



# STSA1805

## LOW VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

PRELIMINARY DATA

| Ordering Code | Marking | Package / Shipment |
|---------------|---------|--------------------|
| STSA1805      | SA1805  | TO-92 / Bulk       |
| STSA1805-AP   | SA1805  | TO-92 / Ammopack   |

- VERY LOW COLLECTOR TO EMITTER SATURATION VOLTAGE
- HIGH CURRENT GAIN CHARACTERISTIC
- FAST-SWITCHING SPEED

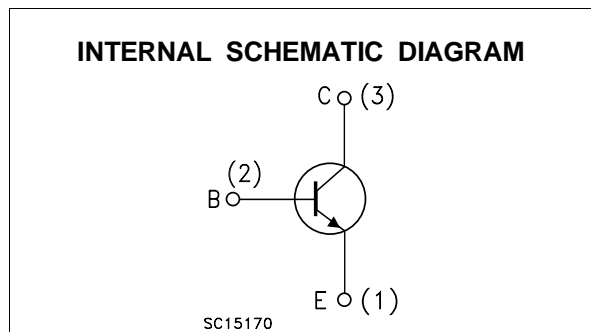
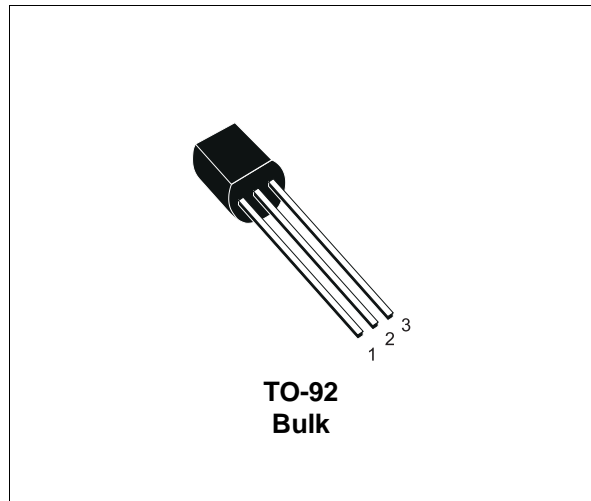
### APPLICATIONS:

- EMERGENCY LIGHTING
- VOLTAGE REGULATORS
- RELAY DRIVERS
- HIGH EFFICIENCY LOW VOLTAGE SWITCHING APPLICATIONS

### DESCRIPTION

The device is manufactured in NPN Planar Technology by using a "Base Island" layout.

The resulting Transistor shows exceptional high gain performance coupled with very low saturation voltage.



### ABSOLUTE MAXIMUM RATINGS

| Symbol    | Parameter                               | Value      | Unit |
|-----------|---|------------|------|
| $V_{CBO}$ | Collector-Base Voltage ( $I_E = 0$ )    | 150        | V    |
| $V_{CEO}$ | Collector-Emitter Voltage ( $I_B = 0$ ) | 60         | V    |
| $V_{EBO}$ | Emitter-Base Voltage ( $I_C = 0$ )      | 7          | V    |
| $I_C$     | Collector Current                       | 5          | A    |
| $I_{CM}$  | Collector Peak Current ( $t_p < 5$ ms)  | 15         | A    |
| $I_B$     | Base Current                            | 2          | A    |
| $P_{tot}$ | Total Dissipation at $T_{amb} = 25$ °C  | 1.1        | W    |
| $T_{stg}$ | Storage Temperature                     | -65 to 150 | °C   |
| $T_j$     | Max. Operating Junction Temperature     | 150        | °C   |

## THERMAL DATA

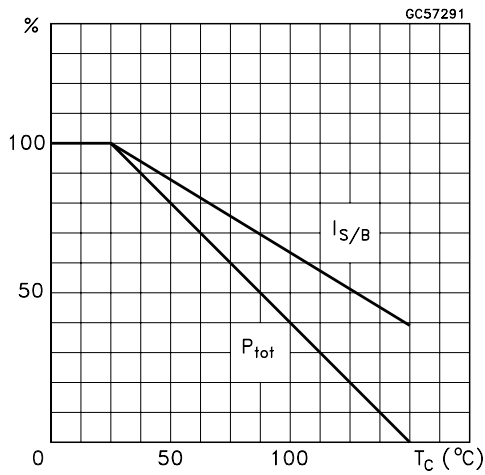
|                       |                                     |     |      |      |
|-----------------------|-------------------------------------|-----|------|------|
| R <sub>thj-amb</sub>  | Thermal Resistance Junction-Ambient | Max | 114  | °C/W |
| R <sub>thj-case</sub> | Thermal Resistance Junction-case    | Max | 83.3 | °C/W |

ELECTRICAL CHARACTERISTICS (T<sub>case</sub> = 25 °C unless otherwise specified)

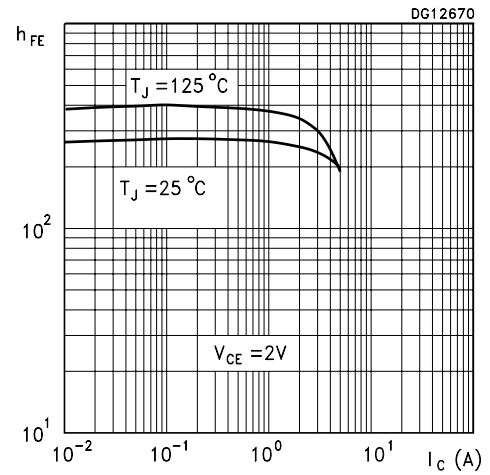
| Symbol  | Parameter  | Test Conditions   |   | Min.            | Typ.              | Max.                    | Unit                 |
|---|--|---|---|-----------------|-------------------|-------------------------|----------------------|
| I <sub>CBO</sub>                                    | Collector Cut-off Current (I <sub>E</sub> = 0)               | V <sub>CB</sub> = 40 V  |   |                 |                   | 0.1                     | μA                   |
| I <sub>EBO</sub>                                    | Emitter Cut-off Current (I <sub>C</sub> = 0)                 | V <sub>EB</sub> = 4 V   |   |                 |                   | 0.1                     | μA                   |
| V <sub>(BR)CBO</sub>                                | Collector-Base Breakdown Voltage (I <sub>E</sub> = 0)        | I <sub>C</sub> = 100 μA   |   | 150             |                   |                         | V                    |
| V <sub>(BR)CEO*</sub>                               | Collector-Emitter Breakdown Voltage (I <sub>B</sub> = 0)     | I <sub>C</sub> = 1 mA   |   | 60              |                   |                         | V                    |
| V <sub>(BR)EBO</sub>                                | Emitter-Base Breakdown Voltage (I <sub>C</sub> = 0)          | I <sub>E</sub> = 100 μA   |   | 7               |                   |                         | V                    |
| V <sub>CE(sat)*</sub>                               | Collector-Emitter Saturation Voltage                         | I <sub>C</sub> = 100 mA<br>I <sub>C</sub> = 2 A<br>I <sub>C</sub> = 3 A<br>I <sub>C</sub> = 5 A | I <sub>B</sub> = 5 mA<br>I <sub>B</sub> = 50 mA<br>I <sub>B</sub> = 150 mA<br>I <sub>B</sub> = 200 mA |                 | 150<br>200        | 50<br>300<br>400<br>600 | mV<br>mV<br>mV<br>mV |
| V <sub>BE(sat)*</sub>                               | Base-Emitter Saturation Voltage                              | I <sub>C</sub> = 2 A  | I <sub>B</sub> = 100 mA   |                 | 0.9               | 1.2                     | V                    |
| h <sub>FE*</sub>                                    | DC Current Gain  | I <sub>C</sub> = 100 mA<br>I <sub>C</sub> = 5 A<br>I <sub>C</sub> = 10 A                        | V <sub>CE</sub> = 2 V<br>V <sub>CE</sub> = 2 V<br>V <sub>CE</sub> = 2 V                               | 200<br>85<br>20 |                   | 400                     |                      |
| f <sub>T</sub>                                      | Transition frequency   | V <sub>CE</sub> = 10 V  | I <sub>C</sub> = 50 mA  |                 | 150               |                         | MHz                  |
| C <sub>CBO</sub>                                    | Collector-Base Capacitance                                   | V <sub>CB</sub> = 10 V  | f = 1 MHz   |                 | 50                |                         | pF                   |
| t <sub>on</sub><br>t <sub>s</sub><br>t <sub>f</sub> | RESISTIVE LOAD<br>Turn- on Time<br>Storage Time<br>Fall Time | I <sub>C</sub> = 1 A<br>I <sub>B1</sub> = - I <sub>B2</sub> = 0.1 A                             | V <sub>CC</sub> = 30 V  |                 | 50<br>1.35<br>120 |                         | ns<br>μs<br>ns       |

\* Pulsed: Pulse duration = 300μs, duty cycle = 1.5 %

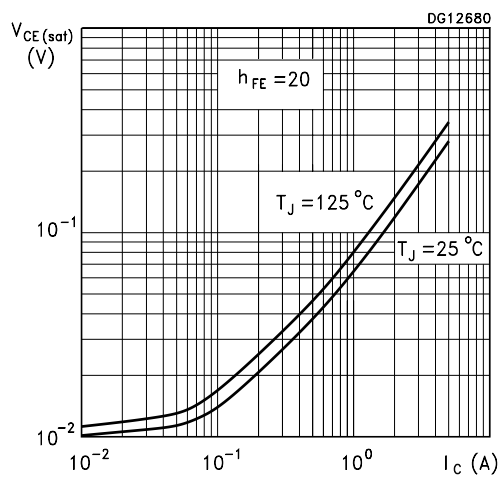
Derating Curve



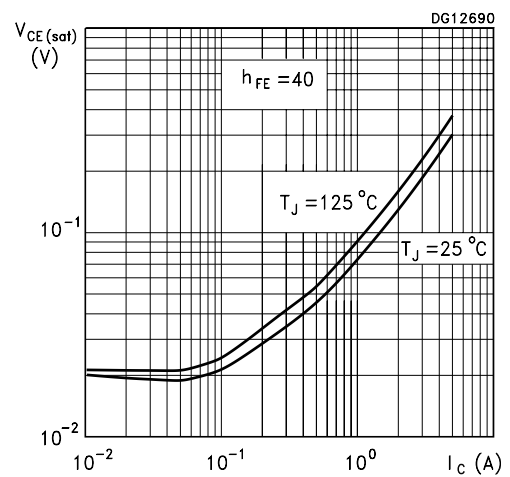
DC Current Gain



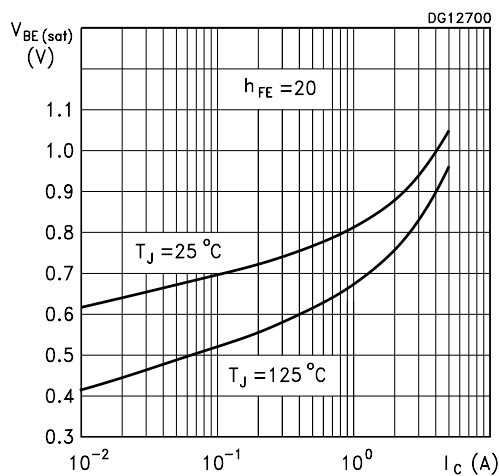
Collector-Emitter Saturation Voltage



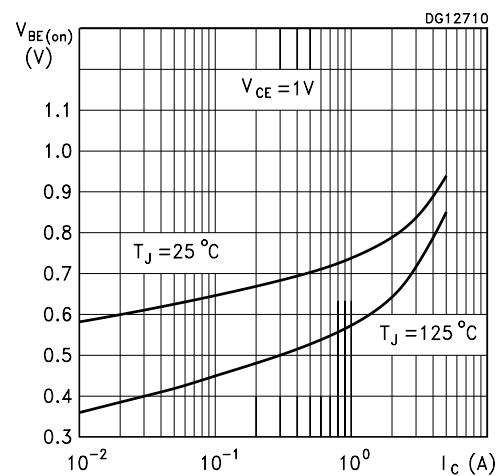
Collector-Emitter Saturation Voltage



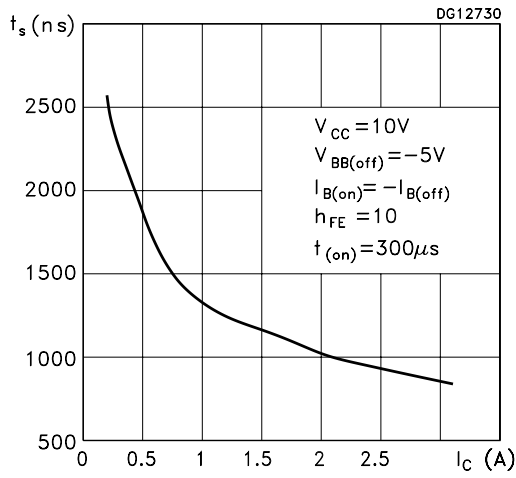
Base-Emitter Saturation Voltage



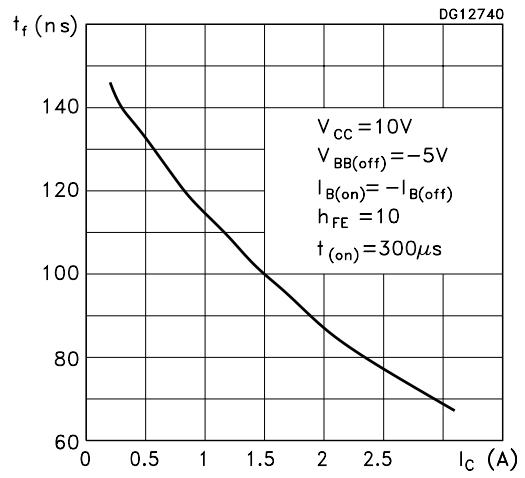
Base-Emitter On Voltage



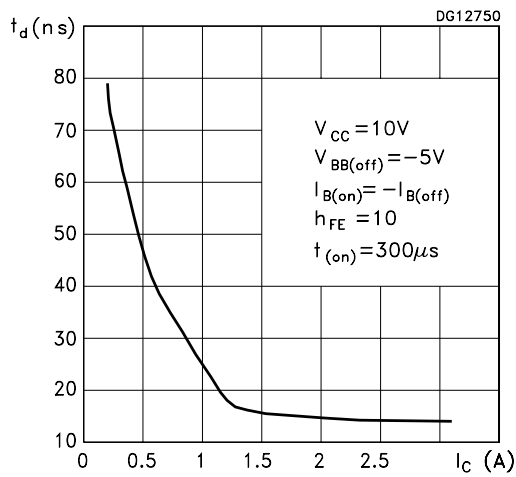
Switching Times Resistive Load



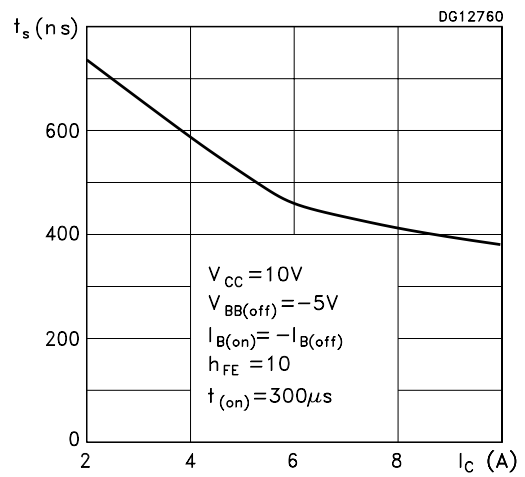
Switching Times Resistive Load



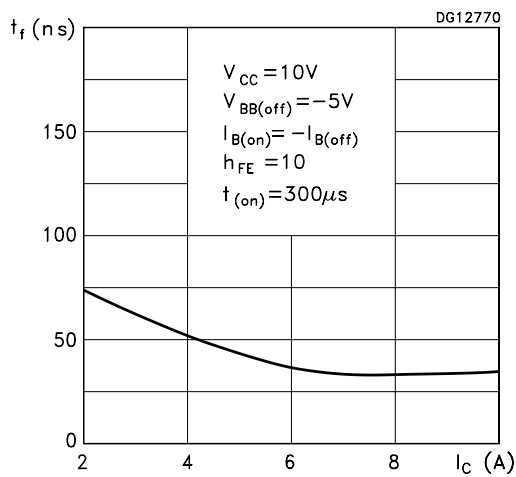
Switching Times Resistive Load

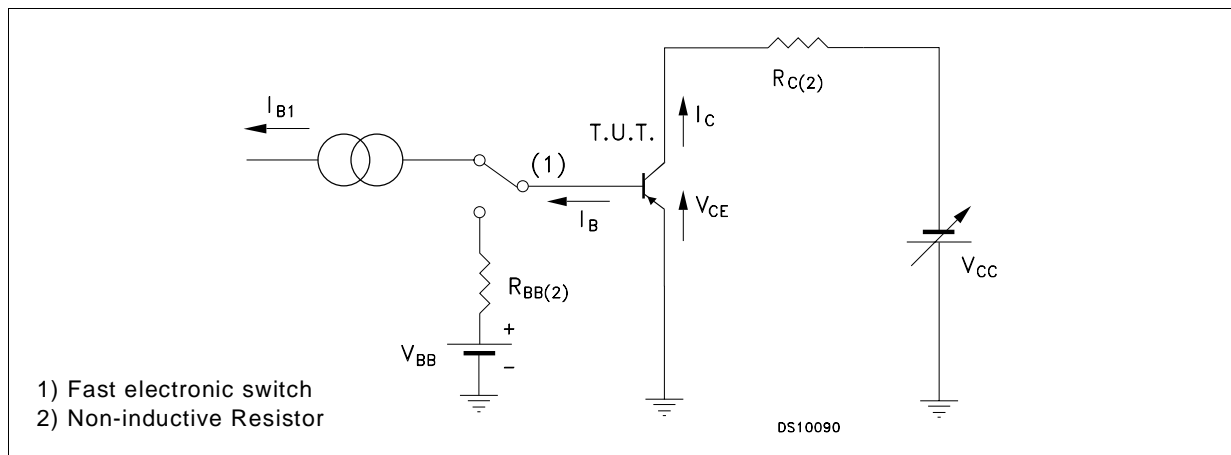


Switching Times Inductive Load



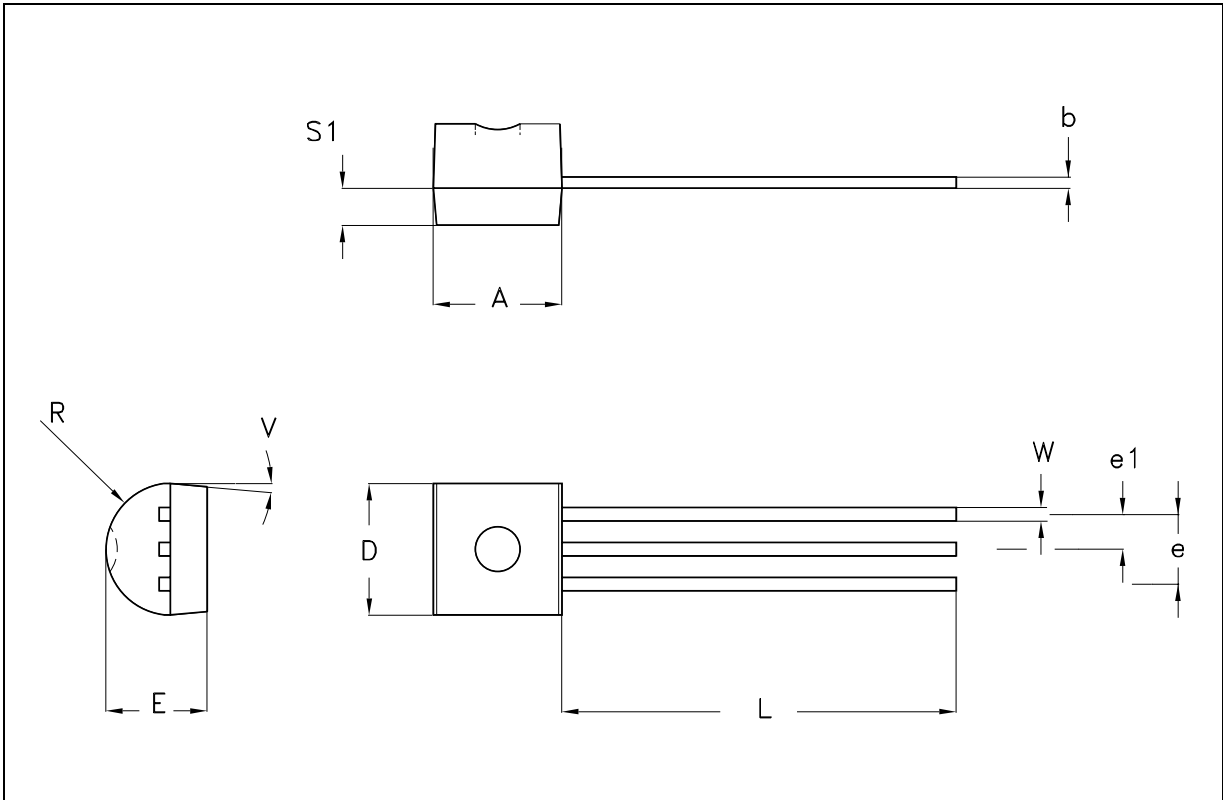
Switching Times Inductive Load



**Figure 1:** Resistive Load Switching Test Circuit.

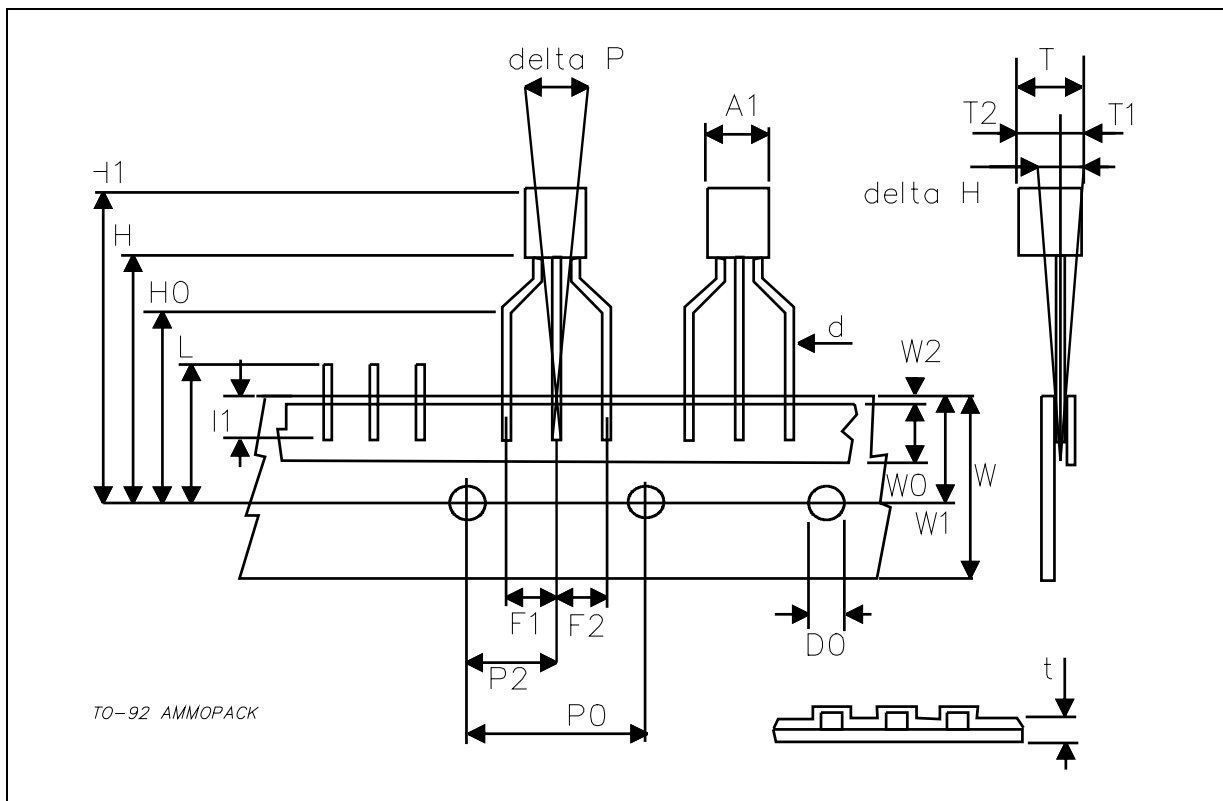
**TO-92 MECHANICAL DATA**

| DIM. | mm       |      |          | inch     |      |          |
|------|----------|------|----------|----------|------|----------|
|      | MIN.     | TYP. | MAX.     | MIN.     | TYP. | MAX.     |
| A    | 4.32     |      | 4.95     | 0.170    |      | 0.195    |
| b    | 0.36     |      | 0.51     | 0.014    |      | 0.020    |
| D    | 4.45     |      | 4.95     | 0.175    |      | 0.194    |
| E    | 3.30     |      | 3.94     | 0.130    |      | 0.155    |
| e    | 2.41     |      | 2.67     | 0.095    |      | 0.105    |
| e1   | 1.14     |      | 1.40     | 0.045    |      | 0.055    |
| L    | 12.70    |      | 15.49    | 0.500    |      | 0.609    |
| R    | 2.16     |      | 2.41     | 0.085    |      | 0.094    |
| S1   | 1.14     |      | 1.52     | 0.045    |      | 0.059    |
| W    | 0.41     |      | 0.56     | 0.016    |      | 0.022    |
| V    | 4 degree |      | 6 degree | 4 degree |      | 6 degree |



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

| DIM.    | mm    |       |       | inch   |       |       |
|---------|-------|-------|-------|--------|-------|-------|
|         | MIN.  | TYP.  | MAX.  | MIN.   | TYP.  | MAX.  |
| A1      |       |       | 4.80  |        |       | 0.189 |
| T       |       |       | 3.80  |        |       | 0.150 |
| T1      |       |       | 1.60  |        |       | 0.063 |
| T2      |       |       | 2.30  |        |       | 0.091 |
| d       |       |       | 0.48  |        |       | 0.019 |
| P0      | 12.50 | 12.70 | 12.90 | 0.492  | 0.500 | 0.508 |
| P2      | 5.65  | 6.35  | 7.05  | 0.222  | 0.250 | 0.278 |
| F1,F2   | 2.44  | 2.54  | 2.94  | 0.096  | 0.100 | 0.116 |
| delta H | -2.00 |       | 2.00  | -0.079 |       | 0.079 |
| W       | 17.50 | 18.00 | 19.00 | 0.689  | 0.709 | 0.748 |
| W0      | 5.70  | 6.00  | 6.30  | 0.224  | 0.236 | 0.248 |
| W1      | 8.50  | 9.00  | 9.25  | 0.335  | 0.354 | 0.364 |
| W2      |       |       | 0.50  |        |       | 0.020 |
| H       | 18.50 |       | 20.50 | 0.728  |       | 0.807 |
| H0      | 15.50 | 16.00 | 16.50 | 0.610  | 0.630 | 0.650 |
| H1      |       |       | 25.00 |        |       | 0.984 |
| D0      | 3.80  | 4.00  | 4.20  | 0.150  | 0.157 | 0.165 |
| t       |       |       | 0.90  |        |       | 0.035 |
| L       |       |       | 11.00 |        |       | 0.433 |
| I1      | 3.00  |       |       | 0.118  |       |       |
| delta P | -1.00 |       | 1.00  | -0.039 |       | 0.039 |



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