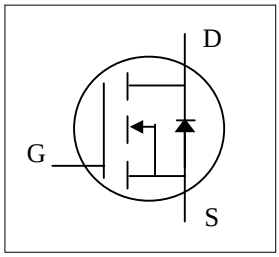
# XP65SL380DH

**Halogen-Free Product**

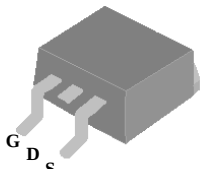
*N-CHANNEL ENHANCEMENT MODE*

*POWER MOSFET*

- **100% $R_g$ & UIS Test**
- **Fast Switching Characteristic**
- **Simple Drive Requirement**
- **RoHS Compliant & Halogen-Free**




| | |
|---|---|
| $BV_{DSS}$ | 650V |
| $R_{DS(ON)}$ | 0.38Ω |
| $I_D$[3] | 10A |




TO-252(H)

## Description

XP65SL380D series are innovated design and silicon process technology to achieve the lowest possible on-resistance and fast switching performance. It provides the designer with an extreme efficient device for use in a wide range of power applications.

The TO-252 package is widely preferred for commercial-industrial surface mount applications and suited for low voltage applications such as DC/DC converters.

## Absolute Maximum Ratings@$T_j$=25°C(unless otherwise specified)

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 650 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $V_{GS}$ | Gate-Source Voltage, AC (f > 1Hz) | ±30 | V |
| $I_D$@$T_C$=25℃ | Drain Current, $V_{GS}$ @ 10V[3] | 10 | A |
| $I_D$@$T_C$=100℃ | Drain Current, $V_{GS}$ @ 10V[3] | 6.5 | A |
| $I_{DM}$ | Pulsed Drain Current[1] | 24 | A |
| dv/dt | MOSFET dv/dt Ruggedness ($V_{DS}$ = 0 …400V ) | 40 | V/ns |
| $P_D$@$T_C$=25℃ | Total Power Dissipation | 78.1 | W |
| $P_D$@$T_A$=25℃ | Total Power Dissipation[6] | 2 | W |
| $E_{AS}$ | Single Pulse Avalanche Energy[4] | 75 | mJ |
| dv/dt | Peak Diode Recovery dv/dt[5] | 15 | V/ns |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | ℃ |

## Thermal Data

| Symbol | Parameter | Value | Units |
|---|---|---|---|
| Rthj-c | Maximum Thermal Resistance, Junction-case | 1.6 | ℃/W |
| Rthj-a | Maximum Thermal Resistance, Junction-ambient (PCB mount)[6] | 62.5 | ℃/W |

## Electrical Characteristics@$T_j$=25°C(unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=250uA | 650 | - | - | V |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance[2] | $V_{GS}$=10V, $I_D$=3.2A | - | - | 0.38 | Ω |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_D$=250uA | 2 | - | 5 | V |
| $g_{fs}$ | Forward Transconductance | $V_{DS}$=15V, $I_D$=3.2A | - | 6 | - | S |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=520V, $V_{GS}$=0V | - | - | 100 | uA |
| $I_{GSS}$ | Gate-Source Leakage | $V_{GS}$=±20V, $V_{DS}$=0V | - | - | ±1 | uA |
| $Q_g$ | Total Gate Charge | $I_D$=5A | - | 33 | 52.8 | nC |
| $Q_{gs}$ | Gate-Source Charge | $V_{DS}$=480V | - | 8 | - | nC |
| $Q_{gd}$ | Gate-Drain ("Miller") Charge | $V_{GS}$=10V | - | 14 | - | nC |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DD}$=300V | - | 13 | - | ns |
| $t_r$ | Rise Time | $I_D$=5A | - | 11 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | $R_G$=3.3Ω | - | 33 | - | ns |
| $t_f$ | Fall Time | $V_{GS}$=10V | - | 8 | - | ns |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V | - | 1160 | 1860 | pF |
| $C_{oss}$ | Output Capacitance | $V_{DS}$=100V | - | 40 | - | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | f=1.0MHz | - | 5 | - | pF |
| $R_g$ | Gate Resistance | f=1.0MHz | - | 3.3 | 6.6 | Ω |

## Source-Drain Diode

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| $V_{SD}$ | Forward On Voltage[2] | $I_S$=3.2A, $V_{GS}$=0V | - | 0.8 | - | V |
| $t_{rr}$ | Reverse Recovery Time | $I_S$=5A, $V_{GS}$=0V | - | 120 | - | ns |
| $Q_{rr}$ | Reverse Recovery Charge | dI/dt=100A/μs | - | 710 | - | nC |

**Notes:**

1.Pulse width limited by max. junction temperature.

2.Pulse test

3.Limited by max. junction temperature. Maximum duty cycle D=0.75

4.Starting $T_j$=25°C , $V_{DD}$=50V , L=150mH , $R_G$=25Ω

5.$I_{SD}$ ≦ $I_D$, $V_{DD}$ ≦ $BV_{DSS}$, starting $T_J$ = 25°C

6.Surface mounted on 1 $in^2$ copper pad of FR4 board

THIS PRODUCT IS SENSITIVE TO ELECTROSTATIC DISCHARGE, PLEASE HANDLE WITH CAUTION.
USE OF THIS PRODUCT AS A CRITICAL COMPONENT IN LIFE SUPPORT OR OTHER SIMILAR SYSTEMS IS NOT AUTHORIZED.
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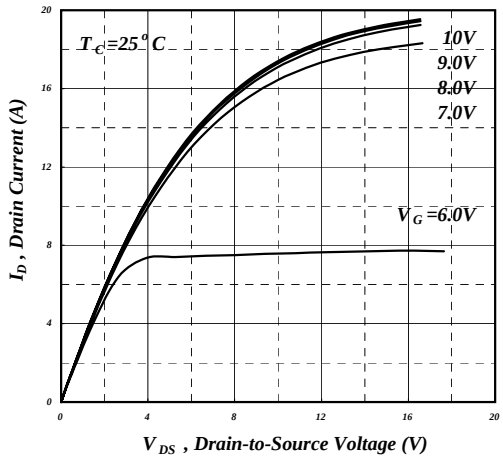



**Fig 1. Typical Output Characteristics**

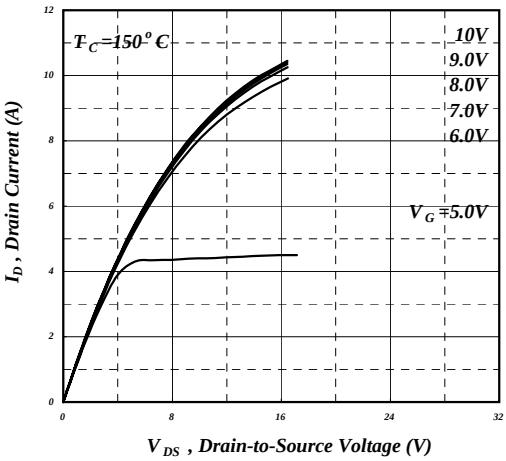



**Fig 2. Typical Output Characteristics**

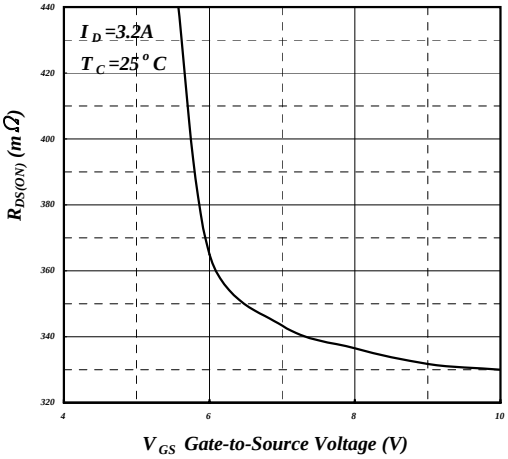



**Fig 3. On-Resistance v.s. Gate Voltage**

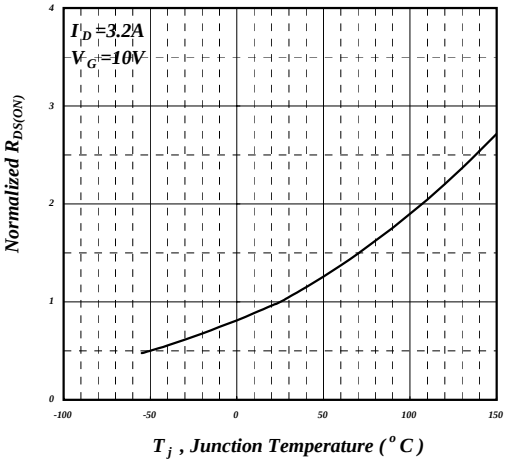



**Fig 4. Normalized On-Resistance v.s. Junction Temperature**

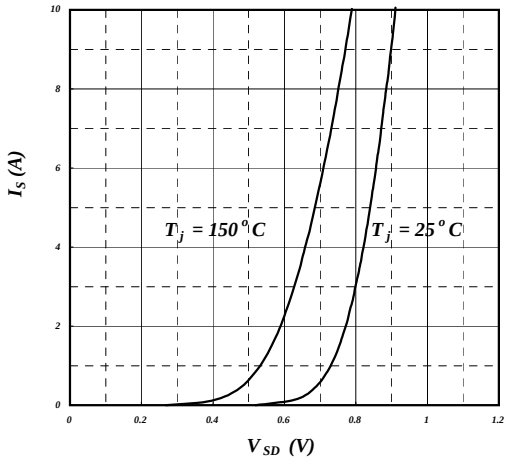



**Fig 5. Forward Characteristic of Reverse Diode**

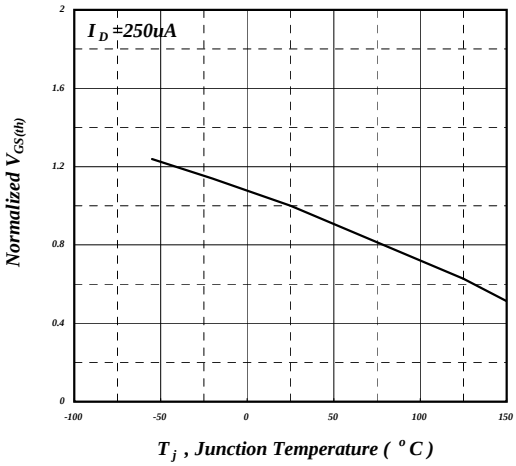



**Fig 6. Gate Threshold Voltage v.s. Junction Temperature**

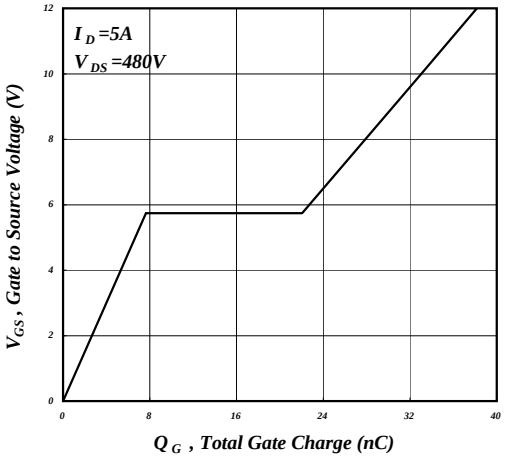



**Fig 7. Gate Charge Characteristics**

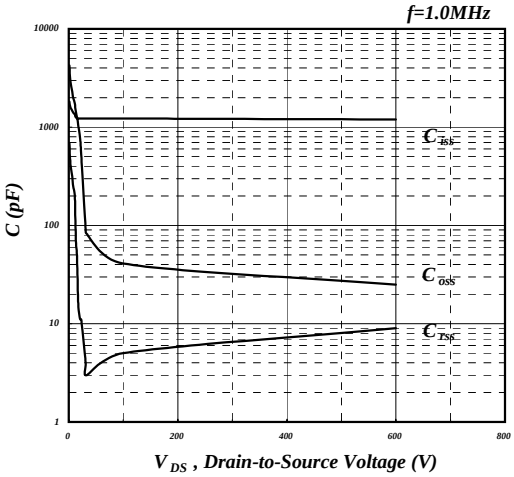



**Fig 8. Typical Capacitance Characteristics**

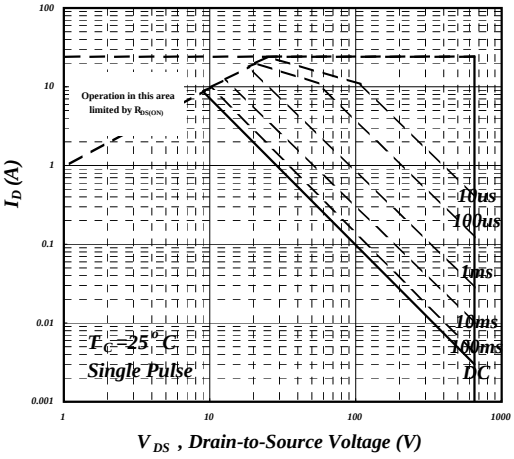



**Fig 9. Maximum Safe Operating Area**

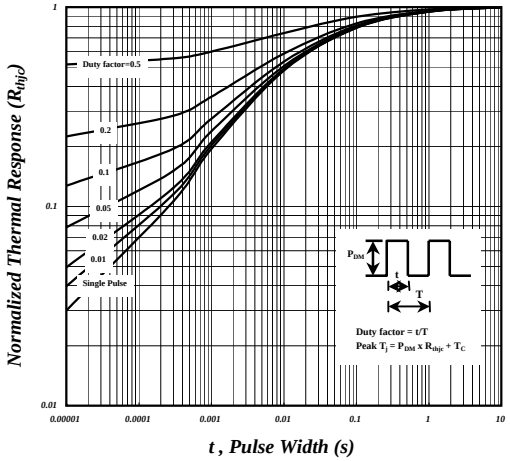



**Fig10. Effective Transient Thermal Impedance**

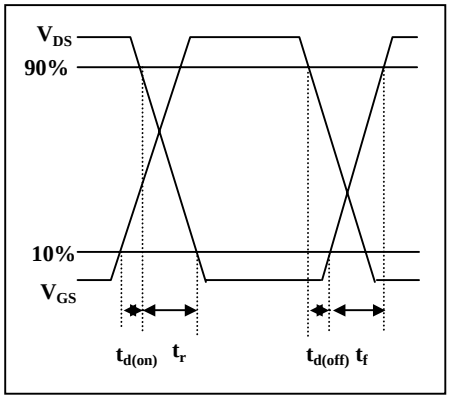



**Fig 11. Switching Time Waveform**

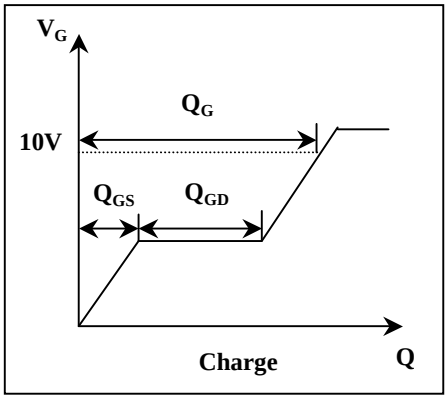



**Fig 12. Gate Charge Waveform**

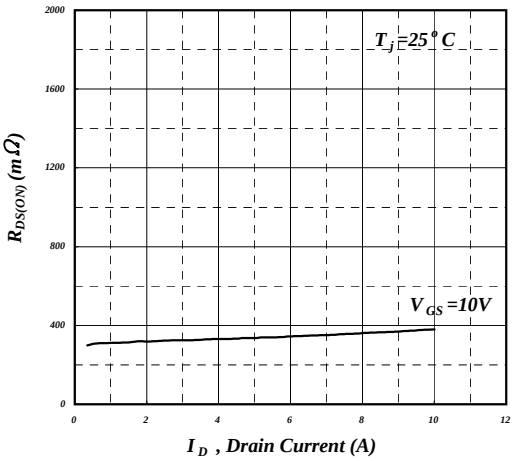



**Fig 13. Typ. Drain-Source on State Resistance**

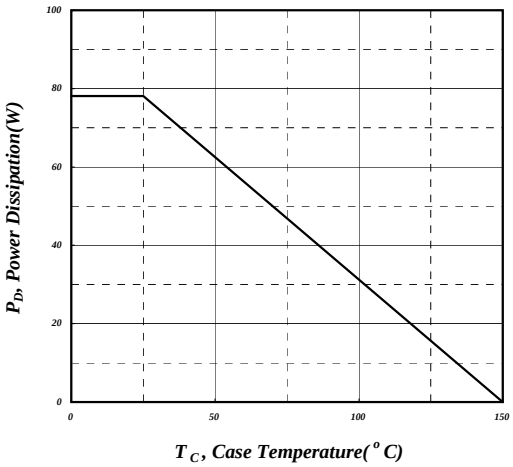
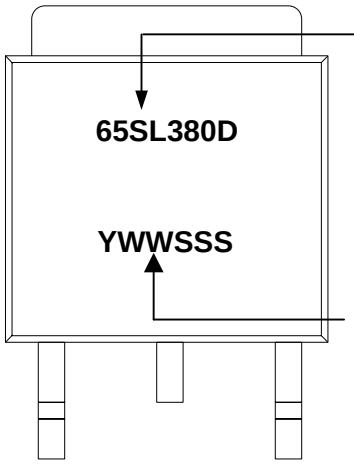
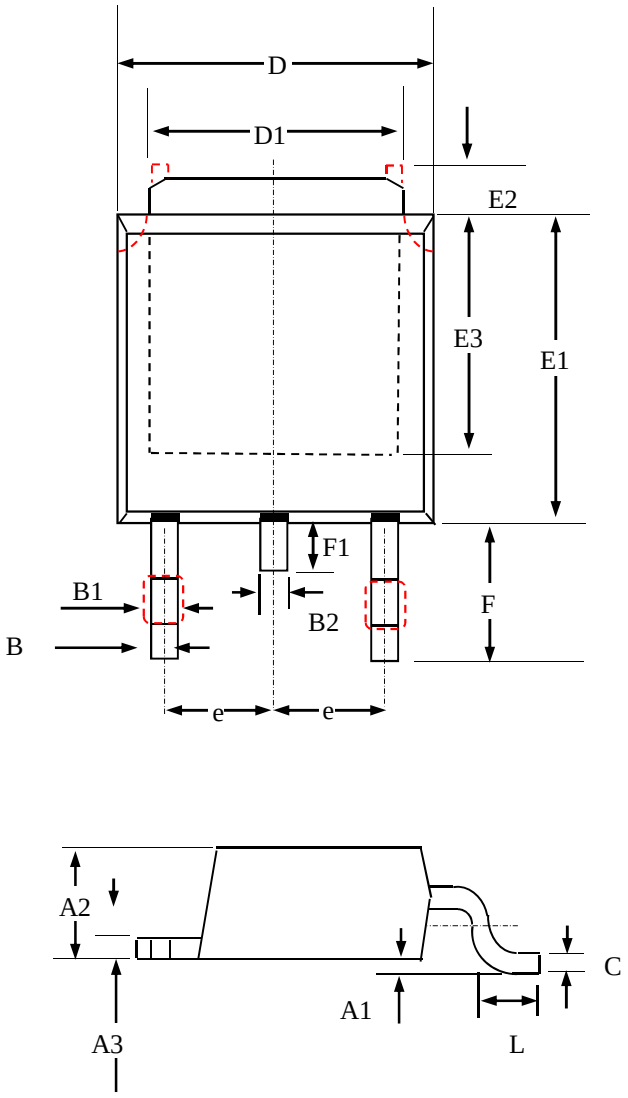



**Fig 14. Total Power Dissipation**

## MARKING INFORMATION



# Package Outline : TO-252







| SYMBOLS | Millimeters | | |
|---|---|---|---|
| | MIN | NOM | MAX |
| A2 | 2.18 | 2.30 | 2.40 |
| A3 | 0.40 | 0.50 | 0.65 |
| B | 0.40 | 0.70 | 1.00 |
| B1 | 0.50 | 0.85 | 1.20 |
| D | 6.00 | 6.50 | 6.80 |
| D1 | 4.80 | 5.35 | 5.90 |
| E3 | 4.00 (ref.) | | |
| F | 2.00 | 2.63 | 3.05 |
| F1 | 0.50 | 0.85 | 1.20 |
| E1 | 5.00 | 5.70 | 6.30 |
| E2 | 0.50 | 1.10 | 1.80 |
| e | 2.3 (ref) | | |
| C | 0.35 | 0.525 | 0.70 |
| A1 | 0.00 | — | 0.25 |
| B2 | — | — | 1.25 |
| L | 0.90 | 1.34 | 1.78 |

1.All Dimensions Are in Millimeters.

2.Dimension Does Not Include Mold Protrusions.

3. Thermal PAD, Body and Pin contour is for reference, it may has little difference by option.

Draw No. M1-H3EFIMT-G-v10

## TO-252 FOOTPRINT：