

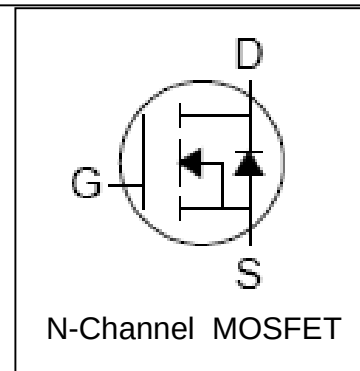
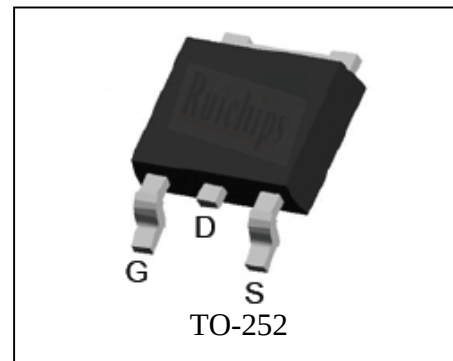
## **Features**

- 30V/55A,  
 $R_{DS(ON)} = 7 \text{ m}\Omega(\text{Typ.}) @ V_{GS} = 10\text{V}$   
 $R_{DS(ON)} = 12 \text{ m}\Omega(\text{Typ.}) @ V_{GS} = 4.5\text{V}$
- Super High Dense Cell Design
- Ultra Low On-Resistance
- 100% avalanche tested
- Lead Free and Green Devices Available  
 (RoHS Compliant)

## **Applications**

- DC-DC Converters

## **Pin Description**



## **Absolute Maximum Ratings**

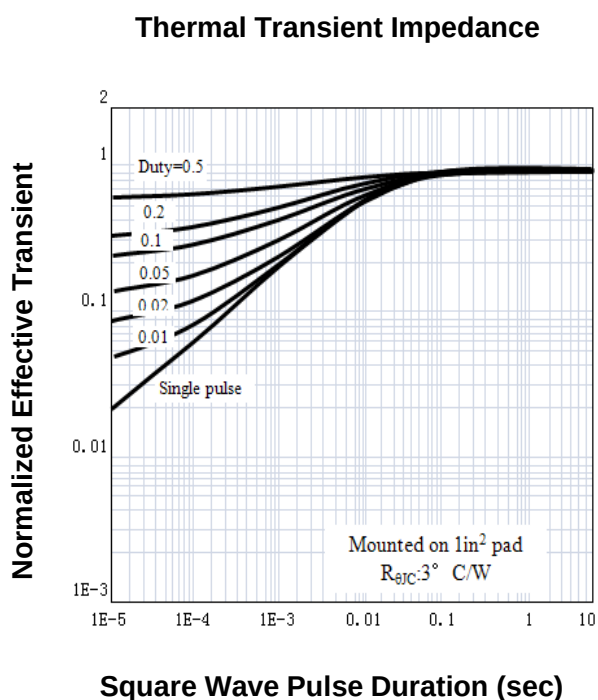
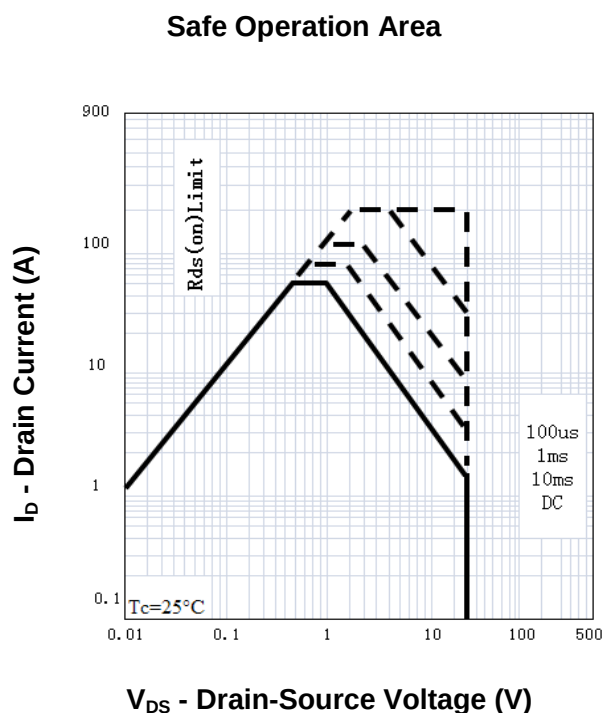
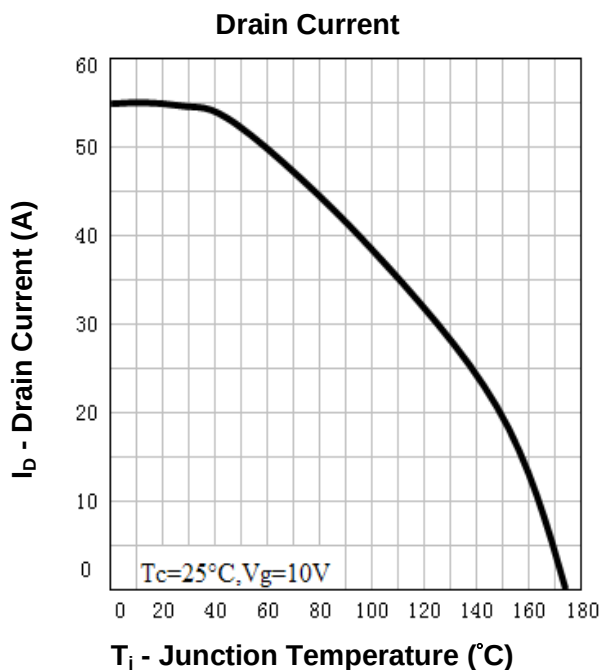
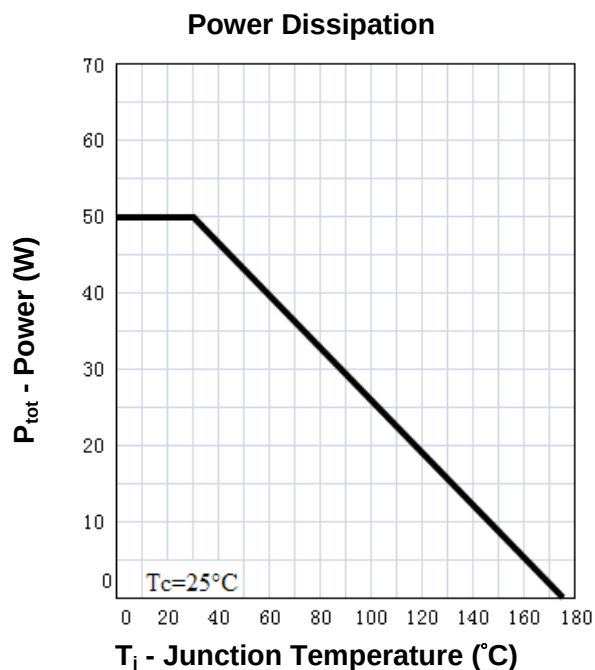
| Symbol                                                       | Parameter                                      |                       | Rating           | Unit |
|--------------------------------------------------------------|------------------------------------------------|-----------------------|------------------|------|
| Common Ratings (T <sub>C</sub> =25°C Unless Otherwise Noted) |                                                |                       |                  |      |
| V <sub>DSS</sub>                                             | Drain-Source Voltage                           |                       | 30               | V    |
| V <sub>GSS</sub>                                             | Gate-Source Voltage                            |                       | ±20              |      |
| T <sub>J</sub>                                               | Maximum Junction Temperature                   |                       | 175              | °C   |
| T <sub>STG</sub>                                             | Storage Temperature Range                      |                       | -55 to 175       | °C   |
| I <sub>S</sub>                                               | Diode Continuous Forward Current               | T <sub>C</sub> =25°C  | 55               | A    |
| Mounted on Large Heat Sink                                   |                                                |                       |                  |      |
| I <sub>DP</sub>                                              | 300μs Pulse Drain Current Tested               | T <sub>C</sub> =25°C  | 200 <sup>①</sup> | A    |
| I <sub>D</sub>                                               | Continuous Drain Current(V <sub>GS</sub> =10V) | T <sub>C</sub> =25°C  | 55               | A    |
|                                                              |                                                | T <sub>C</sub> =100°C | 37               |      |
| P <sub>D</sub>                                               | Maximum Power Dissipation                      | T <sub>C</sub> =25°C  | 50               | W    |
|                                                              |                                                | T <sub>C</sub> =100°C | 25               | W    |
| R <sub>θJC</sub>                                             | Thermal Resistance-Junction to Case            |                       | 3                | °C/W |
| Drain-Source Avalanche Ratings                               |                                                |                       |                  |      |
| E <sub>AS</sub> <sup>②</sup>                                 | Avalanche Energy, Single Pulsed                |                       | 81               | mJ   |

**Electrical Characteristics** (T<sub>C</sub>=25°C Unless Otherwise Noted)

| Symbol                        | Parameter                        | Test Condition                                                                                              | RU3050L |      |      | Unit |
|-------------------------------|----------------------------------|-------------------------------------------------------------------------------------------------------------|---------|------|------|------|
|                               |                                  |                                                                                                             | Min.    | Typ. | Max. |      |
| Static Characteristics        |                                  |                                                                                                             |         |      |      |      |
| BV <sub>DSS</sub>             | Drain-Source Breakdown Voltage   | V <sub>GS</sub> =0V, I <sub>DS</sub> =250μA                                                                 | 30      |      |      | V    |
| I <sub>DSS</sub>              | Zero Gate Voltage Drain Current  | V <sub>DS</sub> = 30V, V <sub>GS</sub> =0V                                                                  |         |      | 1    | μA   |
|                               |                                  | T <sub>J</sub> =85°C                                                                                        |         |      | 30   |      |
| V <sub>GS(th)</sub>           | Gate Threshold Voltage           | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250μA                                                   | 1       | -    | 3    | V    |
| I <sub>GSS</sub>              | Gate Leakage Current             | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                                                                  |         |      | ±100 | nA   |
| R <sub>DS(ON)</sub> ③         | Drain-Source On-state Resistance | V <sub>GS</sub> =10V, I <sub>DS</sub> =50A                                                                  |         | 7    | 9    | mΩ   |
|                               |                                  | V <sub>GS</sub> =4.5V, I <sub>DS</sub> =35A                                                                 |         | 12   | 16   | mΩ   |
| Diode Characteristics         |                                  |                                                                                                             |         |      |      |      |
| V <sub>SD</sub> ③             | Diode Forward Voltage            | I <sub>SD</sub> =50A, V <sub>GS</sub> =0V                                                                   |         |      | 1.2  | V    |
| t <sub>rr</sub>               | Reverse Recovery Time            | I <sub>SD</sub> =50A, dI <sub>SD</sub> /dt=100A/μs                                                          |         | 25   |      | ns   |
| Q <sub>rr</sub>               | Reverse Recovery Charge          |                                                                                                             |         | 16   |      | nC   |
| Dynamic Characteristics ④     |                                  |                                                                                                             |         |      |      |      |
| R <sub>G</sub>                | Gate Resistance                  | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz                                                            |         | 1.5  |      | Ω    |
| C <sub>iss</sub>              | Input Capacitance                | V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, Frequency=1.0MHz                                                 |         | 2630 |      | pF   |
| C <sub>oss</sub>              | Output Capacitance               |                                                                                                             |         | 510  |      |      |
| C <sub>rss</sub>              | Reverse Transfer Capacitance     |                                                                                                             |         | 230  |      |      |
| t <sub>d(ON)</sub>            | Turn-on Delay Time               | V <sub>DD</sub> =15V, R <sub>L</sub> =0.3Ω, I <sub>DS</sub> =50A, V <sub>GEN</sub> =10V, R <sub>G</sub> =5Ω |         | 14   |      | ns   |
| t <sub>r</sub>                | Turn-on Rise Time                |                                                                                                             |         | 65   |      |      |
| t <sub>d(OFF)</sub>           | Turn-off Delay Time              |                                                                                                             |         | 34   |      |      |
| t <sub>f</sub>                | Turn-off Fall Time               |                                                                                                             |         | 29   |      |      |
| Gate Charge Characteristics ④ |                                  |                                                                                                             |         |      |      |      |
| Q <sub>g</sub>                | Total Gate Charge                | V <sub>DS</sub> =24V, V <sub>GS</sub> =10V, I <sub>DS</sub> =50A                                            |         | 40   |      | nC   |
| Q <sub>gs</sub>               | Gate-Source Charge               |                                                                                                             |         | 8    |      |      |
| Q <sub>gd</sub>               | Gate-Drain Charge                |                                                                                                             |         | 12   |      |      |

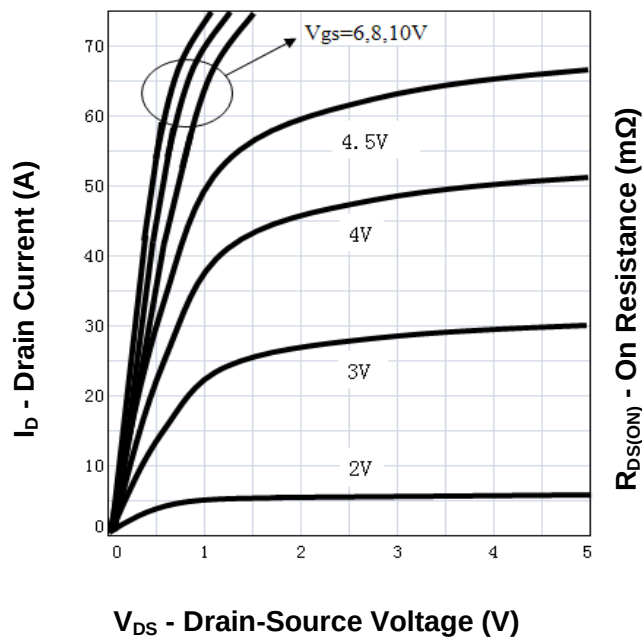
- Notes: ① Pulse width limited by safe operating area.  
 ② Limited by T<sub>Jmax</sub>, I<sub>AS</sub> =18A, V<sub>DD</sub> = 24V, R<sub>G</sub> = 50 Ω , Starting T<sub>J</sub> = 25°C.  
 ③ Pulse test ; Pulse width≤300μs, duty cycle≤2%.  
 ④ Guaranteed by design, not subject to production testing.

## Typical Characteristics

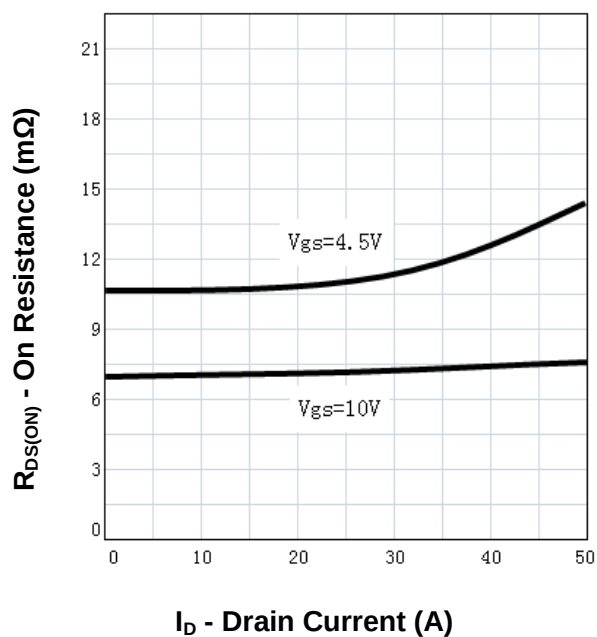


## Typical Characteristics

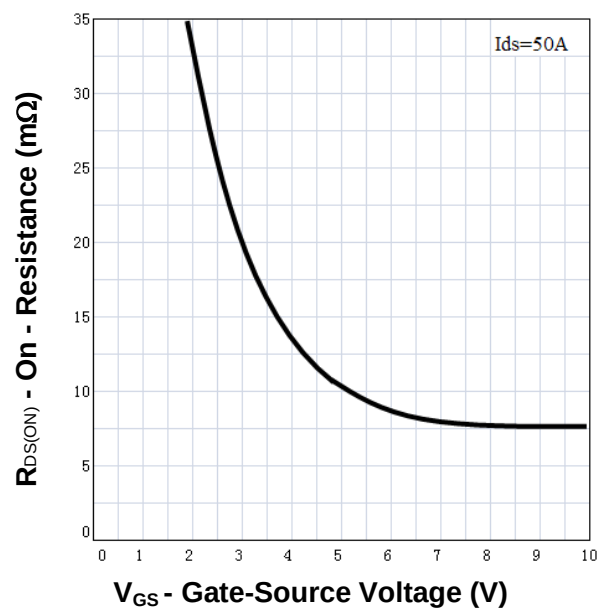
**Output Characteristics**



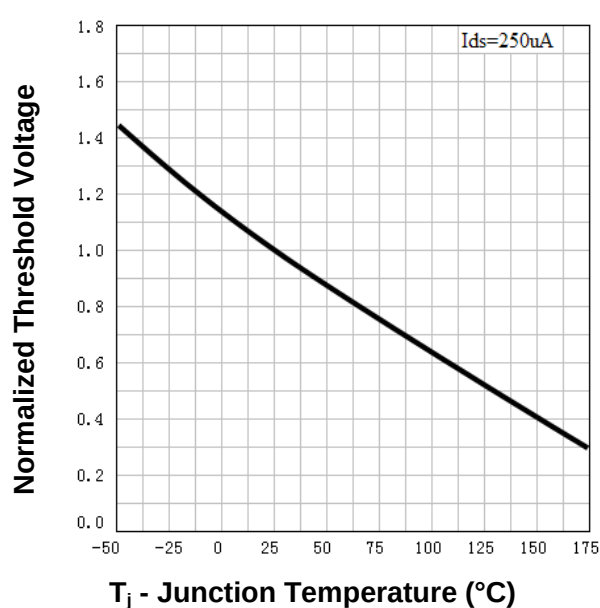
**Drain-Source On Resistance**



**Drain-Source On Resistance**

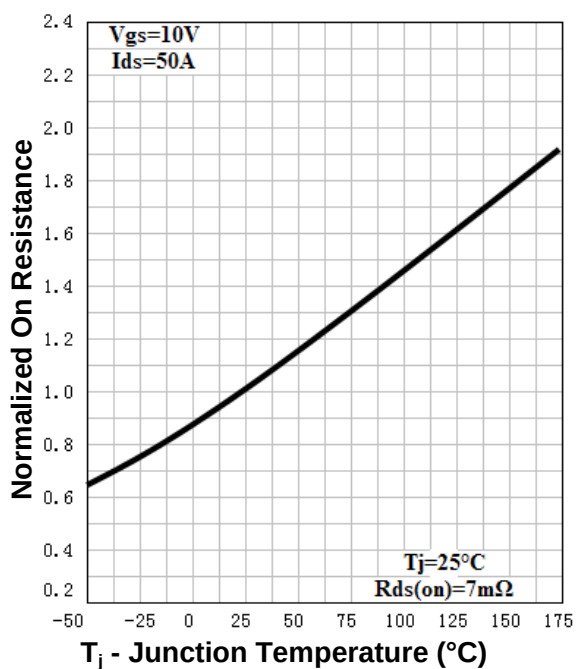


**Gate Threshold Voltage**

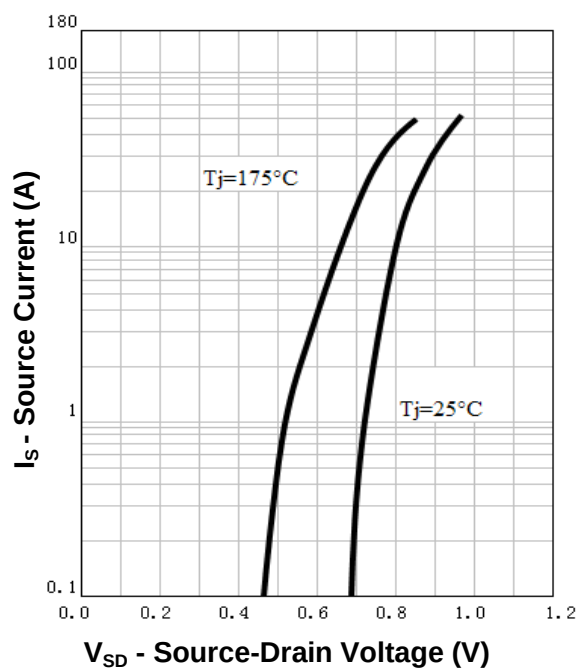


## Typical Characteristics

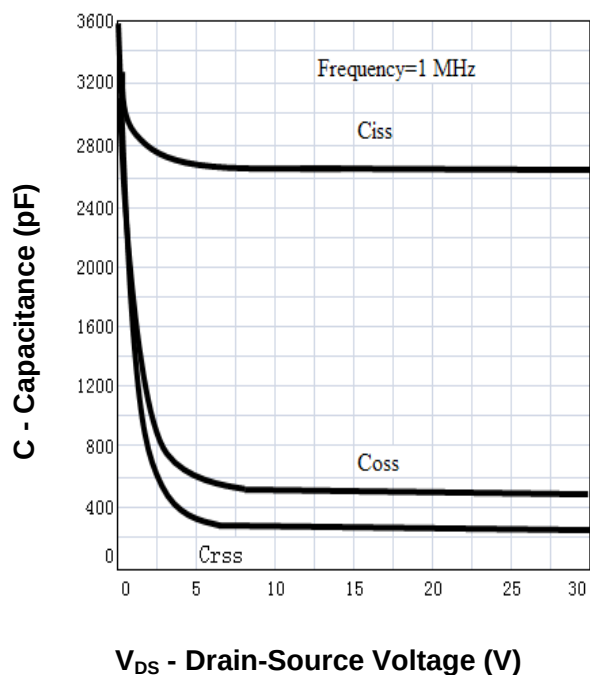
**Drain-Source On Resistance**



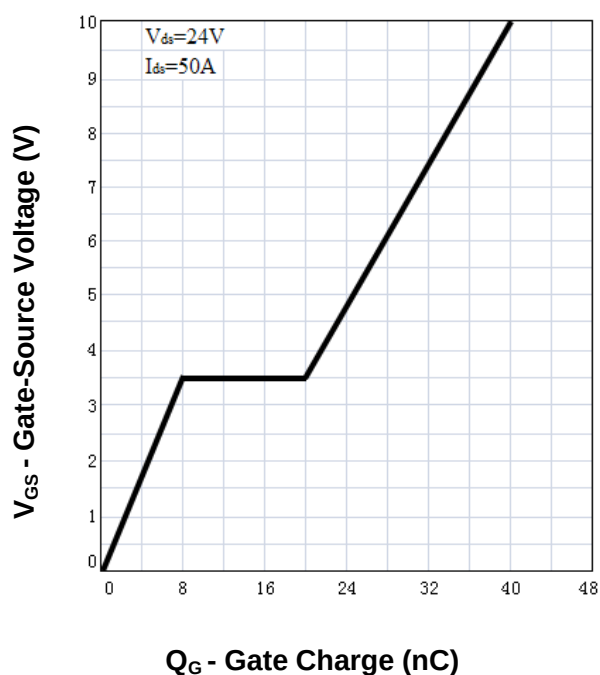
**Source-Drain Diode Forward**



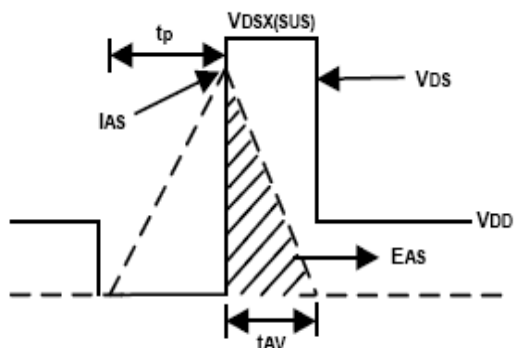
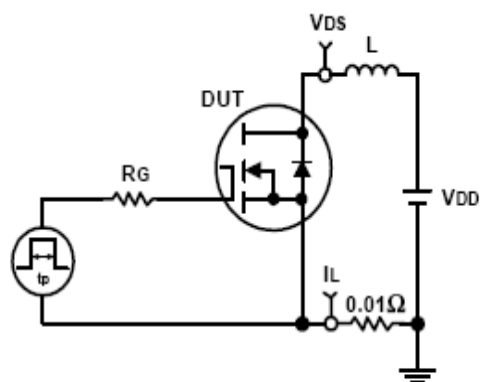
**Capacitance**



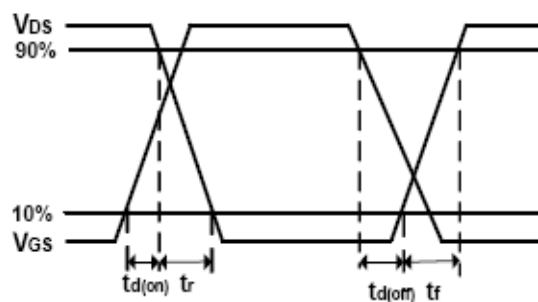
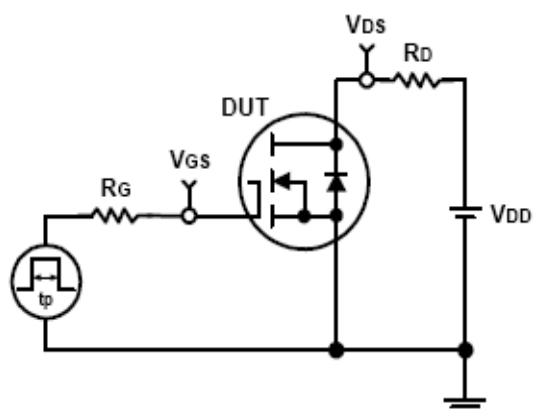
**Gate Charge**



## Avalanche Test Circuit and Waveforms



## Switching Time Test Circuit and Waveforms

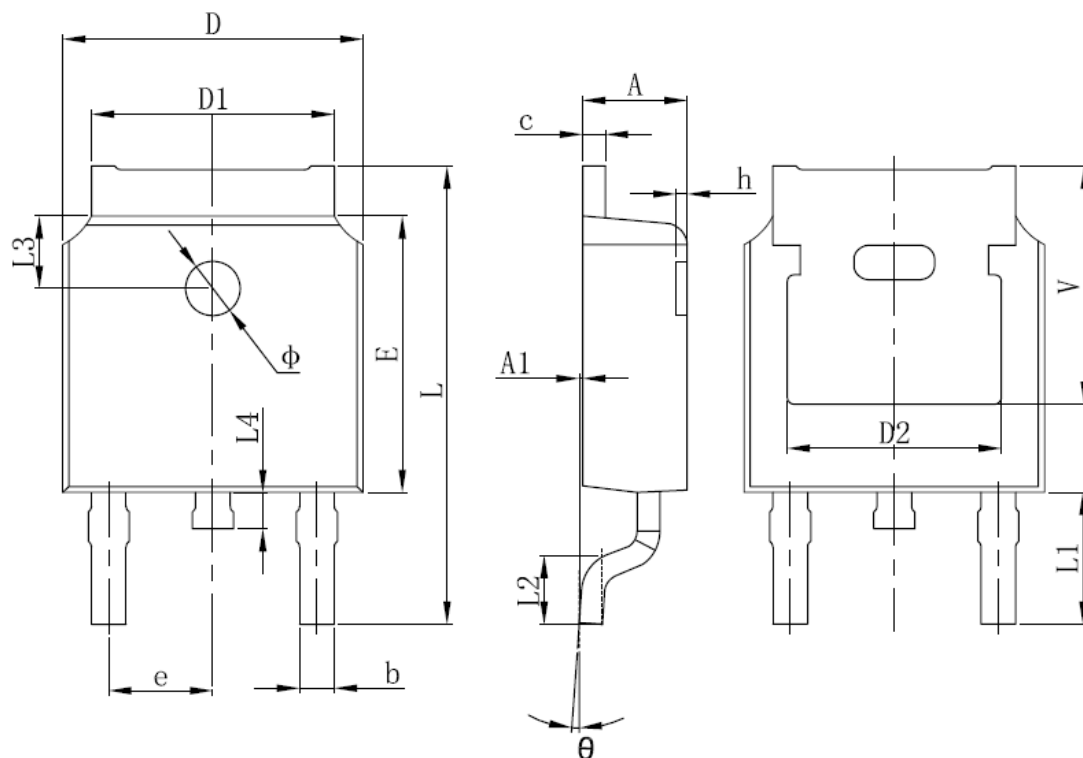


## Ordering and Marking Information

| Device  | Marking | Package | Packaging | Quantity | Reel Size | Tape width |
|---------|---------|---------|-----------|----------|-----------|------------|
| RU3050L | RU3050L | TO-252  | Tape&Reel | 2500     | 13''      | 16mm       |

## Package Information

### TO252-2L



| SYMBOL | MM         |       | INCH       |       | SYMBOL | MM         |        | INCH       |       |
|--------|------------|-------|------------|-------|--------|------------|--------|------------|-------|
|        | MIN        | MAX   | MIN        | MAX   |        | MIN        | MAX    | MIN        | MAX   |
| A      | 2.200      | 2.400 | 0.087      | 0.094 | L      | 9.800      | 10.400 | 0.386      | 0.409 |
| A1     | 0.000      | 0.127 | 0.000      | 0.005 | L1     | 2.900 REF. |        | 0.114 REF. |       |
| b      | 0.660      | 0.860 | 0.026      | 0.034 | L2     | 1.400      | 1.700  | 0.055      | 0.067 |
| C      | 0.460      | 0.580 | 0.018      | 0.023 | L3     | 1.600 REF. |        | 0.063 REF. |       |
| D      | 6.500      | 6.700 | 0.256      | 0.264 | L4     | 0.600      | 1.000  | 0.024      | 0.039 |
| D1     | 5.100      | 5.460 | 0.201      | 0.215 | Φ      | 1.100      | 1.300  | 0.043      | 0.051 |
| D2     | 4.830 REF. |       | 0.190 REF. |       | θ      | 0°         | 8°     | 0°         | 8°    |
| E      | 6.000      | 6.200 | 0.236      | 0.244 | h      | 0.000      | 0.300  | 0.000      | 0.012 |
| e      | 2.186      | 2.386 | 0.086      | 0.094 | V      | 5.350 REF. |        | 0.211 REF. |       |

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



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