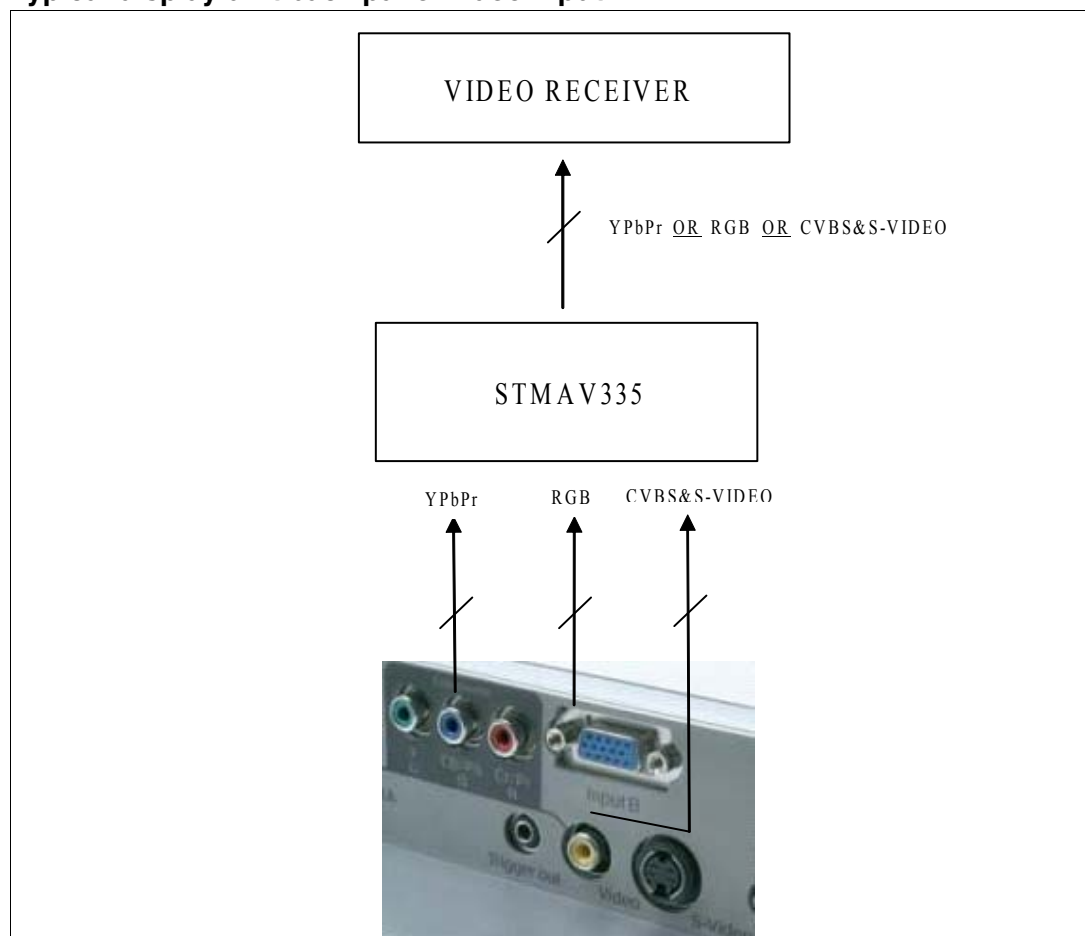


## Introduction

STMAV335 has three sets of 3 to 1 switches that are well suited for switching analog video signals on the back panel of television sets or monitors. Below is a diagram of an STMAV335 typical application configuration:

### Typical display unit back panel video input



As illustrated above, STMAV335 is used to switch one of the three video input sets to the video receiver. Depending on the SEL inputs, YPbPr, RGB, or CVBS&S-VIDEO signals will be directed to the video receiver. Hence less IO is required at the video receiver to handle the many different video signal inputs on the display unit back panel.

Ultimately, integrating STMAV335 to the system will result in a straightforward system design and overall cost reduction.

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# 1 Evaluation board

The STMAV335 evaluation board provides the customer with straightforward evaluation on the performance and the typical use of the switch in the real system.

The boards include an STMAV335 switch, video input and output connectors, jumper for setting the control lines status, and a power supply portion.

## 1.1 Power supply

The board can be powered either directly from a DC power supply or from a DC adaptor. If it is powered from a DC power supply, 5VDC is connected to the power socket labeled VCC5V 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 will be 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 digital noise from coupling to the analog lines, the power distribution is separated from digital and analog sections. Though STMAV335 has also two digital lines, which are SEL1 and SEL2, it should still be powered from the analog supply. The reason is because its main function is to switch analog signals and those two digital lines are mostly static during operation. Hence the analog lines will not be disturbed by the digital part and as such, there is no need to have a separate analog and digital supply for STMAV335.

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

**Table 1. Power connector**

Designator	Notes
VCC5V	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 VCC5V/GND or DC JACK, but not to both.

## 2 Video input & output ports

STMAV335 can switch three sets of video input to a single set of video output. On the evaluation board, the three sets of video input are:

1. RGB (VGA port)
2. YPbPr (3 RCA connector)
3. CVBS (RCA connector) & S-VIDEO (S-connector)

In the real system, the outputs of STMAV335 are directly connected to the video receiver. However for the STMAV335 evaluation board, each output line branches to three signal lines. The reason for this is because each set of different video signal has a different type of connector. During evaluation, each output line should be branched and be connected to a different video connector on the display unit back panel by a cable.

To avoid any PCB trace stub, the 1 to 3 branching of each output line cannot be shorted on the board. The branching of the output line is done by a zero ohm resistor. Depending on which particular set of video signal is active, the zero ohm resistors should be soldered such that the output of STMAV335 is connected to the right video output connector.

**Table 2. Evaluation board video input & output**

Input	Output	SEL	0Ω Jumper output
RGB (VGA_IN)	RGB (VGA_OUT)	SEL1 = '1' SEL2 = '0'	J11 = 'R' J12 = 'G' J13 = 'B'
Y (Y_IN) Pb (Pb_IN) Pr (Pr_IN)	Y (Y_OUT) Pb (Pb_OUT) Pr (Pr_OUT)	SEL1 = '0' SEL2 = '1'	J11 = 'Y' J12 = 'Pb' J13 = 'Pr'
CVBS (CVBS_IN) S-VIDEO (S VIDEO_IN)	CVBS (CVBS_OUT) S-VIDEO (S VIDEO_OUT)	SEL1 = '0' SEL2 = '0'	J11 = 'CVBS' J12 = 'Y(S)' J13 = 'C'

*Note:* SEL1 → JP9, SEL2 → JP10, OPEN = '1' & CLOSE = '0'

### 2.1 Video input conditioning

The blanking level might vary between different video transmitters. This STMAV335 evaluation board can handle video signals with blanking level of 0V to 2.5 V.

If video signal blanking levels are outside the above range, some input conditioning should be done to modify the blanking level to the range specified.

Figure 1. Board schematic

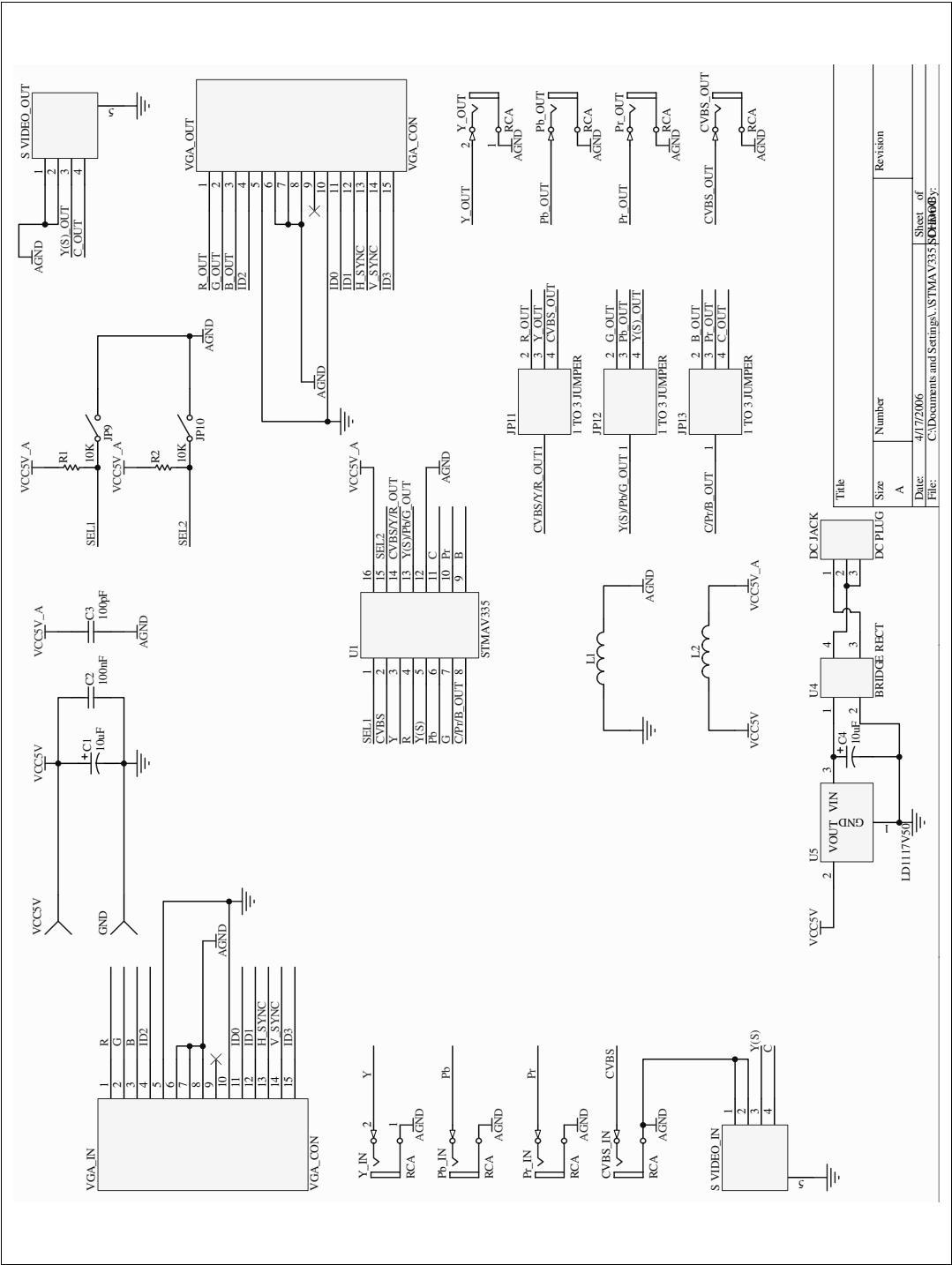


Table 3. Bill of material

No	Component	Designator	Package	Manufacturer
1	STMAV335	U1	TSSOP16	STMicroelectronics
2	S-Video CON	S VIDEO_IN, S VIDEO_OUT		
3	VGA FEMALE CON	VGA_IN, VGA_OUT		
4	RCA CON	Y_IN, Pb_IN, Pr_IN, CVBS_IN, Y_OUT, Pb_OUT, Pr_OUT, CVBS_OUT		
5	LD1117V50	U5	TO-220	STMicroelectronics
6	DF04M RECTIFIER	U4	DFM	GENERAL SEMI
7	DC JACK	DC JACK		
8	POWER SOCKET	VCC5V, GND		
8	POWER SOCKET	VCC5V, GND		
9	FERRITE BEAD	L1, L2	1206	
10	100 nF Cap	C2, C3	0603	
11	10 $\mu$ F Electrolytic Cap	C1, C4	Cap7.62 mm	
12	Jumper	JP9, JP10	HDR 2X1	
13	10 k $\Omega$ Resistor	R1, R2	0603	
14	0 $\Omega$ Resistor	JP11, JP12, JP13	0603	

### 3 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 and bottom layers 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 the digital noise will not get coupled to the analog portion.

All the analog tracks are referenced to the analog ground and all the digital tracks are referenced to the digital ground. In this evaluation board SEL1&SEL2, that in the actual system would come from the digital portion of the system, are included in the analog portion. Since these two select digital lines will be mostly static during operation, it will not cause any disruption to the analog portion.

STMAV335 supply is connected to VCC5V analog and GND analog. To further guarantee the stability of STMAV335 supply, a 100 nF capacitor is used to decouple the VCC pin and should be placed as close as possible to the pin. The stability of the analog supply lines is of significant importance since the bias level of STMAV335 is referenced to it. Any instability on the analog supply will affect the switch characteristics.

Each set of video signals, RGB, YPbPr, and YC (S-VIDEO) are routed with the same track length. This will guarantee minimum channel-to-channel delay that will lead to minimum display distortion.

Figure 2. Recommended board stack-up for 75 Ω impedance

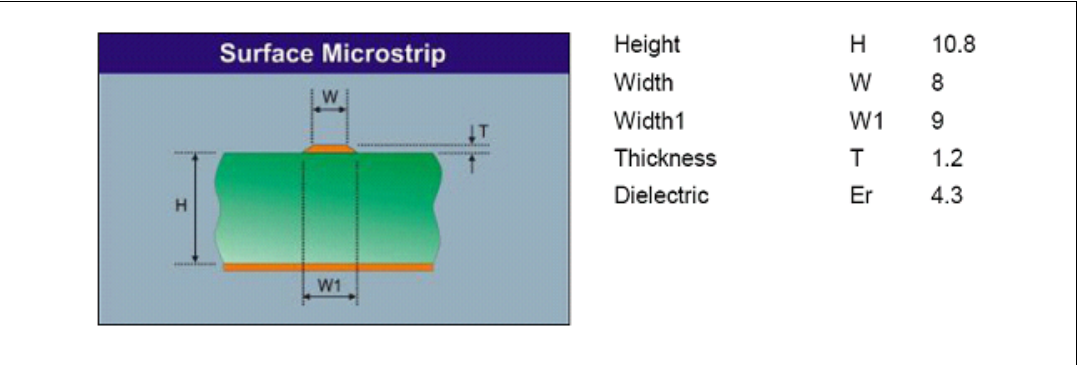


Figure 3. PCB top layer

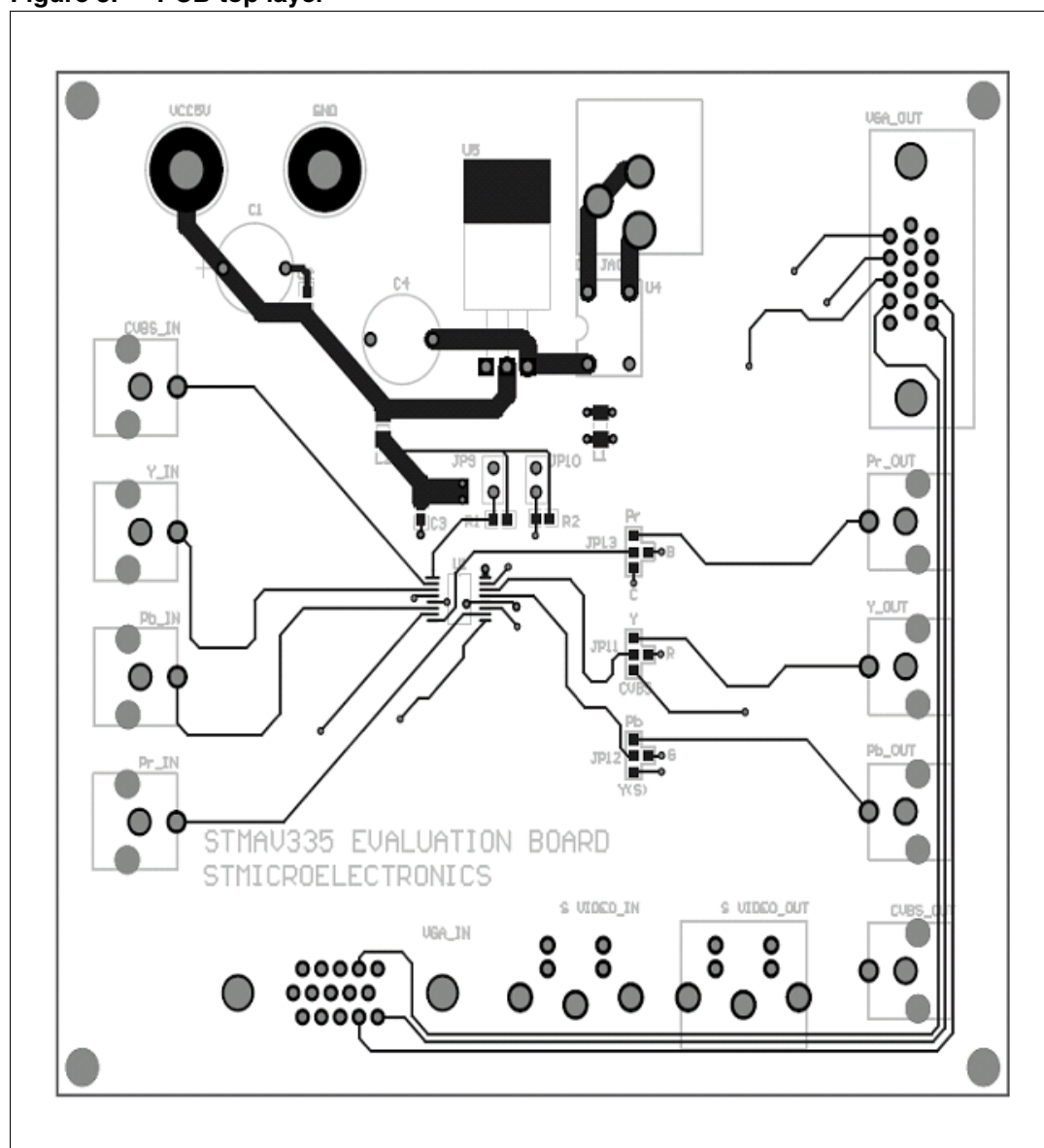




Figure 4. PCB middle layer1&amp;2

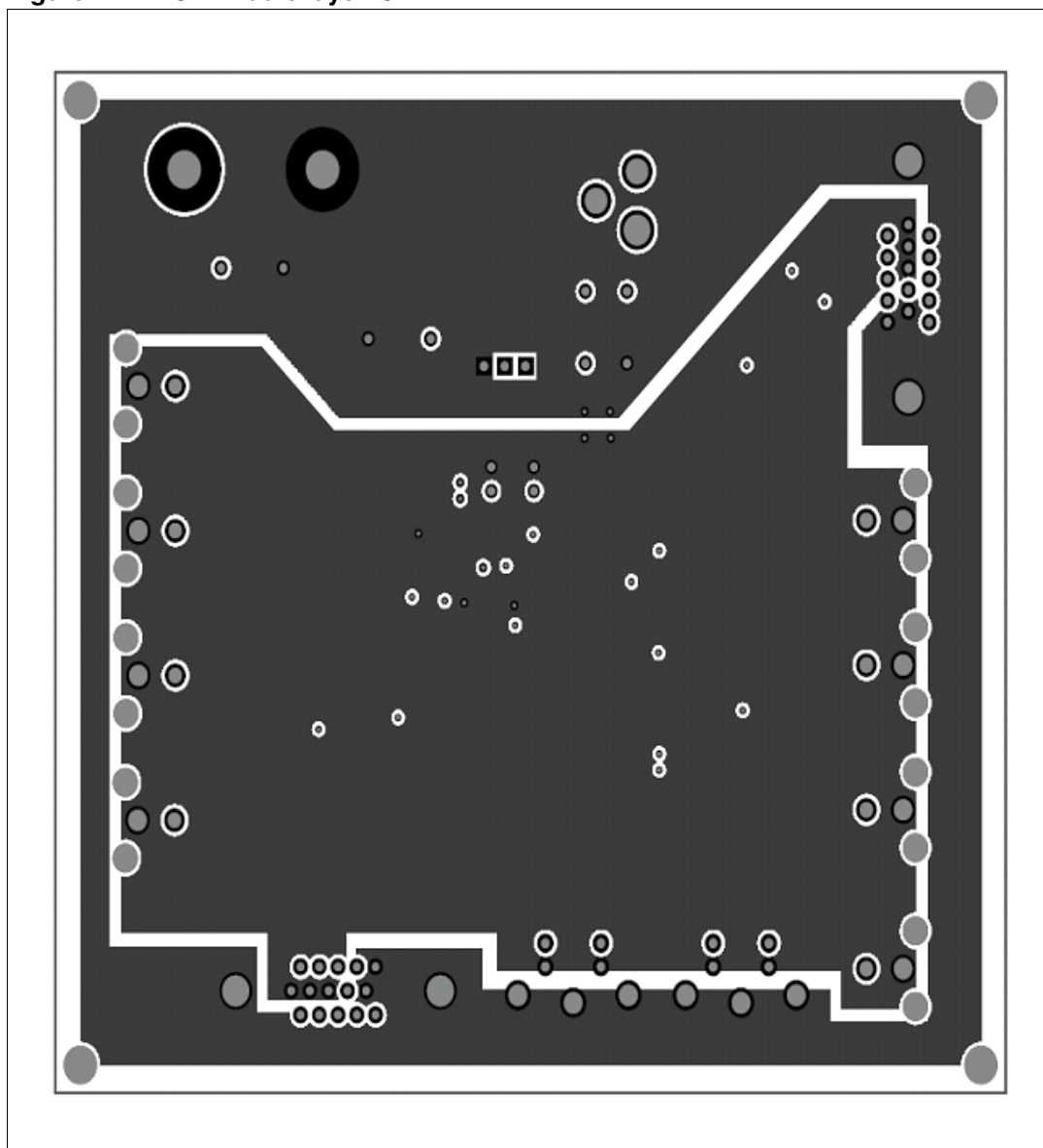
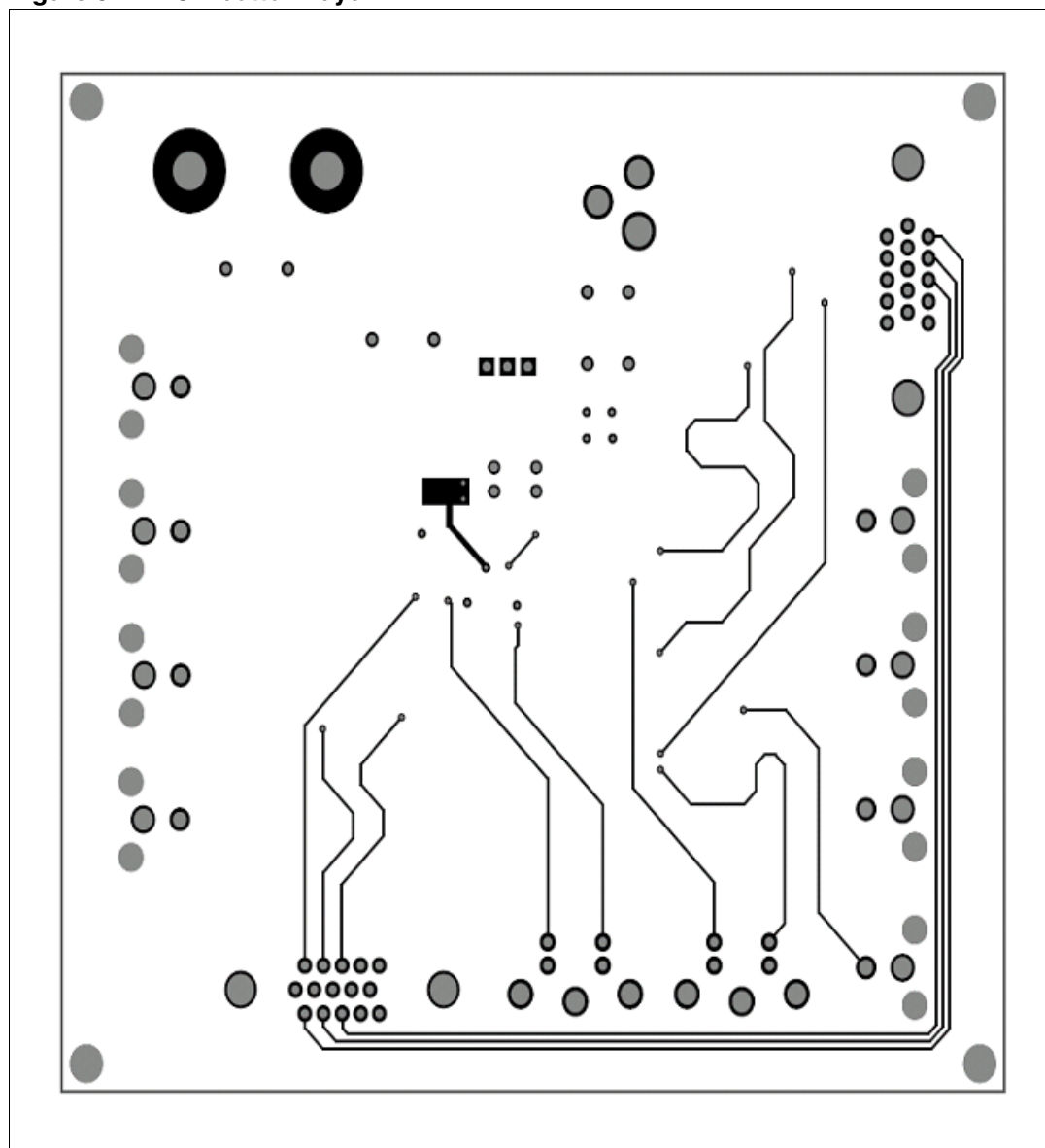


Figure 5. PCB bottom layer



## 4 Revision history

**Table 4. Document revision history**

Date	Revision	Changes
13-Mar-2007	1	Initial release

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