

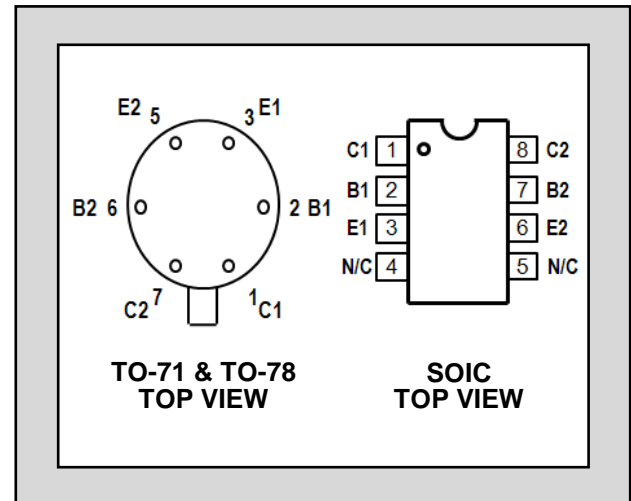
LINEAR SYSTEMS

Twenty-Five Years Of Quality Through Innovation

LS301 LS302 LS303

HIGH VOLTAGE
SUPER-BETA MONOLITHIC DUAL
NPN TRANSISTORS

| FEATURES | | |
|--|------------------------------------|-----------------------------------|
| VERY HIGH GAIN | h_{FE} 2000 @ 1.0 μ A TYP. | |
| LOW OUTPUT CAPACITANCE | C_{OBO} 2.0pF | |
| TIGHT V_{BE} MATCHING | $ V_{BE1} - V_{BE2} = 0.2mV$ TYP. | |
| HIGH f_T | 100 MHz | |
| ABSOLUTE MAXIMUM RATINGS <u>NOTE 1</u> | | |
| @ 25 °C (unless otherwise stated) | | |
| I_C | Collector Current | 5mA |
| Maximum Temperatures | | |
| Storage Temperature | | -55 to +150 °C |
| Operating Junction Temperature | | -55 to +150 °C |
| Maximum Power Dissipation | | ONE SIDE BOTH SIDES |
| Device Dissipation @ Free Air | | 250mW 500mW |
| Linear Derating Factor | | 2.3mW/°C 4.3mW/°C |

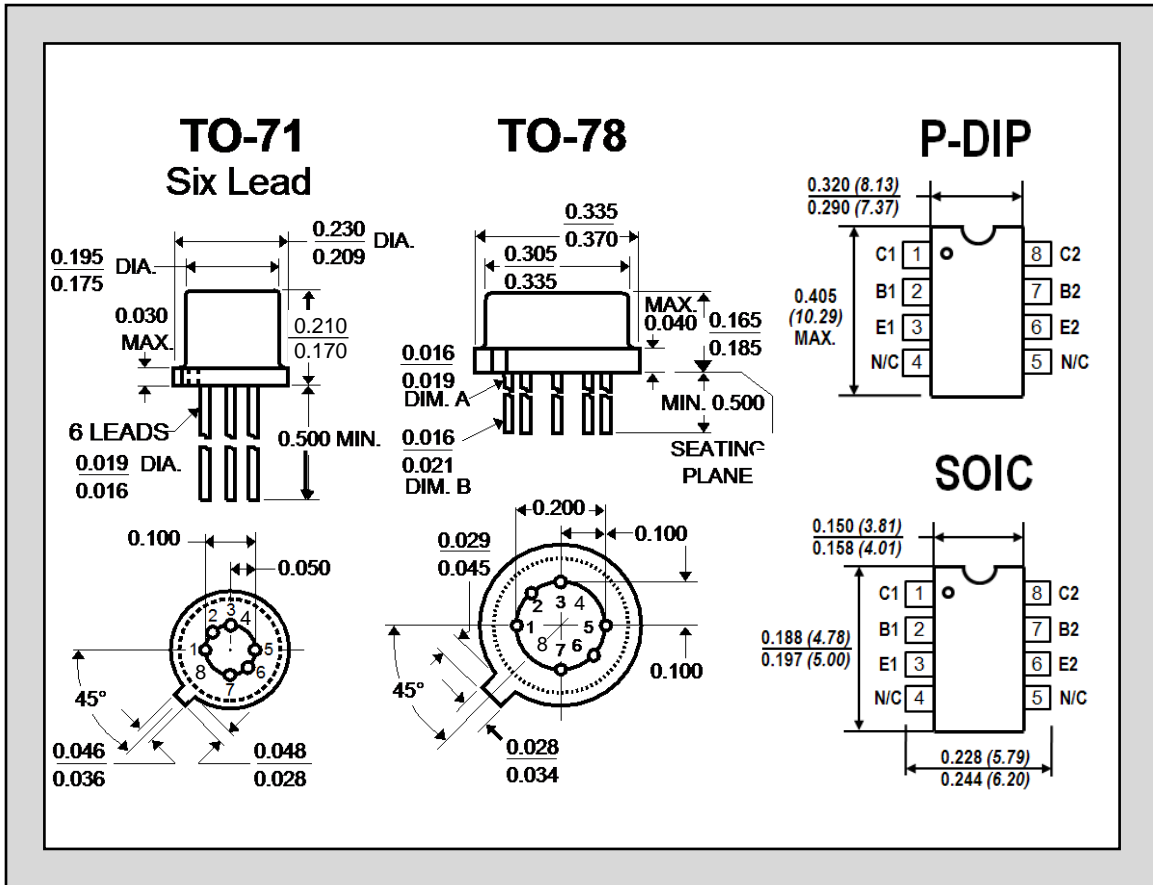


ELECTRICAL CHARACTERISTICS @ 25 °C (unless otherwise stated)

| SYMBOL | CHARACTERISTIC | LS301 | LS302 | LS303 | | UNITS | CONDITIONS |
|---------------|--|-------|-------|-------|------|---------|---|
| BV_{CBO} | Collector to Base Voltage | 18 | 35 | 10 | MIN. | V | $I_C = 10\mu A$ $I_E = 0$ |
| BV_{CEO} | Collector to Emitter Voltage | 18 | 35 | 10 | MIN. | V | $I_C = 1mA$ $I_B = 0$ |
| BV_{EBO} | Emitter-Base Breakdown Voltage | 6.0 | 6.0 | 6.0 | MIN. | V | $I_E = 10\mu A$ $I_C = 0$ <u>NOTE 2</u> |
| BV_{CCO} | Collector To Collector Voltage | 80 | 80 | 20 | MIN. | V | $I_C = 1\mu A$ $I_E = I_B = 0$ |
| h_{FE} | DC Current Gain | 2000 | 1000 | 2000 | TYP. | | $I_C = 1\mu A$ $V_{CE} = 5V$ |
| h_{FE} | DC Current Gain | 2000 | 1000 | 2000 | MIN. | | $I_C = 10\mu A$ $V_{CE} = 5V$ |
| h_{FE} | DC Current Gain | 2000 | 1000 | 2000 | TYP. | | $I_C = 500\mu A$ $V_{CE} = 5V$ |
| $V_{CE(SAT)}$ | Collector Saturation Voltage | 0.5 | 0.5 | 0.5 | MAX. | V | $I_C = 1mA$ $I_B = 0.1mA$ |
| I_{CBO} | Collector Cutoff Current | 100 | 100 | 100 | MAX. | pA | $I_E = 0$ $V_{CB} = \text{NOTE 3}$ |
| I_{EBO} | Emitter Cutoff Current | 0.2 | 0.2 | 0.2 | MAX. | pA | $I_E = 0$ $V_{EB} = 3V$ |
| C_{OBO} | Output Capacitance | 2 | 2 | 2 | MAX. | pF | $I_E = 0$ $V_{CB} = 1V$ |
| C_{C1C2} | Collector to Collector Capacitance | 2 | 2 | 2 | MAX. | pF | $V_{CC} = 0$ |
| I_{C1C2} | Collector to Collector Leakage Current | 1.0 | 1.0 | 1.0 | MAX. | μA | $V_{CC} = \text{NOTE 4}$, $I_E = I_B = 0$ |
| f_T | Current Gain Bandwidth Product | 100 | 100 | 100 | MIN. | MHz | $I_C = 200\mu A$ $V_{CE} = 5V$ |
| NF | Narrow Band Noise Figure | 3 | 3 | 3 | MAX. | dB | $I_C = 10\mu A$ $V_{CE} = 3V$ $BW = 200Hz$ $R_G = 10K$ $f = 1KHz$ |

MATCHING CHARACTERISTICS

| SYMBOL | CHARACTERISTIC | LS301 | LS302 | LS303 | | UNITS | CONDITIONS |
|-------------------------------|---|-------|-------|-------|------|------------------|---|
| $V_{BE1}-V_{BE2}$ | Base Emitter Voltage Differential | 0.2 | 0.2 | 0.2 | TYP. | mV | $I_C = 10\mu A$ $V_{CE} = 5V$ |
| | | 1 | 1 | 1 | MAX. | mV | |
| $I(V_{BE1}-V_{BE2})/^\circ C$ | Base Emitter Voltage Differential Change with Temperature | 1 | 1 | 1 | TYP. | $\mu V/^\circ C$ | $I_C = 10\mu A$ $V_{CE} = 5V$ $T = 55^\circ C$ to $+125^\circ C$ |
| | | 5 | 5 | 5 | MAX. | $\mu V/^\circ C$ | |
| $I_{B1}-I_{B2}$ | Base Current Differential | 0.5 | 1 | 0.5 | TYP. | nA | $I_C = 10\mu A$ $V_{CE} = 1V$ |
| | | 1 | 5 | 1.5 | MAX. | nA | |
| h_{FE1}/h_{FE2} | DC Current Gain Differential | 5 | 5 | 5 | TYP. | % | $I_C = 10\mu A$ $V_{CE} = 5V$ |



NOTES:

1. These ratings are limiting values above which the serviceability of any semiconductor may be impaired
2. The reverse base-to-emitter voltage must never exceed 6.0 volts; the reverse base-to-emitter current must never exceed 10 μA mps.
3. For LS301 & LS302: $V_{CB}=10V$; for LS303: $V_{CB}=5V$
4. For LS301 & LS302: $V_{CC}=\pm 80V$; for LS303: $V_{CC}=\pm 20V$

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