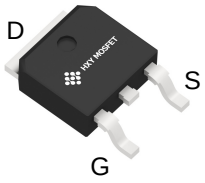
# SUD42N03-3M9P-GE3

N-Channel Enhancement Mode MOSFET

## Description

The SUD42N03-3M9P-GE3 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.

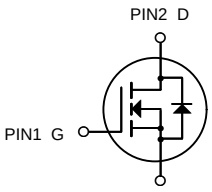



**TO-252-2L (DPAK)**

## General Features

$V_{DS}$ = 30V $I_D$ = 120A

$R_{DS(ON)}$ < 3.8mΩ @ $V_{GS}$=10V




N-Channel MOSFET

## Application

Battery protection

Load switch

Uninterruptible power supply

## Ordering Information

| Product ID | Pack | Brand | Qty(PCS) |
|---|---|---|---|
| SUD42N03-3M9P-GE3 | TO-252-2L(DPAK) | HXY MOSFET | 2500 |

## Absolute Maximum Ratings ($T_C$=25°C 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] | 120 | A |
| $I_D$@$T_C$=100℃ | Continuous Drain Current, $V_{GS}$ @ 10V[1] | 75 | A |
| $I_{DM}$ | Pulsed Drain Current[2] | 384 | A |
| EAS | Single Pulse Avalanche Energy[3] | 196 | mJ |
| $I_{AS}$ | Avalanche Current | 53.8 | A |
| $P_D$@$T_C$=25℃ | Total Power Dissipation[4] | 62.5 | W |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | ℃ |
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient [1] | 62 | ℃/W |

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

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_{DS}$=250μA | 30 | - | - | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=24V, $V_{GS}$=0V | - | - | 1 | μA |
| | | $T_J$=85°C | - | - | 30 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_{DS}$=250μA | 1.4 | 1.7 | 2.5 | V |
| $I_{GSS}$ | Gate Leakage Current | $V_{GS}$=±20V, $V_{DS}$=0V | - | - | ±100 | nA |
| $R_{DS(ON)}$ [d] | Drain-Source On-state Resistance | $V_{GS}$=10V, $I_{DS}$=20A | - | 3 | 3.8 | mΩ |
| | | $T_J$=125°C | - | 4.4 | - | |
| | | $V_{GS}$=4.5V, $I_{DS}$=15A | - | 4.0 | 5.5 | |
| Gfs | Forward Transconductance | $V_{DS}$=5V, $I_{DS}$=10A | - | 24.6 | - | S |
| **Diode Characteristics** | | | | | | |
| $V_{SD}$ [d] | Diode Forward Voltage | $I_{SD}$=20A, $V_{GS}$=0V | - | 0.8 | 1.1 | V |
| $t_{rr}$ | Reverse Recovery Time | $I_{DS}$=20A, $dI_{SD}/dt$=100A/μs | - | 35.6 | - | ns |
| $t_a$ | Charge Time | | - | 19.3 | - | |
| $t_b$ | Discharge Time | | - | 16.3 | - | |
| $Q_{rr}$ | Reverse Recovery Charge | | - | 26 | - | nC |
| **Dynamic Characteristics** [e] | | | | | | |
| $R_G$ | Gate Resistance | $V_{GS}$=0V,$V_{DS}$=0V,F=1MHz | - | 1 | 2 | Ω |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V, $V_{DS}$=15V, Frequency=1.0MHz | - | 2485 | 2971 | pF |
| $C_{oss}$ | Output Capacitance | | - | 850 | - | |
| $C_{rss}$ | Reverse Transfer Capacitance | | - | 85 | - | |
| $t_{d(ON)}$ | Turn-on Delay Time | $V_{DD}$=15V, $R_L$=15Ω, $I_{DS}$=1A, $V_{GEN}$=10V, $R_G$=6Ω | - | 12.4 | 23 | ns |
| $t_r$ | Turn-on Rise Time | | - | 9.5 | 18 | |
| $t_{d(OFF)}$ | Turn-off Delay Time | | - | 27.2 | 49 | |
| $t_f$ | Turn-off Fall Time | | - | 35.2 | 64 | |
| **Gate Charge Characteristics** [e] | | | | | | |
| $Q_g$ | Total Gate Charge | $V_{DS}$=15V, $V_{GS}$=10V, $I_{DS}$=20A | - | 20.6 | 28.8 | nC |
| $Q_g$ | Total Gate Charge | $V_{DS}$=15V, $V_{GS}$=4.5V, $I_{DS}$=20A | - | 9.8 | - | |
| $Q_{gth}$ | Threshold Gate Charge | | - | 1.8 | - | |
| $Q_{gs}$ | Gate-Source Charge | | - | 3.8 | - | |
| $Q_{gd}$ | Gate-Drain Charge | | - | 3.7 | - | |

Note d：Pulse test ; pulse width≤300μs, duty cycle≤2%.
Note e：Guaranteed by design, not subject to production testing.

## Typical Operating Characteristics

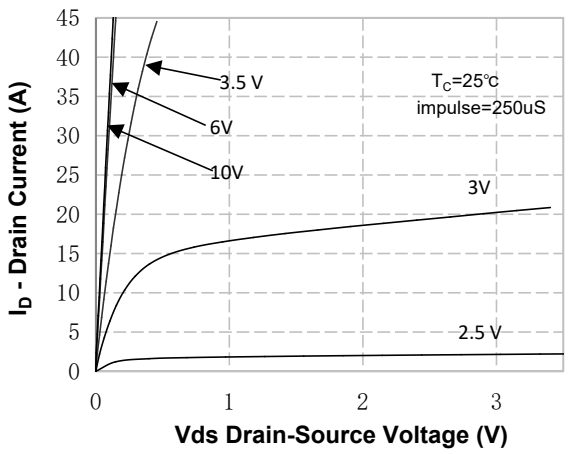



Figure 1. On-Region Characteristics

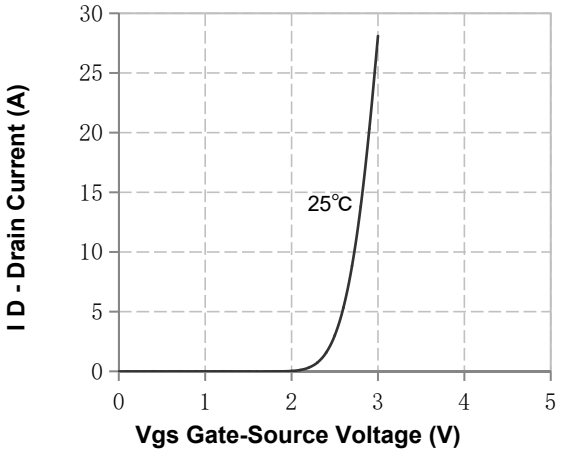



Figure 2. Transfer Characteristics

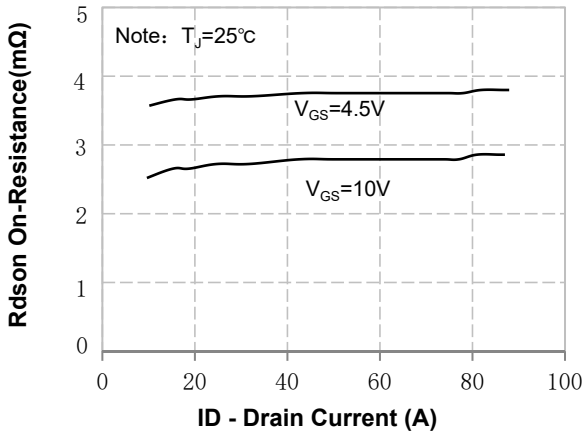



Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

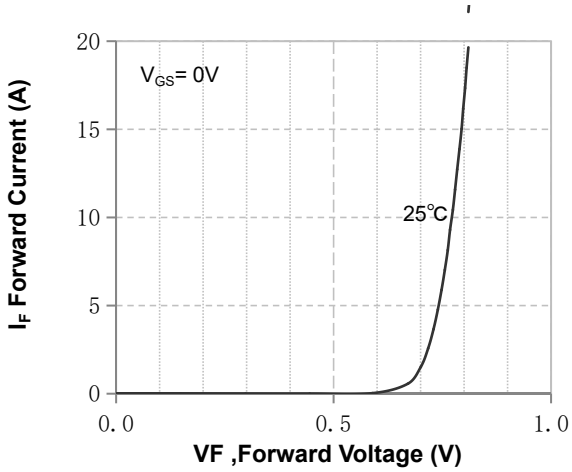



Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

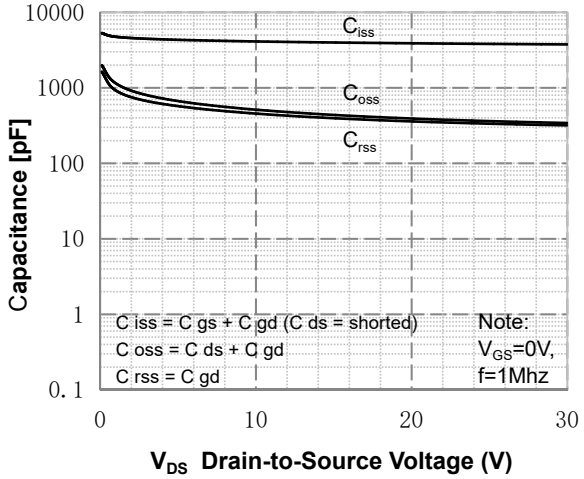



Figure 5. Capacitance Characteristics

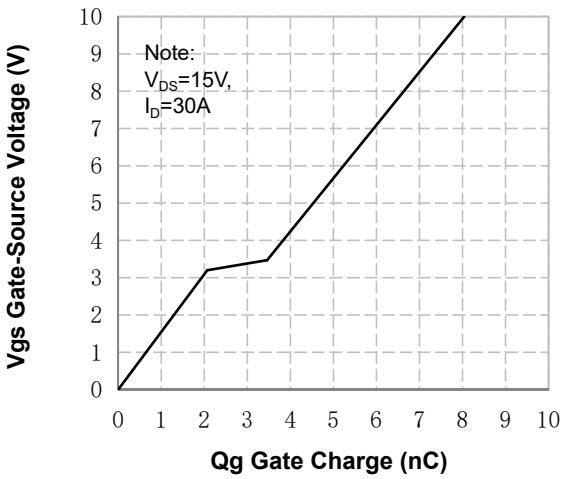



Figure 6. Gate Charge Characteristics

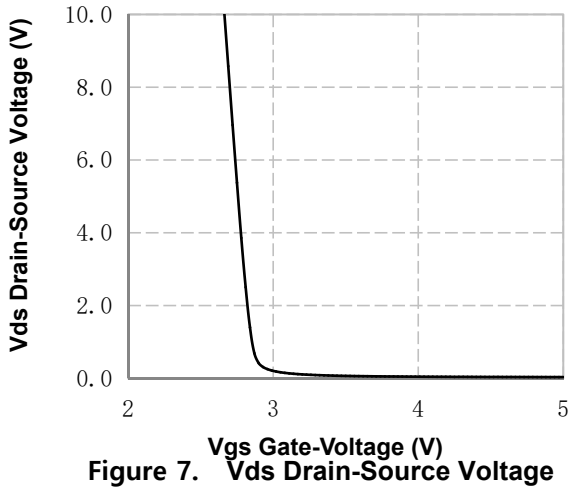



Figure 7. Vds Drain-Source Voltage vs Gate Voltage

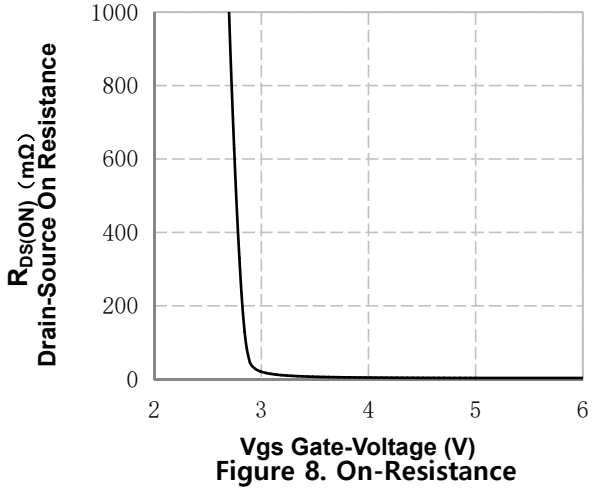



Figure 8. On-Resistance vs Gate Voltage

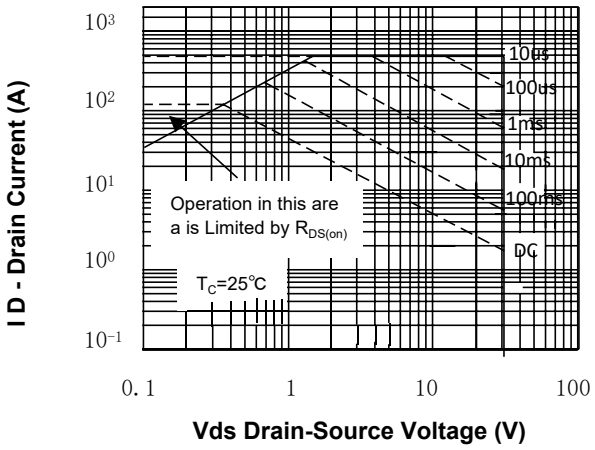



Figure 9. Maximum Safe Operating Area

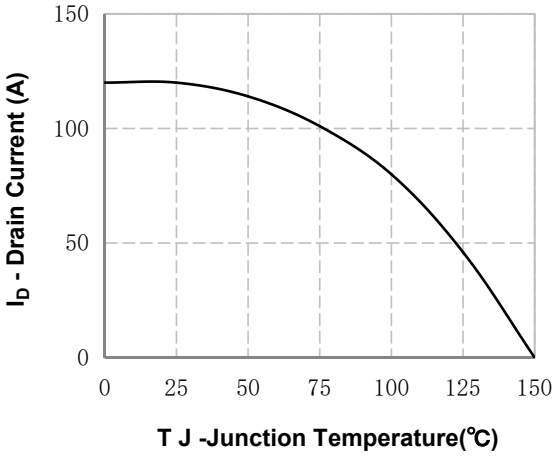



Figure 10. Maximum Continuous Drain Current vs Temperature

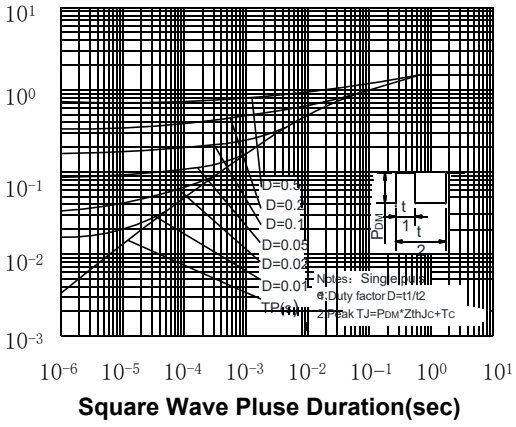
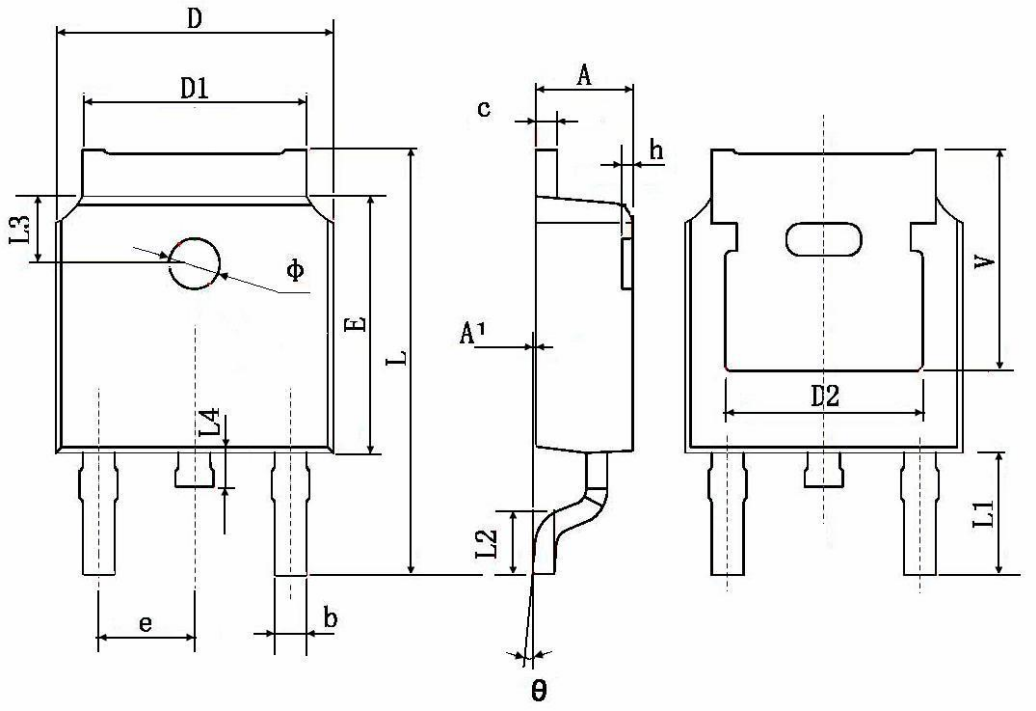



Figure 11. Transient Thermal Response Curve

## TO-252-2L(DPAK) 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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