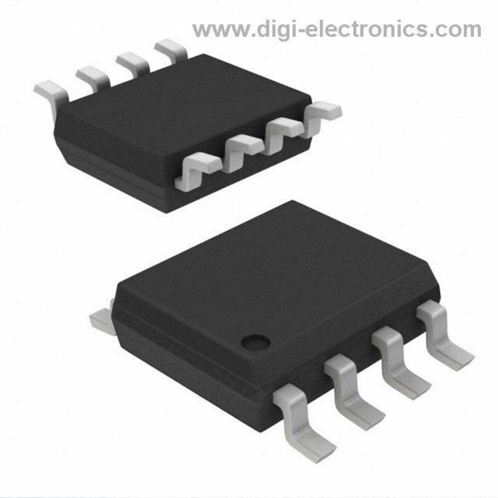
# FDS6575 Datasheet




https://www.DiGi-Electronics.com

| | |
|---|---|
| DiGi Electronics Part Number | FDS6575-DG |
| Manufacturer | onsemi |
| Manufacturer Product Number | FDS6575 |
| Description | MOSFET P-CH 20V 10A 8SOIC |
| Detailed Description | P-Channel 20 V 10A (Ta) 2.5W (Ta) Surface Mount 8-SOIC |

## Purchase and inquiry

| | |
|---|---|
| Manufacturer Product Number: | Manufacturer: |
| FDS6575 | onsemi |
| Series: | Product Status: |
| PowerTrench® | Active |
| FET Type: | Technology: |
| P-Channel | MOSFET (Metal Oxide) |
| Drain to Source Voltage (Vdss): | Current - Continuous Drain (Id) @ 25°C: |
| 20 V | 10A (Ta) |
| Drive Voltage (Max Rds On, Min Rds On): | Rds On (Max) @ Id, Vgs: |
| 2.5V, 4.5V | 13mOhm @ 10A, 4.5V |
| Vgs(th) (Max) @ Id: | Gate Charge (Qg) (Max) @ Vgs: |
| 1.5V @ 250µA | 74 nC @ 4.5 V |
| Vgs (Max): | Input Capacitance (Ciss) (Max) @ Vds: |
| ±8V | 4951 pF @ 10 V |
| FET Feature: | Power Dissipation (Max): |
| - | 2.5W (Ta) |
| Operating Temperature: | Mounting Type: |
| -55°C ~ 175°C (TJ) | Surface Mount |
| Supplier Device Package: | Package / Case: |
| 8-SOIC | 8-SOIC (0.154", 3.90mm Width) |
| Base Product Number: | |
| FDS65 | |

## Environmental & Export classification

| | |
|---|---|
| RoHS Status: | Moisture Sensitivity Level (MSL): |
| ROHS3 Compliant | 1 (Unlimited) |
| REACH Status: | ECCN: |
| REACH Unaffected | EAR99 |
| HTSUS: | |
| 8541.29.0095 | |

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Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild_questions@onsemi.com.

FAIRCHILD
SEMICONDUCTOR ™

September 2001

# FDS6575

## P-Channel 2.5V Specified PowerTrench® MOSFET

### General Description

This P-Channel 2.5V specified MOSFET is a rugged gate version of Fairchild Semiconductor's advanced PowerTrench process. It has been optimized for power management applications with a wide range of gate drive voltage (2.5V – 8V).

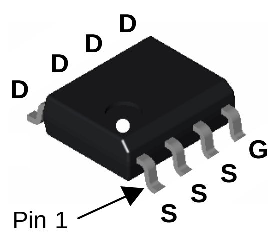
### Applications

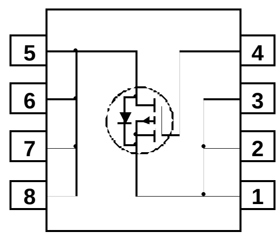
- Power management
- Load switch
- Battery protection

### Features

- –10 A, –20 V. $R_{DS(ON)}$ = 13 mΩ @ $V_{GS}$ = –4.5 V
  $R_{DS(ON)}$ = 17 mΩ @ $V_{GS}$ = –2.5 V
- Low gate charge
- High performance trench technology for extremely low $R_{DS(ON)}$
- High current and power handling capability

SO-8




## Absolute Maximum Ratings $T_A$=25°C unless otherwise noted

| Symbol | Parameter | | Ratings | Units |
|---|---|---|---|---|
| $V_{DSS}$ | Drain-Source Voltage | | –20 | V |
| $V_{GSS}$ | Gate-Source Voltage | | ±8 | V |
| $I_D$ | Drain Current – Continuous | (Note 1a) | –10 | A |
| | – Pulsed | | –50 | |
| $P_D$ | Power Dissipation for Single Operation | (Note 1a) | 2.5 | W |
| | | (Note 1b) | 1.5 | |
| | | (Note 1c) | 1.2 | |
| $T_J$, $T_{STG}$ | Operating and Storage Junction Temperature Range | | –55 to +175 | °C |

## Thermal Characteristics

| | | | | |
|---|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | (Note 1a) | 50 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | (Note 1c) | 125 | °C/W |
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case | (Note 1) | 25 | °C/W |

## Package Marking and Ordering Information

| Device Marking | Device | Reel Size | Tape width | Quantity |
|---|---|---|---|---|
| FDS6575 | FDS6575 | 13'' | 12mm | 2500 units |

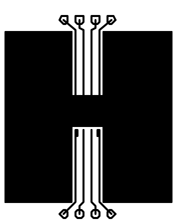
## Electrical Characteristics

$T_A$ = 25°C unless otherwise noted

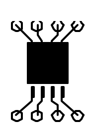
| Symbol | Parameter | Test Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| $BV_{DSS}$ | Drain–Source Breakdown Voltage | $V_{GS}$ = 0 V, $I_D$ = –250 µA | –20 | | | V |
| $\frac{\Delta BV_{DSS}}{\Delta T_J}$ | Breakdown Voltage Temperature Coefficient | $I_D$ = –250 µA, Referenced to 25°C | | –13 | | mV/°C |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ = –16 V, $V_{GS}$ = 0 V | | | –1 | µA |
| $I_{GSSF}$ | Gate–Body Leakage, Forward | $V_{GS}$ = 8 V, $V_{DS}$ = 0 V | | | 100 | nA |
| $I_{GSSR}$ | Gate–Body Leakage, Reverse | $V_{GS}$ = –8 V, $V_{DS}$ = 0 V | | | –100 | nA |
| **On Characteristics** (Note 2) | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$ = $V_{GS}$, $I_D$ = –250 µA | –0.4 | –0.6 | –1.5 | V |
| $\frac{\Delta V_{GS(th)}}{\Delta T_J}$ | Gate Threshold Voltage Temperature Coefficient | $I_D$ = –250 µA, Referenced to 25°C | | 3 | | mV/°C |
| $R_{DS(on)}$ | Static Drain–Source On–Resistance | $V_{GS}$ = –4.5 V, $I_D$ = –10 A<br>$V_{GS}$ = –2.5 V, $I_D$ = –9 A<br>$V_{GS}$= –4.5 V, $I_D$ =–10A, $T_J$=125°C | | 8.5<br>11<br>11 | 13<br>17<br>20 | mΩ |
| $I_{D(on)}$ | On–State Drain Current | $V_{GS}$ = –4.5 V, $V_{DS}$ = –5 V | –50 | | | A |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$ = –5 V, $I_D$ = –10 A | | 57 | | S |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$ = –10 V, $V_{GS}$ = 0 V, f = 1.0 MHz | | 4951 | | pF |
| $C_{oss}$ | Output Capacitance | | | 884 | | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 451 | | pF |
| **Switching Characteristics** (Note 2) | | | | | | |
| $t_{d(on)}$ | Turn–On Delay Time | $V_{DD}$ = –10V, $I_D$ = –1 A, $V_{GS}$ = –4.5 V, $R_{GEN}$ = 6 Ω | | 16 | 29 | ns |
| $t_r$ | Turn–On Rise Time | | | 9 | 18 | ns |
| $t_{d(off)}$ | Turn–Off Delay Time | | | 196 | 314 | ns |
| $t_f$ | Turn–Off Fall Time | | | 78 | 125 | ns |
| $Q_g$ | Total Gate Charge | $V_{DS}$ = –10 V, $I_D$ = –10 A, $V_{GS}$ = –4.5 V | | 53 | 74 | nC |
| $Q_{gs}$ | Gate–Source Charge | | | 6 | | nC |
| $Q_{gd}$ | Gate–Drain Charge | | | 12 | | nC |
| **Drain–Source Diode Characteristics and Maximum Ratings** | | | | | | |
| $I_S$ | Maximum Continuous Drain–Source Diode Forward Current | | | | –2.1 | A |
| $V_{SD}$ | Drain–Source Diode Forward Voltage | $V_{GS}$ = 0 V, $I_S$ = –2.1 A (Note 2) | | –0.6 | –1.2 | V |

**Notes:**

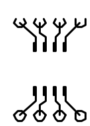
**1.** $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a) 50 °C/W when mounted on a 1in² pad of 2 oz copper



b) 105 °C/W when mounted on a .04 in² pad of 2 oz copper



c) 125 °C/W when mounted on a minimum pad.

Scale 1 : 1 on letter size paper

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

FDS6575

## Typical Characteristics

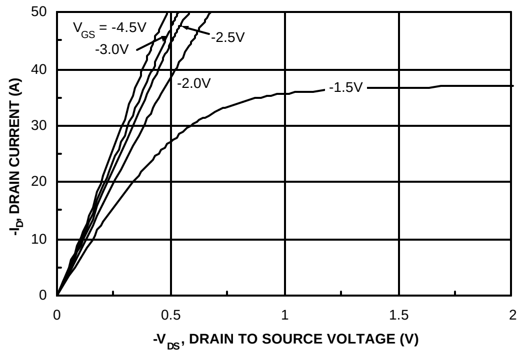



**Figure 1. On-Region Characteristics.**

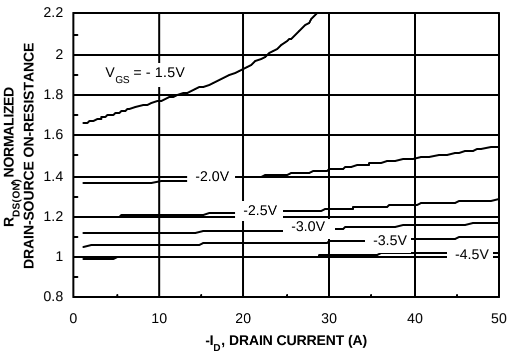



**Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.**

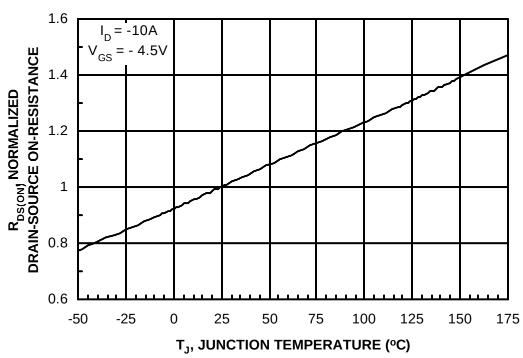



**Figure 3. On-Resistance Variation with Temperature.**

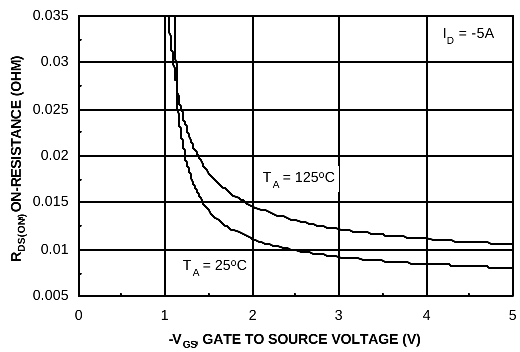



**Figure 4. On-Resistance Variation with Gate-to-Source Voltage.**

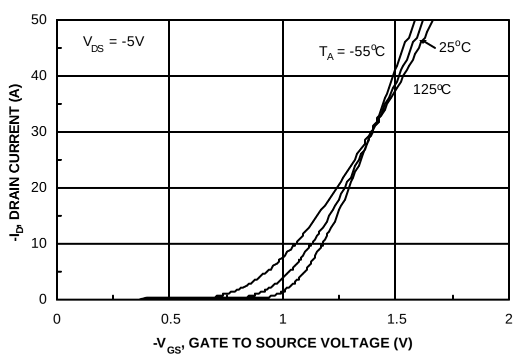



**Figure 5. Transfer Characteristics.**

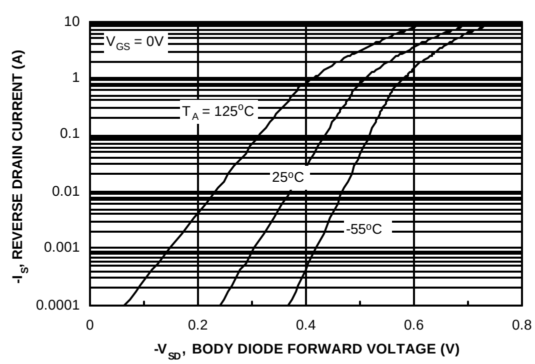



**Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.**

## Typical Characteristics

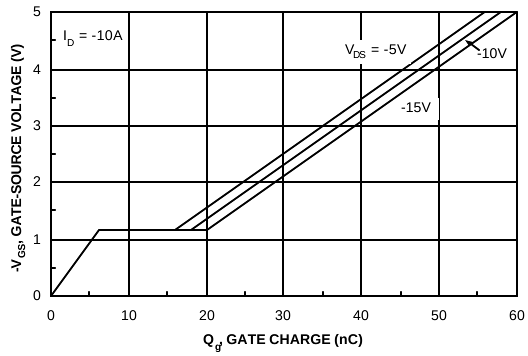



Figure 7. Gate Charge Characteristics.

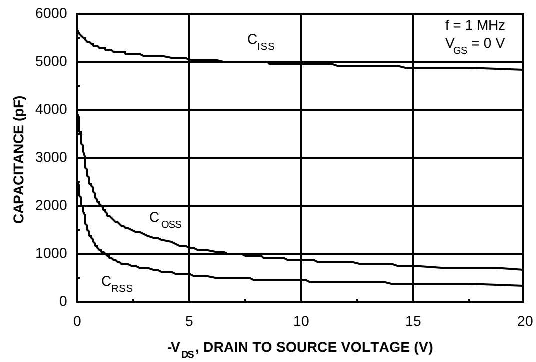



Figure 8. Capacitance Characteristics.

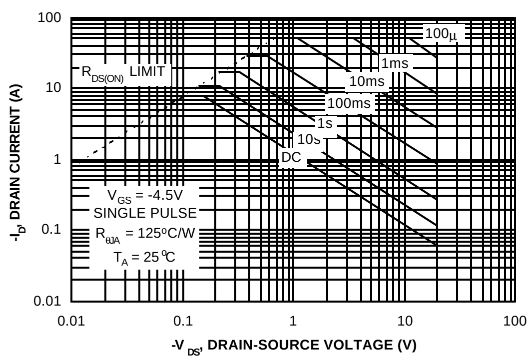



Figure 9. Maximum Safe Operating Area.

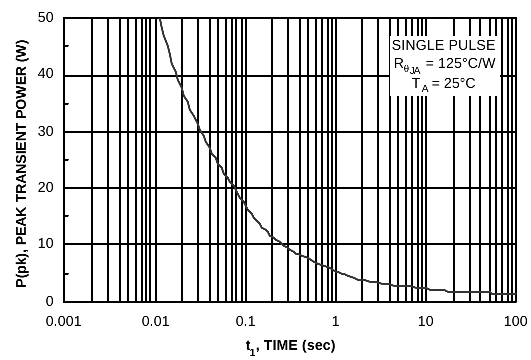



Figure 10. Single Pulse Maximum Power Dissipation.

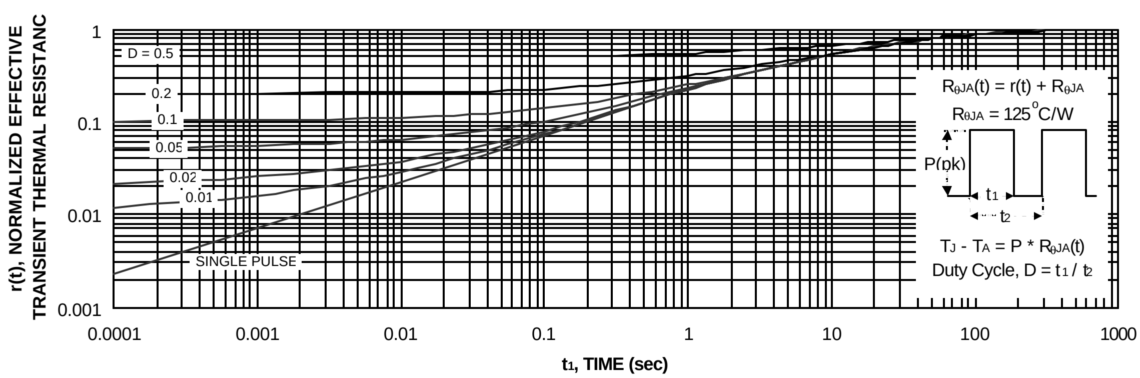



Figure 11. Transient Thermal Response Curve.

Thermal characterization performed using the conditions described in Note 1c.
Transient thermal response will change depending on the circuit board design.

## TRADEMARKS



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