Appendix A

Volume Control Test Data and Graph for Report No.: SUES251100243071

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)							
		GSM 850		WCDMA B2		LTE 66		802.11b	
		2N	8N	2N	8N	2N	8N	2N	8N
AMR-NB	4.75	16.61	21.17	13.06	17.94	13.22	18.01	13.07	17.81
	5.15	16.65	21.26	13.14	17.95	13.26	18.12	13.22	17.98
	5.9	16.67	21.35	13.27	17.96	13.29	18.41	13.30	18.05
	6.7	16.72	21.49	13.62	18.14	13.40	18.55	13.34	18.32
	7.4	16.86	21.63	13.75	18.16	13.43	18.68	13.53	18.39
	7.95	16.88	21.79	13.97	18.19	13.62	18.72	13.55	18.44
	10.2	16.89	21.82	14.06	18.56	13.67	18.76	13.68	18.51
	12.2	17.07	21.88	14.08	18.78	13.84	18.80	13.83	18.59
AMR-WB	6.6	15.21	20.15	11.68	16.41	11.97	16.37	11.55	16.66
	8.85	15.69	20.72	11.86	16.54	11.99	16.61	11.61	16.67
	12.65	15.94	20.88	11.87	16.63	12.00	16.73	11.68	16.70
	14.25	N/A		12.04	16.68	12.03	16.83	11.71	16.77
	15.85			12.09	16.69	12.04	16.95	11.75	16.83
	18.25			12.15	16.82	12.16	17.14	11.76	17.04
	19.85			12.23	17.03	12.18	17.16	12.09	17.05
	23.05			12.33	17.10	12.26	17.22	12.22	17.12
	23.85			12.48	17.25	12.46	17.29	12.46	17.17
EVS-NB	5.9	N/A				13.18	17.89	12.86	17.91
	7.2					13.19	18.10	12.89	18.06
	8					13.24	18.12	12.92	18.14
	9.6					13.30	18.29	12.95	18.23
	13.2					13.37	18.34	13.24	18.27
	16.4					13.44	18.37	13.71	18.48
	24.4					13.53	18.59	13.72	18.54
EVS-WB	5.9					11.54	16.15	11.57	16.10
	7.2					11.60	16.23	11.74	16.29
	8					11.63	16.38	11.81	16.39
	9.6					11.66	16.50	11.85	16.47
	13.2					11.88	16.77	11.91	16.62
	16.4					12.38	16.79	11.97	16.74
	24.4					12.44	16.83	12.12	16.81

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		AMR NB (4.75Kbps)		AMR WB (6.6kbps)	
			2N	8N	2N	8N	2N	8N	2N	8N	2N	8N
GSM	850	6	17.43	21.86	17.48	22.29	17.54	22.36	16.61	21.17	15.21	20.15
	1900	6	17.36	22.14	17.77	22.22	17.65	22.32	16.50	21.15	15.24	20.40

Air Interface	Band	Limit (dB)	Conv. Gain(dB)							
			AMR NB (4.75kbps)		AMR WB (6.6kbps)		EVS NB (5.9kbps)		EVS WB (5.9kbps)	
			2N	8N	2N	8N	2N	8N	2N	8N
WCDMA	B2	6	13.06	17.94	11.68	16.41	N/A			
	B5	6	13.14	18.06	12.02	16.79				
LTE	B2	6	13.54	18.13	12.17	16.48	13.25	17.93	11.68	16.49
	B5	6	13.33	17.79	12.04	16.35	13.24	17.98	11.77	16.22
	B7	6	13.67	17.89	11.94	16.74	13.34	17.77	11.85	16.40
	B12	6	13.61	17.90	12.03	16.62	13.27	17.88	12.01	16.01
	B13	6	13.69	18.12	11.93	16.37	13.66	18.11	12.05	16.52
	B17	6	13.49	17.89	11.95	16.65	13.23	17.84	11.59	16.22
	B48	6	13.70	18.23	12.21	16.82	13.41	18.04	11.73	16.07
	B66(4)	6	13.22	18.01	11.97	16.37	13.18	17.89	11.54	16.15
WLAN-2.4G	802.11b	6	13.07	17.81	11.55	16.66	12.86	17.91	11.57	16.10
	802.11g	6	13.59	17.81	12.07	16.78	13.20	18.02	11.63	16.27
	802.11n	6	12.86	17.90	11.52	16.69	13.49	18.12	11.40	16.44
WLAN-5G	802.11a	6	12.94	17.73	11.97	16.44	13.33	17.82	11.67	16.01
	802.11n	6	13.33	17.88	11.73	16.49	13.14	17.87	11.50	16.26
	802.11ac	6	13.00	17.76	12.24	16.63	13.06	17.96	11.55	16.40

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-1, 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	B2	20	2N	31.25	3.14
	B2	20	8N	27.42	2.88
	B5	20	2N	27.57	3.31
	B5	20	8N	27.84	2.90
	B7	20	2N	31.19	3.02
	B7	20	8N	26.14	2.54
	B12	20	2N	30.51	3.14
	B12	20	8N	27.35	2.79
	B13	20	2N	31.53	3.20
	B13	20	8N	27.35	2.94
	B17	20	2N	30.70	3.44
	B17	20	8N	27.99	1.14
	B48	20	2N	30.95	3.00
	B48	20	8N	25.47	2.70
	B66(4)	20	2N	26.84	3.12
	B66(4)	20	8N	28.61	2.80

2.2 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	25.61	1.95
	2.4G - 802.11b	20	8N	21.31	2.01
	2.4G - 802.11g	20	2N	23.31	1.79
	2.4G - 802.11g	20	8N	30.75	1.88
	2.4G - 802.11n	20	2N	24.40	1.96
	2.4G - 802.11n	20	8N	29.77	1.93
	5G - 802.11a	20	2N	22.01	2.14
	5G - 802.11a	20	8N	25.82	2.43
	5G - 802.11n	20	2N	24.71	2.27
	5G - 802.11n	20	8N	29.46	2.05
	5G - 802.11ac	20	2N	23.25	2.23

	5G - 802.11ac	20	8N	29.60	2.14

2.3 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	B2	20	2N	25.90	1.53
	B2	20	8N	26.64	2.20
	B5	20	2N	26.67	1.84
	B5	20	8N	27.77	2.13
	B7	20	2N	26.69	1.20
	B7	20	8N	25.95	1.40
	B12	20	2N	30.16	1.32
	B12	20	8N	30.60	1.70
	B13	20	2N	26.12	1.27
	B13	20	8N	30.33	1.90
	B17	20	2N	28.75	1.64
	B17	20	8N	30.20	2.00
	B48	20	2N	26.29	1.32
	B48	20	8N	26.93	1.74
	B66(4)	20	2N	29.37	1.36
	B66(4)	20	8N	28.96	1.77

2.4 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	29.35	0.86
	2.4G - 802.11b	20	8N	23.98	0.56
	2.4G - 802.11g	20	2N	21.26	0.60
	2.4G - 802.11g	20	8N	23.63	0.60
	2.4G - 802.11n	20	2N	20.20	0.63
	2.4G - 802.11n	20	8N	24.99	1.36
	5G - 802.11a	20	2N	20.33	1.00
	5G - 802.11a	20	8N	23.29	1.02
	5G - 802.11n	20	2N	23.01	0.76
	5G - 802.11n	20	8N	25.56	0.84
	5G - 802.11ac	20	2N	22.30	0.68
	5G - 802.11ac	20	8N	22.19	0.72