

## Transistors

# -500mA / -12V Low $V_{CE}$ (sat) Digital transistors (with built-in resistors)

## DTB543XE / DTB543XM

### ●Applications

Inverter, Interface, Driver

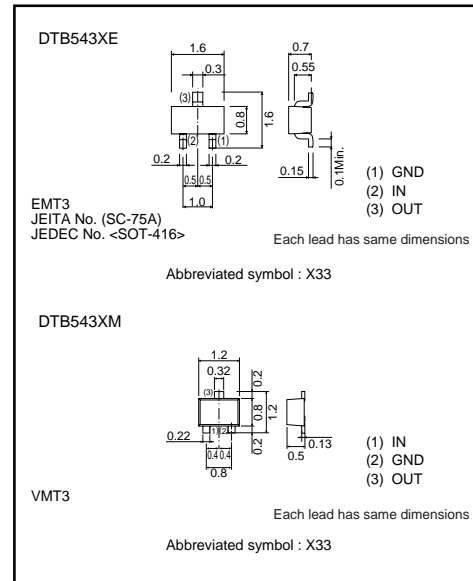
### ●Feature

- 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.
- 4) Only the on / off conditions need to be set for operation, making the device design easy.

### ●Structure

PNP epitaxial planar silicon transistor  
(Resistor built-in type)

### ●External dimensions (Unit : mm)



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

| Parameter                       | Symbol      | Limits      |          | Unit             |
|---------------------------------|-------------|-------------|----------|------------------|
|                                 |             | DTB543XE    | DTB543XM |                  |
| Supply voltage                  | $V_{CC}$    | -12         |          | V                |
| Input voltage                   | $V_{IN}$    | -12 to +7   |          | V                |
| Collector current <sup>*1</sup> | $I_C$ (max) | -500        |          | mA               |
| Power dissipation <sup>*2</sup> | $P_D$       | 150         |          | mW               |
| Junction temperature            | $T_J$       | 150         |          | $^\circ\text{C}$ |
| Storage temperature             | $T_{stg}$   | -55 to +150 |          | $^\circ\text{C}$ |

<sup>\*1</sup> Characteristics of built-in transistor.

<sup>\*2</sup> Each terminal mounted on a recommended land.

### ●Packaging specifications

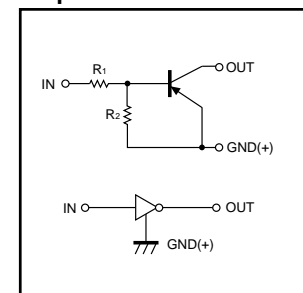
| Part No. | Package                      | EMT3   | VMT3   |
|----------|------------------------------|--------|--------|
|          | Package type                 | Taping | Taping |
|          | Code                         | TL     | T2L    |
|          | Basic ordering unit (pieces) | 3000   | 8000   |
| DTB543XE |                              | ○      | —      |
| DTB543XM |                              | —      | ○      |

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

| Parameter                         | Symbol       | Min. | Typ. | Max. | Unit       | Conditions   |
|-----------------------------------|--------------|------|------|------|------------|--|
|                                   |              |      |      |      |            |  |
| Input voltage                     | $V_{I(off)}$ | —    | —    | -0.3 | V          | $V_{CC}=-5V$ , $I_o=-100\mu\text{A}$                 |
|                                   | $V_{I(on)}$  | -2.5 | —    | —    |            | $V_o=-0.3V$ , $I_o=-20\text{mA}$                     |
| Output voltage                    | $V_{O(on)}$  | —    | -70  | -300 | mV         | $I_o/I_i=-100\text{mA} / -5\text{mA}$                |
| Input current                     | $I_i$        | —    | —    | -1.4 | mA         | $V_i=-5V$  |
| Output current                    | $I_o(off)$   | —    | —    | -500 | nA         | $V_{CC}=-12V$ , $V_i=0V$                             |
| DC current gain                   | $G_i$        | 140  | —    | —    | —          | $V_o=-2V$ , $I_o=-100\text{mA}$                      |
| Transition frequency <sup>*</sup> | $f_T$        | —    | 260  | —    | MHz        | $V_{CE}=-10V$ , $I_E=5\text{mA}$ , $f=100\text{MHz}$ |
| Input resistance                  | $R_1$        | 3.29 | 4.7  | 6.11 | k $\Omega$ | —  |
| Resistance ratio                  | $R_2/R_1$    | 1.7  | 2.1  | 2.6  | —          | —  |

<sup>\*</sup> Characteristics of built-in transistor.

### ●Equivalent circuit



$R_1=4.7\text{k}\Omega$  /  $R_2=10\text{k}\Omega$

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