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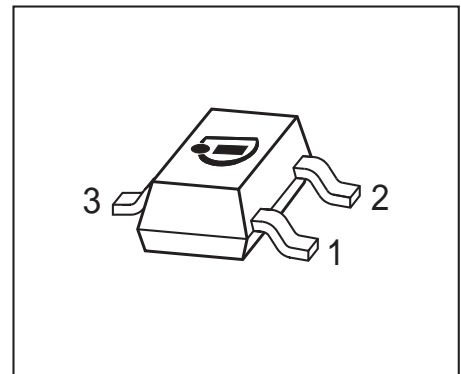
www.Jameco.com ♦ 1-800-831-4242

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Jameco Part Number 1631285

NPN Silicon Switching Transistor

- Low collector-emitter saturation voltage
- Complementary type: SMBT2907AW (PNP)
- Pb-free (RoHS compliant) package¹⁾
- Qualified according AEC Q101



| Type | Marking | Pin Configuration | | | Package |
|---------------------|---------|-------------------|-------|-------|---------|
| SMBT2222A/MMBT2222A | s1P | 1 = B | 2 = E | 3 = C | SOT23 |

Maximum Ratings

| Parameter | Symbol | Value | Unit |
|--|-----------|-------------|------------------|
| Collector-emitter voltage | V_{CEO} | 40 | V |
| Collector-base voltage | V_{CBO} | 75 | |
| Emitter-base voltage | V_{EBO} | 6 | |
| Collector current | I_C | 600 | mA |
| Total power dissipation- $T_S \leq 77 \text{ }^\circ\text{C}$ | P_{tot} | 330 | mW |
| Junction temperature | T_j | 150 | $^\circ\text{C}$ |
| Storage temperature | T_{stg} | -65 ... 150 | |

Thermal Resistance

| Parameter | Symbol | Value | Unit |
|--|------------|------------|------|
| Junction - soldering point ²⁾ | R_{thJS} | ≤ 220 | K/W |

¹⁾Pb-containing package may be available upon special request

²⁾For calculation of R_{thJA} please refer to Application Note Thermal Resistance

Electrical Characteristics at $T_A = 25^\circ\text{C}$, unless otherwise specified

| Parameter | Symbol | Values | | | Unit |
|--|---------------|-----------------------------------|----------------------------|------------------------------|---------------|
| | | min. | typ. | max. | |
| DC Characteristics | | | | | |
| Collector-emitter breakdown voltage $I_C = 10\text{ mA}, I_B = 0$ | $V_{(BR)CEO}$ | 40 | - | - | V |
| Collector-base breakdown voltage $I_C = 10\text{ }\mu\text{A}, I_E = 0$ | $V_{(BR)CBO}$ | 75 | - | - | |
| Emitter-base breakdown voltage $I_E = 10\text{ }\mu\text{A}, I_C = 0$ | $V_{(BR)EBO}$ | 6 | - | - | |
| Collector-base cutoff current $V_{CB} = 60\text{ V}, I_E = 0$ $V_{CB} = 60\text{ V}, I_E = 0, T_A = 150^\circ\text{C}$ | I_{CBO} | - | - | 0.01 10 | μA |
| Emitter-base cutoff current $V_{EB} = 3\text{ V}, I_C = 0$ | I_{EBO} | - | - | 10 | nA |
| DC current gain ¹⁾ $I_C = 100\text{ }\mu\text{A}, V_{CE} = 10\text{ V}$ $I_C = 1\text{ mA}, V_{CE} = 10\text{ V}$ $I_C = 10\text{ mA}, V_{CE} = 10\text{ V}$ $I_C = 150\text{ mA}, V_{CE} = 1\text{ V}$ $I_C = 150\text{ mA}, V_{CE} = 10\text{ V}$ $I_C = 500\text{ mA}, V_{CE} = 10\text{ V}$ | h_{FE} | 35 50 75 50 100 40 | - - - - - - | - - - - 300 - | - |
| Collector-emitter saturation voltage ¹⁾ $I_C = 150\text{ mA}, I_B = 15\text{ mA}$ $I_C = 500\text{ mA}, I_B = 50\text{ mA}$ | V_{CEsat} | - - | - - | 0.3 1 | V |
| Base emitter saturation voltage ¹⁾ $I_C = 150\text{ mA}, I_B = 15\text{ mA}$ $I_C = 500\text{ mA}, I_B = 50\text{ mA}$ | V_{BEsat} | 0.6 - | - - | 1.2 2 | |

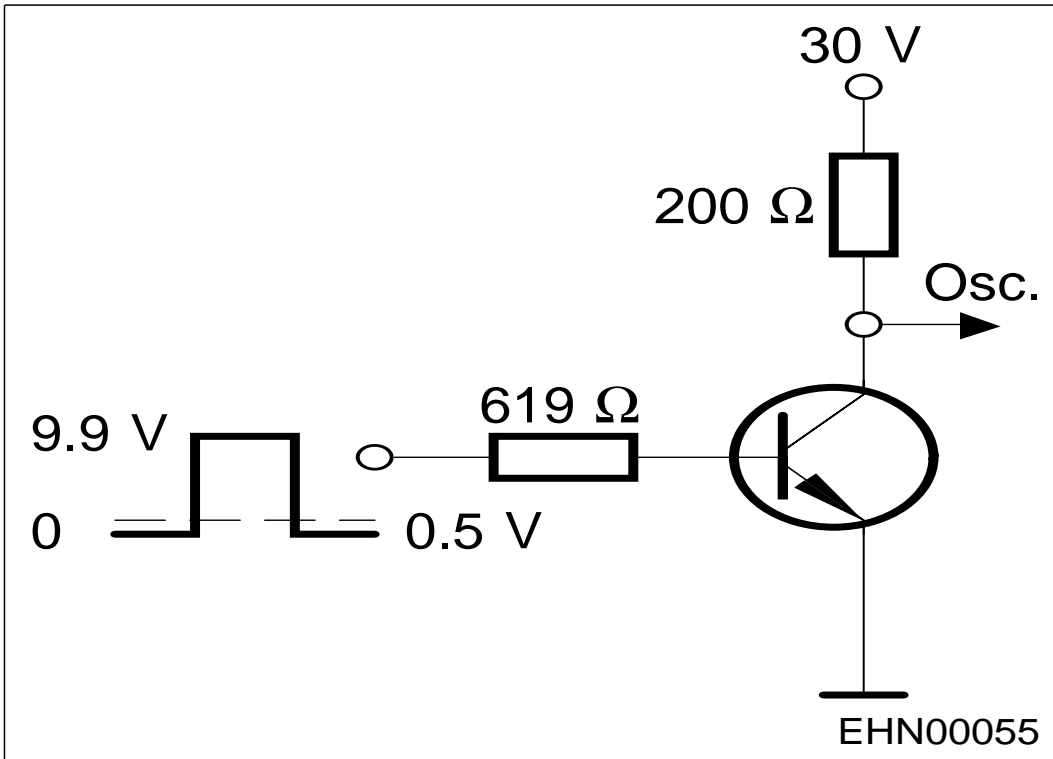
¹⁾Pulse test: $t < 300\text{ }\mu\text{s}$; $D < 2\%$

Electrical Characteristics at $T_A = 25^\circ\text{C}$, unless otherwise specified

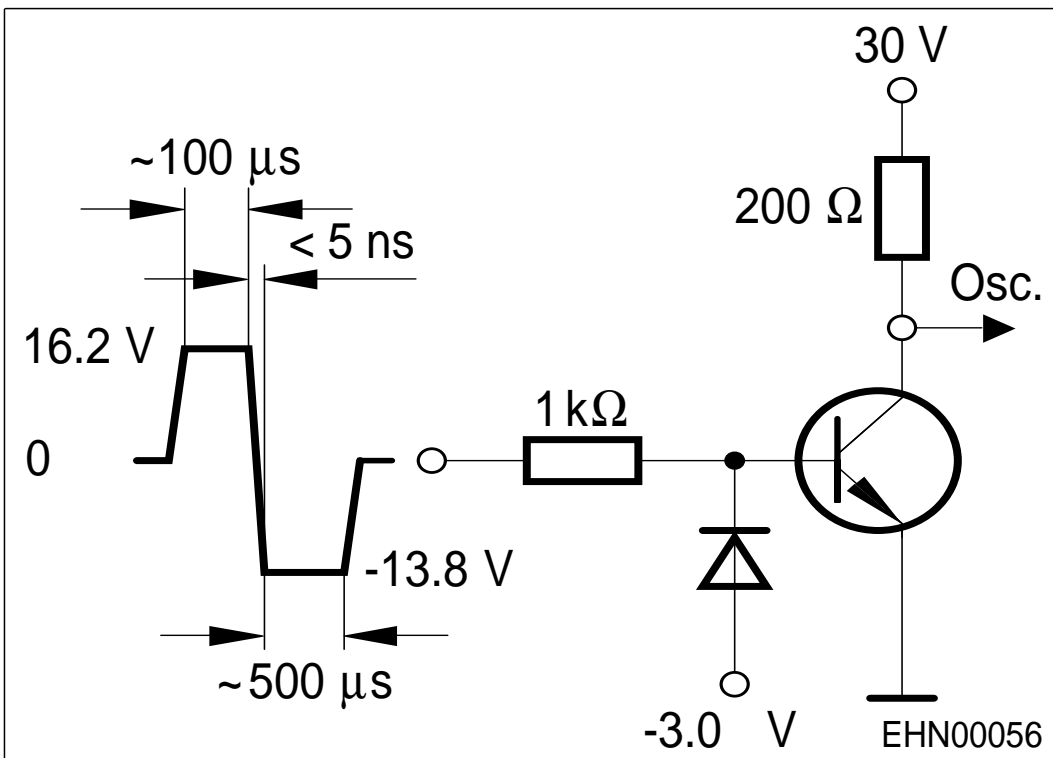
| Parameter | Symbol | Values | | | Unit |
|--|-----------|-----------|--------|------------|---------------|
| | | min. | typ. | max. | |
| AC Characteristics | | | | | |
| Transition frequency $I_C = 20\text{ mA}$, $V_{CE} = 20\text{ V}$, $f = 100\text{ MHz}$ | f_T | 300 | - | - | MHz |
| Collector-base capacitance $V_{CB} = 10\text{ V}$, $f = 1\text{ MHz}$ | C_{cb} | - | 2.5 | 5 | pF |
| Emitter-base capacitance $V_{EB} = 0.5\text{ V}$, $f = 1\text{ MHz}$ | C_{eb} | - | - | 35 | |
| Short-circuit input impedance $I_C = 1\text{ mA}$, $V_{CE} = 10\text{ V}$, $f = 1\text{ kHz}$ $I_C = 10\text{ mA}$, $V_{CE} = 10\text{ V}$, $f = 1\text{ kHz}$ | h_{11e} | 2 0.25 | - - | 8 1.25 | $k\Omega$ |
| Open-circuit reverse voltage transf. ratio $I_C = 1\text{ mA}$, $V_{CE} = 10\text{ V}$, $f = 1\text{ kHz}$ $I_C = 10\text{ mA}$, $V_{CE} = 10\text{ V}$, $f = 1\text{ kHz}$ | h_{12e} | - - | - - | 8 4 | 10^{-4} |
| Short-circuit forward current transf. ratio $I_C = 1\text{ mA}$, $V_{CE} = 10\text{ V}$, $f = 1\text{ kHz}$ $I_C = 10\text{ mA}$, $V_{CE} = 10\text{ V}$, $f = 1\text{ kHz}$ | h_{21e} | 50 75 | - - | 300 375 | - |
| Open-circuit output admittance $I_C = 1\text{ mA}$, $V_{CE} = 10\text{ V}$, $f = 1\text{ kHz}$ $I_C = 10\text{ mA}$, $V_{CE} = 10\text{ V}$, $f = 1\text{ kHz}$ | h_{22e} | 5 25 | - - | 35 200 | μS |
| Delay time $V_{CC} = 30\text{ V}$, $I_C = 150\text{ mA}$, $I_{B1} = 15\text{ mA}$, $V_{BE(\text{off})} = 0.5\text{ V}$ | t_d | - | - | 10 | ns |
| Rise time $V_{CC} = 30\text{ V}$, $I_C = 150\text{ mA}$, $I_{B1} = 15\text{ mA}$, $V_{BE(\text{off})} = 0.5\text{ V}$ | t_r | - | - | 25 | |
| Storage time $V_{CC} = 30\text{ V}$, $I_C = 150\text{ mA}$, $I_{B1} = I_{B2} = 15\text{ mA}$ | t_{stg} | - | - | 225 | |
| Fall time $V_{CC} = 30\text{ V}$, $I_C = 150\text{ mA}$, $I_{B1} = I_{B2} = 15\text{ mA}$ | t_f | - | - | 60 | |
| Noise figure $I_C = 100\text{ }\mu\text{A}$, $V_{CE} = 10\text{ V}$, $f = 1\text{ kHz}$, $\Delta f = 200\text{ Hz}$, $R_S = 1\text{ k}\Omega$ | F | - | - | 4 | dB |

Test circuit

Delay and rise time



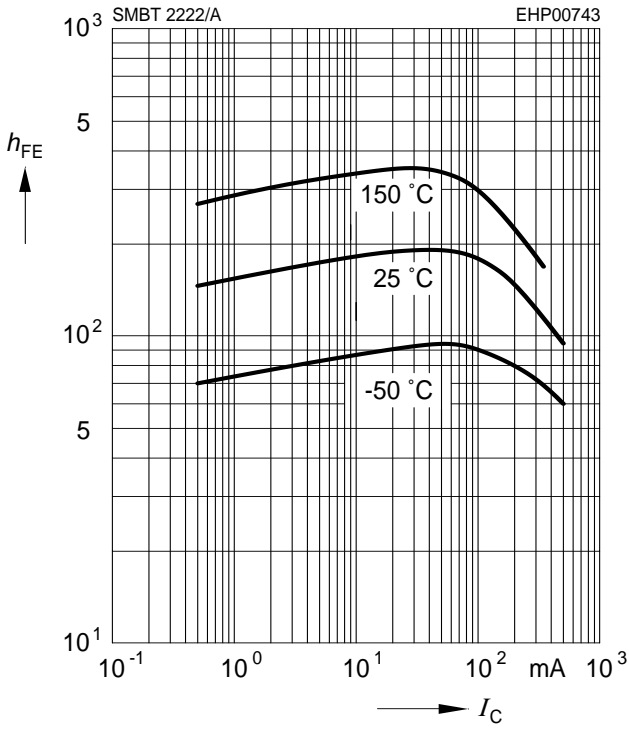
Storage and fall time



Oscillograph: $R > 100\Omega$, $C < 12\text{pF}$, $t_r < 5\text{ns}$

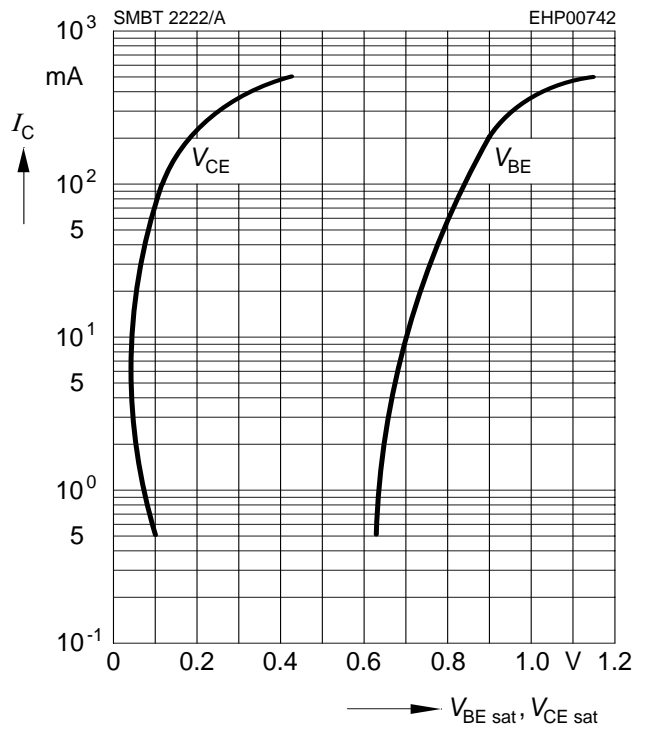
DC current gain $h_{FE} = f(I_C)$

$V_{CE} = 10\text{ V}$



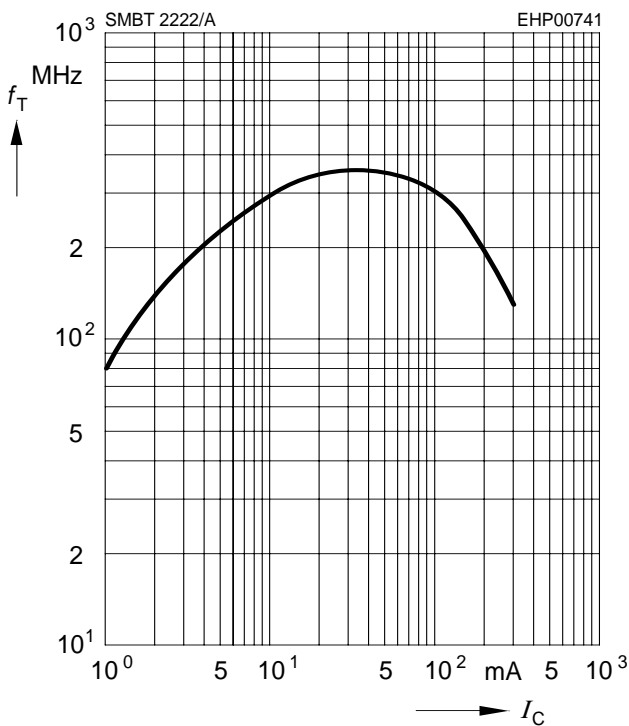
Saturation voltage $I_C = f(V_{BEsat}; V_{CEsat})$

$h_{FE} = 10$



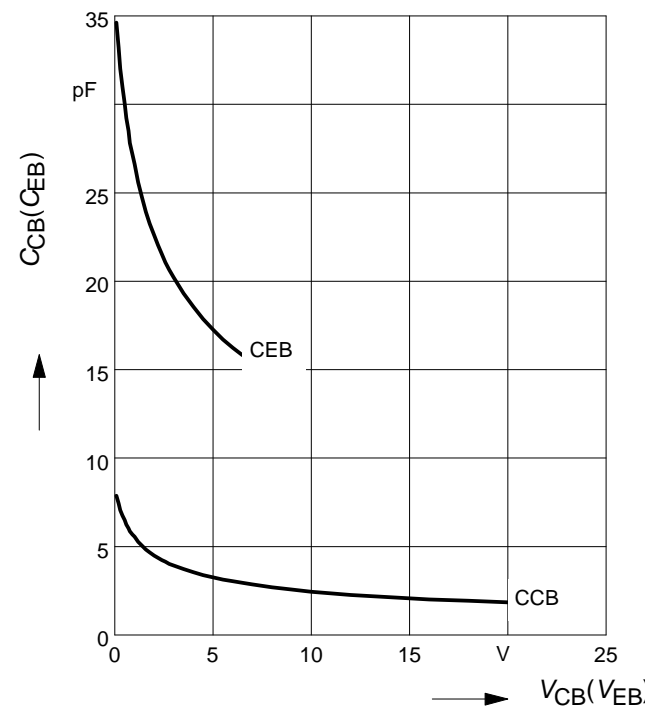
Transition frequency $f_T = f(I_C)$

$V_{CE} = 20\text{ V}$

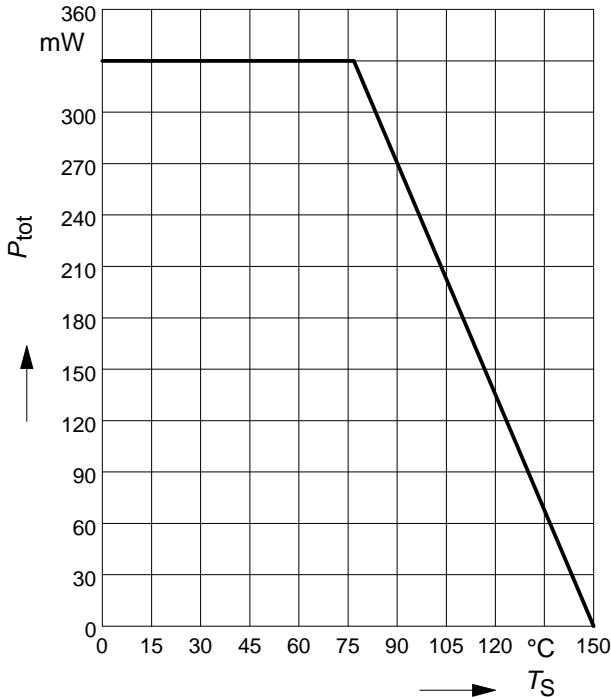


Collector-base capacitance $C_{cb} = f(V_{CB})$

Emitter-base capacitance $C_{eb} = f(V_{EB})$

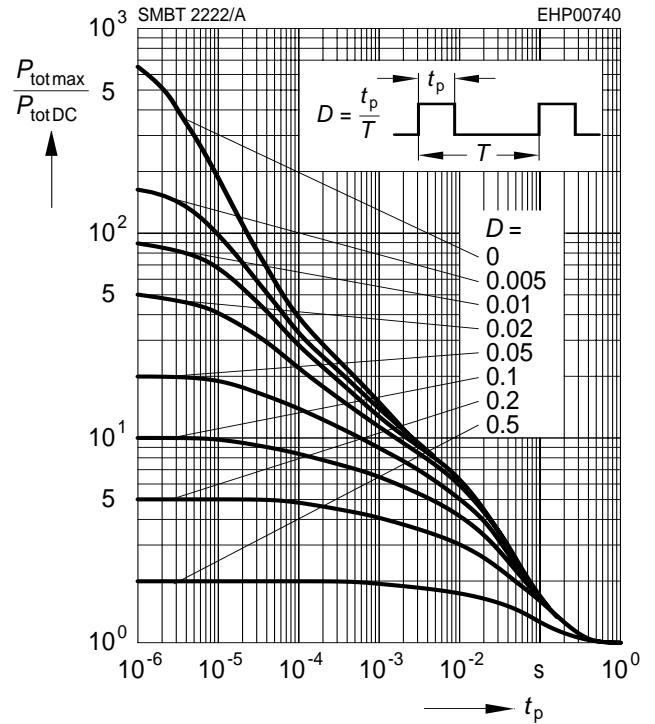


Total power dissipation $P_{tot} = f(T_S)$



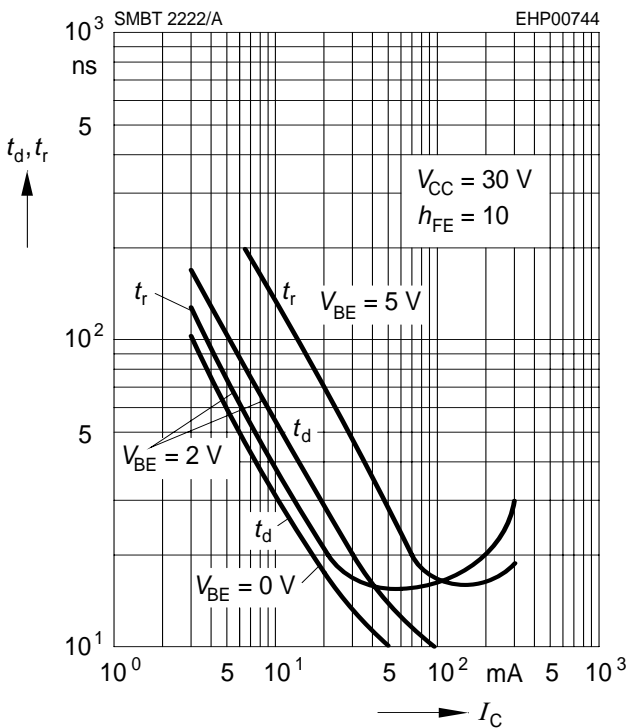
Permissible Pulse Load

$P_{totmax}/P_{totDC} = f(t_p)$



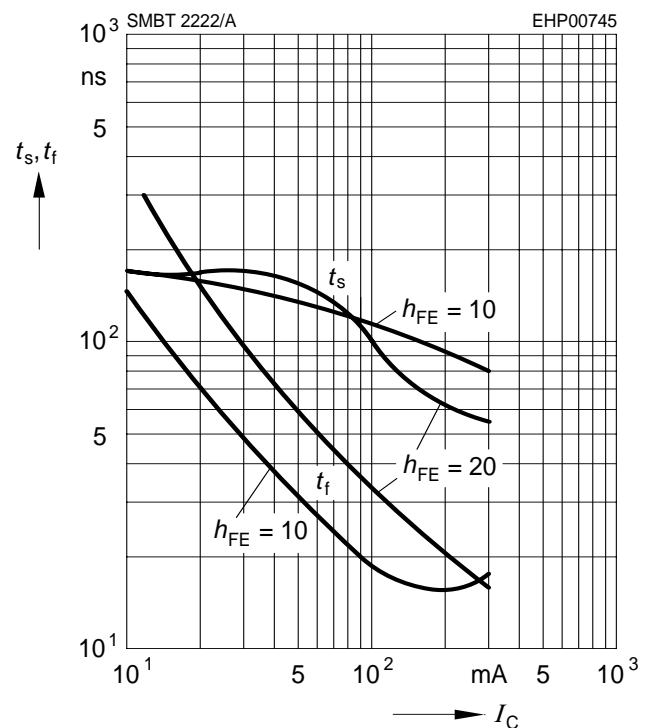
Delay time $t_d = f(I_C)$

Rise time $t_r = f(I_C)$

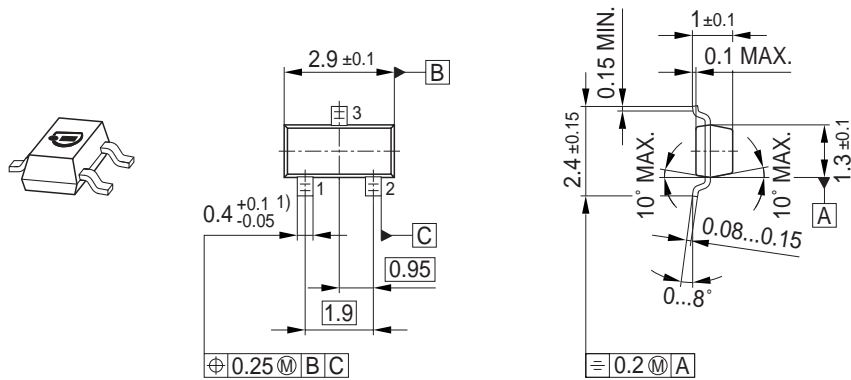


Storage time $t_{stg} = f(I_C)$

Fall time $t_f = f(I_C)$

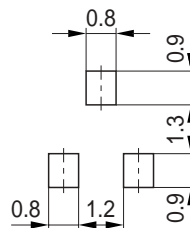


Package Outline

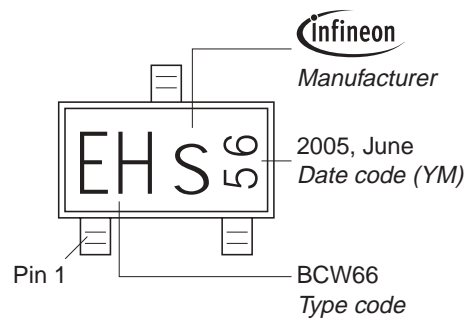


1) Lead width can be 0.6 max. in dambar area

Foot Print

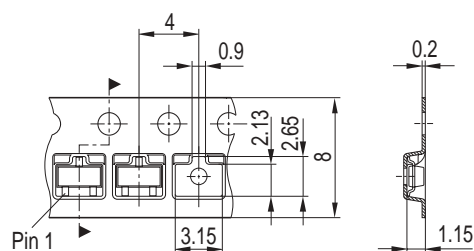


Marking Layout (Example)



Standard Packing

Reel \varnothing 180 mm = 3.000 Pieces/Reel
 Reel \varnothing 330 mm = 10.000 Pieces/Reel



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