RADIO EQUIPMENT DIRECTIVE TEST PLAN

FOR

MILLIMETER WAVE RADAR SENSOR DEVELOPMENT BOARDS

MODEL SERIES: 6843

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1. PURPOSE AND SCOPE

1.1. Introduction

This Test Plan has been developed by UL Verification Services Inc., in consultation with Texas Instruments.

1.2. Purpose

This Test plan defines the requirements for assessment of the equipment under test (EUT) to the Essential Requirements of the Radio Equipment Directive (2014/53/EU). This test plan will be included as part of the Technical Documentation File (TDF) that will be generated as part of the approval process called out by the Radio Equipment Directive (RED).

The EUT consists of a series of development boards to support the operation of Texas Instruments' 6843 series of millimeter-wave radar sensor chipsets intended for Traffic monitoring, Industrial transport, People occupancy, Fall detection and general purpose applications.

1.3. Scope

This Test Plan applies to Models MMWAVEICBOOST, IWR6843ISK, IWR6843ISK-ODS (overhead detection sensing) and IWR6843AOPEVM (antenna on package). It is based upon technical information, drawings, and documentation available at the time of development. It will define the operating parameters and test conditions to be observed during testing. This document includes the following information:

a) Details of the Equipment Under Test.
b) Test Layout, including cable lengths, layouts, and any bonding/grounding arrangements.
c) Confirmation of performance criteria and details of the acceptable limits of degradation.
d) A description of any additional input/output test equipment used to exercise the EUT.

This test plan in no way detracts from or supersedes any contractual specifications placed upon the manufacturer by other organizations.

1.4. Limitations of Scope

This Test Plan, and the anticipated Notified Body Type Examination Certificate associated with this Test Plan, only covers operation of the EUT within the operating boundaries established by this Test Plan and the associated Test Reports.

Such boundaries include, but are not necessarily limited to, Operating Bandwidth, Operating Power and Number of Simultaneous Transmitters.

The EUT is a development board intended for Research and Development (R&D) purposes to enable Texas Instruments' customers and prospective customers to design suitable end products utilizing one or more of the Chipsets that comprise the model families documented in this Test Plan. The operating software furnished with the EUT provides such professional R&D users flexibility to adjust radio parameters to evaluate and optimize their end product designs.

As such it is recognized that professional R&D users might choose to configure the EUT to operate beyond the boundaries over which the EUT was evaluated for compliance with applicable Standards and/or Directives.

The EUT User Manual shall include instructions to the user, that should the user choose to configure the EUT to operate outside the operating boundaries documented in this Test Plan and associated Test Reports, the EUT shall be operated inside a shielded chamber.

2. MANUFACTURER'S DESCRIPTION OF EQUIPMENT

2.1. EUT Description

2.1.1. Summary

The EUT consists of a radar chipset, compatible development board and an interface board.

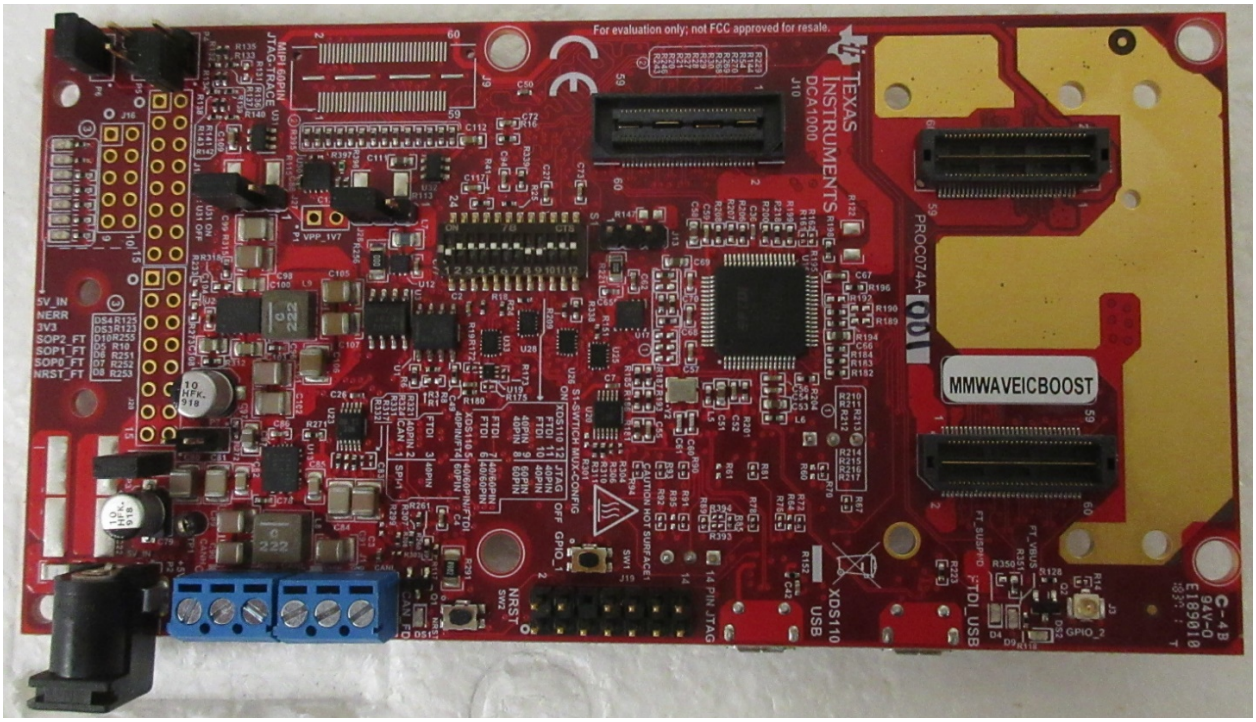
User software with a GUI is installed in a third-party control computer that is connected to the interface board via a USB interface.

Power is furnished by a third-party laboratory bench-top power supply with a 5 VDC output.

The IWR6843 chipset operates in the 57-64 GHz band with FMCW modulation, incorporates 3 transmitters and 4 receivers, and simultaneous transmission on all 3 transmitters is supported.

2.1.2. Interface Board and I/O

The interface board, MMWAVEICBOOST, utilizes a USB port.



Printed circuit board for MMWAVEICBOOST

2.1.3. Power

Power requirement is 5 Vdc, 2.5 A (nominal). Power to the EUT is furnished by a third-party bench-top laboratory power supply, via a cable with a maximum length of 3 m.

2.1.4. Temperature

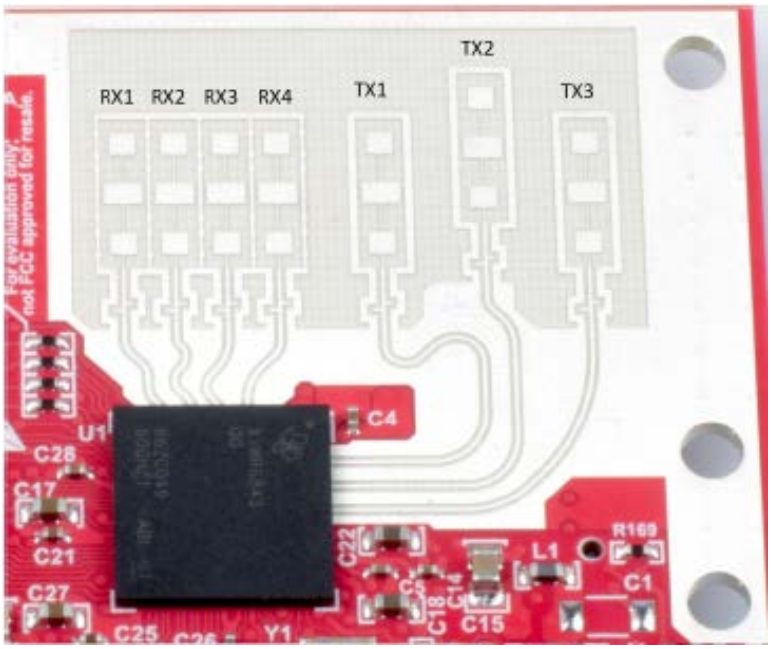
The rated operational ambient temperature range is -20 deg C to +60 deg C.

2.1.5. Performance Criterion:

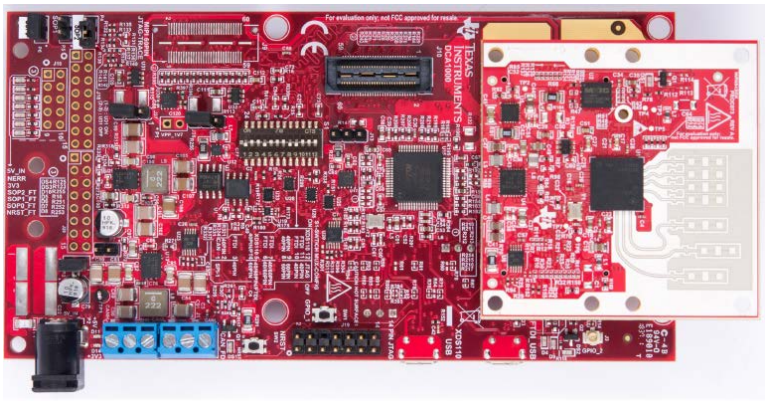
The EUT shall indicate the distance of the target within 20 cm of the distance reported prior to the application of unwanted and/or interference signal(s) as specified by applicable standards.

2.1.6. Model IWR6843ISK Printed Circuit Board and Antennas

Model IWR6843ISK utilizes multi-element antennas for the 3 transmitters and 4 receivers. The high-gain long-range antennas are etched on the Printed Circuit Board.



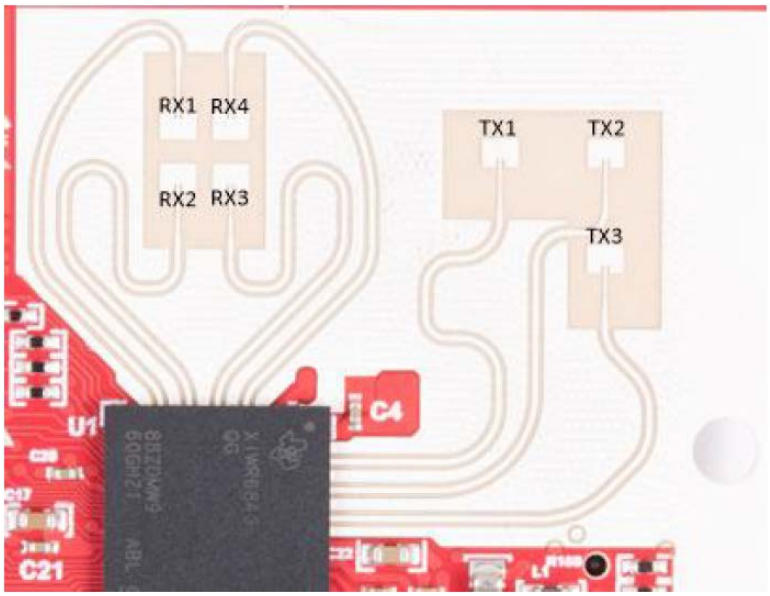
Chipset and antennas for IWR6843ISK



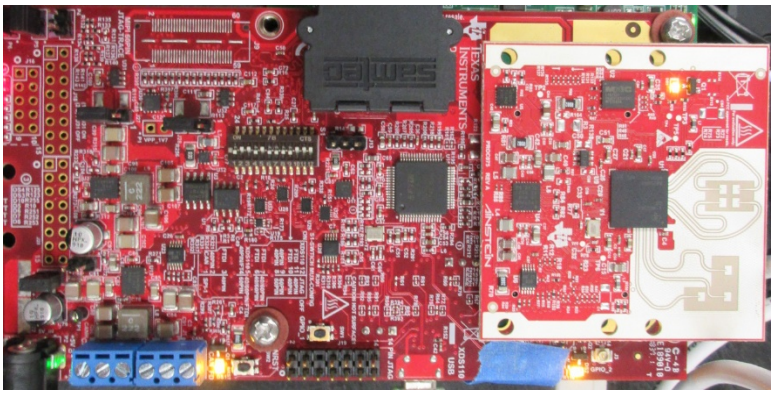
IWR6843ISK Development Board integrated with MMWAVEICBOOST

2.1.7. Model IWR6843ISK-ODS Printed Circuit Board and Antennas

Model IWR6843ISK-ODS utilizes series-fed antennas for the 3 transmitters and 4 receivers. The short-range wide field of view antennas are etched on the Printed Circuit Board.



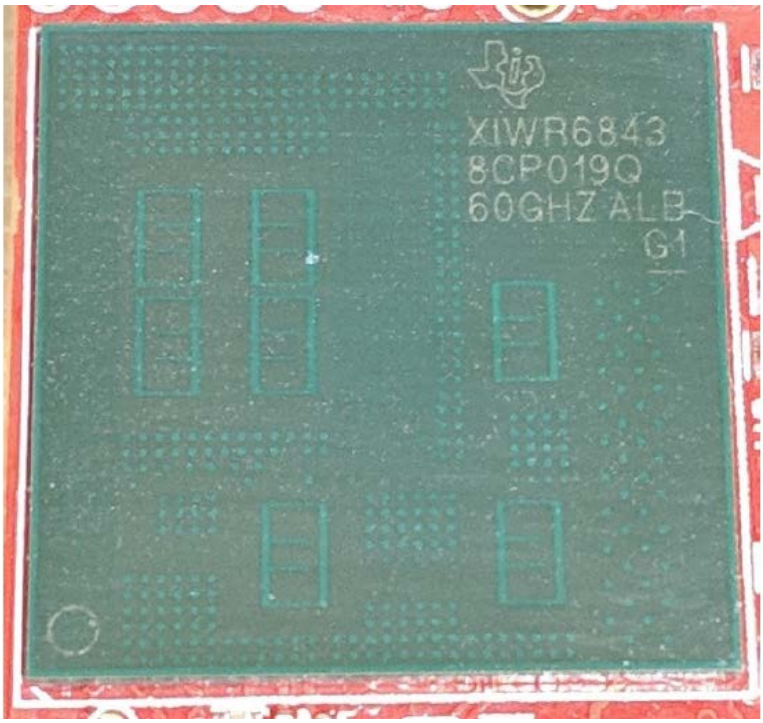
Chipset and antennas for IWR6843ISK-ODS



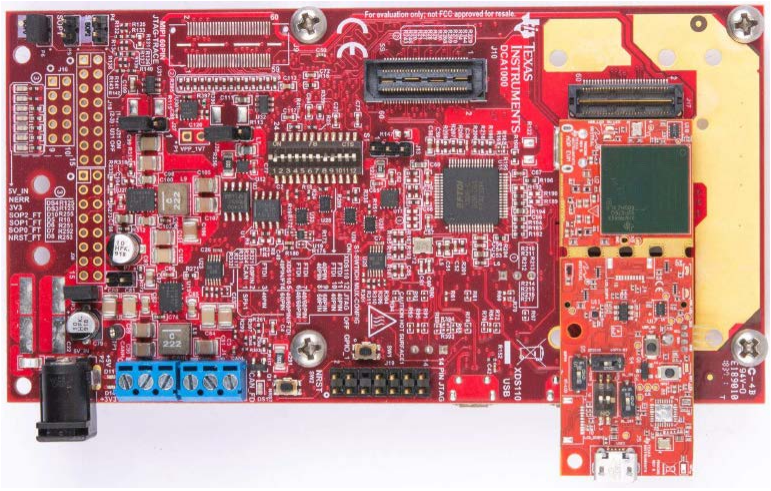
IWR6843ISK-ODS Development Board integrated with MMWAVEBOOST

2.1.8. Model IWR6843AOPEVM Printed Circuit Board and Antennas

Model IWR6843AOP utilizes wide-field antennas for the 3 transmitters and 4 receivers. The antennas are integrated on the transceiver chip package, therefore the Printed Circuit Board does not contain any transmission lines or antennas



Chipset with antennas for IWR6843AOP



IWR6843AOP Development Board integrated with MMWAVEBOOST

2.2. Description of Model Differences

Manufacturer's detailed description of model differences will be included in the TDF supplied to the Notified Body.

2.3. Block Diagram / Schematic

Block diagrams and schematics will be included in the TDF supplied to the Notified Body.

2.4. EUT Photographs

Photographs of the EUT will be included in the TDF supplied to the Notified Body.

2.5. Facilities and Personnel

All testing called for in this document shall be carried out by trained test personnel following published procedures and utilizing calibrated test equipment.

2.6. Equipment Configuration

During radiated testing, the EUT shall be set up on a tabletop in a normal configuration.

Any auxiliary equipment required to perform the tests shall be located outside the influence of the test environment. All input/output data cables will be terminated with a representative load if they are not connected to the equipment that normally forms the output for the product. Layout of power cables and I/O cables shall be in accordance with the manufacturer's requirements and as required by the standards.

Variation to the layout and orientation of cables and other items external to the enclosure port will be permitted between tests depending only on the limitations imposed by the test site.

A note and photographic record of the layout, including the positioning of test instrumentation and auxiliary equipment location, where relevant, shall be made and presented with the test report.

3. SUMMARY OF APPLICABLE STANDARDS AND TESTS

3.1. Summary of Radio Tests

3.1.1. General

Radio Spectral Matters per Draft EN 305 550 v2.1.0 using normative measurement methods per EN 303 396 v1.1.1 as applicable, and for Receiver interference tests EN 303 396 v1.1.1 measurement methods shall be applied in lieu of TS 103 361 v1.1.1 measurement methods.

Required tests are summarized in tables below. The test configurations and the number of operating modes shall be as called out by the referenced standard, unless otherwise noted.

3.1.2. Test Frequencies and Modulation Bandwidths

Each operating bandwidth is operated on one nominal frequency.

NOMINAL OPERATING BANDWIDTH	NOMINAL CENTER FREQUENCY
300 MHz	60.4 GHz
1300 MHz	60.9 GHz
4 GHz	62.15 GHz

3.1.3. Modulation

The device modulation is Frequency Modulated Continuous Wave (FMCW).

3.1.4. Transmitter Designation

- The three transmitters are identified as TX1, TX2 and TX3
- TX1 and TX3 are the outer antennas
- TX2 is the central antenna
- Simultaneous transmission on all three transmitters is identified as TX1-2-3

3.1.5. Antenna Scanning

The antennas are capable of beamforming/beamsteering in both elevation and azimuth.

3.1.6. Extreme Temperature Conditions

Temperature extremes for Extreme Temperature Conditions are -20 deg C and +60 deg C.

3.1.7. Summary of Transmitting Requirements

Radio Spectral Matters per EN 305 550, unless otherwise noted

Requirement	Reference Clauses	Test Condition	Notes
Duty Cycle	EN 303 396 Clause 6.3.6	Reporting Only Normal	TX1-2-3 300 MHz, 1300 MHz and 4 GHz BW
Operating Frequency Range	4.3.2 EN 303 396 Clause 6.3.2	U Normal	Measure -23 dBc BW TX1-2-3 300 MHz, 1300 MHz and 4 GHz BW
Mean Power	4.3.3 EN 303 396 Clause 6.3.4	U Normal	TX1-2-3 300 MHz, 1300 MHz and 4 GHz BW
Mean Power Spectral Density	4.3.4 EN 303 396 Clause 6.3.5	U Normal	TX1-2-3 300 MHz, 1300 MHz and 4 GHz BW
Unwanted emissions in the out-of-band domain	4.3.5 EN 303 396 Clause 6.3.10	U Normal	TX1-2-3 300 MHz, 1300 MHz and 4 GHz BW
Unwanted emissions in the spurious domain	4.3.6 EN 303 396 Clause 6.3.10	U Normal	IWR6843ISK TX1-2-3 300 MHz, 1300 MHz and 4 GHz BW
			IWR6843ISK-ODS and IWR6843AOP TX1-2-3 At and Below 40 GHz: 300 MHz BW Above 40 GHz: 300 MHz, 1300 MHz and 4 GHz BW

3.1.8. Summary of Receiving Requirements

Radio Spectral Matters per EN 305 550, unless otherwise noted

Requirement	Reference Clauses	Test Condition	Notes
Receiver spurious emissions	4.4.2 EN 303 396 Clause 6.3.11	C Normal	N/A Receiver is co-located and operates simultaneously with Transmitter
Receiver interference signal handling	4.4.3 EN 303 396 Clause 6.3.12	U Normal	TX1-3, TX1-2-3 300 MHz, 1300 MHz and 4 GHz BW

3.2. Summary of RF Exposure (RF Safety) Evaluation

RF safety evaluation per General Public Limits from Table 2 Reference Levels of (1999/519/EC) and EN 62311:2008.

3.3. Summary of Electrical Safety Tests

Electrical safety tests per EN 62368-1:2014 + A11:2017

3.4. Summary of EMC Tests

Electromagnetic Compatibility Emissions per EN 301 489-3 v2.1.1, Draft EN 301 489-1 v2.2.0 and Draft EN 301 489-1 v2.2.1

Requirement	Test Method	Notes
Radiated Emission		N/A EUT has no ancillary equipment
Conducted Emission AC Mains Port		N/A EUT has no AC supply
Conducted Emission DC Power Port		N/A DC Power Cable <= 3m length EUT has no dedicated AC/DC supply
Harmonic Current Emissions		N/A EUT has no AC supply
Voltage Fluctuations and Flicker		N/A EUT has no AC supply
Conducted Emission Wired Network Port		N/A EUT has no wired network ports

Electromagnetic Compatibility Immunity per EN 301 489-3 v2.1.1 and Draft EN 301 489-1 v2.2.1

Requirement	Test Method	Notes
RF Electromagnetic Field (80 MHz to 6,000 MHz)	EN 61000-4-3:2006 + A1:2008 + A2:2010	Enclosure Model 6843, 300 MHz BW, 4 GHz BW
Electrostatic Discharge	EN 61000-4-2:2009	HCP and VCP Tests Only Model 6843, 300 MHz BW and 4 GHz BW
Fast Transients Common Mode		N/A DC Power Cable <= 3m length EUT has no dedicated AC/DC supply EUT has no AC supply EUT has no Wired Network Port
RF Common Mode 0,15 MHz to 80 MHz		N/A DC Power Cable <= 3m length EUT has no dedicated AC/DC supply EUT has no AC supply EUT has no Wired Network Port
Voltage Dips and Interruptions		N/A EUT has no AC supply
Surges, Line to Line and Line to Ground		N/A EUT has no AC supply EUT has no Wired Network Port

4. APPLICATION OF RADIO SPECTRAL MATTERS STANDARDS

4.1. Duty Cycle

Test Samples:

Testing is performed in each operating bandwidth using TX1-2-3.

Engineering rationale:

Minor variations in Duty Cycle that might be expected across different numbers of TX chains will have an insignificant impact on parameters subject to regulatory limitations.

4.2. Operating Frequency Range

Test Sample Configurations:

Testing is performed on each operating bandwidth using TX1-2-3.

Engineering rationale:

Simultaneous transmissions on all three transmitters will yield the worst-case performance of the OOB emissions.

Minor variations in Bandwidth that might be expected across different TX chains could have a significant impact on the OOB emissions performance at the sideband skirts of the fundamental spectral envelope. OOB emissions are measured with TX1-2-3 therefore the Bandwidth measurements required to support such OOB tests are also measured with TX1-2-3.

Measurement Procedure:

The -23 dBc Bandwidth is measured instead of the 99% Power Bandwidth.

Engineering rationale:

Applying the 99% BW to an FMCW radar, and simultaneously specifying that the OOB emissions domain begins at the Flow and Fhigh frequencies of the 99% BW, would require that the in-band Power Spectral Density comply with the Power Spectral Density OOB Limits.

Reference OOB Issue V2 attachment to email Correspondence Thread with ETSI ERM TG SRR Working Group Chair pertaining to impact of BW measurement procedure on OOB Compliance showing the impact of the change of the definition of the OOB domain from the R&TTE Directive to the Radio Equipment Directive.

This is unrealistic.

Correspondence plus a Conference Call with the ETSI ERM/TG SRR Working Group Chair indicates that measuring the -23 dBc BW instead of the 99% Power BW provides a reasonable solution, that the working group had considered the -23 dBc BW, that perhaps some members of the working group believed that the -23 dBc BW would be specified as an alternative definition in the published standards, and that the working group will very likely adopt the use of the -23 dBc BW in future revisions of the standards.

Reference Email Correspondence Thread with ETSI ERM TG SRR Working Group Chair pertaining to impact of BW measurement procedure on OOB Compliance.

4.3. Mean Power

Test Sample Configurations:

Testing is performed at Normal environmental conditions on all three operating bandwidths using TX1-2-3.

Engineering rationale:

Simultaneous transmissions on all three transmitters is expected to yield the worst-case mean power.

Measurement Procedure:

Apply Duty Cycle Correction Factor to Mean Power measurements to show the power during the ON time burst of the transmission.

Engineering rationale:

Draft EN 305 550 v2.1.0 describes the mean power as the highest power level of the transmitter power control range during the transmission cycle if the transmitter power control is implemented.

The ON and OFF times of the FMCW modulation are equivalent to two power control levels therefore the Mean Power during the ON time of the FMCW modulation is measured and reported.

4.4. Mean Power Spectral Density

Test Sample Configurations:

Testing is performed at Normal environmental conditions on all three operating bandwidths using TX1-2-3.

Engineering rationale:

Simultaneous transmissions on all three transmitters is expected to yield the worst-case mean power spectral density.

Measurement Procedure:

Apply Duty Cycle Correction Factor to Power Spectral Density measurements to show PSD during the ON time burst of the transmission.

Engineering rationale:

Both Draft EN 305 550 v2.1.0 and EN 303 396 v1.1.1 provide the same description of Mean PSD however neither standard provides guidance as to whether PSD is to measured across the entire period (including ON and OFF times) or only during the ON time.

Measurements of PSD during the ON time burst of the transmission is consistent with other ETSI radio standards.

Correspondence with the ETSI ERM/TG SRR Working Group Chair regarding Final Draft EN 302 264 v2.1.1 and EN 303 396 v1.1.1, which similarly do not provide such guidance confirms that PSD is intended to be measured during the ON time burst of the transmission.

Considering that the base test standard EN 303 396 v1.1.1 is identical, it is clear that under Draft EN 305 550 v2.1.0 PSD is also intended to be measured during the ON time burst of the transmission.

4.5. Unwanted Emissions in the Out-Of-Band Domain

Test Sample Configurations:

Testing is performed at Normal environmental conditions on all three operating bandwidths using TX1-2-3.

Engineering rationale:

Simultaneous transmissions on all three transmitters is expected to yield the worst-case out-of-band emissions.

4.6. Unwanted Emissions in the Spurious Domain

Test Sample Configurations:

For model IWR6843ISK testing is performed on at Normal environmental conditions on all three operating bandwidths using TX1-2-3.

For models IWR6843ISK-ODS and IWR6843AOP testing is performed on at Normal environmental conditions using TX1-2-3…

At and Below 40 GHz: 300 MHz OBW mode from IWR6843ISK
Above 40 GHz: all three operating bandwidths.

Engineering rationale:

Simultaneous transmissions on all three transmitters is expected to yield the worst-case spurious emissions.

Radiated spurious emissions of the IWR6843ISK at and below 40 GHz were very similar among the three OBWs, except the 300 MHz OBW mode was worst case at the third sub-harmonic at ~20 GHz.

Radiated spurious emissions of the IWR6843ISK above 50 GHz exhibited moderate differences among the three OBW modes. The break point is chosen as 40 GHz to be conservative.

4.7. Receiver Spurious Emissions

Applicability:

Not Applicable

Engineering rationale:

All Receivers are co-located with, and operate simultaneously with, the Transmitter(s).

4.8. Receiver interference signal handling

Test Sample Configurations:

Testing is performed at Normal environmental conditions on all three operating bandwidths using TX1-3 and TX1-2-3.

Test conditions:

The unwanted signal source is positioned within the 3 dB beamwidth at the operating centre frequency of the RX boresight.

A suitable Radar Cross Section (RCS) target shall be placed wihin the detection area of the EUT antenna.

Performance Criterion:

During and after the application of the unwanted signal, the EUT shall indicate the distance to the target within 20 cm of the distance indicated prior to the application of the unwanted signal.

Unwanted Signals Specification:

Test each mode using unwanted signals per EN 305 550 Clause 4.4.3.3 Table 11.

Test procedure:

Test per EN 303 396 v1.1.1 Clause 6.3.12.

Engineering rationale:

EN 305 550 makes a reference to TS 103 361 for the receiver interference test procedure. The scope of TS 103 361 is Ultra Wide Band (UWB) devices, which do not utilize FMCW modulation.

The device is a radar utilizing FMCW modulation. EN 303 396. The scope of EN 303 396 is automotive radar and surveillance radar equipment, which utilize FMCW modulation.

The test procedures specified in EN 303 396 Clause 6.3.12 are more suitable for the modulation utilized by the device under test.

5. APPLICATION OF RF EXPOSURE STANDARDS

RF Exposure evaluation is performed in accordance with EN 62311:2008.

Engineering rationale for the application of EN 62311:2008

EN 62311 applies to electrical and electronic equipment for which no dedicated product or product family standard regarding human exposure to electromagnetic fields applies. The frequency range covered is 0 Hz to 300 GHz.

Evaluation method:

Perform RF Exposure Evaluation per EN 62311 Clause 7.2 (1) and (2).

Perform calculations of Power Density using the far field equations given in EN 62311 Annex A.2. Calculate minimum separation distance at which fields comply with the relevant Reference Levels.

6. APPLICATION OF ELECTRICAL PRODUCT SAFETY STANDARDS

Electrical safety testing is performed in accordance with the requirements of EN 62368-1:2014 + A11:2017

Engineering rationale for the application of EN 62368-1:2014 + A11:2017

The scope of EN 62368-1:2014 + A11:2017 is applicable to the EUT.

EN 62368-1:2014 + A11:2017 includes EN 62368-1:2014 + AC:2015, and is more recent, therefore EN 62368-1:2014 + A11:2017 represents the state-of-the-art for Electrical Product Safety testing.

7. APPLICATION OF EMC STANDARDS

7.1. General

ElectroMagnetic Compatibility testing is performed in accordance with EN 301-489-3 v2.1.1 and Draft EN 301-489-1 v2.2.1.

Engineering rationale for the application of EN 301 489-3 v2.1.1

The scope of EN 301-489-3 v2.1.1 is applicable to the EUT.

Engineering rationale for the application of Draft EN 301 489-1 v2.2.1

Draft EN 301-489-1 v2.2.1 is more recent than Draft EN 301 489-1 v2.2.0 which is cited as a normative reference by EN 301 489-3 v2.1.1, therefore Draft EN 301-489-1 v2.2.1 represents the state-of-the-art for EMC testing.

7.2. Application of EMC Emissions Tests

The equipment test requirement is given in the fixed use column of Table 1 in Clause 7.1 of Draft EN 301 489-1 v2.2.1.

7.2.1. Radiated Emissions

Not Applicable. This requirement is satisfied by Radio Spectral Matters requirements as the EUT has no ancillary equipment.

7.2.1. Conducted Emissions, AC Power Input Port

Not Applicable. The EUT has no AC supply.

7.2.2. Conducted Emissions, DC Power Input Port

Not Applicable. The manufacturer declares that the DC Power Input Port is not intended to be used with cables longer than 3 m, the EUT has no dedicated AC/DC supply and the EUT is not vehicular.

The EUT User Manual shall include instructions to the end user to limit the length of the DC power connection to a maximum of 3 m.

7.2.3. Harmonics

Not Applicable. The EUT has no AC supply.

7.2.4. Flicker

Not Applicable. The EUT has no AC supply.

7.2.5. Conducted Emission, Wired Network Port

Not Applicable. The EUT has no wired network port.

7.3. Application of EMC Immunity Tests

The equipment test requirement is given in the fixed use column of Table 2 in Clause 7.2 of Draft EN 301 489-1 v2.2.1.

7.3.1. RF Electromagnetic Field

Test Method: EN 61000-4-3:2006 + A1:2008 + A2:2010

Test level: 3 V/m (measured unmodulated). The test signal shall be amplitude modulated to a depth of 80% depth by a sinusoidal audio signal of 1000 Hz. The test signal frequency range shall be 80 to 6000 MHz. There are no exclusion bands within this range.

Performance criterion A applies for immunity tests with a phenomena of a continuous nature.

During the test the performance shall be

- Operate as intended
- No loss of function
- No unintentional responses

After the test the performance shall be

- Operate as intended
- No loss of function
- No unintentional responses

Test Sample Configuration:

Testing is performed at Normal environmental conditions in the 4 GHz BW mode using TX1-2-3.

Engineering rationale:

The associated co-located transmitter PSD is lowest in the 4 GHz mode therefore the 4 GHz mode represents the worst-case operating bandwidth.

Activating all three transmitters simultaneously will provide the worst-case potential receiver overload condition.

Furthermore, as the frequency range of the immunity signals are well below the EUT operating frequency the selected operating bandwidth will provide an adequate evaluation that is representative of all operating bandwidth modes.

Test conditions:

A suitable Radar Cross Section (RCS) target shall be placed wihin the detection area of the EUT antenna.

Performance Criterion:

During and after the application of the immunity field, the EUT shall indicate the distance to the target within 20 cm of the distance indicated prior to the application of the immunity field.

Test Protocol:

Expose Front side and one edge of the EUT Printed Circuit Board to both polarizations, Vertcal and Horizontal, of the Uniform Electric Field.

Engineering rationale:

The EUT is small therefore exposure of two orthogonal sides of the PCB is sufficient to evaluate the performance with an applied uniform electric field.

7.3.2. Electrostatic Discharge

EN 61000-4-2:2009

Test Severity Levels: Up to +/- 4kV indirect contact discharge to Horizontal Coupling Plane and Vertical Coupling Plane.

Performance criterion B applies for immunity tests with a phenomena of a transient nature.

During the test the performance shall be

- No unintentional responses

After the test the performance shall be

- Operate as intended
- Loss of function(s) shall be self-recoverable
- No degradation of performance

Test Sample Configuration:

Testing is performed at Normal environmental conditions in the 4 GHz BW mode using TX1-2-3.

Engineering rationale:

The associated co-located transmitter PSD is lowest in the 4 GHz mode therefore the 4 GHz mode represents the worst-case operating bandwidth.

Activating all three transmitters simultaneously will provide the worst-case potential receiver overload condition.

Furthermore, as the frequency range of the immunity signals are well below the EUT operating frequency the selected operating bandwidth will provide an adequate evaluation that is representative of all operating bandwidth modes.

Test conditions:

A suitable Radar Cross Section (RCS) target shall be placed wihin the detection area of the EUT antenna.

Performance Criterion:

After the application of ESD discharges, the EUT shall indicate the distance to the target within 20 cm of the distance indicated prior to the application of ESD discharges.

Test Protocol:

Apply indirect contact discharges to the Horizontal Coupling Plane and the Vertical Coupling Plane.

Direct contact or direct air discharges shall not be applied to the EUT.

Engineering rationale:

The EUT is a development board. It is not contained within an enclosure as end users need access to the circuitry in order to make measurements during the R&D process. Only indirect discharges are appropriate for this construction.

Direct contact and direct air discharges are not appropriate for this construction. As the EUT is intended to be used in a laboratory setting these requirements are mitigated by placing the EUT on an ESD-protective mat and the end user wearing an ESD-protective wrist strap connected to the ESD-protective mat.

The EUT User Manual shall include instructions to the end user to place the EUT on an ESD-protective mat and to wear an ESD-protective wrist strap connected to the ESD-protective mat.

7.3.3. Fast Transients Common Mode

Not Applicable. The manufacturer declares that the DC Power Input Port is not intended to be used with cables longer than 3 m, the EUT has no dedicated AC/DC supply, the EUT has no AC supply and the EUT has no wired network port.

The EUT User Manual shall include instructions to the end user to limit the length of the DC power connection to a maximum of 3 m.

7.3.4. Radio Frequency, Common Mode

Not Applicable. The manufacturer declares that the DC Power Input Port is not intended to be used with cables longer than 3 m, the EUT has no dedicated AC/DC supply, the EUT has no AC supply, the EUT has no wired network port and the EUT is not (yet*) vehicular.

The EUT User Manual shall include instructions to the end user to limit the length of the DC power connection to a maximum of 3 m.

7.3.5. Voltage Dips, Fluctuations, Interrupts

Not Applicable. The EUT has no AC supply.

7.3.6. Surges, Line to Line and Line to Ground

Not Applicable. The EUT has no AC supply or wired network port.

8. RELATED AND REFERENCED DOCUMENTS

DIRECTIVE 2014/53/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC

COUNCIL RECOMMENDATION of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz) (1999/519/EC)

DIRECTIVE 2014/30/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility (recast)

DIRECTIVE 2014/35/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits (recast)

Draft EN 305 550 v2.1.0, Short Range Devices (SRD); Radio equipment to be used in the 40 GHz to 246 GHz frequency range; Harmonised Standard for access to radio spectrum

ETSI EN 303 396 v1.1.1, Short Range Devices; Measurement Techniques for Automotive and Surveillance Radar Equipment

ETSI TS 103 361 v1.1.1, Short Range Devices (SRD) using Ultra Wide Band technology (UWB); Receiver technical requirements, parameters and measurement procedures to fulfil the requirements of the Directive 2014/53/EU

Draft ETSI EN 301 489-1 v2.2.0, ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU

Draft ETSI EN 301 489-1 v2.2.1, ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for ElectroMagnetic Compatibility

EN 301 489-3 v2.1.1, ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU

EN 61000-4-2:2009, Electromagnetic Compatibility (EMC) - Part 4: Testing and Measurement techniques - Section 2: Electrostatic discharge immunity test

EN 61000-4-3:2006 + A1:2008 + A2:2010, Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques – Section 3: Radiated, radio-frequency, electromagnetic field immunity test

EN 62311:2008, Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz – 300 GHz)

EN 62368-1:2014 + A11:2017, Audio/video, information and communication technology equipment - Part 1: Safety requirements (IEC 62368-1:2014, modified)

Email Correspondence Thread with ETSI ERM TG SRR Working Group Chair pertaining to impact of BW measurement procedure on OOB Compliance

OOB Issue V2 attachment to email Correspondence Thread with ETSI ERM TG SRR Working Group Chair pertaining to impact of BW measurement procedure on OOB Compliance

Email Correspondence Thread with ETSI ERM TG SRR Working Group Chair pertaining to PSD interpretation

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