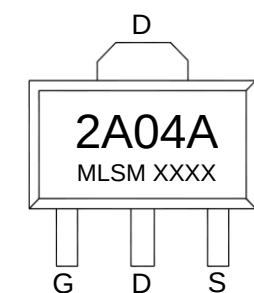


## Features

- Low  $R_{DS(on)}$  & FOM
- Extremely low switching loss
- Excellent stability and uniformity
- Fast switching and soft recovery

## Application

- Consumer electronic power supply
- Motor control
- Synchronous-rectification
- Isolated DC/DC convertor



Marking and pin assignment

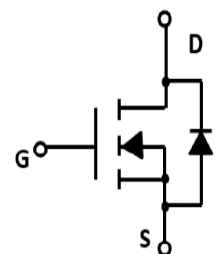
2A04A: Device code  
XXXX: Code

## Product Summary

| $V_{DS}$ | $R_{DS(on)}$ TYP | $I_D$ |
|----------|------------------|-------|
| 200V     | 480mΩ@10V        | 4A    |



SOT-89-3L top view



Schematic diagram



Pb-Free



Halogen-Free

## Absolute Maximum Ratings (TA=25°C unless otherwise noted)

| Symbol | Parameter | Rating | Unit |
|--------|-----------|--------|------|
|--------|-----------|--------|------|

### Common Ratings (TC=25°C Unless Otherwise Noted)

|           |                                  |                             |    |
|-----------|----------------------------------|-----------------------------|----|
| $V_{DS}$  | Drain-Source Breakdown Voltage   | 200                         | V  |
| $V_{GS}$  | Gate-Source Voltage              | ±20                         | V  |
| $T_J$     | Maximum Junction Temperature     | 150                         | °C |
| $T_{STG}$ | Storage Temperature Range        | -50 to 155                  | °C |
| $I_S$     | Diode Continuous Forward Current | $T_c=25^\circ\text{C}$<br>4 | A  |

### Mounted on Large Heat Sink

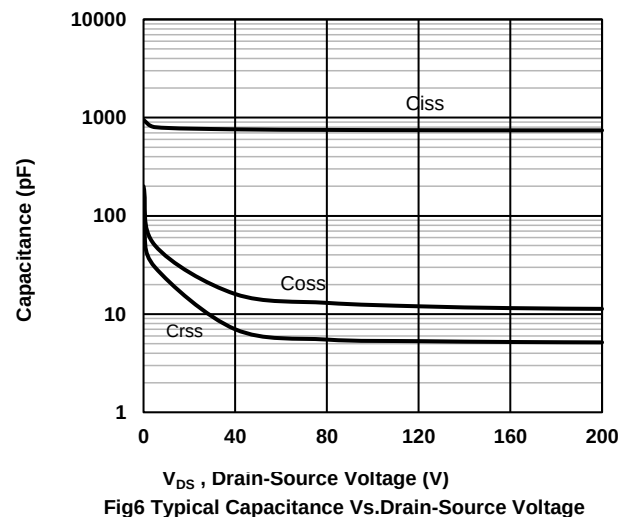
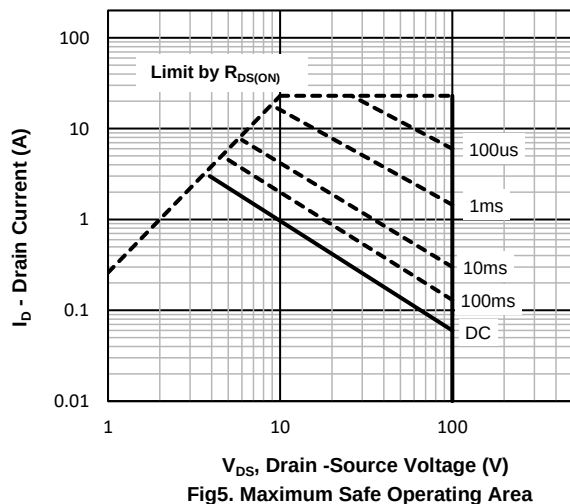
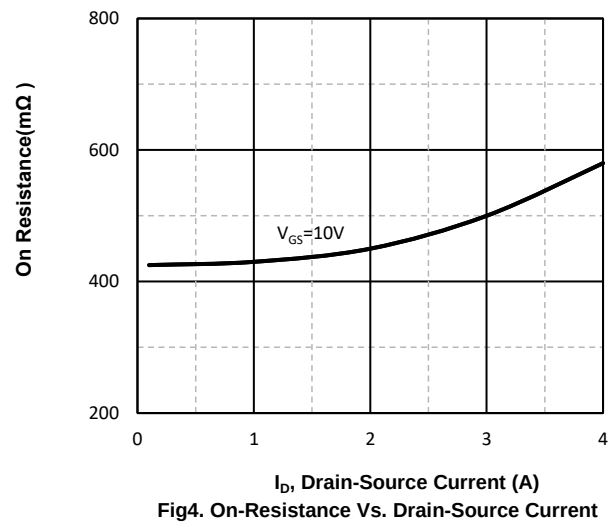
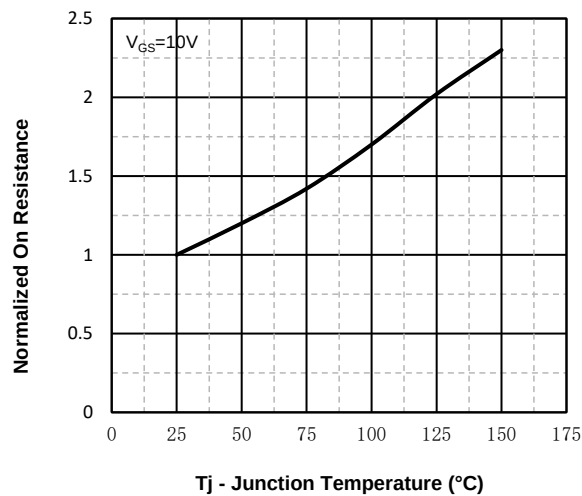
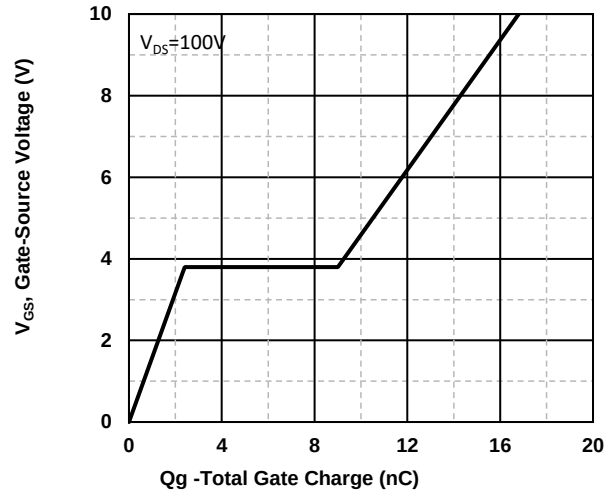
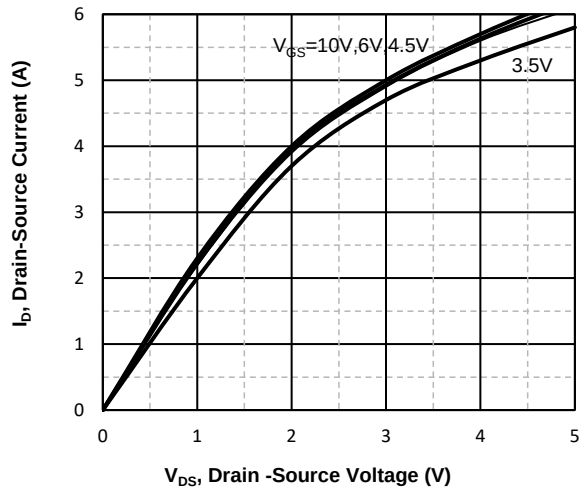
|                 |                                        |                                |      |
|-----------------|----------------------------------------|--------------------------------|------|
| $I_{DM}$        | Pulse Drain Current Tested             | $T_c=25^\circ\text{C}$<br>20   | A    |
| $I_D$           | Continuous Drain Current               | $T_c=25^\circ\text{C}$<br>4    | A    |
| $P_D$           | Maximum Power Dissipation              | $T_c=25^\circ\text{C}$<br>1.96 | W    |
| $R_{\theta JA}$ | Thermal Resistance Junction-to-Ambient | 83.5                           | °C/W |

## Ordering Information (Example)

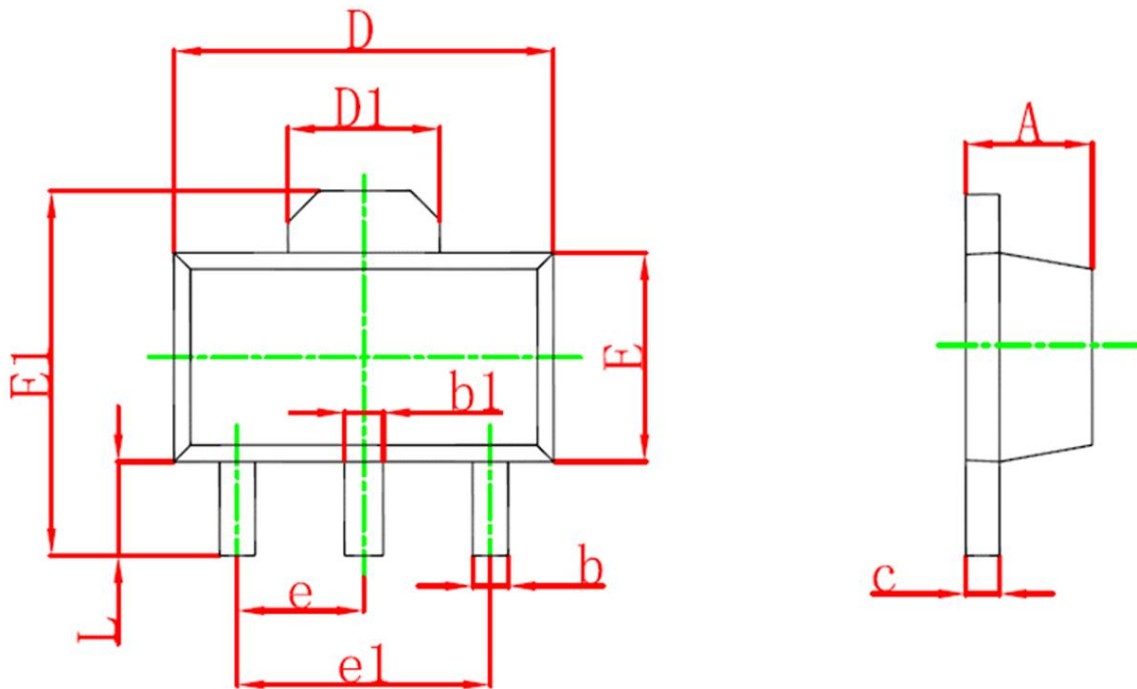
| Type    | Package   | Marking | Minimum Package(pcs) | Inner Box Quantity(pcs) | Outer Carton Quantity(pcs) | Delivery Mode |
|---------|-----------|---------|----------------------|-------------------------|----------------------------|---------------|
| MZ2A04A | SOT-89-3L | 2A04A   | 1,000                | 10,000                  | 40,000                     | 7"reel        |

| Electrical Characteristics (TJ=25℃ unless otherwise noted)              |                                  |                                                                 |     |     |      |      |
|-------------------------------------------------------------------------|----------------------------------|-----------------------------------------------------------------|-----|-----|------|------|
| Symbol                                                                  | Parameter                        | Condition                                                       | Min | Typ | Max  | Unit |
| Static Electrical Characteristics @ TJ = 25℃ (unless otherwise stated)  |                                  |                                                                 |     |     |      |      |
| BV <sub>(BR)DSS</sub>                                                   | Drain-Source Breakdown Voltage   | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                      | 200 | --  | --   | V    |
| I <sub>DSS</sub>                                                        | Zero Gate Voltage Drain Current  | V <sub>DS</sub> =200V, V <sub>GS</sub> =0V                      | --  | --  | 1.0  | uA   |
| I <sub>GSS</sub>                                                        | Gate-Body Leakage Current        | V <sub>GS</sub> =±20V, 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 | 1.8 | 2.5  | V    |
| R <sub>DS(on)</sub>                                                     | Drain-Source On-State Resistance | V <sub>GS</sub> =10V, I <sub>D</sub> =4A                        | --  | 480 | 580  | mΩ   |
| Dynamic Electrical Characteristics @ TJ = 25℃ (unless otherwise stated) |                                  |                                                                 |     |     |      |      |
| C <sub>ISS</sub>                                                        | Input Capacitance                | V <sub>DS</sub> =80V, V <sub>GS</sub> =0V, f=1MHz               | --  | 740 | --   | pF   |
| C <sub>OSS</sub>                                                        | Output Capacitance               |                                                                 | --  | 15  | --   | pF   |
| C <sub>RSS</sub>                                                        | Reverse Transfer Capacitance     |                                                                 | --  | 5   | --   | pF   |
| Switching Characteristics                                               |                                  |                                                                 |     |     |      |      |
| Q <sub>g</sub>                                                          | Total Gate Charge                | V <sub>DS</sub> =160V, I <sub>D</sub> =4A, V <sub>GS</sub> =10V | --  | 17  | --   | nC   |
| Q <sub>gs</sub>                                                         | Gate Source Charge               |                                                                 | --  | 2.5 | --   | nC   |
| Q <sub>gd</sub>                                                         | Gate Drain Charge                |                                                                 | --  | 7   | --   | nC   |
| t <sub>d(on)</sub>                                                      | Turn-on Delay Time               | V <sub>DD</sub> =100V, I <sub>D</sub> =4A, R <sub>G</sub> =25Ω  | --  | 10  | --   | nS   |
| t <sub>r</sub>                                                          | Turn-on Rise Time                |                                                                 | --  | 13  | --   | nS   |
| t <sub>d(off)</sub>                                                     | Turn-Off Delay Time              |                                                                 | --  | 16  | --   | nS   |
| t <sub>f</sub>                                                          | Turn-Off Fall Time               |                                                                 | --  | 15  | --   | nS   |
| Source- Drain Diode Characteristics                                     |                                  |                                                                 |     |     |      |      |
| V <sub>SD</sub>                                                         | Forward on voltage               | Tj=25℃, Is=4A                                                   | --  | --  | 1.4  | V    |

## Typical Operating Characteristics



SOT-89-3L Package information



| Symbol | Dimensions in Millimeters(mm) |       | Dimensions in Inches |       |
|--------|-------------------------------|-------|----------------------|-------|
|        | Min                           | Max   | Min                  | Max   |
| A      | 1.400                         | 1.600 | 0.055                | 0.063 |
| b      | 0.320                         | 0.520 | 0.013                | 0.020 |
| b1     | 0.400                         | 0.580 | 0.016                | 0.023 |
| c      | 0.350                         | 0.440 | 0.014                | 0.017 |
| D      | 4.400                         | 4.600 | 0.173                | 0.181 |
| D1     | 1.550 REF                     |       | 0.061 REF            |       |
| E      | 2.300                         | 2.600 | 0.091                | 0.102 |
| E1     | 3.940                         | 4.250 | 0.155                | 0.167 |
| e      | 1.500 TYP                     |       | 0.060 TYP            |       |
| e1     | 3.000 TYP                     |       | 0.118 TYP            |       |
| L      | 0.900                         | 1.200 | 0.035                | 0.047 |