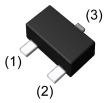
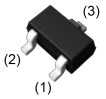
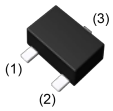
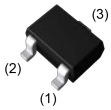
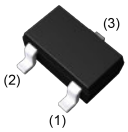
# DTC143E series

NPN 100mA 50V Digital Transistors (Bias Resistor Built-in Transistors) Datasheet

| Parameter | Value |
|---|---|
| $V_{CC}$ | 50V |
| $I_{C(MAX.)}$ | 100mA |
| $R_1$ | 4.7kΩ |
| $R_2$ | 4.7kΩ |

## ●Outline

| | |
|---|---|
| VMT3 DTC143EM (SC-105AA) | EMT3F  DTC143EEB (SC-89) |
| EMT3  DTC143EE SOT-416(SC-75A) | UMT3F  DTC143EUB (SC-85) |
| UMT3  DTC143EUA SOT-323(SC-70) | SMT3  DTC143EKA SOT-346(SC-59) |

## ●Features

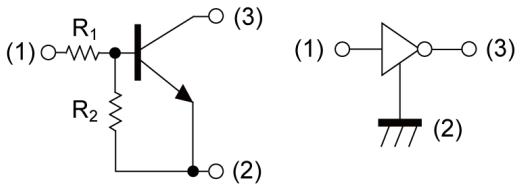
1) Built-In Biasing Resistors, $R_1 = R_2 = 4.7kΩ$
2) Built-in bias resistors enable the configuration of an inverter circuit without connecting external input resistors (see inner circuit) .
3) Only the on/off conditions need to be set for operation, making the circuit design easy.
4) Complementary PNP Types: DTA143E series

## ●Application

INVERTER, INTERFACE,DRIVER

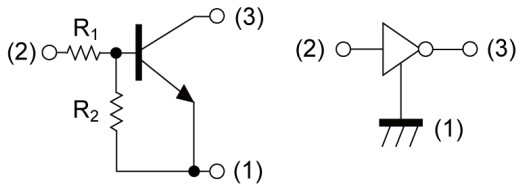
## ●Inner circuit

DTC143EM/ DTC143EEB/ DTC143EUB




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

DTC143EE/ DTC143EUA/ DTC143EKA




(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 |
|---|---|---|---|---|---|---|---|
| DTC143EM | VMT3 | 1212 | T2L | 180 | 8 | 8000 | 23 |
| DTC143EEB | EMT3F | 1616 | TL | 180 | 8 | 3000 | 23 |
| DTC143EE | EMT3 | 1616 | TL | 180 | 8 | 3000 | 23 |
| DTC143EUB | UMT3F | 2021 | TL | 180 | 8 | 3000 | 23 |
| DTC143EUA | UMT3 | 2021 | T106 | 180 | 8 | 3000 | 23 |
| DTC143EKA | SMT3 | 2928 | T146 | 180 | 8 | 3000 | 23 |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## ●Absolute maximum ratings ($T_a$ = 25°C)

| Parameter | | Symbol | Values | Unit |
|---|---|---|---|---|
| Supply voltage | | $V_{CC}$ | 50 | V |
| Input voltage | | $V_{IN}$ | -10 to 30 | V |
| Output current | | $I_O$ | 100 | mA |
| Collector current | | $I_{C(MAX)}$ *1 | 100 | mA |
| Power dissipation | DTC143EM | $P_D$ *2 | 150 | mW |
| | DTC143EEB | | 150 | |
| | DTC143EE | | 150 | |
| | DTC143EUB | | 200 | |
| | DTC143EUA | | 200 | |
| | DTC143EKA | | 200 | |
| Junction temperature | | $T_j$ | 150 | ℃ |
| Range of storage temperature | | $T_{stg}$ | -55 to +150 | ℃ |

## ●Electrical characteristics ($T_a$ = 25°C)

| Parameter | Symbol | Conditions | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| Input voltage | $V_{I(off)}$ | $V_{CC}$ = 5V, $I_O$ = 100μA | - | - | 0.5 | V |
| | $V_{I(on)}$ | $V_O$ = 0.3V, $I_O$ = 20mA | 3.0 | - | - | |
| Output voltage | $V_{O(on)}$ | $I_O$ / $I_I$ = 10mA / 0.5mA | - | 100 | 300 | mV |
| Input current | $I_I$ | $V_I$ = 5V | - | - | 1.8 | 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 | 30 | - | - | - |
| Input resistance | $R_1$ | - | 3.29 | 4.7 | 6.11 | kΩ |
| Resistance ratio | $R_2/R_1$ | - | 0.8 | 1.0 | 1.2 | - |
| Transition frequency | $f_T$ *1 | $V_{CE}$ = 10V, $I_E$ = -5mA, f = 100MHz | - | 250 | - | MHz |

*1 Characteristics of built-in transistor.

*2 Each terminal mounted on a reference land.


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## ●Electrical characteristic curves ($T_a$ =25°C)

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

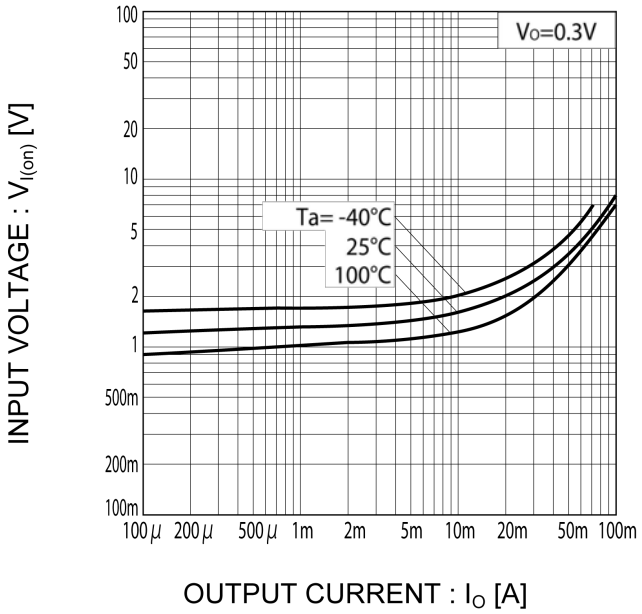



Fig.2 Output current vs. input voltage (OFF characteristics)

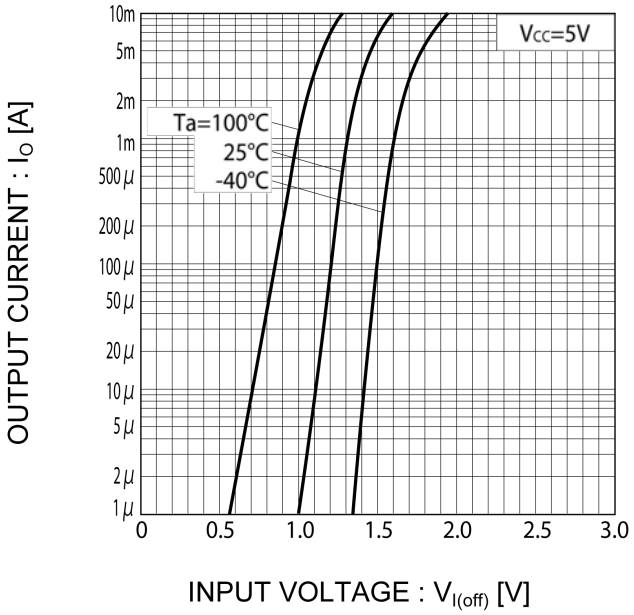



Fig.3 Output current vs. output voltage

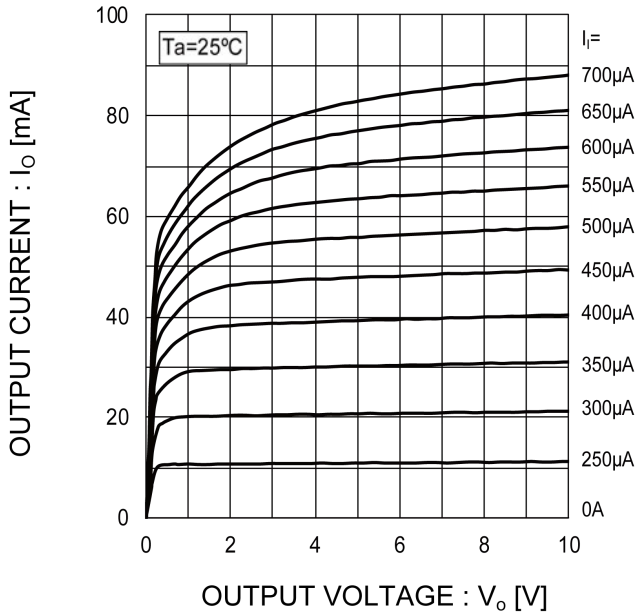
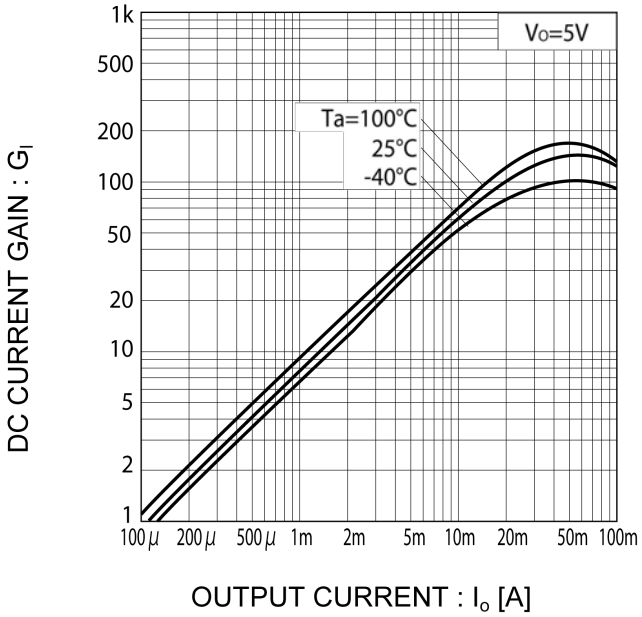



Fig.4 DC current gain vs. output current





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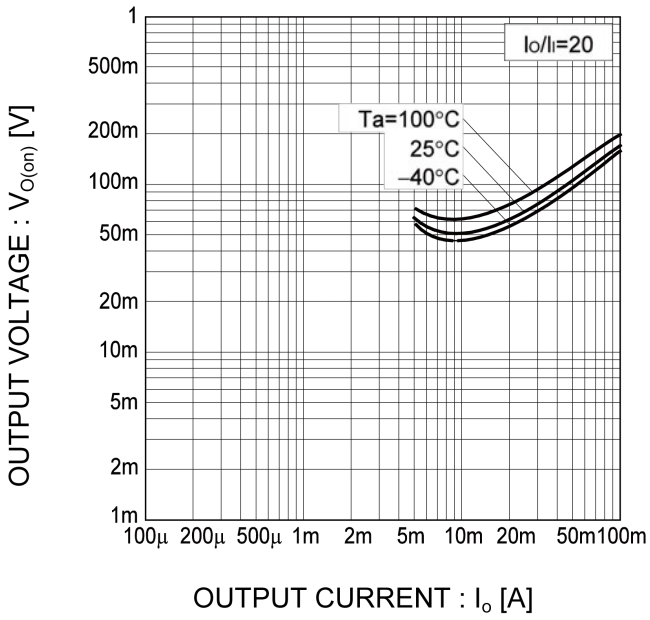
## ●Electrical characteristic curves ($T_a$ =25°C)

Fig.5 Output voltage vs. output current





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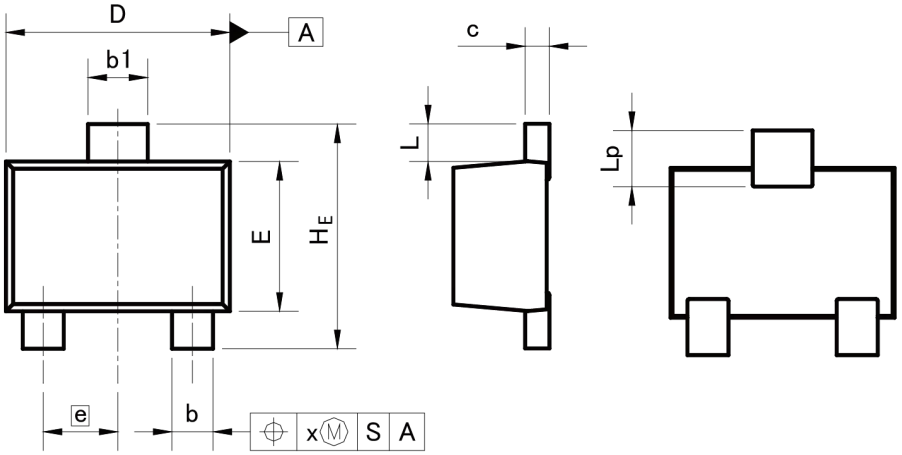
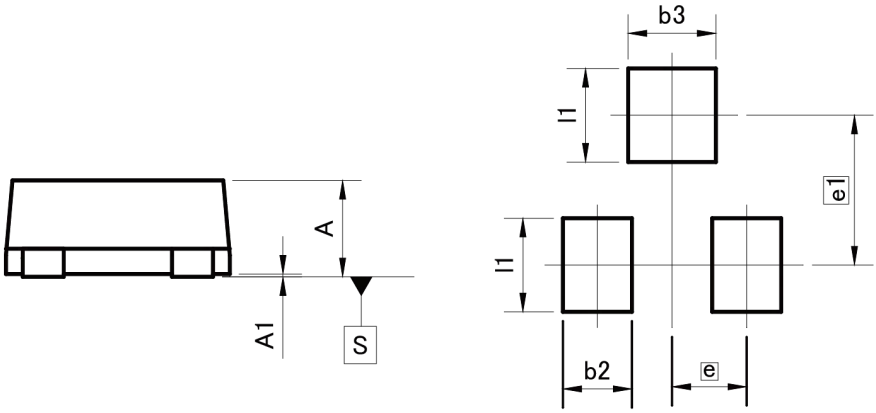
## ●Dimensions

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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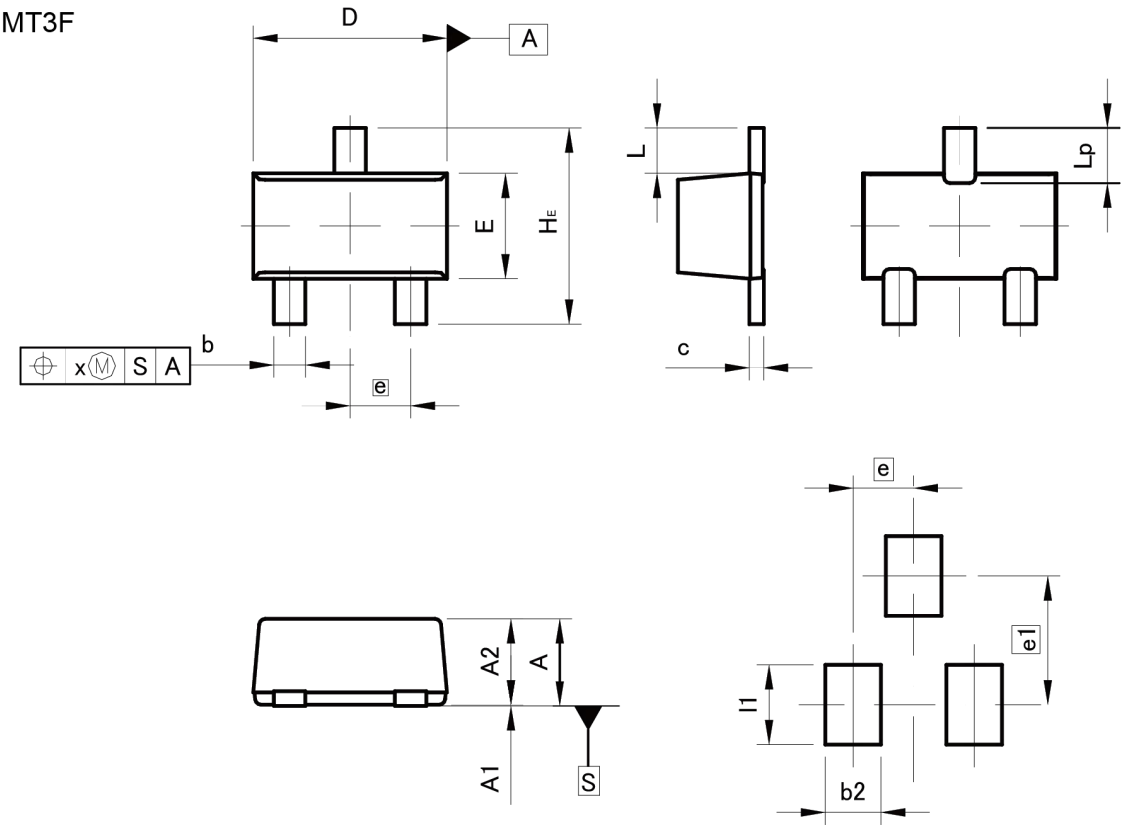
## ●Dimensions

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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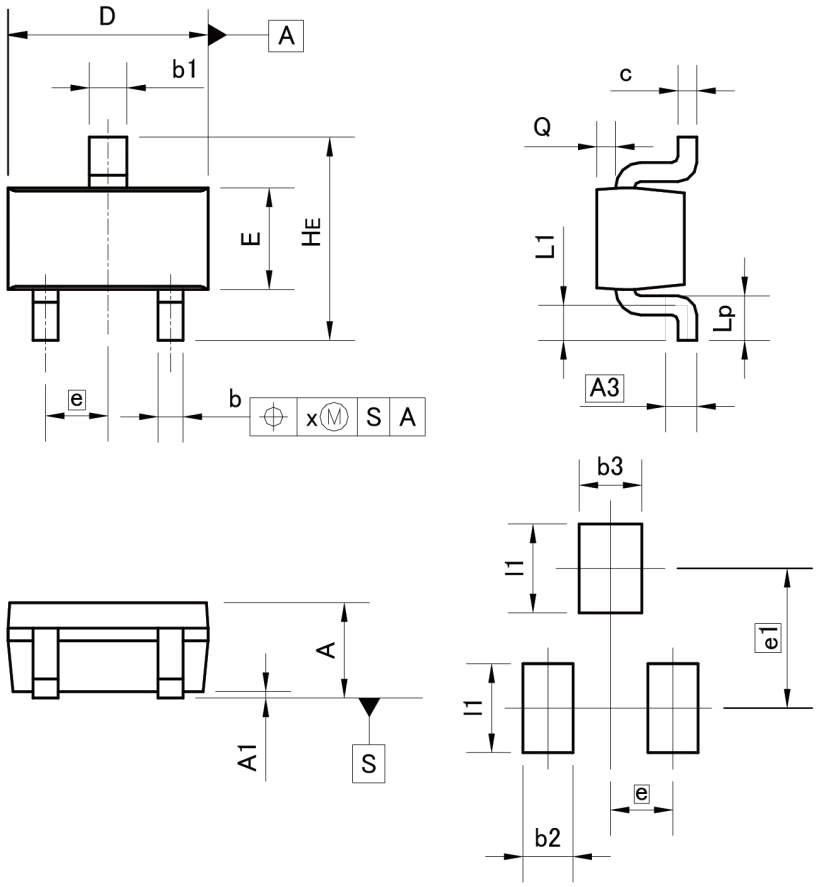
## ●Dimensions

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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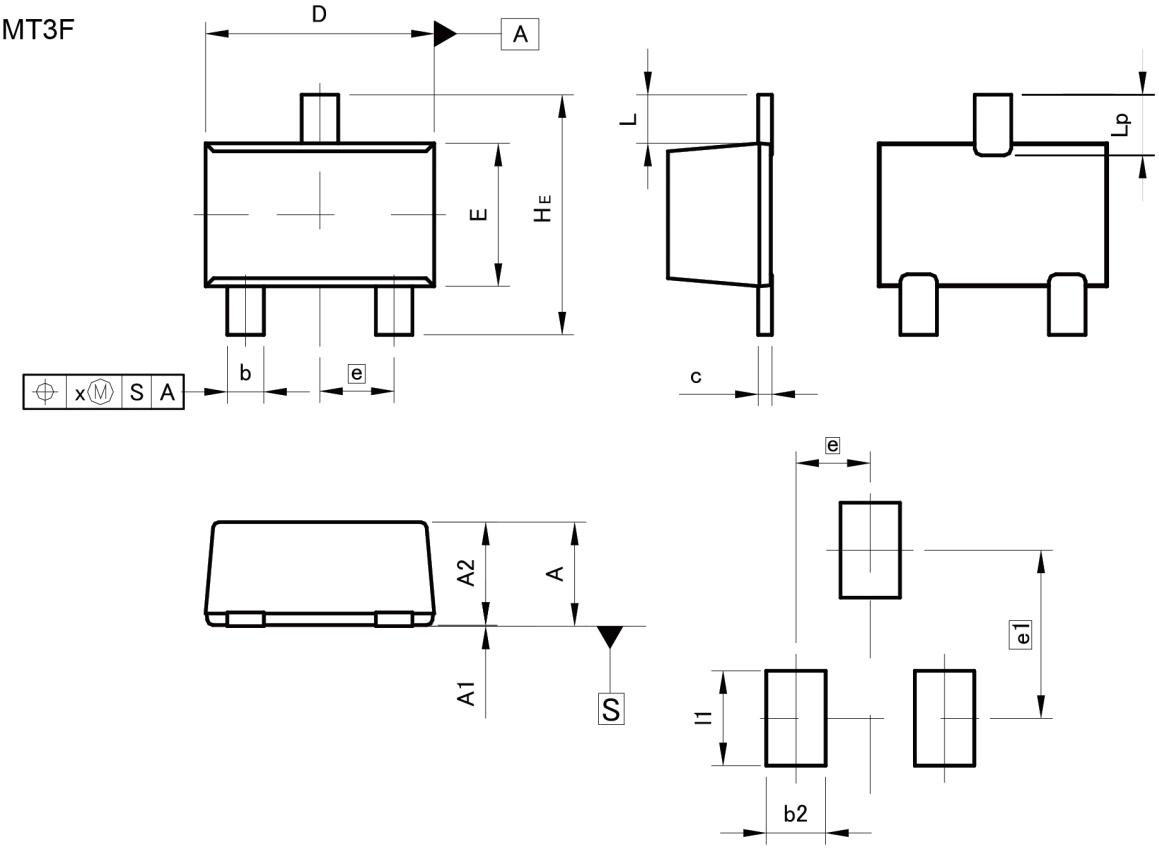
## ●Dimensions

UMT3F




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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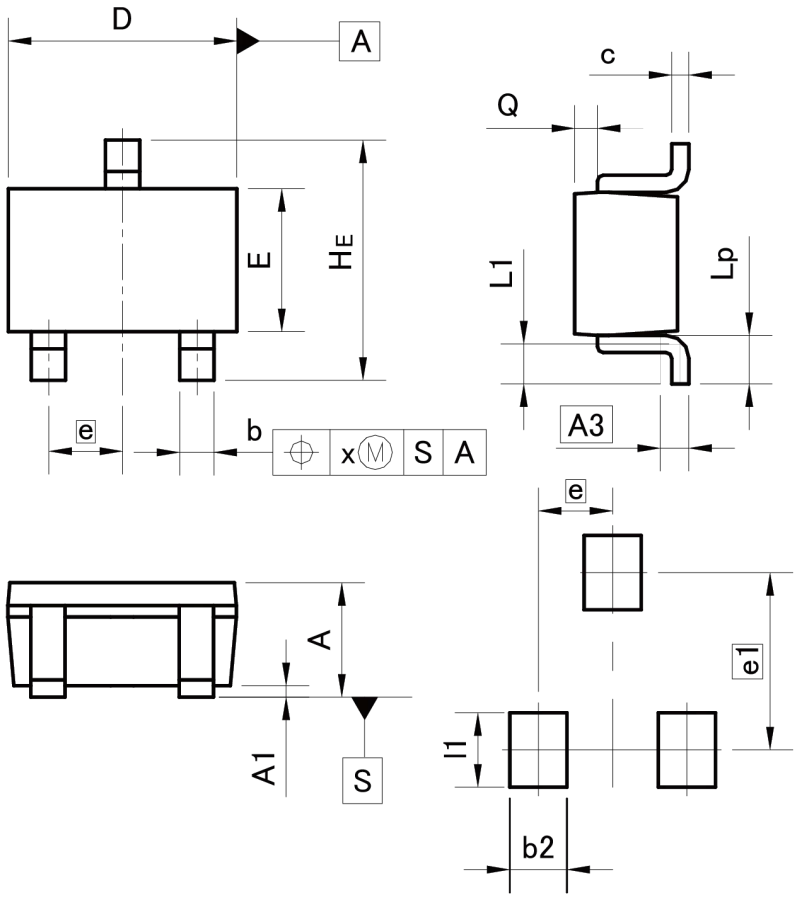
## ●Dimensions

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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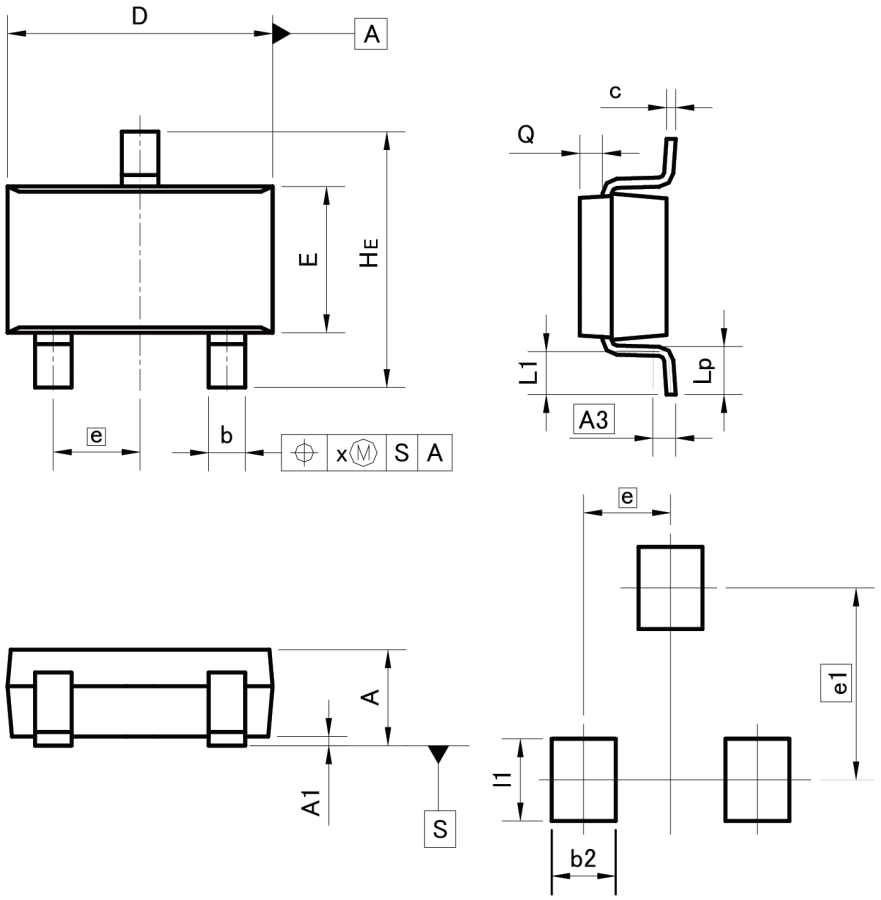
## ●Dimensions

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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7) The Products specified in this document are not designed to be radiation tolerant.

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ROHM SEMICONDUCTOR

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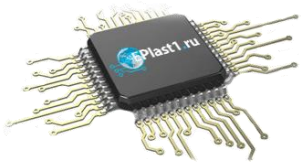
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.




**Как с нами связаться**

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