

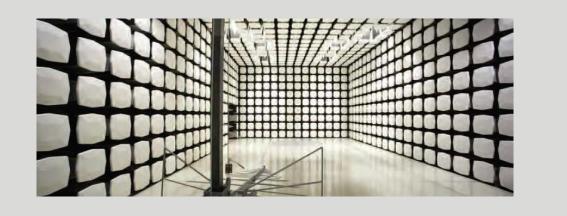
Koyo Electronics Industries Co., LTD

C2-03CPU

FCC 15.207:2020, FCC 15.247:2020

Bluetooth LE

Report # KOYO0001.15



NVLAP LAB CODE: 200881-0







Last Date of Test: March 4, 2020 Koyo Electronics Industries Co., LTD EUT: C2-03CPU

Radio Equipment Testing

Standards	
Specification	Method
FCC 15.207:2020	ANSI C63.10:2013, KDB 558074
FCC 15.247:2020	ANSI C03.10.2013, RDB 556074

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	Yes	Pass	
11.6	Duty Cycle	Yes	Pass	
11.8.2	Occupied Bandwidth	Yes	Pass	
11.9.1.1	Output Power	Yes	Pass	
11.9.1.1	Equivalent Isotropic Radiated Power	Yes	Pass	
11.10.2	Power Spectral Density	Yes	Pass	
11.11	Band Edge Compliance	Yes	Pass	
11.11	Spurious Conducted Emissions	Yes	Pass	
11.12.1, 11.13.2, 6.5, 6.6	Spurious Radiated Emissions	Yes	Pass	

Deviations From Test Standards

None

Approved By:

In

Eric Brandon, Department Manager

Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information. As indicated in the Statement of Work sent with the quotation, Element's standard process is to always use the latest published version of the test methods even when earlier versions are cited in the test specification. Issuance of a purchase order was de facto acceptance of this approach. Otherwise, the client would have advised Element in writing of the specific version of the test methods they wanted applied to the subject testing.

REVISION HISTORY



Revision Number	Description	Date (yyyy-mm-dd)	Page Number
00	None		

ACCREDITATIONS AND AUTHORIZATIONS



United States

FCC - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

A2LA - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Element to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB) and as a CAB for the acceptance of test data.

European Union

European Commission - Within Element, we have a EU Notified Body validated for the EMCD and RED Directives.

Australia/New Zealand

ACMA - Recognized by ACMA as a CAB for the acceptance of test data.

Korea

MSIT / RRA - Recognized by KCC's RRA as a CAB for the acceptance of test data.

Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

Taiwan

BSMI – Recognized by BSMI as a CAB for the acceptance of test data.

NCC - Recognized by NCC as a CAB for the acceptance of test data.

Singapore

IDA – Recognized by IDA as a CAB for the acceptance of test data.

Israel

MOC – Recognized by MOC as a CAB for the acceptance of test data.

Hong Kong

OFCA – Recognized by OFCA as a CAB for the acceptance of test data.

Vietnam

MIC – Recognized by MIC as a CAB for the acceptance of test data.

SCOPE

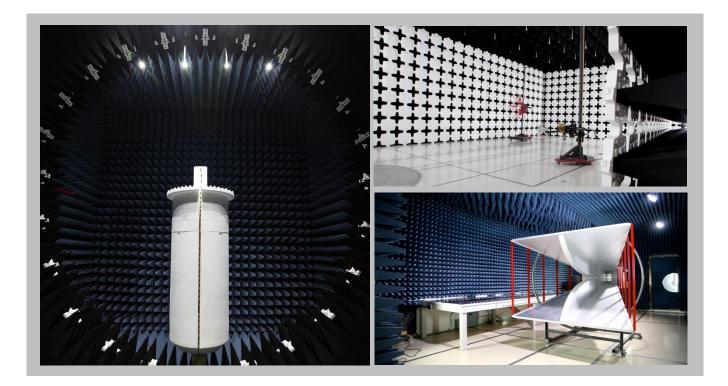
For details on the Scopes of our Accreditations, please visit: https://www.nwemc.com/emc-testing-accreditations

FACILITIES





California Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Minnesota Labs MN01-10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Oregon Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	Texas Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Washington Labs NC01-05 19201 120 th Ave NE Bothell, WA 98011 (425)984-6600		
		NVLAP				
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0		
	Innovation, Sci	ence and Economic Develop	ment Canada			
2834B-1, 2834B-3	2834E-1, 2834E-3	2834D-1	2834G-1	2834F-1		
		BSMI				
SL2-IN-E-1154R	SL2-IN-E-1152R	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R		
		VCCI				
A-0029	A-0109	A-0108	A-0201	A-0110		
Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA						
US0158	US0175	US0017	US0191	US0157		



MEASUREMENT UNCERTAINTY



Measurement Uncertainty

When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement uncertainty is a statistical expression of measurement error qualified by a probability distribution.

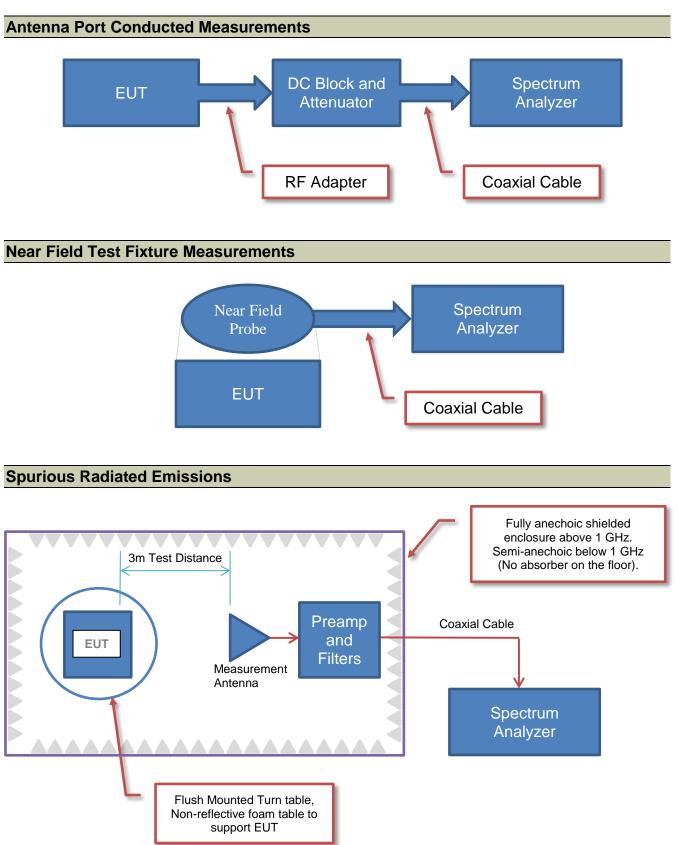
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable test description page. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable), and are available upon request.

The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

Test	+ MU	- MU
Frequency Accuracy	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	1.2 dB	-1.2 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.2 dB	-5.2 dB
AC Powerline Conducted Emissions (dB)	2.4 dB	-2.4 dB

Test Setup Block Diagrams





PRODUCT DESCRIPTION



Client and Equipment Under Test (EUT) Information

Company Name:	Koyo Electronics Industries Co., LTD
Address:	4-9-1 Tenjin-cho
City, State, Zip:	Kodaira-City, Tokyo, 187-0004
Test Requested By:	Kuramoto Hiroyuki
EUT:	C2-03CPU
First Date of Test:	February 10, 2020
Last Date of Test:	March 4, 2020
Receipt Date of Samples:	January 27, 2020
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

Embedded controller with 802.11 and BT

Testing Objective:

To demonstrate compliance of the Bluetooth radio under FCC 15.247 requirements.





Configuration KOYO0001-2

EUT					
Description	Manufacturer	Model/Part Number	Serial Number		
CLICK PLUS	Koyo Electronics Industries Co., LTD.	C2-03CPU	N/A		

Peripherals in test setup boundary						
Description	Manufacturer	Model/Part Number	Serial Number			
DC Power Module 2	Koyo Electronics Industries Co., LTD.	C0-01AC	C0-01AC+19923C443			
Monopole Antenna	Automation Direct	SE-ANT210	None			

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Cable	No	2.9m	No	AC Mains	DC Power Module 2
DC Leads	No	0.1m	No	DC Power Module 2	C2-03CPU

Configuration KOYO0001-3

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
CLICK PLUS	Koyo Electronics Industries Co., LTD.	C2-03CPU	N/A

Peripherals in test setup boundary						
Description	Manufacturer	Model/Part Number	Serial Number			
DC Power Module 2	Koyo Electronics Industries Co., LTD.	C0-01AC	C0-01AC+19923C443			
Dome Antenna	Automation Direct	SE-ANT250	None			

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Cable	No	2.9m	No	AC Mains	DC Power Module 2
DC Leads	No	0.1m	No	DC Power Module 2	C2-03CPU
Coax	Yes	3.0m	No	Dome Antenna	C2-03CPU





Configuration KOYO0001-10

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
CLICK PLUS	Koyo Electronics Industries Co., LTD.	C2-03CPU	N/A

Peripherals in test setup boundary							
Description	Manufacturer	Model/Part Number	Serial Number				
Laptop	Dell	Vostro3360	HM7BPY1				
Power Supply (Laptop)	Dell	6TM1C	CN-06TM1C-72438-3CP-6962-A01				
DC Power Supply	Agilent	U8002A	TPZ				

Cables	Cables							
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2			
Banana Cables (x2)	No	0.5m	No	CLICK PLUS	DC Power Supply			
AC Cable (DC Power Supply)	No	1.8m	No	DC Power Supply	AC Mains			
USB Cable	Yes	3.0m	No	CLICK PLUS	Laptop			
AC Cable (Laptop)	No	0.9m	No	AC Mains	Power Supply (Laptop)			
DC Cable (Laptop)	No	1.8m	Yes	Power Supply (Laptop)	Laptop			





Configuration KOYO0001-11

EUT					
Description	Manufacturer	Model/Part Number	Serial Number		
CLICK PLUS	Koyo Electronics Industries Co., LTD.	C2-03CPU	N/A		

Peripherals in test setup boundary						
Description Manufacturer Model/Part Number Serial Number						
Monopole Antenna	Automation Direct	SE-ANT210	None			
DC Power Supply 2	Kikusui	PMX35-3A	YB000467			

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Power	No	1.8m	No	AC Mains	DC Power Supply 2
DC Power Leads	No	0.3m	No	DC Power Supply 2	C2-03CPU

MODIFICATIONS



Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
		Spurious	Tested as	No EMI suppression	EUT remained at
1	2020-02-10	Radiated	delivered to	devices were added or	Element following the
		Emissions	Test Station.	modified during this test.	test.
			Tested as	No EMI suppression	EUT remained at
2	2020-02-14	Duty Cycle	delivered to	devices were added or	Element following the
			Test Station.	modified during this test.	test.
		Occupied	Tested as	No EMI suppression	EUT remained at
3	2020-02-14	Bandwidth	delivered to	devices were added or	Element following the
		Danuwidth	Test Station.	modified during this test.	test.
		Output	Tested as	No EMI suppression	EUT remained at
4	2020-02-14	Power	delivered to	devices were added or	Element following the
			Test Station.	modified during this test.	test.
		Equivalent	Tested as	No EMI suppression	EUT remained at
5	2020-02-14	Isotropic	delivered to	devices were added or	Element following the
-		Radiated	Test Station.	modified during this test.	test.
		Power		<u> </u>	
		Power	Tested as	No EMI suppression	EUT remained at
6	2020-02-14	Spectral	delivered to	devices were added or	Element following the
		Density	Test Station.	modified during this test.	test.
-		Band Edge	Tested as	No EMI suppression	EUT remained at
7	2020-02-14	Compliance	delivered to	devices were added or	Element following the
		-	Test Station.	modified during this test.	test.
•		Spurious	Tested as	No EMI suppression	EUT remained at
8	2020-02-14	Conducted	delivered to	devices were added or	Element following the
		Emissions	Test Station.	modified during this test.	test.
•	0000 00 47	Powerline	Tested as	No EMI suppression	EUT remained at
9	2020-02-17	Conducted	delivered to	devices were added or	Element following the
		Emissions	Test Station.	modified during this test.	test.
40		Spurious	Tested as	No EMI suppression	Scheduled testing
10	2020-03-04	Radiated	delivered to	devices were added or	was completed.
		Emissions	Test Station.	modified during this test.	



TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Per the standard, an insulating material was also added to ground plane between the EUT's power and remote I/O cables. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 500hm measuring port is terminated by a 500hm EMI meter or a 500hm resistive load. All 500hm measuring ports of the LISN are terminated by 500hm. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Receiver	Rohde & Schwarz	ESR7	ARI	2019-07-08	2020-07-08
Cable - Conducted Cable Assembly	Northwest EMC	MNC, HGN, TYK	MNCA	2019-03-13	2020-03-13
LISN	Solar Electronics	9252-50-R-24-BNC	LIY	2019-03-15	2020-03-15

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

CONFIGURATIONS INVESTIGATED

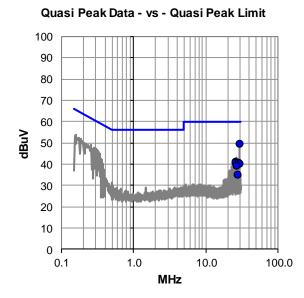
KOYO0001-11

MODES INVESTIGATED

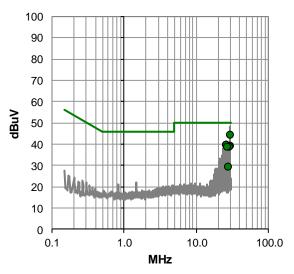
Continuous transmit on Bluetooth BLE, Monopole antenna, Mid channel (2442 MHz), BLE, power level 8.



EUT:	C2-03CPU				Work Order:	KOYO0001
Serial Number:	N/A				Date:	2020-02-17
Customer:	Koyo Electro	Koyo Electronics Industries Co., LTD			Temperature:	22.3°C
Attendees:	None	None			Relative Humidity:	21.3%
Customer Proje	ct: None				Bar. Pressure:	1014 mb
Tested By:	Dan Haas				Job Site:	MN03
Power:	24VDC				Configuration:	KOYO0001-11
TEST SPECI	FICATIONS					
Specification:				Method:		
FCC 15.207:202	20			ANSI C63.10:20	013	
TEST PARA	METERS					
Run #: 1	8	Line:	High Line		Add. Ext. Attenuation (dE	3): 0
COMMENTS	6					
Kikusui 24VDC	supply powered a	t 100VAC/6	0Hz.			
	TING MODES					
Continuous transmit on Bluetooth BLE, Monopole antenna, Mid channel (2442 MHz), BLE, power level 8.						
	S FROM TEST	STAND	ARD			
None						



Average Data - vs - Average Limit





RESULTS - Run #18

Quasi Peak Data - vs - Quasi Peak Limit						
Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)	
29.5	28.300	21.2	49.5	60.0	-10.5	
26.5	19.500	21.4	40.9	60.0	-19.1	
25.9	19.200	21.4	40.6	60.0	-19.4	
28.8	19.200	21.3	40.5	60.0	-19.5	
29.4	18.700	21.2	39.9	60.0	-20.1	
27.1	17.800	21.4	39.2	60.0	-20.8	
28.2	13.600	21.3	34.9	60.0	-25.1	

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
29.5	23.100	21.2	44.3	50.0	-5.7
26.5	18.100	21.4	39.5	50.0	-10.5
25.9	18.100	21.4	39.5	50.0	-10.5
29.4	17.900	21.2	39.1	50.0	-10.9
28.8	17.400	21.3	38.7	50.0	-11.3
27.1	17.100	21.4	38.5	50.0	-11.5
28.2	7.800	21.3	29.1	50.0	-20.9

CONCLUSION

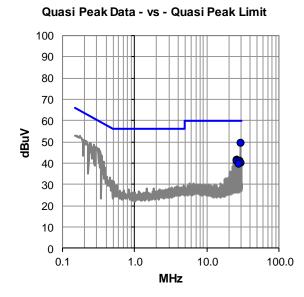
Pass

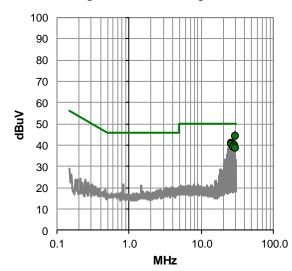
Davil alar

Tested By



EUT:	C2-03CPU				Work Order:	KOYO0001			
Serial Number:	N/A				Date:	2020-02-17			
Customer:	Koyo Electr	onics Indust	ries Co., LTD		Temperature:	22.3°C			
Attendees:	None				Relative Humidity:	21.3%			
Customer Proje	ect: None	None				1014 mb			
Tested By:	Dan Haas				Job Site:	MN03			
Power:	24VDC			Configuration:	KOYO0001-11				
	IFICATIONS								
Specification:				Method:					
FCC 15.207:20	20			ANSI C63.10:20)13				
TEST PARA	METERS								
Run #:	19	Line:	Neutral		Add. Ext. Attenuation (dE	3): 0			
COMMENTS Kikusui 24VDC	S supply powered a	nt 100VAC/6	60Hz.						
EUT OPER	ATING MODES			d channel (2442 N	/Hz), BLE, power level 8.				
	S FROM TEST	STAND	ARD						
None									





Average Data - vs - Average Limit



RESULTS - Run #19

Q	uasi Peak	Data - vs	- Quasi P	eak Limit	
Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
29.5	28.400	21.2	49.6	60.0	-10.4
26.5	20.000	21.4	41.4	60.0	-18.6
25.9	19.600	21.4	41.0	60.0	-19.0
28.8	19.700	21.3	41.0	60.0	-19.0
29.4	18.600	21.2	39.8	60.0	-20.2
28.2	18.400	21.3	39.7	60.0	-20.3

	Average Data - vs - Average Limit										
Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)						
29.5	23.200	21.2	44.4	50.0	-5.6						
26.5	19.400	21.4	40.8	50.0	-9.2						
25.9	18.900	21.4	40.3	50.0	-9.7						
28.8	18.900	21.3	40.2	50.0	-9.8						
28.2	17.700	21.3	39.0	50.0	-11.0						
29.4	17.400	21.2	38.6	50.0	-11.4						

CONCLUSION

Pass

Davil geta

Tested By



XMit 2019.09.05

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Power Supply - DC	Agilent	U8002A	TPZ	NCR	NCR
Block - DC	Fairview Microwave	SD3379	AMI	6-Aug-19	6-Aug-20
Attenuator	S.M. Electronics	SA26B-20	TZP	9-Nov-19	9-Nov-20
Generator - Signal	Keysight	N5171B (EXG)	TEY	31-Dec-19	31-Dec-22
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	23-Dec-19	23-Dec-20
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	15-Sep-19	15-Sep-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The Duty Cycle (x) of the single channel operation of the radio as controlled by the provided test software was measured for each of the EUT operating modes.

There is no compliance requirement to be met by this test, so therefore no Pass / Fail criteria.

The measurements were made using a zero span on the spectrum analyzer to see the pulses in the time domain. The transmit power was set to its default maximum.

The duty cycle was calculated by dividing the transmission pulse duration (T) by the total period of a single on and total off time.

If the transmit duty cycle < 98 percent, burst gating may have been used during some of the other tests in this report to only take the measurement during the burst duration.

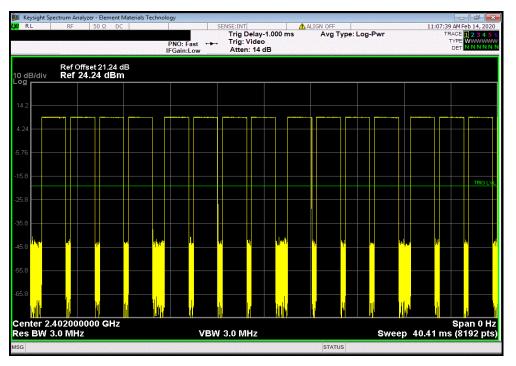


EUT:	C2-03CPU					Work Order:	KOY00001		
Serial Number:	N/A					Date:	14-Feb-20		
Customer:	Koyo Electronics Industri	es Co., LTD				Temperature:	22.8 °C		
Attendees:	None					Humidity:	13.8% RH		
Project:	None				Barometric Pres.: 1030 mbar				
	Andrew Rogstad		Power: 24 VDC			Job Site:	MN08		
TEST SPECIFICAT	IONS		Test Method						
FCC 15.247:2020			ANSI C63.10:2013						
COMMENTS			• •						
		tor, DC block, and measurement	cable.						
	set includes 20 dB attenua M TEST STANDARD 10		cable.						
DEVIATIONS FROM	M TEST STANDARD			Period (ms)	Number of Pulses	Value (%)	Limit (%)	Results	
DEVIATIONS FROM None Configuration #	M TEST STANDARD		Rogatal					Results N/A	
DEVIATIONS FROM None Configuration # BLE/GFSK Low Cha	10 Annel, 2402 MHz		Register Total On Time (ms)	(ms)	Pulses	(%)	(%)		
DEVIATIONS FROM None Configuration # BLE/GFSK Low Cha BLE/GFSK Low Cha	10 10 annel, 2402 MHz annel, 2402 MHz		Total On Time (ms) 8.36	(ms) 10.63	Pulses 4	(%) 78.6	(%) N/A	N/A	
DEVIATIONS FROM None Configuration # BLE/GFSK Low Cha BLE/GFSK Low Cha BLE/GFSK Mid Cha	10 10 annel, 2402 MHz annel, 2402 MHz nnel, 2442 MHz		Total On Time (ms) 8.36 N/A	(ms) 10.63 N/A	Pulses 4 N/A	(%) 78.6 N/A	(%) N/A N/A	N/A N/A	
DEVIATIONS FROM	10 Annel, 2402 MHz annel, 2402 MHz annel, 2442 MHz nnel, 2442 MHz		Total On Time (ms) 8.36 N/A 8.354	(ms) 10.63 N/A 10.63	Pulses 4 N/A 4	(%) 78.6 N/A 78.6	(%) N/A N/A N/A	N/A N/A N/A	



		BLE/GFSK	Low Channel, 24	02 MHz		
	Total	Period	Number of	Value	Limit	
	On Time (ms)	(ms)	Pulses	(%)	(%)	Results
	8.36	10.63	4	78.6	N/A	N/A
Keysight Spectrum Analyzer	r - Element Materials Technolog					
	50 Ω DC	SENSE	INT	ALIGN OFF		11:14:10 AM Feb 14, 2020
			rig Delay-1.000 ms	Avg Typ	e: Log-Pwr	TRACE 1 2 3 4 5 6
	F		rig: Video tten: 14 dB			TRACE 2 3 4 5 6 TYPE WWWWWW DET N N N N N
	IF	Gam.Low ,				
Ref Offse	et 21.24 dB				Δ	Mkr9 10.63 ms. -0.05 dB
10 dB/div Ref 24.	24 dBm					-0.05 GB
11.0	142		<u>_</u> 5∆6		<u>∧</u> 7∆8 <u></u> 9∆10	
4.24 X 20	Y X4	Y X6	Y X	2	- <u>Y</u> Y	
4.24						
-5.76						
-15.8						TRIG LVL
-25.8						
-35.8						
-45.8	1.1.1	No. of B	L transmi		i in the last state	
-45.0	ale te					
-55.8					-	
-65.8	inti.	nt i	, and a second		aldered in a dis	nd.
					n di all'hada	
Center 2.4020000 Res BW 3.0 MHz	JU GHZ	VBW 3.0	MU-7		Swoon 1	Span 0 Hz 5.29 ms (8192 pts)
		VBW J.				
MKR MODE TRC SCL	X 0.004	Y		UNCTION WIDTH	FUNCTI	ON VALUE
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	2.091 ms 992.5 µs	(Δ) -0.16 dB 9.12 dBr	1			
3 Δ4 1 t (Δ)	2.089 ms	(Δ) -0.29 dE	3			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	3.494 ms 2.091 ms	9.24 dBn (Δ) -0.28 dB				=
6 F 1 t	5.995 ms	9.17 dBn	1			in the second seco
7 <u>Δ8</u> 1 t (Δ) 8 F 1 t	2.089 ms 8.494 ms	(Δ) -0.21 dB 9.13 dBn				
9 Δ10 1 t (Δ)	10.63 ms	(Δ) -0.05 dE	3			
10 F 1 t	992.5 µs	9.12 dBn	1			
MSG				STATUS		

BLE/GFSK Low Channel, 2402 MHz							
	Total Period Number of Value Limit						
	On Time (n	ns) (ms)	Pulses	(%)	(%)	Results	_
	N/A	N/A	N/A	N/A	N/A	N/A	





		BLE/GFSI	K Mid Channel, 2	442 MHz		
	Total	Period	Number of	Value	Limit	
(On Time (ms)	(ms)	Pulses	(%)	(%)	Results
	8.354	10.63	4	78.6	N/A	N/A
					•	
.						
Keysight Spectrum Analyzer - E	lement Materials Technolog Ω DC		SE:INT	ALIGN OFF		11:10:58 AM Feb 14, 2020
KL Nº 50	SZ DC		Trig Delay-1.000 ms		e: Log-Pwr	TRACE 1 2 3 4 5 6
			Trig: Video			DET N N N N N
	IF	Gain:Low	Atten: 14 dB			DET
Ref Offset 2	1 24 dP				Δ	Mkr9 10.63 ms
10 dB/div Ref 24.24						-0.02 dB
Log	1Δ2	∧ 3∆4	5∆	6	∧7∆8 ▲9∆10	
14.2				/		
4.24	A4	Å6	X	18		
-5.76						
-15.8						TRIG LVL
-25.8						
-35.8						
-45 8 when the way	a fage	4-11.4	ting.		and the second	i se parte
-55.8						
-65.8 <mark>- 14 (1, 6)</mark>	la la				i _{Kal} inin M	i di
Center 2.44200000				L	White	Span 0 Hz
Res BW 3.0 MHz	GHZ	VRM 3	.0 MHz		Sween 1	5.29 ms (8192 pts)
		0016.0			-	
MKR MODE TRC SCL	X	Y		FUNCTION WIDTH	FUNCT	ION VALUE
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	2.089 ms 996.3 µs	<u>(Δ)</u> -0.17 (9.10 dE	aB Im			
3 Δ4 1 t (Δ)	2.087 ms	(Δ) -0.55 (iB			
4 F 1 t 5 Δ6 1 t (Δ)	<u>3.501 ms</u> 2.089 ms	9.02 dE (Δ) -0.12 d	im IB			
6 F 1 t	5.997 ms	9.05 dE	Im			
7 <u>Δ8</u> <u>1</u> <u>t</u> (Δ)	2.089 ms					
8 F 1 t 9 Δ10 1 t (Δ)	8.498 ms 10.63 ms	9.04 dE (Δ) -0.02 (im IB			
10 F 1 t	996.3 µs	9.10 dE	Bm			
11						•
			III			•
MSG				STATUS		

	BLE/GFSK Mid Channel, 2442 MHz							
	Total Period Number of Value				Limit			
		On Time (ms)	(ms)	Pulses	(%)	(%)	Results	
Г		N/A	N/A	N/A	N/A	N/A	N/A	





			igh Channel, 24			
		Period	Number of	Value	Limit	
	On Time (ms)	(ms)	Pulses	(%)	(%)	Results
	8.36	10.63	4	78.6	N/A	N/A
📜 Keysight Spectrum Analyzer	Element Materials Technology					
	0Ω DC	SENSE:	NT	ALIGN OFF		11:16:25 AM Feb 14, 2020
			g Delay-1.000 ms	Avg Typ	e: Log-Pwr	TRACE 1 2 3 4 5 6
			g: Video ten: 14 dB			TRACE 1 2 3 4 5 6 TYPE WWWWW DET N N N N N N
	IFGa	in:Low At	ten. 14 db			
Ref Offset	:21.24 dB				Δ	Mkr9 10.63 ms
10 dB/div Ref 24.2	4 dBm					0.06 dB
Log	λ 1Δ2	∧ 3∆4	∧ 5∆6		∧ 7∆8 ▲ 9∆10	
14.2 4.24		¥ v				
4.24	/\\4	<u></u>		\$		
-5.76						
-15.8						
						TRIG LVL
-25.8						
-35.8						
-45.8 <mark>dendo alab</mark>	at sp	- Aleka	utrit		wenned and the	0.0
-55.8						
-65.8					a 11	
		<mark>, in i</mark>	illin,			լինդ
Center 2.48000000	0 GH7					Span 0 Hz
Res BW 3.0 MHz		VBW 3.0	MHz		Sweep 1	5.29 ms (8192 pts)
MKR MODE TRC SCL	X	v	FUNCTION F	UNCTION WIDTH		DN VALUE
$1 \Delta 2 1 t (\Delta)$	× 2.091 ms (Δ	Y -0.38 dB	FUNCTION	UNCTION WIDTH	FUNCTI	JN VALUE
2 F 1 t	992.5 µs	8.99 dBm				
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	2.089 ms (∆ 3.494 ms) -0.27 dB 9.04 dBm				
$5 \Delta 6 1 t (\Delta)$	2.089 ms (Δ) -0.99 dB				E
6 F 1 t	5.995 ms	9.04 dBm				
7 <u>Δ8</u> 1 t (Δ) 8 F 1 t	2.091 ms (∆ 8.492 ms	.) -0.25 dB 9.03 dBm				
9 Δ10 1 t (Δ)	10.63 ms (Δ) 0.06 dB				
10 F 1 t	992.5 µs	8.99 dBm				
MSG				STATUS		

	Total Period Number of Value Limit						
	On Time (ms)	(ms)	Pulses	(%)	(%)	Results	
	N/A	N/A	5	N/A	N/A	N/A	

RL R	F 50 Ω DC		E:INT	ALIGN OFF		0 AM Feb 14, 20
		PNO: East +++ T	Trig Delay-1.000 ms Trig: Video Atten: 14 dB	Avg Type: Log-		RACE 1234 TYPE WWWW DET NNNN
dB/div Re	ef Offset 21.24 dB ef 24.24 dBm					
i.2 24 76						
i.8	• • • • • • • • • • • • • • • • • • •					l
	000000 GHz	al a	L	la l		Span 0 ł
es BW 3.0 N	ЛНz	VBW 3.	0 MHz		Sweep 40.41 ms	s (8192 pt
R MODE TRC SC		Y	FUNCTION F	FUNCTION WIDTH	FUNCTION VALUE	
						•



XMit 2019.09.05

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Power Supply - DC	Agilent	U8002A	TPZ	NCR	NCR
Block - DC	Fairview Microwave	SD3379	AMI	6-Aug-19	6-Aug-20
Attenuator	S.M. Electronics	SA26B-20	TZP	9-Nov-19	9-Nov-20
Generator - Signal	Keysight	N5171B (EXG)	TEY	31-Dec-19	31-Dec-22
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	23-Dec-19	23-Dec-20
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	15-Sep-19	15-Sep-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The EUT was set to the channels and modes listed in the datasheet.

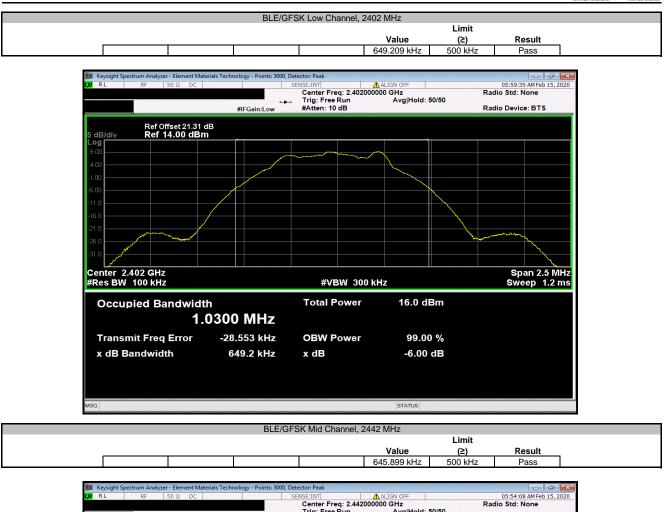
The 6dB occupied bandwidth was measured using 100 kHz resolution bandwidth and 300 kHz video bandwidth. The 99.0% occupied bandwidth was also measured at the same time which can be needed during Output Power depending on the applicable method.

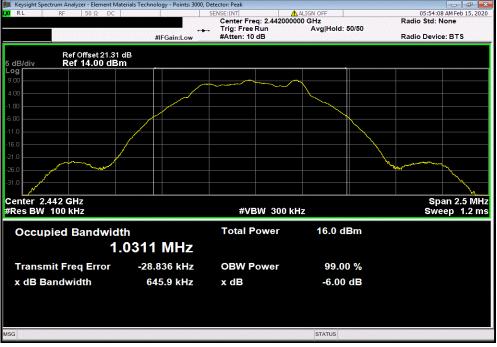


EUT: [C2-03CPU Work Order: KOYO0 Serial Number: N/A Date: 147-E0 Customer: Koyo Electronics Industries Co., LTD Temperature: 122.8 °C Attendees: None Humidity: 13.9% I Project: None Barometric Pres.: 1030 m Tested by: Andrew Rogstad Power: 24 VDC Job Site: 1030 m FECT SPECIFICATIONS Test Method Test Method Job Site: MN08 FCC 15.247:2020 ANSI C63.10:2013	b-20 C s RH mbar
Customer: Koyo Electronics Industries Co., LTD Temperature: 22.8 °C Attendees: None Humidity: 13.9% I Project: None Barometric Pres.: 1030 m Tested by: Andrew Rogstad Power: 24 VDC Job Site: MN08 TEST SPECIFICATIONS Test Method Test Method MN08	C s RH mbar
Attendees: None Humidity: 13.9% I Project: None Barometric Pres.: 1030 m Tested by: Andrew Rogstad Power: 24 VDC Job Site: MN08 TEST SPECIFICATIONS Test Method Test Method MN08	RH mbar
Project: None Barometric Pres.: 1030 m Tested by: Andrew Rogstad Power: 24 VDC Job Site: MN08 TEST SPECIFICATIONS Test Method Te	mbar
Tested by: Andrew Rogstad Power: 24 VDC Job Site: MN08 TEST SPECIFICATIONS Test Method Test Method<	
TEST SPECIFICATIONS Test Method	
FCC 15.247:2020 ANSI C63.10:2013	
COMMENTS	
DEVIATIONS FROM TEST STANDARD	
None	
Configuration # 10 Signature Comp Register	
	Limit
Value	(≥) Result
3LE/GFSK Low Channel, 2402 MHz 649.209 kHz 50	500 kHz Pass
3LE/GFSK Mid Channel, 2442 MHz 645.899 kHz 50	500 kHz Pass
BLE/GFSK High Channel, 2480 MHz 648.892 kHz 50	500 kHz Pass

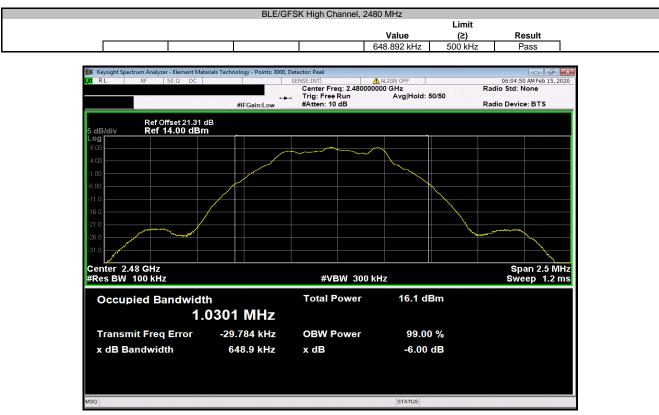
Report No. KOYO0001.15













XMit 2019.09.05

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Power Supply - DC	Agilent	U8002A	TPZ	NCR	NCR
Block - DC	Fairview Microwave	SD3379	AMI	6-Aug-19	6-Aug-20
Attenuator	S.M. Electronics	SA26B-20	TZP	9-Nov-19	9-Nov-20
Generator - Signal	Keysight	N5171B (EXG)	TEY	31-Dec-19	31-Dec-22
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	23-Dec-19	23-Dec-20
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	15-Sep-19	15-Sep-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The transmit frequency was set to the required channels in each band. The transmit power was set to its default maximum.

Prior to measuring peak transmit power the DTS bandwidth (B) was measured.

The method found in ANSI C63.10:2013 Section 11.9.1.1 was used because the RBW on the analyzer was greater than the DTS Bandwidth of the radio.



EUT: C	C2-03CPU			Work Order:	KOY00001	
Serial Number: N	N/A			Date:	14-Feb-20	
Customer: K	Koyo Electronics Industries Co., LT	D		Temperature:	22.8 °C	
Attendees: N					13.8% RH	
Project: N	None			Barometric Pres.:		
	Andrew Rogstad		Power: 24 VDC	Job Site:	MN08	
EST SPECIFICATIO	DNS		Test Method			
CC 15.247:2020			ANSI C63.10:2013			
	et includes 20 dB attenuator, DC blo	ock, and measurement cab	le.			
Reference level offse	·	ock, and measurement cab	le.			
COMMENTS Reference level offse DEVIATIONS FROM 1 Jone	·	ock, and measurement cab	ble.			
Reference level offse DEVIATIONS FROM 1 None	·					
Reference level offse DEVIATIONS FROM 1 Lone	TEST STANDARD		Ne. Regelad	Out Pwr	Limit	
eference level offse EVIATIONS FROM 1 Ione	TEST STANDARD			Out Pwr (dBm)	Limit (dBm)	Result
Reference level offse DEVIATIONS FROM 1 Jone Configuration #	TEST STANDARD					Result Pass
Reference level offse	10 Inel, 2402 MHz			(dBm)	(dBm)	

Report No. KOYO0001.15



	BLE/C	GFSK Low Channel,			
			Out Pwr	Limit	
			(dBm)	(dBm)	Result
			9.714	30	Pass
📁 Keysight Spectrum Analyzer - Element					
LXI RL RF 50Ω D0	C	SENSE:INT	ALIGN OFF #Avg Type	Log-Pwr	06:00:11 AM Feb 15, 2020
	PNO: Fast ↔	Trig: Free Run	Avg Hold:	100/100	TRACE 1 2 3 4 5 6 TYPE M WWWW DET P P P P P P
	IFGain:Low	#Atten: 10 dB			
Ref Offset 21.31	dB			MKL1	2.402 009 GHz 9.714 dBm
5 dB/div Ref 15.00 dBn	n		I	1	3.7 14 GDM
		1			
10.0					
5.00					
0.00					
-5.00					
-10.0					
-15.0					
-20.0					
-25.0					
20.0					
-30.0					
Center 2.402000 GHz					Span 3.500 MHz
#Res BW 2.0 MHz	#V	BW 6.0 MHz		Sweep 1	5pan 3.500 MHz 066 ms (1000 pts)
MSG			STATUS		
	BLE/C	GFSK Mid Channel,	2442 MHz		
			Out Pwr	Limit	
. <u></u>			(dBm)	(dBm)	Result
			9.695	30	Pass
Keysight Spectrum Analyzer - Element X RL RF 50 Ω D0		CENCE ANT	AUTOLOFT		05:54:54 AM Feb 15, 2020
LX/ RL RF 50Ω DO		SENSE:INT	ALIGN OFF	: Log-Pwr	05:54:54 AM Feb 15, 2020 TRACE 1 2 3 4 5 6

K RL RF 50 Ω DC	SENSE:INT	ALIGN OFF	05:54:54 AM Feb 15, 2020
	PNO: Fast Trig: Free Ru IFGain:Low #Atten: 10 dl	B	TRACE 1 2 3 4 5 6 TYPE M WWWW DET P P P P P P
Ref Offset 21.31 dB 5 dB/div Ref 15.00 dBm		Μ	kr1 2.441 956 GHz 9.695 dBm
10.0			
5.00			
0.00			
5.00			
-10.0			
-15.0			
20.0			
-25.0			
Center 2.442000 GHz #Res BW 2.0 MHz	#VBW 6.0 MHz	Swee	Span 3.500 MHz p 1.066 ms (1000 pts)
ASG		STATUS	



			Out Pwr (dBm)	Limit (dBm)	Result
			9.805	30	Pass
鱦 Keysight Spectrum Analyzer - Element Material	s Technology				
LX RL RF 50Ω DC		SENSE:INT	ALIGN OFF		06:05:30 AM Feb 15, 2020
	PNO: Fast 🕶	🛶 🌐 Trig: Free Run	#Avg Type: Avg Hold: 1	: Log-Pwr 100/100	TRACE 1 2 3 4 5 6 TYPE M WWWW DET P P P P P
	IFGain:Low	#Atten: 10 dB			DET PPPPP
Ref Offset 21.31 dB				Mkr1	2.479 883 GHz
5 dB/div Ref 15.00 dBm					9.805 dBm
Log					
		▲1			
10.0					
5.00					
0.00					
-5.00					
-10.0					
-15.0					
-20.0					
-25.0					
-30.0					
Center 2.480000 GHz					Span 3.500 MHz 1.066 ms (1000 pts)
#Res BW 2.0 MHz	#VI	BW 6.0 MHz		Sweep 1	1.066 ms (1000 pts)



XMit 2019.09.05

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Power Supply - DC	Agilent	U8002A	TPZ	NCR	NCR
Block - DC	Fairview Microwave	SD3379	AMI	6-Aug-19	6-Aug-20
Attenuator	S.M. Electronics	SA26B-20	TZP	9-Nov-19	9-Nov-20
Generator - Signal	Keysight	N5171B (EXG)	TEY	31-Dec-19	31-Dec-22
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	23-Dec-19	23-Dec-20
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	15-Sep-19	15-Sep-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The transmit frequency was set to the required channels in each band. The transmit power was set to its default maximum.

Prior to measuring peak transmit power the DTS bandwidth (B) was measured.

The method found in ANSI C63.10:2013 Section 11.9.1.1 was used because the RBW on the analyzer was greater than the DTS Bandwidth of the radio.

The antenna gain was added to the conducted output power to calculate the EIRP.



							TbtTx 2019.08.30.0	XMit 2019.0
EUT: C2	2-03CPU					Work Order:	KOY00001	
Serial Number: N/	A					Date:	14-Feb-20	
Customer: Ko	oyo Electronics Industries C	o., LTD				Temperature:	22.8 °C	
Attendees: No	one					Humidity:	14% RH	
Project: No	one				E	Barometric Pres.:	1030 mbar	
Tested by: Ar	ndrew Rogstad		Power: 24 VDC			Job Site:	MN08	
TEST SPECIFICATION	IS		Test Method					
FCC 15.247:2020			ANSI C63.10:2013	3				
COMMENTS								
DEVIATIONS FROM TI	EST STANDARD							
None								
Configuration #	10	Signature	Rogatal					
Configuration #	10	Signature	to Rogatan	Out Pwr	Antenna	EIRP	EIRP Limit	
Configuration #	10	Signature	to Rogatal	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
_		Signature	ing Rogatan					Result Pass
Configuration # BLE/GFSK Low Channe BLE/GFSK Mid Channe	el, 2402 MHz	Signature	to Rogatal	(dBm)	Gain (dBi)	(dBm)	(dBm)	

Report No. KOYO0001.15



	Out Pwr	SK Low Channel, Antenna	EIRP	EIRP Limit	
	(dBm)	Gain (dBi)	(dBm)	(dBm)	Result
	9.714	1.8	11.514	36	Pass
	0.114	1.0	11.014	00	1 466
Keysight Spectrum Analyzer - Element Materials Te ΙΧΙ RF 50 Ω DC		SENSE:INT	ALIGN OFF		06:00:11 AM Feb 15, 202
14 JUL 10			#Avg Type	e: Log-Pwr	TRACE 1 2 3 4
	PNO: Fast ++-	Trig: Free Run #Atten: 10 dB	Avg Hold:	100/100	TYPE MWWWW DET P P P P
	IFGain:Low	#Atten. To ub			
Ref Offset 21.31 dB				IVIKET	2.402 009 GH 9.714 dBi
5 dB/div Ref 15.00 dBm					3.7 14 UBI
		1			
10.0		<u>\</u> '			
5.00					
0.00					
0.00					
-5.00					
-5.66					
-10.0					
-10.0					
-15.0					
-13.0					
-20.0					
-25.0					
-30.0					
Center 2.402000 GHz					Span 3.500 MH
#Res BW 2.0 MHz	#VB	N 6.0 MHz		Sweep 1.	.066 ms (1000 pt
MSG			STATUS		

	Out Pwr	Antenna	EIRP	EIRP Limit	
	(dBm)	Gain (dBi)	(dBm)	(dBm)	Result
	9.695	1.8	11.495	36	Pass

RL RF 50 Ω DC	S	ENSE:INT	ALIGN OFF	05:54:54 AM Feb 15, 20
	PNO: Fast +++ IFGain:Low	Trig: Free Run #Atten: 10 dB	#Avg Type: Log-Pwr Avg Hold: 100/100	TRACE 1 2 3 4 TYPE MWWW DET P P P P
Ref Offset 21.31 dB IB/div Ref 15.00 dBm			Mkr	1 2.441 956 GF 9.695 dB
.0				
10				
0				
0				
0				
0				
0				
o				
0				
nter 2.442000 GHz				Span 3.500 M
es BW 2.0 MHz	#VBV	N 6.0 MHz	Sweep	1.066 ms (1000 pi



		SK High Channel, 2			
	Out Pwr	Antenna	EIRP	EIRP Limit	
	(dBm)	Gain (dBi)	(dBm)	(dBm)	Result
	9.805	1.8	11.605	36	Pass
Keysight Spectrum Analyzer - Element Materials	Technology				
LX RL RF 50 Ω DC		ENSE:INT	ALIGN OFF		06:05:30 AM Feb 15, 2020
		T	#Avg Typ Avg Hold:	e: Log-Pwr	TRACE 1 2 3 4 5 6
	PNO: Fast +++ IFGain:Low	Trig: Free Run #Atten: 10 dB	Avginoid	: 100/100	TRACE 2 3 4 5 6 TYPE M WWWW DET P P P P P
	II Gail.Low	<i>"</i> /		Mice4	2.479 883 GHz
Ref Offset 21.31 dB				IVIKT I	9.805 dBm
5 dB/div Ref 15.00 dBm					0.000 uBili
		. 1			
10.0		↓ ¹			
10.0					
5.00					
5.00					
0.00					
-5.00					
-10.0					
-15.0					
-20.0					
-25.0					
-30.0					
Center 2.480000 GHz					Span 3.500 MHz
#Res BW 2.0 MHz	#VB\	N 6.0 MHz		Sweep 1.	066 ms (1000 pts)

POWER SPECTRAL DENSITY



Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Power Supply - DC	Agilent	U8002A	TPZ	NCR	NCR
Block - DC	Fairview Microwave	SD3379	AMI	6-Aug-19	6-Aug-20
Attenuator	S.M. Electronics	SA26B-20	TZP	9-Nov-19	9-Nov-20
Generator - Signal	Keysight	N5171B (EXG)	TEY	31-Dec-19	31-Dec-22
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	23-Dec-19	23-Dec-20
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	15-Sep-19	15-Sep-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The maximum power spectral density measurements was measured using the channels and modes as called out on the following data sheets.

Per the procedure outlined in ANSI C63.10 the peak power spectral density was measured in a 3 kHz RBW.

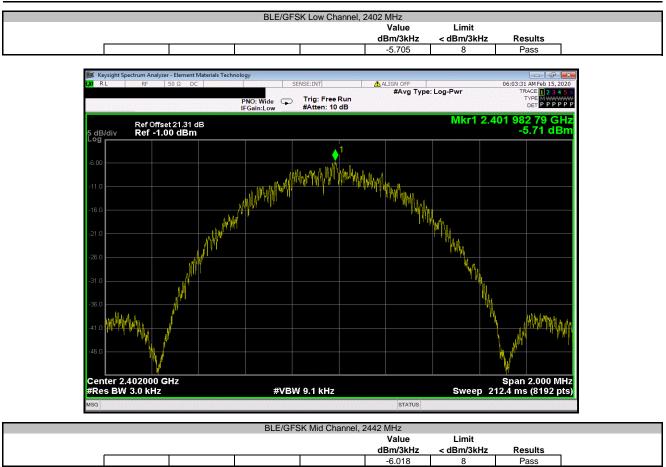
POWER SPECTRAL DENSITY

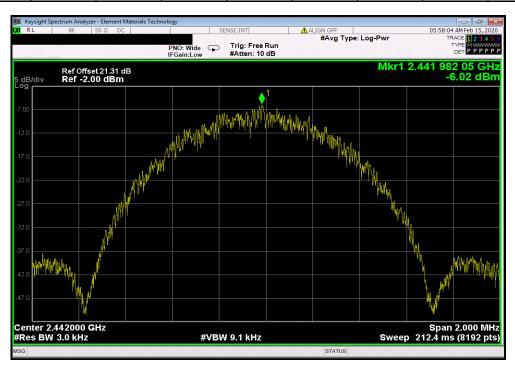


	2-03CPU					er: KOYO0001	
Serial Number: N/	A					te: 14-Feb-20	
Customer: Ko	byo Electronics Industries	Co., LTD			Temperatu	re: 22.8 °C	
Attendees: No						ty: 13.8% RH	
Project: No					Barometric Pre		
Tested by: Ar	ndrew Rogstad		Power	: 24 VDC	Job S	te: MN08	
TEST SPECIFICATION	IS			Test Method			
FCC 15.247:2020				ANSI C63.10:2013			
	includes 20 dB attenuator	r, DC block, and measurement	cable.				
Reference level offset		r, DC block, and measurement	cable.				
COMMENTS Reference level offset DEVIATIONS FROM TI None		r, DC block, and measurement	cable.				
Reference level offset			cable.	Jal			
Reference level offset	EST STANDARD	•		Jart	Value	Limit	
Reference level offset	EST STANDARD			tal	Value dBm/3kHz	Limit < dBm/3kHz	Results
Reference level offset DEVIATIONS FROM T Jone Configuration #	EST STANDARD			tal			Results Pass
Reference level offset	EST STANDARD 10 el, 2402 MHz			Sart	 dBm/3kHz	< dBm/3kHz	

POWER SPECTRAL DENSITY

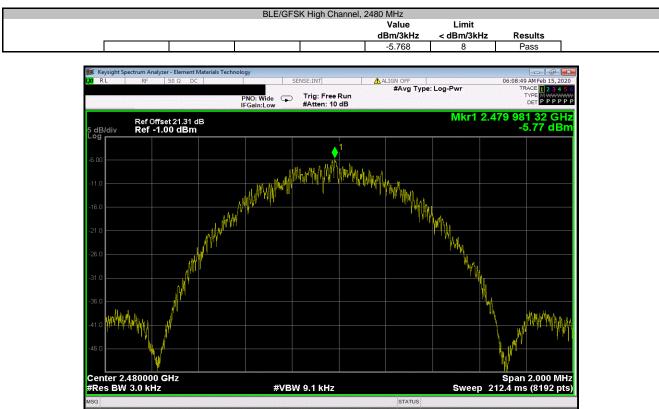






POWER SPECTRAL DENSITY





BAND EDGE COMPLIANCE



XMit 2019.09.05

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Power Supply - DC	Agilent	U8002A	TPZ	NCR	NCR
Block - DC	Fairview Microwave	SD3379	AMI	6-Aug-19	6-Aug-20
Attenuator	S.M. Electronics	SA26B-20	TZP	9-Nov-19	9-Nov-20
Generator - Signal	Keysight	N5171B (EXG)	TEY	31-Dec-19	31-Dec-22
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	23-Dec-19	23-Dec-20
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	15-Sep-19	15-Sep-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The spurious RF conducted emissions at the edges of the authorized bands were measured with the EUT set to low and high transmit frequencies in each available band. The channels closest to the band edges were selected. The EUT was transmitting at the data rate(s) listed in the datasheet.

The spectrum was scanned below the lower band edge and above the higher band edge.

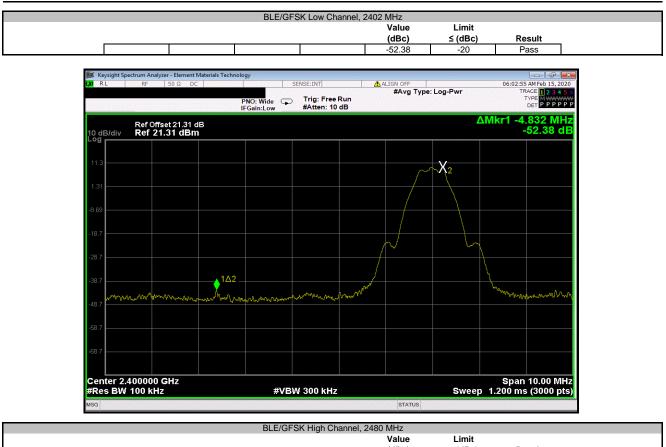
BAND EDGE COMPLIANCE



EUT: C2					Work Order:		
Serial Number: N/	Ά					14-Feb-20	
Customer: Ko	oyo Electronics Industries	Co., LTD			Temperature:	22.8 °C	
Attendees: No	one				Humidity:	13.8% RH	
Project: No	one				Barometric Pres.:	1030 mbar	
Tested by: An	ndrew Rogstad		Power:	24 VDC	Job Site:	MN08	
TEST SPECIFICATION	IS			Test Method			
FCC 15.247:2020				ANSI C63.10:2013			
COMMENTS							
Reference level offset		r, DC block, and measurement cab	le.				
Reference level offset		r, DC block, and measurement cab	le.				
Reference level offset		r, DC block, and measurement cab	le.				
Reference level offset				tal			
Reference level offset DEVIATIONS FROM TE None	EST STANDARD	r, DC block, and measurement cab		tal	Value	Limit	
Reference level offset DEVIATIONS FROM TE None Configuration #	EST STANDARD			tool	(dBc)	≤ (dBc)	Result
Reference level offset DEVIATIONS FROM TE None	EST STANDARD 10 el, 2402 MHz			to the			Result Pass Pass

BAND EDGE COMPLIANCE





		Value	Limit	
		(dBc)	≤ (dBc)	Result
		-51.66	-20	Pass

RL RF	50 Ω DC		SENSE:INT	ALIGN OFF		06:09:13	2 AM Feb 15, 202
		PNO: Wide ⊂ IFGain:Low		#Avg Type:	Log-Pwr	TF	RACE 1 2 3 4 5 TYPE M WWW DET P P P P F
dB/div Ref 21.3	t21.31 dB 31 dBm					ΔMkr1 8	.473 M⊦ -51.66 d
1.3	X ₂₀						
31 69							
8.7							
.7		h.					14
8.7		Malana	Mana	wannan anna	vv.Nrmm	man Anna	brane annih
.7							
enter 2.483500 G Res BW 100 kHz	Hz		BW 200 kHz		C III	Span ep 1.200 ms	10.00 Mi
Res BW 100 KHZ		#V	BW 300 kHz		Swe	ep 1.200 ms	s (aunn bi



XMit 2019.09.05

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Power Supply - DC	Agilent	U8002A	TPZ	NCR	NCR
Block - DC	Fairview Microwave	SD3379	AMI	6-Aug-19	6-Aug-20
Attenuator	S.M. Electronics	SA26B-20	TZP	9-Nov-19	9-Nov-20
Generator - Signal	Keysight	N5171B (EXG)	TEY	31-Dec-19	31-Dec-22
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	23-Dec-19	23-Dec-20
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	15-Sep-19	15-Sep-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting at the data rate(s) listed in the datasheet. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.



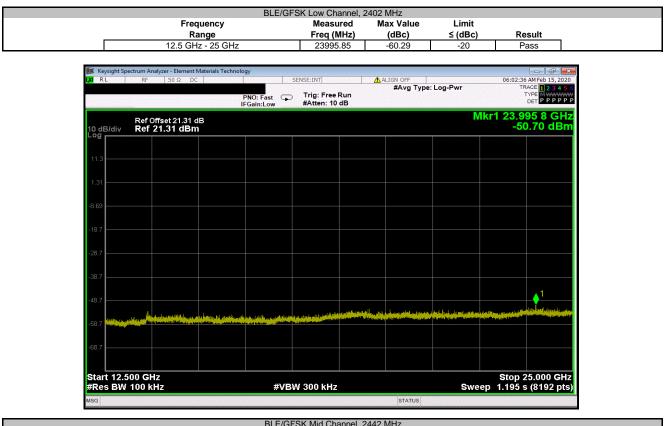
						TbtTx 2019.08.30.0	XMit 2019
EUT.	C2-03CPU				Work Order:		
Serial Number:						14-Feb-20	
	Koyo Electronics Industri				Temperature:		
Attendees:		CS 00., ETD			Humidity:		
Project:					Barometric Pres.:		
	Andrew Rogstad		Power: 24 VDC		Job Site:		
EST SPECIFICAT			Test Method				
CC 15.247:2020			ANSI C63.10:2013				
COMMENTS							
EVIATIONS FROM	M TEST STANDARD						
DEVIATIONS FROM	M TEST STANDARD						
None	M TEST STANDARD	Signature	to Regular				
		Signature	Frequency	Measured	Max Value	Limit	
None	10	Signature	Frequency Range	Freq (MHz)	(dBc)	≤ (dBc)	Result
Ione Configuration # BLE/GFSK Low Cha	10 annel, 2402 MHz	Signature	Frequency				Result N/A
None	10 annel, 2402 MHz	Signature	Frequency Range	Freq (MHz)	(dBc)	≤ (dBc)	
None Configuration # BLE/GFSK Low Cha	10 annel, 2402 MHz annel, 2402 MHz	Signature	Frequency Range Fundamental	Freq (MHz) 2401.97	(dBc) N/A	≤ (dBc) N/A	N/A
Ione Configuration # BLE/GFSK Low Cha BLE/GFSK Low Cha BLE/GFSK Low Cha	10 annel, 2402 MHz annel, 2402 MHz annel, 2402 MHz	Signature	Frequency Range Fundamental 30 MHz - 12.5 GHz	Freq (MHz) 2401.97 3202.69	(dBc) N/A -48.81	≤ (dBc) N/A -20	N/A Pass
ione Configuration # BLE/GFSK Low Cha BLE/GFSK Low Cha BLE/GFSK Low Cha BLE/GFSK Mid Cha	10 annel, 2402 MHz annel, 2402 MHz annel, 2402 MHz annel, 2422 MHz	Signature	Frequency Range Fundamental 30 MHz - 12.5 GHz 12.5 GHz - 25 GHz	Freq (MHz) 2401.97 3202.69 23995.85	(dBc) N/A -48.81 -60.29	≤ (dBc) N/A -20 -20	N/A Pass Pass
Ione Configuration # BLE/GFSK Low Cha BLE/GFSK Low Cha BLE/GFSK Low Cha BLE/GFSK Mid Cha BLE/GFSK Mid Cha	10 annel, 2402 MHz annel, 2402 MHz annel, 2402 MHz annel, 2442 MHz	Signature	Frequency Range Fundamental 30 MHz - 12.5 GHz 12.5 GHz - 25 GHz Fundamental	Freq (MHz) 2401.97 3202.69 23995.85 2441.97	(dBc) N/A -48.81 -60.29 N/A	≤ (dBc) N/A -20 -20 N/A	N/A Pass Pass N/A
Ione Configuration # BLE/GFSK Low Cha BLE/GFSK Low Cha BLE/GFSK Mid Cha BLE/GFSK Mid Cha BLE/GFSK Mid Cha BLE/GFSK Mid Cha	10 annel, 2402 MHz annel, 2402 MHz annel, 2402 MHz annel, 2442 MHz annel, 2442 MHz	Signature	Frequency Range Fundamental 30 MHz - 12.5 GHz 12.5 GHz - 25 GHz Fundamental 30 MHz - 12.5 GHz	Freq (MHz) 2401.97 3202.69 23995.85 2441.97 3255.97	(dBc) N/A -48.81 -60.29 N/A -50.6	≤ (dBc) N/A -20 -20 N/A -20	N/A Pass Pass N/A Pass
None Configuration # BLE/GFSK Low Cha BLE/GFSK Low Cha	10 annel, 2402 MHz annel, 2402 MHz annel, 2402 MHz annel, 2442 MHz annel, 2442 MHz annel, 2442 MHz annel, 2442 MHz	Signature	Frequency Range Fundamental 30 MHz - 12.5 GHz 12.5 GHz - 25 GHz Fundamental 30 MHz - 12.5 GHz 12.5 GHz - 25 GHz	Freq (MHz) 2401.97 3202.69 23995.85 2441.97 3255.97 22358.38	(dBc) N/A -48.81 -60.29 N/A -50.6 -60.24	≤ (dBc) N/A -20 -20 N/A -20 -20 -20	N/A Pass Pass N/A Pass Pass



	-	BLE/GFS	K Low Channel, 2		1.1	
	Frequency		Measured	Max Value (dBc)	Limit ≤ (dBc)	Beault
	Range Fundamental		Freq (MHz) 2401.97	(dBC) N/A	<u>≤ (dBC)</u> N/A	Result N/A
	Fundamental		2401.97	N/A	N/A	IN/A
	m Analyzer - Element Materials Technolo RF 50 Ω DC		NSE:INT	ALIGN OFF		06:00:39 AM Feb 15, 2020
	RF 50 Ω DC	SE		#Avg Type:	Log-Pwr	TRACE 1 2 3 4 5 6
		PNO: Wide 😱 FGain:Low	Trig: Free Run #Atten: 10 dB			TRACE 1 2 3 4 5 6 TYPE M WWWWW DET P P P P P P
R	ef Offset 21.31 dB tef 21.31 dBm				Mkr1 2.4	401 971 74 GHz 9.59 dBm
10 dB/div R						0.00 abiii
			1			
11.3						
1.31						
-8.69						
-0.05						
-18.7						
-28.7						
-38.7						
-48.7						
-58.7						
-68.7						
Center 2.402 #Res BW 10		#VBW	/ 300 kHz		Sweep 1	Span 1.000 MHz .092 ms (8192 pts)
MSG				STATUS		
		BLE/GES	K Low Channel, 2	2402 MH7		
	Frequency	DEL, OI C	Measured	Max Value	Limit	
	Range		Freq (MHz)	(dBc)	≤ (dBc)	Result
	30 MHz - 12.5 GHz		3202.69	-48.81	-20	Pass

RL	RF	50 Ω DC	Section 1				SENSE:INT		≜ A	LIGN OFF		06:01:	36 AM Feb 15, 202
					PNO: Fast (Gain:Low		Trig: Free #Atten: 10	Run dB		#Avg Type:	Log-Pwr		TYPE MWWWW DET P P P P P
dB/div	Ref Offse Ref 21.	t21.31 d 31 dBm	IB I									Mkr1 3.: -3	202 7 GH 9.22 dBr
.3													
31													
59													
.7													
.7													
.7				1									
.7													
				العروب بالع	and the second			المراجع			مغاهد يبطيعه الطعر	ور ورزوان المعاديات	in a state in the state of the
.7 Marialan	a a su di su d			14				The start			فظلمن يعليهم ومتغرر		and a statistic product of the statistic produ
.7													
art 30 M												Stop	12.500 GH
es BW	100 kHz				#\	/B1	№ 300 kHz				Swe	ep 1.192	s (8192 pt

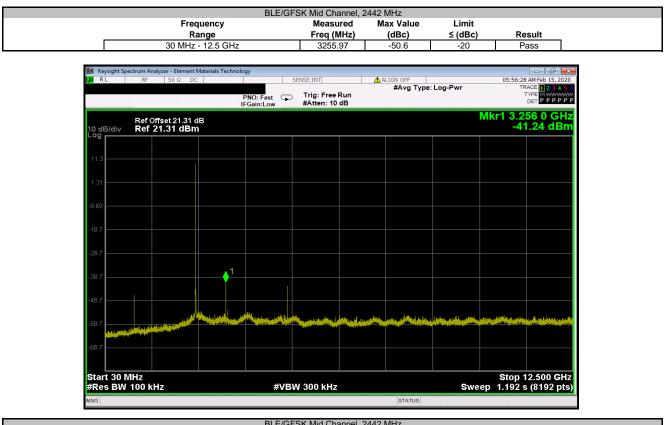




	BLE/GFSK Mid Channel	, 2442 MHz		
Frequency	Measured	Max Value	Limit	
Range	Freq (MHz)	(dBc)	≤ (dBc)	Result
Fundamental	2441.97	N/A	N/A	N/A

RL RF 50 Ω DC	SENSE:INT	ALIGN OFF	05:55:30 AM Feb 15, 20
		#Avg Type: Log-Pwr ree Run	TRACE 1 2 3 4 1 TYPE M WWW DET P P P P
Ref Offset 21.31 dB dB/div Ref 21.31 dBm		Mkı	r1 2.441 969 30 GF 9.35 dBi
		.1	
.3			
31			
69			
7			
7			
7			
7			
7			
.7			
enter 2.4420000 GHz			Span 1.000 Mł
les BW 100 kHz	#VBW 300 k	Hz Swe	eep 1.092 ms (8192 pt





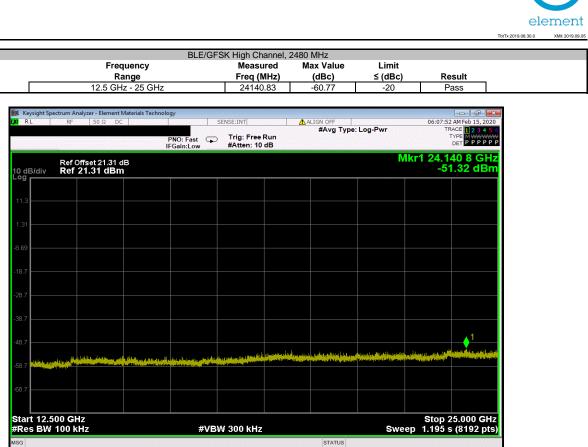
BLE/GFSK Mid Channel, 2442 MHz						
Frequency	Measured	Max Value	Limit			
Range	Freq (MHz)	(dBc)	≤ (dBc)	Result	_	
12.5 GHz - 25 GHz	22358.38	-60.24	-20	Pass	i	

RL	RF 50 \$	R DC		SENSE:INT	A	LIGN OFF		05:57:2	5 AM Feb 15, 20
			PNO: Fast G	Trig: Free R #Atten: 10 c	tun	#Avg Type:	Log-Pwr		TYPE MWWW DET PPPP
dB/div	Ref Offset 2 Ref 21.31	1.31 dB dBm					M	kr1 22.3 -5	58 4 GF 0.88 dB
^g									
1.3									
31									
<u></u>									
.7									
.7									
.7									
3.7			nasida a dikabatan sailaba			e dhattarre ad		فيتصلحون التسفيقين	Gelenal Institution
7			and the district of the	Contraction of the last	a name of the state of the second	and the second	aladima a selectivitadas	State of the second state of the	internet de la contra de la contr
.7									
	00 GHz 100 kHz		#1.1			I	Swo	Stop 2	25.000 GH
es BW	TUU KHZ		#V.	BW 300 kHz			Swe	ep 1.195 s	s (8 192 pi



		BLE/GFS	K High Channel, 2			
	Frequency		Measured	Max Value	Limit	
	Range		Freq (MHz)	(dBc)	≤ (dBc)	Result
	Fundamental		2479.96	N/A	N/A	N/A
	m Analyzer - Element Materials Technolo					
(XIRL	RF 50 Ω DC	SE	NSE:INT	ALIGN OFF #Avg Type:	Log Dur	06:05:52 AM Feb 15, 2020
		PNO: Wide 🖵	Trig: Free Run #Atten: 10 dB	#ritg type.	Log-r Wi	TRACE 1 2 3 4 5 6 TYPE M WWWW DET P P P P P P
R					Mkr1 2	.479 964 41 GHz
10 dB/div R	ef Offset 21.31 dB lef 21.31 dBm					9.45 dBm
11.3			1			
1.31						
-8.69						
-18.7						
-28.7						
-38.7						
-48.7						
-58.7						
co 7						
-68.7						
Center 2.480						Span 1.000 MHz
#Res BW 10	0 kHz	#VBW	300 kHz		Sweep	1.092 ms (8192 pts)
MSG				STATUS		
		BLE/GFS	K High Channel, 2	2480 MHz		
	Frequency		Measured	Max Value	Limit	
	Range		Freq (MHz)	(dBc) ≤ (dBc)		Result
	30 MHz - 12.5 GHz		2487.16	-51.09	-20	Pass

RL	ctrum Analyzer - Eleme RF 50 Ω	DC		SENSE:	INT	ALI	IGN OFF		06:06:5	5 AM Feb 15, 20
			PNO: Fast IFGain:Lov	Tri	g: Free Run tten: 10 dB		#Avg Type:	Log-Pwr	TI	TYPE MWWW DET PPPP
dB/div	Ref Offset 21.3 Ref 21.31 de	1 dB 3m							Mkr1 2.4 -4	87 2 GF 1.64 dB
.3										
31										
;9										
7										
7										
.7		1								
.7			Line Andrewski	، الخريد عند،		العال	. باروب بالاله	A material is a start or an a statilities of	างสาวสีธรรษท	Land Inc.
العادليليوم		And Indian						a state of the second se	a	
.7										
art 30 M	IHz 100 kHz			#VBW 30				Sura	Stop *	12.500 GH
es dw	TOO KHZ			#VDW 30	U KHZ			Swe	ep 1.192 9	s (s i sz bi





PSA-ESCI 2019.11.08.1

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting Bluetooth Low Energy on Low channel (2402 MHz), Mid channel (2442 MHz), and High channel (2480 MHz); Dome antenna; Power level 8

Transmitting Bluetooth Low Energy on Low channel (2402 MHz), Mid channel (2442 MHz), and High channel (2480 MHz); Monopole antenna; Power level 8

Transmitting Bluetooth Low Energy on Low channel (2402 MHz), and High channel (2480 MHz); Monopole antenna; Power level 8

POWER SETTINGS INVESTIGATED

24 VDC

CONFIGURATIONS INVESTIGATED

KOYO0001 - 3 KOYO0001 - 2

FREQUENCY RANGE INVESTIGATED Start Frequency 30 MHz

Stop Frequency 26500 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Antenna - Standard Gain	ETS Lindgren	3160-09	AHG	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	2019-09-11	12 mo
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNP	2019-09-11	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVX	2020-02-18	12 mo
Cable	Element	Double Ridge Guide Horn Cables	MNV	2020-02-18	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AIB	2018-08-27	24 mo
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	2019-12-23	12 mo
Analyzer - Spectrum Analyzer	Keysight	N9010A (EXA)	AFQ	2019-12-21	12 mo
Antenna - Biconilog	ETS Lindgren	3142D	AXO	2019-09-03	24 mo
Cable	ESM Cable Corp.	Bilog Cables	MNH	2019-10-18	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AVO	2019-10-18	12 mo
Antenna - Double Ridge	ETS-Lindgren	3115	AJQ	2019-01-16	24 mo
Cable	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	2019-09-17	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVT	2020-01-17	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AXP	NCR	0 mo
Cable	ESM Cable Corp.	Standard Gain Horn Cables	MNJ	2019-03-08	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVV	2020-01-17	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AIQ	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVW	2020-01-17	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AIP	2018-07-12	24 mo



TEST DESCRIPTION

The highest gain antenna of each type to be used with the EUT was tested. The EUT was configured for the required transmit frequencies and the modes as showed in the data sheets.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These "pre-scans" are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis if required, and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector PK = Peak Detector AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

Measurements at the edges of the allowable band may be presented in an alternative method as provided for in the ANSI C63.10 Marker-Delta method. This method involves performing an in-band fundamental measurement followed by a screen capture of the fundamental and out-of-band emission using reduced measurement instrumentation bandwidths. The amplitude delta measured on this screen capture is applied to the fundamental emission value to show the out-of-band emission level as applied to the limit.

Where the radio test software does not provide for a duty cycle at continuous transmit conditions (> 98%) and the RMS (power average) measurements were made across the on and off times of the EUT transmissions, a duty cycle correction is added to the measurements using the formula of 10*LOG(dc).



Wo	ork Order:	KOYO00	01		Date:	2020-02-10			1	200	
	Project:	None			perature:	22.7 °C		dan	il	area	
	Job Site:	MN05			Humidity:	19% RH	\subset				
Serial	Number:	N/A		Baromet	tric Pres.:	1022 mbai	Te	sted by:	Dan Haas		
	EUT:	C2-03CPU									
Confi	iguration:										
		Koyo Electron	ics Indus	tries Co., L	TD						
	ttendees:										
	T Power:										
	ng Mode:					annel (2402 N	Hz), Mid channel (2	2442 MHz)), and High	n channel	(2480
De	eviations:	None									
Co	omments:						el. A duty cycle corr uty cycle of 78.6%.				3 was
est Speci	fications					Test	Method				
CC 15.247							C63.10:2013				
Run #	146	Test Distan	ice (m)	3	Antenna H	eight(s)	1 to 4(m)		Results	Р	ass
Run #	146	Test Distan	ice (m)	3	Antenna H	eight(s)	1 to 4(m)		Results	P	ass
	146	Test Distan	ice (m)	3	Antenna H	eight(s)	1 to 4(m)		Results	P	ass
Run #	146	Test Distan	nce (m)	3	Antenna H	eight(s)	1 to 4(m)		Results	P	ass
	146	Test Distan	nce (m)	3	Antenna H	eight(s)	1 to 4(m)		Results	P	lass
80	146	Test Distan	nce (m)	3	Antenna H	eight(s)	1 to 4(m)		Results	P	lass
	146	Test Distan	ice (m)	3	Antenna H	eight(s)	1 to 4(m)		Results	P	lass
80	146	Test Distan	ice (m)	3	Antenna H	eight(s)	1 to 4(m)		Results	P	
80 - 70 -	146	Test Distan	nce (m)	3	Antenna H	eight(s)	1 to 4(m)		Results	P	ass
80	146	Test Distan	nce (m)	3	Antenna H	eight(s)	1 to 4(m)		Results	P	ass
80 - 70 -	146	Test Distan	ice (m)	3	Antenna H	eight(s)	1 to 4(m)		Results	P	
80 70 60 50	146	Test Distan	ice (m)	3	Antenna H	eight(s)	1 to 4(m)		Results	P	
80 70 60 50	146	Test Distan	nce (m)	3	Antenna H	eight(s)	1 to 4(m)		Results		
80 70 60 50	146	Test Distan	ice (m)	3	Antenna H	eight(s)	1 to 4(m)		Results	P	
80 70 60 50	146	Test Distan	ice (m)	3	Antenna H	eight(s)	1 to 4(m)		Results	P	
80 70 60 50	146	Test Distan		3	Antenna H	eight(s)	1 to 4(m)		Results	P	
80 - 70 - 60 - 50 - ш/Ллар 40	146	Test Distan		3	Antenna H	eight(s)	1 to 4(m)		Results	P	
80 70 60 50	146	Test Distan		3	Antenna H	eight(s)	1 to 4(m)		Results	P	
80 - 70 - 60 - 50 - ш/Ллар 40		Test Distan		3	Antenna H	eight(s)	1 to 4(m)		Results	P	
80 - 70 - 60 - 50 - W Mage 40 - 30 - 30 - 30 - 30 - 30 - 30 - 30 -		Test Distan		3	Antenna H	eight(s)	1 to 4(m)		Results	P	
80 - 70 - 60 - 50 - ш/Ллар 40		Test Distan		3	Antenna H	eight(s)	1 to 4(m)		Results	P	
80 - 70 - 60 - 50 - W Nngp 40 - 30 - 30 - 30 - 30 - 30 - 30 - 30 -		Test Distan		3	Antenna H	eight(s)	1 to 4(m)		Results	P	
80 70 60 50 www. Angp 30 20		Test Distan		3	Antenna H	eight(s)	1 to 4(m)		Results	P	
80 - 70 - 60 - 50 - W Nngp 40 - 30 - 30 - 30 - 30 - 30 - 30 - 30 -				3	Antenna H	eight(s)	1 to 4(m)		Results	P	
80 - 70 - 60 - 50 - W/Ngp 40 - 30 - 20 - 20		Test Distan		3	Antenna H	eight(s)	1 to 4(m)		Results	P	
80 70 60 50 50 40 30 20 10		Test Distan		3	Antenna H	eight(s)	1 to 4(m)			P	
80 70 60 50 wi/Angp 30 20 10 0		Test Distan		3	Antenna H				Results	P	
80 70 60 50 50 40 30 20 10		Test Distan		3	Antenna H	eight(s)		10000	Results	P	lass

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	
1050.050	40.0	4.0	1.0	070.0	1.0		Marit	A) (45.0	54.0	0.4	Comments
4959.858	40.3	4.6	4.0	278.0	1.0	0.0	Vert	AV	0.0	45.9	54.0	-8.1	EUT-Vert, High-2480 MHz EUT-Vert, Mid-2442 MHz
7323.733	30.6	13.4	1.5	235.9	1.0	0.0	Horz	AV	0.0	45.0	54.0	-9.0	
7325.458	30.6	13.4	1.5	193.9	1.0	0.0	Vert	AV	0.0	45.0	54.0	-9.0	EUT-Vert, Mid-2442 MHz
4803.983	39.4	4.6	1.8	328.0	1.0	0.0	Horz	AV	0.0	45.0	54.0	-9.0	EUT-Vert, Low-2402 MHz
4883.967	39.4	4.5	1.9	333.9	1.0	0.0	Horz	AV	0.0	44.9	54.0	-9.1	EUT-Vert, Mid-2442 MHz
4803.833	38.7	4.6	2.9	82.0	1.0	0.0	Vert	AV	0.0	44.3	54.0	-9.7	EUT-Vert, Low-2402 MHz
4959.925	37.8	4.6	2.5	322.9	1.0	0.0	Horz	AV	0.0	43.4	54.0	-10.6	EUT-Vert, High-2480 MHz
4959.983	37.7	4.6	2.4	289.0	1.0	0.0	Vert	AV	0.0	43.3	54.0	-10.7	EUT-Horiz, High-2480 MHz
4960.067	36.0	4.6	2.5	210.9	1.0	0.0	Horz	AV	0.0	41.6	54.0	-12.4	EUT-Horiz, High-2480 MHz
4884.025	35.9	4.5	1.3	268.9	1.0	0.0	Vert	AV	0.0	41.4	54.0	-12.6	EUT-Vert, Mid-2442 MHz
7324.783	42.3	13.4	1.5	235.9	0.0	0.0	Horz	PK	0.0	55.7	74.0	-18.3	EUT-Vert, Mid-2442 MHz
7324.942	42.3	13.4	1.5	193.9	0.0	0.0	Vert	PK	0.0	55.7	74.0	-18.3	EUT-Vert, Mid-2442 MHz
4960.508	46.6	4.6	4.0	278.0	0.0	0.0	Vert	PK	0.0	51.2	74.0	-22.8	EUT-Vert, High-2480 MHz
4803.992	46.4	4.6	1.8	328.0	0.0	0.0	Horz	PK	0.0	51.0	74.0	-23.0	EUT-Vert, Low-2402 MHz
4883.483	46.4	4.5	1.9	333.9	0.0	0.0	Horz	PK	0.0	50.9	74.0	-23.1	EUT-Vert, Mid-2442 MHz
12398.070	29.1	0.4	1.9	106.9	1.0	0.0	Horz	AV	0.0	30.5	54.0	-23.5	EUT-on side, High-2480 MHz, BLE
12397.530	29.0	0.4	1.3	289.9	1.0	0.0	Vert	AV	0.0	30.4	54.0	-23.6	EUT-Horiz, High-2480 MHz, BLE
4959.725	45.8	4.6	2.4	289.0	0.0	0.0	Vert	PK	0.0	50.4	74.0	-23.6	EUT-Horiz, High-2480 MHz
12009.580	30.1	-0.9	1.6	333.0	1.0	0.0	Vert	AV	0.0	30.2	54.0	-23.8	EUT-Horiz, Low-2402 MHz, BLE
12211.680	29.7	-0.6	1.5	102.0	1.0	0.0	Vert	AV	0.0	30.1	54.0	-23.9	EUT-Horiz, Mid-2442 MHz, BLE
12210.130	29.6	-0.6	1.4	154.0	1.0	0.0	Horz	AV	0.0	30.0	54.0	-24.0	EUT-on side, Mid-2442 MHz, BLE
12011.010	29.9	-0.9	1.5	281.9	1.0	0.0	Horz	AV	0.0	30.0	54.0	-24.0	EUT-on side, Low-2402 MHz, BLE
4803.433	45.3	4.6	2.9	82.0	0.0	0.0	Vert	PK	0.0	49.9	74.0	-24.1	EUT-Vert, Low-2402 MHz

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4959.783	45.3	4.6	2.5	322.9	0.0	0.0	Horz	PK	0.0	49.9	74.0	-24.1	EUT-Vert, High-2480 MHz
4883.983	45.0	4.5	1.3	268.9	0.0	0.0	Vert	PK	0.0	49.5	74.0	-24.5	EUT-Vert, Mid-2442 MHz
4960.508	44.6	4.6	2.5	210.9	0.0	0.0	Horz	PK	0.0	49.2	74.0	-24.8	EUT-Horiz, High-2480 MHz
12399.730	41.1	0.4	1.3	289.9	0.0	0.0	Vert	PK	0.0	41.5	74.0	-32.5	EUT-Horiz, High-2480 MHz, BLE
12398.050	40.8	0.4	1.9	106.9	0.0	0.0	Horz	PK	0.0	41.2	74.0	-32.8	EUT-on side, High-2480 MHz, BLE
12208.290	41.3	-0.7	1.4	154.0	0.0	0.0	Horz	PK	0.0	40.6	74.0	-33.4	EUT-on side, Mid-2442 MHz, BLE
12010.650	41.5	-0.9	1.5	281.9	0.0	0.0	Horz	PK	0.0	40.6	74.0	-33.4	EUT-on side, Low-2402 MHz, BLE
12208.570	41.0	-0.6	1.5	102.0	0.0	0.0	Vert	PK	0.0	40.4	74.0	-33.6	EUT-Horiz, Mid-2442 MHz, BLE
12009.780	41.0	-0.9	1.6	333.0	0.0	0.0	Vert	PK	0.0	40.1	74.0	-33.9	EUT-Horiz, Low-2402 MHz, BLE



							EmiR5 2019.08.15.1	PSA-ESCI 2019.11.08.1
Wor	k Order:	KOYO0001		ate: 2020-			1 5 1	10
	Project:	None	Temperatu		°C	Cho	Rop	bark
	Job Site:	MN09	Humidi Beremetrie Bre					
Serial	Number:	N/A C2-03CPU	Barometric Pre	es.: 1016	mbar	l ested l	by: Andrew Rogsta	ad
Config	juration:							
		Z Koyo Electronics Indu	stries Co. I TD					
	tendees:		Strics 00., ETD					
	Power:							
Operatin		Transmitting Bluetootl Power level 8	n Low Energy on Lo	ow channel (240)2 MHz), ar	nd High channel (24	480 MHz); Monopo	le antenna;
Dev	viations:	None						
Co	mments:	See data comments for the average measu						.0 dB was added
Test Specifi	cations				Test Meth	od		
FCC 15.247					ANSI C63.			
Run #	0	Test Distance (m)	3 Ante	nna Height(s)		1 to 4(m)	Results	Pass
Null #	0	Test Distance (III)		ina neight(3)		1 to 4(iii)	Results	1 833
80								
70								
60					-			
ب ⁵⁰					•			
W/Angp 40						◆		
30 -								
20 -								
10								
0								
10		100		1000 MHz		10000)	100000
				IVITIZ			📕 PK 🔶	AV 😐 QP

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2487.220	32.7	-2.9	2.8	277.0	1.0	20.0	Vert	AV	0.0	50.8	54.0	-3.2	EUT vert, High ch.
2487.160	32.4	-2.9	1.5	234.0	1.0	20.0	Horz	AV	0.0	50.5	54.0	-3.5	EUT on side, High ch.
2387.393	31.3	-3.2	1.5	262.0	1.0	20.0	Horz	AV	0.0	49.1	54.0	-4.9	EUT on side, Low ch.
2389.507	31.3	-3.2	1.5	274.0	1.0	20.0	Vert	AV	0.0	49.1	54.0	-4.9	EUT vert, Low ch.
7439.933	28.3	14.5	1.5	227.0	1.0	0.0	Horz	AV	0.0	43.8	54.0	-10.2	EUT vert, High ch.
7439.430	28.2	14.5	1.5	234.0	1.0	0.0	Vert	AV	0.0	43.7	54.0	-10.3	EUT vert, High ch.
2485.307	44.4	-2.9	2.8	277.0	0.0	20.0	Vert	PK	0.0	61.5	74.0	-12.5	EUT vert, High ch.
2485.927	43.6	-2.9	1.5	234.0	0.0	20.0	Horz	PK	0.0	60.7	74.0	-13.3	EUT on side, High ch.
2388.400	43.2	-3.2	1.5	274.0	0.0	20.0	Vert	PK	0.0	60.0	74.0	-14.0	EUT vert, Low ch.
2387.040	42.8	-3.2	1.5	262.0	0.0	20.0	Horz	PK	0.0	59.6	74.0	-14.4	EUT on side, Low ch.
7440.273	40.0	14.5	1.5	234.0	0.0	0.0	Vert	PK	0.0	54.5	74.0	-19.5	EUT vert, High ch.
7440.397	39.8	14.5	1.5	227.0	0.0	0.0	Horz	PK	0.0	54.3	74.0	-19.7	EUT vert, High ch.



vvo	rk Order: Project:			Tom	Date: perature:	2020-03-0 22.4 °C			100	10
	Job Site:			Tem	Humidity:	22.4 °C 24.1% RF	- 6	To	Rop	lant
	Number:				tric Pres.:	1016 mba	1	2752	y: Andrew Rogsta	
ocna	FUT	C2-03CPU	1	Barome		101011100		Tested by	. Andrew Rogste	40
Confi	guration:	3								
	ustomer:		onics Indu	stries Co I	TD					
	tendees:		511100 11100	01100 00., 1						
	T Power:									
	ng Mode:	Tronomitting				innel (2402 N	MHz), Mid cha	annel (2442 M	Hz), and High cha	annel (2480
De	viations:	Mana	,							
Co	mments:								duty cycle correct 78.6%. DCCF=10	
t Speci	fications					Tes	t Method			
D		Test Plat		<u> </u>	Australia II	1 1 1 (1)	4	4 ()	Description	
Run #	4	Test Dist	ance (m)	3	Antenna He	eight(s)	1 to 4	4(m)	Results	Pass
Run #	4	Test Dist	ance (m)	3	Antenna Ho	eight(s)	1 to 4	4(m)	Results	Pass
80	4	Test Dist	ance (m)	3	Antenna He	eight(s)	1 to 4	4(m)	Results	Pass
	4	Test Dist	ance (m)	3	Antenna He	eight(s)	1 to 2	4(m)	Results	Pass
80	4	Test Dist	ance (m)	3	Antenna He	eight(s)	1 to 4	4(m)	Results	Pass
80	4	Test Dist		3	Antenna He	eight(s)	1 to 4	4(m)		Pass
80 - 70 - 60 -	4	Test Dist	ance (m)	3	Antenna H	eight(s)	1 to 4	4(m)		Pass
80	4	Test Dist	ance (m)	3	Antenna H	eight(s)	1 to 4	4(m)		Pass
80	4	Test Dist	ance (m)	3	Antenna H	eight(s)		4(m)		Pass
80 - 70 - 60 -	4	Test Dist		3	Antenna H	eight(s)	1 to 2			
80	4	Test Dist		3	Antenna He	eight(s)	1 to 4			Pass
80 70 60 50 50 30	4	Test Dist		3	Antenna H	eight(s)				
80 - 70 - 60 - 50 - 50 - 50 - 50 - 50 - 50 - 5	4	Test Dist		3		eight(s)				
80 70 60 50 50 30	4			3		eight(s)				
80 70 60 50 50 40 30 20 10 0	4	Test Dist		3						
80 70 60 50 50 30 20 10		Test Dist	Tance (m)	3		2ight(s)	1 to 2			Pass

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4803,900	43.3	5.2	2.9	163.0	1.0	0.0	Horz	AV	0.0	49.5	54.0	-4.5	PCB Horz, Ant Horz (Z), Low ch.
2485.393	31.4	-2.9	1.5	25.0	1.0	20.0	Horz	AV	0.0	49.5	54.0	-4.5	PCB Horz, Ant Horz (Z), High ch.
2484,467	31.3	-2.9	2.2	219.0	1.0	20.0	Vert	AV	0.0	49.4	54.0	-4.6	PCB Horz, Ant Horz (Z), High ch.
2389,560	31.2	-3.2	2.1	84.0	1.0	20.0	Horz	AV	0.0	49.0	54.0	-5.0	PCB Horz, Ant Horz (Z), Low ch.
2389.960	31.2	-3.2	1.5	253.0	1.0	20.0	Vert	AV	0.0	49.0	54.0	-5.0	PCB Horz, Ant Horz (Z), Low ch.
4959.880	42.2	5.5	4.0	218.0	1.0	0.0	Vert	AV	0.0	48.7	54.0	-5.3	PCB Horz, Ant Horz (X), High ch.
4884.000	42.1	5.3	3.5	209.0	1.0	0.0	Horz	AV	0.0	48.4	54.0	-5.6	PCB Horz, Ant Horz (Z), Mid ch.
4803.907	41.1	5.2	1.0	174.0	1.0	0.0	Vert	AV	0.0	47.3	54.0	-6.7	PCB Horz, Ant Horz (X), Low ch.
4883.953	40.9	5.3	3.3	207.0	1.0	0.0	Vert	AV	0.0	47.2	54.0	-6.8	PCB Horz, Ant Horz (X), Mid ch.
7439.093	28.3	14.5	1.7	332.0	1.0	0.0	Horz	AV	0.0	43.8	54.0	-10.2	PCB Horz, Ant Horz (Z), High ch.
7440.420	28.2	14.5	1.5	300.0	1.0	0.0	Vert	AV	0.0	43.7	54.0	-10.3	PCB Horz, Ant Horz (X), High ch.
7327.053	28.5	14.0	1.5	278.0	1.0	0.0	Vert	AV	0.0	43.5	54.0	-10.5	PCB Horz, Ant Horz (X), Mid ch.
4960.013	36.7	5.5	1.3	171.0	1.0	0.0	Horz	AV	0.0	43.2	54.0	-10.8	PCB Horz, Ant Horz (Z), High ch.
2486.060	43.1	-2.9	1.5	25.0	0.0	20.0	Horz	PK	0.0	60.2	74.0	-13.8	PCB Horz, Ant Horz (Z), High ch.
2386.887	43.1	-3.2	2.1	84.0	0.0	20.0	Horz	PK	0.0	59.9	74.0	-14.1	PCB Horz, Ant Horz (Z), Low ch.
2484.427	42.7	-2.9	2.2	219.0	0.0	20.0	Vert	PK	0.0	59.8	74.0	-14.2	PCB Horz, Ant Horz (Z), High ch.
2386.860	42.5	-3.2	1.5	253.0	0.0	20.0	Vert	PK	0.0	59.3	74.0	-14.7	PCB Horz, Ant Horz (Z), Low ch.
7439.333	39.7	14.5	1.7	332.0	0.0	0.0	Horz	PK	0.0	54.2	74.0	-19.8	PCB Horz, Ant Horz (Z), High ch.
7325.020	40.1	14.0	1.5	278.0	0.0	0.0	Vert	PK	0.0	54.1	74.0	-19.9	PCB Horz, Ant Horz (X), Mid ch.
7441.260	39.5	14.5	1.5	300.0	0.0	0.0	Vert	PK	0.0	54.0	74.0	-20.0	PCB Horz, Ant Horz (X), High ch.
4803.500	48.4	5.2	2.9	163.0	0.0	0.0	Horz	PK	0.0	53.6	74.0	-20.4	PCB Horz, Ant Horz (Z), Low ch.
4959.680	47.7	5.5	4.0	218.0	0.0	0.0	Vert	PK	0.0	53.2	74.0	-20.8	PCB Horz, Ant Horz (X), High ch.
4883.433	47.6	5.3	3.5	209.0	0.0	0.0	Horz	PK	0.0	52.9	74.0	-21.1	PCB Horz, Ant Horz (Z), Mid ch.
4883.493	47.1	5.3	3.3	207.0	0.0	0.0	Vert	PK	0.0	52.4	74.0	-21.6	PCB Horz, Ant Horz (X), Mid ch.
4804.333	47.0	5.2	1.0	174.0	0.0	0.0	Vert	PK	0.0	52.2	74.0	-21.8	PCB Horz, Ant Horz (X), Low ch.
4959.553	44.2	5.5	1.3	171.0	0.0	0.0	Horz	PK	0.0	49.7	74.0	-24.3	PCB Horz, Ant Horz (Z), High ch.