Hardware Test Center Test Request / Test Plan

|  |  |
| --- | --- |
| Description of the EUT | |
| Model Name: |  |
| Model Number: |  |
| S/N: |  |
| Description: |  |
| Keysight Project Number: |  |

|  |  |  |
| --- | --- | --- |
|  | Customer | Hardware Test Center |
| Company: |  | Keysight Technologies Deutschland GmbH |
| Address: |  | Hardware Test Center Europe  Herrenberger Straße 130 71034 Boeblingen Germany |
| First Name: |  |  |
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|  |  |  |  |
| --- | --- | --- | --- |
| Revision | Revision date | Editor | Descrition of changes |
|  |  |  | Initial document |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

# Equipment Under Test (EUT) information

|  |
| --- |
| Purpose of testing |
|  |

Please explain, what the overall purpose result of the test project should be, e.g. “CE marking” or “engineering tests”.

## Physical dimensions of EUT

Note: Physical dimensions are used to determine accessibility to test facilities. Please fill in following form, if your EUT exceeds 150 kg or 1800 mm height or 1000 mm width.

|  |  |  |  |
| --- | --- | --- | --- |
| Depth | Width | Height | Weight |
| mm | mm | mm | kg |

## Power ports

Note: Power ports are all ports at which a conductor or cable carrying electrical power needed for the operation is connected to the equipment. Each port has to be specified. The range of the supply voltage (low and high nominal voltage) must be specified.For 3-phase equipment, the usage of neutral must be defined.

| No. | Voltage | | DC | Frequency | | Phases | Neutral | PE | Max. power | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | min [V] | max [V] |  | min [Hz] | max [Hz] |  |  |  | P  [VA] | I  [A] |
| Port 1 |  |  |  |  |  |  |  |  |  |  |
| Port 2 |  |  |  |  |  |  |  |  |  |  |
| Port 3 |  |  |  |  |  |  |  |  |  |  |
| Port 4 |  |  |  |  |  |  |  |  |  |  |

|  |  |
| --- | --- |
| Specials | |
|  | EUT is powered by an external power supply which is a component of the product |
|  | USB terminal is used for power supply only (no communication) |
|  | Other: |

## Other supplies

|  |  |  |  |
| --- | --- | --- | --- |
| Supply (?) | Pressure | Volume | Description |
|  | bar | l/min |  |
|  | bar | l/min |  |
|  | bar | l/min |  |
|  | bar | l/min |  |

## Operating Environmental Conditions

Note: All test shall be performed within the specified operating environmental conditions of the EUT.

|  |  |
| --- | --- |
| Environmental parameter | Operating specification (EUT) |
| Temperature | °C -     °C |
| Relative humidity | % -     % |
| Absolute air pressure (QFE) | mbar -      mbar |

## Potential hazards caused by the EUT

|  |  |
| --- | --- |
| Hazard (?) | Short description |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

# EMC Tests

## Reporting of test results

|  |  |
| --- | --- |
| Reporting of test results | |
|  | |
| Previous test report available | <add refererence> |

## Customer testplan

|  |  |  |
| --- | --- | --- |
| Is a customer’s testplan available | Yes | No |

**If the testplan is provided, please attach the testplan and skip clause 2.3 to 2.10.**

## Product- or generic-standards or requirements

For partial tests please use clause 2.10 for specification and description of required tests

Emission = Interference  
Immunity = Susceptibility

|  |  |  |  |
| --- | --- | --- | --- |
| Emission / Immunity | Standard | Date of Standard | Environment |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

|  |  |  |
| --- | --- | --- |
| The EUT has wireless communication sub-assemblies: | | |
| Yes  No | Module: | Frequency: |

Wireless communication modules require additional testing depending on the certification status and the correct implementation of the module.

## Signal- or I/O ports

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Port type (I/O, LAN, USB) | Part No. | Ground bonding | Shielded | Diameter\*  [mm] | Max. length  [m] |
|  |  |  | yes |  |  |  |
|  |  |  |  | yes |  |  |
|  |  |  |  | yes |  |  |
|  |  |  |  | yes |  |  |
|  |  |  |  | yes |  |  |
|  |  |  |  | yes |  |  |
|  |  |  |  | yes |  |  |
|  |  |  |  | yes |  |  |
|  |  |  |  | yes |  |  |
|  |  |  |  | yes |  |  |

\* Please provide us with the overall approximate diameter of the cables including insulation to determine the possibility of bundeling during specific tests where authorized.

## Highest internal (clock) frequency

The upper frequency limit of the emission evaluation is related to the highest EUT generated or processed frequency under consideration of all implemented step up frequency conversions.

|  |  |  |
| --- | --- | --- |
| Frequency | Step up conversion | Highest Frequency |
| MHz |  | MHz |

## Operating mode(s) during emission testing

More then one emission mode will increase the test duration significantly.

|  |  |  |
| --- | --- | --- |
| Nr. | Mode | Description |
|  |  |  |
|  |  |  |
|  |  |  |

## Monitored performance parameters during susceptability tests

During tests against continuous phenomenas like (e.g. radiated RF fields) max. accepatable deviatons from performance parameters must be monitored.

|  |  |  |
| --- | --- | --- |
| Nr. | Measurand / Criteria | Allowed deviation from specification |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

|  |  |
| --- | --- |
| Dwell time during Immunity Tests against continuous disturbances | |
| s | Reason for dwell time: |

If an EUT needs more than 2 seconds to potentially react to a disturbance (due to polling intervals, operating cycles, high-pass filter characteristics e.g.) the overall test time of immunity tests against continuous phenomenas will increase significantly.

|  |  |
| --- | --- |
| Monitoring setup | |
|  | Automatic monitoring with customer proprietary software (equipment must be provided by the customer) |
|  | Visual monitoring by HTC personnel |
|  | Monitoring by customer personnel |
|  |  |

## Power frequency magnetic field immunity test

|  |  |
| --- | --- |
| Declaration regarding the applicability of EN/IEC 61000-4-8 | |
|  | The EUT contains no magnetic sensitive components or sub assemblies (e.g: cathode ray tubes, hall-sensors, electrodynamic microphones, reed switches, etc.) |

## Prefered Project Schedule

|  |  |  |
| --- | --- | --- |
| Milestone | Preferred date | Comment |
| Date of EUT delivery |  |  |
| Technical briefing by customer |  | Fill in if required only |
| Start of testing |  | Acknowledged date will be provided by HTC |
| End of testing |  | Projected end date without disruptions |
| Delivery of test results |  | Standard delivery service is 10 working days after end of testing. |

## Special requirements deviating from generic- or product-standard

If tests are required not covered by product- or generic-standards, please describe the tests below:

### Emission tests

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Conducted | | | Details (frequency ranges, limits, etc.) |
|  | 9 kHz | - | 150 kHz |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Radiated | | | Details (frequency ranges, limits, etc.) |
|  | 30 MHz | - | 300 MHz |  |
|  | 300 MHz | - | 1000 MHz |  |
|  | 1 GHz | - | 6 GHz |  |

### Immunity tests diverging from product standards

Specifications acc. to the standard must not be filled in.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Acronym | Standard | Divergent Specification |
|  | Electrostatic discharges | 61000-4-2 | kV Contact discharges       kV Air discharges |
|  | Radiated Immunity | 61000-4-3 | V/m from       to       MHz, log.       % steps, modulation:            V/m from       to       MHz, log.       % steps, modulation:            V/m from       to       MHz, log.       % steps, modulation: |
|  | Burst | 61000-4-4 | kV power lines;       kV signal or I/O lines |
|  | Surges | 61000-4-5 | kV symmetric; power line       Ohm coupling impedance        kV asymmetric; power line.       Ohm coupling impedance        kV signal or I/O line       Ohm coupling impedance |
|  | Conducted  Immunity | 61000-4-6 | V/m from       to       MHz, log.       % steps, modulation: |
|  | Magnetic Immunity | 61000-4-8 | A/m mit  50 Hz  60 Hz  400 Hz |
|  | Voltage Dips & Interuptions | 61000-4-11 | % Unominal for       periods;       % Unominal for       periods;        % Unominal for       periods;        % Unominal for       periods; |

### Tests according Agilent Technologies Environmental Test Manual (ETM)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Acronym | Standard | Divergent Specification | |
|  | Power Line Quality | ETM 756 | Nominal Values and Ranges |  |
| ON/OFF Power Cycling Survival |  |
| Total Harmonic Distortion (THD) |  |
| Slow Voltage Change Survival |  |
| Line Voltage Swell |  |
| Line Voltage Sag |  |
| Line Voltage Transients (Ring Wave) | N/A |
|  | Burst | ETM 756 Line Voltage Transients Supplement | 2 kV mains  1 kV to I/O ports | |
|  | Surges | ETM 756 Line Voltage Transients Supplement | 1 kV mains line to line  2 kV mains line to ground | |
|  | Magnetic Immunity | ETM 765.1 | 30 A/m mit 47 Hz; 50 Hz; 60 Hz; 189 Hz | |
|  | Electrostatic discharges | ETM 765.2 | 6 kV kV Contact discharges 15 kV kV Air discharges | |
|  | IATA (IATA-PI 953) | ETM 765.6 | Magnetometer Measurement | |
|  | Operating Magnetic Field Emissions | ETM 765.7 |  | |

## Additional Comments

# Safety Tests

## Reporting of test results

|  |  |
| --- | --- |
| Complete product test | Partial tests |
| With test report | With test report |
| Previous test report available | <add refererence> |

## Test Standard

|  |  |  |  |
| --- | --- | --- | --- |
|  | IEC | DIN EN | UL / CAN-CSA C22.2 |
| General requirements |  |  |  |
| Equipment for the heating of materials |  |  |  |
| Refrigerating equipment |  |  |  |
| Testing and measuring circuits |  |  |  |
| Semi-automatic laboratory equipment |  |  |  |
| Laser equipment |  |  |  |

## Special Hazards To Be Considered

|  |  |  |
| --- | --- | --- |
| Power supply | | |
|  | Transformer / rectifier power supply | |
|  | Internal switch mode power supply | |
|  | External power supply | |
|  | The power supply is certified by | |
|  |  | UL, file number only if available |
|  |  | CSA, file number only if available |
|  |  | Other, file number only if available |

|  |  |  |
| --- | --- | --- |
| Mains power connection | | |
|  | Detachable power cord |  |
|  | Fixed power cord |  |
|  | Permanent connected |  |

|  |  |  |
| --- | --- | --- |
| Material of enclosure | | |
|  | Metal (no magnesium) | Cosmetic plastic parts are not considered |
|  | Plastic | Temperature specification from       °C to       °C  Safety certification available |

|  |  |  |
| --- | --- | --- |
| Equipment Mobility | | |
|  | Portable |  |
|  | Hand-held |  |
|  | Floor standing |  |
|  | Fixed |  |
|  | Built-in |  |

|  |  |  |
| --- | --- | --- |
| Hazardous Voltages | | |
|  | Means of protection: | |
|  | Is the EUT intended for use in wet locations? | |
|  | Does the EUT generate (internally or with external terminal) voltages above 30 VRMS, 42,4 VPK or 60 V DC | |
|  | V | Purpose: |
|  | V | Purpose: |
|  | V | Purpose: |
|  | V | Purpose: |

|  |  |  |
| --- | --- | --- |
| Batteries | | |
|  | V, rechargeable | Purpose: |
|  | V, rechargeable | Purpose: |
|  | V, rechargeable | Purpose: |

|  |  |
| --- | --- |
| Motors | |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

|  |  |
| --- | --- |
| Heater / Cooler | |
|  |  |
|  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Compressed gases or fluids | | | |
|  |  | Volume | Pressure |
|  |  |  |  |

## Prefered Project Schedule

|  |  |  |
| --- | --- | --- |
| Milestone | Preferred date | Comment |
| Date of EUT delivery |  |  |
| Technical briefing by customer |  | Fill in if required only |
| Start of testing |  | Acknowledged date will be provided by HTC |
| End of testing |  | Projected end date without disruptions |
| Delivery of test results |  | Standard delivery service is 10 working days after end of testing. |

Please take note, that the following documents must be available at start of testing to avoid disruptions or delays:

* Block Diagram
* Schematics and Board Layout
* Manuals
* General Specifications of the EuT (Input power and Environmental Specs) if not already on the EuT or the User Manual
* Label Design if not already on the EuT
* Certificates and/or datasheets of the safety critical components

# Environmental simulation tests

## Reporting of test results

|  |  |
| --- | --- |
| Complete product test | Partial tests |
| With test report | With test report |
|  | Only test protocols |

## Customer testplan

|  |  |  |
| --- | --- | --- |
| Is a customer’s testplan available | Yes | No |

If the testplan is provided by the customer, please skip this chapter and attach the customer testplan.

## Monitored performance parameters

During operating tests max. accepatable deviatons from performance parameters must be monitored.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Nr. | Measurand / Criteria | Allowed deviation from specification | During operational tests | During non-operational tests |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

|  |  |
| --- | --- |
| Monitoring setup | |
|  | Automatic monitoring with customer proprietary software (equipment must be provided by the customer) |
|  | Visual monitoring by HTC personnel |
|  | Monitoring by customer personnel |
|  |  |

## Product Vibration Tests

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Broadband random and guidance acc. IEC 60068-2-64:2008 | | | | | |
| EUT state: | | operating | | non-operating |  |
| EUT orientation: | | top - bottom | | top - bottom |  |
|  | | left - right | | left - right |
|  | | front - rear | | front - rear |
|  | Test profile acc | | <add. info> | | |
|  | Other: | | <add. info> | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Swept Sine and Resonance Dwell acc. IEC 60068-2-6:2007 | | | | | |
| EUT state: | | operating | | non-operating |  |
| EUT orientation: | | top - bottom | | top - bottom |  |
|  | | left - right | | left - right |
|  | | front - rear | | front - rear |
|  | Test profile acc | | <add. info> | | |
|  | Other: | | <add. info> | | |

## Product Shock Tests

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Half-Sine Shock acc. IEC 60068-2-27:2008 | | | | | | |
| EUT state: | | | operating | | non-operating |  |
| EUT orientation: | | | bottom | | bottom |  |
|  | | | top | | top |
|  | | | left | | left |
|  | | | right | | right |
|  | | | front | | front |
|  | | | rear | | rear |
|  | Number of shocks per orientation: | | | 1 | | |
|  | | Test profile acc | | <add. info> | | |
|  | | Other: | | <add. info> | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Trapezoidal Shock acc. IEC 60068-2-27:2008 | | | | | | |
| EUT state: | | | operating | | non-operating |  |
| EUT orientation: | | | bottom | | bottom |  |
|  | | | top | | top |
|  | | | left | | left |
|  | | | right | | right |
|  | | | front | | front |
|  | | | rear | | rear |
|  | Number of shocks per orientation: | | | 1 | | |
|  | | Test profile acc | | <add. info> | | |
|  | | Other: | | <add. info> | | |

## Packaging Tests

|  |  |  |
| --- | --- | --- |
| Vibration Tests | | |
|  | Broadband random and guidance acc. IEC 60068-2-64:2008 Test profile acc | <add. info> |
|  | Swept Sine and Resonance Dwell acc. IEC 60068-2-6:2007 Test profile acc | <add. info> |
|  | Other | <add. info> |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Free Fall acc. IEC60068-2-32:2000 | | | | |
| EUT orientation: | | |  | |
| Faces | Edges | Corners |
| bottom | top-front | top-front-left |
| left | top-left | top-left-rear |
| right | top-rear | top-rear-right |
| front | top-right | top-right-front |
| rear | bottom-front | bottom-front-left |
| top | bottom-left | bottom-left-rear |
|  | bottom-rear | bottom-rear-right |
|  | bottom-right | bottom-right-front |
|  | front-left |  |  | |
|  | left-rear |  |  | |
|  | rear-right |  |  | |
|  | right-front |  |  | |
| Number of falls per orientation: | | 1 | |  |
| Fall height acc | |  | | -- cm |

## Climatic Tests

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Climatic acc. IEC 60068-2-1:2007, IEC 60068-2-2:2007, IEC 60068-2-78, IEC 60068-2-14:2009, IEC 60068-2-30:2005, IEC 60068-2-31:2008, IEC 60068-38:2009 | | | | |
| Temperature | | Humidity | Combined Temperature/Humidity | |
| Profile description (e.g. temperatures, humidities, duration) | | | | |
|  | Temperature test profile acc | | | <add. info> |
|  | Humidity test profile acc | | | <add. info> |
|  | | | | |
| <add. info> | | | | |

## Project Schedule

|  |  |  |
| --- | --- | --- |
| Milestone | Preferred date | Comment |
| Date of EUT delivery |  |  |
| Technical briefing by customer |  | Fill in if required only |
| Start of testing |  | Acknowledged date will be provided by HTC |
| End of testing |  | Projected end date without disruptions |
| Delivery of test results |  | Standard delivery service is 10 working days after end of testing. |

# Compliance Decision Rules

The compliance decision rules, as discussed and agreed upon with the customer, specifying how measurement uncertainty will be accounted for when stating conformity (pass / fail) with a specification or standard, are summarized in this clause.

Only the measurement uncertainties of the laboratory relevant for the test results or compliance decision, and those required by the specification, standard or customer are presented here. Unless otherwise stated, the expanded measurement uncertainties of the test laboratory are based on a coverage factor k = 2 that yields a confidence level of approximately 95 %.

## EMC Testing

### Conducted and Radiated Emission:

The expanded measurement instrumentation uncertainty *U*lab of the test laboratory has been determined according to CISPR 16-4-2 and has also been considered in accordance with CISPR 16-4-2 when determining compliance with the limits.

|  |  |  |  |
| --- | --- | --- | --- |
| Measurement | Frequency range | *U*cispr | *U*lab |
| Conducted emission using V-AMN | 150 kHz to 30 MHz | 3.4 dB | *U*lab < *U*cispr |
| Radiated emission (OATS) | 30 MHz to 1000 MHz | 6.3 dB | *U*lab < *U*cispr |
| Radiated emission | 1 GHz to 6 GHz | 5.2 dB | *U*lab < *U*cispr |

Since *U*lab is less than or equal to *U*cispr of CISPR 16-4-2 Table 1, then an adjustment of the measured level is not required according to CISPR 16-4-2:

* Compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit
* Non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit

### Harmonic Emission acc. IEC 61000-3-2 and Flicker Test acc. IEC 61000-3-3:

For these measurements, the uncertainty of measurement has been taken directly into account when determining compliance with specification, as per ILAC-G8:09/2019. The expanded measurement uncertainties of the test laboratory (*U*) have been estimated as follows:

|  |  |
| --- | --- |
| **Measurement** | ***U*** |
| Harmonic current emission (IEC 61000-3-2) | 2.8 % |
| Voltage fluctuations and flicker (IEC 61000-3-3) | 6.1 % |

A binary statement of conformity based on the simple acceptance rule (guard band *w* = 0) has been applied:



* Pass – Compliance is deemed to occur if no measured value exceeds the specification limit.
* Fail – Non-compliance is deemed to occur if any measured value exceeds the specification limit.

Assuming a normal distribution of measurement results, the probability of false accept (PFA) is ≤ 50 % and the probability of false reject (PFR) is < 50 % and can be better estimated from the following table:

| **│Distance│of measured value to limit** | **Probability of a false statement of conformity (PFA / PFR)** |
| --- | --- |
| ≥ 3 × *U* | ≤ 1 ppm |
| ≥ 1.5 × *U* | ≤ 0.16 % |
| ≥ 1 × *U* | ≤ 2.5 % |
| ≥ 0.83 × *U* | ≤ 5 % |
| > 0 | < 50 % |
| 0 (measured value lies on the limit) | 50 % (worst case scenario) |

### Immunity Tests acc. basic standards IEC 61000-4-x and Environmental Tests:

* The test equipment and test parameters have been calibrated or verified, where applicable, and their measurement instrumentation uncertainty determined in accordance with the relevant basic standards or specifications. All values comply with the accuracy requirements as specified in these standards or specifications.
* Neither the uncertainty of the test instrument / test parameters nor that of the EUT monitoring system has been taken into account in determining compliance of the EUT with the relevant basic standard.
* Additionally, the test parameters that is applied to the EUT during the test process have not been adjusted to take uncertainty into account.

## Safety Testing

All measurements in this report are conducted applying the accuracy method mentioned in IECEE Guide 115 and outlined in Keysight’s internal quality management processes. The tests performed are routine and all sources of uncertainty are minimized. Test parameters such as power source voltage, ambient temperature / humidity are maintained within the defined acceptable limits of the applied standard. Personnel training minimizes uncertainty due to human factors. Instrumentation used have accuracies within the defined limits of IECEE OD-5014 and/or of Keysight’s internal quality management process specifications depending on the more stringent limits.

Therefore, the measurement results are considered in conformance with the requirements of the applied standard if it is within the above prescribed limits without further consideration of Measurement Uncertainties.

## Environmental Testing

**Environmental Tests acc. to the standards IEC 60068-2-x:**

* The uncertainty of the test setup has not been taken into account in determining compliance of the EUT with the relevant basic standard.
* The pass / fail decision is defined by the customer.
* The test equipment and test parameters are calibrated or verified (where applicable), and their measurement uncertainty is calculated in accordance with the relevant basic standards or specifications. All values comply with the accuracy requirements as specified in these standards or specifications.