

## P-Channel Enhancement Mode MOSFET

### 1. Product Information

#### 1.1 Features

- ☒ Surface-mounted package
- ☒ Low gate charge

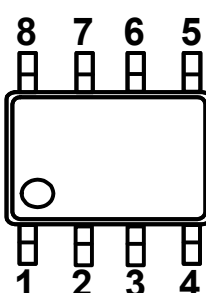
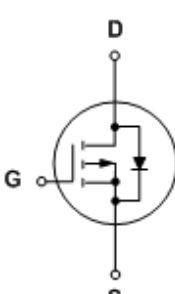
#### 1.2 Applications

- ☒ Motor driver appliances
- ☒ Adapter appliances
- ☒ High power inverter system

#### 1.3 Quick reference

- ☒  $BV \geq -30\text{ V}$
- ☒  $P_{tot} \leq 2.2\text{ W}$
- ☒  $I_D \leq -10\text{ A}$
- ☒  $R_{DS(ON)} \leq 16\text{ m}\Omega @ V_{GS} = -10\text{ V}$
- ☒  $R_{DS(ON)} \leq 25\text{ m}\Omega @ V_{GS} = -4.5\text{ V}$

### 2. Pin Description

| Pin     | Description | Simplified Outline                                                                                              | Symbol                                                                                |
|---------|-------------|-----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1,2,3   | Source      |  <p>Top View<br/>SOP-8L</p> |  |
| 4       | Gate        |                                                                                                                 |                                                                                       |
| 5,6,7,8 | Drain       |                                                                                                                 |                                                                                       |

### 3. Limiting Values

| Symbol            | Parameter                               | Conditions                                                 | Min  | Max      | Unit                          |
|-------------------|-----------------------------------------|------------------------------------------------------------|------|----------|-------------------------------|
| $V_{DS}$          | Drain-Source Voltage                    | $T_A = 25\text{ }^{\circ}\text{C}$                         | -    | - 30     | V                             |
| $V_{GS}$          | Gate-Source Voltage                     | $T_A = 25\text{ }^{\circ}\text{C}$                         | -    | $\pm 20$ | V                             |
| $I_D^*$           | Drain Current ( DC )                    | $T_A = 25\text{ }^{\circ}\text{C}, V_{GS} = -10\text{ V}$  | -    | - 10     | A                             |
|                   |                                         | $T_A = 100\text{ }^{\circ}\text{C}, V_{GS} = -10\text{ V}$ |      | - 5.5    | A                             |
| $I_{DM}^{***}$    | Drain Current ( Pulsed )                | $T_A = 25\text{ }^{\circ}\text{C}, V_{GS} = -10\text{ V}$  | -    | - 34     | A                             |
| $P_{tot}^*$       | Total Power Dissipation                 | $T_A = 25\text{ }^{\circ}\text{C}$                         | -    | 2.2      | W                             |
| $T_{stg}$         | Storage Temperature                     |                                                            | - 55 | 150      | $^{\circ}\text{C}$            |
| $T_J$             | Junction Temperature                    |                                                            | -    | 150      | $^{\circ}\text{C}$            |
| $I_S$             | Diode Forward Current                   | $T_C = 25\text{ }^{\circ}\text{C}$                         | -    | - 10     | A                             |
| $R_{\theta JA}^*$ | Thermal Resistance- Junction to Ambient |                                                            | -    | 56.3     | $^{\circ}\text{C} / \text{W}$ |

Notes :

\* Surface Mounted on 1 in<sup>2</sup> pad area,  $t \leq 10\text{ sec}$

\*\* Pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$

\*\*\* limited by bonding wire

### 4. Marking Information

| Product Name | Marking                                                  |
|--------------|----------------------------------------------------------|
| HDM15P03S    | <div>4435<br/>YWWXXX</div> <div>YWW:<br/>Date Code</div> |

### 5. Ordering Code

| Product Name | Package | Reel Size | Tape width | Quantity | Note |
|--------------|---------|-----------|------------|----------|------|
| HDM15P03S    | SOP8    |           |            | 3000     |      |

Note: JSHD defines " Green " as lead-free ( RoHS compliant ) and halogen free ( Br or Cl does not exceed 900 ppm by weight in homogeneous material and total of Br and Cl does not exceed 1500 ppm by weight; Follow IEC 61249-2-21 and IPC / JEDEC J-STD-020C )

## 6. Electrical Characteristics (T<sub>A</sub> = 25 °C Unless Otherwise Noted)

| Symbol                                   | Parameter                      | Conditions                                                                                                                    | Min  | Typ  | Max   | Unit |
|------------------------------------------|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------|------|------|-------|------|
| Static Characteristics                   |                                |                                                                                                                               |      |      |       |      |
| BV <sub>DSS</sub>                        | Drain-Source Breakdown Voltage | V <sub>GS</sub> = 0 V, I <sub>DS</sub> = - 250 μA                                                                             | - 30 | -    | -     | V    |
| V <sub>GS(th)</sub>                      | Gate Threshold Voltage         | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>DS</sub> = - 250 μA                                                                | - 1  | -    | - 2   | V    |
| I <sub>DSS</sub>                         | Drain Leakage Current          | V <sub>DS</sub> = - 24V, V <sub>GS</sub> = 0 V                                                                                | -    | -    | - 1   | μA   |
| I <sub>GSS</sub>                         | Gate Leakage Current           | V <sub>GS</sub> = ± 20 V, V <sub>DS</sub> = 0 V                                                                               | -    | -    | ± 100 | nA   |
| R <sub>DS(ON)</sub> <sup>a</sup>         | Channel On-State Resistance    | V <sub>GS</sub> = - 10 V, I <sub>D</sub> = - 5A                                                                               | -    | 14.5 | 16    | mΩ   |
|                                          | Channel On-State Resistance    | V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = -3A                                                                               | -    | 23.5 | 25    |      |
| Diode Characteristics                    |                                |                                                                                                                               |      |      |       |      |
| V <sub>SD</sub> <sup>a</sup>             | Diode Forward Voltage          | I <sub>SD</sub> = - 5A, V <sub>GS</sub> = 0 V                                                                                 | -    | -    | - 1.3 | V    |
| t <sub>rr</sub>                          | Reverse Recovery Time          | I <sub>SD</sub> = - 5A, dI <sub>SD</sub> / dt = 100 A / μs                                                                    | -    | 12   | -     | nS   |
| Q <sub>rr</sub>                          | Reverse Recovery Charge        |                                                                                                                               | -    | 6.2  | -     | nC   |
| Dynamic Characteristics <sup>b</sup>     |                                |                                                                                                                               |      |      |       |      |
| C <sub>iss</sub>                         | Input Capacitance              | V <sub>GS</sub> = 0 V, V <sub>DS</sub> = - 15V<br>Frequency = 1 MHz                                                           | -    | 1953 | -     | pF   |
| C <sub>oss</sub>                         | Output Capacitance             |                                                                                                                               | -    | 175  | -     |      |
| C <sub>rss</sub>                         | Reverse Transfer Capacitance   |                                                                                                                               | -    | 146  | -     |      |
| t <sub>d(on)</sub>                       | Turn-on Delay Time             | V <sub>DS</sub> = - 15V, V <sub>GEN</sub> = - 10 V,<br>R <sub>G</sub> = 3.9 Ω, R <sub>L</sub> = 3Ω,<br>I <sub>DS</sub> = - 5A | -    | 5.7  | -     | nS   |
| t <sub>r</sub>                           | Turn-on Rise Time              |                                                                                                                               | -    | 15   | -     |      |
| t <sub>d(off)</sub>                      | Turn-off Delay Time            |                                                                                                                               | -    | 117  | -     |      |
| t <sub>f</sub>                           | Turn-off Fall Time             |                                                                                                                               | -    | 40   | -     |      |
| Gate Charge Characteristics <sup>b</sup> |                                |                                                                                                                               |      |      |       |      |
| Q <sub>g</sub>                           | Total Gate Charge              | V <sub>GS</sub> = - 10 V, V <sub>DS</sub> = - 15V,<br>I <sub>DS</sub> = - 5A                                                  | -    | 33   | -     | nC   |
| Q <sub>gs</sub>                          | Gate-Source Charge             |                                                                                                                               | -    | 8.4  | -     |      |
| Q <sub>gd</sub>                          | Gate-Drain Charge              |                                                                                                                               | -    | 3.7  | -     |      |

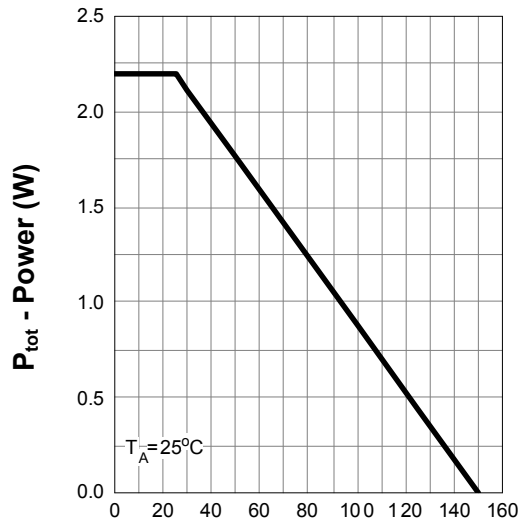
Notes :

a : Pulse test ; pulse width ≤ 300 μs, duty cycle ≤ 2 %

b : Guaranteed by design, not subject to production testing

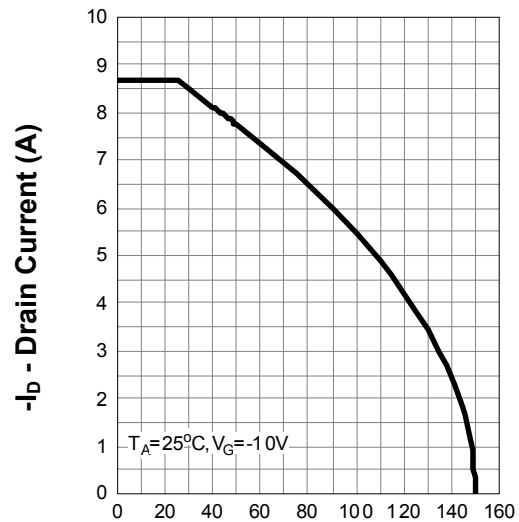
## 7. Typical Characteristics

Power Dissipation



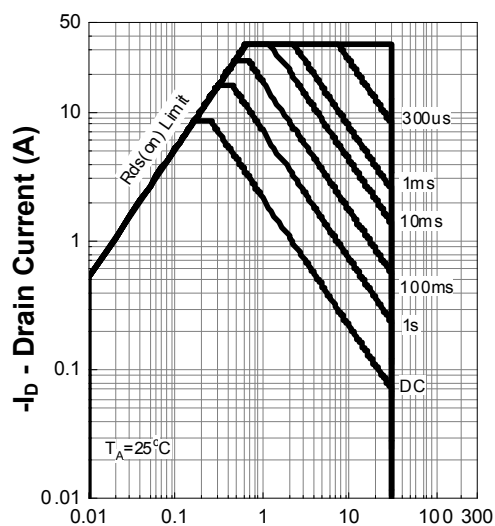
$T_j$  - Junction Temperature ( $^{\circ}\text{C}$ )

Drain Current



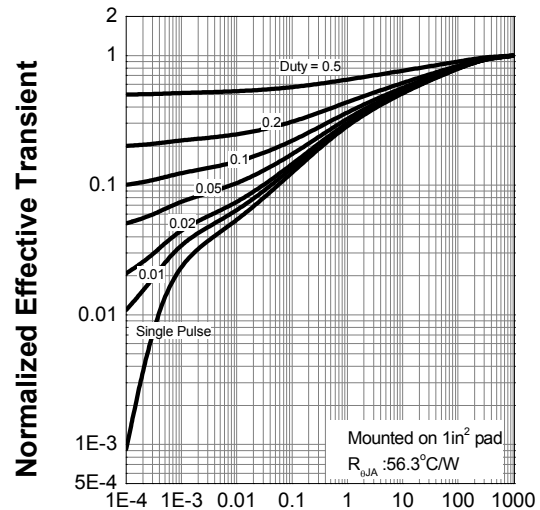
$T_j$  - Junction Temperature ( $^{\circ}\text{C}$ )

Safe Operation Area



$-V_{DS}$  - Drain-Source Voltage (V)

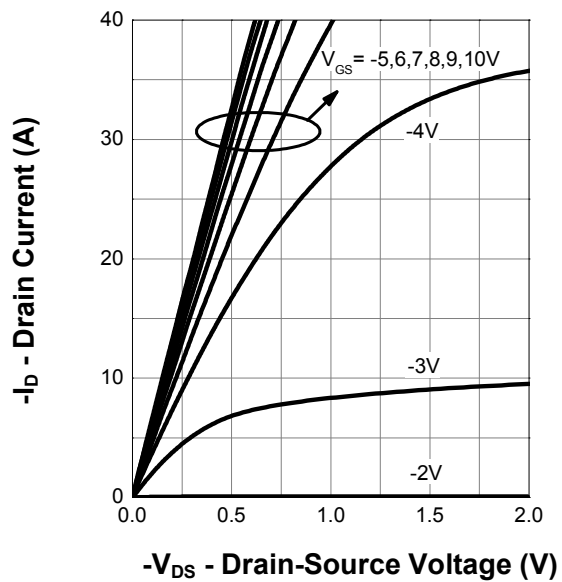
Thermal Transient Impedance



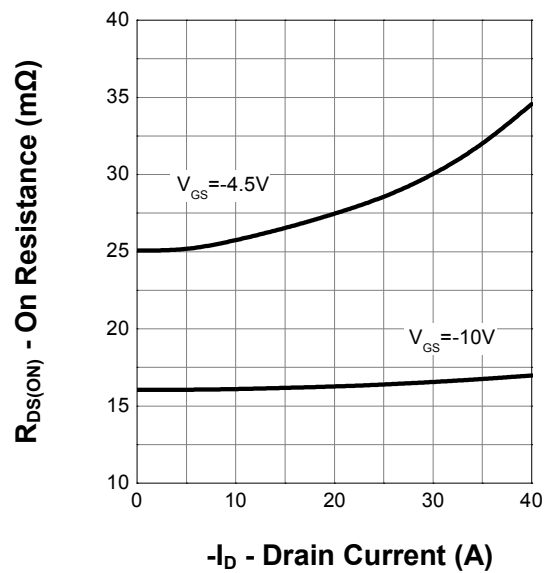
Square Wave Pulse Duration (sec)

## 7. Typical Characteristics (cont.)

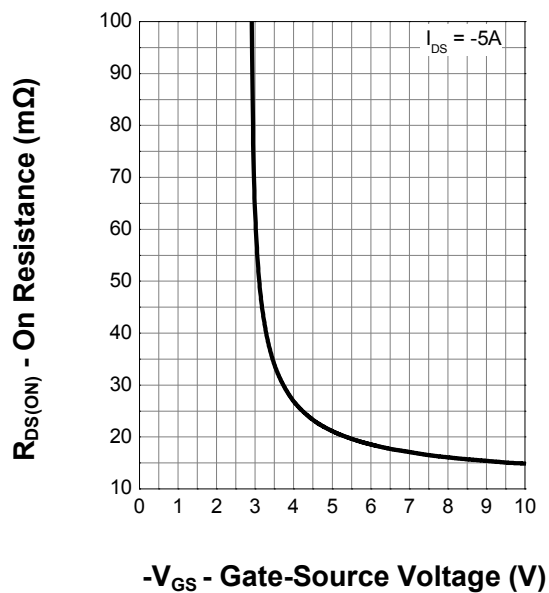
Output Characteristics



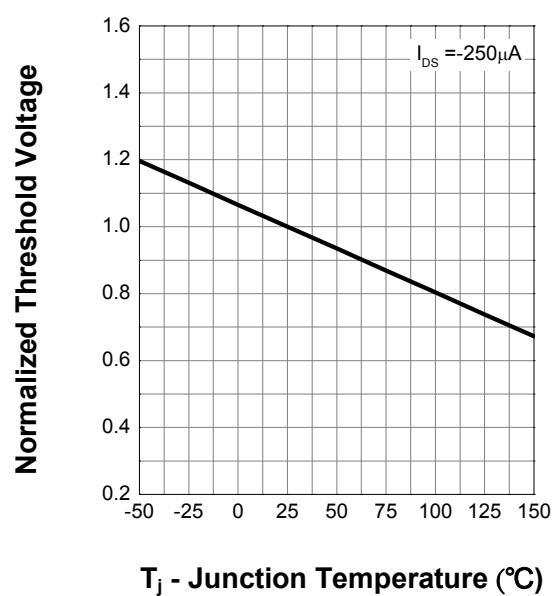
Drain-Source On Resistance



Transfer Characteristics

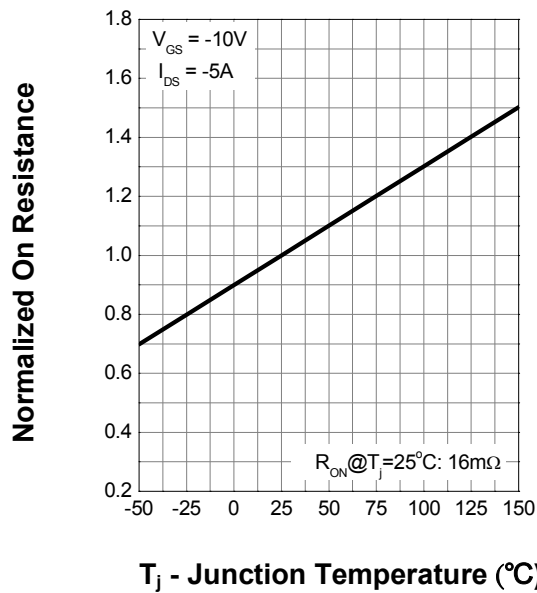


Gate Threshold Voltage

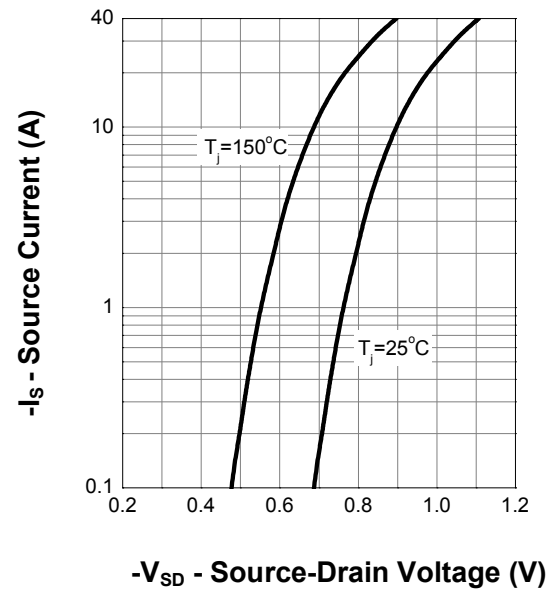


## 7. Typical Characteristics (cont.)

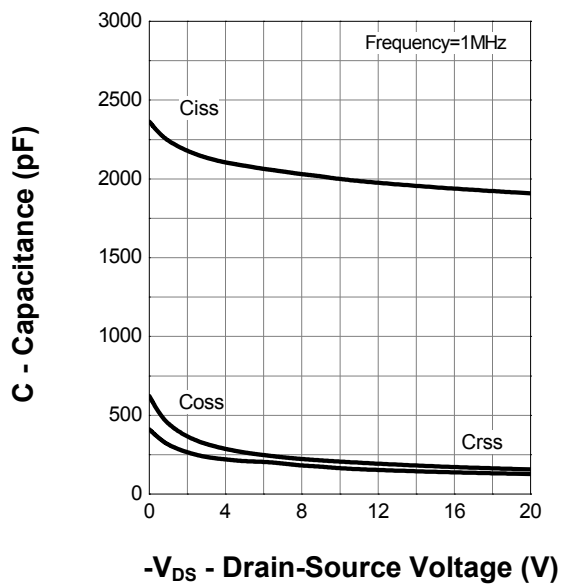
**Drain-Source On Resistance**



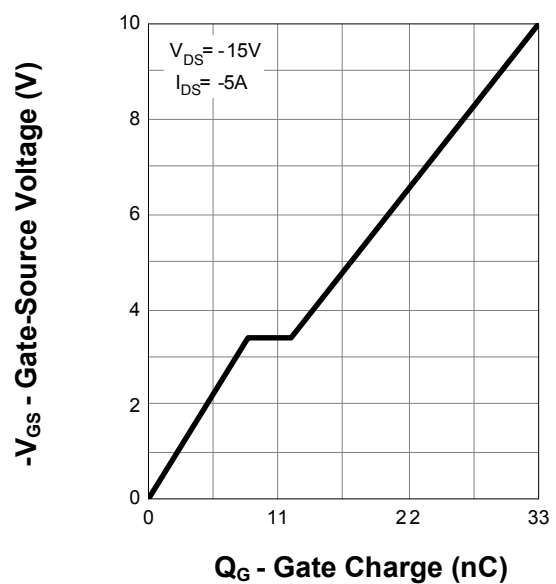
**Source-Drain Diode Forward**



**Capacitance**

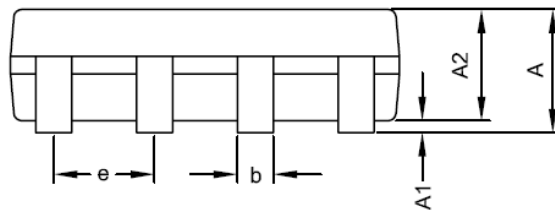
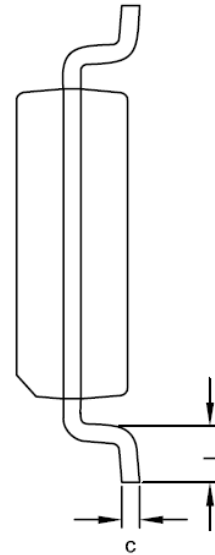
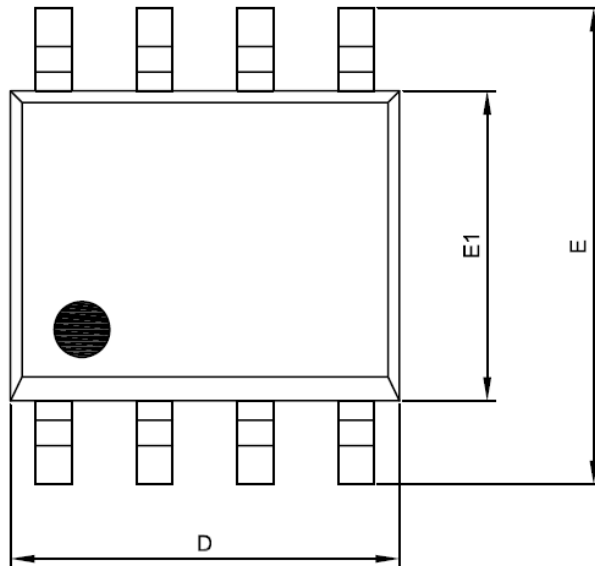


**Gate Charge**



## 8. Package Dimensions

SOP- 8L



| Symbol | Dimensions In Millimeters |      |
|--------|---------------------------|------|
|        | MIN.                      | MAX. |
| A      | 1.35                      | 1.75 |
| A1     | 0.00                      | 0.25 |
| A2     | 1.15                      | 1.50 |
| D      | 4.80                      | 5.00 |
| E      | 5.80                      | 6.20 |
| E1     | 3.80                      | 4.00 |
| c      | 0.19                      | 0.27 |
| b      | 0.33                      | 0.53 |
| e      | 1.27 BSC                  |      |
| L      | 0.40                      | 1.27 |

### Notes :

1. Jedec outline : MS-012AA
2. Dimensions " D " does not include mold flash, protrusions and gate burrs shall not exceed .15 mm (.006 in) per side .
3. Dimensions " E1 " does not include inter-lead flash, or protrusions. Inter-lead flash and protrusions shall not exceed .25 mm (.010 in) per side.