Test Report

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EXHIBIT 6

EXHIBIT 6A: TRANSMITTER OUTPUT POWER – Pursuant 47 CFR 2.1041

6.1 ISM Band Transmitter Output Power -- Pursuant 47 CFR 2.1033(b)(6) and 15.247(b)(2)

(*Test Conducted at Motorola EME accredited lab in FEB 2015*)

The ISM transmitter operating in the 902-928 MHz band is a frequency hopped, fixed output power type. Output power (as defined in 47 CFR 15.247) is controlled as described in Exhibit 7.

Test Freq (MHz)	Power (W)
902.525	**0.961**
915.525	**0.995**
927.475	**0.962**

Maximum peak output power rating: 1000 milliwatts (30 dBm), peak power.

6.2 DC Power Used by Final Amplifier Device -- Pursuant 47 CFR 2.1033(c)8)

In order to prevent the malfunctions that can occur due to directly measuring the DC characteristics of the final RF amplifying stage, data was obtained by measuring the entire radio DC current and is reported herein for the entire radio.

The DC current and the RF output power was a conducted measurement using a power supply set to supply the radio with the nominal battery voltage of 4.0 V. The characteristics were measured during a transmission pulse and are listed in the Table 6-1:

	ISM	
Characteristics	**902-928 MHz**	
Power Setting	**maximum**	
DC Voltage (Volts)	4	
DC Current (A)	0.9	
Output Power (W)	1.0	

Table 6-1 Characteristics for ISM 900 MHz bands

EXHIBIT 6B: OCCUPIED BANDWIDTH – Pursuant 47 CFR 2.1041

6.3 900 MHz ISM Band Modulation Characteristics and Necessary Bandwidth

In the 900 MHz ISM band, the subject radio makes use of Frequency Shift Keying. The modulation can vary from 2FSK, 4FSK, 6FSK or 8FSK.

The data symbols are up-sampled to a rate Ns times the symbol rate, and pulse shaped by a filter having impulse response p_n. The pulse shape filter is the cascade of a square pulse, of duration equal to one symbol interval, convolved with a Gaussian filter with 3 dB bandwidth equal to 8000 Hz or BT = 2.5. The pulse-shaped signal is integrated using a backward-summation, and then mapped to in-phase (I) and quadrature (Q) channels using the cosine and sine functions, respectively. A scaling factor of π/Ns is required to convert the integrator output to modulated phase. This modulation is shown in Figure X.

The pre-modulation filter has the continuous-time impulse response

$$p(t) = Q\left[\frac{2\pi B}{\sqrt{\ln 2}}\left(t-\frac{T}{2}\right)\right] - Q\left[\frac{2\pi B}{\sqrt{\ln 2}}\left(t+\frac{T}{2}\right)\right]$$

where t is time in seconds, T = 1/3200 is the symbol interval in seconds, B is the 8000 Hz 3-dB bandwidth, and Q(x) is the complimentary distribution function for a Gaussian random variable with zero mean and unit variance, given by

$$Q(x) = \int_x^\infty \frac{1}{\sqrt{2\pi}} e^{-x^2/2} dx$$

The discrete-time impulse response is generated by sampling the continuous-time function. In theory, p(t) has infinite time span, but, for all practical purposes, it is time-limited to the interval

$$-3T/4 < t < 3T/4$$

Given this, the discrete-time version is generated as

$$p_n = p\left(t_0 + \frac{nT}{N_s}\right) \qquad n = 0, 1, \ldots, N_p - 1$$

where t_0 is the time of the first sample, N_s is the number of samples per second, and N_p is the filter length.

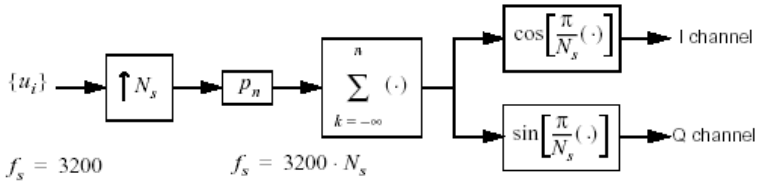


Figure 6-3A. FSK Modulator

OCCCUPIED BAND WIDTH

(Measured with DLR1060 in December 2014 MSI Plantation Engineering Lab)

Figure 6-3B shows the plot of the 8-FSK, traffic channel ISM Band spectrum with its 20 dB bandwidth of 25.65 kHz

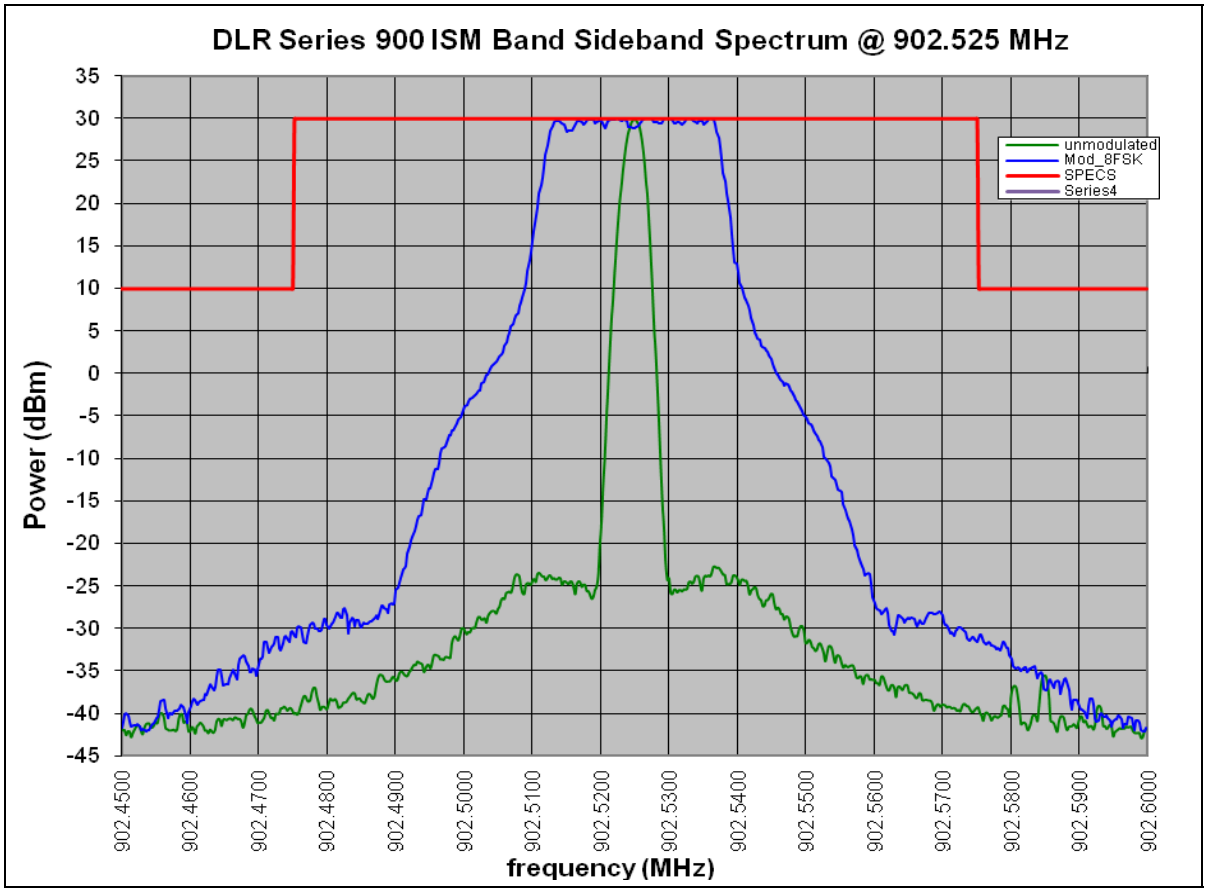


Figure 6-3B. Occupied bandwidth for 902.525MHz 8FSK Spectrum.

OCCCUPIED BAND WIDTH

(Measured with DLR1060 in December 2014 MSI Plantation Engineering Lab)

Figure 6-3C shows the plot of the 8-FSK, traffic channel ISM Band spectrum with its 20 dB bandwidth of 25.65 kHz

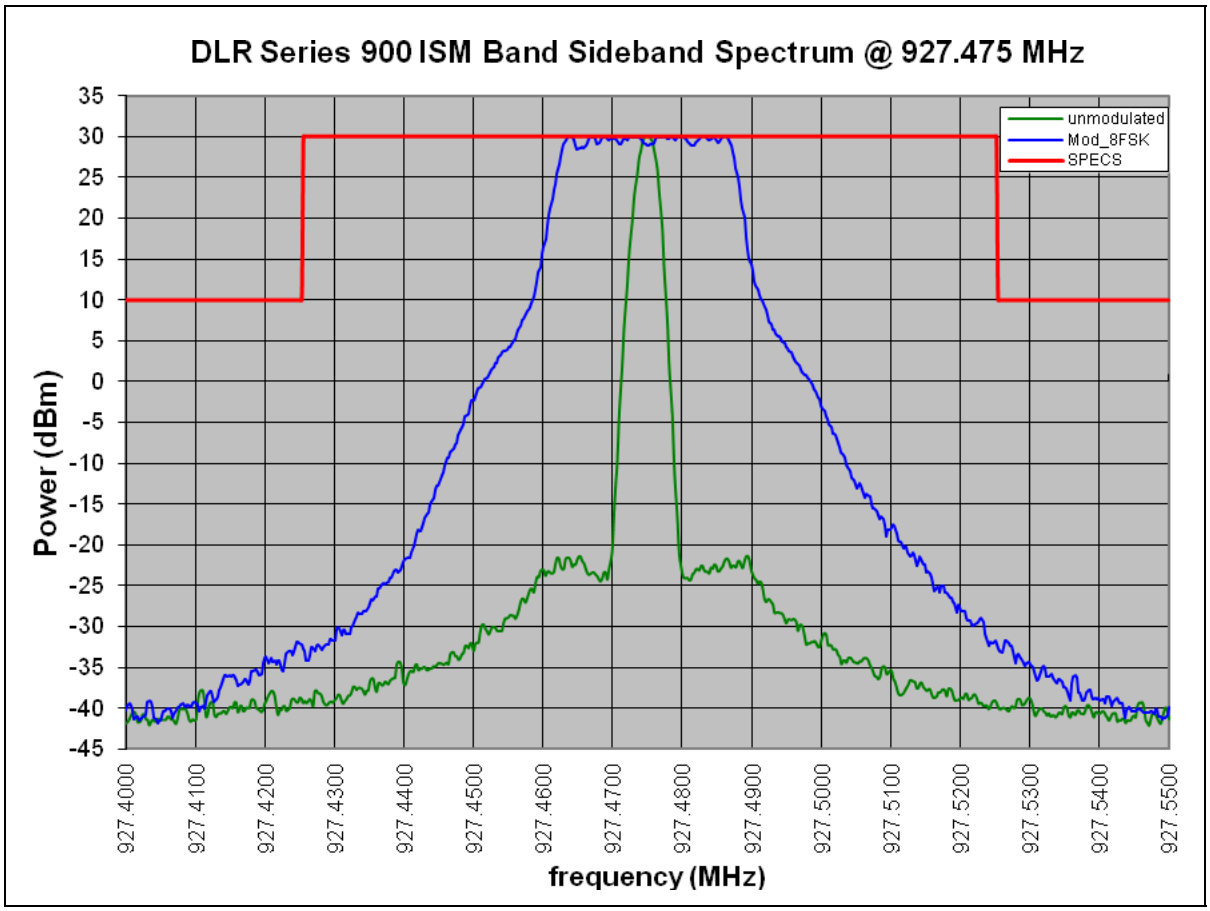


Figure 6-3C. Occupied bandwidth for 927.475MHz 8FSK Spectrum

The emission requirements specified for operation in the 902-928 MHz ISM Band include a requirement that there is no emission greater than –20 dBc detectable in a 100 KHz bandwidth at all frequencies outside the ISM band. For this measurement the transmitter is tuned to maximum output power at the lowest operating frequency. A similar measurement was made at the upper ISM band edge with the transmitter operating at the maximum ISM band operating frequency.

EXHIBIT 6C: RADIATED SPURIOUS – Pursuant 47 CFR 2.1041

6.4 Radiated Spurious Emissions -- Pursuant 47 CFR 2.1053, 2.1057, 15.247(d), 15.209

(Test Conducted with DLR1040 at MSI EMC accredited Lab in November 2014)

For Radiated Spurious Measurements from 19MHz to 1GHz please see attached TIMCO Folder (TIMCO testing 19MHz to 1GHz)

6.4.1 ISM Band Limits

Per 15.247(d) the peak allowable emission shall be less than 10 dBm when measured in a 100 kHz band outside the ISM Band.

Measurement Technique – 15.247 TX Spurious Restricted Band Emissions

Frequency Hopping - Non-standardized testing

Emissions at each freq were maximized by:

Following guidelines specified in ANSI C63.4-2003 with regards to emission maximizations [rotation through three orthogonal axes, etc...

Procedure for final emissions detection:

Freq Span for each harmonic [e.g. 5th harmonic]
Start Freq = low channel freq * harmonic# [e.g. 902*5= 4.51 GHz]
Stop Freq = Hi Channel freq * harmonic# [e.g. 928*5=4.64 GHz]

Detector function = peak
Trace = max hold

1) Find an antenna height where the emissions can be discerned

2) Rotate the EUT in 15 deg increments and looking at the band of interest for over 10 sec [sweep time = 15 ms dwell time = 90 ms |10s peak hold observation assures full capture of all channels]. Execute peak search and mark down maximum emission at each azimuth. Continue until measure all azimuths 0 - 345 degrees. Note the azimuth where the emission is maximum.

3) With EUT oriented in azimuth of maximum emission determined in 2), move the antenna up through 1-4m and find maximum emissions height. Move 1-4 m several times to make sure get max [peak search] [NOTE – no three antenna height testing].

4) Open up the Res / Vid BW to 1 MHz to capture peak emission - note the value

This emission, once corrected by the Duty Cycle Correction Factor as explained in Public Notice DA-00705, must meet the limits for the peak emission found in 15.35(b) [74 dBuV/m].

If this emission meets the 15.209 Average Limit - no further action is necessary

15.247 TX Spurious Radiated Emissions Testing with dwell time correction

Motorola DLR1060

1GHz-10GHz

Model: Motorola DLR1060

TX Power set to Default maximum factory setting 30dBm (1W)

*** Peak meets 20dBc Limit**

**** Dwell Time correction = 20log(dwell time/100ms) = 20Log(10.7ms/100ms)= 19.41dB**

20Log(10.7ms/100ms) = 19.41

902.525 MHz

Frequency (MHz)	Horizontal Measured Electric Field Intensity (dBµV/m)	** Dwell time Emission Correction: Horizontal (dBµV/m)	Vertical Measured Electric Field Intensity (dBµV/m)	** Dwell time Emission Correction: Vertical (dBµV/m)	CFR 47 15.35 "Peak Emission" Limit (dBµV/m)	15.209 Restricted Band "Average Emission" Limit (dBµV/m)	Measured "Average Emission" Level (dBµV/m)
1805.050	51.36	31.95	47.70	28.29	92.82*		
2707.575	68.49	49.08	66.12	46.71	74.00	54.00	Peak Meets Avg. limit
3610.100	54.31	34.90	50.35	30.94	74.00	54.00	Peak Meets Avg. limit
4512.625	64.89	45.48	60.33	40.92	74.00	54.00	Peak Meets Avg. limit
5415.150	55.21	35.80	57.34	37.93	92.82*	54.00	Peak Meets Avg. limit
6317.675	55.66	36.25	53.03	33.62	92.82*	54.00	Peak Meets Avg. limit
7220.200	56.98	37.57	57.34	37.93	74.00	54.00	Peak Meets Avg. limit
8122.725	62.25	42.84	59.14	39.73	74.00	54.00	Peak Meets Avg. limit
9025.250	58.97	39.56	62.73	43.32	74.00	54.00	Peak Meets Avg. limit

915.525 MHz

Frequency (MHz)	Horizontal Measured Electric Field Intensity (dBµV/m)	** Dwell time Emission Correction: Horizontal (dBµV/m)	Vertical Measured Electric Field Intensity (dBµV/m)	** Dwell time Emission Correction: Vertical (dBµV/m)	CFR 47 15.35 "Peak Emission" Limit (dBµV/m)	15.209 Restricted Band "Average Emission" Limit (dBµV/m)	Measured "Average Emission" Level (dBµV/m)
1831.050	47.38	27.97	44.50	25.09	92.82*		
2746.575	59.43	40.02	56.35	36.94	74.00	54.00	Peak Meets Avg. limit
3662.100	54.7	35.29	49.99	30.58	74.00	54.00	Peak Meets Avg. limit
4577.625	64	44.59	62.59	43.18	74.00	54.00	Peak Meets Avg. limit
5493.150	55.29	35.88	55.35	35.94	92.82*	54.00	Peak Meets Avg. limit
6408.675	54.68	35.27	54.60	35.19	92.82*	54.00	Peak Meets Avg. limit
7324.200	56.63	37.22	55.83	36.42	74.00	54.00	Peak Meets Avg. limit
8239.725	59.89	40.48	61.39	41.98	74.00	54.00	Peak Meets Avg. limit
9155.250	58.16	38.75	55.81	36.40	74.00	54.00	Peak Meets Avg. limit

927.475 MHz

Frequency (MHz)	Horizontal Measured Electric Field Intensity (dBµV/m)	** Dwell time Emission Correction: Horizontal (dBµV/m)	Vertical Measured Electric Field Intensity (dBµV/m)	** Dwell time Emission Correction: Vertical (dBµV/m)	CFR 47 15.35 "Peak Emission" Limit (dBµV/m)	15.209 Restricted Band "Average Emission" Limit (dBµV/m)	Measured "Average Emission" Level (dBµV/m)
1854.950	43.5	24.09	42.49	23.08	92.82*		
2782.425	61.35	41.94	63.48	44.07	74.00	54.00	Peak Meets Avg. limit
3709.900	52.22	32.81	51.12	31.71	74.00	54.00	Peak Meets Avg. limit
4637.375	63.14	43.73	60.00	40.59	74.00	54.00	Peak Meets Avg. limit
5564.850	58.38	38.97	56.43	37.02	92.82*	54.00	Peak Meets Avg. limit
6492.325	59.86	40.45	58.71	39.30	92.82*	54.00	Peak Meets Avg. limit
7419.800	55.43	36.02	57.90	38.49	74.00	54.00	Peak Meets Avg. limit
8347.275	62.33	42.92	59.35	39.94	74.00	54.00	Peak Meets Avg. limit
9274.750	66.76	47.35	65.13	45.72	74.00	54.00	Peak Meets Avg. limit

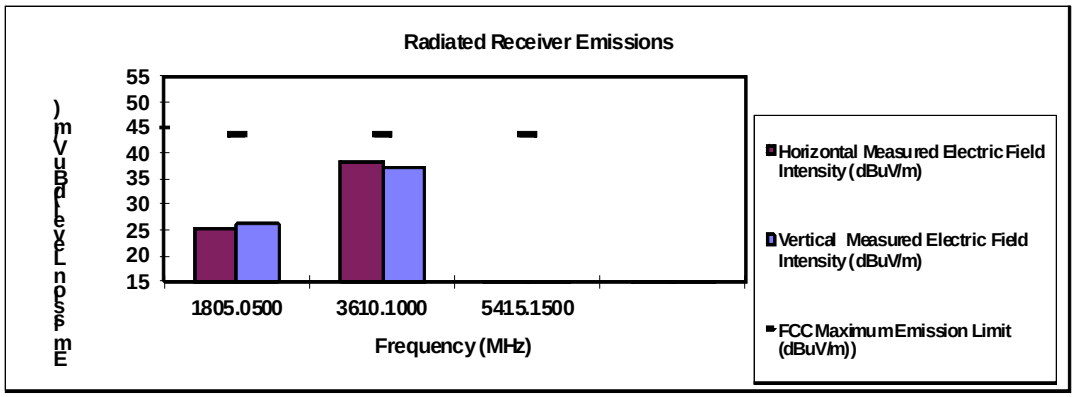
Figure 6-4A

Motorola Solutions

Receiver Radiated Spurious Emissions : DLR1060

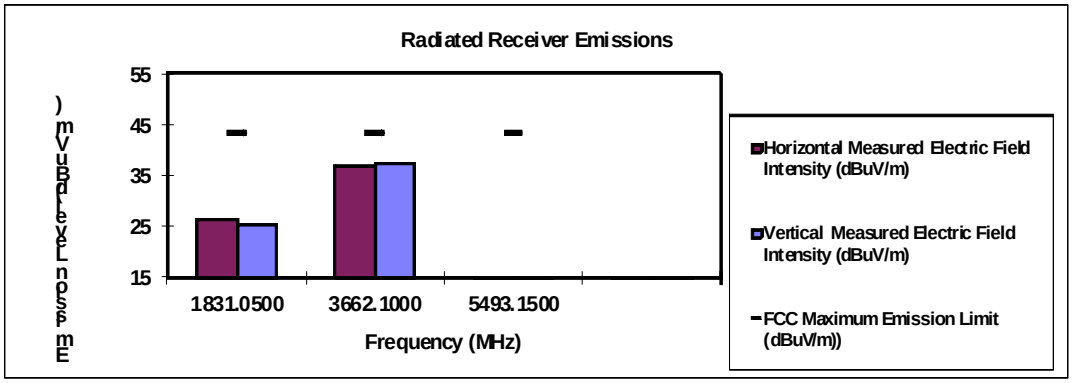
902.525 MHz **Ch. Sp.: 50 KHz** **1 Watts | S/N Unit #2**

Frequency (MHz)	FCC Maximum Emission Limit (dBuV/m))	Horizontal Measured Electric Field Intensity (dBuV/m)	Vertical Measured Electric Field Intensity (dBuV/m)
1805.0500	43.5	25.16	26.13
3610.1000	43.5	38.43	37.43
5415.1500	43.5	*	*



915.525 MHz **Ch. Sp.: 50 KHz** **1 Watts | S/N Unit #2**

Frequency (MHz)	FCC Maximum Emission Limit (dBuV/m))	Horizontal Measured Electric Field Intensity (dBuV/m)	Vertical Measured Electric Field Intensity (dBuV/m)
1831.0500	43.5	26.43	25.52
3662.1000	43.5	36.95	37.65
5493.1500	43.5	*	*



* Indicates the spurious emission could not be detected due to noise limitations or ambients.

Testing performed at 10 Meters, FCC limits calculated using fall-off relationship of 20dB/decade.

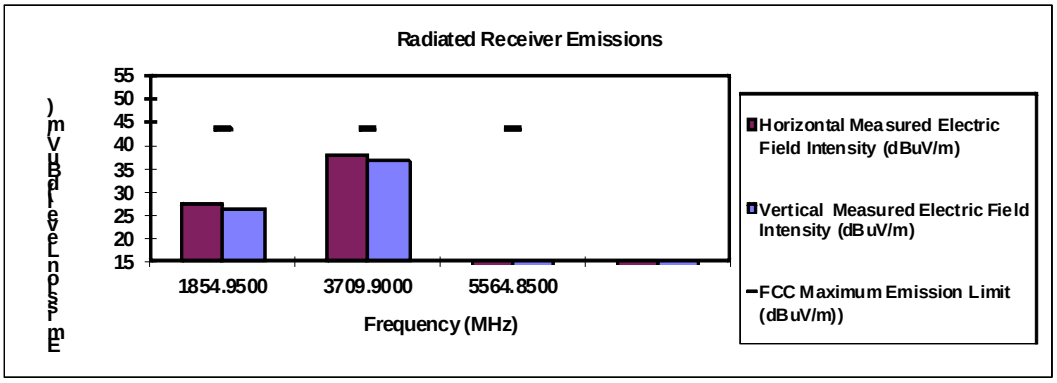
Motorola Plantation EMC Lab – Test Performed by: Curt Mc Lennan **November 13, 2014**

Figure 6-4B

Receiver Radiated Spurious Emissions : DLR1060

927.475 MHz **Ch. Sp.: 50 KHz** **1 Watts | S/N Unit #2**

Frequency (MHz)	FCC Maximum Emission Limit (dBuV/m))	Horizontal Measured Electric Field Intensity (dBuV/m)	Vertical Measured Electric Field Intensity (dBuV/m)
1854.9500	43.5	27.62	26.26
3709.9000	43.5	37.75	36.60
5564.8500	43.5	*	*



* Indicates the spurious emission could not be detected due to noise limitations or ambients.

Testing performed at 10 Meters, FCC limits calculated using fall-off relationship of 20dB/decade.

Motorola Plantation EMC Lab – Test Performed by: Curt Mc Lennan **November 13, 2014**
FCC Registration: 91932 / Industry Canada: IC109U-1

Figure 6-4C

EXHIBIT 6D: ERP MEASURED DATA – Pursuant 47 CFR 2.1041

(*Test Conducted at Timco Engineering Inc in FEB 2015*)

Please see attached TIMCO ERP Data document (418UT15TestReport_ERP) as part of the package for full test details.

EXHIBIT 6E: Frequency Behavior – Pursuant 47 CFR 2.1041

6.5 900 ISM Band Carrier Separation between Hopsets – Pursuant 47 CRF, Part 15.247(a)(1) *(Measured with DLR1060 in December 2014 MSI Plantation Eng. Lab)*

The separation between frequencies is measured to be 500 kHz as shown in Figure 6-41.

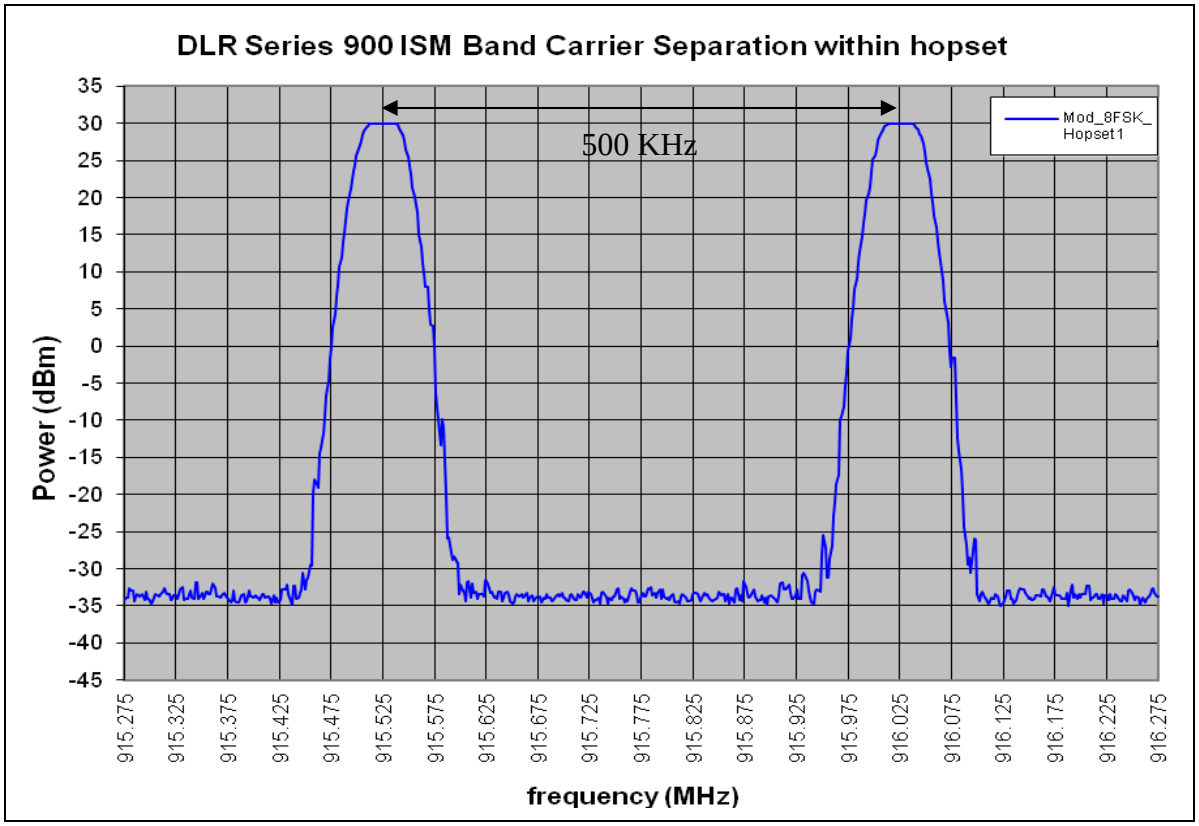


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Figure 6-5A. Plot of 900 MHz ISM Band adjacent channel separation within a hopset.

6.6 900 ISM Band Hopping Bandwidth between Hopsets –Pursuant 47 CRF, Part 15.247 (a)(1)(i) *(Measured with DLR1060 in December 2014 MSI Plantation Engineering Lab)*

Figure 6-6A shows the plot of the 8-FSK, traffic channel ISM Band spectrum with its 20 dB bandwidth of 25.65 kHz. .

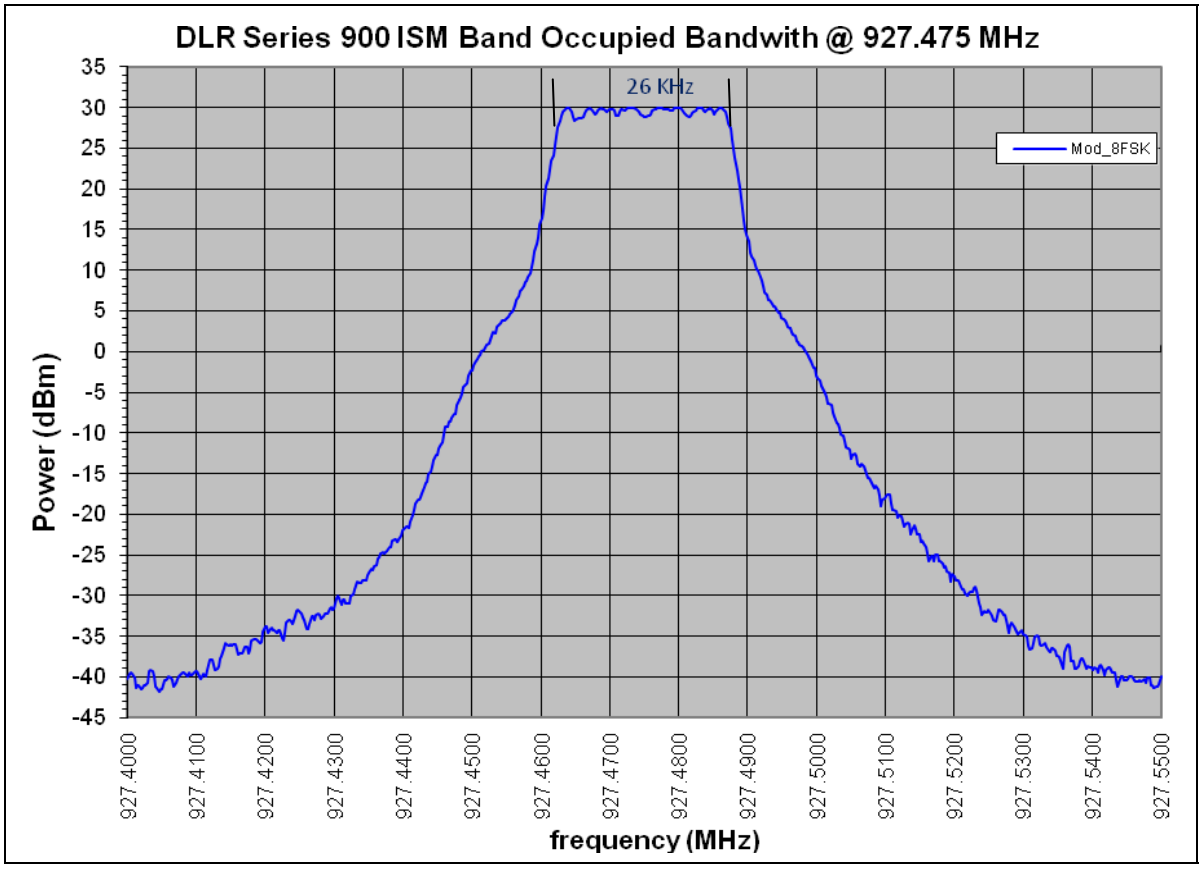

Figure 6-6A. Spectrum analyzer plot of 900 MHz ISM Band 8-FSK traffic channel signal's 99% Bandwidth

The adjacent hopset channel separation was measured between hopset @ 915.525 MHz and hopset @ 916.025 MHz which is 50 kHz.

(Measured with DLR1060 in December 2014 MSI Plantation Engineering Lab)

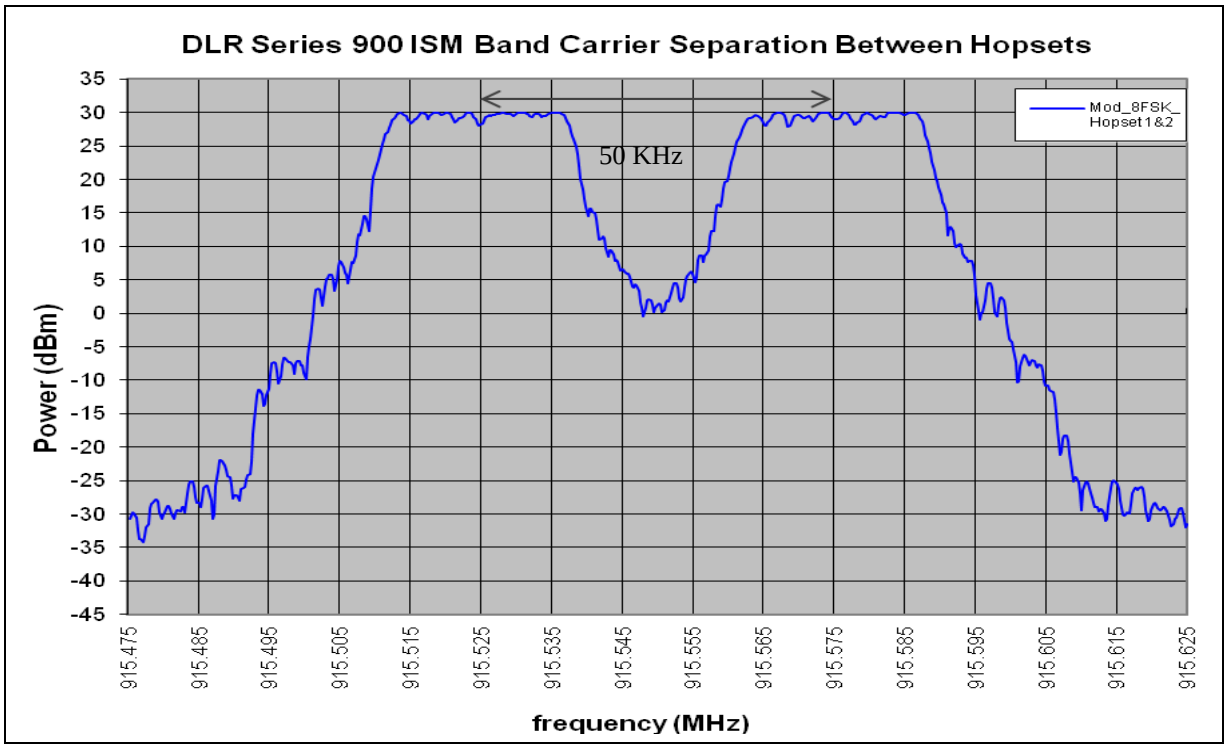

Figure 6-6B. Adjacent hopset separation.

6.7 900 ISM Band Receiver Bandwidth – Pursuant 47 CRF, Part 15.247(a)(1)

The receiver bandwidth is limited by a 2-pole analog filter and digital processing that includes a 5th order sinc filter, IIR high-pass programmable bandwidth filter, and a 15th order programmable selectivity filter. The composite 3dB bandwidth is 28 kHz.

6.8 900 ISM Band Number of Hopping Frequencies – Pursuant 47 CRF, 15.247(a)(1)(i)

The 900 MHz ISM Band transmitter uses 50 frequencies within each selected hopset.

Hopset	1st Frequency (MHz)	Progression (MHz)	Last (50th) Frequency (MHz)
1	902.525	903.025, 903.525, 904.025...	927.025
2	902.575	903.075, 903.575, 904.075...	927.075
3	902.625	903.125, 903.625, 904.125...	927.125
4	902.675	903.175, 903.675, 904.175...	927.175
5	902.725	903.225, 903.725, 904.225...	927.225
6	902.775	903.275, 903.775, 904.275...	927.275
7	902.825	903.325, 903.825, 904.325...	927.325
8	902.875	903.375, 903.875, 904.375...	927.375
9	902.925	903.425, 903.925, 904.425...	927.425
10	902.975	903.475, 903.975, 904.475...	927.475

Table 6-8A. 900 MHz Band Transmitter Frequency Hopsets.

6.9 900 ISM Band Average Time of Occupancy – Pursuant 47 CFR, Part 15.247(a)(1)(i)

(Measured with DLR1060 in December 2014 MSI Plantation Engineering Lab)

Worst case scenario (continuous transmission) is as follows:
85.57 ms bursts at 90 ms intervals (hop intervals)
20 seconds per window / 0.09 seconds per hop = 222.22 hops per window
222.22 hops / 50 carriers = 4.444 bursts per carrier window
4.444 bursts * 0.08557 seconds per burst = 0.3802 seconds (less than the 0.4 second requirement)

The calculations show the average time of occupancy of 0.4 seconds or less.

Verification of burst is shown in Figure 6-44 below.

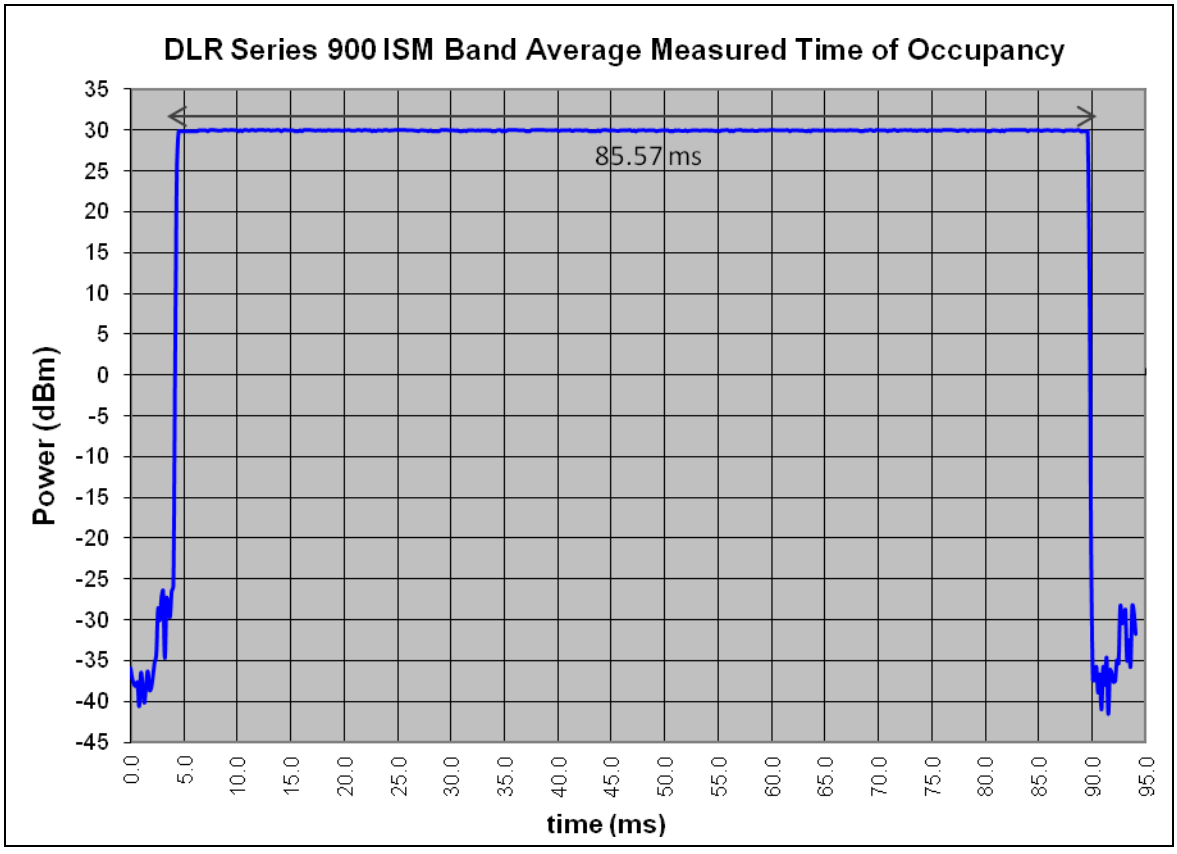

Figure 6-9A. 900 MHz ISM Band Average Measured Time of Occupancy.

6.10 900 ISM Band Equal Distribution of Hopping Frequencies for Continuous Transmission – Pursuant 47 CFR, Part 15.247(a)(1)(i) & 15.247(g)

(Measured with DLR1060 in December 2014 MSI Plantation Engineering Lab)

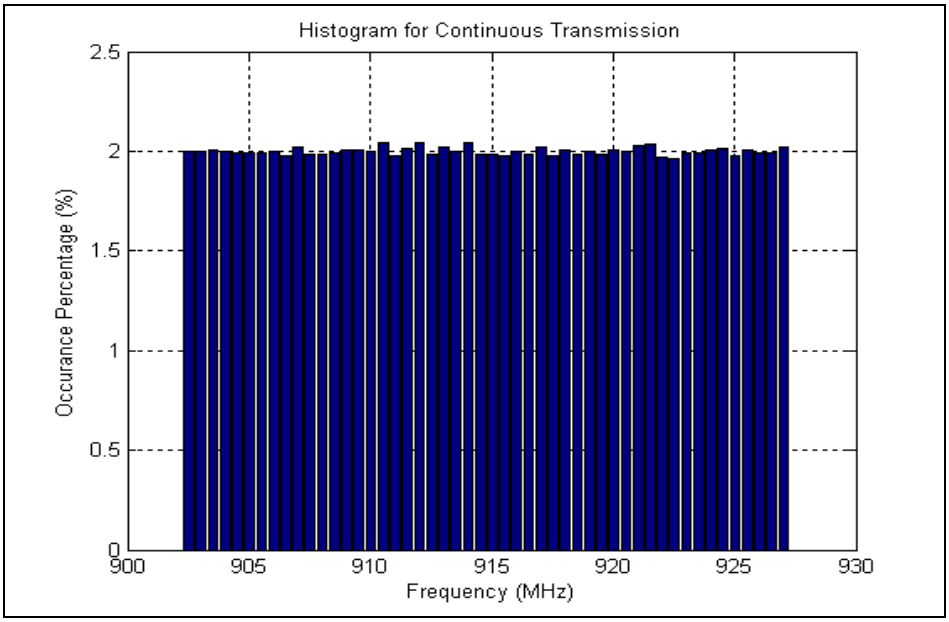

Figure 6-10A. Histogram for 900 MHz ISM Band Continuous Transmission

6.11 900 ISM Band Equal Distribution of Hopping Frequencies for Discontinuous Transmission - Pursuant 47 CFR, Part 15.247(a)(1)(i) & 15.247(g)

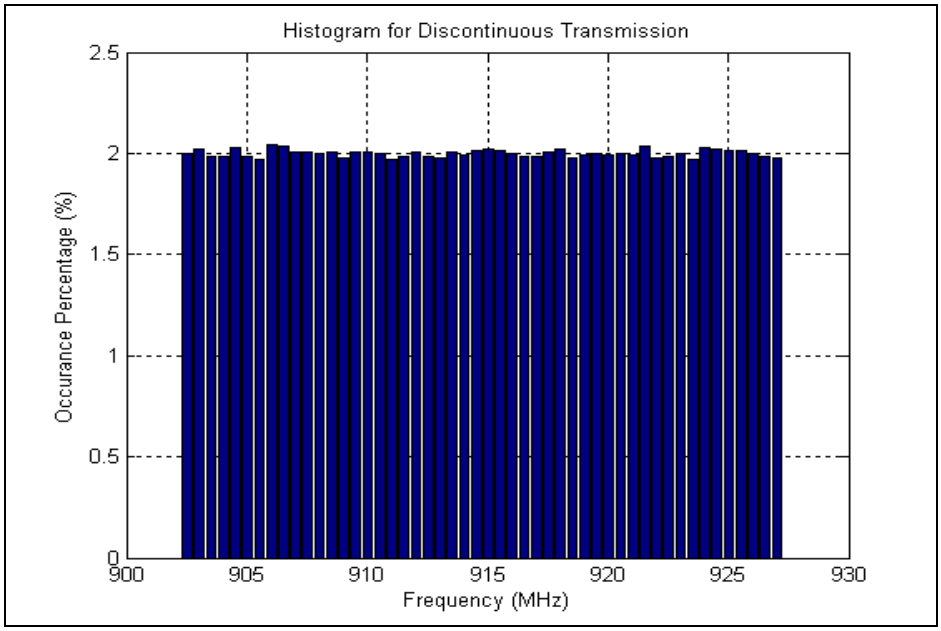

Figure 6-11A. Histogram for 900 MHz ISM Band Discontinuous Transmission

EXHIBIT 6F: FREQUENCY STABILITY -- Pursuant 47 CFR 2.1055a(1) & 2.1055(d)2

(Measured with DLR1060 in December 2014 MSI Plantation Engineering Lab)

The transmitter output frequency stability in the ISM band depends upon the inherent frequency stability of the Temperature Compensated Crystal Oscillator (TCXO) used as the frequency reference in the frequency generation scheme described in section 4 of this application. The total variation of the reference TCXO frequency, including changes caused by ambient temperature, supply voltage variation, and aging of the crystal is specified to be less than 2.25 PPM. This TCXO performance results in a total variation of frequency in the 900 MHz ISM band of less than 2100 Hz from nominal frequency. The radio resets at 3.2V.

No pattern in response to the change in voltage could be identified. There were tens of hertz of noise (uncertainty) in the displayed frequency at all times. This frequency noise appears to have masked the effects of changing the supply voltage.

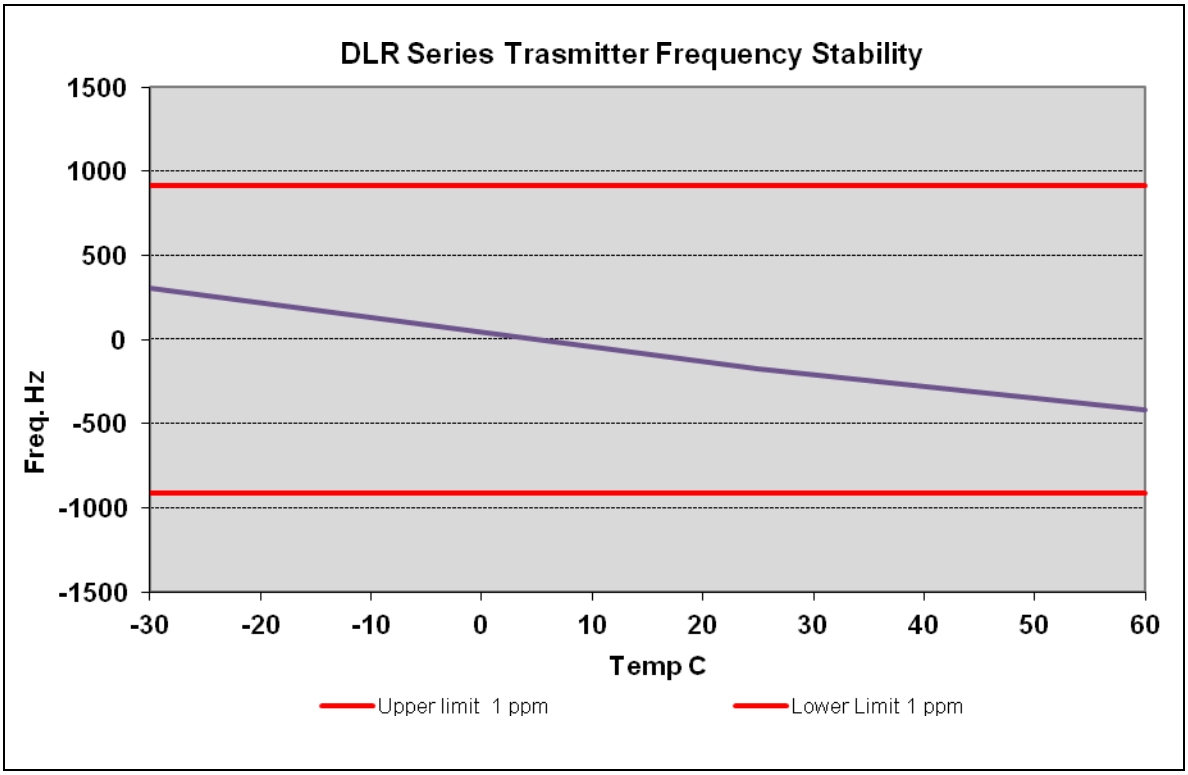

Figure 6-F: Transmitter Frequency Stability (900 MHz ISM band)- Frequency Error vs. Temperature.

EXHIBIT 6G: TEST SET UP PHOTOS