This document summarizes the conducted Hub and SB TX power measurements and antenna performance calculations
The conducted measurements were at the GE RF laboratory (Helsinki, Finland)
The radiated measurements were made at Verkotan laboratory (Oulu, Finland)
Antenna parameters calculated based on radiated and conducted measurement result are: maximum antenna gain and total antenna efficiency
Maximum antenna gain is used as in put in radio standard testing to define the EIRP power from SGS measured conducted power
Total antenna efficiency is used as SB and Hub RF unit test evidence

The devices used to define antenna parameters are (from antenna point of view the both DUTs are mass production equivalent):

Sensor Battery

HLA SN	AXLD041
PWA SN	4R41
SW	MBAN test mode 1.0.0.0.1.0-1.2.86b05b8
proto name	ANT SB C2
modifications	preMVP4 PWA with TX and antenna RF matchings to MVP equivalent

Hub

HLA SN	SRW20030023SP
PWA SN	2YMB
SW	ge-swu-image-beat3-imx7d-0.0.0.20.1.9217 (MBAN test mode 20.1)
proto name	ANT Hub A1
modifications	preMVP4 no modifications

Change history

18 Dec 20	v1	Timo Hakala	Initial version released in MWS

Tables to AMS v1 hub and SB antenna test report

Sensor Battery

Sensor Battery Maximum antenna gain		US MBAN indoor low	US MBAN indoor high	US MBAN anywhere mid	ISM low	ISM mid	ISM high	EU MBAN low	EU MBAN high	unit
	channel	0	11	13	15	31	46	47	52	
	frequency	2362	2390.2	2395.4	2402	2443	2481.5	2485.5	2498	MHz
Free space	max PA	1.8			2.6	1.7	-2.4		-4.8	dBi
	max RFIC	2.3			2.1	0.5	-2.4		-4.3	
	MCAL 0	2.4	3.4	2.0	1.8	2.2	-1.3	-3.2	-4.9	
	MCAL 1				1.5	2.3	-0.5		-2.8	
	ETSI EN300328 and EN300203	N/A			2.3			-3.2		
	FCC part15 and part95	3.4		2.0	2.6			N/A		

Sensor Battery Total antenna efficiency		US MBAN indoor low	US MBAN indoor high	US MBAN anywhere mid	ISM low	ISM mid	ISM high	EU MBAN low	EU MBAN high	unit
	channel	0	11	13	15	31	46	47	52	
	frequency	2362	2390.2	2395.4	2402	2443	2481.5	2485.5	2498	MHz
Free space	max PA	-7.5			-6.0	-7.0	-9.8		-11.1	dB
	max RFIC	-6.6			-6.3	-8.4	-9.9		-10.7	
	MCAL 0	-6.6	-5.7	-6.8	-6.8	-6.8	-8.8	-10.1	-10.8	
	MCAL 1				-7.0	-6.8	-7.8		-9.1	
Body normal	max PA	-11.5			-10.2	-12.0	-13.7		-14.5	
Body flipped	max PA	-10.4			-9.1	-10.3	-12.2		-13.1	

Summary all

use case	DUT	radio	antenna	max gain (dBi)	total efficiency (dB) min	total efficiency (dB) max
free space	SB	MBAN		3.4	-11.1	-5.7
	Hub	MBAN	bottom	3.0	-2.4	-1.3
			top	5.6	-2.3	-1.1
		WLAN 2.4GHz	top	6.0	-2.0	0.4*
		WLAN 5GHz	bottom	4.0	-4.1	-1.5
			top	6.8	-4.4	-0.9
on body	SB	MBAN		N/A	-14.5	-9.1
	Hub	MBAN	bottom	N/A	-6.4	-4.5
			top	N/A	-6.2	-4.6
		WLAN 2.4GHz	top	N/A	-4.9	-3.0
		WLAN 5GHz	bottom	N/A	-6.2	-3.5
			top	N/A	-6.5	-2.7

* positive is due to antenna input (non 50 ohm) vs. power meter (50 ohm) RF matching

Hub

Hub - MBAN bottom antenna Maximum antenna gain		US MBAN indoor low	US MBAN indoor high	US MBAN anywhere mid	ISM low	ISM mid	ISM high	EU MBAN low	EU MBAN high	unit
	channel	0	11	13	15	31	46	47	52	
	frequency	2362	2390.2	2395.4	2402	2443	2481.5	2485.5	2498	MHz
Free space	max PA	2.4			2.7	2.9	3.1		2.2	dBi
	max RFIC	2.1			2.3	2.6	2.6		1.8	
	MCAL 0	2.2	2.5	2.2	2.3	2.7	2.8	2.9	1.9	
	MCAL 1				2.4	2.6	3.0		2.2	
	ETSI EN300328 and EN300203	N/A			3.0			2.9		
	FCC part15 and part95	2.5		2.2	2.9			N/A		

Hub - MBAN bottom antenna Total antenna efficiency		US MBAN indoor low	US MBAN indoor high	US MBAN anywhere mid	ISM low	ISM mid	ISM high	EU MBAN low	EU MBAN high	unit
	channel	0	11	13	15	31	46	47	52	
	frequency	2362	2390.2	2395.4	2402	2443	2481.5	2485.5	2498	MHz
Free space	max PA	-1.8			-1.3	-1.5	-1.5		-2.0	dB
	max RFIC	-1.7			-1.6	-1.8	-1.9		-2.4	
	MCAL 0	-1.6	-1.4	-1.6	-1.6	-1.8	-1.7	-1.8	-2.2	
	MCAL 1				-1.6	-1.9	-1.7		-1.9	
Body normal	max PA	-5.5			-5.6	-5.5	-6.0		-6.4	
Body flipped	max PA	-4.5			-4.6	-4.9	-5.2		-5.6	

Hub - MBAN top antenna Maximum antenna gain		US MBAN indoor low	US MBAN indoor high	US MBAN anywhere mid	ISM low	ISM mid	ISM high	EU MBAN low	EU MBAN high	unit
	channel	0	11	13	15	31	46	47	52	
	frequency	2362	2390.2	2395.4	2402	2443	2481.5	2485.5	2498	MHz
Free space	max PA	4.8			5.2	5.6	5.2		5.5	dBi
	max RFIC	4.2			4.6	5.1	4.9		5.4	
	MCAL 0	4.1	4.3	4.3	4.4	5.0	5.0	5.2	5.1	
	MCAL 1				4.5	5.0	5.1		5.4	
	ETSI EN300328 and EN300203	N/A			5.1			5.4		
	FCC part15 and part95	4.3		4.3	5.6			N/A		

Hub - MBAN top antenna Total antenna efficiency		US MBAN indoor low	US MBAN indoor high	US MBAN anywhere mid	ISM low	ISM mid	ISM high	EU MBAN low	EU MBAN high	unit
	channel	0	11	13	15	31	46	47	52	
	frequency	2362	2390.2	2395.4	2402	2443	2481.5	2485.5	2498	MHz
Free space	max PA	-1.6			-1.1	-1.1	-1.2		-1.3	dB
	max RFIC	-2.0			-1.6	-1.6	-1.5		-1.4	
	MCAL 0	-2.3	-2.0	-1.8	-1.7	-1.7	-1.2	-1.3	-1.4	
	MCAL 1				-1.6	-1.7	-1.2		-1.2	
Body normal	max PA	-6.2			-5.3	-5.1	-5.3		-5.2	
Body flipped	max PA	-5.6			-5.3	-4.9	-4.8		-4.6	

WLAN 2.4 GHz Top

Hub - WLAN 2.4 GHz top antenna Maximum antenna gain		ETSI FCC			ETSI FCC N/A	unit
	channel	1	6	11	13	
	frequency	2412	2437	2462	2472	MHz
Free space	max power	5.2	4.4	6.0	4.2	dBi

Hub - WLAN 2.4 GHz top antenna Total antenna efficiency		ETSI FCC			ETSI FCC N/A	unit
	channel	1	6	11	13	
	frequency	2412	2437	2462	2472	MHz
Free space	max pow	0.4	-2.0	0.1	-1.8	dBi
Body normal	max power	-3.2			-4.9	
Body flipped	max power	-3.0			-4.8	

WLAN 5GHz Top

Hub - WLAN 5 GHz top antenna Maximum antenna gain		ETSI FCC						ETSI FCC N/A	ETSI N/A FCC			unit
	channel	36	48	64	100	108	116	128	140	153	165	
	frequency	5180	5240	5320	5500	5540	5580	5640	5700	5765	5825	MHz
Free space	max power	1.3	2.4	3.7	6.8	6.2	6.0	6.2	5.6	6.0	5.9	dBi

Hub - WLAN 5 GHz top antenna Total antenna efficiency		ETSI FCC						ETSI FCC N/A	ETSI N/A FCC			unit
	channel	36	48	64	100	108	116	128	140	153	165	
	frequency	5180	5240	5320	5500	5540	5580	5640	5700	5765	5825	MHz
Free space	max power	-4.4	-3.8	-3.0	-0.9	-1.7	-2.2	-1.8	-2.6	-2.3	-2.1	dBi
Body normal	max power	-6.5			-3.0						-4.3	
Body flipped	max power	-6.5			-2.7						-4.3	

WLAN 5GHz Bottom

Hub - WLAN 5 GHz bottom antenna Maximum antenna gain		ETSI FCC						ETSI FCC N/A	ETSI N/A FCC			unit
	channel	36	48	64	100	108	116	128	140	153	165	
	frequency	5180	5240	5320	5500	5540	5580	5640	5700	5765	5825	MHz
Free space	max power	1.2	1.0	2.0	3.4	3.1	2.6	3.2	2.5	4.0	3.6	dBi

Hub - WLAN 5 GHz bottom antenna Total antenna efficiency		ETSI FCC						ETSI FCC N/A	ETSI N/A FCC			unit
	channel	36	48	64	100	108	116	128	140	153	165	
	frequency	5180	5240	5320	5500	5540	5580	5640	5700	5765	5825	MHz
Free space	max power	-4.1	-3.6	-2.9	-1.8	-1.5	-2.0	-1.7	-2.3	-2.2	-2.1	dBi
Body normal	max power	-5.7			-4.3						-4.0	
Body flipped	max power	-6.2			-3.5						-4.0	

Verkotan measured duty-cycle	95.8%
duty-cycle correction factor	0.1863449

ANT Hub A1 top -orig

			2 GHz				5 GHz																						
			ETSI				ETSI				ETSI DFS														ETSI N/A (SRD)				
			FCC			FCC N/A	FCC				FCC DFS								FCC N/A			FCC DFS			FCC				
		channel	1	6	11	13	36	40	44	48	52	56	60	64	100	104	108	112	116	120	124	128	132	136	140	149	153	157	161	165
		frequency	2412	2437	2462	2472	5180	5200	5220	5240	5260	5280	5300	5320	5500	5520	5540	5560	5580	5600	5620	5640	5660	5680	5700	5745	5765	5785	5805	5825
free space	DC 94%	cond TX power	9.4	14.1	9.5	14	11.4	11.7	11.6	11.6	9.4	9.5	9.4	9.3	9.9	12.6	12.7	12.8	12.8	12.4	11.8	11.9	12.1	12.2	9.4	9.6	14.5	14.5	14.5	10.5
	DC 100%	TRP	9.66	11.89	9.44	11.99	6.77			7.59				6.1	8.81		10.8		10.46			9.96			6.63		11.97			8.19
		EIRP sum	14.45	18.29	15.27	18.03	12.48			13.8				12.77	16.5		18.76		18.64			17.9			14.78		20.34			16.2
		EIRP vertical	14	17.72	15.16	17.95	11.05			12.05				11	14.81		17.05		16.83			16			12.72		17.72			13.08
		EIRP horizontal	13.14	16.41	11.49	14.75	9.2			10.28				8.72	12.28		14.46		14.5			13.96			11.68		18.22			14.2
	DC corrected 95.8%	TRP	9.8	12.1	9.6	12.2	7.0			7.8				6.3	9.0		11.0		10.6			10.1			6.8		12.2			8.4
		EIRP sum	14.6	18.5	15.5	18.2	12.7			14.0				13.0	16.7		18.9		18.8			18.1			15.0		20.5			16.4
		EIRP vertical	14.2	17.9	15.3	18.1	11.2			12.2				11.2	15.0		17.2		17.0			16.2			12.9		17.9			13.3
		EIRP horizontal	13.3	16.6	11.7	14.9	9.4			10.5				8.9	12.5		14.6		14.7			14.1			11.9		18.4			14.4
		total efficiency	0.4	-2.0	0.1	-1.8	-4.4			-3.8				-3.0	-0.9		-1.7		-2.2			-1.8			-2.6		-2.3			-2.1
		antenna directivity	4.8	6.4	5.8	6.0	5.7			6.2				6.7	7.7		8.0		8.2			7.9			8.2		8.4			8.0
		max antenna gain	5.2	4.4	6.0	4.2	1.3			2.4				3.7	6.8		6.2		6.0			6.2			5.6		6.0			5.9
body normal	DC 94%	cond TX power	9.4	14.1	9.5	14	11.4	11.7	11.6	11.6	9.4	9.5	9.4	9.3	9.9	12.6	12.7	12.8	12.8	12.4	11.8	11.9	12.1	12.2	9.4	9.6	14.5	14.5	14.5	10.5
	DC 100%	TRP	6.18			9.08	4.88								6.95															6.25
		EIRP sum	12.48			16.75	11.44								13.93															13.89
		EIRP vertical	8.91			12.04	9.71								11.77															11.49
		EIRP horizontal	9.97			15.73	10.69								12.63															13.52
	DC corrected 95.8%	TRP	6.4			9.3	5.1								7.1															6.4
		EIRP sum	12.7			16.9	11.6								14.1															14.1
		EIRP vertical	9.1			12.2	9.9								12.0															11.7
		EIRP horizontal	10.2			15.9	10.9								12.8															13.7
		total efficiency	-3.22			-4.92	-6.52								-2.95															-4.25
		antenna directivity	6.3			7.67	6.56								6.98															7.64
		max antenna gain	3.08			2.75	0.04								4.03		-12.7		-12.8		-11.8		-12.1		-9.4		-14.5			3.39
body flipped	DC 94%	cond TX power	9.4			14	11.4	11.7	11.6	11.6	9.4	9.5	9.4	9.3	9.9	12.6	12.7	12.8	12.8	12.4	11.8	11.9	12.1	12.2	9.4	9.6	14.5	14.5	14.5	10.5
	DC 100%	TRP	6.42			9.18	4.9								7.22															6.17
		EIRP sum	12.88			15.79	13.52								16.21															15.12
		EIRP vertical	9.42			12.84	11.91								13.38															13.7
		EIRP horizontal	11.44			14	9.69								13.5															14.44
	DC corrected 95.8%	TRP	6.61			9.4	5.1								7.4															6.4
		EIRP sum	13.07			16.0	13.7								16.4															15.3
		EIRP vertical	9.61			13.0	12.1								13.6															13.9
		EIRP horizontal	11.63			14.2	9.9								13.7															14.6
		total efficiency	-2.98			-4.82	-6.5								-2.68															-4.33
		antenna directivity	6.46			6.61	8.62								8.99															8.95
		max antenna gain	3.48			1.79	2.12								6.31															4.62

ANT Hub A1 bottom -orig

			2 GHz				5 GHz																						
			ETSI				ETSI				ETSI DFS														ETSI N/A (SRD)				
			FCC			FCC N/A	FCC				FCC DFS								FCC N/A			FCC DFS			FCC				
		channel	1	6	11	13	36	40	44	48	52	56	60	64	100	104	108	112	116	120	124	128	132	136	140	149	153	157	161	165
		frequency	2412	2437	2462	2472	5180	5200	5220	5240	5260	5280	5300	5320	5500	5520	5540	5560	5580	5600	5620	5640	5660	5680	5700	5745	5765	5785	5805	5825
free space	DC 94%	cond TX power	N/A	N/A	N/A	N/A	12.9	12.8	12.8	12.8	9.8	9.6	9.6	9.5	10.6	12.5	12.4	12.3	12.3	12.3	12.2	12.1	12	12	8.3	8.7	13.5	13.5	13.5	9.9
	DC 100%	TRP					8.63			9				6.41	8.65		10.7		10.16			10.17			5.86		11.14			7.62
		EIRP sum					13.87			13.63				11.36	13.83		15.33		14.71			15.16			10.63		17.3			13.34
		EIRP vertical					12.68			12.68				9.01	11.24		14.02		13.39			15.05			9.63		17.22			11.73
		EIRP horizontal					11.87			12.78				11	13.66		14.9		14.56			14.46			10.34		15.18			13.16
	DC corrected 95.8%	TRP					8.8			9.2				6.6	8.8		10.9		10.3			10.4			6.0		11.3			7.8
		EIRP sum					14.1			13.8				11.5	14.0		15.5		14.9			15.3			10.8		17.5			13.5
		EIRP vertical					12.9			12.9				9.2	11.4		14.2		13.6			15.2			9.8		17.4			11.9
		EIRP horizontal					12.1			13.0				11.2	13.8		15.1		14.7			14.6			10.5		15.4			13.3
		total efficiency					-4.1			-3.6				-2.9	-1.8		-1.5		-2.0			-1.7			-2.3		-2.2			-2.1
		antenna directivity					5.2			4.6				5.0	5.2		4.6		4.6			5.0			4.8		6.2			5.7
		max antenna gain					1.2			1.0				2.0	3.4		3.1		2.6			3.2			2.5		4.0			3.6
body normal	DC 94%	cond TX power	N/A	N/A	N/A	N/A	12.9	12.8	12.8	12.8	9.8	9.6	9.6	9.5	10.6	12.5	12.4	12.3	12.3	12.3	12.2	12.1	12	12	8.3	8.7	13.5	13.5	13.5	9.9
	DC 100%	TRP					7.24								6.31															5.9
		EIRP sum					14.31								12.3															12.96
		EIRP vertical					10.58								8.61															10.97
		EIRP horizontal					13.52								11.94															11.8
	DC corrected 95.8%	TRP					7.4								6.5															6.1
		EIRP sum					14.5								12.5															13.1
		EIRP vertical					10.8								8.8															11.2
		EIRP horizontal					13.7								12.1															12.0
		total efficiency					-5.66								-4.29															-4
		antenna directivity					7.07								5.99															7.06
		max antenna gain					1.41								1.7															3.06
body flipped	DC 94%	cond TX power	N/A	N/A	N/A	N/A	12.9	12.8	12.8	12.8	9.8	9.6	9.6	9.5	10.6	12.5	12.4	12.3	12.3	12.3	12.2	12.1	12	12	8.3	8.7	13.5	13.5	13.5	9.9
	DC 100%	TRP					6.66								7.07															5.95
		EIRP sum					14.21								13.41															13.97
		EIRP vertical					11.69								10.03															10.61
		EIRP horizontal					11.77								12.75															13.36
	DC corrected 95.8%	TRP					6.8								7.3															6.1
		EIRP sum					14.4								13.6															14.2
		EIRP vertical					11.9								10.2															10.8
		EIRP horizontal					12.0								12.9															13.5
		total efficiency					-6.24								-3.53															-3.95
		antenna directivity					7.55								6.34															8.02
		max antenna gain					1.31								2.81															4.07

ANT Hub A2 top -orig

		2 GHz				5 GHz																							
		ETSI				ETSI				ETSI DFS														ETSI N/A (SRD)				
		FCC			FCC N/A	FCC				FCC DFS								FCC N/A			FCC DFS			FCC				
	channel	1	6	11	13	36	40	44	48	52	56	60	64	100	104	108	112	116	120	124	128	132	136	140	149	153	157	161	165
	frequency	2412	2437	2462	2472	5180	5200	5220	5240	5260	5280	5300	5320	5500	5520	5540	5560	5580	5600	5620	5640	5660	5680	5700	5745	5765	5785	5805	5825
	cond TX power	8.3	12.8	8.2	12.5	10.8	11.3	11.5	11.7	9	9	9	8.9	10.1	12.4	12.4	12.6	12.7	11.8	11.9	12	12.1	12.2	9	9	14.1	14.1	14.1	11.3
	TRP	4.1	0	0	8.66	6.27			0		0		0	0		0		0		0		0		0		0			8.11
	EIRP sum	11.93			15.59	12.03																							15.61
free space	EIRP vertical	11.03			15.56	11.22																							15.61
	EIRP horizontal	10.31			12.54	8.34																							13.41
	total efficiency	-4.2			-3.84	-4.53																							-3.19
	antenna directivity	7.83			6.93	5.76																							7.5
	max antenna gain	3.63			3.09	1.23																							4.31
	cond TX power	9.4	14.1	9.5	14	11.4	11.7	11.6	11.6	9.4	9.5	9.4	9.3	9.9	12.6	12.7	12.8	12.8	12.4	11.8	11.9	12.1	12.2	9.4	9.6	14.5	14.5	14.5	10.5
	TRP	0			0	0				0				0				0						0		0			0
	EIRP sum																												
body normal	EIRP vertical																												
	EIRP horizontal																												
	total efficiency																												
	antenna directivity																												
	max antenna gain																												
	cond TX power	9.4	14.1	9.5	14	11.4	11.7	11.6	11.6	9.4	9.5	9.4	9.3	9.9	12.6	12.7	12.8	12.8	12.4	11.8	11.9	12.1	12.2	9.4	9.6	14.5	14.5	14.5	10.5
	TRP	0			0	0			0				0	0				0						0			0		0
	EIRP sum																												
body flipped	EIRP vertical																												
	EIRP horizontal																												
	total efficiency																												
	antenna directivity																												
	max antenna gain	N/A	N/A	N/A	N/A	12.9	12.8	12.8	12.8	9.8	9.6	9.6	9.5	10.6	12.5	12.4	12.3	12.3	12.3	12.2	12.1	12	12	8.3	8.7	13.5	13.5	13.5	9.9

ANT Hub A2 bottom -orig

		2 GHz				5 GHz																							
		ETSI				ETSI				ETSI DFS														ETSI N/A (SRD)				
		FCC			FCC N/A	FCC				FCC DFS								FCC N/A			FCC DFS			FCC				
	channel	1	6	11	13	36	40	44	48	52	56	60	64	100	104	108	112	116	120	124	128	132	136	140	149	153	157	161	165
	frequency	2412	2437	2462	2472	5180	5200	5220	5240	5260	5280	5300	5320	5500	5520	5540	5560	5580	5600	5620	5640	5660	5680	5700	5745	5765	5785	5805	5825
	cond TX power	N/A	N/A	N/A	N/A	12.6	12.6	12.6	12.5	9.3	9.2	9	8.9	9.8	11.6	11.5	11.4	11.4	11.4	11.3	11.2	11.2	11.1	7.3	7.5	12.3	12.3	12.3	9
	TRP	0	0	0	0	7.72			0		0		0	0		0		0		0		0		0		0			6.85
	EIRP sum					12.62																							12.26
free space	EIRP vertical					11.79																							10.32
	EIRP horizontal					11.45																							12.09
	total efficiency					-4.88																							-2.15
	antenna directivity					4.9																							5.41
	max antenna gain					0.02																							3.26
	cond TX power	N/A	N/A	N/A	N/A	12.9	12.8	12.8	12.8	9.8	9.6	9.6	9.5	10.6	12.5	12.4	12.3	12.3	12.3	12.2	12.1	12	12	8.3	8.7	13.5	13.5	13.5	9.9
	TRP	0			0	0				0				0				0						0		0			0
	EIRP sum																												
body normal	EIRP vertical																												
	EIRP horizontal																												
	total efficiency																												
	antenna directivity																												
	max antenna gain																												
	cond TX power	N/A	N/A	N/A	N/A	12.9	12.8	12.8	12.8	9.8	9.6	9.6	9.5	10.6	12.5	12.4	12.3	12.3	12.3	12.2	12.1	12	12	8.3	8.7	13.5	13.5	13.5	9.9
	TRP	0			0	0			0				0	0				0						0			0		0
	EIRP sum																												
body flipped	EIRP vertical																												
	EIRP horizontal																												
	total efficiency																												
	antenna directivity																												
	max antenna gain																												

ANT Hub A1 top - orig			US MBAN			ISM			EU MBAN		
			indoor		anywhere						
			low	high	mid	low	mid	high	low	high	unit
		channel	0	11	13	15	31	46	47	52	
		frequency	2362	2390.2	2395.4	2402	2443	2481.5	2485.5	2498	MHz
Free space	max PA	cond TX power	10.6	10.5	10.5	10.5	10.2	9.9	9.9	9.7	dBm
		TRP	8.96			9.41	9.1	8.68		8.42	
		EIRP sum	15.4			15.65	15.83	15.12		15.17	
		EIRP vertical	13.98			14.67	15.63	14.96		15.04	
		EIRP horizontal	14.56			14.8	12.74	11.86		11.86	
		total efficiency	-1.64			-1.09	-1.1	-1.22		-1.28	dB
		antenna directivity	6.44			6.24	6.73	6.44		6.75	
		max antenna gain	4.8			5.15	5.63	5.22		5.47	
	max IC	cond TX power	2.1	2.2	2.2	2.2	2	1.6	1.5	1.3	dBm
		TRP	0.06			0.58	0.44	0.07		-0.12	
		EIRP sum	6.31			6.83	7.13	6.46		6.69	
		EIRP vertical	5.02			5.74	6.93	6.29		6.58	
		EIRP horizontal	5.66			6.16	3.93	3.43		3.39	
		total efficiency	-2.04			-1.62	-1.56	-1.53		-1.42	dB
		antenna directivity	6.25			6.25	6.69	6.39		6.81	
		max antenna gain	4.21			4.63	5.13	4.86		5.39	
	MCAL 0	cond TX power	-5.4	-5.2	7.7	7.7	7.7	7.7	-5.3	-5.5	dBm
		TRP	-7.7	-7.21	5.9	6.04	6.05	6.47	-6.55	-6.86	
		EIRP sum	-1.31	-0.93	11.99	12.12	12.69	12.7	-0.14	-0.42	
		EIRP vertical	-2.78	-1.29	11.17	11.26	12.49	12.14	-0.32	-0.58	
		EIRP horizontal	-2.19	-2.31	11.02	11.33	9.17	9.69	-3.32	-3.43	
		total efficiency	-2.3	-2.01	-1.8	-1.66	-1.65	-1.23	-1.25	-1.36	dB
		antenna directivity	6.39	6.28	6.09	6.08	6.64	6.23	6.41	6.44	
		max antenna gain	4.09	4.27	4.29	4.42	4.99	5	5.16	5.08	
	MCAL 1	cond TX power	N/A	N/A	N/A	4.6	4.7	4.5	4.8	4.7	dBm
		TRP				2.97	3.01	3.29		3.53	
		EIRP sum				9.1	9.66	9.55		10.12	
		EIRP vertical				8.14	9.45	9.37		10.01	
		EIRP horizontal				8.33	6.41	6.71		7.06	
		total efficiency				-1.63	-1.67	-1.21		-1.17	dB
		antenna directivity				6.13	6.63	6.26		6.59	
		max antenna gain				4.5	4.96	5.05		5.42	
Body	max PA normal	cond TX power	10.6	10.5	10.5	10.5	10.2	9.9	9.9	9.7	dBm
		TRP	4.39			5.18	5.11	4.6		4.47	
		EIRP sum	12.28			13.48	13.37	13.27		13.19	
		EIRP vertical	8.01			8.57	8.16	6.29		6.77	
		EIRP horizontal	11.09			12.85	12.87	12.89		12.64	
		total efficiency	-6.21			-5.32	-5.09	-5.3		-5.23	dB
		body loss	4.57			4.23	3.99	4.08		3.95	
		antenna directivity	7.89			8.3	8.26	8.67		8.72	
		max antenna gain	1.68			2.38	3.27	3.37		3.49	
	max PA flipped	cond TX power	10.6	10.5	10.5	10.5	10.2	9.9	9.9	9.7	dBm
		TRP	4.97			5.24	5.3	5.14		5.1	
		EIRP sum	11.38			11.75	12.1	11.8		11.71	
		EIRP vertical	9.63			9.93	10.72	10.42		9.48	
		EIRP horizontal	11.08			10.27	10.78	10.16		10.42	
		total efficiency	-5.63			-5.26	-4.9	-4.76		-4.6	dB
		body loss	3.99			4.17	3.8	3.54		3.32	
		antenna directivity	6.41			6.51	6.8	6.66		6.61	
		max antenna gain	0.78			1.25	1.9	1.9		2.01	

ANT Hub A1 bottom - orig			US MBAN			ISM			EU MBAN		
			indoor		anywhere						
			low	high	mid	low	mid	high	low	high	unit
		channel	0	11	13	15	31	46	47	52	
		frequency	2362	2390.2	2395.4	2402	2443	2481.5	2485.5	2498	MHz
Free space	max PA	cond TX power	11.2	10.9	10.8	10.7	10.4	10.1	9	9.3	dBm
		TRP	9.27			9.4	8.63	7.8		7.01	
		EIRP sum	13.52			13.39	12.98	12.42		11.2	
		EIRP vertical	12.52			12.69	12.82	12.21		10.65	
		EIRP horizontal	12.78			12.79	11.73	10.8		9.92	
		total efficiency	-1.83			-1.3	-1.47	-1.5		-1.99	dB
		antenna directivity	6.25			3.99	4.35	4.62		4.19	
		max antenna gain	2.42			2.69	2.88	3.12		2.2	
	max IC	cond TX power	2.2	2.2	2.2	2.2	1.7	0.8	0.7	0.4	dBm
		TRP	0.55			0.6	-0.13	-1.51		-1.99	
		EIRP sum	4.32			4.48	4.3	3.36		2.21	
		EIRP vertical	3.35			3.85	4.14	3.17		1.64	
		EIRP horizontal	3.8			3.94	2.99	1.73		0.99	
		total efficiency	-1.65			-1.6	-1.83	-1.91		-2.39	dB
		antenna directivity	3.77			3.88	4.43	4.47		4.2	
		max antenna gain	2.12			2.28	2.6	2.56		1.81	
	MCAL 0	cond TX power	-4.4	-4.3	8.7	8.7	8.7	8.6	-4.1	-4.4	dBm
		TRP	-6.17	-5.67	7.12	7.1	6.92	6.92	-5.87	-6.61	
		EIRP sum	-2.4	-1.79	10.92	11.04	11.35	11.42	-1.16	-2.5	
		EIRP vertical	-3.39	-2.31	10.49	10.41	11.19	11.23	-1.39	-2.9	
		EIRP horizontal	-2.82	-2.76	10.25	10.47	10.11	9.71	-2.73	-3.74	
		total efficiency	-1.57	-1.37	-1.58	-1.6	-1.78	-1.68	-1.77	-2.21	dB
		antenna directivity	3.77	3.88	3.8	3.94	4.43	4.5	4.71	4.51	
		max antenna gain	2.2	2.51	2.22	2.34	2.65	2.82	2.94	1.9	
	MCAL 1	cond TX power	N/A	N/A	N/A	5.6	5.6	5.7	5.8	5.7	dBm
		TRP				3.99	3.75	4.01		3.8	
		EIRP sum				7.95	8.15	8.68		7.9	
		EIRP vertical				7.31	7.97	8.46		7.62	
		EIRP horizontal				7.41	6.79	7.06		6.67	
		total efficiency				-1.61	-1.85	-1.69		-1.9	dB
		antenna directivity				3.96	4.4	4.67		4.1	
		max antenna gain				2.35	2.55	2.98		2.2	
Body	max PA normal	cond TX power	11.1	10.9	10.8	10.7	10.1	9.3	9.3	9	dBm
		TRP	5.59			5.09	4.58	3.27		2.63	
		EIRP sum	12.84			12.21	11.7	10.39		9.7	
		EIRP vertical	7.8			7.28	6.93	6.13		5.4	
		EIRP horizontal	11.81			11.11	10.67	8.93		8.48	
		total efficiency	-5.51			-5.61	-5.52	-6.03		-6.37	dB
		body loss	3.68			4.31	4.05	4.53		4.38	
		antenna directivity	7.25			7.12	7.12	7.12		7.07	
		max antenna gain	1.74			1.51	1.6	1.09		0.7	
	max PA flipped	cond TX power	11.1	10.9	10.8	10.7	10.1	9.3	9.3	9	dBm
		TRP	6.56			6.12	5.2	4.14		3.44	
		EIRP sum	13.53			12.41	11.96	10.94		10.11	
		EIRP vertical	9.24			8.81	7.71	6.81		6.3	
		EIRP horizontal	12.46			11.66	11.3	10.22		9.07	
		total efficiency	-4.54			-4.58	-4.9	-5.16		-5.56	dB
		body loss	2.71			3.28	3.43	3.66		3.57	
		antenna directivity	6.97			6.29	6.76	6.8		6.87	
		max antenna gain	2.43			1.71	1.86	1.64		1.11	

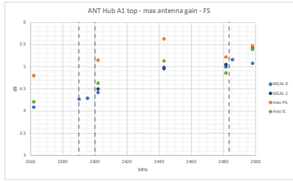
ANT Hub A2 top - orig			US MBAN			ISM			EU MBAN		
			indoor		anywhere						
			low	high	mid	low	mid	high	low	high	unit
		channel	0	11	13	15	31	46	47	52	
		frequency	2362	2390.2	2395.4	2402	2443	2481.5	2485.5	2498	MHz
Free space	max PA	cond TX power	10.9	10.8	10.8	10.7	10.4	10.1	10	9.8	dBm
		TRP	9.17			0	9.32	0		8.76	
		EIRP sum	15.29				15.54			15.18	
		EIRP vertical	13.92				15.26			15.03	
		EIRP horizontal	14.37				12.76			12.33	
		total efficiency	-1.73			-10.7	-1.08	-10.1		-1.04	dB
		antenna directivity	6.12			0	6.22	0		6.42	
		max antenna gain	4.39			-10.7	5.14	-10.1		5.38	
	max IC	cond TX power	2.3	2.3	2.2	2.2	1.9	1.3	1.2	1	dBm
		TRP	0			0	0	0		0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									
	MCAL 0	cond TX power	-5.4	-5.3	7.6	7.7	7.7	7.6	-5.2	-5.4	dBm
		TRP	0	0	0	0	0	0	0	0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									
	MCAL 1	cond TX power	N/A	N/A	N/A	4.7	4.5	4.6	4.6	4.4	dBm
		TRP				0	0	0	0	0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									
Body normal	max PA	cond TX power	10.9	10.8	10.8	10.7	10.4	10.1	10	9.8	dBm
		TRP	0			0	0	0		0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									
Body flipped	max PA	cond TX power	10.9	10.8	10.8	10.7	10.4	10.1	10	9.8	dBm
		TRP	0			0	0	0		0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									

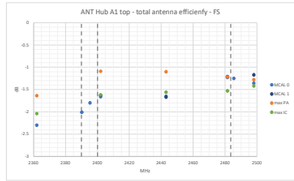
ANT Hub A2 bottom - orig			US MBAN			ISM			EU MBAN		
			indoor		anywhere						
			low	high	mid	low	mid	high	low	high	unit
		channel	0	11	13	15	31	46	47	52	
		frequency	2362	2390.2	2395.4	2402	2443	2481.5	2485.5	2498	MHz
Free space	max PA	cond TX power	11.4	11.1	11	10.9	10.1	9.1	9	8.7	dBm
		TRP	9.74			0	8.51	0		6.47	
		EIRP sum	13.51				12.78			10.58	
		EIRP vertical	12.65				12.62			9.91	
		EIRP horizontal	12.95				11.68			9.71	
		total efficiency	-1.66			-10.9	-1.59	-9.1		-2.23	dB
		antenna directivity	3.77			0	4.27	0		4.11	
		max antenna gain	2.11			-10.9	2.68	-9.1		1.88	
	max IC	cond TX power	2.2	2	1.9	1.8	1.1	0.1	-0.1	-0.4	dBm
		TRP	0			0	0	0		0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									
	MCAL 0	cond TX power	-4.4	-4.3	8.6	8.6	8.6	8.4	-4.1	-4.5	dBm
		TRP	0	0	0	0	0	0	0	0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									
	MCAL 1	cond TX power	N/A	N/A	N/A	5.7	5.8	5.5	5.9	5.7	dBm
		TRP				0	0	0	0	0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									
Body normal	max PA	cond TX power	11.4	11.1	11	10.9	10.1	9.1	9	8.7	dBm
		TRP	0			0	0	0		0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									
Body flipped	max PA	cond TX power	11.4	11.1	11	10.9	10.1	9.1	9	8.7	dBm
		TRP	0			0	0	0		0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									

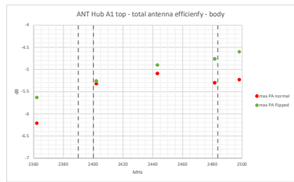
ANT Hub B1 top - mod TX			US MBAN			ISM			EU MBAN		
			indoor		anywhere						
			low	high	mid	low	mid	high	low	high	unit
		channel	0	11	13	15	31	46	47	52	
		frequency	2362	2390.2	2395.4	2402	2443	2481.5	2485.5	2498	MHz
Free space	max PA	cond TX power	11.2	11.2	11.2	11.2	11	10.6	10.6	10.4	dBm
		TRP	9.42				9.29			8.58	
		EIRP sum	15.82				16.04			15.06	
		EIRP vertical	13.9				15.83			14.84	
		EIRP horizontal	15.7				12.7			12.26	
		total efficiency	-1.78			-11.2	-1.71	-10.6		-1.82	dB
		antenna directivity	6.4			0	6.75	0		6.48	
		max antenna gain	4.62			-11.2	5.04	-10.6		4.66	
	max IC	cond TX power	2	2.3	2.3	2.3	2.3	1.8	1.7	1.5	dBm
		TRP	-0.42				-0.16			-0.27	
		EIRP sum	5.49				5.91			6.11	
		EIRP vertical	3.85				4.14	3.17		3.74	
		EIRP horizontal	5.13							5.9	
		total efficiency	-1.42			-2.3	-2.3	-1.8		-1.77	dB
		antenna directivity	5.91			0	0	0		6.38	
		max antenna gain	3.49			-2.3	-2.3	-1.8		4.61	
	MCAL 0	cond TX power									dBm
		TRP									
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency	0	0	0	0	0	0	0	0	dB
		antenna directivity	0	0	0	0	0	0	0	0	
		max antenna gain	0	0	0	0	0	0	0	0	
	MCAL 1	cond TX power	N/A	N/A	N/A						dBm
		TRP									
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency				0	0	0		0	dB
		antenna directivity				0	0	0		0	
		max antenna gain				0	0	0		0	
Body normal	max PA	cond TX power									dBm
		TRP									
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency				0	0	0		0	dB
		antenna directivity				0	0	0		0	
		max antenna gain				0	0	0		0	
Body flipped	max PA	cond TX power									dBm
		TRP									
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency				0	0	0		0	dB
		antenna directivity				0	0	0		0	
		max antenna gain				0	0	0		0	

ANT Hub B1 bottom - mod TX			US MBAN			ISM			EU MBAN		
			indoor		anywhere						
			low	high	mid	low	mid	high	low	high	unit
		channel	0	11	13	15	31	46	47	52	
		frequency	2362	2390.2	2395.4	2402	2443	2481.5	2485.5	2498	MHz
Free space	max PA	cond TX power	11.5	11.4	11.3	11.3	10.7	9.9	9.8	9.6	dBm
		TRP	9.82			9.56	8.58	7.52		6.69	
		EIRP sum	13.69			13.63	13.31	12.54		10.88	
		EIRP vertical	12.39			12.82	13.16	12.35		10.71	
		EIRP horizontal	13.7			12.94	11.52	10.69		9.66	
		total efficiency	-1.68			-1.74	-2.12	-2.38		-2.91	dB
		antenna directivity	3.87			4.07	4.73	5.02		4.19	
		max antenna gain	2.19			2.33	2.61	2.64		1.28	
	max IC	cond TX power	1.9	2.1	2.1	2.1	1.7	1	0.9	0.6	dBm
		TRP	-0.59				-0.59			-2.24	
		EIRP sum	4.3				3.93			1.96	
		EIRP vertical	2.25				3.81			1.67	
		EIRP horizontal	3.74				2.39			0.52	
		total efficiency	-1.55			-2.1	-2.29	-1		-2.84	dB
		antenna directivity	3.95			0	4.52	0		4.2	
		max antenna gain	2.4			-2.1	2.23	-1		1.36	
	MCAL 0	cond TX power									dBm
		TRP									
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency	0	0	0	0	0	0	0	0	dB
		antenna directivity	0	0	0	0	0	0	0	0	
		max antenna gain	0	0	0	0	0	0	0	0	
	MCAL 1	cond TX power	N/A	N/A	N/A						dBm
		TRP									
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency				0	0	0		0	dB
		antenna directivity				0	0	0		0	
		max antenna gain				0	0	0		0	
Body normal	max PA	cond TX power									dBm
		TRP									
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency				0	0	0		0	dB
		antenna directivity				0	0	0		0	
		max antenna gain				0	0	0		0	
Body flipped	max PA	cond TX power									dBm
		TRP									
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency				0	0	0		0	dB
		antenna directivity				0	0	0		0	
		max antenna gain				0	0	0		0	

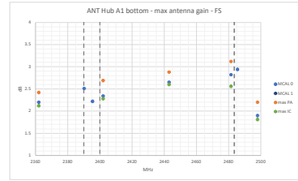
Ant Hub A1 top

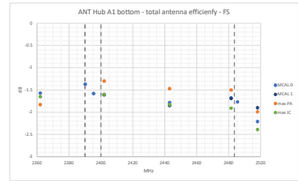


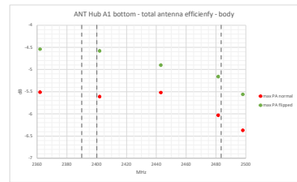




Ant Hub A1 bottom







Measurement data:

tester Verkotan
date 20 Oct 20
place Verkotan antenna lab
temp 23.7 C
RH 21%

SB SW MBAN test mode 1.0.0.0.1.0-1.2.86b05b8

Measurement equipment:

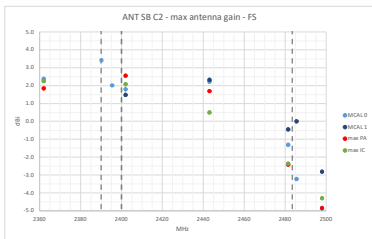
MBAN TX power measurement:
Continuos MBAN signal used in measurement

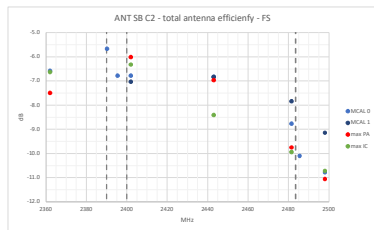
ANT SB A1 - orig			US MBAN indoor low	US MBAN indoor high	US MBAN anywhere mid	ISM low	ISM mid	ISM high	EU MBAN low	EU MBAN high	unit
		channel	0	11	13	15	31	46	47	52	
		frequency	2362	2390.2	2395.4	2402	2443	2481.5	2485.5	2498	MHz
Free space	max PA	cond TX power	11.5	11.3	11.2	11.2	10.9	10.6	10.6	10.5	dBm
		TRP	3.84			3.64	1.64	-0.41		-1.53	
		EIRP sum	12.26			10.99	9.78	6.22		4.23	
		EIRP vertical	10.43			10.55	9.75	4.66		4.03	
		EIRP horizontal	11.8			10.17	7.26	6.11		4.17	
		total efficiency	-7.66			-7.56	-9.26	-11.01		-12.03	dB
		antenna directivity	8.42			7.35	8.14	6.63		5.76	
		max antenna gain	0.76			-0.21	-1.12	-4.38		-6.27	
	max IC	cond TX power	2.8	3	3.1	3.1	3.3	3.3	3.3	3.2	dBm
		TRP	0			0	0	0		0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									
	MCAL 0	cond TX power	-3	-3	10.2	10.1	10.1	10	-2.8	-2.8	dBm
		TRP	0	0	0	0	0	0	0	0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									
	MCAL 1	cond TX power	N/A	N/A	N/A	7.2	7	7	7.2	7.1	dBm
		TRP				0	0	0	0	0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									
Body normal	max PA	cond TX power	11.5	11.3	11.2	11.2	10.9	10.6	10.6	10.5	dBm
		TRP	0			0	0	0		0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									
Body flipped	max PA	cond TX power	11.5	11.3	11.2	11.2	10.9	10.6	10.6	10.5	dBm
		TRP	0			0	0	0		0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									

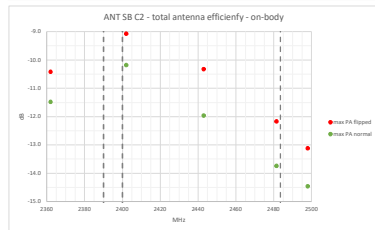
ANT SB B1 - mod TX			US MBAN indoor low	US MBAN indoor high	US MBAN anywhere mid	ISM low	ISM mid	ISM high	EU MBAN low	EU MBAN high	unit
		channel	0	11	13	15	31	46	47	52	
		frequency	2362	2390.2	2395.4	2402	2443	2481.5	2485.5	2498	MHz
Free space	max PA	cond TX power	11.8	11.9	11.9	11.9	11.9	11.9	11.9	11.9	dBm
		TRP	3.65			4.23	3.39	1.72		0.71	
		EIRP sum	11.82			11.86	11.81	8.6		6.33	
		EIRP vertical	10.56			11.63	11.77	8.52		6.15	
		EIRP horizontal	11.3			10.68	8.79	6.64		6.26	
		total efficiency	-8.15			-7.67	-8.51	-10.18		-11.19	dB
		antenna directivity	8.17			7.63	8.42	6.88		5.62	
		max antenna gain	0.02			-0.04	-0.09	-3.3		-5.57	
	max IC	cond TX power	3	3.1	3.1	3.1	3.1	3	3	2.9	dBm
		TRP	-4.59			-5.77	-7.14	-7.72		-8.13	
		EIRP sum	4.1			2.13	0.66	-1.66		-2.34	
		EIRP vertical	1.8			0.78	0.53	-1.69		-2.88	
		EIRP horizontal	3.74			1.45	-1.96	-2.65		-2.53	
		total efficiency	-7.59			-8.87	-10.24	-10.72		-11.03	dB
		antenna directivity	8.69			7.9	7.8	6.06		5.79	
		max antenna gain	1.1			-0.97	-2.44	-4.66		-5.24	
	MCAL 0	cond TX power	-2.9	-2.8	10.1	10	10.1	10.1	-3	-3.1	dBm
		TRP	0	0	0	0	0	0	0	0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									
	MCAL 1	cond TX power	N/A	N/A	N/A	6.9	7	7	7.3	7.2	dBm
		TRP				0	0	0	0	0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									
Body normal	max PA	cond TX power	11.8	11.9	11.9	11.9	11.9	11.9	11.9	11.9	dBm
		TRP	-1.25			-0.45		-2.13			
		EIRP sum	6.09			7.03		4.74			
		EIRP vertical	1.68			1.61		-0.42			
		EIRP horizontal	5.78			6.76		4.57			
		total efficiency	-13.1			-12.4		-14.0			dB
		antenna directivity	7.3			7.5		6.9			
		max antenna gain	-5.7			-4.9		-7.2			
Body flipped	max PA	cond TX power	11.8	11.9	11.9	11.9	11.9	11.9	11.9	11.9	dBm
		TRP	0			0	0	0		0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									

ANT SB C1 - mod TX and ant			US MBAN indoor low	US MBAN indoor high	US MBAN anywhere mid	ISM low	ISM mid	ISM high	EU MBAN low	EU MBAN high	unit
		channel	0	11	13	15	31	46	47	52	
		frequency	2362	2390.2	2395.4	2402	2443	2481.5	2485.5	2498	MHz
Free space	max PA	cond TX power	11.7	11.8	11.8	11.8	11.8	11.9	11.9	11.8	dBm
		TRP	5.8			5.05	1.63	-0.8		-1.94	
		EIRP sum	14.19			13.37	10.63	6.64		4.42	
		EIRP vertical	13.65			13.13	10.56	6.57		4.38	
		EIRP horizontal	13.63			11.65	6.67	3.59		3.14	
		total efficiency	-5.9			-6.75	-10.17	-12.7		-13.74	dB
		antenna directivity	8.39			8.32	9	7.44		6.36	
		max antenna gain	2.49			1.57	-1.17	-5.26		-7.38	
	max IC	cond TX power	3.2	3.3	3.3	3.3	3.3	3.2	3.2	3.1	dBm
		TRP	0			0	0	0		0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									
	MCAL 0	cond TX power	-2.9	-2.8	10.1	10	10.2	10.1	-3.1	-3.1	dBm
		TRP	0	0	0	0	0	0	0	0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									
	MCAL 1	cond TX power	N/A	N/A	N/A	7.1	7.2	7.2	7.2	7.1	dBm
		TRP				0	0	0	0	0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									
Body normal	max PA	cond TX power	11.7	11.8	11.8	11.8	11.8	11.9	11.9	11.8	dBm
		TRP	0			0	0	0		0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									
Body flipped	max PA	cond TX power	11.7	11.8	11.8	11.8	11.8	11.9	11.9	11.8	dBm
		TRP	0			0	0	0		0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									

US MBAN in	2390	10
	2390	-20
US MBAN any	2400	10
	2400	-20
ISM hiah	2483.5	10
	2483.5	-20







ANT SB B2 - mod TX			US MBAN indoor low	US MBAN indoor high	US MBAN anywhere mid	ISM low	ISM mid	ISM high	EU MBAN low	EU MBAN high	unit
		channel	0	11	13	15	31	46	47	52	
		frequency	2362	2390.2	2395.4	2402	2443	2481.5	2485.5	2498	MHz
Free space	max PA	cond TX power	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	dBm
		TRP	3.19			3.79	2.46	0.54		-0.67	
		EIRP sum	11.3			10.81	10.65	7.43		5.07	
		EIRP vertical	9.59			10.69	10.62	7.35		4.55	
		EIRP horizontal	10.91			10.18	7.95	5.54		5.01	
		total efficiency	-8.51			-7.91	-9.24	-11.16		-12.37	dB
		antenna directivity	8.11			7.02	8.19	6.89		5.74	
		max antenna gain	-0.4			-0.89	-1.05	-4.27		-6.63	
	max IC	cond TX power	3	3.1	3.1	3.1	3.1	3	3	2.9	dBm
		TRP	0			0	0	0		0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									
	MCAL 0	cond TX power	-2.9	-2.8	10	10.1	10.1	10	-3	-3.1	dBm
		TRP	0	0	0	0	0	0	0	0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									
	MCAL 1	cond TX power	N/A	N/A	N/A	7.1	7.2	7	7.3	7.1	dBm
		TRP				0	0	0	0	0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									
Body normal	max PA	cond TX power	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	dBm
		TRP	0			0	0	0		0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									
Body flipped	max PA	cond TX power	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	dBm
		TRP	0			0	0	0		0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									

Antenna parameter DUT

ANT SB C2 - mod TX and ant			US MBAN indoor low	US MBAN indoor high	US MBAN anywhere mid	ISM low	ISM mid	ISM high	EU MBAN low	EU MBAN high	unit
		channel	0	11	13	15	31	46	47	52	
		frequency	2362	2390.2	2395.4	2402	2443	2481.5	2485.5	2498	MHz
Free space	max PA	cond TX power	11.6	11.6	11.6	11.6	11.7	11.7	11.6	11.6	dBm
		TRP	4.1			5.59	4.73	1.95		0.54	
		EIRP sum	13.44			14.15	13.39	9.28		6.76	
		EIRP vertical	11.69			13.7	13.37	9.2		6	
		EIRP horizontal	12.97			13.17	9.57	6.6		5.66	
		total efficiency	-7.5			-6.0	-7.0	-9.8		-11.1	dB
		antenna directivity	9.3			8.6	8.7	7.3		6.2	
		max antenna gain	1.8			2.6	1.7	-2.4		-4.8	
	max IC	cond TX power	3.3	3.3	3.3	3.3	3.3	3.2	3.2	3.1	dBm
		TRP	-3.33			-3.02	-5.11	-6.74		-7.62	
		EIRP sum	5.55			5.38	3.8	0.83		-1.2	
		EIRP vertical	4.46			5.09	3.76	0.27		-1.29	
		EIRP horizontal	5.14			4.35	-0.24	-2.17		-2.61	
		total efficiency	-6.6			-6.3	-8.4	-9.9		-10.7	dB
		antenna directivity	8.9			8.4	8.9	7.6		6.4	
		max antenna gain	2.3			2.1	0.5	-2.4		-4.3	
	MCAL 0	cond TX power	-3	-2.9	10.1	10	10.1	10.1	-2.9	-2.9	dBm
		TRP	-9.58	-8.57	3.32	3.22	3.27	1.33	-13	-13.68	
		EIRP sum	-0.63	0.51	12.11	11.79	12.32	8.79	-6.12	-7.77	
		EIRP vertical	-1.69	0.48	12.02	11.59	12.27	8.71	-6.24	-7.79	
		EIRP horizontal	-1.05	-1.54	10.23	10.37	8.06	5.76	-8.33	-8.56	
		total efficiency	-6.6	-5.7	-6.8	-6.8	-6.8	-8.8	-10.1	-10.8	dB
		antenna directivity	9.0	9.1	8.8	8.6	9.1	7.5	6.9	5.9	
		max antenna gain	2.4	3.4	2.0	1.8	2.2	-1.3	-3.2	-4.9	
	MCAL 1	cond TX power	N/A	N/A	N/A	7.1	7	6.9	7.2	7.1	dBm
		TRP				0.07	0.17	-0.94		-2.04	
		EIRP sum				8.58	9.32	6.45		4.29	
		EIRP vertical				8.3	9.26	6.38		4.26	
		EIRP horizontal				7.19	4.98	3.53		3.01	
		total efficiency				-7.0	-6.8	-7.8		-9.1	dB
		antenna directivity				8.5	9.2	7.4		6.3	
		max antenna gain				1.5	2.3	-0.5	← used	-2.8	
Body	max PA normal	cond TX power	11.6	11.6	11.6	11.6	11.7	11.7	11.6	11.6	dBm
		TRP	0.12			1.42	-0.26	-2.04		-2.86	
		EIRP sum	8.23			9.39	6.53	5.27		4.66	
		EIRP vertical	3.22			4.16	2.64	-0.96		-1.8	
		EIRP horizontal	7.98			9.26	6.44	5.22		4.58	
		total efficiency	-11.5			-10.2	-12.0	-13.7		-14.5	dB
		body loss	4.0			4.2	5.0	4.0		3.4	
		antenna directivity	8.1			8.0	6.8	7.3		7.5	
		max antenna gain	-3.4			-2.2	-5.2	-6.4		-6.9	
	max PA flipped	cond TX power	11.6	11.6	11.6	11.6	11.7	11.7	11.6	11.6	dBm
		TRP	1.18			2.53	1.38	-0.47		-1.52	
		EIRP sum	8.04			7.79	7.86	6.39		5.56	
		EIRP vertical	3.44			4.6	4.25	2.09		1.01	
		EIRP horizontal	7.68			7.51	6.7	5.6		4.69	
		total efficiency	-10.4			-9.1	-10.3	-12.2		-13.1	dB
		body loss	2.9			3.1	3.4	2.4		2.1	
		antenna directivity	6.9			5.3	6.5	6.9		7.1	
		max antenna gain	-3.6			-3.8	-3.8	-5.3		-6.0	

ANT SB C3 - mod TX and ant			US MBAN indoor low	US MBAN indoor high	US MBAN anywhere mid	ISM low	ISM mid	ISM high	EU MBAN low	EU MBAN high	unit
		channel	0	11	13	15	31	46	47	52	
		frequency	2362	2390.2	2395.4	2402	2443	2481.5	2485.5	2498	MHz
Free space	max PA	cond TX power	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	dBm
		TRP	3.75			5.38	4.57	1.69		0.44	
		EIRP sum	11.7			13.55	12.15	8.16		6.16	
		EIRP vertical	10.69			11.82	12.13	8.07		5.94	
		EIRP horizontal	11.25			12.91	9.8	6.99		6.05	
		total efficiency	-7.75			-6.12	-6.93	-9.81		-11.06	dB
		antenna directivity	7.95			8.17	7.58	6.47		5.72	
		max antenna gain	0.2			2.05	0.65	-3.34		-5.34	
	max IC	cond TX power	2.8	2.9	2.9	2.9	3	2.9	2.9	2.9	dBm
		TRP	0			0	0	0		0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									
	MCAL 0	cond TX power	-2.9	-2.7	10.1	10.1	10.1	10.1	-3.1	-3.2	dBm
		TRP	0	0	0	0	0	0	0	0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									
	MCAL 1	cond TX power	N/A	N/A	N/A	7	7	6.9	7.2	7.1	dBm
		TRP				0	0	0	0	0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									
Body normal	max PA	cond TX power	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	dBm
		TRP	0			0	0	0		0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									
Body flipped	max PA	cond TX power	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	dBm
		TRP	0			0	0	0		0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									

ANT SB C3 - mod TX Cs 1p2 and ant			US MBAN indoor low	US MBAN indoor high	US MBAN anywhere mid	ISM low	ISM mid	ISM high	EU MBAN low	EU MBAN high	unit
		channel	0	11	13	15	31	46	47	52	
		frequency	2362	2390	2395.4	2402	2443	2482	2485.5	2498	MHz
Free space	max PA	cond TX pow	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	dBm
		TRP	2.7			5.29				1.23	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiey	-8.8			-11.5	-6.21	-11.5		-10.27	dB
		antenna dire	-2.7			0	-5.29	0		-1.23	
		max antenn	-11.5			-11.5	-11.5	-11.5		-11.5	
	max IC	cond TX pow	2.8	2.9	2.9	2.9	3	2.9	2.9	2.9	dBm
		TRP	0			0	0	0			
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									
	MCAL 0	cond TX pow	-2.9	-2.7	10.1	10.1	10.1	10.1	-3.1	-3.2	dBm
		TRP	0	0	0	0	0	0	0	0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									
	MCAL 1	cond TX pow	N/A	N/A	N/A	7	7	6.9	7.2	7.1	dBm
		TRP				0	0	0	0	-1.34	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency								-8.44	dB
		antenna directivity								1.34	
		max antenna gain								-7.1	
Body normal	max PA	cond TX pow	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	dBm
		TRP	0			0	0	0		0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									
Body flipped	max PA	cond TX pow	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	dBm
		TRP	0			0	0	0		0	
		EIRP sum									
		EIRP vertical									
		EIRP horizontal									
		total efficiency									dB
		antenna directivity									
		max antenna gain									

Test environment:

date	14 Oct 2020	18 Oct 2020
tester	212487387 - Timo Hakala	212487387 - Timo Hakala
place	GE Vallila RF lab	GE Vallila RF lab
temp	21.1 C	21.1 C
RH	43.60%	39.70%

Duty-cycle compensation:

Pulse duration	5.75	ms
Pulse on time	5.39	ms
TX duty-cycle	94	%

Hub SW ge-swu-image-beat3-imx7d-0.0.0.20.1.9217

Measurement equipment:
Environment meter: Vaisala HUMICAP, ML 642.6810, calibration valid Jun-2021
RF power meter: R&S NRP18SN, ML 804.6708, calibration valid until 30-Apr-2022
ant cable B

WLAN TX power measurement:
Measured in 802.11g (2GHz) and 802.11 (5) at 6Mbps datarate, 94% duty-cycle (measured) is compensated by R&S NRP18SN
94% duty-cycle (measured) compensated by R&S NRP18SN

Antenna parameter DUT

DUT PWA 2YMB - original --> ANT Hub A1
measured: 16-Oct-2020

	2 GHz				5 GHz																								
	ETSI				ETSI				ETSI DFS															ETSI N/A (SDR)					
	FCC			FCC N/A	FCC				FCC DFS								FCC N/A				FCC DFS			FCC					
	1	6	11	13	36	40	44	48	52	56	60	64	100	104	108	112	116	120	124	128	132	136	140	149	153	157	161	165
frequency (MHz)	2412	2437	2462	2472	5180	5200	5220	5240	5260	5280	5300	5320	5500	5520	5540	5560	5580	5600	5620	5640	5660	5680	5700	5745	5765	5785	5805	5825
TX power (dBm) - top antenna	9.4	14.1	9.5	14	11.4	11.7	11.6	11.6	9.4	9.5	9.4	9.3	9.9	12.6	12.7	12.8	12.8	12.4	11.8	11.9	12.1	12.2	9.4	9.6	14.5	14.5	14.5	10.5
TX power (dBm) - bottom antenna	N/A	N/A	N/A	N/A	12.9	12.8	12.8	12.8	9.8	9.6	9.6	9.5	10.6	12.5	12.4	12.3	12.3	12.3	12.2	12.1	12	12	8.3	8.7	13.5	13.5	13.5	9.9

DUT PWA 3W0D - original --> ANT Hub A2
measured: 14-Oct-2020

	2 GHz				5 GHz																								
	ETSI				ETSI				ETSI DFS															ETSI N/A (SDR)					
	FCC			FCC N/A	FCC				FCC DFS								FCC N/A				FCC DFS			FCC					
	1	6	11	13	36	40	44	48	52	56	60	64	100	104	108	112	116	120	124	128	132	136	140	149	153	157	161	165
frequency (MHz)	2412	2437	2462	2472	5180	5200	5220	5240	5260	5280	5300	5320	5500	5520	5540	5560	5580	5600	5620	5640	5660	5680	5700	5745	5765	5785	5805	5825
TX power (dBm) - top antenna	8.3	12.8	8.2	12.5	10.8	11.3	11.5	11.7	9	9	9	8.9	10.1	12.4	12.4	12.6	12.7	11.8	11.9	12	12.1	12.2	9	9	14.1	14.1	14.1	11.3
TX power (dBm) - bottom antenna	N/A	N/A	N/A	N/A	12.6	12.6	12.6	12.5	9.3	9.2	9	8.9	9.8	11.6	11.5	11.4	11.4	11.4	11.3	11.2	11.2	11.1	7.3	7.5	12.3	12.3	12.3	9

Comments:
ch1 power varies +-0.3dB from measurement to measurement --> this DUT is not preferred in 2GHz WLAN radiated measurement

DUT PWA 3VYK - modified MBAN antenna lines --> ANT Hub B1
measured: 14-Oct-2020

	2 GHz				5 GHz																								
	ETSI				ETSI				ETSI DFS															ETSI N/A (SDR)					
	FCC			FCC N/A	FCC				FCC DFS								FCC N/A				FCC DFS			FCC					
channel	1	6	11	13	36	40	44	48	52	56	60	64	100	104	108	112	116	120	124	128	132	136	140	149	153	157	161	165
frequency (MHz)	2412	2437	2462	2472	5180	5200	5220	5240	5260	5280	5300	5320	5500	5520	5540	5560	5580	5600	5620	5640	5660	5680	5700	5745	5765	5785	5805	5825
TX power (dBm) - top antenna	9.7	13.9	8.8	13.3	11.1	11.4	11.5	11.4	9.2	9.3	9.1	9.1	9.9	12.3	12.4	12.5	12.6	11.7	11.7	11.7	11.9	12.1	9.2	9.5	14.5	14.5	14.5	11.5
TX power (dBm) - bottom antenna	N/A	N/A	N/A	N/A	12.4	12.5	12.4	12.4	9.3	9.3	9.1	9	10	11.9	11.8	11.8	11.7	11.9	11.7	11.6	11.6	11.5	7.6	8.3	13.1	13.1	13	9.4

Test environment:

date	14 Oct 2020	date	16 Oct 2020	date	17 Oct 2020
tester	212487387 - Timo Hakala	tester	212487387 - Timo Hakala	tester	212487387 - Timo Hakala
place	GE Vallila RF lab	place	GE Vallila RF lab	place	GE Vallila RF lab
temp	21.1 C	temp	21.1 C	temp	21.9 C
RH	43.60%	RH	39.70%	RH	31.70%

Hub SW ge-swu-image-beat3-imx7d-0.0.0.20.1.9217 (MBAN test mode 20.1)

Measurement equipment:
Environment meter: Vaisala HUMICAP, ML 642.6810, calibration valid Jun-2021
RF power meter: R&S NRP18SN, ML 804.6708, calibration valid until 30-Apr-2022
ant cable B

MBAN TX power measurement:
Continuos MBAN signal used in measurement

Antenna parameter DUT

DUT PWA 2YMB - original --> ANT Hub A1

measured: 17-Oct-2020		US MBAN indoor		US MBAN anywhere	ISM			EU MBAN	
		low	high	mid	low	mid	high	low	high
	channel	0	11	13	15	31	46	47	52
	frequency (MHz)	2362	2390.2	2395.4	2402	2443	2481.5	2485.5	2498
Max TX power with PA	top antenna (dBm)	10.6	10.5	10.5	10.5	10.2	9.9	9.9	9.7
	bottom antenna (dBm)	11.1	10.9	10.8	10.7	10.1	9.3	9.3	9
Max TX no PA	top antenna (dBm)	2.1	2.2	2.2	2.2	2	1.6	1.5	1.3
	bottom antenna (dBm)	2.2	2.2	2.2	2.2	1.7	0.8	0.7	0.4
MCAL vector 0	top antenna (dBm)	-5.4	-5.2	7.7	7.7	7.7	7.7	-5.3	-5.5
	bottom antenna (dBm)	-4.6	-4.3	8.7	8.7	8.7	8.6	-4.1	-4.4
MCAL vector 1	top antenna (dBm)	N/A	N/A	N/A	4.6	4.7	4.5	4.8	4.7
	bottom antenna (dBm)	N/A	N/A	N/A	5.6	5.6	5.7	5.8	5.7

DUT PWA 3WOD - original --> ANT Hub A2

measured: 14-Oct-2020		US MBAN indoor		US MBAN anywhere	ISM			EU MBAN	
		low	high	mid	low	mid	high	low	high
	channel	0	11	13	15	31	46	47	52
	frequency (MHz)	2362	2390.2	2395.4	2402	2443	2481.5	2485.5	2498
Max TX power with PA	top antenna (dBm)	10.9	10.8	10.8	10.7	10.4	10.1	10	9.8
	bottom antenna (dBm)	11.4	11.1	11	10.9	10.1	9.1	9	8.7
Max TX no PA	top antenna (dBm)	2.3	2.3	2.2	2.2	1.9	1.3	1.2	1
	bottom antenna (dBm)	2.1	2	1.9	1.8	1.1	0.1	-0.1	-0.4
MCAL vector 0	top antenna (dBm)	-5.4	-5.3	7.6	7.7	7.7	7.6	-5.2	-5.4
	bottom antenna (dBm)	-4.4	-4.3	8.6	8.6	8.6	8.4	-4.1	-4.5
MCAL vector 1	top antenna (dBm)	N/A	N/A	N/A	4.7	4.5	4.6	4.6	4.4
	bottom antenna (dBm)	N/A	N/A	N/A	5.7	5.8	5.5	5.9	5.7

DUT PWA 3VYK - modified MBAN antenna lines --> ANT Hub B1

measured: 17-Oct-2020		US MBAN indoor		US MBAN anywhere	ISM			EU MBAN	
		low	high	mid	low	mid	high	low	high
	channel	0	11	13	15	31	46	47	52
	frequency (MHz)	2362	2390.2	2395.4	2402	2443	2481.5	2485.5	2498
Max TX power with PA	top antenna (dBm)	11.2	11.2	11.2	11.2	11	10.6	10.6	10.4
	bottom antenna (dBm)	11.5	11.4	11.3	11.3	10.7	9.9	9.8	9.6
Max TX no PA	top antenna (dBm)	2	2.3	2.3	2.3	2.3	1.8	1.7	1.5
	bottom antenna (dBm)	1.9	2.1	2.1	2.1	1.7	1	0.9	0.6
MCAL vector 0	top antenna (dBm)	-5.5	-5.4	7.5	7.5	7.6	7.5	-5.4	-5.7
	bottom antenna (dBm)	-4.6	-4.4	8.5	8.5	8.6	8.6	-4.3	-4.6
MCAL vector 1	top antenna (dBm)	N/A	N/A	N/A	4.4	4.6	4.7	4.7	4.6
	bottom antenna (dBm)	N/A	N/A	N/A	5.7	5.3	5.7	5.7	5.6

Measurement data:

date	14 Oct 20	date	18 Oct 20
tester	212487387 - Timo Hakala	tester	212487387 - Timo Hakala
place	GE Vallila RF lab	place	GE Vallila RF lab
temp	21.1 C	temp	21.7 C
RH	43.60%	RH	27.70%

SB SW MBAN test mode 1.0.0.0.1.0-1.2.86b05b8

Measurement equipment:
Environment meter: Vaisala HUMICAP, ML 642.6810, calibration valid Jun-2021
RF power meter: R&S NRP18SN, ML 804.6708, calibration valid until 30-Apr-2022
ant cable B (compensated off from the TX power results)

MBAN TX power measurement:
Continuos MBAN signal used in measurement
MAX TX power with PA: MBAN test mode command --pa_ic 63 --pa_ext 1
MAX TX power with PA: MBAN test mode command --pa_ic 63 --pa_ext 1
MCAL vector 0 (or 1): MBAN test command --pa_mcal 0 (or 1)

14 Oct 20

DUT 4R1B - orig --> ANT SB A1	US MBAN indoor		US MBAN anywhere	ISM			EU MBAN	
	low	high	mid	low	mid	high	low	high
channel	0	11	13	15	31	46	47	52
frequency (MHz)	2362	2390.2	2395.4	2402	2443	2481.5	2485.5	2498
Max TX with PA	11.5	11.3	11.2	11.2	10.9	10.6	10.6	10.5
Max TX no PA	2.8	3	3.1	3.1	3.3	3.3	3.3	3.2
MCAL vector 0	-3	-3	10.2	10.1	10.1	10	-2.8	-2.8
MCAL vector 1	N/A	N/A	N/A	7.2	7	7	7.2	7.1

14 Oct 20

DUT 4R3Y - orig --> ANT SB A2	US MBAN indoor		US MBAN anywhere	ISM			EU MBAN	
	low	high	mid	low	mid	high	low	high
channel	0	11	13	15	31	46	47	52
frequency (MHz)	2362	2390.2	2395.4	2402	2443	2481.5	2485.5	2498
Max TX with PA	11.5	11.3	11.3	11.3	11	10.9	10.8	10.8
Max TX no PA	2.7	2.9	3	3	3.2	3.2	3.2	3.1
MCAL vector 0	-3	-3	10.2	10.1	10.1	10.1	-2.8	-2.8
MCAL vector 1	N/A	N/A	N/A	7	7.1	7	7.2	7.1

14 Oct 20

DUT 4R3V - mod K1 --> ANT SB B1	US MBAN indoor		US MBAN anywhere	ISM			EU MBAN	
	low	high	mid	low	mid	high	low	high
channel	0	11	13	15	31	46	47	52
frequency (MHz)	2362	2390.2	2395.4	2402	2443	2481.5	2485.5	2498
Max TX with PA	11.8	11.9	11.9	11.9	11.9	11.9	11.9	11.9
Max TX no PA	3	3.1	3.1	3.1	3.1	3	3	2.9
MCAL vector 0	-2.9	-2.8	10.1	10	10.1	10.1	-3	-3.1
MCAL vector 1	N/A	N/A	N/A	6.9	7	7	7.3	7.2

14 Oct 20

DUT 4R2W - mod K1 --> ANT SB B2	US MBAN indoor		US MBAN anywhere	ISM			EU MBAN	
	low	high	mid	low	mid	high	low	high
channel	0	11	13	15	31	46	47	52
frequency (MHz)	2362	2390.2	2395.4	2402	2443	2481.5	2485.5	2498
Max TX with PA	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7
Max TX no PA	3.1	3.2	3.2	3.2	3.2	3.1	3.1	3
MCAL vector 0	-2.9	-2.8	10	10.1	10.1	10	-3	-3.1
MCAL vector 1	N/A	N/A	N/A	7.1	7.2	7	7.3	7.1

14 Oct 20

DUT 4R49 - mod K1 --> ANT SB B3	US MBAN indoor		US MBAN anywhere	ISM			EU MBAN	
	low	high	mid	low	mid	high	low	high
channel	0	11	13	15	31	46	47	52
frequency (MHz)	2362	2390.2	2395.4	2402	2443	2481.5	2485.5	2498
Max TX with PA	11.6	11.7	11.7	11.7	11.8	11.8	11.8	11.7
Max TX no PA	2.8	2.9	2.9	2.9	3	2.9	2.9	2.8
MCAL vector 0	-2.8	-3	10	10.1	10.2	10	-2.9	-3
MCAL vector 1	N/A	N/A	N/A	7.1	7.2	7.1	7.1	6.9

18 Oct 20

DUT 4PYS - mod K1 + ant --> ANT SB C1	US MBAN indoor		US MBAN anywhere	ISM			EU MBAN	
	low	high	mid	low	mid	high	low	high
channel	0	11	13	15	31	46	47	52
frequency (MHz)	2362	2390.2	2395.4	2402	2443	2481.5	2485.5	2498
Max TX with PA	11.7	11.8	11.8	11.8	11.8	11.9	11.9	11.8
Max TX no PA	3.2	3.3	3.3	3.3	3.3	3.2	3.2	3.1
MCAL vector 0	-2.9	-2.8	10.1	10	10.2	10.1	-3.1	-3.1
MCAL vector 1	N/A	N/A	N/A	7.1	7.2	7.2	7.2	7.1

Antenna parameter DUT

18 Oct 20

DUT 4R41 - mod K1 + ant --> ANT SB C2	US MBAN indoor		US MBAN anywhere	ISM			EU MBAN	
	low	high	mid	low	mid	high	low	high
channel	0	11	13	15	31	46	47	52
frequency (MHz)	2362	2390.2	2395.4	2402	2443	2481.5	2485.5	2498
Max TX with PA	11.6	11.6	11.6	11.6	11.7	11.7	11.6	11.6
Max TX no PA	3.3	3.3	3.3	3.3	3.3	3.2	3.2	3.1
MCAL vector 0	-3	-2.9	10.1	10	10.1	10.1	-2.9	-2.9
MCAL vector 1	N/A	N/A	N/A	7.1	7	6.9	7.2	7.1

18 Oct 20

DUT 4R0C - mod K1 + ant --> ANT SB C3	US MBAN indoor		US MBAN anywhere	ISM			EU MBAN	
	low	high	mid	low	mid	high	low	high
channel	0	11	13	15	31	46	47	52
frequency (MHz)	2362	2390.2	2395.4	2402	2443	2481.5	2485.5	2498
Max TX with PA	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
Max TX no PA	2.8	2.9	2.9	2.9	3	2.9	2.9	2.9
MCAL vector 0	-2.9	-2.7	10.1	10.1	10.1	10.1	-3.1	-3.2
MCAL vector 1	N/A	N/A	N/A	7	7	6.9	7.2	7.1

Measurement equipment:
RF power meter: R&S NRP18SN, ML 804.6708, calibration valid until 30-Apr-2022

ant cable B

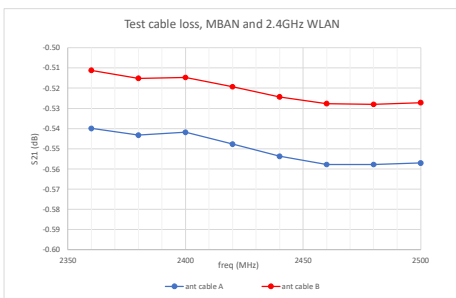
freq[Hz]	re:Trc4_S21	im:Trc4_S21	comp S21
2.00E+09	3.58E-01	8.75E-01	-0.48
2.02E+09	4.55E-01	8.29E-01	-0.49
2.04E+09	5.46E-01	7.72E-01	-0.49
2.06E+09	6.30E-01	7.05E-01	-0.49
2.08E+09	7.06E-01	6.29E-01	-0.49
2.10E+09	7.73E-01	5.45E-01	-0.49
2.12E+09	8.29E-01	4.54E-01	-0.49
2.14E+09	8.75E-01	3.57E-01	-0.49
2.16E+09	9.10E-01	2.55E-01	-0.49
2.18E+09	9.33E-01	1.49E-01	-0.49
2.20E+09	9.44E-01	4.28E-02	-0.49
2.22E+09	9.43E-01	-6.46E-02	-0.49
2.24E+09	9.29E-01	-1.71E-01	-0.49
2.26E+09	9.04E-01	-2.75E-01	-0.49
2.28E+09	8.66E-01	-3.76E-01	-0.50
2.30E+09	8.18E-01	-4.70E-01	-0.50
2.32E+09	7.60E-01	-5.60E-01	-0.50
2.34E+09	6.92E-01	-6.41E-01	-0.51
2.36E+09	6.14E-01	-7.15E-01	-0.51
2.38E+09	5.30E-01	-7.79E-01	-0.52
2.40E+09	4.39E-01	-8.34E-01	-0.51
2.42E+09	3.41E-01	-8.78E-01	-0.52
2.44E+09	2.39E-01	-9.11E-01	-0.52
2.46E+09	1.34E-01	-9.31E-01	-0.53
2.48E+09	2.82E-02	-9.41E-01	-0.53
2.50E+09	-7.77E-02	-9.38E-01	-0.53
2.52E+09	-1.83E-01	-9.23E-01	-0.53
2.54E+09	-2.86E-01	-8.96E-01	-0.53
2.56E+09	-3.85E-01	-8.58E-01	-0.53
2.58E+09	-4.80E-01	-8.09E-01	-0.53
2.60E+09	-5.68E-01	-7.50E-01	-0.53
2.62E+09	-6.50E-01	-6.80E-01	-0.53
2.64E+09	-7.23E-01	-6.02E-01	-0.53
2.66E+09	-7.87E-01	-5.15E-01	-0.53
2.68E+09	-8.41E-01	-4.21E-01	-0.53
2.70E+09	-8.83E-01	-3.22E-01	-0.54
2.72E+09	-9.14E-01	-2.20E-01	-0.54
2.74E+09	-9.33E-01	-1.14E-01	-0.54
2.76E+09	-9.40E-01	-7.43E-03	-0.54
2.78E+09	-9.34E-01	9.93E-02	-0.54
2.80E+09	-9.17E-01	2.05E-01	-0.54
2.82E+09	-8.87E-01	3.07E-01	-0.55
2.84E+09	-8.47E-01	4.05E-01	-0.55
2.86E+09	-7.95E-01	4.99E-01	-0.55
2.88E+09	-7.33E-01	5.85E-01	-0.56
2.90E+09	-6.62E-01	6.64E-01	-0.56
2.92E+09	-5.82E-01	7.34E-01	-0.56
2.94E+09	-4.96E-01	7.95E-01	-0.57
2.96E+09	-4.02E-01	8.46E-01	-0.57
2.98E+09	-3.03E-01	8.85E-01	-0.58
3.00E+09	-2.01E-01	9.13E-01	-0.58
3.02E+09	-9.64E-02	9.30E-01	-0.58
3.04E+09	9.98E-03	9.35E-01	-0.58
3.06E+09	1.16E-01	9.27E-01	-0.59
3.08E+09	2.21E-01	9.08E-01	-0.59
3.10E+09	3.23E-01	8.77E-01	-0.59
3.12E+09	4.20E-01	8.34E-01	-0.59
3.14E+09	5.12E-01	7.81E-01	-0.60
3.16E+09	5.97E-01	7.18E-01	-0.60
3.18E+09	6.74E-01	6.45E-01	-0.60
3.20E+09	7.43E-01	5.64E-01	-0.60
3.22E+09	8.03E-01	4.76E-01	-0.60
3.24E+09	8.51E-01	3.82E-01	-0.60
3.26E+09	8.89E-01	2.83E-01	-0.60
3.28E+09	9.16E-01	1.80E-01	-0.60
3.30E+09	9.30E-01	7.52E-02	-0.60
3.32E+09	9.33E-01	-3.05E-02	-0.60
3.34E+09	9.23E-01	-1.36E-01	-0.60
3.36E+09	9.02E-01	-2.40E-01	-0.60
3.38E+09	8.69E-01	-3.40E-01	-0.60
3.40E+09	8.25E-01	-4.36E-01	-0.60
3.42E+09	7.70E-01	-5.27E-01	-0.60
3.44E+09	7.05E-01	-6.10E-01	-0.61
3.46E+09	6.31E-01	-6.86E-01	-0.61
3.48E+09	5.49E-01	-7.53E-01	-0.61
3.50E+09	4.59E-01	-8.10E-01	-0.62
3.52E+09	3.64E-01	-8.57E-01	-0.62
3.54E+09	2.65E-01	-8.92E-01	-0.63
3.56E+09	1.62E-01	-9.16E-01	-0.63
3.58E+09	5.73E-02	-9.28E-01	-0.63
3.60E+09	-4.84E-02	-9.28E-01	-0.64
3.62E+09	-1.53E-01	-9.16E-01	-0.64
3.64E+09	-2.56E-01	-8.93E-01	-0.64
3.66E+09	-3.55E-01	-8.58E-01	-0.64
3.68E+09	-4.50E-01	-8.12E-01	-0.65
3.70E+09	-5.39E-01	-7.55E-01	-0.65
3.72E+09	-6.21E-01	-6.90E-01	-0.65
3.74E+09	-6.95E-01	-6.15E-01	-0.64
3.76E+09	-7.60E-01	-5.32E-01	-0.65
3.78E+09	-8.16E-01	-4.43E-01	-0.64
3.80E+09	-8.61E-01	-3.48E-01	-0.65
3.82E+09	-8.95E-01	-2.48E-01	-0.64
3.84E+09	-9.17E-01	-1.45E-01	-0.64
3.86E+09	-9.28E-01	-3.92E-02	-0.64
3.88E+09	-9.26E-01	6.68E-02	-0.64
3.90E+09	-9.13E-01	1.72E-01	-0.64
3.92E+09	-8.87E-01	2.74E-01	-0.64
3.94E+09	-8.50E-01	3.74E-01	-0.64
3.96E+09	-8.02E-01	4.68E-01	-0.65
3.98E+09	-7.43E-01	5.56E-01	-0.65
4.00E+09	-6.74E-01	6.37E-01	-0.65
4.02E+09	-5.97E-01	7.10E-01	-0.65
4.04E+09	-5.12E-01	7.72E-01	-0.66
4.06E+09	-4.21E-01	8.25E-01	-0.66
4.08E+09	-3.24E-01	8.67E-01	-0.67
4.10E+09	-2.23E-01	8.97E-01	-0.68
4.12E+09	-1.20E-01	9.16E-01	-0.68
4.14E+09	-1.55E-02	9.23E-01	-0.69
4.16E+09	8.87E-02	9.19E-01	-0.70
4.18E+09	1.92E-01	9.02E-01	-0.71
4.20E+09	2.92E-01	8.73E-01	-0.72
4.22E+09	3.89E-01	8.34E-01	-0.72
4.24E+09	4.80E-01	7.85E-01	-0.73
4.26E+09	5.65E-01	7.26E-01	-0.73
4.28E+09	6.43E-01	6.57E-01	-0.73
4.30E+09	7.13E-01	5.80E-01	-0.73
4.32E+09	7.74E-01	4.96E-01	-0.74
4.34E+09	8.25E-01	4.05E-01	-0.73
4.36E+09	8.65E-01	3.10E-01	-0.73
4.38E+09	8.95E-01	2.09E-01	-0.73
4.40E+09	9.13E-01	1.07E-01	-0.73
4.42E+09	9.19E-01	2.51E-03	-0.73
4.44E+09	9.14E-01	-1.01E-01	-0.73
4.46E+09	8.98E-01	-2.04E-01	-0.72
4.48E+09	8.69E-01	-3.04E-01	-0.72
4.50E+09	8.28E-01	-4.01E-01	-0.72
4.52E+09	7.77E-01	-4.93E-01	-0.72
4.54E+09	7.16E-01	-5.79E-01	-0.71
4.56E+09	6.46E-01	-6.57E-01	-0.71
4.58E+09	5.66E-01	-7.26E-01	-0.72
4.60E+09	4.79E-01	-7.86E-01	-0.72
4.62E+09	3.86E-01	-8.35E-01	-0.72
4.64E+09	2.88E-01	-8.74E-01	-0.73
4.66E+09	1.86E-01	-9.00E-01	-0.73
4.68E+09	8.30E-02	-9.15E-01	-0.74
4.70E+09	-2.17E-02	-9.17E-01	-0.75
4.72E+09	-1.27E-01	-9.08E-01	-0.76
4.74E+09	-2.30E-01	-8.86E-01	-0.77
4.76E+09	-3.29E-01	-8.53E-01	-0.78
4.78E+09	-4.23E-01	-8.09E-01	-0.79
4.80E+09	-5.11E-01	-7.55E-01	-0.80
4.82E+09	-5.92E-01	-6.91E-01	-0.82
4.84E+09	-6.66E-01	-6.18E-01	-0.83
4.86E+09	-7.31E-01	-5.38E-01	-0.84
4.88E+09	-7.86E-01	-4.52E-01	-0.85
4.90E+09	-8.31E-01	-3.60E-01	-0.87
4.92E+09	-8.65E-01	-2.63E-01	-0.88
4.94E+09	-8.88E-01	-1.64E-01	-0.89
4.96E+09	-9.00E-01	-6.26E-02	-0.89
4.98E+09	-9.01E-01	3.86E-02	-0.89
5.00E+09	-8.91E-01	1.40E-01	-0.90
5.02E+09	-8.69E-01	2.39E-01	-0.90
5.04E+09	-8.36E-01	3.35E-01	-0.90
5.06E+09	-7.93E-01	4.28E-01	-0.90
5.08E+09	-7.41E-01	5.15E-01	-0.89
5.10E+09	-6.78E-01	5.96E-01	-0.89
5.12E+09	-6.07E-01	6.68E-01	-0.89
5.14E+09	-5.27E-01	7.33E-01	-0.89
5.16E+09	-4.41E-01	7.89E-01	-0.88
5.18E+09	-3.49E-01	8.35E-01	-0.87
5.20E+09	-2.52E-01	8.70E-01	-0.86
5.22E+09	-1.51E-01	8.93E-01	-0.86
5.24E+09	-4.83E-02	9.05E-01	-0.85
5.26E+09	5.60E-02	9.05E-01	-0.85
5.28E+09	1.59E-01	8.93E-01	-0.85
5.30E+09	2.60E-01	8.68E-01	-0.85
5.32E+09	3.58E-01	8.33E-01	-0.85
5.34E+09	4.51E-01	7.86E-01	-0.86
5.36E+09	5.38E-01	7.28E-01	-0.86
5.38E+09	6.17E-01	6.61E-01	-0.87
5.40E+09	6.88E-01	5.85E-01	-0.89
5.42E+09	7.49E-01	5.02E-01	-0.90
5.44E+09	8.00E-01	4.13E-01	-0.91
5.46E+09	8.41E-01	3.18E-01	-0.93
5.48E+09	8.70E-01	2.20E-01	-0.94
5.50E+09	8.88E-01	1.20E-01	-0.96
5.52E+09	8.94E-01	1.90E-02	-0.98
5.54E+09	8.88E-01	-8.22E-02	-0.99
5.56E+09	8.71E-01	-1.82E-01	-1.01
5.58E+09	8.44E-01	-2.78E-01	-1.03
5.60E+09	8.06E-01	-3.70E-01	-1.04
5.62E+09	7.59E-01	-4.57E-01	-1.05
5.64E+09	7.01E-01	-5.38E-01	-1.07
5.66E+09	6.35E-01	-6.13E-01	-1.09
5.68E+09	5.62E-01	-6.80E-01	-1.09
5.70E+09	4.83E-01	-7.38E-01	-1.09
5.72E+09	3.98E-01	-7.87E-01	-1.09
5.74E+09	3.07E-01	-8.26E-01	-1.10
5.76E+09	2.12E-01	-8.55E-01	-1.10
5.78E+09	1.15E-01	-8.74E-01	-1.10
5.80E+09	1.60E-02	-8.83E-01	-1.08
5.82E+09	-8.31E-02	-8.80E-01	-1.07
5.84E+09	-1.81E-01	-8.66E-01	-1.07
5.86E+09	-2.78E-01	-8.40E-01	-1.07
5.88E+09	-3.72E-01	-8.04E-01	-1.05
5.90E+09	-4.62E-01	-7.57E-01	-1.04
5.92E+09	-5.46E-01	-7.01E-01	-1.03
5.94E+09	-6.23E-01	-6.35E-01	-1.02
5.96E+09	-6.92E-01	-5.59E-01	-1.02
5.98E+09	-7.52E-01	-4.75E-01	-1.02
6.00E+09	-8.02E-01	-3.86E-01	-1.02

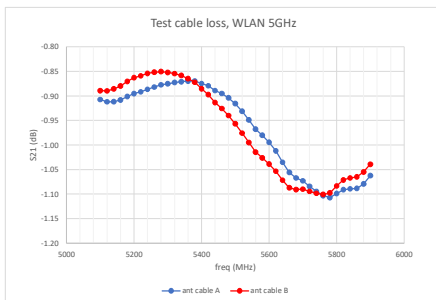
ant cable A

freq[Hz]	re:Trc4_S2	im:Trc4_S	comp S21
2.00E+09	3.87E-01	8.60E-01	-0.51
2.02E+09	4.82E-01	8.10E-01	-0.51
2.04E+09	5.71E-01	7.50E-01	-0.52
2.06E+09	6.53E-01	6.80E-01	-0.52
2.08E+09	7.26E-01	6.01E-01	-0.52
2.10E+09	7.89E-01	5.15E-01	-0.52
2.12E+09	8.42E-01	4.23E-01	-0.52
2.14E+09	8.85E-01	3.24E-01	-0.52
2.16E+09	9.16E-01	2.21E-01	-0.52
2.18E+09	9.35E-01	1.15E-01	-0.52
2.20E+09	9.42E-01	7.83E-03	-0.52
2.22E+09	9.37E-01	-9.94E-02	-0.52
2.24E+09	9.19E-01	-2.05E-01	-0.52
2.26E+09	8.90E-01	-3.08E-01	-0.52
2.28E+09	8.49E-01	-4.07E-01	-0.53
2.30E+09	7.97E-01	-5.00E-01	-0.53
2.32E+09	7.35E-01	-5.87E-01	-0.53
2.34E+09	6.64E-01	-6.66E-01	-0.54
2.36E+09	5.84E-01	-7.36E-01	-0.54
2.38E+09	4.97E-01	-7.97E-01	-0.54
2.40E+09	4.05E-01	-8.48E-01	-0.54
2.42E+09	3.05E-01	-8.88E-01	-0.55
2.44E+09	2.01E-01	-9.16E-01	-0.55
2.46E+09	9.54E-02	-9.33E-01	-0.56
2.48E+09	-1.09E-02	-9.38E-01	-0.56
2.50E+09	-1.16E-01	-9.31E-01	-0.56
2.52E+09	-2.20E-01	-9.12E-01	-0.56
2.54E+09	-3.22E-01	-8.80E-01	-0.56
2.56E+09	-4.20E-01	-8.38E-01	-0.57
2.58E+09	-5.12E-01	-7.85E-01	-0.57
2.60E+09	-5.97E-01	-7.22E-01	-0.57
2.62E+09	-6.76E-01	-6.49E-01	-0.57
2.64E+09	-7.45E-01	-5.67E-01	-0.57
2.66E+09	-8.06E-01	-4.77E-01	-0.57
2.68E+09	-8.55E-01	-3.80E-01	-0.57
2.70E+09	-8.93E-01	-2.80E-01	-0.57
2.72E+09	-9.19E-01	-1.77E-01	-0.57
2.74E+09	-9.33E-01	-7.07E-02	-0.58
2.76E+09	-9.35E-01	3.59E-02	-0.58
2.78E+09	-9.25E-01	1.42E-01	-0.58
2.80E+09	-9.02E-01	2.46E-01	-0.58
2.82E+09	-8.69E-01	3.47E-01	-0.58
2.84E+09	-8.24E-01	4.43E-01	-0.58
2.86E+09	-7.68E-01	5.33E-01	-0.59
2.88E+09	-7.02E-01	6.17E-01	-0.59
2.90E+09	-6.27E-01	6.92E-01	-0.59
2.92E+09	-5.44E-01	7.58E-01	-0.60
2.94E+09	-4.55E-01	8.15E-01	-0.60
2.96E+09	-3.59E-01	8.61E-01	-0.61
2.98E+09	-2.59E-01	8.95E-01	-0.61
3.00E+09	-1.56E-01	9.19E-01	-0.61
3.02E+09	-5.02E-02	9.30E-01	-0.62
3.04E+09	5.65E-02	9.29E-01	-0.62
3.06E+09	1.63E-01	9.16E-01	-0.62
3.08E+09	2.66E-01	8.92E-01	-0.63
3.10E+09	3.66E-01	8.55E-01	-0.63
3.12E+09	4.61E-01	8.08E-01	-0.63
3.14E+09	5.49E-01	7.50E-01	-0.64
3.16E+09	6.30E-01	6.82E-01	-0.64
3.18E+09	7.04E-01	6.06E-01	-0.64
3.20E+09	7.68E-01	5.22E-01	-0.64
3.22E+09	8.22E-01	4.31E-01	-0.64
3.24E+09	8.66E-01	3.35E-01	-0.64
3.26E+09	8.98E-01	2.34E-01	-0.65
3.28E+09	9.19E-01	1.31E-01	-0.64
3.30E+09	9.28E-01	2.57E-02	-0.64
3.32E+09	9.25E-01	-7.97E-02	-0.64
3.34E+09	9.10E-01	-1.84E-01	-0.64
3.36E+09	8.83E-01	-2.87E-01	-0.64
3.38E+09	8.45E-01	-3.85E-01	-0.64
3.40E+09	7.96E-01	-4.78E-01	-0.64
3.42E+09	7.36E-01	-5.66E-01	-0.64
3.44E+09	6.68E-01	-6.45E-01	-0.64
3.46E+09	5.89E-01	-7.17E-01	-0.65
3.48E+09	5.04E-01	-7.80E-01	-0.65
3.50E+09	4.11E-01	-8.32E-01	-0.65
3.52E+09	3.14E-01	-8.73E-01	-0.65
3.54E+09	2.12E-01	-9.02E-01	-0.66
3.56E+09	1.08E-01	-9.20E-01	-0.66
3.58E+09	3.01E-03	-9.26E-01	-0.67
3.60E+09	-1.03E-01	-9.20E-01	-0.67
3.62E+09	-2.07E-01	-9.02E-01	-0.67
3.64E+09	-3.07E-01	-8.73E-01	-0.68
3.66E+09	-4.04E-01	-8.32E-01	-0.68
3.68E+09	-4.96E-01	-7.80E-01	-0.68
3.70E+09	-5.82E-01	-7.18E-01	-0.69
3.72E+09	-6.59E-01	-6.48E-01	-0.69
3.74E+09	-7.28E-01	-5.69E-01	-0.69
3.76E+09	-7.88E-01	-4.82E-01	-0.69
3.78E+09	-8.37E-01	-3.90E-01	-0.69
3.80E+09	-8.76E-01	-2.92E-01	-0.69
3.82E+09	-9.03E-01	-1.91E-01	-0.69
3.84E+09	-9.19E-01	-8.70E-02	-0.69
3.86E+09	-9.23E-01	1.81E-01	-0.69
3.88E+09	-9.15E-01	1.23E-01	-0.69
3.90E+09	-8.95E-01	2.26E-01	-0.69
3.92E+09	-8.64E-01	3.27E-01	-0.69
3.94E+09	-8.21E-01	4.23E-01	-0.69
3.96E+09	-7.67E-01	5.14E-01	-0.69
3.98E+09	-7.03E-01	5.98E-01	-0.69
4.00E+09	-6.30E-01	6.74E-01	-0.70
4.02E+09	-5.50E-01	7.42E-01	-0.69
4.04E+09	-4.62E-01	7.99E-01	-0.69
4.06E+09	-3.68E-01	8.47E-01	-0.70
4.08E+09	-2.68E-01	8.82E-01	-0.70
4.10E+09	-1.65E-01	9.07E-01	-0.70
4.12E+09	-6.10E-02	9.20E-01	-0.70
4.14E+09	4.38E-02	9.21E-01	-0.71
4.16E+09	1.48E-01	9.09E-01	-0.71
4.18E+09	2.50E-01	8.86E-01	-0.72
4.20E+09	3.49E-01	8.51E-01	-0.73
4.22E+09	4.44E-01	8.05E-01	-0.73
4.24E+09	5.32E-01	7.49E-01	-0.73
4.26E+09	6.13E-01	6.84E-01	-0.73
4.28E+09	6.86E-01	6.10E-01	-0.74
4.30E+09	7.51E-01	5.27E-01	-0.75
4.32E+09	8.05E-01	4.39E-01	-0.75
4.34E+09	8.50E-01	3.44E-01	-0.75
4.36E+09	8.83E-01	2.45E-01	-0.75
4.38E+09	9.05E-01	1.43E-01	-0.76
4.40E+09	9.15E-01	3.94E-02	-0.76
4.42E+09	9.13E-01	-6.45E-02	-0.77
4.44E+09	9.00E-01	-1.67E-01	-0.76
4.46E+09	8.76E-01	-2.68E-01	-0.76
4.48E+09	8.40E-01	-3.65E-01	-0.77
4.50E+09	7.92E-01	-4.58E-01	-0.77
4.52E+09	7.35E-01	-5.45E-01	-0.77
4.54E+09	6.68E-01	-6.26E-01	-0.77
4.56E+09	5.93E-01	-6.98E-01	-0.77
4.58E+09	5.09E-01	-7.60E-01	-0.77
4.60E+09	4.19E-01	-8.14E-01	-0.77
4.62E+09	3.23E-01	-8.56E-01	-0.77
4.64E+09	2.23E-01	-8.87E-01	-0.77
4.66E+09	1.21E-01	-9.07E-01	-0.77
4.68E+09	1.77E-02	-9.14E-01	-0.78
4.70E+09	-8.66E-02	-9.10E-01	-0.78
4.72E+09	-1.90E-01	-8.94E-01	-0.78
4.74E+09	-2.92E-01	-8.66E-01	-0.78
4.76E+09	-3.89E-01	-8.26E-01	-0.79
4.78E+09	-4.80E-01	-7.76E-01	-0.79
4.80E+09	-5.65E-01	-7.16E-01	-0.80
4.82E+09	-6.42E-01	-6.46E-01	-0.82
4.84E+09	-7.11E-01	-5.67E-01	-0.82
4.86E+09	-7.70E-01	-4.82E-01	-0.83
4.88E+09	-8.20E-01	-3.91E-01	-0.84
4.90E+09	-8.58E-01	-2.95E-01	-0.85
4.92E+09	-8.84E-01	-1.95E-01	-0.86
4.94E+09	-9.00E-01	-9.27E-02	-0.87
4.96E+09	-9.04E-01	1.02E-02	-0.88
4.98E+09	-8.96E-01	1.12E-01	-0.88
5.00E+09	-8.77E-01	2.13E-01	-0.89
5.02E+09	-8.47E-01	3.10E-01	-0.90
5.04E+09	-8.06E-01	4.04E-01	-0.90
5.06E+09	-7.54E-01	4.92E-01	-0.91
5.08E+09	-6.94E-01	5.74E-01	-0.91
5.10E+09	-6.25E-01	6.49E-01	-0.91
5.12E+09	-5.47E-01	7.15E-01	-0.91
5.14E+09	-4.62E-01	7.73E-01	-0.91
5.16E+09	-3.72E-01	8.20E-01	-0.91
5.18E+09	-2.76E-01	8.58E-01	-0.90
5.20E+09	-1.78E-01	8.84E-01	-0.90
5.22E+09	-7.59E-02	8.99E-01	-0.89
5.24E+09	2.70E-02	9.03E-01	-0.89
5.26E+09	1.30E-01	8.94E-01	-0.88
5.28E+09	2.31E-01	8.74E-01	-0.88
5.30E+09	3.29E-01	8.42E-01	-0.88
5.32E+09	4.24E-01	7.99E-01	-0.87
5.34E+09	5.13E-01	7.45E-01	-0.87
5.36E+09	5.95E-01	6.81E-01	-0.87
5.38E+09	6.70E-01	6.08E-01	-0.87
5.40E+09	7.35E-01	5.27E-01	-0.87
5.42E+09	7.90E-01	4.39E-01	-0.88
5.44E+09	8.34E-01	3.45E-01	-0.89
5.46E+09	8.68E-01	2.46E-01	-0.90
5.48E+09	8.89E-01	1.45E-01	-0.90
5.50E+09	8.99E-01	4.26E-02	-0.92
5.52E+09	8.96E-01	-5.98E-02	-0.93
5.54E+09	8.82E-01	-1.62E-01	-0.95
5.56E+09	8.56E-01	-2.61E-01	-0.97
5.58E+09	8.19E-01	-3.56E-01	-0.98
5.60E+09	7.73E-01	-4.45E-01	-0.99
5.62E+09	7.16E-01	-5.29E-01	-1.01
5.64E+09	6.50E-01	-6.05E-01	-1.04
5.66E+09	5.76E-01	-6.73E-01	-1.06
5.68E+09	4.96E-01	-7.32E-01	-1.07
5.70E+09	4.10E-01	-7.83E-01	-1.07
5.72E+09	3.20E-01	-8.23E-01	-1.08
5.74E+09	2.25E-01	-8.52E-01	-1.09
5.76E+09	1.28E-01	-8.71E-01	-1.10
5.78E+09	2.94E-02	-8.80E-01	-1.11
5.80E+09	-6.95E-02	-8.78E-01	-1.10
5.82E+09	-1.67E-01	-8.66E-01	-1.09
5.84E+09	-2.63E-01	-8.42E-01	-1.09
5.86E+09	-3.56E-01	-8.07E-01	-1.09
5.88E+09	-4.46E-01	-7.62E-01	-1.08
5.90E+09	-5.31E-01	-7.08E-01	-1.06
5.92E+09	-6.08E-01	-6.45E-01	-1.05
5.94E+09	-6.78E-01	-5.72E-01	-1.04
5.96E+09	-7.40E-01	-4.91E-01	-1.03
5.98E+09	-7.93E-01	-4.03E-01	-1.02
6.00E+09	-8.35E-01	-3.09E-01	-1.01

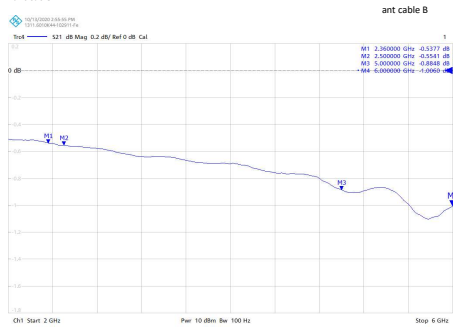
Cable loss combensations used in measurements

2.4GHz	0.53 dB	MBAN and WLAN
5GHz	1 dB	WLAN





ant cable A



ant cable B