



**Advanced Power  
Electronics Corp.**

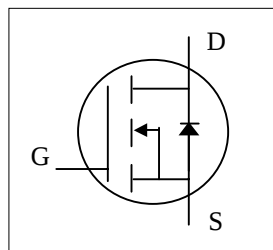
**AP65SL380AH**

**Halogen-Free Product**

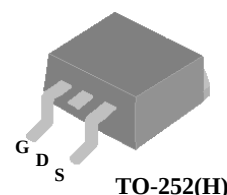
**N-CHANNEL ENHANCEMENT MODE**

**POWER MOSFET**

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



|                       |               |
|-----------------------|---------------|
| $V_{DS} @ T_{j,max.}$ | 700V          |
| $R_{DS(ON)}$          | 0.38 $\Omega$ |
| $I_D^3$               | 10A           |



## Description

AP65SL380A series are from Advanced Power 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@ $T_j=25^\circ\text{C}$ (unless otherwise specified)

| Symbol                        | Parameter                                           | Rating     | Units            |
|-------------------------------|-----------------------------------------------------|------------|------------------|
| $V_{DS}$                      | Drain-Source Voltage                                | 650        | V                |
| $V_{GS}$                      | Gate-Source Voltage                                 | +20        | V                |
| $I_D @ T_C=25^\circ\text{C}$  | Drain Current, $V_{GS} @ 10V^3$                     | 10         | A                |
| $I_D @ T_C=100^\circ\text{C}$ | Drain Current, $V_{GS} @ 10V^3$                     | 6.5        | A                |
| $I_{DM}$                      | Pulsed Drain Current <sup>1</sup>                   | 24         | A                |
| dv/dt                         | MOSFET dv/dt Ruggedness ( $V_{DS} = 0 \dots 400V$ ) | 50         | V/ns             |
| $P_D @ T_C=25^\circ\text{C}$  | Total Power Dissipation                             | 78.1       | W                |
| $P_D @ T_A=25^\circ\text{C}$  | Total Power Dissipation <sup>4</sup>                | 2          | W                |
| $E_{AS}$                      | Single Pulse Avalanche Energy <sup>5</sup>          | 75         | mJ               |
| dv/dt                         | Peak Diode Recovery dv/dt <sup>6</sup>              | 15         | V/ns             |
| $T_{STG}$                     | Storage Temperature Range                           | -55 to 150 | $^\circ\text{C}$ |
| $T_J$                         | Operating Junction Temperature Range                | -55 to 150 | $^\circ\text{C}$ |

## Thermal Data

| Symbol      | Parameter                                                 | Value | Units                     |
|-------------|-----------------------------------------------------------|-------|---------------------------|
| $R_{thj-c}$ | Maximum Thermal Resistance, Junction-case                 | 1.6   | $^\circ\text{C}/\text{W}$ |
| $R_{thj-a}$ | Maximum Thermal Resistance, Junction-ambient <sup>4</sup> | 62.5  | $^\circ\text{C}/\text{W}$ |



# AP65SL380AH

## Electrical Characteristics@T<sub>J</sub>=25°C(unless otherwise specified)

| Symbol              | Parameter                                      | Test Conditions                                          | Min. | Typ. | Max. | Units |
|---------------------|------------------------------------------------|----------------------------------------------------------|------|------|------|-------|
| BV <sub>DSS</sub>   | Drain-Source Breakdown Voltage                 | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA               | 650  | -    | -    | V     |
| R <sub>DS(ON)</sub> | Static Drain-Source On-Resistance <sup>2</sup> | V <sub>GS</sub> =10V, I <sub>D</sub> =3.2A               | -    | -    | 0.38 | Ω     |
| V <sub>GS(th)</sub> | Gate Threshold Voltage                         | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA | 2    | -    | 5    | V     |
| g <sub>fs</sub>     | Forward Transconductance                       | V <sub>DS</sub> =10V, I <sub>D</sub> =5A                 | -    | 10   | -    | S     |
| I <sub>DSS</sub>    | Drain-Source Leakage Current                   | V <sub>DS</sub> =480V, V <sub>GS</sub> =0V               | -    | -    | 100  | uA    |
| I <sub>GSS</sub>    | Gate-Source Leakage                            | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V               | -    | -    | ±100 | nA    |
| Q <sub>g</sub>      | Total Gate Charge                              | I <sub>D</sub> =5A                                       | -    | 32   | 51   | nC    |
| Q <sub>gs</sub>     | Gate-Source Charge                             | V <sub>DS</sub> =480V                                    | -    | 9    | -    | nC    |
| Q <sub>gd</sub>     | Gate-Drain ("Miller") Charge                   | V <sub>GS</sub> =10V                                     | -    | 13   | -    | nC    |
| t <sub>d(on)</sub>  | Turn-on Delay Time                             | V <sub>DD</sub> =300V                                    | -    | 13   | -    | ns    |
| t <sub>r</sub>      | Rise Time                                      | I <sub>D</sub> =5A                                       | -    | 11   | -    | ns    |
| t <sub>d(off)</sub> | Turn-off Delay Time                            | R <sub>G</sub> =3.3Ω                                     | -    | 32   | -    | ns    |
| t <sub>f</sub>      | Fall Time                                      | V <sub>GS</sub> =10V                                     | -    | 8    | -    | ns    |
| C <sub>iss</sub>    | Input Capacitance                              | V <sub>GS</sub> =0V                                      | -    | 1230 | 1965 | pF    |
| C <sub>oss</sub>    | Output Capacitance                             | V <sub>DS</sub> =100V                                    | -    | 40   | -    | pF    |
| C <sub>rss</sub>    | Reverse Transfer Capacitance                   | f=1.0MHz                                                 | -    | 6    | -    | pF    |
| R <sub>g</sub>      | Gate Resistance                                | f=1.0MHz                                                 | -    | 3.6  | 7.2  | Ω     |

## Source-Drain Diode

| Symbol          | Parameter                       | Test Conditions                           | Min. | Typ. | Max. | Units |
|-----------------|---------------------------------|-------------------------------------------|------|------|------|-------|
| V <sub>SD</sub> | Forward On Voltage <sup>2</sup> | I <sub>S</sub> =3.2A, V <sub>GS</sub> =0V | -    | 0.8  | -    | V     |
| t <sub>rr</sub> | Reverse Recovery Time           | I <sub>S</sub> =10A, V <sub>GS</sub> =0V  | -    | 310  | -    | ns    |
| Q <sub>rr</sub> | Reverse Recovery Charge         | di/dt=50A/μs                              | -    | 2.4  | -    | μC    |

### 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.Surface mounted on 1 in<sup>2</sup> copper pad of FR4 board
- 5.Starting T<sub>J</sub>=25°C , V<sub>DD</sub>=50V , L=150mH , R<sub>G</sub>=25Ω
- 6.I<sub>SD</sub> ≤ I<sub>D</sub>, V<sub>DD</sub> ≤ BV<sub>DSS</sub>, starting T<sub>J</sub> = 25°C

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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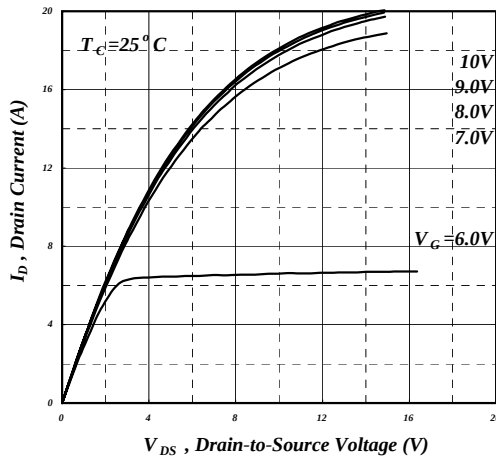


Fig 1. Typical Output Characteristics

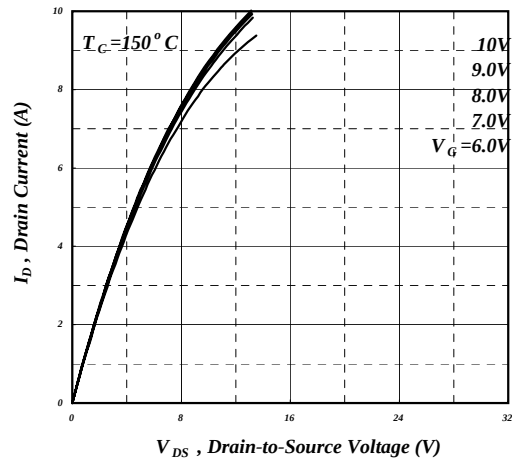


Fig 2. Typical Output Characteristics

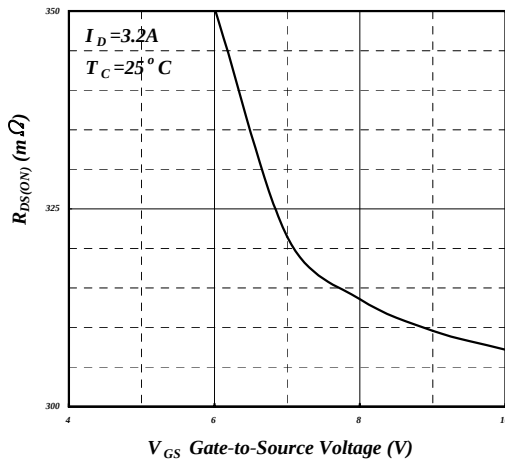


Fig 3. On-Resistance v.s. Gate Voltage

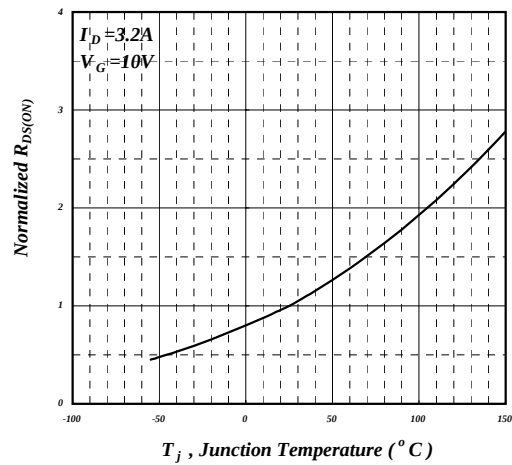


Fig 4. Normalized On-Resistance v.s. Junction Temperature

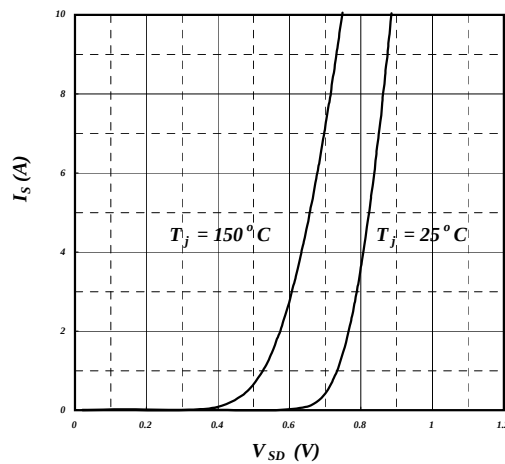


Fig 5. Forward Characteristic of Reverse Diode

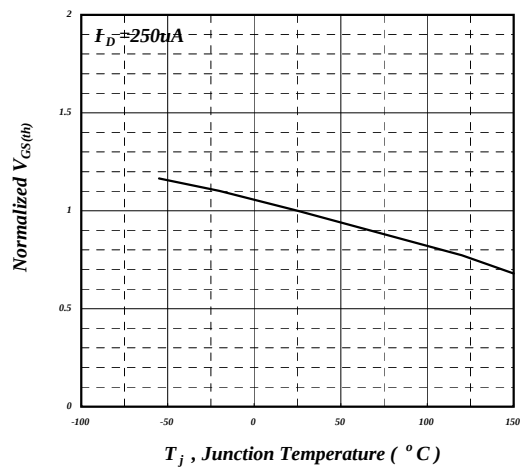


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

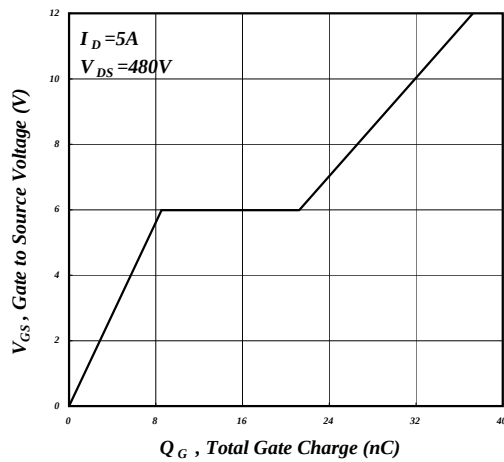


Fig 7. Gate Charge Characteristics

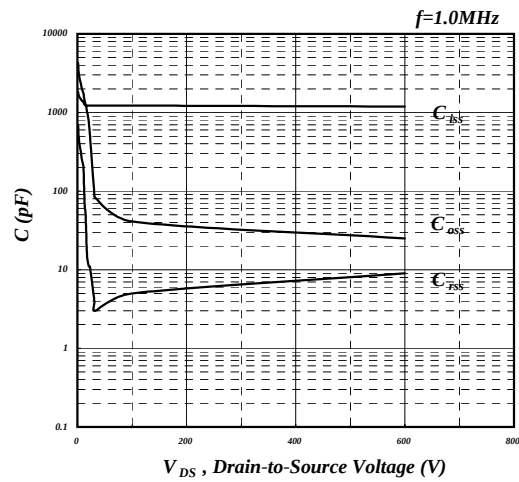


Fig 8. Typical Capacitance Characteristics

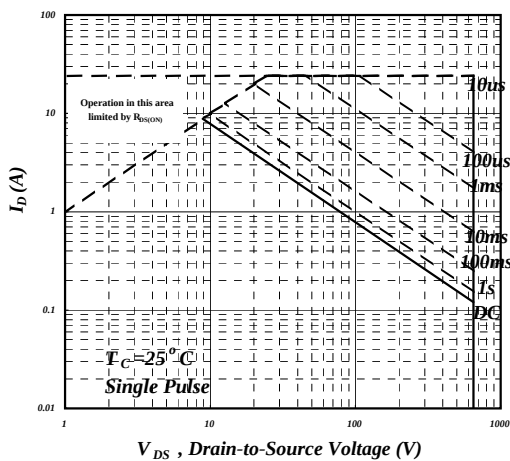


Fig 9. Maximum Safe Operating Area

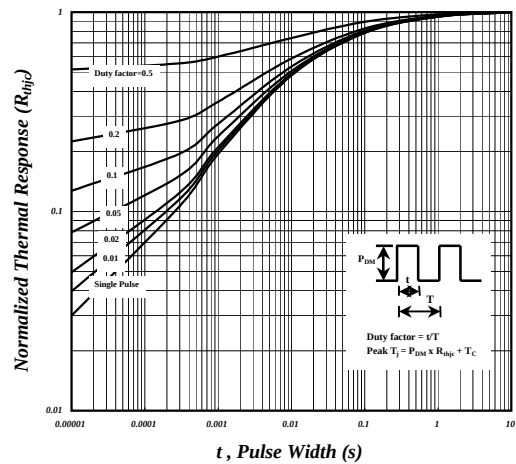


Fig10. Effective Transient Thermal Impedance

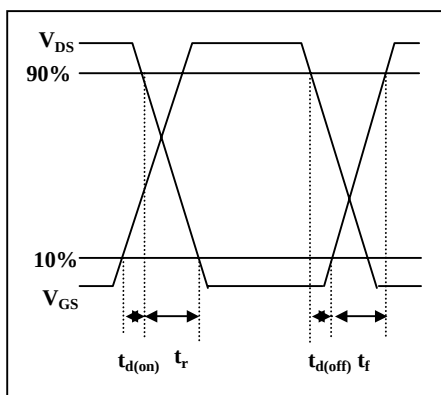


Fig 11. Switching Time Waveform

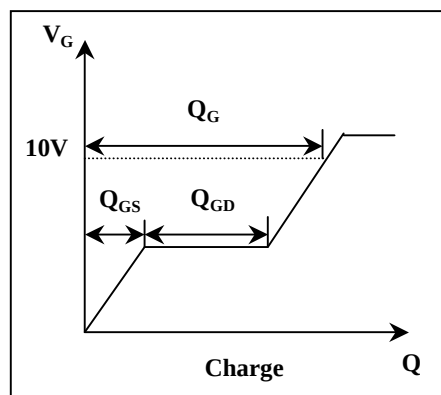


Fig 12. Gate Charge Waveform

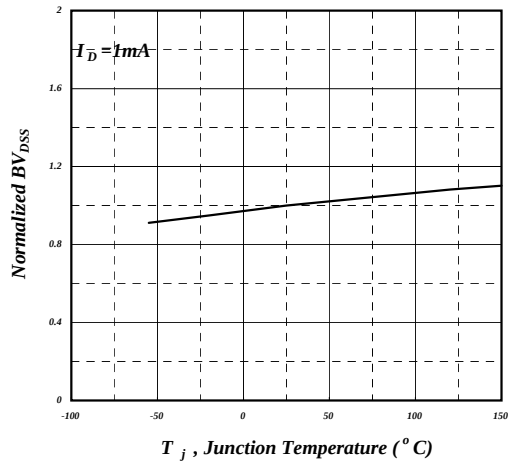


Fig 13. Normalized  $BV_{DSS}$  v.s. Junction Temperature

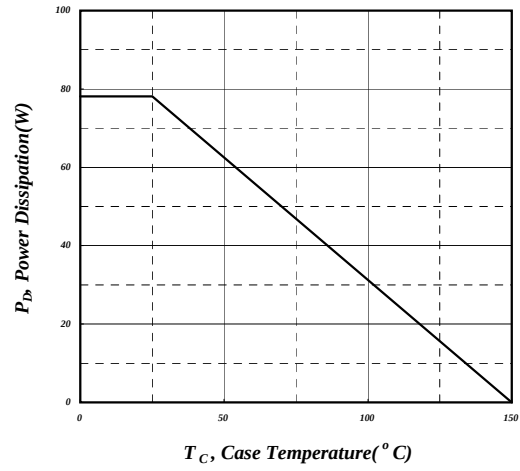


Fig 14. Total Power Dissipation

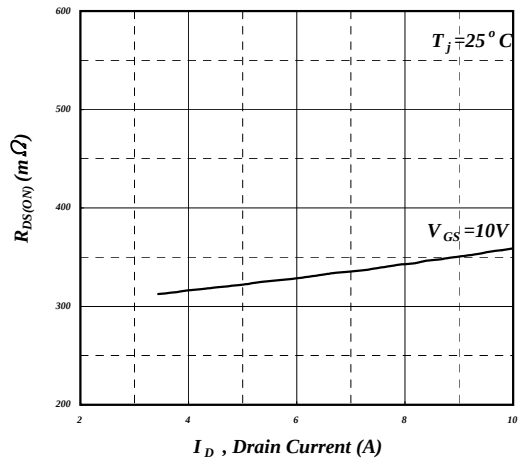


Fig 15. Typ. Drain-Source on State Resistance



# AP65SL380AH

## MARKING INFORMATION

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