

17. Simultaneous Transmission SAR Analysis (KDB 648474)

The Bluetooth's output power is $\leq 60/f(\text{GHz})$ mW, which stand-alone SAR evaluation is not required. Thus, simultaneous transmission SAR evaluation is not required.

17.1. Head exposure condition (3G + WiFi 2.4 GHz)

Test Position	(1) GSM850	(2) GSM1900	(4) UMTS (WCDMA) Band II	(5) WiFi 2.4G	Sum of 1g SAR (mW/g)
Left Touch	0.112			0.020	0.132
		0.114		0.020	0.134
			0.349	0.020	0.369
RightTouch	0.323			0.020	0.343
		0.413		0.020	0.433
			1.090	0.020	1.110

Conclusions:

Simultaneous transmission SAR is not required because the sum of the 1-g SAR is < 1.6 W/kg

17.2. Body exposure condition (3G + WiFi 2.4 GHz)

Test Position	(1) GSM850	(2) GSM1900	(3) UMTS (WCDMA) Band II	(4) WiFi 2.4G	Sum of 1g SAR (mW/g)
Rear	1.14			0.539	1.679
		0.96		0.539	1.499
			1.130	0.539	1.669
Top-edge	0.637			0.000	0.637
		0.987		0.000	0.987
			1.160	0.000	1.160
Left-edge	0.277			0.056	0.333
		0.372		0.056	0.428
			0.522	0.056	0.578

SAR to Peak Location Separation Ratio (SPLSR)

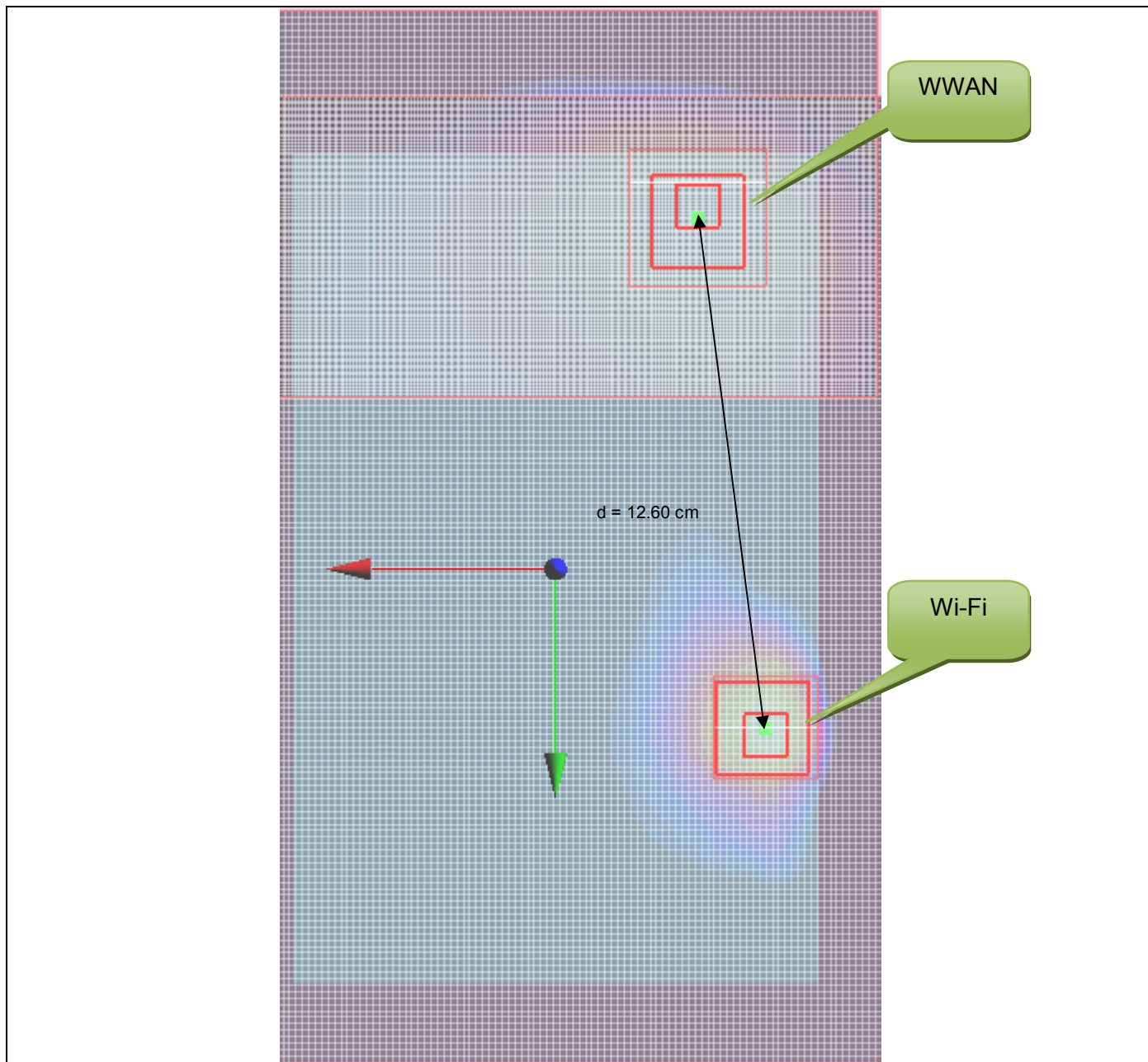
Test Position	Worst-case combination			Σ 1-g SAR (mW/g)	3D distance (cm)	SPLSR
	(1) GSM 850	(3) UMTS (WCDMA) Band II	(4) WiFi 2.4G			
Rear	1.14		0.539	1.679	12.60	0.133
		1.13	0.539	1.669	13.88	0.120

Conclusions:

Simultaneous transmission SAR is not required because the SAR to peak location separation ratios is < 0.3 .

SAR to Peak Location Separation Ratio (SPLSR)

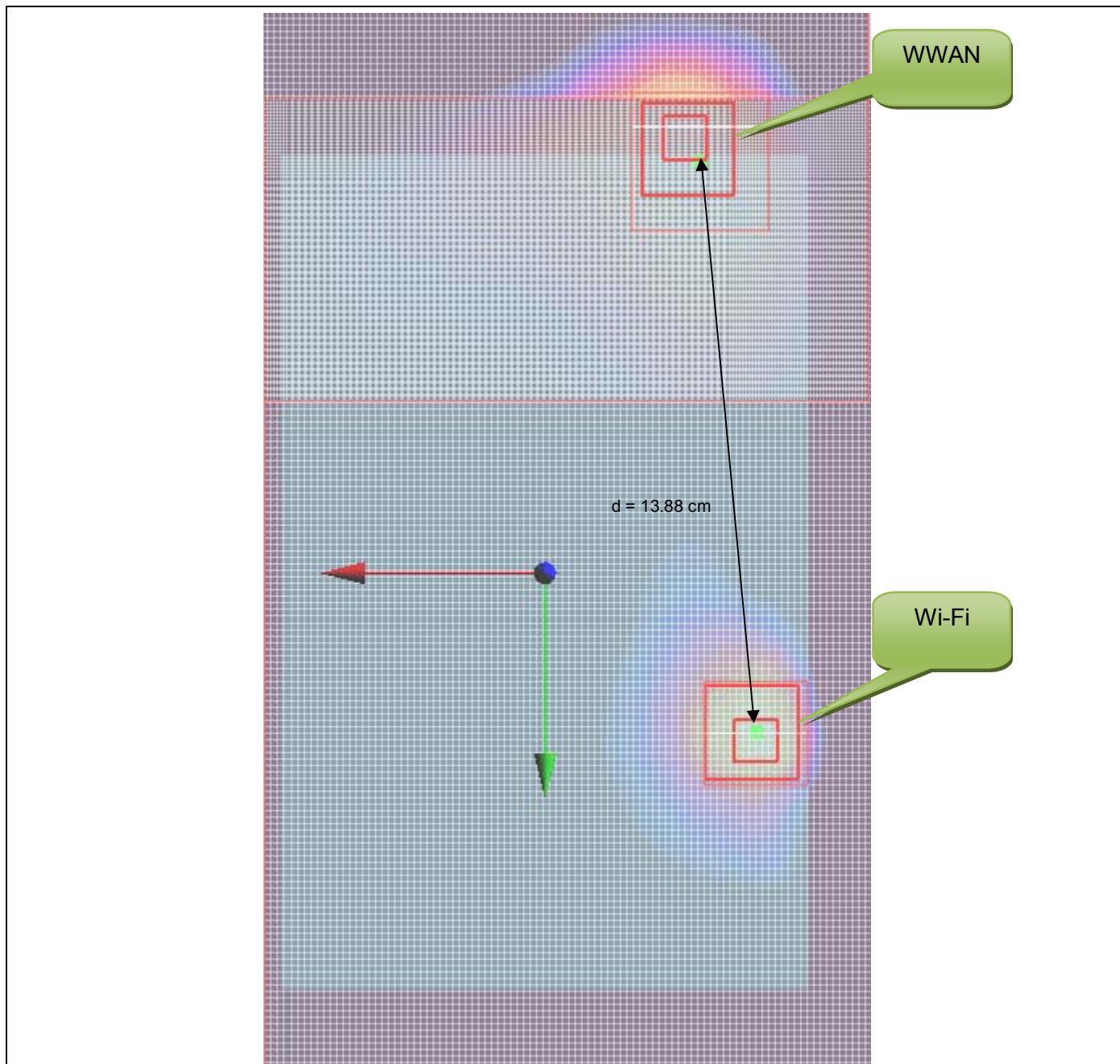
"(1) GSM 850" to "(4) WiFi 2.4GHz"



		Value of SAR	X	Y	Z
		mW/g	m	m	m
GSM 850		2.1	-0.033	-0.0868	-0.184
WiFi 2.4GHz		1.69	-0.0514	0.0378	-0.183
m		cm			
Separation distance (d) =	0.1260	12.60			
	SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)				

SAR to Peak Location Separation Ratio (SPLSR)

"(3) UMTS (WCDMA) Band II" to "(4) WiFi 2.4GHz"



		Value of SAR	X	Y	Z
		mW/g	m	m	m
UMTS (WCDMA) Band II		2.29	-0.0344	-0.1	-0.184
WiFi 2.4GHz		1.69	-0.0514	0.0378	-0.183
m		cm			
Separation distance (d) =		0.1388	13.88		
		SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)			

17.3. Head-exposure condition (3G + WiFi 5 GHz Bands)

Test Position	(1) GSM850	(2) GSM1900	(3) UMTS (WCDMA) Band II	(4) WiFi 5.2GHz	(5) WiFi 5.3GHz	(6) WiFi 5.5GHz	(7) WiFi 5.8GHz	Sum of 1g SAR (mW/g)
Left Touch	0.112			0.019				0.131
		0.114		0.019				0.133
			0.349	0.019				0.368
	0.112				0.023			0.135
		0.114			0.023			0.137
			0.349		0.023			0.372
	0.112					0.032		0.144
		0.114				0.032		0.146
			0.349			0.032		0.381
	0.112						0.033	0.145
		0.114					0.033	0.147
			0.349				0.033	0.382
RightTouch	0.323			0.019				0.342
		0.413		0.019				0.432
			1.090	0.019				1.109
	0.323				0.023			0.346
		0.413			0.023			0.436
			1.090		0.023			1.113
	0.323					0.032		0.355
		0.413				0.032		0.445
			1.090			0.032		1.122
	0.323						0.033	0.356
		0.413					0.033	0.446
			1.090				0.033	1.123

Conclusions:

Simultaneous transmission SAR is not required because the sum of the 1-g SAR is < 1.6 W/kg

17.4. Body exposure condition (3G + WiFi 5 GHz Bands)

Test Position	(1) GSM850	(2) GSM1900	(3) UMTS (WCDMA) Band II	(4) WiFi 5.2GHz	(5) WiFi 5.3GHz	(6) WiFi 5.5GHz	(7) WiFi 5.8GHz	Sum of 1g SAR (mW/g)
Rear	1.14			0.707				1.847
		0.96		0.707				1.667
			1.130	0.707				1.837
	1.14				0.703			1.843
		0.96			0.703			1.663
			1.130		0.703			1.833
	1.14					0.516		1.656
		0.96				0.516		1.476
			1.130			0.516		1.646
	1.14						0.535	1.675
		0.96					0.535	1.495
			1.130				0.535	1.665
Top-edge	0.637			0.000				0.637
		0.987		0.000				0.987
			1.160	0.000				1.160
	0.637				0.000			0.637
		0.987			0.000			0.987
			1.160		0.000			1.160
	0.637					0.000		0.637
		0.987				0.000		0.987
			1.160			0.000		1.160
	0.637						0.000	0.637
		0.987					0.000	0.987
			1.160				0.000	1.160
Left-edge	0.277			0.184				0.461
		0.372		0.184				0.556
			0.520	0.184				0.704
	0.277				0.203			0.480
		0.372			0.203			0.575
			0.520		0.203			0.723
	0.277					0.209		0.486
		0.372				0.209		0.581
			0.520			0.209		0.729
	0.277						0.214	0.491
		0.372					0.214	0.586
			0.520				0.214	0.734

SAR to Peak Location Separation Ratio (SPLSR)

5.2GHz

Test Position	Worst-case combination				Σ 1-g SAR (mW/g)	3D distance (cm)	SPLSR
	(1) GSM850	(2) GSM1900	(3) UMTS (WCDMA) Band II	(4) WiFi 5.2GHz			
Rear	1.14			0.707	1.847	11.52	0.160
		0.96		0.707	1.667	12.46	0.134
			1.13	0.707	1.837	12.79	0.144

5.3GHz

Test Position	Worst-case combination				Σ 1-g SAR (mW/g)	3D distance (cm)	SPLSR
	(1) GSM850	(2) GSM1900	(3) UMTS (WCDMA) Band II	(5) WiFi 5.3GHz			
Rear	1.14			0.703	1.843	11.63	0.158
		0.96		0.703	1.663	12.57	0.132
			1.13	0.703	1.833	12.91	0.142

5.5GHz

Test Position	Worst-case combination				Σ 1-g SAR (mW/g)	3D distance (cm)	SPLSR
	(1) GSM850	(2) GSM1900	(3) UMTS (WCDMA) Band II	(6) WiFi 5.5GHz			
Rear	1.14			0.516	1.656	11.45	0.145
			1.13	0.516	1.646	12.72	0.129

5.8GHz

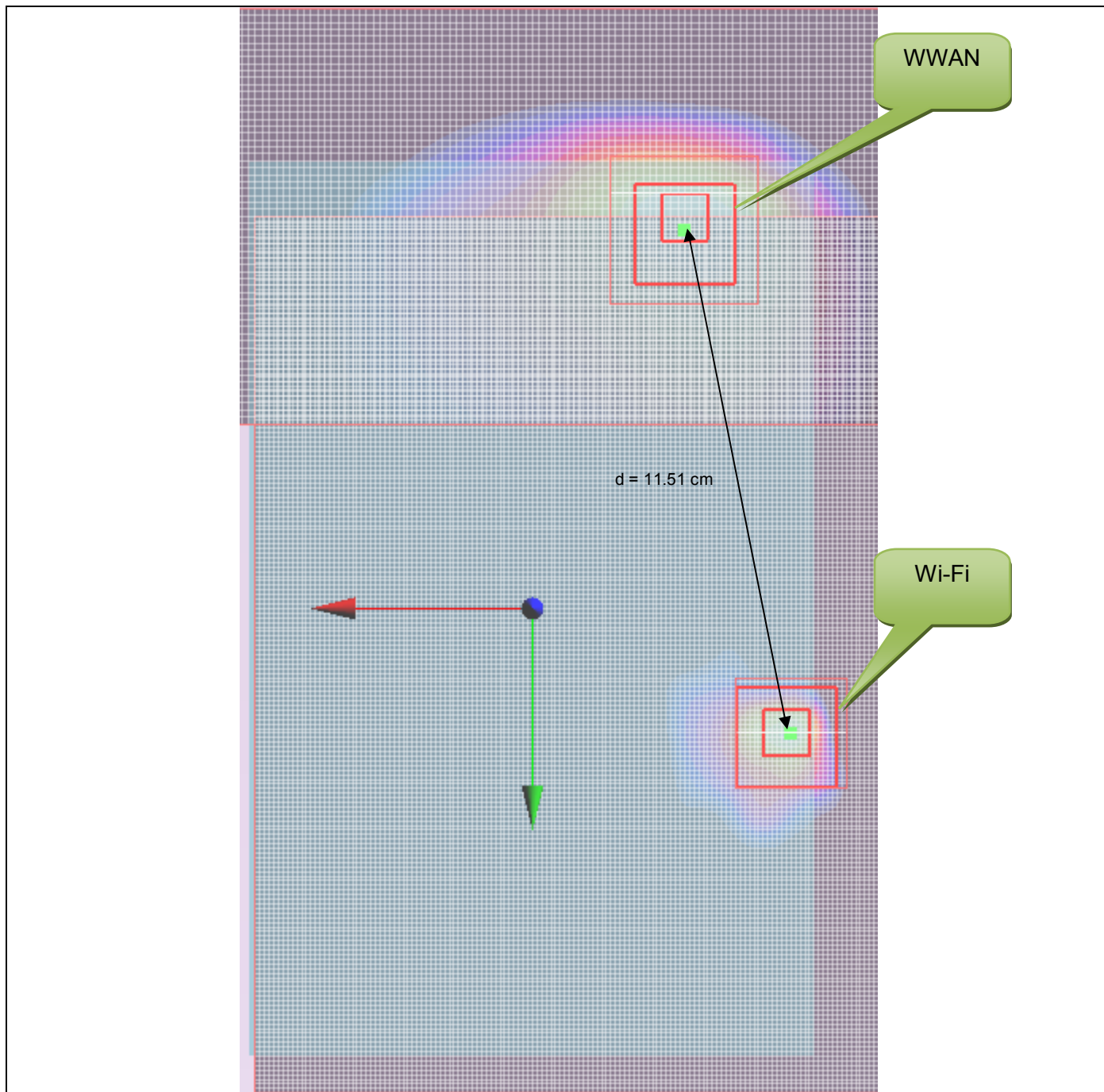
Test Position	Worst-case combination				Σ 1-g SAR (mW/g)	3D distance (cm)	SPLSR
	(1) GSM850	(2) GSM1900	(3) UMTS (WCDMA) Band II	(7) WiFi 5.8GHz			
Rear	1.14			0.535	1.675	11.88	0.141
			1.13	0.535	1.665	13.17	0.126

Conclusions:

Simultaneous transmission SAR is not required because the SAR to peak location separation ratios is < 0.3.

SAR to Peak Location Separation Ratio (SPLSR)

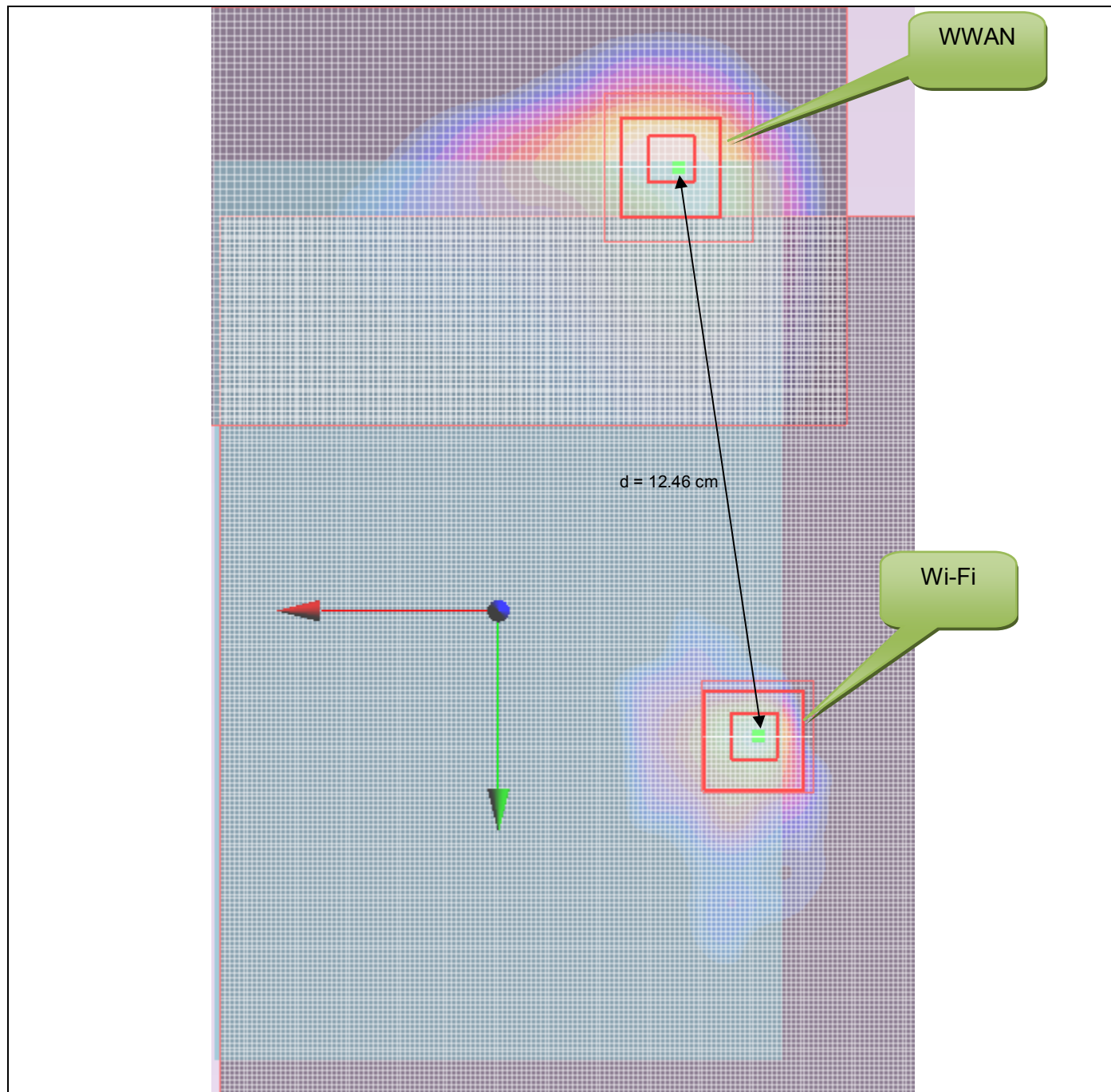
"(1) GSM 850" to "(4) WiFi 5.2GHz"



	Value of SAR mW/g	X m	Y m	Z m
GSM 850	2.1	-0.033	-0.0868	-0.184
WiFi 5.2GHz	3.1	-0.0552	0.0262	-0.184
m	cm			
Separation distance (d) =	0.1152	11.52		
SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)				

SAR to Peak Location Separation Ratio (SPLSR)

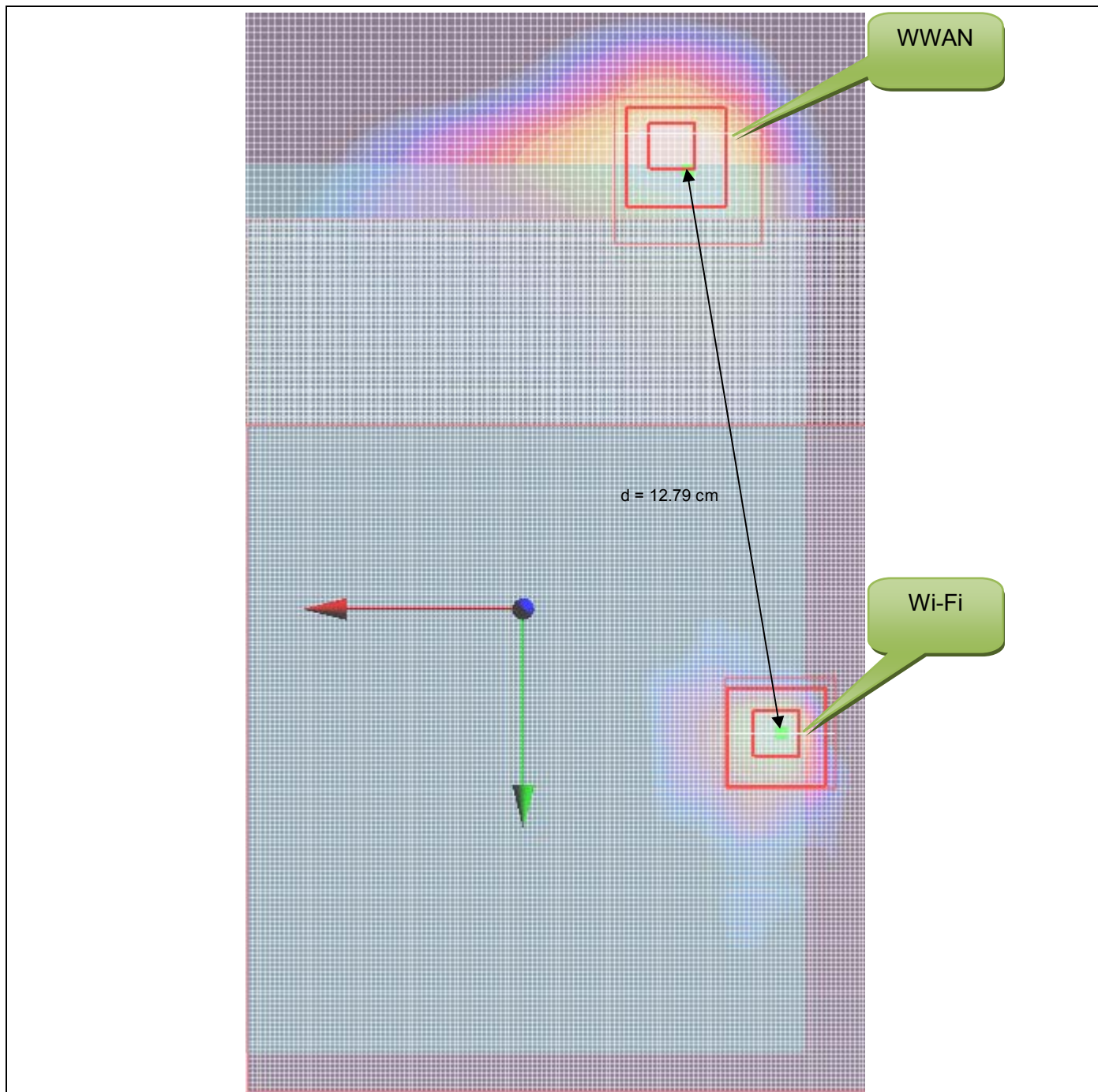
"(2) GSM 1900" to "(4) WiFi 5.2GHz"



		Value of SAR	X	Y	Z
		mW/g	m	m	m
GSM 1900		1.96	-0.0374	-0.0971	-0.183
WiFi 5.2GHz		3.1	-0.0552	0.0262	-0.184
m		cm			
Separation distance (d) =	0.1246	12.46			
	SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)				

SAR to Peak Location Separation Ratio (SPLSR)

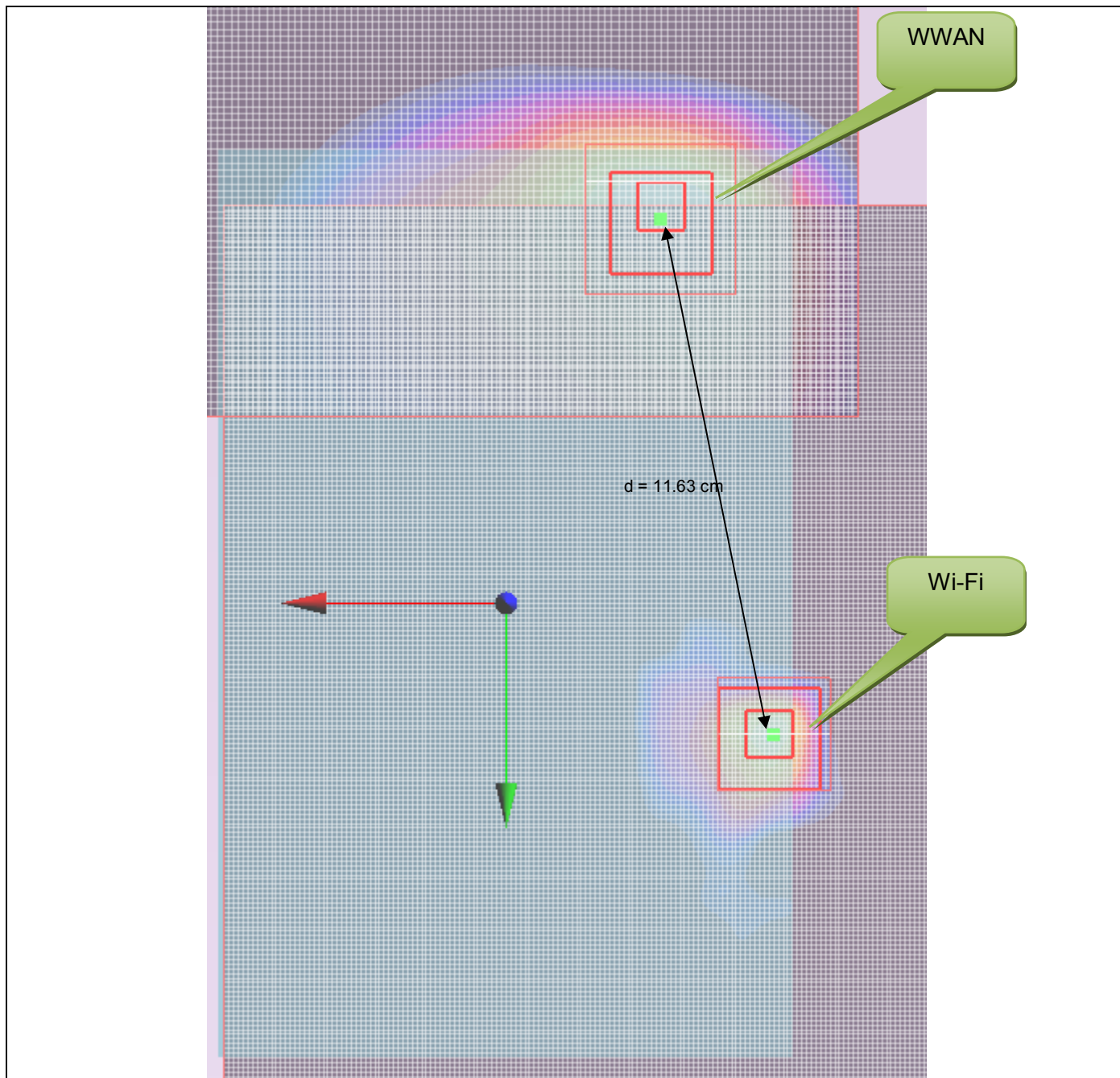
"(3) UMTS (WCDMA) Band II" to "(4) WiFi 5.2GHz"



		Value of SAR	X	Y	Z
		mW/g	m	m	m
UMTS (WCDMA) Band II		2.29	-0.0344	-0.1	-0.184
WiFi 5.2GHz		3.1	-0.0552	0.0262	-0.184
m		cm			
Separation distance (d) =		0.1279	12.79		
		SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)			

SAR to Peak Location Separation Ratio (SPLSR)

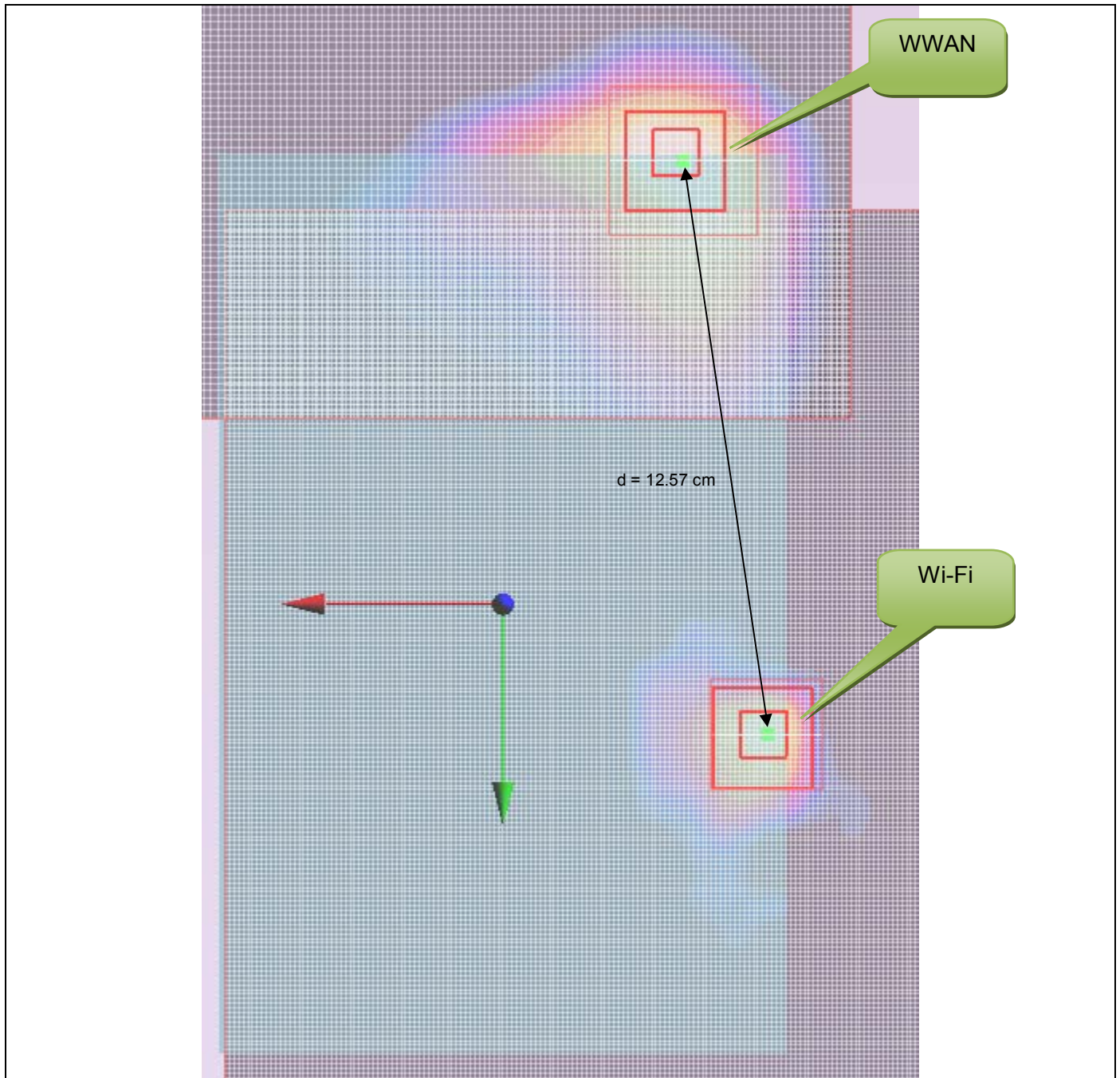
"(1) GSM 850" to "(5) WiFI 5.3GHz"



	Value of SAR	X	Y	Z
	mW/g	m	m	m
GSM 850	2.1	-0.033	-0.0868	-0.184
WiFi 5.3GHz	3.07	-0.0562	0.0272	-0.184
m	cm			
Separation distance (d) =	0.1163	11.63		
	SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)			

SAR to Peak Location Separation Ratio (SPLSR)

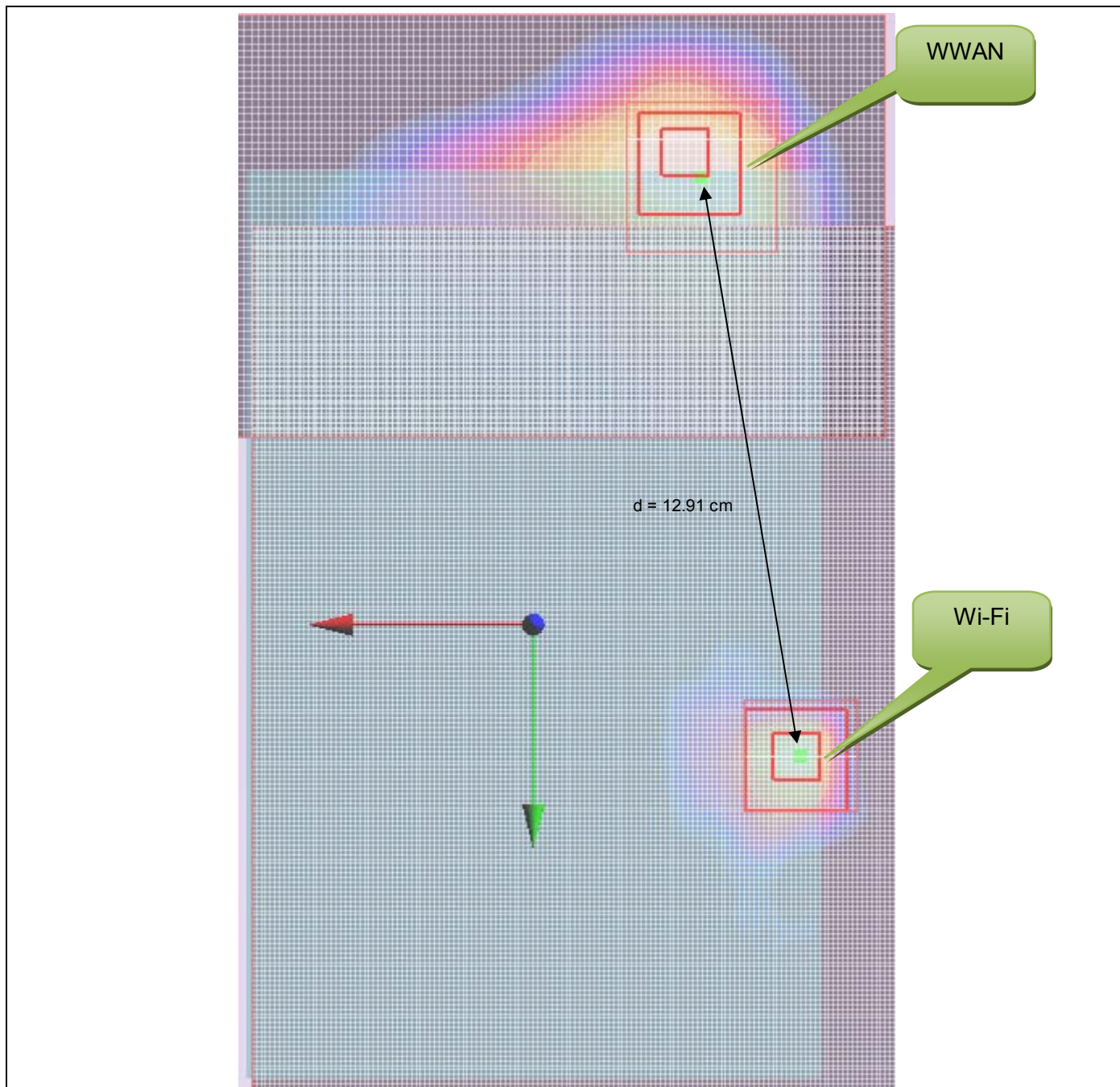
"(2) GSM 1900" to "(5) Wi-Fi 5.3GHz"



		Value of SAR	X	Y	Z
		mW/g	m	m	m
GSM 1900		1.96	-0.0374	-0.0971	-0.183
Wi-Fi 5.3GHz		3.07	-0.0562	0.0272	-0.184
m		cm			
Separation distance (d) =		0.1257	12.57		
		SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)			

SAR to Peak Location Separation Ratio (SPLSR)

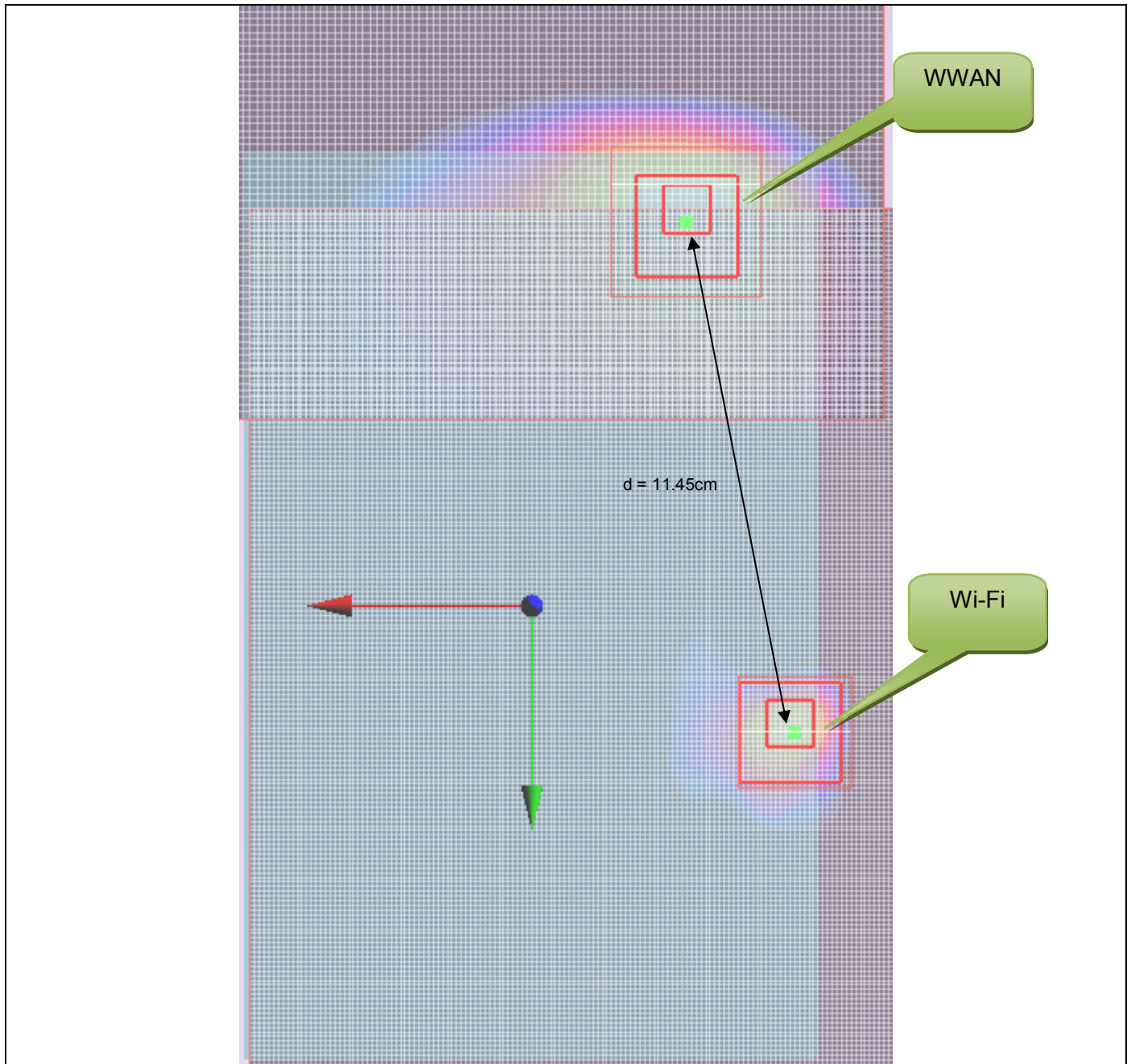
"(3) UMTS (WCDMA) Band II" to "(5) WiFi 5.3GHz"



		Value of SAR	X	Y	Z
		mW/g	m	m	m
UMTS (WCDMA) Band II		2.29	-0.0344	-0.1	-0.184
WiFi 5.3GHz		3.07	-0.0562	0.0272	-0.184
m		cm			
Separation distance (d) =	0.1291	12.91			
	SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)				

SAR to Peak Location Separation Ratio (SPLSR)

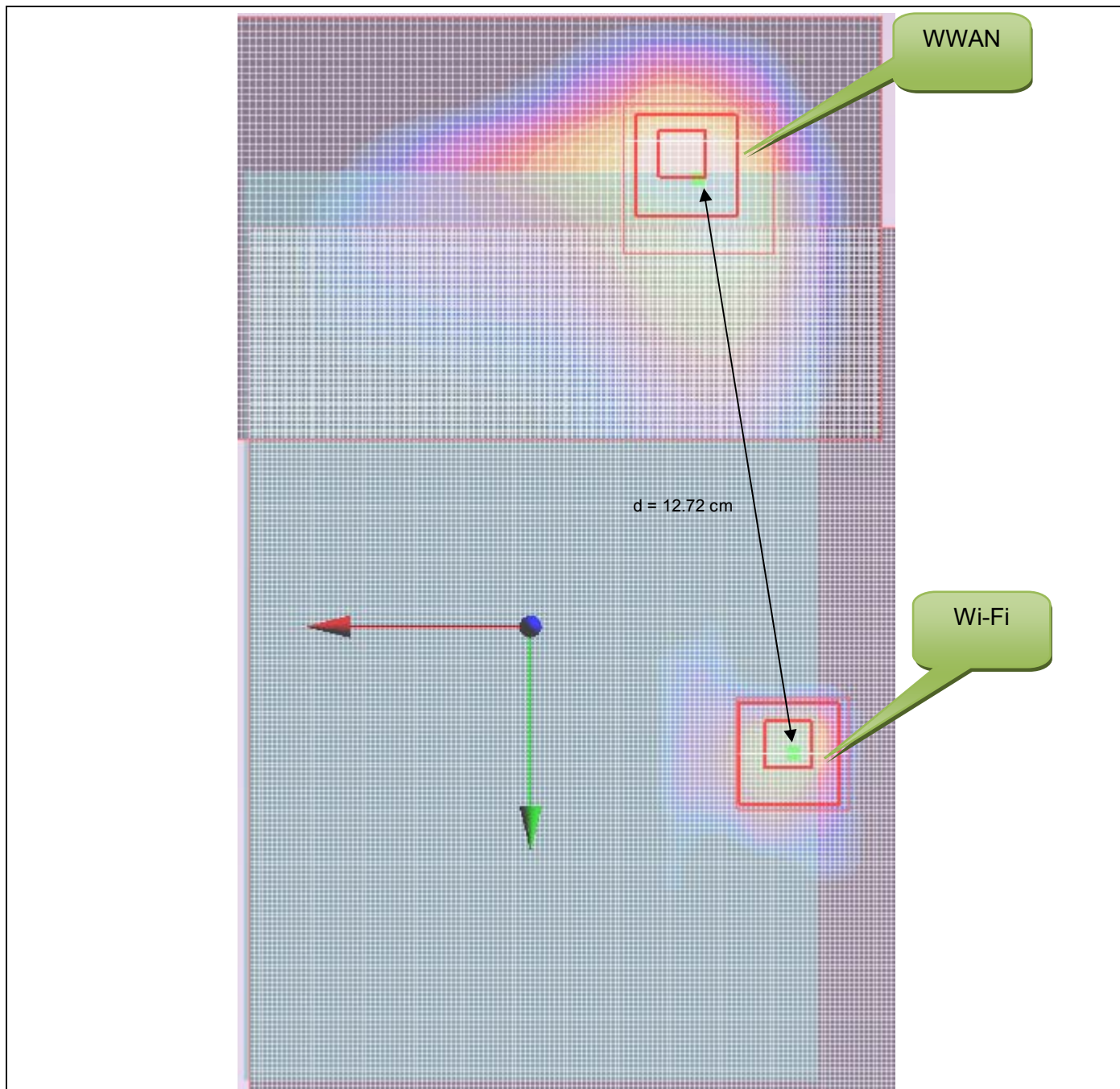
"(1) GSM 850" to "(6) WiFi 5.5GHz"



		Value of SAR	X	Y	Z
		mW/g	m	m	m
GSM 850		2.1	-0.033	-0.0868	-0.184
WiFi 5.5GHz		2.05	-0.056	0.0254	-0.184
m		cm			
Separation distance (d) =		0.1145	11.45		
		SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)			

SAR to Peak Location Separation Ratio (SPLSR)

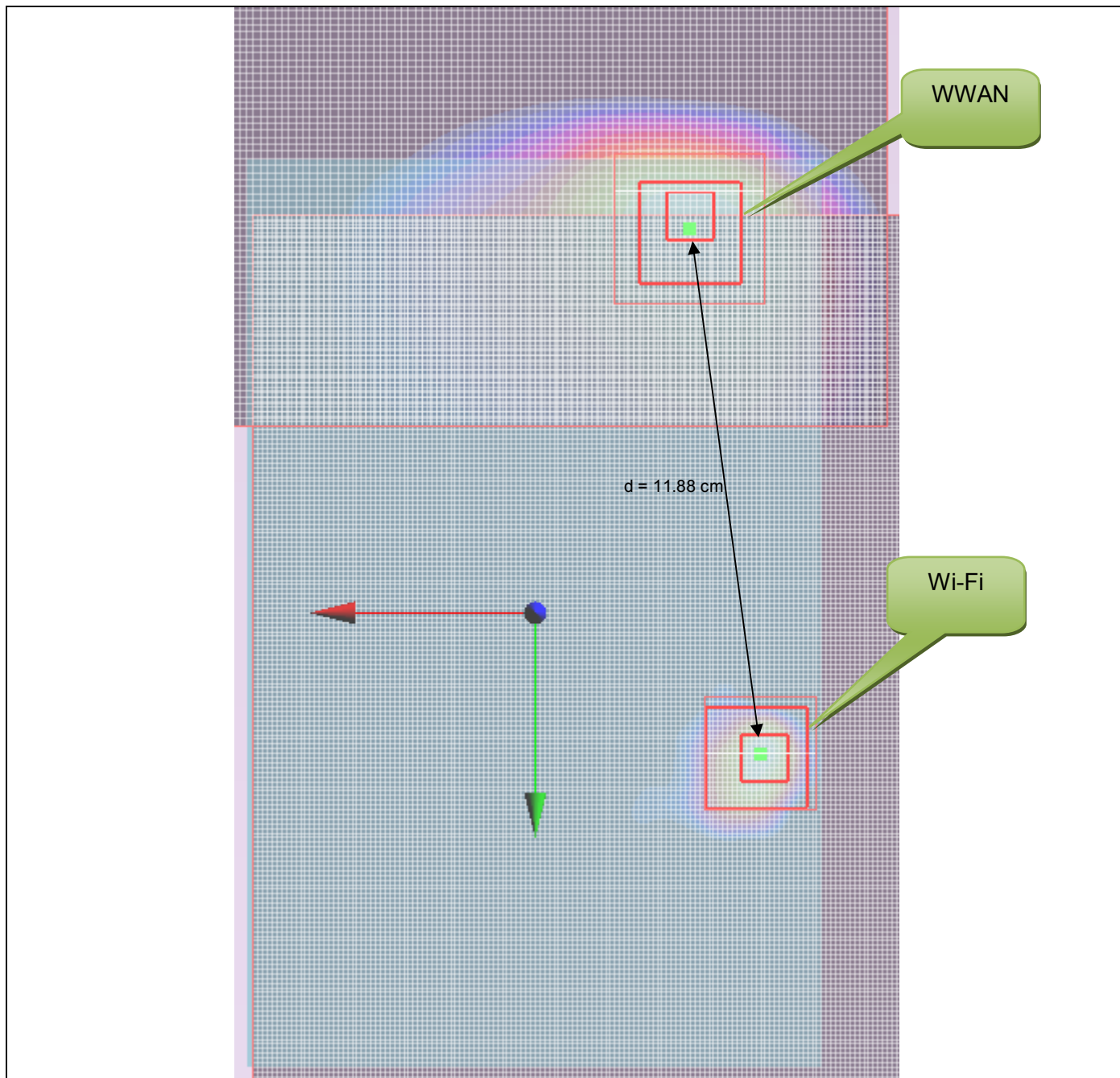
"(3) UMTS (WCDMA) Band II" to "(6) WiFi 5.5GHz"



		Value of SAR	X	Y	Z
		mW/g	m	m	m
UMTS (WCDMA) Band II		2.29	-0.0344	-0.1	-0.184
WiFi 5.5GHz		2.05	-0.056	0.0254	-0.184
m		cm			
Separation distance (d) =		0.1272	12.72		
		SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)			

SAR to Peak Location Separation Ratio (SPLSR)

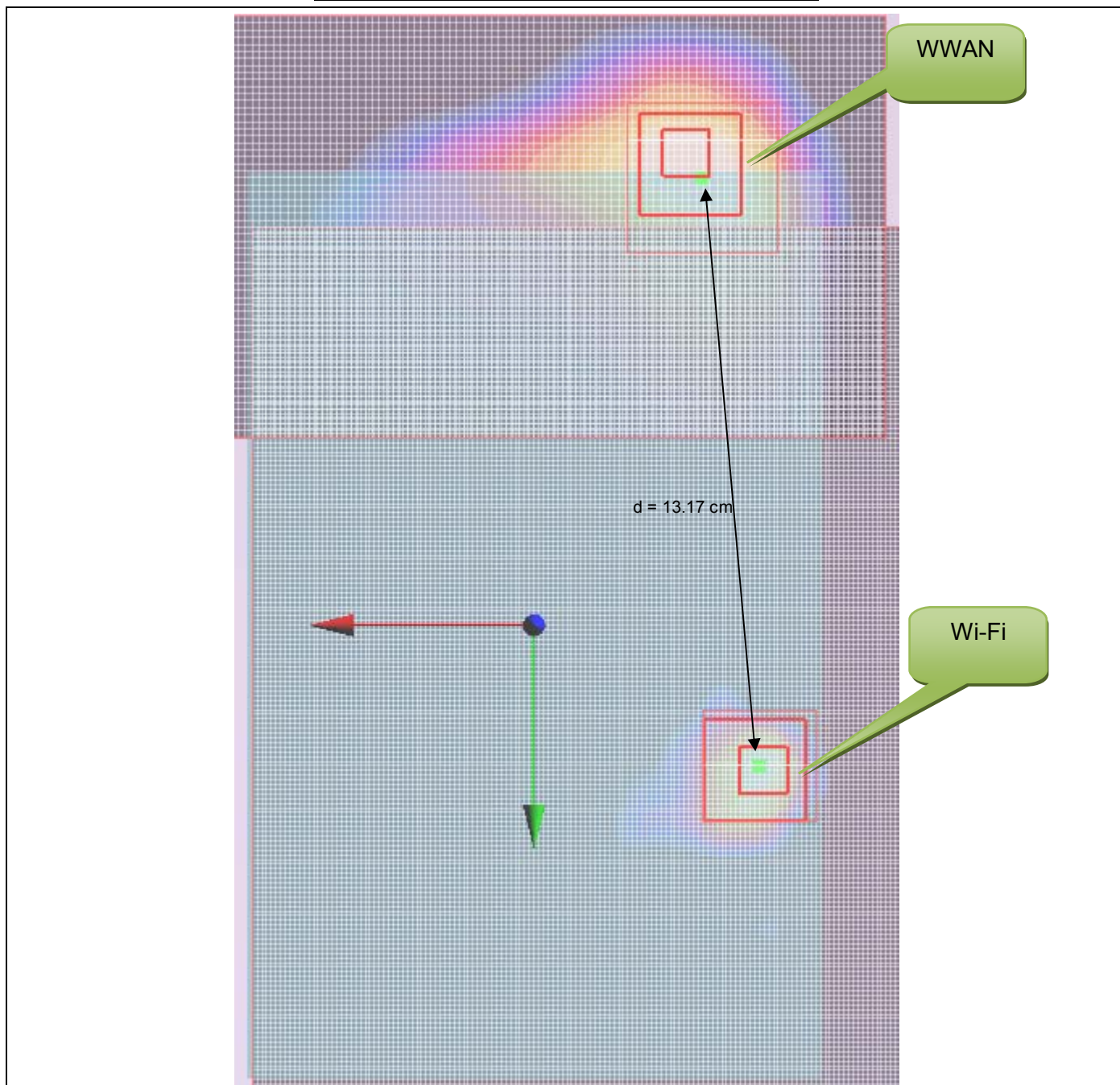
"(1) GSM 850" to "(7) WiFi 5.8GHz"



	Value of SAR	X	Y	Z
	mW/g	m	m	m
GSM 850	2.10	-0.033	-0.0868	-0.184
WiFi 5.8GHz	2.37	-0.0496	0.0308	-0.185
m	cm			
Separation distance (d) =	0.1188	11.88		
SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)				

SAR to Peak Location Separation Ratio (SPLSR)

"(3) UMTS (WCDMA) Band II" to "(7) WiFI 5.8GHz"



	Value of SAR	X	Y	Z
	mW/g	m	m	m
UMTS (WCDMA) Band II	2.29	-0.0344	-0.1	-0.184
WiFi 5.8GHz	2.37	-0.0496	0.0308	-0.185
m	cm			
Separation distance (d) =	0.1317	13.17		
SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)				

18. Appendixes

Refer to separated files for the following appendixes.

- 18.1. Appendix A: System check plots**
- 18.2. Appendix B: SAR test plots for GSM850**
- 18.3. Appendix C: SAR test plots for GSM1900**
- 18.4. Appendix D: SAR test plots for UMTS band II**
- 18.5. Appendix E: SAR test plots for WiFi 2.4 GHz**
- 18.6. Appendix F: SAR test plots for WiFi 5 GHz**
- 18.7. Appendix G: Calibration certificate for E-Field Probe EX3DV4 SN 3686**
- 18.8. Appendix H: Calibration certificate for E-Field Probe EX3DV4 SN 3772**
- 18.9. Appendix I: Calibration Certificate for D835V2 SN 4d117**
- 18.10. Appendix J: Calibration certificate for D1900V2 SN 5d140**
- 18.11. Appendix K: Calibration certificate for D2450V2 SN: 706 w/ extended cal. Data**
- 18.12. Appendix L: Calibration certificate for D5GHzV2 SN 1003**