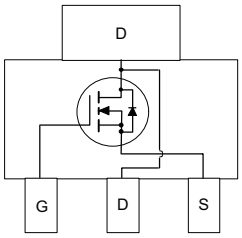
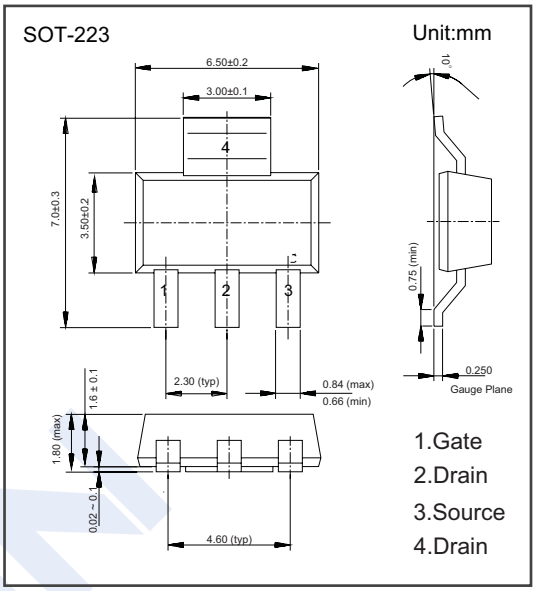
# N-Channel MOSFET

# FDT457N

## Features

- 5 A, 30 V. $R_{DS(ON)}$ = 0.06 Ω @ $V_{GS}$ = 10 V
  $R_{DS(ON)}$ = 0.09 Ω @ $V_{GS}$ = 4.5 V.
- High density cell design for extremely low $R_{DS(ON)}$.
- High power and current handling capability in a widely used surface mount package.




## Absolute Maximum Ratings $T_A$ = 25℃ unless otherwise noted

| Parameter | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 30 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | |
| Continuous Drain Current (Note 1a) | (Note 1a) | $I_D$ | 5 | A |
| Pulsed Drain Current | | $I_{DM}$ | 16 | |
| Power Dissipation | (Note 1a) | $P_D$ | 3 | W |
| | (Note 1b) | | 1.3 | |
| | (Note 1c) | | 1.1 | |
| Thermal Resistance.Junction- to-Ambient | (Note 1a) | $R_{thJA}$ | 42 | ℃/W |
| Thermal Resistance.Junction- to-Case | (Note 1) | $R_{thJC}$ | 12 | |
| Junction Temperature | | $T_J$ | 150 | ℃ |
| Storage Temperature Range | | $T_{stg}$ | -65 to 150 | |

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. 42℃/W when mounted on a 1 $in^2$ pad of2oz Cu.

b. 95℃/W when mounted on a 0.066 $in^2$ pad of 2oz Cu.

c. 110℃/W when mounted on a 0.00123$in^2$ pad of 2oz Cu.

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■ Electrical Characteristics $T_A$ = 25℃ unless otherwise noted

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $V_{DSS}$ | $I_D$=250 μA, $V_{GS}$=0V | 30 | | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=24V, $V_{GS}$=0V | | | 1 | μA |
| | | $V_{DS}$=24V, $V_{GS}$=0V, $T_J$=55℃ | | | 10 | |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{DS}$=0V, $V_{GS}$=±20V | | | ±100 | nA |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$ , $I_D$=250 μA | 1 | | 3 | V |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$=5 A | | | 0.06 | Ω |
| | | $V_{GS}$=10V, $I_D$=5 A , $T_J$=125℃ | | | 0.1 | |
| | | $V_{GS}$=4.5V, $I_D$=3.8 A | | | 0.09 | |
| On State Drain Current | $I_{D(ON)}$ | $V_{GS}$=10 V, $V_{DS}$=5V | 5 | | | A |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$=10V, $I_D$=5A | | 5 | | S |
| Input Capacitance | $C_{iss}$ | $V_{GS}$=0V, $V_{DS}$=15V, f=1MHz | | 235 | | pF |
| Output Capacitance | $C_{oss}$ | | | 145 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 50 | | |
| Total Gate Charge | $Q_g$ | $V_{GS}$=5V, $V_{DS}$=10V, $I_D$=5A | | 4.2 | 5.9 | nC |
| Gate Source Charge | $Q_{gs}$ | | | 1.3 | | |
| Gate Drain Charge | $Q_{gd}$ | | | 1.7 | | |
| Turn-On DelayTime | $t_{d(on)}$ | $V_{GS}$=10V, $V_{DD}$=10V, $I_D$ = 1A,$R_{GEN}$=6 Ω | | 5 | 10 | ns |
| Turn-On Rise Time | $t_r$ | | | 12 | 22 | |
| Turn-Off DelayTime | $t_{d(off)}$ | | | 12 | 22 | |
| Turn-Off Fall Time | $t_f$ | | | 3 | 8 | |
| Maximum Body-Diode Continuous Current | $I_S$ | | | | 2.5 | A |
| Diode Forward Voltage | $V_{SD}$ | $I_S$=2.5A,$V_{GS}$=0V (Note 2) | | | 1.2 | V |

Notes:

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

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■ Typical Characterisitics

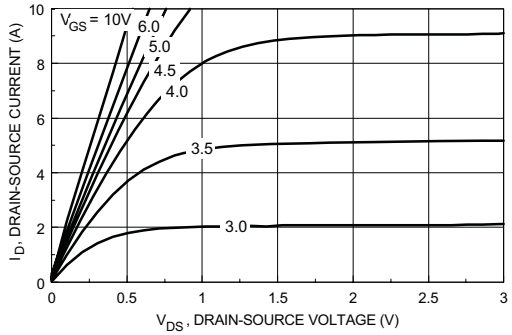


**Figure 1. On-Region Characteristics.**

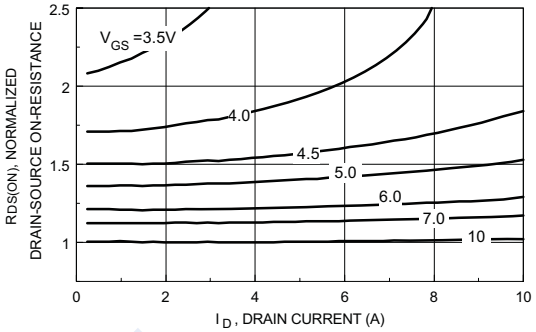


**Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.**

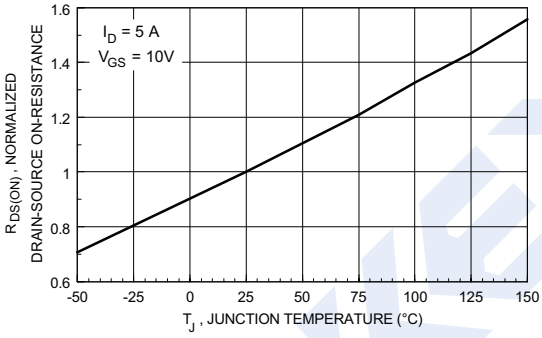


Figure 3. On-Resistance Variation with Temperature.

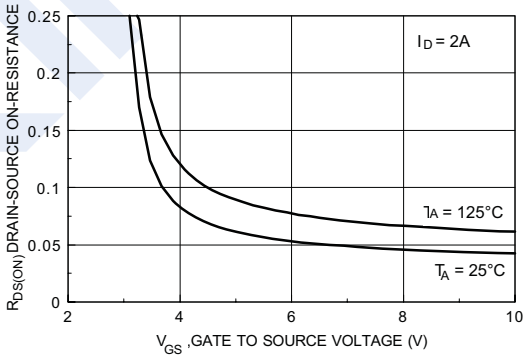


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

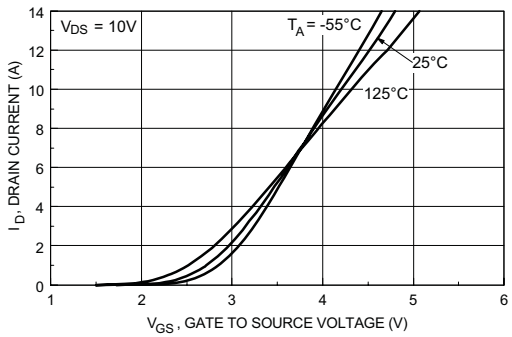


**Figure 5. Transfer Characteristics.**

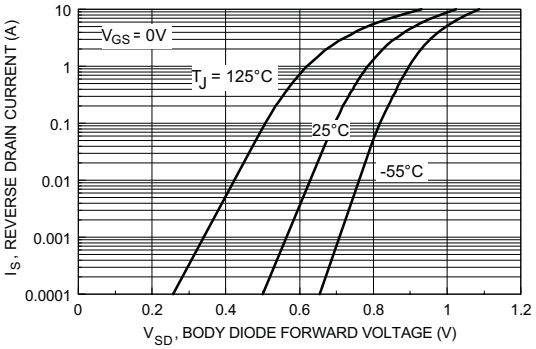


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

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■ Typical Characterisitics

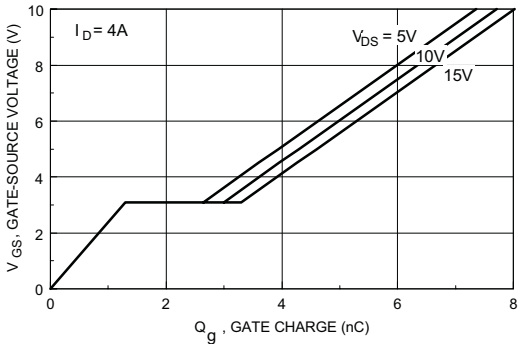


**Figure 7. Gate Charge Characteristics.**

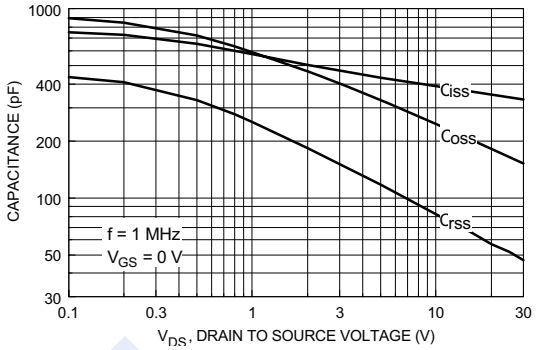


**Figure 8. Capacitance Characteristics.**

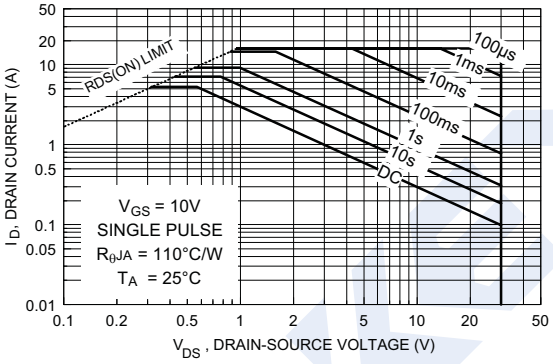


Figure 9. Maximum Safe Operating Area.

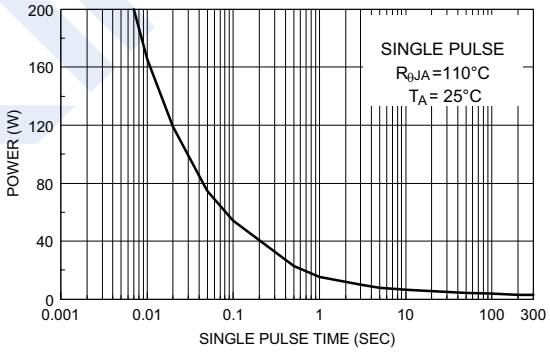


**Figure 10. Single Pulse Maximum Power Dissipation.**

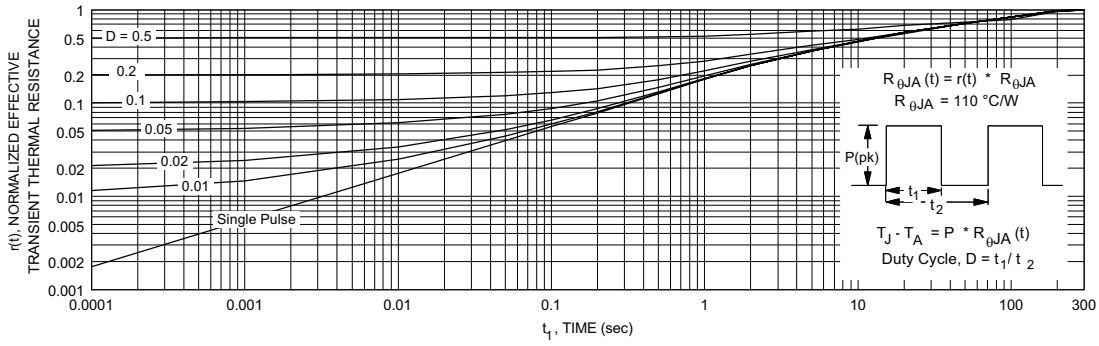


Figure 11. Transient Thermal Response Curve.

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