
ST-NXP Wireless

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As a result, the following changes are applicable to the attached document.

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- **Web site** - <http://www.st.com> is replaced with <http://www.stnwireless.com>
- **Contact information** - the list of sales offices is found at <http://www.stnwireless.com> under Contacts.

If you have any questions related to the document, please contact our nearest sales office. Thank you for your cooperation and understanding.

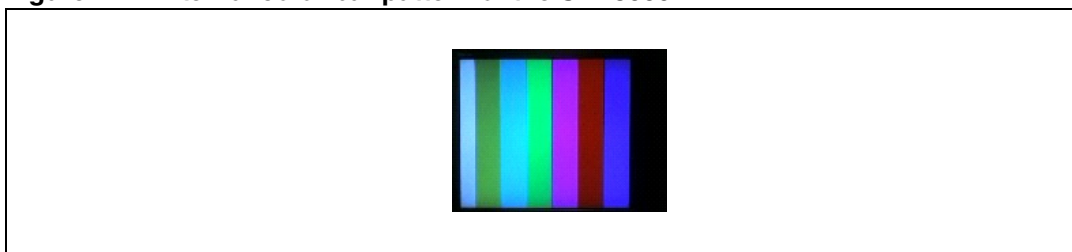
ST-NXP Wireless

STw8009 Spectrum of CVBS video output

Introduction

This document shows the action of the video output analog filter (330pF/2.2uH/330pF, symmetrically loaded with 75R), with a cut-off frequency close to 10 MHz. For both PAL and NTSC video standards, spectrum has been captured with and without filter. The video source is the chosen internal color bar pattern of the STw8009, in order to be compared at customer level if required.

Figure 1. Internal color bar pattern of the STw8009



This typical frame, shown in *Figure 1*, contains a maximum of energy around the color burst frequency for a given standard (4.43 MHz in PAL, 3.57MHz in NTSC). The 27 MHz sampled system creates energy around this frequency with two bands that are image of video baseband, with intrinsic $\sin(x)/x$ filtering.

As energy around sampling frequency can be up to 31 MHz (27 MHz + video band), the upper limit of frequency analysis is rated to 40 MHz. Assuming that no TV set is able to handle a signal that is more than five times the upper limit of video band, there is always an anti-aliasing filter very close to the video input of every digital TV set, on the other side, analog TV sets featuring limited frequency band, so in any case, from an electrical point of view, the analysis limit of 40 MHz is suitable.

Reference documents

- STw8009/STw8019 datasheet
- AN2347 - Getting started with STw8009 and STw8019
- AN2462 - STw8009/STw8019 PCB guidelines

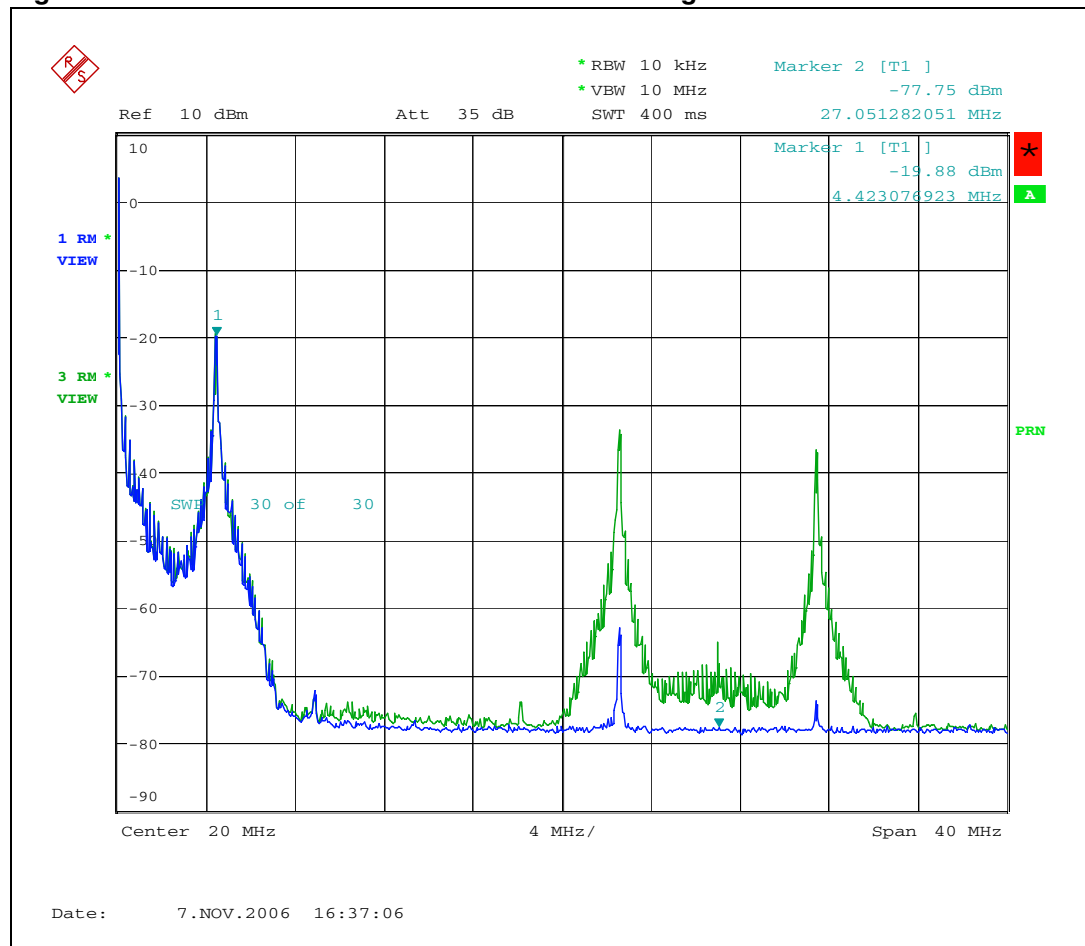
1 Setup description

Tests have been performed on the STw8009 application demo board (see AN2462), driven by the ST ARM DBB control board for I2C commands. Results have been recorded on an R&S FSU spectrum analyzer. As this device is dedicated mainly to RF (using 50R input impedance), a 25R serial resistor has been added, in order to have 75R real load for STw8009 output.

The DBm values given are not absolute, they are as measured on 50R across 75R load. The captured screen copies show how the remaining energy level is relative to the in-band signal with and without low-pass filter.

1.1 Selected video standard PAL BDGHI

Figure 2. Green trace and blue trace schematic diagram



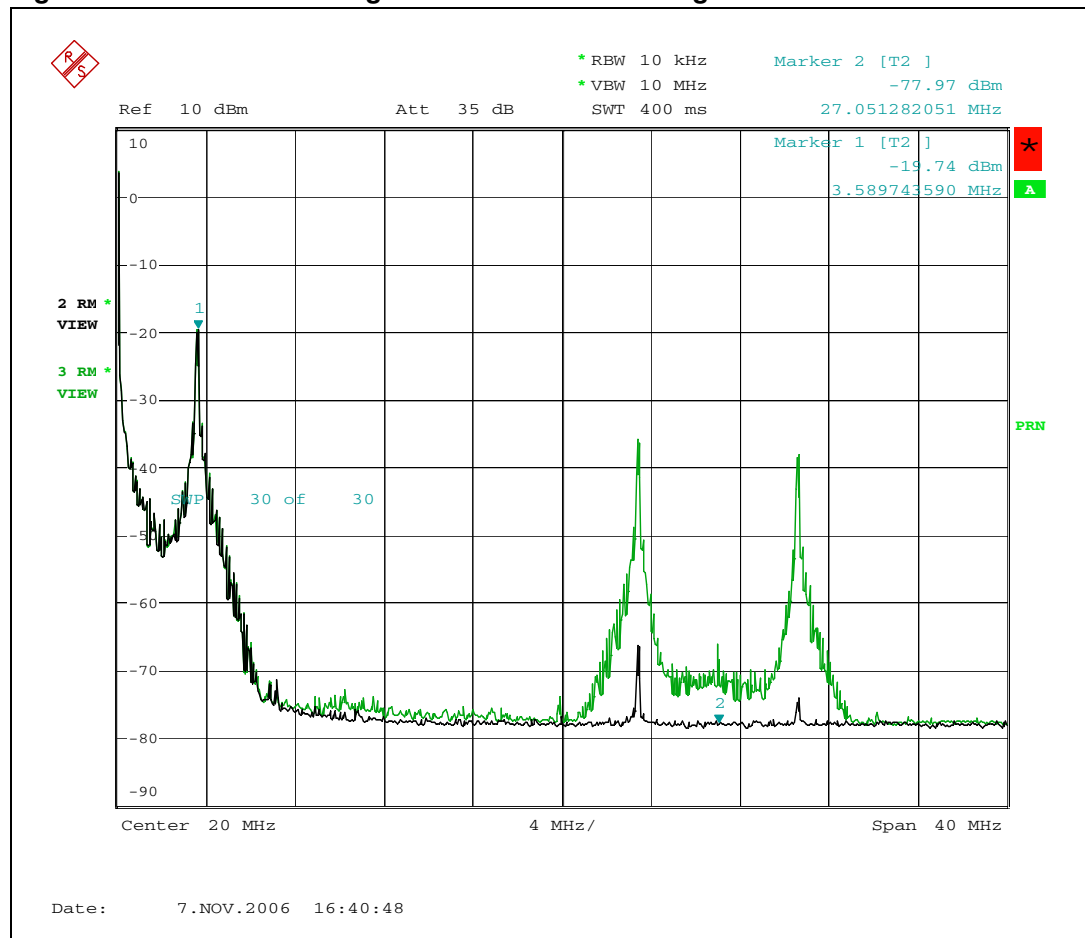
The maximum in-band energy is around PAL color burst frequency (4.43 MHz); out-band energy around sample frequency is around 27 +/- 4.43 MHz and theoretically reproduced and sin(x)/x attenuated every multiple of 27 MHz.

- Blue trace is CVBS video output spectrum with low-pass filter. 27 MHz is no more detected; remaining image energy is still present, but more than 40 dB attenuated.
- Green trace shows spectrum without filter.

Conclusion: the filtering effect is to reduce unwanted energy by at least 30 dB.

1.2 Selected video standard NTSC M

Figure 3. Black trace and green trace schematic diagram



Maximum in-band energy is around NTSC color burst frequency (3.57 MHz); out-band energy around sample frequency is around 27 +/- 3.57 MHz, and theoretically reproduced and sin(x)/x attenuated every multiple of 27 MHz.

Black trace: CVBS video output spectrum with low-pass filter. 27 MHz is no more detected; remaining image energy is still present, but more than 40 dB attenuated.

Green trace shows spectrum without filter and gives the same conclusion as above: the filtering effect is to reduce unwanted energy by at least 30 dB.

2 Revision history

Table 1. Document revision history

Date	Revision	Changes
21-Mar-2007	1	Initial release.

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