



FCC CFR47 PART 15 SUBPART C
CLASS 2 PERMISSIVE CHANGE TEST REPORT
FOR
60 GHz WIRELESSHD DISPLAY MINI CARD TRANSMITTER

MODEL NUMBER: SIL-SK63100

FCC ID: UK2-SIL-SK63100

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Revision History

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--	05/14/2013	As Issued	M. Heckrotte
A	07/15/2013	Revised Reference Report, Clarified measurement and separation distances	M. Heckrotte
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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SILICON IMAGE
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EUT DESCRIPTION: 60GHz WIRELESSHD DISPLAY MINI CARD TRANSMITTER

MODEL: SIL-SK63100

SERIAL NUMBER: See Reference Report

DATE TESTED: See Reference Report

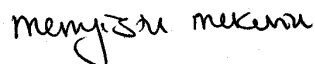
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass

Compliance Certification Services (UL CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For UL CCS By:

Tested By:



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2. TEST METHODOLOGY

The calculations documented in this report were performed in accordance with FCC Bulletin OET 65.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.

4. REFERENCE REPORT

Measurements utilized for the calculations in this report are presented in UL CCS Report 12U14290-3E.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a WirelessHD Source radio module. It is designed to operate as part of a Wireless Video Audio Network (WVAN) in the 57 to 64 GHz band. The EUT sends High Definition Audio/Video to a WirelessHD Sink radio device.

5.1. DESCRIPTION OF CLASS 2 PERMISSIVE CHANGE

The change is to add Mobile Device operating configuration and co-located operation with other transmitters in a Mobile configuration.

6. RF EXPOSURE

6.1. RULES AND LIMITS

FCC RULES

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f ²)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

6.2. EQUATIONS

The power density is calculated using OET 65 Equation 18:

Power density is given by:

$$S = \text{EIRP} / (4 * \pi * D^2)$$

Where

S = Power density in mW/cm²

EIRP = Equivalent Isotropic Radiated Power in mW

D = Separation distance in cm

6.3. OPERATING MODES

The setup phase (LRP) and normal operation (MRP/HRP) do not occur simultaneously; therefore it is appropriate to consider the RF exposure during these two operating modes independently.

MRP and HRP are mutually exclusive modes therefore it is appropriate to consider the RF exposure of these two modes independently.

6.3. MEASURED RESULTS

EIRP values in table below are based on measurements made at a 1.5 m test distance.

Separation distance of 20 cm is used to calculate the power density for RF Exposure purposes.

Freq	EIRP	Separation Distance	Power Density	FCC Limit
(GHz)	(dBm)	(cm)	(mW/cm ²)	(mW/cm ²)

LRP				
60.480	15.0	20.0	0.0063	1.0

MRP				
60.480	28.6	20.0	0.1442	1.0
62.640	27.7	20.0	0.1172	1.0

HRP				
60.480	26.1	20.0	0.0811	1.0
62.640	25.0	20.0	0.0629	1.0

6.4. RESULTS BASED ON WORST-CASE POWER SCALING

6.4.1. POWER SCALING

The HRP mode is the reference mode for device output power.

The output power of the LRP mode and the MRP mode tracks the output power of the HRP mode.

The maximum output power is limited by the maximum specified tolerance limit for HRP power.

Therefore the maximum upward scaling of the output power in all transmitting modes (LRP, HRP and MRP) is determined by the difference between the maximum HRP tolerance limit and the highest measured HRP EIRP on the sample tested. These parameters are average values.

The maximum HRP tolerance limit is 28 dBm EIRP.

The highest measured Average HRP EIRP on the sample tested was 26.1 dBm.

The maximum upward power scaling for the sample tested is 28 dBm EIRP – 26.1 dBm EIRP = 1.9 dB.

The EIRP of each mode is scaled upward by 1.9 dB.

6.4.2. RESULTS WITH POWER SCALING

Scaled EIRP values in table below are based on measurements made at a 1.5 m test distance.

Separation distance of 20 cm is used to calculate the scaled power density for RF Exposure purposes.

Freq	EIRP	Separation Distance	Power Density	FCC Limit
(GHz)	(dBm)	(cm)	(mW/cm ²)	(mW/cm ²)

LRP				
60.480	16.9	20.0	0.0097	1.0

MRP				
60.480	30.5	20.0	0.2233	1.0
62.640	29.6	20.0	0.1815	1.0

HRP				
60.480	28.0	20.0	0.1256	1.0
62.640	26.9	20.0	0.0975	1.0

The worst case scaled power density at a 20 cm separation distance is 0.22 mW/cm².

The fractional portion of the MPE limit is 0.22, or expressed as a percentage = 22%.

6.5. CO-LOCATED RF EXPOSURE

The maximum allowable sum of the scaled fractional portions of the MPE limit of all other co-located transmitters is $1 - 0.22 = 0.78$, or expressed as a percentage = 78%.

For the particular case of co-located WLAN and Bluetooth transmitters which operate in frequency bands where the MPE limit is 1 mW/cm^2 , the maximum allowable sum of the scaled power densities, at a 20 cm separation distance, of all such transmitters is 0.78 mW/cm^2 .

Similarly, for the particular case of co-located WLAN and Bluetooth transmitters, applying OET Bulletin 65 Equation 18 in reverse yields the maximum allowable sum of the scaled EIRPs of all such transmitters. The resulting maximum EIRP is 35.9 dBm, with the provision that each transmitter must comply with the applicable EIRP and/or de facto EIRP limits, which may be less than this total allowable EIRP for multiple transmitters.

END OF REPORT