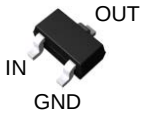
# DTB513Z series

**PNP -500mA -12V Digital Transistors (Bias Resistor Built-in Transistors)** Datasheet

| Parameter | Value |
|---|---|
| $V_{CC}$ | −12V |
| $I_{C(MAX.)}$ | −500mA |
| $R_1$ | 1kΩ |
| $R_2$ | 10kΩ |

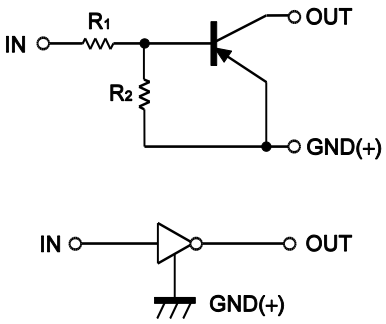
## ●Outline

| VMT3 | EMT3 |
|---|---|
|  |  |
| DTB513ZM<br>(SC-105AA) | DTB513ZE<br>SOT-416 (SC-75A) |

## ●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 :DTD513Z series
6) Lead Free/RoHS Compliant.

## ●Inner circuit




## ●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 |
|---|---|---|---|---|---|---|---|
| DTB513ZM | VMT3 | 1212 | T2L | 180 | 8 | 8,000 | Y11 |
| DTB513ZE | EMT3 | 1616 | TL | 180 | 8 | 3,000 | Y11 |

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

| Parameter | Symbol | Values | Unit |
|---|---|---|---|
| Supply voltage | $V_{CC}$ | −12 | V |
| Input voltage | $V_{IN}$ | −10 to +5 | V |
| Collector current | $I_{C(MAX.)}$ *1 | −500 | 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, $I_O$ = −100μA | - | - | −0.3 | V |
| | $V_{I(on)}$ | $V_O$ = −0.3V, $I_O$ = −20mA | −2.5 | - | - | |
| Output voltage | $V_{O(on)}$ | $I_O$ / $I_I$ = −100mA / −5mA | - | −0.06 | −0.3 | V |
| Input current | $I_I$ | $V_I$ = −5V | - | - | −6.4 | mA |
| Output current | $I_{O(off)}$ | $V_{CC}$ = −12V, $V_I$ = 0V | - | - | −0.5 | μA |
| DC current gain | $G_I$ | $V_O$ = −2V, $I_O$ = −100mA | 140 | - | - | - |
| Input resistance | $R_1$ | - | 0.7 | 1.0 | 1.3 | kΩ |
| Resistance ratio | $R_2/R_1$ | - | 8 | 10 | 12 | - |
| Transition frequency | $f_T$ *1 | $V_{CE}$ = −10V, $I_E$ = 5mA, 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)

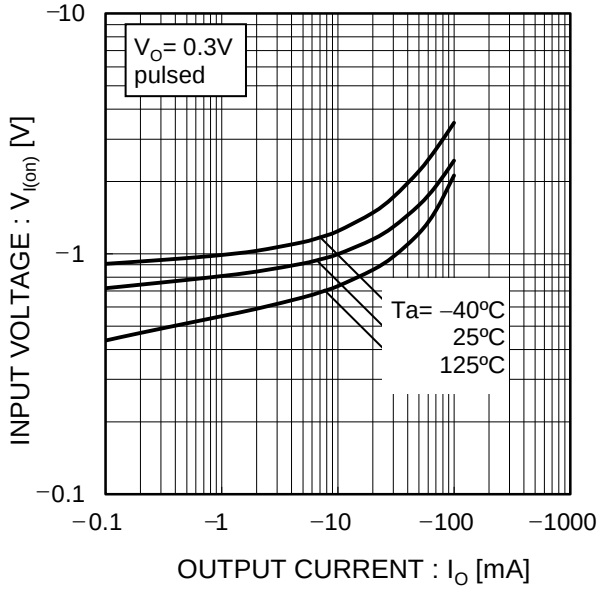



Fig.2 Output current vs. input voltage (OFF characteristics)

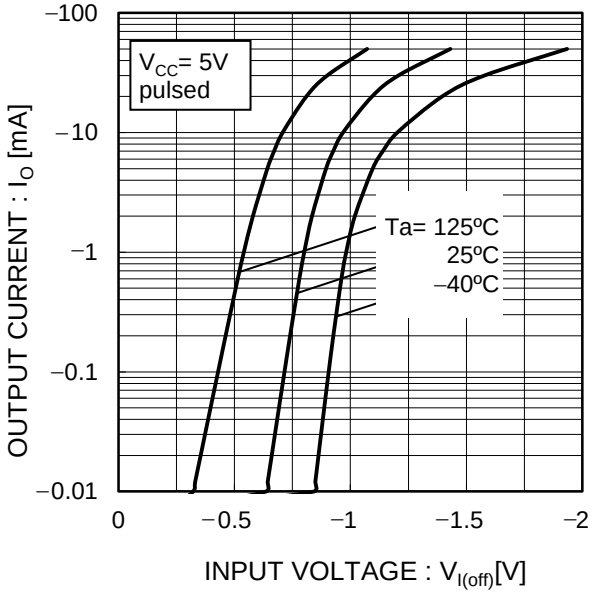



Fig.3 Output current vs. output voltage

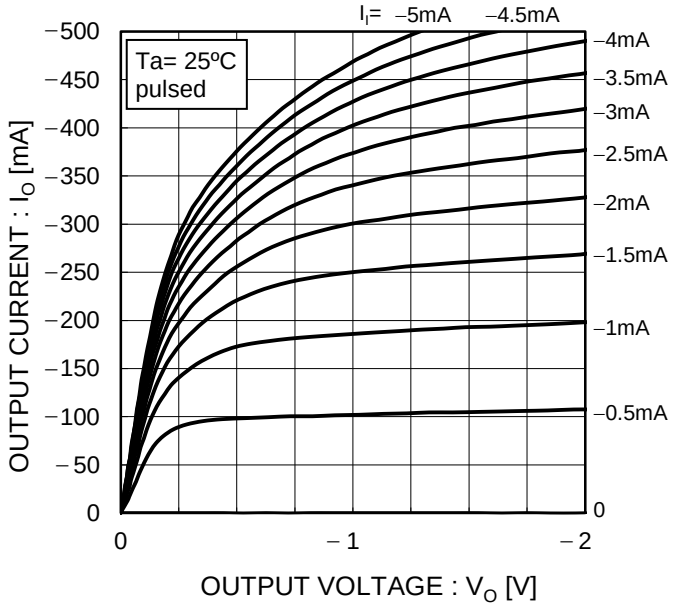
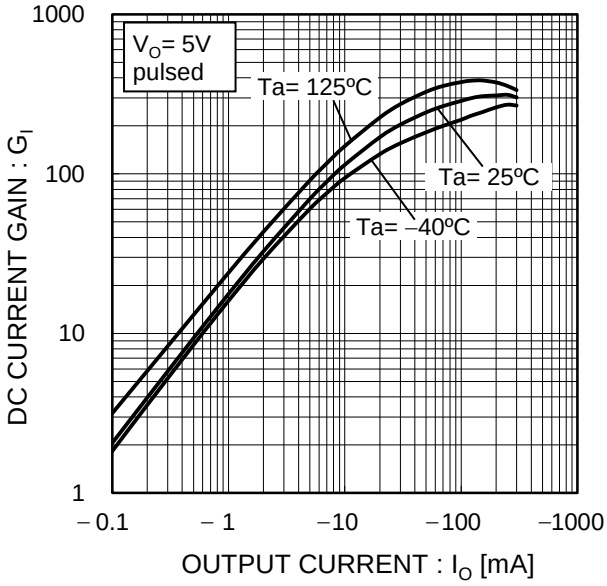
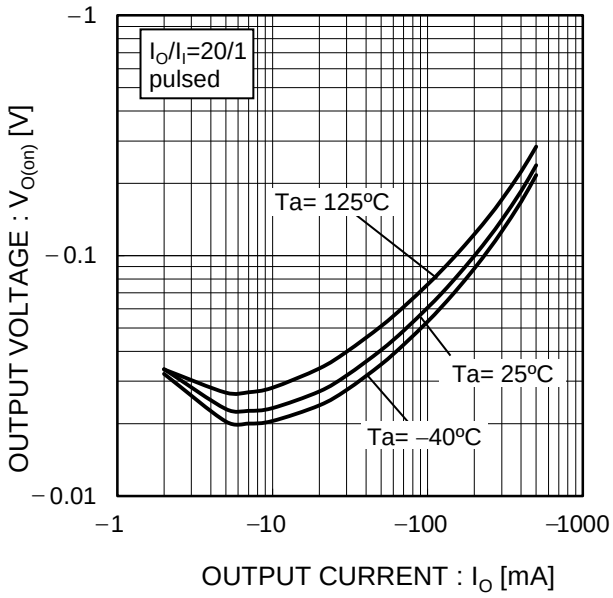



Fig.4 DC current gain vs. output current



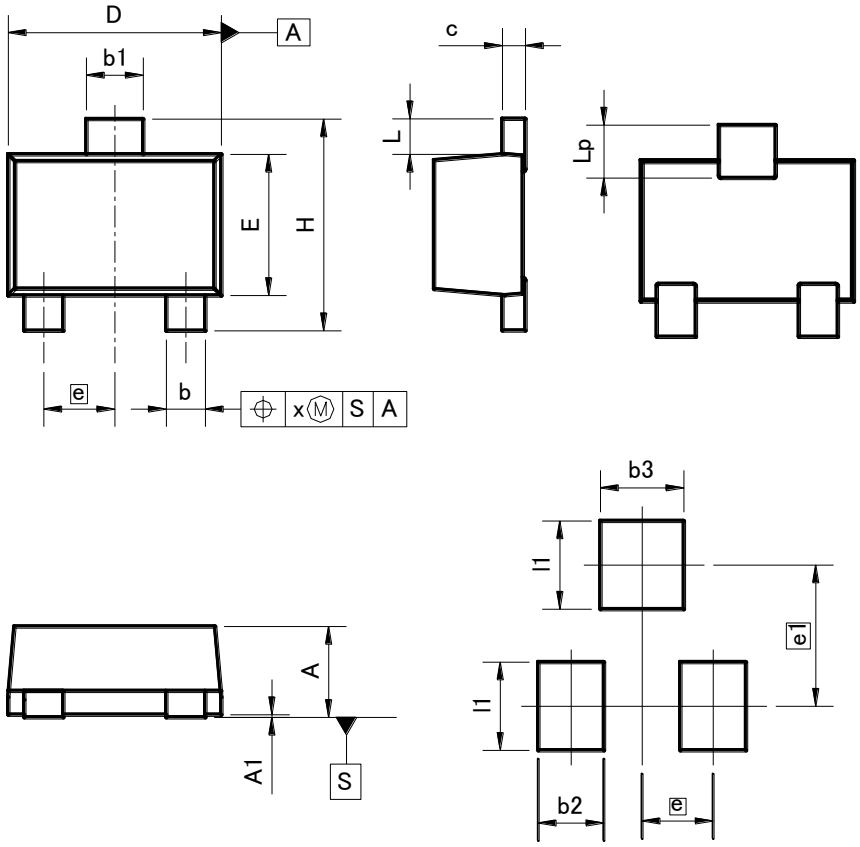
●**Electrical characteristic curves**(Ta = 25°C)

Fig.5 Output voltage vs. output current



●**Dimensions** (Unit : mm)

**VMT3**




**Patterm of terminal position areas**

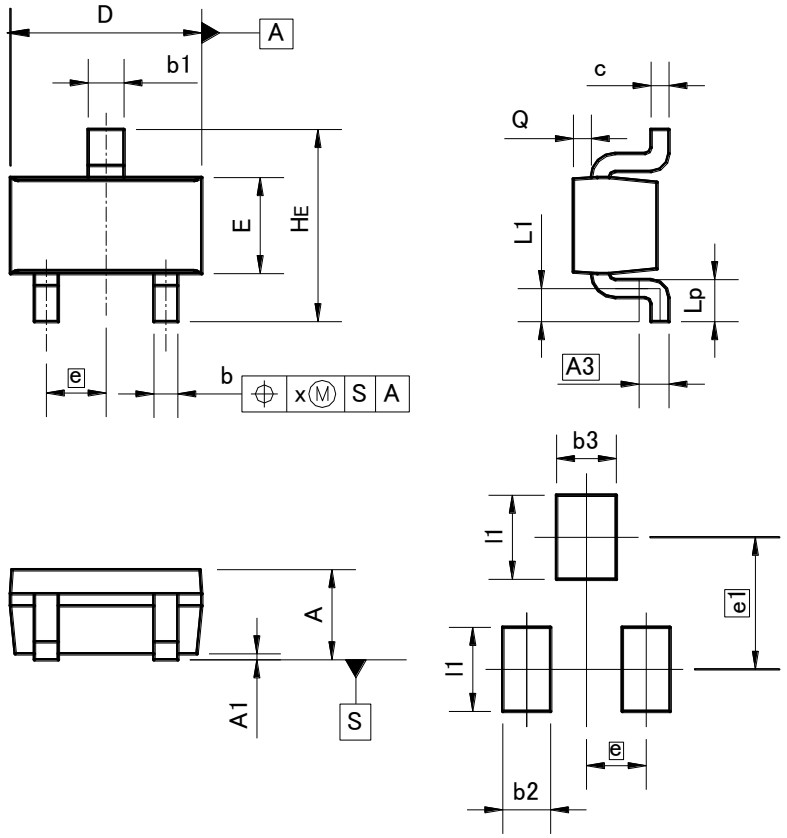
| DIM | MILIMETERS | | INCHES | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | 0.45 | 0.55 | 0.018 | 0.022 |
| A1 | 0.00 | 0.10 | 0 | 0.004 |
| b | 0.17 | 0.27 | 0.007 | 0.011 |
| b1 | 0.27 | 0.37 | 0.011 | 0.015 |
| c | 0.08 | 0.18 | 0.003 | 0.007 |
| D | 1.10 | 1.30 | 0.043 | 0.051 |
| E | 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 | – |
| Lp | 0.20 | 0.40 | 0.008 | – |
| x | – | 0.10 | – | 0.004 |

| DIM | MILIMETERS | | INCHES | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| e1 | 0.80 | | 0.03 | |
| b2 | – | 0.37 | – | 0.015 |
| b3 | – | 0.47 | – | 0.019 |
| l1 | – | 0.50 | – | 0.02 |

Dimension in mm/inches

●**Dimensions** (Unit : mm)

**EMT3**




**Patterm of terminal position areas**

| DIM | MILIMETERS | | INCHES | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | 0.60 | 0.80 | 0.024 | 0.031 |
| A1 | 0.00 | 0.10 | 0 | 0.004 |
| A3 | 0.25 | | 0.01 | |
| b | 0.15 | 0.30 | 0.006 | 0.012 |
| b1 | 0.25 | 0.40 | 0.01 | 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 | | 0.02 | |
| 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 | 0.01 |
| x | – | 0.10 | – | 0.004 |

| DIM | MILIMETERS | | INCHES | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| e1 | 1.10 | | 0.04 | |
| b2 | – | 0.40 | – | 0.016 |
| b3 | – | 0.50 | – | 0.02 |
| l1 | – | 0.70 | – | 0.028 |

Dimension in mm/inches

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