

## Features

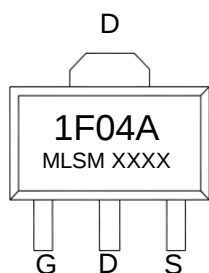
- High density cell design for ultra low  $R_{DS(ON)}$
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high  $E_{AS}$
- Excellent package for good heat dissipation

## Application

- Power switching application

## Product Summary

| $V_{DS}$ | $R_{DS(ON)}$ TYP | $I_D$ |
|----------|------------------|-------|
| 150V     | 250mΩ@10V        | 4A    |
|          | 280mΩ@4.5V       |       |

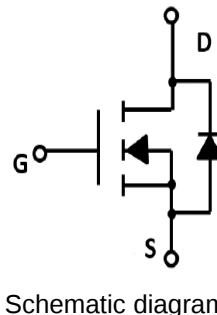


1F04A: Device code  
 XXXX: Code

Marking and pin assignment



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   | 150                    | 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 | $T_C=25^{\circ}C$<br>4 | A  |

## Mounted on Large Heat Sink

|                 |                                     |                          |      |
|-----------------|-------------------------------------|--------------------------|------|
| $I_{DM}$        | Pulse Drain Current Tested          | $T_C=25^{\circ}C$<br>20  | A    |
| $I_D$           | Continuous Drain Current            | $T_C=25^{\circ}C$<br>4   | A    |
| $P_D$           | Maximum Power Dissipation           | $T_C=25^{\circ}C$<br>1.2 | W    |
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient | 108                      | °C/W |

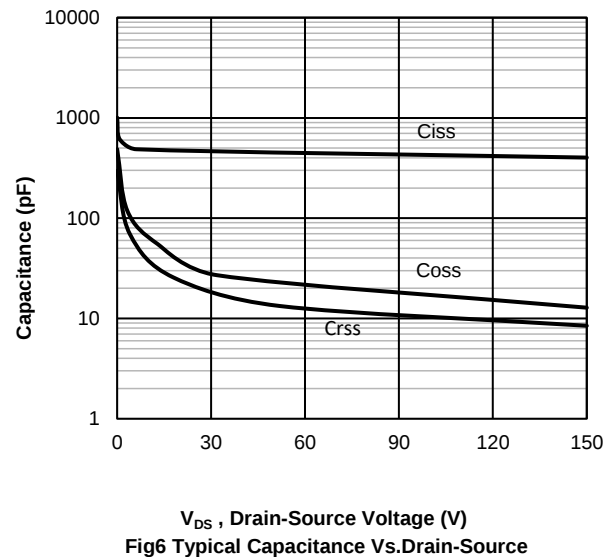
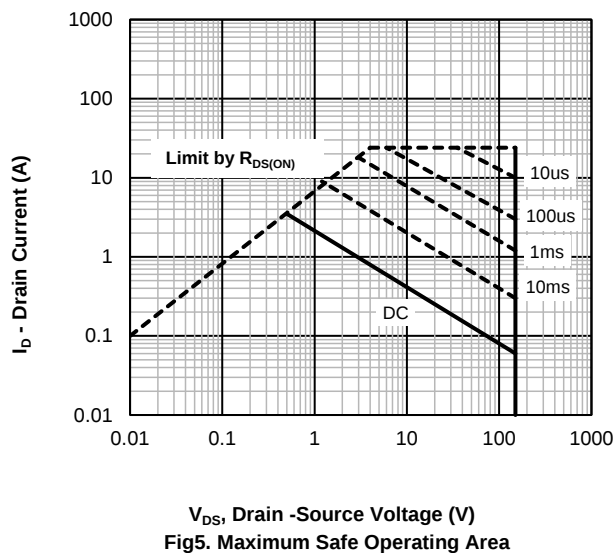
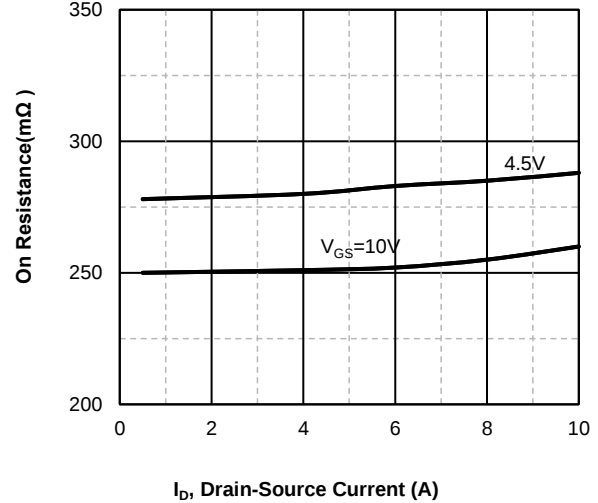
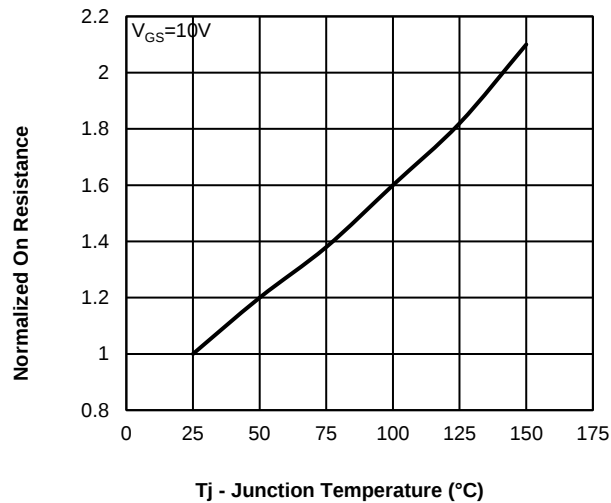
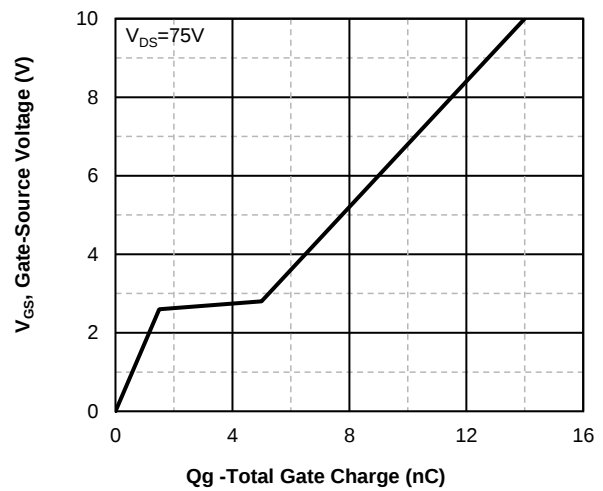
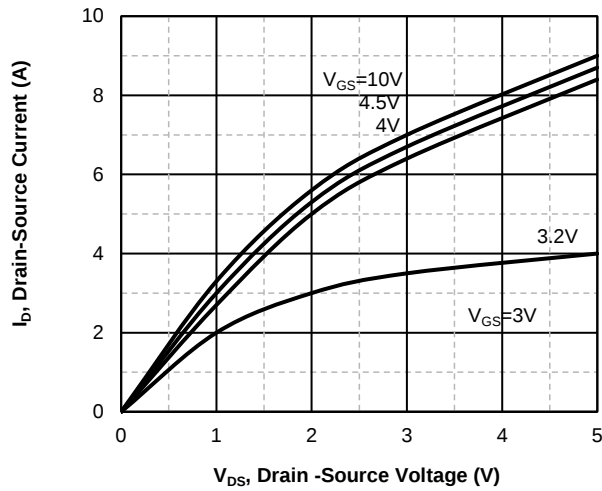
## Ordering Information (Example)

| Type    | Package   | Marking | Minimum Package(pcs) | Inner Box Quantity(pcs) | Outer Carton Quantity(pcs) | Delivery Mode |
|---------|-----------|---------|----------------------|-------------------------|----------------------------|---------------|
| MZ1F04A | SOT-89-3L | 1F04A   | 1,000                | 10,000                  | 40,000                     | 7"reel        |

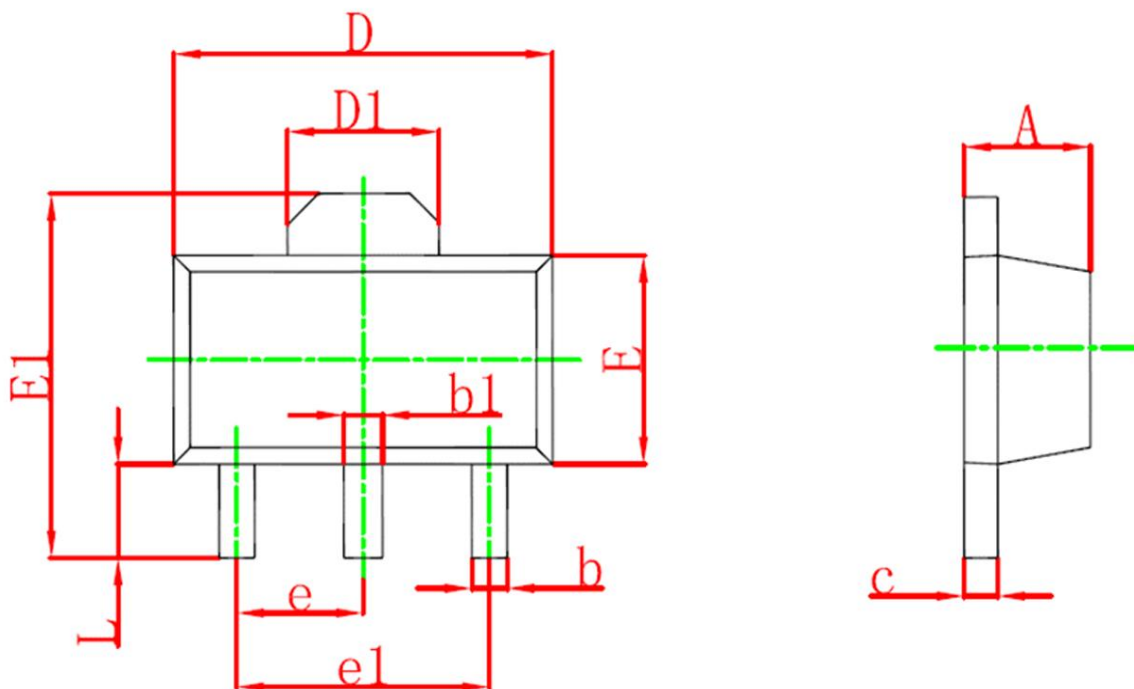
**Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

| Symbol                                                                   | Parameter                        | Condition                      | Min | Typ  | Max  | Unit |
|--------------------------------------------------------------------------|----------------------------------|--------------------------------|-----|------|------|------|
| Static Electrical Characteristics @ TJ = 25°C (unless otherwise stated)  |                                  |                                |     |      |      |      |
| BV(BR)DSS                                                                | Drain-Source Breakdown Voltage   | VGS=0V, ID=250μA               | 150 | --   | --   | V    |
| IDSS                                                                     | Zero Gate Voltage Drain Current  | VDS=150V, VGS=0V               | --  | --   | 1    | μA   |
| IGSS                                                                     | Gate-Body Leakage Current        | VGS=±20V, VDS=0V               | --  | --   | ±100 | nA   |
| VGS(th)                                                                  | Gate Threshold Voltage           | VDS=VGS, ID=250μA              | 1.0 | --   | 2.5  | V    |
| RDS(on)                                                                  | Drain-Source On-State Resistance | VGS=10V, ID=4A                 | --  | 250  | 330  | mΩ   |
|                                                                          |                                  | VGS=4.5V, ID=2A                | --  | 280  | 450  | mΩ   |
| Dynamic Electrical Characteristics @ TJ = 25°C (unless otherwise stated) |                                  |                                |     |      |      |      |
| CISS                                                                     | Input Capacitance                | VDS=75V, VGS=0V, f=1MHz        | --  | 465  | --   | pF   |
| COSS                                                                     | Output Capacitance               |                                | --  | 23   | --   | pF   |
| CRSS                                                                     | Reverse Transfer Capacitance     |                                | --  | 14   | --   | pF   |
| Switching Characteristics                                                |                                  |                                |     |      |      |      |
| Qg                                                                       | Total Gate Charge                | VDS=75V, ID=4A, VGS=10V        | --  | 14   | --   | nC   |
| Qgs                                                                      | Gate Source Charge               |                                | --  | 1.6  | --   | nC   |
| Qgd                                                                      | Gate Drain Charge                |                                | --  | 4    | --   | nC   |
| td(on)                                                                   | Turn-on Delay Time               | VDD=75V, ID=4A, VGS=10V, RG=3Ω | --  | 5.8  | --   | nS   |
| tr                                                                       | Turn-on Rise Time                |                                | --  | 2.2  | --   | nS   |
| td(off)                                                                  | Turn-Off Delay Time              |                                | --  | 16.9 | --   | nS   |
| tf                                                                       | Turn-Off Fall Time               |                                | --  | 2.6  | --   | nS   |
| Source- Drain Diode Characteristics                                      |                                  |                                |     |      |      |      |
| VSD                                                                      | Forward on voltage               | Tj=25°C, Is=4A                 | --  | --   | 1.2  | 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 |