

Appendix A

Volume Control Test Data and Graph for Report No.: SUES250900190672

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 B4		802.11 b		802.11 b	
		2N	8N	2N	2N	2N	8N	2N	8N
AMR-NB	4.75	7.02	13.50	7.12	13.58	7.21	13.33	7.35	13.04
	5.15	7.06	13.54	7.39	13.70	7.26	13.42	7.46	13.08
	5.90	7.11	13.60	7.47	13.72	7.45	13.46	7.50	13.14
	6.70	7.28	13.62	7.61	13.98	7.49	13.62	7.84	13.16
	7.40	7.31	13.65	7.62	14.00	7.55	13.74	7.86	13.47
	7.95	7.55	13.73	7.70	14.06	7.60	13.86	7.96	13.67
	10.20	7.73	13.74	7.73	14.09	7.65	13.87	8.01	13.70
	12.20	7.76	13.89	7.81	14.18	7.72	13.88	8.12	13.90
AMR-WB	6.60	8.25	14.41	7.93	13.94	7.87	14.09	7.84	14.24
	8.85	8.26	14.45	8.03	13.97	7.88	14.10	8.07	14.28
	12.65	8.31	14.53	8.04	14.03	7.89	14.11	8.12	14.29
	14.25	8.32	14.57	8.06	14.04	7.99	14.13	8.14	14.35
	15.85	8.39	14.68	8.16	14.19	8.02	14.19	8.16	14.45
	18.25	8.41	14.73	8.19	14.24	8.03	14.21	8.23	14.49
	19.85	8.42	14.79	8.20	14.25	8.10	14.22	8.29	14.53
	23.05	8.46	14.80	8.22	14.26	8.11	14.23	8.35	14.54
	23.85	8.60	15.01	8.24	14.27	8.18	14.26	8.43	14.58
EVS-NB	5.90	N/A		7.26	13.61	7.21	13.52	7.39	13.44
	7.20			7.32	13.64	7.32	13.53	7.40	13.47
	8.0			7.41	13.77	7.39	13.59	7.67	13.61
	9.6			7.46	13.80	7.45	13.65	7.73	13.75
	13.20			7.51	13.81	7.47	13.70	7.80	13.84
	16.40			7.58	13.83	7.64	13.71	7.87	13.90
	24.4			7.69	13.88	7.72	13.73	7.95	13.98
EVS-WB	5.90			7.50	14.10	7.42	13.66	7.62	13.90
	7.20			7.57	14.24	7.61	13.76	7.92	14.02
	8.0			7.61	14.30	7.85	14.17	7.98	14.06
	9.6			7.81	14.59	8.03	14.40	8.06	14.17
	13.20			7.92	14.61	8.12	14.44	8.24	14.19
	16.40			7.98	14.67	8.17	14.74	8.37	14.27
	24.4			8.47	14.69	8.59	14.77	8.41	14.33

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	7.94	14.28	8.21	14.38	8.16	14.41
	1900	6	7.85	14.05	8.17	14.59	7.95	14.51

Air Interface	Band	Limit (dB)	Conv. Gain(dB)							
			AMR NB (4.7kbps)		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	13.50	8.25	14.41	N/A			
	B5	6	7.00	13.29	8.12	14.31				
LTE	B2	6	7.19	13.41	8.24	14.52	6.91	13.43	7.55	13.77
	B5	6	7.07	13.76	7.82	14.61	6.92	13.59	7.83	13.83
	B48	6	7.30	13.64	8.02	14.24	7.03	13.46	7.58	13.84
	B12	6	7.20	13.43	8.11	14.09	7.23	13.38	7.80	14.09
	B13	6	7.31	13.33	8.17	14.16	7.16	13.56	7.75	13.92
	B66(4)	6	7.12	13.58	7.93	13.94	7.26	13.61	7.50	14.10
NR	n2	6	7.28	13.28	7.95	14.21	7.34	13.75	7.55	13.68
	n5	6	7.30	13.54	7.93	14.19	7.30	13.61	7.62	13.82
	n66	6	7.40	13.67	8.00	14.15	7.38	13.53	7.76	13.79
	n48	6	7.32	13.46	7.95	14.16	7.35	13.79	7.66	13.86
	n77	6	7.21	13.33	7.87	14.09	7.21	13.52	7.42	13.66
WLAN-2.4G	802.11b	6	7.35	13.04	7.84	14.24	7.39	13.44	7.62	13.90
	802.11g	6	7.33	13.00	8.14	14.23	7.68	13.45	7.80	14.17
	802.11n	6	7.42	13.31	8.28	14.38	7.40	13.64	7.77	14.00
WLAN-5G	802.11a	6	7.32	13.47	8.26	14.33	7.51	13.46	7.71	13.83
	802.11n	6	8.76	13.30	8.17	14.47	7.41	13.50	7.72	13.86
	802.11ac	6	7.51	13.21	7.96	14.33	7.42	13.41	7.58	14.17

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	B2	20	2N	26.43	2.42
	B2	20	8N	22.13	1.08
	B5	20	2N	28.68	2.18
	B5	20	8N	22.70	1.22
	B48	20	2N	28.03	2.05
	B48	20	8N	21.83	1.23
	B12(17)	20	2N	28.19	2.10
	B12(17)	20	8N	22.95	1.26
	B13	20	2N	26.82	2.38
	B13	20	8N	21.28	1.47
	B66(4)	20	2N	25.92	2.67
	B66(4)	20	8N	26.30	0.98

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	N2	20	2N	27.20	2.71
	N2	20	8N	23.49	0.85
	N5	20	2N	25.98	2.74
	N5	20	8N	24.29	1.02
	N66	20	2N	26.80	2.49
	N66	20	8N	23.57	1.11
	N48	20	2N	28.40	2.75
	N48	20	8N	23.44	1.15
	N77	20	2N	28.54	2.50
	N77	20	8N	23.31	1.17

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	22.25	2.54
	2.4G - 802.11b	20	8N	24.55	1.19
	2.4G - 802.11g	20	2N	29.07	2.53
	2.4G - 802.11g	20	8N	23.01	1.27
	2.4G - 802.11n	20	2N	26.45	2.59
	2.4G - 802.11n	20	8N	23.93	1.21
	5G - 802.11a	20	2N	28.17	0.84
	5G - 802.11a	20	8N	30.86	0.76
	5G - 802.11n	20	2N	22.93	1.58
	5G - 802.11n	20	8N	23.03	1.52
	5G - 802.11ac	20	2N	26.81	2.62
	5G - 802.11ac	20	8N	23.91	1.14

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	B2	20	2N	25.86	0.19
	B2	20	8N	23.87	0.33
	B5	20	2N	28.32	0.12
	B5	20	8N	24.45	0.37
	B48	20	2N	28.27	0.39
	B48	20	8N	25.70	0.49
	B12(17)	20	2N	24.41	0.32
	B12(17)	20	8N	23.77	0.38
	B13	20	2N	29.93	0.22
	B13	20	8N	24.45	0.31
	B66(4)	20	2N	23.86	0.39
	B66(4)	20	8N	23.39	0.47

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	N2	20	2N	27.48	0.20
	N2	20	8N	22.71	0.61
	N5	20	2N	27.26	0.47
	N5	20	8N	22.47	0.34
	N66	20	2N	25.01	0.52
	N66	20	8N	23.91	0.42
	N48	20	2N	27.67	0.08
	N48	20	8N	24.18	0.84
	N77	20	2N	28.04	0.92
	N77	20	8N	23.47	0.09

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	22.28	0.73
	2.4G - 802.11b	20	8N	24.48	0.64
	2.4G - 802.11g	20	2N	24.28	1.13
	2.4G - 802.11g	20	8N	23.93	0.61
	2.4G - 802.11n	20	2N	27.06	0.72
	2.4G - 802.11n	20	8N	25.77	0.34
	5G - 802.11a	20	2N	21.13	0.20
	5G - 802.11a	20	8N	23.58	0.17
	5G - 802.11n	20	2N	23.67	0.53
	5G - 802.11n	20	8N	25.24	0.60
	5G - 802.11ac	20	2N	21.72	0.14
	5G - 802.11ac	20	8N	23.54	0.57