

## 1.Description

This N-Channel enhancement mode power MOSFET is produced using proprietary planar stripe and DMOS technology. This advanced MOSFET technology has been especially tailored to reduce on-state resistance, and to provide superior switching performance and high avalanche energy strength.

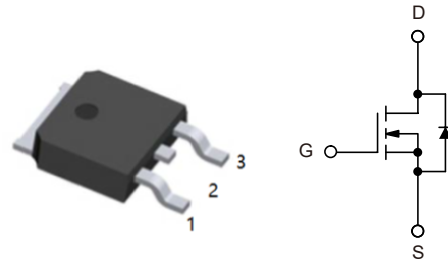
## 2.Features

- $V_{DS(V)}=100V$
- $I_D=15.6A(V_{GS}=10V)$
- $R_{DS(ON)}<100m\Omega(V_{GS}=10V)$
- $R_{DS(ON)}<110m\Omega(V_{GS}=5V)$
- Low Gate Charge (Typ. 14 nC)
- Low Crss (Typ. 35 pF)

## 3.Pinning information

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

TO-252(DPAK)  
top view



## 4.Absolute Maximum Ratings $T_c=25^{\circ}C$

| Parameter                                    | Symbol    | Rating   | Units |
|----------------------------------------------|-----------|----------|-------|
| Drain - Source Voltage                       | $V_{DSS}$ | 100      | V     |
| Drain Current - Continuous $T_c=25^{\circ}C$ | $I_D$     | 15.6     | A     |
| - Continuous $T_c=100^{\circ}C$              |           | 9.8      | A     |
| - Pulsed (Note 1)                            | $I_{DM}$  | 62.4     | A     |
| Gate-Source Voltage                          | $V_{GSS}$ | $\pm 20$ | V     |
| Single Pulse Avalanche Energy (Note 2)       | $E_{AS}$  | 220      | mJ    |
| Avalanche Current (Note 1)                   | $I_{AR}$  | 15.6     | A     |
| Repetitive Avalanche Energy (Note 1)         | $E_{AR}$  | 5        | mJ    |
| Peak Diode Recovery dv/dt (Note 3)           | dv/dt     | 6        | V/ns  |



|                                                                                  |                |            |                       |
|----------------------------------------------------------------------------------|----------------|------------|-----------------------|
| Power Dissipation ( $T_A=25^{\circ}\text{C}$ ) *                                 | $P_D$          | 2.5        | W                     |
| Power Dissipation ( $T_C=25^{\circ}\text{C}$ )                                   |                | 50         | W                     |
| - Derate above $25^{\circ}\text{C}$                                              |                | 0.4        | W/ $^{\circ}\text{C}$ |
| Operating and Storage Temperature Range                                          | $T_J, T_{STG}$ | -55 to 150 | $^{\circ}\text{C}$    |
| Maximum lead temperature for soldering purposes,<br>1/8" from case for 5 seconds | $T_L$          | 300        | $^{\circ}\text{C}$    |

## 5. Thermal Characteristics

| Parameter                                                                            | Symbol          | Rating | Units                       |
|--------------------------------------------------------------------------------------|-----------------|--------|-----------------------------|
| Thermal Resistance, Junction to Case, Max                                            | $R_{\theta JC}$ | 2.5    | $^{\circ}\text{C}/\text{W}$ |
| Thermal Resistance, Junction to Ambient (Minimum Pad of 2-oz Copper), Max            | $R_{\theta JA}$ | 110    | $^{\circ}\text{C}/\text{W}$ |
| Thermal Resistance, Junction to Ambient (*1 in <sup>2</sup> Pad of 2-oz Copper), Max | $R_{\theta JA}$ | 50     | $^{\circ}\text{C}/\text{W}$ |



## 6. Electrical Characteristic ( $T_c=25^\circ\text{C}$ unless otherwise noted)

| Parameter                                 | Symbol                               | Conditions                                                 | Min | Typ  | Max  | Units |
|-------------------------------------------|--------------------------------------|------------------------------------------------------------|-----|------|------|-------|
| Off Characteristics                       |                                      |                                                            |     |      |      |       |
| Drain-Source Breakdown Voltage            | $BV_{DSS}$                           | $I_D=250\mu A$ , $V_{GS}=0V$                               | 100 |      |      | V     |
| Breakdown Voltage Temperature Coefficient | $\frac{\Delta BV_{DSS}}{\Delta T_J}$ | $I_D=250\mu A$<br>Referenced to 25°C                       |     | 0.09 |      | V/°C  |
| Zero Gate Voltage Drain Current           | $I_{DSS}$                            | $V_{DS}=100V$ , $V_{GS}=0V$                                |     |      | 1    | μA    |
|                                           |                                      | $V_{GS}=80V$ , $T_C=125^\circ C$                           |     |      | 10   | μA    |
| Gate-Body Leakage Current, Forward        | $I_{GSSF}$                           | $V_{GS}=20V$ , $V_{DS}=0V$                                 |     |      | 100  | nA    |
| Gate-Body Leakage Current, Reverse        | $I_{GSSR}$                           | $V_{GS}=-20V$ , $V_{DS}=0V$                                |     |      | -100 | nA    |
| On Characteristics                        |                                      |                                                            |     |      |      |       |
| Gate Threshold Voltage                    | $V_{GS(th)}$                         | $V_{DS}=V_{GS}$ , $I_D=250\mu A$                           | 1   |      | 2    | V     |
| Static Drain-Source<br>On-Resistance      | $R_{DS(ON)}$                         | $V_{GS}=10V$ , $I_D=7.8A$                                  |     | 74   | 100  | mΩ    |
|                                           |                                      | $V_{GS}=5V$ , $I_D=7.8A$                                   |     | 82   | 110  | mΩ    |
| Forward Transconductance                  | $g_{FS}$                             | $V_{DS}=30V$ , $I_D=7.8A$                                  |     | 14   |      | S     |
| Dynamic Characteristics                   |                                      |                                                            |     |      |      |       |
| Input Capacitance                         | $C_{iss}$                            | $V_{DS}=25V$ , $V_{GS}=0V$ , $f=1MHz$                      |     | 670  | 870  | pF    |
| Output Capacitance                        | $C_{oss}$                            |                                                            |     | 160  | 210  | pF    |
| Reverse Transfer Capacitance              | $C_{rss}$                            |                                                            |     | 35   | 45   | pF    |
| Switching Characteristics                 |                                      |                                                            |     |      |      |       |
| Turn-On DelayTime                         | $t_{D(on)}$                          | $V_{DD}=50V$ , $I_D=19A$<br>$R_G=25\Omega$<br><br>(Note 4) |     | 14   | 38   | ns    |
| Turn-On Rise Time                         | $t_r$                                |                                                            |     | 410  | 830  | ns    |
| Turn-Off DelayTime                        | $t_{D(off)}$                         |                                                            |     | 20   | 50   | ns    |
| Turn-Off Fall Time                        | $t_f$                                |                                                            |     | 140  | 290  | ns    |
| Total Gate Charge                         | $Q_g$                                | $V_{DS}=80V$ , $I_D=19A$<br>$V_{GS}=5V$<br>(Note 4)        |     | 14   | 18   | nC    |
| Gate to Source Charge                     | $Q_{gs}$                             |                                                            |     | 2.9  |      | nC    |
| Gate to Drain Charge                      | $Q_{gd}$                             |                                                            |     | 9.2  |      | nC    |



| Drain-Source Diode Characteristics                    |          |                        |  |       |      |         |
|-------------------------------------------------------|----------|------------------------|--|-------|------|---------|
| Maximum Continuous Drain-Source Diode Forward Current | $I_S$    |                        |  |       | 15.6 | A       |
| Maximum Pulsed Drain-Source Diode Forward Current     | $I_{SM}$ |                        |  |       | 62.4 | A       |
| Drain-Source Diode Forward Voltage                    | $V_{SD}$ | $V_{GS}=0V, I_S=10A$   |  |       | 1.5  | V       |
| Reverse Recovery Time                                 | $t_{rr}$ | $V_{GS}=0V, I_S=12.8A$ |  | 80    |      | ns      |
| Reverse Recovery Charge                               | $Q_{rr}$ |                        |  | 0.195 |      | $\mu C$ |

- Notes:
- 1. Repetitive rating : pulse-width limited by maximum junction temperature.
  - 2.  $L=1.35mH, I_{AS}=15.6A, V_{DD}=25V, R_G=25\Omega$ , starting  $T_J=25^{\circ}C$ .
  - 3.  $I_{SD} \leq 19A, di/dt \leq 300 A/\mu s, V_{DD} \leq BV_{DSS}$ , starting  $T_J=25^{\circ}C$ .
  - 4. Essentially independent of operating temperature.



## 7.1 Typical characteristic

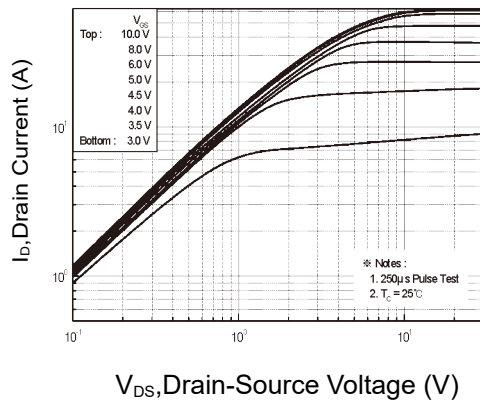


Figure 1: Output Characteristics

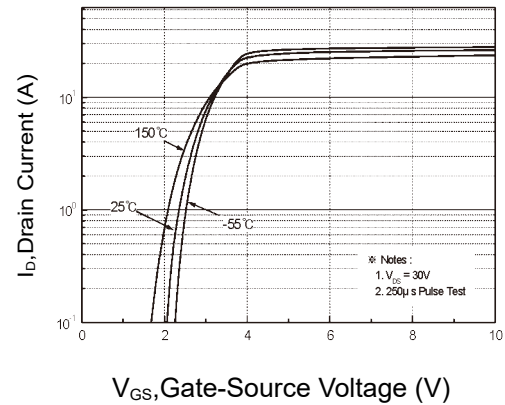


Figure 2: Transfer Characteristics

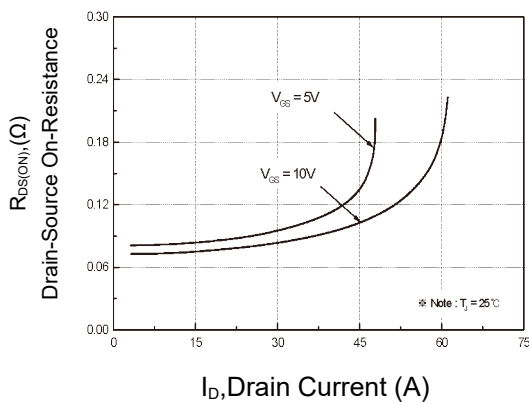


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

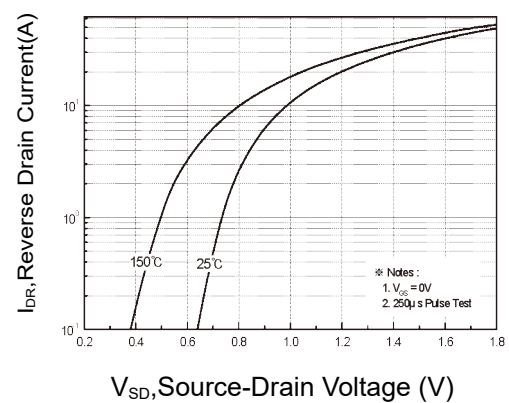


Figure 4: Body Diode Forward Voltage Variation vs. Source Current and Temperature

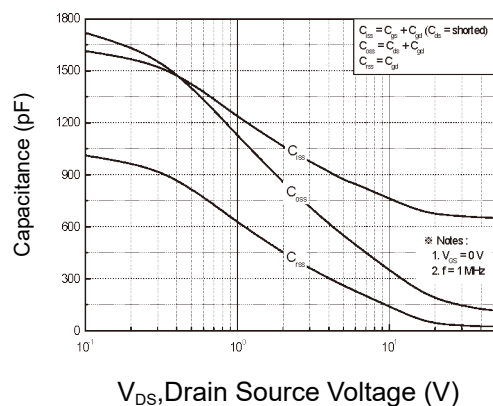


Figure 5: Capacitance Characteristics

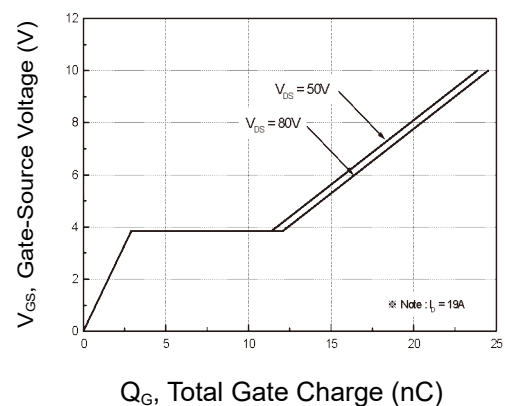


Figure 6: Gate Charge Characteristics



## 7.2 Typical characteristic

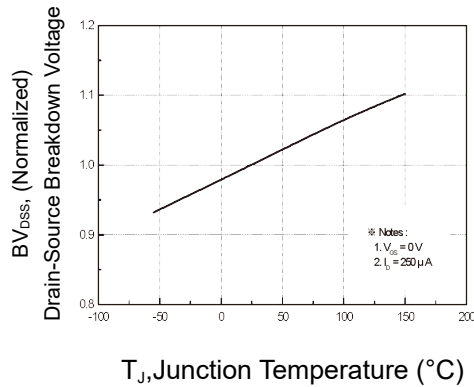


Figure 7: SBreakdown Voltage Variation vs. Temperature

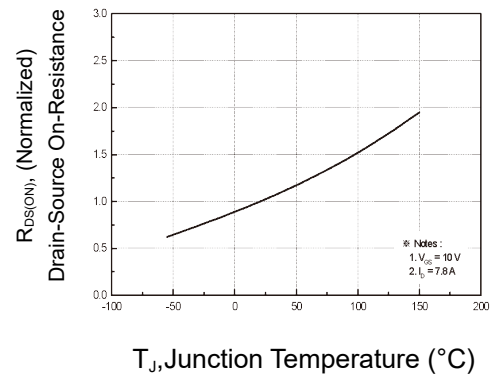


Figure 8: On-Resistance Variation vs. Temperature

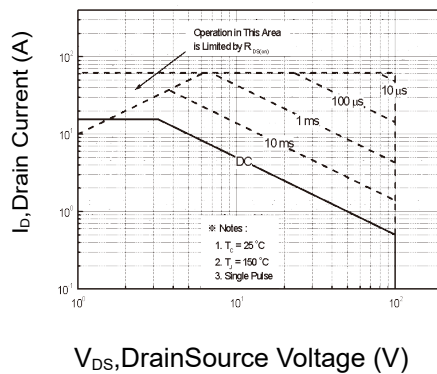


Figure 9: Maximum Safe Operating Area

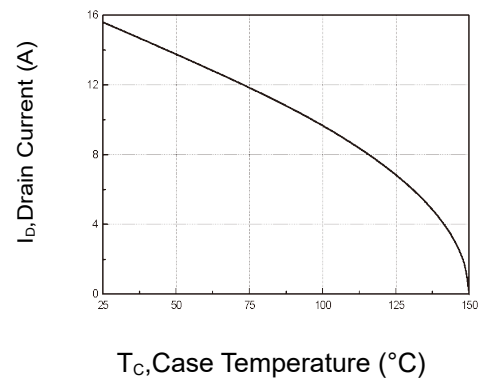


Figure 10: Maximum Drain Current vs. Case Temperature

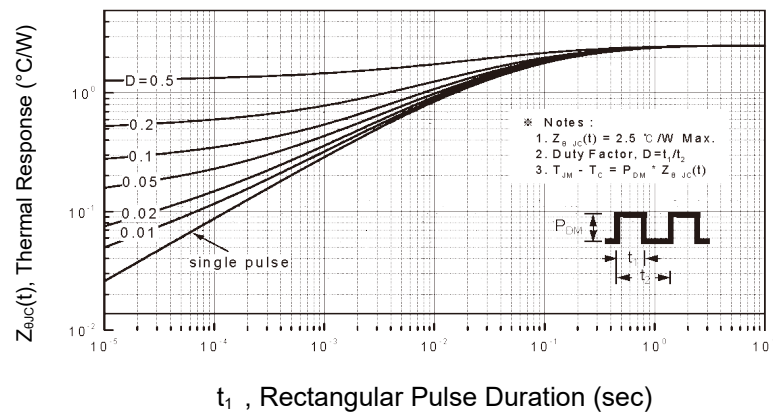
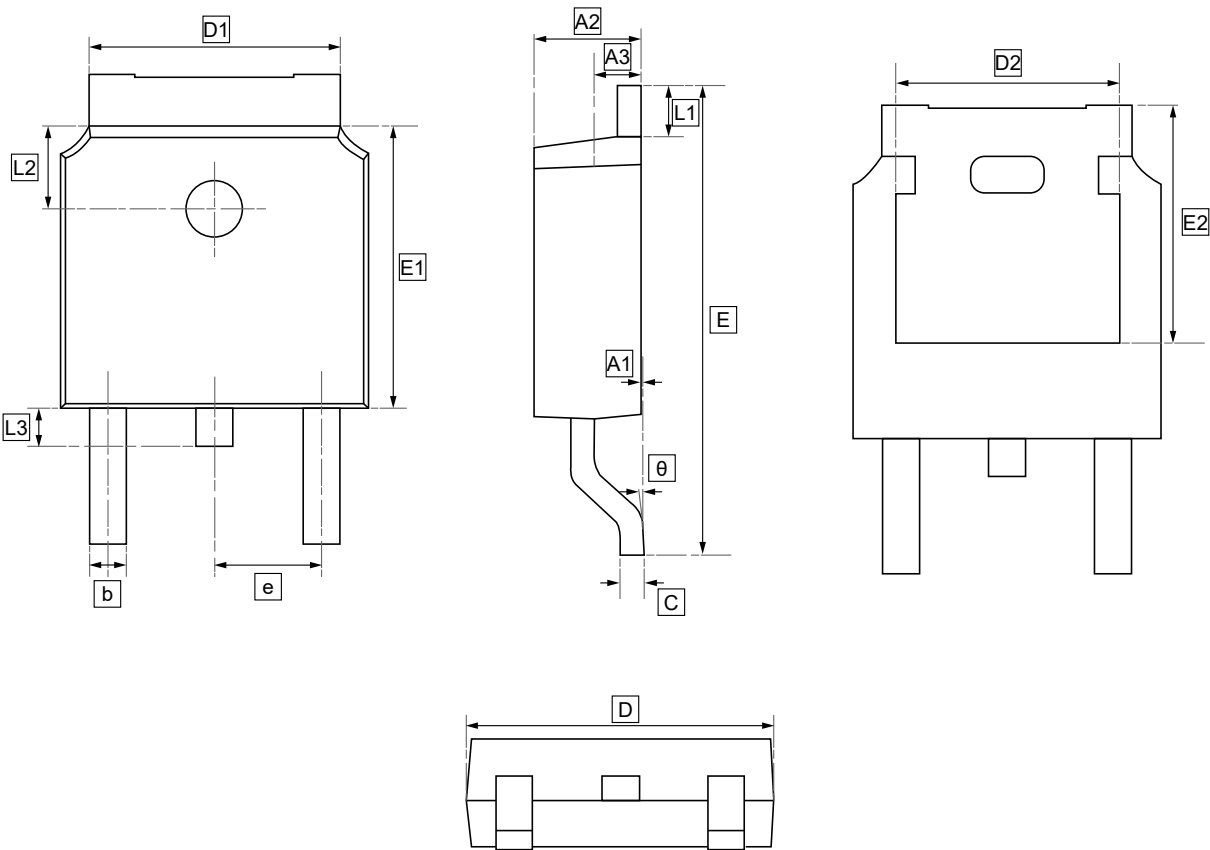


Figure 11: Transient Thermal Response Curve



8.TO-252 Package Outline Dimensions

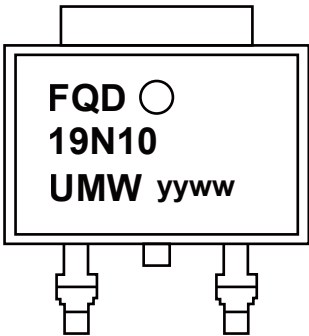


DIMENSIONS (mm are the original dimensions)

| Symbol | A1   | A2   | A3   | b    | c    | D    | D1   | D2   | E     | E1   | E2   | e     | L1   | L2   | L3   | θ    |
|--------|------|------|------|------|------|------|------|------|-------|------|------|-------|------|------|------|------|
| Min    | 0.00 | 2.18 | 0.90 | 0.65 | 0.46 | 6.35 | 4.95 | 4.32 | 9.40  | 5.97 | 5.21 | 2.286 | 0.89 | 1.70 | 0.60 | 0.00 |
| Max    | 0.13 | 2.39 | 1.10 | 0.85 | 0.61 | 6.73 | 5.46 | 4.90 | 10.41 | 6.22 | 5.38 |       | BSC  | 1.27 | 1.90 | 1.00 |



9.Ordering information



yy: Year Code  
ww: Week Code

| Order Code      | Package | Base QTY | Delivery Mode |
|-----------------|---------|----------|---------------|
| UMW FQD19N10LTM | TO-252  | 2500     | Tape and reel |



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