

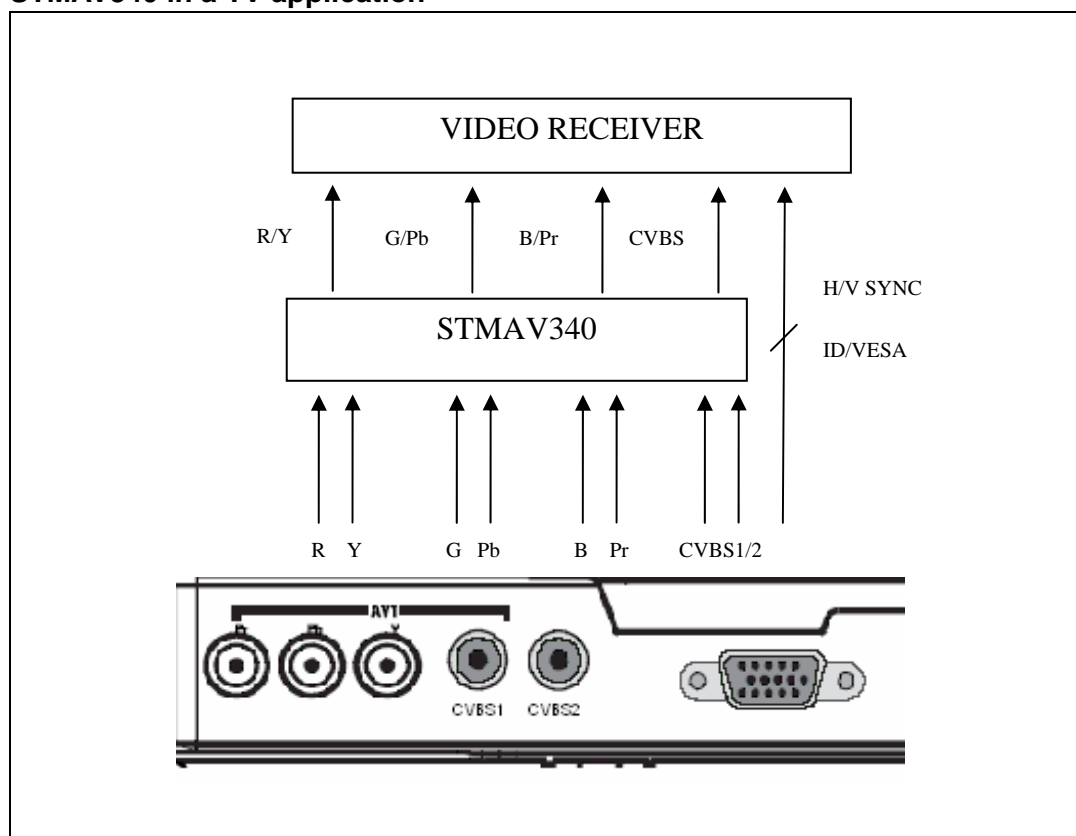
STMAV340 evaluation board & PCB layout recommendation

Introduction

STMAV340 has 4 channels and a 2 to 1 video switch that is well suited for switching analog video signals on a TV or monitor set. Below is a diagram of STMAV340 typical application configuration. As illustrated on the picture below, the 3 channels of the switch can be used to switch two complete sets of RGB and YPbPr to a single RGB/YPbPr output. One additional channel can be used to switch 2 CVBS inputs to a single output that can be directly connected to a single CVBS receiver input.

Without STMAV340 integrated in the system, the video receiver needs to have more input pins to accommodate the many video inputs at the back panel. With the introduction of STMAV340, less IO pins are required at the video receiver. Together with the optimized pin arrangement, the result is a straightforward system design and overall cost reduction.

STMAV340 in a TV application



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1 Evaluation board

The evaluation board was designed with trouble-free customer evaluation in mind. Instead of having two sets of RGB (VGA connector) and YPbPr (RCA connector) as inputs and branching the output to the VGA and RCA connectors, two VGA RGB inputs are connected and the outputs go directly to single VGA connector to a display unit.

For the evaluation, the customer can connect the two sets of inputs to two VGA port of PC, while the output can be directly connected to the VGA port of the display unit.

- Power supply

The board can be powered either directly from a DC power supply or from a DC adaptor. If it is powered from DC power supply, 5VDC is connected to the power socket labeled V_{CC5V} and the ground is connected to the power socket labeled GND. The board can also be powered from a DC adaptor having output voltage of 7 V to 15 V. The DC adaptor voltage is regulated to 5 V by the on board regulator. The DC adaptor can be center positive or negative and it should be connected to the DC JACK.

To prevent the digital lines switching from coupling to the analog lines, the power distribution is separated from digital and analog sections. Although STMAV340 has also two digital lines, which are OE and SEL, it should still be powered from the analog supply because its main function is to switch analog signals and those two digital lines are mostly static during operation. Hence the analog lines are not disturbed by the digital part and, as such, there is no need to have a separate analog and digital supply for STMAV340.

The analog and digital sections on the board are isolated by ferrite beads.

Table 1. STMAV340 Demo board power supply

Designator	Notes
V_{CC5V}	Connect to 5 V of external power supply.
GND	Connect to ground of external power supply.
DC JACK	Connect to DC adaptor output if the board is to be powered from DC adaptor. Input voltage: 7 to 15 V

Note: External power can be applied to either V_{CC5V}/GND or DC JACK, but not to both.

- Video input & output ports

There are four video input ports: VGA1, VGA2, CVBS1, and CVBS2. STMAV340 performs the switching of these video inputs. Depending on the SEL control line, either VGA1 or VGA2 input is directed to VGA_OUT and either CVBS1 or CVBS2 is directed to CVBS_OUT.

Since STMAV340 does not perform the switching of VGA synchronization signals, two STG719 are incorporated to switch both horizontal and vertical synchronization.

VGA port also has some ID signals. To prevent clashing between ID signals from VGA input 1 and 2, the ID lines are isolated by jumpers. If VGA1 is active and to be directed to VGA_OUT, JP1 to JP4 should be closed whereas JP5 to JP8 should be opened. If VGA2 is active and to be directed to VGA_OUT, JP5 to JP8 should be closed whereas JP1 to JP4 should be opened.

Table 2. Video ports on the STMAV340 Demo board

Designator	Notes
VGA1	– Connect to VGA source from PC. – When SEL '0' this port is active – JP1 to JP4 closed. – JP5 to JP8 open.
VGA2	– Connect to VGA source from PC – When SEL '1' this port is active – JP1 to JP4 open. – JP5 to JP8 closed.
CVBS1	– Connect to CVBS source – When SEL '0' this port is active
CVBS2	– Connect to CVBS source – When SEL '1' this port is active
VGA_OUT	Active VGA input is directed to this port. Connect to a display unit.
CVBS_OUT	Active CVBS input is directed to this port. Connect to a display unit.

- Video inputs conditioning

The blanking level might vary between different video transmitters. This STMAV340 evaluation board can handle video signals with blanking level of 0 V to 2.5 V.

If video signals blanking level at outside the above range, some input conditioning should be done to translate the blanking level to the range specified.

- Digital control signals

Table 3. Control signals on the STMAV340 Demo board

Signal	Function	Notes
OE	Enable or disable the output.	JP9 close = LOW (enable) JP9 open = HIGH (disable)
SEL	Select which switch is activated.	JP10 close = LOW (VGA1, CVBA1) JP10 open = HIGH (VGA2, CVBS2)

Figure 1. STMAV340 Evaluation board schematic

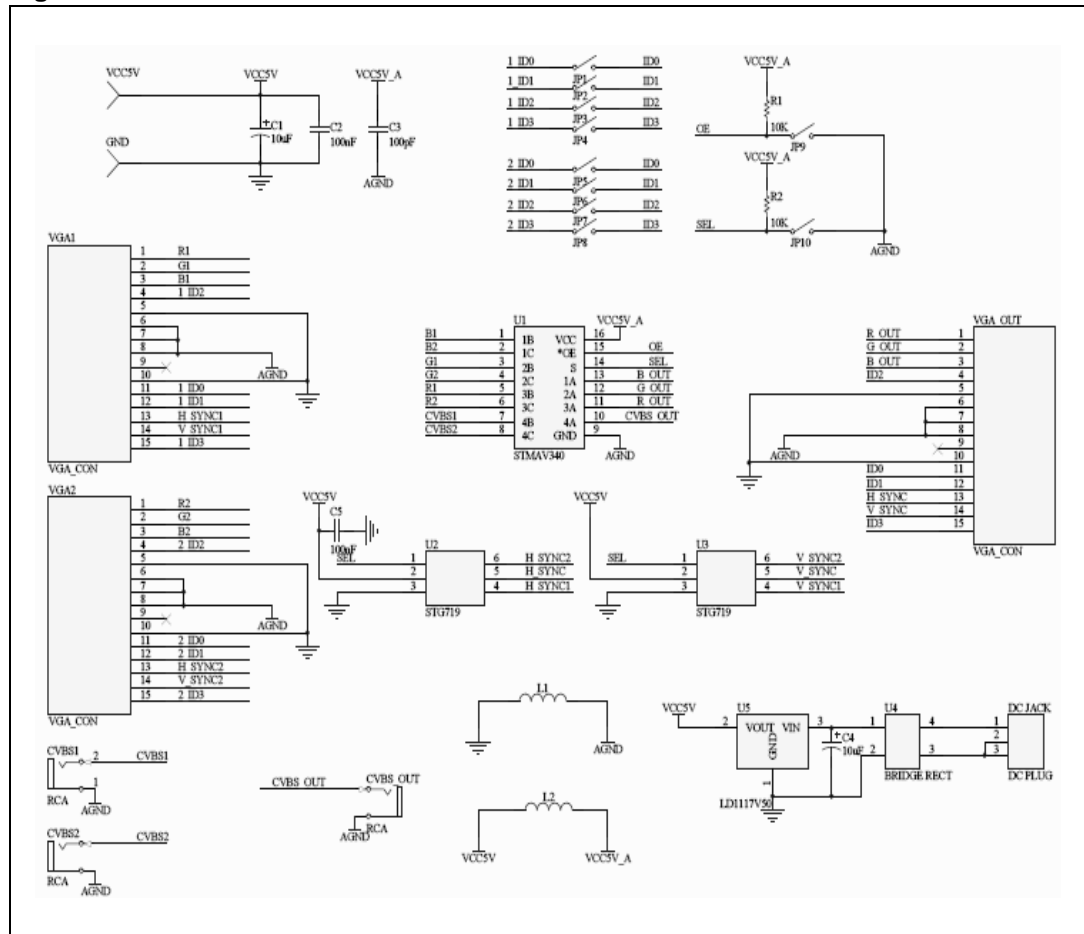


Table 4. Bill of materials (BOM)

No	Component	Designator	Package	Manufacturer
1	STMAV340	U1	TSSOP16	STMicroelectronics
2	STG719STR	U2, U3	SOT23-6L	STMicroelectronics
3	VGA FEMALE CON	VGA1, VGA2, VGA_OUT		
4	RCA CON	CVBS1, CVBS2, CVBS_OUT		
5	LD1117V50	U5	TO-220	STMicroelectronics
6	DF04M RECTIFIER	U4	DFM	GENERAL SEMI
7	DC JACK	DC JACK		
8	POWER SOCKET	V _{CC} 5V, GND		
9	FERRITE BEAD	L1, L2	1206	
10	100 nF Cap	C2,C3, C5	0603	
11	10 μF Electrolytic Cap	C1, C4	Cap7.62 mm	

Table 4. Bill of materials (BOM) (continued)

No	Component	Designator	Package	Manufacturer
12	Jumper	JP1, JP2, JP3, JP4, JP5, JP6, JP7, JP8, JP9, JP10.	HDR 2X1	
13	10k Resistor	R1, R2	0603	

2 PCB layout recommendation

For the purpose of maintaining 75 Ω track for all the analog lines, a 4-layer structure is recommended. All the analog tracks are routed on the top layer of the board. The middle two layers are used for both analog and digital ground.

The middle two layers are identical and separated into two sections, analog and digital grounds. They are separated by a slot area and are only connected at the top layer through ferrite bead. This ensures that the digital switching noise does not get coupled to the analog portion.

All the analog tracks are routed on top of the analog ground and all the digital tracks are routed on top of digital ground. There is one signal, the SEL line, which needs to cross from analog to the digital portion. The crossing is done at the bottom layer exactly below where the ferrite bead is used to bridge the analog and digital ground. Since the SEL digital line is mostly static during operation, it does not cause any disruption to the analog portion.

STMAV340 supply is connected to V_{CC}5V analog and GND analog. To further guarantee the stability of STMAV340 supply, a 100 nF capacitor is used to decouple the V_{CC} pin. The stability of the analog supply lines is of significant importance since the bias level of STMAV340 is referenced to it. Any instability on the analog supply affects the switch characteristics.

Each set of video signals, RGB1, RGB2, and RGB_OUT are routed with the same track length. This guarantees minimum channel-to-channel delay. To guarantee the impedance match on the analog lines, no via is used for routing these signals.

Figure 2. PCB Top layer

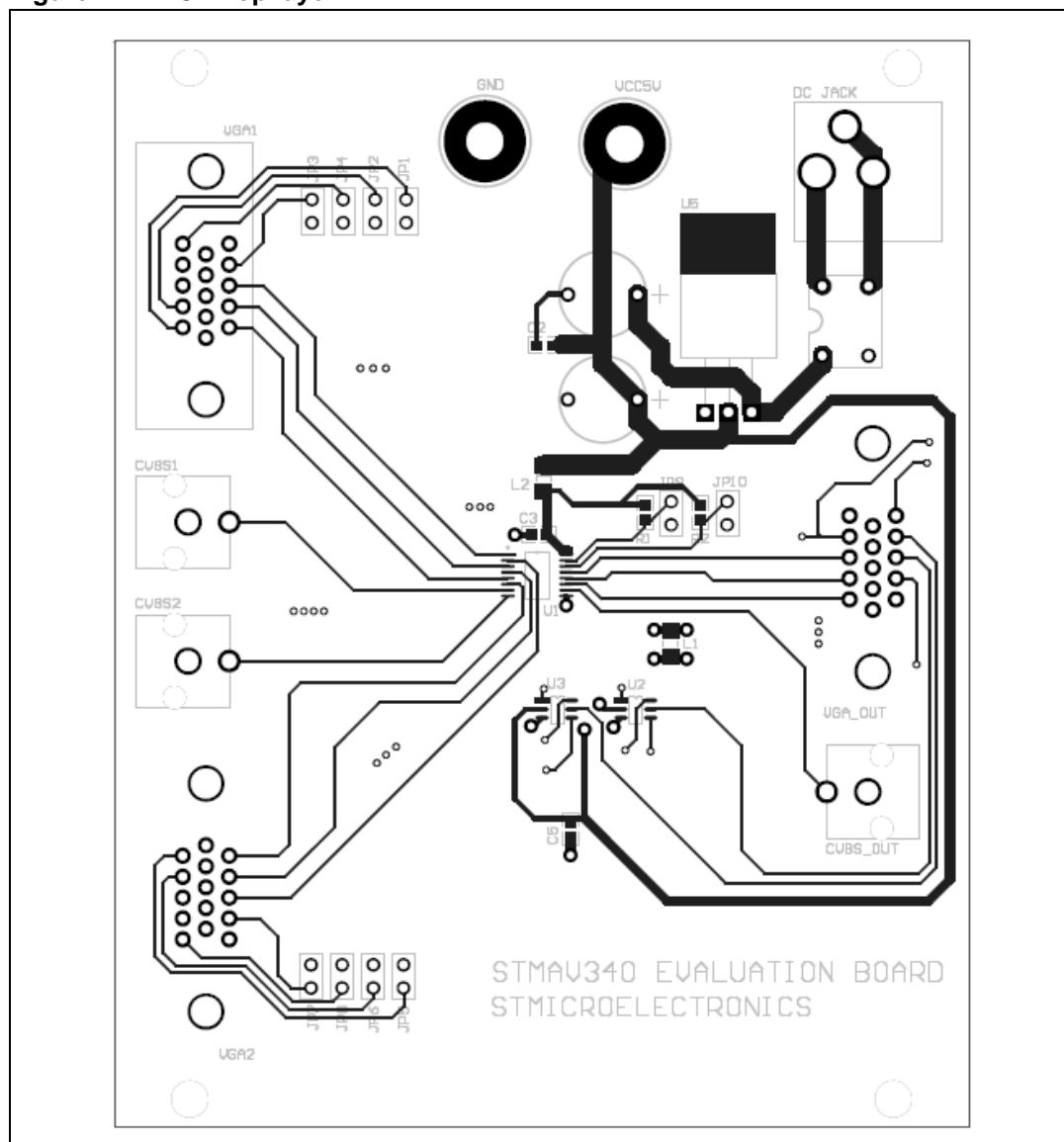


Figure 3. PCB Middle layer

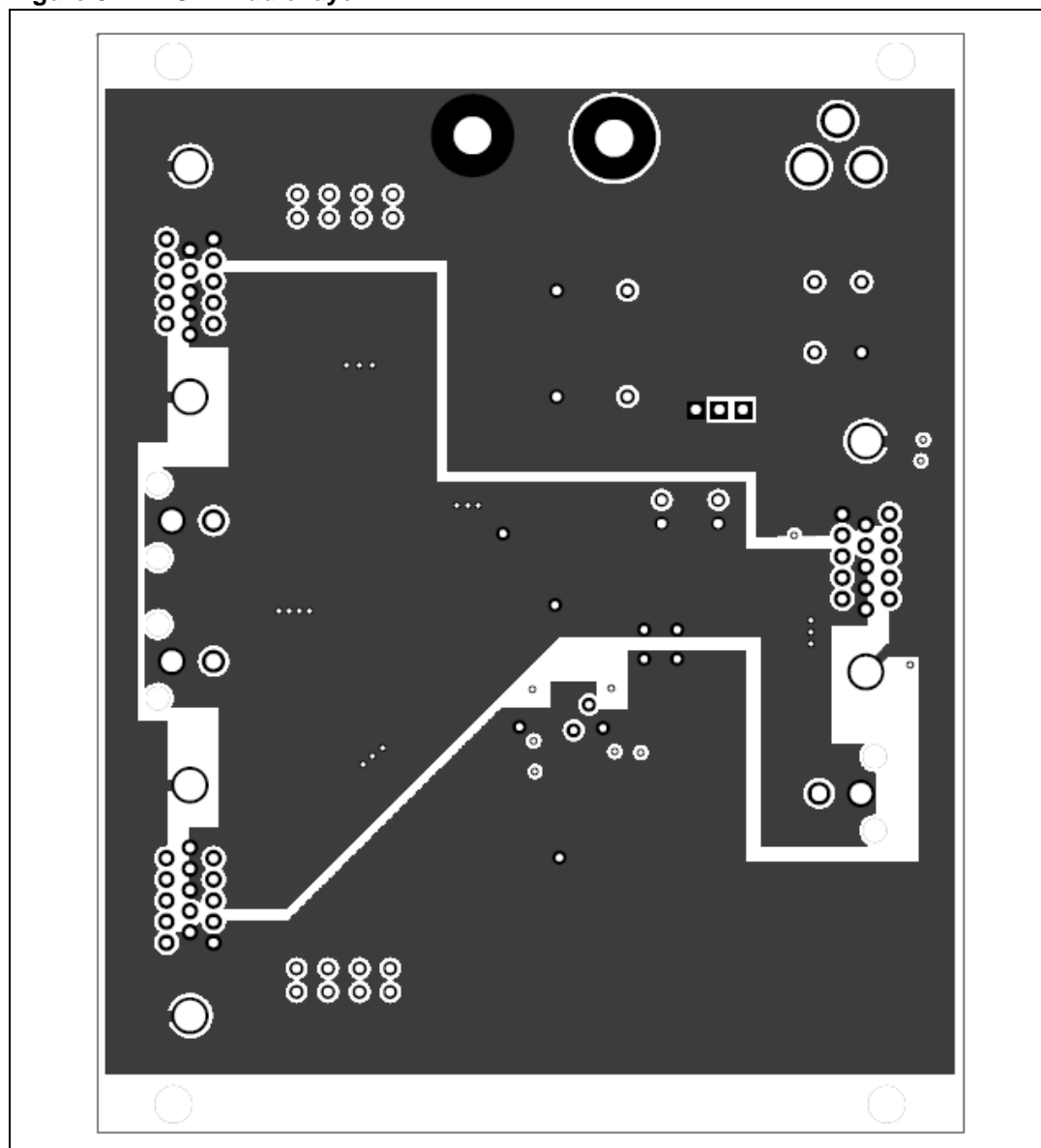
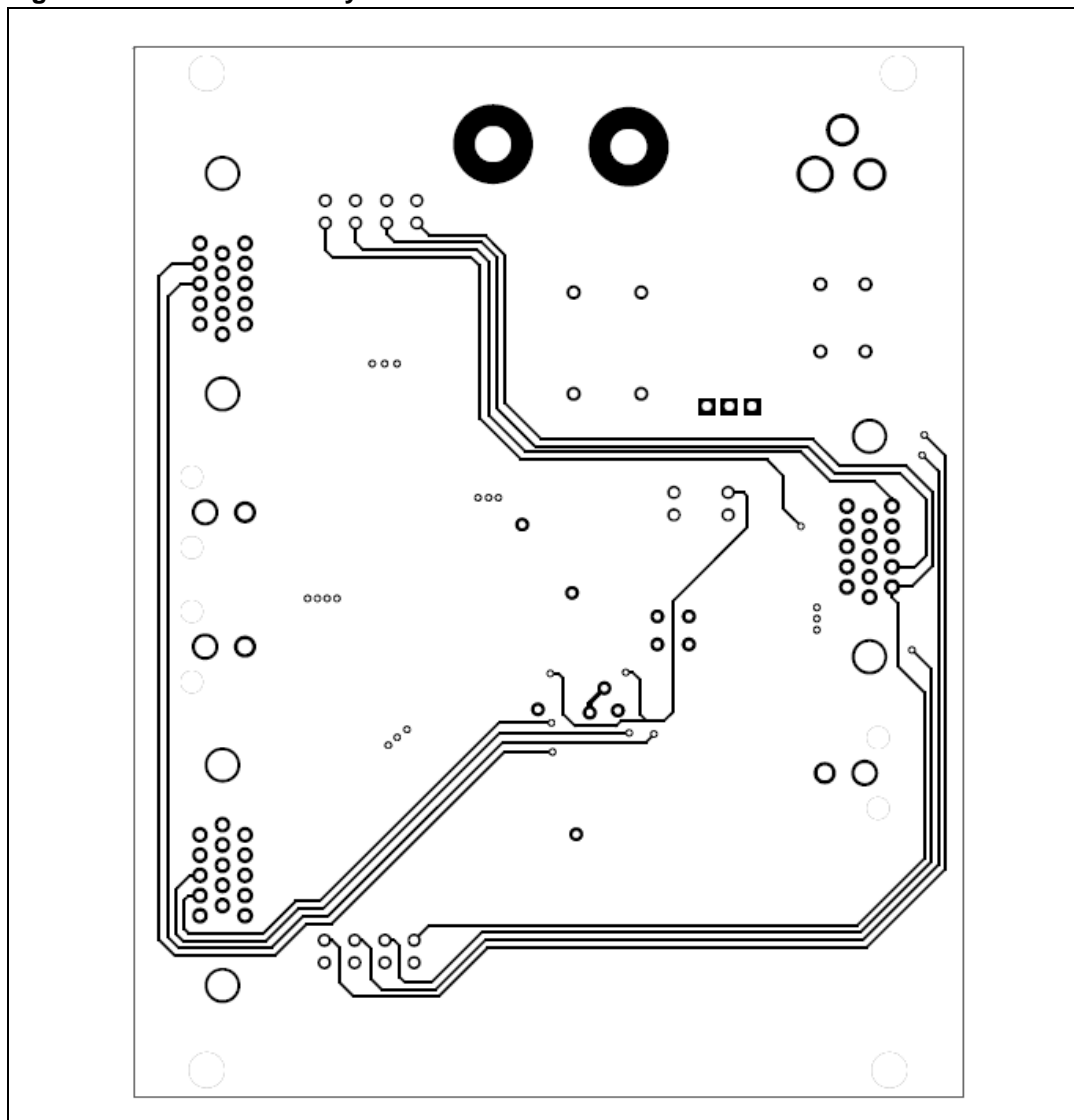


Figure 4. PCB Bottom layer



3 Revision history

Table 5. Revision history

Date	Revision	Changes
30-Apr-2007	1	First issue

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