



KZLT0LS260011 (LTE) BRK26REH00001(Reader Holder Module)

Antennas Evaluation Report

- LTE Main/Aux
- WIFI Main/Core0
- GPS

Date of Report: 2023/ 05 / 04
Department: WCB , Auden Techno Corp.
Prepared by: Derek Yen

auden^o

Persisting in Technology
antenna solutions for wireless technologies

Document/Report Information

Project Name	RK26
Topics	Antennas Evaluation Report
Date of Report	2023/ 05 / 04
Report Revision	Rev06
Dept.	WCB, Auden Techno Corp.
Antenna type	PIFA
Revised by	Hank Li

Report History

Date	Report Rev.	Project Stage	Description
2022/11/11	Rev00	EVT	1. Check Aux LTE antenna performance and tuner effect in EVT device. 2. Fine tune the antennas passive performance .
2022/11/23	Rev01	EVT	1. Check Aux LTE antenna performance and tuner effect in EVT device. 2. Check Wi-Fi Aux antenna performance.
2022/11/28	Rev02	EVT	1. Check Aux LTE antenna performance and tuner effect in EVT device.
2022/12/05	Rev03	EVT	1. Check Aux LTE antenna performance and tuner effect for new main board in EVT device.
2023/03/31	Rev04	DVT2	1. Check Aux LTE antenna performance and tuner effect in DVT device.
2023/03/31	Rev05	DVT2	1. Verify Main, WIFI and GPS antennas performance .
2023/05/04	Rev06	DVT2	1. Verify Main, Div, WIFI Main and GPS antennas performance .

- Platform and Fixture Introduction
- Pictures of Antenna pattern
- Antenna Performance
 - LTE Main
 - LTE Aux
 - WIFI Main/Core0
 - GPS
- Conclusion

Pictures of Device

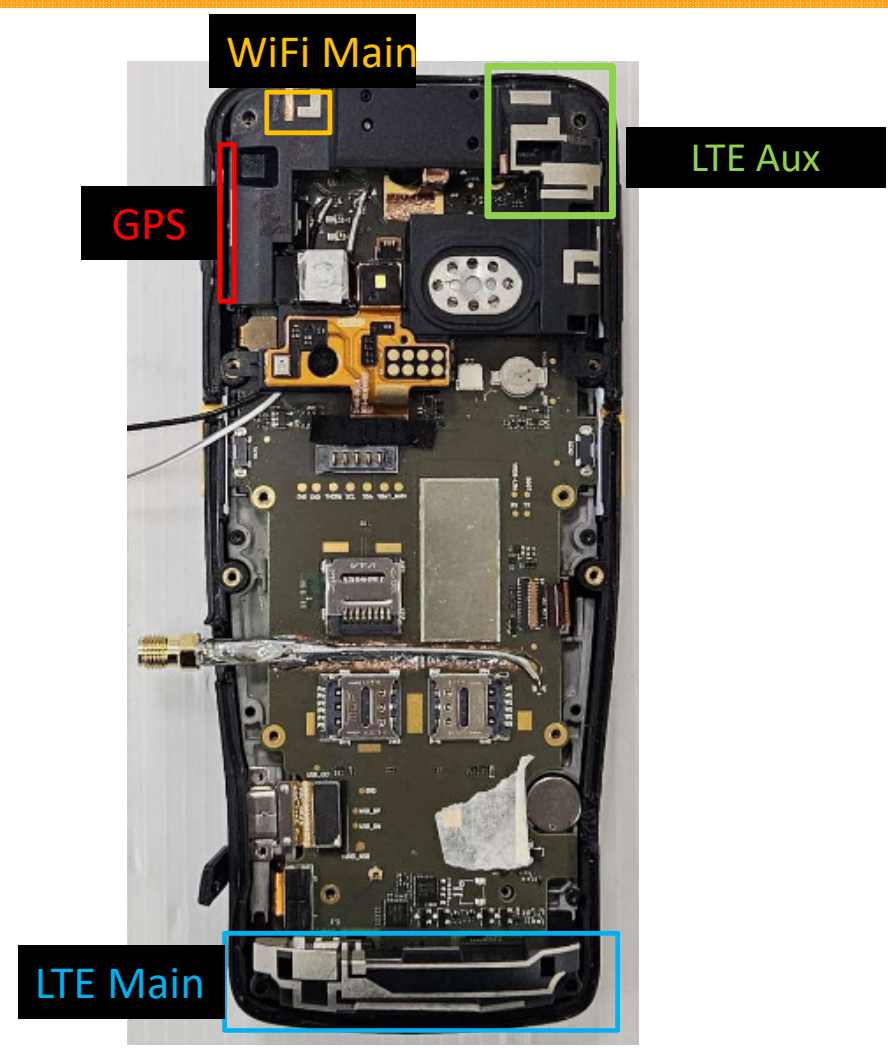


Front view

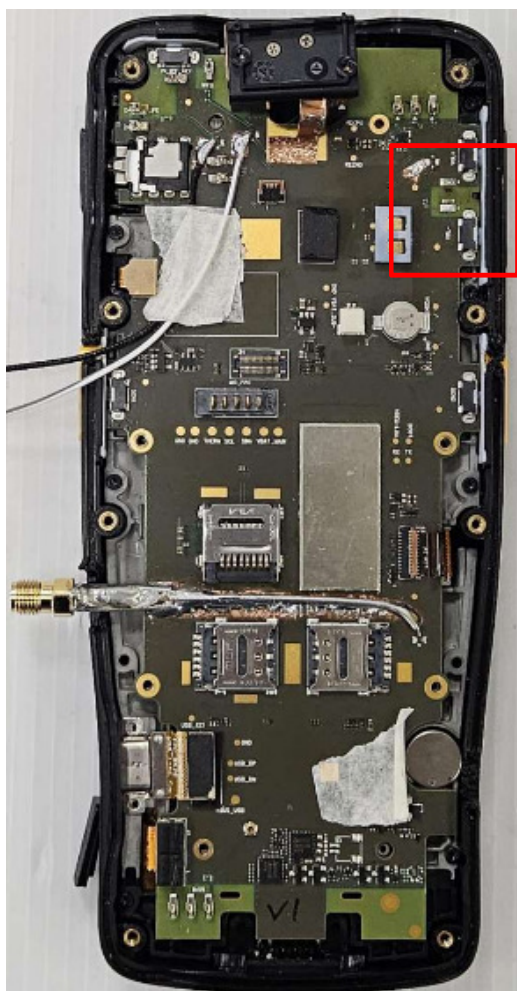


Back view

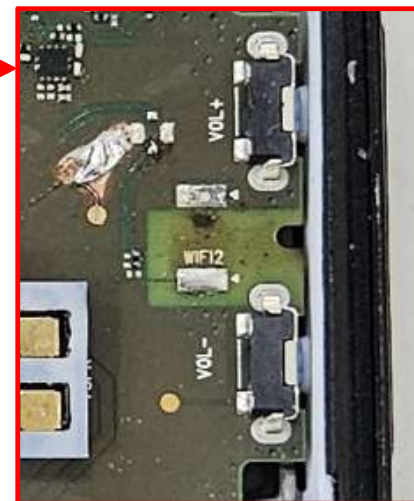
Pictures of Device



Pictures of Device



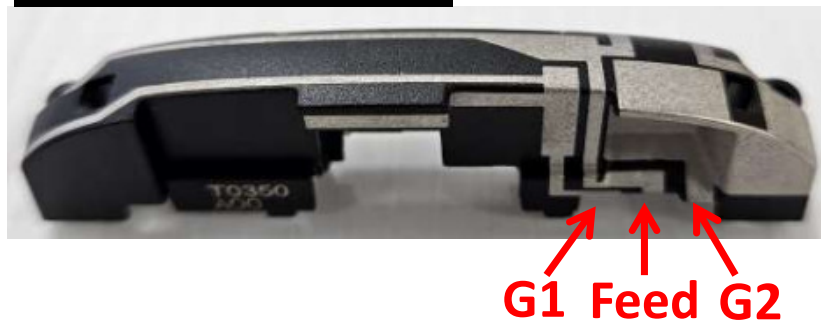
WIFI AUX 彈腳移除



- Platform and Fixture Introduction
- Pictures of Antenna pattern
- Antenna Performance
 - LTE Main
 - LTE Aux
 - WIFI Main/Core0
 - GPS
- Conclusion

Pictures of Antenna

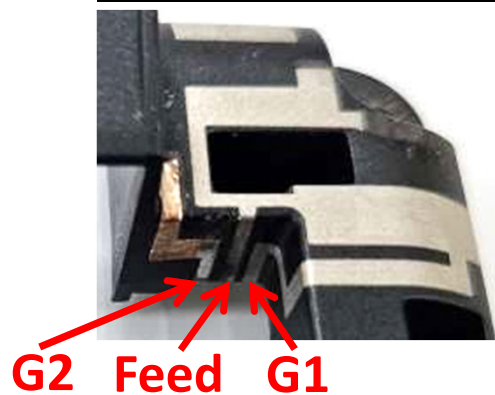
LTE Main antenna



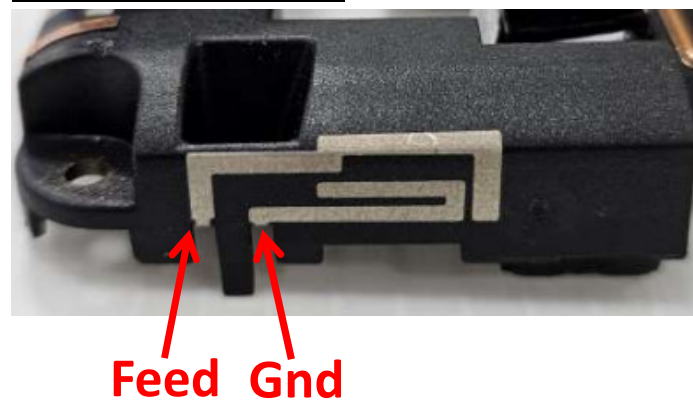
WIFI Main/Core0 antenna



LTE Aux antenna

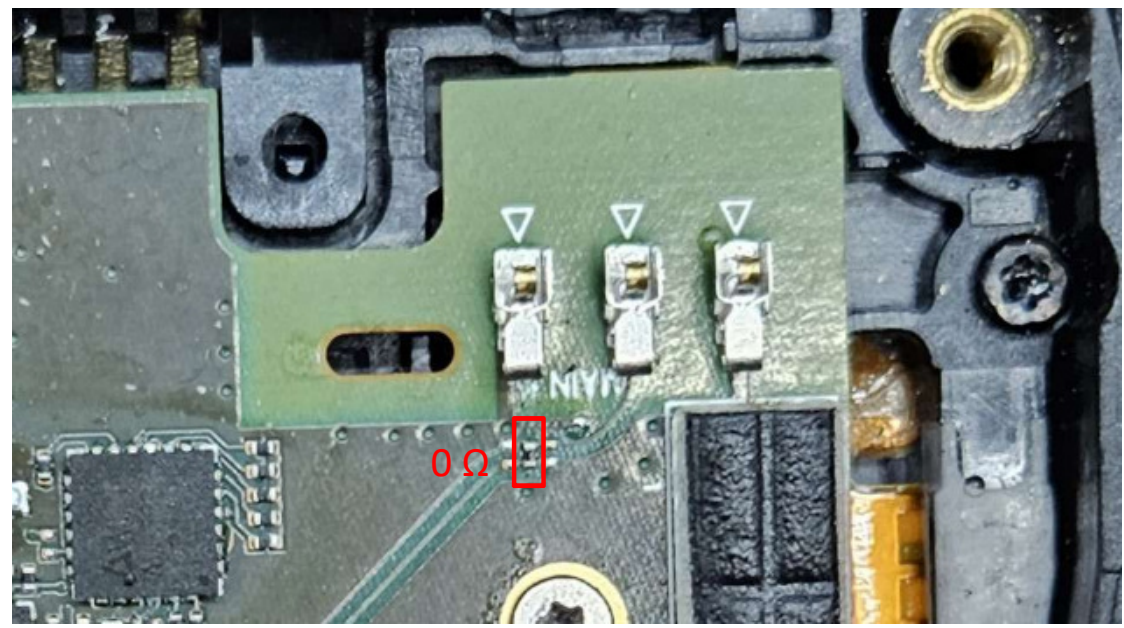
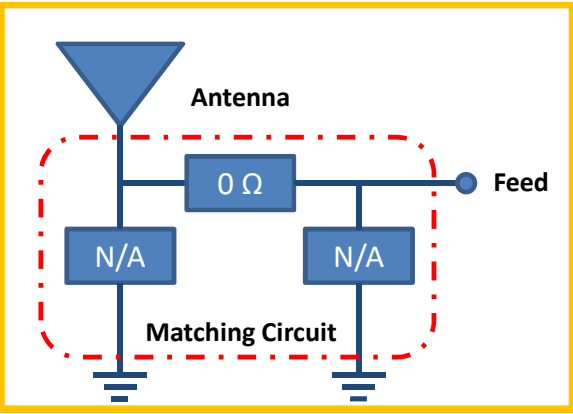


GPS antenna

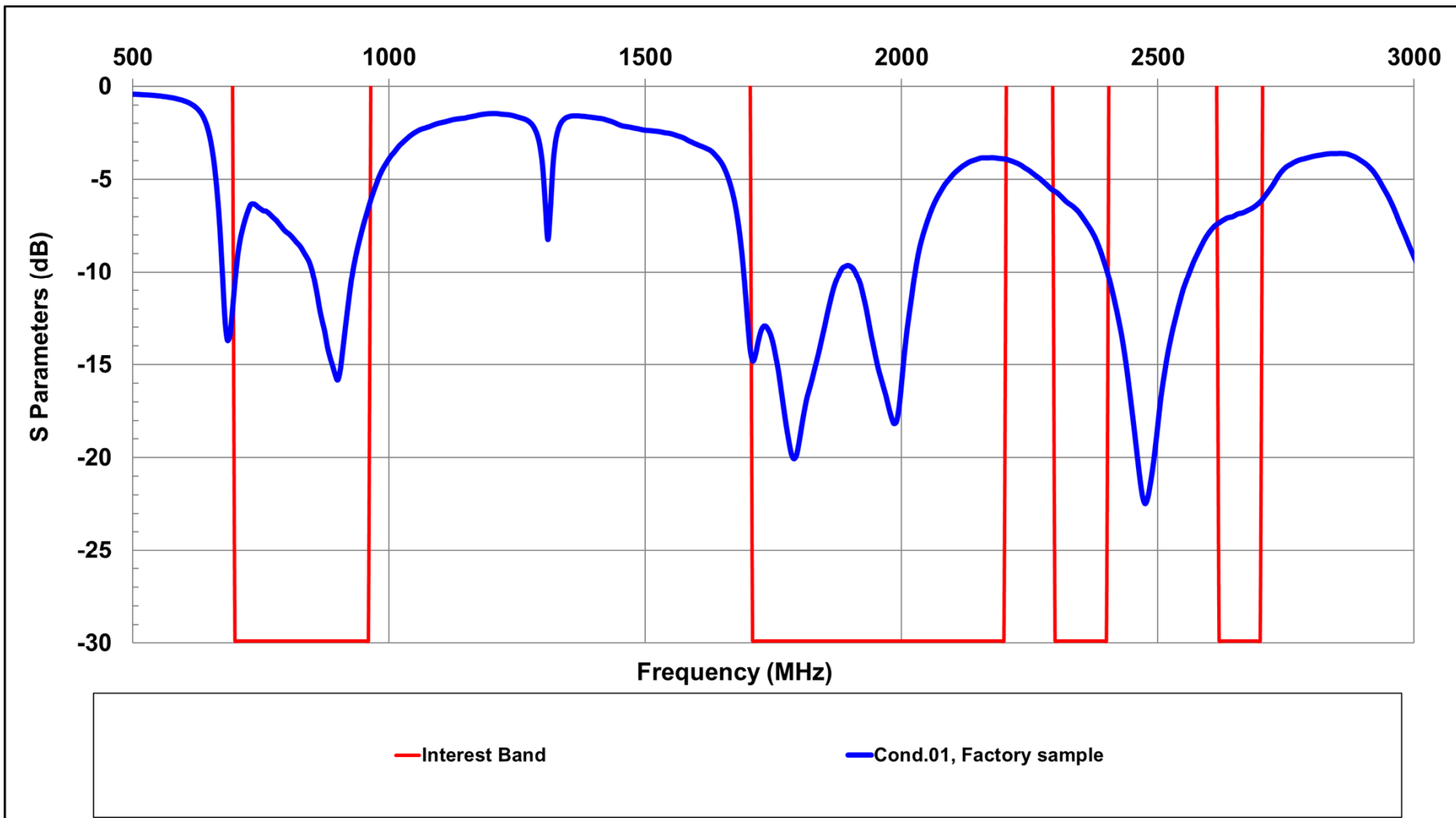


- Platform and Fixture Introduction
- Pictures of Antenna pattern
- Antenna Performance
 - LTE Main
 - LTE Aux
 - WIFI Main/Core0
 - GPS
- Conclusion

Component_LTE Main Antenna



S11_Main LTE Antenna



Efficiency_Main LTE Antenna_Low Band

Conditions		Cond.01	
Date		2023/4/26	
Report Rev.		Rev06	
Antenna (Rev.)		LTE Main	
Project Stage		DVT2	
Detail		*Factory sample.	
Chamber		Auden GTS 2800	
MHz	Spec	MHz	Peak gain (dB)
698	-4.0	698	2.6
703	-4.0	703	3.0
704	-4.0	704	2.9
707	-4.0	707	3.0
710	-4.0	710	2.8
716	-4.0	716	2.5
726	-4.0	726	2.4
728	-4.0	728	2.3
734	-4.0	734	2.3
737	-4.0	737	2.3
740	-4.0	740	2.3
746	-4.0	746	2.4
748	-4.0	748	2.4
751	-4.0	751	2.3
756	-4.0	756	2.0
758	-4.0	758	1.8
777	-4.0	777	0.8
781	-4.0	781	1.2
782	-4.0	782	1.3
787	-4.0	787	1.7
791	-4.0	791	1.9

Conditions		Cond.01	
Date		2023/4/26	
Report Rev.		Rev06	
Antenna (Rev.)		LTE Main	
Project Stage		DVT2	
Detail		*Factory sample.	
Chamber		Auden GTS 2800	
MHz	Spec	MHz	Peak gain (dB)
803	-4.0	803	2.1
806	-4.0	806	2.2
821	-4.0	821	2.3
824	-4.0	824	2.3
832	-4.0	832	2.4
837	-4.0	837	2.3
847	-4.0	847	2.5
849	-4.0	849	2.6
862	-4.0	862	2.9
869	-4.0	869	3.0
880	-4.0	880	3.0
882	-4.0	882	3.0
894	-4.0	894	3.0
898	-4.0	898	2.9
915	-4.0	915	2.9
925	-4.0	925	2.8
943	-4.0	943	2.5
960	-4.0	960	2.0

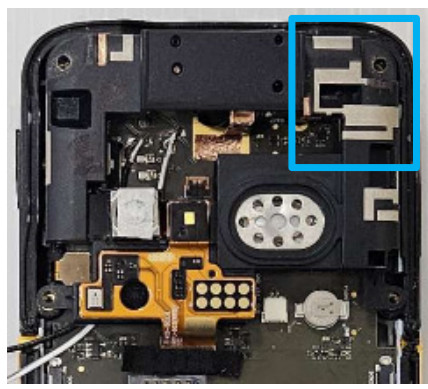
Efficiency_Main LTE_Middle and High Band

Conditions		Cond.01	
Date		2023/4/26	
Report Rev.		Rev06	
Antenna (Rev.)		LTE Main	
Project Stage		DVT2	
Detail		*Factory sample.	
Chamber		Auden GTS 2800	
MHz	Spec	MHz	Peak gain (dBi)
1710	-3.5	1710	2.6
1733	-3.5	1733	2.7
1745	-3.5	1745	2.7
1748	-3.5	1748	2.8
1755	-3.5	1755	2.8
1780	-3.5	1780	2.6
1785	-3.5	1785	2.5
1805	-3.5	1805	2.0
1843	-3.5	1843	1.4
1850	-3.5	1850	1.1
1880	-3.5	1880	1.4
1910	-3.5	1910	1.3
1920	-3.5	1920	1.1
1930	-3.5	1930	1.1
1950	-3.5	1950	1.3
1960	-3.5	1960	1.3
1980	-3.5	1980	1.1
1990	-3.5	1990	1.0
2110	-3.5	2110	-1.0
2133	-3.5	2133	-0.9

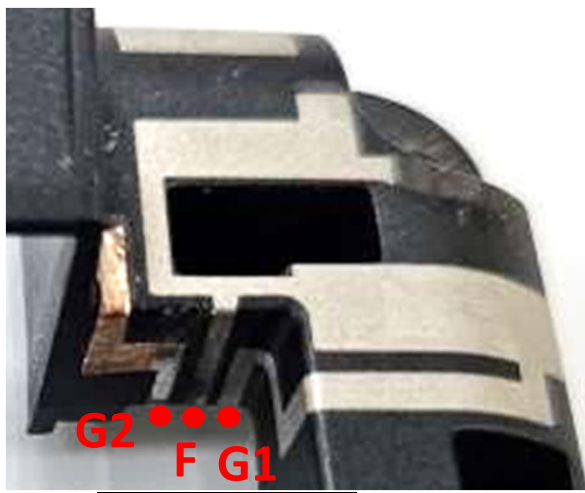
Conditions		Cond.01	
Date		2023/4/26	
Report Rev.		Rev06	
Antenna (Rev.)		LTE Main	
Project Stage		DVT2	
Detail		*Factory sample.	
Chamber		Auden GTS 2800	
MHz	Spec	MHz	Peak gain (dBi)
2140	-3.5	2140	-0.8
2155	-3.5	2155	-0.6
2170	-3.5	2170	-0.2
2200	-3.5	2200	0.4
2300	-3.5	2300	2.4
2305	-3.5	2305	2.5
2310	-3.5	2310	2.6
2315	-3.5	2315	2.5
2350	-3.5	2350	2.8
2355	-3.5	2355	2.6
2360	-3.5	2360	2.5
2400	-3.5	2400	2.2
2402	-3.5	2402	2.1
2442	-3.5	2442	2.4
2494	-3.5	2494	2.2
2500	-3.5	2500	2.2
2535	-3.5	2535	2.5
2570	-3.5	2570	2.1
2620	-3.5	2620	1.4
2655	-3.5	2655	1.3
2690	-3.5	2690	0.9

- Platform and Fixture Introduction
- Pictures of Antenna pattern
- Antenna Performance
 - LTE Main
 - LTE Aux
 - WIFI Main/Core0
 - GPS
- Conclusion

Antenna picture, matching and Switch tuner

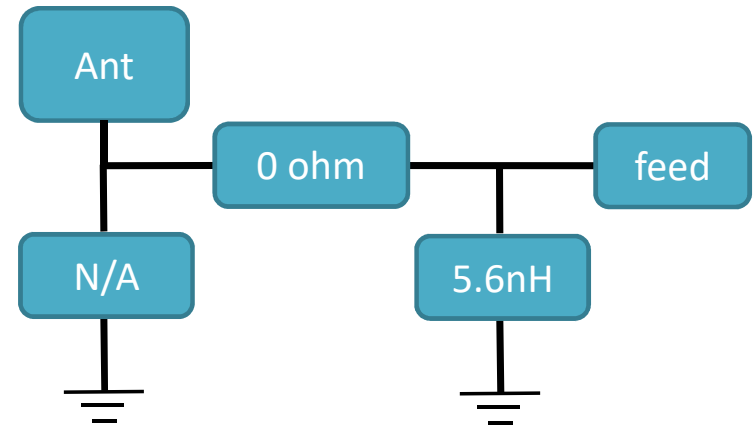


LTE Aux

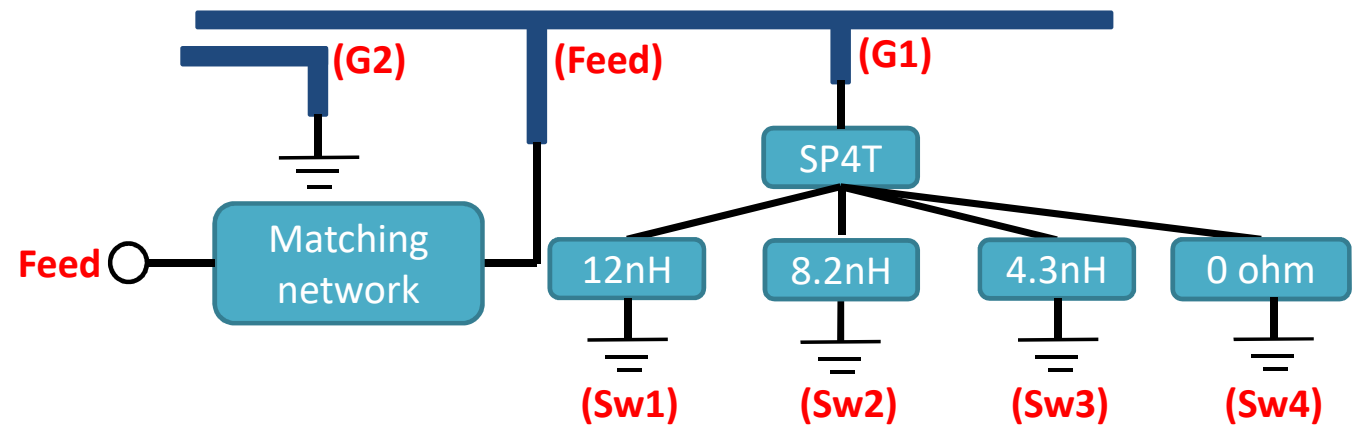


LTE Aux

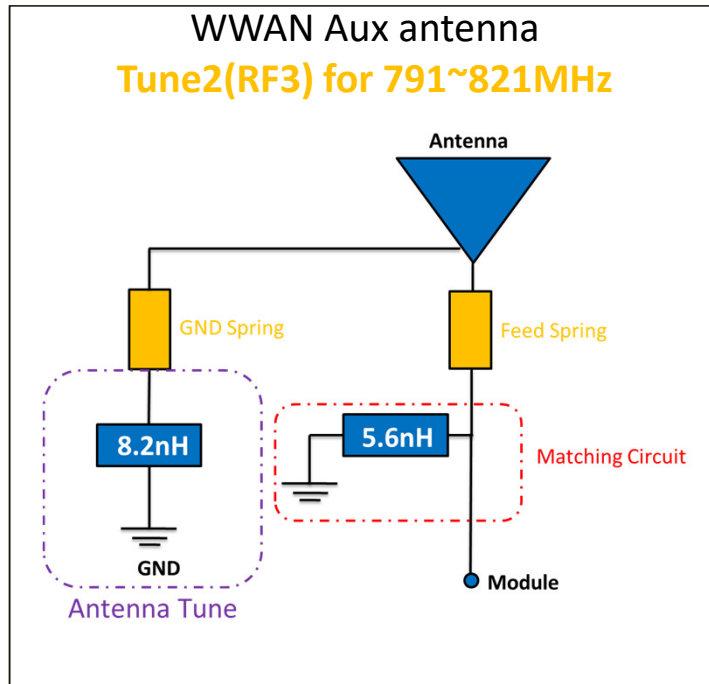
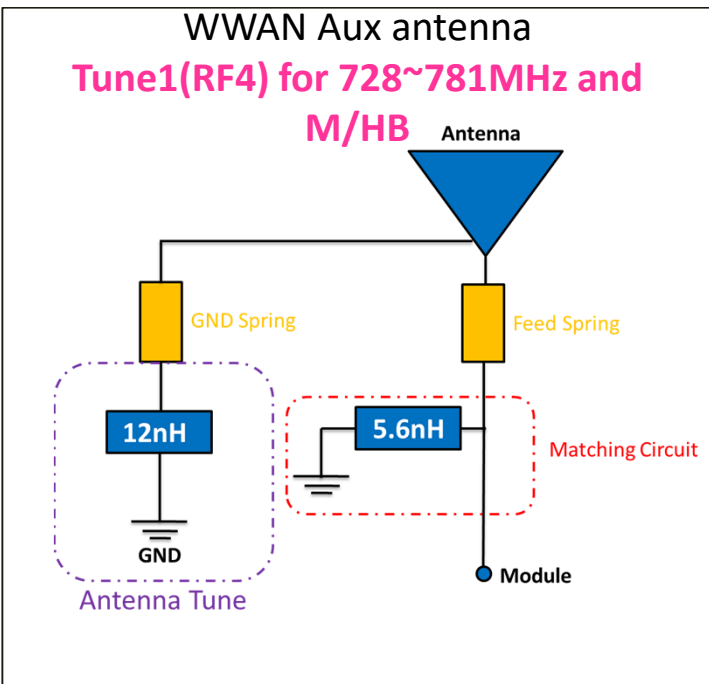
Matching network



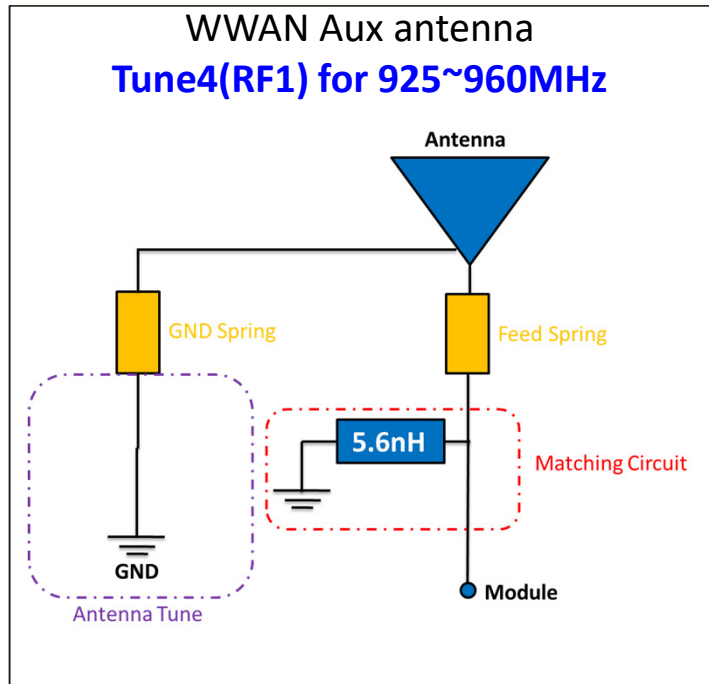
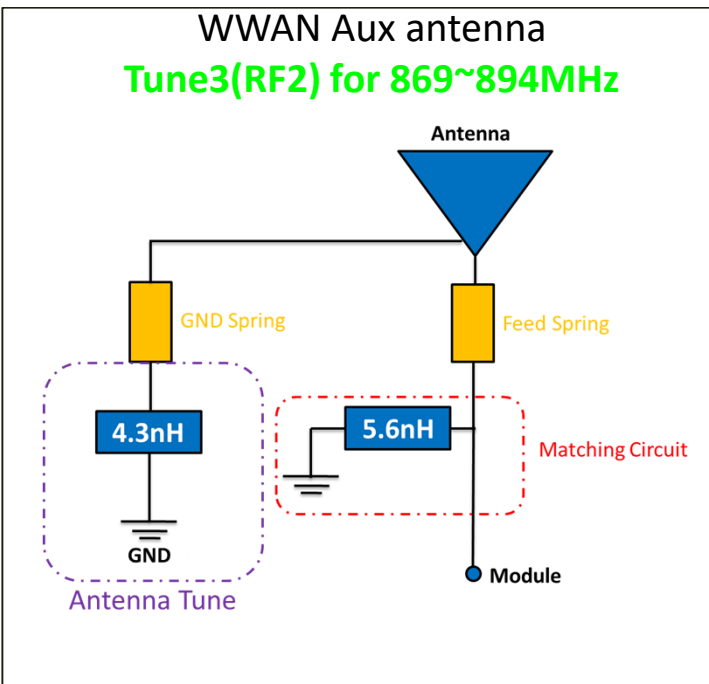
Switch



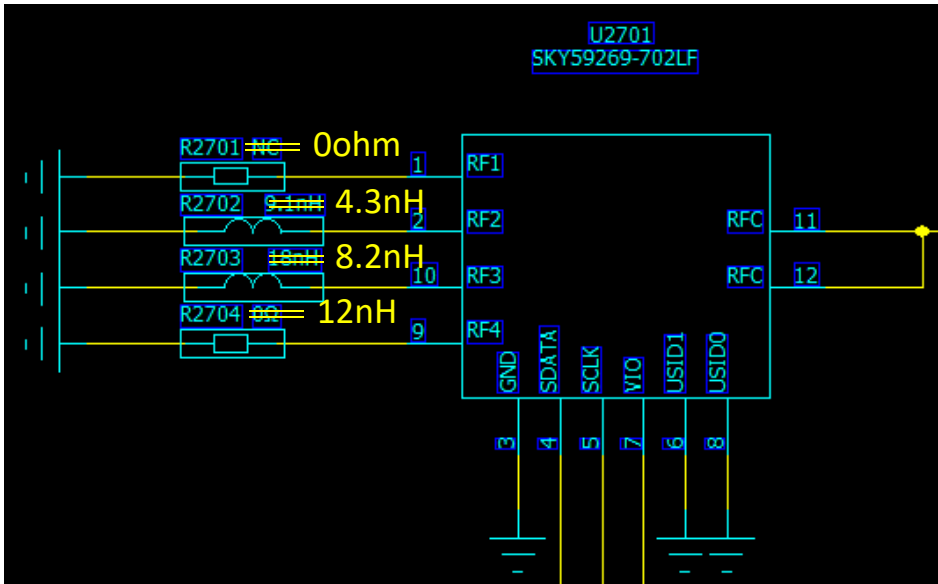
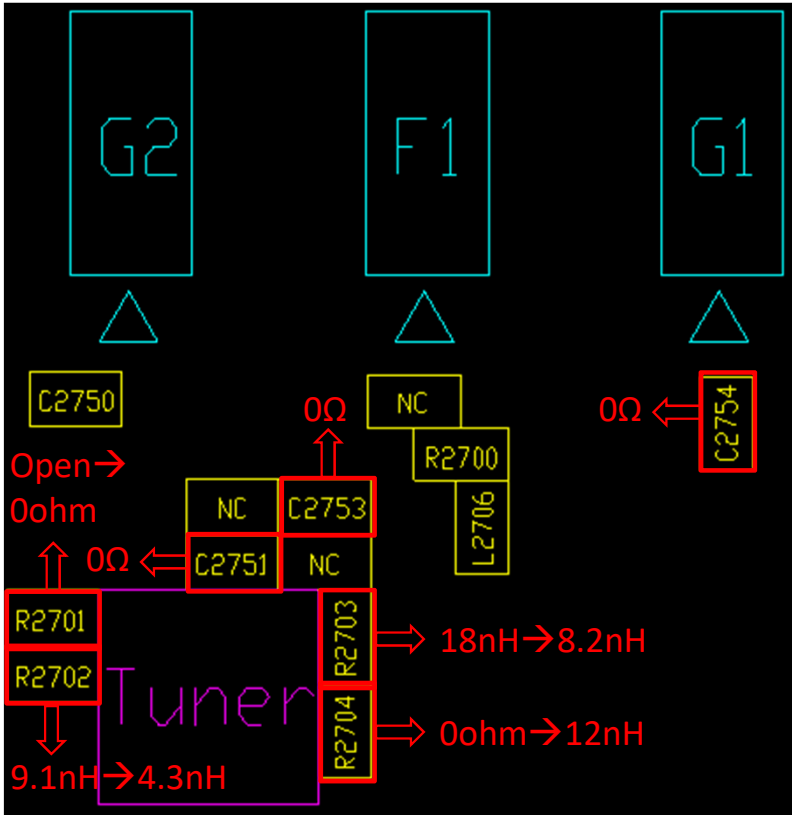
LTE Aux Working Mode



LTE Aux Working Mode

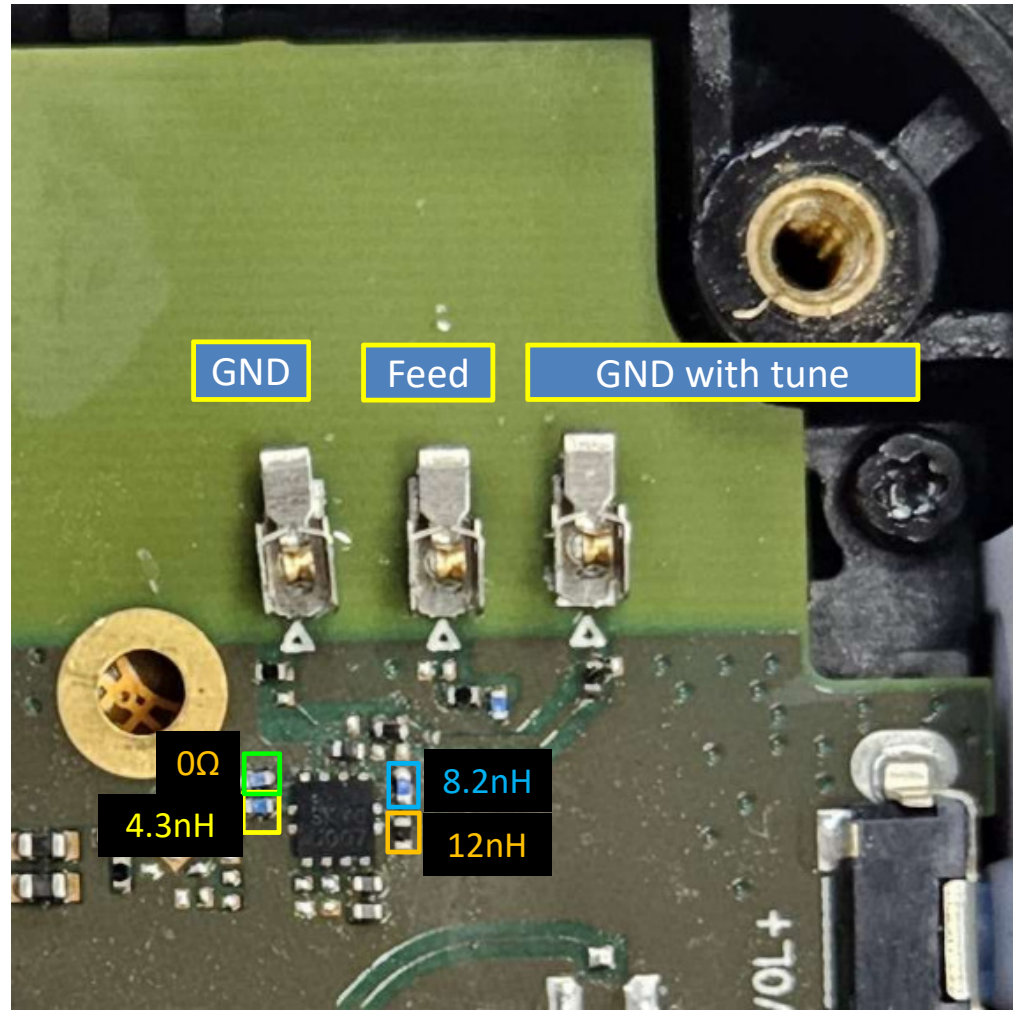
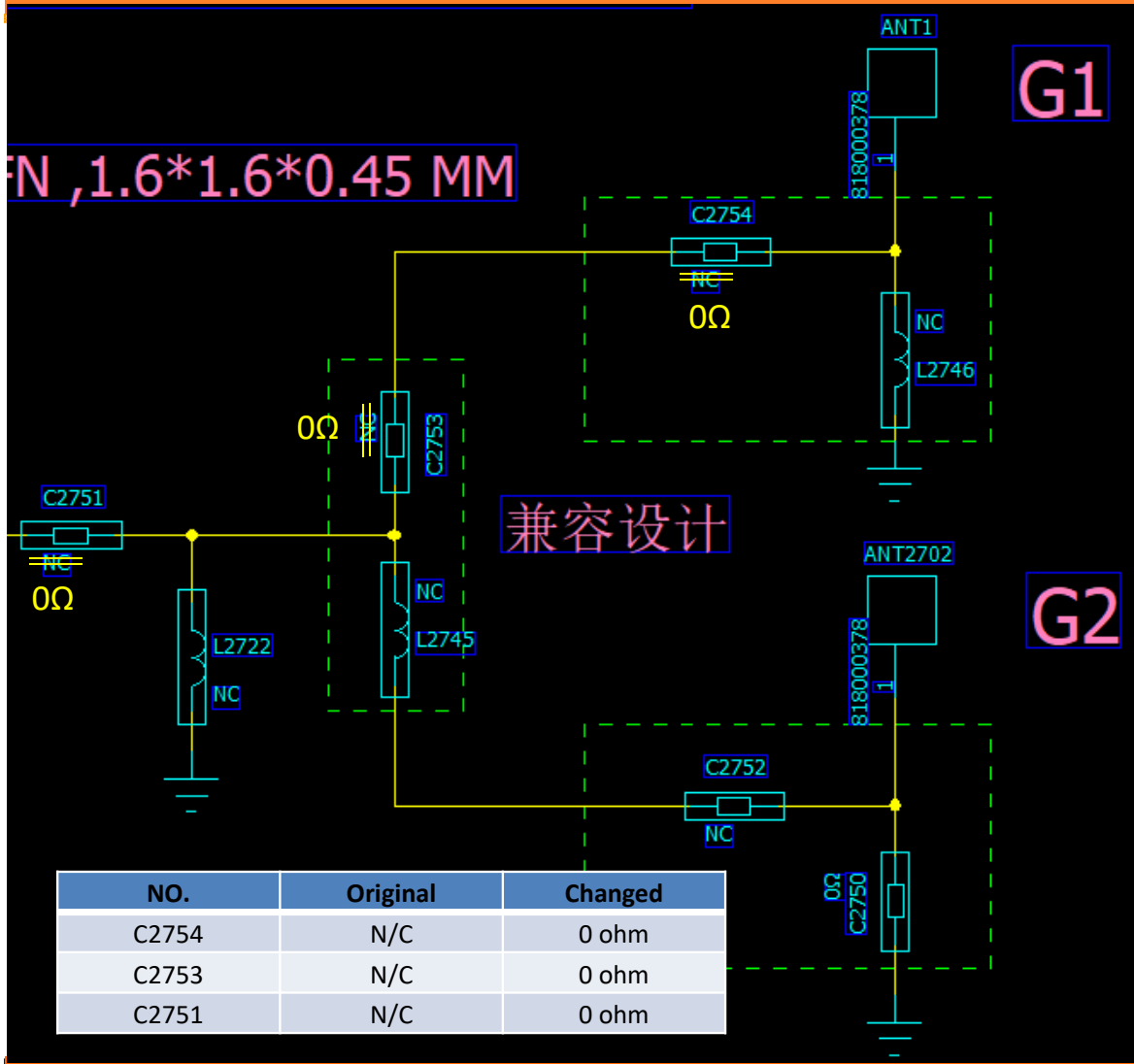


LTE Aux PCB Layout

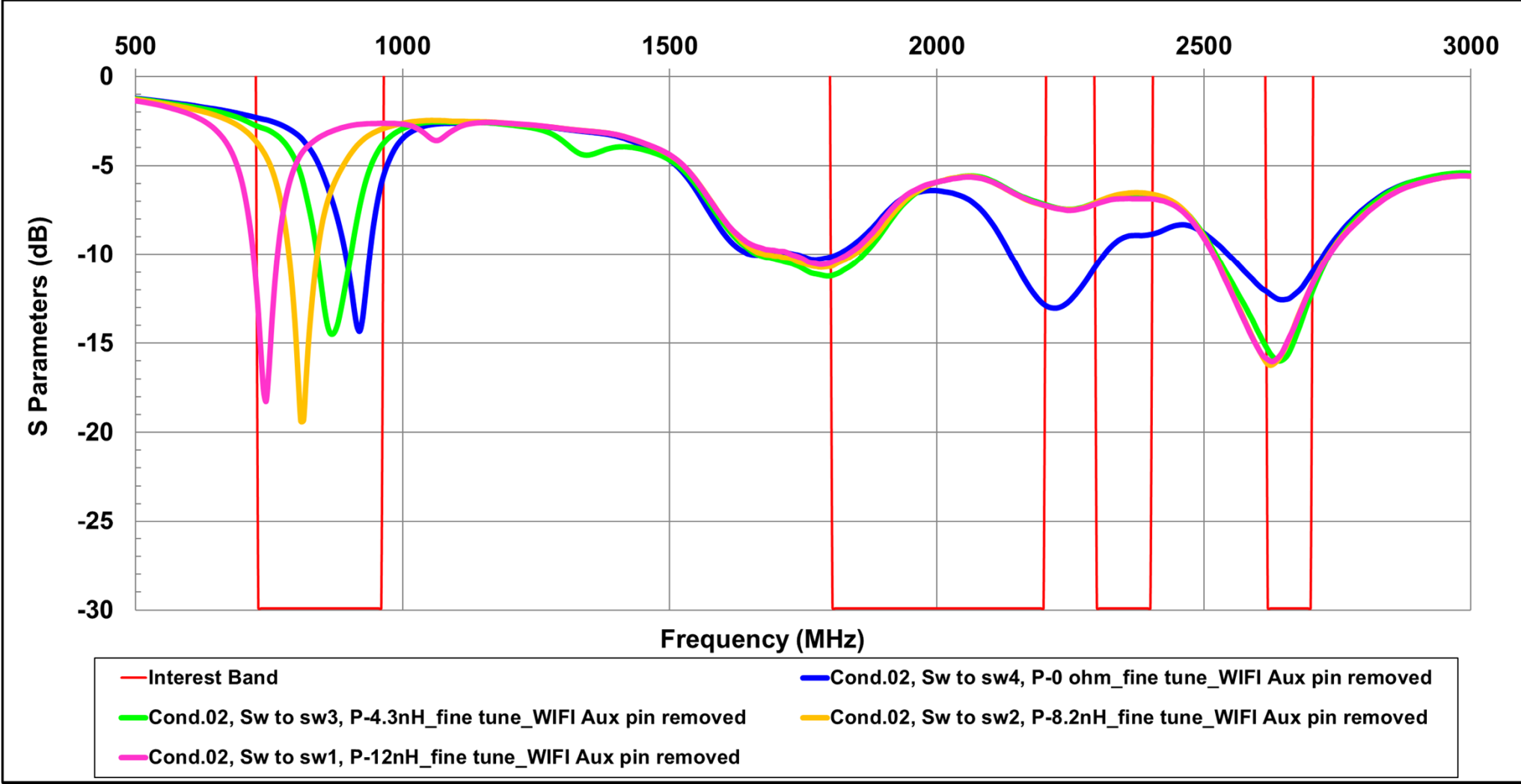


NO.	Original	Changed
R2701	Open	0ohm
R2702	9.1nH	4.3nH
R2703	18nH	8.2nH
R2704	0ohm	12nH

LTE Aux PCB Layout



S11_LTE Aux Antenna_Cond.02



Efficiency_LTE Aux_Low Band_Cond.02

Conditions		Cond.02		Cond.02		Cond.02		Cond.02	
Date		2023/5/3		2023/5/3		2023/5/3		2023/5/3	
Report Rev.		Rev06		Rev06		Rev06		Rev06	
Antenna (Rev.)		LTE Aux		LTE Aux		LTE Aux		LTE Aux	
Project Stage		DVT2		DVT2		DVT2		DVT2	
Detail		*Fine tune *Feed-5.6nH *Sw to sw1, P-12nH *WIFI Aux pin removed		*Fine tune *Feed-5.6nH *Sw to sw2, P-8.2nH *WIFI Aux pin removed		*Fine tune *Feed-5.6nH *Sw to sw3, P-4.3nH *WIFI Aux pin removed		*Fine tune *Feed-5.6nH *Sw to sw4, P-0 ohm *WIFI Aux pin removed	
Chamber		Auden GTS 2800		Auden GTS 2800		Auden GTS 2800		Auden GTS 2800	
MHz	Spec	MHz	Peak gain (dBi)	MHz	Peak gain (dBi)	MHz	Peak gain (dBi)	MHz	Peak gain (dBi)
728	-8.0	728	-5.8	728	-10.2	728	-12.5	728	-15.1
734	-8.0	734	-5.6	734	-9.8	734	-12.1	734	-14.8
737	-8.0	737	-5.6	737	-9.6	737	-12.1	737	-14.9
740	-8.0	740	-5.6	740	-9.5	740	-12.0	740	-14.7
746	-8.0	746	-5.5	746	-8.9	746	-11.5	746	-14.4
751	-8.0	751	-5.5	751	-8.7	751	-11.4	751	-14.3
756	-8.0	756	-5.8	756	-8.4	756	-11.2	756	-14.2
758	-8.0	758	-6.0	758	-8.3	758	-11.1	758	-14.2
781	-8.0	781	-7.3	781	-6.8	781	-9.7	781	-13.0
791	-8.0	791	-8.3	791	-6.3	791	-9.2	791	-12.5
803	-8.0	803	-9.6	803	-6.2	803	-8.7	803	-12.1
806	-8.0	806	-10.0	806	-6.2	806	-8.5	806	-12.0
821	-8.0	821	-11.7	821	-6.5	821	-7.8	821	-11.1
869	-8.0	869	-15.0	869	-8.1	869	-5.7	869	-7.4
882	-8.0	882	-15.4	882	-8.2	882	-5.2	882	-6.3
894	-8.0	894	-15.8	894	-8.6	894	-5.0	894	-5.2
925	-8.0	925	-17.7	925	-10.0	925	-5.6	925	-3.6
943	-8.0	943	-19.0	943	-11.2	943	-6.7	943	-3.8
960	-8.0	960	-20.6	960	-12.0	960	-7.9	960	-5.2

WIFI Aux
彈腳移除

Efficiency_LTE Aux_Middle and High Band_Cond.02

Conditions		Cond.02		Cond.02		Cond.02		Cond.02	
Date		2023/5/3		2023/5/3		2023/5/3		2023/5/3	
Report Rev.		Rev06		Rev06		Rev06		Rev06	
Antenna (Rev.)		LTE Aux		LTE Aux		LTE Aux		LTE Aux	
Project Stage		DVT2		DVT2		DVT2		DVT2	
Detail		*Fine tune *Feed-5.6nH *Sw to sw1, P-12nH *WIFI Aux pin removed		*Fine tune *Feed-5.6nH *Sw to sw2, P-8.2nH *WIFI Aux pin removed		*Fine tune *Feed-5.6nH *Sw to sw3, P-4.3nH *WIFI Aux pin removed		*Fine tune *Feed-5.6nH *Sw to sw4, P-0 ohm *WIFI Aux pin removed	
Chamber		Auden GTS 2800		Auden GTS 2800		Auden GTS 2800		Auden GTS 2800	
MHz	Spec	MHz	Peak gain (dBi)	MHz	Peak gain (dBi)	MHz	Peak gain (dBi)	MHz	Peak gain (dBi)
1805	-7.0	1805	-2.1	1805	-2.0	1805	-2.0	1805	-2.7
1843	-7.0	1843	-2.5	1843	-2.4	1843	-2.3	1843	-3.2
1880	-7.0	1880	-3.0	1880	-3.1	1880	-2.9	1880	-3.8
1930	-7.0	1930	-3.5	1930	-3.4	1930	-3.2	1930	-4.1
1960	-7.0	1960	-4.0	1960	-4.1	1960	-3.9	1960	-4.9
1990	-7.0	1990	-4.1	1990	-4.2	1990	-4.1	1990	-5.4
2110	-7.0	2110	-3.6	2110	-3.8	2110	-3.9	2110	-5.7
2133	-7.0	2133	-3.7	2133	-3.8	2133	-3.8	2133	-6.0
2140	-7.0	2140	-3.7	2140	-3.9	2140	-3.9	2140	-5.9
2155	-7.0	2155	-3.6	2155	-3.6	2155	-3.8	2155	-5.9
2170	-7.0	2170	-3.7	2170	-3.6	2170	-3.6	2170	-5.9
2200	-7.0	2200	-3.8	2200	-3.8	2200	-3.8	2200	-6.2
2300	-7.0	2300	-5.1	2300	-5.3	2300	-5.2	2300	-6.7
2350	-7.0	2350	-4.8	2350	-4.9	2350	-5.3	2350	-6.4
2355	-7.0	2355	-4.8	2355	-4.9	2355	-5.1	2355	-6.4
2360	-7.0	2360	-4.8	2360	-5.1	2360	-5.3	2360	-6.4
2400	-7.0	2400	-4.5	2400	-4.8	2400	-5.1	2400	-6.2
2620	-7.0	2620	-1.9	2620	-1.8	2620	-1.8	2620	-2.5
2655	-7.0	2655	-1.9	2655	-1.9	2655	-1.8	2655	-2.4
2690	-7.0	2690	-2.3	2690	-2.2	2690	-1.9	2690	-2.5

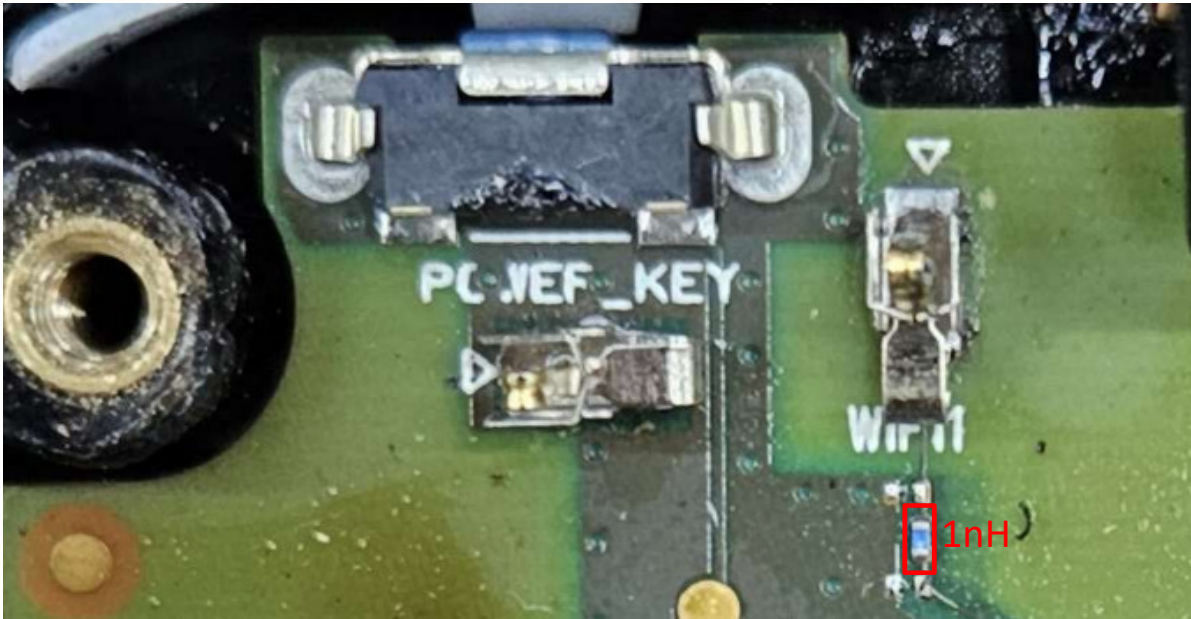
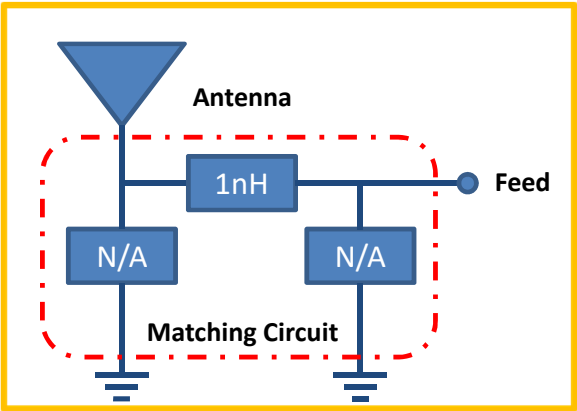
WIFI Aux
彈腳移除

Sw1_Cover LB&MB&HB

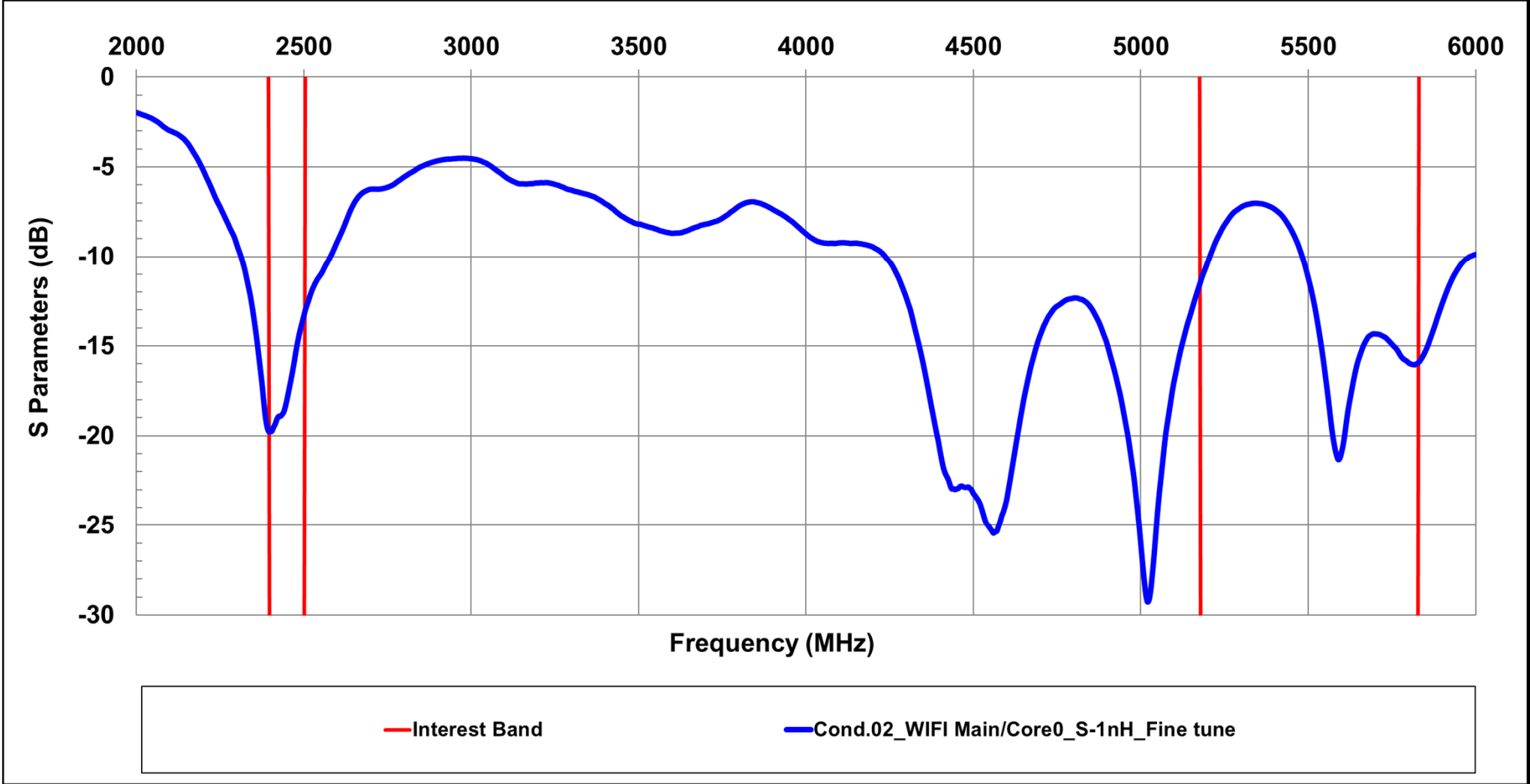
728MHz~781MHz
1805MHz~2690MHz

- Platform and Fixture Introduction
- Pictures of Antenna pattern
- Antenna Performance
 - LTE Main
 - LTE Aux
 - WIFI Main/Core0
 - GPS
- Conclusion

Component_WIFI Main/Core0



S11_WIFI Main/Core0



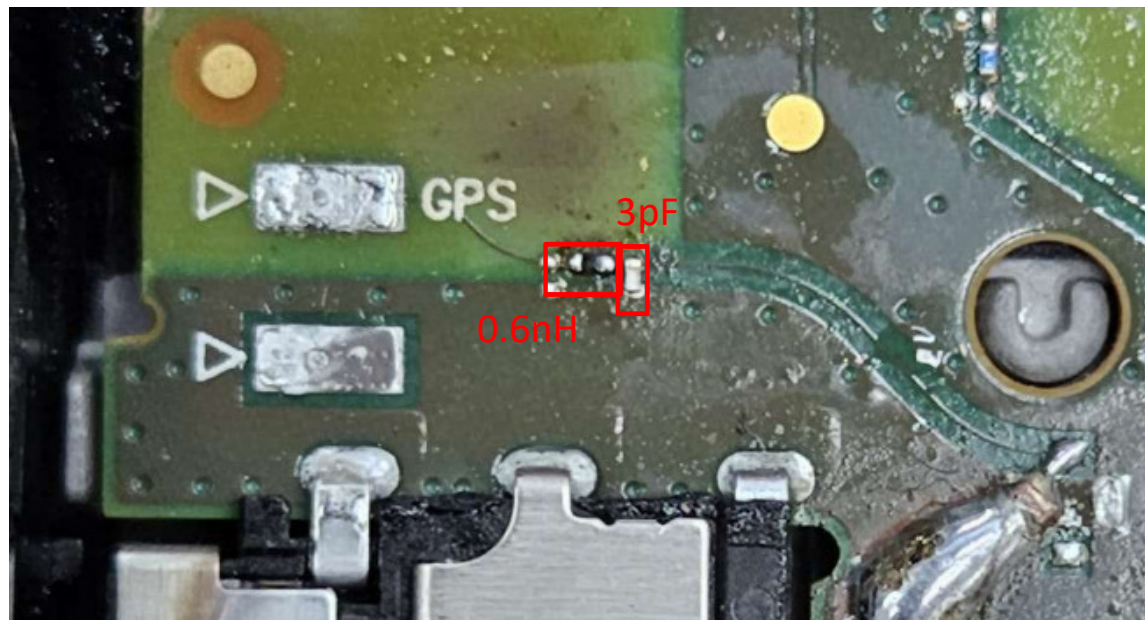
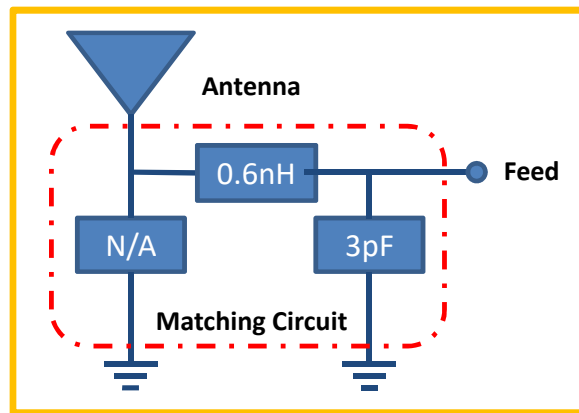
Efficiency_WIFI Main/Core0



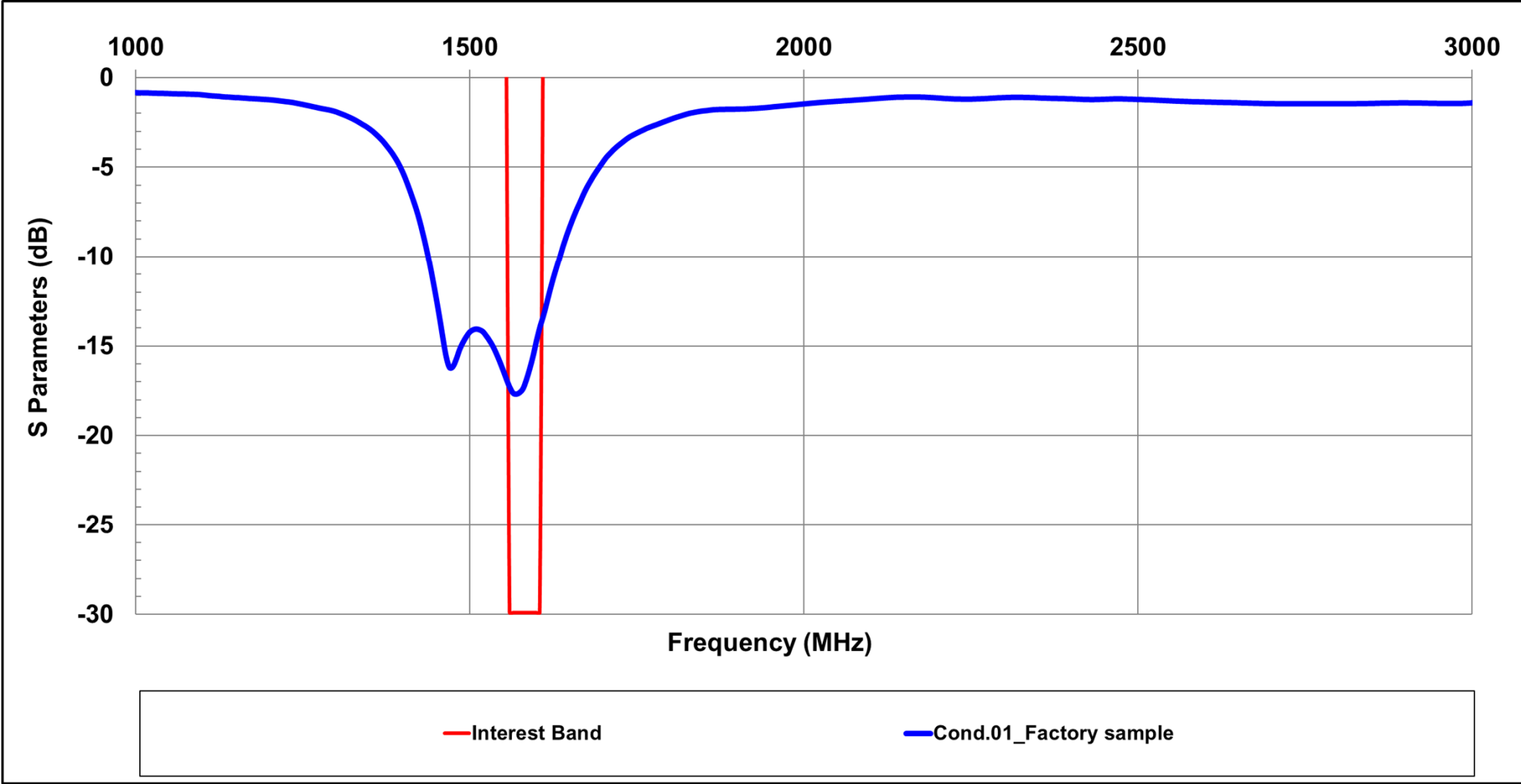
Conditions		Cond.02	
Date		2023/4/26	
Report Rev.		Rev06	
Antenna (Rev.)		WIFI Main/Core0	
Project Stage		DVT2	
Detail		*PIFA Type *S-1nH *Factory sample *Fine tune	
Chamber		Auden GTS2800	
MHz	Spec	MHz	Peak gain (dBi)
2402	-4.0	2402	-1.0
2442	-4.0	2442	0.2
2484	-4.0	2484	0.5
5150	-4.0	5150	-0.8
5250	-4.0	5250	1.0
5350	-4.0	5350	1.4
5470	-4.0	5470	2.5
5725	-4.0	5725	3.5
5785	-4.0	5785	3.1
5875	-4.0	5875	2.8

- Platform and Fixture Introduction
- Pictures of Antenna pattern
- Antenna Performance
 - LTE Main
 - LTE Aux
 - WIFI Main/Core0
 - GPS
- Conclusion

Component_GPS Antenna



S11_GPS Antenna



Efficiency_GPS Antenna

Conditions		Cond.01	
Date		2023/4/26	
Report Rev.		Rev06	
Antenna (Rev.)		GPS	
Project Stage		DVT2	
Detail		*Coupling Type *S-0.6nH, P-3pF *Factory sample	
Chamber		Auden GTS2800	
MHz	Spec	MHz	Peak gain (dBi)
Total Eff.			
1560	-4.0	1565	-2.8
1585	-4.0	1585	-2.1
1610	-4.0	1610	-1.2
UHS Eff.			
1560	-6.0	1565	
1585	-6.0	1585	
1610	-6.0	1610	