

## Demonstration board using the PD54008L-E for 2-way UHF radio

### Features

- Excellent thermal stability
- Frequency: 400 - 470 MHz
- Supply voltage: 7.2 V
- Output power: 8 W
- Power gain:  $12.0 \pm 1.0$  dB
- Efficiency: 56 % - 68 %
- Load mismatch: 20:1
- BeO-free amplifier

### Description

The STEVAL-TDR015V1 is a demonstration board using the PD54008L-E LDMOS transistor. It is designed for 2-way UHF portable radio applications.



**Table 1. Device summary**

Part number	Mechanical specification
STEVAL-TDR015V1	L = 60 mm, W = 30 mm

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# 1 Electrical characteristics

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

**Table 2. Electrical specifications**

Symbol	Test conditions	Min.	Typ.	Max.	Unit
Freq	Frequency range	400		470	MHz
P <sub>OUT</sub>		7	8		W
Gain	@ P <sub>OUT</sub> = 8 W		12.0 ± 1.0		dB
ND	@ P <sub>OUT</sub> = 8 W		56 - 68		%
H2	2nd harmonic @ P <sub>OUT</sub> = 8 W		-28 / -44		dBc
H3	3rd harmonic @ P <sub>OUT</sub> = 8 W		-58 / -61		dBc
VSWR	Load mismatch all phases @ P <sub>OUT</sub> = 8 W			20:1	

## 2 Impedance

Figure 1. Impedance illustration

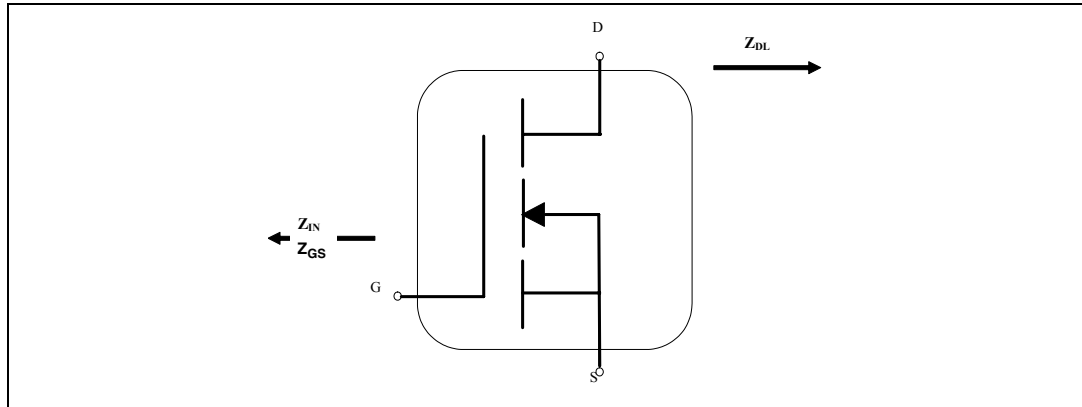


Table 3. Impedance data

F (MHz)	$Z_{GS}$	$Z_{DL}$
400	$1.588 + j3.459$	$2.128 + j1.795$
410	$1.772 + j3.516$	$2.175 + j2.026$
420	$1.912 + j3.440$	$2.236 + j2.266$
430	$1.827 + j3.236$	$2.304 + j2.465$
440	$1.432 + j3.145$	$2.341 + j2.630$
450	$0.982 + j3.368$	$2.385 + j2.771$
460	$0.682 + j3.742$	$2.422 + j2.844$
470	$0.521 + j4.204$	$2.410 + j2.888$

### 3 Typical performance

Figure 2. Output power vs. input power Figure 3. Gain and efficiency vs. output power Freq = 400 Mhz

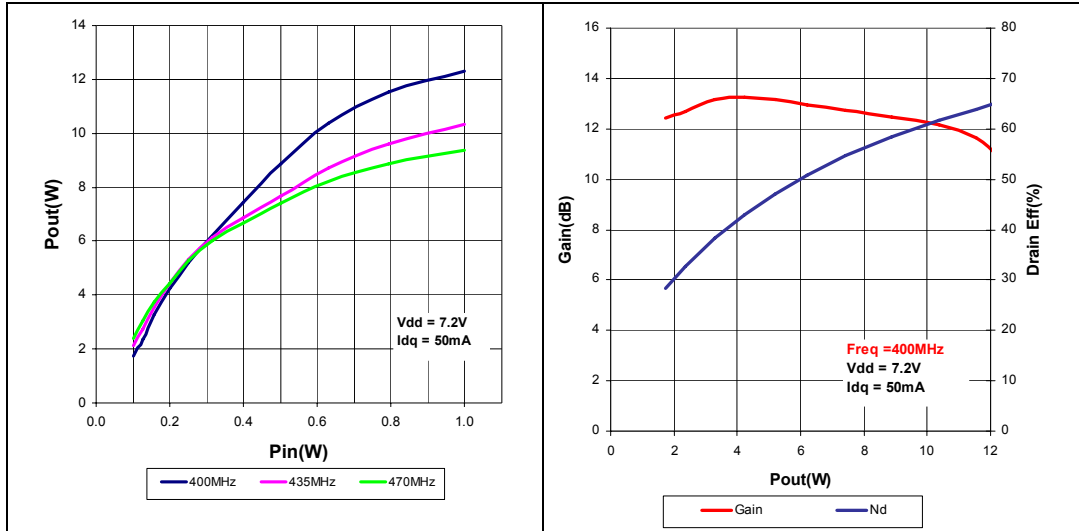


Figure 4. Gain and efficiency vs. output power Freq = 435 Mhz Figure 5. Gain and efficiency vs. output power Freq = 470 Mhz

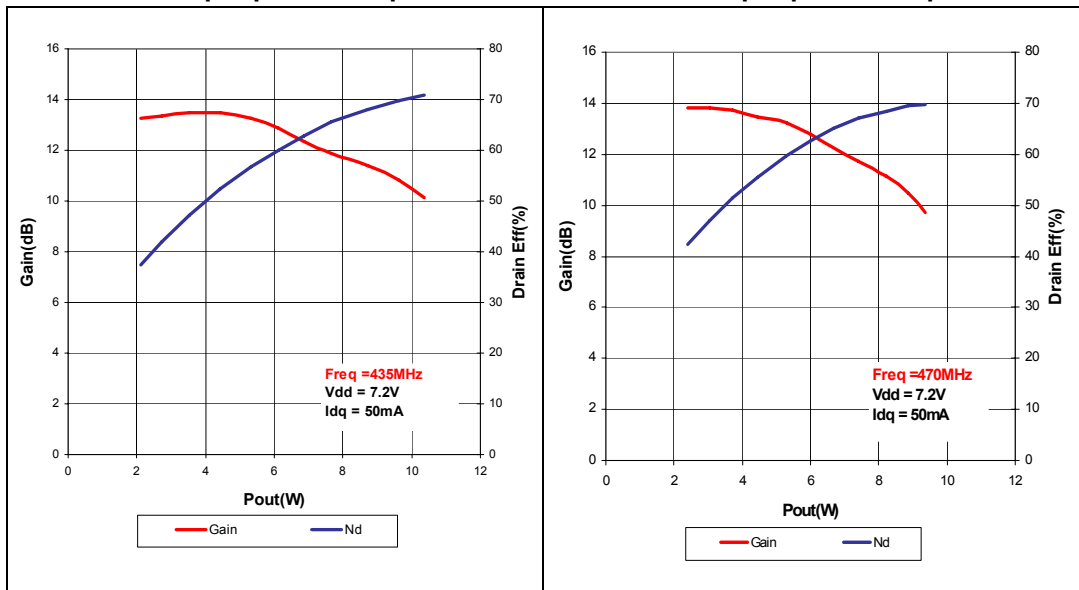


Figure 6. Gain and efficiency vs frequency  
 $P_{OUT} = 7\text{ W}$

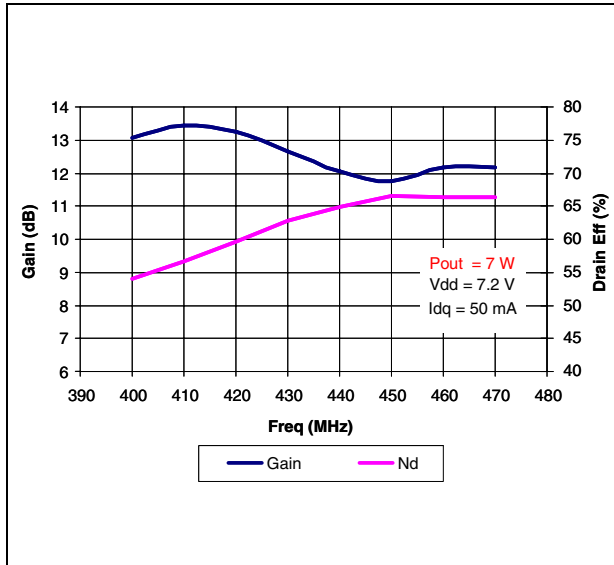


Figure 7. Gain and efficiency vs frequency  
 $P_{OUT} = 8\text{ W}$

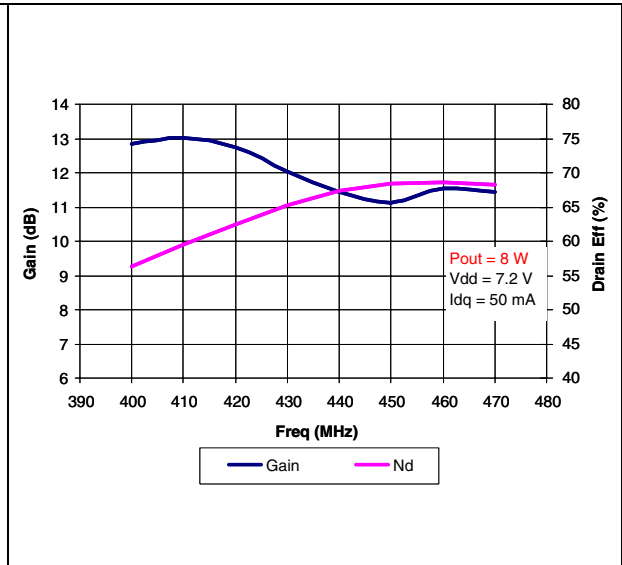


Figure 8. Input return loss vs frequency

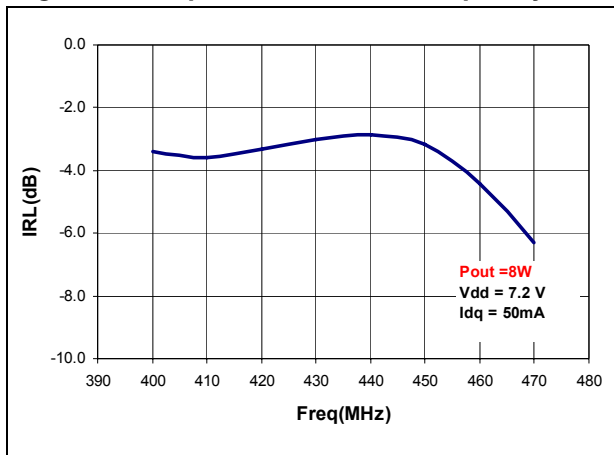


Figure 9. Harmonics vs frequency

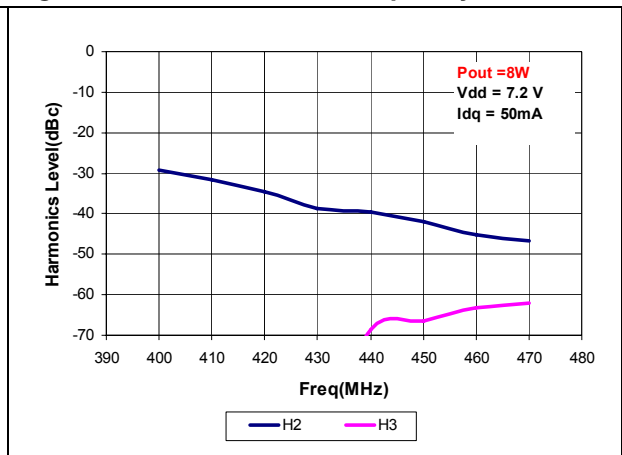
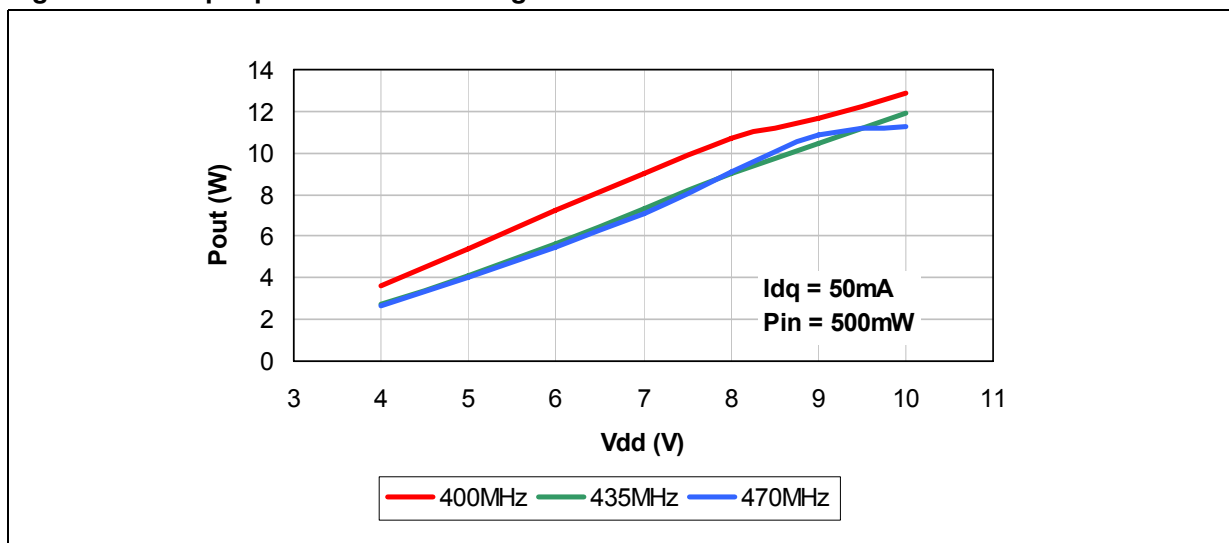


Figure 10. Output power vs drain voltage



## 4 Test circuit

Figure 11. Test circuit schematic

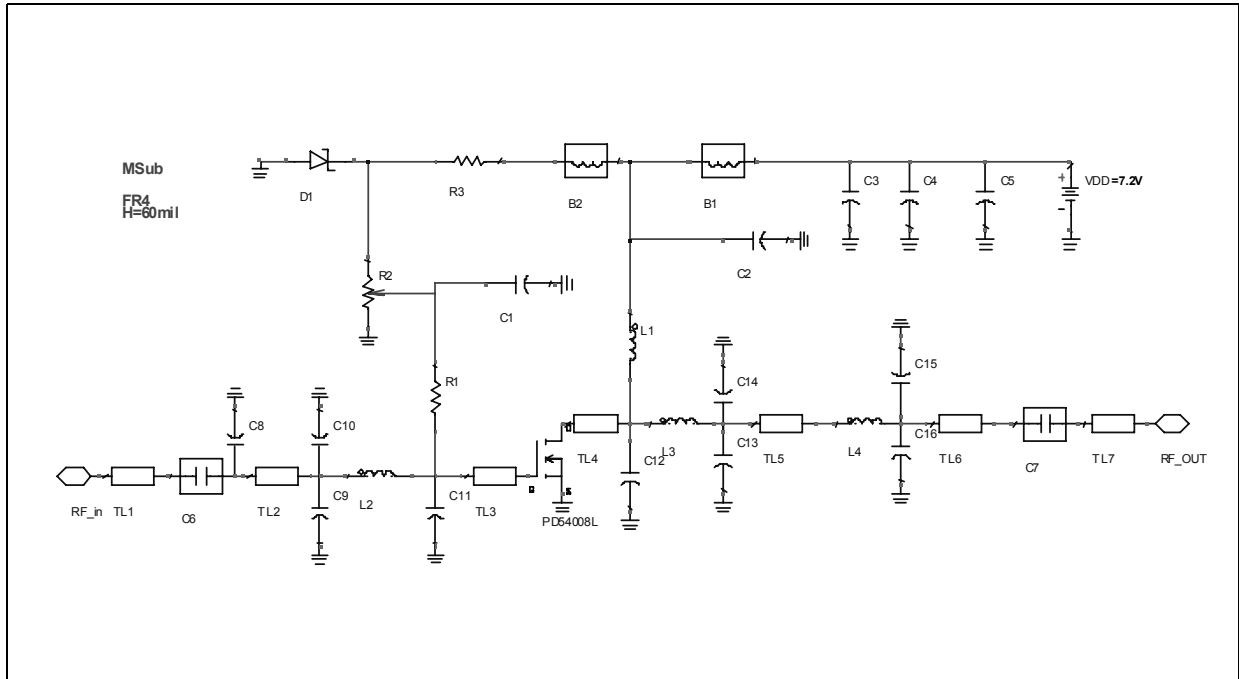


Table 4. Part list

Component ID	Description	Value	Case size	Manufacturer	Part code
C4	Capacitor	10 nF	1206	Murata	GRM42-6X7R104K50
C3	Capacitor	1 nF	1206	Murata	GRM42-6C0G102J50
C1	Capacitor	120 pF	1206	Murata	GRM42-6C0G121J50
C2	Capacitor	120 pF	1206	Murata	GRM42-6C0G121J50
C6	Capacitor	120 pF	100B	ATC	121
C7	Capacitor	120 pF	100B	ATC	121
C8	Capacitor	2 pF	100B	ATC	2R0
C9	Capacitor	13 pF	100B	ATC	130
C10	Capacitor	20 pF	100B	ATC	200
C11	Capacitor	62 pF	100A	ATC	620
C12	Capacitor	43 pF	100A	ATC	430
C13	Capacitor	4.3 pF	100B	ATC	4R3
C14	Capacitor	15 pF	100B	ATC	150
C15	Capacitor	3 pF	100B	ATC	3R0
C16	Capacitor	6.8 pF	100B	ATC	6R8



Table 4. Part list (continued)

Component ID	Description	Value	Case size	Manufacturer	Part code
C5	Capacitor	10 $\mu$ F	SMT	Panasonic	EEVHB1V100P
B2	Ferrite bead			Panasonic	EXCELDRC35C
B1	Ferrite bead			Panasonic	EXCELDRC35C
L1	Inductor	35.5 nH		Coilcraft	B09T
R2	Potentiometer	10 k $\Omega$		Bourns Electronics	3214W-1-103E
R3	Resistor	1 k $\Omega$	1206	Tyco Electronics	01623440-1
R1	Resistor	15 $\Omega$	1206	Tyco Electronics	01623429-1
RF in	SMA-CONN			Johnson	142-0701-801
RF out	SMA-CONN			Johnson	142-0701-801
TL1	Transmission line	W=2.87 mm	L=8.6 mm		
TL2	Transmission line	W=2.87 mm	L=11.7 mm		
TL3	Transmission line	W=4.90 mm	L=5.6 mm		
TL4	Transmission line	W=4.90 mm	L=5.8 mm		
TL5	Transmission line	W=2.87 mm	L=6.4 mm		
TL6	Transmission line	W=2.87 mm	L=4.5 mm		
TL7	Transmission line	W=2.87 mm	L=6.8 mm		
D1	Zener diode	5.1 V	SOD110	Philips	BZX284C5V1
L2	2.55 nH	0906		Coilcraft	0906-3
L3	1.65 nH	0906		Coilcraft	0906-2
L4	3.85 nH	0906		Coilcraft	0906-4
PD54008L	LDMOS			STMicroelectronics	PD54008L
Board: FR-4 THk=0.060" 2 OZ Cu both sides					

## 5 Circuit layout

Figure 12. Test fixture component layout

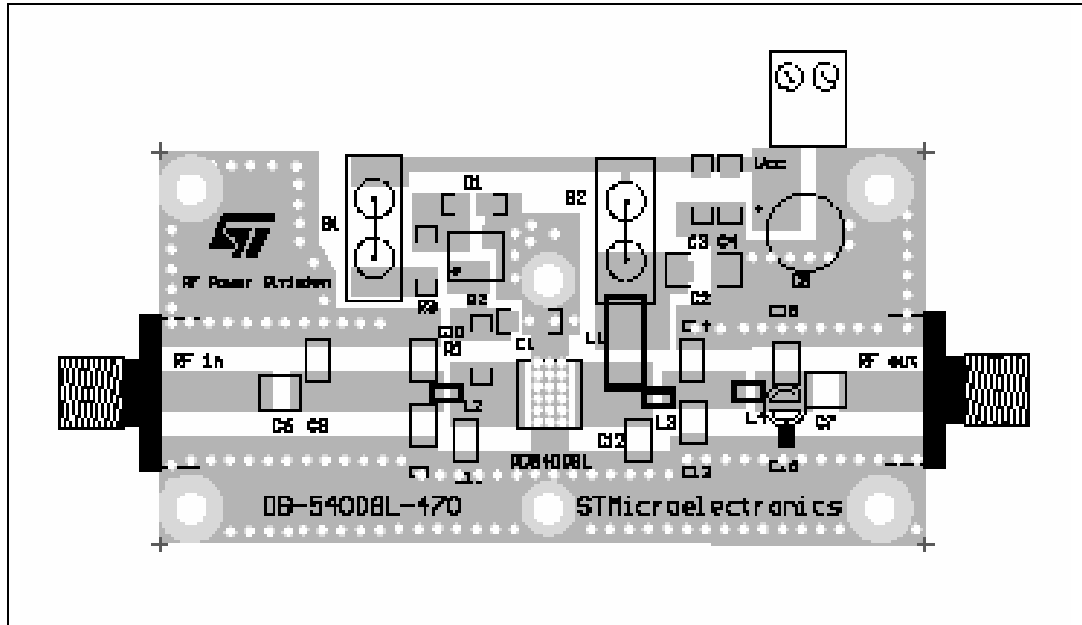
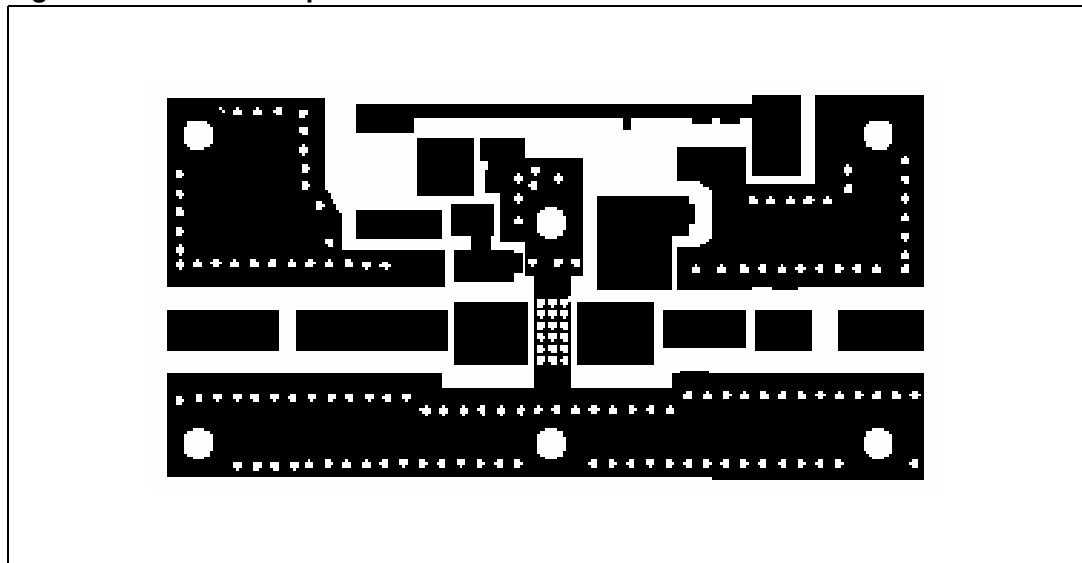


Figure 13. Test circuit photomaster



## 6 Revision history

**Table 5. Document revision history**

Date	Revision	Changes
14-Oct-2010	1	Initial release

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