# STX616

## High voltage NPN power transistor

## Features

- High voltage capability
- High DC current gain
- Minimum lot-to-lot spread for reliable operation

## Applications

- Switching mode power supply
- Battery charger

## Description

The device is manufactured using high voltage multi epitaxial planar technology for high switching speeds and high voltage withstand capability. The device is designed for use in SMPS and battery charger.

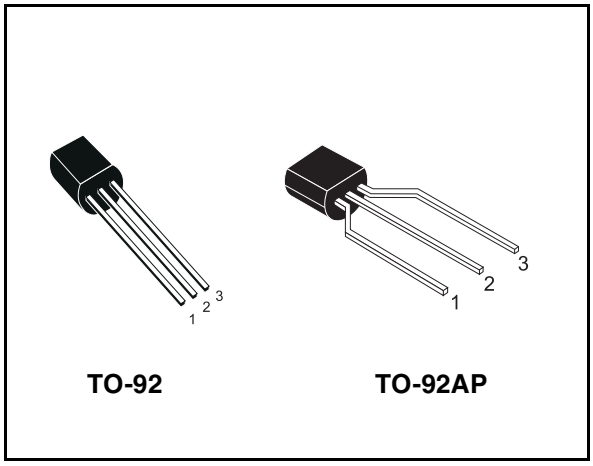



**Figure 1. Internal schematic diagram**

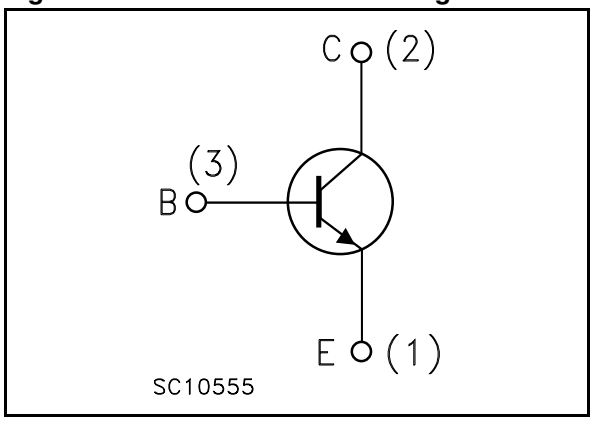



**Table 1. Device summary**

| Order code | Marking | Package | Packaging |
|---|---|---|---|
| STX616 | X616 | TO-92 | Bulk |
| STX616-AP | X616 | TO-92AP | Ammopack |

# 1 Electrical characteristics

($T_{case}$ = 25°C unless otherwise specified)

**Table 2. Absolute maximum rating**

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{CES}$ | Collector-emitter voltage ($V_{BE}$ = 0) | 980 | V |
| $V_{CEO}$ | Collector-emitter voltage ($I_B$ = 0) | 500 | V |
| $V_{EBO}$ | Emitter-base voltage ($I_C$ = 0) | 12 | V |
| $I_C$ | Collector current | 1.5 | A |
| $I_{CM}$ | Collector peak current ($t_P$ < 5ms) | 2.4 | A |
| $I_B$ | Base current | 0.8 | A |
| $I_{BM}$ | Base peak current ($t_P$ < 5ms) | 1.2 | A |
| $P_{tot}$ | Total dissipation at $T_c$ = 25°C | 2.8 | W |
| $T_{stg}$ | Storage temperature | -65 to 150 | °C |
| $T_J$ | Max. operating junction temperature | 150 | °C |

**Table 3. Thermal data**

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $R_{thj\text{-}case}$ | Thermal resistance junction-case | max | 44.6 | °C/W |
| $R_{thj\text{-}amb}$ | Thermal resistance junction-ambient | max | 150 | °C/W |

# 2 Electrical characteristics

($T_{case}$ = 25°C unless otherwise specified)

**Table 4. Electrical characteristics**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_{CES}$ | Collector cut-off current ($V_{BE}$ =0) | $V_{CE}$ = 980V<br>$V_{CE}$ = 980V $T_c$ = 125°C | | | 50<br>0.5 | µA<br>mA |
| $V_{CE(sus)}$ (1) | Collector-emitter sustaining voltage ($I_B$ = 0) | $I_C$ = 10mA | 500 | | | V |
| $V_{EBO}$ | Emitter-base voltage ($I_C$ = 0) | $I_E$ = 1mA | 12 | | | V |
| $V_{CE(sat)}$ (1) | Collector-emitter saturation voltage | $I_C$ = 0.2A $I_B$ = 40mA<br>$I_C$ = 1A $I_B$ = 200mA | | | 0.5<br>1 | V<br>V |
| $V_{BE(sat)}$ (1) | Base-emitter saturation voltage | $I_C$ = 0.2A $I_B$ = 40mA<br>$I_C$ = 1A $I_B$ = 200mA | | | 1<br>1.4 | V<br>V |
| $h_{FE}$ (1) | DC current gain | $I_C$ = 500µA $V_{CE}$ = 2V<br>$I_C$ = 200mA $V_{CE}$ = 5V<br>$I_C$ = 500mA $V_{CE}$ = 5V<br>$I_C$ = 1.5A $V_{CE}$ = 5V | 17<br>25<br>12<br>4 | | | |
| $t_{on}$<br>$t_s$<br>$t_f$ | RESISTIVE LOAD<br>Turn-on time<br>Storage time<br>Fall time | $V_{CC}$ = 250V $I_C$ = 250mA<br>$I_{B1}$ = 65mA $I_{B2}$ = -130mA | | | 0.2<br>5<br>0.65 | µs<br>µs<br>µs |
| $t_{on}$<br>$t_s$<br>$t_f$ | RESISTIVE LOAD<br>Turn-on time<br>Storage time<br>Fall time | $V_{CC}$ = 250V $I_C$ = 0.8A<br>$I_{B1}$ = 160mA $I_{B2}$ = -0.4A | | | 1<br>2.5<br>0.35 | µs<br>µs<br>µs |
| $t_s$<br>$t_f$ | INDUCTIVE LOAD<br>Storage time<br>Fall time | $V_{cl}$ = 300V $I_C$ = 250mA<br>$I_{B1}$ = 65mA $I_{B2}$ = -130mA<br>L = 200µH | | | 5<br>0.5 | µs<br>µs |
| $t_s$<br>$t_f$ | INDUCTIVE LOAD<br>Storage time<br>Fall time | $V_{cl}$ = 300V $I_C$ = 0.8A<br>$I_{B1}$ = 160mA $I_{B2}$ = -0.4A<br>L = 200µH | | | 2.5<br>0.25 | µs<br>µs |

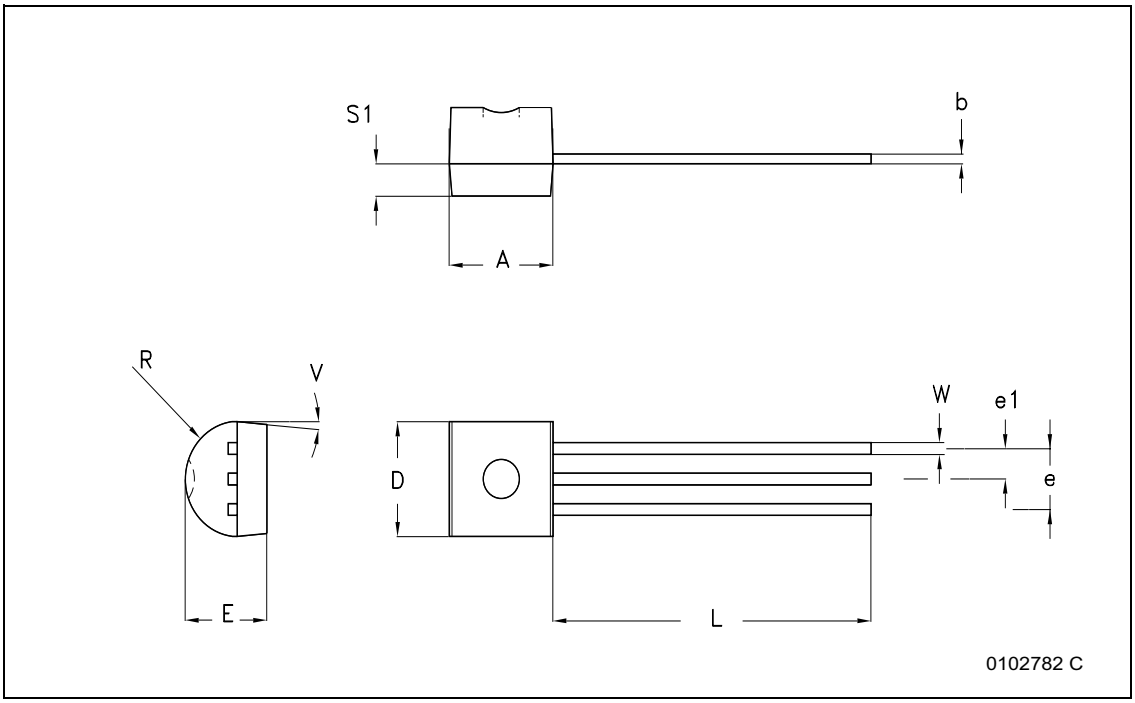
Note (1) Pulsed duration = 300 µs, duty cycle ≤1.5%

# 3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com

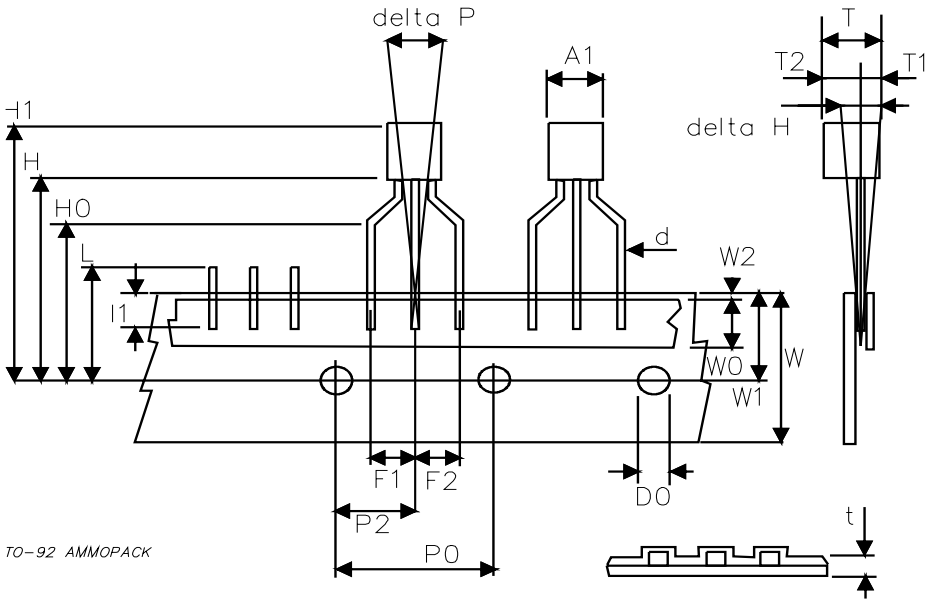
## TO-92 BULK SHIPMENT MECHANICAL DATA

| DIM. | mm. | | |
|---|---|---|---|
| | MIN. | TYP | MAX. |
| A | 4.32 | | 4.95 |
| b | 0.36 | | 0.51 |
| D | 4.45 | | 4.95 |
| E | 3.30 | | 3.94 |
| e | 2.41 | | 2.67 |
| e1 | 1.14 | | 1.40 |
| L | 12.70 | | 15.49 |
| R | 2.16 | | 2.41 |
| S1 | 0.92 | | 1.52 |
| W | 0.41 | | 0.56 |
| V | | 5 $^{O}$ | |



## TO-92 AMMOPACK SHIPMENT (Suffix"-AP") MECHANICAL DATA

| DIM. | mm. | | |
|---|---|---|---|
| | MIN. | TYP | MAX. |
| A1 | | | 4.80 |
| T | | | 3.80 |
| T1 | | | 1.60 |
| T2 | | | 2.30 |
| d | | | 0.48 |
| P0 | 12.50 | 12.70 | 12.90 |
| P2 | 5.65 | 6.35 | 7.05 |
| F1,F2 | 2.44 | 2.54 | 2.94 |
| delta H | -2.00 | | 2.00 |
| W | 17.50 | 18.00 | 19.00 |
| W0 | 5.70 | 6.00 | 6.30 |
| W1 | 8.50 | 9.00 | 9.25 |
| W2 | | | 0.50 |
| H | 18.50 | | 20.50 |
| H0 | 15.50 | 16.00 | 16.50 |
| H1 | | | 25.00 |
| D0 | 3.80 | 4.00 | 4.20 |
| t | | | 0.90 |
| L | | | 11.00 |
| I1 | 3.00 | | |
| delta P | -1.00 | | 1.00 |



# 4 Revision history

Table 5. Document revision history

| Date | Revision | Changes |
|---|---|---|
| 06-Jun-2007 | 1 | Initial release. |
| 22-Oct-2007 | 2 | Added TO-92AP package. |

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