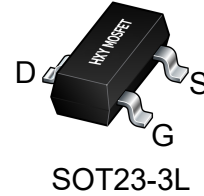




Description

The 5N10 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.



General Features

$V_{DS} = 100V$ $I_D = 5A$

$R_{DS(ON)} < 98\ m\Omega$ @ $V_{GS}=10V$

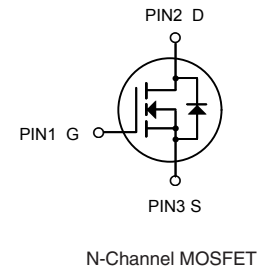
$R_{DS(ON)} < 120m\Omega$ @ $V_{GS}=4.5V$

Application

Battery protection

Load switch

Uninterruptible power supply



Package Marking and Ordering Information

| Product ID | Pack | Marking | Qty(PCS) |
|------------|----------|---------|----------|
| 5N10 | SOT23-3L | 1005 | 3000 |

Absolute Maximum Ratings ($T_A=25^\circ C$ 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 | 5 | A |
| I _{DM} | Drain Current-Pulsed (Note 1) | 20 | A |
| P _D | Maximum Power Dissipation | 1.5 | W |
| T _J , T _{STG} | Operating Junction and Storage Temperature Range | -55 To 175 | °C |
| R _{θJA} | Thermal Resistance, Junction-to-Ambient (Note 2) | 100 | °C/W |



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

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---------------------|---|-----|-----|------|------|
| Drain-Source Breakdown Voltage | BV _{DSS} | V _{GS} =0V I _D =250μA | 100 | - | - | V |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} =100V, V _{GS} =0V | - | - | 1 | μA |
| Gate-Body Leakage Current | I _{GSS} | V _{GS} =±20V, V _{DS} =0V | - | - | ±100 | nA |
| On Characteristics (Note 3) | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} =V _{GS} , I _D =250μA | 1.0 | 1.5 | 2.0 | V |
| Drain-Source On-State Resistance | R _{DS(on)} | V _{GS} =10V, I _D =3A | - | 89 | 98 | mΩ |
| | | V _{GS} =4.5V, I _D =3A | - | 102 | 110 | |
| Forward Transconductance | g _{FS} | V _{DS} =5V, I _D =3A | - | 5 | - | S |
| Dynamic Characteristics (Note4) | | | | | | |
| Input Capacitance | C _{iss} | V _{DS} =50V, V _{GS} =0V, F=1.0MHz | - | 650 | - | PF |
| Output Capacitance | C _{oss} | | - | 24 | - | PF |
| Reverse Transfer Capacitance | C _{rss} | | - | 20 | - | PF |
| Switching Characteristics (Note 4) | | | | | | |
| Turn-on Delay Time | t _{d(on)} | V _{DD} =50V, R _L =19Ω V _{GS} =10V, R _G =3Ω | - | 6 | - | nS |
| Turn-on Rise Time | t _r | | - | 4 | - | nS |
| Turn-Off Delay Time | t _{d(off)} | | - | 20 | - | nS |
| Turn-Off Fall Time | t _f | | - | 4 | - | nS |
| Total Gate Charge | Q _g | V _{DS} =50V, I _D =3A, V _{GS} =10V | - | 20 | - | nC |
| Gate-Source Charge | Q _{gs} | | - | 2.1 | - | nC |
| Gate-Drain Charge | Q _{gd} | | - | 3.3 | - | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage (Note 3) | V _{SD} | V _{GS} =0V, I _S =3A | - | - | 1.2 | V |
| Diode Forward Current (Note 2) | I _S | | - | - | 3 | A |

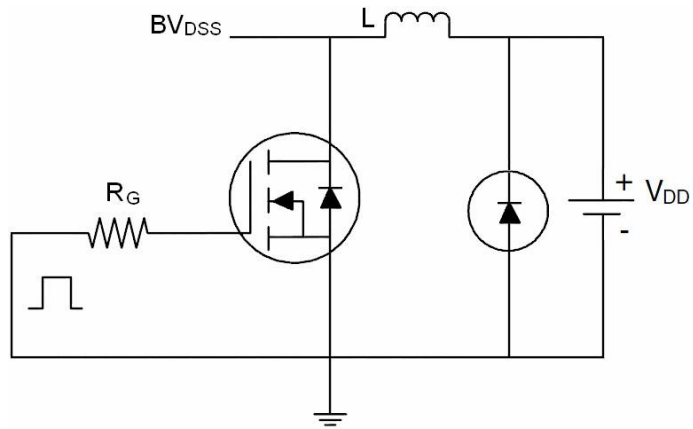
Notes:

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

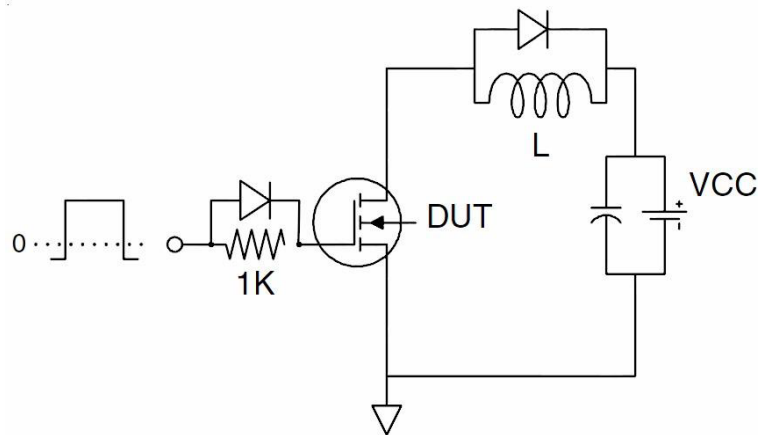


Test Circuit

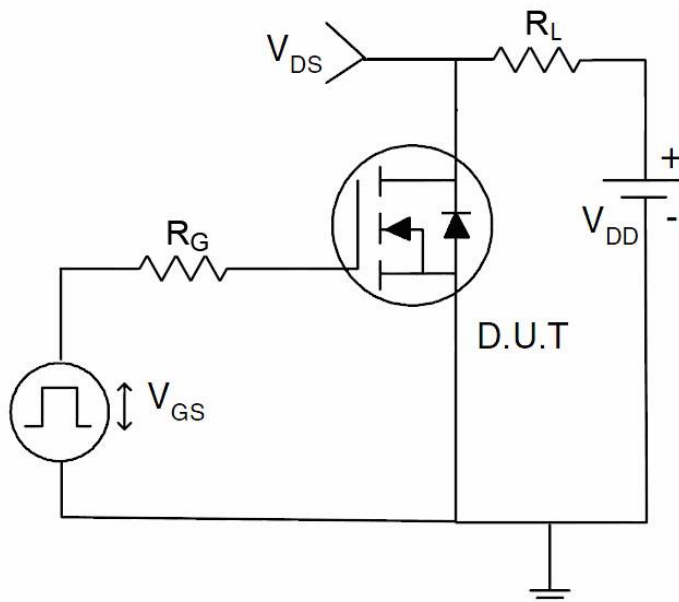
1) E_{AS} test circuit



2) Gate charge test circuit



3) Switch Time Test Circuit





Typical Electrical and Thermal Characteristics (Curves)

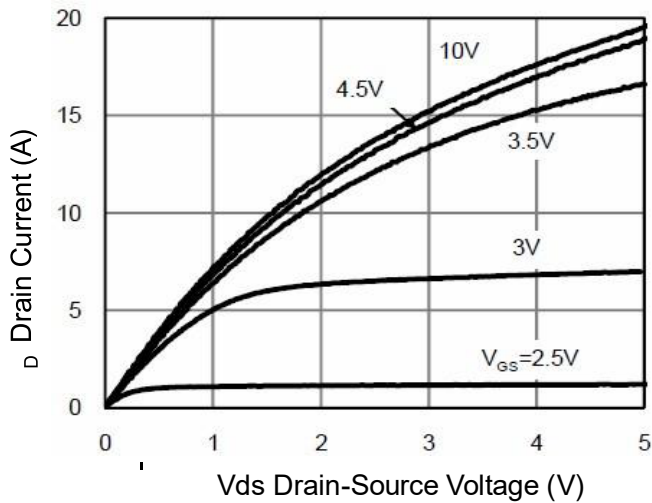


Figure 1 Output Characteristics

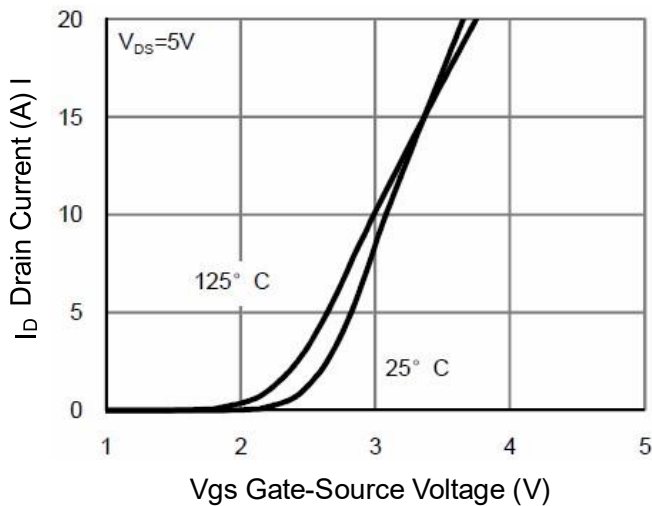


Figure 2 Transfer Characteristics

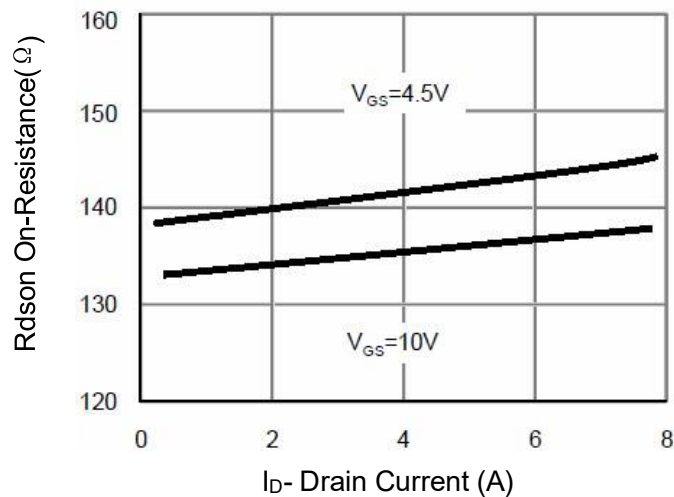


Figure 3 Rdson- Drain Current

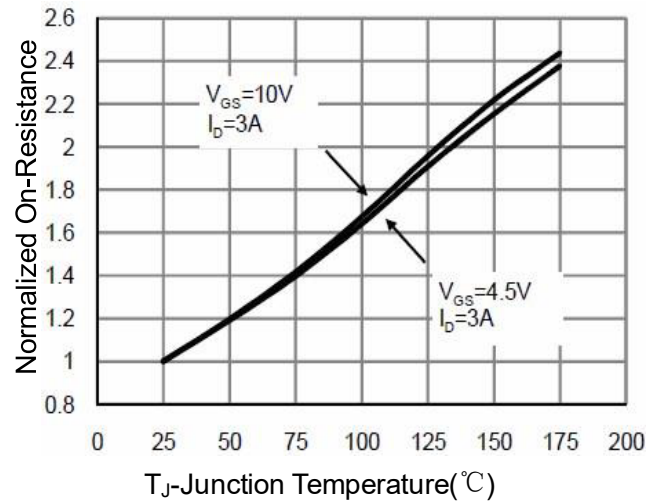


Figure 4 Rdson-Junction Temperature

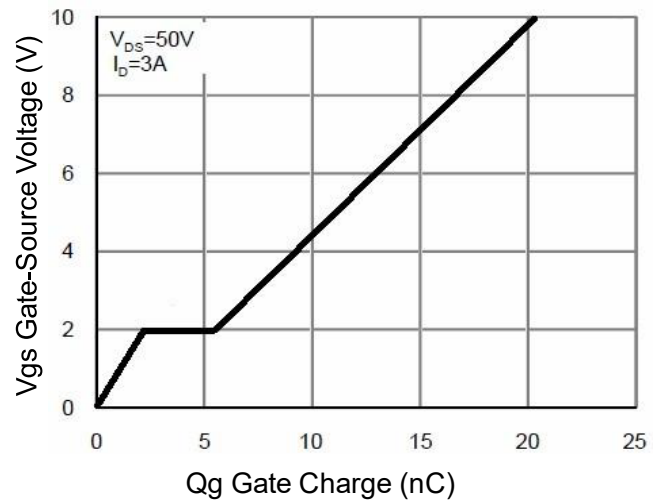


Figure 5 Gate Charge

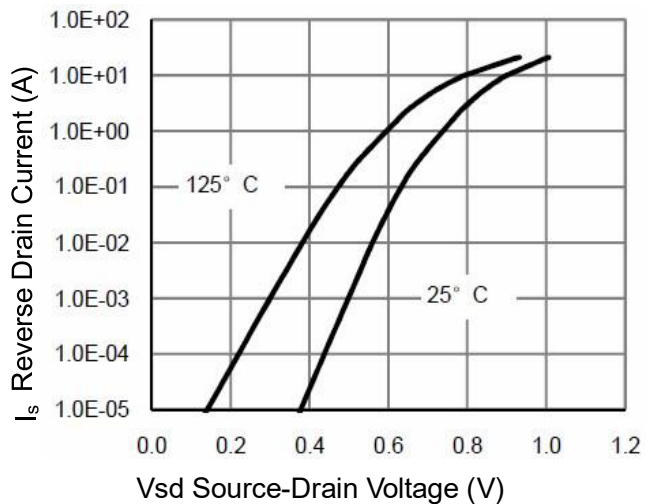


Figure 6 Source- Drain Diode Forward

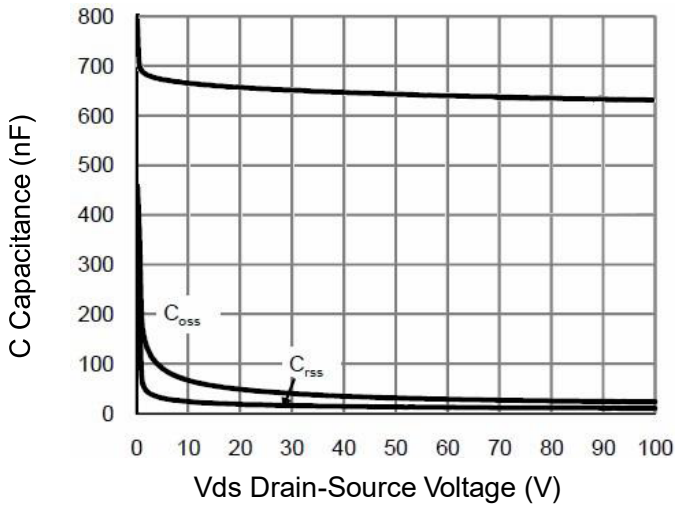


Figure 7 Capacitance vs Vds

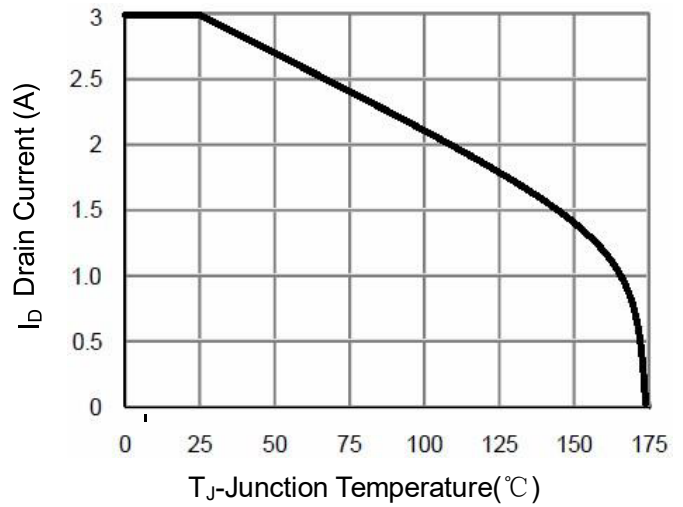


Figure 9 BV_{DSS} vs Junction Temperature

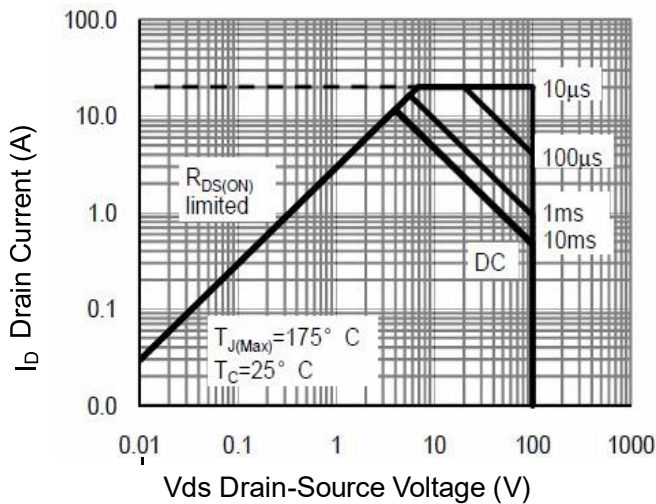


Figure 8 Safe Operation Area

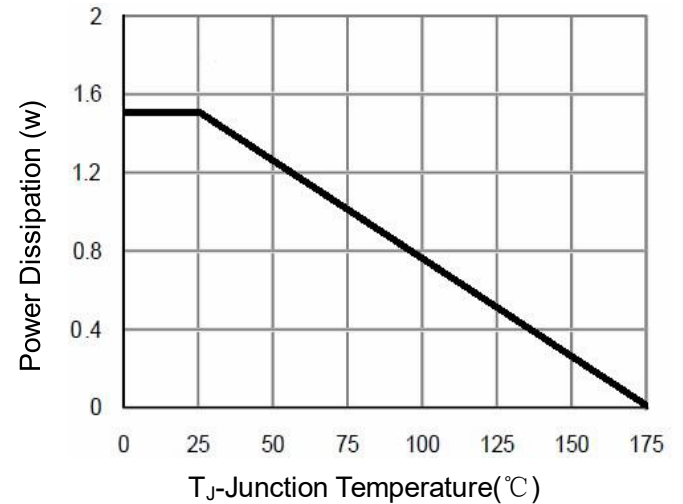


Figure 10 Power De-rating

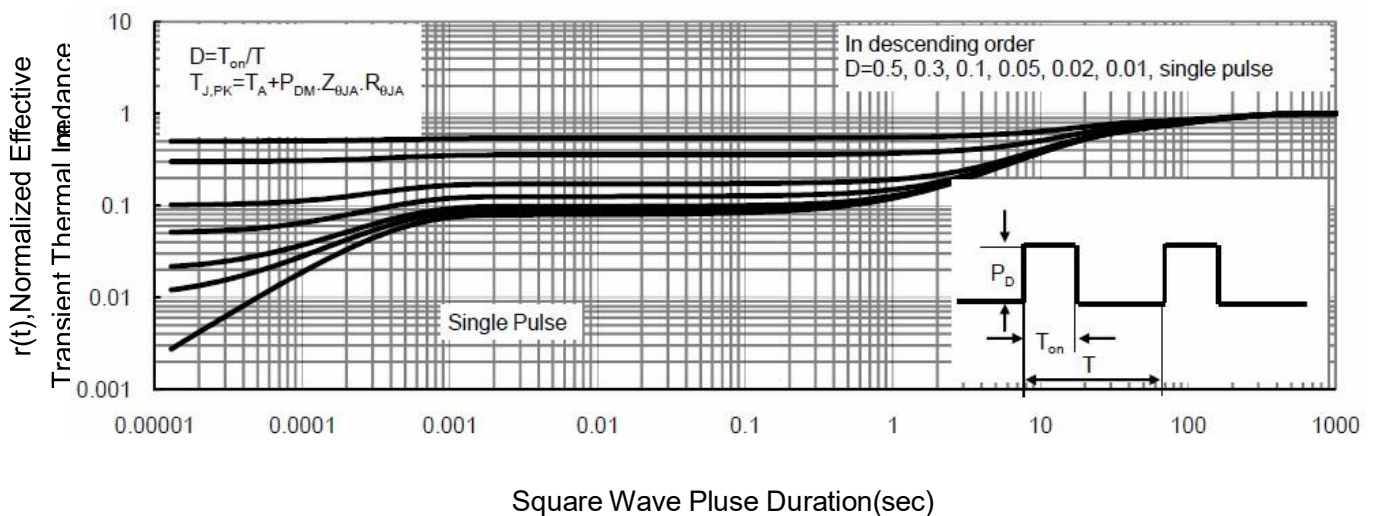
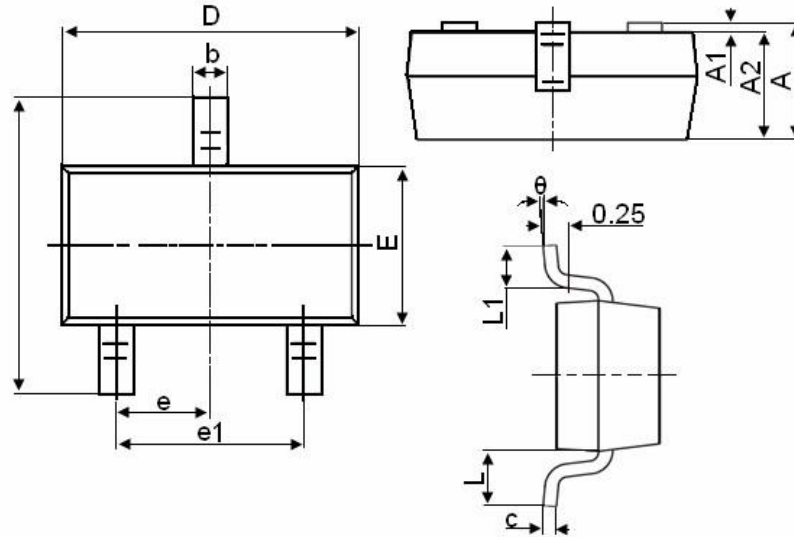


Figure 11 Normalized Maximum Transient Thermal Impedance



SOT23-3L Package Information



| Symbol | Dimensions in Millimeters | |
|----------|---------------------------|-------|
| | MIN. | MAX. |
| A | 1.050 | 1.250 |
| A1 | 0.000 | 0.100 |
| A2 | 1.050 | 1.150 |
| b | 0.300 | 0.500 |
| c | 0.100 | 0.200 |
| D | 2.800 | 3.000 |
| E | 1.500 | 1.700 |
| E1 | 2.650 | 2.950 |
| e | 0.950TYP | |
| e1 | 1.800 | 2.000 |
| L | 0.550REF | |
| L1 | 0.300 | 0.600 |
| θ | 0° | 8° |



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