Radiation Hardened NPN Silicon Dual Transistor

2N2919_2N2920_L_U

Product Overview

Devices:

- 2N2919
- 2N2919L
- 2N2919U
- 2N2920
- 2N2920L
- 2N2920U

Qualified Levels:

- JANSE – 30K Rads (Si)[1]
- JANSK – 50K Rads (Si)[1]
- JANSU – 100K Rads (Si)[1]
- JANSM – 3K Rads (Si)
- JANSD – 10K Rads (Si)
- JANSP – 30K Rads (Si)
- JANSL – 50K Rads (Si)
- JANSR – 100K Rads (Si)
- JANSF – 300K Rads (Si)

Note:

1. Low dose rate 10 mRad/s

Figure 1. TO-78

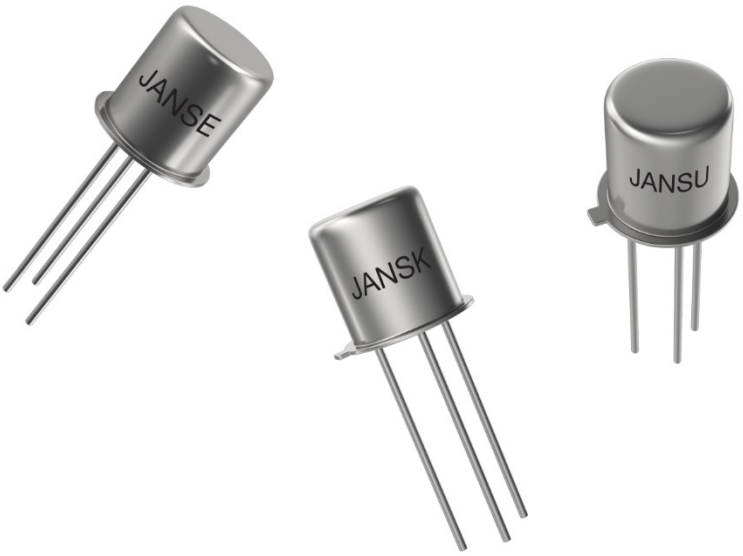
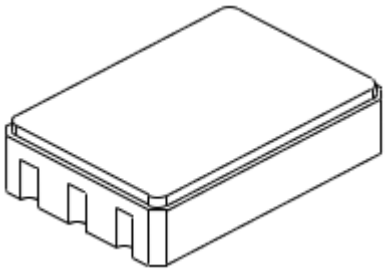


Figure 2. U-Package



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1. Maximum Ratings

Table 1-1. Maximum Ratings at 25 °C Unless Otherwise Noted

Parameters / Test Conditions	Symbol	Value		Unit
Collector-Emitter voltage	V_{CEO}	60		Vdc
Collector-Base voltage	V_{CBO}	70		Vdc
Emitter-Base voltage	V_{EBO}	6.0		Vdc
Collector current	I_C	30		mAdc
Total power dissipation at T_A = +25 °C	P_T	One Section[1]	Both Sections[2]	mW
		200	350	
Operating and storage junction temperature range	T_J, T_{stg}	–65 to +200		°C

Notes:

1. Derate linearly 1.143 mW/°C for T_A > +25 °C (one section).
2. Derate linearly 2.000 mW/°C for T_A > +25 °C (both sections).

2. Electrical Characteristics

Table 2-1. Electrical Characteristics at 25 °C Unless Otherwise Stated

Parameters / Test Conditions		Symbol	Min.	Max.	Unit
Off Characteristics					
Collector-Emitter breakdown voltage I_C = 10 mAdc; pulsed		$V_{(BR)CEO}$	60	—	Vdc
Collector-Base cutoff current V_{CB} = 45 Vdc V_{CB} = 70 Vdc		I_{CBO}	—	2.0 10	ηAdc μAdc
Emitter-Base cutoff current V_{EB} = 5.0 Vdc V_{EB} = 6.0 Vdc		I_{EBO}	—	2.0 10	ηAdc μAdc
On Characteristics					
Forward-Current transfer ratio I_C = 10 μAdc, V_{CE} = 5.0 Vdc I_C = 100 μAdc, V_{CE} = 5.0 Vdc I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc	2N2919, 2N2919L, 2N2919U	h_{FE}	60 100 150	240 325 600	—
I_C = 10 μAdc, V_{CE} = 5.0 Vdc I_C = 100 μAdc, V_{CE} = 5.0 Vdc I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc	2N2920, 2N2920L, 2N2920U	h_{FE}	175 235 300	600 800 1000	
Collector-Emitter saturation voltage I_C = 1.0 mAdc, I_B = 100 μAdc		$V_{CE(sat)}$	—	0.3	Vdc
Base-Emitter saturation voltage I_C = 1.0 mAdc, I_B = 100 μAdc		$V_{BE(sat)}$	0.5	1.0	Vdc

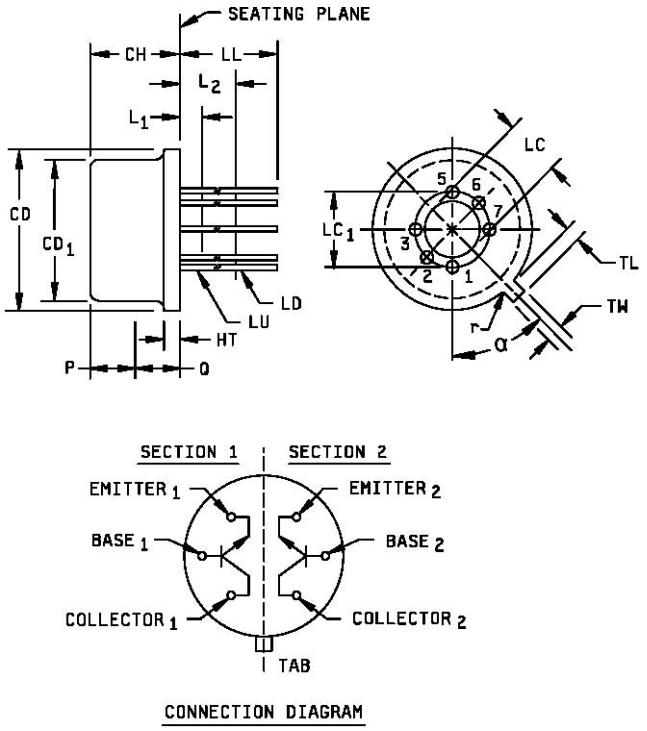
2.1 Dynamic Characteristics

Table 2-2. Dynamic Characteristics

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Forward current transfer ratio, magnitude I_C = 0.5 mAdc, V_{CE} = 5.0 Vdc, f = 20 MHz	$\lvert h_{fe} \rvert$	3.0	20	—
Small-Signal short circuit input impedance I_C = 1.0 mAdc, V_{CE} = 5 Vdc, f = 1.0 kHz	h_{je}	3.0	30	kΩ
Small-Signal short circuit output admittance I_C = 1.0 mAdc, V_{CE} = 5 Vdc, f = 1.0 kHz	h_{oe}	—	60	μmhos
Output capacitance V_{CB} = 5.0 Vdc, I_E = 0, 100 kHz ≤ f ≤ 1.0 MHz	C_{obo}	—	5.0	pF
Noise figure I_C = 10 μAdc, V_{CE} = 5 Vdc, f = 100 Hz, R_G = 10 kΩ I_C = 10 μAdc, V_{CE} = 5 Vdc, f = 1.0 kHz, R_G = 10 kΩ I_C = 10 μAdc, V_{CE} = 5 Vdc, f = 10 kHz, R_G = 10 kΩ	F_1 F_2 F_3	—	5.0 3.0 3.0	dB

3. Package Dimensions

Figure 3-1. Physical Dimensions 2N2919, 2N2919L, 2N2920, and 2N2920L (TO-78)



Symbol	Dimensions				Notes
	Inches		Millimeters		
	Min.	Max.	Min.	Max.	
CD	0.335	0.370	8.51	9.40	—
CD1	0.305	0.335	7.75	8.51	—
CH	0.140	0.260	3.56	6.60	—
HT	0.009	0.041	0.23	1.04	—
LC	0.140	0.160	3.56	4.06	—
LC1	0.200 TP		5.08 TP		9
LD	0.016	0.021	0.041	0.53	10
LL	See notes 10, 11 and 12				
LU	0.016	0.019	0.041	0.48	10
L1	—	0.050	—	1.27	10
L2	0.250	—	6.35	—	10
P	0.100	—	2.54	—	8
Q	—	0.050	—	1.27	7
TL	0.029	0.045	0.74	1.14	5, 6
TW	0.028	0.034	0.71	0.86	4, 5
r	—	0.010	—	0.25	—

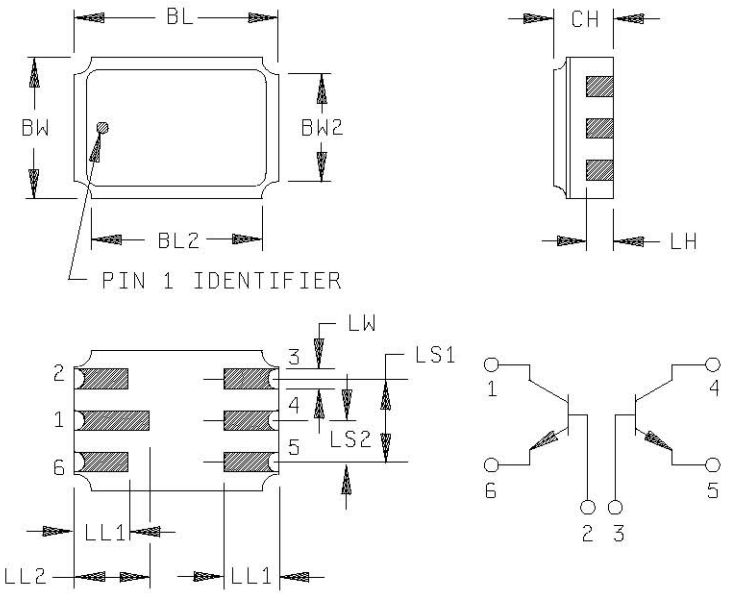
.....continued

Symbol	Dimensions				Notes
	Inches		Millimeters		
	Min.	Max.	Min.	Max.	
α	45°TP		45°TP		9

Notes:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Tab shown omitted.
4. Lead number 4 and 8 omitted on this variation.
5. Beyond r maximum, TW shall be held to a minimum length of 0.21 inch (5.33 mm).
6. TL shall be measured from maximum CD.
7. Details of outline in this zone are optional.
8. CD1 shall not vary more than 0.010 inch (0.25 mm) in zone P. This zone is controlled for automatic handling.
9. Leads at gauge plane 0.054 – 0.055 inch (1.37 – 1.40 mm) below seating plane shall be within 0.007 inch (0.18 mm) radius of true position (TP) at a maximum material condition (MMC) relative to the tab at MMC. The device may be measured by direct methods or by the gauge and gauging procedures described on gauge drawing GS-1.
10. LU applies between L1 and L2. LD applies between L2 and LL minimum. Diameter is uncontrolled in L1 and beyond LL minimum.
11. For transistor types 2N2919 and 2N2920, LL is 0.500 inch (12.70 mm) minimum and 0.750 inch (19.05 mm) maximum.
12. For transistor type 2N2919L and 2N2920L, LL is 1.500 inches (38.10 mm) minimum and 1.750 inches (44.45 mm) maximum.
13. In accordance with ASME Y14.5M, diameters are equivalent to φx symbology.

Figure 3-2. Physical Dimensions (2N2919U and 2N2920U) Surface Mount



Symbol	Dimensions			
	Inches		Millimeters	
	Min.	Max.	Min.	Max.
BL	0.240	0.250	6.10	6.35
BL2	—	0.250	—	6.35
BW	0.165	0.175	4.19	4.44
BW2	—	0.175	—	4.44
CH	0.044	0.080	1.12	2.03
LH	0.026	0.039	0.66	0.99
LL1	0.060	0.070	1.52	1.78
LL2	0.082	0.098	2.08	2.49
LS1	0.095	0.105	2.41	2.67
LS2	0.045	0.055	1.14	1.39
LW	0.022	0.028	0.56	0.71

Pin No.	Transistor
1	Collector no. 1
2	Base no. 1
3	Base no. 2
4	Collector no. 2

.....continued

Pin No.	Transistor
5	Emitter no. 2
6	Emitter no. 1

Notes:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. In accordance with AMSE Y14.5M, diameters are equivalent to φx symbology.

4. Revision History

The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

Revision	Date	Description
A	06/2024	Document was converted to Microchip template. Previous Microsemi literature number T4-LDS-770706 was replaced with DS00005473A.

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