

## NPN SILICON DUAL TRANSISTOR

Qualified per MIL-PRF-19500 /355

### DEVICES

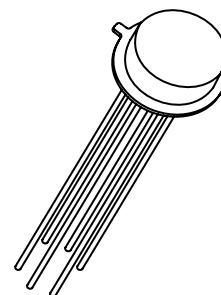
<b>2N2919</b>	<b>2N2919L</b>	<b>2N2919U</b>
<b>2N2920</b>	<b>2N2920L</b>	<b>2N2920U</b>

### LEVELS

**JAN**  
**JANTX**  
**JANTV**  
**JANS**

### ABSOLUTE MAXIMUM RATINGS ( $T_C = +25^\circ\text{C}$ 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
		One Section <sup>1</sup>	Both Sections <sup>2</sup>	
Total Power Dissipation @ $T_A = +25^\circ\text{C}$	$P_T$	200	350	mW
Operating & Storage Junction Temperature Range	$T_J, T_{stg}$	-65 to +200		$^\circ\text{C}$



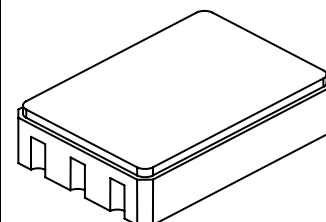
**TO-78**

### NOTES:

- Derate linearly 1.143mW/ $^\circ\text{C}$  for  $T_A > +25^\circ\text{C}$  (one section)
- Derate linearly 2.000mW/ $^\circ\text{C}$  for  $T_A > +25^\circ\text{C}$  (both sections)

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

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
<b>OFF CHARACTERISTICS</b>				
Collector-Emitter Breakdown Voltage $I_C = 10\text{mAdc}$ ; Pulsed	$V_{(BR)CEO}$	60		Vdc
Collector-Base Cutoff Current $V_{CB} = 45\text{Vdc}$ $V_{CB} = 70\text{Vdc}$	$I_{CBO}$		2.0 10	$\eta\text{Adc}$ $\mu\text{Adc}$
Emitter-Base Cutoff Current $V_{EB} = 5.0\text{Vdc}$ $V_{EB} = 6.0\text{Vdc}$	$I_{EBO}$		2.0 10	$\eta\text{Adc}$ $\mu\text{Adc}$



**U - Package**

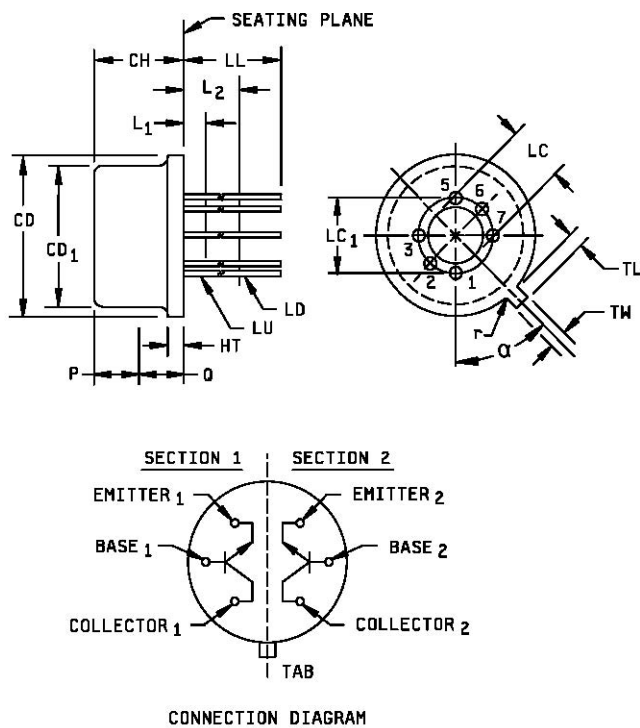
## ELECTRICAL CHARACTERISTICS (con't)

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
<b>ON CHARACTERISTICS</b>				
Forward-Current Transfer Ratio $I_C = 10\mu\text{A dc}, V_{CE} = 5.0\text{V dc}$ $I_C = 100\mu\text{A dc}, V_{CE} = 5.0\text{V dc}$ $I_C = 1.0\text{mA dc}, V_{CE} = 5.0\text{V dc}$ 2N2919, 2N2919L, 2N2919U	$h_{FE}$	60 100 150	240 325 600	
$I_C = 10\mu\text{A dc}, V_{CE} = 5.0\text{V dc}$ $I_C = 100\mu\text{A dc}, V_{CE} = 5.0\text{V dc}$ $I_C = 1.0\text{mA dc}, V_{CE} = 5.0\text{V dc}$ 2N2920, 2N2920L, 2N2920U	$h_{FE}$	175 235 300	600 800 1000	
Collector-Emitter Saturation Voltage $I_C = 1.0\text{mA dc}, I_B = 100\mu\text{A dc}$	$V_{CE(sat)}$		0.3	Vdc
Base-Emitter Saturation Voltage $I_C = 1.0\text{mA dc}, I_B = 100\mu\text{A dc}$	$V_{BE(sat)}$	0.5	1.0	Vdc

## DYNAMIC CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Forward Current Transfer Ratio, Magnitude $I_C = 0.5\text{mA dc}, V_{CE} = 5.0\text{V dc}, f = 20\text{MHz}$	$ h_{fe} $	3.0	20	
Small-Signal Short Circuit Input Impedance $I_C = 1.0\text{mA dc}, V_{CE} = 5\text{V dc}, f = 1.0\text{kHz}$	$h_{je}$	3.0	30	k $\Omega$
Small-Signal Short Circuit Output Admittance $I_C = 1.0\text{mA dc}, V_{CE} = 5\text{V dc}, f = 1.0\text{kHz}$	$h_{oe}$		60	$\mu\text{mhos}$
Output Capacitance $V_{CB} = 5.0\text{V dc}, I_E = 0, 100\text{kHz} \leq f \leq 1.0\text{MHz}$	$C_{obo}$		5.0	pF
Noise Figure $I_C = 10\mu\text{A dc}, V_{CE} = 5\text{V dc}, f = 100\text{Hz}, R_G = 10\text{k}\Omega$ $I_C = 10\mu\text{A dc}, V_{CE} = 5\text{V dc}, f = 1.0\text{kHz}, R_G = 10\text{k}\Omega$ $I_C = 10\mu\text{A dc}, V_{CE} = 5\text{V dc}, f = 10\text{kHz}, R_G = 10\text{k}\Omega$	$F_1$ $F_2$ $F_3$		5.0 3.0 3.0	dB

## PACKAGE DIMENSIONS

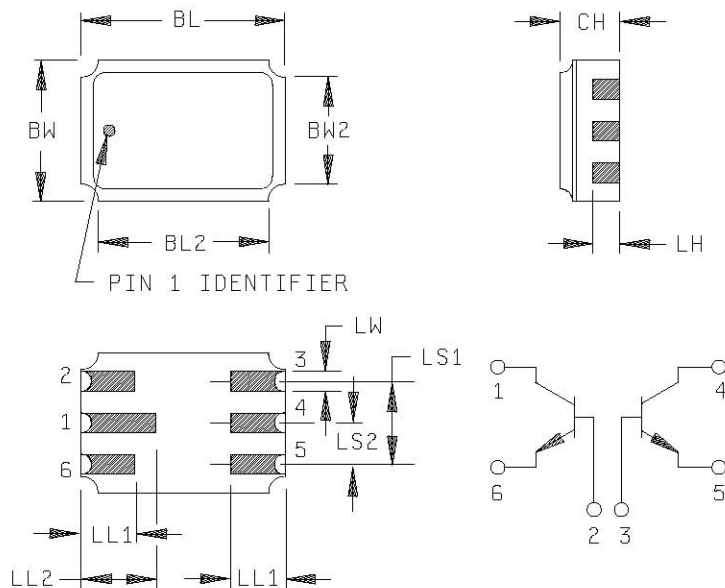


Symbol	DIMENSIONS				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD	.335	.370	8.51	9.40	
CD1	.305	.335	7.75	8.51	
CH	.140	.260	3.56	6.60	
HT	.009	.041	0.23	1.04	
LC	.140	.160	3.56	4.06	
LC1	.200 TP		5.08 TP		9
LD	.016	.021	.041	0.53	10
LL	See notes 10, 11 and 12				
LU	.016	.019	.041	0.48	10
L1		.050		1.27	10
L2	.250		6.35		10
P	.100		2.54		8
Q		.050		1.27	7
TL	.029	.045	0.74	1.14	5, 6
TW	.028	.034	0.71	0.86	4, 5
r		.010		0.25	
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 .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 .010 inch (0.25 mm) in zone P. This zone is controlled for automatic handling.
- 9 Leads at gauge plane .054 - .055 inch (1.37 - 1.40 mm) below seating plane shall be within .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 .500 inch (12.70 mm) minimum and .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  $\phi$ x symbology.

**FIGURE 1.** Physical dimensions 2N2919, 2N2919L, 2N2920, and 2N2920L (TO-78).



Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
BL	.240	.250	6.10	6.35
BL2		.250		6.35
BW	.165	.175	4.19	4.44
BW2		.175		4.44
CH	.044	.080	1.12	2.03
LH	.026	.039	0.66	0.99
LL1	.060	.070	1.52	1.78
LL2	.082	.098	2.08	2.49
LS1	.095	.105	2.41	2.67
LS2	.045	.055	1.14	1.39
LW	.022	.028	0.56	0.71

Pin no.	Transistor
1	Collector no. 1
2	Base no. 1
3	Base no. 2
4	Collector no. 2
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  $\phi$ x symbology.

**FIGURE 2.** Physical dimensions (2N2919U and 2N2920U) Surface mount.