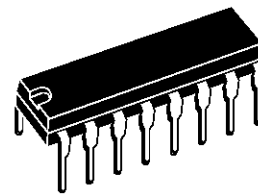


HORIZONTAL AND VERTICAL DEFLECTION MONITOR

- DIRECT LINE DARLINGTON DRIVE
- DIRECT FRAME-YOKE DRIVE ($\pm 1A$)
- COMPOSITE VIDEO SIGNAL INPUT CAPABILITY
- FRAME OUTPUT PROTECTION AGAINST SHORT CIRCUITS
- PLL
- HORIZONTAL OSCILLATOR FREQUENCY RANGE FROM 15kHz TO 100kHz
- VERTICAL OSCILLATOR FREQUENCY RANGE FROM 30Hz TO 120Hz
- VERY FEW EXTERNAL COMPONENT
- VERY LOW COST POWER PACKAGE



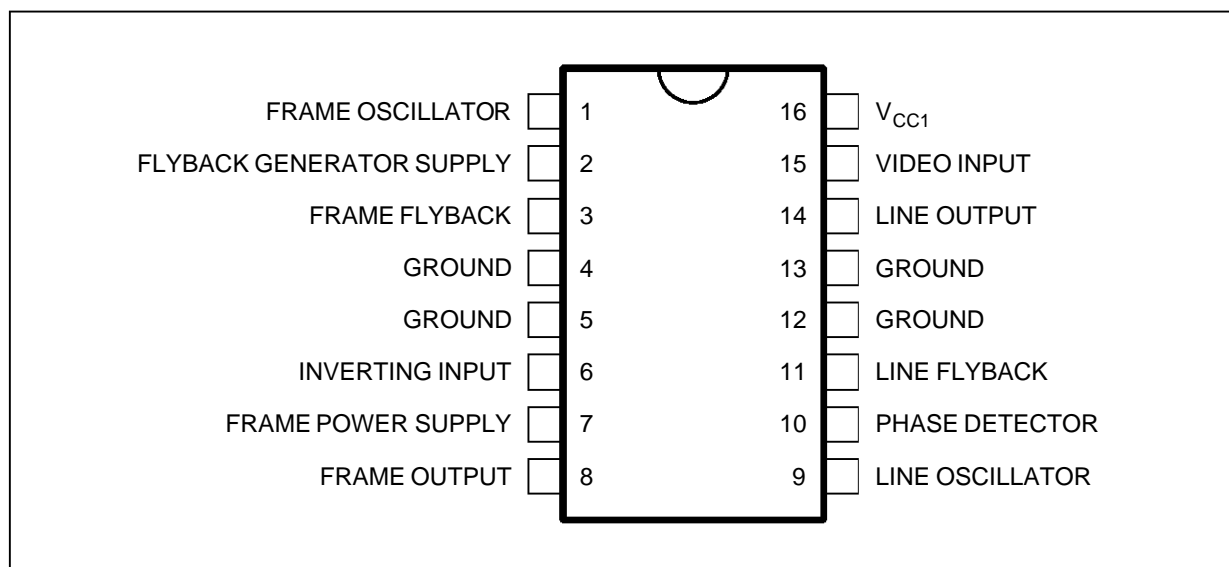
POWERDIP (8+8)
(Plastic Package)

ORDER CODE : TEA2037A

DESCRIPTION

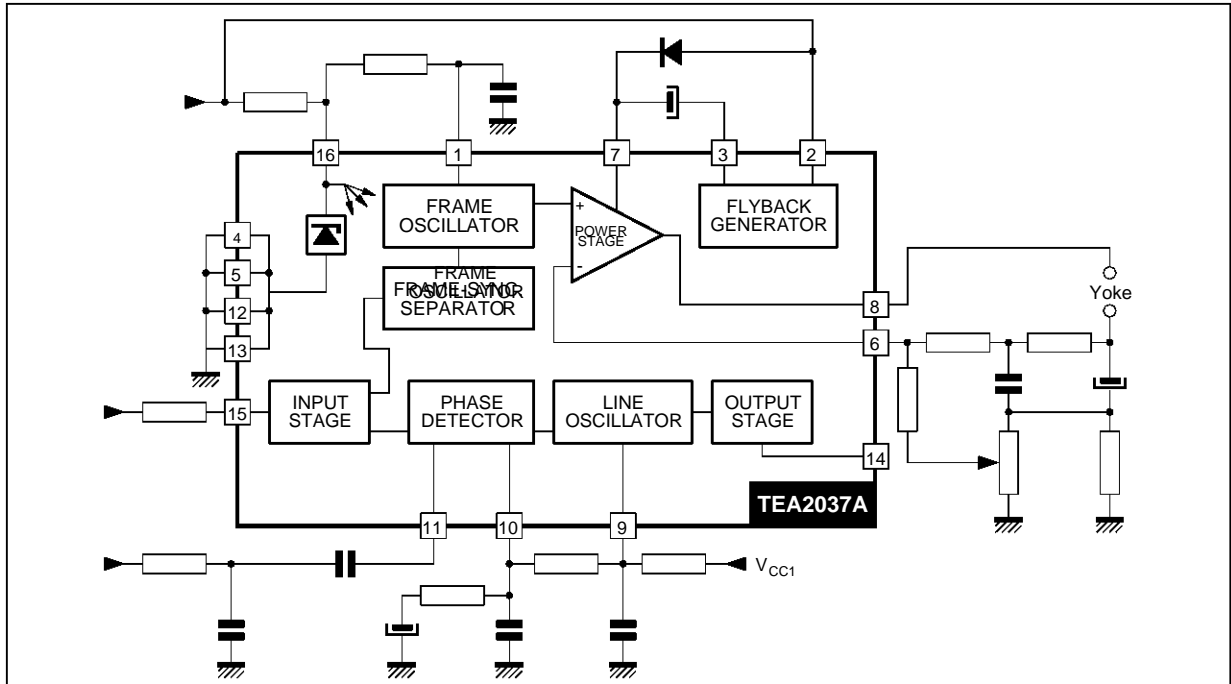
The TEA2037A is an horizontal and vertical deflection circuit. It uses the same concept as TEA2117 but optimised for small screens, for a very low cost solution.

PIN CONNECTIONS



2037A-01.EPS

BLOCK DIAGRAM



2037A-02.EPS

ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|------------------|---------------------------------------|-----------|------|
| V _{CC1} | Supply Voltage | 30 | V |
| V ₂ | Flyback Generator Supply Voltage | 35 | V |
| V ₇ | Frame Power Supply Voltage | 60 | V |
| I _{8nr} | Frame Output Current (non repetitive) | ± 1.5 | A |
| I ₈ | Frame Output Current (continuous) | ± 1 | A |
| V ₁₄ | Line Output Voltage (external) | 60 | V |
| I _{p14} | Line Output Peak Current | 0.8 | A |
| I _{C14} | Line Output Continuous Current | 0.4 | A |
| T _{stg} | Storage Temperature | -40, +150 | °C |
| T _j | Max. Operating Junction Temperature | +150 | °C |

2037A-01.TBL

THERMAL DATA

| Symbol | Parameter | Value | Unit |
|----------------------|--|----------|------|
| R _{th(j-c)} | Junction-case Thermal Resistance | Max. 15 | °C/W |
| R _{th(j-a)} | Junction-ambient Thermal Resistance (soldered on a 35µm thick 45cm ² PC board copper area) | Typ. 45 | °C/W |
| T _j | Recommended Junction Temperature | Max. 120 | °C |

2037A-02.TBL

ELECTRICAL CHARACTERISTICS (T_{amb} = 25°C)

| Symbol | Parameter | Min. | Typ. | Max. | Unit |
|--|---|------|------|------|------|
| SUPPLY (shunt regulator) (Pin 16) | | | | | |
| I _{CC1} | Supply Current | 10 | | 20 | mA |
| V _{CC1} | Supply Voltage (I _{CC1} = 15mA) | 9 | 9.8 | 10.5 | V |
| ΔV _{CC1} | Voltage Variation (I _{CC1} : 10mA to 20mA) | -280 | 50 | +280 | mV |
| LPS | Starting Threshold for Line Output Pulses | | | 5 | V |

2037A-03.TBL

ELECTRICAL CHARACTERISTICS ($T_{amb} = 25^{\circ}\text{C}$) (continued)

| Symbol | Parameter | Min. | Typ. | Max. | Unit |
|---|--|------|-------------------|------|------------------------|
| VIDEO INPUT (Pin 15) | | | | | |
| V ₁₅ | Reference Voltage ($I_{15} = -1\mu\text{A}$) | 1.4 | 1.75 | 2 | V |
| MWF | Minimum Width of Frame Pulse (when synchronized with TTL Signal) | 50 | | | μs |
| V _{IN} | Sync Bottom to Black Level ($R_{\text{SYNC } 15} = 560\text{k}\Omega$) | 0.2 | 0.3 | | V _{PP} |
| LINE OSCILLATOR (Pin 9) | | | | | |
| LT9 | Low Threshold Voltage | 2.8 | 3.2 | 3.6 | V |
| HT9 | High Threshold Voltage | 5.4 | 6.6 | 7.8 | V |
| BI9 | Bias Current | | 100 | | nA |
| DR9 | Discharge Impedance | 1.0 | 1.4 | 1.8 | k Ω |
| FLP1 | Free Running Line Period ($R = 34.9\text{k}\Omega$ Tied to V _{CC1} , $C = 2.2\text{nF}$ Tied to Ground) | 62 | 64 | 66 | μs |
| FLP2 | Free Running Line Period ($R = 13.7\text{k}\Omega$, $C = 2.2\text{nF}$) | | 27 | | μs |
| OT9 | Oscillator Threshold for Line Output Pulse Triggering | | 4.6 | | V |
| $\frac{\Delta F}{\Delta \theta}$ | Horizontal Frequency Drift with Temperature (see application Fig. 8) | | 2 | | Hz/ $^{\circ}\text{C}$ |
| LINE OUTPUT (Pin 14) | | | | | |
| LV14 | Saturation Voltage ($I_{14} = 200\text{mA}$) | | 1.1 | 1.6 | V |
| OPW | Output Pulse Width (line period = 64 μs) | 20 | 22 | 24 | μs |
| LINE FLYBACK INPUT (Pin 11) | | | | | |
| V ₁₁ | Bias Voltage | 1.8 | 2.4 | 3.2 | V |
| Z11 | Input Impedance | 4.5 | 5.8 | 8 | k Ω |
| PHASE DETECTOR | | | | | |
| I ₁₀ | Output Current during Synchro Pulse | 250 | 450 | 800 | μA |
| RI10 | Current Ratio (positive/negative) | 0.95 | 1 | 1.05 | |
| LI10 | Leakage Current | -2 | | +2 | μA |
| CV10 | Control Range Voltage | 2.60 | | 7.10 | V |
| FRAME OSCILLATOR (Pin 1) | | | | | |
| LT1 | Low Threshold Voltage | 1.6 | 2.0 | 2.3 | V |
| HT1 | High Threshold Voltage | 2.6 | 3.1 | 3.6 | V |
| BI1 | Bias Current | | 30 | | nA |
| DR1 | Discharge Impedance | 300 | 470 | 700 | k Ω |
| FFP1 | Free Running Line Period ($R = 845\text{k}\Omega$ Tied to V _{CC1} , $C = 180\text{nF}$ Tied to Ground) | 20.5 | 23 | 25 | ms |
| MFP | Minimum Frame Period ($I_{15} = -100\mu\text{A}$) (with the same RC) | | 12.8 | | ms |
| FFP2 | Free Running Line Period ($R = 408\text{k}\Omega$, $C = 220\text{nF}$) | | 14.3 | | ms |
| FPR | Frame Period Ratio = | 1.7 | 1.8 | 1.9 | |
| FG | Frame Saw-tooth Gain between Pin 1 and non-inverting Input of the Frame Amplifier | | -0.4 | | |
| $\frac{\Delta F}{\Delta \theta}$ | Vertical Frequency Drift with Temperature (see application Fig. 8) | | $4 \cdot 10^{-3}$ | | Hz/ $^{\circ}\text{C}$ |
| FRAME POWER SUPPLY (Pin 7) | | | | | |
| V ₇ | Operating Voltage (with flyback generator) | 10 | | 58 | V |
| I ₇ | Supply Current ($V_7 = 30\text{V}$) | | | 22 | mA |
| FLYBACK GENERATOR SUPPLY (Pin 2) | | | | | |
| V ₂ | Operating Voltage | 10 | | 30 | V |

ELECTRICAL CHARACTERISTICS ($T_{amb} = 25^{\circ}C$) (continued)

| Symbol | Parameter | Min. | Typ. | Max. | Unit |
|----------------------|--|------|--------------|------------|--------|
| FRAME OUTPUT (Pin 8) | | | | | |
| LV8A LV8B | Saturation Voltage to Ground ($V_7 = 30V$) $I_8 = 0.1$ $I_8 = 1A$ | | 0.06 0.37 | 0.6 1 | V V |
| HV8A HV8B | Saturation Voltage to V_7 ($V_7 = 30V$) $I_8 = -0.1$ $I_8 = -1A$ | | 1.3 1.7 | 1.6 2.4 | V V |
| FV8A FV8B | Saturation Voltage to V_7 in Flyback Mode ($V_8 > V_7$) $I_8 = 0.1$ $I_8 = 1A$ | | 1.6 2.5 | 2.1 4.5 | V V |

FLYBACK GENERATOR (Pins 2 and 3)

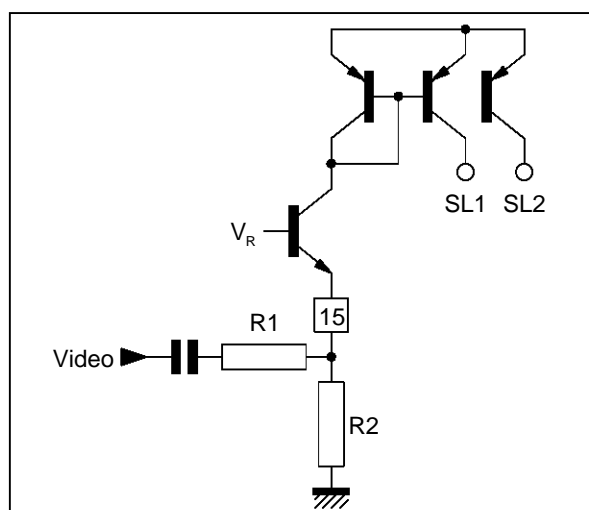
| | | | | | |
|------------------------------|--|--|--------------------------|--------------------------|------------------|
| F2DA F2DB FSVA FSVB | Flyback Transistor on (output = high state) ($V_2 = 30V$) $V_{3/2}$ with $I_{3 \rightarrow 2} = 0.1A$ $I_{3 \rightarrow 2} = 1A$ $V_{2/3}$ with $I_{3 \rightarrow 2} = 0.1$ $I_{3 \rightarrow 2} = 1A$ | | 1.5 3.0 0.8 2.2 | 2.1 4.5 1.1 4.5 | V V V V |
| | Flyback Transistor off (output = $V_7 - 8V$) ($V_7 = V_2 = 30V$) | | | | |
| FCI | Leakage Current Pin 2 | | | 170 | μA |

The TEA2037A performs all the video and power functions required to provide signals for the direct drive of the line darlington and frame yoke.

It contains:

- A shunt regulator
- A synchronization separator
- An integrated frame separator without external components
- A saw-tooth generator for the frame
- A power amplifier for direct drive of frame yoke (short circuit protected)
- An open collector output for the line darlington drive
- A line phase detector and a voltage control oscillator

Figure 1 : Synchronization Separator Circuit

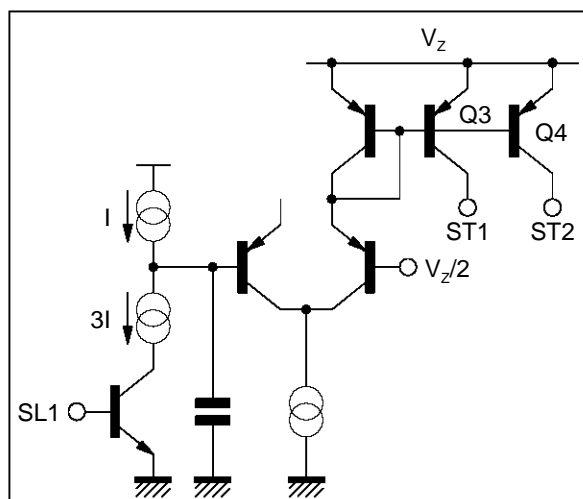


2037A-03.EPS

The slice level of sync-separation is fixed by value of the external resistors R_1 and R_2 . V_R is an internally fixed voltage.

The sync-pulse allows the discharge of the capacitor by a 2×1 current. A line sync-pulse is not able to discharge the capacitor under $V_z/2$. A frame sync pulse permits the complete discharge of the capacitor, so during the frame sync-pulse Q3 and Q4 provide current for the other parts of the circuit.

Figure 2 : Frame Separator

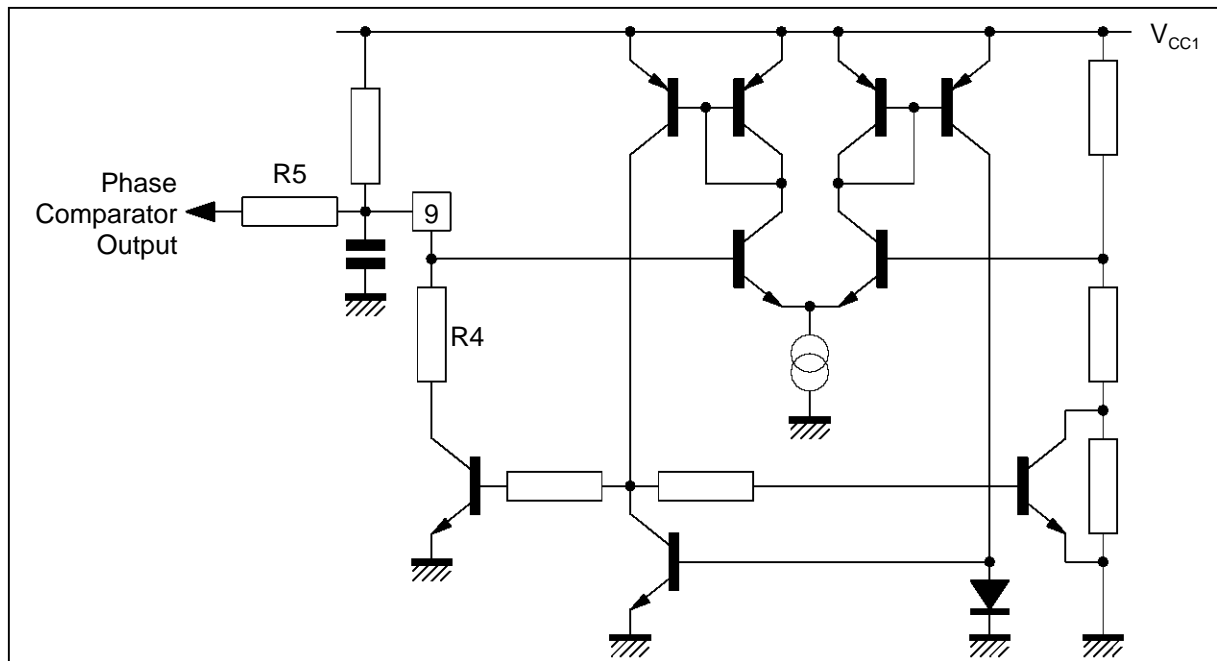


The oscillator thresholds are internally fixed by resistors. The discharge of the capacitor depends on the internal resistor R_4 . The control voltage is applied on resistor R_5 .

2037A-05.TBL

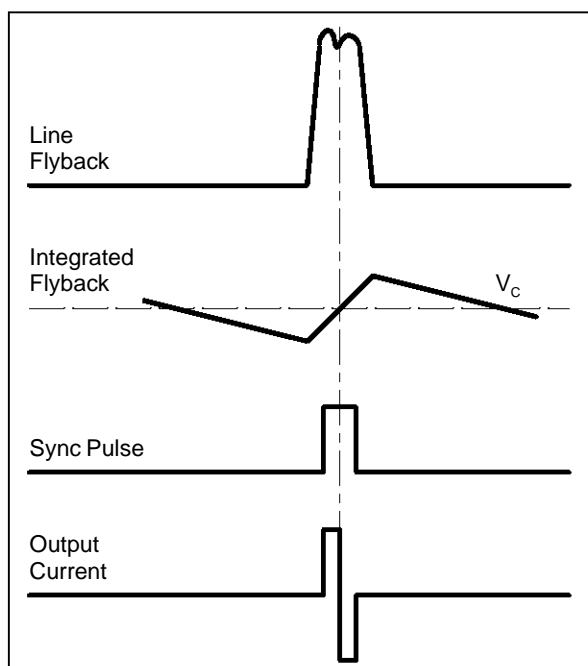
2037A-04.EPS

Figure 3 : Line Oscillator



2037A-05.EPS

Figure 4 : Phase Comparator

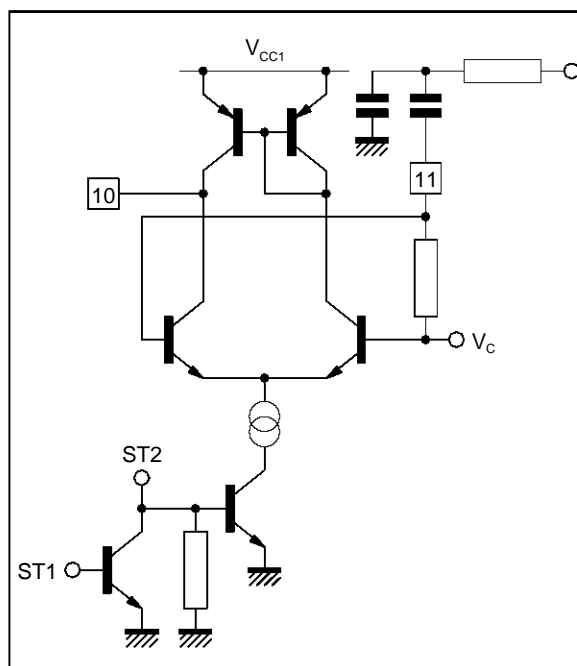


2037A-06.EPS

The sync-pulse drives the current in the comparator. The line flyback integrated by the external network gives on pin 11 a saw tooth, the DC offset of this saw tooth is fixed by V_C . The comparator output provides a positive current for the part of the signal on pin 11 greater than to V_C and a negative

current for the other part. When the line flyback and the video signal are synchronized, the output of the comparator is an alternatively negative and positive current. The frame sync-pulse inhibits the comparator to prevent frequency drift of the line oscillator on the frame beginning.

Figure 5



2037A-07.EPS

Line Output (pin 14)

It is an open collector output which is able to drive pulse current of 800mA for a rapid discharging of the darlington base. The output pulse time is 22µs for a 64µs period.

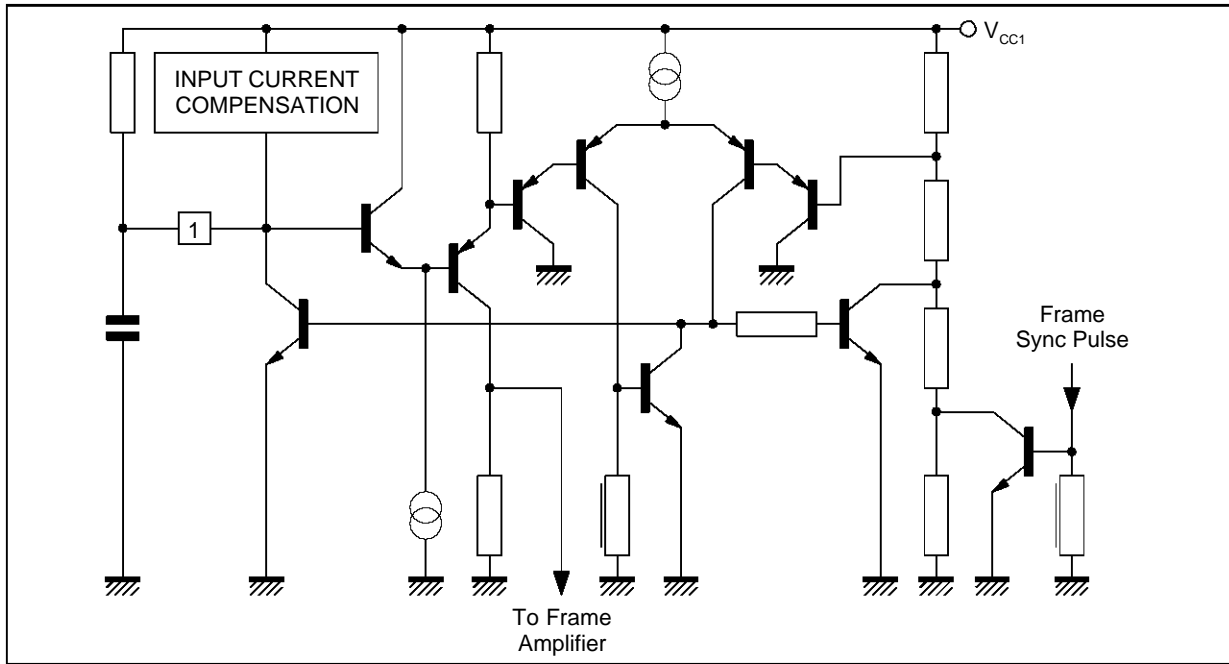
The oscillator thresholds are internally fixed by resistors. The oscillator is synchronized during the

last half free run period. The input current during the charge of the capacitor is less than 100nA.

Frame Output Amplifier

This amplifier is able to drive directly the frame yoke. Its output is short circuit and overload protected ; it contains also a thermal protection.

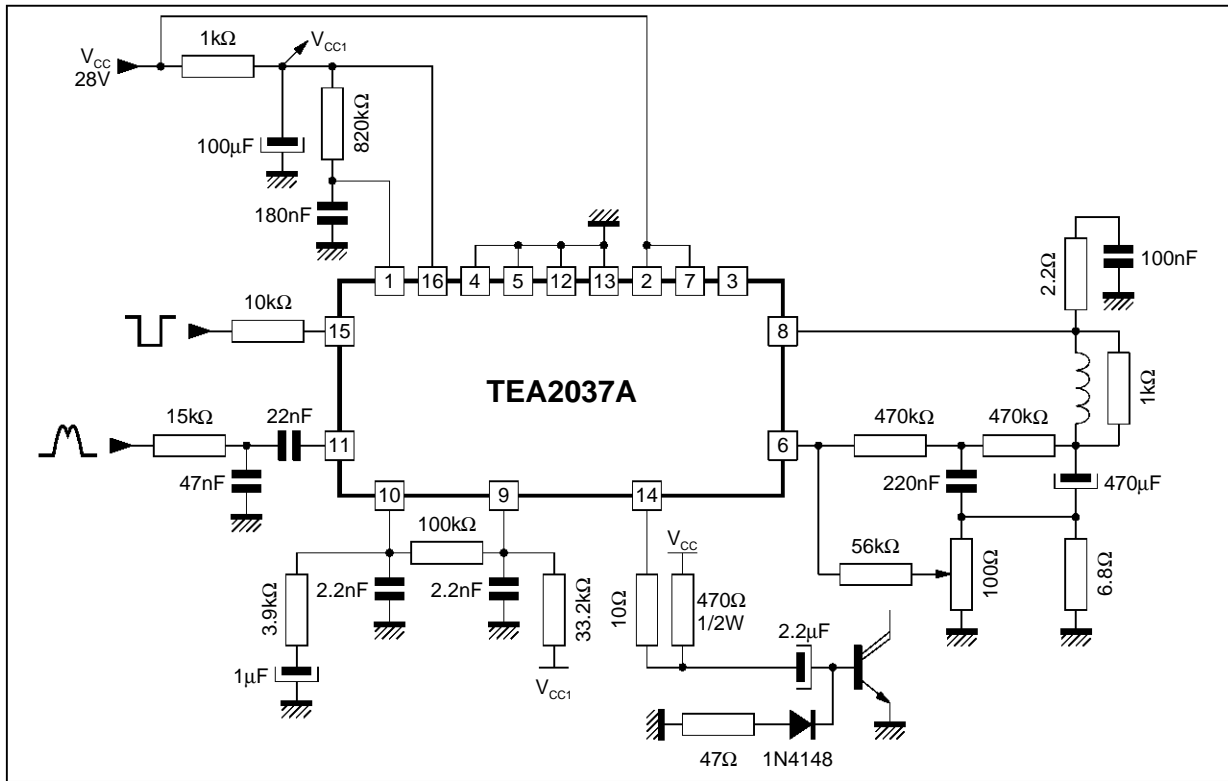
Figure 6 : Frame Oscillator



2037A-08.EPS

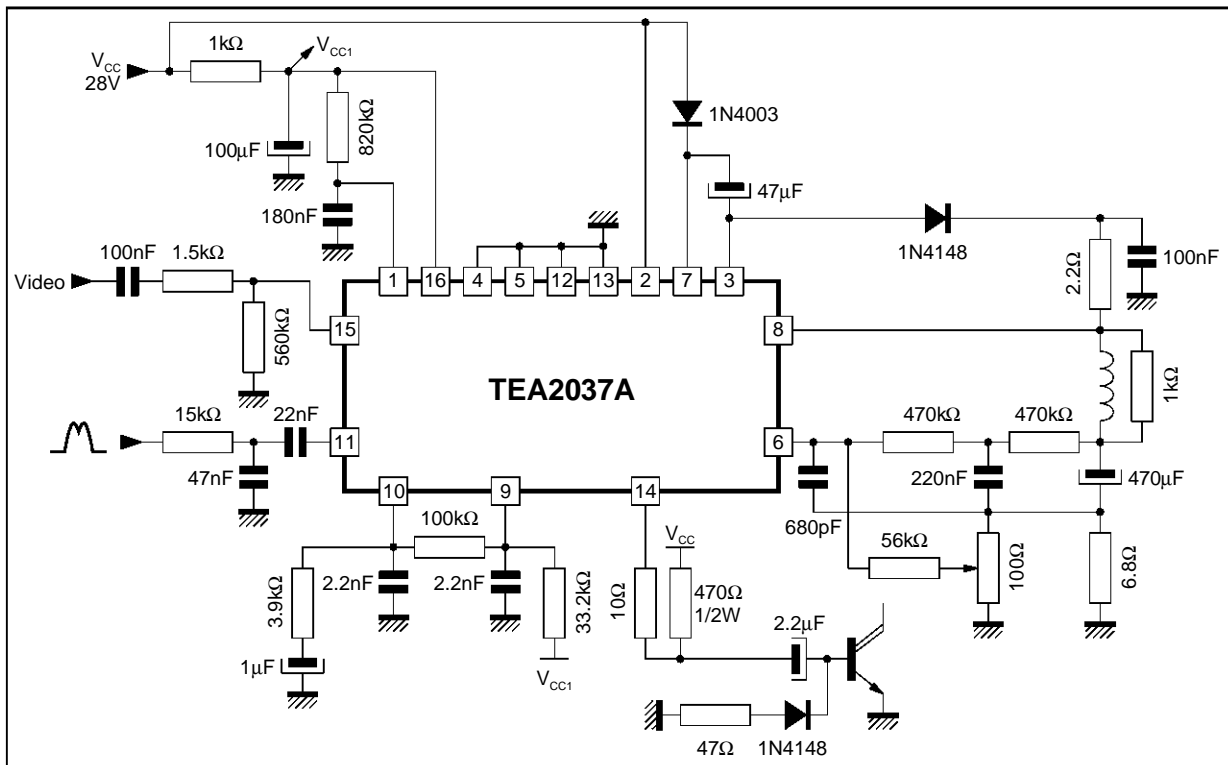
TYPICAL APPLICATION FOR DISPLAY UNITS

Figure 7 : Application without flyback generator and with sync-pulse drive ; yoke : 72mH, 40Ω



2037A-09.EPS

Figure 8 : Application with flyback generator and video ; yoke : 72mH, 40Ω

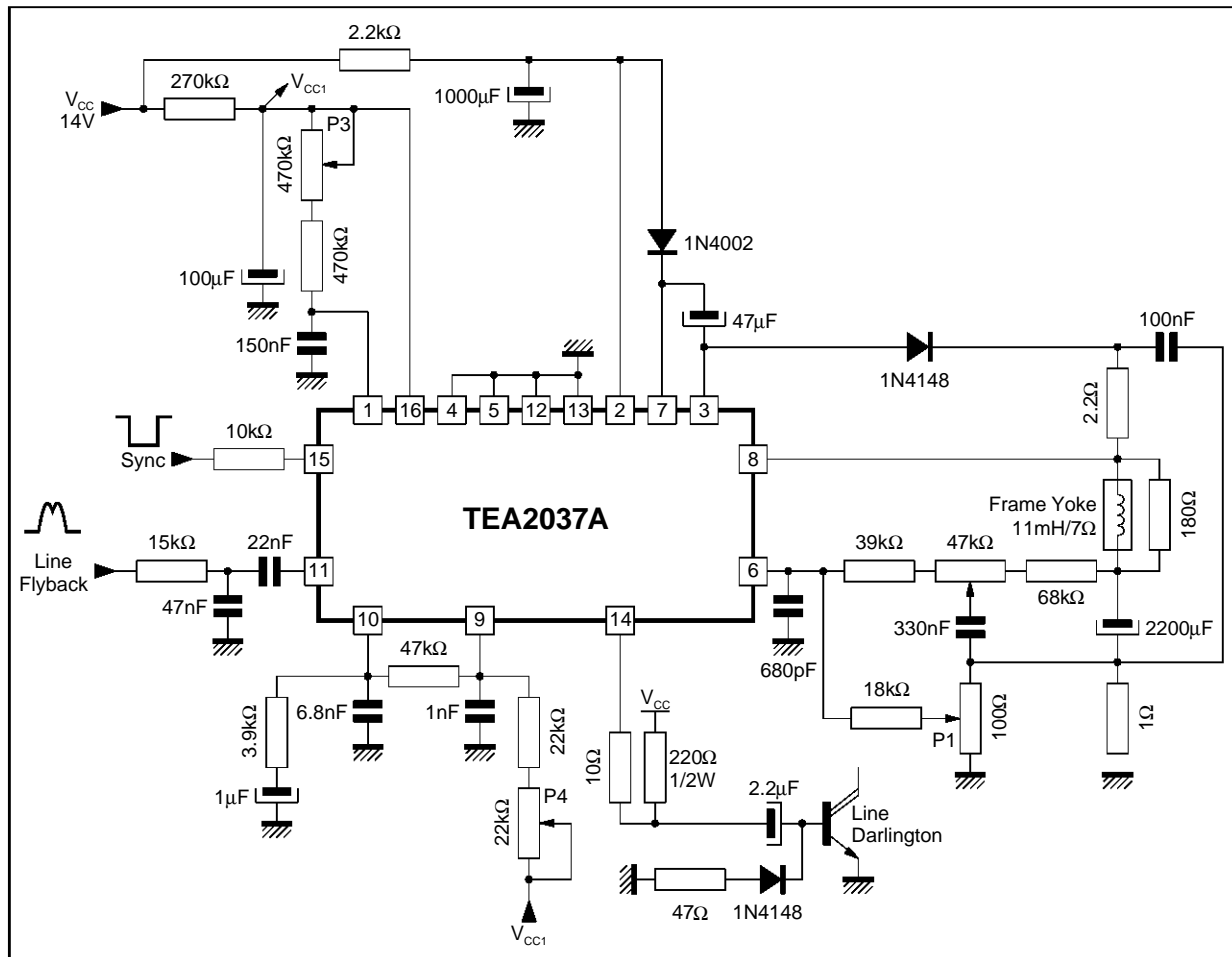


2037A-10.EPS

TEA2037A

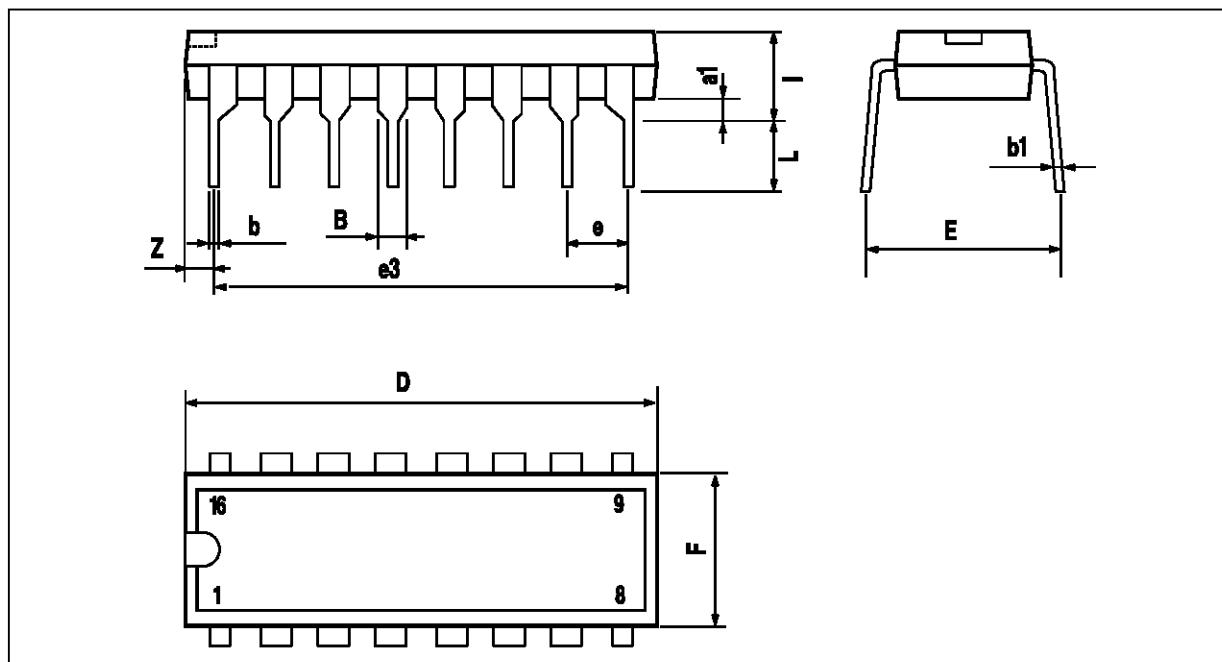
TYPICAL APPLICATION FOR HIGH FREQUENCY MONITOR CHARACTERISTICS

| | |
|---|---|
| <ul style="list-style-type: none"> • Screen : 14" Colour • Frame deflection yoke : 11mH, 7Ω, 750mA peak-to-peak • V_{CC} = + 14V with flyback generator • Frame flyback time : 0.6ms • Vertical frequency : 72Hz • Vertical free-running period : 16ms (adjustable) • Horizontal frequency : 35kHz (adjustable) • Line flyback time : 5.5μs | <ul style="list-style-type: none"> • Capture range : ± 5μs (@ sync pulse = 4.7μs) • Input signal : negative TTL sync (line + frame) • Dissipated power : 1.4W (heatsink required) • Adjustments : <ul style="list-style-type: none"> • Vertical amplitude • Vertical Linearity • Vertical frequency • Horizontal frequency |
|---|---|



2037A-11.EPS

PACKAGE MECHANICAL DATA
16 PINS - PLASTIC POWERDIP



PM-DIP16.EPS

| Dimensions | Millimeters | | | Inches | | |
|------------|-------------|-------|------|--------|-------|-------|
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| a1 | 0.51 | | | 0.020 | | |
| B | 0.85 | | 1.40 | 0.033 | | 0.055 |
| b | | 0.50 | | | 0.020 | |
| b1 | 0.38 | | 0.50 | 0.015 | | 0.020 |
| D | | | 20.0 | | | 0.787 |
| E | | 8.80 | | | 0.346 | |
| e | | 2.54 | | | 0.100 | |
| e3 | | 17.78 | | | 0.700 | |
| F | | | 7.10 | | | 0.280 |
| l | | | 5.10 | | | 0.201 |
| L | | 3.30 | | | 0.130 | |
| Z | | | 1.27 | | | 0.050 |

DIP16PW.TBL

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