

Appendix A

Volume Control Test Data and Graph for Report No.: SUES251000204071

The DUT shall have at least one volume control setting that will produce a conversational gain of ≥ 6 .

Verdict: Pass.

1.1 For codecs with bit rate, check the bit rate with the worst conversational gain

Codec	Codec Bitrate (kbps)	Conv. Gain(dB)							
		WCDMA B2		LTE 41		NR n78		802.11b	
		2N	8N	2N	8N	2N	8N	2N	8N
AMR-NB	4.75	13.96	18.85	14.41	19.13	14.74	19.58	14.51	19.38
	5.15	13.99	19.05	14.49	19.45	14.92	19.89	14.61	19.45
	5.9	14.28	19.07	14.54	19.56	14.99	19.93	14.70	19.46
	6.7	14.37	19.11	14.56	19.62	15.00	19.99	14.71	19.61
	7.4	14.41	19.16	14.73	19.68	15.04	20.07	14.76	19.69
	7.95	14.42	19.31	14.76	19.77	15.14	20.08	14.86	19.72
	10.2	14.49	19.32	14.87	19.81	15.15	20.13	14.97	19.85
	12.2	14.80	19.36	14.88	19.89	15.22	20.15	15.12	19.87
AMR-WB	6.6	8.24	13.07	8.41	13.11	8.32	13.25	8.49	13.17
	8.85	8.27	13.12	8.54	13.15	8.36	13.34	8.50	13.22
	12.65	8.39	13.15	8.59	13.20	8.39	13.36	8.55	13.23
	14.25	8.42	13.21	8.63	13.24	8.40	13.40	8.56	13.24
	15.85	8.55	13.22	8.66	13.30	8.47	13.41	8.60	13.27
	18.25	8.61	13.25	8.69	13.37	8.49	13.43	8.64	13.30
	19.85	8.65	13.30	8.75	13.38	8.53	13.44	8.65	13.31
	23.05	8.71	13.33	8.79	13.40	8.55	13.46	8.67	13.38
	23.85	8.89	13.44	8.81	13.43	8.66	13.47	8.71	13.41
EVS-NB	5.9	N/A		14.15	19.24	13.82	18.86	14.27	19.08
	7.2			14.21	19.25	13.98	18.95	14.45	19.10
	8			14.22	19.45	14.08	18.96	14.60	19.18
	9.6			14.29	19.53	14.16	18.97	14.62	19.24
	13.2			14.42	19.61	14.27	19.08	14.63	19.50
	16.4			14.49	19.88	14.60	19.25	14.78	19.59
	24.4			15.15	19.90	14.74	19.46	14.95	19.64
EVS-WB	5.9			8.12	13.09	8.10	13.03	8.17	12.82
	7.2			8.27	13.10	8.15	13.07	8.43	13.72
	8			8.29	13.18	8.23	13.23	8.48	13.72
	9.6			8.42	13.22	8.31	13.39	8.58	13.72
	13.2			8.57	13.28	8.35	13.56	8.66	13.72
	16.4			8.62	13.30	8.54	13.58	8.67	13.72
	24.4			8.83	13.44	9.02	13.66	8.70	13.72
EVS-SWB	9.6			10.34	14.40	10.59	14.46	10.13	14.41
	13.2			10.42	14.56	10.62	14.73	10.17	14.66
	16.4			10.59	14.78	10.71	14.89	10.34	14.76
	24.4			10.62	14.84	10.72	14.96	10.67	14.86

1.2 For codecs with bit rate, tested only bit rate with the worst conversational gain

Air Interface	Band	Limit (dB)	Conv. Gain(dB)					
			FR V1		FR V2		HR V1	
			2N	8N	2N	8N	2N	8N
GSM	850	6	15.32	19.92	15.52	20.21	15.54	19.92
	1900	6	15.18	19.97	15.42	20.23	15.25	20.07

Air Interface	Band	Limit (dB)	Conv. Gain(dB)									
			AMR NB (4.75kbps)		AMR WB (6.6kbps)		EVS NB (5.9kbps)		EVS WB (5.9kbps)		EVS SWB (9.6kbps)	
			2N	8N	2N	8N	2N	8N	2N	8N	2N	8N
WCDMA	B2	6	13.96	18.85	8.24	13.07	N/A					
	B4	6	14.15	18.77	8.33	12.92						
	B5	6	14.06	18.86	8.35	12.79						
LTE	B25(2)	6	14.92	19.81	8.65	13.39	14.34	19.08	8.40	13.11	10.41	14.45
	B26(5)	6	14.06	19.78	8.41	13.18	14.17	18.95	8.39	12.90	10.68	14.22
	B7	6	15.19	19.71	8.69	13.16	14.27	19.10	8.41	12.97	10.78	14.56
	B12	6	15.07	19.79	8.61	13.40	14.25	19.17	8.56	13.14	11.20	14.24
	B13	6	14.96	19.82	8.36	13.27	14.16	19.02	8.58	13.02	11.24	14.64
	B14	6	15.15	19.65	8.60	13.20	14.37	19.07	8.51	12.97	10.52	14.03
	B71	6	15.03	19.74	8.60	13.36	14.20	19.20	8.32	13.13	10.67	14.53
	B41(38)	6	14.41	19.13	8.41	13.11	14.15	19.24	8.12	13.09	10.34	14.40
	B66(4)	6	15.04	19.89	8.33	13.39	14.21	19.00	8.39	13.21	10.76	14.49
NR	n25	6	14.63	19.14	8.54	13.45	13.96	18.78	8.17	12.99	10.58	14.86
	n41	6	14.70	19.38	8.57	13.39	14.11	19.12	8.50	13.08	10.73	14.50
	n66	6	14.59	19.48	8.71	13.34	14.15	19.06	8.30	13.14	11.16	14.42
	n71	6	14.61	19.32	8.43	13.44	13.89	18.92	8.23	13.32	10.30	13.97
	n78	6	14.74	19.58	8.32	13.25	13.82	18.86	8.10	13.03	10.59	14.46
WLAN-2.4G	802.11b	6	14.51	19.38	8.49	13.17	14.27	19.08	8.17	12.82	10.13	14.41
	802.11g	6	14.48	19.36	8.60	13.45	14.34	19.21	8.10	13.05	11.02	14.15
	802.11n	6	14.44	19.24	8.55	13.50	14.30	19.01	8.30	13.15	10.84	14.79
WLAN-5G	802.11a	6	14.42	19.22	8.50	13.11	14.24	18.85	8.30	12.95	10.72	14.80
	802.11n	6	14.14	19.28	8.29	13.31	14.31	19.41	8.38	13.20	10.78	14.84
	802.11ac	6	14.09	19.30	8.55	13.11	14.21	19.15	8.26	13.11	10.81	14.95
	802.11ax	6	14.22	18.94	8.61	13.38	14.35	19.08	8.56	13.03	10.90	14.41
WLAN-6G	802.11ax	6	14.33	19.29	8.69	13.22	14.28	19.21	8.18	12.96	10.93	14.25

The noise power shall ≥ 20 when tested over the range of 1/3 octave band center frequencies. The receive frequency response shall be measured at the DRP in 1/12 octave bands. After translation to the FF, it shall fall between the applicable upper and lower limits.

Volume Control: Max-2, LRP: FF

Verdict: Pass

2.1 Distortion Test Result and Frequency Response for EVS-NB 24.4 kbps and LTE

Air Interface	Band	Limit (dB)	Mounting Force	Minimum PN-SDNR (dB)	Receive Acoustic Frequency Response Performance
LTE	B25(2)	20	2N	30.68	1.90
	B25(2)	20	8N	30.38	0.91
	B26(5)	20	2N	28.23	1.96
	B26(5)	20	8N	31.11	1.06
	B7	20	2N	29.59	2.01
	B7	20	8N	30.77	0.82
	B12(17)	20	2N	29.95	1.76
	B12(17)	20	8N	30.72	0.82
	B13	20	2N	31.05	1.94
	B13	20	8N	27.09	0.82
	B14	20	2N	30.94	1.72
	B14	20	8N	31.62	1.03
	B71	20	2N	28.66	1.71
	B71	20	8N	30.88	0.80
	B41(38)	20	2N	30.01	1.34
	B41(38)	20	8N	31.11	0.85
	B66(4)	20	2N	30.03	2.19
	B66(4)	20	8N	29.62	1.77

2.2 Distortion Test Result and Frequency Response for EVS-NB 24.4 kbps and FR1

Air Interface	Band	Limit (dB)	Mounting Force	Minimum PN-SDNR (dB)	Receive Acoustic Frequency Response Performance
FR1	n25	20	2N	29.66	1.73
	n25	20	8N	30.04	0.91
	n41	20	2N	28.64	1.78
	n41	20	8N	30.57	0.99
	n66	20	2N	30.60	1.71
	n66	20	8N	30.73	0.82
	n71	20	2N	30.76	1.82
	n71	20	8N	30.64	0.98
	n78	20	2N	26.96	1.96
	n78	20	8N	31.21	0.84

2.3 Distortion Test Result and Frequency Response for EVB-NB 24.4 kbps and WLAN

Air Interface	Band	Limit (dB)	Mounting Force	Minimum PN-SDNR (dB)	Receive Acoustic Frequency Response Performance
WLAN	2.4G - 802.11b	20	2N	30.39	1.80
	2.4G - 802.11b	20	8N	30.08	1.21
	2.4G - 802.11g	20	2N	32.12	1.75
	2.4G - 802.11g	20	8N	31.81	1.61
	2.4G - 802.11n	20	2N	32.70	2.03
	2.4G - 802.11n	20	8N	30.94	2.02
	5G - 802.11a	20	2N	31.77	1.77
	5G - 802.11a	20	8N	33.36	1.55
	5G - 802.11n	20	2N	30.53	1.79
	5G - 802.11n	20	8N	31.06	1.04
	5G - 802.11ac	20	2N	32.09	1.81
	5G - 802.11ac	20	8N	33.49	1.63
	5G - 802.11ax	20	2N	32.73	2.13
	5G - 802.11ax	20	8N	32.64	1.86
	6G - 802.11ax	20	2N	32.02	1.75
	6G - 802.11ax	20	8N	31.56	1.76

2.4 Distortion Test Result and Frequency Response for EVB-WB 24.4 kbps and LTE

Air Interface	Band	Limit (dB)	Mounting Force	Minimum PN-SDNR (dB)	Receive Acoustic Frequency Response Performance
LTE	B25(2)	20	2N	26.66	2.68
	B25(2)	20	8N	28.26	3.03
	B26(5)	20	2N	27.14	2.26
	B26(5)	20	8N	29.28	3.26
	B7	20	2N	27.86	2.56
	B7	20	8N	26.93	3.07
	B12(17)	20	2N	28.85	2.34
	B12(17)	20	8N	24.38	3.07
	B13	20	2N	27.80	2.16
	B13	20	8N	28.78	3.12
	B14	20	2N	28.59	2.34
	B14	20	8N	25.46	2.87
	B71	20	2N	26.82	2.53
	B71	20	8N	27.47	2.94
	B41(38)	20	2N	25.54	2.27
	B41(38)	20	8N	28.92	2.68
	B66(4)	20	2N	23.90	2.28
	B66(4)	20	8N	28.83	3.39

2.5 Distortion Test Result and Frequency Response for EVB-WB 24.4 kbps and NR

Air Interface	Band	Limit (dB)	Mounting Force	Minimum PN-SDNR (dB)	Receive Acoustic Frequency Response Performance
FR1	n25	20	2N	27.15	2.26
	n25	20	8N	29.26	3.21
	n41	20	2N	27.45	2.08
	n41	20	8N	26.27	2.34
	n66	20	2N	27.87	2.14
	n66	20	8N	27.19	2.45
	n71	20	2N	27.32	1.98
	n71	20	8N	26.95	2.39
	n78	20	2N	27.38	2.21
	n78	20	8N	25.13	3.04

2.6 Distortion Test Result and Frequency Response for EVB-WB 24.4 kbps and WLAN

Air Interface	Band	Limit (dB)	Mounting Force	Minimum PN-SDNR (dB)	Receive Acoustic Frequency Response Performance
WLAN	2.4G - 802.11b	20	2N	28.85	2.34
	2.4G - 802.11b	20	8N	30.05	2.92
	2.4G - 802.11g	20	2N	27.93	2.97
	2.4G - 802.11g	20	8N	28.56	2.83
	2.4G - 802.11n	20	2N	25.98	2.17
	2.4G - 802.11n	20	8N	29.25	3.02
	5G - 802.11a	20	2N	24.05	2.53
	5G - 802.11a	20	8N	27.63	3.42
	5G - 802.11n	20	2N	27.57	2.82
	5G - 802.11n	20	8N	28.20	3.02
	5G - 802.11ac	20	2N	26.68	2.48
	5G - 802.11ac	20	8N	28.75	3.11
	5G - 802.11ax	20	2N	25.45	2.56
	5G - 802.11ax	20	8N	30.43	2.87
	6G - 802.11ax	20	2N	24.99	2.51
	6G - 802.11ax	20	8N	29.67	2.93