



Report No.: SUES260500117671
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Appendix A

**Volume Control Test Data and Plots
For Report No.: SUES260500117671**

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 B2		802.11 b	
		2N	8N	2N	8N	2N	8N
AMR-NB	4.75	8.88	13.14	8.71	13.55	8.67	13.41
	5.15	8.89	13.20	8.76	13.60	8.71	13.45
	5.90	9.23	13.25	8.90	13.65	8.78	13.51
	6.70	9.23	13.51	8.89	13.78	8.83	13.57
	7.40	9.35	13.39	9.10	13.92	8.89	13.63
	7.95	9.43	13.59	9.87	13.91	8.94	13.67
	10.20	9.51	13.61	9.87	13.96	9.10	13.71
	12.20	9.33	13.71	10.04	14.12	9.15	13.76
AMR-WB	6.60	7.97	12.14	7.80	12.52	7.89	12.41
	8.85	8.33	12.62	8.10	12.92	7.98	12.45
	12.65	8.41	12.50	8.01	12.91	8.05	12.48
	14.25	8.45	12.56	8.20	12.95	8.11	12.51
	15.85	8.41	12.60	8.16	12.83	8.19	12.55
	18.25	8.48	12.61	8.14	13.00	8.17	12.57
	19.85	8.50	12.62	8.15	12.92	8.16	12.61
	23.05	8.54	12.66	8.15	13.07	8.17	12.69
	23.85	8.53	12.68	8.14	12.99	8.15	12.77
EVS-NB	5.90	N/A		9.23	13.44	8.66	13.53
	7.20			9.44	13.51	8.90	13.56
	8.0			9.53	13.59	8.82	13.61
	9.6			9.65	13.71	8.93	13.69
	13.20			9.96	13.76	8.76	13.72
	16.40			10.02	14.04	9.18	13.78
	24.4			9.46	13.74	9.29	13.83
EVS-WB	5.90			7.72	12.13	7.54	12.41
	7.20			7.84	12.28	7.57	12.45
	8.0			7.81	12.32	7.63	12.51
	9.6			7.98	12.31	7.78	12.55
	13.20			7.97	12.45	7.73	12.58
	16.40			8.25	12.69	7.82	12.65
	24.4			8.31	12.43	7.89	12.73

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

Air Interface	Band	Limit	Conv. Gain(dB)					
		(dB)	FR V1		FR V2		HR V1	
			2N	8N	2N	8N	2N	8N
GSM	850	6	8.99	13.9	9.05	13.87	9.38	14.24
	850-Sample 2	6	8.90	N/A				
	1900	6	9.14	13.91	9.07	13.85	9.45	14.17
	1900-Sample 2	6	N/A			13.49	N/A	

Air Interface	Band	Limit	Conv. Gain(dB)							
		(dB)	AMR NB		AMR WB		EVS NB		EVS WB	
			(4.7kbps)		(6.6kbps)		(5.9kbps)		(5.9kbps)	
			2N	8N	2N	8N	2N	8N	2N	8N
WCDMA	B2	6	8.91	13.03	7.81	12.17	N/A			
	B2-Sample 2	6	N/A		7.41	N/A				
	B4	6	8.88	13.14	7.97	12.14				
	B5	6	8.87	13.02	8	12.12				
	B5-Sample 2	6	N/A			11.74				
LTE	B2	6	8.71	13.55	7.8	12.52	9.23	13.44	7.72	12.13
	B7	6	8.47	13.12	7.64	12.44	8.46	13.22	7.22	11.94
	B7-Sample 2	6	N/A						6.89	N/A
	B12(17)	6	8.53	13.18	7.57	12.38	8.52	13.31	7.42	11.95
	B13	6	8.51	13.21	7.55	12.44	8.56	13.31	7.34	11.88
	B13-Sample 2	6	N/A							11.63
	B26(5)	6	8.47	13.4	7.63	12.51	8.54	13.26	7.33	12.09
	B41(38)	6	8.54	13.26	7.72	12.42	8.5	13.24	7.37	11.91
	B66(4)	6	8.62	13.3	7.71	12.52	8.67	13.28	7.31	11.98
WLAN-2.4G	802.11b	6	8.67	13.41	7.89	12.41	8.66	13.53	7.54	12.41
	802.11g	6	8.71	13.49	7.77	12.39	8.54	13.54	7.45	12.12
	802.11g-Sample 2	6	N/A						7.24	11.86
	802.11n	6	8.71	13.4	7.66	12.49	8.31	13.47	7.77	12.33

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	Audio Codec	Limit	Mounting Force	Minimum PN-SDNR	Receive Acoustic Frequency Response Performance
			(dB)	(N)	(dB)	
LTE	B2	EVS NB 24.4Kbps	≥ 20	2N	32.63	2.69
	B2	EVS NB 24.4Kbps	≥ 20	8N	22.94	2.4
	B2 -Sample 2	EVS NB 24.4Kbps	≥ 20	8N	26.58	1.23
	B7	EVS NB 24.4Kbps	≥ 20	2N	33.87	2.94
	B7	EVS NB 24.4Kbps	≥ 20	8N	32.49	1.79
	B12(17)	EVS NB 24.4Kbps	≥ 20	2N	26.96	2.93
	B12(17) - Sample 2	EVS NB 24.4Kbps	≥ 20	2N	32.03	2.45
	B12(17)	EVS NB 24.4Kbps	≥ 20	8N	26.99	2.01
	B13	EVS NB 24.4Kbps	≥ 20	2N	31.13	2.93
	B13	EVS NB 24.4Kbps	≥ 20	8N	26.51	2.01
	B26(5)	EVS NB 24.4Kbps	≥ 20	2N	27.02	2.93
	B26(5)	EVS NB 24.4Kbps	≥ 20	8N	33.4	2.01
	B41(38)	EVS NB 24.4Kbps	≥ 20	2N	28.51	1.98
	B41(38)	EVS NB 24.4Kbps	≥ 20	8N	27.49	2.09
	B66(4)	EVS NB 24.4Kbps	≥ 20	2N	32.83	2.86
	B66(4)	EVS NB 24.4Kbps	≥ 20	8N	32.49	2.02

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

Air Interface	Band	Audio Codec	Limit	Mounting Force	Minimum PN-SDNR (dB)	Receive Acoustic Frequency Response Performance
			(dB)			
WLAN	2.4G - 802.11b	EVS NB 24.4Kbps	≥20	2N	26.77	1.78
	2.4G - 802.11b - Sample 2	EVS NB 24.4Kbps	≥20	2N	24.41	1.26
	2.4G - 802.11b	EVS NB 24.4Kbps	≥20	8N	27.69	1.66
	2.4G - 802.11b - Sample 2	EVS NB 24.4Kbps	≥20	8N	32.36	1.46
	2.4G - 802.11g	EVS NB 24.4Kbps	≥20	2N	29.43	1.87
	2.4G - 802.11g	EVS NB 24.4Kbps	≥20	8N	28.11	1.57
	2.4G - 802.11n	EVS NB 24.4Kbps	≥20	2N	28.83	1.63
	2.4G - 802.11n	EVS NB 24.4Kbps	≥20	8N	27.88	1.44

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

Air Interface	Band	Audio Codec	Limit	Mounting Force	Minimum PN-SDNR	Receive Acoustic Frequency Response Performance
			(dB)	(N)	(dB)	
LTE	B2	EVS WB 24.4Kbps	≥20	2N	31.49	1.89
	B2	EVS WB 24.4Kbps	≥20	8N	22.27	1.51
	B2 -Sample 2	EVS WB 24.4Kbps	≥20	8N	28.49	1.81
	B7	EVS WB 24.4Kbps	≥20	2N	36.44	2.49
	B7	EVS WB 24.4Kbps	≥20	8N	30.09	1.5
	B12(17)	EVS WB 24.4Kbps	≥20	2N	23.3	1.83
	B12(17)	EVS WB 24.4Kbps	≥20	8N	26.4	1.54
	B13	EVS WB 24.4Kbps	≥20	2N	23.14	2.49
	B13 -Sample 2	EVS WB 24.4Kbps	≥20	2N	24.73	2.26
	B13	EVS WB 24.4Kbps	≥20	8N	27.46	1.67
	B26(5)	EVS WB 24.4Kbps	≥20	2N	23.18	1.9
	B26(5)	EVS WB 24.4Kbps	≥20	8N	24.21	1.65
	B41(38)	EVS WB 24.4Kbps	≥20	2N	30.9	2.11
	B41(38)	EVS WB 24.4Kbps	≥20	8N	24.83	2.1
	B66(4)	EVS WB 24.4Kbps	≥20	2N	25.5	2.26
	B66(4)	EVS WB 24.4Kbps	≥20	8N	24.79	1.66

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

Air Interface	Band	Audio Codec	Limit	Mounting Force	Minimum PN-SDNR (dB)	Receive Acoustic Frequency Response Performance
			(dB)			
WLAN	2.4G - 802.11b	EVS WB 24.4Kbps	≥20	2N	23.37	1.18
	2.4G - 802.11b - Sample 2	EVS WB 24.4Kbps	≥20	2N	25.59	1.4
	2.4G - 802.11b	EVS WB 24.4Kbps	≥20	8N	23.84	1.25
	2.4G - 802.11g	EVS WB 24.4Kbps	≥20	2N	29.06	0.97
	2.4G - 802.11g	EVS WB 24.4Kbps	≥20	8N	22.94	0.97
	2.4G - 802.11g - Sample 2	EVS WB 24.4Kbps	≥20	8N	23.67	1.58
	2.4G - 802.11n	EVS WB 24.4Kbps	≥20	2N	28.18	1.14
	2.4G - 802.11n	EVS WB 24.4Kbps	≥20	8N	25.26	1.18