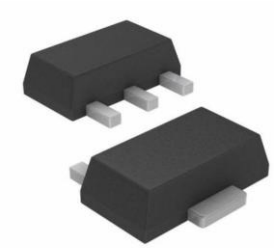
# WT3904J

**NPN Silicon Transistor**

## Features

- Complementary to WT3906J
- Low Current
- Low Voltage

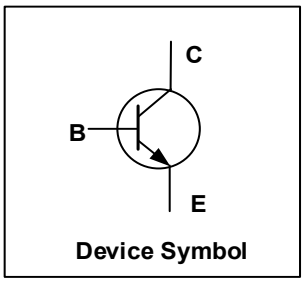


SOT-89

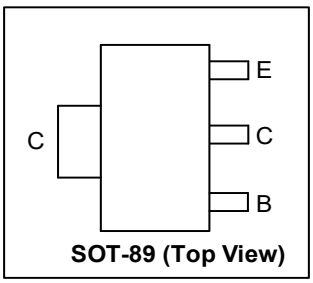
## Mechanical Characteristics

- SOT-89 Package
- Marking : Making Code
- RoHS Compliant & HF
- Device meets MSL3 requirement

## Schematic & PIN Configuration




Device Symbol




SOT-89 (Top View)

## Absolute Maximum Rating

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Collector Base Voltage | $V_{CBO}$ | 60 | V |
| Collector Emitter Voltage | $V_{CEO}$ | 40 | V |
| Emitter Base Voltage | $V_{EBO}$ | 6 | V |
| Collector Current | $I_C$ | 200 | mA |
| Collector Power Dissipation | $P_C$ | 500 | mW |
| Operating Temperature Range | $T_j$ | -55 ~ 150 | °C |
| Storage Temperature | $T_{stg}$ | -55 ~ 150 | °C |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 250 | °C/W |

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## Electrical Characteristics (Ta=25°C unless otherwise noted)

| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Collector-Base Breakdown Voltage | $V_{(BR)CBO}$ | $I_C$ = 10μA, $I_E$ = 0 | 60 | - | - | V |
| Collector-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | $I_C$ = 1mA, $I_B$ = 0 | 40 | - | - | V |
| Emitter-Base Breakdown Voltage | $V_{(BR)EBO}$ | $I_E$ = 10μA, $I_C$ = 0 | 6 | - | - | V |
| Collector Cut-off Current | $I_{CBO}$ | $V_{CB}$ = 60V, $I_E$ = 0 | - | - | 50 | nA |
| Collector Cut-off Current | $I_{CEX}$ | $V_{CE}$ = 30V, $V_{EB(off)}$ = 3V | - | - | 50 | nA |
| Emitter Cut-off Current | $I_{EBO}$ | $V_{EB}$ = 5V, $I_C$ = 0 | - | - | 100 | nA |
| DC Current Gain | $h_{FE(1)}$ | $V_{CE}$ =1V, $I_C$ = 0.1mA | 40 | - | - | - |
| | $h_{FE(2)}$ | $V_{CE}$ = 1V, $I_C$ = 1mA | 70 | - | - | - |
| | $h_{FE(3)}$ | $V_{CE}$ = 1V, $I_C$ = 10mA | 100 | - | 300 | - |
| | $h_{FE(4)}$ | $V_{CE}$ = 1V, $I_C$ = 50mA | 60 | - | - | - |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C$ =10mA, $I_B$ = 1mA | - | - | 0.2 | V |
| | | $I_C$ = 50mA, $I_B$ = 5mA | | | 0.3 | V |
| Base-Emitter Saturation Voltage | $V_{BE(sat)}$ | $I_C$ =10mA, $I_B$ = 1mA | 0.65 | - | 0.85 | V |
| | | $I_C$ = 50mA, $I_B$ = 5mA | - | - | 0.95 | V |
| Transition Frequency | $f_T$ | $V_{CE}$=20V, $I_C$=10mA, f=100MHz | 300 | - | - | MHz |
| Collector Output Capacitance | $C_{ob}$ | $V_{CB}$=5V, $I_E$=0, f=1MHz | - | - | 4 | pF |
| Base Input Capacitance | $C_{ib}$ | $V_{EB}$=0.5V, $I_C$=0, f=1MHz | - | - | 8 | pF |
| Delay Time | $t_d$ | $V_{CC}$ = 3V, $V_{BE(off)}$ = -0.5V, $I_C$ = 10mA, $I_{B1}$ = 1mA | - | - | 35 | ns |
| Rise Time | $t_r$ | $V_{CC}$ = 3V, $V_{BE(off)}$ = -0.5V, $I_C$ = 10mA, $I_{B1}$ = 1mA | - | - | 35 | ns |
| Storage Time | $t_s$ | $V_{CC}$ = 3V, $I_C$ = 10mA, $I_{B1}$ = $I_{B2}$ = 1mA | - | - | 200 | ns |
| Fall Time | $t_f$ | $V_{CC}$ = 3V, $I_C$ = 10mA, $I_{B1}$ = $I_{B2}$ = 1mA | - | - | 50 | ns |

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## Typical Characteristics

Figure 1.Static Characteristic

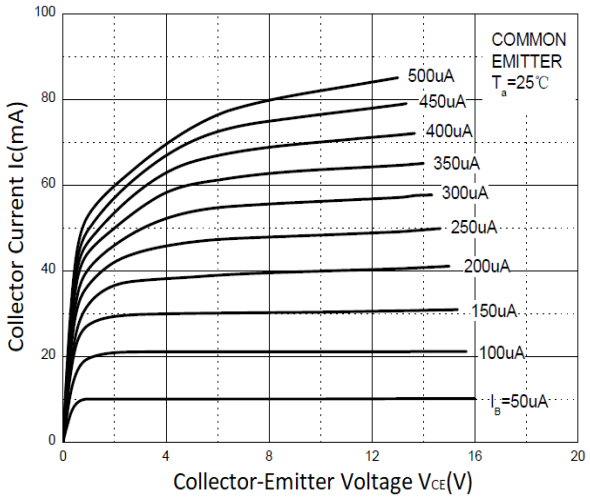



Figure 2. $h_{fe}$ vs. $I_C$

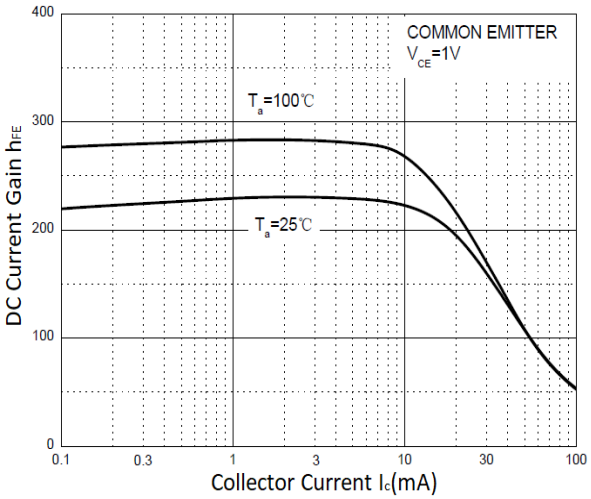



Figure 3. $V_{CEsat}$ vs. $I_C$

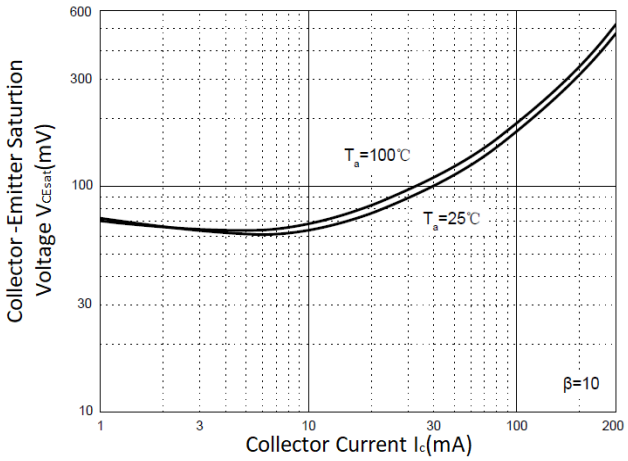



Figure 4. $V_{BEsat}$ vs. $I_C$

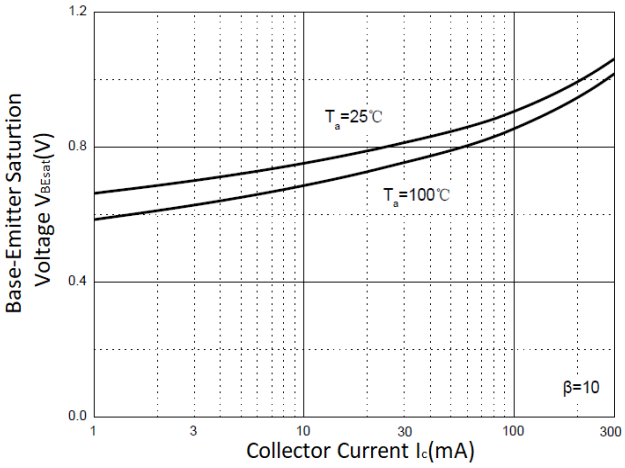



Figure 5. $I_C$ vs. $V_{BE}$

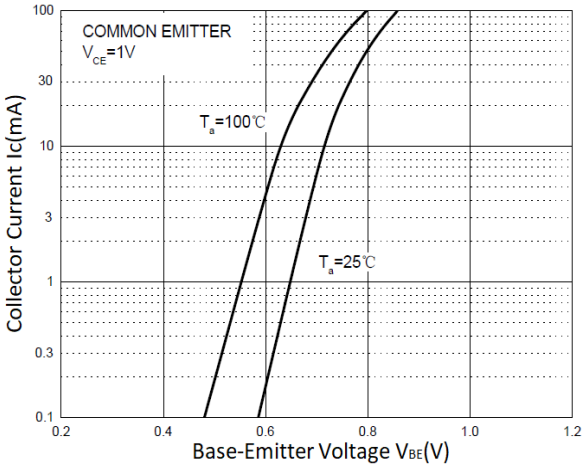
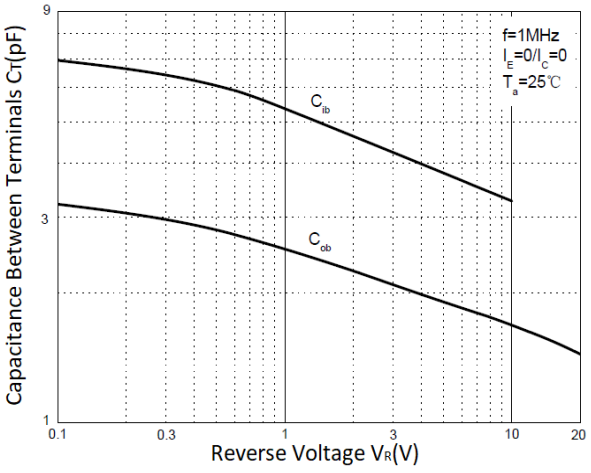
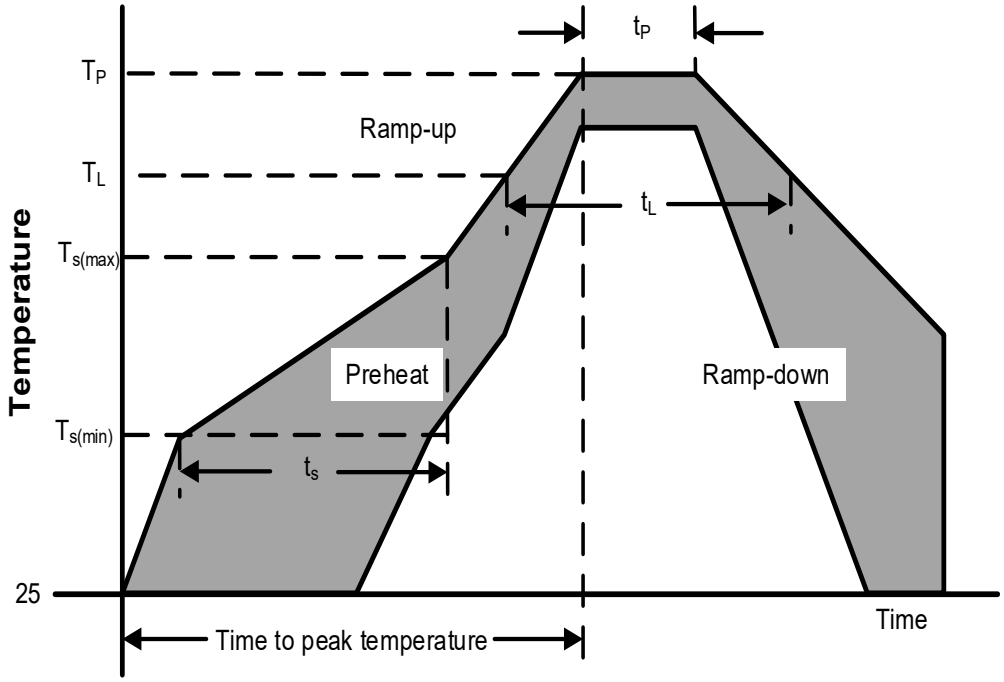



Figure 6. $C_{ob}$ / $C_{ib}$ vs. $V_{CB}$ / $V_{EB}$



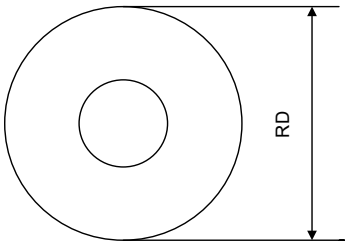
## Soldering Parameters

| Reflow Condition | | Pb – Free assembly |
|---|---|---|
| Pre Heat | Temperature Min ($T_{s(min)}$) | 150°C |
| | Temperature Max ($T_{s(max)}$) | 200°C |
| | Time (min to max) (ts ) | 60 – 190 secs |
| Average ramp up rate (Liquidus Temp) ($T_L$) to peak | | 5°C/second max |
| $T_{S(max)}$ to $T_L$——Ramp-up Rate | | 5°C/second max |
| Reflow | Temperature ($T_L$) (Liquidus) | 217°C |
| | Temperature ($t_L$) | 60 – 150 seconds |
| Peak Temperature ($T_P$) | | 260+0/-5 °C |
| Time within actual peak Temperature ($t_p$ ) | | 20 – 40 seconds |
| Ramp-down Rate | | 5°C/second max |
| Time 25°C to peak Temperature ($T_P$) | | 8 minutes Max. |
| Do not exceed | | 280°C |

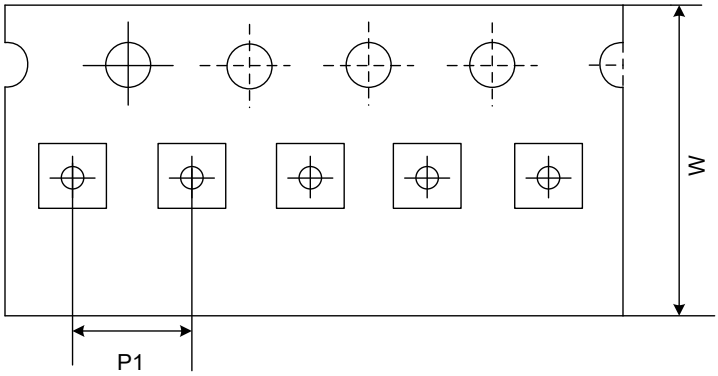


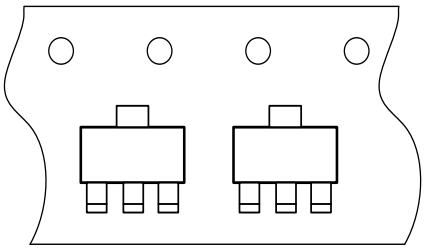
## Tape And Reel Information

**Reel Dimensions**




**Tape Dimensions**



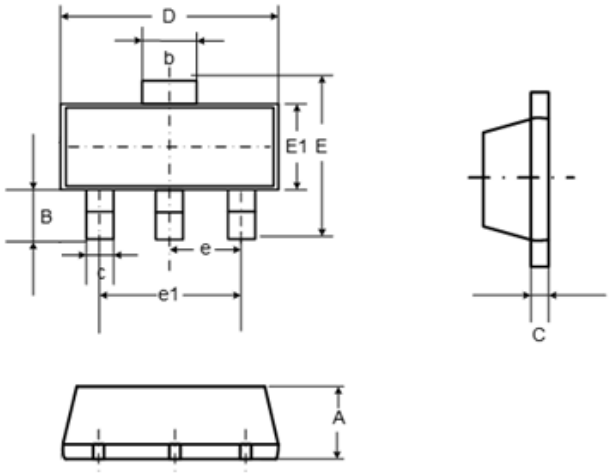


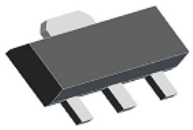
User Direction of Feed

| | | |
|---|---|---|
| RD | Reel Dimensions | 7 inch |
| W | Overall width of the carrier tape | 12 mm |
| P1 | Pitch between successive cavity centers | 8 mm |

## Outline Drawing – SOT-89

**PACKAGE OUTLINE**

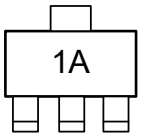


**SOT-89-3L**

| SYMBOL | MILIMETER | |
|---|---|---|
| | MIN | MAX |
| A | 1.40 | 1.60 |
| B | 0.85 | 1.20 |
| b | 1.50 | 1.80 |
| C | 0.35 | 0.44 |
| c | 0.32 | 0.52 |
| E | 3.94 | 4.30 |
| E1 | 2.30 | 2.60 |
| D | 4.40 | 4.60 |
| e | 1.45 | 1.55 |
| e1 | 3.00REF | |

## Marking Codes

| Part Number | WT3904J |
|---|---|
| Marking Code |  |



## Package Information

Qty：1k/Reel

### CONTACT INFORMATION

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WAYON website: **http://www.way-on.com**
For additional information, please contact your local Sales Representative.

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## Product Specification Statement

1. The product specification aims to provide users with a reference regarding various product parameters, performance, and usage. It presents certain aspects of the product's performance in graphical form and is intended solely for users to select product and make product comparisons, enabling users to better understand and evaluate the characteristics and advantages of the product. It does not constitute any commitment, warranty, or guarantee.

2. The product parameters described in the product specification are numerical values, characteristics, and functions obtained through actual testing or theoretical calculations of the product in an independent or ideal state. Due to the complexity of product applications and variations in test conditions and equipment, there may be slight fluctuations in parameter test values. WAYON shall not guarantee that the actual performance of the product when installed in the customer's system or equipment will be entirely consistent with the product specification, especially concerning dynamic parameters. It is recommended that users consult with professionals for product selection and system design. Users should also thoroughly validate and assess whether the actual parameters and performance when installed in their respective systems or equipment meet their requirements or expectations. Additionally, users should exercise caution in verifying product compatibility issues, and WAYON assumes no responsibility for the application of the product.

3. WAYON strives to provide accurate and up-to-date information to the best of our ability. However, due to technical, human, or other reasons, WAYON cannot guarantee that the information provided in the product specification is entirely accurate and error-free. WAYON shall not be held responsible for any losses or damages resulting from the use or reliance on any information in these product specifications. WAYON reserves the right to revise or update the product specification and the products at any time without prior notice, and the user's continued use of the product specification is considered an acceptance of these revisions and updates. Prior to purchasing and using the product, users should verify the above information with WAYON to ensure that the product specification is the most current, effective, and complete. If users are particularly concerned about product parameters, please consult WAYON in detail or request relevant product test reports. Any data not explicitly mentioned in the product specification shall be subject to separate agreement.

4. Users are advised to pay attention to the parameter limit values specified in the product specification and maintain a certain margin in design or application to ensure that the product does not exceed the parameter limit values defined in the product specification. This precaution should be taken to avoid exceeding one or more of the limit values, which may result in permanent irreversible damage to the product, ultimately affecting the quality and reliability of the system or equipment.

5. The design of the product is intended to meet civilian needs and is not guaranteed for use in harsh environments or precision equipment. It is not recommended for use in systems or equipment such as medical devices, aircraft, nuclear power, and similar systems, where failures in these systems or equipment could reasonably be expected to result in personal injury. WAYON shall assume no responsibility for any consequences resulting from such usage.

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