

## -30V<sub>DS</sub>/±20V<sub>GS</sub> P-Channel Advanced Mode MOSFET

### Features

- V<sub>DS</sub>=-30V, I<sub>D</sub>=-10A
- R<sub>DS(ON)</sub>=20mΩ (TYP.) V<sub>GS</sub>=-10V
- Reliable and Rugged
- Avalanche Rated
- Fast Switching
- Low On-Resistance

### Applications

- Load Switch
- Power management in portable/desktop PCs
- DC/DC conversion

### Ordering Information

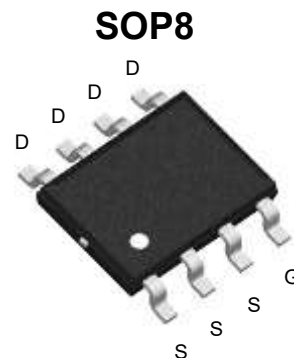
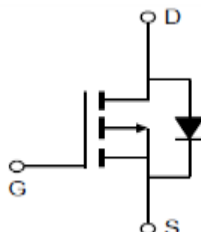
| Device | package | Device Marking | Package Qty. |
|--------|---------|----------------|--------------|
| HM4435 | SOP-8   | **             | 3000/PCS     |

### Absolute Maximum Ratings (T<sub>a</sub>=25°C, unless otherwise noted)

| Parameter                                         | Symbol                            | Value   | Unit |
|---------------------------------------------------|-----------------------------------|---------|------|
| Drain-Source Voltage (V <sub>GS</sub> =0V)        | V <sub>DS</sub>                   | -30     | V    |
| Gate-Source Voltage (V <sub>GS</sub> =0V, static) | V <sub>GS</sub>                   | ±20     | V    |
| Continuous Drain Current (T <sub>a</sub> =25°C)   | I <sub>D</sub>                    | -10     | A    |
| Continuous Drain Current (T <sub>a</sub> =70°C)   |                                   | -7      | A    |
| Pulsed Drain Current                              | I <sub>DM</sub>                   | -40     | A    |
| Avalanche Energy, Single Pulsed                   | E <sub>AS</sub>                   | -       | mJ   |
| Maximum Power Dissipation (T <sub>a</sub> =25°C)  | P <sub>D</sub>                    | 3.7     | W    |
| Operating, Storage Temperature Range              | T <sub>J</sub> , T <sub>STG</sub> | -55~150 | °C   |

### Electrical Characteristics

| Parameter                        | Symbol              | Test Conditions                                            | Min. | Typ. | Max. | Unit |
|----------------------------------|---------------------|------------------------------------------------------------|------|------|------|------|
| Drain-Source Breakdown Voltage   | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA                | -30  | -    | -    | V    |
| Zero Gate Voltage Drain Current  | I <sub>DSS</sub>    | V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V                 | -    | -    | -1   | μA   |
| Gate -Source Leakage Current     | I <sub>GSS</sub>    | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                 | -    | -    | ±100 | nA   |
| Gate Threshold Voltage           | V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =-250μA | -1   | -1.5 | -2.4 | V    |
| Drain-Source On-stage Resistance | R <sub>DS(ON)</sub> | V <sub>GS</sub> =-10V, I <sub>D</sub> =-1A                 | -    | -    | 20   | mΩ   |
|                                  |                     | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-1A                | -    | -    | 34   |      |



## Thermal Characteristics

| Parameter                              | Symbol          | Min. | Typ. | Max. | Unit                        |
|----------------------------------------|-----------------|------|------|------|-----------------------------|
| Thermal Resistance,Junction-to-Case    | $R_{\theta JC}$ | -    | -    | -    | $^{\circ}\text{C}/\text{W}$ |
| Thermal Resistance,Junction-to-Ambient | $R_{\theta JA}$ | -    | 33.8 | -    | $^{\circ}\text{C}/\text{W}$ |

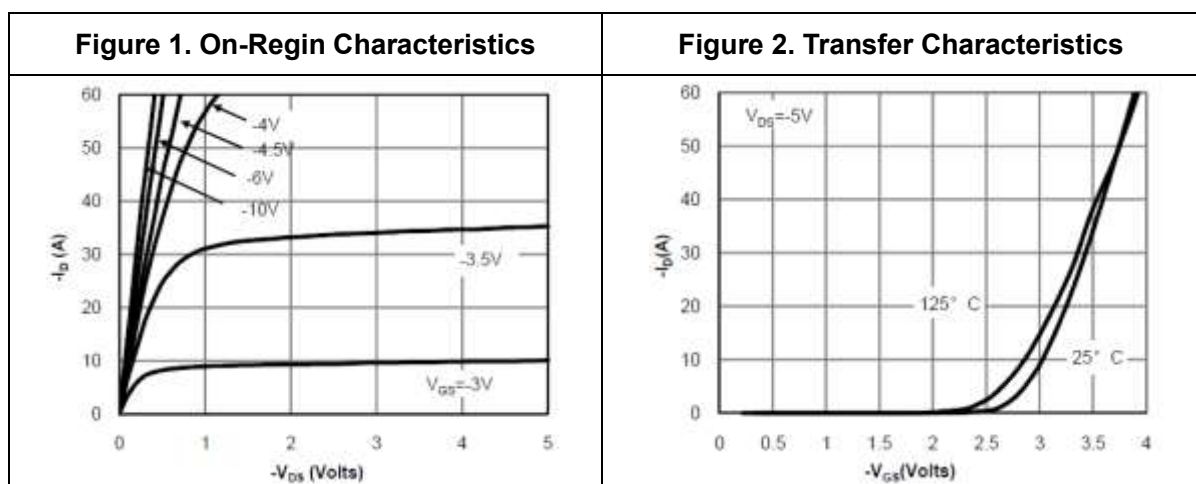
## Dynamic Characteristics

| Parameter                    | Symbol       | Test Conditions      | Min. | Typ. | Max. | Unit     |
|------------------------------|--------------|----------------------|------|------|------|----------|
| Input capacitance            | $C_{iss}$    | $V_{DS}=-15\text{V}$ | -    | 1540 | -    | pF       |
| Output capacitance           | $C_{oss}$    | $V_{GS}=0\text{V}$   | -    | 325  | -    |          |
| Reverse transfer capacitance | $C_{rss}$    | $f=1\text{MHz}$      | -    | 275  | -    |          |
| Gate Resistance              | $R_g$        | $f=1\text{MHz}$      | -    | -    | -    | $\Omega$ |
| Total Gate Charge            | $Q_g$        | $V_{DS}=-15\text{V}$ | -    | 28   | -    | nC       |
| Gate Source Charge           | $Q_{gs}$     | $V_{GS}=-10\text{V}$ | -    | 5.2  | -    |          |
| Gate Drain Charge            | $Q_{gd}$     | $I_D=-15\text{A}$    | -    | 7.5  | -    |          |
| Turn-on delay Time           | $t_{d(on)}$  | $V_{GS}=-10\text{V}$ | -    | 13   | -    | ns       |
| Rise time                    | $t_r$        | $V_{DS}=-15\text{V}$ | -    | 18   | -    |          |
| Turn-off delay Time          | $t_{d(off)}$ | $R_L=1\Omega$        | -    | 93   | -    |          |
| Fall time                    | $t_f$        | $R_G=3\Omega$        | -    | 63   | -    |          |

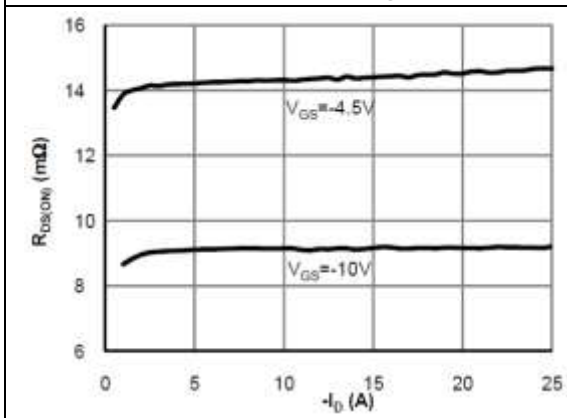
## Reverse Diode Characteristics

| Parameter                  | Symbol   | Test Conditions                        | Min. | Typ. | Max. | Unit |
|----------------------------|----------|----------------------------------------|------|------|------|------|
| Body Diode Forward Voltage | $V_{SD}$ | $V_{GS}=0\text{V}, I_{SD}=-1\text{A}$  | -    | -    | -1.2 | V    |
| Reverse Recovery Time      | $t_{rr}$ | $V_{GS}=0\text{V}, I_{SD}=-15\text{A}$ | -    | -    | -    | ns   |
| Reverse Recovery Charge    | $Q_{rr}$ | $d_i/d_t=100\text{A}/\mu\text{s}$      | -    | -    | -    | nC   |

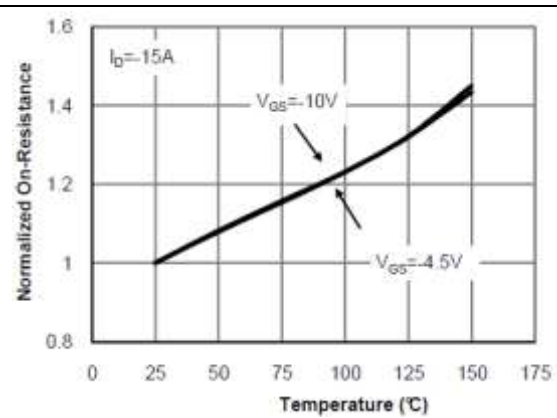
## Electrical Characteristics Diagrames



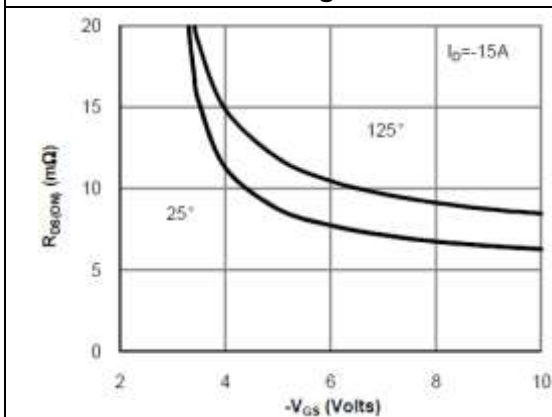
**Figure 3. On-Resistance vs. Drain Current and Gate Voltage**



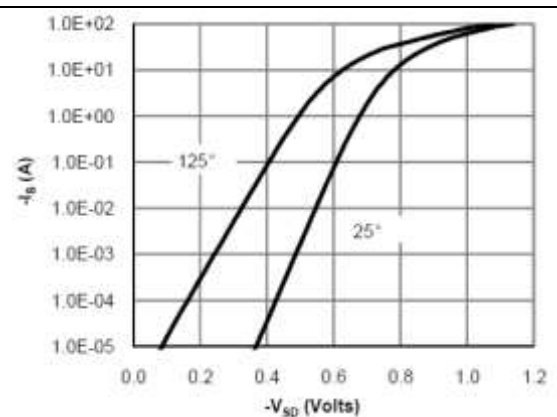
**Figure 4. On-Resistance vs. Junction Temperature**



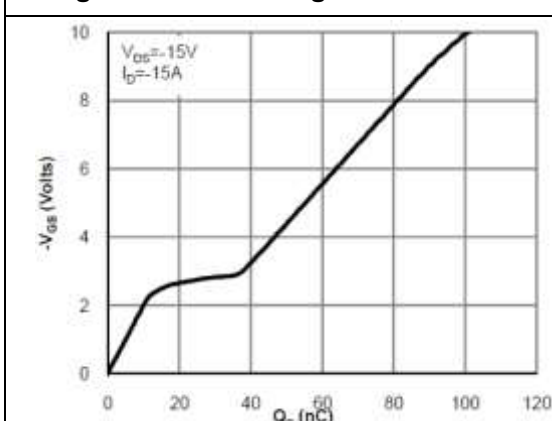
**Figure 5. On-Resistance vs. Gate-Source Voltage**



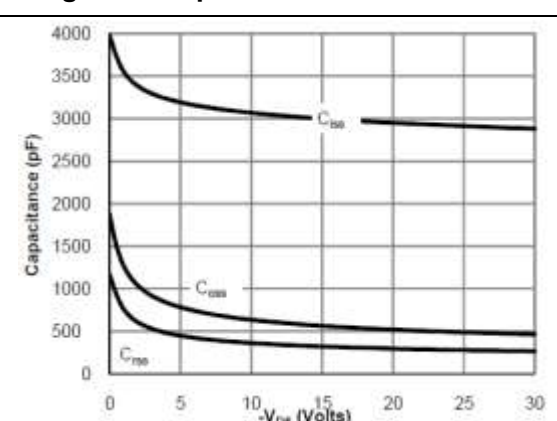
**Figure 6. Body-Diode Characteristics**



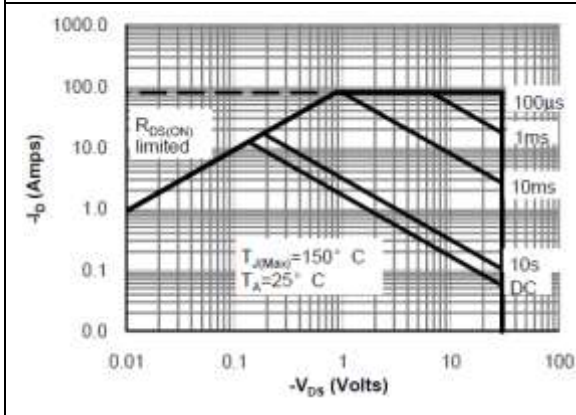
**Figure 7. Gate-Charge Characteristics**



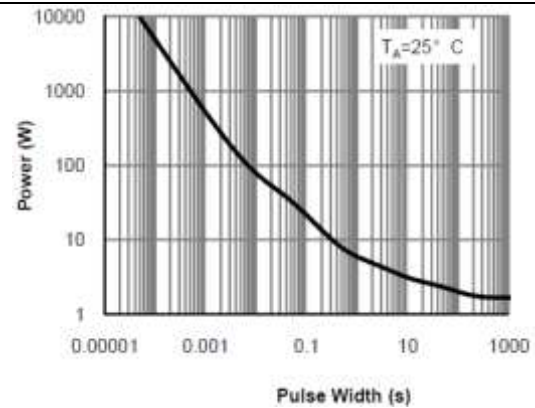
**Figure 8. Capacitance Characteristics**



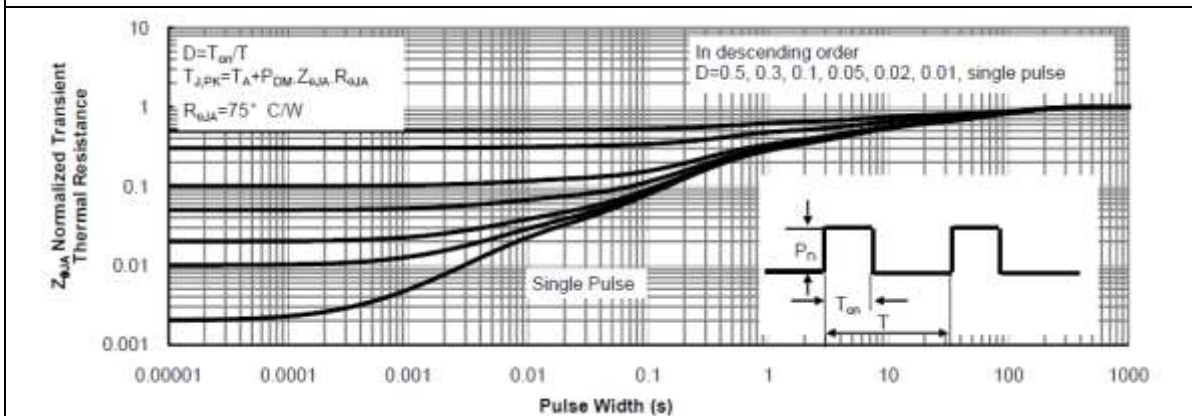
**Figure 9. Maximum Forward Biased Safe Operating Area**



**Figure 10. Single Pulse Power Rating Junction-to-Ambient**



**Figure 11. Normalized Maximum Transient Thermal Impedance**



## Physical Dimensions

### SOP8

| 符号 | 尺寸 (mm)   |       | 符号 | 尺寸 (mm)  |       |
|----|-----------|-------|----|----------|-------|
|    | 最小值       | 最大值   |    | 最小值      | 最大值   |
| A  | 4.80      | 5.00  | C3 | 0.05     | 0.20  |
| A1 | 0.356     | 0.456 | C4 | 0.203    | 0.233 |
| A2 | 1.27 TYP  |       | D  | 1.05 TYP |       |
| A3 | 0.345 TYP |       | D1 | 0.40     | 0.80  |
| B  | 3.80      | 4.00  | R1 | 0.20 TYP |       |
| B1 | 5.80      | 6.20  | R2 | 0.20 TYP |       |
| B2 | 5.00 TYP  |       | θ1 | 17° TYP4 |       |
| C  | 1.30      | 1.60  | θ2 | 13° TYP4 |       |
| C1 | 0.55      | 0.65  | θ3 | 0° ~ 8°  |       |
| C2 | 0.55      | 0.65  | θ4 | 4° ~ 12° |       |

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