



# Spot Check Evaluation

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager



**SPORTON INTERNATIONAL INC.**

**No. 52, Hwa Ya 1<sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.**



## TABLE OF CONTENTS

REVISION HISTORY.....	3
1. INTRODUCTION SECTION.....	4
2. DIFFERENCE SECTION .....	5
3. SPOT CHECK VERIFICATION DATA SECTION .....	6
4. REFERENCE DETAIL SECTION.....	9
APPENDIX A. SPOT CHECK TEST RESULT	





## 1. Introduction Section

The original model (FCC ID: ZNFX240H) and the variant model (FCC ID: ZNFX240F) has identical PCB layout, antenna, SW implementation for Bluetooth/Wi-Fi/GPS/GSM/WCDMA/LTE. Based on their similarity, the FCC Part 15C (equipment class: DTS, DSS) and Part 22, 24, 27 (equipment class: PCS) test data issued for original model also apply for the variant model.

The applicant takes full responsibility that the test data as referenced in section 4 below represent compliance for this FCC ID (FCC ID: ZNFX240F).



## 2. Difference Section

The original model (FCC ID: ZNFX240H) and the variant model (FCC ID: ZNFX240F) has identical PCB layout, antenna, SW implementation for Bluetooth/Wi-Fi/GPS/GSM/WCDMA/LTE. The details of similarity and difference can be found in the Produce Equality Description.

The product specification is outlined in the following table:

FCC ID		ZNFX240H	ZNFX240F
<b>Wireless Tech</b>	<b>Mode</b>	<b>Frequency (MHz)</b>	
<b>GSM</b>	GSM Voice GPRS (GMSK) EDGE (8PSK)	Multi-Slot Class 12 DTM: No	850/1900
<b>UMTS</b>	AMR/RCM12.2Kbps HSDPA/HSUPA/DC-HSDPA		850/1900
<b>LTE (FDD)</b>	QPSK 16QAM	B5/B4/B2	B5/B4/B2/B7
<b>Wi-Fi</b>	11b/11g/11n(HT20)/11n(HT40)		2412-2462 MHz
<b>Bluetooth</b>	BR/EDR/LE		2402-2480 MHz



### 3. Spot Check Verification Data Section

Summary of the spot check:

Test Item	Mode	ZNFX240H Worst Result	ZNFX240F Worst Result	Difference (dB)
<b>Average Conducted Power (dBm)</b>	802.11b	16.97	16.89	0.08
	802.11g	14.63	14.58	0.05
	11n HT20	11.43	11.18	0.25
	11n HT40	10.99	10.98	0.01
	BT (1Mbps)	7.06	7.13	-0.07
	BT (2Mbps)	4.71	4.78	-0.07
	BT (3Mbps)	4.67	4.83	-0.16
	BT-LE	-0.93	-0.97	0.04
	GSM 850 (GPRS)	33.85	33.48	0.37
	GSM 850 (EDGE)	26.86	27.00	-0.14
	GSM 1900 (GPRS)	29.95	30.00	-0.05
	GSM 1900 (EDGE)	25.77	26.00	-0.23
	UMTS B2 (RMC 12.2Kbps)	24.87	24.79	0.08
	UMTS B4 (RMC 12.2Kbps)	24.85	24.59	0.26
	UMTS B5 (RMC 12.2Kbps)	24.86	24.65	0.21
	LTE B2 (FDD - QPSK)	24.43	24.47	-0.04
	LTE B4 (FDD - QPSK)	24.41	24.45	-0.04
LTE B5 (FDD - QPSK)	24.50	24.39	0.11	
LTE B7 (FDD - QPSK)	23.02	22.85	0.17	
<b>Peak Radiated Spurious Emission (Band Edge) (dBuV/m)</b>	11n HT40	59.53	60.27	-0.74
	BT (1Mbps)	44.26	45.18	-0.92
	BT-LE	54.28	53.90	0.38
<b>Average Radiated Spurious Emission (Band Edge) (dBuV/m)</b>	11n HT40	46.76	47.11	-0.35
	BT (1Mbps)	19.44	20.33	-0.89
	BT-LE	44.71	45.10	-0.39
<b>Peak Radiated Spurious Emission (Harmonic) (dBuV/m)</b>	11n HT40	37.88	38.42	-0.54
	BT (1Mbps)	38.86	39.27	-0.41
	BT-LE	37.65	38.20	-0.55
<b>Radiated Spurious Emission (dBm)</b>	GSM 850 (GPRS)	-54.68	-53.65	-1.03
	GSM 1900 (GPRS)	-39.45	-41.82	2.37
	UMTS B4 (RMC 12.2Kbps)	-50.37	-51.66	1.29
	LTE B2 (FDD - QPSK) / 1.4MHz	-42.24	-40.84	-1.40
	LTE B4 (FDD - QPSK) / 10MHz	-40.82	-42.27	1.45
	LTE B5 (FDD - QPSK) / 1.4MHz	-44.96	-44.94	-0.02
	LTE B7 (FDD - QPSK) / 15MHz	-51.34	-53.34	2.00



Maximum ERP/EIRP (W)	System	Type of Modulation	FCC ID ZNFX240H	FCC ID ZNFX240F
	GSM850 GPRS class 8	GMSK	0.4864	0.5794
	GSM850 EDGE class 8	8PSK	0.1710	0.1683
	WCDMA Band V RMC 12.2Kbps	BPSK	0.0953	0.0944
	GSM1900 GPRS class 8	GMSK	0.7096	0.8185
	GSM1900 EDGE class 8	8PSK	0.2355	0.2931
	WCDMA Band II RMC 12.2Kbps	BPSK	0.1910	0.2123
	WCDMA Band IV RMC 12.2Kbps	BPSK	0.2858	0.2831

Maximum ERP/EIRP (W)	LTE Band 2		QPSK		16QAM	
	BW (MHz)	Frequency Range (MHz)	FCC ID ZNFX240H	FCC ID ZNFX240F	FCC ID ZNFX240H	FCC ID ZNFX240F
	1.4	1850.7 ~ 1909.3	0.1803	-	0.1396	-
	3	1851.5 ~ 1908.5	0.1742	-	0.1435	-
	5	1852.5 ~ 1907.5	<b>0.1968</b>	0.1932	0.1611	-
	10	1855.0 ~ 1905.0	0.1862	-	0.1452	-
	15	1857.5 ~ 1902.5	0.1738	-	<b>0.1629</b>	0.1153
	20	1860.0 ~ 1900.0	0.1702	0.1393	0.1416	0.1135
	LTE Band 4		QPSK		16QAM	
	BW (MHz)	Frequency Range (MHz)	FCC ID ZNFX240H	FCC ID ZNFX240F	FCC ID ZNFX240H	FCC ID ZNFX240F
	1.4	1710.7 ~ 1754.3	0.2138	-	0.1644	-
	3	1711.5 ~ 1753.5	0.1986	-	0.1710	-
	5	1712.5 ~ 1752.5	0.1888	-	0.1671	-
	10	1715.0 ~ 1750.0	<b>0.2366</b>	0.2307	0.1866	-
	15	1717.5 ~ 1747.5	0.2173	-	0.1936	-
	20	1720.0 ~ 1745.0	0.2084	0.2344	<b>0.1941</b>	0.2333



Maximum ERP/EIRP (W)	LTE Band 5		QPSK		16QAM	
	BW (MHz)	Frequency Range (MHz)	FCC ID ZNFX240H	FCC ID ZNFX240F	FCC ID ZNFX240H	FCC ID ZNFX240F
	1.4	824.7 ~ 848.3	0.0895	-	0.0685	-
	3	825.5 ~ 847.5	0.0968	-	0.0743	-
	5	826.5 ~ 846.5	<b>0.0973</b>	0.0989	<b>0.0748</b>	0.0785
	10	829.0 ~ 844.0	0.0927	0.0959	0.0721	0.0659
	LTE Band 7		QPSK		16QAM	
	BW (MHz)	Frequency Range (MHz)	FCC ID ZNFX240H	FCC ID ZNFX240F	FCC ID ZNFX240H	FCC ID ZNFX240F
	5	2502.5 ~ 2567.5	0.1346	-	0.1084	-
	10	2505.0 ~ 2565.0	0.1384	-	0.1146	-
15	2507.5 ~ 2562.5	<b>0.1384</b>	0.1607	0.1130	-	
20	2510.0 ~ 2560.0	0.1337	0.1500	<b>0.1146</b>	0.1245	

**Conclusion:**

Radiated spurious emission test against the variant model based on the worst-case condition from the original model was performed in this filing to demonstrate the test data from original model remains representative for the variant model.

Based on the spot check test result (power levels measured are within 0.5dB, and the worst case of RSE spot check verification based on the worst condition from the original model is within 3dB, and are compliance with the limits), the test data from the original model is representative for the variant model.

The unwanted, harmonics, radiated spurious emission is reported peak measurement only due to spurious lower than 20dB than the limit.

The detail test results can be found in this document, Appendix A, hereafter.



## 4. Reference detail Section

Equipment Class	Reference FCC ID	Type Grant/Permissive Change	Reference Application	Folder Test/RF Exposure	Report Title
DTS	ZNFX240H	Original Grant	FR6O1802B FR6O1802C	Part 15C	All sections applicable
			FA6O1802	RF Exposure	All sections applicable
DSS	ZNFX240H	Original Grant	FR6O1802A	Part 15C	All sections applicable
			FA6O1802	RF Exposure	All sections applicable
PCS	ZNFX240H	Original Grant	FG6O1802A FG6O1802B	Part 22(H) Part 24(E) Part 27(L) Part 27(M)	All sections Applicable
			FA6O1802	RF Exposure	All sections applicable



## Appendix A. Spot Check Test Result

### 1.1 Conducted power

#### <2.4GHz WLAN>

2.4GHz WLAN	Mode	Channel	Frequency (MHz)	Data Rate	Tune-Up Limit	FCC ID ZNFX240H Average power (dBm)	FCC ID ZNFX240F Average power (dBm)
	802.11b		CH 1	2412	1Mbps	16.0	15.93
CH 6			2437	17.0		16.97	16.89
CH 11			2462	16.0		15.99	15.73
802.11g		CH 1	2412	6Mbps	12.0	11.94	11.90
		CH 6	2437		15.0	14.63	14.58
		CH 11	2462		13.5	13.26	13.03
802.11n-HT20		CH 1	2412	MCS0	11.5	11.13	11.08
		CH 6	2437			11.35	11.16
		CH 11	2462			11.43	11.18
802.11n-HT40		CH 3	2422	MCS0	9.5	9.14	9.13
		CH 6	2437		11.0	10.94	10.93
		CH 9	2452			10.99	10.98

#### <Bluetooth>

Mode	Channel	Frequency (MHz)	Tune-Up Limit	FCC ID ZNFX240H Average power (dBm)	FCC ID ZNFX240F Average power (dBm)
Bluetooth (1Mbps)	CH 00	2402	8.0	6.00	6.10
	CH 39	2441		7.06	7.13
	CH 78	2480		5.87	5.58
Bluetooth (2Mbps)	CH 00	2402	5.0	3.63	3.77
	CH 39	2441		4.71	4.78
	CH 78	2480		3.44	3.36
Bluetooth (3Mbps)	CH 00	2402	5.0	3.62	3.73
	CH 39	2441		4.67	4.83
	CH 78	2480		3.45	3.38
BLE (GFSK)	CH 00	2402	0.0	-1.70	-1.77
	CH 19	2440		-0.93	-0.97
	CH 39	2480		-2.17	-2.22



<WWAN>

GSM850		FCC ID ZNFX240H Average power (dBm)			FCC ID ZNFX240F Average power (dBm)		
TX Channel	Tune-up Limit (dBm)	128	189	251	128	189	251
Frequency (MHz)		824.2	836.4	848.8	824.2	836.4	848.8
GSM 1 Tx slot	34.00	33.84	33.81	33.73	33.47	33.38	33.40
GPRS 1 Tx slot	34.00	<b>33.85</b>	33.81	33.73	<b>33.48</b>	33.38	33.40
GPRS 2 Tx slots	30.50	30.17	30.16	30.13	30.41	30.31	30.36
GPRS 3 Tx slots	29.00	28.51	28.50	28.48	28.77	28.63	28.70
GPRS 4 Tx slots	28.00	27.31	27.30	27.27	27.56	27.45	27.50
EDGE 1 Tx slot	27.00	26.84	<b>26.86</b>	26.82	26.92	26.96	<b>27.00</b>
EDGE 2 Tx slots	25.00	24.72	24.68	24.61	24.85	24.86	24.95
EDGE 3 Tx slots	23.50	23.11	23.08	22.98	23.19	23.17	23.23
EDGE 4 Tx slots	22.5	21.94	21.93	21.85	22.10	22.07	22.15

GSM1900		FCC ID ZNFX240H Average power (dBm)			FCC ID ZNFX240F Average power (dBm)		
TX Channel	Tune-up Limit (dBm)	512	661	810	512	661	810
Frequency (MHz)		1850.2	1880	1909.8	1850.2	1880	1909.8
GSM 1 Tx slot	30.00	29.94	29.87	29.80	29.93	29.78	29.62
GPRS 1 Tx slot	30.00	<b>29.95</b>	29.87	29.80	<b>29.94</b>	29.78	29.62
GPRS 2 Tx slots	27.50	27.03	26.96	26.92	27.50	27.36	27.20
GPRS 3 Tx slots	26.00	25.50	25.50	25.51	25.98	25.76	25.68
GPRS 4 Tx slots	25.00	24.43	24.46	24.53	24.93	24.74	24.66
EDGE 1 Tx slot	26.00	25.75	<b>25.77</b>	25.65	25.99	<b>26.00</b>	25.83
EDGE 2 Tx slots	24.00	23.64	23.64	23.45	23.93	23.90	23.74
EDGE 3 Tx slots	22.00	21.86	21.87	21.71	22.00	21.99	21.99
EDGE 4 Tx slots	21.00	20.85	20.86	20.68	20.99	21.00	20.97



WCDMA II		FCC ID ZNFX240H Average power (dBm)			FCC ID ZNFX240F Average power (dBm)		
TX Channel	Tune-up Limit (dBm)	9262	9400	9538	9262	9400	9538
Frequency (MHz)		1852.4	1880	1907.6	1852.4	1880	1907.6
AMR 12.2Kbps	25.00	24.85	24.80	24.75	24.75	24.69	24.62
RMC 12.2Kbps	25.00	<b>24.87</b>	24.81	24.79	<b>24.79</b>	24.73	24.63
HSDPA Subtest-1	24.00	23.80	23.68	23.68	23.89	23.81	23.51
HSDPA Subtest-2	24.00	23.79	23.70	23.72	23.66	23.80	23.45
HSDPA Subtest-3	23.50	23.31	23.24	23.21	23.24	23.34	22.97
HSDPA Subtest-4	23.50	23.29	23.22	23.18	23.21	23.31	22.93
DC-HSDPA Subtest-1	24.00	23.74	23.64	23.61	23.88	23.75	23.47
DC-HSDPA Subtest-2	24.00	23.74	23.62	23.66	23.64	23.78	23.43
DC-HSDPA Subtest-3	23.50	23.22	23.23	23.15	23.15	23.29	22.94
DC-HSDPA Subtest-4	23.50	23.25	23.11	23.09	23.13	23.24	22.86
HSUPA Subtest-1	24.00	22.04	22.09	22.08	22.04	22.04	22.09
HSUPA Subtest-2	22.00	21.81	21.72	21.64	21.87	21.85	21.75
HSUPA Subtest-3	23.00	22.76	22.73	22.66	22.83	22.82	22.79
HSUPA Subtest-4	22.00	21.23	21.14	21.08	21.30	21.34	21.27
HSUPA Subtest-5	24.00	23.80	23.70	23.60	23.80	23.80	23.50



WCDMA IV		FCC ID ZNFX240H Average power (dBm)			FCC ID ZNFX240F Average power (dBm)		
TX Channel	Tune-up Limit (dBm)	1312	1413	1513	1312	1413	1513
Frequency (MHz)		1712.4	1732.6	1752.6	1712.4	1732.6	1752.6
AMR 12.2Kbps	25.00	24.74	24.81	24.83	24.50	24.49	24.58
RMC 12.2Kbps	25.00	24.76	24.82	<b>24.85</b>	24.52	24.50	<b>24.59</b>
HSDPA Subtest-1	24.00	23.95	23.93	23.88	23.71	23.68	23.77
HSDPA Subtest-2	24.00	23.92	23.91	23.87	23.73	23.69	23.78
HSDPA Subtest-3	23.50	23.50	23.46	23.45	23.26	23.26	23.33
HSDPA Subtest-4	23.50	23.45	23.43	23.45	23.28	23.23	23.28
DC-HSDPA Subtest-1	24.00	23.93	23.90	23.86	23.70	23.57	23.74
DC-HSDPA Subtest-2	24.00	23.84	23.82	23.83	23.70	23.63	23.70
DC-HSDPA Subtest-3	23.50	23.39	23.38	23.42	23.25	23.19	23.28
DC-HSDPA Subtest-4	23.50	23.44	23.38	23.34	23.24	23.22	23.23
HSUPA Subtest-1	24.00	22.02	22.09	22.05	22.03	22.04	22.00
HSUPA Subtest-2	22.00	21.91	21.83	21.80	21.78	21.68	21.79
HSUPA Subtest-3	23.00	22.98	22.89	22.84	22.74	22.68	22.77
HSUPA Subtest-4	22.00	21.40	21.34	21.31	21.22	21.15	21.28
HSUPA Subtest-5	24.00	23.90	23.90	23.60	23.70	23.60	23.30



WCDMA V		FCC ID ZNFX240H Average power (dBm)			FCC ID ZNFX240F Average power (dBm)		
TX Channel	Tune-up Limit (dBm)	4132	4182	4233	4132	4182	4233
Frequency (MHz)		826.4	836.4	846.6	826.4	836.4	846.6
AMR 12.2Kbps	25.00	24.72	24.66	24.83	24.60	24.55	24.63
RMC 12.2Kbps	25.00	24.75	24.71	<b>24.86</b>	24.63	24.58	<b>24.65</b>
HSDPA Subtest-1	24.00	23.62	23.56	23.57	23.67	23.52	23.56
HSDPA Subtest-2	24.00	23.62	23.52	23.60	23.68	23.58	23.56
HSDPA Subtest-3	23.50	23.17	23.06	23.12	23.25	23.11	23.10
HSDPA Subtest-4	23.50	23.14	23.06	23.07	23.27	23.09	23.06
DC-HSDPA Subtest-1	24.00	23.60	23.50	23.46	23.59	23.49	23.53
DC-HSDPA Subtest-2	24.00	23.52	23.47	23.50	23.60	23.48	23.55
DC-HSDPA Subtest-3	23.50	23.08	22.96	23.07	23.15	23.04	23.00
DC-HSDPA Subtest-4	23.50	23.05	23.02	23.05	23.19	23.06	23.04
HSUPA Subtest-1	24.00	22.09	22.06	22.02	22.09	22.08	22.09
HSUPA Subtest-2	22.00	21.63	21.52	21.69	21.67	21.59	21.63
HSUPA Subtest-3	23.00	22.61	22.51	22.67	22.68	22.58	22.62
HSUPA Subtest-4	22.00	21.01	20.95	21.09	21.15	21.06	21.13
HSUPA Subtest-5	24.00	23.60	23.50	23.60	23.60	23.50	23.60



LTE Band 2 / 20MHz			FCC ID ZNFX240H Average power (dBm)			FCC ID ZNFX240F Average power (dBm)		
TX Channel			18700	18900	19100	18700	18900	19100
Frequency (MHz)								
Modulation	RB Size	RB offset	1860	1880	1900	1860	1880	1900
Tune-up Limit (dBm)								
QPSK	1	0	24.41	<b>24.43</b>	24.37	<b>24.47</b>	24.35	24.37
QPSK	1	49	24.18	24.42	24.36	24.22	24.21	24.20
QPSK	1	99	24.28	23.88	23.77	24.17	23.98	23.81
QPSK	50	0	23.48	23.49	23.47	23.49	23.45	23.39
QPSK	50	24	23.46	23.37	23.40	23.44	23.41	23.37
QPSK	50	50	23.45	23.31	23.42	23.46	23.43	23.38
QPSK	100	0	23.48	23.49	23.39	23.46	23.50	23.39
16QAM	1	0	23.41	23.43	23.46	23.44	23.42	23.44
16QAM	1	49	23.41	23.43	23.44	23.48	23.43	23.44
16QAM	1	99	23.44	23.17	23.25	23.44	23.41	22.90
16QAM	50	0	22.43	22.43	22.36	22.43	22.47	22.45
16QAM	50	24	22.39	22.50	22.35	22.39	22.35	22.41
16QAM	50	50	22.33	22.44	22.40	22.45	22.41	22.41
16QAM	100	0	22.16	22.41	22.32	22.41	22.35	22.45



LTE Band 4 / 20MHz			FCC ID ZNFX240H Average power (dBm)			FCC ID ZNFX240F Average power (dBm)			
TX Channel			Tune-up Limit (dBm)	20050	20175	20300	20050	20175	20300
Frequency (MHz)				1720	1732.5	1745	1720	1732.5	1745
Modulation	RB Size	RB offset							
QPSK	1	0	24.5	24.37	<b>24.41</b>	24.40	24.29	24.12	<b>24.45</b>
QPSK	1	49		24.28	24.28	24.30	24.06	24.15	24.23
QPSK	1	99		24.27	24.24	24.24	24.17	24.09	24.02
QPSK	50	0	23.5	23.41	23.48	23.45	23.19	23.24	23.16
QPSK	50	24		23.39	23.38	23.41	23.18	23.09	23.10
QPSK	50	50		23.38	23.38	23.38	23.18	23.08	23.13
QPSK	100	0		23.40	23.43	23.41	23.15	23.19	23.16
16QAM	1	0	23.5	23.46	23.44	23.47	23.36	23.25	23.42
16QAM	1	49		23.44	23.45	23.50	23.25	23.29	23.31
16QAM	1	99		23.43	23.41	23.43	23.25	23.14	23.13
16QAM	50	0	22.5	22.41	22.35	22.38	22.17	22.33	22.38
16QAM	50	24		22.31	22.32	22.34	22.10	22.49	22.44
16QAM	50	50		22.31	22.31	22.32	22.09	22.44	22.41
16QAM	100	0		22.33	22.30	22.33	22.05	22.41	22.42



LTE Band 5 / 20MHz			FCC ID ZNFX240H Average power (dBm)			FCC ID ZNFX240F Average power (dBm)			
TX Channel			Tune-up Limit (dBm)	20450	20525	20600	20450	20525	20600
Frequency (MHz)				829	836.5	844	829	836.5	844
Modulation	RB Size	RB offset							
QPSK	1	0	24.5	24.44	24.41	24.37	24.38	24.36	24.27
QPSK	1	49		<b>24.50</b>	24.39	24.37	<b>24.39</b>	24.31	24.30
QPSK	1	99		24.42	24.40	24.09	24.34	24.21	24.03
QPSK	50	0	23.5	23.49	23.46	23.14	23.43	23.41	23.35
QPSK	50	24		23.44	23.48	23.14	23.42	23.38	23.36
QPSK	50	50		23.45	23.43	23.17	23.41	23.35	23.38
QPSK	100	0		23.49	23.50	23.23	23.47	23.43	23.42
16QAM	1	0	23.5	23.50	23.49	23.28	23.49	23.45	23.41
16QAM	1	49		23.44	23.44	23.36	23.44	23.43	23.47
16QAM	1	99		23.42	23.45	23.23	23.46	23.44	23.38
16QAM	50	0	22.5	22.47	22.44	22.17	22.43	22.38	22.35
16QAM	50	24		22.50	22.42	22.16	22.42	22.35	22.36
16QAM	50	50		22.49	22.45	22.07	22.41	22.33	22.36
16QAM	100	0		22.49	22.47	22.21	22.45	22.40	22.40



LTE Band 7 / 20MHz			FCC ID ZNFX240H Average power (dBm)			FCC ID ZNFX240F Average power (dBm)				
TX Channel			20850	21100	21350	20850	21100	21350		
Frequency (MHz)										
Modulation	RB Size	RB offset	2510	2535	2560	2510	2535	2560		
Tune-up Limit (dBm)										
QPSK	1	0	<b>23.02</b>	22.60	21.96	<b>22.85</b>	22.55	22.00		
QPSK	1	49		22.95	22.49		21.49	22.84	22.62	21.49
QPSK	1	99		22.86	22.30		21.58	22.66	22.76	21.68
QPSK	50	0	23.5	22.11	21.59	20.65	21.99	21.66	20.67	
QPSK	50	24		22.07	21.51	20.52	21.95	21.71	20.54	
QPSK	50	50		22.06	21.45	20.59	21.86	21.77	20.68	
QPSK	100	0		22.04	21.49	20.58	21.92	21.69	20.65	
16QAM	1	0	23.5	22.17	21.74	21.15	22.01	21.68	21.34	
16QAM	1	49		22.18	21.68	20.67	21.99	21.75	20.63	
16QAM	1	99		22.08	21.47	20.78	21.81	21.94	20.87	
16QAM	50	0	22.5	20.98	20.52	19.61	20.86	20.57	19.60	
16QAM	50	24		20.96	20.43	19.48	20.81	20.59	19.46	
16QAM	50	50		20.95	20.38	19.56	20.76	20.64	19.62	
16QAM	100	0		20.93	20.42	19.54	20.78	20.54	19.57	



## 1.2 Radiated Spurious Emission

### 2.4GHz BT/WLAN

Mode	Ch	Freq. (MHz)	Peak /Avg.	FCC ID ZNFX240H						FCC ID ZNFX240F					
				Band edge			Harmonic			Band edge			Harmonic		
				Frequency	Level	Limit	Frequency	Level	Limit	Frequency	Level	Limit	Frequency	Level	Limit
				(MHz)	(dBuV/m)	(dBuV/m)	(MHz)	(dBuV/m)	(dBuV/m)	(MHz)	(dBuV/m)	(dBuV/m)	(MHz)	(dBuV/m)	(dBuV/m)
BT(1Mbps)	CH 78	2480	P	2484.64	44.26	74	7440	38.86	74	2483.84	45.18	74	7440	39.27	74
			A	2484.64	19.44	54				2483.84	20.33	54			
BLE	CH 39	2480	P	2491.2	54.28	74	7440	37.65	74	2495.8	53.9	74	7440	38.2	74
			A	2488.68	44.71	54				2489.88	45.1	54			
802.11n-HT40	CH 03	2422	P	2389.94	59.53	74	7266	37.88	74	2388.44	60.27	74	7266	38.42	74
			A	2389.38	46.76	54				2389.28	47.11	54			



2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
BLE CH 39 2480MHz	*	2480	97.48	-	-	94.63	27.45	8.98	33.58	186	347	P	H
	*	2480	96.84	-	-	93.99	27.45	8.98	33.58	186	347	A	H
		2495.8	53.9	-20.1	74	50.99	27.5	8.98	33.57	186	347	P	H
		2489.88	45.1	-8.9	54	42.2	27.5	8.98	33.58	186	347	A	H
	*	2480	92.11	-	-	89.26	27.45	8.98	33.58	147	3	P	V
	*	2480	91.54	-	-	88.69	27.45	8.98	33.58	147	3	A	V
		2493.96	54.16	-19.84	74	51.25	27.5	8.98	33.57	147	3	P	V
		2492.68	45.03	-8.97	54	42.12	27.5	8.98	33.57	147	3	A	V

BLE (Harmonic @ 3m)

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
BLE CH 39 2480MHz		4960	33.78	-40.22	74	41.75	31.94	11.12	51.03	100	0	P	H
		7440	38.18	-35.82	74	38.37	37.44	12.88	50.51	100	0	P	H
		4960	32.34	-41.66	74	40.31	31.94	11.12	51.03	100	0	P	V
		7440	38.2	-35.8	74	38.39	37.44	12.88	50.51	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

BT (Band Edge @ 3m)

BT	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
BT CH 78 2480MHz	*	2480	104.33	-	-	101.48	27.45	8.98	33.58	184	348	P	H
	*	2480	79.48	-	-	-	-	-	-	-	-	A	H
		2483.84	45.18	-28.82	74	42.33	27.45	8.98	33.58	184	348	P	H
		2483.84	20.33	-33.67	54	-	-	-	-	-	-	A	H
	*	2480	100.08	-	-	97.23	27.45	8.98	33.58	148	14	P	V
	*	2480	75.23	-	-	-	-	-	-	-	-	A	V
		2483.8	44.86	-29.14	74	42.01	27.45	8.98	33.58	148	14	P	V
		2483.8	20.01	-33.99	54	-	-	-	-	-	-	A	V

BT (Harmonic @ 3m)

BT	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
BT CH 78 2480MHz		4960	33.68	-40.32	74	41.65	31.94	11.12	51.03	100	0	P	H
		4960	8.83	-45.17	54	-	-	-	-	-	-	A	H
		7440	39.27	-34.73	74	39.46	37.44	12.88	50.51	100	0	P	H
		7440	14.42	-39.58	54	-	-	-	-	-	-	A	H
		4960	33.4	-40.6	74	41.37	31.94	11.12	51.03	100	0	P	V
		4960	8.55	-45.45	54	-	-	-	-	-	-	A	V
		7440	38.19	-35.81	74	38.38	37.44	12.88	50.51	100	0	P	V
		7440	13.34	-40.66	54	-	-	-	-	-	-	A	V

Remark	1.	No other spurious found.
	2.	All results are PASS against Peak and Average limit line.



**2.4GHz 2400~2483.5MHz  
WIFI 802.11n HT40 (Band Edge @ 3m)**

WIFI Ant. 1	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
802.11n HT40 CH 03 2422MHz		2388.435	60.27	-13.73	74	57.79	27.19	8.89	33.6	200	334	P	H
		2389.275	47.11	-6.89	54	44.63	27.19	8.89	33.6	200	334	A	H
	*	2422	102.86	-	-	100.22	27.29	8.94	33.59	200	334	P	H
	*	2422	94.51	-	-	91.87	27.29	8.94	33.59	200	334	A	H
		2488.03	53.8	-20.2	74	50.9	27.5	8.98	33.58	200	334	P	H
		2488.31	45.22	-8.78	54	42.32	27.5	8.98	33.58	200	334	A	H
		2389.485	53.96	-20.04	74	51.48	27.19	8.89	33.6	208	360	P	V
		2389.275	44.81	-9.19	54	42.33	27.19	8.89	33.6	208	360	A	V
	*	2422	96.78	-	-	94.14	27.29	8.94	33.59	208	360	P	V
	*	2422	88.55	-	-	85.91	27.29	8.94	33.59	208	360	A	V
		2492.37	55.14	-18.86	74	52.23	27.5	8.98	33.57	208	319	P	V
		2484.74	44.9	-9.1	54	42.05	27.45	8.98	33.58	208	319	A	V

**WIFI 802.11n HT40 (Harmonic @ 3m)**

WIFI Ant. 1	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )
802.11n HT40 CH 03 2422MHz		4844	32.28	-41.72	74	40.87	31.72	10.77	51.08	100	0	P	H
		7266	38.42	-35.58	74	38.96	37.23	12.74	50.51	100	0	P	H
		4844	32.05	-41.95	74	40.64	31.72	10.77	51.08	100	0	P	V
		7266	37.76	-36.24	74	38.3	37.23	12.74	50.51	100	0	P	V

<b>Remark</b>	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												
---------------	---	--	--	--	--	--	--	--	--	--	--	--	--



**Note symbol**

*	<b>Fundamental Frequency</b> which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is <b>over limit</b> line.
P/A	<b>Peak</b> or <b>Average</b>
H/V	<b>Horizontal</b> or <b>Vertical</b>
-L	<b>Low channel location</b>
-R	<b>High channel location</b>

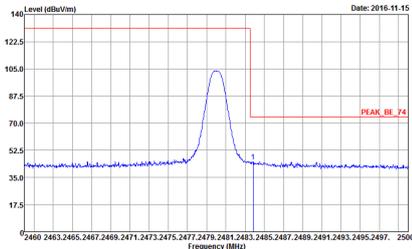
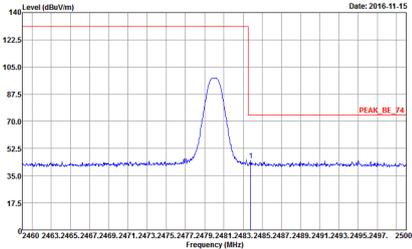


## Note symbol

-L	Low channel location
-R	High channel location



**2.4GHz 2400~2483.5MHz  
BT (Band Edge @ 3m)**

BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH78 2480MHz	
1	Horizontal	Vertical
Peak	 <p>Site : 03CH11-HY Condition : PEAK_BE_74 3m HORN 9120D-HF HORIZONTAL Detector : Peak Project : 601804</p>	 <p>Site : 03CH11-HY Condition : PEAK_BE_74 3m HORN 9120D-HF VERTICAL Detector : Peak Project : 601804</p>



**2.4GHz 2400~2483.5MHz**

**BT (Harmonic @ 3m)**

BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH78 2480MHz	
1	Horizontal	Vertical
<p><b>Peak</b> <b>Avg.</b></p>	<p>Site : 03CH11-HY            Condition : PEAK_74 3m 9170 SHF HORM_150809 HORIZONTAL            Detector : Peak            Project : 601804</p>	<p>Site : 03CH11-HY            Condition : PEAK_74 3m 9170 SHF HORM_150809 VERTICAL            Detector : Peak            Project : 601804</p>



2.4GHz 2400~2483.5MHz  
BLE (Band Edge @ 3m)

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE CH39 2480MHz	
1	Horizontal	Vertical
Peak	<p>Site : 03CH11-HY Condition : PEAK_BE_74 3m HORN 91200-HF HORIZONTAL Detector : Peak Project : 6O1B04</p>	<p>Site : 03CH11-HY Condition : PEAK_BE_74 3m HORN 91200-HF VERTICAL Detector : Peak Project : 6O1B04</p>
Avg.	<p>Site : 03CH11-HY Condition : AVG_BE_54 3m HORN 91200-HF HORIZONTAL Detector : Peak Project : 6O1B04</p>	<p>Site : 03CH11-HY Condition : AVG_BE_54 3m HORN 91200-HF VERTICAL Detector : Peak Project : 6O1B04</p>



**2.4GHz 2400~2483.5MHz**

**BLE (Harmonic @ 3m)**

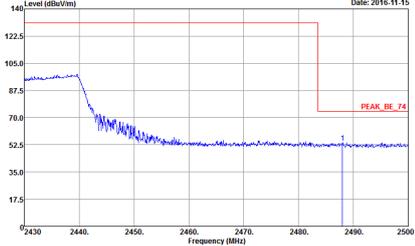
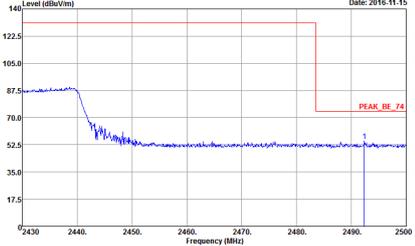
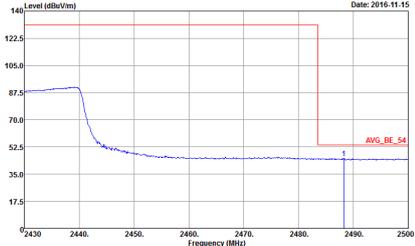
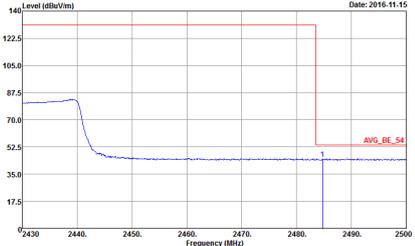
BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BLE CH39 2480MHz	
1	Horizontal	Vertical
<p><b>Peak</b> <b>Avg.</b></p>	<p>Site : 03CH11-HY            Condition : PEAK_74 3m 9170 SHF HORM_150809 HORIZONTAL            Detector : Peak            Project : 601804</p>	<p>Site : 03CH11-HY            Condition : PEAK_74 3m 9170 SHF HORM_150809 VERTICAL            Detector : Peak            Project : 601804</p>



**2.4GHz 2400~2483.5MHz**  
**WIFI 802.11n HT40 (Band Edge @ 3m)**

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH03 2422MHz - L	
1	Horizontal	Vertical
<b>Peak</b>	<p>Site : 03GH11-HY            Condition : PEAK_BE_74 3m HORN 9120D-HF HORIZONTAL            RBW:1000.000KHz VBW:3000.000KHz SWT:Auto            Detector : Peak            Project : 601804</p>	<p>Site : 03GH11-HY            Condition : PEAK_BE_74 3m HORN 9120D-HF VERTICAL            RBW:1000.000KHz VBW:3000.000KHz SWT:Auto            Detector : Peak            Project : 601804</p>
<b>Avg.</b>	<p>Site : 03GH11-HY            Condition : AVG_BE_54 3m HORN 9120D-HF HORIZONTAL            RBW:1000.000KHz VBW:3.000KHz SWT:Auto            Detector : Peak            Project : 601804</p>	<p>Site : 03GH11-HY            Condition : AVG_BE_54 3m HORN 9120D-HF VERTICAL            RBW:1000.000KHz VBW:3.000KHz SWT:Auto            Detector : Peak            Project : 601804</p>



WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH03 2422MHz - R	
1	Horizontal	Vertical
Peak	 <p>Site : 03CH11-HY            Condition : PEAK_BE_74 3m HORN 9120D-HF HORIZONTAL            RBW:1000.000KHz VBW:3000.000KHz SWT:Auto            Detector : Peak            Project : 601804</p>	 <p>Site : 03CH11-HY            Condition : PEAK_BE_74 3m HORN 9120D-HF VERTICAL            RBW:1000.000KHz VBW:3000.000KHz SWT:Auto            Detector : Peak            Project : 601804</p>
Avg.	 <p>Site : 03CH11-HY            Condition : AVG_BE_54 3m HORN 9120D-HF HORIZONTAL            RBW:1000.000KHz VBW:3000.000KHz SWT:Auto            Detector : Peak            Project : 601804</p>	 <p>Site : 03CH11-HY            Condition : AVG_BE_54 3m HORN 9120D-HF VERTICAL            RBW:1000.000KHz VBW:3000.000KHz SWT:Auto            Detector : Peak            Project : 601804</p>



**2.4GHz 2400~2483.5MHz  
WIFI 802.11n HT40 (Harmonic @ 3m)**

WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11n HT40 CH03 2422MHz	
1	Horizontal	Vertical
Peak Avg.	<p>Site : 03CH11-HY Condition : PEAK_74 3m 9170 SHF HORM_150809 HORIZONTAL Detector : Peak Project : 6O1804</p>	<p>Site : 03CH11-HY Condition : PEAK_74 3m 9170 SHF HORM_150809 VERTICAL Detector : Peak Project : 6O1804</p>



Mode	Ch	Freq. (MHz)	Modulation	FCC ID ZNFX240H			FCC ID ZNFX240F		
				Frequency	Level	Limit	Frequency	Level	Limit
				(MHz)	(dBm)	(dBm)	(MHz)	(dBm)	(dBm)
GSM850	CH 128	824.2	GPRS class 8	4120	-54.68	-13	1648	-53.65	-13
GSM1900	CH 512	1850.2	GPRS class 8	3702	-39.45	-13	3702	-41.82	-13
WCDMA Band IV	CH 1513	1752.6	RMC 12.2Kbps	3504	-50.37	-13	7008	-51.66	-13
LTE Band II	CH 18607	1850.7	QPSK / 1.4MHz	3702	-42.24	-13	3702	-27.84	-13
LTE Band IV	CH 20000	1715	QPSK / 10MHz	5130	-40.82	-13	5130	-42.27	-13
LTE Band V	CH 20643	848.3	QPSK / 1.4MHz	2544	-44.96	-13	2544	-44.94	-13
LTE Band VII	CH 20825	2507.5	QPSK / 15MHz	5004	-51.34	-25	5004	-53.34	-25



## GSM850

GSM850 (GPRS class 8)									
Channel	Frequency ( MHz )	ERP ( dBm )	Limit ( dBm )	Over Limit ( dB )	SPA Reading (dBm)	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	1648	-53.65	-13	-40.65	-40.91	-55.41	0.98	4.89	H
	2472	-57.95	-13	-44.95	-51.27	-59.83	1.28	5.32	H
	3296	-55.95	-13	-42.95	-51.1	-59.36	1.54	7.10	H
	1648	-53.83	-13	-40.83	-42.09	-55.59	0.98	4.89	V
	2472	-57.59	-13	-44.59	-51.29	-59.47	1.28	5.32	V
	3296	-55.65	-13	-42.65	-51.05	-59.06	1.54	7.10	V

## GSM1900

GSM1900 (GPRS class 8)									
Channel	Frequency ( MHz )	EIRP ( dBm )	Limit ( dBm )	Over Limit ( dB )	SPA Reading (dBm)	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	3702	-43.45	-13	-30.45	-39.1	-50.02	1.67	8.24	H
	7404	-52.29	-13	-39.29	-56.35	-61.44	2.46	11.61	H
	9252	-50.49	-13	-37.49	-56.87	-60.55	2.54	12.60	H
	3702	-41.82	-13	-28.82	-37.59	-48.39	1.67	8.24	V
	7404	-48.01	-13	-35.01	-52.22	-57.16	2.46	11.61	V
	9252	-49.95	-13	-36.95	-56.68	-60.01	2.54	12.60	V

## WCDMA B4

WCDMA Band IV (RMC 12.2Kbps)									
Channel	Frequency ( MHz )	EIRP ( dBm )	Limit ( dBm )	Over Limit ( dB )	SPA Reading (dBm)	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain (dBi)	Polarization (H/V)
Highest	3504	-65.28	-13	-52.28	-61.17	-71.68	1.61	8.00	H
	5256	-63.72	-13	-50.72	-64.54	-70.94	2.48	9.70	H
	7008	-51.66	-13	-38.66	-55.94	-59.89	2.59	10.82	H
	3504	-65.27	-13	-52.27	-60.97	-71.67	1.61	8.00	V
	5256	-63.70	-13	-50.70	-64.49	-70.92	2.48	9.70	V
	7008	-54.46	-13	-41.46	-58.75	-62.69	2.59	10.82	V



## LTE Band 2

LTE Band 2 / 1.4MHz / QPSK									
Channel	Frequency ( MHz )	EIRP ( dBm )	Limit ( dBm )	Over Limit ( dB )	SPA Reading (dBm)	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	3702	-40.95	-13	-27.95	-36.79	-47.52	1.67	8.24	H
	5550	-59.29	-13	-46.29	-61.98	-66.36	2.65	9.72	H
	7404	-52.97	-13	-39.97	-57.16	-62.12	2.46	11.61	H
	3702	-40.84	-13	-27.84	-36.67	-47.41	1.67	8.24	V
	5550	-52.74	-13	-39.74	-55.4	-59.81	2.65	9.72	V
	7404	-58.29	-13	-45.29	-62.69	-67.44	2.46	11.61	V

## LTE Band 4

LTE Band 4 / 10MHz / QPSK									
Channel	Frequency ( MHz )	EIRP ( dBm )	Limit ( dBm )	Over Limit ( dB )	SPA Reading (dBm)	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	3420	-50.33	-13	-37.33	-46.14	-56.4	1.58	7.65	H
	5130	-45.55	-13	-32.55	-46.13	-52.84	2.41	9.70	H
	6858	-56.25	-13	-43.25	-60.95	-64.24	2.64	10.63	H
	3420	-50.00	-13	-37.00	-45.86	-56.07	1.58	7.65	V
	5130	-42.27	-13	-29.27	-42.69	-49.56	2.41	9.70	V
	6858	-57.05	-13	-44.05	-61.72	-65.04	2.64	10.63	V

## LTE Band 5

LTE Band 5 / 1.4MHz / QPSK									
Channel	Frequency ( MHz )	ERP ( dBm )	Limit ( dBm )	Over Limit ( dB )	SPA Reading (dBm)	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain (dBi)	Polarization (H/V)
Highest	1696	-60.42	-13	-47.42	-48.71	-62.02	1.00	4.75	H
	2544	-59.56	-13	-46.56	-53	-61.54	1.30	5.44	H
	3392	-64.02	-13	-51.02	-59.7	-67.82	1.57	7.52	H
	6784	-58.42	-13	-45.42	-63.25	-64.15	2.66	10.54	H
	1696	-61.11	-13	-48.11	-49.84	-62.71	1.00	4.75	V
	2544	-44.94	-13	-31.94	-38.83	-46.92	1.30	5.44	V
	3392	-64.92	-13	-51.92	-60.63	-68.72	1.57	7.52	V
	6784	-59.12	-13	-46.12	-63.86	-64.85	2.66	10.54	V



## LTE Band 7

LTE Band 7 / 15MHz / QPSK									
Channel	Frequency ( MHz )	EIRP ( dBm )	Limit ( dBm )	Over Limit ( dB )	SPA Reading (dBm)	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	5004	-53.89	-25	-28.89	-53.87	-61.25	2.34	9.70	H
	7500	-59.87	-25	-34.87	-64	-69.24	2.43	11.80	H
	10026	-59.20	-25	-34.20	-67.09	-68.71	2.70	12.21	H
	5004	-53.34	-25	-28.34	-53.13	-60.7	2.34	9.70	V
	7500	-60.31	-25	-35.31	-64.68	-69.68	2.43	11.80	V
	10026	-58.92	-25	-33.92	-66.74	-68.43	2.70	12.21	V

End of this report