

# 2N3057A, 2N3700, 2N3700UB

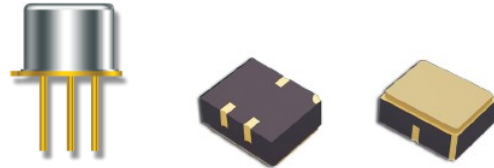


## NPN Low Power Silicon Transistor

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.
<b>Off Characteristics</b>					
Collector - Emitter Breakdown Voltage	$I_C = 30 \text{ mA}$	$V_{(BR)CEO}$	V	80	—
Collector - Base Cutoff Current	$V_{BC} = 140 \text{ V}$	$I_{CBO}$	$\mu\text{A}$	—	10
Emitter - Base Cutoff Current	$V_{EB} = 7 \text{ V}$	$I_{EBO1}$	$\mu\text{A}$	—	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
<b>On Characteristics<sup>1</sup></b>					
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
<b>Dynamic Characteristics</b>					
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
<b>Safe Operating Area</b>					
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  $\mu\text{s}$ , 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	$T_{OP}, T_{STG}$	$-65^\circ\text{C}$ to $+200^\circ\text{C}$

2. Derate linearly @ 2.85 mW / °C for  $T_A = 25^\circ\text{C}$
3. 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

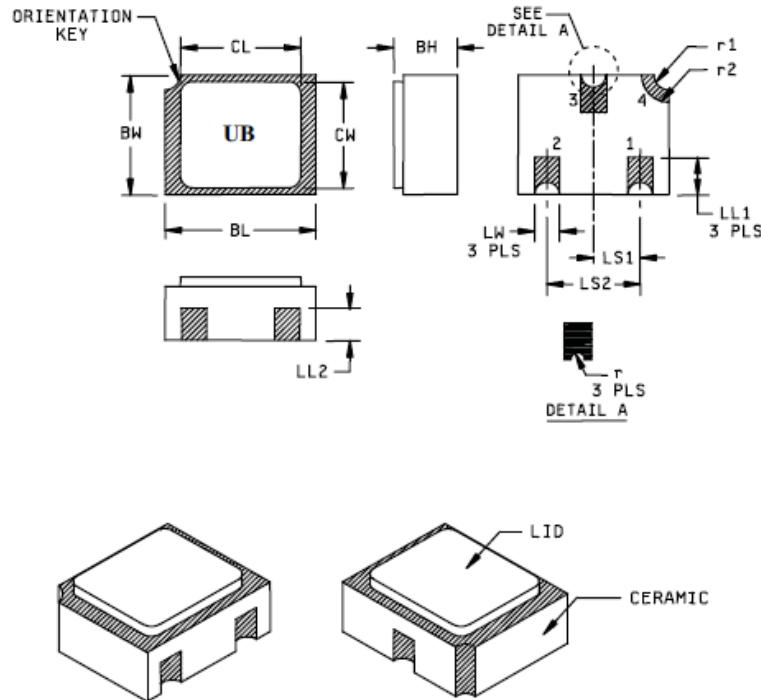
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## Outline Drawing (UB Surface Mount)



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 <sub>1</sub>	.036	.040	0.91	1.02	
LS <sub>2</sub>	.071	.079	1.81	2.01	
LW	.016	.024	0.41	0.61	
r		.008		.203	
r <sub>1</sub>		.012		.305	
r <sub>2</sub>		.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  $\phi$ x symbology.

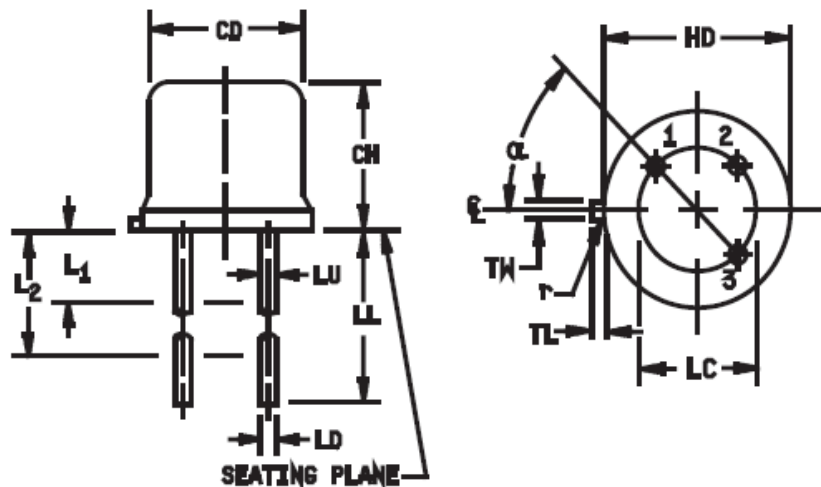
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## Outline Drawing (TO-46) for 2N3057 only



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 L<sub>1</sub> and L<sub>2</sub>. Dimension LD applies between L<sub>2</sub> and LL minimum. Diameter is uncontrolled in L<sub>1</sub> 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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