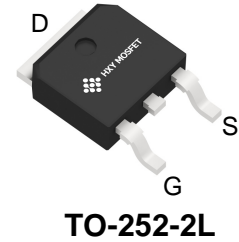




### Description

The RD3L220SNTL1 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

$V_{DS} = 60V$   $I_D = 50A$

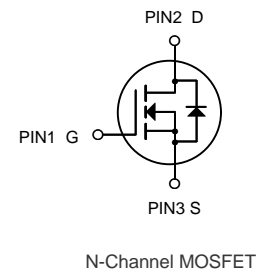
$R_{DS(ON)} < 17m\Omega @ V_{GS}=10V$

### Application

Battery protection

Load switch

Uninterruptible power supply



### Ordering Information

| Product ID   | Pack      | Brand     | Qty(PCS) |
|--------------|-----------|-----------|----------|
| RD3L220SNTL1 | TO-252-2L | HXYMOSFET | 2500     |

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

| Symbol                | Parameter                                | Rating     | Units        |
|-----------------------|--|------------|--------------|
| $V_{DS}$              | Drain-Source Voltage                     | 60         | V            |
| $V_{GS}$              | Gate-Source Voltage                      | $\pm 20$   | V            |
| $I_D@T_C=25^\circ C$  | Continuous Drain Current, $V_{GS} @ 10V$ | 50         | A            |
| $I_D@T_C=100^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V$ | 38         | A            |
| $I_{DM}$              | Pulsed Drain Current                     | 180        | A            |
| EAS                   | Single Pulse Avalanche Energy            | 280        | mJ           |
| $I_{AS}$              | Avalanche Current                        | 28         | A            |
| $P_D@T_C=25^\circ C$  | Total Power Dissipation                  | 87.7       | W            |
| $T_{STG}$             | Storage Temperature Range                | -55 to 150 | $^\circ C$   |
| $T_J$                 | Operating Junction Temperature Range     | -55 to 150 | $^\circ C$   |
| $R_{\theta JA}$       | Thermal Resistance Junction-Ambient      | 62         | $^\circ C/W$ |



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

| Parameter                                 | Symbol              | Condition  | Min | Typ  | Max  | Unit |
|---|---------------------|--|-----|------|------|------|
| <b>Off Characteristics</b>                |                     |  |     |      |      |      |
| Drain-Source Breakdown Voltage            | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V I <sub>D</sub> =250μA  | 60  | -    | -    | V    |
| Zero Gate Voltage Drain Current           | I <sub>DSS</sub>    | V <sub>DS</sub> =60V, V <sub>GS</sub> = 0V   | -   | -    | 1    | μA   |
| Gate-Body Leakage Current                 | I <sub>GSS</sub>    | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V   | -   | -    | ±100 | nA   |
| <b>On Characteristics (Note 3)</b>        |                     |  |     |      |      |      |
| Gate Threshold Voltage                    | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA   | 1.0 | 1.5  | 2.5  | V    |
| Drain-Source On-State Resistance          | R <sub>DS(ON)</sub> | V <sub>GS</sub> =10V, I <sub>D</sub> =30A  | -   | 13   | 17   | mΩ   |
| Forward Transconductance                  | g <sub>FS</sub>     | V <sub>DS</sub> =5V, I <sub>D</sub> =30A   | 30  | -    | -    | S    |
| <b>Dynamic Characteristics (Note4)</b>    |                     |  |     |      |      |      |
| Input Capacitance                         | C <sub>ISS</sub>    | V <sub>DS</sub> =25V, V <sub>GS</sub> =0V,<br>F=1.0MHz   | -   | 2498 | -    | PF   |
| Output Capacitance                        | C <sub>OSS</sub>    |  | -   | 185  | -    | PF   |
| Reverse Transfer Capacitance              | C <sub>RSS</sub>    |  | -   | 80   | -    | PF   |
| <b>Switching Characteristics (Note 4)</b> |                     |  |     |      |      |      |
| Turn-on Delay Time                        | t <sub>d(on)</sub>  | V <sub>DD</sub> =30V, I <sub>D</sub> =2A, R <sub>L</sub> =1Ω<br>V <sub>GS</sub> =10V, R <sub>GEN</sub> =3Ω | -   | 12   | -    | nS   |
| Turn-on Rise Time                         | t <sub>r</sub>      |  | -   | 5.2  | -    | nS   |
| Turn-Off Delay Time                       | t <sub>d(off)</sub> |  | -   | 38   | -    | nS   |
| Turn-Off Fall Time                        | t <sub>f</sub>      |  | -   | 27   | -    | nS   |
| Total Gate Charge                         | Q <sub>g</sub>      | V <sub>DS</sub> =30V, I <sub>D</sub> =30A,<br>V <sub>GS</sub> =10V   | -   | 36   | -    | nC   |
| Gate-Source Charge                        | Q <sub>gs</sub>     |  | -   | 9.9  | -    | nC   |
| Gate-Drain Charge                         | Q <sub>gd</sub>     |  | -   | 6.6  | -    | nC   |
| <b>Drain-Source Diode Characteristics</b> |                     |  |     |      |      |      |
| Diode Forward Voltage (Note 3)            | V <sub>SD</sub>     | V <sub>GS</sub> =0V, I <sub>S</sub> =30A   | -   | -    | 1.2  | V    |
| Diode Forward Current (Note 2)            | I <sub>S</sub>      |  | -   | -    | 58   | A    |
| Reverse Recovery Time                     | t <sub>rr</sub>     | T <sub>J</sub> = 25°C, I <sub>F</sub> =30A<br>di/dt = 100A/μs (Note3)                                      | -   | 35   |      | nS   |
| Reverse Recovery Charge                   | Q <sub>rr</sub>     |  | -   | 47   |      | nC   |
| Forward Turn-On Time                      | t <sub>on</sub>     | 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. E<sub>AS</sub> condition: T<sub>J</sub>=25°C, V<sub>DD</sub>=30V, V<sub>G</sub>=10V, L=0.5mH, R<sub>g</sub>=25Ω



### Typical Electrical and Thermal Characteristics (Curves)

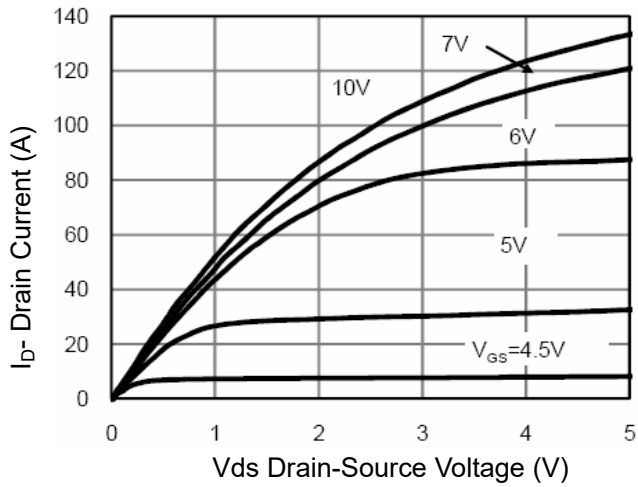


Figure 1 Output Characteristics

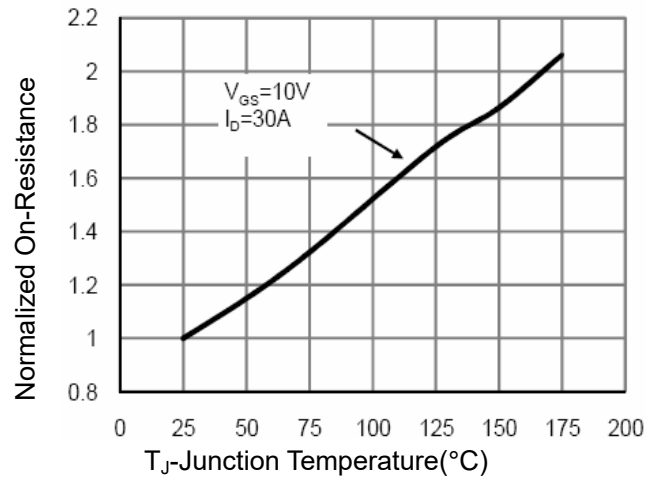


Figure 4 Rdson-Junction Temperature

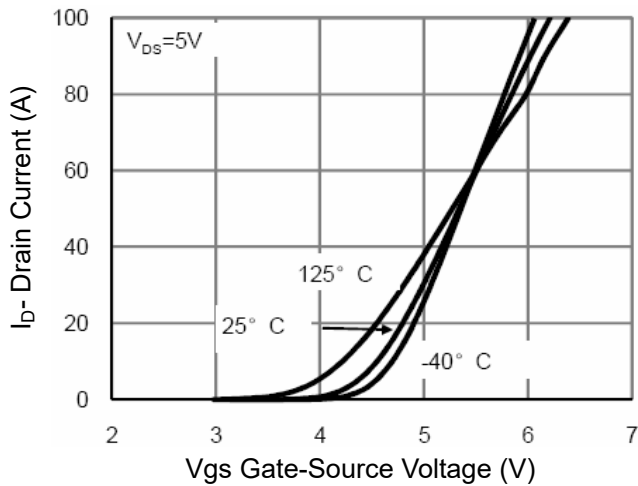


Figure 2 Transfer Characteristics

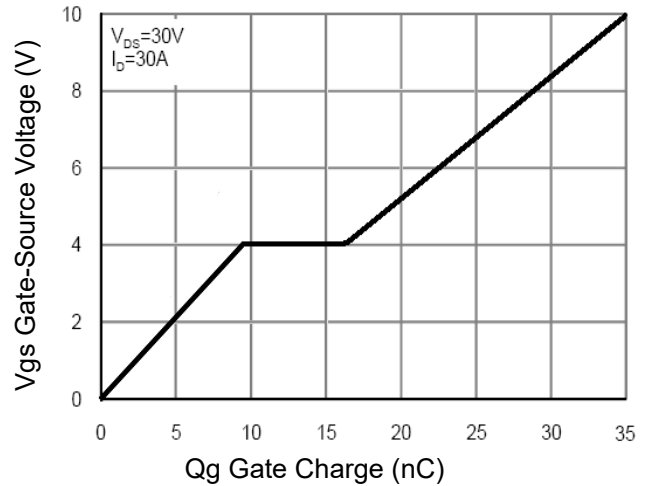


Figure 5 Gate Charge

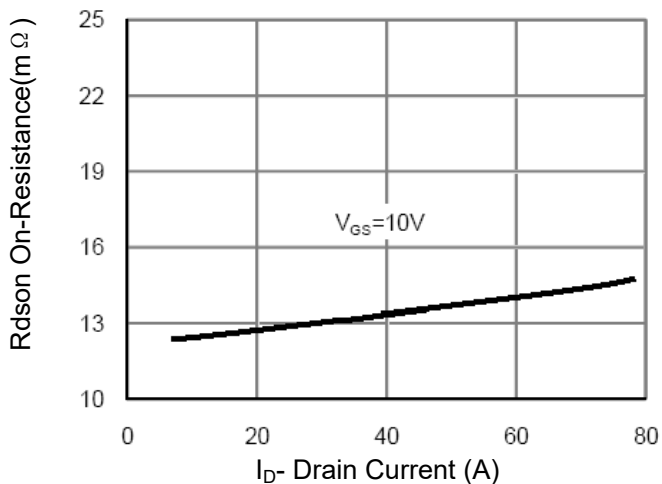


Figure 3 Rdson- Drain Current

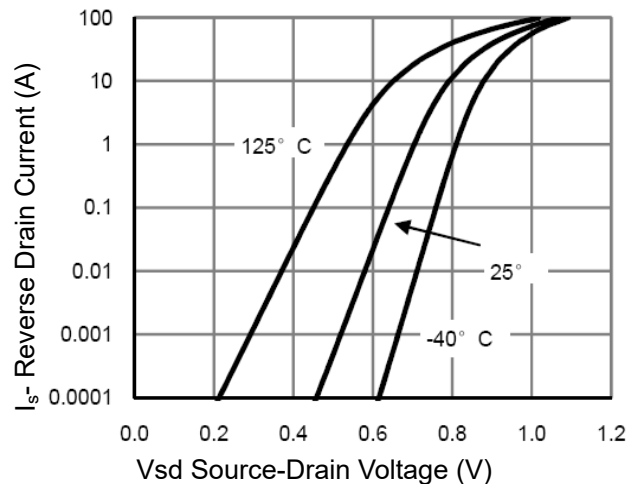


Figure 6 Source- Drain Diode Forward

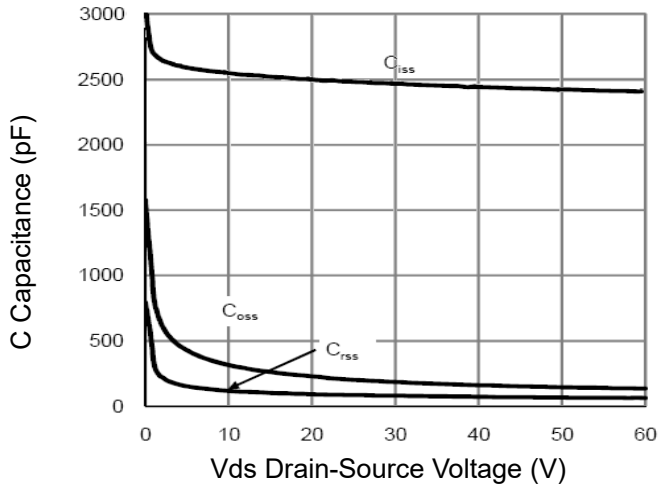


Figure 7 Capacitance vs Vds

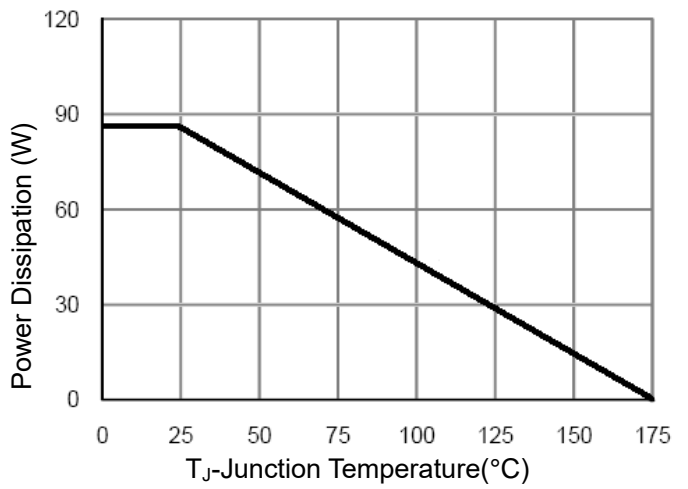


Figure 9 Power De-rating

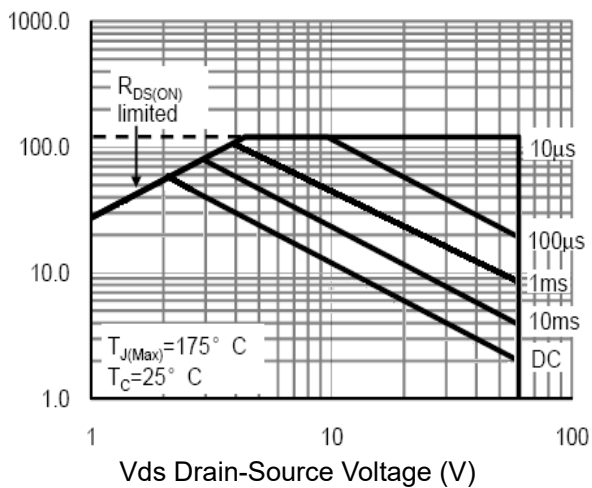


Figure 8 Safe Operation Area

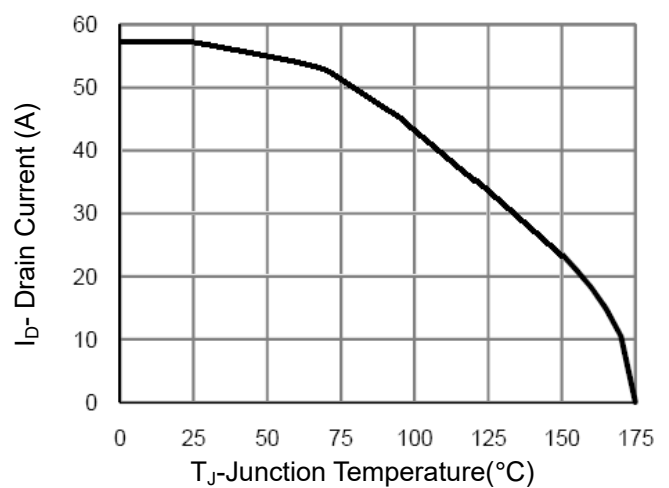
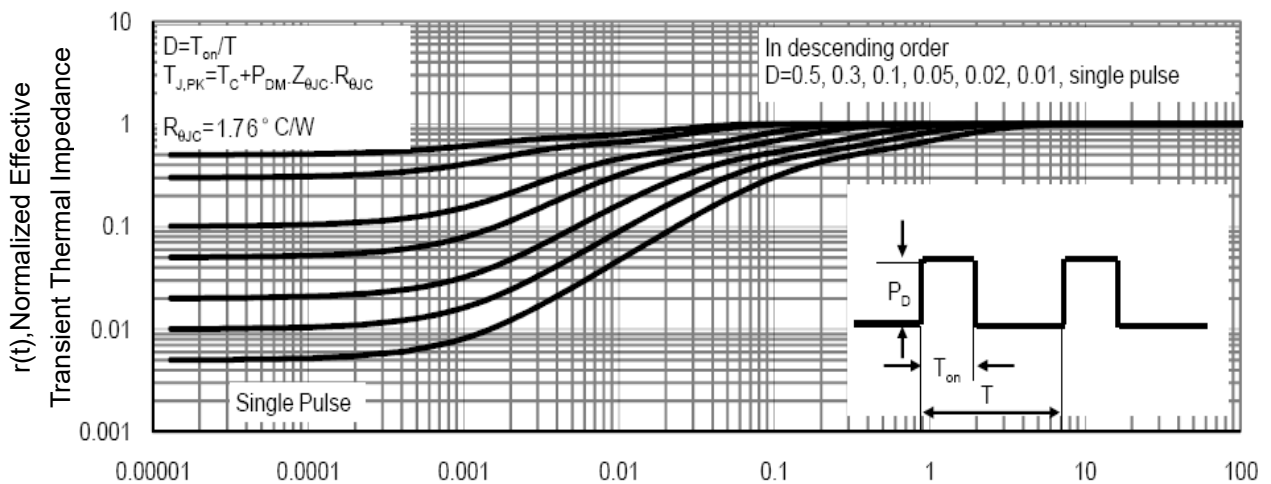
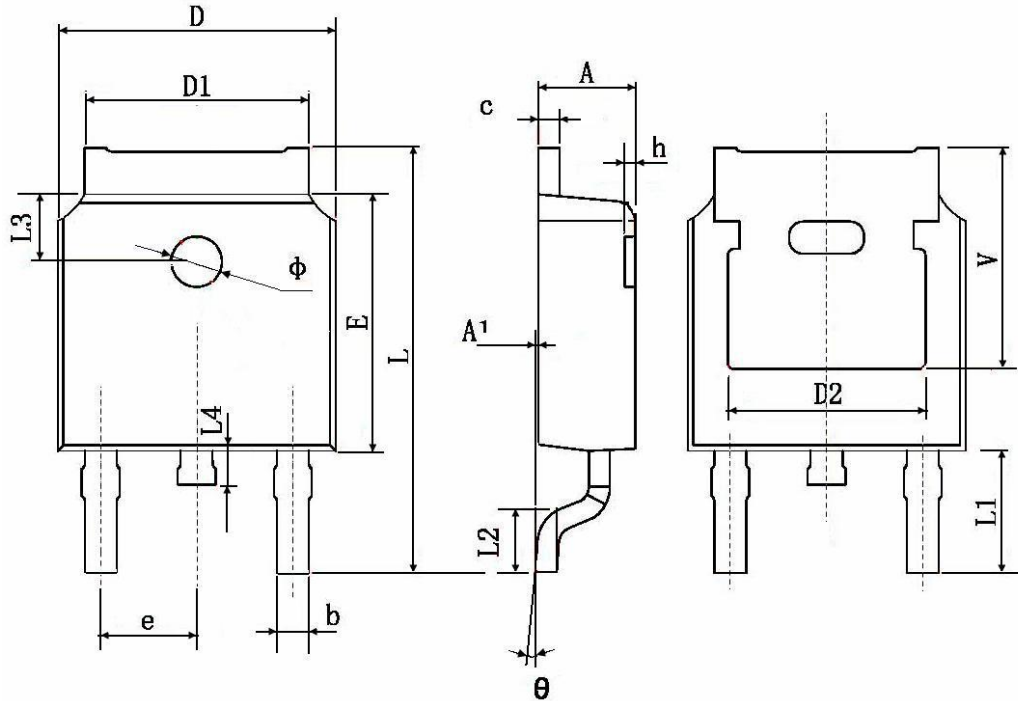


Figure 10 ID Current- Junction Temperature





**TO-252-2L Package Information**



| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min.                      | Max.   | Min.                 | Max.  |
| A      | 2.200                     | 2.400  | 0.087                | 0.094 |
| A1     | 0.000                     | 0.127  | 0.000                | 0.005 |
| b      | 0.660                     | 0.860  | 0.026                | 0.034 |
| c      | 0.460                     | 0.580  | 0.018                | 0.023 |
| D      | 6.500                     | 6.700  | 0.256                | 0.264 |
| D1     | 5.100                     | 5.460  | 0.201                | 0.215 |
| D2     | 0.483 TYP.                |        | 0.190 TYP.           |       |
| E      | 6.000                     | 6.200  | 0.236                | 0.244 |
| e      | 2.186                     | 2.386  | 0.086                | 0.094 |
| L      | 9.800                     | 10.400 | 0.386                | 0.409 |
| L1     | 2.900 TYP.                |        | 0.114 TYP.           |       |
| L2     | 1.400                     | 1.700  | 0.055                | 0.067 |
| L3     | 1.600 TYP.                |        | 0.063 TYP.           |       |
| L4     | 0.600                     | 1.000  | 0.024                | 0.039 |
| φ      | 1.100                     | 1.300  | 0.043                | 0.051 |
| θ      | 0°                        | 8°     | 0°                   | 8°    |
| h      | 0.000                     | 0.300  | 0.000                | 0.012 |
| V      | 5.350 TYP.                |        | 0.211 TYP.           |       |



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