


AUT report for SDR operation of Kamstrup helix antenna
As per "35-Part-15-Antenna-Updates-TCB_Oct_2022.pdf"

Tested by	kamstrup a/s			
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Test specification	EN/IEC 61000-4-3 (M-CDC)			
Device under test				
Antenna type	Helix			
Reference	30261216			
Use	The antenna is used with Kamstrup meters KWM2220 and KWM3220 both approved under FCC id OUY-KWMX220.			
Test results	Frequency	902 MHz	915 MHz	928 MHz
	Peak Gain	-2 dBi	-2 dBi	-3 dBi
	Total efficiency	-4 dB	-5 dB	-5 dB
	Directivity	2 dBi	2 dBi	2 dBi
Test conditions				
Temperature	20 oC - 22 oC / 68 oF - 72 oF			
Date	2022.06.30			
Test by	Kamstrup			
Report				
Date	2023.07.12			
Report by	Kamstrup			

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1 Equipment under test

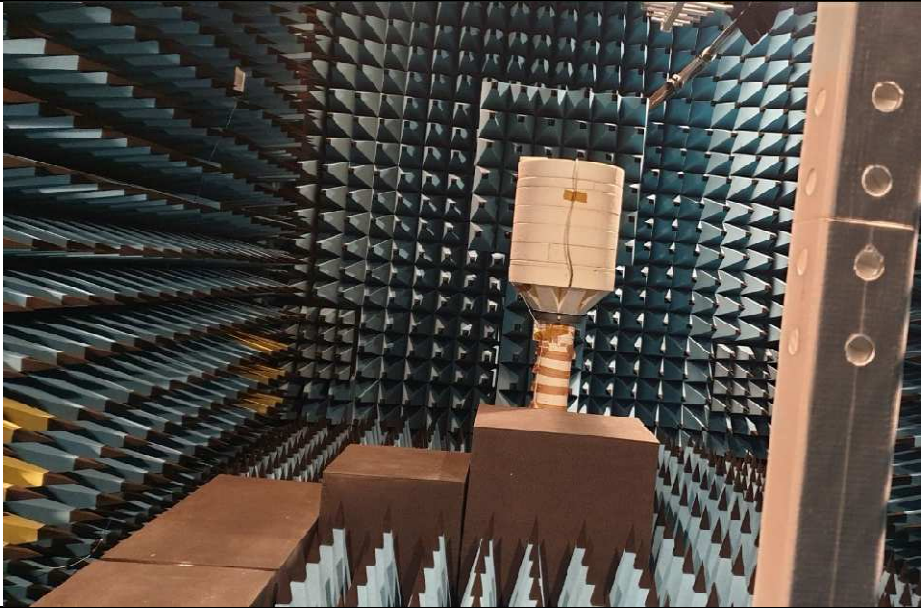

Description	Proprietary helix antenna designed specifically for Kamstrup KWM series water meters
Electric specification	
Frequency range:	902 - 928 MHz
Impedance:	50 Ohm
VSWR:	3:1
Gain:	0 dBi
Radiation	Omnidirectional
Polarization	Linear
Mechanical specification	
Connector	Proprietary
Material	
Helix	Metal
Dielectric	Poly Carbonate
Temperature	
Operational	-20 °C - 55 °C / 32 °F - 131°F
Storage	-20 °C - 55 °C / 68°F - 131°F
Design	
Antenna information used for conformity with limits	<p>Spurious emission measurements were performed with the antenna mounted on the DUT in reports G0M-2211-1783-EF0115B and G0M-2211-1783-TFC247DT.</p> <p>The maximal in-band gain is used for calculations of exposure in report G0M-2211-1783-TFC91MP.</p>

2 Support Equipment

Housing	KWM 2220 meter shell
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3 Test setup

Method	Full 3D antenna measurements in the anechoic chamber
Chamber certification	Shielding Efficiency: EN 50147-1 (M-CDC, AR and AC) Field Uniformity: EN 61000-4-3 (M-CDC) FS-NSA and VSWR: CISPR 16-1-4 (M-CDC)
Site/equipment information:	

Test Chamber	Antenna Chamber AC and Pre-Compliance EMC Chamber M-CDC, AlbatrossProjects 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 2021-08-26, by Rohde & Schwarz Certificate number 1700-00950-039
Antenna	Verified on 2021-08-24 by Kamstrup technical personnel
Boom	Verified on 2021-08-24 by Kamstrup technical personnel
Turntable	Verified on 2021-08-24 by Kamstrup technical personnel
Full system	Verified on 2021-08-24 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.
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4 Results

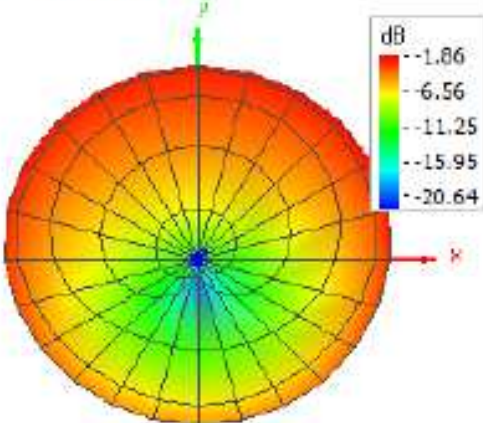
4.1 Source of antenna gain information

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

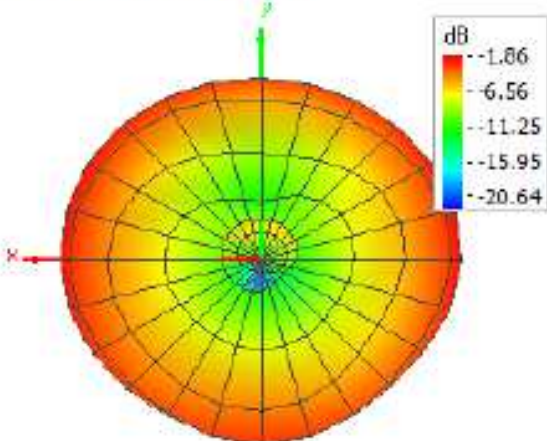
4.2 Max gain, polarization, θ , ϕ and radiation plots for max gain plane

4.2.1 Radiation plots at 902 MHz

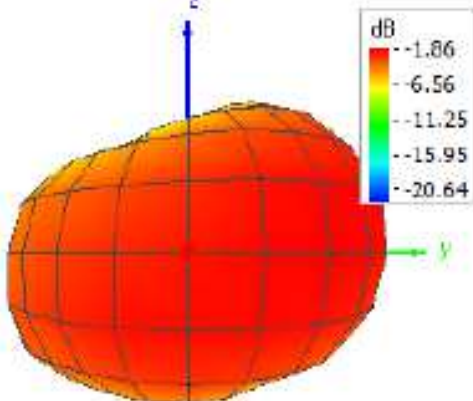
Theta = 0, Phi = 0



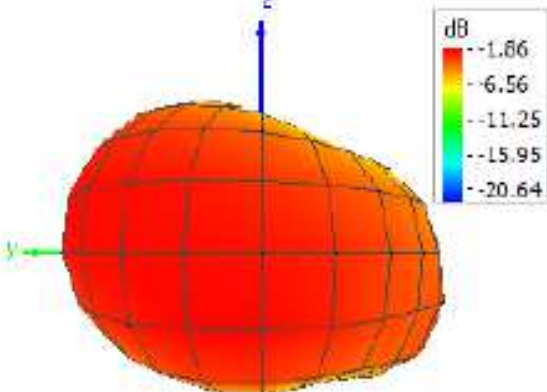
Theta = 180, Phi = 0



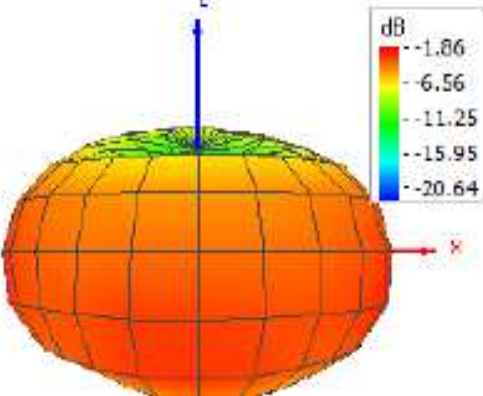
Theta = 90, Phi = 0



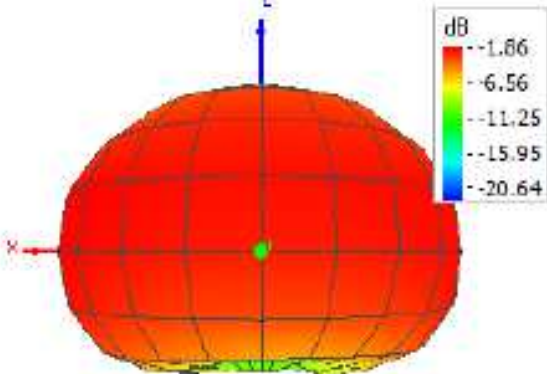
Theta = 90, Phi = 180



Theta = 90, Phi = 270

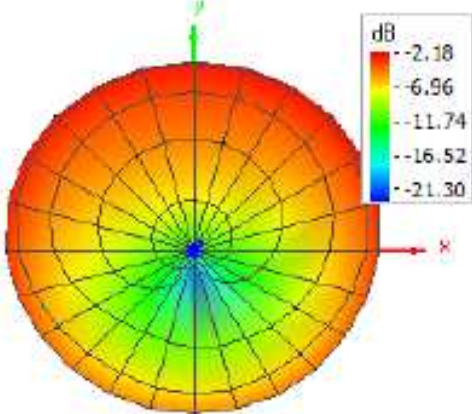


Theta = 90, Phi = 90

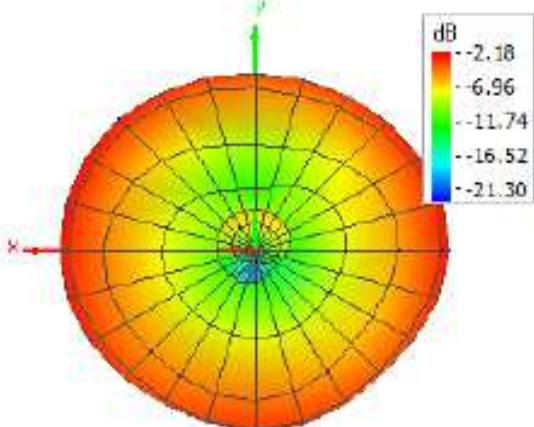


4.2.2 Radiation plots at 915 MHz

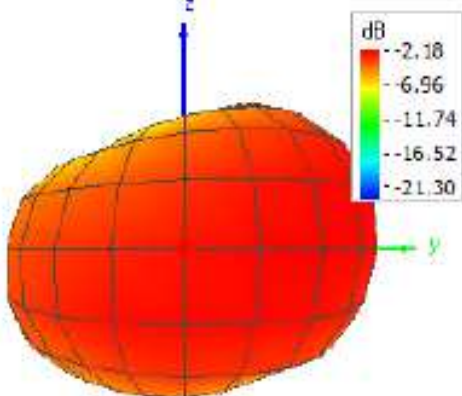
Theta = 0, Phi = 0



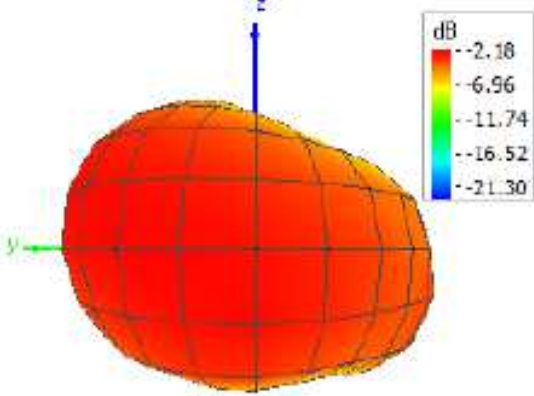
Theta = 180, Phi = 0



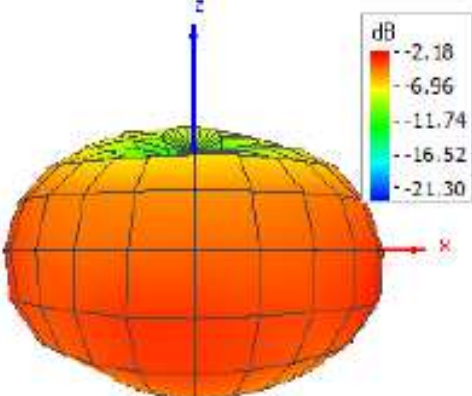
Theta = 90, Phi = 0



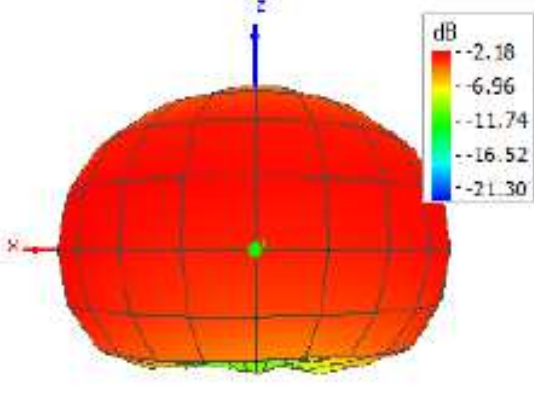
Theta = 90, Phi = 180



Theta = 90, Phi = 270

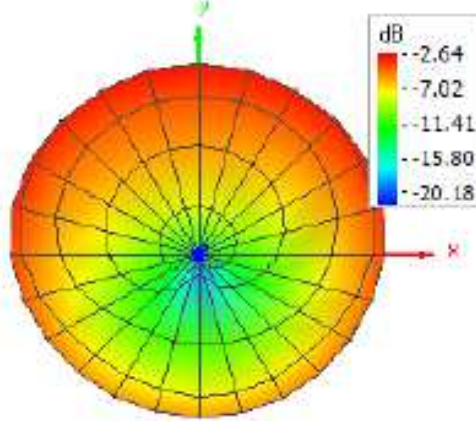


Theta = 90, Phi = 90

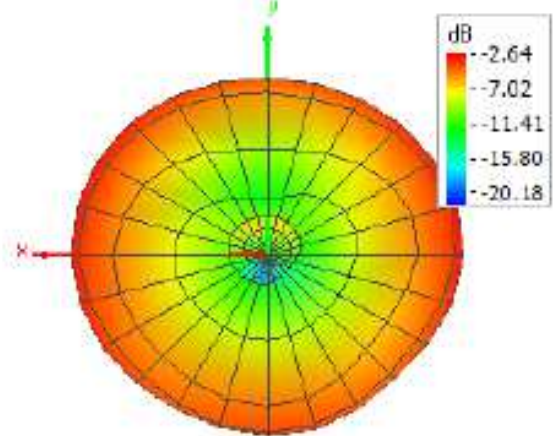


4.2.3 Radiation plots at 928 MHz

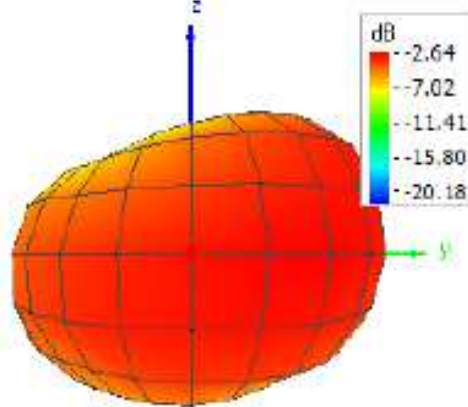
Theta = 0, Phi = 0



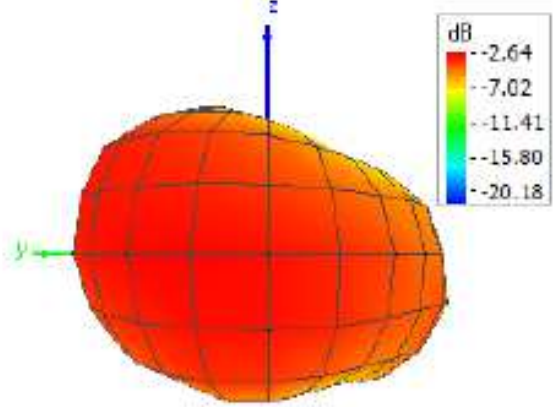
Theta = 180, Phi = 0



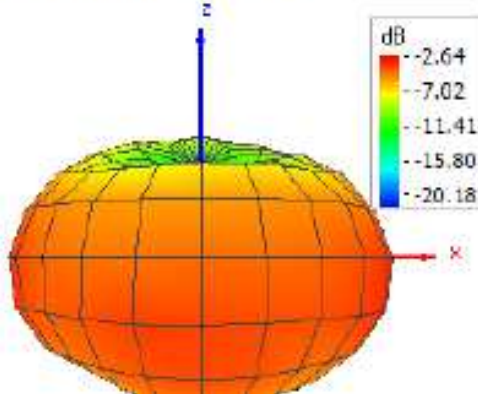
Theta = 90, Phi = 0



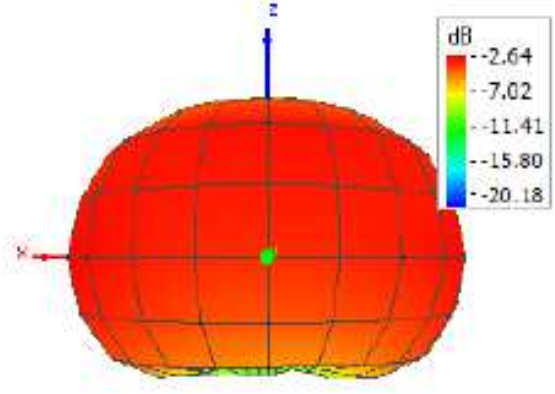
Theta = 90, Phi = 180



Theta = 90, Phi = 270



Theta = 90, Phi = 90



5 Signature

A handwritten signature in black ink, appearing to read 'Frederik S.' with a stylized flourish at the end.

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