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March 2008

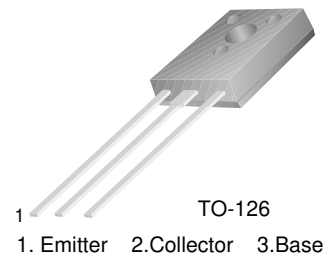
# 2SA1381/KSA1381 PNP Epitaxial Silicon Transistor

## Applications

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

## Features

- High Voltage :  $V_{CEO} = -300V$
- Low Reverse Transfer Capacitance :  $C_{re} = 2.3pF$  at  $V_{CB} = -30V$
- Excellent Gain Linearity for low THD
- High Frequency: 150MHz
- Full thermal and electrical Spice models are available
- Complement to 2SC3503/KSC3503



## 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                   | $V_{CB} = -30\text{V}, f = 1\text{MHz}$    |      | 3.1  |      | pF            |
| $C_{re}$      | Reverse Transfer Capacitance         | $V_{CB} = -30\text{V}, f = 1\text{MHz}$    |      | 2.3  |      | pF            |

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

| Part Number* | Marking  | Package | Packing Method | Remarks      |
|--------------|----------|---------|----------------|--------------|
| 2SA1381CSTU  | 2SA1381C | TO-126  | TUBE           | hFE1 C grade |
| 2SA1381DSTU  | 2SA1381D | TO-126  | TUBE           | hFE1 D grade |
| 2SA1381ESTU  | 2SA1381E | TO-126  | TUBE           | hFE1 E grade |
| 2SA1381FSTU  | 2SA1381F | TO-126  | TUBE           | hFE1 F grade |
| KSA1381CSTU  | A1381C   | TO-126  | TUBE           | hFE1 C grade |
| KSA1381DSTU  | A1381D   | TO-126  | TUBE           | hFE1 D grade |
| KSA1381ESTU  | A1381E   | TO-126  | TUBE           | hFE1 E grade |
| KSA1381FSTU  | A1381F   | 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

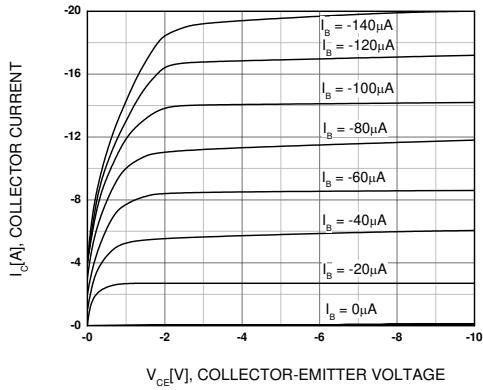


Figure 1. Static Characteristic

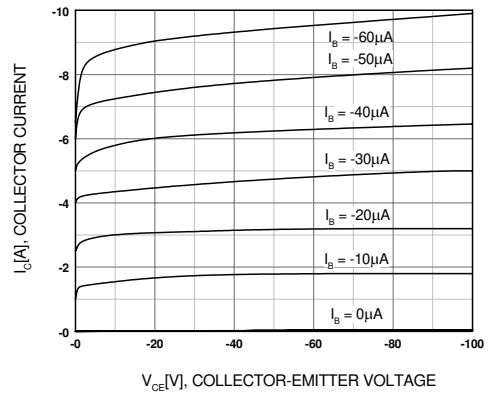


Figure 2. Static Characteristic

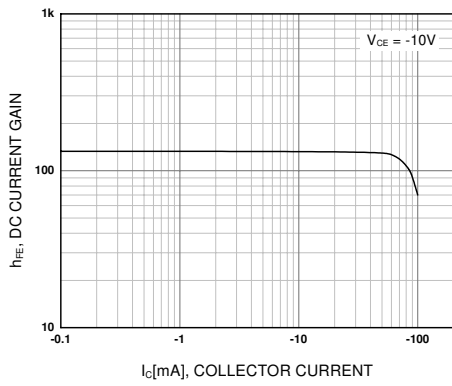


Figure 3. DC current Gain

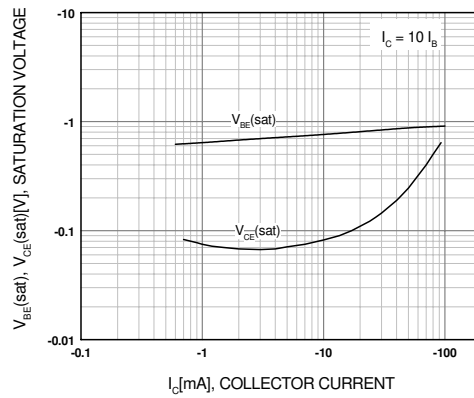


Figure 4. Base-Emitter Saturation Voltage  
Collector-Emitter Saturation Voltage

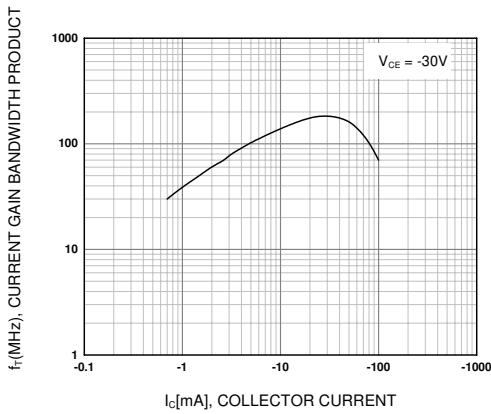


Figure 5. Current Gain Bandwidth Product

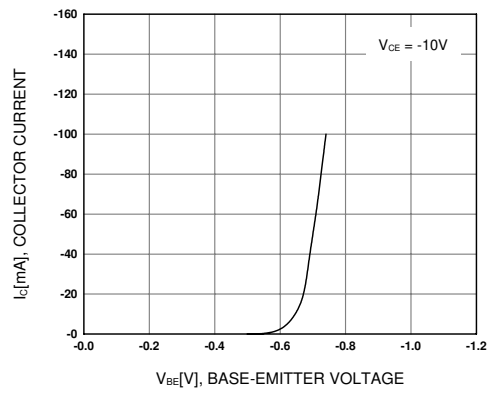


Figure 6. Base-Emitter On Voltage

Typical Characteristics (Continued)

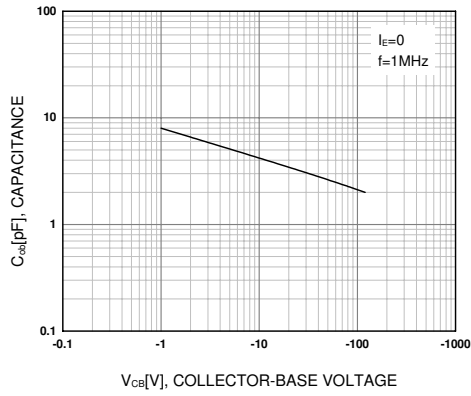


Figure 7. Collector Output Capacitance

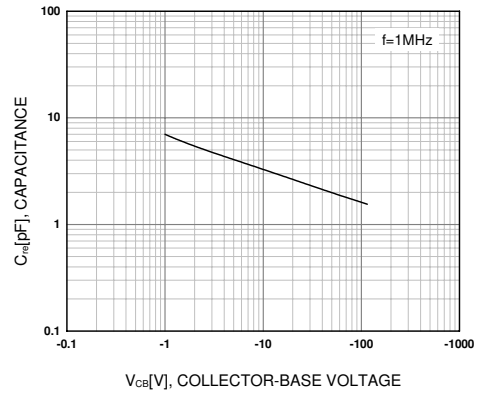


Figure 8. Reverse Transfer Capacitance

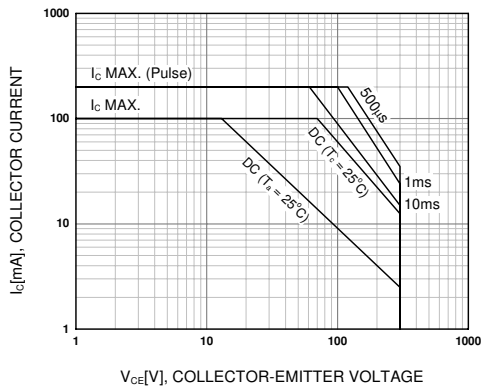


Figure 9. Safe Operating Area

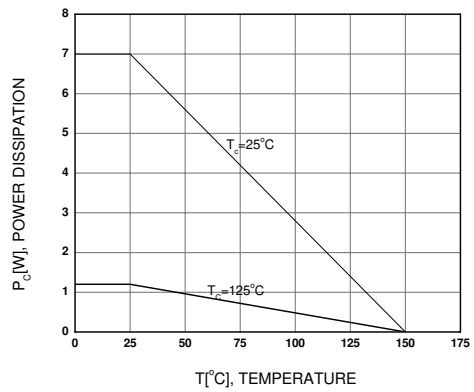
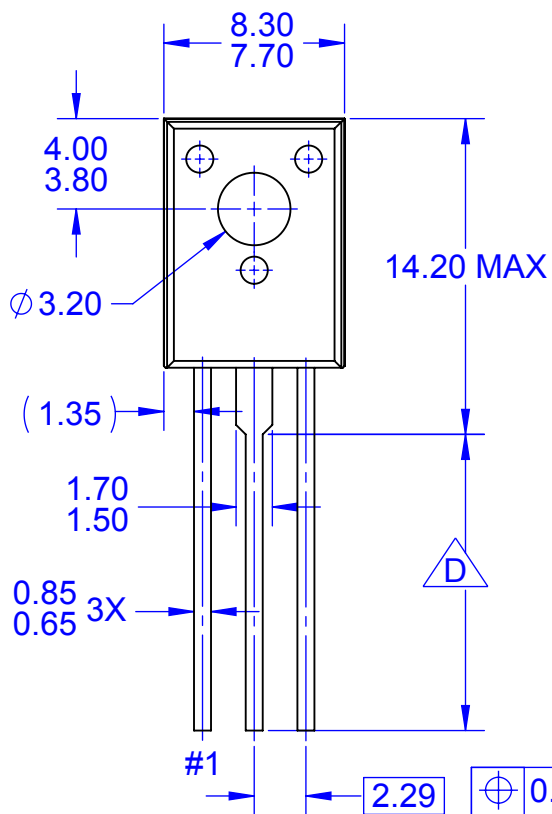
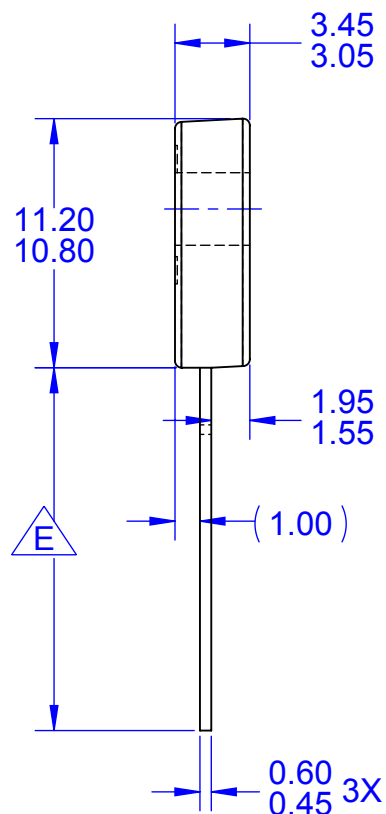


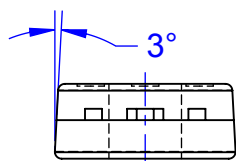
Figure 10. Power Derating



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

$\triangle D$  FOR TERMINAL LENGTH "D", REFER TO TABLE

$\triangle E$  FOR TERMINAL LENGTH "E", REFER TO TABLE

F. DRAWING FILENAME: MKT-TO126Arev2



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