AUT report for SDR operation of Kamstrup wall 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	IFA
Reference	6699490 and 699491
Use	The antenna is used with Kamstrup meters KWM2220 and KWM3220 both approved under FCC id OUY-KWMX220.
Test results	

Frequency	902 MHz	914 MHz	928 MHz
Peak Gain	-1 dBi	-1 dBi	-3 dBi
Total efficiency	-5 dB	-4 dB	-5 dB
Directivity	4 dBi	3 dBi	2 dBi

Test conditions	
Temperature	20 oC - 22 oC / 68 oF - 72 oF
Date	2017.01.25
Test by	Kamstrup
Report	
Date	2023.07.12
Report by	Kamstrup

Contents

1 Equipment under test

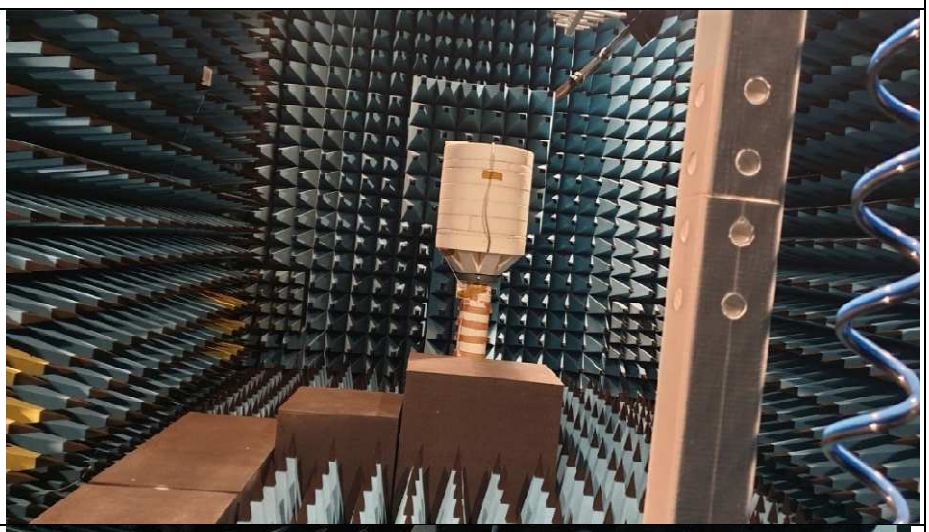
Description	Proprietary antenna for use if the meter is placed inside or near a building with bad coverage. It is designed specifically for Kamstrup KWM series water meters. The antenna comes with either 2- or 20-meter cable. Hence, two references numbers 6699490 and 6699491 refer to this antenna. The test is performed with a shortened cable.
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	
Radiator	Steel
Dielectric	Air and polycarbonate
Temperature	
Operational	-20 ºC - 55 ºC / 32 ºF - 131ºF
Storage	-20 ºC - 55 ºC / 68ºF - 131ºF
Design	
Antenna information used for conformity with limits	Spurious emission measurements were performed with the antenna mounted on the DUT in reports G0M-2211-1783-EF0115B and G0M-2211-1783-TFC247DT. The maximal in-band gain is used for calculations of exposure in report G0M-2211-1783-TFC91MP.

2 Support Equipment

NA	

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:	Received from vendor 01-09-2016
Antenna	Verified on 2016-11-10 by Kamstrup technical personnel
Boom	Verified on 2016-11-10 by Kamstrup technical personnel
Turntable	Verified on 2016-11-10 by Kamstrup technical personnel
Full system	Verified on 2016-11-10 by Kamstrup technical personnel
Test software	AMS32 antenna test suit from Rohde & Schwarz
Test setup	
Anechoic chamber	
Antenna Placement	
Additional equipment	NA
Signal feed	The signal was fed through the coaxial cable.

4 Results

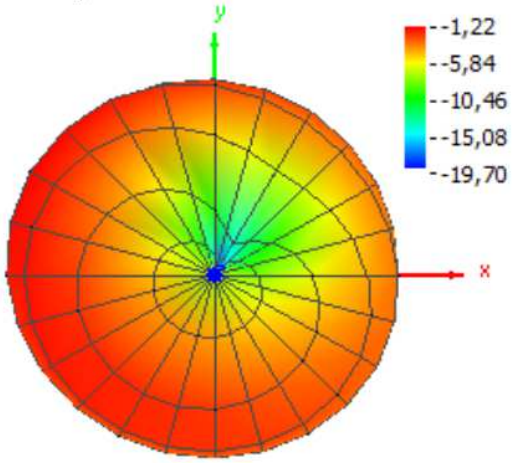
4.1 Source of antenna gain information

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

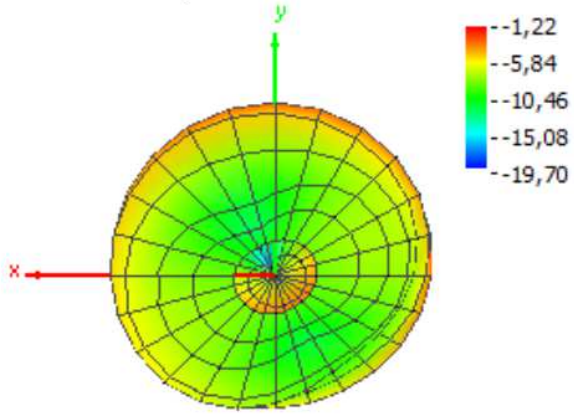
4.2 Max gain, polarization, θ, ϕ and radiation plots for max gain plane

4.2.1 Radiation plots at 902 MHz

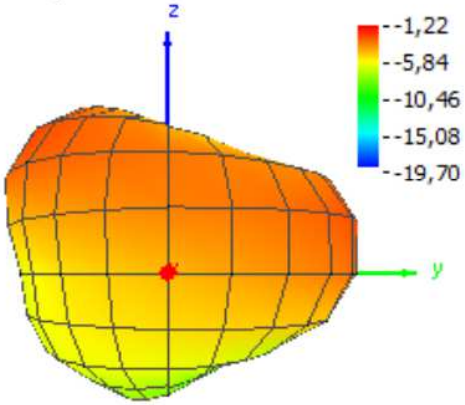
Theta = 0, Phi = 0



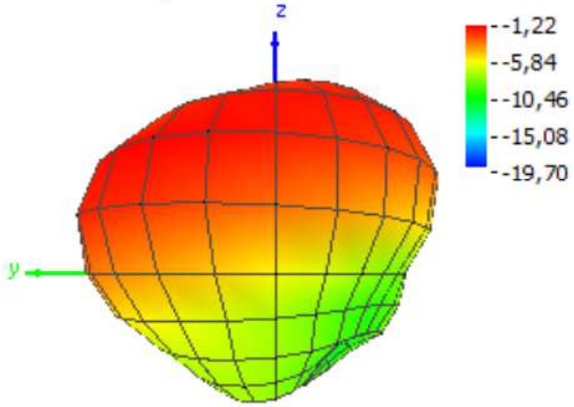
Theta = 180, Phi = 0



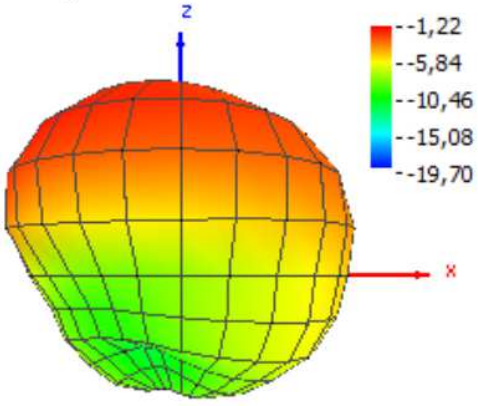
Theta = 90, Phi = 0



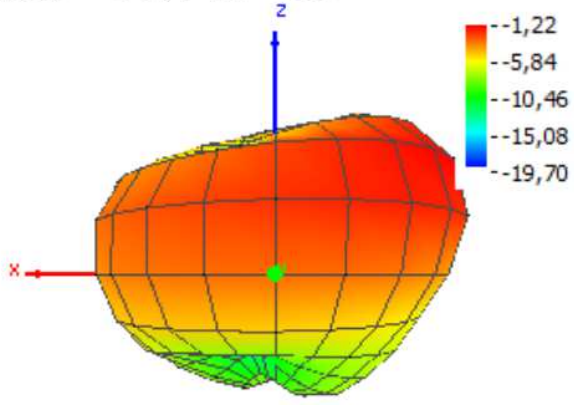
Theta = 90, Phi = 180



Theta = 90, Phi = 270

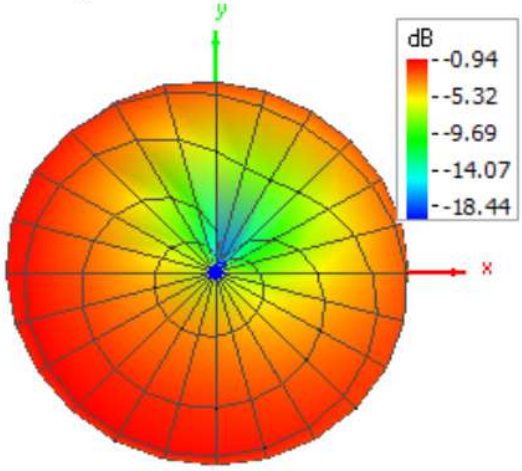


Theta = 90, Phi = 90

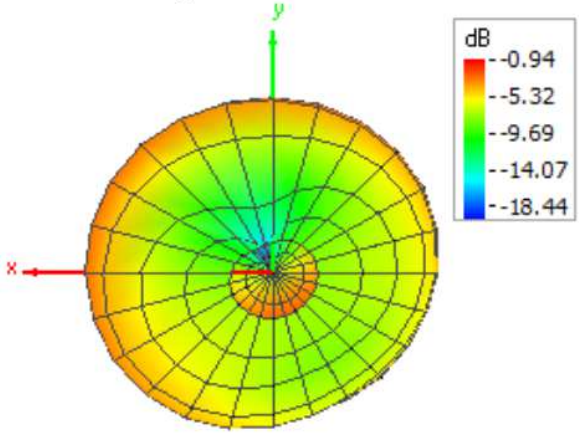


4.2.2 Radiation plots at 914 MHz

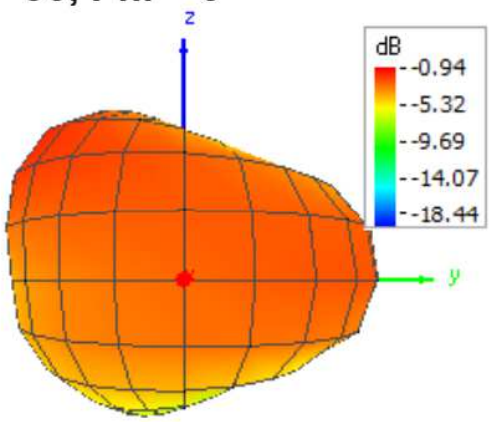
Theta = 0, Phi = 0



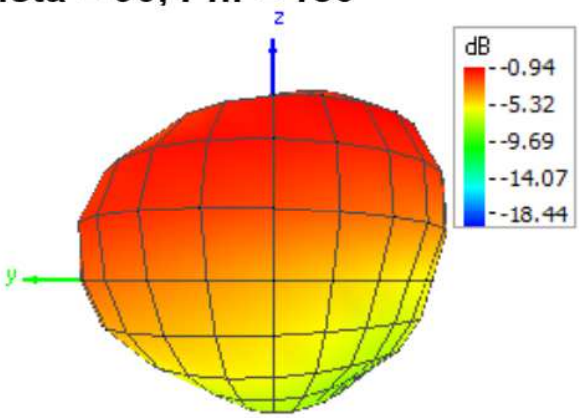
Theta = 180, Phi = 0



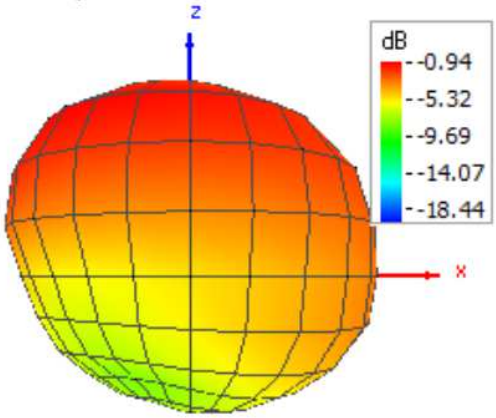
Theta = 90, Phi = 0



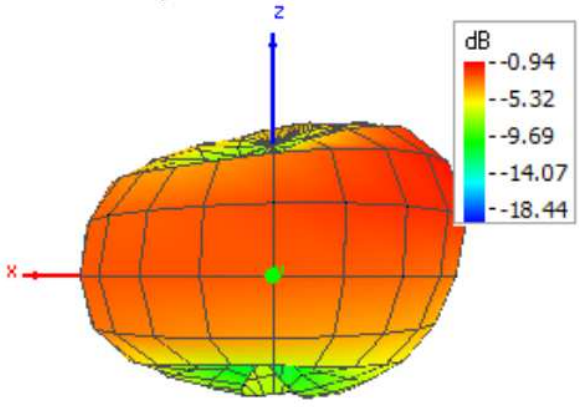
Theta = 90, Phi = 180



Theta = 90, Phi = 270

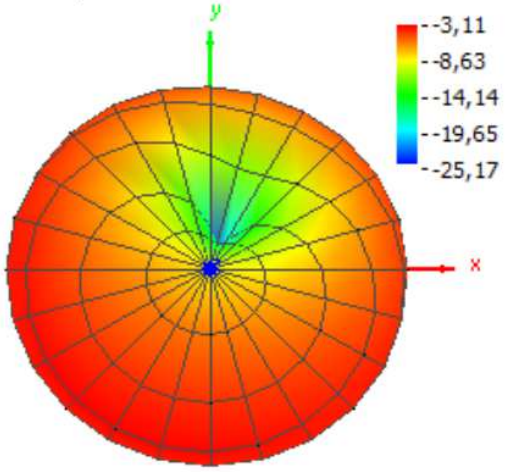


Theta = 90, Phi = 90

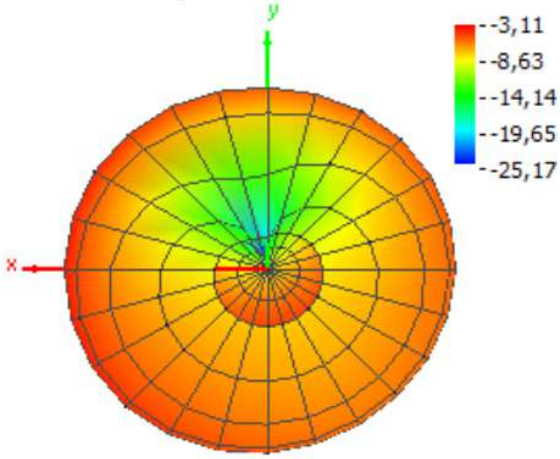


4.2.3 Radiation plots at 928 MHz

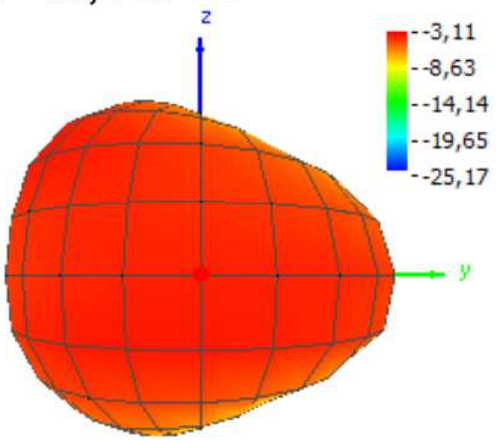
Theta = 0, Phi = 0



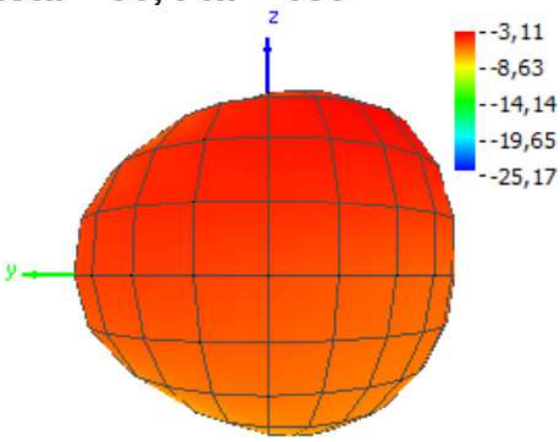
Theta = 180, Phi = 0



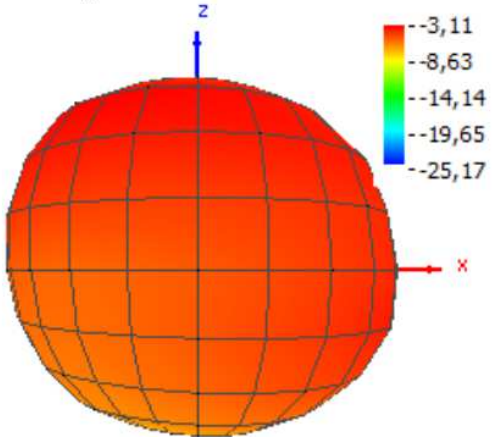
Theta = 90, Phi = 0



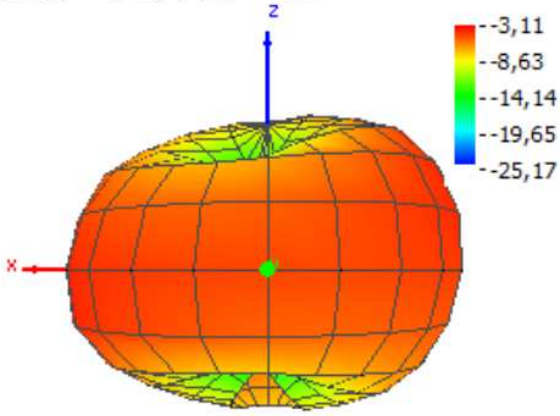
Theta = 90, Phi = 180



Theta = 90, Phi = 270



Theta = 90, Phi = 90



5 Signature

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