

Test Result and Measuring equipment for certification

2.4GHz low-power data communication system

Tx mode

Radio Equipment for test	Model or type name: SRM200A		Test environment	Temperature : 21 °C	Test Method: TELEC-T401(Ver9.0)	F1D, 2402~2480 MHz, 2MHz Separation: 40 channels	3 mW
				Humidity : 51 %			
	Serial number:	#0	Engineer: N.H.KIM Reviewer: Y.H.LEE Date: OCT.14.2019 ~ NOV.19.2019 Test location: HCT				

Equipment	Model and type name	Serial number	Manufacturer	Last Calibrated date	Calibration Company	Note
	Signal Analyzer(N9020A)	US46220219	AGILENT Technologies	2019-04-11	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	DC Power Supply(E3632A)	KR75306225	AGILENT Technologies	2019-04-11	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	POWER METER(N1911A)	MY45100523	AGILENT Technologies	2019-04-10	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Power Sensor (N1921A)	MY52260025	AGILENT Technologies	2019-04-10	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Fixed Attenuator (8493C)	10342	HEWLETT PACKARD	2019-04-11	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	DIGITAL MULTIMETER(34401A)	US36010057	AGILENT Technologies	2019-10-24	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha

Test result	Electric performance	Voltage		V	Limit	DC 3.30 V (normal)				DC 3.63 V (high)				DC 2.97 V (low)				Note	
		Test Frequency		MHz		2402	2440	2480		2402	2440	2480		2402	2440	2480			
		Frequency error(measured frequency)			MHz	2401.9931	2439.9970	2480.0004		2402.0013	2439.9968	2480.0004		2402.0024	2439.9881	2479.9928			
		Frequency error		ppm	50	-2.86	-1.23	0.14		0.56	-1.30	0.16		0.99	-4.87	-2.90			
		Occupied bandwidth		MHz	26	1.06	1.06	1.06		1.05	1.06	1.06		1.06	1.06	1.06			
		Spreading bandwidth		MHz	NA														
		Spreading Factor		-	NA														
		Spurious (measured frequency)		-	MHz	2372.50	2149.45	2288.48		2375.50	2376.50	2343.99		2379.50	2355.49	2349.99			
				30 ~ 2387 MHz	μW	2.5	0.029	0.018	0.022		0.017	0.018	0.016		0.030	0.016	0.015		
				(measured frequency)	-	MHz	2400.00	2399.96	2395.36		2400.00	2399.42	2390.76		2399.99	2398.32	2391.60		
				2387 ~ 2400 MHz	μW	25	0.944	0.020	0.015		0.959	0.017	0.014		0.930	0.018	0.015		
				(measured frequency)	-	MHz	2492.87	2485.93	2483.51		2492.98	2483.76	2483.67		2491.24	2484.57	2483.53		
				2483.5 ~ 2496.5 MHz	μW	25	0.016	0.017	0.536		0.015	0.018	0.544		0.016	0.014	0.513		
				(measured frequency)	-	MHz	7205.15	7320.69	2496.50		7206.65	7319.69	7439.73		7207.15	7321.19	7439.73		
		2496.5 ~ 12500 MHz		μW	2.5	0.051	0.058	0.073		0.048	0.052	0.057		0.049	0.045	0.040			
		Antenna power		mW	3	1.954	1.923	1.857		1.953	1.923	1.854		1.955	1.922	1.857			
		deviation		%	-80	-34.88	-35.91	-38.09		-34.91	-35.90	-38.20		-34.83	-35.92	-38.11			
					20														
		Collateral Emission		(measured frequency)	-	MHz	832.04	703.98	889.54		831.99	831.99	831.99		831.99	831.99	64.00		
				30 ~ 1000 MHz	nW/100kHz	4	0.002	0.002	0.005		0.002	0.002	0.002		0.002	0.002	0.002		
				(measured frequency)	-	MHz	1864.23	1864.23	1864.23		2431.18	1865.38	1864.80		1864.80	2432.33	1864.23		
		1000 ~ 12500 MHz		nW	20	0.045	0.055	0.032		0.073	0.034	0.021		0.054	0.028	0.037			
		E.I.R.P.		mW/Mhz	NA														
		Hopping Frequency staying time		sec	NA														
		Interference Protection (Device ID)				yes	Complies	Complies	Complies		Complies	Complies	Complies		Complies	Complies	Complies		
		Carrier Sense				NA													

Antenna Gain: 5.33 dBi

NA = Not Applicable

Allowed Maximum E.I.R.P. :

Test Result and Measuring equipment for certification

2.4GHz low-power data communication system

11 Mbps

Radio Equipment for test	Model or type name:	SRM200A	Test environment	Temperature : 21 °C	Test Method:	TELEC-T401(Ver9.0)	G1D, 2412 to 2472 MHz (5 MHz separation 13 carriers)	802.11b	0.00598W/MHz
				Humidity : 51 %					
	Serial number:	#0	Engineer: N.H.KIM Reviewer: Y.H.LEE Date: SEP.25.2019 ~ NOV.19.2019 Test location: HCT						

Equipment	Model and type name	Serial number	Manufacturer	Last Calibrated date	Calibration Company	Note
	Signal Analyzer(N9020A)	US46220219	AGILENT Technologies	2019-04-11	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	DC Power Supply(E3632A)	KR75306225	AGILENT Technologies	2019-04-11	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	POWER METER(N1911A)	MY45100523	AGILENT Technologies	2019-04-10	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Power Sensor (N1921A)	MY52260025	AGILENT Technologies	2019-04-10	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Fixed Attenuator (8493C)	10342	HEWLETT PACKARD	2019-04-11	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	DIGITAL MULTIMETER(34401A)	US36010057	AGILENT Technologies	2019-10-24	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha

Test result	Electric performance	Voltage		Limit	DC 3.30 V (normal)			DC 3.63 V (high)			DC 2.97 V (low)			Note
		Test Frequency	MHz		2412	2442	2472	2412	2442	2472	2412	2442	2472	
		Frequency error(measured frequency)	MHz		2411.9886	2441.9902	2471.9911	2411.9903	2441.9901	2471.9910	2411.9902	2441.9898	2471.9906	11Mbps symbol rate : 1.375 MHz
		Frequency error	ppm	50	-4.73	-4.00	-3.59	-4.02	-4.05	-3.64	-4.08	-4.17	-3.81	
		Occupied bandwidth	MHz	26	11.38	11.38	11.29	11.31	11.35	11.36	11.35	11.35	11.40	
		Spreading bandwidth	MHz	0.5	8.06	8.12	8.11	8.06	8.06	8.07	8.04	8.09	8.08	
		Spreading Factor	-	5	5.86	5.90	5.90	5.86	5.86	5.87	5.85	5.88	5.87	
		Spurious (measured frequency)	-	MHz	2386.88	2366.59	2369.26	2385.78	2366.47	2215.80	2386.39	2384.45	2367.80	
		30 ~ 2387 MHz	μW	2.5	0.055	0.031	0.027	0.054	0.028	0.026	0.066	0.030	0.026	
		(measured frequency)	-	MHz	2397.21	2388.22	2394.92	2397.35	2398.36	2398.71	2397.48	2399.09	2393.15	
		2387 ~ 2400 MHz	μW	25	1.431	0.031	0.035	1.369	0.031	0.027	1.453	0.037	0.031	
		(measured frequency)	-	MHz	2483.53	2492.25	2483.51	2493.91	2490.55	2483.53	2487.80	2488.12	2483.50	
		2483.5 ~ 2496.5 MHz	μW	25	0.030	0.034	1.506	0.027	0.034	1.025	0.031	0.028	1.296	
		(measured frequency)	-	MHz	12007.33	12045.34	12109.86	11948.56	11961.81	11918.80	11992.32	12024.83	11979.07	
		2496.5 ~ 12500 MHz	μW	2.5	0.046	0.052	0.044	0.058	0.051	0.046	0.041	0.051	0.052	
		Antenna power	mW/MHz	5.98	6.840	6.264	5.579	6.724	6.554	5.703	7.015	6.538	5.636	
		deviation	%	-80	14.38	4.75	-6.70	12.45	9.61	-4.63	17.31	9.34	-5.75	
		20												
		Collateral Emission (measured frequency)	-	MHz	480.02	836.14	889.34	889.34	845.19	320.01	891.79	320.01	889.14	
		30 ~ 1000 MHz	nW/100kHz	4	0.0007	0.0012	0.0009	0.0008	0.0016	0.0008	0.0009	0.0007	0.0008	
		(measured frequency)	-	MHz	3216.05	3256.30	3295.98	3216.05	3256.30	3295.98	3216.05	3256.30	3295.98	
		1000 ~ 12500 MHz	nW/MHz	20	0.1242	0.0734	0.0543	0.1222	0.0734	0.0508	0.1125	0.0956	0.0500	
		E.I.R.P.	mW/MHz	NA										
		Hopping Frequency staying time	sec	NA										
		Interference Protection (Device ID)	yes	Complies	Complies	Complies		Complies	Complies	Complies	Complies	Complies	Complies	
		Carrier Sense	NA											
		Antenna power 1Mbps	mW/MHz	5.98	6.410	5.752	5.149							
		deviation	%		7.19	-3.82	-13.89							
		Antenna power 2Mbps	mW/MHz	5.98	6.533	5.959	5.299							
		deviation	%		9.25	-0.35	-11.38							
		Antenna power 5.5Mbps	mW/MHz	5.98	6.556	6.048	5.426							
		deviation	%		9.63	1.14	-9.27							
		Antenna power 11Mbps	mW/MHz	5.98	6.840	6.264	5.579							
		deviation	%		14.38	4.75	-6.70							

Antenna Gain: 4.44 dBi

NA = Not Applicable

Allowed Maximum E.I.R.P.:

※ Note: TX Power was set-up as 'b:15.5' in test mode.

Test Result and Measuring equipment for certification

2.4GHz low-power data communication system

12 Mbps

Radio Equipment for test	Model or type name:	SRM200A	Test environment	Temperature : 21 °C	Test Method:	TELEC-T401(Ver9.0)	D1D, G1D, 2412 to 2472 MHz (5 MHz separation 13 carriers) 802.11g (1TX1RX)	0.004W/MHz
			Humidity : 51 %					
	Serial number:	#0	Engineer: N.H.KIM Reviewer: Y.H.LEE Date: NOV.01.2019 ~ NOV.07.2019 Test location: HCT					

Equipment	Model and type name	Serial number	Manufacturer	Last Calibrated date	Calibration Company	Note
	Signal Analyzer(N9020A)	US46220219	AGILENT Technologies	2019-04-11	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	DC Power Supply(E3632A)	KR75306225	AGILENT Technologies	2019-04-11	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	POWER METER(N1911A)	MY45100523	AGILENT Technologies	2019-04-10	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Power Sensor (N1921A)	MY52260025	AGILENT Technologies	2019-04-10	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Fixed Attenuator (8493C)	10342	HEWLETT PACKARD	2019-04-11	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	DIGITAL MULTIMETER(34401A)	US36010057	AGILENT Technologies	2019-10-24	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha

Test result	Electric performance	Voltage		Limit	DC 3.30 V (normal)			DC 3.63 V (high)			DC 2.97 V (low)			Note
		Test Frequency	MHz		2412	2442	2472	2412	2442	2472	2412	2442	2472	
		Frequency error(measured frequency)	MHz	2411.99	2441.99	2471.99		2411.99	2441.99	2471.99	2411.99	2441.99	2471.99	
		Frequency error	ppm	50	-3.72	-4.32	-3.77	-4.02	-4.03	-3.81	-3.80	-4.16	-3.71	
		Occupied bandwidth	MHz	26	18.55	18.83	18.72	18.53	18.69	18.23	18.56	18.89	18.82	12 Mbps
		Spreading bandwidth	MHz	0.5	15.03	14.89	15.11	14.77	14.92	14.89	14.85	15.06	15.16	
		Spurious (measured frequency)	-	MHz	2386.15	2386.39	2378.49	2386.27	2386.15	2384.08	2386.03	2386.64	2375.58	
		30 ~ 2387 MHz	μW	2.5	0.042	0.817	0.293	0.040	0.884	0.282	0.056	0.915	0.312	
		(measured frequency)	-	MHz	2399.94	2397.84	2387.57	2399.96	2399.97	2387.38	2399.79	2399.77	2387.17	
		2387 ~ 2400 MHz	μW	25	7.265	2.164	0.264	7.155	2.219	0.276	6.450	2.275	0.265	
		(measured frequency)	-	MHz	2483.93	2484.97	2483.53	2483.62	2484.11	2483.77	2483.70	2483.57	2483.55	
		2483.5 ~ 2496.5 MHz	μW	25	0.499	2.566	8.507	0.528	2.451	4.788	0.493	2.495	5.276	
		(measured frequency)	-	MHz	2505.00	2498.75	2496.75	2507.50	2498.50	2506.00	2509.50	2509.25	2500.00	
		2496.5 ~ 12500 MHz	μW	2.5	0.215	1.044	0.049	0.215	1.127	0.011	0.208	0.429	0.040	
		Antenna power	mW/MHz	5.98	3.061	2.879	2.569	3.191	3.089	2.820	3.073	2.868	2.881	
		deviation	%	-80	-23.46	-28.04	-35.78	-20.22	-22.78	-29.50	-23.18	-28.31	-27.98	
				20										
		Collateral Emission (measured frequency)	-	MHz										
		30 ~ 1000 MHz	nW/100kHz	4										
		(measured frequency)	-	MHz										
		1000 ~ 12500 MHz	nW/MHz	20										
		E.I.R.P.	mW/MHz	NA										
		Hopping Frequency staying time	sec	NA										
		Interference Protection (Deveice ID)	yes	Complies	Complies	Complies		Complies	Complies	Complies	Complies	Complies	Complies	
		Carrier Sense	NA											
		Antenna power 6Mbps	mW/MHz	5.98	1.996	2.691	2.415							
		deviation	%	-50.09	-32.72	-39.63								
		Antenna power 9Mbps	mW/MHz	5.98	2.855	2.712	2.409							
		deviation	%	-28.63	-32.20	-39.76								
		Antenna power 12Mbps	mW/MHz	5.98	3.061	2.879	2.569							
		deviation	%	-23.46	-28.04	-35.78								
		Antenna power 18Mbps	mW/MHz	5.98	2.659	2.385	2.228							
		deviation	%	-33.53	-40.37	-44.30								
		Antenna power 24Mbps	mW/MHz	5.98	2.743	2.452	2.298							
		deviation	%	-31.43	-38.69	-42.56								
		Antenna power 36Mbps	mW/MHz	5.98	2.418	2.258	1.972							
		deviation	%	-39.56	-43.54	-50.69								
		Antenna power 48Mbps	mW/MHz	5.98	1.795	1.703	1.487							
		deviation	%	-55.13	-57.43	-62.82								
		Antenna power 54Mbps	mW/MHz	5.98	1.582	1.438	1.271							
		deviation	%	-60.45	-64.04	-68.23								

Antenna Gain: 4.44 dBi

NA = Not Applicable

Allowed Maximum E.I.R.P. :

※ Note: TX Power was set-up as 'g: 12.5' in test mode

Test Result and Measuring equipment for certification

2.4GHz low-power data communication system

12 Mbps

Radio Equipment for test	Model or type name: SRM200A	Test environment	Temperature : 21 °C	Test Method: TELEC-T401(Ver9.0)	D1D, G1D, 2412 to 2472 MHz (5 MHz separation 13 carriers) 802.11n (1TX1RX)	0.004W/MHz
	Humidity : 51 %					
	Serial number: #0	Engineer: N.H.KIM Reviewer: Y.H.LEE Date: NOV.01.2019 ~ NOV.19.2019 Test location: HCT				

Equipment	Model and type name	Serial number	Manufacturer	Last Calibrated date	Calibration Company	Note
	Signal Analyzer(N9020A)	US46220219	AGILENT Technologies	2019-04-11	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	DC Power Supply(E3632A)	KR75306225	AGILENT Technologies	2019-04-11	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	POWER METER(N1911A)	MY45100523	AGILENT Technologies	2019-04-10	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Power Sensor (N1921A)	MY52260025	AGILENT Technologies	2019-04-10	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Fixed Attenuator (8493C)	10342	HEWLETT PACKARD	2019-04-11	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	DIGITAL MULTIMETER(34401A)	US36010057	AGILENT Technologies	2019-10-24	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha

Test result	Electric performance	Voltage		Limit	DC 3.30 V (normal)			DC 3.63 V (high)			DC 2.97 V (low)			Note
		V	MHz		2412	2442	2472	2412	2442	2472	2412	2442	2472	
		Test Frequency	MHz											
		Frequency error(measured frequency)		MHz	2411.99	2441.99	2471.99	2411.99	2441.99	2471.99	2411.99	2441.99	2471.99	
		Frequency error		ppm	50	-3.72	-4.32	-4.02	-4.03	-3.81	-3.80	-4.16	-3.71	
		Occupied bandwidth		MHz	26	19.66	19.81	19.70	19.54	19.80	19.30	19.70	19.94	19.73
		Spreading bandwidth		MHz	0.5	16.07	16.01	15.99	15.98	15.88	15.84	16.01	16.01	16.07
		Spurious (measured frequency)		MHz	2386.88	2385.78	2374.36	2386.76	2386.27	2379.95	2386.88	2386.15	2377.64	
		30 ~ 2387 MHz		μW	2.5	0.152	0.902	0.288	0.152	0.858	0.294	0.226	0.865	0.280
		(measured frequency)		MHz	2399.96	2399.87	2387.29	2399.96	2398.92	2387.22	2399.99	2399.01	2387.91	
		2387 ~ 2400 MHz		μW	25	0.141	2.304	0.256	0.138	2.201	0.272	0.163	2.292	0.265
		(measured frequency)		MHz	2483.85	2483.50	2483.88	2483.83	2483.86	2483.50	2484.07	2484.18	2484.18	
		2483.5 ~ 2496.5 MHz		μW	25	0.258	2.516	7.552	0.255	2.418	4.365	0.279	2.534	6.193
		(measured frequency)		MHz	2514.51	2541.77	2500.25	2511.51	2542.52	2496.50	2513.26	2498.75	2499.25	
		2496.5 ~ 12500 MHz		μW	2.5	0.204	0.206	0.032	0.179	0.212	0.126	0.205	0.002	0.046
		Antenna power		mW/MHz	5.89	2.928	2.820	2.520	2.849	2.520	2.352	2.920	2.583	2.358
		deviation		%	-80	-26.81	-29.50	-37.00	-28.78	-36.99	-41.20	-27.01	-35.41	-41.04
				20										
		Collateral Emission (measured frequency)		MHz										
		30 ~ 1000 MHz		nW/100kHz	4									
		(measured frequency)		MHz										
		1000 ~ 12500 MHz		nW/MHz	20									
		E.I.R.P.		mW/MHz	NA									
		Hopping Frequency staying time		sec	NA									
		Interference Protection (Device ID)		yes	Complies	Complies	Complies	Complies	Complies	Complies	Complies	Complies	Complies	
		Carrier Sense		NA										
		Antenna power 6.5Mbps MCS0		mW/MHz	5.89	2.777	2.665	2.358						
		deviation		%	-30.58	-33.37	-41.05							
		Antenna power 13Mbps MCS1		mW/MHz	5.89	2.928	2.820	2.520						
		deviation		%	-26.81	-29.50	-37.00							
		Antenna power 19.5Mbps MCS2		mW/MHz	5.89	2.511	2.388	2.163						
		deviation		%	-37.22	-40.30	-45.91							
		Antenna power 26Mbps MCS3		mW/MHz	5.89	2.645	2.508	2.284						
		deviation		%	-33.88	-37.29	-42.90							
		Antenna power 39Mbps MCS4		mW/MHz	5.89	2.333	2.316	1.990						
		deviation		%	-41.68	-42.09	-50.25							
		Antenna power 52Mbps MCS5		mW/MHz	5.89	1.725	1.697	1.458						
		deviation		%	-56.87	-57.58	-63.55							
		Antenna power 58.5Mbps MCS6		mW/MHz	5.89	1.557	1.390	1.199						
		deviation		%	-61.09	-65.25	-70.01							
		Antenna power 65Mbps MCS7		mW/MHz	5.89	1.075	1.027	0.863						
		deviation		%	-73.13	-74.34	-78.42							

Antenna Gain: 4.44 dBi

NA = Not Applicable

Allowed Maximum E.I.R.P.:

* Note: TX Power was set-up as 'n: 12.5' in test mode