SamHop Microelectronics Corp.

# SDU/D30N02

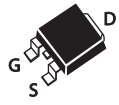
May,2004 ver1.1

## N-Channel Enhancement Mode Field Effect Transistor

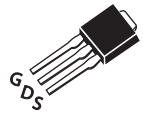
| PRODUCT SUMMARY | | |
|---|---|---|
| $V_{DSS}$ | $I_D$ | $R_{DS(ON)}$ (mΩ) Max |
| 20V | 25A | 20 @ $V_{GS}$ = 4.5V |

### FEATURES

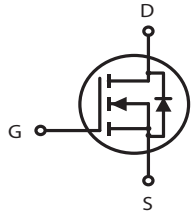
- Super high dense cell design for low $R_{DS(ON)}$.
- Rugged and reliable.
- TO-252 and TO-251 Package.




SDU SERIES
TO-252AA(D-PAK)




SDD SERIES
TO-251(I-PAK)




## ABSOLUTE MAXIMUM RATINGS ($T_A$=25°C unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 20 | V |
| Gate-Source Voltage | $V_{GS}$ | ±12 | V |
| Drain Current-Continuous @TJ=125°C | $I_D$ | 25 | A |
| -Pulsed [a] | $I_{DM}$ | 42 | A |
| Drain-Source Diode Forward Current | $I_S$ | 30 | A |
| Maximum Power Dissipation @Tc=25°C | $P_D$ | 50 | W |
| Operating and Storage Temperature Range | $T_J$, $T_{STG}$ | -55 to 175 | °C |
| **THERMAL CHARACTERISTICS** | | | |
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 3 | °C/W |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 50 | °C/W |

# SDU/D30N02

## ELECTRICAL CHARACTERISTICS (Tc=25°C unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$ = 0V, $I_D$ = 250uA | 20 | | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 16V, $V_{GS}$ = 0V | | | 1 | uA |
| Gate-Body Leakage | $I_{GSS}$ | $V_{GS}$ = ±8V, $V_{DS}$ = 0V | | | ±100 | nA |
| ON CHARACTERISTICS [a] | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250uA | 0.9 | 1.0 | 1.5 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$ = 4.5V, $I_D$ = 20A | | 15 | 20 | m ohm |
| On-State Drain Current | $I_{D(ON)}$ | $V_{DS}$ = 10V, $V_{GS}$ = 4.5V | 30 | | | A |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$ = 10V, $I_D$ = 20A | | 25 | | S |
| DYNAMIC CHARACTERISTICS [b] | | | | | | |
| Input Capacitance | $C_{ISS}$ | $V_{DD}$ =10V, $V_{GS}$ = 0V<br>f = 1.0MHz | | 1385 | | pF |
| Output Capacitance | $C_{OSS}$ | | | 595 | | pF |
| Reverse Transfer Capacitance | $C_{RSS}$ | | | 145 | | pF |
| SWITCHING CHARACTERISTICS [b] | | | | | | |
| Turn-On Delay Time | $t_{D(ON)}$ | $V_{DD}$ = 15V,<br>$I_D$ =1A,<br>$V_{GS}$ = 10 V,<br>$R_{GEN}$ = 6 ohm | | 26 | | ns |
| Rise Time | $t_r$ | | | 31 | | ns |
| Turn-Off Delay Time | $t_{D(OFF)}$ | | | 122 | | ns |
| Fall time | $t_f$ | | | 27 | | ns |
| Total Gate Charge | $Q_g$ | $V_{DS}$ = 10V, $I_D$ = 30A,<br>$V_{GS}$ = 4.5 V | | 18 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 4.6 | | nC |
| Gate-Drain Charge | $Q_{gd}$ | | | 5.3 | | nC |

## ELECTRICAL CHARACTERISTICS ($T_C$=25°C unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| DRAIN-SOURCE DIODE CHARACTERISTICS [a] | | | | | | |
| Diode Forward Voltage | $V_{SD}$ | $V_{GS}$ = 0V, Is = 30A | | | 1.3 | V |

Notes

a.Pulse Test:Pulse Width≤300us, Duty Cycle≤ 2%.

b.Guaranteed by design, not subject to production testing.

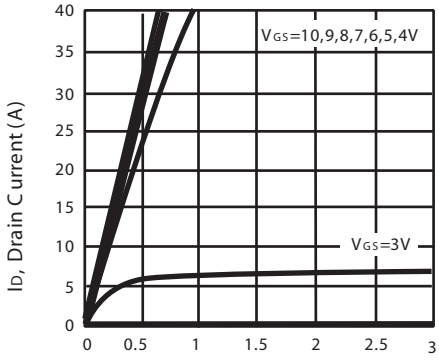



Figure 1. Output Characteristics

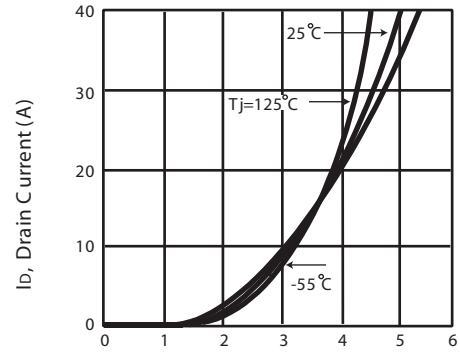



Figure 2. Transfer Characteristics

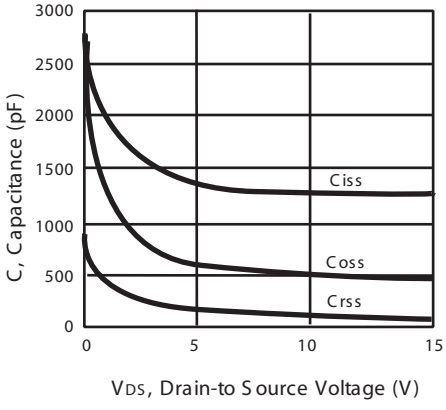



Figure 3. Capacitance

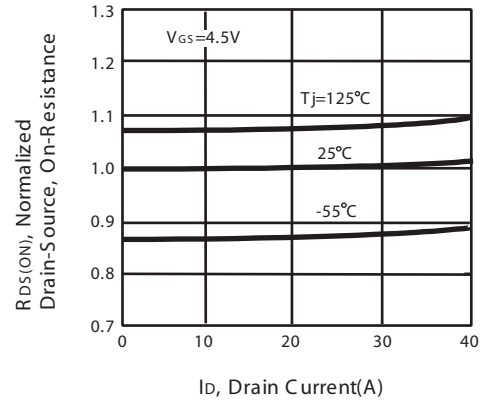



Figure 4. On-Resistance Variation with Drain Current and Temperature

# SDU/D30N02

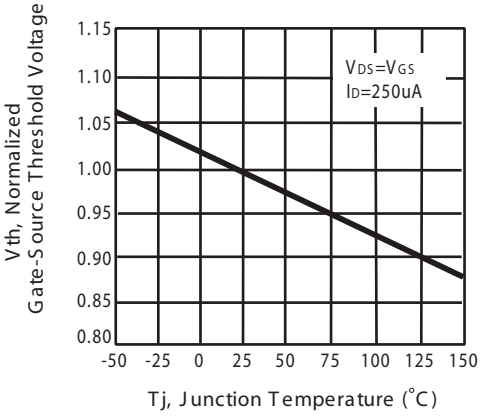



Figure 5. Gate Threshold Variation with Temperature

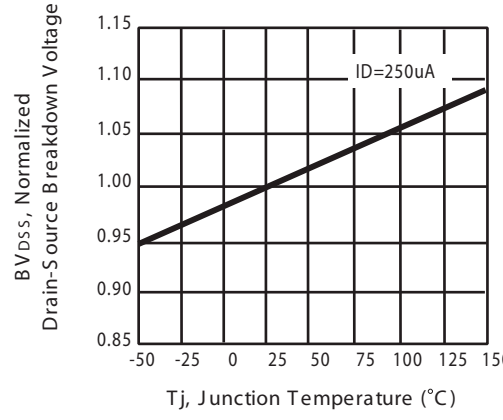



Figure 6. Breakdown Voltage Variation with Temperature

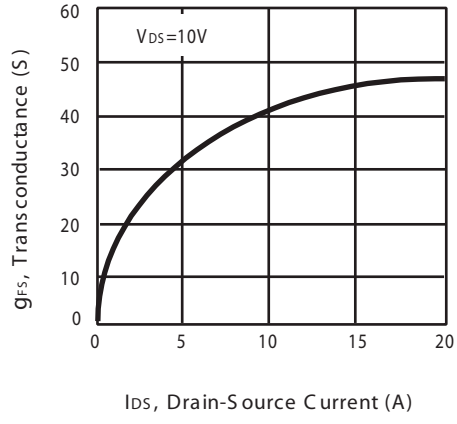



Figure 7. Transconductance Variation with Drain Current

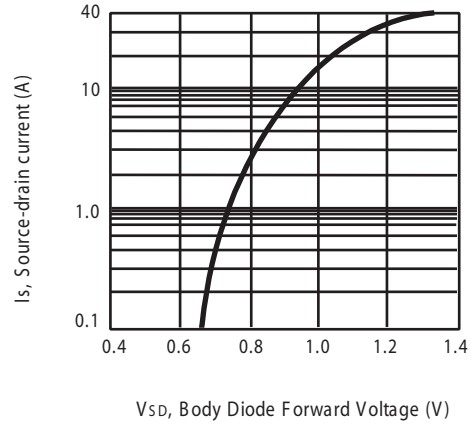



Figure 8. Body Diode Forward Voltage Variation with Source Current

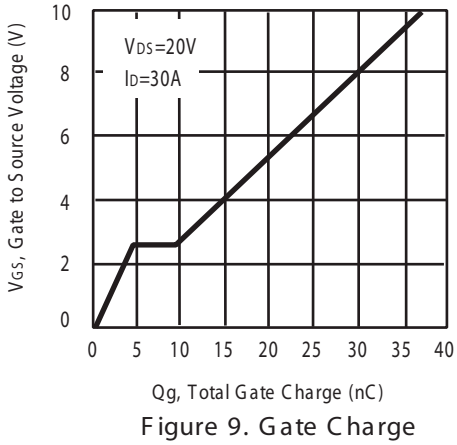



Figure 9. Gate Charge

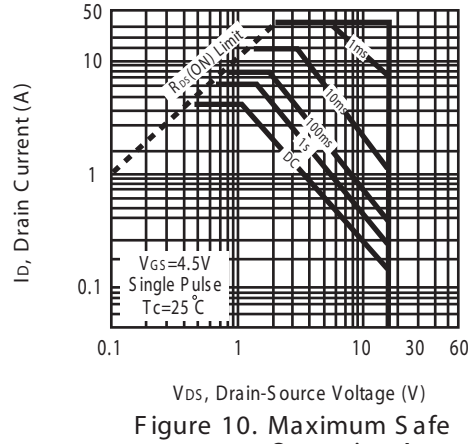



Figure 10. Maximum Safe Operating Area

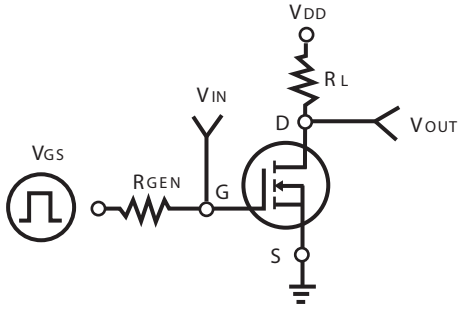



Figure 11. Switching Test Circuit

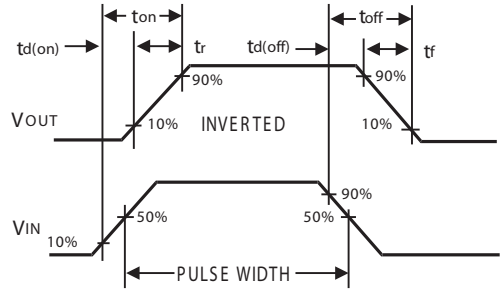



Figure 12. Switching Waveforms

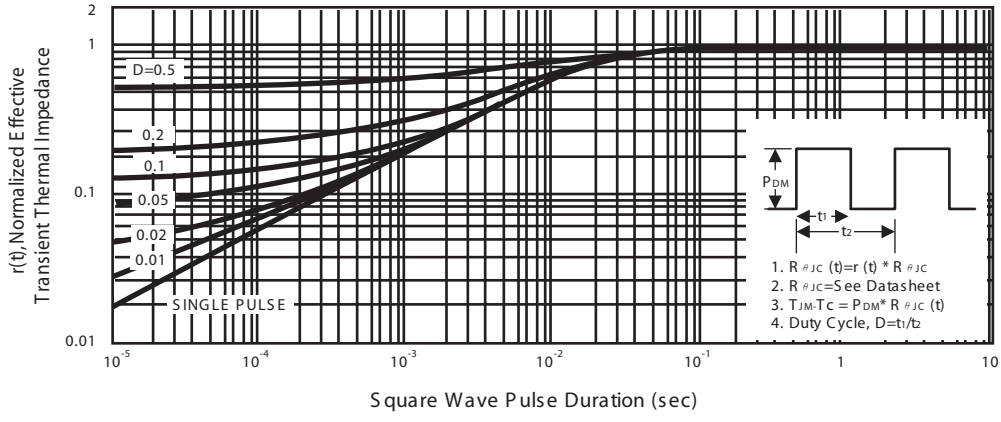



Figure 13. Normalized Thermal Transient Impedance Curve

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