# UMW STD20NF06L

60V N-Channel MOSFET

## 1.Description

The STD20NF06L uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It ca n be used in a wide variety of applications.

## 2.1Features

- $V_{DS\ (V)}$=60V
- $I_D$=30A
- $R_{DS(ON)}$<25mΩ($V_{GS}$=10V)
- $R_{DS(ON)}$<30mΩ($V_{GS}$=4.5V)

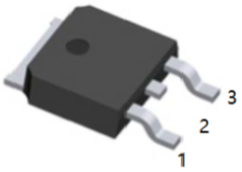
## 2.2Features

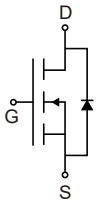
- Advanced Trench Technology
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- Lead free product is acquired

## 3.Pinning information

| Pin | Symbol | Description |
|---|---|---|
| 1 | G | GATE |
| 2 | D | DRAIN |
| 3 | S | SOURCE |

**TO-252(DPAK)**
**top view**




## 4.Absolute Maximum Ratings $T_A$= 25°C

| Parameter | | Symbol | Rating | Units |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 60 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | |
| Drain Current-Continuous[Note3] | $T_C$=25°C | $I_D$ | 30 | A |
| | $T_C$=100°C | | 20 | |
| Drain Current-Pulsed[Note1] | | $I_{DM}$ | 120 | |
| Avalanche Energy[Note4] | | $E_{AS}$ | 72 | mJ |
| Maximum Power Dissipation | $T_C$=25°C | $P_D$ | 55 | W |
| Storage Temperature Range | | $T_{STG}$ | -55 to 150 | °C |
| Junction Temperature Range | | $T_J$ | -55 to 150 | °C |

## 5.Thermal Resistance Rating

| Parameter | Symbol | Typ | Max | Units |
|---|---|---|---|---|
| Thermal Resistance,Junction-to-Case | $R_{thJC}$ | | 2.7 | °C/W |

## 6.SPECIFICATIONS ($T_J$= 25°C, unless otherwise noted)

| Parameter | Symbol | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V, $I_{DS}$=250μA | 60 | | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=60V, $V_{GS}$=0V | | | 1 | μA |
| Gate-Body Leakage | $I_{GSS}$ | $V_{GS}$=±20V, $V_{DS}$=0V | | | ±100 | nA |
| **ON CHARACTERISTIC** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_{DS}$=250μA | 1 | 1.6 | 2.5 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_{DS}$=15A | | 25 | 35 | mΩ |
| | | $V_{GS}$=4.5V, $I_{DS}$=10A | | 30 | 40 | mΩ |
| **DYNAMIC CHARACTERISTICS** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=25V, $V_{GS}$=0V, f=1MHz | | 1562 | | pF |
| Output Capacitance | $C_{oss}$ | | | 75.4 | | pF |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 66.8 | | pF |
| **SWITCHING CHARACTERISTICS** | | | | | | |
| Turn-On Delay Time | $t_{D(on)}$ | $V_{GS}$=10V, $V_{DS}$=30V<br>$R_{GEN}$=1.8Ω, $I_D$=15A | | 7.5 | | ns |
| Rise Time | $t_r$ | | | 21 | | ns |
| Turn-Off Delay Time | $t_{D(off)}$ | | | 16 | | ns |
| Fall Time | $t_f$ | | | 23.5 | | ns |
| Total Gate Charge at 10V | $Q_g$ | $V_{DS}$=30V, $I_{DS}$=15A, $V_{GS}$=10V | | 25 | | nC |
| Gate to Source Gate Charge | $Q_{gs}$ | | | 4.5 | | nC |
| Gate to Drain“Miller”Charge | $Q_{gd}$ | | | 6.5 | | nC |

| DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS | | | | | | |
|---|---|---|---|---|---|---|
| Drain-Source Diode Forward Voltage | $V_{SD}$ | $V_{GS}$=0V, $I_{DS}$=15A | | | 1.2 | V |
| Reverse Recovery Time | $t_{rr}$ | $T_J$=25°C, $I_F$=15A | | 29 | | nS |
| Reverse Recovery Charge | $Q_{rr}$ | dI/dt=100A/μs | | 45 | | uC |

Notes:

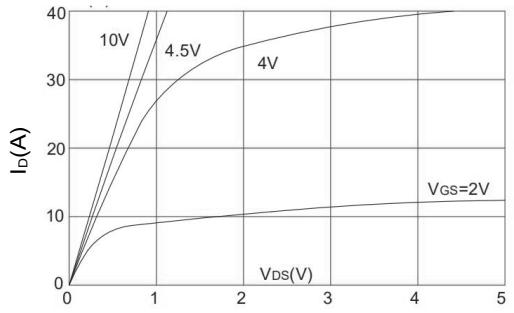
1: Repetitive rating, pulse width limited by maximum junction temperature.

2: Surface mounted on FR4 Board, t≤10sec.

3: Pulse width ≤ 300μs, duty cycle ≤ 2%.

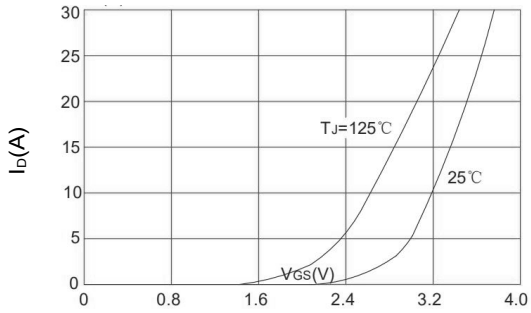
4: $E_{AS}$ condition: L=0.5mH,$V_{DD}$=30V, $V_G$=10V, $V_{GATE}$=60V,Start $T_J$=25°C.

## 7.1Typical Characterisitics



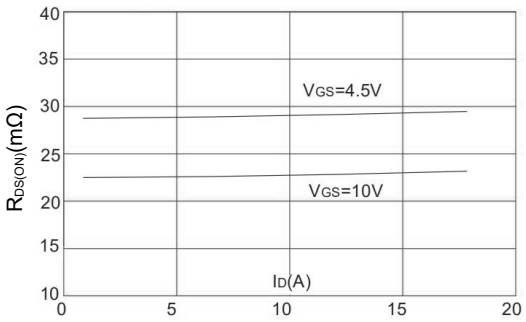

$V_{DS}$(V)

Figure 1: Output Characteristics



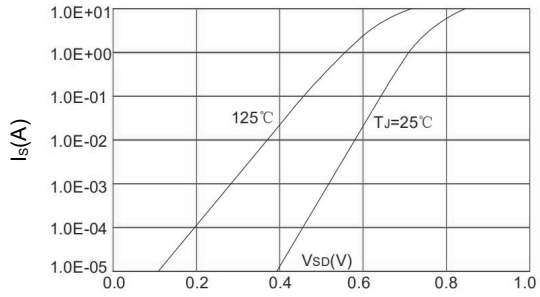

$V_{GS}$(V)

Figure 2: Typical Transfer Characteristics



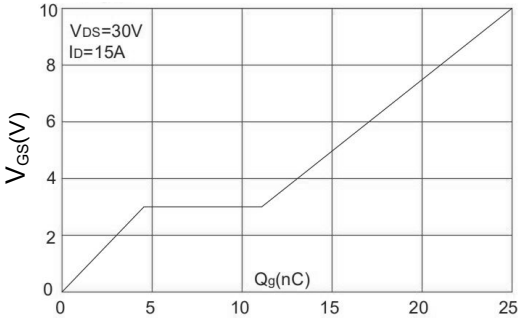

$I_D$(A)

Figure 3: On-resistance vs. Drain Current



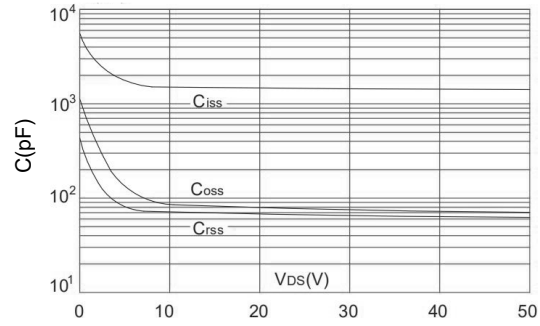

$V_{SD}$(V)

Figure 4: Body Diode Characteristics




$Q_g$(nC)

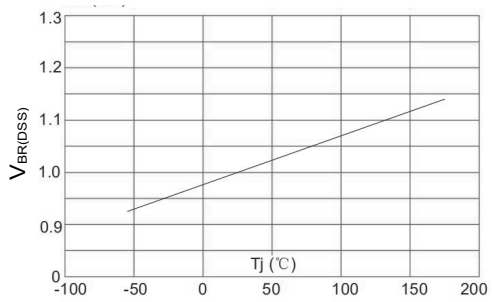
Figure 5: Gate Charge Characteristics




$V_{DS}$(V)

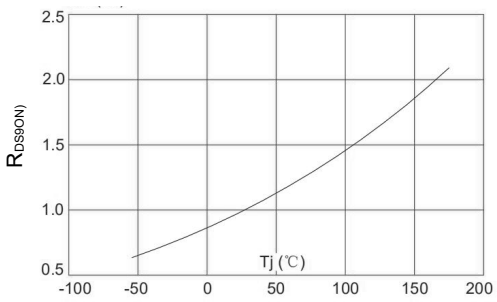
Figure 6: Capacitance Characteristics

## 7.2Typical Characterisitics



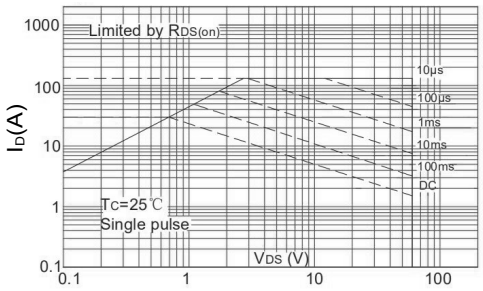

$T_J$(°C)

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature



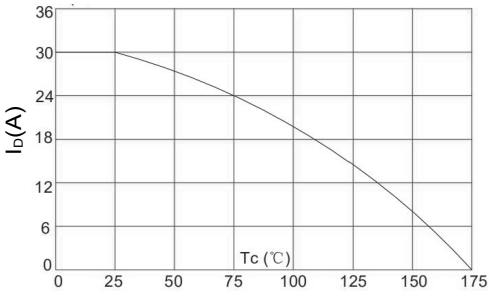

$T_J$(°C)

Figure 8: Normalized on Resistance vs Junction Temperature



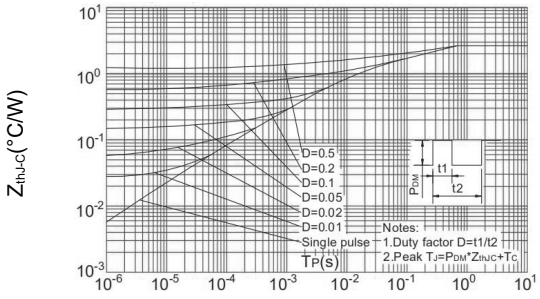

$V_{DS}$(V)

Figure 9: Maximum Safe Operating Area




$T_C$(°C)

Figure 10: Maximum Continuous Drain Currentvs. Case Temperature




Tp(s)

Figure 11: Maximum EffectiveTransient ThermalImpedance, Junction-to-Case

## 7.3Typical Characterisitics

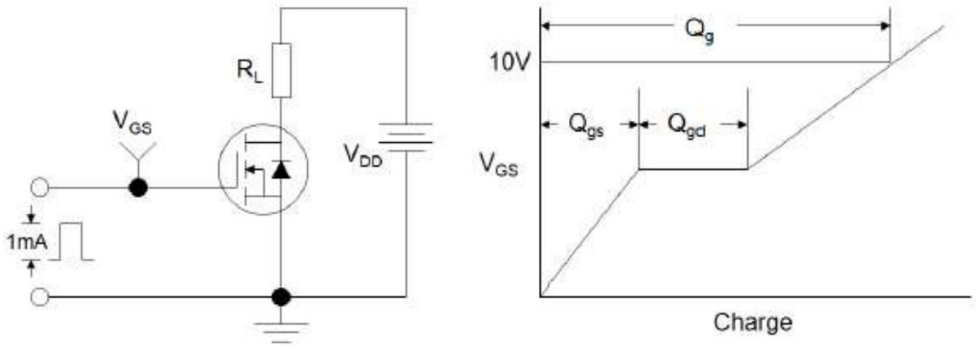



**Figure1:Gate Charge Test Circuit & Waveform**

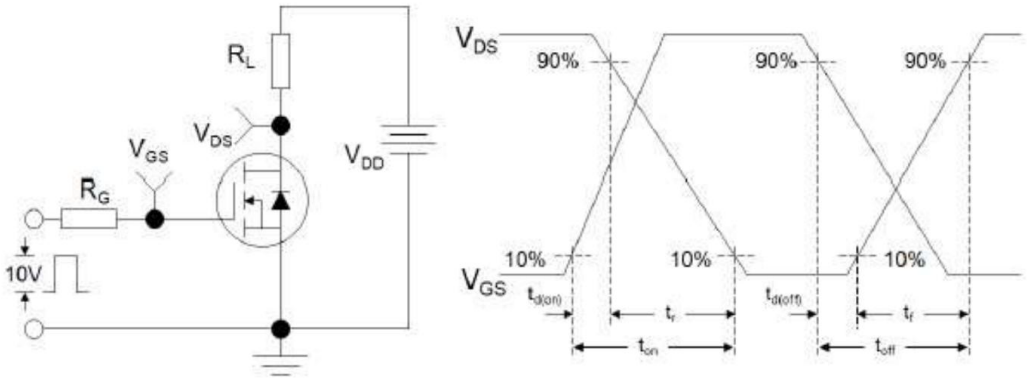



**Figure 2: Resistive Switching Test Circuit & Waveforms**

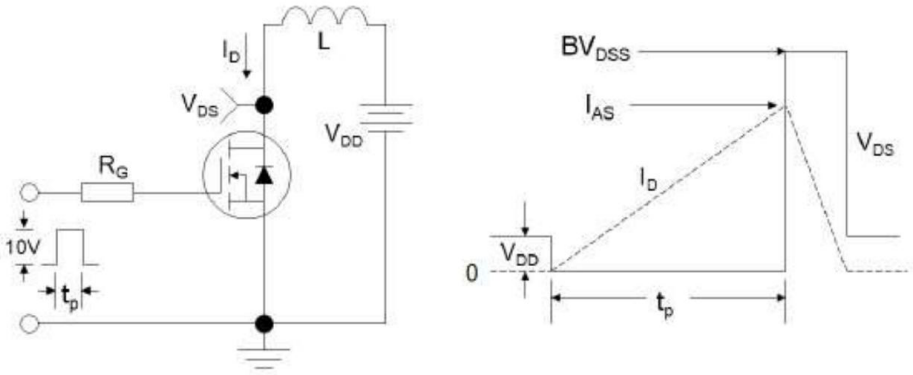
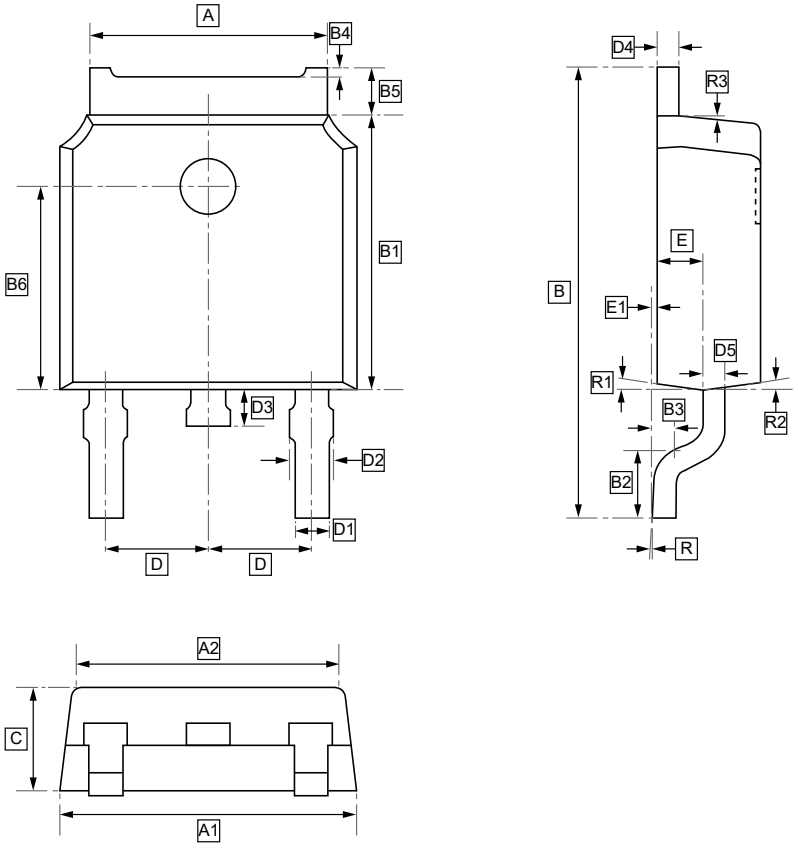



**Figure 3:Unclamped inductive Switching Test Circuit & Waveforms**

## 8.TO-252 Package Outline Dimensions

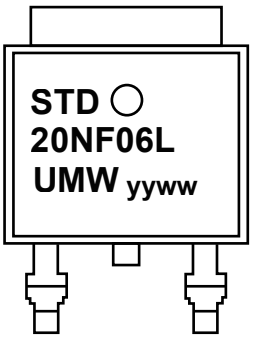



**DIMENSIONS (mm are the original dimensions)**

| Symbol | A | A1 | A2 | B | B1 | B2 | B3 | B4 | B5 | B6 | C | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Min** | 5.1 | 6.4 | 5.6 | 9.5 | 5.9 | 1.35 | 0.4 | 0.1 | 0.85 | 4.35 | 2.15 | 2.286 |
| **Max** | 5.5 | 6.8 | 6.0 | 10.3 | 6.3 | 1.65 | 0.6 | (typ.) | 1.05 | 4.65 | 2.45 | (typ.) |

| Symbol | D1 | D2 | D3 | D4 | D5 | E | E1 | R | R1 | R2 | R3 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Min** | 0.66 | 0.81 | 0.65 | 0.42 | 0.42 | 0.86 | 0.05 | 0° | 7° | 7° | 7° |
| **Max** | 0.86 | 1.01 | 0.95 | 0.58 | 0.58 | 1.16 | 0.05 | 6° | (typ.) | (typ.) | (typ.) |

## 9.Ordering information




yy: Year Code
ww: Week Code

| Order Code | Package | Base QTY | Delivery Mode |
|---|---|---|---|
| UMW STD20NF06L | TO-252 | 2500 | Tape and reel |

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