

### <For DTr1(NPN)>

| Parameter     | Value        |
|---------------|--------------|
| $V_{CC}$      | 50V          |
| $I_{C(MAX.)}$ | 100mA        |
| $R_1$         | 10k $\Omega$ |
| $R_2$         | 47k $\Omega$ |

### <For DTr2(PNP)>

| Parameter     | Value        |
|---------------|--------------|
| $V_{CC}$      | -50V         |
| $I_{C(MAX.)}$ | -100mA       |
| $R_1$         | 10k $\Omega$ |
| $R_2$         | 47k $\Omega$ |

### ●Features

- 1) Both the DTC114Y chip and DTA114Y 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.

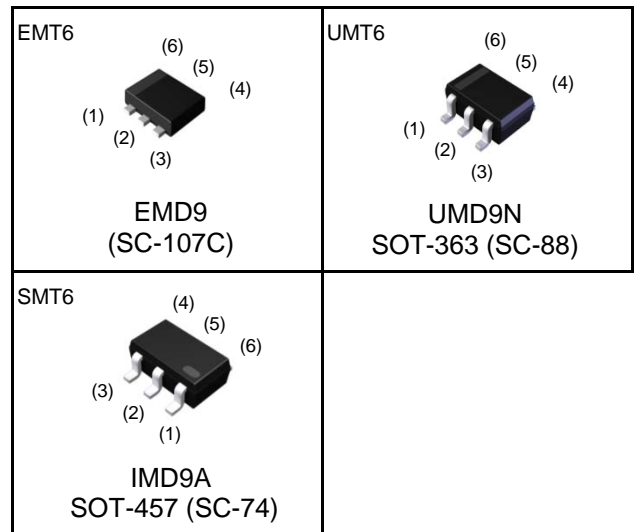
### ●Application

Inverter circuit, Interface circuit, Driver circuit

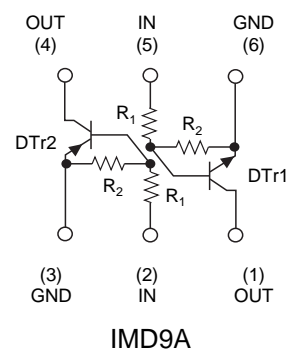
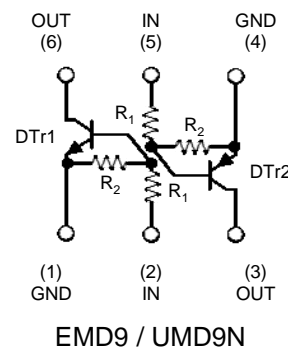
### ●Packaging specifications

| Part No. | Package | Package size (mm) | Taping code | Reel size (mm) | Tape width (mm) | Basic ordering unit (pcs) | Marking |
|----------|---------|-------------------|-------------|----------------|-----------------|---------------------------|---------|
| EMD9     | EMT6    | 1616              | T2R         | 180            | 8               | 8,000                     | D9      |
| UMD9N    | UMT6    | 2021              | TR          | 180            | 8               | 3,000                     | D9      |
| IMD9A    | SMT6    | 2928              | T108        | 180            | 8               | 3,000                     | D9      |

### ●Outline



### ●Inner circuit



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

| Parameter                    |              | Symbol             | DTr1(NPN)                 | DTr2(PNP) | Unit |
|------------------------------|--------------|--------------------|---------------------------|-----------|------|
| Supply voltage               |              | $V_{CC}$           | 50                        | -50       | V    |
| Input voltage                |              | $V_{IN}$           | -6 to +40                 | -40 to +6 | V    |
| Output current               |              | $I_O$              | 70                        | -70       | mA   |
| Collector current            |              | $I_{C(MAX.)}^{*1}$ | 100                       | -100      | mA   |
| Power dissipation            | EMD9 / UMD9N | $P_D^{*2}$         | 150 (Total) <sup>*3</sup> |           | mW   |
|                              | IMD9A        |                    | 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        | $V_{I(off)}$ | $V_{CC} = 5V, I_O = 100\mu A$              | -    | -    | 0.3  | V          |
|                      | $V_{I(on)}$  | $V_O = 0.3V, I_O = 1mA$                    | 1.4  | -    | -    |            |
| Output voltage       | $V_{O(on)}$  | $I_O / I_I = 5mA / 0.25mA$                 | -    | 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      | $G_I$        | $V_O = 5V, I_O = 5mA$                      | 68   | -    | -    | -          |
| Input resistance     | $R_1$        | -  | 7    | 10   | 13   | k $\Omega$ |
| Resistance ratio     | $R_2/R_1$    | -  | 3.7  | 4.7  | 5.7  | -          |
| 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        | $V_{I(off)}$ | $V_{CC} = -5V, I_O = -100\mu A$            | -    | -    | -0.3  | V          |
|                      | $V_{I(on)}$  | $V_O = -0.3V, I_O = -1mA$                  | -1.4 | -    | -     |            |
| Output voltage       | $V_{O(on)}$  | $I_O / I_I = -5mA / -0.25mA$               | -    | -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      | $G_I$        | $V_O = -5V, I_O = -5mA$                    | 68   | -    | -     | -          |
| Input resistance     | $R_1$        | -  | 7    | 10   | 13    | k $\Omega$ |
| Resistance ratio     | $R_2/R_1$    | -  | 3.7  | 4.7  | 5.7   | -          |
| 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)

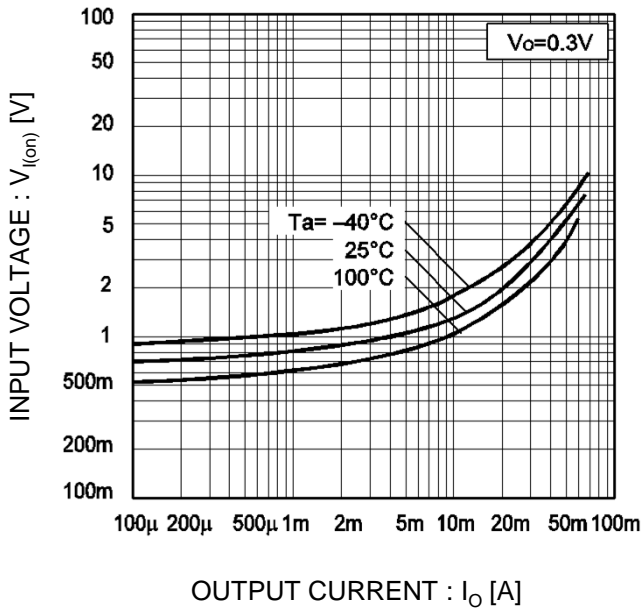


Fig.2 Output current vs. input voltage (OFF characteristics)

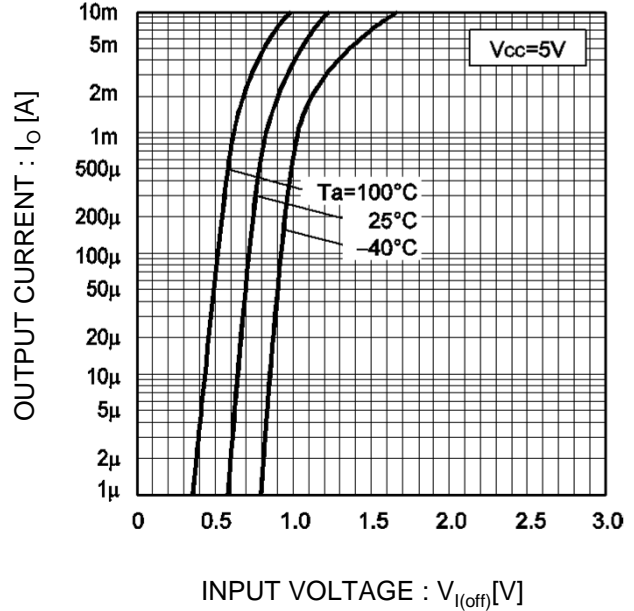


Fig.3 Output current vs. output voltage

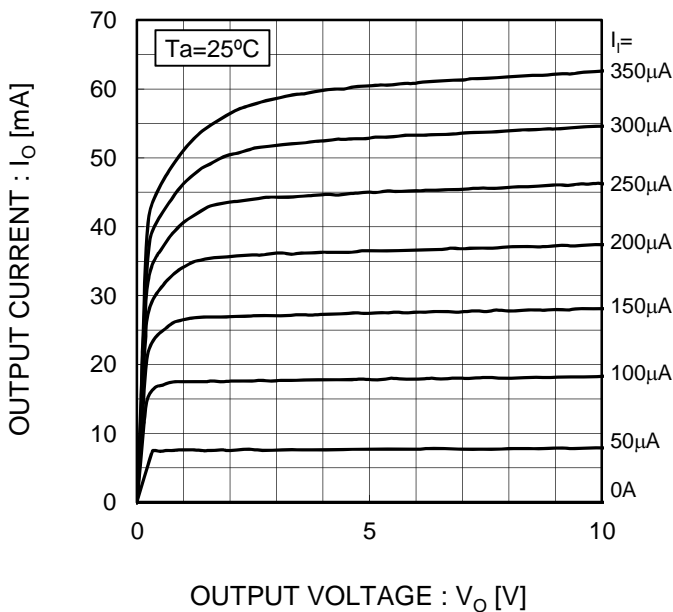
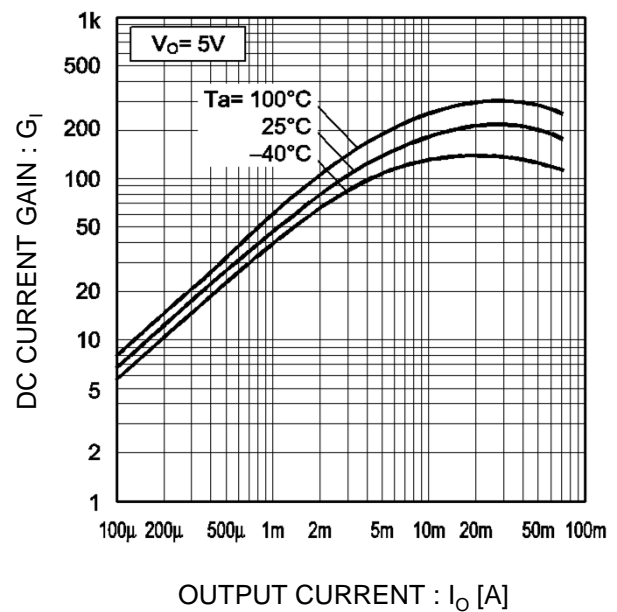
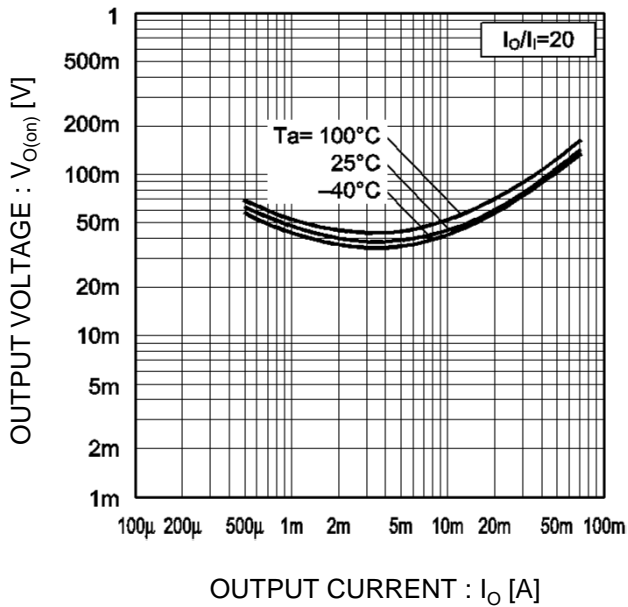


Fig.4 DC current gain vs. output current



●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)

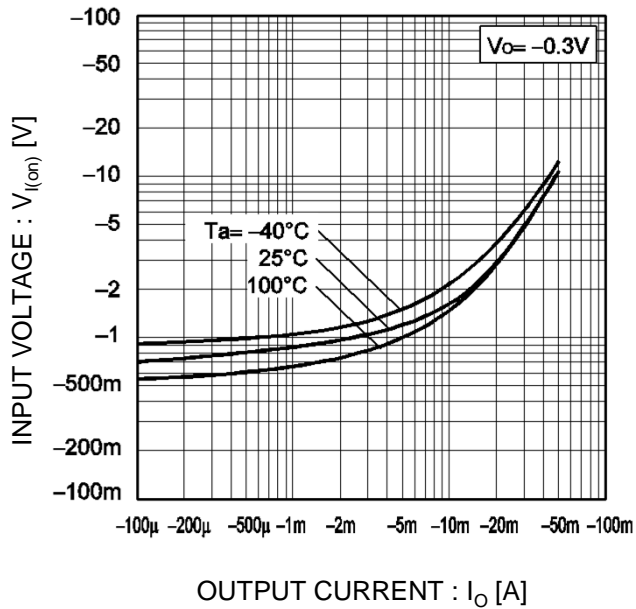
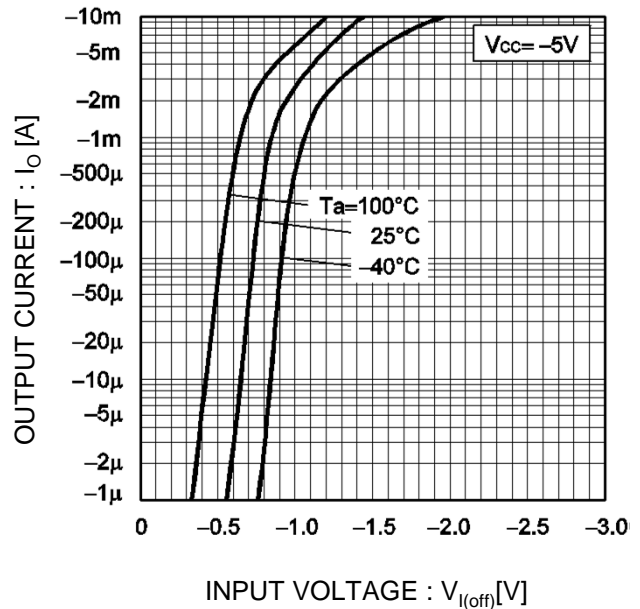


Fig.7 Output current vs. input voltage (OFF characteristics)



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

Fig.8 Output current vs. output voltage

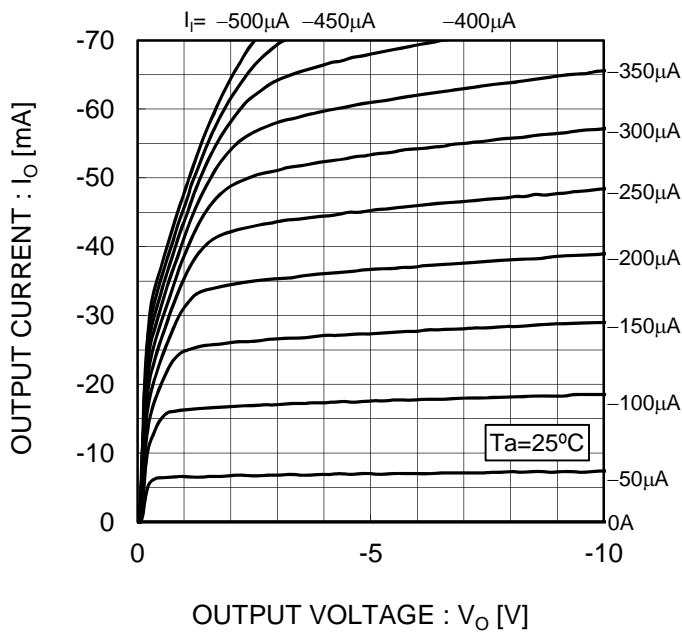


Fig.9 DC current gain vs. output current

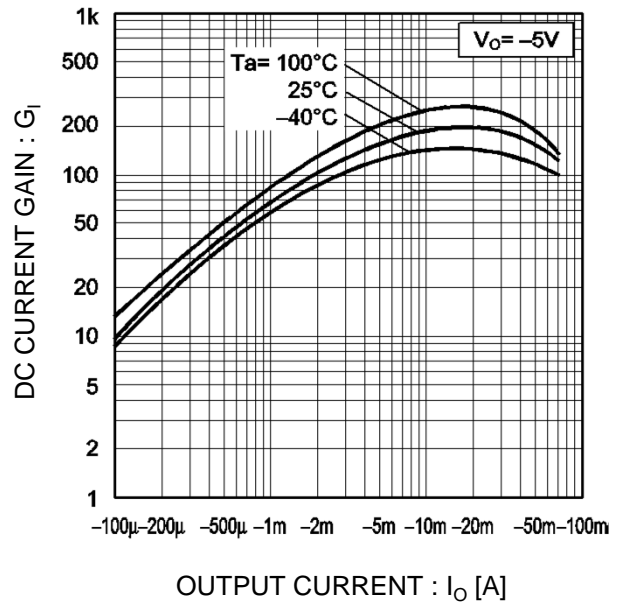
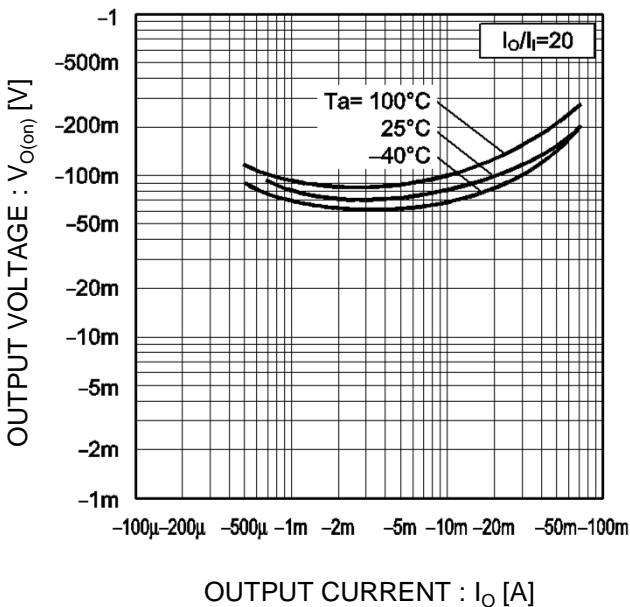
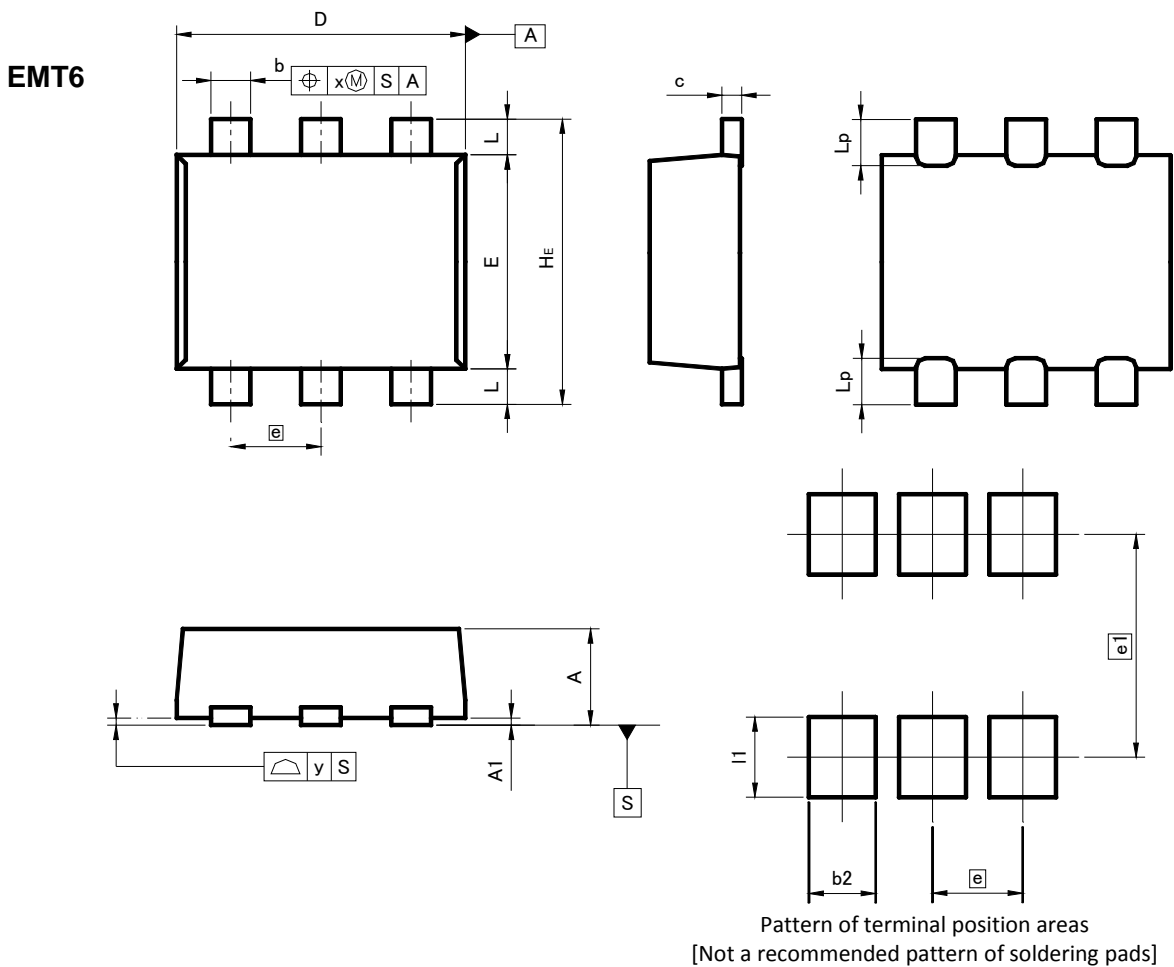


Fig.10 Output voltage vs. output current



●Dimensions (Unit : mm)



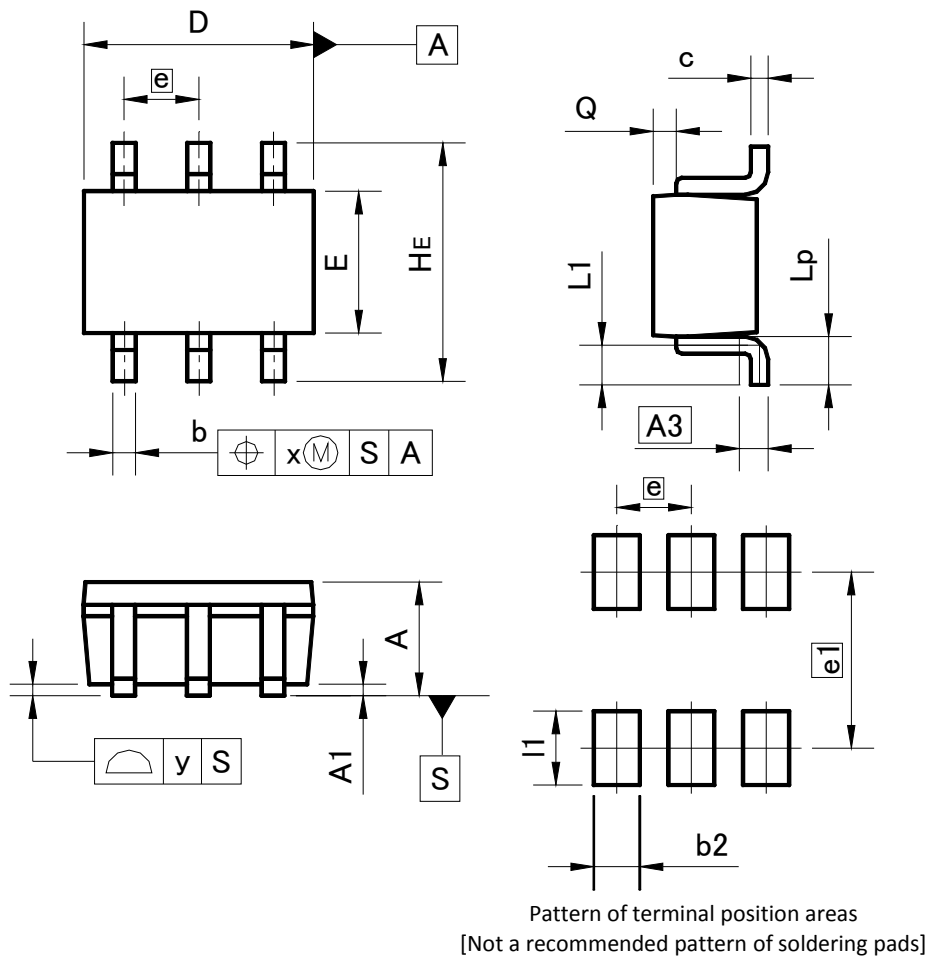
| DIM | MILIMETERS |      | INCHES |       |
|-----|------------|------|--------|-------|
|     | MIN        | MAX  | MIN    | MAX   |
| A   | 0.45       | 0.55 | 0.018  | 0.022 |
| A1  | 0.00       | 0.10 | 0.000  | 0.004 |
| b   | 0.17       | 0.27 | 0.007  | 0.011 |
| c   | 0.08       | 0.18 | 0.003  | 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



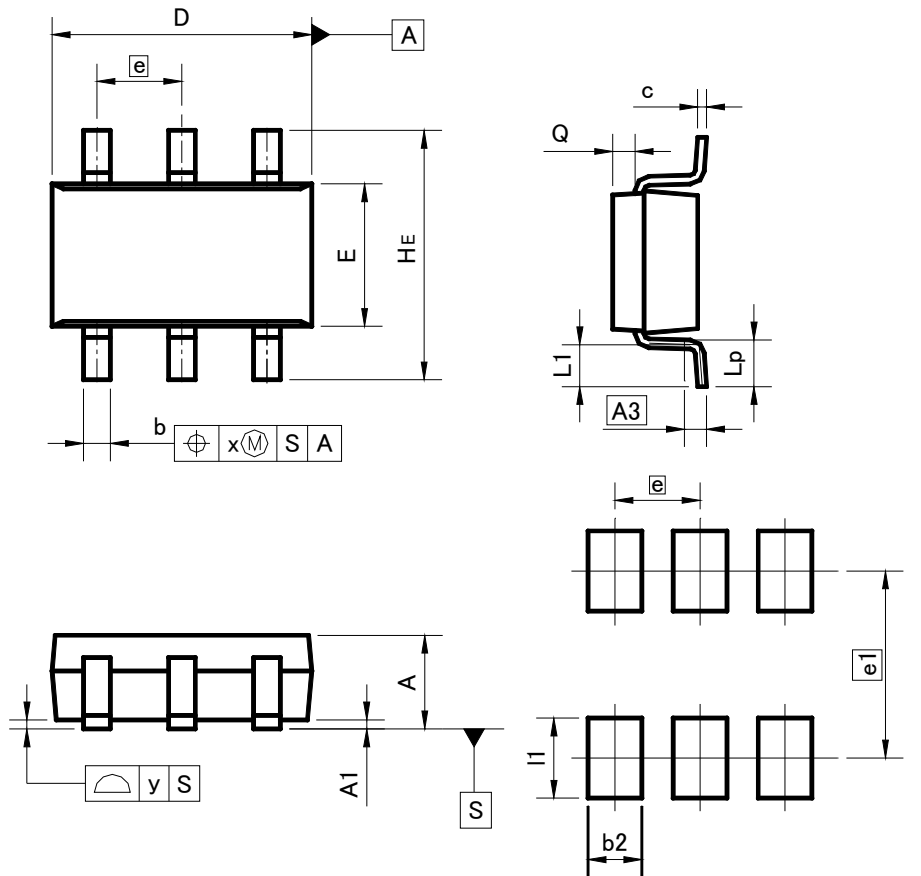
| DIM | MILIMETERS |      | INCHES |       |
|-----|------------|------|--------|-------|
|     | MIN        | MAX  | MIN    | MAX   |
| A   | 0.80       | 1.00 | 0.031  | 0.039 |
| A1  | 0.00       | 0.10 | 0.000  | 0.004 |
| A3  | 0.25       |      | 0.010  |       |
| b   | 0.15       | 0.30 | 0.006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



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   | 0.25       | 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  |       |
| l1  | -          | 0.90 | -      | 0.035 |

Dimension in mm / inches



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