

2001-11-22

ELFA

PRODUKTINFORMATION

Vi reserverar oss mot fel samt förbehåller oss rätten till ändringar utan föregående meddelande

ELFA artikelnr

71-096-48 FDV301N DFET N-kan SOT23

FDV301N Digital FET , N-Channel

General Description

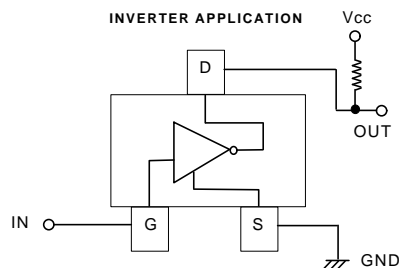
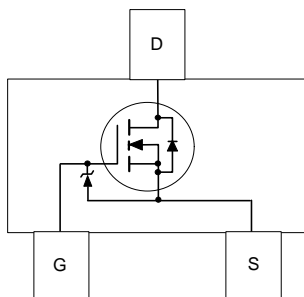
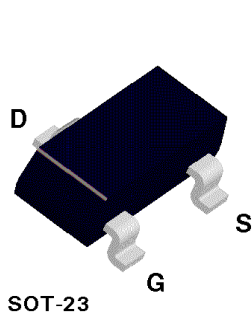
This N-Channel logic level enhancement mode field effect transistor is produced using Fairchild's proprietary, high cell density, DMOS technology. This very high density process is especially tailored to minimize on-state resistance. This device has been designed especially for low voltage applications as a replacement for digital transistors. Since bias resistors are not required, this one N-channel FET can replace several different digital transistors, with different bias resistor values.

Features

- 25 V, 0.22 A continuous, 0.5 A Peak.
 $R_{DS(ON)} = 5 \Omega @ V_{GS} = 2.7 V$
 $R_{DS(ON)} = 4 \Omega @ V_{GS} = 4.5 V.$
- Very low level gate drive requirements allowing direct operation in 3V circuits. $V_{GS(th)} < 1.5V.$
- Gate-Source Zener for ESD ruggedness.
>6kV Human Body Model
- Replace multiple NPN digital transistors with one DMOS FET.



Mark:301



Absolute Maximum Ratings $T_A = 25^\circ C$ unless other wise noted

Symbol	Parameter	FDV301N	Units
V_{DSS}, V_{CC}	Drain-Source Voltage, Power Supply Voltage	25	V
V_{GSS}, V_I	Gate-Source Voltage, V_{IN}	8	V
I_D, I_O	Drain/Output Current - Continuous	0.22	A
		0.5	
P_D	Maximum Power Dissipation	0.35	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to 150	$^\circ C$
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	$^\circ C/W$
-----------------	---	-----	--------------

Inverter Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
$I_{O(off)}$	Zero Input Voltage Output Current	$V_{CC} = 20\text{ V}$, $V_I = 0\text{ V}$			1	μA
$V_{I(off)}$	Input Voltage	$V_{CC} = 5\text{ V}$, $I_O = 10\ \mu\text{A}$			0.5	V
$V_{I(on)}$		$V_O = 0.3\text{ V}$, $I_O = 0.005\text{ A}$	1			V
$R_{O(on)}$	Output to Ground Resistance	$V_I = 2.7\text{ V}$, $I_O = 0.2\text{ A}$		4	5	Ω

Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
--------	-----------	------------	-----	-----	-----	-------

OFF CHARACTERISTICS

BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}$, $I_D = 250\ \mu\text{A}$	25			V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	$I_D = 250\ \mu\text{A}$, Referenced to 25°C		25		$\text{mV}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 20\text{ V}$, $V_{GS} = 0\text{ V}$			1	μA
					10	μA
I_{GSS}	Gate - Body Leakage Current	$V_{GS} = 8\text{ V}$, $V_{DS} = 0\text{ V}$			100	nA

ON CHARACTERISTICS (Note)

$\Delta V_{GS(th)}/\Delta T_J$	Gate Threshold Voltage Temp. Coefficient	$I_D = 250\ \mu\text{A}$, Referenced to 25°C		-2.1		$\text{mV}/^\circ\text{C}$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = 250\ \mu\text{A}$	0.65	0.85	1.5	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 2.7\text{ V}$, $I_D = 0.2\text{ A}$		3.8	5	Ω
				6.3	9	
			$V_{GS} = 4.5\text{ V}$, $I_D = 0.4\text{ A}$	3.1	4	
$I_{D(on)}$	On-State Drain Current	$V_{GS} = 2.7\text{ V}$, $V_{DS} = 5\text{ V}$	0.2			A
g_{FS}	Forward Transconductance	$V_{DS} = 5\text{ V}$, $I_D = 0.4\text{ A}$		0.2		S

DYNAMIC CHARACTERISTICS

C_{iss}	Input Capacitance	$V_{DS} = 10\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1.0\text{ MHz}$		9.5		pF
C_{oss}	Output Capacitance			6		pF
C_{riss}	Reverse Transfer Capacitance			1.3		pF

SWITCHING CHARACTERISTICS (Note)

$t_{D(on)}$	Turn - On Delay Time	$V_{DD} = 6\text{ V}$, $I_D = 0.5\text{ A}$, $V_{GS} = 4.5\text{ V}$, $R_{GEN} = 50\ \Omega$		3.2	8	ns
t_r	Turn - On Rise Time			6	15	ns
$t_{D(off)}$	Turn - Off Delay Time			3.5	8	ns
t_f	Turn - Off Fall Time			3.5	8	ns
Q_g	Total Gate Charge		$V_{DS} = 5\text{ V}$, $I_D = 0.2\text{ A}$, $V_{GS} = 4.5\text{ V}$		0.49	0.7
Q_{gs}	Gate-Source Charge			0.22		nC
Q_{gd}	Gate-Drain Charge			0.07		nC

DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS

I_S	Maximum Continuous Drain-Source Diode Forward Current			0.29		A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}$, $I_S = 0.29\text{ A}$ (Note)		0.8	1.2	V

Note:
Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2.0\%$.

Typical Electrical Characteristics

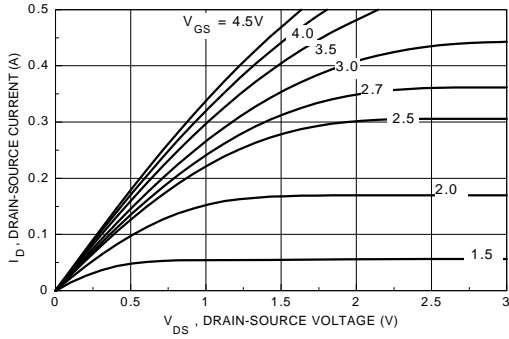


Figure 1. On-Region Characteristics.

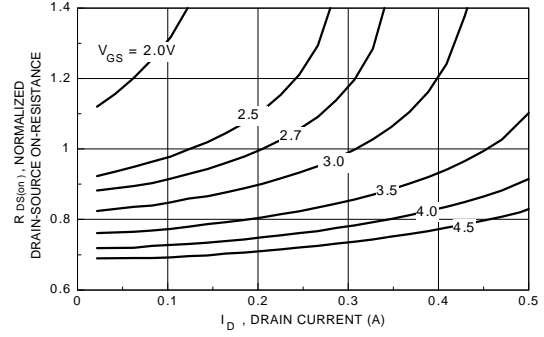


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

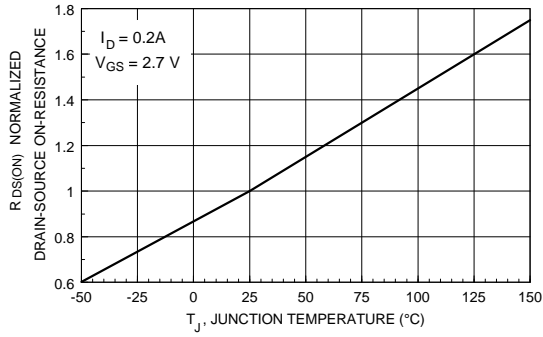


Figure 3. On-Resistance Variation with Temperature.

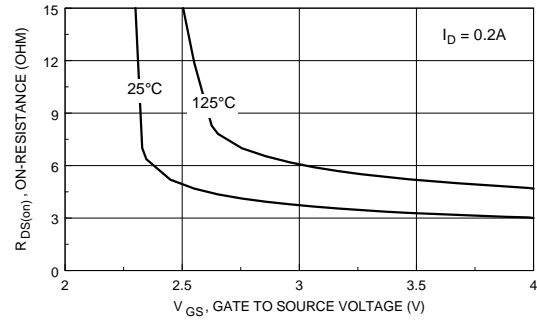


Figure 4. On Resistance Variation with Gate-To-Source Voltage.

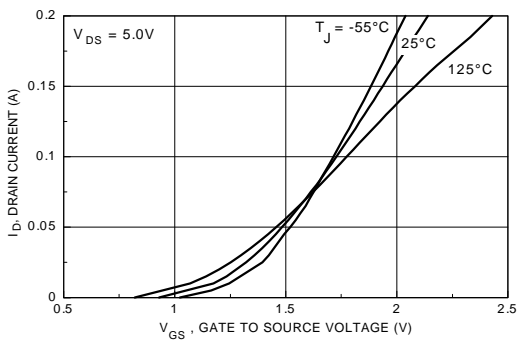


Figure 5. Transfer Characteristics.

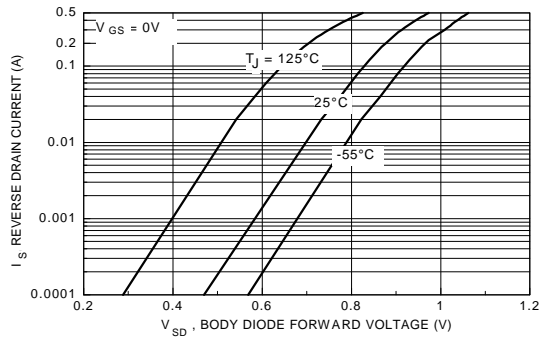


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Electrical And Thermal Characteristics

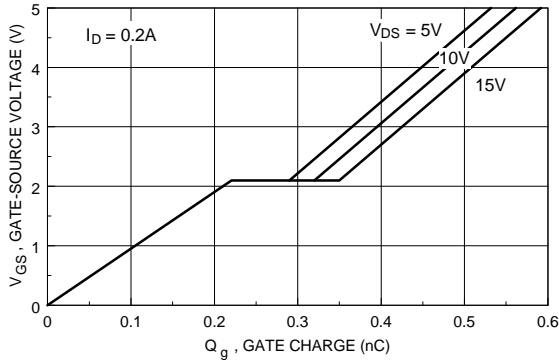


Figure 7. Gate Charge Characteristics.

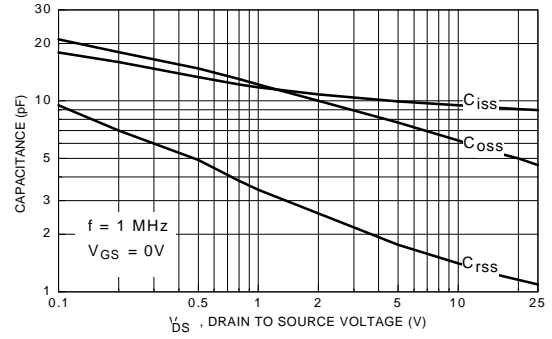


Figure 8. Capacitance Characteristics.

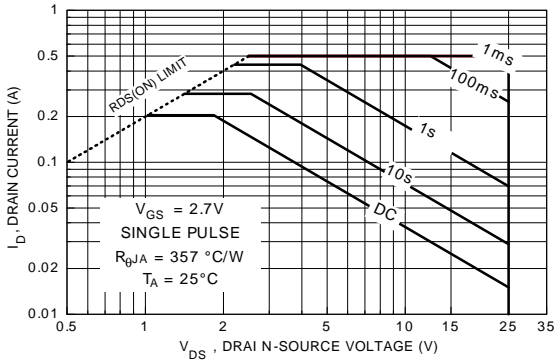


Figure 9. Maximum Safe Operating Area.

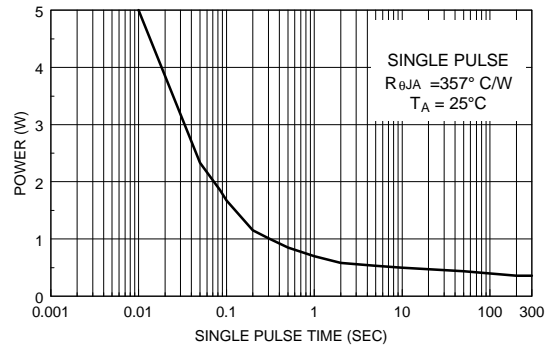


Figure 10. Single Pulse Maximum Power Dissipation.

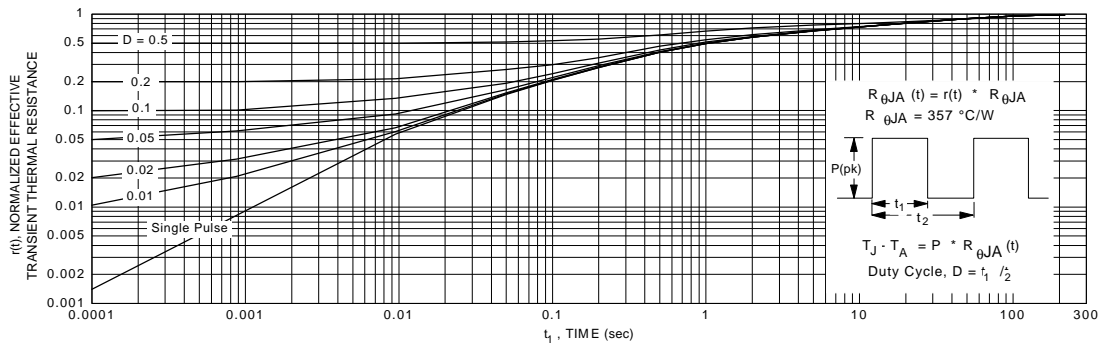


Figure 11. Transient Thermal Response Curve.

TRADEMARKS

The following are registered and unregistered trademarks Fairchild Semiconductor owns or is authorized to use and is not intended to be an exhaustive list of all such trademarks.

ACEx™	ISOPLANAR™	UHC™
CoolFET™	MICROWIRE™	VCX™
CROSSVOLT™	POP™	
E ² CMOS™	PowerTrench™	
FACT™	QST™	
FACT Quiet Series™	Quiet Series™	
FAST®	SuperSOT™-3	
FASTr™	SuperSOT™-6	
GTO™	SuperSOT™-8	
HiSeC™	TinyLogic™	

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.