

APPLICATION NOTE

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Prepared : M.Wada
S.Kametani
Confirmed : T.Okawa
(Taking charge of Silicon RF by
MIYOSHI Electronics)

SUBJECT: RD01MUS1 & RD07MVS1 VHF wide band matching circuit characteristics

SUMMARY:

This application note shows the RF characteristics data for VHF wide band (Po vs. Frequency characteristics) with RD01MUS1 & RD07MVS1 2Stage Amp.

- Sample history :
 - RD01MUS1: Lot number "2K291"
 - RD07MVS1: Lot number "031AA"

- Evaluate conditions :
 - @f=135-175MHz : Vdd=7.2V, Idq=0.75A (Vgg adj.) Basic

- Results :
 - Page 2 shows the Vdd dependence RF characteristics data.
 - Page 3-4 shows the Vgg dependence RF characteristics data.
 - Page 5-6 shows the Pin dependence RF characteristics data.
 - Page 7 shows the Equivalent Circuit.

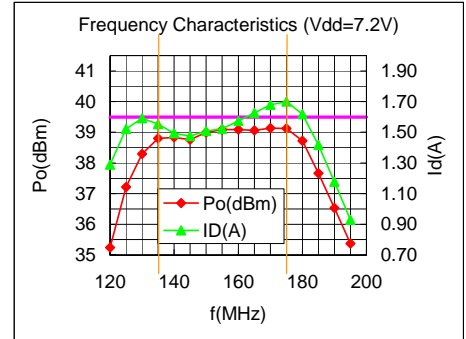
2 stage Amp VHF wide band matching circuit characteristics

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RD01MUS1 & RD07MVS1 2stage Amp matching circuit's Vdd dependence characteristics

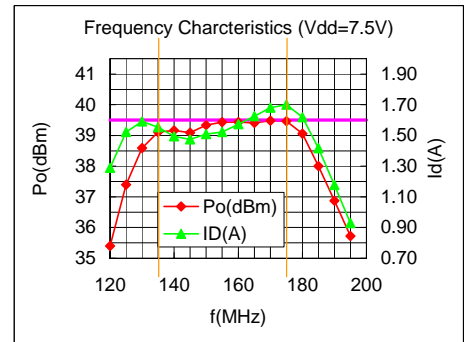
1). Conditions: Vdd=7.2V, Pin=13dBm, Vgg=5V, Idq=800mA

f(MHz)	Pin(dBm)	Po(dBm)	Po(W)	ID(A)	d(%)	R.L (dB)	Harmonics 2fo(dBc)	Harmonics 3fo(dBc)
120	12.99	35.24	3.34	1.289	36.01	-11.00	-16.70	-34.55
125	13.04	37.22	5.27	1.522	48.08	-11.71	-19.95	-44.28
130	12.99	38.29	6.75	1.591	58.91	-12.45	-19.39	-49.02
135	13.04	38.80	7.59	1.553	67.89	-13.17	-17.20	-44.50
140	12.96	38.84	7.65	1.494	71.11	-14.27	-16.08	-43.74
145	13.04	38.76	7.52	1.475	70.82	-16.00	-14.67	-42.51
150	13.02	39.00	7.94	1.509	73.07	-18.43	-14.78	-47.36
155	13.05	39.09	8.11	1.523	73.97	-21.94	-19.65	-51.39
160	13.04	39.09	8.11	1.574	71.54	-21.57	-24.68	-53.85
165	12.98	39.06	8.06	1.626	68.84	-21.79	-27.69	-57.29
170	13.02	39.13	8.19	1.680	67.74	-22.44	-29.38	<-60
175	13.02	39.13	8.18	1.700	66.81	-23.21	-30.60	<-60
180	12.97	38.72	7.45	1.619	63.87	-22.53	-31.56	<-60
185	13.00	37.67	5.84	1.417	57.26	-21.81	-32.30	<-60
190	12.98	36.54	4.50	1.178	53.09	-21.39	-32.27	<-60
195	13.03	35.37	3.45	0.929	51.52	-18.39	-31.76	<-60



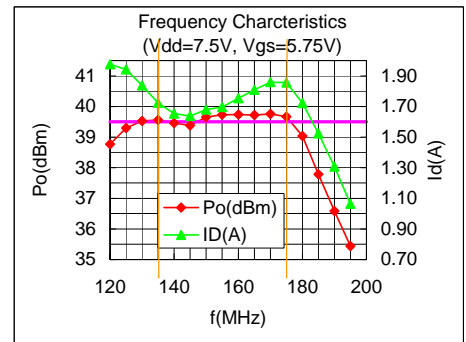
2). Conditions: Vdd=7.5V, Pin=13dBm, Vgg=5V, Idq=800mA

f(MHz)	Pin(dBm)	Po(dBm)	Po(W)	ID(A)	d(%)	R.L (dB)	Harmonics 2fo(dBc)	Harmonics 3fo(dBc)
120	12.98	35.40	3.47	1.315	35.18	-10.99	-16.73	-34.39
125	13.04	37.40	5.49	1.553	47.15	-11.71	-19.62	-43.84
130	12.98	38.59	7.22	1.647	58.49	-12.44	-19.28	-48.79
135	13.03	39.11	8.15	1.611	67.43	-13.14	-17.26	-44.44
140	12.95	39.17	8.25	1.552	70.89	-14.23	-16.13	-43.33
145	13.03	39.09	8.11	1.533	70.56	-16.02	-14.68	-42.48
150	13.02	39.33	8.58	1.568	72.95	-18.41	-14.76	-47.01
155	13.05	39.44	8.78	1.585	73.89	-22.06	-19.67	-50.75
160	13.03	39.43	8.78	1.637	71.49	-21.51	-24.66	-53.82
165	12.97	39.41	8.72	1.691	68.77	-21.77	-27.64	-57.56
170	13.01	39.48	8.87	1.747	67.69	-22.38	-29.36	<-60
175	13.02	39.47	8.85	1.768	66.75	-23.09	-30.48	-57.87
180	12.96	39.06	8.05	1.685	63.67	-22.11	-31.48	-57.22
185	13.00	38.00	6.31	1.475	57.07	-21.78	-32.31	<-60
190	12.97	36.87	4.86	1.228	52.82	-21.25	-32.39	<-60
195	13.02	35.72	3.73	0.970	51.29	-18.24	-31.86	<-60



3). Conditions: Vdd=7.5V, Pin=13dBm, Vgg=5.75V, Idq=1718mA

f(MHz)	Pin(dBm)	Po(dBm)	Po(W)	ID(A)	d(%)	R.L (dB)	Harmonics 2fo(dBc)	Harmonics 3fo(dBc)
120	13.03	38.77	7.53	1.976	50.82	-11.20	-16.73	-34.39
125	13.02	39.30	8.51	1.942	58.39	-12.05	-19.62	-43.84
130	12.95	39.53	8.98	1.837	65.15	-12.85	-16.98	-44.37
135	13.02	39.56	9.04	1.723	69.97	-13.95	-16.32	-43.88
140	13.01	39.46	8.84	1.654	71.25	-15.35	-15.37	-44.15
145	13.02	39.38	8.67	1.638	70.60	-17.09	-14.04	-44.02
150	12.99	39.65	9.23	1.680	73.28	-19.88	-14.27	-47.99
155	13.04	39.73	9.39	1.697	73.81	-21.35	-19.23	-51.78
160	13.01	39.74	9.41	1.754	71.56	-22.17	-24.27	-54.75
165	13.05	39.72	9.37	1.810	69.05	-22.41	-27.59	-58.33
170	12.98	39.75	9.45	1.859	67.77	-23.82	-29.39	<-60
175	12.98	39.67	9.27	1.857	66.54	-24.78	-30.57	<-60
180	13.05	39.04	8.02	1.722	62.07	-23.80	-31.74	-57.35
185	12.98	37.78	6.00	1.524	52.51	-22.42	-32.98	<-60
190	12.97	36.58	4.55	1.308	46.43	-21.71	-33.21	<-60
195	13.03	35.44	3.50	1.064	43.82	-18.39	-32.58	<-60



2 stage Amp VHF wide band matching circuit characteristics

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RD01MUS1 & RD07MVS1 2 stage Amp matching circuit's Vgs dependence character

1). Conditions: V_{gg}=5V, Pin=13dBm, V_{dd}=7.2V, I_{dq}=800mA

f(MHz)	Pin(dBm)	Po(dBm)	Po(W)	ID(A)	d(%)	R.L (dB)	Harmonics 2fo(dBc)	Harmonics 3fo(dBc)
120	12.99	35.24	3.34	1.289	36.01	-11.00	-16.70	-34.55
125	13.04	37.22	5.27	1.522	48.08	-11.71	-19.95	-44.28
130	12.99	38.29	6.75	1.591	58.91	-12.45	-19.39	-49.02
135	13.04	38.80	7.59	1.553	67.89	-13.17	-17.20	-44.50
140	12.96	38.84	7.65	1.494	71.11	-14.27	-16.08	-43.74
145	13.04	38.76	7.52	1.475	70.82	-16.00	-14.67	-42.51
150	13.02	39.00	7.94	1.509	73.07	-18.43	-14.78	-47.36
155	13.05	39.09	8.11	1.523	73.97	-21.94	-19.65	-51.39
160	13.04	39.09	8.11	1.574	71.54	-21.57	-24.68	-53.85
165	12.98	39.06	8.06	1.626	68.84	-21.79	-27.69	-57.29
170	13.02	39.13	8.19	1.680	67.74	-22.44	-29.38	<-60
175	13.02	39.13	8.18	1.700	66.81	-23.21	-30.60	<-60
180	12.97	38.72	7.45	1.619	63.87	-22.53	-31.56	<-60
185	13.00	37.67	5.84	1.417	57.26	-21.81	-32.30	<-60
190	12.98	36.54	4.50	1.178	53.09	-21.39	-32.27	<-60
195	13.03	35.37	3.45	0.929	51.52	-18.39	-31.76	<-60

Note: RD01MUS1 V_{gs}=3V, I_{dq}=150mA , RD07MVS1 V_{gs}=2.44V, I_{dq}=650mA

2). Conditions: V_{gg}=5.25V, Pin=13dBm, V_{dd}=7.2V, I_{dq}=1060mA

f(MHz)	Pin(dBm)	Po(dBm)	Po(W)	ID(A)	d(%)	R.L (dB)	Harmonics 2fo(dBc)	Harmonics 3fo(dBc)
120	13.05	36.68	4.66	1.527	42.39	-11.08	-17.85	-36.92
125	13.01	38.02	6.33	1.666	52.80	-11.80	-19.49	-45.60
130	13.06	38.67	7.35	1.657	61.64	-12.57	-18.17	-46.09
135	13.01	38.95	7.84	1.584	68.78	-13.38	-16.83	-44.45
140	13.04	38.93	7.82	1.522	71.35	-14.66	-15.89	-43.81
145	13.02	38.85	7.67	1.501	70.99	-16.32	-14.45	-42.95
150	13.00	39.10	8.12	1.539	73.29	-19.34	-14.63	-47.18
155	13.03	39.20	8.31	1.557	74.12	-21.18	-19.54	-51.47
160	13.02	39.20	8.32	1.610	71.75	-21.90	-24.55	-54.41
165	12.97	39.17	8.26	1.661	69.05	-21.82	-27.65	-57.68
170	13.00	39.23	8.37	1.714	67.85	-22.72	-29.41	<-60
175	13.00	39.20	8.31	1.726	66.89	-23.62	-30.59	<-60
180	13.06	38.73	7.46	1.628	63.68	-22.44	-31.51	-57.31
185	12.99	37.62	5.78	1.425	56.33	-21.97	-32.46	<-60
190	12.96	36.47	4.44	1.193	51.70	-20.70	-32.47	<-60
195	13.02	35.31	3.40	0.945	49.92	-18.57	-32.00	<-60

Note: RD01MUS1 V_{gs}=3.12V, I_{dq}=158mA , RD07MVS1 V_{gs}=2.54V, I_{dq}=902mA

3). Conditions: V_{gg}=5.75V, Pin=13dBm, V_{dd}=7.2V, I_{dq}=1718mA

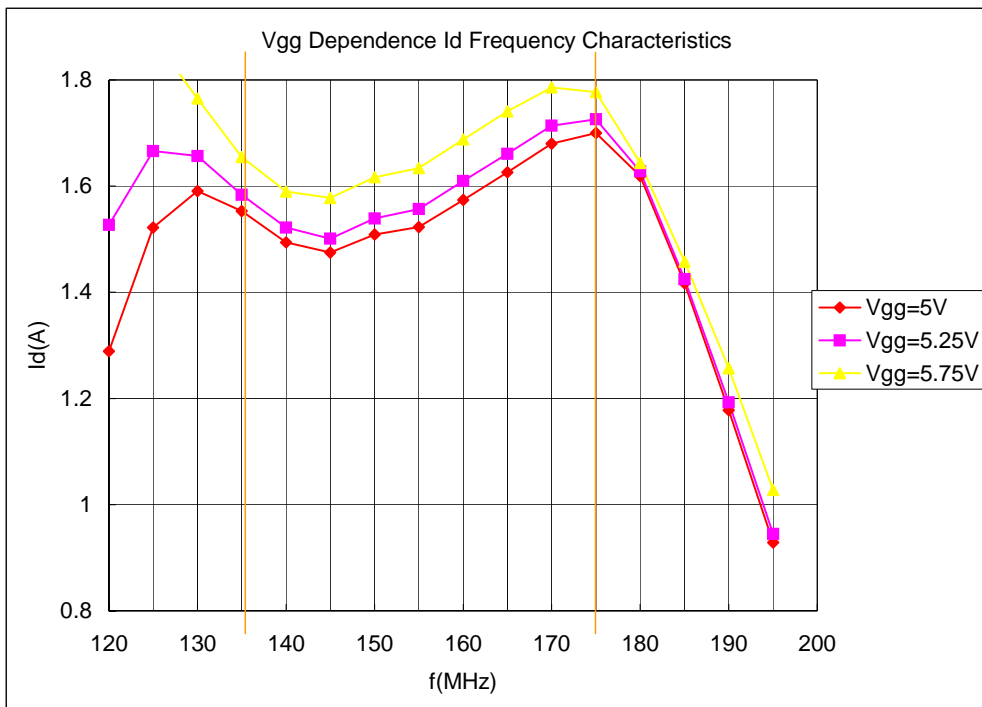
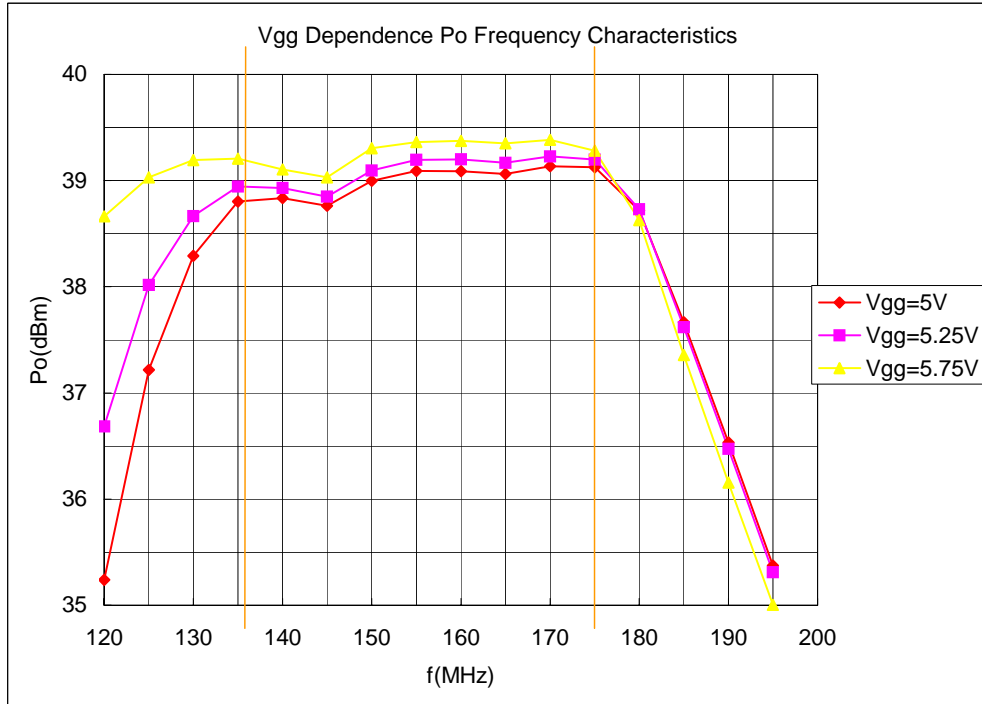
f(MHz)	Pin(dBm)	Po(dBm)	Po(W)	ID(A)	d(%)	R.L (dB)	Harmonics 2fo(dBc)	Harmonics 3fo(dBc)
120	12.98	38.66	7.35	1.942	52.58	-11.18	-17.53	-39.69
125	13.03	39.03	8.00	1.879	59.12	-12.06	-17.24	-43.22
130	12.99	39.19	8.31	1.765	65.36	-12.90	-16.82	-44.18
135	13.03	39.21	8.33	1.655	69.92	-14.00	-16.24	-44.06
140	12.95	39.11	8.14	1.590	71.09	-15.38	-15.37	-44.35
145	13.03	39.03	8.00	1.578	70.41	-17.07	-13.98	-44.08
150	13.03	39.30	8.52	1.617	73.19	-19.60	-14.20	-48.25
155	13.05	39.36	8.64	1.634	73.41	-21.18	-19.24	-51.98
160	13.04	39.37	8.66	1.688	71.24	-21.84	-24.24	-54.42
165	12.98	39.35	8.61	1.741	68.70	-21.90	-27.63	-57.51
170	13.02	39.38	8.68	1.786	67.48	-23.43	-29.43	<-60
175	13.02	39.28	8.48	1.777	66.25	-24.45	-30.59	<-60
180	12.97	38.63	7.29	1.644	61.59	-23.41	-31.82	<-60
185	13.01	37.36	5.44	1.458	51.83	-22.43	-33.01	<-60
190	12.98	36.15	4.13	1.257	45.58	-21.68	-33.32	<-60
195	13.04	35.00	3.17	1.028	42.77	-18.36	-32.77	<-60

Note: RD01MUS1 V_{gs}=3.43V, I_{dq}=193mA , RD07MVS1 V_{gs}=2.79V, I_{dq}=1525mA

2 stage Amp VHF wide band matching circuit characteristics

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RD01MUS1 & RD07MVS1 2 stage Amp matching circuit's V_{gs} dependence characteristics



2 stage Amp VHF wide band matching circuit characteristics

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RD01MUS1 & RD07MVS1 2 stage Amp matching circuit's Pin dependence characteri

1). Conditions: Pin=13dBm, Vdd=7.2V, Vgg=5V, Idq=800mA

f(MHz)	Pin(dBm)	Po(dBm)	Po(W)	ID(A)	d(%)	R.L (dB)	Harmonics 2fo(dBc)	Harmonics 3fo(dBc)
120	12.99	35.24	3.34	1.289	36.01	-11.00	-16.70	-34.55
125	13.04	37.22	5.27	1.522	48.08	-11.71	-19.95	-44.28
130	12.99	38.29	6.75	1.591	58.91	-12.45	-19.39	-49.02
135	13.04	38.80	7.59	1.553	67.89	-13.17	-17.20	-44.50
140	12.96	38.84	7.65	1.494	71.11	-14.27	-16.08	-43.74
145	13.04	38.76	7.52	1.475	70.82	-16.00	-14.67	-42.51
150	13.02	39.00	7.94	1.509	73.07	-18.43	-14.78	-47.36
155	13.05	39.09	8.11	1.523	73.97	-21.94	-19.65	-51.39
160	13.04	39.09	8.11	1.574	71.54	-21.57	-24.68	-53.85
165	12.98	39.06	8.06	1.626	68.84	-21.79	-27.69	-57.29
170	13.02	39.13	8.19	1.680	67.74	-22.44	-29.38	<-60
175	13.02	39.13	8.18	1.700	66.81	-23.21	-30.60	<-60
180	12.97	38.72	7.45	1.619	63.87	-22.53	-31.56	<-60
185	13.00	37.67	5.84	1.417	57.26	-21.81	-32.30	<-60
190	12.98	36.54	4.50	1.178	53.09	-21.39	-32.27	<-60
195	13.03	35.37	3.45	0.929	51.52	-18.39	-31.76	<-60

2). Conditions: Pin=15dBm, Vdd=7.2V, Vgg=5V, Idq=800mA

f(MHz)	Pin(dBm)	Po(dBm)	Po(W)	ID(A)	d(%)	R.L (dB)	Harmonics 2fo(dBc)	Harmonics 3fo(dBc)
120	15.05	35.76	3.77	1.347	38.83	-10.94	-16.70	-34.55
125	15.02	37.49	5.61	1.568	49.71	-11.56	-19.95	-44.28
130	14.99	38.76	7.52	1.664	62.77	-12.09	-17.49	-45.53
135	15.04	39.03	8.00	1.585	70.10	-12.75	-16.54	-43.77
140	14.96	38.96	7.86	1.517	71.98	-13.86	-15.82	-43.81
145	15.04	38.85	7.68	1.494	71.40	-15.55	-14.48	-42.77
150	15.02	39.07	8.08	1.523	73.64	-18.55	-14.65	-47.28
155	15.06	39.10	8.12	1.518	74.29	-21.58	-19.70	-51.47
160	15.04	39.08	8.09	1.565	71.80	-21.97	-24.73	-53.76
165	14.98	39.08	8.08	1.623	69.16	-21.92	-27.70	-57.33
170	15.01	39.16	8.24	1.684	67.97	-22.92	-29.41	<-60
175	15.01	39.14	8.20	1.703	66.91	-23.04	-30.44	<-60
180	14.98	38.77	7.54	1.624	64.49	-22.97	-31.38	<-60
185	15.01	37.83	6.07	1.406	59.98	-22.80	-31.99	<-60
190	15.00	36.74	4.72	1.147	57.15	-20.89	-31.86	<-60
195	14.94	35.52	3.56	0.899	55.07	-18.03	-31.40	<-60

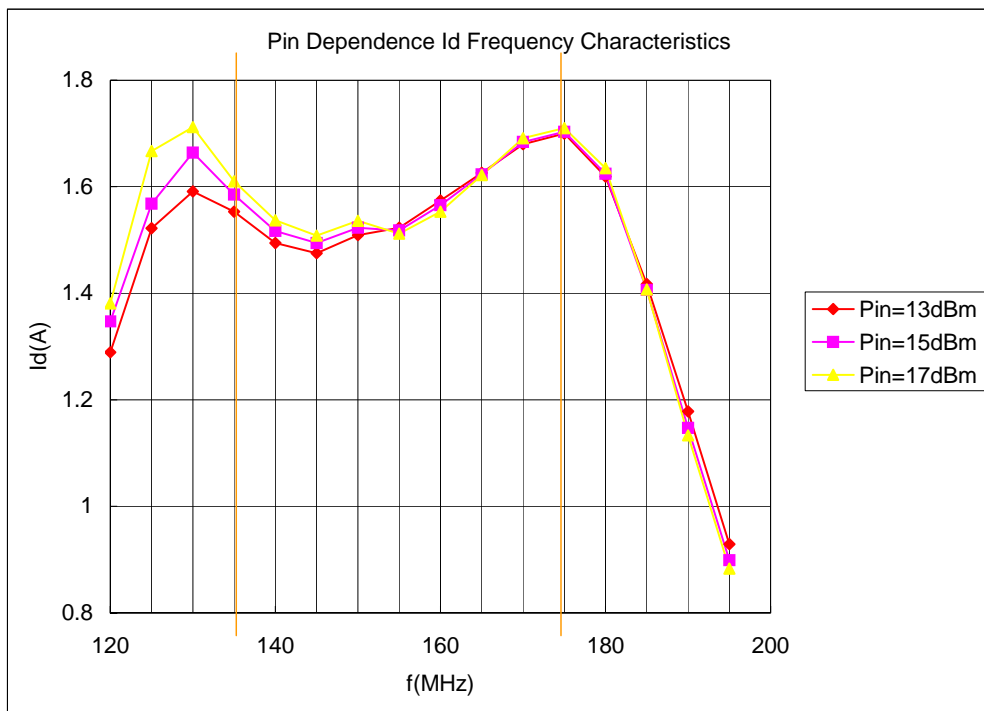
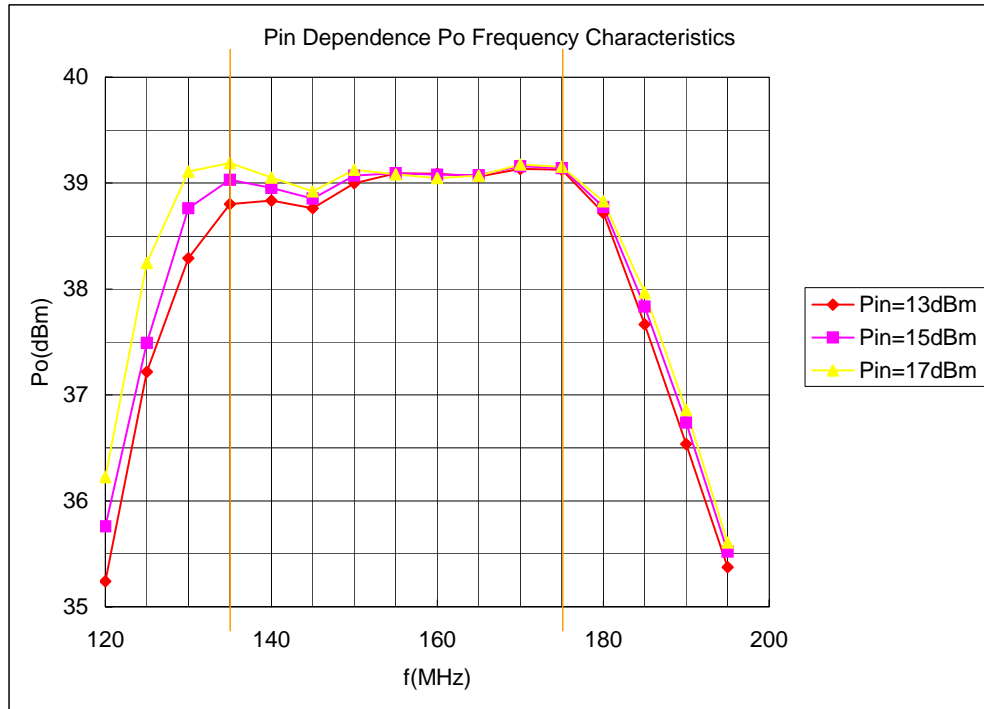
3). Conditions: Pin=17dBm, Vdd=7.2V, Vgg=5V, Idq=800mA

f(MHz)	Pin(dBm)	Po(dBm)	Po(W)	ID(A)	d(%)	R.L (dB)	Harmonics 2fo(dBc)	Harmonics 3fo(dBc)
120	17.01	36.22	4.19	1.381	42.15	-10.86	-16.70	-34.55
125	16.98	38.25	6.68	1.667	55.65	-11.28	-14.98	-37.76
130	16.99	39.11	8.14	1.712	66.05	-11.84	-16.69	-43.36
135	17.02	39.19	8.30	1.610	71.59	-12.60	-16.16	-43.21
140	17.04	39.05	8.04	1.537	72.64	-13.68	-15.51	-43.52
145	17.03	38.92	7.80	1.508	71.83	-15.16	-14.33	-43.03
150	17.00	39.13	8.18	1.536	73.94	-17.82	-14.58	-47.73
155	17.03	39.08	8.10	1.512	74.36	-20.64	-19.73	-51.01
160	17.01	39.05	8.03	1.553	71.82	-20.75	-24.75	-53.37
165	16.95	39.07	8.07	1.622	69.13	-20.70	-27.70	-57.30
170	16.98	39.17	8.27	1.691	67.92	-21.60	-29.35	<-60
175	16.99	39.16	8.23	1.710	66.87	-23.37	-30.48	<-60
180	17.04	38.83	7.63	1.635	64.85	-23.68	-31.27	<-60
185	16.99	37.97	6.26	1.407	61.81	-22.94	-31.67	<-60
190	16.97	36.86	4.85	1.133	59.46	-19.95	-31.65	<-60
195	17.02	35.61	3.64	0.883	57.19	-18.04	-31.32	<-60

2 stage Amp VHF wide band matching circuit characteristics

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RD01MUS1 & RD07MVS1 2 stage Amp matching circuit's Pin dependence characteristics



2 stage Amp VHF wide band matching circuit characteristics

AN-VHF-013-A

VHF band 2 stage Amp Equivalent Circuit (@f=135-175MHz)

