



## DTB713Z series

PNP -200mA -30V Digital Transistors (Bias Resistor Built-in Transistors)

Datasheet

| Parameter     | Value         |
|---------------|---------------|
| $V_{CC}$      | -30V          |
| $I_{C(MAX.)}$ | -200mA        |
| $R_1$         | 1.0k $\Omega$ |
| $R_2$         | 10k $\Omega$  |

## ●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) 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) Complementary NPN Types :DTD713Z series
- 6) Lead Free/RoHS Compliant.



## ●Application

Switching circuit, Inverter circuit, Interface circuit, Driver circuit

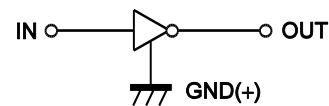
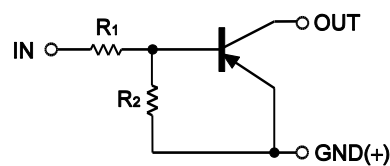
## ●Packaging specifications

| Part No. | Package | Package size (mm) | Taping code | Reel size (mm) | Tape width (mm) | Basic ordering unit (pcs) | Marking |
|----------|---------|-------------------|-------------|----------------|-----------------|---------------------------|---------|
| DTB713ZM | VMT3    | 1212              | T2L         | 180            | 8               | 8,000                     | P11     |
| DTB713ZE | EMT3    | 1616              | TL          | 180            | 8               | 3,000                     | P11     |

## ●Outline

|  |   |
|--|---|
| VMT3<br><br>DTB713ZM<br>(SC-105AA) | EMT3<br><br>DTB713ZE<br>SOT-416 (SC-75A) |
|--|---|

## ●Inner circuit



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

| Parameter                    | Symbol             | Values      | Unit |
|------------------------------|--------------------|-------------|------|
| Supply voltage               | $V_{CC}$           | -30         | V    |
| Input voltage                | $V_{IN}$           | -10 to +5   | V    |
| Collector current            | $I_{C(MAX.)}^{*1}$ | -200        | mA   |
| Power dissipation            | $P_D^{*2}$         | 150         | mW   |
| Junction temperature         | $T_j$              | 150         | °C   |
| Range of storage temperature | $T_{stg}$          | -55 to +150 | °C   |

**●Electrical characteristics (Ta = 25°C)**

| Parameter            | Symbol       | Conditions                                  | Min. | Typ.  | Max. | Unit       |
|----------------------|--------------|---|------|-------|------|------------|
| Input voltage        | $V_{I(off)}$ | $V_{CC} = -5V, I_O = -100\mu A$             | -    | -     | -0.3 | V          |
|                      | $V_{I(on)}$  | $V_O = -0.3V, I_O = -20mA$                  | -2.5 | -     | -    |            |
| Output voltage       | $V_{O(on)}$  | $I_O / I_I = -50mA / -2.5mA$                | -    | -0.07 | -0.3 | V          |
| Input current        | $I_I$        | $V_I = -5V$                                 | -    | -     | -6.4 | mA         |
| Output current       | $I_{O(off)}$ | $V_{CC} = -30V, V_I = 0V$                   | -    | -     | -0.5 | $\mu A$    |
| DC current gain      | $G_I$        | $V_O = -2V, I_O = -100mA$                   | 140  | -     | -    | -          |
| Input resistance     | $R_1$        | -   | 0.7  | 1.0   | 1.3  | k $\Omega$ |
| Resistance ratio     | $R_2/R_1$    | -   | 8    | 10    | 12   | -          |
| Transition frequency | $f_T^{*1}$   | $V_{CE} = -10V, I_E = 5mA,$<br>$f = 100MHz$ | -    | 260   | -    | MHz        |

\*1 Characteristics of built-in transistor

\*2 Each terminal mounted on a reference footprint

●Electrical characteristic curves(Ta = 25°C)

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

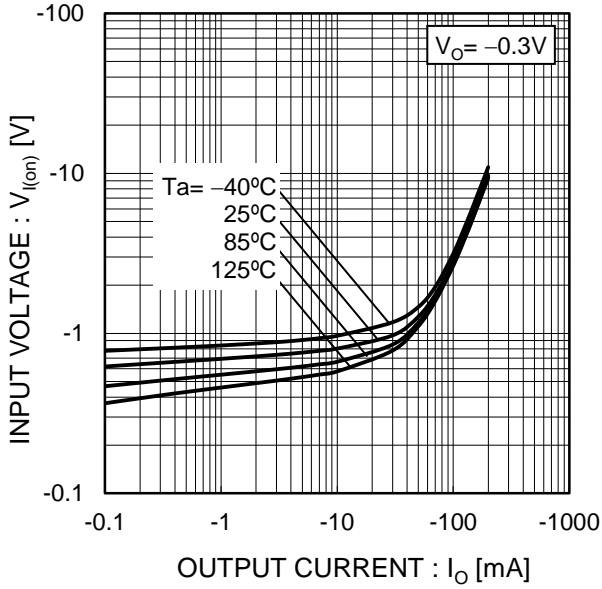


Fig.2 Output current vs. input voltage (OFF characteristics)

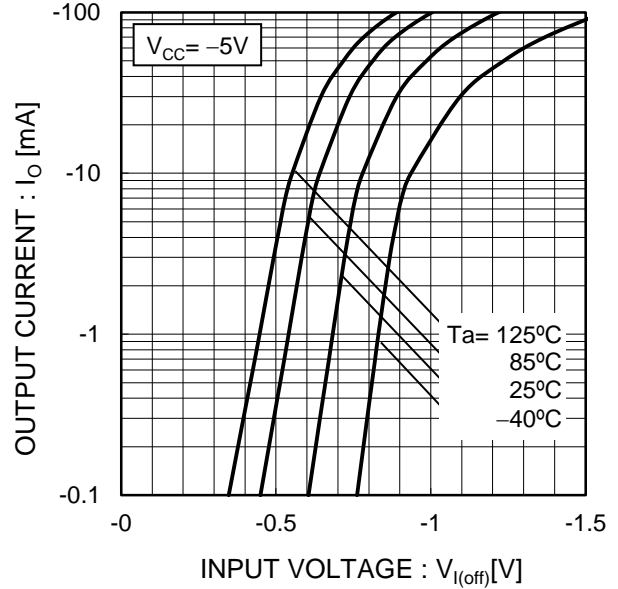


Fig.3 Output current vs. output voltage

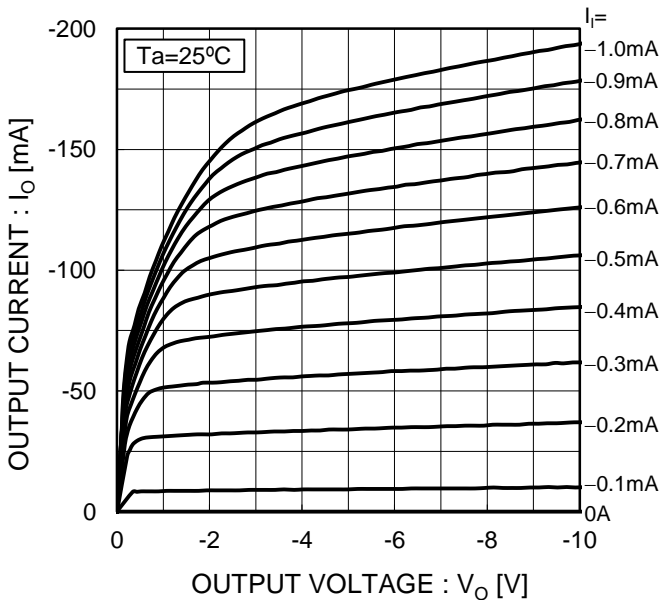
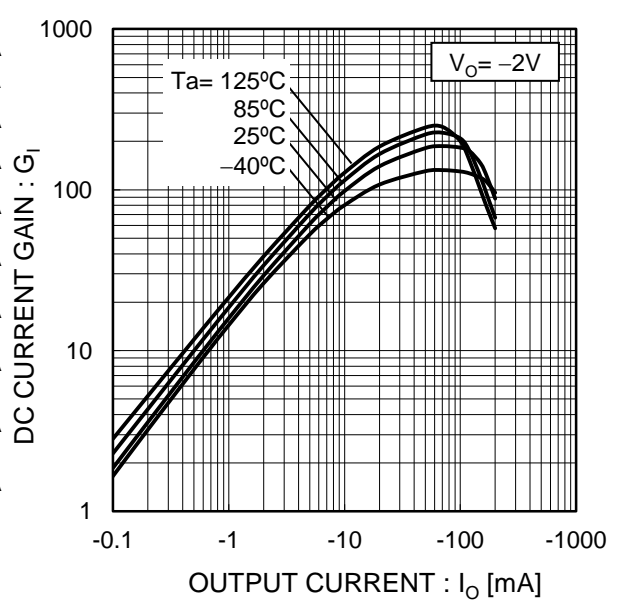
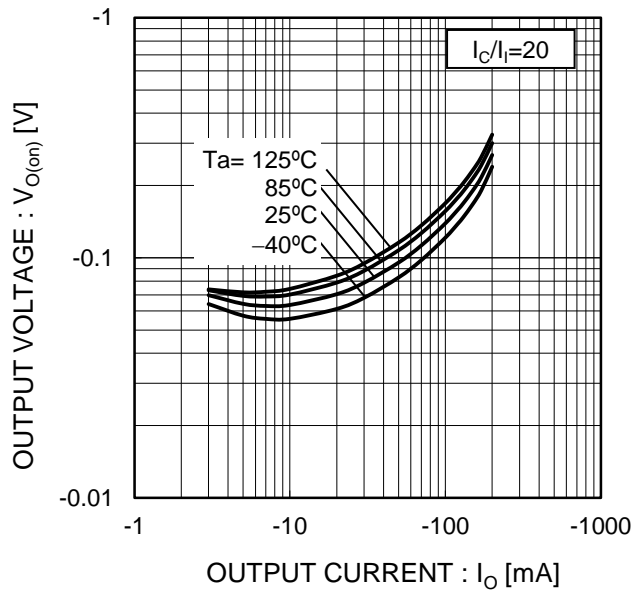


Fig.4 DC current gain vs. output current

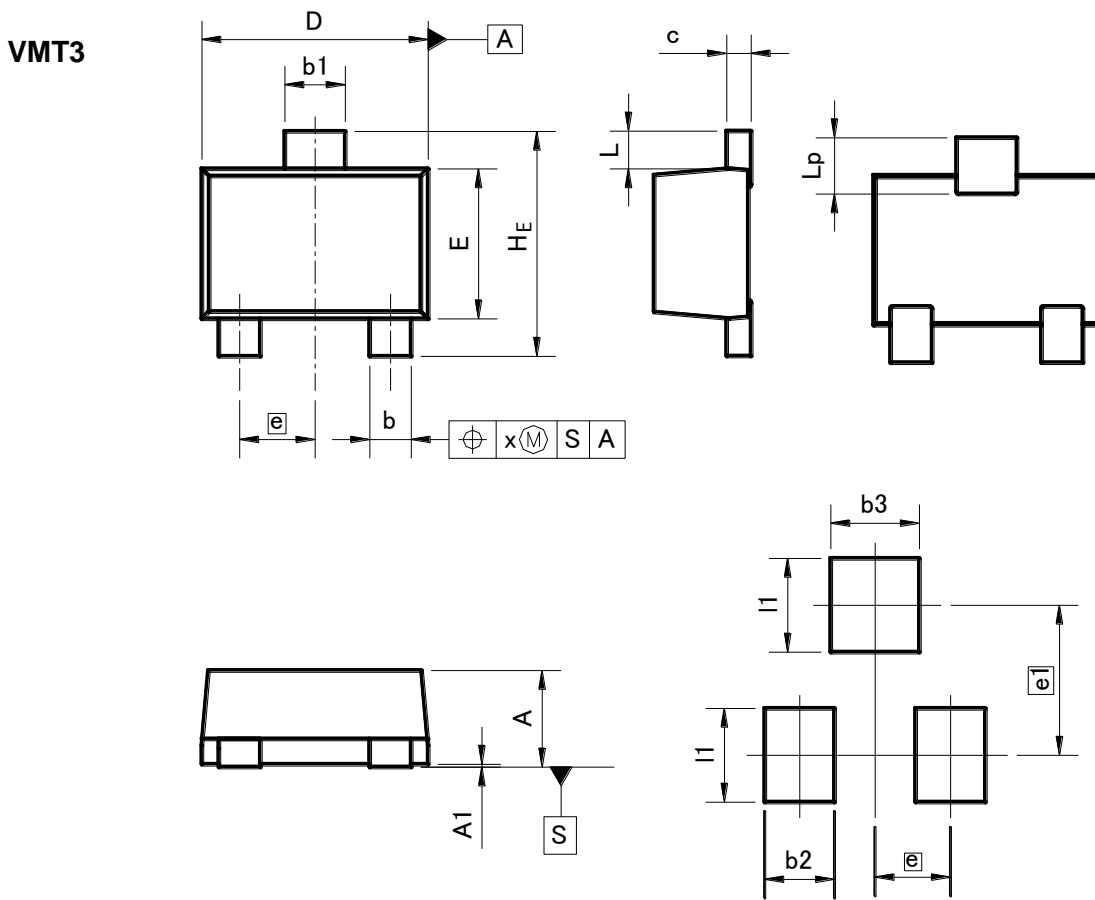


●Electrical characteristic curves( $T_a = 25^\circ\text{C}$ )

Fig.5 Output voltage vs. output current



●Dimensions (Unit : mm)



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

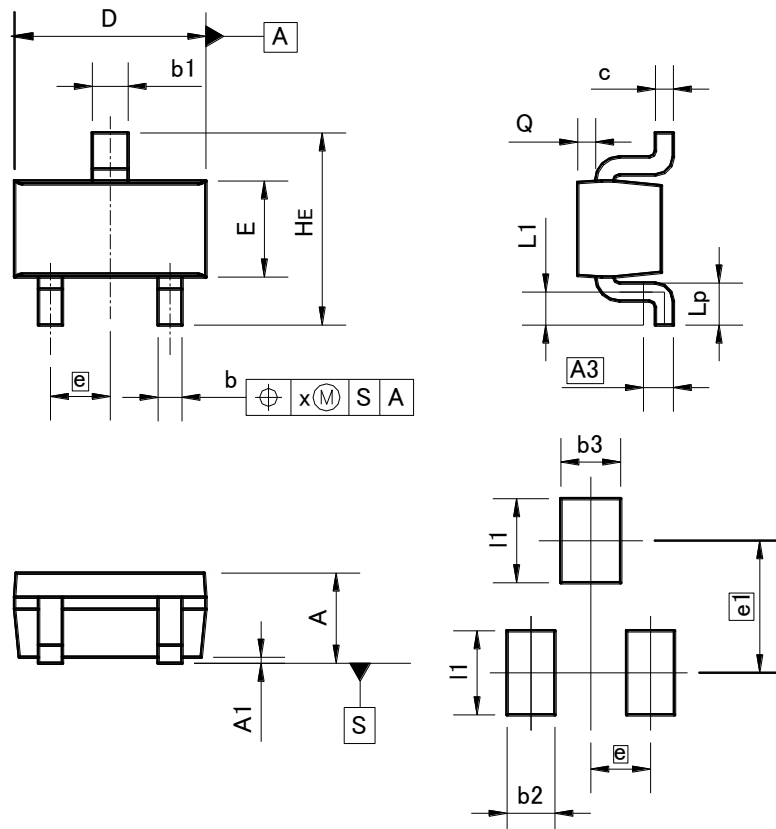
| DIM | MILIMETERS |      | INCHES |       |
|-----|------------|------|--------|-------|
|     | MIN        | MAX  | MIN    | MAX   |
| A   | 0.45       | 0.55 | 0.018  | 0.022 |
| A1  | 0.00       | 0.10 | 0.000  | 0.004 |
| b   | 0.17       | 0.27 | 0.007  | 0.011 |
| b1  | 0.27       | 0.37 | 0.011  | 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 (Unit : mm)

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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