

## N-Ch 60V Fast Switching MOSFETs

### Features

- Low  $R_{DS(on)}$  @  $V_{GS}=10V$
- 5V Logic Level Control
- N Channel SOT523 Package
- HMB ESD Protection 1KV
- Pb-Free, RoHS Compliant

### Applications

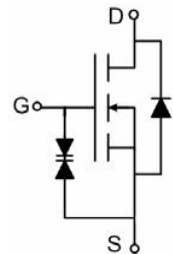
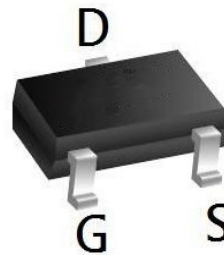
- LED Lighting Application,
- ON/OFF switch
- Networking

### Product Summary



| BVDSS | RDSON | ID   |
|-------|-------|------|
| 60V   | 1.5Ω  | 0.5A |

### SOT-523 Pin Configuration



### Absolute Maximum Ratings ( $T_A=25^{\circ}C$ unless otherwise specified)

| Symbol                                                       | Parameter                                       |                      | Rating     | Unit |
|--------------------------------------------------------------|-------------------------------------------------|----------------------|------------|------|
| Common Ratings (T <sub>A</sub> =25°C Unless Otherwise Noted) |                                                 |                      |            |      |
| V <sub>GS</sub>                                              | Gate-Source Voltage                             |                      | ±20        | V    |
| V <sub>(BR)DSS</sub>                                         | Drain-Source Breakdown Voltage                  |                      | 60         | V    |
| T <sub>J</sub>                                               | Maximum Junction Temperature                    |                      | 150        | °C   |
| T <sub>STG</sub>                                             | Storage Temperature Range                       |                      | -50 to 150 | °C   |
| Mounted on Large Heat Sink                                   |                                                 |                      |            |      |
| I <sub>DM</sub>                                              | Pulse Drain Current Tested①                     | T <sub>A</sub> =25°C | 0.8        | A    |
| I <sub>D</sub>                                               | Continuous Drain Current(V <sub>GS</sub> =4.5V) | T <sub>A</sub> =25°C | 0.3        | A    |
|                                                              |                                                 | T <sub>A</sub> =70°C | 0.24       |      |
| P <sub>D</sub>                                               | Maximum Power Dissipation                       | T <sub>A</sub> =25°C | 0.9        | W    |
|                                                              |                                                 | T <sub>A</sub> =70°C | 0.6        |      |
| R <sub>θJA</sub>                                             | Thermal Resistance Junction-Ambient             |                      | 125        | °C/W |

### Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise specified)

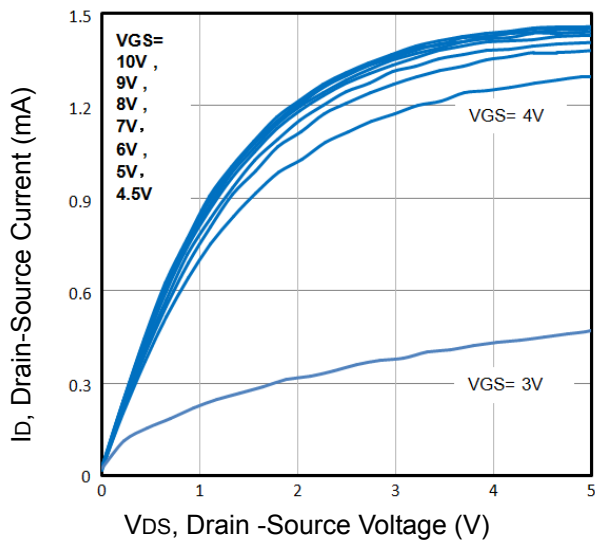
| Symbol                                                                               | Parame                                                 | Condition                                                                                       | Min | Typ  | Max  | Unit |
|--------------------------------------------------------------------------------------|--------------------------------------------------------|-------------------------------------------------------------------------------------------------|-----|------|------|------|
| Static Electrical Characteristics @ T <sub>J</sub> = 25°C (unless otherwise stated)  |                                                        |                                                                                                 |     |      |      |      |
| V <sub>(BR)DSS</sub>                                                                 | Drain-Source Breakdown Voltage                         | V <sub>GS</sub> =0V I <sub>D</sub> =250μA                                                       | 60  | --   | --   | V    |
| I <sub>DSS</sub>                                                                     | Zero Gate Voltage Drain Current(T <sub>A</sub> =25°C)  | V <sub>DS</sub> =60V, V <sub>GS</sub> =0V                                                       | --  | --   | 1    | μA   |
|                                                                                      | Zero Gate Voltage Drain Current(T <sub>A</sub> =125°C) | V <sub>DS</sub> =60V, V <sub>GS</sub> =0V                                                       | --  | --   | 100  | uA   |
| I <sub>GSS</sub>                                                                     | Gate-Body Leakage Current                              | V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V                                                      | --  | --   | ±100 | nA   |
| V <sub>GS(TH)</sub>                                                                  | Gate Threshold Voltage                                 | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                        | 1.0 | 1.5  | 2.5  | V    |
| R <sub>DS(ON)</sub>                                                                  | Drain-Source On-State Resistance②                      | V <sub>GS</sub> =10V, I <sub>D</sub> =0.3A                                                      | --  | 1.5  | 3    | Ω    |
| R <sub>DS(ON)</sub>                                                                  | Drain-Source On-State Resistance②                      | V <sub>GS</sub> =4.5V, I <sub>D</sub> =0.2A                                                     | --  | 2.6  | 6    | Ω    |
| Dynamic Electrical Characteristics @ T <sub>J</sub> = 25°C (unless otherwise stated) |                                                        |                                                                                                 |     |      |      |      |
| C <sub>iss</sub>                                                                     | Input Capacitance                                      | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V,<br>f=1MHz                                            | --  | 1    |      | pF   |
| C <sub>oss</sub>                                                                     | Output Capacitance                                     |                                                                                                 | --  | 3    | --   | pF   |
| C <sub>rss</sub>                                                                     | Reverse Transfer Capacitance                           |                                                                                                 | --  | 0    | --   | pF   |
| Q <sub>g</sub>                                                                       | Total Gate Charge                                      | V <sub>DS</sub> =30V<br>I <sub>D</sub> =0.3A,<br>V <sub>GS</sub> =4.5V                          | --  | 0.5  | --   | nC   |
| Q <sub>gs</sub>                                                                      | Gate Source Charge                                     |                                                                                                 | --  | 0.12 | --   | nC   |
| Q <sub>gd</sub>                                                                      | Gate Drain Charge                                      |                                                                                                 | --  | 0.21 | --   | nC   |
| Switching Characteristics                                                            |                                                        |                                                                                                 |     |      |      |      |
| t <sub>d(on)</sub>                                                                   | Turn on Delay Time                                     | V <sub>DD</sub> =30V,<br>I <sub>D</sub> =0.3A,<br>R <sub>G</sub> =3.3Ω,<br>V <sub>GS</sub> =10V | --  | 4.5  | --   | n    |
| t <sub>r</sub>                                                                       | Turn on Rise Time                                      |                                                                                                 | --  | 3.1  | --   | n    |
| t <sub>d(off)</sub>                                                                  | Turn Off Delay Time                                    |                                                                                                 | -   | 15   | --   | n    |
| t <sub>f</sub>                                                                       | Turn Off Fall Time                                     |                                                                                                 | --  | 3.3  | --   | n    |
| Source Drain Diode Characteristics                                                   |                                                        |                                                                                                 |     |      |      |      |
| I <sub>SD</sub>                                                                      | Source drain current(Body Diode)                       | T <sub>A</sub> =25°C                                                                            | --  | -    | 0.2  | A    |
| V <sub>SD</sub>                                                                      | Forward on voltage②                                    | T <sub>J</sub> =25°C, I <sub>SD</sub> =0.2A,<br>V <sub>GS</sub> =0V                             | --  | 0    | 1.2  | V    |

**Notes:**

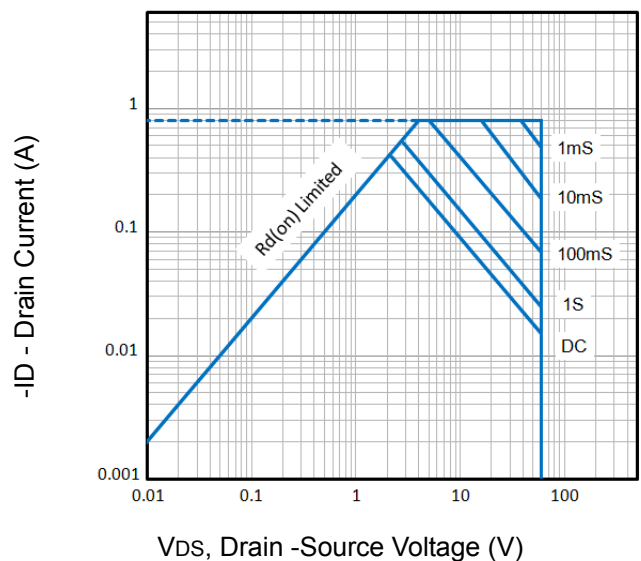
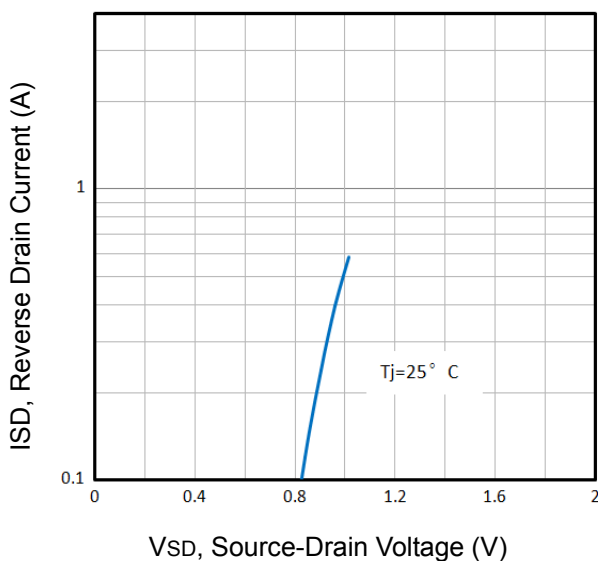
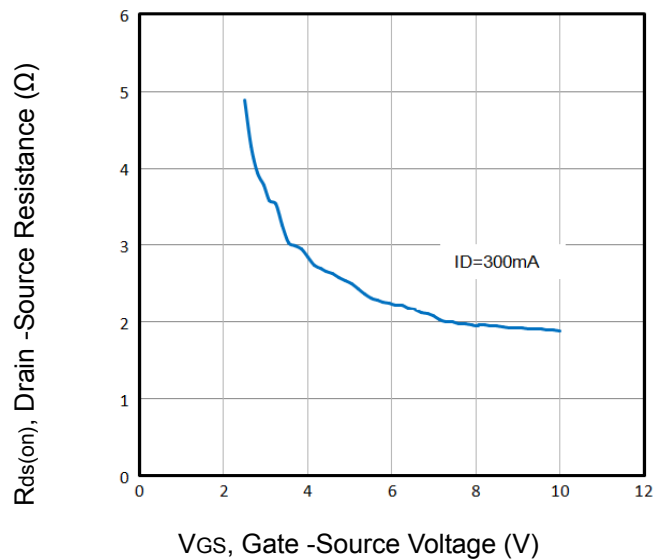
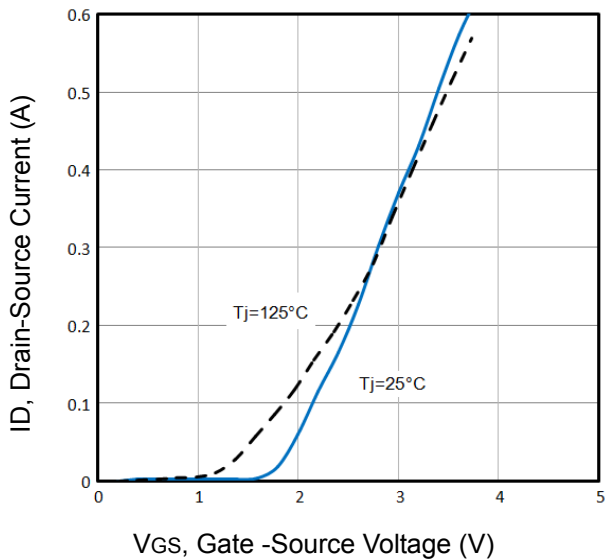
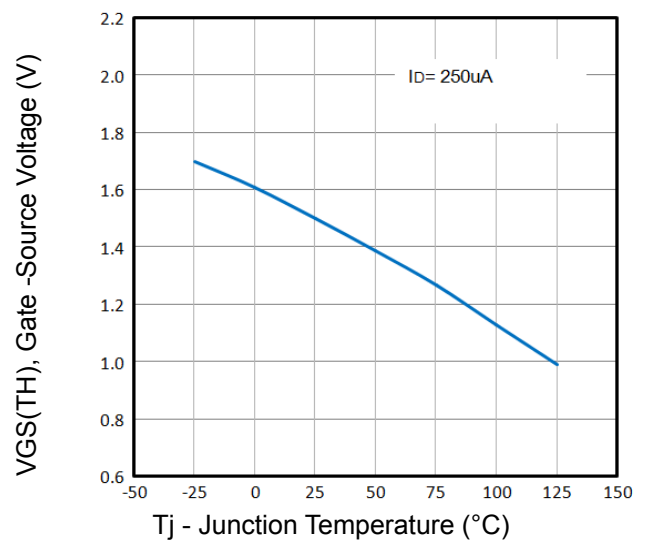
① Pulse width limited by maximum allowable junction temperature

② Pulse test ; Pulse width≤300μs, duty cycle≤2%.

## Typical Characteristics

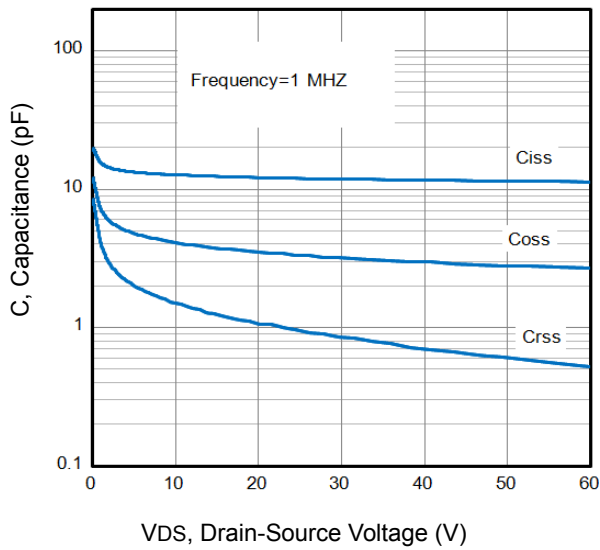


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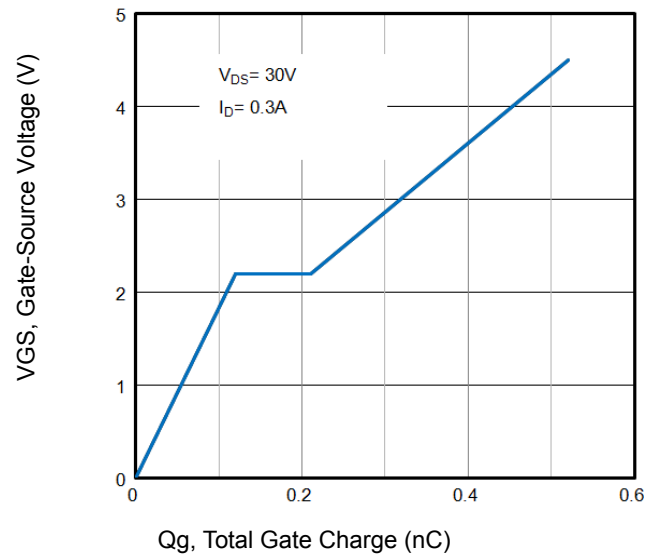


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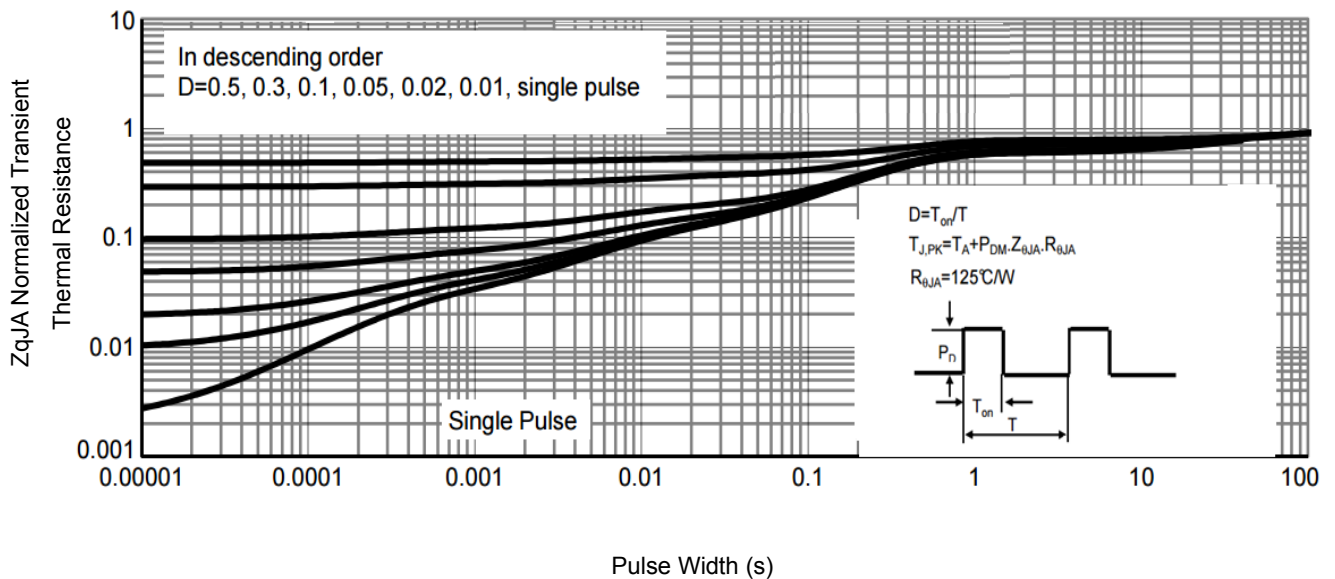
### Typical Characteristics



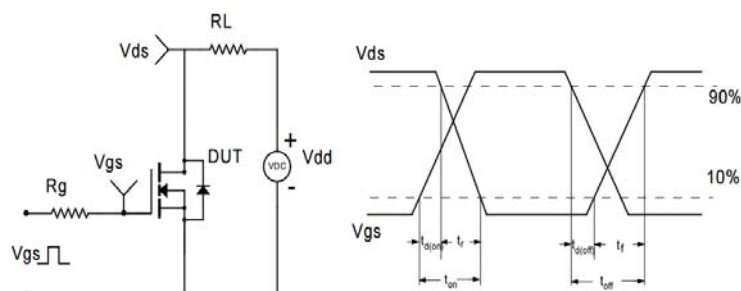
**Fig7.** Typical Capacitance Vs. Drain-Source Voltage



**Fig8.** Typical Gate Charge Vs. Gate-Source Voltage

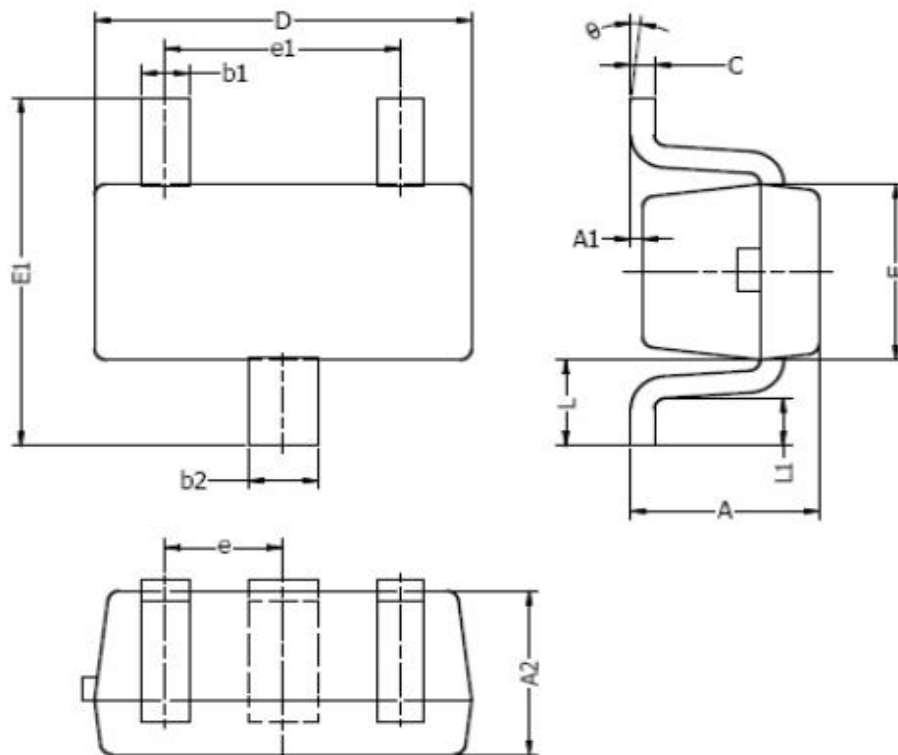


**Fig9.** Normalized Maximum Transient Thermal Impedance



**Fig10.** Switching Time Test Circuit and waveforms

### Package Mechanical Data-SOT-523-3L



| DIM | MILLIMETERS |      | INCHES     |       |
|-----|-------------|------|------------|-------|
|     | MIN         | MAX  | MIN        | MAX   |
| A   | 0.70        | 0.90 | 0.028      | 0.035 |
| A1  | 0.00        | 0.10 | 0.000      | 0.004 |
| A2  | 0.70        | 0.80 | 0.028      | 0.031 |
| b1  | 0.15        | 0.25 | 0.006      | 0.010 |
| b2  | 0.25        | 0.35 | 0.010      | 0.014 |
| c   | 0.10        | 0.20 | 0.004      | 0.008 |
| D   | 1.50        | 1.70 | 0.059      | 0.067 |
| E   | 0.70        | 0.90 | 0.028      | 0.035 |
| E1  | 1.45        | 1.75 | 0.057      | 0.069 |
| e   | 0.50 TYP.   |      | 0.020 TYP. |       |
| e1  | 0.90        | 1.10 | 0.035      | 0.043 |
| L   | 0.40 REF.   |      | 0.016 REF. |       |
| L1  | 0.10        | 0.30 | 0.004      | 0.012 |
| θ   | 0°          | 8°   | 0°         | 8°    |

**NOTES:**

1. Above package outline conforms to JEITA EIAJ ED-7500A SC-75A.
2. Dimensions are exclusive of Burrs, Mold Flash & Tie Bar extrusions.