

# HEF4894B

## 12-stage shift-and-store register LED driver

Rev. 9 — 18 April 2016

Product data sheet

### 1. General description

The HEF4894B is a 12-stage serial shift register. It has a storage latch associated with each stage for strobing data from the serial input (D) to the parallel LED driver outputs (QP0 to QP11). Data is shifted on positive-going clock (CP) transitions. The data in each shift register stage is transferred to the storage register when the strobe (STR) input is HIGH. Data in the storage register appears at the output whenever the output enable (OE) input signal is HIGH.

Two serial outputs (QS1 and QS2) are available for cascading a number of HEF4894B devices. Serial data is available at QS1 on positive-going clock edges to allow high-speed operation in cascaded systems with a fast clock rise time. The same serial data is available at QS2 on the next negative going clock edge. This is used for cascading HEF4894B devices when the clock has a slow rise time.

It operates over a recommended  $V_{DD}$  power supply range of 3 V to 15 V referenced to  $V_{SS}$  (usually ground). Unused inputs must be connected to  $V_{DD}$ ,  $V_{SS}$ , or another input.

### 2. Features and benefits

- Fully static operation
- 5 V, 10 V, and 15 V parametric ratings
- Standardized symmetrical output characteristics
- Specified from  $-40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$  and  $-40\text{ }^{\circ}\text{C}$  to  $+125\text{ }^{\circ}\text{C}$
- Complies with JEDEC standard JESD 13-B

### 3. Ordering information

**Table 1. Ordering information**

All types operate from  $-40\text{ }^{\circ}\text{C}$  to  $+125\text{ }^{\circ}\text{C}$ .

| Type number | Package |  |          |
|-------------|---------|--|----------|
|             | Name    | Description  | Version  |
| HEF4894BT   | SO20    | plastic small outline package; 20 leads; body width 7.5 mm             | SOT163-1 |
| HEF4894BTT  | TSSOP20 | plastic thin shrink small outline package; 20 leads; body width 4.4 mm | SOT360-1 |

4. Functional diagram

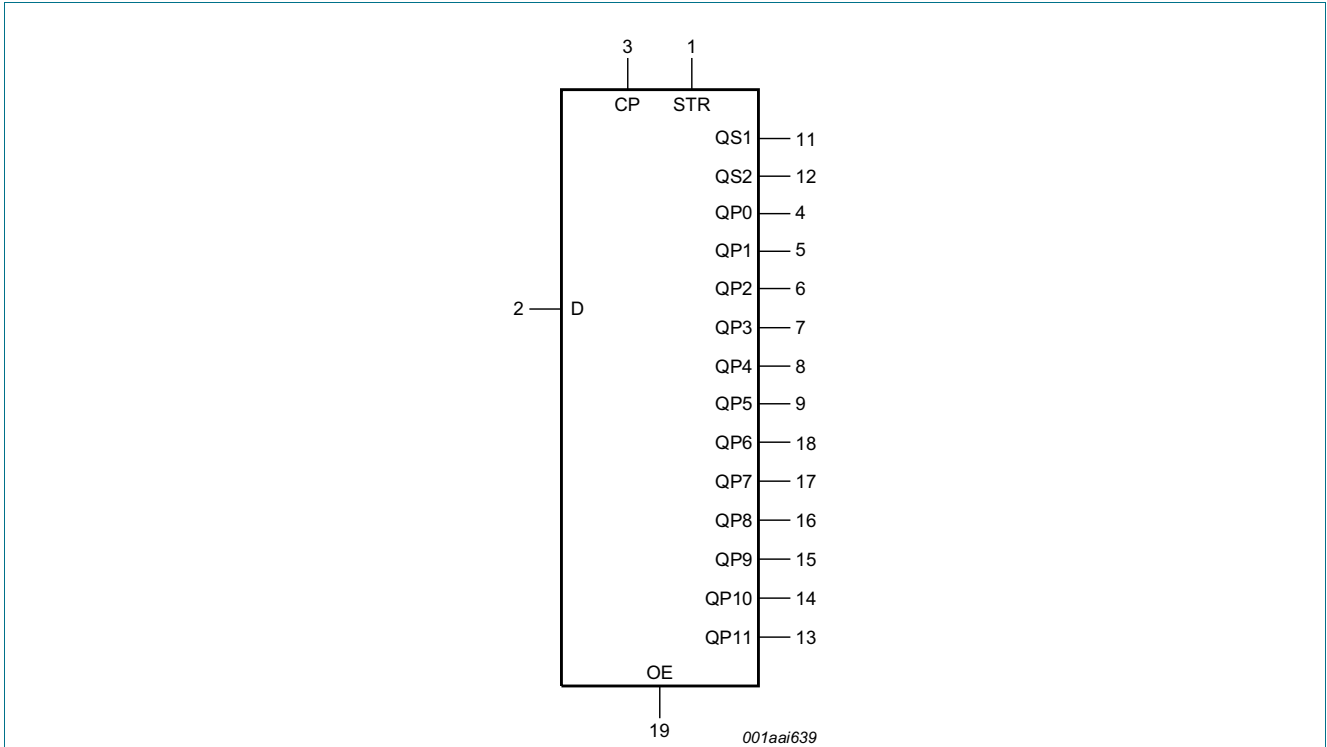


Fig 1. Logic Symbol

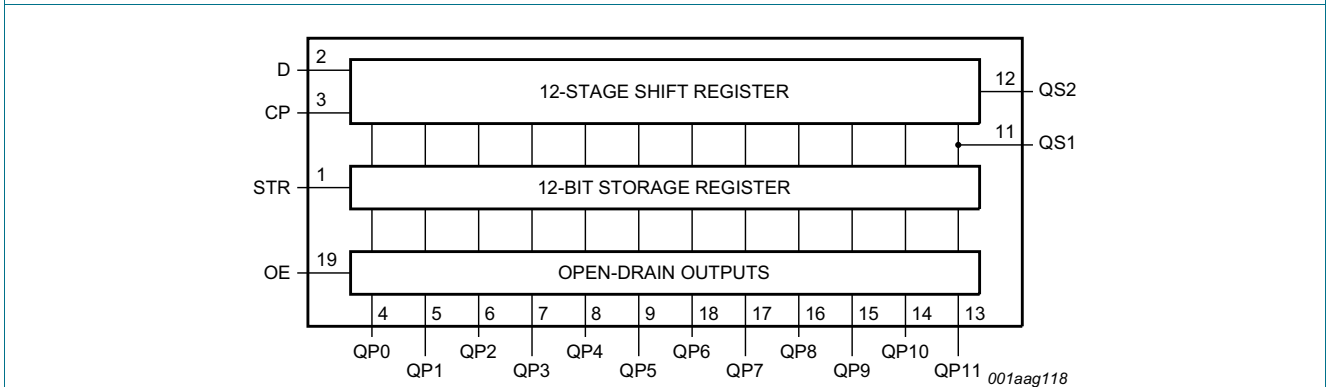


Fig 2. Functional diagram

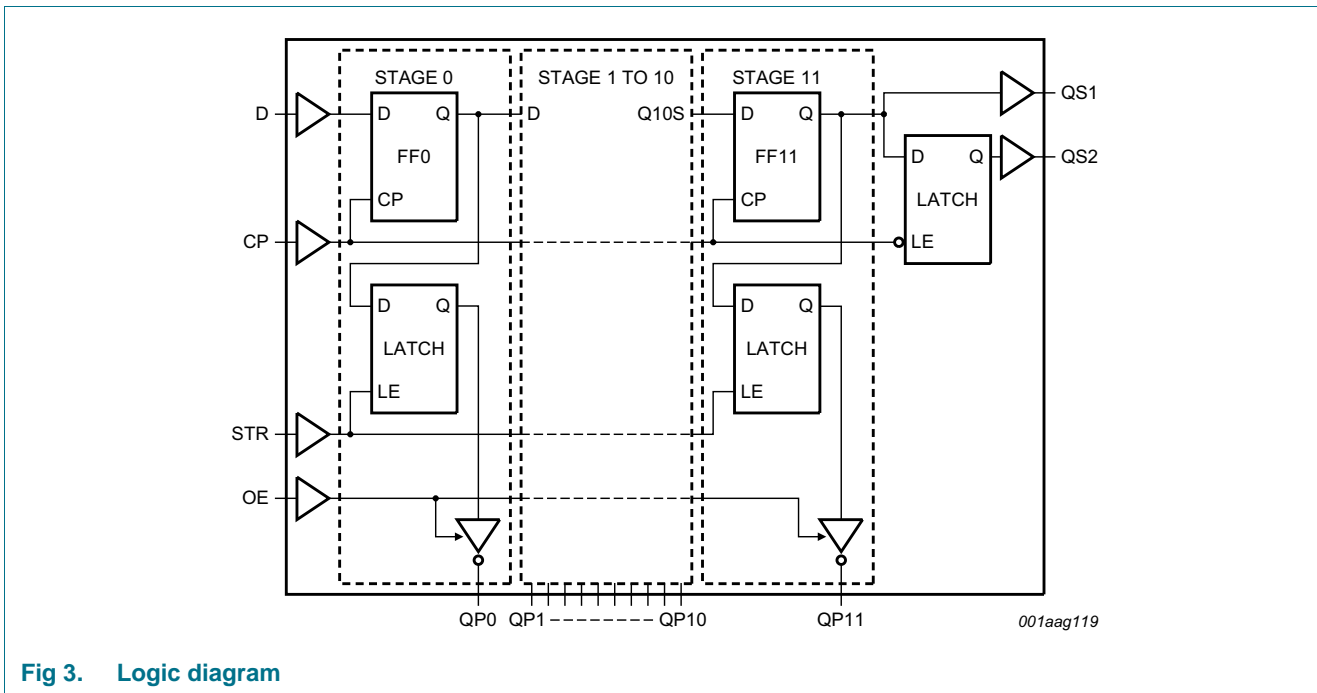


Fig 3. Logic diagram

## 5. Pinning information

### 5.1 Pinning

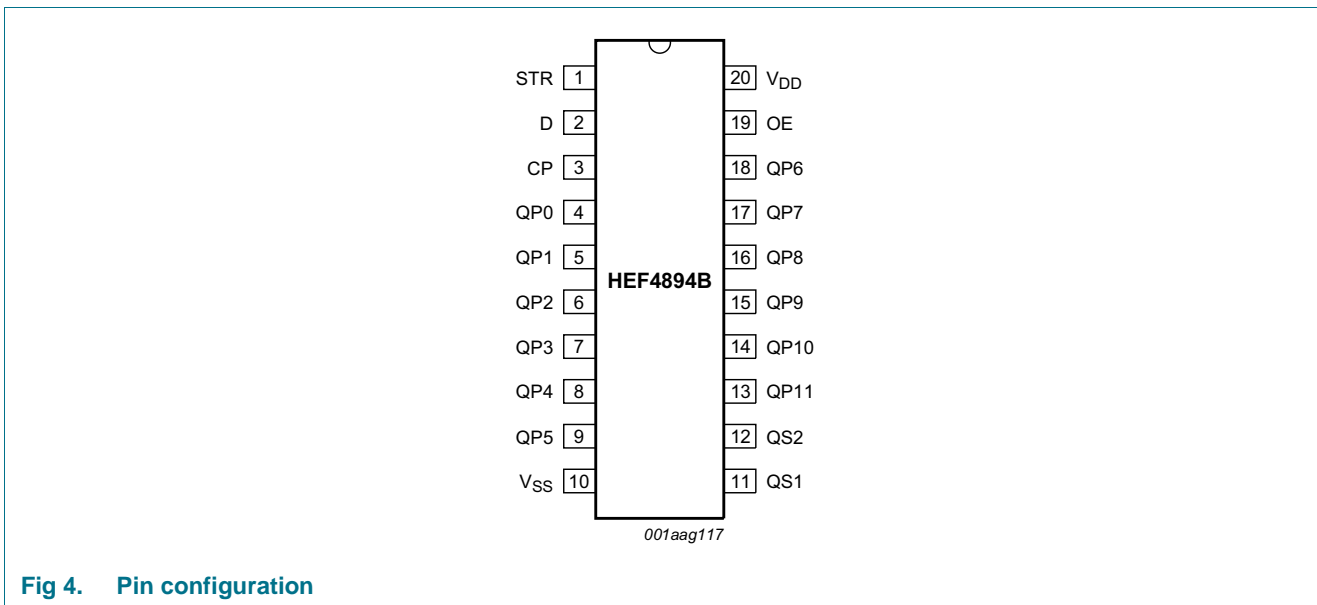


Fig 4. Pin configuration

## 5.2 Pin description

Table 2. Pin description

| Symbol          | Pin                                      | Description         |
|-----------------|--|---------------------|
| D               | 2  | serial input        |
| QP0 to QP11     | 4, 5, 6, 7, 8, 9, 18, 17, 16, 15, 14, 13 | parallel output     |
| QS1             | 11                                       | serial output       |
| QS2             | 12                                       | serial output       |
| CP              | 3  | clock input         |
| STR             | 1  | strobe input        |
| OE              | 19                                       | output enable input |
| V <sub>DD</sub> | 20                                       | supply voltage      |
| V <sub>SS</sub> | 10                                       | ground (0 V)        |

## 6. Functional description

Table 3. Function table<sup>[1]</sup>

At the positive clock edge the information in the 10<sup>th</sup> register stage is transferred to the 11<sup>th</sup> register stage and the QS output

| Control |    |     | Input | Parallel output |           | Serial output      |                    |
|---------|----|-----|-------|-----------------|-----------|--------------------|--------------------|
| CP      | OE | STR | D     | QP0             | QPn       | QS1 <sup>[2]</sup> | QS2 <sup>[3]</sup> |
| ↑       | L  | X   | X     | Z               | Z         | Q10S               | no change          |
| ↓       | L  | X   | X     | Z               | Z         | no change          | Q11S               |
| ↑       | H  | L   | X     | no change       | no change | Q10S               | no change          |
| ↑       | H  | H   | L     | Z               | QPn – 1   | Q10S               | no change          |
| ↑       | H  | H   | H     | L               | QPn – 1   | Q10S               | no change          |
| ↓       | H  | H   | H     | no change       | no change | no change          | Q11S               |

[1] H = HIGH voltage level; L = LOW voltage level; X = don't care; ↑ = LOW-to-HIGH clock transition; ↓ = HIGH-to-LOW clock transition; Z = high-impedance OFF-state.

[2] Q10S = the data in register stage 10 before the LOW to HIGH clock transition.

[3] Q11S = the data in register stage 11 before the HIGH to LOW clock transition.

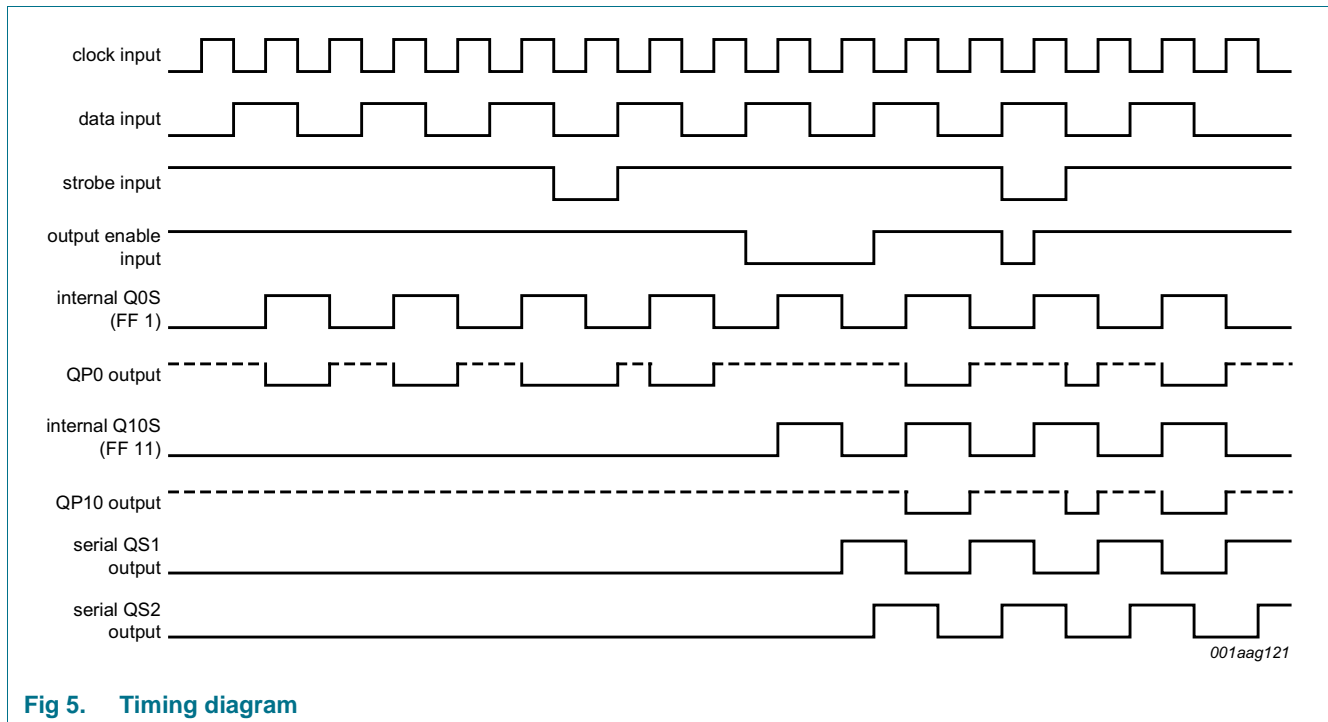


Fig 5. Timing diagram

## 7. Limiting values

**Table 4. Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol    | Parameter               | Conditions  | Min  | Max            | Unit |
|-----------|-------------------------|---|------|----------------|------|
| $V_{DD}$  | supply voltage          |   | -0.5 | +18            | V    |
| $I_{IK}$  | input clamping current  | $V_I < -0.5\text{ V}$ or $V_I > V_{DD} + 0.5\text{ V}$              | -    | $\pm 10$       | mA   |
| $V_I$     | input voltage           |   | -0.5 | $V_{DD} + 0.5$ | V    |
| $I_{OK}$  | output clamping current | QSn outputs; $V_O < -0.5\text{ V}$ or $V_O > V_{DD} + 0.5\text{ V}$ | -    | $\pm 10$       | mA   |
|           |                         | QPn outputs; $V_O < 0.5\text{ V}$                                   | -    | 40             | mA   |
| $I_I$     | input leakage current   |   | -    | $\pm 10$       | mA   |
| $I_O$     | output current          | QSn outputs   | -    | $\pm 10$       | mA   |
|           |                         | QPn outputs   | -    | 40             | mA   |
| $T_{stg}$ | storage temperature     |   | -65  | +150           | °C   |
| $T_{amb}$ | ambient temperature     |   | -40  | +125           | °C   |
| $P_{tot}$ | total power dissipation | $T_{amb} = -40\text{ °C}$ to $+125\text{ °C}$                       |      |                |      |
|           |                         | SO20 package <a href="#">[1]</a>                                    | -    | 500            | mW   |
|           |                         | TSSOP20 package <a href="#">[2]</a>                                 | -    | 500            | mW   |
| $P$       | power dissipation       | per output  | -    | 100            | mW   |

[1] For SO20 package:  $P_{tot}$  derates linearly with 8 mW/K above 70 °C.

[2] For TSSOP20 package:  $P_{tot}$  derates linearly with 5.5 mW/K above 60 °C.

## 8. Recommended operating conditions

Table 5. Recommended operating conditions

| Symbol              | Parameter                           | Conditions             | Min | Typ | Max      | Unit            |
|---------------------|-------------------------------------|------------------------|-----|-----|----------|-----------------|
| $V_{DD}$            | supply voltage                      |                        | 3   | -   | 15       | V               |
| $V_I$               | input voltage                       |                        | 0   | -   | $V_{DD}$ | V               |
| $T_{amb}$           | ambient temperature                 | in free air            | -40 | -   | +125     | °C              |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{DD} = 5\text{ V}$  | -   | -   | 3.75     | $\mu\text{s/V}$ |
|                     |                                     | $V_{DD} = 10\text{ V}$ | -   | -   | 0.5      | $\mu\text{s/V}$ |
|                     |                                     | $V_{DD} = 15\text{ V}$ | -   | -   | 0.08     | $\mu\text{s/V}$ |

## 9. Static characteristics

Table 6. Static characteristics

$V_{SS} = 0\text{ V}$ ;  $V_I = V_{SS}$  or  $V_{DD}$ ; unless otherwise specified.

| Symbol   | Parameter                 | Conditions                               | $V_{DD}$ | $T_{amb} = -40\text{ °C}$ |           | $T_{amb} = +25\text{ °C}$ |           | $T_{amb} = +85\text{ °C}$ |           | $T_{amb} = +125\text{ °C}$ |           | Unit          |
|----------|---------------------------|--|----------|---------------------------|-----------|---------------------------|-----------|---------------------------|-----------|----------------------------|-----------|---------------|
|          |                           |  |          | Min                       | Max       | Min                       | Max       | Min                       | Max       | Min                        | Max       |               |
| $V_{IH}$ | HIGH-level input voltage  | $ I_O  < 1\ \mu\text{A}$                 | 5 V      | 3.5                       | -         | 3.5                       | -         | 3.5                       | -         | 3.5                        | -         | V             |
|          |                           |  | 10 V     | 7.0                       | -         | 7.0                       | -         | 7.0                       | -         | 7.0                        | -         | V             |
|          |                           |  | 15 V     | 11.0                      | -         | 11.0                      | -         | 11.0                      | -         | 11.0                       | -         | V             |
| $V_{IL}$ | LOW-level input voltage   | $ I_O  < 1\ \mu\text{A}$                 | 5 V      | -                         | 1.5       | -                         | 1.5       | -                         | 1.5       | -                          | 1.5       | V             |
|          |                           |  | 10 V     | -                         | 3.0       | -                         | 3.0       | -                         | 3.0       | -                          | 3.0       | V             |
|          |                           |  | 15 V     | -                         | 4.0       | -                         | 4.0       | -                         | 4.0       | -                          | 4.0       | V             |
| $V_{OH}$ | HIGH-level output voltage | QSn outputs;<br>$ I_O  < 1\ \mu\text{A}$ | 5 V      | 4.95                      | -         | 4.95                      | -         | 4.95                      | -         | 4.95                       | -         | V             |
|          |                           |  | 10 V     | 9.95                      | -         | 9.95                      | -         | 9.95                      | -         | 9.95                       | -         | V             |
|          |                           |  | 15 V     | 14.95                     | -         | 14.95                     | -         | 14.95                     | -         | 14.95                      | -         | V             |
| $V_{OL}$ | LOW-level output voltage  | QSn outputs;<br>$ I_O  < 1\ \mu\text{A}$ | 5 V      | -                         | 0.05      | -                         | 0.05      | -                         | 0.05      | -                          | 0.05      | V             |
|          |                           |  | 10 V     | -                         | 0.05      | -                         | 0.05      | -                         | 0.05      | -                          | 0.05      | V             |
|          |                           |  | 15 V     | -                         | 0.05      | -                         | 0.05      | -                         | 0.05      | -                          | 0.05      | V             |
|          |                           | QPn outputs;<br>$ I_O  < 20\text{ mA}$   | 5 V      | -                         | 0.75      | -                         | 0.75      | -                         | 1.5       | -                          | 1.5       | V             |
|          |                           |  | 10 V     | -                         | 0.75      | -                         | 0.75      | -                         | 1.5       | -                          | 1.5       | V             |
|          |                           |  | 15 V     | -                         | 0.75      | -                         | 0.75      | -                         | 1.5       | -                          | 1.5       | V             |
| $I_{OH}$ | HIGH-level output current | QSn outputs                              |          |                           |           |                           |           |                           |           |                            |           |               |
|          |                           | $V_O = 2.5\text{ V}$                     | 5 V      | -                         | -1.7      | -                         | -1.4      | -                         | -1.1      | -                          | -1.1      | mA            |
|          |                           | $V_O = 4.6\text{ V}$                     | 5 V      | -                         | -0.64     | -                         | -0.5      | -                         | -0.36     | -                          | -0.36     | mA            |
|          |                           | $V_O = 9.5\text{ V}$                     | 10 V     | -                         | -1.6      | -                         | -1.3      | -                         | -0.9      | -                          | -0.9      | mA            |
|          |                           | $V_O = 13.5\text{ V}$                    | 15 V     | -                         | -4.2      | -                         | -3.4      | -                         | -2.4      | -                          | -2.4      | mA            |
| $I_{OL}$ | LOW-level output current  | QSn outputs                              |          |                           |           |                           |           |                           |           |                            |           |               |
|          |                           | $V_O = 0.4\text{ V}$                     | 5 V      | 0.64                      | -         | 0.5                       | -         | 0.36                      | -         | 0.36                       | -         | mA            |
|          |                           | $V_O = 0.5\text{ V}$                     | 10 V     | 1.6                       | -         | 1.3                       | -         | 0.9                       | -         | 0.9                        | -         | mA            |
|          |                           | $V_O = 1.5\text{ V}$                     | 15 V     | 4.2                       | -         | 3.2                       | -         | 2.4                       | -         | 2.4                        | -         | mA            |
| $I_I$    | input leakage current     |  | 15 V     | -                         | $\pm 0.1$ | -                         | $\pm 0.1$ | -                         | $\pm 1.0$ | -                          | $\pm 1.0$ | $\mu\text{A}$ |

**Table 6. Static characteristics ...continued**  
 $V_{SS} = 0\text{ V}$ ;  $V_I = V_{SS}$  or  $V_{DD}$ ; unless otherwise specified.

| Symbol   | Parameter                | Conditions                                 | $V_{DD}$ | $T_{amb} = -40\text{ }^{\circ}\text{C}$ |     | $T_{amb} = +25\text{ }^{\circ}\text{C}$ |     | $T_{amb} = +85\text{ }^{\circ}\text{C}$ |     | $T_{amb} = +125\text{ }^{\circ}\text{C}$ |     | Unit          |
|----------|--------------------------|--|----------|---|-----|---|-----|---|-----|--|-----|---------------|
|          |                          |  |          | Min                                     | Max | Min                                     | Max | Min                                     | Max | Min                                      | Max |               |
| $I_{OZ}$ | OFF-state output current | QPn output is HIGH;<br>$V_O = 15\text{ V}$ | 5 V      | -                                       | 2   | -                                       | 2   | -                                       | 15  | -  | 15  | $\mu\text{A}$ |
|          |                          |  | 10 V     | -                                       | 2   | -                                       | 2   | -                                       | 15  | -  | 15  | $\mu\text{A}$ |
|          |                          |  | 15 V     | -                                       | 2   | -                                       | 2   | -                                       | 15  | -  | 15  | $\mu\text{A}$ |
| $I_{DD}$ | supply current           | $I_O = 0\text{ A}$                         | 5 V      | -                                       | 5   | -                                       | 5   | -                                       | 150 | -  | 150 | $\mu\text{A}$ |
|          |                          |  | 10 V     | -                                       | 10  | -                                       | 10  | -                                       | 300 | -  | 300 | $\mu\text{A}$ |
|          |                          |  | 15 V     | -                                       | 20  | -                                       | 20  | -                                       | 600 | -  | 600 | $\mu\text{A}$ |
| $C_I$    | input capacitance        |  | -        | -                                       | -   | 7.5                                     | -   | -                                       | -   | -  | pF  |               |

## 10. Dynamic characteristics

**Table 7. Dynamic characteristics**  
 $V_{SS} = 0\text{ V}$ ;  $T_{amb} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified. For test circuit see [Figure 10](#).

| Symbol    | Parameter                          | Conditions   | $V_{DD}$ | Extrapolation formula                    | Min | Typ | Max | Unit |
|-----------|------------------------------------|--|----------|--|-----|-----|-----|------|
| $t_{PHL}$ | HIGH to LOW propagation delay      | CP to QS1;<br>see <a href="#">Figure 6</a>                       | 5 V      | $132\text{ ns} + (0.55\text{ ns/pF})C_L$ | -   | 160 | 320 | ns   |
|           |                                    |  | 10 V     | $53\text{ ns} + (0.23\text{ ns/pF})C_L$  | -   | 65  | 130 | ns   |
|           |                                    |  | 15 V     | $37\text{ ns} + (0.16\text{ ns/pF})C_L$  | -   | 45  | 90  | ns   |
|           |                                    | CP to QS2;<br>see <a href="#">Figure 6</a>                       | 5 V      | $92\text{ ns} + (0.55\text{ ns/pF})C_L$  | -   | 120 | 240 | ns   |
|           |                                    |  | 10 V     | $39\text{ ns} + (0.23\text{ ns/pF})C_L$  | -   | 50  | 100 | ns   |
|           |                                    |  | 15 V     | $32\text{ ns} + (0.16\text{ ns/pF})C_L$  | -   | 40  | 80  | ns   |
| $t_{PLH}$ | LOW to HIGH propagation delay      | CP to QS1;<br>see <a href="#">Figure 6</a>                       | 5 V      | $102\text{ ns} + (0.55\text{ ns/pF})C_L$ | -   | 130 | 260 | ns   |
|           |                                    |  | 10 V     | $44\text{ ns} + (0.23\text{ ns/pF})C_L$  | -   | 55  | 110 | ns   |
|           |                                    |  | 15 V     | $32\text{ ns} + (0.16\text{ ns/pF})C_L$  | -   | 40  | 80  | ns   |
|           |                                    | CP to QS2;<br>see <a href="#">Figure 6</a>                       | 5 V      | $102\text{ ns} + (0.55\text{ ns/pF})C_L$ | -   | 130 | 260 | ns   |
|           |                                    |  | 10 V     | $49\text{ ns} + (0.23\text{ ns/pF})C_L$  | -   | 60  | 120 | ns   |
|           |                                    |  | 15 V     | $37\text{ ns} + (0.16\text{ ns/pF})C_L$  | -   | 45  | 90  | ns   |
| $t_{PZL}$ | OFF-state to LOW propagation delay | CP to QPn;<br>see <a href="#">Figure 6</a>                       | 5 V      |  | -   | 240 | 480 | ns   |
|           |                                    |  | 10 V     |  | -   | 80  | 160 | ns   |
|           |                                    |  | 15 V     |  | -   | 55  | 110 | ns   |
|           |                                    | STR to QPn;<br>see <a href="#">Figure 7</a>                      | 5 V      |  | -   | 140 | 280 | ns   |
|           |                                    |  | 10 V     |  | -   | 70  | 140 | ns   |
|           |                                    |  | 15 V     |  | -   | 55  | 110 | ns   |
| $t_{PLZ}$ | LOW to OFF-state propagation delay | CP to QPn;<br>see <a href="#">Figure 6</a> and <a href="#">7</a> | 5 V      |  | -   | 170 | 340 | ns   |
|           |                                    |  | 10 V     |  | -   | 75  | 150 | ns   |
|           |                                    |  | 15 V     |  | -   | 60  | 120 | ns   |
|           |                                    | STR to QPn;<br>see <a href="#">Figure 7</a>                      | 5 V      |  | -   | 100 | 200 | ns   |
|           |                                    |  | 10 V     |  | -   | 40  | 100 | ns   |
|           |                                    |  | 15 V     |  | -   | 35  | 70  | ns   |

**Table 7. Dynamic characteristics ...continued**

$V_{SS} = 0\text{ V}$ ;  $T_{amb} = 25\text{ °C}$  unless otherwise specified. For test circuit see [Figure 10](#).

| Symbol         | Parameter               | Conditions  | $V_{DD}$              | Extrapolation formula                   | Min | Typ | Max | Unit |
|----------------|-------------------------|---|-----------------------|---|-----|-----|-----|------|
| $t_{en}$       |                         | OE to QPn;<br>see <a href="#">Figure 8</a>        | 5 V <sup>[2]</sup>    |   | -   | 100 | 200 | ns   |
|                |                         |   | 10 V                  |   | -   | 55  | 110 | ns   |
|                |                         |   | 15 V                  |   | -   | 50  | 100 | ns   |
| $t_{dis}$      |                         | OE to QPn;<br>see <a href="#">Figure 8</a>        | 5 V <sup>[2]</sup>    |   | -   | 80  | 160 | ns   |
|                |                         |   | 10 V                  |   | -   | 40  | 80  | ns   |
|                |                         |   | 15 V                  |   | -   | 30  | 60  | ns   |
| $t_t$          | transition time         | QS1, QS2;<br>see <a href="#">Figure 6</a>         | 5 V <sup>[1][3]</sup> | $35\text{ ns} + (1.00\text{ ns/pF})C_L$ | -   | 85  | 170 | ns   |
|                |                         |   | 10 V                  | $19\text{ ns} + (0.42\text{ ns/pF})C_L$ | -   | 40  | 80  | ns   |
|                |                         |   | 15 V                  | $16\text{ ns} + (0.28\text{ ns/pF})C_L$ | -   | 30  | 60  | ns   |
| $t_W$          | pulse width             | CP; LOW and HIGH;<br>see <a href="#">Figure 6</a> | 5 V                   |   | 60  | 30  | -   | ns   |
|                |                         |   | 10 V                  |   | 30  | 15  | -   | ns   |
|                |                         |   | 15 V                  |   | 24  | 12  | -   | ns   |
|                |                         | STR; HIGH;<br>see <a href="#">Figure 7</a>        | 5 V                   |   | 80  | 40  | -   | ns   |
|                |                         |   | 10 V                  |   | 60  | 30  | -   | ns   |
|                |                         |   | 15 V                  |   | 24  | 12  | -   | ns   |
| $t_{su}$       | set-up time             | D to CP;<br>see <a href="#">Figure 9</a>          | 5 V                   |   | 60  | 30  | -   | ns   |
|                |                         |   | 10 V                  |   | 20  | 10  | -   | ns   |
|                |                         |   | 15 V                  |   | 15  | 5   | -   | ns   |
| $t_h$          | hold time               | D to CP;<br>see <a href="#">Figure 9</a>          | 5 V                   |   | +5  | -15 | -   | ns   |
|                |                         |   | 10 V                  |   | 20  | 5   | -   | ns   |
|                |                         |   | 15 V                  |   | 20  | 5   | -   | ns   |
| $f_{clk(max)}$ | maximum clock frequency | CP; see <a href="#">Figure 6</a>                  | 5 V                   |   | 5   | 10  | -   | MHz  |
|                |                         |   | 10 V                  |   | 11  | 22  | -   | MHz  |
|                |                         |   | 15 V                  |   | 14  | 28  | -   | MHz  |

[1] The typical values of the propagation delay and transition times are calculated from the extrapolation formulas shown ( $C_L$  in pF).

[2]  $t_{en}$  is the same as  $t_{PZL}$  and  $t_{dis}$  is the same as  $t_{PLZ}$ .

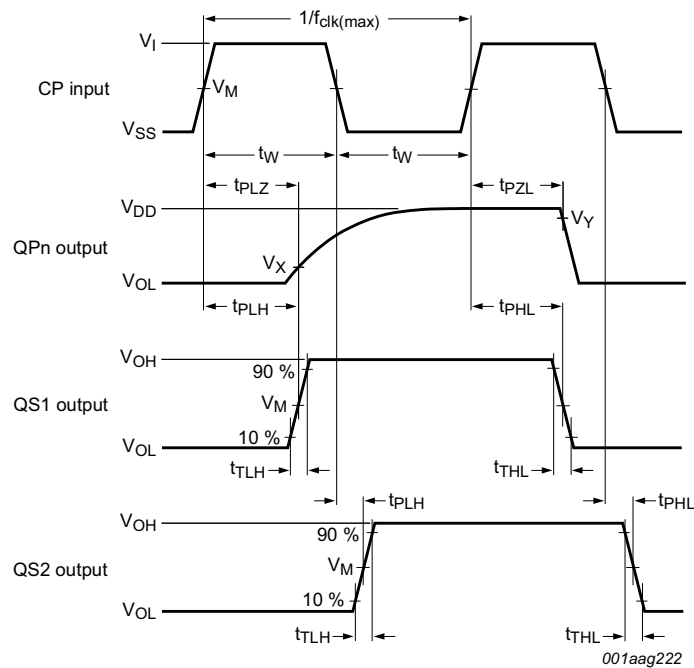
[3]  $t_t$  is the same as  $t_{TLH}$  and  $t_{THL}$ .

**Table 8. Dynamic power dissipation**

$P_D$  can be calculated from the formulas shown.  $V_{SS} = 0\text{ V}$ ;  $t_r = t_f \leq 20\text{ ns}$ ;  $T_{amb} = 25\text{ °C}$ .

| Symbol | Parameter                 | $V_{DD}$ | Typical formula  | Where  |
|--------|---------------------------|----------|--|--|
| $P_D$  | dynamic power dissipation | 5 V      | $P_D = 1200 \times f_i + \Sigma(f_o \times C_L) \times V_{DD}^2\ \mu\text{W}$  | $f_i$ = input frequency in MHz;<br>$f_o$ = output frequency in MHz;<br>$C_L$ = output load capacitance in pF;<br>$\Sigma(f_o \times C_L)$ = sum of the outputs;<br>$V_{DD}$ = supply voltage in V. |
|        |                           | 10 V     | $P_D = 5550 \times f_i + \Sigma(f_o \times C_L) \times V_{DD}^2\ \mu\text{W}$  |  |
|        |                           | 15 V     | $P_D = 15000 \times f_i + \Sigma(f_o \times C_L) \times V_{DD}^2\ \mu\text{W}$ |  |

11. Waveforms



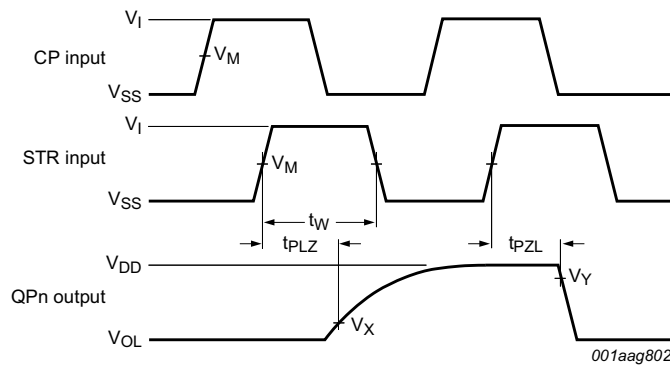
Parallel output measurement points are given in [Table 9](#).

$V_{OL}$  and  $V_{OH}$  are typical output voltage levels that occur with the output load.

**Fig 6. Propagation delay clock (CP) to output (QPn, QS1, QS2), clock pulse width and maximum clock frequency**

**Table 9. Measurement points**

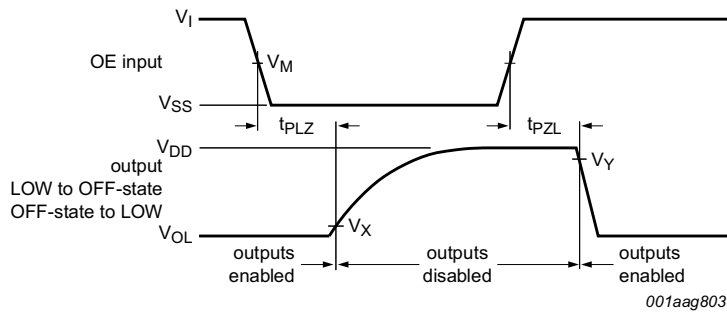
| Supply      | Input       | Output      |          |          |
|-------------|-------------|-------------|----------|----------|
| $V_{DD}$    | $V_M$       | $V_M$       | $V_X$    | $V_Y$    |
| 5 V to 15 V | $0.5V_{DD}$ | $0.5V_{DD}$ | $0.1V_O$ | $0.9V_O$ |



Measurement points are given in [Table 9](#).

$V_{OL}$  is the typical output voltage level that occurs with the output load.

**Fig 7. Strobe (STR) to output (QPn) propagation delays and the strobe pulse width**

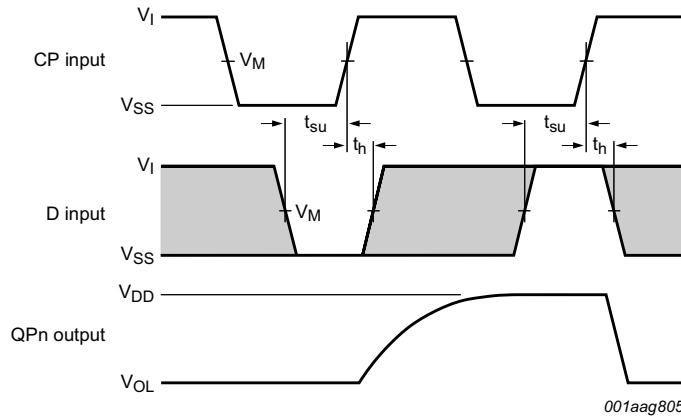


001aag803

Measurement points are given in [Table 9](#).

$V_{OL}$  is the typical output voltage level that occurs with the output load.

**Fig 8. Enable and disable times for input OE**



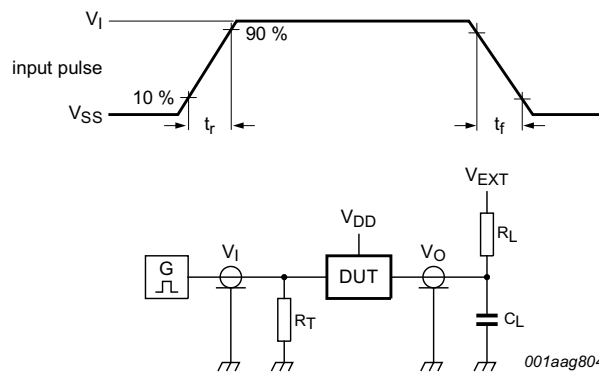
001aag805

Measurement points are given in [Table 9](#).

$V_{OL}$  is a typical output voltage level that occurs with the output load.

The shaded areas indicate when the input is permitted to change for predictable output performance.

**Fig 9. Set-up and hold times for the data input (D)**



Test data is given in [Table 10](#).

Definitions for test circuit:

DUT = Device Under Test;

$R_L$  = Load resistance;

$C_L$  = load capacitance;

$R_T$  = Termination resistance should be equal to output impedance of  $Z_o$  of the pulse generator;

$V_{EXT}$  = External voltage for measuring switching times.

**Fig 10. Test circuit for measuring switching times**

**Table 10. Test data**

| Supply      | Input    |              | $V_{EXT}$          |                    | Load  |              |
|-------------|----------|--------------|--------------------|--------------------|-------|--------------|
| $V_{DD}$    | $V_I$    | $t_r, t_f$   | $t_{PLZ}, t_{PZL}$ | $t_{PLH}, t_{PHL}$ | $C_L$ | $R_L$        |
| 5 V to 15 V | $V_{DD}$ | $\leq 20$ ns | $V_{DD}$           | open               | 50 pF | 1 k $\Omega$ |

## 12. Application information

Application example: serial-to-parallel data converting LED driver.

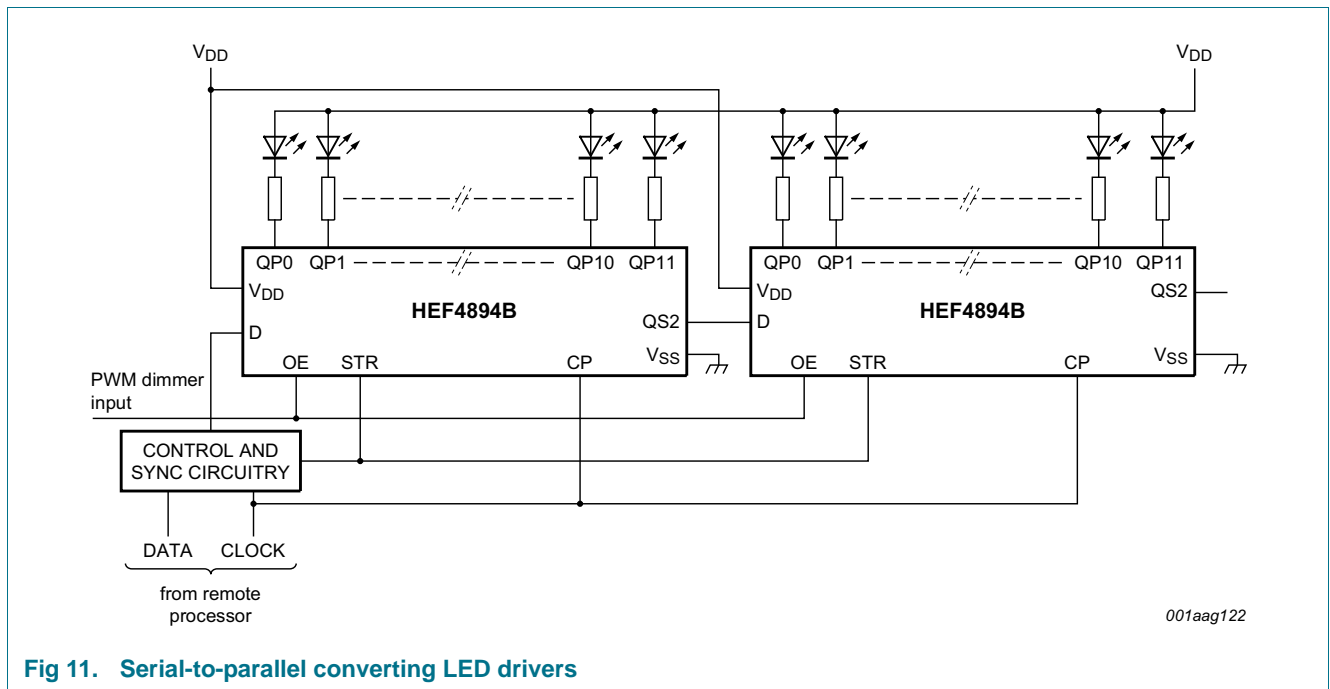


Fig 11. Serial-to-parallel converting LED drivers

13. Package outline

SO20: plastic small outline package; 20 leads; body width 7.5 mm

SOT163-1

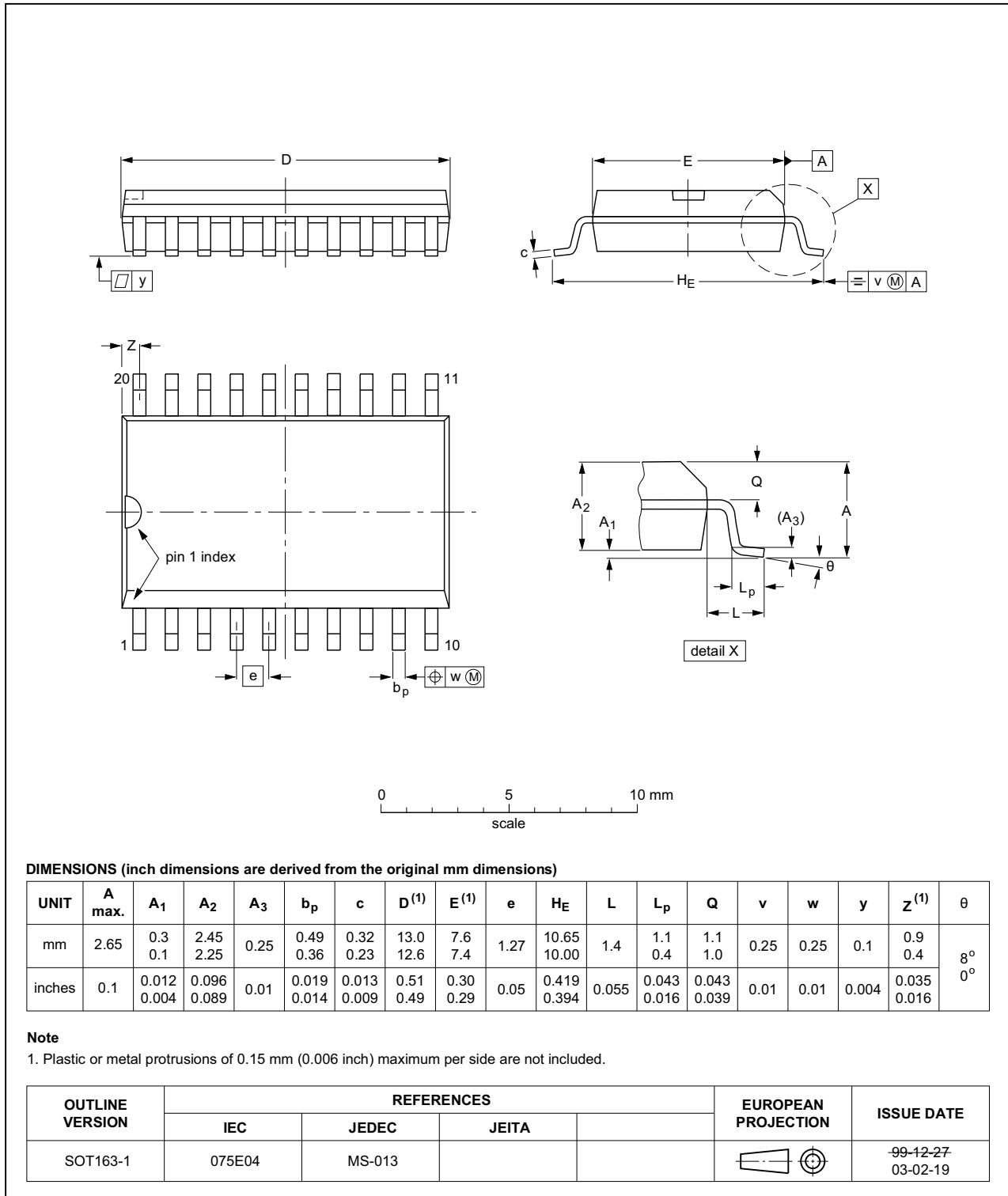


Fig 12. Package outline SOT163-1 (SO20)

TSSOP20: plastic thin shrink small outline package; 20 leads; body width 4.4 mm

SOT360-1

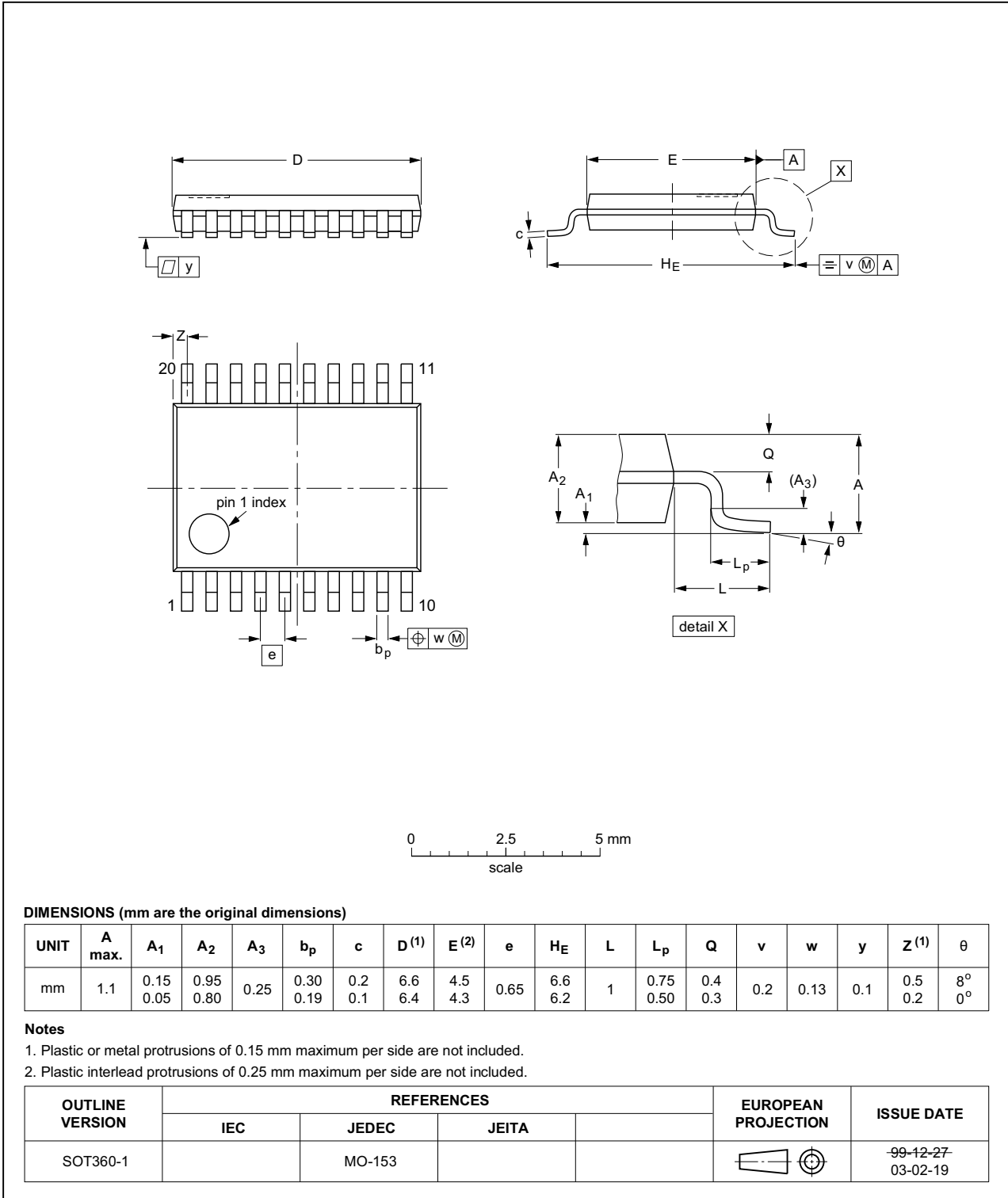


Fig 13. Package outline SOT360-1 (TSSOP20)

## 14. Abbreviations

Table 11. Abbreviations

| Acronym | Description          |
|---------|----------------------|
| DUT     | Device Under Test    |
| LED     | Light Emitting Diode |

## 15. Revision history

Table 12. Revision history

| Document ID      | Release date  | Data sheet status     | Change notice | Supersedes       |
|------------------|---|-----------------------|---------------|------------------|
| HEF4894B v.9     | 20160418  | Product data sheet    | -             | HEF4894B v.8     |
| Modifications:   | <ul style="list-style-type: none"> <li>Type number HEF4894BP (SOT146-1) removed.</li> </ul>   |                       |               |                  |
| HEF4894B v.8     | 20111122  | Product data sheet    | -             | HEF4894B v.7     |
| Modifications:   | <ul style="list-style-type: none"> <li>Section Applications removed</li> <li><a href="#">Table 6</a>: I<sub>OH</sub> minimum values changed to maximum</li> </ul> |                       |               |                  |
| HEF4894B v.7     | 20100813  | Product data sheet    | -             | HEF4894B v.6     |
| HEF4894B v.6     | 20100408  | Product data sheet    | -             | HEF4894B v.5     |
| HEF4894B v.5     | 20091222  | Product data sheet    | -             | HEF4894B v.4     |
| HEF4894B v.4     | 20080827  | Product data sheet    | -             | HEF4894B_CNV v.3 |
| HEF4894B_CNV v.3 | 19950101  | Product specification | -             | HEF4894B_CNV v.2 |
| HEF4894B_CNV v.2 | 19950101  | Product specification | -             | -                |

## 16. Legal information

### 16.1 Data sheet status

| Document status <sup>[1][2]</sup> | Product status <sup>[3]</sup> | Definition  |
|-----------------------------------|-------------------------------|---|
| Objective [short] data sheet      | Development                   | This document contains data from the objective specification for product development. |
| Preliminary [short] data sheet    | Qualification                 | This document contains data from the preliminary specification.                       |
| Product [short] data sheet        | Production                    | This document contains the product specification.                                     |

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nexperia.com>.

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For sales office addresses, please send an email to: [salesaddresses@nexperia.com](mailto:salesaddresses@nexperia.com)

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