

Prüfbericht - Nr.: <i>Test Report No.:</i>	50323449 001	Auftrags-Nr.: <i>Order No.:</i>	180116641	Seite 1 von 4 <i>Page 1 of 4</i>
Kunden-Referenz-Nr.: <i>Client Reference No.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	18.11.2019	
Auftraggeber: <i>Client:</i>	Ring LLC 1523 26th St, Santa Monica, CA 90404, USA			
Prüfgegenstand: <i>Test item:</i>	Smart Lightbulb			
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	5AT1S3, 5AT3S4			
Auftrags-Inhalt: <i>Order content:</i>	TÜV Rheinland – Frequency Exposure Compliance			
Prüfgrundlage: <i>Test specification:</i>	FCC Part1-1.1307(b)(1) FCC Part1-1.1310 ANSI/IEEE C95.1-1992 RSS-102 Issue 5 March 2015			
Wareneingangsdatum: <i>Date of receipt:</i>	18.11.2019			
Prüfmuster-Nr.: <i>Test sample No.:</i>	A001035241 001-002			
Prüfzeitraum: <i>Testing period:</i>	09.12.2019			
Ort der Prüfung: <i>Place of testing:</i>	TÜV Rheinland / CCIC (Ningbo) Co., Ltd.			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland / CCIC (Ningbo) Co., Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von / tested by:		kontrolliert von / reviewed by:		
08.01.2020 Caidong Xie/PE 		08.01.2020 Feng Liang/TC 		
Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>
Sonstiges/ Other: The Radio Frequency Exposure Compliance Assessment of this product are evaluated in this report which was additional tests as test reports 50321015 001.				
FCC ID: 2AEUPRB19001 IC: 20271-RB19001				
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
*Legende: 1= Sehr gut 2 = gut 3= befriedigend 4= ausreichend 5 = mangelhaft P(ass) =entspricht o.g. Prüfgrundlage(n) F(ail)= entspricht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T =nicht getestet Legend: 1= very good 2 = good 3= satisfactory 4= sufficient 5 = poor P(ass) = passed a.m. test specification(s) F(ail)= failed a.m. test specification(s) N/A = not applicable N/T = not tested				
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.</i>				

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Radio Frequency Exposure Compliance

Result:

Pass

1. Maximum E.I.R.P

E.I.R.P. BLE for Block A

Modulation Type and Operation band	Channel	Channel Frequency (MHz)	Peak Output Power (dBm)	Antenna Gain (dBi)	Maximum E.I.R.P. (dBm)
BLE 2402MHz~2480MHz	Low Channel	2402	2.56	2.44	5.00 (3.16mW)
	Mid Channel	2440	2.49		
	High Channel	2480	2.43		

E.I.R.P. LoRa DTS, LoRa FHSS and FSK FHSS for Block B

Modulation Type and Operation band	Channel	Channel Frequency (MHz)	Peak Output Power (dBm)	Antenna Gain (dBi)	Maximum E.I.R.P. (dBm)
1. LoRa 500KHz DTS 902.5MHz~926.5	Low Channel	902.5	19.99	-1.69	19.54 (89.95mW)
	Mid Channel	914.5	20.03		
	High Channel	926.5	20.02		
2. LoRa 500KHz DTS 902.5MHz~926.5	Low Channel	903	20.28		
	Mid Channel	907.8	20.64		
	High Channel	914.2	20.35		
3. LoRa 500KHz DTS 902.5MHz~926.5	Low Channel	923.3	20.25		
	Mid Channel	925.1	20.27		
	High Channel	926.9	20.22		
4. LoRa 250KHz FHSS 902.3MHz~926.7MHz	Low Channel	902.3	20.60		
	Mid Channel	914.3	20.27		
	High Channel	926.7	20.33		
5. LoRa 125KHz FHSS 902.3MHz~914.9MHz	Low Channel	902.3	20.90		
	Mid Channel	908.5	20.82		
	High Channel	914.9	20.64		
6. LoRa 125KHz FHSS 902.2MHz~927.8MHz	Low Channel	902.2	21.23		
	Mid Channel	915	20.91		
	High Channel	927.8	20.49		
7. FSK 150Kbps FHSS 902.4MHz~927.6MHz	Low Channel	902.4	20.08		
	Mid Channel	914.8	20.32		
	High Channel	927.6	19.07		
8. FSK 50Kbps FHSS 902.2MHz~927.8MHz	Low Channel	902.2	20.86		
	Mid Channel	915	20.39		
	High Channel	927.8	20.06		
9. FSK 5Kbps FHSS	Low Channel	902.2	20.53		

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902.2MHz~927.8MHz	Mid Channel	915	20.39		
	High Channel	927.8	20.23		
10. FSK 250Kbps FHSS 902.5MHz~927.5MHz	Low Channel	902.5	21.01		
	Mid Channel	915	20.63		
	High Channel	927.5	20.31		

2. RF Exposure Evaluation for FCC

MPE Calculation

The power Density (mW / CM^2) is calculated as follows:

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

S=power density (mW / CM^2)

P=power input to the antenna (mW)

G=power input to the antenna in the direction of interest relative to an isotropic radiator

R=distance to the center of radiation of the antenna (CM)

FCC MPE, Block A standalone operation

Block	Transmit Frequency (MHz)	Power Density limit (mW / CM^2)	Max. Radio Power (dBm)	Antenna Gain (dBi)	Distance (CM)	Power Density (mW / CM^2)	Result
A	2402	1.0	2.56	2.44	20	0.000629	0.000629<1

Conclusion: Compliance with FCC's RF Exposure.

FCC MPE, Block B standalone operation

Block	Transmit Frequency (MHz)	Power Density limit (mW / CM^2)	Max. Radio Power (dBm)	Antenna Gain (dBi)	Distance (CM)	Power Density (mW / CM^2)	Result
B	902.2	0.61	21.23	-1.69	20	0.0179	0.0179<0.61

Conclusion: Compliance with FCC's RF Exposure.

FCC MPE, Block A and Block B simultaneous operation

According to 865664D02 2.2 d) 1):

The sum of the ratios of the spatially averaged results to the applicable frequency dependent MPE limits:

Simultaneous Transmission mode	The sum of the ratios	Result
Block A + B	0.000629/1 +0.0179/0.61	=0.02997 < 1

Conclusion: Compliance with FCC's RF Exposure.

3. RF Exposure Evaluation for IC

EUT RF Exposure Evaluation standalone operation

Exemption Limits for Routine Evaluation – RF Exposure Evaluation

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

At or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum E.I.R.P. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;

RF exposure evaluation exempted power for Block A: 2.67W

RF exposure evaluation exempted power for Block B: 1.37W

The max E.I.R.P. for Block A: 5dBm = 0.00316W

The max E.I.R.P. for Block B: 19.54dBm = 0.08995W

All E.I.R.P. are less than RF exposure evaluation exempted power. So RF exposure evaluation is not required.

EUT RF Exposure Evaluation simultaneous operation

The sum of the ratios of the spatially averaged results to the applicable frequency dependent MPE limits:

Simultaneous Transmission mode	The sum of the ratios	Result
Block A + B	$0.003162/2.67 + 0.08995/1.37$	$=0.0675 < 1$

Conclusion: Compliance with IC's RF Exposure.