



## STEVAL-TDR021V1

Demonstration board using the PD84008L-E for 900 MHz 2-way radio

### Features

- Excellent thermal stability
- Frequency: 740 - 950 MHz
- Supply voltage: 7.2 V
- Output power: 5 W
- Power gain:  $11 \pm 1.0$  dB
- Efficiency: 48 % - 54%
- Load mismatch: infinite
- BeO free amplifier

### Description

The STEVAL-TDR021V1 is a demonstration board using the PD84008L-E LDMOS transistor. It is designed for 2-way UHF portable radio applications.

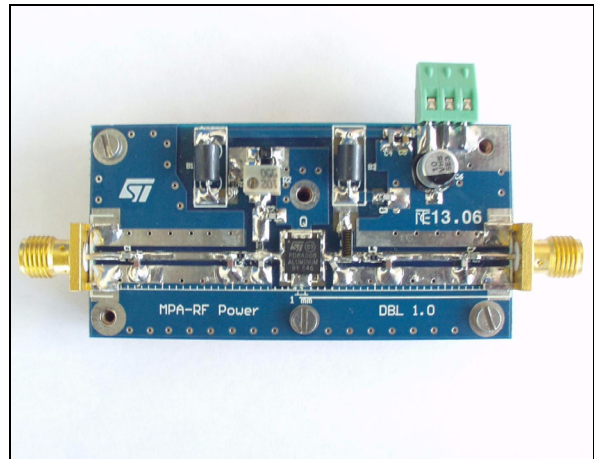


Table 1. Device summary

| Part number     | Mechanical specification |
|-----------------|--------------------------|
| STEVAL-TDR021V1 | L = 60 mm, W = 30 mm     |

# Contents

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# 1 Electrical characteristics

$T_A = +25\text{ }^\circ\text{C}$ ,  $V_{DD} = 7.5\text{ V}$ ,  $I_{dq} = 50\text{ mA}$

**Table 2. Electrical specification**

| Symbol           | Test conditions                                    | Min. | Typ.      | Max. | Unit |
|------------------|--|------|-----------|------|------|
| Freq             | Frequency range                                    | 740  |           | 950  | MHz  |
| P <sub>OUT</sub> |  |      | 5         |      | W    |
| Gain             | @ P <sub>IN</sub> = 26 dB                          |      | 11 ± 1.0  |      | dB   |
| ND               | @ P <sub>IN</sub> = 26 dB                          |      | 49 - 54   |      | %    |
| H2               | 2 <sup>ND</sup> Harmonic @ P <sub>IN</sub> = 26 dB |      | -46 / -60 |      | dBc  |
| H3               | 3 <sup>RD</sup> Harmonic @ P <sub>IN</sub> = 26 dB |      | -54 / -60 |      | dBc  |
| VSWR             | Load mismatch all phases @ P <sub>OUT</sub> = 5 W  |      | Infinite  |      |      |

## 2 Impedance

Figure 1. Impedance graphic

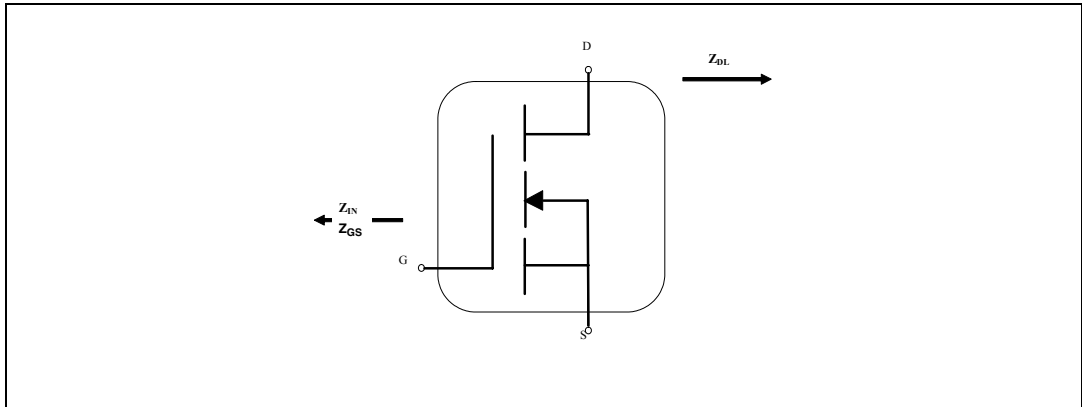
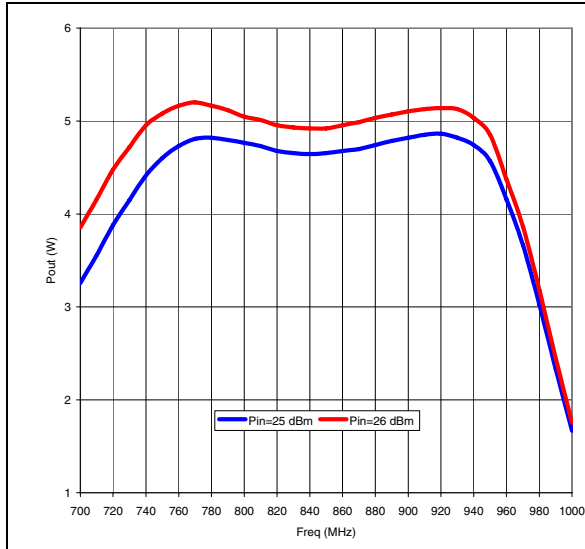


Table 3. Impedance data

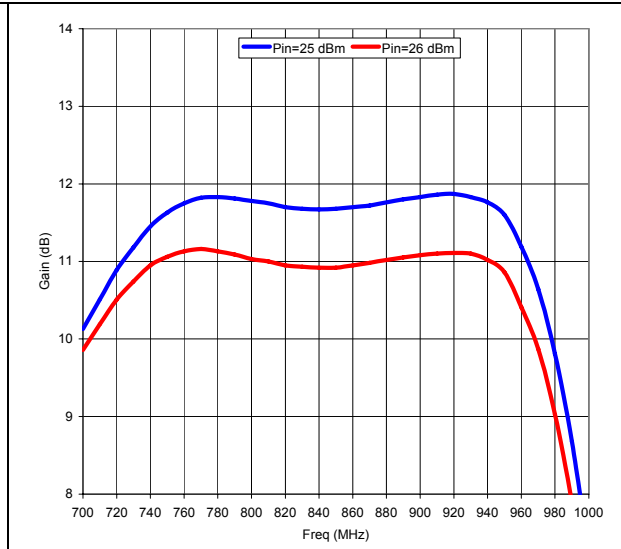
| F (MHz) | Z <sub>GS</sub> | Z <sub>DL</sub> |
|---------|-----------------|-----------------|
| 740     | 1.87 - j5.74    | 3.04 - j6.19    |
| 750     | 1.84 - j5.65    | 3.10 - j6.13    |
| 760     | 1.83 - j5.55    | 3.17 - j6.09    |
| 770     | 1.81 - j5.43    | 3.26 - j6.04    |
| 780     | 1.79 - j5.30    | 3.35 - j5.60    |
| 790     | 1.74 - j5.19    | 3.43 - j5.98    |
| 800     | 1.70 - j5.13    | 3.51 - j6.02    |
| 810     | 1.67 - j5.05    | 3.61 - j6.09    |
| 820     | 1.68 - j4.97    | 3.70 - j6.20    |
| 830     | 1.69 - j4.89    | 3.82 - j6.32    |
| 840     | 1.69 - j4.80    | 3.91 - j6.48    |
| 850     | 1.68 - j4.72    | 3.94 - j6.70    |
| 860     | 1.67 - j4.68    | 3.90 - j6.96    |
| 870     | 1.66 - j4.61    | 3.82 - j7.22    |
| 880     | 1.66 - j4.54    | 3.67 - j7.48    |
| 890     | 1.66 - j4.48    | 3.47 - j7.65    |
| 900     | 1.61 - j4.37    | 3.17 - j7.74    |
| 910     | 1.54 - j4.26    | 2.85 - j7.79    |
| 920     | 1.48 - j4.18    | 2.48 - j7.81    |
| 930     | 1.43 - j4.12    | 2.12 - j7.77    |
| 940     | 1.36 - j4.04    | 1.77 - j7.67    |
| 950     | 1.33 - j3.98    | 1.49 - j7.51    |

### 3 Typical performance

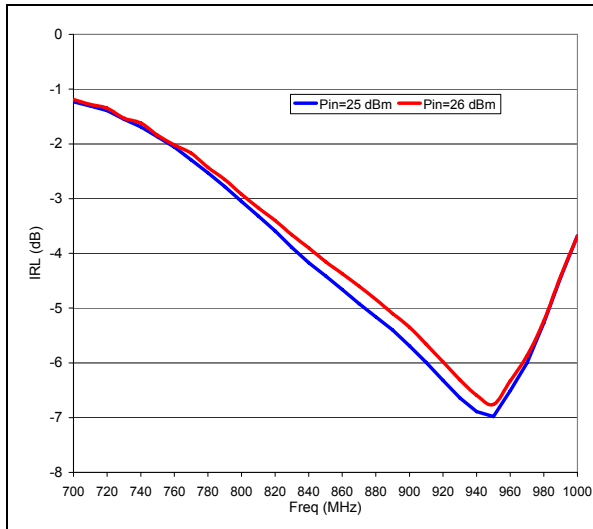
**Figure 2. Output power vs. frequency**  
 Vdd = 7.2 V - Idq = 200 mA



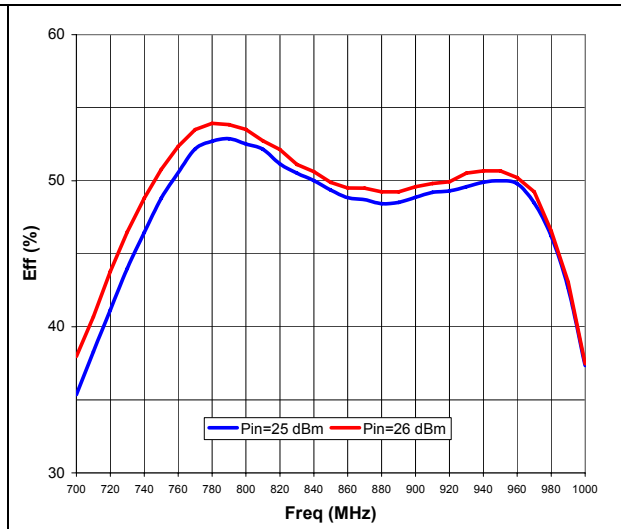
**Figure 3. Gain vs. frequency**  
 Vdd = 7.2 V - Idq = 200 mA



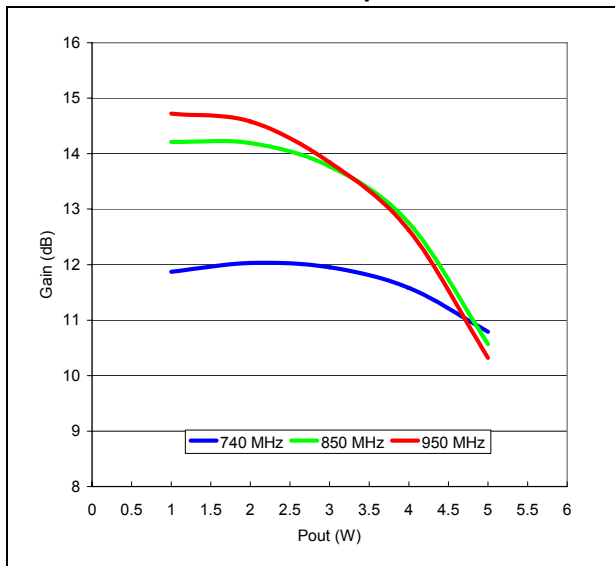
**Figure 4. Input return loss vs. frequency**  
 Vdd = 7.2 V - Idq = 200 mA



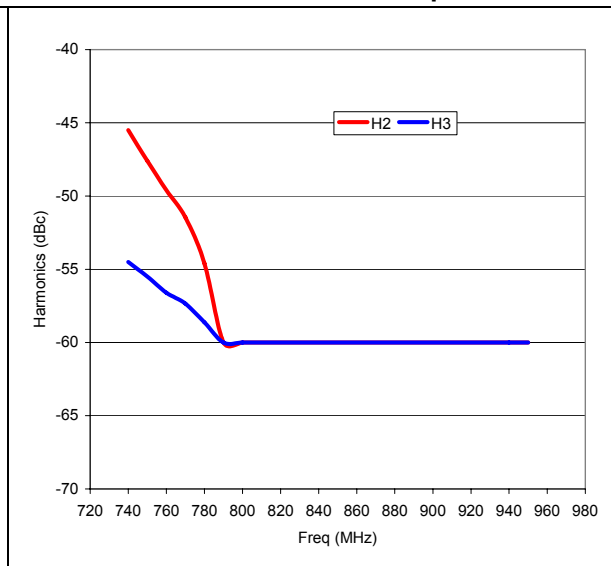
**Figure 5. Efficiency vs. frequency**  
 Vdd = 7.2 V - Idq = 200 mA



**Figure 6. Gain vs. output**  
**Vdd = 7.2 V - Idq = 200 mA**



**Figure 7. Harmonics vs. frequency** Pin = 26 dBm  
**Vdd = 7.2 V - Idq = 200 mA**



## 4 Test circuit

Figure 8. Test circuit schematic

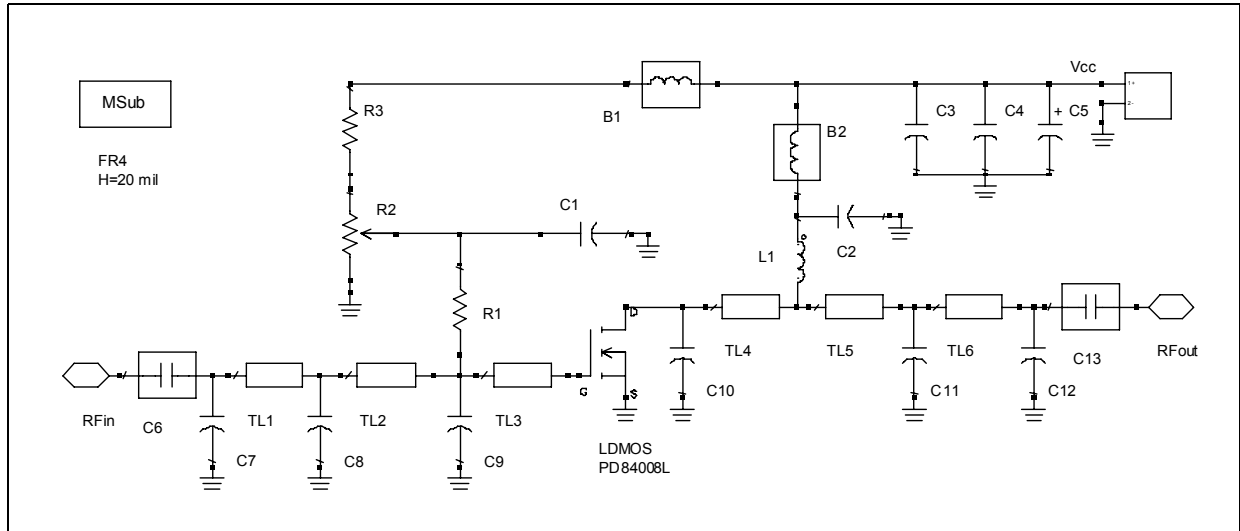


Table 4. Component part list

| Component ID | Description   | Value    | Case size | Manufacturer       | Part code             |
|--------------|---------------|----------|-----------|--------------------|-----------------------|
| B1           | Ferrite bead  |          |           | Panasonic          | EXCELDRC35C           |
| B2           | Ferrite bead  |          |           | Panasonic          | EXCELDRC35C           |
| C1, C2       | Capacitor     | 150 pF   | 0603      | Murata             | GRM39-C0G151J50D500   |
| C3           | Capacitor     | 1 nF     | 0603      | Murata             | GRM39-COG102J50D500   |
| C4           | Capacitor     | 10 nF    | 0603      | Murata             | GRM39-X7R103K50C560_  |
| C5           | Capacitor     | 10 μF    | SMT       | Panasonic          | EEVHB1V100P           |
| C6, C13      | Capacitor     | 39 pF    | 0603      | Murata             | GRM39-C0G390J50D500   |
| C7, C8       | Capacitor     | 3,9 pF   | 0603      | Murata             | GRM39-C0G3R9C50Z500   |
| C9, C10      | Capacitor     | 18 pF    | 0603      | Murata             | GRQ706-C0G180J50K500  |
| C11          | Capacitor     | 8.2 pF   | 0603      | Murata             | GRM39-C0G8R2D50Z500   |
| C12          | Capacitor     | 2 pF     | 0603      | Murata             | GRQ706-C0G020C100K500 |
| L1           | Inductor      | 12.55 nH |           | Coilcraft          | 1606-10               |
| R1           | Resistor      | 510 Ω    | 0603      | Tyco electronics   |                       |
| R2           | Potentiometer | 1 kΩ     |           | Bourns electronics | 3224W-1-102           |

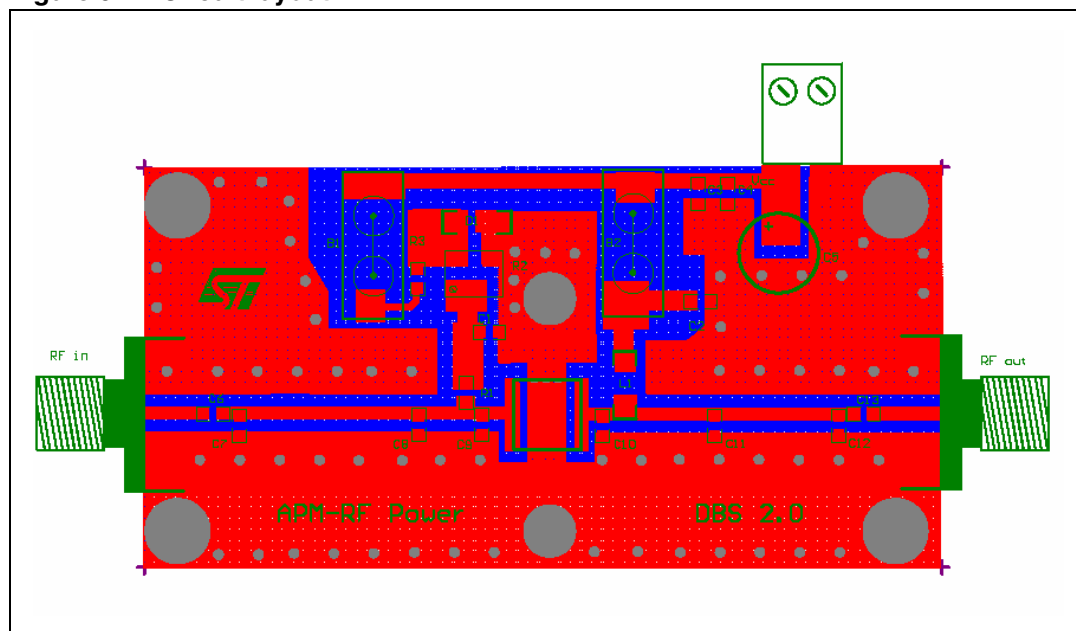
Table 4. Component part list (continued)

| Component ID  | Description                       | Value        | Case size | Manufacturer       | Part code    |
|---------------|-----------------------------------|--------------|-----------|--------------------|--------------|
| R3            | Resistor                          | 100 $\Omega$ | 0603      | Tyco electronics   | 01623440-1   |
| TL1           | Transmission Line                 | W=0.92 mm    | L=12,5 mm |                    |              |
| TL2           | Transmission Line                 | W=0.92 mm    | L=3,5 mm  |                    |              |
| TL3           | Transmission Line                 | W=0.92 mm    | L=2,6 mm  |                    |              |
| TL4           | Transmission Line                 | W=0.92 mm    | L=1,8 mm  |                    |              |
| TL5           | Transmission Line                 | W=0.92 mm    | L=5,3 mm  |                    |              |
| TL6           | Transmission Line                 | W=0.92 mm    | L=10.0 mm |                    |              |
| RF in, RF out | SMA-CONN                          | 50 $\Omega$  | 60 mils   | Johnson            | 142-0701-801 |
| PD84008L-E    | LDMOS                             |              |           | STMicroelectronics | PD84008L-E   |
| Board         | FR-4 THk=0.020" 2OZ Cu both sides |              |           |                    |              |



## 5 Circuit layout

Figure 9. Circuit layout



## 6 Revision history

**Table 5. Document revision history**

| Date        | Revision | Changes         |
|-------------|----------|-----------------|
| 14-Oct-2010 | 1        | Initial release |

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