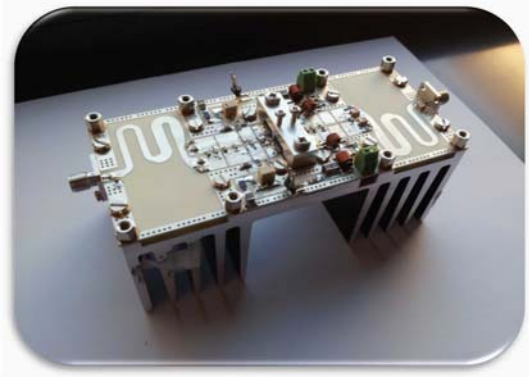
STEVAL-TDR032V1

RF power amplifier based on the PD85050S for mobile radio applications

Data brief



Mechanical specification:
L = 125 mm, W = 56 mm

Table 1. Device summary

Part number
STEVAL-TDR032V1

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.

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: 760-870 MHz
- Supply voltage: 12.5 V
- Output power: 60 W
- Gain: 10 dB min
- Efficiency: 50% typical
- Stability: load V_{SWR} 3:1 minimum
- BeO free amplifier
- RoHS compliant

Description

The STEVAL-TDR032V1 demonstration board is designed for mobile radio applications. It uses two PD85050S LDMOS transistors.

1 Electrical characteristics

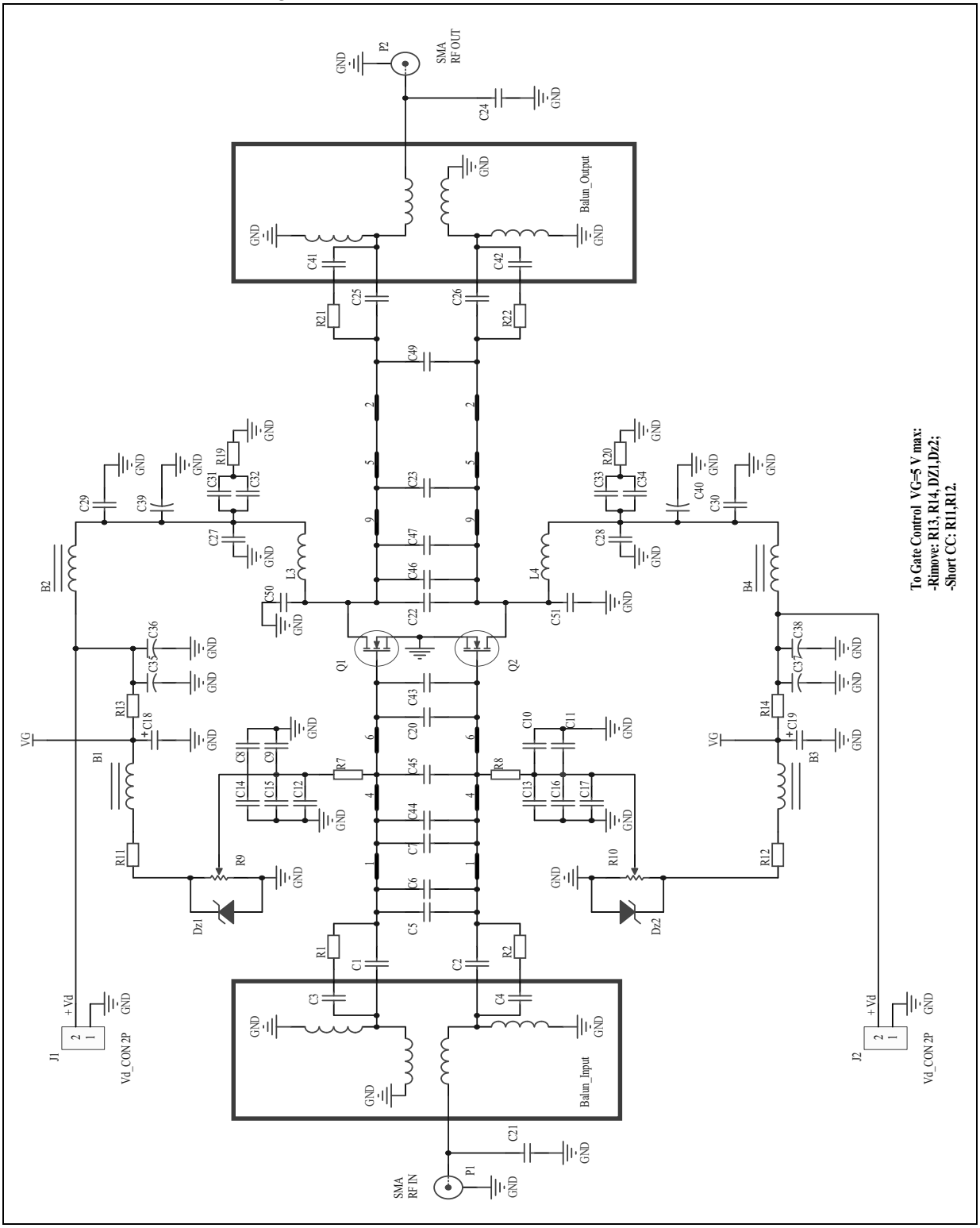
T_A = + 25 °C, V_{DD} = 12.5 V, I_{dq} = 400 mA

Table 2. Electrical specification

Symbol	Test conditions	Min.	Typ.	Max.	Unit
Freq	Frequency range	760		870	MHz
P_{OUT}	P_{IN} = 6 W	60			W
Gain	@ P_{OUT} = 60 W	10			dB
η	P_{OUT} = 60 W PEP		50		%
Stability: spurious	Load mismatch all phases 3:1 minimum V_{SWR}			-60	dBc

2 Schematic diagram

Figure 1. STEVAL-TDR032V1 circuit schematic



3 PCB layout

Figure 2. Board layout

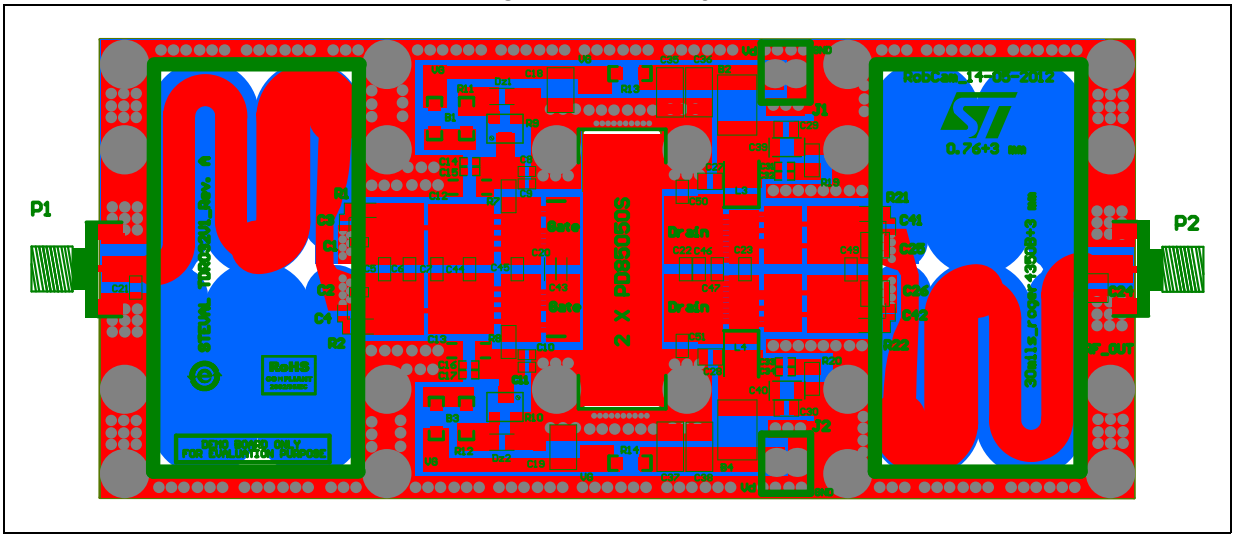


Table 3. Component list

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	603	Tyco Electronics	CRG0603F47R
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	MURPVG5A502 C01R00
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	ATC800A390JT
C3,C4,C41,C42	Capacitor	470 pF	603	Murata	GRM1885C1H47 1JA01
C5	Capacitor	2.2 pF	805	Murata	GQM2195C2E2R 2BB12
C6,C23	Capacitor	4.3	805	Murata	GQM2195C2E4R 3BB12
C44	Capacitor	5.1	805	Murata	GQM2195C2E5R 1BB12

Table 3. Component list (continued)

Component ID	Description	Value	Case size	Manufacturer	Part code
C43	Capacitor	10 pF	805	Murata	GQM2195C2E100JB12
C45	Capacitor	4.7 pF	805	Murata	GQM2195C2E4R7BB12
C46	Capacitor	1.5 pF	805	Murata	GQM2195C2E1R5BB12
C7,C47	Capacitor	2 pF	805	Murata	GQM2195C2E2R0BB12
C8,C9,C10,C11	Capacitor	100 pF	603	Murata	CQM1885C1H101JB01
C12,C13	Capacitor	10 uF - 16 V	SMT	Murata	GRM31MF51C106ZA12
C14,C15,C16,C17,C31,C32,C33, C34	Capacitor	22 nF	603	Murata	GRM188R71H223KA01
C20	Capacitor	8.2 pF	805	Murata	GQM2195C2E8R2BB12
C21,C49	Capacitor	0.5 pF	805	Murata	GQM2195C2ER50BB12
C50, C51	Capacitor	8.2 pF	805	Murata	GQM2195C2E8R2BB12
C22	Capacitor	9.1pF	805	Murata	GQM2195C2E9R1BB12
C24	Capacitor	0.5 pF	SMT	ATC	ATC100B0R5CW500X
C25,C26	Capacitor	27 pF	SMT	ATC	ATC100B270KW500X
C27,C28,C29,C30	Capacitor	100 pF	805	Murata	CQM2195C2E101JB12
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

Table 3. Component list (continued)

Component ID	Description	Value	Case size	Manufacturer	Part code
Board	STEVAL_TDR032V1_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 TDR 030V1		PPGPC002 - Rev A
8 threaded spacers M3 X 5			Richco HTSBC-M3-5-5-2C		RS: 105-8167

Note: BOM does not includes heatsink

4 Typical performance

Figure 3. Output power, efficiency vs. frequency, V_D = 12.5V_Pin = 5 W, Δf = 760-870 MHz, 2 X PD85050S

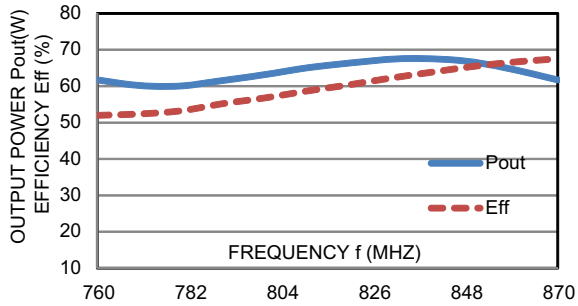


Figure 4. Output power, efficiency vs. frequency, V_D = 12.5V_Pin = 6 W, Δf = 760-870 MHz, 2 X PD85050S

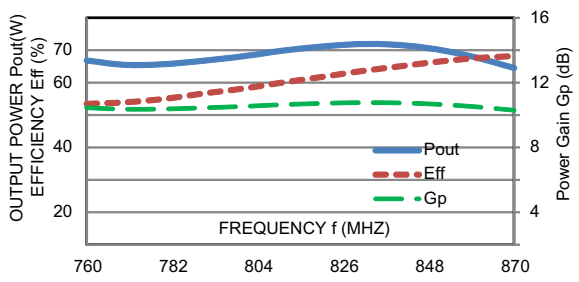


Figure 5. Input return loss, vs. frequency, V_D =12.5V_Pin = 6 W, Δf = 760-870 MHz, 2 X PD85050S

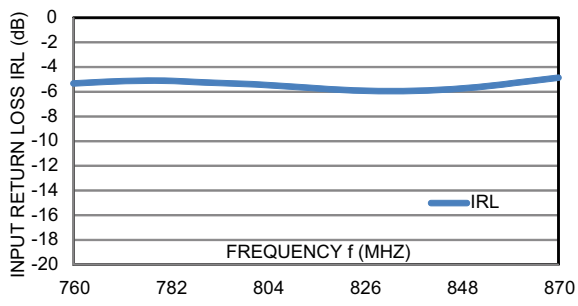


Figure 6. 2nd, 3nd harmonics vs. frequency, V_D = 12.5 V_Pin = 6 W, Δf=760-870 MHz, 2 X PD85050S

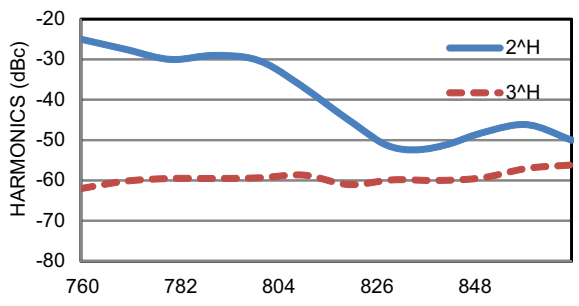


Figure 7. Output power and drain current vs. drain voltage, V_G = 5 V, Pin = 5 W, f = 760 MHz, 2 X PD85050S

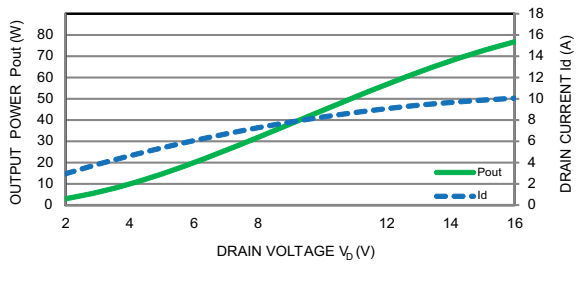


Figure 8. Output power and drain current vs. drain voltage, V_G = 5 V, Pin = 5 W, f = 782 MHz, 2 X PD85050S

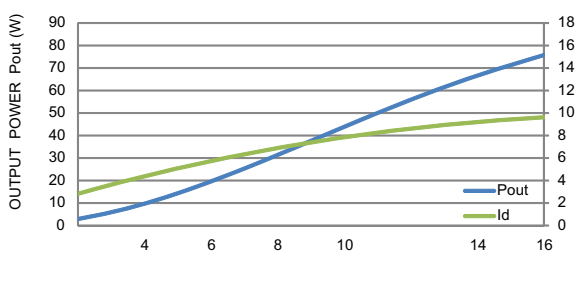


Figure 9. Output power and drain current vs. drain voltage, V_G = 5 V, Pin = 5 W, f = 782 MHz, 2 X PD85050S

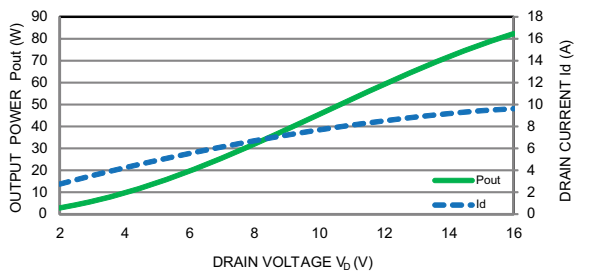


Figure 10. Output power and drain current vs. drain voltage, V_G = 5 V, Pin = 5 W, f = 826 MHz, 2 X PD85050S

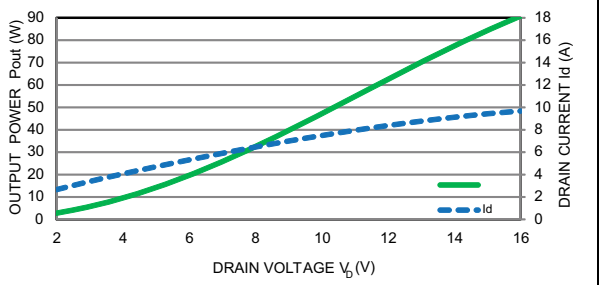


Figure 11. Output power and drain current vs. drain voltage, V_G = 5 V, Pin = 5 W, f = 848 MHz, 2 X PD85050SV

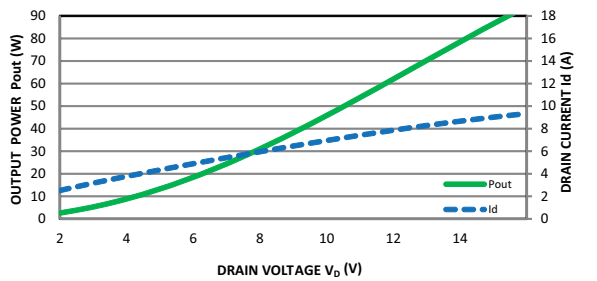
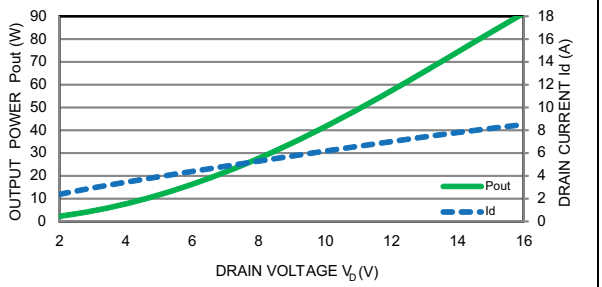


Figure 12. Output power and drain current vs. drain voltage, V_G = 5V , Pin = 5 W, f = 870 MHz, 2 X PD85050S



5 Revision history

Table 4. Document revision history

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

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