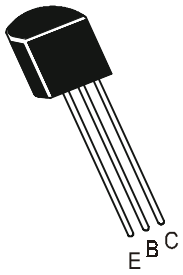
## PNP SILICON PLANAR EPITAXIAL TRANSISTORS

**BC212, BC212A, BC212B**
**BC213, BC213A, BC213B, BC213C**
**BC214, BC214B, BC214C**




**TO-92**
**Plastic Package**

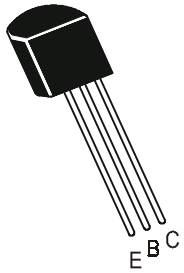
### Silicon Small Signal General Purpose Amplifier

**ABSOLUTE MAXIMUM RATINGS (Ta=25ºC unless specified otherwise)**

| DESCRIPTION | SYMBOL | BC212 | BC213 | BC214 | UNITS |
|---|---|---|---|---|---|
| **Collector Emitter Voltage** | $V_{CEO}$ | 50 | 30 | 30 | V |
| **Collector Base Voltage** | $V_{CBO}$ | 60 | 45 | 45 | V |
| **Emitter Base Voltage** | $V_{EBO}$ | | 5 | | V |
| **Collector Current Continuous** | $I_C$ | | 100 | | mA |
| **Power Dissipation @ Ta=25ºC** | $P_D$ | | 350 | | mW |
| **Derate Above 25ºC** | | | 2.8 | | mW/ºC |
| **Power Dissipation @ Tc=25ºC** | $P_D$ | | 1 | | W |
| **Derate Above 25ºC** | | | 8 | | mW/ºC |
| **Operating And Storage Junction Temperature Range** | $T_j$, $T_{stg}$ | | -55 to +150 | | ºC |
| **THERMAL RESISTANCE** | | | | | |
| **Junction to ambient** | $R_{th(j-a)}$ | | 357 | | ºC/W |
| **Junction to case** | $R_{th(j-c)}$ | | 125 | | ºC/W |

## PNP SILICON PLANAR EPITAXIAL TRANSISTORS

**BC212, BC212A, BC212B**
**BC213, BC213A, BC213B, BC213C**
**BC214, BC214B, BC214C**




**TO-92**
**Plastic Package**

**ELECTRICAL CHARACTERISTICS (Ta=25ºC Unless Specified Otherwise)**

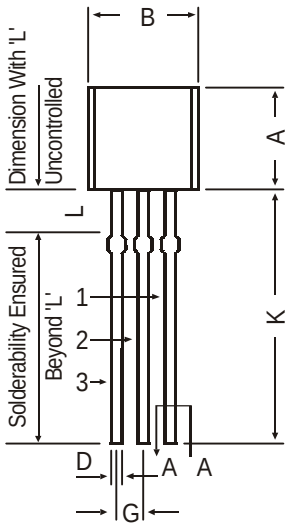
| DESCRIPTION | SYMBOL | TEST CONDITION | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| **Collector Emitter Voltage** | $V_{CEO}$ | $I_C$=2mA,$I_B$=0 | | | | |
| **BC212** | | | 50 | | | V |
| **BC213, BC214** | | | 30 | | | V |
| **Collector Base Voltage** | $V_{CBO}$ | $I_C$=10µA.$I_E$=0 | | | | |
| **BC212** | | | 60 | | | V |
| **BC213, BC214** | | | 45 | | | V |
| **Emitter Base Voltage** | $V_{EBO}$ | $I_E$=10µA, $I_C$=0 | 5 | | | V |
| **Collector Cut off Current** | $I_{CBO}$ | $V_{CB}$=30V,$I_E$=0 | | | 15 | nA |
| **Emitter Cut off Current** | $I_{EBO}$ | $V_{EB}$=4V, $I_C$=0 | | | 15 | nA |
| **DC Current Gain** | | | | | | |
| **BC212, BC213** | $h_{FE}$ | $I_C$=10µA,$V_{CE}$=5V | 40 | | | |
| **BC214** | | | 100 | | | |
| **BC212** | | $I_C$=2mA,$V_{CE}$=5V | 60 | | | |
| **BC213** | | | 80 | | | |
| **BC214** | | | 140 | | 600 | |
| **BC212, BC214** | | $I_C$=100mA,$V_{CE}$=5V* | | 120 | | |
| **BC213** | | | | 140 | | |
| **Collector Emitter Saturation Voltage** | $V_{CE(sat)}$ | $I_C$=10mA,$I_B$=0.5mA | | 0.10 | | V |
| | | $I_C$=100mA,$I_B$=5mA* | | 0.25 | 0.6 | V |
| **Base Emitter Saturation Voltage** | $V_{BE(sat)}$ | $I_C$=100mA,$I_B$=5mA* | | 1.00 | 1.4 | V |
| **Base Emitter On Voltage** | $V_{BE(on)}$ | $I_C$=2mA,$V_{CE}$=5V | 0.6 | 0.62 | 0.72 | V |

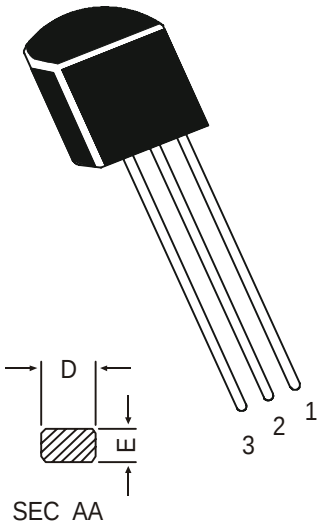
**ELECTRICAL CHARACTERISTICS (Ta=25ºC Unless Specified Otherwise)**

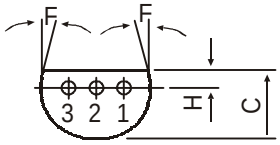
| DESCRIPTION | SYMBOL | TEST CONDITION | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| **DYNAMICS CHARACTERISTICS** | | | | | | |
| **Transition Frequency** | | | | | | |
| **BC212** | $f_T$ | $I_C$=10mA, $V_{CE}$=5V | | 280 | | MHz |
| **BC213** | | f=50MHz | | 360 | | MHz |
| **BC214** | | | | 320 | | MHz |
| **Output Capacitance** | $C_{ob}$ | $V_{CB}$=10V, $I_E$=0 | | | 6 | pF |
| **Noise Figure** | | | | | | |
| **BC212, BC213** | NF | $I_C$=200µA, $V_{CE}$=5V<br>$R_S$=2KW f=1KHz<br>f=200$H_Z$ | | | 10 | dB |
| **BC214** | NF | $I_C$=200µA, $V_{CE}$=5V<br>$R_S$=2KW f=30Hz<br>to 15KHz | | | 2 | dB |
| **Small Signal Current Gain** | | | | | | |
| **BC212** | $\lvert h_{fe} \rvert$ | $I_C$=2mA, $V_{CE}$=5V | 60 | | | |
| **BC213** | | f=1K$H_Z$ | 80 | | | |
| **BC214** | | | 140 | | | |
| **A** | | | 100 | | 300 | |
| **B** | | | 200 | | 400 | |
| **C** | | | 350 | | 600 | |

***Pulse Condition: Pulse Width 300us, Duty Cycle 2%.**

# TO-92 Plastic Package



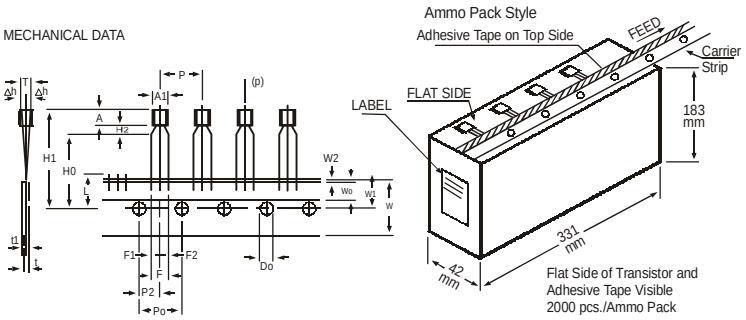




PIN CONFIGURATION
1. COLLECTOR
2. BASE
3. EMITTER

| DIM | MIN. | MAX. |
|---|---|---|
| A | 4.32 | 5.33 |
| B | 4.45 | 5.20 |
| C | 3.18 | 4.19 |
| D | 0.41 | 0.55 |
| E | 0.35 | 0.50 |
| F | 5 DEG | |
| G | 1.14 | 1.40 |
| H | 1.14 | 1.53 |
| K | 12.70 | — |
| L | 1.982 | 2.082 |

All diminsions in mm.

## TO-92 Transistors on Tape and Ammo Pack




**All dimensions in mm unless specified otherwise**

| ITEM | SYMBOL | SPECIFICATION MIN. | NOM. | MAX. | TOL . | REMARKS |
|---|---|---|---|---|---|---|
| BODY WIDTH | A1 | 4.0 | | 4.8 | | |
| BODY HEIGHT | A | 4.8 | | 5.2 | | |
| BODY THICKNESS | T | 3.9 | | 4.2 | | |
| PITCH OF COMPONENT | P | | 12.7 | | ±1 | |
| FEED HOLE PITCH | Po | | 12.7 | | ±0.3 | CUMULATIVE PITCH ERROR 1.0 mm/20 PITCH |
| FEED HOLE CENTRE TO COMPONENT CENTRE | P2 | | 6.35 | | ±0.4 | TO BE MEASURED AT BOTTOM OF CLINCH |
| DISTANCE BETWEEN OUTER LEADS | F | | 5.08 | | +0.6 -0.2 | |
| COMPONENT ALIGNMENT | △h | | 0 | 1 | | AT TOP OF BODY |
| TAPE WIDTH | W | | 18 | | ±0.5 | |
| HOLD-DOWN TAPE WIDTH | Wo | | 6 | | ±0.2 | |
| HOLE POSITION | W1 | | 9 | | +0.7 -0.5 | |
| HOLD-DOWN TAPE POSITION | W2 | | 0.5 | | ±0.2 | |
| LEAD WIRE CLINCH HEIGHT | Ho | | 16 | | ±0.5 | |
| COMPONENT HEIGHT | H1 | | | 23.25 | | |
| LENGTH OF SNIPPED LEADS | L | | | 11.0 | | |
| FEED HOLE DIAMETER | Do | | 4 | | ±0.2 | |
| TOTAL TAPE THICKNESS | t | | | 1.2 | | t1 0.3 - 0.6 |
| LEAD - TO - LEAD DISTANCEF1, | F2 | | 2.54 | | +0.4 -0.1 | |
| CLINCH HEIGHT | H2 | | | 3 | | |
| PULL - OUT FORCE | (P) | 6N | | | | |

**NOTES**
1. MAXIMUM ALIGNMENT DEVIATION BETWEEN LEADS NOT TO BE GREATER THAN 0.2 mm.
2. MAXIMUM NON-CUMULATIVE VARIATION BETWEEN TAPE FEED HOLES SHALL NOT EXCEED 1 mm IN 20 PITCHES.
3. HOLDDOWN TAPE NOT TO EXCEED BEYOND THE EDGE(S) OF CARRIER TAPE AND THERE SHALL BE NO EXPOSURE OF ADHESIVE.
4. NO MORE THAN 3 CONSECUTIVE MISSING COMPONENTS ARE PERMITTED.
5. A TAPE TRAILER, HAVING AT LEAST THREE FEED HOLES ARE REQUIRED AFTER THE LAST COMPONENT.
6. SPLICES SHALL NOT INTERFERE WITH THE SPROCKET FEED HOLES.

## Packing Detail

| PACKAGE | STANDARD PACK | | INNER CARTON BOX | | OUTER CARTON BOX | | |
|---|---|---|---|---|---|---|---|
| | Details | Net Weight/Qty | Size | Qty | Size | Qty | Gr Wt |
| TO-92 Bulk | 1K/polybag | 200 gm/1K pcs | 3" x 7.5" x 7.5" | 5K | 17" x 15" x 13.5" | 80K | 23 kgs |
| TO-92 T&A | 2K/ammo box | 645 gm/2K pcs | 12.5" x 8" x 1.8" | 2K | 17" x 15" x 13.5" | 32K | 12.5 kgs |

## Disclaimer

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