

Koyo Electronics Industries Co., LTD

C2-03CPU

FCC 15.207:2020, FCC 15.247:2020

Bluetooth FHSS

Report # KOYO0001.14



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, KDB 556074

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	Yes	Pass	
6.5, 6.6	Spurious Radiated Emissions	Yes	Pass	
7.5	Duty Cycle	Yes	Pass	
7.8.2	Carrier Frequency Separation	Yes	Pass	
7.8.3	Number of Hopping Frequencies	Yes	Pass	
7.8.4	Dwell Time	Yes	Pass	
7.8.5	Output Power	Yes	Pass	
7.8.5	Equivalent Isotropic Radiated Power	Yes	Pass	
7.8.6	Band Edge Compliance	Yes	Pass	
7.8.6	Band Edge Compliance - Hopping Mode	Yes	Pass	
7.8.7	Occupied Bandwidth	Yes	Pass	
7.8.8	Spurious Conducted Emissions	Yes	Pass	

Deviations From Test Standards

None

Approved By:

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, Science and Economic Development 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

A	
Company Name:	Koyo Electronics Industries Co., LID
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 11, 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					
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

Configuration KOYO0001-17

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 Supply	Kikusui	PWR401ML	TQL	

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Cable (DC Power Supply)	No	1.8m	No	DC Power Supply	AC Mains
DC Leads	No	0.4 m	No	DC Power Supply	CLICK PLUS

MODIFICATIONS



Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
		Spurious	Tested as	No EMI suppression	EUT remained at
1	2020-02-11	Radiated	delivered to	devices were added or	Element following the
		Emissions	Test Station.	modified during this test.	test.
		Carrier	Tested as	No EMI suppression	EUT remained at
2	2020-02-14	Frequency	delivered to	devices were added or	Element following the
		Separation	Test Station.	modified during this test.	test.
		Number of	Tested as	No EMI suppression	EUT remained at
3	2020-02-14	Hopping	delivered to	devices were added or	Element following the
		Frequencies	Test Station.	modified during this test.	test.
			Tested as	No EMI suppression	EUT remained at
4	2020-02-14	Dwell Time	delivered to	devices were added or	Element following the
			Test Station.	modified during this test.	test.
		Output	Tested as	No EMI suppression	EUT remained at
5	2020-02-14	Power	delivered to	devices were added or	Element following the
		1 OWCI	Test Station.	modified during this test.	test.
		Equivalent	Tested as	No FMI suppression	FUT remained at
6	2020-02-14	Isotropic	delivered to	devices were added or	Element following the
0	2020 02 11	Radiated	Test Station	modified during this test	test
		Power	1 oot Otation.	modified daming the teet.	
		Band Edge	Tested as	No EMI suppression	FUT remained at
7	2020-02-14	Compliance-	delivered to	devices were added or	Element following the
•		Hopping	Test Station.	modified during this test.	test.
		Mode		······································	
•		Band Edge	lested as	No EMI suppression	EUT remained at
8	2020-02-14	Compliance	delivered to	devices were added or	Element following the
			Test Station.	modified during this test.	test.
•		Occupied	lested as	No EMI suppression	EUT remained at
9	2020-02-14	Bandwidth	delivered to	devices were added or	Element following the
		Oraciniacia	Test Station.	modified during this test.	test.
10	0000 00 44	Spurious	lested as	NO EIVII suppression	EUT remained at
10	2020-02-14		delivered to	devices were added or	Element following the
		Emissions	Test Station.	modified during this test.	test.
	0000 00 47	Powerline	l ested as	NO EIVII SUPPRESSION	EUT remained at
11	2020-02-17		delivered to	devices were added or	Element following the
		Emissions	Test Station.	modified during this test.	test.
40	0000 00 00	Dute Call	l ested as		EUT remained at
12	2020-02-26	Duty Cycle	delivered to	devices were added or	Liement following the
			Test Station.	modified during this test.	iesi.
40	2020 22 24	Spurious	I ESTED AS		Scheduled testing
13	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, Monopole antenna, Mid channel (2441 MHz), DH5, power level 8.



EUT:	C2-03CPU				Work Order:	KOYO0001				
Serial Number:	N/A				Date:	2020-02-17				
Customer:	Koyo Electro	nics Indust	ries Co., LTD		Temperature:	22.3°C				
Attendees:	None				Relative Humidity:	21.3%				
Customer Project:	None				Bar. Pressure:	1014 mb				
Tested By:	Dan Haas			Job Site:	MN03					
Power:	24VDC				Configuration:	KOYO0001-11				
TEST SPECIFICATIONS										
Specification: Method:										
FCC 15.207:2020 ANSI C63.10:2013										
TEST PARAME	TERS									
Run #: 15		Line:	High Line		Add. Ext. Attenuation (dB	3): 0				
COMMENTS	· · · ·									
Kikusui 24VDC supply powered at 100VAC/60Hz.										
EUT OPERATING MODES										
Continuous transmit on Bluetooth, Monopole antenna, Mid channel (2441 MHz), DH5, power level 8.										
DEVIATIONS F	ROM TEST	STANDA	ARD							
None										



Average Data - vs - Average Limit





RESULTS - Run #15

Quasi Peak Data - vs - Quasi Peak Limit											
Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)						
29.5	27.800	21.2	49.0	60.0	-11.0						
26.5	19.600	21.4	41.0	60.0	-19.0						
28.8	19.500	21.3	40.8	60.0	-19.2						
25.9	18.900	21.4	40.3	60.0	-19.7						
29.4	18.400	21.2	39.6	60.0	-20.4						
28.2	18.000	21.3	39.3	60.0	-20.7						

Average Data - vs - Average Limit											
Freq Amp. Factor Adjusted Limit M (MHz) (dBuV) (dB) (dBuV) (dBuV)											
29.5	22.600	21.2	43.8	50.0	-6.2						
26.5	18.700	21.4	40.1	50.0	-9.9						
28.8	18.500	21.3	39.8	50.0	-10.2						
25.9	17.400	21.4	38.8	50.0	-11.2						
29.4	17.200	21.2	38.4	50.0	-11.6						
28.2	16.900	21.3	38.2	50.0	-11.8						

CONCLUSION

Pass

Denil alla

Tested By



EUT:	C2-03CPU				Work Order:	KOYO0001				
Serial Number:	N/A				Date:	2020-02-17				
Customer:	Koyo Electro	nics Indust	ries Co., LTD		Temperature:	22.3°C				
Attendees:	None				Relative Humidity:	21.3%				
Customer Project:	None				Bar. Pressure:	1014 mb				
Tested By:	Dan Haas			Job Site:	MN03					
Power:	24VDC				Configuration:	KOYO0001-11				
TEST SPECIFICATIONS										
Specification:	Specification: Method:									
FCC 15.207:2020				ANSI C63.10:20	13					
TEST PARAME	TERS									
Run #: 17		Line:	Neutral		Add. Ext. Attenuation (dB): 0				
COMMENTS										
Kikusui 24VDC supply powered at 100VAC/60Hz.										
EUT OPERATING MODES										
Continuous transmit on Bluetooth, Monopole antenna, Mid channel (2441 MHz), DH5, power level 8.										
DEVIATIONS FROM TEST STANDARD										
None										





Average Data - vs - Average Limit



RESULTS - Run #17

Quasi Peak Data - vs - Quasi Peak 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	20.100	21.4	41.5	60.0	-18.5						
28.8	19.700	21.3	41.0	60.0	-19.0						
25.9	19.500	21.4	40.9	60.0	-19.1						
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)	Freq Amp. Factor Adjusted Limit (MHz) (dBuV) (dB) (dBuV) (dBuV)										
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						
29.4	17.700	21.2	38.9	50.0	-11.1						
28.2	17.500	21.3	38.8	50.0	-11.2						

CONCLUSION

Pass

Denil alla

Tested By



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 on Low channel (2402 MHz) and High channel (2480 MHz), Dome antenna, various data rates, power level 8 Transmitting Bluetooth on Low channel (2402 MHz), Mid channel (2441 MHz), and High channel (2480 MHz), Dome antenna, various data rates, power level 8

Transmitting Bluetooth on Low channel (2402 MHz), Mid channel (2441 MHz), and High channel (2480 MHz); Monopole antenna; Power level 8; various data rates

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.



							EmiR5 2019.08.15.1	PSA-ESCI 2019.11.0		
Wor	k Order:	KOYO0001	Date:	2020-	20-02-11					
	Project:	None	Temperature:	22.	1 °C	1 2	and s	tar		
	Job Site:	MN05	Humidity:	21.9	% RH	C				
Serial I	Number:	N/A	Barometric Pres.:	1019	mbar	Tested by	: Dan Haas			
	EUT:	C2-03CPU								
Config	juration:	2								
Cı	stomer:	Koyo Electronics Indu	stries Co., LTD							
Att	tendees:	None	·							
EUT	T Power:	24 VDC								
Operatin	g Mode:	Transmitting Bluetoot	h on Low channel (240 8: various data rates	02 MHz), M	id channel (2441 MHz), and Higl	h channel (2480	MHz); Monopole		
De	viations:	None								
Co	mments:	See comments for El applied based on a m	JT orientation, transmit leasured duty cycle of	t channel, a 57.57%. D0	and data rate CCF=10*log	e. A duty cycle correct (1/.5757)=2.4	ction factor (DC	CF) of 2.4 dB wa		
est Specif	ications				Test Metho	bd				
CC 15 247-2020										
Run #	164	Test Distance (m)	3 Antenna	ı Height(s)		1 to 4(m)	Results	Pass		
80										
00										
70 -										
60										
50										
ء 50										
5						■ 2 ▼				
8 10						•				
30 -										
20										
40										
10										
₀ ⊥										
10		100		10000		100000				
10		100		10000		100000				
							📕 PK 🛛 🔶	AV 😑 QP		

Freq	Amplitude	Factor	Antenna Height	Azimuth	Duty Cycle Correction Factor	External Attenuation	Polarity/ Transducer Type	Detector	Distance Adjustment	Adjusted	Spec. Limit	Compared to Spec.	
(MHz)	(dBuV)	(dB)	(meters)	(degrees)	(dB)	(dB)			(dB)	(dBuV/m)	(dBuV/m)	(dB)	Commonto
2497 452	22.4	27	1.5	179.0	2.4	20.0	Vort	A\/	0.0	52.1	54.0	1.0	EUT-Vert High-2480 MHz DH5
2407.455	22.2	-3.7	1.5	125.0	2.4	20.0	Horz		0.0	52.1	54.0	-1.9	EUT-on side High-2480 MHz DH5
2407.000	33.3	-3.7	1.0	204.0	2.4	20.0	Horz		0.0	52.0	54.0	-2.0	EUT-Horiz High-2480 MHz DH5
2487 407	32.5	-3.7	1.5	242.1	2.4	20.0	Horz		0.0	51.0	54.0	-2.4	EUT-Vert High-2480 MHz DH5
2486 833	32.6	-3.7	1.5	331.0	2.4	20.0	Vert	AV	0.0	51.3	54.0	-2.7	FUT-Horiz High-2480 MHz DH5
2486 693	32.6	-3.7	1.5	220.0	2.4	20.0	Vert	AV	0.0	51.3	54.0	-2.7	EUT-on side, High-2480 MHz, DH5
2486 667	32.6	-3.7	1.5	317.0	2.4	20.0	Vert	AV	0.0	51.3	54.0	-2.7	EUT-Vert, High-2480 MHz, 3DH5
2387.160	32.6	-3.7	3.2	56.0	2.4	20.0	Vert	AV	0.0	51.3	54.0	-2.7	EUT-Horiz, Low-2402 MHz, 2DH5
2389.933	32.5	-3.7	2.3	160.9	2.4	20.0	Vert	AV	0.0	51.2	54.0	-2.8	EUT-Horiz, Low-2402 MHz, DH5
2389.747	32.5	-3.7	1.5	40.1	2.4	20.0	Horz	AV	0.0	51.2	54.0	-2.8	EUT-Horiz, Low-2402 MHz, DH5
2388.107	32.5	-3.7	1.7	55.0	2.4	20.0	Horz	AV	0.0	51.2	54.0	-2.8	EUT-Vert, Low-2402 MHz, DH5
2389.367	32.5	-3.7	3.4	122.0	2.4	20.0	Vert	AV	0.0	51.2	54.0	-2.8	EUT-on side, Low-2402 MHz, DH5
2388.413	32.5	-3.7	1.5	275.1	2.4	20.0	Horz	AV	0.0	51.2	54.0	-2.8	EUT-on side, Low-2402 MHz, DH5
2388.533	32.5	-3.7	1.5	91.1	2.4	20.0	Horz	AV	0.0	51.2	54.0	-2.8	EUT-Horiz, Low-2402 MHz, 2DH5
2388.487	32.5	-3.7	1.1	318.9	2.4	20.0	Vert	AV	0.0	51.2	54.0	-2.8	EUT-Horiz, Low-2402 MHz, 3DH5
2389.500	32.5	-3.7	1.5	27.0	2.4	20.0	Horz	AV	0.0	51.2	54.0	-2.8	EUT-Horiz, Low-2402 MHz, 3DH5
2484.080	32.5	-3.8	1.5	301.0	2.4	20.0	Vert	AV	0.0	51.1	54.0	-2.9	EUT-Vert, High-2480 MHz, 2DH5
2388.100	32.4	-3.7	1.5	241.9	2.4	20.0	Vert	AV	0.0	51.1	54.0	-2.9	EUT-Vert, Low-2402 MHz, DH5
4803.975	41.9	4.6	3.7	127.8	2.4	0.0	Vert	AV	0.0	48.9	54.0	-5.1	EUT-Horiz, Low-2402 MHz, DH5
4879.917	41.7	4.6	2.0	239.9	2.4	0.0	Horz	AV	0.0	48.7	54.0	-5.3	EUT-on side, Mid-2441 MHz, DH5
4803.925	40.3	4.6	3.6	130.0	2.4	0.0	Vert	AV	0.0	47.3	54.0	-6.7	EUT-Horiz, Low-2402 MHz, 2DH5
4803.942	40.1	4.6	2.2	66.9	2.4	0.0	Vert	AV	0.0	47.1	54.0	-6.9	EUT-on side, Low-2402 MHz, DH5
7322.092	30.8	13.4	1.5	234.0	2.4	0.0	Horz	AV	0.0	46.6	54.0	-7.4	EUT-on side, Mid-2441 MHz, DH5

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
7442.392	30.8	13.4	3.3	130.1	2.4	0.0	Horz	AV	0.0	46.6	54.0	-7.4	EUT-Horiz, High-2480 MHz, DH5
7322.158	30.6	13.4	1.5	226.9	2.4	0.0	Vert	AV	0.0	46.4	54.0	-7.6	EUT-Horiz, Mid-2441 MHz, DH5
4804.033	39.4	4.6	1.5	260.9	2.4	0.0	Horz	AV	0.0	46.4	54.0	-7.6	EUT-on side, Low-2402 MHz, DH5
7441.708	30.6	13.4	1.5	73.0	2.4	0.0	Vert	AV	0.0	46.4	54.0	-7.6	EUT-Horiz, High-2480 MHz, DH5
4959.908	39.0	4.6	2.6	288.0	2.4	0.0	Vert	AV	0.0	46.0	54.0	-8.0	EUT-Horiz, High-2480 MHz, DH5
4804.000	38.2	4.6	1.2	168.9	2.4	0.0	Horz	AV	0.0	45.2	54.0	-8.8	EUT-Horiz, Low-2402 MHz, DH5
4803.967	37.5	4.0	1.9	155.0	2.4	0.0	Vert		0.0	44.5	54.0 54.0	-9.5	EUT-Vert Low-2402 MHz DH5
4960.017	36.8	4.6	1.9	167.0	2.4	0.0	Horz	AV	0.0	43.8	54.0	-10.2	EUT-on side, High-2480 MHz, DH5
4879.942	35.9	4.6	1.5	34.0	2.4	0.0	Vert	AV	0.0	42.9	54.0	-11.1	EUT-Horiz, Mid-2441 MHz, DH5
4959.967	35.8	4.6	2.2	45.0	2.4	0.0	Horz	AV	0.0	42.8	54.0	-11.2	EUT-Horiz, High-2480 MHz, DH5
4804.042	34.5	4.6	2.2	55.0	2.4	0.0	Vert	AV	0.0	41.5	54.0	-12.5	EUT-Horiz, Low-2402 MHz, 3DH5
2484.687	45.0 44.7	-3.8	1.5	220.0	0.0	20.0	Vert	PK	0.0	61.2 61.0	74.0	-12.8	EUT-On side, High-2480 MHz, DH5
2486.260	44.6	-3.7	1.5	178.9	0.0	20.0	Vert	PK	0.0	60.9	74.0	-13.1	EUT-Vert, High-2480 MHz, DH5
3202.677	39.3	-0.8	1.5	137.1	2.4	0.0	Vert	AV	0.0	40.9	54.0	-13.1	EUT-Vert, Low-2402 MHz, DH5
2487.380	44.5	-3.7	1.5	301.0	0.0	20.0	Vert	PK	0.0	60.8	74.0	-13.2	EUT-Vert, High-2480 MHz, 2DH5
2388.607	44.4	-3.7	2.3	160.9	0.0	20.0	Vert	PK	0.0	60.7	74.0	-13.3	EUT-Horiz, Low-2402 MHz, DH5
2387.620	44.3	-3.7	1.5	241.9	0.0	20.0	Vert	PK	0.0	60.6	74.0	-13.4	EUT-Vert, LOW-2402 MHZ, DH5
2388.367	44.2	-3.7	1.5	91.1	0.0	20.0	Horz	PK	0.0	60.5	74.0	-13.5	EUT-Horiz, Low-2402 MHz, 2DH5
2388.600	44.2	-3.7	1.5	27.0	0.0	20.0	Horz	PK	0.0	60.5	74.0	-13.5	EUT-Horiz, Low-2402 MHz, 3DH5
2484.680	44.3	-3.8	1.6	135.0	0.0	20.0	Horz	PK	0.0	60.5	74.0	-13.5	EUT-on side, High-2480 MHz, DH5
2483.867	44.2	-3.8	1.5	242.1	0.0	20.0	Horz	PK	0.0	60.4	74.0	-13.6	EUT-Vert, High-2480 MHz, DH5
2386.507	44.1	-3.7	3.2	56.0	0.0	20.0	Vert	PK	0.0	60.4	74.0	-13.6	EUT-Horiz, Low-2402 MHz, 2DH5
2388.480	44.1	-3.7	1.1	318.9	0.0	20.0	Vert	PK	0.0	60.4 40.2	74.0 54.0	-13.6	EUT-HORIZ, LOW-2402 MHz, 3DH5
2389.407	43.9	-0.8	3.4	122.0	0.0	20.0	Vert	PK	0.0	40.3 60.2	74.0	-13.8	EUT-on side, Low-2402 MHz, DH5
2484.727	43.9	-3.8	1.5	331.0	0.0	20.0	Vert	PK	0.0	60.1	74.0	-13.9	EUT-Horiz, High-2480 MHz, DH5
2388.533	43.8	-3.7	1.5	40.1	0.0	20.0	Horz	PK	0.0	60.1	74.0	-13.9	EUT-Horiz, Low-2402 MHz, DH5
2387.853	43.7	-3.7	1.7	55.0	0.0	20.0	Horz	PK	0.0	60.0	74.0	-14.0	EUT-Vert, Low-2402 MHz, DH5
2389.887	43.6	-3.7	1.5	275.1	0.0	20.0	Horz	PK	0.0	59.9	74.0	-14.1	EUT-On Side, LOW-2402 MHZ, DHS
7438 025	42.1	13.4	3.3	130.1	0.0	0.0	Horz	PK	0.0	55.5	74.0	-18.5	EUT-Horiz, High-2480 MHz, DH5
7440.300	42.0	13.4	1.5	73.0	0.0	0.0	Vert	PK	0.0	55.4	74.0	-18.6	EUT-Horiz, High-2480 MHz, DH5
7322.158	41.9	13.4	1.5	234.0	0.0	0.0	Horz	PK	0.0	55.3	74.0	-18.7	EUT-on side, Mid-2441 MHz, DH5
7442.025	41.6	13.4	3.2	102.9	0.0	0.0	Horz	PK	0.0	55.0	74.0	-19.0	EUT-on side, High-2480 MHz, DH5
4803.750	47.4	4.6	1.9	155.0	0.0	0.0	Horz	PK	0.0	52.0	74.0	-22.0	EUT-Vert, LOW-2402 MHZ, DH5 ELIT-Horiz, High-2480 MHz, DH5
12398.320	29.1	0.4	1.5	28.9	2.4	0.0	Horz	AV	0.0	31.9	54.0	-22.1	EUT-on side, High-2480 MHz, DH5
4880.275	47.3	4.5	2.0	239.9	0.0	0.0	Horz	PK	0.0	51.8	74.0	-22.2	EUT-on side, Mid-2441 MHz, DH5
12201.390	30.0	-0.7	1.5	330.0	2.4	0.0	Vert	AV	0.0	31.7	54.0	-22.3	EUT-Horiz, Mid-2441 MHz, DH5
12197.810	29.8	-0.7	1.5	135.9	2.4	0.0	Horz	AV	0.0	31.5	54.0	-22.5	EUT-on side, Mid-2441 MHz, DH5
4803.500	46.9	4.6	3.6	130.0	0.0	0.0	Vert	PK	0.0	51.5	74.0	-22.5	EUT-Horiz, Low-2402 MHz, 2DH5
12009.340	29.9	-0.9	1.5	274.1	2.4	0.0	Vert	AV	0.0	31.4	54.0	-22.0	EUT-Horiz, Low-2402 MHz, 3DH5
12009.220	29.7	-0.9	1.5	296.0	2.4	0.0	Horz	AV	0.0	31.2	54.0	-22.8	EUT-on side, Low-2402 MHz, DH5
4803.667	46.3	4.6	3.7	127.8	0.0	0.0	Vert	PK	0.0	50.9	74.0	-23.1	EUT-Horiz, Low-2402 MHz, DH5
4804.383	46.2	4.6	1.5	260.9	0.0	0.0	Horz	PK	0.0	50.8	74.0	-23.2	EUT-on side, Low-2402 MHz, DH5
4803.942	46.1	4.6	2.2	66.9	0.0	0.0	Vert	PK	0.0	50.7	74.0	-23.3	EUT-on side, Low-2402 MHz, DH5
4003.033	45.9	4.0	2.6	288.0	0.0	0.0	Vert	PK	0.0	20.5 29.9	74.0	-23.5	EUT-Horiz High-2480 MHz DH5
4803.675	44.9	4.6	1.5	187.0	0.0	0.0	Vert	PK	0.0	49.5	74.0	-24.5	EUT-Vert, Low-2402 MHz, DH5
4960.475	44.2	4.6	1.9	167.0	0.0	0.0	Horz	PK	0.0	48.8	74.0	-25.2	EUT-on side, High-2480 MHz, DH5
4959.142	44.1	4.6	2.2	45.0	0.0	0.0	Horz	PK	0.0	48.7	74.0	-25.3	EUT-Horiz, High-2480 MHz, DH5
4879.600	43.9	4.6	1.5	34.0	0.0	0.0	Vert	PK	0.0	48.5	74.0	-25.5	EUT-Horiz, Mid-2441 MHz, DH5
3202 693	43.9	4.0 -0.8	2.2 1.5	55.0 137 1	0.0	0.0	Vert	PK	0.0	40.0 45.8	74.0 74.0	-25.5 -28.2	EUT-Vert. Low-2402 MHz DH5
3202.518	46.3	-0.8	1.5	138.0	0.0	0.0	Horz	PK	0.0	45.5	74.0	-28.5	EUT-Vert, Low-2402 MHz, DH5
12199.700	41.7	-0.7	1.5	330.0	0.0	0.0	Vert	PK	0.0	41.0	74.0	-33.0	EUT-Horiz, Mid-2441 MHz, DH5
12398.230	40.5	0.4	1.1	28.9	0.0	0.0	Horz	PK	0.0	40.9	74.0	-33.1	EUT-on side, High-2480 MHz, DH5
12398.790	40.4	0.4	1.9	342.0	0.0	0.0	Vert	PK	0.0	40.8	74.0	-33.2	EUT-HORIZ, HIGh-2480 MHz, DH5
12201.150	41.4 41.3	-0.7	1.5	135.9	0.0	0.0	H0IZ Vert	PK	0.0	40.7 40.4	74.0 74.0	-33.3	EUT-Horiz Low-2402 MHz DH5
12008.430	41.2	-0.9	1.5	274.1	0.0	0.0	Vert	PK	0.0	40.3	74.0	-33.7	EUT-Horiz, Low-2402 MHz. 3DH5
12010.280	40.9	-0.9	1.5	296.0	0.0	0.0	Horz	PK	0.0	40.0	74.0	-34.0	EUT-on side, Low-2402 MHz, DH5



WOR Order KOTOOOI Late: 2020/32 Project: None Temperature: 222.3°C Addedition Job Site: MN05 Humidity: 25.3% RH Tested by: [Andrew Rogstad EUT: C2-03CPU Configuration: 3 Customer: Koyo Electronics Industries Co., LTD Attendes: None EUT Power: 24 VDC Transmitting Bluetooth on Low channel (2402 MHz), Mid channel (2440 MHz), and High channel (2480 MHz) antenna, various data rates, power level 8 None Deviations: See comments for EUT and antenna orientation, transmit frequency, and data rate. A duty cycle correction fa of 2.4 dB was applied based on a measured duty cycle of 57.5%. DCCF=10'log(1/.5757)=2.4 est Specifications Cc 15.247:2020 Antenna Height(5) 1 to 4(m) Results 40 Antenna Height(5) 1 to 4(m) Results Ansi C63.10.2013 40 Antenna Height(5) 1 to 4(m) Results Ansi C63.10.2013 Antenna Height(5) 1 to 4(m) Ansi C63.10.2013 40 Antenna Height(5) 1 to 4(m) Ansi C63.10.2013 Antenna Height(5) 1 to 4(m) Antenna Height(5) 1 to 4(m) Antenna Height(5) 1 to 4(m) Antenna Height(5) 1 to	Mari		KOX00004		Detai	2020	22.02	1		EmiR5 2019.08.15.1	PSA-ESCI 2019
Torget. Torice Temperature. ZZZ O Common Magnetic Serial Number: N/A Barometric Pres.: 1012 mbar Tested by: [Andrew Rogstad] Configuration: 3 Customer: Koyo Electronics Industries Co., LTD Attendees: None Attendees: None Transmitting Bluetooth on Low channel (2402 MHz), Mid channel (2440 MHz), and High channel (2480 MHz) antenna, various data rates, power level 8 Deviations: None See comments for EUT and antenna orientation, transmit frequency, and data rate. A duty cycle correction fe of 2.4 dB was applied based on a measured duty cycle of 57.57%. DCCF=10*log(1/.5757)=2.4 Ses Specifications Test Method C0 15.247:2020 Antenna Height(s) 1 to 4(m) Results 0 0 0 0 0 0 10 100 1000 1000 1000 0	work	Project:	Nono	Tom	Date:	2020-	00-02	-		100	10
Job Stie NiA Barometric Pres: 23.3% RM Tested by: [Andrew Rogstad EUT: C2-03CPU Configuration: 3 Customer: Koyo Electronics Industries Co., LTD Attendees: None EUT Power: 24 VDC Power: 24 VDC Operating Mode: Transmitting Bluetooth on Low channel (2402 MHz), Mid channel (2440 MHz), and High channel (2480 MHz) aritema, various data rates, power level 8 Deviations: None See comments for EUT and antenna orientation, transmit frequency, and data rate. A duty cycle correction fs of 2.4 dB was applied based on a measured duty cycle of 57.5%. DCCF=10 ¹ log(1/.5757)=2.4 st Specifications Test Method ANSI C63.10:2013 ANSI C63.10:2013		Project:	NUTIE	Ten	perature:	22.2		6	10	Rap	bart
Second voltage Total in the provided in t	J. Coniel N	op Site:	UNIVO NI/A	Derement	Humiaity:	20.3%	o KH		Tested		a al
Configurations 3 Customer: Koyo Electronics Industries Co., LTD Attendees: None EUT Power: 24 VDC Operating Mode: Transmitting Bluetooth on Low channel (2402 MHz), Mid channel (2440 MHz), and High channel (2480 MHz) antenna, various data rates, power level 8 Deviations: Comments: See comments for EUT and antenna orientation, transmit frequency, and data rate. A duty cycle correction fs of 2.4 dB was applied based on a measured duty cycle of 57.57%. DCCF=10*log(11.5757)=2.4 st Specifications Cc 15.247:2020 Run # 229 Test Distance (m) 3 Antenna Height(s) 1 to 4(m) Results 0 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	Serial N	lumber:	N/A	Baromet	ric Pres.:	1012	mbar		lested	by: Andrew Rogst	ad
Consignation: 3 Custome: Koyo Electronics Industries Co., LTD Attendes: None EUT Power: 24 VDC Operating Mode: Transmitting Bluetooth on Low channel (2402 MHz), Mid channel (2400 MHz), and High channel (2400 MHz) aritenna, various data rates, power level 8 None See comments for EUT and antenna orientation, transmit frequency, and data rate. A duty cycle correction fe comments: of 2.4 dB was applied based on a measured duty cycle of 57.57%. DCCF=10*log(1/.5757)=2.4 at Specifications C 15.247:2020 Run # 229 Test Distance (m) 3 Antenna Height(s) 1 to 4(m) Results 0 0 0 0 0 0 0 0 0 0 0 0 0	<u> </u>	EUT:	C2-03CPU								
Customer: Koyo Electronics industries Co., LTD Attendes: None EUT Power: 24 VDC Operating Mod: Tambitting Bluetooth on Low channel (2402 MHz), Mid channel (2440 MHz), and High channel (2460 MHz) antenna, various data rates, power level 8 Deviations: None See comments for EUT and antenna orientation, transmit frequency, and data rate. A duty cycle correction fe of 2.4 dB was applied based on a measured duty cycle of 57.57%. DCCF=10*log(1/.5757)=2.4 st Specifications C 15.247:2020 Antenna Height(s) 1 to 4(m) Run # 229 Test Distance (m) 3 Antenna Height(s) 1 to 4(m) Run # 229 Test Distance (m) 3 Antenna Height(s) 1 to 4(m) and a	Config	uration:	3								
Attendes: None EUT Power: 24 VDC Operating Mode: Tansmitting Bluetooth on Low channel (2402 MHz), Mid channel (2440 MHz), and High channel (2480 MHz) antenna, various data rates, power level 8 Deviations: None See comments for EUT and antenna orientation, transmit frequency, and data rate. A duty cycle correction fs comments: of 2.4 dB was applied based on a measured duty cycle of 57.57%. DCCF=10*log(1/.5757)=2.4 st Specifications C 15.247:2020 ANSI C63.10:2013 Run # 229 Test Distance (m) 3 Antenna Height(s) 1 to 4(m) Results 0 0 0 0 0 0 0 0 0 0 0 0 0	Cu	stomer:	Koyo Electronics In	idustries Co., L	.TD						
EUT Power: 24 VDC Operating Mode: Transmitting Bluetooth on Low channel (2402 MHz), Mid channel (2440 MHz), and High channel (2480 MHz) antenna, various data rates, power level 8 Deviations: None See comments for EUT and antenna orientation, transmit frequency, and data rate. A duty cycle correction fs of 2.4 dB was applied based on a measured duty cycle of 57.57%. DCCF=10°log(11.5757)=2.4 Stepecifications Comments: Cliptications Run # 229 Test Distance (m) 3 Antenna Height(s) 1 to 4(m) Results	Atte	endees:	None								
Operating Mode: Transmitting Bluetooth on Low channel (2402 MHz), Mid channel (2400 MHz), and High channel (2400 Mz), and the second	EUT	Power:	24 VDC								
Deviations: None See comments for EUT and antenna orientation, transmit frequency, and data rate. A duty cycle correction fe of 2.4 dB was applied based on a measured duty cycle of 57.57%. DCCF=10*log(11.5757)=2.4 st Specifications Test Method C 15.247:2020 ANSI C63.10:2013 Run # 229 Test Distance (m) 3 Antenna Height(s) 1 to 4(m) Results 80 Image: comment of a second sec	Operating	g Mode:	Transmitting Blueto antenna, various da	ooth on Low ch ata rates, powe	annel (2402 er level 8	MHz), Mie	d channel	(2440 M	IHz), and H	ligh channel (2480 l	MHz), Dome
See comments for EUT and antenna orientation, transmit frequency, and data rate. A duty cycle correction fe of 2.4 dB was applied based on a measured duty cycle of 57.57%. DCCF=10°log(1/.5757)=2.4	Dev	iations:	None								
st Specifications Test Method C 15.247:2020 ANSI C63.10:2013 Run # 229 Test Distance (m) 3 Antenna Height(s) 1 to 4(m) Results 80 0 0 0 0 0 0 0 90 0 0 0 0 0 0 0 0 90 0 0 0 0 0 0 0 0 90 0 0 0 0 0 0 0 0 90 0 0 0 0 0 0 0 0 90 0 0 0 0 0 0 0 0 90 0 0 0 0 0 0 0 0 90 0 0 0 0 0 0 0 0 0 90 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Con	nments:	See comments for of 2.4 dB was appli	EUT and anter ied based on a	nna orientatio measured d	on, transn uty cycle	nit frequer of 57.57%	ncy, and b. DCCF=	data rate. =10*log(1/.	A duty cycle correct 5757)=2.4	ion factor (DC
Run # 229 Test Distance (m) 3 Antenna Height(s) 1 to 4(m) Results 80 0 0 0 0 0 0 0 90 0 0 0 0 0 0 0 90 0 0 0 0 0 0 0 0 10 100 1000 1000 1000 0 0 0 0	st Specific	cations					Test Met	hod			
Run # 229 Test Distance (m) 3 Antenna Height(s) 1 to 4(m) Results 80	C 15 247	2020					ANSI C6	3 10.201	3		
$ \begin{array}{c} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$	Run # 229		Test Distance (I	m) 3	Antenna H	leight(s)		1 to 4	(m)	Results	Pass
70 60 50 40 30 20 10 100 100 100 100 1000 1000	80										
	70										
60 50 40 30 20 10 100 100 100 1000 1000											
$\mathbf{y}_{\mathbf{x}}^{50} + \mathbf{y}_{\mathbf{x}}^{50} + \mathbf{y}_{\mathbf{x}}$	60										
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MHz						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
4803.917	41.0	4.6	1.5	171.8	2.4	0.0	Horz	AV	0.0	48.0	54.0	-6.0	PCB Horz, Ant Horz Z, Low ch., DH5
4803.908	40.8	4.6	2.36	182.9	2.4	0.0	Vert	AV	0.0	47.8	54.0	-6.2	PCB Horz, Ant Horz X, Low ch., DH5
4883.942	40.8	4.5	2.0	196.9	2.4	0.0	Horz	AV	0.0	47.7	54.0	-6.3	PCB Horz, Ant Horz Z, Mid ch., DH5
7441.850	30.8	13.4	2.19	94.0	2.4	0.0	Vert	AV	0.0	46.6	54.0	-7.4	PCB Horz, Ant Horz X, High ch., DH5
7442.492	30.8	13.4	1.5	94.0	2.4	0.0	Horz	AV	0.0	46.6	54.0	-7.4	PCB Horz, Ant Horz Z, High ch., DH5
7328.217	30.7	13.4	1.5	239.0	2.4	0.0	Horz	AV	0.0	46.5	54.0	-7.5	PCB Horz, Ant Horz Z, Mid ch., DH5
7323.858	30.5	13.4	1.5	52.1	2.4	0.0	Vert	AV	0.0	46.3	54.0	-7.7	PCB Horz, Ant Horz X, Mid ch., DH5
4959.933	39.2	4.6	1.5	188.1	2.4	0.0	Horz	AV	0.0	46.2	54.0	-7.8	PCB Horz, Ant Horz Z, High ch., DH5
4959.992	37.9	4.6	1.85	116.0	2.4	0.0	Vert	AV	0.0	44.9	54.0	-9.1	PCB Horz, Ant Horz X, High ch., DH5
4883.950	36.0	4.5	1.5	119.0	2.4	0.0	Vert	AV	0.0	42.9	54.0	-11.1	PCB Horz, Ant Horz X, Mid ch., DH5
7441.500	42.8	13.4	2.19	94.0	0.0	0.0	Vert	PK	0.0	56.2	74.0	-17.8	PCB Horz, Ant Horz X, High ch., DH5
7325.458	42.6	13.4	1.5	52.1	0.0	0.0	Vert	PK	0.0	56.0	74.0	-18.0	PCB Horz, Ant Horz X, Mid ch., DH5
7326.925	42.5	13.4	1.5	239.0	0.0	0.0	Horz	PK	0.0	55.9	74.0	-18.1	PCB Horz, Ant Horz Z, Mid ch., DH5
7440.483	41.9	13.4	1.5	94.0	0.0	0.0	Horz	PK	0.0	55.3	74.0	-18.7	PCB Horz, Ant Horz Z, High ch., DH5
4959.808	47.6	4.6	1.5	188.1	0.0	0.0	Horz	PK	0.0	52.2	74.0	-21.8	PCB Horz, Ant Horz Z, High ch., DH5
4804.458	46.9	4.6	1.5	171.8	0.0	0.0	Horz	PK	0.0	51.5	74.0	-22.5	PCB Horz, Ant Horz Z, Low ch., DH5
4884.250	46.9	4.5	2.0	196.9	0.0	0.0	Horz	PK	0.0	51.4	74.0	-22.6	PCB Horz, Ant Horz Z, Mid ch., DH5
4804.233	46.8	4.6	2.36	182.9	0.0	0.0	Vert	PK	0.0	51.4	74.0	-22.6	PCB Horz, Ant Horz X, Low ch., DH5
4960.375	45.3	4.6	1.85	116.0	0.0	0.0	Vert	PK	0.0	49.9	74.0	-24.1	PCB Horz, Ant Horz X, High ch., DH5
4884.000	44.3	4.5	1.5	119.0	0.0	0.0	Vert	PK	0.0	48.8	74.0	-25.2	PCB Horz, Ant Horz X, Mid ch., DH5



Work Orde					EmiR5 2019.08.15.1	PSA-ESCI 2019.11.
	r: KOYO0001	Date:	2020-03-04		1 - 1	10
Projec	None	Temperature:	22.4 °C	Cho	Rope	last
Job Site	MN09	Humidity:	24.1% RH	Testedhur	Andrew Develo	
Serial Numbe		Barometric Pres.:	1016 mbar	Tested by:	Andrew Rogsta	d
Configuration	2					
Custome	Kovo Electronice Indu	istries Co. I TD				
Attendee	None					
FUT Powe						
Operating Mode	Transmitting Bluetoot	th on Low channel (2402 l	MHz) and High cha	nnel (2480 MHz), variou	us data rates, po	ower level 8
Deviation	None					
Comments	See comments for EL of 2.4 dB was applied	JT and antenna orientation based on a measured du	on, transmit frequer uty cycle of 57.57%	ncy, and data rate. A dut DCCF=10*log(1/.5757	ty cycle correction)=2.4	on factor (DCC
est Specification	5		Test Met	hod		
CC 15.247:2020			ANSI C63	3.10:2013		
Run # 2	Test Distance (m)	3 Antenna H	eight(s)	1 to 4(m)	Results	Pass
	, , , , , , , , , , , , , , , , ,					
80						
70						
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ب ⁵⁰			•			
50				•		
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40			•	•		
50 40 30				•		
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40 30				•		
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40 30 20						
50 40 30 20 10						
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50 40 30 20 10						
50 40 30 20 10 0				•		
50 40 30 20 10 0 10	100			•		100000

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
2487.287	32.2	-2.9	1.5	120.0	2.4	20.0	Horz	AV	0.0	51.7	54.0	-2.3	PCB Horz, Ant Horz (Z), High ch., DH5
2485.687	31.8	-2.9	1.5	159.0	2.4	20.0	Vert	AV	0.0	51.3	54.0	-2.7	PCB Horz, Ant Horz (Z), High ch., DH5
2484.287	31.6	-2.9	1.5	89.0	2.4	20.0	Horz	AV	0.0	51.1	54.0	-2.9	PCB Horz, Ant Horz (Z), High ch., 3DH5
2487.033	31.4	-2.9	1.5	215.0	2.4	20.0	Horz	AV	0.0	50.9	54.0	-3.1	PCB Horz, Ant Horz (Z), High ch., 3DH5
2388.060	31.5	-3.2	1.5	345.0	2.4	20.0	Horz	AV	0.0	50.7	54.0	-3.3	PCB Horz, Ant Horz (Z), Low ch., DH5
2388.900	31.4	-3.2	1.5	149.0	2.4	20.0	Horz	AV	0.0	50.6	54.0	-3.4	PCB Horz, Ant Horz (Z), Low ch., 2DH5
2389.847	31.3	-3.2	1.5	260.0	2.4	20.0	Vert	AV	0.0	50.5	54.0	-3.5	PCB Horz, Ant Horz (Z), Low ch., DH5
2386.340	31.3	-3.2	2.9	221.0	2.4	20.0	Horz	AV	0.0	50.5	54.0	-3.5	PCB Horz, Ant Horz (Z), Low ch., 3DH5
4803.987	37.4	5.2	1.4	180.0	2.4	0.0	Horz	AV	0.0	45.0	54.0	-9.0	PCB Horz, Ant Horz (Z), Low ch., 3DH5
4803.980	37.1	5.2	1.1	350.0	2.4	0.0	Horz	AV	0.0	44.7	54.0	-9.3	PCB Horz, Ant Horz (Z), Low ch., 2DH5
2486.727	43.7	-2.9	1.5	120.0	0.0	20.0	Horz	PK	0.0	60.8	74.0	-13.2	PCB Horz, Ant Horz (Z), High ch., DH5
2485.927	43.4	-2.9	1.5	159.0	0.0	20.0	Vert	PK	0.0	60.5	74.0	-13.5	PCB Horz, Ant Horz (Z), High ch., DH5
2387.080	43.7	-3.2	1.5	260.0	0.0	20.0	Vert	PK	0.0	60.5	74.0	-13.5	PCB Horz, Ant Horz (Z), Low ch., DH5
2484.333	43.3	-2.9	1.5	89.0	0.0	20.0	Horz	PK	0.0	60.4	74.0	-13.6	PCB Horz, Ant Horz (Z), High ch., 3DH5
2487.473	42.9	-2.9	1.5	215.0	0.0	20.0	Horz	PK	0.0	60.0	74.0	-14.0	PCB Horz, Ant Horz (Z), High ch., 3DH5
2386.887	43.1	-3.2	2.9	221.0	0.0	20.0	Horz	PK	0.0	59.9	74.0	-14.1	PCB Horz, Ant Horz (Z), Low ch., 3DH5
2388.453	42.8	-3.2	1.5	345.0	0.0	20.0	Horz	PK	0.0	59.6	74.0	-14.4	PCB Horz, Ant Horz (Z), Low ch., DH5
2387.480	42.8	-3.2	1.5	149.0	0.0	20.0	Horz	PK	0.0	59.6	74.0	-14.4	PCB Horz, Ant Horz (Z), Low ch., 2DH5
4803.940	45.4	5.2	1.4	180.0	0.0	0.0	Horz	PK	0.0	50.6	74.0	-23.4	PCB Horz, Ant Horz (Z), Low ch., 3DH5
4804.253	45.1	5.2	1.1	350.0	0.0	0.0	Horz	PK	0.0	50.3	74.0	-23.7	PCB Horz, Ant Horz (Z), Low ch., 2DH5



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	Kikusui	PWR401ML	TQL	NCR	NCR
Generator - Signal	Agilent	E4422B	TGQ	15-Mar-18	15-Mar-21
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	23-Dec-19	23-Dec-20
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
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.



							TbtTx 2019.08.30.0	0 XMit 2019.09.05
EUT	: C2-03CPU					Work Order:	KOYO0001	
Serial Number	: N/A					Date:	26-Feb-20	
Customer	Koyo Electronics Industrie	es Co., LTD				Temperature:	22.4 °C	
Attendees	None					Humidity:	22.4% RH	
Project	: None					Barometric Pres.:	1030 mbar	
Tested by	Andrew Rogstad		Power: 24VDC			Job Site:	MN08	
TEST SPECIFICAT	IONS		Test Method					
FCC 15.247:2020			ANSI C63.10:2013					
COMMENTS								
None								
DEVIATIONS FRO	M TEST STANDARD							
None								
Configuration #	47		- In UN					
Configuration #	17	Signature	Roptart					
		olghataro	Total	Period	Number of	Value	Limit	
			On Time (ms)	(ms)	Periods	(%)	(%)	Results
DH5, GFSK								
	Low Channel (2402 MHz)		5.76	10	1	57.6	N/A	N/A
	Low Channel (2402 MHz)		N/A	N/A	5	N/A	N/A	N/A
	Mid Channel (2441 MHz)		5.758	10	1	57.58	N/A	N/A
	Mid Channel (2441 MHz)		N/A	N/A	5	N/A	N/A	N/A
	High Channel (2480 MHz)		5.757	10	1	57.57	N/A	N/A
	High Channel (2480 MHz)		N/A	N/A	5	N/A	N/A	N/A
2DH5, pi/4-DQPSK								
	Low Channel (2402 MHz)		5.771	10	1	57.71	N/A	N/A
	Low Channel (2402 MHz)		N/A	N/A	5	N/A	N/A	N/A
	Mid Channel (2441 MHz)		5.775	10	1	57.75	N/A	N/A
	Mid Channel (2441 MHz)		N/A	N/A	5	N/A	N/A	N/A
	High Channel (2480 MHz)		5.775	10	1	57.75	N/A	N/A
	High Channel (2480 MHz)		N/A	N/A	5	N/A	N/A	N/A
3DH5, 8-DPSK								
	Low Channel (2402 MHz)		5.781	10	1	57.81	N/A	N/A
	Low Channel (2402 MHz)		N/A	N/A	5	N/A	N/A	N/A
	Mid Channel (2441 MHz)		5.778	10	1	57.78	N/A	N/A
	Mid Channel (2441 MHz)		N/A	N/A	5	N/A	N/A	N/A
	High Channel (2480 MHz)		5.779	10	1	57.79	N/A	N/A
	High Channel (2480 MHz)		N/A	N/A	5	N/A	N/A	N/A



	Total	Period	Number of	Value	l imit	
	On Time (ms)	(me)	Periode	(%)	(%)	Results
	5.76	10	1	57.6	<u>ν</u>	N/A
	5.70	10	1	57.0	IN/A	IN/A
Keysight Spectrum Analyzer	- Element Materials Techno	ogy				
CKU RF S	50 Ω DC	SE	Trig Delay-1 000 m		og-Pwr	04:12:05 AM Feb 27, 2020 TRACE 2 3 4 5 (
		PNO: Fast	Trig: Video			TYPE WWWWWW
		IFGain:Low	Atten: 10 dB			DET
					Δ	Mkr5 10.00 ms
10 dB/div Ref 0.00) dBm					-0.02 dB
Log		Δ1Δ2		∧3∆4		▲5∆6
-10.0 X		Y X				
-20.0		/\4				TRIG L VI
-30.0						
40.0						
-40.0						
-50.0						
-60.0						
-70.0 detailable office		dia terrativa anti-		ntrafter and	ىلى قى لى <mark>الرومة بى بىرىمى بى الخالية</mark>	an his al disselle for
-80.0						
90.0		e de		1	. In the second second	1
		اللر بترخيرينا		i and the second se	10.000 (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000)	uldada a bhainn
Center 2.4020000	0 GHz					Span 0 Hz
Res BW 3.0 MHz		VBW	3.0 MHz		Sweep 12	2.01 ms (8192 pts)
MKR MODE TRC SCL	x	Y	FUNCTION	FUNCTION WIDTH	FUNCTIO	ON VALUE
1 Δ2 1 t (Δ)	2.879 m	s (Δ) -0.63	dB			
2 F 1 t 3 A4 1 t (A)	<u>997.9 µ</u> 2 881 m	s -12.25 d	Bm dB			
4 F 1 t	4.745 m	s -12.57 d	Bm			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	10.00 m	s (Δ) -0.02	dB			E
7	557.1 µ	-12.25 u				
8						
10						
11						
		1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 -	m			•

		DH5, GFS	K, Low Channel (2402 MHz)			
	Total	Period	Number of	Value	Limit		
	On Time (ms)	(ms)	Periods	(%)	(%)	Results	
	N/A	N/A	5	N/A	N/A	N/A	





	Total	Period	Number of	Value	Limit	
	On Time (ms)	(ms)	Periods	(%)	(%)	Results
	5.758	10	1	57.58	N/A	N/A
Keysight Spectrum Analyzer	- Element Materials Techno	logy		-		
LXURL RF !	50 Ω DC	SE	NSE:INT		og-Pwr	04:16:43 AM Feb 27, 2020
		PNO: Fast	Trig: Video	s Avg Type. I	.og-r wi	
		IFGain:Low	Atten: 10 dB			Mkr5 10 00 ms
10 dB/div Ref 0.00) dBm				Δ	0.18 dB
Log		1Δ2		3∆4		_5∆6
A 10.0		Y X4		Y		
-20.0						TRIG LVL
-30.0						
-40.0						
-50.0						
-60.0						
-70.0 <mark>Million Anno 1</mark>				- Matshards	<mark>de tit, dis additates dia de la basta</mark>	in the provin
-80.0						
-90.0 <mark>. 1</mark>		- <mark>Makalin k</mark>		The second	ana di akan ing kata da sa kata d	under haun
Center 2.44100000	0 GHZ	VBW	3 0 MHz		Sween 12	Span 0 Hz
		VEW	5.0 14112		Oweep 12	.orms (orsz pts)
1 A2 1 t (A)	× 2.879 m	s (Δ) -0.50	dB	FUNCTION WIDTH	FUNCTIO	N VALUE
2 F 1 t	997.1 µ	s -12.31 d	Bm			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	<u>2.879 m</u> 4.747 m	s (<u>A)</u> -0.97 s -12.35 d	Bm			
5 Δ6 1 t (Δ)	10.00 m	s (Δ) 0.18	dB			E
	997.1 µ	s -12.31 d	-1111			
8						
10						
11						

		DH5, GFS	K, Mid Channel (2441 MHz)		
	Total	Period	Number of	Value	Limit	
	On Time (ms)	(ms)	Periods	(%)	(%)	Results
	N/A	N/A	5	N/A	N/A	N/A





On Time (ms) (ms) Periods (%) (%) Results 5.757 10 1 57.57 N/A N/A If Keysight Spectrum Analyzer - Bement Materials Technology Image: Comparison of the second of the s		Total	Period	Number of	Value	Limit	
5.757 10 1 57.57 N/A N/A Mc Keysight Spectrum Analyzer - Element Materials Technology Constraint Constr		On Time (ms)	(ms)	Periods	(%)	(%)	Results
If Keysight Spectrum Analyzer - Element Materials Technology SENSE INT Allon OFF 041824 MIReb 27, 2020 PNO: Fast → Trig: Video Avg Type: Log-Pwr TRACE 041824 MIReb 27, 2020 PNO: Fast → Trig: Video Avg Type: Log-Pwr TRACE 041824 MIReb 27, 2020 PNO: Fast → Trig: Video Avg Type: Log-Pwr TRACE 041824 MIReb 27, 2020 IO dE/div Ref 0.00 dBm 102 Atten: 10 dB Avg Type: Log-Pwr TRACE 041824 MIReb 27, 2020 10 dE/div Ref 0.00 dBm 102 Atten: 10 dB Avg Type: Log-Pwr Trig: Video 105 dB 10 dE/div Ref 0.00 dBm 102 Atten: 10 dB 55.66 100 55.66 10 dE/div Ref 0.00 dBm 102 Atten: 10 dB 50.06 100 55.66 10 dE/div Ref 0.00 dBm 102 Atten: 10 dB S0.04 55.66 100 200 de/div Atten: 10 dB 102 Atten: 10 dB S0.04 S0.04 50.04 200 de/div Atten: 10 dB Atten: 10 dB S0.04 S0.04 S0.04 S0.04		5.757	10	1	57.57	N/Á	N/A
Exception Sector Outside Technology							
R R R R SO C Sense INT A LIGN OFF Oct.B2/LB C Oct.B2/LB <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>							
PNO: Fast (FGain:Low Trig Delay-1.000 ms (FGain:Low Avg Type: Log-Pwr Trig: Video Atten: 10 dB Trig Delay-1.000 ms (Atten: 10 dB 0 dB/div Ref 0.00 dBm 0 </td <td>Keysight Spectrum Analyzer</td> <td>- Element Materials Techno</td> <td></td> <td>NSEIINT</td> <td>ALIGN OFF</td> <td></td> <td>04:18:24 AM Eeb 27, 20</td>	Keysight Spectrum Analyzer	- Element Materials Techno		NSEIINT	ALIGN OFF		04:18:24 AM Eeb 27, 20
PNO: Fast IFGain:Low Trig: Video Atten: 10 dB Trig: Video Atten: 10 dB AMKr5 10.00 ms 1.05 dB 100 AMKr5 10.00 dBm 1.05 dB 1.05 dB 1.05 dB 100 A 1.02 3.04 5.06 100 A 1.02 3.04 5.06 100 A 1.02 3.04 5.06 100 A A 5.06 1.05 200 A A A 5.06 100 A A A 5.06 200 A A A 5.06 200 A A A A 400 A A A A 400 A A A A 600 A A A A A 600 A A A A A 600 A B A A A 600 A A B A				Trig Delay-1.000 n	ns Avg Type:	Log-Pwr	TRACE 1 2 3 4
Inclusion Attent: 10 dB AdMkr5 10.00 dBm 1.05 dB 100 dB/div Ref 0.00 dBm 100 dB/div 1.02 dB/div 10 dB/div 1.02 dB/div 10 dA/div 1.02 dB/div			PNO: Fast	Trig: Video			DET N N N N
ΔMKr5 10.00 ms 10 dB/div Ref 0.00 dBm 10 dB/div 10 d 20 dB/div 10 d			IFGain:Low	Atten: 10 dB			
10 dB/div Ref 0.00 dBm 1.05 dB 10 dB/div 1Δ2 3Δ4 5Δ6 10 dB/div 1Δ2 44 100 10 dB/div 1Δ2 44 100 10 dB/div 1Δ2 44 100 10 dB/div 10 dB/div 100 100 10 dB/div 100 2878 ms (Δ) 128 dB 11 A2 1 t 100 2878 ms (Δ) 128 dB 11 A2 1 t (Δ) 2878 ms (Δ) 128 dB 2 F 1 t (Δ) 2878 ms (Δ) 128 dB 4 2 F 1 t (Δ) 2878 ms (Δ) 128 dB <						Δ	Mkr5 10.00 m
100 1Δ2 3Δ4 5Δ6 200 1Δ2 3Δ4 5Δ6 200 1Δ2 3Δ4 5Δ6 200 1Δ2 1Δ2 3Δ4 400 1Δ2 1Δ2 1Δ2 600 1Δ2 1Δ2 1Δ2 700 1Δ2 1Δ2 1Δ2 700 1Δ2 1Δ2 1Δ2 7 1<	10 dB/div Ref 0.00) dBm					1.05 d
200 200 700 </td <td>10.0</td> <td></td> <td>∆^{1∆2} .</td> <td></td> <td>∆^{3∆4}</td> <td></td> <td><u></u>5∆6</td>	10.0		∆ ^{1∆2} .		∆ ^{3∆4}		<u></u> 5∆6
200 300 100 <td>-10.0 X</td> <td></td> <td>X4</td> <td></td> <td>Y</td> <td></td> <td></td>	-10.0 X		X4		Y		
300 40.0 40.0 50.0 50.0	-20.0						TRIG L'
40.0 50.0	-30.0						
Span 0 Hz Span 0 Hz 400 0 1	-40.0						
60.0 60.0	-50.0						
Context 2.4800000000 GHz Span 0 Hz Res BW 3.0 MHz VBW 3.0 MHz Function 1 Δ2 T t 2 F 1 t 3 Δ4 1 t 4 1 t 5 Δ6 1 6 F 1 7 9 -13.23 dBm 7 1 0 1 0.00 ms 2 F 1 4 1 5 2.67 ms 6 F 1 7 9 9 -13.23 dBm 7 -13.23 dBm 7 -1 7 -1 10 -1 10 -1 10 -1	00.0						
200 1 <th1< th=""> 1<</th1<>	-80.0						
State Y Function Function Function Value MRR MODE TRC Scale	-70.0 helpicke filte ber				te te de la Martin		(i) Man (i) (i) in the second s
So 0 Span 0 Hz Center 2.480000000 GHz Span 0 Hz Res BW 3.0 MHz VBW 3.0 MHz Sweep 12.01 ms (8192 pts) MRR MODE TRC ScL X Y FUNCTION FUNCTION width 1 Δ2 1 t (Δ) 2.878 ms (Δ) 1.28 dB 2 F 1 t 994.1 us -14.07 dBm -14.07 dBm 3 Δ4 1 t (Δ) 2.879 ms (Δ) -0.33 dB 4 F 1 t 4.745 ms -12.37 dBm -12.37 dBm 6 A6 1 t (Δ) 1.05 dB -13.23 dBm -13.23 dBm 7 - - -13.23 dBm - - - - 9 - - - - - - - - 10 - - - - - - - - - - - 995.6 μs - - - - - - - - - - - </td <td>-80.0</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	-80.0						
Min Min Min Min Min Span 0 Hz	-90.0 <mark></mark>		<mark>ianat Attaninia</mark>		- เป็นไม่ได้ เป	transformation in the state	na de ditti de
Center 2.480000000 GHz Span 0 Hz Span 0 Hz Span 0 Hz Span 0 Hz Sweep 12.01 ms (8192 pts) MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE P 1 Δ2 T t Δ4 1 t Δ4 1 Character F F T T 4.07 dBm F F T T 4.03 3 dB F F F T T 4.745 ms -12.37 dBm F F T T 995.6 µs -13.23 dBm F F F T T 995.6 µs -13.23 dBm F F F T T 995.6 µs -13.23 dBm F F F T F<			a a bitat				
KRE BODE TRC SUBJECT X Y FUNCTION FUNCTION FUNCTION VIDTH FUNCTION VALUE 1 Δ2 T t (Δ) 2.878 ms (Δ) 1.28 dB -	Center 2.4800000	U GHZ	\/B\M			Burgan 4	Span U H
MMR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE 1 Δ2 F 1 t Δ3 Δ4 1 t 994,1 µs -14.07 dBm	Res DW 3.0 MHZ		V D VV	3.0 MHZ		Sweep 12	2.01 ms (8 192 pt
Δ2 1 t 2.878 ms (Δ) 1.28 dB 2 F 1 t 994.1 us -14.07 dBm 3 Δ4 1 t (Δ) 2.879 ms (Δ) -0.33 dB 4 F 1 t 4.745 ms -12.37 dBm 6 Δ6 1 t (Δ) 10.00 ms (Δ) 1.05 dB 7 995.6 μs -13.23 dBm -13.23 dBm -13.23 dBm -13.23 dBm 9 9	MKR MODE TRC SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION	ON VALUE
3 Δ4 1 t (Δ) 2.879 ms (Δ) -0.33 dB 4 F 1 t 4.745 ms -12.37 dBm 6 Δ6 1 t (Δ) 10.05 dB 6 F 1 t 995.6 μs -13.23 dBm 7 9 -13.23 dBm -13.23 dBm -13.23 dBm 10 10 10 10 10 10	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	2.878 m 994.1 u	s (Δ) 1.28 s -14.07 d	Bm			
4 F 1 C 4,/45 ms -12.37 dsm 5 Δ6 1 t (Δ) 10.06 dB [] 6 F 1 t 995.6 μs -13.23 dBm [] 7 995.6 μs -13.23 dBm [] [] [] [] 9 9 -13.23 dBm []<	3 Δ4 1 t (Δ)	2.879 m	s (Δ) -0.33	dB			
6 F 1 t 995.6 µs -13.23 dBm 7 8 9 9 10 10 11 11 11	4 - t $5 \Delta 6 1 t (\Delta)$	<u>4./45 m</u> 10.00 m	s <u>-12.37 d</u> s (Δ) <u>1.05</u>	dB			
	6 F 1 t	995.6 µ	s -13.23 d	Bm			
	8						
	9						
	10						
	•			m.			•

		DH5, GFSI	K, High Channel ((2480 MHz)		
	Total	Period	Number of	Value	Limit	
	On Time (ms)	(ms)	Periods	(%)	(%)	Results
	N/A	N/A	5	N/A	N/A	N/A





	Total	Period	Number of	Value	Limit	
	On Time (ms)	(ms)	Periods	(%)	(%)	Results
	5.771	10	1	57.71	N/A	N/A
	1					
Mary Salah Casata an Anala		ta ma				
Keysight Spectrum Analy	50 Q DC	SE	NSE:INT	ALIGN OFF		04:25:24 AM Feb 27, 2020
			Trig Delay-1.000 n	ns Avg Type: L	og-Pwr	TRACE 1 2 3 4 5
		PNO: Fast ++-	Atten: 10 dB			DETNNNN
					/	Mkr5 10 00 mg
	00 dBm					0 15 dF
Log		Δ1 <u>Λ</u> 2		∧ 3∆4		5/6
-10.0 X						
-20.0	n til a bakar til son die <mark>en den ander an den ste</mark>	ntahsika 🔨 🔨	in and in the second second second second	unitifu mundificianda		
-30.0			(پیک ان کر در میں میں بھی بھی ہے ج			
-40.0						
50.0						
-50.0						
-60.0						
-70.0 http://www.blad		the test part of		an binder at the		diplophistic di bite
-80.0						
-90.0		<mark>to alco, bi</mark> di, d		n at the training of the second s	n an an thailt is a na an bhaile an tha	in at a faith a faith a faith
Cepter 2 402000	000 GHz					Span 0 Hz
Res BW 3.0 MHz		VBW	3.0 MHz		Sweep 1	2.01 ms (8192 pts
MKBI MODELTBCI SCL	x	Y	FUNCTION	EUNCTION WIDTH	FUNCT	
1 Δ2 1 t (Δ)	2.886 m	s (Δ) 0.35	dB			
2 F 1 t 3 A4 1 t (A)	997.1 µ 2 885 m	s -12.42 d	Bm			
4 F 1 t	4.751 m	s -12.70 d	Bm			
6 F 1 t (Δ)	<u>10.00 m</u> 997.1 u	IS (Δ) 0.15 IS -12.42 d	Bm			
7						
9						
10						
			m			
				an in in		

		2DH5, pi/4-DC	PSK, Low Chanr	nel (2402 MHz)		
	Total	Period	Number of	Value	Limit	
	On Time (ms)	(ms)	Periods	(%)	(%)	Results
	N/A	N/A	5	N/A	N/A	N/A





Total	2010, pi/4-D	Number of	Value	Limit		
Total On Time (n		Doriodo	(0/)	(9/)	Poculto	
	10	renous	(70)	(/0)	NIA	1
5.775	10		57.75	IN/A	IN/A	
Keysight Spectrum Analyzer - Element Materials	Technology					×
X/RL RF 50Ω DC	SI	INSE:INT	ALIGN OFF	Les Dus	04:22:57 AM Feb 27, 2	020
	PNO: Fast ↔→ IFGain:Low	Trig: Video Atten: 10 dB	is Avgrype.	. Log-Pwr	TYPE WWWA DET N N N	
				Δ	Mkr5 10.00 n	ns
10 dB/div Ref 0.00 dBm	142		4 2 4 4		-0.43 0	IB
-10.0			34			
	nindation him	للتدليدين والمرام ومطروبين	adadd all a and d		Line Line Line Line Line Line Line Line	dan
-30.0			a sani ja kani k) lines	Hole.
40.0						
-40.0						
-50.0						
-60.0						
-70.0	te da la della de della de		a la state de la	. Laidi birat bala birati darama	in all the second all filles	
-80.0						
	. Örder fan die de		i aanidku	hilder a grad a dita di ki ki akara ta	or a frithelith de their	
Cepter 2 44100000 GHz					Snan û l	Hz
Res BW 3.0 MHz	VBW	3.0 MHz		Sweep 1	2.01 ms (8192 p	ts)
MKR MODE TRC SCL X	Y	FUNCTION	FUNCTION WIDTH	FUNCT	ION VALUE	-
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	389 ms (Δ) 0.14	dB				
3 Δ4 1 t (Δ) 2.	386 ms (Δ) 0.38	dB				
4 - 1 t 4.	<u>4/ms -12.47 d</u> .00 ms (Δ)0.43	Bm				E
6 F 1 t 9	94.1 μs -12.27 d	Bm				
8						
9						
11						-
		In the second		used and the second second		

2DH5, pi/4-DQPSK, Mid Channel (2441 MHz)								
		Total	Period	Number of	Value	Limit		
_		On Time (ms)	(ms)	Periods	(%)	(%)	Results	
		N/A	N/A	5	N/A	N/A	N/A	





	Total	Period	Number of	Value	Limit	
	On Time (me)	(me)	Periode	(%)	(%)	Results
	5 775	10	1	57.75	(/o)	N/A
	5.775	10	I	57.75	IN/A	IN/A
Keysight Spectrum Analyzer	- Element Materials Techno	logy				
LXIRL RF !	50 Ω DC	S	ENSE:INT	ALIGN OFF		04:21:08 AM Feb 27, 203
		PNO: Fast +++	Trig: Video Atten: 10 dB	ns Avg type.	Log-F wi	
					1	\Mkr5 10.00 m
10 dB/div Ref 0.00) dBm					0.02 d
10.0						▲5∆6
-20.0 	<mark>n de skillen i de skillen de se se</mark>	nin na i	de la la de la la de la la de la desta	tek divit in finituit		de ditterrevez
-30.0						
-40.0						
-50.0						
CO.0						
-60.0						
-70.0 torn and the		. This provide both		divide a star		
-80.0						
-90.0		<mark>ە باين بىرىرى بار</mark>		ير بالنام ال	ak al a data italah dah data a	. in the state
Center 2.48000000	0 GHz	1/514/	2.0.1411-		0	Span 0 H
Res BW 3.0 MHz		VBW	3.0 MHz		Sweep	12.01 ms (8192 pt
MKR MODE TRC SCL	x	Y	FUNCTION	FUNCTION WIDTH	FUNC	TION VALUE
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	2.886 m	s (Δ) 0.1	6 dB			
3 Δ4 1 t (Δ)	2.889 m	s (Δ) 0.6	3 dB			
4 F 1 t	4.747 m	s -12.61 c	iBm 2 dB			
$\begin{array}{c c} 6 & F & 1 \\ \hline \end{array} t \\ \end{array}$	997.1 µ	s (<u>12</u>) 0.0	iBm			
7						
9						
10						
				1		

2DH5, pi/4-DQPSK, High Channel (2480 MHz)								
		Total	Period	Number of	Value	Limit		
		On Time (ms)	(ms)	Periods	(%)	(%)	Results	_
		N/A	N/A	5	N/A	N/A	N/A	







3DH5, 8-DPSK, Low Channel (2402 MHz)							
		Total	Period	Number of	Value	Limit	
		On Time (ms)	(ms)	Periods	(%)	(%)	Results
		N/A	N/A	5	N/A	N/A	N/A





		3DH5, 8-DF	PSK, Mid Channel	(2441 MHz)		
	Total	Period	Number of	Value	Limit	
	On Time (ms)	(ms)	Periods	(%)	(%)	Results
	5.778	10	1	57.78	N/A	N/A
Keysight Spectrum Analyzer	- Element Materials Techno	logy				
LXI RL RF !	50 Ω DC	S	ENSE:INT	ALIGN OFF		04:30:00 AM Feb 27, 202
		BN0 5	Trig Delay-1.000 m	s Avg Type:	Log-Pwr	TRACE 1 2 3 4 5
		IFGain:Low	Atten: 10 dB			DETNNNN
					^	Mkr5 10 00 m
	dBm				_	0.28 dl
Log		Δ1 <u>Δ</u> 2		A 3A4		546
-10.0 V						
-20.0	ու անունի կերերին ան	Lumb 1	ويرجع والبلار أتار الانتقاريان ال	al hitati andi		ي بالعربي الم
-30.0						
10.0	Almini da akada da		The start of the state of the set			l l l'unitadi
-40.0						
-50.0						
-60.0						
-70.0 <mark>achte coddur</mark>		the desired states			Land the Repberg of Longar	tetiliantia, lasta hai
-80.0						
-90.0					n and and around a	he hat h
					ليربر بالارا تتلكر مناكاته و	
Center 2.44100000	0 GHz					Span 0 H
Res BW 3.0 MHz		VBW	3.0 MHz		Sweep 1	2.01 ms (8192 pts
MKR MODE TRC SCL	x	Y	FUNCTION	FUNCTION WIDTH	FUNCT	ION VALUE
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	2.889 m	s (Δ) 0.90	0 dB IBm			
3 Δ4 1 t (Δ)	2.889 m	s (Δ) 1.0	0 dB			
4 + 1 + 1 + 1	4.745 m	s -12.76 c	IBm 8 dB			
6 F 1 t	997.1 µ	s -12.62 c	lBm			
7						
9						
10						

3DH5, 8-DPSK, Mid Channel (2441 MHz)								
		Total	Period	Number of	Value	Limit		
		On Time (ms)	(ms)	Periods	(%)	(%)	Results	
		N/A	N/A	5	N/A	N/A	N/A	







3DH5, 8-DPSK, High Channel (2480 MHz)							
		Total	Period	Number of	Value	Limit	
		On Time (ms)	(ms)	Periods	(%)	(%)	Results
		N/A	N/A	5	N/A	N/A	N/A



CARRIER FREQUENCY SEPARATION



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 channel carrier frequencies in the 2400-2483.5MHz band must be separated by 25 kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Or, if the output power is less than 125 mW, the channel separation can be 25 kHz or 2/3 of the 20dB bandwidth. The EUT was operated in pseudorandom hopping mode. The spectrum was scanned across two adjacent peaks. The separation between the peaks of these channels was measured.

The EUT has an output of less than 125 mW, the largest 20dB occupied bandwidth is 1.322 MHz.

1.322 MHz * 2/3 = 0.881 MHz

CARRIER FREQUENCY SEPARATION



			TbtTx 2019.08.30.0	XMit 2019.09.05		
EUT: C2-03CPU		Work Order:	KOY00001			
Serial Number: N/A		Date:	14-Feb-20			
Customer: Koyo Electronics Industries Co., LTD		Temperature:	22.2 °C			
Attendees: None	Humidity:	: 14.7% RH				
Project: None	Project: None					
Tested by: Andrew Rogstad	Power: 24 VDC	Job Site:	MN08			
TEST SPECIFICATIONS	Test Method					
FCC 15.247:2020	ANSI C63.10:2013					
COMMENTS						
Reference level offset includes 20 dB attenuator, DC block, and measurement	cable.					
DEVIATIONS FROM TEST STANDARD						
None						
Configuration # 10 Signature	to Roptal					
		Value	Limit (≥)	Results		
Hopping Mode (All Channels)			. /			
DH5, GFSK						
Mid Channel, 2441 MHz	Mid Channel, 2441 MHz					

CARRIER FREQUENCY SEPARATION





NUMBER OF HOPPING FREQUENCIES



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 number of hopping frequencies was measured across the authorized band. The hopping function of the EUT was enabled.

NUMBER OF HOPPING FREQUENCIES



			TbtTx 2019.08.30.0	XMit 2019.09.05
EUT: C2-03CPU		Work Order:	KOYO0001	
Serial Number: N/A		Date:	14-Feb-20	
Customer: Koyo Electronics Industries Co., LTD		Temperature:	22.2 °C	
Attendees: None		Humidity:	14.6% RH	
Project: None		Barometric Pres.:	1025 mbar	
Tested by: Andrew Rogstad	Power: 24 VDC	Job Site:	MN08	
TEST SPECIFICATIONS	Test Method			
FCC 15.247:2020	ANSI C63.10:2013			
COMMENTS				
Reference level offset includes 20 dB attenuator, DC block, and measurement ca	ble.			
DEVIATIONS FROM TEST STANDARD				
None				
Configuration # 10 Signature	Rootal			
		Number of	Limit	
		Channels	(≥)	Results
Hopping Mode (All Channels)				
DH5, GFSK				
Mid Channel, 2441 MHz		79	15	Pass

NUMBER OF HOPPING FREQUENCIES







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 average dwell time per hopping channel was measured at one hopping channel in the middle of the authorized band. The hopping function of the EUT was enabled.

The dwell time limit is based on the Number of Hopping Channels * 400 mS. For Bluetooth this would be 79 Channels * 400mS = 31.6 Sec.

On Time During 31.6 Sec = Pulse Width * Average Number of Pulses * Scale Factor

>Average Number of Pulses is based on 4 samples.

Scale Factor = 31.6 Sec / Screen Capture Sweep Time = 31.6 Sec / 6.32 Sec = 5



									TbtTx 2019.08.30.0	D XMit 2019.09.05
EUT	C2-03CPU							Work Order: K	OYO0001	
Serial Number	: N/A							Date: 14	4-Feb-20	
Customer	: Koyo Electronics Industr	ies Co., LTD						Temperature: 22	2.3 °C	
Attendees	None							Humidity: 14	4.7% RH	
Project	: None							Barometric Pres.: 10	025 mbar	
Tested by	: Andrew Rogstad			Power:	24 VDC			Job Site: M	N08	
TEST SPECIFICAT	TIONS				Test Method					
FCC 15.247:2020					ANSI C63.10:2013					
COMMENTS										
Reference level of	fset includes 20 dB attenua	ator, DC block	k, and measurement cab	le.						
DEVIATIONS FRO	M TEST STANDARD									
None										
Configuration #	10		Signature	Rope	tal					
			- ¥	Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
Hopping Mode (All	Channels)									
	DH5, GFSK									
	Mid Channel,	2441 MHz		2.878	N/A	N/A	N/A	N/A	N/A	N/A
	Mid Channel,	2441 MHz		N/A	14	N/A	N/A	N/A	N/A	N/A
	Mid Channel,	2441 MHz		N/A	15	N/A	N/A	N/A	N/A	N/A
	Mid Channel,	2441 MHz		N/A	12	N/A	N/A	N/A	N/A	N/A
	Mid Channel,	2441 MHz		N/A	16	N/A	N/A	N/A	N/A	N/A
	Mid Channel,	2441 MHz		2.878	N/A	14.25	5	205.06	400	Pass
	2DH5, pi/4-DQPSK									
	Mid Channel,	2441 MHz		2.885	N/A	N/A	N/A	N/A	N/A	N/A
	Mid Channel,	2441 MHz		N/A	19	N/A	N/A	N/A	N/A	N/A
	Mid Channel,	2441 MHz		N/A	16	N/A	N/A	N/A	N/A	N/A
	Mid Channel,	2441 MHz		N/A	17	N/A	N/A	N/A	N/A	N/A
	Mid Channel,	2441 MHZ		N/A	17	N/A	N/A	N/A	N/A	N/A
	Mid Channel,	2441 MHz		2.885	N/A	17.25	5	248.83	400	Pass
	JUHD, 6-DPSK	2444 MU-		2.006	NI/A	NI/A	N1/A	N1/A	N1/A	NI/A
	wid Channel,			2.900 N/A	1E	IN/A	IN/A	IN/A	IN/A	IN/A
	Mid Channel,	2441 IVIEZ		IN/A N/A	10	N/A N/A	IN/A N/A	IN/A N/A	N/A N/A	IN/A N/A
	Mid Channel,			IN/A	10	IN/A	N/A	IN/A	N/A	N/A
	Mid Channel,	2441 IVIEZ		IN/A N/A	19	N/A N/A	IN/A N/A	IN/A N/A	N/A N/A	IN/A N/A
	Mid Channel,			11/A 2.006	17 N/A	17/A	N/A	IN/A 247.01	1N/A	IN/A Doco
	wid Channel,			2.900	N/A	17	5	247.01	400	r dSS



ruise Width	Number of	Average No.	Scale	On Time (ms)		Poculte
2.878	N/A	N/A	N/A	N/A	N/A	N/A
2.070	11/A	IN/A	11/7	11/7	11/4	IN/A
Keyright Spectrum Apaliger	- Element Materials Tech	nology				
REYSIGNE SPECIAL ANALYZER	50 Ω DC	SEI	NSE:INT	ALIGN OFF		08:32:48 AM Feb 15, 2020
			Trig Delay-1.000	ms #Avg Type Avg Hold:>	: Log-Pwr 100/100	TRACE 1 2 3 4 5 6 TYPE MWWWW
		IFGain:Low	#Atten: 10 dB	Arginoid.	100/100	DET PPPPF
Ref Offse	t 21 31 dB				1	\Mkr1 2.878 ms
5 dB/div Ref 21.3	31 dBm					-8.921 dB
-~9						
16.3						
والمحدين يتنا						
11.3						
	M I MAG IM	hanna and punanted	A MA INTANDA A	A MEDICARIA AND AND AN	M140 M10 -	
6.31	(\	Louis C Links	And A satisfie	A . A . Market Market A M.	Marken M	
	Xa					
1.31	<u>^</u>					
-3.69					<u> </u> 1∆2 _	
-8.69						
-13.7						TRIG LVL
-18 7						
-23.7						
Center 2.44100000 Res BM 300 kHz	UGHZ	#\/B)A(30 kHz		Sween	Span 0 Hz
			SW MIII2	STATIS	- Gweep	need ins (2000 prs)
130				STATUS		
	Hopping	n Mode (All Chann	nels) DH5 GES	K Mid Channel 2	441 MHz	
Pulse Width	Number of	Average No.	Scale	On Time (ms)	Limit	
(ms)	Pulses	of Pulses	Factor	During 31.6 s	(ms)	Results
N/A	14	N/A	N/A	N/A	N/A	N/A

🗾 Keysi	ght Spectrum Ana	alyzer - Elemer	nt Materials	Technology										PX
LXI RL	RF	50 Ω	DC		S	ENSE:INT		ALIGN	N OFF			08:33:03	AM Feb 1	5,2020
						Trig Delay	-50.00 m	is #	#Avg Typ	e: Log-Pwr		TF	ACE 12	3 4 5 6
				PNO: Fas	at 😱	Trig: Video	4D)						DET P P	PPPP
				IFGain:Lo	w	#Atten: 10	ub							
	Ref O	ffset 21.31	dB											
5 dB/di	iv Ref	21.31 dB	m											
Log														
16.3														
11.2														
11.5														
1							1 1							
6.31	 													
1.31	H													
2.60														
-3.03														
-8.69	lt												r i se	
-13.7	H										_			
H-														RIG LVL
-18 7														
100.1														
-23.7														
							1							
Contra	- 2 44400	0000 011											Cnor	0.115
	1 2.44100		Z		#\/D\	20 64-				0	voon	6 220 /	span	
Res -	WF JUU KH				#VDV	V 30 KHZ				51	veep	07.0720 S	7(6192	-prs)
MSG									STATUS					



(ms)	Pulses	of Pulses	Factor	During 31.6 s	(ms)	Results
N/A	15	N/A	N/A	N/A	N/A	N/A
-						
Keysight Spectrum Analyze	r - Element Materials Tech 50 Ω DC	nnology SENS	E:INT	ALIGN OFF		08:33:17 AM Feb 15, 2020
			rig Delay-50.00 i	ms #Avg Type:	Log-Pwr	TRACE 1 2 3 4 5 6
		PNO: Fast IFGain:Low #	Atten: 10 dB			DETPPPPP
Ref Offse	et 21.31 dB					
5 dB/div Ref 21.	31 dBm			1	1	
16.3						
11.3						
6.31						
1.31						
-3.69						
-8 69						
-13.7						TRIGUNI
-18.7						
-23.7						
			,			
Center 2.44100000	00 GHz					Span <u>0 Hz</u>
Res BW 300 kHz		#VBW 3	30 kHz		Sweep	6.320 s (8192 pts)
MSG				STATUS		
	Hornin	a Mode (All Channe		K Mid Channel 2/	41 MH7	
Pulse Width	Number of	Average No.	Scale	On Time (ms)	Limit	
(ms)	Pulses	of Pulses	Factor	During 31.6 s	(ms)	Results
N/A	12	N/A	N/A	N/A	N/A	N/A
Keysight Spectrum Analyze	r - Element Materials Tech	Inology SENS	E-INT	ALIGN OFF		08:33:32 AM Feb 15, 2020

KL		F 50	ΩΟΟ		PNO: Fast C IFGain:Low	⇒	Trig Delay- Trig: Video #Atten: 10	50.00 ms dB	#Avg T	ype: L	.og-Pwr	08:33:.	RACE 1 2 3 4 5 6 TYPE WWWWW DET P P P P P P
5 dB/c	Re div R e	f Offset 2 ef 21.31	21.31 d dBm	В								-	
16.3 -													
11.3 -													
6.31 -													
1.31 -													
-3.69 -													
-8.69 -													
-13.7 -													TRIG LVL
-18.7 -													
-23.7								1					
Cent Res I	er 2.441 3W 300	000000 (Hz	GHz		#V	/BW	30 kHz				Swe	eep 6.320	Span 0 Hz s (8192 pts)
MSG									STATUS	5			



Pulse Width	Number of	Average No.	Scale	On Time (ms)	Limit	
(ms)	Pulses	of Pulses	Factor	During 31.6 s	(ms)	Results
N/A	16	N/A	N/A	N/A	N/A	N/A
Dec.						
Keysight Spectrum Analyzer	Element Materials Tech	nology		ALIGN OFF		08:33:46 AM Feb 15, 2020
			Trig Delay-50.00 m	s #Avg Type:	Log-Pwr	TRACE 1 2 3 4 5 6
		PNO: Fast IFGain:Low	#Atten: 10 dB			DET PPPPP
Diforent	04 24 45					
5 dB/div Ref 21.3	1 dBm					
16.2						
10.5						
11.3						
6.31						
1.31						
-3.69						
-8.69						
-13.7						
						TRIG LVL
-18.7						
-23.7						
			1			
Center 2.44100000) GHz					Span 0 Hz
Res BW 300 kHz		#VBW	/ 30 kHz		Sweep	6.320 s (8192 pts)
MSG				STATUS		

	Pulse Width	Pulse Width Number of Average No. Scale On Time (ms) Limit							
	(ms)	Pulses	of Pulses	Factor	During 31.6 s	(ms)	Results		
[2.878	N/A	14.25	5	205.06	400	Pass		

Calculation Only

No Screen Capture Required



	Bulco Width	Hopping Mo	de (All Channels), 2DH5, pi/4-D	QPSK, Mid Channe	l, 2441 MHz	
	(ms)	Pulses	of Pulses	Factor	During 31.6 s	(ms)	Results
	2.885	N/A	N/A	N/A	N/A	N/A	N/A
💓 Key	sight Spectrum Analyzer	- Element Materials Techi 50 Ω DC	nology SE	NSE:INT	ALIGN OFF		09:08:01 AM Feb 15, 2020
			PNO: Fast ↔→	Trig Delay-1.000 Trig: Video #Atten: 10 dB	ms #Avg Type Avg Hold:	: Log-Pwr 100/100	TRACE 1 2 3 4 5 6 TYPE M WWWW DET P P P P P P
	Ref Offse	t 21.31 dB	II Gam.Low				∆Mkr1 2.885 ms
5 dB/	div Ref 21.3	1 dBm		I		1	2.064 GB
10.0							
16.3							
11.3							
6 31		r May	8 8	Å	R		
0.01		í l WAAA	Munna.	MMAMMAM	Maad A Land Alam		
1.31		X ₂	te di di di de di	. Hardah ta akada	then to the print of the	a Mail Antida	
-3.69							
-8.69							
-13.7							TRIG LVL
-18.7							
10.7							
-23.7							
Cent Res	er 2.44100000 BW 300 kHz	U GHZ	#VBW	30 kHz		Sweep :	Span 0 Hz 5.064 ms (2000 pts)
MSG					STATUS		
		Hopping Ma	de (All Channele) 2DH5 ni/4-D	OPSK Mid Chappe	L 2441 MHz	
	Pulse Width	Number of	Average No.	Scale	On Time (ms)	Limit	
г	(ms)	Pulses	of Pulses	Factor	During 31.6 s	(ms)	Results
	N/A	19	N/A	N/A	N/A	N/A	N/A

Pulse Width	Number of	Average No.	Scale	On Time (ms)	Limit	
(ms)	Pulses	of Pulses	Factor	During 31.6 s	(ms)	Results
N/A	19	N/A	N/A	N/A	N/A	N/A

鱦 Keysight Spe	ctrum Analyzer - Ele	ment Materials Tech	nology						
LXI RL	RF 50 Ω	DC	PNO: Fast ↔→ IFGain:Low	SENSE:INT Trig Delay-50. Trig: Video #Atten: 10 dB	.00 ms	IGN OFF #Avg Type:	Log-Pwr	09:08:24 TR	AM Feb 15, 2020 ACE 1 2 3 4 5 6 TYPE WWWWWW DET P P P P P P
5 dB/div Log	Ref Offset 21 Ref 21.31 (.31 dB dBm							
16.3									
11.3									
6.31									
1.31									
-3.69									
-13.7									TRIÇ _VL
-18.7									
-23.7								1	
Center 2.4 Res BW 3	41000000 G 00 kHz	Hz	#VB	↓1 W 30 kHz			Swee	p 6.320 s	Span 0 Hz (8192 pts)
MSG						STATUS			



		Hopping Mo	de (All Channels)), 2DH5, pi/4-DQ	PSK, Mid Channe	l, 2441 MHz	
	Pulse Width	Number of	Average No.	Scale	On Time (ms)	Limit	
	(ms)	Pulses	of Pulses	Factor	During 31.6 s	(ms)	Results
	N/A	16	N/A	N/A	N/A	N/A	N/A
	Constant and the second s	Flower Meterials Task					
	RL RF	50 Ω DC	SEI	NSE:INT	ALIGN OFF		09:08:39 AM Feb 15, 2020
			PNO: Fast ↔→ IFGain:Low	Trig Delay-50.00 n Trig: Video #Atten: 10 dB	ns #Avg Type:	Log-Pwr	TRACE 1 2 3 4 5 6 TYPE WWWWW DET P P P P P P
5 d	Ref Offs B/div Ref 21.	et 21.31 dB 31 dBm					
10							
16.	-						
11.							
6.3							
1.3	0						
-3.0							
-13	7						
-18	7						
-23.	7						
				1			
Ce Re	nter 2.4410000 s BW 300 kHz	00 GHz	#VBW	30 kHz		Sweep	Span 0 Hz 6.320 s (8192 pts)
MSG					STATUS		
	Dulas Mi tit	Hopping Mo	ode (All Channels)), 2DH5, pi/4-DQ	PSK, Mid Channe	I, 2441 MHz	
	Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
	N/A	17	N/A	N/A	N/A	N/A	N/A

🚺 Ke	ysight Spe	ectrum Ai	nalyzer -	Element	Materials Te	chnology										
XI R	L	RF	5	0Ω D	C			SENSE:INT	lav-50.00 m	<u> </u>	LIGN OFF		l og-Pwr		09:08:55	AM Feb 15, 2020
						PNO: IFGair	Fast ↔ h:Low	Trig: Vi #Atten:	deo 10 dB		#/\v	y type	. Log-i wi			
5 dB	/div	Ref (Ref	Offset 21.3	21.31 1 dBr	dB n											
LUg																
16.3																
11.3																
6.31																
1.31																
-3.69										+		_				
-8.69										_						
-13.7																TRICLUM
-18.7																100 242
10.1																
-23.7										1		11				
Cen	ter 2.4	44100	0000) GHz												Span 0 Hz
Res	BW 3	100 kH	z				#VB	W 30 kH	Z				St	weep	6.320 s	s (8192 pts)
MSG											STA	TUS				



(ms)	Pulses	of Pulses	Factor	During 31.6 s	(ms)	Results
N/A	17	N/A	N/A	N/A	N/A	N/A
Keysight Spectrum Analyzer	- Element Materials Tech i0 Ω DC	nology SEI	NSE:INT	ALIGN OFF		09:09:09 AM Feb 15, 2020
			Trig Delay-50.00 n	ns #Avg Type:	Log-Pwr	TRACE 1 2 3 4 5 6
		PNO: Fast +++ IFGain:Low	#Atten: 10 dB			DET PPPPP
Ref Offset	21 31 dB					
5 dB/div Ref 21.3	1 dBm					
Log						
16.3						
11.3						
6.31						
1.31						
-3.69						
-8.69						
-13.7						
19.7						
-10.7						
-23.7						
Cepter 2 4410000			↓1			Spap () Hz
Res BW 300 kHz	GHZ	#VBW	30 kHz		Sweep	6.320 s (8192 pts)
MSG				STATUS		

	Hopping Ivio	de (All Channels)	i, 20H5, pi/4-DQi	PSK, Mid Channe	1, 2441 IVIHZ	
Pulse Width	Number of	Average No.	Scale	On Time (ms)	Limit	
(ms)	Pulses	of Pulses	Factor	During 31.6 s	(ms)	Results
2.885	N/A	17.25	5	248.83	400	Pass

Calculation Only

No Screen Capture Required



		Hopping I	Mode (All Channe	ls), 3DH5, 8-DP	SK, Mid Channel, 2	2441 MHz	
	Pulse Width	Number of	Average No.	Scale	On Time (ms)	Limit	Poculto
Г	2.906	N/A	N/A	N/A	N/A	N/A	N/A
					L · · · · · · L		
🌉 Key	/sight Spectrum Analyzer	- Element Materials Tech	nology				
L <mark>XI</mark> RL	L RF !	50 Ω DC	SE	NSE:INT Trig Delay-1.000 r	ALIGN OFF ns #Avg Type:	Log-Pwr	09:11:20 AM Feb 15, 2020 TRACE 1 2 3 4 5 6
			PNO: Fast ++-	Trig: Video #Atten: 10 dB	Avg Hold: 1	00/100	DET PPPPP
	Ref Offse	t 21.31 dB				1	Mkr1 2.906 ms
5 dB/	div Ref 21.3	1 dBm					1.054 dB
Ű							
16.3							
11.3							
6.31		(⁷ ``,n					
		(Maria	γ_{μ}	\mathcal{P}	1) 54 4 50 60 10 10 10	5111	
1.31				<u> </u>	4 4 4 4	¹ 1∆2 −	
3.69		X ₂					
-3.65							
-8.69							
							TRIG LVL
-13.7							
-18.7							
-23.7							
Cent	ter 2.44100000	0 GHz	#VBM	30 647		Sween 5	Span 0 Hz
MSG	500 M12			- 39 MHZ	STATUS	Gweep d	
					0		
		Hopping I	Mode (All Channe	ls), 3DH5, 8-DP	SK, Mid Channel, 2	2441 MHz	
	Pulse Width	Number of	Average No.	Scale	On Time (ms)	Limit	
	(ma)	Dulass		Factor	During 21 6 o	(ma)	Beaulta

🊺 Keysight Spe	ctrum Anal	/zer - Elemen	t Material	s Techn	ology											-) 6	X
X RL	RF	50 Ω [DC			9	SENSE:INT	Day 50 00	ALIGN O	FF		Duer		09:1	1:35 A	MFeb 15,	2020
					PNO: F IFGain:	ast ↔ Low	Trig: Vi #Atten:	deo 10 dB	 #6	vgiy	pe. Log-				TY	PE WWW ET P P P	PPF
5 dB/div	Ref Off Ref 2	set 21.31 1.31 dB	dB m														
16.3																	
11.2																	
6.31										_							
1.31																	
-3.69										_							
-8.69																	
																-	10114
-13.7																	10 2 42
-18.7																	
-23.7		11		1									1				1
								↓ 1									
Center 2.4 Res BW 3	41000 00 kHz	000 GH:	Ζ			#VB\	W 30 kH	z				Sv	/ee	o 6.32	0 s	Span ((8192) Hz pts)
MSG					_				ST	TATUS		_					



	Pu	ulse (m	Wid s)	th	N	um Pul	ber o ses	f	Averag of Pu	je No. Ises		Sca Fact	le or		On Tim During	ne (ms) 31.6 s	1	Limit (ms)		Re	sults		
		N/	A			1	7		N/	A		N//	4		N/	/A		N/A		1	N/A		
		. .			-												નવાલકાલા				(Martine and		
XI R	ysight L	Spectru	RF	alyzer -	0 Ω	DC	aterials	echno	blogy	5	ENSE:	INT			ALIGN	OFF				09:11:5	0 AM Fel	b 15, 202	20
									PNO: Fas IFGain:Lo	st 🔸	Tri Tri #A	ig Delay ig: Vide tten: 10	-50.0 o dB	0 ms	#,	Avg Type	e: Log	-Pwr		TI	RACE 1 TYPE V DET P	2345 ////////////////////////////////////	6 ₩
5 dE Loa	/div	L. L.	tef O tef :	ffset 21.3	21.3 1 dE	1 dE 3m	3																
16.3																							
11.3																							
6.31																							
						_		_	_	_													
								-					╫──										
8 69																							
-0.05																							
-13.7	-							-															4
-18.7								-					+										
<u>-</u>																							
-20.1																							
Cer	ter	2.44	100	0000) GH	z							↓								Spa	in 0 H:	z
Res	BW	300	kH	z						#VB\	N 30	kHz						Swe	ep 6	.320	s (81	92 pts	s)
MSG																STATUS							
_						_	lann'		ada (All	Char	e e }		0.5			heers	044	4 8 41 1-					_
	P	ulse	Wid	th	N	uml	ber o	ig ivi F	Averac	onann 1e No	eis),	Sca	, ŏ-L le	122h	On Tim	nannel, ne (ms)	244	Limit					
		(m	s)			Pul	ses		of Pu	lses		Fact	or		During	<u>31.6</u> s		(ms)		Re	sults		
		N/	A			1	9		N/	A		N//	4		Ň	/A		N/A		1	N/A		

🚺 Key	sight Spe	ectrum Analy	yzer - Eleme	nt Materials	s Technol	ogy											and the second			
LXVI RL	-	RF	50 Ω	DC		PNO: Fast IFGain:Low		ENSE:IN Trig Trig #Att	Delay- : Video en: 10	50.00 dB	ms	ALIGN C #A	vg Ty	pe: L	og-Pw	r		09:12:0 T	6 AM Fe RACE 1 TYPE W DET P	2 3 4 5 6 WWWWW P P P P P P
5 dB/ ^{Log} [div	Ref Off Ref 2	⁵ set 21.3′ 1.31 dB	dB m		1													1	
16.3																				
11.3																				
6.31										╁┟─┟										
1.31																				
-3.69																				
-8.69																				
-13.7																				TRIG LVL
-18.7																				
-23.7																1				
Cent Res	er 2.4 BW 3	41000 00 kHz	000 GH	z			#VBV	V 30	kHz							Swe	eep	6.320	Spa s (81	n 0 Hz 92 pts)
MSG												S	TATUS							



		Hopping I	Mode (All Channe	els), 3DH5, 8-DP	SK. Mid Channel.	2441 MHz	
	Pulse Width	Number of	Average No.	Scale	On Time (ms)	Limit	
-	(ms)	Pulses	of Pulses	Factor	During 31.6 s	(ms)	Results
	N/A	17	N/A	N/A	N/A	N/A	N/A
📜 Key	vsight Spectrum Analyzer	- Element Materials Tech	nology	NCLINT	ALIEN OFF		00:12:21 AMEeb 15, 2020
		50 S2 DC	30	Trig Delay-50.00 n	ns #Avg Type:	Log-Pwr	TRACE 1 2 3 4 5 6
			PNO: Fast +++	Trig: Video #Atten: 10 dB			DET PPPPP
			I Gameon				
5 dB/	div Ref 21.3	121.31 dB 31 dBm					
Log							
10.9							
16.3							
11.3							
6.31					_		
1.31							
-3.69							
9.69							
-0.05							
-13.7							
-18.7							
-23.7				1 11			
				1			
Cen	ter 2.44100000	0 GHz					Span 0 Hz
Res	BW 300 kHz		#VBW	/ 30 kHz		Sweep	6.320 s (8192 pts)
MSG					STATUS		
		lless'					
	Pulse Width	Hopping I Number of	Viode (All Channe	eis), 3DH5, 8-DPS Scale	On Time (ms)	2441 MHZ	
	(ms)	Pulses	of Pulses	Factor	During 31.6 s	(ms)	Results
]	2.906	N/A	17	5	247.01	400	Pass

Pulse Width	Number of	Average No.	Scale	On Time (ms)	Limit	
(ms)	Pulses	of Pulses	Factor	During 31.6 s	(ms)	Results
2.906	N/A	17	5	247.01	400	Pass

Calculation Only

No Screen Capture Required