

# ZDT1048

## SM-8 Dual NPN medium power high gain transistors

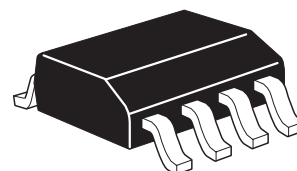
### Summary

$BV_{CEO} > 17.5V$

$I_{C(cont)} = 5A$

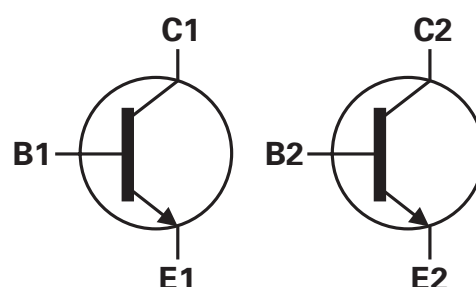
$V_{CE(sat)} < 75mV @ 1A$

$P_D = 2.75W$



### Description

Advanced process capability has been used to achieve this high performance device. Combining two NPN transistors in the SM-8 package provides a compact solution for the intended applications.



### Features

- Dual NPN device
- Very low saturation voltage
- High gain
- SM 8 package

### Applications

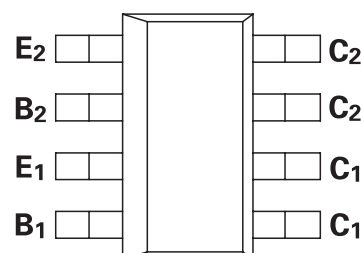
- CCFL invertors
- Royer circuits

### Ordering information

| DEVICE    | Reel size (inches) | Tape width (mm) | Quantity per reel |
|-----------|--------------------|-----------------|-------------------|
| ZDT1048TA | 7                  | 12              | 1000              |

### Device marking

T1048



## Absolute maximum ratings

| Parameter                               | Symbol         | Value       | Unit |
|-----------------------------------------|----------------|-------------|------|
| Collector-base voltage                  | $V_{CBO}$      | 50          | V    |
| Collector-emitter voltage               | $V_{CEO}$      | 17.5        | V    |
| Emitter-base voltage                    | $V_{EBO}$      | 5           | V    |
| Peak pulse current                      | $I_{CM}$       | 20          | A    |
| Continuous collector current            | $I_C$          | 5           | A    |
| Base current                            | $I_B$          | 500         | mA   |
| Operating and storage temperature range | $T_j; T_{stg}$ | -55 to +150 | °C   |

## Thermal Characteristics

| Parameter                                                 | Symbol    | Value | Unit  |
|-----------------------------------------------------------|-----------|-------|-------|
| Total power dissipation at $T_{amb} = 25^\circ\text{C}^*$ | $P_{tot}$ | 2.25  | W     |
| Any single die "on"                                       |           | 2.75  | W     |
| Both die "on" equally                                     |           | 18    | V     |
| Derate above $25^\circ\text{C}^*$                         |           | 22    | mW/°C |
| Any single die "on"                                       |           | 55.6  | °C/W  |
| Both die "on" equally                                     |           | 45.5  | °C/W  |
| Thermal resistance - junction to ambient*                 |           |       |       |
| Any single die "on"                                       |           |       |       |
| Both die "on" equally                                     |           |       |       |

\* The power which can be dissipated assuming the device is mounted in a typical manner on a PCB with copper equal to 2 inches square.

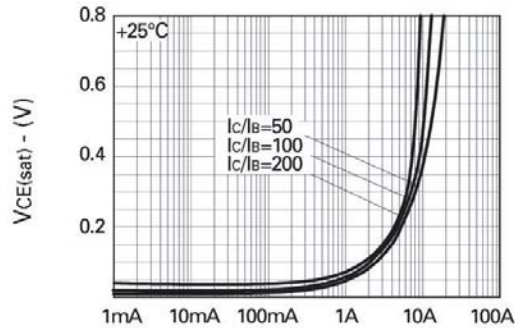
## Electrical characteristics (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated).

| Parameter                             | Symbol        | Min. | Typ. | Max. | Unit | Conditions                                                    |
|---------------------------------------|---------------|------|------|------|------|---------------------------------------------------------------|
| Collector-base breakdown voltage      | $V_{(BR)CBO}$ | 50   | 85   |      | V    | $I_C=100\mu\text{A}$                                          |
| Collector-emitter breakdown voltage   | $V_{CES}$     | 50   | 85   |      | V    | $I_C=100\mu\text{A}$                                          |
| Collector-emitter breakdown voltage   | $V_{CEO}$     | 17.5 | 24   |      | V    | $I_C=10\text{mA}$                                             |
| Collector-emitter breakdown voltage   | $V_{CEV}$     | 50   | 85   |      | V    | $I_C=100\mu\text{A}$ , $V_{EB}=1\text{V}$                     |
| Emitter-base breakdown voltage        | $V_{(BR)EBO}$ | 5    | 8.7  |      | V    | $I_E=100\mu\text{A}$                                          |
| Collector cut-off current             | $I_{CBO}$     |      | 0.3  | 10   | nA   | $V_{CB}=35\text{V}$                                           |
| Emitter cut-off current               | $I_{EBO}$     |      | 0.3  | 10   | nA   | $V_{EB}=4\text{V}$                                            |
| Collector-emitter cut-off current     | $I_{CES}$     |      | 0.3  | 10   | nA   | $I_{CES}=35\text{V}$                                          |
| Collector-emitter saturation voltage  | $V_{CE(sat)}$ |      | 27   | 45   | mV   | $I_C=0.5\text{A}$ , $I_B=10\text{mA}^{(*)}$                   |
|                                       |               |      | 55   | 75   | mV   | $I_C=1\text{A}$ , $I_B=10\text{mA}^{(*)}$                     |
|                                       |               |      | 120  | 160  | mV   | $I_C=2\text{A}$ , $I_B=10\text{mA}^{(*)}$                     |
|                                       |               |      | 200  | 240  | mV   | $I_C=5\text{A}$ , $I_B=100\text{mA}^{(*)}$                    |
|                                       |               |      | 200  | 300  | mV   | $I_C=5\text{A}$ , $I_B=50\text{mA}^{(*)}$                     |
| Base-emitter saturation voltage       | $V_{BE(sat)}$ |      | 1000 | 1100 | mV   | $I_C=5\text{A}$ , $I_B=100\text{mA}^{(*)}$                    |
| Base-emitter turn on voltage          | $V_{BE(on)}$  |      | 900  | 1000 | mV   | $I_C=5\text{A}$ , $V_{CE}=2\text{V}^{(*)}$                    |
| Static forward current transfer ratio | $h_{FE}$      | 280  | 440  | 1200 |      | $I_C=10\text{mA}$ , $V_{CE}=2\text{V}^{(*)}$                  |
|                                       |               | 300  | 450  |      |      | $I_C=0.5\text{A}$ , $V_{CE}=2\text{V}^{(*)}$                  |
|                                       |               | 300  | 450  |      |      | $I_C=1\text{A}$ , $V_{CE}=2\text{V}^{(*)}$                    |
|                                       |               | 250  | 300  |      |      | $I_C=5\text{A}$ , $V_{CE}=2\text{V}^{(*)}$                    |
|                                       |               | 50   | 80   |      |      | $I_C=20\text{A}$ , $V_{CE}=2\text{V}^{(*)}$                   |
| Transition frequency                  | $f_T$         |      | 150  |      | MHz  | $I_C=50\text{mA}$ , $V_{CE}=10\text{V}$<br>$f=50\text{MHz}$   |
| Output capacitance                    | $C_{obo}$     |      | 60   | 80   | pF   | $V_{CB}=10\text{V}$ , $f=1\text{MHz}$                         |
| Switching times                       | $t_{on}$      |      | 120  |      | ns   | $I_C=4\text{A}$ , $I_B=40\text{mA}$ , $V_{CC}=10\text{V}$     |
|                                       | $t_{off}$     |      | 250  |      | ns   | $I_C=4\text{A}$ , $I_B=\pm 40\text{mA}$ , $V_{CC}=10\text{V}$ |

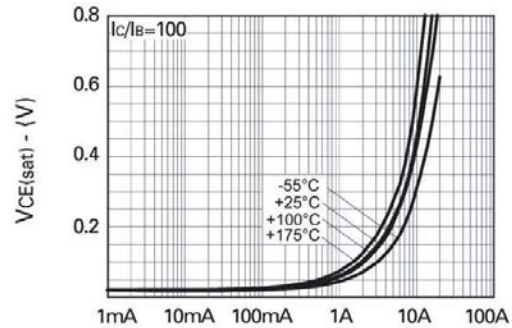
### NOTES:

(\*) Measured under pulsed conditions. Pulse width=300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$

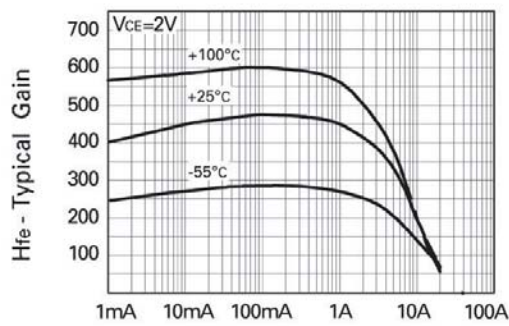
## Typical characteristics



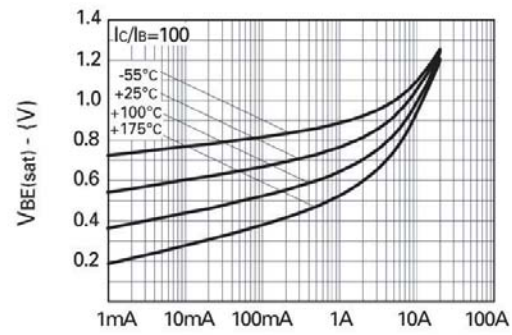
$I_C$ -Collector Current  
 **$V_{CE(sat)}$  v  $I_C$**



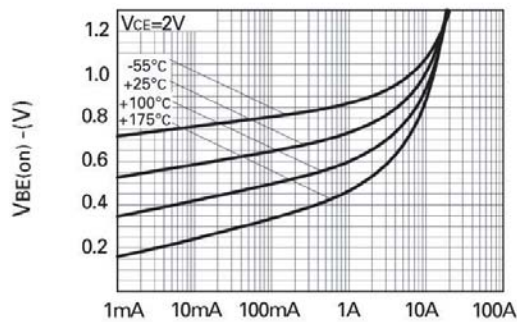
$I_C$ -Collector Current  
 **$V_{CE(sat)}$  v  $I_C$**



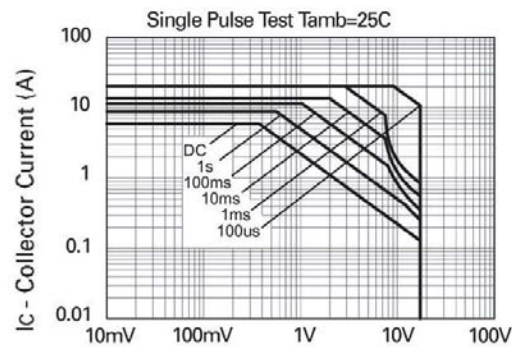
$I_C$ -Collector Current  
 **$h_{FE}$  v  $I_C$**



$I_C$ -Collector Current  
 **$V_{BE(sat)}$  v  $I_C$**

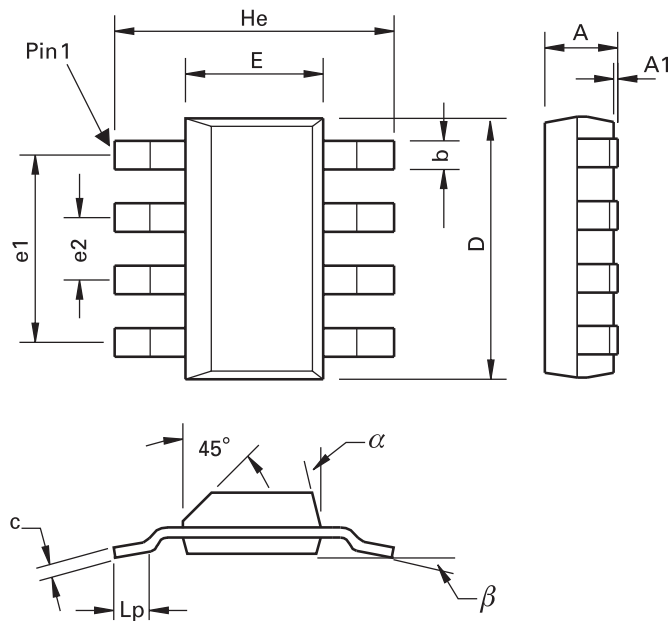


$I_C$ -Collector Current  
 **$V_{BE(on)}$  v  $I_C$**



$V_{CE}$  - Collector Voltage  
**Safe Operating Area**

## Package outline - SM8



| DIM | Millimeters |      |      | Inches |       |        | DIM | Millimeters |      |      | Inches |       |        |
|-----|-------------|------|------|--------|-------|--------|-----|-------------|------|------|--------|-------|--------|
|     | Min.        | Max. | Typ. | Min.   | Max.  | Typ.   |     | Min.        | Max. | Typ. | Min.   | Max.  | Typ.   |
| A   | -           | 1.7  | -    | -      | 0.067 | -      | e1  | -           | -    | 4.59 | -      | -     | 0.1807 |
| A1  | 0.02        | 0.1  | -    | 0.0008 | 0.004 | -      | e2  | -           | -    | 1.53 | -      | -     | 0.0602 |
| b   | -           | -    | 0.7  | -      | -     | 0.0275 | He  | 6.7         | 7.3  | -    | 0.264  | 0.287 | -      |
| c   | 0.24        | 0.32 | -    | 0.009  | 0.013 | -      | Lp  | 0.9         | -    | -    | 0.035  | -     | -      |
| D   | 6.3         | 6.7  | -    | 0.248  | 0.264 | -      | α   | -           | 15°  | -    | -      | 15°   | -      |
| E   | 3.3         | 3.7  | -    | 0.130  | 0.145 | -      | β   | -           | -    | 10°  | -      | -     | 10°    |

**Note:** Controlling dimensions are in millimeters. Approximate dimensions are provided in inches

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| "Not recommended for new designs" | Device is still in production to support existing designs and production       |
| "Obsolete"                        | Production has been discontinued                                               |

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|                       |                                                                                                                                                                                                             |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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