

1. Description

These devices are well suited for low voltage and battery powered applications where low in-line power loss and fast switching are required.

2.2 Features

- High power and current handling capability.
- High performance trench technology for extremely low $R_{DS(ON)}$

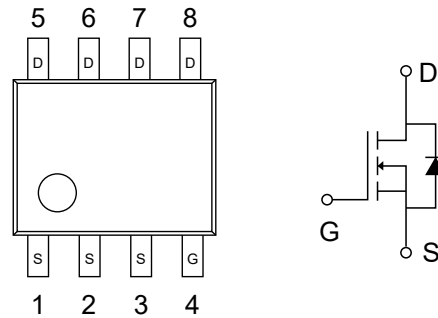
2.1 Features

- $V_{DS(V)}=20V$
- $I_D=15A(V_{GS}=4.5V)$
- $R_{DS(ON)}<6m\Omega(V_{GS}=4.5V)$
- $R_{DS(ON)}<8m\Omega(V_{GS}=2.5V)$

3. Pinning information

| Pin | Symbol | Description |
|---------|--------|-------------|
| 4 | G | GATE |
| 1,2,3 | S | SOURCE |
| 5,6,7,8 | D | DRAIN |

SOP-8



4. Absolute Maximum Ratings $T_A=25^\circ C$ unless otherwise noted

| Parameter | Symbol | Value | Units |
|--|----------------|------------------|------------|
| Drain-Source Voltage | V_{DSS} | 20 | V |
| Gate-Source Voltage | V_{GSS} | ± 8 | V |
| Drain Current – Continuous – Pulsed | I_D | 15 | A |
| | | (Note 1a) 50 | |
| Power Dissipation for Single Operation | P_D | (Note 1a) 2.5 | W |
| | | (Note 1b) 1.2 | |
| | | (Note 1c) 1 | |
| Junction and Storage Temperature Range | T_J, T_{STG} | -55 to 150 | $^\circ C$ |



5. Thermal Characteristics

| Parameter | Symbol | Rating | Units |
|---|-----------------|--------|-------|
| Thermal Resistance, Junction-to-Ambient (Note 1a) | $R_{\theta JA}$ | 50 | °C/W |
| Thermal Resistance, Junction-to-Case (Note 1) | $R_{\theta JC}$ | 25 | °C/W |



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

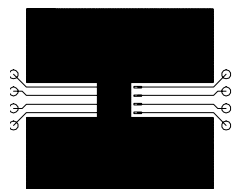
| Parameter | Symbol | Conditions | Min | Typ | Max | Units |
|--|--|--|-----|------|------|-------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | I _D =250μA, V _{GS} =0V | 20 | | | V |
| Breakdown Voltage Temperature Coefficient | $\frac{\Delta BV_{DSS}}{\Delta T_J}$ | I _D =250μA Referenced to 25°C | | 29 | | mV/°C |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} =16V, V _{GS} =0V | | | 1 | μA |
| Gate-Body Leakage, Forward | I _{GSSF} | V _{DS} =0V, V _{GS} =8V | | | 100 | nA |
| Gate-Body Leakage, Reverse | I _{GSSR} | V _{DS} =0V, V _{GS} =-8V | | | -100 | nA |
| On Characteristics (Note 2) | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} =V _{GS} , I _D =250μA | 1 | 1.2 | 1.4 | V |
| Gate Threshold Voltage Temperature Coefficient | $\frac{\Delta V_{GS(th)}}{\Delta T_J}$ | I _D =250μA Referenced to 25°C | | -4 | | mV/°C |
| Static Drain-Source On-Resistance | R _{DS(on)} | V _{GS} =4.5V, I _D =15A V _{GS} =2.5V, I _D =12A | | 6 | 7.5 | mΩ |
| | | | | 8 | 10 | |
| On-State Drain Current | I _{D(on)} | V _{GS} =4.5V, V _{DS} =5V | 25 | | | A |
| Forward Transconductance | g _{FS} | V _{DS} =5V, I _D =15A | | 70 | | S |
| Dynamic Characteristics | | | | | | |
| Input Capacitance | C _{iss} | V _{DS} =10V, V _{GS} =0V, f=1MHz | | 4700 | | pF |
| Output Capacitance | C _{oss} | | | 850 | | pF |
| Reverse Transfer Capacitance | C _{rss} | | | 310 | | pF |
| SWITCHING PARAMETERS (Note 2) | | | | | | |
| Turn-On Delay Time | t _{D(on)} | V _{DD} =10V, I _D =1A V _{GS} =4.5V, R _{GEN} =6Ω | | 20 | 32 | ns |
| Turn-On Rise Time | t _r | | | 27 | 44 | ns |
| Turn-Off Delay Time | t _{D(off)} | | | 95 | 133 | ns |
| Turn-Off Fall Time | t _f | | | 35 | 56 | ns |
| Total Gate Charge | Q _g | V _{DS} =10V, I _D =15A V _{GS} =5V | | 47 | 66 | nC |
| Gate-Source Charge | Q _{gs} | | | 7 | | nC |
| Gate-Drain Charge | Q _{gd} | | | 10.5 | | nC |



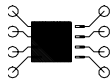
| Drain-Source Diode Characteristics | | | | | | |
|---|----------|---------------------------------------|--|------|-----|---|
| Maximum Continuous Drain-Source Diode Forward Current | I_S | | | | 2.1 | A |
| Drain-Source Diode Forward Voltage | V_{SD} | $V_{GS}=0V, I_S=2.1A(\text{Note } 2)$ | | 0.65 | 1.2 | V |

Notes:

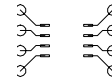
1. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta JA}$ is determined by the user's board design.



a) 50° C/W when mounted on a 0.5 in² pad of 2 oz. copper.



b) 105° C/W when mounted on a 0.02 in² pad of 2 oz. copper.



c) 125° C/W when mounted on a 0.003 in² pad of 2 oz. copper.

Scale 1 : 1 on letter size paper

2. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%

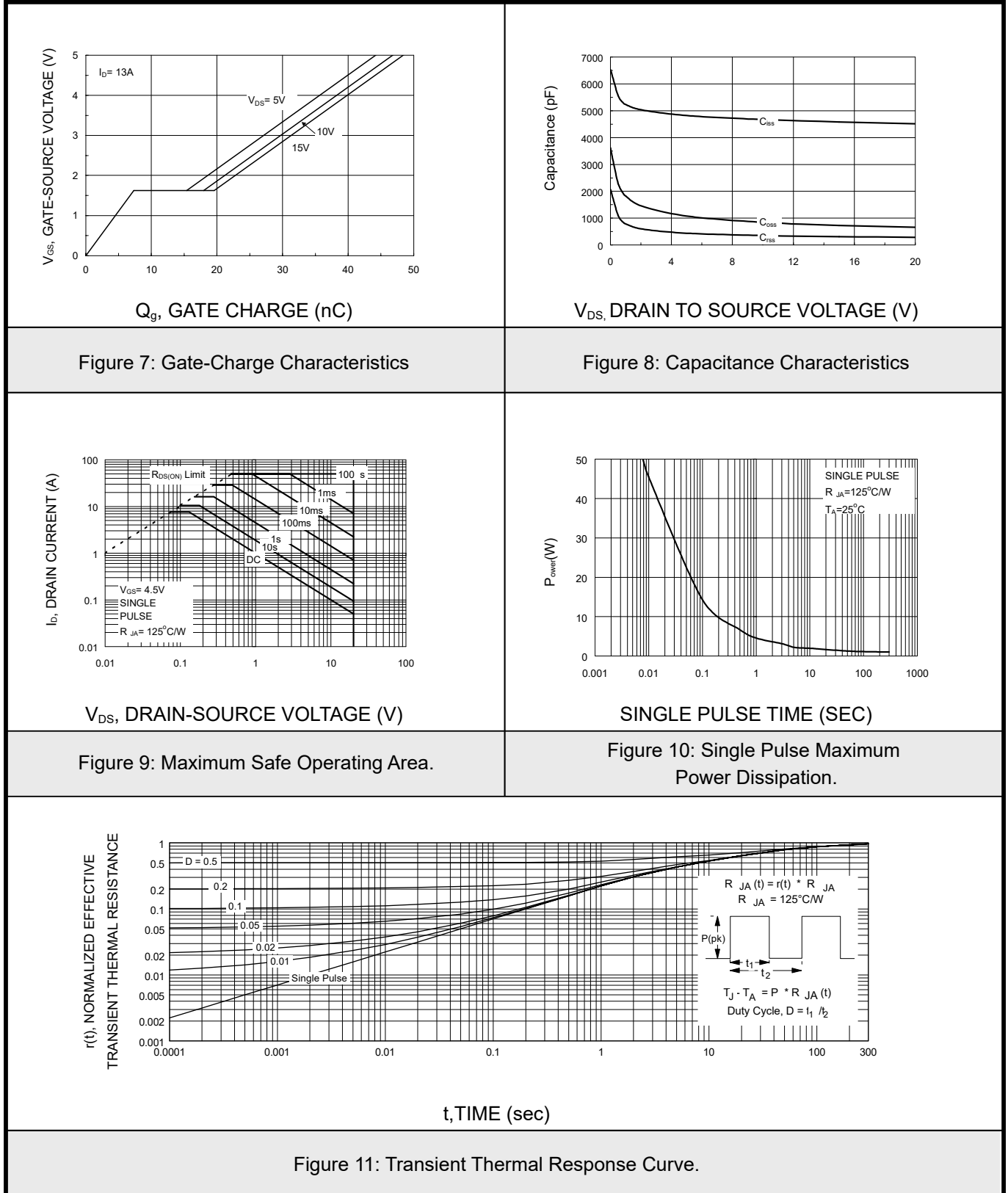


7.1 TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

| | |
|--|--|
| <p>I_D, DRAIN CURRENT (A)</p> <p>V_{GS}, GATE TO SOURCE VOLTAGE (V)</p> | <p>$R_{DS(ON)}$, NORMALIZED DRAIN-SOURCE ON-RESISTANCE</p> <p>I_D, DRAIN CURRENT (A)</p> |
| <p>Fig 1: On-Region Characteristics.</p> | <p>Figure 2: On-Resistance Variation with Drain Current and Gate Voltage.</p> |
| <p>$R_{DS(ON)}$, NORMALIZED DRAIN-SOURCE ON-RESISTANCE</p> <p>T_J, JUNCTION TEMPERATURE ($^{\circ}C$)</p> | <p>$R_{DS(ON)}$, ON RESISTANCE (OHM)</p> <p>V_{GS}, GATE TO SOURCE VOLTAGE (V)</p> |
| <p>Figure 3: On-Resistance Variation with Temperature.</p> | <p>Figure 4: On-Resistance Variation with Gate-to-Source Voltage.</p> |
| <p>I_D, DRAIN CURRENT (A)</p> <p>V_{GS}, GATE TO SOURCE VOLTAGE (V)</p> | <p>I_S, REVERSE DRAIN CURRENT (A)</p> <p>V_{SD}, BODY DIODE VOLTAGE (V)</p> |
| <p>Figure 5: Transfer Characteristics.</p> | <p>Figure 6: . Body Diode Forward Voltage Variation with Source Current and Temperature.</p> |

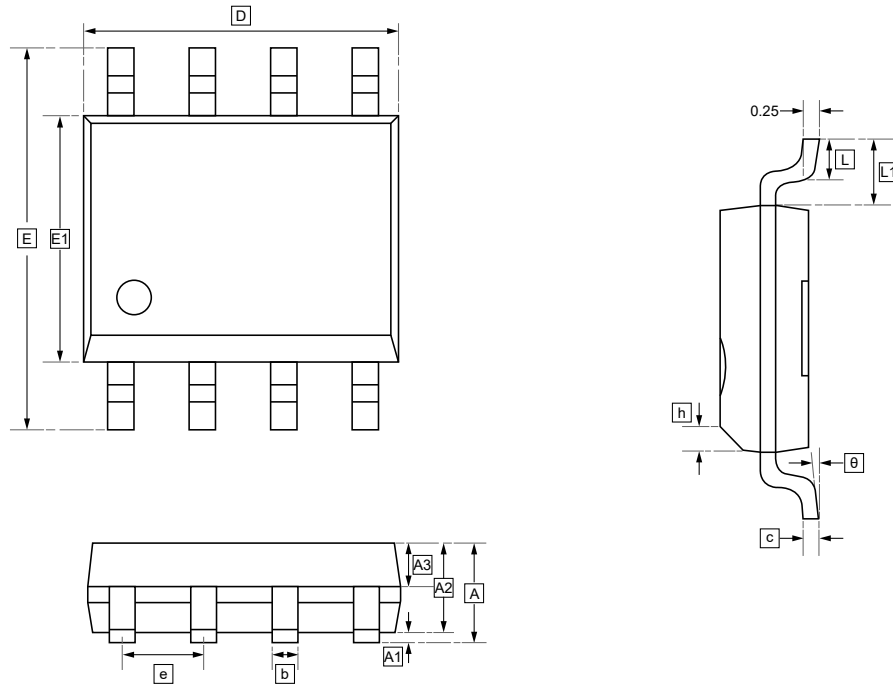


7.2 TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS





8.SOP-8 Package Outline Dimensions



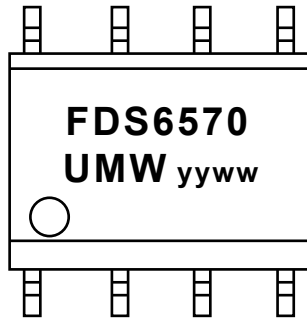
DIMENSIONS (mm are the original dimensions)

| Symbol | A | A1 | A2 | A3 | b | c | D | E | E1 | e | h | L |
|--------|------|------|------|------|------|------|------|------|------|------|------|------|
| Min | - | 0.05 | 1.30 | 0.60 | 0.39 | 0.20 | 4.80 | 5.80 | 3.80 | 1.24 | 0.30 | 0.50 |
| Max | 1.75 | 0.20 | 1.50 | 0.70 | 0.47 | 0.24 | 5.00 | 6.20 | 4.00 | 1.30 | 0.50 | 0.80 |

| Symbol | L1 | θ |
|--------|------|----|
| Min | 1.00 | 0° |
| Max | 1.10 | 8° |



9. Ordering information



yy: Year Code
ww: Week Code

| Order Code | Package | Base QTY | Delivery Mode |
|--------------|---------|----------|---------------|
| UMW FDS6570A | SOP-8 | 3000 | Tape and reel |



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