



NDT2955

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P-Channel Enhancement Mode Field Effect Transistor

General Description

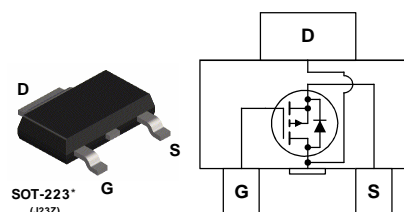
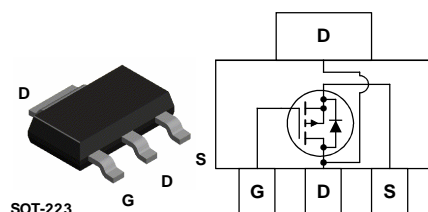
This 60V P-Channel MOSFET is produced using Fairchild Semiconductor's high voltage Trench process. It has been optimized for power management applications.

Applications

- DC/DC converter
- Power management

Features

- -2.5 A, -60 V. $R_{DS(ON)} = 300m\Omega @ V_{GS} = -10 V$
 $R_{DS(ON)} = 500m\Omega @ V_{GS} = -4.5 V$
- 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

$T_A = 25^\circ C$ unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DSS}	Drain-Source Voltage	-60	V
V_{GSS}	Gate-Source Voltage	± 20	V
I_D	Drain Current – Continuous (Note 1a)	-2.5	A
	– Pulsed	-15	
P_D	Maximum Power Dissipation (Note 1a)	3.0	W
	(Note 1b)	1.3	
	(Note 1c)	1.1	
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ C$

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1a)	42	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Note 1)	12	

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
2955	NDT2955	13"	12mm	2500 units

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Avalanche Ratings						
W_{DSS}	Drain-Source Avalanche Energy	Single Pulse, $V_{DD} = 30\text{ V}$, $I_D = 2.5\text{ A}$			174	mJ
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}$, $I_D = -250\text{ }\mu\text{A}$	-60			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = -250\text{ }\mu\text{A}$, Referenced to 25°C		-60		mV/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -60\text{ V}$, $V_{GS} = 0\text{ V}$			-10	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 2)						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = -250\text{ }\mu\text{A}$	-2	-2.6	-4	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = -250\text{ }\mu\text{A}$, Referenced to 25°C		5.7		mV/ $^\circ\text{C}$
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = -10\text{ V}$, $I_D = -2.5\text{ A}$ $V_{GS} = -4.5\text{ V}$, $I_D = -2\text{ A}$ $V_{GS} = -10\text{ V}$, $I_D = -2.5\text{ A}$, $T_J = 125^\circ\text{C}$		95 163 153	300 500 513	m Ω
$I_{D(on)}$	On-State Drain Current	$V_{GS} = -10\text{ V}$, $V_{DS} = -5\text{ V}$	-12			A
g_{FS}	Forward Transconductance	$V_{DS} = -10\text{ V}$, $I_D = -2.5\text{ A}$		5.5		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = -30\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1.0\text{ MHz}$		601		pF
C_{oss}	Output Capacitance			85		pF
C_{rss}	Reverse Transfer Capacitance			35		pF
Switching Characteristics (Note 2)						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = -30\text{ V}$, $I_D = -1\text{ A}$, $V_{GS} = -10\text{ V}$, $R_{GEN} = 6\text{ }\Omega$		12	21	ns
t_r	Turn-On Rise Time			10	20	ns
$t_{d(off)}$	Turn-Off Delay Time			19	34	ns
t_f	Turn-Off Fall Time			6	12	ns
Q_g	Total Gate Charge	$V_{DS} = -30\text{ V}$, $I_D = -2.5\text{ A}$, $V_{GS} = -10\text{ V}$		11	15	nC
Q_{gs}	Gate-Source Charge			2.4		nC
Q_{gd}	Gate-Drain Charge			2.7		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current				-2.5	A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}$, $I_S = -2.5\text{ A}$ (Note 2)		-0.8	-1.2	V
t_{rr}	Diode Reverse Recovery Time	$I_F = -2.5\text{ A}$,		25		nS
Q_{rr}	Diode Reverse Recovery Charge	$dI_F/dt = 100\text{ A}/\mu\text{s}$		40		nC

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°C/W when mounted on a 1 in^2 pad of 2 oz copper



b) 95°C/W when mounted on a $.0066\text{ in}^2$ pad of 2 oz copper



c) 110°C/W when mounted on a minimum pad.

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

Typical Characteristics

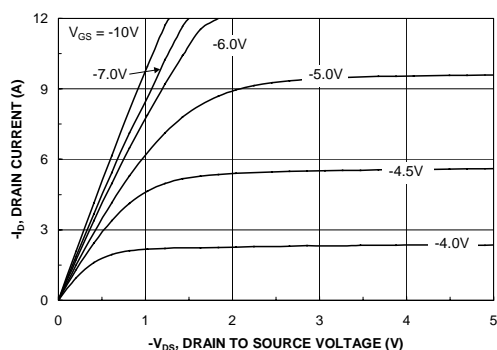


Figure 1. On-Region Characteristics.

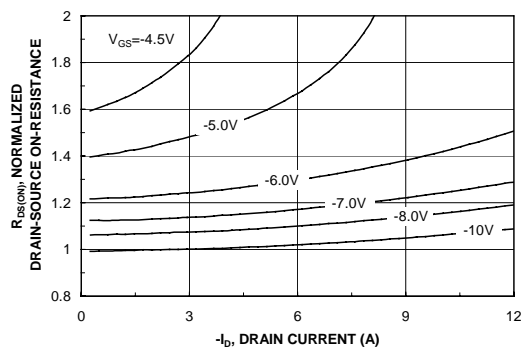


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

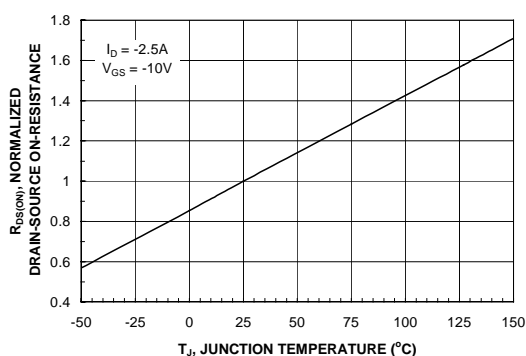


Figure 3. On-Resistance Variation with Temperature.

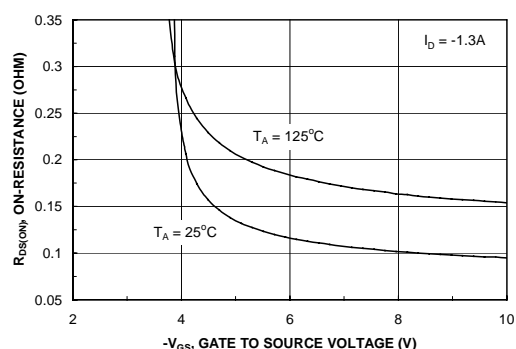


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

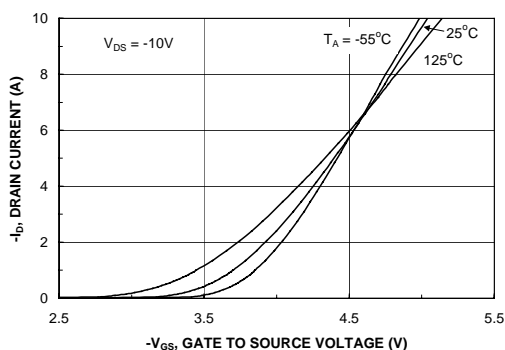


Figure 5. Transfer Characteristics.

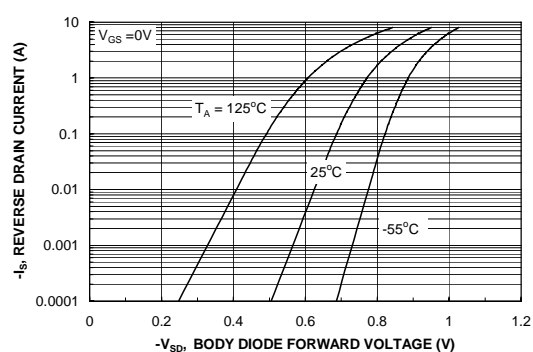


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

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