



Micro Commercial Components



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SI2304

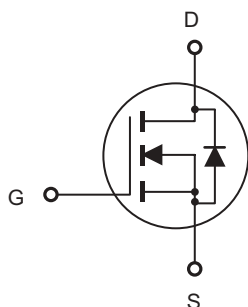
## Features

- Halogen free available upon request by adding suffix "-HF"
- Lead Free Finish/RoHS Compliant ("P" Suffix designates RoHS Compliant. See ordering information)
- Epoxy meets UL 94 V-0 flammability rating
- Moisture Sensitivity Level 1
- 30V, 2.5A,  $R_{DS(ON)} = 65m\Omega$  @  $V_{GS} = 10V$
- 30V, 2.0A,  $R_{DS(ON)} = 90m\Omega$  @  $V_{GS} = 4.5V$
- High dense cell design for extremely low  $R_{DS(ON)}$
- Rugged and reliable
- Lead free product is acquired
- SOT-23 Package
- Marking Code: S4

## Maximum Ratings @ 25°C Unless Otherwise Specified

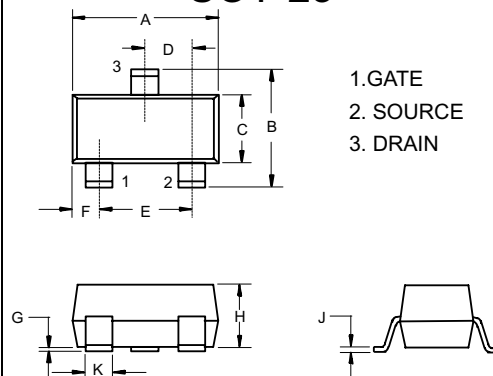
| Symbol          | Parameter                              | Rating      | Unit |
|-----------------|----------------------------------------|-------------|------|
| $V_{DS}$        | Drain-source Voltage                   | 30          | V    |
| $I_D$           | Drain Current-Continuous               | 2.5         | A    |
| $I_{DM}$        | Drain Current-Pulsed                   | 10          | A    |
| $V_{GS}$        | Gate-source Voltage                    | $\pm 20$    | V    |
| $P_D$           | Total Power Dissipation                | 0.25        | W    |
| $R_{\theta JA}$ | Thermal Resistance Junction to Ambient | 500         | °C/W |
| $T_J$           | Operating Junction Temperature         | -55 to +150 | °C   |
| $T_{STG}$       | Storage Temperature                    | -55 to +150 | °C   |

## Internal Block Diagram



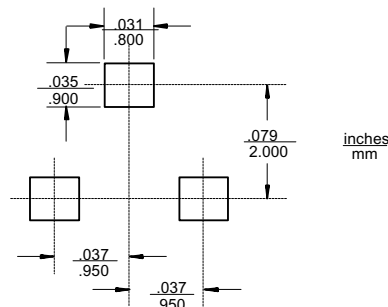
## N-Channel Enhancement Mode Field Effect Transistor

### SOT-23



| DIM | INCHES |       | MM   |      | NOTE |
|-----|--------|-------|------|------|------|
|     | MIN    | MAX   | MIN  | MAX  |      |
| A   | .110   | .120  | 2.80 | 3.04 |      |
| B   | .083   | .104  | 2.10 | 2.64 |      |
| C   | .047   | .055  | 1.20 | 1.40 |      |
| D   | .035   | .041  | .89  | 1.03 |      |
| E   | .070   | .081  | 1.78 | 2.05 |      |
| F   | .018   | .024  | .45  | .60  |      |
| G   | .0005  | .0039 | .013 | .100 |      |
| H   | .035   | .044  | .89  | 1.12 |      |
| J   | .003   | .007  | .085 | .180 |      |
| K   | .015   | .020  | .37  | .51  |      |

### Suggested Solder Pad Layout





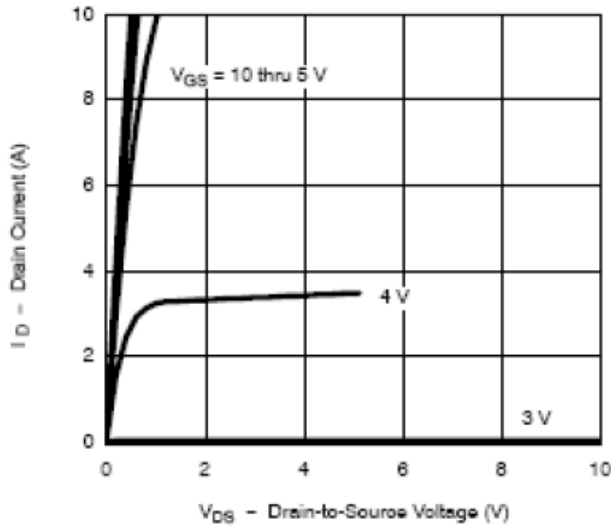
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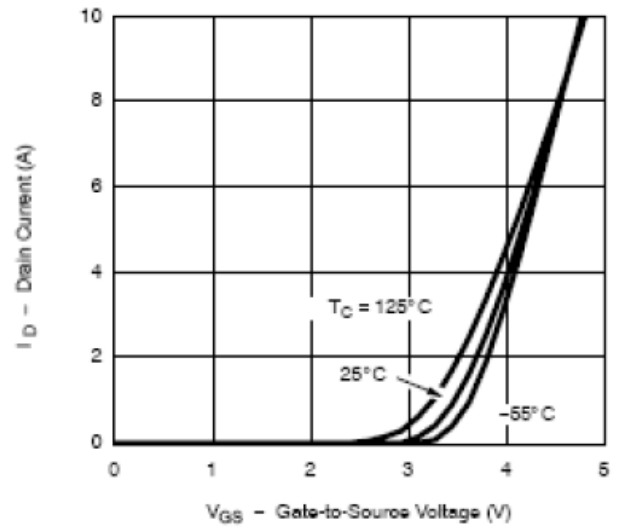
## Electrical Characteristics $T_A = 25^\circ\text{C}$ unless otherwise noted

| Parameter                                              | Symbol              | Test Condition                                                                                                  | Min | Typ | Max  | Units |
|--------------------------------------------------------|---------------------|-----------------------------------------------------------------------------------------------------------------|-----|-----|------|-------|
| Off Characteristics                                    |                     |                                                                                                                 |     |     |      |       |
| 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> =1V                                                                       |     |     | 1    | μA    |
| Gate Body Leakage Current, Forward                     | I <sub>GSSF</sub>   | V <sub>GS</sub> = 20V, V <sub>DS</sub> = 0V                                                                     |     |     | 100  | nA    |
| Gate Body Leakage Current, Reverse                     | I <sub>GSSR</sub>   | V <sub>GS</sub> = -20V, V <sub>DS</sub> = 0V                                                                    |     |     | -100 | nA    |
| On Characteristics                                     |                     |                                                                                                                 |     |     |      |       |
| Gate Threshold Voltage                                 | V <sub>GS(th)</sub> | V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> =250μA                                                       | 1   |     | 3    | V     |
| Static Drain-Source On-Resistance                      | R <sub>DS(on)</sub> | V <sub>GS</sub> =10V, I <sub>D</sub> =2.5A                                                                      |     |     | 65   | mΩ    |
|                                                        |                     | V <sub>GS</sub> =4.5V, I <sub>D</sub> =2A                                                                       |     |     | 90   | mΩ    |
| Forward Transconductance                               | g <sub>FS</sub>     | V <sub>DS</sub> =4.5V, I <sub>D</sub> =2.5A                                                                     |     | 4.6 |      | S     |
| Dynamic Characteristics                                |                     |                                                                                                                 |     |     |      |       |
| Input Capacitance                                      | C <sub>iss</sub>    | V <sub>DS</sub> =15V, V <sub>GS</sub> = 0V,<br>f = 1.0 MHz                                                      |     | 240 |      | pF    |
| Output Capacitance                                     | C <sub>oss</sub>    |                                                                                                                 |     | 110 |      | pF    |
| Reverse Transfer Capacitance                           | C <sub>rss</sub>    |                                                                                                                 |     | 17  |      | pF    |
| Switching Characteristics                              |                     |                                                                                                                 |     |     |      |       |
| Turn-On Delay Time                                     | t <sub>d(on)</sub>  | V <sub>DD</sub> = 15V, I <sub>D</sub> =1A,<br>V <sub>GEN</sub> =10V, R <sub>G</sub> =6Ω,<br>R <sub>L</sub> =15Ω |     | 8   | 20   | ns    |
| Turn-On Rise Time                                      | t <sub>r</sub>      |                                                                                                                 |     | 12  | 30   | ns    |
| Turn-Off Delay Time                                    | t <sub>d(off)</sub> |                                                                                                                 |     | 17  | 35   | ns    |
| Turn-Off Fall Time                                     | t <sub>f</sub>      |                                                                                                                 |     | 8   | 20   | ns    |
| Total Gate Charge                                      | Q <sub>g</sub>      | V <sub>DS</sub> =15V, I <sub>D</sub> =2.5A,<br>V <sub>GS</sub> =10V                                             |     | 4.5 | 10   | nC    |
| Gate-Source Charge                                     | Q <sub>gs</sub>     |                                                                                                                 |     | 0.8 |      | nC    |
| Gate-Drain Charge                                      | Q <sub>gd</sub>     |                                                                                                                 |     | 1.0 |      | nC    |
| Drain-Source Diode Characteristics and Maximun Ratings |                     |                                                                                                                 |     |     |      |       |
| Drain-Source Diode Forward Voltage                     | V <sub>SD</sub>     | V <sub>GS</sub> = 0V, I <sub>S</sub> =1.25A                                                                     |     |     | 1.2  | V     |

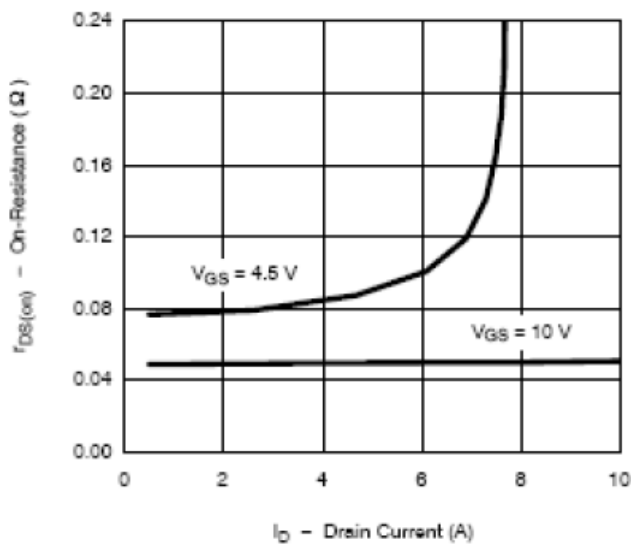
Output Characteristics



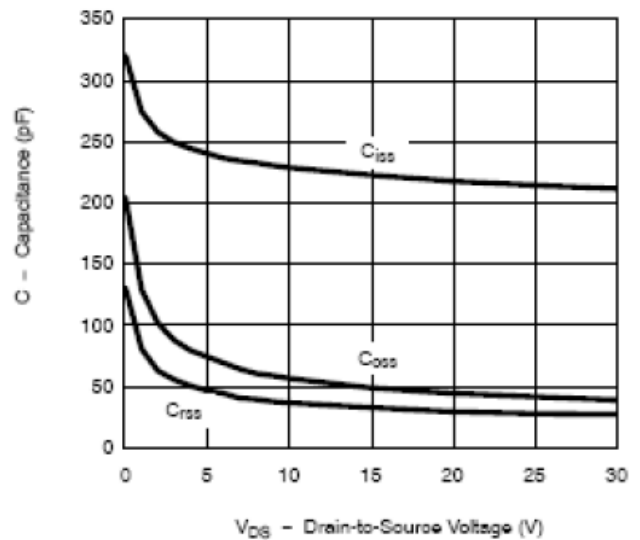
Transfer Characteristics



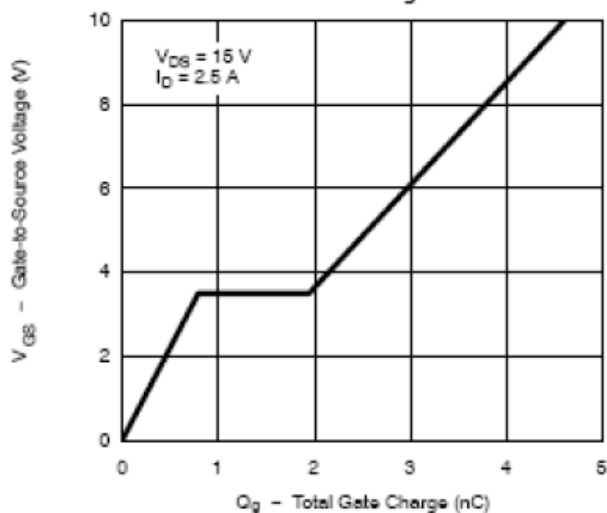
On-Resistance vs. Drain Current



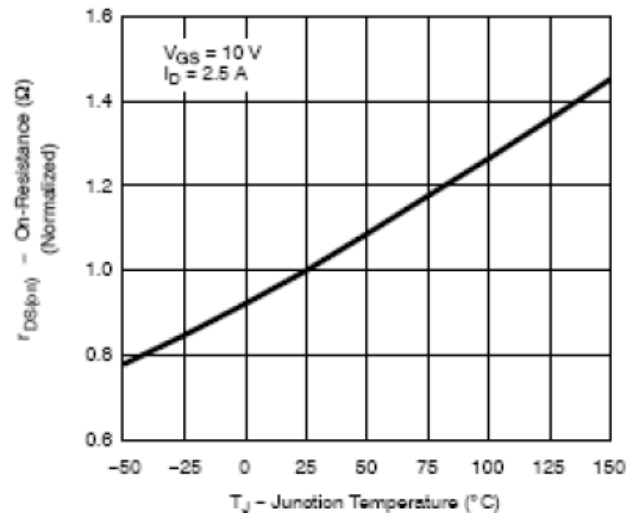
Capacitance

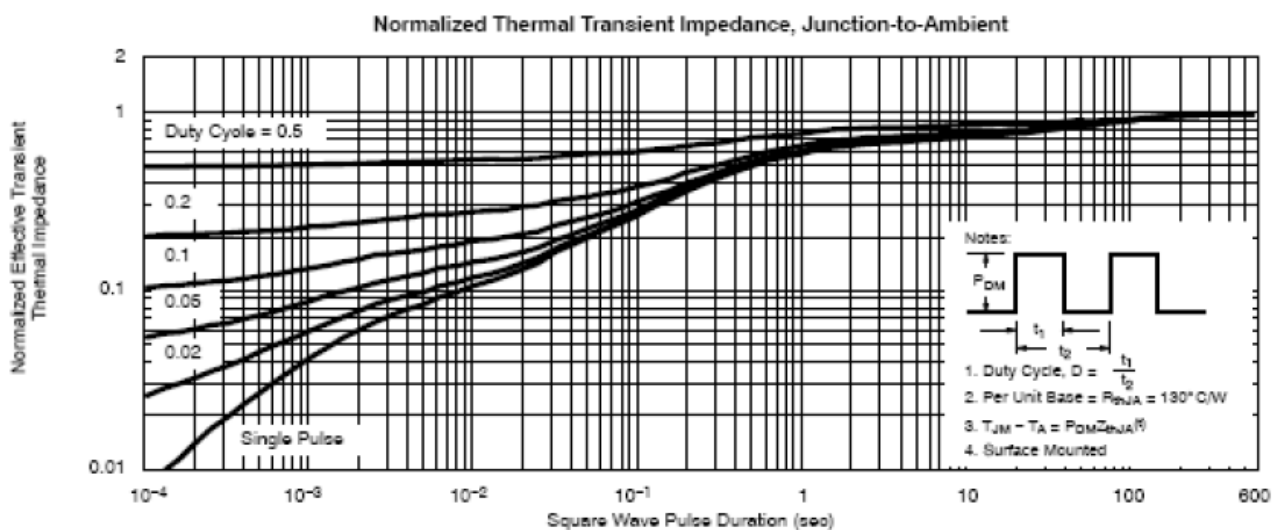
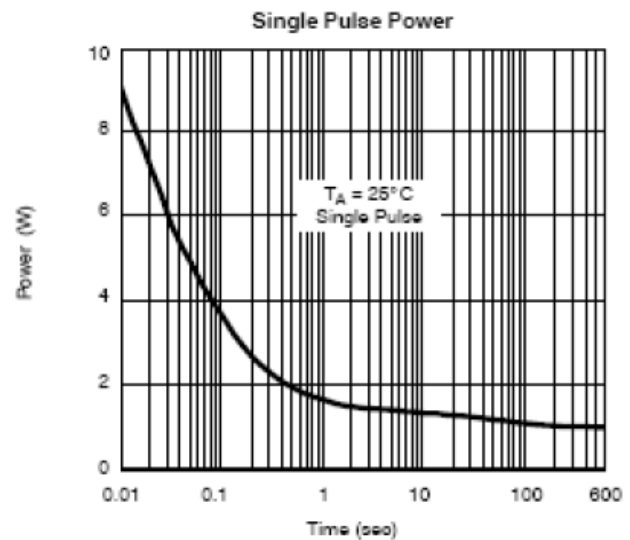
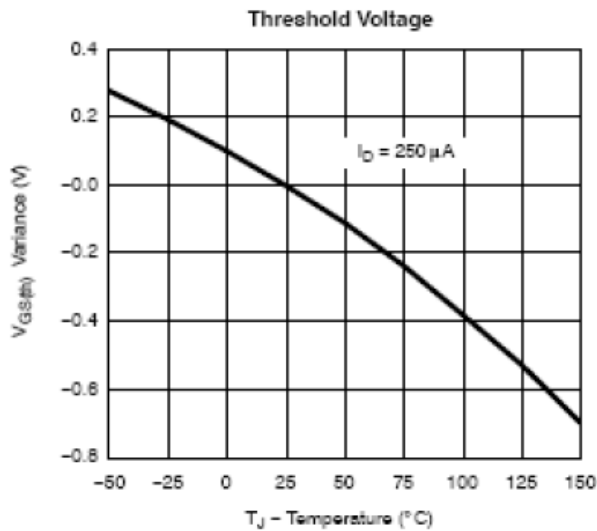
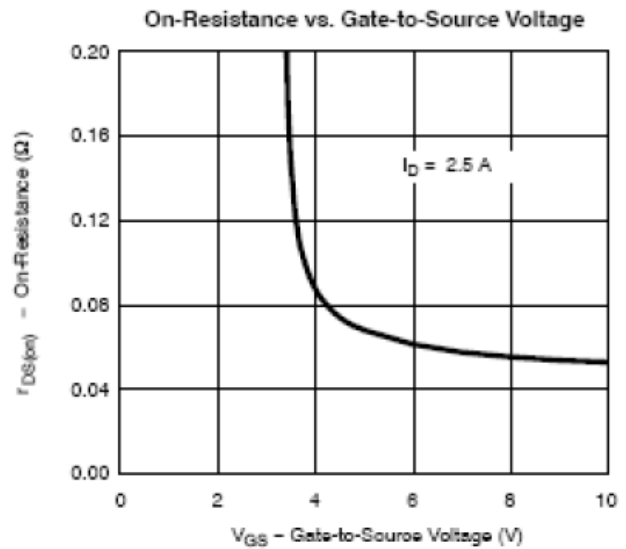
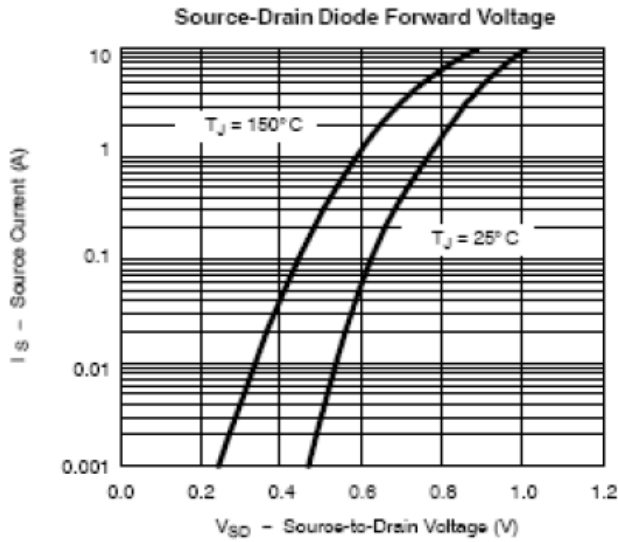


Gate Charge



On-Resistance vs. Junction Temperature





## Ordering Information :

| Device         | Packing               |
|----------------|-----------------------|
| Part Number-TP | Tape&Reel: 3Kpcs/Reel |

Note : Adding "-HF" suffix for halogen free, eg. Part Number-TP-HF

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