

PAL LUMA-CHROMA & DEFLECTION PROCESSOR

PRELIMINARY DATA

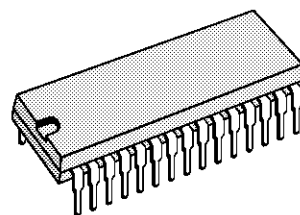
- FEW EXTERNAL COMPONENTS
- RGB AND FAST BLANKING INPUTS
- DC-CONTROLLED BRIGHTNESS, CONTRAST AND SATURATION
- CERAMIC 500kHz VCO FOR LINE DEFLECTION
- NO LINE AND FRAME OSCILLATOR ADJUSTMENTS REQUIRED
- PHASE-LOCKED REFERENCE OSCILLATOR USING A STANDARD 4.43MHz QUARTZ
- OSD CAPABILITY ON OUTPUTS
- VIDEO IDENTIFICATION GENERATOR

DESCRIPTION

The STV2100 is a PAL chroma decoder, video and H/V deflection processor for CTV.

Used with the TDA8222, this IC permits a complete low cost solution with external output stages.

The pin connection allows board compatibility with the PAL/SECAM processor STV2110.



SHRINK DIP30
(plastic package)

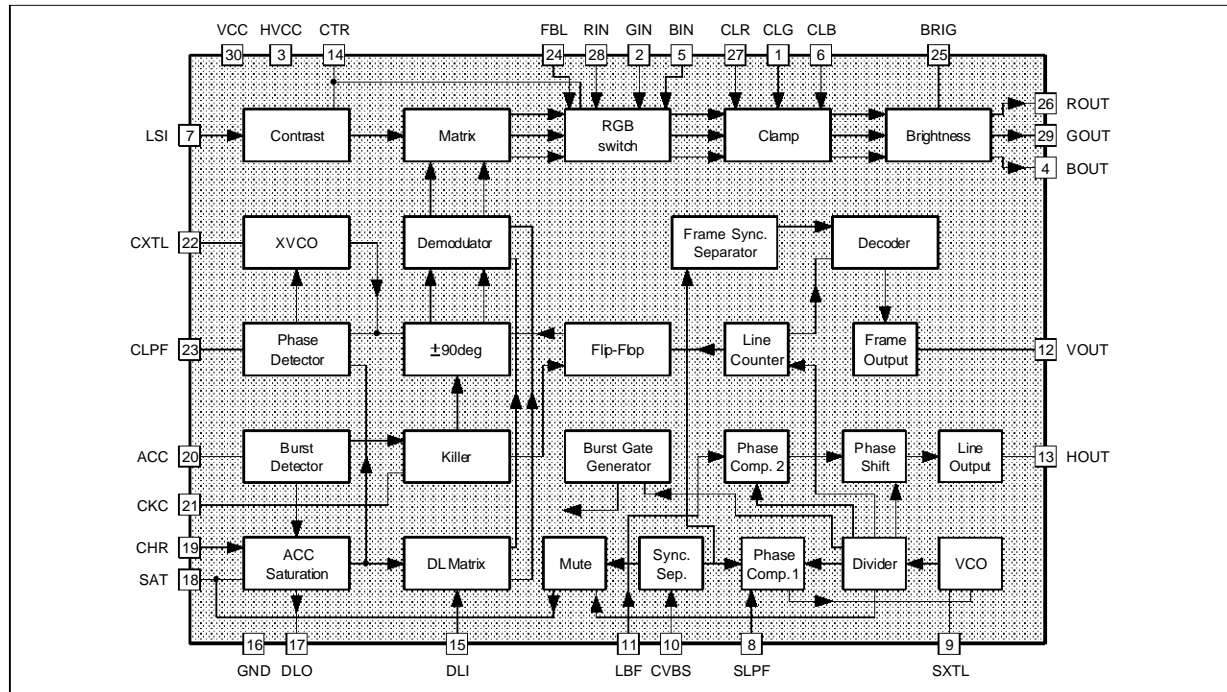
ORDER CODE : STV2100

PIN CONNECTIONS

| | | | | | |
|------------------------|------|----|----|------|-----------------------|
| GREEN CLAMP CAPACITOR | CLG | 1 | 30 | VCC | SUPPLY VOLTAGE INPUT |
| GREEN INPUT | GIN | 2 | 29 | GOUT | GREEN OUTPUT |
| HORIZONTAL VCC | HVCC | 3 | 28 | RIN | RED INPUT |
| BLUE OUTPUT | BOUT | 4 | 27 | CLR | RED CLAMP CAPACITOR |
| BLUE INPUT | BIN | 5 | 26 | ROUT | RED OUTPUT |
| BLUE CLAMP CAPACITOR | CLB | 6 | 25 | BRIG | BRIGHTNESS CONTROL |
| LUMINANCE SIGNAL INPUT | LSI | 7 | 24 | FBL | FAST BLANKING INPUT |
| SCANNING LOOP FILTER | SLPF | 8 | 23 | CLPF | CHROMA LOOP FILTER |
| SCANNING XTAL | SXTL | 9 | 22 | CXTL | CHROMA XTAL |
| COMPOSITE VIDEO SIGNAL | CVBS | 10 | 21 | CKC | KILLER CAPACITOR |
| LINE FLYBACK INPUT | LFB | 11 | 20 | ACC | ACC CONTROL CAPACITOR |
| VERTICAL OUTPUT | VOUT | 12 | 19 | CHR | CHROMA INPUT |
| HORIZONTAL OUTPUT | HOUT | 13 | 18 | SAT | SATURATION CONTROL |
| CONTRAST CONTROL | CTR | 14 | 17 | DLO | CHROMA OUTPUT |
| DELAY CHROMA INPUT | DLI | 15 | 16 | GND | GROUND |

2100-01.EPS

BLOCK DIAGRAM



2100-02.EPS

FUNCTIONAL DESCRIPTION

DEFLECTION

Synchronization Separator

The synchronization separator is based on the bottom of synchronization pulses alignment to an internal reference voltage. An external capacitor permits to align syncro. pulses, two external resistors determines the detection threshold of synchro pulses.

The frame synchronization pulses are locked to a 32µs reference signal to perfect interlacing.

Horizontal Scanning

The horizontal scanning frequency is obtained from a 500kHz VCO. The circuit uses two phase-locked loops (PLL). The first one controls the frequency, the second one, fully integrated, controls the relative phase of the synchronisation and the line flyback signals.

The first PLL has two time constants : a long time constant during the picture to have a good noise immunity, a short time constant at the beginning of the frame to recapture faster the phase in case of VCR video signal. More over, the PLL is in short time constant three lines before frame pulses occurred, it permits to ensure good interlacing when the video signal comes from a VCR tape with high phase error. The horizontal output signal is 28µs width. On starting up, horizontal pulses are enabled at VCC = 6.8V.

On shutting down, horizontal pulses are inhibited for VCC = 6.2V .

The vertical output signal is 10.5 lines width. It permits to drive a sawtooth generator like TDA1771.

A video recognition function permits to sent the information of no video identification to SAT pin : it forces a low level voltage on this pin.

CHROMA

ACC Amplifier, DL Matrix and Demodulators

The ACC amplifier involves three gain stages : the first one controlled by saturation control voltage, the second one controlled by contrast control voltage, the third one controlled by ACC control voltage. The second stage permits to have a good tracking between the luminance and chrominance signals. The dynamic range of ACC is over than 30dB. The burst signal is not affected by contrast and saturation gain stages. The chrominance output signal is fed to the external delay line.

Then the adding and subtraction of the direct and delayed signals are performed by the DL matrix function. The outputs signals U and V are fed to U and V demodulators which consist in two synchronous detectors. The U demodulator multiplies the (B-Y) signal with the 0°, 4.43MHz reference signal. The V demodulator multiplies the (R-Y) signal with the alternative ± 90°, 4.43MHz reference signal.

4.43MHz Phase Locked Loop

The oscillating frequency of the 4.43Mhz crystal oscillator is controlled by the output voltage of the loop filter. The phase detector will lock the 90° reference signal to the direct burst signal. A 90° phase shifter permits to recover the 0° reference signal. A flip-flop driven by line pulses permits to generate the alternative ± 90° signal.

ACC Control and Color Killer

The direct burst signal is demodulated with the ± 90° reference signal. The demodulation result is used both by ACC control and killer functions.

If the demodulation result is always positive, the killer capacitor is charged and the PAL signal is identified (color ON).

When demodulation result is always negative, the killer capacitor is discharged, when the voltage across the capacitor reaches the flip-flop inhibition level, the alternance of ± 90° signal is reversed, then the reference signal is in phase with alternative burst and the killer capacitor is charged again.

In case of no video signal, the killer voltage is maintained to a middle voltage below color OFF

threshold.

The ACC control voltage is obtained by the peak detection of the demodulated output signal.

VIDEO

The luminance input is controlled by the contrast control stage which range is 20dB.

The luminance and color difference signals are added in the video matrix circuit to obtain the color signals.

The color signals are sent to a RGB switch which will drive to the outputs either internal RGB signals or external RGB signals. With a second threshold on fast blanking input, it is possible to blank the RGB outputs and thus to connect RGB On Screen Display signals directly on the outputs.

The RGB inputs are controlled by a 12dB range contrast control stage.

The black levels are controlled thanks three external capacitors. To avoid the black level of the inserted signal differing from the black level of the normal video signal, the external RGB are clamped to the black level of the luminance signal. Therefore, an AC coupling is required for the RGB inputs.

ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|------------------|---------------------|-----------|------|
| V _{CC} | Supply Voltage | 12 | V |
| T _{stg} | Storage Temperature | -55, +150 | °C |

2100-01.TBL

THERMAL DATA

| Symbol | Parameter | Value | Unit |
|----------------------|-------------------------------------|---------|------|
| R _{th(j-a)} | Junction-ambient Thermal Resistance | Max. 80 | °C/W |

2100-02.TBL

DC AND AC ELECTRICAL CHARACTERISTICS (V_{CC} = 9V, T_{amb} = 25°C unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|------------------------|--|-----------------|------|------|------|------|
| HV _{CC} | Scanning Supply Voltage (Pin 3) | | 8 | 9 | 10 | V |
| V _{CC} | Video & Chroma Supply Voltage (Pin 30) | | 8 | 9 | 10 | V |
| I _{CCh} | Scanning Supply Current (Pin 3) | No load | | 20 | 30 | mA |
| I _{CCv&c} | Video & Chroma Supply Current (Pin 30) | No load | | 30 | 50 | mA |
| P _D | Total Power Dissipation | No load | | 450 | 800 | mW |

LUMINANCE INPUT (Pin 7)

| | | | | | | |
|------------------|--|--|--|-------|-----|------------------|
| V _{BW7} | Input Level before Clipping (black to white) | | | | 450 | mV _{PP} |
| V _{DC7} | DC Operating Voltage | No input signal | | 2.8 | | V |
| I ₇ | Input Current | <ul style="list-style-type: none"> ● During burst period ● Out of burst period | | ± 100 | 5 | μA μA |
| G ₇ | Luma Gain | | | 12 | | |
| BW ₇ | Bandwidth | -3dB | | 5 | | MHz |

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STV2100

DC AND AC ELECTRICAL CHARACTERISTICS ($V_{CC} = 9V$, $T_{amb} = 25^{\circ}C$ unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------------------|--------------------------|-----------------|------|--------|------|------|
| CONTRAST CONTROL (Pin 14) | | | | | | |
| V ₁₄ | Contrast Control Voltage | | | 2 to 4 | | V |
| G ₁₄ | Contrast Control Range | | | 20 | | dB |
| I ₁₄ | Input Current | | | | 20 | μA |

BRIGHTNESS CONTROL (Pin 25)

| | | | | | | |
|-----------------|----------------------------|--|--|----------|----|----|
| V ₂₅ | Brightness Control Voltage | | | 1.5 to 7 | | V |
| I ₂₅ | Input Current | | | | 10 | μA |

RGB OUTPUTS (Pins 26-29-4)

| | | | | | | |
|----------------------------|--|--|--|-----|-----|-----------------|
| V _{BW26-29-4} | Output Signal Amplitude (black to white) | <ul style="list-style-type: none"> ● 0.35V B to W @ Pin 7 ● Contrast @ max ● Sat. @ min ● Brig. @ 2V | | 4.2 | | V |
| V _{BLU26-29-4} | Blue Channel Output Amplitude (No Y) | <ul style="list-style-type: none"> ● At Pin 19 (B-Y) signal : 300mV_{PP} with burst amplitude 300mV ● Contrast @ typ ● Sat. @ typ ● Brig. @ 4V | | 5.6 | | V _{PP} |
| I ₂₆₋₂₉₋₄ | Individual Output Sinking Current | | | 2 | | mA |
| V _{M26-29-4} | Maximum Peak White Level | | | 8 | | V |
| V _{blank 26-29-4} | Blanking Level | | | 0.7 | | V |
| ΔV ₂₆₋₂₉₋₄ | Difference in the Black Level between the three Channels | | | 50 | 500 | mV |
| ΔV _{CTR} | Variation of Black Level with Contrast | | | | 120 | mV |
| ΔV _{REL} | Relative Black Level Variation between the three Channels during Variation of CTR (10dB), BRIG (± 1V), V _{CC} (± 10%) | | | | 20 | mV |
| ΔV _{video-RGB} | Difference between Black Level of Video and Inserted Signal at the Output | | | | 200 | mV |
| ΔV _{temp} | Black Level Thermal Drift | | | 0.5 | | mV/°C |
| REJ1 | Crosstalk External RGB → Video | 1MHz | | -50 | | dB |
| REJ2 | Crosstalk Video → External RGB | 1MHz | | -50 | | dB |

RGB CLAMP CAPACITORS (Pins 27-1-6)

| | | | | | | |
|-----------------------|-----------------|--|--|-------|---|----|
| I ₂₇₋₁₋₆ | Control Current | | | ± 100 | | μA |
| I _{l 27-1-6} | Leakage Current | | | | 5 | μA |

RGB INPUTS (Pins 28-2-5)

| | | | | | | |
|--------------------------|------------------------------|--------------|--|-----|---|-----|
| V _{BW28-2-5} | Maximum Input Level (B to W) | | | | 2 | V |
| V _{clamp28-2-5} | Clamp Level | Contrast max | | 2.9 | | V |
| BW ₂₈₋₂₋₅ | Bandwidth | -3dB | | 8 | | MHz |
| G _{CTR} | RGB Contrast Control Range | | | 12 | | dB |
| G ₂₈₋₂₋₅ | RGB Gain | | | 6 | | |

FAST BLANKING INPUT (Pin 24)

| | | | | | | |
|---------------------|------------------------------|-------------|--|-----|-----|----|
| V _{TH1-24} | First Threshold (switching) | | | 0.7 | | V |
| V _{TH2-24} | Second Threshold (switching) | | | 2.1 | | V |
| I ₂₄ | Input Current | 0V @ Pin 24 | | | 100 | μA |
| T _{switch} | Switching Delay | | | 50 | | ns |
| T _{blank} | Blanking Delay | | | 50 | | ns |

CHROMINANCE INPUT (Pin 19)

| | | | | | | |
|-----------------------|---|--|--|----|-----|------------------|
| V ₁₉ | Input Level before Clipping | | | | 900 | mV _{PP} |
| V _{burst-19} | Minimum Burst Signal Amplitude within the ACC Control Range | | | 30 | | mV _{PP} |

DC AND AC ELECTRICAL CHARACTERISTICS ($V_{CC} = 9V$, $T_{amb} = 25^{\circ}C$ unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--|----------------------|--|------|------|------|------|
| CHROMINANCE INPUT (Pin 19) (continued) | | | | | | |
| G_{ACC} | ACC Control Range | Change of burst over whole ACC control range < 1dB | 30 | | | dB |
| R_{19} | Input Impedance | | | 8 | | k |
| V_{DC-19} | DC Operating Voltage | No input signal | | 2.8 | | V |

SATURATION CONTROL INPUT (Pin 18)

| | | | | | | |
|--------------|---|--|--|-----|----|---------|
| I_{18} | Input Current | | | | 10 | μA |
| SAT-CTR | Tracking between Luminance and Chrominance Signals over 10dB Contrast Control | | | | 2 | dB |
| V_{low-18} | Low Level when no Video Recognition | | | 100 | | mV |

ACC CAPACITOR (Pin 20)

| | | | | | | |
|-----------|------------------|--------------------------|--|-----|---|---------|
| I_{20} | Charging Current | During burst gate period | | 200 | | μA |
| I_{l20} | Leakage Current | Out of burst gate period | | | 5 | μA |

KILLER CAPACITOR (Pin 21)

| | | | | | | |
|--------------|-----------------------------------|------------------|--|-----|---|---------|
| V_{OFF-21} | Collor off Voltage | No chroma signal | | 4.9 | | V |
| V_{ON-21} | Color on Voltage | | | 5.4 | | V |
| V_{INH-21} | PAL Flip-flop Inhibition Level | | | 3.2 | | V |
| I_{21} | Control Current | | | 200 | | μA |
| I_{l21} | Leakage Current | | | | 5 | μA |
| V_{nom-21} | Voltage with Nominal Input Signal | | | 6.0 | | V |

PLL LOOP FILTER (Pin 23)

| | | | | | | |
|-----------|-----------------|--|--|-----|---|---------|
| I_{23} | Control Current | | | 800 | | μA |
| I_{l23} | Leakage Current | | | | 5 | μA |

CHROMA XTAL (Pin 22)

| | | | | | | |
|------|----------------|--|--|-----|--|----|
| CR22 | Catching Range | | | 700 | | Hz |
|------|----------------|--|--|-----|--|----|

SUBCARRIER OUTPUT (Pin 17)

| | | | | | | |
|----------------|------------------------|--------------------------|--|-----|--|----------|
| $V_{burst-17}$ | Output Burst Amplitude | Within ACC control range | | 2.6 | | V_{PP} |
|----------------|------------------------|--------------------------|--|-----|--|----------|

DELAYED CHANNEL INPUT (Pin 15)

| | | | | | | |
|-------------|----------------------|-----------------|--|-----|--|---|
| V_{DC-15} | DC Operating Voltage | No input signal | | 2.2 | | V |
| R_{15} | Input Impedance | | | 8 | | k |

COMPOSITE VIDEO BASE BAND SIGNAL (Pin 10)

| | | | | | | |
|--------------|--------------------|--------------------|-----|-----|-----|----------|
| V_{REF-10} | Voltage Reference | $I_{10} = -1\mu A$ | 0.6 | 0.8 | 1.0 | V |
| V_{10} | Video Input Signal | | | | 2.5 | V_{PP} |

SCANNING VCO (Pin 9)

| | | | | | | |
|-----------------|---------------------------------------|--|--|-----------|--|-----|
| F_9 | Frequency after Divider | | | 15.625 | | kHz |
| CR ₉ | Frequency Control Range after Divider | | | ± 700 | | Hz |

PLL LOOP FILTER (Pin 8)

| | | | | | | |
|--------------|-------------------------------|--|--|------|--|----|
| I_{low-8} | Output Current Low Loop Gain | | | 0.15 | | mA |
| I_{high-8} | Output Current High Loop Gain | | | 0.40 | | mA |

LINE FLYBACK INPUT (Pin 11)

| | | | | | | |
|-------------------------|--|--|------|-----|---|----------|
| V_{TH-11} | Threshold | | | 0 | | V |
| V_{11} | Line Flyback Amplitude | | 0.8 | | | V_{PP} |
| V_{DC-11} | Minimum DC Voltage | | -0.4 | | | V |
| I_{11} | Input Current | | | | 5 | μA |
| D _{11/26-28-4} | Delay between LFB Pulse and Line Blanking on RGB Outputs | | | 200 | | ns |

2100-05.TBL

STV2100

DC AND AC ELECTRICAL CHARACTERISTICS ($V_{CC} = 9V, T_{amb} = 25^{\circ}C$ unless otherwise specified)

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

HORIZONTAL OUTPUT (Pin 13)

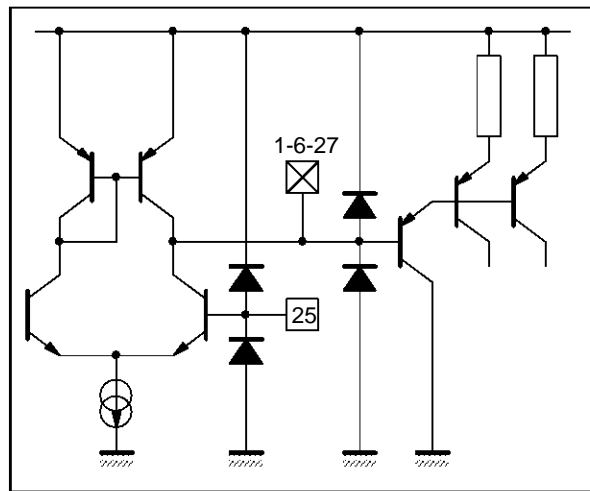
| | | | | | | |
|-----------------|---------------------------------|-----------------|----|-----|----|---------|
| T_{13} | Output Pulse Width | | 26 | 28 | 29 | μs |
| V_{low-13} | Output Voltage (open collector) | $I_{13} = 10mA$ | | 1 | | V |
| $V_{start-13}$ | V_{CC} Start Level | | | 6.8 | | V |
| $V_{stop-13}$ | V_{CC} Stop Level | | | 6.2 | | V |
| Δt_{13} | $\phi 2$ Phase Range | | | 10 | | μs |

VERTICAL OUTPUT (Pin 12)

| | | | | | | |
|--------------|---------------------------------|-----------------|--|------------|--|-------|
| T_{12} | Output Pulse Width | | | 10.5 | | lines |
| T_{sync} | Frame Synchro. Window | | | 248 to 352 | | line |
| V_{low-12} | Output Voltage (open collector) | $I_{12} = 10mA$ | | 1 | | V |

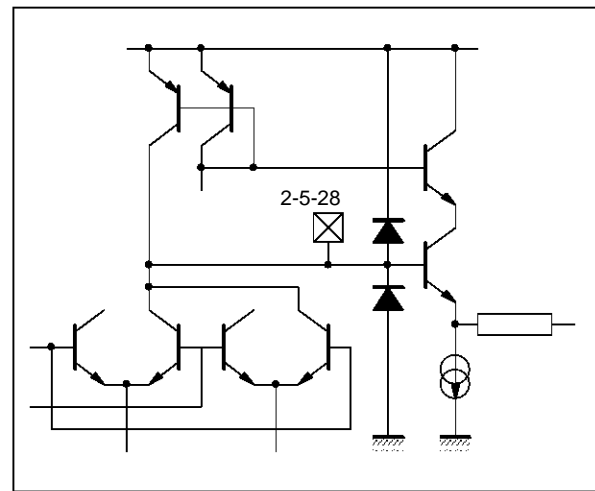
2100-06.TBL

Figure 1 : Pins 1-6-27-25 (CLG, CLB, CLR, BRIG)



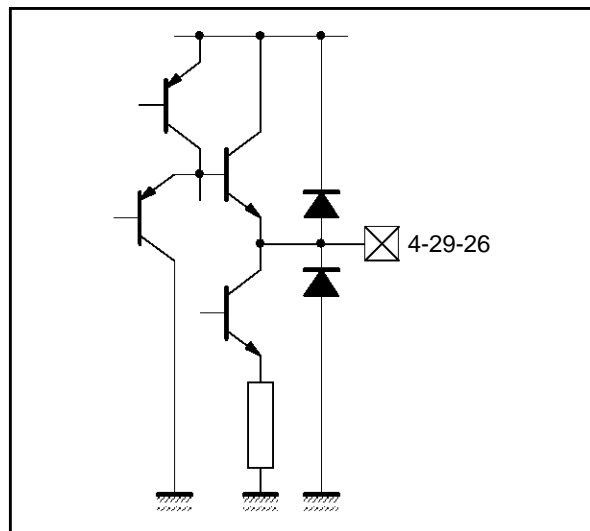
2100-03.EPS

Figure 2 : Pins 2-5-28 (G_{IN}, B_{IN}, R_{IN})



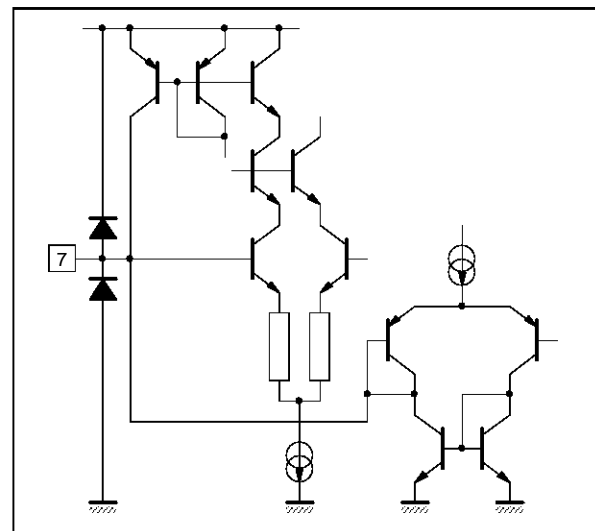
2100-04.EPS

Figure 3 : Pins 4-29-26 (B_{OUT}, G_{OUT}, R_{OUT})



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Figure 4 : Pin 7 (LSI)



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Figure 5 : Pin 8 (SLPF)

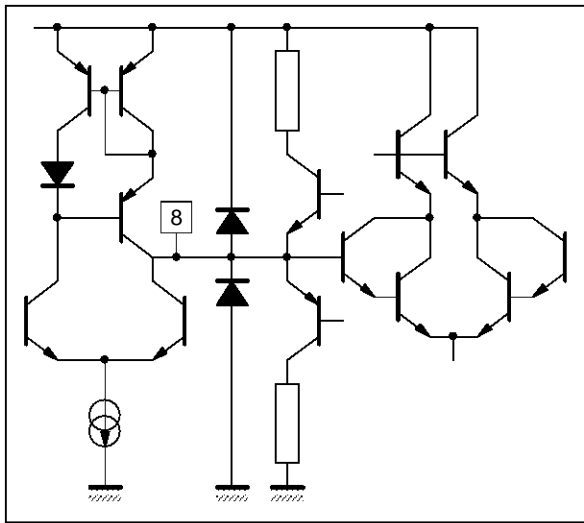


Figure 6 : Pin 9 (SXTL)

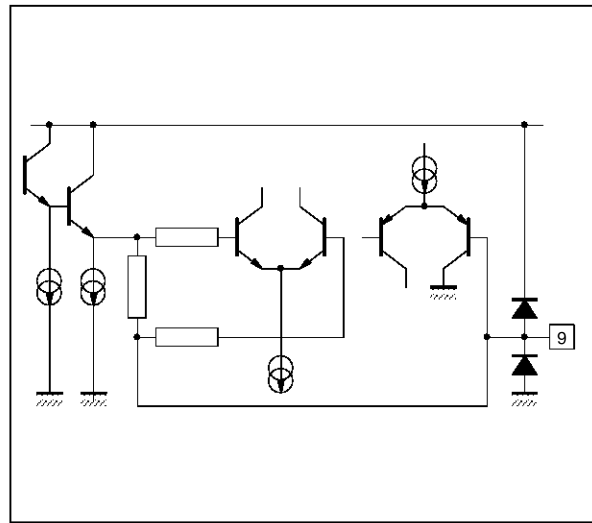


Figure 7 : Pin 10 (CVBS)

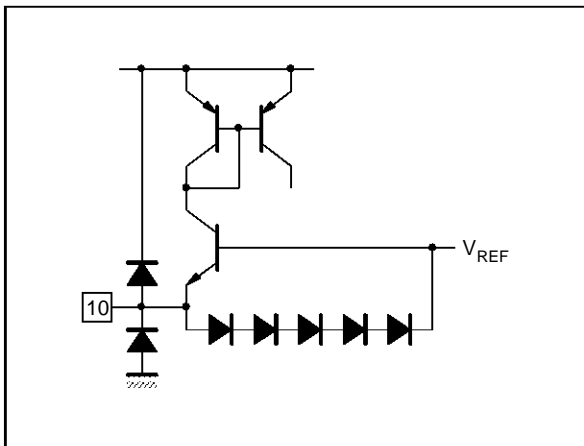


Figure 8 : Pin 11 (LFB)

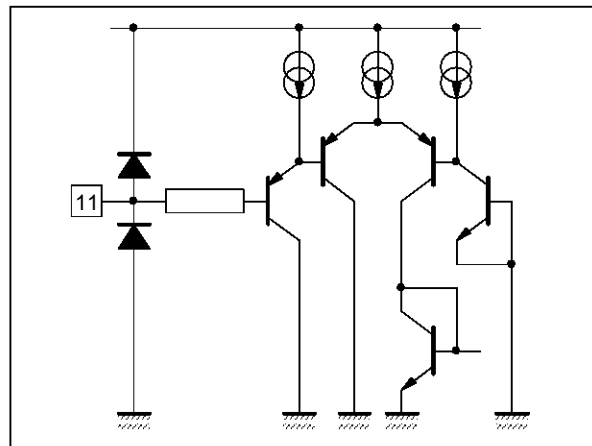


Figure 9 : Pins 12-13 (VOUT, HOUT)

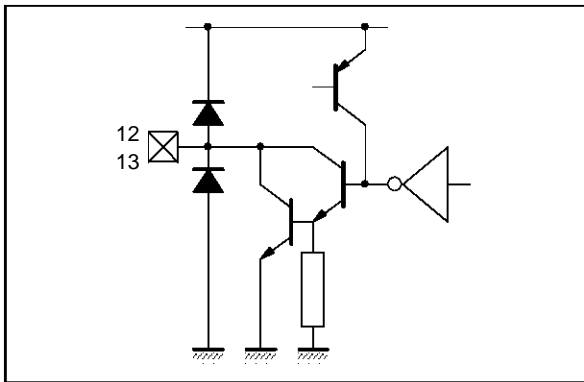


Figure 10 : Pin 14 (CTR)

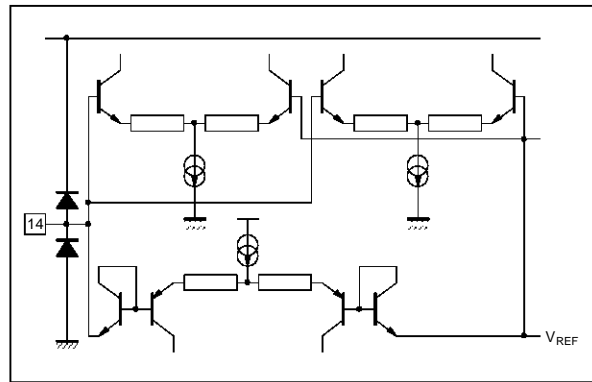
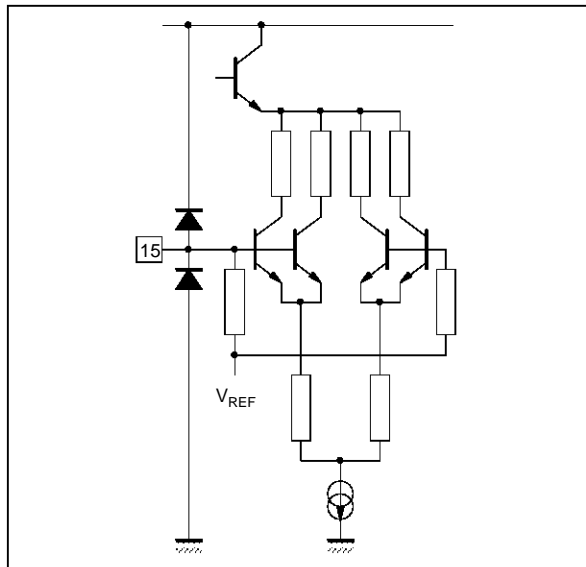
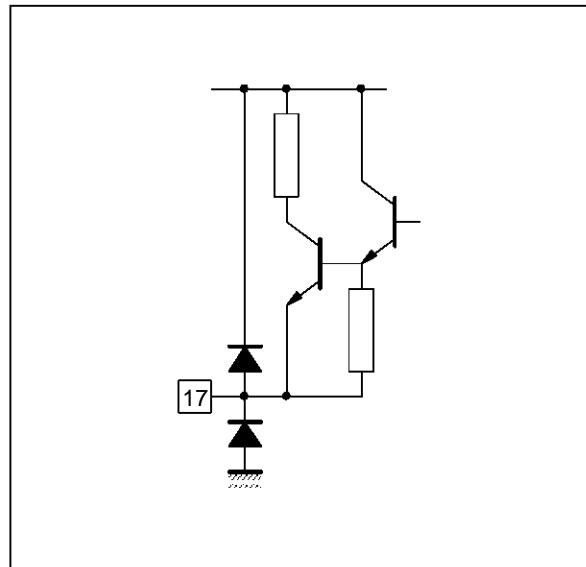


Figure 11 : Pin 15 (DLI)



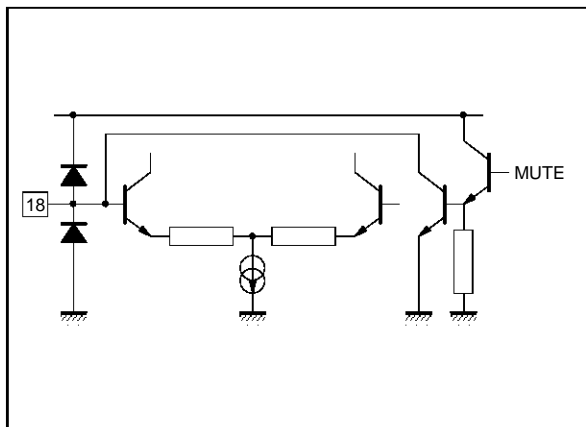
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Figure 12 : Pin 17 (DLO)



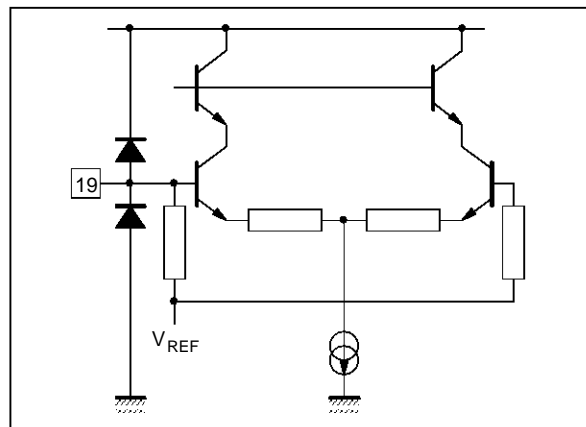
2100-14.EPS

Figure 13 : Pin 18 (SAT)



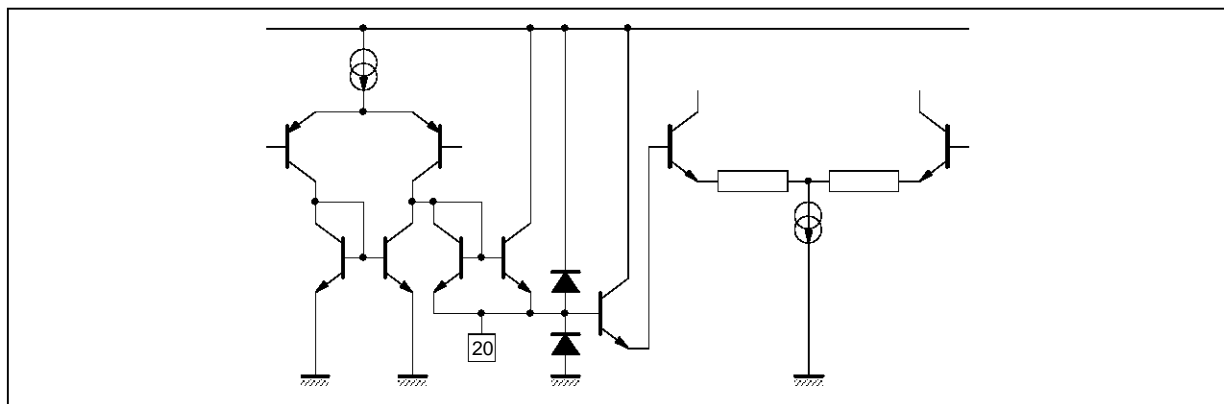
2100-15.EPS

Figure 14 : Pin 19 (CHR)



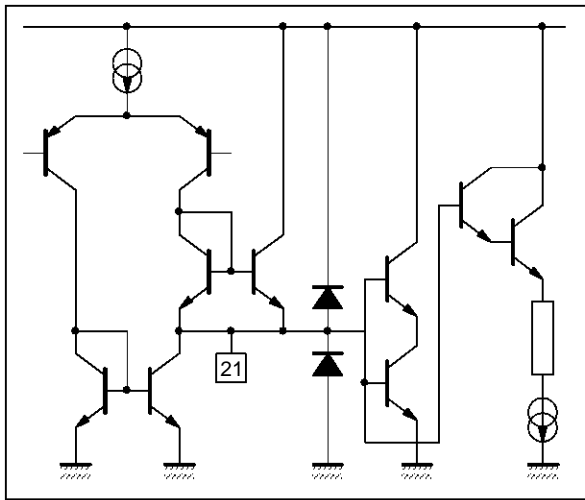
2100-16.EPS

Figure 15 : Pin 120 (ACC)



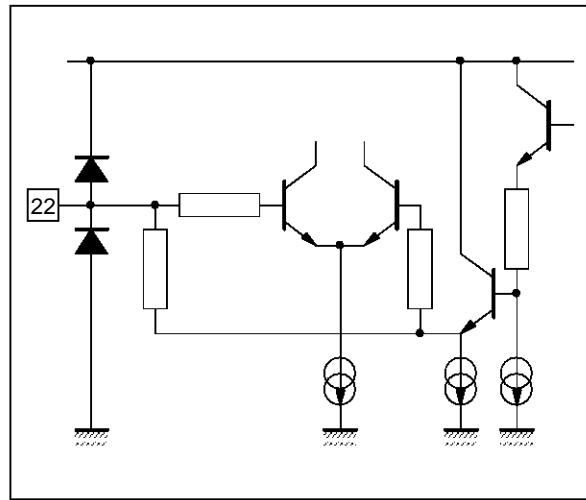
2100-17.EPS

Figure 16 : Pin 21 (CKC)



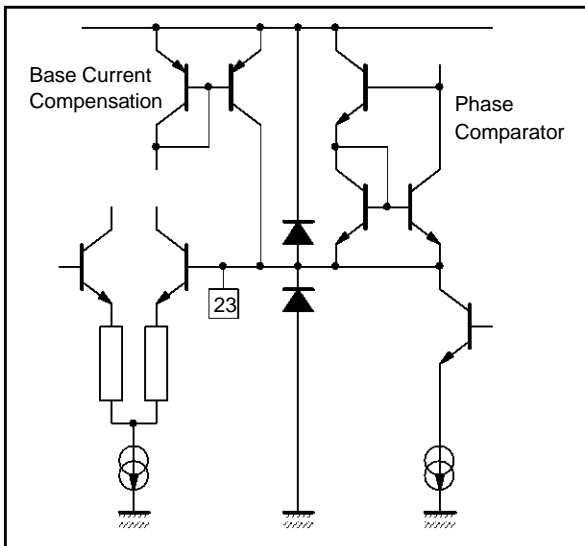
2100-18.EPS

Figure 17 : Pin 22 (CXTL)



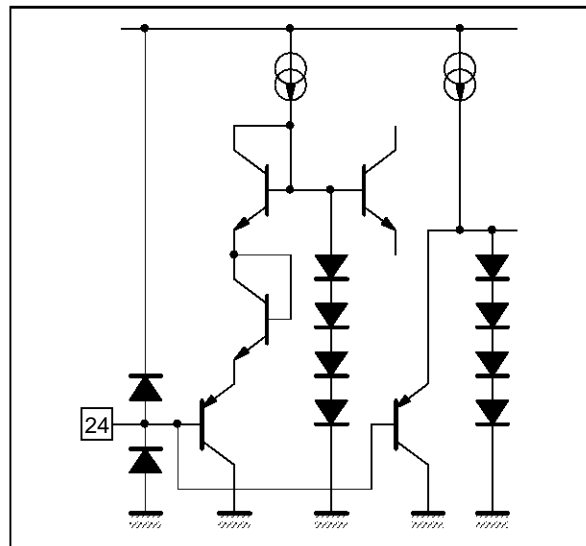
2100-19.EPS

Figure 18 : Pin 23 (CLPF)



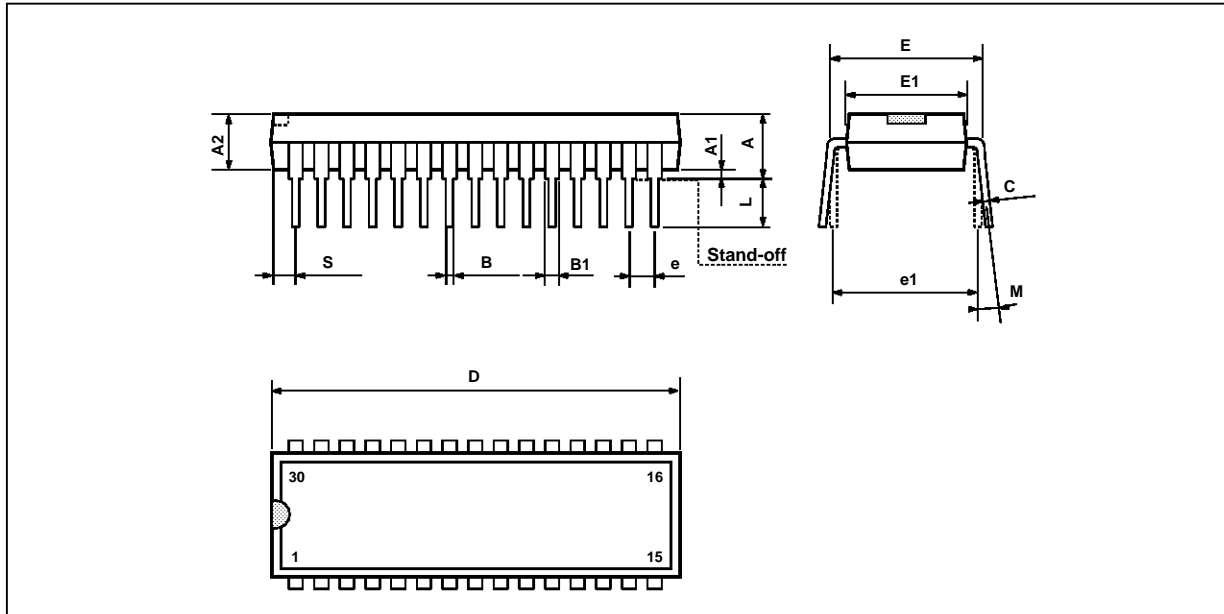
2100-20.EPS

Figure 19 : Pin 24 (FBL)



2100-21.EPS

PACKAGE MECHANICAL DATA
30 PINS - PLASTIC SHRINK



PMSDIP30.EPS

| 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° (min.), 15° (max.) | | | | | |
| S | 0.31 | | | 0.012 | | |

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