

S8050



NPN UNIVERSAL SMALL SIGNAL TRANSISTOR

$V_{CBO}$ : 40 Volts

$I_C$ : 500 Ampers

Package: SOT-23

FEATURES

- NPN General-Purpose Small Signal Transistor.
- Small Temperature Drift And Low Cost.
- Extremely Low Saturation Voltage Drop
- The Summary Capacitor Is Suitable For High-Frequency Applications.
- Complementary to S8550

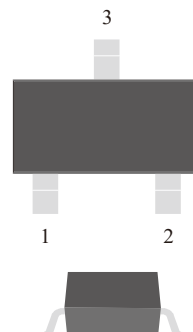
MECHANICAL DATA

- **Package:** Molding Compound Meets UL 94V-0 Flammability Rating.  
The Material Of Product Compliance With RoHS Requirements.
- **Mounting Position:** Any.
- **Pin and polarity:** As Shown In The Figure On The Right.

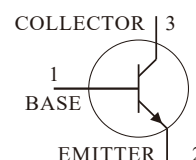
Device DATA

|         |         |         |         |
|---------|---------|---------|---------|
| Device  | S8050-L | S8050-H | S8050-J |
| Marking | J3Y     | J3Y     | J3Y     |

Diagram:



Polarity:



Maximum Ratings ( $T_a=25^{\circ}\text{C}$  Unless otherwise specified)

| Parameter                 | Test Conditions | Symbol    | Ratings | Unit |
|---------------------------|-----------------|-----------|---------|------|
| Collector-Base Voltage    |                 | $V_{CBO}$ | 40      | V    |
| Collector-Emitter Voltage |                 | $V_{CEO}$ | 25      | V    |
| Emitter-Base Voltage      |                 | $V_{EBO}$ | 5       | V    |
| Collector Current         |                 | $I_C$     | 500     | mA   |

Thermal Characteristics ( $T_a=25^{\circ}\text{C}$  Unless otherwise specified )

| Parameter                                                     | Test Conditions                                    | Symbol          | Ratings    | Unit                        |
|---------------------------------------------------------------|----------------------------------------------------|-----------------|------------|-----------------------------|
| Total Device Power Dissipation                                |                                                    | $P_D$           | 300        | mW                          |
| Derating Factor                                               | above $25^{\circ}\text{C}$                         | $D_F$           | 2.4        | mW/ $^{\circ}\text{C}$      |
| Operating Junction Temperature Range                          |                                                    | $T_J$           | -55 to 150 | $^{\circ}\text{C}$          |
| Storage Temperature Range                                     |                                                    | $T_{STD}$       | -55 to 150 |                             |
| Thermal Resistance From Junction To Ambient With Steady-State | Device Mounted On 1 in2 FR-4 Board With 2oz.Copper | $R_{\theta JA}$ | 417        | $^{\circ}\text{C}/\text{W}$ |

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**ELECTRICAL CHARACTERISTICS (Ta= 25°C)**

| Characteristic                       | Test Condition                                | Symbol        | Min. | Typ. | Max. | Unit |
|--------------------------------------|-----------------------------------------------|---------------|------|------|------|------|
| <b>OFF CHARACTERISTICS</b>           |                                               |               |      |      |      |      |
| Collector-Base Breakdown Voltage     | $I_C = 100 \text{ uAdc}, I_E = 0$             | $V_{(BR)CBO}$ | 40   | -    | -    | V    |
| Collector-Emitter Breakdown Voltage  | $I_C = 1 \text{ mAdc}, I_B = 0$               | $V_{(BR)CEO}$ | 25   | -    | -    | V    |
| Emitter-Base Breakdown Voltage       | $I_E = 100 \text{ uAdc}, I_C = 0$             | $V_{(BR)EBO}$ | 5    | -    | -    | V    |
| Emitter Cut-off Current              | $V_{CB} = 40 \text{ Vdc}, I_E = 0$            | $I_{CBO}$     | -    | -    | 100  | nA   |
| Base Cut-off Current                 | $V_{CE} = 20 \text{ Vdc}, I_B = 0$            | $I_{CEO}$     | -    | -    | 100  | nA   |
| Collector Cut-off Current            | $V_{EB} = 3 \text{ Vdc}, I_C = 0$             | $I_{EBO}$     | -    | -    | 100  | nA   |
| <b>ON CHARACTERISTICS</b>            |                                               |               |      |      |      |      |
| DC Current Gain                      | $V_{CE} = 1 \text{ V}, I_C = 50 \text{ mA}$   | $H_{FE(1)}$   | 120  | -    | 400  | -    |
|                                      | $V_{CE} = 1 \text{ V}, I_C = 500 \text{ mA}$  | $H_{FE(2)}$   | 50   | -    | -    | -    |
| Collector-Emitter Saturation Voltage | $I_C = 500 \text{ mA}, I_B = 50 \text{ mA}$   | $V_{CE(Sat)}$ | -    | -    | 0.6  | V    |
| Base-Emitter Saturation Voltage      | $I_C = 500 \text{ mA}, V_{CE} = 50 \text{ V}$ | $V_{BE(Sat)}$ | -    | -    | 1.2  | V    |
| Transition Frequency                 | $V_{CE} = 6 \text{ V}, I_C = 20 \text{ mA}$   | $f_T$         | 100  | -    | -    | MHz  |
|                                      | $f = 30 \text{ MHz}$                          |               |      |      |      |      |

**Classification Of  $H_{FE(1)}$** 

| Rank  | L       | H       | J       |
|-------|---------|---------|---------|
| Range | 120-200 | 200-350 | 300-400 |

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### Typical Characteristics Curves

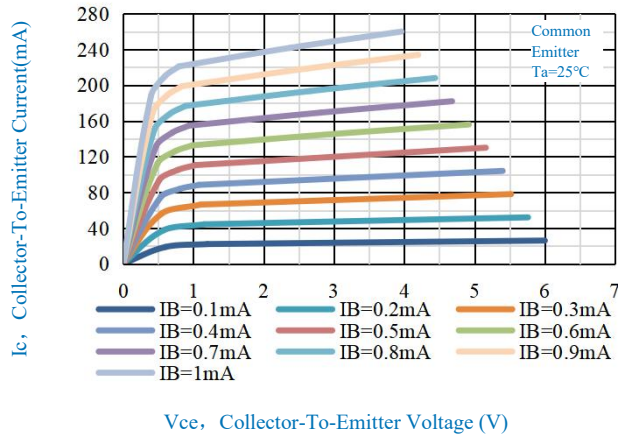


Fig.1-Static Characteristics

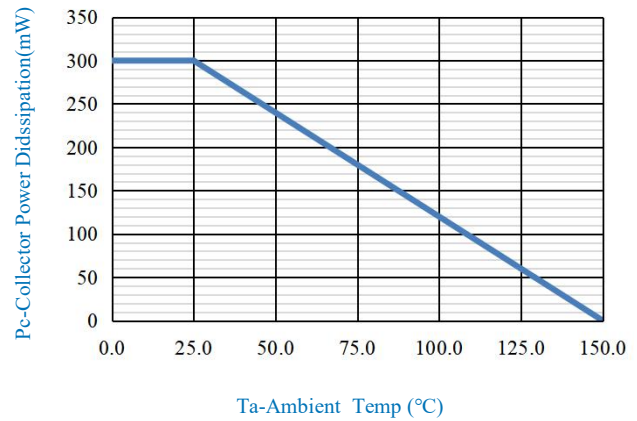


Fig.2-Collector Power Dissipation Vs.  $T_a$

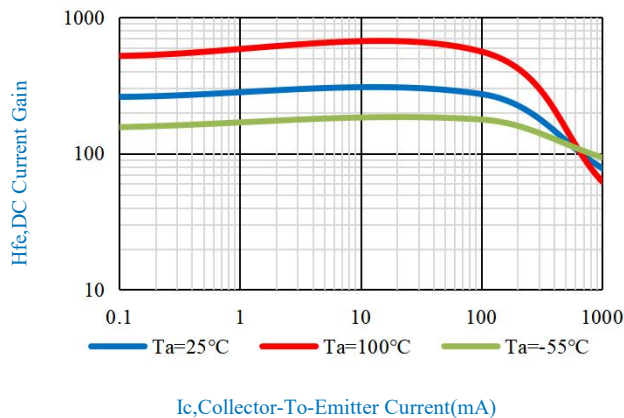


Fig.3-Dc Current Gain Vs. Collector Current

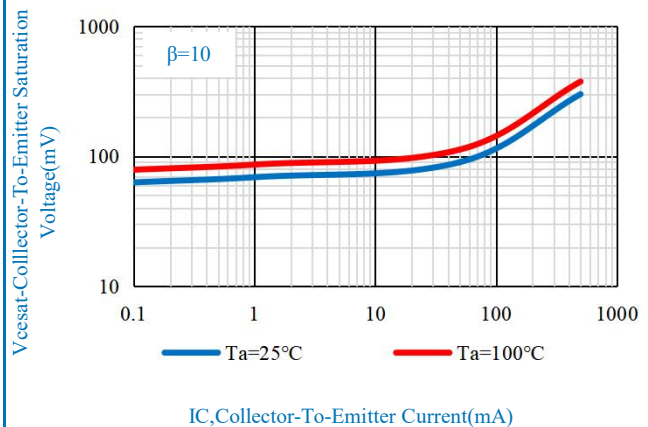


Fig.4-Base-To-Emitter Saturation Voltage Vs. Collector Current

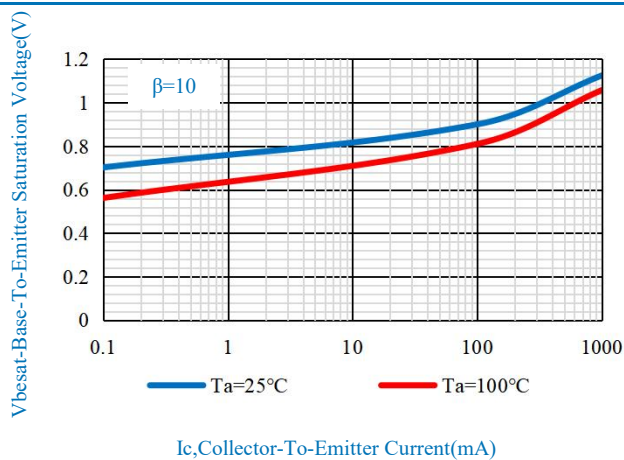


Fig.5-Base-To-Emitter Saturation Voltage Vs. Collector Current

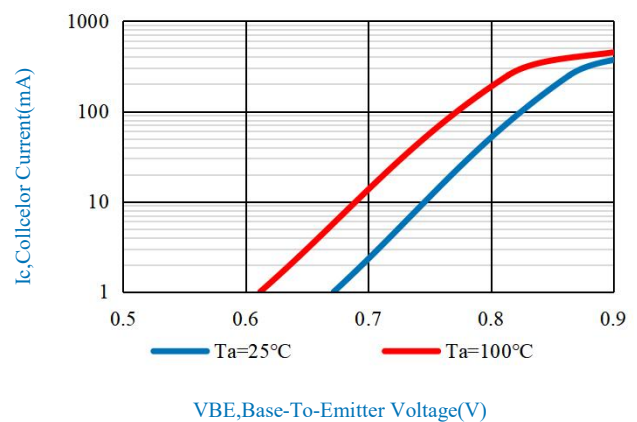


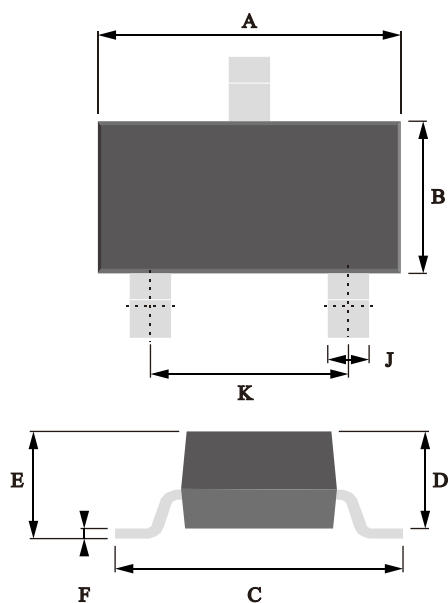
Fig.6-Base-To-Emitter Voltage Characteristics

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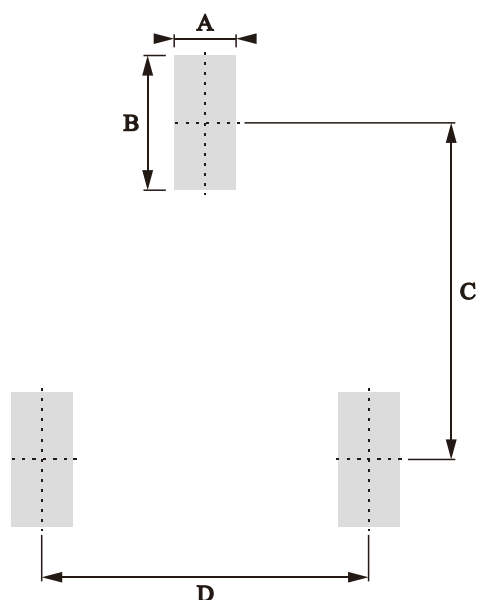
OUTLINE DRAWINGS



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| OUTLINE DIMENSIONS |             |      |      |        |      |        |
|--------------------|-------------|------|------|--------|------|--------|
| Dim.               | Millimeters |      |      | Inches |      |        |
|                    | Min.        | Typ. | Max. | Min.   | Typ. | Max.   |
| A                  | 2.80        | -    | 3.20 | 0.1102 | -    | 0.1260 |
| B                  | 1.15        | -    | 1.45 | 0.0453 | -    | 0.0571 |
| C                  | 2.25        | -    | 2.65 | 0.0886 | -    | 0.1043 |
| D                  | 0.85        | -    | 1.15 | 0.0335 | -    | 0.0453 |
| E                  | 0.90        | -    | 1.20 | 0.0354 | -    | 0.0472 |
| F                  | 0.08        | -    | 0.18 | 0.0031 | -    | 0.0071 |
| J                  | 0.30        | -    | 0.50 | 0.0118 | -    | 0.0197 |
| K                  | 1.70        | -    | 2.10 | 0.0669 | -    | 0.0827 |

RECOMMENDED LAYOUT DRAWINGS



SOT-23

| OUTLINE DIMENSIONS |             |      |      |        |        |      |
|--------------------|-------------|------|------|--------|--------|------|
| Dim.               | Millimeters |      |      | Inches |        |      |
|                    | Min.        | Typ. | Max. | Min.   | Typ.   | Max. |
| A                  | -           | 0.60 | -    | -      | 0.0000 | -    |
| B                  | -           | 0.80 | -    | -      | 0.0315 | -    |
| C                  | -           | 2.00 | -    | -      | 0.0787 | -    |
| D                  | -           | 1.90 | -    | -      | 0.0748 | -    |

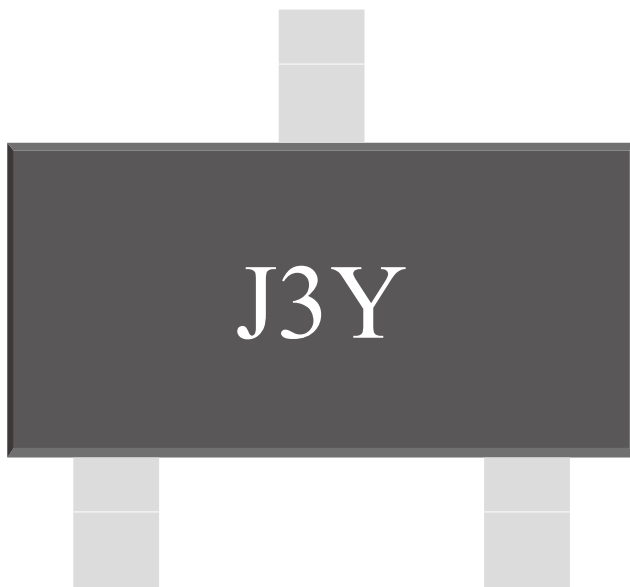
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## MARKING INFORMATION

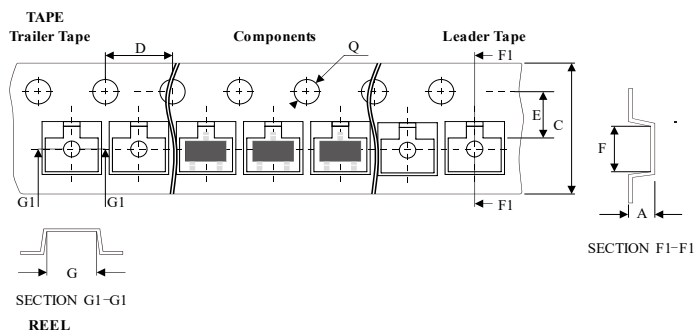
## MARKING INSTRUCTIONS



J3Y=mark

## PACKAGING

## SOT-23



### OUTLINE DIMENSIONS

| Dim.        | Millimeters |      |        | Inches |      |        |
|-------------|-------------|------|--------|--------|------|--------|
|             | Min.        | Typ. | Max.   | Min.   | Typ. | Max.   |
| <b>TAPE</b> |             |      |        |        |      |        |
| A           | 1.12        | -    | 1.32   | 0.0441 | -    | 0.0520 |
| C           | 7.90        | -    | 8.10   | 0.3110 | -    | 0.3189 |
| D           | 3.70        | -    | 4.30   | 0.1457 | -    | 0.1693 |
| E           | 3.40        | -    | 3.60   | 0.1339 | -    | 0.1417 |
| F           | 2.67        | -    | 2.87   | 0.1051 | -    | 0.1130 |
| G           | 3.05        | -    | 3.25   | 0.1201 | -    | 0.1280 |
| Q Φ         | 1.40        | -    | 1.60   | 0.0551 | -    | 0.0630 |
| <b>REEL</b> |             |      |        |        |      |        |
| L Φ         | 176.00      | -    | 180.00 | 6.929  | -    | 7.087  |
| R           | 12.00       | -    | 14.00  | 0.4724 | -    | 0.5512 |
| M           | 11.00       | -    | 13.00  | 0.4331 | -    | 0.5118 |

## PACKING INFORMATION

| Package Type | Package Code | Product Weight Approx(g/Pcs) | Package Method | Quantity (Pcs/Min. Pack.) | Quantity (Pcs/Inner Box) | Quantity (Pcs/Carton) |
|--------------|--------------|------------------------------|----------------|---------------------------|--------------------------|-----------------------|
| SOT-23       | P1           | 0.008                        | 7" Reel        | 3000                      | 45000                    | 180000                |

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**Recommended wave soldering condition**

| Product         | Peak Temperature | Soldering Time  |
|-----------------|------------------|-----------------|
| Pb-free devices | 260 +0/-5 °C     | 5 +1/-1 seconds |

**Recommended temperature profile for IR reflow**

|  | Profile feature                                                                                                                          | Sn-Pb eutectic Assembly          | Pb-free Assembly                 |
|--|------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|----------------------------------|
|  | Average ramp-up rate (T <sub>smax</sub> to T <sub>p</sub> )                                                                              | 3°C/second max.                  | 3°C/second max.                  |
|  | Preheat-Temperature Min (T <sub>S</sub> min)<br>-Temperature Max (T <sub>S</sub> max)<br>-Time(t <sub>s</sub> min to t <sub>s</sub> max) | 100°C<br>150°C<br>60-120 seconds | 150°C<br>200°C<br>60-180 seconds |
|  | Time maintained above:<br>-Temperature (T <sub>L</sub> )<br>- Time (t <sub>L</sub> )                                                     | 183°C<br>60-150 seconds          | 217°C<br>60-150 seconds          |
|  | Peak Temperature(T <sub>P</sub> )                                                                                                        | 240 +0/-5 °C                     | 260 +0/-5 °C                     |
|  | Time within 5°C of actual peak temperature (t <sub>p</sub> )                                                                             | 10-30 seconds                    | 20-40 seconds                    |
|  | Ramp down rate                                                                                                                           | 6°C/second max.                  | 6°C/second max.                  |
|  | Time 25 °C to peak temperature                                                                                                           | 6 minutes max.                   | 8 minutes max.                   |

Note : All temperatures refer to topside of the package, measured on the package body surface.

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Specification Revision History

| Rev.        | Date       | Changed Items | Pre-Changed Content | Changed Content |
|-------------|------------|---------------|---------------------|-----------------|
| A/1         | 2014-10-20 | First Issue   |                     |                 |
| Blank Below |            |               |                     |                 |