



A Test Lab Techno Corp.

Changan Lab : N o. 140-1, Changan Street, Bade District, Taoyuan City 33465, Taiwan (R.O.C)
Tel : 886-3-271-0188 / Fax : 886-3-271-0190



MPE Report

Test Report No.	: 1606FS20
Applicant	: D Link Corporation
Product Type	: 4G LTE M2M modem
Trade Name	: D-Link
Model Number	: DWM-311
Date of Received	: Jul. 28, 2016
Test Period	: Jul. 28, 2016
Date of Issued	: Jul. 01, 2016
Test Specification	: ANSI / IEEE Std.C95.1-1992 / IEEE Std. 1528-2013 47 CFR § 2.1091 47 CFR § 1.1310
Location of Test Lab.	: Chang-an Lab.

1. The test operations have to be performed with cautious behavior, the test results are as attached.
2. The test results are under chamber environment of A Test Lab Techno Corp. A Test Lab Techno Corp. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples.
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Approved By : Bill Hu
(Bill Hu)

Tested By : Mark Duan
(Mark Duan)



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1. Description of Equipment under Test (EUT)

Applicant	D Link Corporation 17595 Mt. Herrmann Fountain Valley, CA 92708 United States			
Manufacturer	D Link Corporation 17595 Mt. Herrmann Fountain Valley, CA 92708 United States			
Product Type	4G LTE M2M modem			
Trade Name	D-Link			
Model Number	DWM-311			
FCC ID	KA2WM311A1			
Frequency Range	Band	UL Frequency (MHz)	DL Frequency (MHz)	Modulation
	LTE Band 2	1850.7 ~ 1909.3	1930.7 ~ 1989.3	QPSK, 16QAM
	LTE Band 4	1710.7 ~ 1754.3	2110.7 ~ 2154.3	QPSK, 16QAM
	LTE Band 13	777 ~ 787	746 ~ 756	QPSK, 16QAM
Antenna Type	LTE External Antenna			
Antenna Gain	LTE Band 2	2.87 dBi		
	LTE Band 4	2.02 dBi		
	LTE Band 13	-0.65 dBi		
RF Evaluation	0.084 mW/cm ²			

The above equipment was tested by A Test Lab Techno Corp. For compliance with the requirements set forth in 47 CFR § 2.1091 / 47 CFR § 1.1310. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties



2. Human Exposure Assessment

Due to the design and installation of this product, it is not possible to conduct SAR evaluation. This is because client either manufactures or supplies the antenna(s) that will be used in the installation of this product. Therefore, this product will be evaluated as a mobile device per 47 CFR § 1.1310 titled "Radiofrequency radiation exposure limits", generally referred to as MPE limits.

In 47 CFR § 2.1091, paragraph (b) defines a mobile device as "a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 cm is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons." This product is intended to be installed into a vehicle such that the unit is physically secured at one location. In the installation guide supplied with the product,

Client has made the following statement: "IMPORTANT: To meet the FCC's RF Exposure Guidelines, the antenna should be installed so there is at least 20 cm of separation between the body of the user and nearby persons and the antenna". Based on the installation of the transceiver and the antenna, the transmitters radiating structure is more than 20 cm from the user. Thus, this product is a "mobile device" as defined in section § 2.1091 paragraph (b).

Exposure evaluation

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

Where

S: power density

P: power input to the antenna

G: power gain of the antenna in the direction of interest relative to an isotropic radiator.

R: distance to the center of radiation of the antenna.



3. RF Output Power

The conducted power turn-up tolerance reference manufacturer specification.

Band	Channel Bandwidth	Modulation	Channel	Frequency (MHz)	RB Configuration		Average Power	
					Size	Offset	(dBm)	(W)
LTE Band 2	5 MHz	QPSK	18625	1852.5	1	0	23.19	0.208
					1	12	23.04	0.201
					1	24	22.78	0.190
					12	0	22.19	0.166
					12	6	22.13	0.163
					12	13	22.05	0.160
			18900	1880.0	25	0	22.05	0.160
					1	0	23.10	0.204
					1	12	22.91	0.195
					1	24	22.88	0.194
					12	0	22.18	0.165
					12	6	22.15	0.164
			19175	1907.5	12	13	22.06	0.161
					25	0	22.05	0.160
					1	0	23.14	0.206
					1	12	23.08	0.203
					1	24	22.86	0.193
					12	0	22.07	0.161
		16QAM	18625	1852.5	12	6	22.05	0.160
					12	13	22.05	0.160
					25	0	22.01	0.159
					1	0	22.30	0.170
					1	12	22.09	0.162
					1	24	21.96	0.157
			18900	1880.0	12	0	21.22	0.132
					12	6	21.13	0.130
					12	13	21.11	0.129
					25	0	21.05	0.127
					1	0	22.37	0.173
					1	12	22.15	0.164
			19175	1907.5	1	24	22.02	0.159
					12	0	21.26	0.134
					12	6	21.07	0.128
					12	13	21.01	0.126
					25	0	21.00	0.126
					1	0	22.23	0.167
		19175	1907.5	1	12	22.10	0.162	
				1	24	21.91	0.155	
				12	0	21.05	0.127	
				12	6	21.02	0.126	
				12	11	21.02	0.126	
				25	0	21.01	0.126	



Band	Channel Bandwidth	Modulation	Channel	Frequency (MHz)	RB Configuration		Average Power	
					Size	Offset	(dBm)	(W)
LTE Band 2	10 MHz	QPSK	18650	1855.0	1	0	23.15	0.207
					1	24	22.95	0.197
					1	49	22.48	0.177
					25	0	22.47	0.177
					25	12	22.31	0.170
					25	25	22.25	0.168
			50	0	22.22	0.167		
			1	0	23.05	0.202		
			1	24	22.99	0.199		
			1	49	22.65	0.184		
			25	0	22.48	0.177		
			25	12	22.28	0.169		
			25	25	22.27	0.169		
			50	0	22.19	0.166		
			1	0	23.10	0.204		
			1	24	22.83	0.192		
			1	49	22.73	0.187		
			25	0	22.33	0.171		
		25	12	22.29	0.169			
		25	25	22.19	0.166			
		50	0	22.12	0.163			
		1	0	22.22	0.167			
		1	24	22.17	0.165			
		1	49	22.05	0.160			
		25	0	21.36	0.137			
		25	12	21.22	0.132			
		25	25	21.20	0.132			
		50	0	21.18	0.131			
		1	0	22.07	0.161			
		1	24	21.84	0.153			
		1	49	21.81	0.152			
		25	0	21.48	0.141			
		25	12	21.33	0.136			
		25	25	21.28	0.134			
		50	0	21.21	0.132			
		1	0	22.15	0.164			
1	24	22.11	0.163					
1	49	21.81	0.152					
25	0	21.23	0.133					
25	12	21.12	0.129					
25	25	21.08	0.128					
50	0	20.99	0.126					
16QAM	18650	1855.0	18650	1855.0	1	0	22.22	0.167
					1	24	22.17	0.165
					1	49	22.05	0.160
					25	0	21.36	0.137
					25	12	21.22	0.132
					25	25	21.20	0.132
	50	0	21.18	0.131				
	1	0	22.07	0.161				
	1	24	21.84	0.153				
	1	49	21.81	0.152				
	25	0	21.48	0.141				
	25	12	21.33	0.136				
	25	25	21.28	0.134				
	50	0	21.21	0.132				
	1	0	22.15	0.164				
	1	24	22.11	0.163				
	1	49	21.81	0.152				
	25	0	21.23	0.133				
25	12	21.12	0.129					
25	25	21.08	0.128					
50	0	20.99	0.126					



Band	Channel Bandwidth	Modulation	Channel	Frequency (MHz)	RB Configuration		Average Power		
					Size	Offset	(dBm)	(W)	
LTE Band 2	15 MHz	QPSK	18675	1857.5	1	0	23.22	0.210	
					1	38	23.15	0.207	
					1	74	23.05	0.202	
					36	0	22.88	0.194	
					36	18	22.82	0.191	
					36	39	22.81	0.191	
			18900	1880.0	75	0	22.64	0.184	
					1	0	23.06	0.202	
					1	38	22.95	0.197	
					1	74	22.79	0.190	
					36	0	22.55	0.180	
					36	18	22.50	0.178	
			19125	1902.5	36	39	22.49	0.177	
					75	0	22.41	0.174	
					1	0	23.18	0.208	
					1	38	23.16	0.207	
					1	74	23.15	0.207	
					36	0	23.15	0.207	
			16QAM	18675	1857.5	36	18	22.96	0.198
						36	39	22.77	0.189
						75	0	22.76	0.189
						1	0	22.39	0.173
						1	38	22.33	0.171
						1	74	21.90	0.155
		18900		1880.0	36	0	21.89	0.155	
					36	18	21.61	0.145	
					36	39	21.49	0.141	
					75	0	21.43	0.139	
					1	0	22.16	0.164	
					1	38	22.10	0.162	
		19125		1902.5	1	74	21.67	0.147	
					36	0	21.66	0.147	
					36	18	21.38	0.137	
					36	39	21.26	0.134	
					75	0	21.20	0.132	
					1	0	22.26	0.168	
		18675		1857.5	1	38	22.20	0.166	
					1	74	21.77	0.150	
					36	0	21.76	0.150	
					36	18	21.48	0.141	
					36	39	21.36	0.137	
					75	0	21.30	0.135	



Band	Channel Bandwidth	Modulation	Channel	Frequency (MHz)	RB Configuration		Average Power	
					Size	Offset	(dBm)	(W)
LTE Band 2	20 MHz	QPSK	18700	1860.0	1	0	23.17	0.207
					1	49	23.10	0.204
					1	99	23.04	0.201
					50	0	22.31	0.170
					50	25	22.07	0.161
					50	50	22.04	0.160
			100	0	22.02	0.159		
			1	0	23.06	0.202		
			1	49	22.99	0.199		
			1	99	22.96	0.198		
			50	0	22.37	0.173		
			50	25	22.36	0.172		
			50	50	22.26	0.168		
			100	0	22.24	0.167		
			1	0	23.10	0.204		
			1	49	23.06	0.202		
			1	99	23.00	0.200		
			50	0	22.61	0.182		
		50	25	22.44	0.175			
		50	50	22.37	0.173			
		100	0	22.33	0.171			
		1	0	22.34	0.171			
		1	49	22.12	0.163			
		1	99	22.11	0.163			
		50	0	21.50	0.141			
		50	25	21.42	0.139			
		50	50	21.30	0.135			
		100	0	21.25	0.133			
		1	0	22.08	0.161			
		1	49	21.97	0.157			
		1	99	21.76	0.150			
		50	0	21.31	0.135			
		50	25	21.21	0.132			
		50	50	21.01	0.126			
		100	0	21.00	0.126			
		1	0	22.12	0.163			
		1	49	22.01	0.159			
		1	99	22.00	0.158			
		50	0	21.56	0.143			
		50	25	21.31	0.135			
		50	50	21.29	0.135			
		100	0	21.19	0.132			



Band	Channel Bandwidth	Modulation	Channel	Frequency (MHz)	RB Configuration		Average Power			
					Size	Offset	(dBm)	(W)		
LTE Band 4	5 MHz	QPSK	19975	1712.5	1	0	23.08	0.203		
					1	12	23.06	0.202		
					1	24	23.01	0.200		
					12	0	22.69	0.186		
					12	6	22.59	0.182		
					12	13	22.47	0.177		
			25	0	22.28	0.169				
			1	0	23.02	0.200				
			1	12	22.94	0.197				
			1	24	22.84	0.192				
			12	0	22.19	0.166				
			12	6	22.12	0.163				
			12	13	22.08	0.161				
			25	0	21.90	0.155				
			1	0	22.95	0.197				
			1	12	22.81	0.191				
			1	24	22.62	0.183				
			12	0	21.40	0.138				
			12	6	21.40	0.138				
			12	13	21.38	0.137				
			25	0	21.31	0.135				
			1	0	22.23	0.167				
			1	12	22.18	0.165				
			1	24	21.84	0.153				
		12	0	21.72	0.149					
		12	6	21.61	0.145					
		12	13	21.59	0.144					
		25	0	20.84	0.121					
		1	0	22.14	0.164					
		1	12	22.08	0.161					
		1	24	21.85	0.153					
		12	0	21.28	0.134					
		12	6	21.11	0.129					
		12	13	21.05	0.127					
		25	0	20.93	0.124					
		1	0	22.08	0.161					
		1	12	22.01	0.159					
		1	24	21.56	0.143					
		12	0	20.94	0.124					
		12	6	20.91	0.123					
		12	11	20.91	0.123					
		25	0	20.87	0.122					
		16QAM	19975	1712.5	19975	1712.5	1	0	22.23	0.167
							1	12	22.18	0.165
							1	24	21.84	0.153
							12	0	21.72	0.149
							12	6	21.61	0.145
							12	13	21.59	0.144
25	0		20.84	0.121						
1	0		22.14	0.164						
1	12		22.08	0.161						
1	24		21.85	0.153						
12	0		21.28	0.134						
12	6		21.11	0.129						
12	13		21.05	0.127						
25	0		20.93	0.124						
1	0		22.08	0.161						
1	12		22.01	0.159						
1	24		21.56	0.143						
12	0		20.94	0.124						
12	6		20.91	0.123						
12	11		20.91	0.123						
25	0		20.87	0.122						



Band	Channel Bandwidth	Modulation	Channel	Frequency (MHz)	RB Configuration		Average Power	
					Size	Offset	(dBm)	(W)
LTE Band 4	10 MHz	QPSK	2000	1715.0	1	0	23.06	0.202
					1	24	23.01	0.200
					1	49	22.91	0.195
					25	0	22.83	0.192
					25	12	22.75	0.188
					25	25	22.71	0.187
			20175	1732.5	50	0	21.95	0.157
					1	0	23.01	0.200
					1	24	22.96	0.198
					1	49	22.94	0.197
					25	0	22.50	0.178
					25	12	22.50	0.178
			20350	1750.0	25	25	22.36	0.172
					50	0	22.16	0.164
					1	0	22.93	0.196
					1	24	22.86	0.193
					1	49	22.81	0.191
					25	0	21.80	0.151
		16QAM	2000	1715.0	25	12	21.64	0.146
					25	25	21.63	0.146
					50	0	21.62	0.145
					1	0	22.12	0.163
					1	24	22.08	0.161
					1	49	21.57	0.144
			20175	1732.5	25	0	21.31	0.135
					25	12	21.23	0.133
					25	25	21.08	0.128
					50	0	21.05	0.127
					1	0	21.91	0.155
					1	24	21.82	0.152
			20350	1750.0	1	49	21.80	0.151
					25	0	21.51	0.142
					25	12	21.49	0.141
					25	25	21.35	0.136
					50	0	21.13	0.130
					1	0	21.83	0.152
2000	1715.0	1	24	21.75	0.150			
		1	49	21.68	0.147			
		25	0	20.95	0.124			
		25	12	20.88	0.122			
		25	25	20.86	0.122			
		50	0	20.81	0.121			



Band	Channel Bandwidth	Modulation	Channel	Frequency (MHz)	RB Configuration		Average Power	
					Size	Offset	(dBm)	(W)
LTE Band 4	15 MHz	QPSK	20025	1717.5	1	0	23.05	0.202
					1	38	23.03	0.201
					1	74	22.81	0.191
					36	0	22.55	0.180
					36	18	22.54	0.179
					36	39	22.47	0.177
			20175	1732.5	75	0	22.05	0.160
					1	0	23.03	0.201
					1	38	23.01	0.200
					1	74	22.86	0.193
					36	0	22.78	0.190
					36	18	22.72	0.187
			20325	1747.5	36	39	22.46	0.176
					75	0	21.93	0.156
					1	0	22.88	0.194
					1	38	22.82	0.191
					1	74	22.76	0.189
					36	0	22.71	0.187
		16QAM	20025	1717.5	36	18	22.67	0.185
					36	39	22.65	0.184
					75	0	21.84	0.153
					1	0	22.19	0.166
					1	38	22.13	0.163
					1	74	21.72	0.149
			20175	1732.5	36	0	21.69	0.148
					36	18	21.57	0.144
					36	39	21.48	0.141
					75	0	21.21	0.132
					1	0	22.13	0.163
					1	38	22.09	0.162
			20325	1747.5	1	74	21.96	0.157
					36	0	21.93	0.156
					36	18	21.86	0.153
					36	39	21.74	0.149
					75	0	21.66	0.147
					1	0	22.06	0.161
		20025	1717.5	1	38	22.01	0.159	
				1	74	21.78	0.151	
				36	0	21.38	0.137	
				36	18	21.13	0.130	
				36	39	21.12	0.129	
				75	0	21.04	0.127	



Band	Channel Bandwidth	Modulation	Channel	Frequency (MHz)	RB Configuration		Average Power	
					Size	Offset	(dBm)	(W)
LTE Band 4	20 MHz	QPSK	20050	1720.0	1	0	23.08	0.203
					1	49	23.01	0.200
					1	99	22.77	0.189
					50	0	22.71	0.187
					50	25	22.46	0.176
					50	50	22.39	0.173
			100	0	22.01	0.159		
			1	0	22.94	0.197		
			1	49	22.88	0.194		
			1	99	22.69	0.186		
			50	0	22.57	0.181		
			50	25	22.52	0.179		
			50	50	22.34	0.171		
			100	0	21.94	0.156		
			1	0	22.84	0.192		
			1	49	22.76	0.189		
			1	99	22.54	0.179		
			50	0	22.46	0.176		
		50	25	22.37	0.173			
		50	50	22.25	0.168			
		100	0	21.86	0.153			
		1	0	22.29	0.169			
		1	49	22.25	0.168			
		1	99	21.84	0.153			
		50	0	21.14	0.130			
		50	25	20.98	0.125			
		50	50	20.95	0.124			
		100	0	20.92	0.124			
		1	0	22.26	0.168			
		1	49	22.21	0.166			
		1	99	21.89	0.155			
		50	0	21.61	0.145			
		50	25	20.99	0.126			
		50	50	20.92	0.124			
		100	0	20.87	0.122			
		1	0	22.22	0.167			
		1	49	22.16	0.164			
		1	99	21.97	0.157			
		50	0	20.95	0.124			
		50	25	20.91	0.123			
		50	50	20.88	0.122			
		100	0	20.86	0.122			



Band	Channel Bandwidth	Modulation	Channel	Frequency (MHz)	RB Configuration		Average Power		
					Size	Offset	(dBm)	(W)	
LTE Band 13	5 MHz	QPSK	23205	779.5	1	0	23.03	0.201	
					1	12	23.01	0.200	
					1	24	22.92	0.196	
					12	0	22.17	0.165	
					12	6	22.06	0.161	
					12	13	21.98	0.158	
			23230	782.0	25	0	21.94	0.156	
					1	0	22.93	0.196	
					1	12	22.90	0.195	
					1	24	22.85	0.193	
					12	0	21.97	0.157	
					12	6	21.87	0.154	
			23255	784.5	12	13	21.84	0.153	
					25	0	21.77	0.150	
					1	0	22.91	0.195	
					1	12	22.88	0.194	
					1	24	22.15	0.164	
					12	0	21.93	0.156	
			16QAM	23205	779.5	12	6	21.77	0.150
						12	13	21.72	0.149
						25	0	21.38	0.137
						1	0	22.13	0.163
						1	12	21.73	0.149
						1	24	21.55	0.143
		23230		782.0	12	0	21.12	0.129	
					12	6	21.08	0.128	
					12	13	20.98	0.125	
					25	0	20.97	0.125	
					1	0	21.72	0.149	
					1	12	21.67	0.147	
		23255		784.5	1	24	21.56	0.143	
					12	0	20.96	0.125	
					12	6	20.87	0.122	
					12	13	20.83	0.121	
					25	0	20.81	0.121	
					1	0	21.71	0.148	
		23205		779.5	1	12	21.41	0.138	
					1	24	21.06	0.128	
					12	0	20.83	0.121	
					12	6	20.74	0.119	
					12	13	20.71	0.118	
					25	0	20.63	0.116	



Band	Channel Bandwidth	Modulation	Channel	Frequency (MHz)	RB Configuration		Average Power	
					Size	Offset	(dBm)	(W)
LTE Band 13	10 MHz	QPSK	23230	782.0	1	0	22.94	0.197
					1	24	22.81	0.191
					1	49	22.45	0.176
					25	0	22.37	0.173
					25	12	22.16	0.164
					25	25	22.05	0.160
		16QAM	23230	782.0	50	0	21.82	0.152
					1	0	22.20	0.166
					1	24	22.05	0.160
					1	49	21.42	0.139
					25	0	21.32	0.136
					25	12	21.26	0.134
					25	25	21.04	0.127
					50	0	20.98	0.125



4. Test Result

Band	Channel Bandwidth	Modulation	Frequency (MHz)	Limit (mw/cm ²)	Distance [R] (cm)	Power [P] (dBm)	ANT Gain (dB)	Numeric Gain [G]	Duty Cycle	[P] x [G] with Duty cycle [TP] (mW)	Power Density [S] (mw/cm ²)
LTE Band 2	15MHz	QPSK	1857.5	1.00	20	23.40	2.87	1.94	1	424.426	0.084
		QPSK	1880.0	1.00	20	23.40	2.87	1.94	1	424.426	0.084
		QPSK	1902.5	1.00	20	23.40	2.87	1.94	1	424.426	0.084
		16-QAM	1857.5	1.00	20	22.50	2.87	1.94	1	344.986	0.069
		16-QAM	1880.0	1.00	20	22.50	2.87	1.94	1	344.986	0.069
		16-QAM	1902.5	1.00	20	22.50	2.87	1.94	1	344.986	0.069
LTE Band 4	5MHz	QPSK	1712.5	1.00	20	23.20	2.02	1.59	1	332.198	0.066
		QPSK	1732.5	1.00	20	23.20	2.02	1.59	1	332.198	0.066
		QPSK	1752.5	1.00	20	23.20	2.02	1.59	1	332.198	0.066
		16-QAM	1712.5	1.00	20	22.40	2.02	1.59	1	276.310	0.055
		16-QAM	1732.5	1.00	20	22.40	2.02	1.59	1	276.310	0.055
		16-QAM	1752.5	1.00	20	22.40	2.02	1.59	1	276.310	0.055
LTE Band 13	5MHz	QPSK	887.5	0.59	20	23.20	-0.65	0.86	1	179.679	0.036
		QPSK	900.0	0.60	20	23.20	-0.65	0.86	1	179.679	0.036
		QPSK	912.5	0.61	20	23.20	-0.65	0.86	1	179.679	0.036
		16-QAM	887.5	0.59	20	22.30	-0.65	0.86	1	146.049	0.029
		16-QAM	900.0	0.60	20	22.30	-0.65	0.86	1	146.049	0.029
		16-QAM	912.5	0.61	20	22.30	-0.65	0.86	1	146.049	0.029

Note: The Power [P] is max tune-up power (upper limit).