

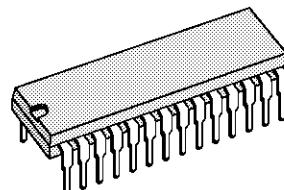
PAL/SECAM COLOR TV DECODER

- FULLY AUTOMATIC MULTISTANDARD SWITCHING : THE CIRCUIT INCLUDES A SCANNING CONTROL SYSTEM USED FOR THE AUTOMATIC STANDARD RECOGNITION
- NO CRYSTALS REQUIRED : ALL THE FREQUENCIES ARE SYNTHESIZED FROM THE EXTERNAL REFERENCE FREQUENCY OF 62.5kHz, AND FROM SPECIFIED DATA STORED IN AN INTERNAL ROM
- AUTOMATIC BELL FILTER ADJUSTMENT
- ONLY ONE DELAY LINE COMPENSATION ADJUSTMENT
- AUTOMATIC INTERNAL PAL OSCILLATOR ADJUSTMENT
- AUTOMATIC ADJUSTMENT FOR FOB AND FOR IN SECAM
- POSITIVE R-Y AND B-Y OUTPUTS

DESCRIPTION

The TEA5640F is a multistandard TV decoder for PAL-SECAM. The circuit automatically selects the standard corresponding to the input signal. It pro-

duces all the reference frequencies required for decoding, which is achieved by a digital frequency synthesizer. Included on the chip are four numerical frequency locked loops that allow the elimination of PAL crystals. The circuit uses an external reference frequency of 62.5kHz generally provided by the frequency synthesis tuner of the TV set.



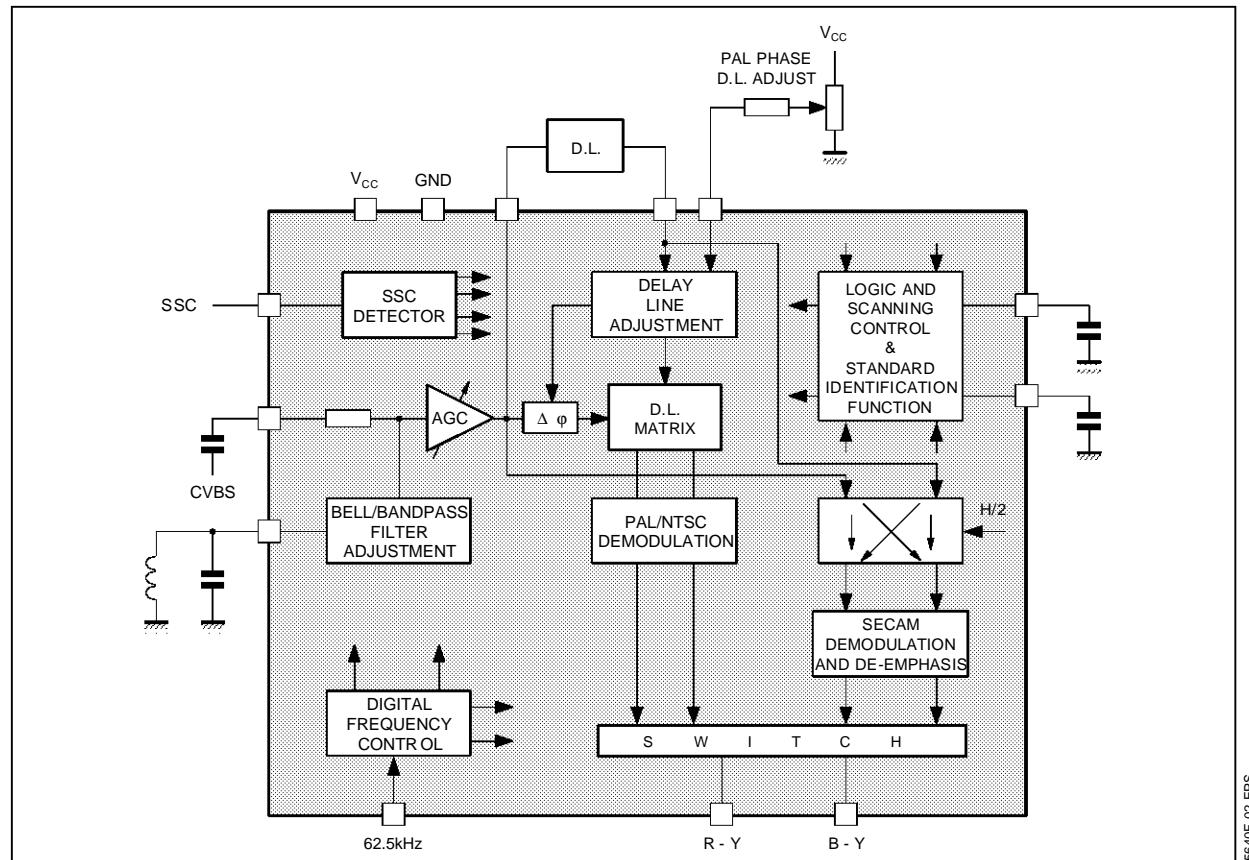
DIP28
 (Plastic Package)

ORDER CODE : TEA5640F

PIN CONNECTIONS

| | | | | | |
|--------------------------|--------------------------|----|----|--------------------------|-----------------------------------|
| AGC FILTER | <input type="checkbox"/> | 1 | 28 | <input type="checkbox"/> | NOT DELAYED SIGNAL OUTPUT |
| DELAYED SIGNAL INPUT | <input type="checkbox"/> | 2 | 27 | <input type="checkbox"/> | NOT DELAYED SIGNAL OUTPUT |
| DELAYED SIGNAL INPUT | <input type="checkbox"/> | 3 | 26 | <input type="checkbox"/> | STANDARD RESEARCH INFORMATION |
| DL GAIN COMPENSATION | <input type="checkbox"/> | 4 | 25 | <input type="checkbox"/> | CHROMINANCE INPUT |
| DL PHASE COMPENSATION | <input type="checkbox"/> | 5 | 24 | <input type="checkbox"/> | DC DECOUPLING |
| GROUND | <input type="checkbox"/> | 6 | 23 | <input type="checkbox"/> | BAND FILTER |
| SUPER SANDCASTLE INPUT | <input type="checkbox"/> | 7 | 22 | <input type="checkbox"/> | GROUND |
| GROUND | <input type="checkbox"/> | 8 | 21 | <input type="checkbox"/> | PAL VCO FILTER |
| REGULATED VOLTAGE | <input type="checkbox"/> | 9 | 20 | <input type="checkbox"/> | CURRENT SUPPLY |
| REGULATED CONTROL OUTPUT | <input type="checkbox"/> | 10 | 19 | <input type="checkbox"/> | NOT TO BE CONNECTED |
| V IDENTIFICATION | <input type="checkbox"/> | 11 | 18 | <input type="checkbox"/> | REGULATED VOLTAGE |
| B-Y DE-EMPHASIS | <input type="checkbox"/> | 12 | 17 | <input type="checkbox"/> | R-Y DE-EMPHASIS |
| B-Y OUTPUT VOLTAGE | <input type="checkbox"/> | 13 | 16 | <input type="checkbox"/> | R-Y OUTPUT VOLTAGE |
| D/A CURRENT REFERENCE | <input type="checkbox"/> | 14 | 15 | <input type="checkbox"/> | 62.5kHz REFERENCE FREQUENCY INPUT |

BLOCK DIAGRAM (simplified)



FEATURES

- Full automatic multistandard switching :
The circuit includes a scanning control system that provides all the switchings required for the automatic standard recognition. This system is synchronized by the frame pulse.
- No crystal requirement :
The PAL frequencies are synthesized originally by the external reference frequency of 62.5kHz and data stored in the ROM.
- Automatic gain adjustment of the bell filter :
By switching an internal capacitor network included in a digital loop.
- Automatic gain adjustment of the delay line compensations :
This adjustment is made on the burst and is refreshed every line retrace
- Automatic adjustment for PAL oscillator :
This oscillator has a digital and an analogic loop. the PAL frequencies are memorized in a ROM

connected to the digital loop. The digital loop gives the right frequency and the analogic one holds the phase.

- Automatic adjustment of F0R and F0B in SECAM :
These frequencies are programmed in the ROM and are sent to two other digital loops when SECAM standard is selected.
- Automatic difference phase error compensation in PAL mode.
The PAL VCO is locked on the burst and during the line, on the blue picture content (0° axis color vector).

STANDARD SWITCHING AND INHIBITION

SECAM recognition :

- When SECAM on, Pin 12 and Pin 17 DC voltages are lower than 5V.
- For other standards, Pin 12 and Pin 17 DC voltages are regulated Vcc (typical 8V).

ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|-------------------|-----------------------------|------------|------|
| V | Supply Voltage | 9.5 | V |
| I | Current | 200 | mA |
| T _{oper} | Operating Temperature Range | 0, +70 | °C |
| T _{stg} | Storage Temperature | - 40, +150 | °C |

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THERMAL DATA

| Symbol | Parameter | Value | Unit |
|----------------------|--|-------|------|
| R _{th(j-a)} | Junction Ambient Thermal Resistance (with mini 10 % Cu on board) | 55 | °C/W |

5640F-02.TBL

ELECTRICAL CHARACTERISTICST_{amb} = 25 °C ; V_{CC} = 12V ; With Normalized Color Bar Pattern Input Signal (75%)Subcarrier Level : 320mV_{PP}

Refer to Application Diagram Page (unless otherwise specified)

| Symbol | Parameter | Min. | Typ. | Max. | Unit |
|------------------|---|----------------|------|------|------|
| SUPPLIES | | | | | |
| V _{REG} | Regulated Voltage I ₁₀ = 4mA | Pins 9-18 | 7.5 | 8 | V |
| I _{CC} | Supply Current | Pin 9 + Pin 18 | 90 | 120 | mA |
| I ₉ | Supply Current | Pin 9 | | 90 | mA |
| I ₁₈ | Supply Current | Pin 18 | | 27 | mA |
| V _{I2L} | DC Voltage at I ₂₀ = 15mA | Pin 20 | | 0.8 | V |
| I ₁₀ | Input Current | Pin 10 | 2 | 5 | mA |
| | Transfer Characteristic (I ₁₀ = 4.0mA) | | 250 | | mA/V |

CURRENT REFERENCE (Pin 14)

| | | | | | |
|-----------------|---------------------------------------|-----|-----|-----|---|
| V ₁₄ | DC Voltage (I ₁₄ = 0.77mA) | 1.2 | 1.4 | 1.6 | V |
|-----------------|---------------------------------------|-----|-----|-----|---|

INTERNAL BIAS (Pin 24)

| | | | | | |
|-----------------|------------------------------------|-----|-----|-----|---|
| V ₂₄ | DC Voltage | 3.7 | 4.2 | 4.7 | V |
| | Impedance (I _{out} = 2mA) | | 90 | 110 | Ω |

REFERENCE CLOCK INPUT (f = 62.5kHz ± 6Hz, Pin 15)

| | | | | | |
|------------------|---|----------------------------|------|-----|----|
| I _{15L} | Low Level Input Current (V ₁₅ = 2.1V) | - 20 | - 10 | - 5 | μA |
| I _{15H} | High Level Input Current (V ₁₅ = 3.2V) | | 5 | 10 | μA |
| V _{15L} | Low Level Input Voltage | R _{Source} = 68kΩ | | 1 | V |
| V _{15H} | High Level Input Voltage | R _{Source} = 68kΩ | 4 | | V |
| | Voltage Threshold | | 2.8 | | V |

SUPER SANDCASTLE DETECTOR (Pin 7)

| | | | | | |
|----------------|--|------|------|-----|----|
| V _B | Blanking Threshold | 0.5 | 0.75 | 0.9 | V |
| V _L | Line Threshold | 1.6 | 1.8 | 1.9 | V |
| V ₆ | Burst Gate Threshold | 3.2 | 3.5 | 3.8 | V |
| | Minimum Frame Blanking Duration | 1.15 | | | mS |
| I ₇ | Input Current (V ₇ = 1.75V) | - 20 | | 0 | μA |
| | Max Input Voltage Pin 7 | | | 6.0 | V |

CHROMINACE INPUT (Pin 25)

| | | | | |
|-----------------|--------------------------|-----|------|-----------------|
| V ₂₅ | DC Voltage | 5.5 | | V |
| | Maximum AC Input Voltage | | 0.64 | V _{PP} |
| | Impedance | 0.8 | 1 | kΩ |

5640F-03.TBL

TEA5640F

ELECTRICAL CHARACTERISTICS (continued)

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

AUTOMATIC GAIN CONTROL

| SECAM MODE | | | | | |
|-----------------------------------|--|----------|-----|----------|----------------------------|
| | 0dB Reference Voltage for Measurement on Pins 27-28 (chroma input voltage $V_{25} = 320\text{mV}_{\text{PP}}$) | 50 | 150 | 250 | mV_{PP} |
| | AC Voltage Variation on Pins 27-28 $V_{25} = + 6\text{dB}$ $V_{25} = - 24\text{dB}$ | -3 -5 | | +3 +2 | dB dB |
| PAL/NTSC MODE WITH IDENTIFICATION | | | | | |
| | 0dB Reference Voltage for Measurement on Pins 13-16 (chroma input voltage $V_{25} = 320\text{mV}_{\text{PP}}$) | | | | |
| | AC Voltage Variation on Pins 13-16 $V_{25} = + 6\text{dB}$ $V_{25} = - 24\text{dB}$ | -3 -5 | | +3 +2 | dB dB |

DEMODULATOR PART

| GENERALITIES | | | | | |
|--------------|---|------------|-----|---------|----------------|
| V_{13} | B-Y Output DC Voltage | Pin 13 | 2.7 | 3.3 | 4 V |
| V_{16} | R-Y Output DC Voltage | Pin 16 | 3 | 3.5 | 4.2 V |
| | Maximum Sink Current | Pins 13-16 | 0.4 | | mA |
| | Differential Delay Time Between PAL/SECAM | | | 50 | nS |
| | Delay Diff Tolerance | | | 50 | nS |
| | Delay Between Chroma Output and Luma Signal | | 450 | | nS |
| | B-Y Output AC Impedance ($\pm 50\mu\text{A}$) | | 250 | | Ω |
| | R-Y Output AC Impedance ($\pm 50\mu\text{A}$) | | 250 | | Ω |
| | Blanking Level Offset (% of the pp output signal) | | | ± 2 | % |

SECAM MODE

| | | | | | |
|------------------|--|-----|------|------|-------------------------|
| V_{BYS} | B-Y AC Voltage | 1.0 | 1.34 | 1.6 | V_{PP} |
| V_{RYS} | R-Y AC Voltage | 0.8 | 1.05 | 1.3 | V_{PP} |
| | B-Y/R-Y Ratio | 1.1 | | 1.45 | |
| | Residual Subcarrier | | 30 | | mV_{PP} |
| | Max overshoot on output SECAM signals (see test conditions Note 2) | | | 5 | % |
| | SECAM Rise Time (see test conditions Note 1) | | | 800 | ns |

PAL MODE

| | | | | | |
|------------------|---------------------|-----|------|------|-------------------------|
| V_{BYP} | B-Y AC Voltage | 1.0 | 1.34 | 1.6 | V_{PP} |
| V_{RYP} | R-Y AC Voltage | 0.8 | 1.05 | 1.3 | V_{PP} |
| | B-Y/R-Y Ratio | 1.1 | | 1.45 | |
| | Residual Subcarrier | | 30 | | mV_{PP} |

PAL/SECAM OUTPUT BALANCE

| | | | | | |
|---------------|------------|--|--|---------|-------------|
| RYPS | R-Y Output | | | ± 2 | dB |
| BYPs | B-Y Output | | | ± 2 | dB |

DE-EMPHASIS (Pins 12-17)

| | | | | | |
|--|--|--|-------------------------|-----|------------------|
| | DC Voltage SECAM Mode (blanking level) | | 3.5 | 4.0 | V |
| | Impedance SECAM Mode | | 11 | | $\text{k}\Omega$ |
| | DC Voltage PAL Mode | | V_{REG} | | V |
| | Impedance PAL Mode | | 70 | | $\text{k}\Omega$ |

Notes : 1. Rise Time Test Conditions

- SECAM Color Bar Patterns 75%
- Generator TEKTRONIX 143
- Standard Application without any output load
- Measure between 10% and 90% on the major transition (Green Violet)

2. Overshoot Test Conditions

- Idem than for Rise Time
- Ratio between the value of the overshoot and the peak-to-peak value of the transition after overshoot (on the flat level)

5640F-04.TBL

ELECTRICAL CHARACTERISTICS (continued)

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

REFERENCE OSCILLATOR PLL

| | | | | | |
|--|----------------------------|-------|--|--|----|
| | Catching Range in PAL Mode | ± 350 | | | Hz |
| | Holding Range | ± 500 | | | Hz |

BAND FILTER (Pin 23)

| | | | | | |
|----|--|------|-----|------|------|
| | Impedance SECAM Mode | 3.7 | 4.7 | 5.7 | |
| | Impedance PAL Mode | 0.85 | 1.1 | 1.35 | |
| | Minimum Switchable Internal Capacitance (all standards) | | 20 | | |
| | Maximum Switchable Internal Capacitance (all standards) | | 50 | | |
| ΔF | Internal Oscillator Frequency Range for (L = 10μH, C = 68pF) | 590 | | | |
| | Frequency Offset, After Automatic Adjustement | | | | ± 10 |

UNDELAYED SIGNAL OUTPUTS (Pins 27-28)

| | | | | | |
|-----------------------------------|--------------|---|-----|--|----|
| V ₂₇ , V ₂₈ | DC Voltage | | 1.6 | | V |
| I ₂₇ , I ₂₈ | Sink Current | 1 | | | mA |
| | Impedance | | 30 | | Ω |

IDENTIFICATION

| BURST ATTENUATION RANGE / NOMINAL LEVEL | | | | | |
|---|--|----------|-----|-----|----------|
| | SECAM Mode (line identification) PAL Mode | 30 30 | | | dB dB |
| SECAM MODE | | | | | |
| V ₂₆ | Pin 26 Voltage (unloaded) | 6.9 | 7.8 | 8.5 | V |
| | Pin 26 Impedance | 5 | 13 | 25 | kΩ |
| PAL MODE | | | | | |
| V ₂₆ | Pin 26 Voltage (unloaded) | 3.6 | 4.2 | 4.9 | V |
| | Pin 26 Impedance | 2 | 6 | 15 | kΩ |

DELAYED SIGNAL INPUT (Pins 2-3)

| | | | | | |
|--|------------------------|------|-----|------|----|
| | DC Voltage in PAL Mode | | 2.4 | | V |
| | Input Impedance | 0.88 | 1.1 | 1.32 | kΩ |

DELAY LINE ATTENUATION COMPENSATION

| | | | | | |
|--|---|-----|-----|------|----|
| | Range of Automatic Attenuation Compensation | - 3 | - 9 | - 15 | dB |
|--|---|-----|-----|------|----|

DELAY LINE PHASE SHIFT COMPENSATION

| | | | | | |
|--|---|------|--|--|--------|
| | Range of Phase Shift Compensation with a 100kΩ Potentiometer (see application diagram) | ± 30 | | | degree |
|--|---|------|--|--|--------|

ALTERNATION LINE DETECTION PAL OR SECAM (Pin 11)

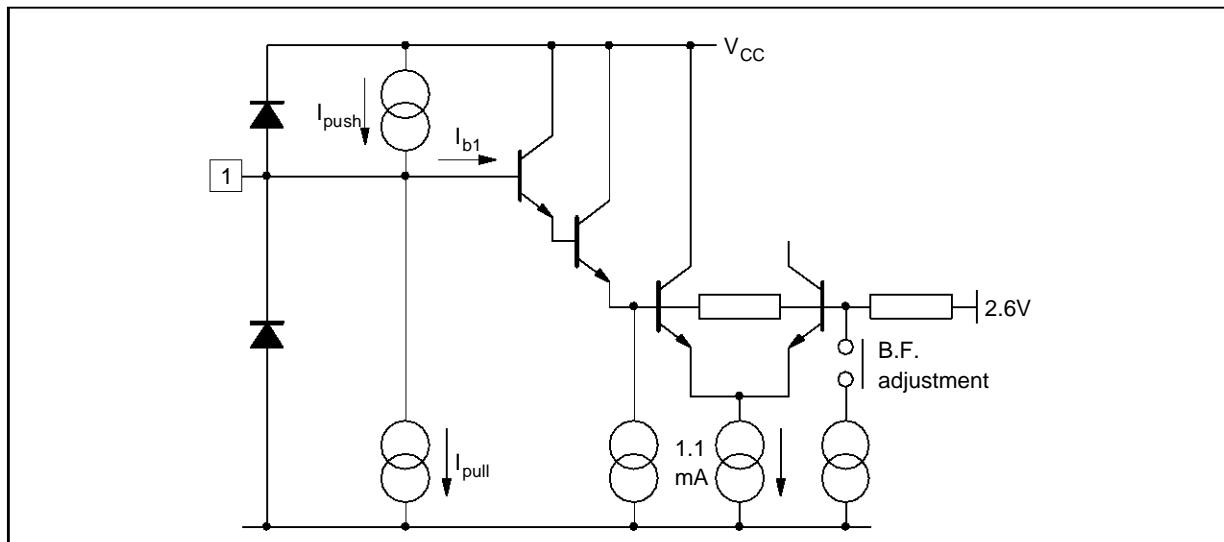
| | | | | | |
|-------------------|---|-------|--|-------|----|
| V _{TH-H} | High Differential Threshold (V _{TH-H} = V _{11H} - V ₂₄) | 200 | | 350 | mV |
| V _{TH-L} | Low Differential Threshold (V _{TH-L} = V _{11L} - V ₂₄) | - 350 | | - 200 | mV |
| | Leakage Current Threshold (V ₁₁ = V ₂₄ + 1V) | | | 0.5 | μA |

5640F-05.TBL

TEA5640F

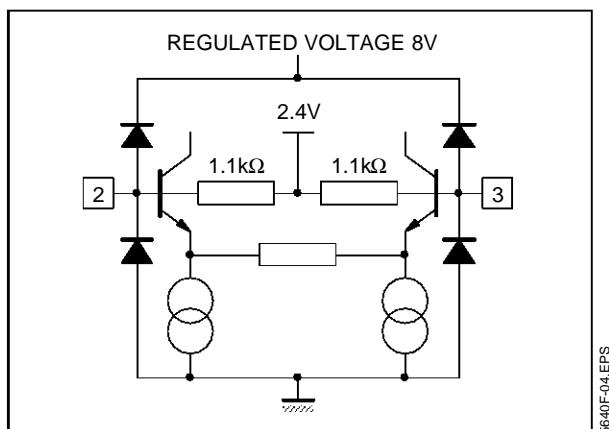
INPUTS/OUTPUTS EQUIVALENT INTERNAL DIAGRAMS

Pin 1



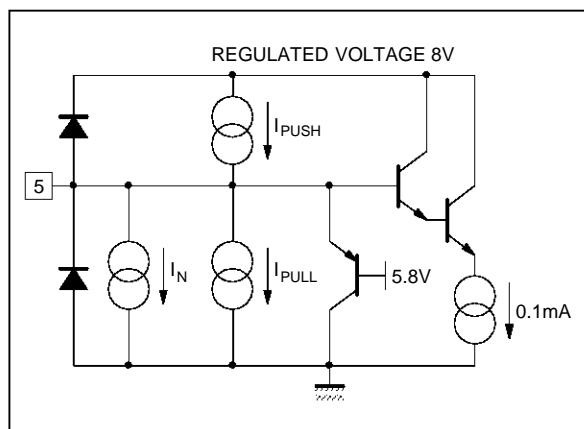
5640F-03.EPS

Pins 2-3



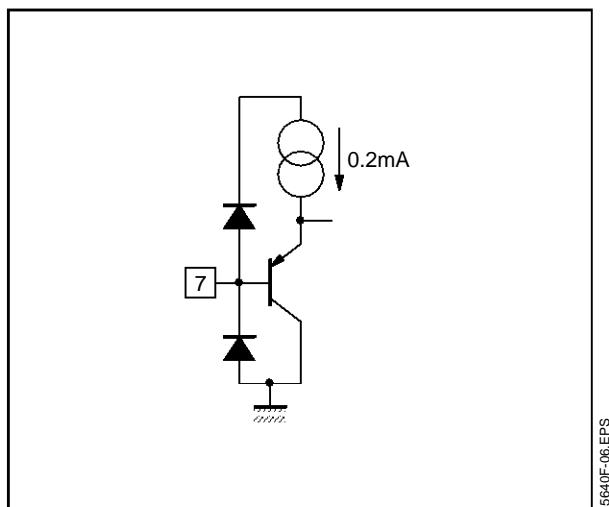
5640F-04.EPS

Pin 5



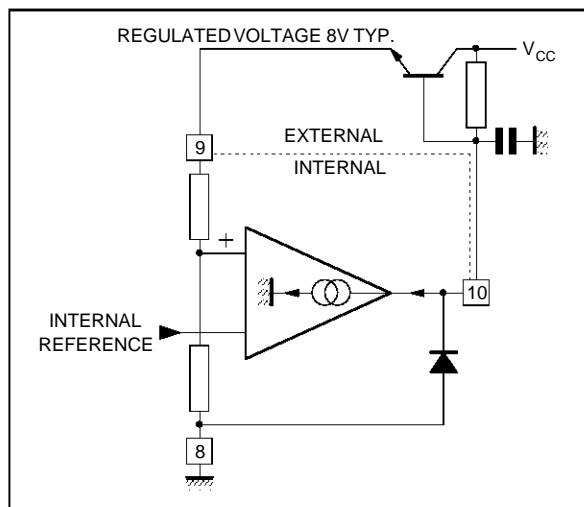
5640F-05.EPS

Pin 7



5640F-06.EPS

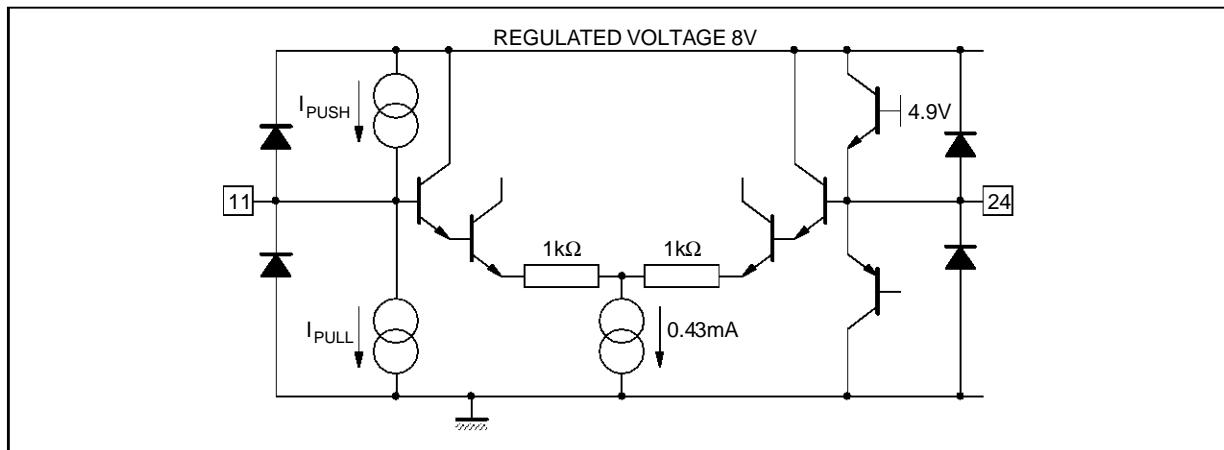
Pins 8-9-10



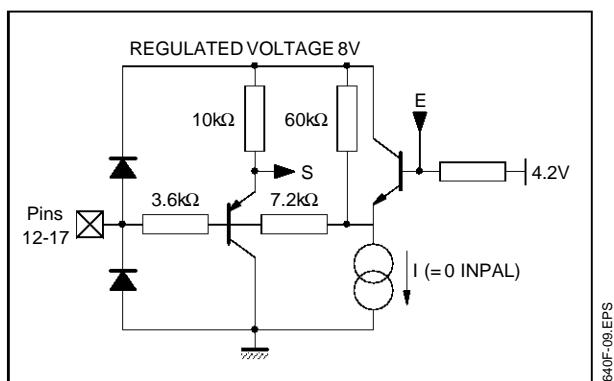
5640F-07.EPS

INPUTS/OUTPUTS EQUIVALENT INTERNAL DIAGRAMS (continued)

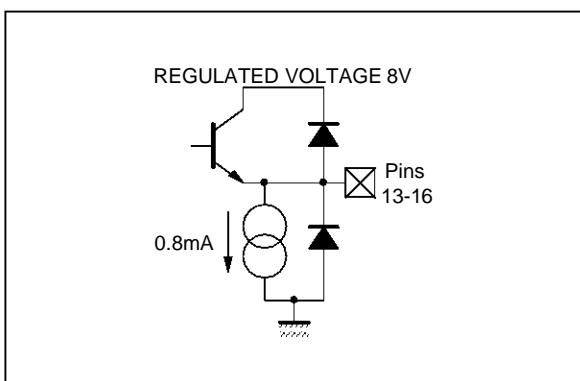
Pins 11-24



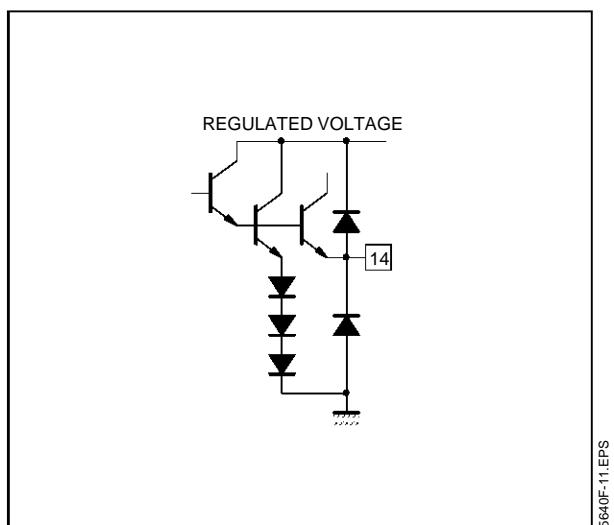
Pins 12-17



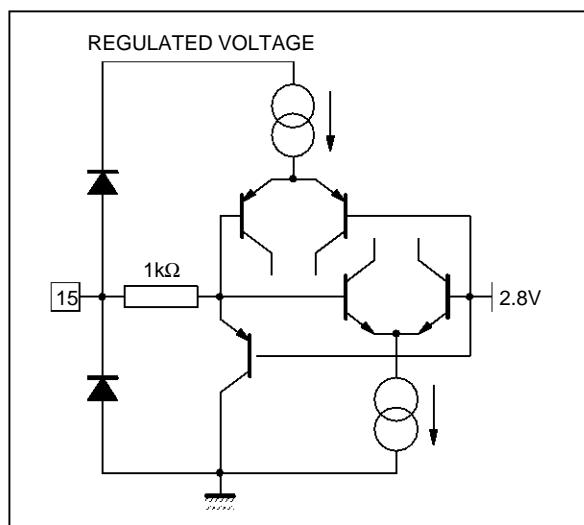
Pins 13 - 16



Pin 14

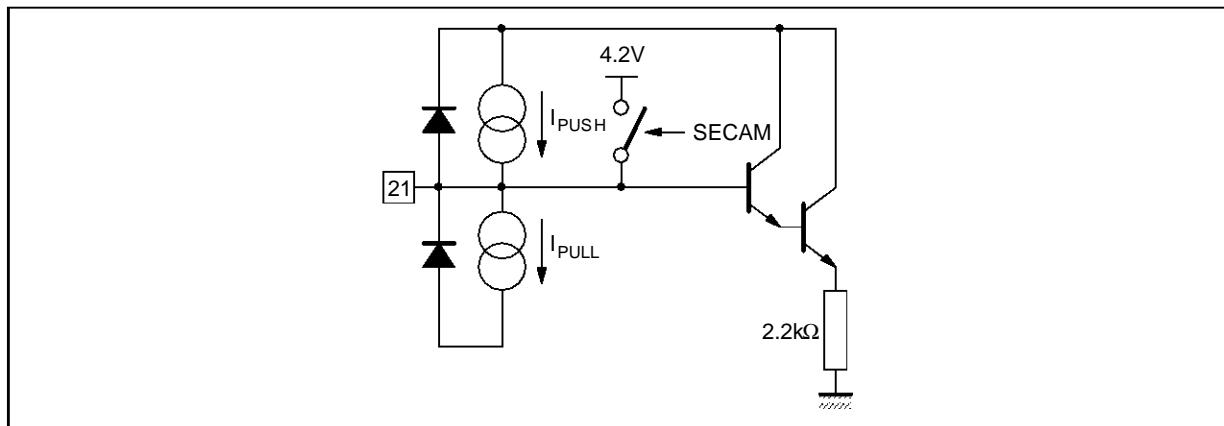


Pin 15



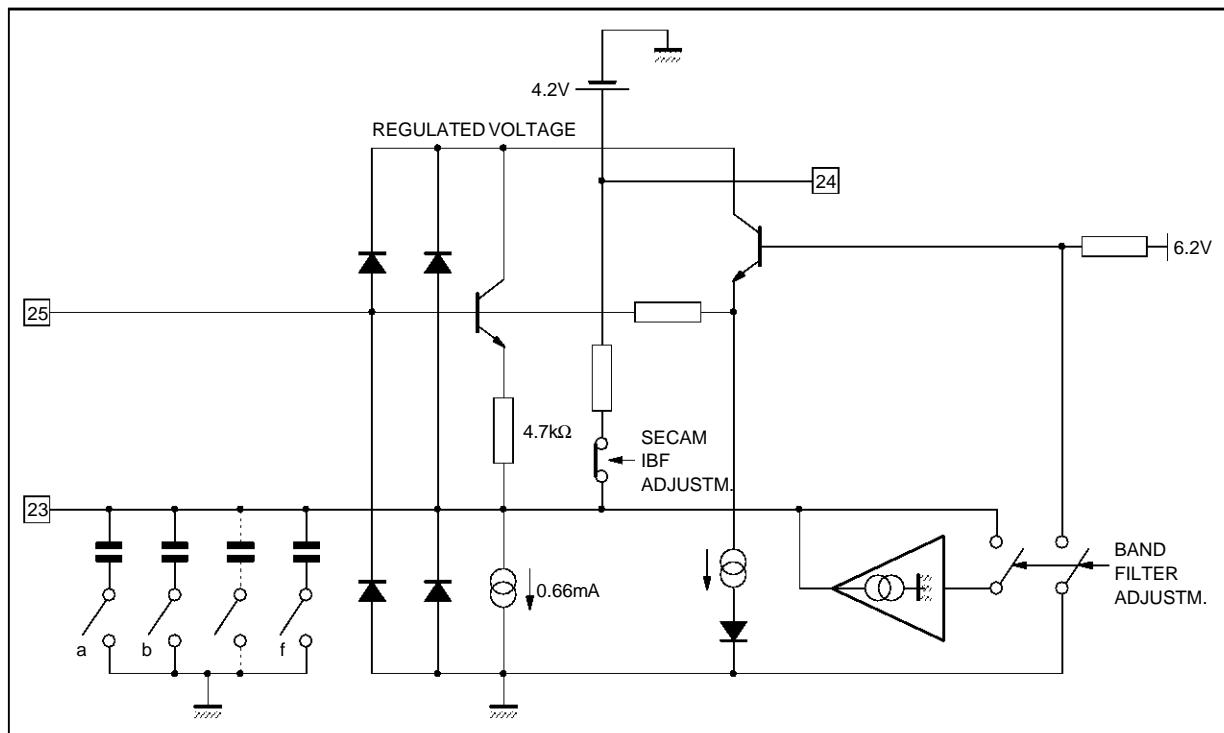
INPUTS/OUTPUTS EQUIVALENT INTERNAL DIAGRAMS (continued)

Pin 21



5640F-13.EPS

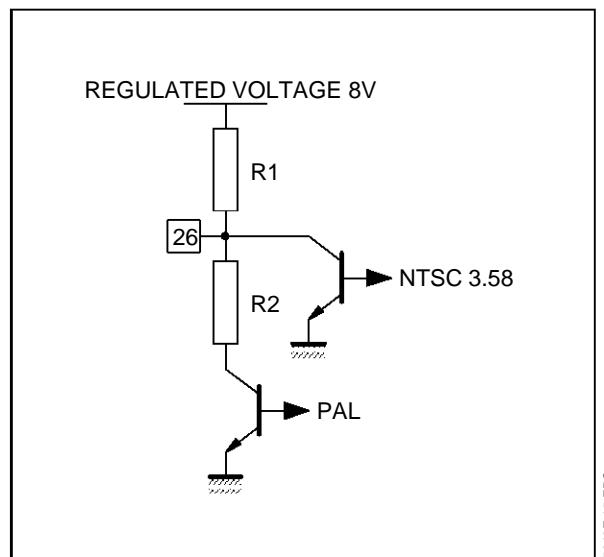
Pins 23-24-25



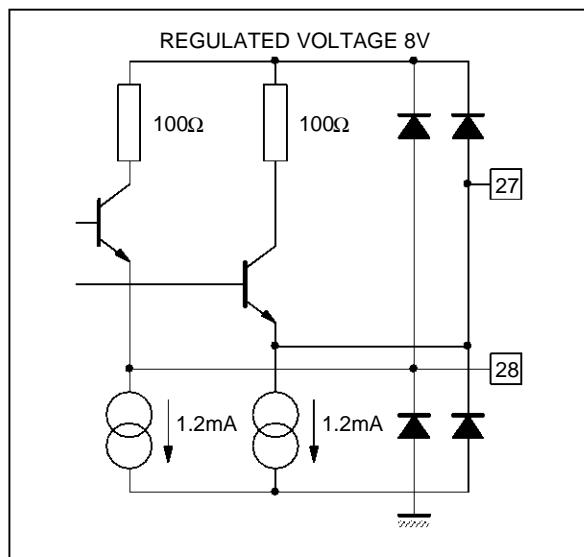
5640F-14.EPS

INPUTS/OUTPUTS EQUIVALENT INTERNAL DIAGRAMS (continued)

Pin 26

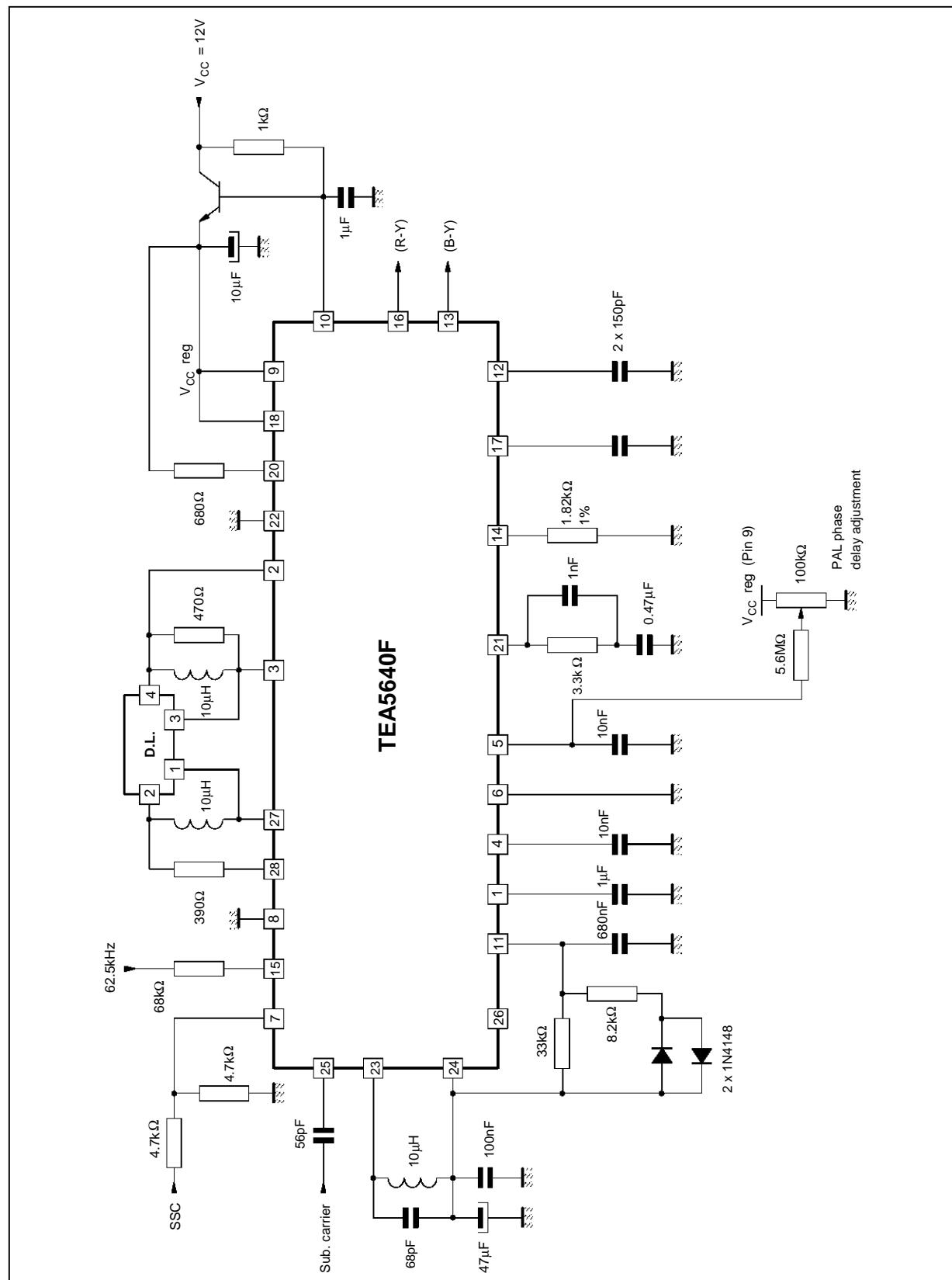


Pins 27 - 28



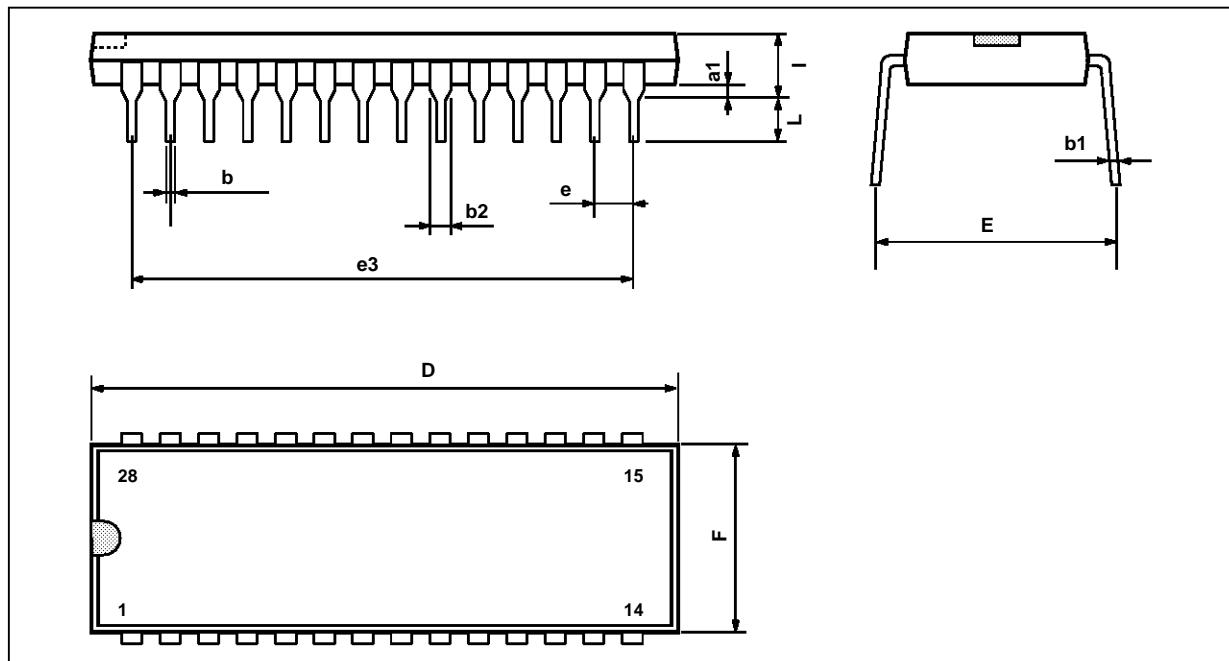
TEA5640F

TYPICAL APPLICATION for PAL/SECAM



PACKAGE MECHANICAL DATA

28 PINS - PLASTIC DIP



PM-DIP28.EPS

DIP28.TBL

| Dimensions | Millimeters | | | Inches | | |
|------------|-------------|-------|-------|--------|-------|-------|
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| a1 | | 0.63 | | | 0.025 | |
| b | | 0.45 | | | 0.018 | |
| b1 | 0.23 | | 0.31 | 0.009 | | 0.012 |
| b2 | | 1.27 | | | 0.050 | |
| D | | | 37.4 | | | 1.470 |
| E | 15.2 | | 16.68 | 0.598 | | 0.657 |
| e | | 2.54 | | | 0.100 | |
| e3 | | 33.02 | | | 1.300 | |
| F | | | 14.1 | | | 0.555 |
| i | | 4.445 | | | 0.175 | |
| L | | 3.3 | | | 0.130 | |

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