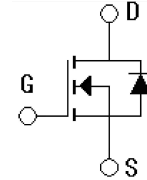


## Features

- 850V, 10A,  $R_{DS(on),max}=0.98\Omega$
- Low  $C_{rss}$ (typical 20pF)
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability
- RoHS product



## Applications

- LED power supplies
- High frequency switch mode power supplies
- Electronic lamp ballasts based on half bridge

## Absolute Ratings ( $T_C=25^\circ\text{C}$ )

| Parameter                                       | Symbol         |                    | Value    | Unit |
|-------------------------------------------------|----------------|--------------------|----------|------|
| Drain-Source Voltage                            | $V_{DSS}$      |                    | 850      | V    |
| Transient Gate-Source Voltage                   | $V_{GSM}$      |                    | ±30      | V    |
| Continuous Gate-Source Voltage                  | $V_{GSS}$      |                    | ±20      | V    |
| Drain Current-continuous                        | $I_D$          | $T_C=25^{\circ}C$  | 10       | A    |
|                                                 |                | $T_C=100^{\circ}C$ | 6.4      | A    |
| Drain Current-pulse (note 1)                    | $I_{DM}$       |                    | 30       | A    |
| Single pulse avalanche energy<br>(note 2)       | $E_{AS}$       |                    | 120      | mJ   |
| Avalanche Current (note 1)                      | $I_{AR}$       |                    | 2        | A    |
| Repetitive Avalanche Energy(note 1)             | $E_{AR}$       |                    | 1.6      | mJ   |
| Power Dissipation (TO-252)                      | $P_D$          | $T_C=25^{\circ}C$  | 113      | W    |
|                                                 |                | $T_C=100^{\circ}C$ | 45       | W    |
| Operating and Storage Temperature Range         | $T_J, T_{STG}$ |                    | -55~+150 | °C   |
| Peak Diode Recovery dv/dt (note 3)              | dv/dt          |                    | 5.0      | V/ns |
| Maximum Lead Temperature for Soldering Purposes | $T_L$          |                    | 300      | °C   |

## Electrical Characteristics( $T_{CASE}=25^\circ\text{C}$ unless otherwise specified)

| Parameter                       | Symbol     | Tests conditions                        | Min | Type | Max | Units         |
|---------------------------------|------------|-----------------------------------------|-----|------|-----|---------------|
| Drain-Source Voltage            | $BV_{DSS}$ | $I_D=250\mu\text{A}, V_{GS}=0\text{V}$  | 850 | -    | -   | V             |
| Zero Gate Voltage Drain Current | $I_{DSS}$  | $V_{DS}=V_{DSS}, V_{GS}=0\text{V}$      | -   | -    | 10  | $\mu\text{A}$ |
|                                 |            | $V_{DS}=V_{DSS}, T_C=125^\circ\text{C}$ | -   | -    | 100 | $\mu\text{A}$ |

|                                               |                      |                                                                                                         |     |      |      |    |
|-----------------------------------------------|----------------------|---------------------------------------------------------------------------------------------------------|-----|------|------|----|
| Gate body leakage current                     | I <sub>GSS</sub>     | V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V                                                              | -   | -    | ±100 | nA |
| On-Characteristics                            |                      |                                                                                                         |     |      |      |    |
| Gate Threshold Voltage                        | V <sub>GS(th)</sub>  | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                                | 3.0 | 4.2  | 5.0  | V  |
| Static Drain-Source On-Resistance             | R <sub>DS(ON)</sub>  | V <sub>GS</sub> =10V, I <sub>D</sub> =5.0A                                                              | -   | 0.74 | 0.98 | Ω  |
| Forward Transconductance                      | g <sub>FS</sub>      | V <sub>DS</sub> =40V, I <sub>D</sub> =5.0A<br>(note 4)                                                  | 6.0 | 9.4  | -    | S  |
| Dynamic Characteristics                       |                      |                                                                                                         |     |      |      |    |
| Input capacitance                             | C <sub>iss</sub>     | V <sub>DS</sub> =25V, V <sub>GS</sub> =0V,<br>f=1.0MHz                                                  | -   | 749  | -    | pF |
| Output capacitance                            | C <sub>oss</sub>     |                                                                                                         | -   | 24.1 | -    | pF |
| Reverse transfer capacitance                  | C <sub>rss</sub>     |                                                                                                         | -   | 0.7  | -    | pF |
| Switching-Characteristics                     |                      |                                                                                                         |     |      |      |    |
| Turn-On delay time                            | t <sub>d(on)</sub>   | V <sub>DD</sub> =400V, I <sub>D</sub> =5A,<br>R <sub>GEN</sub> =25Ω<br>(note 4,5)                       | -   | 48   | -    | ns |
| Turn-On rise time                             | t <sub>r</sub>       |                                                                                                         | -   | 17   | -    | ns |
| Turn-Off delay time                           | t <sub>d(Off)</sub>  |                                                                                                         | -   | 32   | -    | ns |
| Turn-Off rise time                            | t <sub>f</sub>       |                                                                                                         | -   | 25   | -    | ns |
| Total Gate Charge                             | Q <sub>g</sub>       | V <sub>DS</sub> =640V, I <sub>D</sub> =5A,<br>V <sub>GS</sub> =10V<br>(note 4,5)                        | -   | 20   | -    | nC |
| Gate-Source Charge                            | Q <sub>gs</sub>      |                                                                                                         | -   | 4.5  | -    | nC |
| Gate-Drain Charge                             | Q <sub>gd</sub>      |                                                                                                         | -   | 9.0  | -    | nC |
| Gate Plateau Voltage                          | V <sub>plateau</sub> |                                                                                                         | -   | 5.3  | -    | V  |
| Drain-Source Diode Characteristics            |                      |                                                                                                         |     |      |      |    |
| Diode Forward Voltage<br>(note 3)             | V <sub>SD</sub>      | V <sub>GS</sub> =0V, I <sub>S</sub> =5A                                                                 | -   | -    | 1.2  | V  |
| Pulsed Drain-Source Diode Forward Current     | I <sub>SM</sub>      | -                                                                                                       | -   | -    | 30   | A  |
| Continuous Drain Source Diode Forward Current | I <sub>S</sub>       | -                                                                                                       | -   | -    | 10   | A  |
| Reverse recovery time                         | t <sub>rr</sub>      | V <sub>GS</sub> =0V, I <sub>S</sub> =5A<br>dI <sub>F</sub> /dt=100A/μs<br>V <sub>R</sub> =400V (note 4) | -   | 285  | -    | ns |
| Reverse recovery charge                       | Q <sub>rr</sub>      |                                                                                                         | -   | 1800 | -    | nC |
| Reverse recovery current                      | I <sub>rr</sub>      |                                                                                                         | -   | 16   | -    | A  |

## Thermal Characteristics

| Parameter                                    | Symbol        | Value | Unit          |
|----------------------------------------------|---------------|-------|---------------|
| Thermal Resistance, junction to Case, Max    | $R_{th(j-C)}$ | 1.1   | $^{\circ}C/W$ |
| Thermal Resistance, Junction to Ambient, Max | $R_{th(j-A)}$ | 62    | $^{\circ}C/W$ |

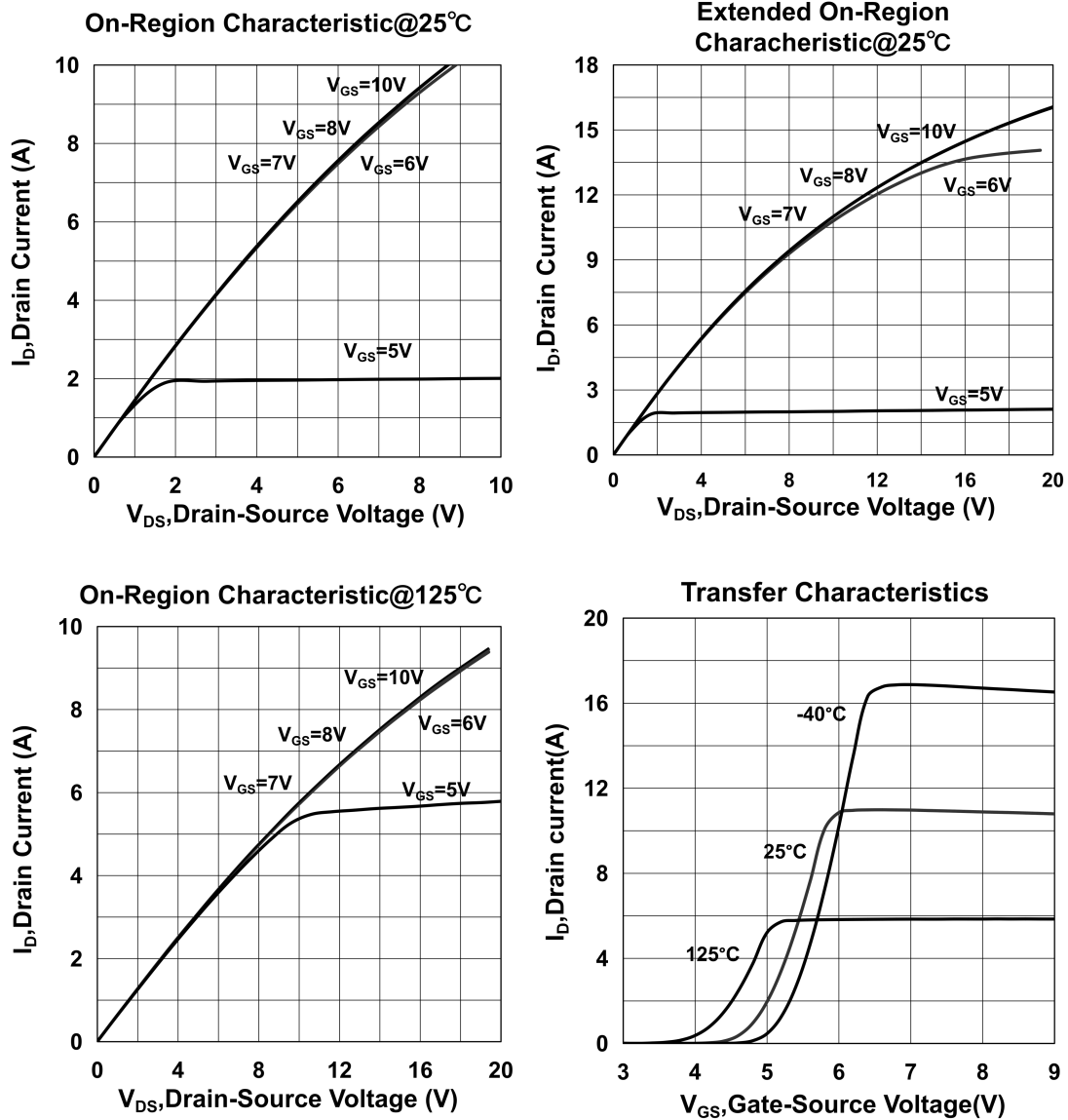
## Notes:

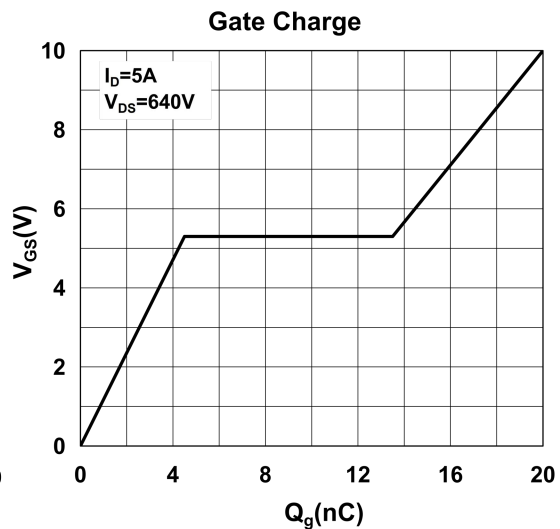
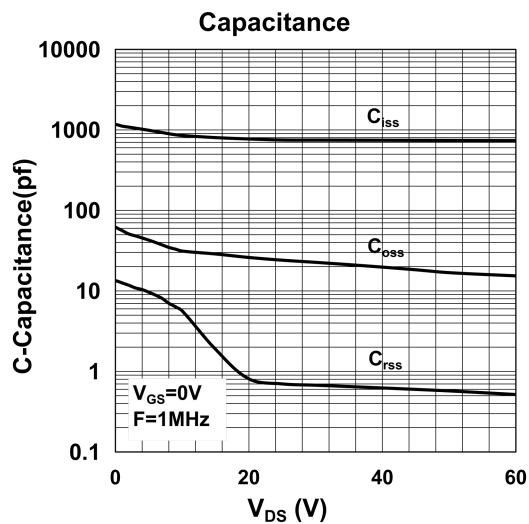
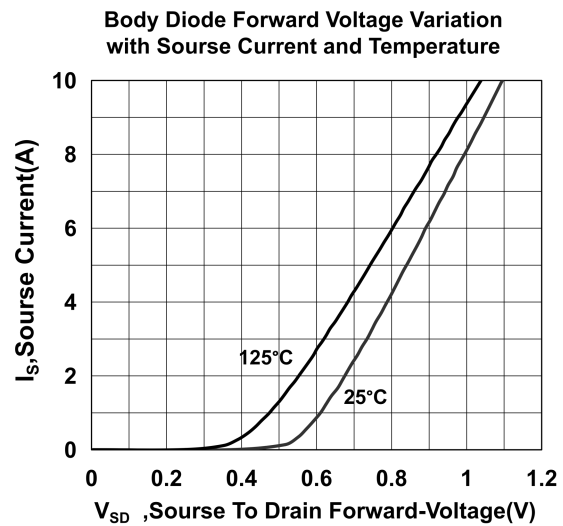
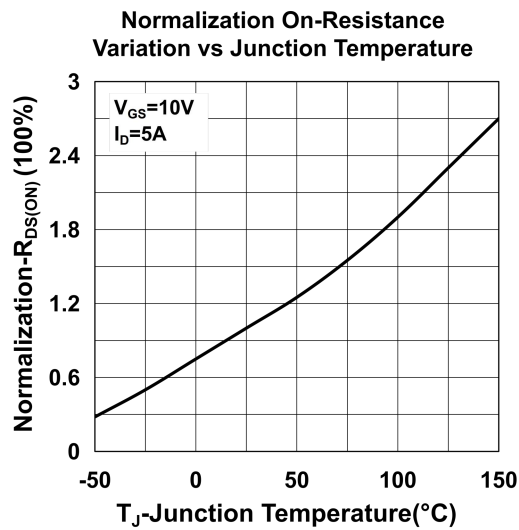
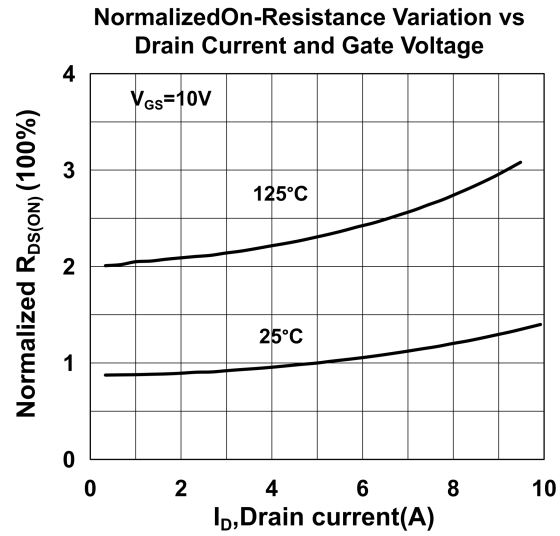
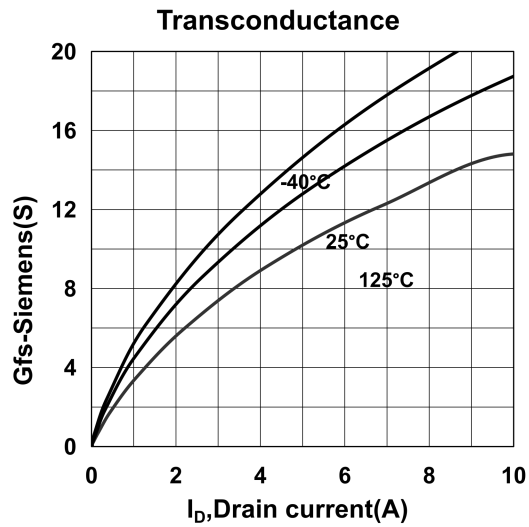
1. Pulse width limited by maximum junction temperature
2.  $L=60\text{mH}$ ,  $I_{AS}=2.0\text{A}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=25\ \Omega$ , Starting  $T_J=25^\circ\text{C}$
3.  $I_{SD} \leq 10\text{A}$ ,  $di/dt \leq 300\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J=25^\circ\text{C}$
4. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$
5. Essentially independent of operating temperature

## Order Message

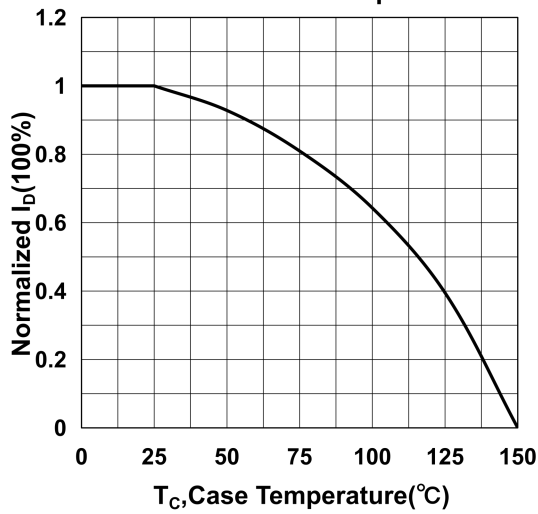
| Order codes | Package | Marking     | Units/Reel |
|-------------|---------|-------------|------------|
| MS10N85ICD0 | TO-252  | MS10N85ICD0 | 2500       |

## ELECTRICAL CHARACTERISTICS (curves)

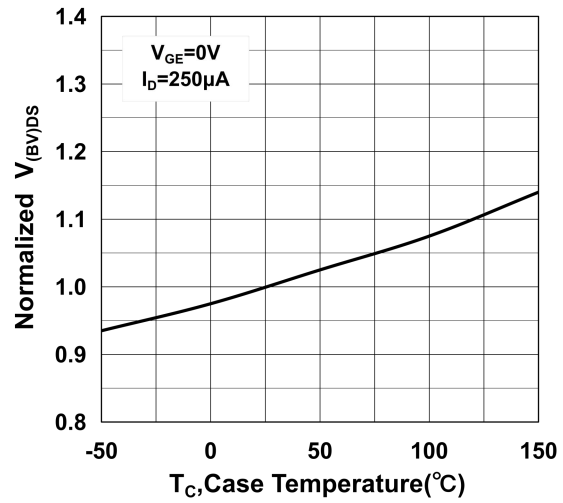




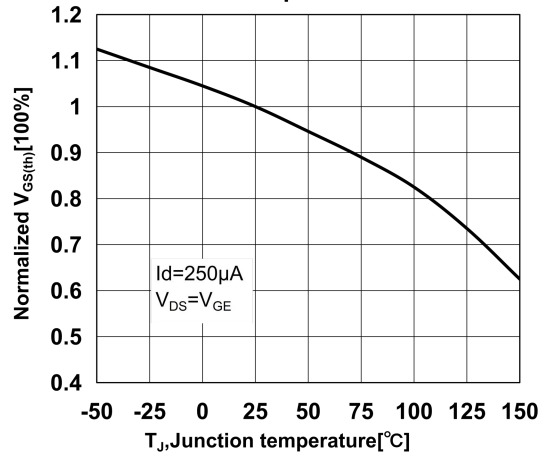
Normalized Maximum Drain Current vs Case Temperature



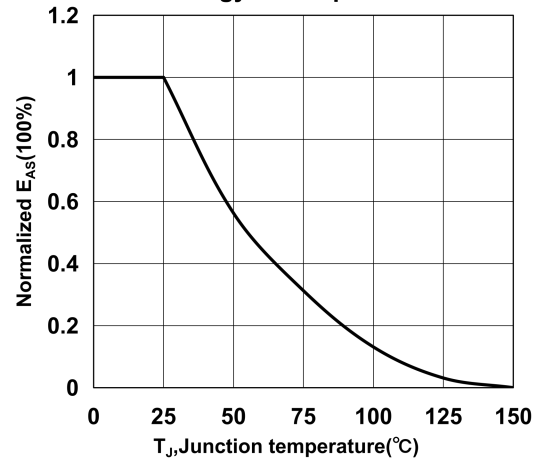
Normalized  $V_{(BV)DS}$  vs temperature



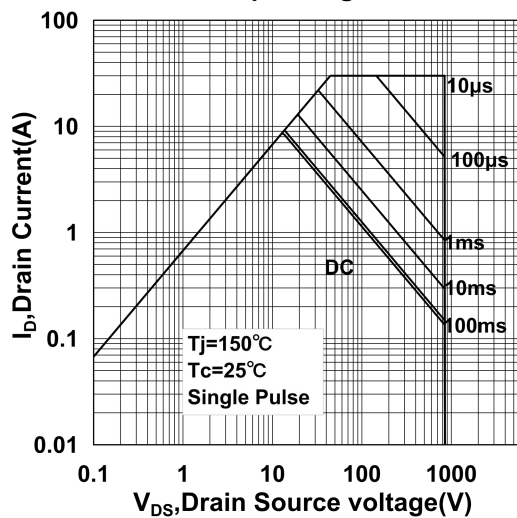
Normalized gate threshold voltage vs temperature



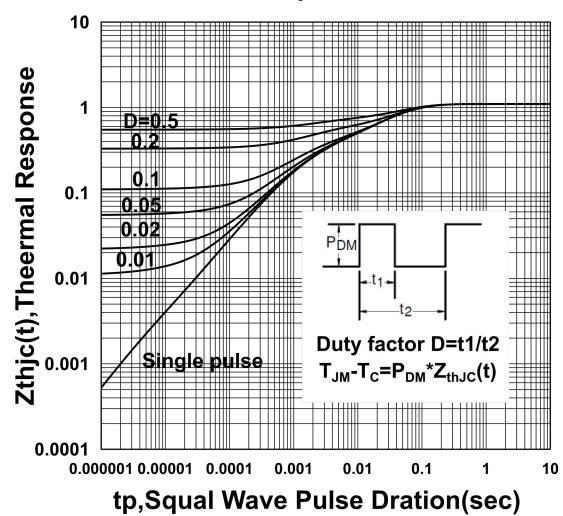
Normalized maximum avalanche energy vs temperature



Safe Operating Area



Transient response Curve



## PACKAGE MECHANICAL DATA

