EMH1 / UMH1N / IMH1A

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

Datasheet

| Parameter | Tr1 and Tr2 |
|----------------------|-----------------|
| V _{CC} | 50V |
| I _{C(MAX.)} | 100mA |
| R ₁ | 22 k Ω |
| R_2 | 22kΩ |

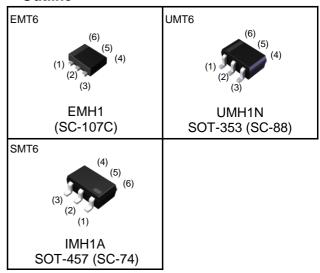
Features

- 1) Built-In Biasing Resistors, $R_1 = R_2 = 22k\Omega$.
- 2) Two DTC124E chips in one package.
- 3) Built-in bias resistors enable the configuration of an inverter circuit without connecting external input resistors (see inner circuit).
- 4) 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.
- 5) Only the on/off conditions need to be set for operation, making the circuit design easy.
- 6) Lead Free/RoHS Compliant.

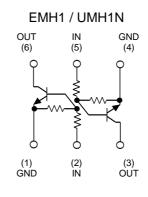
Application

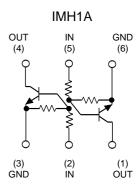
Inverter circuit, Interface circuit, Driver circuit

Outline



●Inner circuit





Packaging specifications

| Part No. | Package | Package size (mm) | Taping code | Reel size (mm) | Tape width (mm) | Basic ordering unit (pcs) | Marking |
|----------|---------|-------------------------|----------------|-------------------|-----------------|---------------------------------|---------|
| EMH1 | EMT6 | 1616 | T2R | 180 | 8 | 8,000 | H1 |
| UMH1N | UMT6 | 2021 | TR | 180 | 8 | 3,000 | H1 |
| IMH1A | SMT6 | 2928 | T108 | 180 | 8 | 3,000 | H1 |

● Absolute maximum ratings (Ta = 25°C)

<For Tr1 and Tr2 in common>

| Para | ameter | Symbol | Values | Unit |
|--------------------------|--------------|-------------------------|---------------------------|------|
| Supply voltage | | V _{CC} | 50 | V |
| Input voltage | | V _{IN} | −10 to +40 | V |
| Output current | | Io | 30 | mA |
| Collector current | | I _{C(MAX.)} *1 | 100 | mA |
| Power dissipation | EMH1 / UMH1N | P _D *2 | 150 (Total) ^{*3} | mW |
| IMH1A | | P_{D} | 300 (Total)*4 | mW |
| Junction temperature | | T _j | 150 | °C |
| Range of storage tempera | ature | T _{stg} | -55 to +150 | °C |

●Electrical characteristics(Ta = 25°C)

<For Tr1 and Tr2 in common>

| Parameter | Symbol | Conditions | Min. | Тур. | Max. | Unit |
|----------------------|--------------------------------|---|------|------|------|------|
| Input voltage | $V_{I(off)}$ | $V_{CC} = 5V, I_{O} = 100 \mu A$ | - | - | 0.5 | V |
| | $V_{I(on)}$ | $V_0 = 0.2V, I_0 = 5mA$ | 3.0 | - | - | V |
| Output voltage | $V_{O(on)}$ | $I_{O}/I_{I} = 10mA/0.5mA$ | - | 0.1 | 0.3 | V |
| Input current | I ₁ | V _I = 5V | - | - | 0.36 | mA |
| Output current | I _{O(off)} | $V_{CC} = 50V, V_I = 0V$ | - | - | 0.5 | μΑ |
| DC current gain | Gı | $V_O = 5V$, $I_O = 5mA$ | 56 | - | - | - |
| Input resistance | R ₁ | - | 15.4 | 22 | 28.6 | kΩ |
| Resistance ratio | R ₂ /R ₁ | - | 0.8 | 1 | 1.2 | - |
| Transition frequency | f _T *1 | $V_{CE} = 10V, I_{E} = -5mA,$ f = 100MHz | - | 250 | - | MHz |

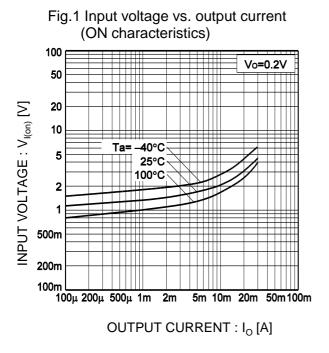
^{*1} Characteristics of built-in transistor

^{*2} Each terminal mounted on a reference footprint

^{*3 120}mW per element must not be exceeded.

^{*4 200}mW per element must not be exceeded.

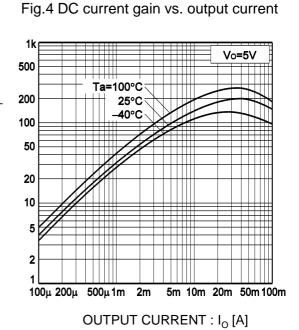
●Electrical characteristic curves(Ta = 25°C)



(OFF characteristics) 10m 5m 2m Ta=100°C OUTPUT CURRENT : I_o [A] 1m 25°C 500u 40°C 200µ 100µ **50**μ **20**µ 10_µ 2μ 3.0 INPUT VOLTAGE : $V_{I(off)}[V]$

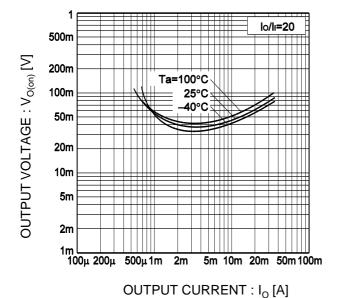
Fig.2 Output current vs. input voltage

Fig.3 Output current vs. output voltage $I_1 =$ 30 150µA 140µA 130µA OUTPUT CURRENT : Io [mA] 120µA 20 110µA GAIN 100µA 90μΑ CURRENT 80μΑ 10 70µA 60μΑ 50µA Ta=25ºC 0 0 5 10 OUTPUT VOLTAGE : Vo [V]

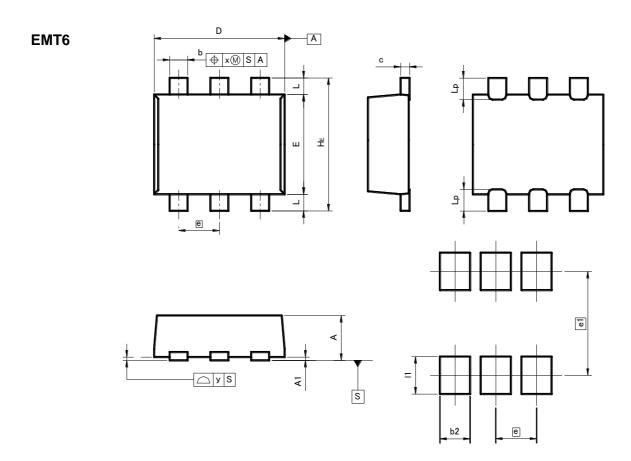


●Electrical characteristic curves(Ta = 25°C)

Fig.5 Output voltage vs. output current



●Dimensions (Unit : mm)



Patterm of terminal position areas

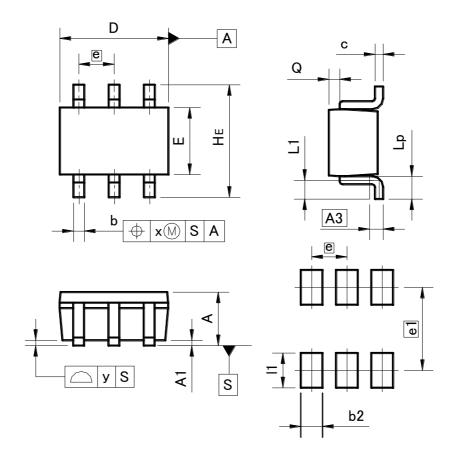
| DIM | MILIMETERS | | INCHES | | |
|-----|------------|------|--------|-------|--|
| DIM | MIN | MAX | MIN | MAX | |
| A1 | 0.00 | 0.10 | 0 | 0.004 | |
| Α | 0.45 | 0.55 | 0.018 | 0.022 | |
| b | 0.17 | 0.27 | 0.007 | 0.011 | |
| С | 0.08 | 0.18 | 0.003 | 0.007 | |
| D | 1.50 | 1.70 | 0.059 | 0.067 | |
| E | 1.10 | 1.30 | 0.043 | 0.051 | |
| е | 0. | 50 | 0.02 | | |
| HE | 1.50 | 1.70 | 0.059 | 0.067 | |
| L | 0.10 | 0.30 | 0.004 | 0.012 | |
| Lp | _ | 0.35 | _ | 0.014 | |
| х | _ | 0.10 | - | 0.004 | |
| У | _ | 0.10 | _ | 0.004 | |

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

Dimension in mm/inches

● **Dimensions** (Unit: mm)

UMT6



Patterm of terminal position areas

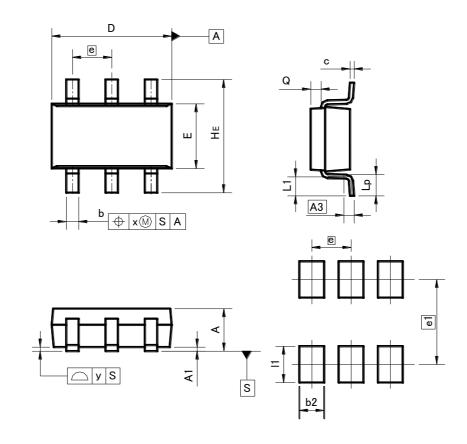
| DIM | MILIMETERS | | INCHES | | |
|-----|------------|------|--------|-------|--|
| DIM | MIN | MAX | MIN | MAX | |
| Α | 0.80 | 1.00 | 1 | 0.039 | |
| A1 | 0.00 | 0.10 | 0 | 0.004 | |
| A3 | 0.2 | 25 | 0.0 | 01 | |
| b | 0.15 | 0.30 | 0.006 | 0.012 | |
| С | 0.10 | 0.20 | 0.004 | 0.008 | |
| D | 1.90 | 2.10 | 0.075 | 0.083 | |
| E | 1.15 | 1.35 | 0.045 | 0.053 | |
| е | 0.0 | 65 | 0.03 | | |
| HE | 2.00 | 2.20 | 0.079 | 0.087 | |
| L1 | 0.20 | 0.50 | 0.008 | 0.02 | |
| Lp | 0.25 | 0.55 | 0.01 | 0.022 | |
| Q | 0.10 | 0.30 | 0.004 | 0.012 | |
| х | _ | 0.10 | _ | 0.004 | |
| У | _ | 0.10 | _ | 0.004 | |

| DIM | MILIMETERS | | INCHES | | |
|-----|------------|--------|--------|-------|--|
| DIM | MIN | MAX | MIN | MAX | |
| e1 | 1.55 | | 0.06 | | |
| b2 | - 0.40 | | _ | 0.016 | |
| 11 | 1 | - 0.65 | | 0.026 | |

Dimension in mm/inches

● **Dimensions** (Unit: mm)

SMT6



Patterm of terminal position areas

| DIM | MILIME | ETERS | INC | HES |
|-----|--------|-------|-------|-------|
| DIM | MIN | MAX | MIN | MAX |
| Α | 1.00 | 1.30 | 0.039 | 0.051 |
| A1 | 0.00 | 0.10 | 0 | 0.004 |
| A3 | 0.2 | 25 | 0.0 | 01 |
| b | 0.25 | 0.40 | 0.01 | 0.016 |
| С | 0.09 | 0.25 | 0.004 | 0.01 |
| D | 2.80 | 3.00 | 0.11 | 0.118 |
| E | 1.50 | 1.80 | 0.059 | 0.071 |
| е | 0.0 | 95 | 0.04 | |
| 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 |
| х | _ | 0.20 | - | 0.008 |
| У | _ | 0.10 | _ | 0.004 |

| DIM | MILIMETERS | | INCHES | | |
|---------|------------|------|--------|-------|--|
| DIM MIN | | MAX | MIN | MAX | |
| e1 | 2.10 | | 0.08 | | |
| b2 | 0.60 | | ı | 0.024 | |
| 11 | | 0.90 | - | 0.035 | |

Dimension in mm/inches

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