# N5998A-02 <u>S E R V I C E N O T E</u>

Supersedes: NONE

## N5998A: HDMI 1.3 Protocol Analyzer and Generator

Serial Numbers: DE47300001/DE47300188

In certain cases the N5998A does not capture HDMI 1080p signals correctly and shows pixel errors after capturing HDMI frames.

To Be Performed By: Agilent-Qualified Personnel

Parts Required: P/N	Description	Qty.	
0699-6623	4.7 KOhms Resistors	1	can be supplied by division
•	Jumper Wire		
File: "VIC16_RGB	_12Bit_60Hz.vgf <sup>*</sup> to be supplied	d by the	division.

### ADMINISTRATIVE INFORMATION

SERVICE NOTE	CLASSIFICATION:		
	MODIFICATION	RECOMMEND	ED
ACTION CATEGORY: :	[[]] IMMEDIATELY x ON SPECIFIED FAILURE x AGREEABLE TIME	STANDARDS LABOR: 1.	0 Hours
LOCATION CATEGORY:	[[]] CUSTOMER INSTALLABLE [[]] ON-SITE X SERVICE CENTER	SERVICE [[]] RETURN INVENTORY: x SCRAP [[]] SEE TEXT	USED [[]] RETURN PARTS: x SCRAP [[]] SEE TEXT
AVAILABILITY:	PRODUCT'S SUPPORT LIFE	NO CHARGE AVAILABLE UNTIL	: June 1, 2009
AUTHOR: KH		PRODUCT LINE: PL24	
ADDITIONAL INF	ORMATION:		

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#### Note:

If the serial number of the N5998A is DE47300136 or less, please ensure that the service note N5998A-01 has been implemented first. Please contact Kurt Hellinga in case of questions.

#### Situation:

When capturing HDMI 1.3 1080p video frames with the N5998A, the instrument does not capture the frames correctly in all cases. If frames from specific DUTs are captured, pixel errors might occur. An illustration of these pixel errors is shown in figure 1 below:



#### Figure 1

As a consequence of these pixel errors, the following HDMI 1.3 compliance tests specified in the HDMI 1.3b CTS might fail: 7-16, 7-17, 7-24 and 7-25.

#### Page 3 of 14 Solution/Action:

Fixing this bug requires a few hardware modifications and the installation of software version 1.2 or later.

To perform the hardware modifications, proceed as follows:

1. Remove the 4 screws and the two edges at the back of the instrument:





2. Slide off the cover of the instrument:



Figure 3

3. Disconnect the plugs as shown in the following 2 illustrations:



Figure 4



Figure 5

4. Remove the 3 screws at the front of the instrument as shown below:



Figure 6

5. Remove the cooling vent:



6. Remove the motherboard by removing the following screws:



Figure 7

The areas which need modifications can be found in the following 2 areas:



6. The following modifications need to be made near the Silicon Image Receiver Chip:



Figure 9

7. Near the FPGA one resistor needs to be removed and the other side of the jumper wire needs to be connected:



Figure 10

Now glue the jumper wire to the PCB board using appropriate epoxy.



This is how the board should look like after the modifications:

Figure 11



- 8. Reassemble the unit in the reverse order.
- 9. Verify correct operations as follows

For functional verification a second N5998A is required. A sufficient number of units should be available in demstock. Contact Kurt Hellinga (Telnet.: 778-3013) in case of issues or questions. Two PCs are needed to control the two N5998A's.

Connect the two N5998A's by connecting the HDMI output of the second N5998A to the HDMI input of the N5998A to be tested (the unit with the HW modifications. The second N5998A will be used to generate a 1080p frame to be captured by the N5998A under test. If the N5998A under test captures the frame correctly the unit is functionally correct.

To generate a 1080p frame with the second N5998A start the N5998A and select the "HDMI Video Timing Generator" Tab at the top of the screen. Select file "VIC16\_RGB\_12Bit\_60Hz.vgf" and Video Format Timing 16: 1920x1080p@60Hz. (Contact Kurt Hellinga (<u>kurt\_hellinga@agilent.com</u> to get a copy of the file.)

ectory Name C:\data\PAG\Service Note	User Directory	
es IC16_RGB_12Bit_60Hz.vgf	Video Format Timing 16 : 1920×1080p @ 60Hz	V
Pixel Repetition Factor(Pixel Sent X times)  No Repetition 2 4	Color Space	Bar Information(0xNNNN)           LNETB         0000           LNSBB         0000           PNELB         0000           PNSRB         0000           NSRB         0000           Box 16:9(Top)         Box 14:9(Top)           Box 14:9(Center)         4;3(Center)           16:9(Center)         14:9(Center)           14:9(Center)         14:9(Center)
With Audio	Audio Data	Start Stop

Figure 13

Press Start to start generating the frame.

The N5998A to be tested must be set to capture the 1080p frame:

Select Tab HDMI Capture, select the frequency range for 222.75 MHz (4 ranges might be shown), select a file name and an upload size (200MByte is sufficient):

🔊 HDMI Protocol Analyzer : Ver1.1.6A	
HDMI Capture HDMI Evaluator HDMI Video Timing Generator EDID Writer	
HDMI Pixel Clock 25MHz-74.999MHz 75MHz-129.999MHz 130MHz-224.999MHz HDMI Capture Capture Board Ready Capture Done Capture Start HDMI Upload Create New File Test-Capture Upload Size[1-4096] 200 MByte	
Upload	
	Exit

Figure 14

When the "Capture Board Ready" indicator is green, press the "Capture Start" button. When the "Capture Done" indicator is green, select a directory and filename on the PC using the "Create New File" button. Specify a file size of 200 MByte and press "Upload", the captured file will be stored on your PC.

Now the captured file must be evaluated.

Select the "HDMI Evaluator" Tab at the top. Enter the Target File Name (the filename and directory you have specified in the HDMI Capture tab), select Video Format Timing "16: 1920x1080p @ 60Hz", select Test ID "(7-27) AVI InfoFrame" and check the "AVI InfoFrame Packet" Checkbox.

	ы ,	ideo Format Timing	
Target File Name Test-Capture	File Open	16 : 1920×1080p @ 60Hz	~
		act ID	
	~	(7-27) AVI InfoFrame	~
		Protocol HDMI DVI Color Format RGB XvYCC YCbCr(4:2:2) YCbCr(4:4:4)	
		Color Depth 24 bits 30 bits 36 bits 48 bits	
		Options AVI InfoFrame Packet Audio AcP, ISRC1, ISRC2 Packet	
TMDS Clock(Hz) Packet LOG		Start Cancel	

Figure 15

Press start.

Now the test starts.

Dialog

During the test the following screen will be displayed:

Figure 16

On this screen check for pixel errors. If you see the above grey scale without any colored random pixels this is correct.

Select aspect ratio 16:9 and press "Finish".

Select test item 7-25 Video Format Timing and insert "222 750 000" Hz in the TMDS Clock Range. Click the start button to start the test and verify that the logfile shows a pass at the end of each tested frame.

							Video Format Timing	
arget File Name	P:\Standards\HDI	4I\PAG-N5998A	\Captured Files\mo	odified hv	File Open		16 : 1920×1080p @ 60Hz	
	ter ben ben internet		1 111 11 0 0 0				Test ID	
Number of pixel No Error	Clocks that HSYNC I	emains active s	hould be 44.0 (HS	_LEN)		<u>^</u>	(7-25) Video Format Timing	
Number of pixel No Error	clocks from end of '	/ideo Data Peri	od to HSYNC active	edge should t	oe 88.0 (VID		Protocol HDMI ODVI	
Number of pixel	clocks in Video Data	Period minus 2	(for Guard Band) :	should be 1920	) (H_ACTIVE		Color Format	
Number of pixel No Error	clocks between two	HSYNC active	edges should be 22	200.0 (H_TOT/	AL)	III	RGB XVYCC     YCbCr(4:2:2)	
Number of lines No Error	that VSYNC remains	active should l	be 5 (VS_LEN)				O YCbCr(4:4:4)	
Number of Vide No Error	o Data Periods betw	een each two V	SYNC active edges	should be 108	30 (V_ACTIV		24 bits     0 30 bits     0 48 bits	
Number of pixel No Error	clocks between VSN	NC active edge	s divided by H_TO	TAL should be	1125.0 (V_T		Ontions	
Number of HSYI No Error	NC pulses from VSYN	IC active edge I	o Video Data Perio	d should be 41	I (VS_TO_VII		AVI InfoFrame Packet	
Test ID 7-25 : P	ASS						ACP, ISRC1, ISRC2 Packet	
د]		Ш			>	~		
MDS Clock(Hz)	148500000		Packet LOG	]			Start Cancel	1

Figure 17