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Title **TA-1420 Antenna Specification**
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CHANGE HISTORY

Version	Status	Date	Handled by	Comments
0.1	Draft	2021-8-10	JH Yoon	Initial Draft
1.0	Official	2021-11-10	Clear Lei	Update according Lab comments for FCC final review
1.0	Official	2021-11-12	Clear Lei	Remove RF target to avoid FCC confusing
2.0	Official	2022-9-15	JH Yoon & Clear Lei	Add B25.B26 inform and update TA code
3.0	Official	2022-9-28	JH Yoon & Clear Lei	Add WIFI/BT gain
3.1	Official	2022-9--29	JH Yoon & Clear Lei	Delete WIFI/BT/GPS gain of page 21
3.2	Official	2022-9--29	JH Yoon & Clear Lei	Change WIFI&BT Gain to -2.5dB

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1. INTRODUCTION / SPECIFICATION STRUCTURE

The present document constitutes one behalf of the antenna specification for any Nokia program. For any Nokia program the antenna specification will consist of a generic part and a project specific part. The present document is the project specific part of the specification. The generic document has document number DXX13337-EN. It is only updated via the Nokia Global Antenna Technology Steering forum and is always aligned across Nokia. The document is distributed to the supplier by Nokia sourcing management after updates.

The project specific part of the antenna specification always takes precedence over the generic specification. This means that if a delta to one of the generic sections is stated in the project specific specification then that delta takes precedence.

Updates to the generic specification are delivered to one central contact person at the antenna supplier. The supplier is responsible for ensuring that the latest version of the generic antenna specification is used by all projects. Whenever a new version of the generic antenna specification is released all running projects, which do not yet have parts approved for mass production, must switch to that version of the generic antenna specification within two weeks, regardless if the project started with an older version of the generic specification. If changing to the latest version of the Generic Specification will result in increased part price, lower capacity, or worse reliability the supplier must escalate this to Nokia Antenna SLM before implementing the requirements in the new release. Projects that have parts approved for mass production at the time of the release can change to the new version if Nokia approves. For all projects the control plan must state which version of the generic antenna specification is being followed. Unless specific instructions are given, running projects do not need to change to a new version of the project specific template when a new version is released.

This document contains the functional specification, test specification, and project specific requirements for all antennas listed in the project specific part of the specification. As this document is used both internal and external specification, not all antenna modules will be relevant for all suppliers. The supplier should work on the modules agreed with Nokia in the project. As the specification is both for internal and external use, there will be a number of the requirements that the supplier has no possibility of influencing if he has not been assigned with design responsibility.

Notice that this document is valid as specification for both 1st source suppliers (lead suppliers) and non-1st source suppliers (copy suppliers). Lead suppliers must start reading this document from section 2, whereas copy suppliers must start reading the document from appendix 8.

The document is structured as follows:

Section 2 contains the preconditions for the cooperation between Nokia and the antenna/JRD supplier.

Section 3 contains the definition of task split between Nokia and antenna supplier along with a description of the phone.

Section 错误!未找到引用源。 contains the conducted maximum power of all protocols available in the phone.

Section 4 contains the antenna specification (RF, environmental, mech., quality).

Section 5 contains the R&D test specification, stating how the product performance is verified.

Section 6 contains the production test specification.

Section 7 contains the mechanical acceptance procedure.

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Appendix 8 contains a detailed description several topics relating to production.
Appendix 9 contains the specification for copy suppliers.
Appendix 10 contains a list of documents referred in this document.
Appendix 11 contains an acronym list.

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2. PRECONDITIONS

The generic part of this section is available in section 2 of the Generic Antenna Specification H015061622-EN.

2.1 Deltas to Section 2 in Generic Antenna Specification

N/A

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3. PHONE DESCRIPTION AND TASK RESPONSIBILITY SPLIT

The generic part of this section is available in section 3 of the Generic Antenna Specification H015061622-EN.

3.1 Deltas to section 3 in Generic Antenna Specification

In Table 1 the mechanical modes of the phone are described. These mode definitions will be used in the rest of the document.

In Table 2 the antenna assemblies covered The phone is a **clamshell** phone with 2 different antenna assemblies covering Main /Diversity. The antennas are placed at the bottom, top and left top corner of the D cover.

by the document are listed.

Table 2 also defines the split of responsibility between HMD and the supplier for all antennas in the phone.

Mode	Description	Korea variant	HAC mode (select also standard version)	Body SAR mode	Head SAR mode, Single Tx slot	Head SAR mode, Multiple Tx slots
Primary mode	Folder open	Yes <input type="checkbox"/>	2006 <input type="checkbox"/> <input type="checkbox"/> 2007	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Secondary mode		No <input checked="" type="checkbox"/>				

Table 1 Definition of mechanical modes and SAR specifics of the phone.

Assy. name	NOKIA code	Assy. drawing number	Protocols included in assy.	MOSS classes of assy.	Responsibility of antenna supplier	Responsibility of HMD	Packaging
Main Antenna			GSM 850/900/1800/1900 WCDMA: II, IV, V LTE B2/B4/B5/B7/B12/B13/B17/B41/ B66/B71/ B25/B26	<input type="checkbox"/> Class I <input checked="" type="checkbox"/> Class II <input type="checkbox"/> Class III	<input type="checkbox"/> Design <input checked="" type="checkbox"/> Production <input type="checkbox"/> Couplers	<input checked="" type="checkbox"/> Design <input type="checkbox"/> Production <input checked="" type="checkbox"/> Couplers	<input type="checkbox"/> ESD Tray <input type="checkbox"/> Tape and Reel <input checked="" type="checkbox"/> N/A
GPS/WLAN Antenna			GNSS/WIFI 2.4G	<input type="checkbox"/> Class I <input type="checkbox"/> Class II <input type="checkbox"/> Class III	<input type="checkbox"/> Design <input type="checkbox"/> Production <input type="checkbox"/> Couplers	<input type="checkbox"/> Design <input type="checkbox"/> Production <input type="checkbox"/> Couplers	<input type="checkbox"/> ESD Tray <input type="checkbox"/> Tape and Reel <input type="checkbox"/> N/A
Diversity			WCDMA: II, IV, V LTE B2/B4/B5/B7/B12/B13/B17/B41/ B66/B71	<input type="checkbox"/> Class I <input checked="" type="checkbox"/> Class II <input type="checkbox"/> Class III	<input type="checkbox"/> Design <input checked="" type="checkbox"/> Production <input checked="" type="checkbox"/> Couplers	<input checked="" type="checkbox"/> Design <input type="checkbox"/> Production <input type="checkbox"/> Coupler	<input type="checkbox"/> ESD Tray <input type="checkbox"/> Tape and Reel <input checked="" type="checkbox"/> N/A

Table 2 List of assemblies covered by the document.

Mode	Test Position	Test with these Hand Phantoms
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Primary mode	Talk position + hand	<input type="checkbox"/> IXB-090R <input checked="" type="checkbox"/> CTIA fold hand <input type="checkbox"/> CTIA monoblock hand <input type="checkbox"/> CTIA PDA hand <input type="checkbox"/> Custom hand
Secondary mode	Talk position + hand	<input type="checkbox"/> IXB-090R <input type="checkbox"/> CTIA fold hand <input type="checkbox"/> CTIA monoblock hand <input type="checkbox"/> CTIA PDA hand <input type="checkbox"/> Custom hand
Primary mode	Browse mode	<input type="checkbox"/> IXB-090R <input type="checkbox"/> CTIA narrow data hand <input type="checkbox"/> CTIA PDA hand <input type="checkbox"/> Custom hand
Secondary mode	Browse mode	<input type="checkbox"/> IXB-090R <input type="checkbox"/> CTIA narrow data hand <input type="checkbox"/> CTIA PDA hand <input type="checkbox"/> Custom hand

Table 3: Hand Phantoms to be used for talk position + hand and browse mode testing.

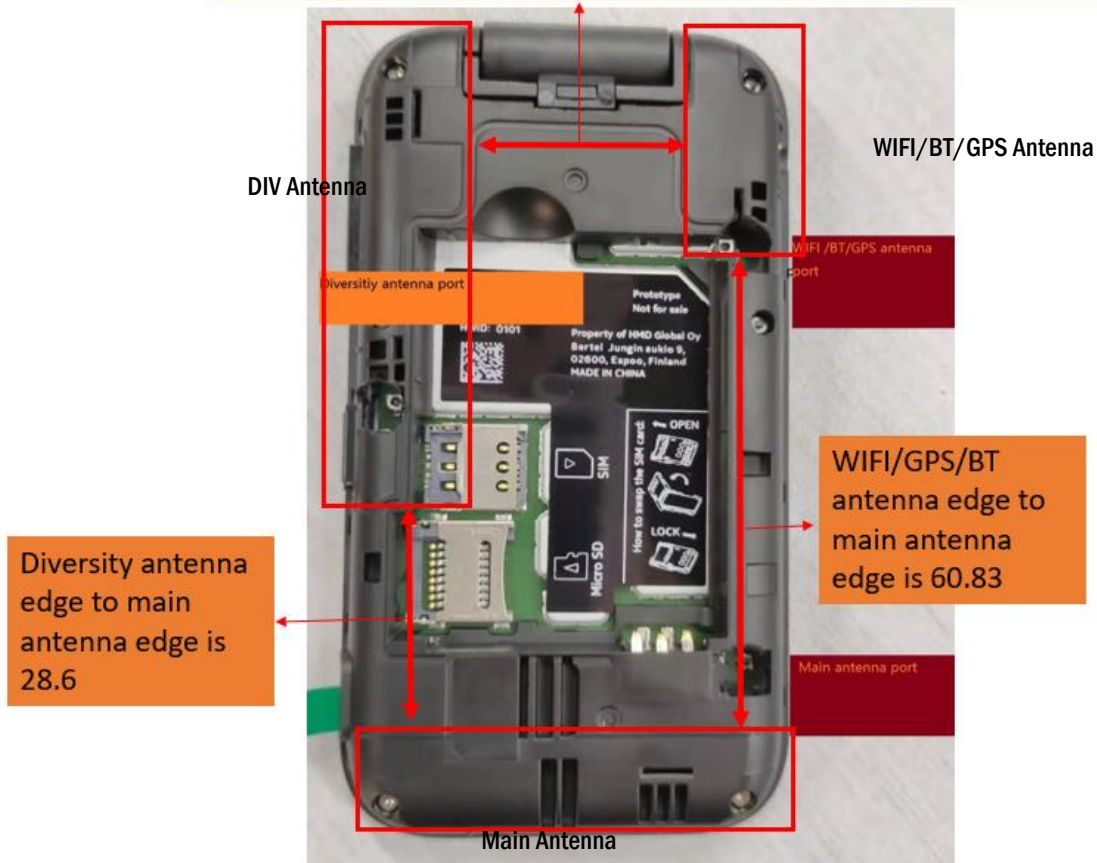
3.2 Further details on supplier responsibilities

NA

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3.3 Antenna position with separation distances

Diversity antenna edge to WIFI/GPS/BT antenna edge is 28.6



Antenna name	Manufacture	Type	Code	
Diversity antenna	Speed	FPC antenna	F-2A-CC-2053-000-K0	ANT_DIV_67.3*20.41*0.12_T01_Black
WIFI&GPS&BT antenna	Speed	FPC antenna	F-2A-CC-2054-000-K0	ANT_CWS_35.49*20.55*0.12_T01_Black
Main antenna	Speed	FPC antenna	F-2A-CC-2052-000-K0	ANT_MAIN_61.85*23.71*0.12_T01_Black

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4. ANTENNA FUNCTIONAL SPECIFICATION

The generic part of this section is available in section 5 of the Generic Antenna Specification H015061622-EN.

4.1 Deltas to section 5.1 Generic Antenna Specification

The electrical requirements to cellular antennas are listed in Table 10,11,12,13 and 14.

Item	Requirement + platform	Parameter	GSM850	EGSM900	DCS1800	PCS 1900	Unit
A	NA	Tx frequency range	824-849	880-915	1710-1785	1850-1910	MHz
		Rx frequency range	869-894	925-960	1805-1880	1930-1990	MHz
		Nominal impedance	50	50	50	50	Ohm
Passive performance							
B	Minimum acceptable performance of Cabled Golden Phone	S11 (Tx/Rx) - Primary Mode, FS, TP, TP+hand	≤ -6 / -4	≤ -6 / -4	≤ -6 / -4	≤ -6 / -4	dB
		S11(Tx/Rx) - Secondary mode, FS, TP, TP+hand	NA	NA	NA	NA	dB
		Isolation – SEE Table	-	-	-	-	-
OTA performance - PRIMARY MODE							
C	Minimum acceptable performance of Active Golden Phone	TRP FS (worst channel – low, mid, high) /Avg.	≥27/27	≥27/27	≥23/25	≥23/25	dBm
		TRP TP (worst channel – low, mid, high) /Avg.	NA	NA	NA	NA	dBm
		TRP TP + Hand (worst channel – low, mid, high) /Avg.	≥16.5/18	≥16.5/18	≥17/19	≥17/19	dBm
		TRP Browse Mode (worst channel – low, mid, high) /Avg.	NA	NA	NA	NA	dBm
		TIS FS (worst channel – low, mid, high) /Avg.	≤-101.5/-102.5	≤-101.5/-102.5	≤-103/-104	≤-103/-104	dBm
		TIS TP (worst channel – low, mid, high) /Avg.	NA	NA	NA	NA	dBm
		TIS TP + Hand (worst channel – low, mid, high) /Avg.	≤-92.5/-94	≤-92.5/-94	≤-95/-97	≤-95/-97	dBm
		TIS Browse Mode (worst channel – low, mid, high) /Avg.	NA	NA	NA	NA	dBm
OTA performance - SECONDARY MODE							
D	Minimum acceptable performance of Active Golden Phone	TRP FS (worst channel – low, mid, high)	NA	NA	NA	NA	dBm
		TRP TP (worst channel – low, mid, high)	NA	NA	NA	NA	dBm
		TRP TP + Hand (worst channel – low, mid, high)	NA	NA	NA	NA	dBm
		TRP Browse Mode (worst channel – low, mid, high)	NA	NA	NA	NA	dBm
		TIS FS (worst channel – low, mid, high)	NA	NA	NA	NA	dBm
		TIS TP (worst channel – low, mid, high)	NA	NA	NA	NA	dBm
		TIS TP + Hand (worst channel – low, mid, high)	NA	NA	NA	NA	dBm
		TIS Browse Mode (worst channel – low, mid, high)	NA	NA	NA	NA	dBm
Production Variation Requirements – PRIMARY MODE							
E	Minimum acceptable performance of Limit Antenna in Active-/Cabled Reference Phone	Maximum TRP/TIS-FS degradation relative to minimum spec (Item C)	1.0	1.0	1.0	1.0	dB
		Maximum TRP/TIS-FS degradation relative to Active Golden Phone	1.5	1.5	1.5	1.5	dB
		Maximum FS return-loss degradation relative to minimum spec (Item B)	0.0	0.0	0.0	0.0	dB
		Maximum TRP-FS increase relative to Active Golden Phone	0.5	0.5	0.5	0.5	dB
		Maximum allowable frequency limits relative to Cabled Golden Phone	±7	±7	±15	±15	MHz
Product Validation Requirements – PRIMARY MODE							
F	Build antenna subjected to product validation tests in build Phone	Maximum band-average TRP/TIS-FS degradation to minimum spec (Item C) over 15 phones.	0.5	0.5	0.5	0.5	dB
		Maximum band-average TRP/TIS-FS degradation from before test to after test over 15 phones	1	1	1	1	dB
		Maximum return-loss degradation to minimum spec (Item B) over 15 phones	0	0	0	0	dB
		Power rating	2.0	2.0	2.0	2.0	W

Table 10: Electrical requirements for the antenna in the GSM bands. Refer to Table 1 for definition of the modes of the phone.

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Item	Requirement + platform	Parameter		WCDMA band II	WCDMA band IV	WCDMA band V		Unit
A	NA	Tx frequency range		1850-1910	1710-1755	824-849		MHz
		Rx frequency range		1930-1990	2110-2155	869-894		MHz
		Nominal impedance		50	50	50		Ohm
Passive performance								
B	Minimum acceptable performance of Cabled Golden Phone	S11 (Tx/Rx) - Primary Mode, FS, TP, TP+hand		NA	NA	NA		dB
		S11(Tx/Rx) - Secondary mode, FS, TP, TP+hand		NA	NA	NA		dB
		Isolation – SEE Table		NA	NA	NA		dB
OTA performance - PRIMARY MODE								
C	Minimum acceptable performance of Active Golden Phone	TRP FS (worst channel – low, mid, high) /Avg.		NA	NA	NA		dBm
		TRP TP (worst channel – low, mid, high) /Avg.		NA	NA	NA		dBm
		TRP TP + Hand (worst channel – low, mid, high) /Avg.		NA	NA	NA		dBm
		TRP Browse Mode (worst channel – low, mid, high) /Avg.		NA	NA	NA		dBm
		TIS FS (worst channel – low, mid, high) /Avg.		NA	NA	NA		dBm
		TIS TP (worst channel – low, mid, high) /Avg.		NA	NA	NA		dBm
		TIS TP + Hand (worst channel – low, mid, high) /Avg.		NA	NA	NA		dBm
OTA performance - SECONDARY MODE								
D	Minimum acceptable performance of Active Golden Phone	TRP FS (worst channel – low, mid, high)		NA	NA	NA		dBm
		TRP TP (worst channel – low, mid, high)		NA	NA	NA		dBm
		TRP TP + Hand (worst channel – low, mid, high)		NA	NA	NA		dBm
		TRP Browse Mode (worst channel – low, mid, high)		NA	NA	NA		dBm
		TIS FS (worst channel – low, mid, high)		NA	NA	NA		dBm
		TIS TP (worst channel – low, mid, high)		NA	NA	NA		dBm
		TIS TP + Hand (worst channel – low, mid, high)		NA	NA	NA		dBm
Production Variation Requirements – PRIMARY MODE								
E	Minimum acceptable performance of Limit Antenna in Active-/Cabled Reference Phone	Maximum TRP/TIS-FS degradation relative to minimum spec (Item C)		NA	NA	NA		dB
		Maximum TRP/TIS-FS degradation relative to Active Golden Phone		NA	NA	NA		dB
		Maximum FS return-loss degradation relative to minimum spec (Item B)		NA	NA	NA		dB
		Maximum TRP-FS increase relative to Active Golden Phone		NA	NA	NA		dB
		Maximum allowable frequency limits relative to Cabled Golden Phone		NA	NA	NA		MHz
Product Validation Requirements – PRIMARY MODE								
F	Build antenna subjected to product validation tests in build Phone	Maximum band-average TRP/TIS-FS degradation to minimum spec (Item C) over 15 phones.		NA	NA	NA		dB
		Maximum band-average TRP/TIS-FS degradation from before test to after test over 15 phones		NA	NA	NA		dB
		Maximum return-loss degradation to minimum spec (Item B) over 15 phones		NA	NA	NA		dB
		Power rating		NA	NA	NA		W

Table 11: Electrical requirements to the antenna in the WCDMA/TD-SCDMA band(s). Refer to Table 1 for definition of the modes of the phone.

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Item	Requirement + platform	Parameter	LTE2(25)	LTE4	LTE5(26)	LTE7	LTE12	LTE13	LTE17	LTE66	LTE71	Unit	
A	NA	Tx frequency range	1850-1915	1710-1755	814-849	2620-2690	703-748	703-748	703-748	880-915	703-748	MHz	
		Rx frequency range	1930-1995	2110-2155	859-894	2620-2690	758-803	758-803	758-803	925-960	758-803	MHz	
		Nominal impedance	50	50	50	50	50	50	50	50	50	Ohm	
Passive performance													
B	Minimum acceptable performance of Cabled Reference Phone	S11 (Tx/Rx) - Primary Mode, FS, TP, TP+hand	≤ -6 / -4	≤ -6 / -4	≤ -6 / -4	≤ -6 / -4	≤ -6 / -4	≤ -6 / -4	≤ -6 / -4	≤ -6 / -4	≤ -6 / -4	dB	
		S11(Tx/Rx) - Secondary mode, FS, TP, TP+hand	NA	NA	NA	NA	NA	NA	NA	NA	NA	dB	
		Isolation – SEE Table			-	-	-	-	-	-	-	-	
OTA performance - PRIMARY MODE													
C	Minimum acceptable performance of Active Golden Phone	TRP FS (worst channel – low, mid, high) /Avg.	≥17/18	≥17/18	≥16/18	≥15/17	≥15/17	≥15/17	≥15/17	NA	≥15/17	dBm	
		TRP TP (worst channel – low, mid, high) /Avg.	NA	NA	NA	NA	NA	NA	NA	NA	NA	dBm	
		TRP TP + Hand (worst channel – low, mid, high) /Avg.	≥12/13	≥12/13	≥11/13	≥8,5/10	≥8/10	≥8/10	≥8/10	≥8/10	≥11/13	≥8/10	dBm
		TRP Browse Mode (worst channel – low, mid, high) /Avg.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	dBm
		TIS FS (worst channel – low, mid, high) /Avg.	≤-91/-93	≤-91/-93	≤-94/-95	≤-89/-91	≤-90/-92	≤-90/-92	≤-90/-92	≤-90/-92	≤-94/-95	≤-90/-92	dBm
		TIS TP (worst channel – low, mid, high) /Avg.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	dBm
		TIS TP + Hand (worst channel – low, mid, high) /Avg.	≤-86/-88	≤-86/-88	≤-88/-89.5	≤-83/-85	≤-83/-85	≤-83/-85	≤-83/-85	≤-83/-85	≤-88/-89.5	≤-83/-85	dBm
TIS Browse Mode (worst channel – low, mid, high) /Avg.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	dBm		
OTA performance - SECONDARY MODE													
D	Minimum acceptable performance of Active Golden Phone	TRP FS (worst channel – low, mid, high)	NA	NA	NA	NA	NA	NA	NA	NA	NA	dBm	
		TRP TP (worst channel – low, mid, high)	NA	NA	NA	NA	NA	NA	NA	NA	NA	dBm	
		TRP TP + Hand (worst channel – low, mid, high)	NA	NA	NA	NA	NA	NA	NA	NA	NA	dBm	
		TRP Browse Mode (worst channel – low, mid, high)	NA	NA	NA	NA	NA	NA	NA	NA	NA	dBm	
		TIS FS (worst channel – low, mid, high)	NA	NA	NA	NA	NA	NA	NA	NA	NA	dBm	
		TIS TP (worst channel – low, mid, high)	NA	NA	NA	NA	NA	NA	NA	NA	NA	dBm	
		TIS TP + Hand (worst channel – low, mid, high)	NA	NA	NA	NA	NA	NA	NA	NA	NA	dBm	
TIS Browse Mode (worst channel – low, mid, high)	NA	NA	NA	NA	NA	NA	NA	NA	NA	dBm			
Production Variation Requirements – PRIMARY MODE													
E	Minimum acceptable performance of Limit Antenna in Active-/ Cabled Reference Phone	Maximum TRP/TIS-FS degradation relative to minimum spec (Item C)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	dB	
		Maximum TRP/TIS-FS degradation relative to Active Golden Phone	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	dB	
		Maximum FS return-loss degradation relative to minimum spec (Item B)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	dB	
		Maximum TRP-FS increase relative to Active Golden Phone	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	dB	
		Maximum allowable frequency limits relative to Cabled Golden Phone	±15	±15	±15	±7	±7	±7	±7	±7	±7	±7	MHz
Product Validation Requirements – PRIMARY MODE													
F	Build antenna subjected to product validation tests in build Phone	Maximum band-average TRP/TIS-FS degradation to minimum spec (Item C) over 15 phones.	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	dB	
		Maximum band-average TRP/TIS-FS degradation from before test to after test over 15 phones	1	1	1	1	1	1	1	1	1	dB	
		Maximum return-loss degradation to minimum spec (Item B) over 15 phones	0	0	0	0	0	0	0	0	0	dB	
		Power rating	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	W

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Table 12: Electrical requirements to the antenna in the FDD_LTE band(s). Refer to Table 1 for definition of the modes of the phone.

Item	Requirement + platform	Parameter	LTE38	LTE39	LTE40	LTE41	Unit
A	NA	Frequency range	NA	NA	NA	2500-2700	MHz
							MHz
		Nominal impedance	NA	NA	NA	50	Ohm
		Passive performance					
B	Minimum acceptable performance of Cabled Golden Phone	S11 (Tx/Rx) - Primary Mode, FS, TP, TP+hand	NA	NA	NA	≤ -6 / -4	dB
		S11(Tx/Rx) - Secondary mode, FS, TP, TP+hand	NA	NA	NA	NA	dB
		Isolation – SEE Table	-	-	-	-	-
		OTA performance - PRIMARY MODE					
C	Minimum acceptable performance of Active Golden Phone	TRP FS (worst channel – low, mid, high) /Avg.	NA	NA	NA	NA	dBm
		TRP TP (worst channel – low, mid, high) /Avg.	NA	NA	NA	NA	dBm
		TRP TP + Hand (worst channel – low, mid, high) /Avg.	NA	NA	NA	NA	dBm
		TRP Browse Mode (worst channel – low, mid, high) /Avg.	NA	NA	NA	NA	dBm
		TIS FS (worst channel – low, mid, high) /Avg.	NA	NA	NA	NA	dBm
		TIS TP (worst channel – low, mid, high) /Avg.	NA	NA	NA	NA	dBm
		TIS TP + Hand (worst channel – low, mid, high) /Avg.	NA	NA	NA	NA	dBm
		TIS Browse Mode (worst channel – low, mid, high) /Avg.	NA	NA	NA	NA	dBm
		OTA performance - SECONDARY MODE					
D	Minimum acceptable performance of Active Golden Phone	TRP FS (worst channel – low, mid, high)	NA	NA	NA	NA	dBm
		TRP TP (worst channel – low, mid, high)	NA	NA	NA	NA	dBm
		TRP TP + Hand (worst channel – low, mid, high)	NA	NA	NA	NA	dBm
		TRP Browse Mode (worst channel – low, mid, high)	NA	NA	NA	NA	dBm
		TIS FS (worst channel – low, mid, high)	NA	NA	NA	NA	dBm
		TIS TP (worst channel – low, mid, high)	NA	NA	NA	NA	dBm
		TIS TP + Hand (worst channel – low, mid, high)	NA	NA	NA	NA	dBm
		TIS Browse Mode (worst channel – low, mid, high)	NA	NA	NA	NA	dBm
		Production Variation Requirements – PRIMARY MODE					
E	Minimum acceptable performance of Limit Antenna in Active-Cabled Reference Phone	Maximum TRP/TIS-FS degradation relative to minimum spec (Item C)	NA	NA	NA	1.0	dB
		Maximum TRP/TIS-FS degradation relative to Active Golden Phone	NA	NA	NA	1.5	dB
		Maximum FS return-loss degradation relative to minimum spec (Item B)	NA	NA	NA	0.0	dB
		Maximum TRP-FS increase relative to Active Golden Phone	NA	NA	NA	0.5	dB
		Maximum allowable frequency limits relative to Cabled Golden Phone	NA	NA	NA	±15	MHz
		Product Validation Requirements – PRIMARY MODE					
F	Build antenna subjected to product validation tests in build Phone	Maximum band-average TRP/TIS-FS degradation to minimum spec (Item C) over 15 phones.	NA	NA	NA	0.5	dB
		Maximum band-average TRP/TIS-FS degradation from before test to after test over 15 phones	NA	NA	NA	1	dB
		Maximum return-loss degradation to minimum spec (Item B) over 15 phones	NA	NA	NA	0	dB
		Power rating	NA	NA	NA	2.0	W

Table 13: Electrical requirements to the antenna in the TDD_LTE band(s). Refer to Table 1 for definition of the modes of the phone.

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4.2 Deltas to section 5.2 in Generic Antenna Specification

The electrical requirements for the antennas covering the non-cellular bands are stated in 14.

Item	Requirement + platform	Parameter	GPS	BT	WLAN	Unit
A	N/A	Performance benchmark	N/A	N/A	N/A	-
		Frequency range	1575MHz	2400-2480	2400-2480	MHz
		Nominal impedance	50	50	50	Ohm
		Passive performance				
B	Minimum acceptable performance of Cabled Golden Phone	S11 - Primary Mode, FS, TP, TP+hand	≤-6	≤-6	≤-6	dB
		S11 - Secondary mode, FS, TP, TP+hand	N/A	N/A	N/A	dB
		Isolation – SEE Table	-	-	-	-
		OTA performance - PRIMARY MODE				
C	Minimum acceptable performance of Active Golden Phone	TRP FS (worst channel – low, mid, high)	N/A	N/A	N/A	dBref / dBm *
		TRP TP (worst channel – low, mid, high)	N/A	N/A	N/A	dBref / dBm *
		TRP TP + Hand (worst channel – low, mid, high)	N/A	N/A	N/A	dBref / dBm *
		TRP Browse Mode (worst channel – low, mid, high)	N/A	N/A	N/A	dBref / dBm *
		TIS FS (worst channel – low, mid, high)	N/A	N/A	N/A	dBref / dBm *
		TIS TP (worst channel – low, mid, high)	N/A	N/A	N/A	dBref / dBm *
		TIS TP + Hand (worst channel – low, mid, high)	N/A	N/A	N/A	dBref / dBm *
		TIS Browse Mode (worst channel – low, mid, high)	N/A	N/A	N/A	dBref / dBm *
		OTA performance - SECONDARY MODE				
D	Minimum acceptable performance of Active Golden Phone	TRP FS (worst channel – low, mid, high)	N/A	N/A	N/A	dBref / dBm *
		TRP TP (worst channel – low, mid, high)	N/A	N/A	N/A	dBref / dBm *
		TRP TP + Hand (worst channel – low, mid, high)	N/A	N/A	N/A	dBref / dBm *
		TRP Browse Mode (worst channel – low, mid, high)	N/A	N/A	N/A	dBref / dBm *
		TIS FS (worst channel – low, mid, high)	N/A	N/A	N/A	dBref / dBm *
		TIS TP (worst channel – low, mid, high)	N/A	N/A	N/A	dBref / dBm *
		TIS TP + Hand (worst channel – low, mid, high)	N/A	N/A	N/A	dBref / dBm *
		TIS Browse Mode (worst channel – low, mid, high)	N/A	N/A	N/A	dBref / dBm *
		Production Variation Requirements – PRIMARY MODE	N/A	N/A	N/A	
E	Minimum acceptable performance of Limit Antenna in Active-/Cabled Reference Phone	Maximum TRP/TIS-FS degradation relative to minimum spec (Item C)	N/A	N/A	N/A	dB
		Maximum TRP/TIS-FS degradation relative to Active Golden Phone	N/A	N/A	N/A	dB
		Maximum FS return-loss degradation relative to minimum spec (Item B)	N/A	N/A	N/A	dB
		Maximum TRP-FS increase relative to Active Golden Phone	-	N/A	N/A	dB
		Maximum allowable limits relative to Cabled Golden Phone	N/A	N/A	N/A	MHz
		Product Validation Requirements – PRIMARY MODE				
F	Build antenna subjected to product validation tests in build Phone	Maximum band-average TRP/TIS-FS degradation to minimum spec (Item C) over 15 phones.	N/A	N/A	N/A	dB
		Maximum band-average TRP/TIS-FS degradation from before test to after test over 15 phones	N/A	N/A	N/A	dB
		Maximum return-loss degradation to minimum spec (Item B) over 15 phones	N/A	N/A	N/A	dB
		Power rating	N/A	N/A	N/A	W

Table 14: Electrical requirements for the antennas covering the non-cellular bands. *dBref / dBm: For all phones with a reference phone defined in the first row of the table, the requirement is dBref. For all phones without a reference phone defined, the requirement is dBm. Refer to Table 1 for definition of the modes of the phone.

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A \ B	GSM	WCDMA	LTE	Div1	BT/wifi
GSM					
WCDMA					
LTE					
Div.1					
BT/wifi					

Table 15: 50ohm isolation in dB between band A and band B. How to read: <[isolation in band A]/[isolation in band B]/[isolation outside bands]>. Only applicable for protocols specified in Table 10,11,12,13 and 14.

4.3 Other deltas to section 5 in Generic Antenna Specification.

Band	TX [MHz]	RX [MHz]	Frequency shift	TRP [dBm]	TIS [dBm]
GSM850	824-849	869-894	$f_0 - \Delta f \leq \text{Resonance frequency} \leq f_0 + \Delta f$	+/- 0.5	+/-0.5

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GSM900	880-915	925-960	$f_0 - \Delta f \leq \text{Resonance frequency} \leq f_0 + \Delta f$	+/- 0.5	+/-0.5
GSM1800	1710-1785	1805-1880	$f_0 - \Delta f \leq \text{Resonance frequency} \leq f_0 + \Delta f$	+/- 0.5	+/-0.5
GSM 1900	1850-1910	1930-1990	$f_0 - \Delta f \leq \text{Resonance frequency} \leq f_0 + \Delta f$	+/- 0.5	+/-0.5
WCDMA II	1850-1910	1930-1990	$f_0 - \Delta f \leq \text{Resonance frequency} \leq f_0 + \Delta f$	+/- 0.5	+/-0.5
WCDMA IV	1710-1755	2110-2155	$f_0 - \Delta f \leq \text{Resonance frequency} \leq f_0 + \Delta f$	+/- 0.5	+/-0.5
WCDMA V	824-849	869-894	$f_0 - \Delta f \leq \text{Resonance frequency} \leq f_0 + \Delta f$	+/- 0.5	+/-0.5
LTE B2	1850-1910	1930-1990	$f_0 - \Delta f \leq \text{Resonance frequency} \leq f_0 + \Delta f$	+/- 0.5	+/-0.5
LTE B4	1710-1755	2110-2155	$f_0 - \Delta f \leq \text{Resonance frequency} \leq f_0 + \Delta f$	+/- 0.5	+/-0.5
LTE B5	824-849	869-894	$f_0 - \Delta f \leq \text{Resonance frequency} \leq f_0 + \Delta f$	+/- 0.5	+/-0.5
LTE B7	2500-2570	2620-2690	$f_0 - \Delta f \leq \text{Resonance frequency} \leq f_0 + \Delta f$	+/- 0.5	+/-0.5
LTE B12	699-716	729-746	$f_0 - \Delta f \leq \text{Resonance frequency} \leq f_0 + \Delta f$	+/- 0.5	+/-0.5
LTE B13	777-787	746-756	$f_0 - \Delta f \leq \text{Resonance frequency} \leq f_0 + \Delta f$	+/- 0.5	+/-0.5
LTE B17	704-716	734-746	$f_0 - \Delta f \leq \text{Resonance frequency} \leq f_0 + \Delta f$	+/- 0.5	+/-0.5
LTE B66	1700-1755	2110-2165	$f_0 - \Delta f \leq \text{Resonance frequency} \leq f_0 + \Delta f$	+/- 0.5	+/-0.5
LTE B71	600-626	676-700	$f_0 - \Delta f \leq \text{Resonance frequency} \leq f_0 + \Delta f$	+/- 0.5	+/-0.5
LTE 25	1850-1915	1930-1995	$f_0 - \Delta f \leq \text{Resonance frequency} \leq f_0 + \Delta f$	+/- 0.5	+/-0.5
LTE 26	814-849	859-894	$f_0 - \Delta f \leq \text{Resonance frequency} \leq f_0 + \Delta f$	+/- 0.5	+/-0.5
LTE B41	2300-2400		$f_0 - \Delta f \leq \text{Resonance frequency} \leq f_0 + \Delta f$	+/- 0.5	+/-0.5
GPS	1575		$f_0 - \Delta f \leq \text{Resonance frequency} \leq f_0 + \Delta f$	+/- 0.5	+/-0.5
BT	2400-2484		$f_0 - \Delta f \leq \text{Resonance frequency} \leq f_0 + \Delta f$	+/- 0.5	+/-0.5
Wi-Fi 2.4G	2400-2484		$f_0 - \Delta f \leq \text{Resonance frequency} \leq f_0 + \Delta f$	+/- 0.5	+/-0.5
Wi-Fi 5G	N/A		N/A	N/A	N/A

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Table16: TA XXXX antennas frequency band definition

Electric – Requirement and Measurement	
Parameter	Spec.
VSWR	<3:1
Return Loss	<-6dB
Peak Gain	LTE 71 : -7.5dBi LTE 12, 17 : -4.06 dBi LTE 13 : -3.11 dBi LTE B5, LTE26, GSM 850, WCDMA V : -2.41 dBi GSM 900 : -3.17 dBi GSM 1800, WCDMA IV, LTE 4, 66 : -2.5 dBi GSM 1900, WCDMA II, LTE B2, LTE B25 : -2.57 dBi LTE 7, 41 : -2.1 dBi WIFI/BT: -2.5dBi GPS: -1.77dBi
Efficiency	LTE 71 : 17.78% LTE 12, 17 : 39.81% LTE 13 : 48.98% LTE B5, GSM 850, WCDMA V : 57.54% GSM 900 : 47.86% GSM 1800, WCDMA IV, LTE 4, 66 : 56.23% GSM 1900, WCDMA II, LTE B2, : 54.95% LTE 7, 41 : 61.66% WIFI/BT:52.24% GPS:66.5%
Isolation	<-13dB
Radiation Pattern	Omni-directional

Table17: TA-1420 antenna Requirement and measurement

Main Antenna 2D Drawing

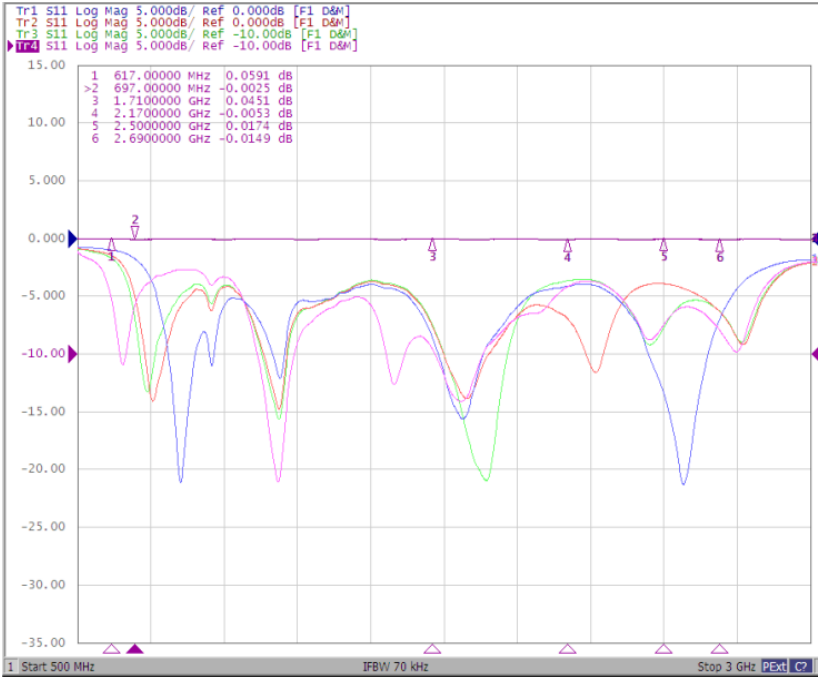
N/A

Diversity antenna 2D drawing

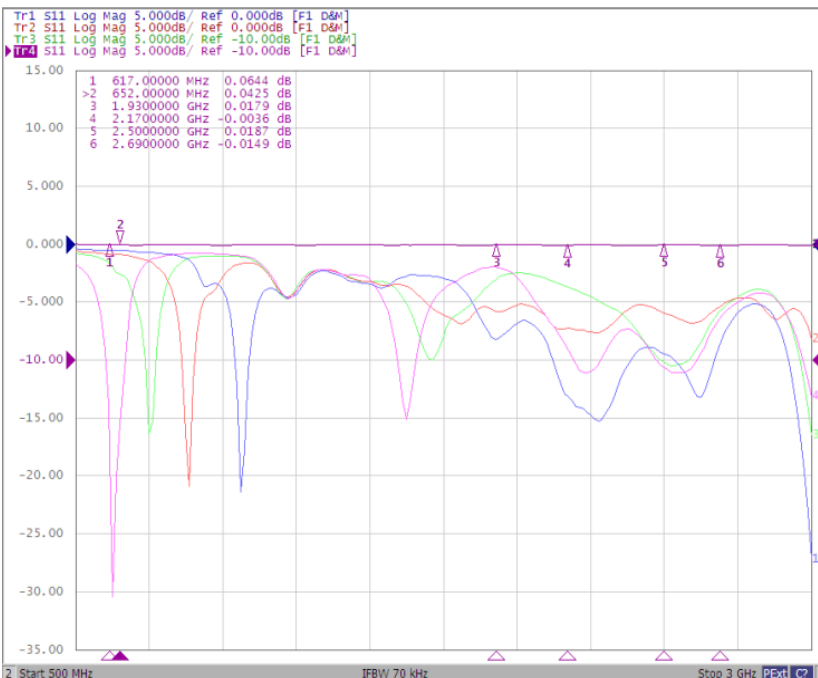
N/A

Main Antenna Return Loss

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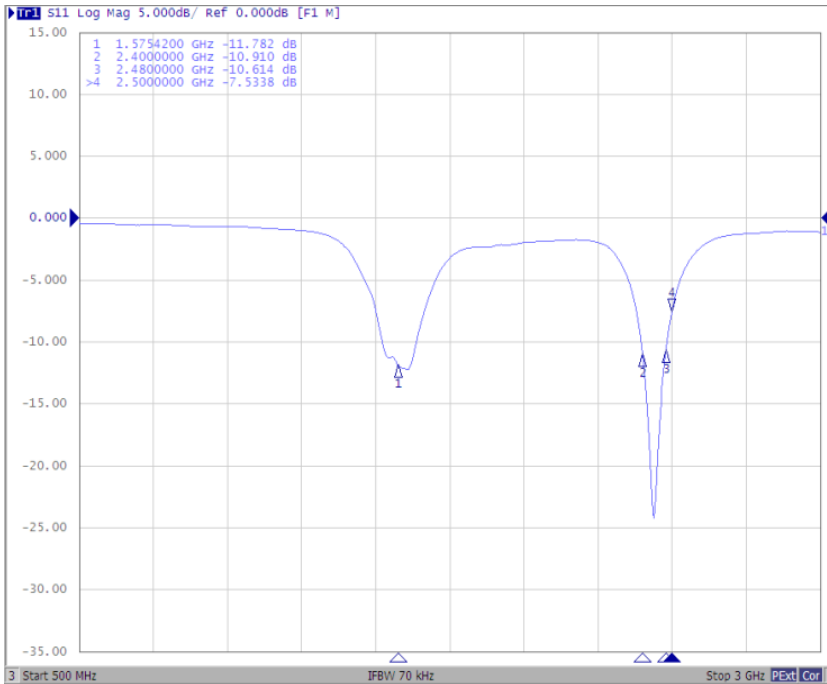


Diversity antenna Return loss



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GPS/WLAN combo Antenna_3D Radiation patterns



5. R&D TEST SPECIFICATION

The generic part of this section is available in section 6 of the Generic Antenna Specification DXX13337-EN.

5.1 Deltas to section 6 in Generic Antenna Specification.

N/A

6. PRODUCTION TEST SPECIFICATION

The generic part of this section is available in section 7 of the Generic Antenna Specification DXX13337-EN.

6.1 Deltas to section 7 in Generic Antenna Specification.

N/A

7. TOOL APPROVAL SET-UP

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The generic part of this section is available in section 8 of the Generic Antenna Specification DXX13337-EN.

7.1 Deltas to section 8 in Generic Antenna Specification.

N/A

8. APPENDIX: PRODUCTION SET-UP DETAILS

The generic part of this section is available in appendix 9 of the Generic Antenna Specification DXX13337-EN.

8.1 Deltas to appendix 9 in Generic Antenna Specification.

N/A

9. APPENDIX: REQUIREMENTS TO COPY-SOURCE ANTENNAS

The generic part of this section is available in appendix 10 of the Generic Antenna Specification DXX13337-EN.

9.1 Deltas to appendix 10 in Generic Antenna Specification.

N/A

10. APPENDIX: LIST OF REFERENCES

The generic part of this section is available in appendix 11 of the Generic Antenna Specification DXX13337-EN.

10.1 Deltas to appendix 11 in Generic Antenna Specification.

DXX13337-EN “Split Antenna Specification – Generic Part”

11. APPENDIX: ACRONYM LIST

The generic part of this section is available in appendix 12 of the Generic Antenna Specification DXX13337-EN.

11.1 Deltas to appendix 12 in Generic Antenna Specification.

Acronym	Explanation
ABS	Absolute value
Avg	Average case across low-mid-high channel in a frequency band. Calculated on linearized values.
BOM	Bill Of Materials
BT	Bluetooth
CEM	Contract Electronics Manufacturer

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CE marked	The initials "CE" do not stand for any specific words but are a declaration by the manufacturer that his product meets the requirements of the applicable European Directive(s).
DVB-H	Digital Video Broadcast - Handheld
E-JRD	Extended Joint R&D
EiRP	Effective isotropic Radiated Power
EiRS	Effective isotropic Radiated Sensitivity
EMF	Electromagnetic Fields
ESD	Electro Static Discharge
FM	Frequency Modulation
FPC	Flexible Printed Circuit
FS	Free space
GPS	Global Positioning System
GR&R	Gauge Reproducibility and Repeatability
GSM	Global System for Mobile Communications
HAC	Hearing Aid Compatibility
JRD	Joint R&D
MDF	Material Data Form
MSM	Mechanics Sourcing Manager
NDA	Non Disclosure Agreement
OTA	Over The Air
PD	Product Development milestone
PPP	Pick and Place Pads
RF	Radio Frequency
SAR	Specific Absorption Rate
SPC	Statistical Process Control
TIS	Total Isotropic Sensitivity
TP	Talk position
TP+H	Task position + hand
TRP	Total Radiated Power
TRS	Total Radiated Sensitivity
UMTS	Universal Mobile Telecommunications System
WC	Worst case across low-mid-high channel in a frequency band.
WiMax	Worldwide Interoperability for Microwave Access
WLAN	Wireless LAN