UM0890
User manual

2-stage RF power amplifier with LPF based on the PD85006L-E and STAP85050 RF power transistors

Introduction

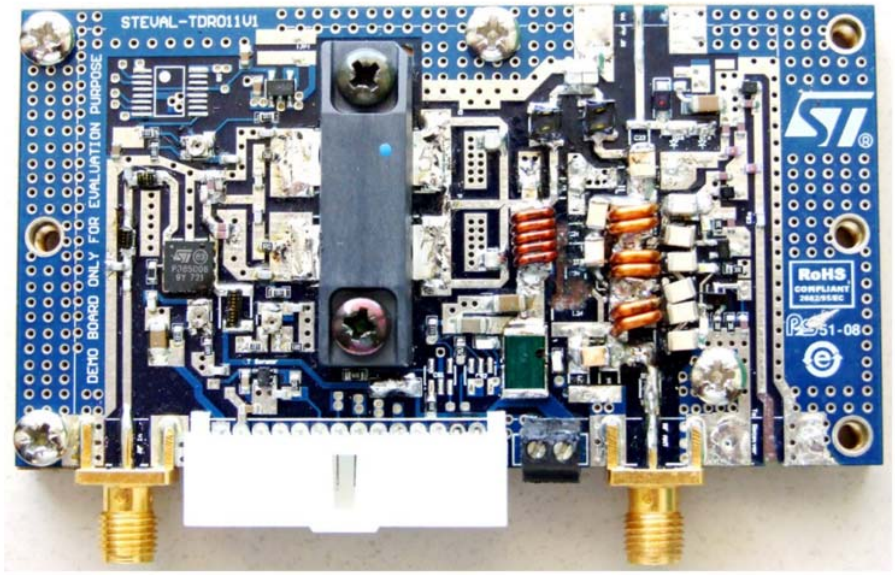
This user manual briefly describes the function and use of the STEVAL-TDR011V1 demonstration board.

The board is a two-stage 50 W RF power amplifier which includes an output LPF (low-pass filter) for harmonics rejection. It also features power detection and a temperature sensor.

The main purpose of the board is to demonstrate the functioning and performance of the PD85006L-E and the STAP85050 devices from the LdmoST plastic family of RF power transistors.

The application is specifically designed for 2-way analog and digital mobile radios.

Figure 1. STEVAL-TDR011V1 demonstration board

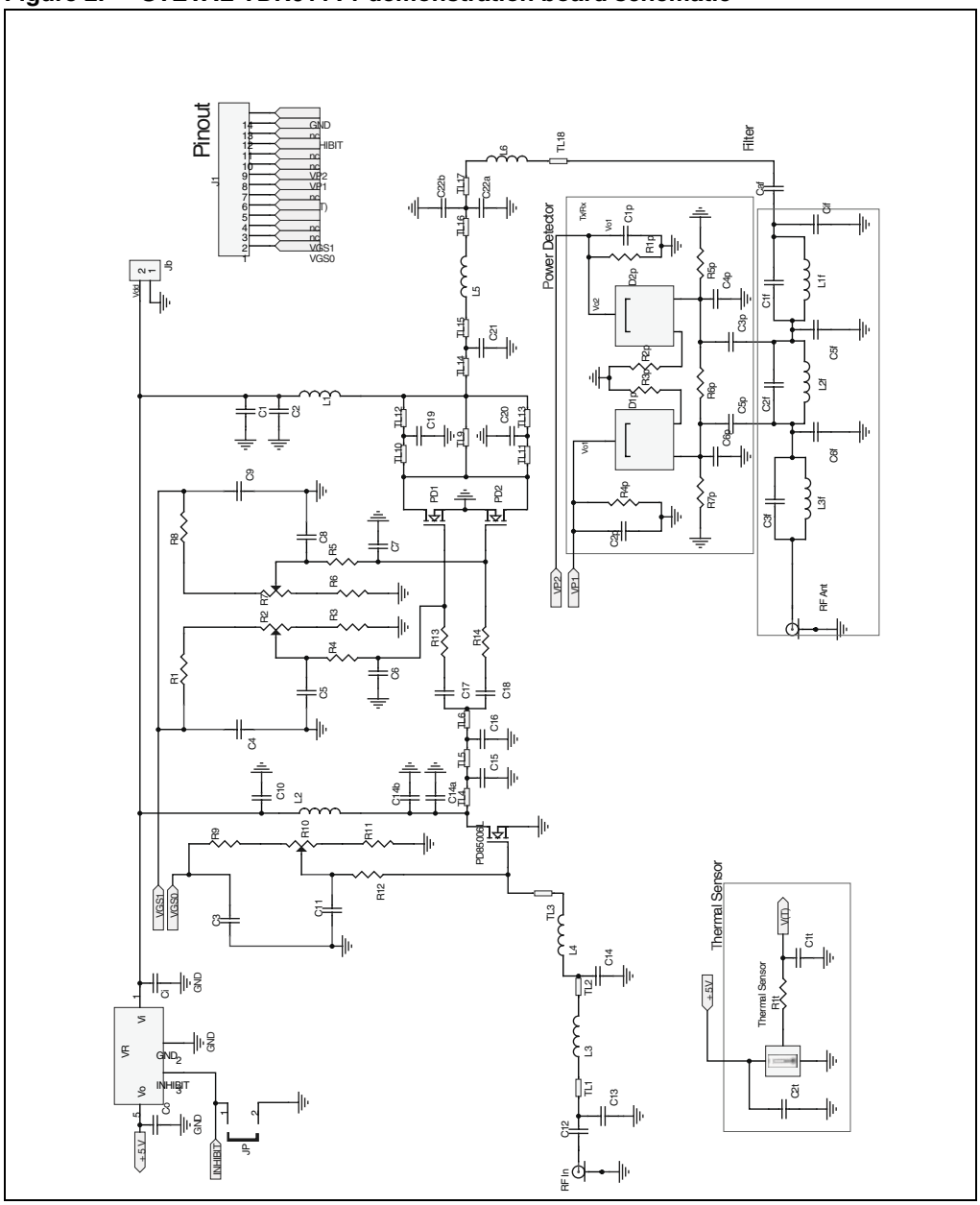


1 Schematic diagram

The schematic diagram in *Figure 2* shows the following stages:

a) low pass band filter
b) power detector
c) thermal temperature sensor
d) voltage regulator

Figure 2. STEVAL-TDR011V1 demonstration board schematic



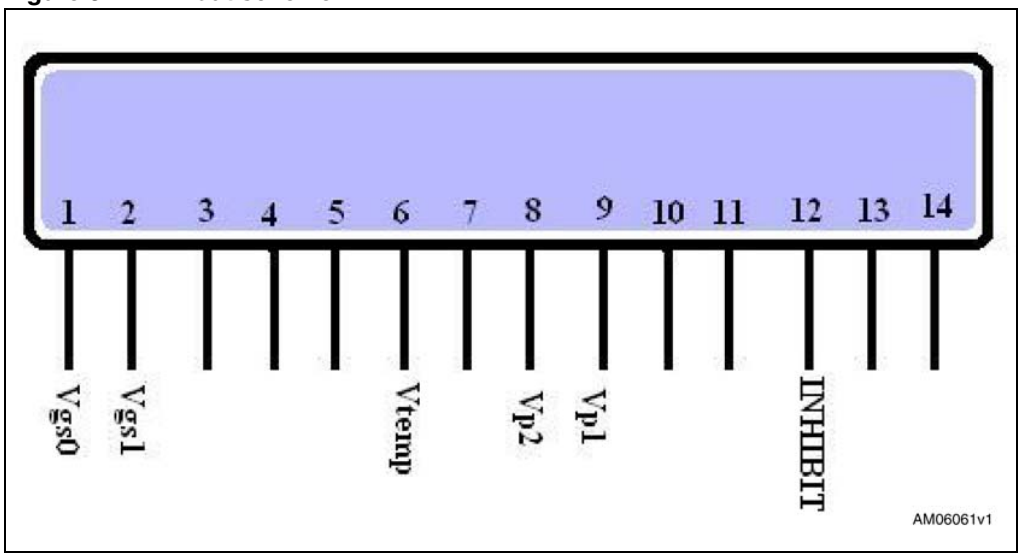
2 Testing procedure

2.1 Equipment required

1. DC power supply
2. RF power amplifier
3. RF signal generator
4. Power meters
5. Multimeter

2.2 Connector pin-out

Figure 3. Pin-out scheme



2.3 Testing

To ensure the correct functioning of the STEVAL-TDR011V1, perform the following procedure:

a) Connect a power supply with a high current capability (about 10 A) and set 13.6 V on the drain.

b) The board features a voltage regulator (VR) to supply 5 V to a temperature sensor (TS). Switch on the INHIBIT pin to activate the VR, and read the temperature with the TS according to the following transfer function:

Equation 1

$$T = -1481.96 + \sqrt{2.1962 \times 10^{6} + \frac{(1.8639 - V_o)}{3.88 \times 10^{-6}}}$$

The INHIBIT is not internally pulled up, and cannot be left floating. Disable the device when connected to GND, or to a positive voltage less than 0.18 V.

c) Select the bias gate mode by configuring the wires as shown in *Figure 6* and *Figure 7*.

2.4 Thermal information

The temperature is taken on the surface of the PCB. If the PCB with its metal flange is cooled using an additional heat-sink (*Figure 5*), the main path of the heat (Pa) is easily dissipated, maintaining the PCB temperature below 70 °C (*Figure 4*).

Figure 4. Temperature trend

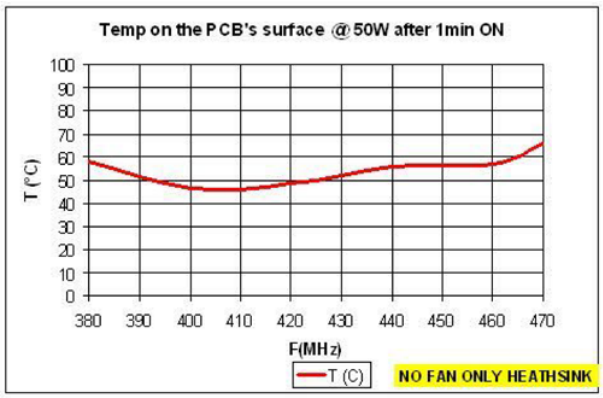
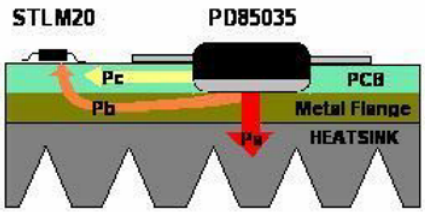
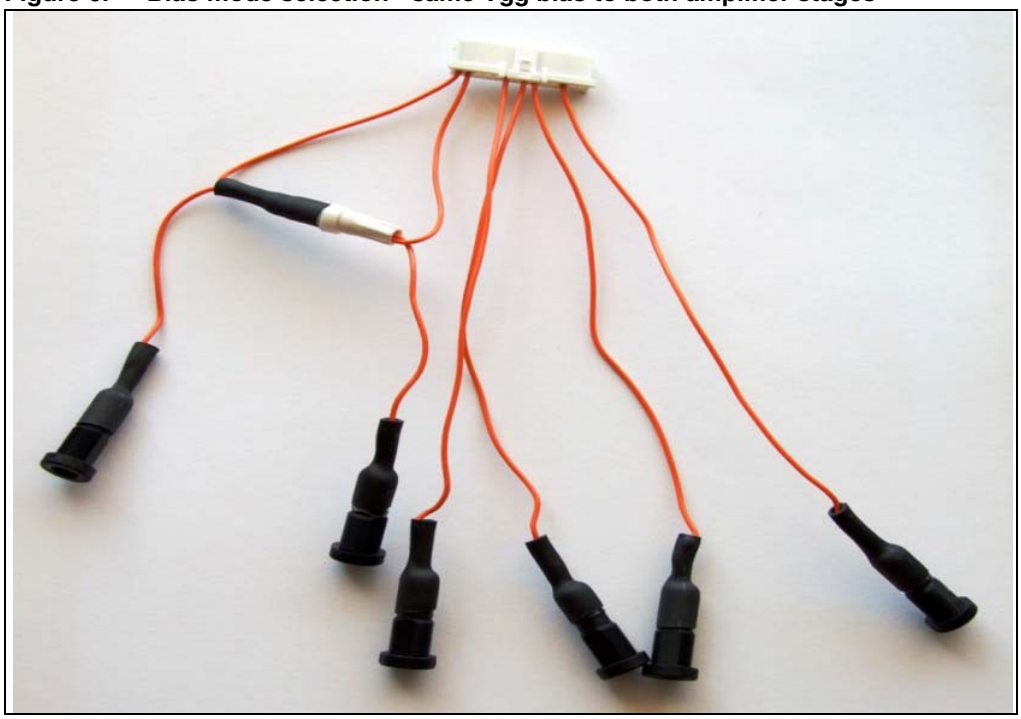


Figure 5. PCB with an additional heat-sink



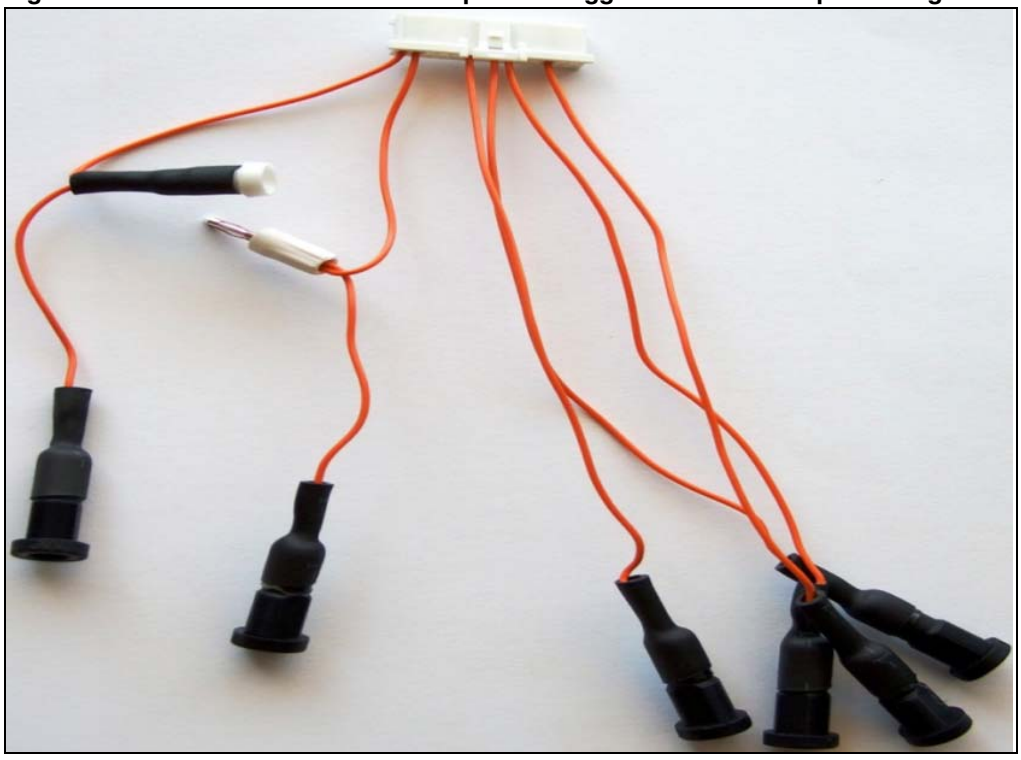
In *Figure 6*, the two wires are connected together in order to apply the same Vgg bias to both stages of the amplifier.

Figure 6. Bias mode selection - same Vgg bias to both amplifier stages



In *Figure 7*, the two wires must be open in order to apply two independent Vgg biases on each stage of the amplifier.

Figure 7. Bias mode selection - independent Vgg bias on each amplifier stage



3 Revision history

Table 1. Document revision history

Date	Revision	Changes
18-Jan-2010	1	Initial release.

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