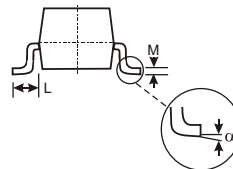
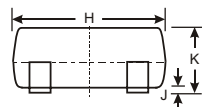
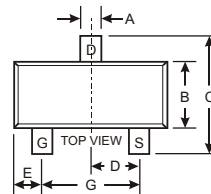


### Features

- Super high density cell design for extremely low  $R_{DS(ON)}$ .
- Exceptional on-resistance and maximum DC current capability.
- We declare that the material of product compliance with RoHS requirements.



| SOT-23               |       |       |
|----------------------|-------|-------|
| Dim                  | Min   | Max   |
| A                    | 0.37  | 0.51  |
| B                    | 1.20  | 1.40  |
| C                    | 2.30  | 2.50  |
| D                    | 0.89  | 1.03  |
| E                    | 0.45  | 0.60  |
| G                    | 1.78  | 2.05  |
| H                    | 2.80  | 3.00  |
| J                    | 0.013 | 0.10  |
| K                    | 0.903 | 1.10  |
| L                    | 0.45  | 0.61  |
| M                    | 0.085 | 0.180 |
| $\alpha$             | 0°    | 8°    |
| All Dimensions in mm |       |       |

### APPLICATIONS

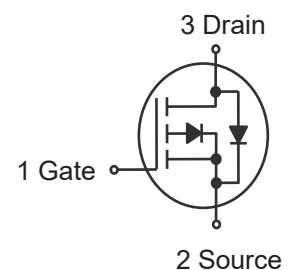
- Power Management in Notebook.
- Portable equipment.
- Battery powered system.
- Load switch.
- Marking Code:3401 OR A19T.

### Maximum Ratings @ $T_A = 25^\circ\text{C}$ unless otherwise specified

| Parameter                                                               | Symbol          | Value         | Unit               |
|-------------------------------------------------------------------------|-----------------|---------------|--------------------|
| Drain-Source Voltage                                                    | $V_{DS}$        | -30           | V                  |
| Gate-Source Voltage                                                     | $V_{GS}$        | $\pm 12$      | V                  |
| Drain Current                                                           | $I_D$           | -4.4          | A                  |
| Peak Drain Current <sup>1)</sup>                                        | $I_{DM}$        | -16           | A                  |
| Power Dissipation                                                       | $P_D$           | 1.25          | W                  |
| Thermal Resistance from Junction to Ambient (PCB mounted) <sup>2)</sup> | $R_{\theta JA}$ | 100           | $^\circ\text{C/W}$ |
| Junction Temperature                                                    | $T_J$           | 150           | $^\circ\text{C}$   |
| Storage Temperature Range                                               | $T_{stg}$       | - 55 to + 150 | $^\circ\text{C}$   |

<sup>1)</sup> Repetitive Rating: Pulse width limited by the Maximum junction temperature.

<sup>2)</sup> 1 in<sup>2</sup> 2oz Cu PCB board.



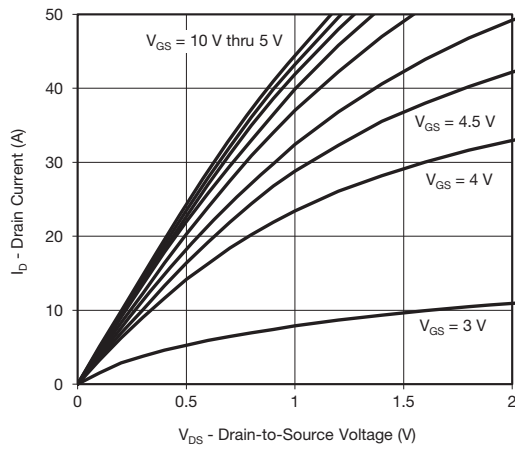
### Electrical Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

| Parameter                                              | Symbol        | Test Condition                                                          | Min  | Typ | Max       | Units      |
|--------------------------------------------------------|---------------|-------------------------------------------------------------------------|------|-----|-----------|------------|
| Off characteristics                                    |               |                                                                         |      |     |           |            |
| Drain-source breakdown voltage                         | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = -250\mu A$                                          | -30  |     |           | V          |
| Zero gate voltage drain current                        | $I_{DSS}$     | $V_{DS} = -24V, V_{GS} = 0V$                                            |      |     | -1        | $\mu A$    |
| Gate-source leakage current                            | $I_{GSS}$     | $V_{GS} = \pm 12V, V_{DS} = 0V$                                         |      |     | $\pm 100$ | nA         |
| On characteristics                                     |               |                                                                         |      |     |           |            |
| Drain-source on-resistance<br>(note 1)                 | $R_{DS(on)}$  | $V_{GS} = -10V, I_D = -4.4A$                                            |      | 40  | 55        | m $\Omega$ |
|                                                        |               | $V_{GS} = -4.5V, I_D = -4A$                                             |      | 50  | 65        | m $\Omega$ |
|                                                        |               | $V_{GS} = -2.5V, I_D = -1A$                                             |      | 70  | 90        | m $\Omega$ |
| Forward tranconductance (note 1)                       | $g_{FS}$      | $V_{DS} = -5V, I_D = -5A$                                               | 7    |     |           | S          |
| Gate threshold voltage                                 | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = -250\mu A$                                      | -0.7 |     | -1.3      | V          |
| Dynamic characteristics (note 2)                       |               |                                                                         |      |     |           |            |
| Input capacitance                                      | $C_{iss}$     | $V_{DS} = -15V, V_{GS} = 0V, f = 1MHz$                                  |      | 954 |           | pF         |
| Output capacitance                                     | $C_{oss}$     |                                                                         |      | 115 |           | pF         |
| Reverse transfer capacitance                           | $C_{rss}$     |                                                                         |      | 77  |           | pF         |
| Switching characteristics (note 2)                     |               |                                                                         |      |     |           |            |
| Turn-on delay time                                     | $t_{d(on)}$   | $V_{GS} = -10V, V_{DS} = -15V,$<br>$R_L = 3.6\Omega, R_{GEN} = 6\Omega$ |      |     | 6.3       | ns         |
| Turn-on rise time                                      | $t_r$         |                                                                         |      |     | 3.2       | ns         |
| Turn-off delay time                                    | $t_{d(off)}$  |                                                                         |      |     | 38.2      | ns         |
| Turn-off fall Time                                     | $t_f$         |                                                                         |      |     | 12        | ns         |
| Drain-source diode characteristics and maximum ratings |               |                                                                         |      |     |           |            |
| Diode forward voltage (note 1)                         | $V_{SD}$      | $I_S = -1A, V_{GS} = 0V$                                                |      |     | -1        | V          |

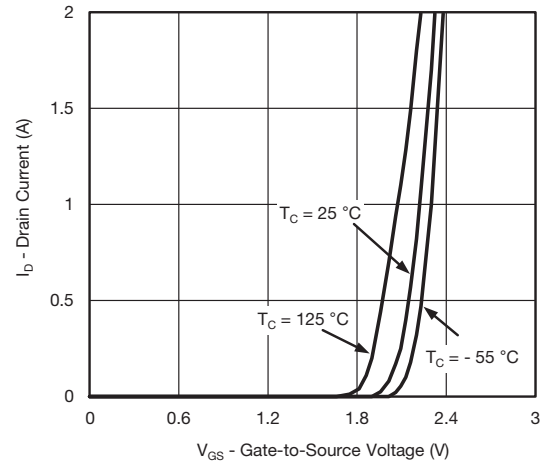
**Note :**

1. Pulse Test : Pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .
2. These parameters have no way to verify.

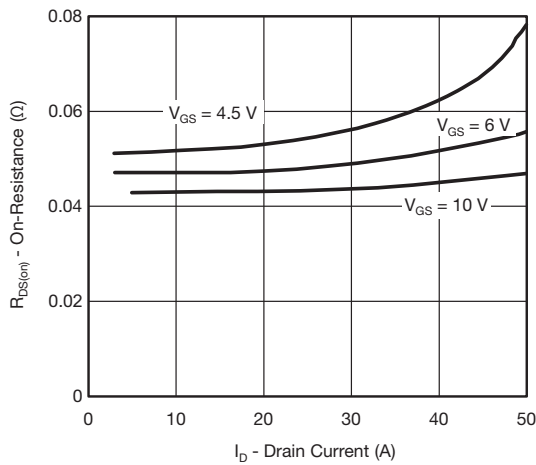
### TYPICAL TRANSIENT CHARACTERISTICS



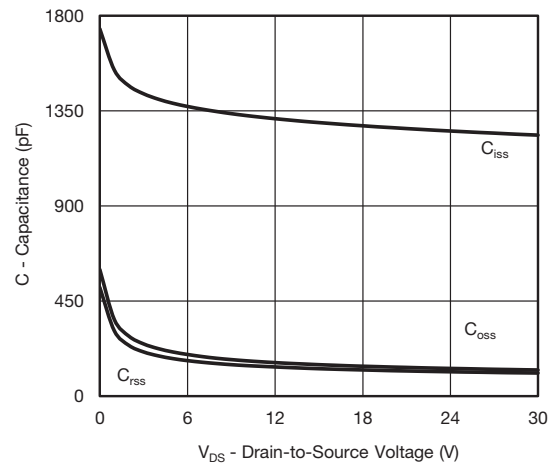
**Output Characteristics**



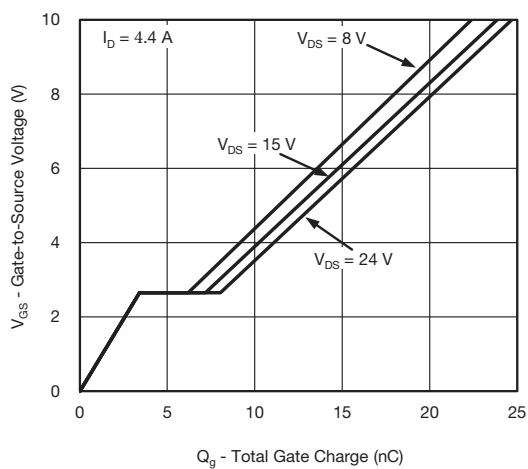
**Transfer Characteristics**



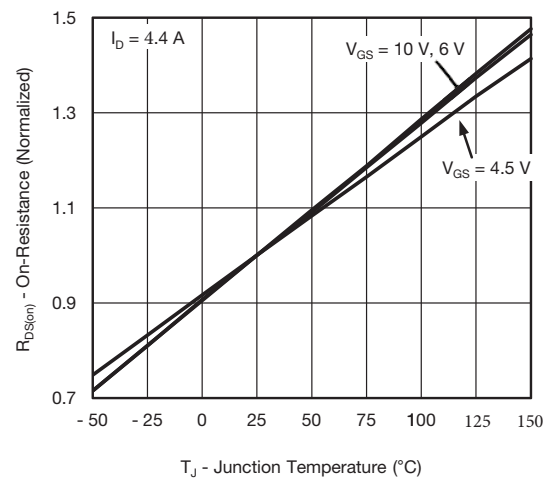
**On-Resistance vs. Drain Current**



**Capacitance**

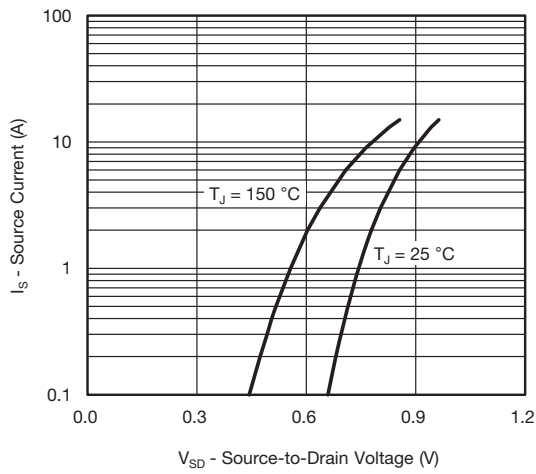


**Gate Charge**

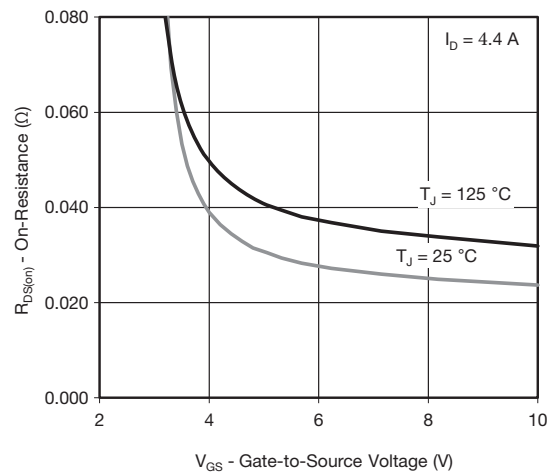


**On-Resistance vs. Junction Temperature**

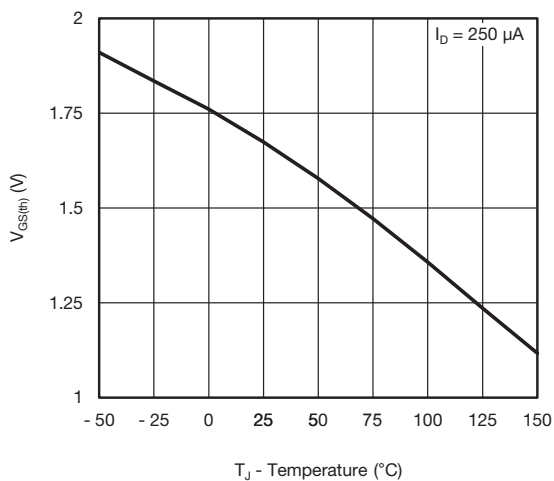
### TYPICAL TRANSIENT CHARACTERISTICS



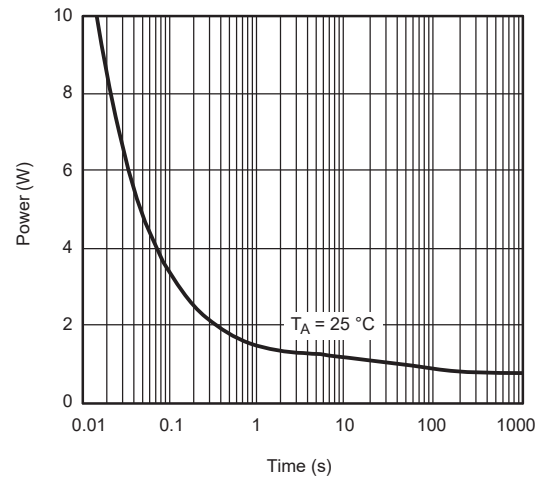
Source-Drain Diode Forward Voltage



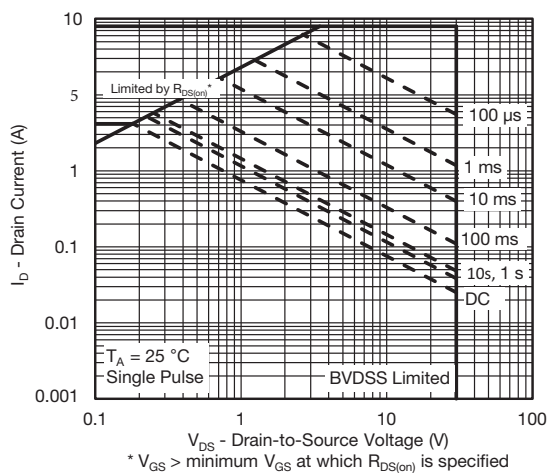
On-Resistance vs. Gate-to-Source Voltage



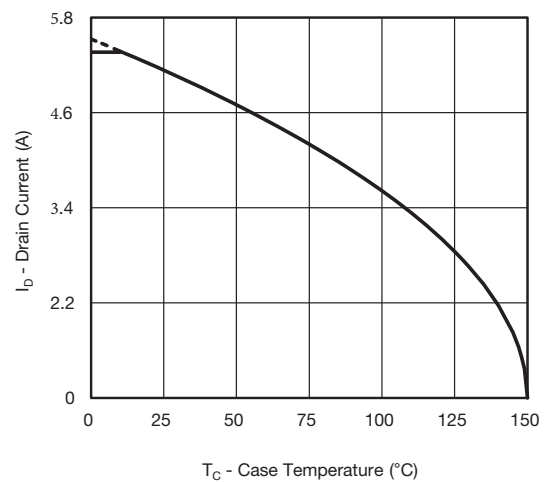
Threshold Voltage



Single Pulse Power (Junction-to-Ambient)

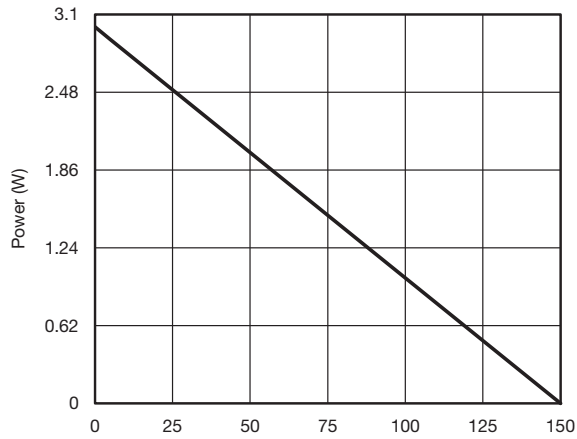


Safe Operating Area, Junction-to-Ambient

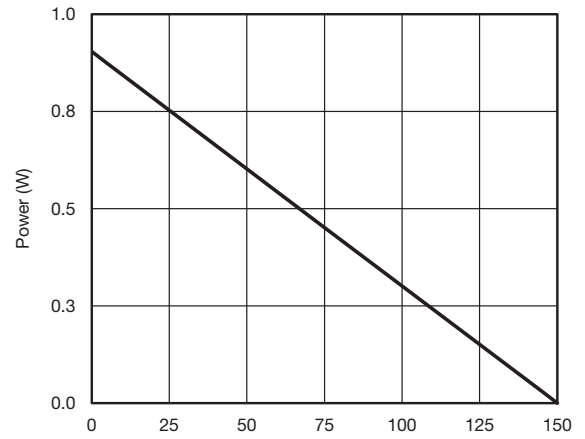


Current Derating\*

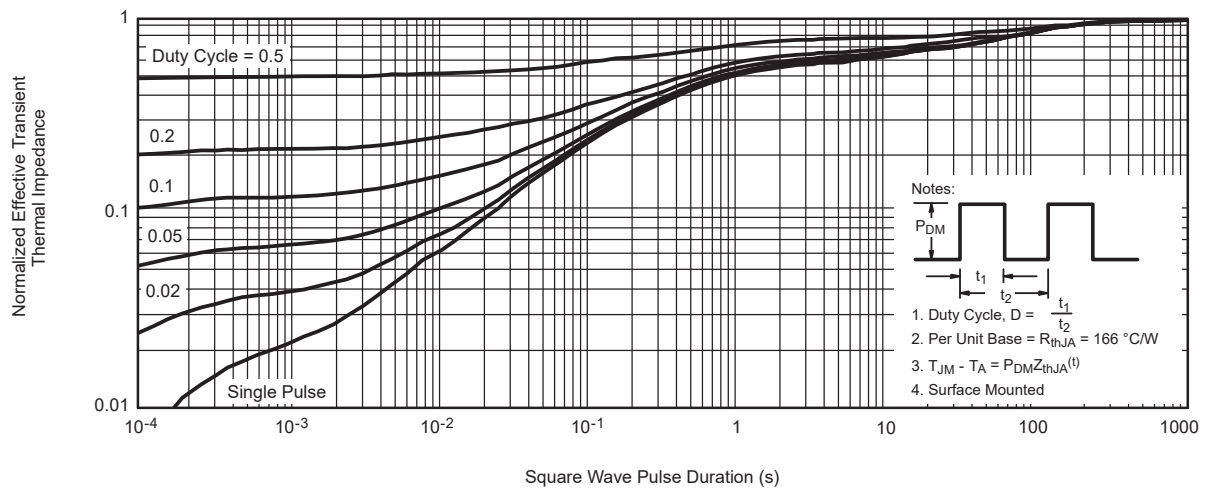
### TYPICAL TRANSIENT CHARACTERISTICS



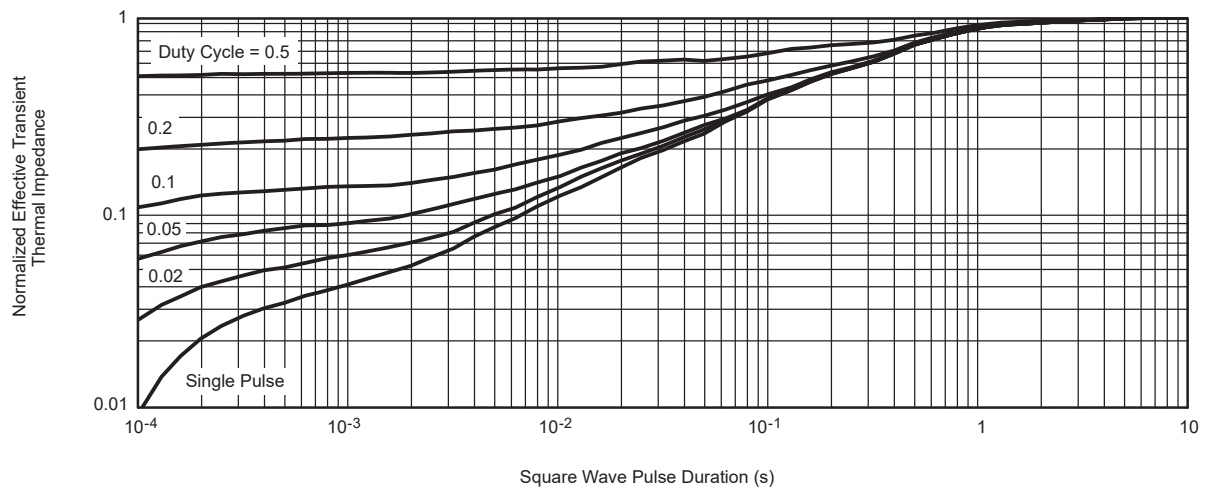
$T_C$  - Case Temperature ( $^{\circ}\text{C}$ )  
**Power, Junction-to-Foot**



$T_A$  - Ambient Temperature ( $^{\circ}\text{C}$ )  
**Power, Junction-to-Ambient**



**Normalized Thermal Transient Impedance, Junction-to-Ambient**



**Normalized Thermal Transient Impedance, Junction-to-Foot**

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