

RF power module based on the PD85050S for mobile radio applications

Data brief

Features

- N-channel enhancement-mode lateral MOSFETs ($I_{DD} \approx 0$ @ $V_{DD} = 12.5$ V, $V_{GG} = 0$ V)
- $P_{out} > 70$ W, $\eta_{tot} = 50\%$ (typ) @ $V_{DD} = 12.5$ V, $V_{GG} = 5$ V, $P_{in} = 5$ dBm
- Broadband frequency range: 380-470 MHz
- High moisture sensitivity level
- Low power control current $I_{GG} = 3$ mA (typ) @ $V_{GG} = 5$ V
- ESD protection
- Development kit available to aid in production or system integration.
- RoHS compliant

Description

The STEVAL-TDR034V1 demonstration board is a 70 W hybrid RF power module for 12.5 V mobile radios that operate in the 380-470 MHz band.

This module is a 3-stage lineup power amplifier using the PD84002, the PD85006L-E and two PD85050S specially designed for broadband operation, which allows power control, high gain and high efficiency.

The board uses devices in plastic packages to ensure a high moisture sensitivity level.

For additional information, please refer to www.st.com/rf.

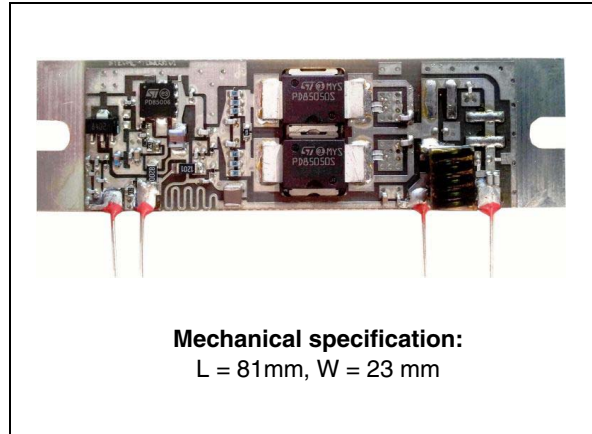


Table 1. Device summary

Order code
STEVAL-TDR034V1

1 Electrical characteristics

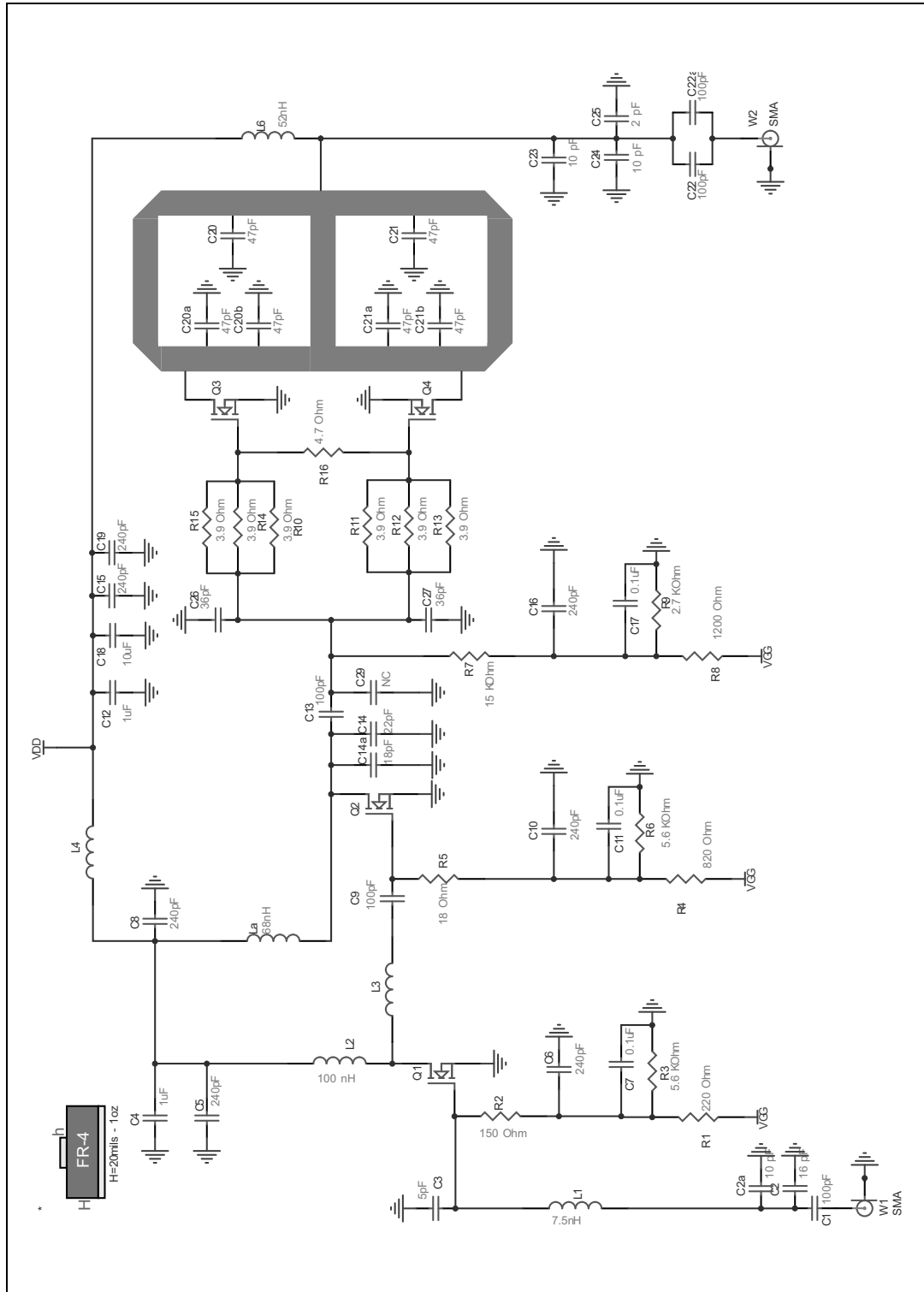
Table 2. Electrical specification ($T_{\text{case}} = +25\text{ }^{\circ}\text{C}$, $Z_G = Z_L = 50\text{ }\Omega$, unless otherwise specified)

Symbol	Test conditions		Min.	Typ.	Max.	Unit
F	Frequency range		380	-	470	MHz
P _{out}	Output power	V _{DD} = 12.5 V		70		W
η_T	Total efficiency	V _{GG} = 5 V		50		%
2fo	2nd harmonic	P _{in} = 5 dBm			-55	dBc
ρ_{in}	Input V _{SWR}				-3	dB
I _{GG}	Gate current	V _{DD} = 0 V, V _{GG} = 5 V, P _{in} = 0 W		3		mA
I _{DD}	Leakage current	V _{DD} = 17 V, V _{GG} = 0 V, P _{in} = 0 W		0		mA
-	Stability	V _{DD} = 12.5 - 15 V, P _{in} = 5 dBm, P _{out} = 70 W (V _{GG} control), Load V _{SWR} = 4:1	No parasitic oscillation			-
-	Load V _{SWR} tolerance	V _{DD} = 15 V, P _{in} = 5 dBm, P _{out} = 70 W (V _{GG} control), Load V _{SWR} = 20:1	No degradation or destruction			-

All parameters, conditions, ratings and limits are subject to change without notice.

2 Schematic diagram

Figure 1. STEVAL-TDR034V1 circuit schematic



3 PCB layout

Figure 2. Board layout

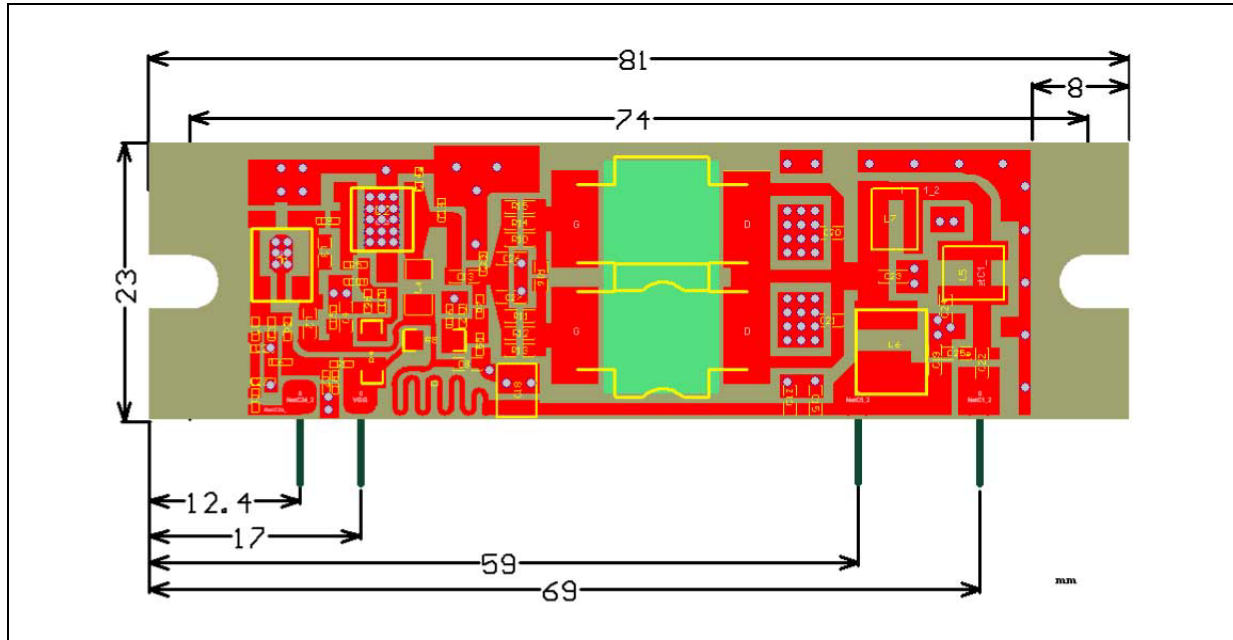


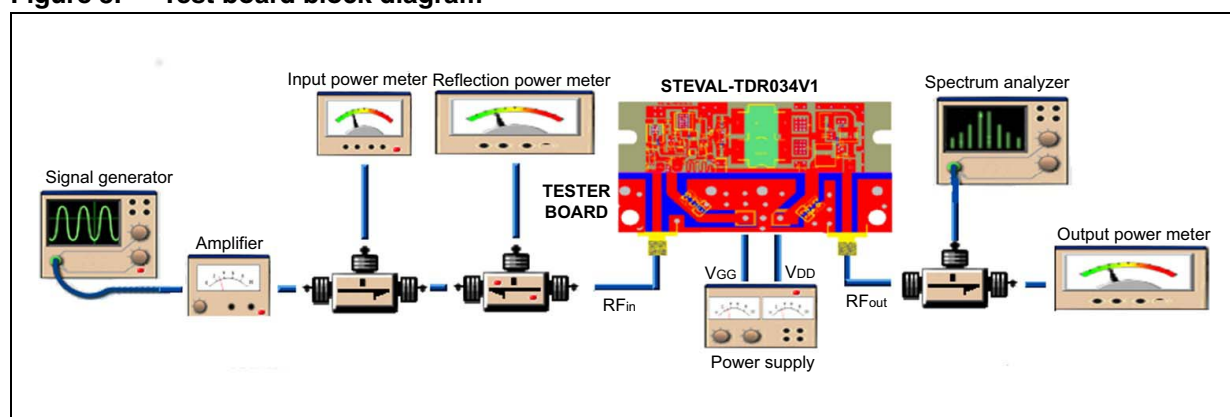
Table 3. Component list

Designator	Manufacturer	Quantity	Value	Manufacturer part number	Footprint
C1, C9	Murata	2	100 pF	GRM1555C1H101JA01	0402
C2	Murata	1	16 pF	GJM1555C1H160GB01#	0402
C2a	Murata	1	10 pF	GJM1555C1H100JZ01#	0402
C3	Murata	1	5 pF	GRM1555C1H5R0GA01#	0402
C4	Murata	1	1 μ F	GRM188R61E105KA12#	0603
C5, C6, C8, C10, C15, C16, C19	Murata	7	240 pF	GRM1555C1H241JA01#	0402
C7, C11, C17	Murata	3	0.1 μ F	GRM155C81E104KA12#	0402
C12	Murata	1	1 μ F	GRM188B31E105KA75#	0603
C13	Murata	1	100 pF	GQM1885C1H101GB01#	0603
C22, C22a	Murata	2	100 pF	GQM2195C1H101JB01#	0805
C14	Murata	1	27 pF	GRM1555C1H270FA01#	0402
C14a	Murata	1	18 pF	GRM1555C1H180JZ01#	0402
C18	Murata	1	10 μ F	GRM32ER71H106KA12#	1210
C20, C20a, C20b, C21, C21a, C21b	Murata	6	47 pF	GQM1875C2E470GB12#	0603
C23, C24	Murata	2	10 pF	GQM1875C2E100JB12#	0603

Table 3. Component list (continued)

Designator	Manufacturer	Quantity	Value	Manufacturer part number	Footprint
C25	Murata	1	2 pF	GCM1885C2A2R0CB01#	0603
C26, C27	Murata	2	36 pF	GRM1555C1H360GA01#	0603
C29	Murata	1	NC		
L1	Coilcraft	1	7.5 nH	0402CS-7N5XJLW	0402
L2	Coilcraft	1	100 nH	0603HP-R10X_LU	0603
L6	Coilcraft	1	52 nH	NA5778-AE	
La	Coilcraft	1	68 nH	1008HQ-68NX_LC	0402
Q1	STM	1	SOT89	PD84002	SOT89
Q2	STM	1	PowerFlat	PD85006L	PowerFlat
Q3, Q4	STM	2	PSO-10	PD85050S	PSO-10
R1	Vishay	1	220 Ω	CRCW0402220RFKED	0402
R2	Vishay	1	150 Ω	CRCW0402150RFKED	0402
R3, R6	Vishay	2	5.6 K Ω	CRCW04025K60FKED	0402
R4	Vishay	1	820 Ω	CRCW1206820RFKEA	1206
R5	Vishay	1	18 Ω	CRCW040218R0FKED	0402
R7	Vishay	1	15 K Ω	CRCW040215K0FKED	0402
R8	Vishay	1	1200 Ω	CRCW12061K20FKEA	1206
R9	Vishay	1	2,7 K Ω	CRCW04022K7CEED	0402
R10, R11, R12, R13, R14, R15	KOA Speer	6	3.9 Ω	RK73H1JTTD3R90F	0603
R16	Vishay	1	4.7 Ω	CRCW06034R70FKEA	0603
Substrate			FR-4	20 mils 1 oz copper	

Figure 3. Test board block diagram



Note: **Test board:** All measurements have been done including 50 Ω lines input and output with $I_L = 0.06$ dB into 380 MHz - 500 MHz

Table 4. Test board component list

Designator	Manufacturer	Quantity	Value	Manufacturer part number	Type
C1, C2		2	100 μ F		Tantalum
C3, C4	Murata	2	10 μ F	GRM42-6X7R225K25D52K	0402
C5, C6	Murata	2	2.2 μ F	GRM42-6X5R106K25D539	0603
Substrate			FR-4	60 mils 1 oz copper	

4 Revision history

Table 5. Document revision history

Date	Revision	Changes
11-Feb-2013	1	Initial release.

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