Test report cover sheet

Maximum Permissible Exposure – Calculations for the European Union (RED)

1. Declaration of RF exposure compliance for EN62311 2008

Transmitter(s) Installed	mmWave Sensor EVM
Model number:	IWR6843AOPEVM
Manufacturer:	Texas Instruments
Judgement of Compliance	Compliant
Compliance Distance	20 cm
Radiated Transmitter Power (EIRP) (dBm)	Channel 1 (500 MHz bandwidth): 4.31 Channel 2 (1300 MHz bandwidth): 7.23 Channel 3 (4000 MHz bandwidth): 13.13
4.3.1. Maximum Permissible Exposure considerations are:	During normal operation, user and user extremities must be at least 20 cm removed from any transmitting antenna. The Requirements for the European Union are from EN62311 2008 Only one channel is operational at any given time.
Verdict	Compliant with 20cm zone

2. Attestation

ATTESTATION: I attest that the calculations were performed or supervised by me; that the calculations were based on the worst-case power output at the worst-case frequency of the transmitting device. All possible configurations have been considered when calculating the worst case Maximum Permissible Exposure requirements as detailed below.

Signature:	
Date:	August 21, 2020
Name:	James Cunningham, EMC/MIL/WL Supervisor

ASSESSMENT DECISION

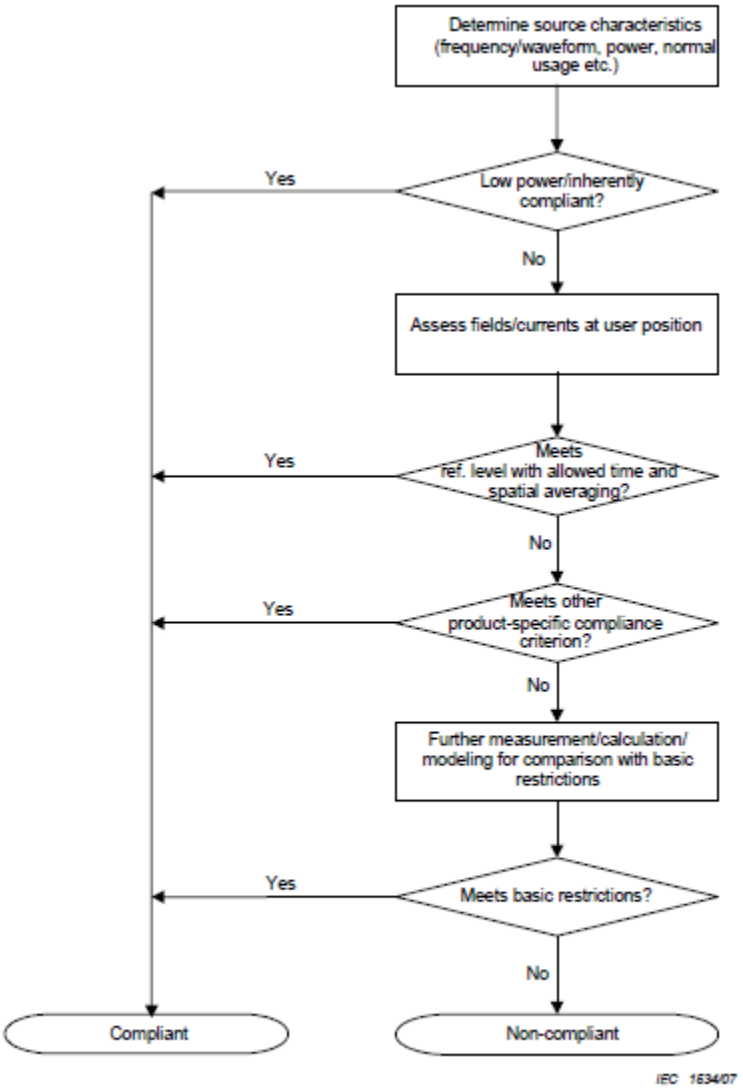

Figure 1 – Assessment flowchart

The essential requirements of Directive 2014/53/EU in the article 3.1(a) and the limits must be taken from Council Recommendation 99/519/EC for General Population of from ICNIRP Guidelines for Occupational Exposure, EN 62311:2008 Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz to 300 GHz) (IEC 62311:2007, modified)

Table 8.1-1: *Council Recommendation 99/519/EC Annex II: Basic restrictions for electric, magnetic and electromagnetic fields (0–300 GHz)*

Frequency range	Magnetic flux density (mT)	Current density (Ma/m²) (rms)	Whole body average (W/kg)	Localized SAR (head and trunk) (W/kg)	Localized SAR (limbs) (W/kg)	Power density, S (W/m²)
0 Hz	40	–	–	–	–	–
> 0–1 Hz	–	8	–	–	–	–
1–4 Hz	–	8/f*	–	–	–	–
4–1 000 Hz	–	2	–	–	–	–
1–100 kHz	–	f/500*	–	–	–	–
0.1–10 MHz	–	f/500*	0.08	2	4	–
10–10 000 MHz	–	–	0.08	2	4	–
10–300 GHz	–	–	–	–	–	10
Note: f is the frequency in Hz						

Table 8.1-2: *Council Recommendation 99/519/EC Annex III: Reference levels for electric, magnetic and electromagnetic fields (0–300 GHz)*

Frequency range	E-field strength (V/m)	H-field strength (A/m)	B-field (μT)	Equivalent plane wave power density S_{EQ} (W/m²)
0–1 Hz	–	3.2×10^4	4×10^4	–
1–8 Hz	1000	$3.2\times10^4/f^2$	$4\times10^4/f^2$	–
8–25 Hz	1000	4000/f	5000/f	–
25–800 Hz	250/f	4/f	5/f	–
0.8–3 kHz	250/f	5	6.25	–
3–150 kHz	87	5	6.25	–
0.15–1 MHz	87	0.73/f	0.92/f	–
1–10 MHz	$87/f^{1/2}$	0.73/f	0.92/f	–
10–400 MHz	28	0.073	0.092	2
400–2000 MHz	$1375\times f^{1/2}$	$0.0037\times f^{1/2}$	$0.0046\times f^{1/2}$	f/200
2–300 GHz	61	0.16	0.2	10
Note: f is the frequency in MHz				

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Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{PG}{4\pi R^2}$$

Measurement is Radiated and the Antenna is intergral to the unit. Therefore the antenna was included in the EIRP measurement and antenna gain is therefore given as 0.

Output power measurements in test report 379611-TRFWL were EIRP (radiated) values and were measured in dBµV/m, Therefore the converstion from dBµV/m to dBm is: 102.07 dBµV/m - 95.34dB = 6.84 (102.07 is from the refereced test report page 17.

where: S = power density
P = power input to the antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

	500MHz OBW	1300MHz OBW	4000MHz OBW	
Maximum peak EIRP	4.31	7.23	13.13	dBm
Cable and Jumper loss:	0	0	0	dB
Maximum peak EIRP	4.31	7.23	13.13	dBm
Power in mW	0.002697739	0.005284453	0.020558906	W
Single Antenna - Integral Antenna	0	0	0	dBi
Number of Antennae:	1	1	1	
Total Antenna gain (typical):	0	0	0	dBi
Antenna Gain (numeric)	1	1	1	(numeric)
Prediction distance:	0.2	0.2	0.2	m
Prediction frequency:	61250	60930	62120	MHz
MPE limit for uncontrolled exposure at prediction frequency:	10	10	10	W/m^2
Power density at prediction frequency:	0.005366982	0.010513084	0.040900644	W/m^2
Tx On time:	1	1	1	ms
Tx period time:	1	1	1	ms
Average Factor:	100	100	100	%
Average Power density at prediction frequency:	0.005366982	0.010513084	0.040900644	W/m^2