

## FEATURES

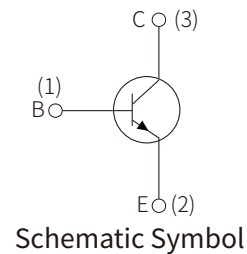
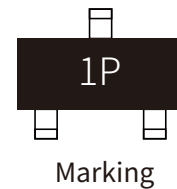
- Complementary to MMBT2907A
- Power Dissipation of 300mW
- High Stability and High Reliability

## MECHANICAL DATA

- SOT-23 small outline plastic package
- Epoxy UL: 94V-0
- Mounting position: Any

## APPROVALS

|             |                                    |
|-------------|------------------------------------|
| <b>RoHS</b> | Compliance with 2011/65/EU         |
| <b>HF</b>   | Compliance with IEC61249-2-21:2003 |



## MAXIMUM RATINGS ( $T_A=25^{\circ}\text{C}$ )

| Parameter                                   | Symbol          | Value    | Unit                        |
|---------------------------------------------|-----------------|----------|-----------------------------|
| Collector-Base Voltage                      | $V_{CBO}$       | 75       | V                           |
| Collector-Emitter Voltage                   | $V_{CEO}$       | 40       |                             |
| Emitter-Base Voltage                        | $V_{EBO}$       | 6        |                             |
| Collector Current                           | $I_C$           | 600      | mA                          |
| Collector Power Dissipation                 | $P_C$           | 300      | mW                          |
| Thermal Resistance From Junction To Ambient | $R_{\theta JA}$ | 417      | $^{\circ}\text{C}/\text{W}$ |
| Junction Temperature                        | $T_J$           | 150      | $^{\circ}\text{C}$          |
| Storage Temperature                         | $T_{STG}$       | -55~+150 | $^{\circ}\text{C}$          |

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C)

| Parameter                            | Symbol                 | Test Conditions                                                                                   | Min. | Typ. | Max. | Unit |
|--------------------------------------|------------------------|---------------------------------------------------------------------------------------------------|------|------|------|------|
| Collector-base breakdown voltage     | V <sub>(BR)CBO</sub>   | I <sub>C</sub> =10μA, I <sub>E</sub> =0                                                           | 75   |      |      | V    |
| Collector-emitter breakdown voltage  | V <sub>(BR)CEO</sub>   | I <sub>C</sub> =10mA, I <sub>B</sub> =0                                                           | 40   |      |      |      |
| Emitter-base breakdown voltage       | V <sub>(BR)EBO</sub>   | I <sub>E</sub> =10μA, I <sub>C</sub> =0                                                           | 6    |      |      |      |
| Collector cut-off current            | I <sub>CEX</sub>       | V <sub>CE</sub> =30V, V <sub>EB(off)</sub> =3V                                                    |      |      | 10   | nA   |
| Collector cut-off current            | I <sub>CBO</sub>       | V <sub>CB</sub> =60V, I <sub>E</sub> =0                                                           |      |      | 10   |      |
| Emitter cut-off current              | I <sub>EBO</sub>       | V <sub>EB</sub> =3V, I <sub>C</sub> =0                                                            |      |      | 100  |      |
| DC current gain                      | h <sub>FE(1)</sub>     | V <sub>CE</sub> =10V, I <sub>C</sub> =150mA                                                       | 100  |      | 300  |      |
|                                      | h <sub>FE(2)</sub>     | V <sub>CE</sub> =10V, I <sub>C</sub> =0.1mA                                                       | 40   |      |      |      |
|                                      | h <sub>FE(3)</sub>     | V <sub>CE</sub> =10V, I <sub>C</sub> =500mA                                                       | 42   |      |      |      |
| Collector-emitter saturation voltage | V <sub>CE(sat)1*</sub> | I <sub>C</sub> =500mA, I <sub>B</sub> =50mA                                                       |      |      | 1.00 | V    |
|                                      | V <sub>CE(sat)2*</sub> | I <sub>C</sub> =150mA, I <sub>B</sub> =15mA                                                       |      |      | 0.30 |      |
| Base-emitter saturation voltage      | V <sub>BE(sat)1*</sub> | I <sub>C</sub> =500mA, I <sub>B</sub> =50mA                                                       |      |      | 2.00 |      |
|                                      | V <sub>BE(sat)2*</sub> | I <sub>C</sub> =150mA, I <sub>B</sub> =15mA                                                       |      |      | 1.20 |      |
| Transition frequency                 | f <sub>T</sub>         | V <sub>CE</sub> =20V, I <sub>C</sub> =20mA, f=100MHz                                              | 300  |      |      | MHz  |
| Delay time                           | td                     | V <sub>CC</sub> =30V, V <sub>BE(off)</sub> =-0.5V<br>I <sub>C</sub> =150mA, I <sub>B1</sub> =15mA |      |      | 10   | nS   |
| Rise time                            | tr                     |                                                                                                   |      |      | 25   |      |
| Storage time                         | ts                     | V <sub>CC</sub> =30V, I <sub>C</sub> =150mA,<br>I <sub>B1</sub> =I <sub>B2</sub> =15mA            |      |      | 225  |      |
| Fall time                            | tf                     |                                                                                                   |      |      | 60   |      |

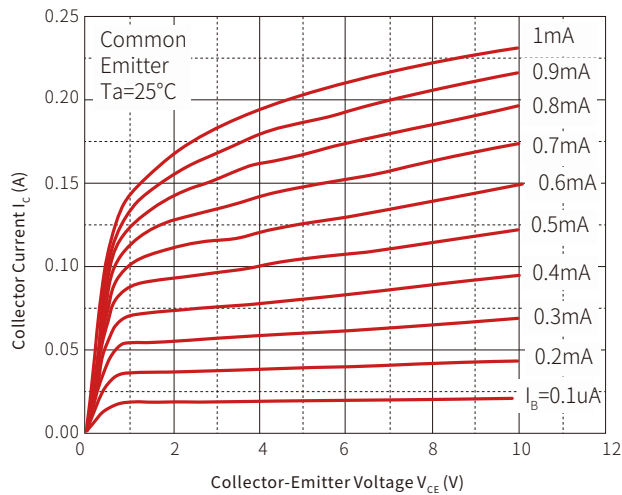
\*Pulse test: pulse width ≤300μs, duty cycle ≤2.0%.

## CLASSIFICATION OF H<sub>FE(1)</sub>

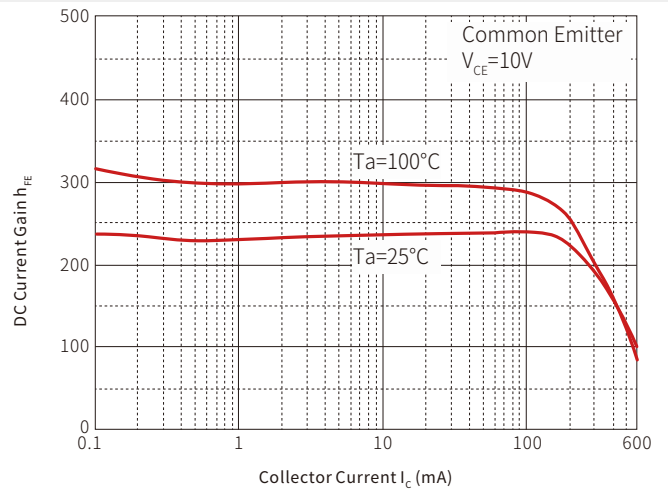
|       |         |         |
|-------|---------|---------|
| Rank  | L       | H       |
| Range | 100-200 | 200-300 |

## TYPICAL CHARACTERISTICS

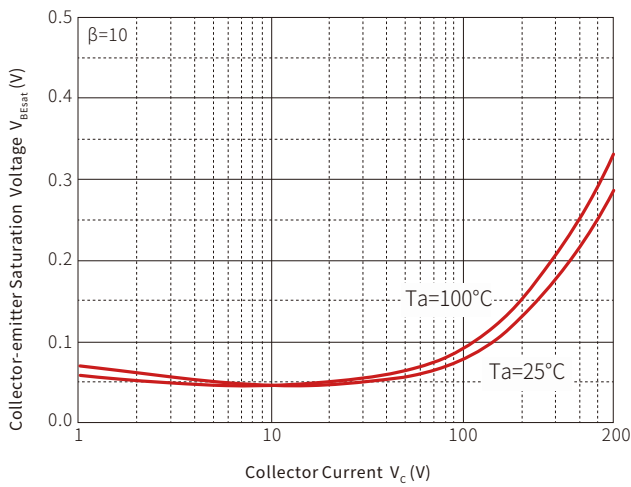
Static Characteristic



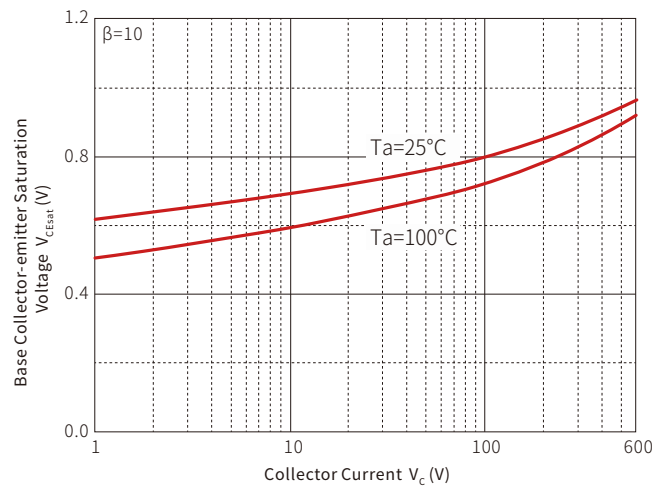
$h_{FE}$  —  $I_C$

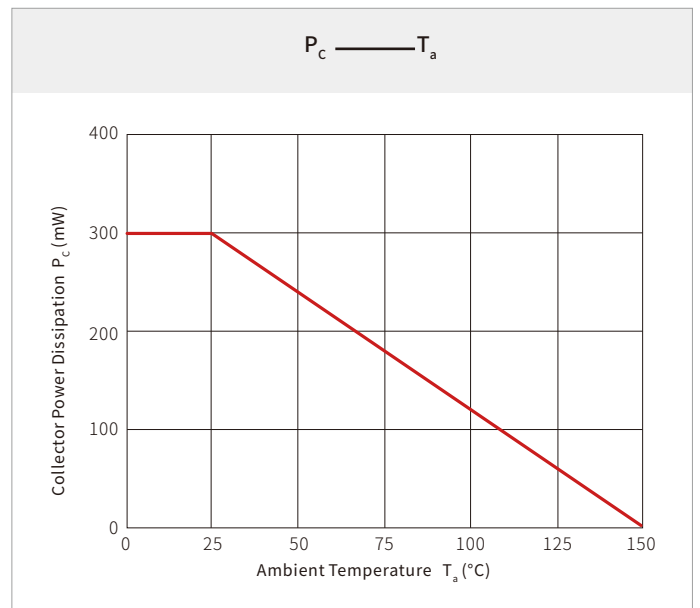
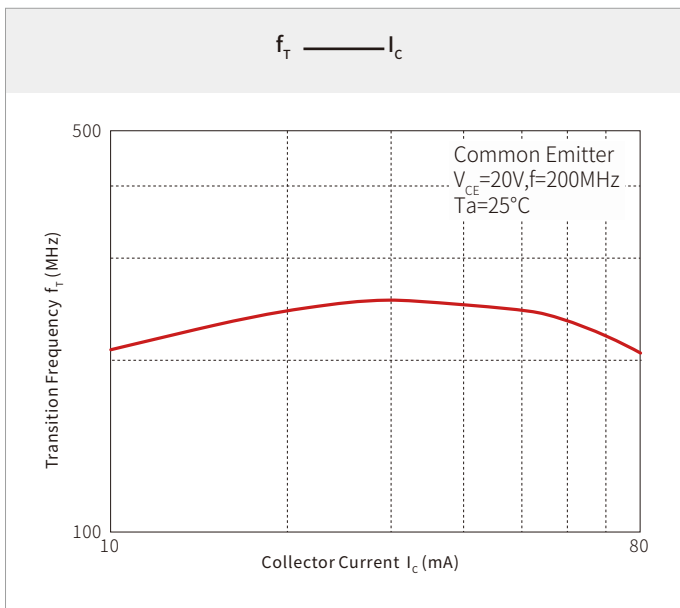
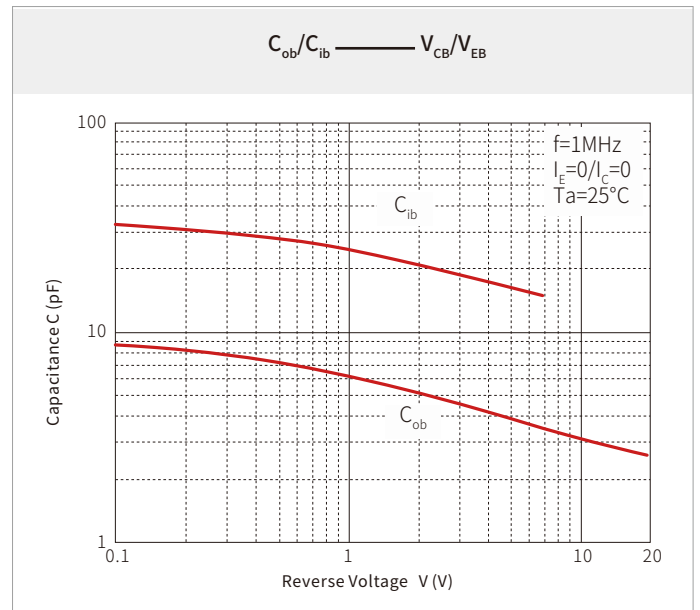
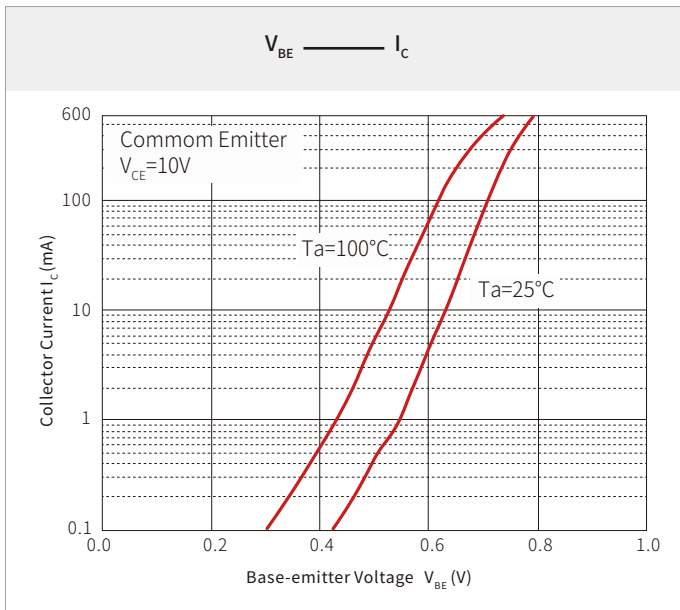


$V_{BE\text{ sat}}$  —  $I_C$



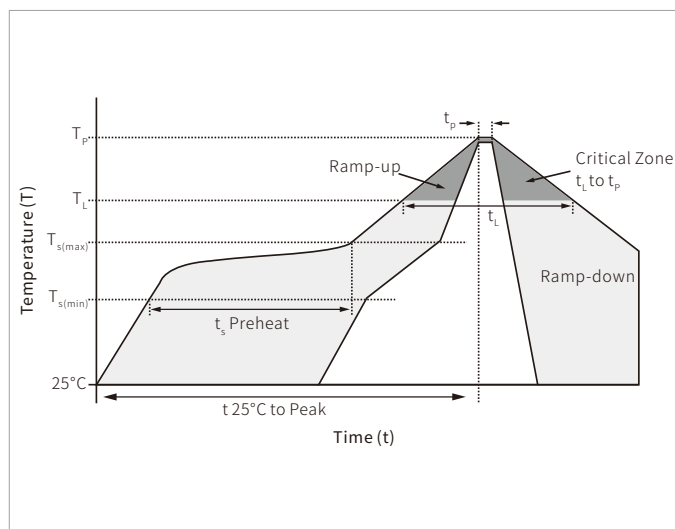
$V_{CE\text{ sat}}$  —  $I_C$



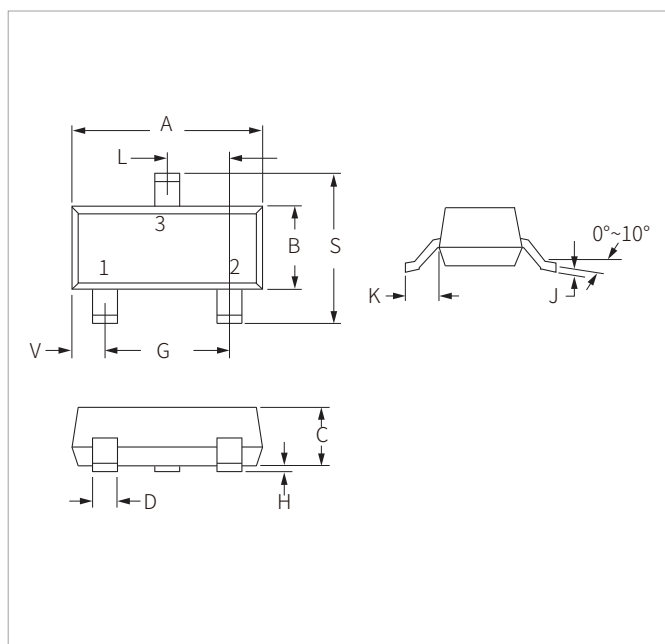


## SOLDERING PARAMETERS

| Reflow Condition                                       |                                  | Lead-free assembly |
|--------------------------------------------------------|----------------------------------|--------------------|
| Pre Heat                                               | Temperature Max ( $T_{s(min)}$ ) | 150°C              |
|                                                        | Temperature Max ( $T_{s(max)}$ ) | 200°C              |
|                                                        | Time (min to max) ( $t_s$ )      | 60 – 180 secs      |
| Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak) |                                  | 3°C/second max     |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                   |                                  | 3°C/second max     |
| Reflow                                                 | Temperature ( $T_L$ ) (Liquidus) | 217°C              |
|                                                        | Time (min to max) ( $t_L$ )      | 60 – 150 seconds   |
| Peak Temperature ( $T_p$ )                             |                                  | 260°C              |
| Time within 5°C of actual peak Temperature ( $t_p$ )   |                                  | 20 – 40 seconds    |
| Ramp-down Rate                                         |                                  | 6°C/second max     |
| Time 25°C to peak Temperature ( $T_p$ )                |                                  | 8 minutes max.     |
| Do not exceed                                          |                                  | 260°C              |

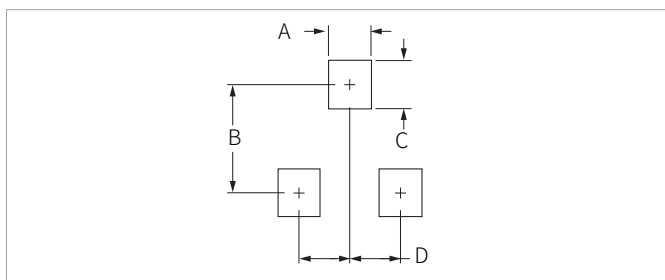


## SOT-23 PACKAGE INFORMATION



| Ref. | Millimeters |       | Inches |       |
|------|-------------|-------|--------|-------|
|      | Min.        | Max.  | Min.   | Max.  |
| A    | 2.80        | 3.05  | 0.110  | 0.120 |
| B    | 1.20        | 1.40  | 0.047  | 0.055 |
| C    | 0.90        | 1.15  | 0.035  | 0.045 |
| D    | 0.37        | 0.50  | 0.015  | 0.020 |
| G    | 1.75        | 2.05  | 0.069  | 0.081 |
| H    | 0.01        | 0.100 | 0.001  | 0.004 |
| J    | 0.085       | 0.180 | 0.003  | 0.007 |
| K    | 0.35        | 0.69  | 0.014  | 0.029 |
| L    | 0.89        | 1.02  | 0.035  | 0.040 |
| S    | 2.10        | 2.65  | 0.083  | 0.104 |
| V    | 0.45        | 0.60  | 0.018  | 0.024 |

## RECOMMENDED PAD LAYOUT DIMENSIONS



| Ref. | Millimeters |      | Inches |       |
|------|-------------|------|--------|-------|
|      | Min.        | Max. | Min.   | Max.  |
| A    | 0.71        | 0.97 | 0.028  | 0.038 |
| B    | 1.88        | 2.13 | 0.074  | 0.084 |
| C    | 0.71        | 0.97 | 0.028  | 0.038 |
| D    | 0.81        | 1.07 | 0.032  | 0.042 |

## ORDERING INFORMATION

| Part Number | Component Package | QTY/Reel | Reel Size |
|-------------|-------------------|----------|-----------|
| MMBT2222A   | SOT-23            | 3000PCS  | 7"        |

**Headquarters**

No.3387 Shendu Road  
Pujiang I&E Park  
Minhang Shanghai China  
201000

**Hotline**

400-021-5756

**Web**

<https://www.semiware.com>

**Sales Center**

Tel: 86-21-3463-7458  
Email: [sales18@semiware.com](mailto:sales18@semiware.com)

**Customer Service**

Tel: 86-21-5484-1001  
Email: [sales17@semiware.com](mailto:sales17@semiware.com)

**Technical Support**

Tel: 86-21-3463-7654  
Email: [fae01@semiware.com](mailto:fae01@semiware.com)

**Complaint & Suggestions**

Tel: 86-21-3463-7172  
Ext: 8868  
Email: [cs03@semiware.com](mailto:cs03@semiware.com)

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