



## Dual N -Channel Enhancement Power MOSFET

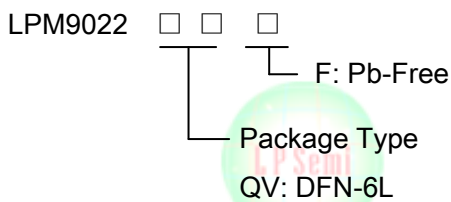
### General Description

The LPM9022 integrates two N-Channel enhancement MOSFET Transistor. It uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. This device is suitable for using in DC-DC conversion, power switch and charging circuit. Standard Product LPM9022 is Pb-free and Halogen-free.

### Features

- ◆ Trench Technology
- ◆ Single NMOS:  $V_{DS}=20V$ ,  $I_D=6A$ 
  - $R_{DS(ON)} < 26m\Omega @ V_{GS}=2.5V$
  - $R_{DS(ON)} < 20m\Omega @ V_{GS}=4.5V$
- ◆ Super high density cell design
- ◆ Extremely Low Threshold Voltage
- ◆ Small package DFN-6L 2\*3mm

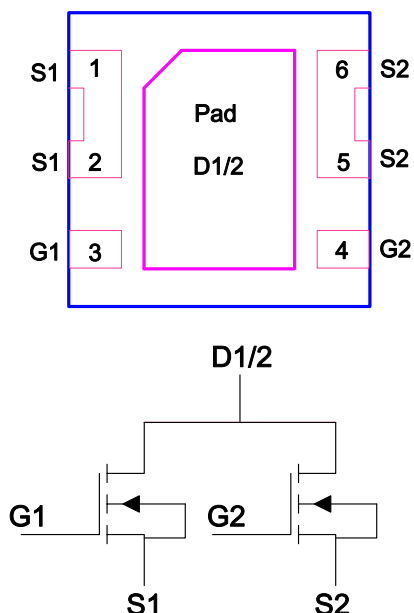
### Order Information



### Applications

- ✧ Driver for Relay, Solenoid, Motor, LED etc.
- ✧ DC-DC converter circuit
- ✧ Power Switch
- ✧ Load Switch
- ✧ Charging

### Pin Configurations



### Marking Information

| Device  | Marking | Package | Shipping |
|---------|---------|---------|----------|
| LPM9022 |         | DFN-6L  | 3K/REEL  |

### Pin Description

| Pin Number | Pin Description    |
|------------|--------------------|
| 1,2        | Source Of NMOS1    |
| 3          | Gate Of NMOS1      |
| 4          | Gate Of NMOS2      |
| 5,6        | Source Of NMOS2    |
| Bottom Pad | Drain Of Both NMOS |



## Absolute Maximum Ratings

| Parameter                      |         | Symbol    | LPM9022    | Unit |
|--------------------------------|---------|-----------|------------|------|
| Drain-Source Voltage           |         | $V_{DS}$  | 20         | V    |
| Gate-Source Voltage            |         | $V_{GS}$  | $\pm 10$   |      |
| Continuous Drain Current       | TA=25°C |           | 12         | A    |
| Maximum Power Dissipation      | TA=25°C |           | 1.6        | W    |
| Operating Junction Temperature |         | $T_J$     | -40 to 150 | °C   |
| Lead Temperature               |         | $T_L$     | 260        | °C   |
| Storage Temperature Range      |         | $T_{stg}$ | -55 to 150 | °C   |

## Thermal resistance ratings

| Parameter                              |              | Symbol          | LPM9022 | Unit |
|----------------------------------------|--------------|-----------------|---------|------|
| Junction-to-Ambient Thermal Resistance | Steady State | $R_{\theta JA}$ | 80      | °C/W |





## Electrical Characteristics

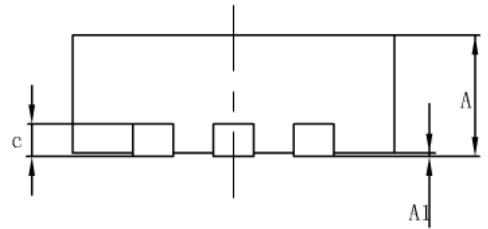
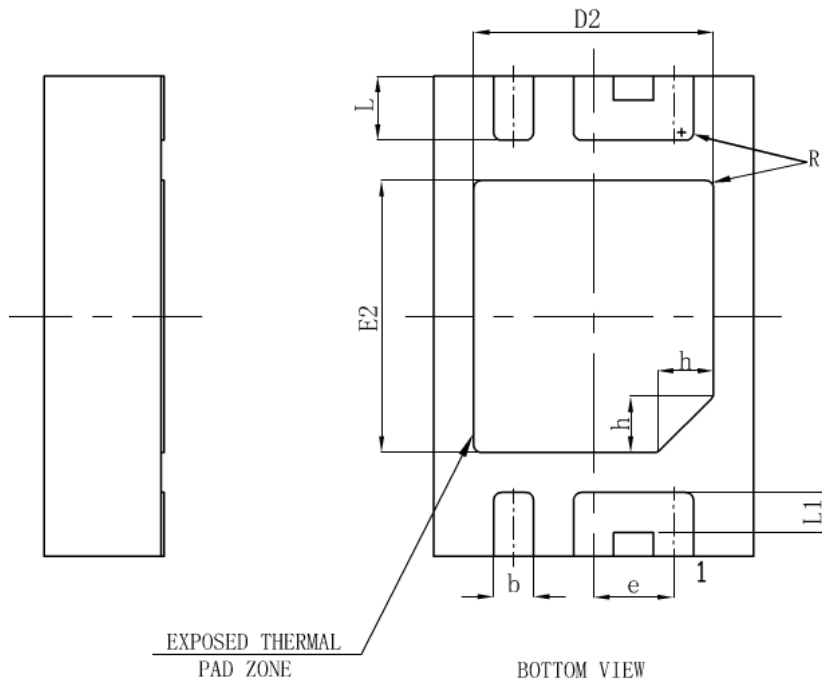
| Parameter                                       | Symbol              | Test Condition                                                                                | Min | Typ. | Max  | Units |
|-------------------------------------------------|---------------------|-----------------------------------------------------------------------------------------------|-----|------|------|-------|
| OFF CHARACTERISTICS                             |                     |                                                                                               |     |      |      |       |
| Drain-to-Source Breakdown Voltage               | BV <sub>DSS</sub>   | V <sub>GS</sub> = 0 V, I <sub>D</sub> =250uA                                                  |     | 20   |      | V     |
| Zero Gate Voltage Drain Current                 | I <sub>DSS</sub>    | V <sub>DS</sub> =20V, V <sub>GS</sub> = 0V                                                    |     |      | 500  | nA    |
| Gate-to-source Leakage Current                  | I <sub>GSS</sub>    | V <sub>DS</sub> =0V, V <sub>GS</sub> =±10V                                                    |     |      | ±100 | nA    |
| ON CHARACTERISTICS ( <sup>Note c</sup> )        |                     |                                                                                               |     |      |      |       |
| Gate Threshold Voltage                          | V <sub>GS(TH)</sub> | V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> =250uA                                     | 0.4 |      | 0.95 | V     |
| Drain-to-source On-resistance                   | R <sub>DS(on)</sub> | V <sub>GS</sub> = 2.5V                                                                        |     |      | 26   | mΩ    |
|                                                 |                     | V <sub>GS</sub> = 4.5V, I <sub>D</sub> =6A                                                    |     |      | 20   |       |
| Forward Transconductance                        | g <sub>FS</sub>     | V <sub>DS</sub> =2.5V, I <sub>D</sub> =6A                                                     | 4   |      |      | S     |
| CAPACITANCES, CHARGES ( <sup>Note d</sup> )     |                     |                                                                                               |     |      |      |       |
| Input Capacitance                               | C <sub>ISS</sub>    | V <sub>GS</sub> = 0V,<br>f =1.0MHz<br>V <sub>DS</sub> =15V                                    |     | 1550 |      | pF    |
| Output Capacitance                              | C <sub>OSS</sub>    |                                                                                               |     | 300  |      |       |
| Reverse Transfer Capacitance                    | C <sub>RSS</sub>    |                                                                                               |     | 180  |      |       |
| Total Gate Charge                               | Q <sub>G(TOT)</sub> | V <sub>GS</sub> =4.5V,<br>V <sub>DS</sub> =15V,<br>I <sub>D</sub> =6A                         |     | 13   |      | nC    |
| Gate-to-Source Charge                           | Q <sub>GS</sub>     |                                                                                               |     | 5.5  |      |       |
| Gate-to-Drain Charge                            | Q <sub>GD</sub>     |                                                                                               |     | 3.5  |      |       |
| SWITCHING CHARACTERISTICS ( <sup>Note d</sup> ) |                     |                                                                                               |     |      |      |       |
| Turn-On Delay Time                              | t <sub>d(ON)</sub>  | V <sub>GS</sub> =10V,<br>V <sub>DD</sub> =20V,<br>I <sub>D</sub> =1.0A,<br>R <sub>G</sub> =6Ω |     | 30   |      | ns    |
| Rise Time                                       | t <sub>r</sub>      |                                                                                               |     | 20   |      |       |
| Turn-Off Delay Time                             | t <sub>d(OFF)</sub> |                                                                                               |     | 100  |      |       |
| Fall Time                                       | t <sub>f</sub>      |                                                                                               |     | 80   |      |       |
| BODY DIODE CHARACTERISTICS                      |                     |                                                                                               |     |      |      |       |
| Forward Voltage <sup>(Note c)</sup>             | V <sub>SD</sub>     | V <sub>GS</sub> = 0 V, I <sub>S</sub> =1A                                                     |     | 0.2  | 1.0  | V     |

**Note:**

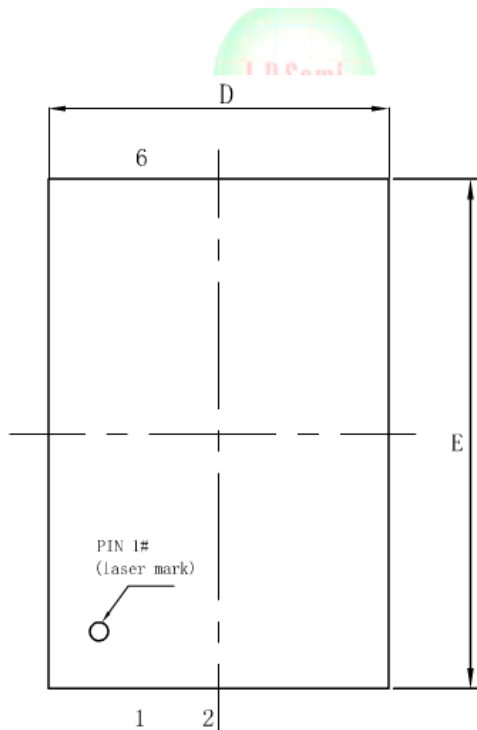
- Pulse width limited by maximum junction temperature.
- Surface mounted on FR4 board,  $t < 10s$ .
- Pulse width  $< 295\mu s$ , Duty Cycle  $< 2\%$ .
- Guaranteed by design, not subject to production.



## Packaging Information



SIDE VIEW



TOP VIEW

| SYMBOL | MILLIMETER |      |      |
|--------|------------|------|------|
|        | MIN        | NOM  | MAX  |
| A      | 0.70       | 0.75 | 0.80 |
| A1     | 0.00       | 0.02 | 0.05 |
| b      | 0.20       | 0.25 | 0.30 |
| c      | 0.18       | 0.20 | 0.25 |
| D      | 1.95       | 2.00 | 2.05 |
| D2     | 1.45       | 1.50 | 1.55 |
| e      | 0.50BSC    |      |      |
| E      | 2.95       | 3.00 | 3.05 |
| E2     | 1.65       | 1.70 | 1.75 |
| L      | 0.35       | 0.40 | 0.45 |
| L1     | 0.20       | 0.25 | 0.30 |
| h      | 0.30       | 0.35 | 0.40 |
| R      | 0.05REF    |      |      |