# OM SENI

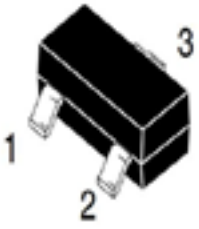
## FDV303N
## Digital FET, N-Channel

### General Description

These N-Channel enhancement mode field effect transistors are produced using Fairchild's proprietary, high cell density, DMOS technology. This very high density process is tailored to minimize on-state resistance at low gate drive conditions. This device is designed especially for application in battery circuits using either one lithium or three cadmium or NMH cells. It can be used as an inverter or for high-efficiency miniature discrete DC/DC conversion in compact portable electronic devices like cellular phones and pagers. This device has excellent on-state resistance even at gate drive voltages as low as 2.5 volts.

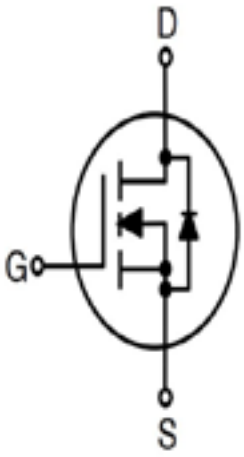
### Features

- 25 V, 0.68 A continuous, 2 A Peak.
  $R_{DS(ON)}$ = 0.45 Ω @ $V_{GS}$ = 4.5 V
  $R_{DS(ON)}$ = 0.6 Ω @ $V_{GS}$= 2.7 V.
- Very low level gate drive requirements allowing direct operation in 3V circuits. $V_{GS(th)}$ < 1V.
- Gate-Source Zener for ESD ruggedness.>6kV Human Body Model
- Compact industry standard SOT-23 surface mount package.
- Alternative to TN0200T and TN0201T.




SOT-23

1 - Gate
2 - Source
3 - Drain




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

| Symbol | Parameter | FDV303N | Units |
|---|---|---|---|
| $V_{DSS}$ | Drain-Source Voltage, Power Supply Voltage | 25 | V |
| $V_{GSS}$ | Gate-Source Voltage, $V_{IN}$ | 8 | V |
| $I_D$ | Drain/Output Current - Continuous | 0.68 | A |
| | - Pulsed | 2 | |
| $P_D$ | Maximum Power Dissipation | 0.35 | W |
| $T_J$,$T_{STG}$ | Operating and Storage Temperature Range | -55 to 150 | °C |
| ESD | Electrostatic Discharge Rating MIL-STD-883D Human Body Model (100pf / 1500 Ohm) | 6.0 | kV |
| **THERMAL CHARACTERISTICS** | | | |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 357 | °C/W |

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## Electrical Characteristics ($T_A$ = 25 °C unless otherwise noted )

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$ = 0 V, $I_D$ = 250 µA | 25 | | | V |
| $\Delta BV_{DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient | $I_D$ = 250 µA, Referenced to 25 °C | | 26 | | mV / °C |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ = 20 V, $V_{GS}$ = 0 V | | | 1 | µA |
| | | $T_J$ = 55°C | | | 10 | µA |
| $I_{GSS}$ | Gate - Body Leakage Current | $V_{GS}$ = 8 V, $V_{DS}$ = 0 V | | | 100 | nA |
| **ON CHARACTERISTICS** (Note) | | | | | | |
| $\Delta V_{GS(th)}/\Delta T_J$ | Gate Threshold Voltage Temp. Coefficient | $I_D$ = 250 µA, Referenced to 25 °C | | -2.6 | | mV / °C |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$ = $V_{GS}$, $I_D$ = 250 µA | 0.65 | 0.8 | 1 | V |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$ = 4.5 V, $I_D$ = 0.5 A | | 0.33 | 0.45 | Ω |
| | | $T_J$ =125°C | | 0.52 | 0.8 | |
| | | $V_{GS}$ = 2.7 V, $I_D$ = 0.2 A | | 0.44 | 0.6 | |
| $I_{D(ON)}$ | On-State Drain Current | $V_{GS}$ = 2.7 V, $V_{DS}$ = 5 V | 0.5 | | | A |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$ = 5 V, $I_D$ = 0.5 A | | 1.45 | | S |
| **DYNAMIC CHARACTERISTICS** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$ = 10 V, $V_{GS}$ = 0 V, f = 1.0 MHz | | 50 | | pF |
| $C_{oss}$ | Output Capacitance | | | 28 | | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 9 | | pF |
| **SWITCHING CHARACTERISTICS** (Note) | | | | | | |
| $t_{D(on)}$ | Turn - On Delay Time | $V_{DD}$ = 6 V, $I_D$ = 0.5 A, $V_{GS}$ = 4.5 V, $R_{GEN}$ = 50 Ω | | 3 | 6 | ns |
| $t_r$ | Turn - On Rise Time | | | 8.5 | 18 | ns |
| $t_{D(off)}$ | Turn - Off Delay Time | | | 17 | 30 | ns |
| $t_f$ | Turn - Off Fall Time | | | 13 | 25 | ns |
| $Q_g$ | Total Gate Charge | $V_{DS}$ = 5 V, $I_D$ = 0.5 A, $V_{GS}$ = 4.5 V | | 1.64 | 2.3 | nC |
| $Q_{gs}$ | Gate-Source Charge | | | 0.38 | | nC |
| $Q_{gd}$ | Gate-Drain Charge | | | 0.45 | | nC |
| **DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS** | | | | | | |
| $I_S$ | Maximum Continuous Drain-Source Diode Forward Current | | | | 0.3 | A |
| $V_{SD}$ | Drain-Source Diode Forward Voltage | $V_{GS}$ = 0 V, $I_S$ = 0.5 A (Note) | | 0.83 | 1.2 | V |

Note:

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

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## Typical Electrical Characteristics

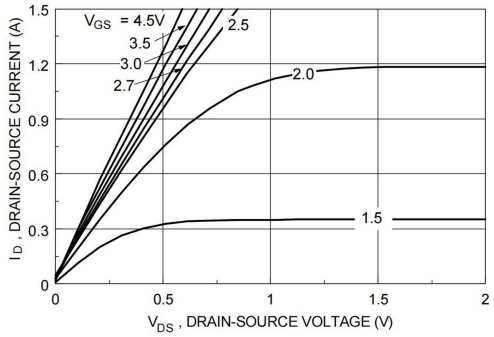



**Figure 1. On-Region Characteristics.**

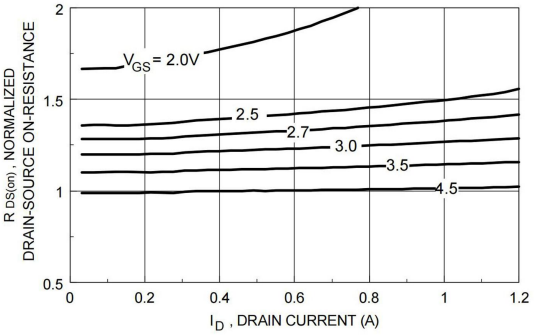



**Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.**

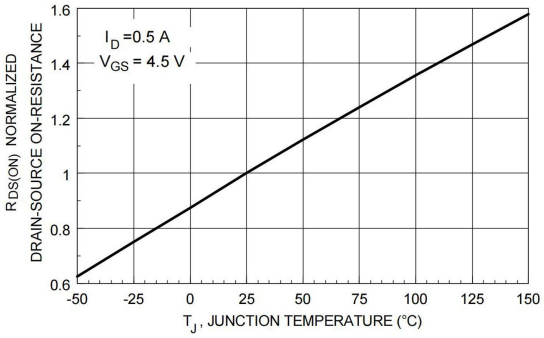



**Figure 3. On-Resistance Variation with Temperature.**

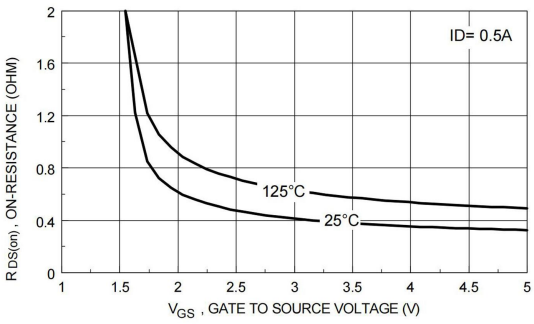



**Figure 4. On Resistance Variation with Gate-To- Source Voltage.**

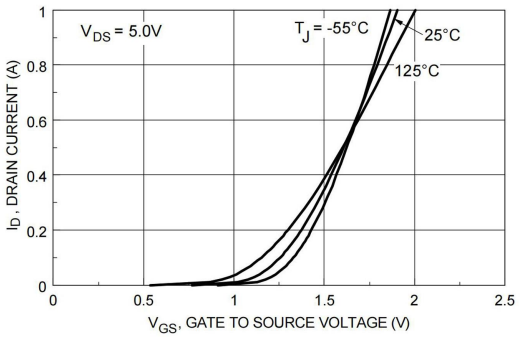



**Figure 5. Transfer Characteristics.**

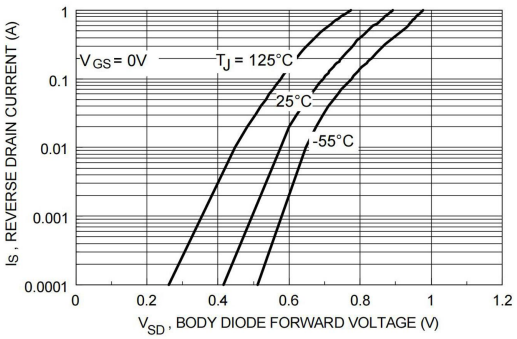



**Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.**

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## Typical Electrical And Thermal Characteristics

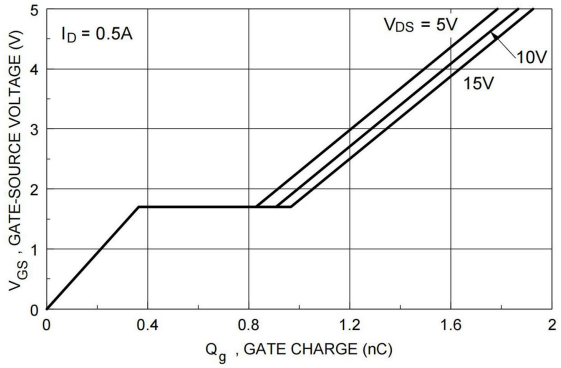



**Figure 7. Gate Charge Characteristics.**

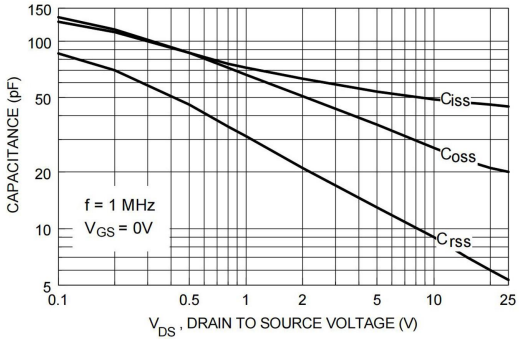



**Figure 8. Capacitance Characteristics.**

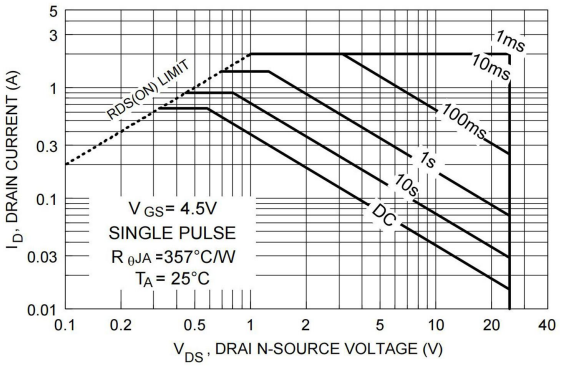



Figure 9. Maximum Safe Operating Area.

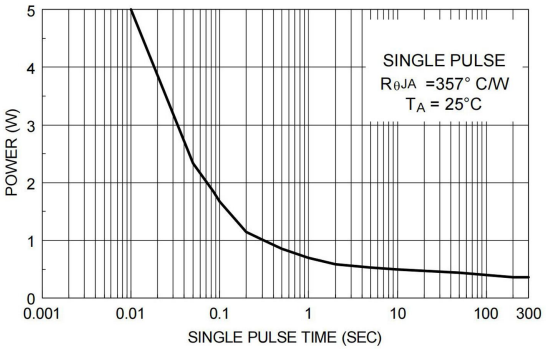



**Figure 10. Single Pulse Maximum Power Dissipation.**

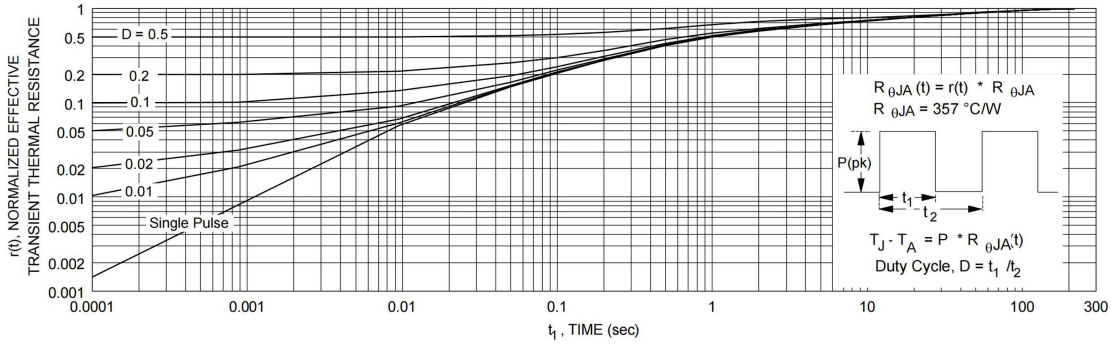


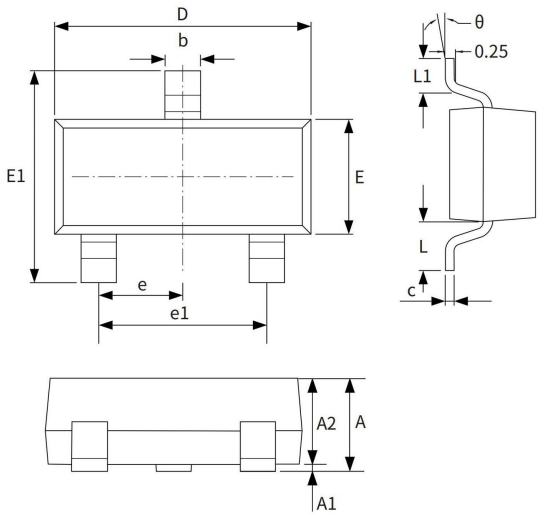

Figure 11. Transient Thermal Response Curve.

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## Ordering Information

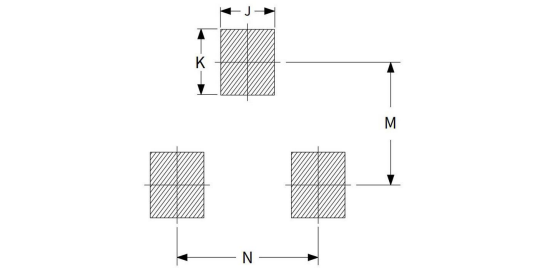
| PACKAGE | PACKAGE CODE | UNIT WEIGHT(g) | REEL(pcs) | BOX(pcs) | CARTON(pcs) | DELIVERY MODE |
|---|---|---|---|---|---|---|
| SOT-23 | R1 | 0.008 | 3000 | 30000 | 240000 | 7'' |

## Package Outline Dimensions (SOT-23)




| Symbol | Dimensions | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 0.90 | 1.15 | 0.035 | 0.045 |
| A1 | - | 0.10 | - | 0.004 |
| A2 | 0.90 | 1.05 | 0.035 | 0.041 |
| b | 0.30 | 0.50 | 0.012 | 0.020 |
| c | 0.10 | 0.20 | 0.004 | 0.008 |
| D | 2.80 | 3.00 | 0.110 | 0.118 |
| E | 1.20 | 1.40 | 0.047 | 0.055 |
| E1 | 2.25 | 2.55 | 0.089 | 0.100 |
| e | 0.950TYP | | 0.037TYP | |
| e1 | 1.80 | 2.00 | 0.071 | 0.079 |
| L | 0.550REF | | 0.022REF | |
| L1 | 0.30 | 0.50 | 0.012 | 0.020 |
| θ | - | 8° | - | 8° |

## Suggested Pad Layout




| Symbol | Dimensions | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| J | 0.75 | 0.85 | 0.030 | 0.033 |
| K | 0.85 | 0.95 | 0.033 | 0.037 |
| M | 1.95 | 2.05 | 0.077 | 0.081 |
| N | 1.85 | 1.95 | 0.073 | 0.077 |