

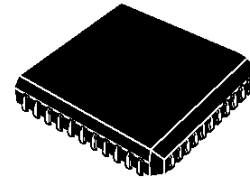
## PAL/NTSC DIGITAL ENCODER

ADVANCE DATA

- BOTH 625 & 525 LINES MULTIPLEXED 8 BIT DIGITAL INPUT ACCORDING TO CCIR 601-2 AND REC 656
- NTSC M, PAL M, PAL B, D, G, H, I, PAL N (ARGENTINA) PROGRAMMABLE OUTPUT
- COMPOSITE OR LINE SYNCHRONISM OUTPUT
- CVBS, Y, C ANALOG OUTPUTS THROUGH 9 BIT DACs
- RGB ANALOG OUTPUTS THROUGH 8 BIT DACs
- OSD INSERTION WITH CLUT AND 6.75MHz OUTPUT CLOCK REFERENCE
- TRUE 27MHz MODULATOR
- TRUE NTSC ENCODING WITH I, Q AXIS
- OVERSAMPLING TO 27MHz FOR EASY OUTPUT FILTERING
- ODD/EVEN SYNCHRONISM INPUT/OUTPUT
- ON CHIP TEST PATTERN GENERATOR
- I<sup>2</sup>C BUS CONTROLLED
- EASY CONFIGURATION TO ANY STANDARD WITH ONE REGISTER LOADING

### DESCRIPTION

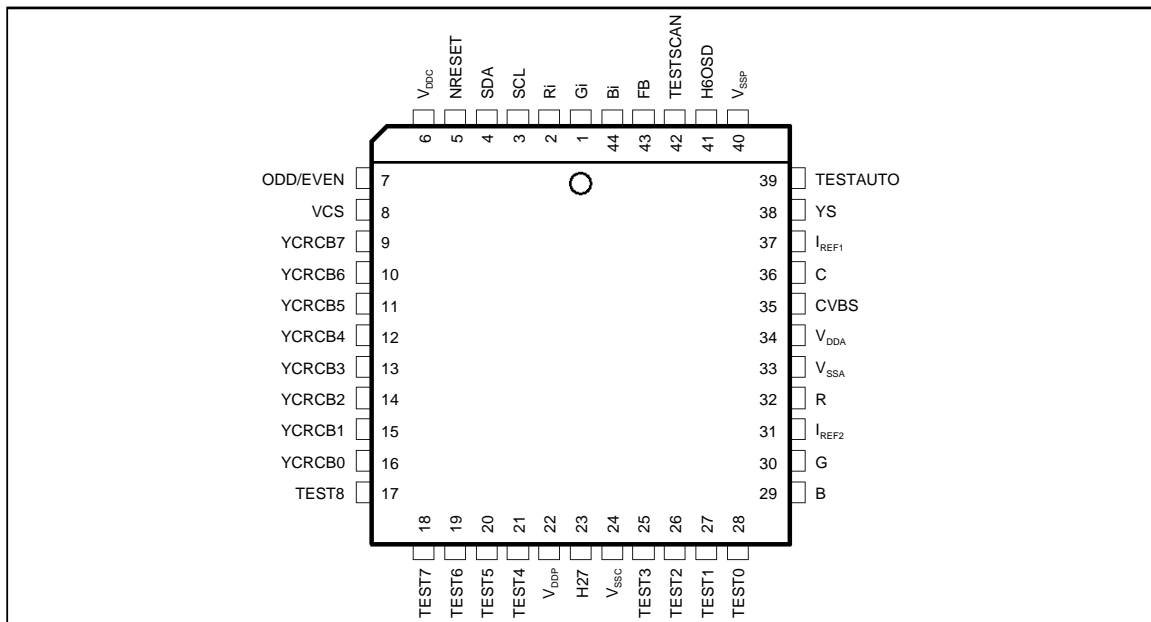
The STV0116 converts the digital output of a Video MPEG decoder into a standard analog base band NTSC/PAL signal, with a modulated subcarrier. Both composite and SVHS format video signals are simultaneously delivered to 3 analog outputs. The STV0116 includes additionally three analog RGB outputs to be used for the SCART plug.



**PLCC44**  
(Plastic Chip Carrier)

**ORDER CODE : STV0116**

### PIN CONNECTIONS

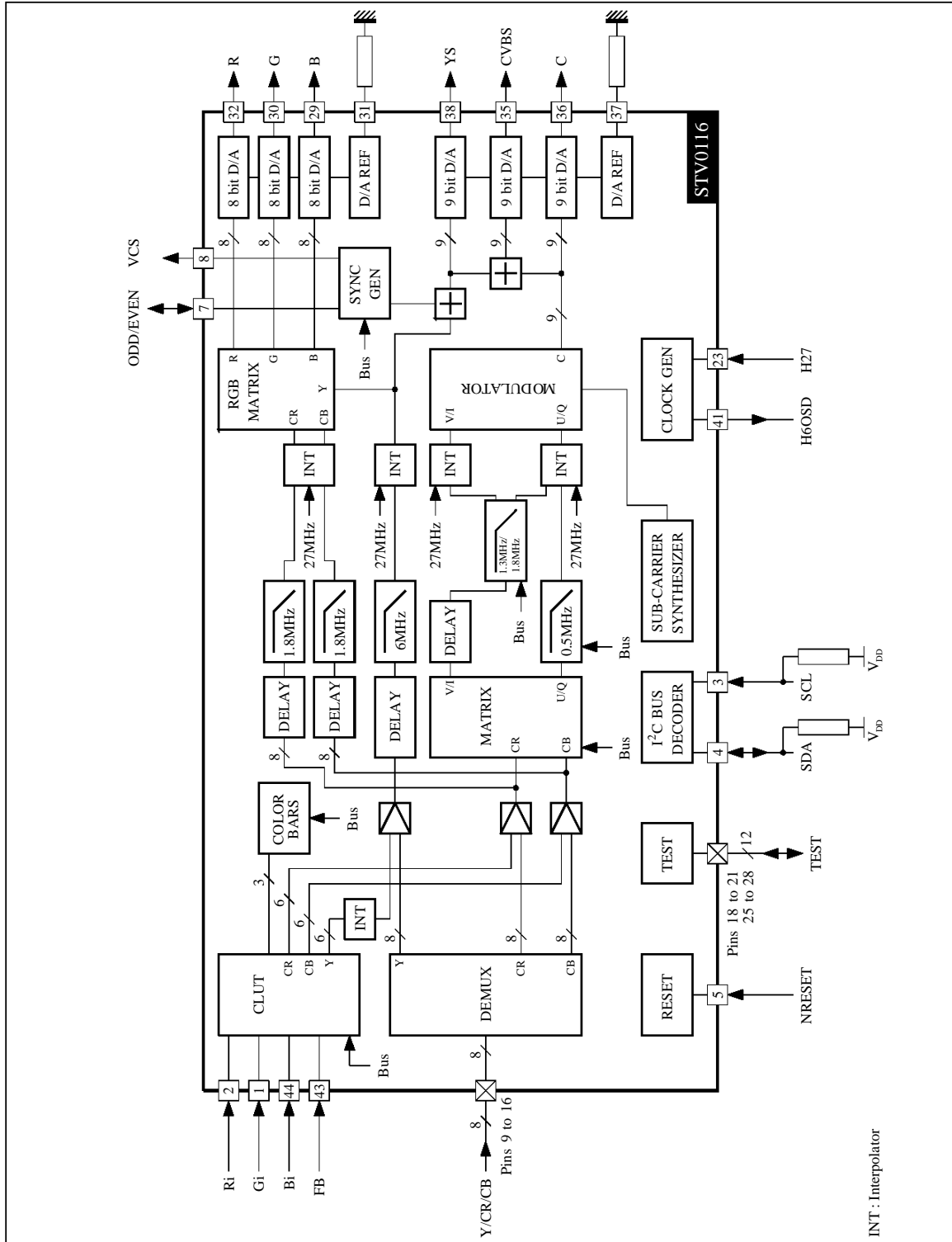


**PIN DESCRIPTION**

Pin N°	Symbol	Type	Function
23	H27	I	27MHz input clock reference. LOW/HIGH ratio : 50%. FALL and RISE time : 5ns Max. The rising edge is the reference for HOLD and SETUP time of all inputs. The duration of High/Low level is in accordance with REC656 (18.5ns ±3ns with less than 3ns of jitter).
7	ODD/EVEN	I/O	ODD/EVEN frame input (slave mode by ODD/EVEN), output (master mode or slave mode by EAV). The synchronism reference is the rising edge of H27. Default polarity : odd field = LOW level, even field = HIGH level.
5	NRESET	I	The hard reset is active low. It has priority on software reset. FALL and RISE time of hard NRESET < 20ns. Hold time of hard NRESET > 80ns. No synchronism of hard NRESET is necessary. NRESET Imposes default states.
3	SCL	I	Serial interface with microcontroller. Spread of frequency : 0 to 400kbit/s. Level 0 > 200ns.
4	SDA	I/O	Trigger pads to ensure a low frequency input. Maximum capacitance for each bus line (400pF). Chip address (hex) : b0 (write mode), b1 (read mode).
9 to 16	YCRCB [7:0]	I	Time multiplexed 4:2:2 luminance and color difference input as defined in CCIR Rec 601_2 and Rec 656 (TTL levels inputs). 525 lines/60Hz or 625 lines/50Hz. Timing (Rec 656 part II). A line length is 1716 or 1728 periods of 27MHz for 525 or 625 line systems respectively.
2 - 1 - 44	Ri, Gi, Bi	I	OSD serial inputs. OSD_Pixel minimum width is 148ns (i.e. 6.75MHz). Ri, Gi, Bi transcoded to Y, CR, CB according to CLUT (8 colors among 262144). CLUT tint programmable
43	FB	I	Fast blanking is minimum 1 OSD_pixel large. FB synchronous to H27. OSD active when FB is HIGH.
41	H6OSD	O	6.75MHz clock output for the reference of an OSD input signal.
8	VCS	O	Composite synchronization or horizontal line synchronization output. Polarity (default : positive). The synchronism reference is the rising edge of H27.
37	I <sub>REF1</sub>	I	Reference current source of the triple 9 bit DAC for CVBS, YS and C. For a reference load of 1.8kΩ : 1.7 < I <sub>REF1</sub> (mA) < 2.1.
35	CVBS	O	Current analog video composite output.
38	YS	O	Current analog luminance output with composite synchronization, SVHS compatible.
36	C	O	Current analog chrominance output, SVHS compatible.
32 - 30 - 29	R, G, B	O	Current analog outputs synchronone with CVBS.
31	I <sub>REF2</sub>	I	Reference current source of the triple 8 bit DAC for R, G, B. For a reference load of 1.8kΩ : 1.7 < I <sub>REF2</sub> (mA) < 2.1.
40 - 22	V <sub>SSP</sub> - V <sub>DDP</sub>		0V-5V supply for pads.
24 - 6	V <sub>SSC</sub> - V <sub>DCC</sub>		0V-5V supply for core.
33 - 34	V <sub>SSA</sub> - V <sub>DDA</sub>		0V-5V supply for DACs.

0116-01.TBL

BLOCK DIAGRAM



0116-02.EPS

**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
V <sub>DD</sub>	Supply Voltage	7	V
V <sub>IN</sub>	Digital Inputs	V <sub>DD</sub> + 0.3	V
V <sub>OUT</sub>	Digital and Analog Outputs	0, V <sub>DD</sub>	V
T <sub>oper</sub>	Operating Temperature	0, +70	°C
T <sub>stg</sub>	Storage Temperature	-20, +150	°C

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**ELECTRICAL CHARACTERISTICS**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
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DC (V<sub>DDA</sub> = V<sub>DDP</sub> = V<sub>DDC</sub> = 5V, T<sub>amb</sub> = 0 to 70°C, unless otherwise specified)

Supply						
V <sub>DDA</sub>	Analog Supply Voltage		4.75	5	5.25	V
I <sub>DDA</sub>	Analog Supply Current	I <sub>REF1</sub> = I <sub>REF2</sub> = 3mA R <sub>L</sub> = 400Ω		30		mA
V <sub>DDP</sub>	Output Buffer Supply Voltage		4.75	5	5.25	V
I <sub>DDP</sub>	Output Buffer Supply Current	Autotest mode		30		mA
V <sub>DDC</sub>	Core Supply Voltage		4.75	5	5.25	V
I <sub>DDC</sub>	Core Supply Current	Autotest mode		20		mA
Digital Inputs						
V <sub>L</sub>	Input Voltage LOW (SDA, SCL)		-0.50		1.50	V
V <sub>H</sub>	Input Voltage HIGH (SDA, SCL)		3		7	V
V <sub>IL</sub>	Input Voltage LOW (any others are TTL compatible)		-0.50		0.80	V
V <sub>IH</sub>	Input Voltage HIGH (any others are TTL compatible)		2		V <sub>DD</sub> + 0.5	V
I <sub>L</sub>	Input Leakage Current	V <sub>Lmin</sub> Or V <sub>IHmax</sub>			10	μA
C <sub>L</sub>	Input Capacitance (all inputs)				10	pF
Digital Outputs						
V <sub>OL</sub>	Output Voltage LOW	I <sub>OL</sub> = 1mA	V <sub>SS</sub>		0.60	V
V <sub>OH</sub>	Output Voltage HIGH	I <sub>OH</sub> = -1mA	2.40		V <sub>DD</sub>	V
DACs						
RES1	Resolution (YS, C, CVBS)		9			Bits
RES2	Resolution (R, G, B)		8			Bits
ILE	Integral Linearity Error	I <sub>REF</sub> = 3mA, V <sub>DDA</sub> = 5V, R <sub>L</sub> = 400Ω			±2	LSB
DLE	Differential Linearity Error	I <sub>REF</sub> = 3mA, V <sub>DDA</sub> = 5V, R <sub>L</sub> = 400Ω			±1	LSB
I <sub>G</sub>	Current Gain			2		
G <sub>E</sub>	Gain Error			3		%

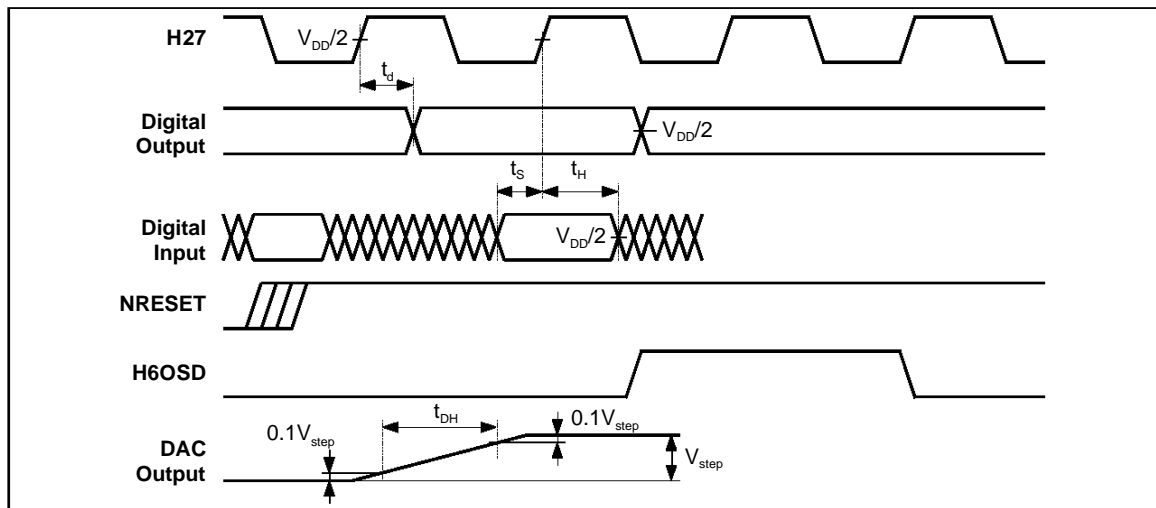
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**ELECTRICAL CHARACTERISTICS** (continued)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
AC ( $V_{DDA} = V_{DDP} = V_{DDC} = 5V$ , $T_{amb} = 0$ to $70^{\circ}C$ , $C_L = 20pF$ , unless otherwise specified)						
Digital Inputs						
$t_s$	Input Data Set-up Time		5			ns
$t_H$	Input Data Hold Time		10			ns
Digital Outputs						
$t_d$	Output Delay Time	$C_L = 10pF$			29	ns
ph0	Output Phase of H6OSD After Reset			H27		
Fmi	Frequency of SCL				2	MHz
Clock Input						
$t_c$	Clock Cycle Time			27		MHz
$t_D$	Clock Duty Factor			50		%
$t_R$	Clock Rise Time				5	ns
$t_F$	Clock Fall Time				5	ns
DAC Output						
$t_{DH}$	Output Delay Time	32 LSB max step 9 bit dac 16 LSB max step 8 bit dac $I_{REF} = 3mA$ , $R_L = 400\Omega$ , $C_L = 10pF$			29	ns

0116-04.TEL

**Figure 1**



0116-21.EPS

**CIRCUIT DESCRIPTION**

The STV0116 can operate either in master mode or in slave mode receiving a vertical parity synchronism signal from MPEG IC.

An I<sup>2</sup>C Bus allows to control the main functions :

- Selection of the standard,
- Synchronisation mode and polarity,
- Color killing,
- Reset of the synchronism and oscillator,
- Test mode,
- By-pass of the chroma filters,
- Sub-carrier phase and frequency adjustment,
- OSD CLUT.

**Pixel Input Format**

The digital input is a time multiplexed YCBCR 8 bit stream.

The samples represent a succession of CB/Y/CR/Y component values and are latched on the rising edge of H27 (27MHz clock). This input is fully compatible with SGS-THOMSON MPEG decoder IC's outputs.

**Video Timing**

The STV0116 outputs interlaced video to conform to the NTSC or PAL timing specifications. Non standard line counts in PAL or NTSC modes are not supported.

The 8 field (for PAL) and 4 field (for NTSC) burst sequences are internally generated, using the 27MHz clock as reference.

Rise and fall times of sync, blanking interval, and the burst envelope are internally controlled according to the composite video specification (see Figures 6 and 7).

Only lines 1 to 9, 264 to 272 for 525 and 624 to 5, 311 to 318 for 625 lines system respectively are blanked. The others can be used for data encoding.

**Master Mode**

After a software reset, the sync generator starts counting 27MHz clock pulses and provides a complete composite sync pulse sequence of 4 fields to the NTSC encoder.

For PAL, the combination with the ODD/EVEN line sequence gives the 8 field sequence for the color burst insertion. At the end of a sequence the counter is automatically reset and a new sequence can start. In the same time an ODD/EVEN frame pulse is output to control the MPEG decoder.

**Slave Mode**

After a software reset, the sync counter waits for the falling edge of the ODD/EVEN pulse sent to the

ODD/EVEN Pin selected as an input. Then a sequence identical to the one in master mode can start and is reset by the next falling edge of the field pulse (see Figure 2).

If no ODD/EVEN pulse is present after a full 3 frames sequence, the IC can either regenerate itself the next sequences in "free running" using the 27MHz clock, or switch on the internal test bar pattern, or blank the outputs, after reading status register.

Alternatively the STV0116 can be set to extract the synchronization directly from the Y/CR/CB input data sequence (see Figure 3).

These different modes are selectable by the I<sup>2</sup>C Bus.

**Chrominance Encoding**

The demultiplexed CR, CB samples feed a chroma I/Q matrix for NTSC and a U/V matrix for PAL. The U/V or I/Q chroma signals are then band limited according to the CCIR 624 recommendations and interpolated at a 27MHz pixel rate. This process makes easier the filtering for the D/A conversion and allows a more accurate encoding.

A Discrete Time Oscillator, using a 22 bit phase accumulator, generates the color sub-carrier. This signal feeds a quadrature modulator which modulates the baseband chroma signals.

The phase and the frequency of the sub-carrier can be adjusted if needed or reset by software.

**Luminance Processing**

The demuxed Y samples are band limited and interpolated at 27MHz samples rate.

Then a gain and offset compensation is applied to the luma signal before inserting the synchronism pulses.

The interpolation filter compensates for the sinX/X attenuation provided by the D/A conversion, and greatly simplifies the output filtering.

A delay is inserted in the luma path to transmit correctly picture transition.

**CVBS and SVHS Outputs**

Each digital signal drives a 9 bit D/A converter operating at 27MHz.

The outputs are current sources and are proportional to the current reference value. For 3mA reference current and 400Ω load, the levels are such that a PNP emitter follower is enough to drive the SCART plug (1V from sync tip to white level). The integrated over sampling filters make the external antialiasing low pass filter simpler.

**CIRCUIT DESCRIPTION** (continued)

**Reset Procedure**

A hard reset is performed by grounding the reset pin. This will set the IC in PAL BDGHI and slave mode. The "software reset" configure the IC according to the configuration fixed by register 0 (that isn't reseted itself). The sync generator is then ready for a new sequence. This will be initialized either by the next clock pulse in master mode, or by the next field pulse in slave mode.

**R, G, B Outputs**

After demux, CR/CB data feed a 4 times interpolation filter at 27MHz sample rate. Then the chroma base-band signal is band limited at 1.8MHz and matrixed with Y. Three 8 bit D/A converters generate R, G, B outputs at 27MHz.

**H6OSD Output**

This 6.75Mhz clock signal is intended to trig the OSD input data. It is synchronous with the H27 clock reference.

**Master/Slave Functionality**

T = 1 period of H27. Duration of active line is 1440T.

**R, G, B, FB OSD Inputs**

These are logic inputs for OSD insertion. FB (fast blanking) is used to switch from the main video input to the RGB inputs. FB and RGB inputs must be locked to the H27 clock. They are latched on the rising edge of 6.75MHz clock signal.

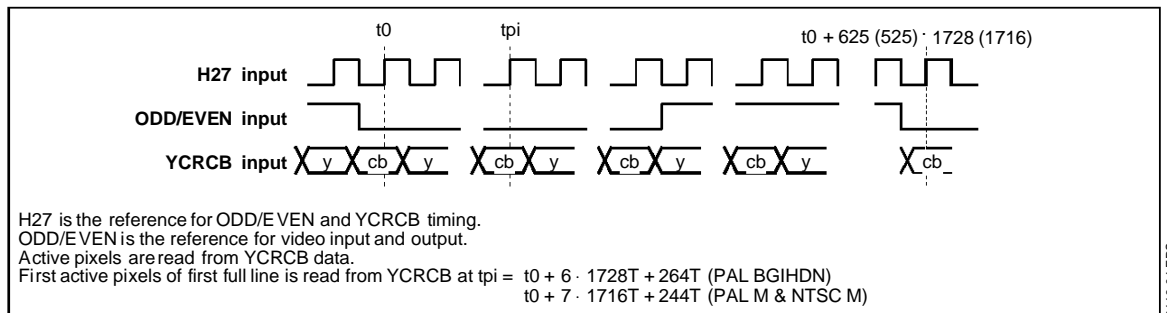
The RGB inputs allow 8 color combinations. The internal CLUT (color look up table) affects for each of these 8 values a color chosen among 643 preset for Y, CR, CB components. As CLUT performs the matrixing into Y, CR and CB, the resulting signals take benefit of the oversampling filters in the main path. Additionally the Y signal is interpolated. Inserted OSD rate is 6.75Mbit/s.

**Signal Quality Detector**

It is active if the timing reference synchronization data of the input data stream is present.

By use of Hamming decoding in video Y/CR/CB (EAV, SAV), the IC generates a bit (HOK). This bit indicates multiple errors of the hamming decoding. It can be read by the microcontroller.

**Figure 2 :** Slave 1 (Slave by ODD/EVEN)



**Figure 3 :** Slave 2 (Slave by EAV, End of Active Video, taken on YCRCB)

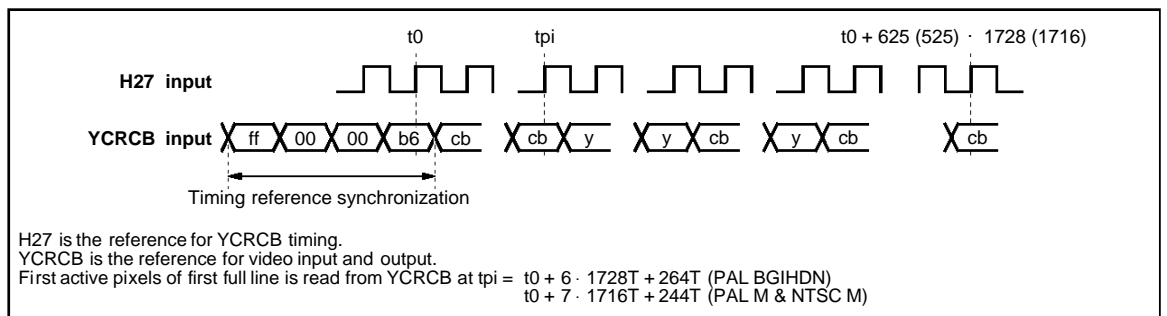
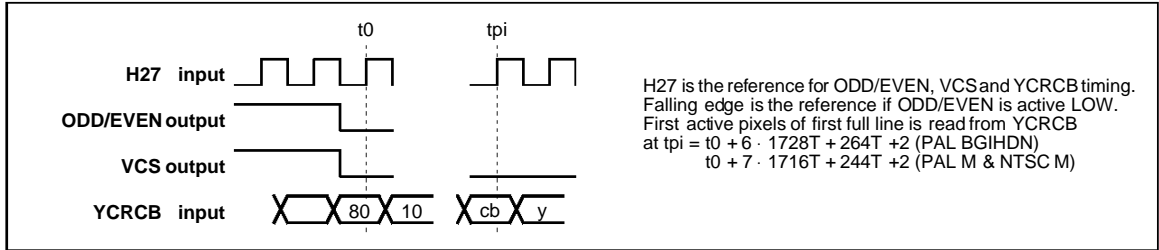


Figure 4 : Master Mode



**Freerun and SLAVE Mode**

If freerun is allowed and the vertical synchronism is lost, all the video signals are generated with the picture sampled on YCRCB. VCS is still available. If freerun is not allowed VCS is stopped and YS, C, CVBS, R, G, B are at BLACK level.

**Synchronization Signals**

$T = 37.037ns = 1$  period of H27 (27MHz).

Figure 5 : H27 Input Maximum Acceptance

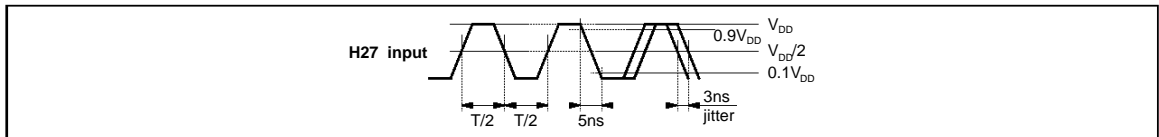


Figure 6 : Logic and Analog Synchronisms

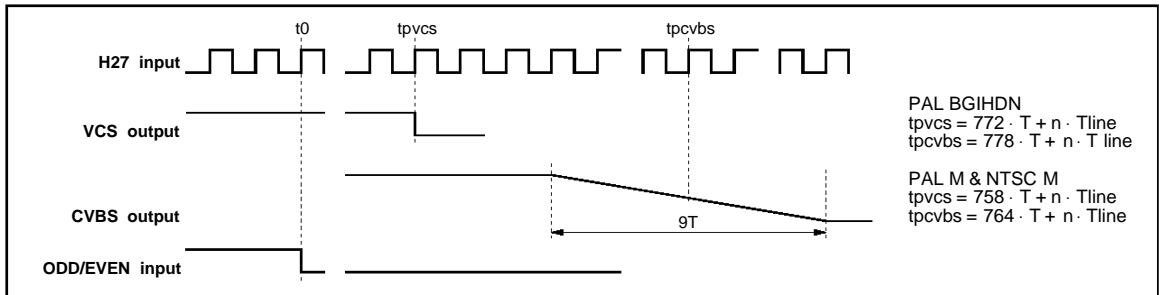


Figure 7 : Logic and Analog Synchronisms (Slave by EAV synchro only)

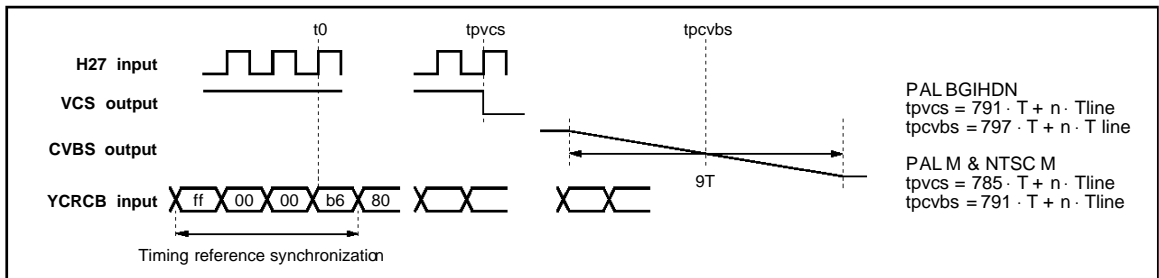


Figure 8 : YCRCB and OSD Delay to Analog Output

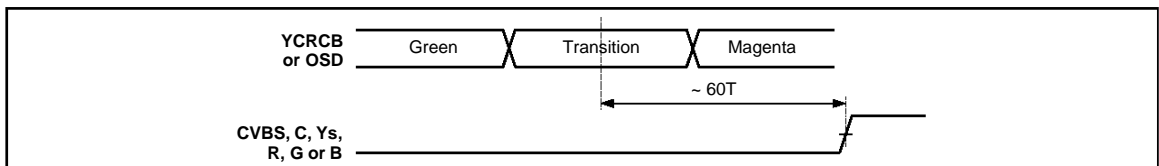
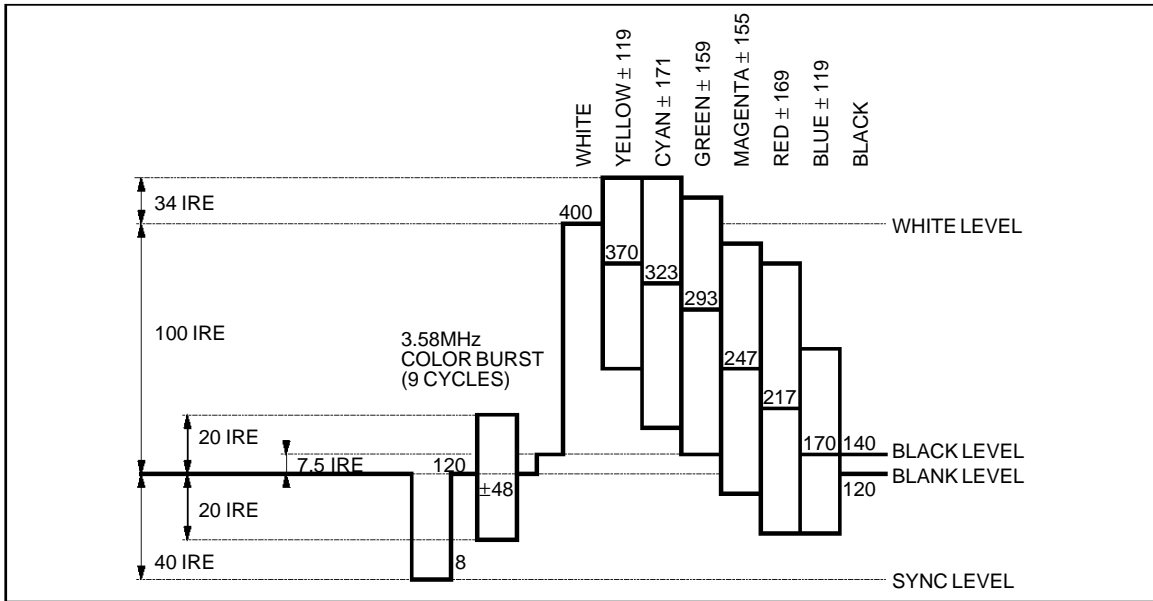
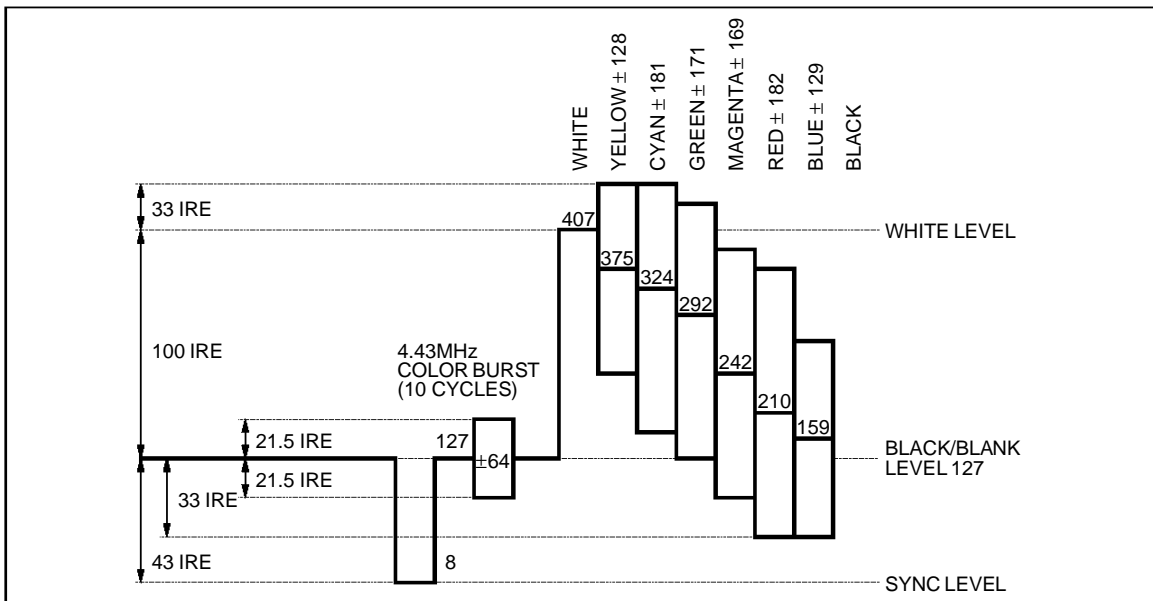


Figure 9 : M Composite NTSC Output (100% Saturation, 100% Amplitude Colour Bars)



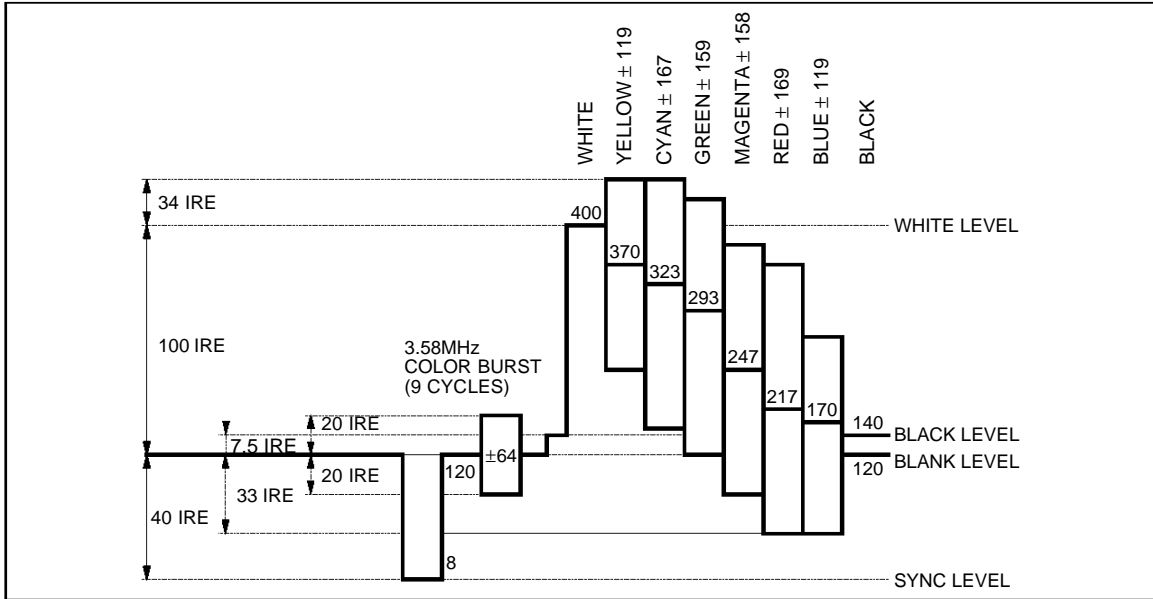
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Figure 10 : Composite PAL BGDHIN Output (100% Saturation, 100% Amplitude Bars)



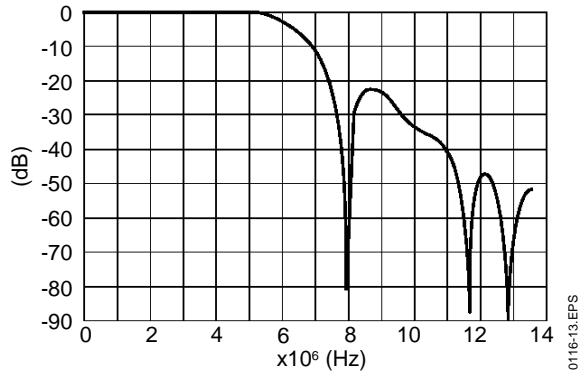
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Figure 11 : Composite PAL M Output (100% Saturation, 100% Amplitude Bars)



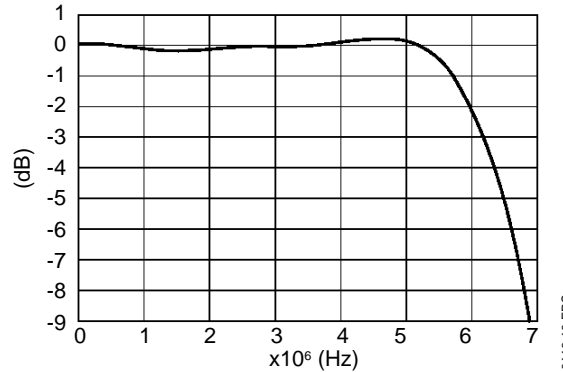
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Figure 12 : Luma Filter



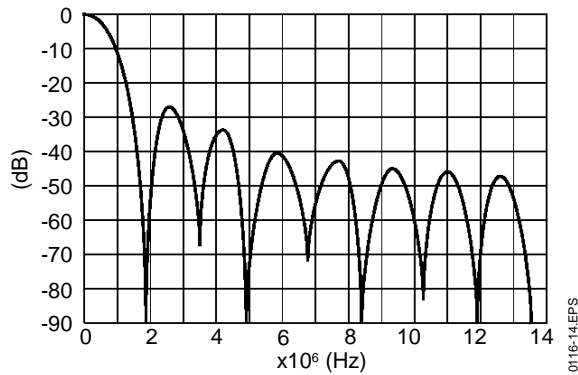
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Figure 12a : Luma Filter



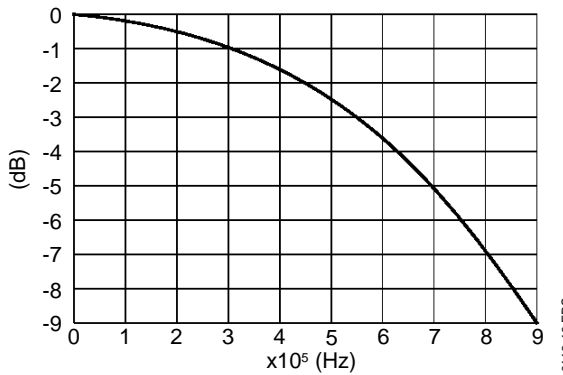
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Figure 13 : Chroma Q Filter



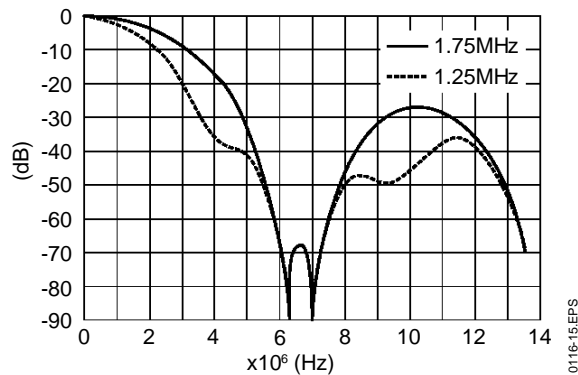
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Figure 13a : Chroma Q Filter



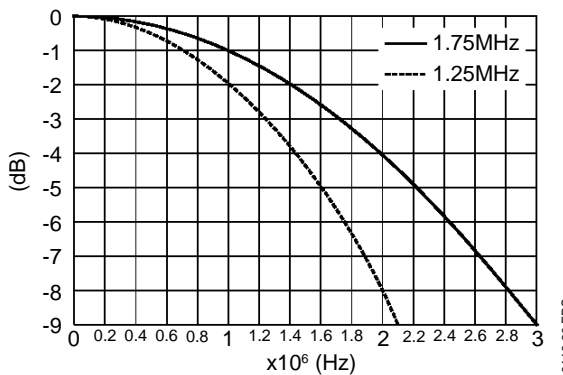
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Figure 14 : Chroma Filters



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Figure 14a : Chroma Filters



0116-20.EPS

Note : Those filter curves include the  $\text{sinc}/x$  attenuation of DACs.

**I<sup>2</sup>C REGISTERS DESCRIPTION**

The IC is controlled by an I<sup>2</sup>C Bus and internal registers can be read or written by an external microcontroller.

Encoder addresses are :

- Write 10110000 (b0 hex).

- Read 10110001 (b1 hex).

Registers are organized as follows :

Reg 0 : Sync mode selection, standard selection, sync polarity selection

Reg 1 : Color killer, chroma filter selection, sync output selection

Reg 2, 3 : Sync delay

Reg 4 to 9 : Sub-carrier frequencies

Reg 10 to 17 : Y clut for RiGiBi input encoding

Reg 18 to 25 : CR clut for RiGiBi input encoding

Reg 26 to 33 : CB clut for RiGiBi input encoding

Reg 34 : Test (not to be used)

Reg 35 : Status

Reg 36 to 38 : Line forcing

**I<sup>2</sup>C FORMAT**

**Write Mode** (all registers except STATUS)

S	Slave address	W	A	Sub-address	A	Data 0	A	...	Data N	A	P
---	---------------	---	---	-------------	---	--------	---	-----	--------	---	---

S Start condition

Slave address 1011000

W = '0' Write flag

A Acknowledge, generated by slave (STV0116) when OK A = '0' else '1'

Sub-address Sub-address register (content is made of one byte)

Data 0 First data byte

Data N Continued data bytes (address is automatically incremented) and A's

P Stop condition

**Read Mode** (all registers)

S	Slave address	W	AC	Sub-address N	AC	P
---	---------------	---	----	---------------	----	---

Then :

S	Slave address	R	AC	Data N	AM	Data N+1	AM	P
---	---------------	---	----	--------	----	----------	----	---

S Start condition

Slave address 7 bit address for STV0116 : 1011000

W = '0' Write flag

AC Acknowledge, generated by slave (STV0116) when OK, AC = '0' else '1'

R = '1' Read flag

Sub-address 8 bit sub-address register

Data N Data byte of register N, sent by STV0116

Data N+1 Data byte of register N+1 (address automatically incremented)

AM Acknowledge, generated by the microcontroller AM = '0' when acknowledge is OK else '1'

P Stop condition (when last AM = '1')

**Remarks**

Writing of a register :

Registers 0, 1, ..., 34 can be loaded sequentially with only one start/stop condition followed by the sub-address of the first register desired.

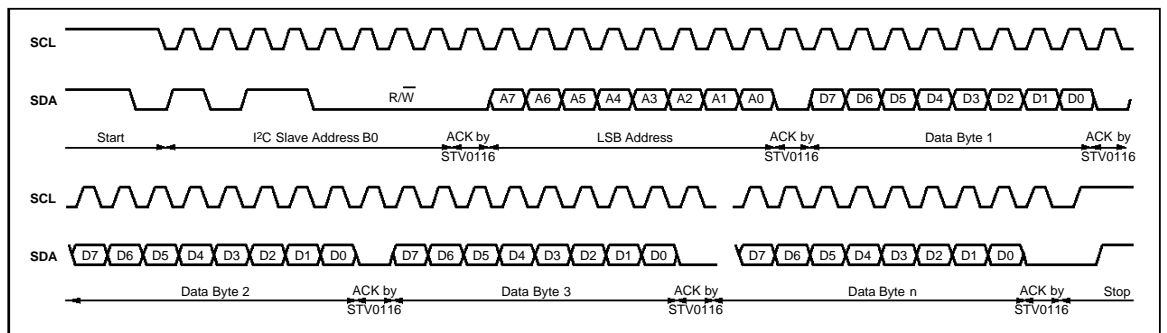
Example : Start followed by address b0 and sub-address 1 and then 3 bytes of data and stop : the cfg register will be loaded with the first byte and delay register will be loaded with the 2 others bytes.

Reading of a register :

Example 1 : Reading of register 35 (STATUS) : start followed by address b0 hex, AC = '0', then sub-address 35, AC = '0' and stop. Then start, address b1, AC = '0' and then data of register 35, AM = '1' and stop condition.

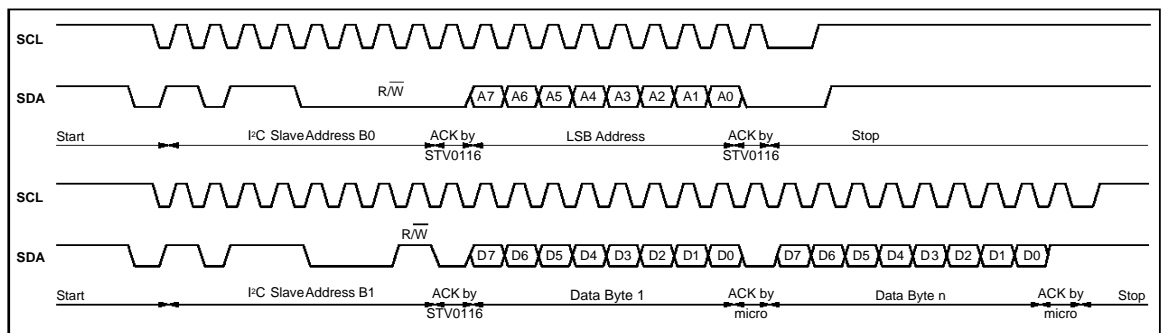
Example 2 : Reading of registers 0 to 3 : start followed by address b0 hex, AC = '0', and sub-address 0, AC = '0' and stop. Then start, address b1, AC = '0' and then first byte of register 0, AM = '0', second byte from register 1, AM = '0', third byte of register 2, AM = '0', fourth byte from register 3, AM = '1' and stop condition.

**Figure 15 : STV0116/I<sup>2</sup>C Write Operation**



0116-16.A1

**Figure 16 : STV0116/I<sup>2</sup>C Read Operation**



0116-17.EPS

**REGISTERS MAPPING AND DESCRIPTION**

(\*) default mode on hard NRESET.

(\*\*) default mode on TESTAUTO.

**Register 0 Control (Read/Write)**

		MSB						LSB	
		d7	d6	d5	d4	d3	d2	d1	d0
Register 0		std1	std0	sym1	sym0	sys1	sys0	mod1	mod0
	std1	std0	Standard selection						
(*)	0	0	PAL BDGHI						
	0	1	PAL N Argentina						
	1	0	NTSC M						
	1	1	PAL M						
	sym1	Freerun							
(*)	0	Disable							
	1	Enable : free-run is active even if ODD/EVEN is incorrectly positioned (with a time constant of 3 consecutive lost frames) in slave mode.							
	sym0	Frame synchronization source in slave mode							
(*)	0	ODD/EVEN input							
	1	YCRCB (extraction of F from EAV)							
	sys1	Synchro : VCS polarity							
(*)	0	Positive							
	1	Negative							
	sys0	Frame synchro : ODD/EVEN polarity (as input (slave) or as output (slave : synchro from EAV or master))							
(*)	0	Synchro on ODD/EVEN falling edge							
	1	Synchro on ODD/EVEN rising edge							
	mod1	No reset							
(*)	0	No reset							
	1	Software reset							
	mod0	Slave							
(*)	0	Slave							
(**)	1	Master (freerun forced)							

**Note :** Software reset is automatically disabled at I<sup>2</sup>C stop condition. Reset is active during 4 H27 periods.

**REGISTERS MAPPING AND DESCRIPTION** (continued)**Register 1 Cfg** (Read/Write)

		MSB						LSB	
		d7	d6	d5	d4	d3	d2	d1	d0
Register 1		hsnvcs	rstddfs	flt1	syncok	coki	-	-	-
	hsnvcs	Output signal selection on VCS							
(*)	0	Composite synchro							
	1	Horizontal synchro							
	rstddfs	Reset of DDFS (Direct Digital Frequency Synthesizer)							
	0 to 1	Transition generates a pulse reset for oscillator							
	0								
	flt1	Chroma pass band filter							
(*)	1	1.3MHz, 0.45MHz for Q only							
	0	1.8MHz							
	syncok	Synchro availability in case of no free-run active							
(*)	0	Synchro OFF							
	1	Synchro available (if sym1 = 0)							
	coki	Color kill							
(*)	0	Color ON							
	1	Color suppressed on C and CVBS (on CVBS only in next release)							

**Note :** FOUR FILTERS FOR ENCODING NEEDS.

Luma passband filter (6.3MHz (BW = 5.75MHz with sinX/X D/A conversion))

Chroma passband filter (1.3MHz/1.8MHz : U/V and I, 1.8MHz/0.45MHz : Q, 1.8MHz : CR, CB for R, G, B encoding)  
(chroma BW becomes 1.2MHz/1.7MHz, 0.45MHz, 1.7MHz with sinX/X DAC).

**Register 2 Delay\_msb** (Read/Write)

		MSB						LSB	
		d7	d6	d5	d4	d3	d2	d1	d0
Register 2		d10	d9	d8	d7	d6	d5	d4	d3

**Register 3 Delay\_lsb**

		MSB						LSB	
		d7	d6	d5	d4	d3	d2	d1	d0
<i>Read Mode :</i>									
Register 3		d2	d1	d0	Reg2, d4	Reg2, d3	Reg2, d2	Reg2, d1	Reg2, d0
<i>Write Mode :</i>									
Register 3		d2	d1	d0	xx	xx	xx	xx	xx

d[10:0] sample polynomial counter at 27MHz

Sample polynomial counter  $(1 + x^2 + x^{11})$  value on which falling edge of F (ODD/EVEN signal) is detected on YCRCB (F is extracted from EAV word)

1st byte : 21 (hex 15), 2nd byte : 128 (hex 80) for PAL BDGHIN (625 lines)

1st byte : 201 (hex c9), 2nd byte : 128 (hex 80) for M (525 lines)

Sample polynomial counter value on which falling edge of ODD/EVEN is detected

(\*) 1st byte : 0, 2nd byte : 32 (hex 20) for PAL BDGHIN (625 lines)

1st byte : 0, 2nd byte : 32 (hex 20) for M (525 lines)

**Note :** Delay register should be loaded before Control register for synchro on YCRCB cross table of sample polynomial counter is given cech.txt file.

**REGISTERS MAPPING AND DESCRIPTION** (continued)

**Register Increment for ddfs (Digital Frequency Synthesizer) (Read/Write)**

	MSB							LSB (see Note)
	d7	d6	d5	d4	d3	d2	d1	d0
Register 4	xx	xx	d21	d20	d19	d18	d17	d16
Register 5	d15	d14	d13	d12	d11	d10	d9	d8
Register 6	d7	d6	d5	d4	d3	d2	d1	d0

- (\*) Reset value depends on standard chosen in register 0
- |   |   |
|---|---|
| x x 0 0 1 0 0 0 0 1 1 1 1 1 0 0 0 0 0 1 1 1 1 1 NTSC M  | f = 3.5795452MHz error = +0.2Hz<br>f <sub>th</sub> = 3579545 ±10Hz    |
| x x 0 0 1 0 1 0 1 0 0 0 0 0 1 0 0 1 1 0 0 0 1 1 PALBGHI | f = 4.4336206MHz error = +1.85Hz<br>f <sub>th</sub> = 4433618.75 ±5Hz |
| x x 0 0 1 0 0 0 0 1 1 1 1 1 0 1 1 0 1 0 0 1 0 1 PALN    | f = 3.5820558MHz error = -0.45Hz<br>f <sub>th</sub> = 3582056.25 ±5Hz |
| x x 0 0 1 0 0 0 0 1 1 1 1 0 0 1 1 0 1 1 1 1 0 0 PALM    | f = 3.5756120MHz error = +0.51Hz<br>f <sub>th</sub> = 3575611.49 ±5Hz |

Note : 1 LSB = 6.43Hz

**Register Phase Offset for ddfs (Digital Frequency Synthesizer) (Read/Write)**

	MSB							LSB
	d7	d6	d5	d4	d3	d2	d1	d0
Register 7	xx	xx	o21	o20	o19	o18	o17	o16
Register 8	o15	o14	o13	o12	o11	o10	o9	o8
Register 9	o7	o6	o5	o4	o3	o2	o1	o0

- (\*) Reset value depends on standard chosen in register 0

**REGISTERS MAPPING AND DESCRIPTION** (continued)**Register Palety** (Read/Write)

	MSB							LSB
	d7	d6	d5	d4	d3	d2	d1	d0
<i>Read Mode :</i>								
Register 10	Reg10,d5	Reg10,d5	y75	y74	y73	y72	y71	y70
Register 11	Reg11,d5	Reg11,d5	y65	y64	y63	y62	y61	y60
Register 12	Reg12,d5	Reg12,d5	y55	y54	y53	y52	y51	y50
Register 13	Reg13,d5	Reg13,d5	y45	y44	y43	y42	y41	y40
Register 14	Reg14,d5	Reg14,d5	y35	y34	y33	y32	y31	y30
Register 15	Reg15,d5	Reg15,d5	y25	y24	y23	y22	y21	y20
Register 16	Reg16,d5	Reg16,d5	y15	y14	y13	y12	y11	y10
Register 17	Reg17,d5	Reg17,d5	y05	y04	y03	y02	y01	y00
<i>Write Mode :</i>								
Register 10	xx	xx	y75	y74	y73	y72	y71	y70
Register 11	xx	xx	y65	y64	y63	y62	y61	y60
Register 12	xx	xx	y55	y54	y53	y52	y51	y50
Register 13	xx	xx	y45	y44	y43	y42	y41	y40
Register 14	xx	xx	y35	y34	y33	y32	y31	y30
Register 15	xx	xx	y25	y24	y23	y22	y21	y20
Register 16	xx	xx	y15	y14	y13	y12	y11	y10
Register 17 NTSC	xx	xx	y05	y04	y03	y02	y01	y00
Register 17 PAL (to be loaded)	xx	xx	0	0	0	1	0	0

8 x 6 bit words for Y component.

Default Value :	R0, B0, C0	Y(hexa)	Color	(100% white to black)
	111	3B	white	y7x
	110	28	yellow	y6x
	101	14	magenta	y5x
	100	10	red	y4x
	011	21	cyan	y3x
	010	1D	green	y2x
	001	09	blue	y1x
	000	04	black	y0x

**REGISTERS MAPPING AND DESCRIPTION** (continued)**Register Paletcr** (Read/Write)

	MSB							LSB
	d7	d6	d5	d4	d3	d2	d1	d0
<i>Read Mode :</i>								
Register 18	Reg18,d5	Reg18,d5	cr75	cr74	cr73	cr72	cr71	cr70
Register 19	Reg19,d5	Reg19,d5	cr65	cr64	cr63	cr62	cr61	cr60
Register 20	Reg20,d5	Reg20,d5	cr55	cr54	cr53	cr52	cr51	cr50
Register 21	Reg21,d5	Reg21,d5	cr45	cr44	cr43	cr42	cr41	cr40
Register 22	Reg22,d5	Reg22,d5	cr35	cr34	cr33	cr32	cr31	cr30
Register 23	Reg23,d5	Reg23,d5	cr25	cr24	cr23	cr22	cr21	cr20
Register 24	Reg24,d5	Reg24,d5	cr15	cr14	cr13	cr12	cr11	cr10
Register 25	Reg25,d5	Reg25,d5	cr05	cr04	cr03	cr02	cr01	cr00

*Write Mode :*

Register 18	xx	xx	cr75	cr74	cr73	cr72	cr71	cr70
Register 19	xx	xx	cr65	cr64	cr63	cr62	cr61	cr60
Register 20	xx	xx	cr55	cr54	cr53	cr52	cr51	cr50
Register 21	xx	xx	cr45	cr44	cr43	cr42	cr41	cr40
Register 22	xx	xx	cr35	cr34	cr33	cr32	cr31	cr30
Register 23	xx	xx	cr25	cr24	cr23	cr22	cr21	cr20
Register 24	xx	xx	cr15	cr14	cr13	cr12	cr11	cr10
Register 25	xx	xx	cr05	cr04	cr03	cr02	cr01	cr00

8 x 6 bit words for CR component.

Default Value :	R0, B0, C0	CR(hexa)	Color	(75% white to black)
	111	20	white	cr7x
	110	23	yellow	cr6x
	101	31	magenta	cr5x
	100	35	red	cr4x
	011	0B	cyan	cr3x
	010	0E	green	cr2x
	001	1C	blue	cr1x
	000	20	black	cr0x

**REGISTERS MAPPING AND DESCRIPTION** (continued)**Register Paletcb** (Read/Write)

	MSB							LSB
	d7	d6	d5	d4	d3	d2	d1	d0
<i>Read Mode :</i>								
Register 26	Reg26,d5	Reg26,d5	cb75	cb74	cb73	cb72	cb71	cb70
Register 27	Reg27,d5	Reg27,d5	cb65	cb64	cb63	cb62	cb61	cb60
Register 28	Reg28,d5	Reg28,d5	cb55	cb54	cb53	cb52	cb51	cb50
Register 29	Reg29,d5	Reg29,d5	cb45	cb44	cb43	cb42	cb41	cb40
Register 30	Reg30,d5	Reg30,d5	cb35	cb34	cb33	cb32	cb31	cb30
Register 31	Reg31,d5	Reg31,d5	cb25	cb24	cb23	cb22	cb21	cb20
Register 32	Reg32,d5	Reg32,d5	cb15	cb14	cb13	cb12	cb11	cb10
Register 33	Reg33,d5	Reg33,d5	cb05	cb04	cb03	cb02	cb01	cb00
<i>Write Mode :</i>								
Register 26	xx	xx	cb75	cb74	cb73	cb72	cb71	cb70
Register 27	xx	xx	cb65	cb64	cb63	cb62	cb61	cb60
Register 28	xx	xx	cb55	cb54	cb53	cb52	cb51	cb50
Register 29	xx	xx	cb45	cb44	cb43	cb42	cb41	cb40
Register 30	xx	xx	cb35	cb34	cb33	cb32	cb31	cb30
Register 31	xx	xx	cb25	cb24	cb23	cb22	cb21	cb20
Register 32	xx	xx	cb15	cb14	cb13	cb12	cb11	cb10
Register 33	xx	xx	cb05	cb04	cb03	cb02	cb01	cb00

8 x 6 bit words for CB component.

Default Value :	R0, B0, C0	CB(hexa)	Color	(75% white to black)
	111	20	white	cb7x
	110	0B	yellow	cb6x
	101	2E	magenta	cb5x
	100	19	red	cb4x
	011	27	cyan	cb3x
	010	12	green	cb2x
	001	35	blue	cb1x
	000	20	black	cb0x

**REGISTERS MAPPING AND DESCRIPTION** (continued)

**Register 35 Status** (Read)

		MSB						LSB	
		d7	d6	d5	d4	d3	d2	d1	d0
Register 35		hok	atfr	std1	std0	sym1	sym0	sys1	sys0
	hok	Hamming decoding of ODD/EVEN signal from YCRCB							
	0	Multiple errors							
	1	0 or 1 error							
	atfr	Frame synchronization flag							
	0	Encoder not synchronized							
	1	In slave mode : encoder synchronized							
	std1	std0	Standard selection						
(*)	0	0	PAL BDGHI						
	0	1	PAL N (Argentina)						
	1	0	NTSC M						
	1	1	PAL M						
	sym1	Freerun							
(*)	0	Disable							
	1	Enable : free-run is active in case of ODD/EVEN suppression (with a time constant of 3 consecutive lost of frame) and slave mode							
	sym0	Frame synchronization source in slave mode							
(*)	0	ODD/EVEN input							
	1	YCRCB (extraction of F from EAV)							
	sys1	Synchro : VCS polarity							
(*)	0	Positive							
	1	Negative							
	sys0	Frame synchro : ODD/EVEN polarity							
(*)	0	Synchro on ODD/EVEN falling edge							
	1	Synchro on ODD/EVEN rising edge							

**Note :** SIGNAL QUALITY DETECTOR by use of hamming decoding on EAV, SAV in YCRCB input.

**Register Compression** (Read/Write)

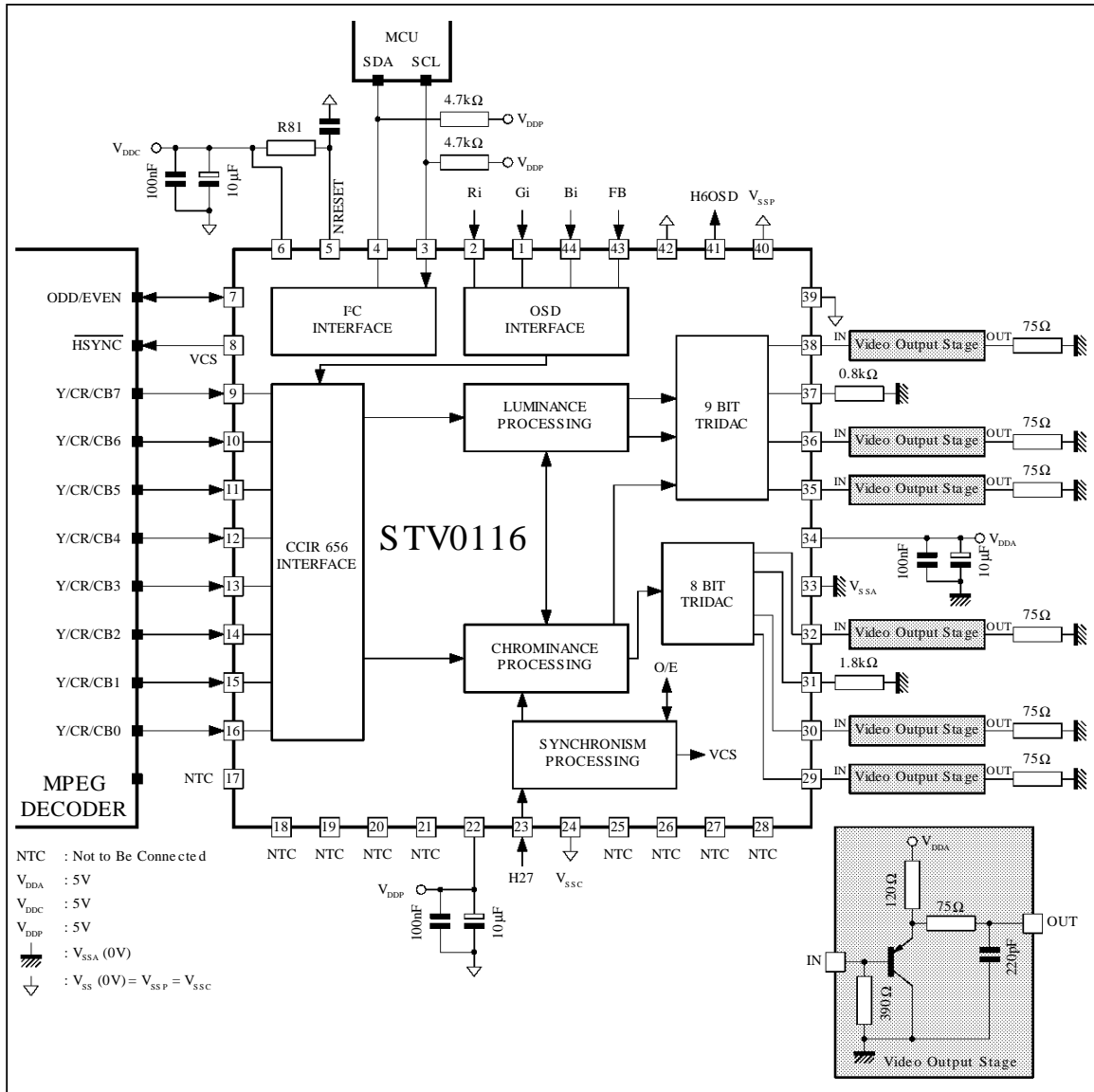
		MSB						LSB	
		d7	d6	d5	d4	d3	d2	d1	d0
<i>Read Mode :</i>									
Register 36		lf9	lf8	lf7	lf6	lf5	lf4	lf3	lf2
Register 37		lf1	lf0	lc9	lc8	lc7	lc6	lc5	lc4
Register 38		lc3	lc2	lc1	lc0	0	0	0	0
<i>Write Mode :</i>									
Register 36		lf9	lf8	lf7	lf6	lf5	lf4	lf3	lf2
Register 37		lf1	lf0	lc9	lc8	lc7	lc6	lc5	lc4
Register 38		lc3	lc2	lc1	lc0	x	x	x	x

It is used to compress on line fonctionnal patterns.

"lc" is the line number value\* on which the polynomial line counter ( $1 + x^3 + x^{10}$ ) is forced (when it occurs) with 'lf' value.

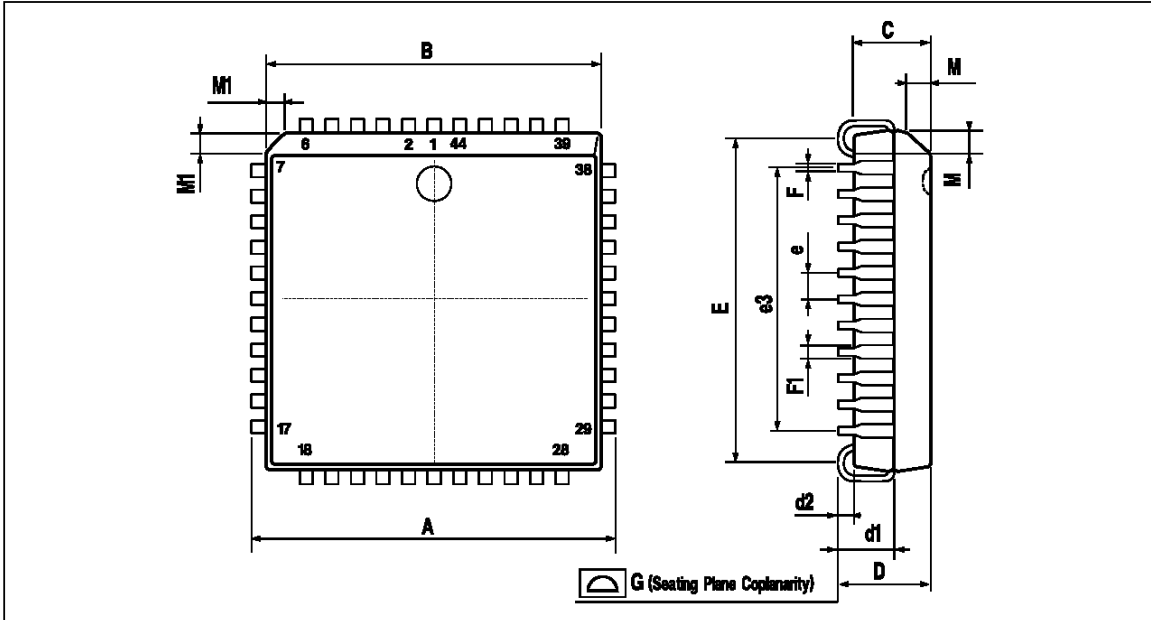
- (\*) On reset 'lf' = 001, 'lc' = 000 (line counter never goes to 000 value)  
1st byte : 00, 2nd byte : 40 hex, 3rd byte : 00

APPLICATION DIAGRAM



0116-03.EPS

**PACKAGE MECHANICAL DATA**  
44 PINS - PLASTIC CHIP CARRIER



PMPLCC44LEPS

Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	17.4		17.65	0.685		0.695
B	16.51		16.65	0.650		0.656
C	3.65		3.7	0.144		0.146
D	4.2		4.57	0.165		0.180
d1	2.59		2.74	0.102		0.108
d2		0.68			0.027	
E	14.99		16	0.590		0.630
e		1.27			0.050	
e3		12.7			0.500	
F		0.46			0.018	
F1		0.71			0.028	
G			0.101			0.004
M		1.16			0.046	
M1		1.14			0.045	

PLCC44.TBI

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