

Appendix A

Volume Control Test Data and Graph for Report No.: SUCR2411000511WM

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 B4		LTE B66		NR n77		802.11 b	
		2N	8N	2N	8N	2N	8N	2N	8N
AMR-NB	4.75	7.25	11.72	6.91	11.45	7.36	11.61	7.31	12.29
	5.15	7.31	11.75	6.94	11.51	7.37	11.72	7.63	12.50
	5.90	7.34	11.85	7.25	11.79	7.67	12.14	7.68	12.67
	6.70	7.44	12.01	7.28	11.88	7.63	12.19	7.63	12.64
	7.40	7.49	12.05	7.35	11.90	7.67	12.21	7.68	12.67
	7.95	7.50	12.04	7.49	12.04	7.89	12.39	7.91	12.88
	10.20	7.69	12.18	7.52	12.12	7.93	12.39	7.92	12.86
	12.20	7.70	12.23	7.53	12.15	7.91	12.42	7.97	12.81
AMR-WB	6.60	6.14	11.06	6.22	10.83	6.34	11.00	6.44	11.63
	8.85	6.53	11.27	6.24	10.84	6.58	11.33	6.77	11.68
	12.65	6.70	11.30	6.26	10.85	6.62	11.47	6.66	11.73
	14.25	6.74	11.42	6.30	10.87	6.81	11.44	6.81	11.71
	15.85	6.66	11.39	6.33	10.91	6.85	11.29	6.84	11.74
	18.25	6.63	11.36	6.32	10.93	6.87	11.24	6.75	11.75
	19.85	6.62	11.40	6.35	10.94	6.90	11.28	6.88	11.80
	23.05	6.62	11.33	6.35	10.93	6.85	11.31	6.93	11.79
	23.85	6.69	11.37	6.37	10.94	6.88	11.35	6.83	11.76
EVS-NB	5.90	N/A		7.46	11.78	7.39	11.84	7.48	12.40
	7.20			7.51	11.91	7.53	12.15	7.65	12.44
	8.0			7.56	11.93	7.63	12.07	7.64	12.42
	9.6			7.63	11.96	7.64	12.00	7.66	12.52
	13.20			7.68	12.02	7.66	12.15	7.72	12.61
	16.40			7.72	12.10	7.69	12.17	7.80	12.65
	24.4			7.74	12.26	7.71	12.17	7.74	12.43
EVS-WB	5.90			6.09	10.74	6.56	11.02	6.87	11.39
	7.20			6.13	10.77	6.76	11.06	6.92	11.75
	8.0			6.54	10.81	6.82	11.03	7.13	11.76
	9.6			6.55	10.93	6.00	11.40	7.40	11.91
	13.20			6.61	11.26	7.08	11.32	7.43	11.93
	16.40			6.62	11.27	6.93	11.44	7.53	12.11
	24.4			6.62	11.28	7.20	11.57	7.47	11.95
	32.0			6.63	11.34	7.13	11.55	7.58	12.08
	48.0			6.58	11.35	7.16	11.58	7.68	12.16
	64.0			6.49	11.43	7.21	11.55	7.75	12.11
	96.0			6.79	11.46	7.18	11.66	7.47	12.21
	128			6.80	11.54	7.30	11.68	7.60	12.33
EVS-SWB	9.6	N/A		6.66	13.22	7.66	13.31	7.71	13.60
	13.20			6.69	13.23	7.68	13.44	7.81	13.71
	16.40			6.96	13.31	7.70	13.58	7.83	13.66
	24.4			7.45	13.76	8.23	13.81	8.24	14.19
	32.0			7.46	13.96	8.22	14.07	8.26	14.20
	48.0			7.59	13.79	8.38	13.96	8.56	14.03

	64.0		7.65	13.80	8.53	14.33	8.69	14.25
	96.0		7.65	13.86	8.43	14.24	8.56	14.27
	128		7.55	13.79	8.39	14.21	8.49	14.43

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	7.71	11.94	7.66	12.44	7.59	11.99
	1900	6	6.94	12.14	7.83	12.40	7.75	12.11

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	7.02	11.65	6.27	11.01	N/A			
	B4	6	7.25	11.72	6.14	11.06				
	B5	6	7.13	11.77	6.33	10.92				
LTE	B 7	6	7.39	12.41	6.62	11.73	7.21	12.43	6.85	11.83
	B 12(17)	6	7.51	12.37	6.42	11.77	7.27	12.26	6.54	11.79
	B 13	6	7.31	12.22	6.52	11.59	7.20	12.38	6.33	11.63
	B 14	6	7.23	12.32	6.54	11.65	7.31	12.36	6.40	11.71
	B 25(2)	6	7.31	12.27	6.63	11.77	7.26	12.42	6.50	11.69
	B 26(5)	6	7.40	12.31	6.50	11.56	7.22	12.17	6.39	11.71
	B 41(38)	6	7.22	12.46	6.54	11.70	7.23	12.33	6.72	11.69
	B 42	6	7.25	12.64	6.56	11.72	7.35	12.29	6.74	11.82
	B 48	6	7.39	12.65	6.70	11.89	7.39	12.52	6.59	11.87
	B 66(4)	6	6.91	11.45	6.22	10.83	7.46	11.78	6.09	10.74
FR1	B 71	6	7.35	12.26	6.61	11.56	7.18	12.28	6.44	11.76
	N7	6	7.34	12.42	6.81	11.74	7.68	12.27	6.45	11.72
	N12	6	7.22	12.48	6.65	11.71	7.37	12.26	6.43	11.77
	N13	6	7.26	12.18	6.63	11.64	7.29	12.39	6.52	11.76
	N14	6	7.20	12.23	6.63	11.65	7.07	12.33	6.50	11.63
	N25(2)	6	7.20	12.21	6.55	11.69	7.19	12.37	6.39	11.76
	N26(5)	6	7.32	12.29	6.62	11.61	7.21	12.28	6.45	11.62
	N41(38)	6	7.40	12.57	6.64	11.68	7.28	12.53	6.24	11.82
	N48	6	7.36	12.53	6.69	11.81	7.43	12.14	6.52	11.81
	N66	6	7.31	12.69	6.47	11.62	7.66	12.48	6.53	12.01
	N71	6	7.36	12.17	6.53	11.75	7.39	12.38	6.45	11.76
	N77(78)	6	7.36	11.61	6.34	11.00	7.39	11.84	6.56	11.02
WLAN-2.4G	802.11b	6	7.31	12.29	6.44	11.63	7.48	12.40	6.87	11.39
	802.11g	6	7.18	12.30	6.76	11.44	7.33	12.24	6.60	11.22
	802.11n	6	7.36	12.19	6.60	11.34	7.48	12.32	6.55	11.50
	802.11ax	6	7.26	12.29	6.75	11.39	7.44	12.45	6.37	11.36
WLAN-5G	802.11a	6	7.28	12.16	6.83	11.30	7.49	12.19	6.44	11.49
	802.11n	6	7.22	12.15	6.77	11.28	7.35	12.16	6.50	11.47
	802.11ac	6	7.28	12.18	6.62	11.22	7.34	12.34	6.56	11.40
	802.11ax	6	7.29	12.31	6.79	11.39	7.21	12.16	6.69	11.46
WLAN-6E	802.11a	6	7.34	12.14	6.64	11.29	7.05	12.22	6.44	11.73

	802.11n	6	7.18	12.26	6.53	11.26	7.67	12.25	6.76	11.50
	802.11ac	6	7.16	12.16	6.55	11.34	7.61	12.24	6.36	11.51
	802.11ax	6	7.19	12.19	6.56	11.56	7.63	12.27	6.55	11.41

Air Interface	Band	Limit (dB)	Conv. Gain(dB)	
			EVS SWB (9.6kbps)	
			2N	8N
LTE	B 7	6	7.54	13.68
	B 12(17)	6	7.76	13.52
	B 13	6	7.53	13.62
	B 14	6	7.44	13.60
	B 25(2)	6	7.67	13.29
	B 26(5)	6	7.68	13.40
	B 41(38)	6	7.56	13.40
	B 42	6	7.51	13.41
	B 48	6	7.73	13.23
	B 66(4)	6	6.66	13.22
	B 71	6	7.71	12.99
FR1	N7	6	7.53	13.42
	N12	6	7.58	13.34
	N13	6	7.64	13.40
	N14	6	7.48	13.23
	N25(2)	6	7.43	13.26
	N26(5)	6	7.49	13.17
	N41(38)	6	7.44	13.33
	N48	6	7.39	13.18
	N66	6	7.47	13.21
	N71	6	7.46	13.10
	N77(78)	6	7.66	13.31
WLAN-2.4G	802.11b	6	7.71	13.60
	802.11g	6	7.45	12.93
	802.11n	6	7.35	12.92
	802.11ax	6	7.37	13.13
WLAN-5G	802.11a	6	7.42	12.87
	802.11n	6	7.40	12.81
	802.11ac	6	7.39	12.78
	802.11ax	6	7.41	13.01
WLAN-6E	802.11a	6	7.43	13.27
	802.11n	6	7.44	13.40
	802.11ac	6	7.46	13.34
	802.11ax	6	7.69	13.34

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	B7	20	2N	23.55	1.33
	B7	20	8N	27.35	1.09
	B12(17)	20	2N	26.03	2.05
	B12(17)	20	8N	26.71	0.76
	B13	20	2N	29.36	1.79
	B13	20	8N	26.64	0.54
	B14	20	2N	26.19	1.74
	B14	20	8N	26.35	0.69
	B25(2)	20	2N	29.87	2.06
	B25(2)	20	8N	24.18	0.99
	B26(5)	20	2N	26.54	1.84
	B26(5)	20	8N	28.14	0.89
	B41(38)	20	2N	25.82	2.04
	B41(38)	20	8N	22.34	1.07
	B42	20	2N	26.39	2.04
	B42	20	8N	24.80	1.01
	B48	20	2N	26.19	1.87
	B48	20	8N	26.10	0.77
	B66(4)	20	2N	23.29	1.21
	B66(4)	20	8N	25.72	0.91
	B71	20	2N	30.54	1.78
	B71	20	8N	27.56	0.62

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	n7	20	2N	30.85	1.78
	n7	20	8N	28.37	0.81
	n12	20	2N	27.77	1.87
	n12	20	8N	25.55	0.49
	n13	20	2N	25.84	1.99
	n13	20	8N	26.43	0.76
	n14	20	2N	27.51	1.78
	n14	20	8N	27.67	0.51
	n25(2)	20	2N	27.96	1.70
	n25(2)	20	8N	29.54	0.57
	n26(5)	20	2N	26.69	1.68
	n26(5)	20	8N	28.23	0.59
	n41(38)	20	2N	28.42	1.80
	n41(38)	20	8N	26.32	1.41
	n48	20	2N	29.00	2.12
	n48	20	8N	24.63	0.88
	n66	20	2N	26.59	1.84
	n66	20	8N	25.50	0.61
	n71	20	2N	25.01	1.68
	n71	20	8N	26.93	0.76
	n77(78)	20	2N	26.36	1.41
	n77(78)	20	8N	24.07	1.14

2.3 Distortion Test Result and Frequency Response for EVS-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	27.70	1.49
	2.4G - 802.11b	20	8N	24.30	1.09
	2.4G - 802.11g	20	2N	29.06	1.90
	2.4G - 802.11g	20	8N	24.98	0.52
	2.4G - 802.11n	20	2N	25.03	1.34
	2.4G - 802.11n	20	8N	22.17	0.37
	2.4G - 802.11ax	20	2N	28.19	1.79
	2.4G - 802.11ax	20	8N	23.21	0.35
	5G - 802.11a	20	2N	27.81	1.55
	5G - 802.11a	20	8N	22.09	0.50
	5G - 802.11n	20	2N	23.30	1.61
	5G - 802.11n	20	8N	25.86	0.73
	5G - 802.11ac	20	2N	20.73	1.88
	5G - 802.11ac	20	8N	23.33	0.59
	5G - 802.11ax	20	2N	25.37	1.95
	5G - 802.11ax	20	8N	23.72	0.55
	6G - 802.11a	20	2N	20.86	1.94
	6G - 802.11a	20	8N	24.83	0.77
	6G - 802.11n	20	2N	26.32	1.41
	6G - 802.11n	20	8N	25.55	0.49
	6G - 802.11ac	20	2N	21.83	1.70
	6G - 802.11ac	20	8N	23.41	0.22
	6G - 802.11ax	20	2N	26.06	1.92
	6G - 802.11ax	20	8N	27.05	0.72

2.4 Distortion Test Result and Frequency Response for EVB-WB 128 kbps and LTE

Air Interface	Band	Limit (dB)	Mounting Force	Minimum PN-SDNR (dB)	Receive Acoustic Frequency Response Performance
LTE	B7	20	2N	32.80	1.63
	B7	20	8N	24.17	2.06
	B12(17)	20	2N	29.15	0.81
	B12(17)	20	8N	22.01	0.98
	B13	20	2N	29.46	0.90
	B13	20	8N	22.48	0.95
	B14	20	2N	28.65	0.73
	B14	20	8N	23.22	1.03
	B25(2)	20	2N	27.04	0.81
	B25(2)	20	8N	23.14	1.06
	B26(5)	20	2N	28.86	0.50
	B26(5)	20	8N	23.62	0.99
	B41(38)	20	2N	25.87	0.93
	B41(38)	20	8N	21.23	1.24
	B42	20	2N	29.52	0.83
	B42	20	8N	21.10	1.11
	B48	20	2N	28.35	1.17
	B48	20	8N	21.98	1.20
	B66(4)	20	2N	31.76	1.14
	B66(4)	20	8N	24.06	2.06
	B71	20	2N	28.06	0.52
	B71	20	8N	24.70	1.05

2.5 Distortion Test Result and Frequency Response for EVS-WB 128 kbps and FR1

Air Interface	Band	Limit (dB)	Mounting Force	Minimum PN-SDNR (dB)	Receive Acoustic Frequency Response Performance
FR1	n7	20	2N	29.53	0.80
	n7	20	8N	24.11	1.15
	n12	20	2N	28.44	0.71
	n12	20	8N	24.27	1.23
	n13	20	2N	29.26	1.01
	n13	20	8N	23.65	1.25
	n14	20	2N	28.88	1.43
	n14	20	8N	22.02	1.16
	n25(2)	20	2N	28.06	0.95
	n25(2)	20	8N	23.73	1.22
	n26(5)	20	2N	28.26	0.80
	n26(5)	20	8N	23.94	1.13
	n41(38)	20	2N	27.40	1.61
	n41(38)	20	8N	27.73	1.02
	n48	20	2N	28.12	1.12
	n48	20	8N	27.58	1.59
	n66	20	2N	24.04	0.79
	n66	20	8N	23.90	1.23
	n71	20	2N	29.24	0.82
	n71	20	8N	28.90	1.47
	n77(78)	20	2N	32.24	1.57
	n77(78)	20	8N	22.28	1.91

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	22.46	1.48
	2.4G - 802.11b	20	8N	20.48	1.81
	2.4G - 802.11g	20	2N	28.46	0.97
	2.4G - 802.11g	20	8N	22.09	1.04
	2.4G - 802.11n	20	2N	28.75	0.93
	2.4G - 802.11n	20	8N	22.44	1.05
	2.4G - 802.11ax	20	2N	27.59	0.95
	2.4G - 802.11ax	20	8N	21.37	1.17
	5G - 802.11a	20	2N	27.45	0.90
	5G - 802.11a	20	8N	20.95	1.02
	5G - 802.11n	20	2N	27.69	0.89
	5G - 802.11n	20	8N	20.88	1.07
	5G - 802.11ac	20	2N	29.53	0.80
	5G - 802.11ac	20	8N	20.95	1.06
	5G - 802.11ax	20	2N	21.31	1.59
	5G - 802.11ax	20	8N	22.52	1.08
	6G - 802.11a	20	2N	24.97	1.72
	6G - 802.11a	20	8N	22.59	1.07
	6G - 802.11n	20	2N	20.88	1.60
	6G - 802.11n	20	8N	20.57	1.10
	6G - 802.11ac	20	2N	21.81	1.41
	6G - 802.11ac	20	8N	20.84	1.07
	6G - 802.11ax	20	2N	27.72	1.31
	6G - 802.11ax	20	8N	20.77	1.07