

| Parameter     | Value         |
|---------------|---------------|
| $V_{CC}$      | -50V          |
| $I_{C(MAX.)}$ | -100mA        |
| $R_1$         | 2.2k $\Omega$ |
| $R_2$         | 47k $\Omega$  |

## ●Features

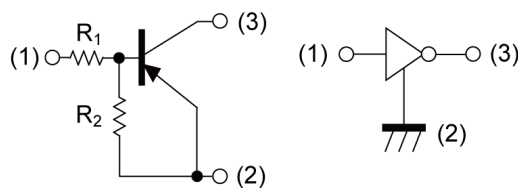
- 1) Built-In Biasing Resistors
- 2) Built-in bias resistors enable the configuration of an inverter circuit without connecting external input resistors (see inner circuit) .
- 3) Only the on/off conditions need to be set for operation, making the circuit design easy.
- 4) Complementary NPN Types: DTC123J series

## ●Application

INVERTER, INTERFACE, DRIVER

## ●Inner circuit

DTA123JM/ DTA123JEB/ DTA123JUB

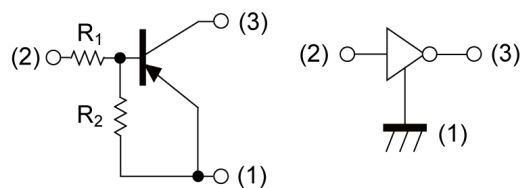


(1) IN (BASE)  
(2) GND (+) (EMITTER)  
(3) OUT (COLLECTOR)

## ●Outline

|                                                 |                                                 |
|-------------------------------------------------|-------------------------------------------------|
| <p>VMT3</p> <p>DTA123JM<br/>(SC-105AA)</p>      | <p>EMT3F</p> <p>DTA123JEB<br/>(SC-89)</p>       |
| <p>EMT3</p> <p>DTA123JE<br/>SOT-416(SC-75A)</p> | <p>UMT3F</p> <p>DTA123JUB<br/>(SC-85)</p>       |
| <p>UMT3</p> <p>DTA123JUA<br/>SOT-323(SC-70)</p> | <p>SMT3</p> <p>DTA123JKA<br/>SOT-346(SC-59)</p> |

DTA123JE/ DTA123JUA/ DTA123JKA



(1) GND (+) (EMITTER)  
(2) IN (BASE)  
(3) OUT (COLLECTOR)

## ●Packaging specifications

| Part No.  | Package | Package size | Taping code | Reel size (mm) | Tape width (mm) | Basic ordering unit.(pcs) | Marking |
|-----------|---------|--------------|-------------|----------------|-----------------|---------------------------|---------|
| DTA123JM  | VMT3    | 1212         | T2L         | 180            | 8               | 8000                      | E32     |
| DTA123JEB | EMT3F   | 1616         | TL          | 180            | 8               | 3000                      | E32     |
| DTA123JE  | EMT3    | 1616         | TL          | 180            | 8               | 3000                      | E32     |
| DTA123JUB | UMT3F   | 2021         | TL          | 180            | 8               | 3000                      | 132     |
| DTA123JUA | UMT3    | 2021         | T106        | 180            | 8               | 3000                      | 132     |
| DTA123JKA | SMT3    | 2928         | T146        | 180            | 8               | 3000                      | E32     |

● **Absolute maximum ratings** ( $T_a = 25^\circ\text{C}$ )

| Parameter                    |           | Symbol            | Values      | Unit             |
|------------------------------|-----------|-------------------|-------------|------------------|
| Supply voltage               |           | $V_{CC}$          | -50         | V                |
| Input voltage                |           | $V_{IN}$          | -12 to 5    | V                |
| Output current               |           | $I_O$             | -100        | mA               |
| Collector current            |           | $I_{C(MAX)}^{*1}$ | -100        | mA               |
| Power dissipation            | DTA123JM  | $P_D^{*2}$        | 150         | mW               |
|                              | DTA123JEB |                   | 150         |                  |
|                              | DTA123JE  |                   | 150         |                  |
|                              | DTA123JUB |                   | 200         |                  |
|                              | DTA123JUA |                   | 200         |                  |
|                              | DTA123JKA |                   | 200         |                  |
| Junction temperature         |           | $T_j$             | 150         | $^\circ\text{C}$ |
| Range of storage temperature |           | $T_{stg}$         | -55 to +150 | $^\circ\text{C}$ |

● **Electrical characteristics** ( $T_a = 25^\circ\text{C}$ )

| Parameter            | Symbol       | Conditions                                  | Values |      |      | Unit       |
|----------------------|--------------|---------------------------------------------|--------|------|------|------------|
|                      |              |                                             | Min.   | Typ. | Max. |            |
| Input voltage        | $V_{I(off)}$ | $V_{CC} = -5V, I_O = -100\mu A$             | -      | -    | -0.5 | V          |
|                      | $V_{I(on)}$  | $V_O = -0.3V, I_O = -5mA$                   | -1.1   | -    | -    |            |
| Output voltage       | $V_{O(on)}$  | $I_O / I_I = -5mA / -0.25mA$                | -      | -100 | -300 | mV         |
| Input current        | $I_I$        | $V_I = -5V$                                 | -      | -    | -3.6 | mA         |
| Output current       | $I_{O(off)}$ | $V_{CC} = -50V, V_I = 0V$                   | -      | -    | -500 | nA         |
| DC current gain      | $G_I$        | $V_O = -5V, I_O = -10mA$                    | 80     | -    | -    | -          |
| Input resistance     | $R_I$        | -                                           | 1.54   | 2.2  | 2.86 | k $\Omega$ |
| Resistance ratio     | $R_2/R_1$    | -                                           | 17     | 21   | 26   | -          |
| Transition frequency | $f_T^{*1}$   | $V_{CE} = -10V, I_E = 5mA,$<br>$f = 100MHz$ | -      | 250  | -    | MHz        |

\*1 Characteristics of built-in transistor.

\*2 Each terminal mounted on a reference land.

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

Fig.1 Input voltage vs. output current (ON characteristics)

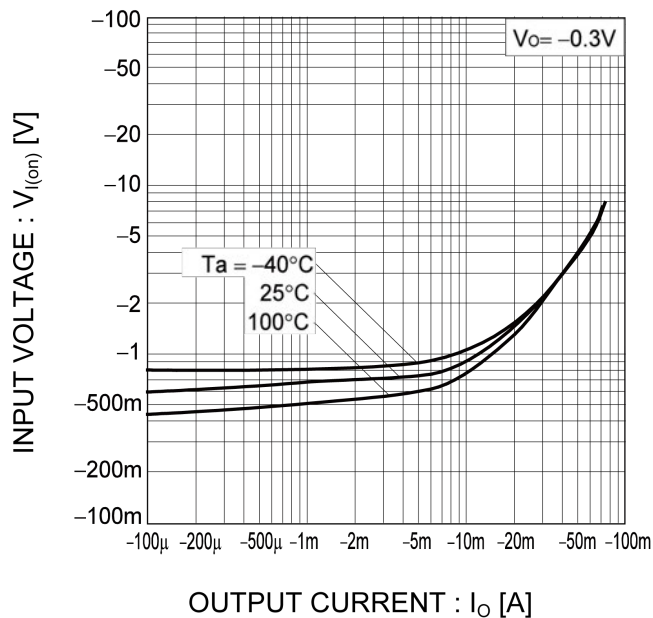


Fig.2 Output current vs. input voltage (OFF characteristics)

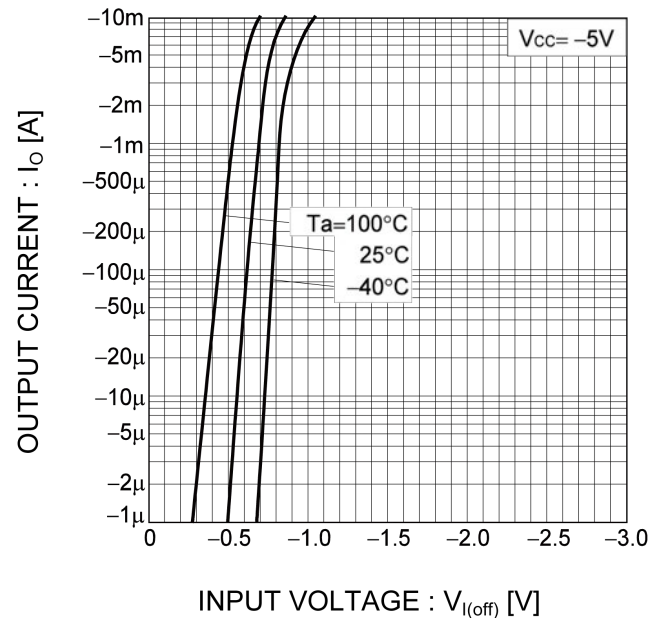


Fig.3 Output current vs. output voltage

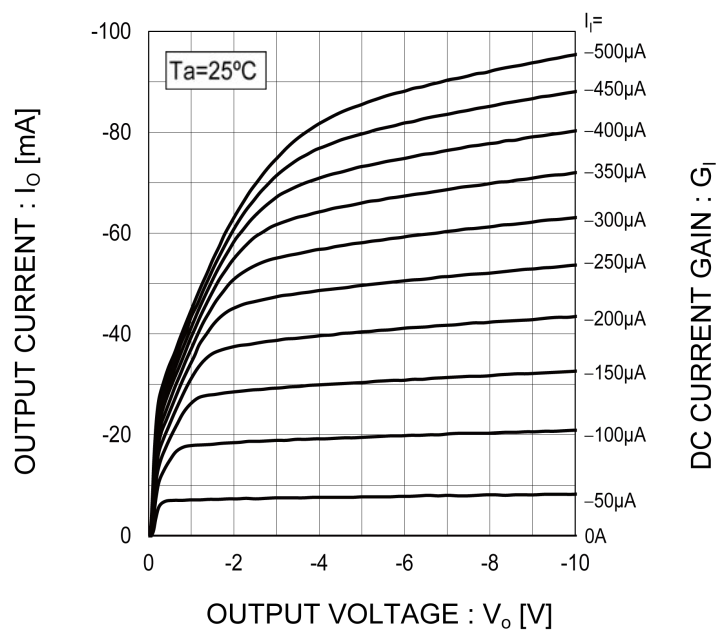
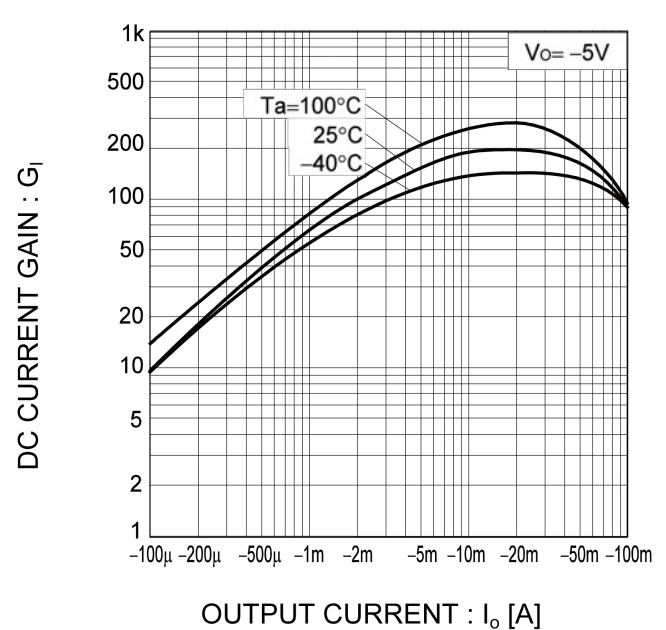
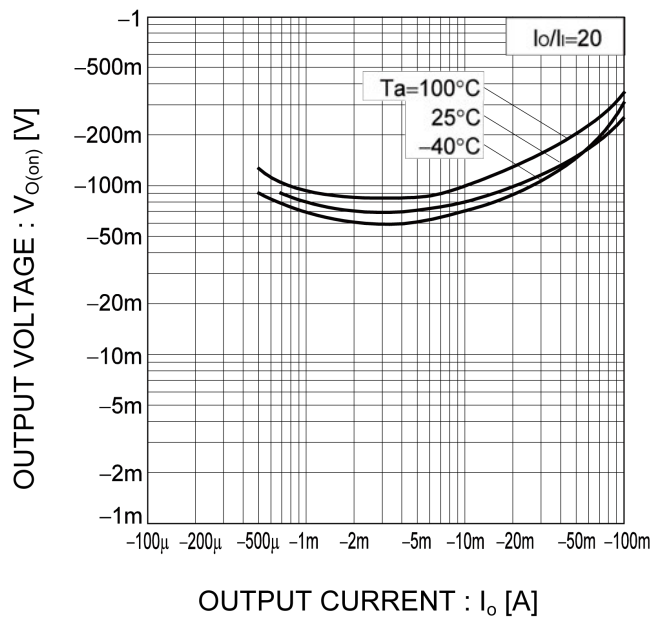


Fig.4 DC current gain vs. output current

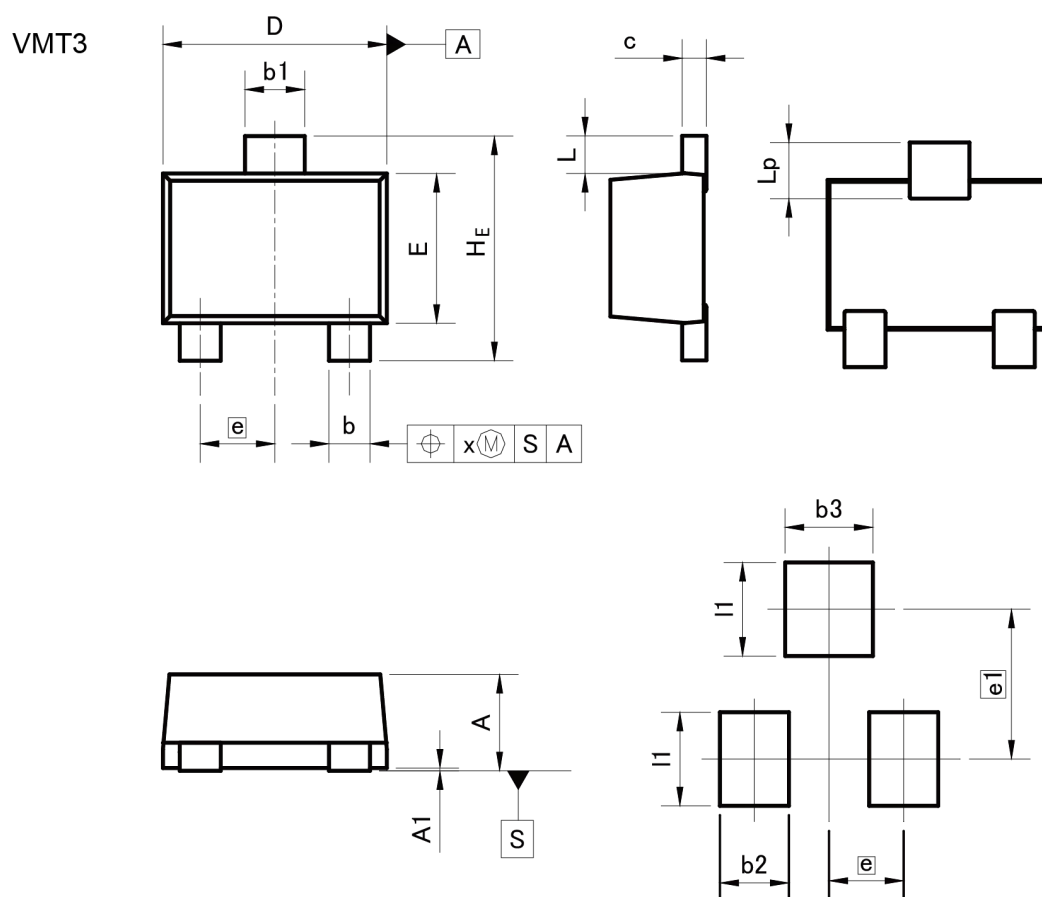


●Electrical characteristic curves (T<sub>a</sub> =25°C)

Fig.5 Output voltage vs. output current



## ●Dimensions



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 |

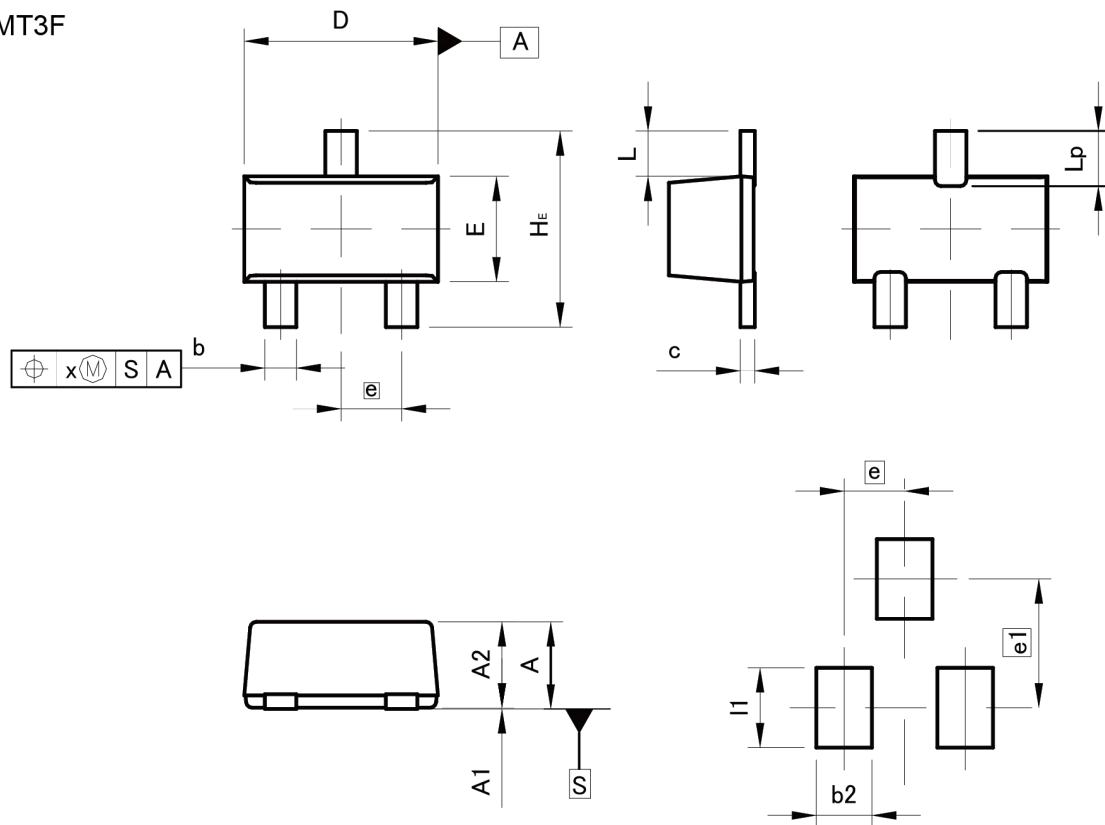
  

| DIM | MILIMETERS |      | INCHES |       |
|-----|------------|------|--------|-------|
|     | MIN        | MAX  | MIN    | MAX   |
| b2  | —          | 0.37 | —      | 0.015 |
| b3  | —          | 0.47 | —      | 0.019 |
| e1  | 0.80       |      | 0.031  |       |
| l1  | —          | 0.50 | — 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

Dimension in mm/inches

## ●Dimensions

EMT3F



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

| DIM | MILIMETERS |      | INCHES |       |
|-----|------------|------|--------|-------|
|     | MIN        | MAX  | MIN    | MAX   |
| A   | 0.65       | 0.85 | 0.026  | 0.033 |
| A1  | 0.00       | 0.10 | 0.000  | 0.004 |
| A2  | 0.60       | 0.80 | 0.024  | 0.031 |
| b   | 0.21       | 0.36 | 0.008  | 0.014 |
| c   | 0.08       | 0.18 | 0.003  | 0.007 |
| D   | 1.50       | 1.70 | 0.059  | 0.067 |
| E   | 0.76       | 0.96 | 0.030  | 0.038 |
| e   | 0.50       |      | 0.020  |       |
| HE  | 1.50       | 1.70 | 0.059  | 0.067 |
| L   | 0.37       |      | 0.015  |       |
| Lp  | 0.35       | 0.55 | 0.014  | 0.022 |
| x   | —          | 0.10 | —      | 0.004 |

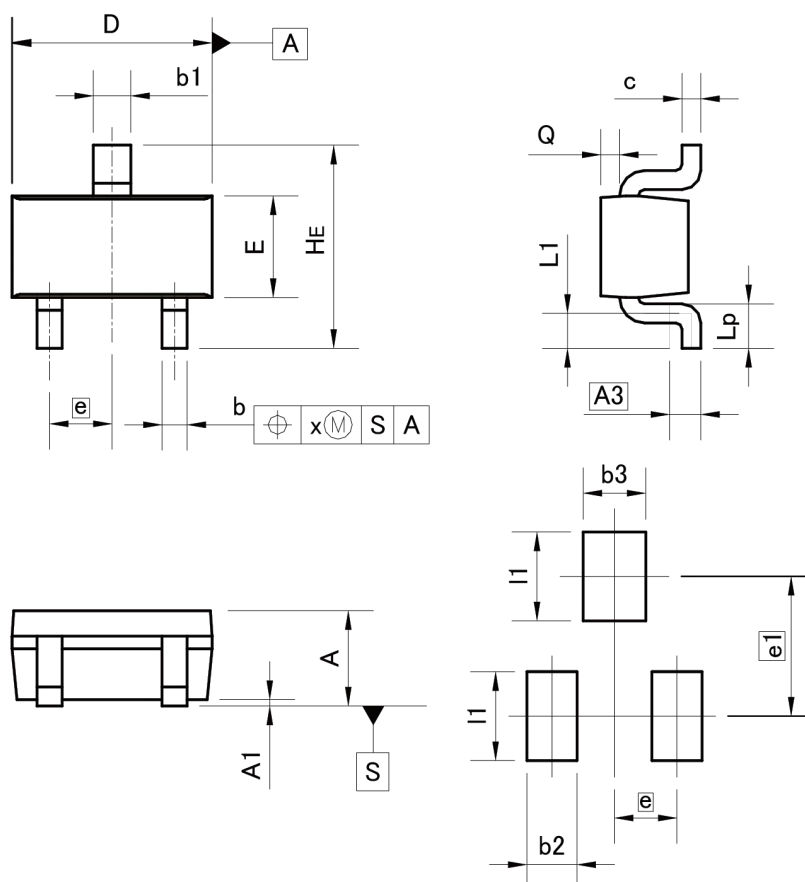
  

| DIM | MILIMETERS |      | INCHES |       |
|-----|------------|------|--------|-------|
|     | MIN        | MAX  | MIN    | MAX   |
| b2  | —          | 0.46 | —      | 0.018 |
| e1  | —          | 1.05 | —      | 0.041 |
| l1  | —          | 0.65 | —      | 0.026 |

Dimension in mm/inches

## ●Dimensions

EMT3



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

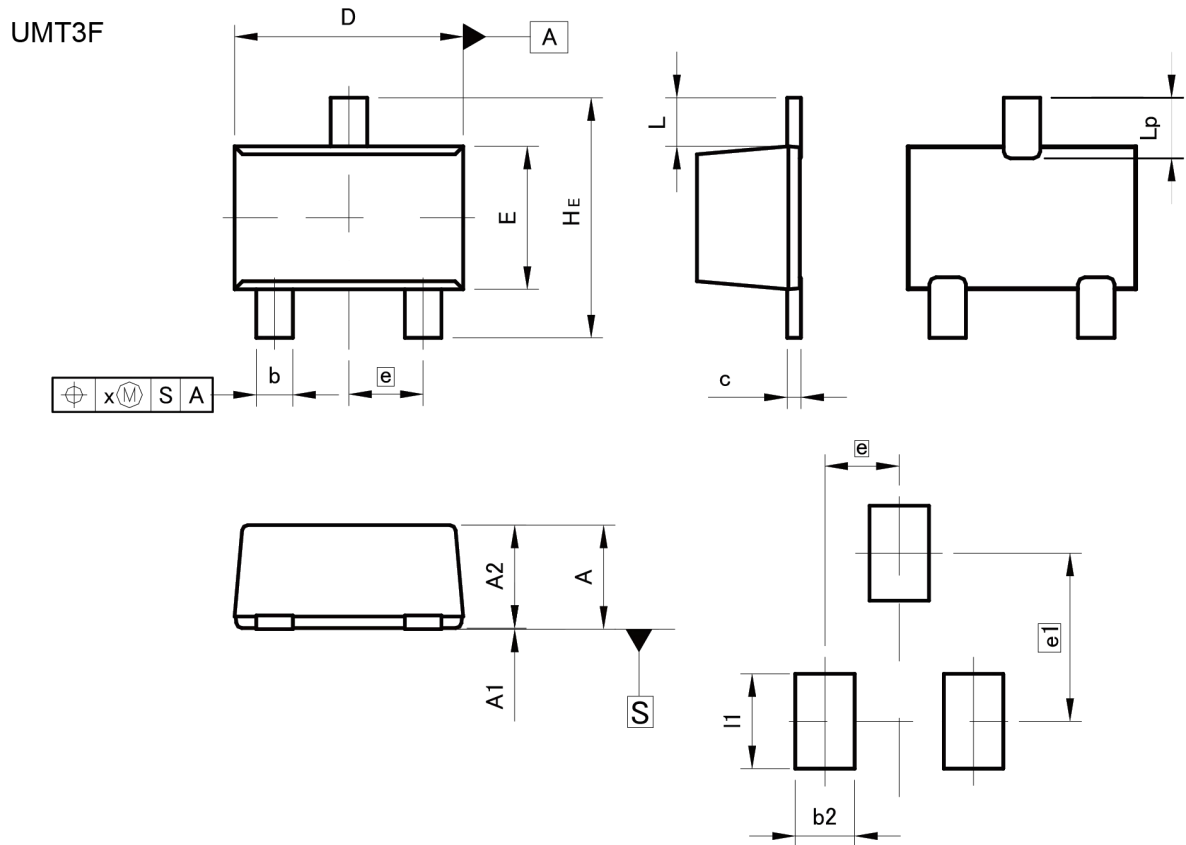
| DIM | MILIMETERS |      | INCHES |       |
|-----|------------|------|--------|-------|
|     | MIN        | MAX  | MIN    | MAX   |
| A   | 0.60       | 0.80 | 0.024  | 0.031 |
| A1  | 0.00       | 0.10 | 0.000  | 0.004 |
| A3  | 0.25       |      | 0.010  |       |
| b   | 0.15       | 0.30 | 0.006  | 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



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

| DIM | MILIMETERS |      | INCHES |       |
|-----|------------|------|--------|-------|
|     | MIN        | MAX  | MIN    | MAX   |
| A   | 0.85       | 1.05 | 0.033  | 0.041 |
| A1  | 0.00       | 0.10 | 0.000  | 0.004 |
| A2  | 0.80       | 1.00 | 0.031  | 0.039 |
| b   | 0.27       | 0.42 | 0.011  | 0.017 |
| c   | 0.08       | 0.18 | 0.003  | 0.007 |
| 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 |
| L   | 0.43       |      | 0.017  |       |
| Lp  | 0.43       | 0.63 | 0.017  | 0.025 |
| x   | —          | 0.10 | —      | 0.004 |

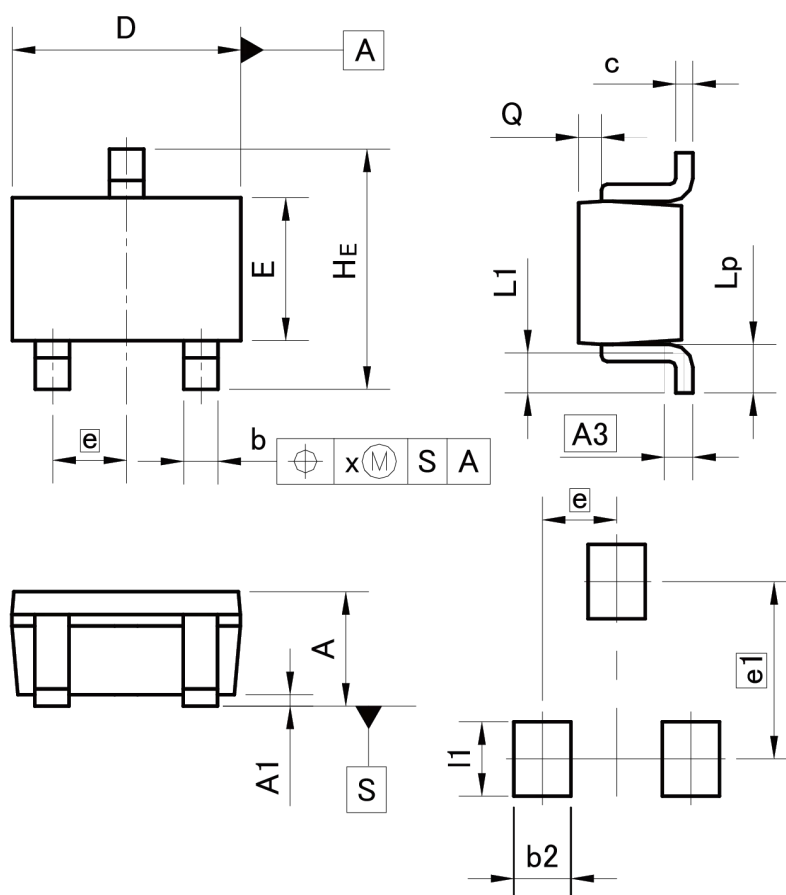
  

| DIM | MILIMETERS |      | INCHES |       |
|-----|------------|------|--------|-------|
|     | MIN        | MAX  | MIN    | MAX   |
| b2  | —          | 0.52 | —      | 0.020 |
| e1  | 1.47       |      | 0.058  |       |
| l1  | —          | 0.83 | —      | 0.033 |

Dimension in mm/inches

## ●Dimensions

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

SMT3



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

| 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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