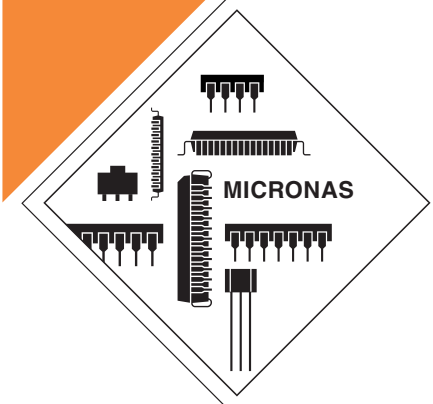

PRELIMINARY DATA SHEET

VSP 94x5B, VSP 94x7B
OPTIMUS
Color Decoder and Scan-Rate Converter
Version Cx

Edition Nov. 28, 2002
6251-576-3PD

MICRONAS

2.4.9. Noise Measurement

As noise reduction algorithms usually decrease the quality of pictures with little noise, it is highly desirable to apply a noise adaptive mechanism, which makes strong corrections in pictures with poor quality, and little corrections in pictures with good quality. To control this mechanism, it is necessary to measure the extent of noise.

The noise measurement algorithm can be used to change the parameters of the temporal noise reduction processing depending on the actual noise level of the input signal. This is done by the TV- microcontroller which reads the noise level (***NOISEME***) and sends different parameter sets to the temporal noise reduction registers of the VSP 94x2A depending on this value (0=no noise, 126=strong noise). Value 127 indicates an overflow status which means that the measurement failed.

The value is determined by averaging several fields. The line taken for noise measurement is selected by ***NMLINE***. If ***NOISEME*** contains updated data which was not read so far, ***NMSTATUS*** is set. ***NMSTATUS*** is reset when read.

The ***NMLINE*** parameter determines the line, which is used in the VSP 94x5B for the measurement. In case ***NMLINE***=0, line 2 of the field A and line 315 of the field B is chosen. In case of ***NMLINE=3***, line 5 of the field A and line 318 of the field B is chosen. The measurement position can be adjusted (***NMPOS***) as well as the sensitivity (***NMSENSE***).

2.4.10. Noise Reduction

The Fig. 2–39 shows a block diagram of the motion adaptive temporal noise reduction. The structure of the temporal motion adaptive noise reduction is the same for luminance as for chrominance signal. Noise reduction is enabled by ***NRON***.

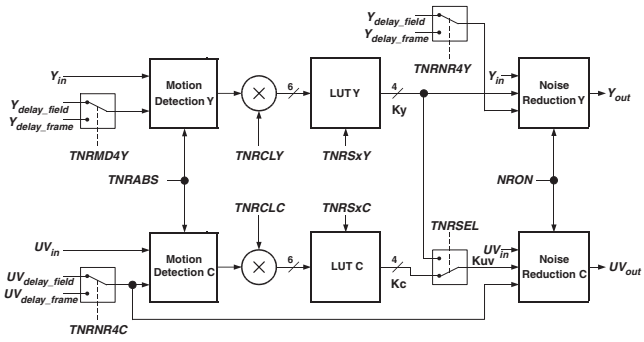

Fig. 2–39: Temporal noise reduction

Depending on the motion in the input signal, the K-factor Ky (Kuv) is adjustable between 0 (no motion) and 15 (motion) by the motion detector. The K-factor for the chrominance filter can be either Ky (output of the luminance motion detector, ***TNRSEL***=0) or Kuv (output of the chrominance motion detector, ***TNRSEL***=1). The delay of the feedback path is a field or frame delay (***TNRNR4YM***, ***TNRNR4CM***).

The motion detector for master channel of luminance and chrominance can be field or frame based (***TNRMD4YM***). The recursive filtering should be set to the **same** algorithm (***TNRNR4YM,*** field- or frame-based filtering). The chrominance motion detection uses always the delay of the noise reduction (***TNRNR4CM***). For slave channel, delay of motion detection and noise reduction can not be selected separately for luminance and chrominance. ***TNRNR4YS*** selects whether field or frame delay is used.

Table 2–19: Allowed combinations for Master NR

Y Noise Reduction	C Noise Reduction	Settings Y	C uses C Motion Detection	C uses Y Motion Detection
Field based	Field based	***TNRMD4YM***=1 ***TNRNR4YM***=1	***TNRNR4CM***=1 / ***TNRSELM***=1	***TNRNR4CM***=1 / ***TNRSELM***=0
Field based	Frame based		***TNRNR4CM***=0 / ***TNRSELM***=1	Not available
Frame based	Field based	***TNRMD4YM***=0 ***TNRNR4YM***=0	***TNRNR4CM***=1 / ***TNRSELM***=1	
Frame based	Frame based		***TNRNR4CM***=0 / ***TNRSELM***=1	***TNRNR4CM***=0 / ***TNRSELM***=0

Table 2–20: Allowed combinations for Slave NR

Y Noise Reduction	C Noise Reduction	Settings Y	C uses C Motion Detection	C uses Y Motion Detection
Field based	Field based	***TNRNR4YS***=1	***TNRSELS***=1	***TNRSELS***=0
Field based	Frame based	Not allowed		
Frame based	Field based			
Frame based	Frame based	***TNRNR4YS***=0	***TNRSELS***=1	***TNRSELS***=0

The output of the motion detector is weighted using the parameters ***TNRCLC*** and ***TNRCLY***. The look-up table input value range is separated into 8 segments.

It is possible to define a predefined curve characteristic for each segment. The curve characteristics can be programmed by the parameters ***TNRYSx*** for luminance and ***TNRCSx*** for chrominance. The curve-start is defined by ***TNRYSS*** (***TNRCSS***) at the end of the last segment. The overall curve is now constructed by connecting the end of segment 6 to the beginning of segment 7 and so on. Negative values of Ky (Kuv) are not possible and clipped to zero. A continuous mapping of 64 motion values to 16 Ky (Kuv) values is the result.

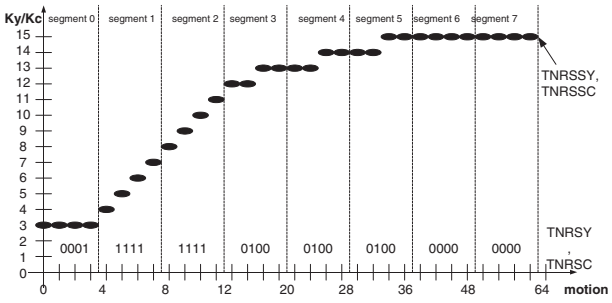

Fig. 2–40: Predefined curve characteristics for LUT

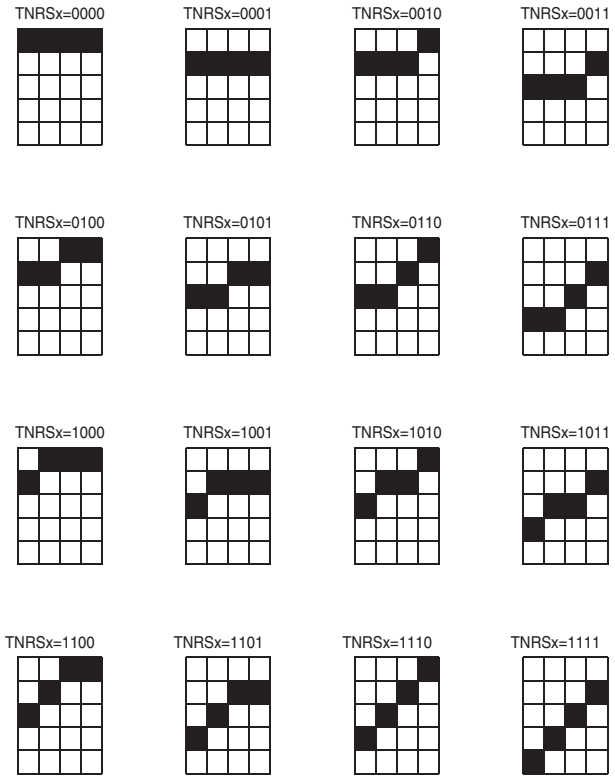

Fig. 2–41: Segments of LUT