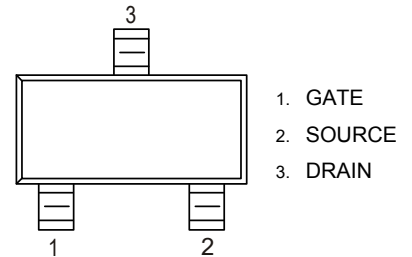


## Features

- -20V, -3A,  $R_{DS(ON)} = 65m\Omega @ V_{GS} = -4.5V$
- Improved dv/dt capability
- Fast switching
- Green Device Available

## SOT-23-3L

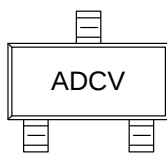
RoHS  
COMPLIANT



## Applications

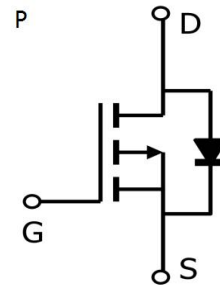
- Notebook
- Load Switch
- Battery Protection
- Hand-held Instruments

## Marking



ADCV= Device code

## Equivalent Circuit



## Absolute Maximum Ratings $T_c = 25^\circ\text{C}$ unless otherwise noted

| Symbol    | Parameter                                                | Rating     | Units               |
|-----------|----------------------------------------------------------|------------|---------------------|
| $V_{DS}$  | Drain-Source Voltage                                     | -20        | V                   |
| $V_{GS}$  | Gate-Source Voltage                                      | $\pm 8$    | V                   |
| $I_D$     | Drain Current – Continuous ( $T_c = 25^\circ\text{C}$ )  | -3.0       | A                   |
|           | Drain Current – Continuous ( $T_c = 100^\circ\text{C}$ ) | -2.4       | A                   |
| $I_{DM}$  | Drain Current – Pulsed <sup>1</sup>                      | -15.2      | A                   |
| $P_D$     | Power Dissipation ( $T_c = 25^\circ\text{C}$ )           | 1.56       | W                   |
|           | Power Dissipation – Derate above $25^\circ\text{C}$      | 0.012      | W/ $^\circ\text{C}$ |
| $T_{STG}$ | Storage Temperature Range                                | -55 to 150 | $^\circ\text{C}$    |
| $T_J$     | Operating Junction Temperature Range                     | -55 to 150 | $^\circ\text{C}$    |

## Thermal Characteristics

| Symbol          | Parameter                              | Typ. | Max. | Unit               |
|-----------------|----------------------------------------|------|------|--------------------|
| $R_{\theta JA}$ | Thermal Resistance Junction to ambient | ---  | 80   | $^\circ\text{C/W}$ |

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

### Off Characteristics

| Symbol                              | Parameter                                 | Conditions                                                        | Min. | Typ.  | Max. | Unit |
|-------------------------------------|-------------------------------------------|-------------------------------------------------------------------|------|-------|------|------|
| BV <sub>DSS</sub>                   | Drain-Source Breakdown Voltage            | V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA                       | -20  | ---   | ---  | V    |
| ΔBV <sub>DSS</sub> /ΔT <sub>J</sub> | BV <sub>DSS</sub> Temperature Coefficient | Reference to 25°C, I <sub>D</sub> =-1mA                           | ---  | -0.01 | ---  | V/°C |
| I <sub>DSS</sub>                    | Drain-Source Leakage Current              | V <sub>DS</sub> =-20V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C  | ---  | ---   | -1   | uA   |
|                                     |                                           | V <sub>DS</sub> =-16V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C | ---  | ---   | -10  | uA   |
| I <sub>GSS</sub>                    | Gate-Source Leakage Current               | V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V                        | ---  | ---   | ±10  | uA   |

### On Characteristics

|                      |                                             |                                                           |      |      |      |       |
|----------------------|---------------------------------------------|-----------------------------------------------------------|------|------|------|-------|
| R <sub>DS(ON)</sub>  | Static Drain-Source On-Resistance           | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-3A               | ---  | 65   | 75   | mΩ    |
|                      |                                             | V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-2A               | ---  | 85   | 110  |       |
| V <sub>GS(th)</sub>  | Gate Threshold Voltage                      | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250uA | -0.4 | -0.6 | -1.0 | V     |
| ΔV <sub>GS(th)</sub> | V <sub>GS(th)</sub> Temperature Coefficient |                                                           | ---  | 3    | ---  | mV/°C |
| gfs                  | Forward Transconductance                    | V <sub>DS</sub> =-10V, I <sub>S</sub> =-1A                | ---  | 2.2  | ---  | S     |

### Dynamic and switching Characteristics

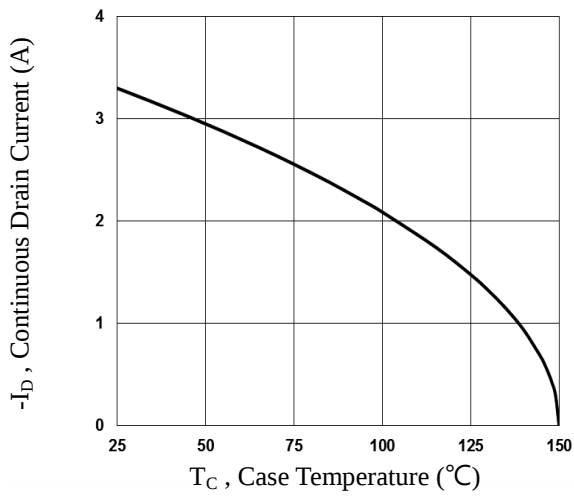
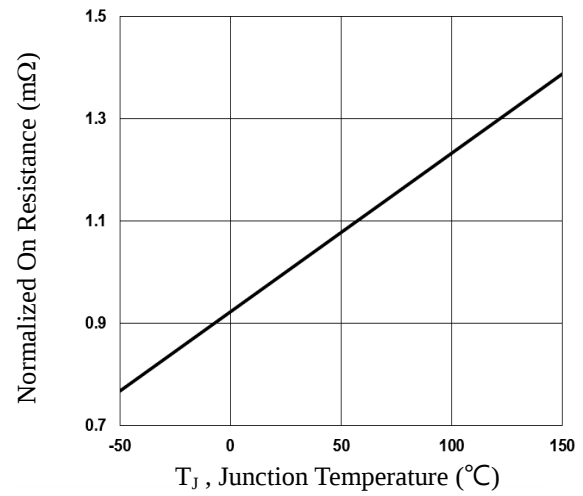
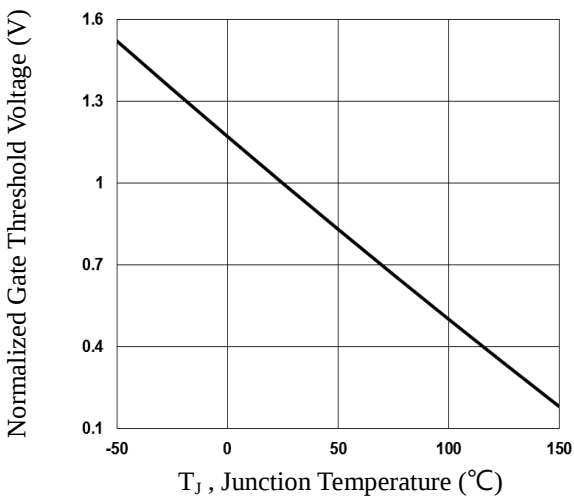
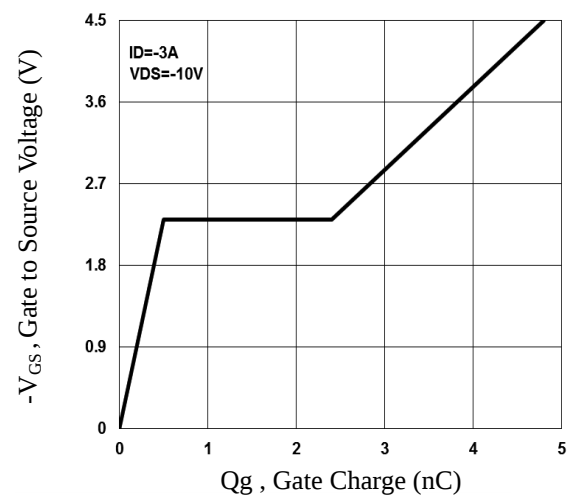
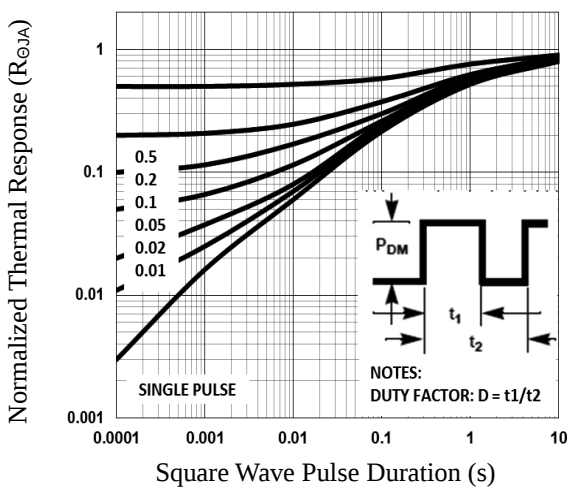
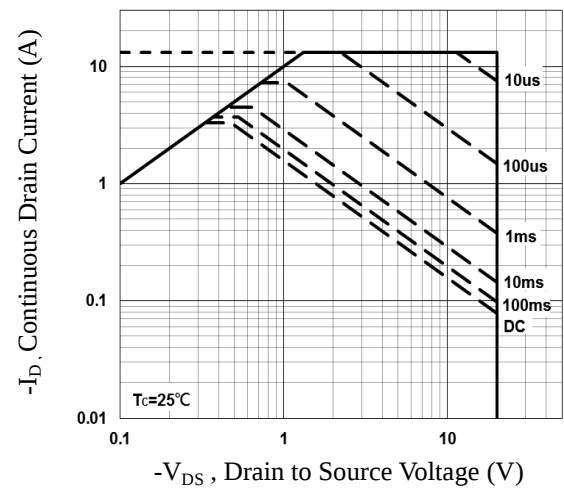
|                     |                                     |                                                                                           |     |      |     |    |
|---------------------|-------------------------------------|-------------------------------------------------------------------------------------------|-----|------|-----|----|
| Q <sub>g</sub>      | Total Gate Charge <sup>2, 3</sup>   | V <sub>DS</sub> =-10V, V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-3A                        | --- | 4.8  | --- | nC |
| Q <sub>gs</sub>     | Gate-Source Charge <sup>2, 3</sup>  |                                                                                           | --- | 0.5  | --- |    |
| Q <sub>gd</sub>     | Gate-Drain Charge <sup>2, 3</sup>   |                                                                                           | --- | 1.9  | --- |    |
| T <sub>d(on)</sub>  | Turn-On Delay Time <sup>2, 3</sup>  | V <sub>DD</sub> =-10V, V <sub>GS</sub> =-4.5V, R <sub>G</sub> =25Ω<br>I <sub>D</sub> =-1A | --- | 3.5  | --- | nS |
| T <sub>r</sub>      | Rise Time <sup>2, 3</sup>           |                                                                                           | --- | 12.6 | --- |    |
| T <sub>d(off)</sub> | Turn-Off Delay Time <sup>2, 3</sup> |                                                                                           | --- | 32.6 | --- |    |
| T <sub>f</sub>      | Fall Time <sup>2, 3</sup>           |                                                                                           | --- | 8.4  | --- |    |
| C <sub>iss</sub>    | Input Capacitance                   | V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, F=1MHz                                        | --- | 560  | --- | pF |
| C <sub>oss</sub>    | Output Capacitance                  |                                                                                           | --- | 85   | --- |    |
| C <sub>rss</sub>    | Reverse Transfer Capacitance        |                                                                                           | --- | 70   | --- |    |

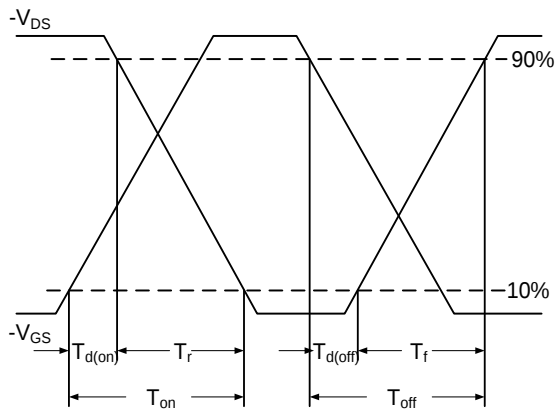
### Drain-Source Diode Characteristics and Maximum Ratings

| Symbol          | Parameter                 | Conditions                                                     | Min. | Typ. | Max.  | Unit |
|-----------------|---------------------------|----------------------------------------------------------------|------|------|-------|------|
| I <sub>S</sub>  | Continuous Source Current | V <sub>G</sub> =V <sub>D</sub> =0V, Force Current              | ---  | ---  | -3.0  | A    |
| I <sub>SM</sub> | Pulsed Source Current     |                                                                | ---  | ---  | -15.2 | A    |
| V <sub>SD</sub> | Diode Forward Voltage     | V <sub>GS</sub> =0V, I <sub>S</sub> =-1A, T <sub>J</sub> =25°C | ---  | ---  | -1.2  | V    |

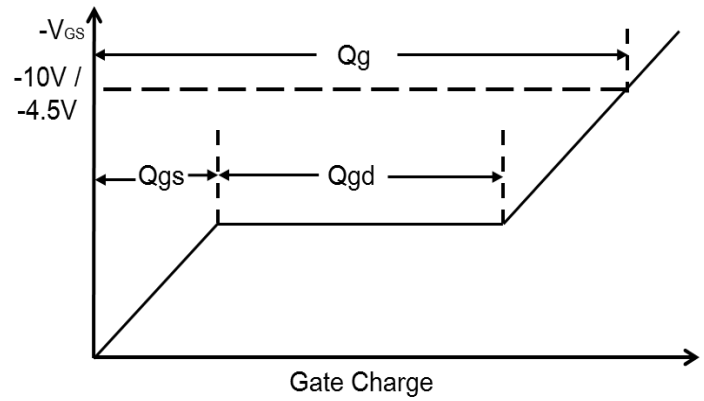
Note :

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.


**Fig.1 Continuous Drain Current vs.  $T_C$** 

**Fig.2 Normalized  $RD_{SON}$  vs.  $T_J$** 

**Fig.3 Normalized  $V_{th}$  vs.  $T_J$** 

**Fig.4 Gate Charge Waveform**

**Fig.5 Normalized Transient Response**

**Fig.6 Maximum Safe Operation Area**

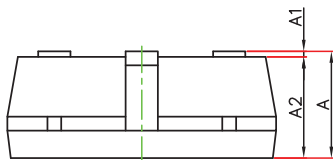
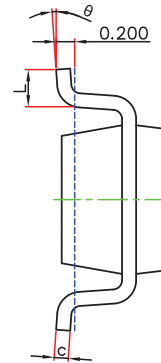
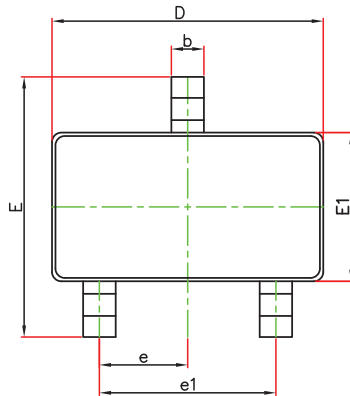


**Fig.7 Switching Time Waveform**



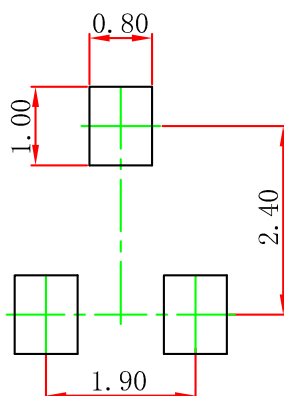
**Fig.8 Gate Charge Waveform**

## SOT-23-3L Package Outline Dimensions



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min.                      | Max.  | Min.                 | Max.  |
| A      | 1.050                     | 1.250 | 0.041                | 0.049 |
| A1     | 0.000                     | 0.100 | 0.000                | 0.004 |
| A2     | 1.050                     | 1.150 | 0.041                | 0.045 |
| b      | 0.300                     | 0.500 | 0.012                | 0.020 |
| c      | 0.100                     | 0.200 | 0.004                | 0.008 |
| D      | 2.820                     | 3.020 | 0.111                | 0.119 |
| E1     | 1.500                     | 1.700 | 0.059                | 0.067 |
| E      | 2.650                     | 2.950 | 0.104                | 0.116 |
| e      | 0.950(BSC)                |       | 0.037(BSC)           |       |
| e1     | 1.800                     | 2.000 | 0.071                | 0.079 |
| L      | 0.300                     | 0.600 | 0.012                | 0.024 |
| K      | 0°                        | 8°    | 0°                   | 8°    |

## SOT-23-3L Suggested Pad Layout



Note:

1. Controlling dimension: in/millimeters.
2. General tolerance:  $\pm 0.05\text{mm}$ .
3. The pad layout is for reference purposes only.