# Silicon Epitaxal Base Mesa Transistor

T-33-21

**2SB713 (PNP)**
**2SD751 (NPN)**

**TOP-3 Package (See Page 36 For Dimensions)**

## 2SB713 (PNP)

### Absolute Maximum Ratings (Ta=25°C)

| Item | Symbol | Rating | Unit |
|---|---|---|---|
| Collector-Base Voltage | $-V_{CBO}$ | 200 | V |
| Collector-Emitter Voltage | $-V_{CEO}$ | 140 | V |
| Emitter-Base Voltage | $-V_{EBO}$ | 5 | V |
| Peak Collector Current | $-I_{CM}$ | 15 | A |
| Collector Current | $-I_C$ | 9 | A |
| Collector Power Dissipation | $P_C$* | 100 | W |
| Junction Temperature | $T_j$ | 150 | °C |
| Storage Temperature | $T_{stg}$ | −55~+150 | °C |

*Tc=25°C

**High Power Audio Frequency Amplifier Complementary Pair with 2SD751**

**Feature:**
• Large collector power dissipation: 100W(Tc=25°C)

****$h_{FE}$ Classification**

| $h_{FE}$ | 100~200 | 60~120 | 40~80 |
|---|---|---|---|
| Class | P | Q | R |

### Electrical Characteristics (Ta=25°C)

| Item | Symbol | Condition | | min. | typ. | max. | Unit |
|---|---|---|---|---|---|---|---|
| Collector Cutoff Current | $-I_{CBO}$ | $-V_{CB}$=140V, | $I_E$=0 | | | 50 | μA |
| Emitter Cutoff Current | $-I_{EBO}$ | $-V_{EB}$=3V, | $I_C$=0 | | | 50 | μA |
| DC Current Gain | $h_{FE1}$ | $-V_{CE}$=5V, | $-I_C$=0.02A | 20 | | | — |
| | $h_{FE2}$** | $-V_{CE}$=5V, | $-I_C$=1.0A | 40 | | 200 | — |
| | $h_{FE3}$ | $-V_{CE}$=5V, | $-I_C$=5.0A | 15 | | | — |
| Base-Emitter Voltage | $-V_{BE}$ | $-V_{CE}$=5V, | $-I_C$=7.0A | | | 1.8 | V |
| Collector-Emitter Saturation Voltage | $-V_{CE(sat)}$ | $-I_C$=5A, | $-I_B$=0.7A | | | 2.0 | V |
| Gain Bandwidth Product | $f_T$ | $-V_{CE}$=5V, | $-I_C$=0.5A | | 20 | | MHz |

## 2SD751 (NPN)

### Absolute Maximum Ratings (Ta=25°C)

| Item | Symbol | Rating | Unit |
|---|---|---|---|
| Collector-Base Voltage | $V_{CBO}$ | 200 | V |
| Collector-Emitter Voltage | $V_{CEO}$ | 140 | V |
| Emitter-Base Voltage | $V_{EBO}$ | 5 | V |
| Peak Collector Current | $I_{CM}$ | 15 | A |
| Collector Current | $I_C$ | 9 | A |
| Collector Power Dissipation | $P_C$* | 100 | W |
| Junction Temperature | $T_j$ | 150 | °C |
| Storage Temperature | $T_{stg}$ | −55~+150 | °C |

*Tc=25°C

**High Power Audio Frequency Amplifier Complementary Pair with 2SB713**

**Feature:**
• Large collector power dissipation: 100W(Tc=25°C)

****$h_{FE}$ Classification**

| $h_{FE}$ | 100~200 | 60~120 | 40~80 |
|---|---|---|---|
| Class | P | Q | R |

### Electrical Characteristics (Ta=25°C)

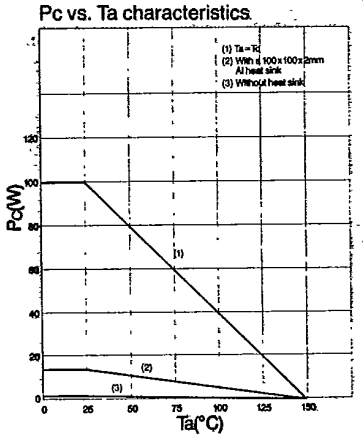
| Item | Symbol | Condition | | min. | typ. | max. | Unit |
|---|---|---|---|---|---|---|---|
| Collector Cutoff Current | $I_{CBO}$ | $V_{CB}$=140V, | $I_E$=0 | | | 50 | μA |
| Emitter Cutoff Current | $I_{EBO}$ | $V_{EB}$=3V, | $I_C$=0 | | | 50 | μA |
| DC Current Gain | $h_{FE1}$ | $V_{CE}$=5V, | $I_C$=0.02A | 20 | | | — |
| | $h_{FE2}$** | $V_{CE}$=5V, | $I_C$=1.0A | 40 | | 200 | — |
| | $h_{FE3}$ | $V_{CE}$=5V, | $I_C$=5.0A | 15 | | | — |
| Base-Emitter Voltage | $V_{BE}$ | $V_{CE}$=5V, | $I_C$=7.0A | | | 1.8 | V |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C$=7.0A, | $I_B$=0.7A | | | 2.0 | V |
| Gain Bandwidth Product | $f_T$ | $V_{CE}$=5V, | $I_C$=0.5A | | 20 | | MHz |

T-33-21

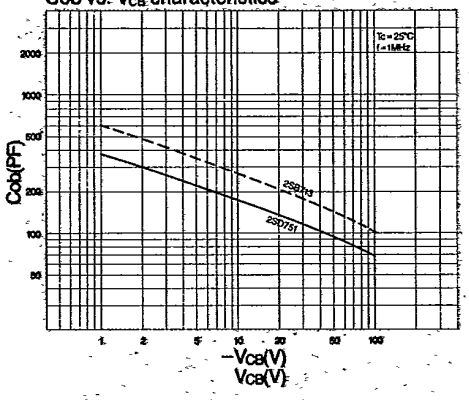
# 2SB713 (PNP)
# 2SD751 (NPN)

## Typical Characteristics

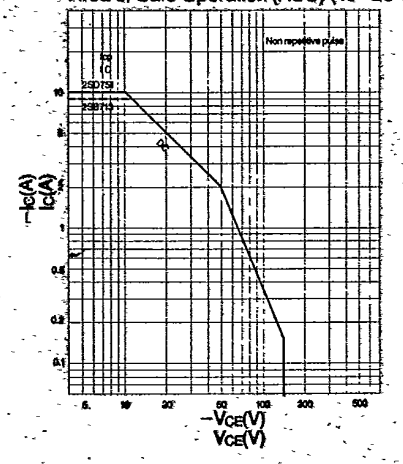
Pc vs. Ta characteristics



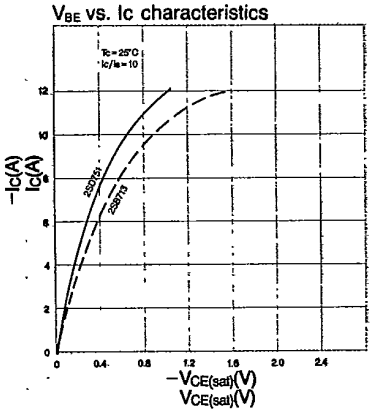

Cob vs. $V_{CB}$ characteristics



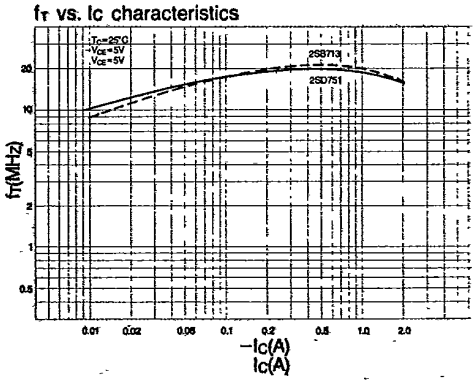

Area of Safe Operation (ASO) (Tc=25°C)



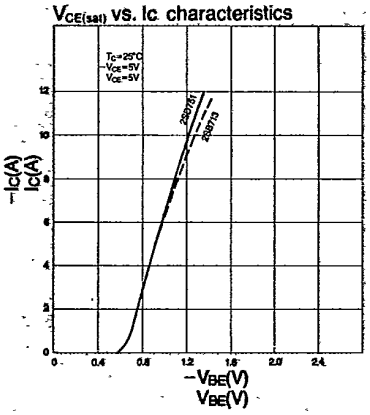

$V_{BE}$ vs. Ic characteristics



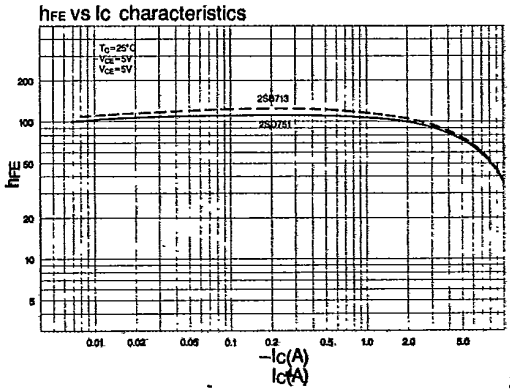

$f_T$ vs. Ic characteristics

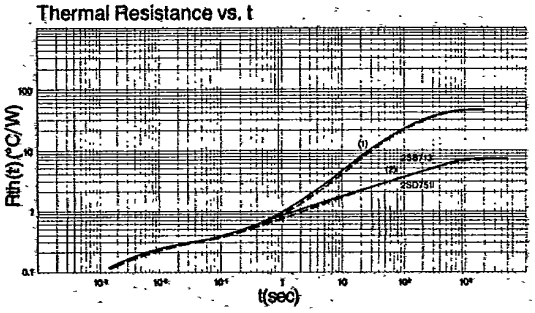



$V_{CE(sat)}$ vs. Ic characteristics




$h_{FE}$ vs Ic characteristics




Transient Thermal Resistance
Notes: Rth was measured at Ta=25°C and under natural convection

Thermal Resistance vs. t