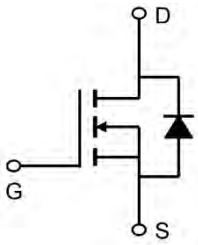
Leiditech

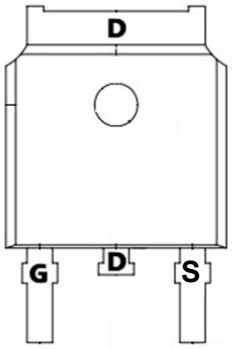
# LMAK180N03

## 30V N-Channel Enhancement Mode MOSFET

## Description

The LMAK180N03 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.



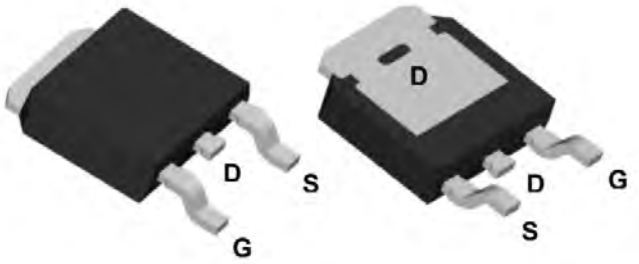

## General Features

$V_{DS}$=30V $I_D$ =180A

$R_{DS(ON)}$ < 3.2mΩ @ $V_{GS}$=10V **(Typ.2.1mΩ)**

## Application

- Battery protection
- Load switch
- Uninterruptible power supply




### Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity |
|---|---|---|---|---|---|
| LMAK180N03 | AP180N03D | TO-252 | - | - | 2500 |

### Absolute Maximum Ratings ($T_C$=25℃unless otherwise noted)

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 30 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$@$T_C$=25℃ | Continuous Drain Current, $V_{GS}$ @ 10V[1,6] | 180 | A |
| $I_D$@$T_C$=100℃ | Continuous Drain Current, $V_{GS}$ @ 10V[1,6] | 145 | A |
| $I_{DM}$ | Pulsed Drain Current[2] | 500 | A |
| EAS | Single Pulse Avalanche Energy[3] | 246 | mJ |
| $I_{AS}$ | Avalanche Current | 70.2 | A |
| $P_D$@$T_C$=25℃ | Total Power Dissipation[4] | 187 | W |
| $T_{STG}$ | Storage Temperature Range | -55 to 175 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 175 | ℃ |
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient [1] | 62 | ℃/W |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case[1] | 0.8 | ℃/W |

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

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| BVDSS | Drain-Source Breakdown Voltage | $V_{GS}$=0V , $I_D$=250uA | 30 | 38 | --- | V |
| △BVDSS/△TJ | $BV_{DSS}$ Temperature Coefficient | Reference to 25℃ , $I_D$=1mA | --- | 0.014 | --- | V/℃ |
| RDS(ON) | Static Drain-Source On-Resistance[2] | $V_{GS}$=10V , $I_D$=30A | --- | 2.1 | 3.2 | mΩ |
| | | $V_{GS}$=4.5V , $I_D$=15A | --- | 3.0 | 3.8 | |
| VGS(th) | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$ , $I_D$ =250uA | 1.2 | 1.6 | 2.5 | V |
| △$V_{GS(th)}$ | $V_{GS(th)}$ Temperature Coefficient | | --- | -4 | --- | mV/℃ |
| IDSS | Drain-Source Leakage Current | $V_{DS}$=24V , $V_{GS}$=0V , $T_J$=25℃ | --- | --- | 1 | uA |
| | | $V_{DS}$=24V , $V_{GS}$=0V , $T_J$=55℃ | --- | --- | 5 | |
| IGSS | Gate-Source Leakage Current | $V_{GS}$=±20V , $V_{DS}$=0V | --- | --- | ±100 | nA |
| gfs | Forward Transconductance | $V_{DS}$=5V , $I_D$=30A | --- | 50 | --- | S |
| $R_g$ | Gate Resistance | $V_{DS}$=0V , $V_{GS}$=0V , f=1MHz | --- | 1.7 | --- | Ω |
| $Q_g$ | Total Gate Charge (4.5V) | $V_{DS}$=15V , $V_{GS}$=10V , $I_D$=15A | --- | 56.9 | --- | nC |
| Qgs | Gate-Source Charge | | --- | 13.8 | --- | |
| Qgd | Gate-Drain Charge | | --- | 23.5 | --- | |
| Td(on) | Turn-On Delay Time | $V_{DD}$=15V , $V_{GS}$=10V<br>$R_G$=3.3Ω,<br>$I_D$=1A | --- | 20.1 | --- | ns |
| $T_r$ | Rise Time | | --- | 6.3 | --- | |
| Td(off) | Turn-Off Delay Time | | --- | 124.6 | --- | |
| $T_f$ | Fall Time | | --- | 15.8 | --- | |
| Ciss | Input Capacitance | $V_{DS}$=15V , $V_{GS}$=0V , f=1MHz | --- | 5850 | --- | pF |
| Coss | Output Capacitance | | --- | 720 | --- | |
| Crss | Reverse Transfer Capacitance | | --- | 525 | --- | |
| IS | Continuous Source Current[1,5] | $V_G$=$V_D$=0V , Force Current | --- | --- | 205 | A |
| ISM | Pulsed Source Current[2,5] | | --- | --- | 500 | A |
| VSD | Diode Forward Voltage[2] | $V_{GS}$=0V , $I_S$=1A , $T_J$=25℃ | --- | --- | 1.2 | V |

**Note :**

1、The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper.

2、The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%

3、The EAS data shows Max. rating . The test condition is VDD=25V,VGS=10V,L=0.1Mh,IAS=22A

4、The power dissipation is limited by 175℃ junction temperature

5、The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

## Typical Characteristics

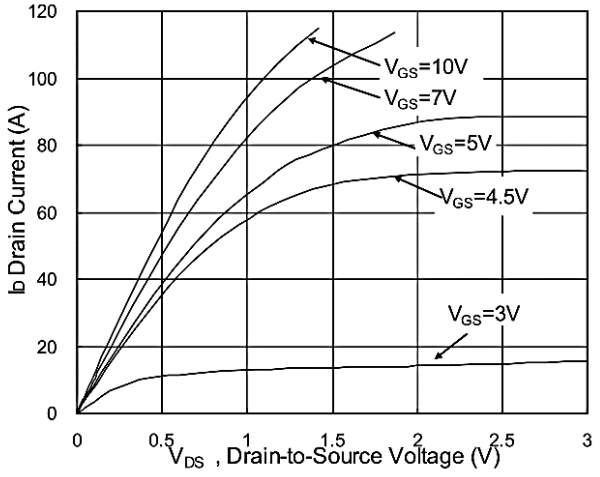



Fig.1 Typical Output Characteristics

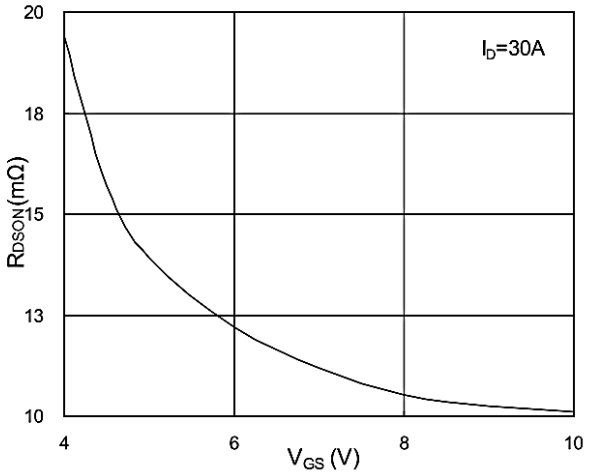



Fig.2 On-Resistance vs. G-S Voltage

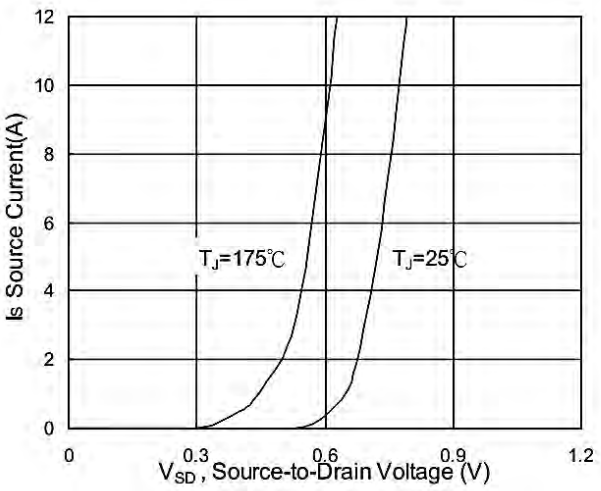



Fig.3 Forward Characteristics of Reverse

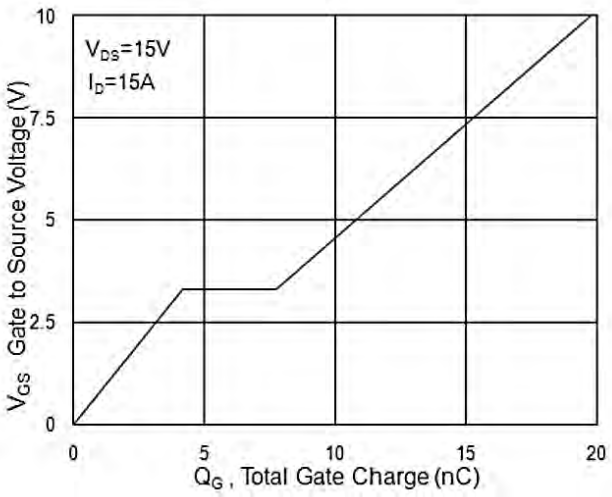



Fig.4 Gate-Charge Characteristics

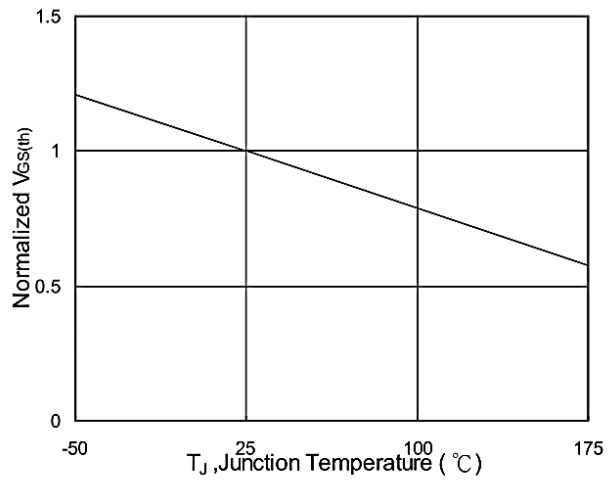



Fig.5 Normalized $V_{GS(th)}$ vs. $T_J$

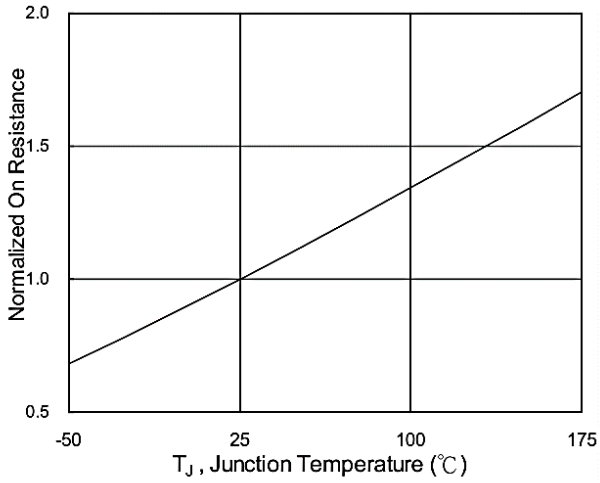



Fig.6 Normalized $R_{DSON}$ vs. $T_J$

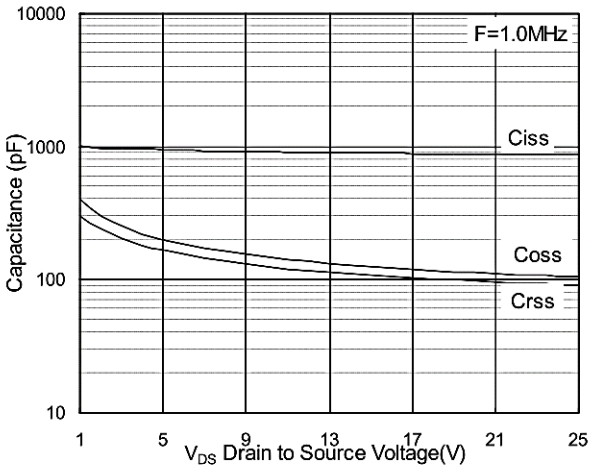



Fig.7 Capacitance

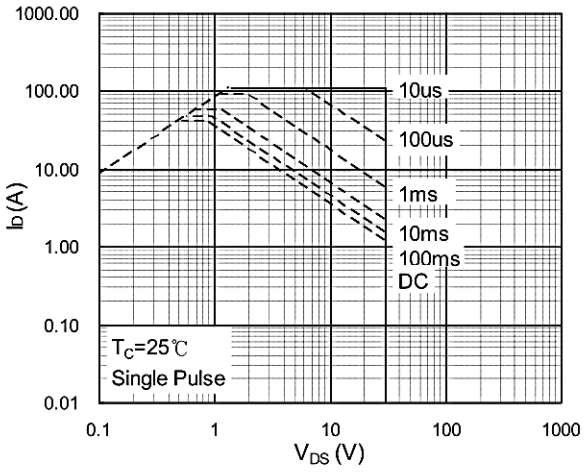



Fig.8 Safe Operating Area

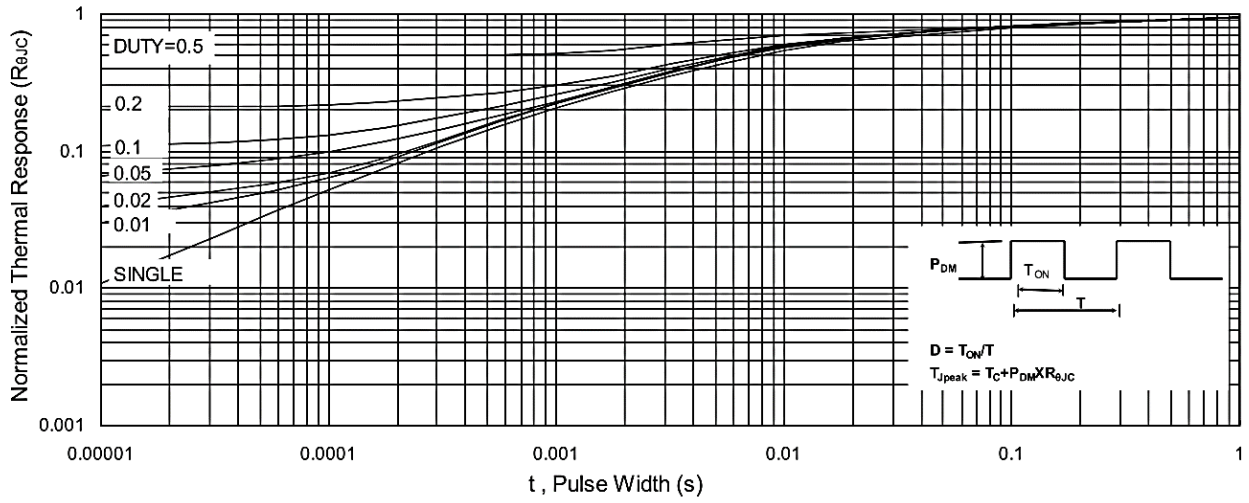



Fig.9 Normalized Maximum Transient Thermal Impedance

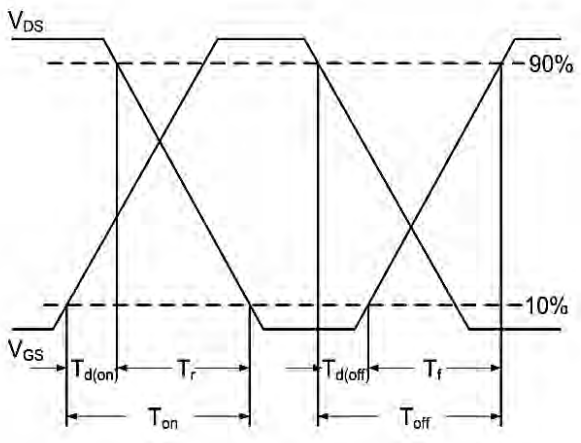



Fig.10 Switching Time Waveform

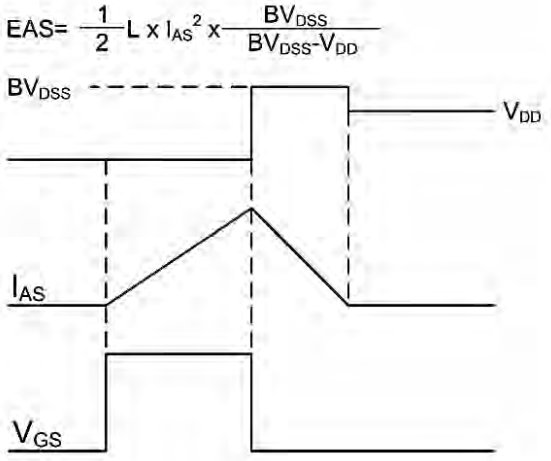
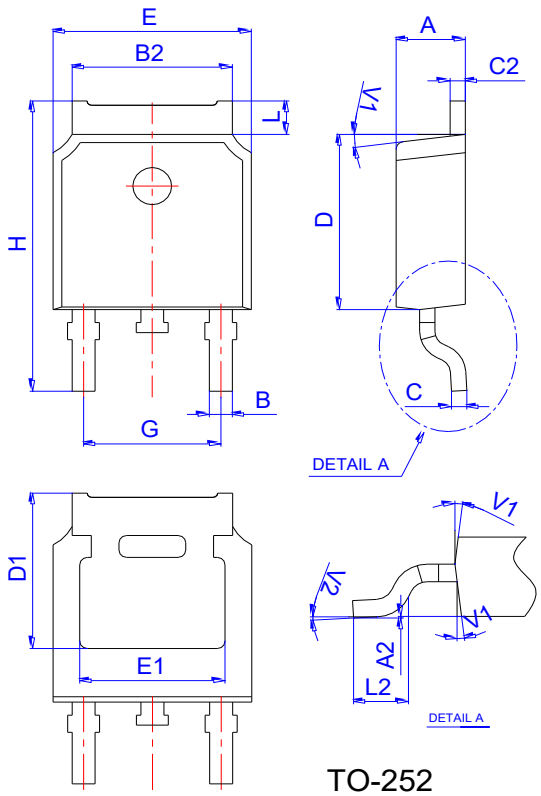



Fig.11 Unclamped Inductive Switching Waveform

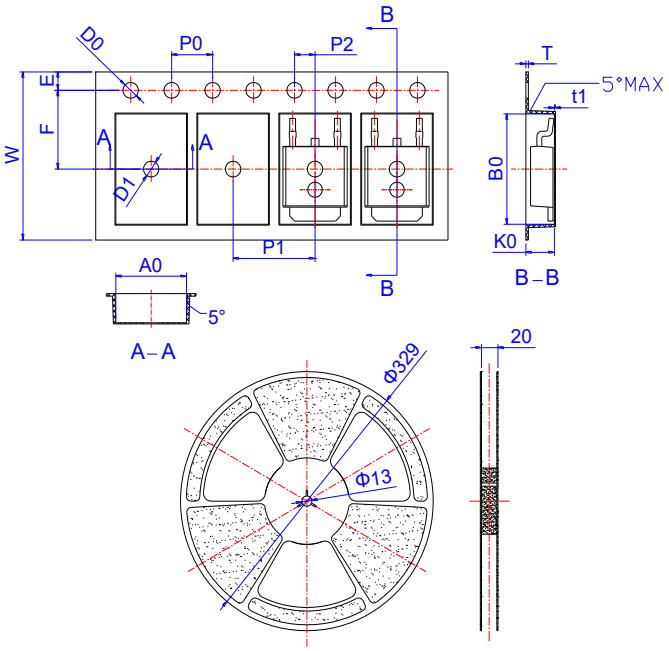
## Package Mechanical Data：TO-252




TO-252

| Ref. | Dimensions | | | | | |
|---|---|---|---|---|---|---|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 2.10 | | 2.50 | 0.083 | | 0.098 |
| A2 | 0 | | 0.10 | 0 | | 0.004 |
| B | 0.66 | | 0.86 | 0.026 | | 0.034 |
| B2 | 5.18 | | 5.48 | 0.202 | | 0.216 |
| C | 0.40 | | 0.60 | 0.016 | | 0.024 |
| C2 | 0.44 | | 0.58 | 0.017 | | 0.023 |
| D | 5.90 | | 6.30 | 0.232 | | 0.248 |
| D1 | 5.30REF | | | 0.209REF | | |
| E | 6.40 | | 6.80 | 0.252 | | 0.268 |
| E1 | 4.63 | | | 0.182 | | |
| G | 4.47 | | 4.67 | 0.176 | | 0.184 |
| H | 9.50 | | 10.70 | 0.374 | | 0.421 |
| L | 1.09 | | 1.21 | 0.043 | | 0.048 |
| L2 | 1.35 | | 1.65 | 0.053 | | 0.065 |
| V1 | | 7° | | | 7° | |
| V2 | 0° | | 6° | 0° | | 6° |

## Reel Specification




| Ref. | Dimensions | | | | | |
|---|---|---|---|---|---|---|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| W | 15.90 | 16.00 | 16.10 | 0.626 | 0.630 | 0.634 |
| E | 1.65 | 1.75 | 1.85 | 0.065 | 0.069 | 0.073 |
| F | 7.40 | 7.50 | 7.60 | 0.291 | 0.295 | 0.299 |
| D0 | 1.40 | 1.50 | 1.60 | 0.055 | 0.059 | 0.063 |
| D1 | 1.40 | 1.50 | 1.60 | 0.055 | 0.059 | 0.063 |
| P0 | 3.90 | 4.00 | 4.10 | 0.154 | 0.157 | 0.161 |
| P1 | 7.90 | 8.00 | 8.10 | 0.311 | 0.315 | 0.319 |
| P2 | 1.90 | 2.00 | 2.10 | 0.075 | 0.079 | 0.083 |
| A0 | 6.85 | 6.90 | 7.00 | 0.270 | 0.271 | 0.276 |
| B0 | 10.45 | 10.50 | 10.60 | 0.411 | 0.413 | 0.417 |
| K0 | 2.68 | 2.78 | 2.88 | 0.105 | 0.109 | 0.113 |
| T | 0.24 | | 0.27 | 0.009 | | 0.011 |
| t1 | 0.10 | | | 0.004 | | |
| 10P0 | 39.80 | 40.00 | 40.20 | 1.567 | 1.575 | 1.583 |

Shanghai Leiditech Electronic Co.,Ltd
Email: sale1@leiditech.com
Tel : +86- 021 50828806
Fax : +86- 021 50477059