

AP1805EQD

Dual-N-Channel Enhancement Mosfet

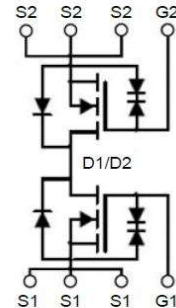
AIIPOWER

DATA SHEET

Feature

- 18V,15A
 $R_{DS(ON)} < 5.2m\Omega @ V_{GS}=4.5V$ TYP=3.8 m Ω
 $R_{DS(ON)} < 6.2m\Omega @ V_{GS}=2.5V$ TYP=4.8 m Ω
- Advanced Trench Technology
- Lead free product is acquired
- ESD >2KV

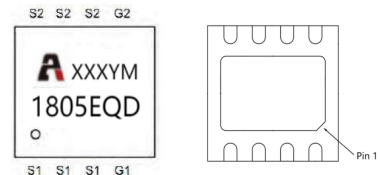
Equivalent Circuit



Application

- PWM applications
- Load Switch
- Power management

DFN 3x3 Package



Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity (PCS) |
|----------------|-----------|----------------|-----------|------------|----------------|
| 1805EQD | AP1805EQD | DFN3X3 | - | - | 5000 |

ABSOLUTE MAXIMUM RATINGS ($T_a=25^\circ\text{C}$ unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|---|-----------------|-----------|---------------------------|
| Drain-Source Voltage | V_{DS} | 18 | V |
| Gate-Source Voltage | V_{GS} | ± 10 | V |
| Continuous Drain Current ($T_a=25^\circ\text{C}$) | I_D | 15 | A |
| Continuous Drain Current ($T_a=100^\circ\text{C}$) | I_D | 10 | A |
| Pulsed Drain Current ⁽¹⁾ | I_{DM} | 60 | A |
| Single Pulsed Avalanche Energy ⁽²⁾ | E_{AS} | 30 | mJ |
| Power Dissipation | P_D | 32 | W |
| Thermal Resistance from Junction to Case ⁽⁴⁾ | $R_{\theta JC}$ | 3.9 | $^\circ\text{C}/\text{W}$ |
| Junction Temperature | T_J | 150 | $^\circ\text{C}$ |
| Storage Temperature | T_{STG} | -55~ +150 | $^\circ\text{C}$ |

MOSFET ELECTRICAL CHARACTERISTICS($T_a=25^{\circ}\text{C}$ unless otherwise noted)

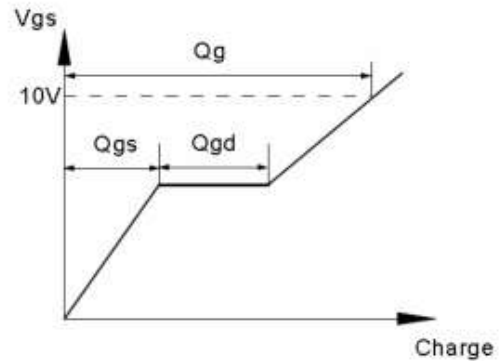
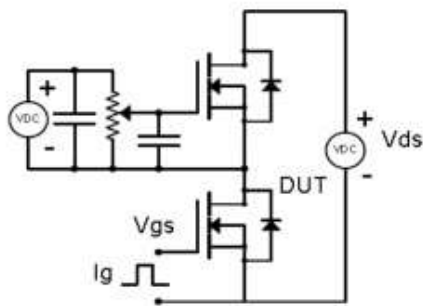
| Parameter | Symbol | Test Condition | Min | Type | Max | Unit |
|---|---------------|---|-----|------|----------|------------|
| Static Characteristics | | | | | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = 250\mu A$ | 18 | - | - | V |
| Zero gate voltage drain current | I_{DSS} | $V_{DS} = 18V, V_{GS} = 0V$ | - | - | 1 | μA |
| Gate-body leakage current | I_{GSS} | $V_{GS} = \pm 10V, V_{DS} = 0V$ | - | - | ± 10 | μA |
| Gate threshold voltage ⁽³⁾ | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\mu A$ | 0.5 | 0.7 | 0.9 | V |
| Drain-source on-resistance ⁽³⁾ | $R_{DS(on)}$ | $V_{GS} = 4.5V, I_D = 3A$ | - | 3.8 | 5.2 | m Ω |
| | | $V_{GS} = 2.5V, I_D = 3A$ | - | 4.8 | 6.2 | |
| Dynamic characteristics | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS} = 10V, V_{GS} = 0V, f = 1MHz$ | - | 2610 | - | pF |
| Output Capacitance | C_{oss} | | - | 344 | - | |
| Reverse Transfer Capacitance | C_{rss} | | - | 320 | - | |
| Switching characteristics | | | | | | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD} = 15V, I_D = 3A,$ $V_{GS} = 4.5V, R_G = 3.3\Omega$ | - | 8 | - | ns |
| Turn-on rise time | t_r | | - | 36 | - | |
| Turn-off delay time | $t_{d(off)}$ | | - | 378 | - | |
| Turn-off fall time | t_f | | - | 201 | - | |
| Total Gate Charge | Q_g | $V_{DS} = 10V, I_D = 3A,$ $V_{GS} = 4.5V$ | - | 36 | - | nC |
| Gate-Source Charge | Q_{gs} | | - | 3 | - | |
| Gate-Drain Charge | Q_{gd} | | - | 13.2 | - | |
| Source-Drain Diode characteristics | | | | | | |
| Diode Forward voltage ⁽³⁾ | V_{DS} | $V_{GS} = 0V, I_S = 3A$ | - | - | 1.2 | V |
| Diode Forward current ⁽⁴⁾ | I_S | | - | - | 15 | A |
| Body Diode Reverse Recovery Time | t_{rr} | $T_J = 25^{\circ}, I_F = 3A, di/dt = 100A/\mu s$ | | 21 | | ns |
| Body Diode Reverse Recovery Charge | Q_{rr} | $T_J = 25^{\circ}, I_F = 3A, di/dt = 100A/\mu s$ | | 9 | | nc |

Notes:

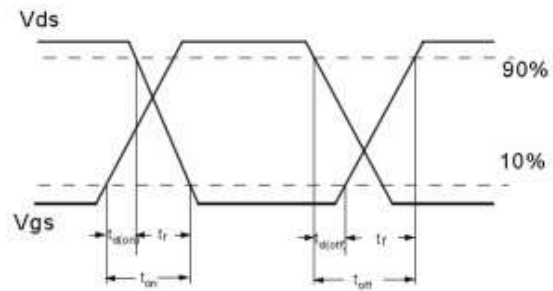
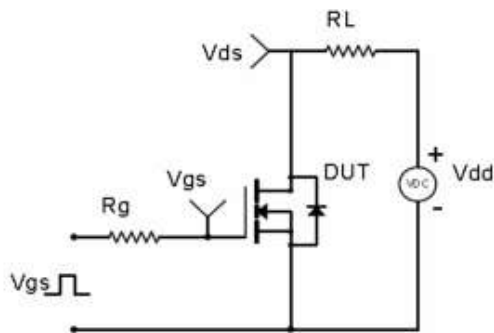
1. Repetitive Rating: pulse width limited by maximum junction temperature
2. EAS Condition: $T_J = 25^{\circ}\text{C}, V_{DD} = 10V, R_G = 25\Omega, L = 0.5\text{mH}$
3. Pulse Test: pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
4. Surface Mounted on FR4 Board, $t \leq 10\text{ sec}$

Test Circuit & Waveform

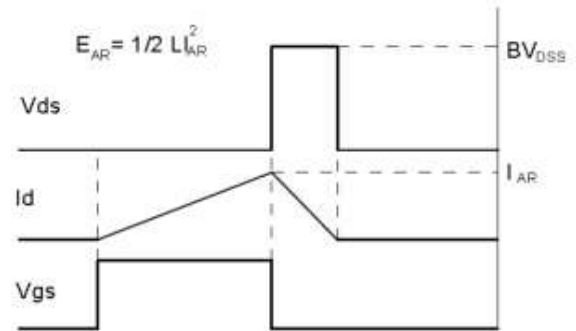
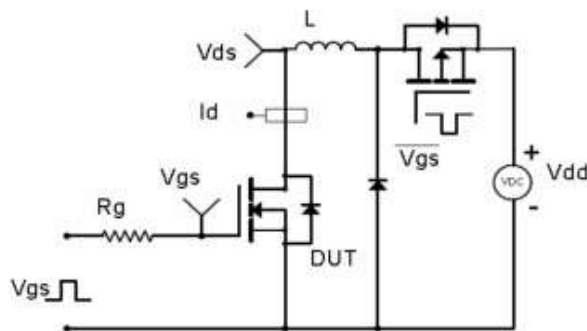
Gate Charge Test Circuit & Waveform



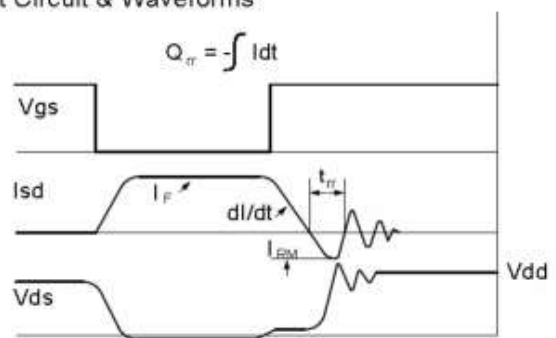
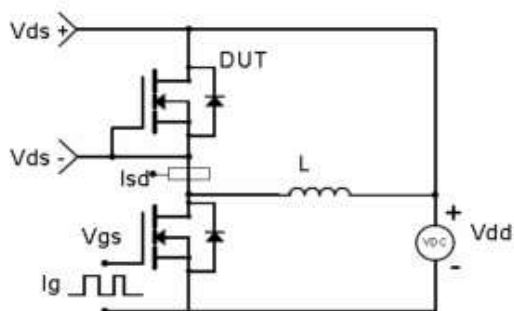
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Typical Performance Characteristics

Fig.1 Typical Output Characteristics

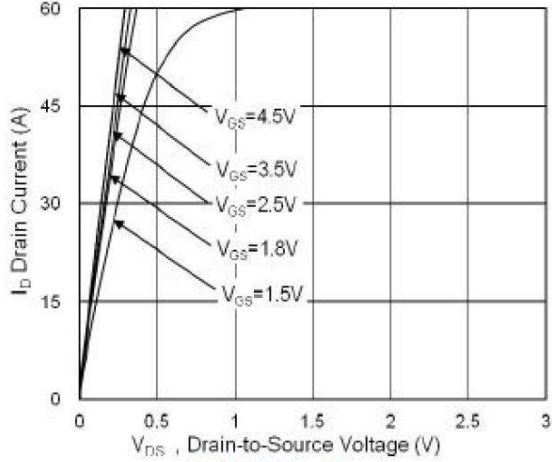


Fig.2 On-Resistance vs. Gate-Source

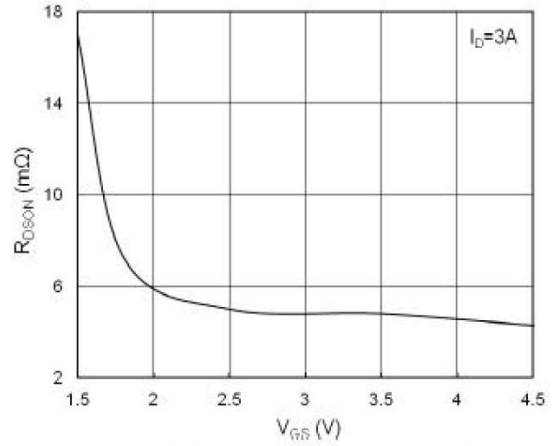


Fig.3 Forward Characteristics Of Reverse

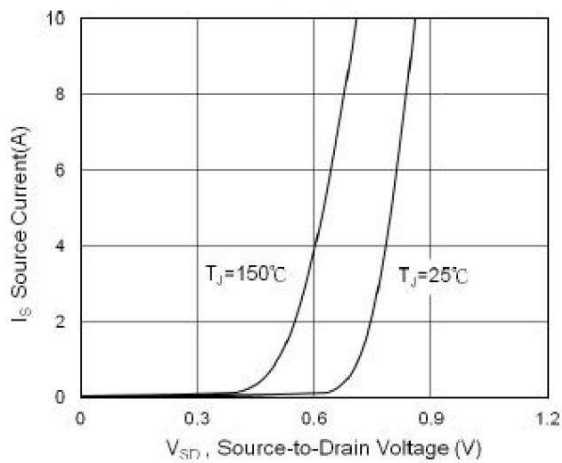


Fig. 4 Gate Charge Characteristics

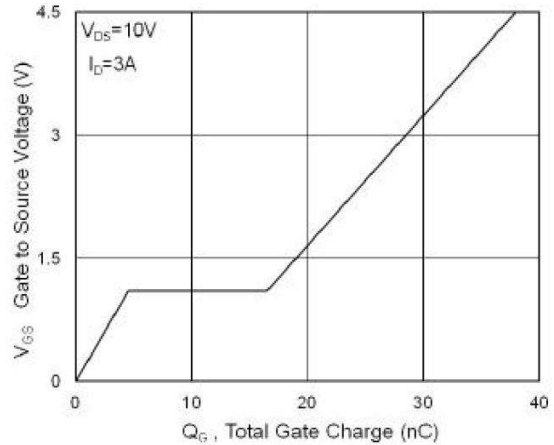


Fig.5 $V_{GS(th)}$ vs. T_J

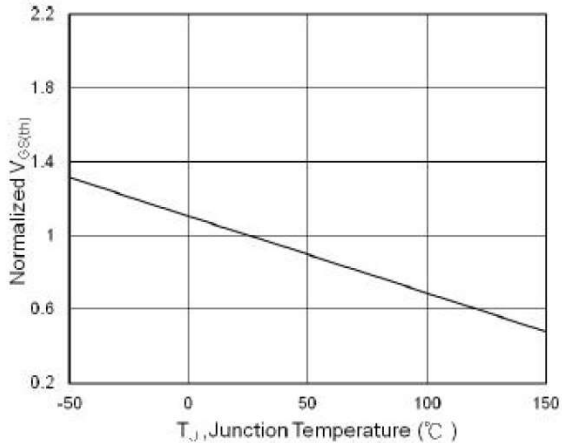


Fig. 6 Normalized R_{DSON} vs. T_J

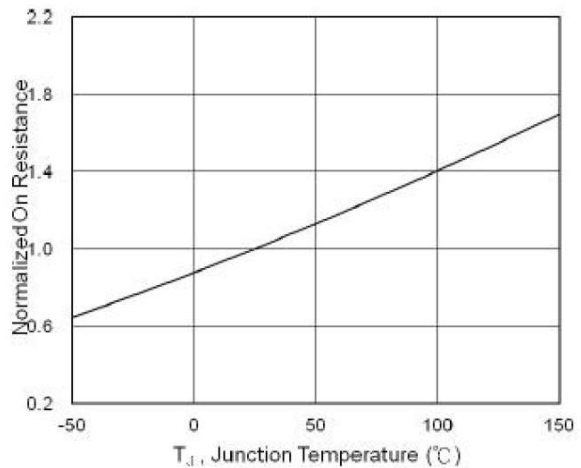


Fig.7 Capacitance

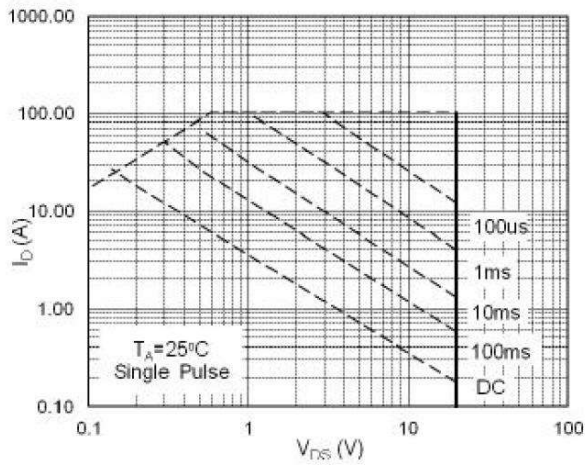


Fig.8 Safe Operating Area

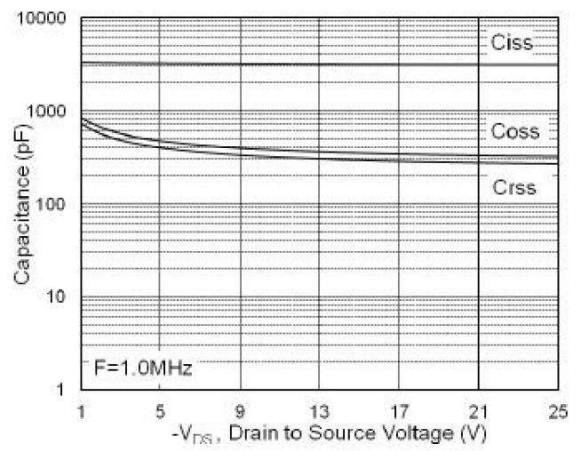
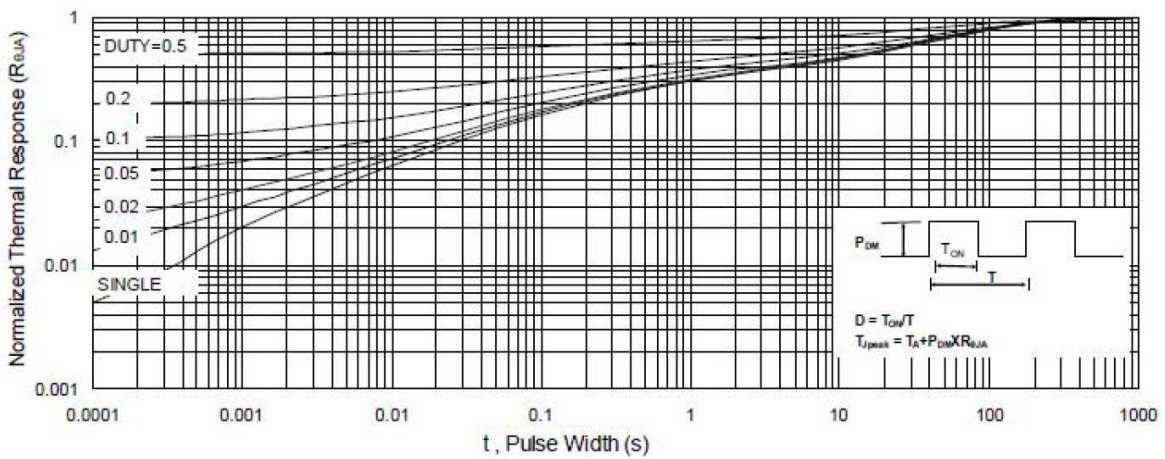
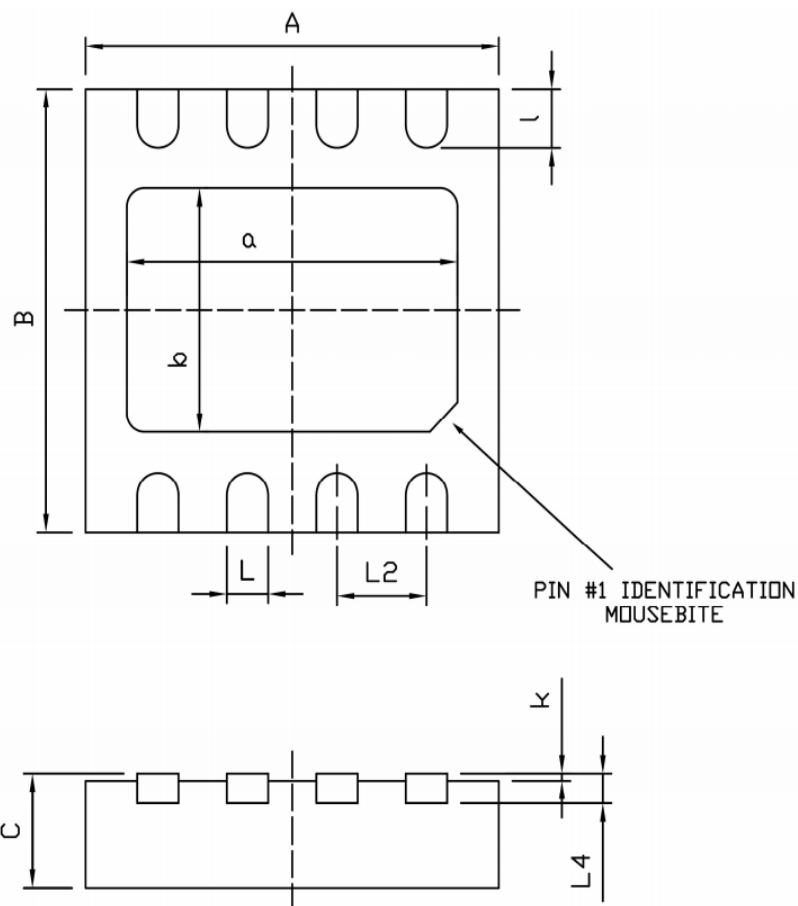


Fig. 9 Normalized Maximum Transient Thermal Impedance



DFN3X3 Package Information



| Dimensions In Millimeterer | | | |
|-------------------------------|-------|------|-------|
| Symbol | MIN | TYP | MAX |
| A | 2.95 | 3.00 | 3.05 |
| B | 2.95 | 3.00 | 3.05 |
| C | 0.70 | 0.75 | 0.80 |
| L | 0.25 | 0.30 | 0.35 |
| l | 0.324 | 0.40 | 0.476 |
| L2 | - | 0.65 | - |
| L4 | - | 0.20 | - |
| a | 2.20 | 2.30 | 2.40 |
| b | 1.40 | 1.50 | 1.60 |
| k | 0.00 | - | 0.05 |

Revision History

| Revision | Release | Remark |
|----------|------------|---------------------|
| V1.2 | 2024/11/05 | Update package data |

Disclaimer

The information given in this document describes the independent performance of the product, but similar performance is not guaranteed under other working conditions, and cannot be guaranteed when installed with other products or equipment. To achieve the required performance of the product in actual scenarios, the customer should conduct a complete application test to assess the functionality of the product.

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