| | | |
|---|---|---|
| $V_{DSS}$ | 30 | V |
| $I_D$ | 6 | A |
| $R_{DS(ON)}$ | 18 mΩ | |

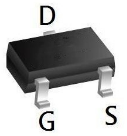
## FEATURES

*30V,6.0A, RDS(ON) =18mΩ @VGS = 10V*
*Improved dv/dt capability*
*Fast switching*
*Green Device Available*

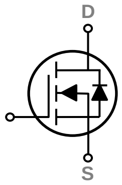
## APPLICATION

*MB / VGA / Vcore*
*Load Switch*
*Hand-Held Instrument*

X4ZL



**SOT23-3L top view**



**Schematic Diagram**

## MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

### Absolute Maximum Ratings Tc=25℃ unless otherwise noted

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 30 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$ | Drain Current – Continuous ($T_C$=25℃) | 6.0 | A |
| | Drain Current – Continuous ($T_C$=100℃) | 3.8 | A |
| $I_{DM}$ | Drain Current – Pulsed[1] | 23 | A |
| $P_D$ | Power Dissipation ($T_C$=25℃) | 1.4 | W |
| | Power Dissipation – Derate above 25℃ | 0.012 | W/℃ |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | ℃ |

### Thermal Characteristics

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

## Electrical characteristics ($T_J$ =25℃ unless otherwise noted)

### Off Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V , $I_D$=250uA | 30 | --- | --- | V |
| $\triangle BV_{DSS}/\triangle T_J$ | $BV_{DSS}$ Temperature Coefficient | Reference to 25℃ , $I_D$=1mA | --- | 0.04 | --- | V/℃ |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=30V , $V_{GS}$=0V , $T_J$=25℃ | --- | --- | 1 | uA |
| | | $V_{DS}$=24V , $V_{GS}$=0V , $T_J$=125℃ | --- | --- | 10 | uA |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=±20V , $V_{DS}$=0V | --- | --- | ±100 | nA |

### On Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance[3] | $V_{GS}$=10V , $I_D$=5.5A | --- | 18 | 25 | mΩ |
| | | $V_{GS}$=4.5V , $I_D$=4A | --- | 27 | 40 | mΩ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$ , $I_D$ =250uA | 1.0 | 1.6 | 2.5 | V |
| $\triangle V_{GS(th)}$ | $V_{GS(th)}$ Temperature Coefficient | | --- | -4 | --- | mV/℃ |

### Dynamic and switching Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $Q_g$ | Total Gate Charge[3,4] | $V_{DS}$=15V , $V_{GS}$=4.5V , $I_D$=6A | --- | 4.1 | --- | nC |
| $Q_{gs}$ | Gate-Source Charge[3,4] | | --- | 1 | --- | |
| $Q_{gd}$ | Gate-Drain Charge[3,4] | | --- | 2.1 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time[3,4] | $V_{DD}$=15V , $V_{GS}$=10V , $R_G$=6Ω<br>$I_D$=1A | --- | 2.8 | --- | ns |
| $T_r$ | Rise Time[3,4] | | --- | 7.2 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time[3,4] | | --- | 15.8 | --- | |
| $T_f$ | Fall Time[3,4] | | --- | 4.6 | --- | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=25V , $V_{GS}$=0V , F=1MHz | --- | 345 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 55 | --- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 32 | --- | |

### Drain-Source Diode Characteristics and Maximum Ratings

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current | $V_G$=$V_D$=0V , Force Current | --- | --- | 6.0 | A |
| $I_{SM}$ | Pulsed Source Current[3] | | --- | --- | 12 | A |
| $V_{SD}$ | Diode Forward Voltage[3] | $V_{GS}$=0V , $I_S$=1A , $T_J$=25℃ | --- | --- | 1.2 | V |

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $V_{DD}$=25V,$V_{GS}$=10V,L=1mH,$I_{AS}$=8A.,$R_G$=25Ω,Starting $T_J$=25℃.
3. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
4. Essentially independent of operating temperature.

## RATING AND CHARACTERISTIC CURVES

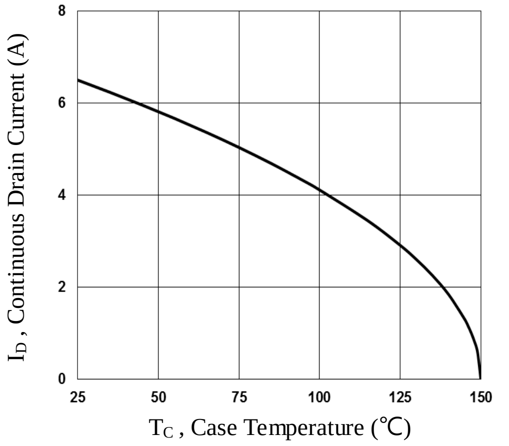


**Fig.1 Continuous Drain Current vs. $T_C$**

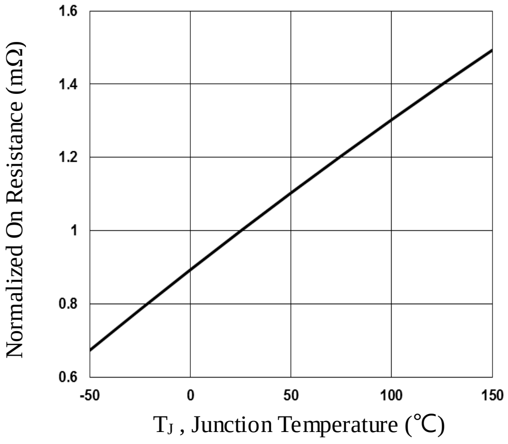


**Fig.2 Normalized RDSON vs. $T_J$**

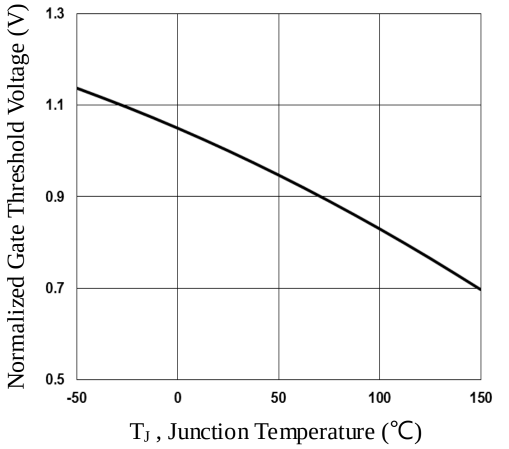


**Fig.3 Normalized $V_{th}$ vs. $T_J$**

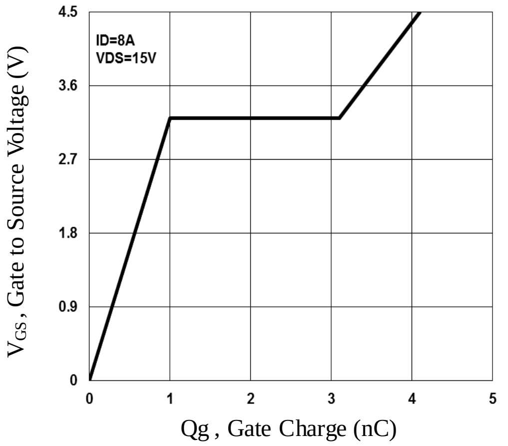


**Fig.4 Gate Charge Waveform**

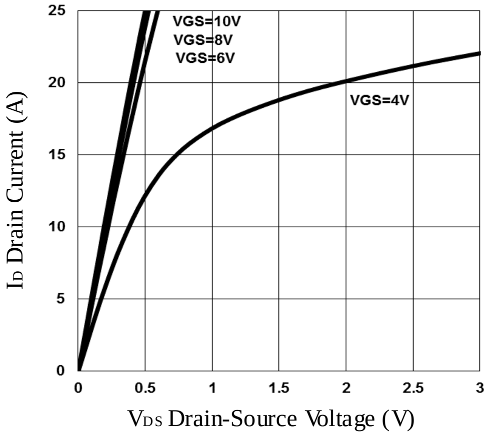


**Fig.5 On Region Characteristics**

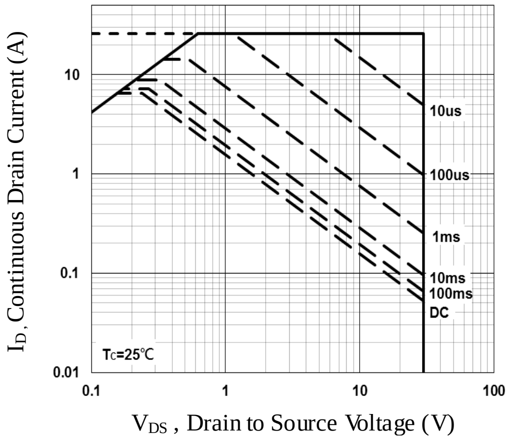


**Fig.6 Maximum Safe Operation Area**

## RATING AND CHARACTERISTIC CURVES

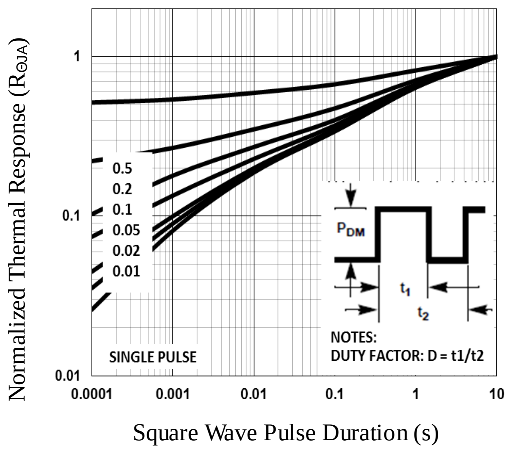


**Fig.7 Normalized Transient Response**

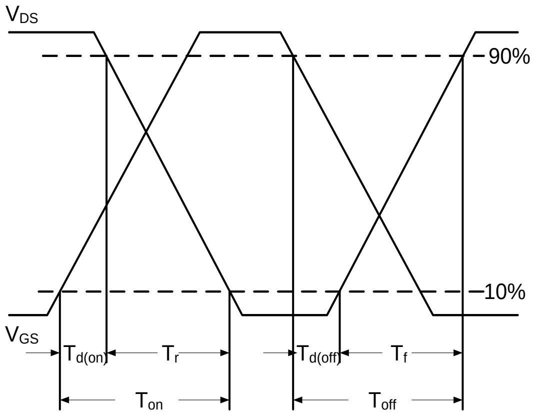
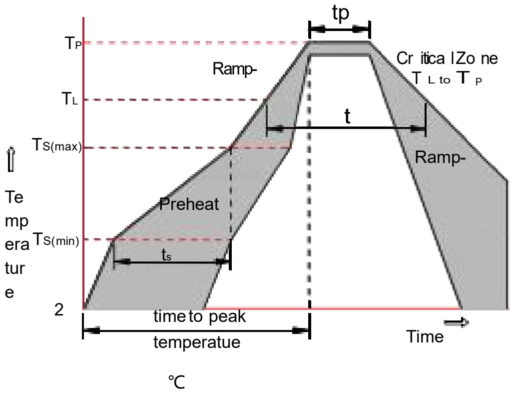


**Fig.8 Switching Time Waveform**

## Soldering parameters

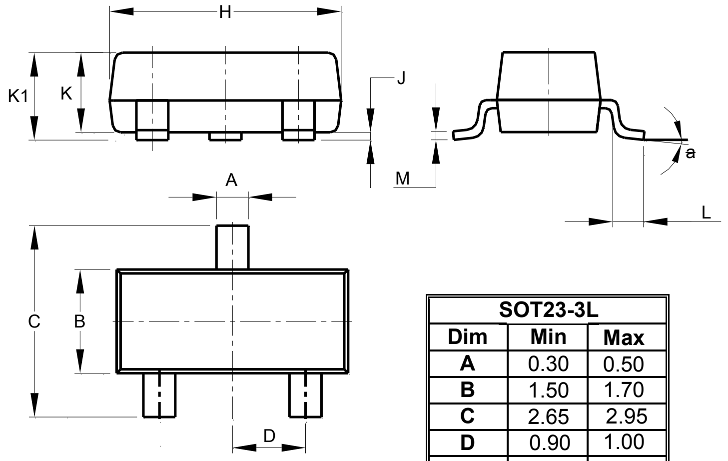
| Reflow Condition | | Pb-Free assembly (see as bellow) |
|---|---|---|
| Pre Heat | -Temperature Min ($T_{s(min)}$) | +150℃ |
| | -Temperature Max($T_{s(max)}$) | +200℃ |
| | -Time (Min to Max) (ts) | 60-180 secs. |
| Average ramp up rate (Liquid us Temp ($T_L$) to peak) | | 3℃/sec. Max |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate | | 3℃/sec. Max |
| Reflow | -Temperature($T_L$)(Liquid us) | +217℃ |
| | -Temperature($t_L$) | 60-150 secs. |
| Peak Temp ($T_p$) | | +260(+0/-5)℃ |
| Time within 5℃ of actual Peak Temp ($t_p$) | | 30 secs. Max |
| Ramp-down Rate | | 6℃/sec. Max |
| Time 25℃ to Peak Temp ($T_P$) | | 8 min. Max |
| Do not exceed | | +260℃ |

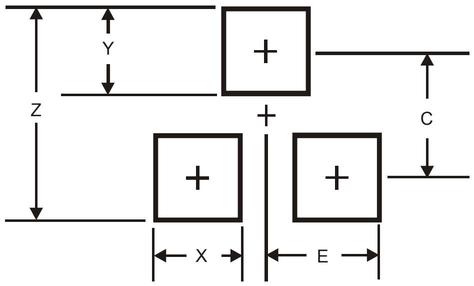
**FIG5:** Reflow condition



## Package Dimensions & Suggested Pad Layout

**SOT23-3L**





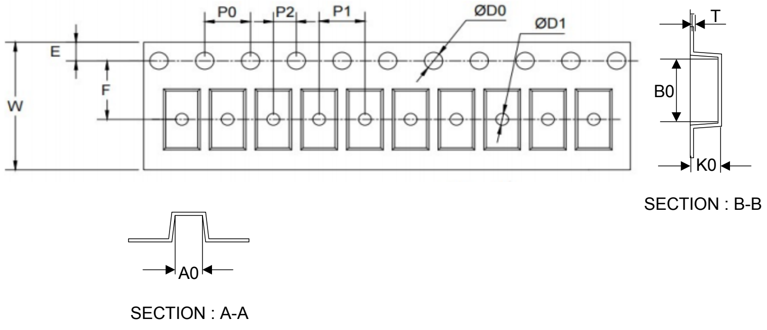
**SOT23-3L**

| Dim | Min | Max |
|---|---|---|
| A | 0.30 | 0.50 |
| B | 1.50 | 1.70 |
| C | 2.65 | 2.95 |
| D | 0.90 | 1.00 |
| H | 2.82 | 3.02 |
| J | | 0.10 |
| K | 1.05 | 1.15 |
| K1 | 1.05 | 1.25 |
| L | 0.30 | 0.60 |
| M | 0.10 | 0.20 |
| a | 0° | 8° |
| All Dimensions in mm | | |

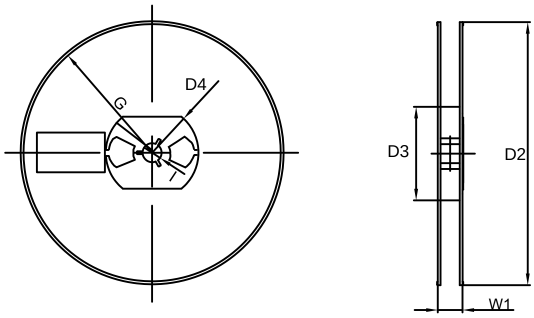
| Dimensions | SOT23-3L |
|---|---|
| Z | 3.3 |
| X | 0.9 |
| Y | 1.0 |
| C | 2.3 |
| E | 1.40 |

## Tape & rell specification

Tape



7” Reel



| Symbol | Dimension (mm) |
|---|---|
| P0 | 4.00±0.20 |
| P1 | 4.00±0.20 |
| P2 | 2.00±0.20 |
| D0 | 1.55±0.20 |
| D1 | 1.05±0.20 |
| E | 1.55±0.20 |
| F | 3.60±0.20 |
| W | 8.00±0.20 |
| A0 | 3.80±0.20 |
| B0 | 3.50±0.20 |
| K0 | 1.55±0.20 |
| T | 0.25±0.15 |
| D2 | 178.0±5.0 |
| D3 | 55Min. |
| D4 | R24.0±3.0 |
| G | R82.0±3.0 |
| I | 13.0±2.0 |
| W1 | 11.0±3.0 |

Quantity: 3000PCS