

2N3057A, 2N3700, 2N3700UB

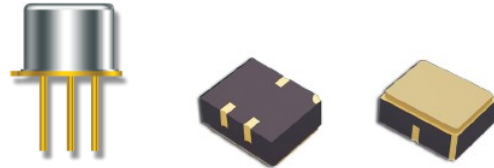


NPN Low Power Silicon Transistor

Rev. V1

Features

- JANS Qualified to MIL-PRF-19500/391
- 2N3700 & 2N3700UB available in JANSR JEDEC registered 2N3700, 2N3057
- Lightweight & Low Power
- Ideal for Space, Military, & other High Reliability Applications
- TO-18 (TO-206AA), TO-46 (TO-206AB) Surface Mount UB Package Styles Package



Electrical Characteristics

| Parameter | Test Conditions | Symbol | Units | Min. | Max. |
|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-----------------------|----------------------|
| Off Characteristics | | | | | |
| Collector - Emitter Breakdown Voltage | $I_C = 30 \text{ mA}$ | $V_{(BR)CEO}$ | V | 80 | — |
| Collector - Base Cutoff Current | $V_{BC} = 140 \text{ V}$ | I_{CBO} | μA | — | 10 |
| Emitter - Base Cutoff Current | $V_{EB} = 7 \text{ V}$ | I_{EBO1} | μA | — | 10 |
| Collector - Emitter Cutoff Current | $V_{CE} = 90 \text{ V}$ | I_{CES} | nA | — | 10 |
| Emitter - Base Cutoff Current | $V_{EB} = 5 \text{ Vdc}$ | I_{EBO2} | nA | — | 10 |
| On Characteristics¹ | | | | | |
| Forward Current Transfer Ratio | $I_C = 150 \text{ mA}, V_{CE} = 10 \text{ V}$ $I_C = 10 \text{ mA}, V_{CE} = 10 \text{ V}$ $I_C = 500 \text{ mA}, V_{CE} = 10 \text{ V}$ $I_C = 1 \text{ mA}, V_{CE} = 10 \text{ V}$ | H_{FE} | - | 100 90 50 15 | 300 — 300 — |
| Collector - Emitter Saturation Voltage | $I_C = 150 \text{ mA}, I_B = 15 \text{ mA}$ $I_C = 500 \text{ mA}, I_B = 50 \text{ mA}$ | $V_{CE(SAT)}$ | Vdc | — | 0.2 0.5 |
| Base - Emitter Saturation Voltage | $I_C = 150 \text{ mA}, I_B = 15 \text{ mA}$ | $V_{BE(SAT)}$ | Vdc | — | 1.1 |
| Dynamic Characteristics | | | | | |
| Small-Signal Short-Circuit Forward Current Transfer Ratio | $I_C = 1 \text{ A}, V_{CE} = 5 \text{ V}, f = 1 \text{ kHz}$ | H_{FE} | | 80 | 400 |
| Magnitude of Small-Signal Short-Circuit Forward Current Transfer Ratio | $I_C = 50 \text{ mA}, V_{CE} = 10 \text{ V}, f = 20 \text{ MHz}$ | $ H_{FE} $ | | 5 | 20 |
| Output Capacitance | $V_{CB} = 10 \text{ V}, I_E = 0, 100 \text{ kHz} \leq f \leq 1 \text{ MHz}$ $V_{CB} = 0.5 \text{ V}, I_E = 0, 100 \text{ kHz} \leq f \leq 1 \text{ MHz}$ | C_{OBO} C_{IBO} | pF | — | 12 60 |
| Safe Operating Area | | | | | |
| DC Tests: | $T_C = +25 \text{ }^\circ\text{C}, 1 \text{ Cycle}, t = 10 \text{ ms}$ | | | | |
| Test 1: | $V_{CE} = 10 \text{ V}, I_C = 180 \text{ mA}$ | | | | |
| Test 2: | $V_{CE} = 40 \text{ V}, I_C = 50 \text{ mA}$ | | | | |
| Test 3: | $V_{CE} = 80 \text{ V}, I_C = 15 \text{ mA}$ | | | | |

1. Pulse Test: Pulse Width = 300 μs , Duty Cycle $\leq 2\%$.

Absolute Maximum Ratings

| Ratings | Symbol | Value |
|-----------------------------------------------------------------------------------------|-------------------|---------------------------------------------|
| Collector - Emitter Voltage | V_{CEO} | 80 V |
| Collector - Base Voltage | V_{CBO} | 140 V |
| Emitter - Base Voltage | V_{EBO} | 7 V |
| Collector Current | I_C | 1 A |
| Total Power Dissipation @ $T_A = 25^\circ\text{C}^2$ @ $T_C = 25^\circ\text{C}^3$ | P_T | 0.5 W 1.0 W |
| Operating & Storage Temperature Range | T_{OP}, T_{STG} | -65°C to $+200^\circ\text{C}$ |

- Derate linearly @ 2.85 mW / °C for $T_A = 25^\circ\text{C}$
- Derate linearly @ 10.3 mW / °C for $T_C = 25^\circ\text{C}$

Thermal Characteristics

| Characteristics | Symbol | Max. Value |
|-----------------------------------------|-----------------|------------|
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 150°C/W |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 325°C/W |

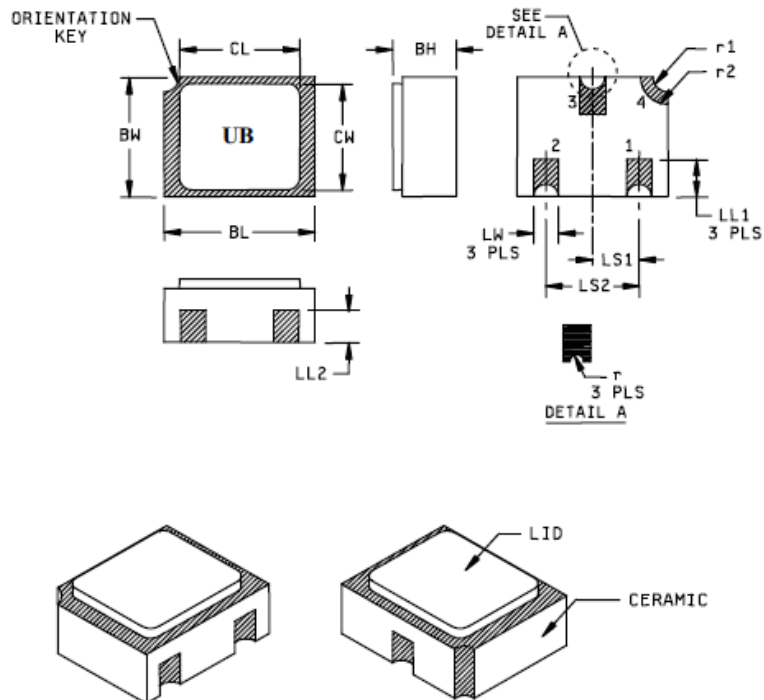
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Outline Drawing (UB Surface Mount)



| Symbol | Dimensions | | | | Note |
|--------|------------|------|-------------|------|------|
| | Inches | | Millimeters | | |
| | Min | Max | Min | Max | |
| BH | .046 | .056 | 1.17 | 1.42 | |
| BL | .115 | .128 | 2.92 | 3.25 | |
| BW | .085 | .108 | 2.16 | 2.74 | |
| CL | | .128 | | 3.25 | |
| CW | | .108 | | 2.74 | |
| LL1 | .022 | .038 | 0.56 | 0.96 | |
| LL2 | .017 | .035 | 0.43 | 0.89 | |

| Symbol | Dimensions | | | | Note |
|-----------------|------------|------|-------------|------|------|
| | Inches | | Millimeters | | |
| | Min | Max | Min | Max | |
| LS ₁ | .036 | .040 | 0.91 | 1.02 | |
| LS ₂ | .071 | .079 | 1.81 | 2.01 | |
| LW | .016 | .024 | 0.41 | 0.61 | |
| r | | .008 | | .203 | |
| r ₁ | | .012 | | .305 | |
| r ₂ | | .022 | | .559 | |

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Hatched areas on package denote metalized areas.
4. Pad 1 = Base, Pad 2 = Emitter, Pad 3 = Collector, Pad 4 = Shielding connected to the lid.
5. In accordance with ASME Y14.5M, diameters are equivalent to ϕx symbology.

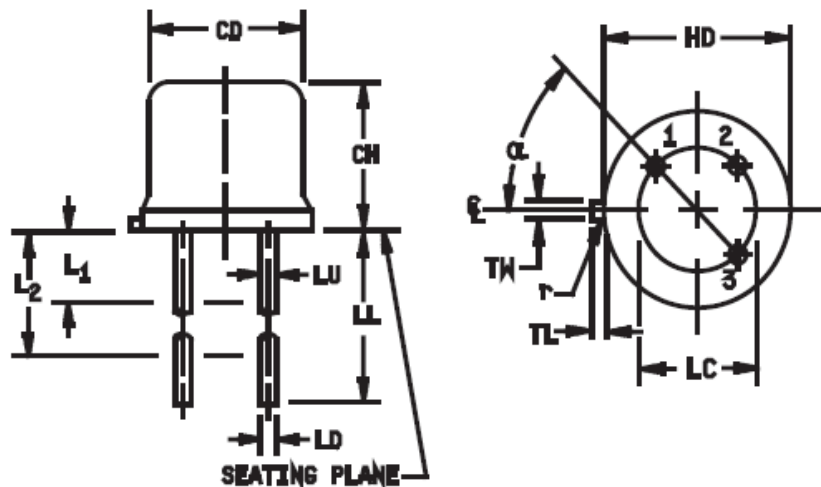
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NPN Low Power Silicon Transistor

Rev. V1

Outline Drawing (TO-46) for 2N3057 only



| Symbol | Dimensions | | | | Note |
|--------|------------|-------|-------------|-------|--------|
| | Inches | | Millimeters | | |
| | Min | Max | Min | Max | |
| CD | .178 | .195 | 4.52 | 4.95 | |
| CH | .065 | .085 | 1.65 | 2.16 | |
| HD | .209 | .230 | 5.31 | 5.84 | |
| LC | .100 TP | | 2.54 TP | | 6 |
| LD | .016 | .021 | 0.41 | 0.53 | 7 |
| LL | .500 | 1.750 | 12.70 | 44.45 | 7 |
| LU | .016 | .019 | 0.41 | 0.48 | 7 |
| L1 | | .050 | | 1.27 | 7 |
| L2 | .250 | | 6.35 | | 7 |
| TL | .028 | .048 | 0.71 | 1.22 | 3 |
| TW | .036 | .046 | 0.91 | 1.17 | 2 |
| r | | .007 | | 0.18 | 10, 11 |
| α | 45° TP | | 45° TP | | 6 |

NOTES:

1. Dimension are in inches.
2. Millimeters are given for general information only.
3. Beyond r (radius) maximum, TW shall be held for a minimum length of .011 inch (0.28 mm).
4. Dimension TL measured from maximum HD.
5. Leads at gauge plane .054 +.001 -.000 inch (1.37 +0.03 -0.00 mm) below seating plane shall be within .007 inch (0.18 mm) radius of true position (TP) at maximum material condition (MMC) relative to tab at MMC. The device may be measured by direct methods.
6. Dimension LU applies between L₁ and L₂. Dimension LD applies between L₂ and LL minimum. Diameter is uncontrolled in L₁ and beyond LL minimum.
7. All three leads.
8. The collector shall be internally connected to the case.
9. Dimension r (radius) applies to both inside comers of tab.
10. In accordance with ASME Y14.5M, diameters are equivalent to φx symbology.
11. Lead 1 = emitter, lead 2 = base, lead 3 = collector.

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