



STEVAL-IHP001V3

ZigBee[®] SmartPlug demonstration board
based on the STM32F10x, SPZB260-PRO and STPM01

Data brief

Features

- Monitors energy consumption and electrical parameters
- Power network overload prevention and remote load management in a wireless HAN
- Network/standalone operating modes
- Relay/Triac modes for on/off and dimming features
- RoHS compliant

Description

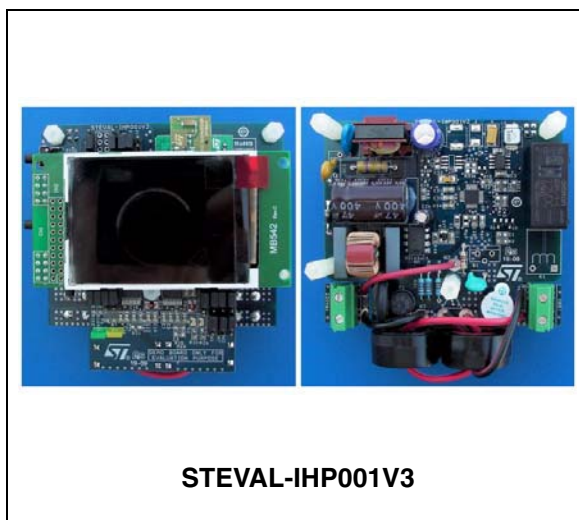
The STEVAL-IHP001V3 ZigBee[®] SmartPlug demonstration board employs the STM32F10x microcontroller, ZigBee SPZB260-PRO module and STPM01 energy metering IC to implement a ZigBee meter node which allows the user to monitor and manage the energy consumption of a connected load.

The SmartPlug board is a demonstration platform which provides guidelines for developing a home/building automation subsystem for energy management.

In a typical home system implementation, the board is plugged into an electrical wall socket, and supplies a home appliance or other generic electrical load.

Current, power, energy and other information related to the electrical load connected to the SmartPlug board can be shown on an LCD display locally, or sent to a ZigBee data concentrator through a home/building ZigBee network.

While the STEVAL-IHP001V3 replaces the STEVAL-IHP001V2, the hardware for both the V2 and V3 versions of the SmartPlug demonstration boards are identical. The STEVAL-IHP001V3 differs from the V2 version only in terms of the ZigBee PRO stack update.



In addition to the ZigBee PRO stack features, this update allows the use of the STEVAL-IFS013V2 USB-ZigBee dongle as network coordinator.

1 Schematic diagrams

Figure 1. AC load driver circuit

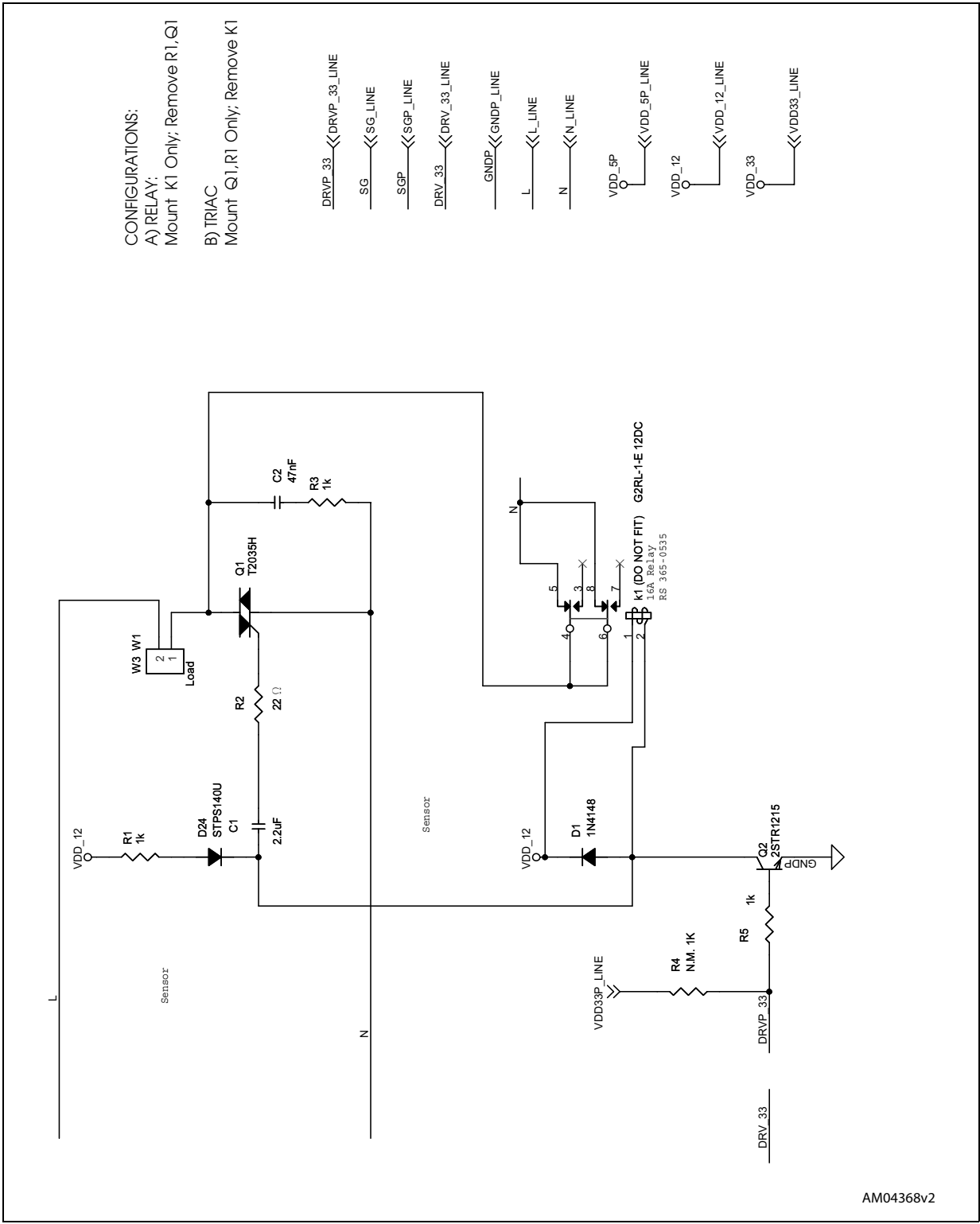
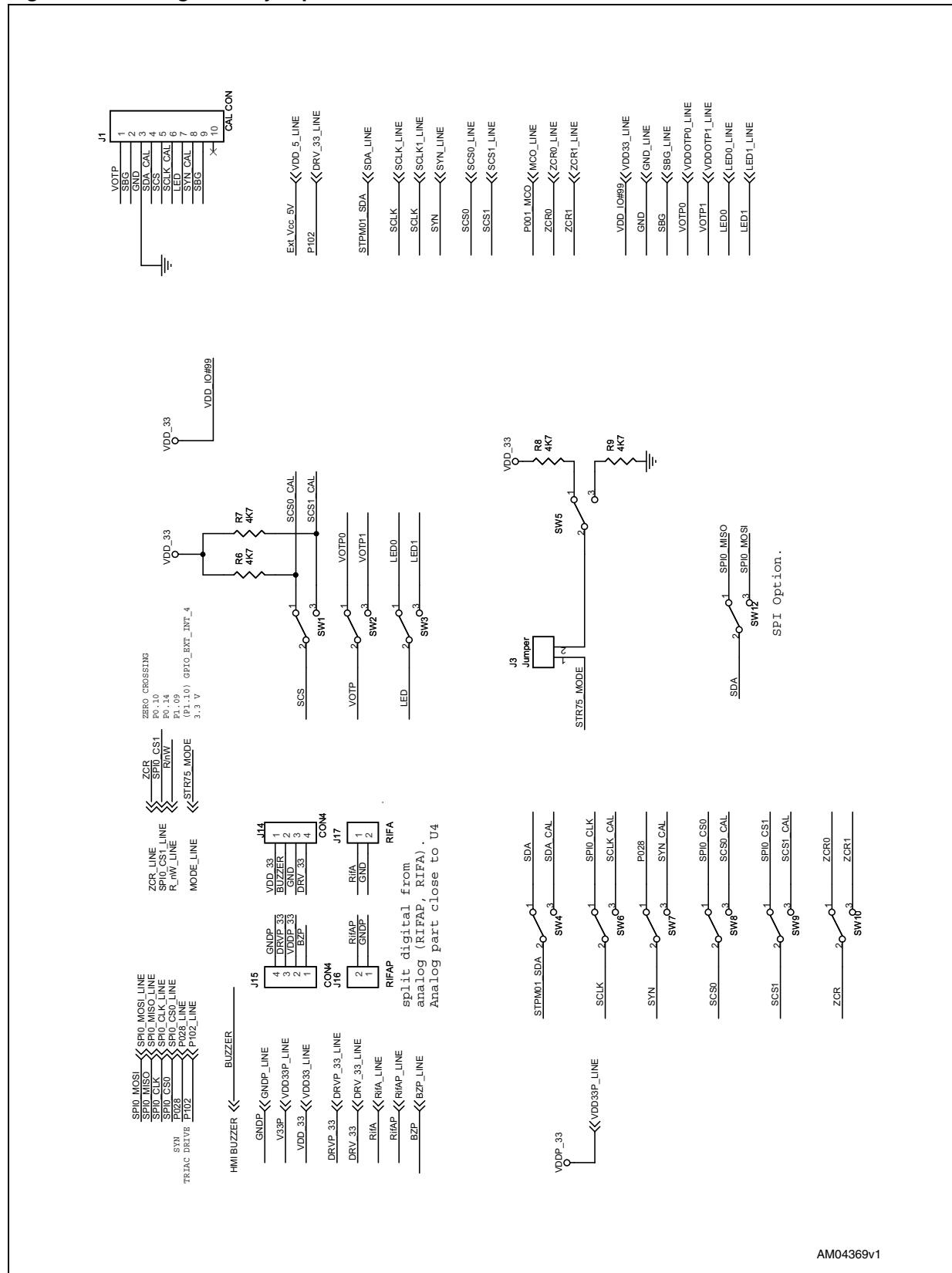


Figure 2. Configuration jumpers



The schematic diagram illustrates the internal circuitry of the AM04370v1 module, centered around a microcontroller (U1) and several peripheral components.

- Microcontroller (U1):** An 8-pin device with pins labeled SDA, SCL, VDD, GND, OS/INT, A0, A1, and A2. It is connected to various sensors and displays.
- Temperature Sensor (U11):** An I2C sensor (STLM75M2E) connected to the microcontroller's SDA and SCL lines. It also has VDD and GND connections.
- LCD Color Display (J7):** A 7-pin connector for the display, with pins for LCD-CLK, LCD-DO, LCD-DI, LCD-RS, LCD-WR, LCD-B/LT, and RESET#.
- Push Button (B1):** A momentary button connected to the microcontroller's A0 pin through a pull-up resistor (R107).
- Buzzer (B2):** A buzzer connected to the microcontroller's A1 pin through a pull-up resistor (R106).
- LEDs (LED3, LED4):** Two LEDs connected to the microcontroller's A2 pin through a pull-up resistor (R105).
- Connectors:**
 - J5 (CONN1):** A 7-pin connector for the display, with pins for LCD-CLK, LCD-DO, LCD-DI, LCD-RS, LCD-WR, LCD-B/LT, and RESET#.
 - J6 (JTAG):** A 20-pin connector for JTAG programming, with pins for JT-TMS, JT-TCK, JT-TDI, JT-TMS, JT-TCK, JT-TDO, RESET#, and JTAG.
 - J8 (ZigBee - CONN1):** A 6-pin connector for the ZigBee module, with pins for VRED, MISO, MOSI, SSEL, RSTB, and RSTB.
 - J9 (ZigBee - CONN2):** A 6-pin connector for the ZigBee module, with pins for VRED, MISO, MOSI, SSEL, RSTB, and RSTB.
- Resistors:** Various resistors are used for pull-up and current limiting, including R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R100, R101, R102, R103, R104, R105, R106, R107, R108, R109, R110, R111, R112, R113, R114, R115, R116, R117, R118, R119, R120, R121, R122, R123, R124, R125, R126, R127, R128, R129, R130, R131, R132, R133, R134, R135, R136, R137, R138, R139, R140, R141, R142, R143, R144, R145, R146, R147, R148, R149, R150, R151, R152, R153, R154, R155, R156, R157, R158, R159, R160, R161, R162, R163, R164, R165, R166, R167, R168, R169, R170, R171, R172, R173, R174, R175, R176, R177, R178, R179, R180, R181, R182, R183, R184, R185, R186, R187, R188, R189, R190, R191, R192, R193, R194, R195, R196, R197, R198, R199, R200, R201, R202, R203, R204, R205, R206, R207, R208, R209, R210, R211, R212, R213, R214, R215, R216, R217, R218, R219, R220, R221, R222, R223, R224, R225, R226, R227, R228, R229, R230, R231, R232, R233, R234, R235, R236, R237, R238, R239, R240, R241, R242, R243, R244, R245, R246, R247, R248, R249, R250, R251, R252, R253, R254, R255, R256, R257, R258, R259, R260, R261, R262, R263, R264, R265, R266, R267, R268, R269, R270, R271, R272, R273, R274, R275, R276, R277, R278, R279, R280, R281, R282, R283, R284, R285, R286, R287, R288, R289, R290, R291, R292, R293, R294, R295, R296, R297, R298, R299, R300, R301, R302, R303, R304, R305, R306, R307, R308, R309, R310, R311, R312, R313, R314, R315, R316, R317, R318, R319, R320, R321, R322, R323, R324, R325, R326, R327, R328, R329, R330, R331, R332, R333, R334, R335, R336, R337, R338, R339, R340, R341, R342, R343, R344, R345, R346, R347, R348, R349, R350, R351, R352, R353, R354, R355, R356, R357, R358, R359, R360, R361, R362, R363, R364, R365, R366, R367, R368, R369, R370, R371, R372, R373, R374, R375, R376, R377, R378, R379, R380, R381, R382, R383, R384, R385, R386, R387, R388, R389, R390, R391, R392, R393, R394, R395, R396, R397, R398, R399, R400, R401, R402, R403, R404, R405, R406, R407, R408, R409, R410, R411, R412, R413, R414, R415, R416, R417, R418, R419, R420, R421, R422, R423, R424, R425, R426, R427, R428, R429, R430, R431, R432, R433, R434, R435, R436, R437, R438, R439, R440, R441, R442, R443, R444, R445, R446, R447, R448, R449, R450, R451, R452, R453, R454, R455, R456, R457, R458, R459, R460, R461, R462, R463, R464, R465, R466, R467, R468, R469, R470, R471, R472, R473, R474, R475, R476, R477, R478, R479, R480, R481, R482, R483, R484, R485, R486, R487, R488, R489, R490, R491, R492, R493, R494, R495, R496, R497, R498, R499, R500, R501, R502, R503, R504, R505, R506, R507, R508, R509, R510, R511, R512, R513, R514, R515, R516, R517, R518, R519, R520, R521, R522, R523, R524, R525, R526, R527, R528, R529, R530, R531, R532, R533, R534, R535, R536, R537, R538, R539, R540, R541, R542, R543, R544, R545, R546, R547, R548, R549, R550, R551, R552, R553, R554, R555, R556, R557, R558, R559, R560, R561, R562, R563, R564, R565, R566, R567, R568, R569, R570, R571, R572, R573, R574, R575, R576, R577, R578, R579, R580, R581, R582, R583, R584, R585, R586, R587, R588, R589, R590, R591, R592, R593, R594, R595, R596, R597, R598, R599, R600, R601, R602, R603, R604, R605, R606, R607, R608, R609, R610, R611, R612, R613, R614, R615, R616, R617, R618, R619, R620, R621, R622, R623, R624, R625, R626, R627, R628, R629, R630, R631, R632, R633, R634, R635, R636, R637, R638, R639, R640, R641, R642, R643, R644, R645, R646, R647, R648, R649, R650, R651, R652, R653, R654, R655, R656, R657, R658, R659, R660, R661, R662, R663, R664, R665, R666, R667, R668, R669, R670, R671, R672, R673, R674, R675, R676, R677, R678, R679, R680, R681, R682, R683, R684, R685, R686, R687, R688, R689, R690, R691, R692, R693, R694, R695, R696, R697, R698, R699, R700, R701, R702, R703, R704, R705, R706, R707, R708, R709, R710, R711, R712, R713, R714, R715, R716, R717, R718, R719, R720, R721, R722, R723, R724, R725, R726, R727, R728, R729, R730, R731, R732, R733, R734, R735, R736, R737, R738, R739, R740, R741, R742, R743, R744, R745, R746, R747, R748, R749, R750, R751, R752, R753, R754, R755, R756, R757, R758, R759, R760, R761, R762, R763, R764, R765, R766, R767, R768, R769, R770, R771, R772, R773, R774, R775, R776, R777, R778, R779, R780, R781, R782, R783, R

AM04371v1

Figure 5. Energy meter circuit

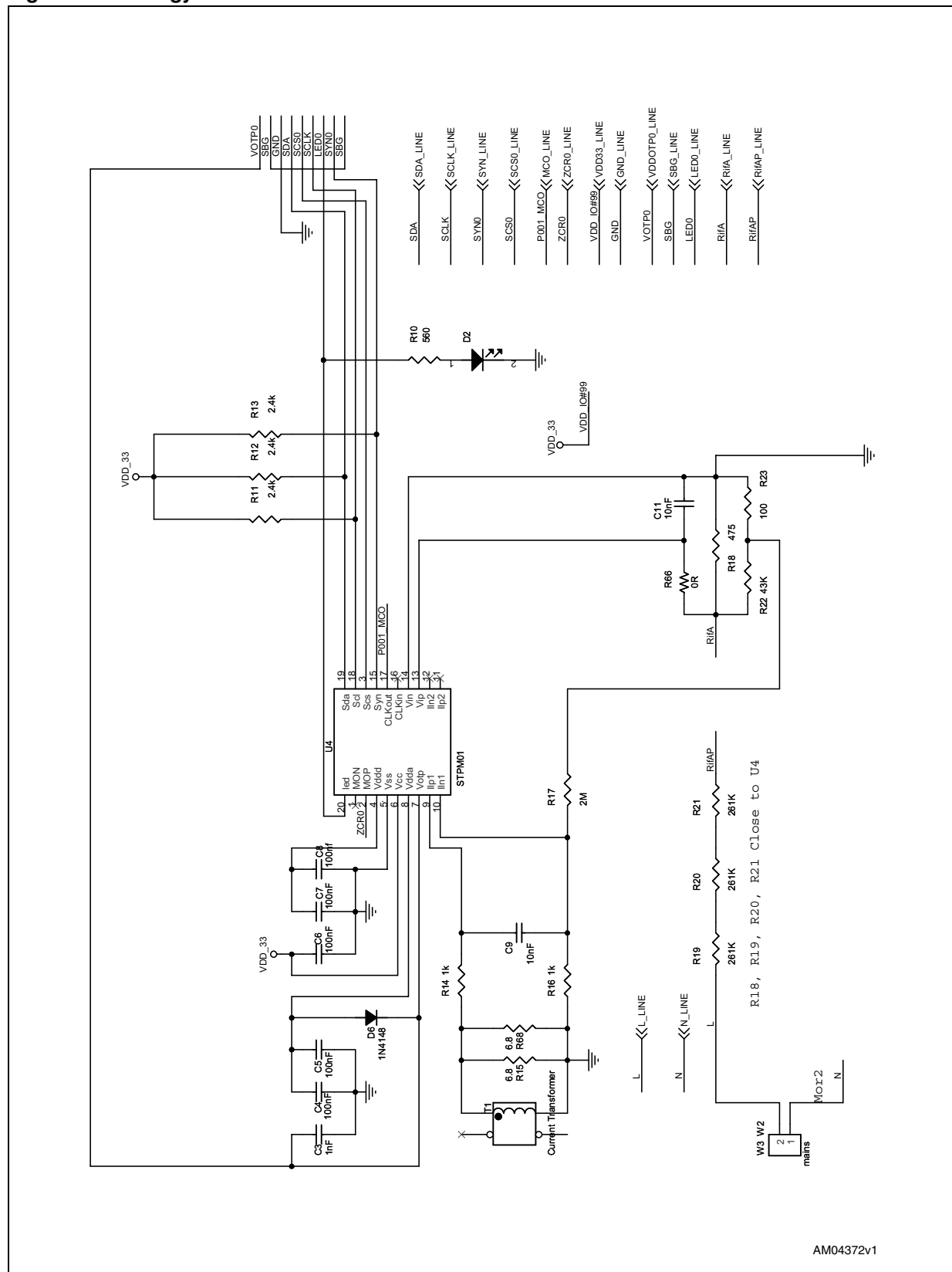
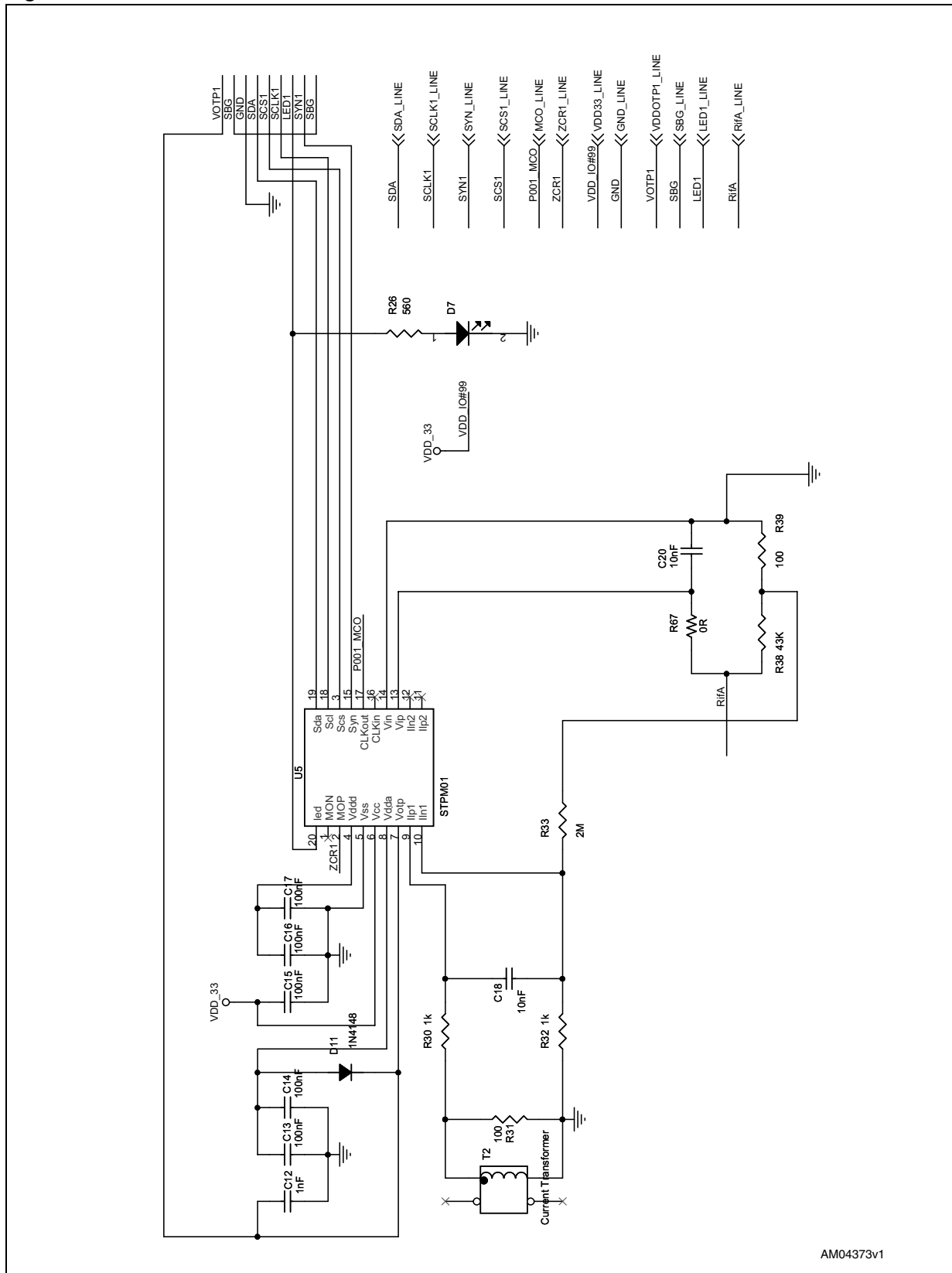


Figure 6. Differential current meter circuit



The schematic diagram illustrates the power supply circuit for a heart rate monitor. The input is a 100V AC source (L, N). The circuit includes a fuse (F1), a transformer (T1), a bridge rectifier (D12, D13, D14, D15), a voltage doubler (C21, C22, C23), a filter capacitor (C24), a Zener diode (D17), and a Viper12A regulator (U6). The output is connected to a heart rate monitor (HRTM) and a GNDP line. The circuit is powered by a 100V AC source (L, N).

Legend:

- L: Line
- N: Neutral

The schematic diagram illustrates the internal architecture of the AM04375V1 power management IC. It features two ST54DN750L DC-DC converters, a BAT54AW90T Schottky diode, and a variety of passive components including resistors (R45-R59), capacitors (C29-C46), and inductors (L2, L3). The diagram shows the connections for VIN, VDD3P3P_LINE, GNDP, and HEARTP_LINE. The IC is shown in a 28-pin package with pins labeled from 1 to 28.

2 Revision history

Table 1. Document revision history

Date	Revision	Changes
26-Apr-2010	1	Initial release.

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