

# Test Report



## INTENTIONAL RADIATOR TESTS ACCORDING TO FCC PART 15 C AND ISED CANADA REQUIREMENTS

Equipment Under Test:	Indoor mini Drone system with UWB radio technology
Trademark:	Intel
Model:	Shooting Star Mini Drone
Applicant:	Intel Corporation 2200 Mission College Blvd Santa Clara, CA 95054 USA
Manufacturer:	Intel Behringstraße 10 82152 Planegg GERMANY
FCC Rule Part:	Part 15 C
IC Rule Part:	RSS-GEN Issue 4, 2014

- *Partial testing, see test suite*

Date: 12 October 2018

Issued by:

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Date: 12 October 2018

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## Equipment Under Test (EUT)

Type:	Indoor mini Drone system with UWB radio technology
Model:	Shooting Star Mini Drone
Trade Mark:	Intel
Serial no:	-
Software version:	-
Hardware version:	-

## General Description

The Intel Shooting Star Mini Drone system is an UAV dedicated for aerial displays.

The Shooting Star Mini system contains three main components:

1. The Aerial Drone. This is the lightweight UAV that contains the LED light used to produce the show effects. No serial numbers.
2. The Launch Pad provides the launch and charging facilities for fifteen (15) drones. No serial number.
3. The Anchors for control and indoor positioning. No serial number.

The system uses 6.5 GHz UWB radio module. The module is FCC certified and CE marked.

According to the manufacturer the highest clock frequency is under 108 MHz.

## Samples and Modifications

No.	Name	Description
1	Launchpad	Normal sample, no modifications
2	Anchor	Normal sample, no modifications
3	Drones	15 drones, Normal sample, no modifications

## Specifications

Nominal frequency:	6489.6 MHz
Nominal Channel Bandwidth:	500 MHz
Highest Internal Frequency:	<108 MHz

## Power Requirements

Launch Pad:

Rated voltage: 100 – 240 VAC ~ 50 – 60Hz  
Rated current: 1.7 A

Anchor:

Rated voltage: 5 VDC (USB)

Aerial Drone:

Battery operated: 3.7 VDC internal Li-ion battery

**Cable Lengths and Types**

<b>Cable:</b>	<b>Length:</b>	<b>Type:</b>
Mains power	0.3 - 5 m	unshielded (L,N,PE)
USB cable	<3 m	unshielded

**Peripherals**

- Huawei Power Bank model: AP007
- Intel NUC PC model: NUC7i5BNK, S/N: G6BN81500TS1
- FSP AC/DC adaptor model: FSP065-10AABA
- PC Laptop HP Elitebook 8540w

All peripherals were supplied by the manufacturer.

## Disclaimer

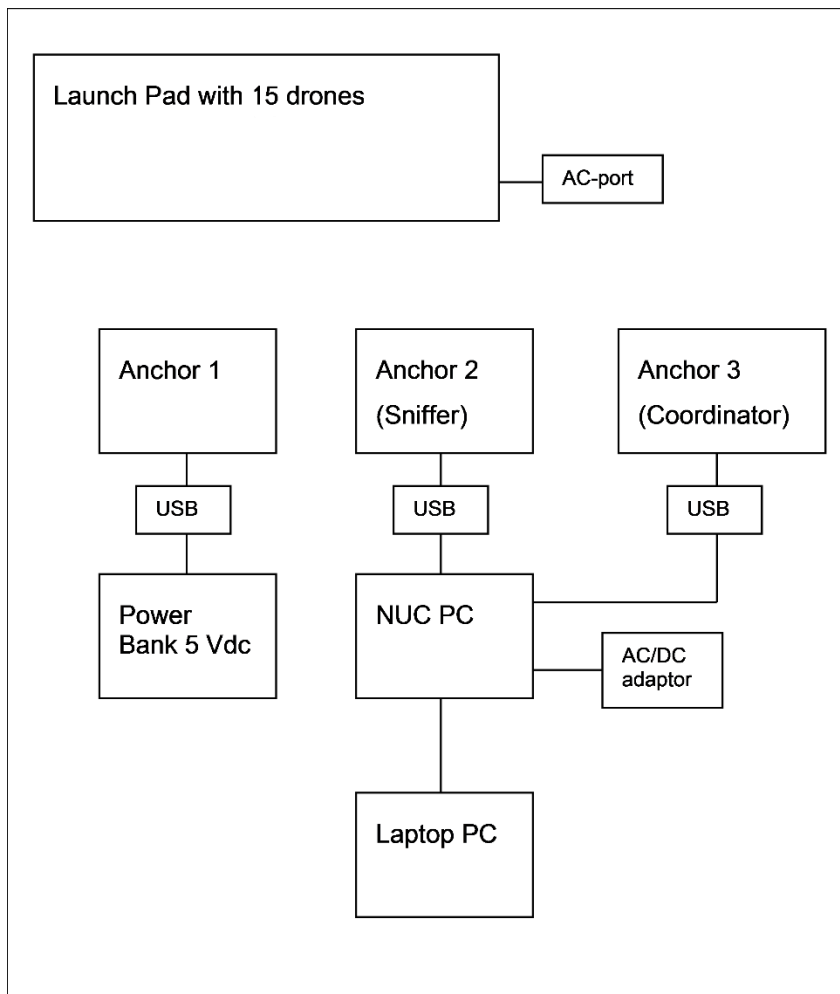
*This document is issued by the Company under its General Conditions of service accessible at [http://www.sgs.com/terms and conditions.htm](http://www.sgs.com/terms_and_conditions.htm). attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.*

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*Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only. This document cannot be reproduced except in full, without prior approval of the Company.*

## EUT Test Conditions during Testing

Configuration of the EUT was made to correspond to the actual assembling conditions as far as possible. The functionality and the communication link were monitored with customer control program. Fifteen Aerial Drones were set on the Launch Pad for recharging. Rotors were not rotating during they were on the Launch Pad. This setup with 15 drones charging simultaneously and radio communications on, represents worst case mode of operation. Radiated emissions were also measured for the Aerial Drone alone in hovering mode. The EUTs were also monitored with a video camera.



**Picture 1.** Block diagram of the test setup

## Conducted Emissions In The Frequency Range 150 kHz – 30 MHz

### Summary of Testing

Test Specification	Description of Test	Result
§15.207(a) / RSS-GEN 8.8	Conducted Emissions on Power Supply Lines	<b>PASS</b>

### Test Facility

Testing Laboratory / address: FCC registration number: <b>904175</b>	SGS Fimko Ltd Särkiniementie 3 FI-00210, HELSINKI FINLAND
Test Site:	<input type="checkbox"/> Kara 10, ISED Canada registration number: <b>8708A-1</b> <input checked="" type="checkbox"/> Kara 5, ISED Canada registration number: <b>8708A-2</b> <input type="checkbox"/> Laru 3 <input type="checkbox"/> Kallio 10

## Conducted Emissions In The Frequency Range 150 kHz – 30 MHz

### TEST RESULTS

#### Conducted Emissions In The Frequency Range 150 kHz - 30 MHz.

**Standard:** ANSI C63.10 (2013)  
**Tested by:** MIH  
**Date:** 27 August 2018  
**Temperature:** 20 °C  
**Humidity:** 54 % RH  
**Measurement uncertainty:**  $\pm 2.9$  dB Level of confidence 95 % ( $k = 2$ )

**FCC Rule: 15.207 (a)**  
**RSS-GEN 8.8**

#### Test plan

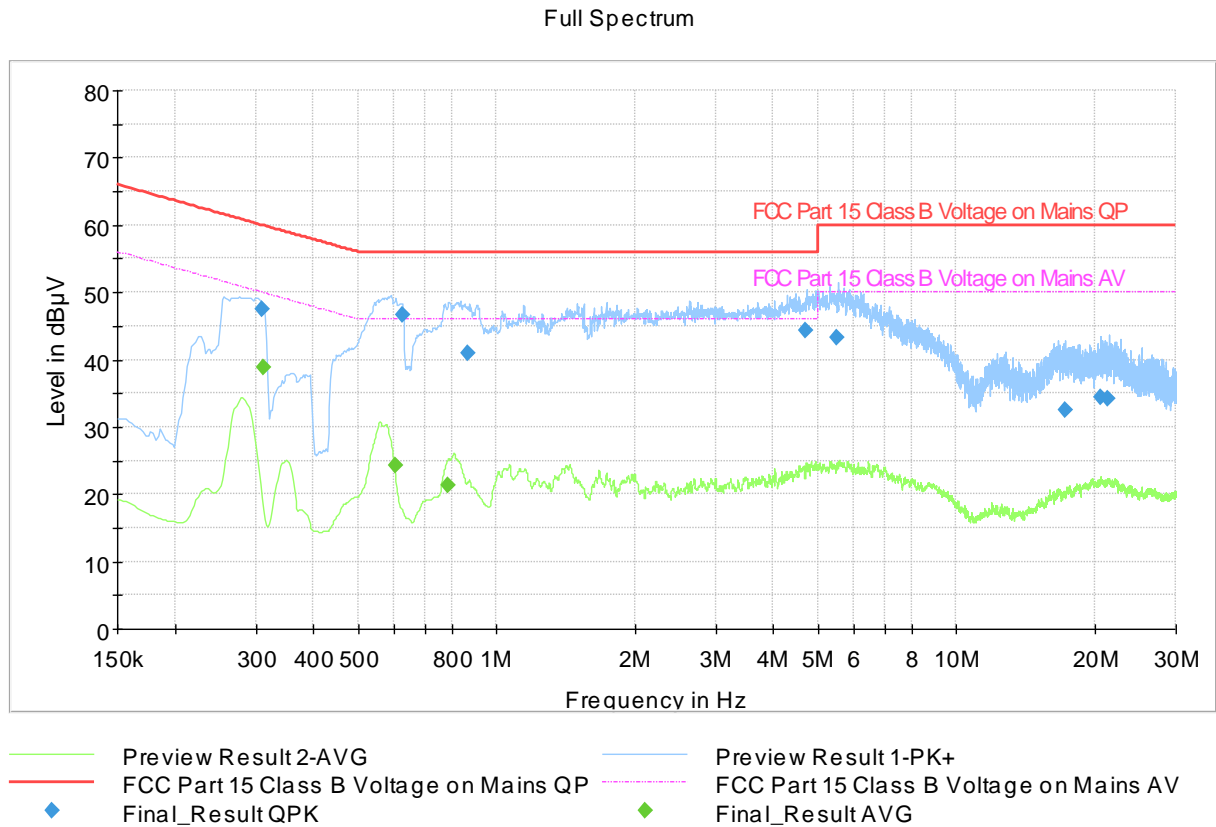
Conducted disturbance voltage was measured with an artificial main network from 150 kHz to 30 MHz with 4.5 kHz steps and a resolution bandwidth of 9 kHz. Measurements were carried out with peak and average detectors. During the test the EUT was powered from the separate power supply (115 VAC / 60 Hz) through the LISN.

Frequency of emission (MHz)	Conducted limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\*Decreases with the logarithm of the frequency.



## Conducted Emissions In The Frequency Range 150 kHz – 30 MHz



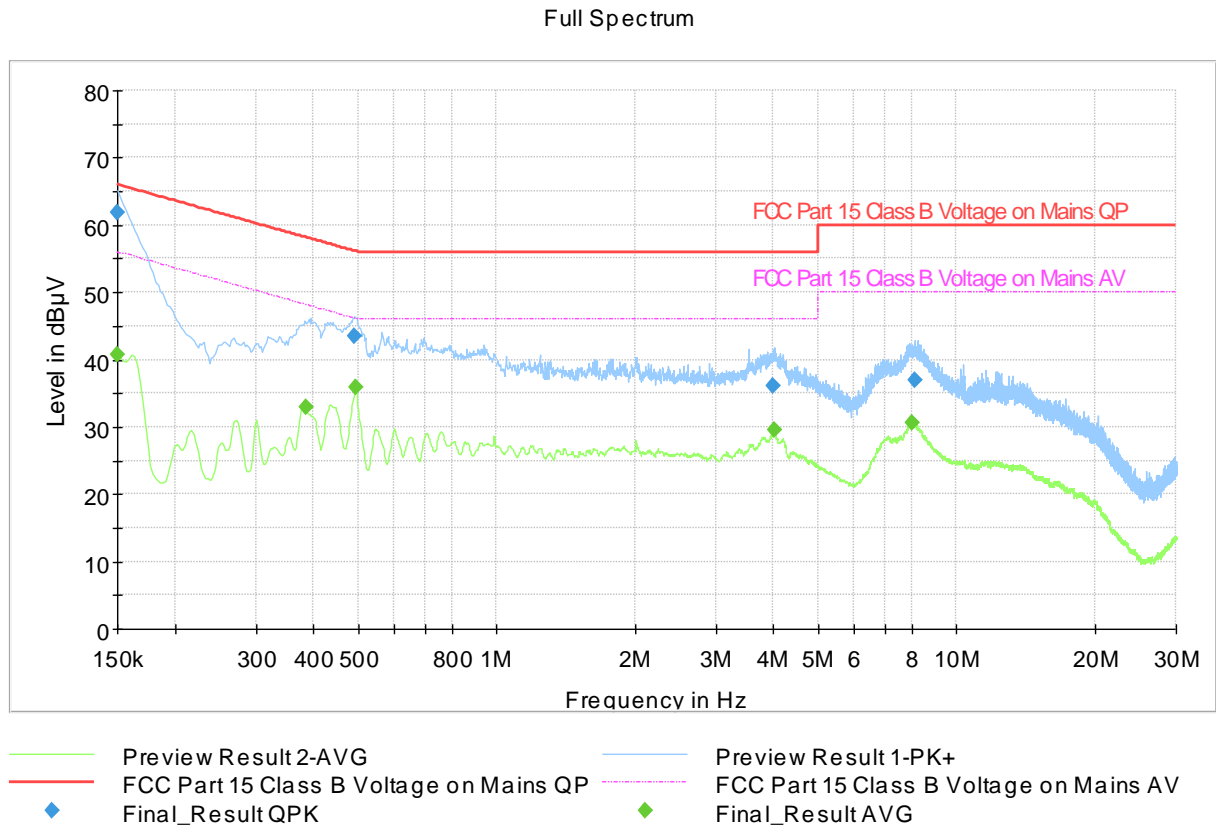
**Figure 1.** The measured results with peak- and average detectors at the Launch AC-port

**Table 1.** Final Quasipeak and Average results (Launch pad AC-port)

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.310000	47.53	---	59.97	12.44	1000.0	9.000	N	ON	10.2
0.311500	---	38.79	49.93	11.14	1000.0	9.000	N	ON	10.2
0.602250	---	24.17	46.00	21.83	1000.0	9.000	N	ON	10.3
0.623750	46.72	---	56.00	9.28	1000.0	9.000	N	ON	10.2
0.786000	---	21.23	46.00	24.77	1000.0	9.000	N	ON	10.3
0.869000	41.01	---	56.00	14.99	1000.0	9.000	N	ON	10.3
4.706750	44.34	---	56.00	11.66	1000.0	9.000	N	ON	10.4
5.497750	43.37	---	60.00	16.63	1000.0	9.000	N	ON	10.4
17.232750	32.47	---	60.00	27.53	1000.0	9.000	L1	ON	10.5
20.582750	34.36	---	60.00	25.64	1000.0	9.000	N	ON	10.7
21.407750	34.09	---	60.00	25.91	1000.0	9.000	N	ON	10.6

The presented final values contain the correction factors and can be directly compare with the limits.

Conducted Emissions In The Frequency Range 150 kHz – 30 MHz



**Figure 2.** The measured results with peak- and average detectors at the NUC power adaptor

**Table 2.** Final Quasipeak and Average results (NUC power adaptor)

Frequency (MHz)	QuasiPeak (dB $\mu$ V)	Average (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.150000	---	40.70	56.00	15.30	1000.0	9.000	L1	ON	9.9
0.150000	61.86	---	66.00	4.14	1000.0	9.000	N	ON	10.1
0.386500	---	32.87	48.14	15.27	1000.0	9.000	N	ON	10.3
0.491000	43.50	---	56.15	12.65	1000.0	9.000	N	ON	10.3
0.493250	---	35.98	46.11	10.13	1000.0	9.000	N	ON	10.3
3.982000	36.12	---	56.00	19.88	1000.0	9.000	L1	ON	10.0
4.015250	---	29.52	46.00	16.48	1000.0	9.000	L1	ON	10.0
8.023750	---	30.59	50.00	19.41	1000.0	9.000	N	ON	10.5
8.135750	37.03	---	60.00	22.97	1000.0	9.000	N	ON	10.5

The presented final values contain the correction factors and can be directly compare with the limits.

**Conducted Emissions**

Equipment	Manufacturer	Type	Inv or serial	Prev Calib	Next Calib
TEST SOFTWARE	ROHDE & SCHWARZ	EMC-32	-	-	-
LISN	ROHDE & SCHWARZ	ENV216	inv:9611	2018-03-01	2019-03-01
LISN	ROHDE & SCHWARZ	ESH3-Z5	inv:8019	2018-05-24	2019-05-24
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESU 26	inv:8453	2018-06-27	2019-06-27
ATTENUATOR	PASTERNAK	PE 7004-4	inv:10126	2017-12-01	2019-12-01
POWER SUPPLY	CALIFORNIA INSTR.	5001 iX Series II	inv:7826	-	-