

## PNP SILICON DUAL TRANSISTOR

Qualified per MIL-PRF-19500 /336

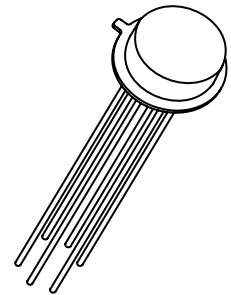
### DEVICES

**2N3810      2N3811**  
**2N3810L    2N3811L**  
**2N3810U    2N3811U**

**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	$V_{CBO}$	60		Vdc
Emitter-Base Voltage	$V_{EBO}$	5.0		Vdc
Collector Current	$I_C$	50		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		$^\circ\text{C}$



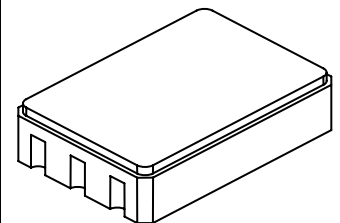
**TO-78**

### 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 $I_C = 100\mu\text{Adc}$	$V_{(BR)CEO}$	60		Vdc
Collector-Base Cutoff Current $V_{CB} = 50\text{Vdc}$ $V_{CB} = 60\text{Vdc}$	$I_{CBO}$		10 10	$\eta\text{Adc}$ $\mu\text{Adc}$
Emitter-Base Cutoff Current $V_{EB} = 4.0\text{Vdc}$ $V_{EB} = 5.0\text{Vdc}$	$I_{EBO}$		10 10	$\eta\text{Adc}$ $\mu\text{Adc}$



**U - Package**



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# TECHNICAL DATA SHEET

Gort Road Business Park, Ennis, Co. Clare, Ireland  
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## ELECTRICAL CHARACTERISTICS (con't)

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
<b>ON CHARACTERISTICS</b>				
Forward-Current Transfer Ratio $I_C = 10\mu\text{A dc}, V_{CE} = 5.0\text{V dc}$ $I_C = 100\mu\text{A dc}, V_{CE} = 5.0\text{V dc}$ $I_C = 1.0\text{mA dc}, V_{CE} = 5.0\text{V dc}$ $I_C = 10\text{mA dc}, V_{CE} = 5.0\text{V dc}$ 2N3810, 2N3810L, 2N3810U	$h_{FE}$	100 150 150 125	450 450	
$I_C = 1.0\mu\text{A dc}, V_{CE} = 5.0\text{V dc}$ $I_C = 10\mu\text{A dc}, V_{CE} = 5.0\text{V dc}$ $I_C = 100\mu\text{A dc}, V_{CE} = 5.0\text{V dc}$ $I_C = 1.0\text{mA dc}, V_{CE} = 5.0\text{V dc}$ $I_C = 10\text{mA dc}, V_{CE} = 5.0\text{V dc}$ 2N3811, 2N3811L, 2N3811U	$h_{FE}$	75 225 300 300 250	900 900	
Collector-Emitter Saturation Voltage $I_C = 100\mu\text{A dc}, I_B = 10\mu\text{A dc}$ $I_C = 1.0\text{mA dc}, I_B = 100\mu\text{A dc}$	$V_{CE(sat)}$		0.2 0.25	Vdc
Base-Emitter Saturation Voltage $I_C = 100\mu\text{A dc}, I_B = 10\mu\text{A dc}$ $I_C = 1.0\text{mA dc}, I_B = 100\mu\text{A dc}$	$V_{BE(sat)}$		0.7 0.8	Vdc
Base-Emitter Non-Saturation Voltage $V_{CE} = 5.0\text{V dc}, I_C = 100\mu\text{A dc}$	$V_{BE}$		0.7	Vdc

## DYNAMIC CHARACTERISTICS

Forward Current Transfer Ratio, Magnitude $I_C = 500\mu\text{A dc}, V_{CE} = 5.0\text{V dc}, f = 30\text{MHz}$ $I_C = 1.0\text{mA dc}, V_{CE} = 5.0\text{V dc}, f = 100\text{MHz}$	$ h_{fe} $	1.0 1.0	5.0	
Small-Signal Short Circuit Forward Current Transfer Ratio $I_C = 1.0\text{mA dc}, V_{CE} = 10\text{V dc}, f = 1.0\text{kHz}$ 2N3810, 2N3810L, 2N3810U 2N3811, 2N3811L, 2N3811U	$h_{fe}$	150 300	600 900	
Small-Signal Short Circuit Input Impedance $I_C = 1.0\text{mA dc}, V_{CE} = 10\text{V dc}, f = 1.0\text{kHz}$ 2N3810, 2N3810L, 2N3810U 2N3811, 2N3811L, 2N3811U	$h_{je}$	3.0 3.0	30 40	k $\Omega$
Small-Signal Short Circuit Output Admittance $I_C = 1.0\text{mA dc}, V_{CE} = 10\text{V dc}, f = 1.0\text{kHz}$ 2N3810, 2N3810L, 2N3810U 2N3811, 2N3811L, 2N3811U	$h_{oe}$	5.0	60	$\mu\text{mhos}$



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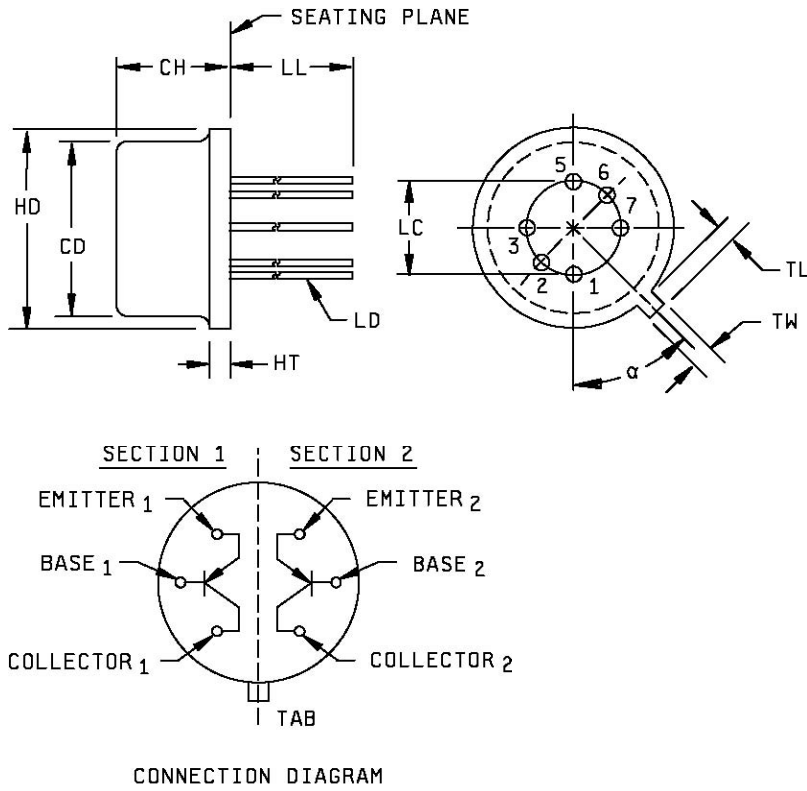
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## DYNAMIC CHARACTERISTICS (cont.)

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Output Capacitance $V_{CB} = 5.0\text{Vdc}$ , $I_E = 0$ , $100\text{kHz} \leq f \leq 1.0\text{MHz}$	$C_{obo}$		5.0	pF
Input Capacitance $V_{EB} = 5.0\text{Vdc}$ , $I_C = 0$ , $100\text{kHz} \leq f \leq 1.0\text{MHz}$	$C_{ibo}$		8.0	pF
Noise Figure				
$I_C = 100\mu\text{A}$ dc, $V_{CE} = 10\text{Vdc}$ , $f = 100\text{Hz}$ , $R_G = 3.0\text{k}\Omega$ 2N3810, L, U	$F_1$		7.0	dB
$I_C = 100\mu\text{A}$ dc, $V_{CE} = 10\text{Vdc}$ , $f = 1.0\text{kHz}$ , $R_G = 3.0\text{k}\Omega$ 2N3810, L, U	$F_2$		3.0	
$I_C = 100\mu\text{A}$ dc, $V_{CE} = 10\text{Vdc}$ , $f = 10\text{kHz}$ , $R_G = 3.0\text{k}\Omega$ 2N3810, L, U	$F_3$		2.5	
$I_C = 100\mu\text{A}$ dc, $V_{CE} = 10\text{Vdc}$ , $f = 10\text{Hz to } 15.7\text{kHz}$ , $R_G = 3.0\text{k}\Omega$ 2N3810, L, U	$F_4$		3.5	
$I_C = 100\mu\text{A}$ dc, $V_{CE} = 10\text{Vdc}$ , $f = 100\text{Hz}$ , $R_G = 3.0\text{k}\Omega$ 2N3811, L, U	$F_1$		4.0	dB
$I_C = 100\mu\text{A}$ dc, $V_{CE} = 10\text{Vdc}$ , $f = 1.0\text{kHz}$ , $R_G = 3.0\text{k}\Omega$ 2N3811, L, U	$F_2$		1.5	
$I_C = 100\mu\text{A}$ dc, $V_{CE} = 10\text{Vdc}$ , $f = 10\text{kHz}$ , $R_G = 3.0\text{k}\Omega$ 2N3811, L, U	$F_3$		2.0	
$I_C = 100\mu\text{A}$ dc, $V_{CE} = 10\text{Vdc}$ , $f = 10\text{Hz to } 15.7\text{kHz}$ , $R_G = 3.0\text{k}\Omega$ 2N3811, L, U	$F_4$		2.5	

## PACKAGE DIMENSIONS

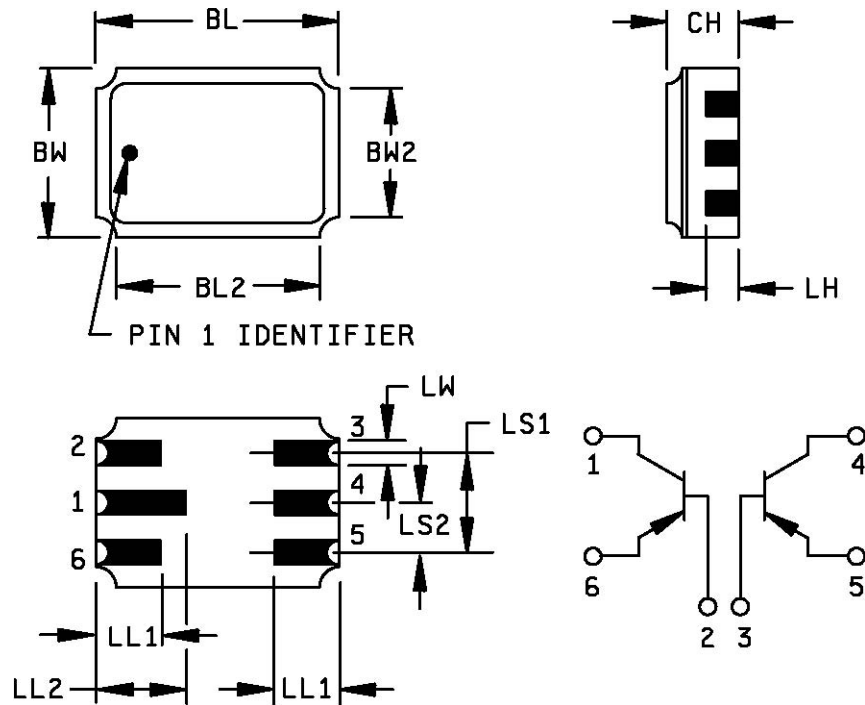


Ltr	DIMENSIONS				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD	.305	.335	7.75	8.51	
CH	.150	.185	3.81	4.70	
HD	.335	.370	8.51	9.40	
HT	.009	.041	0.23	1.04	
LC	.200 BSC		5.08 BSC		
LD	.016	.021	0.41	0.53	10
LL	See notes 10, 11, and 13				
$\alpha$	45° TP		45° TP		9
TL	.029	.045	0.74	1.14	5, 6
TW	.028	.034	0.71	0.86	4, 5

### NOTES:

- 1 Dimensions are in inches.
- 2 Millimeters are given for general information only.
- 3 Refer to rules for dimensioning Semiconductor Product Outlines included in Publication No. 95.
- 4 Lead number 4 and 8 omitted on this variation.
- 5 TW must be held to a minimum length of .021 inch (0.53 mm).
- 6 LL measured from maximum HD.
- 7 Details of outline in this zone optional.
- 8 CD shall not vary more than .010 inch (0.25mm) 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 (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 procedure described on gauge drawing GS-1.
- 10 LD applies to LL minimum.
- 11 r (radius) applies to both inside corners of tab.
- 12 For transistor types 2N3810 and 2N3811, LL is .500 inch (12.70 mm) minimum, and .750 inch (19.05 mm) maximum. (TO-78).
- 13 For transistor types 2N3810L and 2N3811L, LL is 1.500 inches (38.10 mm) minimum, and 1.750 inches (44.45 mm) maximum.
- 14 In accordance with AMSE Y14.5M, diameters are equivalent to  $\phi$ x symbology.
- 15 Leads 3 and 5 = emitter, leads 2 and 6 = base, leads 1 and 7 = collector.

**FIGURE 1.** Physical dimensions (similar to 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	4.45
BW2		.175		4.45
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	1.40
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 (2N3810U and 2N3811U).