

Transistors

2SA1037AK / 2SA1576A / 2SA1774 /  
2SA2029 / 2SA933AS

# General Purpose Transistor (-50V, -0.15A)

**2SA1037AK / 2SA1576A / 2SA1774 / 2SA2029 /  
2SA933AS**

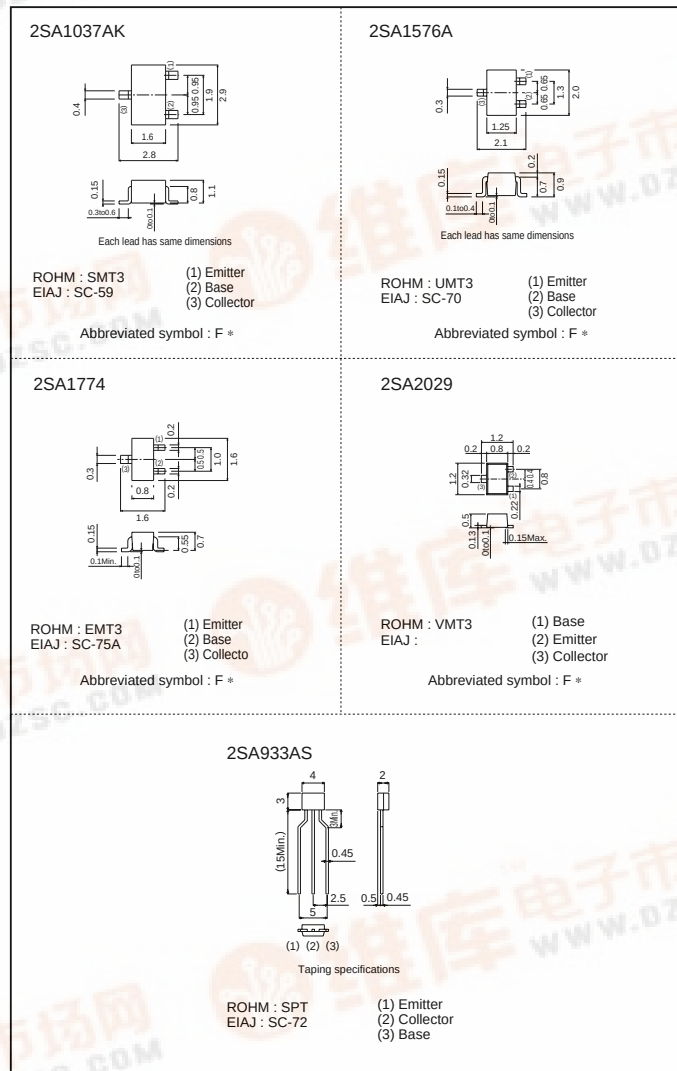
## ●Features

- 1) Excellent  $h_{FE}$  linearity.
- 2) Complements the 2SC2412K / 2SC4081 / 2SC4617 / 2SC5658 / 2SC1740S.

## ●Structure

Epitaxial planar type.  
PNP silicon transistor

## ●External dimensions (Units : mm)



\* Denotes  $h_{FE}$

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### ●Absolute maximum ratings (Ta=25°C)

| Parameter                   |                     | Symbol           | Limits   | Unit   |
|-----------------------------|---------------------|------------------|----------|--------|
| Collector-base voltage      |                     | V <sub>CB0</sub> | −60      | V      |
| Collector-emitter voltage   |                     | V <sub>CEO</sub> | −50      | V      |
| Emitter-base voltage        |                     | V <sub>EB0</sub> | −6       | V      |
| Collector current           |                     | I <sub>C</sub>   | −0.15    | A (DC) |
| Collector power dissipation | 2SA1037AK, 2SA1576A | P <sub>C</sub>   | 0.2      | W      |
|                             | 2SA2029, 2SA1774    |                  | 0.15     |        |
|                             | 2SA933AS            |                  | 0.3      |        |
| Junction temperature        |                     | T <sub>J</sub>   | 150      | °C     |
| Storage temperature         |                     | T <sub>stg</sub> | −55~+150 | °C     |

### ●Electrical characteristics (Ta=25°C)

| Parameter                            | Symbol               | Min. | Typ. | Max. | Unit | Conditions                                          |
|--------------------------------------|----------------------|------|------|------|------|-----------------------------------------------------|
| Collector-base breakdown voltage     | BV <sub>CB0</sub>    | −60  | −    | −    | V    | I <sub>C</sub> =−50μA                               |
| Collector-emitter breakdown voltage  | BV <sub>CEO</sub>    | −50  | −    | −    | V    | I <sub>C</sub> =−1μA                                |
| Emitter-base breakdown voltage       | BV <sub>EB0</sub>    | −6   | −    | −    | V    | I <sub>E</sub> =−50μA                               |
| Collector cutoff current             | I <sub>CB0</sub>     | −    | −    | −0.1 | μA   | V <sub>CB</sub> =−60V                               |
| Emitter cutoff current               | I <sub>EB0</sub>     | −    | −    | −0.1 | μA   | V <sub>EB</sub> =−6V                                |
| Collector-emitter saturation voltage | V <sub>CE(sat)</sub> | −    | −    | −0.5 | V    | I <sub>C</sub> /I <sub>B</sub> =−50mA/−5mA          |
| DC current transfer ratio            | h <sub>FE</sub>      | 120  | −    | 560  | −    | V <sub>CE</sub> =−6V, I <sub>C</sub> =−1mA          |
| Transition frequency                 | f <sub>T</sub>       | −    | 140  | −    | MHz  | V <sub>CE</sub> =−12V, I <sub>E</sub> =2mA, f=30MHz |
| Output capacitance                   | C <sub>ob</sub>      | −    | 4.0  | 5.0  | pF   | V <sub>CB</sub> =−12V, I <sub>E</sub> =0A, f=1MHz   |

### ●Packaging specifications and h<sub>FE</sub>

| Type      | h <sub>FE</sub> | Package                      | Taping |      |      |      |      |
|-----------|-----------------|------------------------------|--------|------|------|------|------|
|           |                 | Code                         | T146   | T106 | TL   | T2L  | TP   |
|           |                 | Basic ordering unit (pieces) | 3000   | 3000 | 3000 | 8000 | 5000 |
| 2SA2029   | QRS             |                              | —      | —    | —    | ○    | —    |
| 2SA1037AK | QRS             |                              | ○      | —    | —    | —    | —    |
| 2SA1576A  | QRS             |                              | —      | ○    | —    | —    | —    |
| 2SA1774   | QRS             |                              | —      | —    | ○    | —    | —    |
| 2SA933AS  | QRS             |                              | —      | —    | —    | —    | ○    |

h<sub>FE</sub> values are classified as follows:

| Item            | Q       | R       | S       |
|-----------------|---------|---------|---------|
| h <sub>FE</sub> | 120~270 | 180~390 | 270~560 |

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### ●Electrical characteristic curves

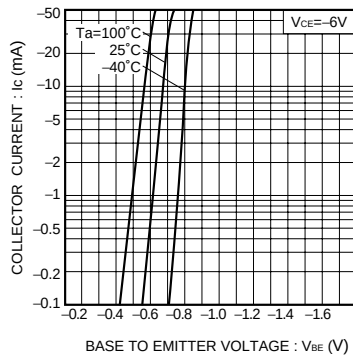


Fig.1 Grounded emitter propagation characteristics

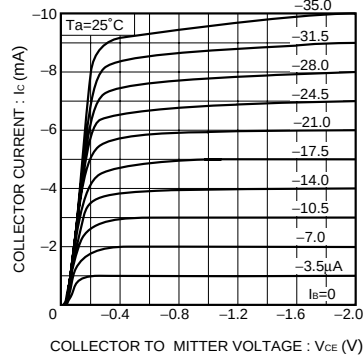


Fig.2 Grounded emitter output characteristics (I)

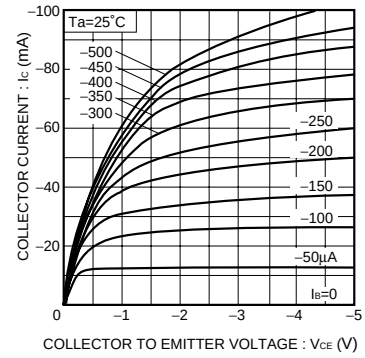


Fig.3 Grounded emitter output characteristics (II)

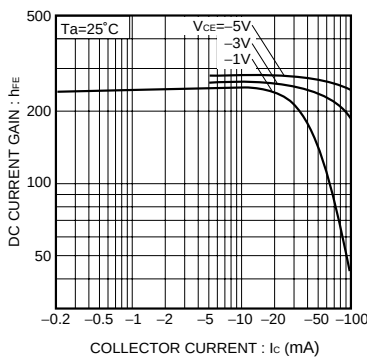


Fig.4 DC current gain vs. collector current (I)

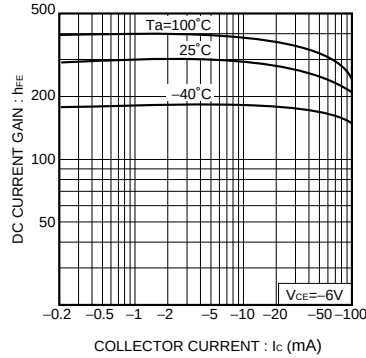


Fig.5 DC current gain vs. collector current (II)

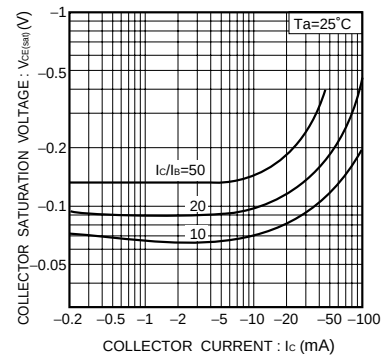


Fig.6 Collector-emitter saturation voltage vs. collector current (I)

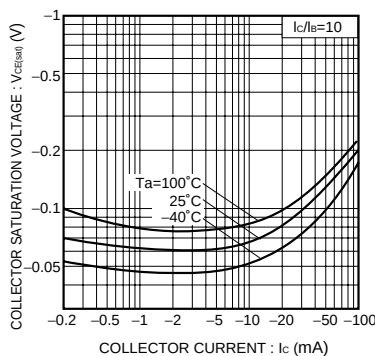


Fig.7 Collector-emitter saturation voltage vs. collector current (II)

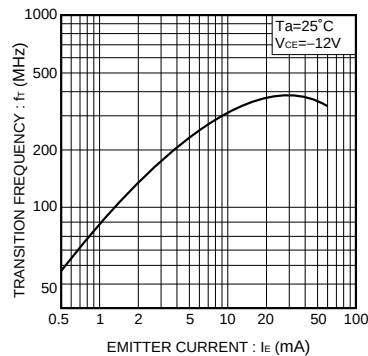


Fig.8 Gain bandwidth product vs. emitter current

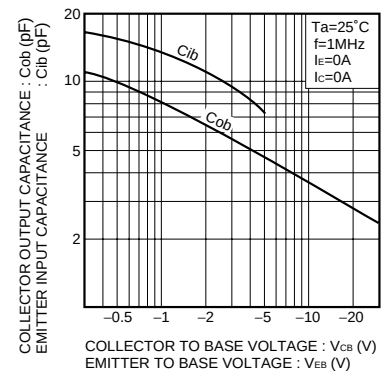


Fig.9 Collector output capacitance vs. collector-base voltage  
Emitter input capacitance vs. emitter-base voltage