



Low Power NPN Silicon Transistor

Qualified per MIL-PRF-19500/391

Qualified Levels:
JAN, JANTX,
JANTXV, and JANS

DESCRIPTION

This 2N3700UB NPN ceramic surface mount device is military qualified for high-reliability applications.

Important: For the latest information, visit our website <http://www.microsemi.com>.

FEATURES

- Surface mount equivalent to JEDEC registered 2N3700 number.
- JAN, JANTX, JANTXV and JANS qualifications are available per MIL-PRF-19500/391.
- Rad hard levels are also available per MIL-PRF-19500/391. (See RHA datasheet for [JANS 2N3700UB](#).)
- RoHS compliant versions available (commercial grade only).

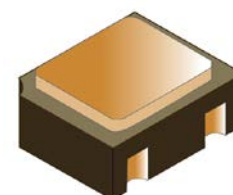
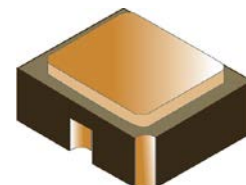
APPLICATIONS / BENEFITS

- Ceramic UB surface mount package.
- Lightweight.
- Low power.
- Military and other high-reliability applications.

MAXIMUM RATINGS @ $T_A = +25^\circ\text{C}$ unless otherwise noted.

Parameters/Test Conditions	Symbol	Value	Unit
Junction and Storage Temperature	T_J and T_{STG}	-65 to +200	$^\circ\text{C}$
Thermal Impedance Junction-to-Ambient	$R_{\theta JA}$	325	$^\circ\text{C/W}$
Thermal Impedance Junction-to-Solder Pad	$R_{\theta JSP}$	90	$^\circ\text{C/W}$
Collector-Emitter Voltage	V_{CEO}	80	V
Collector-Base Voltage	V_{CBO}	140	V
Emitter-Base Voltage	V_{EBO}	7.0	V
Collector Current	I_C	1.0	A
Total Power Dissipation: @ $T_A = +25^\circ\text{C}$ ⁽¹⁾	P_D	0.5	W

Notes: 1. Derate linearly 6.6 mW/ $^\circ\text{C}$ for $T_A \geq +25^\circ\text{C}$.



UB Package

Also available in:

TO-18 (TO-206AA)

(lead)
 [2N3700](#)

TO-39 (TO-205AD)

(lead)
 [2N3019](#)

TO-5 package

(lead)
 [2N3019S](#)

TO-46 (TO-206AB)

(lead)
 [2N3057A](#)

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MECHANICAL and PACKAGING

- CASE: Ceramic.
- TERMINALS: Gold plating over nickel under plate (hot solder dip optional for military).
- MARKING: Part number, date code, manufacturer's ID.
- TAPE & REEL option: Standard per EIA-481D. Consult factory for quantities.
- WEIGHT: < 0.04 grams.
- See [Package Dimensions](#) on last page.

PART NOMENCLATURE

JAN 2N3700 UB (e4)

Reliability Level

JAN = JAN level
JANTX = JANTX level
JANTXV = JANTXV level
JANS = JANS level
Blank = Commercial

JEDEC type number

(see [Electrical Characteristics](#) table)

RoHS Compliance

e4 = RoHS compliant (gold plating without solder dip option)
Blank = non-RoHS compliant

Surface Mount Package

SYMBOLS & DEFINITIONS

Symbol	Definition
f	Frequency
I_B	Base current (dc)
I_E	Emitter current (dc)
T_A	Ambient temperature
T_C	Case temperature
T_{SP}	Solder pad temperature
V_{CB}	Collector to base voltage (dc)
V_{CE}	Collector to emitter voltage (dc)
V_{EB}	Emitter to base voltage (dc)

ELECTRICAL CHARACTERISTICS @ $T_A = +25^\circ\text{C}$, unless otherwise noted

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage $I_C = 30\text{ mA}$	$V_{(BR)CEO}$	80		V
Collector-Base Cutoff Current $V_{CB} = 140\text{ V}$	I_{CBO}		10	μA
Emitter-Base Cutoff Current $V_{EB} = 7\text{ V}$	I_{EBO1}		10	μA
Collector-Emitter Cutoff Current $V_{CE} = 90\text{ V}$	I_{CES}		10	nA
Emitter-Base Cutoff Current $V_{EB} = 5.0\text{ V}$	I_{EBO2}		10	nA
ON CHARACTERISTICS				
Forward-Current Transfer Ratio $I_C = 150\text{ mA}, V_{CE} = 10\text{ V}$ $I_C = 0.1\text{ mA}, V_{CE} = 10\text{ V}$ $I_C = 10\text{ mA}, V_{CE} = 10\text{ V}$ $I_C = 500\text{ mA}, V_{CE} = 10\text{ V}$ $I_C = 1.0\text{ A}, V_{CE} = 10\text{ V}$	h_{FE}	100 50 90 50 15	300 300 300	
Collector-Emitter Saturation Voltage $I_C = 150\text{ mA}, I_B = 15\text{ mA}$ $I_C = 500\text{ mA}, I_B = 50\text{ mA}$	$V_{CE(sat)}$		0.2 0.5	V
Base-Emitter Saturation Voltage $I_C = 150\text{ mA}, I_B = 15\text{ mA}$	$V_{BE(sat)}$		1.1	V

DYNAMIC CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Small-Signal Short-Circuit Forward Current Transfer Ratio $I_C = 1.0\text{ mA}, V_{CE} = 5.0\text{ V}, f = 1.0\text{ kHz}$	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} $	5.0	20	
Output Capacitance $V_{CB} = 10\text{ V}, I_E = 0, 100\text{ kHz} \leq f \leq 1.0\text{ MHz}$	C_{obo}		12	pF
Input Capacitance $V_{EB} = 0.5\text{ V}, I_C = 0, 100\text{ kHz} \leq f \leq 1.0\text{ MHz}$	C_{ibo}		60	pF

ELECTRICAL CHARACTERISTICS @ $T_A = +25\text{ }^{\circ}\text{C}$ unless otherwise noted (continued)
SAFE OPERATION AREA (See SOA graph below and [MIL-STD-750, method 3053](#))

DC Tests
 $T_C = 25\text{ }^{\circ}\text{C}$, 1 cycle, $t = 10\text{ ms}$
Test 1

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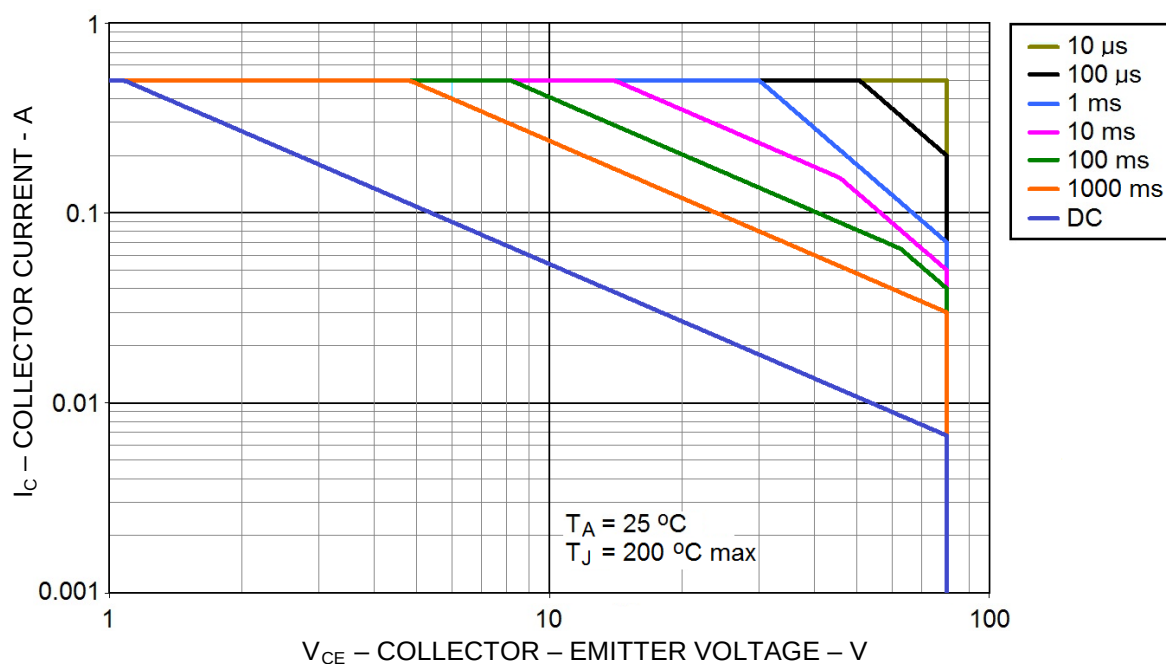
 $V_{CE} = 10\text{ V}$
 $I_C = 180\text{ mA}$
Test 2

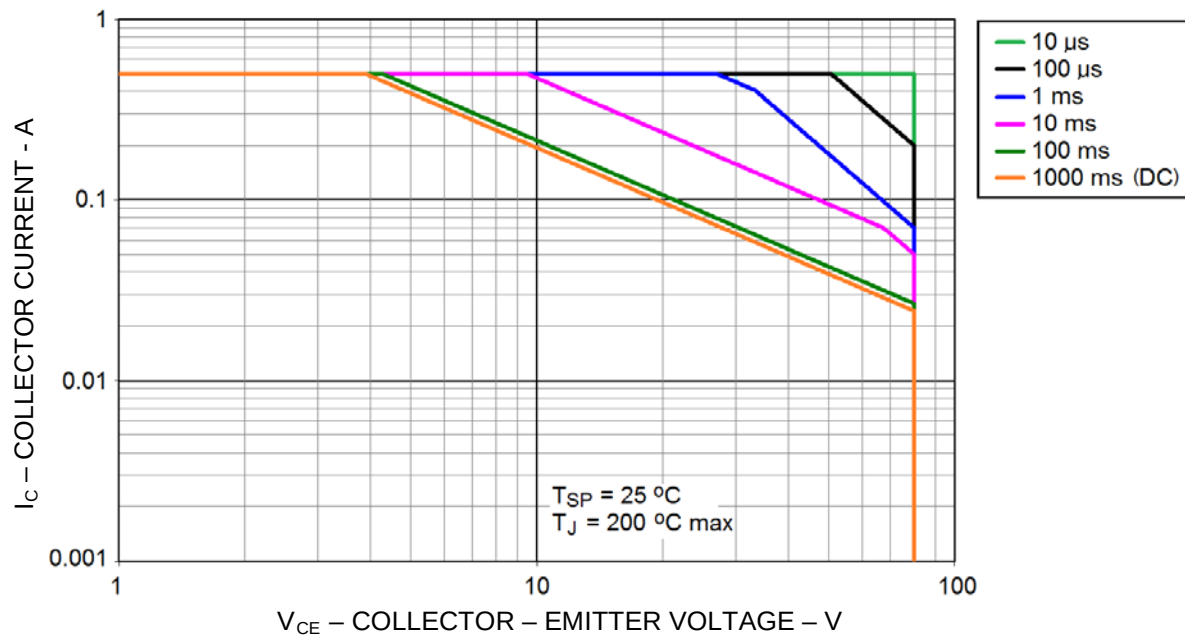
2N3700UB

 $V_{CE} = 40\text{ V}$
 $I_C = 45\text{ mA}$
Test 3

2N3700UB

 $V_{CE} = 80\text{ V}$
 $I_C = 22.5\text{ mA}$

(1) Pulse Test: Pulse Width = $300\text{ }\mu\text{s}$, duty cycle $\leq 2.0\%$.

Maximum Safe Operating Area @ $T_A = 25\text{ }^{\circ}\text{C}$
See additional SOA graph on next page.

ELECTRICAL CHARACTERISTICS @ $T_A = +25^\circ\text{C}$ unless otherwise noted (continued)


Maximum Safe Operating Area ($T_{SP} = 25^\circ\text{C}$)

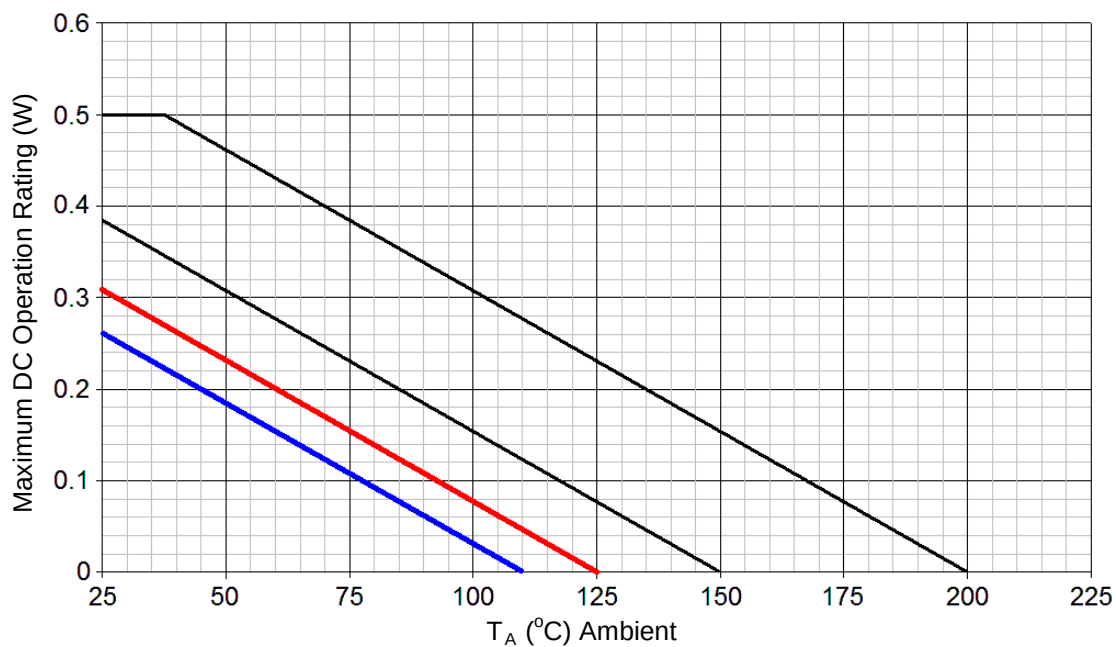
GRAPHS


FIGURE 1
Temperature-Power Derating ($R_{\Theta JA}$)

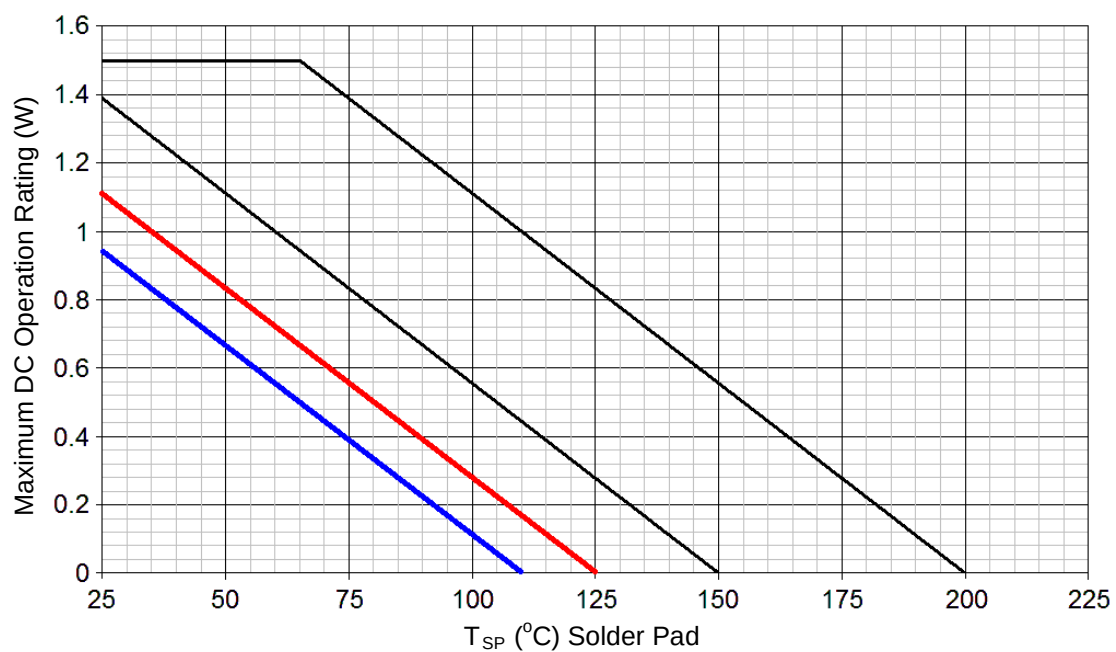
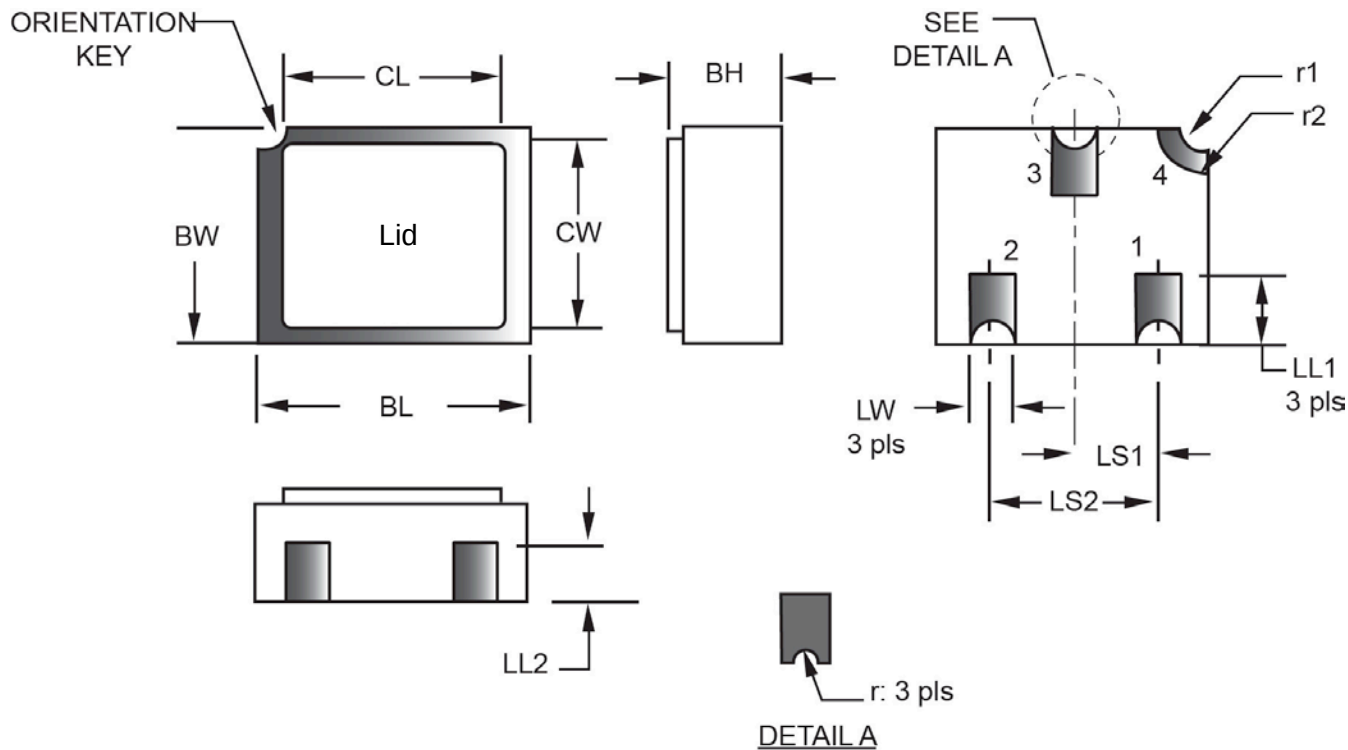


FIGURE 2
Temperature-Power Derating ($R_{\Theta JSP}$)

PACKAGE DIMENSIONS


Symbol	Dimensions				Note	Symbol	Dimensions				Note
	Inch		Millimeters				Inch		Millimeters		
	Min	Max	Min	Max			Min	Max	Min	Max	
BH	0.046	0.056	1.17	1.42		LS ₁	0.035	0.039	0.89	0.99	
BL	0.115	0.128	2.92	3.25		LS ₂	0.071	0.079	1.80	2.01	
BW	0.085	0.108	2.16	2.74		LW	0.016	0.024	0.41	0.61	
CL	-	0.128	-	3.25		r	-	0.008	-	0.20	
CW	-	0.108	-	2.74		r ₁	-	0.012	-	0.31	
LL ₁	0.022	0.038	0.56	0.96		r ₂	-	.022	-	0.56	
LL ₂	0.017	0.035	0.43	0.89							

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Hatched areas on package denote metallized 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.