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March 2008

# 2SC3503/KSC3503

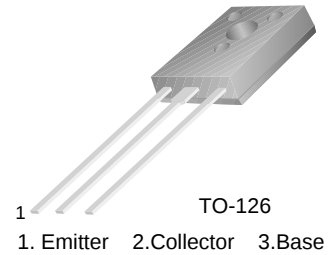
## NPN Epitaxial Silicon Transistor

### Applications

- Audio, Voltage Amplifier and Current Source
- CRT Display, Video Output
- General Purpose Amplifier

### Features

- High Voltage :  $V_{CEO} = 300V$
- Low Reverse Transfer Capacitance :  $C_{re} = 1.8pF$  at  $V_{CB} = 30V$
- Excellent Gain Linearity for low THD
- High Frequency: 150MHz
- Full thermal and electrical Spice models are available
- Complement to 2SA1381/KSA1381.



### Absolute Maximum Ratings\* $T_a = 25^\circ C$ unless otherwise noted

| Symbol         | Parameter                                                           | Ratings     | Units      |
|----------------|---------------------------------------------------------------------|-------------|------------|
| $BV_{CBO}$     | Collector-Base Voltage                                              | 300         | V          |
| $BV_{CEO}$     | Collector-Emitter Voltage                                           | 300         | V          |
| $BV_{EBO}$     | Emitter-Base Voltage                                                | 5           | V          |
| $I_C$          | Collector Current(DC)                                               | 100         | mA         |
| $I_{CP}$       | Collector Current(Pulse)                                            | 200         | mA         |
| $P_C$          | Total Device Dissipation, $T_C = 25^\circ C$<br>$T_C = 125^\circ C$ | 7<br>1.2    | W<br>W     |
| $T_J, T_{STG}$ | Junction and Storage Temperature                                    | - 55 ~ +150 | $^\circ C$ |

\* These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

### Thermal Characteristics\* $T_a = 25^\circ C$ unless otherwise noted

| Symbol          | Parameter                            | Max. | Units        |
|-----------------|--------------------------------------|------|--------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case | 17.8 | $^\circ C/W$ |

\* Device mounted on minimum pad size

### $h_{FE}$ Classification

| Classification | C       | D        | E         | F         |
|----------------|---------|----------|-----------|-----------|
| $h_{FE}$       | 40 ~ 80 | 60 ~ 120 | 100 ~ 200 | 160 ~ 320 |

**Electrical Characteristics\***  $T_a = 25^\circ\text{C}$  unless otherwise noted

| Symbol        | Parameter                            | Test Condition                              | Min. | Typ. | Max. | Units         |
|---------------|--------------------------------------|---------------------------------------------|------|------|------|---------------|
| $BV_{CBO}$    | Collector-Base Breakdown Voltage     | $I_C = 10\mu\text{A}$ , $I_E = 0$           | 300  |      |      | V             |
| $BV_{CEO}$    | Collector-Emitter Breakdown Voltage  | $I_C = 1\text{mA}$ , $I_B = 0$              | 300  |      |      | V             |
| $BV_{EBO}$    | Emitter-Base Breakdown Voltage       | $I_E = 10\mu\text{A}$ , $I_C = 0$           | 5    |      |      | V             |
| $I_{CBO}$     | Collector Cut-off Current            | $V_{CB} = 200\text{V}$ , $I_E = 0$          |      |      | 0.1  | $\mu\text{A}$ |
| $I_{EBO}$     | Emitter Cut-off Current              | $V_{EB} = 4\text{V}$ , $I_C = 0$            |      |      | 0.1  | $\mu\text{A}$ |
| $h_{FE}$      | DC Current Gain                      | $V_{CE} = 10\text{V}$ , $I_C = 10\text{mA}$ | 40   |      | 320  |               |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage | $I_C = 20\text{mA}$ , $I_B = 2\text{mA}$    |      |      | 0.6  | V             |
| $V_{BE(sat)}$ | Base-Emitter Saturation Voltage      | $I_C = 20\text{mA}$ , $I_B = 2\text{mA}$    |      |      | 1    | V             |
| $f_T$         | Current Gain Bandwidth Product       | $V_{CE} = 30\text{V}$ , $I_C = 10\text{mA}$ |      | 150  |      | MHz           |
| $C_{ob}$      | Output Capacitance                   | $V_{CB} = 30\text{V}$ , $f = 1\text{MHz}$   |      | 2.6  |      | pF            |
| $C_{re}$      | Reverse Transfer Capacitance         | $V_{CB} = 30\text{V}$ , $f = 1\text{MHz}$   |      | 1.8  |      | pF            |

\* Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycles  $\leq 2\%$ **Ordering Information**

| Part Number* | Marking  | Package | Packing Method | Remarks      |
|--------------|----------|---------|----------------|--------------|
| 2SC3503CSTU  | 2SC3503C | TO-126  | TUBE           | hFE1 C grade |
| 2SC3503DSTU  | 2SC3503D | TO-126  | TUBE           | hFE1 D grade |
| 2SC3503ESTU  | 2SC3503E | TO-126  | TUBE           | hFE1 E grade |
| 2SC3503FSTU  | 2SC3503F | TO-126  | TUBE           | hFE1 F grade |
| KSC3503CSTU  | C3503C   | TO-126  | TUBE           | hFE1 C grade |
| KSC3503DSTU  | C3503D   | TO-126  | TUBE           | hFE1 D grade |
| KSC3503ESTU  | C3503E   | TO-126  | TUBE           | hFE1 E grade |
| KSC3503FSTU  | C3503F   | TO-126  | TUBE           | hFE1 F grade |

\* 1. Affix "-S-" means the standard TO126 Package.(see package dimensions). If the affix is "-STS-" instead of "-S-", that mean the short-lead TO126 package.  
2. Suffix "-TU" means the tube packing. The Suffix "TU" could be replaced to other suffix character as packing method.

## Typical Characteristics

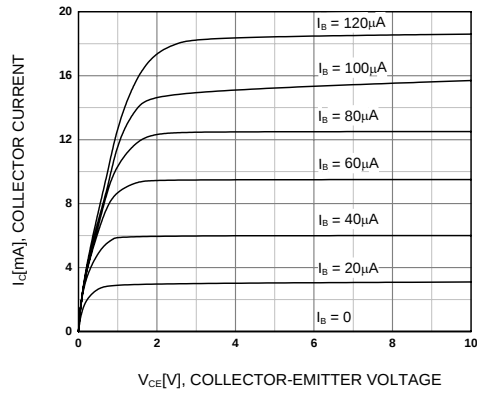


Figure 1. Static Characteristic

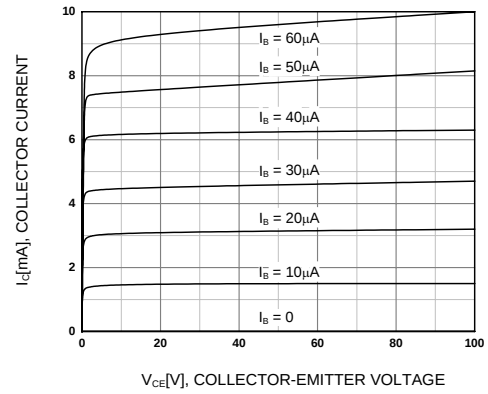


Figure 2. Static Characteristic

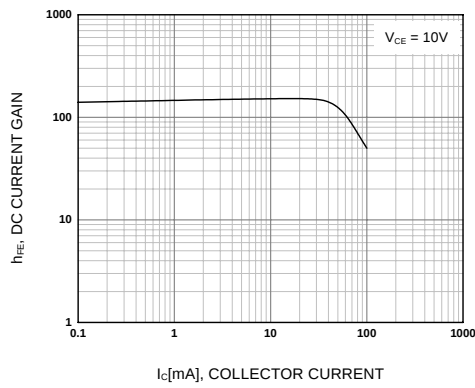


Figure 3. DC current Gain

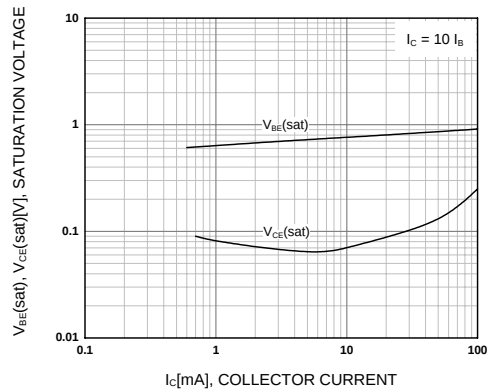


Figure 4. Base-Emitter Saturation Voltage  
Collector-Emitter Saturation Voltage

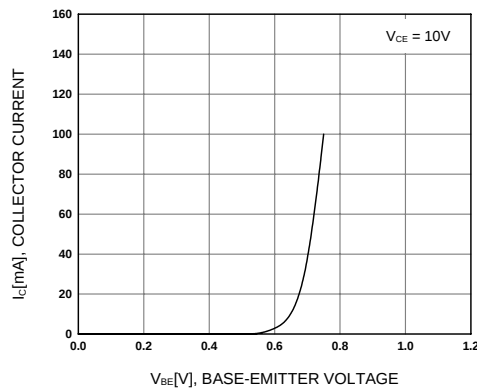


Figure 5. Base-Emitter On Voltage

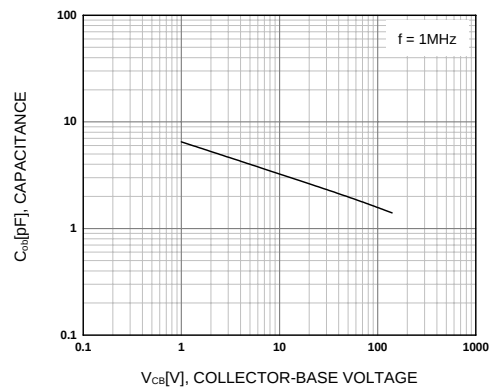


Figure 6. Collector Output Capacitance

## Typical Characteristics (Continued)

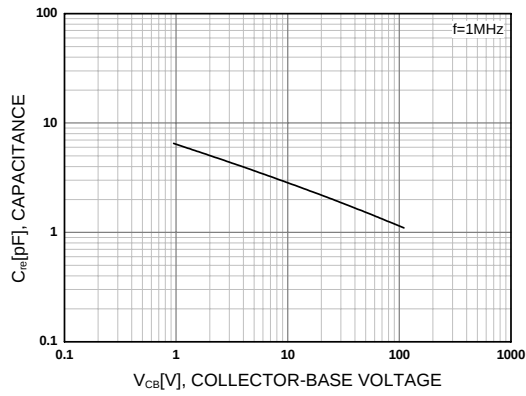


Figure 7. Reverse Transfer Capacitance

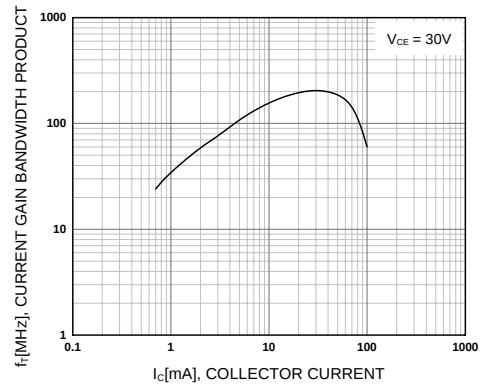


Figure 8. Current Gain Bandwidth Product

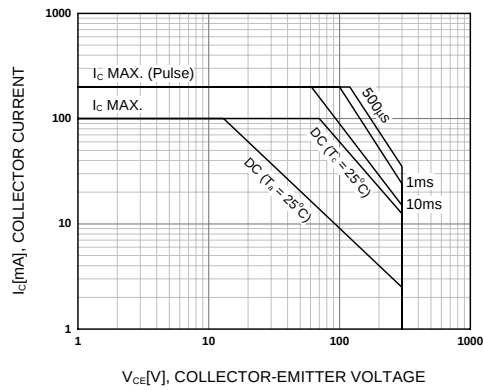


Figure 9. Safe Operating Area

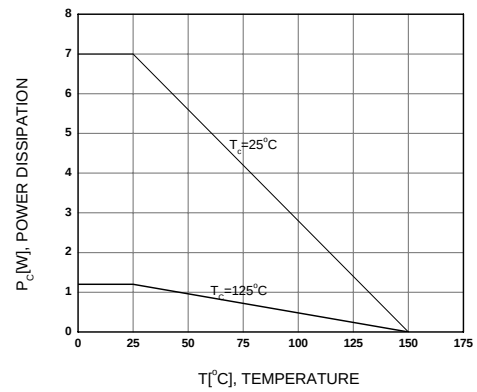
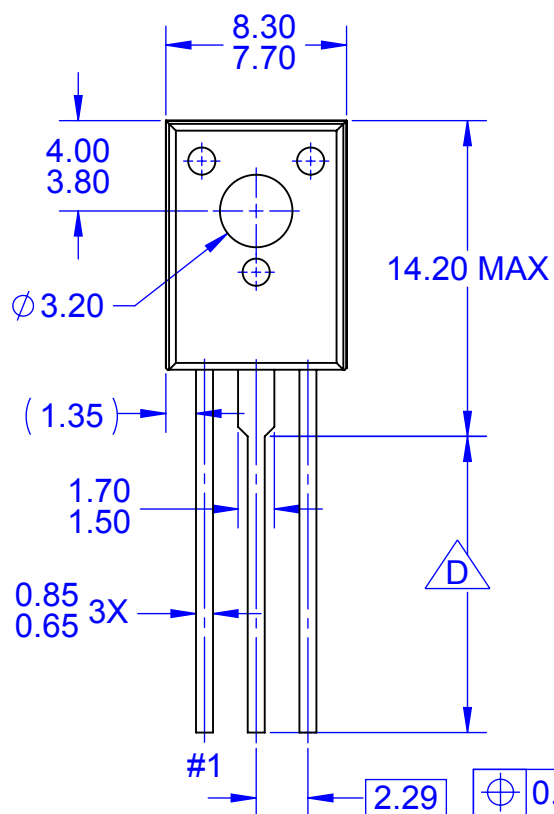
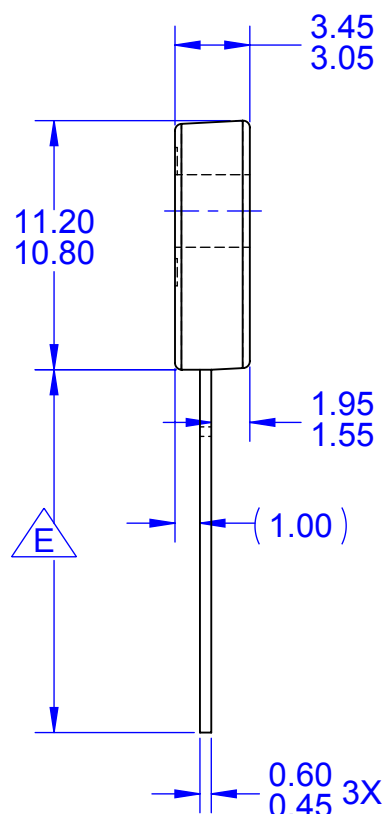


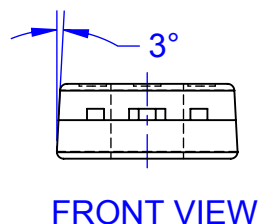
Figure 10. Power Derating



TOP VIEW



SIDE VIEW



FRONT VIEW

| PRODUCTION CODE   | TERMINAL LENGTH "D" | TERMINAL LENGTH "E" |
|-------------------|---------------------|---------------------|
| TSSTU             | 3.45 - 4.05         | 6.45-7.45           |
| TSTU              | 2.36 - 2.96         | 5.36-6.36           |
| NONE (STD LENGTH) | 12.76 - 13.36       | 15.76-16.76         |

NOTES:

- A. NO INDUSTRY STANDARD APPLIES TO THIS PACKAGE
- B. ALL DIMENSIONS ARE IN MILLIMETERS
- C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR PROTRUSIONS

 FOR TERMINAL LENGTH "D", REFER TO TABLE

 FOR TERMINAL LENGTH "E", REFER TO TABLE

F. DRAWING FILENAME: MKT-TO126AArev2



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105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

Skype отдела продаж:

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