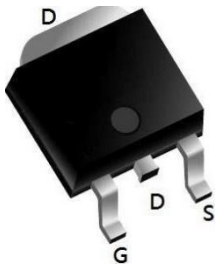


### Features

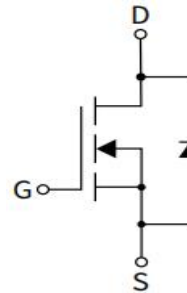
- 100% EAS Guaranteed
- Super Low Gate Charge
- Green Device Available
- Excellent  $CdV/dt$  effect decline
- Advanced high cell density Trench technology

### Application

- PWM applications
- Load Switch
- Power management



TO252-3L top view



Schematic diagram

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

| Parameter                                     | Symbol    | Value                             | Unit               |
|-----------------------------------------------|-----------|-----------------------------------|--------------------|
| Drain-Source Voltage                          | $V_{DS}$  | 30                                | V                  |
| Gate-Source Voltage                           | $V_{GS}$  | $\pm 20$                          | V                  |
| Continuous Drain Current, $V_{GS}@10\text{V}$ | $I_D$     | $T_C = 25^{\circ}\text{C}$<br>80  | A                  |
|                                               |           | $T_C = 100^{\circ}\text{C}$<br>50 | A                  |
| Pulsed Drain Current <sup>1</sup>             | $I_{DM}$  | 350                               | A                  |
| Single Pulsed Avalanche Energy <sup>4</sup>   | EAS       | 100                               | mJ                 |
| Avalanche Current                             | $I_{AS}$  | -                                 | A                  |
| Total Power Dissipation                       | $P_D$     | 50                                | W                  |
| $T_C = 25^{\circ}\text{C}$                    |           |                                   |                    |
| Storage Temperature Range                     | $T_{STG}$ | -55 ~ 150                         | $^{\circ}\text{C}$ |
| Operating Junction Temperature Range          | $T_J$     | -55 ~ 150                         | $^{\circ}\text{C}$ |

**Thermal Resistance Ratings**

| Parameter                              | Symbol          | Value | Unit                 |
|----------------------------------------|-----------------|-------|----------------------|
| Thermal Resistance Junction to Ambient | $R_{\theta JA}$ | 29    | $^{\circ}\text{C/W}$ |
| Thermal Resistance Junction to Case    | $R_{\theta JC}$ | 2.5   | $^{\circ}\text{C/W}$ |

**Electrical Characteristics ( $T_J=25^{\circ}\text{C}$ , unless otherwise noted)**

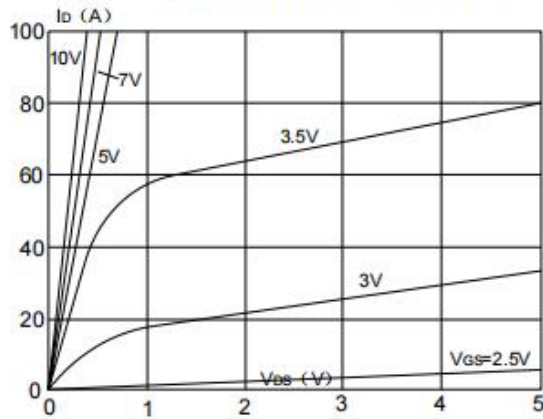
| Parameter                                 | Symbol       | Test Conditions                                     | Min. | Typ. | Max.      | Unit       |
|-------------------------------------------|--------------|-----------------------------------------------------|------|------|-----------|------------|
| Drain-Source Breakdown Voltage            | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$                           | 30   | -    | -         | V          |
| Drain to Source Leakage Current           | $I_{DSS}$    | $V_{DS}=30V, V_{GS}=0V$                             | -    | -    | 1         | $\mu A$    |
| Gate to Body Leakage Current              | $I_{GSS}$    | $V_{GS}=\pm 20V, V_{DS}=0V$                         | -    | -    | $\pm 100$ | nA         |
| Gate Threshold Voltage                    | $V_{GS(th)}$ | $V_{GS}=V_{DS}, I_D=250\mu A$                       | 1.2  | 1.6  | 2         | V          |
| Drain-Source On-Resistance                | $R_{DS(on)}$ | $V_{GS}=10V, I_D=30A$                               | -    | 4.2  | 6         | m $\Omega$ |
|                                           |              | $V_{GS}=4.5V, I_D=20A$                              | -    | 6    | 7.5       |            |
| Gate Resistance                           | $R_g$        | $V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$               | -    | 1.4  | -         | $\Omega$   |
| Total Gate Charge( $10V$ ) <sup>2,3</sup> | $Q_g$        | $V_{DS}=15V, V_{GS}=10V,$<br>$I_D=30A$              | -    | 35   | -         | nC         |
| Gate-Source Charge                        | $Q_{gs}$     |                                                     | -    | 6.6  | -         |            |
| Gate-Drain(“Miller”) Charge               | $Q_{gd}$     |                                                     | -    | 7    | -         |            |
| Turn-On Delay Time <sup>2,3</sup>         | $t_{d(on)}$  | $V_{DD}=15V, V_{GS}=10V,$<br>$R_G=3\Omega, I_D=30A$ | -    | 8    | -         | ns         |
| Rise Time                                 | $t_r$        |                                                     | -    | 15   | -         |            |
| Turn-Off Delay Time                       | $t_{d(off)}$ |                                                     | -    | 33   | -         |            |
| Fall Time                                 | $t_f$        |                                                     | -    | 10   | -         |            |
| Input Capacitance                         | $C_{iss}$    | $V_{DS}=15V, V_{GS}=0V, f=1\text{MHz}$              | -    | 2200 | -         | pF         |
| Output Capacitance                        | $C_{oss}$    |                                                     | -    | 239  | -         |            |
| Reverse Transfer Capacitance              | $C_{rss}$    |                                                     | -    | 201  | -         |            |
| Continuous Source Current                 | $I_S$        | $V_G=V_D=0V, \text{Force Current}$                  | -    | 80   | -         | A          |
| Pulsed Source Current                     | $I_{SM}$     |                                                     | -    | 350  | -         | A          |
| Diode Forward Voltage                     | $V_{SD}$     | $V_{GS}=0V, I_S=40A, T_J=25^{\circ}\text{C}$        | -    | -    | 0.86      | V          |

Note :

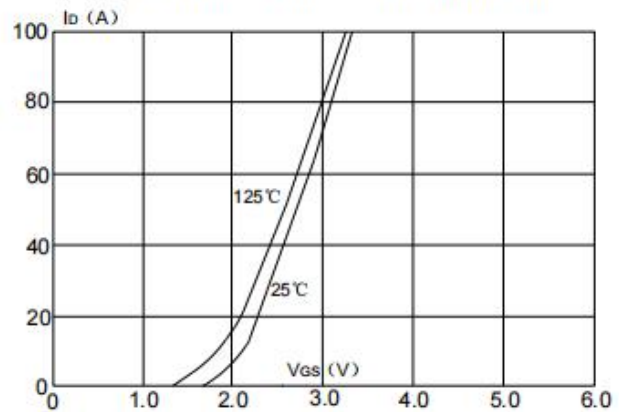
1. Repetitive Rating: Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed, pulse width=300us, duty cycle=2%.
3. Essentially independent of operating temperature.
4. The EAS data shows Max. rating. The test condition is  $V_{DD}=15V, V_{GS}=10V, L=0.5\text{mH}$ .

### Typical Performance Characteristics

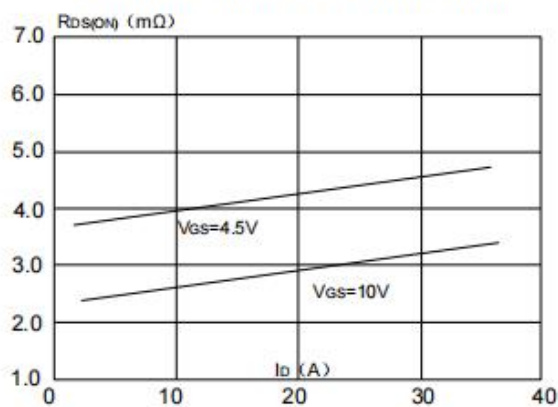
**Fig1 Output Characteristics**



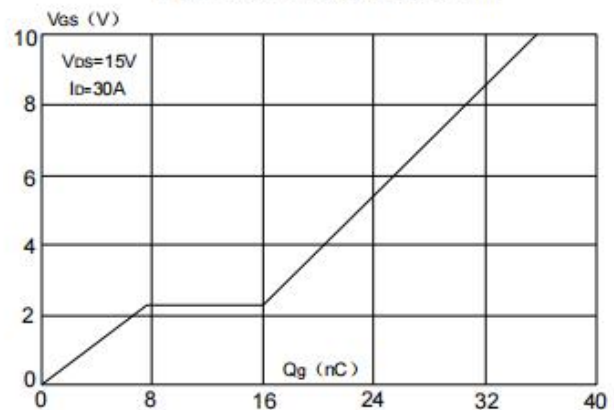
**Fig2 Typical Transfer Characteristics**



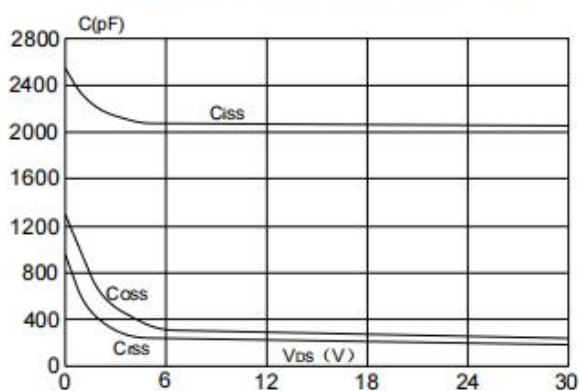
**Fig3 On-resistance vs. Drain Current**



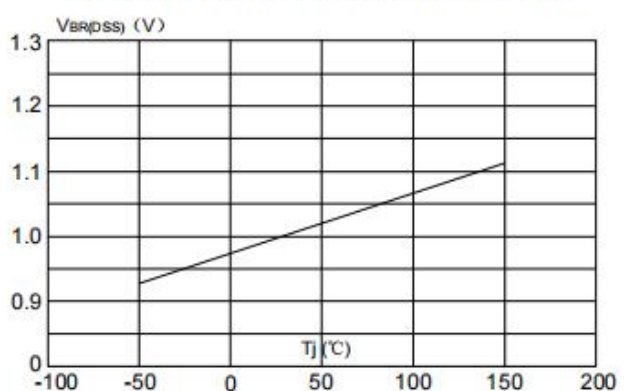
**Fig4 Gate Charge Waveform**



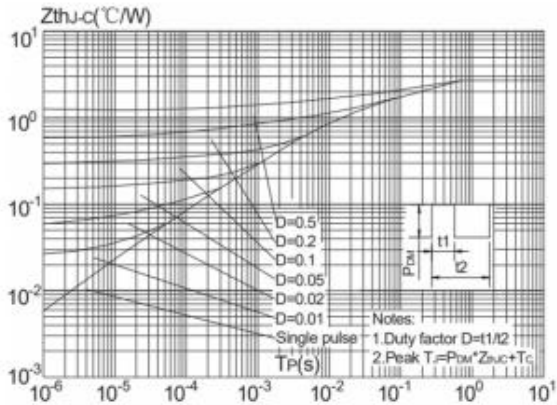
**Fig5 Capacitance Characteristics**



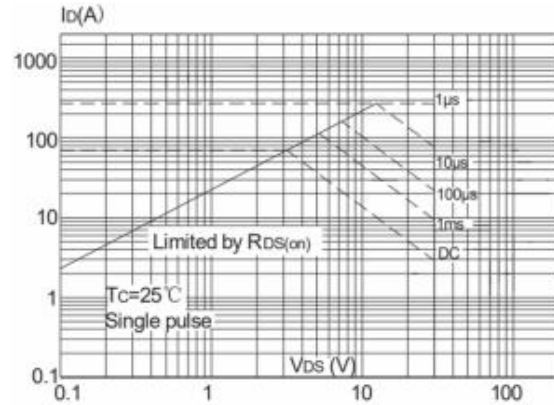
**Fig6 Normalized Breakdown Voltage vs.  $T_J$**



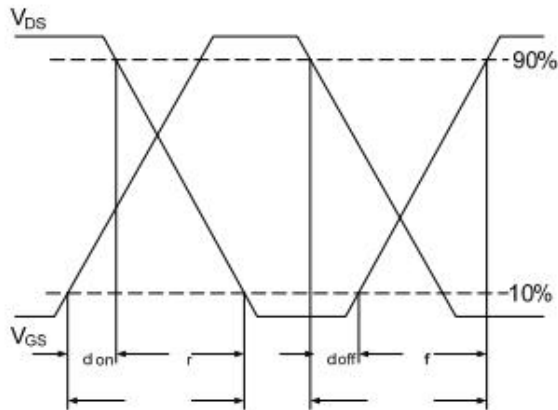
**Fig7 Normalized Transient Impedance**



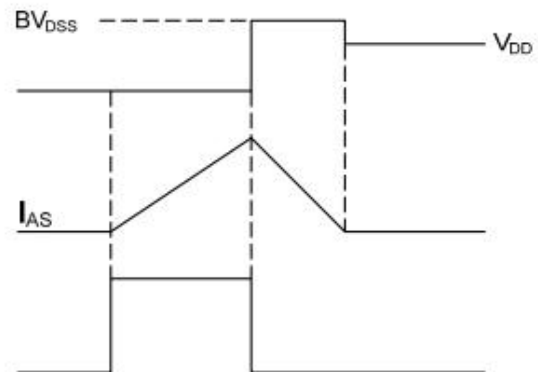
**Fig8 Maximum Safe Operation Area**



**Fig9 Switching Time Waveform**

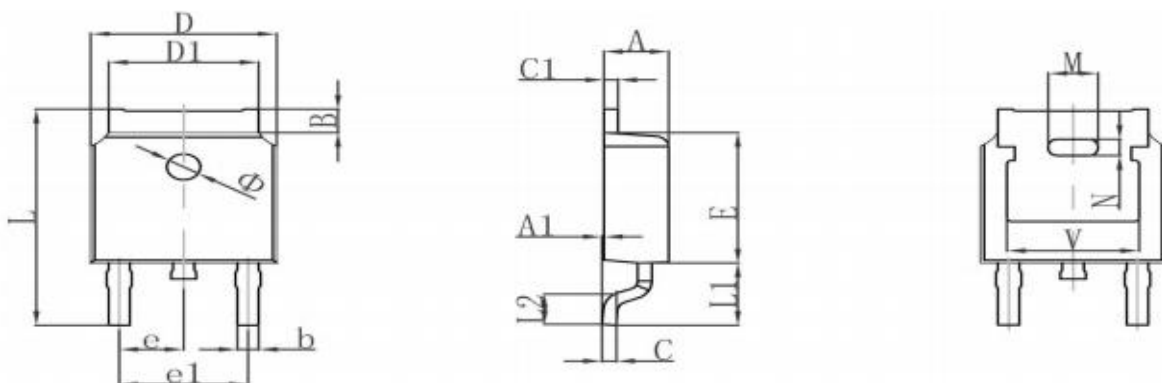


**Fig10 EAS Waveform**



**Package Mechanical Data**

**TO252-3L**



| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min.                      | Max.   | Min.                 | Max.  |
| A      | 2.200                     | 2.380  | 0.087                | 0.094 |
| A1     | 0.000                     | 0.100  | 0.000                | 0.004 |
| B      | 0.800                     | 1.400  | 0.031                | 0.055 |
| b      | 0.710                     | 0.810  | 0.028                | 0.032 |
| C      | 0.460                     | 0.560  | 0.018                | 0.022 |
| C1     | 0.460                     | 0.560  | 0.018                | 0.022 |
| D      | 6.500                     | 6.700  | 0.256                | 0.264 |
| D1     | 5.130                     | 5.460  | 0.202                | 0.215 |
| E      | 6.000                     | 6.200  | 0.236                | 0.244 |
| e      | 2.286TYP                  |        | 0.090TYP             |       |
| e1     | 4.327                     | 4.727  | 0.170                | 0.186 |
| M      | 1.778REF                  |        | 0.070REF             |       |
| N      | 0.762REF                  |        | 0.018REF             |       |
| L      | 9.800                     | 10.400 | 0.386                | 0.409 |
| L1     | 2.9REF                    |        | 0.114REF             |       |
| L2     | 1.400                     | 1.700  | 0.055                | 0.067 |
| V      | 4.830REF                  |        | 0.190REF             |       |
| Φ      | 1.100                     | 1.300  | 0.043                | 0.051 |