

## Features

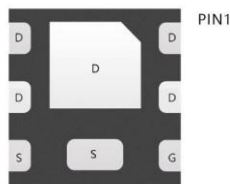
- Low  $R_{DS(on)}$  & FOM
- Extremely low switching loss
- Excellent stability and uniformity
- Fast switching and soft recovery

## Application

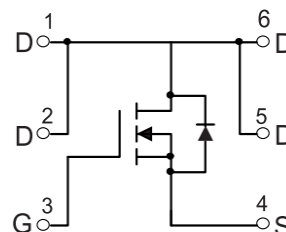
- Consumer electronic power supply
- Motor control
- Synchronous-rectification
- Isolated DC/DC convertor

## Product Summary

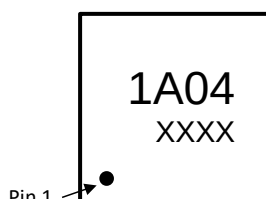
| $V_{DS}$ | $R_{DS(ON)}$ TYP | $I_D$ |
|----------|------------------|-------|
| 100V     | 180mΩ@10V        | 4A    |
|          | 220mΩ@4.5V       |       |



DFN2X2-6L view



Schematic diagram



Pin 1

Marking and pin assignment

2A04 : Device code  
 XXXX: Code  
 Solid dot: Pin1 indicator



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 <sub>DS</sub>  | Drain-Source Breakdown Voltage   |         | 100        | V  |
| V <sub>GS</sub>  | Gate-Source Voltage              |         | ±20        | V  |
| T <sub>J</sub>   | Maximum Junction Temperature     |         | 150        | °C |
| T <sub>STG</sub> | Storage Temperature Range        |         | -50 to 155 | °C |
| I <sub>S</sub>   | Diode Continuous Forward Current | Tc=25°C | 4          | A  |

### Mounted on Large Heat Sink

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

## Ordering Information (Example)

| Type     | Package   | Marking | Minimum Package(pcs) | Inner Box Quantity(pcs) | Outer Carton Quantity(pcs) | Delivery Mode |
|----------|-----------|---------|----------------------|-------------------------|----------------------------|---------------|
| MLSM1A04 | DFN2X2-6L | 1A04    | 3,000                | 45,000                  | 180,000                    | 7"reel        |

| Electrical Characteristics (TJ=25°C unless otherwise noted)              |                                  |                                                                                    |     |      |      |      |
|--------------------------------------------------------------------------|----------------------------------|------------------------------------------------------------------------------------|-----|------|------|------|
| Symbol                                                                   | Parameter                        | Condition                                                                          | Min | Typ  | Max  | Unit |
| Static Electrical Characteristics @ TJ = 25°C (unless otherwise stated)  |                                  |                                                                                    |     |      |      |      |
| BV <sub>(BR)DSS</sub>                                                    | Drain-Source Breakdown Voltage   | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                                         | 100 | --   | --   | V    |
| I <sub>DSS</sub>                                                         | Zero Gate Voltage Drain Current  | V <sub>DS</sub> =100V, V <sub>GS</sub> =0V                                         | --  | --   | 1.0  | μA   |
| 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                                           | --  | 180  | 250  | mΩ   |
|                                                                          |                                  | V <sub>GS</sub> =4.5V, I <sub>D</sub> =2A                                          | --  | 220  | 300  | mΩ   |
| Dynamic Electrical Characteristics @ TJ = 25°C (unless otherwise stated) |                                  |                                                                                    |     |      |      |      |
| C <sub>ISS</sub>                                                         | Input Capacitance                | V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f=1MHz                                  | --  | 387  | --   | pF   |
| C <sub>OSS</sub>                                                         | Output Capacitance               |                                                                                    | --  | 31   | --   | pF   |
| C <sub>RSS</sub>                                                         | Reverse Transfer Capacitance     |                                                                                    | --  | 28   | --   | pF   |
| Switching Characteristics                                                |                                  |                                                                                    |     |      |      |      |
| Q <sub>g</sub>                                                           | Total Gate Charge                | V <sub>DS</sub> =50V, I <sub>D</sub> =4A, V <sub>GS</sub> =10V                     | --  | 9.5  | --   | nC   |
| Q <sub>gs</sub>                                                          | Gate Source Charge               |                                                                                    | --  | 1.8  | --   | nC   |
| Q <sub>gd</sub>                                                          | Gate Drain Charge                |                                                                                    | --  | 1.98 | --   | nC   |
| t <sub>d(on)</sub>                                                       | Turn-on Delay Time               | V <sub>DS</sub> =50V, I <sub>D</sub> =4A, V <sub>GS</sub> =10V, R <sub>G</sub> =1Ω | --  | 4    | --   | nS   |
| t <sub>r</sub>                                                           | Turn-on Rise Time                |                                                                                    | --  | 18   | --   | nS   |
| t <sub>d(off)</sub>                                                      | Turn-Off Delay Time              |                                                                                    | --  | 13.5 | --   | nS   |
| t <sub>f</sub>                                                           | Turn-Off Fall Time               |                                                                                    | --  | 28   | --   | nS   |
| Source- Drain Diode Characteristics                                      |                                  |                                                                                    |     |      |      |      |
| V <sub>SD</sub>                                                          | Forward on voltage               | Tj=25°C, Is=4A                                                                     | --  | --   | 1.2  | V    |

## Typical Operating Characteristics

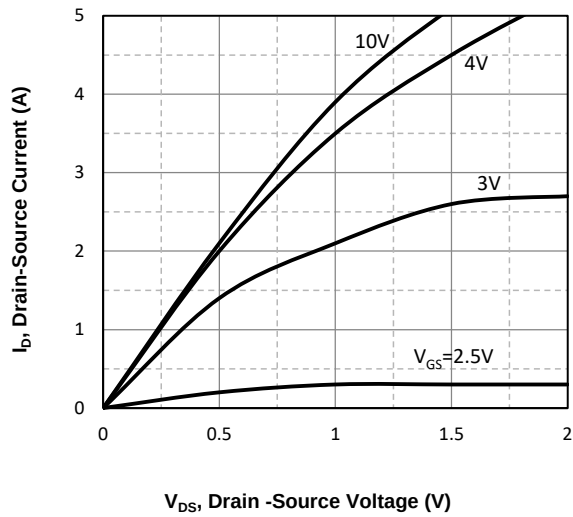


Fig1. Typical Output Characteristics

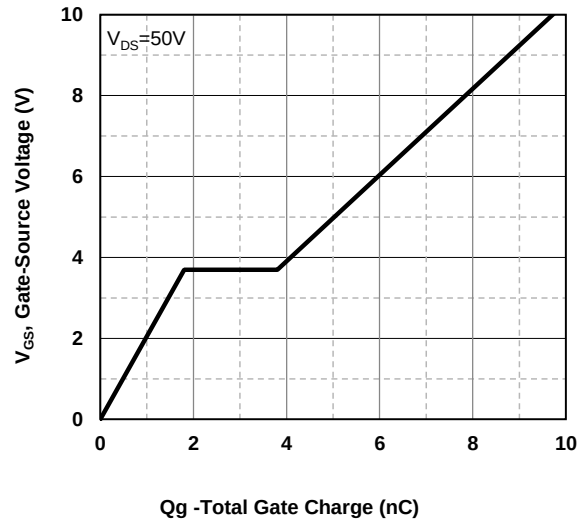


Fig2. Typical Gate Charge Vs. Gate-Source Voltage

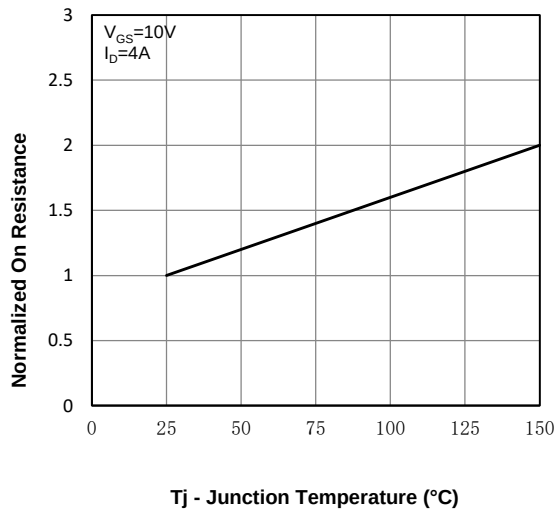


Fig3. Normalized On-Resistance Vs. Temperature

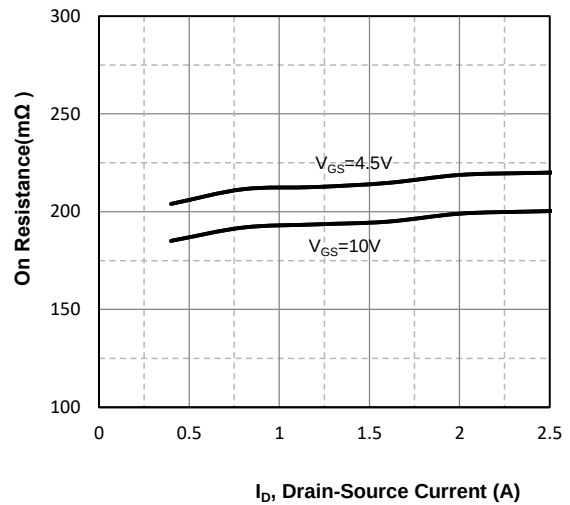


Fig4. On-Resistance Vs. Drain-Source Current

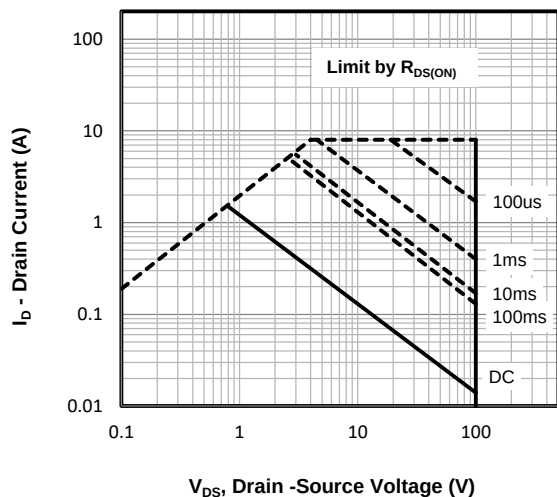


Fig5. Maximum Safe Operating Area

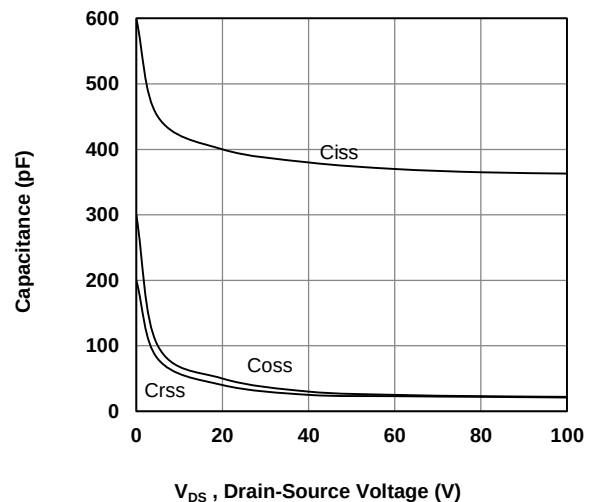
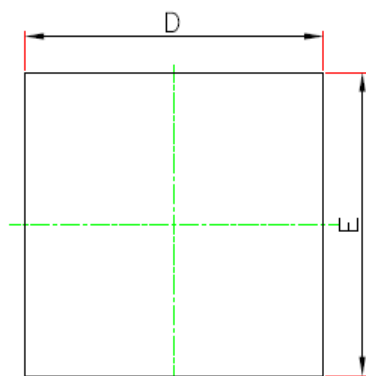
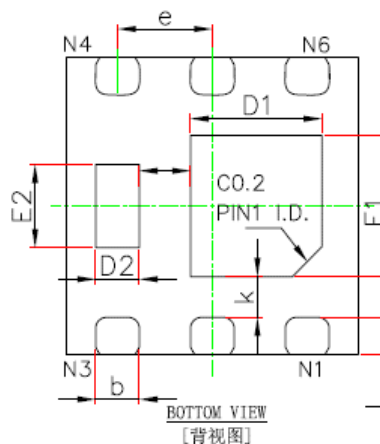


Fig6. Typical Capacitance Vs. Drain-Source Voltage

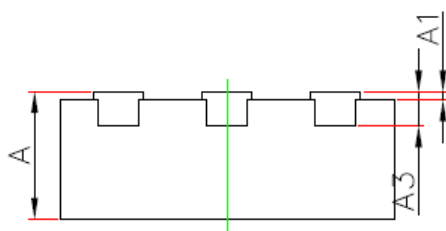
DFN2X2-6L Package information



TOP VIEW  
[顶视图]



BOTTOM VIEW  
[背视图]



SIDE VIEW  
[侧视图]

| Symbol | Dimensions in Millimeters(mm) |       | Dimensions In Inches |       |
|--------|-------------------------------|-------|----------------------|-------|
|        | Min                           | Max   | Min                  | Max   |
| A      | 0.600                         | 0.700 | 0.023                | 0.027 |
| A1     | 0.000                         | 0.050 | 0.000                | 0.001 |
| A3     | 0.203REF                      |       | 0.007REF             |       |
| b      | 0.315                         | 0.415 | 0.012                | 0.016 |
| D      | 1.924                         | 2.076 | 0.075                | 0.081 |
| E      | 1.924                         | 2.076 | 0.075                | 0.081 |
| e      | 0.650TYP                      |       | 0.225TYP             |       |
| L      | 0.224                         | 0.376 | 0.008                | 0.014 |
| k      | 0.200                         | -     | 0.007                | -     |
| E1     | 1.000                         | 1.200 | 0.039                | 0.047 |
| D1     | 0.900                         | 1.100 | 0.035                | 0.043 |
| E2     | 0.700                         | 0.900 | 0.027                | 0.035 |
| D2     | 0.150                         | 0.350 | 0.005                | 0.013 |