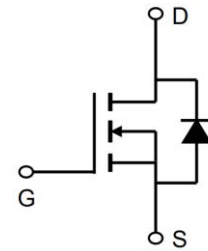


Description

The LM50N10D uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V.

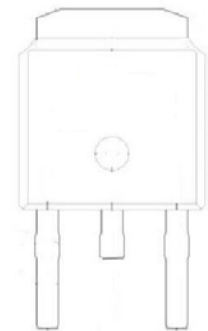
This device is suitable for use as a Battery protection or in other Switching application.



General Features

$V_{DS} = 100V$ $I_D = 50A$

$R_{DS(ON)} < 28m\Omega @ V_{GS}=10V$



Application

Battery protection

Load switch

Uninterruptible power supply



Package Marking and Ordering Information

| Product ID | Pack | Marking | Qty(PCS) |
|------------|--------|---------|----------|
| LM50N10D | TO-252 | | 2500 |

Absolute Maximum Ratings ($T_c=25^\circ C$ unless otherwise noted)

| Symbol | Parameter | Limit | Unit |
|--------------------|--|------------|---------------|
| V_{DS} | Drain-Source Voltage | 100 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| I_D | Drain Current-Continuous | 50 | A |
| $I_D(100^\circ C)$ | Drain Current-Continuous($T_C=100^\circ C$) | 21 | A |
| I_{DM} | Pulsed Drain Current | 70 | A |
| P_D | Maximum Power Dissipation | 85 | W |
| | Derating factor | 0.57 | W/ $^\circ C$ |
| E_{AS} | Single pulse avalanche energy ^(Note 5) | 256 | mJ |
| T_J, T_{STG} | Operating Junction and Storage Temperature Range | -55 To 175 | $^\circ C$ |
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case ^(Note 2) | 1.8 | $^\circ C/W$ |

Electrical Characteristics (T_c=25°C unless otherwise noted)

| Symbol | Parameter | Condition | Min | Typ | Max | Unit |
|-------------------|---|--|-----|------|------|------|
| BV _{DSS} | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =250μA | 100 | | - | V |
| IDSS | Zero Gate Voltage Drain Current | V _{DS} =100V, V _{GS} =0V | - | - | 1 | μA |
| IGSS | Gate-Body Leakage Current | V _{GS} =±20V, V _{DS} =0V | - | - | ±100 | nA |
| VGS(th) | Gate Threshold Voltage | V _{DS} =V _{GS} , I _D =250μA | 1 | | 3 | V |
| RDS(ON) | Drain-Source On-State Resistance | V _{GS} =10V, I _D =20A | - | 24 | 28 | mΩ |
| RDS(ON) | Drain-Source On-State Resistance | V _{GS} =4.5V, I _D =10A | - | 28 | 30 | mΩ |
| gFS | Forward Transconductance | V _{DS} =5V, I _D =10A | - | 15 | - | S |
| C _{iss} | Input Capacitance | V _{DS} =25V, V _{GS} =0V, F=1.0MHz | - | 2000 | - | PF |
| C _{oss} | Output Capacitance | | - | 300 | - | PF |
| C _{rss} | Reverse Transfer Capacitance | | - | 250 | - | PF |
| td(on) | Turn-on Delay Time | V _{DD} =50V, R _L =5Ω V _{GS} =10V, R _{GEN} =3Ω | - | 7 | - | nS |
| t _r | Turn-on Rise Time | | - | 7 | - | nS |
| td(off) | Turn-Off Delay Time | | - | 29 | - | nS |
| t _f | Turn-Off Fall Time | | - | 7 | - | nS |
| Q _g | Total Gate Charge | V _{DS} =50V, I _D =10A, V _{GS} =10V | - | 39 | - | nC |
| Q _{gs} | Gate-Source Charge | | - | 8 | - | nC |
| Q _{gd} | Gate-Drain Charge | | - | 12 | - | nC |
| VSD | Diode Forward Voltage ^(Note 3) | V _{GS} =0V, I _S =20A | - | - | 1.2 | V |
| I _S | Diode Forward Current ^(Note 2) | - | - | - | 30 | A |
| t _{rr} | Reverse Recovery Time | T _J = 25°C, I _F = 10A di/dt = 100A/μs ^(Note3) | - | 32 | - | nS |
| Q _{rr} | Reverse Recovery Charge | | - | 53 | - | nC |
| ton | Forward Turn-On Time | Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD) | | | | |

Notes:

- 1、 Repetitive Rating: Pulse width limited by maximum junction temperature.
- 2、 Surface Mounted on FR4 Board, t ≤ 10 sec.
- 3、 Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
- 4、 Guaranteed by design, not subject to production
- 5、 EAS Condition : T_j=25°C, V_{DD}=50V, V_G=10V, L=0.5mH, R_g=25Ω, I_{AS}=32A

Typical Electrical and Thermal Characteristics (Curves)

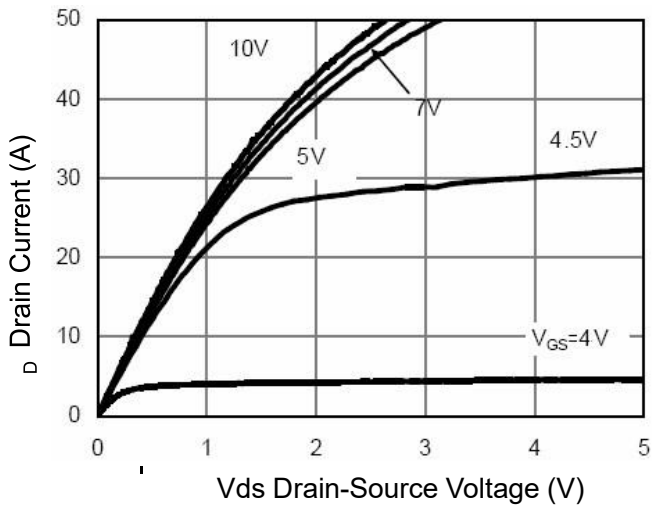


Figure 1 Output Characteristics

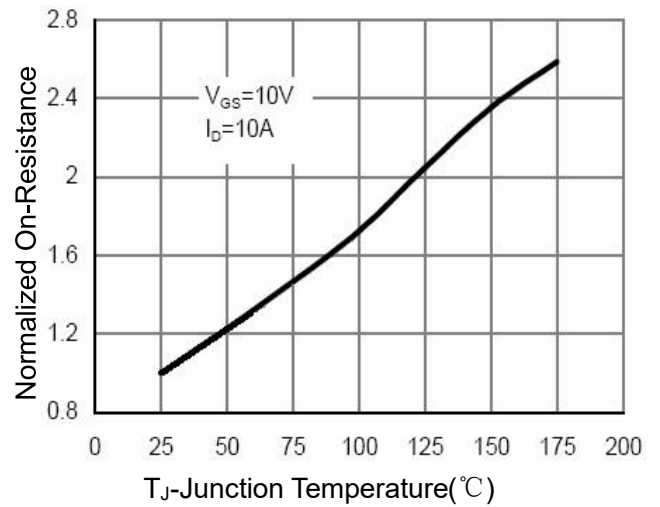


Figure 4 R_{dson} -Junction Temperature

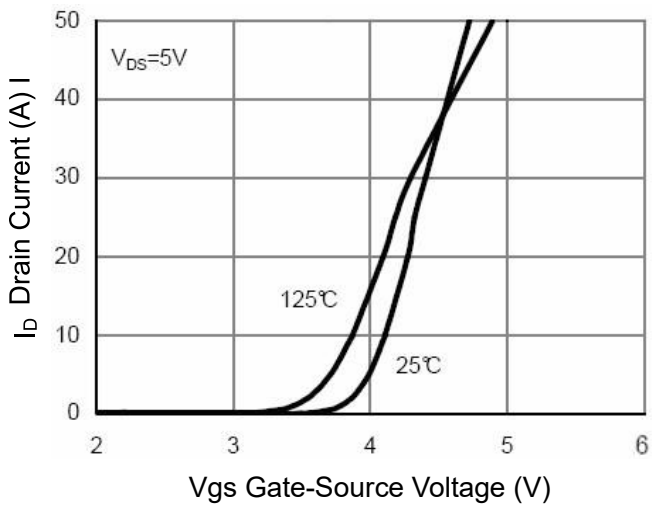


Figure 2 Transfer Characteristics

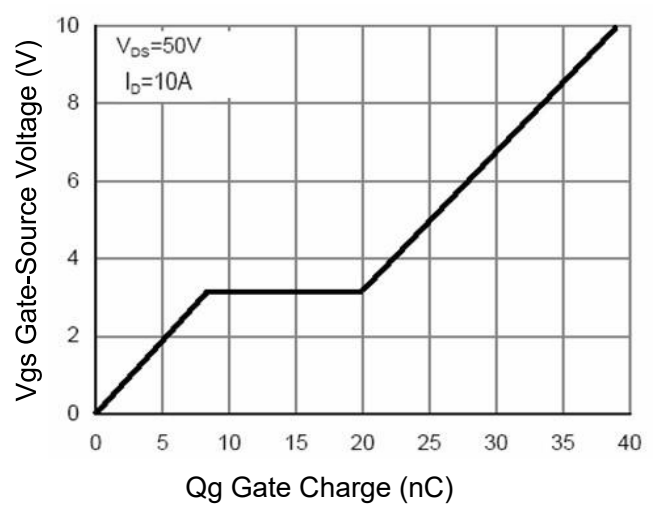


Figure 5 Gate Charge

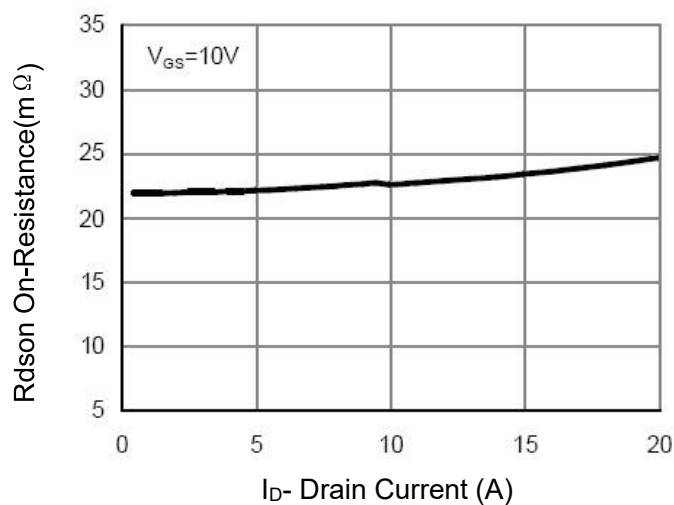


Figure 3 R_{dson} - Drain Current

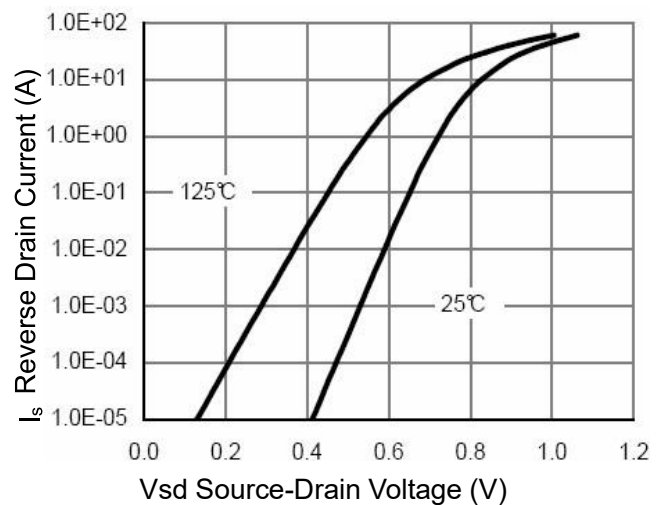


Figure 6 Source- Drain Diode Forward

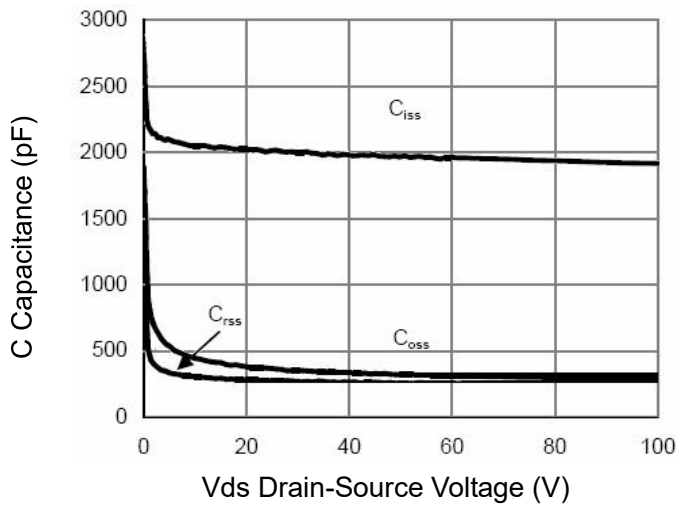


Figure 7 Capacitance vs Vds

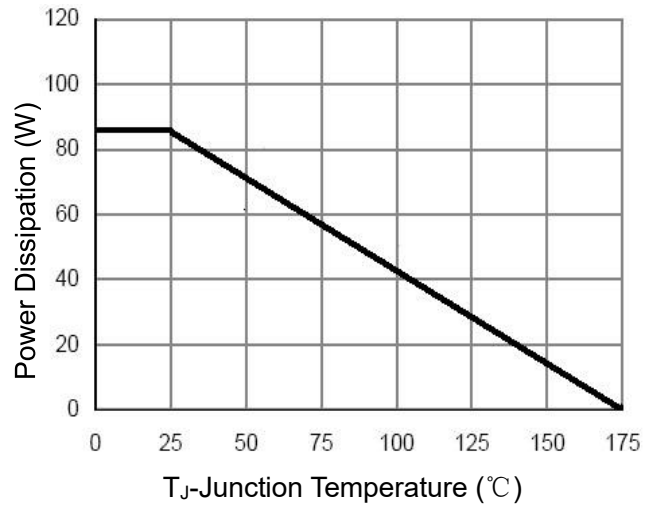


Figure 9 Power De-rating

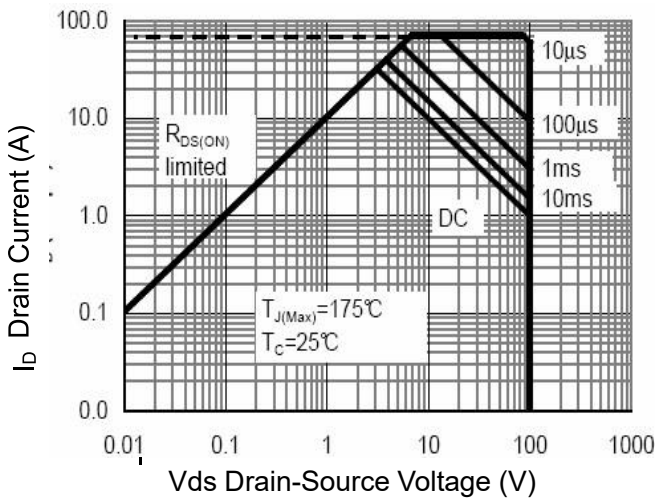


Figure 8 Safe Operation Area

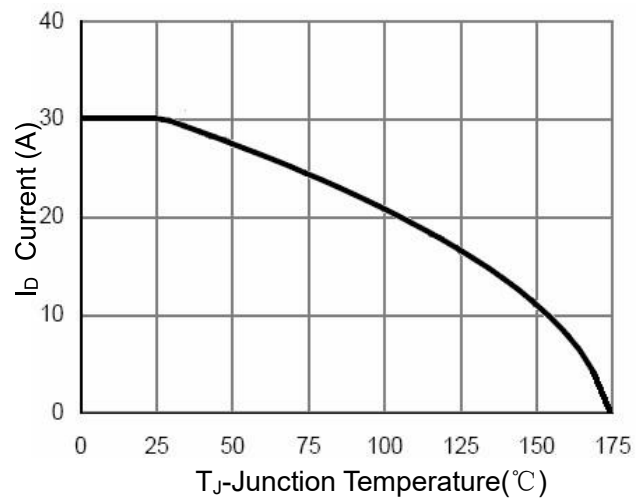


Figure 10ID Current- Junction Temperature

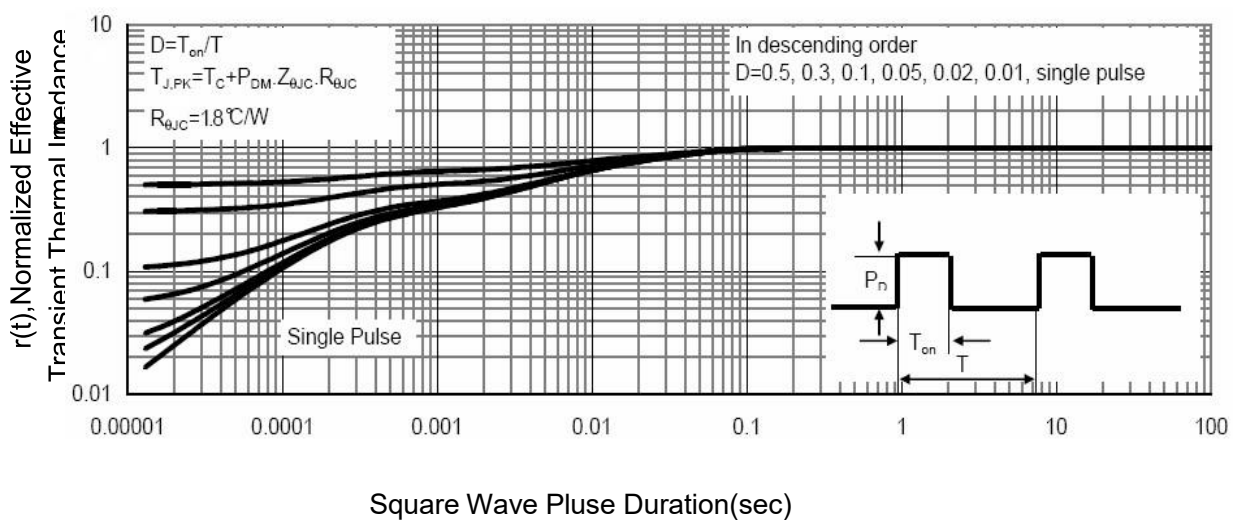
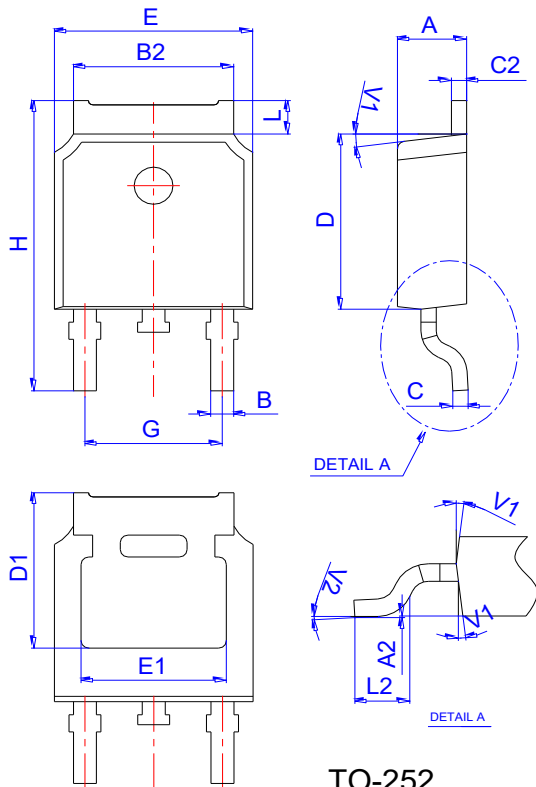


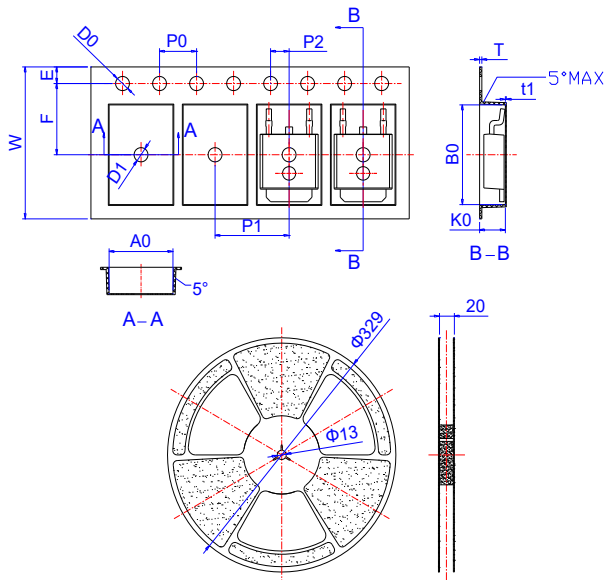
Figure 11 Normalized Maximum Transient Thermal Impedance

Package Mechanical Data TO-252-3L



| 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-TO-252



| 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 |