



PN2222A

SMALL SIGNAL NPN TRANSISTOR

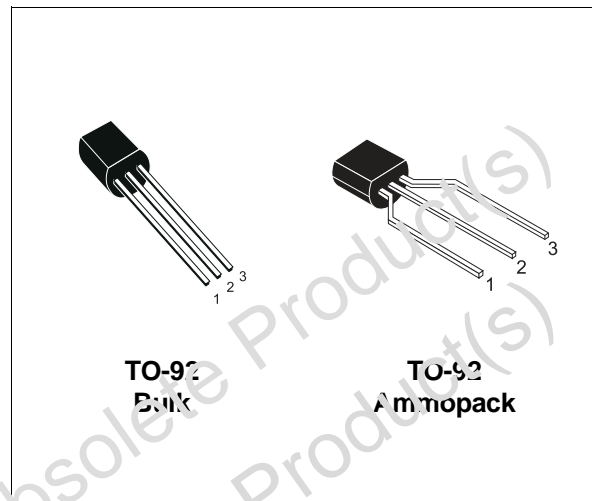
PRELIMINARY DATA

| Ordering Code | Marking | Package / Shipment |
|---------------|---------|--------------------|
| PN2222A | PN2222A | TO-92 / Bulk |
| PN2222A-AP | PN2222A | TO-92 / Ammopack |

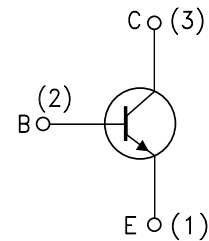
- SILICON EPITAXIAL PLANAR NPN TRANSISTOR
- TO-92 PACKAGE SUITABLE FOR THROUGH-HOLE PCB ASSEMBLY
- THE PNP COMPLEMENTARY TYPE IS PN2907A

APPLICATIONS

- WELL SUITABLE FOR TV AND HOME APPLIANCE EQUIPMENT
- SMALL LOAD SWITCH TRANSISTOR WITH HIGH GAIN AND LOW SATURATION VOLTAGE



INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|-----------|---|------------|------|
| V_{CBO} | Collector-Emitter Voltage ($I_E = 0$) | 75 | V |
| V_{CEO} | Collector-Emitter Voltage ($I_B = 0$) | 40 | V |
| V_{EBO} | Emitter-Base Voltage ($I_C = 0$) | 6 | V |
| I_C | Collector Current | 0.6 | A |
| I_{CM} | Collector Peak Current ($t_p < 5$ ms) | 0.8 | A |
| P_{tot} | Total Dissipation at $T_{amb} = 25$ °C | 500 | mW |
| T_{stg} | Storage Temperature | -65 to 150 | °C |
| T_j | Max. Operating Junction Temperature | 150 | °C |

PN2222A

THERMAL DATA

| | | | | |
|-----------------------|-------------------------------------|-----|------|------|
| R _{thj-amb} | Thermal Resistance Junction-Ambient | Max | 250 | °C/W |
| R _{thj-case} | Thermal Resistance Junction-Case | Max | 83.3 | °C/W |

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

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|------------------------|--|--|-----------------------------------|------|------------|--------------------------------------|
| I _{CEX} | Collector Cut-off Current (V _{BE} = -3 V) | V _{CE} = 60 V | | | 10 | nA |
| I _{BEX} | Base Cut-off Current (V _{BE} = -3 V) | V _{CE} = 60 V | | | 20 | nA |
| I _{CB0} | Collector Cut-off Current (I _E = 0) | V _{CB} = 75 V V _{CB} = 75 V | | | 10 10 | nA μA |
| I _{EBO} | Emitter Cut-off Current (I _C = 0) | V _{EB} = 3 V | | | 15 | nA |
| V _{(BR)CEO} * | Collector-Emitter Breakdown Voltage (I _B = 0) | I _C = 10 mA | 40 | | | V |
| V _{(BR)CBO} | Collector-Base Breakdown Voltage (I _E = 0) | I _C = 10 μA | 75 | | | V |
| V _{(BR)EBO} | Emitter-Base Breakdown Voltage (I _C = 0) | I _E = 10 μA | 6 | | | V |
| V _{CE(sat)} * | Collector-Emitter Saturation Voltage | I _C = 150 mA I _B = 15 mA I _C = 500 mA I _B = 50 mA | | | 0.3 1 | V V |
| V _{BE(sat)} * | Collector-Base Saturation Voltage | I _C = 150 mA I _B = 15 mA I _C = 500 mA I _B = 50 mA | 0.6 | | 1.2 2 | V V |
| h _{FE} * | DC Current Gain | I _C = 0.1 mA V _{CE} = 10 V I _C = 1 mA V _{CE} = 10 V I _C = 10 mA V _{CE} = 10 V I _C = 150 mA V _{CE} = 10 V I _C = 150 mA V _{CE} = 1 V I _C = 500 mA V _{CE} = 10 V | 35 50 75 100 50 40 | | 300 | |
| f _T | Transition Frequency | I _C = 20 mA V _{CE} = 20V f = 100MHz | | 270 | | MHz |
| C _{CL0} | Collector-Base Capacitance | I _E = 0 V _{CB} = 10 V f = 1 MHz | | 4 | 8 | pF |
| C _{EBO} | Emitter-Base Capacitance | I _C = 0 V _{EB} = 0.5 V f = 1MHz | | 20 | 25 | pF |
| NF | Noise Figure | I _C = 0.1 mA V _{CE} = 10 V f = 1 KHz Δf = 200 Hz R _G = 1 KΩ | | 4 | | dB |
| h _{ie} * | Input Impedance | V _{CE} = 10 V I _C = 1 mA f = 1 KHz V _{CE} = 10 V I _C = 10 mA f = 1 KHz | 2 0.25 | | 8 1.25 | KΩ KΩ |
| h _{re} * | Reverse Voltage Ratio | V _{CE} = 10 V I _C = 1 mA f = 1 KHz V _{CE} = 10 V I _C = 10 mA f = 1 KHz | | | 8 4 | 10 ⁻⁴ 10 ⁻⁴ |
| h _{fe} * | Small Signal Current Gain | V _{CE} = 10 V I _C = 1 mA f = 1 KHz V _{CE} = 10 V I _C = 10 mA f = 1 KHz | 50 75 | | 300 375 | |
| h _{oe} * | Output Admittance | V _{CE} = 10 V I _C = 1 mA f = 1 KHz V _{CE} = 10 V I _C = 10 mA f = 1 KHz | 5 25 | | 35 200 | μS μS |

* Pulsed: Pulse duration = 300 μs, duty cycle ≤ 2 %

ELECTRICAL CHARACTERISTICS (Continued)

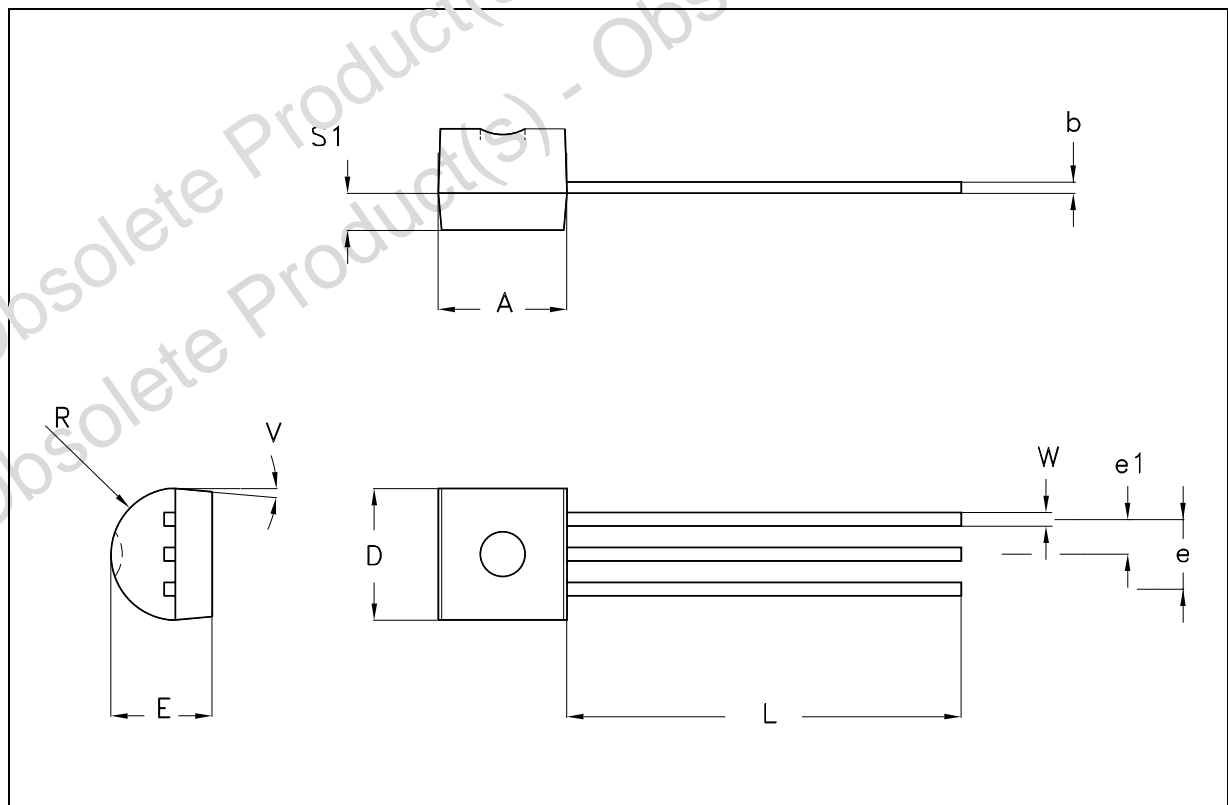
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------|--------------|--|------|------|------|------|
| t_d | Delay Time | $I_C = 150 \text{ mA}$ $I_B = 15 \text{ mA}$ | | 5 | 10 | ns |
| t_r | Rise Time | $V_{CC} = 30 \text{ V}$ | | 12 | 25 | ns |
| t_s | Storage Time | $I_C = 150 \text{ mA}$ $I_{B1} = - I_{B2} = 15 \text{ mA}$ | | 185 | 225 | ns |
| t_f | Fall Time | $V_{CC} = 30 \text{ V}$ | | 24 | 60 | ns |

* Pulsed: Pulse duration = 300 μs , duty cycle $\leq 2 \%$

Obsolete Product(s) - Obsolete Product(s)
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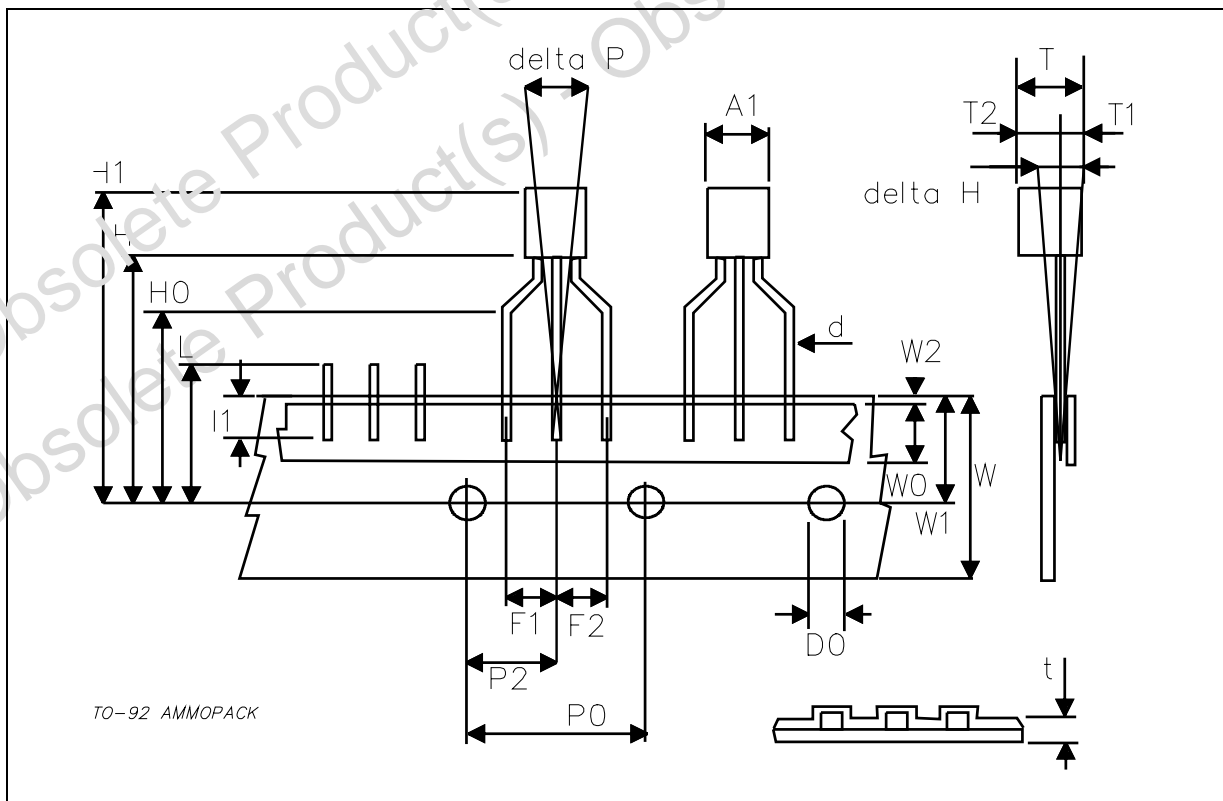
TO-92 MECHANICAL DATA

| 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 | | | 0.30 | | | 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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