ON Semiconductor®

FDV303N
Digital FET, N-Channel

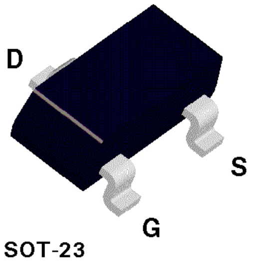
General Description

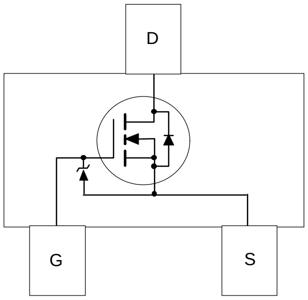
These N-Channel enhancement mode field effect transistors are produced using ON Semiconductor's proprietary, high cell density, DMOS technology. This very high density process is tailored to minimize on-state resistance at low gate drive conditions. This device is designed especially for application 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.
  $R_{DS(ON)} = 0.45\ \Omega$ @ $V_{GS} = 4.5$ V
  $R_{DS(ON)} = 0.6\ \Omega$ @ $V_{GS} = 2.7$ V.
- Very low level gate drive requirements allowing direct operation in 3V circuits. $V_{GS(th)} < 1$V.
- Gate-Source Zener for ESD ruggedness.>6kV Human Body Model
- Compact industry standard SOT-23 surface mount package.
- Alternative to TN0200T and TN0201T.

Mark:303





Absolute Maximum Ratings $T_A = 25^\circ$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

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%.

Typical Electrical Characteristics

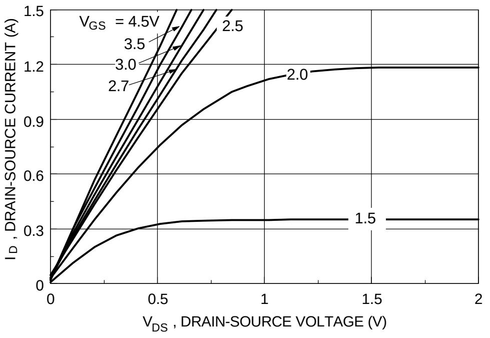


Figure 1. On-Region Characteristics.

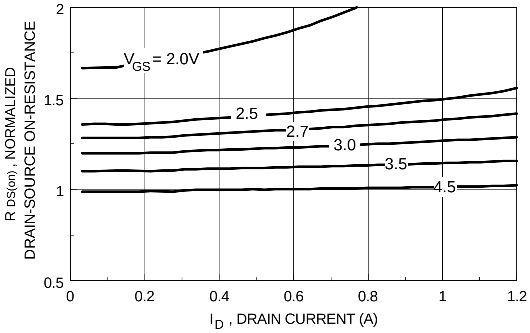


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

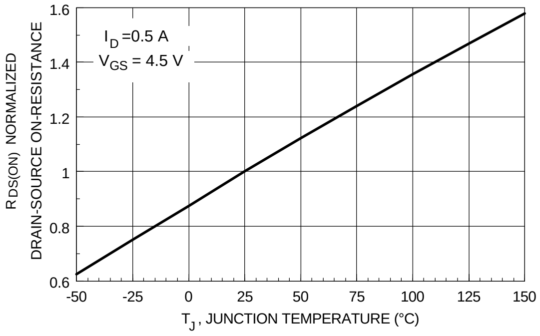


Figure 3. On-Resistance Variation with Temperature.

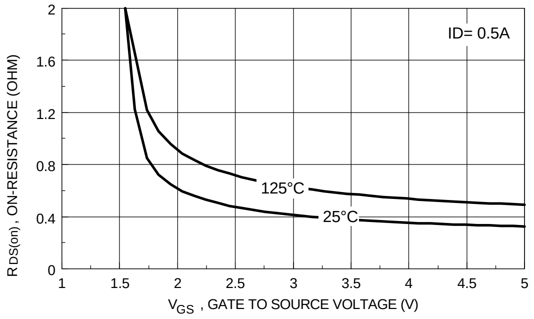


Figure 4. On Resistance Variation with Gate-To- Source Voltage.

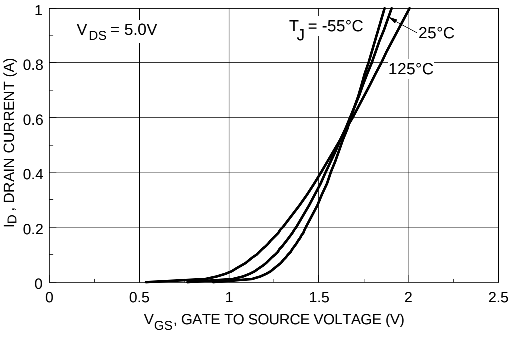


Figure 5. Transfer Characteristics.

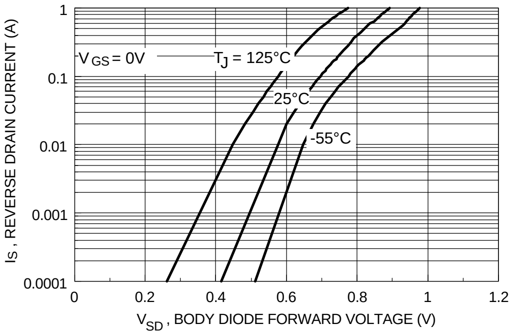


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Electrical And Thermal Characteristics

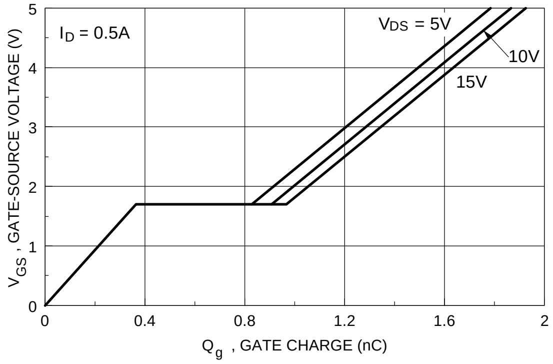


Figure 7. Gate Charge Characteristics.

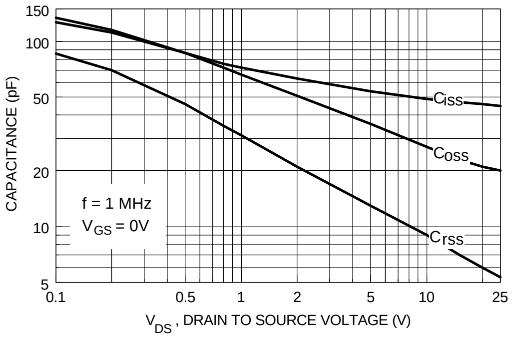


Figure 8. Capacitance Characteristics.

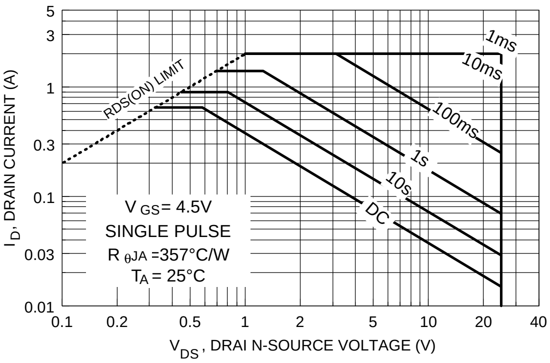


Figure 9. Maximum Safe Operating Area.

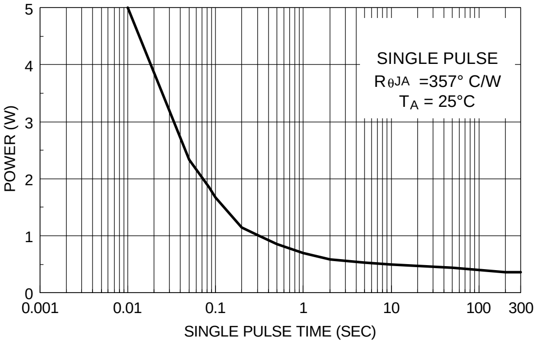


Figure 10. Single Pulse Maximum Power Dissipation.

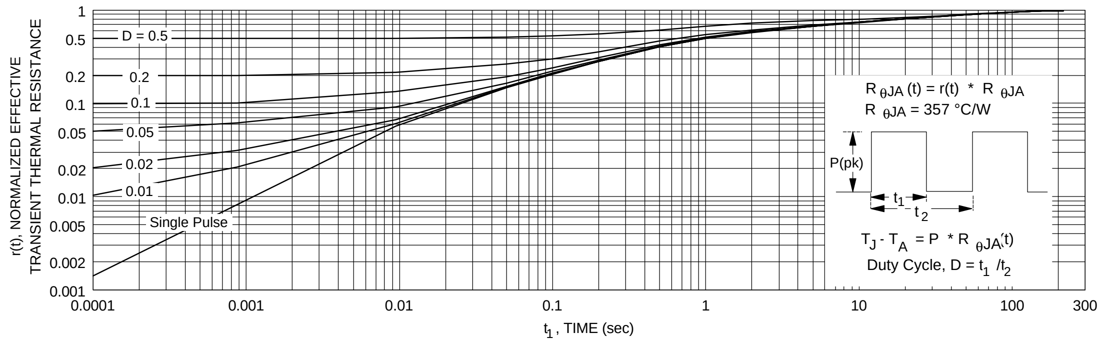


Figure 11. Transient Thermal Response Curve.

ON Semiconductor and ON are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent−Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81−3−5817−1050

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative