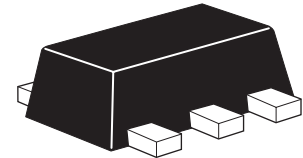


# ZXTN25040DZ

## 40V, SOT89, NPN medium power transistor

### Summary

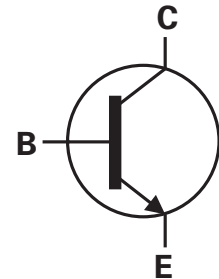
$BV_{CEX} > 130V$   
 $BV_{CEO} > 40V$   
 $BV_{ECO} > 6V$   
 $I_{C(cont)} = 5A$   
 $V_{CE(sat)} < 60mV @ 1A$   
 $R_{CE(sat)} = 38m\Omega$   
 $P_D = 2.4W$



Complementary part number ZXTP25040DZ

### Description

Packaged in the SOT89 outline this new low saturation 40V NPN transistor offers extremely low on state losses making it ideal for use in DC-DC circuits and various driving and power management functions.

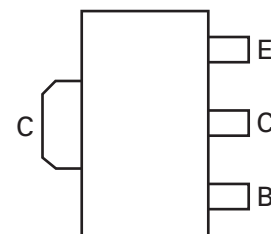


### Features

- Extremely low equivalent on resistance;  $R_{CE(sat)} = 36m\Omega$  at 5A
- 5A continuous current
- Up to 10 amps peak current
- Very low saturation voltages
- Excellent  $h_{FE}$  characteristics
- 6V reverse blocking capability

### Applications

- Emergency lighting circuits
- Motor driving (including DC fans)
- Solenoid, relay and actuator drivers
- DC-DC modules
- Backlight inverters
- Power switches
- MOSFET gate drivers



Pinout - top view

### Ordering information

| Device        | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---------------|--------------------|-----------------|-------------------|
| ZXTN25040DZTA | 7                  | 12              | 1000              |

### Device marking

1C8

# ZXTN25040DZ

## Absolute maximum ratings

| Parameter  | Symbol         | Limit       | Unit  |
|--|----------------|-------------|-------|
| Collector-base voltage                             | $V_{CBO}$      | 130         | V     |
| Collector-emitter voltage (forward blocking)       | $V_{CEX}$      | 130         | V     |
| Collector-emitter voltage                          | $V_{CEO}$      | 40          | V     |
| Emitter-collector voltage (reverse blocking)       | $V_{ECO}$      | 6           | V     |
| Emitter-base voltage                               | $V_{EBO}$      | 7           | V     |
| Continuous collector current <sup>(b)</sup>        | $I_C$          | 5           | A     |
| Base current                                       | $I_B$          | 1           | A     |
| Peak pulse current                                 | $I_{CM}$       | 10          | A     |
| Power dissipation at $T_{amb} = 25^{\circ}C^{(a)}$ | $P_D$          | 1.1         | W     |
| Linear derating factor                             |                | 8.8         | mW/°C |
| Power dissipation at $T_{amb} = 25^{\circ}C^{(b)}$ | $P_D$          | 1.8         | W     |
| Linear derating factor                             |                | 14.4        | mW/°C |
| Power dissipation at $T_{amb} = 25^{\circ}C^{(c)}$ | $P_D$          | 2.4         | W     |
| Linear derating factor                             |                | 19.2        | mW/°C |
| Power dissipation at $T_{amb} = 25^{\circ}C^{(d)}$ | $P_D$          | 4.46        | W     |
| Linear derating factor                             |                | 35.7        | mW/°C |
| Operating and storage temperature range            | $T_j, T_{stg}$ | - 55 to 150 | °C    |

## Thermal resistance

| Parameter                          | Symbol          | Limit | Unit |
|------------------------------------|-----------------|-------|------|
| Junction to ambient <sup>(a)</sup> | $R_{\theta JA}$ | 117   | °C/W |
| Junction to ambient <sup>(b)</sup> | $R_{\theta JA}$ | 68    | °C/W |
| Junction to ambient <sup>(c)</sup> | $R_{\theta JA}$ | 51    | °C/W |
| Junction to ambient <sup>(d)</sup> | $R_{\theta JA}$ | 28    | °C/W |

### NOTES:

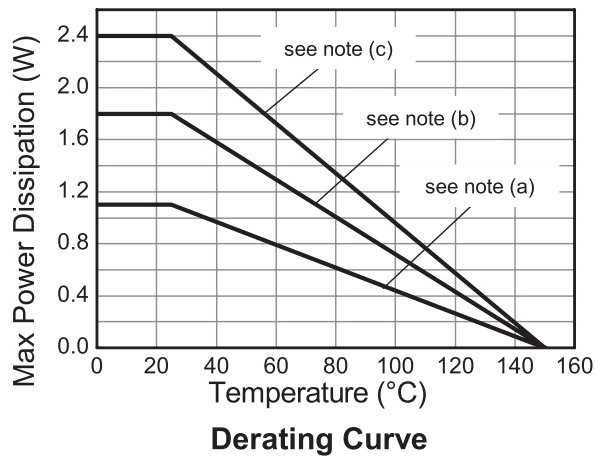
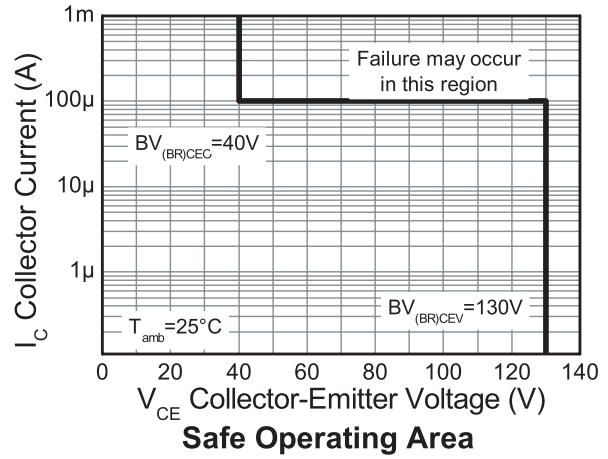
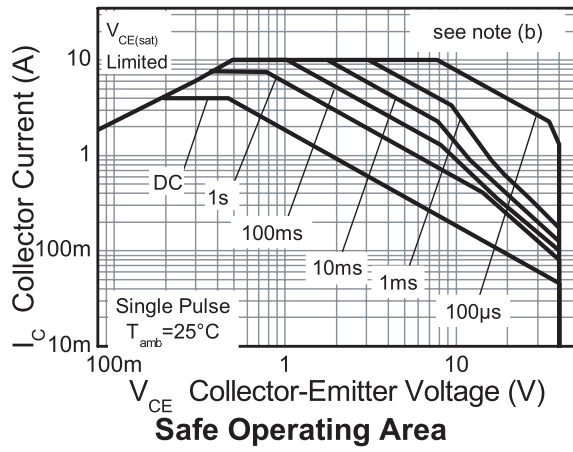
(a) For a device surface mounted on 15mm x 15mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.

(b) Mounted on 25mm x 25mm x 1.6mm FR4 PCB with a high coverage of single sided 2 oz copper in still air conditions.

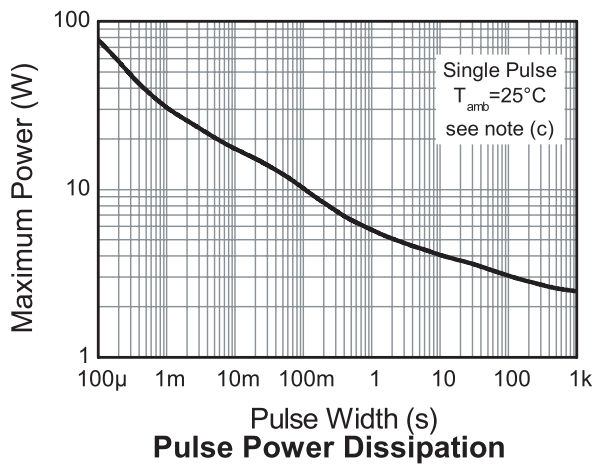
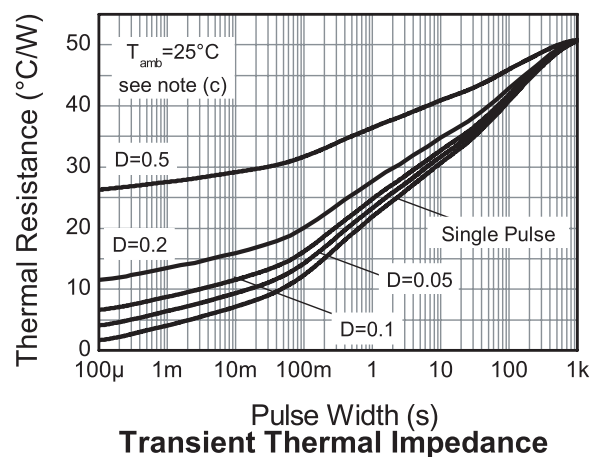
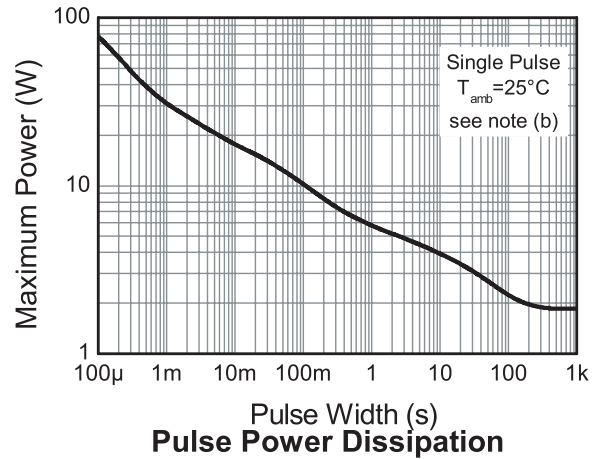
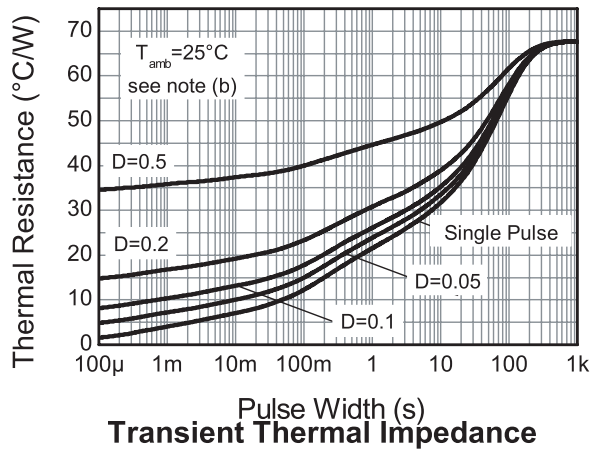
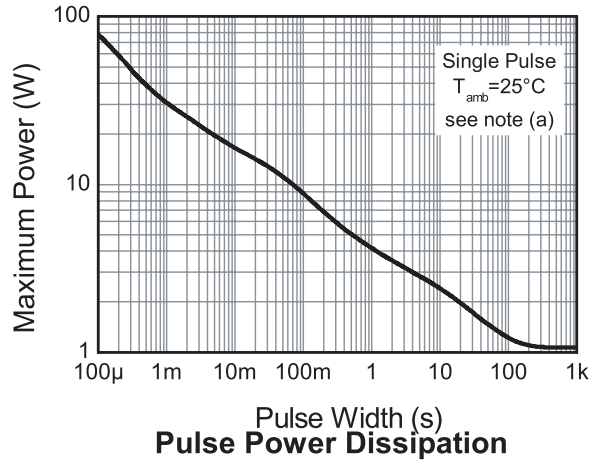
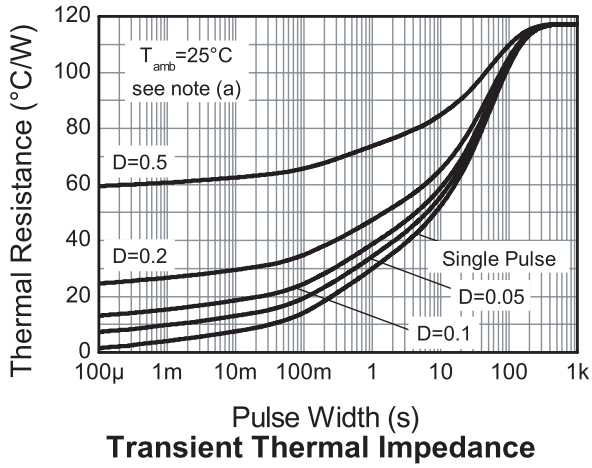
(c) Mounted on 50mm x 50mm x 1.6mm FR4 PCB with a high coverage of single sided 2 oz copper in still air conditions.

(d) As (c) above measured at  $t < 5$ secs.

## Thermal characteristics



## Thermal characteristics (cont.)



# ZXTN25040DZ

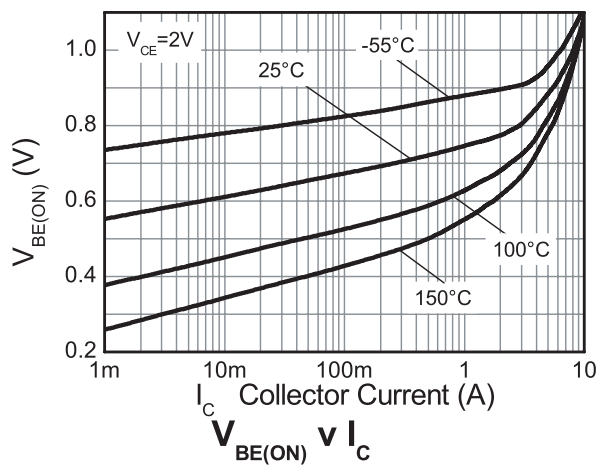
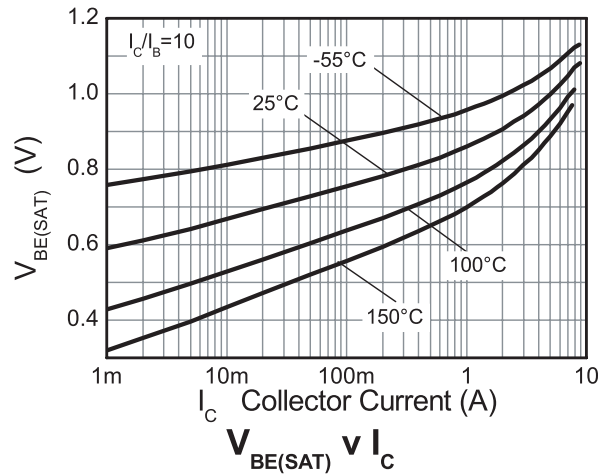
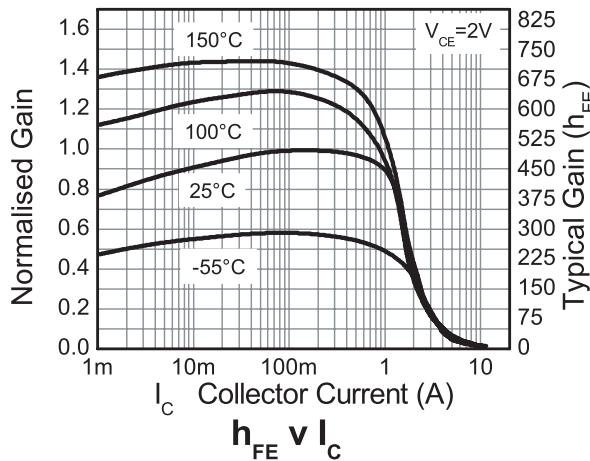
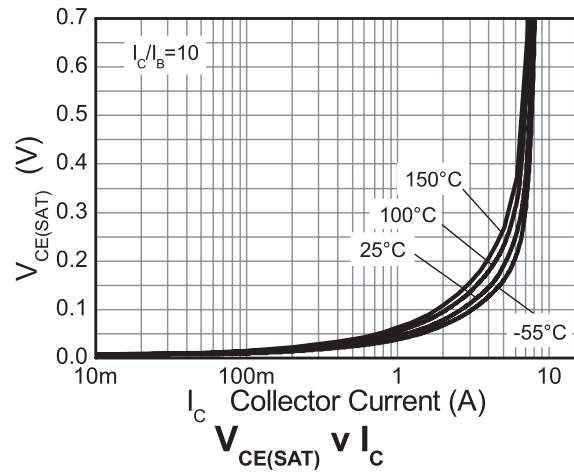
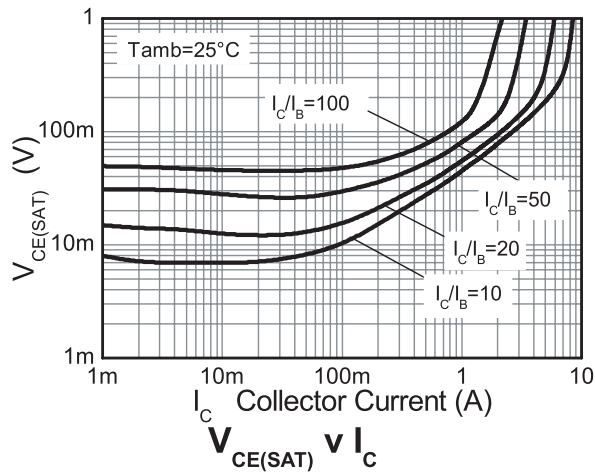
## Electrical characteristics (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

| Parameter  | Symbol        | Min.             | Typ.                    | Max.                    | Unit                 | Conditions  |
|--|---------------|------------------|-------------------------|-------------------------|----------------------|---|
| Collector-base breakdown voltage                       | $BV_{CBO}$    | 130              | 170                     |                         | V                    | $I_C = 100\mu\text{A}$  |
| Collector-emitter breakdown voltage (forward blocking) | $BV_{CEX}$    | 130              | 170                     |                         | V                    | $V_{CE} = 130\text{V}; R_{BE} \leq 1\text{k}\Omega$ or $-1\text{V} < V_{BE} < 0.25\text{V}$   |
| Collector-emitter breakdown voltage (base open)        | $BV_{CEO}$    | 40               | 63                      |                         | V                    | $I_C = 10\text{mA}^{(*)}$   |
| Emitter-base breakdown voltage                         | $BV_{EBO}$    | 7                | 8.3                     |                         | V                    | $I_E = 100\mu\text{A}$  |
| Emitter-collector breakdown voltage (reverse blocking) | $BV_{ECX}$    | 6                | 7.4                     |                         | V                    | $I_E = 100\mu\text{A}, R_{BC} \leq 1\text{k}\Omega$ or $0.25\text{V} > V_{BC} > -0.25\text{V}$  |
| Emitter-collector breakdown voltage (base open)        | $BV_{ECO}$    | 6                | 7.4                     |                         | V                    | $I_E = 100\mu\text{A}$ ,  |
| Collector-base cut-off current                         | $I_{CBO}$     |                  | <1                      | 50<br>20                | nA<br>$\mu\text{A}$  | $V_{CB} = 100\text{V}$<br>$V_{CB} = 100\text{V}, T_{amb} = 100^{\circ}\text{C}$   |
| Collector-emitter cut-off current                      | $I_{CEX}$     |                  | -                       | 100                     | nA                   | $V_{CE} = 100\text{V}; R_{BE} \leq 1\text{k}\Omega$ or $-1\text{V} < V_{BE} < 0.25\text{V}$   |
| Emitter-base cut-off current                           | $I_{EBO}$     |                  | <1                      | 50                      | nA                   | $V_{EB} = 5.6\text{V}$  |
| Collector-emitter saturation voltage                   | $V_{CE(sat)}$ |                  | 50<br>125<br>140<br>190 | 60<br>215<br>215<br>260 | mV<br>mV<br>mV<br>mV | $I_C = 1\text{A}, I_B = 100\text{mA}^{(*)}$<br>$I_C = 1\text{A}, I_B = 10\text{mA}^{(*)}$<br>$I_C = 2\text{A}, I_B = 40\text{mA}^{(*)}$<br>$I_C = 5\text{A}, I_B = 500\text{mA}^{(*)}$      |
| Base-emitter saturation voltage                        | $V_{BE(sat)}$ |                  | 1000                    | 1100                    | mV                   | $I_C = 5\text{A}, I_B = 500\text{mA}^{(*)}$   |
| Base-emitter turn-on voltage                           | $V_{BE(on)}$  |                  | 910                     | 1000                    | mV                   | $I_C = 5\text{A}, V_{CE} = 2\text{V}^{(*)}$   |
| Static forward current transfer ratio                  | $h_{FE}$      | 300<br>300<br>20 | 450<br>450<br>40<br>10  | 900                     |                      | $I_C = 10\text{mA}, V_{CE} = 2\text{V}^{(*)}$<br>$I_C = 1\text{A}, V_{CE} = 2\text{V}^{(*)}$<br>$I_C = 5\text{A}, V_{CE} = 2\text{V}^{(*)}$<br>$I_C = 10\text{A}, V_{CE} = 2\text{V}^{(*)}$ |
| Transition frequency                                   | $f_T$         |                  | 190                     |                         | MHz                  | $I_C = 50\text{mA}, V_{CE} = 10\text{V}$<br>$f = 100\text{MHz}$   |
| Output capacitance                                     | $C_{OBO}$     |                  | 11.7                    | 20                      | pF                   | $V_{CB} = 10\text{V}, f = 1\text{MHz}^{(*)}$  |
| Delay time   | $t_d$         |                  | 64                      |                         | ns                   | $V_{CC} = 10\text{V}$<br>$I_C = 1\text{A}$ ,<br>$I_{B1} = I_{B2} = 10\text{mA}$   |
| Rise time  | $t_r$         |                  | 108                     |                         | ns                   |   |
| Storage time   | $t_s$         |                  | 428                     |                         | ns                   |   |
| Fall time  | $t_f$         |                  | 130                     |                         | ns                   |   |

### NOTES:

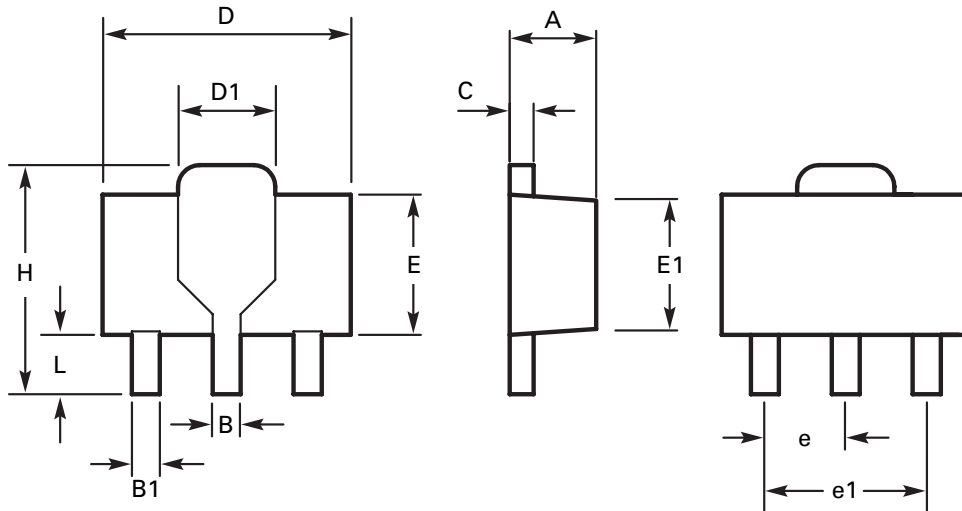
(\*) Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ ; duty cycle  $\leq 2\%$ .

## Typical characteristics



# ZXTN25040DZ

## Package outline - SOT89



| DIM | Millimeters |      | Inches |       | DIM | Millimeters |      | Inches    |       |
|-----|-------------|------|--------|-------|-----|-------------|------|-----------|-------|
|     | Min         | Max  | Min    | Max   |     | Min         | Max  | Min       | Max   |
| A   | 1.40        | 1.60 | 0.550  | 0.630 | E1  | 2.13        | 2.29 | 0.084     | 0.090 |
| B   | 0.44        | 0.56 | 0.017  | 0.022 | e   | 1.50 BSC    |      | 0.059 BSC |       |
| B1  | 0.36        | 0.48 | 0.014  | 0.019 | e1  | 3.00 BSC    |      | 0.118 BSC |       |
| C   | 0.35        | 0.44 | 0.014  | 0.019 | H   | 3.94        | 4.25 | 0.155     | 0.167 |
| D   | 4.40        | 4.60 | 0.173  | 0.181 | L   | 0.89        | 1.20 | 0.155     | 0.167 |
| E   | 2.29        | 2.60 | 0.090  | 0.102 |     | -           | -    | -         | -     |

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

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|                                   |  |
|-----------------------------------|--|
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| "Active"                          | Product status recommended for new designs                                     |
| "Last time buy (LTB)"             | Device will be discontinued and last time buy period and delivery is in effect |
| "Not recommended for new designs" | Device is still in production to support existing designs and production       |
| "Obsolete"                        | Production has been discontinued   |

### Datasheet status key:

|                       |   |
|-----------------------|---|
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**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.