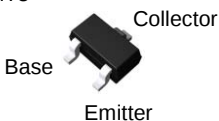
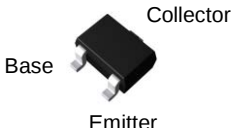
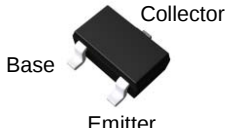


| Parameter | Value |
|-----------|-------|
| $V_{CEO}$ | 50V   |
| $I_C$     | 150mA |

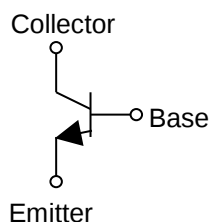
### ●Features

- 1) High DC current gain.  
 $h_{FE} \approx 2700$  (Max.)
- 2) High emitter-base voltage.  
 $V_{EBO}$  is Min. 12V
- 3) Low  $V_{CE(sat)}$   
 $V_{CE(sat)} = 0.3V$  (Max.)  
( $I_C/I_B = 50mA/5mA$ )
- 4) Lead Free/RoHS Compliant.

### ●Outline

|                                                                                                                                   |                                                                                                                                     |
|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| <p>VMT3</p>  <p>2SD2707<br/>(SC-105AA)</p>      | <p>EMT3</p>  <p>2SD2654<br/>SOT-416 (SC-75A)</p> |
| <p>UMT3</p>  <p>2SD2351<br/>SOT-323 (SC-70)</p> | <p>SMT3</p>  <p>2SD2226K<br/>SOT-346 (SC-59)</p> |

### ●Inner circuit



### ●Applications

Muting circuit

### ●Packaging specifications

| Part No. | $h_{FE}$ | Package | Package size (mm) | Taping code | Reel size (mm) | Tape width (mm) | Basic ordering unit (pcs) | Marking           |
|----------|----------|---------|-------------------|-------------|----------------|-----------------|---------------------------|-------------------|
| 2SD2707  | V        | VMT3    | 1212              | T2L         | 180            | 8               | 8,000                     | BJx <sup>*1</sup> |
| 2SD2654  | VW       | EMT3    | 1616              | TL          | 180            | 8               | 3,000                     | BJx <sup>*1</sup> |
| 2SD2351  | VW       | UMT3    | 2021              | T106        | 180            | 8               | 3,000                     | BJx <sup>*1</sup> |
| 2SD2226K | VW       | SMT3    | 2928              | T146        | 180            | 8               | 3,000                     | BJx <sup>*1</sup> |

\*1 x :  $h_{FE}$  rank

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

| Parameter                    |                   | Symbol        | Values      | Unit |
|------------------------------|-------------------|---------------|-------------|------|
| Collector-base voltage       |                   | $V_{CBO}$     | 60          | V    |
| Collector-emitter voltage    |                   | $V_{CEO}$     | 50          | V    |
| Emitter-base voltage         |                   | $V_{EBO}$     | 12          | V    |
| Collector current            |                   | $I_C$         | 150         | mA   |
|                              |                   | $I_{CP}^{*1}$ | 200         | mA   |
| Power dissipation            | 2SD2226K, 2SD2351 | $P_D^{*2}$    | 200         | mW   |
|                              | 2SD2351, 2SD2707  |               | 150         | mW   |
| Junction temperature         |                   | $T_j$         | 150         | °C   |
| Range of storage temperature |                   | $T_{stg}$     | -55 to +150 | °C   |

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

| Parameter                            | Symbol        | Conditions                                                      | Min. | Typ. | Max. | Unit          |
|--------------------------------------|---------------|-----------------------------------------------------------------|------|------|------|---------------|
| Collector-emitter breakdown voltage  | $BV_{CEO}$    | $I_C = 1\text{mA}$                                              | 50   | -    | -    | V             |
| Collector-base breakdown voltage     | $BV_{CBO}$    | $I_C = 10\mu\text{A}$                                           | 60   | -    | -    | V             |
| Emitter-base breakdown voltage       | $BV_{EBO}$    | $I_E = 10\mu\text{A}$                                           | 12   | -    | -    | V             |
| Collector cut-off current            | $I_{CBO}$     | $V_{CB} = 50\text{V}$                                           | -    | -    | 0.3  | $\mu\text{A}$ |
| Emitter cut-off current              | $I_{EBO}$     | $V_{EB} = 12\text{V}$                                           | -    | -    | 0.3  | $\mu\text{A}$ |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $I_C = 50\text{mA}, I_B = 5\text{mA}$                           | -    | -    | 0.3  | V             |
| DC current gain                      | $h_{FE}$      | $V_{CE} = 5\text{V}, I_C = 1\text{mA}$                          | 820  | -    | 2700 | -             |
| Transition frequency                 | $f_T$         | $V_{CE} = 5\text{V}, I_E = -10\text{mA}$<br>$f = 100\text{MHz}$ | -    | 250  | -    | MHz           |
| Output capacitance                   | $C_{ob}$      | $V_{CB} = 5\text{V}, I_E = 0\text{mA}$<br>$f = 1\text{MHz}$     | -    | 3.5  | -    | pF            |

\*1  $P_W = 10\text{ms}$  Single pulse.

\*2 Each terminal mounted on a reference footprint

**● $h_{FE}$  rank categories**

| Rank     | V           | W            |
|----------|-------------|--------------|
| $h_{FE}$ | 820 to 1800 | 1200 to 2700 |

●Electrical characteristic curves( $T_a = 25^\circ\text{C}$ )

Fig.1 Ground Emitter Propagation Characteristics

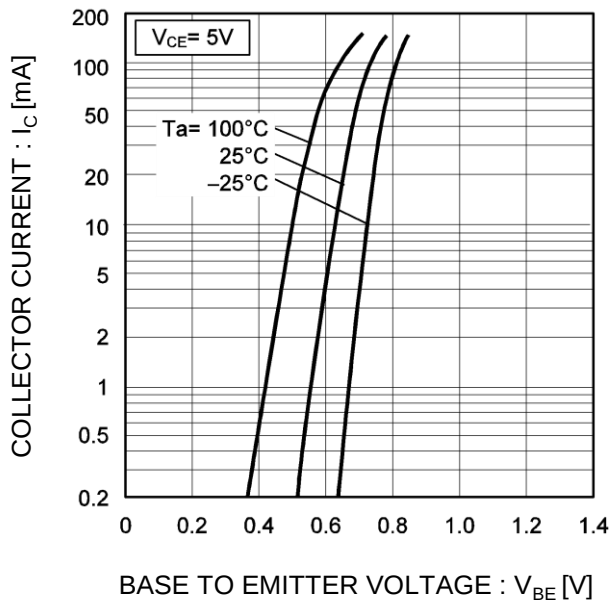


Fig.2 Typical Output Characteristics

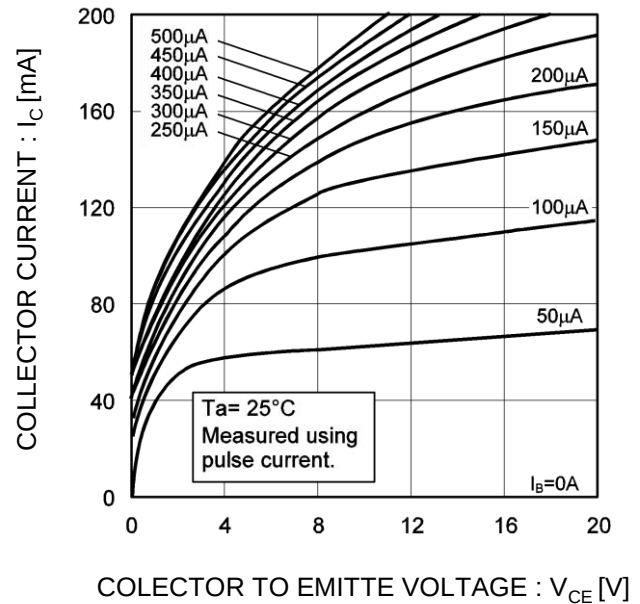


Fig.3 DC Current Gain vs. Collector Current(I)

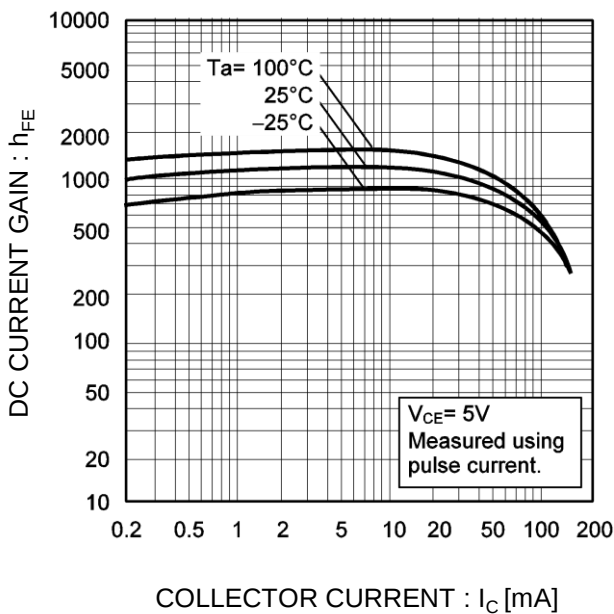
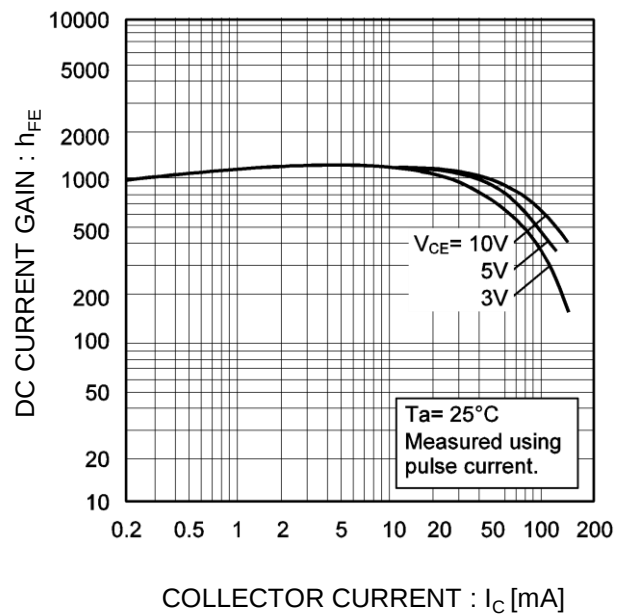


Fig.4 DC Current Gain vs. Collector Current(II)



●Electrical characteristic curves(Ta = 25°C)

Fig.5 Collector-Emitter Saturation Voltage vs. Collector Current (I)

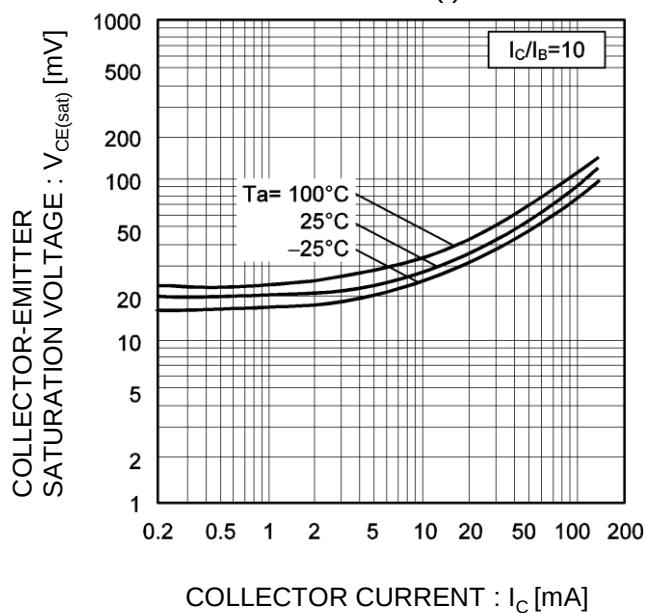


Fig.6 Collector-Emitter Saturation Voltage vs. Collector Current (II)

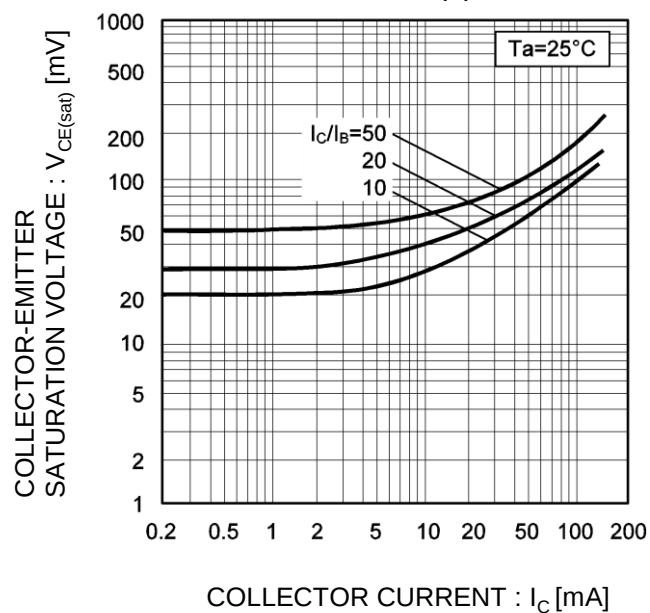


Fig.7 Base-Emitter Saturation Voltage vs. Collector Current

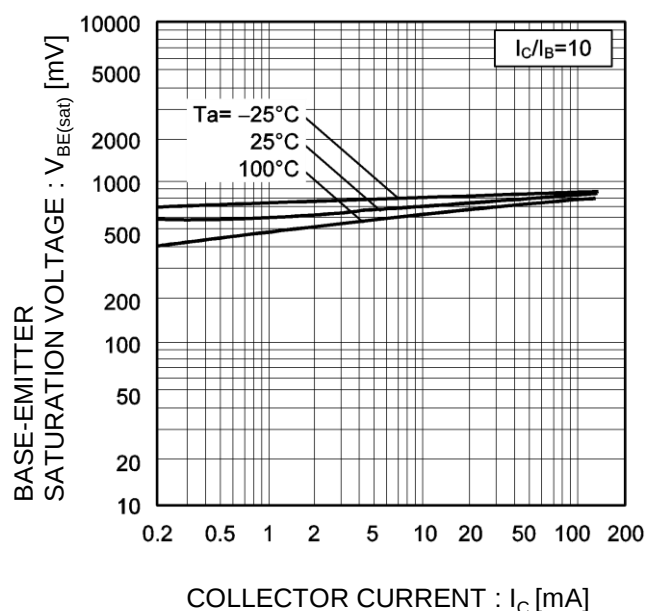
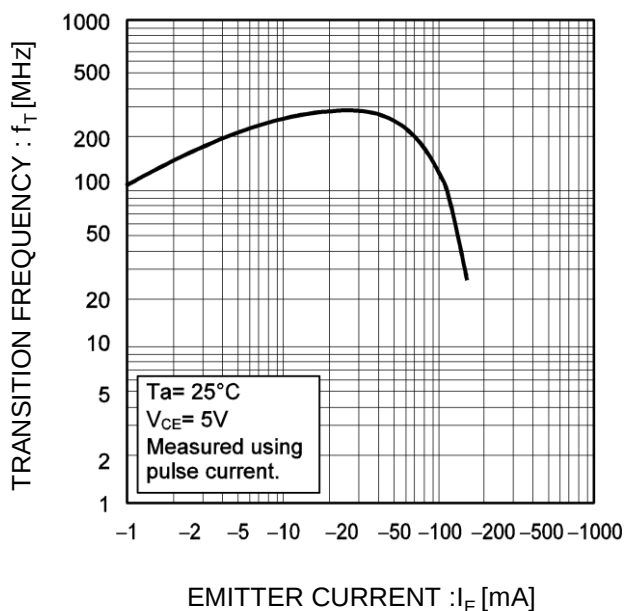


Fig.8 Gain Bandwidth Product vs. Emitter Current



# ●Electrical characteristic curves(Ta = 25°C)

Fig.9 Emitter input capacitance vs.  
Emitter-Base Voltage  
Collector output capacitance vs.  
Collector-Base Voltage

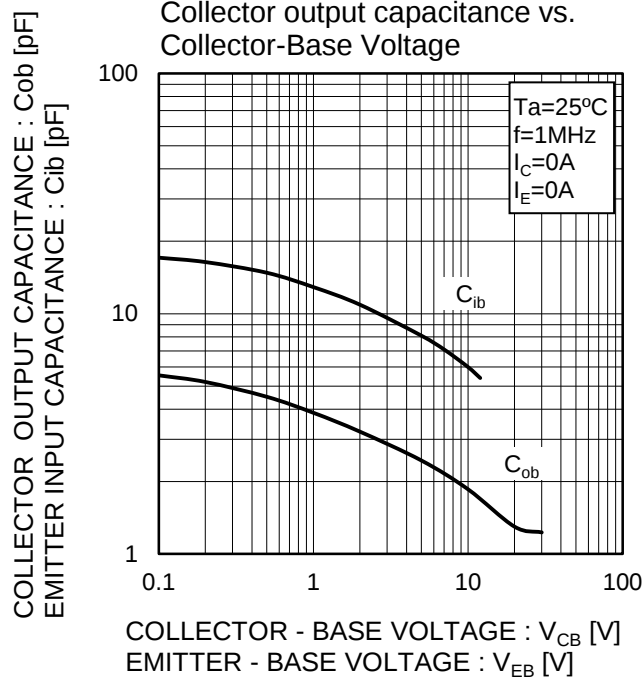


Fig.10 ON-state resistance vs.  
base current characteristics

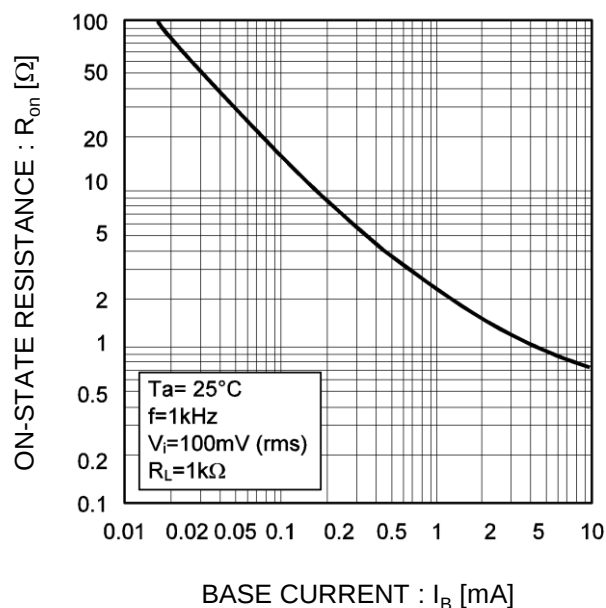


Fig.11 Safe Operating Area

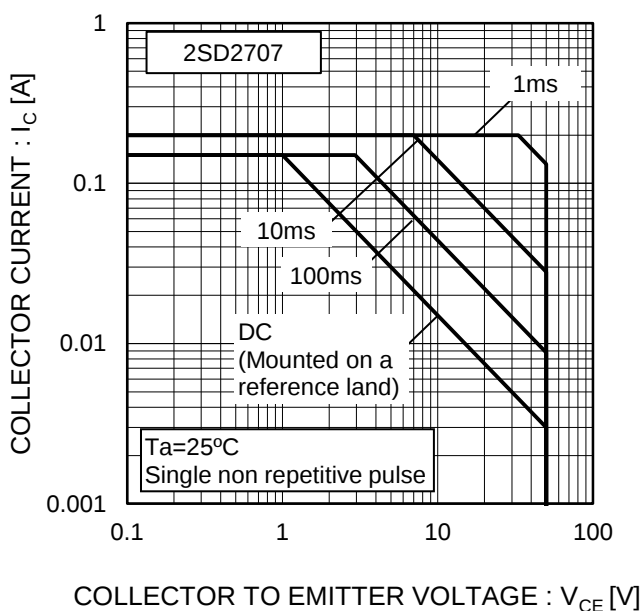
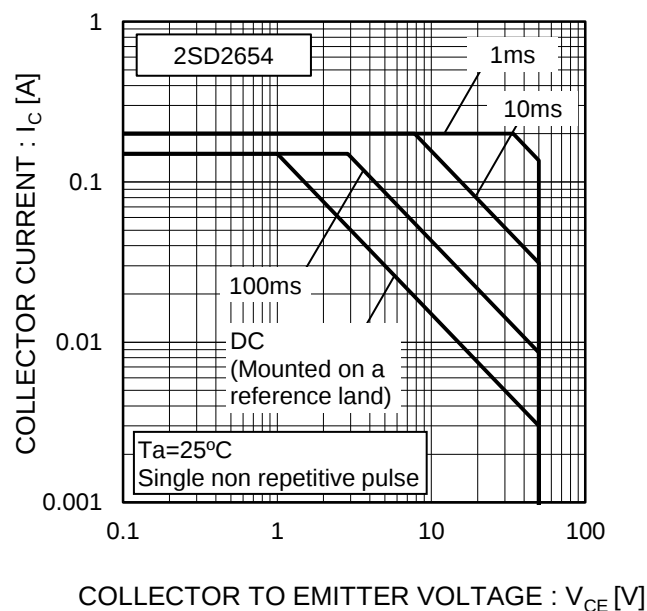


Fig.12 Safe Operating Area



●Electrical characteristic curves( $T_a = 25^\circ\text{C}$ )

Fig.13 Safe Operating Area

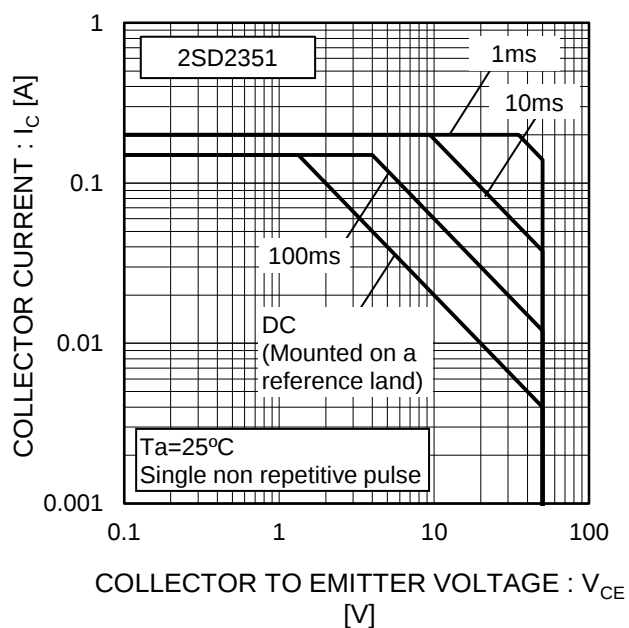
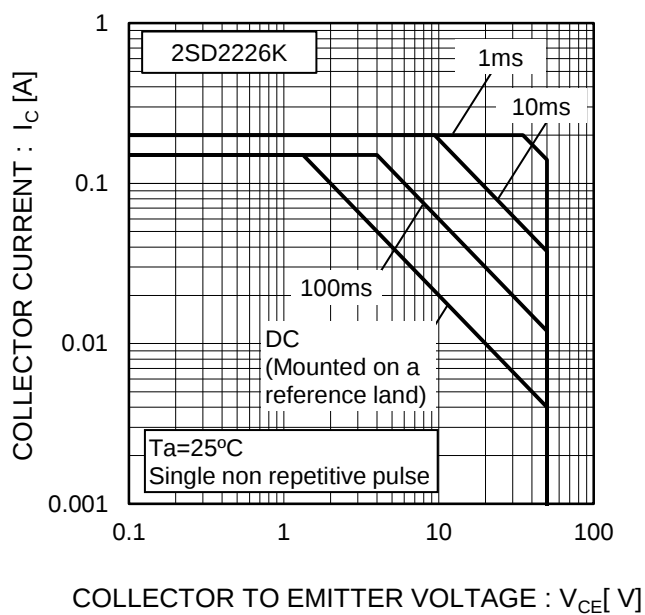
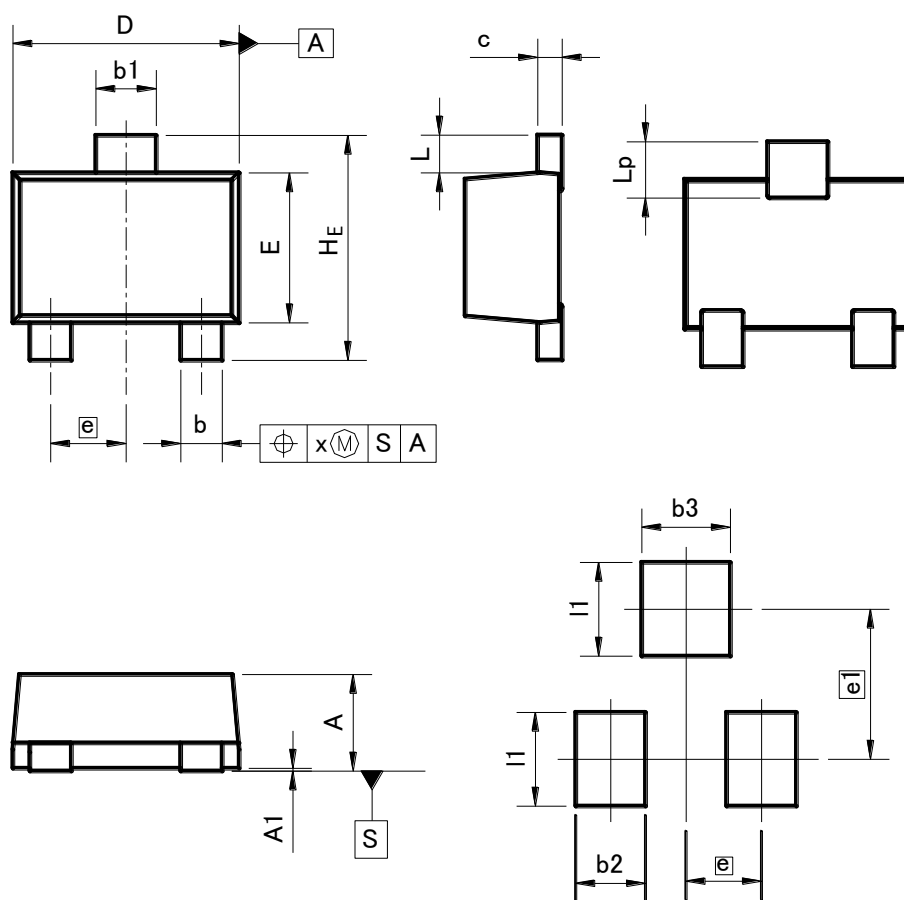


Fig.14 Safe Operating Area



## ●Dimensions (Unit : mm)

## VMT3



Pattern of terminal position areas  
[Not a recommended pattern of soldering pads]

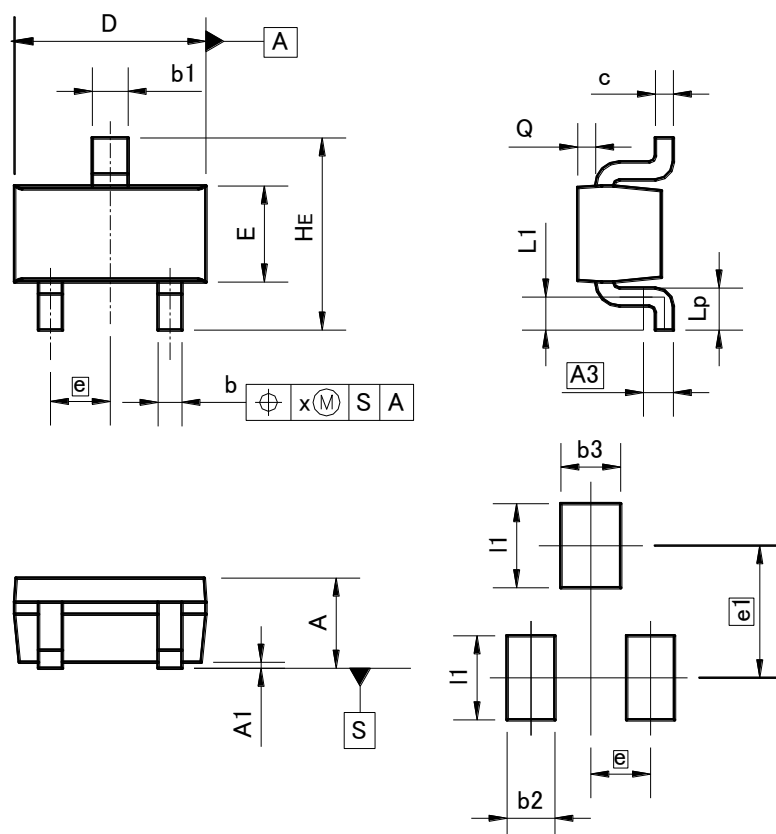
| DIM | MILIMETERS |      | INCHES |       |
|-----|------------|------|--------|-------|
|     | MIN        | MAX  | MIN    | MAX   |
| A   | 0.45       | 0.55 | 0.018  | 0.022 |
| A1  | 0.00       | 0.10 | 0.000  | 0.004 |
| b   | 0.17       | 0.27 | 0.007  | 0.011 |
| b1  | 0.27       | 0.37 | 0.011  | 0.015 |
| c   | 0.08       | 0.18 | 0.003  | 0.007 |
| D   | 1.10       | 1.30 | 0.043  | 0.051 |
| E   | 0.70       | 0.90 | 0.028  | 0.035 |
| e   | 0.40       |      | 0.02   |       |
| HE  | 1.10       | 1.30 | 0.043  | 0.051 |
| L   | 0.10       | 0.30 | 0.004  | 0.012 |
| Lp  | 0.20       | 0.40 | 0.008  | 0.016 |
| x   | —          | 0.10 | —      | 0.004 |

| DIM | MILIMETERS |      | INCHES |       |
|-----|------------|------|--------|-------|
|     | MIN        | MAX  | MIN    | MAX   |
| b2  | —          | 0.37 | —      | 0.015 |
| b3  | —          | 0.47 | —      | 0.019 |
| e1  | 0.80       |      | 0.031  |       |
| l1  | —          | 0.50 | —      | 0.020 |

Dimension in mm / inches

## ●Dimensions (Unit : mm)

## EMT3



Pattern of terminal position areas  
[Not a recommended pattern of soldering pads]

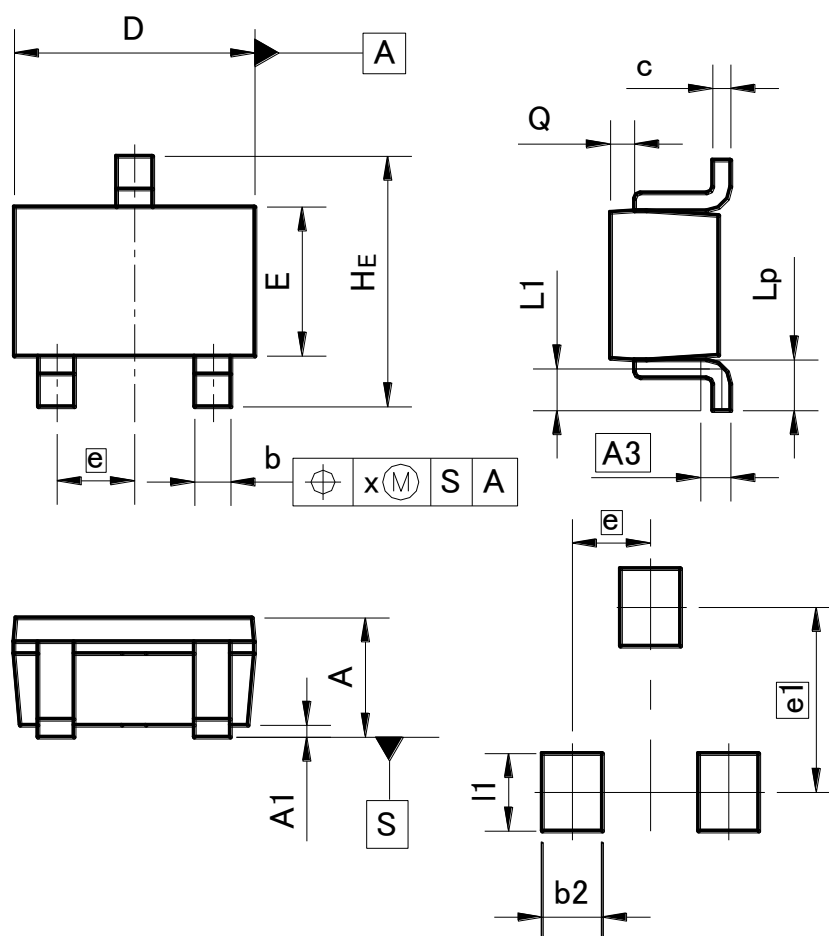
| DIM | MILIMETERS |      | INCHES |       |
|-----|------------|------|--------|-------|
|     | MIN        | MAX  | MIN    | MAX   |
| A   | 0.60       | 0.80 | 0.024  | 0.031 |
| A1  | 0.00       | 0.10 | 0.000  | 0.004 |
| A3  | 0.25       |      | 0.010  |       |
| b   | 0.15       | 0.30 | 0.006  | 0.012 |
| b1  | 0.25       | 0.40 | 0.010  | 0.016 |
| c   | 0.10       | 0.20 | 0.004  | 0.008 |
| D   | 1.50       | 1.70 | 0.059  | 0.067 |
| E   | 0.70       | 0.90 | 0.028  | 0.035 |
| e   | 0.50       |      | 0.020  |       |
| HE  | 1.40       | 1.80 | 0.055  | 0.071 |
| L1  | 0.10       | —    | 0.004  | —     |
| Lp  | 0.15       | —    | 0.006  | —     |
| Q   | 0.05       | 0.25 | 0.002  | 0.010 |
| x   | —          | 0.10 | —      | 0.004 |

| DIM | MILIMETERS |      | INCHES |       |
|-----|------------|------|--------|-------|
|     | MIN        | MAX  | MIN    | MAX   |
| b2  | —          | 0.40 | —      | 0.016 |
| b3  | —          | 0.50 | —      | 0.020 |
| e1  | 1.10       |      | 0.043  |       |
| l1  | —          | 0.70 | —      | 0.028 |

Dimension in mm / inches

## ●Dimensions (Unit : mm)

UMT3



Pattern of terminal position areas  
[Not a recommended pattern of soldering pads]

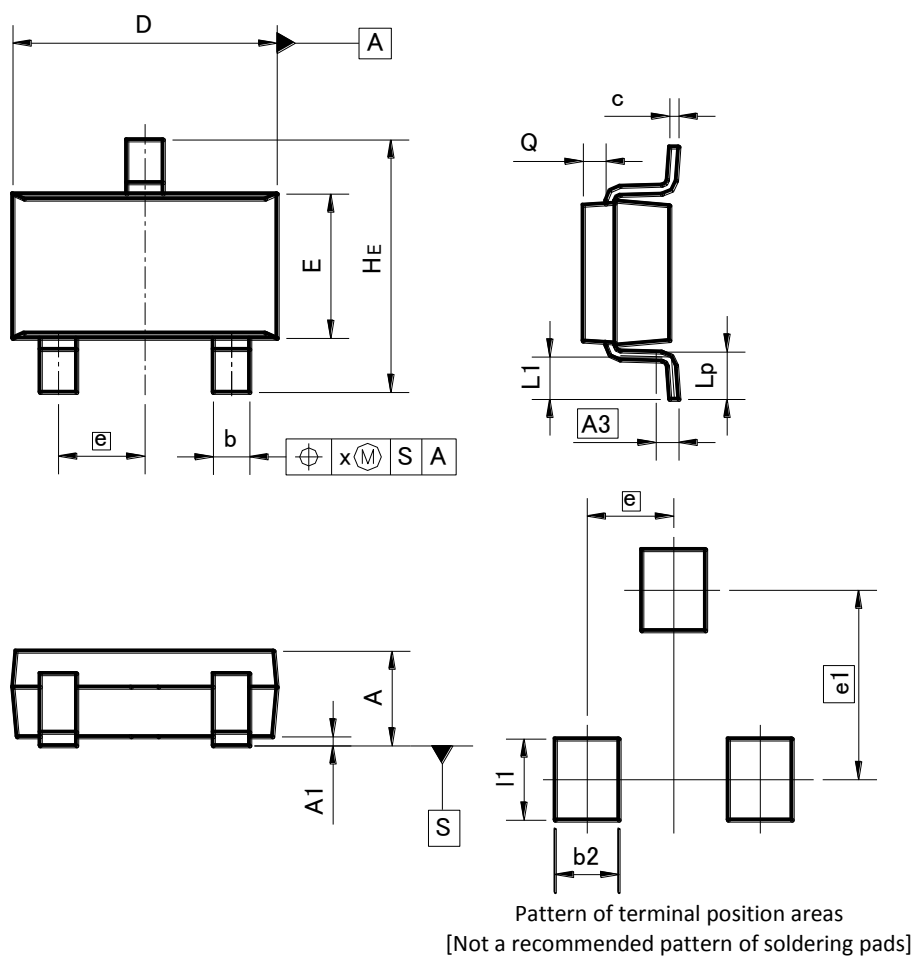
| DIM | MILIMETERS |      | INCHES |       |
|-----|------------|------|--------|-------|
|     | MIN        | MAX  | MIN    | MAX   |
| A   | 0.80       | 1.00 | 0.031  | 0.039 |
| A1  | 0.00       | 0.10 | 0.000  | 0.004 |
| A3  | 0.25       |      | 0.010  |       |
| b   | 0.15       | 0.30 | 0.006  | 0.012 |
| c   | 0.10       | 0.20 | 0.004  | 0.008 |
| D   | 1.90       | 2.10 | 0.075  | 0.083 |
| E   | 1.15       | 1.35 | 0.045  | 0.053 |
| e   | 0.65       |      | 0.026  |       |
| HE  | 2.00       | 2.20 | 0.079  | 0.087 |
| L1  | 0.20       | 0.50 | 0.008  | 0.020 |
| Lp  | 0.25       | 0.55 | 0.010  | 0.022 |
| Q   | 0.10       | 0.30 | 0.004  | 0.012 |
| x   | —          | 0.10 | —      | 0.004 |

| DIM | MILIMETERS |      | INCHES |       |
|-----|------------|------|--------|-------|
|     | MIN        | MAX  | MIN    | MAX   |
| b2  | —          | 0.50 | —      | 0.020 |
| e1  | 1.55       |      | 0.061  |       |
| l1  | —          | 0.65 | —      | 0.026 |

Dimension in mm / inches

## ●Dimensions (Unit : mm)

SMT3



| DIM | MILIMETERS |      | INCHES |       |
|-----|------------|------|--------|-------|
|     | MIN        | MAX  | MIN    | MAX   |
| A   | 1.00       | 1.30 | 0.039  | 0.051 |
| A1  | 0.00       | 0.10 | 0.000  | 0.004 |
| A3  | 0.25       |      | 0.010  |       |
| b   | 0.35       | 0.50 | 0.014  | 0.020 |
| c   | 0.09       | 0.25 | 0.004  | 0.010 |
| D   | 2.80       | 3.00 | 0.110  | 0.118 |
| E   | 1.50       | 1.80 | 0.059  | 0.071 |
| e   | 0.95       |      | 0.037  |       |
| HE  | 2.60       | 3.00 | 0.102  | 0.118 |
| L1  | 0.30       | 0.60 | 0.012  | 0.024 |
| Lp  | 0.40       | 0.70 | 0.016  | 0.028 |
| Q   | 0.20       | 0.30 | 0.008  | 0.012 |
| x   | —          | 0.10 | —      | 0.004 |
| y   | —          | 0.10 | —      | 0.004 |

| DIM | MILIMETERS |      | INCHES |       |
|-----|------------|------|--------|-------|
|     | MIN        | MAX  | MIN    | MAX   |
| b2  | —          | 0.60 | —      | 0.024 |
| e1  | 2.10       |      | 0.083  |       |
| l1  | —          | 0.90 | —      | 0.035 |

Dimension in mm / inches

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