

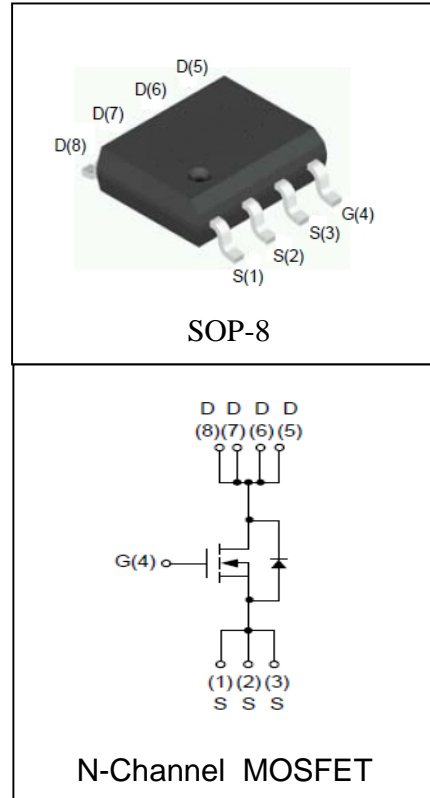
### Features

- 20V/20A,  
 $R_{DS(ON)} = 3.5m\Omega$  (Typ.) @  $V_{GS} = 10V$   
 $R_{DS(ON)} = 3.8m\Omega$  (Typ.) @  $V_{GS} = 4.5V$   
 $R_{DS(ON)} = 5.6m\Omega$  (Typ.) @  $V_{GS} = 2.5V$
- Super High Dense Cell Design
- Low  $R_{DS(ON)}$
- Reliable and Rugged
- Lead Free and Green Available

### Applications

- DC/DC Converter

### Pin Description



### Absolute Maximum Ratings

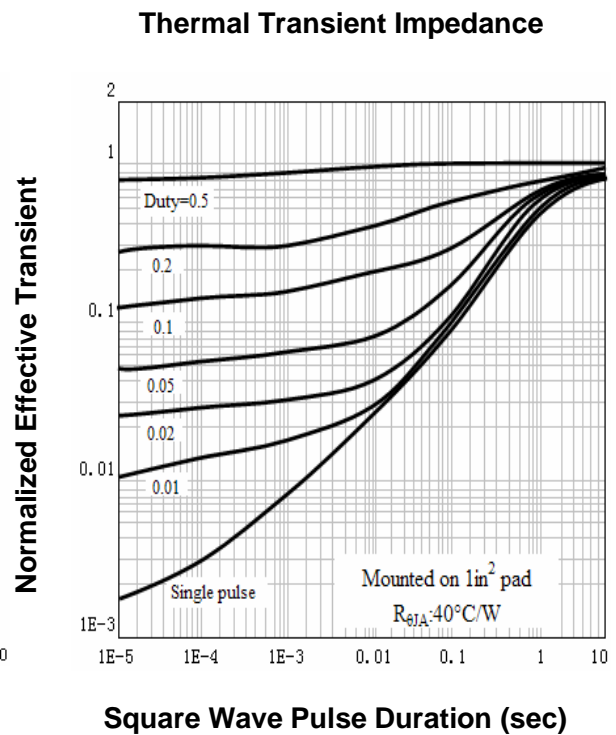
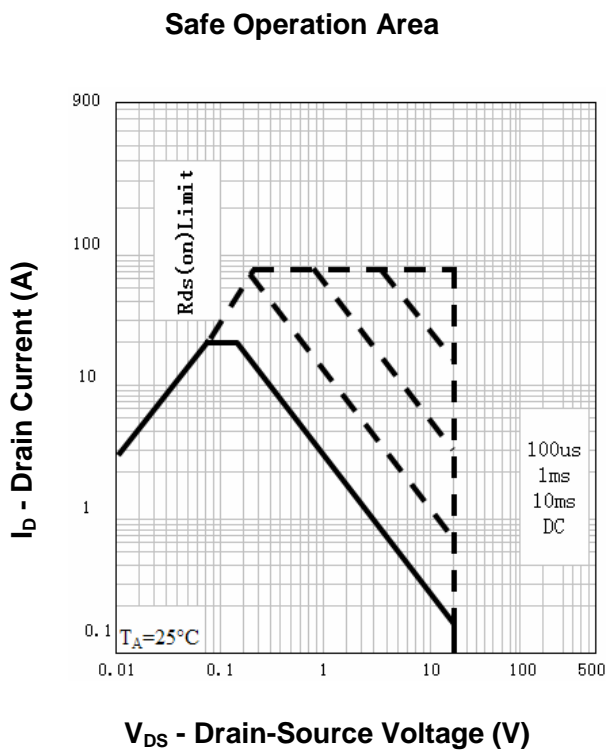
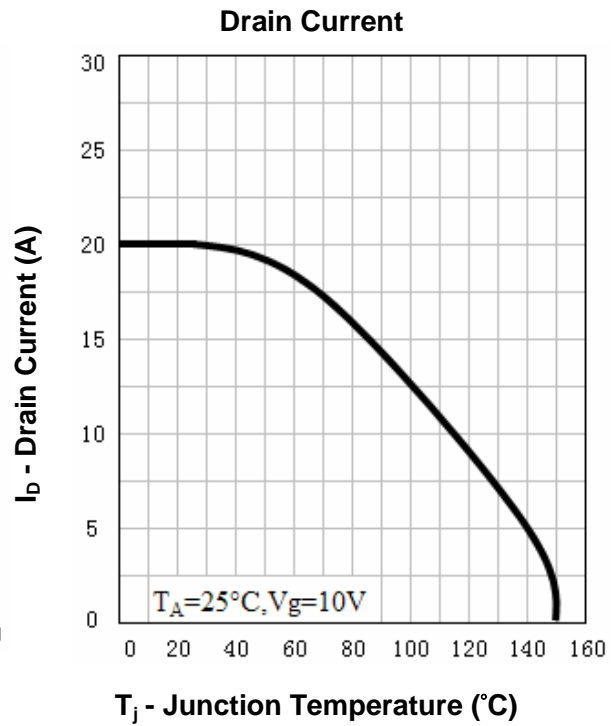
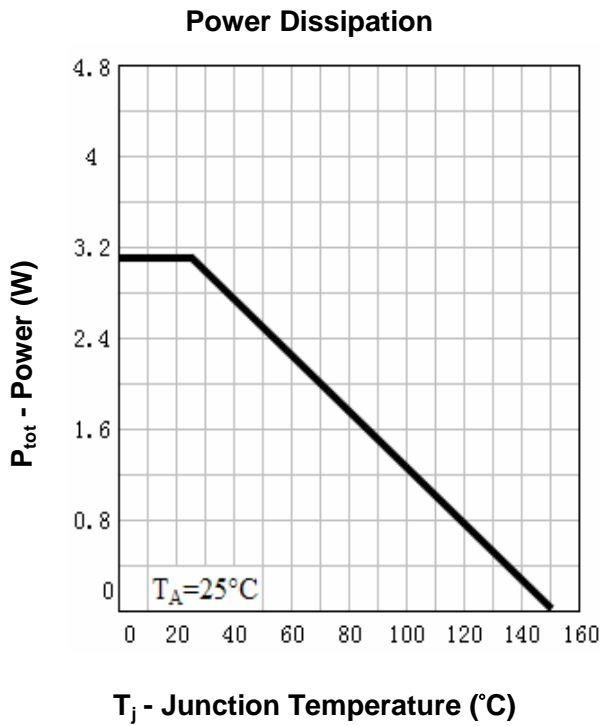
| Symbol   | Parameter                                   | Rating                                | Unit         |
|--|---|---------------------------------------|--------------|
| <b>Common Ratings</b> ( $T_A = 25^\circ C$ Unless Otherwise Noted) |   |                                       |              |
| $V_{DSS}$  | Drain-Source Voltage                        | 20                                    | V            |
| $V_{GSS}$  | Gate-Source Voltage                         | $\pm 12$                              |              |
| $T_J$  | Maximum Junction Temperature                | 150                                   | $^\circ C$   |
| $T_{STG}$  | Storage Temperature Range                   | -55 to 150                            | $^\circ C$   |
| $I_S$  | Diode Continuous Forward Current            | $T_A = 25^\circ C$<br>4.4             | A            |
| <b>Mounted on Large Heat Sink</b>                                  |   |                                       |              |
| $I_{DP}$   | 300 $\mu s$ Pulse Drain Current Tested      | $T_A = 25^\circ C$<br>70 <sup>①</sup> | A            |
| $I_D$  | Continuous Drain Current ( $V_{GS} = 10V$ ) | $T_A = 25^\circ C$                    | A            |
|  |   | $T_A = 70^\circ C$                    |              |
| $P_D$  | Maximum Power Dissipation                   | $T_A = 25^\circ C$                    | W            |
|  |   | $T_A = 70^\circ C$                    |              |
| $R_{\theta JA}$ <sup>②</sup>                                       | Thermal Resistance-Junction to Ambient      | 40                                    | $^\circ C/W$ |

**Electrical Characteristics** ( $T_A=25^\circ\text{C}$  Unless Otherwise Noted)

| Symbol  | Parameter                        | Test Condition   | RU2020H |      |           | Unit       |
|---|----------------------------------|--|---------|------|-----------|------------|
|   |                                  |  | Min.    | Typ. | Max.      |            |
| <b>Static Characteristics</b>                     |                                  |  |         |      |           |            |
| $BV_{DSS}$  | Drain-Source Breakdown Voltage   | $V_{GS}=0V, I_{DS}=250\mu A$   | 20      |      |           | V          |
| $I_{DSS}$   | Zero Gate Voltage Drain Current  | $V_{DS}=20V, V_{GS}=0V$<br>$T_J=85^\circ\text{C}$                          |         |      | 1         | $\mu A$    |
|   |                                  |  |         |      | 30        |            |
| $V_{GS(th)}$                                      | Gate Threshold Voltage           | $V_{DS}=V_{GS}, I_{DS}=250\mu A$   | 0.5     | 1    | 1.5       | V          |
| $I_{GSS}$   | Gate Leakage Current             | $V_{GS}=\pm 12V, V_{DS}=0V$  |         |      | $\pm 100$ | nA         |
| $R_{DS(ON)}^{(3)}$                                | Drain-Source On-state Resistance | $V_{GS}=10V, I_{DS}=20A$   |         | 3.5  | 5.2       | m $\Omega$ |
|   |                                  | $V_{GS}=4.5V, I_{DS}=16A$  |         | 3.8  | 6.5       | m $\Omega$ |
|   |                                  | $V_{GS}=2.5V, I_{DS}=12A$  |         | 5.6  | 9         | m $\Omega$ |
| <b>Diode Characteristics</b>                      |                                  |  |         |      |           |            |
| $V_{SD}^{(3)}$                                    | Diode Forward Voltage            | $I_{SD}=1A, V_{GS}=0V$   |         |      | 1         | V          |
| $t_{rr}$  | Reverse Recovery Time            | $I_{SD}=10A, di_{SD}/dt=100A/\mu s$  |         | 27   |           | ns         |
| $Q_{rr}$  | Reverse Recovery Charge          |  |         | 39   |           | nC         |
| <b>Dynamic Characteristics</b> <sup>(4)</sup>     |                                  |  |         |      |           |            |
| $R_G$   | Gate Resistance                  | $V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$                                      |         | 2    |           | $\Omega$   |
| $C_{iss}$   | Input Capacitance                | $V_{GS}=0V,$<br>$V_{DS}=10V,$<br>Frequency=1.0MHz                          |         | 3680 |           | pF         |
| $C_{oss}$   | Output Capacitance               |  |         | 1530 |           |            |
| $C_{riss}$  | Reverse Transfer Capacitance     |  |         | 370  |           |            |
| $t_{d(ON)}$                                       | Turn-on Delay Time               | $V_{DD}=10V, R_L=1\Omega,$<br>$I_{DS}=10A, V_{GEN}=4.5V,$<br>$R_G=6\Omega$ |         | 20   |           | ns         |
| $t_r$   | Turn-on Rise Time                |  |         | 25   |           |            |
| $t_{d(OFF)}$                                      | Turn-off Delay Time              |  |         | 92   |           |            |
| $t_f$   | Turn-off Fall Time               |  |         | 45   |           |            |
| <b>Gate Charge Characteristics</b> <sup>(4)</sup> |                                  |  |         |      |           |            |
| $Q_g$   | Total Gate Charge                | $V_{DS}=16V, V_{GS}=4.5V,$<br>$I_{DS}=10A$                                 |         | 53   |           | nC         |
| $Q_{gs}$  | Gate-Source Charge               |  |         | 11   |           |            |
| $Q_{gd}$  | Gate-Drain Charge                |  |         | 20   |           |            |

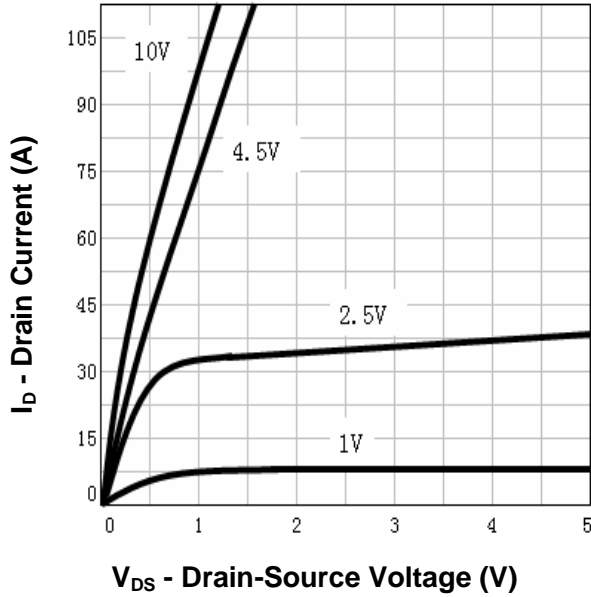
- Notes: ① Pulse width limited by safe operating area.  
 ② When mounted on 1 inch square copper board,  $t \leq 10\text{sec}$ .  
 ③ Pulse test ; Pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .  
 ④ Guaranteed by design, not subject to production testing.

**Typical Characteristics**

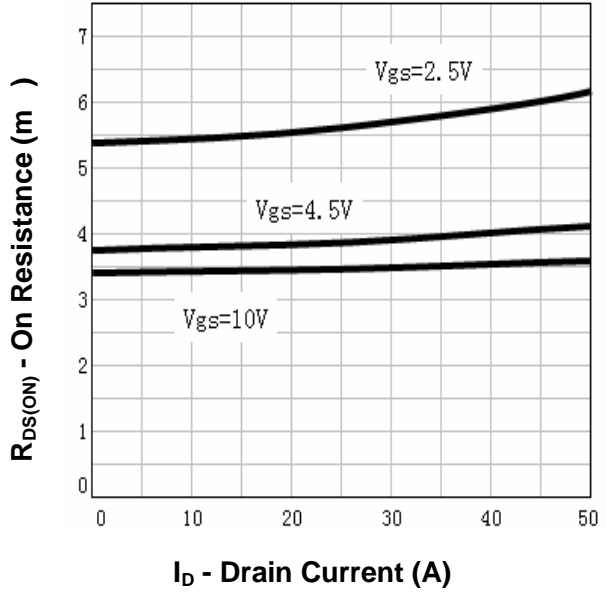


**Typical Characteristics**

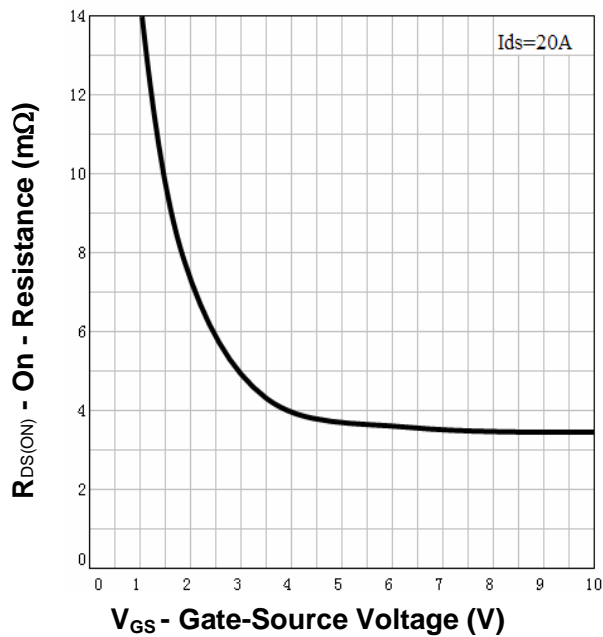
**Output Characteristics**



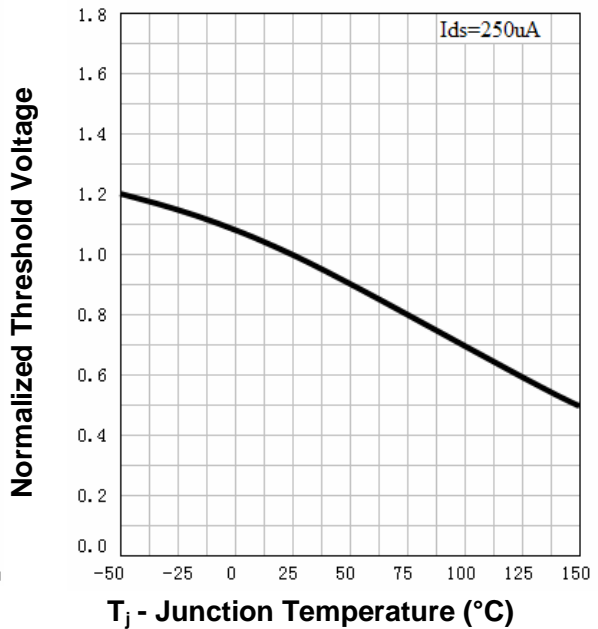
**Drain-Source On Resistance**



**Drain-Source On Resistance**

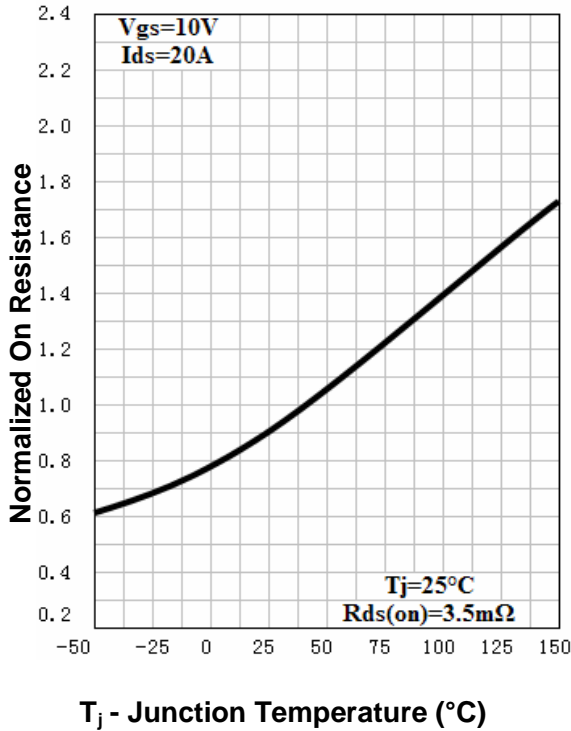


**Gate Threshold Voltage**

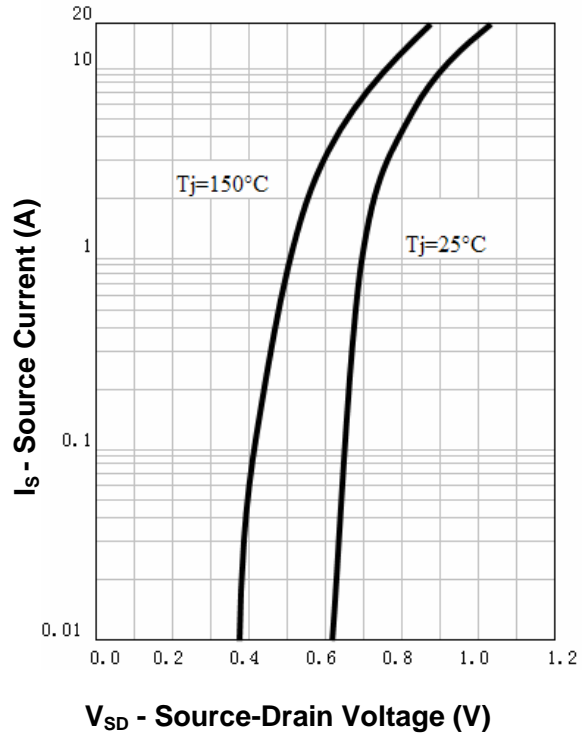


**Typical Characteristics**

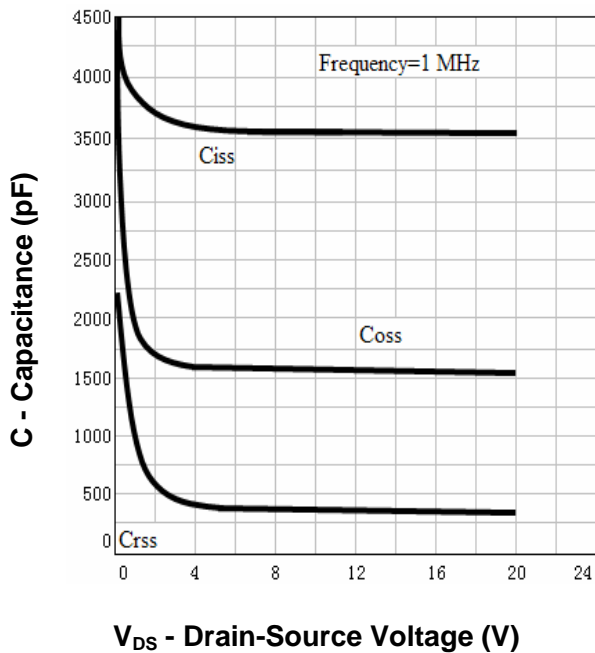
**Drain-Source On Resistance**



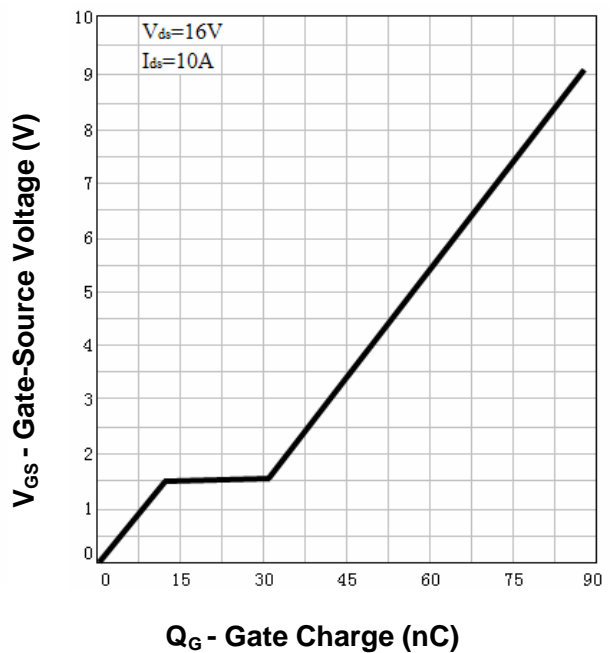
**Source-Drain Diode Forward**



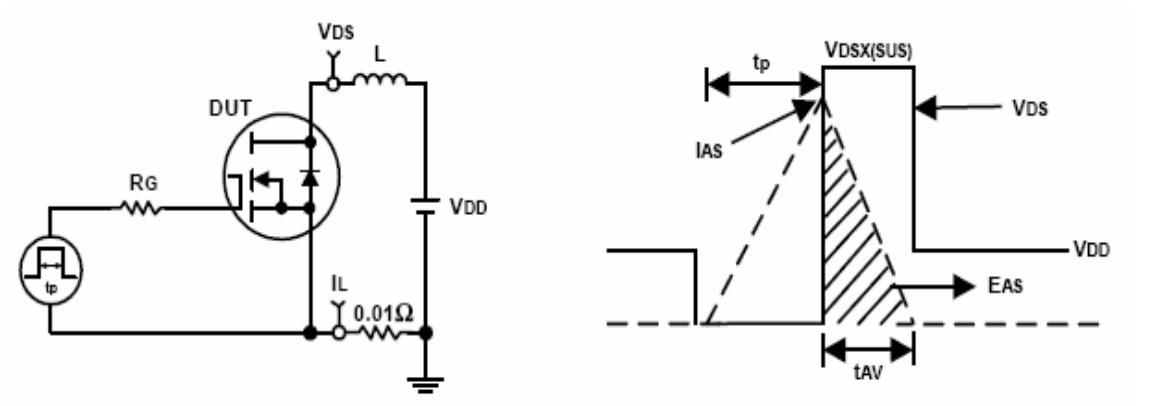
**Capacitance**



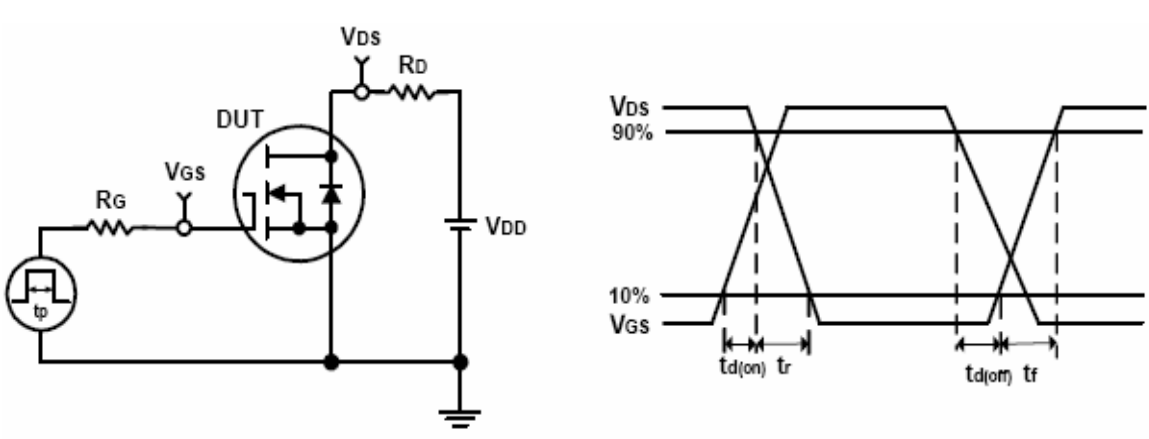
**Gate Charge**



### Avalanche Test Circuit and Waveforms



### Switching Time Test Circuit and Waveforms

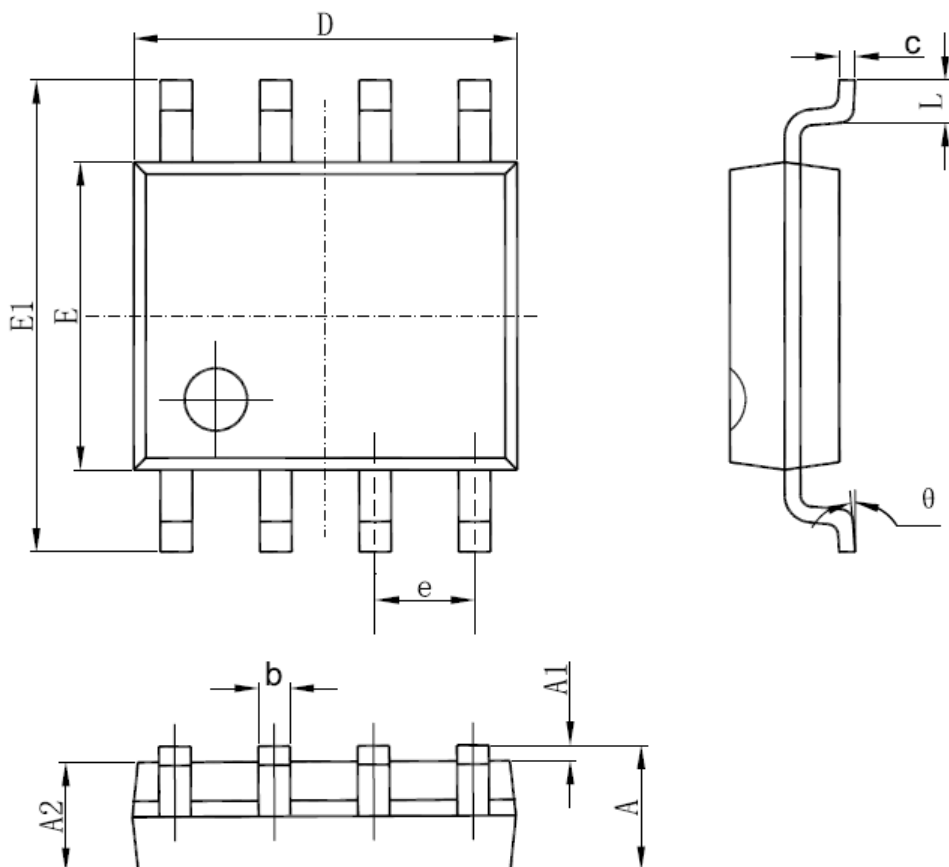


**Ordering and Marking Information**

| <b>Device</b> | <b>Marking</b> | <b>Package</b> | <b>Packaging</b> | <b>Quantity</b> | <b>Reel Size</b> | <b>Tape width</b> |
|---------------|----------------|----------------|------------------|-----------------|------------------|-------------------|
| RU2020H       | RU2020H        | SOP-8          | Tape&Reel        | 2500            | 13''             | 12mm              |

**Package Information**

**SOP-8**



| SYMBOL | MM    |       | INCH  |       | SYMBOL   | MM          |       | INCH        |       |
|--------|-------|-------|-------|-------|----------|-------------|-------|-------------|-------|
|        | MIN   | MAX   | MIN   | MAX   |          | MIN         | MAX   | MIN         | MAX   |
| A      | 1.350 | 1.750 | 0.053 | 0.069 | E        | 3.800       | 4.000 | 0.150       | 0.157 |
| A1     | 0.100 | 0.250 | 0.004 | 0.010 | E1       | 5.800       | 6.200 | 0.228       | 0.244 |
| A2     | 1.350 | 1.550 | 0.053 | 0.061 | e        | 1.270 (BSC) |       | 0.050 (BSC) |       |
| b      | 0.330 | 0.510 | 0.013 | 0.020 | L        | 0.400       | 1.270 | 0.016       | 0.050 |
| c      | 0.170 | 0.250 | 0.006 | 0.010 | $\theta$ | 0°          | 8°    | 0°          | 8°    |
| D      | 4.700 | 5.100 | 0.185 | 0.200 |          |             |       |             |       |

ALL DIMENSIONS REFER TO JEDEC STANDARD  
DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS



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