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TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT process)

# 2SC2713

## Audio Frequency General Purpose Amplifier Applications

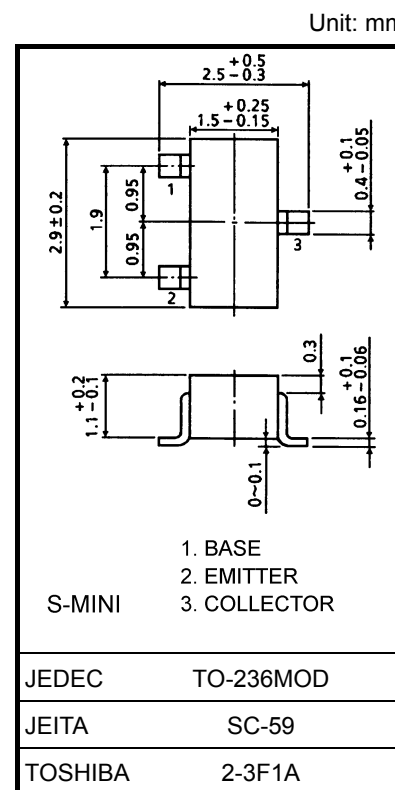
- High voltage:  $V_{CEO} = 120\text{ V}$
- Excellent  $h_{FE}$  linearity:  $h_{FE} (I_C = 0.1\text{ mA})/h_{FE} (I_C = 2\text{ mA}) = 0.95$  (typ.)
- High  $h_{FE}$ :  $h_{FE} = 200$  to  $700$
- Low noise:  $NF = 1\text{ dB}$  (typ.),  $10\text{ dB}$  (max)
- Complementary to 2SA1163
- Small package

## Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

| Characteristics             | Symbol    | Rating     | Unit             |
|-----------------------------|-----------|------------|------------------|
| Collector-base voltage      | $V_{CBO}$ | 120        | V                |
| Collector-emitter voltage   | $V_{CEO}$ | 120        | V                |
| Emitter-base voltage        | $V_{EBO}$ | 5          | V                |
| Collector current           | $I_C$     | 100        | mA               |
| Base current                | $I_B$     | 20         | mA               |
| Collector power dissipation | $P_C$     | 150        | mW               |
| Junction temperature        | $T_j$     | 125        | $^\circ\text{C}$ |
| Storage temperature range   | $T_{stg}$ | -55 to 125 | $^\circ\text{C}$ |

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).



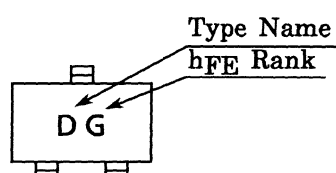
Weight: 0.012 g (typ.)

## Electrical Characteristics ( $T_a = 25^\circ\text{C}$ )

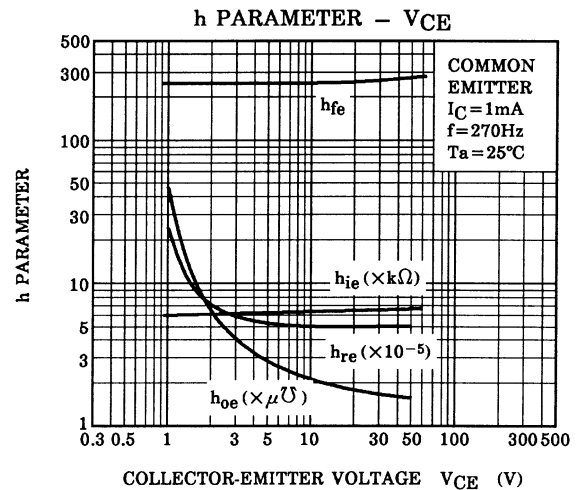
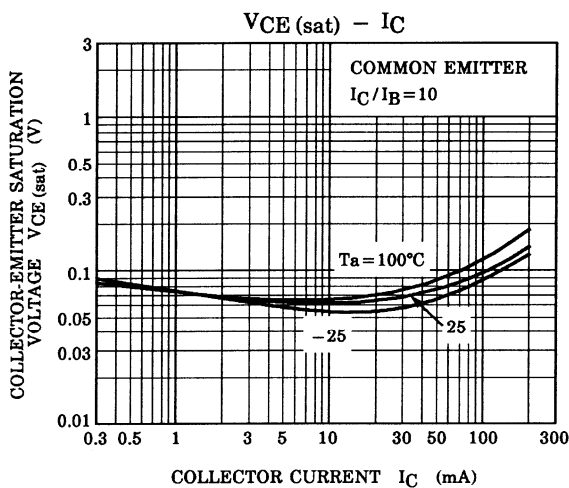
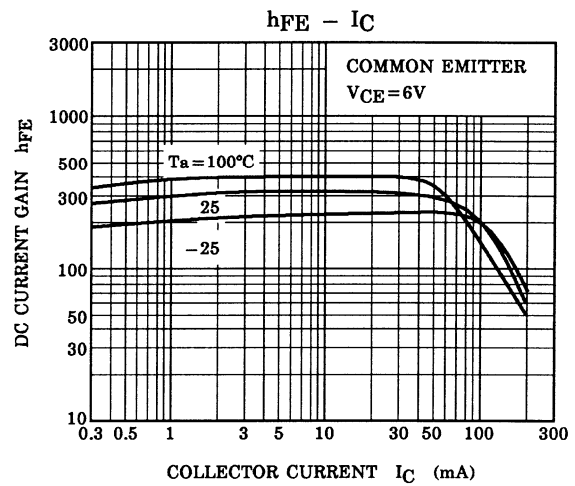
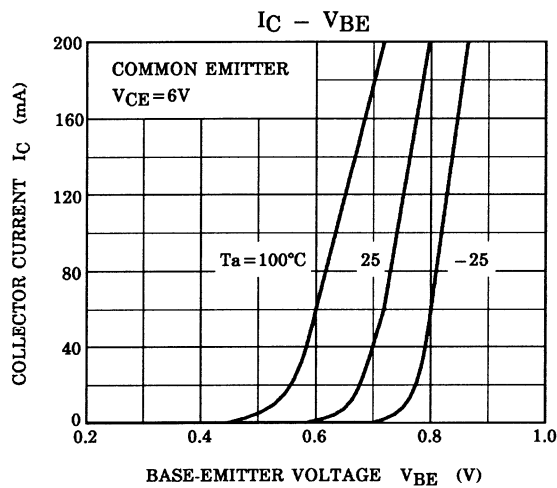
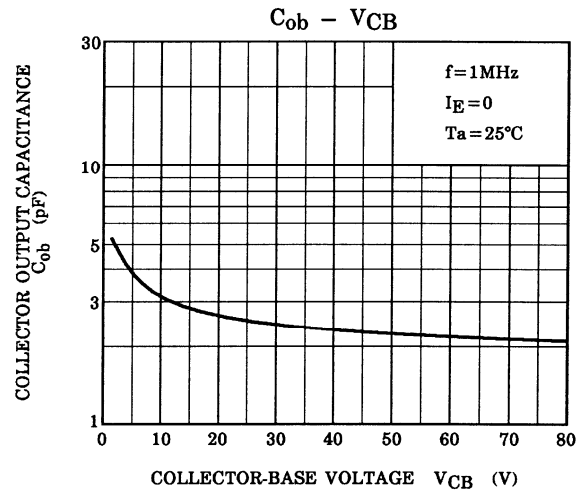
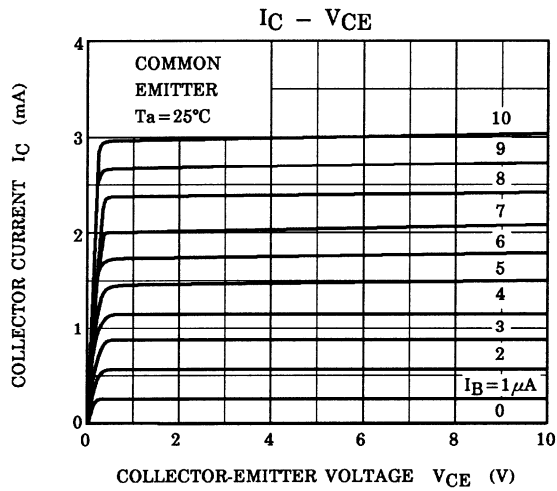
| Characteristics                      | Symbol             | Test Condition                                                                            | Min | Typ. | Max | Unit          |
|--------------------------------------|--------------------|-------------------------------------------------------------------------------------------|-----|------|-----|---------------|
| Collector cut-off current            | $I_{CBO}$          | $V_{CB} = 120\text{ V}, I_E = 0$                                                          | —   | —    | 0.1 | $\mu\text{A}$ |
| Emitter cut-off current              | $I_{EBO}$          | $V_{EB} = 5\text{ V}, I_C = 0$                                                            | —   | —    | 0.1 | $\mu\text{A}$ |
| DC current gain                      | $h_{FE}$<br>(Note) | $V_{CE} = 6\text{ V}, I_C = 2\text{ mA}$                                                  | 200 | —    | 700 |               |
| Collector-emitter saturation voltage | $V_{CE(sat)}$      | $I_C = 10\text{ mA}, I_B = 1\text{ mA}$                                                   | —   | —    | 0.3 | V             |
| Transition frequency                 | $f_T$              | $V_{CE} = 6\text{ V}, I_C = 1\text{ mA}$                                                  | —   | 100  | —   | MHz           |
| Collector output capacitance         | $C_{ob}$           | $V_{CB} = 10\text{ V}, I_E = 0, f = 1\text{ MHz}$                                         | —   | 3.0  | —   | pF            |
| Noise figure                         | NF                 | $V_{CE} = 6\text{ V}, I_C = 0.1\text{ mA}$<br>$f = 1\text{ kHz}, R_G = 10\text{ k}\Omega$ | —   | 1.0  | 10  | dB            |

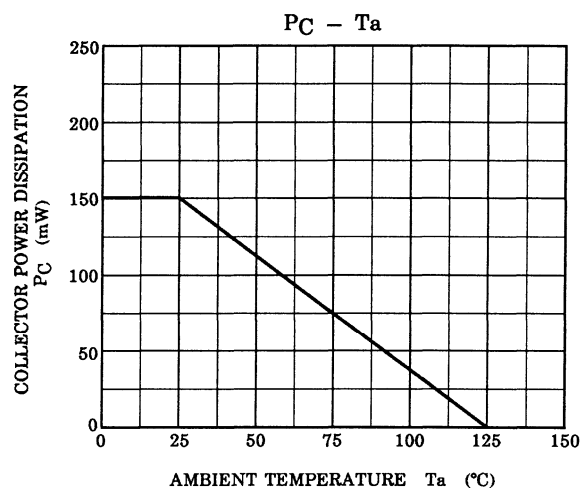
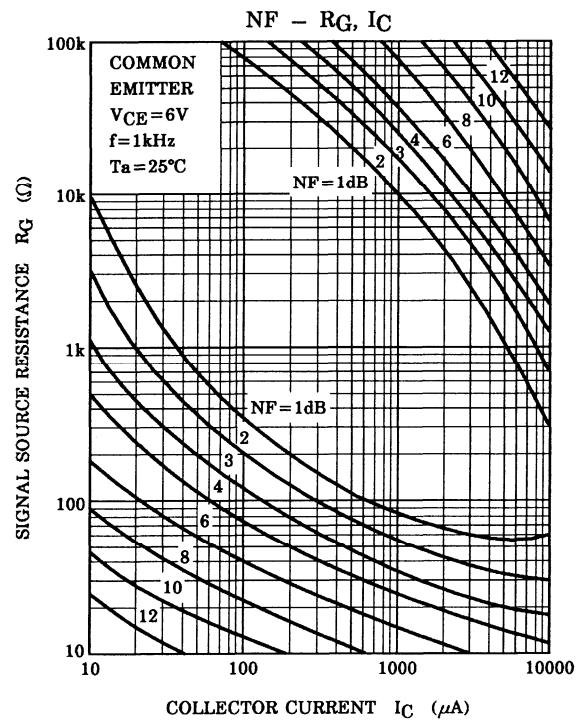
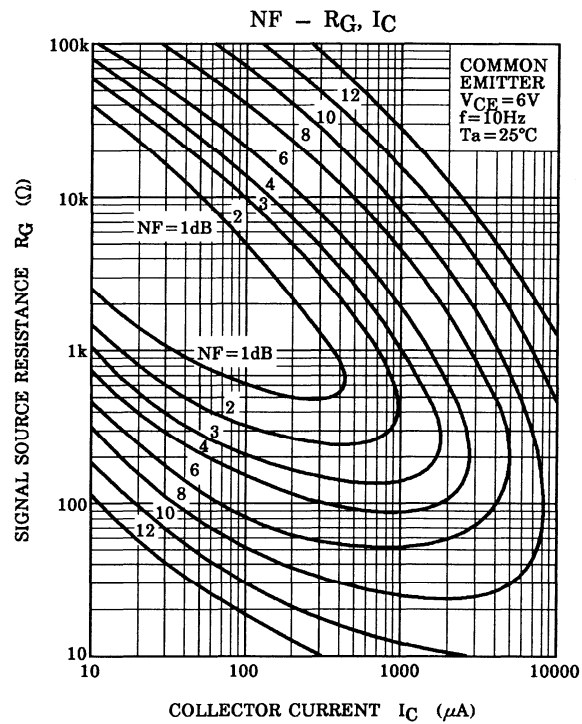
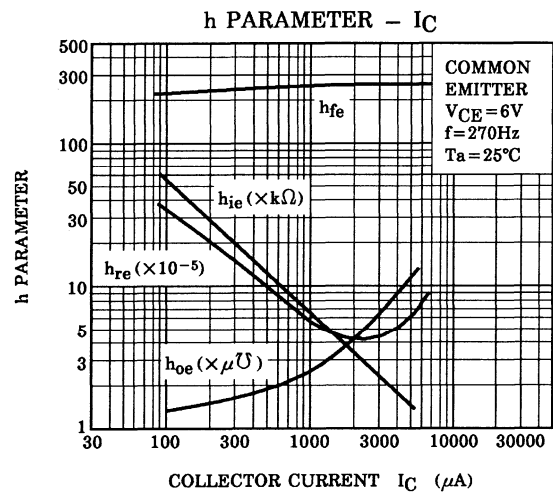
Note:  $h_{FE}$  classification GR (G): 200~400, BL (L): 350~700, ( ) marking symbol

## Marking



Start of commercial production  
1982-10





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