



### N-Channel Enhancement Mode Power MOSFET

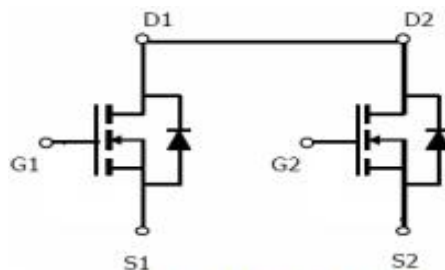
The MX8205AH uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching applications.

#### General Features

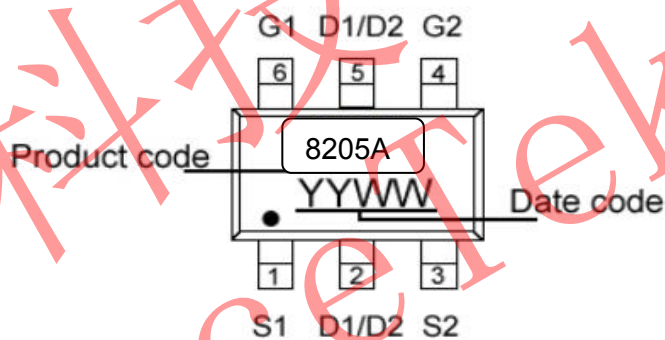
- ◆  $V_{DS} = 20V, I_D = 6A$   
 $R_{DS(ON)} (Typ.) = 22m\Omega @ V_{GS} = 4.5V$   
 $R_{DS(ON)} (Typ.) = 27m\Omega @ V_{GS} = 2.5V$
- ◆ High Power and current handing capability
- ◆ Lead free product is acquired
- ◆ Surface Mount Package

#### Applicatio

Battery protection  
 Load switch  
 Power management



Schematic diagram



Marking and pin assignment

Table 1. Absolute Maximum Ratings ( $T_A = 25^\circ C$ )

| Parameter  | Symbol         | Limit      | Unit       |
|--|----------------|------------|------------|
| Drain-Source Voltage                             | $V_{DS}$       | 20         | V          |
| Gate-Source Voltage                              | $V_{GS}$       | $\pm 12$   | V          |
| Drain Current-Continuous                         | $I_D$          | 6          | A          |
| Drain Current-Pulsed (Note 1)                    | $I_{DM}$       | 20         | A          |
| Maximum Power Dissipation                        | $P_D$          | 1.07       | W          |
| Operating Junction and Storage Temperature Range | $T_J, T_{STG}$ | -55 To 150 | $^\circ C$ |



**Thermal Characteristic**

|  |                 |    |               |
|--|-----------------|----|---------------|
| Thermal Resistance, Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 80 | $^{\circ}C/W$ |
|--|-----------------|----|---------------|

**Electrical Characteristics (TA=25 $^{\circ}C$  unless otherwise noted)**

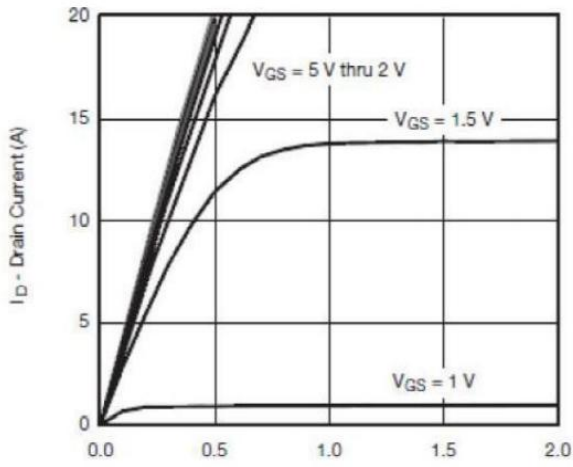
| Parameter                                 | Symbol       | Condition                              | Min | Typ  | Max       | Unit       |
|---|--------------|--|-----|------|-----------|------------|
| <b>Off Characteristics</b>                |              |  |     |      |           |            |
| Drain-Source Breakdown Voltage            | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$              | 20  | -    | -         | V          |
| Zero Gate Voltage Drain Current           | $I_{DSS}$    | $V_{DS}=16V, V_{GS}=0V$                | -   | -    | 1         | $\mu A$    |
| Gate-Body Leakage Current                 | $I_{GSS}$    | $V_{GS}=\pm 12V, V_{DS}=0V$            | -   | -    | $\pm 100$ | nA         |
| <b>On Characteristics (Note 3)</b>        |              |  |     |      |           |            |
| Gate Threshold Voltage                    | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$          | 0.5 |      | 1.2       | V          |
| Drain-Source On-State Resistance          | $R_{DS(on)}$ | $V_{GS}=4.5V, I_D=6A$                  | -   | 22   | 25        | m $\Omega$ |
|   |              | $V_{GS}=2.5V, I_D=3.2A$                | -   | 27   | 37        | m $\Omega$ |
| Forward Transconductance                  | $g_{FS}$     | $V_{DS}=5V, I_D=4.5A$                  | -   | 10   | -         | S          |
| <b>Dynamic Characteristics (Note 4)</b>   |              |  |     |      |           |            |
| Input Capacitance                         | $C_{iss}$    | $V_{DS}=10V, V_{GS}=0V,$<br>$F=1.0MHz$ | -   | 850  | -         | PF         |
| Output Capacitance                        | $C_{oss}$    |  | -   | 1200 | -         | PF         |
| Reverse Transfer Capacitance              | $C_{rss}$    |  | -   | 60   | -         | PF         |
| <b>Switching Characteristics (Note 4)</b> |              |  |     |      |           |            |
| Turn-on Delay Time                        | $t_{d(on)}$  | $V_{DD}=10V, I_D=5A,$<br>$V_{GS}=4.5V$ | -   | 10   |           | nS         |
| Turn-on Rise Time                         | $t_r$        |  | -   | 16   |           | nS         |
| Turn-Off Delay Time                       | $t_{d(off)}$ |  | -   | 31   |           | nS         |
| Turn-Off Fall Time                        | $t_f$        |  | -   | 10   |           | nS         |
| Total Gate Charge                         | $Q_g$        | $V_{DS}=10V, I_D=6A,$<br>$V_{GS}=4.5V$ | -   | 15   |           | nC         |
| Gate-Source Charge                        | $Q_{gs}$     |  | -   | 2    | -         | nC         |
| Gate-Drain Charge                         | $Q_{gd}$     |  | -   | 3    | -         | nC         |
| <b>Drain-Source Diode Characteristics</b> |              |  |     |      |           |            |
| Diode Forward Voltage (Note 3)            | $V_{SD}$     | $V_{GS}=0V, I_S=1.6A$                  | -   | 0.85 | 1.2       | V          |
| Diode Forward Current (Note 2)            | $I_S$        |  | -   | 0.79 | 2         | A          |

**Notes:**

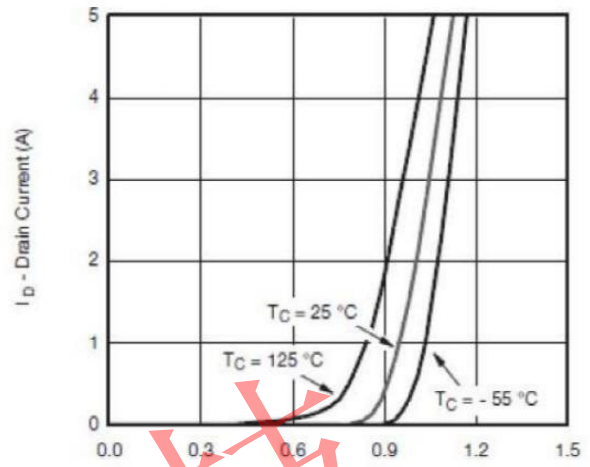
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .



### TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



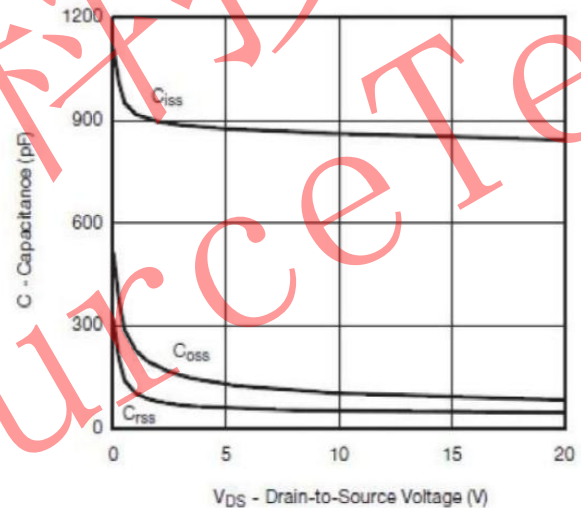
Output Characteristics



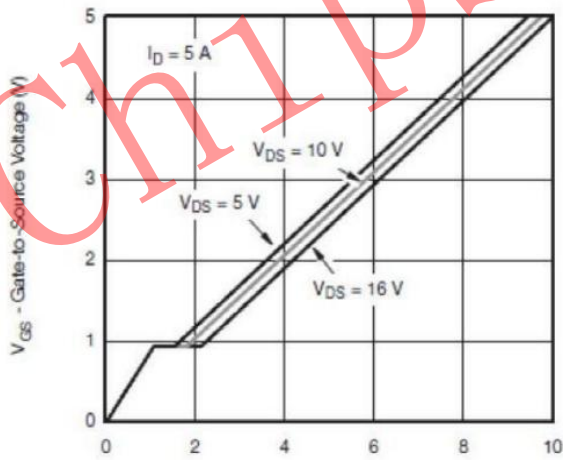
Transfer Characteristics



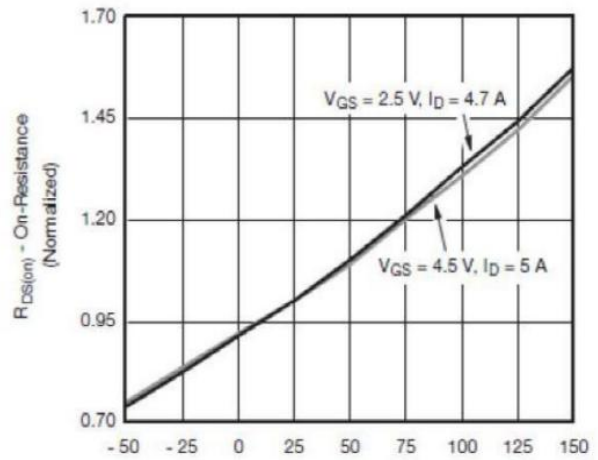
On-Resistance vs. Drain Current and Gate Voltage



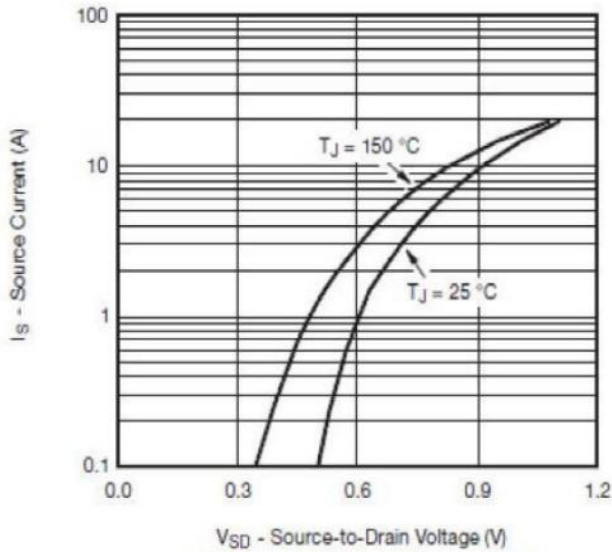
Capacitance



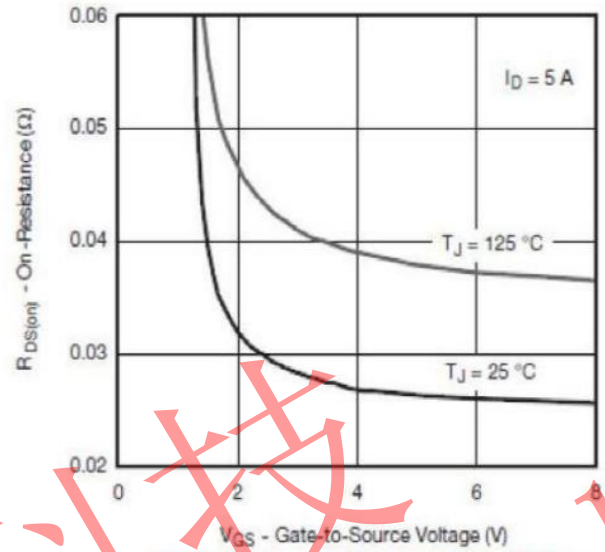
Gate Charge



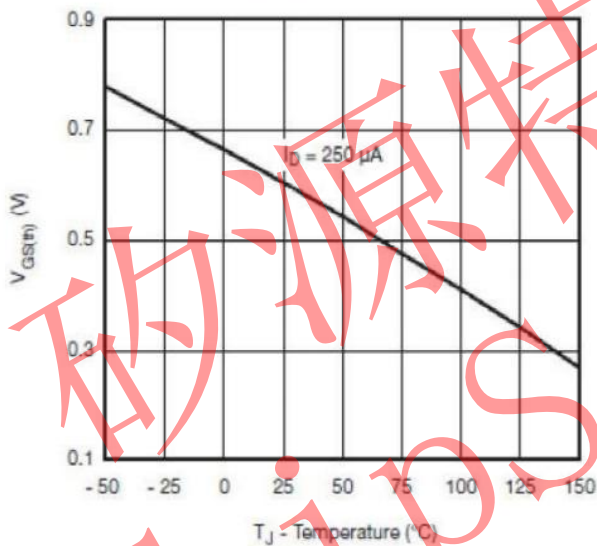
On-Resistance vs. Junction Temperature



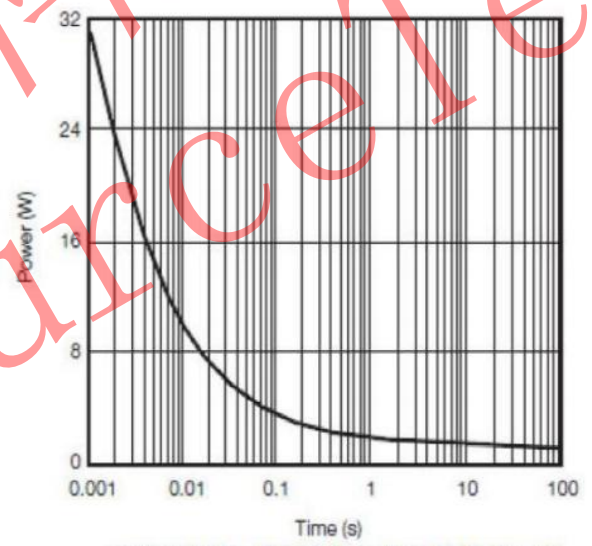
Source-Drain Diode Forward Voltage



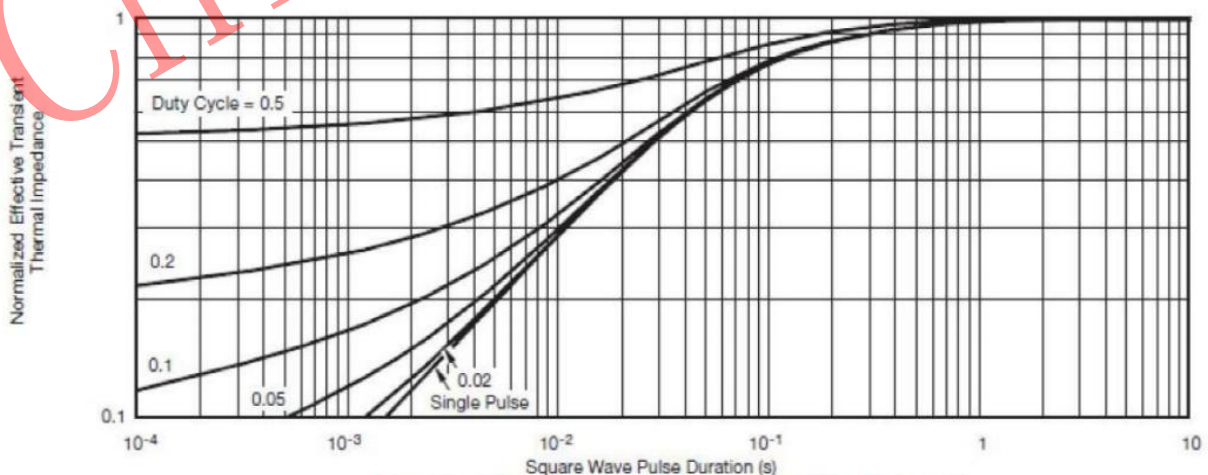
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power (Junction-to-Ambient)

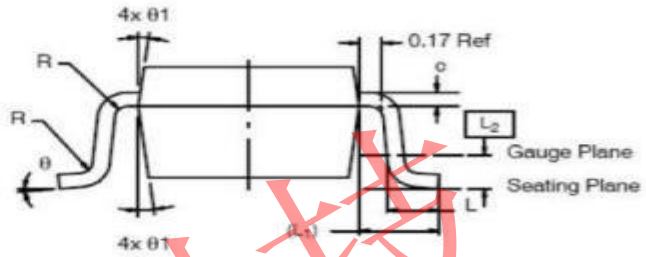
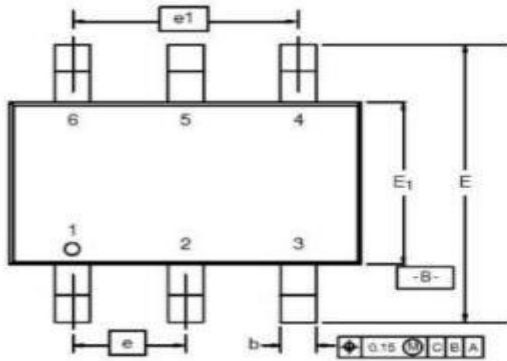


Normalized Thermal Transient Impedance, Junction-to-Foot





SOT23-6 PACKAGE INFOR



| Dimensions     |             |      |      |            |       |       |
|----------------|-------------|------|------|------------|-------|-------|
| SYMBOL         | Millimeters |      |      | Inches     |       |       |
|                | MIN         | NOM  | MAX  | MIN        | NOM   | MAX   |
| A              | 0.91        | -    | 1.10 | 0.036      | -     | 0.043 |
| A <sub>1</sub> | 0.01        | -    | 0.10 | 0.0004     | -     | 0.004 |
| A <sub>2</sub> | 0.90        | -    | 1.00 | 0.035      | 0.038 | 0.039 |
| b              | 0.30        | 0.32 | 0.45 | 0.012      | 0.013 | 0.018 |
| c              | 0.10        | 0.15 | 0.20 | 0.004      | 0.006 | 0.008 |
| D              | 2.95        | 3.05 | 3.10 | 0.116      | 0.120 | 0.122 |
| E              | 2.70        | 2.85 | 2.98 | 0.106      | 0.112 | 0.117 |
| E <sub>1</sub> | 1.55        | 1.65 | 1.70 | 0.061      | 0.065 | 0.067 |
| e              | 1.00 BSC    |      |      | 0.0394 BSC |       |       |
| e <sub>1</sub> | 1.90        | 2.00 | 2.10 | 0.075      | 0.080 | 0.085 |
| L              | 0.35        | -    | 0.50 | 0.014      | -     | 0.020 |
| L <sub>1</sub> | 0.60 Ref    |      |      | 0.024 Ref  |       |       |
| L <sub>2</sub> | 0.25 BSC    |      |      | 0.010 BSC  |       |       |
| R              | 0.10        | -    | -    | 0.004      | -     | -     |
| θ              | 0°          | 4°   | 8°   | 0°         | 4°    | 8°    |
| θ <sub>1</sub> | 7° Nom      |      |      | 7° Nom     |       |       |