



Speaker volume test

Test equipment

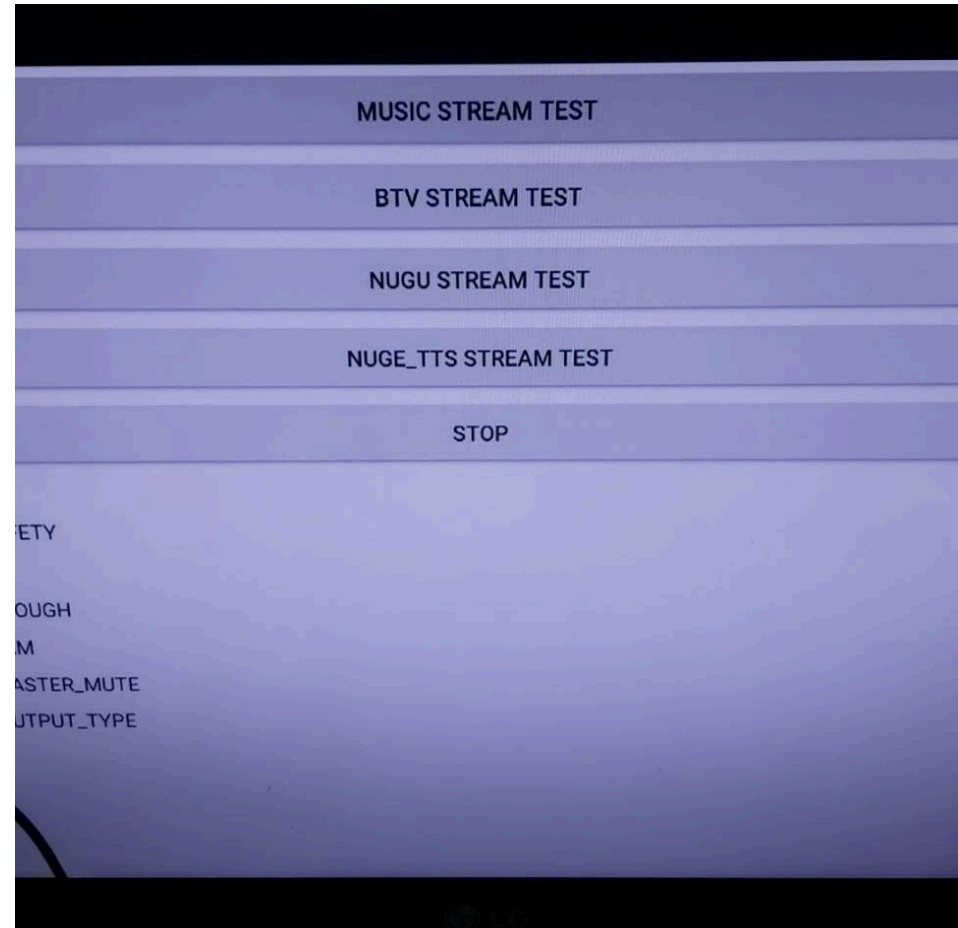
Equipment list	apx585
	b&k 2690
	b&k4191 Microphone



APP-DEBUG.apk

Using app-debug.apk to play tone for volume test:

- Music stream test
- BTV stream test
- NUGU stream test
- NUGU_TTS stream test



Test results

Speaker test

	MUSIC STREAM TEST	BTV STREAM TEST	NUGU STREAM TEST	NUGU_TTS STREAM TEST
0 step	34.2	52.8	34	34
1 step	41.5	52.8	37.8	38
2 step	42.7	52.8	38.8	38.8
3 step	44.2	52.8	39.7	39.7
4 step	45.6	52.8	40.6	40.8
5 step	46.9	52.8	41.8	41.7
6 step	48.3	53.8	43.1	43
7 step	49.8	54.8	44.1	44.2
8 step	51.9	55.8	45.7	45.8
9 step	53.3	56.8	47	47.1
10 step	54.9	57.8	48.4	48.4
11 step	56.4	58.8	49.6	49.7
12 step	57.9	59.8	51.1	51
13 step	59.5	60.8	52.4	52.3
14 step	61.1	61.8	53.8	53.8
15 step	62.6	62.8	55.2	55.2
16 step	64.6	63.8	57	56.9
17 step	66.2	64.8	58.3	58.3
18 step	67.7	63.8	59.7	59.7
19 step	69.3	66.8	61.3	61
20 step	70.8	67.8	62.4	62.4
21 step	72.2	68.8	63.8	63.8
22 step	73.6	69.8	65.2	65.2
23 step	75.4	70.8	66.5	66.6
24 step	77.4	71.8	68.4	68.4
25 step	79	72.8	69.8	69.8
26 step	80.5	72.8	71.1	71.1
27 step	82	72.8	72.5	72.5
28 step	83.6	72.8	73.9	73.9
29 step	85.1(THD 3.6%)	72.8	75.2	75.2
30 step	86.6(THD 4.6%)	72.8	76.6	76.6
31 step	88(THD 4.9%)	72.8	78	78
32 step	90(THD 5.2%)	72.8	79.8	79.8

Note: red mark are THD over 1%, the others are under 1%.

VS

HDMI volume test: LKFS



	SBS_CM5000_AAC.ts	SBS_정파.mpg
	CH1(Left)	CH1(Left)
1st	-77.37	-77.37
2nd	-76.04	-76.03
3rd	-74.49	-74.49
4th	-73.16	-73.15
5th	-71.87	-71.86
6th	-70.02	-70.00
7th	-68.02	-68.01
8th	-65.27	-65.26
9th	-63.25	-63.25
10th	-61.25	-61.25
11th	-59.29	-59.29
12th	-57.41	-57.42
13th	-55.57	-55.56
14th	-53.79	-53.79
15th	-52.08	-52.08
16th	-49.87	-49.86
17th	-48.28	-48.24
18th	-46.66	-46.66
19th	-45.08	-45.1
20th	-43.52	-43.51
21th	-41.95	-41.95
22th	-40.41	-40.41
23th	-38.87	-38.86
24th	-36.82	-36.81
25th	-35.28	-35.28
26th	-33.74	-33.73
27th	-32.21	-32.21
28th	-30.67	-30.67
29th	-29.15	-29.14
30th	-27.61	-27.61
31th	-26.08	-26.08
32th	-24.04	-24.04

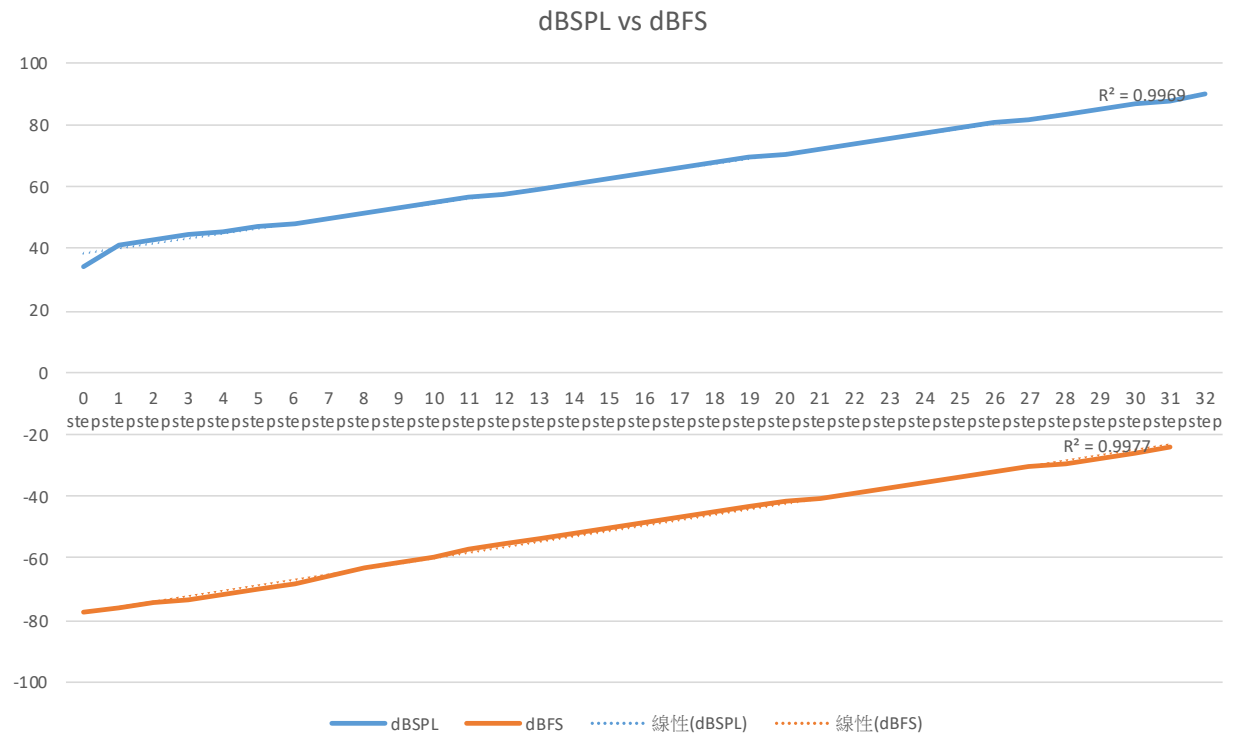
dB SPL compares dBFS

Compare HDMI & Speaker output volume

- Speaker: dB SPL
- HDMI LKFS: dBFS

Trend for these two output volume

- Speaker: 0.9969
- HDMI LKFS: 0.9972



Summary

- Speaker volume test
 - Using APP-DEBUG.apk to test by music stream for 1KHz 0dB tone.
 - The maximum volume is 90dBSPL within the THD is 5.2%.
- Compare with HDMI LKFS
 - The linearity of speaker and HDMI LKFS seem similar which refer to the same volume table.
 - Speaker test is playing 0dBFS 1KHz tone for test.