Radio Frequency Exposure Evaluation Report

FOR:
Qolsys Inc.

Model Number:
IQ Shock Mini

Product Description:
Door Sensor Alarm System

FCC ID: 2AAJXQS-IQSKM
IC: *11205A-QSIQSKM*

Per:
CFR Part Part1 (1.1307 &1.1310), Part 2 (2.1091),
FCC KDB 447498 D01 General RF Exposure Guidance v06
ISEDC RSS-102 Issue 5

Report number: EMC_QOLSY-011-23001_FCC_ISED_MPE_Rev1

DATE: 2023-03-29

***CETECOM* Inc.**
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1 Assessment

This RF Exposure evaluation report provides evidence for compliance of the below identified device with the RF Exposure limits for mobile devices as defined in FCC CFR Part 1 (1.1307 &1.1310), Part 2 (2.1091) and IC standard RSS-102 issue 5 under worst case conditions (measured or rated RF output power, antenna gain, distance towards human body, multiple transmitter information as presented by the applicant).
In addition, maximum antenna gain or minimum distance towards the human body is calculate respectively, where relevant.

The device meets the limits as stipulated by the above given FCC and IC rule parts based on available specifications for worst case conditions at 20cm distance to the body.

Company	Description	Model #
Qolsys Inc.	The IQ Shock Mini is an encrypted sensor with superior range specifically designed with multi-level vibration detection. It can alert you if a door is left open and provide security for anything that opens or closes. It is intended to work only with our Alarm panels.	IQ Shock Mini

Responsible for Testing Laboratory:

Date	Section	Name	Signature
2023-03-29	Compliance	Arndt Stoecker (Director of Regulatory Services)	Arndt Stoecker Digitally signed by: Arndt Stoecker DN: CN = Arndt Stoecker email = arndt.stoecker@cetecom.com C = US O = CETECOM Inc Date: 2023.03.29 15:08:16 -07'00'

Responsible for the Report:

Date	Section	Name	Signature
2023-03-29	Compliance	Art Thammanavarat (Senior EMC Engineer)	art. thammanavarat @cetecom.com Digitally signed by: art. thammanavarat@cetecom.com DN: CN = art. thammanavarat@cetecom.com Date: 2023.03.29 14:48:25 -07'00'

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Street Address:	411 Dixon Landing Road
City/Zip Code	Milpitas, CA 95035
Country	USA
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Compliance Manager:	Arndt Stoecker
Responsible Project Leader:	Akanksha Baskaran

2.2 Identification of the Client / Manufacturer

Client Firm/Name:	Qolsys Inc.
Street Address:	1919 S. Bascom Ave. Suite 600
City/Zip Code	Campbell, California, 95008
Country	USA

Identification of the Manufacturer

Manufacturer's Name:	Same as Client
Manufacturers Address:	
City/Zip Code	
Country	

3 Equipment under Assessment

Model No	IQ Shock Mini
HW Version	x27
SW Version	1.8
PMN	IQ Shock Mini
Contains FCC-ID	2AAJXQS-IQSKM
Contains IC:	11205A-QSIQSKM
Operating Voltage Range	3VDC
Operating Temperature Range	Low : 0 ºC Norm 25 ºC High 40 ºC
Radios included in the device	**Periodic radio** SRF Frequency of operation: 319.5MHz
Sample Revision	☐Prototype ☐Production ☒ Pre-Production
EUT Dimensions	23.98mm x 13.89mm x 63.25mm
EUT Diameter	■ < 60 cm ☐ Other _____

4 RF Exposure Limits and FCC and IC Basic Rules

For the specific described radio apparatus the following basic limits and rules apply for both, FCC and IC where not indicated differently.

4.1 Power Density Limits acc. to FCC 1.1310(e) / RSS-102 i5, cl. 4:

FCC

Frequency Range (MHz)	Power density (mW/cm²)	Averaging time (minutes)
300 – 1500	f (MHz) /1500	30
1500 – 100000	1.0	30

IC

300 – 6000	0.02619 x f (MHz) $^{0.6834}$	6

4.2 Routine Environmental Evaluation Categorical Exclusion Limits acc. to FCC 2.1091(c) / RSS-102, cl. 2.5 (rounded to 1 decimal point):

FCC

Operating frequency < 1.5GHz: excluded if ERP < 1.5W / 31.8dBm (EIRP: 33.9 dBm);
Operating frequency > 1.5GHz: excluded if ERP < 3.0W / 34.8dBm (EIRP: 36.9 dBm);

$$P_{th}(\text{mW}) = ERP_{20\,cm}\,(\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \leq f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \leq f \leq 6\ \text{GHz} \end{cases}$$

FCC SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and ≤ 50 mm

The SAR exclusion table from 447498 D01§Appendix A is reproduced below:

Table1: SAR evaluation - 1g exemption limits for routine evaluation based on frequency and separation distance.

Frequency MHz	Exemption Limits (mW)				
	At separation distance of ≤5mm	At separation distance of 10mm	At separation distance of 15mm	At separation distance of 20mm	At separation distance of 25mm
150	39	77	116	155	194
300	27	55	82	110	137
450	22	45	67	89	112
835	16	33	49	66	82
900	16	32	47	63	79
1500	12	24	37	49	61
1900	11	22	33	44	54
2450	10	19	29	38	48
3600	8	16	24	32	40
5200	7	13	20	26	33
5400	6	13	19	26	32
5800	6	12	19	25	31

Frequency MHz	Exemption Limits (mW)				
	At separation distance of 30mm	At separation distance of 35mm	At separation distance of 40mm	At separation distance of 45mm	At separation distance of ≥50mm
150	232	271	310	349	387
300	164	192	219	246	274
450	134	157	179	201	224
835	98	115	131	148	164
900	95	111	126	142	158
1500	73	86	98	110	122
1900	65	76	87	98	109
2450	57	67	77	86	96
3600	47	55	63	71	79
5200	39	46	53	59	66
5400	39	45	52	58	65
5800	37	44	50	56	62

Table1: SAR evaluation - 10g exemption limits for routine evaluation based on frequency and separation distance.

Frequency MHz	Exemption Limits (mW)				
	At separation distance of ≤5mm	At separation distance of 10mm	At separation distance of 15mm	At separation distance of 20mm	At separation distance of 25mm
150	97.5	192.5	290	387.5	485
300	67.5	137.5	205	275	342.5
450	55	112.5	167.5	222.5	280
835	40	82.5	122.5	165	205
900	40	80	117.5	157.5	197.5
1500	30	60	92.5	122.5	152.5
1900	27.5	55	82.5	110	135
2450	25	47.5	72.5	95	120
3600	20	40	60	80	100
5200	17.5	32.5	50	65	82.5
5400	15	32.5	47.5	65	80
5800	15	30	47.5	62.5	77.5

Frequency MHz	Exemption Limits (mW)				
	At separation distance of 30mm	At separation distance of 35mm	At separation distance of 40mm	At separation distance of 45mm	At separation distance of ≥50mm
150	580	677.5	775	872.5	967.5
300	410	480	547.5	615	685
450	335	392.5	447.5	502.5	560
835	245	287.5	327.5	370	410
900	237.5	277.5	315	355	395
1500	182.5	215	245	275	305
1900	162.5	190	217.5	245	272.5
2450	142.5	167.5	192.5	215	240
3600	117.5	137.5	157.5	177.5	197.5
5200	97.5	115	132.5	147.5	165
5400	97.5	112.5	130	145	162.5
5800	92.5	110	125	140	155

IC SAR Test Exclusion Calculations

The SAR exclusion table from RSS-102 issue 5 §2.5.1 is reproduced below:

Table1: SAR evaluation - 1g exemption limits for routine evaluation based on frequency and separation distance.

Frequency MHz	Exemption Limits (mW)				
	At separation distance of ≤5mm	At separation distance of 10mm	At separation distance of 15mm	At separation distance of 20mm	At separation distance of 25mm
≤300	71	101	132	162	193
450	52	70	88	106	123
750*	25	39	52	66	79
835	17	30	42	55	67
1750*	8	13	21	37	61
1900	7	10	18	34	60
2300*	5	8	16	31	54
2450	4	7	15	30	52
2500*	4	7	15	30	52
2600*	4	7	15	30	52
3500	2	6	16	32	55
5200*	1	6	15	28	45
5300*	1	6	15	28	44
5600*	1	6	15	27	42
5800	1	6	15	27	41

Frequency MHz	Exemption Limits (mW)				
	At separation distance of 30mm	At separation distance of 35mm	At separation distance of 40mm	At separation distance of 45mm	At separation distance of ≥50mm
≤300	223	254	284	315	345
450	141	159	177	195	213
750*	93	107	121	134	148
835	80	92	105	117	130
1750*	96	144	208	288	389
1900	99	153	225	316	431
2300*	87	131	187	257	342
2450	83	123	173	235	309
2500*	83	123	173	235	308
2600*	83	123	173	234	306
3500	86	124	170	225	290
5200*	64	85	107	130	154
5300*	63	83	103	125	146
5600*	59	76	92	108	122
5800	56	71	85	97	106

*Exemption Limits calculated using linear interpolation per RSS 102 Issue 5 §2.5.1.

When 10 gram value applies, the exemption limits for routine evaluation in Table 1 of RSS 102 Issue 5 §2.5.1, are multiplied by a factor of 2.5. The resulting values are illustrated in the table below.

Table1: SAR evaluation - 10g exemption limits for routine evaluation based on frequency and separation distance.

Frequency MHz	Exemption Limits (mW)				
	At separation distance of ≤5mm	At separation distance of 10mm	At separation distance of 15mm	At separation distance of 20mm	At separation distance of 25mm
≤300	177.5	252.5	330	405	482.5
450	130	175	220	265	307.5
750*	62.5	97.5	130	165	197.5
835	42.5	75	105	137.5	167.5
1750*	20	32.5	52.5	92.5	152.5
1900	17.5	25	45	85	150
2300*	12.5	20	40	77.5	135
2450	10	17.5	37.5	75	130
2500*	10	17.5	37.5	75	130
2600*	10	17.5	37.5	75	130
3500	5	15	40	80	137.5
5200*	2.5	15	37.5	70	112.5
5300*	2.5	15	37.5	70	110
5600*	2.5	15	37.5	67.5	105
5800	2.5	15	37.5	67.5	102.5

Frequency MHz	Exemption Limits (mW)				
	At separation distance of 30mm	At separation distance of 35mm	At separation distance of 40mm	At separation distance of 45mm	At separation distance of ≥50mm
≤300	557.5	635	710	787.5	862.5
450	352.5	397.5	442.5	487.5	532.5
750*	232.5	267.5	302.5	335	370
835	200	230	262.5	292.5	325
1750*	240	360	520	720	972.5
1900	247.5	382.5	562.5	790	1077.5
2300*	217.5	327.5	467.5	642.5	855
2450	207.5	307.5	432.5	587.5	772.5
2500*	207.5	307.5	432.5	587.5	770
2600*	207.5	307.5	432.5	585	765
3500	215	310	425	562.5	725
5200*	160	212.5	267.5	325	385
5300*	157.5	207.5	257.5	312.5	365
5600*	147.5	190	230	270	305
5800	140	177.5	212.5	242.5	265

*Exemption Limits calculated using linear interpolation per RSS 102 Issue 5 §2.5.1.

4.3 RF Exposure Estimation (MPE Estimation)

Having available the source based average output power and peak antenna gain or the ERP/EIRP of the specified device and for a known minimum distance of its radiating structures from the body of persons according to its use cases (at least 20cm) the power density at that distance can be estimated by the following formula for plane-wave equivalent conditions (far-field conditions), when ground reflection is neglected.

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

Where: S = power density (mW/cm^2 or W/m^2)
P = power input to the antenna (mW or W)
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 (cm or m)

5 Evaluations

5.1 RF Exposure Exclusion results

Band	Frequency (MHz)	Output Power		Antenna Gain (dBi)	E.I.R.P		Separation Distances (mm)	Exemption Limit (mW)	Calculated Threshold Value	Result
		dBm	mW		dBm	mW				
SRF	319.5	-2.20	0.60	-7.89	-10.09	0.10	5	See Sections 4.2	3.6	Excluded

5.2 Conclusion:

SRF radio complies with routine environmental evaluation requirements for RF exposure. Simultaneous transmission with other radios is not support.

6 Revision History

Date	Report Name	Changes to report	Prepared by
2023-03-06	EMC_QOLSY_011_23001_FCC_ISED_MPE	Initial Release	Art Thammanavarat
2023-03-29	EMC_QOLSY_011_23001_FCC_ISED_MPE_Rev1	**Report Revised :** 1. Section 2.2: Updated Address.	Art Thammanavarat

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