



Compliance Certification Services (Shenzhen) Inc.

## FCC 47 CFR PART 22, PART 24, PART 27

### TEST REPORT

For

DVR S597

Model: E-006-0597

Brand: N/A

Test Report Number:

C181105Z01-RP2

Issued for

PeopleNet Communications Corporation

4400 Baker Road, Minnetonka, Minnesota, United States

Issued by:

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## Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	Nov 05, 2018	Initial Issue	ALL	Anna Liu



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## 1. TEST RESULT CERTIFICATION

<b>Product</b>	DVR S597
<b>Model</b>	E-006-0597
<b>Brand</b>	N/A
<b>Tested</b>	Nov 03, 2018
<b>Applicant</b>	PeopleNet Communications Corporation
<b>Manufacturer</b>	4400 Baker Road, Minnetonka, Minnesota, United States

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 2.1053, Part 22.917, Part 24.238, Part 27.53	PASS

### We hereby certify that:

The above equipment was tested by Compliance Certification Services (Shenzhen) Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.26:2015 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 2.1053, Part 22.917, Part 24.238, Part 27.53.

The test results of this report relate only to the tested sample EUT identified in this report.

*Approved by:*

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Supervisor of EMC Dept.  
Compliance Certification Services (Shenzhen) Inc.

*Reviewed by:*

Nancy Fu  
Supervisor of Report Dept.  
Compliance Certification Services (Shenzhen) Inc.



## 2. EUT DESCRIPTION

<b>Product</b>	DVR S597
<b>Model Number</b>	E-006-0597
<b>Brand</b>	N/A
<b>Model Discrepancy</b>	N/A
<b>Identify Number</b>	C181105Z01-RP2
<b>Received Date</b>	Nov 5 , 2018
<b>Power Supply</b>	12Vdc from Li-ion Battery
<b>Frequency Range</b>	WCDMA Band II: UL: 1852.4MHz~1907.6MHz, DL: 1932.6MHz~1987.4MHz WCDMA Band IV: UL: 1712.4MHz~1752.6MHz, DL: 2112.6MHz~2152.4MHz WCDMA Band V: UL: 826.4MHz~846.6MHz, DL: 871.6MHz~1891.4MHz FDD Band 2: UL: 1850.7MHz~1900.0MHz, DL: 1930.7MHz~1980.0MHz FDD Band 4: UL: 1710.7MHz~1755.0MHz, DL: 2110.7MHz~2150.0MHz FDD Band 5: UL: 824.7MHz~844.0MHz, DL: 869.7MHz~889.0MHz FDD Band 12: UL: 699.7MHz~711.0MHz, DL: 729.7MHz~741.0MHz
<b>Number of Channels</b>	Please see the clause 3.1
<b>Antenna Specification</b>	WCDMA II: 4.16dBi WCDMA IV: 4.16dBi WCDMA V: 3.34dBi FDD Band 2: 4.16dBi FDD Band 4: 4.16dBi FDD Band 5: 3.34dBi FDD Band 12: 3.34dBi
<b>Hardware Version</b>	Rev 1.5
<b>Software Version</b>	DV423V1.0.0

**Note:** This submittal(s) (test report) is intended for FCC ID: **NKS-S597** filing to comply with Section FCC 47 CFR Part 2.1053, Part 22.917, Part 24.238, Part 27.53, Radiated Spurious Emissions.



### 3. TEST METHODOLOGY

#### 3.1 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

Use engineering mode to control EUT to maintain continuous transmission and reception mode.

Test Frequency:

WCDMA Band II	
Channel	Frequency (MHz)
9262	1852.40
9400	1880.00
9538	1907.60

Band 2			
Test channel	Bandwidth(MHz)	N <sub>UL</sub>	Frequency of Uplink (MHz)
Low Range	1.4	18607	1850.70
	3	18615	1851.50
	5	18625	1852.50
	10	18650	1855.00
	15	18675	1857.50
	20	18700	1860.00
Mid Range	1.4/3/5/10/15/20	18900	1880.00
High Range	1.4	19193	1909.30
	3	19185	1908.50
	5	19175	1907.50
	10	19150	1905.00
	15	19125	1902.50
	20	19100	1900.00



### 3.2 SETUP CONFIGURATION OF EUT

See test photographs.

### 3.3 SUPPORT EQUIPMENT

No.	Equipment	Model No.	Serial No.	FCC ID	Brand	Data Cable	Power Cord
/	/	/	/	/	/	/	/

**Notes:**

*Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*



## 4. FACILITIES AND ACCREDITATIONS

### 4.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

**No.10-1, Mingkeda Logistics Park, No.18 Huanguan South RD., Guan Lan Town, Longhuaxin District, Shenzhen, China**

The sites are constructed in conformance with the requirements of ANSI C63.10:2013, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

### 4.2 ACCREDITATIONS

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

<b>USA</b>	A2LA
<b>China</b>	CNAS

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

<b>USA</b>	FCC
<b>Japan</b>	VCCI(C-4815, R-4320, T-2317, G-10624)
<b>Canada</b>	INDUSTRY CANADA

Copies of granted accreditation certificates are available for downloading from our web site, <http://www.ccssz.com>

### 4.3 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Parameter	Uncertainty
Radiated Emission, 30 to 200 MHz Test Site : 966(2)	+/-3.6880dB
Radiated Emission, 200 to 1000 MHz Test Site : 966(2)	+/-3.6695dB
Radiated Emission, 1 to 8 GHz	+/-5.1782dB
Radiated Emission, 8 to 18 GHz	+/-5.2173dB
Radiated Emission, 18 to 26 GHz	+/-5.6512dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

The measured result is above (below) the specification limit by a margin less than the measurement uncertainty; it is therefore not possible to state compliance based on the 95% level of confidence. However, the result indicates that compliance (non-compliance) is more probable than non-compliance) with the specification limit.



## 5. FCC PART 22/24/27 REQUIREMENTS

### 5.1 RADIATED EMISSIONS

#### LIMIT

WCDMA Band II/LTE FDD Band 2: -13dBm  
LTE FDD Band 7: -25dBm

#### TEST PROCEDURE

1. EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.50m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz, and the maximum value of the receiver should be recorded as (Pr).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. An amplifier should be connected to the Signal Source output port. And the cable should be connecting between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
6. The measurement results are obtained as described below:  
$$\text{Power(EIRP)} = \text{PMea} - \text{PAg} - \text{Pcl} + \text{Ga}$$
We used SMF100A microwave signal generator which signal level can up to 33dBm, so we not used power Amplifier for substitution test; The measurement results are amend as described below:  
$$\text{Power(EIRP)} = \text{PMea} - \text{Pcl} + \text{Ga}$$



7. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.  
ERP can be calculated from EIRP by subtracting the gain of the dipole,  $ERP = EIRP - 2.15\text{dBi}$ .
8. Test frequency range should extend to 10th harmonic of highest fundamental frequency.

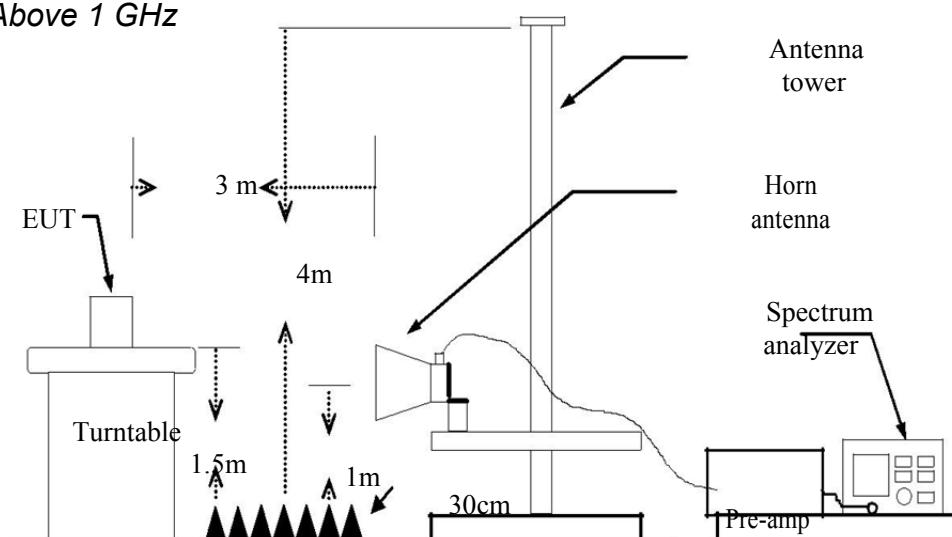
## **MEASUREMENT EQUIPMENT USED**

<b>Radiated Emission Test Site 966(2)</b>					
<b>Name of Equipment</b>	<b>Manufacturer</b>	<b>Model Number</b>	<b>Serial Number</b>	<b>Last Calibration</b>	<b>Due Calibration</b>
PSA Series Spectrum Analyzer	Agilent	N9010A	MY52221469	02/18/2018	02/19/2019
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	02/18/2018	02/19/2019
Amplifier	EMEC	EM330	060661	02/17/2018	03/16/2019
High Noise Amplifier	Agilent	8449B	3008A01838	02/20/2018	02/19/2019
Loop Antenna	COM-POWER	AL-130	121044	09/25/2017	09/24/2018
Bilog Antenna	SCHAFFNER	CBL6143	5082	02/20/2018	02/19/2019
Horn Antenna	SCHWARZBECK	BBHA9120	D286	02/20/2018	02/19/2019
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170-497	02/20/2018	02/19/2019
Turn Table	N/A	N/A	N/A	N.C.R	N.C.R
Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R
Controller	Sunol Sciences	SC104V	022310-1	N.C.R	N.C.R
Controller	CT	N/A	N/A	N.C.R	N.C.R
Temp. / Humidity Meter	Anymetre	JR913	N/A	02/20/2018	02/19/2019
Test S/W	FARAD	LZ-RF / CCS-SZ-3A2			

**Remark:** Each piece of equipment is scheduled for calibration once a year.

## **Test Configuration**

**Above 1 GHz**





## TEST PROCEDURE

### 1) Sequence of testing above 18 GHz

#### **Setup:**

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

#### **Pre measurement:**

- The antenna is moved spherical over the EUT in different polarisations of the antenna.

#### **Final measurement:**

- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak and Average detector.
- The final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.



## TEST RESULTS

Above 18GHz

**Only show worse case**

WCDMA Band II					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
9262	18152.62	Vertical	-41.25	-13.00	Pass
	18556.23	Vertical	-48.36		
	18112.62	Horizontal	-42.26		
	19542.10	Horizontal	-46.11		
9400	19012.62	Vertical	-41.25	-13.00	Pass
	19521.14	Vertical	-49.62		
	18441.63	Horizontal	-42.66		
	18956.41	Horizontal	-50.14		
9538	18252.36	Vertical	-41.03	-13.00	Pass
	18741.52	Vertical	-48.63		
	18452.02	Horizontal	-42.44		
	19874.15	Horizontal	-49.36		



LTE FDD Band 2 Radiated Spurious Emissions							
Bandwidth	Modulation	Test Channel	Spurious Emission			Limit (dBm)	Result
			Frequency	Level (dBm)	Polarization		
1.4MHz	QPSK	L	18270.18	-40.07	Vertical	-13.00	Pass
			19383.12	-46.54	Vertical		
			18678.82	-43.24	Horizontal		
			19768.02	-51.41	Horizontal		
1.4MHz	QPSK	M	18158.37	-42.25	Vertical	-13.00	Pass
			19275.09	-47.47	Vertical		
			18334.40	-43.81	Horizontal		
			19537.07	-51.77	Horizontal		
1.4MHz	QPSK	H	18951.55	-42.91	Vertical	-13.00	Pass
			19572.62	-47.25	Vertical		
			18561.47	-44.44	Horizontal		
			19211.01	-51.34	Horizontal		
3MHz	QPSK	L	18416.56	-42.26	Vertical	-13.00	Pass
			19350.29	-47.34	Vertical		
			18778.74	-44.10	Horizontal		
			19429.78	-52.70	Horizontal		
3MHz	QPSK	M	18445.14	-42.67	Vertical	-13.00	Pass
			19756.43	-47.79	Vertical		
			18234.55	-45.77	Horizontal		
			19584.45	-50.33	Horizontal		
3MHz	QPSK	H	18922.42	-42.12	Vertical	-13.00	Pass
			19146.43	-47.13	Vertical		
			18668.91	-43.55	Horizontal		
			19107.93	-51.86	Horizontal		



LTE FDD Band 2 Radiated Spurious Emissions							
Bandwidth	Modulation	Test Channel	Spurious Emission			Limit (dBm)	Result
			Frequency	Level (dBm)	Polarization		
5MHz	QPSK	L	18149.99	-42.47	Vertical	-13.00	Pass
			19068.20	-46.34	Vertical		
			18218.19	-44.87	Horizontal		
			19112.00	-50.33	Horizontal		
5MHz	QPSK	M	18211.69	-41.06	Vertical	-13.00	Pass
			19160.79	-47.98	Vertical		
			18395.77	-45.90	Horizontal		
			19375.84	-50.39	Horizontal		
5MHz	QPSK	H	18527.61	-42.72	Vertical	-13.00	Pass
			19154.95	-49.00	Vertical		
			18189.93	-44.64	Horizontal		
			19103.48	-51.01	Horizontal		
10MHz	QPSK	L	18056.52	-42.11	Vertical	-13.00	Pass
			19087.48	-46.75	Vertical		
			18162.12	-44.23	Horizontal		
			19418.13	-52.79	Horizontal		
10MHz	QPSK	M	18666.38	-41.42	Vertical	-13.00	Pass
			19683.79	-48.76	Vertical		
			18420.98	-44.36	Horizontal		
			19479.35	-51.20	Horizontal		
10MHz	QPSK	H	18945.73	-40.91	Vertical	-13.00	Pass
			19716.44	-47.03	Vertical		
			18814.15	-44.56	Horizontal		
			19091.00	-52.25	Horizontal		



LTE FDD Band 2 Radiated Spurious Emissions							
Bandwidth	Modulation	Test Channel	Spurious Emission			Limit (dBm)	Result
			Frequency	Level (dBm)	Polarization		
15MHz	QPSK	L	18716.67	-40.70	Vertical	-13.00	Pass
			19249.65	-46.42	Vertical		
			18938.10	-44.83	Horizontal		
			19030.69	-51.17	Horizontal		
15MHz	QPSK	M	18972.85	-41.09	Vertical	-13.00	Pass
			19646.34	-46.83	Vertical		
			18658.24	-43.18	Horizontal		
			19285.26	-52.59	Horizontal		
15MHz	QPSK	H	18944.12	-40.86	Vertical	-13.00	Pass
			19019.81	-46.69	Vertical		
			18511.92	-43.08	Horizontal		
			19486.98	-50.90	Horizontal		
20MHz	QPSK	L	18636.76	-40.74	Vertical	-13.00	Pass
			19550.71	-47.54	Vertical		
			18465.37	-43.01	Horizontal		
			19175.73	-51.93	Horizontal		
20MHz	QPSK	M	18821.76	-41.67	Vertical	-13.00	Pass
			19474.28	-46.49	Vertical		
			18417.68	-44.24	Horizontal		
			19715.44	-52.61	Horizontal		
20MHz	QPSK	H	18503.93	-40.13	Vertical	-13.00	Pass
			19019.45	-48.95	Vertical		
			18325.93	-45.32	Horizontal		
			19263.88	-51.39	Horizontal		



**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 3MHz, Sweep time = auto.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = auto.
5. Frequency (MHz). = Emission frequency in MHz  
Reading (dB $\mu$ V/m) = Uncorrected Analyzer / Receiver Reading  
Correction Factor (dB) = Antenna factor + Cable loss – Amplifier gain  
Limit (dB $\mu$ V/m) = Limit stated in standard  
Margin (dB) = Result (dB $\mu$ V/m)- Limit (dB $\mu$ V/m)  
Peak = Peak Reading  
AVG. = Average Reading  
Remark = Mark Peak Reading or Average Reading

## **TEST Photographs**

