

TO-252-2L Plastic-Encapsulate Transistors

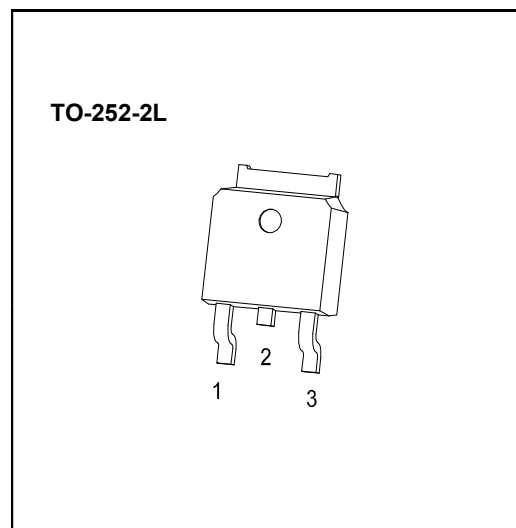
TRANSISTOR (NPN)

Features:

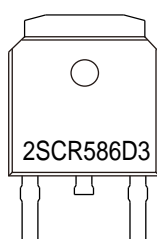
- 1) Suitable for Power Driver.
- 2) Complementary PNP Types : 2SAR586D3.
- 3) Low $V_{CE(sat)}$
 $V_{CE(sat)}=300\text{mV(Max.)}$
 $(I_C/I_B=2\text{A}/100\text{mA})$

Application:

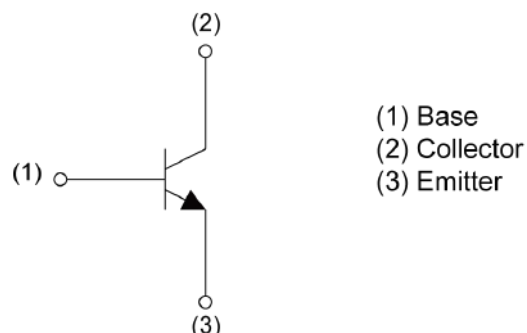
LOW FREQUENCY AMPLIFIER



Packaging specifications



Inner circuit



MAXIMUM RATINGS ($T_a=25^\circ\text{C}$ unless otherwise note)

| Symbol | Parameter | Value | Unit |
|-----------|-------------------------------|-------------|------------------|
| V_{CBO} | Collector-Base Voltage | 80 | V |
| V_{CEO} | Collector-Emitter Voltage | 80 | V |
| V_{EBO} | Emitter-Base Voltage | 6 | V |
| I_C | Collector Current -Continuous | 5 | A |
| P_C | Collector Power Dissipation | 10 | W |
| T_J | Junction Temperature | 150 | $^\circ\text{C}$ |
| T_{stg} | Storage Temperature | -55 to +150 | $^\circ\text{C}$ |

● Absolute maximum ratings ($T_a = 25^\circ\text{C}$)

| Parameter | Symbol | Values | Unit |
|------------------------------|---------------|-------------|------------------|
| Collector-base voltage | V_{CBO} | 80 | V |
| Collector-emitter voltage | V_{CEO} | 80 | V |
| Emitter-base voltage | V_{EBO} | 6 | V |
| Collector current | I_C | 5 | A |
| | I_{CP}^{*1} | 10 | A |
| Power dissipation | P_D^{*2} | 10 | W |
| Junction temperature | T_j | 150 | $^\circ\text{C}$ |
| Range of storage temperature | T_{stg} | -55 to +150 | $^\circ\text{C}$ |

● Electrical characteristics ($T_a = 25^\circ\text{C}$)

| Parameter | Symbol | Conditions | Values | | | Unit |
|--------------------------------------|--------------------|--|--------|------|------|---------------|
| | | | Min. | Typ. | Max. | |
| Collector-base breakdown voltage | BV_{CBO} | $I_C = 100\mu\text{A}$ | 80 | - | - | V |
| Collector-emitter breakdown voltage | BV_{CEO} | $I_C = 1\text{mA}$ | 80 | - | - | V |
| Emitter-base breakdown voltage | BV_{EBO} | $I_E = 100\mu\text{A}$ | 6 | - | - | V |
| Collector cut-off current | I_{CBO} | $V_{CB} = 80\text{V}$ | - | - | 1 | μA |
| Emitter cut-off current | I_{EBO} | $V_{EB} = 4\text{V}$ | - | - | 1 | μA |
| Collector-emitter saturation voltage | $V_{CE(sat)}^{*3}$ | $I_C = 2\text{A}, I_B = 100\text{mA}$ | - | 100 | 300 | mV |
| DC current gain | h_{FE}^{*3} | $V_{CE} = 3\text{V}, I_C = 500\text{mA}$ | 120 | - | 390 | - |
| Transition frequency | f_T^{*3} | $V_{CE} = 10\text{V}, I_E = -500\text{mA}, f = 100\text{MHz}$ | - | 200 | - | MHz |
| Output capacitance | C_{ob} | $V_{CB} = 10\text{V}, I_E = 0\text{A}, f = 1\text{MHz}$ | - | 50 | - | pF |
| Turn-On time | t_{on} | $I_C = 2.5\text{A}, I_{B1} = 250\text{mA}$ | - | 45 | - | ns |
| Storage time | t_{stg} | $I_{B2} = -250\text{mA}, V_{CC} \approx 10\text{V}, R_L = 3.9\Omega$ | - | 700 | - | ns |
| Fall time | t_f | See test circuit | - | 180 | - | ns |

*1 $P_w=10\text{ms}$ Single Pulse

*2 $T_c=25^\circ\text{C}$

*3 Pulsed

Typical Characteristics

- Electrical characteristic curves ($T_a = 25^\circ\text{C}$)

Fig.1 Grounded Emitter Propagation Characteristics

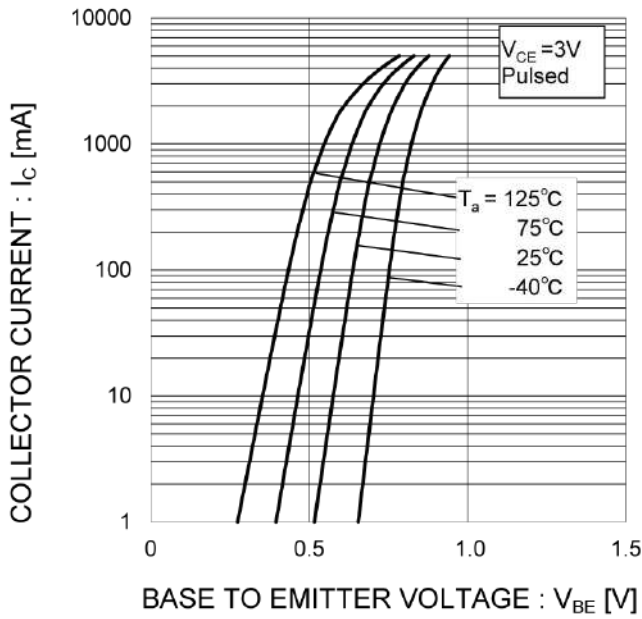


Fig.2 Typical Output Characteristics

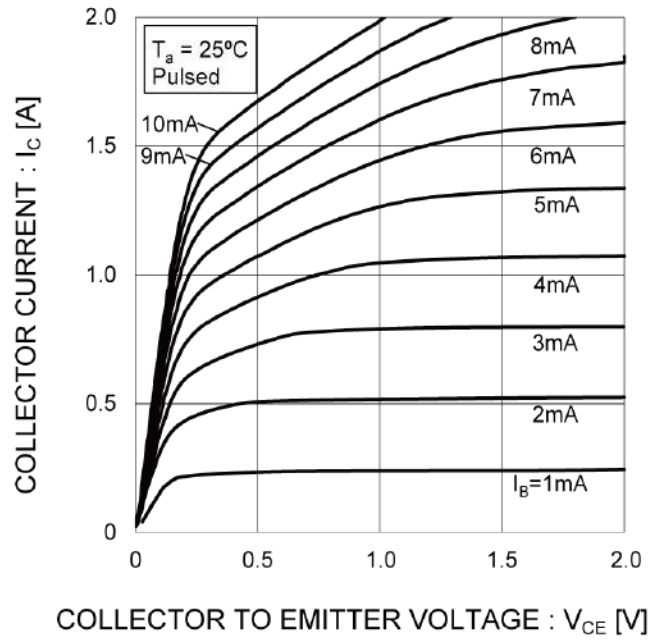


Fig.3 DC Current Gain vs. Collector Current(I)

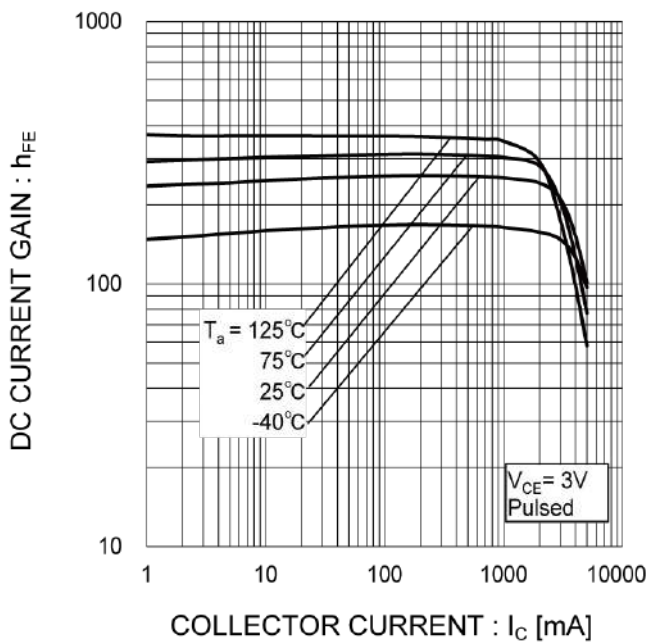
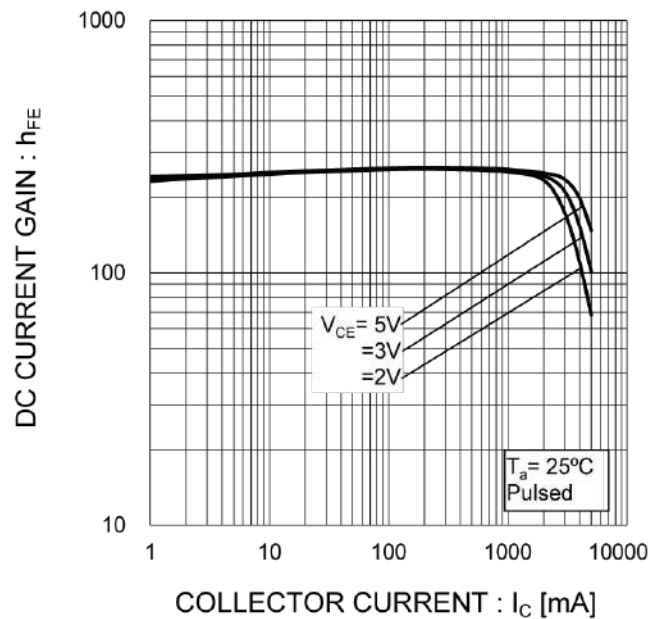


Fig.4 DC Current Gain vs. Collector Current(II)



Typical Characteristics

●Electrical characteristic curves($T_a = 25^\circ\text{C}$)

Fig.5 Collector-Emitter Saturation Voltage vs. Collector Current(I)

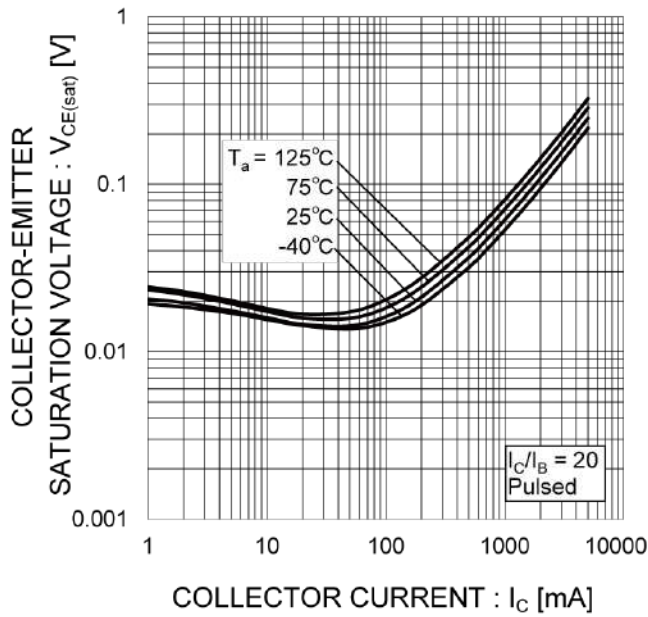


Fig.6 Collector-Emitter Saturation Voltage vs. Collector Current(II)

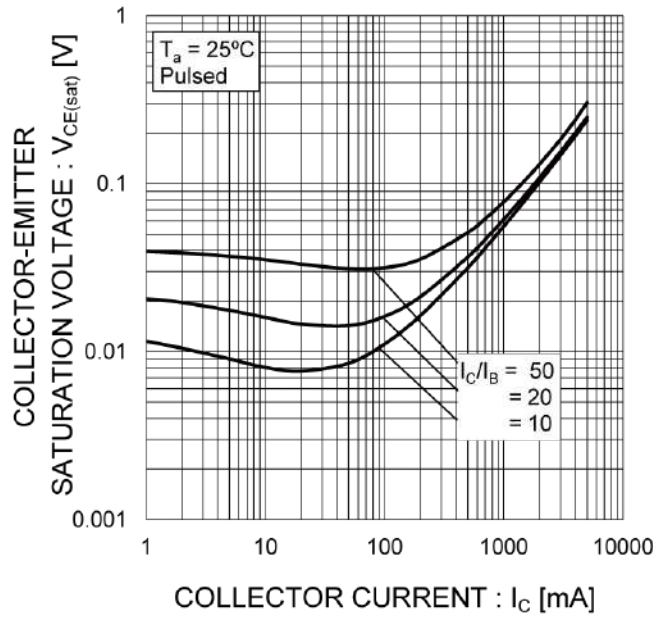


Fig.7 Base-Emitter Saturation Voltage vs. Collector Current

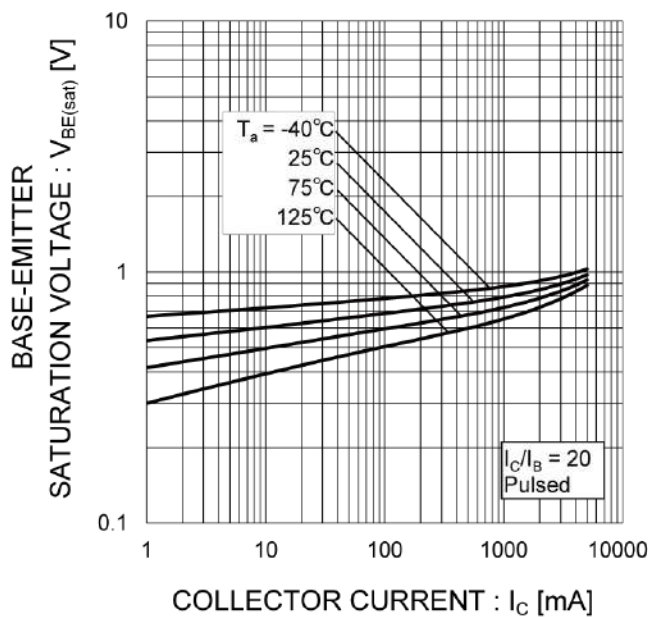
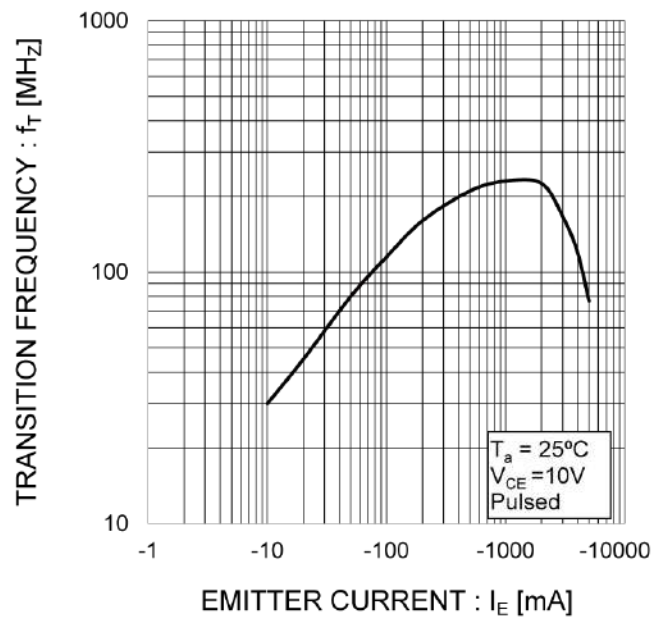


Fig.8 Gain Bandwidth Product vs. Emitter Current



Typical Characteristics

● **Electrical characteristic curves** ($T_a = 25^\circ\text{C}$)

Fig.9 Emitter input capacitance vs.
 Emitter-Base Voltage
 Collector output capacitance vs.
 Collector-Base Voltage

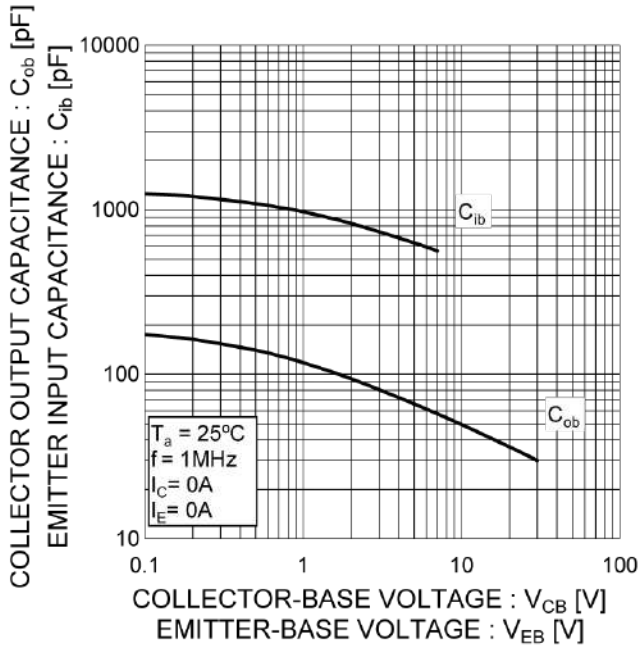
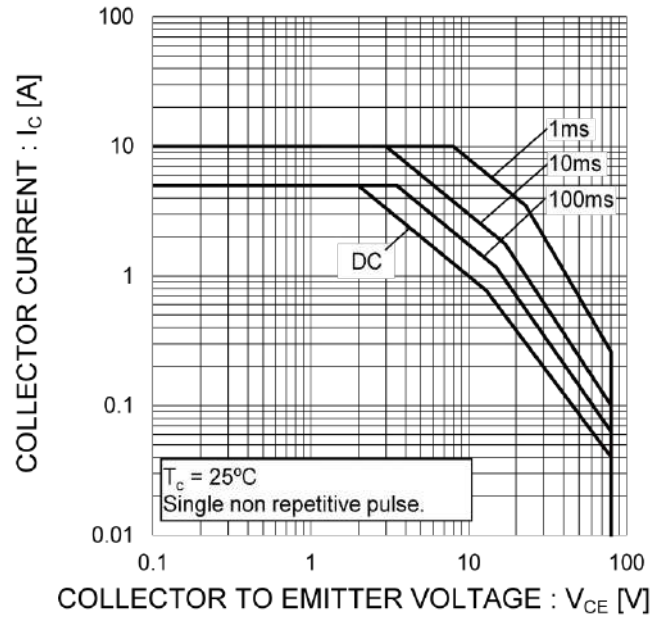
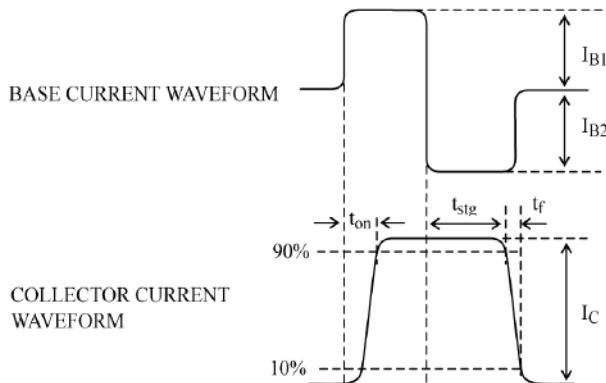
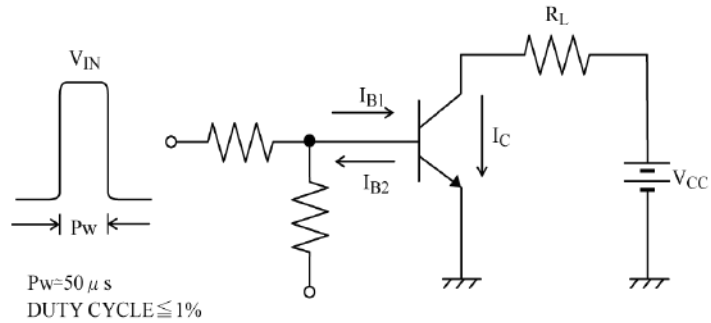


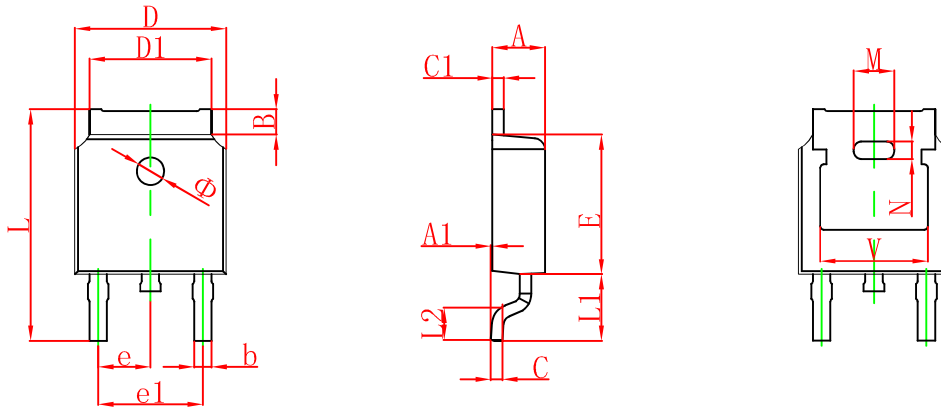
Fig.10 Safe Operating Area



SWITCHING TIME TEST CIRCUIT

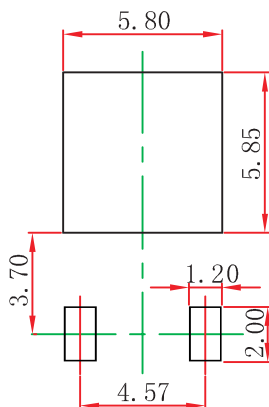


TO-252(4R)-2L Package Outline Dimensions



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|--------|----------------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 2.200 | 2.380 | 0.087 | 0.094 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| B | 0.800 | 1.400 | 0.031 | 0.055 |
| b | 0.710 | 0.810 | 0.028 | 0.032 |
| c | 0.460 | 0.560 | 0.018 | 0.022 |
| c1 | 0.460 | 0.560 | 0.018 | 0.022 |
| D | 6.500 | 6.700 | 0.256 | 0.264 |
| D1 | 5.130 | 5.460 | 0.202 | 0.215 |
| E | 6.000 | 6.200 | 0.236 | 0.244 |
| e | 2.286 TYP. | | 0.090 TYP. | |
| e1 | 4.327 | 4.727 | 0.170 | 0.186 |
| M | 1.778REF. | | 0.070REF. | |
| N | 0.762REF. | | 0.018REF. | |
| L | 9.800 | 10.400 | 0.386 | 0.409 |
| L1 | 2.9REF. | | 0.114REF. | |
| L2 | 1.400 | 1.700 | 0.055 | 0.067 |
| V | 4.830 REF. | | 0.190 REF. | |
| Φ | 1.100 | 1.300 | 0.043 | 0.051 |

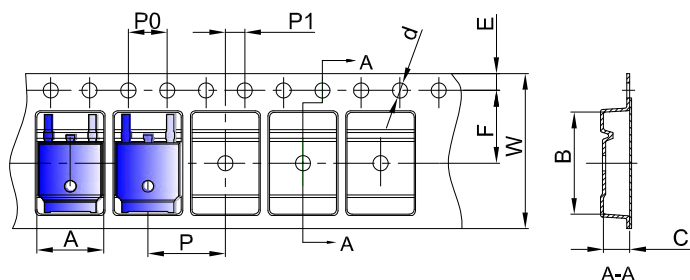
TO-252(4R)-2L Suggested Pad Layout



- Note:
1. Controlling dimension: in millimeters.
 2. General tolerance: $\pm 0.05\text{mm}$.
 3. The pad layout is for reference purposes only.

To-252(4R)-2L Tape and Reel

TO-252 Embossed Carrier Tape

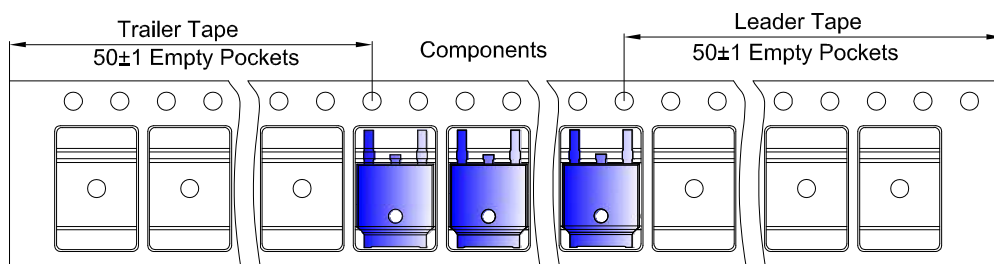


Packaging Description:

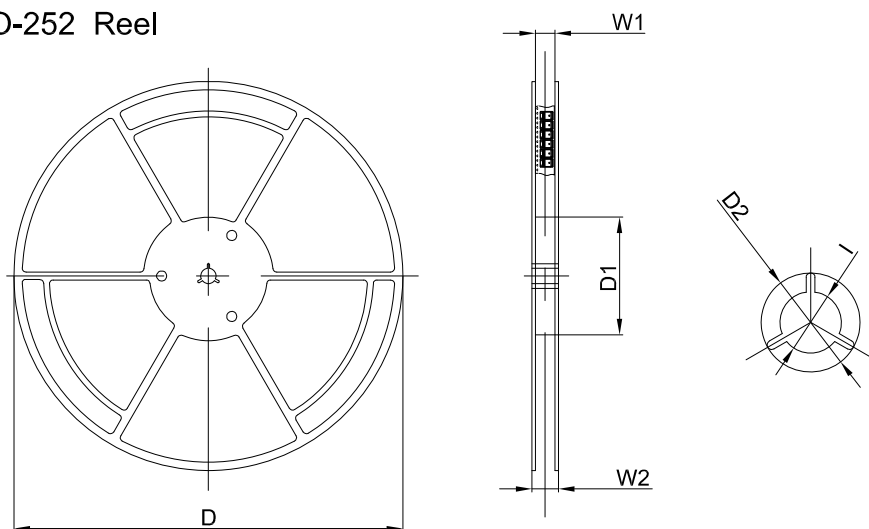
TO-252 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 25,00 units per 13" or 33.0 cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).

| Dimensions are in millimeter | | | | | | | | | | |
|------------------------------|------|-------|------|-------|------|------|------|------|------|-------|
| Pkg type | A | B | C | d | E | F | P0 | P | P1 | W |
| TO-252 | 6,90 | 10,50 | 2,70 | Ø1,55 | 1,75 | 7,50 | 4,00 | 8,00 | 2,00 | 16,00 |

TO-252 Tape Leader and Trailer



TO-252 Reel



| Dimensions are in millimeter | | | | | | |
|------------------------------|--------|--------|--------|-------|-------|--------|
| Reel Option | D | D1 | D2 | W1 | W2 | I |
| 13" Dia | 330.00 | 100.00 | Ø21.00 | 16.40 | 21.00 | Ø13.00 |

| REEL | Reel Size | Box | Box Size(mm) | Carton | Carton Size(mm) | G.W.(kg) |
|-----------|-----------|-----------|--------------|------------|-----------------|----------|
| 2,500 pcs | 13inch | 2,500 pcs | 340×336×29 | 25,000 pcs | 353×346×365 | |