On-Body Radio Propagation Channel Characterization at 2.45 GHz and its Exposure Effects on Neurophysiological and Behavioral of Adults

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LIST OF ABBREVIATIONS

.EDF	European Data File
A-Fr	Anterior-Frontal
AIC	Akaike Information Criterion
ANOVA	Analysis of Variance
ANSI	American National Standards Institute
BCWC	Body-centric wireless communication
Be-Cu	Beryllium copper
BMI	Body mass index
BodyLAN	Body Local area network
BPD	Diastolic blood pressure
BPS	Systolic blood pressure
BSI	Brain Symmetry Index
BT	Body temperature
CANTAB	Computer-administered Cambridge Neurophysiological Test Automated Battery
CDF	Cumulative distribution function
CST	Computer Simulation Technology
ECG	Electrocardiography
ECG	Electrocardiography
EEG	Electroencephalogram
EHS	Electromagnetic HyperSensitivity
EM	Electromagnetic

EMF	Electromagnetic fields
FCC	Federal Communications Commission
F-Cn	Fronto-central
FDTD	Finite-difference time-domain
FFT	Fast Fourier transform
FIT	Finite integral technique
fMRI	functional Magnetic Resonance Imaging
fNIRS	functional near-infrared spectroscopy
Fr	Frontal
GND	Ground
GSM	Global System for Mobile Communication
HFP	High frequency power
HR	Hear rate
HSCA	Horn shaped self complementary antenna
ICNIRP	International Commission Non-Ionizing Radiation Protection
IEEE-USA	Institute of Electrical and Electronics Engineers - United States
ISM	Industrial, Scientific, and Medical
ITU-R	International Telecommunication Radio
JNC7	Joint National Committee on Prevention, Detection, EvaluationTreatment of High Blood Pressure
LA	Left ankle
LC	Left chest
LCR	Level crossing rate
LFP	Low-frequency power
LOS	Line-of-Sight

LS	Least squares
LT	Left thigh
LTE-TDD	Long Term Evolution-Time Division Multiplexing
LW	Left waist
MAP	Mean arterial pressure
MEM	Microelectromechanical
MICS	Medical Implanted Communication System
ML	Maximum Likelihood
MRI	Magnetic Resonance Imaging
MRI	Magnetic Resonance Imaging
N	Normal
NLOS	Non-line-of-sight
Oc	Occipital
OW	Overweight
PAL	Paired associated learning
PDP	Power delay profile
PEC	Perfect Electrical Conductor
PICA	Planar inverted cone antenna
PIFA	Planar inverted-F antenna
PNA	Performance Network Analyzer
PP	Pulse pressure
Pr	Parietal
PSD	Power spectral density
PVC	Polyvinyl chloride

RA	Right ankle
RC	Right chest
RF	Radio frequency
RF- EMF	Radio frequency electromagnetic fields
RFID	Radio Frequency Identification
RT	Right thigh
RTI	Reaction time
RUA	Upper right arm
RVP	Rapid virtual processing
RW	Right waist
Rx	Receiving antenna
SA	Spectrum Analyzer
SAR	Specific Absorption Rate
SD	Standard deviation
SE	Standard error
SG	Signal generator
SMA	Subminiature version A
SNR	Signal-to-Noise Ratio
SSM	Scientific Council of Swedish Radiation Safety Authority
SSP	Spatial span
TM	Textile monopole
TMS	Transcranial magnetic simulation
TP	Textile patch
Tp	Temporal

TSA	Tapered slot antennas
Tx	Transmitting antenna
UMTS	Universal Mobile Telecommunications System
UW	Underweight
UWB	Ultra Wideband
VTAM	Clothes for Teleassistance in Medicine Project
WBAN	Wireless body area network
WCDMA	Wide code division multiple access
WEALTHY	European Wearable Healthcare System
WHO	World Health Organizations
WiFi	Wireless Fidelity
WiMAX	Worldwide Interoperability for microwave access
WLAN	Wireless Local Area Network
WMTS	Wireless, Medical Telemetry Services
WPAN	Wireless personal area networks

LIST OF SYMBOLS

c	Speed of light (m/s)
$\bar{E}_r$	Reflected electric field
E_0	Arbitrary amplitude
$\bar{E}_t$	Transmitted electric field
E	Electric field
$\|E\|$	Root means square (rms) value of induced electrical field (V/m)/ absolute EEG spectral power
E_i	*Incident* Electric field
H	Magnetic field
$\bar{H}_r$	Reflected magnetic field
$\bar{H}_t$	Reflected magnetic field
V_r	Reflected voltage wave
V_{in}	Incident voltage wave
k	Wavenumber of a plane wave
η	Wave impedance
d	Distance
d_0	Reference distance
γ	Path loss exponent
ρ	Density of tissue (kg/m^3)
α	Alpha wave/p-value
β	Beta wave

θ	Angle/Pattern in the azimuth plane /theta wave
δ	Delta wave
$tan\delta$	Tangent loss
A	Power
k	Rician k-factor
K	Number approximation parameters in the selected model
m	Nakagami m-factor
M	Mean length
n	Sample size
Γ(m)	Gamma function
Ω	Ohm/mean square value of amplitude
PL_{dB}	Modeled path loss
$PL(d_0)$	Average path loss at reference distance
P_t	Transmitted power
P_r	Received power
G_t	Transmit antenna gain
G_r	Receive antenna gain
f	Resonant frequency
N	Total number of sampled points
L	System loss factor/maximized log likelihood
L_m	Length of transmission line for textile monopole
L_M	Monopole patch length
t	Thickness of Shieldit Super E-textile
S_{11}	Reflection Loss (VSWR)

S_{21}	Transmission coefficient
$Z_{\lambda/4}$	Quarter-wave impedance
Z_0	Characteristic impedance
Z_L	Antenna impedance
X_σ	Shadowing (large-scale) fading
η_0	Wave impedance of free space
ω_0	Resonant frequency at free space
λ_0	Free space wavelength of the resonant frequency
λ_{eff}	Effective wavelength of the resonant frequency
δ_s	Skin depth
v	Velocity
π	Pi
c	Speed of light
θ_i	Incident angle
θ_r	Reflected angle
θ_t	Transmitted angle
SAR	Specific absorption rate (W/Kg)
Γ	Reflection coefficient
T	Transmission coefficient
T_c	Coherence time
λ	Wavelength (m)
σ	Conductivity (S/m)/standard deviation
σ_{eff}	Effective conductivity (S/m)
ε_r	Electric permittivity