

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

●Outline

| SOT-723 | SOT-416 |
|--------------------|--------------------|
| | |
| DTB513ZM (VMT3) | DTB513ZE (EMT3) |

●Features

- 1) $V_{CE(sat)}$ is lower than conventional products.
- 2) Built-in bias resistors enable the configuration of an inverter circuit without connecting external input resistors (see equivalent circuit).
- 3) The bias resistors consist of thin-film resistors with complete isolation to allow positive.

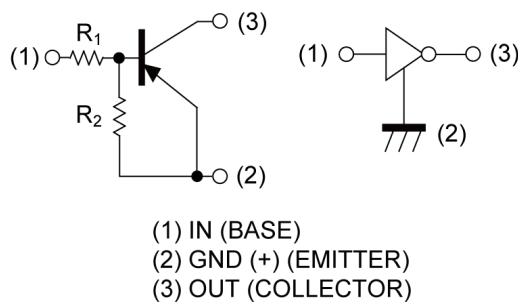
biasing of the input. They also have the advantage of almost completely eliminating parasitic effects.

●Application

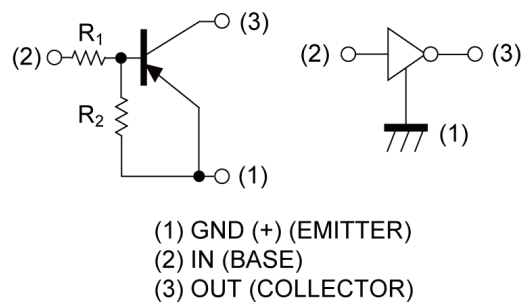
INVERTER, INTERFACE, DRIVER

●Inner circuit

DTB513ZM



DTB513ZE



●Packaging specifications

| Part No. | Package | Package size | Taping code | Reel size (mm) | Tape width (mm) | Basic ordering unit.(pcs) | Marking |
|----------|----------------|--------------|-------------|----------------|-----------------|---------------------------|---------|
| DTB513ZM | SOT-723 (VMT3) | 1212 | T2L | 180 | 8 | 8000 | Y11 |
| DTB513ZE | SOT-416 (EMT3) | 1616 | TL | 180 | 8 | 3000 | Y11 |

● **Absolute maximum ratings** ($T_a = 25^\circ\text{C}$)

| 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 | DTB513ZM | P_D^{*2} | 150 | mW |
| | DTB513ZE | | 150 | |
| Junction temperature | | T_j | 150 | $^\circ\text{C}$ |
| Range of storage temperature | | T_{stg} | -55 to +150 | $^\circ\text{C}$ |

● **Electrical characteristics** ($T_a = 25^\circ\text{C}$)

| Parameter | Symbol | Conditions | Values | | | Unit |
|----------------------|--------------|--|--------|------|------|------------|
| | | | Min. | Typ. | Max. | |
| Input voltage | $V_{I(off)}$ | $V_{CC} = -5\text{V}, I_O = -100\mu\text{A}$ | - | - | -0.3 | V |
| | $V_{I(on)}$ | $V_O = -0.3\text{V}, I_O = -20\text{mA}$ | -2.5 | - | - | |
| Output voltage | $V_{O(on)}$ | $I_O = -100\text{mA}, I_I = -5\text{mA}$ | - | -60 | -300 | mV |
| Input current | I_I | $V_I = -5\text{V}$ | - | - | -6.4 | mA |
| Output current | $I_{O(off)}$ | $V_{CC} = -12\text{V}, V_I = 0\text{V}$ | - | - | -500 | nA |
| DC current gain | G_I | $V_O = -2\text{V}, I_O = -100\text{mA}$ | 140 | - | - | - |
| Input resistance | R_1 | - | 0.7 | 1 | 1.3 | k Ω |
| Resistance ratio | R_2/R_1 | - | 8 | 10 | 12 | - |
| Transition frequency | f_T^{*1} | $V_{CE} = -10\text{V}, I_E = 5\text{mA},$ $f = 100\text{MHz}$ | - | 260 | - | MHz |

*1 Characteristics of built-in transistor

*2 Each terminal mounted on a reference land.

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

Fig.1 Input Voltage vs. Output Current (ON Characteristics)

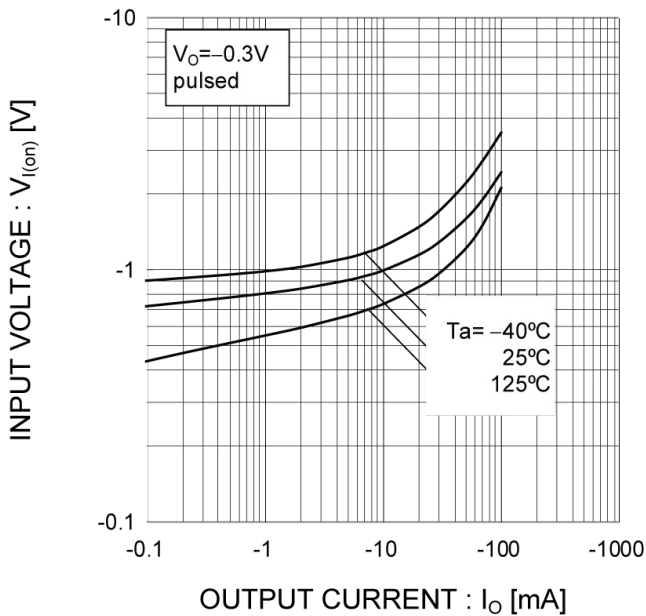


Fig.2 Output Current vs. Input Voltage (OFF Characteristics)

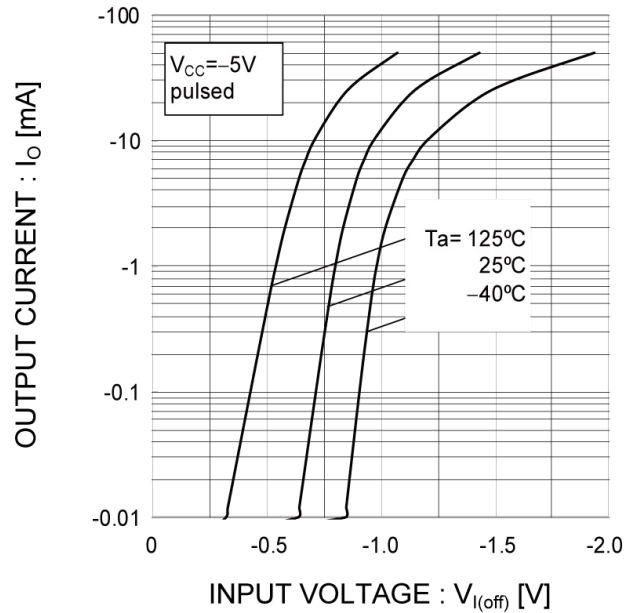


Fig.3 Output Current vs. Output Voltage

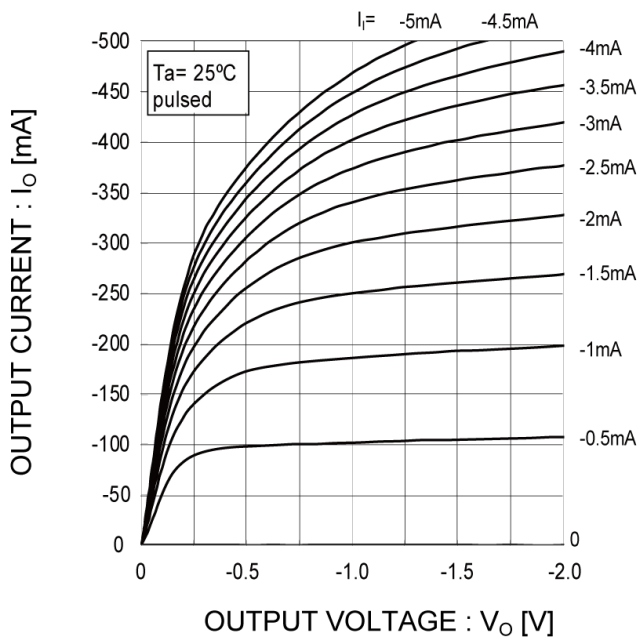
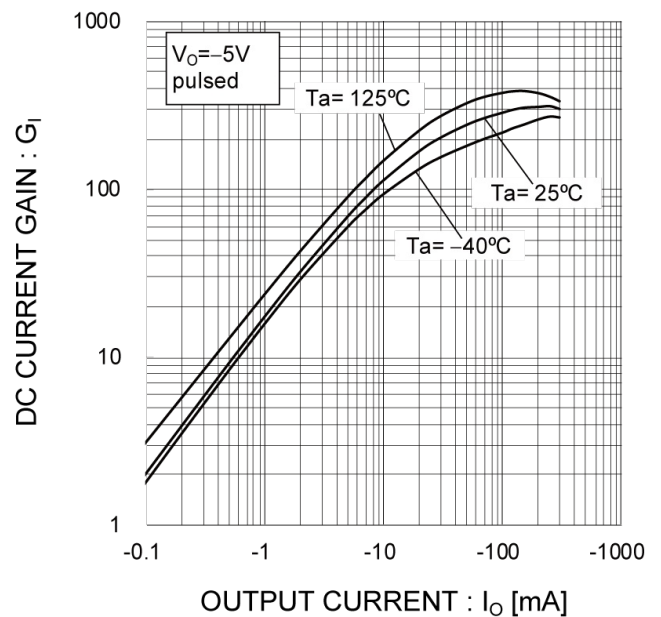
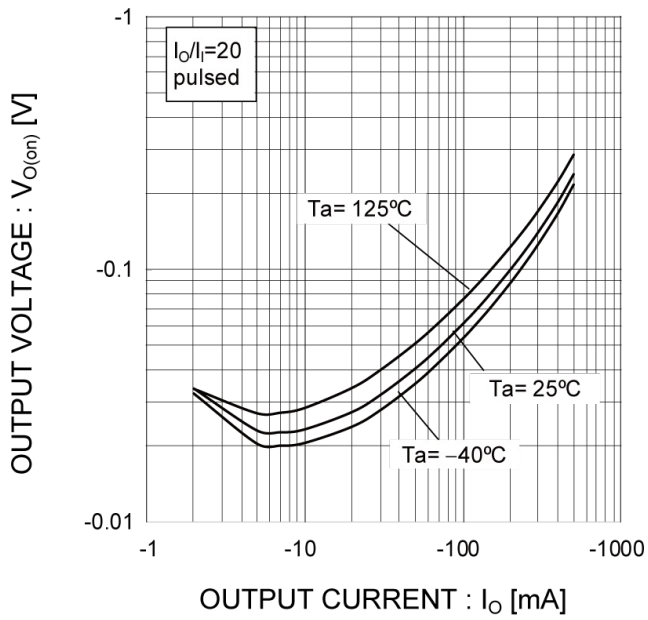


Fig.4 DC Current Gain vs. Output Current



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

Fig.5 Output Voltage vs. Output Current



●Dimensions

SOT-723
SC-105AA
(VMT3)



Pattern of terminal position areas
[Not a 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 | |
| I1 | - | 0.50 | - | 0.020 |

Dimension in mm/inches

●Dimensions

SOT-416
SC-75A
(EMT3)



Pattern of terminal position areas
[Not a 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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| JAPAN | USA | EU | CHINA |
|-----------|-----------|------------|-----------|
| CLASS III | CLASS III | CLASS II b | CLASS III |
| CLASS IV | | CLASS III | |

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 - Use of our Products in places where the Products are exposed to static electricity or electromagnetic waves
 - Use of our Products in proximity to heat-producing components, plastic cords, or other flammable items
 - Sealing or coating our Products with resin or other coating materials
 - Use of our Products without cleaning residue of flux (even if you use no-clean type fluxes, cleaning residue of flux is recommended); or Washing our Products by using water or water-soluble cleaning agents for cleaning residue after soldering
 - Use of the Products in places subject to dew condensation
- The Products are not subject to radiation-proof design.
- Please verify and confirm characteristics of the final or mounted products in using the Products.
- 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.
- De-rate Power Dissipation (Pd) depending on Ambient temperature (Ta). When used in sealed area, confirm the actual ambient temperature.
- Confirm that operation temperature is within the specified range described in the product specification.
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Телефон: 8 (812) 309-75-97 (многоканальный)

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Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А