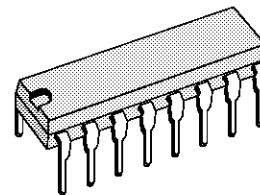


**SYNCHRO AND HORIZONTAL DEFLECTION  
CONTROL FOR COLOR TV SET**

- LINE OSCILLATOR (two levels switching)
- PHASE COMPARISON BETWEEN SYNCHRO-PULSE AND OSCILLATOR VOLTAGE Ø 1, ENABLED BY AN INTERNAL PULSE, (better parasitic immunity)
- PHASE COMPARISON BETWEEN THE FLYBACK PULSES AND THE OSCILLATOR VOLTAGE Ø 2
- COINCIDENCE DETECTOR PROVIDING A LARGE HOLD-IN-RANGE
- FILTER CHARACTERISTICS AND GATE SWITCHING FOR VIDEO RECORDER APPLICATION
- NOISE GATED SYNCHRO SEPARATOR
- FRAME PULSE SEPARATOR
- BLANKING AND SAND CASTLE OUTPUT PULSES
- HORIZONTAL POWER STAGE PHASE LAGGING CIRCUIT
- SWITCHING OF CONTROL OUTPUT PULSE WIDTH
- SEPARATED SUPPLY VOLTAGE OUTPUT STAGE ALLOWING DIRECT DRIVE OF SCR'S CIRCUIT
- SECURITY CIRCUIT MAKES THE OUTPUT PULSE SUPPRESSED WHEN LOW SUPPLY VOLTAGE

**DESCRIPTION**

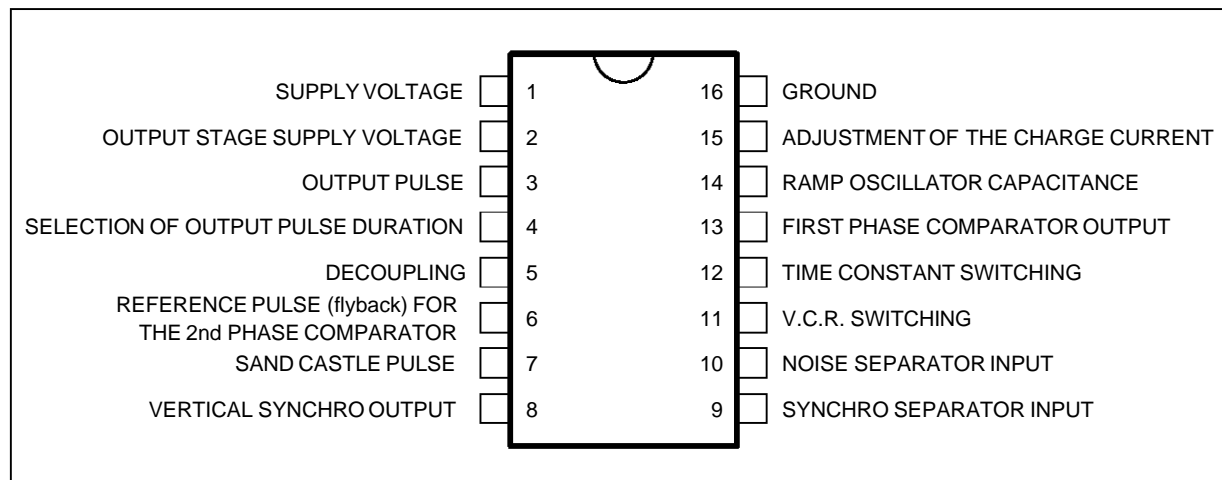
The TDA2593 is a circuit intended for the horizontal deflection of color TV sets, supplied with transistors or SCR'S.



**DIP16**  
(Plastic Package)

**ORDER CODE : TDA2593**

**PIN CONNECTIONS**



2593-01.EPS

# TDA2593

## MAIN CHARACTERISTICS

| Symbol  | Parameter      | Typ. | Unit |
|---------|----------------|------|------|
| V(1-16) | Supply Voltage | 12   | V    |
| I(1)    | Supply Current | 30   | mA   |

### INPUT SIGNALS

|               |   |  |   |
|---------------|---|--|---|
| V(9-16) (pp)  | Synchro Separator Input Voltage   | 3 to 4                                   | V |
| V(10-16) (pp) | Noise Separators Input Voltage  | 3 to 4                                   | V |
| V(4-16)       | Control Voltage of the Output Pulse Switching Circuit<br>t = 7 μs (thyristor)<br>t = 14 μs + t <sub>d</sub> (transistor)<br>t = 0 (V(3-16) = 0) | 9.4 to V(1-16)<br>0 to 3.5<br>5.4 to 5.6 | V |
| V(4-16)       |   |  | V |
| V(4-16)       |   |  | V |

### OUTPUT SIGNALS

|              |                                       |      |   |
|--------------|---------------------------------------|------|---|
| V(8-16) (pp) | Frame Synchro Pulse                   | 11   | V |
| V(7-16) (pp) | Sandcastle Pulse                      | 11   | V |
| V(3-16) (pp) | Horizontal Driver Stage Control Pulse | 10.5 | V |

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## ABSOLUTE MAXIMUM RATINGS (Maximum Ratings according to CEI 134 Datasheet)

| Symbol                             | Parameter                                 | Value     | Unit |
|------------------------------------|---|-----------|------|
| V(1-16)                            | Supply Voltage to Pin 1                   | 13.2      | V    |
| V(2-16)                            | Supply Voltage to Pin 2                   | 18        | V    |
| V(4-16)                            | Voltage to Pin 4                          | 13.2      | V    |
| V(9-16)                            | Voltage to Pin 9                          | ±6        | V    |
| V(10-16)                           | Voltage to Pin 10                         | ±6        | V    |
| V(11-16)                           | Voltage to Pin 11                         | 13.2      | V    |
| I <sub>2M</sub> = -I <sub>3M</sub> | Current at Pins 2 and 3 (with thyristor)  | 650       | mA   |
| I <sub>2M</sub> = I <sub>3M</sub>  | Current at Pins 2 and 3 (with transistor) | 400       | mA   |
| I(4)                               | Current to Pin 4                          | 1         | mA   |
| I(6)                               | Current to Pin 6                          | ±10       | mA   |
| I(7)                               | Current to Pin 7                          | -10       | mA   |
| I(11)                              | Current to Pin 11                         | 2         | mA   |
| P <sub>tot</sub>                   | Power Dissipation                         | 800       | mW   |
| T <sub>oper</sub>                  | Operating Ambient Temperature             | -20, +70  | °C   |
| T <sub>stg</sub>                   | Storage Temperature                       | -25, +125 | °C   |

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## ELECTRICAL OPERATING CHARACTERISTICS

(T<sub>amb</sub> = 25°C, V<sub>1</sub>-V<sub>16</sub> = 12V, unless otherwise specified)

| Symbol             | Parameter   | Min. | Typ.     | Max. | Unit            |
|--------------------|---|------|----------|------|-----------------|
| V <sub>9-16</sub>  | Input Signals<br>Synchro Separator (Pin 9)<br>Input Threshold Voltage |      | 0.8      |      | V               |
| I <sub>9</sub>     | Input Threshold Current   |      |          | 5    | μA              |
| I <sub>9</sub>     | On-state Input Current  |      | 5 to 100 |      | μA              |
| I <sub>9</sub>     | Disconnect Input Current  | 100  | 150      |      | μA              |
| I <sub>9</sub>     | Off-state Input Current (V <sub>9-16</sub> = -5V)                     |      |          | -1   | μA              |
| V <sub>9</sub>     | Video Input Signal (positive synchro pulses) (note 1)                 |      | 3 to 4   |      | V <sub>PP</sub> |
| V <sub>10-16</sub> | Noise Separator (Pin 10)<br>Input Threshold Voltage                   |      | 1.4      |      | V               |

2593-03.TBL

Note : 1. Allowed range 1 to 7V

**ELECTRICAL OPERATING CHARACTERISTICS**(T<sub>amb</sub> = 25°C, V<sub>1</sub>-V<sub>16</sub> = 12V, unless otherwise specified)

| Symbol             | Parameter   | Min.       | Typ.   | Max.     | Unit            |
|--------------------|---|------------|--|----------|-----------------|
| I <sub>10</sub>    | Input Threshold Current   | 100        | 150  |          | μA              |
| I <sub>10</sub>    | Input Current   |            | 5 to 100   |          | μA              |
| I <sub>10</sub>    | Off-state Input Current (V <sub>10-16</sub> = -5V)  |            |  | -1       | μA              |
| V <sub>10</sub>    | Video Input Signal (positive synchro pulses) (note 1)   |            | 3 to 4   |          | V <sub>PP</sub> |
| V <sub>10</sub>    | Allowed superimposed parasitic signal   |            |  | 7        | V               |
| V <sub>6-16</sub>  | Fly-back Pulse (Pin 6)<br>Input Threshold Voltage   |            | 1.4  |          | V               |
| V <sub>6</sub>     | Input Limitation Level  |            | -0.7 and +1.4                                      |          | V               |
| I <sub>6</sub>     | Input Current   | 0.01       | 1  | 2        | mA              |
| V <sub>4-16</sub>  | Output Pulse Width Control Switch (Pin 4)<br>Input Voltage<br>t = 7 μs (thyristor)<br>t = 14 μs + t <sub>d</sub> (transistor)<br>t = 0 (V <sub>3-16</sub> = 0) (note 2) |            | 9.4 to V <sub>1-16</sub><br>0 to 3.5<br>5.4 to 6.6 |          | V<br>V<br>V     |
| I(4)               | Input Current<br>t = 7 μs (thyristor)<br>t = 14 μs + t <sub>j</sub> (transistor)<br>t = 0 (V <sub>3-16</sub> = 0)   | 200<br>200 | 0  |          | μA<br>μA<br>μA  |
| V <sub>11-16</sub> | Video Recorder Switch (Pin 11)<br>Input Voltage<br>(Pin 11 low level)<br>(Pin 11 to +V <sub>CC</sub> )  |            | 0 to 2.5<br>9 to V <sub>1-16</sub>                 |          | V<br>V          |
| I <sub>11</sub>    | Input Current<br>(Pin 11 low level)<br>(Pin 11 to +V <sub>CC</sub> )  |            |  | 200<br>2 | μA<br>mA        |
| V <sub>8-16</sub>  | Output Signals<br>Frame Synchro Pulses (positive) (Pin 8)<br>Output Voltage (peak value)  | 10         | 11   |          | V               |
| R <sub>8</sub>     | Output Impedance  |            | 2  |          | kΩ              |
| t <sub>on</sub>    | Delay Between Leading Edge of Input Signal and Leading Edge of Output Signal  |            | 15   |          | μs              |
| t <sub>off</sub>   | Delay Between Trailing Edge of Input Signal and Trailing Edge of Output Signal  |            | 15   |          | μs              |

**SANDCASTLE PULSE (POSITIVE) (PIN 7)**

|                   |  |      |    |      |    |
|-------------------|--|------|----|------|----|
| V <sub>7-16</sub> | Output Voltage (peak value)  | 10   | 11 |      | V  |
| R <sub>7</sub>    | Output Impedance   |      | 70 |      | Ω  |
| I <sub>7</sub>    | Output Current During Trailing Edge  |      | 2  |      | mA |
| t <sub>7</sub>    | Sandcastle Pulse Width (V <sub>7</sub> = 7 V)  | 3.7  |    | 4.3  | μs |
| Δt                | Phase Between Middle Input Synchro Pulse and Leading Edge of Sandcastle Pulse (V <sub>7</sub> = 7 V) | 2.15 |    | 3.15 | μs |

**FLY-BACK BLANKING PULSE (PIN 7)**

|                   |                                     |   |    |   |    |
|-------------------|-------------------------------------|---|----|---|----|
| V <sub>7-16</sub> | Output Voltage (peak value)         | 4 |    | 5 | V  |
| R <sub>7</sub>    | Output Impedance                    |   | 70 |   | Ω  |
| I <sub>7</sub>    | Output Current During Trailing Edge |   | 2  |   | mA |

**CONTROL PULSE FOR HORIZONTAL DRIVER (POSITIVE) (PIN 3)**

|                                  |   |     |                     |     |          |
|----------------------------------|---|-----|---------------------|-----|----------|
| V <sub>3-16</sub>                | Output Voltage (peak value)   |     | 10.5                |     | V        |
| R <sub>3</sub>                   | Output Impedance (leading edge)<br>(trailing edge)  |     | 2.5<br>20           |     | Ω<br>Ω   |
| t <sub>3</sub><br>t <sub>3</sub> | Control Pulse Width<br>V <sub>4</sub> = 9.4 to V <sub>1-16</sub><br>V <sub>4</sub> = 0 to 4V (note 3) | 5.5 | 14 + t <sub>c</sub> | 8.5 | μs<br>μs |
| V <sub>1-16</sub>                | Control pulse is disabled for   |     | 4                   |     | V        |

- Notes :**
1. Allowed range 1 to 7V
  2. Or Pin 4 not connected.
  3. With t<sub>r</sub> = 12μs

2593-04.TBL

## TDA2593

### ELECTRICAL OPERATING CHARACTERISTICS (continued)

( $T_{amb} = 25^{\circ}\text{C}$ ,  $V_1-V_{16} = 12\text{V}$ , unless otherwise specified)

| Symbol | Parameter | Min. | Typ. | Max. | Unit |
|--------|-----------|------|------|------|------|
|--------|-----------|------|------|------|------|

#### OVERALL PHASE RELATIONSHIP

|                     |   |     |    |     |                           |
|---------------------|---|-----|----|-----|---------------------------|
| $t_z$               | Phase Between Middle Synchro Pulse and Middle Fly-back Pulse ( $t_r = 12 \mu\text{s}$ , note 4) | 1.9 |    | 3.3 | $\mu\text{s}$             |
| $\Delta I/\Delta t$ | Sensitivity to Current Adjust   |     | 30 |     | $\mu\text{A}/\mu\text{s}$ |

#### OSCILLATOR (PINS 14 AND 15)

|  |  |  |            |               |                        |
|--|--|--|------------|---------------|------------------------|
| $V_{14-16}$                                  | Threshold Voltage (low level)<br>(high level)  |  | 4.4<br>7.6 |               | V<br>V                 |
| $I_{14}$                                     | Current Generator  |  | $\pm 0.47$ |               | mA                     |
| $f$  | Free Running Frequency ( $C_{osc} = 4700\text{pF}$ , $R_{osc} = 12\text{k}\Omega$ )        |  | 15625      |               | Hz                     |
| $\Delta f$                                   | Tolerance on Frequency (note 5)  |  |            | $\pm 5$       | %                      |
| $\Delta f/15$                                | Frequency Control Sensitivity  |  | 31         |               | Hz/ $\mu\text{A}$      |
| $\Delta f$                                   | Spread of Frequency  |  | $\pm 10$   |               | %                      |
| $\frac{\Delta f/f}{\Delta V/V \text{ nom.}}$ | Influence of Supply Voltage on Frequency (note 5)  |  |            | $\pm 0.05$    | %                      |
| $\Delta f$                                   | Frequency change when decreasing the supply down to 5 V ( $V_{1-16} = 5\text{V}$ , note 5) |  |            | $\pm 10$      | %                      |
| T  | Frequency Temperature Coefficient (note 5)   |  |            | $\pm 10^{-4}$ | Hz/ $^{\circ}\text{C}$ |

#### PHASE COMPARATOR $\phi 1$ (PIN 13)

|              |   |  |                        |    |                    |
|--------------|---|--|------------------------|----|--------------------|
| $V_{13-16}$  | Control Voltage Range   |  | 3.8 to 8.2             |    | V                  |
| $I_{13}$     | Control Current (peak value)  |  | $\pm 1.9$ to $\pm 2.3$ |    | mA                 |
| $I_{13}$     | Off-state Current ( $V_{13-16} = 4$ to $8\text{V}$ )  |  |                        | -1 | $\mu\text{A}$      |
| $R_{13}$     | Output Impedance ( $V_{13-16} = 4$ to $8\text{V}$ , note 6)<br>( $V_{13-16} < 3.8\text{V}$ or $> 8.2\text{V}$ , note 7) |  | High<br>Low            |    |                    |
|              | Control Sensibility   |  | 2                      |    | kHz/ $\mu\text{s}$ |
| $\Delta f$   | Catching and Holding Range  |  | $\pm 780$              |    | Hz                 |
| $\Delta f/f$ | Catching and Holding Range Tolerance (note 5)   |  | $\pm 10$               |    | %                  |

#### PHASE COMPARATOR $\phi 2$ AND PHASE-SHIFT (PIN 5)

|                       |   |  |            |     |               |
|-----------------------|---|--|------------|-----|---------------|
| $V_{5-16}$            | Control Voltage Range   |  | 5.4 to 7.6 |     | V             |
| $I_5$                 | Control Current (peak value)  |  | $\pm 1$    |     | mA            |
| $I_5$                 | Off-state Output Current ( $V_{5-16} = 5.4$ to $7.6\text{V}$ )  |  |            | -5  | $\mu\text{A}$ |
| $R_5$                 | Output Impedance ( $V_{5-16} = 5.4$ to $7.6\text{V}$ , note 6)<br>( $V_{5-16} < 5.4\text{V}$ or $> 7.6\text{V}$ ) |  | High<br>8  |     | k $\Omega$    |
| $t_d$                 | Max. delay Between Output Pulse Leading Edge and Fly-back Pulse Trailing Edge ( $t_r = 12 \mu\text{s}$ )          |  |            | 15  | $\mu\text{s}$ |
| $\Delta t/\Delta t_d$ | Static Control Error  |  |            | 0.2 | %             |

#### COINCIDENCE DETECTOR (PIN 11)

|             |  |  |             |  |          |
|-------------|--|--|-------------|--|----------|
| $V_{11-16}$ | Output Voltage   |  | 0.5 to 6    |  | V        |
| $I_{11}$    | Output Current (without coincidence)<br>(with coincidence) |  | 0.1<br>-0.5 |  | mA<br>mA |

#### TIME CONSTANT SWITCH (PIN 12)

|             |   |  |           |  |                        |
|-------------|---|--|-----------|--|------------------------|
| $V_{12-16}$ | Output Voltage  |  | 6         |  | V                      |
| $I_{12}$    | Output Current  |  | $\pm 1$   |  | mA                     |
| $R_{12}$    | Output Impedance ( $V_{11-16} = 2.5$ to $7\text{V}$ )<br>( $V_{11-16} < 1.5$ or $> 9\text{V}$ ) |  | 100<br>60 |  | $\Omega$<br>k $\Omega$ |

#### PULSE GENERATOR (INTERNAL)

|   |             |  |     |  |               |
|---|-------------|--|-----|--|---------------|
| t | Pulse Width |  | 7.5 |  | $\mu\text{s}$ |
|---|-------------|--|-----|--|---------------|

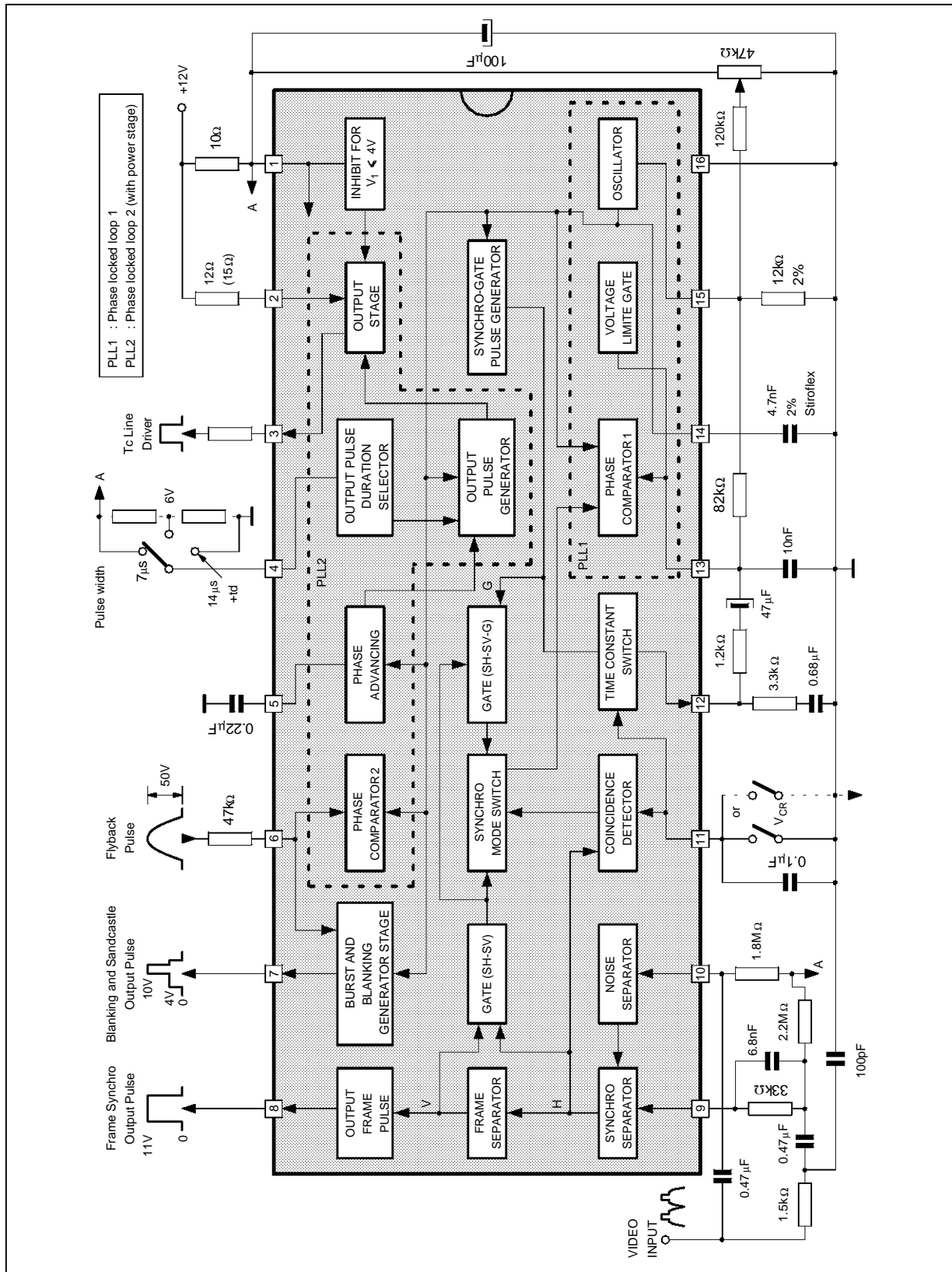
**Notes :** 4. The adjustment of overall phase relation (and output pulse leading edge position) is automatically performed by phase comparator  $\phi 2$ . If additional adjustment is needed, a current have to be imposed at pin 5.

5. Tolerance of peripheral components not included.

6. Current generator.

7. Emitter-follower

BLOCK DIAGRAM AND TYPICAL APPLICATION

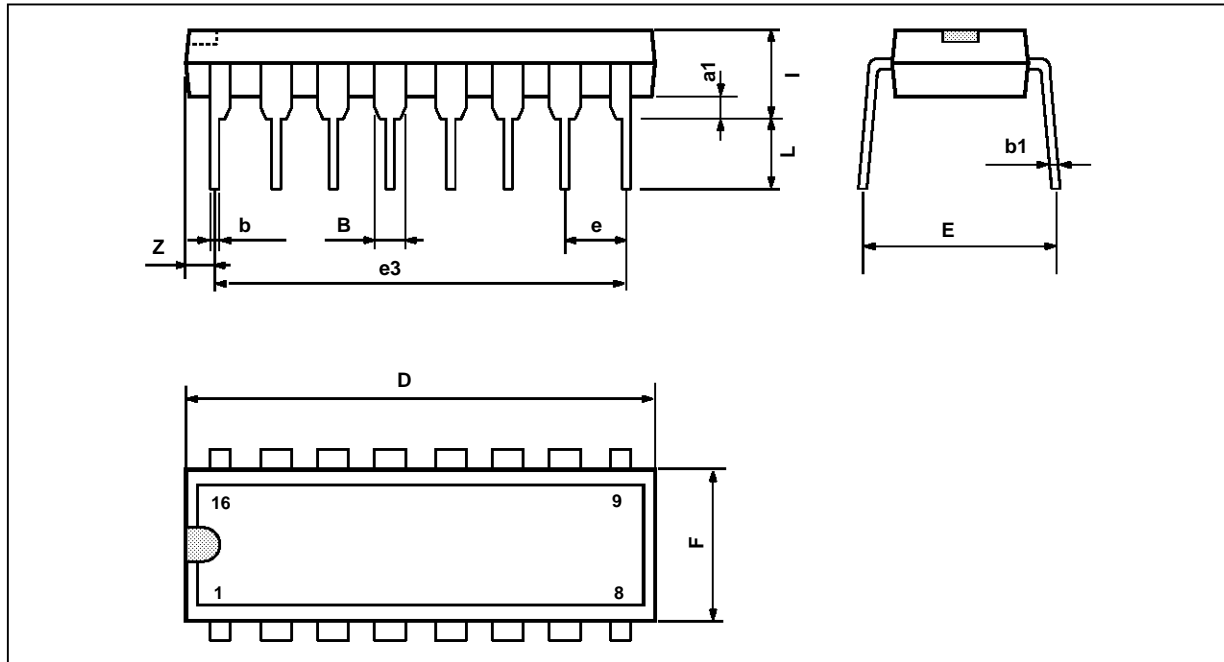


2593-02.EPS

# TDA2593

## PACKAGE MECHANICAL DATA

16 PINS - PLASTIC DIP



PMDIP16.EPS

| Dimensions | Millimeters |       |      | Inches |       |       |
|------------|-------------|-------|------|--------|-------|-------|
|            | Min.        | Typ.  | Max. | Min.   | Typ.  | Max.  |
| a1         | 0.51        |       |      | 0.020  |       |       |
| B          | 0.77        |       | 1.65 | 0.030  |       | 0.065 |
| b          |             | 0.5   |      |        | 0.020 |       |
| b1         |             | 0.25  |      |        | 0.010 |       |
| D          |             |       | 20   |        |       | 0.787 |
| E          |             | 8.5   |      |        | 0.335 |       |
| e          |             | 2.54  |      |        | 0.100 |       |
| e3         |             | 17.78 |      |        | 0.700 |       |
| F          |             |       | 7.1  |        |       | 0.280 |
| i          |             |       | 5.1  |        |       | 0.201 |
| L          |             | 3.3   |      |        | 0.130 |       |
| Z          |             |       | 1.27 |        |       | 0.050 |

DIP16.TBL

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