



# NES

## NEW ENGLAND SEMICONDUCTOR

### 2N3725

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

| Characteristics                                                                                                                 | Symbol        | Min | Max        | Unit                |
|---------------------------------------------------------------------------------------------------------------------------------|---------------|-----|------------|---------------------|
| <b>OFF CHARACTERISTICS</b>                                                                                                      |               |     |            |                     |
| Collector-Emitter Breakdown Voltage (1)<br>$I_C = 10 \text{ mAdc}, I_B = 0$                                                     | $V_{(BR)CEO}$ | 50  |            | Vdc                 |
| Collector-Emitter Breakdown Voltage<br>$I_C = 10 \mu\text{A}, V_{BE} = 0$                                                       | $V_{(BR)CES}$ | 80  |            | Vdc                 |
| Collector-Base Breakdown Voltage<br>$I_C = 10 \mu\text{A}, I_E = 0$                                                             | $V_{(BR)CBO}$ | 80  |            | Vdc                 |
| Emitter-Base Breakdown Voltage<br>$I_E = 10 \mu\text{A}, I_C = 0$                                                               | $V_{(BR)EBO}$ | 6.0 |            | Vdc                 |
| Collector Cutoff Current<br>$V_{CB} = 60 \text{ Vdc}, I_E = 0$<br>$V_{CB} = 60 \text{ Vdc}, I_E = 0, T_A = 100^{\circ}\text{C}$ | $I_{CBO}$     |     | 1.7<br>120 | $\mu\text{A}$<br>dc |
| Collector Cutoff Current<br>$V_{CE} = 80 \text{ Vdc}, V_{BE} = 0$                                                               | $I_{CES}$     |     | 10         | $\mu\text{A}$       |
| Base Current<br>$V_{CE} = 80 \text{ Vdc}, V_{BE} = 0$                                                                           | $I_B$         |     | 10         | $\mu\text{A}$       |

#### ON CHARACTERISTICS (1)

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |               |                                                          |                                              |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------------------------------------------------|----------------------------------------------|-----|
| <b>DC Current Gain</b><br>$I_C = 10 \text{ mAdc}, V_{CE} = 1.0 \text{ Vdc}$<br>$I_C = 100 \text{ mAdc}, V_{CE} = 1.0 \text{ Vdc}$<br>$I_C = 100 \text{ mAdc}, V_{CE} = 1.0 \text{ Vdc}, T_A = -55^{\circ}\text{C}$<br>$I_C = 300 \text{ mAdc}, V_{CE} = 1.0 \text{ Vdc}$<br>$I_C = 500 \text{ mAdc}, V_{CE} = 1.0 \text{ Vdc}$<br>$I_C = 500 \text{ mAdc}, V_{CE} = 1.0 \text{ Vdc}, T_A = -55^{\circ}\text{C}$<br>$I_C = 800 \text{ mAdc}, V_{CE} = 2.0 \text{ Vdc}$<br>$I_C = 1.0 \text{ Adc}, V_{CE} = 5.0 \text{ Vdc}$<br>$I_C = 800 \text{ mAdc}, V_{CE} = 2.0 \text{ Vdc}$<br>$I_C = 1.0 \text{ Adc}, V_{CE} = 5.0 \text{ Vdc}$ |               |                                                          |                                              |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | $h_{FE}$      | 30<br>60<br>30<br>40<br>35<br>20<br>25<br>30<br>20<br>25 | 150                                          |     |
| <b>Collector-Emitter Saturation Voltage</b><br>$I_C = 10 \text{ mAdc}, I_B = 1.0 \text{ mAdc}$<br>$I_C = 100 \text{ mAdc}, I_B = 10 \text{ mAdc}$<br>$I_C = 300 \text{ mAdc}, I_B = 30 \text{ mAdc}$<br>$I_C = 500 \text{ mAdc}, I_B = 50 \text{ mAdc}$<br>$I_C = 800 \text{ mAdc}, I_B = 80 \text{ mAdc}$<br>$I_C = 1.0 \text{ Adc}, I_B = 100 \text{ mAdc}$                                                                                                                                                                                                                                                                         |               |                                                          |                                              |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | $V_{CE(sat)}$ |                                                          | 0.25<br>0.26<br>0.40<br>0.52<br>0.80<br>0.95 | Vdc |
| <b>Base-Emitter Saturation Voltage</b><br>$I_C = 10 \text{ mAdc}, I_B = 1.0 \text{ mAdc}$<br>$I_C = 100 \text{ mAdc}, I_B = 10 \text{ mAdc}$<br>$I_C = 300 \text{ mAdc}, I_B = 30 \text{ mAdc}$<br>$I_C = 500 \text{ mAdc}, I_B = 50 \text{ mAdc}$<br>$I_C = 800 \text{ mAdc}, I_B = 80 \text{ mAdc}$<br>$I_C = 1.0 \text{ Adc}, I_B = 100 \text{ mAdc}$                                                                                                                                                                                                                                                                              |               |                                                          |                                              |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | $V_{BE(sat)}$ |                                                          | 0.76<br>0.86<br>1.1<br>1.1<br>1.5<br>1.7     | Vdc |

#### SMALL SIGNAL CHARACTERISTICS

|                                                                                                                        |           |     |    |              |
|------------------------------------------------------------------------------------------------------------------------|-----------|-----|----|--------------|
| <b>Current-Gain -- Bandwidth Products (2)</b><br>$I_C = 50 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}, f = 100 \text{ MHz}$ |           |     |    |              |
|                                                                                                                        | $f_T$     | 300 |    | MHz          |
| <b>Output Capacitance</b><br>$V_{CB} = 10 \text{ Vdc}, I_E = 0, f = 1.0 \text{ MHz}$                                   |           |     |    |              |
|                                                                                                                        | $C_{obc}$ |     | 10 | $\text{p}^F$ |
| <b>Input Capacitance</b><br>$V_{EB} = 0.5 \text{ Vdc}, I_C = 0, f = 1.0 \text{ MHz}$                                   |           |     |    |              |
|                                                                                                                        | $C_{ibo}$ |     | 55 | $\text{p}^F$ |

#### SWITCHING CHARACTERISTICS

|               |                                                                                                                |           |    |                |
|---------------|----------------------------------------------------------------------------------------------------------------|-----------|----|----------------|
| Delay Time    | $V_{CC} = 30 \text{ Vdc}, V_{BE(off)} = 3.5 \text{ Vdc}$<br>$I_C = 500 \text{ mAdc}, I_{B1} = 50 \text{ mAdc}$ | $t_d$     | 10 | $\eta\text{S}$ |
| Rise Time     |                                                                                                                | $t_r$     | 30 |                |
| Turn-On Time  |                                                                                                                | $t_{on}$  | 35 |                |
| Storage Time  | $V_{CC} = 30 \text{ Vdc}, I_C = 500 \text{ mAdc},$<br>$I_{B1} = I_{B2} = 50 \text{ mAdc}$                      | $t_s$     | 50 |                |
| Fall Time     |                                                                                                                | $t_f$     | 25 |                |
| Turn-Off Time |                                                                                                                | $t_{off}$ | 60 |                |

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

(2)  $f_T = |h_{fe}| = f_{test}$

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