



April 1995

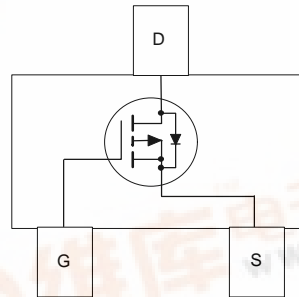
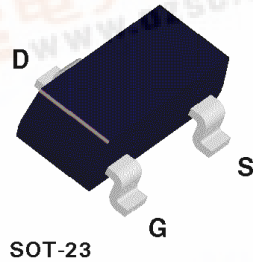
NDS0605 P-Channel Enhancement Mode Field Effect Transistor

General Description

These P-Channel enhancement mode power field effect transistors are produced using Fairchild's proprietary, high cell density, DMOS technology. This very high density process has been designed to minimize on-state resistance, provide rugged and reliable performance and fast switching. They can be used, with a minimum of effort, in most applications requiring up to 0.18A DC and can deliver pulsed currents up to 1A. This product is particularly suited to low voltage applications requiring a low current high side switch.

Features

- -0.18A, -60V. $R_{DS(ON)} = 5\Omega$ @ $V_{GS} = -10V$.
- Voltage controlled p-channel small signal switch.
- High density cell design for low $R_{DS(ON)}$.
- High saturation current.



Absolute Maximum Ratings

$T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	NDS0605	Units
V_{DSS}	Drain-Source Voltage	-60	V
V_{DGR}	Drain-Gate Voltage ($R_{GS} \leq 1\text{ M}\Omega$)	-60	V
V_{GSS}	Gate-Source Voltage - Continuous	± 20	V
I_D	Drain Current - Continuous	-0.18	A
	- Pulsed	-1	
P_D	Maximum Power Dissipation $T_A = 25^\circ\text{C}$	0.36	W
	Derate above 25°C	2.9	
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_L	Maximum lead temperature for soldering purposes, 1/16" from case for 10 seconds	300	$^\circ\text{C}$

THERMAL CHARACTERISTICS

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	350	$^\circ\text{C/W}$
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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	$V_{GS} = 0\text{ V}, I_D = -10\ \mu\text{A}$	-60			V	
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -48\text{ V}, V_{GS} = 0\text{ V}$			-1	μA	
			$T_J = 125^\circ\text{C}$			-500	μA
I_{GSSF}	Gate - Body Leakage, Forward	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$			100	nA	
I_{GSSR}	Gate - Body Leakage, Reverse	$V_{GS} = -20\text{ V}, V_{DS} = 0\text{ V}$			-100	nA	
ON CHARACTERISTICS (Note 1)							
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\ \mu\text{A}$			-3	V	
			$T_J = 125^\circ\text{C}$	-0.6		-2.8	
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = -10\text{ V}, I_D = -0.5\text{ A}$			5	Ω	
			$T_J = 125^\circ\text{C}$			10	
			$V_{GS} = -4.5\text{ V}, I_D = -0.25\text{ A}$			7.5	
			$T_J = 125^\circ\text{C}$		15		
$I_{D(on)}$	On-State Drain Current	$V_{GS} = -10\text{ V}, V_{DS} = -10\text{ V}$			-0.6	A	
			$V_{GS} = -4.5\text{ V}, V_{DS} = -10\text{ V}$			-0.25	
g_{FS}	Forward Transconductance	$V_{DS} = -10\text{ V}, I_D = -0.2\text{ A}$	0.07			S	
DYNAMIC CHARACTERISTICS							
C_{iss}	Input Capacitance	$V_{DS} = -25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$			60	pF	
C_{oss}	Output Capacitance				25	pF	
C_{rss}	Reverse Transfer Capacitance				5	pF	
SWITCHING CHARACTERISTICS (Note 1)							
$t_{D(on)}$	Turn - On Delay Time	$V_{DD} = -30\text{ V}, I_D = -0.2\text{ A},$ $V_{GS} = -10\text{ V}, R_{GEN} = 25\ \Omega$			10	nS	
t_T	Turn - On Rise Time				15	nS	
$t_{D(off)}$	Turn - Off Delay Time				15	nS	
t_f	Turn - Off Fall Time				20	nS	
DRAIN-SOURCE DIODE CHARACTERISTICS							
I_S	Continuous Source Diode Current				-0.18	A	
I_{SM}	Maximum Pulsed Source Diode Current (Note 1)				-1	A	
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = -0.5\text{ A}$ (Note 1)			-1.5	V	
			$T_J = 125^\circ\text{C}$			-1.3	

Note :

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

Typical Electrical Characteristics

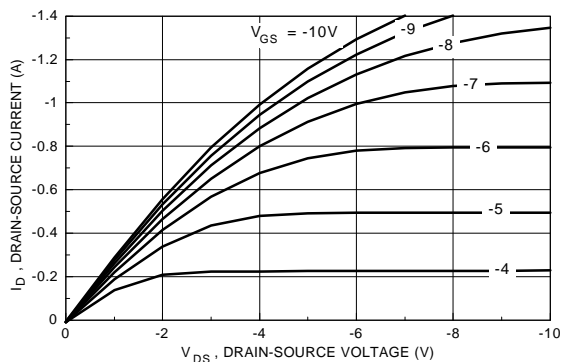


Figure 1. On-Region Characteristics

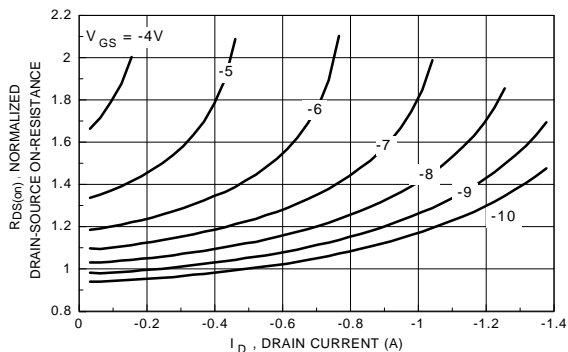


Figure 2. On-Resistance Variation with Gate Voltage and Drain Current

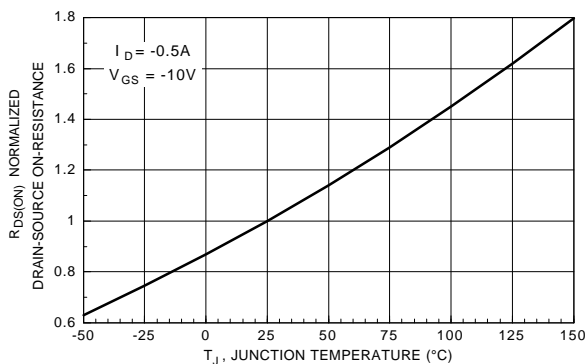


Figure 3. On-Resistance Variation with Temperature

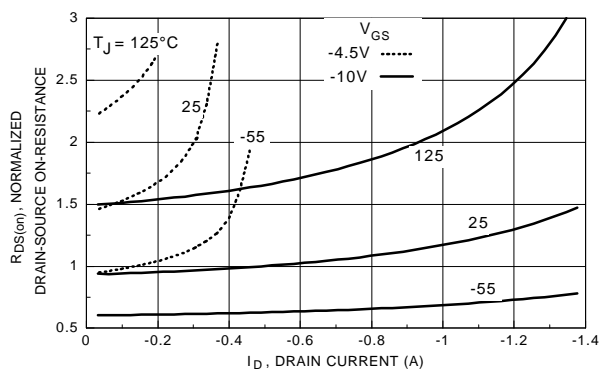


Figure 4. On-Resistance Variation with Drain Current and Temperature

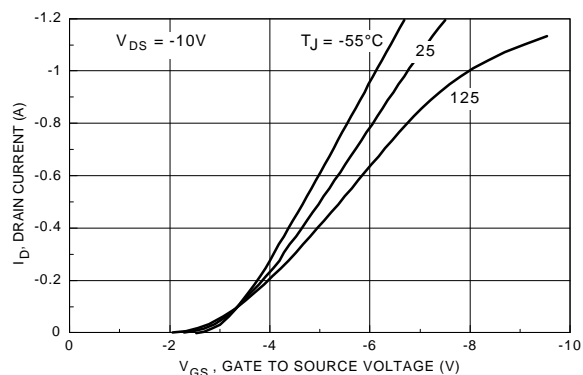


Figure 5. Transfer Characteristics

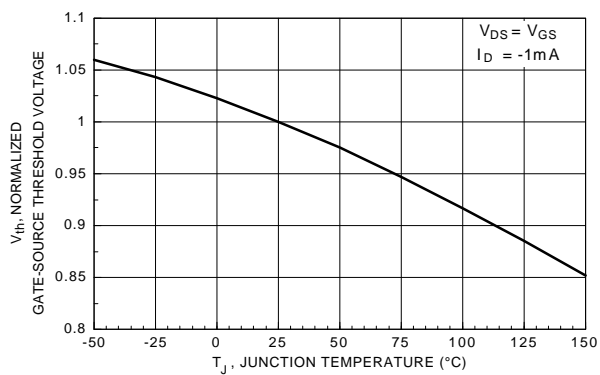


Figure 6. Gate Threshold Variation with Temperature

Typical Electrical Characteristics (continued)

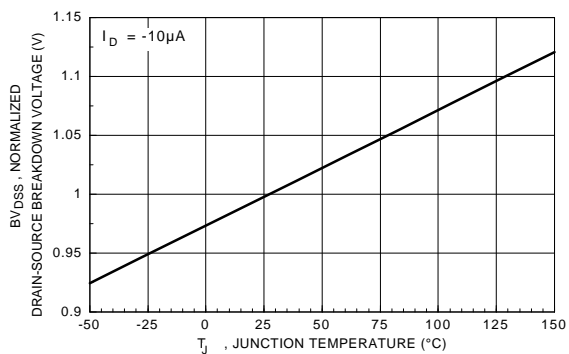


Figure 7. Breakdown Voltage Variation with Temperature

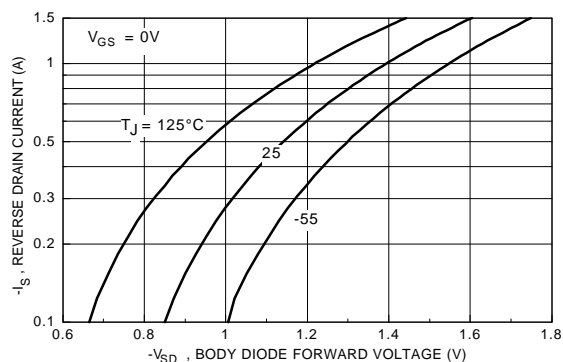


Figure 8. Body Diode Forward Voltage Variation with Current and Temperature

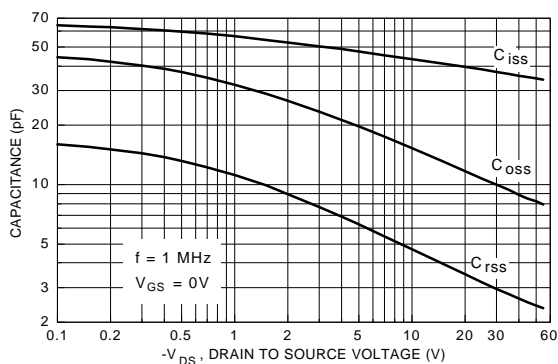


Figure 9. Capacitance Characteristics

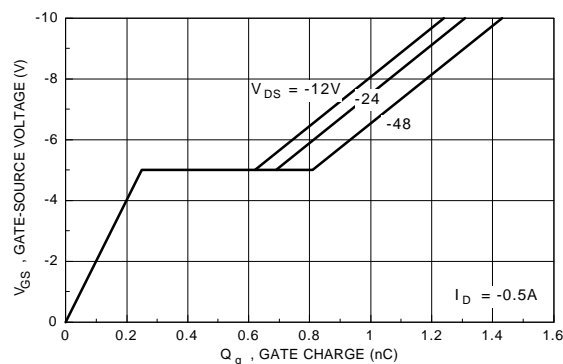


Figure 10. Gate Charge Characteristics

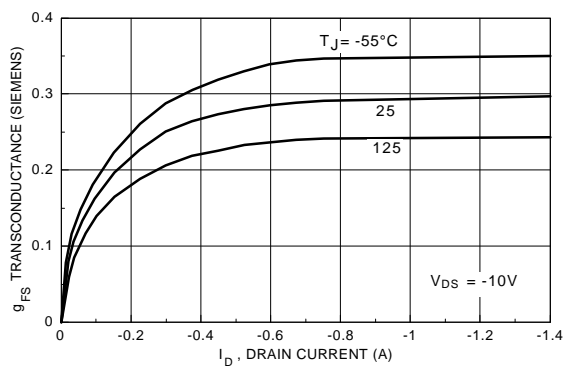


Figure 11. Transconductance Variation with Drain Current and Temperature

Typical Electrical Characteristics (continued)

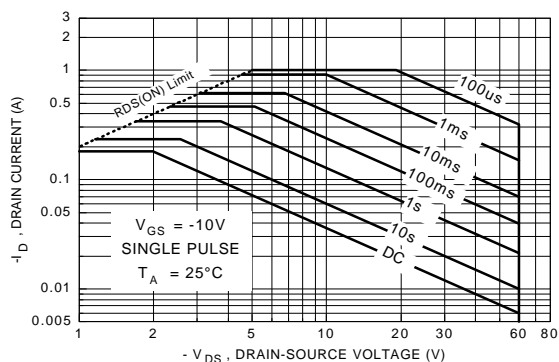


Figure 12. Maximum Safe Operating Area

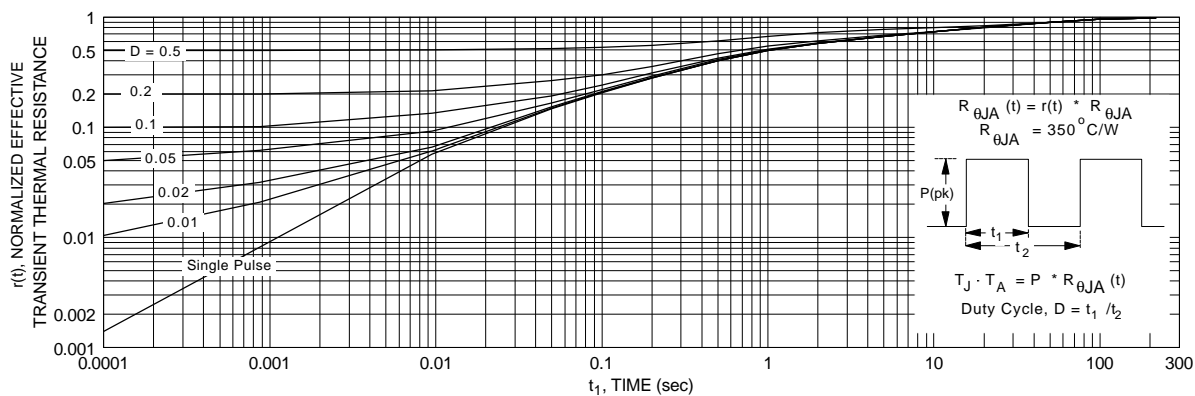


Figure 13. Transient Thermal Response Curve.