STEVAL-TDR033V1

RF power amplifier based on the PD85050S for mobile radio applications

Data brief

Table 1. Device summary

Order code
STEVAL-TDR033V1

A proper planar balun embedded on the PCB (patent pending) allows the management of balanced versus unbalanced input/output signals.

For additional information regarding the PD85050S please refer to the device datasheet.

Features

- Excellent thermal stability
- Frequency: 896-941 MHz
- Supply voltage: 12.5 V
- Output power: 60 W
- Gain: 10 dB min
- Efficiency: 50% min
- Stability load VSWR 3:1 minimum
- BeO free amplifier
- RoHS compliant

Description

The STEVAL-TDR033V1 demonstration board is designed for mobile radio applications. It uses two PD85050S LDMOS transistors.

The demonstration board is a push-pull class AB power amplifier which uses a lumped L-C input/output network type on balanced microstrip lines.

1 Electrical characteristics

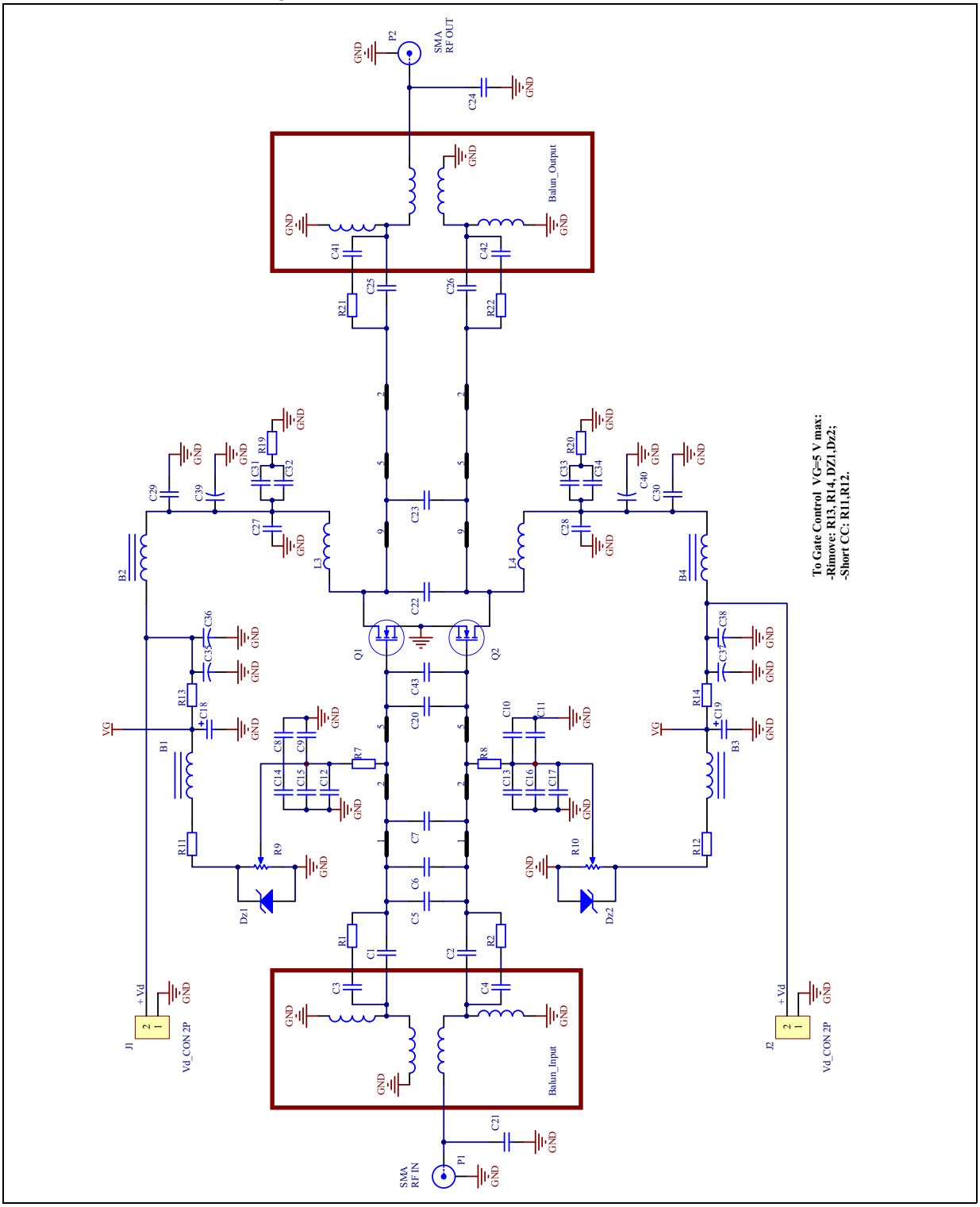
T_A = + 25 °C, V_{DD} = 12.5V, I_{dq} = 400 mA

Table 2. Electrical specification

Symbol	Test conditions	Min.	Typ.	Max.	Unit
Freq	Frequency range	896		941	MHz
P_{OUT}	P_{IN} = 6 W	60			W
Gain	@ P_{OUT} = 60 W	10			dB
h	P_{OUT} = 60 W	50			%
Stability: spurious	Load mismatch all phases 3:1 minimum V_{SWR}			-60	dBc

2 Schematic diagram

Figure 1. STEVAL-TDR033V1 circuit schematic



3 PCB layout

Figure 2. Board layout

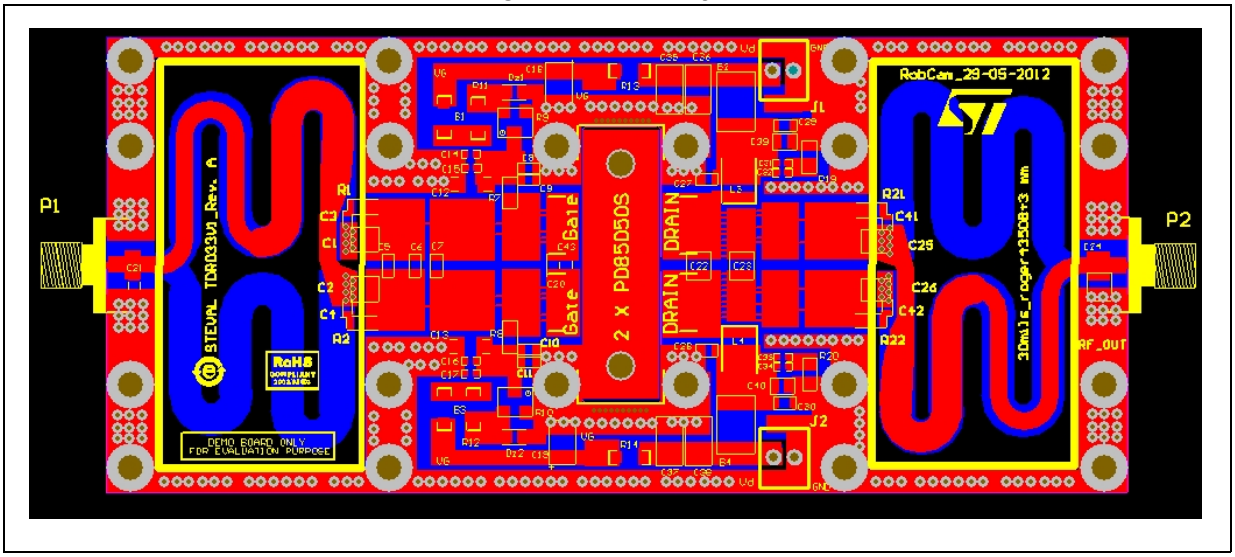


Table 3. Component list

Component ID	Description	Value	Case size	Manufacturer	Part code
B1,B3	Chip inductor	1000 nH	1206	Coilcraft	1206CS-102XJB
B2,B4	Ferrite bead	700 n	SMT	Korin	ASC050847D-700N
R1,R2	Resistor	47 W	1206	Tyco Electronics	CRG1206F47R
R13,R14	Resistor	0 W	1206	NEOHM	5-1622002-0
R7,R8	Resistor	15 W	1206	Bourns-E24	CR1206-FX-15R0
R9,R10	Potentiometer	10 kW		Murata	MURPVG5A502C01R00
R11,R12	Resistor	1100 W	1206	Bourns-E24	CR1206-FX-112
R19,R20	Resistor	27 W	1206	Bourns-E24	CR1206-FX-27R0
R21,R22	Resistor	50 W	1206-2W	Florida RF Labs	81A8004B50-5F
C1,C2	Capacitor	39 pF	SMT	ATC	ATC600F390JT
C3,C4,C41,C42	Capacitor	470 pF	603	Murata	GRM1885C1H471JA01
C5	Capacitor	2 pF	SMT	ATC	ATC600F2R0CT
C6,C43	Capacitor	3 pF	SMT	ATC	ATC600F3R0BT
C7	Capacitor	4.7 pF	SMT	ATC	ATC600F4R7CT
C12,C13	Capacitor	10 uF-16 V	SMT	Murata	GRM31MF51C106ZA12

Table 3. Component list (continued)

Component ID	Description	Value	Case size	Manufacturer	Part code
C14,C15,C16,C17,C31,C32,C33,C34	Capacitor	22 nF	603	Murata	GRM188R71H223KA01
C20	Capacitor	12 pF	SMT	ATC	ATC600F120JT
C21	Capacitor	1 pF	SMT	ATC	ATC600F1R0BT
C22	Capacitor	11 pF	SMT	ATC	ATC100B110JW
C23	Capacitor	1.3 pF	SMT	ATC	ATC100B1R3CW500X
C24	Capacitor	0.7 pF	SMT	ATC	ATC100B0R7CW500X
C25,C26	Capacitor	27 pF	SMT	ATC	ATC800R270JT
C8,C9,C10,C11,C27,C28,C29,C30	Capacitor	100 pF	SMT	ATC	ATC800A101JT
C18,C19,C35,C36,C37,C38	Capacitor	10 uF-35 V	SMT	Murata	GRM32ER7YA106KA12
C39,C40	Capacitor	4.7 uF-25 V	SMT	Murata	GRM21BR61E475KA12
L3,L4	Inductor	33 nH	SMT	Korin	AS080447-33N
D1,D2	Zener diode	5.1 V	SOD110	Philips	BZX284C5V1
Vdd_2P_J1,J2	Connector DC	2 poli	2.54mm	Weidmuller	LM3.5/2/90 3.2
P1_P2	RF connector	SMA_Female	Flange screw mount	Radiall	R124.510.000W
Q1-Q2	LDMOS	PD85050S	PowerSO-10RF	ST	PD85050S
Board	STEVAL-TDR033V1_Rev. A_ROGER 4350B, two layers, Tk=30 mils, 1 OZ Cu on TOP-Bottom layers, Finit. Metal Chem. Tin-HAL LF; Total Tk=0.83 mm, TOP screen printing comp.				
Copper carrier			Mechanical plate -STEVAL-TDR033V1		PPGPC003 - Rev B
Cap			Cap POS10RF -- STEVAL TDR030V1		PPGPC002 - Rev A

Note: BOM does not include heatsink

4 Typical performance

Figure 3. Output power and drain current vs. drain voltage, V_G = 5 V, Pin = 5 W, f = 896 MHz, 2 X PD85050S

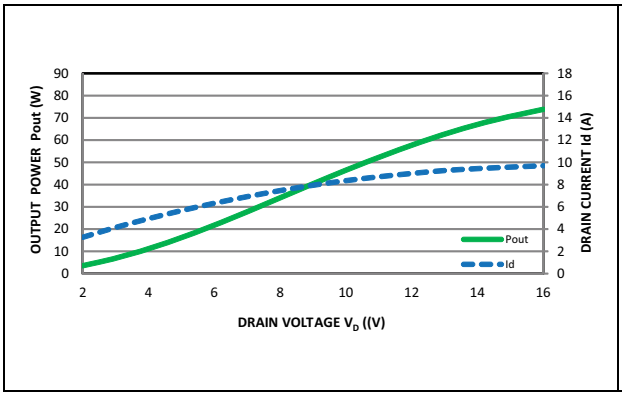


Figure 4. Output power and DRAIN current vs. drain voltage, V_G = 5 V, Pin = 5 W, f = 915 MHz, 2 X PD85050S

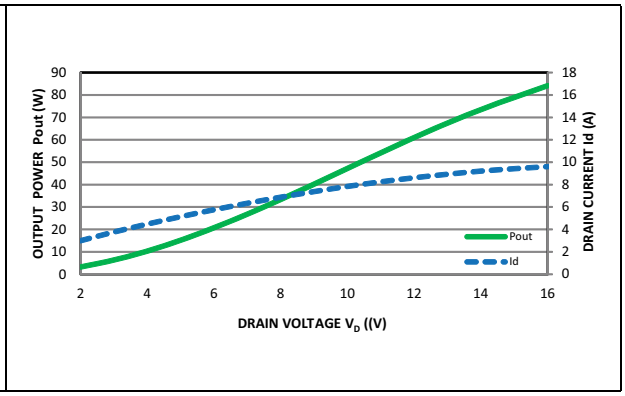


Figure 5. Output power and drain current vs. drain voltage, V_G = 5 V, Pin = 5 W, f = 925 MHz, 2 X PD85050S

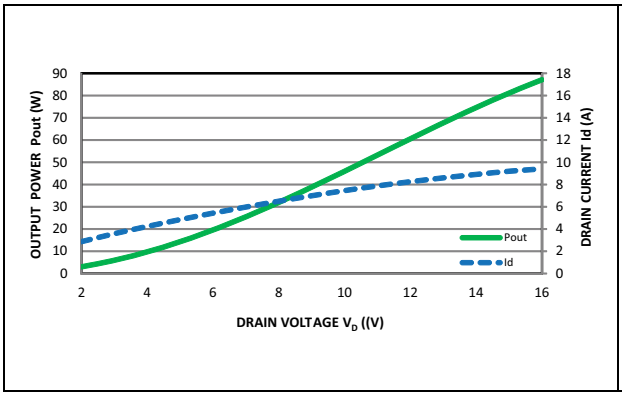


Figure 6. Output power and drain current vs. drain voltage, V_G = 5 V, Pin = 5W, f = 941 MHz, 2 X PD85050S

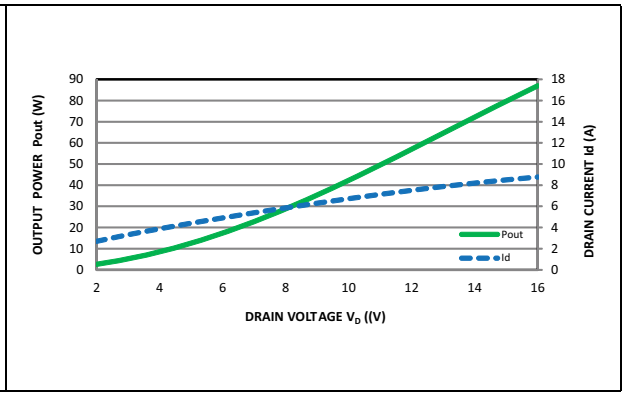


Figure 7. Output power, efficiency, vs. frequency, V_D = 12.5 V_Pin = 5 W, Δf = 896-941 MHz, 2 X PD85050S

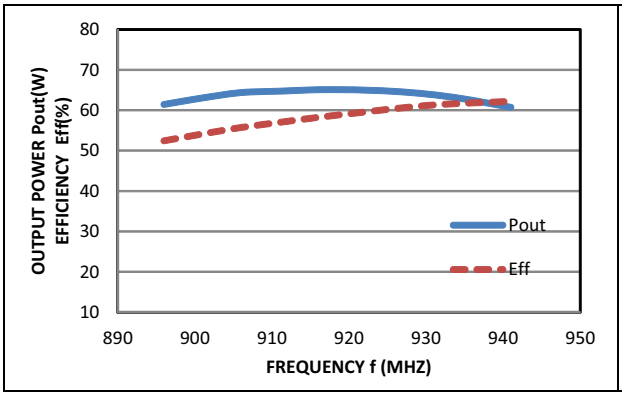


Figure 8. Output power, efficiency, vs. frequency, V_D = 12.5 V_Pin = 6 W, Δf = 896-941 MHz, 2 X PD85050S

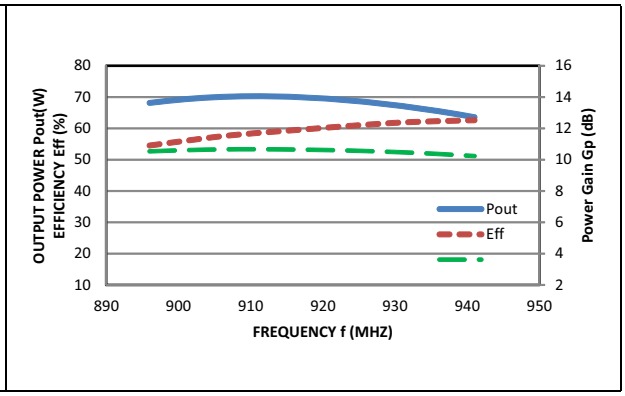


Figure 9. Input return loss vs. frequency, V_D = 12.5 V_Pin = 6 W, Δf = 896-941 MHz, 2 X PD85050S

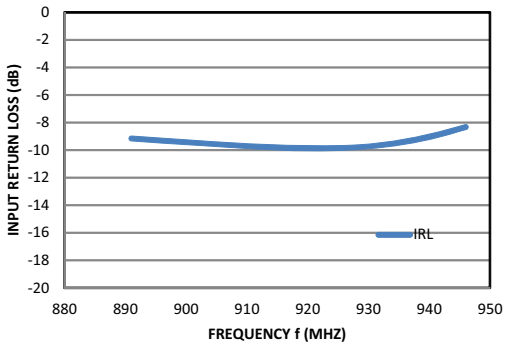
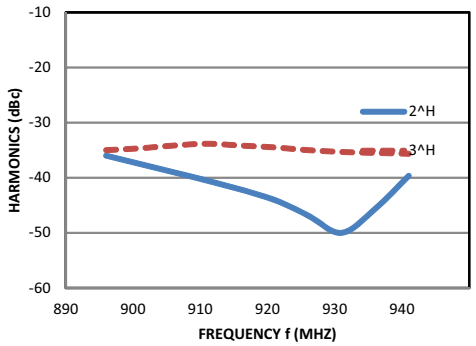


Figure 10. 2nd, 3nd harmonics vs. frequency,V_D =1 2.5 V_Pin = 6 W, Δf = 896-941 MHz, 2 X PD85050S



5 Revision history

Table 4. Document revision history

Date	Revision	Changes
12-Feb-2013	1	Initial release
18-Jun-2013	2	Added *Section 4: Typical performance*.

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