

APPLICATION NOTE

Document NO. AN-UHF-135
Date : 17th Apr. 2012
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(Taking charge of Silicon RF by
MIYOSHI Electronics)

SUBJECT: RD04HMS2 single-stage amplifier with f=330-400MHz evaluation board.(Vdd=12.5V)

SUMMARY:

This application note shows the RF wide band characteristics data

Sample history :

RD04HMS2: Lot number "102XA-G"

Evaluate conditions :

RD04HMS2 @f=330 to 400MHz : Vdd=12.5V, Idq=75mA (V_{gg} adjust)

Results :

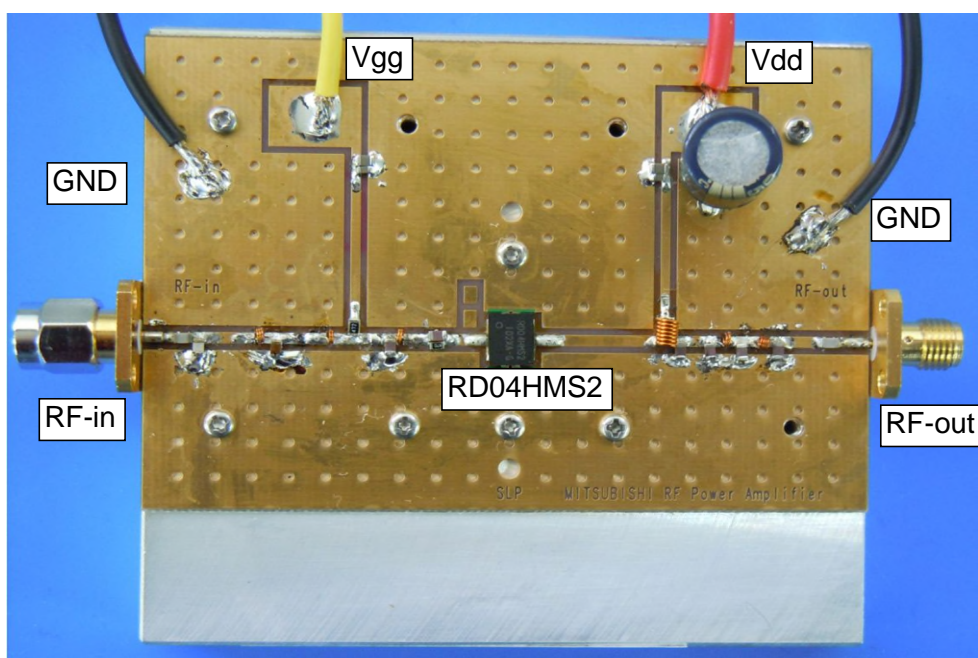
Page 2. shows the equivalent circuit.

Page 3-4. shows the typical RF characteristics (Frequency characteristics) data.

Page 5-9. shows the typical RF characteristics (P_{out} vs. P_{in} characteristics) data.

Page 10-13. shows the typical RF characteristics (P_{out} vs. V_{dd} characteristics) data.

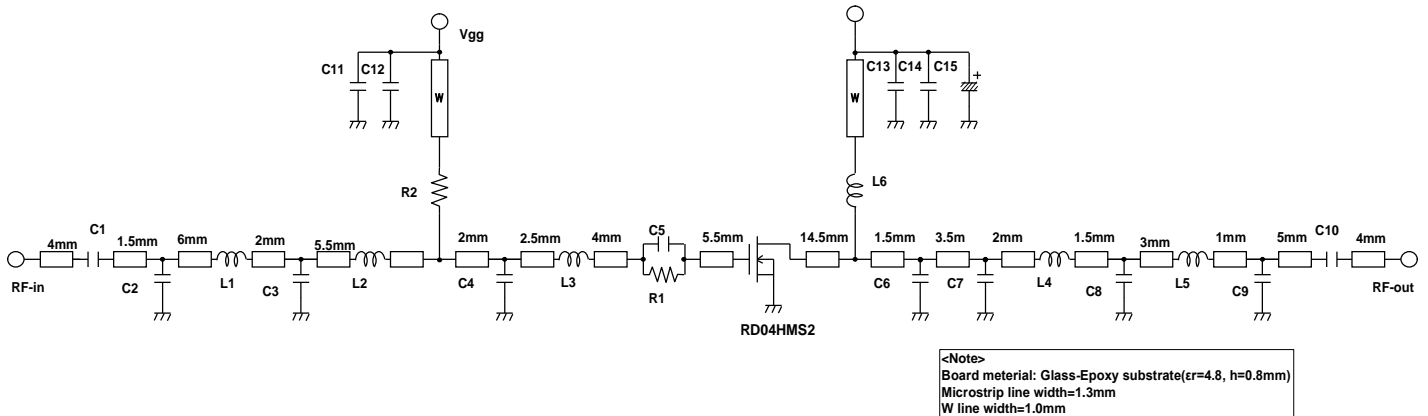
Page 14-16. shows the typical RF characteristics (P_{out} vs. V_{gg} characteristics) data.



RD04HMS2 single-stage amplifier with f=330-400MHz evaluation board.(Vdd=12.5V)

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RD04HMS2 single-stage amplifier equivalent circuit.(@f=330 to 400MHz,Vdd=12.5V)



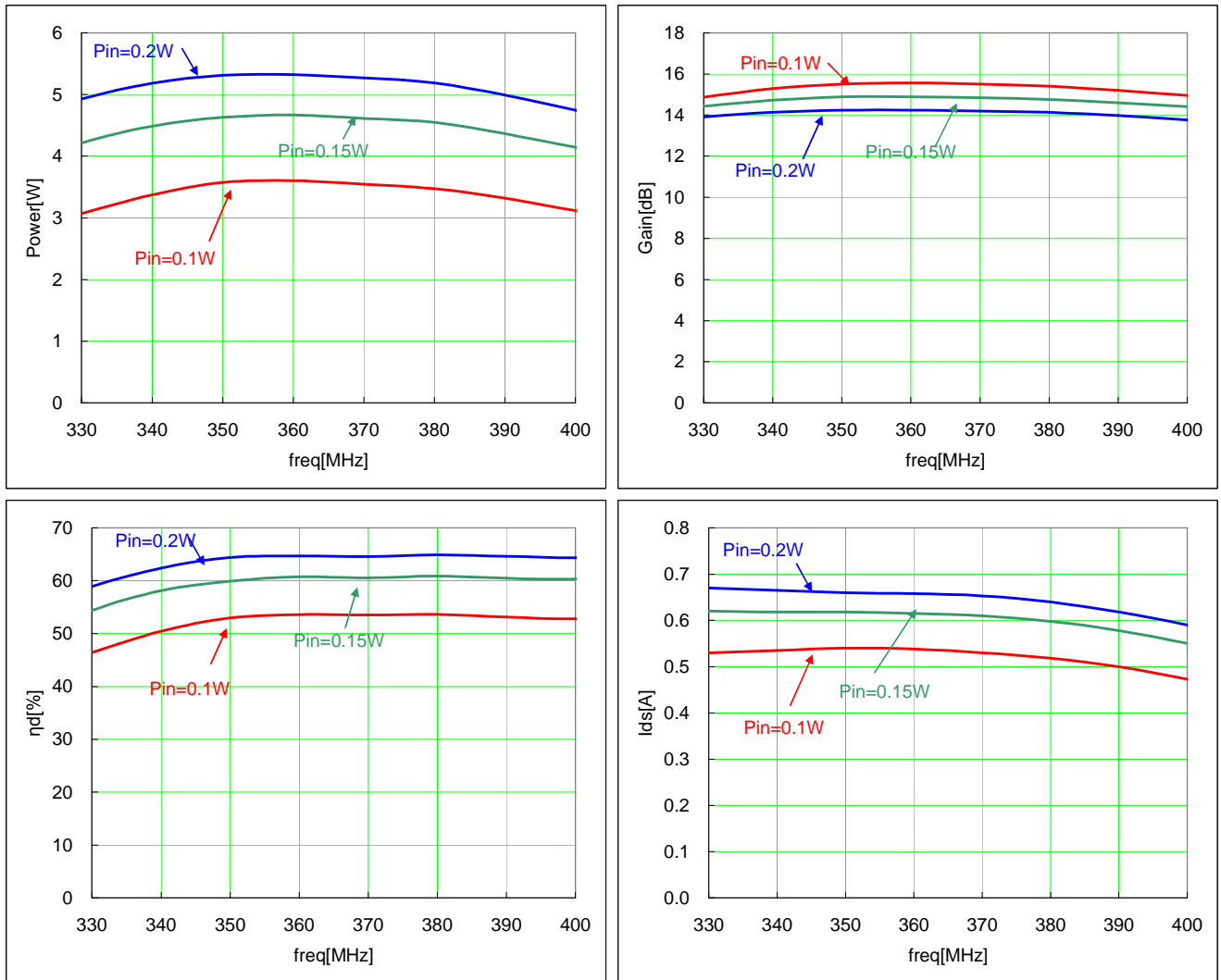
No.	Description	P/N	Qty	Manufacturer
Tr	MOSFET	RD04HMS2	1	Mitsubishi Electric Corporation
C 1	100 pF 2012 50V	GRM2162C1H101JA01D	1	MURATA MANUFACTURING CO.
C 2	6 pF 2012 50V	GRM2162C1H6R0JZ01D	1	MURATA MANUFACTURING CO.
C 3	24 pF 2012 50V	GRM2162C1H240JZ01D	1	MURATA MANUFACTURING CO.
C 4	36 pF 2012 50V	GRM2162C1H360JZ01D	1	MURATA MANUFACTURING CO.
C 5	24 pF 2012 50V	GRM2162C1H240JZ01D	1	MURATA MANUFACTURING CO.
C 6	27 pF 2012 50V	GRM2162C1H270JZ01D	1	MURATA MANUFACTURING CO.
C 7	27 pF 2012 50V	GRM2162C1H270JZ01D	1	MURATA MANUFACTURING CO.
C 8	33 pF 2012 50V	GRM2162C1H330JZ01D	1	MURATA MANUFACTURING CO.
C 9	11 pF 2012 50V	GRM2162C1H110JA01D	1	MURATA MANUFACTURING CO.
C 10	100 pF 2012 50V	GRM2162C1H101JA01D	1	MURATA MANUFACTURING CO.
C 11	1000 pF 1608 50V	GRM188R11H102KA01E	1	MURATA MANUFACTURING CO.
C 12	22000 pF 1608 50V	GRM188R11H223KA01E	1	MURATA MANUFACTURING CO.
C 13	1000 pF 1608 50V	GRM188R11H102KA01E	1	MURATA MANUFACTURING CO.
C 14	22000 pF 1608 50V	GRM188R11H223KA01E	1	MURATA MANUFACTURING CO.
C 15	220 uF 35V	EEUFC1V221	1	Panasonic Corporation
L 1	12 nH Diameter: Wire=0.23mm Inside=1.1mm T/N of coils=3		1	Homebuilt
L 2	8 nH Diameter: Wire=0.23mm Inside=1.1mm T/N of coils=2		1	Homebuilt
L 3	8 nH Diameter: Wire=0.23mm Inside=1.1mm T/N of coils=2		1	Homebuilt
L 4	8 nH Diameter: Wire=0.23mm Inside=1.1mm T/N of coils=2		1	Homebuilt
L 5	16 nH Diameter: Wire=0.23mm Inside=1.1mm T/N of coils=4		1	Homebuilt
L 6	37 nH Diameter: Wire=0.4mm Inside=1.6mm T/N of coils=7		1	Homebuilt
R 1	4.7k ohm 2012	RPC10T472J	1	TAIYOSHA ELECTRIC CO.
R 2	47 ohm 1608	RPC05N470J	1	TAIYOSHA ELECTRIC CO.
Pb	PCB	MS3A0166	1	Homebuilt

↓ OPTION

Rc	1	SMA Jack 4Hole	PAF-S00-000	1	Gigalanne
	2	SMA Male 4Hole	A4018	1	Mpdevice
Bc	1	Bias connector red color	TM-605R	2	MSK Corporation
Bc	2	Bias connector black color	TM-605B	2	MSK Corporation
Pe		Aluminum pedestal		1	Homebuilt
Pd		Graphitized sheet	EYGS182310	-	Panasonic Corporation
		Conducting wire		4	Homebuilt
		Screw M2		16	-

RD04HMS2 single-stage amplifier Frequency characteristics.

@ Vdd=12.5V, Idq=75mA(Vgg=2.55V), **Pin=0.2W**, **Pin=0.15W**, **Pin=0.1W**



RD04HMS2 single-stage amplifier Frequency characteristics Data.

@ **Pin=0.2W** (23dBm), Vdd=12.5V, Idq=75mA(Vgg=2.55V)

f [MHz]	Po [dBm]	Po [W]	Gp [dB]	Idd [A]	ηd [%]	P.A.E. [%]	2fo [dBc]	3fo [dBc]	R.L. [-dB]
330	36.93	4.9	13.9	0.67	58.9	56.5	-37.2	-54.8	-4.0
340	37.15	5.2	14.1	0.67	62.4	60.0	-40.2	-56.7	-4.6
350	37.25	5.3	14.2	0.66	64.4	62.0	-43.2	-54.7	-5.0
360	37.26	5.3	14.2	0.66	64.7	62.3	-46.0	-47.7	-5.1
370	37.22	5.3	14.2	0.65	64.6	62.1	-48.5	-53.2	-4.9
380	37.15	5.2	14.1	0.64	64.9	62.4	-50.2	-50.8	-4.5
390	36.98	5.0	14.0	0.62	64.6	62.0	-52.0	-54.5	-4.1
400	36.76	4.7	13.8	0.59	64.4	61.7	-53.0	-57.3	-3.7

RD04HMS2 single-stage amplifier Frequency characteristics Data.@ **Pin=0.15W** (21.8dBm),Vdd=12.5V,Idq=75mA(Vgg=2.55V)

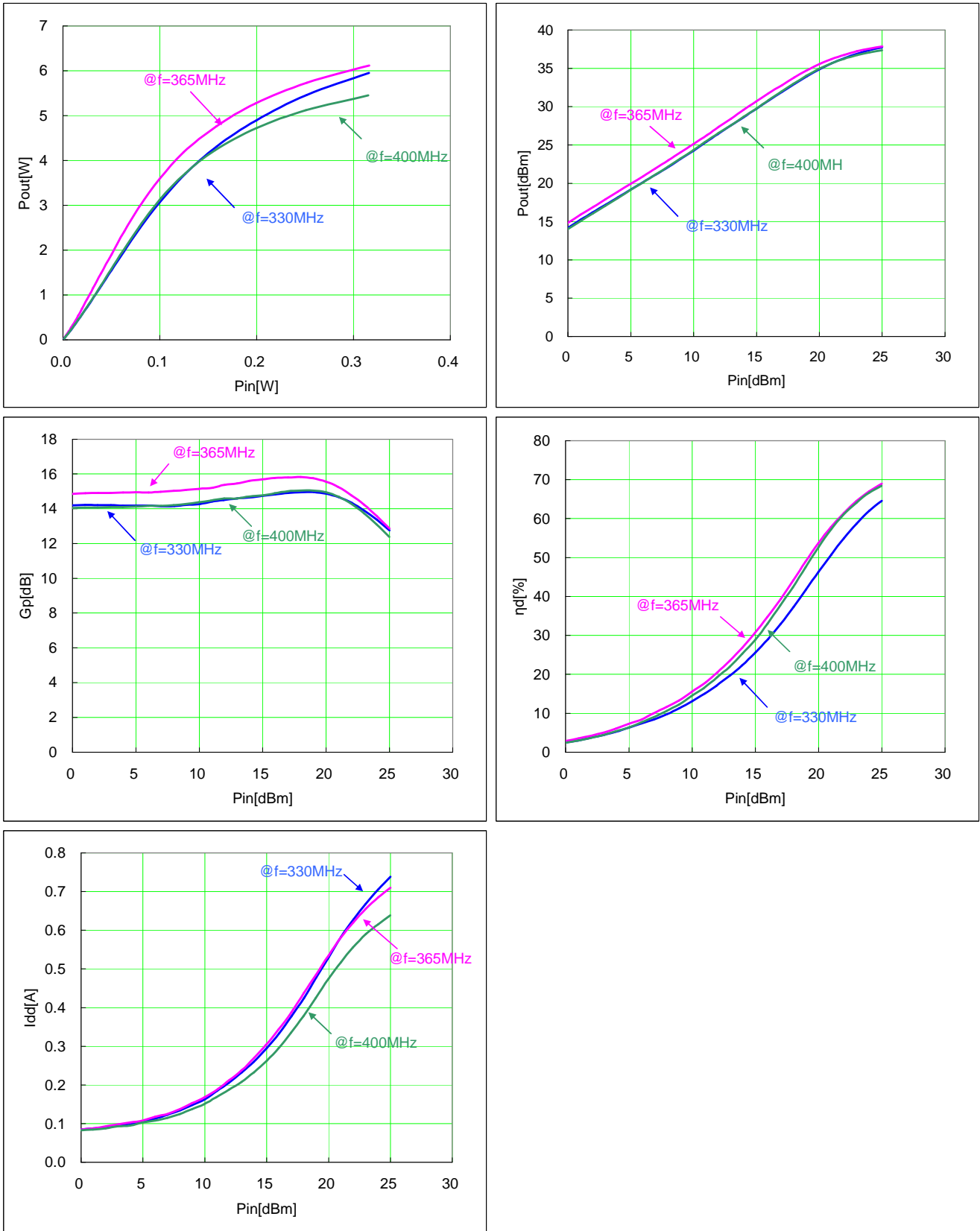
f [MHz]	Po [dBm]	Po [W]	Gp [dB]	Idd [A]	η_d [%]	P.A.E. [%]	2fo [dBc]	3fo [dBc]	R.L. [-dB]
330	36.25	4.2	14.4	0.62	54.4	52.4	-37.3	-53.3	-4.0
340	36.52	4.5	14.7	0.62	58.1	56.2	-38.3	-57.7	-4.5
350	36.66	4.6	14.9	0.62	59.9	58.0	-43.3	-55.7	-4.9
360	36.69	4.7	14.9	0.62	60.7	58.8	-46.0	-57.3	-5.1
370	36.64	4.6	14.9	0.61	60.5	58.5	-48.5	-61.0	-4.8
380	36.58	4.5	14.8	0.60	60.9	58.8	-50.3	-54.5	-4.5
390	36.40	4.4	14.6	0.58	60.5	58.4	-51.8	-56.3	-4.0
400	36.17	4.1	14.4	0.55	60.3	58.1	-52.7	-58.0	-3.7

@ **Pin=0.1W** (20dBm),Vdd=12.5V,Idq=75mA(Vgg=2.55V)

f [MHz]	Po [dBm]	Po [W]	Gp [dB]	Idd [A]	η_d [%]	P.A.E. [%]	2fo [dBc]	3fo [dBc]	R.L. [-dB]
330	34.88	3.1	14.9	0.53	46.4	44.9	-37.5	-57.0	-3.9
340	35.28	3.4	15.3	0.54	50.5	49.0	-40.3	-59.7	-4.5
350	35.53	3.6	15.5	0.54	53.0	51.5	-43.3	-54.0	-4.9
360	35.57	3.6	15.6	0.54	53.6	52.1	-45.8	-47.2	-5.0
370	35.50	3.5	15.5	0.53	53.5	52.0	-48.0	-61.2	-4.8
380	35.41	3.5	15.4	0.52	53.6	52.1	-50.2	-52.5	-4.4
390	35.21	3.3	15.2	0.50	53.1	51.5	-51.0	-54.8	-3.9
400	34.94	3.1	15.0	0.47	52.8	51.1	-49.3	-56.3	-3.6

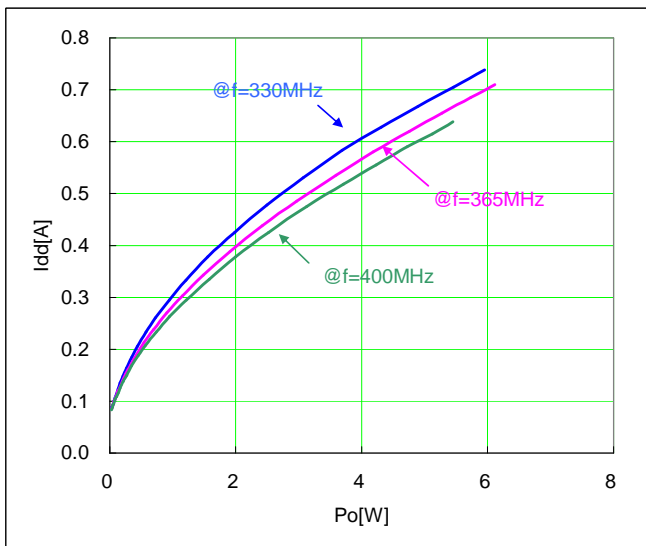
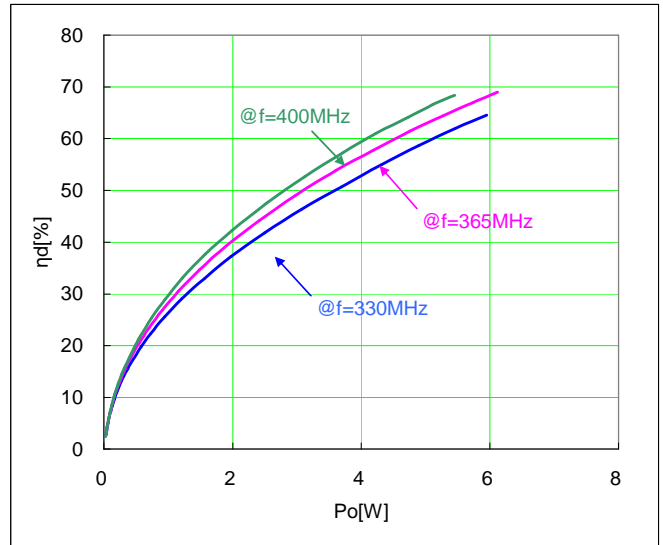
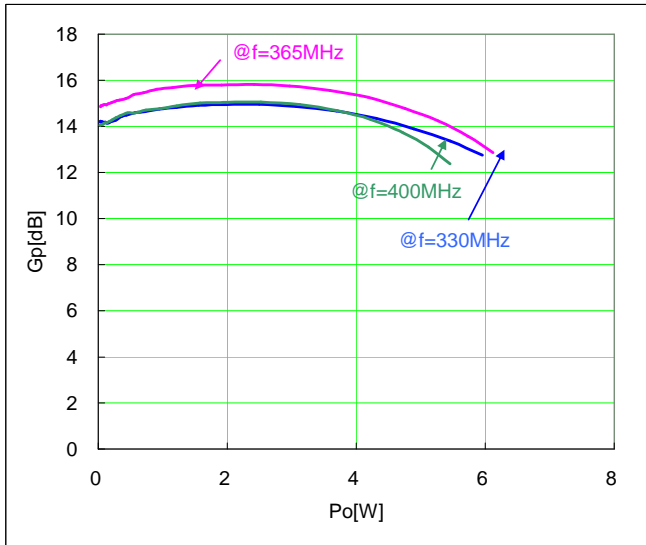
RD04HMS2 single-stage amplifier Pout vs. Pin characteristics.

@ Vdd=12.5V, Idq=75mA(Vgg=2.55V), f=330MHz, f=365MHz, f=400MHz



RD04HMS2 single-stage amplifier Pout vs. Pin characteristics.

@ Vdd=12.5V, Idq=75mA(Vgg=2.55V), f=330MHz, f=365MHz, f=400MHz



RD04HMS2 single-stage amplifier Pout vs. Pin characteristics data@ [f=330MHz](#), Vdd=12.5V, Idq=75mA(Vgg=2.55V)

Vdd [V]	Pin [dBm]	Pin [W]	Po [dBm]	Po [W]	Gp [dB]	Idd [A]	η_d [%]	P.A.E. [%]	R.L. [-dB]
12.5	-0.01	0.00	14.18	0.03	14.19	0.09	2.5	2.4	-3.8
12.5	1.00	0.00	15.22	0.03	14.22	0.09	3.0	2.9	-3.9
12.5	1.96	0.00	16.18	0.04	14.22	0.09	3.7	3.5	-3.8
12.5	3.01	0.00	17.21	0.05	14.20	0.10	4.4	4.3	-3.8
12.5	3.97	0.00	18.15	0.07	14.19	0.10	5.2	5.0	-3.8
12.5	5.00	0.00	19.18	0.08	14.18	0.11	6.3	6.1	-3.8
12.5	6.01	0.00	20.19	0.10	14.18	0.11	7.4	7.1	-3.8
12.5	6.97	0.00	21.12	0.13	14.15	0.12	8.4	8.1	-3.8
12.5	8.02	0.01	22.17	0.16	14.15	0.14	9.8	9.4	-3.8
12.5	8.97	0.01	23.19	0.21	14.22	0.15	11.3	10.8	-3.8
12.5	10.00	0.01	24.26	0.27	14.26	0.16	13.1	12.6	-3.8
12.5	11.00	0.01	25.41	0.35	14.41	0.19	15.0	14.5	-3.8
12.5	11.91	0.02	26.40	0.44	14.49	0.21	17.0	16.4	-3.7
12.5	13.00	0.02	27.59	0.57	14.60	0.23	19.7	19.1	-3.7
12.5	13.95	0.02	28.59	0.72	14.64	0.26	22.3	21.5	-3.8
12.5	15.00	0.03	29.75	0.94	14.75	0.30	25.6	24.7	-3.8
12.5	16.00	0.04	30.82	1.21	14.82	0.33	29.0	28.1	-3.8
12.5	17.01	0.05	31.92	1.56	14.91	0.38	33.0	31.9	-3.8
12.5	18.02	0.06	32.97	1.98	14.95	0.43	37.3	36.1	-3.8
12.5	19.01	0.08	33.97	2.49	14.96	0.48	41.8	40.4	-3.9
12.5	20.01	0.10	34.87	3.07	14.86	0.53	46.4	44.9	-3.9
12.5	21.01	0.13	35.67	3.69	14.66	0.58	50.7	49.0	-4.0
12.5	22.01	0.16	36.35	4.31	14.34	0.63	54.9	52.9	-4.0
12.5	23.00	0.20	36.90	4.89	13.89	0.67	58.6	56.2	-4.0
12.5	24.01	0.25	37.37	5.46	13.36	0.71	62.0	59.1	-4.0
12.5	25.00	0.32	37.75	5.95	12.75	0.74	64.5	61.1	-4.0

RD04HMS2 single-stage amplifier Pout vs. Pin characteristics data@ **f=365MHz**, Vdd=12.5V, Idq=75mA(Vgg=2.55V)

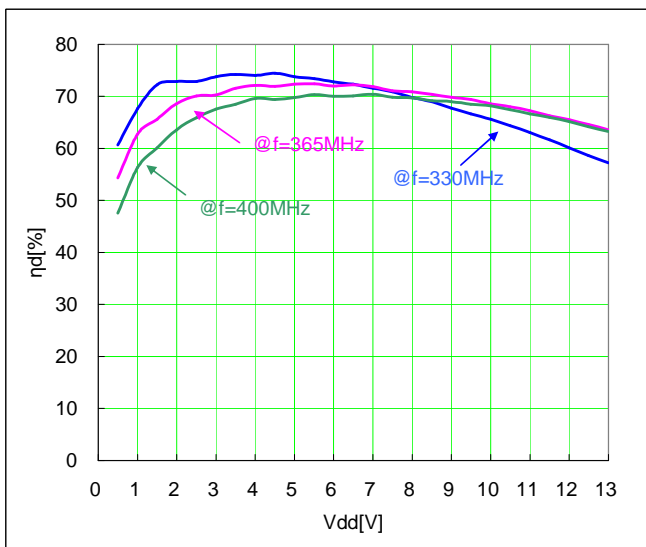
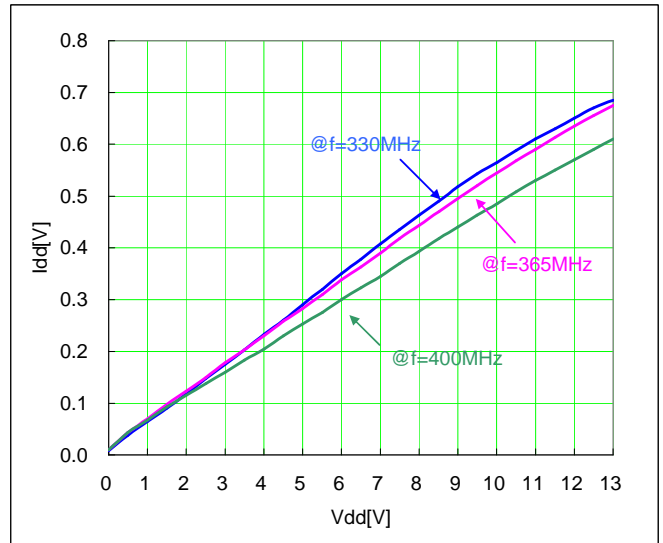
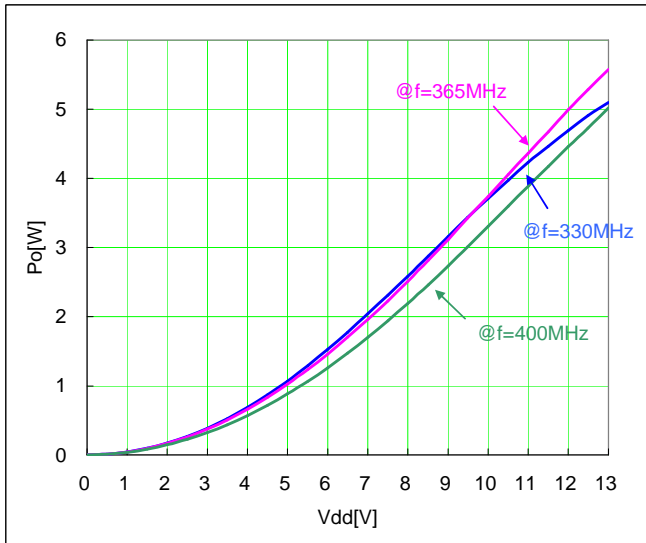
Vdd [V]	Pin [dBm]	Pin [W]	Po [dBm]	Po [W]	Gp [dB]	Idd [A]	η d [%]	P.A.E. [%]	R.L. [-dB]
12.5	-0.02	0.00	14.83	0.03	14.85	0.09	2.9	2.8	-4.7
12.5	1.01	0.00	15.91	0.04	14.90	0.09	3.5	3.4	-4.8
12.5	2.02	0.00	16.92	0.05	14.90	0.09	4.2	4.1	-4.8
12.5	2.99	0.00	17.90	0.06	14.91	0.10	5.0	4.9	-4.8
12.5	3.98	0.00	18.91	0.08	14.93	0.10	6.0	5.8	-4.8
12.5	4.99	0.00	19.93	0.10	14.94	0.11	7.3	7.1	-4.8
12.5	6.00	0.00	20.93	0.12	14.93	0.12	8.4	8.1	-4.8
12.5	6.96	0.00	21.94	0.16	14.98	0.13	10.0	9.7	-4.7
12.5	7.99	0.01	23.02	0.20	15.03	0.14	11.6	11.3	-4.7
12.5	8.97	0.01	24.05	0.25	15.09	0.15	13.3	12.9	-4.8
12.5	9.97	0.01	25.12	0.32	15.15	0.17	15.5	15.0	-4.7
12.5	11.08	0.01	26.29	0.43	15.21	0.19	17.9	17.4	-4.8
12.5	11.99	0.02	27.36	0.55	15.37	0.21	20.5	19.9	-4.7
12.5	12.98	0.02	28.43	0.70	15.46	0.24	23.4	22.8	-4.7
12.5	13.97	0.02	29.57	0.91	15.60	0.27	26.9	26.1	-4.7
12.5	14.93	0.03	30.62	1.15	15.69	0.30	30.5	29.6	-4.7
12.5	15.95	0.04	31.72	1.49	15.77	0.34	34.7	33.8	-4.7
12.5	17.01	0.05	32.80	1.91	15.80	0.39	39.3	38.3	-4.8
12.5	18.01	0.06	33.83	2.42	15.82	0.44	44.2	43.0	-4.8
12.5	18.98	0.08	34.72	2.97	15.75	0.49	48.9	47.6	-4.9
12.5	20.01	0.10	35.56	3.59	15.55	0.54	53.8	52.3	-4.9
12.5	20.96	0.12	36.22	4.18	15.25	0.58	57.7	56.0	-5.0
12.5	22.00	0.16	36.77	4.76	14.78	0.62	61.4	59.4	-5.0
12.5	22.99	0.20	37.22	5.27	14.23	0.66	64.4	62.0	-5.0
12.5	24.01	0.25	37.58	5.73	13.57	0.69	67.0	64.0	-5.0
12.5	25.00	0.32	37.87	6.12	12.86	0.71	69.0	65.4	-5.0

RD04HMS2 single-stage amplifier Pout vs. Pin characteristics data@ **f=400MHz**, Vdd=12.5V, Idq=75mA(Vgg=2.55V)

Vdd [V]	Pin [dBm]	Pin [W]	Po [dBm]	Po [W]	Gp [dB]	Idd [A]	η_d [%]	P.A.E. [%]	R.L. [-dB]
12.5	-0.02	0.00	14.03	0.03	14.05	0.08	2.4	2.3	-3.6
12.5	0.98	0.00	15.05	0.03	14.07	0.09	3.0	2.9	-3.6
12.5	1.99	0.00	16.06	0.04	14.07	0.09	3.7	3.5	-3.6
12.5	2.98	0.00	17.07	0.05	14.09	0.09	4.4	4.2	-3.5
12.5	3.97	0.00	18.07	0.06	14.09	0.10	5.4	5.2	-3.6
12.5	4.98	0.00	19.11	0.08	14.12	0.10	6.3	6.1	-3.5
12.5	6.01	0.00	20.17	0.10	14.16	0.11	7.7	7.4	-3.6
12.5	6.97	0.00	21.13	0.13	14.16	0.12	9.0	8.7	-3.6
12.5	7.98	0.01	22.19	0.17	14.21	0.13	10.6	10.2	-3.6
12.5	8.98	0.01	23.25	0.21	14.27	0.14	12.2	11.8	-3.5
12.5	9.93	0.01	24.31	0.27	14.38	0.15	14.4	13.9	-3.5
12.5	10.90	0.01	25.37	0.34	14.47	0.17	16.4	15.8	-3.5
12.5	11.97	0.02	26.56	0.45	14.58	0.19	19.3	18.6	-3.5
12.5	12.97	0.02	27.56	0.57	14.59	0.21	21.9	21.2	-3.5
12.5	13.96	0.02	28.67	0.74	14.71	0.23	25.3	24.4	-3.5
12.5	15.01	0.03	29.78	0.95	14.77	0.26	28.9	27.9	-3.5
12.5	15.96	0.04	30.85	1.22	14.89	0.30	33.0	32.0	-3.5
12.5	16.98	0.05	31.98	1.58	15.00	0.34	37.7	36.5	-3.5
12.5	17.96	0.06	33.01	2.00	15.05	0.38	42.3	41.0	-3.5
12.5	18.96	0.08	34.01	2.52	15.05	0.43	47.4	46.0	-3.6
12.5	20.00	0.10	34.95	3.13	14.95	0.48	52.7	51.0	-3.6
12.5	21.01	0.13	35.69	3.71	14.68	0.52	57.3	55.3	-3.6
12.5	21.96	0.16	36.26	4.23	14.30	0.56	61.0	58.7	-3.7
12.5	23.01	0.20	36.74	4.72	13.73	0.59	64.1	61.4	-3.7
12.5	24.00	0.25	37.09	5.12	13.10	0.62	66.6	63.4	-3.7
12.5	24.99	0.32	37.37	5.45	12.38	0.64	68.4	64.4	-3.8

RD04HMS2 single-stage amplifier Pout vs.Vdd characteristics.

@ Pin=0.2W(23dBm), Idq=75mA(Vgg=2.55V), f=330MHz, f=365MHz, f=400MHz



RD04HMS2 single-stage amplifier Pout vs. Vdd characteristics data@ **f=330MHz**, Pin=0.2W(23dBm), Idq=75mA(Vgg=2.55V)

Vdd [V]	Idq [A]	Po [dBm]	Po [W]	Gp [dB]	Idd [A]	η_d [%]	2fo [dBc]	3fo [dBc]	R.L. [-dB]
0.0	0.003	-2.1	0.0	-25.2	0.01	0.0	-27.5	-27.5	-3.9
0.5	0.038	10.6	0.0	-12.4	0.04	60.6	-39.5	-41.2	-4.1
1.0	0.043	16.5	0.0	-6.5	0.07	67.6	-40.2	-47.2	-4.1
1.5	0.045	19.9	0.1	-3.1	0.09	72.2	-41.8	-42.2	-4.2
2.0	0.048	22.4	0.2	-0.7	0.12	72.9	-41.3	-52.8	-4.2
2.5	0.048	24.3	0.3	1.4	0.15	72.9	-41.3	-53.3	-4.2
3.0	0.050	25.9	0.4	2.9	0.18	73.8	-41.0	-44.5	-4.2
3.5	0.050	27.2	0.5	4.2	0.20	74.2	-40.8	-57.3	-4.2
4.0	0.053	28.4	0.7	5.4	0.23	74.0	-41.0	-58.5	-4.2
4.5	0.053	29.4	0.9	6.4	0.26	74.4	-40.3	-59.3	-4.2
5.0	0.055	30.3	1.1	7.3	0.29	73.8	-40.5	-58.8	-4.2
5.5	0.055	31.1	1.3	8.2	0.32	73.4	-40.5	<-60	-4.2
6.0	0.058	31.8	1.5	8.8	0.35	72.8	-40.2	-58.7	-4.2
6.5	0.058	32.5	1.8	9.5	0.38	72.3	-39.7	<-60	-4.2
7.0	0.060	33.1	2.0	10.1	0.41	71.6	-39.7	<-60	-4.2
7.5	0.060	33.6	2.3	10.6	0.44	70.9	-39.3	<-60	-4.2
8.0	0.063	34.1	2.6	11.2	0.46	69.8	-39.2	<-60	-4.1
8.5	0.063	34.6	2.9	11.6	0.49	69.0	-38.7	<-60	-4.1
9.0	0.065	35.0	3.2	12.0	0.52	67.7	-38.3	<-60	-4.1
9.5	0.068	35.4	3.4	12.3	0.54	66.6	-38.5	<-60	-4.1
10.0	0.068	35.7	3.7	12.7	0.57	65.6	-38.2	<-60	-4.1
10.5	0.070	36.0	4.0	13.0	0.59	64.4	-38.0	<-60	-4.1
11.0	0.070	36.3	4.2	13.2	0.61	63.1	-37.8	<-60	-4.0
11.5	0.073	36.5	4.5	13.5	0.63	61.6	-37.8	<-60	-4.0
12.0	0.075	36.7	4.7	13.7	0.65	60.1	-37.5	-48.3	-4.0
12.5	0.078	36.9	4.9	13.9	0.67	58.6	-37.3	-57.8	-4.0
13.0	0.080	37.1	5.1	14.1	0.69	57.2	-37.3	<-60	-4.0

RD04HMS2 single-stage amplifier Pout vs. Vdd characteristics data@ **f=365MHz**, Pin=0.2W(23dBm), Idq=75mA(Vgg=2.55V)

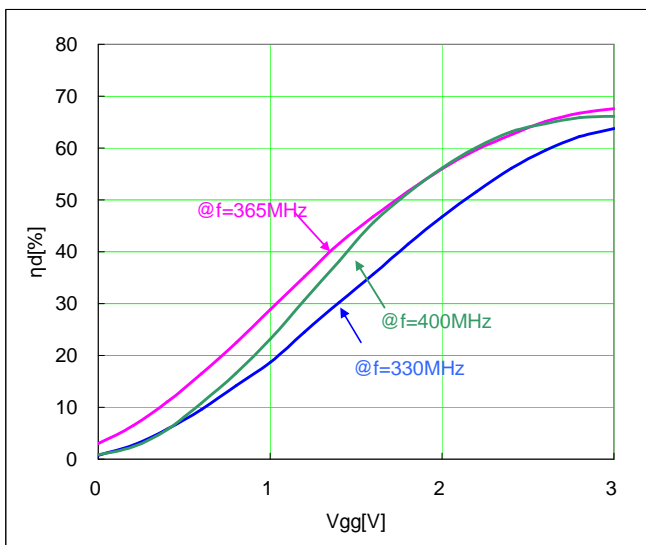
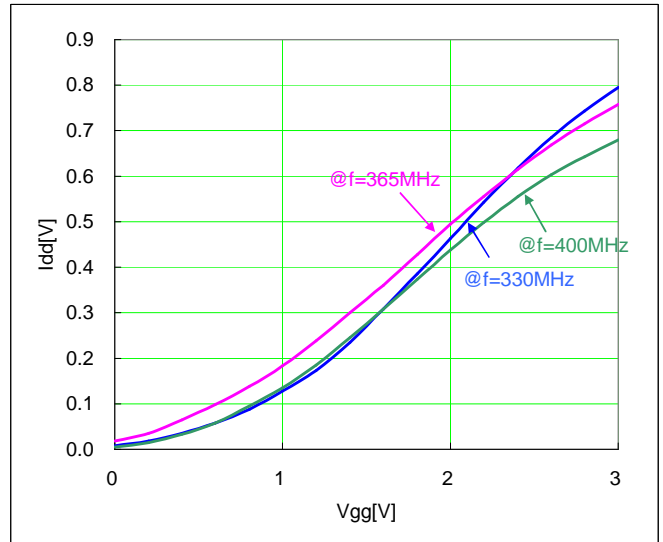
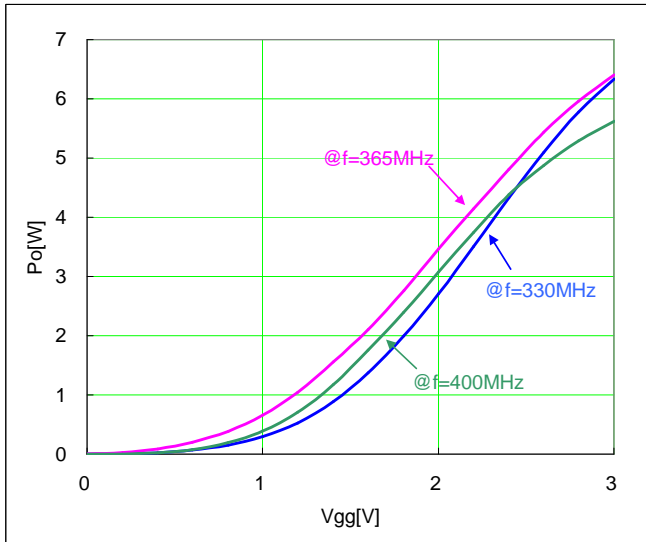
Vdd [V]	Idq [A]	Po [dBm]	Po [W]	Gp [dB]	Idd [A]	η_d [%]	2fo [dBc]	3fo [dBc]	R.L. [-dB]
0.0	0.003	-1.8	0.0	-24.8	0.01	0.0	-28.8	-29.5	-5.0
0.5	0.038	10.6	0.0	-12.4	0.04	54.3	-34.7	-35.7	-5.1
1.0	0.043	16.5	0.0	-6.6	0.07	62.8	-47.7	-48.0	-5.2
1.5	0.045	19.8	0.1	-3.2	0.10	65.6	-50.0	-51.2	-5.2
2.0	0.048	22.3	0.2	-0.7	0.12	68.6	-49.7	-53.2	-5.3
2.5	0.048	24.2	0.3	1.2	0.15	70.1	-48.7	-53.8	-5.3
3.0	0.050	25.7	0.4	2.7	0.18	70.3	-47.0	-52.7	-5.3
3.5	0.050	27.1	0.5	4.1	0.20	71.6	-50.3	-56.3	-5.3
4.0	0.053	28.2	0.7	5.2	0.23	72.1	-49.8	-59.5	-5.3
4.5	0.053	29.2	0.8	6.2	0.26	71.9	-50.0	-58.5	-5.3
5.0	0.055	30.1	1.0	7.1	0.28	72.4	-49.5	-58.7	-5.3
5.5	0.055	30.9	1.2	7.9	0.31	72.4	-49.5	-58.7	-5.3
6.0	0.058	31.6	1.5	8.7	0.34	72.0	-49.8	-59.5	-5.3
6.5	0.058	32.3	1.7	9.3	0.36	72.2	-63.8	<-60	-5.3
7.0	0.060	32.9	2.0	10.0	0.39	71.8	-49.5	-58.7	-5.2
7.5	0.060	33.5	2.2	10.5	0.42	71.1	-49.5	-55.7	-5.2
8.0	0.063	34.0	2.5	11.0	0.44	70.9	-49.2	-57.7	-5.2
8.5	0.063	34.5	2.8	11.5	0.47	70.4	-75.2	<-60	-5.2
9.0	0.065	34.9	3.1	12.0	0.50	69.8	-65.3	<-60	-5.2
9.5	0.065	35.3	3.4	12.3	0.52	69.4	-66.2	<-60	-5.1
10.0	0.068	35.7	3.7	12.8	0.55	68.6	-48.2	<-60	-5.1
10.5	0.070	36.1	4.1	13.1	0.57	68.0	-63.2	<-60	-5.1
11.0	0.070	36.4	4.4	13.4	0.59	67.2	-71.2	<-60	-5.1
11.5	0.073	36.7	4.7	13.7	0.61	66.3	-71.0	<-60	-5.0
12.0	0.075	37.0	5.0	14.0	0.64	65.5	-71.0	<-60	-5.0
12.5	0.075	37.2	5.3	14.2	0.66	64.6	-70.7	<-60	-5.0
13.0	0.078	37.5	5.6	14.5	0.68	63.5	-47.0	-54.5	-5.0

RD04HMS2 single-stage amplifier Pout vs. Vdd characteristics data@ **f=400MHz**, Pin=0.2W(23dBm), Idq=75mA(Vgg=2.55V)

Vdd [V]	Idq [A]	Po [dBm]	Po [W]	Gp [dB]	Idd [A]	η_d [%]	2fo [dBc]	3fo [dBc]	R.L. [-dB]
0.0	0.003	-2.8	0.0	-25.9	0.01	0.0	-28.2	-28.2	-3.8
0.5	0.038	10.1	0.0	-12.9	0.04	47.5	-41.8	-42.0	-4.0
1.0	0.043	15.9	0.0	-7.1	0.07	56.3	-46.8	-47.0	-4.0
1.5	0.045	19.2	0.1	-3.8	0.09	60.1	-50.5	-50.5	-4.0
2.0	0.048	21.6	0.1	-1.4	0.12	63.6	-53.3	-53.7	-4.1
2.5	0.048	23.6	0.2	0.6	0.14	65.9	-53.7	-54.3	-4.1
3.0	0.050	25.1	0.3	2.1	0.16	67.5	-55.0	-56.2	-4.1
3.5	0.050	26.4	0.4	3.4	0.18	68.5	-53.2	-57.8	-4.1
4.0	0.053	27.6	0.6	4.6	0.21	69.6	-56.7	-59.2	-4.1
4.5	0.053	28.6	0.7	5.6	0.23	69.4	-55.7	-56.3	-4.1
5.0	0.055	29.5	0.9	6.4	0.25	69.8	-53.8	-56.3	-4.1
5.5	0.055	30.3	1.1	7.3	0.28	70.3	-54.8	-57.8	-4.0
6.0	0.058	31.0	1.3	8.0	0.30	70.0	-55.8	-56.0	-4.0
6.5	0.058	31.7	1.5	8.7	0.32	70.1	-55.5	-56.8	-4.0
7.0	0.060	32.3	1.7	9.3	0.35	70.4	-54.5	-55.2	-4.0
7.5	0.060	32.9	1.9	9.9	0.37	69.8	-54.2	-56.5	-4.0
8.0	0.063	33.4	2.2	10.4	0.39	69.7	-56.2	-56.3	-3.9
8.5	0.063	33.9	2.5	10.9	0.42	69.2	-55.2	-55.3	-3.9
9.0	0.065	34.4	2.7	11.4	0.44	69.0	-55.3	-56.8	-3.9
9.5	0.065	34.8	3.0	11.8	0.46	68.5	-55.0	-55.5	-3.9
10.0	0.068	35.2	3.3	12.2	0.49	68.1	-54.7	-54.8	-3.8
10.5	0.070	35.6	3.6	12.5	0.51	67.4	-54.5	-56.0	-3.8
11.0	0.070	35.9	3.9	12.9	0.53	66.6	-53.7	-54.7	-3.8
11.5	0.073	36.2	4.2	13.2	0.55	66.0	-53.7	-55.7	-3.8
12.0	0.075	36.5	4.5	13.5	0.57	65.2	-53.2	-57.8	-3.7
12.5	0.075	36.7	4.7	13.8	0.59	64.1	-53.3	-55.5	-3.7
13.0	0.078	37.0	5.0	14.0	0.61	63.3	-53.0	-54.8	-3.7

RD04HMS2 single-stage amplifier Pout vs.Vgg characteristics.

@Vdd=12.5V, Pin=0.2W(23dBm), f=330MHz, f=365MHz, f=400MHz



RD04HMS2 single-stage amplifier Pout vs. Vdd characteristics data@ **f=330MHz**, Vdd=12.5V, Pin=0.2W(23dBm)

Vgg [V]	Pin [dBm]	Pin [W]	Po [dBm]	Po [W]	Gp [dB]	Idd [A]	η_d [%]	R.L. [-dB]
0.0	23.00	0.20	-1.18	0.00	-24.18	0.01	0.8	-3.5
0.2	22.99	0.20	7.86	0.01	-15.13	0.02	2.7	-3.4
0.4	22.99	0.20	14.01	0.03	-8.98	0.04	5.8	-3.4
0.6	22.99	0.20	18.41	0.07	-4.58	0.06	9.6	-3.4
0.8	23.00	0.20	21.93	0.16	-1.07	0.09	14.2	-3.4
1.0	23.01	0.20	24.76	0.30	1.75	0.13	18.7	-3.4
1.2	23.00	0.20	27.24	0.53	4.24	0.17	24.5	-3.4
1.4	23.00	0.20	29.48	0.89	6.48	0.24	30.2	-3.5
1.6	23.01	0.20	31.38	1.37	8.37	0.31	35.7	-3.5
1.8	22.99	0.20	33.00	2.00	10.01	0.39	41.5	-3.6
2.0	22.98	0.20	34.32	2.71	11.35	0.46	46.8	-3.7
2.2	23.00	0.20	35.45	3.50	12.44	0.54	51.6	-3.8
2.4	23.01	0.20	36.37	4.33	13.35	0.62	56.1	-3.9
2.6	23.00	0.20	37.07	5.10	14.07	0.69	59.6	-4.0
2.8	22.96	0.20	37.62	5.78	14.65	0.74	62.2	-4.2
3.0	22.96	0.20	38.02	6.34	15.05	0.80	63.8	-4.3

RD04HMS2 single-stage amplifier Pout vs. Vgg characteristics data@ **f=365MHz**, Vdd=12.5V, Pin=0.2W(23dBm)

Vgg [V]	Pin [dBm]	Pin [W]	Po [dBm]	Po [W]	Gp [dB]	Idd [A]	η_d [%]	R.L. [-dB]
0.0	23.01	0.20	8.29	0.01	-14.72	0.02	3.0	-4.5
0.2	22.97	0.20	14.52	0.03	-8.45	0.04	6.5	-4.5
0.4	23.01	0.20	19.52	0.09	-3.49	0.07	11.0	-4.5
0.6	23.01	0.20	23.05	0.20	0.03	0.10	16.5	-4.5
0.8	22.99	0.20	25.88	0.39	2.89	0.14	22.5	-4.5
1.0	22.97	0.20	28.20	0.66	5.23	0.18	28.9	-4.5
1.2	22.98	0.20	30.20	1.05	7.22	0.24	35.2	-4.5
1.4	23.00	0.20	31.93	1.56	8.93	0.30	41.6	-4.5
1.6	22.97	0.20	33.23	2.11	10.26	0.36	46.8	-4.6
1.8	22.98	0.20	34.41	2.76	11.43	0.43	51.7	-4.6
2.0	23.01	0.20	35.40	3.46	12.38	0.50	56.0	-4.7
2.2	22.98	0.20	36.17	4.14	13.19	0.56	59.7	-4.8
2.4	22.96	0.20	36.82	4.81	13.86	0.62	62.6	-4.9
2.6	23.00	0.20	37.35	5.44	14.35	0.67	65.2	-5.0
2.8	22.99	0.20	37.75	5.96	14.76	0.72	66.7	-5.2
3.0	23.00	0.20	38.06	6.40	15.07	0.76	67.6	-5.3

RD04HMS2 single-stage amplifier Pout vs. Vgg characteristics data@ **f=400MHz**, Vdd=12.5V, Pin=0.2W(23dBm)

Vgg [V]	Pin [dBm]	Pin [W]	Po [dBm]	Po [W]	Gp [dB]	Idd [A]	η_d [%]	R.L. [-dB]
0.0	23.01	0.20	-2.73	0.00	-25.75	0.01	0.9	-3.5
0.2	22.99	0.20	6.49	0.00	-16.51	0.02	2.4	-3.5
0.4	23.00	0.20	13.69	0.02	-9.30	0.03	5.7	-3.5
0.6	23.00	0.20	18.93	0.08	-4.07	0.06	10.8	-3.5
0.8	23.01	0.20	22.93	0.20	-0.08	0.10	16.6	-3.5
1.0	22.98	0.20	25.91	0.39	2.93	0.14	23.1	-3.5
1.2	22.99	0.20	28.50	0.71	5.51	0.19	30.7	-3.4
1.4	23.01	0.20	30.69	1.17	7.68	0.25	38.3	-3.4
1.6	23.03	0.20	32.45	1.76	9.42	0.31	45.7	-3.4
1.8	22.99	0.20	33.79	2.39	10.80	0.37	51.4	-3.4
2.0	23.00	0.20	34.88	3.08	11.88	0.44	56.2	-3.5
2.2	23.01	0.20	35.73	3.74	12.72	0.50	60.1	-3.6
2.4	23.03	0.20	36.42	4.38	13.39	0.56	63.2	-3.6
2.6	23.00	0.20	36.88	4.88	13.88	0.60	64.7	-3.7
2.8	22.99	0.20	37.24	5.29	14.25	0.64	65.9	-3.8
3.0	22.98	0.20	37.50	5.62	14.52	0.68	66.1	-4.0