TEST REPORT

FCC ID: VWZT800

Applicant：SPECTRA Technologies Holdings Co.Ltd.

Address：Unit 1301-09,19－20, Tower II,Grand Century Place, 193 Prince Edward Road West,Kowloon,Hong Kong

Equipment Under Test(EUT):

Name	: EFTPOS Terminal
Model	: T800
Trademark	: SPECTRA Technologies

In Accordance with:FCC PART 2; FCC PART 22H; FCC PART PART 24E

Report No : STE100311149

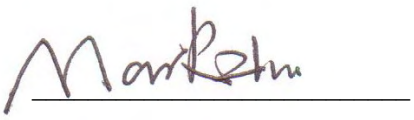
Date of Test : Mar 11---12, 2010

Date of Issue : Mar 15, 2010

Test Result: **PASS**

In the configuration tested, the EUT complied with the standards specified above

Authorized Signature



(Mark Zhu)

General Manager

The manufacture should ensure that all the products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of Shenzhen Certification Technology Service Co., Ltd. Or test done by Shenzhen Certification Technology Service Co., Ltd. Approvals in connection with, distribution or use of the product described in this report must be approved by Shenzhen Certification Technology Service Co., Ltd. Approvals in writing.

Contents

1. General Information

1.1. Description of Device (EUT)

EUT	:	EFTPOS Terminal
Model No.	:	T800
Trademark	:	SPECTRA Technologies
Power supply	:	DC 9V from battery or DC 9V from adapter
Radio Technology	:	GSM/GPRS 850/900/1800/1900
GPRS Multislot Class	:	Class 10
Power class	:	GSM/GPRS 850/900: Class 4 GSM/GPRS 1800/1900: Class 1
Operation frequency	:	824.2MHz—848.8MHz and 1850.2MHz—1909.8MHz
FCC Operation frequency	:	824.2MHz—848.8MHz and 1850.2MHz—1909.8MHz
Modulation	:	GMSK
Antenna Type	:	Integral Patch antenna, Gain:0.22dBi
Applicant	:	SPECTRA Technologies Holdings Co.Ltd.
Address	:	Unit 1301-09,19－20, Tower II,Grand Century Place, 193 Prince Edward Road West,Kowloon,Hong Kong

1.2. Test Lab information

Shenzhen Certification Technology Service Co.,Ltd.
3F, Bldg.27, Area A, Tanglang Industrial Zone, Xili Town, Nanshan District,
Shenzhen 518055, Guangdong, P.R. China
FCC Registered No.:305283

2. Summary of test

2.1. Summary of test result

Description of Test Item	Standard	Results
Conducted Output power	FCC PART 2: 2.1046 FCC PART 22H: 22.913 (a) FCC PART 24E: 24.232 (c)	PASS
Radiated Output power(erp/eirp)	FCC PART 22H:22.913 (a) FCC PART 24E:24.232(c)	PASS
Occupied bandwidth	FCC PART 2: 2.1049 FCC PART 22H: 22.917 (b) FCC PART 24E: 24.238 (b)	PASS
Frequency stability	FCC PART 2: 2.1055 FCC PART 22H: 22.355 FCC PART 24E: 24.235	PASS
Conducted spurious emission (Antenna terminal)	FCC PART 2: 2.1051 FCC PART 22H: 22.917 FCC PART 24E: 24.238	PASS
Radiated spurious emissions	FCC PART 2: 2.1053 FCC PART 22H: 22.917 FCC PART 24E: 24.238	PASS
Block edge compliance	FCC PART 22H: 22.917 (b) FCC PART 24E: 24.238 (b)	PASS
Power Line Conducted Emission Test	FCC Part 15: 15.207 ANSI C63.4: 2003	PASS

2.2. Assistant equipment used for test

N/A

2.3. Test mode

During all testing, EUT is in link mode with base station emulator at maximum power level in each test mode and channel as below:

Mode	Channel	Frequency(MHz)
GSM 850	128	824.2
	190	836.6
	251	848.8
PCS 1900	512	1850.2
	661	1880.0
	810	1909.8

2.4. Test Environment Conditions

Temperature range	21-25℃
Humidity range	40-75%
Pressure range	86-106kPa

2.5. Measurement Uncertainty (95% confidence levels, k=2)

Item	MU	Remark
Uncertainty for Power point Conducted Emissions Test	2.42dB	
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.54dB	Polarize: V
	4.1dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	2.08dB	Polarize: H
	2.56dB	Polarize: V
Uncertainty for radio frequency	1×10-9	
Uncertainty for conducted RF Power	0.65dB	
Uncertainty for temperature	0.2℃	
Uncertainty for humidity	1%	
Uncertainty for DC and low frequency voltages	0.06%	

2.6. Test Equipment

Equipment	Manufacture	Model No.	Serial No.	Last cal.	Cal Interval
3m Semi-Anechoic	ETS-LINDGREN	N/A	SEL0017	16/06/2009	1Year
Spectrum analyzer	Agilent	E4443A	MY46185649	06/06/2009	1Year
Receiver	R&S	ESCI	100492	04/06/2009	1Year
Receiver	R&S	ESCI	101202	07/01/2010	1Year
Bilog Antenna	Sunol	JB3	A121206	04/06/2009	1Year
Horn Antenna	EMCO	3115	640201028-06	04/06/2009	1Year
Power Meter	Anritsu	ML2487A	6K00001491	02/23/2009	1Year
ETS Horn Antenna	ETS	3160	SEL0076	12/08/2009	1Year
Active Loop Antenna	Beijing Daze	ZN30900A	SEL0097	15/06/2009	1Year
Cable	Resenberger	N/A	No.1	04/06/2009	1Year
Cable	SCHWARZBECK	N/A	No.2	04/06/2009	1Year
Cable	SCHWARZBECK	N/A	No.3	04/06/2009	1Year
Pre-amplifier	R&S	AFS42-00101800-25-S-42	SEL0081	18/06/2009	1Year
Pre-amplifier	R&S	AFS33-18002650-30-8P-44	SEL0080	18/06/2009	1Year
Base station	Agilent	E5515C	GB44300243	May.08, 09	1 Year
Temperature controller	Terchy	MHQ	120	May.08, 09	1Year
Power divider	Anritsu	K240C	020346	May.08, 09	1 Year
Signal Generator	HP	83732B	VS3449051	May.08, 09	1 Year
Attenuator	Agilent	8491B	MY39262165	May.08, 09	1 Year
GPS Signal	Welnavigate	GS50	6423517	N/A	N/A

3. Conducted Output power

3.1. Block Diagram of Test Setup

3.2. Limit

Cellular Telephone 850MHz	PCS 1900MHz
38.5dBm(ERP)	33dBm(EIRP)

3.3. Test Procedure

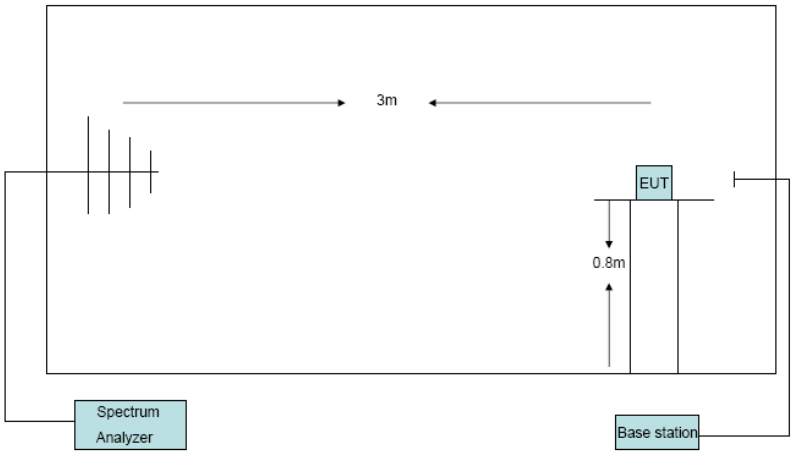
(1) The EUT's RF output port was connected to base station.
(2) Set EUT at maximum power level through base station by power level command
(3) Measure the maximum output power of EUT at each frequency band and mode by base station.

3.4. Test Result

EUT: EFTPOS Terminal M/N:T800 Power: DC 9V from adapter						
Ambient Temperature:24℃		Relative Humidity: 62%				
Test date: 2010-03-11		Test site: RF site Tested by: TaTa_Chen				
Conclusion:PASS						
Mode	Channel	PK Output Power(dBm)	ERP (dBm)	EIRP (dBm)	Limit	
					ERP(dBm)	EIRP(dBm)
GSM 850	128	31.33	29.4	/	38.5	/
	190	31.45	29.52	/	38.5	/
	251	31.57	29.64	/	38.5	/
PCS 1900	512	29.23	/	29.45	/	33
	661	29.12	/	29.34	/	33
	810	29.20	/	29.42	/	33
Note: EIRP=Pk output power +Antenna Gain(0.22dBi); ERP=PK output power + Antenna Gain(0.22dBi) -2.15						

4. Radiated Output power

4.1. Block Diagram of Test Setup



4.2. Limit

Cellular Telephone 850MHz	PCS 1900MHz
38.5dBm(ERP)	33dBm(EIRP)

4.3. Test Procedure

1. The EUT was placed on an non-conductive rotating platform with 0.8 meter height in an anechoic chamber. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and a spectrum analyzer with RBW= 3MHz,VBW= 3MHz and peak detector settings.
2. During the measurement, the EUT was enforced in maximum power and linked with a base station. The highest emission was recorded from analyzer power level (LVL) from the 360 degrees rotation of the turntable and the test antenna raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations.
3. Effective Isotropic Radiated Power (EIRP) was measured by substitution method according to TIA/EIA-603-C. The EUT was replaced by dipole antenna (for frequency lelow 1GHz) or Horn antenna(for frequecny above 1GHz) at same location with same polarize of reveiver antenna and then a known power of each measure frequency from S.G. was applied into the dipole antenna or Horn antenna through a Tx cable, and then recorded the maximum Analyzer reading through raised and lowered the test antenna. The correction factor (in dB) = S.G. - Tx Cable loss + Substitution antenna gain –Substitution antenna Loss(only for Dipole antenna) - Analyzer reading. Then the EUT's

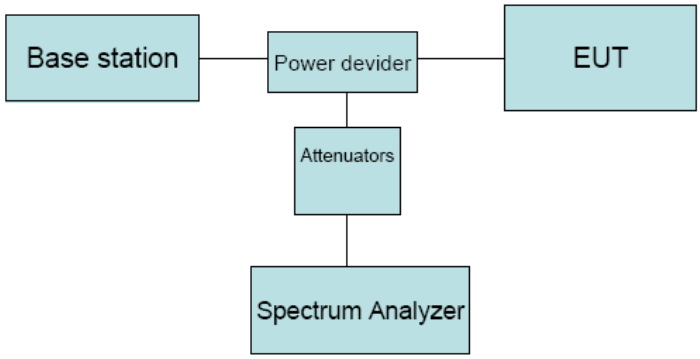
EIRP was calculated with the correction factor, EIRP= LVL + Correction factor and ERP = EIRP – 2.15

4.4. Test Result

EUT: EFTPOS Terminal M/N:T800					
Power:DC 9V from adapter					
Ambient Temperature:23℃			Relative Humidity: 60%		
Test date: 2010-03-11			Test site: RF site	Tested by: TaTa_Chen	
Conclusion: PASS					
Mode	Channel	LVL (dBm)	Correction factor(dB)	ERP (dBm)	EIRP (dBm)
GSM 850	128	1.21	30.42	29.48	/
	190	1.21	30.21	29.27	/
	251	1.89	30.05	29.79	/
PCS 1900	512	-20.34	46.80	/	26.46
	661	-20.45	46.45	/	26.00
	810	-20.68	46.58	/	25.90
ERP=LVL+Correction factor -2.15 EIRP=LVL+Correction factor					

5. Occupied Bandwidth

5.1. B lock Diagram of Test Setup



5.2. Limit

N/A

5.3. Test Procedure

1. The EUT' RF output port was connected to Spectrum Analyzer and Base Station via power divider.

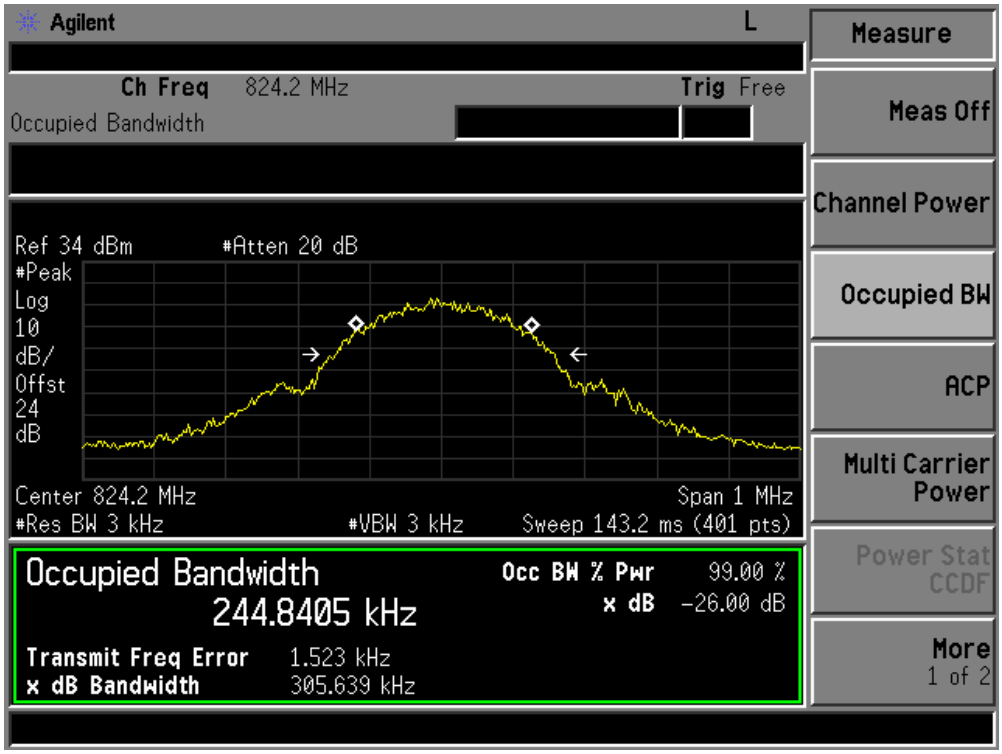
2. Spectrum analyzer's occupied bandwidth measure function was used to measure 99% bandwidth and -26dBc bandwidth

5.4. Test Result

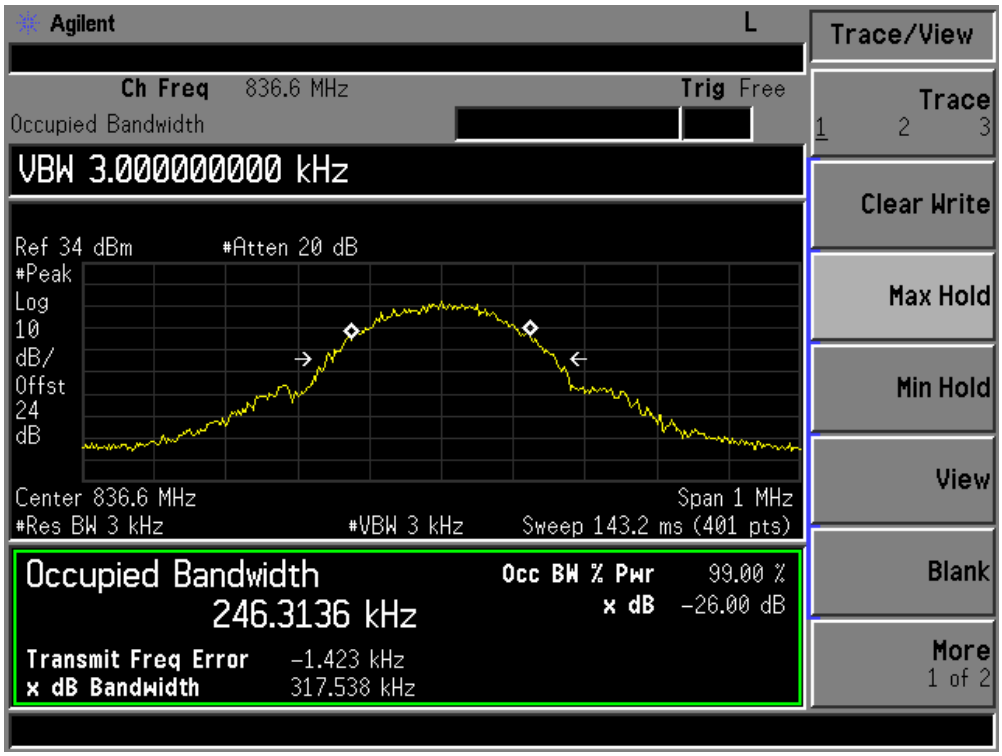
EUT: EFTPOS Terminal M/N:T800			
Power:DC 9V from adapter			
Ambient Temperature:23℃		Relative Humidity: 60%	
Test date: 2010-03-11		Test site: RF site	Tested by: TaTa_Chen
Mode	Channel	99% bandwidth (KHz)	-26dBc bandwidth (KHz)
GSM 850	128	244.84	305.639
	190	246.31	317.54
	251	245.03	311.36
PCS 1900	512	246.65	309.01
	661	246.00	315.44
	810	247.68	311.02

5.5. Orginal test data

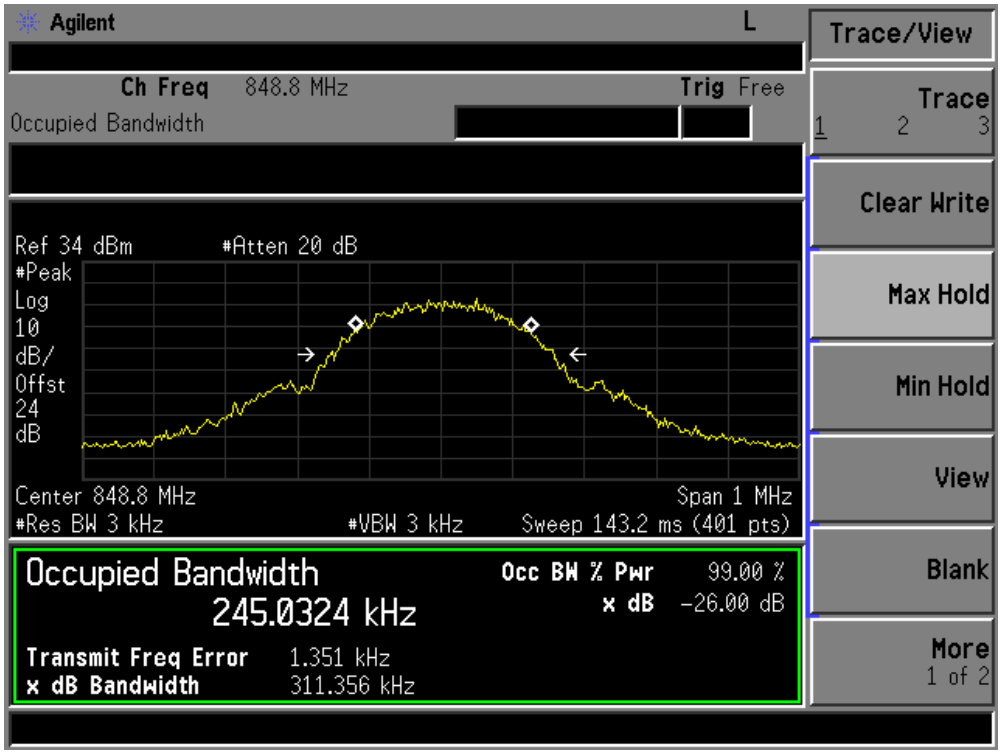
GSM 850 CH128



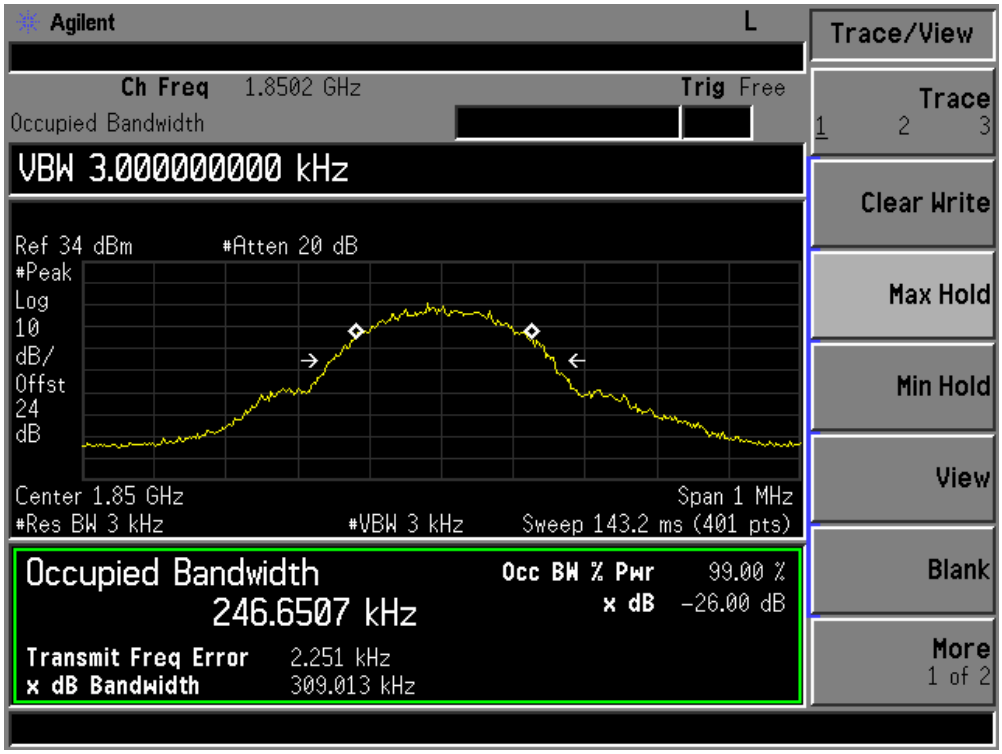
GSM 850 CH190



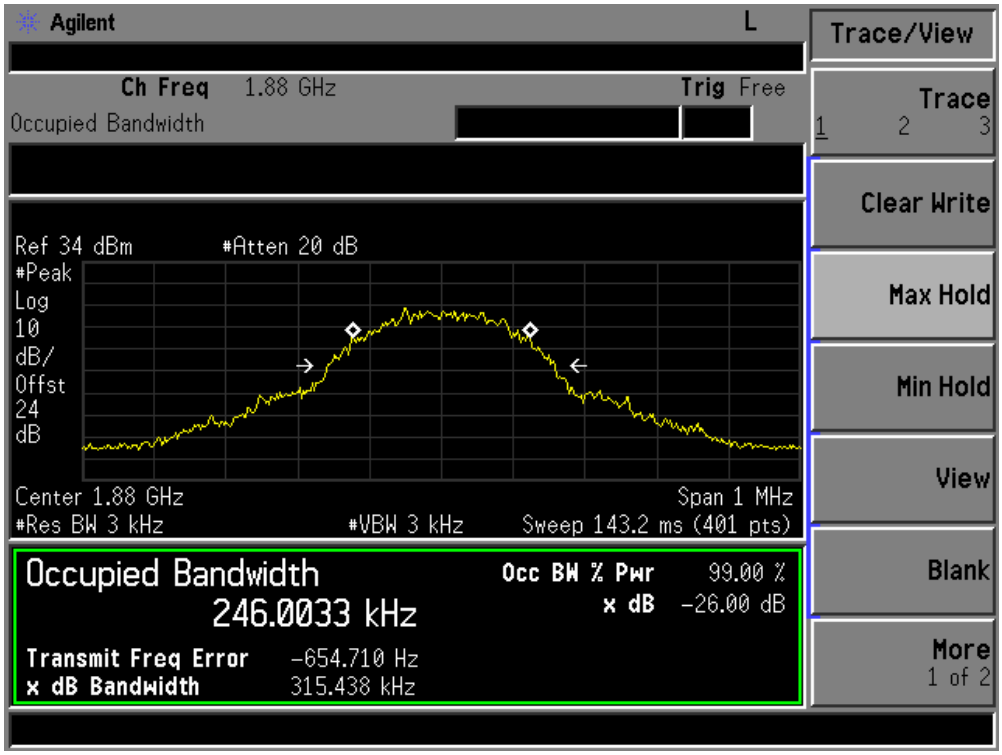
GSM 850 CH251



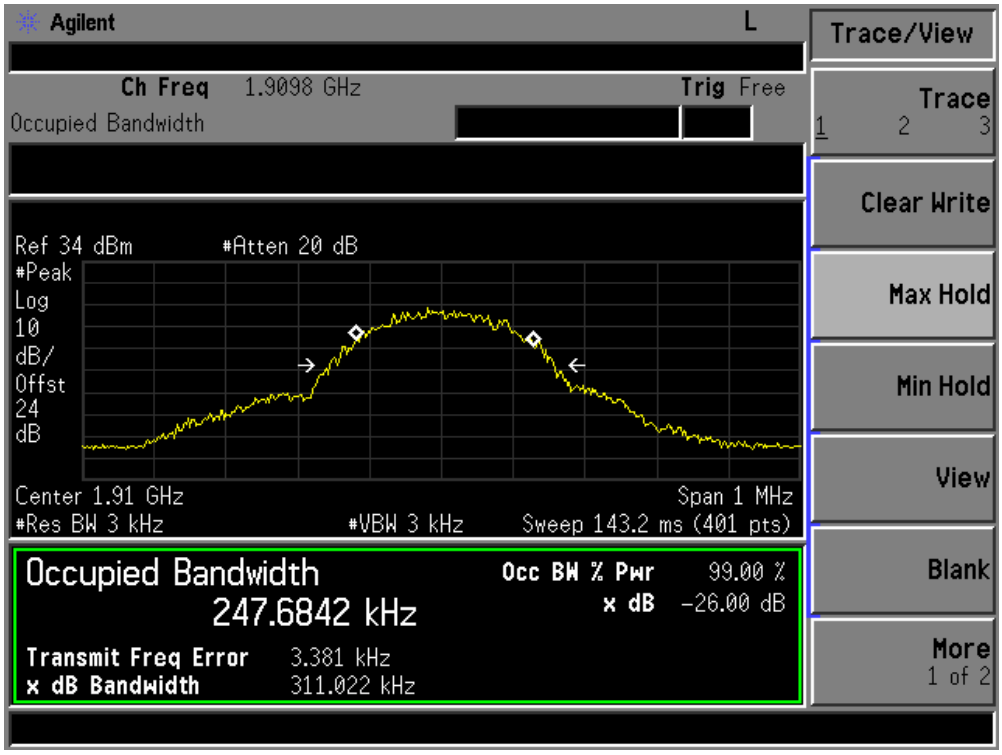
PCS 1900 CH512



PCS 1900 CH661

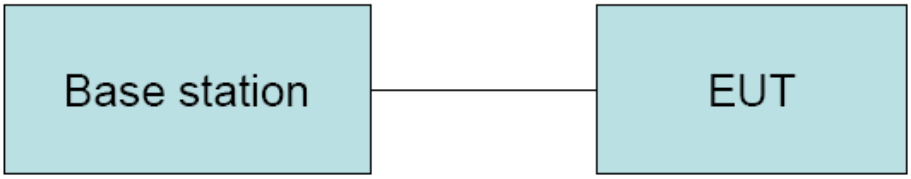


PCS 1900 CH810



6. Frequency stability

6.1. Block Diagram of Test Setup



6.2. Limit

Cellular Telephone 850MHz	PCS 1900MHz
± 2.5 ppm	Must stay within the authorized frequency block

6.3. Test Procedure

Test Procedures for Temperature Variation:

1. The EUT was set up in the thermal chamber and connected with the base station.
2. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized for three hours. Power was applied and the maximum change in frequency was recorded within one minute.
3. With power OFF, the temperature was raised in 10°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.
4. If the EUT can not be turned on at -30°C, the testing lowest temperature will be raised in 10°C step until the EUT can be turned on.

Test Procedures for Voltage Variation

1. The EUT was placed in a temperature chamber at 25±5° C and connected with the base station.
2. The power supply voltage to the EUT was varied from 9V to 7V(Note)
3. The variation in frequency was measured for the worst case.

Note: When power below 7V, device will stop work

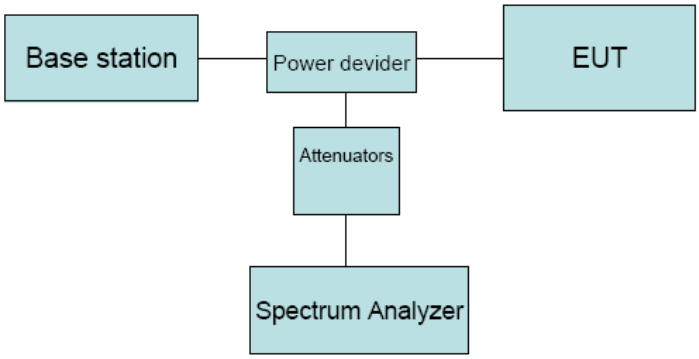
6.4. Test Result

EUT: EFTPOS Terminal M/N:T800			
Ambient Temperature:23℃		Relative Humidity: 60%	
Test date: 2010-03-11		Test site: RF site	Tested by: TaTa_Chen
Conclusion:PASS			
Mode	Voltage (V)	Frequency error (Hz)	Frequency error (ppm)
GSM 850 CH 190	9V	-43	-0.051
	8.5V	-34	-0.041
	8V	43	0.051
	7.5V	-43	-0.051
	7V	35	0.041
PCS 1900 CH661	9V	32	0.017
	8.5V	31	0.016
	8V	-35	-0.018
	7.5V	-31	-0.016
	7V	41	0.021

Mode	Temperature (℃)	Frequency error (Hz)	frequency error (ppm)
GSM 850 CH190	-30	34	0.018
	-20	31	0.016
	-10	-22	-0.011
	0	34	0.018
	10	-31	-0.016
	20	-43	-0.022
	30	25	0.013
	40	-22	-0.011
	50	25	0.013
PCS 1900 CH661	-30	-21	-0.011
	-20	-32	-0.017
	-10	33	0.017
	0	-35	-0.018
	10	-31	-0.016
	20	31	0.016
	30	-36	-0.019
	40	-46	-0.024
	50	54	0.028

7. Conducted spurious emissions

7.1. Block Diagram of Test Setup



7.2. Limit

The mean power of emissions must be attenuated below the mean power of the unmodulated carrier (P) on any frequency outside the frequency band by at least (43 + 10 log P) dB, in this case, -13dBm.

7.3. Test Procedure

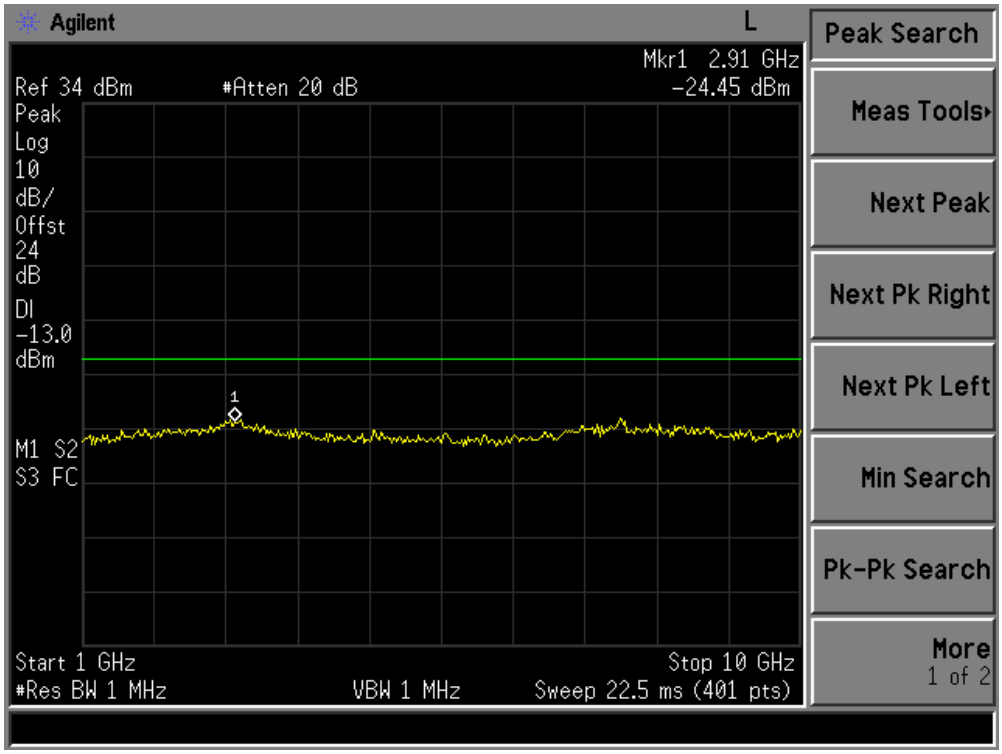
1. The EUT was connected to spectrum analyzer and base station via power divider.

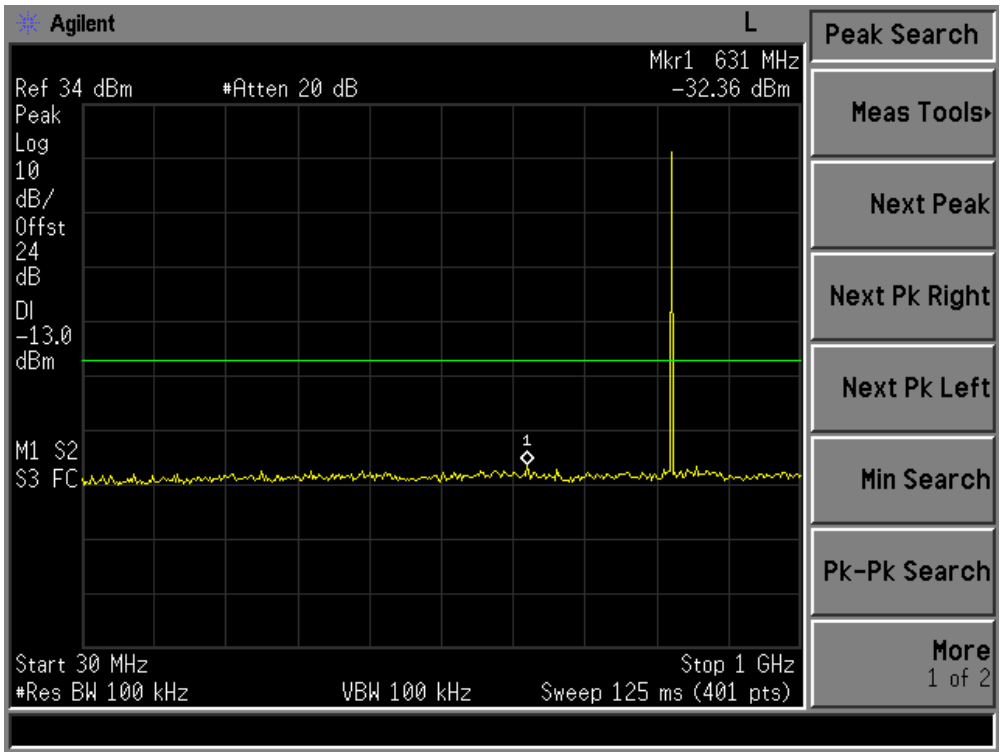
2. The low,middle and high channels of each band and mode's spurious emissions for 30MHz to 10th Harmonic were measured by Spectrum analyzer.

7.4. Test Result

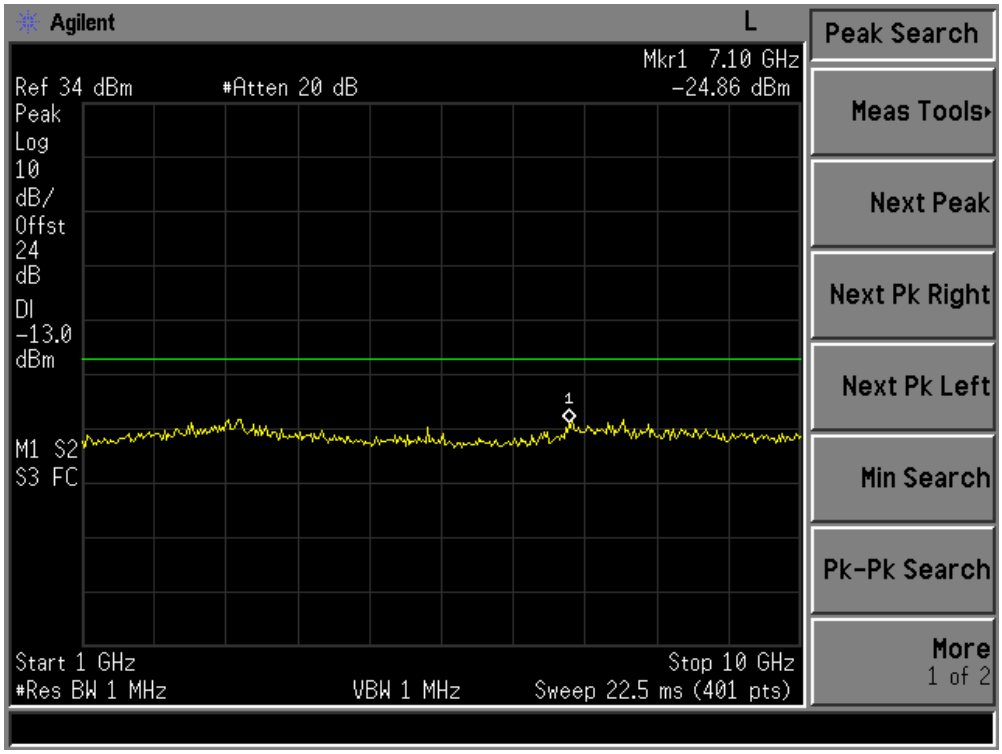
PASS

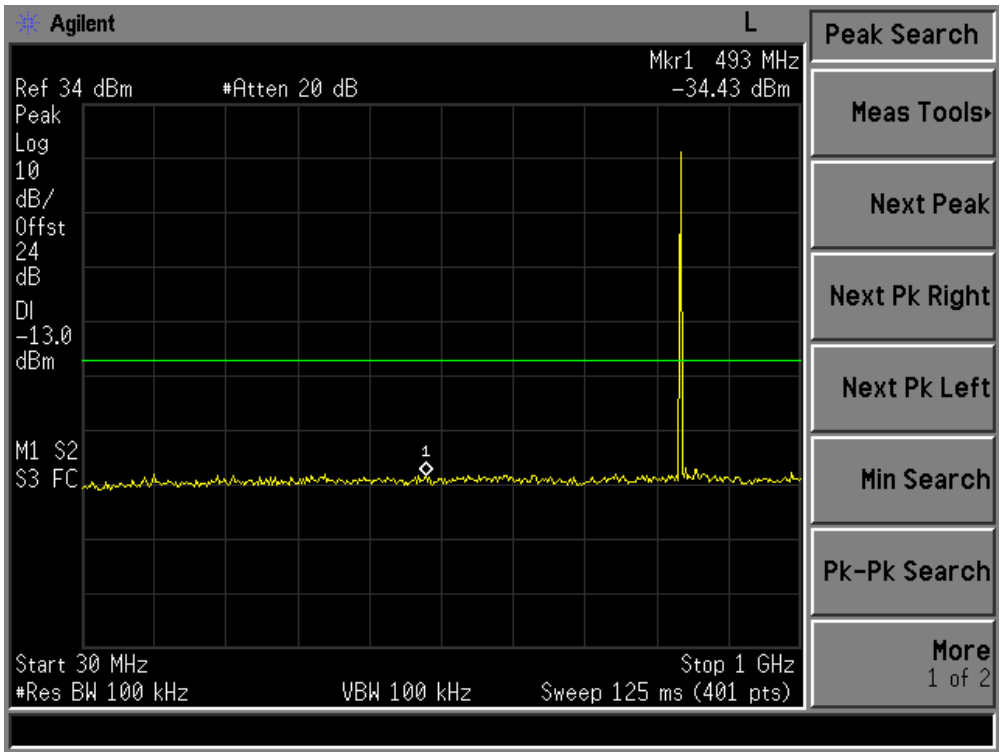
Test Mode: GSM 850 CH 128



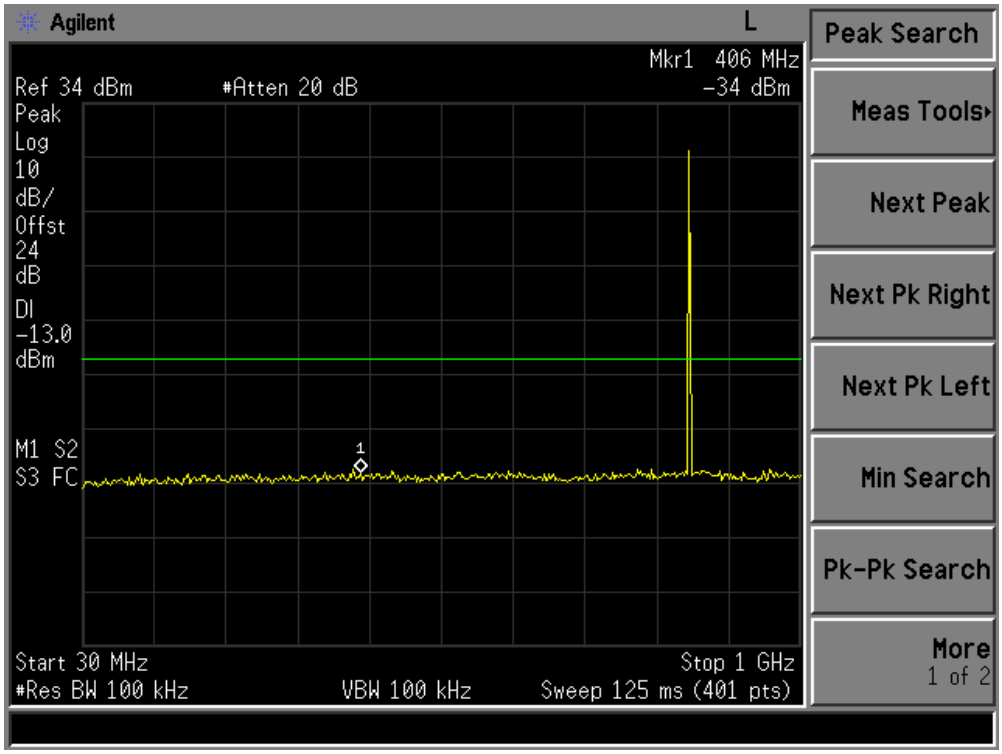


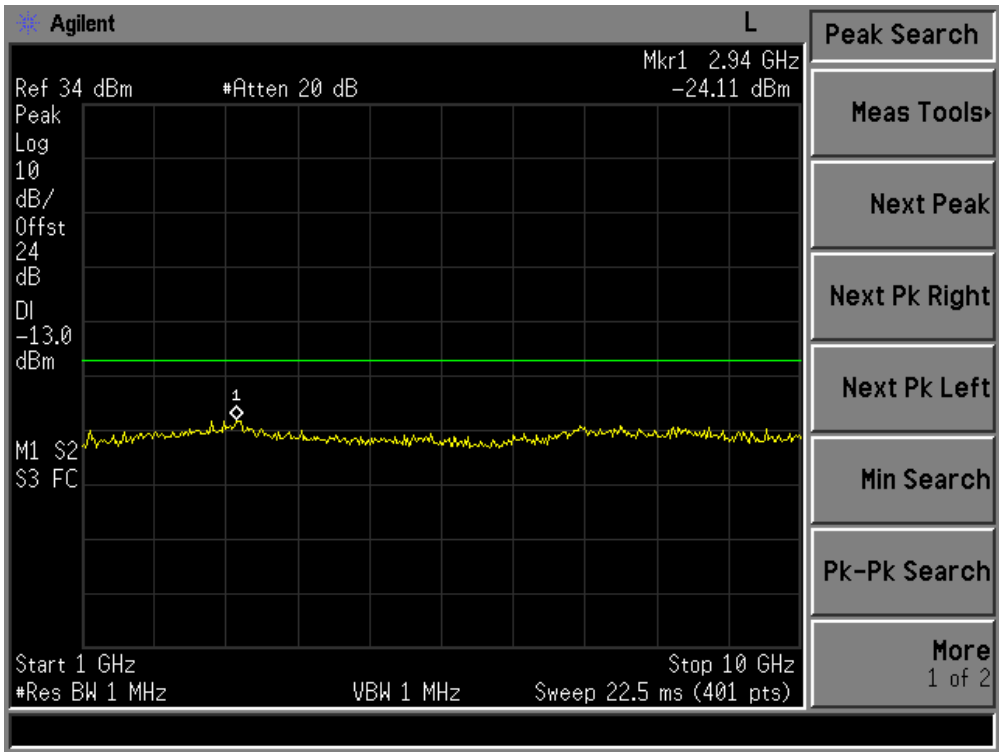
Test Mode: GSM 850 CH 190



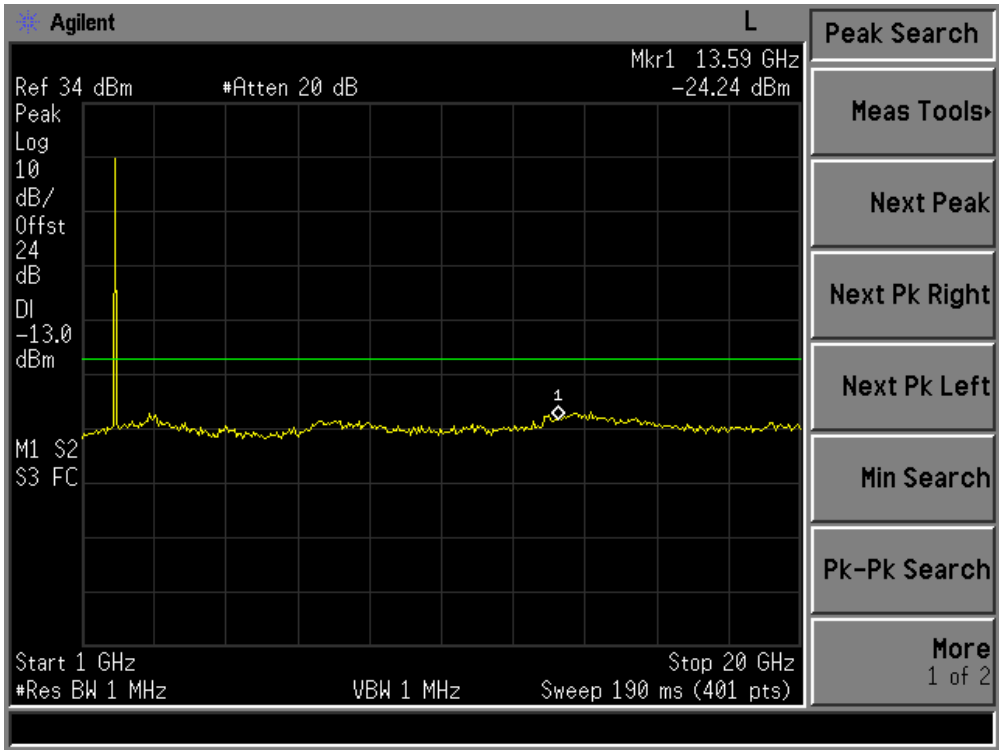


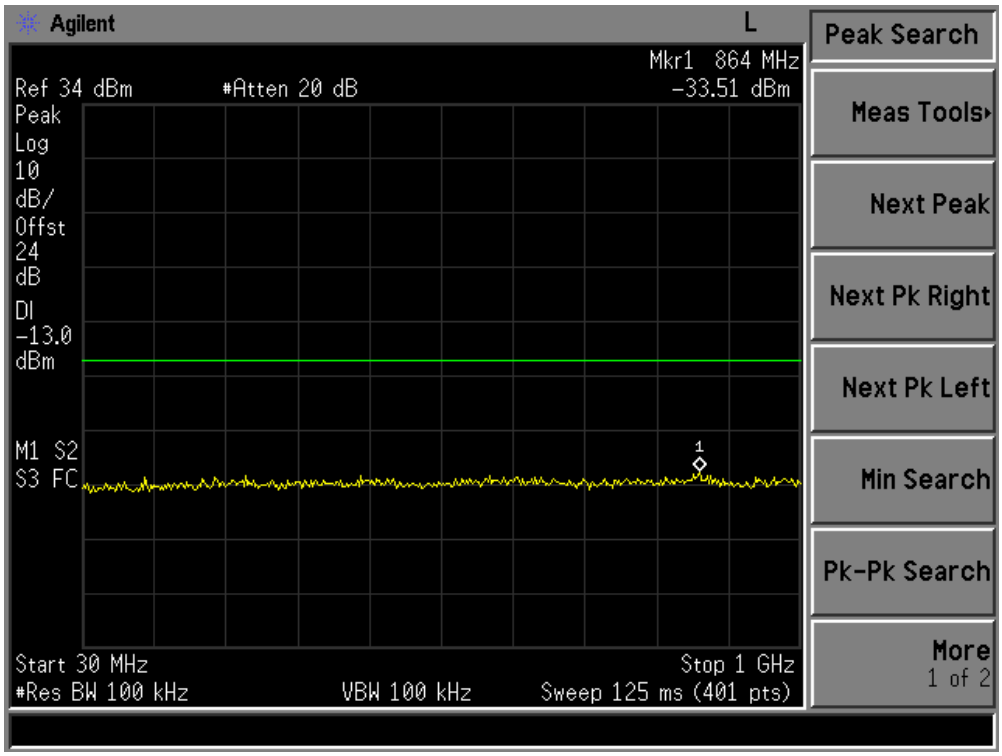
Test Mode: GSM 850 CH 251



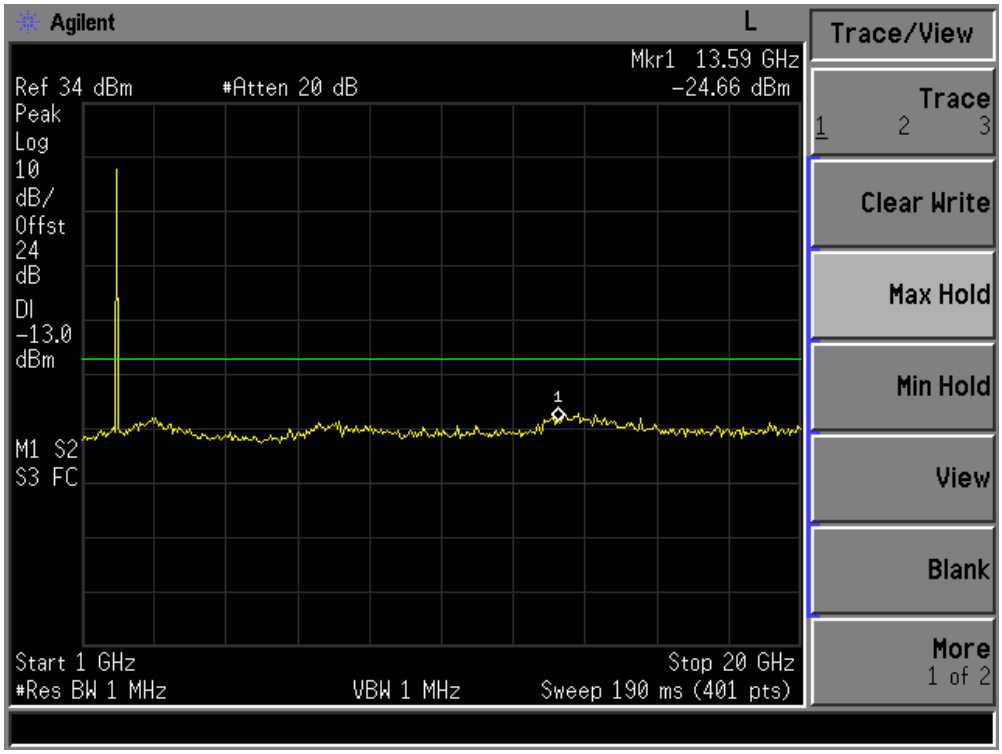


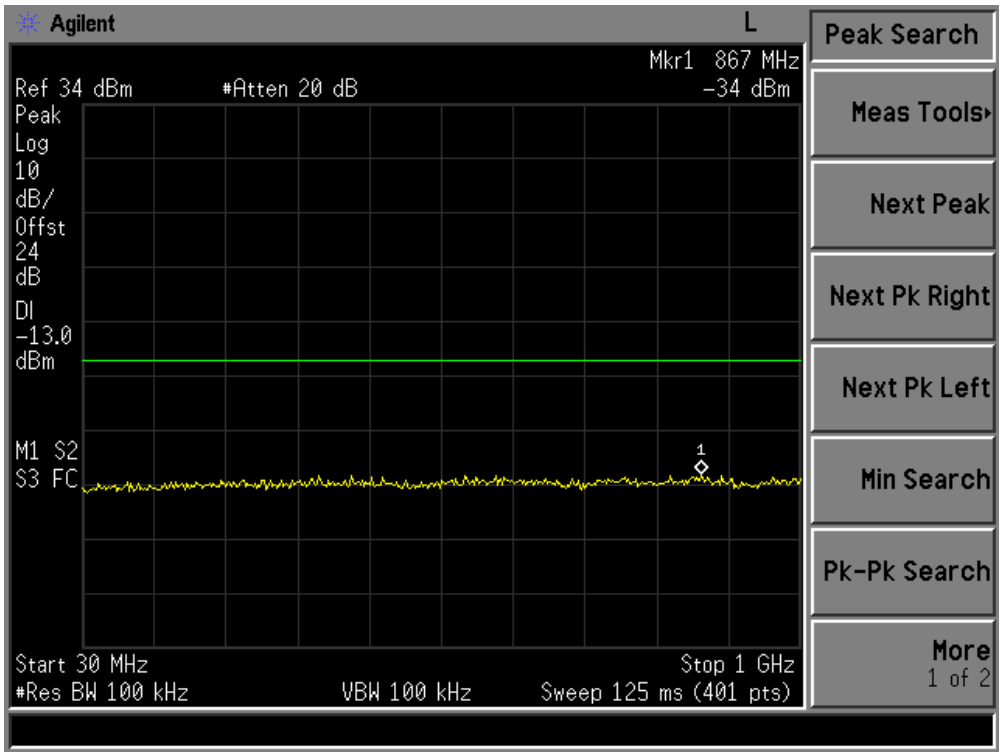
Test Mode: GSM 1900 CH 512



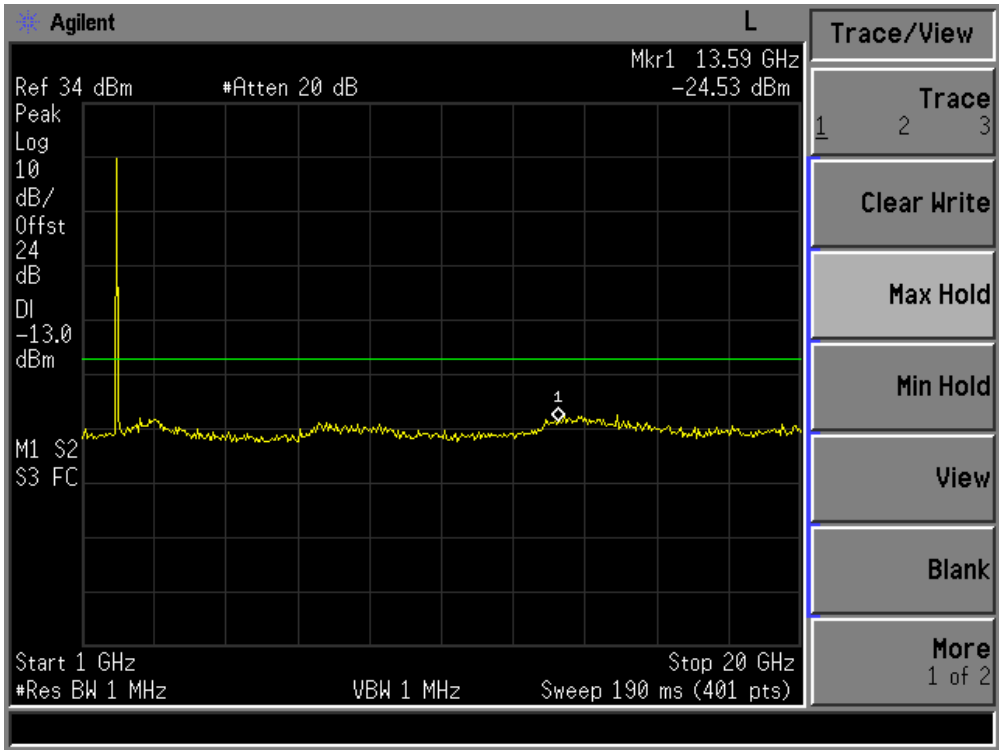


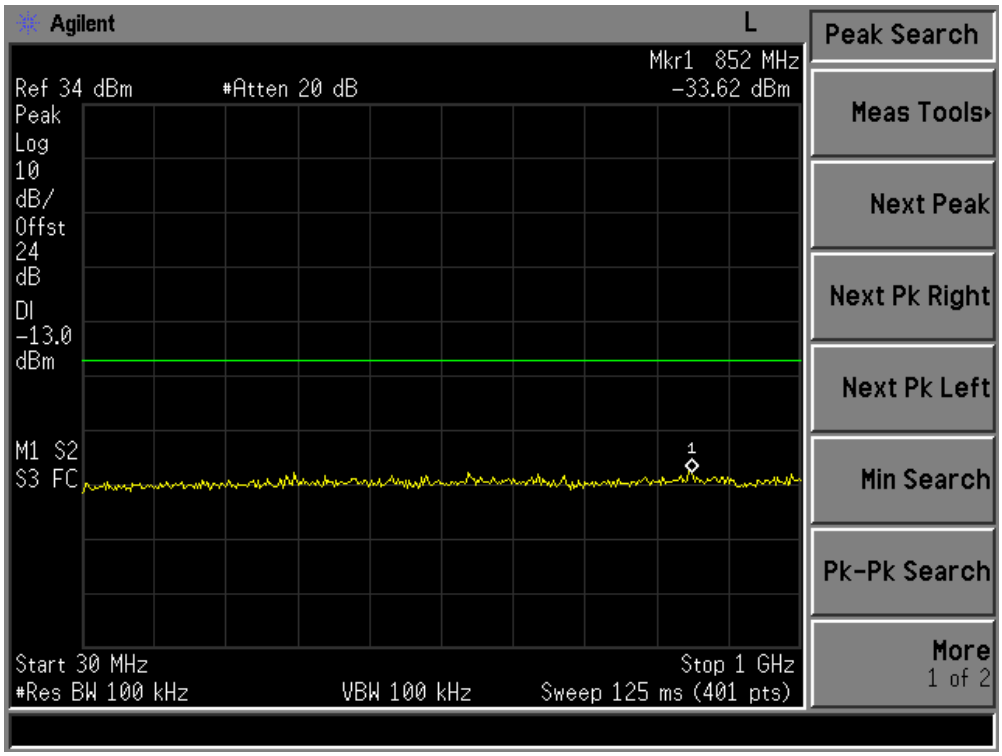
Test Mode: GSM 1900 CH 661





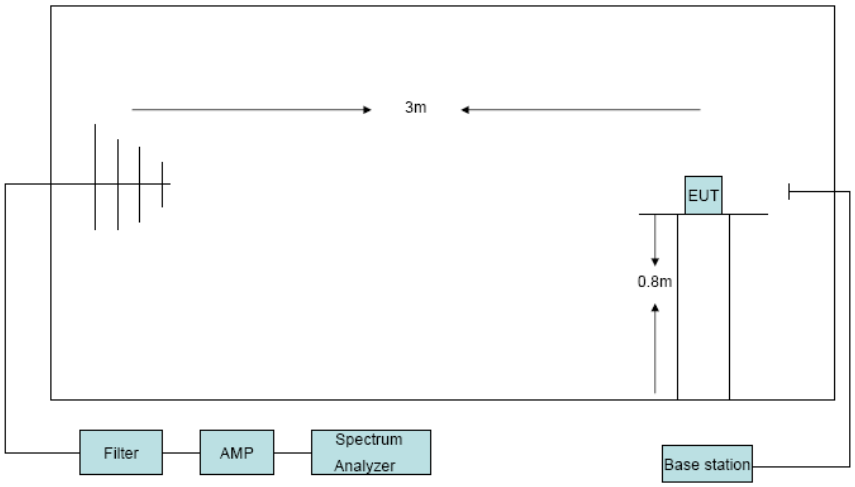
Test Mode: GSM 1900 CH 810





8. Radiated Spurious emissions

8.1. Block Diagram of Test Setup



8.2. Limit

The mean power of emissions must be attenuated below the mean power of the unmodulated carrier (P) on any frequency outside the frequency band by at least (43 + 10 log P) dB, in this case, -13dBm.

8.3. Test Procedure

1. The EUT was placed on an non-conductive rotating platform with 0.8 meter height in an anechoic chamber. The radiated spurious emissions from 30MHz to 10^{th} harmonious of fundamental frequency were measured at 3m with a test antenna and a spectrum analyzer with RBW= 1MHz,VBW= 1MHz ,peak detector settings.
2. During the measurement, the EUT was enforced in maximum power and linked with a base station.All the spurious emissions(record as LVL) at 3m were measured by rotation of the turntable and the test antenna raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations.
3. Final spurious emissions levels were measured by substitution method according to TIA/EIA-603-C. The EUT was replaced by dipole antenna (for frequency lelow 1GHz) or Horn antenna(for frequecny above 1GHz) at same location with same polarize of reveiver antenna and then a known power of each measure frequency from S.G. was applied into the dipole antenna or Horn antenna through a Tx cable, and then recorded the maximum Analyzer reading through raised and lowered the test antenna. The correction factor (in dB) = S.G. - Tx Cable loss + Substitution antenna gain –Substitution antenna Loss(only for Dipole antenna) - Analyzer reading. Then final

spurious emissions were calculated with the correction factor, EIRP= LVL + Correction factor and ERP = EIRP – 2.15

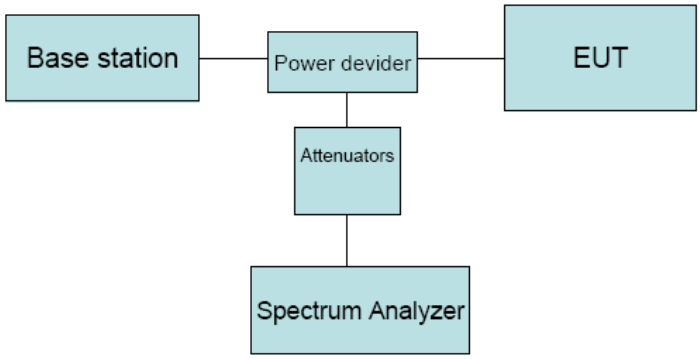
8.4. Test Result

EUT:EFTPOS Terminal M/N:T800						
Power:DC 9V from adapter						
Test Date: 2010-03-11		Test site: RF Chamber		Tested by: TaTa_Chen		
Ambient Temperature: 24℃		Relative Humidity: 60%				
Conclusion:PASS						
Test result						
Test Mode：GSM 850 CH128						
Frequency (MHz)	Antenna polarization	LVL (dBm)	Correction factor(dB)	Result (ERP)(dBm)	Limit (dBm)	Margin (dB)
1648.4	H	-55.34	11.5	-45.99	-13	32.99
1648.4	V	-54.23	10.56	-45.82	-13	32.82
Test Mode： GSM 850 CH190						
1673.2	H	-56.34	10.94	-47.55	-13	34.55
2509.8	H	/	/	/	-13	/
1673.2	V	-58.43	10.9	-49.68	-13	36.68
2509.8	V	/	/	/	-13	/
Test mode: GSM 850 CH251						
1697.6	H	-63.11	11.67	-53.59	-13	40.59
2546.4	H	/	/	/	-13	/
1697.6	V	-55.34	11.13	-46.36	-13	33.36
2546.4	V	/	/	/	-13	/

Test Mode：GSM 1900 CH512						
Frequency (MHz)	Antenna polarization	LVL (dBm)	Correction factor(dB)	Result (EIRP)(dBm)	Limit (dBm)	Margin (dB)
3700.4	H	-56.34	8.57	-47.77	-13	34.77
5550.6	H	/	/	/	-13	/
3700.4	V	-56.43	8.37	-48.06	-13	35.06
5550.6	V	/	/	/	-13	/
Test Mode： GSM 1900 CH661						
3760	H	-57.38	8.75	-48.63	-13	35.63
5640	H	/	/	/	-13	/
3760	V	-58.32	8.55	-49.77	-13	36.77
5640	V	/	/	/	-13	/
Test mode: GSM 1900 CH810						
3819.6	H	-59.21	8.94	-50.27	-13	37.27
5729.4	H	/	/	/	-13	/
3819.6	V	-57.38	8.72	-48.66	-13	35.66
5729.4	V	/	/	/	-13	/
Note: All the other emissions not recorded were too low to read, and deemed to comply with limit.						

9. Block Edge Compliance

9.1. Block Diagram of Test Setup



9.2. Limit

The mean power of emissions must be attenuated below the mean power of the unmodulated carrier (P) on any frequency outside the frequency band by at least (43 + 10 log P) dB, in this case, -13dBm.

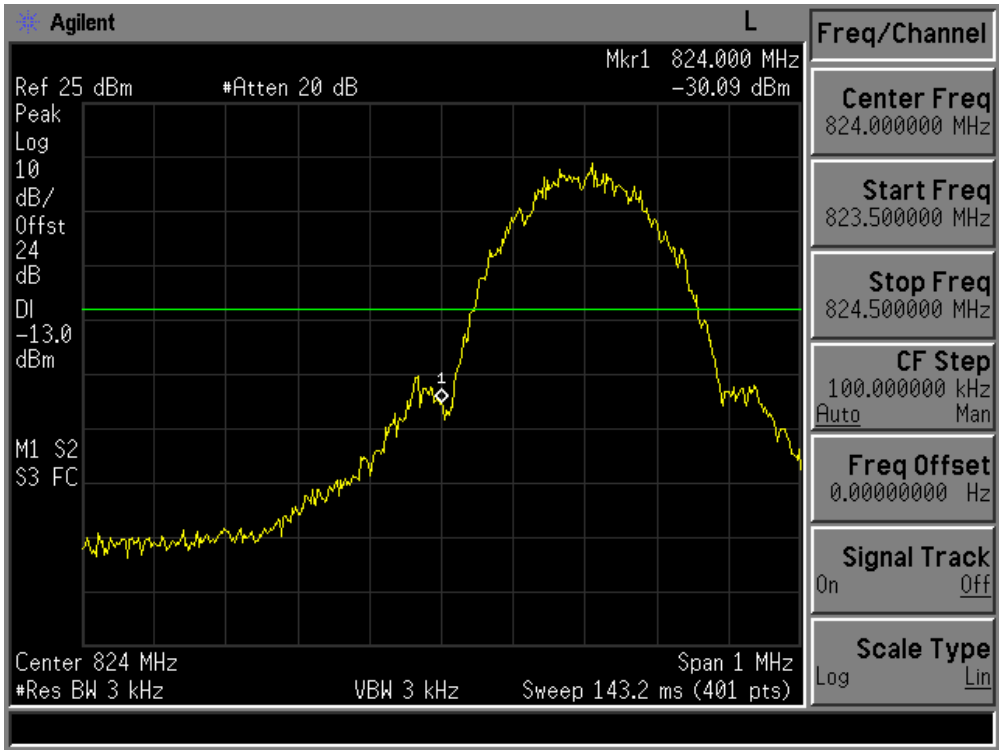
9.3. Test Procedure

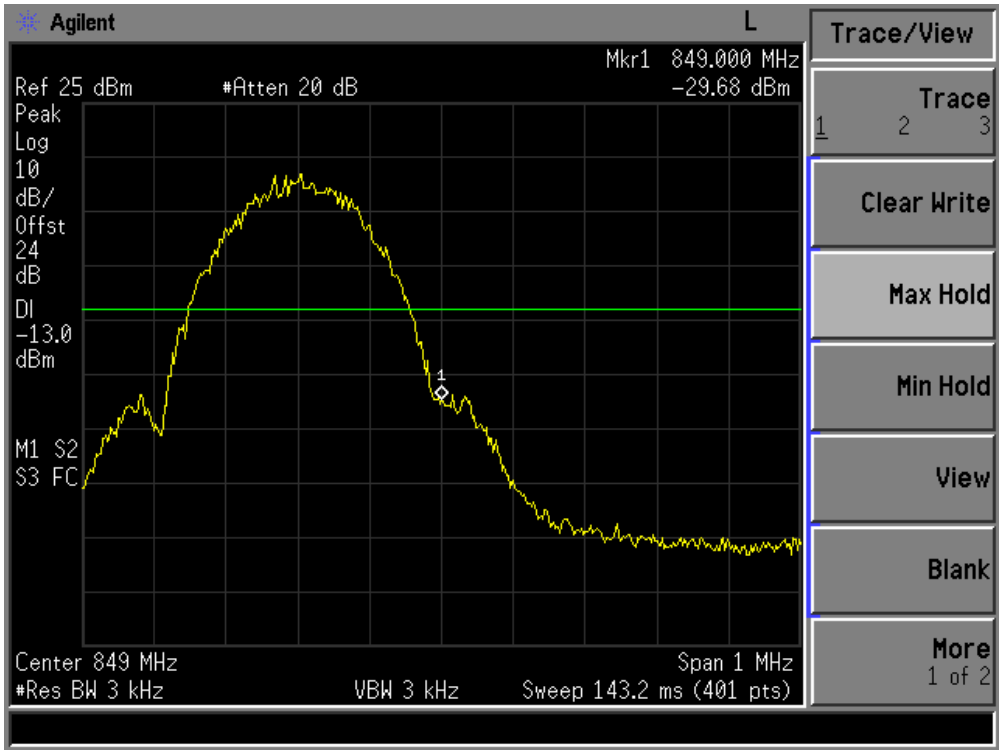
1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The band edges of low and high channels for the highest RF powers were measured.

9.4. Test Result

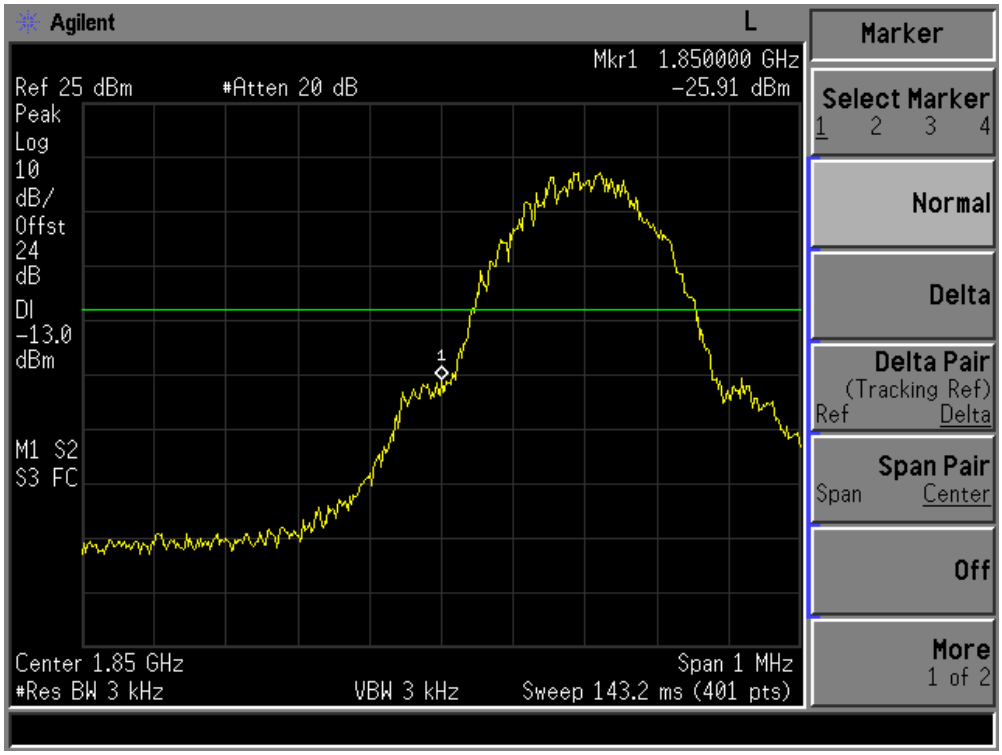
PASS

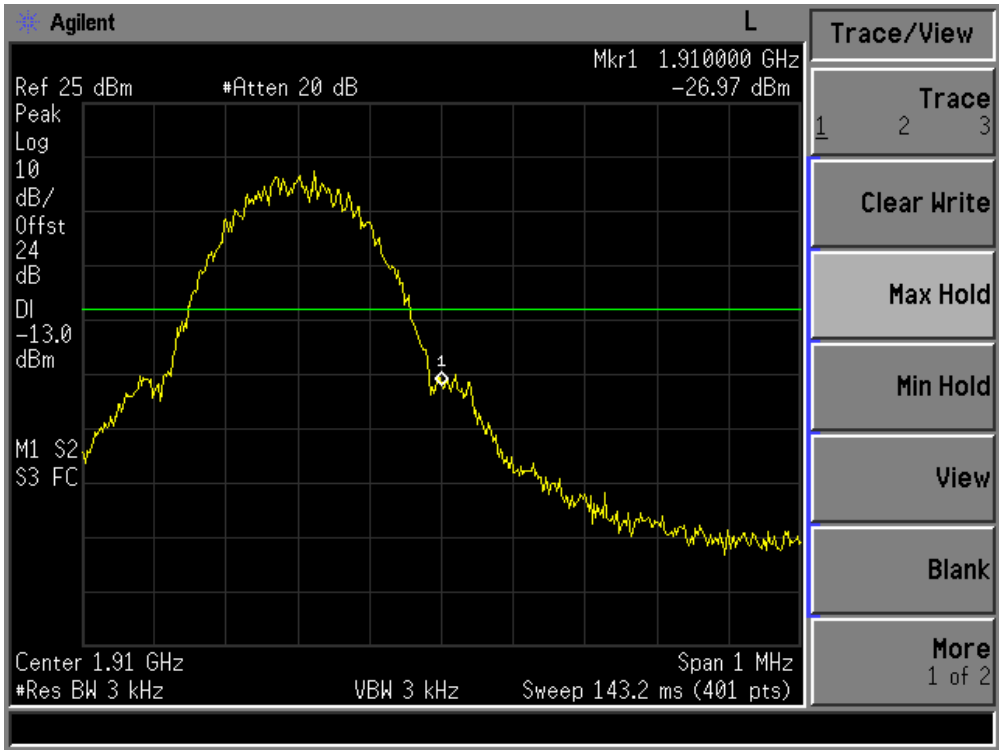
Test Mode: GSM 850





Test Mode: GSM 1900





10. Power line conducted emissions

10.1. Limit

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μV)	Average Level dB(μV)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Notes: 1. * Decreasing linearly with logarithm of frequency.

2. The lower limit shall apply at the transition frequencies.

10.2. Test Procedure

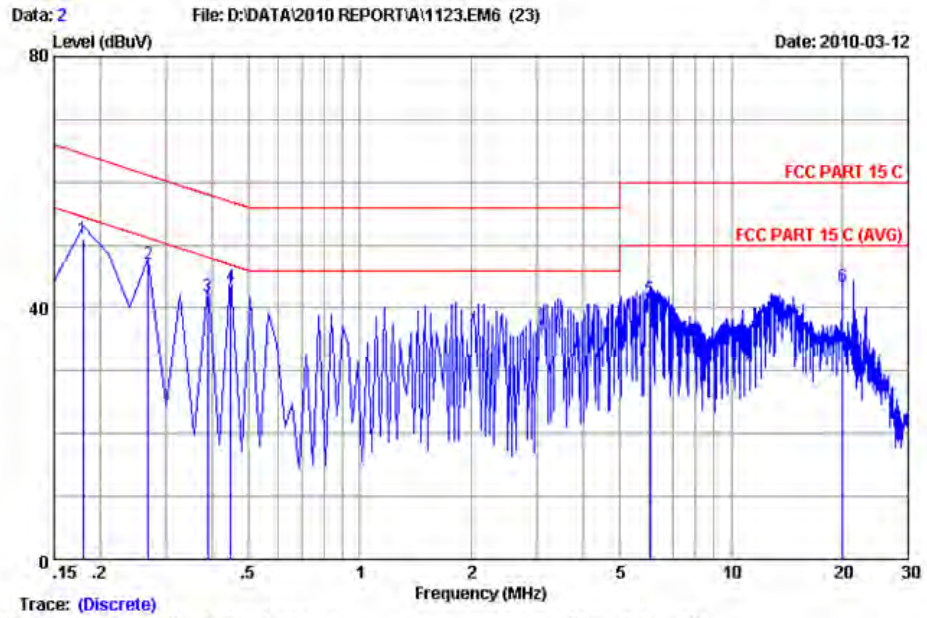
The EUT was placed on a non-metallic table, 80cm above the ground plane. The EUT was powered from adapter which connected to the power mains through a line impedance stabilization network (L.I.S.N. 1#).In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.4: 2003 on Conducted Emission Test.

The bandwidth of test receiver (R & S ESHS10) is set at 10kHz.

The frequency range from 150kHz to 30MHz is checked.

10.3.Test Result

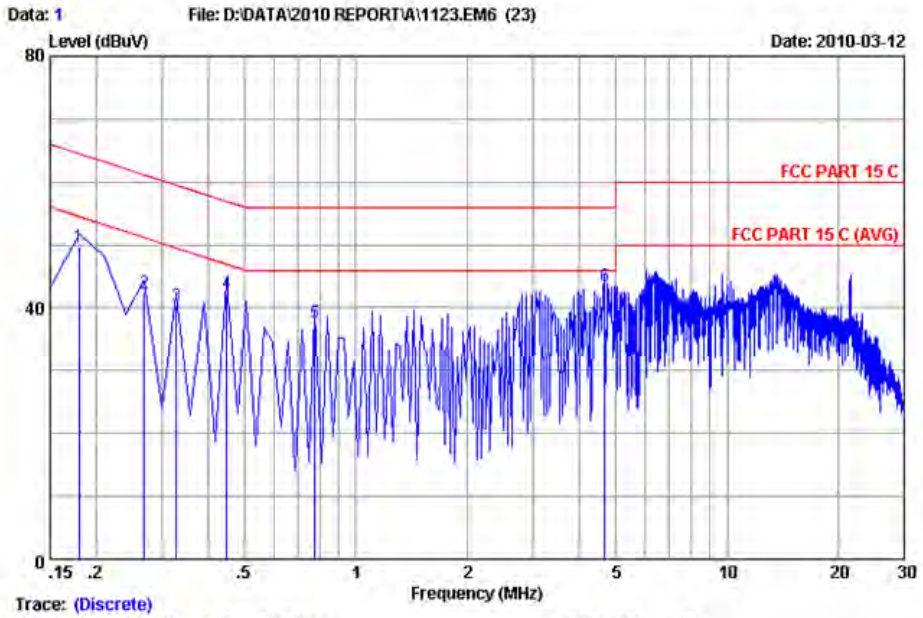
PASS



Site no : No.1 Conduction Data no : 2
Dis./Ant. : ** 2009 KNW407 VB NEUTRAL
Limit : FCC PART 15 C
Env./Ins. : Temp:23'C Humi:54% Engineer : TaTa_Chen
EUT : EFTPOS Terminal M/N:T800
Power Rating : DC 9V from Adapter Input AC 120V/60Hz
Test Mode : Tx Mode

No	Freq (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.17985	0.45	9.88	40.61	50.94	64.49	13.55	QP
2	0.26940	0.42	9.88	36.63	46.93	61.14	14.21	QP
3	0.38880	0.36	9.89	31.58	41.83	58.09	16.26	QP
4	0.44850	0.35	9.89	33.21	43.45	56.90	13.45	QP
5	6.060	0.39	9.92	31.06	41.37	60.00	18.63	QP
6	20.000	0.57	10.01	32.91	43.49	60.00	16.51	QP

Remarks: 1.Emission Level=LISN Factor+Cable Loss+Reading.
2.If the average limit is met when useing a quasi-peak detector.
the EUT shall be deemed to meet both limits and measurement
with average detector is unnecessary.



Trace: (Discrete)

Site no :No.1 Conduction Data no :1
Dis./Ant. :** 2009 KNW407 VA LINE
Limit :FCC PART 15 C
Env./Ins. :Temp:23'C Humi:54% Engineer :TaTa_Chen
EUT :EFTPOS Terminal M/N:T800
Power Rating :DC 9V from Adapter Input AC 120V/60Hz
Test Mode :Tx Mode

No	Freq (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.17985	0.43	9.88	39.35	49.66	64.49	14.83	QP
2	0.26940	0.40	9.88	32.06	42.34	61.14	18.80	QP
3	0.32910	0.37	9.89	30.06	40.32	59.47	19.15	QP
4	0.44850	0.34	9.89	32.18	42.41	56.90	14.49	QP
5	0.77685	0.35	9.89	27.47	37.71	56.00	18.29	QP
6	4.687	0.39	9.91	33.08	43.38	56.00	12.62	QP

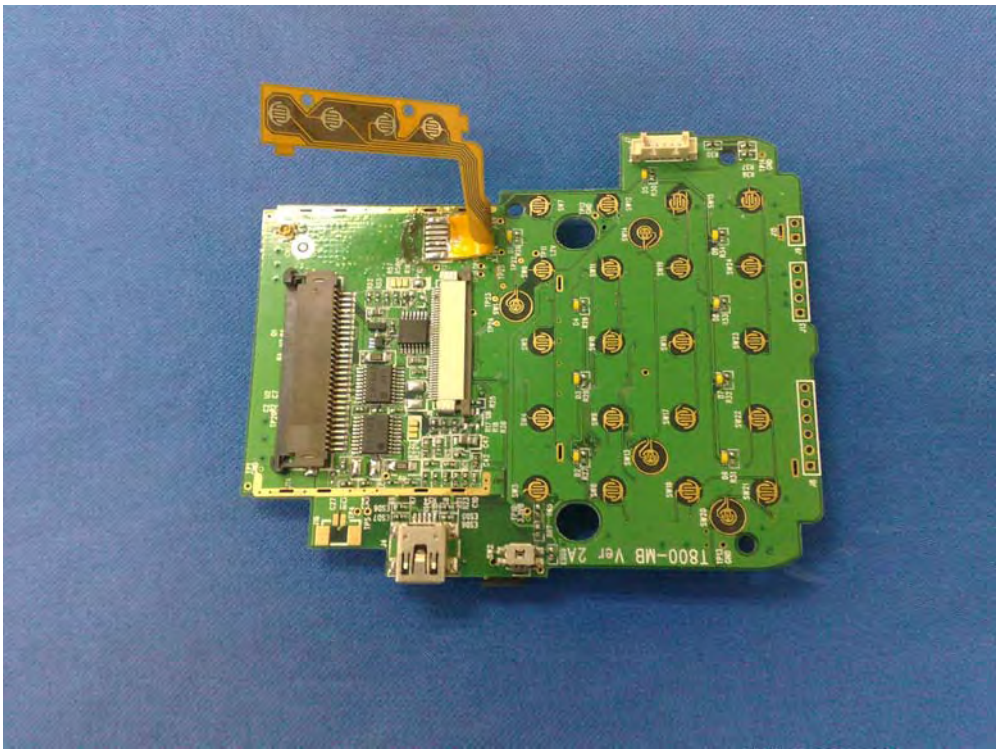
Remarks: 1.Emission Level=LISN Factor+Cable Loss+Reading.
2.If the average limit is met when useing a quasi-peak detector.
the EUT shall be deemed to meet both limits and measurement
with average detector is unnecessary.

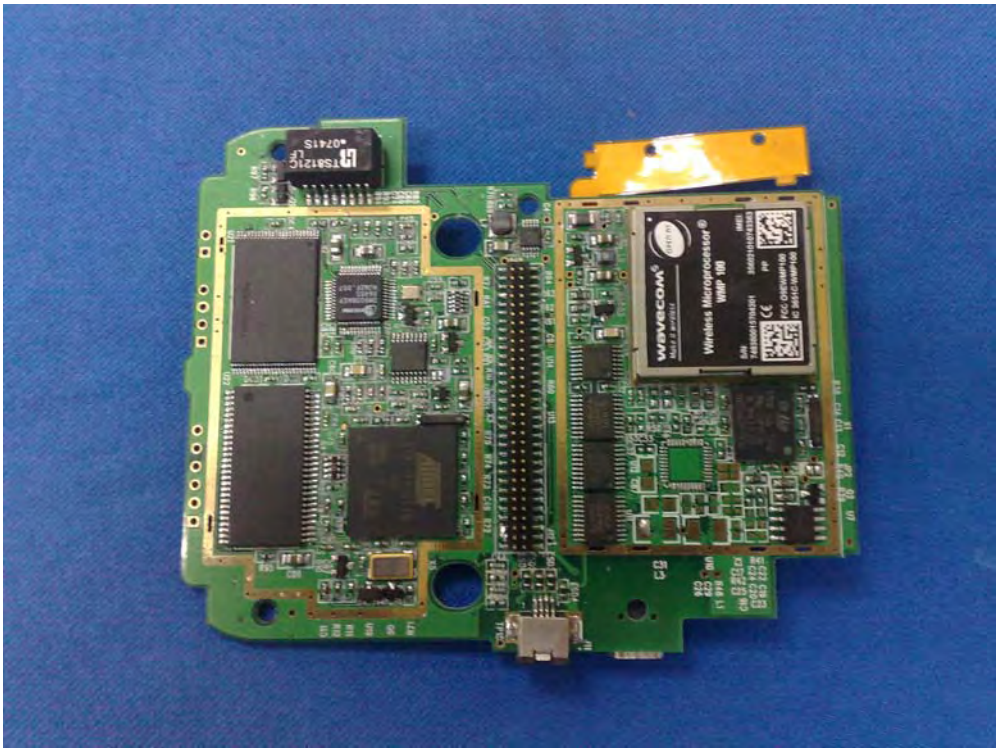
11. Testsetup photo

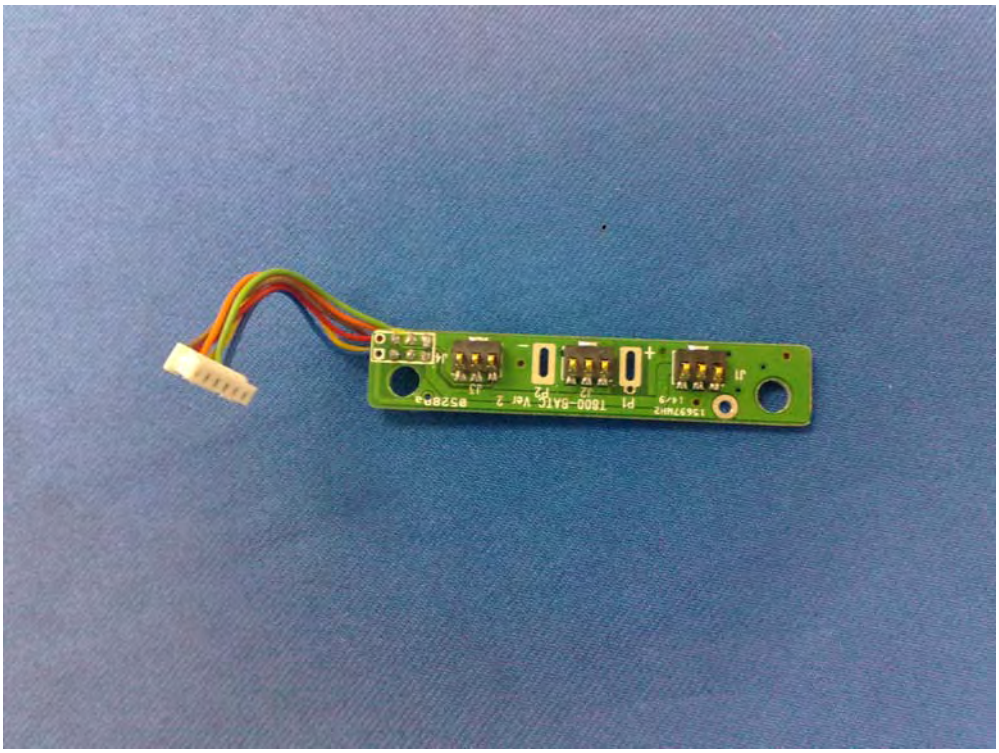
12. Photos of EUT

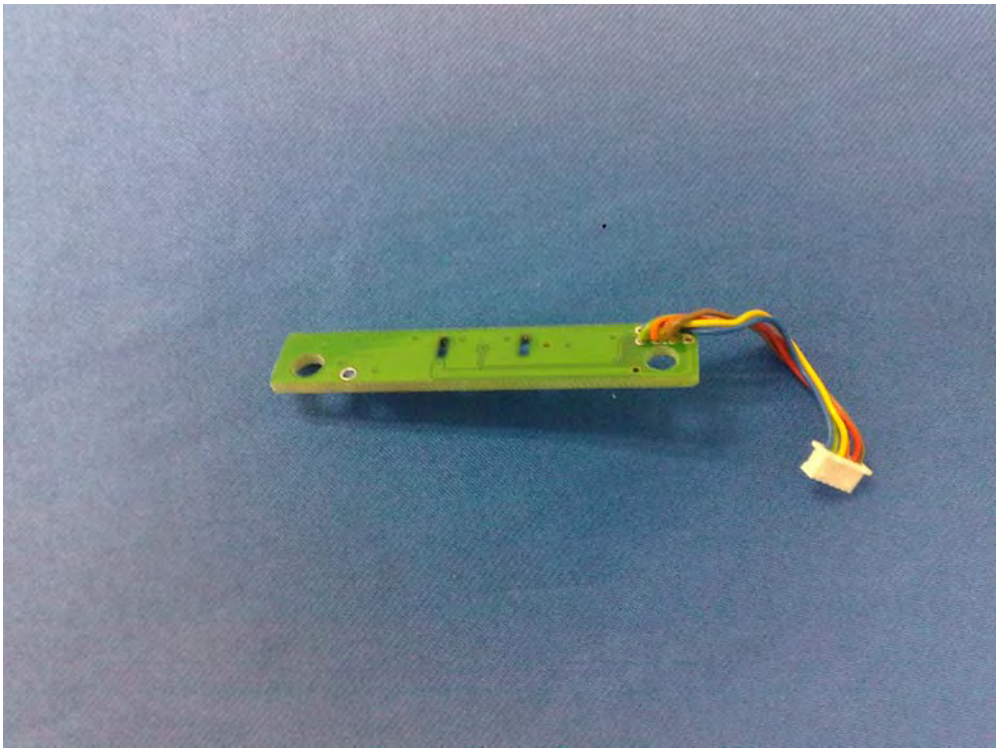

SPECTRA
1

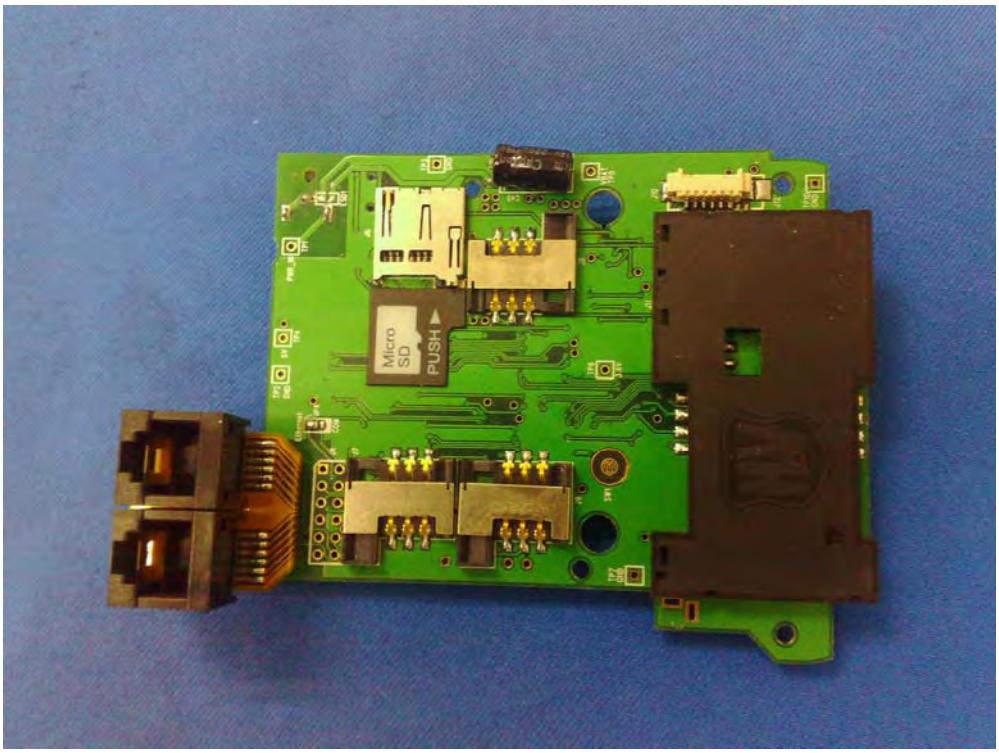

SPECTRA

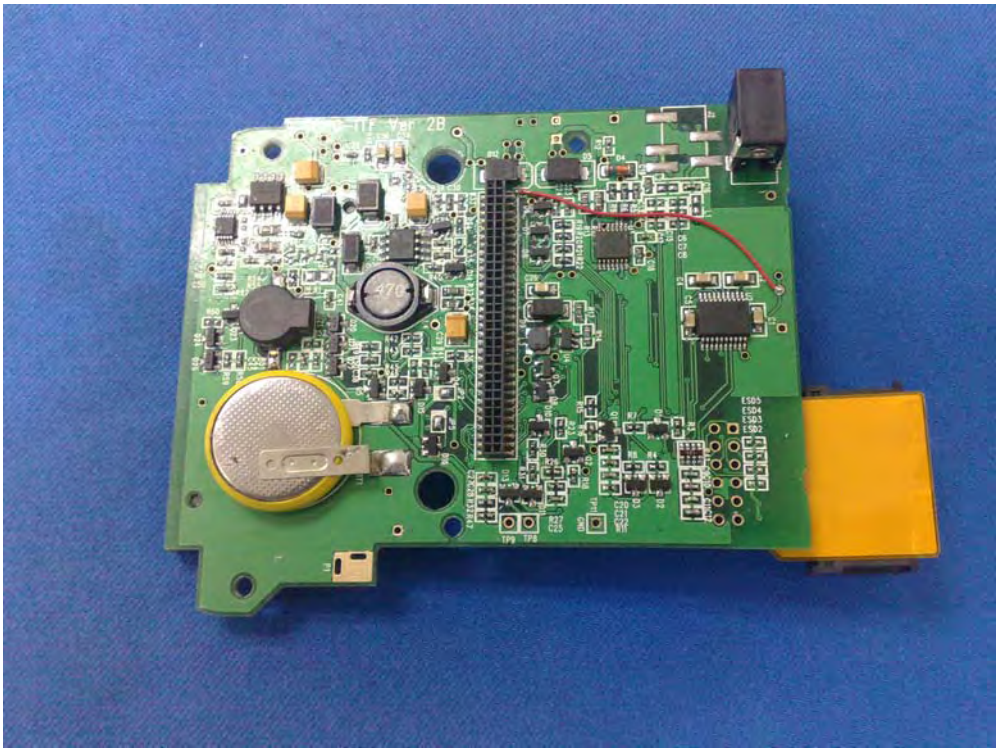

T800-MB Ver 2A

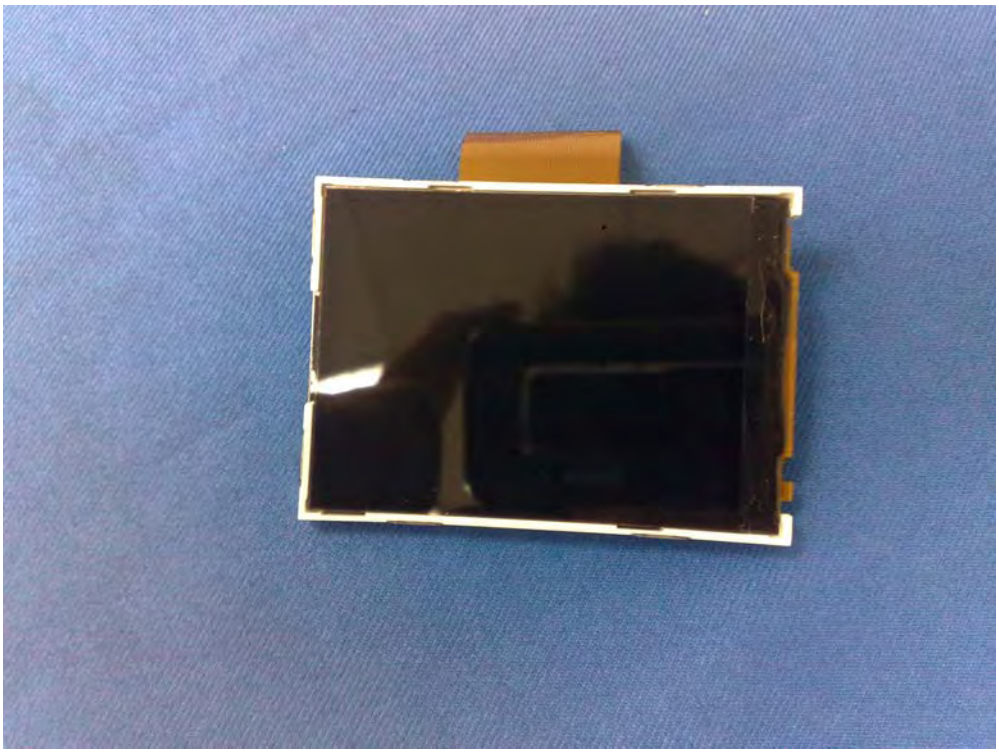

wavecom
Wireless Microprocessor
WMP 100

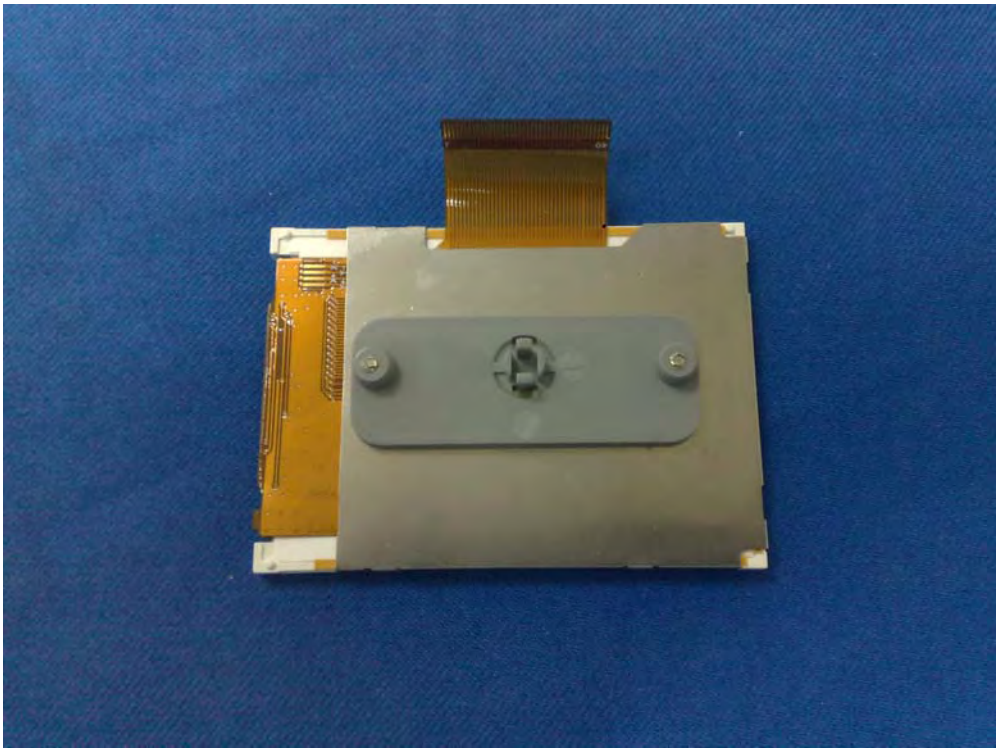


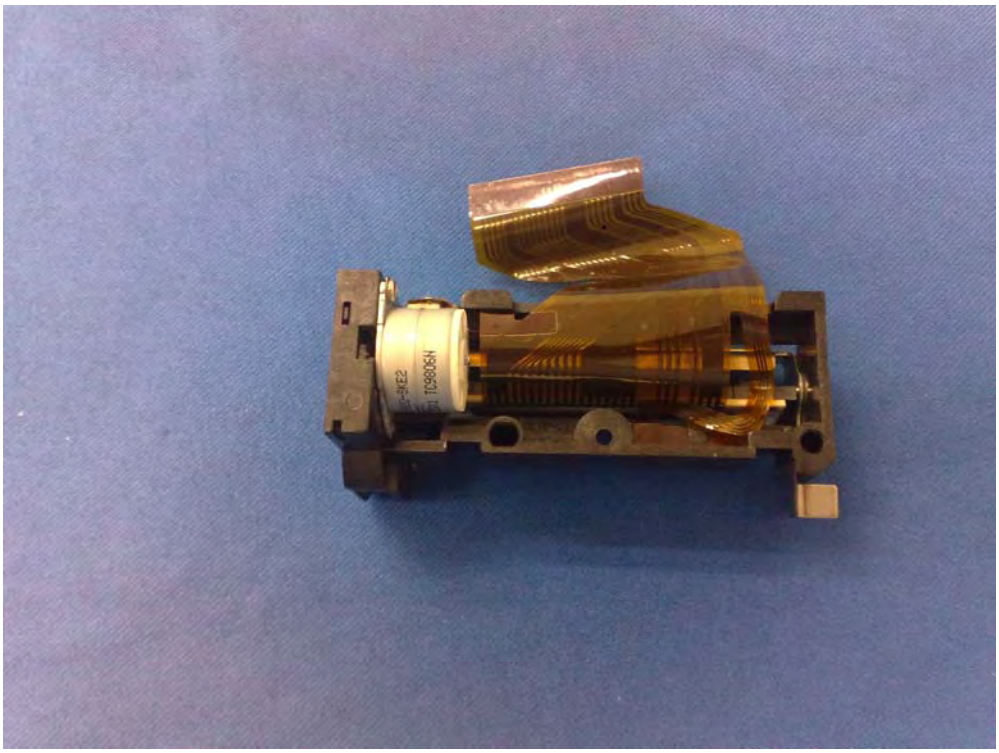


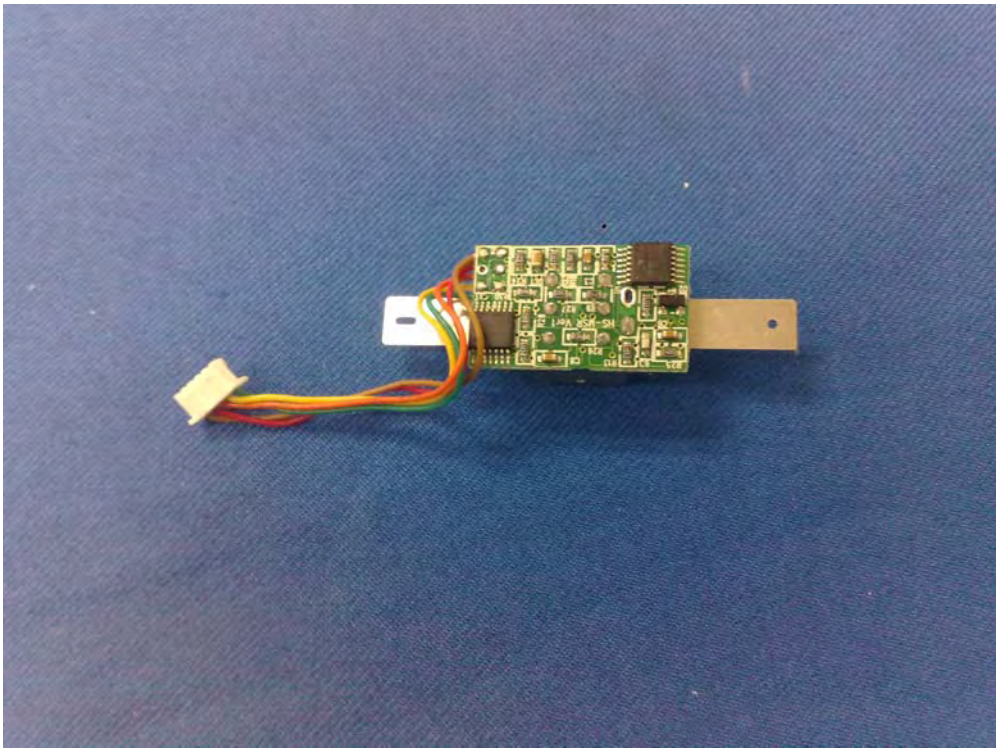

Micro
SD
PUSH

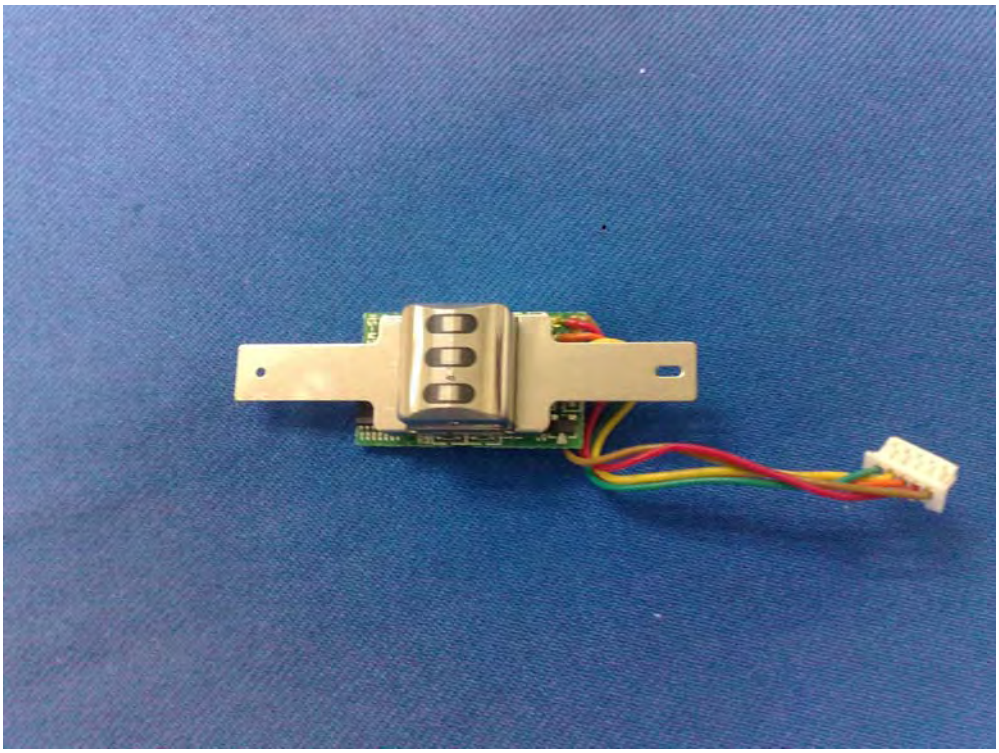


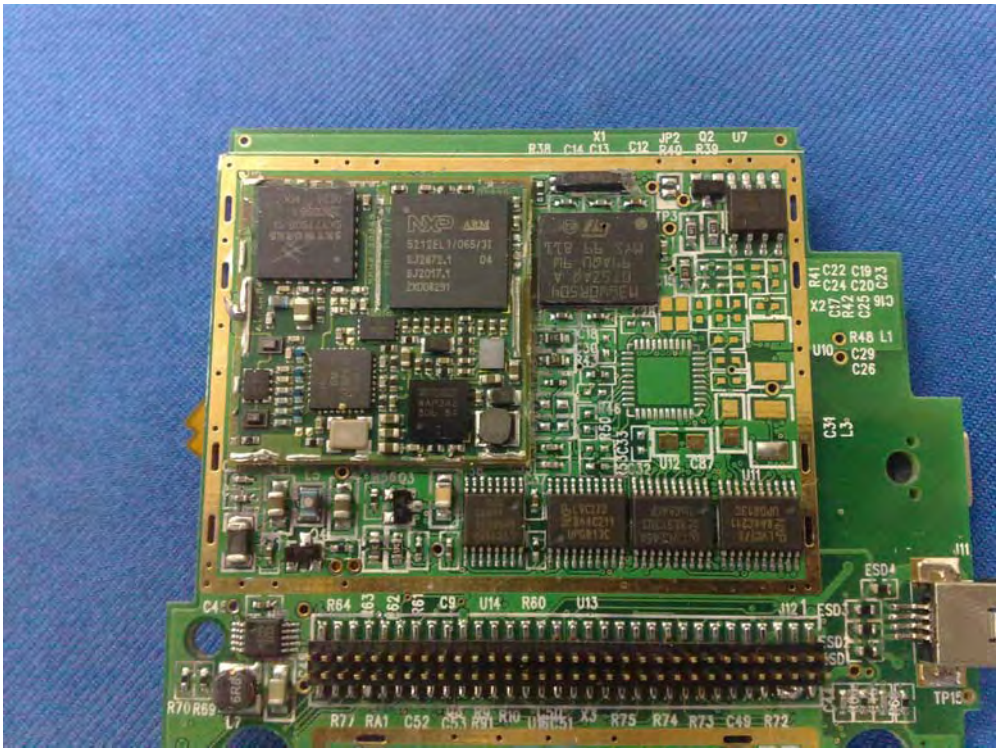











X1
JP2
Q2
U7
R41
C22
C19
C24
C20
C23
X2
C27
R42
C25
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R48
L1
U10
C29
C26
C31
L3
U12
C87
U11
ESD4
J11
C45
R64
R63
R62
R61
C9
U14
R60
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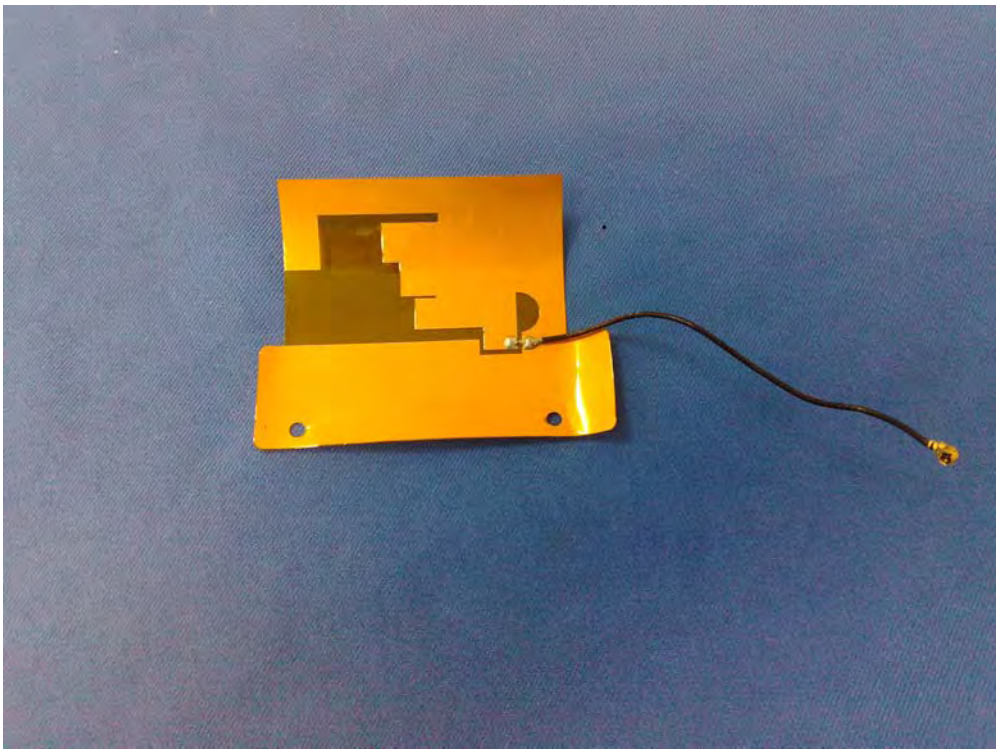
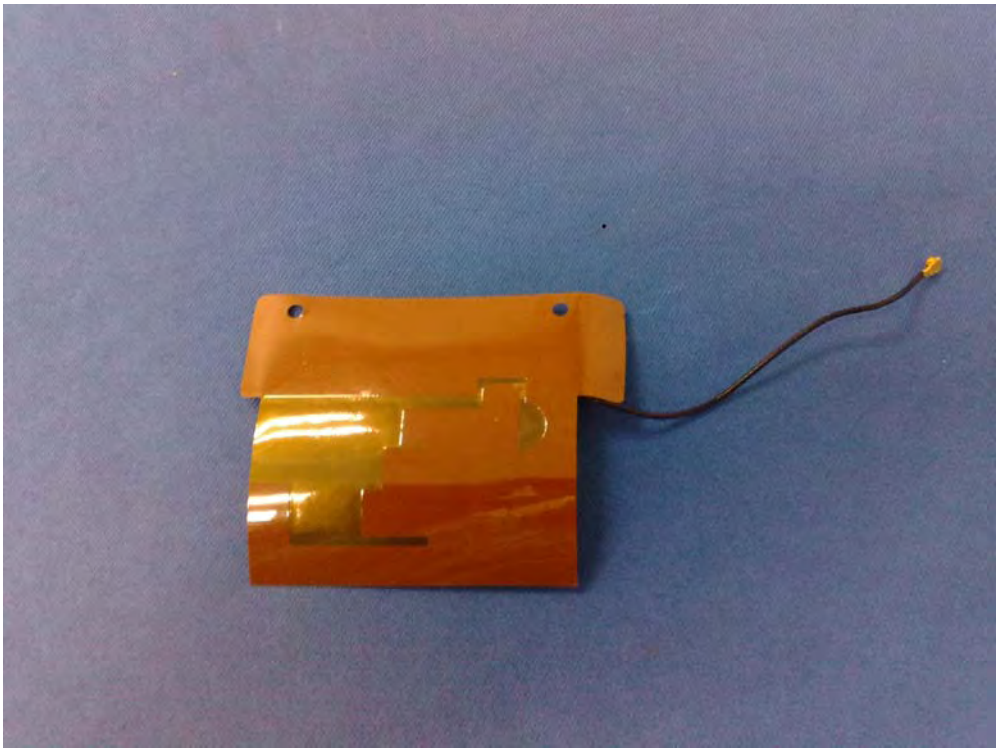
R73
C48
R72






Huntkey
ADAPTER 电源适配器
MODEL/型号: ADP036-094B
INPUT/输入: 100V-240V~ 1.0A
50/60Hz
OUTPUT/输出: 9.0V⎓4A
CAUTION:
Do not remove this cover under any circumstances.
Manufactured By: Huntkey
Made in China 中国制造

END OF REPOR