

2N3057A, 2N3700, 2N3700UB

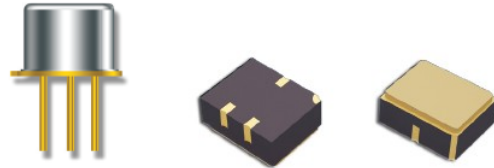


NPN Low Power Silicon Transistor

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 |

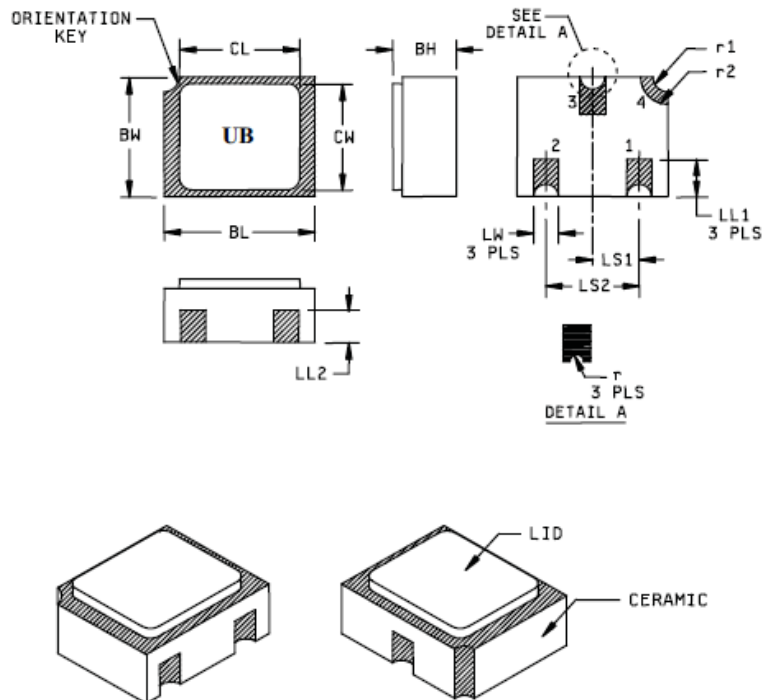
2N3057A, 2N3700, 2N3700UB



NPN Low Power Silicon Transistor

Rev. V1

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 ϕ x symbology.

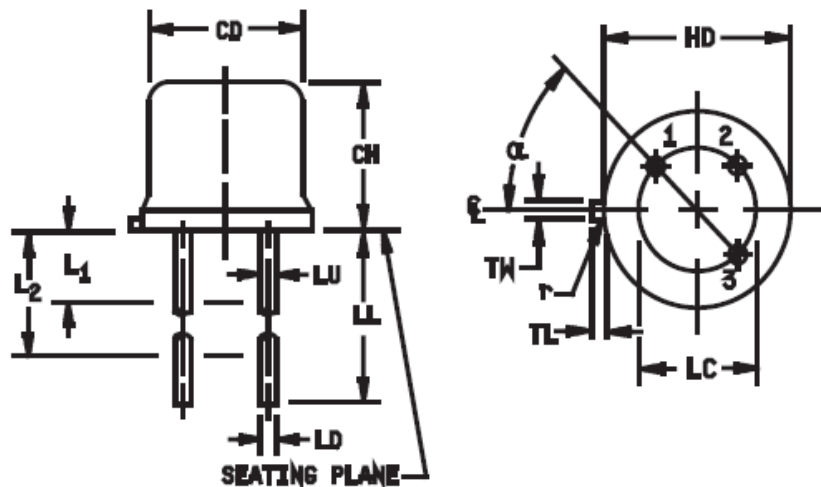
2N3057A, 2N3700, 2N3700UB



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.

M/A-COM Technology Solutions Inc. All rights reserved.

Information in this document is provided in connection with M/A-COM Technology Solutions Inc ("MACOM") products. These materials are provided by MACOM as a service to its customers and may be used for informational purposes only. Except as provided in MACOM's Terms and Conditions of Sale for such products or in any separate agreement related to this document, MACOM assumes no liability whatsoever. MACOM assumes no responsibility for errors or omissions in these materials. MACOM may make changes to specifications and product descriptions at any time, without notice. MACOM makes no commitment to update the information and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to its specifications and product descriptions. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document.

THESE MATERIALS ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, RELATING TO SALE AND/OR USE OF MACOM PRODUCTS INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, CONSEQUENTIAL OR INCIDENTAL DAMAGES, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT. MACOM FURTHER DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THE INFORMATION, TEXT, GRAPHICS OR OTHER ITEMS CONTAINED WITHIN THESE MATERIALS. MACOM SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOST REVENUES OR LOST PROFITS, WHICH MAY RESULT FROM THE USE OF THESE MATERIALS.

MACOM products are not intended for use in medical, lifesaving or life sustaining applications. MACOM customers using or selling MACOM products for use in such applications do so at their own risk and agree to fully indemnify MACOM for any damages resulting from such improper use or sale.