

EMC TEST REPORT  
for  
IMAKE INTERNATIONAL CO., LTD.

Product : Gas Detector  
Model No. : YA-CG916, GD-85, GD-86, GD87, GD-88,  
GD-89, GD-90, GD-85V, GD-86V, GD-87V,  
GD-88V, GD-89V, GD-90V

Prepared for : IMAKE INTERNATIONAL CO., LTD.  
Address : Building 1, MeLi AAA , West of Renmin Rd,  
Longhua,Baoan, Shenzhen, 518109, Guangdong,  
China

Prepared by : Shenzhen Accurate Technology Co., Ltd.  
Address : 1/F., Building A, Changyuan New Material Port,  
Science & Industry Park, Nanshan District, Shenzhen,  
Guangdong, P.R. China

Tel: +86-755-26503290  
Fax: +86-755-26503396

Report No. : RTZ210312007-EMA1  
Date of Test : December 8, 2017  
Date of Report Rev.1 : December 8, 2017  
Date of Report Rev.2 : Mar. 15, 2021

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## Test Report Declaration

Applicant : IMAKE INTERNATIONAL CO., LTD.  
Manufacturer : Shenzhen Usafe Intelligent Technology Co., Ltd  
Product : Gas Detector  
Model No. : YA-CG916, GD-85, GD-86, GD87, GD-88, GD-89, GD-90,  
GD-85V, GD-86V, GD-87V, GD-88V, GD-89V, GD-90V  
Trade name : n.a.

Measurement Procedure Used:

**EN IEC 61000-6-3: 2021**

**EN 50130-4: 2011+A1:2014 (IEC 61000-4-2: 2008**

**IEC 61000-4-3: 2006+A1:2007+A2:2010**

**IEC 61000-4-4: 2012**

**IEC 61000-4-5: 2014+A1:2017**

**IEC 61000-4-6: 2013)**

The device described above is tested by Shenzhen Accurate Technology Co., Ltd. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Accurate Technology Co., Ltd. is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the EN 61000-6-3&EN 50130-4 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Accurate Technology Co., Ltd.

Date of Test : December 8, 2017  
Date of Report Rev.1: December 8, 2017  
Date of Report Rev.2: Mar. 15, 2021

Prepared by :



( Ting Lü, Engineer)

Approved & Authorized Signer :



( Martin Lü, Manager)

## 1. TEST RESULTS SUMMARY

Test Items	Test Standard	Test Results
Power Line Conducted Emission	EN IEC 61000-6-3: 2021	Pass
Radiated Emission	EN IEC 61000-6-3: 2021	Pass
Electrostatic Discharge Immunity	EN 50130-4: 2011+A1:2014 (IEC 61000-4-2: 2008)	Pass
Radiated Electromagnetic Fields Immunity	EN 50130-4: 2011+A1:2014 (IEC 61000-4-3: 2006+A1:2007+A2:2010)	Pass
Electrical Fast Transient /Burst Immunity	EN 50130-4: 2011+A1:2014 (IEC61000-4-4: 2012)	Pass
Surge Immunity	EN 50130-4: 2011+A1:2014 (IEC 61000-4-5: 2014+A1:2017)	Pass
Injected Current Susceptibility	EN 50130-4: 2011+A1:2014 (IEC61000-4-6: 2013)	Pass

## 2. GENERAL INFORMATION

### 2.1. Description of Device (EUT)

Product : Gas Detector

Model No. : YA-CG916, GD-85, GD-86, GD87, GD-88, GD-89, GD-90, GD-85V, GD-86V, GD-87V, GD-88V, GD-89V, GD-90V  
(Note: these models are identical in schematic, structure and critical components except for model name. So we prepare YA-CG916 for test only.)

Rating : DC 9-26V

Trade name : n.a.

Applicant : IMAKE INTERNATIONAL CO., LTD.  
Address : Building 1, MeLi AAA , West of Renmin Rd, Longhua, Baoan, Shenzhen, 518109, Guangdong, China

Manufacturer : Shenzhen Usafe Intelligent Technology Co., Ltd  
Address : 5th Floor, Building 3, Baolaite Industrial Park, No.24 Xinbu Road, Tongle, Longgang District, Shenzhen, China

Date of sample : December 6, 2017  
receiver

Date of Test : December 8, 2017

Sample No. : 1701989

## 2.2. Description of Test Facility

- EMC Lab : Accredited by American Association for Laboratory Accreditation (A2LA)  
The Certificate Number is 4297.01
- Listed by Innovation, Science and Economic Development Canada (ISED)  
The Registration Number is 5077A-2
- Accredited by China National Accreditation Service for Conformity Assessment (CNAS)  
The Registration Number is CNAS L3193
- Name of Firm : Shenzhen Accurate Technology Co., Ltd.
- Site Location : 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China
- Subcontracted Items : 1) Radiated RF Electromagnetic Fields
- Subcontractor : Shenzhen Academy of Metrology and Quality Inspection  
Site Location : Bldg. of Metrology & Quality Inspection, Longzhu Road  
Nanshan District, Shenzhen, Guangdong, China

## 2.3. Measurement Uncertainty

- Conducted Emission Expanded Uncertainty :  $U=2.72dB, k=2$   
(9kHz-30MHz)
- Radiated emission expanded uncertainty :  $U=4.28dB, k=2$   
(30MHz-1000MHz)

### 3. DESCRIPTION OF VERSION

Edition No.	Date of Rev.	Summary	Report No.
Rev.1	December 8, 2017	Original Report	ATE20172450
Rev.2	Mar. 15, 2021	Update Applicant, model number and standard	RTZ210312007-EMA1

Remark for Rev.2

1. REV.1:

Applicant: Shenzhen Usafe Intelligent Technology Co., Ltd

Address: 5th Floor, Building 3, Baolaite Industrial Park, No. 24 Xinbu Road, Tongle, Longgang District, Shenzhen, China

Model Number: YA-CG916, YA-G903, YA-G908, YA-CG913, YA-G916, YA-G918, YA-G920, YA-G926, YA-G928

REV.2:

Applicant: IMAKE INTERNATIONAL CO., LTD.

Address: Building 1, MeLi AAA , West of Renmin Rd, Longhua,Baoan, Shenzhen, 518109, Guangdong, China

Model Number: YA-CG916, GD-85, GD-86, GD87, GD-88, GD-89, GD-90, GD-85V, GD-86V, GD-87V, GD-88V, GD-89V, GD-90V

2. Manufacture and Address: Same

Product: Same

## 4. MEASURING DEVICE AND TEST EQUIPMENT

### 4.1. The Equipment Used to Measure Conducted Disturbance (L.I.S.N)

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCS30	100307	Dec. 25, 2020	1 Year
2.	L.I.S.N.	Schwarzbeck	NLSK8126	8126431	Dec. 25, 2020	1 Year
3.	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100815	Dec. 25, 2020	1 Year
4.	50Ω Coaxial Switch	Anritsu Corp	MP59B	6200506474	Dec. 25, 2020	1 Year
5.	Conducted Emission Test Software: ES-K1 V1.71					

### 4.2. For Radiated Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESR	101817	Dec. 24, 2020	1 Year
2.	Amplifier	SONOMA INSTRUMENT	310 N	186131	Dec. 25, 2020	1 Year
3.	50 Coaxial Switch	Anritsu Corp	MP59B	6100237248	Dec. 25, 2020	1 Year
4.	Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan.05, 2020	3 Year
5.	Radiated Emission Test Software: EZ EMC V1.1.4.2					

### 4.3. For Electrical Fast Transient /Burst Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ULTRA COMPACT SIMULATOR	EM TEST	UCS 500 N5	V0928104968	Dec. 24, 2020	1Year
2.	CAPACITIVE CLAMP	EM TEST	HFK	0509-34	Dec. 24, 2020	1Year
3.	EMC PRO SYSTEM (IMMUNITY TESTER)	THERMO	EMC PRO Plus-BASE	1108237	Dec. 24, 2020	1Year

### 4.4. For Electrostatic Discharge Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ESD Generator	TESEQ	NSG 437	823	Dec. 26, 2020	1 Year

#### 4.5.The Equipment Used to Measure Surge Immunity

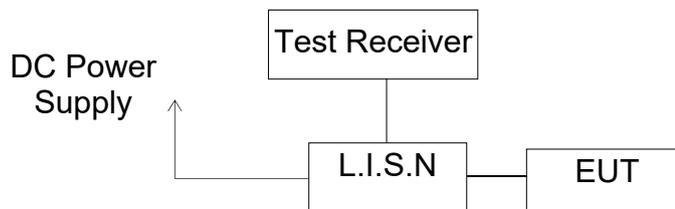
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ULTRA COMPACT SIMULATOR	EM TEST	UCS 500 N5	V0928104968	Dec. 24, 2020	1Year
2.	EMC PRO SYSTEM (IMMUNITY TESTER)	THERMO	EMC PRO Plus-BASE	1108237	Dec. 24, 2020	1Year

#### 4.6.For Injected Current Susceptibility Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Conducted Immunity Test System	FRANKONIA	CIT-10	126B1121	Dec. 25, 2020	1Year
2.	CDN	FRANKONIA	CDN-M2/3	A3027020	Dec. 25, 2020	1Year
3.	EM Injection Clamp	FCC	F-203I-23mm	091824	Dec. 25, 2020	1Year
4.	6dB Attenuator	Weinschel	WA59-6-33	A329	/	/
5.	CS Test Software : IEC/EN61000-4-6 V1.1.1					

## 5. POWER LINE CONDUCTED EMISSION MEASUREMENT

### 5.1. Block Diagram of Test Setup



(EUT: Gas Detector)

### 5.2. Measuring Standard

EN IEC 61000-6-3: 2021

### 5.3. Power Line Conducted Emission Limits

Frequency (MHz)	Limit dB( $\mu$ V)	
	Quasi-peak Level	Average Level
0.15 - 0.50	79.0	66.0
0.50 - 30.00	73.0	60.0

Note1: The lower limit shall apply at the transition frequencies.

### 5.4. EUT Configuration on Measurement

The following equipments are installed on Conducted Emission Measurement to meet EN 61000-6-3 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

#### 5.4.1. Gas Detector (EUT)

Model Number : YA-CG916  
Manufacturer : Shenzhen Usafe Intelligent Technology Co., Ltd

## 5.5. Operating Condition of EUT

- 5.5.1. Setup the EUT as shown on Section 5.1.
- 5.5.2. Turn on the power of all equipments.
- 5.5.3. Let the EUT work in test mode (On) and measure it.

## 5.6. Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and connected to the DC mains through Line Impedance Stability Network (L.I.S.N). This provided a  $50\Omega$  coupling impedance for the tested equipments. Both sides of DC line are investigated to find out the maximum conducted emission according to the EN 61000-6-3 regulations during conducted emission measurement.

The bandwidth of the field strength meter (R&S Test Receiver ESCS30) is set at 9 kHz in 150 kHz-30MHz.

The frequency range from 150 kHz to 30MHz is investigated for DC mains. The test voltage is DC 12V

### 5.7.Measuring Results

**PASS.**

The frequency range 150 kHz to 30MHz is investigated.

Test Mode: On(DC 12V)								
Positive								
<b>MEASUREMENT RESULT: "US-1209-07_fin"</b>								
2017-12-9 9:14								
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE	
0.784000	31.30	11.1	73	41.7	QP	+	GND	
1.614000	34.40	11.2	73	38.6	QP	+	GND	
6.055000	19.50	11.5	73	53.5	QP	+	GND	
<b>MEASUREMENT RESULT: "US-1209-07_fin2"</b>								
2017-12-9 9:14								
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE	
0.776000	31.10	11.1	60	28.9	AV	+	GND	
1.800000	29.90	11.2	60	30.1	AV	+	GND	
5.355000	14.30	11.5	60	45.7	AV	+	GND	
Negative								
<b>MEASUREMENT RESULT: "US-1209-06_fin"</b>								
2017-12-9 9:12								
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE	
0.824000	31.30	11.1	73	41.7	QP	-	GND	
1.576000	34.50	11.2	73	38.5	QP	-	GND	
5.680000	19.60	11.5	73	53.4	QP	-	GND	
<b>MEASUREMENT RESULT: "US-1209-06_fin2"</b>								
2017-12-9 9:12								
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE	
0.778000	30.70	11.1	60	29.3	AV	-	GND	
1.548000	28.90	11.2	60	31.1	AV	-	GND	
6.030000	15.70	11.5	60	44.3	AV	-	GND	

Note: Emissions attenuated more than 20 dB below the permissible value are not reported.

Margin=Limit - Level

The spectral diagrams are attached as below.

ACCURATE TECHNOLOGY CO., LTD

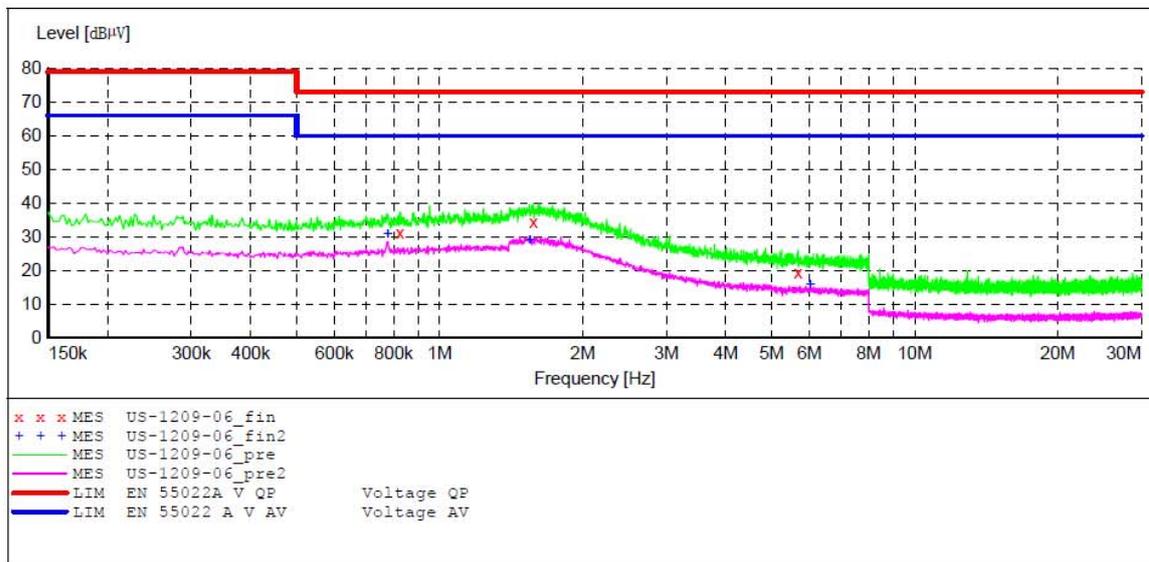
CONDUCTED EMISSION STANDARD EN61000-6-3

EUT: Gas Detector M/N:YA-CG916  
 Manufacturer: USAFE  
 Operating Condition: ON  
 Test Site: 1#Shielding Room  
 Operator: JAMES  
 Test Specification: - 12V  
 Comment: Report NO.:ATE20172450  
 Start of Test: 2017-12-9 / 9:10:28

SCAN TABLE: "V 150K-30MHz fin"

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	4.5 kHz	QuasiPeak	1.0 s	9 kHz	NSLK8126 2008

Short Description: \_SUB\_STD\_VTERM2 1.70  
Average



MEASUREMENT RESULT: "US-1209-06\_fin"

2017-12-9 9:12

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.824000	31.30	11.1	73	41.7	QP	-	GND
1.576000	34.50	11.2	73	38.5	QP	-	GND
5.680000	19.60	11.5	73	53.4	QP	-	GND

MEASUREMENT RESULT: "US-1209-06\_fin2"

2017-12-9 9:12

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.778000	30.70	11.1	60	29.3	AV	-	GND
1.548000	28.90	11.2	60	31.1	AV	-	GND
6.030000	15.70	11.5	60	44.3	AV	-	GND

**ACCURATE TECHNOLOGY CO., LTD**

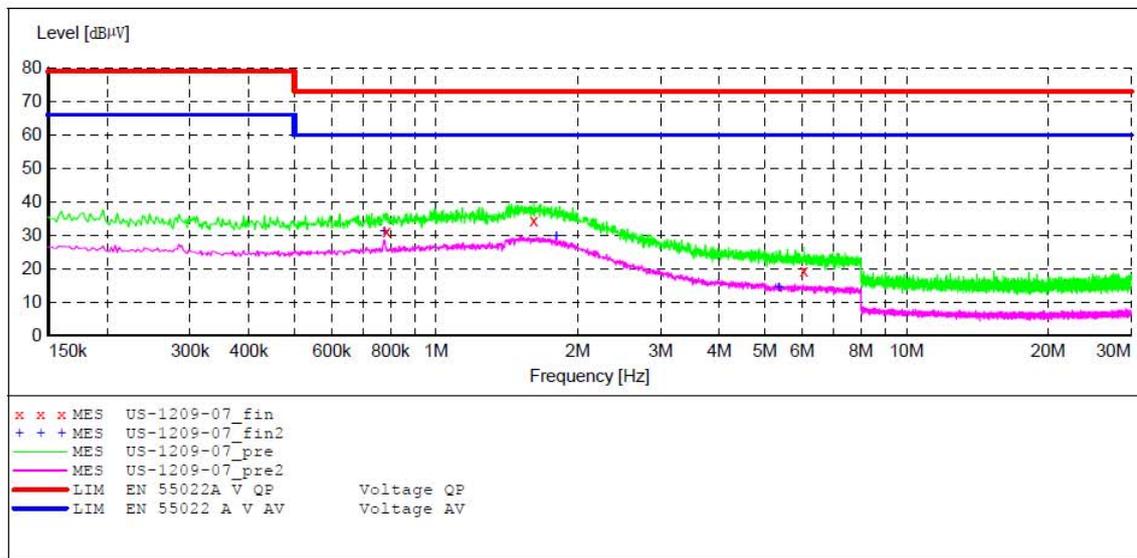
**CONDUCTED EMISSION STANDARD EN61000-6-3**

EUT: Gas Detector M/N:YA-CG916  
 Manufacturer: USAFE  
 Operating Condition: ON  
 Test Site: 1#Shielding Room  
 Operator: JAMES  
 Test Specification: + 12V  
 Comment: Report NO.:ATE20172450  
 Start of Test: 2017-12-9 / 9:12:51

**SCAN TABLE: "V 150K-30MHz fin"**

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	4.5 kHz	QuasiPeak	1.0 s	9 kHz	NSLK8126 2008

Short Description: \_SUB\_STD\_VTERM2 1.70  
Average



**MEASUREMENT RESULT: "US-1209-07\_fin"**

2017-12-9 9:14

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.784000	31.30	11.1	73	41.7	QP	+	GND
1.614000	34.40	11.2	73	38.6	QP	+	GND
6.055000	19.50	11.5	73	53.5	QP	+	GND

**MEASUREMENT RESULT: "US-1209-07\_fin2"**

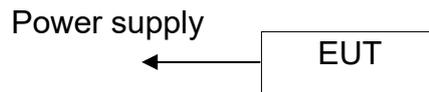
2017-12-9 9:14

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.776000	31.10	11.1	60	28.9	AV	+	GND
1.800000	29.90	11.2	60	30.1	AV	+	GND
5.355000	14.30	11.5	60	45.7	AV	+	GND

## 6. RADIATED EMISSION MEASUREMENT

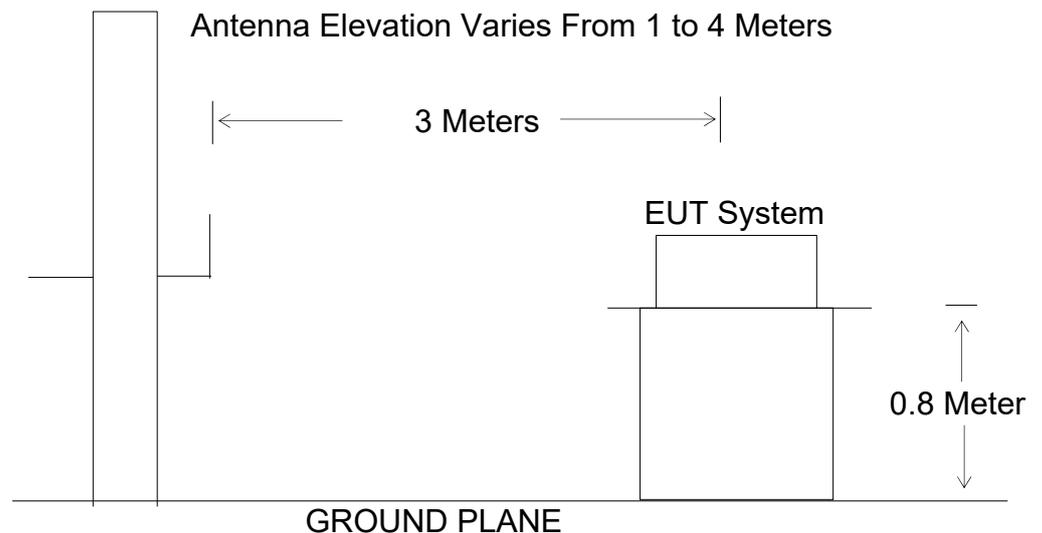
### 6.1. Block Diagram of Test

#### 6.1.1. Block diagram of connection between the EUT and simulators



(EUT: Gas Detector)

#### 6.1.2. Block diagram of test setup (In chamber)



### 6.2. Measuring Standard

EN IEC 61000-6-3: 2021

### 6.3. Radiated Emission Limits

Frequency (MHz)	Distance (Meters)	Field Strengths Limit dB( $\mu$ V/m)
30 - 230	3	40
230 - 1000	3	47

Note: (1) The smaller limit shall apply at the combination point between two frequency bands.

(2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.

## 6.4.EUT Configuration on Test

Test equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

### 6.4.1. Gas Detector (EUT)

Model No.: YA-CG916

Manufacturer: Shenzhen Usafe Intelligent Technology Co., Ltd

## 6.5.Operating Condition of EUT

6.5.1. Turn on the power.

6.5.2. Let the EUT work in test mode (On) and measure it.

## 6.6.Test Procedure

The EUT is placed on a turntable, which is 0.8 meter high above the ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Bilog antenna (calibrated by Dipole Antenna) is used as a receiving antenna. Both horizontal and vertical polarizations of the antenna are set on test.

The bandwidth of the Receiver (ESR) is set at 120 kHz.

## 6.7.Measuring Results

**PASS.**

The frequency range from 30MHz to 1000MHz is investigated.

Note: Emissions attenuated more than 20 dB below the permissible value are not reported.

Margin=Result - Limit

The spectral diagrams are attached as below.



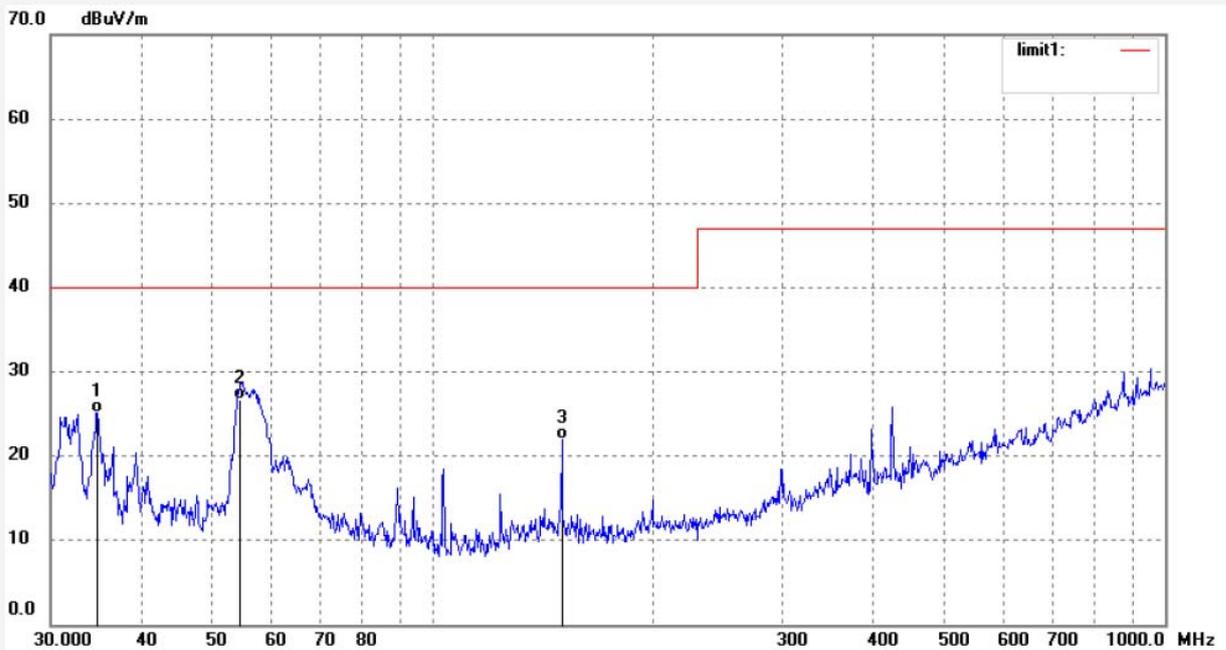
**ACCURATE TECHNOLOGY CO., LTD.**

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,  
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber  
Tel:+86-0755-26503290  
Fax:+86-0755-26503396

Job No.: JC #675	Polarization: Horizontal
Standard: EN61000-6-3	Power Source: DC 12V
Test item: Radiation Test	Date: 17/12/08/
Temp.( C)/Hum.(%) 25 C / 55 %	Time: 9/56/17
EUT: Gas Detector	Engineer Signature: jc
Mode: ON	Distance: 3m
Model: YA-CG916	
Manufacturer: USAFE	

Note: Report NO.:ATE20172450



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	34.7705	46.49	-21.39	25.10	40.00	-14.90	QP			
2	54.5167	53.60	-26.92	26.68	40.00	-13.32	QP			
3	149.9676	49.98	-28.05	21.93	40.00	-18.07	QP			



**ACCURATE TECHNOLOGY CO., LTD.**

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,  
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: JC #676

Standard: EN61000-6-3

Test item: Radiation Test

Temp.( C)/Hum.(%) 25 C / 55 %

EUT: Gas Detector

Mode: ON

Model: YA-CG916

Manufacturer: USAFE

Polarization: Vertical

Power Source: DC 12V

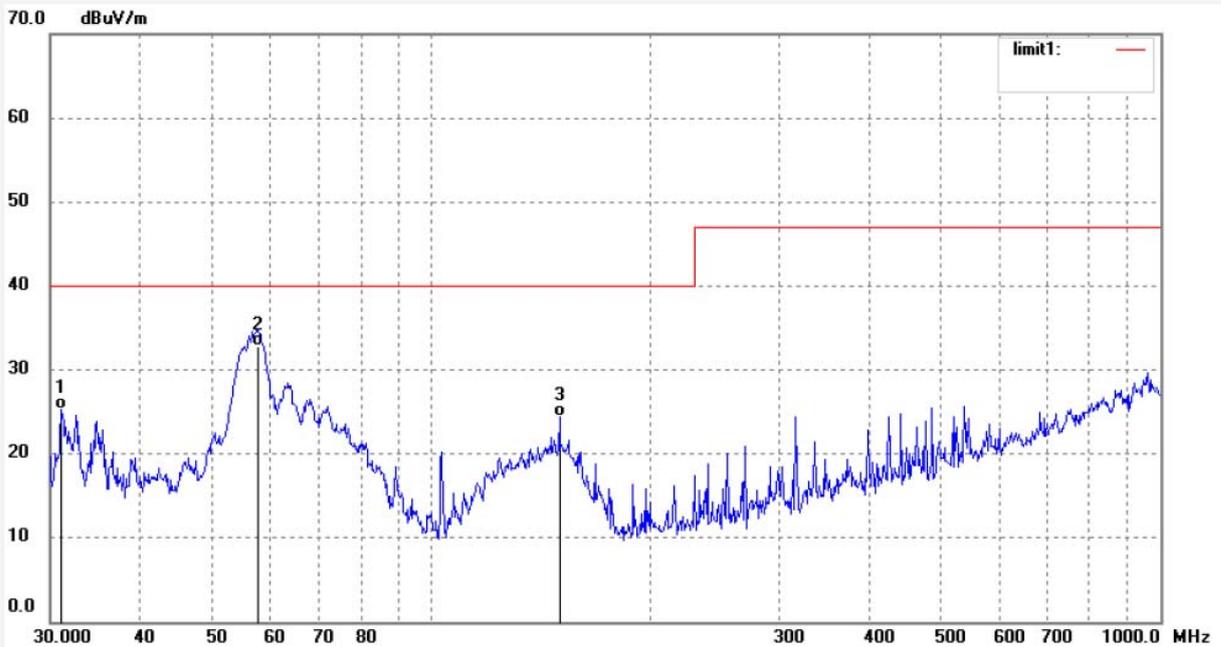
Date: 17/12/08/

Time: 9/57/11

Engineer Signature: jc

Distance: 3m

Note: Report NO.:ATE20172450

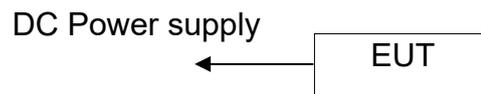


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	31.0728	45.68	-20.47	25.21	40.00	-14.79	QP			
2	57.8722	60.00	-27.12	32.88	40.00	-7.12	QP			
3	149.9676	52.48	-28.05	24.43	40.00	-15.57	QP			

## 7. ELECTROSTATIC DISCHARGE IMMUNITY TEST

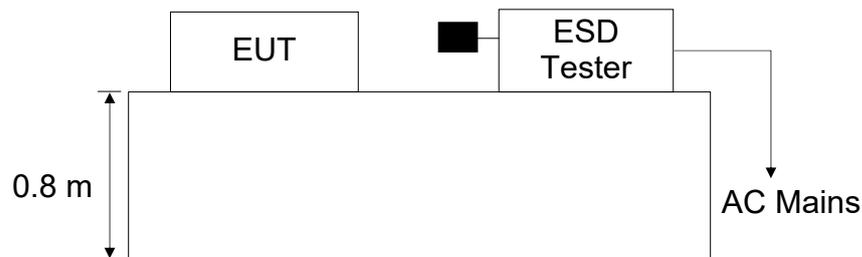
### 7.1. Block Diagram of Test Setup

#### 7.1.1. Block diagram of connection between the EUT and simulators



(EUT: Gas Detector)

#### 7.1.2. Block diagram of ESD test setup



### 7.2. Test Standard

EN 50130-4: 2011+A1:2014 (IEC61000-4-2: 2008

Severity Level: 1, 2, 3 / Air Discharge:  $\pm 2, 4, 8$  kV; Contact Discharge:  $\pm 2, 4, 6$  kV)

### 7.3. Severity Levels and Performance Criterion

#### 7.3.1. Severity level

Level	Test Voltage Contact Discharge (kV)	Test Voltage Air Discharge (kV)
1.	$\pm 2$	$\pm 2$
2.	$\pm 4$	$\pm 4$
3.	$\pm 6$	$\pm 8$
4.	$\pm 8$	$\pm 15$
X	Special	Special

#### 7.3.2. Performance Criterion: **B**, refer to EN 50130-4 section 9.4.

## 7.4.EUT Configuration

### 7.4.1.Gas Detector(EUT)

Model Number : YA-CG916

Serial Number : n.a.

Manufacturer : Shenzhen Usafe Intelligent Technology Co., Ltd

## 7.5.Operating Condition of EUT

7.5.1.Turn on the power.

7.5.2.After that, let the EUT work in test mode and measure it.

## 7.6.Test Procedure

7.6.1.Contact discharges to the conductive surfaces and to coupling planes:

The EUT shall be exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points (a minimum of 50 discharges at each point). One of the test points shall be subjected to at least 50 indirect discharges (contact) to the centre of the front edge of the horizontal coupling plane. The remaining three test points shall each receive at least 50 direct contact discharges. If no direct contact test points are available, then at least 200 indirect discharges shall be applied in the indirect mode [see IEC 61000-4-2 for use of the Vertical Conducting Plane (VCP)]. Tests shall be performed at a maximum repetition rate of one discharge per second.

7.6.2.Air discharge at slots and apertures, and insulating surfaces:

On those parts of the EUT where it is not possible to perform contact discharge testing, the equipment should be investigated to identify user accessible points where breakdown may occur; examples are openings at edges of keys, or in the cover of keyboards and telephone handsets. Such points are tested using the air discharge method. See also IEC 61000-4-2 regarding painted surfaces. This investigation should be restricted to those areas normally handled by the user. A minimum of 10 single air discharges shall be applied to the selected test point for each such area.

The application of electrostatic discharges to the contacts of open connectors is not required by this publication.

## 7.7. Test Results

PASS

Please refer to the following page.



# Electrostatic Discharge Test Results

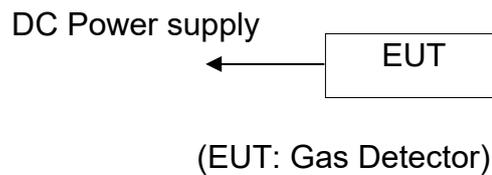
Shenzhen Accurate Technology Co., Ltd.

Applicant:	Shenzhen Usafe Intelligent Technology Co., Ltd	Test Date:	December 8, 2017
EUT:	Gas Detector	Temperature :	25°C
M/N:	YA-CG916	Humidity:	48%
Power Supply:	DC 12V	Test Mode:	ON
Air discharge:	±2, 4, 8kV	Criterion:	A
Contact discharge:	±2, 4, 6kV	Test Engineer:	Frank
Location	Kind A-Air Discharge C-Contact Discharge	Result	
Non-conductive Enclosure	A	PASS	
Conductive Enclosure	C	PASS	
HCP	C	PASS	
VCP of front	C	PASS	
VCP of rear	C	PASS	
VCP of left	C	PASS	
VCP of right	C	PASS	
Remark :	Test Equipment : ESD Generator (TESEQ, NSG 437)		

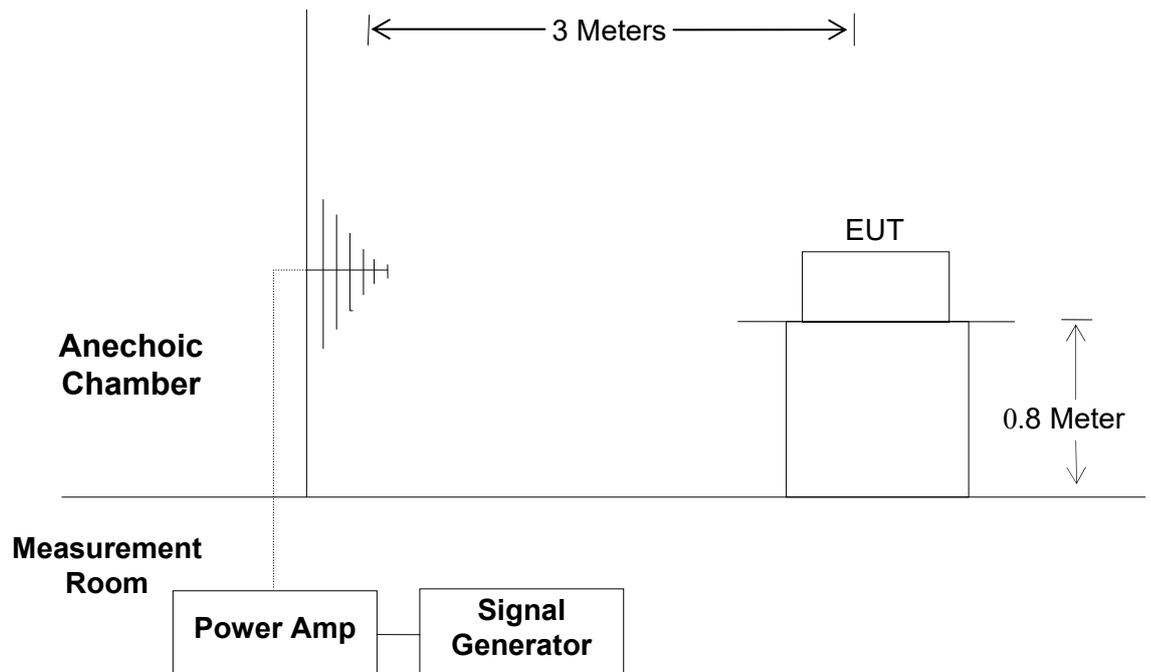
## 8. RF FIELD STRENGTH SUSCEPTIBILITY TEST

### 8.1. Block Diagram of Test

#### 8.1.1. Block diagram of connection between the EUT and simulators



#### 8.1.2. Block diagram of R/S test setup



### 8.2. Test Standard

EN 50130-4: 2011+A1:2014

(IEC61000-4-3: 2006+A1:2007+A2:2010, Severity Level: 3, 10V/m)

### 8.3. Severity Levels and Performance Criterion

#### 8.3.1. Severity Level

Level	Field Strength V/m
1.	1
2.	3
3.	10
X	Special

8.3.2. Performance Criterion : **A**, refer to EN 50130-4 section 10.4.

#### 8.4. EUT Configuration on Test

The configuration of the EUT is same as Section 5.4.

#### 8.5. Operating Condition of EUT

Same as radiated emission measurement, which is listed in Section 5.5 except the test set up replaced by Section 8.1.

#### 8.6. Test Procedure

The EUT are placed on a table which is 0.8 meter high above the ground. The EUT is set 3 meters away from the transmitting antenna which is mounted on an antenna tower. Both horizontal and vertical polarizations of the antenna are set on test. Each of the four sides of the EUT must be faced this transmitting antenna and measured individually. In order to judge the EUT performance, a CCD camera is used to monitor its screen.

All the scanning conditions are as following:

Condition of Test	Remark
1. Fielded Strength	10V/m (Severity Level 3)
2. Scanning Frequency	80-2700MHz
3. Modulation	
(1) Amplitude modulation	80%, 1kHz, sinusoidal
(2) Pulse modulation	1 Hz (0.5s ON, 0.5s OFF)

#### 8.7. Test Results

**PASS.**

Please refer to the following page.

# RF Field Strength Susceptibility Test Results

Shenzhen Accurate Technology Co., Ltd.

Applicant:	Shenzhen Usafe Intelligent Technology Co., Ltd	Test Date:	December 8, 2017
EUT:	Gas Detector	Temperature:	25°C
M/N:	YA-CG916	Humidity:	48%
Field Strength:	10 V/m	Criterion:	A
Power Supply:	DC 12V	Test Mode:	ON
Frequency Range:	80 MHz to 2700 MHz	Test Engineer:	Frank

Modulation:  None  Pulse  AM 1kHz 80%

Frequency Range:  
80 - 2700MHz(10V/m)

Steps	#	/	%	#	/	%
	Horizontal			Vertical		
Front	PASS			PASS		
Right	PASS			PASS		
Rear	PASS			PASS		
Left	PASS			PASS		

**Test Equipment :**

1. Signal Generator : SMB100A(Rohde & Schwarz) & SMF100A(Rohde & Schwarz)
2. Power Amplifier : MT310A(PRANA) & A-001(MILMEGA)
3. Broadband Antenna : HL046E(Rohde & Schwarz)
4. Horn Antenna: ATH800M5GA(AR)

Note:

## 9. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

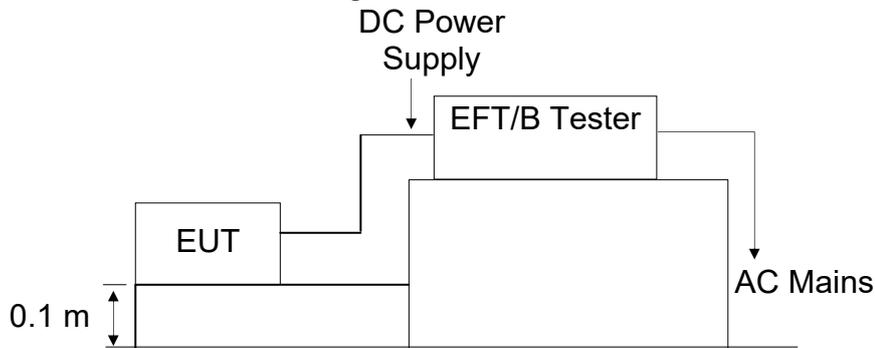
### 9.1. Block Diagram of Test Setup

#### 9.1.1. Block Diagram of the EUT



(EUT: Gas Detector)

#### 9.1.2. Block Diagram of the AC Mains



### 9.2. Test Standard

EN50130-4: 2011

(IEC61000-4-4: 2012 Severity Level, Level 2: 1kV & 0.5kV & 0.25kV)

### 9.3. Severity Levels and Performance Criterion

#### 9.3.1. Severity level

Open Circuit Output Test Voltage $\pm 10\%$		
Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1.	0.5 KV	0.25 KV
2.	1 KV	0.5 KV
3.	2 KV	1 KV
4.	4 KV	2 KV
X	Special	Special

#### 9.3.2. Performance Criterion : **B**

## 9.4.EUT Configuration

The configuration of EUT is listed in Section 5.4.

## 9.5.Operating Condition of EUT

9.5.1.Setup the EUT as shown in Section 9.1.

9.5.2.Turn on the power of all equipments.

9.5.3.Let the EUT work in test mode then measure it.

## 9.6.Test Procedure

The EUT is put on the table, which is 0.1 meter high above the ground. This reference ground plane shall project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m.

9.6.1.For input DC power ports:

The EUT is connected to the power mains by using a coupling device, which couples the EFT interference signal to DC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 2 mins.

## 9.7.Test Result

**PASS.**

Please refer to the following page.

# Electrical Fast Transient/Burst Test Results

Shenzhen Accurate Technology Co., Ltd.

Standard	IEC 61000-4-4: 2012	Result : <input checked="" type="checkbox"/> PASS / <input type="checkbox"/> FAIL	
Applicant : <u>Shenzhen Usafe Intelligent Technology Co., Ltd</u>			
EUT : <u>Gas Detector</u>			
M/N : <u>YA-CG916</u>			
Input Voltage: <u>DC 12V</u>			
Criterion : <u>B</u>			
Ambient Condition :		<u>25 °C</u>	<u>49% RH</u>
Operation Mode: On			
Line : <input type="checkbox"/> AC Mains		Line : <input type="checkbox"/> Signal line <input checked="" type="checkbox"/> DC output line	
Coupling : <input type="checkbox"/> Direct		Coupling : <input checked="" type="checkbox"/> Capacitive	
Test Time : 120s			
Line	Test Voltage	Result(+)	Result(-)
L			
N			
PE			
L、N			
L、PE			
N、PE			
L、N、PE			
DC line	0.25&0.5&1.0KV	PASS	PASS
Note :			
Test Equipment		Burst Tester Model : ULTRA COMPACT SIMULATOR: UCS 500 N5(EM TEST) CAPACITIVE CLAMP: HFK (EM TEST)	

## 10.SURGE IMMUNITY TEST

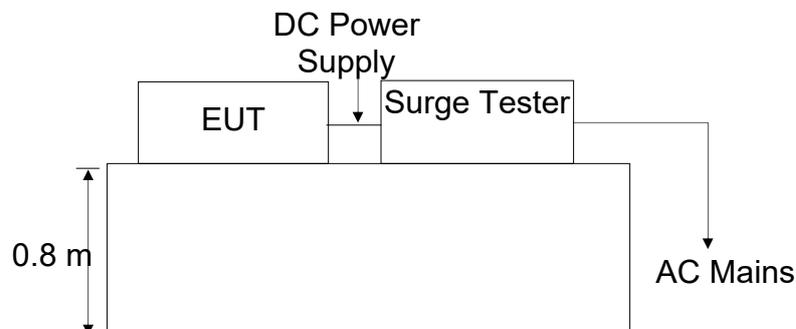
### 10.1.Block Diagram of Test Setup

#### 10.1.1.Block Diagram of the EUT



(EUT: Gas Detector)

#### 10.1.2.Surge Test Setup



### 10.2.Test Standard

EN50130-4: 2011

(IEC61000-4-5: 2014+A1:2017, Severity Level: Level 1&2, 0.5&1.0kV)

### 10.3.Severity Levels and Performance Criterion

#### 10.3.1.Severity level

Severity Level	Open-Circuit Test Voltage KV
1	0.5
2	1.0
3	2.0
4	4.0
*	Special

#### 11.3.2. Performance Criterion: **B**

#### 10.4.EUT Configuration

The configuration of EUT is listed in Section 4.4.

#### 10.5.Operating Condition of EUT

10.5.1.Setup the EUT as shown in Section 10.1.

10.5.2.Turn on the power of all equipments.

10.5.3.Let the EUT work in test mode then measure it.

#### 10.6.Test Procedure

- 1) Set up the EUT and test generator as shown on Section 10.1.2.
- 2) For line to earth coupling mode, provide a 1.0 KV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points.
- 3) At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
- 4) Different phase angles are done individually.
- 5) Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

#### 10.7.Test Result

**PASS.**

Please refer to the following page.



## 11.INJECTED CURRENTS SUSCEPTIBILITY TEST

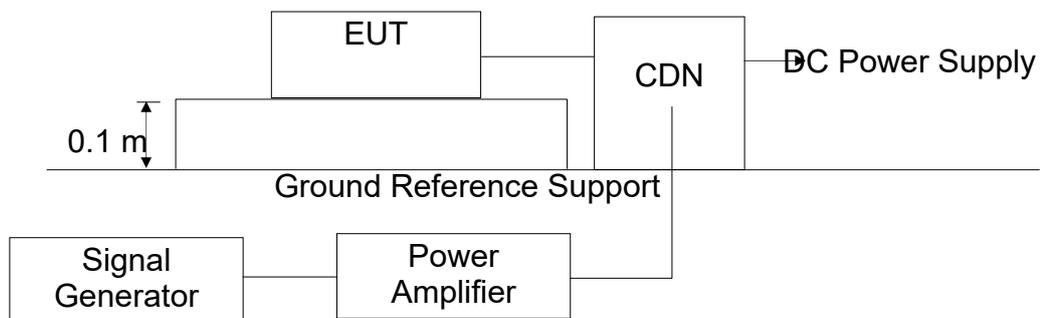
### 11.1.Block Diagram of Test Setup

#### 11.1.1.Block Diagram of the EUT



(EUT: Gas Detector)

#### 11.1.2.Block Diagram of Test Setup



### 11.2.Test Standard

EN50130-4: 2011

(IEC61000-4-6: 2013, Severity Level 3: 10V (rms), 0.15MHz-100MHz)

### 11.3.Severity Levels and Performance Criterion

#### 11.3.1.Severity level

Level	Field Strength V(rms)
1.	1
2.	3
3.	10
X	Special

#### 11.3.2.Performance Criterion: **A**

## 11.4.EUT Configuration

The configuration of EUT is listed in Section 5.4.

## 11.5.Operating Condition of EUT

11.5.1.Setup the EUT as shown in Section 11.1.

11.5.2.Turn on the power of all equipments.

11.5.3.Let the EUT work in test mode then measure it.

## 11.6.Test Procedure

11.6.1.For DC Mains

- 1) Set up the EUT, CDN and test generators as shown on Section 11.1.
- 2) Let the EUT work in test mode and measure it.
- 3) The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
- 4) The disturbance signal described below is injected to EUT through CDN.
- 5) The EUT operates within its operational mode(s) under intended climatic conditions after power on.
- 6) The frequency range is swept from 150kHz to 100MHz using 10V signal level, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave.
- 7) The rate of sweep shall not exceed  $1.5 \times 10^{-3}$  decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
- 8) Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

## 11.7.Test Results

**PASS.**

Please refer to the following page.

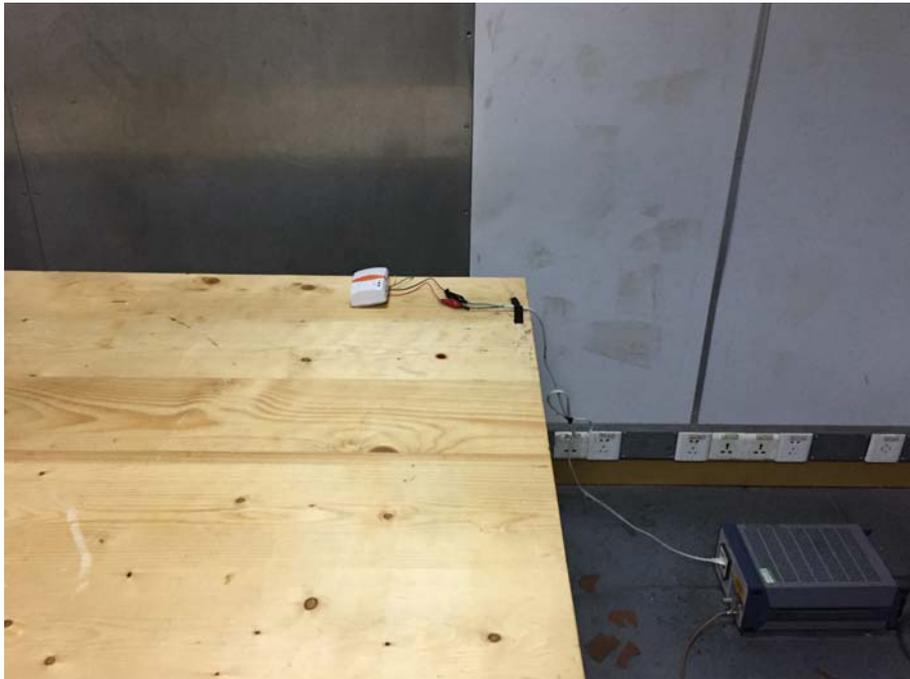
## Injected Currents Susceptibility Test Results

Shenzhen Accurate Technology Co., Ltd.

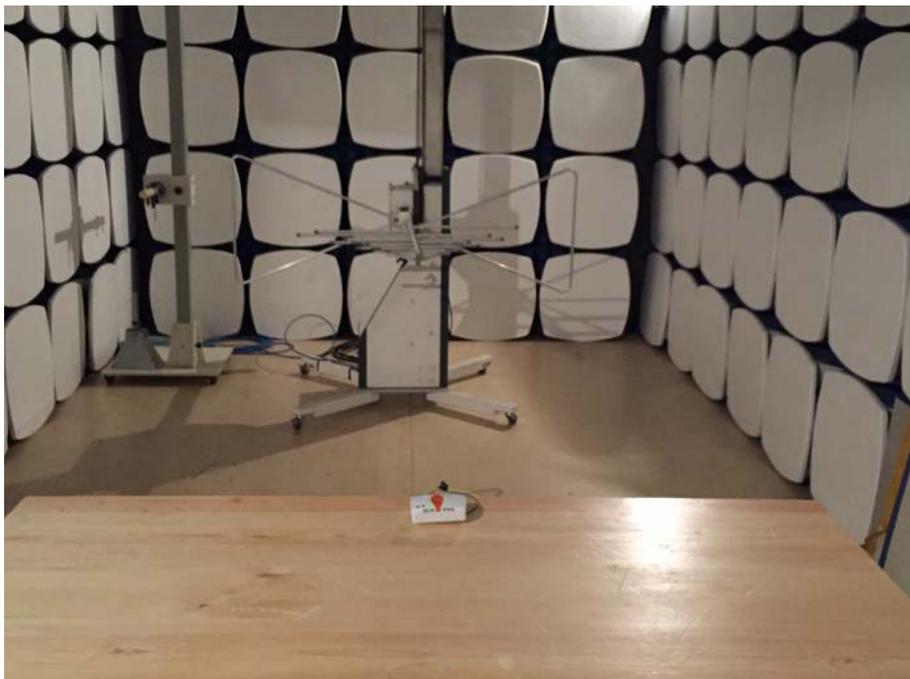
Applicant: <u>Shenzhen Usafe Intelligent Technology Co., Ltd</u>			Test Date : <u>December 8, 2017</u>	
EUT : <u>Gas Detector</u>			Temperature : <u>24°C</u>	
M/N : <u>YA-CG916</u>			Humidity : <u>47%</u>	
Power Supply : <u>DC 12V</u>			Test Engineer : <u>Frank</u>	
Test Mode : On				
Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Criterion	Result
0.15 - 100	DC Mains	10V	A	PASS
Test Mode :				
Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Criterion	Result
Remark : 1. Modulation Signal:1KHz 80% AM 2. Measurement Equipment : Conducted Immunity Test System: CIT-10 (FRANKONIA) CDN : CDN-M2/3 (FRANKONIA) EM Injection Clamp: F-203I-23mm Calibration Fixture: F-203I-23mm-CF			Note:	

## 12.PHOTOGRAPHS

### 12.1.Photo of Conducted Emission Measurement



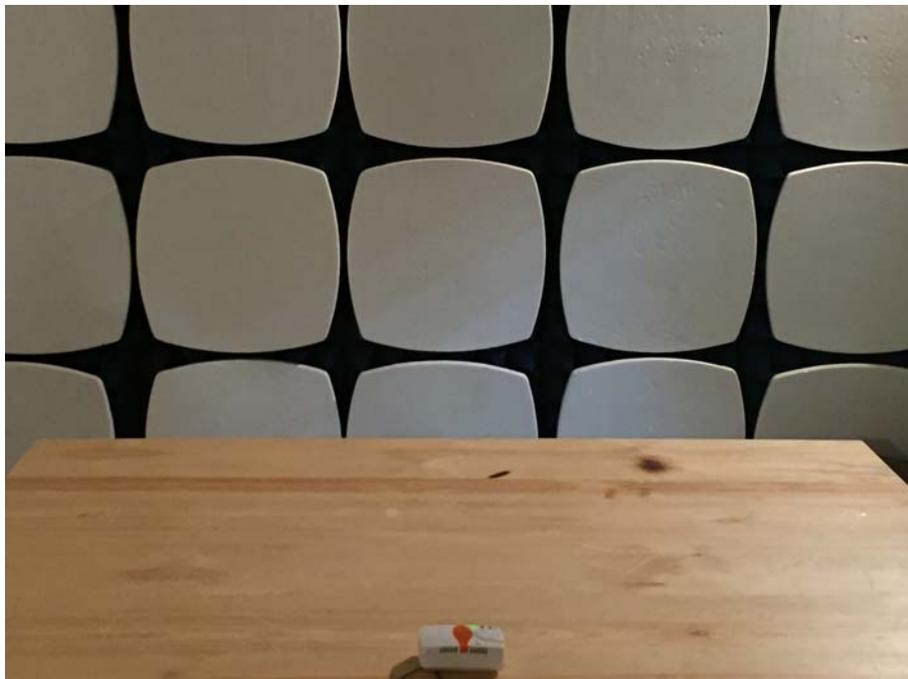
### 12.2.Photos of Radiated Emission Measurement



### 12.3.Photo of Electrostatic Discharge Test



### 12.4.Photo of RF Field Strength Susceptibility Test



### 12.5. Photograph of set-up for EFT/B susceptibility



### 12.6. Photograph of set-up for surge



### 12.7. Photograph of set-up for Conducted Susceptibility



### 12.8. Photographs of the EUT

