APPLICATION NOTE

MITSUBISHI ELECTRIC
Silicon RF Power Semiconductors

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SUBJECT: RD07MUS2B single-stage amplifier
efficiency matching RF performance at f= 400-470MHz,Vdd=7.2V

SUMMARY:

This application note shows the RF wide band characteristics data
(Frequency characteristics, Pout vs. Pin characteristics) at 400 to 470 MHz band.

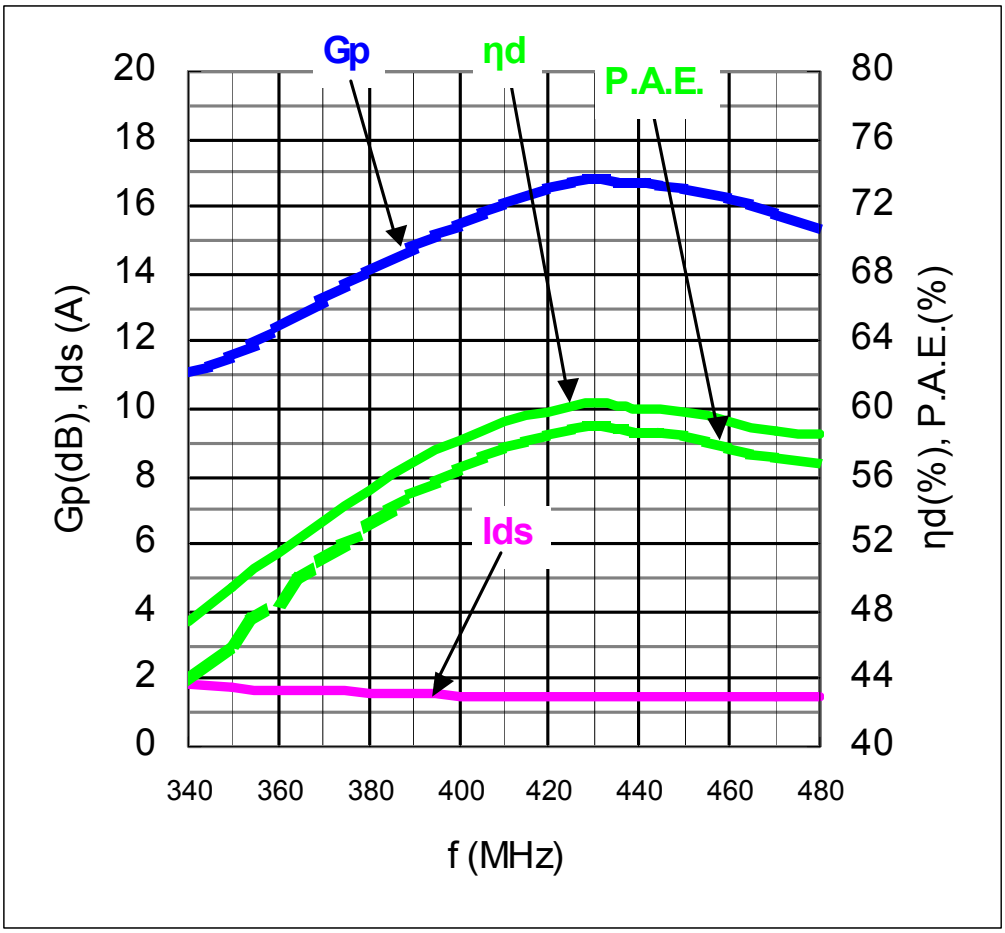
- Sample history :
  RD07MUS2B: Lot number “086ZE-G”

- Evaluate conditions :
  RD07MUS2B @f=400 to 470MHz : Vds=7.2V, Idq=250mA (Vgs adjust)

- Results :
  Page 2-3. shows the typical RF characteristics (Frequency characteristics) data.
  Page 4-9. shows the typical RF characteristics (Pout vs. Pin characteristics) data.
  Page 10-12. shows the typical RF characteristics (Pout vs. Vgg characteristics) data.
  Page 13. shows the efficiency matching equivalent circuit.

RD07MUS2B single-stage amplifier Frequency characteristics 1

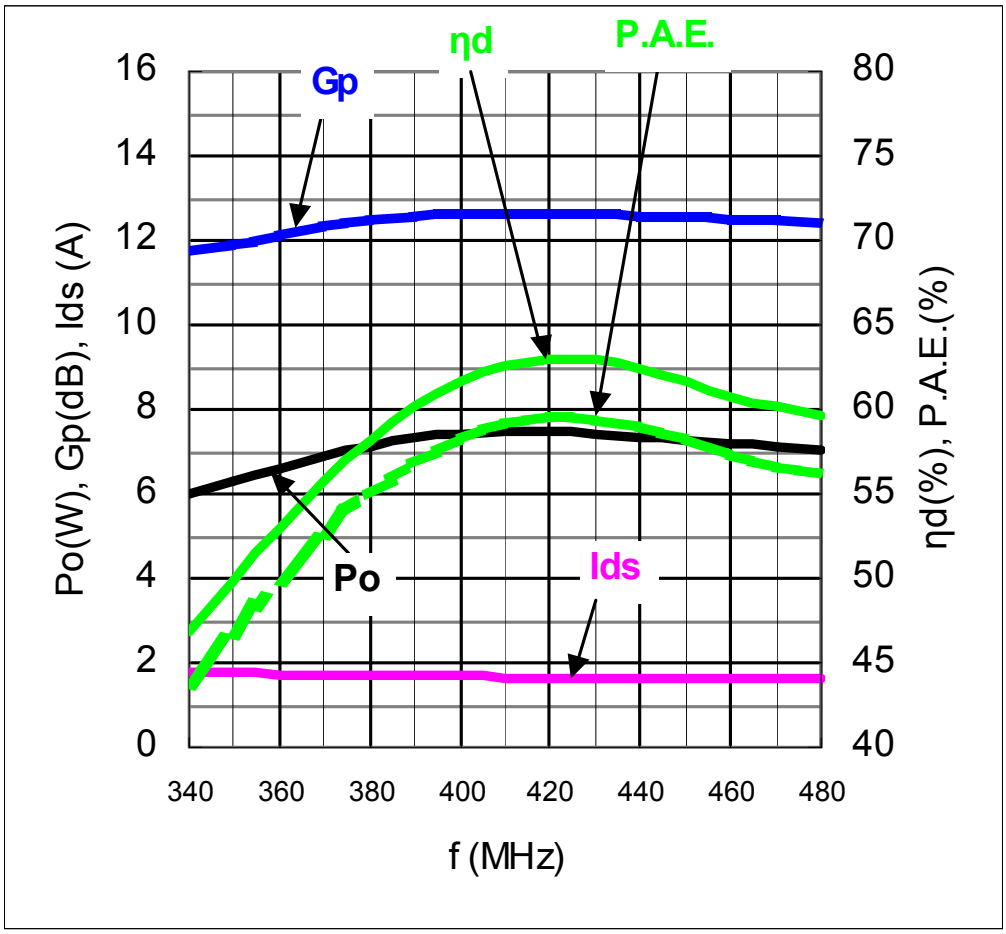
@ Vdd=7.2V, Idq=250mA, **Po=6.3W** (38dBm ; **ANT 5W + 1dB Condition**)



Vds (V)	f (MHz)	Pi (W)	Pi (dBm)	Gp (dB)	Ids (A)	ηd (%)	P.A.E. (%)
7.2	340	0.487	26.9	11.1	1.85	47.4	43.7
	350	0.437	26.4	11.6	1.77	49.5	46.0
	360	0.359	25.5	12.5	1.70	51.5	48.6
	370	0.297	24.7	13.3	1.64	53.4	50.9
	380	0.249	24.0	14.0	1.59	55.2	53.0
	390	0.210	23.2	14.8	1.54	56.8	54.9
	400	0.179	22.5	15.5	1.51	58.1	56.5
	410	0.154	21.9	16.1	1.48	59.2	57.7
	420	0.139	21.4	16.6	1.46	59.9	58.5
	430	0.131	21.2	16.8	1.45	60.3	59.0
	435	0.133	21.2	16.8	1.46	60.2	58.9
	440	0.134	21.3	16.7	1.46	60.0	58.8
	450	0.138	21.4	16.6	1.47	59.8	58.5
	460	0.148	21.7	16.3	1.48	59.2	57.9
	470	0.164	22.1	15.9	1.49	58.8	57.2
	480	0.182	22.6	15.4	1.50	58.5	56.8

RD07MUS2B single-stage amplifier Frequency characteristics 2

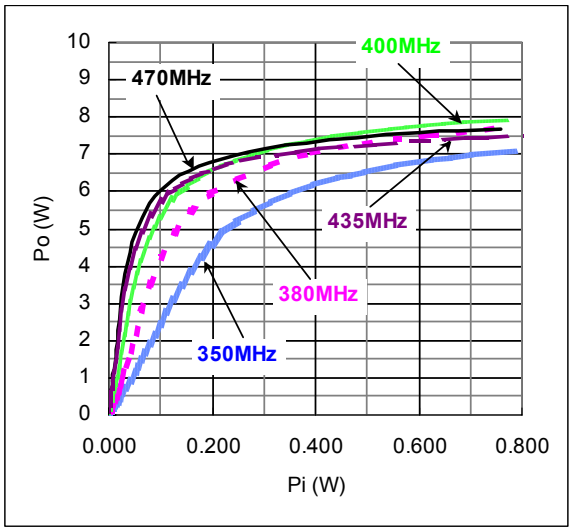
@ Vdd=7.2V, Idq=250mA, **Pi=0.4W** (26dBm)

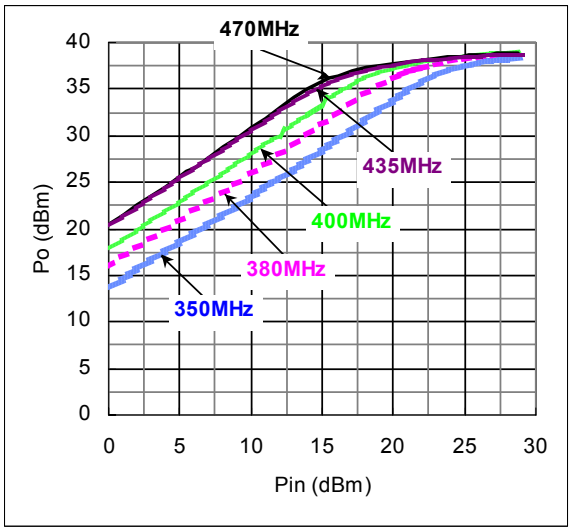


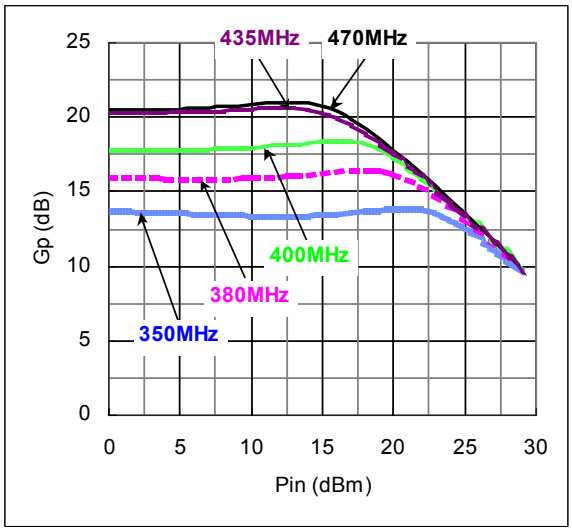
Vds (V)	f (MHz)	Po (W)	Po (dBm)	Gp (dB)	Ids (A)	ηd (%)	P.A.E. (%)
7.2	340	6.03	37.8	11.8	1.79	46.8	43.7
	350	6.28	38.0	11.9	1.75	49.9	46.7
	360	6.61	38.2	12.2	1.73	53.0	49.8
	370	6.90	38.4	12.4	1.72	55.8	52.6
	380	7.14	38.5	12.5	1.70	58.2	55.0
	390	7.31	38.6	12.6	1.69	60.2	56.9
	400	7.42	38.7	12.7	1.67	61.6	58.3
	410	7.46	38.7	12.7	1.66	62.6	59.2
	420	7.45	38.7	12.7	1.64	63.0	59.6
	430	7.39	38.7	12.6	1.63	62.9	59.5
	440	7.31	38.6	12.6	1.63	62.5	59.0
	450	7.22	38.6	12.6	1.63	61.7	58.3
	460	7.15	38.5	12.5	1.63	60.8	57.4
	470	7.11	38.5	12.5	1.64	60.1	56.7
	480	7.07	38.5	12.5	1.65	59.7	56.3

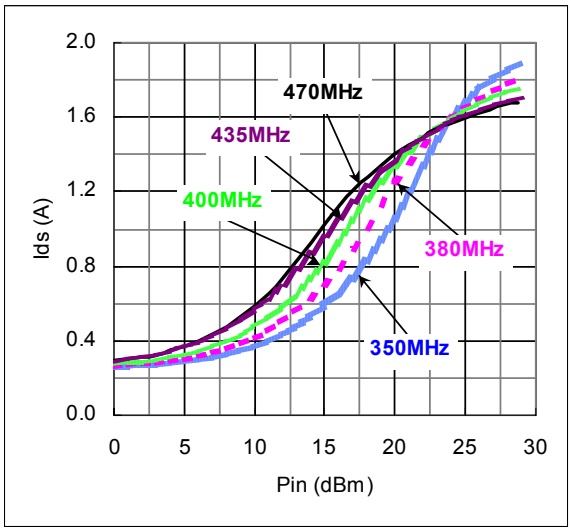
RD07MUS2B single-stage amplifier Pout vs. Pin characteristics

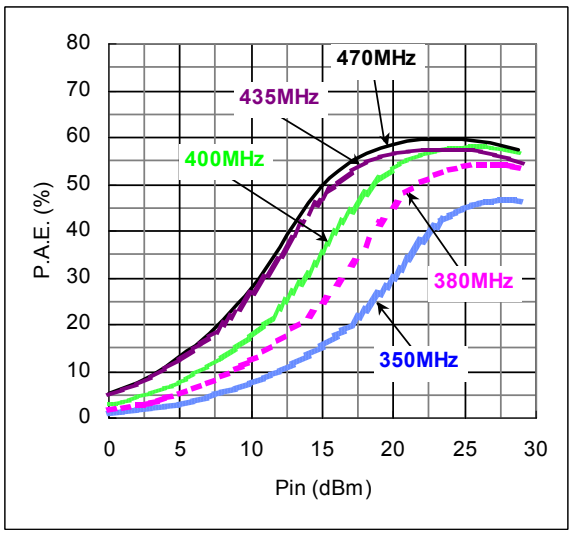
@ Vdd=7.2V, Idq=250mA, **f=350MHz, 380MHz, 400MHz, 435MHz, 470MHz**

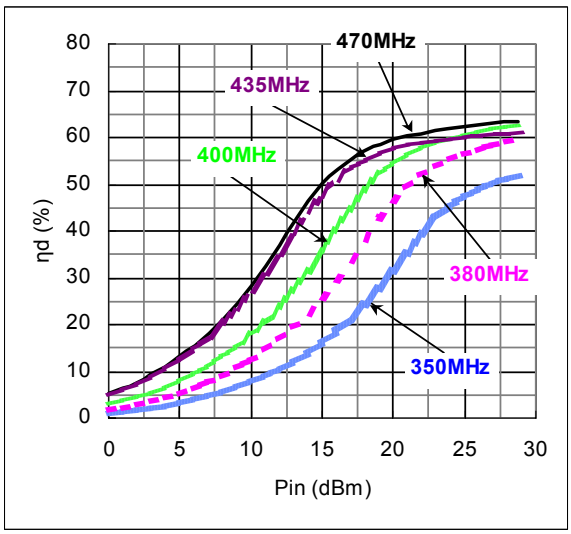












RD07MUS2B single-stage amplifier Pout vs. Pin characteristics data

@ f=350MHz, Idq=250mA

Vds (V)	Pi (W)	Pi (dBm)	Po (W)	Po (dBm)	Gp (dB)	Ids (A)	ηd (%)	P.A.E. (%)
7.46	0.001	0.0	0.024	13.7	13.7	0.27	1.2	1.1
7.46	0.001	1.0	0.029	14.7	13.7	0.27	1.5	1.4
7.45	0.002	2.0	0.037	15.7	13.7	0.27	1.8	1.7
7.45	0.002	3.0	0.046	16.6	13.6	0.28	2.2	2.1
7.45	0.003	4.0	0.058	17.6	13.6	0.28	2.7	2.6
7.45	0.003	5.0	0.072	18.6	13.6	0.29	3.3	3.2
7.45	0.004	6.0	0.090	19.6	13.5	0.30	4.0	3.8
7.45	0.005	7.0	0.112	20.5	13.5	0.31	4.8	4.6
7.45	0.006	8.0	0.141	21.5	13.5	0.33	5.7	5.5
7.44	0.008	9.0	0.175	22.4	13.5	0.35	6.8	6.5
7.44	0.010	10.0	0.219	23.4	13.4	0.37	7.9	7.6
7.43	0.012	11.0	0.275	24.4	13.4	0.40	9.2	8.8
7.43	0.016	12.0	0.345	25.4	13.4	0.44	10.7	10.2
7.42	0.020	13.0	0.434	26.4	13.4	0.48	12.2	11.7
7.41	0.025	14.0	0.550	27.4	13.4	0.53	14.1	13.4
7.40	0.031	15.0	0.700	28.5	13.5	0.59	16.1	15.4
7.39	0.040	16.0	0.892	29.5	13.5	0.66	18.4	17.6
7.38	0.050	17.0	1.140	30.6	13.6	0.73	21.1	20.1
7.36	0.063	18.0	1.467	31.7	13.7	0.83	24.1	23.0
7.34	0.079	19.0	1.890	32.8	13.8	0.94	27.5	26.4
7.32	0.099	20.0	2.418	33.8	13.9	1.06	31.3	30.0
7.30	0.125	21.0	3.069	34.9	13.9	1.19	35.3	33.8
7.28	0.157	22.0	3.829	35.8	13.9	1.34	39.3	37.7
7.25	0.198	23.0	4.572	36.6	13.6	1.47	42.8	40.9
7.23	0.249	24.0	5.221	37.2	13.2	1.59	45.5	43.3
7.22	0.314	25.0	5.752	37.6	12.6	1.68	47.5	44.9
7.21	0.396	26.0	6.188	37.9	11.9	1.75	49.1	45.9
7.20	0.497	27.0	6.546	38.2	11.2	1.81	50.3	46.5
7.19	0.627	28.0	6.857	38.4	10.4	1.86	51.4	46.7
7.18	0.791	29.0	7.119	38.5	9.5	1.90	52.2	46.4

@ **f=380MHz**, Idq=250mA

Vds (V)	Pi (W)	Pi (dBm)	Po (W)	Po (dBm)	Gp (dB)	Ids (A)	ηd (%)	P.A.E. (%)
7.44	0.001	0.0	0.040	16.0	16.0	0.27	2.0	1.9
7.44	0.001	1.0	0.050	17.0	16.0	0.28	2.4	2.4
7.44	0.002	2.0	0.063	18.0	16.0	0.28	3.0	2.9
7.44	0.002	3.0	0.078	18.9	15.9	0.29	3.7	3.6
7.44	0.003	4.0	0.099	19.9	15.9	0.30	4.5	4.4
7.43	0.003	5.0	0.124	20.9	15.9	0.31	5.4	5.3
7.43	0.004	6.0	0.155	21.9	15.9	0.32	6.5	6.4
7.43	0.005	7.0	0.195	22.9	15.9	0.34	7.8	7.6
7.43	0.006	8.0	0.246	23.9	15.9	0.36	9.2	9.0
7.42	0.008	9.0	0.309	24.9	15.9	0.39	10.8	10.5
7.42	0.010	10.0	0.391	25.9	15.9	0.42	12.6	12.3
7.41	0.013	11.0	0.496	27.0	16.0	0.46	14.7	14.3
7.40	0.016	12.0	0.629	28.0	16.0	0.50	16.9	16.5
7.39	0.020	13.0	0.805	29.1	16.1	0.56	19.5	19.1
7.38	0.025	14.0	1.028	30.1	16.1	0.62	22.4	21.9
7.37	0.031	15.0	1.322	31.2	16.2	0.70	25.7	25.1
7.35	0.040	16.0	1.698	32.3	16.3	0.79	29.4	28.7
7.34	0.050	17.0	2.188	33.4	16.4	0.89	33.6	32.9
7.32	0.063	18.0	2.784	34.4	16.5	1.00	38.0	37.1
7.30	0.079	19.0	3.497	35.4	16.4	1.13	42.5	41.5
7.28	0.100	20.0	4.238	36.3	16.3	1.25	46.5	45.4
7.26	0.125	21.0	4.887	36.9	15.9	1.36	49.6	48.3
7.24	0.158	22.0	5.462	37.4	15.4	1.45	52.0	50.5
7.23	0.199	23.0	5.950	37.7	14.8	1.53	53.9	52.1
7.22	0.249	24.0	6.360	38.0	14.1	1.59	55.3	53.2
7.21	0.313	25.0	6.725	38.3	13.3	1.65	56.5	53.9
7.20	0.394	26.0	7.043	38.5	12.5	1.70	57.5	54.3
7.19	0.494	26.9	7.315	38.6	11.7	1.74	58.3	54.4
7.18	0.623	27.9	7.558	38.8	10.8	1.78	59.1	54.2
7.18	0.786	29.0	7.771	38.9	9.9	1.81	59.7	53.7

@ **f=400MHz**, Idq=250mA

Vds (V)	Pi (W)	Pi (dBm)	Po (W)	Po (dBm)	Gp (dB)	Ids (A)	ηd (%)	P.A.E. (%)
7.44	0.001	0.0	0.061	17.8	17.8	0.28	3.0	2.9
7.44	0.001	1.0	0.076	18.8	17.8	0.28	3.6	3.6
7.44	0.002	2.0	0.095	19.8	17.8	0.29	4.4	4.4
7.44	0.002	3.0	0.120	20.8	17.8	0.30	5.4	5.3
7.43	0.003	4.0	0.151	21.8	17.8	0.31	6.6	6.4
7.43	0.003	5.0	0.190	22.8	17.8	0.33	7.9	7.7
7.43	0.004	6.0	0.240	23.8	17.8	0.34	9.4	9.2
7.42	0.005	7.0	0.303	24.8	17.8	0.37	11.1	10.9
7.42	0.006	8.0	0.382	25.8	17.8	0.39	13.1	12.9
7.41	0.008	9.0	0.486	26.9	17.9	0.43	15.3	15.0
7.41	0.010	10.0	0.615	27.9	17.9	0.47	17.7	17.4
7.40	0.012	11.0	0.788	29.0	18.0	0.52	20.5	20.2
7.39	0.016	12.0	1.011	30.0	18.1	0.58	23.6	23.3
7.38	0.020	13.0	1.295	31.1	18.2	0.65	27.1	26.7
7.36	0.025	14.0	1.668	32.2	18.3	0.73	31.2	30.7
7.35	0.031	14.9	2.135	33.3	18.3	0.82	35.5	35.0
7.33	0.039	15.9	2.711	34.3	18.4	0.92	40.1	39.5
7.31	0.049	16.9	3.396	35.3	18.4	1.04	44.7	44.0
7.29	0.062	17.9	4.107	36.1	18.2	1.16	48.8	48.0
7.28	0.078	18.9	4.741	36.8	17.8	1.26	51.9	51.1
7.26	0.098	19.9	5.287	37.2	17.3	1.34	54.3	53.3
7.25	0.123	20.9	5.763	37.6	16.7	1.42	56.2	55.0
7.24	0.155	21.9	6.167	37.9	16.0	1.48	57.6	56.2
7.23	0.195	22.9	6.526	38.1	15.2	1.54	58.8	57.0
7.22	0.246	23.9	6.842	38.4	14.4	1.59	59.7	57.6
7.21	0.308	24.9	7.115	38.5	13.6	1.63	60.5	57.9
7.21	0.388	25.9	7.359	38.7	12.8	1.67	61.2	58.0
7.20	0.489	26.9	7.573	38.8	11.9	1.70	61.8	57.8
7.19	0.613	27.9	7.756	38.9	11.0	1.73	62.3	57.4
7.19	0.774	28.9	7.922	39.0	10.1	1.76	62.7	56.6

@ **f=435MHz**, Idq=250mA

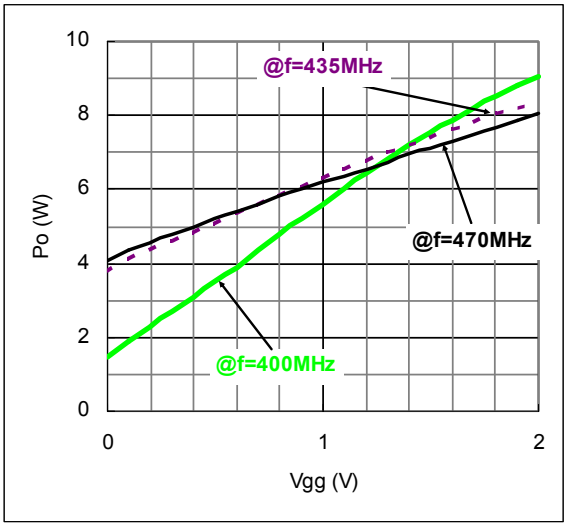
Vds (V)	Pi (W)	Pi (dBm)	Po (W)	Po (dBm)	Gp (dB)	Ids (A)	ηd (%)	P.A.E. (%)
7.42	0.001	0.0	0.112	20.5	20.5	0.29	5.2	5.1
7.42	0.001	1.0	0.141	21.5	20.5	0.30	6.3	6.3
7.42	0.002	2.0	0.177	22.5	20.5	0.31	7.7	7.6
7.42	0.002	3.0	0.225	23.5	20.5	0.33	9.3	9.2
7.41	0.003	4.0	0.284	24.5	20.5	0.35	11.1	11.0
7.41	0.003	5.0	0.360	25.6	20.5	0.37	13.1	13.0
7.40	0.004	6.0	0.459	26.6	20.6	0.40	15.5	15.4
7.40	0.005	7.0	0.582	27.7	20.6	0.43	18.2	18.0
7.39	0.006	8.0	0.745	28.7	20.7	0.48	21.2	21.0
7.38	0.008	9.0	0.956	29.8	20.8	0.53	24.6	24.4
7.37	0.010	10.0	1.221	30.9	20.9	0.59	28.3	28.0
7.36	0.013	11.0	1.563	31.9	20.9	0.66	32.4	32.1
7.35	0.016	12.0	2.005	33.0	21.0	0.74	37.1	36.8
7.33	0.020	13.0	2.549	34.1	21.0	0.83	41.9	41.5
7.32	0.025	14.1	3.159	35.0	20.9	0.93	46.4	46.0
7.30	0.032	15.1	3.779	35.8	20.7	1.03	50.2	49.8
7.28	0.041	16.1	4.381	36.4	20.3	1.13	53.3	52.8
7.27	0.051	17.1	4.883	36.9	19.8	1.21	55.6	55.0
7.26	0.064	18.0	5.314	37.3	19.2	1.28	57.3	56.6
7.25	0.080	19.0	5.701	37.6	18.5	1.34	58.6	57.8
7.24	0.100	20.0	6.025	37.8	17.8	1.40	59.5	58.5
7.23	0.124	20.9	6.305	38.0	17.1	1.45	60.3	59.1
7.22	0.155	21.9	6.561	38.2	16.3	1.49	60.9	59.5
7.21	0.194	22.9	6.786	38.3	15.4	1.53	61.4	59.6
7.21	0.243	23.8	6.981	38.4	14.6	1.57	61.8	59.7
7.20	0.304	24.8	7.155	38.5	13.7	1.60	62.2	59.6
7.20	0.382	25.8	7.308	38.6	12.8	1.62	62.6	59.3
7.20	0.478	26.8	7.442	38.7	11.9	1.64	62.9	58.9
7.19	0.602	27.8	7.564	38.8	11.0	1.66	63.2	58.2
7.19	0.759	28.8	7.674	38.9	10.0	1.68	63.5	57.2

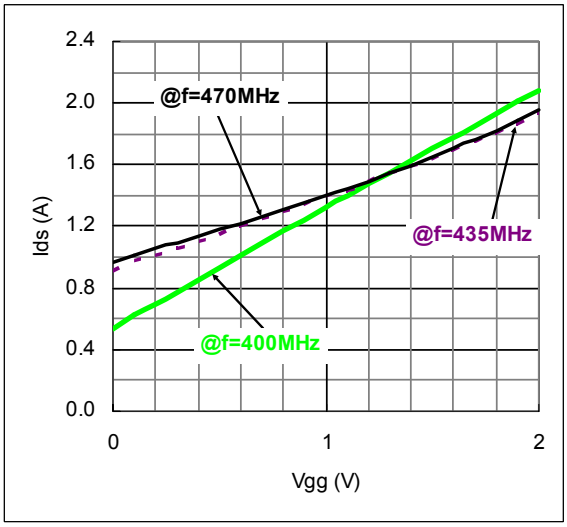
@ **f=470MHz,** Idq=250mA

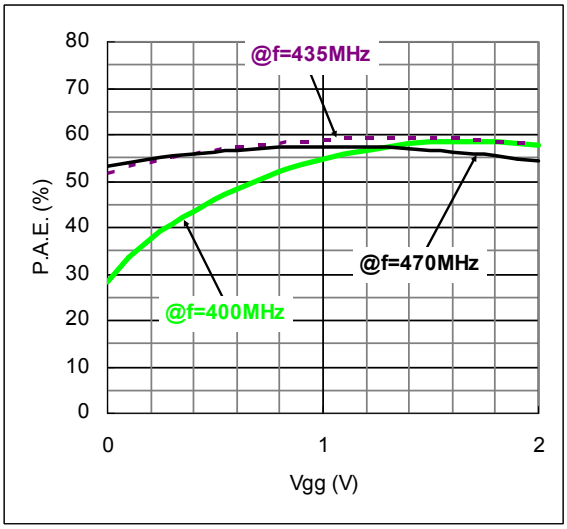
Vds (V)	Pi (W)	Pi (dBm)	Po (W)	Po (dBm)	Gp (dB)	Ids (A)	ηd (%)	P.A.E. (%)
7.42	0.001	0.0	0.106	20.2	20.3	0.29	4.9	4.9
7.42	0.001	1.0	0.134	21.3	20.3	0.30	6.0	6.0
7.42	0.002	2.0	0.169	22.3	20.3	0.31	7.3	7.2
7.42	0.002	3.0	0.214	23.3	20.3	0.33	8.9	8.8
7.41	0.003	4.0	0.270	24.3	20.3	0.34	10.6	10.5
7.41	0.003	5.0	0.341	25.3	20.3	0.37	12.6	12.5
7.41	0.004	6.0	0.432	26.4	20.3	0.39	14.9	14.7
7.40	0.005	7.0	0.549	27.4	20.4	0.43	17.5	17.3
7.39	0.006	8.0	0.696	28.4	20.4	0.46	20.3	20.1
7.39	0.008	9.0	0.887	29.5	20.5	0.51	23.5	23.3
7.38	0.010	10.0	1.125	30.5	20.5	0.57	27.0	26.8
7.37	0.013	11.0	1.433	31.6	20.6	0.63	30.9	30.7
7.35	0.016	12.0	1.813	32.6	20.6	0.70	35.2	34.9
7.34	0.020	13.0	2.282	33.6	20.6	0.78	39.7	39.4
7.33	0.025	14.0	2.815	34.5	20.5	0.87	44.0	43.6
7.31	0.032	15.0	3.363	35.3	20.2	0.97	47.7	47.2
7.29	0.040	16.1	3.933	35.9	19.9	1.06	50.9	50.3
7.28	0.051	17.1	4.471	36.5	19.4	1.15	53.4	52.8
7.26	0.064	18.1	4.947	36.9	18.9	1.23	55.3	54.6
7.25	0.081	19.1	5.376	37.3	18.2	1.31	56.6	55.8
7.24	0.102	20.1	5.747	37.6	17.5	1.38	57.6	56.6
7.23	0.129	21.1	6.073	37.8	16.7	1.44	58.4	57.1
7.22	0.162	22.1	6.350	38.0	15.9	1.49	58.9	57.4
7.21	0.204	23.1	6.593	38.2	15.1	1.54	59.4	57.5
7.21	0.257	24.1	6.802	38.3	14.2	1.58	59.7	57.4
7.20	0.323	25.1	6.978	38.4	13.3	1.61	60.0	57.3
7.19	0.409	26.1	7.134	38.5	12.4	1.64	60.3	56.9
7.19	0.515	27.1	7.268	38.6	11.5	1.67	60.6	56.3
7.19	0.648	28.1	7.387	38.7	10.6	1.69	60.9	55.5
7.18	0.821	29.1	7.498	38.7	9.6	1.71	61.1	54.4

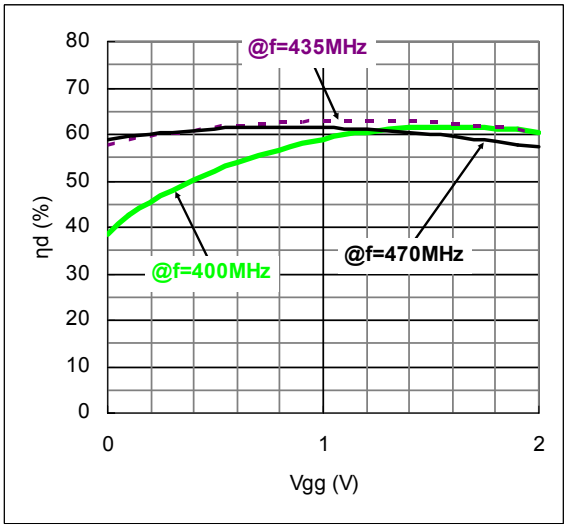
RD07MUS2B single-stage amplifier Pout vs. Vgg characteristics

@ Vdd=7.2V, Pi=0.4W (=26dBm), **f=400MHz, 435MHz, 470MHz**









RD07MUS2B single-stage amplifier Pout vs. Vgg characteristics data

@ **f=400MHz**, Pi=0.4W (=26dBm)

Vgg (V)	Idq (A)	Po (W)	Po (dBm)	Ids (A)	ηd (%)	P.A.E. (%)
0.0	0	1.48	31.7	0.53	38.6	28.1
0.1	0	1.92	32.8	0.63	42.5	33.6
0.2	0	2.27	33.6	0.70	45.2	37.3
0.3	0	2.68	34.3	0.78	47.9	40.7
0.4	0	3.07	34.9	0.85	50.0	43.5
0.5	0	3.49	35.4	0.93	52.1	46.1
0.6	0	3.90	35.9	1.01	53.9	48.3
0.7	0	4.35	36.4	1.09	55.4	50.4
0.8	0	4.77	36.8	1.17	56.7	52.0
0.9	0	5.19	37.2	1.25	57.9	53.5
1.0	0	5.61	37.5	1.32	59.0	54.8
1.1	0	6.03	37.8	1.40	59.9	55.9
1.2	0.01	6.44	38.1	1.48	60.5	56.8
1.3	0.05	6.81	38.3	1.55	61.0	57.5
1.4	0.15	7.20	38.6	1.63	61.4	58.0
1.5	0.35	7.55	38.8	1.70	61.6	58.3
1.6	0.67	7.89	39.0	1.78	61.7	58.5
1.7	1.07	8.22	39.1	1.86	61.6	58.6
1.8	1.52	8.53	39.3	1.93	61.3	58.4
1.9	1.95	8.82	39.5	2.01	60.9	58.2
2.0	2.37	9.05	39.6	2.08	60.4	57.8

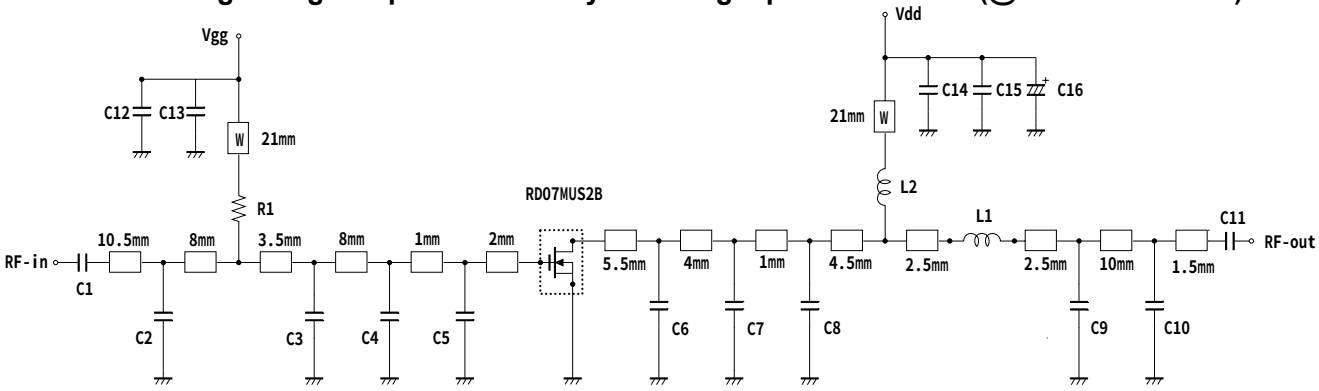
@ **f=435MHz**, Pi=0.4W (=26dBm)

Vgg (V)	Idq (A)	Po (W)	Po (dBm)	Ids (A)	ηd (%)	P.A.E. (%)
0.0	0	3.78	35.8	0.91	57.7	51.6
0.1	0	4.12	36.2	0.97	58.8	53.1
0.2	0	4.35	36.4	1.02	59.5	54.1
0.3	0	4.62	36.6	1.06	60.3	55.0
0.4	0	4.85	36.9	1.11	60.9	55.9
0.5	0	5.09	37.1	1.15	61.4	56.6
0.6	0	5.36	37.3	1.20	61.8	57.2
0.7	0	5.58	37.5	1.25	62.2	57.8
0.8	0	5.83	37.7	1.30	62.5	58.2
0.9	0	6.07	37.8	1.34	62.7	58.6
1.0	0	6.31	38.0	1.39	62.9	58.9
1.1	0	6.54	38.2	1.44	63.1	59.2
1.2	0.01	6.76	38.3	1.49	63.1	59.3
1.3	0.05	7.02	38.5	1.54	63.0	59.4
1.4	0.15	7.20	38.6	1.59	62.9	59.4
1.5	0.35	7.41	38.7	1.64	62.7	59.3
1.6	0.67	7.63	38.8	1.70	62.3	59.1
1.7	1.07	7.81	38.9	1.75	62.0	58.8
1.8	1.52	8.04	39.1	1.81	61.6	58.5
1.9	1.95	8.21	39.1	1.87	61.1	58.1
2.0	2.37	8.40	39.2	1.93	60.5	57.6

@ **f=470MHz**, Pi=0.4W (=26dBm)

Vgg (V)	Idq (A)	Po (W)	Po (dBm)	Ids (A)	ηd (%)	P.A.E. (%)
0.0	0	4.08	36.1	0.96	58.8	53.1
0.1	0	4.35	36.4	1.01	59.6	54.1
0.2	0	4.55	36.6	1.05	60.1	54.8
0.3	0	4.78	36.8	1.10	60.5	55.4
0.4	0	4.97	37.0	1.14	60.9	56.0
0.5	0	5.19	37.2	1.18	61.1	56.4
0.6	0	5.39	37.3	1.22	61.3	56.8
0.7	0	5.59	37.5	1.26	61.4	57.0
0.8	0	5.82	37.6	1.31	61.5	57.3
0.9	0	6.01	37.8	1.36	61.5	57.4
1.0	0	6.21	37.9	1.40	61.5	57.5
1.1	0	6.35	38.0	1.44	61.2	57.4
1.2	0.01	6.56	38.2	1.49	61.0	57.3
1.3	0.05	6.75	38.3	1.54	60.8	57.2
1.4	0.15	6.95	38.4	1.60	60.5	57.0
1.5	0.35	7.13	38.5	1.65	60.1	56.7
1.6	0.67	7.31	38.6	1.71	59.5	56.2
1.7	1.07	7.49	38.7	1.76	59.0	55.8
1.8	1.52	7.68	38.9	1.83	58.4	55.4
1.9	1.95	7.85	38.9	1.89	57.8	54.9
2.0	2.37	8.04	39.1	1.95	57.2	54.3

RD07MUS2B single-stage amplifier efficiency matching equivalent circuit (@f=400 to 470MHz)



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 Type		Value	Type name	Vender
Capacitor	C1	100pF	GRM2162C1H101GD01E	Murata Manufacturing Co., Ltd.
	C2	8pF	GRM2162C1H8R0DD01E	Murata Manufacturing Co., Ltd.
	C3	29pF	GRM2162C1H290GD01E	Murata Manufacturing Co., Ltd.
	C4	12pF	GRM2162C1H120GD01E	Murata Manufacturing Co., Ltd.
	C5	54pF	GRM2162C1H540GD01E	Murata Manufacturing Co., Ltd.
	C6	18pF	GRM2162C1H180GD01E	Murata Manufacturing Co., Ltd.
	C7	12pF	GRM2162C1H120GD01E	Murata Manufacturing Co., Ltd.
	C8	18pF	GRM2162C1H180GD01E	Murata Manufacturing Co., Ltd.
	C9	8pF	GRM2162C1H8R0DD01E	Murata Manufacturing Co., Ltd.
	C10	4pF	GRM2162C1H4R0DD01E	Murata Manufacturing Co., Ltd.
	C11	100pF	GRM2162C1H101GD01E	Murata Manufacturing Co., Ltd.
	C12	22000pF	GRM216R11H223KA01E	Murata Manufacturing Co., Ltd.
	C13	1000pF	GRM216R11H102KA01E	Murata Manufacturing Co., Ltd.
	C14	1000pF	GRM216R11H102KA01E	Murata Manufacturing Co., Ltd.
	C15	22000pF	GRM216R11H223KA01E	Murata Manufacturing Co., Ltd.
	C16	22μF	A0603	NICHICON CORPORATION
Resistance	R1	4.7K OHM	CR1/10-472JB	Hokuriku Electric Industry Co.,Ltd.
Inductance	L1	6.6nH Enameled wire 2Turns, Diameter:0.23mm,φ1.66mm (the out side diameter)	2302S	Yoneda Processing Place Co.,Ltd.
	L2	31.0nH Enameled wire 6Turns, Diameter:0.23mm,φ1.66mm (the out side diameter)	2306C	Yoneda Processing Place Co.,Ltd.