

### Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)MAX}$ | $I_D$ |
|---------------|-----------------|-------|
| 100V          | 85mΩ@10V        | 7A    |
|               | 105mΩ@4.5V      |       |

### Feature

- Excellent gate charge x  $R_{DS(on)}$  product (FOM)
- Very low on-resistance  $R_{DS(on)}$
- Suffix “-Q1” for AEC-Q101

### Application

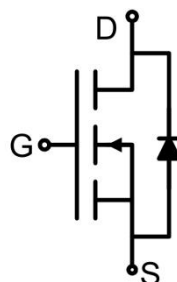
- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

### Package

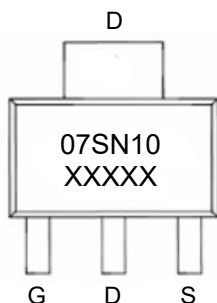


SOT-223

### Circuit diagram



### Marking



### Absolute maximum ratings ( $T_A=25^{\circ}\text{C}$ unless otherwise noted)

| Parameter                                            | Symbol          | Value           | Unit                        |
|------------------------------------------------------|-----------------|-----------------|-----------------------------|
| Drain-Source Voltage                                 | $V_{DS}$        | 100             | V                           |
| Gate-Source Voltage                                  | $V_{GS}$        | $\pm 20$        | V                           |
| Continuous Drain Current                             | $I_D$           | 7               | A                           |
| Pulsed Drain Current <sup>1)</sup>                   | $I_{DM}$        | 28              | A                           |
| Single Pulse Avalanche Energy <sup>4)</sup>          | $E_{AS}$        | 20              | mJ                          |
| Power Dissipation                                    | $P_D$           | 2.5             | W                           |
| Thermal Resistance Junction to Ambient <sup>2)</sup> | $R_{\theta JA}$ | 50              | $^{\circ}\text{C}/\text{W}$ |
| Operating Junction Temperature                       | $T_J$           | $-55 \sim +150$ | $^{\circ}\text{C}$          |
| Storage Temperature                                  | $T_{STG}$       | $-55 \sim +150$ | $^{\circ}\text{C}$          |

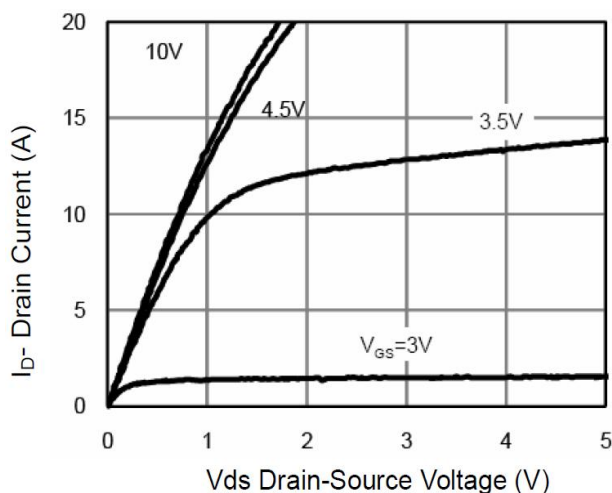
### Electrical characteristics ( $T_A=25^{\circ}\text{C}$ , unless otherwise noted)

| Parameter                                | Symbol               | Test Condition                                                                         | Min. | Typ. | Max. | Unit |
|------------------------------------------|----------------------|----------------------------------------------------------------------------------------|------|------|------|------|
| Static Characteristics                   |                      |                                                                                        |      |      |      |      |
| Drain-source breakdown voltage           | V <sub>(BR)DSS</sub> | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                                             | 100  |      |      | V    |
| Zero gate voltage drain current          | I <sub>DSS</sub>     | V <sub>DS</sub> =100V, V <sub>GS</sub> =0V                                             |      |      | 1    | μA   |
| Gate-body leakage current                | I <sub>GSS</sub>     | V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V                                             |      |      | ±100 | nA   |
| Gate threshold voltage <sup>3)</sup>     | V <sub>GS(th)</sub>  | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                               | 1.2  | 1.9  | 2.5  | V    |
| Drain-source on-resistance <sup>3)</sup> | R <sub>DS(on)</sub>  | V <sub>GS</sub> =10V, I <sub>D</sub> =7A                                               |      | 75   | 85   | mΩ   |
|                                          |                      | V <sub>GS</sub> =4.5V, I <sub>D</sub> =7A                                              |      | 85   | 105  |      |
| Dynamic characteristics <sup>5)</sup>    |                      |                                                                                        |      |      |      |      |
| Input Capacitance                        | C <sub>iss</sub>     | V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f =1MHz                                     |      | 443  |      | pF   |
| Output Capacitance                       | C <sub>oss</sub>     |                                                                                        |      | 80   |      |      |
| Reverse Transfer Capacitance             | C <sub>rss</sub>     |                                                                                        |      | 15.4 |      |      |
| Total Gate Charge                        | Q <sub>g</sub>       | V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>D</sub> =7A                         |      | 7.2  |      | nC   |
| Gate-Source Charge                       | Q <sub>gs</sub>      |                                                                                        |      | 1.3  |      |      |
| Gate-Drain Charge                        | Q <sub>gd</sub>      |                                                                                        |      | 1    |      |      |
| Turn-on delay time                       | t <sub>d(on)</sub>   | V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, R <sub>G</sub> =2.5Ω<br>R <sub>L</sub> =7Ω |      | 6    |      | nS   |
| Turn-on rise time                        | t <sub>r</sub>       |                                                                                        |      | 2.5  |      |      |
| Turn-off delay time                      | t <sub>d(off)</sub>  |                                                                                        |      | 18   |      |      |
| Turn-off fall time                       | t <sub>f</sub>       |                                                                                        |      | 2.5  |      |      |
| Source-Drain Diode characteristics       |                      |                                                                                        |      |      |      |      |
| Diode Forward Current <sup>2)</sup>      | I <sub>S</sub>       |                                                                                        |      |      | 7    | A    |
| Diode Forward Voltage <sup>3)</sup>      | V <sub>SD</sub>      | V <sub>GS</sub> =0V, I <sub>S</sub> =7A                                                |      |      | 1.2  | V    |
| Reverse Recovery Time                    | T <sub>rr</sub>      | I <sub>F</sub> =3.5A, di/dt =100A/us <sup>3)</sup>                                     |      | 31.2 |      | nS   |
| Reverse Recovery Charge                  | Q <sub>rr</sub>      | T <sub>J</sub> = 25°C                                                                  |      | 41.2 |      | nC   |

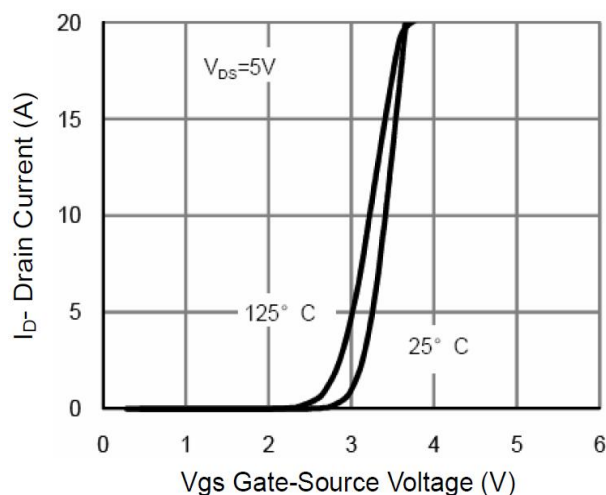
Notes:

- 1) Repetitive Rating: Pulse width limited by maximum junction temperature.
- 2) Surface Mounted on FR4 Board,  $t \leq 10$  sec.
- 3) Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .
- 4) EAS condition:  $T_J=25^{\circ}\text{C}$ ,  $V_{DS}=50\text{V}$ ,  $V_G=10\text{V}$ ,  $L=0.5\text{mH}$ ,  $R_g=25\Omega$ .
- 5) Guaranteed by design, not subject to production.

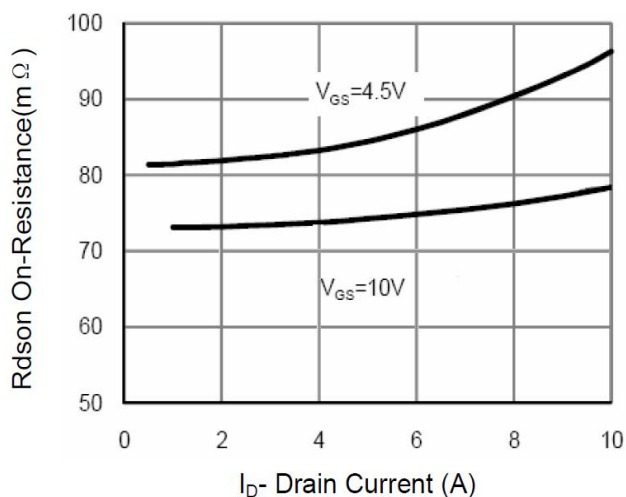
### Typical Characteristics



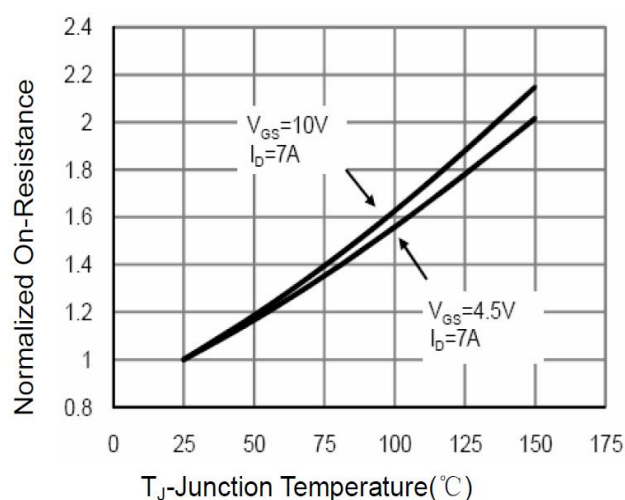
**Figure 1 Output Characteristics**



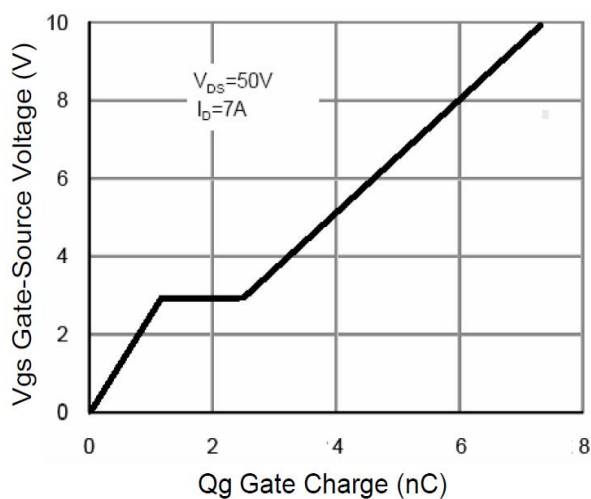
**Figure 2 Transfer Characteristics**



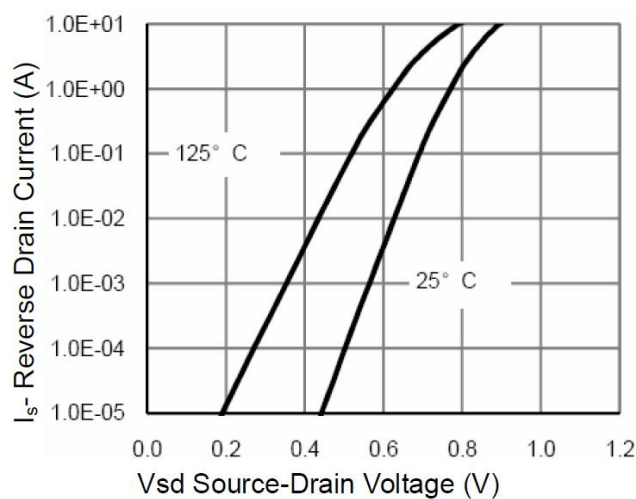
**Figure 3  $R_{DS(on)}$ - Drain Current**



**Figure 4  $R_{DS(on)}$ -Junction Temperature**

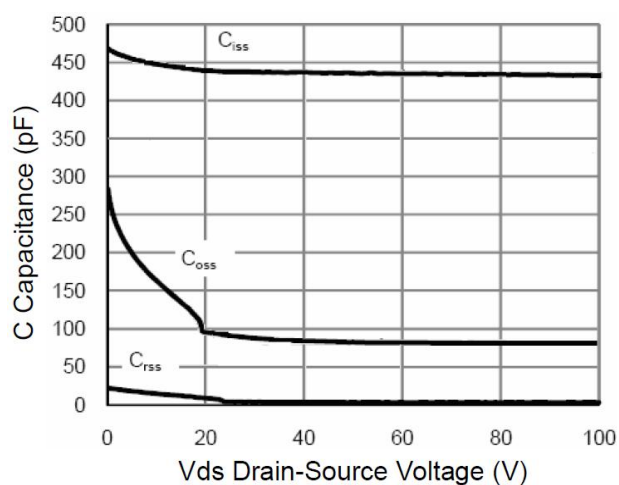


**Figure 5 Gate Charge**

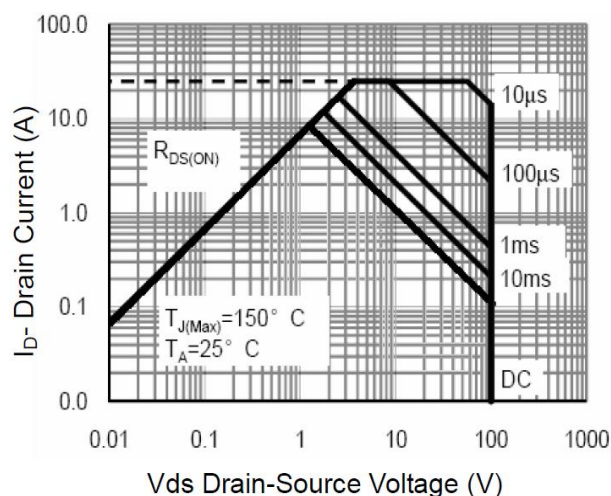


**Figure 6 Source- Drain Diode Forward**

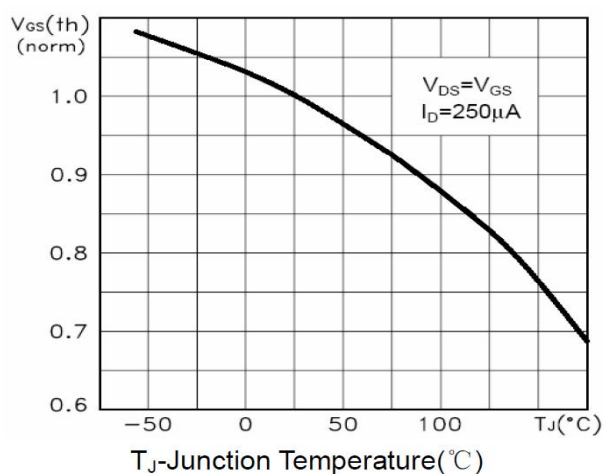
### Typical Characteristics



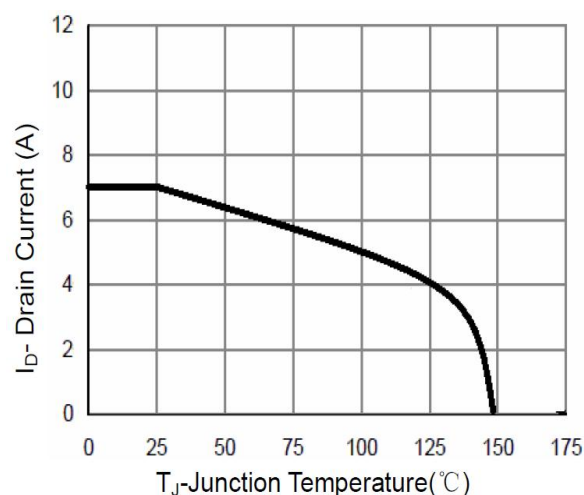
**Figure 7 Capacitance vs Vds**



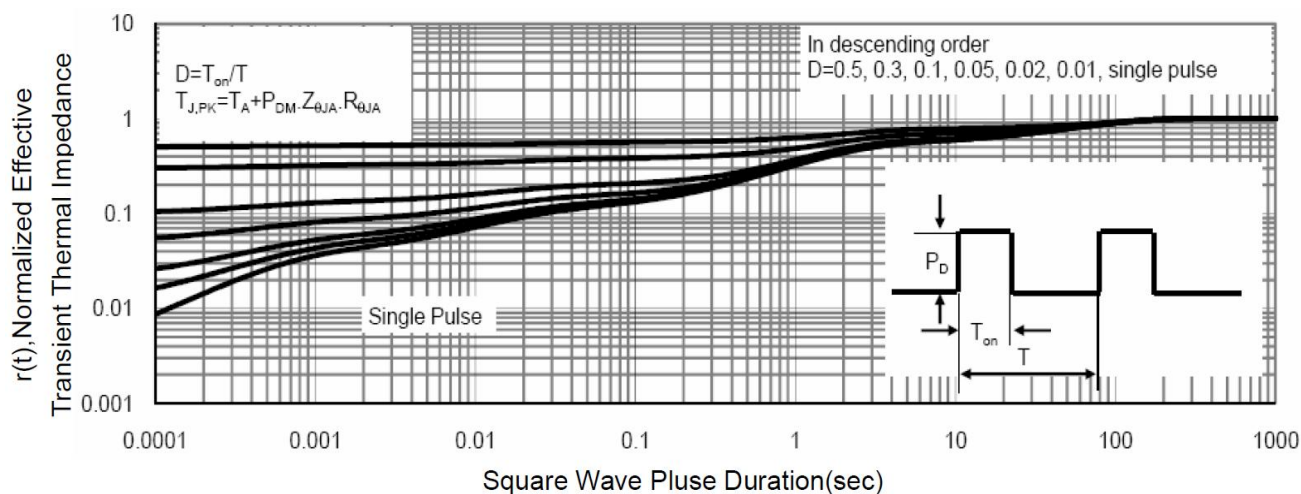
**Figure 8 Safe Operation Area**



**Figure 9 V<sub>GS</sub>(th) vs Junction Temperature**

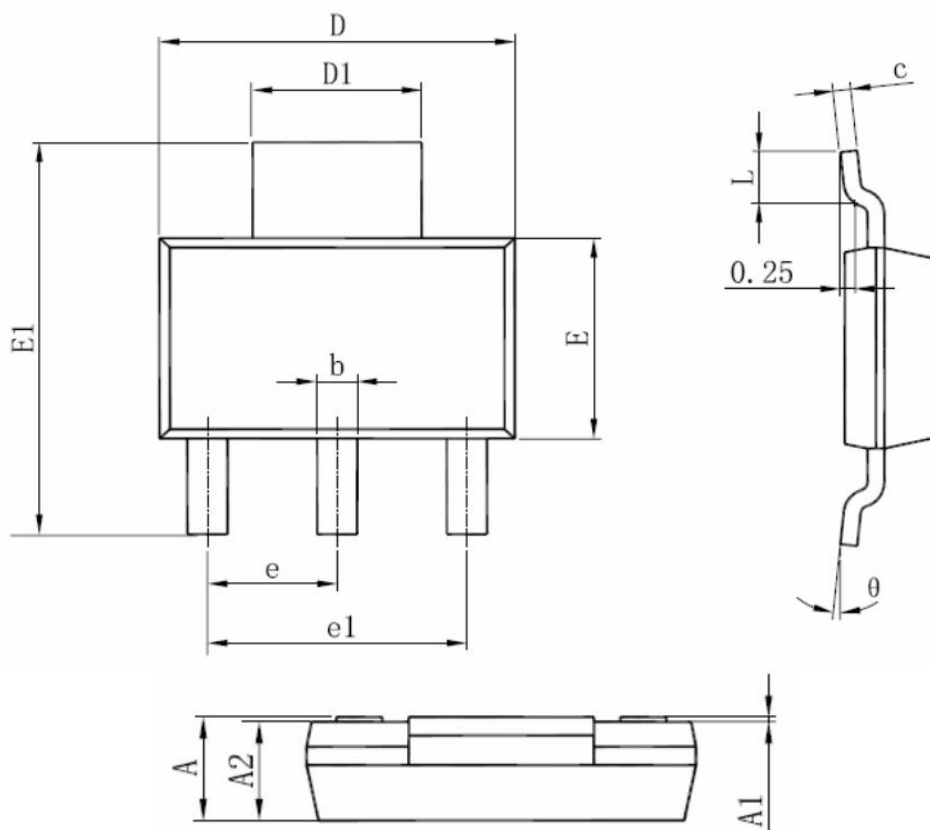


**Figure 10 Current De-ratin**



**Figure 11 Normalized Maximum Transient Thermal Impedance**

## SOT-223 Package Information



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min.                      | Max.  | Min.                 | Max.  |
| A      | -                         | 1.800 | -                    | 0.071 |
| A1     | 0.000                     | 0.120 | 0.000                | 0.005 |
| A2     | 1.450                     | 1.750 | 0.057                | 0.069 |
| b      | 0.600                     | 0.840 | 0.024                | 0.033 |
| c      | 0.230                     | 0.350 | 0.009                | 0.014 |
| D      | 6.200                     | 6.700 | 0.244                | 0.264 |
| D1     | 2.900                     | 3.100 | 0.114                | 0.122 |
| E      | 3.300                     | 3.700 | 0.130                | 0.146 |
| E1     | 6.700                     | 7.300 | 0.264                | 0.287 |
| e      | 2.300 BSC.                |       | 0.091 BSC.           |       |
| e1     | 4.600 BSC.                |       | 0.182 BSC.           |       |
| L      | 0.750                     | -     | 0.030                | -     |
| θ      | 0°                        | 10°   | 0°                   | 10°   |