Digital video encoder (DENC2-M)

SAA7188A

FEATURES
- Monolithic CMOS 5V device
- Digital PAL/NTSC encoder
- System pixel frequency: 13.5 MHz
- Accepts MPEG decoded data
- 8-bit wide MPEG port
- Input data format Cb, Y, Cr, Y, ... (CCIR-656 like)
- 16-bit wide YUV input port
- I²C-bus control port or, alternatively, MPU parallel control port
- Encoder can be master or slave
- Programmable horizontal and vertical input synchronization phase
- Programmable horizontal and vertical output synchronization phase
- OSD overlay with LUTs (8*3 bytes)
- 'Line 21' Closed Caption encoder
- Macrovision Pay-per-View copy protection system as option (Note 1)

- Cross colour reduction
- DACs running at 27 MHz with 10 bits resolution
- Controlled rise/fall times of output syncs and blanking
- Down mode of DACs
- CVBS and S-Video output simultaneously
- 68-pin PLCC package

DESCRIPTION
The Digital Video Encoder 2 (DENC2-M) encodes digital YUV video data to an NTSC or PAL CVBS or S-Video signal.

The circuit accepts CCIR compatible YUV data with 720 active pixels per line in 4:2:2 multiplexed formats, e.g., MPEG decoded data. It includes a sync/clock generator as well as on-chip D/A converters.

The circuit is compatible to the DIG.TV2 chip family.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MIN	TYP	MAX	UNIT
V_{DDD}	Digital supply voltage range	4.5	5.0	5.5	V
V_{DDA}	Analog supply voltage range	4.75	5.0	5.25	V
I_{DDD}	Supply current digital	–	140	170	mA
I_{DDA}	Supply current analog	–	50	55	mA
V_i	Input signal levels	TTL-compatible			V
V_O	Analog output signals, Y, C and CVBS without load (peak-to-peak value)	–	2	–	V
R_L	Load resistance	80	–	–	Ω
ILE	LF integral linearity error	–	–	±2	LSB
DLE	LF differential linearity error	–	–	±1	LSB
T_{amb}	Operating ambient temperature range	0	–	+70	°C

ORDERING INFORMATION

EXTENDED TYPE NUMBER	PACKAGE			
	PINS	PIN POSITION	MATERIAL	CODE
SAA7188A	68	PLCC	plastic	SOT188

SAA7185 and SAA7188A Comparison
The SAA7185 and SAA7188A are both CCIR video encoders with similar performance and programming requirements. The differences between the two devices are as follows:

The SAA7188A has the capability to insert Macrovision (ver.3) onto the video output. Macrovision is a form of anti-taping protection that allows one to view, but not record, the video signal from a VCR. To use this device, proof of a Macrovision license is required to obtain the device and the Macrovision programing information.

The SAA7185 is identical to the SAA7188A with the exception that the Macrovision capability is not available and an attempt to use the Macrovision functionality will result in the encoder disabling the

output DAC. This is to prevent attempts of defeating the anti-copying feature by replacing a SAA7188A with a SAA7185.

The parts are pin and software compatible, with one exception. In the case of SAA7185, the upper four bits of register 6D should be set to 0 before programming the remainder of the device. make certain that all registers that are called out to be programmed to 0 are, in fact, programmed as such.

Also note that, for both devices, the horizontal trigger (registers ^E and ^F) should never be programmed as a 0, as this will cause the horizontal trigger to lock up. If this should happen, program horizontal trigger to a non-zero value, change the LSB of register 6C, and then restore this bit to the original value.