

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

| Characteristics                             | Conditions                              | Symbol   | Min. | Max. | Unit              |
|---|---|----------|------|------|-------------------|
| <b>OFF CHARACTERISTICS</b>                  |   |          |      |      |                   |
| Collector-Emitter Breakdown Voltage         | Ic = 1mA , (Note)                       | V(BR)CEO | 40   |      | V                 |
| Collector-Base Breakdown Voltage            | Ic = 10μA                               | V(BR)CBO | 60   |      | V                 |
| Emitter-Base Breakdown Voltage              | IE = 10μA                               | V(BR)EBO | 6.0  |      | V                 |
| Base Cut-off Current                        | VCE=30V , VEB=3V                        | IBL      |      | 50   | nA                |
| Collector Cut-off Current                   | VCE=30V , VEB=3V                        | ICEX     |      | 50   | nA                |
| <b>ON CHARACTERISTICS (Note)</b>            |   |          |      |      |                   |
| DC Current Gain                             | VCE=1V , Ic=0.1mA                       | hFE      | 40   |      |                   |
|   | VCE=1V , Ic=1.0mA                       |          | 70   |      |                   |
|   | VCE=1V , Ic=10mA                        |          | 100  | 300  |                   |
|   | VCE=1V , Ic=50mA                        |          | 60   |      |                   |
|   | VCE=1V , Ic=100mA                       |          | 30   |      |                   |
| Collector-Emitter Saturation Voltage (Note) | Ic=10mA , IB=1.0mA                      | VCE(sat) |      | 0.2  | V                 |
|   | Ic=50mA , IB=5.0mA                      |          |      | 0.3  |                   |
| Base-Emitter Saturation Voltage (Note)      | Ic=10mA , IB=1.0mA                      | VBE(sat) | 0.65 | 0.85 | V                 |
|   | Ic=50mA , IB=5mA                        |          |      | 0.95 |                   |
| <b>SMALL-SIGNAL CHARACTERISTICS</b>         |   |          |      |      |                   |
| Current - Gain - Bandwidth Product          | VCE=20V , Ic=10mA , f=100MHz            | fr       | 300  |      | MHZ               |
| Output Capacitance                          | VCB=5.0V , IE=0 , f=1.0MHz              | Cobo     |      | 4.0  | pF                |
| Input Capacitance                           | VBE=0.5V , Ic=0 , f=1.0MHz              | Cibo     |      | 8.0  | pF                |
| Input Impedancen                            | VCE=10V , Ic=1.0mA , f=1.0kHz           | hie      | 1.0  | 10   | kΩ                |
| Voltage Feedback Ratio                      | VCE=10V , Ic=1.0mA , f=1.0kHz           | hre      | 0.5  | 8.0  | X10 <sup>-4</sup> |
| Small - Signal Current Gain                 | VCE=10V , Ic=1.0mA , f=1.0kHz           | hfe      | 100  | 400  |                   |
| Output Admittance                           | VCE=10V , Ic=1.0mA , f=1.0kHz           | hoe      | 1.0  | 40   | μmos              |
| Noise Figure                                | VCE=5V , Ic=100μA , f=1.0kHz , Rs=1.0kΩ | NF       |      | 5.0  | dB                |
| <b>SWITCHING CHARACTERISTICS</b>            |   |          |      |      |                   |
| Delay Time                                  | VCC=3.0V , VBE=-0.5V                    | td       |      | 35   | nS                |
| Rise Time                                   | Ic=10mA , IB1=1.0mA                     | tr       |      | 35   | nS                |
| Storage Time                                | VCC=3.0V ,                              | ts       |      | 200  | nS                |
| Fall Time                                   | Ic=10mA , IB1=IB2=1.0mA                 | tf       |      | 50   | nS                |

Note: 1. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2.0%.

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REV:E

## RATING AND CHARACTERISTIC CURVES (MMBT3904-G)

Fig.1 - ON Voltages

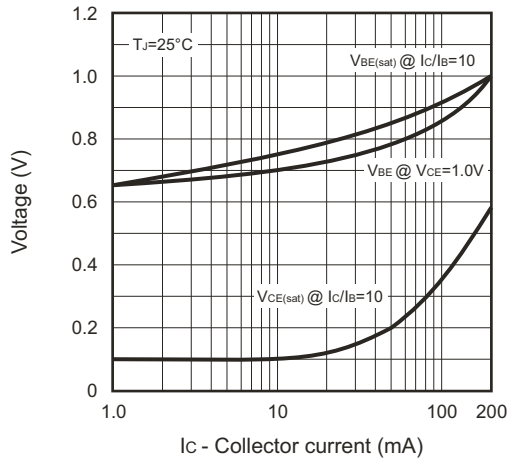


Fig.2 - Temperature Coefficients

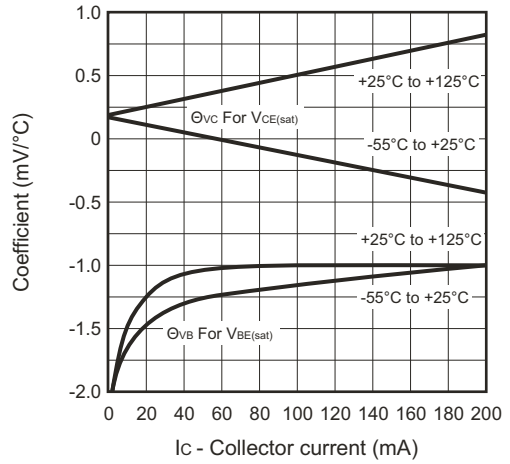


Fig.3 - Turn-On Time

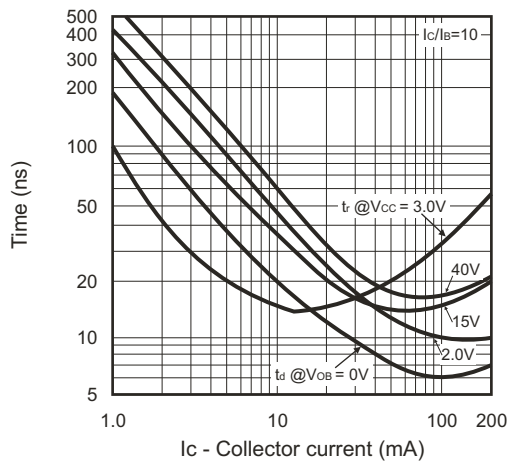


Fig.4 - Rise Time

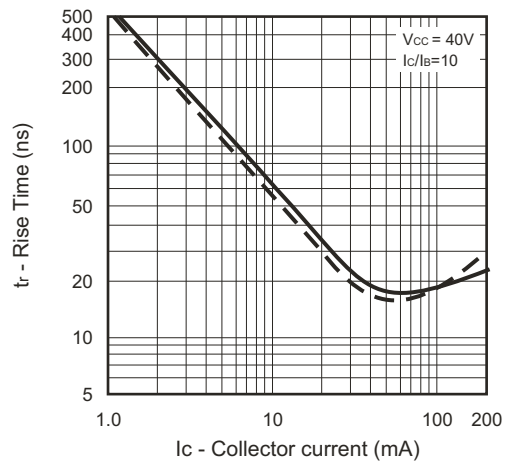


Fig.5 - Collector Saturation Region

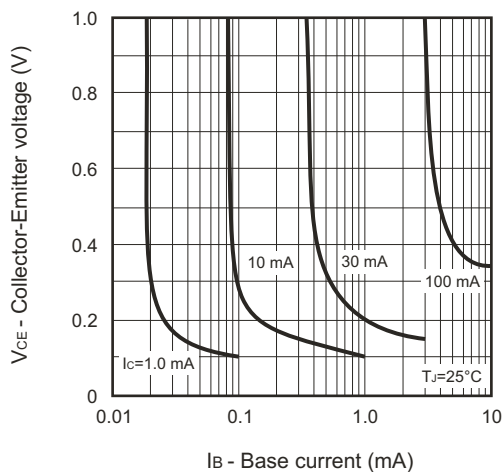
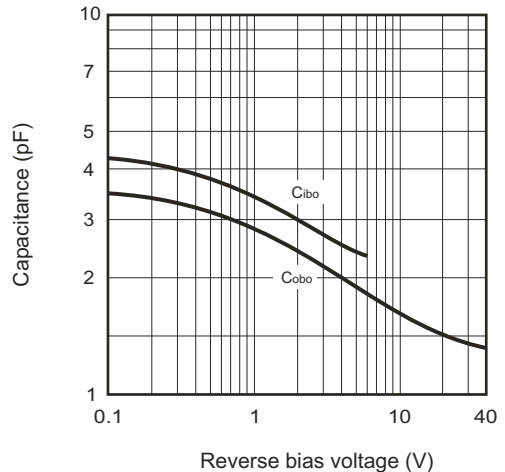
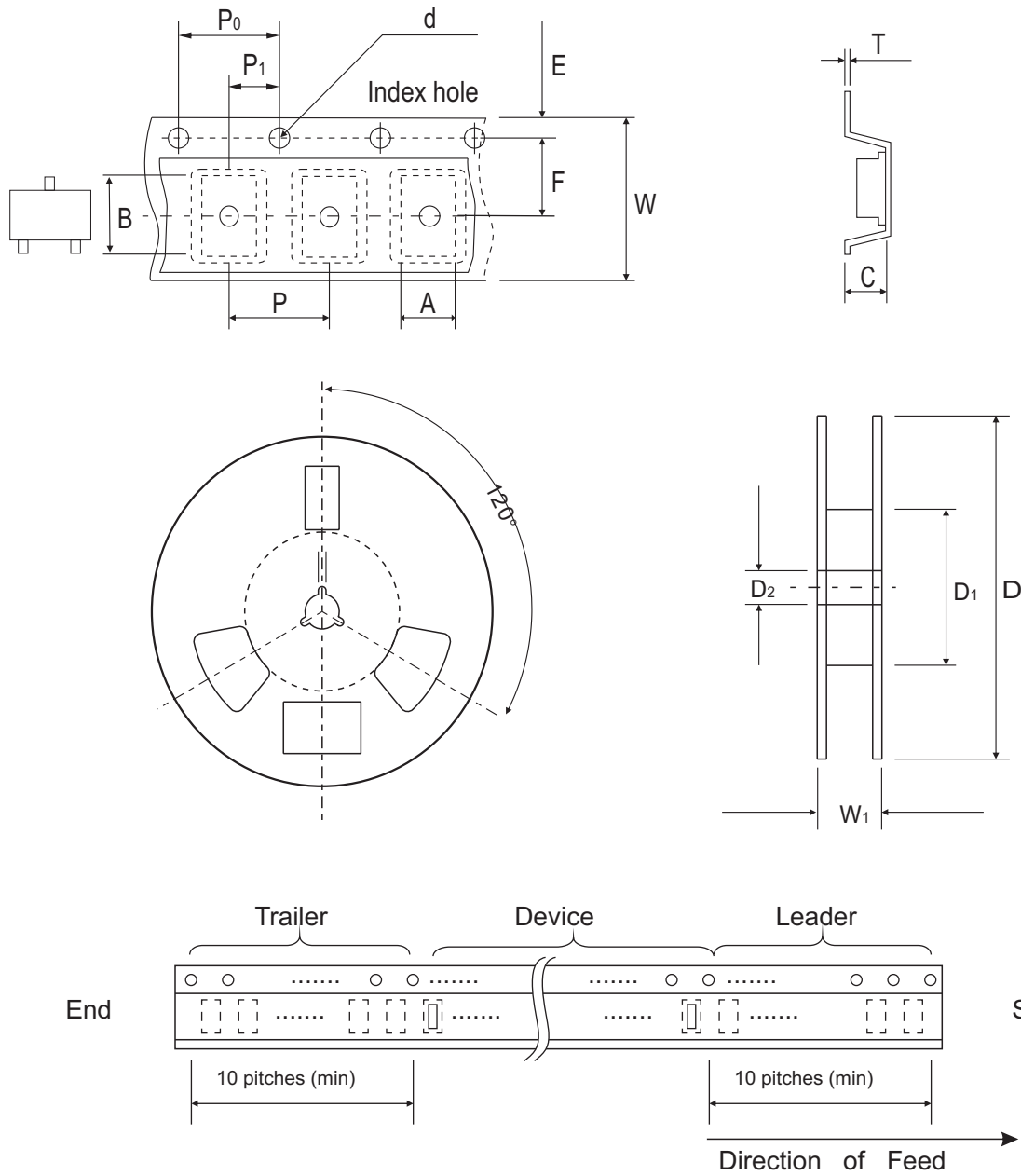


Fig.6 - Capacitance



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## Reel Taping Specification

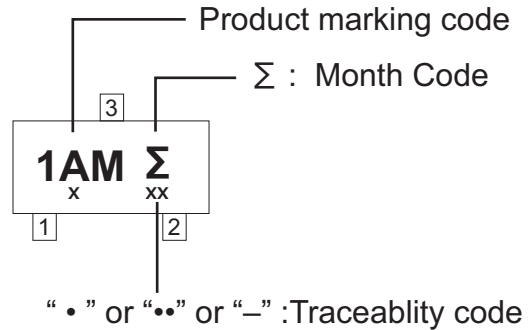


| SOT-23 | SYMBOL | A             | B             | C             | d             | D            | D <sub>1</sub> | D <sub>2</sub> |
|--------|--------|---------------|---------------|---------------|---------------|--------------|----------------|----------------|
|        | (mm)   | 3.10 ± 0.10   | 2.85 ± 0.10   | 1.40 ± 0.10   | 1.55 ± 0.10   | 178 ± 1      | 50.0 MIN.      | 13.0 ± 0.20    |
|        | (inch) | 0.122 ± 0.004 | 0.112 ± 0.004 | 0.055 ± 0.004 | 0.061 ± 0.004 | 7.008 ± 0.04 | 1.969 MIN.     | 0.512 ± 0.008  |

| SOT-23 | SYMBOL | E             | F             | P             | P <sub>0</sub> | P <sub>1</sub> | W             | W <sub>1</sub> |
|--------|--------|---------------|---------------|---------------|----------------|----------------|---------------|----------------|
|        | (mm)   | 1.75 ± 0.10   | 3.50 ± 0.05   | 4.00 ± 0.10   | 4.00 ± 0.10    | 2.00 ± 0.05    | 8.00 ± 0.30   | 14.4 MAX.      |
|        | (inch) | 0.069 ± 0.004 | 0.138 ± 0.002 | 0.157 ± 0.004 | 0.157 ± 0.004  | 0.079 ± 0.004  | 0.315 ± 0.008 | 0.567 MAX.     |

## Marking Code

| Part Number | Marking Code |       |
|-------------|--------------|-------|
| MMBT3904-G  | 1AM          | 1AM Σ |



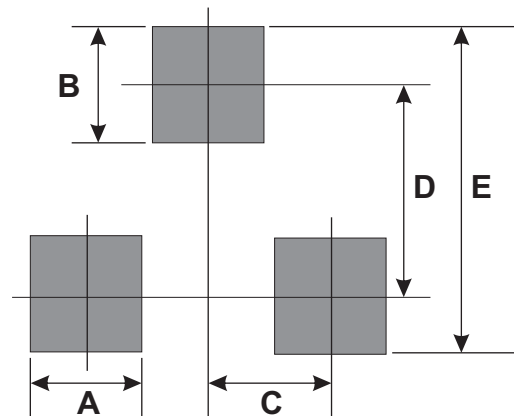
## Month Code:

| Month | Odd Year (per A.D.) | Even Year (per A.D.) |
|-------|---------------------|----------------------|
| Jan   | 1                   | E                    |
| Feb   | 2                   | F                    |
| Wer   | 3                   | H                    |
| Apr   | 4                   | J                    |
| May   | 5                   | K                    |
| Jun   | 6                   | L                    |

| Month | Odd Year (per A.D.) | Even Year (per A.D.) |
|-------|---------------------|----------------------|
| Jul   | 7                   | N                    |
| Aug   | 8                   | P                    |
| Sep   | 9                   | U                    |
| Oct   | T                   | X                    |
| Nov   | V                   | Y                    |
| Dec   | C                   | Z                    |

## Suggested PAD Layout

| SIZE | SOT-23 |        |
|------|--------|--------|
|      | (mm)   | (inch) |
| A    | 0.80   | 0.031  |
| B    | 0.90   | 0.035  |
| C    | 0.95   | 0.037  |
| D    | 2.00   | 0.079  |
| E    | 2.90   | 0.114  |



## Standard Packaging

| Case Type | REEL PACK    |                  |
|-----------|--------------|------------------|
|           | REEL ( pcs ) | Reel Size (inch) |
| SOT-23    | 3,000        | 7                |

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