

## FEATURES

- | High Density Cell Design For Low  $R_{DS(On)}$
- | Voltage Controlled Small Signal Switch
- | Rugged and Reliable
- | High Saturation Current Capability
- | ESD Protected

## APPLICATION

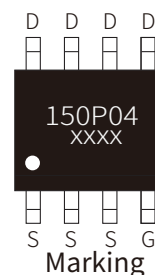
- | Direct logic-level interface: TTL/CMOS
- | Drivers: relays, solenoids, lamps
- | hammers, display, memories, etc.
- | Battery operated systems
- | Solid-state relays

## APPROVALS

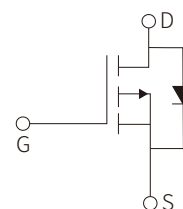
|             |                                    |
|-------------|------------------------------------|
| <b>RoHS</b> | Compliance with 2011/65/EU         |
| <b>HF</b>   | Compliance with IEC61249-2-21:2003 |



SOP-8



Marking



Schematic Symbol

## ABSOLUTE MAXIMUM RATINGS

| Parameter                                                           | Symbol          | Value      | Unit               |
|---------------------------------------------------------------------|-----------------|------------|--------------------|
| Drain-Source Voltage                                                | $V_{DS}$        | -40        | V                  |
| Gate-Source Voltage                                                 | $V_{GS}$        | $\pm 20$   | V                  |
| Maximum Drain Current - Continuous ( $T_a=25^\circ\text{C}$ )       | $I_D$           | -10        | A                  |
| Maximum Drain Current - Continuous ( $T_a=70^\circ\text{C}$ )       | $I_D$           | -8         | A                  |
| Power Dissipation for Single Operation ( $T_a=25^\circ\text{C}$ )   | $P_D$           | 1.7        | W                  |
| Power Dissipation for Single Operation ( $T_a=70^\circ\text{C}$ )   | $P_D$           | 1.1        | W                  |
| Thermal Resistance from Junction to Ambient ( $t \leq 10\text{s}$ ) | $R_{\theta JA}$ | 40         | $^\circ\text{C/W}$ |
| Thermal Resistance from Junction to Ambient                         | $R_{\theta JA}$ | 75         | $^\circ\text{C/W}$ |
| Maximum Junction-to-Lead                                            | $R_{\theta JL}$ | 24         | $^\circ\text{C/W}$ |
| Junction Temperature                                                | $T_J$           | 150        | $^\circ\text{C}$   |
| Storage Temperature Range                                           | $T_{STG}$       | -55 to 150 | $^\circ\text{C}$   |

## ELECTRICAL CHARACTERISTICS (Ta=25°C )

| Parameter                                       | Symbol        | Test Conditions                                          | Min  | Typ  | Max       | Unit |
|-------------------------------------------------|---------------|----------------------------------------------------------|------|------|-----------|------|
| Drain-source Breakdown Voltage                  | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=-250\mu A$                               | -40  |      |           | V    |
| Gate-body leakage current                       | $I_{GSS}$     | $V_{DS}=\pm 20V, V_{GS}=0V$                              |      |      | $\pm 100$ | nA   |
| Zero gate voltage drain current                 | $I_{DSS}$     | $V_{DS}=-40V, V_{GS}=0V$                                 |      |      | -1.0      | uA   |
|                                                 |               | $V_{DS}=-40V, V_{GS}=0V, T_J=55^\circ C$                 |      |      | -5.0      | uA   |
| Gate-source threshold voltage <sup>(2)</sup>    | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=-250\mu A$                           | -1.2 | -1.6 | -2.5      | V    |
| Drain-source on-state resistance <sup>(2)</sup> | $R_{DS(on)}$  | $V_{GS}=-10V, I_D=-10A$                                  |      | 13.1 | 15        | mΩ   |
|                                                 |               | $V_{GS}=-4.5V, I_D=-7A$                                  |      | 18   | 21        | mΩ   |
| Forward Transconductance                        | $g_{FS}$      | $V_{DS}=-5V, I_D=-10A$                                   |      | 9.5  |           | S    |
| Diode Forward Voltage                           | $V_{SD}$      | $I_S=-1A, V_{GS}=0V$                                     |      | -0.8 | -1.0      | V    |
| Total Gate Charge                               | $Q_g(10V)$    | $V_{GS}=-10V, V_{DS}=-20V, I_D=-10A$                     |      | 42   | 55        | nC   |
| Total Gate Charge                               | $Q_g(4.5V)$   |                                                          |      | 18.6 |           | nC   |
| Gate-Source Charge                              | $Q_{gs}$      |                                                          |      | 7    |           | nC   |
| Gate-Drain Charge                               | $Q_{gd}$      |                                                          |      | 8.6  |           | nC   |
| Gate Resistance                                 | $R_g$         | $V_{GS}=0V, V_{DS}=0V, f=1MHz$                           |      | 8.5  |           | Ω    |
| Input Capacitance                               | $C_{iss}$     | $V_{GS}=0V, V_{DS}=-25V, f=1MHz$                         |      | 3300 |           | pF   |
| Output Capacitance                              | $C_{oss}$     |                                                          |      | 135  |           | pF   |
| Reverse Transfer Capacitance                    | $C_{rss}$     |                                                          |      | 177  |           | pF   |
| Turn-on Delay Time                              | $t_{d(ON)}$   | $V_{GS}=-10V, V_{DS}=-20V, R_L=2\Omega, R_{GEN}=3\Omega$ |      | 9.4  |           | ns   |
| Turn-on Rise Time                               | $t_r$         |                                                          |      | 20   |           | ns   |
| Turn-off Delay Time                             | $t_{d(OFF)}$  |                                                          |      | 55   |           | ns   |
| Turn-off Fall Time                              | $t_f$         |                                                          |      | 30   |           | ns   |

## PARAMETER CHARACTERISTIC CURVE

Figure1: On-Region Characteristics

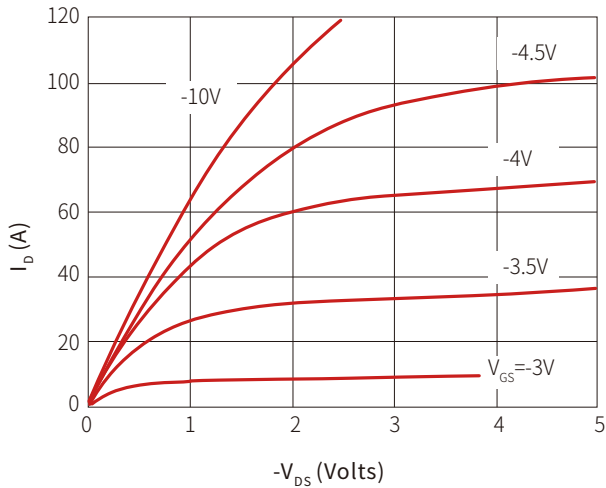


Figure2: Transfer Characteristics

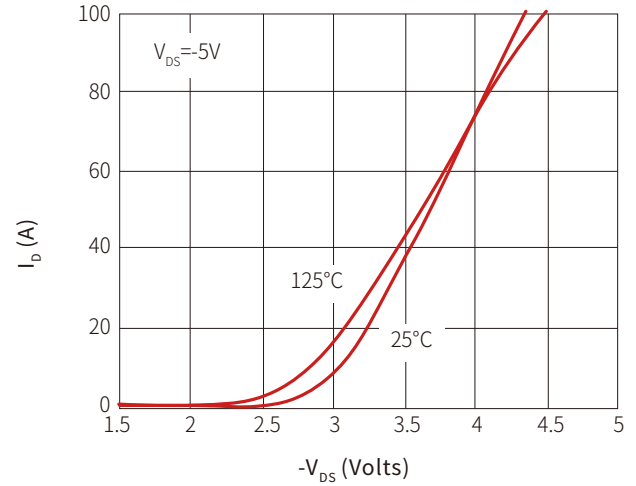


Figure3: On-Resistance vs. Drain Current and Gate Voltage

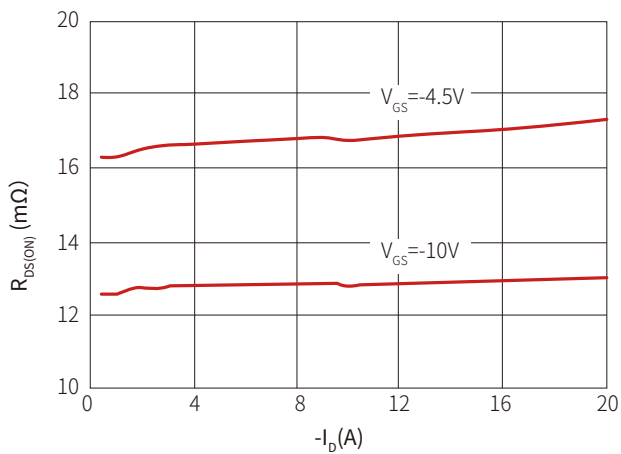
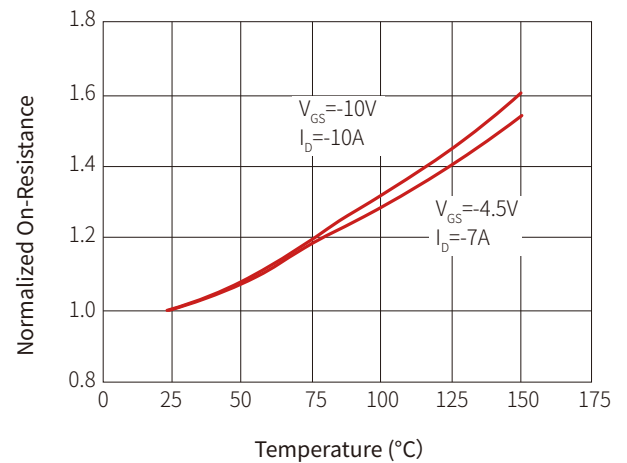
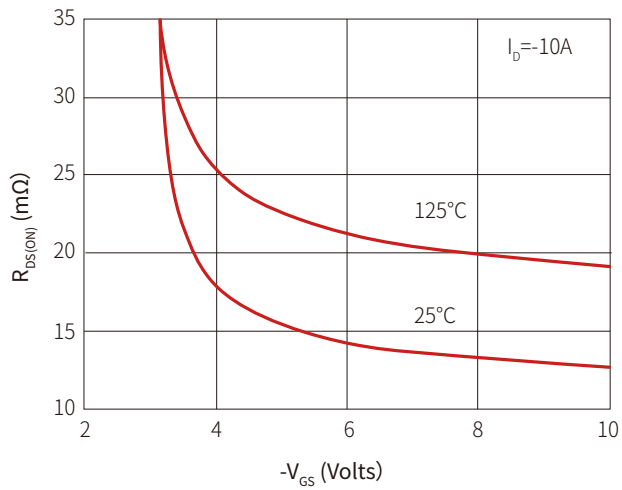
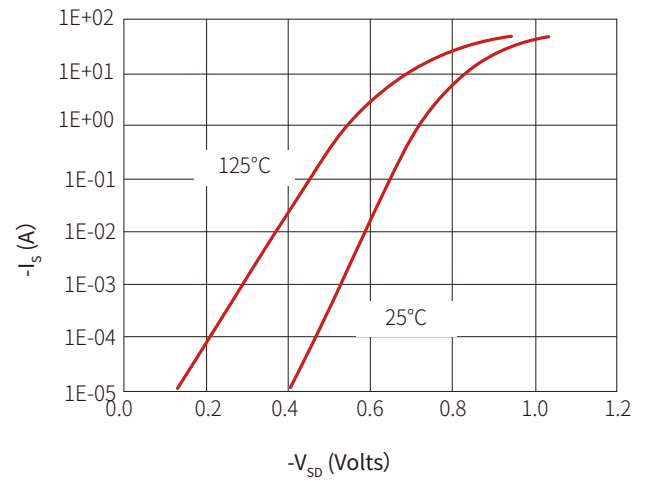
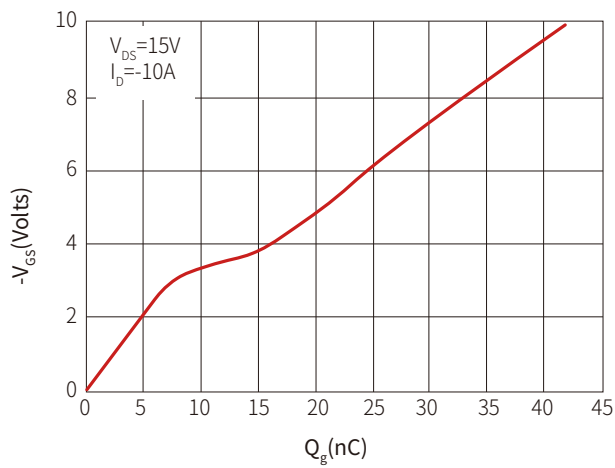
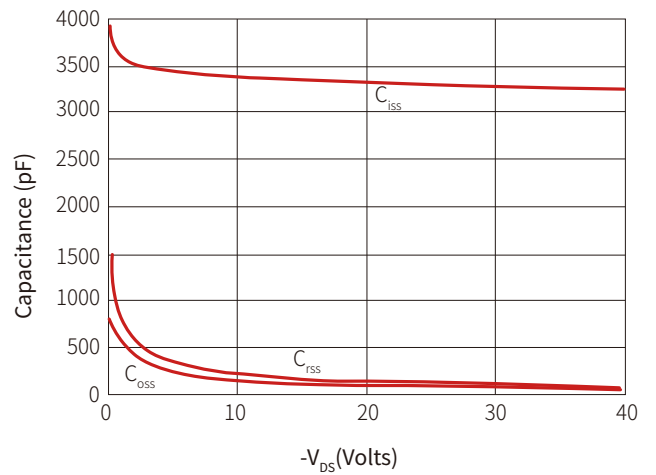
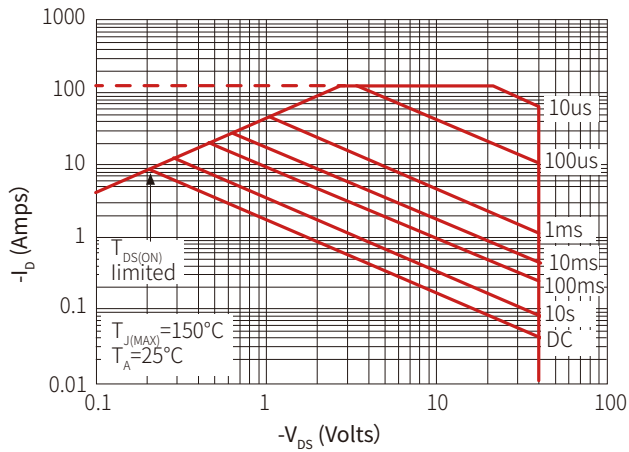


Figure4: On-Resistance vs. Junction Temperature

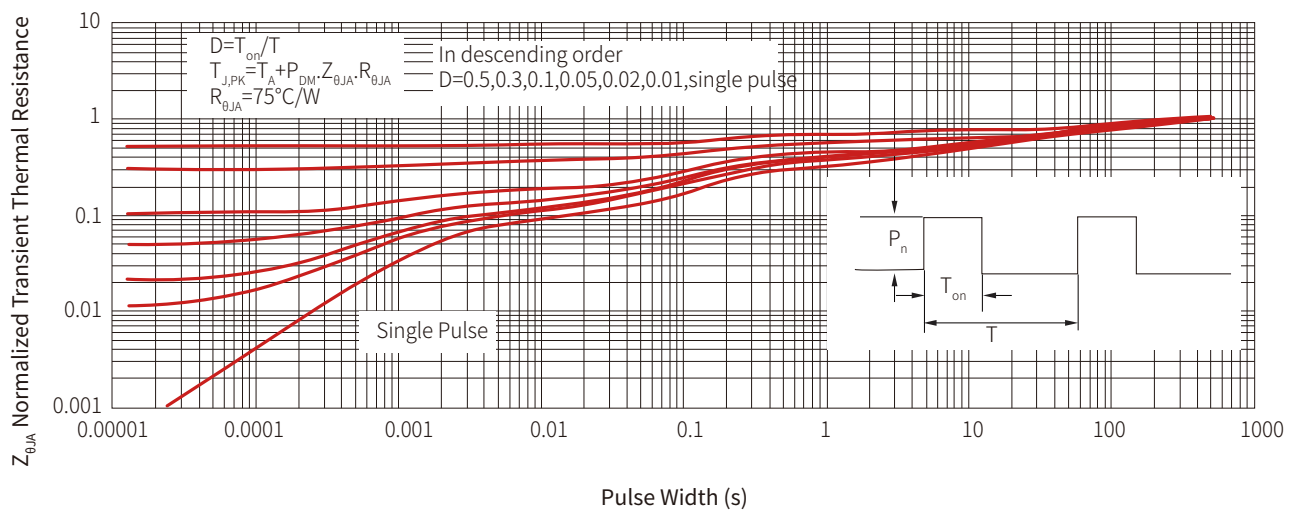


**Figure 5: On-Resistance vs. Gate-Source Voltage**

**Figure 6: Body-Diode Characteristics**

**Figure 7: Gate-Charge Characteristics**

**Figure 8: Capacitance Characteristics**


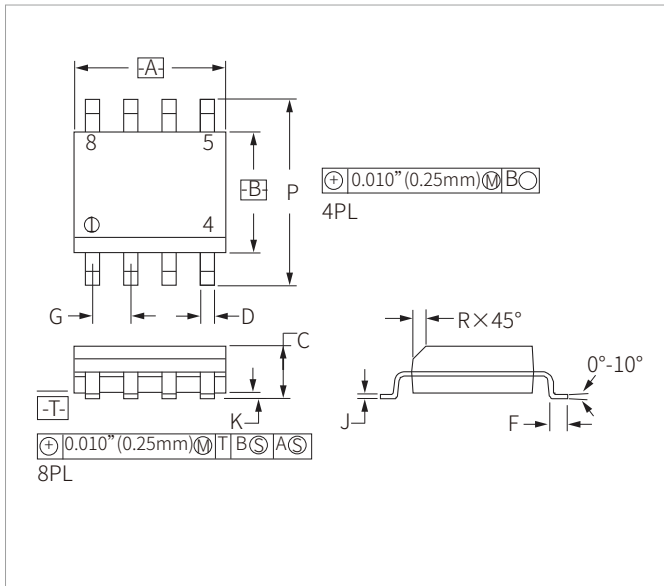
**Figure 9: Maximum Forward Biased Safe Operating Area**



**Figure 10: Normalized Maximum Transient Thermal Impedance**

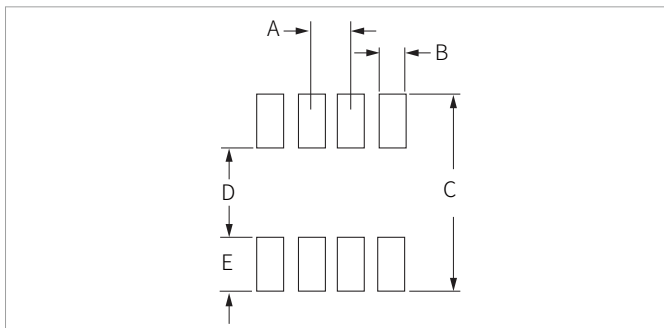


## SOP-8 PACKAGE INFORMATION



| Ref. | Millimeters |      | Inches   |       |
|------|-------------|------|----------|-------|
|      | Min.        | Max. | Min.     | Max.  |
| A    | 4.70        | 5.30 | 0.185    | 0.209 |
| B    | 3.80        | 4.20 | 0.150    | 0.165 |
| C    | 1.35        | 1.75 | 0.054    | 0.068 |
| D    | 0.35        | 0.49 | 0.014    | 0.019 |
| F    | 0.40        | 1.25 | 0.016    | 0.049 |
| G    | 1.27BSC     |      | 0.050BSC |       |
| J    | 0.18        | 0.25 | 0.007    | 0.009 |
| K    | 0.10        | 0.25 | 0.004    | 0.008 |
| P    | 5.80        | 6.20 | 0.229    | 0.244 |
| R    | 0.25        | 0.50 | 0.010    | 0.019 |

## RECOMMENDED PAD LAYOUT DIMENSIONS



| Ref. | Millimeters |      | Inches |       |
|------|-------------|------|--------|-------|
|      | Min         | Max  | Min    | Max   |
| A    | 1.14        | 1.40 | 0.045  | 0.055 |
| B    | 0.64        | 0.89 | 0.025  | 0.035 |
| C    | 6.22        | -    | 0.245  | -     |
| D    | 3.94        | 4.17 | 0.155  | 0.165 |
| E    | 1.02        | 1.27 | 0.040  | 0.050 |

## ORDERING INFORMATION

| Part Number | Component Package | QTY/Reel | Reel Size |
|-------------|-------------------|----------|-----------|
| SPM8P10N04  | SOP-8             | 4000PCS  | 13"       |

**Headquarters**

No.3387 Shendu Road  
Pujiang I&E Park  
Minhang Shanghai China  
201000

**Hotline**

400-021-5756

**Web**

<https://www.semiware.com>

**Sales Center**

Tel: 86-21-3463-7458  
Email: [sales18@semiware.com](mailto:sales18@semiware.com)

**Customer Service**

Tel: 86-21-5484-1001  
Email: [sales17@semiware.com](mailto:sales17@semiware.com)

**Technical Support**

Tel: 86-21-3463-7654  
Email: [fae01@semiware.com](mailto:fae01@semiware.com)

**Complaint & Suggestions**

Tel: 86-21-3463-7172  
Ext: 8868  
Email: [cs03@semiware.com](mailto:cs03@semiware.com)

**By QR Code**

Website



Wechat

To find your local partner within Semiware's global website: [www.semiware.com](http://www.semiware.com)

© 2022 Semiware Semiconductor Inc.

The content of this document has been carefully checked and understood. However, neither Semiware nor its subsidiaries assume any liability whatsoever for any errors or inaccuracies of this document and the consequences thereof. Published specifications are subject to change without notice. Product suitability for any area of application must ultimately be determined by the customer. In all cases, products must never be operated outside their published specifications. Semiware does not guarantee the availability of all published products. This disclaimer shall be governed by substantive Chinese law and resulting disputes shall be settled by the courts at the place of business of Semiware. Latest publications and a complete disclaimer can be downloaded from the Semiware website. All trademarks recognized.