

RFSA2714 Application Note

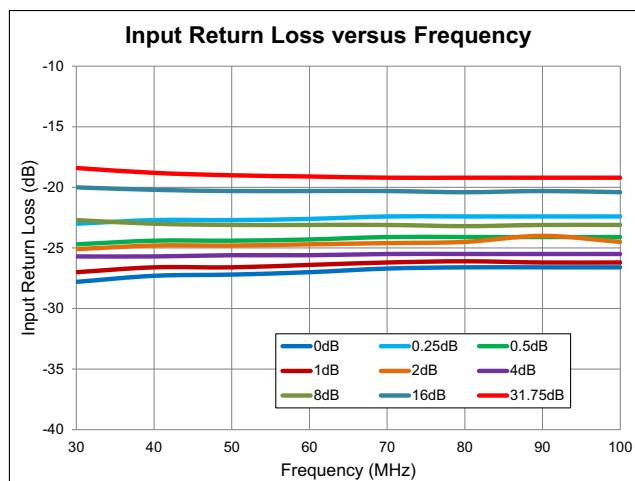
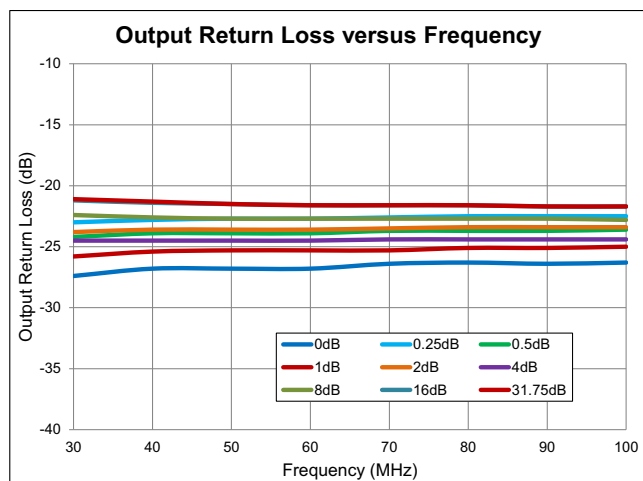
Product Description

RFSA2714 is a QFN package 7-bit Digital Step Attenuator (DSA) that is capable of high linearity over the entire 31.75dB gain control range with excellent step accuracy in 0.25dB steps. The RFSA2714 is parallel controlled and has an on-chip decoder that is both 3V and 5V compatible. This Digital Step Attenuator is ideal for Transceiver IF Applications, Cellular, GSM, PCS, UMTS, LTE, WiMAX/WiFi, Wireless Data and Satellite Terminals.

The RFSA2714 was tested at the following frequencies 30MHz, 50MHz, 1000MHz, 2000MHz and 4000MHz. The following performance data was collected at varying attenuation state, room temperature and V_{DD} , V_{CTL} at both 3V and 5V.

NOTE: Input and output capacitors C11 and C12 were changed to 1 μ F in order to perform the test. P_{OUT} =10dBm/tone, 1MHz spacing for the test.

Data V_{CC} : 3V



Attenuation = 0dB			
Frequency (MHz)	Loss (dB)	Output P1dB	Input IP3
30	-0.96	16.3	47.7
50	-1.06	17.5	48.2
1000	-1.4	20.8	52.6
2000	-1.83	20.85	52.9
4000	-2.83	21.8	44.8

Attenuation = 0.25dB			
Frequency (MHz)	Loss (dB)	Output P1dB	Input IP3
30	-1.23	16.4	44.53
50	-1.38	17.9	46.6
1000	-1.67	21.1	48.9
2000	-2.18	21.2	48.7
4000	-3.17	22	44.3

Attenuation = 0.5dB			
Frequency (MHz)	Loss (dB)	Output P1dB	Input IP3
30	-1.47	16.7	48.1
50	-1.64	18.3	48.1
1000	-1.94	21.3	52.5
2000	-2.36	21.5	53.5
4000	-3.41	22.5	45.2

Attenuation = 1dB			
Frequency (MHz)	Loss (dB)	Output P1dB	Input IP3
30	-1.98	17.4	49.2
50	-2.14	19.2	49.6
1000	-2.54	22.3	52.7
2000	-2.86	22.5	53.5
4000	-3.9	23.5	45.7

Attenuation = 2dB			
Frequency (MHz)	Loss (dB)	Output P1dB	Input IP3
30	-2.98	18.8	47.2
50	-3.14	20.3	47.4
1000	-3.46	23.2	52.6
2000	-3.88	23.4	52.9
4000	-4.8	24.5	46.1

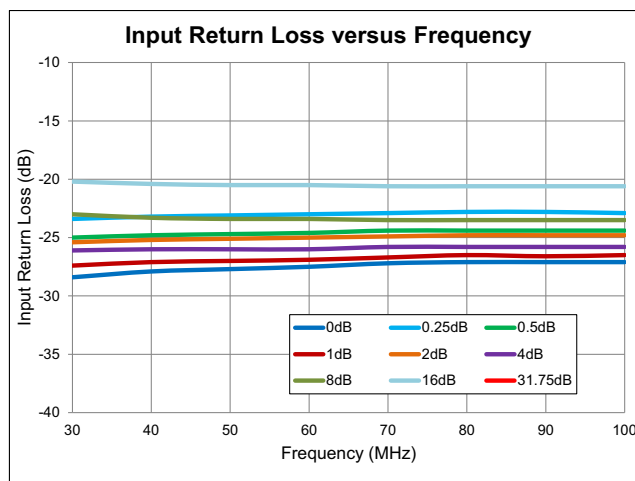
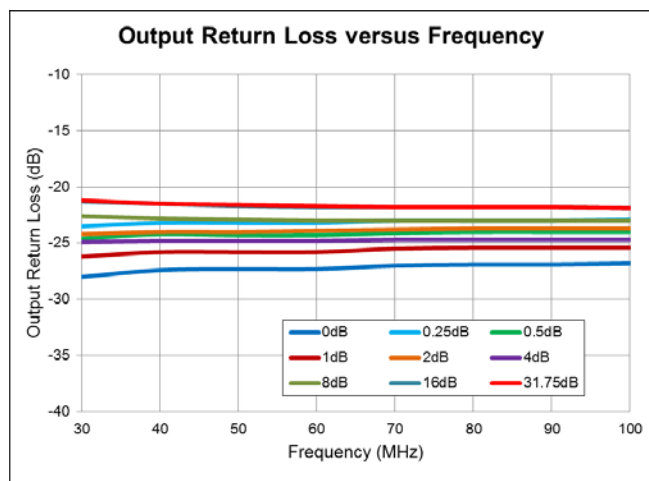
Attenuation = 4dB			
Frequency (MHz)	Loss (dB)	Output P1dB	Input IP3
30	-4.98	21	47.9
50	-5.15	22.4	47.2
1000	-5.5	24.5	51.5
2000	-5.92	25.2	51.7
4000	-6.82	26.6	45.8

Attenuation = 8dB			
Frequency (MHz)	Loss (dB)	Output P1dB	Input IP3
30	-8.71	19	44.2
50	-8.86	20	44.3
1000	-9.29	22	47.5
2000	-9.72	23	47.1
4000	-10.68	27	44.6

Attenuation = 16dB			
Frequency (MHz)	Loss (dB)	Output P1dB	Input IP3
30	-16.37	16.3	40.5
50	-16.6	16.8	40.7
1000	-17.14	20	46.84
2000	-17.51	20.4	45.81
4000	-18.63	23	40.73

Attenuation = 31.75dB			
Frequency (MHz)	Loss (dB)	Output P1dB	Input IP3
30	-31.52	>28	40.4
50	-32.04	28.7	40.4
1000	-32.29	>29	39.5
2000	-33.11	>29	38.4
4000	-34.13	>27	33

Data V_{CC} : 3.3V



Attenuation = 0dB			
Frequency (MHz)	Loss (dB)	Output P1dB	Input IP3
30	-0.95	17.8	48.1
50	-1.03	18.6	48.3
1000	-1.42	22	52.9
2000	-1.73	22.3	53.7
4000	-2.81	23.35	45.5

Attenuation = 0.25dB			
Frequency (MHz)	Loss (dB)	Output P1dB	Input IP3
30	-1.2	18.1	45.9
50	-1.3	18.8	47.6
1000	-1.67	22.4	49.9
2000	-2.09	22.5	49.8
4000	-3.11	23.6	44.9

Attenuation = 0.5dB			
Frequency (MHz)	Loss (dB)	Output P1dB	Input IP3
30	-1.48	18.4	47.9
50	-1.58	19.2	48
1000	-1.96	22.7	52.8
2000	-2.34	22.78	53.5
4000	-3.36	24	45.7

Attenuation = 1dB			
Frequency (MHz)	Loss (dB)	Output P1dB	Input IP3
30	-1.98	18.9	47.8
50	-2.07	20.3	47.9
1000	-2.47	23.57	53.3
2000	-2.84	23.7	53.5
4000	-3.86	24.9	45.9

Attenuation = 2dB			
Frequency (MHz)	Loss (dB)	Output P1dB	Input IP3
30	-2.96	20	47.5
50	-3.06	21.5	47.4
1000	-3.43	24.4	53.3
2000	-3.85	24.7	52.9
4000	-4.76	26.35	45.6

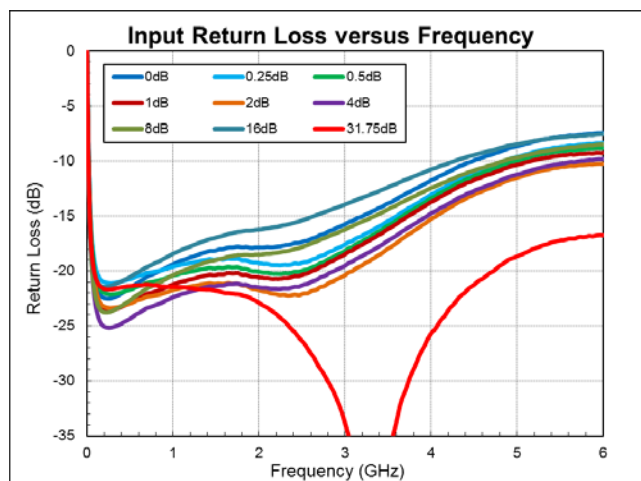
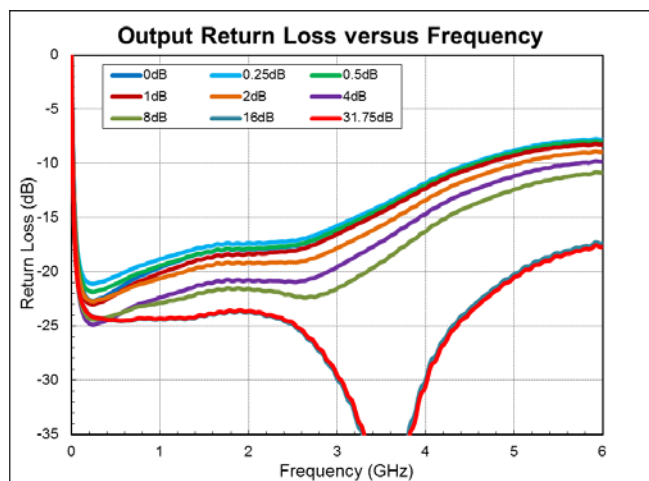
Attenuation = 4dB			
Frequency (MHz)	Loss (dB)	Output P1dB	Input IP3
30	-4.99	22.5	47.8
50	-5.08	23.6	47.2
1000	-5.46	26.4	51.76
2000	-5.9	27.2	51.5
4000	-6.8	>27	45.6

Attenuation = 8dB			
Frequency (MHz)	Loss (dB)	Output P1dB	Input IP3
30	-8.7	20	44.1
50	-8.78	22	44.4
1000	-9.92	23	48.8
2000	-9.71	25	47.9
4000	-10.68	>27	44.7

Attenuation = 16dB			
Frequency (MHz)	Loss (dB)	Output P1dB	Input IP3
30	-16.36	17.6	40.4
50	-16.54	18.4	40.6
1000	-17.16	21.4	47.26
2000	-17.52	22	45.62
4000	-18.66	24.6	40.66

Attenuation = 31.75dB			
Frequency (MHz)	Loss (dB)	Output P1dB	Input IP3
30	-31.54	25.2	40.3
50	-32.06	28.4	40.3
1000	-32.35	>29	39.4
2000	-33.17	>29	38.3
4000	-34.22	>27	32.62

Data V_{CC} : 5V



Attenuation = 0dB			
Frequency (MHz)	Loss (dB)	Output P1dB	Input IP3
30	-0.87	23.4	55.4
50	-0.84	23.9	55.3
1000	-1.34	27.6	55.6
2000	-1.83	27.7	56.9
4000	-2.74	>27	46.7

Attenuation = 0.25dB			
Frequency (MHz)	Loss (dB)	Output P1dB	Input IP3
30	-1.09	23.5	50.4
50	-1.08	24	52.5
1000	-1.57	27.6	52.5
2000	-2.03	27.7	52.7
4000	-2.99	>27	46.4

Attenuation = 0.5dB			
Frequency (MHz)	Loss (dB)	Output P1dB	Input IP3
30	-1.42	24.1	54.9
50	-1.41	24.4	55.2
1000	-1.91	27.84	55.5
2000	-2.36	27.8	57.8
4000	-3.29	>27	47

Attenuation = 1dB			
Frequency (MHz)	Loss (dB)	Output P1dB	Input IP3
30	-1.92	25.2	55
50	-1.97	26	55.3
1000	-2.43	>29	55.5
2000	-2.66	>28	57.5
4000	-3.77	>27	47.8

Attenuation = 2dB			
Frequency (MHz)	Loss (dB)	Output P1dB	Input IP3
30	-2.9	26.4	54.5
50	-2.94	27.7	54.6
1000	-3.49	>28	55.5
2000	-3.85	>29	57.2
4000	-4.68	>27	47

Attenuation = 4dB			
Frequency (MHz)	Loss (dB)	Output P1dB	Input IP3
30	-4.95	26.9	53.5
50	-4.96	28.2	53.2
1000	-5.46	>28	54.8
2000	-5.75	>28	56
4000	-6.76	>27	46.6

Attenuation = 8dB			
Frequency (MHz)	Loss (dB)	Output P1dB	Input IP3
30	-8.76	28.9	51.4
50	-8.78	29.82	51.3
1000	-9.38	>29	52.1
2000	-9.65	>29	51.9
4000	-10.73	>27	46.1

Attenuation = 16dB			
Frequency (MHz)	Loss (dB)	Output P1dB	Input IP3
30	-16.43	22.65	48
50	-16.62	23.72	48
1000	-17.32	27.5	51
2000	-17.55	27.4	50.3
4000	-18.81	>27	45.3

Attenuation = 31.75dB			
Frequency (MHz)	Loss (dB)	Output P1dB	Input IP3
30	-31.66	25.75	40
50	-32.37	29.1	40.1
1000	-32.53	>29	43.8
2000	-33.41	>29	42.9
4000	-34.29	>27	37.1