



# STEVAL-IHP001V3

ZigBee<sup>®</sup> 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

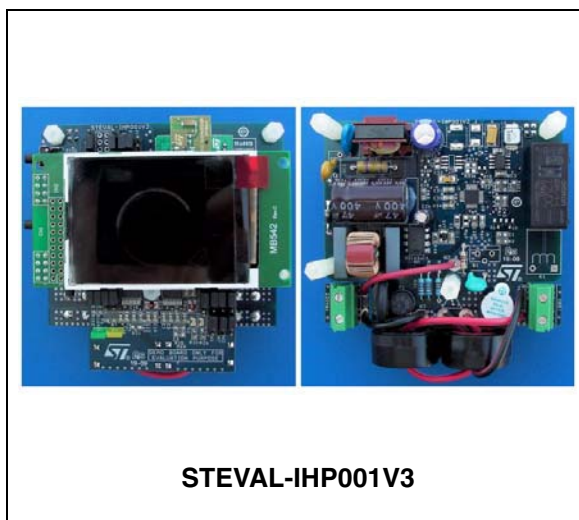
The STEVAL-IHP001V3 ZigBee<sup>®</sup> SmartPlug demonstration board employs the STM32F10x microcontroller, ZigBee SPZB260-PRO module and STPM01 energy metering IC to implement a ZigBee meter node which allows the user to monitor and manage the energy consumption of a connected load.

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.

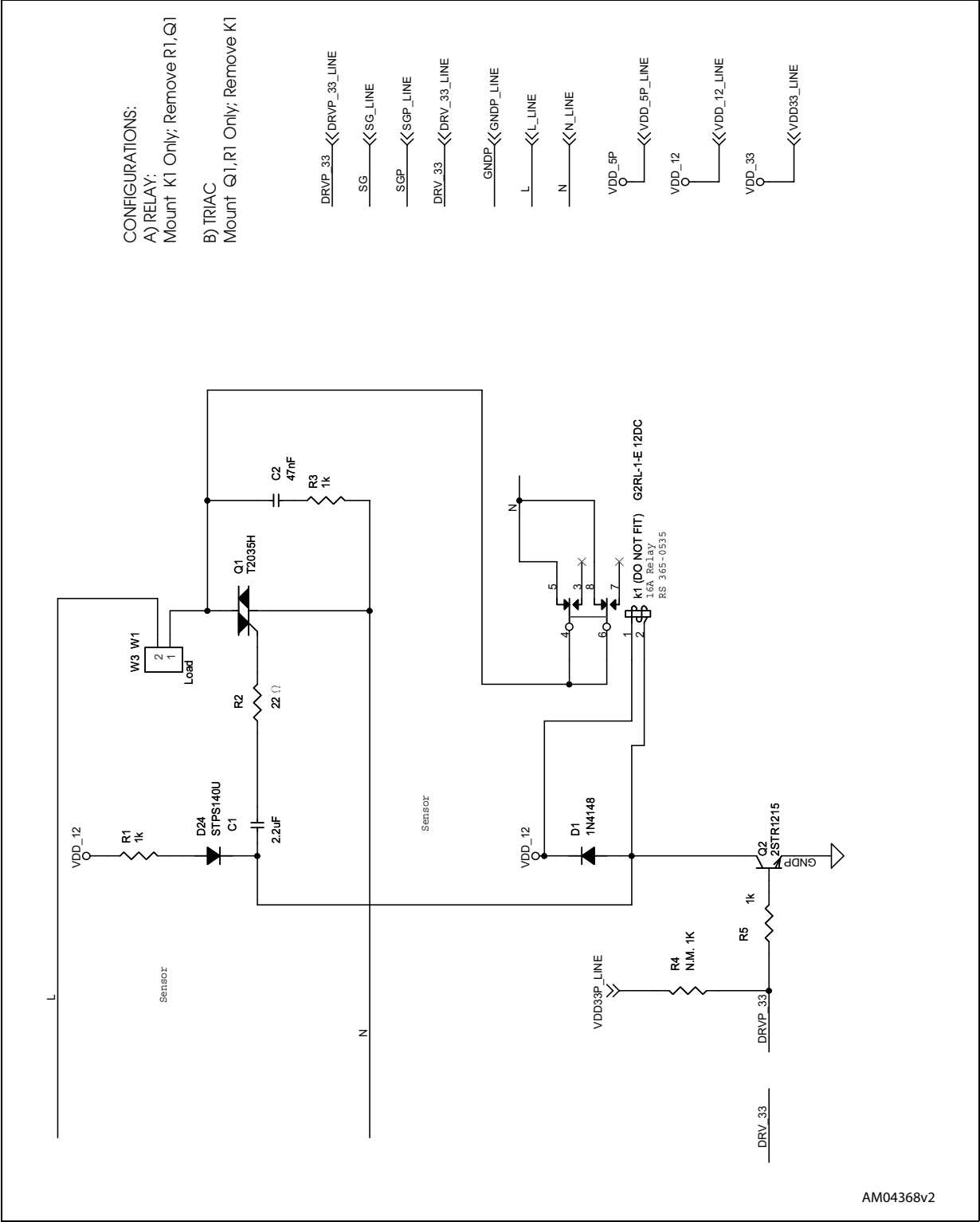
While the STEVAL-IHP001V3 replaces the STEVAL-IHP001V2, the hardware for both the V2 and V3 versions of the SmartPlug demonstration boards are identical. The STEVAL-IHP001V3 differs from the V2 version only in terms of the ZigBee PRO stack update.



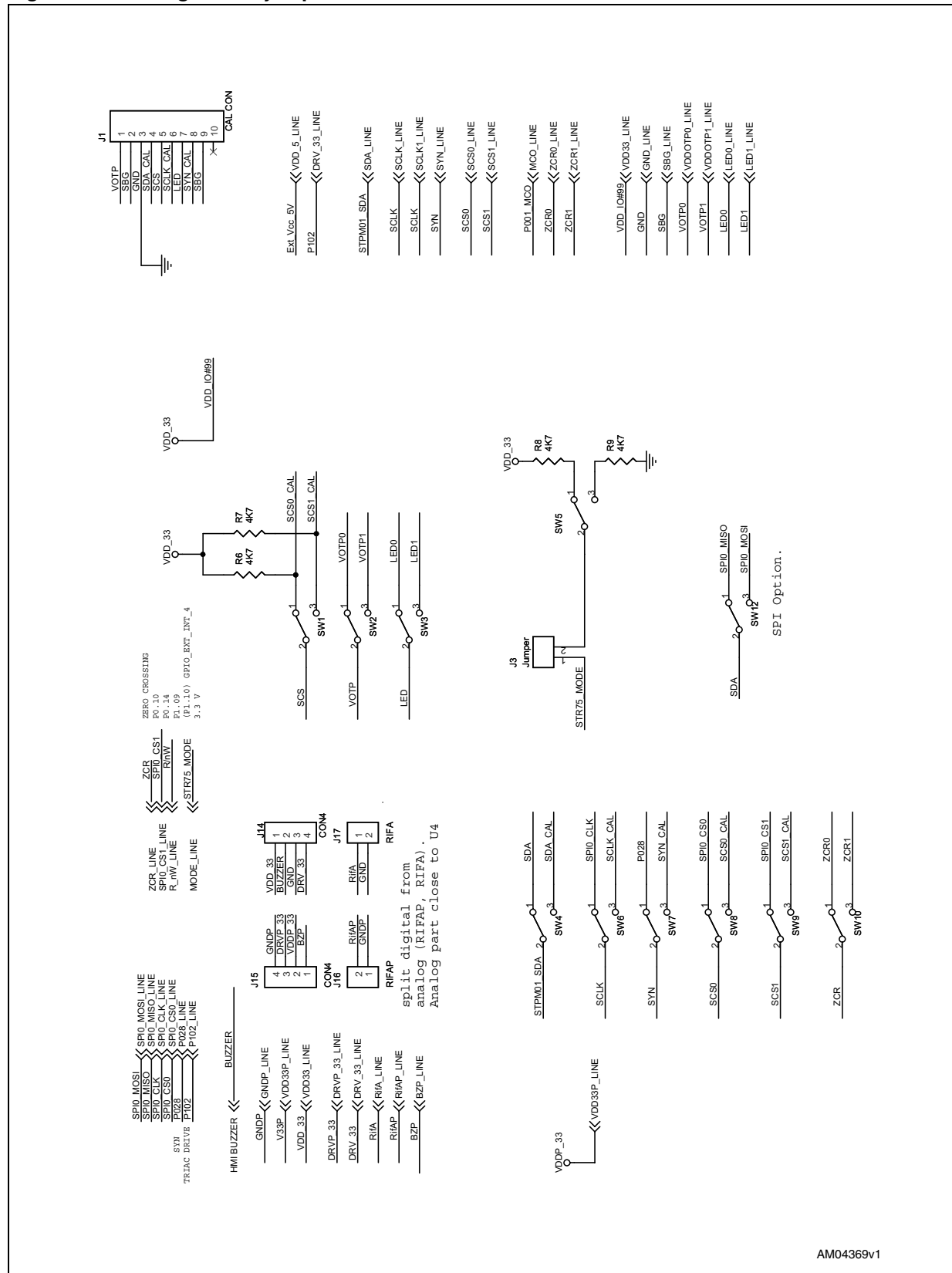
In addition to the ZigBee PRO stack features, this update allows the use of the STEVAL-IFS013V2 USB-ZigBee dongle as network coordinator.

# 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 its various peripherals. Key components and their connections include:

- Microcontroller (U1):** The central processing unit, with pins for VDD, GND, and various control lines.
- Power Management:**
  - VCC 3V3:** The main power supply rail, connected to various components.
  - Temperature Sensor (U11):** A ST1W75M2E sensor connected to the microcontroller's TSENS-INT pin.
  - Push Button and LEDs:** A push button (B1) and four LEDs (LED3, LED4, LED5, LED6) are connected to the microcontroller's I/O pins.
- Communication Interfaces:**
  - UART:** The microcontroller's TX and RX pins are connected to a 2STR1215 driver and a 4K7 resistor (R101) for the BZP line.
  - I2C:** The microcontroller's SDA and SCL pins are connected to an ALS12C-SCL interface.
  - GPIO:** Various pins are connected to the microcontroller's I/O lines, including JT-TMS, JT-TCK, JT-TDI, JT-TDO, and RESET#.
- Connectors:**
  - J5 LCD-CONN1:** A 6-pin connector for the LCD display.
  - J6 JTAG:** A 20-pin connector for JTAG debugging.
  - J7 LCD-CONN2:** A 6-pin connector for the LCD display.
  - J8 JTAG:** A 20-pin connector for JTAG debugging.
- Resistors and Capacitors:** Various passive components are used for signal conditioning and power filtering, including resistors R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R98, R99, 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, R784, R785, R786, R787, R788, R789, R790, R791, R792, R793, R794, R795, R796, R797, R798, R799, R80

VCC\_3V3

OSC\_32-IN

OSC\_32-OUT

Y1

C58 10pF

32.768 KHz

C59 10pF

J18

CONF1

LED3

LED4

SP1-NSS

SP1-SCK

SP1-MISO

SP1-MOSI

SYN

TRAC DRV

B1

B2

JT-TMS

JT-TCK

JT-TDI

PA0-WKUP

PA1-USART2-CTS/ADC\_IN0/TIM2-CH1-ETR

PA2-USART2-RTS/ADC\_IN1/TIM2-CH2

PA3-USART2-RX/ADC\_IN2/TIM2-CH4

PA4-USART2-TX/ADC\_IN3/TIM2-CH3

PA5-SP1-SCK/ADC\_IN5

PA6-SP1-MISO/ADC\_IN6/TIM3-CH1

PA7-SP1-MOSI/ADC\_IN7/TIM3-CH2

PA8-USART1-CK/TIM1-CH1/MCO

PA9-USART1-TX/TIM1-CH2

PA10-USART1-RX/TIM1-CH3

PA11-USART1-CTS/CAN\_RX/USBDM(2)/TIM1-CH4

PA12-USART1-RTS/CAN\_TX/USBDP(2)/TIM1-ETR

PA13/JTMS-SWDAT

PA14/JTCK-SWCLK

PA15/JTDI

PD0/OSC-IN

PD1/OSC-OUT

PD2/TIM3-ETR

RESET#

VCC\_3V3

R108

Y2

8MHz

R109 10K

C60 22pF

SW11

C62 100nF

C68 10nF

R110 10K

VDDA

VSSA

BOOT0

NRST

STM32F103R8T6

U12

VBAT

VCC\_3V3

J10

ANALOG\_CONN (DO NOT FIT)

9

10

11

12

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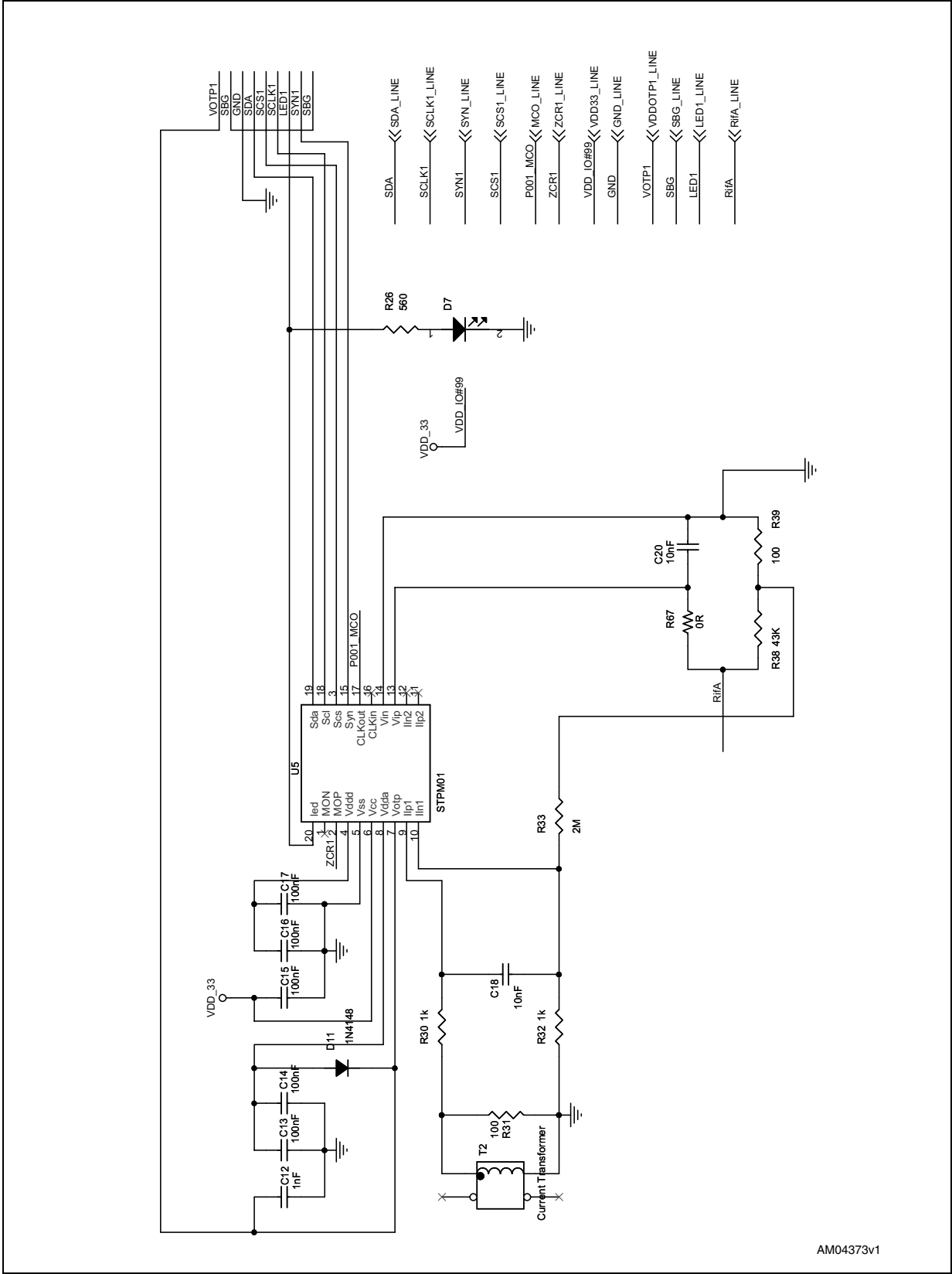
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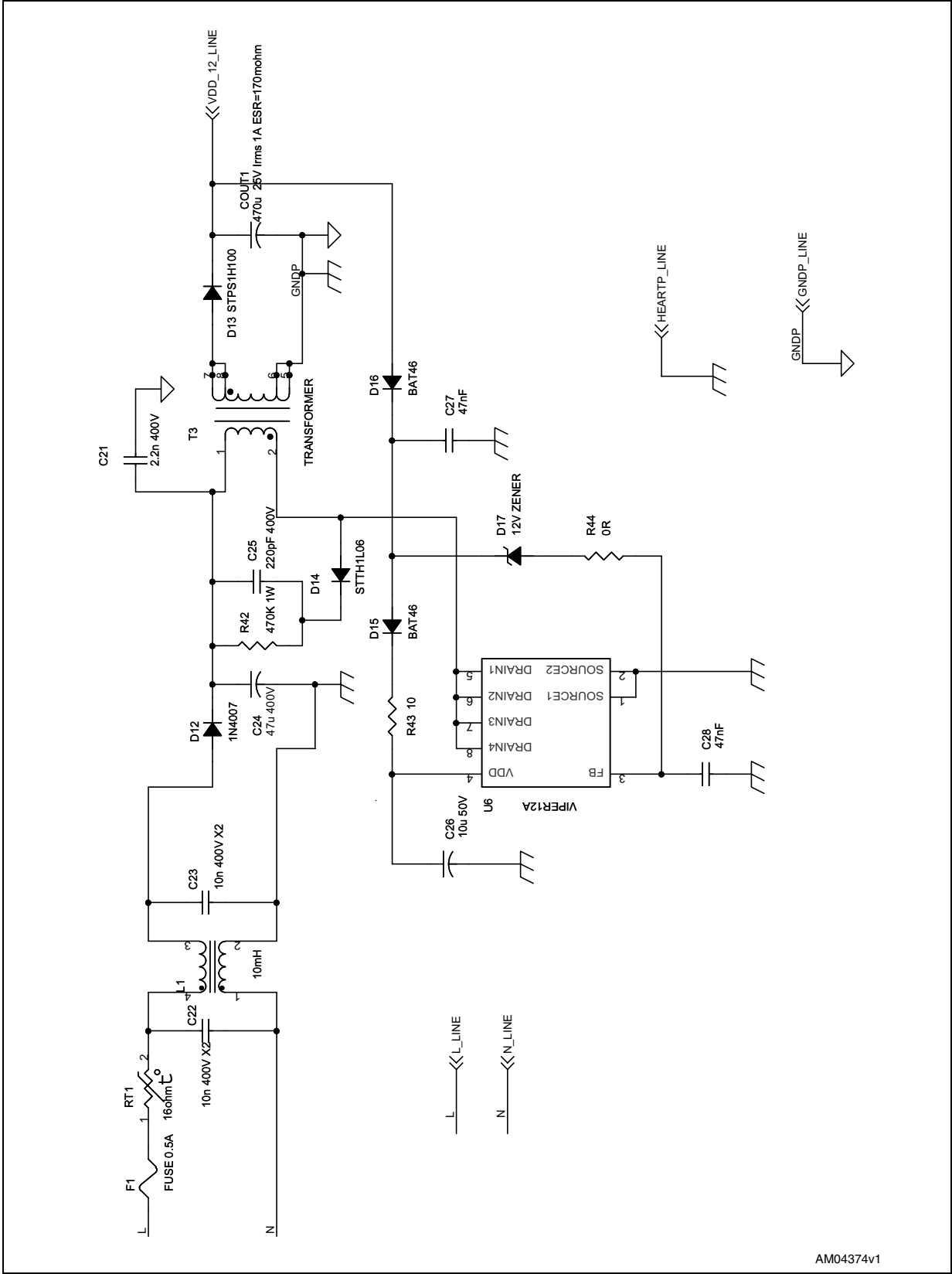
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Figure 6. Differential current meter circuit



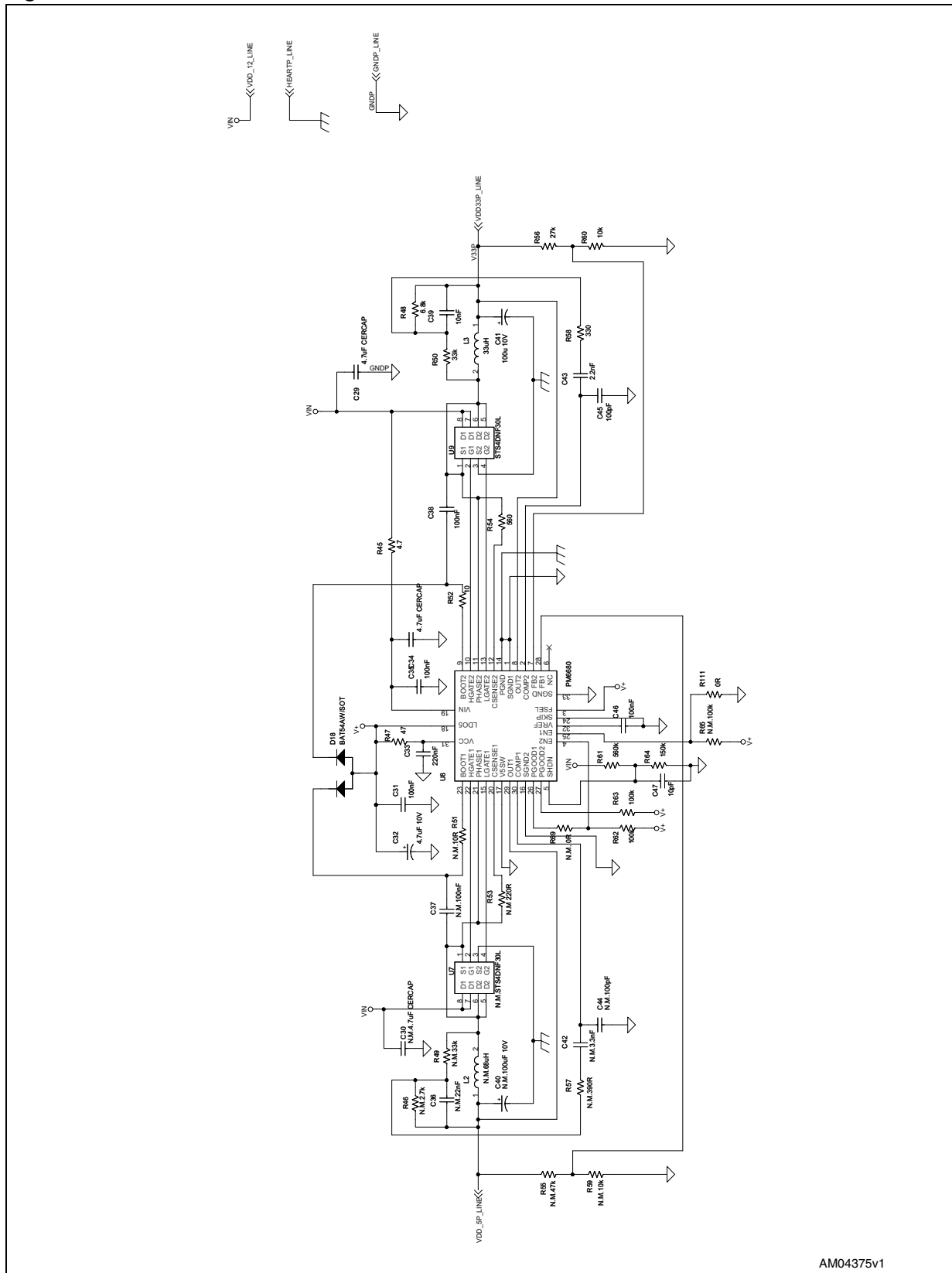
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Figure 7. AC-DC converter circuit





**Figure 8. DC-DC converter circuit**



## 2 Revision history

**Table 1. Document revision history**

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

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