

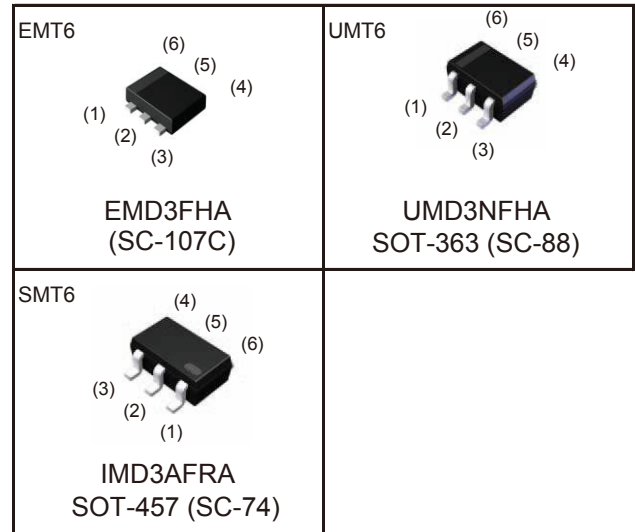
<For DTr1(NPN)>

| Parameter     | Value        |
|---------------|--------------|
| $V_{CC}$      | 50V          |
| $I_{C(MAX.)}$ | 100mA        |
| $R_1$         | 10k $\Omega$ |
| $R_2$         | 10k $\Omega$ |

<For DTr2(PNP)>

| Parameter     | Value        |
|---------------|--------------|
| $V_{CC}$      | -50V         |
| $I_{C(MAX.)}$ | -100mA       |
| $R_1$         | 10k $\Omega$ |
| $R_2$         | 10k $\Omega$ |

### ●Outline



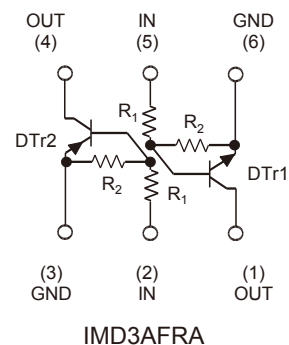
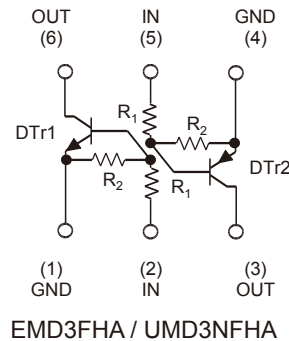
### ●Features

- 1) Both the DTC114E chip and DTA114E chip in one package.
- 2) Built-in bias resistors enable the configuration of an inverter circuit without connecting external input resistors (see inner circuit).
- 3) The bias resistors consist of thin-film resistors with complete isolation to allow negative biasing of the input. They also have the advantage of completely eliminating parasitic effects.
- 4) Only the on/off conditions need to be set for operation, making the circuit design easy.
- 5) Lead Free/RoHS Compliant.

### ●Application

Inverter circuit, Interface circuit, Driver circuit

### ●Inner circuit



### ●Packaging specifications

| Part No. | Package | Package size (mm) | Taping code | Reel size (mm) | Tape width (mm) | Basic ordering unit (pcs) | Marking |
|----------|---------|-------------------|-------------|----------------|-----------------|---------------------------|---------|
| EMD3FHA  | EMT6    | 1616              | T2R         | 180            | 8               | 8,000                     | D3      |
| UMD3NFHA | UMT6    | 2021              | TR          | 180            | 8               | 3,000                     | D3      |
| IMD3AFRA | SMT6    | 2928              | T108        | 180            | 8               | 3,000                     | D3      |

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

| Parameter                    |                    | Symbol             | DTr1(NPN)                 | DTr2(PNP)  | Unit |
|------------------------------|--------------------|--------------------|---------------------------|------------|------|
| Supply voltage               |                    | $V_{CC}$           | 50                        | -50        | V    |
| Input voltage                |                    | $V_{IN}$           | -10 to +40                | -40 to +10 | V    |
| Output current               |                    | $I_O$              | 50                        | -50        | mA   |
| Collector current            |                    | $I_{C(MAX.)}^{*1}$ | 100                       | -100       | mA   |
| Power dissipation            | EMD3FHA / UMD3NFHA | $P_D^{*2}$         | 150 (Total) <sup>*3</sup> |            | mW   |
|                              | IMD3AFRA           |                    | 300 (Total) <sup>*4</sup> |            | mW   |
| Junction temperature         |                    | $T_j$              | 150                       |            | °C   |
| Range of storage temperature |                    | $T_{stg}$          | -55 to +150               |            | °C   |

**●Electrical characteristics**(Ta = 25°C) <For DTr1(NPN)>

| Parameter            | Symbol       | Conditions                                 | Min. | Typ. | Max. | Unit       |
|----------------------|--------------|--|------|------|------|------------|
| Input voltage        | $V_{I(off)}$ | $V_{CC} = 5V, I_O = 100\mu A$              | -    | -    | 0.5  | V          |
|                      | $V_{I(on)}$  | $V_O = 0.3V, I_O = 10mA$                   | 3.0  | -    | -    |            |
| Output voltage       | $V_{O(on)}$  | $I_O / I_I = 10mA / 0.5mA$                 | -    | 0.1  | 0.3  | V          |
| Input current        | $I_I$        | $V_I = 5V$                                 | -    | -    | 0.88 | mA         |
| Output current       | $I_{O(off)}$ | $V_{CC} = 50V, V_I = 0V$                   | -    | -    | 0.5  | $\mu A$    |
| DC current gain      | $G_1$        | $V_O = 5V, I_O = 5mA$                      | 30   | -    | -    | -          |
| Input resistance     | $R_1$        | -  | 7    | 10   | 13   | k $\Omega$ |
| Resistance ratio     | $R_2/R_1$    | -  | 0.8  | 1    | 1.2  | -          |
| Transition frequency | $f_T^{*1}$   | $V_{CE} = 10V, I_E = -5mA$<br>$f = 100MHz$ | -    | 250  | -    | MHz        |

**●Electrical characteristics**(Ta = 25°C) <For DTr2(PNP)>

| Parameter            | Symbol       | Conditions                                 | Min. | Typ. | Max.  | Unit       |
|----------------------|--------------|--|------|------|-------|------------|
| Input voltage        | $V_{I(off)}$ | $V_{CC} = -5V, I_O = -100\mu A$            | -    | -    | -0.5  | V          |
|                      | $V_{I(on)}$  | $V_O = -0.3V, I_O = -10mA$                 | -3.0 | -    | -     |            |
| Output voltage       | $V_{O(on)}$  | $I_O / I_I = -10mA / -0.5mA$               | -    | -0.1 | -0.3  | V          |
| Input current        | $I_I$        | $V_I = -5V$                                | -    | -    | -0.88 | mA         |
| Output current       | $I_{O(off)}$ | $V_{CC} = -50V, V_I = 0V$                  | -    | -    | -0.5  | $\mu A$    |
| DC current gain      | $G_1$        | $V_O = -5V, I_O = -5mA$                    | 30   | -    | -     | -          |
| Input resistance     | $R_1$        | -  | 7    | 10   | 13    | k $\Omega$ |
| Resistance ratio     | $R_2/R_1$    | -  | 0.8  | 1    | 1.2   | -          |
| 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 footprint

\*3 120mW per element must not be exceeded.

\*4 200mW per element must not be exceeded.

●Electrical characteristic curves (Ta = 25°C) <For DTr1(NPN)>

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

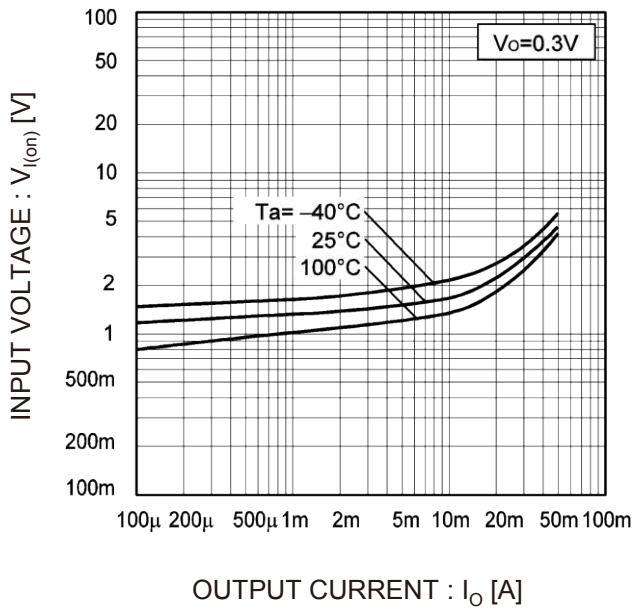


Fig.2 Output current vs. input voltage (OFF characteristics)

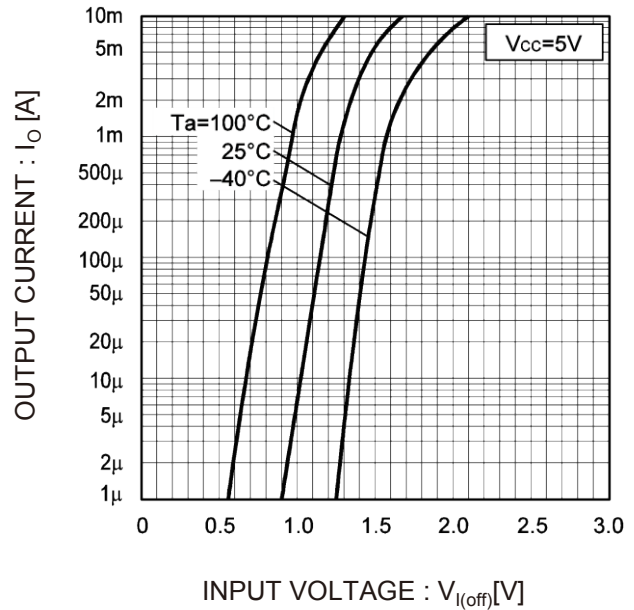


Fig.3 Output current vs. output voltage

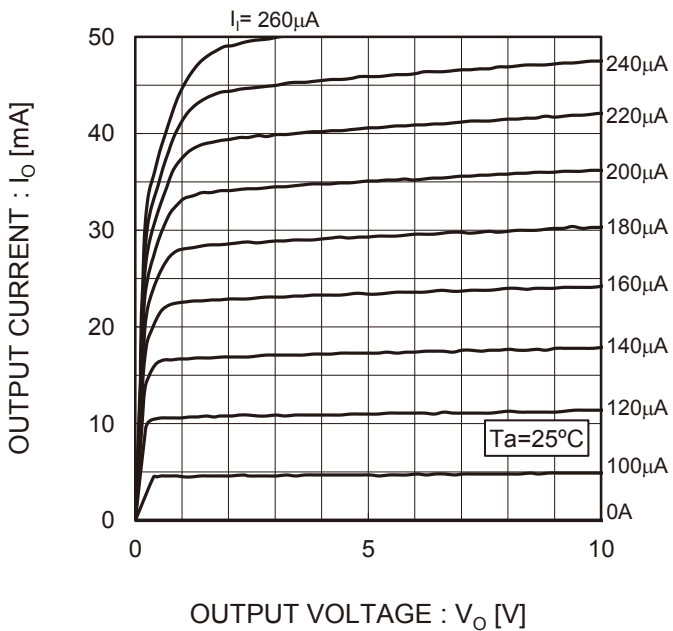
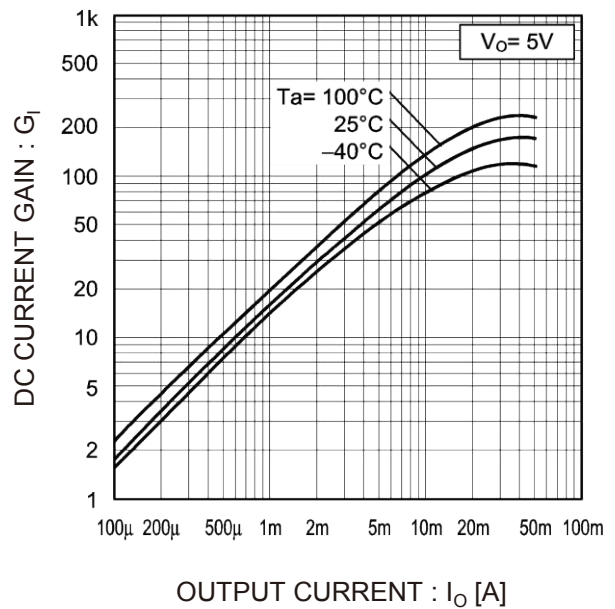
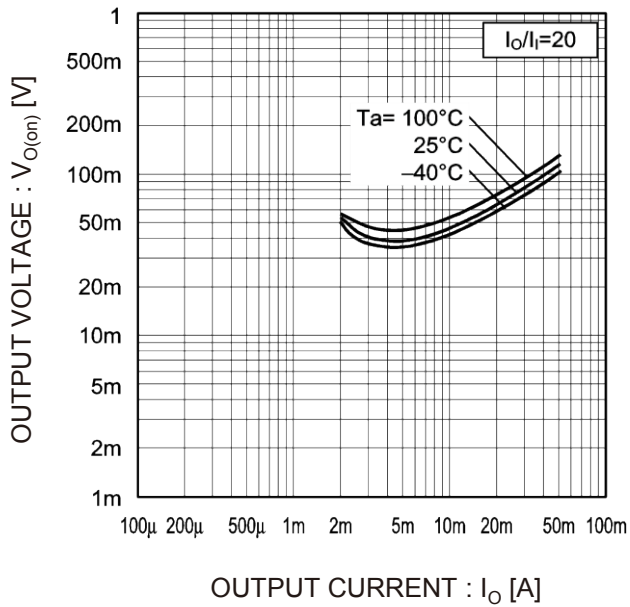


Fig.4 DC current gain vs. output current



●Electrical characteristic curves (Ta = 25°C) <For DTr1(NPN)>

Fig.5 Output voltage vs. output current



●Electrical characteristic curves (Ta = 25°C) <For DTr2(PNP)>

Fig.6 Input voltage vs. output current (ON characteristics)

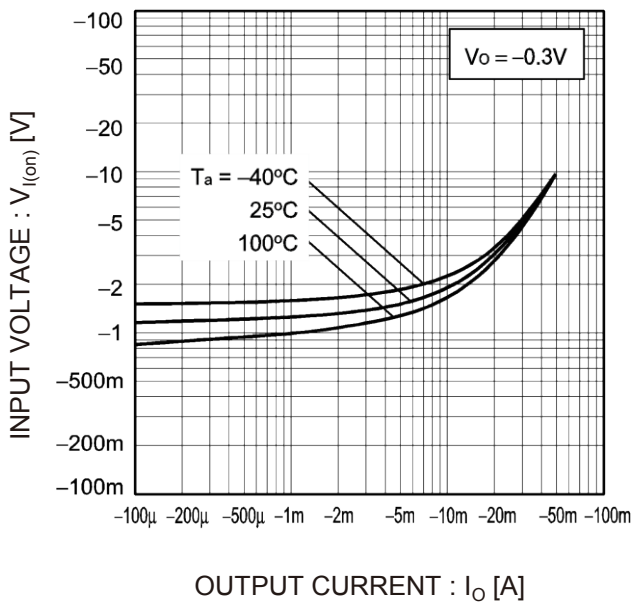
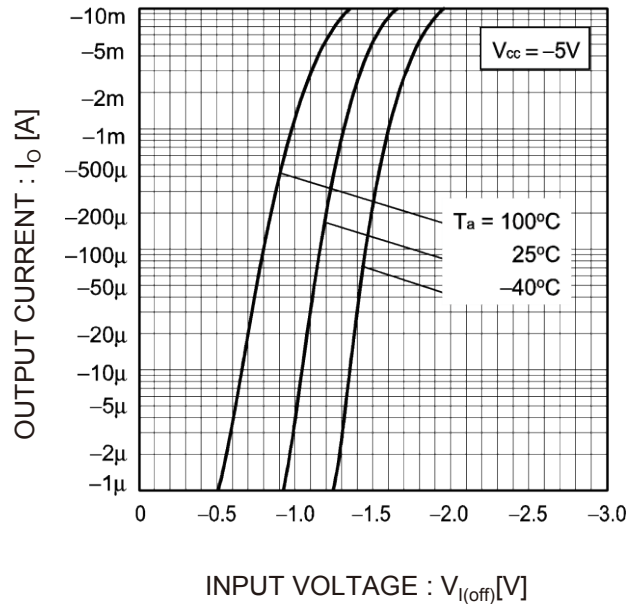


Fig.7 Output current vs. input voltage (OFF characteristics)



●Electrical characteristic curves (Ta = 25°C) <For DTr2(PNP)>

Fig.8 Output current vs. output voltage

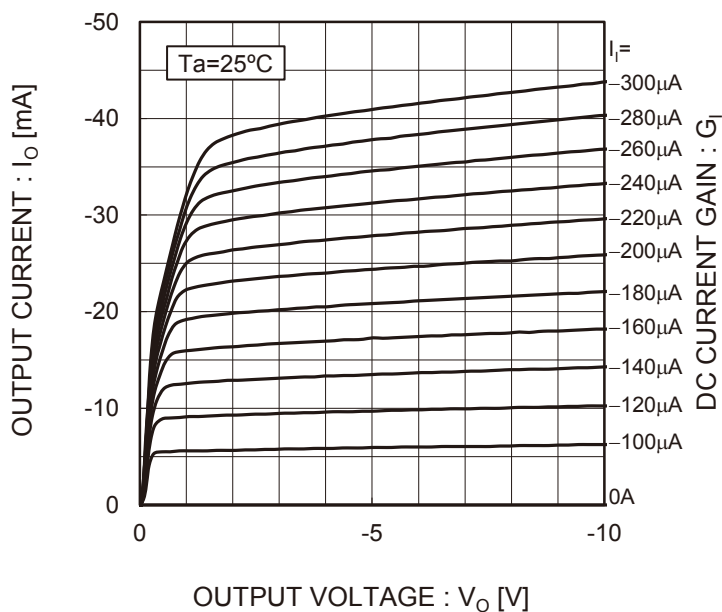


Fig.9 DC current gain vs. output current

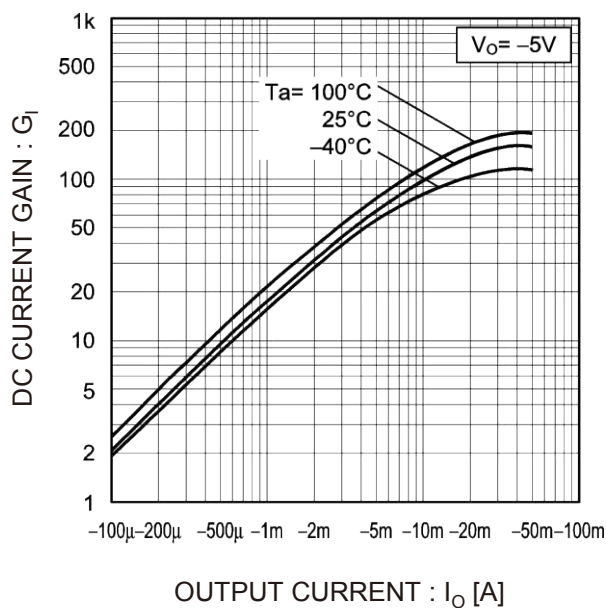
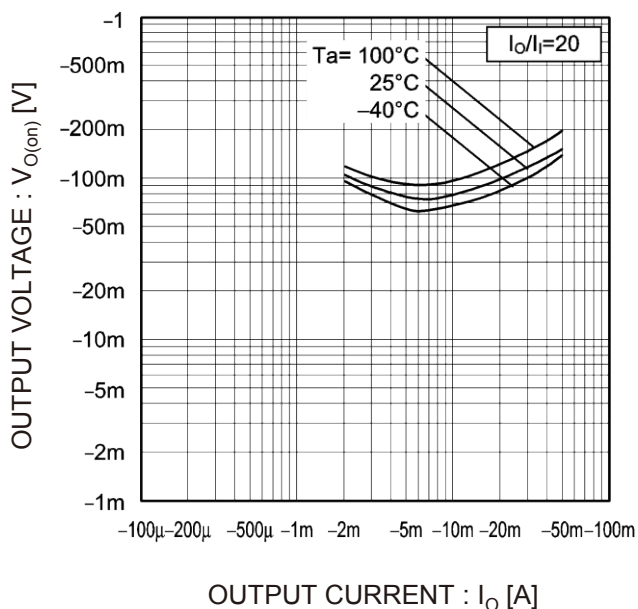
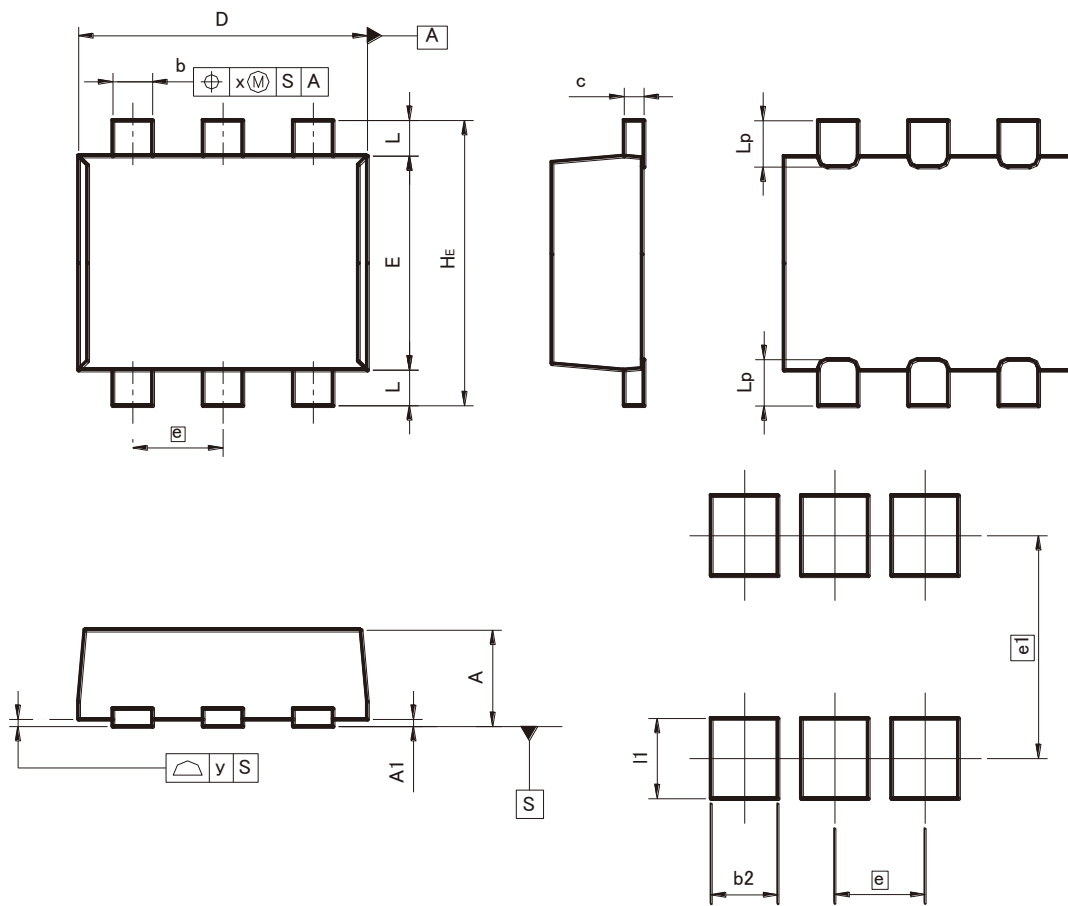


Fig.10 Output voltage vs. output current



●Dimensions (Unit : mm)

EMT6



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

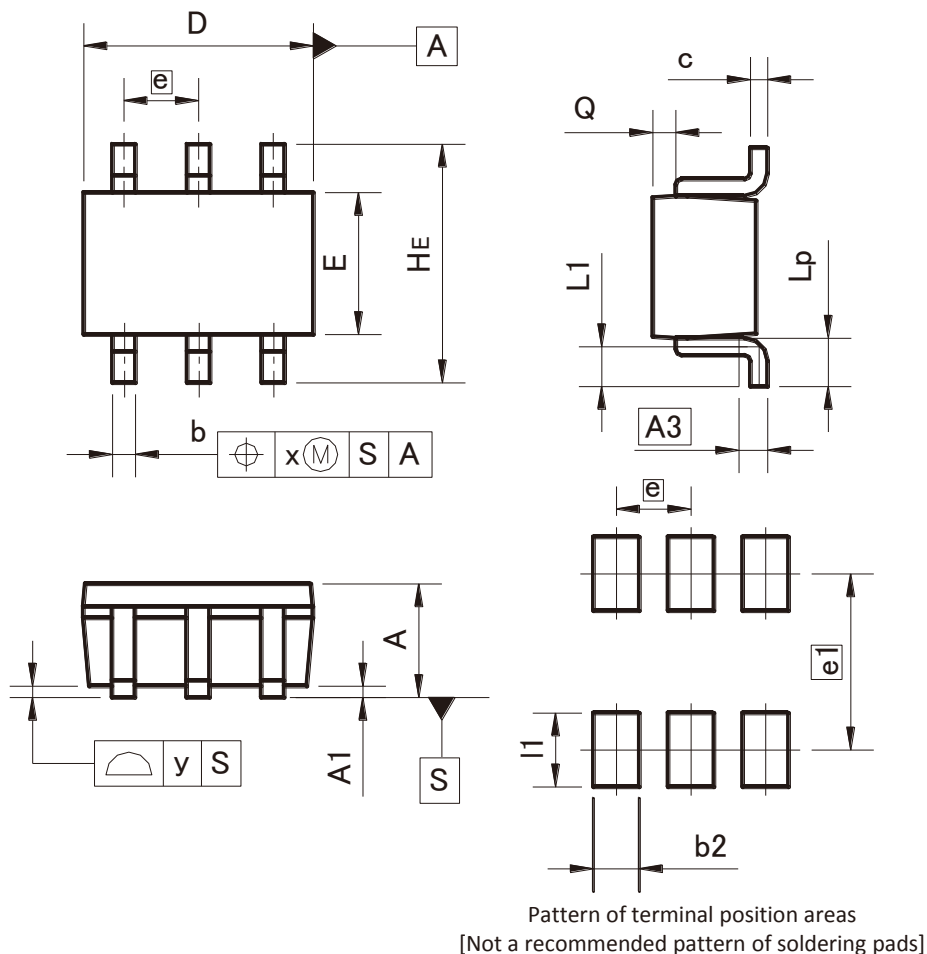
| DIM | MILIMETERS |      | INCHES |       |
|-----|------------|------|--------|-------|
|     | MIN        | MAX  | MIN    | MAX   |
| A   | 0.45       | 0.55 | 0.018  | 0.022 |
| A1  | 0.00       | 0.10 | 0.000  | 0.004 |
| b   | 0.17       | 0.27 | 0.007  | 0.011 |
| c   | 0.08       | 0.18 | 0.003  | 0.007 |
| D   | 1.50       | 1.70 | 0.059  | 0.067 |
| E   | 1.10       | 1.30 | 0.043  | 0.051 |
| e   | 0.50       |      | 0.020  |       |
| HE  | 1.50       | 1.70 | 0.059  | 0.067 |
| L   | 0.10       | 0.30 | 0.004  | 0.012 |
| Lp  | -          | 0.35 | -      | 0.014 |
| x   | -          | 0.10 | -      | 0.004 |
| y   | -          | 0.10 | -      | 0.004 |

| DIM | MILIMETERS |      | INCHES |       |
|-----|------------|------|--------|-------|
|     | MIN        | MAX  | MIN    | MAX   |
| b2  | -          | 0.37 | -      | 0.015 |
| e1  | 1.25       |      | 0.049  |       |
| l1  | -          | 0.45 | -      | 0.018 |

Dimension in mm / inches

●Dimensions (Unit : mm)

UMT6



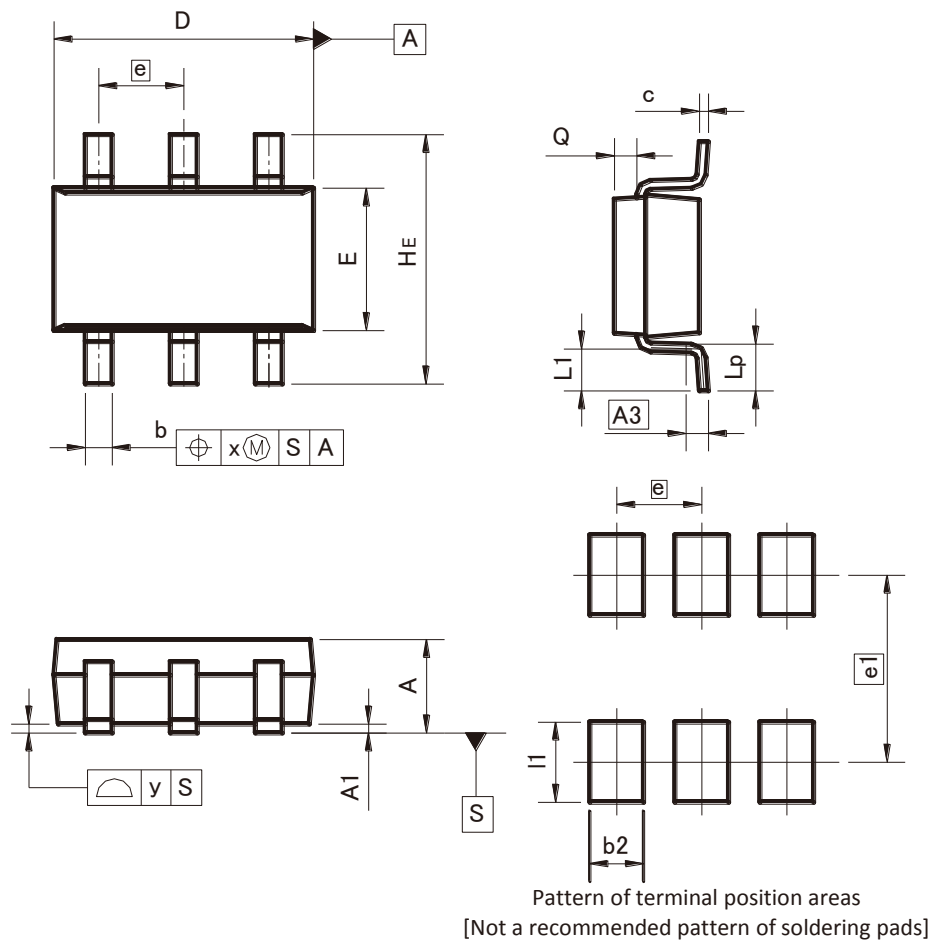
| DIM | MILIMETERS |      | INCHES |       |
|-----|------------|------|--------|-------|
|     | MIN        | MAX  | MIN    | MAX   |
| A   | 0.80       | 1.00 | 0.031  | 0.039 |
| A1  | 0.00       | 0.10 | 0.000  | 0.004 |
| A3  | 0.25       |      | 0.010  |       |
| b   | 0.15       | 0.30 | 0.006  | 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 |
| y   | -          | 0.10 | -      | 0.004 |

| DIM | MILIMETERS |      | INCHES |       |
|-----|------------|------|--------|-------|
|     | MIN        | MAX  | MIN    | MAX   |
| b2  | -          | 0.40 | -      | 0.016 |
| e1  | 1.55       |      | 0.061  |       |
| l1  | -          | 0.65 | -      | 0.026 |

Dimension in mm / inches

●Dimensions (Unit : mm)

SMT6



| 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   | 0.25       | 0.40 | 0.010  | 0.016 |
| 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   | -          | 0.20 | -      | 0.008 |
| y   | -          | 0.10 | -      | 0.004 |

| DIM | MILIMETERS |      | INCHES |       |
|-----|------------|------|--------|-------|
|     | MIN        | MAX  | MIN    | MAX   |
| b2  | -          | 0.60 | -      | 0.024 |
| e1  | 2.10       |      | 0.083  |       |
| I1  | -          | 0.90 | -      | 0.035 |

Dimension in mm / inches



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|-----------|-----------|------------|-----------|
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| CLASS IV  |           | CLASS III  |           |

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4. The Products are not subject to radiation-proof design.
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6. In particular, if a transient load (a large amount of load applied in a short period of time, such as pulse. is applied, confirmation of performance characteristics after on-board mounting is strongly recommended. Avoid applying power exceeding normal rated power; exceeding the power rating under steady-state loading condition may negatively affect product performance and reliability.
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8. Confirm that operation temperature is within the specified range described in the product specification.
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  - [c] the Products are exposed to direct sunshine or condensation
  - [d] the Products are exposed to high Electrostatic
2. Even under ROHM recommended storage condition, solderability of products out of recommended storage time period may be degraded. It is strongly recommended to confirm solderability before using Products of which storage time is exceeding the recommended storage time period.
3. Store / transport cartons in the correct direction, which is indicated on a carton with a symbol. Otherwise bent leads may occur due to excessive stress applied when dropping of a carton.
4. Use Products within the specified time after opening a humidity barrier bag. Baking is required before using Products of which storage time is exceeding the recommended storage time period.

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