April 2015

NDT2955

P-Channel Enhancement Mode Field Effect Transistor

General Description

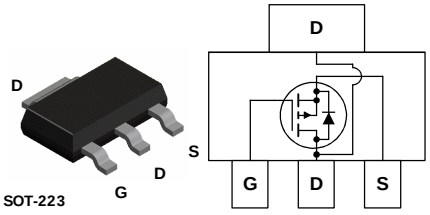
This 60V P-Channel MOSFET is produced using Fairchild Semiconductor's high voltage Trench process. It has been optimized for power management plications.

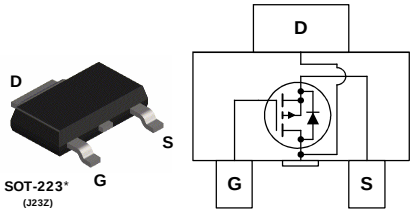
Applications

- DC/DC converter
- Power management

Features

- –2.5 A, –60 V. $R_{DS(ON)}$ = 300mΩ @ V_{GS} = –10 V
  $R_{DS(ON)}$ = 500mΩ @ 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°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	°C

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1a)	42	°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°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 V, I_D = 2.5 A			174	mJ
Off Characteristics						
BV_{DSS}	Drain–Source Breakdown Voltage	V_{GS} = 0 V, I_D = –250 µA	–60			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = –250 µA, Referenced to 25°C		–60		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = –60 V, V_{GS} = 0 V			–10	µA
I_{GSSF}	Gate–Body Leakage, Forward	V_{GS} = –20 V, V_{DS} = 0 V			100	nA
I_{GSSR}	Gate–Body Leakage, Reverse	V_{GS} = –20 V, V_{DS} = 0 V			–100	nA
On Characteristics (Note 2)						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = –250 µA	–2	–2.6	–4	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I_D = –250 µA, Referenced to 25°C		5.7		mV/°C
$R_{DS(on)}$	Static Drain–Source On–Resistance	V_{GS} = –10 V, I_D = –2.5 A V_{GS} = –4.5 V, I_D = –2 A V_{GS}=–10 V, I_D =–2.5 A, T_J=125°C		95 163 153	300 500 513	mΩ
$I_{D(on)}$	On–State Drain Current	V_{GS} = –10 V, V_{DS} = –5 V	–12			A
g_{FS}	Forward Transconductance	V_{DS} = –10 V, I_D = –2.5 A		5.5		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = –30 V, V_{GS} = 0 V, f = 1.0 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 V, I_D = –1 A, V_{GS} = –10 V, R_{GEN} = 6 Ω		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 V, I_D = –2.5 A, V_{GS} = –10 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 V, I_S = –2.5 A (Note 2)		–0.8	–1.2	V
t_{rr}	Diode Reverse Recovery Time	I_F = –2.5 A, d_{iF}/d_t = 100 A/µs		25		nS
Q_{rr}	Diode Reverse Recovery Charge			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 1in^2 pad of 2 oz copper

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

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

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

Typical Characteristics

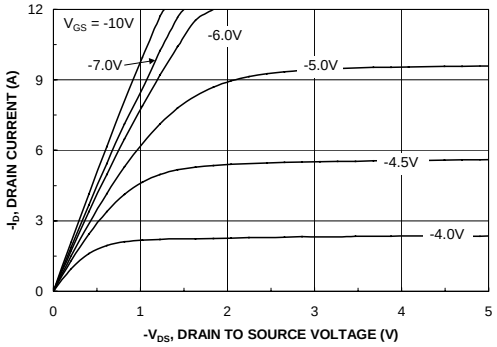


Figure 1. On-Region Characteristics.

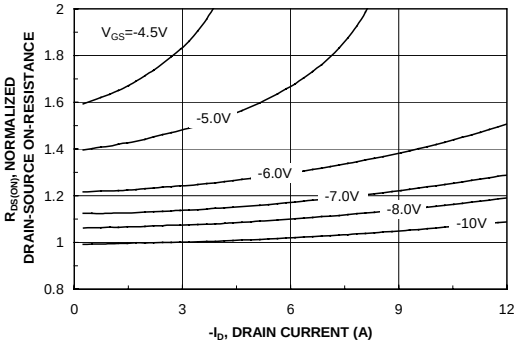


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

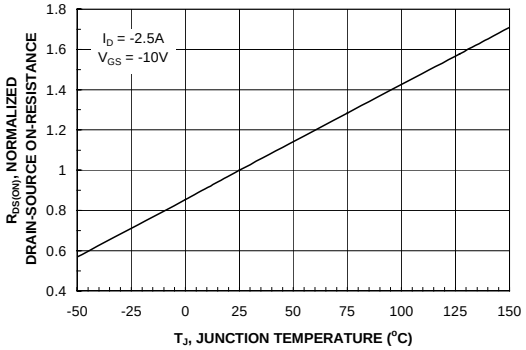


Figure 3. On-Resistance Variation withTemperature.

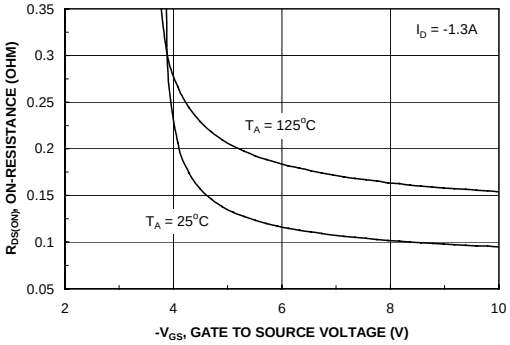


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

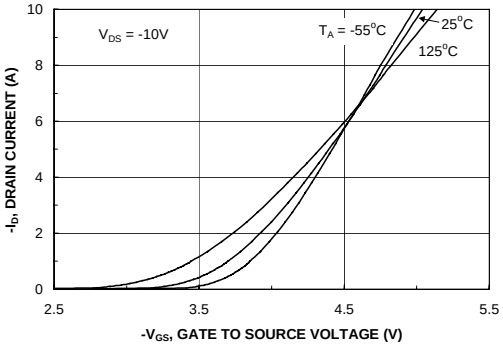


Figure 5. Transfer Characteristics.

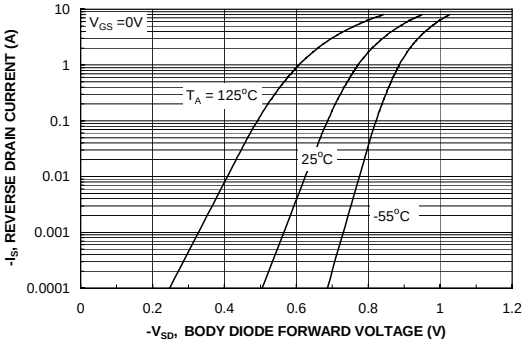
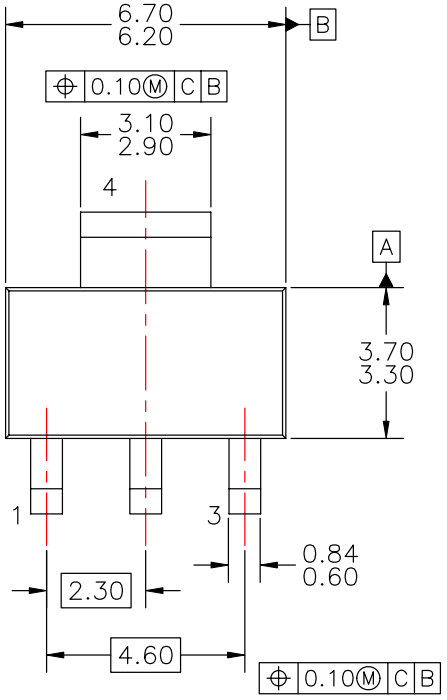


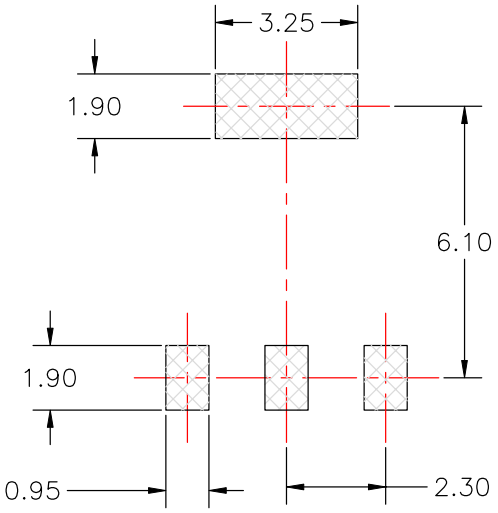
Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

APPROVED
July-14-2008

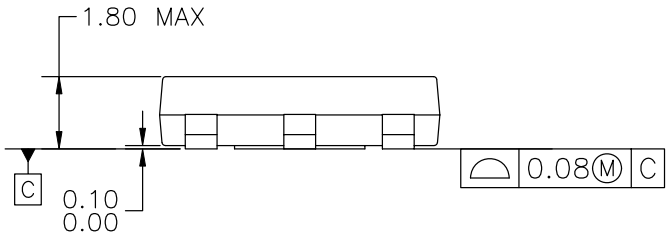
REVISIONS

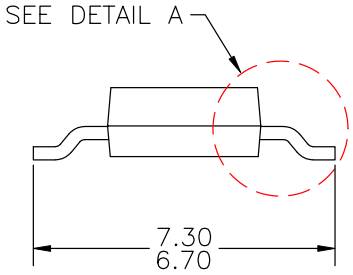
LTR	DESCRIPTION	DATE	NAME/SITE
A	RELEASE TO DOCUMENT CONTROL	JAN.25,1996	TL/FSCP
2	CHG DWG TEMPLATE FR NATIONAL TO FAIRCHILD; CHG DIM STYLE FR DUAL INCH[MM] TO SINGLE, MM; CHG LD WID FR $0.74^{+0.05}_{-0.07}$ TO 0.60–0.84; REMOVE PKG THICK DIM (1.6); CHG TOTAL PKG HT FR $1.80^{}_{1.20}$ TO 1.80 MAX; CHG FOOT LANDING DIM FR 0.91 MIN TO 0.60 MIN; CHG LD THICKNESS FR $0.3^{+0.09}_{-0.07}$ TO 0.20–0.35; ADD DRAFT ANGLE OF MOLDED BODY TOP & BOT; CHG LD LGTH TO PKG EDGE DIM TO BASIC; CHG LD PITCH FR 2.29 BS TO 2.30 BS; CHG BODY WID FR $3.56^{+0.18}_{-0.38}$ TO $3.70^{}_{3.30}$; CHG BODY LN FR $6.5^{+0.3}_{-0.4}$ TO $6.70^{}_{6.30}$; CHG TOTAL PKG WID FR $6.96^{+0.33}_{-0.38}$ TO $7.30^{}_{6.70}$; CHG PAD SIZE FR 0.99 MAX TO 0.95; CHG PAD PITCH FR 2.286 TO 2.30; CHG THERMAL TAB SIZE FR 3.28 MAX TO 3.25; CHG PAD SIZE FR 1.5 TO 1.90; CHG PAD SPACE FR 6.3 TO 6.10; CHG NOTE '2' TO 'A' W/O DATE; DEL NOTE ON LD FINISH; ADD NOTES B, C, D, E & F.	12FEB08	LZSC/FSCP

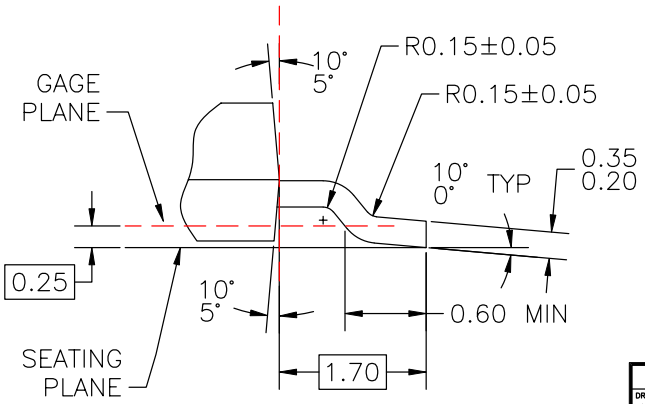




LAND PATTERN RECOMMENDATION







DETAIL A
SCALE: 2:1

NOTES: UNLESS OTHERWISE SPECIFIED

A) DRAWING BASED ON JEDEC REGISTRATION TO–261, VARIATION AA.
B) DIMENSIONS ARE INCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.
C) ALL DIMENSIONS ARE IN MILLIMETERS.
D) DRAWING CONFORMS TO ASME Y14.5M–1994.
E) LANDPATTERN NAME: SOT230P700X180–4BN
F) DRAWING FILENAME: MKT–MA04AREV2

APPROVALS	DATE
DRAWN: J.U. COMPARATIVO JR.	26FEB2008
CHECKED: L.Z. STA CRUZ	
APPROVED: M.R. GESTOLE	
G.S. BAJE	

PROJECTION INCH [MM]

FAIRCHILD SEMICONDUCTOR TM

MOLDED PACKAGE
SOT–223, 4 LEAD

SCALE	SIZE	DRAWING NUMBER	REV
1:1	A3	MKT–MA04A	2

FORMERLY: N/A

SHEET : 1 OF 1

TRADEMARKS

The following includes registered and unregistered trademarks and service marks, owned by Fairchild Semiconductor and/or its global subsidiaries, and is not intended to be an exhaustive list of all such trademarks.

AccuPower™
AttitudeEngine™
Awinda®
AX-CAP®*
BitSiC™
Build it Now™
CorePLUS™
CorePOWER™
CROSSVOLT™
CTL™
Current Transfer Logic™
DEUXPEED®
Dual Cool™
EcoSPARK®
EfficientMax™
ESBC™
Fairchild®
Fairchild Semiconductor®
FACT Quiet Series™
FACT®
FastvCore™
FETBench™
FPS™
F-PFS™
FRFET®
Global Power Resource SM
GreenBridge™
Green FPS™
Green FPS™ e-Series™
G*max*™
GTO™
IntelliMAX™
ISOPLANAR™
Making Small Speakers Sound Louder and Better™
MegaBuck™
MICROCOUPLER™
MicroFET™
MicroPak™
MicroPak2™
MillerDrive™
MotionMax™
MotionGrid®
MTi®
MTx®
MVN®
mWSaver®
OptoHiT™
OPTOLOGIC®
OPTOPLANAR®
®
Power Supply WebDesigner™
PowerTrench®
PowerXS™
Programmable Active Droop™
QFET®
QS™
Quiet Series™
RapidConfigure™
™
Saving our world, 1mW/W/kW at a time™
SignalWise™
SmartMax™
SMART START™
Solutions for Your Success™
SPM®
STEALTH™
SuperFET®
SuperSOT™-3
SuperSOT™-6
SuperSOT™-8
SupreMOS®
SyncFET™
Sync-Lock™
SYSTEM GENERAL®*
TinyBoost®
TinyBuck®
TinyCalc™
TinyLogic®
TINYOPTO™
TinyPower™
TinyPWM™
TinyWire™
TranSiC™
TriFault Detect™
TRUECURRENT®*
µSerDes™
SerDes™
UHC®
Ultra FRFET™
UniFET™
VCX™
VisualMax™
VoltagePlus™
XS™
Xsens™
仙童®

* Trademarks of System General Corporation, used under license by Fairchild Semiconductor.

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION, OR DESIGN. TO OBTAIN THE LATEST, MOST UP-TO-DATE DATASHEET AND PRODUCT INFORMATION, VISIT OUR WEBSITE AT HTTP://WWW.FAIRCHILDSEMI.COM. 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. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

AUTHORIZED USE

Unless otherwise specified in this data sheet, this product is a standard commercial product and is not intended for use in applications that require extraordinary levels of quality and reliability. This product may not be used in the following applications, unless specifically approved in writing by a Fairchild officer: (1) automotive or other transportation, (2) military/aerospace, (3) any safety critical application – including life critical medical equipment – where the failure of the Fairchild product reasonably would be expected to result in personal injury, death or property damage. Customer's use of this product is subject to agreement of this Authorized Use policy. In the event of an unauthorized use of Fairchild's product, Fairchild accepts no liability in the event of product failure. In other respects, this product shall be subject to Fairchild's Worldwide Terms and Conditions of Sale, unless a separate agreement has been signed by both Parties.

ANTI-COUNTERFEITING POLICY

Fairchild Semiconductor Corporation's Anti-Counterfeiting Policy. Fairchild's Anti-Counterfeiting Policy is also stated on our external website, www.fairchildsemi.com, under Terms of Use

Counterfeiting of semiconductor parts is a growing problem in the industry. All manufacturers of semiconductor products are experiencing counterfeiting of their parts. Customers who inadvertently purchase counterfeit parts experience many problems such as loss of brand reputation, substandard performance, failed applications, and increased cost of production and manufacturing delays. Fairchild is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. Fairchild strongly encourages customers to purchase Fairchild parts either directly from Fairchild or from Authorized Fairchild Distributors who are listed by country on our web page cited above. Products customers buy either from Fairchild directly or from Authorized Fairchild Distributors are genuine parts, have full traceability, meet Fairchild's quality standards for handling and storage and provide access to Fairchild's full range of up-to-date technical and product information. Fairchild and our Authorized Distributors will stand behind all warranties and will appropriately address any warranty issues that may arise. Fairchild will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources. Fairchild is committed to combat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors.

PRODUCT STATUS DEFINITIONS

Definition of Terms

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

Rev. I77