SGS-THOMSON MICROELECTRONICS

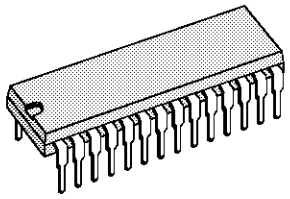
TEA5640F

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

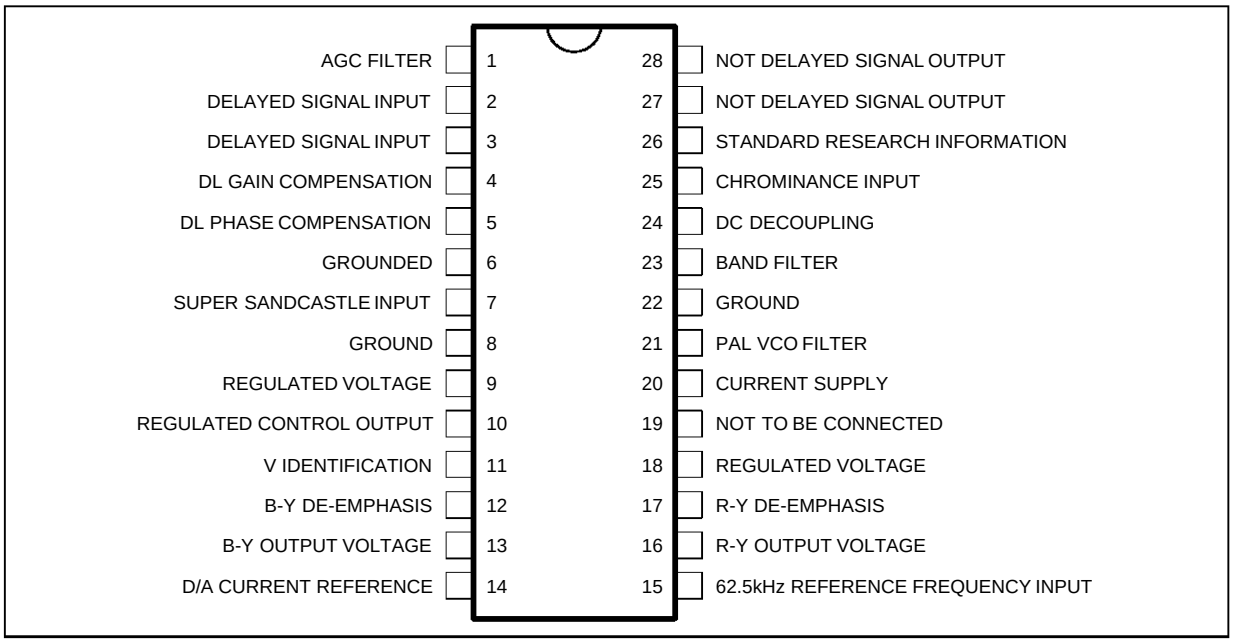
The TEA5640F is a multistandard TV decoder for PAL-SECAM. The circuit automatically selects the standard corresponding to the input signal. It produces all the reference frequencies required for decoding, which is achieved by a digital frequency synthesizer. Included on the chip are four numerical frequency 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)

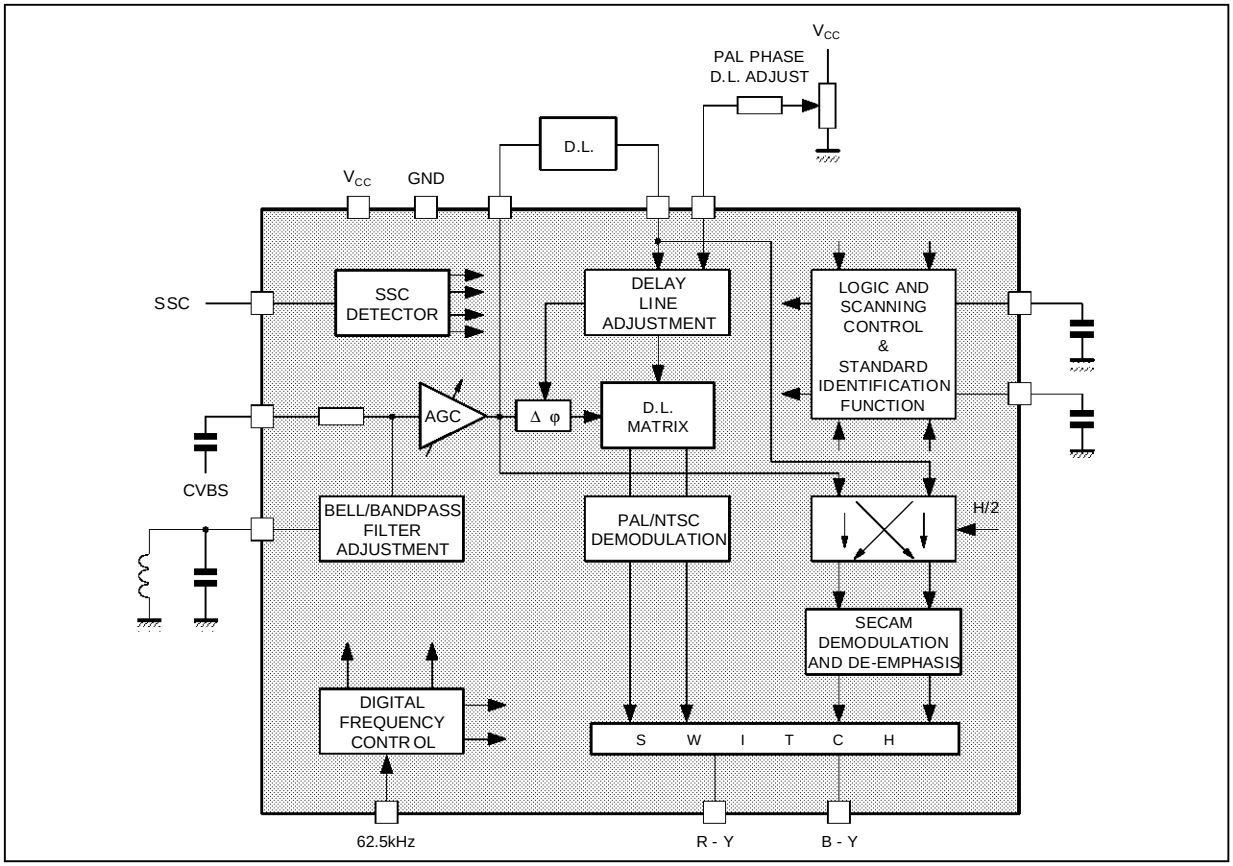
ORDER CODE : TEA5640F

PIN CONNECTIONS



5640F-01.EPS

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 V_{CC} (typical 8V).

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V	Supply Voltage	Pins 9 - 18	9.5	V
I	Current	Pin 20	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
$R_{th\ (j\text{-}a)}$	Junction Ambient Thermal Resistance (with mini 10 % Cu on board)	55	°C/W

5640F-02.TBL

ELECTRICAL CHARACTERISTICS

T_{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	8.5	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

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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} = 320mV$_{PP}$)		50	150	250	mV$_{PP}$
	AC Voltage Variation on Pins 27-28	V_{25} = + 6dB V_{25} = – 24dB	– 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} = 320mV$_{PP}$)					
	AC Voltage Variation on Pins 13-16	V_{25} = + 6dB V_{25} = – 24dB	– 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 (± 50µA)			250		Ω
	R-Y Output AC Impedance (± 50µA)			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		kΩ
	DC Voltage PAL Mode			V_{REG}		V
	Impedance PAL Mode			70		kΩ

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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)

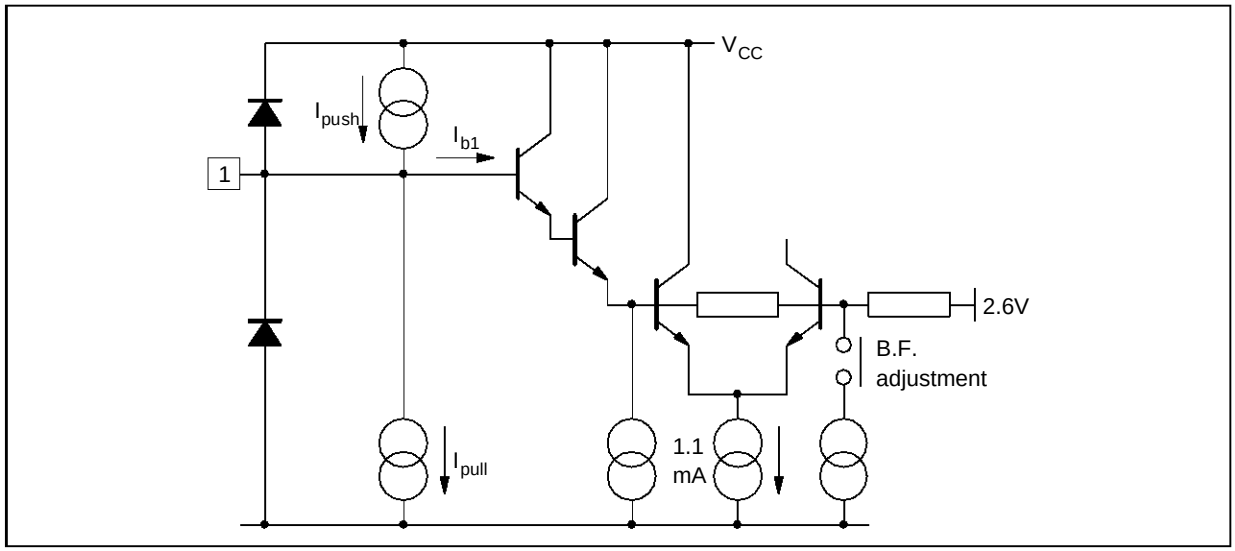
ELECTRICAL CHARACTERISTICS (continued)

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

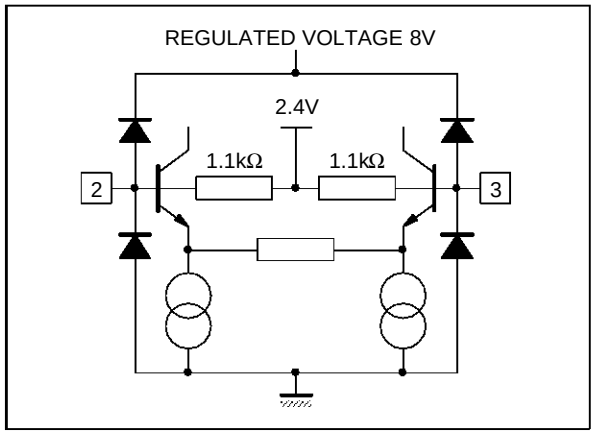
5640F-05.TBL

INPUTS/OUTPUTS EQUIVALENT INTERNAL DIAGRAMS

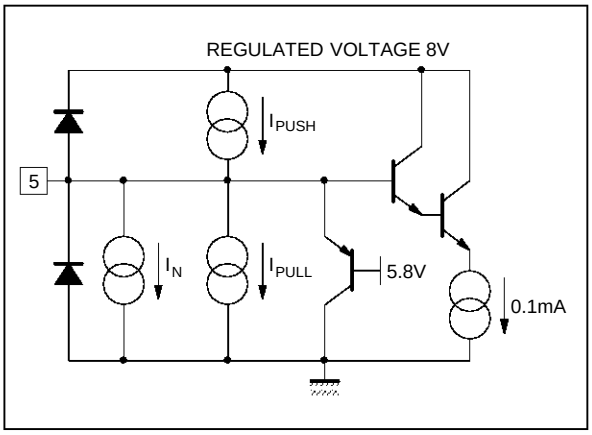
Pin 1



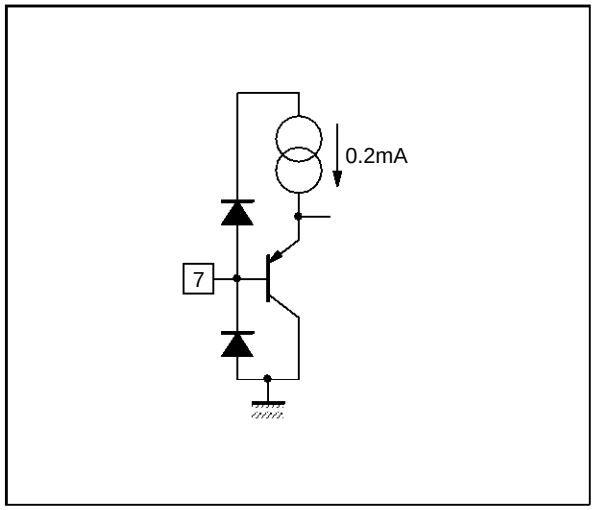
Pins 2-3



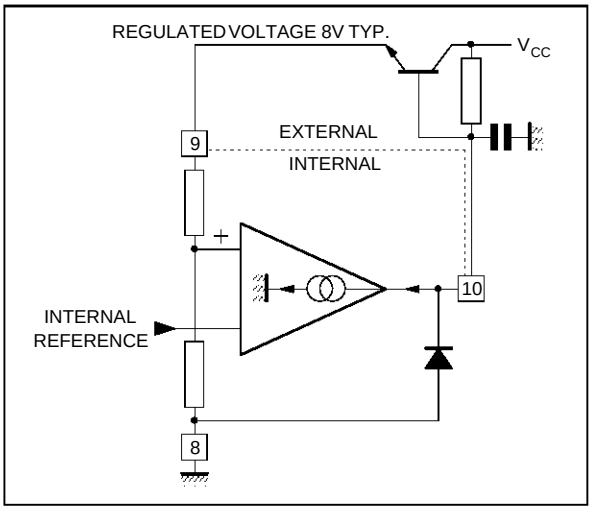
Pin 5



Pin 7

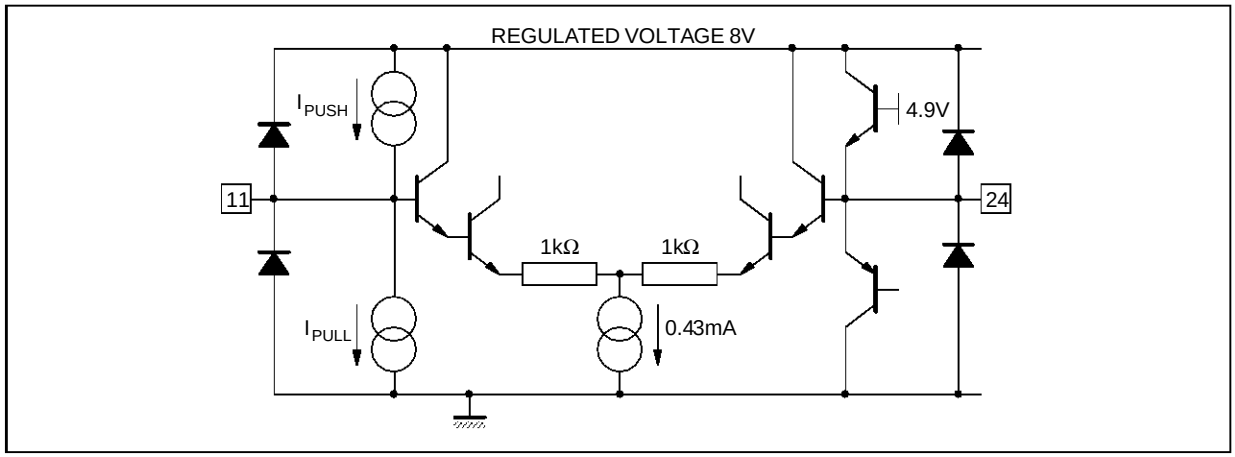


Pins 8-9-10

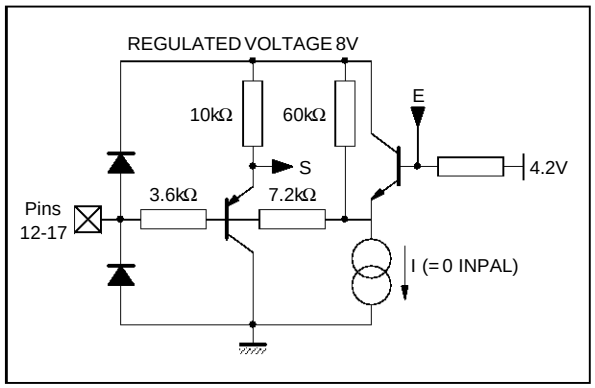


INPUTS/OUTPUTS EQUIVALENT INTERNAL DIAGRAMS (continued)

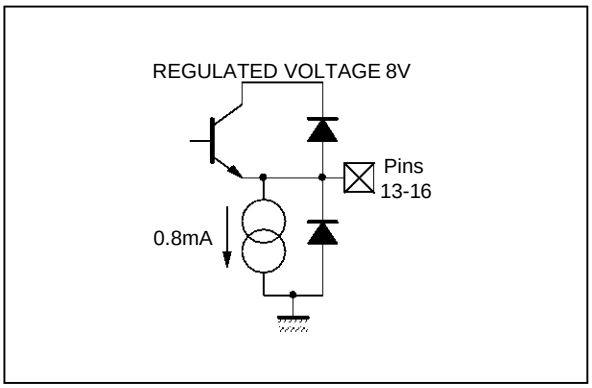
Pins 11-24



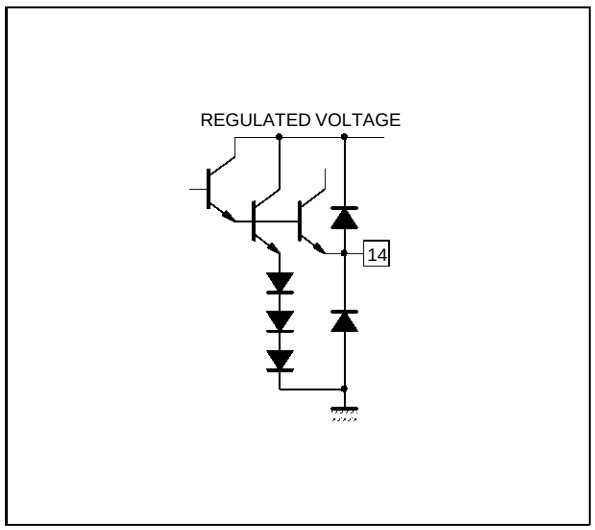
Pins 12-17



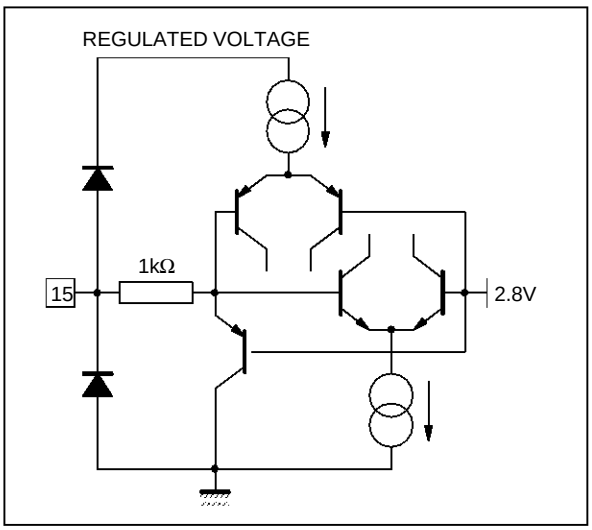
Pins 13 - 16



Pin 14

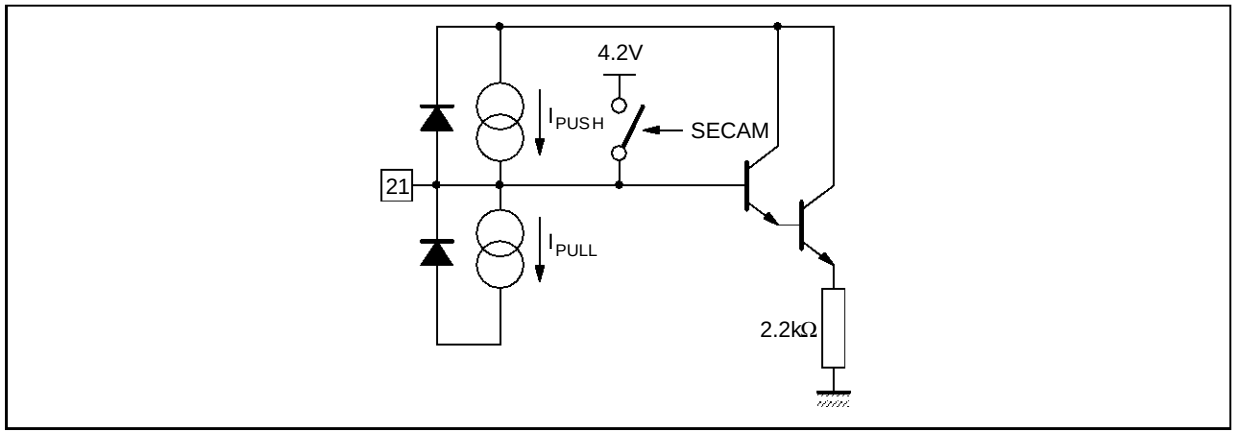


Pin 15

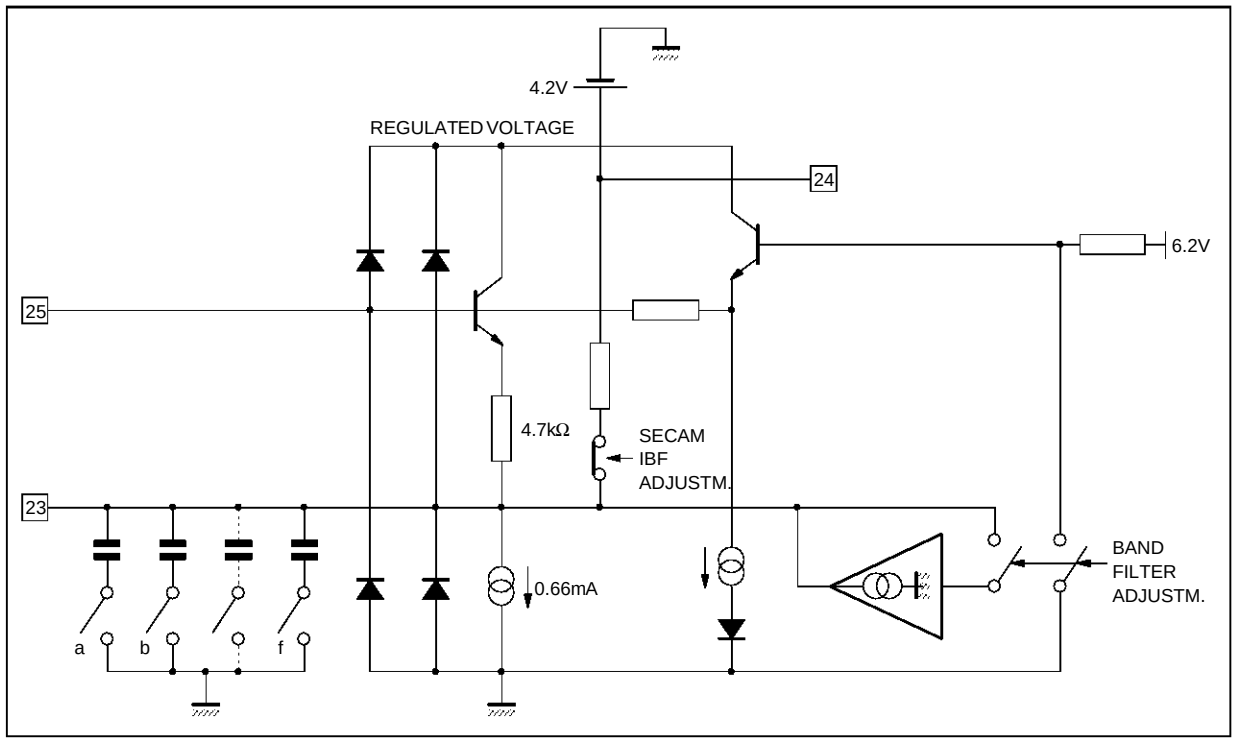


INPUTS/OUTPUTS EQUIVALENT INTERNAL DIAGRAMS (continued)

Pin 21

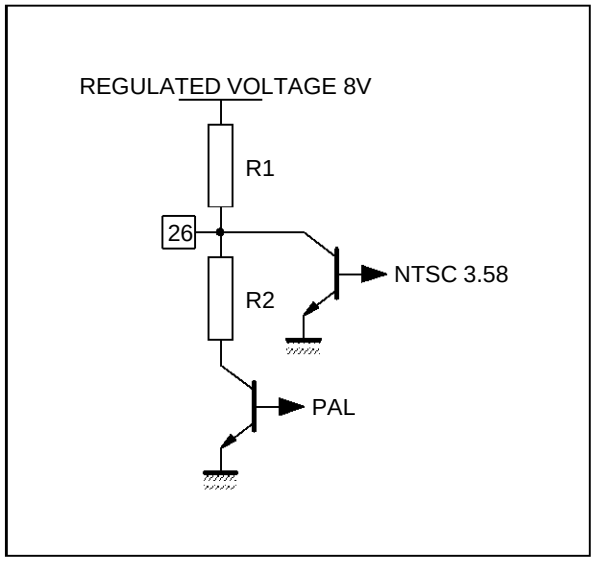


Pins 23-24-25

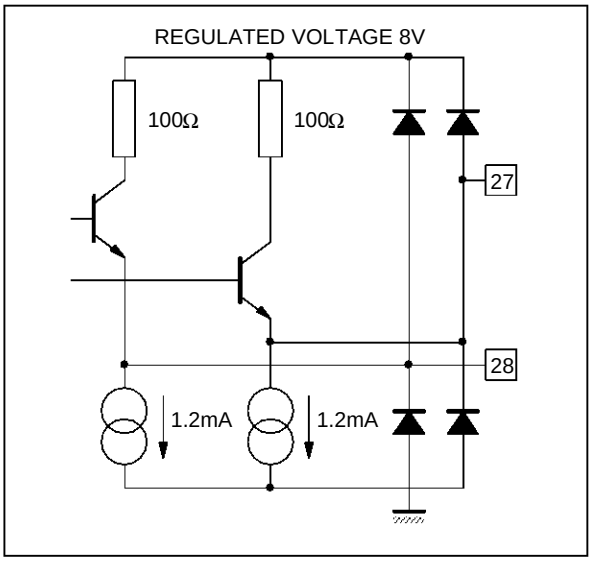


INPUTS/OUTPUTS EQUIVALENT INTERNAL DIAGRAMS (continued)

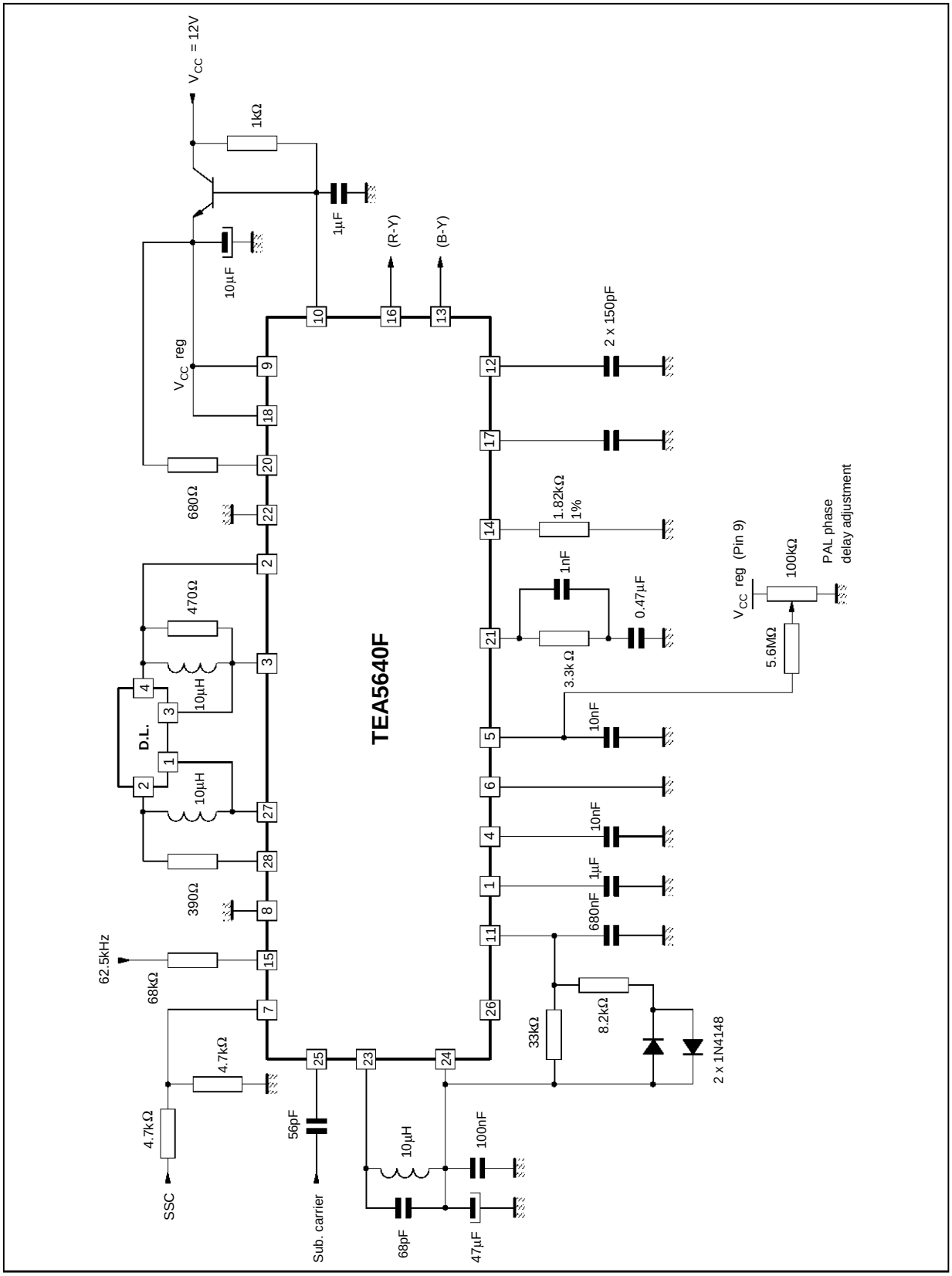
Pin 26



Pins 27 - 28

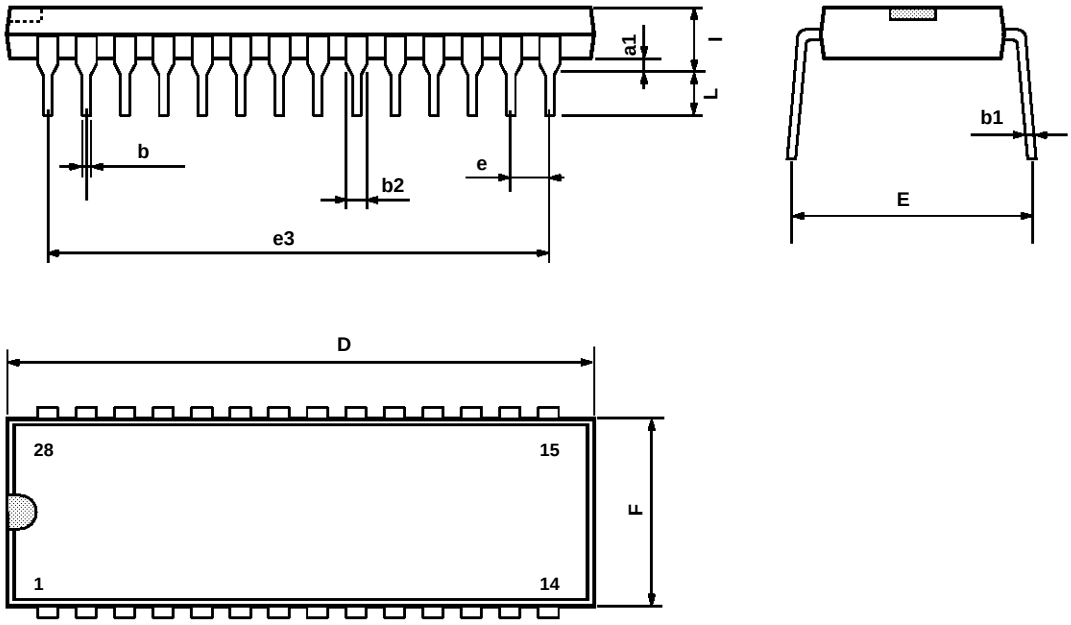


TYPICAL APPLICATION for PAL/SECAM



PACKAGE MECHANICAL DATA

28 PINS - PLASTIC DIP



PM-DIP28.EPS

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	

DIP28.TBL