

HN1B04FE

Audio Frequency General Purpose Amplifier Applications

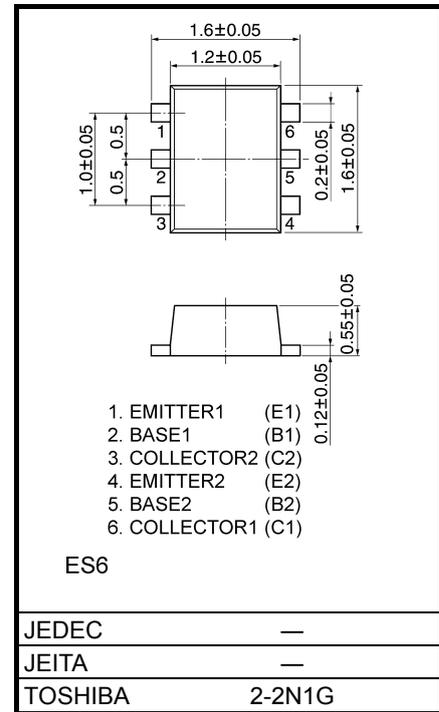
Unit: mm

Q1:

- High voltage and high current
: $V_{CEO} = 50V, I_C = 150mA$ (max)
- High h_{FE} : $h_{FE} = 120$ to 400
- Excellent h_{FE} linearity
: $h_{FE}(I_C = 0.1mA) / h_{FE}(I_C = 2mA) = 0.95$ (typ.)

Q2:

- High voltage and high current
: $V_{CEO} = -50V, I_C = -150mA$ (max)
- High h_{FE} : $h_{FE} = 120$ to 400
- Excellent h_{FE} linearity
: $h_{FE}(I_C = -0.1mA) / h_{FE}(I_C = -2mA) = 0.95$ (typ.)

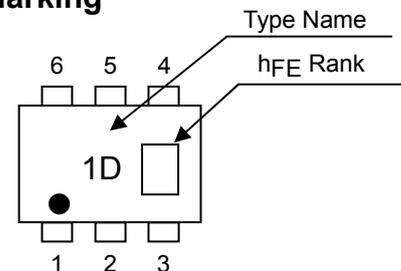


Weight: 3.0mg (typ.)

Q1 Absolute Maximum Ratings (Ta = 25°C)

| Characteristic | Symbol | Rating | Unit |
|---------------------------|-----------|--------|------|
| Collector-base voltage | V_{CBO} | 60 | V |
| Collector-emitter voltage | V_{CEO} | 50 | V |
| Emitter-base voltage | V_{EBO} | 5 | V |
| Collector current | I_C | 150 | mA |
| Base current | I_B | 30 | mA |

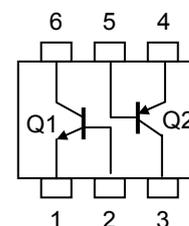
Marking



Q2 Absolute Maximum Ratings (Ta = 25°C)

| Characteristic | Symbol | Rating | Unit |
|---------------------------|-----------|--------|------|
| Collector-base voltage | V_{CBO} | -50 | V |
| Collector-emitter voltage | V_{CEO} | -50 | V |
| Emitter-base voltage | V_{EBO} | -5 | V |
| Collector current | I_C | -150 | mA |
| Base current | I_B | -30 | mA |

Equivalent Circuit (Top View)



Q1, Q2 Common Absolute Maximum Ratings (Ta = 25°C)

| Characteristic | Symbol | Rating | Unit |
|-----------------------------|-----------|------------|------|
| Collector power dissipation | P_C^* | 100 | mW |
| Junction temperature | T_j | 150 | °C |
| Storage temperature range | T_{stg} | -55 to 150 | °C |

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

* Total rating

Start of commercial production
2000-05

Q1 Electrical Characteristics (Ta = 25°C)

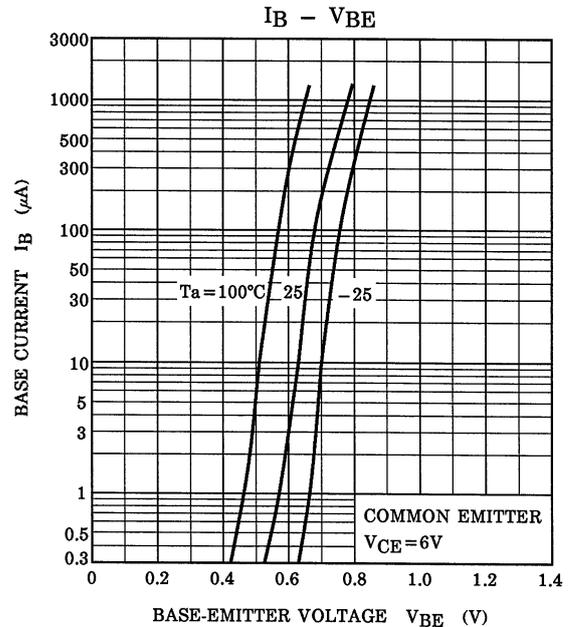
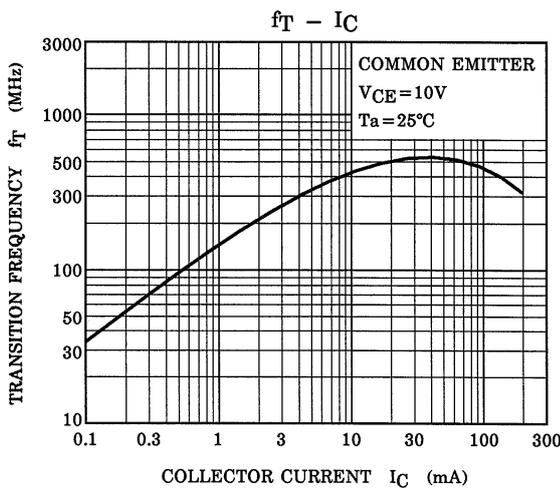
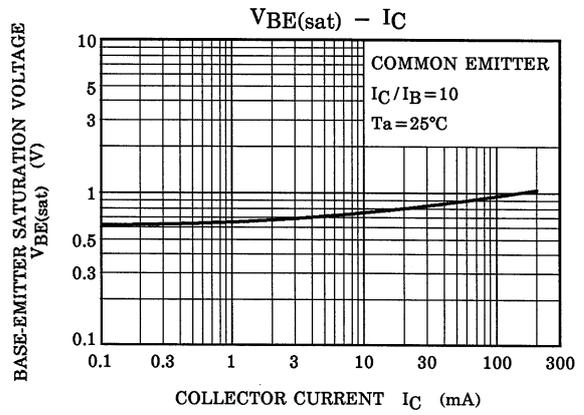
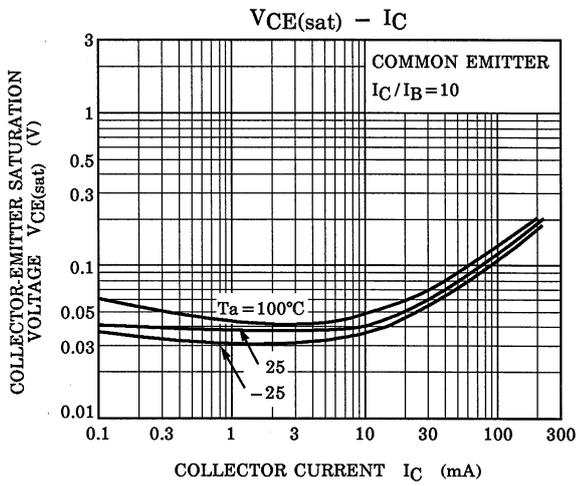
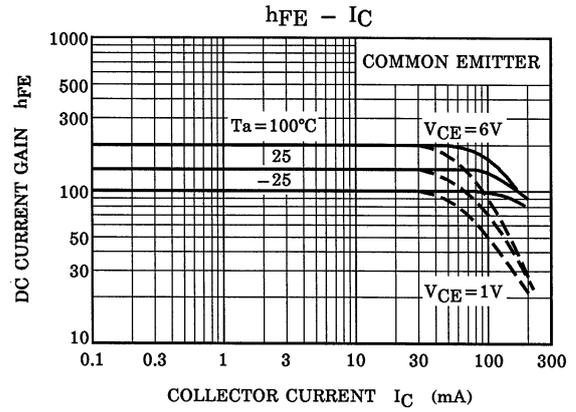
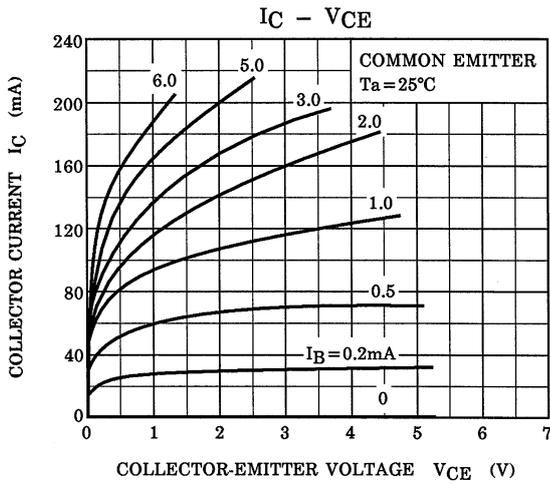
| Characteristic | Symbol | Test Circuit | Test Condition | Min | Typ. | Max | Unit |
|--------------------------------------|-----------------|--------------|-----------------------------------|-----|------|------|---------|
| Collector cut-off current | I_{CBO} | — | $V_{CB} = 60V, I_E = 0$ | — | — | 0.1 | μA |
| Emitter cut-off current | I_{EBO} | — | $V_{EB} = 5V, I_C = 0$ | — | — | 0.1 | μA |
| DC current gain | h_{FE} (Note) | — | $V_{CE} = 6V, I_C = 2mA$ | 120 | — | 400 | |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | — | $I_C = 100mA, I_B = 10mA$ | — | 0.1 | 0.25 | V |
| Transition frequency | f_T | — | $V_{CE} = 10V, I_C = 1mA$ | 80 | — | — | MHz |
| Collector output capacitance | C_{ob} | — | $V_{CB} = 10V, I_E = 0, f = 1MHz$ | — | 2 | — | pF |

Q2 Electrical Characteristics (Ta = 25°C)

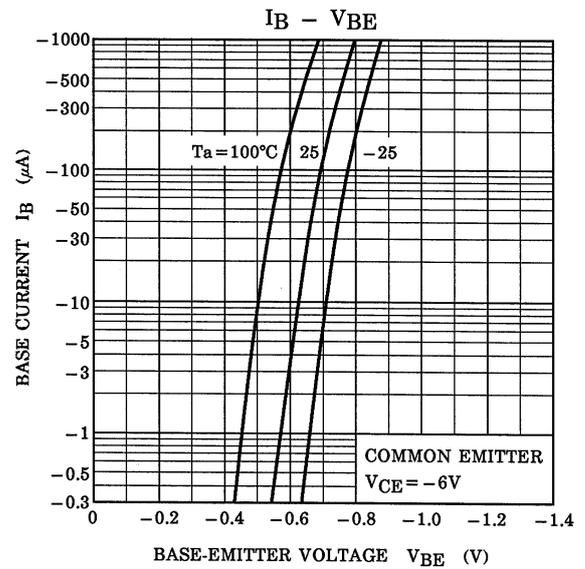
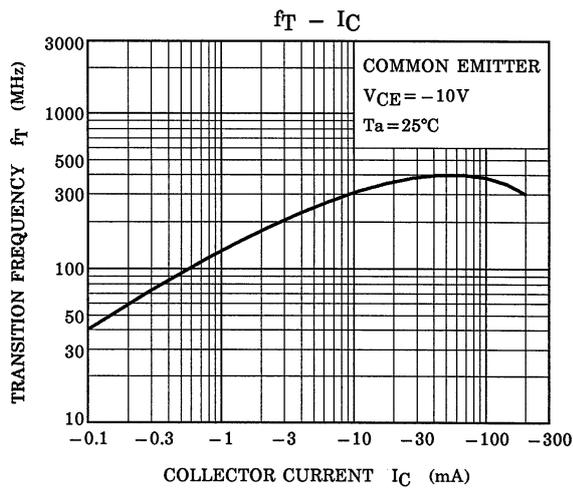
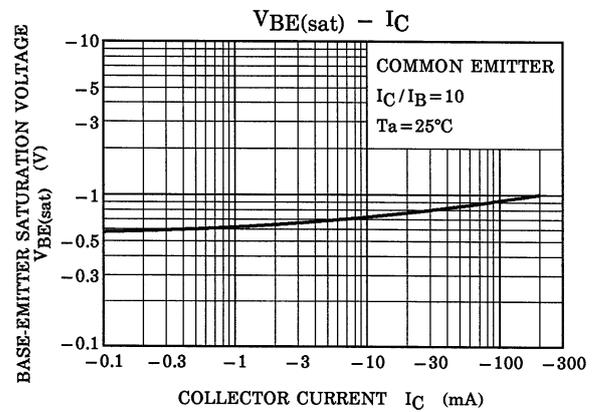
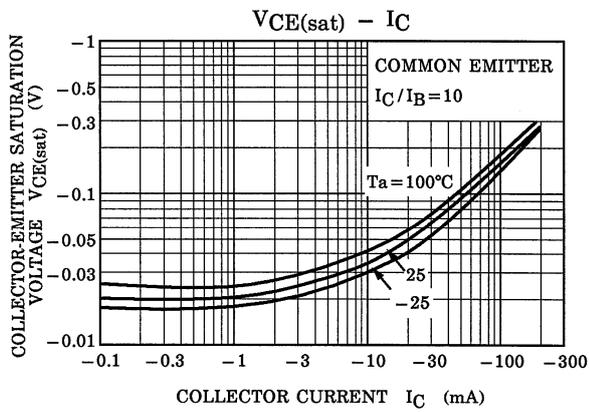
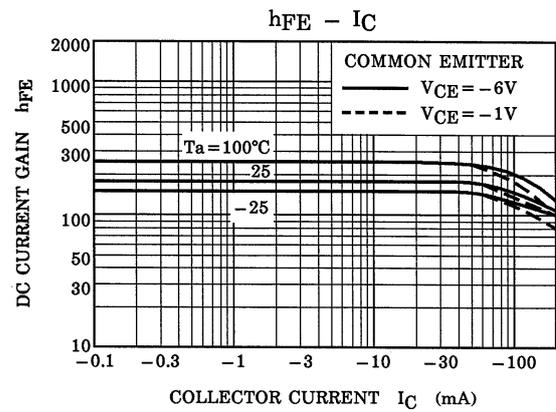
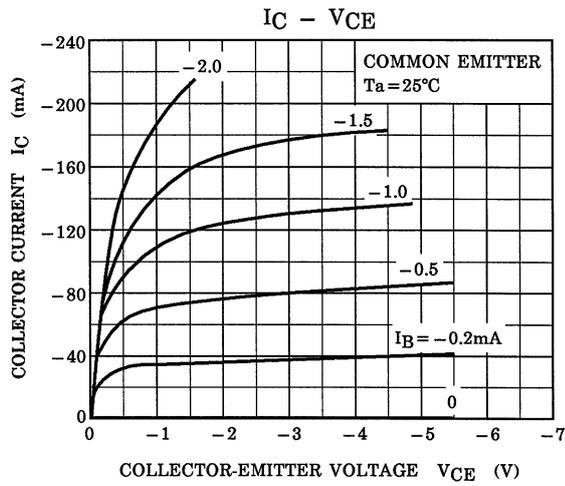
| Characteristic | Symbol | Test Circuit | Test Condition | Min | Typ. | Max | Unit |
|--------------------------------------|-----------------|--------------|------------------------------------|-----|------|------|---------|
| Collector cut-off current | I_{CBO} | — | $V_{CB} = -50V, I_E = 0$ | — | — | -0.1 | μA |
| Emitter cut-off current | I_{EBO} | — | $V_{EB} = -5V, I_C = 0$ | — | — | -0.1 | μA |
| DC current gain | h_{FE} (Note) | — | $V_{CE} = -6V, I_C = -2mA$ | 120 | — | 400 | |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | — | $I_C = -100mA, I_B = -10mA$ | — | -0.1 | -0.3 | V |
| Transition frequency | f_T | — | $V_{CE} = -10V, I_C = -1mA$ | 80 | — | — | MHz |
| Collector output capacitance | C_{ob} | — | $V_{CB} = -10V, I_E = 0, f = 1MHz$ | — | 4 | — | pF |

Note: h_{FE} Classification Y (Y): 120 to 240, GR (G): 200 to 400
 () Marking Symbol

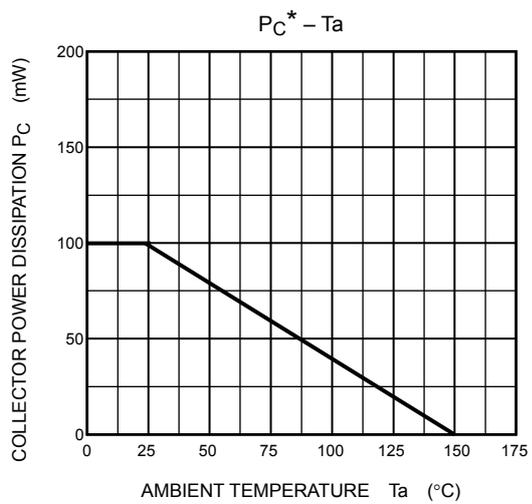
Q1 (NPN transistor)



Q2 (PNP transistor)



(Q1, Q2 Common)



*:Total Rating

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