

500mA/12V Low V_{CE(sat)}Digital transistor (with built-in resistor)

| Parameter | Value |
|----------------------|-------|
| V _{CC} | 12V |
| I _{C(MAX.)} | 500mA |
| R ₁ | 1kΩ |
| R ₂ | 10kΩ |

● Outline



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 negative.

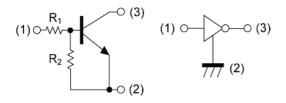
biasing of the input. They also have the advantage of almost completely eliminating parasitic effects.

Application

INVERTER, INTERFACE, DRIVER

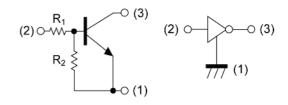
•Inner circuit

DTD513ZM



- (1) IN (BASE)
- (2) GND (EMITTER)
- (3) OUT (COLLECTOR)

DTD513ZE



- (1) GND (EMITTER)
- (2) IN (BASE)
- (3) OUT (COLLECTOR)

Packaging specifications

| Part No. | Package | Package size | Taping code | Reel size (mm) | Tape width (mm) | Basic ordering unit.(pcs) | Marking |
|----------|-------------------|-----------------|----------------|-------------------|-----------------|---------------------------------|---------|
| DTD513ZM | SOT-723 (VMT3) | 1212 | T2L | 180 | 8 | 8000 | Y21 |
| DTD513ZE | SOT-416 (EMT3) | 1616 | TL | 180 | 8 | 3000 | Y21 |

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

| Parameter | | | Values | Unit |
|------------------------------|----------|-------------------|-------------|--------|
| Supply voltage | | | 12 | V |
| Input voltage | | | -5 to 10 | V |
| Collector current | | | 500 | mA |
| | DTD513ZM | D *2 | 150 | 100/07 |
| Power dissipation | DTD513ZE | P _D *2 | 150 | mW |
| Junction temperature | | | 150 | °C |
| Range of storage temperature | | | -55 to +150 | °C |

● Electrical characteristics (T_a = 25°C)

| Doromotor | Cymahal | Conditions | Values | | | Unit | |
|------------------------------------|--------------------------------|---|--------|------|------|-------|--|
| Parameter | Symbol | Conditions | Min. | Тур. | Max. | UTIIL | |
| Input valtage | $V_{I(off)}$ | V _{CC} = 5V, I _O = 100μA | - | - | 0.3 | V | |
| Input voltage | V _{I(on)} | V _O = 0.3V, I _O = 20mA | 2.5 | - | - | | |
| Output voltage | V _{O(on)} | I _O = 100mA, I _I = 5mA | - | 60 | 300 | mV | |
| Input current | l _l | V _I = 5V | 1 | - | 6.4 | mA | |
| Output current I _{Q(off)} | | $V_{CC} = 12V, V_{I} = 0V$ | - | - | 500 | nA | |
| DC current gain | G _I | V _O = 2V, I _O = 100mA | 140 | - | - | - | |
| Input resistance | R ₁ | - | 0.7 | 1 | 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 land.

● Electrical characteristic curves (T_a =25°C)

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

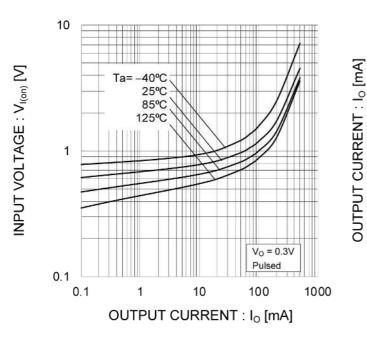


Fig.2 Output Current vs. Input Voltage (OFF Characteristics)

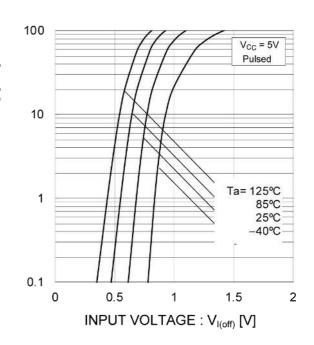


Fig.3 Output Current vs. Output Voltage

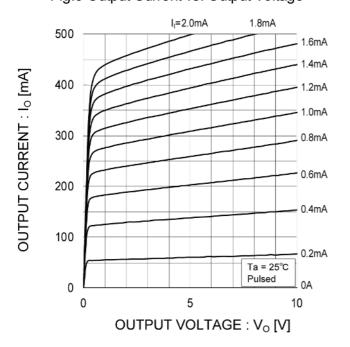
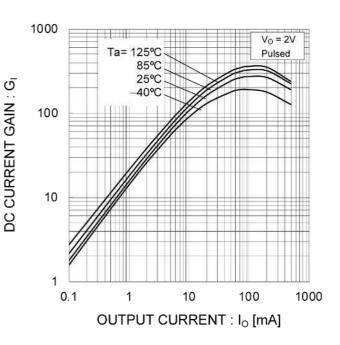
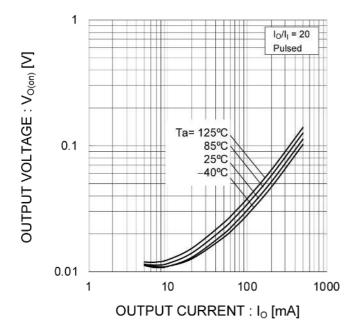


Fig.4 DC Current Gain vs. Output Current

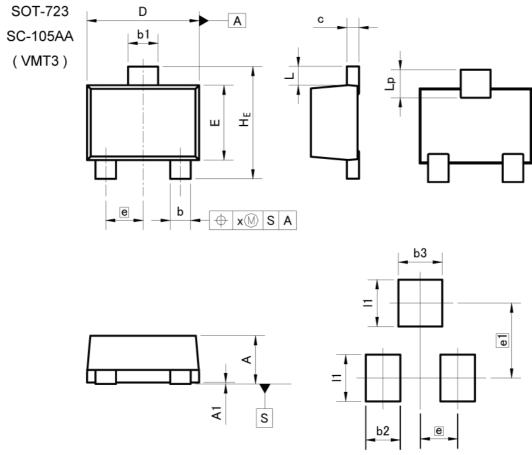


●Electrical characteristic curves (T_a =25°C)

Fig.5 Output Voltage vs. Output Current



Dimensions



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

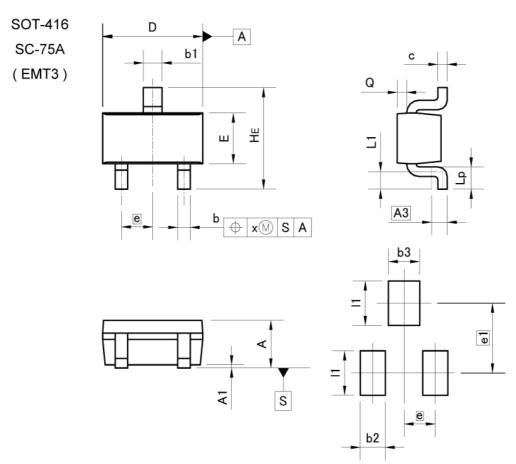
| DIM - | MILIMETERS | | INCHES | |
|-------|------------|------|--------|-------|
| DIM L | MIN | MAX | MIN | MAX |
| Α | 0.45 | 0.55 | 0.018 | 0.022 |
| A1 | 0.00 | 0.10 | 0.000 | 0.004 |
| b | 0.17 | 0.27 | 0.007 | 0.011 |
| b1 | 0.27 | 0.37 | 0.011 | 0.015 |
| С | 0.08 | 0.18 | 0.003 | 0.007 |
| D | 1.10 | 1.30 | 0.043 | 0.051 |
| E | 0.70 | 0.90 | 0.028 | 0.035 |
| е | 0.4 | 40 | 0.0 | 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 |
| х | = | 0.10 | - | 0.004 |

| DIM | MILIMETERS | | INCHES | |
|-----|------------|------|------------------|-------|
| DIM | MIN | MAX | MIN | MAX |
| b2 | - <u> </u> | 0.37 | - | 0.015 |
| b3 | 크 | 0.47 | (<u>210</u> | 0.019 |
| e1 | 0.80 | | 0.0 | 031 |
| 11 | =0 | 0.50 | 72 55 | 0.020 |

Dimension in mm/inches



Dimensions



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

| DIM | MILIM | ETERS | INCHES | |
|-----|-------|-------|--------|-------|
| DIM | MIN | MAX | MIN | MAX |
| Α | 0.60 | 0.80 | 0.024 | 0.031 |
| A1 | 0.00 | 0.10 | 0.000 | 0.004 |
| A3 | 0. | 25 | 0.0 | 10 |
| b | 0.15 | 0.30 | 0.006 | 0.012 |
| b1 | 0.25 | 0.40 | 0.010 | 0.016 |
| С | 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 |
| е | 0. | 50 | 0.0 | 20 |
| HE | 1.40 | 1.80 | 0.055 | 0.071 |
| L1 | 0.10 | - | 0.004 | 8# |
| Lp | 0.15 | = | 0.006 | 25 |
| Q | 0.05 | 0.25 | 0.002 | 0.010 |
| х | | 0.10 | _ | 0.004 |

| DIM | MILIMETERS | | INCHES | |
|-------|------------------|------|-----------------|-------|
| DIM L | MIN | MAX | MIN | MAX |
| b2 | 100 | 0.40 | | 0.016 |
| b3 | 2: 02 | 0.50 | - | 0.020 |
| e1 | 1.10 | | 0.0 | 043 |
| 11 | | 0.70 | 3 3 | 0.028 |

Dimension in mm/inches



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| Ī | JÁPAN | USA | EU | CHINA |
|---|---------|----------|------------|-----------|
| Ī | CLASSⅢ | CLACCIII | CLASS II b | CL ACCIII |
| | CLASSIV | CLASSⅢ | CLASSⅢ | CLASSⅢ |

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 - [f] Sealing or coating our Products with resin or other coating materials
 - [g] 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
 - [h] Use of the Products in places subject to dew condensation
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- 8. Confirm that operation temperature is within the specified range described in the product specification.
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For details, please refer to ROHM Mounting specification

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 - [c] the Products are exposed to direct sunshine or condensation
 - [d] the Products are exposed to high Electrostatic
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