



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of "Quality Parts,Customers Priority,Honest Operation,and Considerate Service",our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China





# N-Channel Depletion-Mode Vertical DMOS FETs

## Features

- ▶ High input impedance
- ▶ Low input capacitance
- ▶ Fast switching speeds
- ▶ Low on-resistance
- ▶ Free from secondary breakdown
- ▶ Low input and output leakage

## Applications

- ▶ Normally-on switches
- ▶ Solid state relays
- ▶ Converters
- ▶ Linear amplifiers
- ▶ Constant current sources
- ▶ Power supply circuits
- ▶ Telecom

## Ordering Information

| Part Number     | Package Option    | Packing   |
|-----------------|-------------------|-----------|
| DN2540N3-G      | TO-92             | 1000/Bag  |
| DN2540N3-G P002 | TO-92             | 2000/Reel |
| DN2540N3-G P003 |                   |           |
| DN2540N3-G P005 |                   |           |
| DN2540N3-G P013 |                   |           |
| DN2540N3-G P014 |                   |           |
| DN2540N5-G      | TO-220            | 50/Tube   |
| DN2540N8-G      | TO-243AA (SOT-89) | 2000/Reel |

-G denotes a lead (Pb)-free / RoHS compliant package.  
 Contact factory for Wafer / Die availability.  
 Devices in Wafer / Die form are lead (Pb)-free / RoHS compliant.

## Absolute Maximum Ratings

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

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.

## General Description

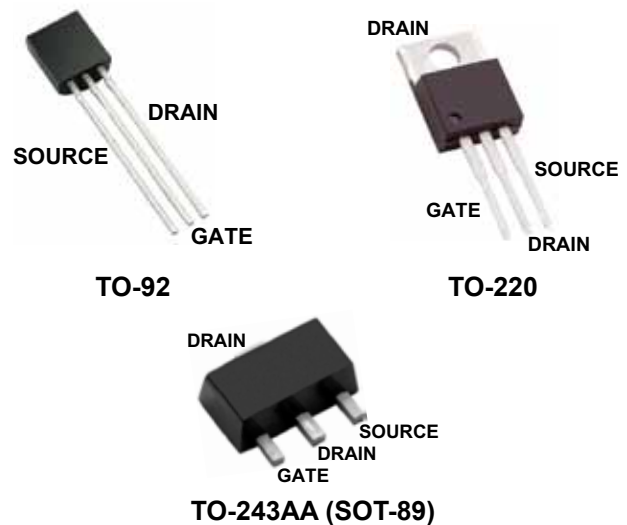
The Supertex DN2540 is a low threshold depletion mode (normally-on) transistor utilizing an advanced vertical DMOS structure and Supertex's well-proven silicon-gate manufacturing process. This combination produces a device with the power handling capabilities of bipolar transistors and with the high input impedance and positive temperature coefficient inherent in MOS devices. Characteristic of all MOS structures, this device is free from thermal runaway and thermally-induced secondary breakdown.

Supertex's vertical DMOS FETs are ideally suited to a wide range of switching and amplifying applications where high breakdown voltage, high input impedance, low input capacitance, and fast switching speeds are desired.

## Product Summary

| $BV_{DSX}/BV_{DGX}$ | $R_{DS(ON)}$<br>(max) | $I_{DSS}$<br>(min) |
|---------------------|-----------------------|--------------------|
| 400V                | 25Ω                   | 150mA              |

## Pin Configuration



## Typical Thermal Resistance

| Package           | $\theta_{ja}$ |
|-------------------|---------------|
| TO-92             | 132°C/W       |
| TO-220            | 29°C/W        |
| TO-243AA (SOT-89) | 133°C/W       |

Product Marking



YY = Year Sealed  
 WW = Week Sealed  
 \_\_\_\_\_ = "Green" Packaging



L = Lot Number  
 YY = Year Sealed  
 WW = Week Sealed  
 \_\_\_\_\_ = "Green" Packaging

Package may or may not include the following marks: Si or

TO-92

Package may or may not include the following marks: Si or

TO-220



W = Code for week sealed  
 \_\_\_\_\_ = "Green" Packaging

Package may or may not include the following marks: Si or

TO-243AA (SOT-89)

Thermal Characteristics

| Package  | $I_D$<br>(continuous) <sup>†</sup> | $I_D$<br>(pulsed) | Power Dissipation<br>@ $T_c = 25^\circ C$ | $I_{DR}$ <sup>†</sup> | $I_{DRM}$ |
|----------|------------------------------------|-------------------|-------------------------------------------|-----------------------|-----------|
| TO-92    | 120mA                              | 500mA             | 1.0W                                      | 120mA                 | 500mA     |
| TO-220   | 500mA                              | 500mA             | 15W                                       | 500mA                 | 500mA     |
| TO-243AA | 170mA                              | 500mA             | 1.6W <sup>‡</sup>                         | 170mA                 | 500mA     |

Notes:

- <sup>†</sup>  $I_D$  (continuous) is limited by max rated  $T_f$
- <sup>‡</sup> Mounted on FR5 board, 25mm x 25mm x 1.57mm,  $T_A = 25^\circ C$ .

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

| Sym                  | Parameter                                  | Min  | Typ | Max  | Units          | Conditions                                                          |
|----------------------|--------------------------------------------|------|-----|------|----------------|---------------------------------------------------------------------|
| $BV_{DSX}$           | Drain-to-source breakdown voltage          | 400  | -   | -    | V              | $V_{GS} = -5.0V, I_D = 100\mu A$                                    |
| $V_{GS(OFF)}$        | Gate-to-source off voltage                 | -1.5 | -   | -3.5 | V              | $V_{DS} = 25V, I_D = 10\mu A$                                       |
| $\Delta V_{GS(OFF)}$ | Change in $V_{GS(OFF)}$ with temperature   | -    | -   | -4.5 | mV/ $^\circ C$ | $V_{DS} = 25V, I_D = 10\mu A$                                       |
| $I_{GSS}$            | Gate body leakage current                  | -    | -   | 100  | nA             | $V_{GS} = \pm 20V, V_{DS} = 0V$                                     |
| $I_{D(OFF)}$         | Drain-to-source leakage current            | -    | -   | 10   | $\mu A$        | $V_{DS} = \text{Max rating}, V_{GS} = -10V$                         |
|                      |                                            | -    | -   | 1.0  | mA             | $V_{DS} = 0.8 \text{ Max Rating}, V_{GS} = -10V, T_A = 125^\circ C$ |
| $I_{DSS}$            | Saturated drain-to-source current          | 150  | -   | -    | mA             | $V_{GS} = 0V, V_{DS} = 25V$                                         |
| $R_{DS(ON)}$         | Static drain-to-source on-state resistance | -    | 17  | 25   | $\Omega$       | $V_{GS} = 0V, I_D = 120mA$                                          |
| $\Delta R_{DS(ON)}$  | Change in $R_{DS(ON)}$ with temperature    | -    | -   | 1.1  | %/ $^\circ C$  | $V_{GS} = 0V, I_D = 120mA$                                          |
| $G_{FS}$             | Forward transconductance                   | -    | 325 | -    | mmho           | $V_{DS} = 10V, I_D = 100mA$                                         |
| $C_{ISS}$            | Input capacitance                          | -    | 200 | 300  | pF             | $V_{GS} = -10V, V_{DS} = 25V, f = 1MHz$                             |
| $C_{OSS}$            | Common source output capacitance           | -    | 12  | 30   |                |                                                                     |
| $C_{RSS}$            | Reverse transfer capacitance               | -    | 1.0 | 5.0  |                |                                                                     |

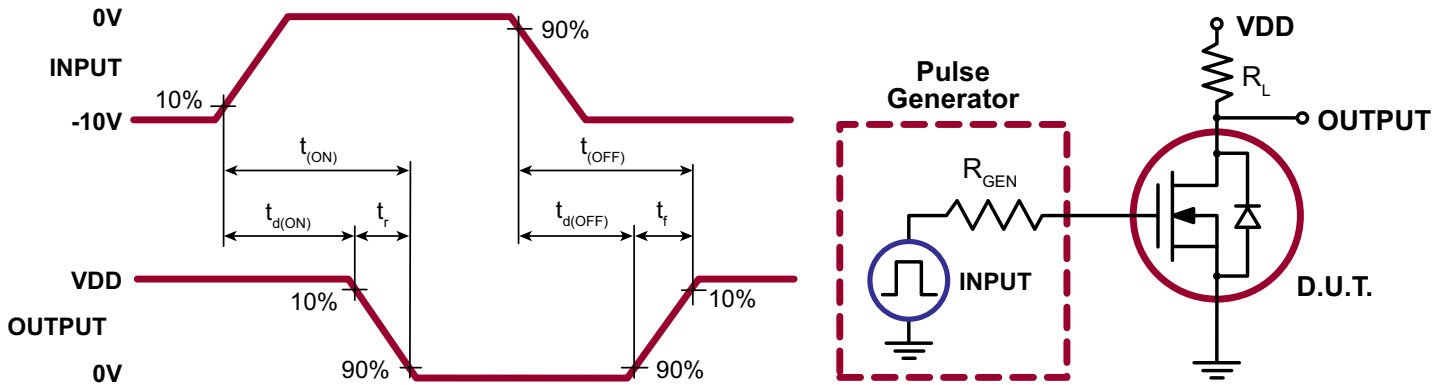
**Electrical Characteristics** (cont.)

| Sym          | Parameter                  | Min | Typ | Max | Units | Conditions                                                 |
|--------------|----------------------------|-----|-----|-----|-------|------------------------------------------------------------|
| $t_{d(ON)}$  | Turn-on delay time         | -   | -   | 10  | ns    | $V_{DD} = 25V,$<br>$I_D = 150mA,$<br>$R_{GEN} = 25\Omega,$ |
| $t_r$        | Rise time                  | -   | -   | 15  |       |                                                            |
| $t_{d(OFF)}$ | Turn-off delay time        | -   | -   | 15  |       |                                                            |
| $t_f$        | Fall time                  | -   | -   | 20  |       |                                                            |
| $V_{SD}$     | Diode forward voltage drop | -   | -   | 1.8 | V     | $V_{GS} = -10V, I_{SD} = 120mA$                            |
| $t_{rr}$     | Reverse recovery time      | -   | 800 | -   | ns    | $V_{GS} = -10V, I_{SD} = 1.0A$                             |

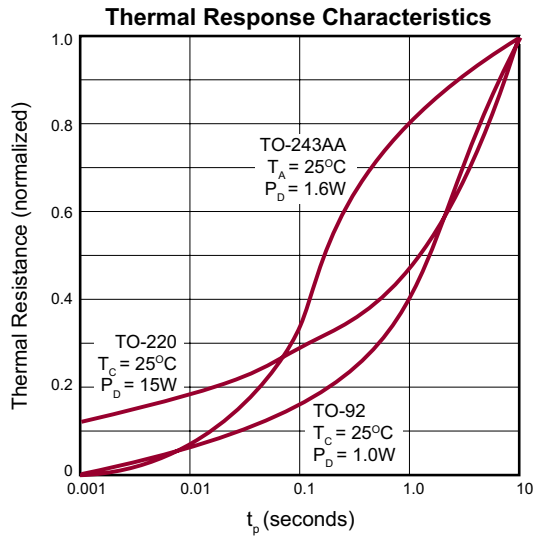
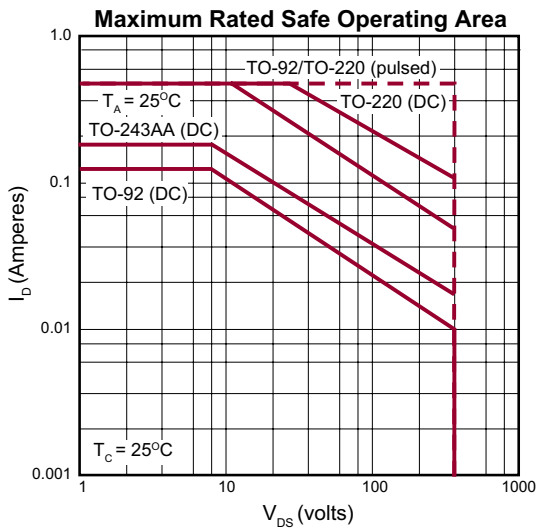
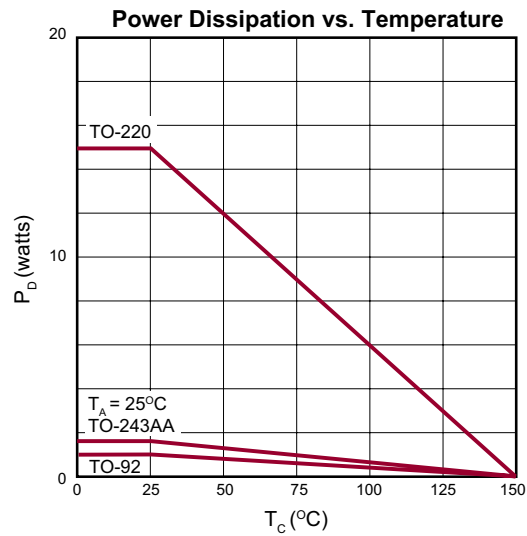
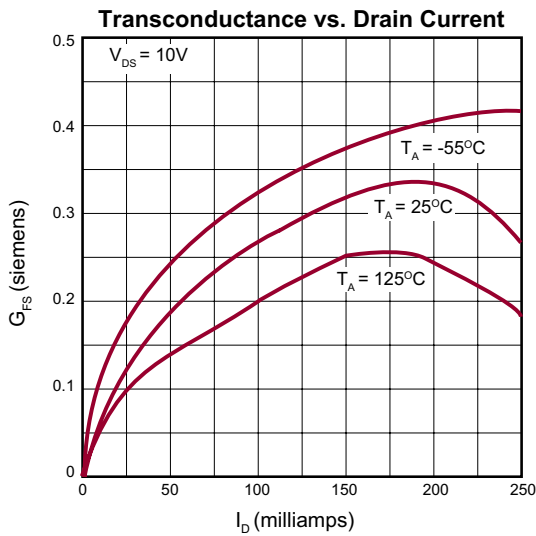
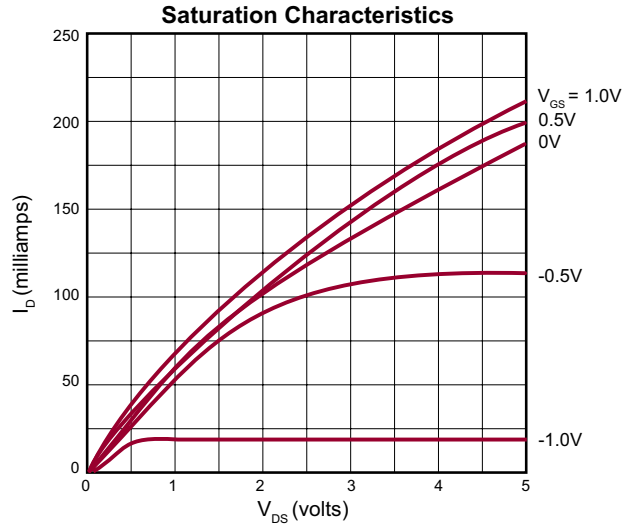
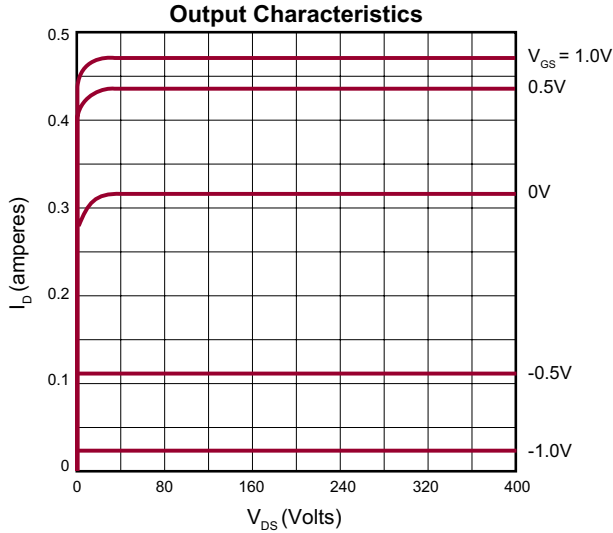
**Notes:**

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

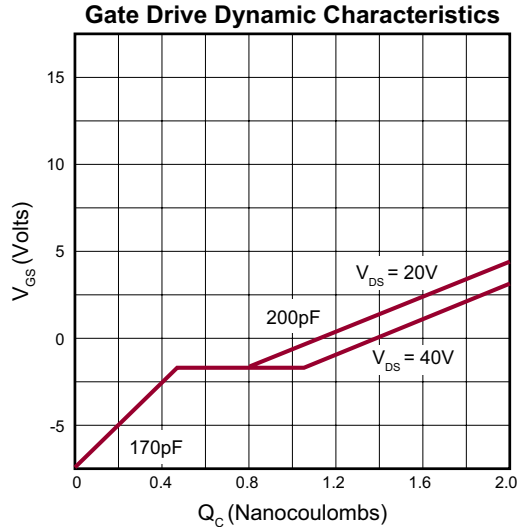
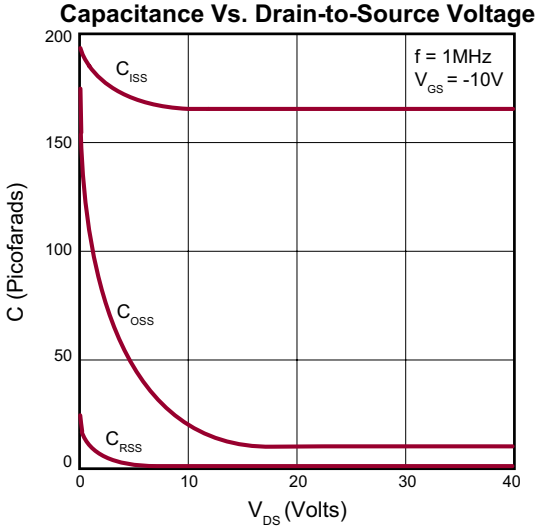
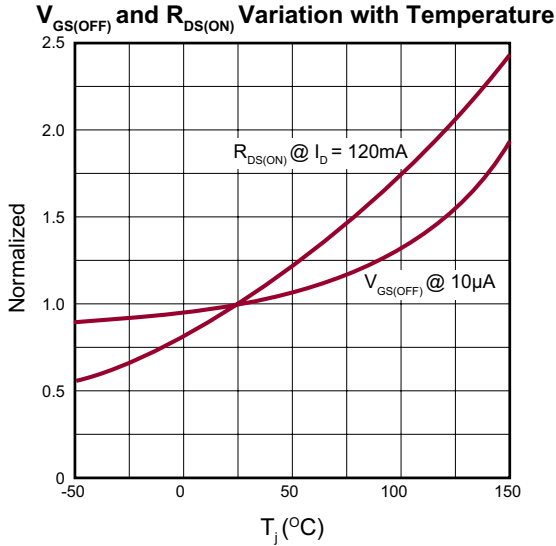
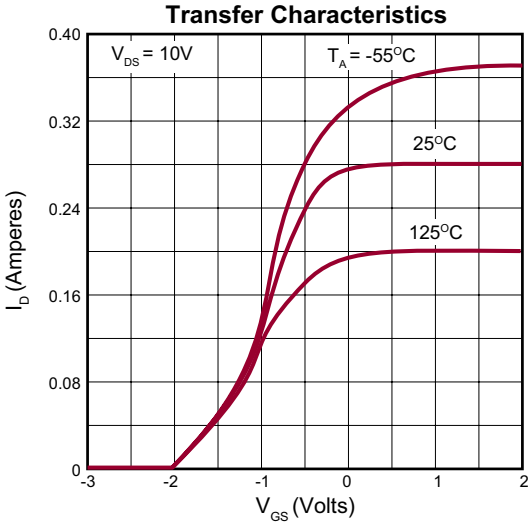
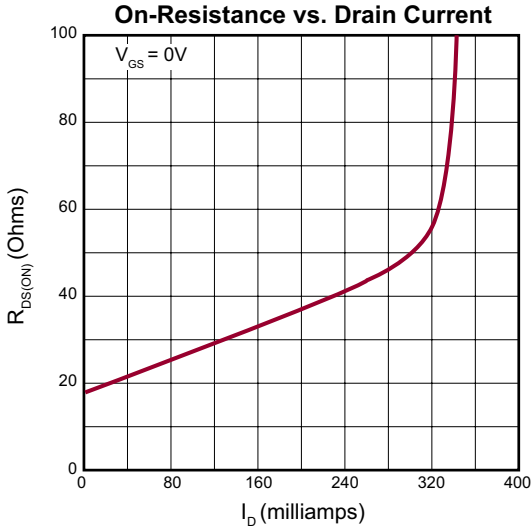
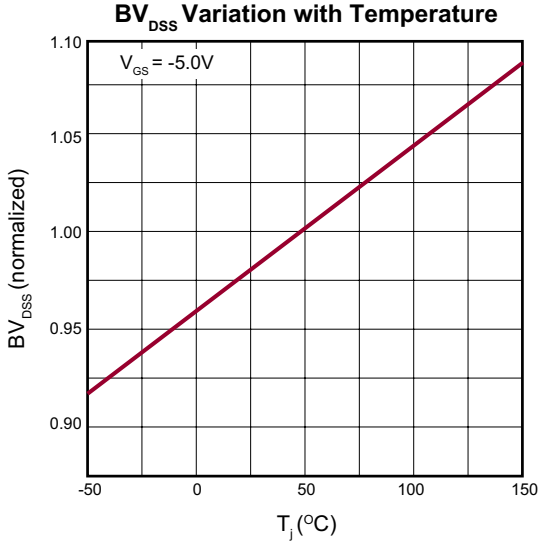
**Switching Waveforms and Test Circuit**



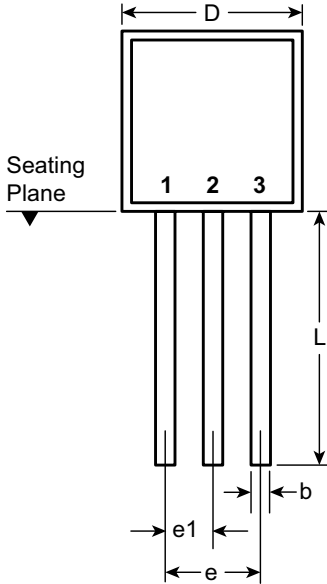
# Typical Performance Curves



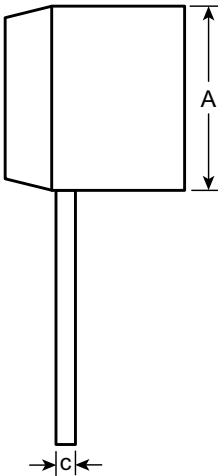
Typical Performance Curves (cont.)



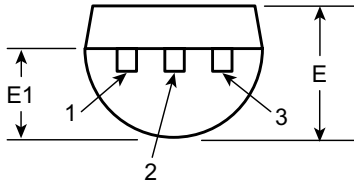
### 3-Lead TO-92 Package Outline (N3)



**Front View**



**Side View**

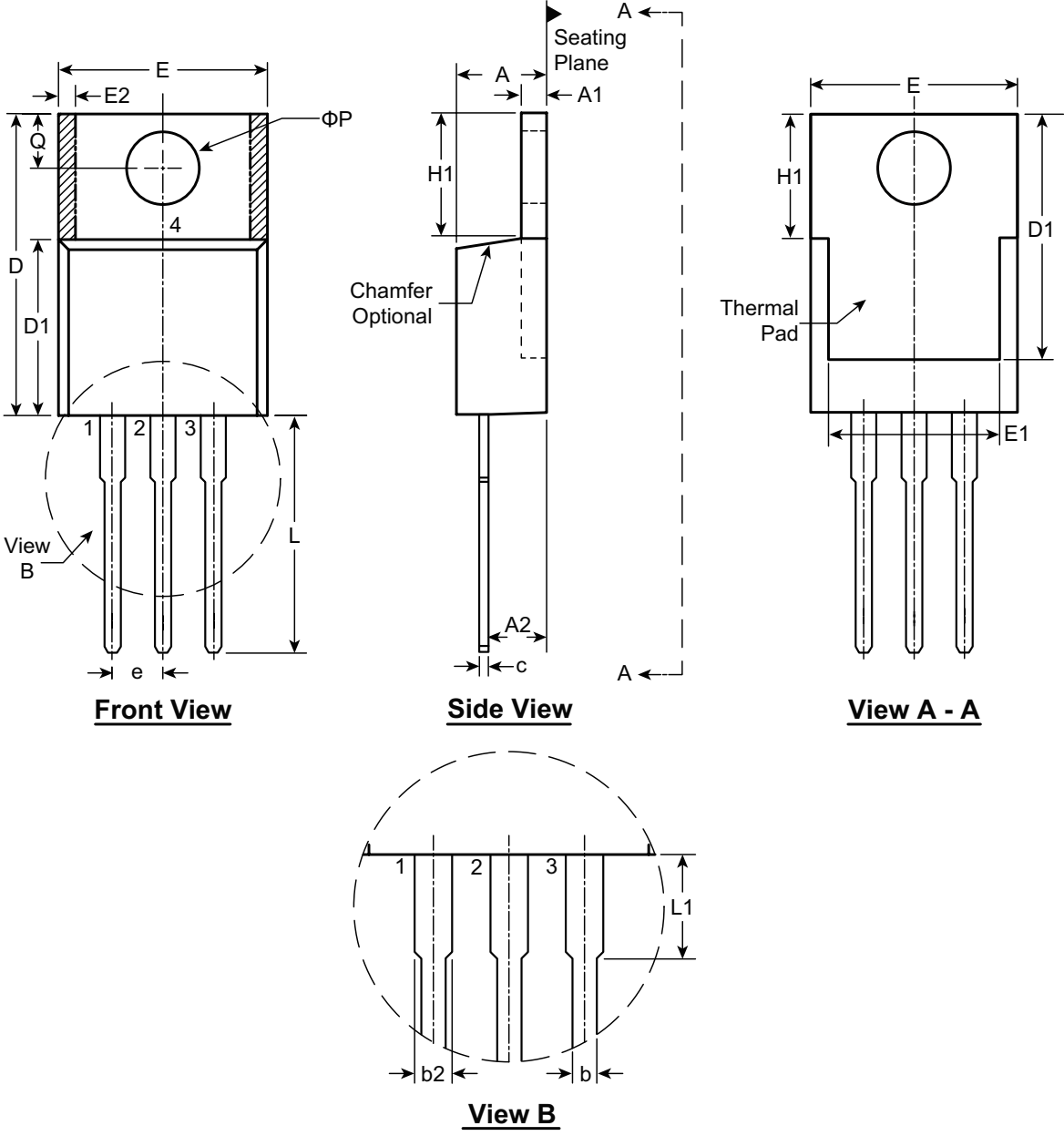


**Bottom View**

| Symbol              | A   | b    | c                 | D                 | E    | E1   | e    | e1   | L    |       |
|---------------------|-----|------|-------------------|-------------------|------|------|------|------|------|-------|
| Dimensions (inches) | MIN | .170 | .014 <sup>†</sup> | .014 <sup>†</sup> | .175 | .125 | .080 | .095 | .045 | .500  |
|                     | NOM | -    | -                 | -                 | -    | -    | -    | -    | -    | -     |
|                     | MAX | .210 | .022 <sup>†</sup> | .022 <sup>†</sup> | .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.**  
**Supertex Doc.#: DSPD-3TO92N3, Version E041009.**

### 3-Lead TO-220 Package Outline (N5)



| Symbol             | A   | A1   | A2   | b                 | b2   | c    | D                 | D1   | D2                | E                 | E1   | E2   | e     | H1          | L    | L1   | Q     | ΦP   |      |   |
|--------------------|-----|------|------|-------------------|------|------|-------------------|------|-------------------|-------------------|------|------|-------|-------------|------|------|-------|------|------|---|
| Dimension (inches) | MIN | .140 | .020 | .080              | .015 | .045 | .012 <sup>†</sup> | .560 | .326 <sup>†</sup> | .474 <sup>†</sup> | .380 | .270 | 0.20* | .100<br>BSC | .230 | .500 | .200* | .100 | .139 |   |
|                    | NOM | -    | -    | -                 | .027 | .057 | -                 | -    | -                 | -                 | -    | -    | -     |             | -    | -    | -     | -    | -    | - |
|                    | MAX | .190 | .055 | .120 <sup>†</sup> | .040 | .070 | .024              | .650 | .361 <sup>†</sup> | .507              | .420 | .350 | .030  |             | .270 | .580 | .250  | .135 | .161 |   |

JEDEC Registration TO-220, Variation AB, Issue K, April 2002.

\* This dimension is not specified in the JEDEC drawing.

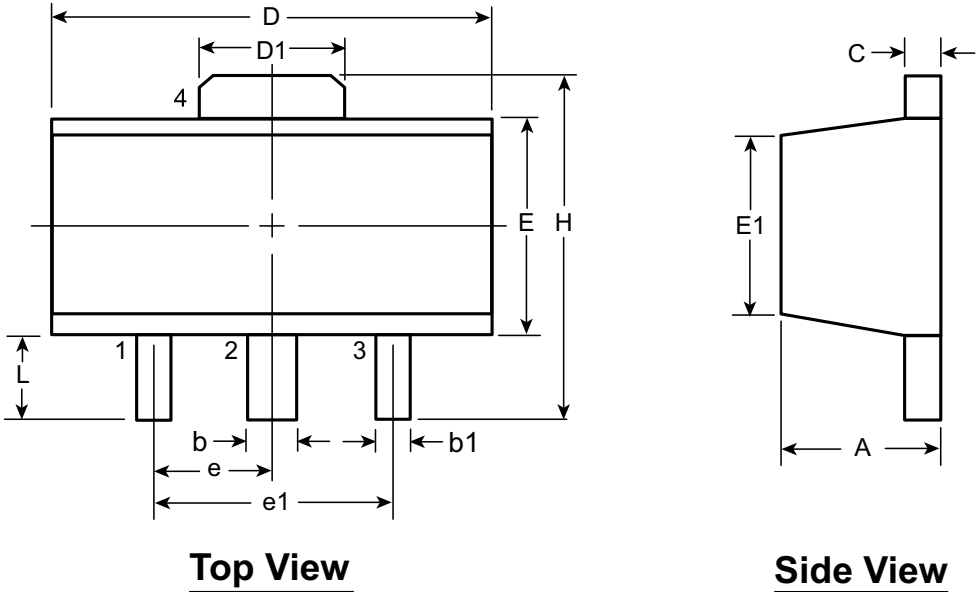
† This dimension differs from the JEDEC drawing.

Drawings not to scale.

Supertex Doc. #: DSPD-3TO220N5, Version C041009.



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



**Top View**

**Side View**

| 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.

Supertex Doc. #: DSPD-3TO243AAN8, Version F111010.

(The package drawing(s) in this data sheet may not reflect the most current specifications. For the latest package outline information go to <http://www.supertex.com/packaging.html>.)

Supertex inc. does not recommend the use of its products in life support applications, and will not knowingly sell them for use in such applications unless it receives an adequate "product liability indemnification insurance agreement." Supertex inc. does not assume responsibility for use of devices described, and limits its liability to the replacement of the devices determined defective due to workmanship. No responsibility is assumed for possible omissions and inaccuracies. Circuitry and specifications are subject to change without notice. For the latest product specifications refer to the Supertex inc. (website: <http://www.supertex.com>)