

APPLICATION NOTE

Document NO. AN-900-030-A

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SUBJECT: RD05MMP1 Single-Stage amplifier RF performance at $f=800-900\text{MHz}$, $V_{dd}=7.2\text{V}$

SUMMARY:

This application note shows the RF Wide band characteristics data

(Pout vs. Frequency characteristics, Pout vs. Pin characteristics) at 800-900 MHz Band.

- Sample history :
 - RD05MMP1: Lot number " 064XA-G "

- Evaluate conditions :
 - RD05MMP1 @ $f=800-900\text{MHz}$: $V_{ds}=7.2\text{V}$, $I_{dq}=1.0\text{A}$ (V_{gs} adjust)

- Results :
 - Page 2 shows the typical RF characteristics (Pout vs. Frequency characteristics) data.
 - Page 3-4 shows the typical RF characteristics (Pout vs. Pin characteristics) data.
 - Page 5 shows the Equivalent Circuit.

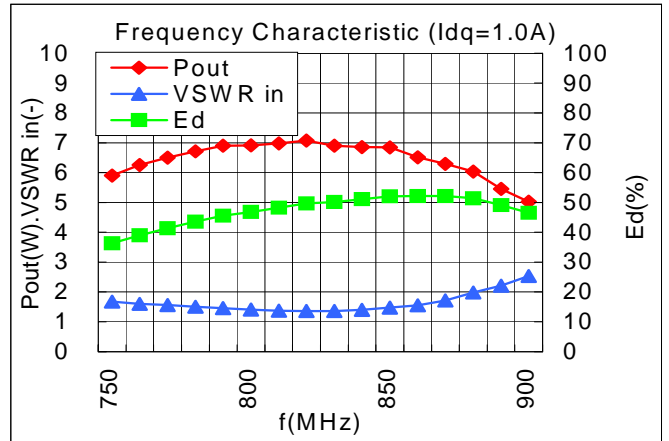
RD05MMP1 Single-Stage amplifier RF performance at f=800-900MHz, Vdd=7.2V

- AN-900-030-A -

RD05MMP1 Single-Stage amplifier Frequency Characteristics f=800-900MHz.

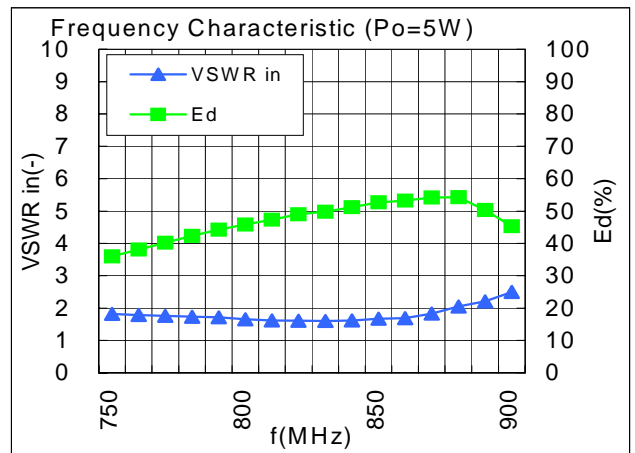
Pin=0.7W, Vds=7.2V, Idq=1.0A (Vgs Adjust)

f (MHz)	Pout (W)	Ids (A)	Ed (%)	RL (dB)	VSWR in (-)	2SP (dB)	3SP (dB)
750	5.90	2.27	36.3	12.0	1.7	-39.4	-60.8
760	6.25	2.24	39.0	12.7	1.6	-41.2	-61.9
770	6.50	2.20	41.3	13.2	1.6	-45.2	-62.9
780	6.71	2.15	43.6	13.9	1.5	-46.7	-60.6
790	6.90	2.12	45.6	14.6	1.5	-48.4	-59.4
800	6.91	2.06	46.8	15.4	1.4	-50.8	-58.7
810	6.98	2.02	48.2	16.0	1.4	-53.0	-58.8
820	7.07	1.99	49.6	16.2	1.4	-53.3	-58.4
830	6.90	1.93	50.1	16.2	1.4	-54.9	-57.2
840	6.85	1.88	51.1	15.6	1.4	-56.4	-57.2
850	6.84	1.84	52.1	14.3	1.5	-56.4	-58.0
860	6.51	1.75	52.1	13.3	1.5	-52.9	-57.6
870	6.29	1.69	52.2	11.6	1.7	-49.9	-58.4
880	6.03	1.64	51.4	9.7	2.0	-47.5	-57.9
890	5.45	1.55	49.1	8.5	2.2	-46.4	-58.6
900	5.02	1.51	46.6	7.2	2.5	-45.6	-59.2



Po=5W Constant, Vgs Adjustment, Vds=7.2V, Pin=0.7W

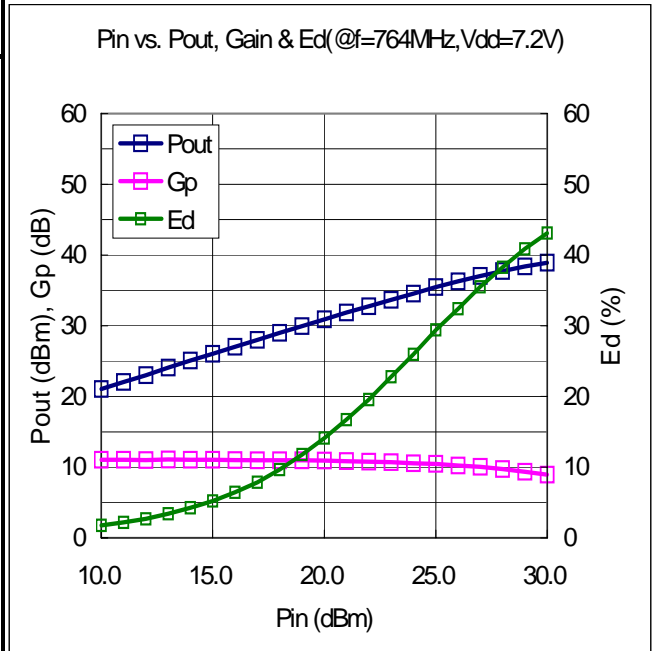
f (MHz)	Vgs (V)	Ids (A)	Ed (%)	RL (dB)	VSWR in (-)	2SP (dB)	3SP (dB)
750	2.57	1.96	36.0	10.7	1.8	-36.4	-59.7
760	2.50	1.85	38.1	11.0	1.8	-37.1	-61.9
770	2.42	1.75	40.2	11.2	1.8	-39.6	-63.1
780	2.35	1.67	42.3	11.4	1.7	-40.4	-62.7
790	2.28	1.59	44.3	11.6	1.7	-40.6	-62.6
800	2.28	1.53	45.8	12.2	1.7	-40.9	-60.8
810	2.26	1.49	47.3	12.6	1.6	-42.3	-60.3
820	2.21	1.44	49.0	12.6	1.6	-43.0	-60.0
830	2.22	1.39	49.8	12.8	1.6	-43.9	-59.7
840	2.22	1.36	51.2	12.5	1.6	-45.0	-59.3
850	2.21	1.34	52.7	12.0	1.7	-46.4	-58.7
860	2.31	1.31	53.2	11.9	1.7	-49.6	-58.4
870	2.31	1.28	54.2	10.7	1.8	-51.7	-58.2
880	2.35	1.28	54.2	9.3	2.0	-65.0	-58.1
890	2.61	1.38	50.3	8.5	2.2	-51.3	-58.4
900	2.61	1.53	45.3	7.4	2.5	-45.2	-57.8



RD05MMP1 Single-Stage amplifier Pout vs. Pin characteristics

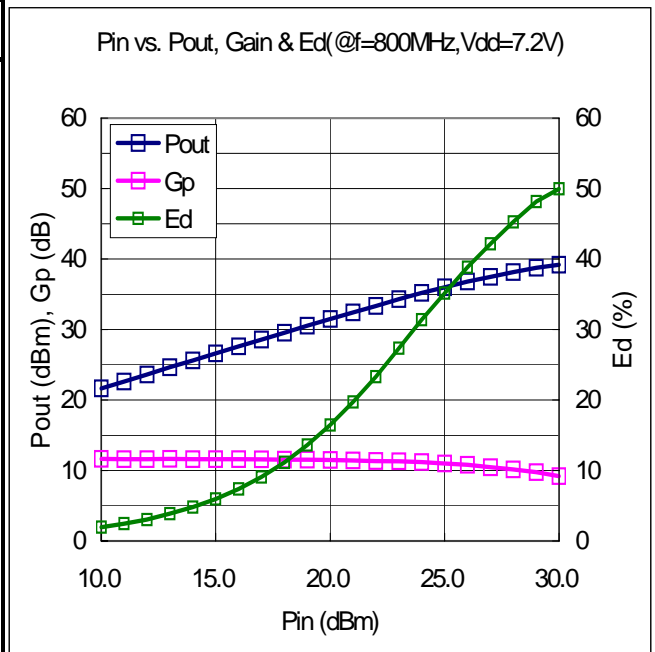
f=764MHz, Vds=7.2V, Idq=1.0A(Vgs Adjust)

Pin		Pout		Gp (dB)	Ids (A)	Ed (%)
(dBm)	(W)	(dBm)	(W)			
10.0	0.01	21.06	0.13	11.06	1.01	1.76
11.0	0.01	22.03	0.16	11.03	1.02	2.17
12.0	0.02	23.01	0.20	11.01	1.03	2.70
13.0	0.02	24.07	0.26	11.07	1.04	3.41
14.0	0.03	25.06	0.32	11.06	1.05	4.24
15.0	0.03	26.03	0.40	11.03	1.07	5.22
16.0	0.04	27.01	0.50	11.01	1.08	6.44
17.0	0.05	27.97	0.63	10.97	1.11	7.86
18.0	0.06	28.98	0.79	10.98	1.14	9.67
19.0	0.08	29.96	0.99	10.96	1.17	11.75
20.0	0.10	30.91	1.23	10.91	1.21	14.11
21.0	0.13	31.85	1.53	10.85	1.27	16.72
22.0	0.16	32.76	1.89	10.76	1.34	19.54
23.0	0.20	33.68	2.33	10.68	1.42	22.76
24.0	0.25	34.56	2.86	10.56	1.53	25.97
25.0	0.32	35.48	3.53	10.48	1.67	29.40
26.0	0.40	36.25	4.22	10.25	1.81	32.38
27.0	0.50	37.03	5.05	10.03	1.97	35.50
28.0	0.63	37.73	5.93	9.73	2.15	38.28
29.0	0.79	38.36	6.85	9.36	2.33	40.86
30.0	1.00	38.92	7.80	8.92	2.51	43.10



f=800MHz, Vds=7.2V, Idq=1.0A(Vgs Adjust)

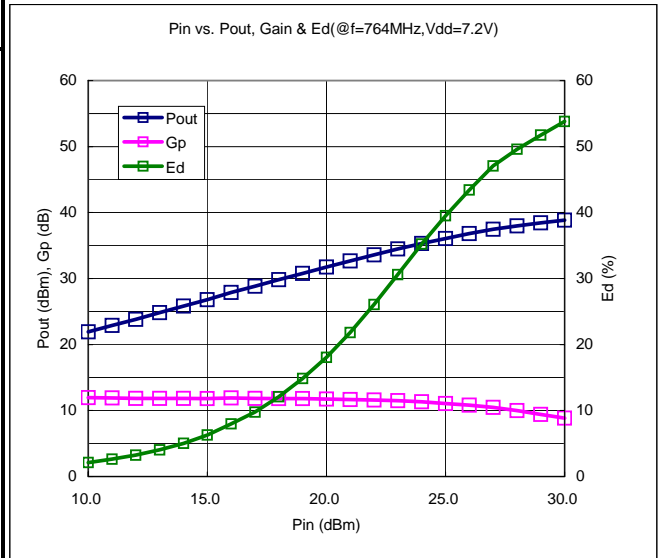
Pin		Pout		Gp (dB)	Ids (A)	Ed (%)
(dBm)	(W)	(dBm)	(W)			
10.0	0.01	21.65	0.15	11.65	1.03	1.98
11.0	0.01	22.62	0.18	11.62	1.03	2.45
12.0	0.02	23.60	0.23	11.60	1.04	3.06
13.0	0.02	24.65	0.29	11.65	1.05	3.87
14.0	0.03	25.63	0.37	11.63	1.06	4.80
15.0	0.03	26.62	0.46	11.62	1.07	5.97
16.0	0.04	27.60	0.58	11.60	1.08	7.38
17.0	0.05	28.57	0.72	11.57	1.10	9.07
18.0	0.06	29.55	0.90	11.55	1.12	11.14
19.0	0.08	30.53	1.13	11.53	1.15	13.62
20.0	0.10	31.49	1.41	11.49	1.19	16.47
21.0	0.13	32.43	1.75	11.43	1.23	19.72
22.0	0.16	33.35	2.16	11.35	1.29	23.29
23.0	0.20	34.31	2.70	11.31	1.37	27.35
24.0	0.25	35.18	3.30	11.18	1.46	31.37
25.0	0.32	35.99	3.97	10.99	1.57	35.16
26.0	0.40	36.81	4.80	10.81	1.72	38.85
27.0	0.50	37.48	5.60	10.48	1.84	42.16
28.0	0.63	38.16	6.55	10.16	2.01	45.28
29.0	0.79	38.78	7.55	9.78	2.18	48.16
30.0	1.00	39.19	8.30	9.19	2.31	49.97



RD05MMP1 Single-Stage amplifier Pout vs. Pin Characteristics

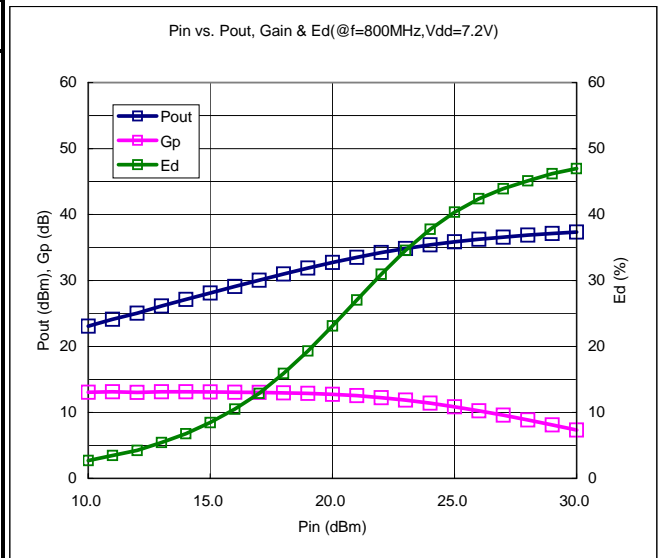
f=850MHz, Vds=7.2V, Idq=1.0A(Vgs Adjust)

Pin		Pout		Gp (dB)	Ids (A)	Ed (%)
(dBm)	(W)	(dBm)	(W)			
10.0	0.01	21.93	0.16	11.93	1.03	2.10
11.0	0.01	22.92	0.20	11.92	1.04	2.62
12.0	0.02	23.83	0.24	11.83	1.04	3.22
13.0	0.02	24.83	0.30	11.83	1.05	4.03
14.0	0.03	25.83	0.38	11.83	1.06	5.04
15.0	0.03	26.82	0.48	11.82	1.06	6.28
16.0	0.04	27.90	0.62	11.90	1.07	7.98
17.0	0.05	28.83	0.76	11.83	1.09	9.77
18.0	0.06	29.81	0.96	11.81	1.10	12.08
19.0	0.08	30.79	1.20	11.79	1.12	14.86
20.0	0.10	31.74	1.49	11.74	1.15	18.07
21.0	0.13	32.68	1.85	11.68	1.18	21.82
22.0	0.16	33.60	2.29	11.60	1.22	26.07
23.0	0.20	34.49	2.81	11.49	1.28	30.60
24.0	0.25	35.32	3.40	11.32	1.34	35.23
25.0	0.32	36.08	4.06	11.08	1.43	39.51
26.0	0.40	36.82	4.81	10.82	1.54	43.42
27.0	0.50	37.47	5.58	10.47	1.65	47.07
28.0	0.63	37.98	6.28	9.98	1.76	49.59
29.0	0.79	38.43	6.97	9.43	1.87	51.73
30.0	1.00	38.86	7.69	8.86	1.98	53.83

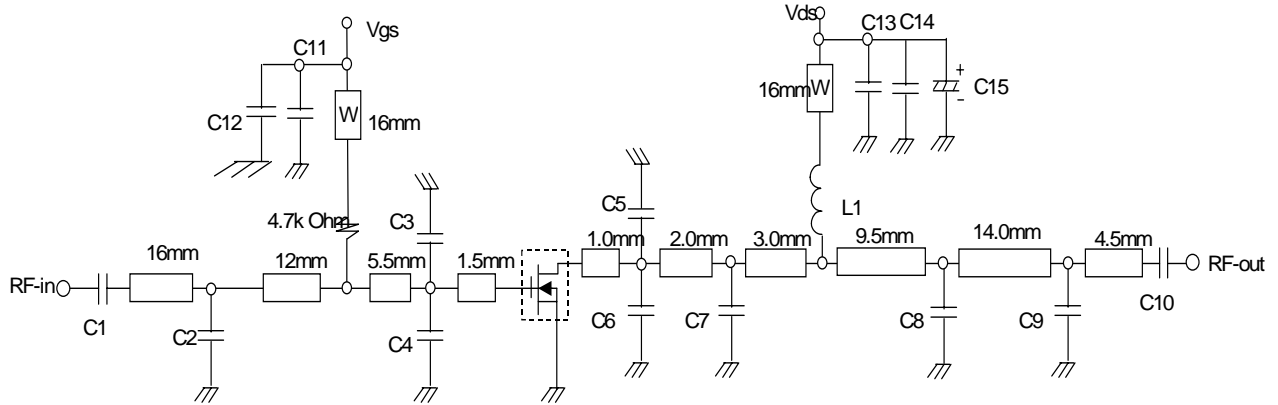


f=900MHz, Vds=7.2V, Idq=1.0A(Vgs Adjust)

Pin		Pout		Gp (dB)	Ids (A)	Ed (%)
(dBm)	(W)	(dBm)	(W)			
10.0	0.01	23.07	0.20	13.07	1.03	2.72
11.0	0.01	24.15	0.26	13.15	1.04	3.47
12.0	0.02	25.04	0.32	13.04	1.05	4.24
13.0	0.02	26.15	0.41	13.15	1.05	5.45
14.0	0.03	27.13	0.52	13.13	1.06	6.80
15.0	0.03	28.11	0.65	13.11	1.06	8.46
16.0	0.04	29.08	0.81	13.08	1.07	10.49
17.0	0.05	30.02	1.00	13.02	1.08	12.90
18.0	0.06	30.98	1.25	12.98	1.09	15.90
19.0	0.08	31.89	1.55	12.89	1.11	19.32
20.0	0.10	32.75	1.88	12.75	1.13	23.12
21.0	0.13	33.53	2.25	12.53	1.16	27.04
22.0	0.16	34.24	2.65	12.24	1.19	30.95
23.0	0.20	34.86	3.06	11.86	1.23	34.55
24.0	0.25	35.40	3.47	11.40	1.27	37.78
25.0	0.32	35.85	3.85	10.85	1.32	40.37
26.0	0.40	36.26	4.23	10.26	1.38	42.40
27.0	0.50	36.58	4.55	9.58	1.44	43.92
28.0	0.63	36.87	4.86	8.87	1.50	45.12
29.0	0.79	37.13	5.16	8.13	1.55	46.19
30.0	1.00	37.34	5.42	7.34	1.60	46.97



RD05MMP1 Single-Stage amplifier Equivalent Circuit (@f=800-900MHz)



Note: Board material= glass-Epoxy Substrate
 Micro strip line width= 1.3mm/50OHM, er=4.8, t=0.8mm
 W: Line width=1.0mm

Parts Number	Capacity	type name	corporation
C1	150pF	GRM1882C1H151JA01	Murata Manufacturing Co., Ltd
C2	4pF	GRM1882C1H4R0CZ01	Murata Manufacturing Co., Ltd
C3	8pF	GRM1882C1H8R0DZ01	Murata Manufacturing Co., Ltd
C4	8pF	GRM1882C1H8R0DZ01	Murata Manufacturing Co., Ltd
C5	8pF	GRM1882C1H8R0DZ01	Murata Manufacturing Co., Ltd
C6	8pF	GRM1882C1H8R0DZ01	Murata Manufacturing Co., Ltd
C7	3pF	GRM1883C1G3R0CZ01	Murata Manufacturing Co., Ltd
C8	1pF	GRM1884C1H1R0CZ01	Murata Manufacturing Co., Ltd
C9	1pF	GRM1884C1H1R0CZ01	Murata Manufacturing Co., Ltd
C10	150pF	GRM1882C1H151JA01	Murata Manufacturing Co., Ltd
C11	100pF	GRM1882C1H101JA01	Murata Manufacturing Co., Ltd
C12	1000pF	GRM1882C1H102JA01	Murata Manufacturing Co., Ltd
C13	100pF	GRM1882C1H101JA01	Murata Manufacturing Co., Ltd
C14	1000pF	GRM1882C1H102JA01	Murata Manufacturing Co., Ltd
C15	22uF	A0603	NICHICON CORPORATION
R1	4.7K OHM	CR1/10-472JB	Hokuriku Electric Industry Co.,Ltd.
L1	24.4nH Enameled wire 5 Turns, D:0.23mm, 1.37mm(outside diameter)	2305A	Yoneda Processing Place Co.,Ltd.

