APPLICATION NOTE

MITSUBISHI ELECTRIC
Silicon RF Power Semiconductors

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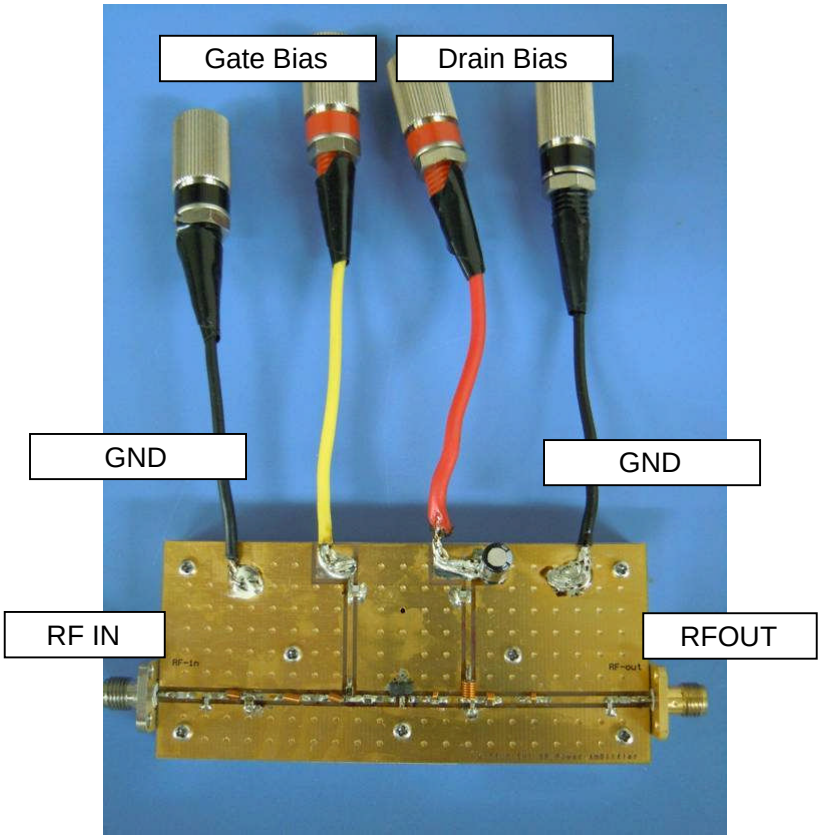
SUBJECT: RD01MUS2B single-stage amplifier with f=135-175MHz evaluation board

Features:

- The evaluation board for RD01MUS2B
- Frequency: 135-175MHz
- Typical input power: 30mW
- Typical output power: 1.45W
- Quiescent Current: 40mA
- Operating Current: 0.29A
- Surface-mounted RF power amplifier structure



PCB L=90mm W=40mm

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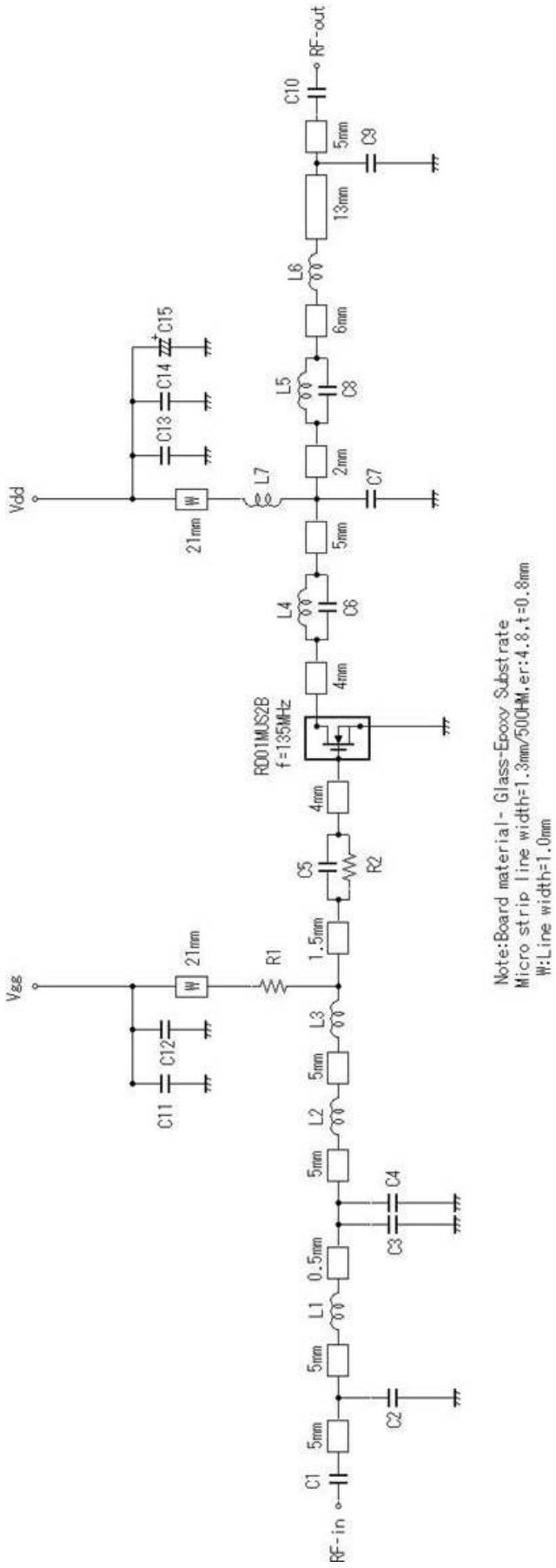
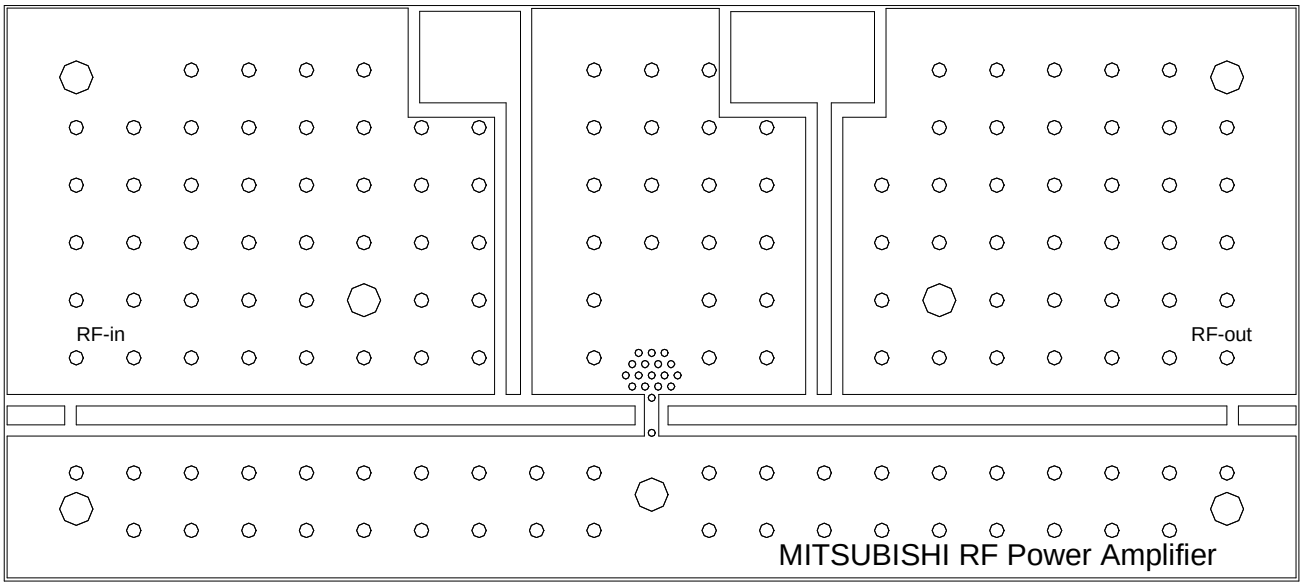
1. Equivalent Circuitry



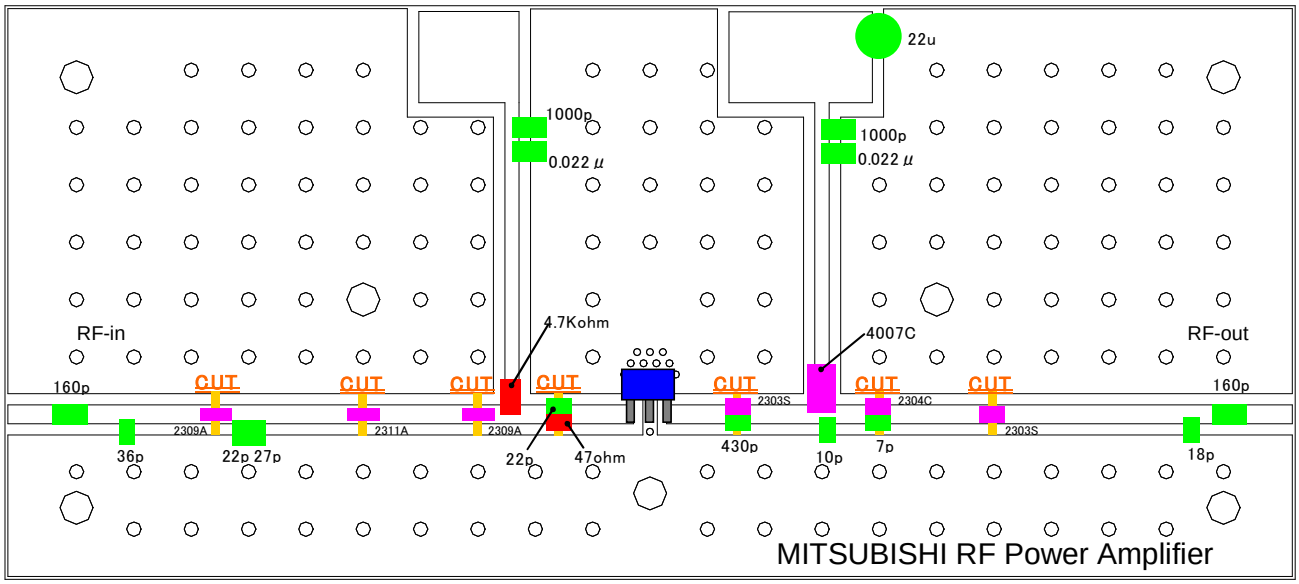
2. PCB Layout

BOARD OUTLINE: 90.0*40.0(mm)
MATERIAL : FR-4<R1705>
THICKNESS : 0.8(mm)

TOP VIEW



TOP VIEW (Parts mounting)



3. Component List

- Component List

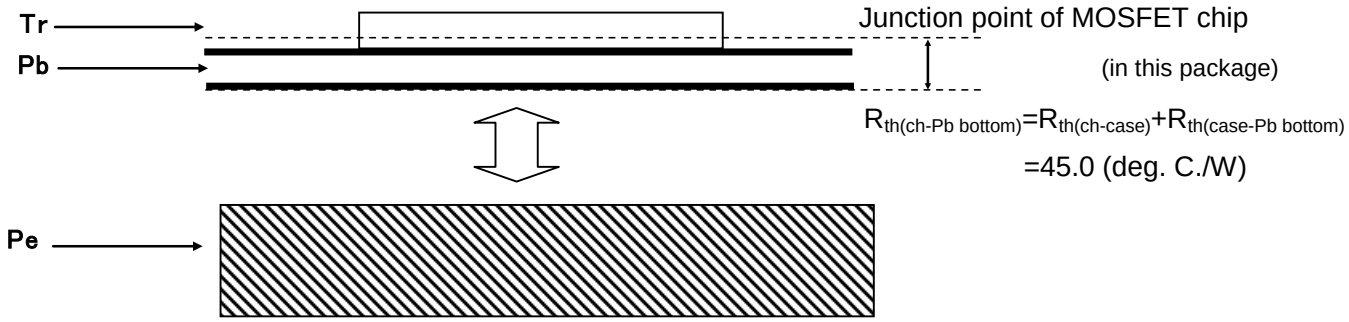
No.	Description	P/N	Qty	Manufacturer
Tr	MOSFET	RD01MUS2B	1	Mitsubishi Electric Corporation
C 1	160 pF 2012 50V	GRM2162C1H161JA01D	1	MURATA MANUFACTURING CO.
C 2	36 pF 1608 50V	GRM1882C1H360JA01D	1	MURATA MANUFACTURING CO.
C 3	22 pF 1608 50V	GRM1882C1H220JA01D	1	MURATA MANUFACTURING CO.
C 4	27 pF 1608 50V	GRM1882C1H270JA01D	1	MURATA MANUFACTURING CO.
C 5	22 pF 1608 50V	GRM1882C1H220JA01D	1	MURATA MANUFACTURING CO.
C 6	430 pF 1608 50V	GRM1882C1H431JA01D	1	MURATA MANUFACTURING CO.
C 7	10 pF 1608 50V	GRM1882C1H100JA01D	1	MURATA MANUFACTURING CO.
C 8	7 pF 1608 50V	GRM1882C1H7R0JA01D	1	MURATA MANUFACTURING CO.
C 9	18 pF 1608 50V	GRM1882C1H180JA01D	1	MURATA MANUFACTURING CO.
C 10	160 pF 2012 50V	GRM2162C1H161JA01D	1	MURATA MANUFACTURING CO.
C 11	1000 pF 2012 50V	GRM2162C1H102JA01D	1	MURATA MANUFACTURING CO.
C 12	0.022 μF 1608 50V	GRM188BC1H223KA01D	1	MURATA MANUFACTURING CO.
C 13	1000 pF 2012 50V	GRM2162C1H102JA01D	1	MURATA MANUFACTURING CO.
C 14	0.022 μF 1608 50V	GRM188BC1H223KA01D	1	MURATA MANUFACTURING CO.
C 15	22 uF 50V	H1002	1	NICHICON CORPORATION
L 1	40 nH * Diameter: Wire=0.23mm Inside=1.1mm T/N of coils=9		1	YC CORPORATION Co.,Ltd.
L 2	51 nH * Diameter: Wire=0.23mm Inside=1.1mm T/N of coils=11		1	YC CORPORATION Co.,Ltd.
L 3	40 nH * Diameter: Wire=0.23mm Inside=1.1mm T/N of coils=9		1	YC CORPORATION Co.,Ltd.
L 4	12 nH * Diameter: Wire=0.23mm Inside=1.1mm T/N of coils=3		1	YC CORPORATION Co.,Ltd.
L 5	17 nH * Diameter: Wire=0.23mm Inside=1.1mm T/N of coils=4		1	YC CORPORATION Co.,Ltd.
L 6	12 nH * Diameter: Wire=0.23mm Inside=1.1mm T/N of coils=3		1	YC CORPORATION Co.,Ltd.
L 7	37 nH * Diameter: Wire=0.4mm Inside=1.6mm T/N of coils=7		1	YC CORPORATION Co.,Ltd.
R 1	4.7k ohm 2012	RPC10T472J	1	TAIYOSHA ELECTRIC CO.
R 2	100 ohm 1608	RPC05T101J	1	TAIYOSHA ELECTRIC CO.
Pb	PCB	MS3A0138	1	Homebuilt
Rc	SMA female connector	HRM-300-118S	2	HIROSE ELECTRIC CO.,LTD
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
	Conducting wire		4	Homebuilt
	Screw M2		11	-

* Inductor of Rolling Coil measurement condition : f=100MHz

- Standard Deliverable

TYPE1	Evaluation Board assembled with all the component
TYPE2	PCB (raw board)

4. Thermal Design of Heat Sink



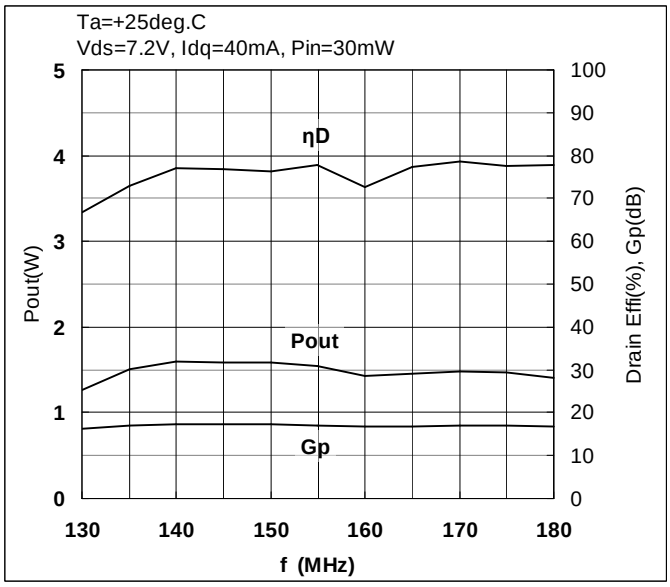
$Tch_{(delta)}$=(Pout/Efficiency-Pout+Pin) x $R_{th(ch\text{-}Pb\ bottom)}$=(1W/60%-1W+0.03) x 45 = 31 (deg. C.)
Also, operating Tj ("$Tj_{(op)}$")=120 (deg. C.), in case of RD series that $Tch_{(max)}$ = 150 (deg. C.)
Therefore $T_{Pb\ bottom\text{-}air}$ as delta temperature between Pb bottom and the ambient 60 deg. C.
$T_{Pb\ bottom\text{-}air}$="$Tj_{(op)}$"- $Tch_{(delta)}$ - $Ta_{(60deg.C.)}$=120-31-60=29 (deg. C.)

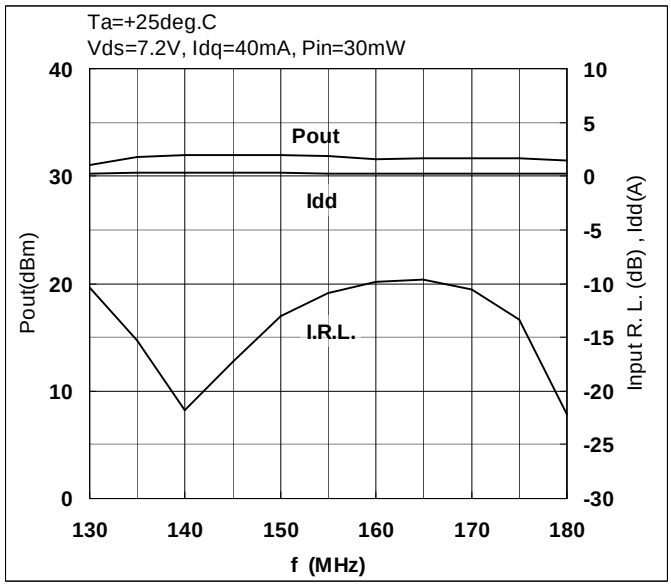
In terms of long-term reliability, "$Tj_{(op)}$" has to be kept less than 120 deg. C. i.e. $T_{Pb\ bottom\text{-}air}$ has to be less than 29 deg. C..
The thermal resistance of the heat sink to border it:
$Rth_{(Pb\ bottom\text{-}air)}$=$T_{Pb\ bottom\text{-}air}$/(Pout/Efficiency-Pout+Pin)=29/(1W/60%-1W+0.03)= 41 (deg. C./W)
Therefore
it is preferable that the thermal resistance of the heat sink is much smaller than 41 deg. C./W.

5. Typical Performance

5-1. Frequency vs.

OUTPUT POWER, POWER GAIN, DRAIN EFFICIENCY, DRAIN CURRENT and INPUT RETURN LOSS
(Vds=7.2V)



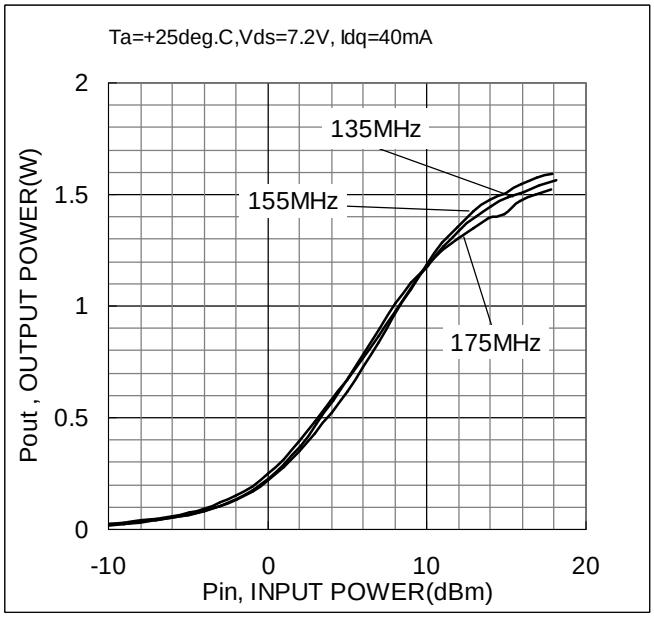


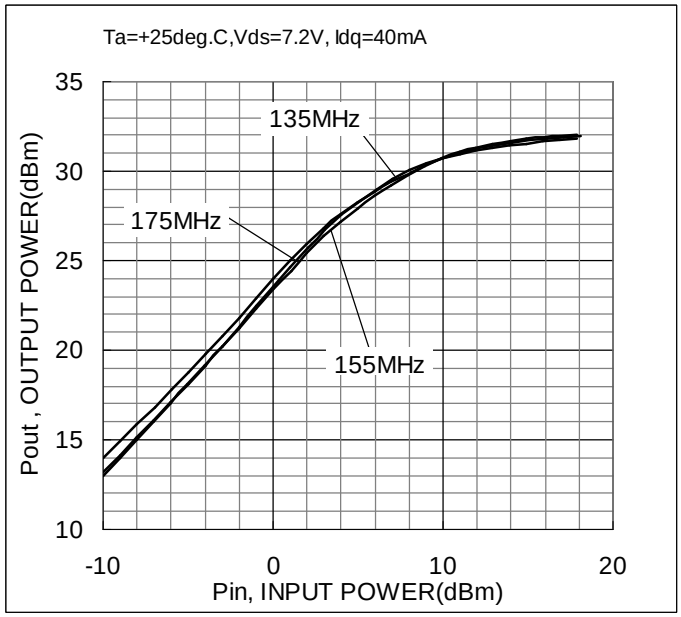
Ta=+25deg. C., Vds=7.2V, Idq=40mA, Pin=30mW

Freq. (MHz)	Vgg (V)	Pin (dBm)	Pin (W)	Pout (dBm)	Pout (W)	Gp (dB)	ID(RF) (A)	ηadd (%)	ηD (%)	I.R.L. (dB)
130	1.28	14.8	0.03	31.0	1.26	16.2	0.26	65.1	66.7	-10.3
135	1.28	14.8	0.03	31.8	1.51	17.0	0.29	71.5	72.9	-15.3
140	1.28	14.8	0.03	32.0	1.60	17.2	0.29	75.6	77.1	-21.7
145	1.28	14.8	0.03	32.0	1.59	17.2	0.29	75.3	76.7	-17.3
150	1.28	14.8	0.03	32.0	1.58	17.2	0.29	74.9	76.4	-13.0
155	1.28	14.8	0.03	31.9	1.54	17.1	0.28	76.5	78.0	-10.9
160	1.28	14.8	0.03	31.6	1.44	16.8	0.28	71.1	72.6	-9.8
165	1.28	14.8	0.03	31.7	1.46	16.9	0.26	75.7	77.3	-9.6
170	1.28	14.8	0.03	31.7	1.49	17.0	0.26	77.0	78.6	-10.5
175	1.28	14.8	0.03	31.7	1.47	16.9	0.26	76.1	77.7	-13.3
180	1.28	14.8	0.03	31.5	1.40	16.7	0.25	76.2	77.8	-22.2

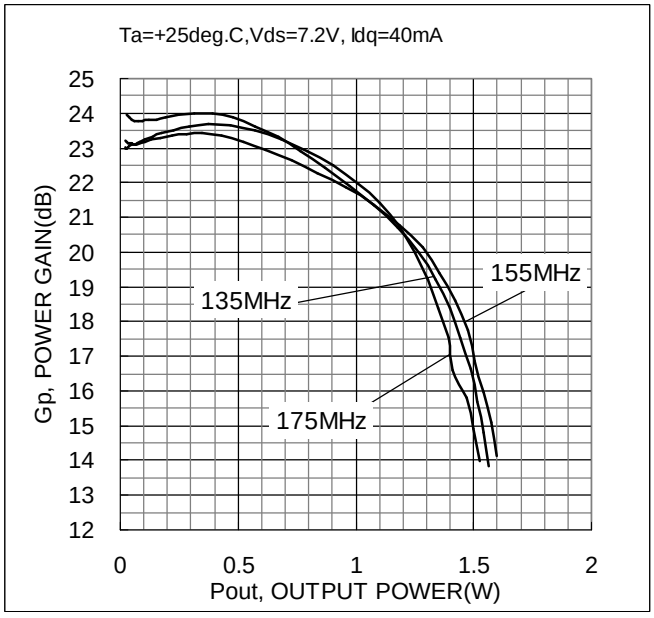
5-2. RF Power vs.

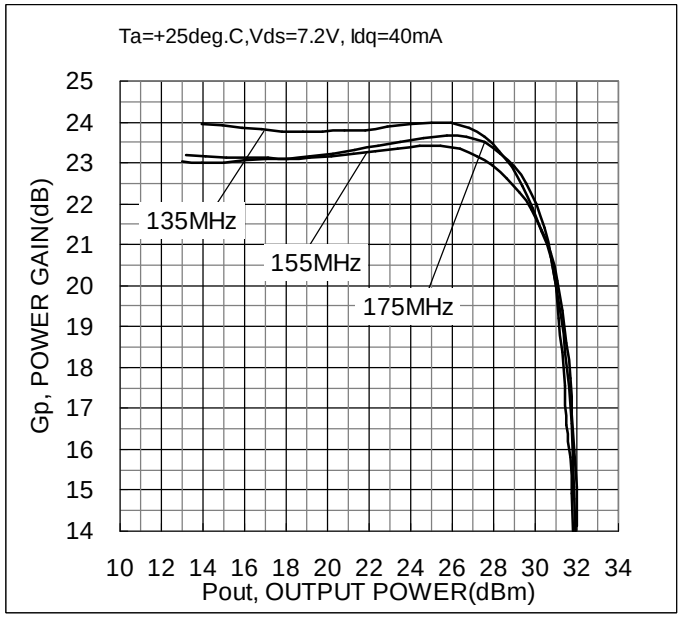
INPUT POWER (Vds=7.2V)



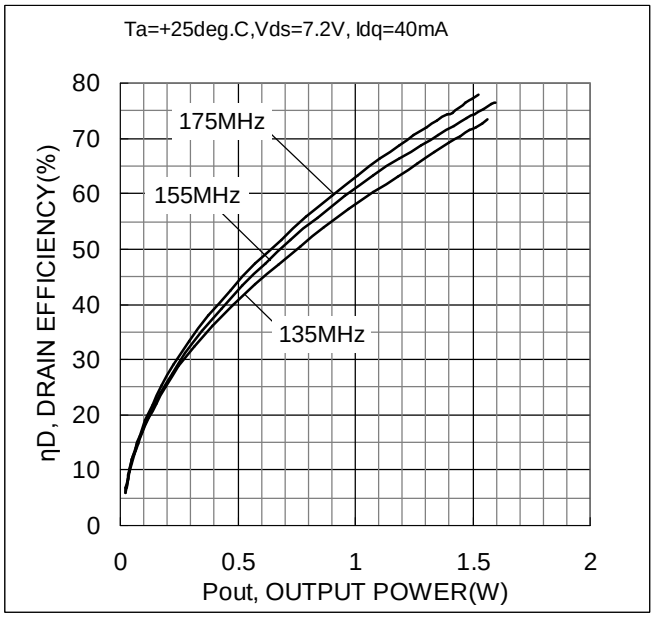


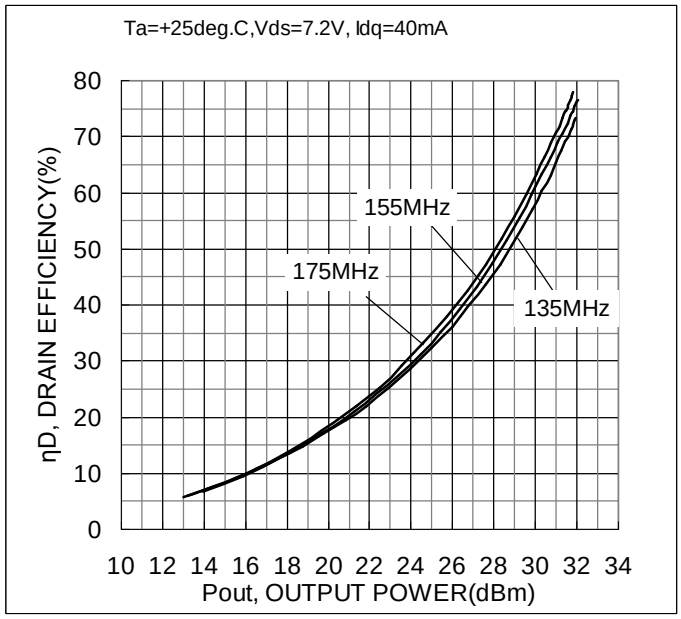
POWER GAIN (Vds=7.2V)



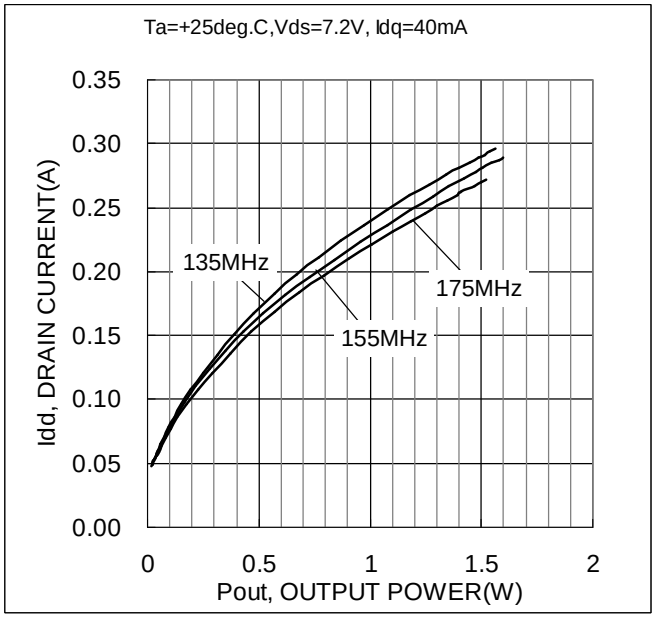


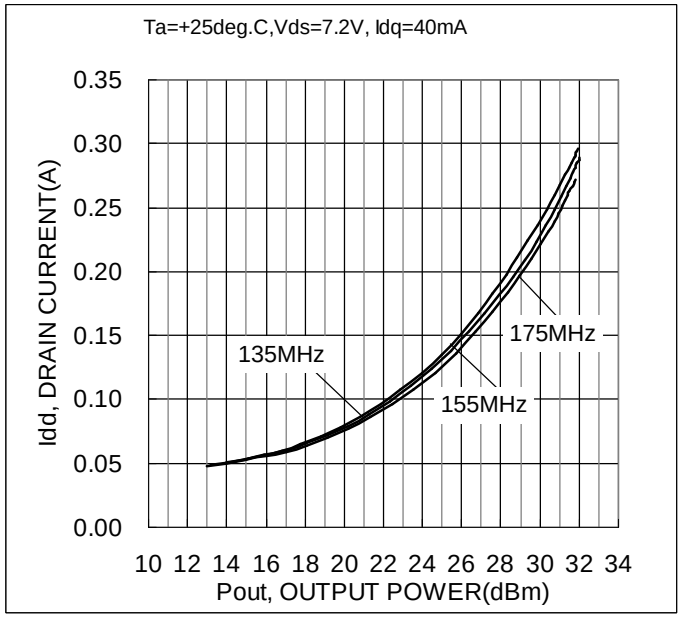
DRAIN EFFICIENCY (Vds=7.2V)



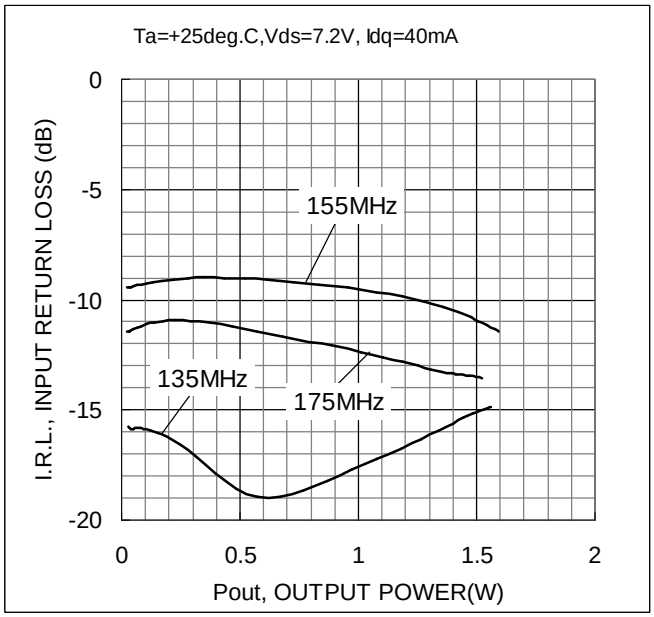


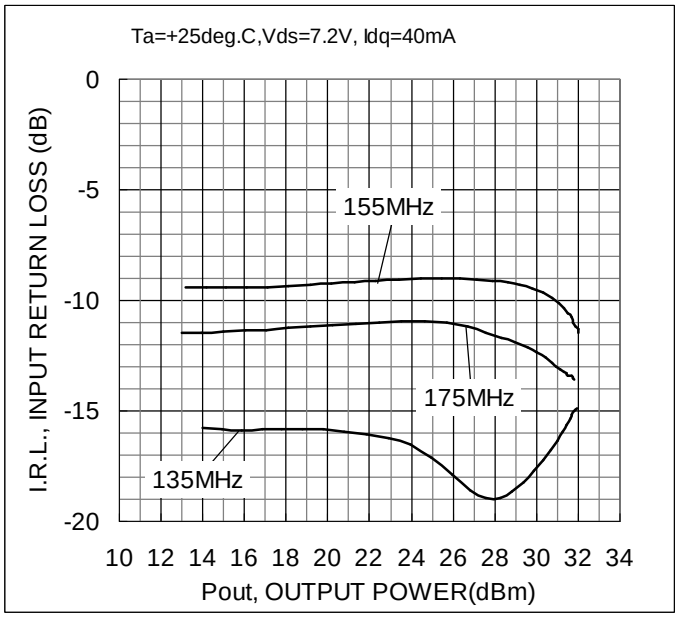
DRAIN CURRENT (Vds=7.2V)





INPUT RETURN LOSS (Vds=7.2V)





Ta=+25deg. C., Vds=7.2V, Idq=40mA

135MHz	Vgg	Pin		Pout		Gp	ID(RF)	ηadd	ηD	I.R.L.
	(V)	(dBm)	(mW)	(dBm)	(W)	(dB)	(A)	(%)	(%)	(dB)
	1.29	-10.0	0.000	14.0	0.02	23.9	0.05	6.8	6.8	-15.8
	1.29	-9.0	0.000	14.9	0.03	23.9	0.05	8.1	8.1	-15.8
	1.29	-8.0	0.000	15.9	0.04	23.9	0.06	9.5	9.6	-15.9
	1.29	-7.0	0.000	16.8	0.05	23.8	0.06	11.1	11.2	-15.9
	1.29	-6.0	0.000	17.8	0.06	23.8	0.06	12.8	12.9	-15.8
	1.29	-5.0	0.000	18.8	0.08	23.8	0.07	14.8	14.9	-15.8
	1.29	-4.0	0.000	19.8	0.10	23.8	0.08	16.9	17.0	-15.9
	1.29	-3.0	0.001	20.8	0.12	23.8	0.09	19.4	19.4	-15.9
	1.29	-2.0	0.001	21.8	0.15	23.8	0.10	21.9	22.0	-16.0
	1.29	-1.0	0.001	22.9	0.19	23.9	0.11	25.1	25.2	-16.2
	1.29	0.0	0.001	24.0	0.25	24.0	0.12	28.7	28.8	-16.6
	1.29	1.0	0.001	25.0	0.32	24.0	0.14	32.3	32.4	-17.1
	1.29	2.0	0.002	26.0	0.39	24.0	0.15	36.0	36.2	-17.9
	1.29	3.0	0.002	26.8	0.48	23.9	0.17	39.8	40.0	-18.6
	1.29	4.0	0.002	27.6	0.57	23.6	0.18	43.5	43.7	-18.9
	1.29	5.0	0.003	28.3	0.67	23.3	0.20	47.0	47.2	-18.9
	1.29	5.9	0.004	28.9	0.77	22.9	0.21	50.3	50.5	-18.7
	1.29	7.0	0.005	29.4	0.87	22.4	0.22	53.5	53.9	-18.2
	1.29	8.0	0.006	29.9	0.97	21.9	0.24	56.8	57.2	-17.7
	1.29	9.0	0.008	30.3	1.08	21.3	0.25	59.9	60.3	-17.2
	1.29	10.0	0.010	30.7	1.18	20.7	0.26	62.7	63.2	-16.8
	1.29	11.0	0.013	31.0	1.26	20.0	0.27	64.8	65.5	-16.3
	1.29	12.0	0.016	31.3	1.34	19.2	0.28	66.7	67.5	-16.0
	1.29	13.1	0.020	31.5	1.40	18.4	0.28	68.2	69.2	-15.6
	1.29	14.1	0.026	31.6	1.45	17.5	0.29	69.1	70.4	-15.4
	1.29	15.1	0.032	31.7	1.49	16.6	0.29	69.9	71.5	-15.2
	1.29	16.1	0.041	31.8	1.51	15.7	0.29	70.2	72.1	-15.0
	1.29	17.1	0.051	31.9	1.54	14.8	0.29	70.4	72.8	-14.9
	1.29	18.1	0.065	31.9	1.56	13.8	0.30	70.3	73.4	-14.9

155MHz

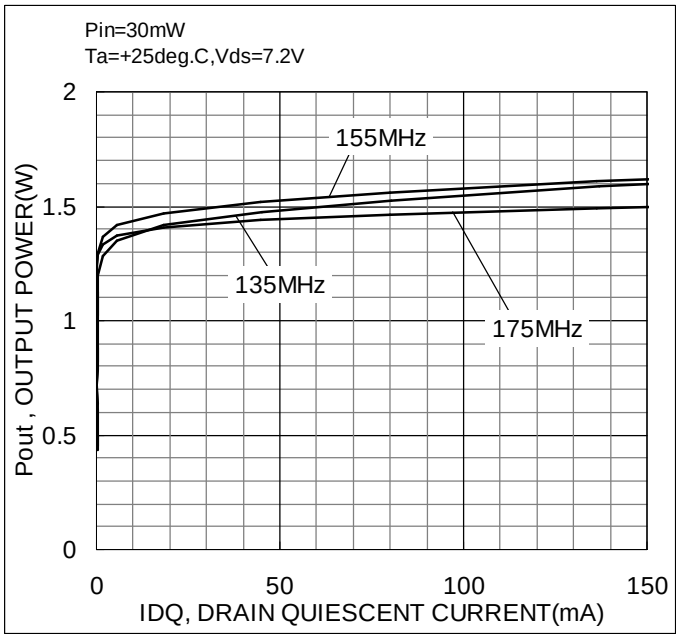
Vgg	Pin		Pout		Gp	ID(RF)	ηadd	ηD	I.R.L.
(V)	(dBm)	(W)	(dBm)	(W)	(dB)	(A)	(%)	(%)	(dB)
1.29	-10.0	0.000	13.2	0.02	23.2	0.05	5.9	5.9	-9.4
1.29	-9.0	0.000	14.2	0.03	23.2	0.05	7.1	7.1	-9.4
1.29	-8.0	0.000	15.1	0.03	23.1	0.05	8.4	8.5	-9.4
1.29	-7.0	0.000	16.1	0.04	23.1	0.06	9.9	10.0	-9.4
1.29	-6.0	0.000	17.1	0.05	23.1	0.06	11.8	11.9	-9.4
1.29	-5.0	0.000	18.1	0.06	23.1	0.07	13.6	13.7	-9.3
1.29	-4.0	0.000	19.2	0.08	23.1	0.07	15.8	15.9	-9.3
1.29	-3.0	0.001	20.2	0.10	23.2	0.08	18.2	18.3	-9.2
1.29	-2.0	0.001	21.3	0.13	23.2	0.09	20.9	21.0	-9.2
1.29	-1.0	0.001	22.3	0.17	23.3	0.10	23.8	23.9	-9.1
1.29	0.0	0.001	23.4	0.22	23.4	0.11	27.3	27.5	-9.1
1.29	1.0	0.001	24.5	0.28	23.4	0.12	31.1	31.2	-9.0
1.29	2.0	0.002	25.4	0.35	23.4	0.14	35.1	35.2	-9.0
1.29	3.0	0.002	26.4	0.43	23.4	0.15	39.1	39.2	-9.0
1.29	4.0	0.003	27.2	0.52	23.2	0.17	43.1	43.3	-9.0
1.29	5.0	0.003	27.9	0.62	22.9	0.18	47.2	47.4	-9.1
1.29	6.0	0.004	28.6	0.73	22.6	0.20	51.3	51.6	-9.2
1.29	6.9	0.005	29.2	0.84	22.3	0.21	55.2	55.6	-9.3
1.29	7.9	0.006	29.8	0.96	21.9	0.22	59.2	59.6	-9.5
1.29	9.0	0.008	30.3	1.08	21.4	0.24	62.8	63.3	-9.7
1.29	9.9	0.010	30.7	1.19	20.8	0.25	65.8	66.4	-9.9
1.29	11.0	0.012	31.1	1.28	20.1	0.26	68.2	68.8	-10.1
1.29	11.9	0.016	31.3	1.36	19.4	0.27	69.8	70.6	-10.3
1.29	12.9	0.020	31.5	1.42	18.6	0.27	71.3	72.3	-10.6
1.29	13.9	0.025	31.7	1.48	17.8	0.28	72.5	73.7	-10.8
1.29	14.9	0.031	31.8	1.51	16.9	0.28	72.9	74.4	-11.0
1.29	15.9	0.039	31.9	1.55	16.0	0.28	73.5	75.4	-11.2
1.29	16.9	0.049	32.0	1.58	15.1	0.29	73.8	76.2	-11.3
1.29	17.9	0.062	32.0	1.60	14.1	0.29	73.6	76.5	-11.5

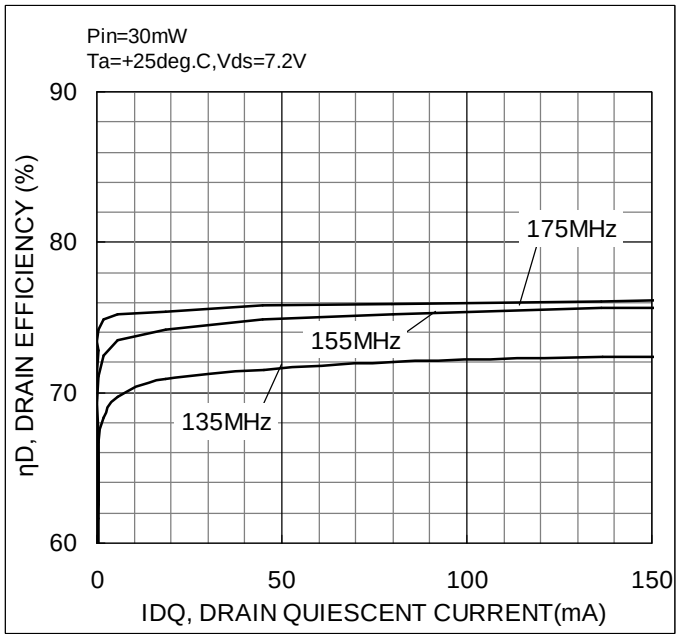
175MHz

Vgg	Pin		Pout		Gp	ID(RF)	ηadd	ηD	I.R.L.
(V)	(dBm)	(W)	(dBm)	(W)	(dB)	(A)	(%)	(%)	(dB)
1.29	-10.0	0.000	13.0	0.02	23.0	0.05	5.7	5.8	-11.5
1.29	-9.0	0.000	14.0	0.02	23.0	0.05	6.9	6.9	-11.5
1.29	-8.0	0.000	15.0	0.03	23.0	0.05	8.3	8.3	-11.4
1.29	-7.0	0.000	16.0	0.04	23.1	0.06	9.9	10.0	-11.4
1.29	-6.0	0.000	17.1	0.05	23.1	0.06	11.8	11.9	-11.3
1.29	-5.0	0.000	18.1	0.06	23.1	0.06	13.9	14.0	-11.3
1.29	-4.0	0.000	19.1	0.08	23.2	0.07	16.2	16.3	-11.2
1.29	-3.0	0.001	20.2	0.11	23.2	0.08	18.9	19.0	-11.1
1.29	-2.0	0.001	21.3	0.14	23.3	0.09	21.8	21.9	-11.0
1.29	-1.0	0.001	22.4	0.18	23.4	0.10	25.2	25.3	-11.0
1.29	0.0	0.001	23.5	0.23	23.5	0.11	28.9	29.0	-10.9
1.29	1.0	0.001	24.6	0.29	23.6	0.12	33.2	33.3	-10.9
1.29	2.0	0.002	25.7	0.37	23.7	0.14	37.8	38.0	-11.0
1.29	3.1	0.002	26.7	0.47	23.6	0.15	42.4	42.6	-11.2
1.29	4.1	0.003	27.6	0.57	23.5	0.17	47.1	47.3	-11.4
1.29	5.1	0.003	28.3	0.68	23.2	0.18	51.5	51.7	-11.7
1.29	6.1	0.004	29.0	0.79	22.9	0.20	55.5	55.8	-11.9
1.29	7.1	0.005	29.6	0.90	22.5	0.21	59.3	59.6	-12.1
1.29	8.1	0.006	30.0	1.01	22.0	0.22	62.9	63.3	-12.4
1.29	9.0	0.008	30.4	1.10	21.4	0.23	65.9	66.3	-12.6
1.29	10.0	0.010	30.7	1.19	20.7	0.24	68.2	68.8	-12.8
1.29	11.0	0.013	31.0	1.25	20.0	0.25	70.0	70.7	-13.0
1.29	11.9	0.016	31.2	1.30	19.2	0.25	71.1	72.0	-13.1
1.29	12.9	0.020	31.3	1.35	18.4	0.26	72.2	73.3	-13.2
1.29	13.9	0.025	31.4	1.39	17.5	0.26	73.1	74.4	-13.3
1.29	14.9	0.031	31.5	1.41	16.6	0.26	73.0	74.7	-13.4
1.29	15.9	0.039	31.7	1.47	15.8	0.27	74.4	76.4	-13.4
1.29	16.8	0.048	31.8	1.50	14.9	0.27	74.7	77.2	-13.5
1.29	17.8	0.061	31.8	1.52	14.0	0.27	74.7	77.8	-13.6

5-3. Drain Quiescent Current vs.

OUTPUT POWER and DRAIN EFFICIENCY (Vds=7.2V)





Ta=+25deg. C., Vds=7.2V, Pin=30mW

135MHz	Vgg	Idq	Pin		Pout		Idd	ηD	ηadd	Gain	I.R.L.
	(V)	(mA)	(dBm)	(W)	(dBm)	(W)	(A)	(%)	(%)	(dB)	(dB)
	0.71	0.2	14.8	0.03	30.1	1.02	0.23	62.9	61.0	15.3	13.8
	0.80	0.2	14.8	0.03	30.5	1.11	0.24	64.8	63.0	15.7	14.0
	0.90	0.4	14.8	0.03	30.8	1.20	0.25	66.7	65.0	16.0	14.2
	1.01	1.8	14.8	0.03	31.1	1.29	0.26	68.4	66.8	16.3	14.5
	1.10	5.6	14.8	0.03	31.3	1.35	0.27	69.7	68.1	16.5	14.7
	1.20	18.4	14.8	0.03	31.5	1.42	0.28	70.9	69.4	16.7	14.9
	1.31	45.0	14.8	0.03	31.7	1.48	0.29	71.5	70.1	16.9	15.1
	1.40	80.1	14.8	0.03	31.8	1.53	0.30	72.0	70.6	17.1	15.4
	1.50	136.8	14.8	0.03	32.0	1.58	0.31	72.3	71.0	17.2	15.7
	1.61	206.6	14.8	0.03	32.2	1.64	0.32	72.5	71.1	17.4	15.9

155MHz

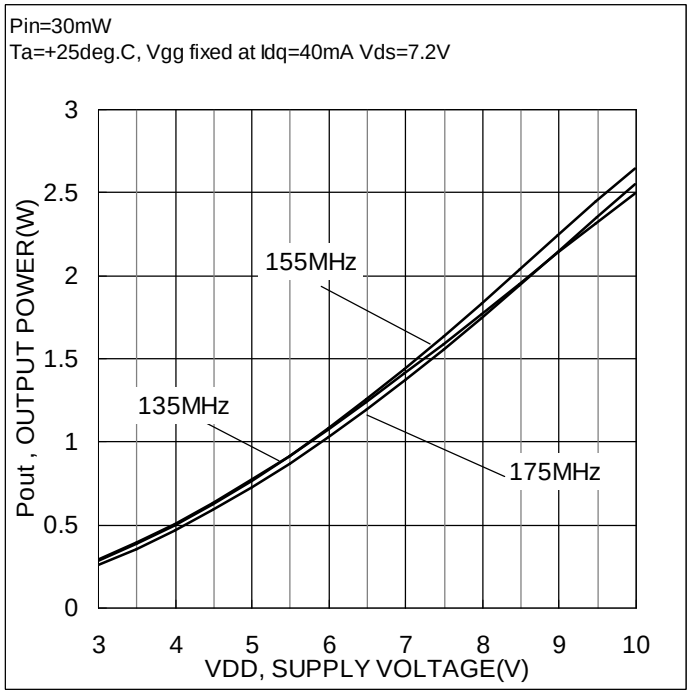
Vgg (V)	Idq (mA)	Pin (dBm)	Pin (W)	Pout (dBm)	Pout (W)	Idd (A)	ηD (%)	ηadd (%)	Gain (dB)	I.R.L. (dB)
0.71	0.2	14.8	0.03	30.5	1.12	0.23	67.3	65.5	15.7	11.2
0.80	0.2	14.8	0.03	30.8	1.21	0.24	69.3	67.6	16.1	11.1
0.90	0.5	14.8	0.03	31.1	1.29	0.25	71.1	69.4	16.4	11.1
1.01	1.8	14.8	0.03	31.4	1.36	0.26	72.5	70.9	16.6	11.1
1.10	5.6	14.8	0.03	31.5	1.42	0.27	73.5	72.0	16.7	11.0
1.20	18.5	14.7	0.03	31.7	1.47	0.28	74.2	72.7	16.9	11.0
1.31	44.8	14.7	0.03	31.8	1.52	0.28	74.9	73.4	17.1	11.0
1.40	79.9	14.8	0.03	31.9	1.56	0.29	75.2	73.7	17.2	10.9
1.50	136.4	14.8	0.03	32.1	1.61	0.30	75.7	74.3	17.3	10.8
1.61	205.8	14.8	0.03	32.2	1.65	0.30	75.7	74.3	17.4	10.8

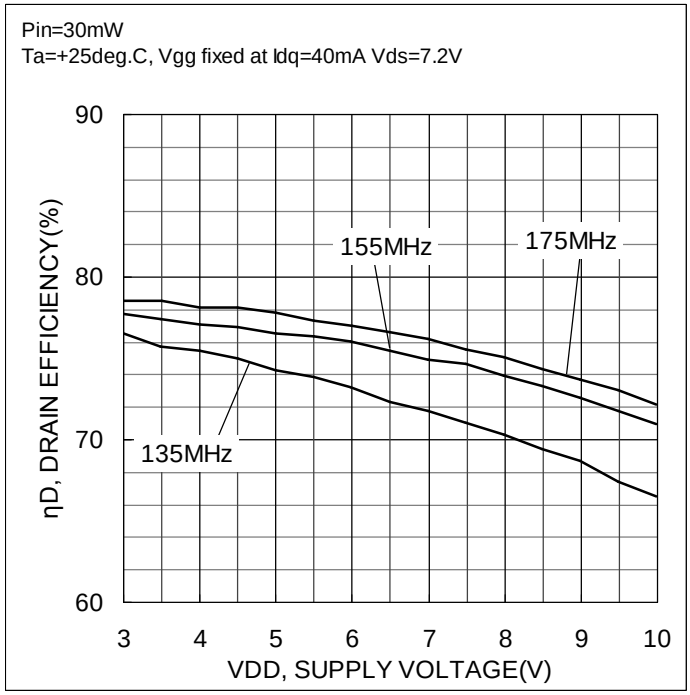
175MHz

Vgg (V)	Idq (mA)	Pin (dBm)	Pin (W)	Pout (dBm)	Pout (W)	Idd (A)	ηD (%)	ηadd (%)	Gain (dB)	I.R.L. (dB)
0.71	0.2	14.8	0.03	30.8	1.19	0.23	72.8	70.9	16.0	12.2
0.80	0.2	14.8	0.03	30.9	1.24	0.23	73.4	71.6	16.1	12.3
0.90	0.5	14.8	0.03	31.1	1.29	0.24	74.2	72.5	16.3	12.5
1.01	1.7	14.8	0.03	31.3	1.33	0.25	74.9	73.2	16.5	12.7
1.10	5.5	14.8	0.03	31.4	1.37	0.25	75.2	73.6	16.6	12.8
1.20	18.4	14.8	0.03	31.5	1.41	0.26	75.4	73.8	16.7	13.1
1.31	44.8	14.8	0.03	31.6	1.44	0.26	75.8	74.3	16.8	13.3
1.40	79.8	14.8	0.03	31.7	1.47	0.27	75.9	74.3	16.9	13.5
1.50	136.2	14.8	0.03	31.7	1.49	0.27	76.1	74.6	17.0	13.7
1.61	205.7	14.8	0.03	31.8	1.52	0.28	76.4	74.9	17.0	14.1

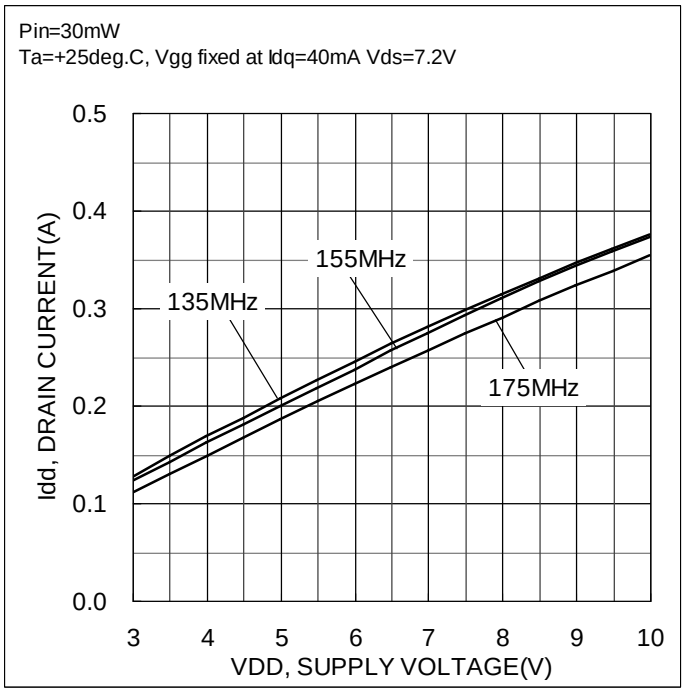
5-4. DC Power Supply vs.

OUTPUT POWER and DRAIN EFFICIENCY (Idq=40mA)





DRAIN CURRENT (Idq=40mA)



Ta=+25deg. C., Idq=40mA

135MHz

Vgg (V)	Vdd (V)	Idq (mA)	Pin (dBm)	Pin (mW)	Pout (dBm)	Pout (W)	Idd (A)	ηD (%)	ηadd (%)	Gain (dB)	I.R.L. (dB)
1.29	3.0	33.8	14.8	0.03	24.7	0.3	0.13	76.5	68.7	9.9	13.5
1.29	3.5	34.6	14.8	0.03	26.0	0.4	0.15	75.7	69.9	11.2	13.7
1.29	4.0	35.4	14.8	0.03	27.1	0.5	0.17	75.5	71.0	12.3	13.9
1.29	4.5	36.3	14.8	0.03	28.0	0.6	0.19	75.0	71.4	13.2	14.1
1.29	5.0	37.0	14.8	0.03	28.9	0.8	0.21	74.3	71.4	14.1	14.3
1.29	5.5	37.7	14.8	0.03	29.6	0.9	0.23	73.9	71.5	14.9	14.6
1.29	6.0	38.5	14.8	0.03	30.3	1.1	0.25	73.2	71.2	15.5	14.7
1.29	6.5	39.4	14.8	0.03	30.9	1.2	0.26	72.3	70.6	16.2	14.9
1.29	7.0	40.3	14.8	0.03	31.5	1.4	0.28	71.8	70.3	16.7	15.1
1.29	7.5	41.2	14.8	0.03	32.0	1.6	0.30	71.1	69.7	17.2	15.3
1.29	8.0	42.2	14.8	0.03	32.5	1.8	0.32	70.4	69.2	17.7	15.5
1.29	8.5	43.1	14.8	0.03	32.9	1.9	0.33	69.4	68.4	18.1	15.6
1.29	9.0	44.1	14.8	0.03	33.3	2.1	0.35	68.7	67.7	18.5	15.8
1.29	9.5	45.1	14.8	0.03	33.6	2.3	0.36	67.4	66.5	18.9	15.9
1.29	10.0	46.2	14.8	0.03	34.0	2.5	0.38	66.6	65.8	19.2	16.1

155MHz

Vgg (V)	Vdd (V)	Idq (mA)	Pin (dBm)	Pin (W)	Pout (dBm)	Pout (W)	Idd (A)	ηD (%)	ηadd (%)	Gain (dB)	I.R.L. (dB)
1.29	3.0	33.8	14.7	0.03	24.6	0.3	0.12	77.8	69.7	9.8	11.7
1.29	3.5	34.5	14.7	0.03	25.9	0.4	0.14	77.4	71.4	11.1	11.6
1.29	4.0	35.3	14.7	0.03	27.0	0.5	0.16	77.1	72.5	12.2	11.5
1.29	4.5	36.2	14.7	0.03	28.0	0.6	0.18	77.0	73.3	13.2	11.4
1.29	5.0	36.9	14.7	0.03	28.8	0.8	0.20	76.6	73.6	14.1	11.4
1.29	5.5	37.7	14.7	0.03	29.6	0.9	0.22	76.4	73.9	14.9	11.3
1.29	6.0	38.4	14.7	0.03	30.3	1.1	0.24	76.1	74.0	15.6	11.2
1.29	6.5	39.3	14.7	0.03	31.0	1.3	0.26	75.4	73.7	16.3	11.1
1.29	7.0	40.2	14.7	0.03	31.6	1.4	0.28	74.9	73.3	16.8	11.0
1.29	7.5	41.0	14.7	0.03	32.1	1.6	0.29	74.7	73.3	17.4	10.9
1.29	8.0	41.9	14.7	0.03	32.6	1.8	0.31	74.0	72.8	17.9	10.8
1.29	8.5	42.9	14.7	0.03	33.1	2.0	0.33	73.3	72.3	18.4	10.8
1.29	9.0	44.0	14.7	0.03	33.5	2.2	0.34	72.6	71.6	18.8	10.7
1.29	9.5	45.0	14.7	0.03	33.9	2.4	0.36	71.8	70.9	19.1	10.6
1.29	10.0	46.1	14.7	0.03	34.2	2.6	0.37	71.0	70.2	19.5	10.6

175MHz

Vgg (V)	Vdd (V)	Idq (mA)	Pin (dBm)	Pin (W)	Pout (dBm)	Pout (W)	Idd (A)	ηD (%)	ηadd (%)	Gain (dB)	I.R.L. (dB)
1.29	3.0	33.8	14.8	0.03	24.2	0.3	0.11	78.5	69.6	9.4	13.1
1.29	3.5	34.5	14.8	0.03	25.5	0.4	0.13	78.5	72.0	10.8	13.2
1.29	4.0	35.4	14.8	0.03	26.7	0.5	0.15	78.1	73.1	11.9	13.3
1.29	4.5	36.0	14.8	0.03	27.7	0.6	0.17	78.1	74.1	12.9	13.3
1.29	5.0	36.9	14.8	0.03	28.6	0.7	0.19	77.8	74.6	13.8	13.3
1.29	5.5	37.6	14.8	0.03	29.4	0.9	0.20	77.3	74.7	14.6	13.3
1.29	6.0	38.4	14.8	0.03	30.1	1.0	0.22	77.0	74.8	15.3	13.3
1.29	6.5	39.2	14.8	0.03	30.8	1.2	0.24	76.7	74.7	16.0	13.3
1.29	7.0	40.0	14.8	0.03	31.4	1.4	0.26	76.2	74.5	16.6	13.3
1.29	7.5	41.0	14.8	0.03	31.9	1.6	0.27	75.6	74.1	17.2	13.3
1.29	8.0	42.0	14.8	0.03	32.4	1.7	0.29	75.0	73.8	17.6	13.3
1.29	8.5	43.0	14.8	0.03	32.9	1.9	0.31	74.4	73.2	18.1	13.2
1.29	9.0	43.9	14.7	0.03	33.3	2.1	0.32	73.7	72.7	18.6	13.2
1.29	9.5	44.9	14.8	0.03	33.7	2.3	0.34	73.0	72.1	19.0	13.2
1.29	10.0	46.0	14.8	0.03	34.1	2.6	0.35	72.2	71.3	19.3	13.2

6. Revision history

Revision	Change	Date
-	Initial release	11-Nov.-2011