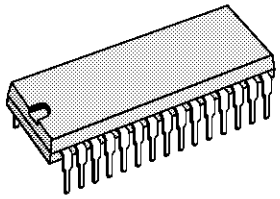
SGS-THOMSON MICROELECTRONICS

TEA5652

WIDE BAND VIDEO PROCESSOR

- Y, R-Y, B-Y INPUTS
- 2 RGB AND FAST BLANKING SOURCES
- RGB SOURCES MATRIXING INTO Y, R-Y, B-Y
- ANALOG CUT-OFF CONTROLS
- ANALOG CONTROLS FOR : BRIGHTNESS, CONTRAST, SATURATION ON ALL INPUT SIGNALS
- BEAM CURRENT LIMITER
- 62.5kHz GENERATOR (FOR TEA5640)
- INTERNAL INDEXATION BETWEEN SATURATION AND CONTRAST



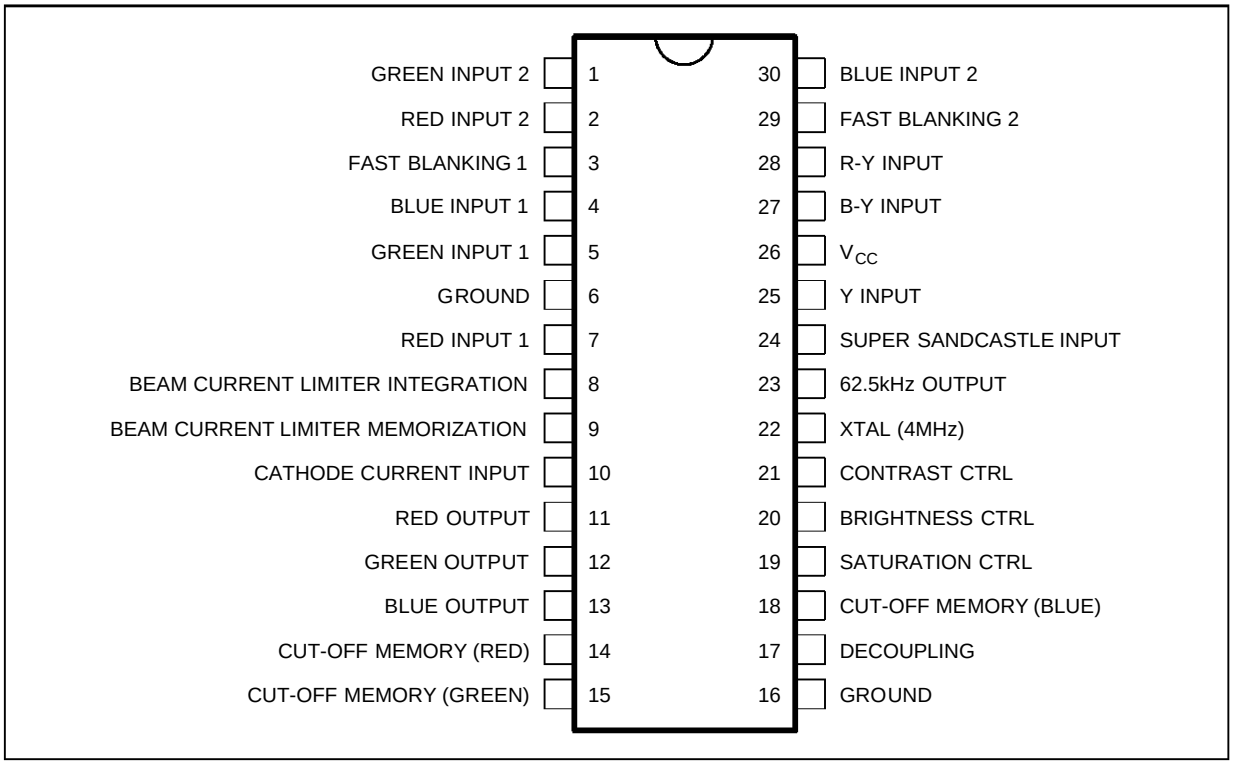
SHRINK30
(Plastic Package)

ORDER CODE : TEA5652S

DESCRIPTION

The TEA5652 is a wide band flexible video processor intended for low-cost CTV. It integrates two RGB and fast blanking inputs, a beam current limiter and a 62.5kHz generator (for TEA5640).

PIN CONNECTIONS



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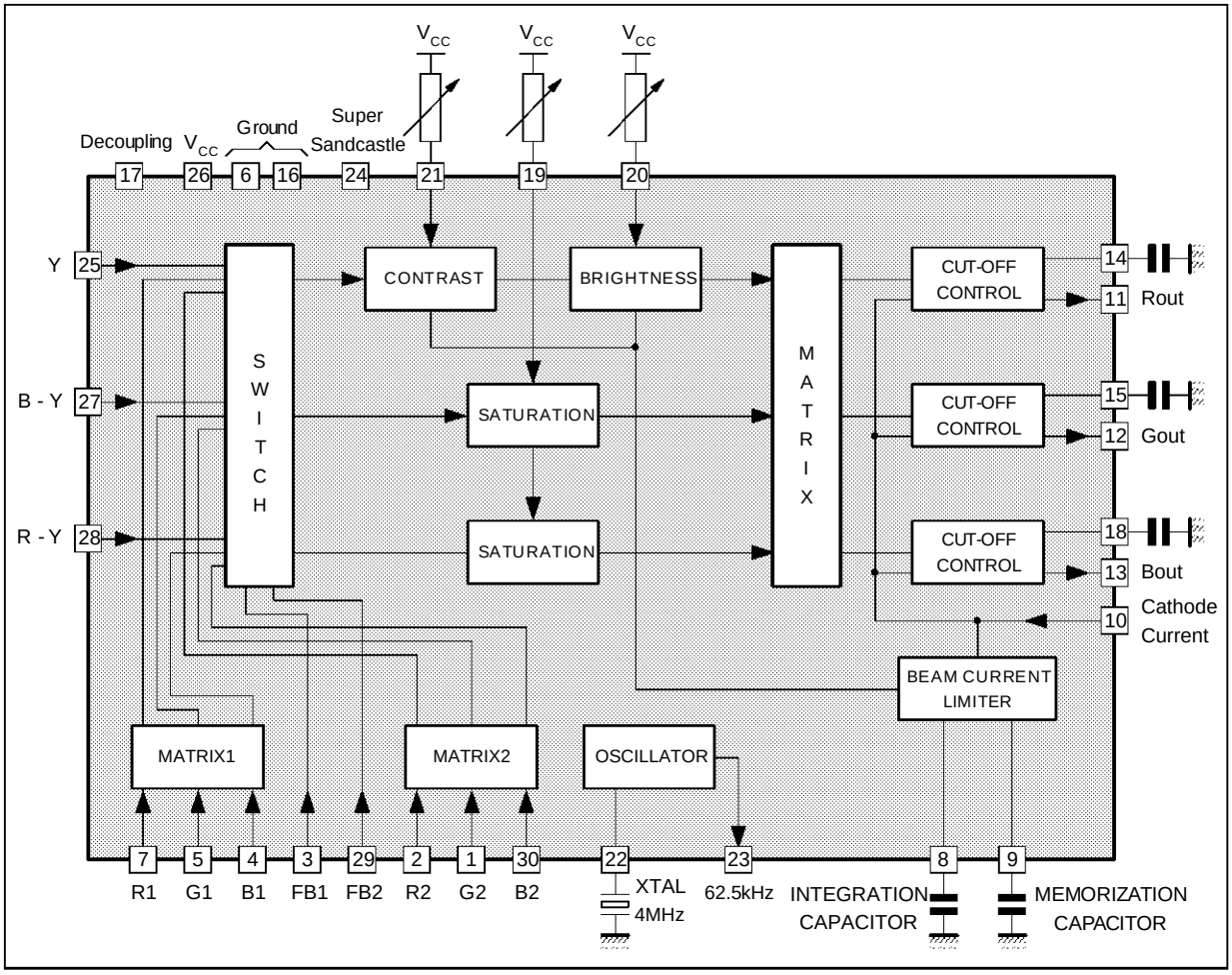
BLOCK DIAGRAM



GENERAL DESCRIPTION

This circuit includes the following features.

- One Y, R-Y, B-Y input
- Two R, G, B sources with their associated fast blankings
- Analog inputs for contrast brightness and saturation controls both on TV and RGB pictures.
- Saturation contrast indexation internally made.
- Analog cut-off controls.
- Start beam current limiter.
- Average beam current limiter.
- 62.5kHz generator to drive TEA5640 multistandard chroma decoder.

CLAMPING SYSTEM

Because the clamp information are selected after fast blanking switch it is necessary to clamp source by source line after line.

So during frame retrace the Y, R-Y, B-Y source is sampled during the burst gate of every line.

During the frame one source is selected by line : one line Y, R-Y, B-Y, one line RGB1, one line RGB2.

Analog Controls

Brightness, contrast and saturation are controlled by analog inputs.

The indexation between saturation and contrast is achieved internally.

Analog Cut-off Controls
The IC incorporates a standard sequential analog cut-off controls.
The controls are achieved sequentially during the four lines following the end of the frame retrace.

Beam Current Limiter (see Figures 1 and 2)
A new beam current limiter is used in this circuit. It provides the following features.
- a short time constant (one frame)
- no brightness and contrast variation during the frame
- a limitation of peak magnitudes

62.5kHz Generator
This function is devoted to deliver the 62.5kHz frequency reference to the chroma decoder TEA5640 from a 4MHz crystal. By this way the TEA5652 and TEA5640 can achieve a complete multistandard luma-chroma application.

Beam Current Limiter Capacitors Setting

C1 CALCULATION
C1 is the capacitor which integrates the cathode current during the frame :

$$C1 = \frac{1.15 \times I_{CATH} \times T_{AV}}{100 \times V_{TH}}$$

I_{CATH} : Average current per cathode
T_{AV} : Averaging duration = Frame period - Frame retrace duration ~ 18.5ms for 50Hz operation
V_{TH} : Beam current limiter threshold voltage ~ 2.5V for V_{CC} = 8V
example : for $I_{cathode}$ = 800µA **C1 = 68nF**

C2 SETTING
The value of the memorization capacitor is determined to obtain good picture stability from one frame to following one.
We advice a value of 680nF for standard operation.

Figure 1 : Beam Current Limiter Block Diagram

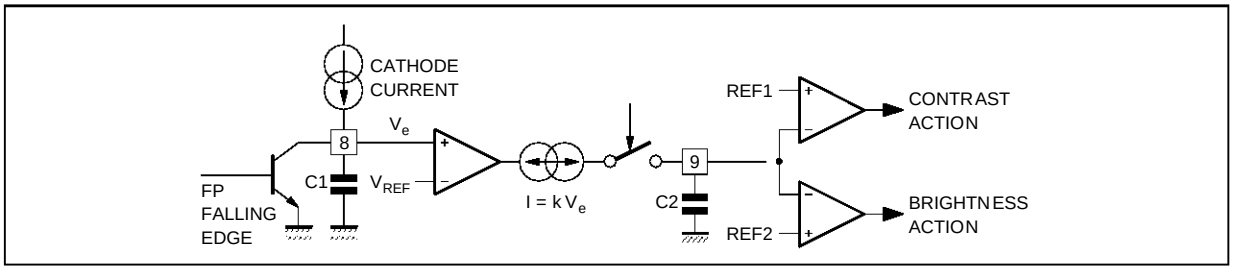
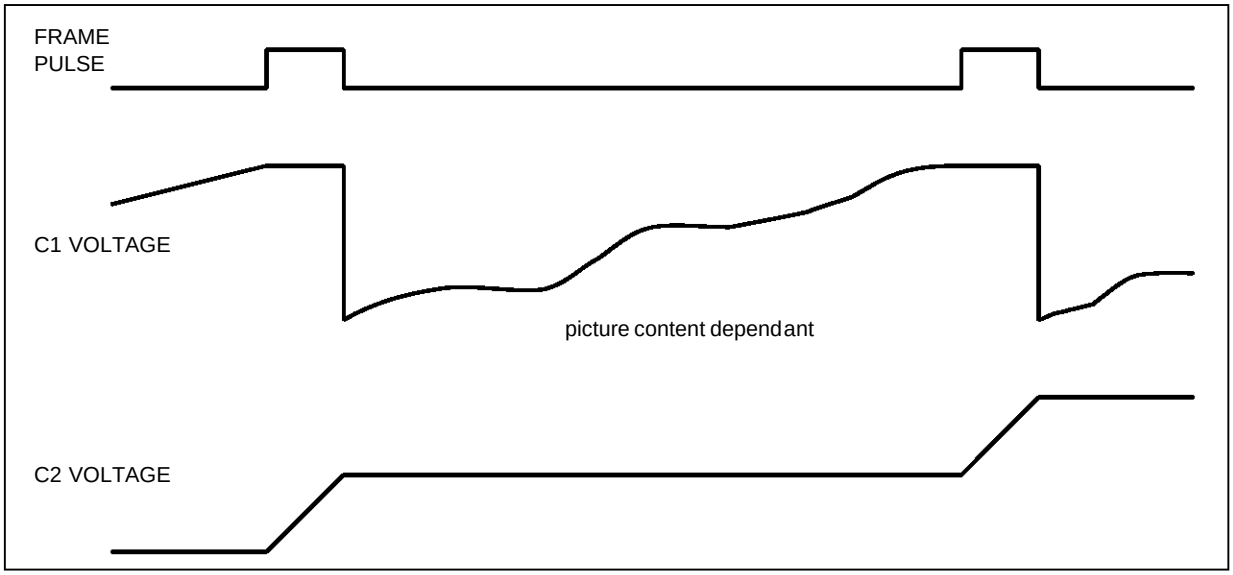


Figure 2 : Beam Current Limiter Waveforms



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	12.6	V
T_{amb}	Operating Ambient Temperature	0, +70	^oC

5652-01.TBL

THERMAL DATA

Symbol	Parameter	Value	Unit
$R_{th\ (j-a)}$	Juntion-ambient Thermal Resistance	70	$^oC/W$

5652-02.TBL

ELECTRICAL CHARACTERISTICS (V_{CC} = 8V, T_{amb} = 25^{o}C, unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
SUPPLY SECTION (Pin 26)						
V_{CC}	Supply Voltage		7.5	8	8.5	V
I_{CC}	Supply Current	no loads on outputs		55	80	mA
Y-CVBS INPUT (Pin 25)						
CVBS	Signal Amplitude	100% white CVBS signal		0.5	0.75	Vpp
DC Y A	DC Level			1.7		V
I_{CLPY}	Positive Clamp Current			180		µA
I_{CLNY}	Negative Clamp Current			180		µA
$I_{LEAK\ Y}$	Leakage Current				1	µA
R-Y INPUT (Pin 28)						
R-Y A	Signal Amplitude	75% color bar pattern		1.05	1.47	Vpp
DC R-Y	DC Level			2.7		V
I_{CLPR}	Positive Clamp Current			180		µA
I_{CLNR}	Negative Clamp Current			180		µA
$I_{LEAK\ A}$	Leakage Current				1	µA
B-Y INPUT (Pin 27)						
B-Y A	Signal Amplitude	75% color bar pattern		1.3	1.86	Vpp
DC B-Y	DC Level			2.7		V
I_{CLPB}	Positive Clamp Current			180		µA
I_{CLNB}	Negative Clamp Current			180		µA
$I_{LEAK\ B}$	Leakage Current				1	µA
R-G-B INPUTS (Pins 1-2-4-5-7-30)						
RGB A	Signal Amplitude	100% amplitude		0.7	1	Vpp
DC RGB	DC Level			2.6		V
I_{CLP}	Positive Clamp Current			180		µA
I_{CLN}	Negative Clamp Current			180		µA
I_{LEAK}	Leakage Current				1	µA
FAST BLANKING INPUTS (Pins 3-29)						
FBLL	TV/RGB Low Level				0.5	V
FBHL	TV/RGB High Level		0.95		3	V
Z_{IN} FB	Input Impedance			1		kΩ
T_{ON} FB	Switching Delay Time On			40		nsec
T_{OFF} FB	Switching Delay Time Off			40		nsec

5652-03.TBL

ELECTRICAL CHARACTERISTICS (V_{CC} = 8V, T_{amb} = 25°C, unless otherwise specified) (continued)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
CONTRAST CONTROL (Pin 21)						
Typ. CONT	Nominal Value	Maximum contrast		0		dB
Min. CONT	Minimum Value			-16		dB
DC Max. C	DC Level for Contrast Max.			4.2		V
DC Min. C	DC Level for Contrast Min.			1.2		V
$I_{CONT\ C}$	Input Current				2	µA
SATURATION CONTROL (Pin 19)						
Max. SAT	Over Saturation Value			6		dB
Off SAT	Color Off Value	Referred to over saturation value		-45		dB
DC Nom. S	DC Level for Nominal Saturation			2.75		V
DC Max. S	DC Level for Over Saturation			4.25		V
DC Min. S	DC Level for Minimum Saturation			1.5		V
$I_{CONT\ S}$	Input Current				2	µA
BRIGHTNESS CONTROL (Pin 20)						
$I_{CONT\ B}$	Input Current				2	µA
BRIG	Brightness Range	Referred to nominal input levels (350mV B/W)		± 40		%
DC Max. B	DC Level for Maximum Brightness			4		V
DC Min. B	DC Level for Minimum Brightness			2		V
RGB OUTPUTS (Pins 11-12-13)						
High CLIP	High Clipping Level	Refered to minimal black level		185		%
	Blanking Voltage			0.5		V
	Typical Output B/W	Contrast max. - B/W input 350mV		1.6		V
	Minimum DC Level Cut-off Inserted	Cut-off caps DC voltage = 2.5V		1.7		V
	Maximum DC Level Cut-off Inserted	Cut-off caps DC voltage = V_{CC}		4.8		V
Y BAND	Y Bandwidth	-3dB attenuation	8	15		MHz
B-Y BAND	B-Y Bandwidth	-3dB attenuation	8	10		MHz
R-Y BAND	R-Y Bandwidth	-3dB attenuation	8	10		MHz
RGB BAND	RGB Bandwidth	-3dB attenuation	8	15		MHz
CROSSTALK						
CRRY	RGB/YUV Crosstalk	0 - 5MHz		45		dB
CRYR	RGB1/RGB2 Crosstalk	0 - 5MHz		45		dB
AUTOMATIC CUT-OFF (Pins 10-14-15-18)						
LEA REF	Leakage Current Reference Voltage			2		V
COF REF	Cut-off Reference	Refered to leakage current reference measured on Pin 10		+350		mV
I_{COP}	Capacitor Cut-off Positive Clamping Current			100		µA
I_{CON}	Capacitor Cut-off Negative Clamping Current			100		µA
BS REF	Start Beam Current Detection Reference Voltage	Pin 10		2.5		V
I_{LEAK}	Low Voltage Output Current	V_{10} = 0V		200		µA

5652-04.TBL

ELECTRICAL CHARACTERISTICS (V_{CC} = 8V, T_{amb} = 25°C, unless otherwise specified) (continued)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
AVERAGE BEAM CURRENT LIMITER (Pin 8)						
	Max. Contrast Action	First action (decreasing)		-5		dB
	Max. Brightness Action	After contrast decreasing		80		%
V_{C1TH}	C1 Threshold Voltage			2.5		V
	C1 Discharging Current			10		mA
	Current Ratio between Pin 10 and 8			100		
C2 Y	C2 Min. Voltage	$V_{C1} < V_{C1TH}$		2.2		V
C2 I_C	Max. C2 Charging Current	V_{C1} = 6V		50		µA
C2 T_C	C2 Threshold Voltage for Contrast Action			2.6		V
C2 T_B	C2 Threshold Voltage for Brightness Action			3.2		V
SUPERSANDCASTLE INPUT (Pin 24)						
FT	Frame Threshold			0.7		V
LT	Line Threshold			1.9		V
BGT	Burst Gate Threshold			4		V
I_{OUT} SSC	Output Current	V_{24} = 0V		30		µA
XTAL (Pin 22)						
DC XTAL	DC Level			2.4		V
Z_S XTAL	Output Impedance			400		Ω
62.5kHz OUTPUT (Pin 23)						
Z_S	Output Impedance			250		Ω
DC H	DC Level High			6		V
DC L	DC Level Low			1.3		V
DC	Duty Cycle			100		%

5652-05.TBL

INPUTS/OUTPUTS EQUIVALENT INTERNAL DIAGRAMS

Figure 3 : Pins 1-2-4-5-7-30

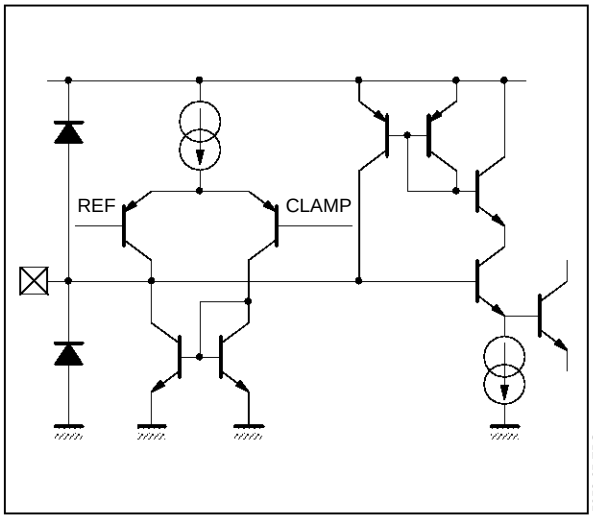


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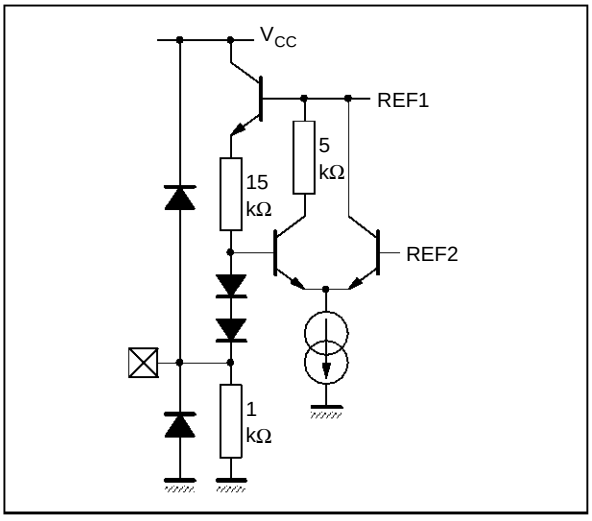
Figure 4 : Pins 3-29



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INPUTS/OUTPUTS EQUIVALENT INTERNAL DIAGRAMS (continued)

Figure 5 : Pins 8-9

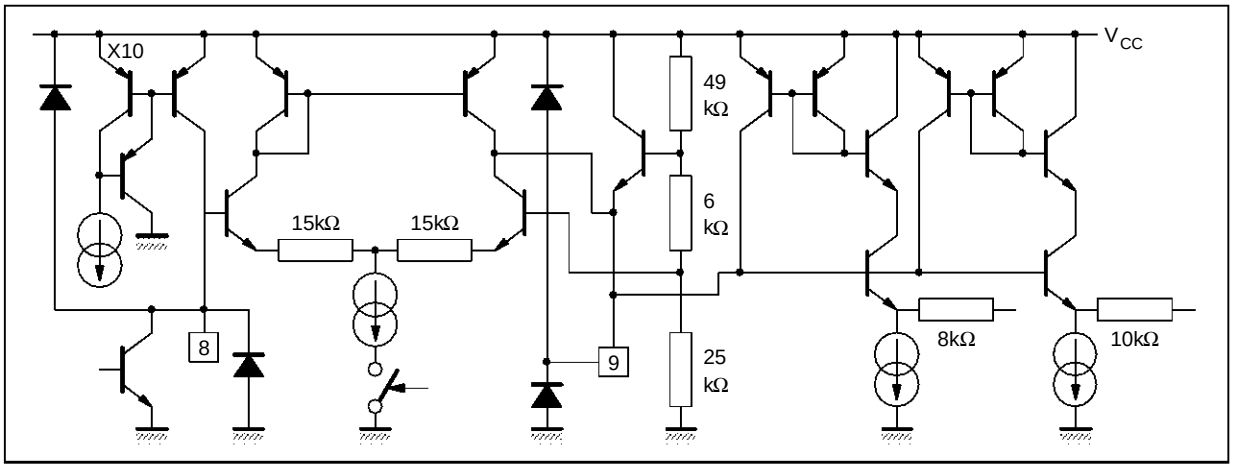


Figure 6 : Pins 10-14-15-18

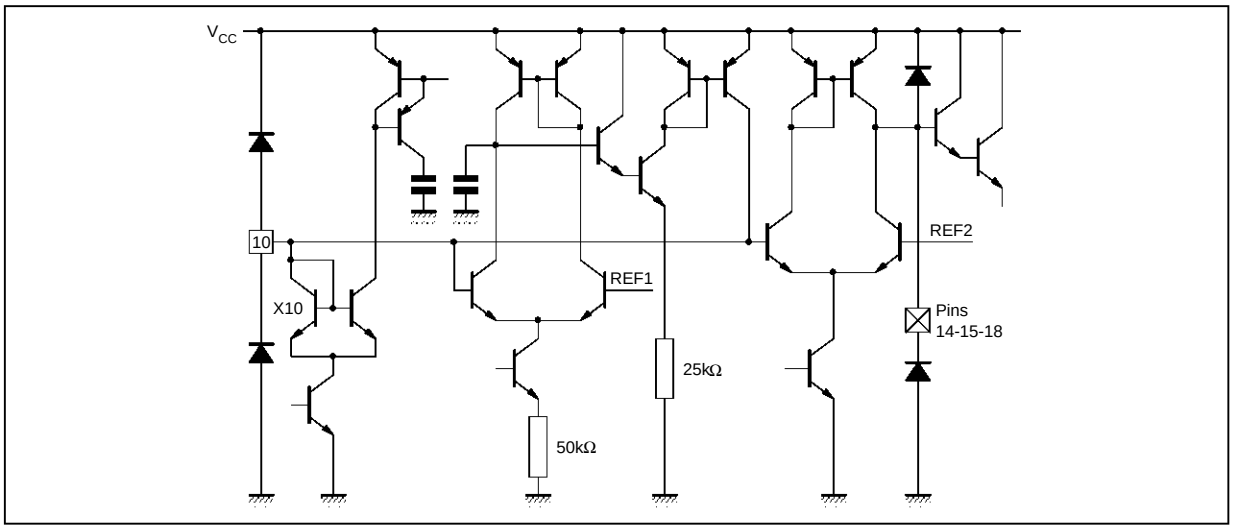


Figure 7 : Pin 19

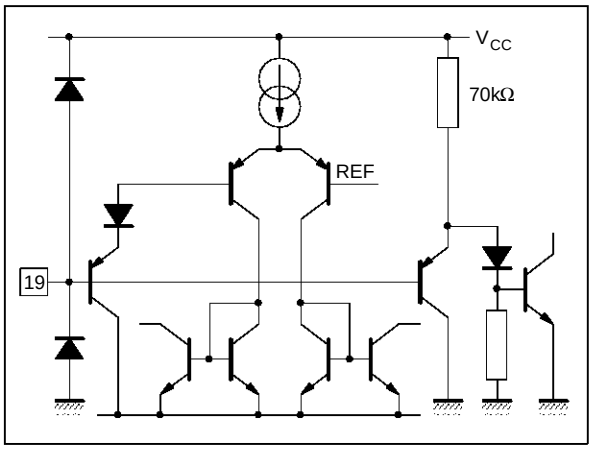
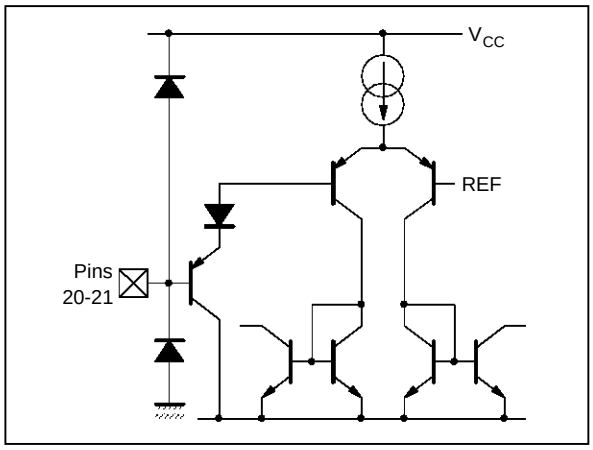


Figure 8 : Pins 20-21



INPUTS/OUTPUTS EQUIVALENT INTERNAL DIAGRAMS (continued)

Figure 9 : Pin 22

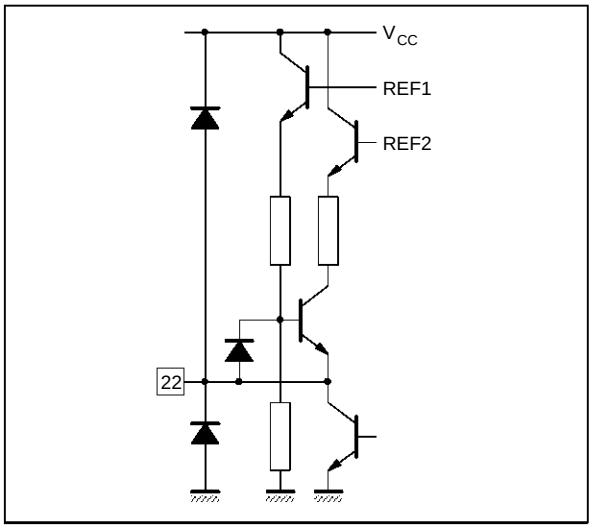


Figure 10 : Pin 23

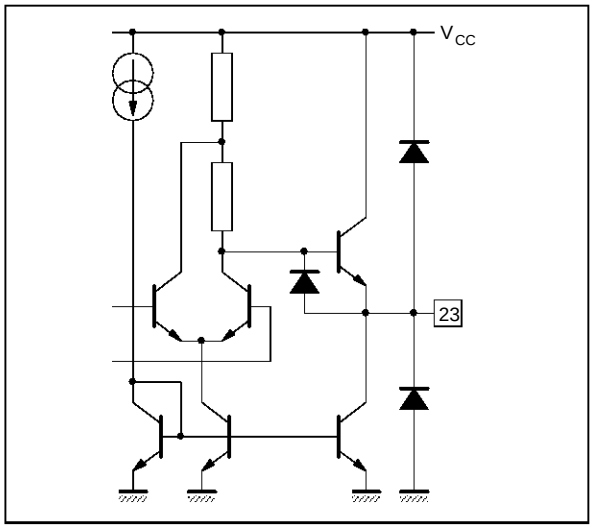


Figure 11 : Pin 24

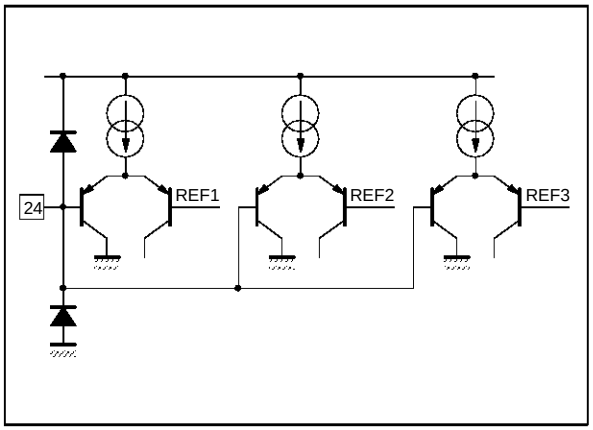


Figure 12 : Pin 25

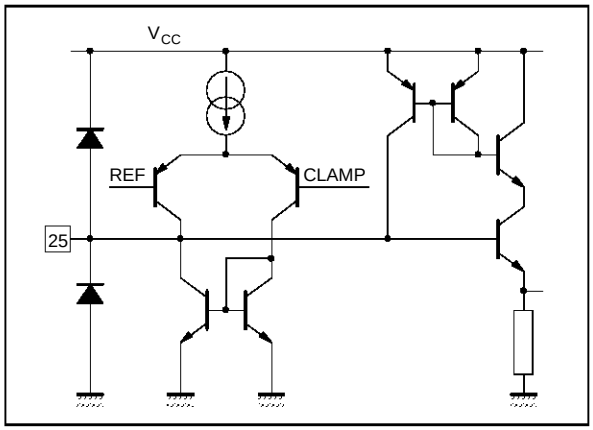


Figure 13 : Pins 26-17

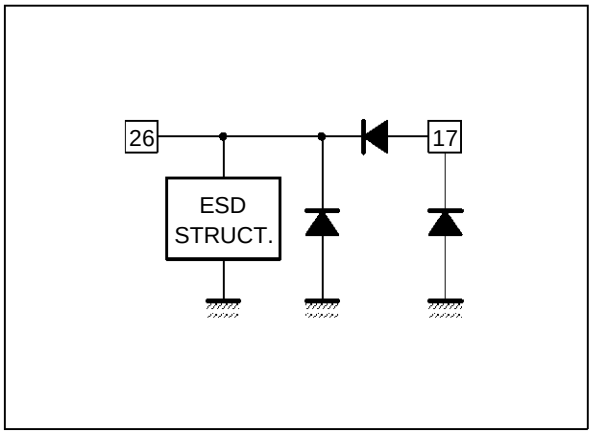


Figure 14 : Pins 27-28

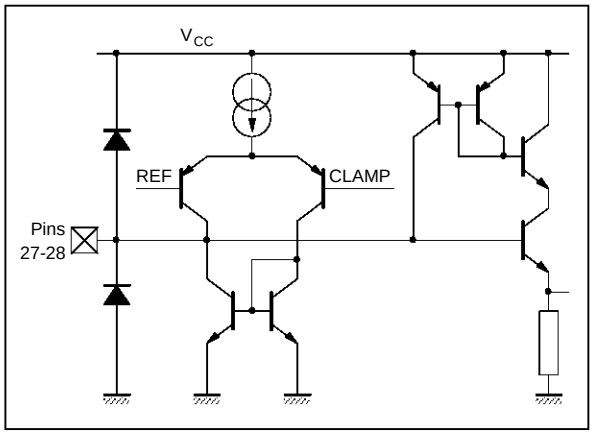


Figure 19 : Beam Current Limiter Action
Contrast Variation = f(V_{BCL2})

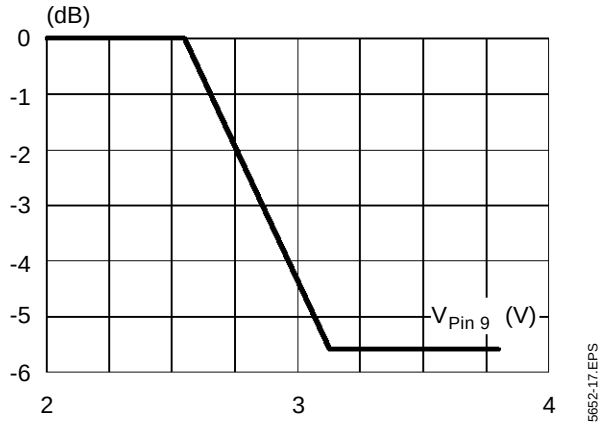


Figure 20 : Beam Current Limiter Action
Brightness Variation = f(V_{BCL2})

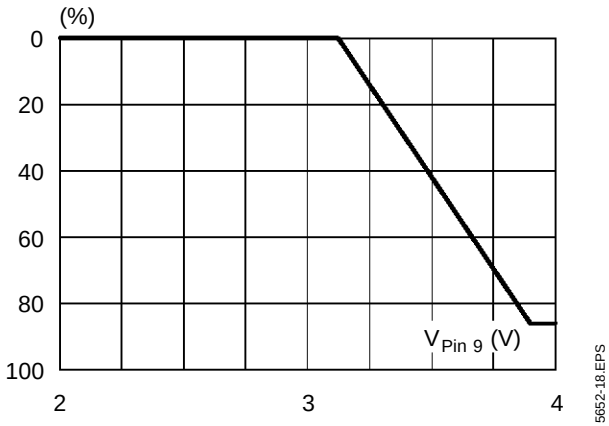


Figure 21 : Contrast Variation

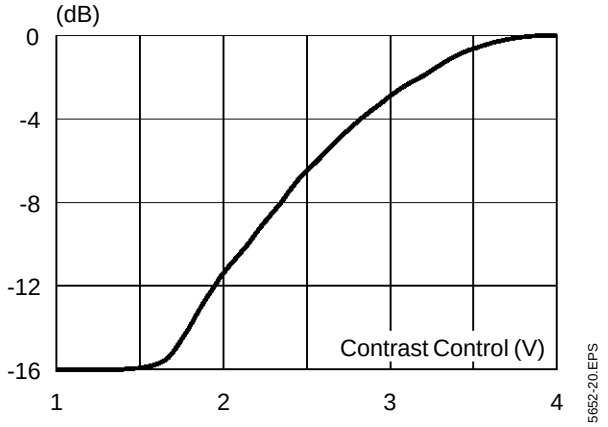


Figure 22 : Saturation Variation

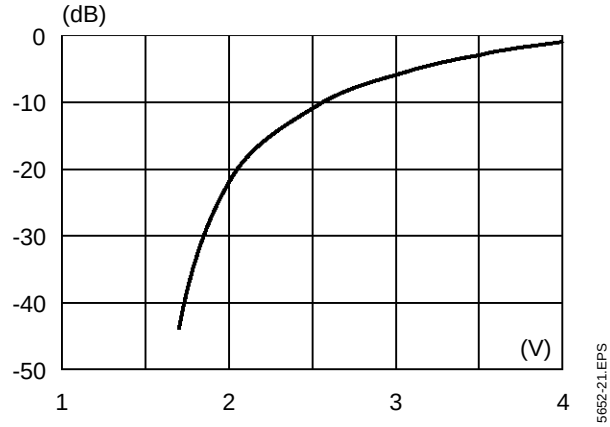
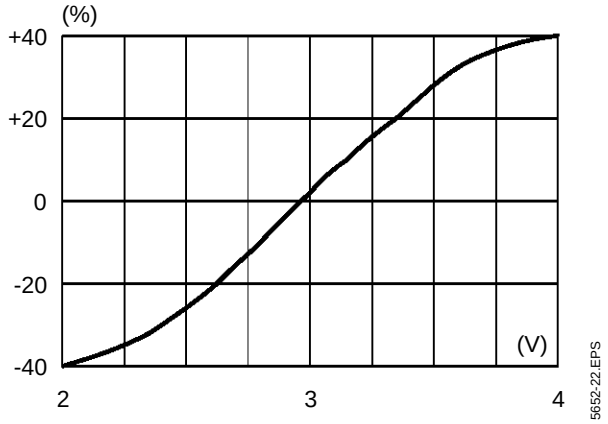
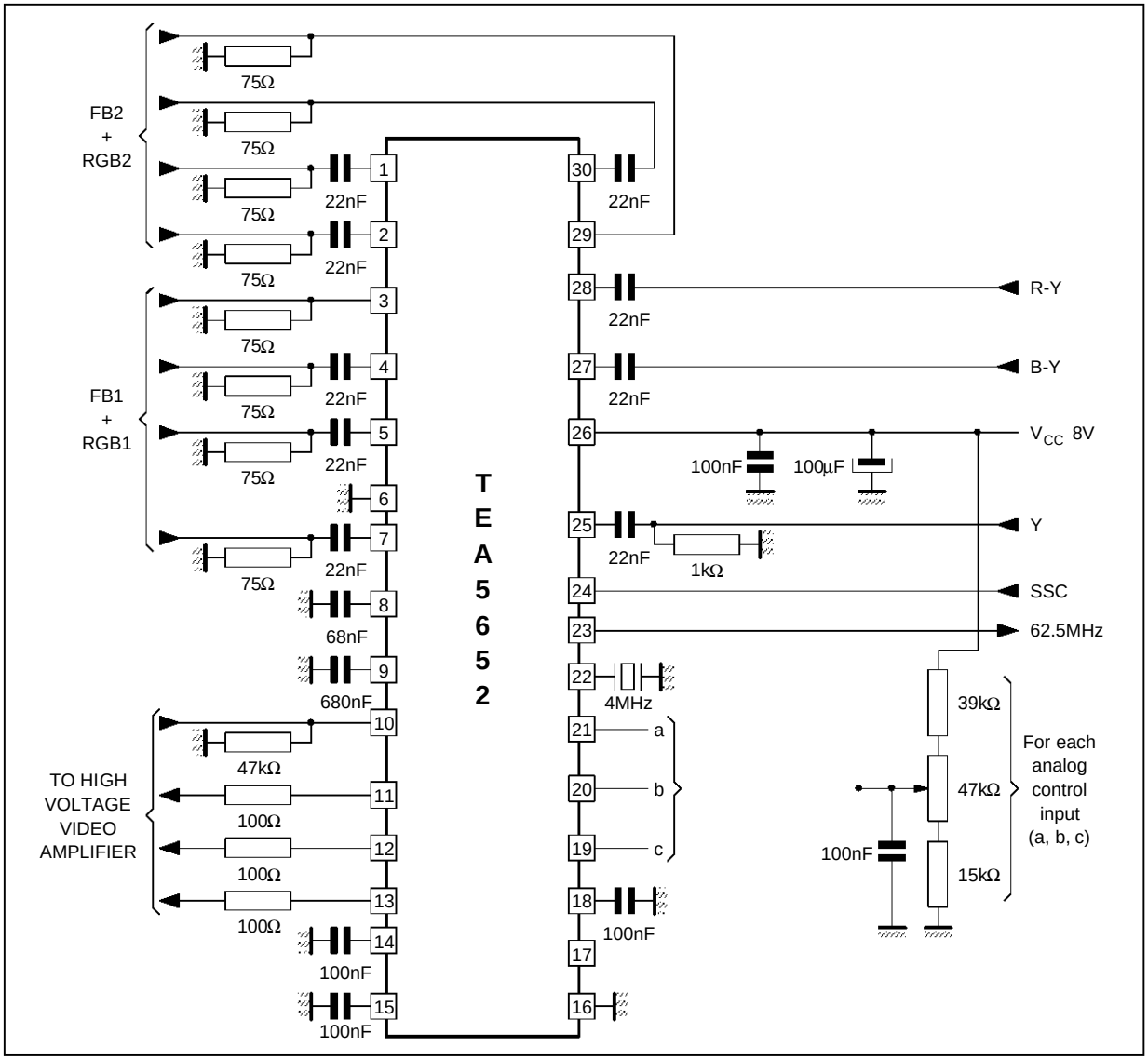


Figure 23 : Brigthness Variation

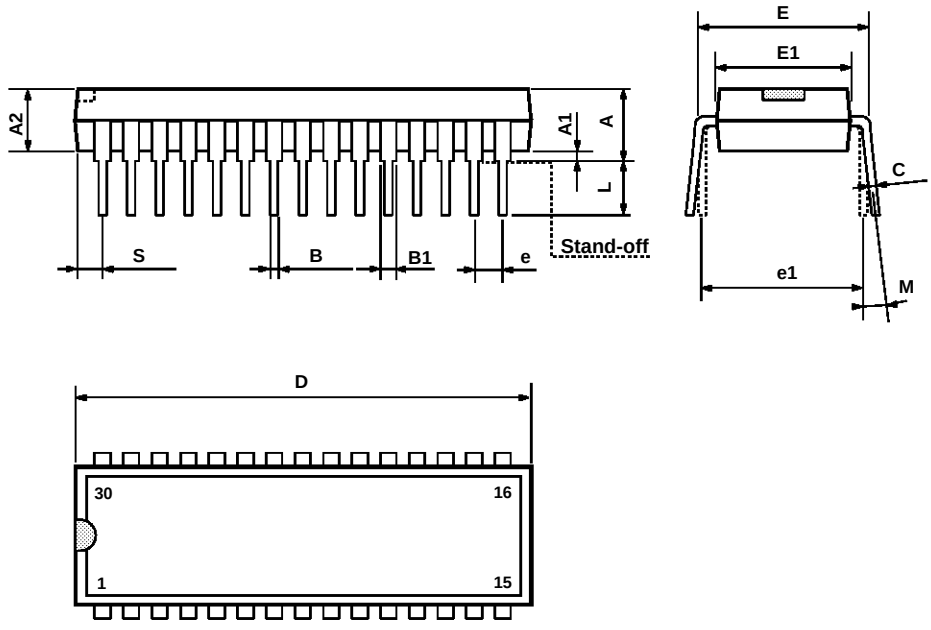


TYPICAL APPLICATION



PACKAGE MECHANICAL DATA

30 PINS - PLASTIC SHRINK DIP



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Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			5.08			0.20
A1	0.51			0.020		
A2	3.05	3.81	4.57	0.12	0.15	0.18
B	0.36	0.46	0.56	0.014	0.018	0.022
B1	0.76	0.99	1.40	0.030	0.039	0.055
C	0.20	0.25	0.36	0.008	0.01	0.014
D	27.43	27.94	28.45	1.08	1.10	1.12
E	10.16	10.41	11.05	0.400	0.410	0.435
E1	8.38	8.64	9.40	0.330	0.340	0.370
e		1.78			0.070	
e1		10.16			0.400	
L	2.54	3.30	3.81	0.10	0.13	0.15
M	0^o (min.), 15^o (max.)					
S	0.31			0.012		

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