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**ADV7622**

**Register Settings Recommendations**

**Rev 1.2**

**October 2011**

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## About This Document

This document describes ADI register setting recommendations and adjustments for the ADV7622. This document must be used in conjunction with the latest Hardware Manual and Software Manual.

## Disclaimer

The information contained in this document is proprietary information of Analog Devices B.V. This document must not be made available to anybody other than the intended recipient without the written permission of ADI.

The contents of this document are believed to be correct. If errors within this document are found or clarifications are needed, contact the author: AV-Video Applications, who will respond as soon as possible.

## Revision History

Revision	Date	Changes
Rev. 1.0	29/07/2010	Initial
Rev. 1.1	27/06/2011	Section 1.2 – added B2 02 write Section 1.2 – added 68 75 write Section 1.3.7 – Detail clarified Section 1.3.10 – Detail clarified
Rev 1.2	03/10/11	Section 1.4.4 – New Section Section 1.3.2 – Section removed

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# 1. HDMI Receiver Register Settings

## 1.1 Recommended I2C Addresses

On the ADI evaluation platform, the following register settings are used to configure the variable I2C map addresses. These can be configured as required for customer systems.

B2 EF 12	HDMI Tx INFOFRAME Map I <sup>2</sup> C address
B2 F0 84	TX EDID Map I <sup>2</sup> C address
B2 F4 80	CEC Map I <sup>2</sup> C address
B2 F5 7C	INFOFRAME Map I <sup>2</sup> C address
B2 F8 4C	DPLL Map I <sup>2</sup> C address
B2 F9 64	REPEATER Map I <sup>2</sup> C address
B2 FA 6C	EDID Map I <sup>2</sup> C address
B2 FB 68	HDMI Receiver Map I <sup>2</sup> C address
B2 FD 44	CP Map I <sup>2</sup> C address

The fixed I<sup>2</sup>C addresses in the ADV7622 are for the IO I<sup>2</sup>C map (0xB2) and TX MAIN I<sup>2</sup>C map (0xBA). These can be configured as required for customer systems by pulling ALSB high or low.

## 1.2 Recommended Initialization Settings

ADI recommends that these register settings are programmed to set the part correctly in HDMI mode.

### IO Map

B2 02 FX ADI recommended write (X to be replaced with RGB/YPrPb setting as required)  
B2 1F 20 ADI recommended write

### HDMI Map

68 00 00 ADI recommended write  
68 0D 04 ADI recommended write  
68 50 04 ADI recommended write  
68 57 B9 ADI recommended write  
68 58 63 ADI recommended write  
68 6C 18 ADI recommended write  
68 75 10 ADI recommended write  
68 99 A1 ADI recommended write  
68 9B 09 ADI recommended write  
68 9D 02 ADI recommended write  
68 C0 00 ADI recommended write

### TX Main Map

BA 98 07 ADI recommended write  
BA 9A 80 ADI recommended write  
BA 9B 1A ADI recommended write  
BA DF 39 ADI recommended write

## 1.3 HDMI Receiver Dynamic Settings

The following settings and processes are required for the best performance.

### 1.3.1 Hot Plug Assert

To manually assert a hot plug, e.g. to replicate a down stream hot plug in a repeater application, the following writes should be employed

B2 20 F8	Manually assert hot plug on port A
B2 20 F4	Manually assert hot plug on port B
B2 20 F2	Manually assert hot plug on port C
B2 20 F1	Manually assert hot plug on port D

Following a manual assertion of the hot plug, the hot plug must also be manually de-asserted.

### 1.3.2 Free-run Operation

For best free-run performance, the following steps should be employed

- Set PRIM\_MODE to the desired free-run standard (IO Map, 0x01[3:0])
- Set VID\_STD to the desired free-run standard (IO Map, 0x00[4:0])
- Set VFREQ to the frequency of the desired free-run standard (IO Map, 0x01[6:4])
- Enable the CP mode to slave free-run parameters from PRIM\_MODE and VID\_STD (CP Map, 0x0C9[0])
- Enable free-run mode (CP Map, 0xBF[0])

### 1.3.3 Power Down Modes

The ADV7622 has two power down modes – power down mode 0 and power down mode 1. In power down mode 0, chassis supply is not available. The hardware recommendations outlined in the hardware manual must be followed for this mode.

In power down mode 1, chassis supply is available but the ADV7622 is powered down via the I2C power down bit. This mode can be used to put the part into low power mode whilst monitoring the CEC.

To correctly power down the ADV7622, the following steps should be employed

- Put the RX section into power down mode (B2 0C 62)
- Put the TX section into power down mode (BA 41 50)

When returning from low power mode, to correctly power up the ADV7622, the following steps should be employed

- Put the TX section into power down mode (BA 41 10)
- Put the RX section into power down mode (B2 0C 42)

### 1.3.4 Low Frequency 720p Formats

To process the low frame rate video formats 720p24, 720p25 and 720p30, the following write should be employed

- HDMI Map, 0x4C[2] = 1

For all other formats, this bit should be cleared. An algorithm to define when this bit should be set is as follows: If the total horizontal blanking length (hsync front porch + hsync pulse width + hsync back porch) is greater

than half the total line length, set HDMI Map, 0x4C[2]. If the total horizontal blanking length (hsync front porch + hsync pulse width + hsync back porch) is less than half the total line length, clear HDMI Map, 0x4C[2]

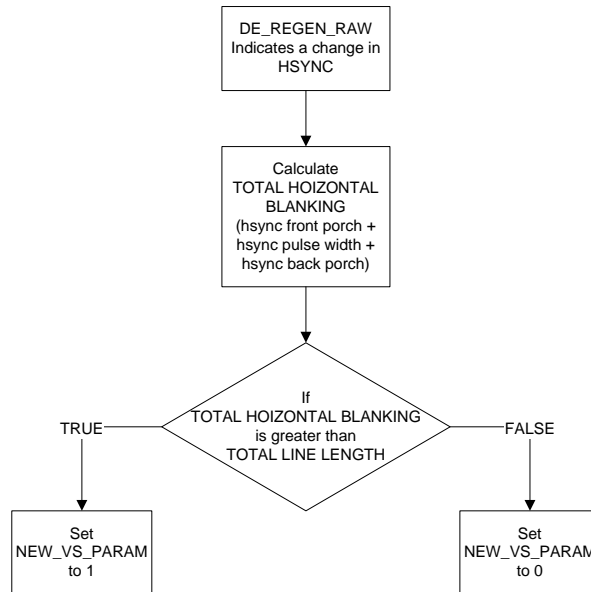


Figure 1. Low Frame Rate Formats Algorithm

### 1.3.5 Packet Detection

The ADV7622 does not generate an interrupt when a source stops sending the following infoframes:

- Audio infoframe
- Source Prod infoframe
- MPEG Source infoframe
- Vendor Specific infoframe
- ACP infoframe
- ISRC1 infoframe
- ISRC2 infoframe
- Gamut infoframe

To detect when a source has stopped sending an infoframe, the following steps should be employed

- Clear infoframe interrupt RAW bit
- If RAW bit does not get set during max allowed packet repeat time, the source has stopped sending the infoframe

For example, 3D content is indicated using the Vendor Specific (VS) infoframe. It has been observed that some 3D sources stop sending the VS infoframe should their output be switched from 3D to 2D. For this reason, the application must detect when the VS infoframe has stopped being received.

A suggested ISR Routine that could be employed is as follows

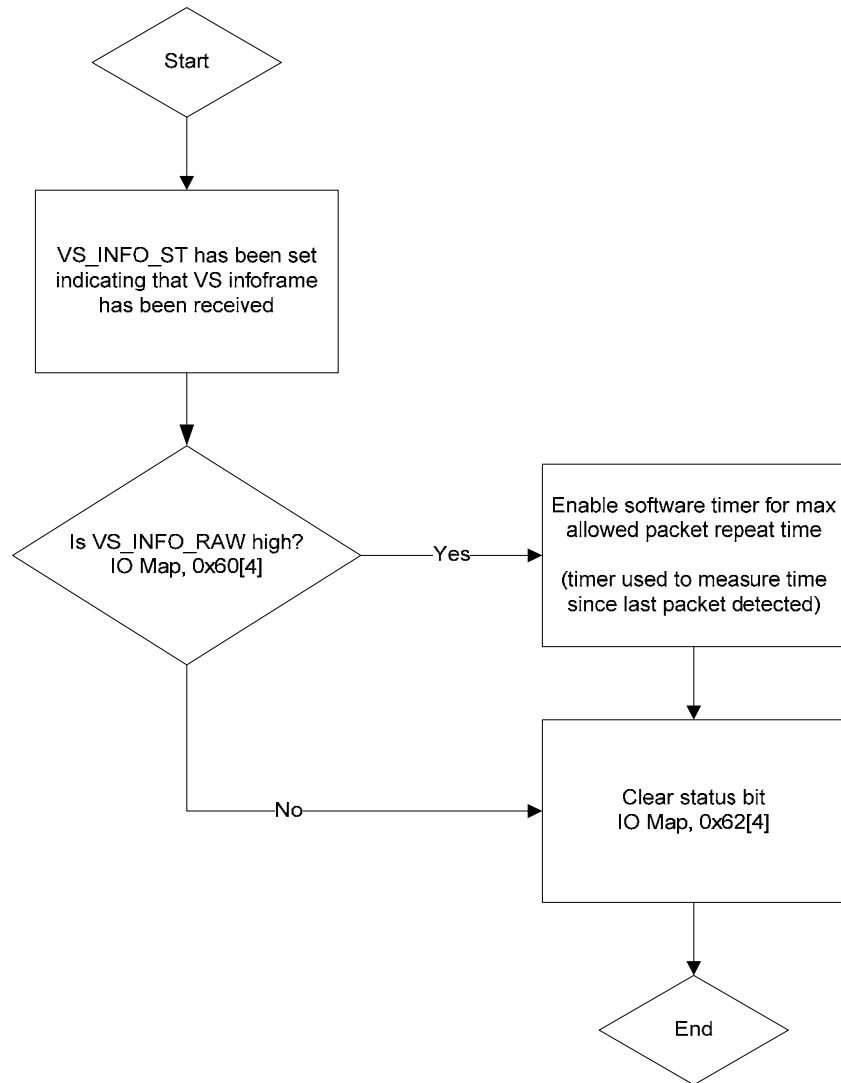


Figure 2. ISR Routine



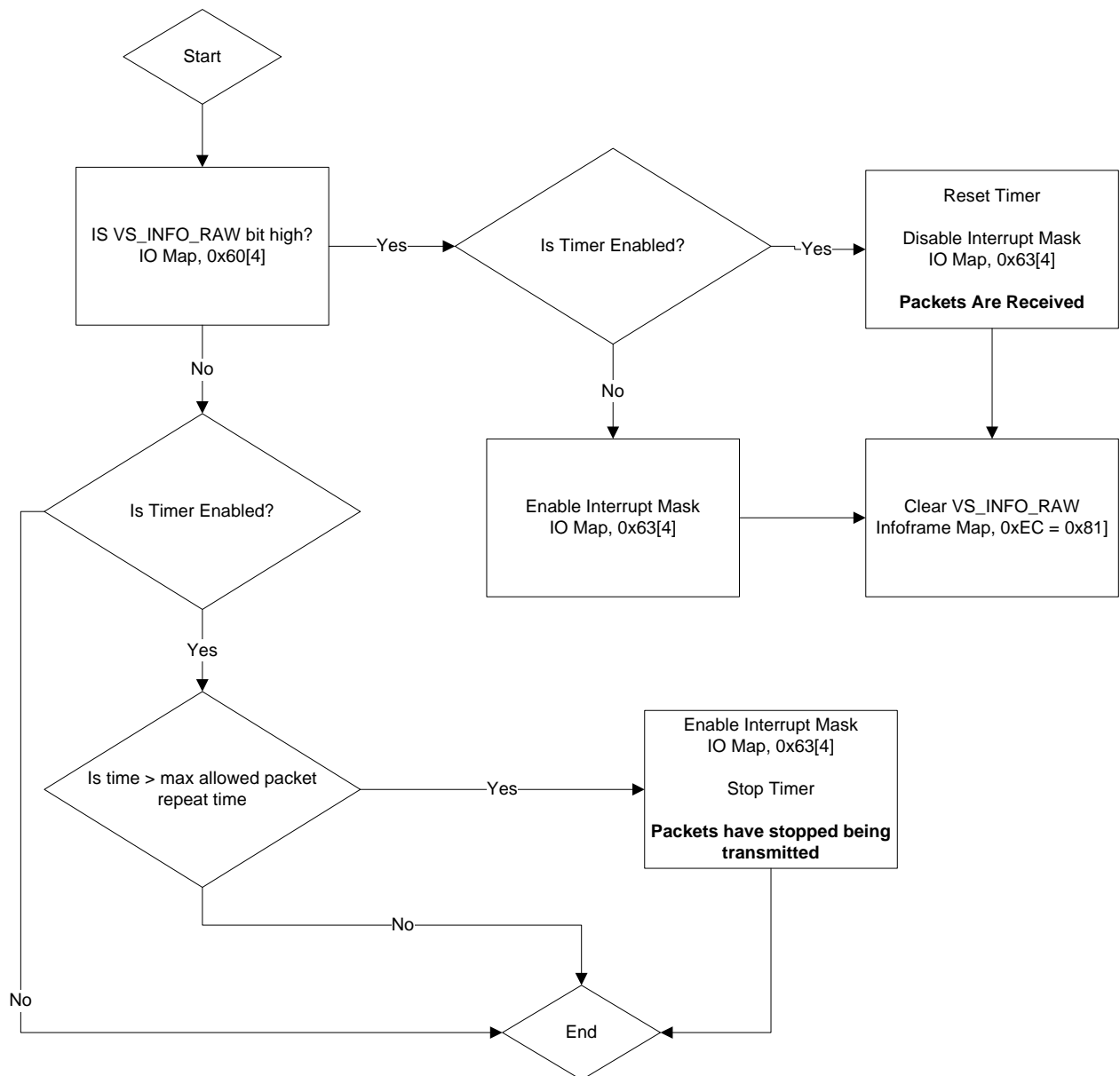


Figure 3. Infoframe Task

### 1.3.6 Equalizer Settings

Depending on the situation, there are a number of equalizer setting recommendations. The low frequency gain (LFG) and high frequency gain (HFG) registers for each port are outlined as follows

	Port A	Port B	Port C	Port D
LFG	HDMI Map, 0x8D	HDMI Map, 0x90	HDMI Map, 0x93	HDMI Map, 0x89
HFG	HDMI Map, 0x8E	HDMI Map, 0x91	HDMI Map, 0x94	HDMI Map, 0x8A

It is recommended to use the values outlined below as these are evaluated thoroughly prior to release of silicon. They balance cable length support versus jitter rejection. Varying the values will compromise either the maximum cable length that can be supported or the amount of jitter that the part will reject.

### 1.3.6.1 Internally Routed Traces

For an input that is routed directly from another device on a PCB over a short trace e.g. the TX of an SOC to the RX of the ADV7622, the following equalizer settings are recommended

- LFG = 0x0B
- HFG = 0x30

### 1.3.6.2 Cable Support

For support of a conventional cable, the following equalizer settings are recommended

- LFG = 0x0B
- HFG = 0x20

### 1.3.7 Port Switching in HBR/DSD Applications

If HBR or DSD audio formats are supported, it is recommended to manually mute the audio when switching between ports. To correctly manually mute the audio on ADV7622, the following step should be employed

- Set manual mute bit prior to port change (HDMI Map, 0x1A[4] to 1)

To correctly unmute the audio on ADV7622, the following step should be employed

- Clear manual mute bit after port change (HDMI Map, 0x1A[4] to 0)

### 1.3.8 DSD Audio

If DSD audio format is supported, the following algorithm should be employed

- Whilst initializing a newly selected port, poll DST\_DOUBLE (HDMI Map, 0x19[2])
- If DST\_DOUBLE is 1,
  - Toggle clock termination on that port (HDMI Map, 0x01[6:3]) from 0 to 1 and back to 0
  - Continue
- If DST\_DOUBLE is 0, do nothing
  - Continue

### 1.3.9 Colour Space or Colour Sampling Changes

When switching between any two different video types (e.g. RGB -> YCbCr or 4:4:2 to 4:4:4), the following bit must be toggled

- CP Map, 0xBA[7] must be toggled from 0 to 1 and back to 0

For example, the bit should be toggled in all of the following situations

- Switching from RGB -> YCbCr 4:4:4
- Switching from RGB -> YCbCr 4:2:2
- Switching from YCrCb 4:4:4 -> RGB
- Switching from YCrCb 4:4:4 -> YCrCb 4:2:2
- Switching from YCrCb 4:2:2 -> RGB
- Switching from YCrCb 4:2:2 -> YCrCb 4:4:4

### 1.3.10 3D 1080i 50/60Hz Side by Side Full

To support 1080i 50/60Hz 3D, side by side full, the following write should be employed

- B2 C1 2F

### **1.3.11 VIC 39**

To support VIC 39, the following writes should be employed

- 44 88 FF
- 44 89 FF
- 44 7C 80

## 1.4 HDMI Transmitter Dynamic Settings

The following settings and processes are required for the best performance.

### 1.4.1 Black Out Mode

To force a black out on the TMDS outputs of the ADV7622, the following steps should be employed

- Set the desired colour output (CP Map, 0xC1 and 0xC2) – black, blue etc
- Force constant colour output from the CP core (CP Map, 0xBF[3])

If the OSD is enabled, it will be overlaid on top of the black out screen

### 1.4.2 TMDS Power Down

If an application calls for the TX outputs to be powered down, the following steps should be employed

- Set the charge injection of the TX to 0
- Power down the TMDS data channels

To return from TMDS power down mode, the following steps should be employed

- Power up the TMDS data channels
- Set the charge injection of the TX to

### 1.4.3 VIC Clearing

The HDMI transmitter of the ADV7622 does not automatically clear the VIC transmitted should the source for the TX switch from a CEA-861 format (e.g. 480p) to a non CEA-861 format (e.g. 1280x800). To do this, the following write should be employed

- TX Main Map, 0x3C = 0x00

### 1.4.4 Audio Return Channel

To combat the coupling of noise onto the audio return channel (ARC) output of the ADV7622, it is recommended to enable the hysteresis circuit in the ADV7622.

- HDMI Map, 0xFF[6] = 1