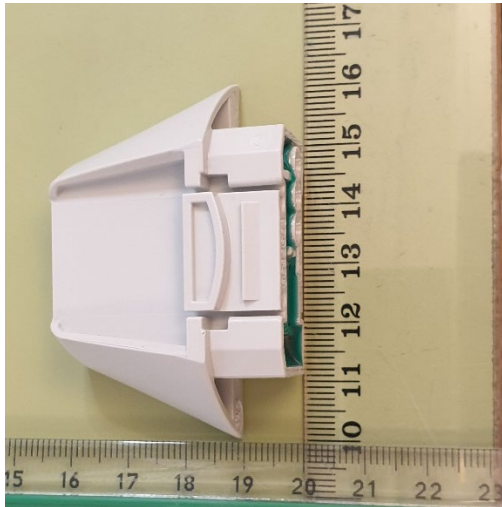


AUT report for NB-IoT & SRD operation of Kamstrup ClickOn antenna			
Tested by	kamstrup A/S		
Address	Industrivej 28, Stilling dk-8660 Skanderborg		
Contact	TEL: +45 89 93 10 00 FAX: +45 89 93 10 01 E-MAIL: kamstrup@kamstrup.dk WEB: www.kamstrup.com		
Test specification	CTIA		
Device under test			
Antenna type	monopole		
Reference	6699663		
Use	The antenna is used with Kamstrup Water Meters KWM2220 and KWM3220 with NB-IoT and SRD radio.		
Test results	Frequency	617 - 960 MHz	1710 - 2200 MHz
	VSWR in free Space	< 4:1	< 5:1
	Antenna efficiency	-4 dB	-5.5 dB
	Max 3D Gain	0 dBi	0 dBi
	# port	1	
	Impedance	50 Ω	
	Polarization	Linear	
	Pattern Azimuth	Omnidirectional	
DC short	Yes		
Test conditions			
Temperature	20 - 22 °C / 68 - 72 °F		
Date	2023.08.23		
Test by	Kamstrup A/S		
Report			
Date	2023.10.25		
Report by	Kamstrup A/S		

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1 Equipment under test

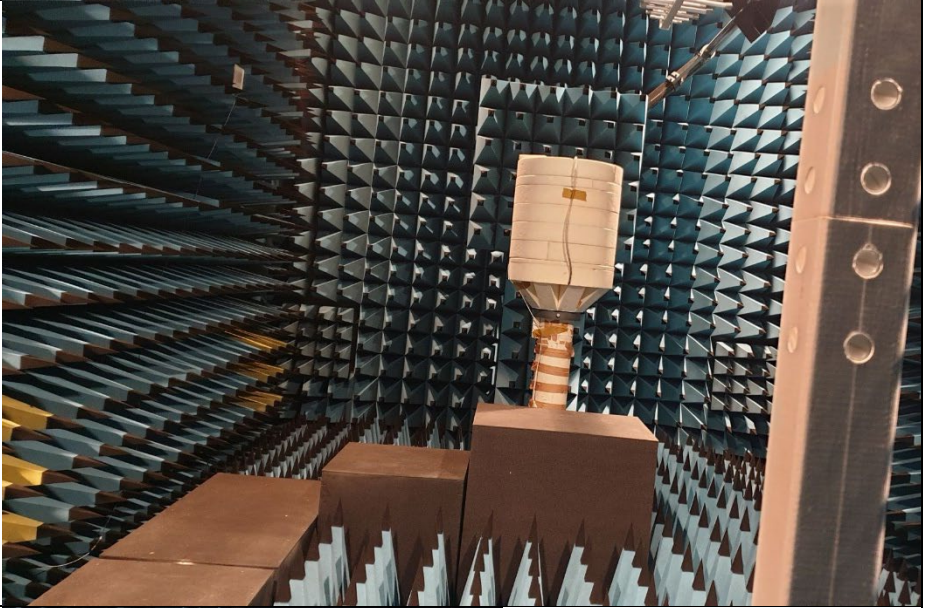
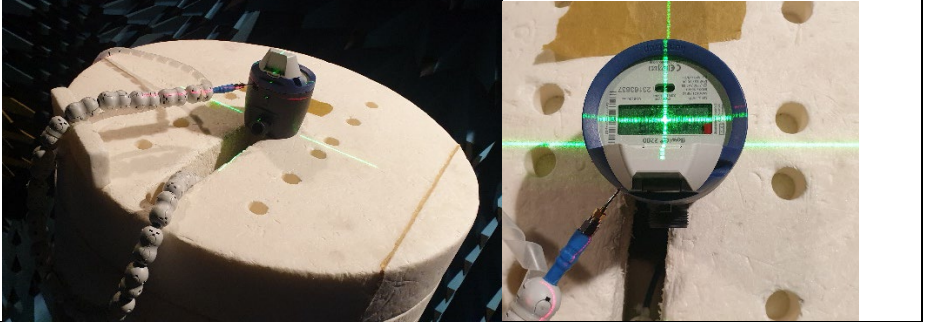
Description	Proprietary ClickOn antenna designed specifically for Kamstrup KWM series water meters
Electric specification	
Frequency range:	617 - 960 MHz, 1710 - 2200 MHz
Impedance:	50 Ohm
VSWR:	5:1
Gain:	0 dBi
Radiation	Omnidirectional
Polarization	Linear
Mechanical specification	
Connector	Proprietary
Material	
Antenna elements	Metal
Dielectric	Poly Carbonate
Temperature	
Operational	-20 °C - 55 °C / -4 °F - 131°F
Storage	-20 °C - 55 °C / -4 °F - 131°F
Design	
Antenna information used for conformity with limits	

2 Support Equipment

Housing	KWM 2220-meter
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3 Test setup

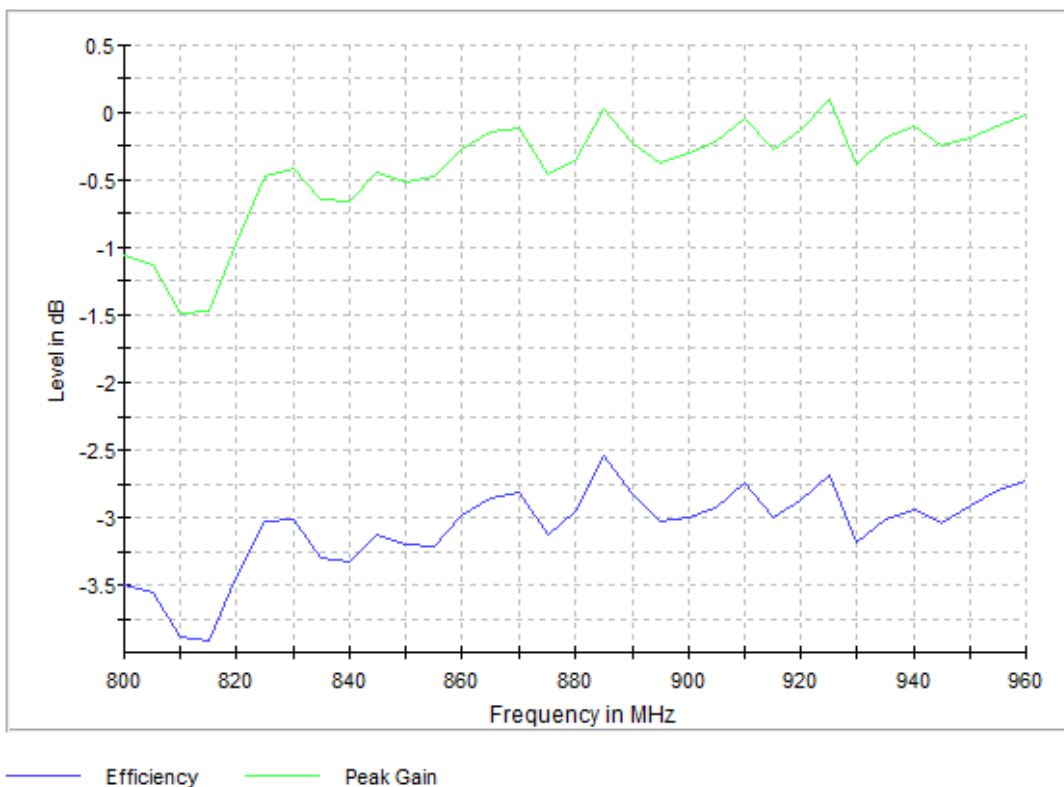
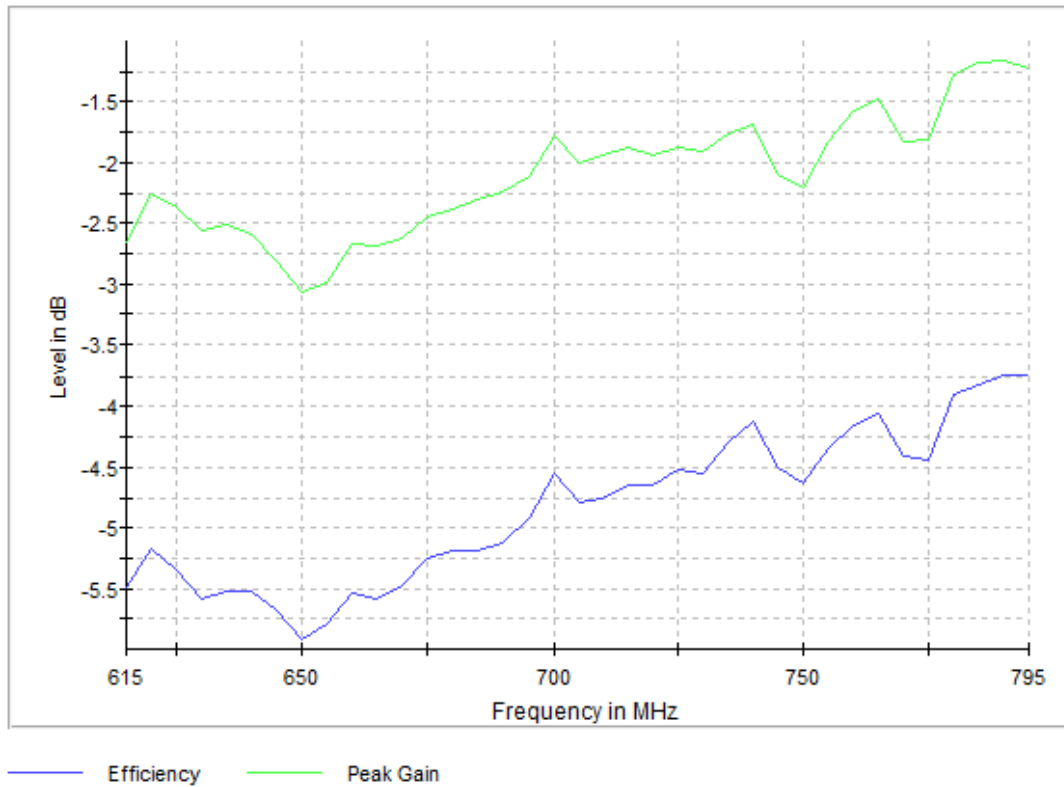
Method	Full 3D antenna measurements in the anechoic chamber
Chamber certification	Shielding Efficiency: EN 50147-1
Site/equipment information:	
Test Chamber	Antenna Chamber AC, Albatross Projects 003-008-017/14E

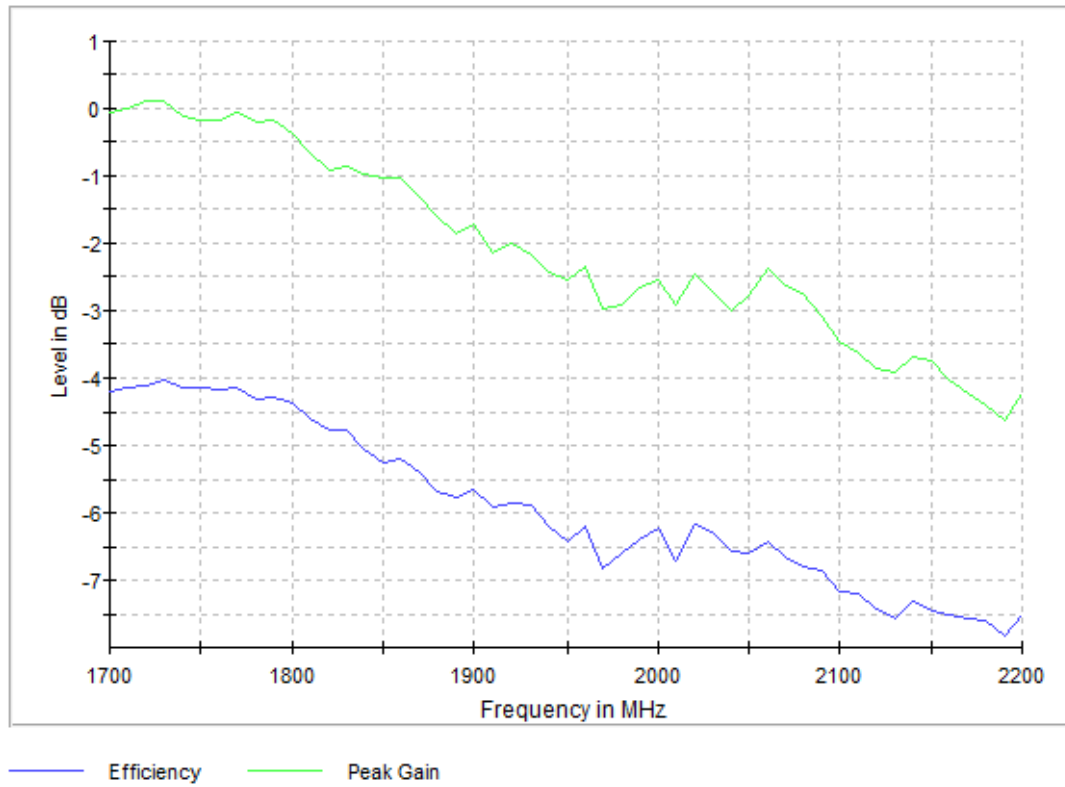
Test Equipment:	
Network analyzer	Rohde & Schwarz, ZVL6
Antenna	The Howland Company, QR-3A
Theta Axis Boom	Maturo
Phi Axis Turntable	Maturo
Antenna/equipment calibration status:	
ZVL6:	Calibrated 2023-01-27, by Rohde & Schwarz Certificate number 0001-300683390
Antenna	Verified on 2023-02-13 by Kamstrup technical personnel
Boom	Verified on 2023-02-13 by Kamstrup technical personnel
Turntable	Verified on 2023-02-13 by Kamstrup technical personnel
Full system	Verified on 2023-02-13 by Kamstrup technical personnel
Test software	AMS32 antenna test suit from Rohde & Schwarz
Test setup	
Anechoic chamber	
Antenna Placement	
Additional equipment	The antenna was mounted on a KWM meter, where the signal to the antenna was fed through a coaxial cable.

4 Results

4.1 Source of antenna gain information

The antenna gain was characterized with 3D measurements performed with the system and methods described in section above.

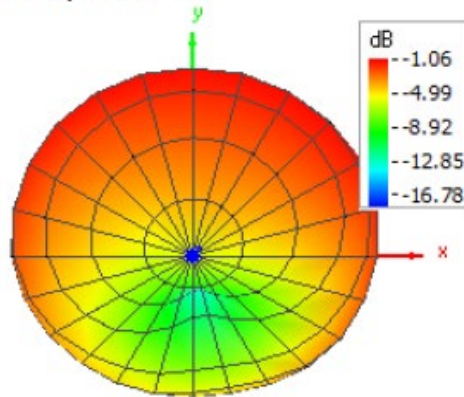




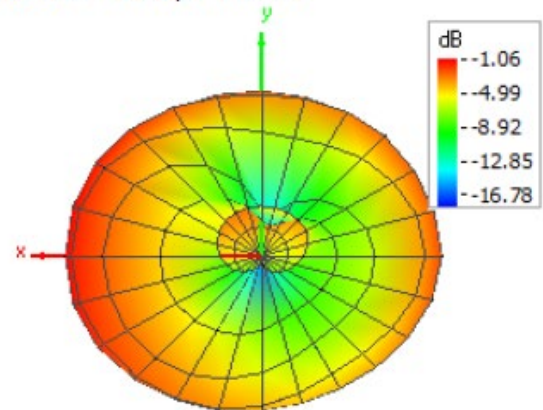
4.2 Max gain, polarization, θ , ϕ and radiation plots for max gain plane

4.2.1 Radiation plots at 800 MHz

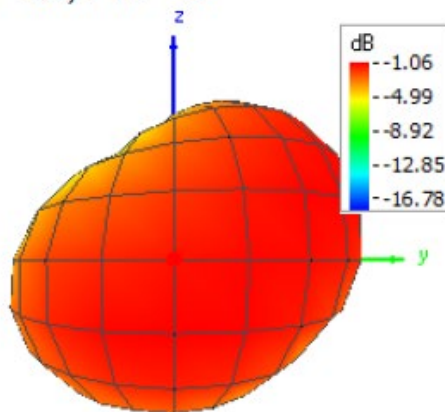
Theta = 0, Phi = 0



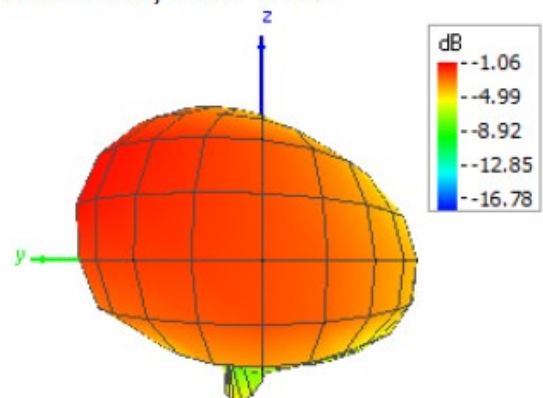
Theta = 180, Phi = 0



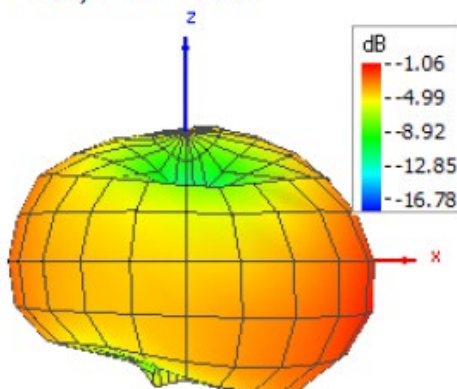
Theta = 90, Phi = 0



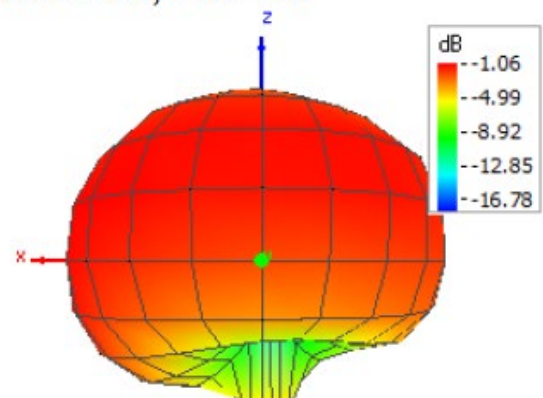
Theta = 90, Phi = 180



Theta = 90, Phi = 270

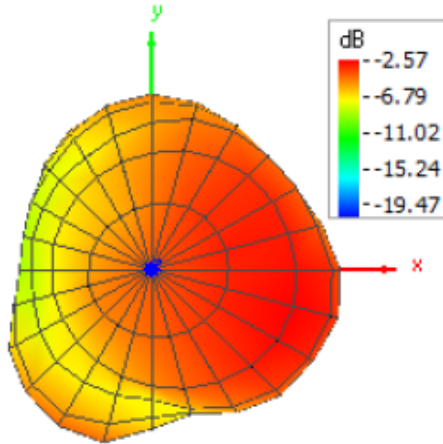


Theta = 90, Phi = 90

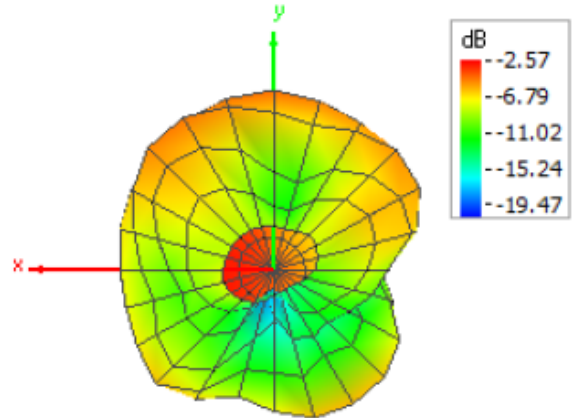


4.2.2 Radiation plots at 1950 MHz

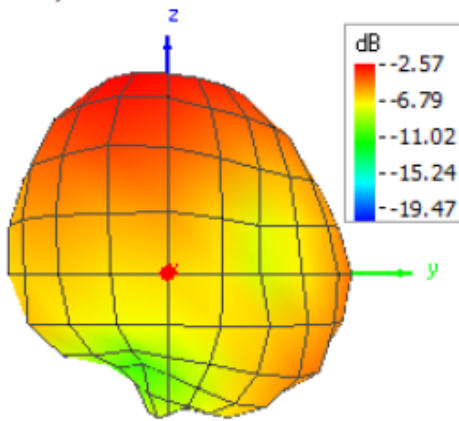
Theta = 0, Phi = 0



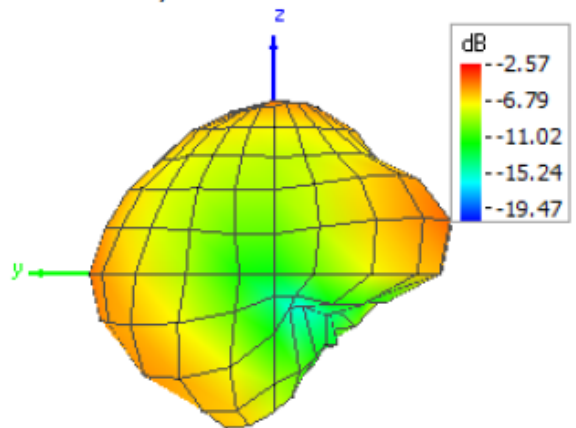
Theta = 180, Phi = 0



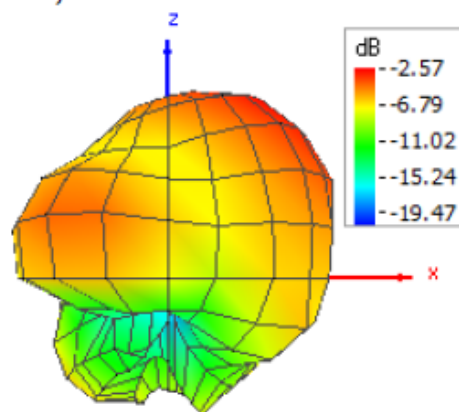
Theta = 90, Phi = 0



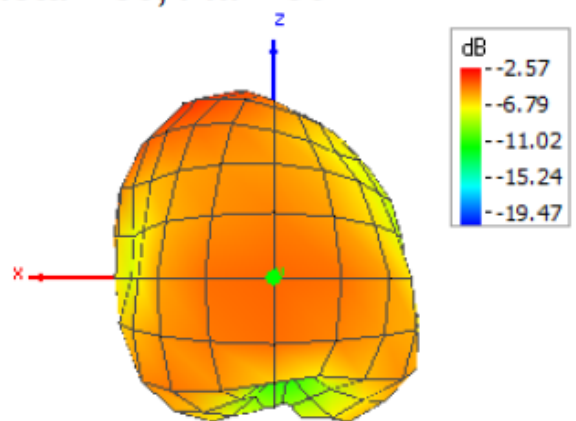
Theta = 90, Phi = 180



Theta = 90, Phi = 270



Theta = 90, Phi = 90



5 Signature

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