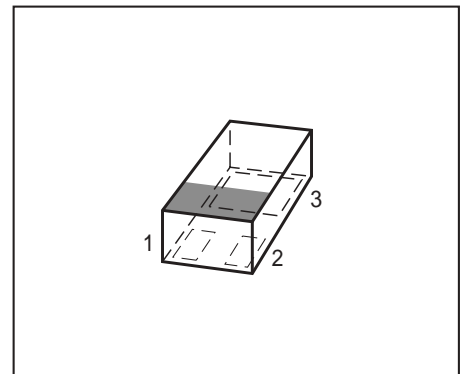


NPN Silicon Germanium RF Transistor*

- High gain ultra low noise RF transistor
- Provides outstanding performance for a wide range of wireless applications up to 10 GHz
- Ideal for WLAN and all 5-6 GHz applications
- High OIP_3 and P_{-1dB} for driver stages
- High maximum stable and available gain
 $G_{ms} = 21$ dB at 1.8 GHz, $G_{ma} = 11.5$ dB at 6 GHz
- 150 GHz f_T -Silicon Germanium technology
- Extremely small and flat leadless package, reduced height 0.32 mm max.
- Pb-free (RoHS compliant) package¹⁾
- Qualified according AEC Q101



* Short term description



ESD (Electrostatic discharge) sensitive device, observe handling precaution!

| Type | Marking | Pin Configuration | | | Package |
|------------|---------|-------------------|-----|-----|----------|
| BFR750L3RH | R8 | 1=B | 2=C | 3=E | TSLP-3-9 |

¹Pb-containing package may be available upon special request

Maximum Ratings

| Parameter | Symbol | Value | Unit |
|--|------------------|-------------|------------------|
| Collector-emitter voltage $T_A > 0^\circ\text{C}$ $T_A \leq 0^\circ\text{C}$ | V_{CEO} | 4 3.5 | V |
| Collector-emitter voltage | V_{CES} | 13 | |
| Collector-base voltage | V_{CBO} | 13 | |
| Emitter-base voltage | V_{EBO} | 1.2 | |
| Collector current | I_{C} | 90 | mA |
| Base current | I_{B} | 9 | |
| Total power dissipation ¹⁾ $T_{\text{S}} \leq 96^\circ\text{C}$ | P_{tot} | 360 | mW |
| Junction temperature | T_{j} | 150 | $^\circ\text{C}$ |
| Ambient temperature | T_{A} | -65 ... 150 | |
| Storage temperature | T_{stg} | -65 ... 150 | |

Thermal Resistance

| Parameter | Symbol | Value | Unit |
|--|-------------------|------------|------|
| Junction - soldering point ²⁾ | R_{thJS} | ≤ 150 | K/W |

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

| Parameter | Symbol | Values | | | Unit |
|-----------|--------|--------|------|------|------|
| | | min. | typ. | max. | |

DC Characteristics

| | | | | | |
|--|-----------------------------|-----|-----|-----|---------------|
| Collector-emitter breakdown voltage $I_{\text{C}} = 3 \text{ mA}$, $I_{\text{B}} = 0$ | $V_{(\text{BR})\text{CEO}}$ | 4 | 4.7 | - | V |
| Collector-emitter cutoff current $V_{\text{CE}} = 13 \text{ V}$, $V_{\text{BE}} = 0$ | I_{CES} | - | - | 100 | μA |
| Collector-base cutoff current $V_{\text{CB}} = 5 \text{ V}$, $I_{\text{E}} = 0$ | I_{CBO} | - | - | 100 | nA |
| Emitter-base cutoff current $V_{\text{EB}} = 0.5 \text{ V}$, $I_{\text{C}} = 0$ | I_{EBO} | - | - | 10 | μA |
| DC current gain $I_{\text{C}} = 60 \text{ mA}$, $V_{\text{CE}} = 3 \text{ V}$, pulse measured | h_{FE} | 160 | 250 | 400 | - |

¹ T_{S} is measured on the collector lead at the soldering point to the pcb

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

 R_{thJS} demanded by P_{tot} and T_{S} , to be fulfilled by design

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

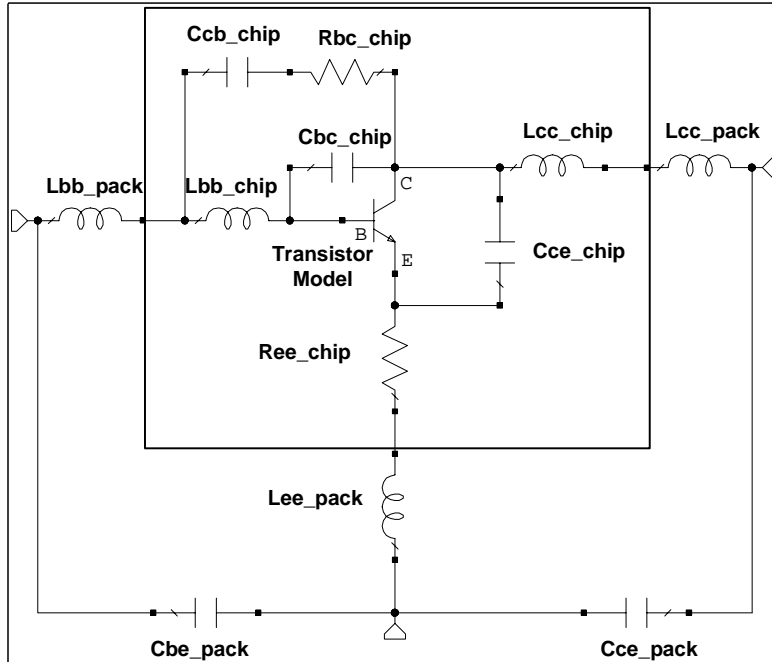
| Parameter | Symbol | Values | | | Unit |
|---|---------------|--------|------------|------|------|
| | | min. | typ. | max. | |
| AC Characteristics (verified by random sampling) | | | | | |
| Transition frequency $I_C = 60\text{ mA}$, $V_{CE} = 3\text{ V}$, $f = 2\text{ GHz}$ | f_T | - | 37 | - | GHz |
| Collector-base capacitance $V_{CB} = 3\text{ V}$, $f = 1\text{ MHz}$, emitter grounded | C_{cb} | - | 0.24 | 0.42 | pF |
| Collector emitter capacitance $V_{CE} = 3\text{ V}$, $f = 1\text{ MHz}$, base grounded | C_{ce} | - | 0.31 | - | |
| Emitter-base capacitance $V_{EB} = 0.5\text{ V}$, $f = 1\text{ MHz}$, collector grounded | C_{eb} | - | 0.97 | - | |
| Noise figure $I_C = 25\text{ mA}$, $V_{CE} = 3\text{ V}$, $f = 1.8\text{ GHz}$, $Z_S = Z_{Sopt}$ $I_C = 25\text{ mA}$, $V_{CE} = 3\text{ V}$, $f = 6\text{ GHz}$, $Z_S = Z_{Sopt}$ | F | - | 0.6 1.1 | - | dB |
| Power gain, maximum stable ¹⁾ $I_C = 60\text{ mA}$, $V_{CE} = 3\text{ V}$, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$, $f = 1.8\text{ GHz}$ | G_{ms} | - | 21 | - | dB |
| Power gain, maximum available ¹⁾ $I_C = 60\text{ mA}$, $V_{CE} = 3\text{ V}$, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$, $f = 6\text{ GHz}$ | G_{ma} | - | 11.5 | - | dB |
| Transducer gain $I_C = 60\text{ mA}$, $V_{CE} = 3\text{ V}$, $Z_S = Z_L = 50\ \Omega$, $f = 1.8\text{ GHz}$ $I_C = 60\text{ mA}$, $V_{CE} = 3\text{ V}$, $Z_S = Z_L = 50\ \Omega$, $f = 6\text{ GHz}$ | $ S_{21e} ^2$ | - | 18 8 | - | dB |
| Third order intercept point at output ²⁾ $V_{CE} = 3\text{ V}$, $I_C = 60\text{ mA}$, $f = 1.8\text{ GHz}$, $Z_S = Z_L = 50\ \Omega$ | IP_3 | - | 29.5 | - | dBm |
| 1dB Compression point at output $I_C = 60\text{ mA}$, $V_{CE} = 3\text{ V}$, $Z_S = Z_L = 50\ \Omega$, $f = 1.8\text{ GHz}$ | P_{-1dB} | - | 16.5 | - | |

¹⁾ $G_{ma} = |S_{21e} / S_{12e}| (k - (k^2 - 1)^{1/2})$, $G_{ms} = |S_{21e} / S_{12e}|$
²⁾ IP_3 value depends on termination of all intermodulation frequency components.
Termination used for this measurement is $50\ \Omega$ from 0.1 MHz to 6 GHz

SPICE Parameter (Gummel-Poon Model, Berkley-SPICE 2G.6 Syntax):
Transistor Chip Data:

| | | | | | | | | |
|-------|-----------|----------|-------|-------|------------|--------|-----------|--------------------|
| IS = | 2.66 e-12 | mA | BF = | 753 | - | NF = | 1.015 | - |
| VAF = | 95 | V | IKF = | 292 | mA | ISE = | 1.54 e-11 | mA |
| NE = | 1.8 | - | BR = | 76 | - | NR = | 1 | - |
| VAR = | 1.33 | V | IKR = | 1.33 | mA | ISC = | 1 e-27 | mA |
| NC = | 2 | - | RB = | 1 | Ω | IRB = | 1 e15 | A |
| RBM = | 0.9 | Ω | RE = | 20 | m Ω | RC = | 0.9 | Ω |
| CJE = | 0.475 | pF | VJE = | 0.69 | V | MJE = | 0.085 | - |
| TF = | 0.0021 | ns | XTF = | 3 | - | VTF = | 2.1 | V |
| ITF = | 2540 | mA | PTF = | 0.5 | - | CJC = | 0.173 | pF |
| VJC = | 0.45 | V | MJC = | 0.31 | - | XCJC = | 0.01 | - |
| TR = | 1.2 | ns | CJS = | 0.325 | pF | VJS = | 0.65 | V |
| MJS = | 0.25 | - | XTB = | -2.2 | - | EG = | 1.11 | - |
| XTI = | 0.436 | - | FC = | 0.5 | - | TNOM | 25 | $^{\circ}\text{C}$ |
| AF = | 1 | - | KF = | 0 | - | | | |

All parameters are ready to use, no scaling is necessary.

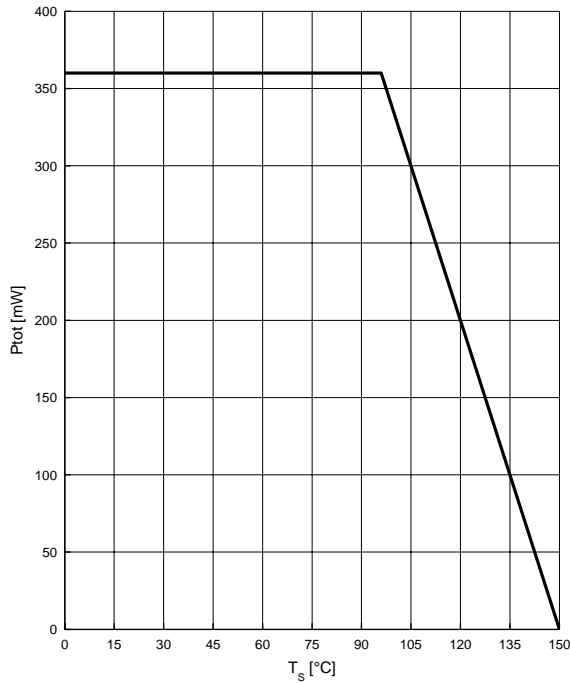
Package Equivalent Circuit:


| | | | |
|----------------|---|---------|----------|
| L_{bb_chip} | = | 0.212 | nA |
| L_{cc_chip} | = | 0.07472 | nH |
| L_{bb_pack} | = | 0.0184 | nH |
| L_{cc_pack} | = | 0.277 | nH |
| L_{ee_pack} | = | 0.239 | nH |
| C_{bc_chip} | = | 0.015 | pF |
| C_{cb_chip} | = | 0.013 | pF |
| C_{ce_chip} | = | 0.282 | pF |
| C_{be_pack} | = | 0.064 | pF |
| C_{ce_pack} | = | 0.0492 | pF |
| R_{bc_chip} | = | 7 | Ω |
| R_{ee_chip} | = | 0.566 | Ω |

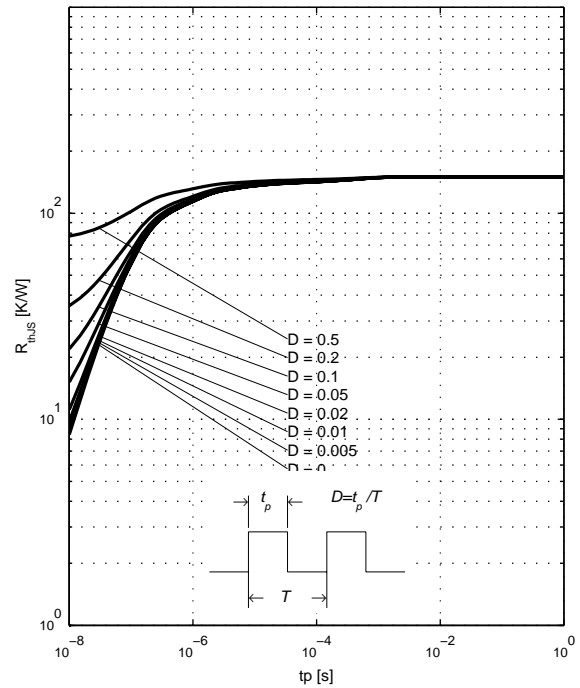
Valid up to 6GHz

For examples and ready to use parameters please contact your local Infineon Technologies distributor or sales office to obtain a Infineon Technologies CD-ROM or see Internet: <http://www.infineon.com>

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

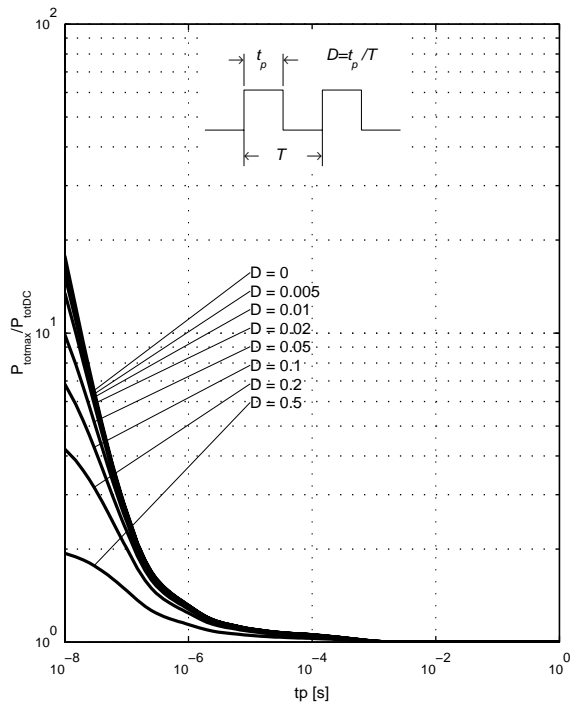


Permissible Puls Load $R_{thJS} = f(t_p)$



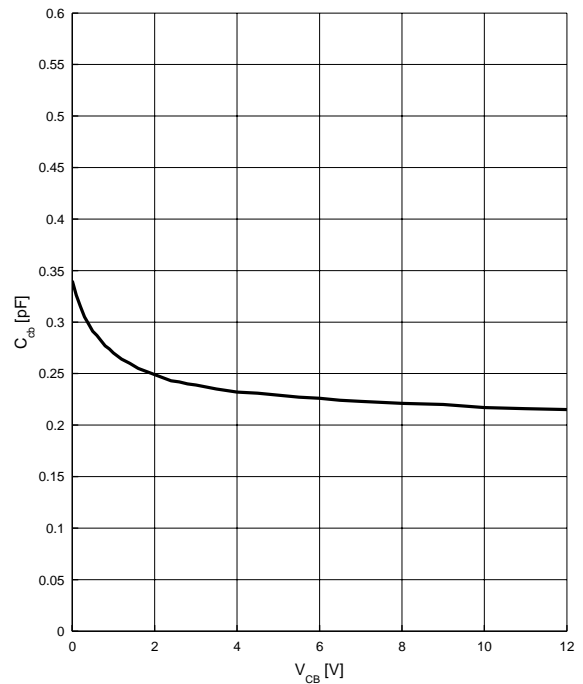
Permissible Pulse Load

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



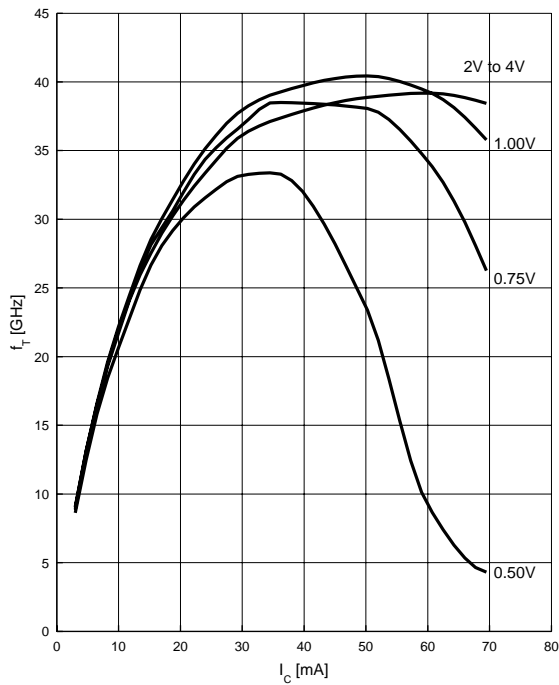
Collector-base capacitance $C_{cb} = f(V_{CB})$

$f = 1$ MHz



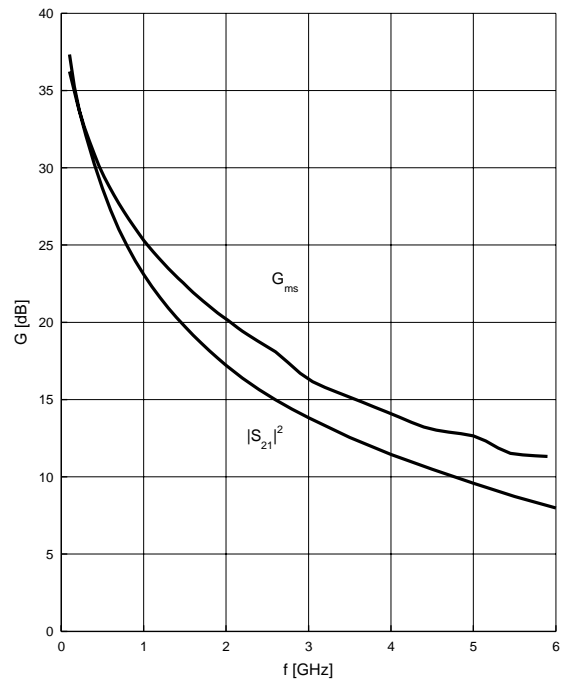
Transition frequency $f_T = f(I_C)$

$V_{CE} = \text{parameter}, f = 1 \text{ GHz}$



Power gain $G_{ma}, G_{ms} = f(f)$

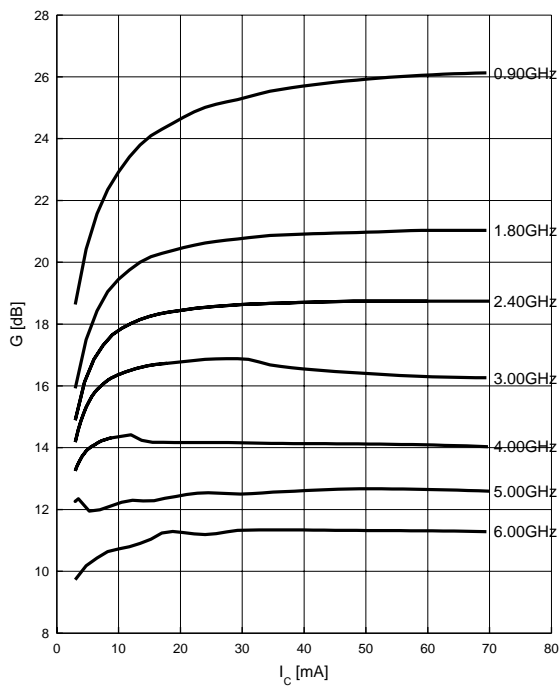
$V_{CE} = 3 \text{ V}, I_C = 60 \text{ mA}$



Power gain $G_{ma}, G_{ms} = f(I_C)$

$V_{CE} = 3 \text{ V}$

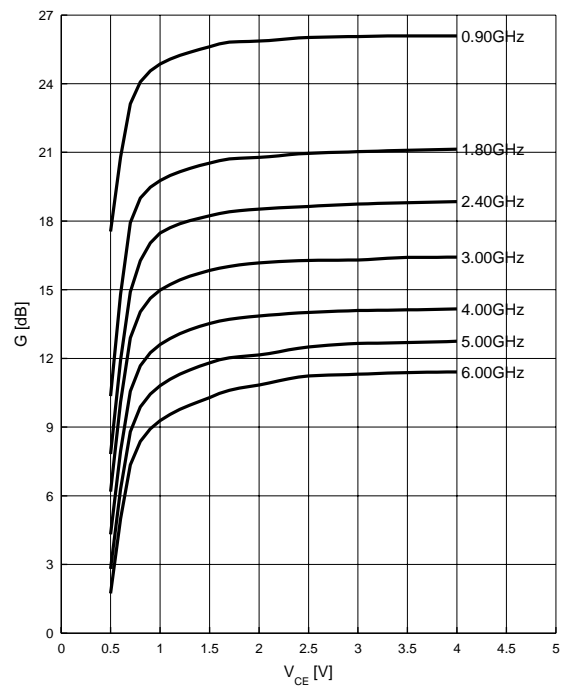
$f = \text{parameter}$



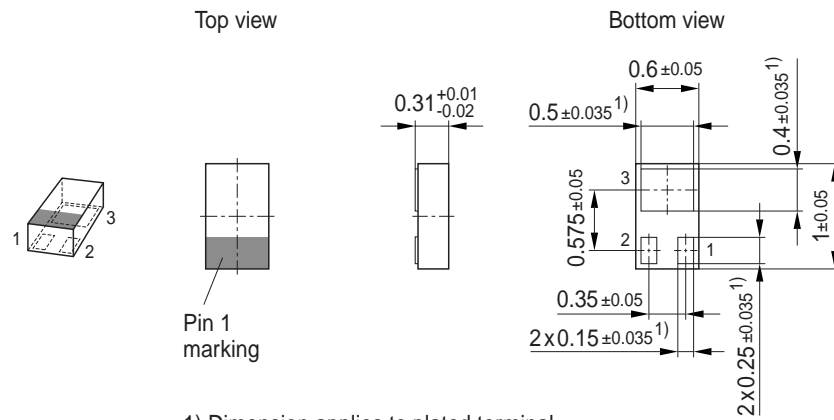
Power gain $G_{ma}, G_{ms} = f(V_{CE})$

$I_C = 60 \text{ mA}$

$f = \text{parameter}$



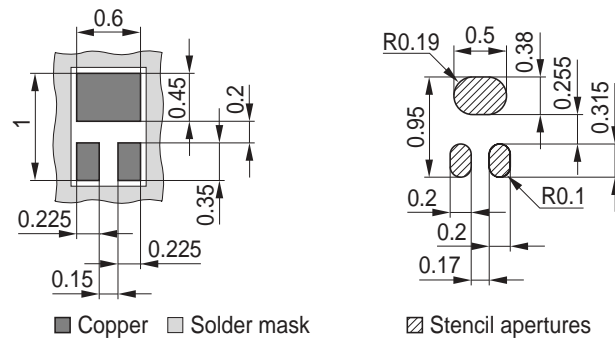
Package Outline



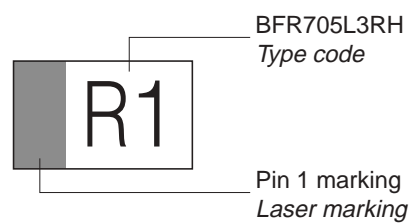
1) Dimension applies to plated terminal

Foot Print

For board assembly information please refer to Infineon website "Packages"

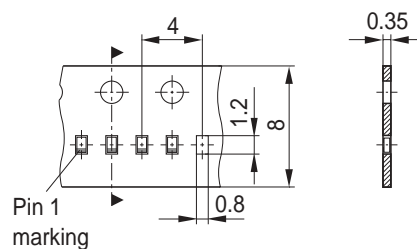


Marking Layout (Example)



Standard Packing

Reel ø180 mm = 15.000 Pieces/Reel



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