

## 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                       |                            | mA <sub>dc</sub> |
|                                                     |                | 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

### Note:

- Derate linearly 1.143mW/ $^\circ\text{C}$  for  $T_A > +25^\circ\text{C}$  (one section)
- Derate linearly 2.00mW/ $^\circ\text{C}$  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<br>$I_C = 100\mu\text{A}_{dc}$                  | $V_{(BR)CEO}$ | 60   |          | Vdc                                       |
| Collector-Base Cutoff Current<br>$V_{CB} = 50\text{Vdc}$<br>$V_{CB} = 60\text{Vdc}$ | $I_{CBO}$     |      | 10<br>10 | $\eta\text{A}_{dc}$<br>$\mu\text{A}_{dc}$ |
| Emitter-Base Cutoff Current<br>$V_{EB} = 4.0\text{Vdc}$<br>$V_{EB} = 5.0\text{Vdc}$ | $I_{EBO}$     |      | 10<br>10 | $\eta\text{A}_{dc}$<br>$\mu\text{A}_{dc}$ |



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# TECHNICAL DATA SHEET

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### ELECTRICAL CHARACTERISTICS (con't)

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

### DYNAMIC CHARACTERISTICS

|                                                                                                                                                                                                  |            |            |            |                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------|------------|------------------|
| Forward Current Transfer Ratio, Magnitude<br>$I_C = 500\mu\text{Adc}$ , $V_{CE} = 5.0\text{Vdc}$ , $f = 30\text{MHz}$<br>$I_C = 1.0\text{mAdc}$ , $V_{CE} = 5.0\text{Vdc}$ , $f = 100\text{MHz}$ | $ h_{fe} $ | 1.0<br>1.0 | 5.0        |                  |
| Small-Signal Short Circuit Forward Current Transfer Ratio<br>$I_C = 1.0\text{mAdc}$ , $V_{CE} = 10\text{Vdc}$ , $f = 1.0\text{kHz}$<br>2N3810, 2N3810L, 2N3810U<br>2N3811, 2N3811L, 2N3811U      | $h_{fe}$   | 150<br>300 | 600<br>900 |                  |
| Small-Signal Short Circuit Input Impedance<br>$I_C = 1.0\text{mAdc}$ , $V_{CE} = 10\text{Vdc}$ , $f = 1.0\text{kHz}$<br>2N3810, 2N3810L, 2N3810U<br>2N3811, 2N3811L, 2N3811U                     | $h_{je}$   | 3.0<br>3.0 | 30<br>40   | k $\Omega$       |
| Small-Signal Short Circuit Output Admittance<br>$I_C = 1.0\text{mAdc}$ , $V_{CE} = 10\text{Vdc}$ , $f = 1.0\text{kHz}$<br>2N3810, 2N3810L, 2N3810U<br>2N3811, 2N3811L, 2N3811U                   | $h_{oe}$   | 5.0        | 60         | $\mu\text{mhos}$ |
| Output Capacitance<br>$V_{CB} = 5.0\text{Vdc}$ , $I_E = 0$ , $100\text{kHz} \leq f \leq 1.0\text{MHz}$                                                                                           | $C_{obo}$  |            | 5.0        | pF               |
| Input Capacitance<br>$V_{EB} = 5.0\text{Vdc}$ , $I_C = 0$ , $100\text{kHz} \leq f \leq 1.0\text{MHz}$                                                                                            | $C_{ibo}$  |            | 8.0        | pF               |



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### DYNAMIC CHARACTERISTICS (cont.)

| Parameters / Test Conditions                                                                                                       | Symbol | Min. | Max. | Unit |
|------------------------------------------------------------------------------------------------------------------------------------|--------|------|------|------|
| Noise Figure                                                                                                                       |        |      |      |      |
| $I_C = 100\mu\text{Adc}$ , $V_{CE} = 10\text{Vdc}$ , $f = 100\text{Hz}$ , $R_G = 3.0\text{k}\Omega$ 2N3810, L, U                   | $F_1$  |      | 7.0  | dB   |
| $I_C = 100\mu\text{Adc}$ , $V_{CE} = 10\text{Vdc}$ , $f = 1.0\text{kHz}$ , $R_G = 3.0\text{k}\Omega$ 2N3810, L, U                  | $F_2$  |      | 3.0  |      |
| $I_C = 100\mu\text{Adc}$ , $V_{CE} = 10\text{Vdc}$ , $f = 10\text{kHz}$ , $R_G = 3.0\text{k}\Omega$ 2N3810, L, U                   | $F_3$  |      | 2.5  |      |
| $I_C = 100\mu\text{Adc}$ , $V_{CE} = 10\text{Vdc}$ , $f = 10\text{Hz to } 15.7\text{kHz}$ , $R_G = 3.0\text{k}\Omega$ 2N3810, L, U | $F_4$  |      | 3.5  |      |
| $I_C = 100\mu\text{Adc}$ , $V_{CE} = 10\text{Vdc}$ , $f = 100\text{Hz}$ , $R_G = 3.0\text{k}\Omega$ 2N3811, L, U                   | $F_1$  |      | 4.0  | dB   |
| $I_C = 100\mu\text{Adc}$ , $V_{CE} = 10\text{Vdc}$ , $f = 1.0\text{kHz}$ , $R_G = 3.0\text{k}\Omega$ 2N3811, L, U                  | $F_2$  |      | 1.5  |      |
| $I_C = 100\mu\text{Adc}$ , $V_{CE} = 10\text{Vdc}$ , $f = 10\text{kHz}$ , $R_G = 3.0\text{k}\Omega$ 2N3811, L, U                   | $F_3$  |      | 2.0  |      |
| $I_C = 100\mu\text{Adc}$ , $V_{CE} = 10\text{Vdc}$ , $f = 10\text{Hz to } 15.7\text{kHz}$ , $R_G = 3.0\text{k}\Omega$ 2N3811, L, U | $F_4$  |      | 2.5  |      |

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