



Product Change Notification - SYST-17FTLY060

Date:

20 Aug 2018

Product Category:

Depletion Mode MOSFETs

Affected CPNs:**Notification subject:**

Data Sheet - LND150/LND250 N-Channel Depletion-Mode DMOS FETs Data Sheet

Notification text:

SYST-17FTLY060

Microchip has released a new DeviceDoc for the LND150/LND250 N-Channel Depletion-Mode DMOS FETs Data Sheet of devices. If you are using one of these devices please read the document located at [LND150/LND250 N-Channel Depletion-Mode DMOS FETs Data Sheet](#).

Notification Status: Final

Description of Change: 1) Converted and merged Supertex Doc#s DSFP-LND150 and DSFP-LND250 to Microchip DS20005454 2) Changed the package marking format 3) Removed the TO-92 N3 P005 media type 4) Added some sections to comply with the standard Microchip Technology Inc. documentation format 5) Made minor text changes throughout the document

Impacts to Data Sheet: None

Reason for Change: To Improve Manufacturability and conversion of Supertex datasheet to Microchip datasheet conventions.

Change Implementation Status: Complete**Date Document Changes Effective:** 20 Aug 2018

NOTE: Please be advised that this is a change to the document only the product has not been changed.

Markings to Distinguish Revised from Unrevised Devices: N/A**Attachment(s):**

[LND150/LND250 N-Channel Depletion-Mode DMOS FETs Data Sheet](#)

Please contact your local [Microchip sales office](#) with questions or concerns regarding this notification.

Terms and Conditions:

If you wish to change your product/process change notification (PCN) profile please log on to our website at <http://www.microchip.com/PCN> sign into myMICROCHIP to open the myMICROCHIP home page, then select a profile option from the left navigation bar.

To opt out of future offer or information emails (other than product change notification emails), click here to go to [microchipDIRECT](#) and login, then click on the "My account" link, click on "Update profile" and un-check the box that states "Future offers or information about Microchip's products or services."

Affected Catalog Part Numbers (CPN)

LND150K1-G
LND150N3-G
LND150N3-G-P002
LND150N3-G-P003
LND150N3-G-P013
LND150N3-G-P014
LND150N8-G
LND150ND
LND150ND-APX
LND150NW
LND150NW-8
LND250K1-G

N-Channel Depletion-Mode DMOS FETs

Features

- Free from Secondary Breakdown
- Low-Power Drive Requirement
- Ease of Paralleling
- Excellent Thermal Stability
- Integral Source-Drain Diode
- High Input Impedance and Low C_{ISS}
- ESD Gate Protection

Applications

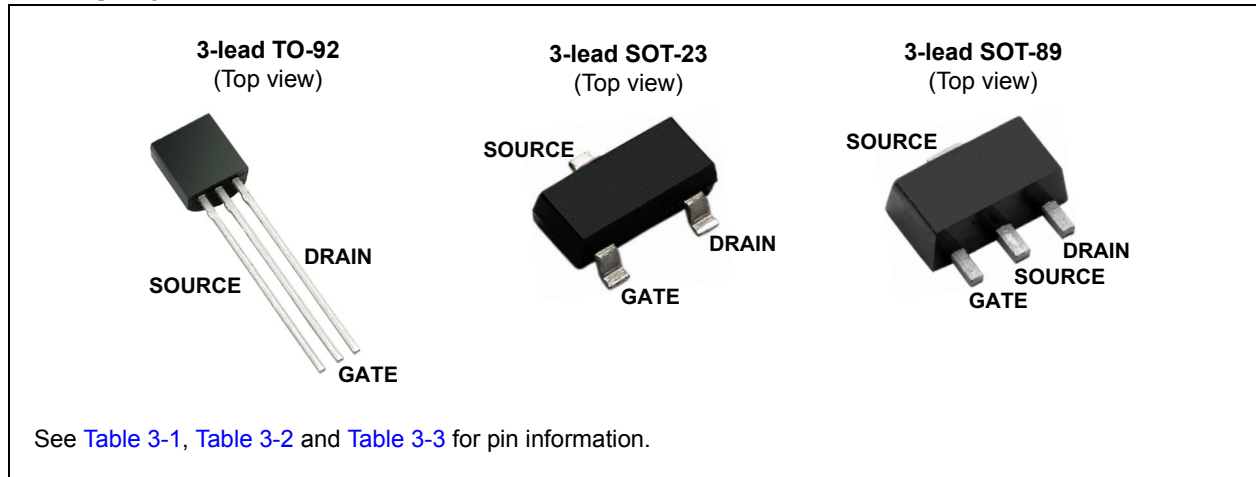
- Solid-State Relays
- Normally-On Switches
- Converters
- Power Supply Circuits
- Constant-Current Sources
- Input Protection Circuits

General Description

The LND150 and LND250 are high-voltage N-channel Depletion-mode (normally-on) transistors utilizing lateral DMOS technology. The gate is ESD protected.

The LND150/LND250 are ideal for high-voltage applications, such as normally-on switches, precision constant-current sources, voltage-ramp generation and amplification.

Package Types



LND150/LND250

1.0 ELECTRICAL CHARACTERISTICS

ABSOLUTE MAXIMUM RATINGS†

Drain-to-Source Voltage	BV_{DSX}
Drain-to-Gate Voltage	BV_{DGX}
Gate-to-Source Voltage	$\pm 20V$
Operating Ambient Temperature, T_A	$-55^{\circ}C$ to $150^{\circ}C$
Storage Temperature, T_S	$-55^{\circ}C$ to $150^{\circ}C$

† **Notice:** Stresses above those listed under “Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational listings of this specification is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

DC ELECTRICAL CHARACTERISTICS

Electrical Specifications: $T_A = 25^{\circ}C$ unless otherwise specified. All DC parameters are 100% tested at $25^{\circ}C$ unless otherwise stated. Pulse test: 300 μs pulse, 2% duty cycle

Parameter	Sym.	Min.	Typ.	Max.	Unit	Conditions
Drain-to-Source Breakdown Voltage	BV_{DSX}	500	—	—	V	$V_{GS} = -10V, I_D = 1 mA$
Gate-to-Source Off Voltage	$V_{GS(OFF)}$	-1	—	-3	V	$V_{GS} = 25V, I_D = 100 nA$
Change in $V_{GS(OFF)}$ with Temperature	$\Delta V_{GS(OFF)}$	—	—	5	mV/ $^{\circ}C$	$V_{GS} = 25V, I_D = 100 nA$ (Note 1)
Gate Body Leakage Current	I_{GSS}	—	—	100	nA	$V_{GS} = \pm 20V, V_{DS} = 0V$
Drain-to-Source Leakage Current	$I_{D(OFF)}$	—	—	100	nA	$V_{GS} = -10V, V_{DS} = 450V$
		—	—	100	μA	$V_{DS} = 0.8V$ Maximum rating, $V_{GS} = -10V, T_A = 125^{\circ}C$ (Note 1)
Saturated Drain-to-Source Current	I_{DSS}	1	—	3	mA	$V_{GS} = 0V, V_{DS} = 25V$
Static Drain-to-Source On-State Resistance	$R_{DS(ON)}$	—	850	1000	Ω	$V_{GS} = 0V, I_D = 0.5 mA$
Change in $R_{DS(ON)}$ with Temperature	$\Delta R_{DS(ON)}$	—	—	1.2	%/ $^{\circ}C$	$V_{GS} = 0V, I_D = 0.5 mA$ (Note 1)

Note 1: Specification is obtained by characterization and is not 100% tested.

AC ELECTRICAL CHARACTERISTICS

Electrical Specifications: $T_A = 25^\circ\text{C}$ unless otherwise specified. Specification is obtained by characterization and is not 100% tested.

Parameter	Sym.	Min.	Typ.	Max.	Unit	Conditions
Forward Transconductance	G_{FS}	1	2	—	mmho	$V_{DS} = 0\text{V}$, $I_D = 1\text{ mA}$
Input Capacitance	C_{ISS}	—	7.5	10	pF	$V_{GS} = -10\text{V}$, $V_{DS} = 25\text{V}$, $f = 1\text{ MHz}$
Common Source Output Capacitance	C_{OSS}	—	2	3.5	pF	
Reverse Transfer Capacitance	C_{RSS}	—	0.5	1	pF	
Turn-On Delay Time	$t_{d(ON)}$	—	0.09	—	ns	$V_{DD} = 25\text{V}$, $I_D = 1\text{ mA}$, $R_{GEN} = 25\Omega$
Rise Time	t_r	—	0.45	—	ns	
Turn-Off Delay Time	$t_{d(OFF)}$	—	0.1	—	ns	
Fall Time	t_f	—	1.3	—	ns	
DIODE PARAMETER						
Diode Forward Voltage Drop	V_{SD}	—	—	0.9	V	$V_{GS} = -10\text{V}$, $I_{SD} = 1\text{ mA}$ (Note 1)
Reverse Recovery Time	t_{rr}	—	200	—	ns	$V_{GS} = -10\text{V}$, $I_{SD} = 1\text{ mA}$

Note 1: Unless otherwise stated, all DC parameters are 100% tested at $+25^\circ\text{C}$. Pulse test: 300 μs pulse, 2% duty cycle.

TEMPERATURE SPECIFICATIONS

Parameter	Sym.	Min.	Typ.	Max.	Unit	Conditions
TEMPERATURE RANGE						
Operating Ambient Temperature	T_A	-55	—	+150	$^\circ\text{C}$	
Storage Temperature	T_S	-55	—	+150	$^\circ\text{C}$	
PACKAGE THERMAL RESISTANCE						
3-lead TO-92	θ_{JA}	—	132	—	$^\circ\text{C/W}$	
3-lead SOT-23	θ_{JA}	—	203	—	$^\circ\text{C/W}$	
3-lead SOT-89	θ_{JA}	—	133	—	$^\circ\text{C/W}$	

THERMAL CHARACTERISTICS

Package	I_D (Note 1) (Continuous) (mA)	I_D (Pulsed) (A)	Power Dissipation at $T_A = 25^\circ\text{C}$ (W)	I_{DR} (mA)	I_{DRM} (Note 1) (A)
3-lead TO-92	30	30	0.74	30	30
3-lead SOT-23	13	30	0.36	13	30
3-lead SOT-89	30	30	1.6 (Note 2)	30	30

Note 1: I_D (continuous) is limited by maximum rated T_J .

2: $T_A = 25^\circ\text{C}$. Mounted on an FR4 Board, 25 mm x 25 mm x 1.57 mm.

LND150/LND250

2.0 TYPICAL PERFORMANCE CURVES

Note: The graphs and tables provided following this note are a statistical summary based on a limited number of samples and are provided for informational purposes only. The performance characteristics listed herein are not tested or guaranteed. In some graphs or tables, the data presented may be outside the specified operating range (e.g. outside specified power supply range) and therefore outside the warranted range.

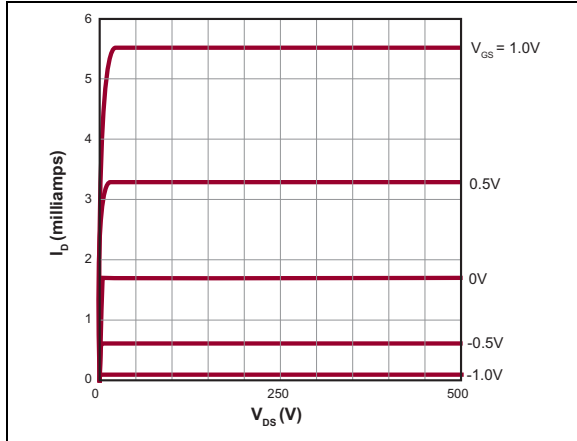


FIGURE 2-1: Output Characteristics.

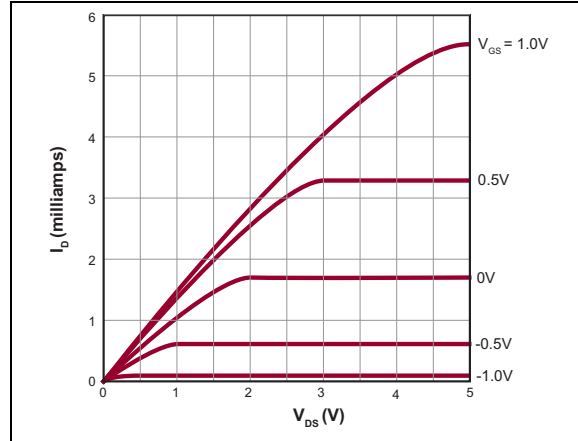


FIGURE 2-4: Saturation Characteristics.

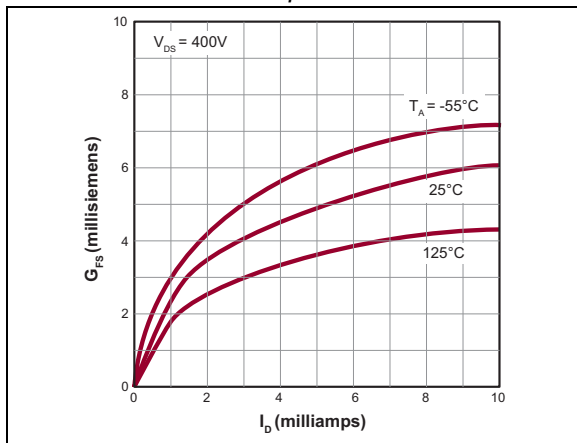


FIGURE 2-2: Transconductance vs. Drain Current.

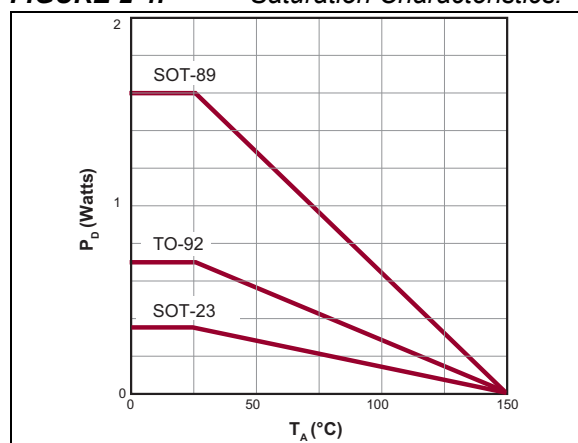


FIGURE 2-5: Power Dissipation vs. Ambient Temperature.

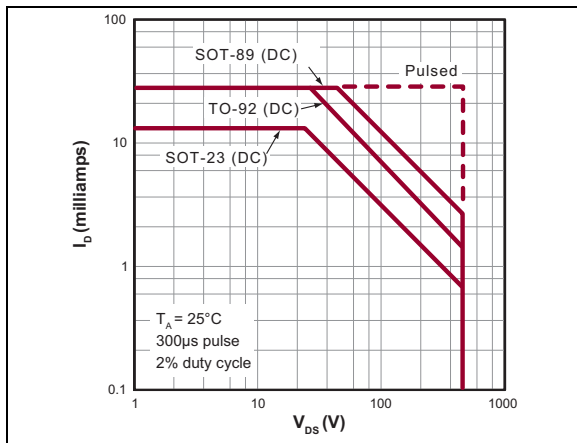


FIGURE 2-3: Maximum Rated Safe Operating Area.

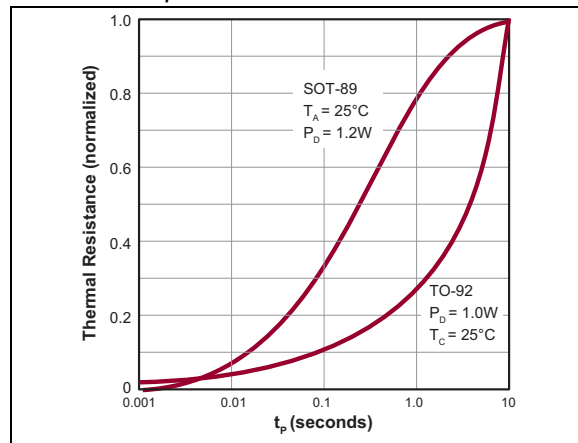


FIGURE 2-6: Thermal Response Characteristics.

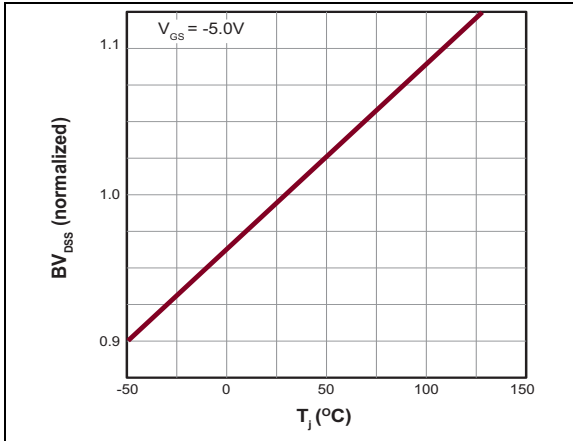


FIGURE 2-7: BV_{DSS} Variation with Temperature.

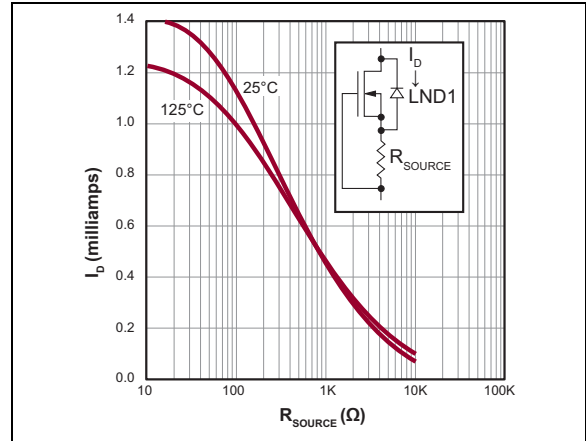


FIGURE 2-10: Drain Current vs. R_{SOURCE} .

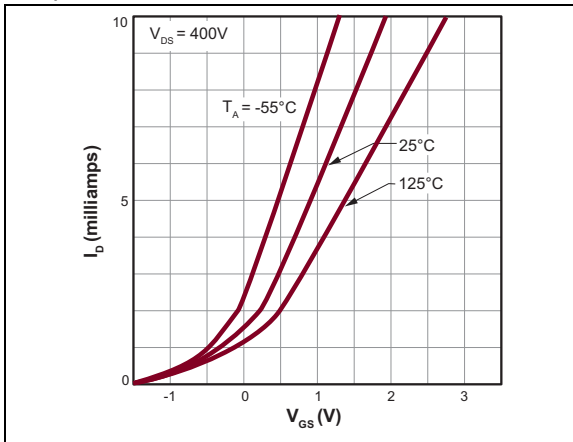


FIGURE 2-8: Transfer Characteristics.

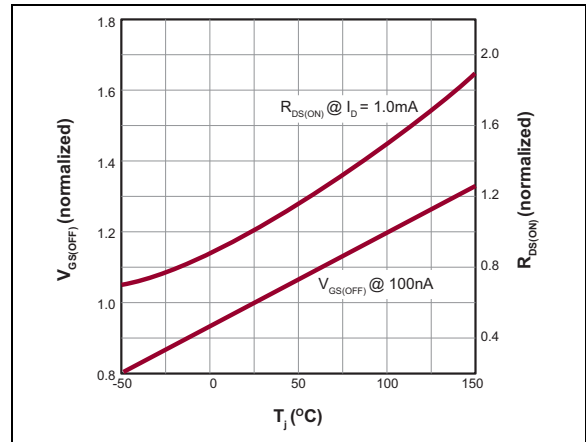


FIGURE 2-11: $V_{GS(OFF)}$ and R_{DS} Variation with Temperature.

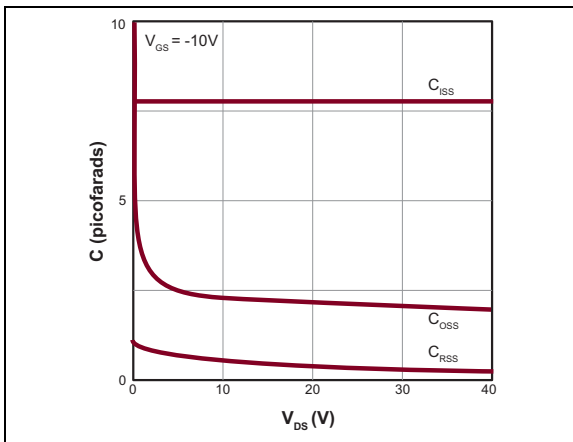


FIGURE 2-9: Capacitance vs. Drain-to-Source Voltage.

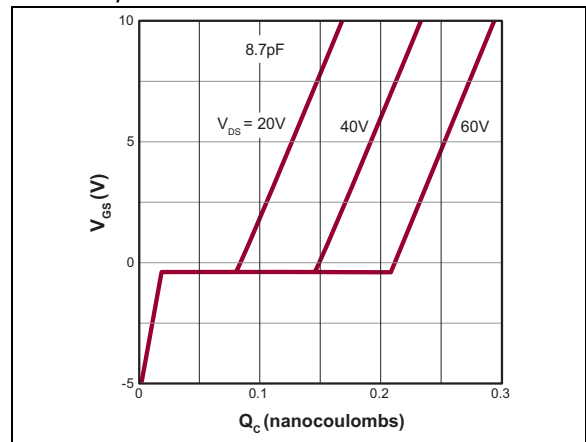


FIGURE 2-12: Gate Drive Dynamic Characteristics.

LND150/LND250

3.0 PIN DESCRIPTION

The details on the pins of LND150/LND250 are listed on [Table 3-1](#), [Table 3-2](#) and [Table 3-3](#). Refer to [Package Types](#) for the location of pins.

TABLE 3-1: TO-92 PIN FUNCTION TABLE

Pin Number	Pin Name	Description
1	SOURCE	SOURCE
2	GATE	GATE
3	DRAIN	DRAIN

TABLE 3-2: SOT-23 PIN FUNCTION TABLE

Pin Number	Pin Name	Description
1	GATE	GATE
2	DRAIN	DRAIN
3	SOURCE	SOURCE

TABLE 3-3: SOT-89 PIN FUNCTION TABLE

Pin Number	Pin Name	Description
1	GATE	GATE
2, 4	SOURCE	SOURCE
3	DRAIN	DRAIN

4.0 FUNCTIONAL DESCRIPTION

Figure 4-1 illustrates the switching waveforms and test circuit for LND150/LND250.

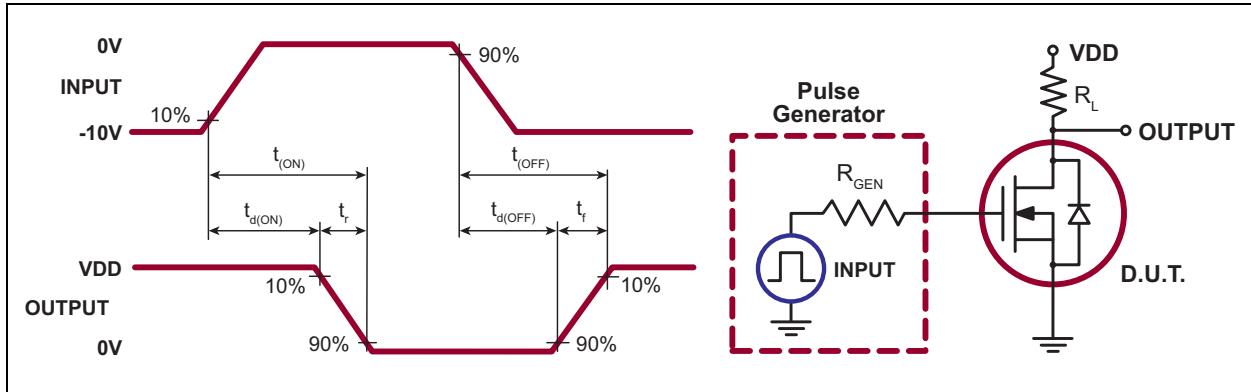


FIGURE 4-1: Switching Waveforms and Test Circuit.

TABLE 4-1: PRODUCT SUMMARY

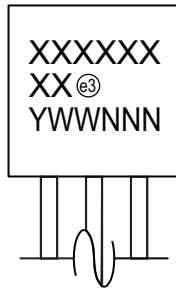
BV_{DSX}/BV_{DGX} (V)	$R_{DS(ON)}$ (Maximum) (Ω)	$I_{DSS(ON)}$ (Minimum) (mA)
500	1000	1

LND150/LND250

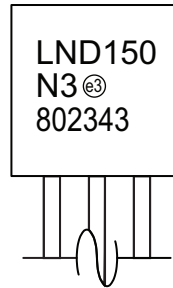
5.0 PACKAGING INFORMATION

5.1 Package Marking Information

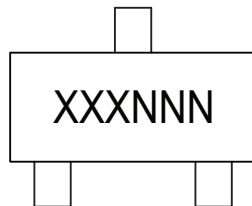
3-lead TO-92



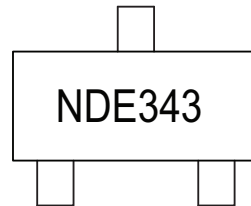
Example



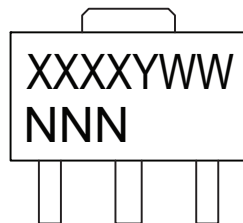
3-lead SOT-23



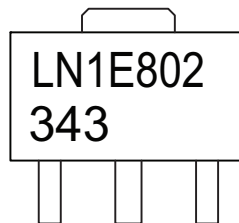
Example



3-lead SOT-89

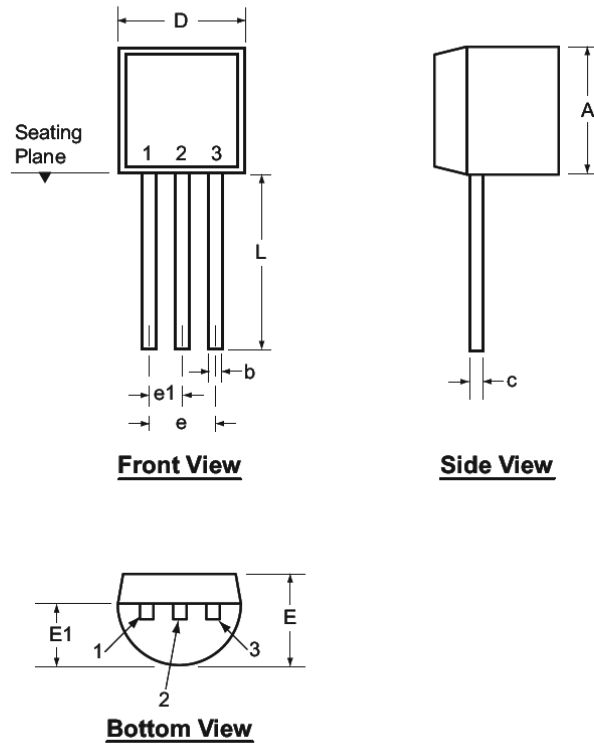


Example



Legend:	XX...X	Product Code or Customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week '01')
	NNN	Alphanumeric traceability code
	(e3)	Pb-free JEDEC® designator for Matte Tin (Sn)
	*	This package is Pb-free. The Pb-free JEDEC designator (e3) can be found on the outer packaging for this package.
Note:	In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for product code or customer-specific information. Package may or not include the corporate logo.	

3-Lead TO-92 Package Outline (L/LL/N3)



Note: For the most current package drawings, see the Microchip Packaging Specification at www.microchip.com/packaging.

Symbol	A	b	c	D	E	E1	e	e1	L	
Dimensions (inches)	MIN	.170	.014 [†]	.014 [†]	.175	.125	.080	.095	.045	.500
	NOM	-	-	-	-	-	-	-	-	-
	MAX	.210	.022 [†]	.022 [†]	.205	.165	.105	.105	.055	.610*

JEDEC Registration TO-92.

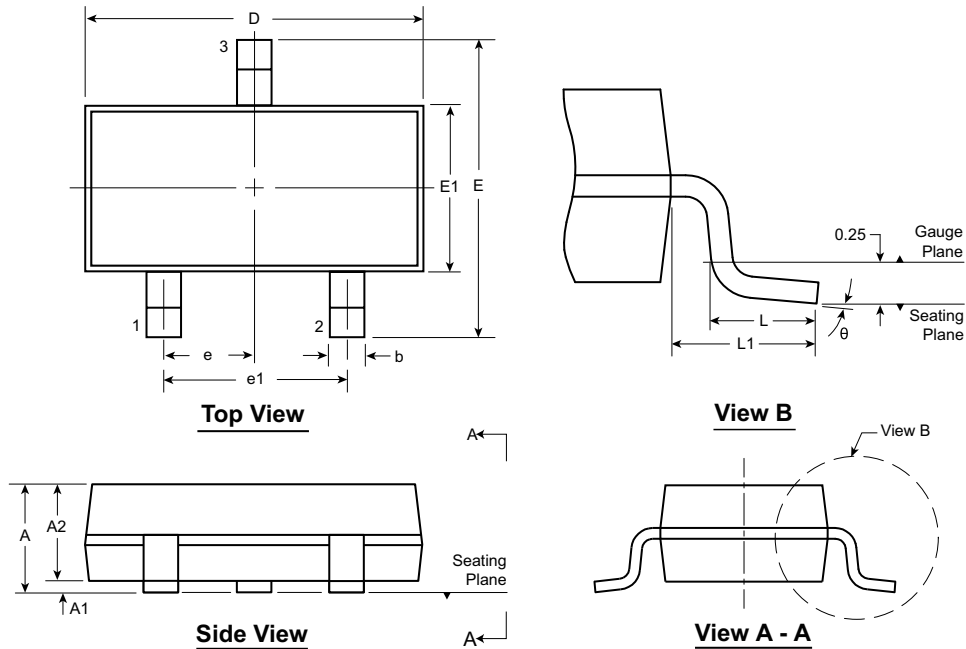
* This dimension is not specified in the JEDEC drawing.

† This dimension differs from the JEDEC drawing.

Drawings not to scale.

LND150/LND250

3-Lead TO-236AB (SOT-23) Package Outline (K1/T) 2.90x1.30mm body, 1.12mm height (max), 1.90mm pitch



Note: For the most current package drawings, see the Microchip Packaging Specification at www.microchip.com/packaging.

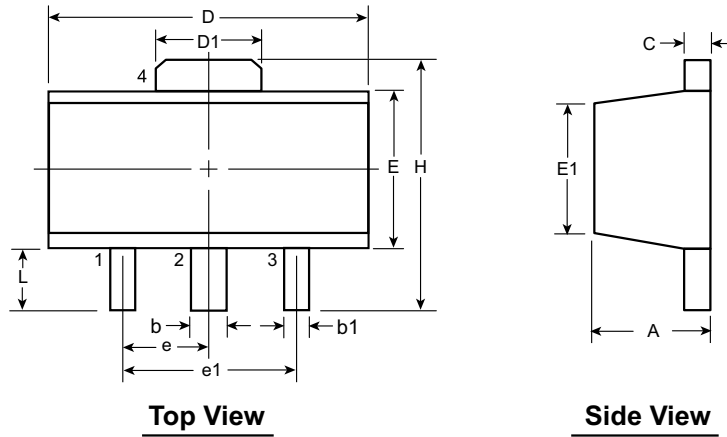
Symbol	A	A1	A2	b	D	E	E1	e	e1	L	L1	θ	
Dimension (mm)	MIN	0.89	0.01	0.88	0.30	2.80	2.10	1.20	0.95 BSC	1.90 BSC	0.20 [†]	0.54 REF	0°
	NOM	-	-	0.95	-	2.90	-	1.30			0.50		-
	MAX	1.12	0.10	1.02	0.50	3.04	2.64	1.40			0.60		8°

JEDEC Registration TO-236, Variation AB, Issue H, Jan. 1999.

[†] This dimension differs from the JEDEC drawing.

Drawings not to scale.

3-Lead TO-243AA (SOT-89) Package Outline (N8)



Note: For the most current package drawings, see the Microchip Packaging Specification at www.microchip.com/packaging.

Symbol		A	b	b1	C	D	D1	E	E1	e	e1	H	L
Dimensions (mm)	MIN	1.40	0.44	0.36	0.35	4.40	1.62	2.29	2.00 [†]	1.50 BSC	3.00 BSC	3.94	0.73 [†]
	NOM	-	-	-	-	-	-	-	-			-	-
	MAX	1.60	0.56	0.48	0.44	4.60	1.83	2.60	2.29			4.25	1.20

JEDEC Registration TO-243, Variation AA, Issue C, July 1986.

[†] This dimension differs from the JEDEC drawing

Drawings not to scale.

LND150/LND250

NOTES:

APPENDIX A: REVISION HISTORY

Revision A (August 2018)

- Converted and merged Supertex Doc#s DSFP-LND150 and DSFP-LND250 to Microchip DS20005454
- Changed the package marking format
- Removed the TO-92 N3 P005 media type
- Added some sections to comply with the standard Microchip Technology Inc. documentation format
- Made minor text changes throughout the document

LND150/LND250

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, refer to the factory or the listed sales office.

<u>PART NO.</u>	<u>XX</u>	-	<u>X</u>	-	<u>X</u>
Device	Package Options		Environmental		Media Type
Devices:	LND150 = N-Channel Depletion-Mode DMOS FET LND250 = N-Channel Depletion-Mode DMOS FET				
Packages:	N3 = 3-lead TO-92 K1 = 3-lead SOT-23 N8 = 3-lead SOT-89				
Environmental:	G = Lead (Pb)-free/ROHS-compliant package				
Media Types:	(blank) = 1000/Bag for an N3 package = 3000/Reel for a K1 package = 2000/Reel for an N8 package P002 = 2000/Reel for an N3 package P003 = 2000/Reel for an N3 package P013 = 2000/AMMO Pack for an N3 package P014 = 2000/AMMO Pack for an N3 package				
Note: LND250 is only offered in 3-lead SOT-23 package.					
Examples:					
a) LND150N3-G:	N-Channel Depletion-Mode DMOS FET, 3-lead TO-92, 1000/Bag				
b) LND150K1-G:	N-Channel Depletion-Mode DMOS FET, 3-lead SOT-23, 3000/Reel				
c) LND150N8-G:	N-Channel Depletion-Mode DMOS FET, 3-lead TO-92, 2000/Reel				
d) LND150N3-G-P002:	N-Channel Depletion-Mode DMOS FET, 3-lead TO-92, 2000/Reel				

Note the following details of the code protection feature on Microchip devices:

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as “unbreakable.”

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO ITS CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE. Microchip disclaims all liability arising from this information and its use. Use of Microchip devices in life support and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights unless otherwise stated.

Microchip received ISO/TS-16949:2009 certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona; Gresham, Oregon and design centers in California and India. The Company's quality system processes and procedures are for its PIC® MCUs and dsPIC® DSCs, KEELOQ® code hopping devices, Serial EEPROMs, microperipherals, nonvolatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001:2000 certified.

**QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
= ISO/TS 16949 =**

Trademarks

The Microchip name and logo, the Microchip logo, AnyRate, AVR, AVR logo, AVR Freaks, BitCloud, chipKIT, chipKIT logo, CryptoMemory, CryptoRF, dsPIC, FlashFlex, flexPWR, Helder, JukeBlox, KeeLoq, Klear, LANCheck, LINK MD, maXStylus, maXTouch, MediaLB, megaAVR, MOST, MOST logo, MPLAB, OptoLyzer, PIC, picoPower, PICSTART, PIC32 logo, Prochip Designer, QTouch, SAM-BA, SpyNIC, SST, SST Logo, SuperFlash, tinyAVR, UNI/O, and XMEGA are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

ClockWorks, The Embedded Control Solutions Company, EtherSynch, Hyper Speed Control, HyperLight Load, IntellIMOS, mTouch, Precision Edge, and Quiet-Wire are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Adjacent Key Suppression, AKS, Analog-for-the-Digital Age, Any Capacitor, AnyIn, AnyOut, BodyCom, CodeGuard, CryptoAuthentication, CryptoAutomotive, CryptoCompanion, CryptoController, dsPICDEM, dsPICDEM.net, Dynamic Average Matching, DAM, ECAN, EtherGREEN, In-Circuit Serial Programming, ICSP, INICnet, Inter-Chip Connectivity, JitterBlocker, KlearNet, KlearNet logo, memBrain, Mindi, MiWi, motorBench, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, MultiTRAK, NetDetach, Omniscient Code Generation, PICDEM, PICDEM.net, PICKit, PICtail, PowerSmart, PureSilicon, QMatrix, REAL ICE, Ripple Blocker, SAM-ICE, Serial Quad I/O, SMART-I.S., SQI, SuperSwitcher, SuperSwitcher II, Total Endurance, TSHARC, USBCheck, VariSense, ViewSpan, WiperLock, Wireless DNA, and ZENA are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

Silicon Storage Technology is a registered trademark of Microchip Technology Inc. in other countries.

GestIC is a registered trademark of Microchip Technology Germany II GmbH & Co. KG, a subsidiary of Microchip Technology Inc., in other countries.

All other trademarks mentioned herein are property of their respective companies.

© 2018, Microchip Technology Incorporated, All Rights Reserved.
ISBN: 978-1-5224-3438-2



MICROCHIP

Worldwide Sales and Service

AMERICAS

Corporate Office
2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 480-792-7200
Fax: 480-792-7277
Technical Support:
<http://www.microchip.com/support>
Web Address:
www.microchip.com

Atlanta

Duluth, GA
Tel: 678-957-9614
Fax: 678-957-1455

Austin, TX

Tel: 512-257-3370

Boston

Westborough, MA
Tel: 774-760-0087
Fax: 774-760-0088

Chicago

Itasca, IL
Tel: 630-285-0071
Fax: 630-285-0075

Dallas

Addison, TX
Tel: 972-818-7423
Fax: 972-818-2924

Detroit

Novi, MI
Tel: 248-848-4000

Houston, TX

Tel: 281-894-5983

Indianapolis

Noblesville, IN
Tel: 317-773-8323
Fax: 317-773-5453
Tel: 317-536-2380

Los Angeles

Mission Viejo, CA
Tel: 949-462-9523
Fax: 949-462-9608
Tel: 951-273-7800

Raleigh, NC

Tel: 919-844-7510

New York, NY

Tel: 631-435-6000

San Jose, CA

Tel: 408-735-9110
Tel: 408-436-4270

Canada - Toronto

Tel: 905-695-1980
Fax: 905-695-2078

ASIA/PACIFIC

Australia - Sydney

Tel: 61-2-9868-6733

China - Beijing

Tel: 86-10-8569-7000

China - Chengdu

Tel: 86-28-8665-5511

China - Chongqing

Tel: 86-23-8980-9588

China - Dongguan

Tel: 86-769-8702-9880

China - Guangzhou

Tel: 86-20-8755-8029

China - Hangzhou

Tel: 86-571-8792-8115

China - Hong Kong SAR

Tel: 852-2943-5100

China - Nanjing

Tel: 86-25-8473-2460

China - Qingdao

Tel: 86-532-8502-7355

China - Shanghai

Tel: 86-21-3326-8000

China - Shenyang

Tel: 86-24-2334-2829

China - Shenzhen

Tel: 86-755-8864-2200

China - Suzhou

Tel: 86-186-6233-1526

China - Wuhan

Tel: 86-27-5980-5300

China - Xian

Tel: 86-29-8833-7252

China - Xiamen

Tel: 86-592-2388138

China - Zhuhai

Tel: 86-756-3210040

ASIA/PACIFIC

India - Bangalore

Tel: 91-80-3090-4444

India - New Delhi

Tel: 91-11-4160-8631

India - Pune

Tel: 91-20-4121-0141

Japan - Osaka

Tel: 81-6-6152-7160

Japan - Tokyo

Tel: 81-3-6880-3770

Korea - Daegu

Tel: 82-53-744-4301

Korea - Seoul

Tel: 82-2-554-7200

Malaysia - Kuala Lumpur

Tel: 60-3-7651-7906

Malaysia - Penang

Tel: 60-4-227-8870

Philippines - Manila

Tel: 63-2-634-9065

Singapore

Tel: 65-6334-8870

Taiwan - Hsin Chu

Tel: 886-3-577-8366

Taiwan - Kaohsiung

Tel: 886-7-213-7830

Taiwan - Taipei

Tel: 886-2-2508-8600

Thailand - Bangkok

Tel: 66-2-694-1351

Vietnam - Ho Chi Minh

Tel: 84-28-5448-2100

EUROPE

Austria - Wels

Tel: 43-7242-2244-39
Fax: 43-7242-2244-393

Denmark - Copenhagen

Tel: 45-4450-2828
Fax: 45-4485-2829

Finland - Espoo

Tel: 358-9-4520-820

France - Paris

Tel: 33-1-69-53-63-20
Fax: 33-1-69-30-90-79

Germany - Garching

Tel: 49-8931-9700

Germany - Haan

Tel: 49-2129-3766400

Germany - Heilbronn

Tel: 49-7131-67-3636

Germany - Karlsruhe

Tel: 49-721-625370

Germany - Munich

Tel: 49-89-627-144-0
Fax: 49-89-627-144-44

Germany - Rosenheim

Tel: 49-8031-354-560

Israel - Ra'anana

Tel: 972-9-744-7705

Italy - Milan

Tel: 39-0331-742611
Fax: 39-0331-466781

Italy - Padova

Tel: 39-049-7625286

Netherlands - Drunen

Tel: 31-416-690399
Fax: 31-416-690340

Norway - Trondheim

Tel: 47-7288-4388

Poland - Warsaw

Tel: 48-22-3325737

Romania - Bucharest

Tel: 40-21-407-87-50

Spain - Madrid

Tel: 34-91-708-08-90
Fax: 34-91-708-08-91

Sweden - Gothenberg

Tel: 46-31-704-60-40

Sweden - Stockholm

Tel: 46-8-5090-4654

UK - Wokingham

Tel: 44-118-921-5800
Fax: 44-118-921-5820