



N-Channel Depletion-Mode DMOS FET

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

General Description

The LND150 is a high voltage N-channel depletion mode (normally-on) transistor utilizing Supertex's lateral DMOS technology. The gate is ESD protected.

The LND150 is ideal for high voltage applications in the areas of normally-on switches, precision constant current sources, voltage ramp generation and amplification.

Applications

- ▶ Solid state relays
- ▶ Normally-on switches
- ▶ Converters
- ▶ Power supply circuits
- ▶ Constant current sources
- ▶ Input protection circuits

Ordering Information

Device	Package Options			BV_{DSX}/BV_{DGX} (V)	$R_{DS(ON)}$ (max) (K Ω)	I_{DSS} (min) (mA)
	TO-236AB (SOT-23)	TO-92	TO-243AA (SOT-89)			
LND150	LND150K1-G	LND150N3-G	LND150N8-G	500	1.0	1.0

-G indicates package is RoHS compliant ('Green')



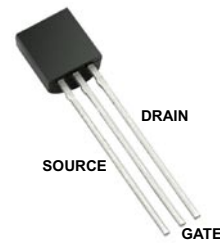
Absolute Maximum Ratings

Parameter	Value
Drain-to-source	BV_{DSX}
Drain-to-gate	BV_{DGX}
Gate-to-source	$\pm 20V$
Operating and storage temperature	$-55^{\circ}C$ to $+150^{\circ}C$
Soldering temperature*	$300^{\circ}C$

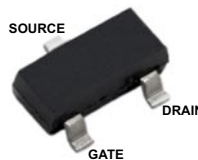
Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied. Continuous operation of the device at the absolute rating level may affect device reliability. All voltages are referenced to device ground.

* Distance of 1.6mm from case for 10 seconds.

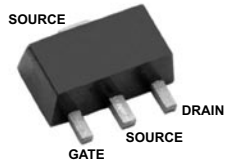
Pin Configurations



TO-92 (N3)



TO-236AB (SOT-23) (K1)



TO-243AA (SOT-89) (N8)

Product Marking

NDEW W = Code for Week Sealed
_____ = "Green" Packaging

TO-236AB (SOT-23) (K1)

SILN YY = Year Sealed
D 1 5 0 WW = Week Sealed
YYWW _____ = "Green" Packaging

TO-92 (N3)

LN1EW W = Code for Week Sealed
_____ = "Green" Packaging

TO-243AA (SOT-89) (N8)

Thermal Characteristics

Package	I_D (continuous) [†] (mA)	I_D (pulsed) (mA)	Power Dissipation @ $T_A = 25^\circ\text{C}$ (W)	θ_{jc} ($^\circ\text{C}/\text{W}$)	θ_{ja} ($^\circ\text{C}/\text{W}$)	I_{DR} (mA)	I_{DRM}^\ddagger (mA)
TO-236AB (SOT-23)	13	30	0.36	200	350	13	30
TO-92	30	30	0.74	125	170	30	30
TO-243AA (SOT-89)	30	30	1.6 [‡]	15	78	30	30

Notes:

- [†] I_D (continuous) is limited by max rated T_j .
- [‡] Mounted on FR4 board, 25mm x 25mm x 1.57mm

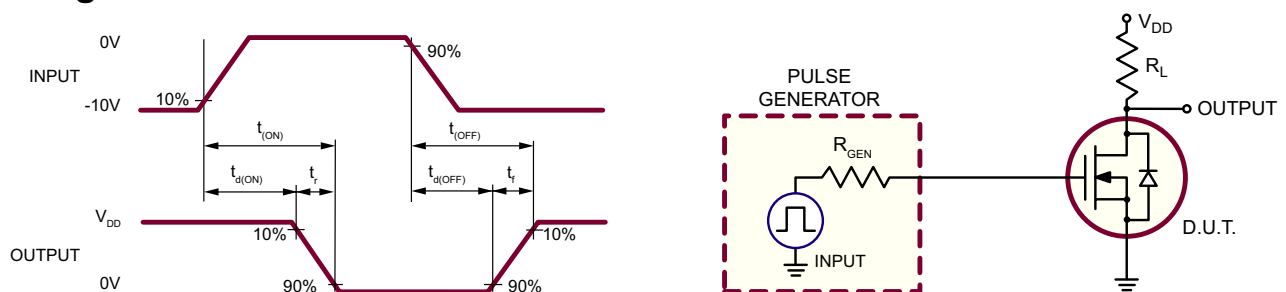
Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise specified)

Sym	Parameter	Min	Typ	Max	Units	Conditions
BV_{DSX}	Drain-to-source breakdown voltage	500	-	-	V	$V_{GS} = -10\text{V}, I_D = 1.0\text{mA}$
$V_{GS(OFF)}$	Gate-to-source off voltage	-1.0	-	-3.0	V	$V_{GS} = 25\text{V}, I_D = 100\text{nA}$
$\Delta V_{GS(OFF)}$	Change in $V_{GS(OFF)}$ with temperature	-	-	5.0	mV/ $^\circ\text{C}$	$V_{GS} = 25\text{V}, I_D = 100\text{nA}$
I_{GSS}	Gate body leakage current	-	-	100	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
$I_{D(OFF)}$	Drain-to-source leakage current	-	-	100	nA	$V_{GS} = -10\text{V}, V_{DS} = 450\text{V}$
		-	-	100	μA	$V_{DS} = 0.8\text{V Max Rating}, V_{GS} = -10\text{V}, T_A = 125^\circ\text{C}$
I_{DSS}	Saturated drain-to-source current	1.0	-	3.0	mA	$V_{GS} = 0\text{V}, V_{DS} = 25\text{V}$
$R_{DS(ON)}$	Static drain-to-source on-state resistance	-	850	1000	Ω	$V_{GS} = 0\text{V}, I_D = 0.5\text{mA}$
$\Delta R_{DS(ON)}$	Change in $R_{DS(ON)}$ with temperature	-	-	1.2	%/ $^\circ\text{C}$	$V_{GS} = 0\text{V}, I_D = 0.5\text{mA}$
G_{FS}	Forward transconductance	1.0	2.0	-	m Ω	$V_{DS} = 0\text{V}, I_D = 1.0\text{mA}$
C_{ISS}	Input capacitance	-	7.5	10	pF	$V_{GS} = -10\text{V}, V_{DS} = 25\text{V}, f = 1.0\text{MHz}$
C_{OSS}	Common source output capacitance	-	2.0	3.5		
C_{RSS}	Reverse transfer capacitance	-	0.5	1.0		
$t_{d(ON)}$	Turn-on delay time	-	0.09	-	μs	$V_{DD} = 25\text{V}, I_D = 1.0\text{mA}, R_{GEN} = 25\Omega$
t_r	Rise time	-	0.45	-		
$t_{d(OFF)}$	Turn-off delay time	-	0.1	-		
t_f	Fall time	-	1.3	-		
V_{SD}	Diode forward voltage drop	-	-	0.9	V	$V_{GS} = -10\text{V}, I_{SD} = 1.0\text{mA}$
t_{rr}	Reverse recovery time	-	200	-	ns	$V_{GS} = -10\text{V}, I_{SD} = 1.0\text{mA}$

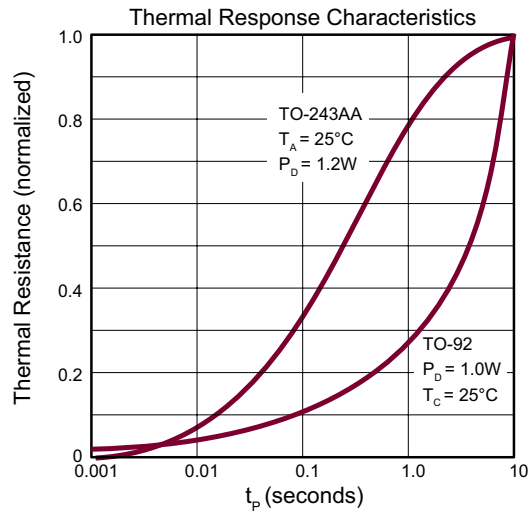
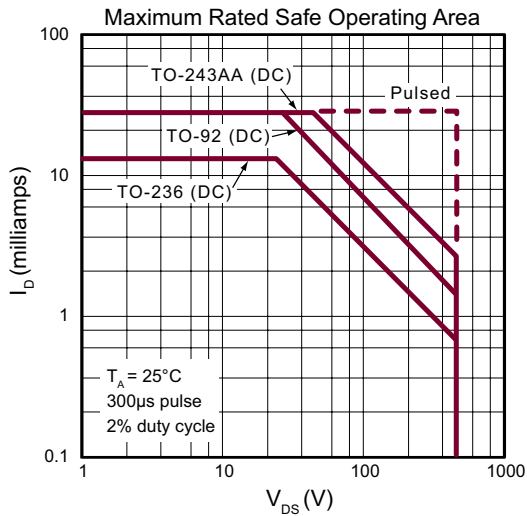
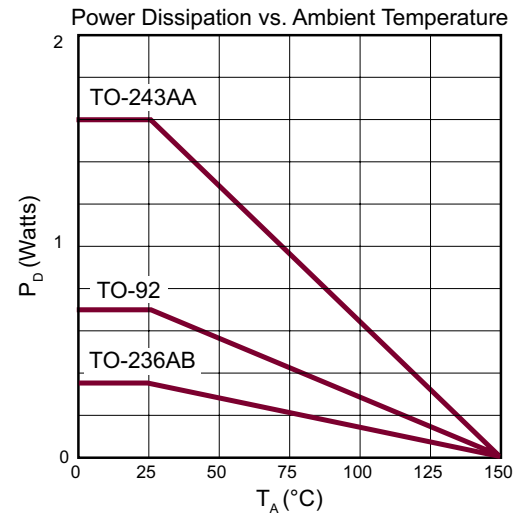
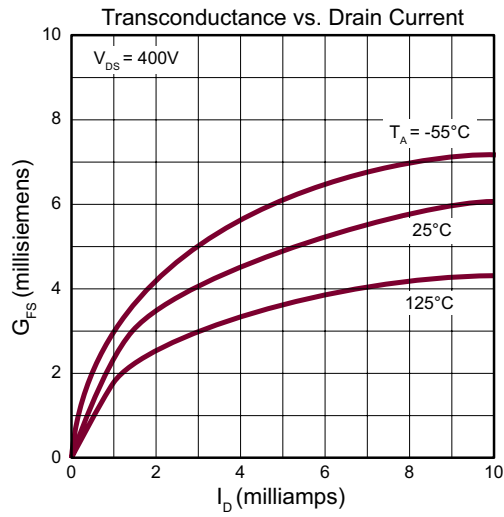
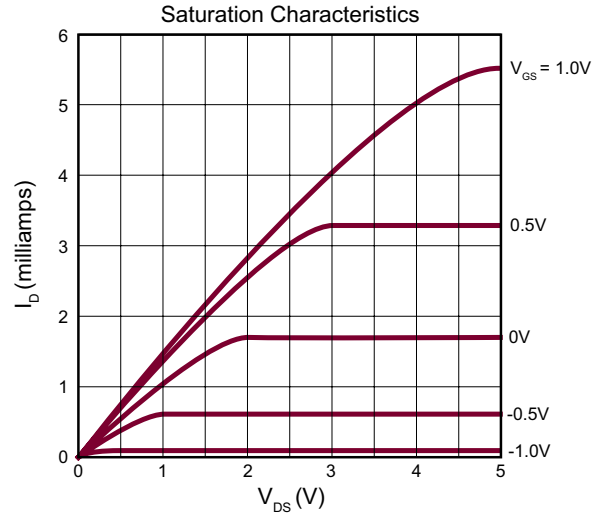
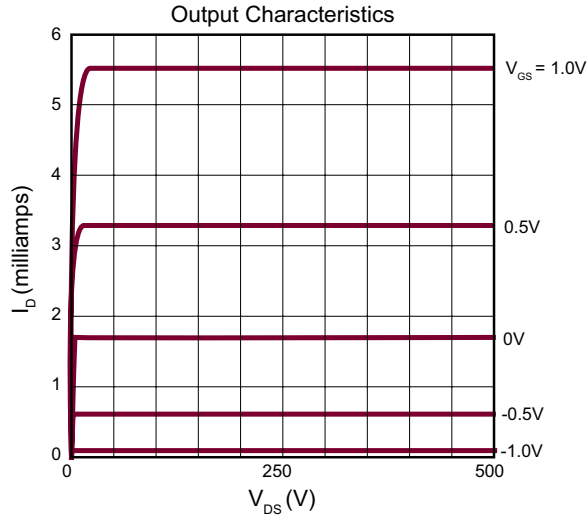
Notes:

- All D.C. parameters 100% tested at 25°C unless otherwise stated. (Pulse test: 300 μs pulse, 2% duty cycle.)
- All A.C. parameters sample tested.

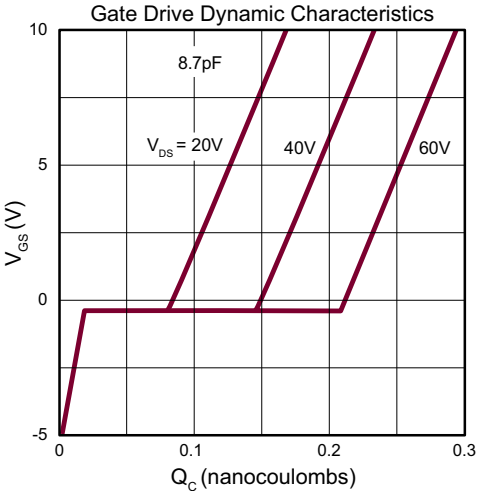
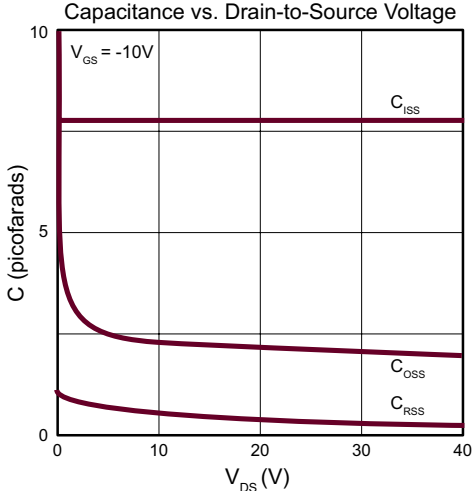
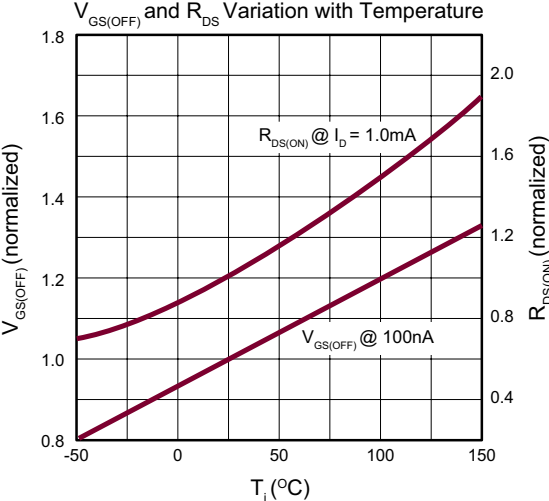
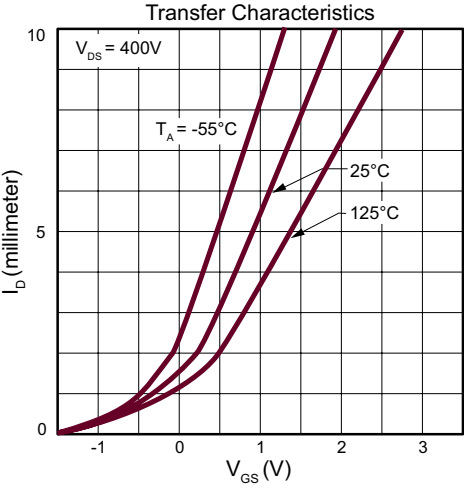
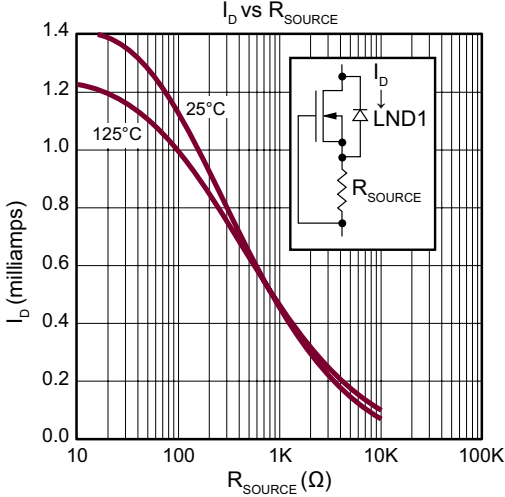
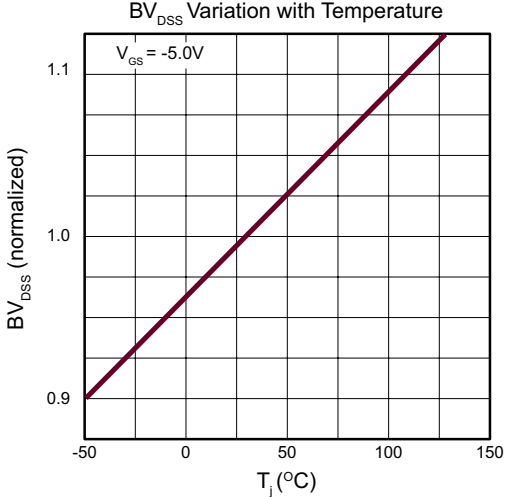
Switching Waveforms and Test Circuit



Typical Performance Curves

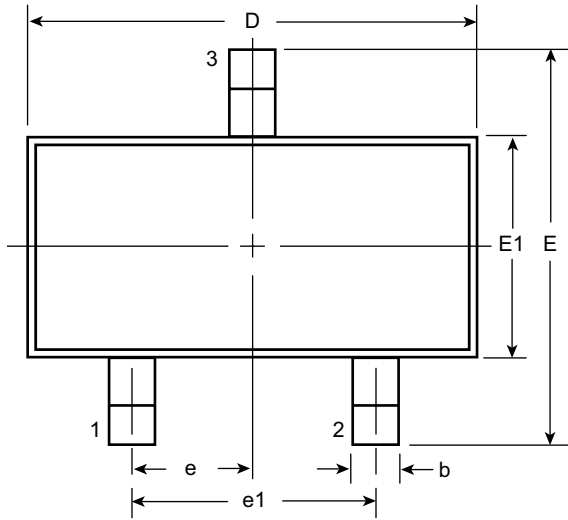


Typical Performance Curves (cont.)

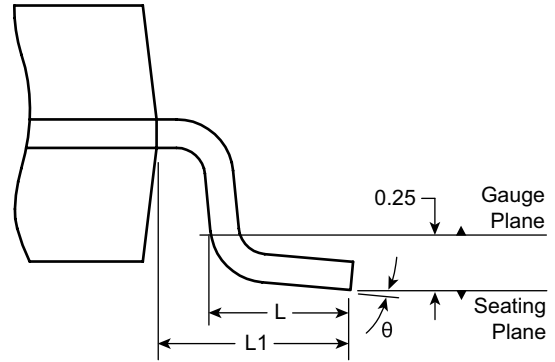


3-Lead TO-236AB (SOT-23) Package Outline (K1)

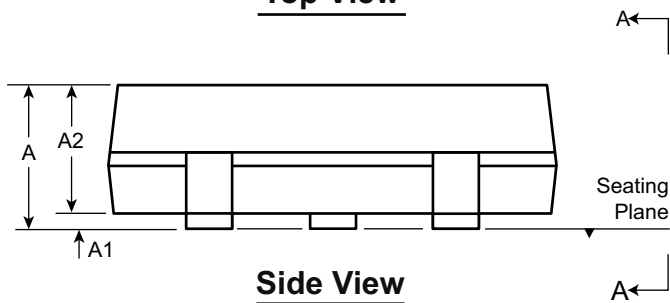
2.90x1.30mm body, 1.12mm height (max), 1.90mm pitch



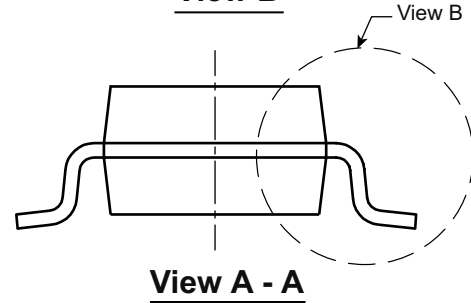
Top View



View B



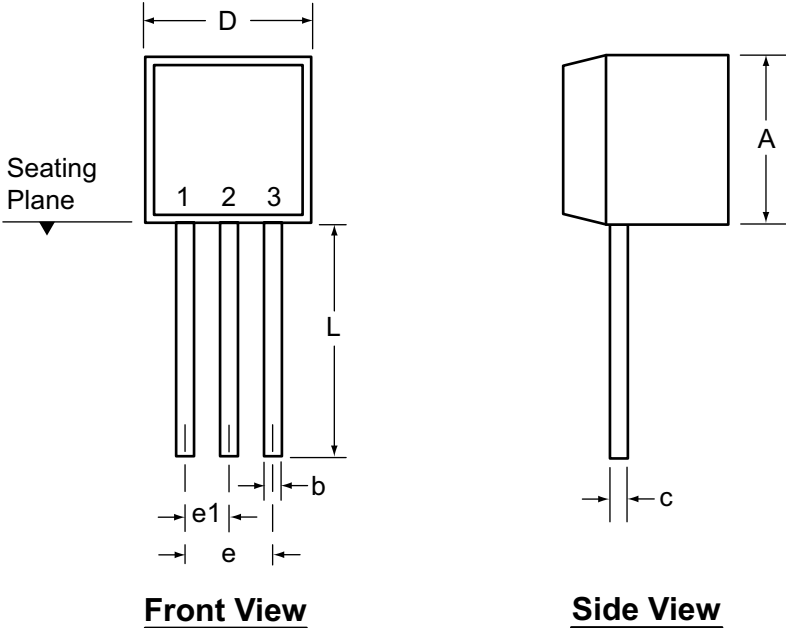
Side View



View A - A

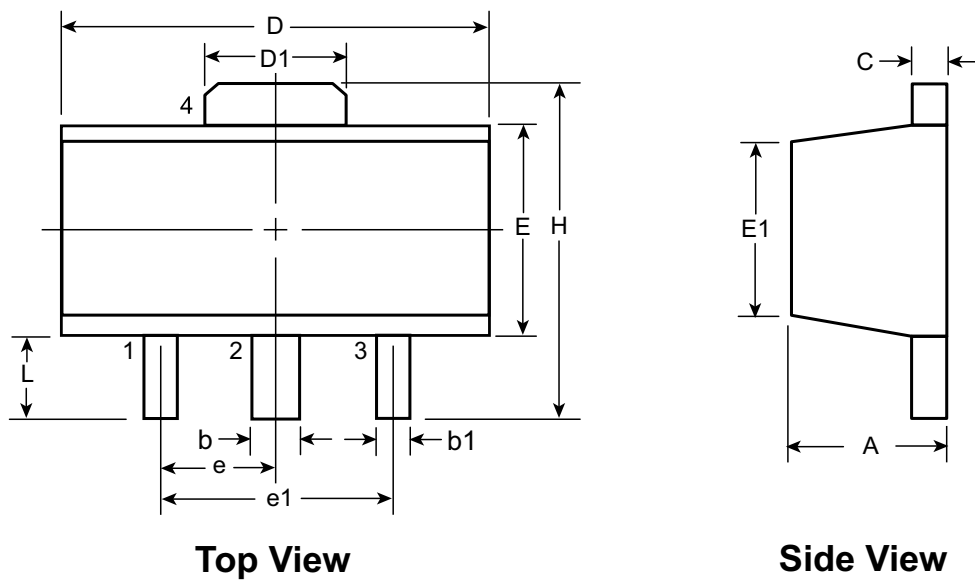
Symbol	A	A1	A2	b	D	E	E1	e	e1	L	L1	θ		
Dimension (mm)	MIN	0.89	0.01	0.88	0.30	2.80	2.10	1.20	0.95 BSC	1.90 BSC	0.20 ^t	0.54 REF	0°	
	NOM	-	-	0.95	-	2.90	-	1.30					0.50	-
	MAX	1.12	0.10	1.02	0.50	3.04	2.64	1.40					0.60	8°

3-Lead TO-92 Package Outline (N3)



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*

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



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	0.89	
	NOM	-	-	-	-	-	-	-	-			-	-	-
	MAX	1.60	0.56	0.48	0.44	4.60	1.83	2.60	2.29			4.25	1.20	