



## ACREL CO., LTD.

# CE EMC REPORT

|                  |                                                                                                                            |
|------------------|----------------------------------------------------------------------------------------------------------------------------|
| Prepared For :   | ACREL CO., LTD.<br>No.253, Yulv Road, Jiading District, Shanghai, China                                                    |
| Product Name:    | DJSF SERIES ELECTRONIC DC MEASURING DEVICE                                                                                 |
| Model :          | DJSF1352, DJSF1352-RN, DJSF1352-RN/K, DJSF1352-RN/K-P1,<br>DJSF1352-RN/D                                                   |
| Prepared By :    | BST Testing (Shenzhen) Co.,Ltd.<br>No.7, New Era Industrial Zone, Guantian, Bao'an District,<br>Shenzhen, Guangdong, China |
| Test Date:       | Jun. 17-18, 2019                                                                                                           |
| Date of Report : | Jun. 18, 2019                                                                                                              |
| Report No.:      | BSTXD1906116974060ER                                                                                                       |



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## TEST REPORT DECLARATION

|                 |   |                                                                                                                                                                                                                                                             |
|-----------------|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Applicant       | : | ACREL CO., LTD.                                                                                                                                                                                                                                             |
| Address         | : | No.253, Yulv Road, Jiading District, Shanghai, China                                                                                                                                                                                                        |
| EUT Description | : | DJSF SERIES ELECTRONIC DC MEASURING DEVICE                                                                                                                                                                                                                  |
| Model Number    | : | DJSF1352, DJSF1352-RN, DJSF1352-RN/K,<br>DJSF1352-RN/K-P1, DJSF1352-RN/D<br><b>(Note: The series products have the same circuit diagram, PCB layout and functionality. The differences are the model name and appearance, so, we select Acrel to test.)</b> |

### Test Standards:

EN61326-1:2013

EN61000-3-2:2014

EN61000-3-3:2013

The EUT described above is tested by BST Testing (Shenzhen) Co.,Ltd. EMC Laboratory to determine the maximum emissions from the EUT and ensure the EUT to be compliance with the immunity requirements of the EUT. BST Testing (Shenzhen) Co.,Ltd. EMC Laboratory is assumed full responsibility for the accuracy of the test results. Also, this report shows that the EUT technically complies with the 2014/30/EU directive and its amendment requirements.

The test report is valid for above tested sample only and shall not be reproduced in part without written approval of the laboratory.

Prepared by :

Assistant

Tested by :

Test Engineer

Reviewer :

Approved &amp; Authorized Signer :

Supervisor  
Lab Manager



## 1. TEST RESULTS SUMMARY

Table 1 Test Results Summary

| Test Items                            | Test Results |
|---------------------------------------|--------------|
| Power Line Conducted Emission Test    | PASS         |
| Radiated Emission Test                | PASS         |
| Harmonic Current Emission Test        | PASS         |
| Voltage Fluctuations & Flicker Test   | PASS         |
| Electrostatic Discharge Test          | PASS         |
| RF Field Strength Susceptibility Test | PASS         |
| Electrical Fast Transient/Burst Test  | PASS         |
| Surge Test                            | PASS         |
| Injected Currents Susceptibility Test | PASS         |
| Voltage Dips And Interruptions Test   | PASS         |



## 2. GENERAL INFORMATION

### 2.1. Report information

- 2.1.1. This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that BST approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that BST in any way guarantees the later performance of the product/equipment.
- 2.1.2. The sample/s mentioned in this report is/are supplied by Applicant, BST therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture or any information supplied.
- 2.1.3. Additional copies of the report are available to the Applicant at an additional fee. No third part can obtain a copy of this report through BST, unless the applicant has authorized BST in writing to do so.

### 2.2. Measurement Uncertainty

(95% confidence levels,  $k=2$ )

| Test Item                                                  | Uncertainty |
|------------------------------------------------------------|-------------|
| Uncertainty for Conduction emission test                   | 2.2dB       |
| Uncertainty for Radiation emission test<br>(30MHz to 1GHz) | 4.0dB       |

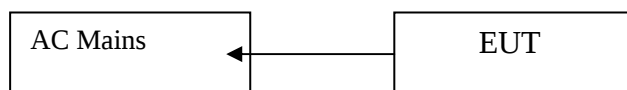


### 3. PRODUCT DESCRIPTION

#### 3.1. EUT Description

|              |   |                                                                                                                        |
|--------------|---|------------------------------------------------------------------------------------------------------------------------|
| Description  | : | DJSF SERIES ELECTRONIC DC MEASURING DEVICE                                                                             |
| Applicant    | : | ACREL CO., LTD.<br>No.253, Yulv Road, Jiading District, Shanghai, China                                                |
| Manufacturer | : | JIANGSU ACREL ELECTRIC MFG. CO., LTD.<br>No.5, Dongmeng Road, Nanzha Street, Jiangyin City,<br>Jiangsu Province, China |
| Model Number | : | DJSF1352, DJSF1352-RN, DJSF1352-RN/K,<br>DJSF1352-RN/K-P1, DJSF1352-RN/D                                               |

#### 3.2. Block Diagram of EUT Configuration



#### 3.3. Operating Condition of EUT

Test mode 1: On

#### 3.4. Test Conditions

Temperature: 23-26℃

Relative Humidity: 55-68 %

#### 3.5. Modifications

No modification was made.



### 3.6. Abbreviations

|     |                                |
|-----|--------------------------------|
| AC  | Alternating Current            |
| AMN | Artificial Mains Network       |
| DC  | Direct Current                 |
| EM  | ElectroMagnetic                |
| EMC | ElectroMagnetic Compatibility  |
| EUT | Equipment Under Test           |
| IF  | Intermediate Frequency         |
| RF  | Radio Frequency                |
| rms | root mean square               |
| EMI | Electromagnetic Interference   |
| EMS | Electromagnetic Susceptibility |

### 3.7. Performance Criterion

**Criterion A:** The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended.

**Criterion B:** After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the equipment is used as intended.

**Criterion C:** Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions.



## 4. T EQUIPMENT USED

### 4.1. For Conducted Emission Test

| Item | Equipment      | Manufacturer    | Model No. | Serial No. | Last Cal.     | Cal. Interval |
|------|----------------|-----------------|-----------|------------|---------------|---------------|
| 1.   | Test Receiver  | Rohde & Schwarz | ESHS30    | 828985/018 | Oct. 08, 2018 | 1 Year        |
| 2.   | Pulse Limiter  | Rohde & Schwarz | ESH3-Z2   | 100006     | Oct. 08, 2018 | 1 Year        |
| 3.   | L.I.S.N.       | Rohde & Schwarz | ESH2-Z5   | 834549/005 | Oct. 08, 2018 | 1 Year        |
| 4.   | Conical        | Emtek           | N/A       | N/A        | N/A           | N/A           |
| 5.   | Voltage Probe  | Schwarzbeck     | TK9416    | N/A        | Oct. 08, 2018 | 1 Year        |
| 6.   | Coaxial Switch | Anritsu         | MP59B     | 6100214550 | Oct. 08, 2018 | 1 Year        |

### 4.2. For Radiated Emission Measurement

| Item | Equipment         | Manufacturer  | Model No. | Serial No. | Last Cal.     | Cal. Interval |
|------|-------------------|---------------|-----------|------------|---------------|---------------|
| 1.   | Spectrum Analyzer | ANRITSU       | MS2661C   | 6200140915 | Oct. 08, 2018 | 1 Year        |
| 2.   | Test Receiver     | Rohde&Schwarz | ESC830    | 828982/018 | Oct. 08, 2018 | 1 Year        |
| 3.   | Bilog Antenna     | Schwarzbeck   | VULB9163  | 142        | Oct. 08, 2018 | 1 Year        |
| 4.   | 50 Coaxial Switch | Anritsu Corp  | MP59B     | 6100237248 | Oct. 08, 2018 | 1 Year        |
| 5.   | Cable             | Schwarzbeck   | AK9513    | ACRX1      | Oct. 08, 2018 | 1 Year        |
| 6.   | Cable             | Rosenberger   | N/A       | FR2RX2     | Oct. 08, 2018 | 1 Year        |
| 7.   | Cable             | Schwarzbeck   | AK9513    | CRRX2      | Oct. 08, 2018 | 1 Year        |
| 8.   | Cable             | Schwarzbeck   | AK9513    | CRRX2      | Oct. 08, 2018 | 1 Year        |
| 9.   | Signal Generator  | HP            | 864A      | 3625U00573 | Oct. 08, 2018 | 1 Year        |

### 4.3. For Harmonic / Flicker Test

| Item | Equipment                     | Manufacturer | Model No. | Serial No. | Last Cal.   | Cal. Interval |
|------|-------------------------------|--------------|-----------|------------|-------------|---------------|
| 1.   | Harmonic and Flicker analyzer | Laplace      | AC2000A   | 309709     | Oct. 08, 18 | 1 Year        |

### 4.4. For Electrostatic Discharge Immunity Test

| Item | Equipment  | Manufacturer | Model No. | Serial No. | Last Cal.   | Cal. Interval |
|------|------------|--------------|-----------|------------|-------------|---------------|
| 1.   | ESD Tester | HAEFELY      | PSD 1600  | H911'292   | Oct. 08, 18 | 1 Year        |

### 4.5. For RF Strength Susceptibility Test

| Item | Equipment               | Manufacturer | Model No.   | Serial No. | Last Cal.   | Cal. Interval |
|------|-------------------------|--------------|-------------|------------|-------------|---------------|
| 1.   | Signal Generator        | HP           | 8648A       | 3633A02081 | Oct. 08, 18 | 1 Year        |
| 2.   | Amplifier               | A&R          | 500A100     | 17034      | NCR         | NCR           |
| 3.   | Amplifier               | A&R          | 100W/1000M1 | 17028      | NCR         | NCR           |
| 4.   | Isotropic Field Monitor | A&R          | FM2000      | 16829      | NCR         | NCR           |
| 5.   | Isotropic Field Probe   | A&R          | FLW220100   | 16755      | Oct. 08, 18 | 1 Year        |
| 6.   | Biconic Antenna         | EMCO         | 3108        | 9507-2534  | NCR         | NCR           |
| 7.   | Log-periodic Antenna    | A&R          | AT1080      | 16812      | NCR         | NCR           |
| 8.   | PC                      | N/A          | 486DX2      | N/A        | N/A         | N/A           |



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

| Item | Equipment    | Manufacturer | Model No. | Serial No. | Last Cal.     | Cal. Interval |
|------|--------------|--------------|-----------|------------|---------------|---------------|
| 1.   | Burst Tester | HAEFELY      | PEFT 4010 | 080981-16  | Oct. 08, 2018 | 1 Year        |

#### 4.7. For Surge Test

| Item | Equipment    | Manufacturer | Model No. | Serial No. | Last Cal.     | Cal. Interval |
|------|--------------|--------------|-----------|------------|---------------|---------------|
| 1.   | Surge Tester | HAEFELY      | PSURGE4.1 | 080107-04  | Oct. 08, 2018 | 1 Year        |

#### 4.8. For Injected Currents Susceptibility Test

| Item | Equipment       | Manufacturer | Model No.   | Serial No.   | Last Cal.     | Cal. Interval |
|------|-----------------|--------------|-------------|--------------|---------------|---------------|
| 1.   | Simulator       | EMTEST       | CWS 500C    | 0900-12      | Oct. 08, 2018 | 1 Year        |
| 2.   | CDN             | EMTEST       | CDN-M2      | 510010010010 | Oct. 08, 2018 | 1 Year        |
| 3.   | VDN             | EMTEST       | CDN-M3      | 0900-11      | Oct. 08, 2018 | 1 Year        |
| 4.   | Injection Clamp | EMTEST       | F-2031-23MM | 368          | Oct. 08, 2018 | 1 Year        |
| 5.   | Attenuator      | EMTEST       | ATT6        | 0010222a     | Oct. 08, 2018 | 1 Year        |

#### 4.9. For Magnetic Field Immunity Test

| Item | Equipment             | Manufacturer | Model No. | Serial No. | Last Cal.     | Cal. Interval |
|------|-----------------------|--------------|-----------|------------|---------------|---------------|
| 1.   | Magnetic Field Tester | HEAFELY      | MAG100.1  | 083858-10  | Oct. 08, 2018 | 1 Year        |

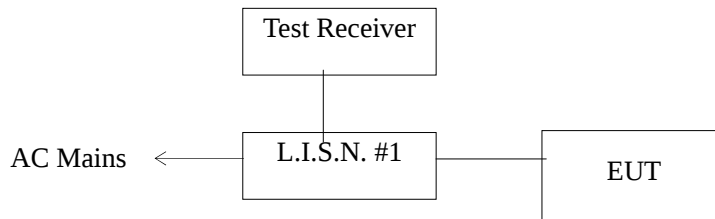
#### 4.10. For Voltage Dips and Interruptions Test

| Item | Equipment   | Manufacturer | Model No.  | Serial No. | Last Cal.     | Cal. Interval |
|------|-------------|--------------|------------|------------|---------------|---------------|
| 1.   | Dips Tester | HEAFELY      | PLINE 1610 | 083732-18  | Oct. 08, 2018 | 1 Year        |



## 5. POWER LINE CONDUCTED EMISSION TEST

### 5.1. Block Diagram of Test Setup



### 5.2. Test Standard

EN61326-1:2013

### 5.3. Power Line Conducted Emission Limit

| Frequency<br>MHz | Limits dB(μV)    |               |
|------------------|------------------|---------------|
|                  | Quasi-peak Level | Average Level |
| 0.15 ~ 0.50      | 66 ~ 56*         | 56 ~ 46*      |
| 0.50 ~ 5.00      | 56               | 46            |
| 5.00 ~ 30.00     | 60               | 50            |

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

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

### 5.4. EUT Configuration on Test

The following equipments are installed on conducted emission test to meet EN61326-1 requirement and operating in a manner, which tends to maximize its emission characteristics in a normal application.

#### 5.4.1. EUT Information

Model Number : DJSF1352  
Serial Number : N/A  
Manufacturer : JIANGSU ACREL ELECTRIC MFG. CO., LTD.



## 5.5. Operating Condition of EUT

5.5.1. Setup the EUT and simulators as shown in Section 5.1.

5.5.2. Turn on the power of all equipments.

5.5.3. Let the EUT work in test modes (ON) and test it.

## 5.6. Test Procedure

The EUT is put on the ground and connected to the AC mains through a Artificial Mains Network (AMN). This provided 50ohm-coupling impedance for the tested equipments. Both sides of AC line are checked to find out the maximum conducted emission levels according to the EN61326-1 regulations during conducted emission test.

The bandwidth of the test receiver is set at 9kHz.

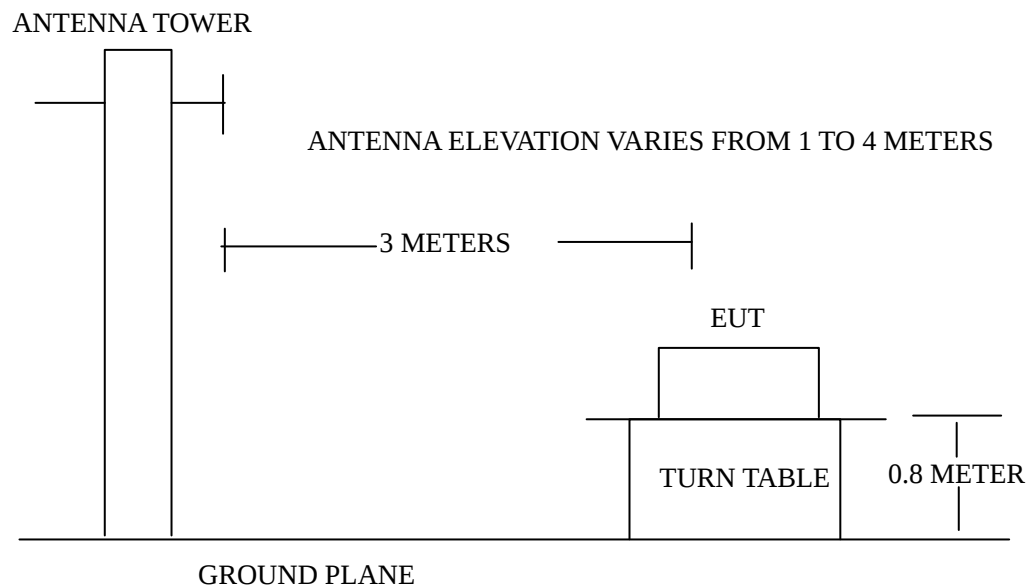
The frequency range from 150 KHz to 30 MHz is investigated. and all the scanning waveform is put in **Appendix I**.

## 5.7. Test Result

**PASS.**

## 6. RADIATED EMISSION TEST

### 6.1. Semi-Anechoic Chamber Setup Diagram



### 6.2. Test Standard

EN61326-1:2013

### 6.3. Radiated Emission Limit

All emanations from a Class B computing devices or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below:

| FREQUENCY<br>(MHz) | DISTANCE<br>(Meters) | FIELD STRENGTHS LIMITS<br>(dB $\mu$ V/m) |
|--------------------|----------------------|------------------------------------------|
| 30 ~ 230           | 3                    | 40                                       |
| 230 ~ 1000         | 3                    | 47                                       |

Note:(1) The tighter limit shall apply at the edge between two frequency bands.

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

### 6.4. EUT Configuration on Test

The EN61326-1 Class B regulations test method must be used to find the maximum emission during radiated emission test.



## 6.5. Operating Condition of EUT

- 6.5.1. Setup the EUT as shown on Section 6.1.
- 6.5.2. Turn on the power of all equipments.
- 6.5.3. Let the EUT work in test mode(On) and measure it.

## 6.6. Test Procedure

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table 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 a antenna tower. The antenna can move up and down between 1 to 4 meters to find out the maximum emission level. Broadband antenna (calibrated by dipole antenna) are used as a receiving antenna. Both horizontal and vertical polarization of the antenna are set on test. The bandwidth setting on the test receiver is 120 KHz. The EUT is tested in Semi-Anechoic Chamber. and all the scanning waveform is put in **Appendix II.**

## 6.7. Test Results

**PASS.**



## 7. HARMONIC CURRENT EMISSION TEST

### 7.1. Block Diagram of Test Setup



### 7.2. Test Standard and Limit

#### 7.2.1. Test Standard

EN61000-3-2:2014

#### 7.2.2. Limits

Table 12 Harmonic Current Test Limit (Class A)

| Harmonic order<br>(n) | Maximum permissible harmonic current<br>(A) |
|-----------------------|---------------------------------------------|
| Odd harmonics         |                                             |
| 3                     | 2.30                                        |
| 5                     | 1.14                                        |
| 7                     | 0.77                                        |
| 9                     | 0.40                                        |
| 11                    | 0.33                                        |
| 13                    | 0.21                                        |
| $15 \leq n \leq 39$   | $0.15 \times 15/n$                          |
| Even harmonics        |                                             |
| 2                     | 1.08                                        |
| 4                     | 0.43                                        |
| 6                     | 0.30                                        |
| $8 \leq n \leq 40$    | $0.23 \times 8/n$                           |



### 7.3. Test Procedure

The power cord of the EUT is connected to the output of the test system. Turn on the Power of the EUT and use the test system to test the harmonic current level.

### 7.4. Test Results

**PASS.**



## 8. VOLTAGE FLUCTUATIONS & FLICKER TEST

### 8.1. Block Diagram of Test Setup

Same as Section 7.1..

### 8.2. Test Standard

EN61000-3-3:2013

### 8.3. Operating Condition of EUT

Same as Section 7.3.. The power cord of the EUT is connected to the output of the test system.  
Turn on the power of the EUT and use the test system to test.

Flicker Test Limit

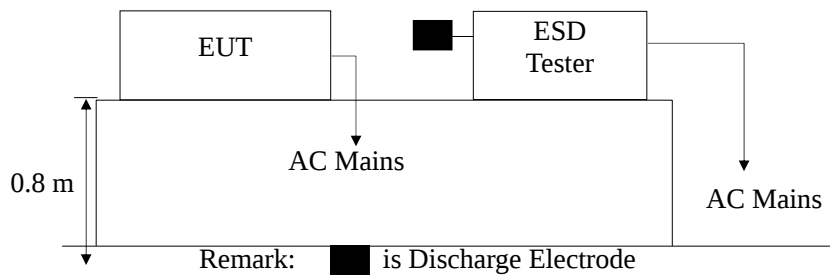
| Test items | Limits                    |
|------------|---------------------------|
| Pst        | 1.0                       |
| dc         | 3.3%                      |
| dmax       | 4.0%                      |
| dt         | Not exceed 3.3% for 500ms |

### 8.4. Test Results

**PASS.**

## 9. ELECTROSTATIC DISCHARGE TEST

### 9.1. Block Diagram of ESD Test Setup



### 9.2. Test Standard

EN61326-1:2013 (EN61000-4-2:2009)

Severity Level 3 for Air Discharge at 8KV

Severity Level 2 for Contact Discharge at 4KV

### 9.3. Severity Levels and Performance Criterion

#### 9.3.1. Severity level

| Level | Test Voltage<br>Contact Discharge (KV) | Test Voltage<br>Air Discharge (KV) |
|-------|----------------------------------------|------------------------------------|
| 1.    | 2                                      | 2                                  |
| 2.    | 4                                      | 4                                  |
| 3.    | 6                                      | 8                                  |
| 4.    | 8                                      | 15                                 |
| X.    | Special                                | Special                            |

#### 9.3.2. Performance criterion: B

### 9.4. EUT Configuration on Test

The configuration of EUT are listed in Section 3.2.



## 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 (on) and test it.

## 9.6. Test Procedure

### 9.6.1. Air Discharge:

This test is done on a non-conductive surfaces. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

### 9.6.2. Contact Discharge:

All the procedure shall be same as Section 9.6.1. except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

### 9.6.3. Indirect discharge for horizontal coupling plane

At least 20 single discharges shall be applied to the horizontal coupling plane, at points on each side of the EUT. The discharge electrode positions vertically at a distance of 0.1m from the EUT and with the discharge electrode touching the coupling plane.

### 9.6.4. Indirect discharge for vertical coupling plane

At least 20 single discharge shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

## 9.7. Test Results

**PASS.**

Please refer to the following page.



## Electrostatic Discharge Test Results

BST Testing (Shenzhen) Co.,Ltd.

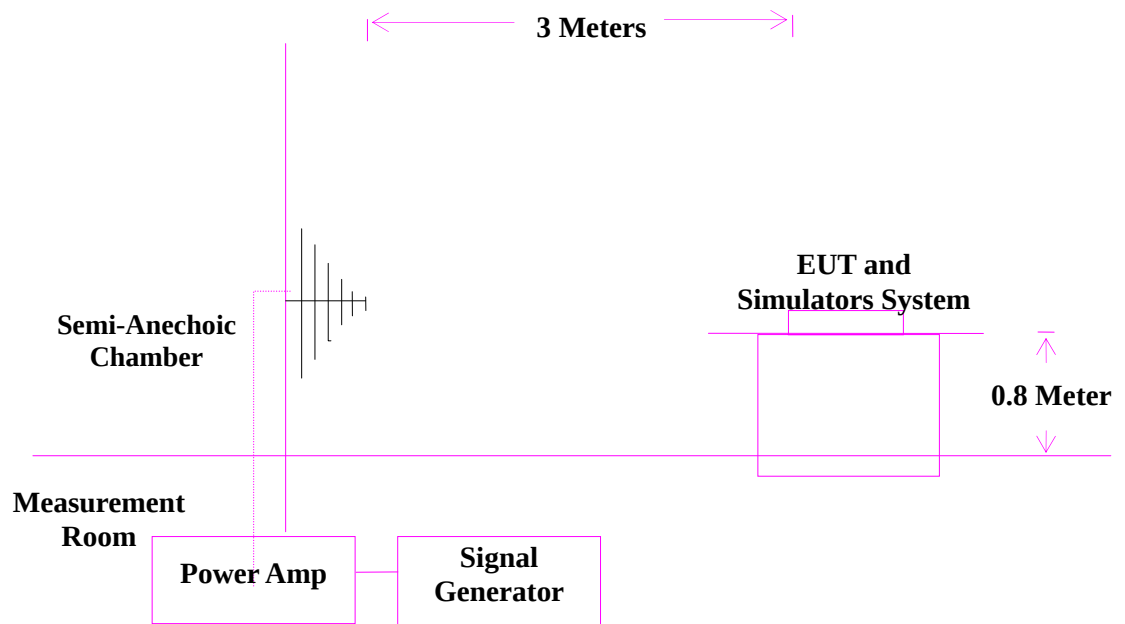
| Applicant                                                                                  | : ACREL CO., LTD.                               | Test Date   | : Jun. 17, 2019 |
|--------------------------------------------------------------------------------------------|-------------------------------------------------|-------------|-----------------|
| EUT                                                                                        | : DJSF SERIES ELECTRONIC DC<br>MEASURING DEVICE | Temperature | : 22 °C         |
| M/N                                                                                        | : DJSF1352                                      | Humidity    | : 50 %          |
| Power Supply                                                                               | : -                                             | Test Mode   | : ON            |
| Test Engineer                                                                              | :                                               |             |                 |
| Air Discharge: $\pm 8KV$ For each point positive 10 times and negative 10 times discharge. |                                                 |             |                 |
| Contact Discharge: $\pm 4KV$                                                               |                                                 |             |                 |
| Location                                                                                   | Kind<br>A-Air Discharge<br>C-Contact Discharge  | Result      |                 |
| Slots                                                                                      | A                                               | PASS        |                 |
| Metal parts                                                                                | C                                               | PASS        |                 |
| HCP                                                                                        | C                                               | PASS        |                 |
| VCP                                                                                        | C                                               | PASS        |                 |

Discharge should be considered on Contact and Air and Horizontal Coupling Plane (HCP) and Vertical Coupling Plane (VCP).



## 10.RF FIELD STRENGTH SUSCEPTIBILITY TEST

### 10.1.R/S Test Setup



### 10.2.Test Standard

EN61326-1:2013 (EN 61000-4-3:2006 + A1:2008 + A2:2010)  
Severity Level 2 at 3V / m

### 10.3.Severity Levels and Performance Criterion

#### 10.3.1.Severity level

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

#### 10.3.2.Performance criterion : A



#### 10.4.EUT Configuration on Test

The configuration of EUT are listed in Section 3.2

#### 10.5.Operating Condition of EUT

Setup the EUT as shown in Section 10.1.. The operating condition of EUT are listed in section 3.3.

#### 10.6.Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter 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 polarization of the antenna are set on test. Each of the four sides of EUT must be faced this transmitting antenna and measured individually. In order to judge the EUT performance, a CCD camera is used to monitor the EUT. All the scanning conditions are as follows :

| Condition of Test            | Remarks                     |
|------------------------------|-----------------------------|
| -----                        | -----                       |
| 1. Fielded Strength          | 3 V/m (Severity Level 2)    |
| 2. Radiated Signal           | Modulated                   |
| 3. Scanning Frequency        | 80 - 1000 MHz,1.4GHz-2.7GHz |
| 4. Sweeping time of radiated | 0.0015 decade/s             |
| 5. Dwell Time                | 1 Sec.                      |

#### 10.7.Test Results

**PASS.**

Please refer to the following page.



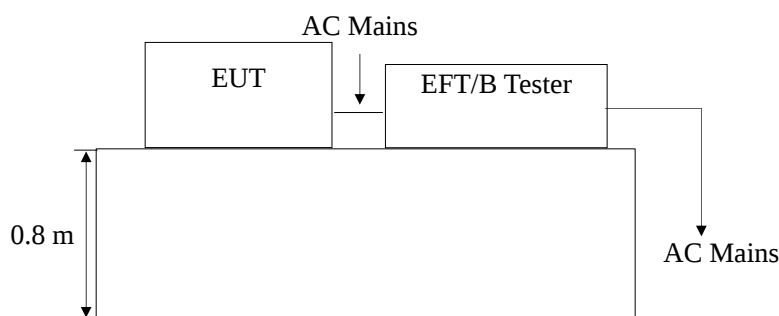
## RF Field Strength Susceptibility Test Results

BST Testing (Shenzhen) Co.,Ltd.

|                                                                                                                           |                                              |                 |                                          |
|---------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|-----------------|------------------------------------------|
| Applicant                                                                                                                 | : ACREL CO., LTD.                            | Test Date       | : Jun. 17, 2019                          |
| EUT                                                                                                                       | : DJSF SERIES ELECTRONIC DC MEASURING DEVICE | Temperature     | : 22 °C                                  |
| M/N                                                                                                                       | : DJSF1352                                   | Humidity        | : 50 %                                   |
| Power Supply                                                                                                              | : -                                          | Test Mode       | : ON                                     |
| Test Engineer                                                                                                             | :                                            | Frequency Range | : 80 MHz to 1000 MHz<br>1.4GHz to 2.7GHz |
| Modulation: <input checked="" type="checkbox"/> AM <input type="checkbox"/> Pulse <input type="checkbox"/> none 1 KHz 80% |                                              |                 |                                          |
| Criterion : A                                                                                                             |                                              |                 |                                          |
|                                                                                                                           | Frequency Rang : 80-1000                     |                 |                                          |
| Steps                                                                                                                     | 1%                                           | 1%              |                                          |
|                                                                                                                           | Horizontal                                   | Vertical        |                                          |
| Front                                                                                                                     | Pass                                         | Pass            |                                          |
| Right                                                                                                                     | Pass                                         | Pass            |                                          |
| Rear                                                                                                                      | Pass                                         | Pass            |                                          |
| Left                                                                                                                      | Pass                                         | Pass            |                                          |

## 11.ELECTRICAL FAST TRANSIENT/BURST TEST

### 11.1.EFT Test Setup



### 11.2.Test Standard

EN61326-1:2013 (EN61000-4-4:2012)  
Severity Level 2 at 1KV(5/50 ns, 5 kHz)

### 11.3.Severity Levels and Performance Criterion

#### 11.3.1.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                                             |

#### 11.3.2.Performance criterion : B

### 11.4.EUT Configuration on Test

The configuration of EUT are listed in Section 3.2..

### 11.5.Operating Condition of EUT

Setup the EUT as shown in Section 11.1.. The operating condition of EUT are listed in section 3.3.



## 11.6. Test Procedure

The EUT is put on the table which is 0.8 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 the EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m.

### 11.6.1. For input and output AC power ports:

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

### 11.6.2. For signal lines and control lines ports:

It's unnecessary to test.

### 11.6.3. For DC output line ports:

It's unnecessary to test.

## 11.7. Test Results

**PASS.**



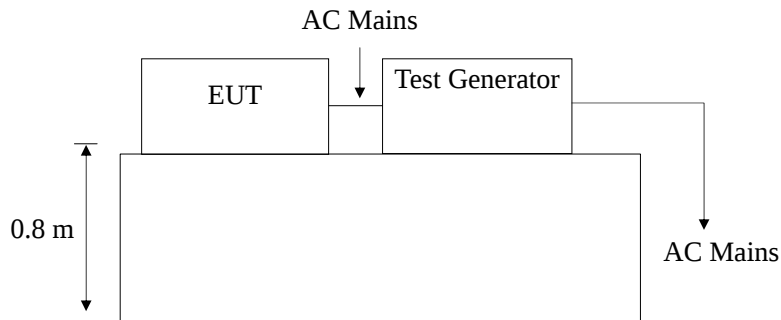
## Electrical Fast Transient/Burst Test Results

BST Testing (Shenzhen) Co.,Ltd.

|                                                                |                                  |                       |                      |                |                      |                   |                       |                      |                |
|----------------------------------------------------------------|----------------------------------|-----------------------|----------------------|----------------|----------------------|-------------------|-----------------------|----------------------|----------------|
| <i>Applicant</i> : <i>ACREL CO., LTD.</i>                      |                                  |                       |                      |                | <i>Test Date</i> :   |                   | <i>Jun. 17, 2019</i>  |                      |                |
| <i>EUT</i> : <i>DJSF SERIES ELECTRONIC DC MEASURING DEVICE</i> |                                  |                       |                      |                | <i>Temperature</i> : |                   | <i>22 ℃</i>           |                      |                |
| <i>M/N</i> : <i>DJSF1352</i>                                   |                                  |                       |                      |                | <i>Humidity</i> :    |                   | <i>50 %</i>           |                      |                |
| <i>Power Supply</i> : -                                        |                                  |                       |                      |                | <i>Test Mode</i> :   |                   | <i>ON</i>             |                      |                |
| <i>Test Engineer</i> :                                         |                                  |                       |                      |                |                      |                   |                       |                      |                |
| <i>Inject Place : AC Mains</i>                                 |                                  |                       |                      |                |                      |                   |                       |                      |                |
| <i>Inject Line</i>                                             | <i>Voltage KV</i>                | <i>Inject Time(s)</i> | <i>Inject Method</i> | <i>Results</i> | <i>Inject Line</i>   | <i>Voltage KV</i> | <i>Inject Time(s)</i> | <i>Inject Method</i> | <i>Results</i> |
| <i>L</i>                                                       | <i>±1KV<br/>(5/50 ns, 5 kHz)</i> | <i>120</i>            | <i>Direct</i>        | <i>PASS</i>    |                      |                   |                       |                      |                |
| <i>N</i>                                                       | <i>±1KV<br/>(5/50 ns, 5 kHz)</i> | <i>120</i>            | <i>Direct</i>        | <i>PASS</i>    |                      |                   |                       |                      |                |
| <i>L N</i>                                                     | <i>±1KV<br/>(5/50 ns, 5 kHz)</i> | <i>120</i>            | <i>Direct</i>        | <i>PASS</i>    |                      |                   |                       |                      |                |
|                                                                |                                  |                       |                      |                |                      |                   |                       |                      |                |
|                                                                |                                  |                       |                      |                |                      |                   |                       |                      |                |
|                                                                |                                  |                       |                      |                |                      |                   |                       |                      |                |
|                                                                |                                  |                       |                      |                |                      |                   |                       |                      |                |
|                                                                |                                  |                       |                      |                |                      |                   |                       |                      |                |

## 12.SURGE TEST

### 12.1.Surge Test Setup



### 12.2.Test Standard

EN61326-1:2013 (EN61000-4-5:2014)  
Severity Level 2 for Line to Neutral at 0.5 kVa/1 kVb

### 12.3.Severity Levels and Performance Criterion

#### 12.3.1.Severity level

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

Performance criterion : C

### 12.4.EUT Configuration on Test

The configuration of EUT are listed in Section 3.2.

### 12.5.Operating Condition of EUT

12.5.1.Setup the EUT as shown in Section 12.1..

12.5.2.Turn on the power of all equipments.

12.5.3.Let the EUT work in test mode (on) and test it.



## 12.6.Test Procedure

- 1) Setup the EUT and test generator as shown on Section 12.1.
- 2) For line to line coupling mode, provide a 0.5KV 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.

## 12.7.Test Results

**PASS.**



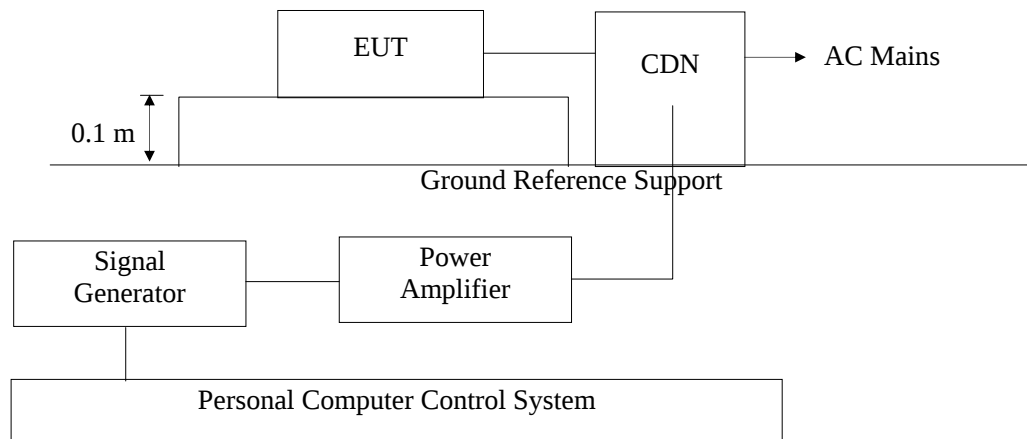
## Surge Immunity Test Results

BST Testing (Shenzhen) Co.,Ltd.

| Applicant : ACREL CO., LTD.                      |          |             |             | Test Date : Jun. 17, 2019 |        |
|--------------------------------------------------|----------|-------------|-------------|---------------------------|--------|
| EUT : DJSF SERIES ELECTRONIC DC MEASURING DEVICE |          |             |             | Temperature : 22 °C       |        |
| M/N : DJSF1352                                   |          |             |             | Humidity : 50 %           |        |
| Power Supply : -                                 |          |             |             | Test Mode : ON            |        |
| Test Engineer :                                  |          |             |             |                           |        |
| Location                                         | Polarity | Phase Angle | No of Pulse | Pulse Voltage (KV)        | Result |
| L-N                                              | +        | 0           | 5           | 0.5 kV/1 kV               | PASS   |
|                                                  | +        | 90          | 5           | 0.5 kV/1 kV               | PASS   |
|                                                  | +        | 180         | 5           | 0.5 kV/1 kV               | PASS   |
|                                                  | +        | 270         | 5           | 0.5 kV/1 kV               | PASS   |
|                                                  | -        | 0           | 5           | 0.5 kV/1 kV               | PASS   |
|                                                  | -        | 90          | 5           | 0.5 kV/1 kV               | PASS   |
|                                                  | -        | 180         | 5           | 0.5 kV/1 kV               | PASS   |
|                                                  | -        | 270         | 5           | 0.5 kV/1 kV               | PASS   |

## 13. INJECTED CURRENTS SUSCEPTIBILITY TEST

### 13.1. Block Diagram of Test AC Mains Setup



### 13.2. Test Standard

EN61326-1:2013 (EN61000-4-6:2014)

Severity Level 2 at 1 V (rms), 0.15MHz ~ 80MHz

### 13.3. Severity Levels and Performance Criterion

#### 13.3.1. Severity level

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

#### 13.3.2. Performance criterion: A

### 13.4. EUT Configuration on Test

The configuration of EUT are listed in Section 3.2



### 13.5.Operating Condition of EUT

Setup the EUT as shown in Section 13.1.. The operating condition of EUT are listed in section 3.3

### 13.6.Test Procedure

- 1) Set up the EUT, CDN and test generators as shown on Section 13.1.
- 2) Let the EUT work in test mode and test it.
- 3) The EUT are placed on an insulating support 0.8m 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 80MHz using 1V 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.

### 13.7.Test Results

**PASS .**



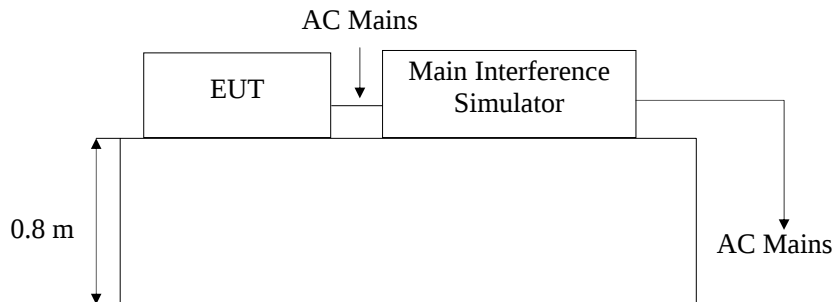
## Injected Currents Susceptibility Test Results

BST Testing (Shenzhen) Co.,Ltd.

| Applicant : ACREL CO., LTD.                      |                   |                      | Test Date : Jun. 17, 2019 |        |
|--------------------------------------------------|-------------------|----------------------|---------------------------|--------|
| EUT : DJSF SERIES ELECTRONIC DC MEASURING DEVICE |                   |                      | Temperature : 22 °C       |        |
| M/N : DJSF1352                                   |                   |                      | Humidity : 50 %           |        |
| Power Supply : -                                 |                   |                      | Test Mode : ON            |        |
| Test Engineer :                                  |                   |                      |                           |        |
| Frequency Range (MHz)                            | Injected Position | Strength             | Criterion                 | Result |
| 0.15 ~ 20                                        | AC Line           | 1V(rms), Unmodulated | A                         | PASS   |
| 20 ~ 80                                          | AC Line           | 1V(rms), Unmodulated | A                         | PASS   |

## 14. VOLTAGE DIPS AND INTERRUPTIONS TEST

### 14.1. Voltage Dips and Interruptions Test Setup



Remark: Combination wave generator and decoupling network are included in test generator.

### 14.2. Test Standard

EN61326-1:2006 (EN61000-4-11:2004)

### 14.3. Severity Levels and Performance Criterion

#### 14.3.1. Severity level

| Test Level<br>%U <sub>T</sub> | Voltage dip and short<br>interruptions<br>%U <sub>T</sub> | Duration<br>(in period) |
|-------------------------------|-----------------------------------------------------------|-------------------------|
| 0                             | 100                                                       | 0.5p                    |
| 40                            | 60                                                        | 5p                      |
| 70                            | 30                                                        | 0.5p                    |

#### 14.3.2. Performance criterion : C & B

### 14.4. EUT Configuration on Test

The configuration of EUT are listed in Section 3.2.

### 14.5. Operating Condition of EUT

14.5.1. Setup the EUT as shown in Section 14.1.

14.5.2. Turn on the power of all equipments.

14.5.3. Let the EUT work in test mode (ON) and test it.



#### 14.6.Test Procedure

- 1) Set up the EUT and test generator as shown on Section 14.1.
- 2) The interruptions is introduced at selected phase angles with specified duration.
- 3) Record any degradation of performance.

#### 14.7.Test Result

**PASS.**



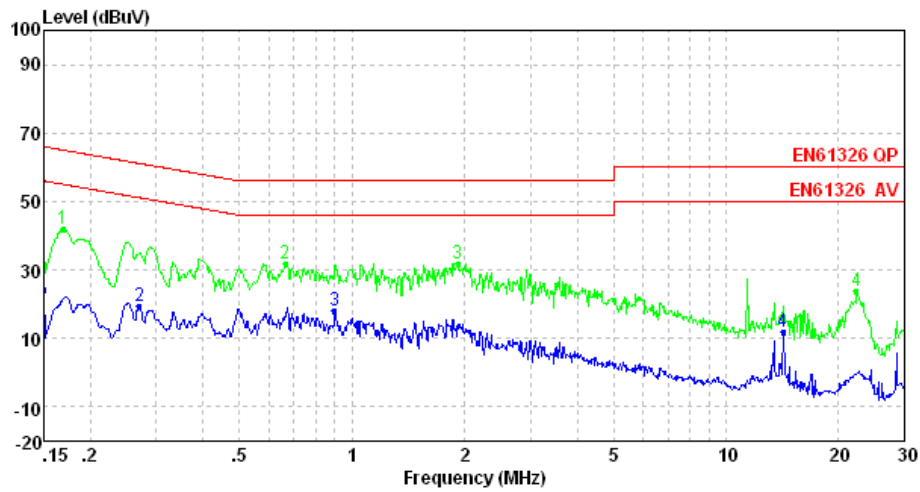
## Voltage Dips And Interruptions Test Results

BST Testing (Shenzhen) Co.,Ltd.

|                              |                                                              |                                 |                    |                      |               |
|------------------------------|--------------------------------------------------------------|---------------------------------|--------------------|----------------------|---------------|
| <i>Applicant</i> :           | ACREL CO., LTD.                                              |                                 |                    | <i>Test Date</i> :   | Jun. 17, 2019 |
| <i>EUT</i> :                 | DJSF SERIES ELECTRONIC DC<br>MEASURING DEVICE                |                                 |                    | <i>Temperature</i> : | 22 ℃          |
| <i>M/N</i> :                 | DJSF1352                                                     |                                 |                    | <i>Humidity</i> :    | 50 %          |
| <i>Power Supply</i> :        | -                                                            |                                 |                    | <i>Test Mode</i> :   | ON            |
| <i>Test Engineer</i> :       |                                                              |                                 |                    |                      |               |
| <i>Test Level</i><br>% $U_T$ | <i>Voltage Dips &amp;<br/>Short Interruptions</i><br>% $U_T$ | <i>Duration (in<br/>period)</i> | <i>Phase Angle</i> | <i>Criterion</i>     | <i>Result</i> |
| 0                            | 100                                                          | 0.5P                            | 0° ~360°           | C                    | PASS          |
| 40                           | 60                                                           | 5P                              | 0° ~360°           | C                    | PASS          |
| 70                           | 30                                                           | 0.5P                            | 0° ~360°           | B                    | PASS          |



## APPENDIX I



Site : Shenzhen BST Technology Co.,Ltd.

Condition:

: RBW:9.000KHz VBW:300.000KHz

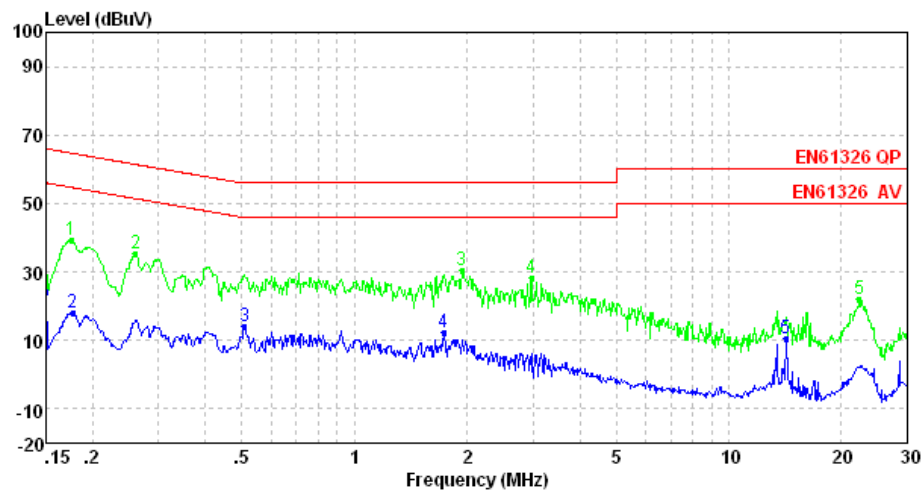
|       | Freq  | Level | Limit | Over   |         |        |
|-------|-------|-------|-------|--------|---------|--------|
|       | MHz   | dBuV  | Line  | Limit  | dB      | Remark |
| 1 Max | 0.15  | 24.44 | 56.00 | -31.56 | Average | LINE   |
| 2     | 0.27  | 19.50 | 51.12 | -31.62 | Average | LINE   |
| 3     | 0.90  | 17.92 | 46.00 | -28.08 | Average | LINE   |
| 4     | 14.21 | 11.81 | 50.00 | -38.19 | Average | LINE   |

Site : Shenzhen BST Technology Co.,Ltd.

Condition:

: RBW:9.000KHz VBW:300.000KHz

|       | Freq  | Level | Limit | Over   |      |        |
|-------|-------|-------|-------|--------|------|--------|
|       | MHz   | dBuV  | Line  | Limit  | dB   | Remark |
| 1 Max | 0.17  | 41.95 | 65.03 | -23.08 | Peak | LINE   |
| 2     | 0.66  | 31.83 | 56.00 | -24.17 | Peak | LINE   |
| 3     | 1.92  | 31.69 | 56.00 | -24.31 | Peak | LINE   |
| 4     | 22.30 | 23.90 | 60.00 | -36.10 | Peak | LINE   |



Site : Shenzhen BST Technology Co.,Ltd.

Condition:

: RBW:9.000KHz VBW:300.000KHz

|       | Freq  | Level | Limit | Over   | Remark  | Pol/Phase |
|-------|-------|-------|-------|--------|---------|-----------|
|       | MHz   | dBuV  | dBuV  | dB     |         |           |
| 1 Max | 0.15  | 24.46 | 56.00 | -31.54 | Average | NEUTRAL   |
| 2     | 0.18  | 18.22 | 54.64 | -36.42 | Average | NEUTRAL   |
| 3     | 0.51  | 14.08 | 46.00 | -31.92 | Average | NEUTRAL   |
| 4     | 1.73  | 12.24 | 46.00 | -33.76 | Average | NEUTRAL   |
| 5     | 14.21 | 10.63 | 50.00 | -39.37 | Average | NEUTRAL   |

Site : Shenzhen BST Technology Co.,Ltd.

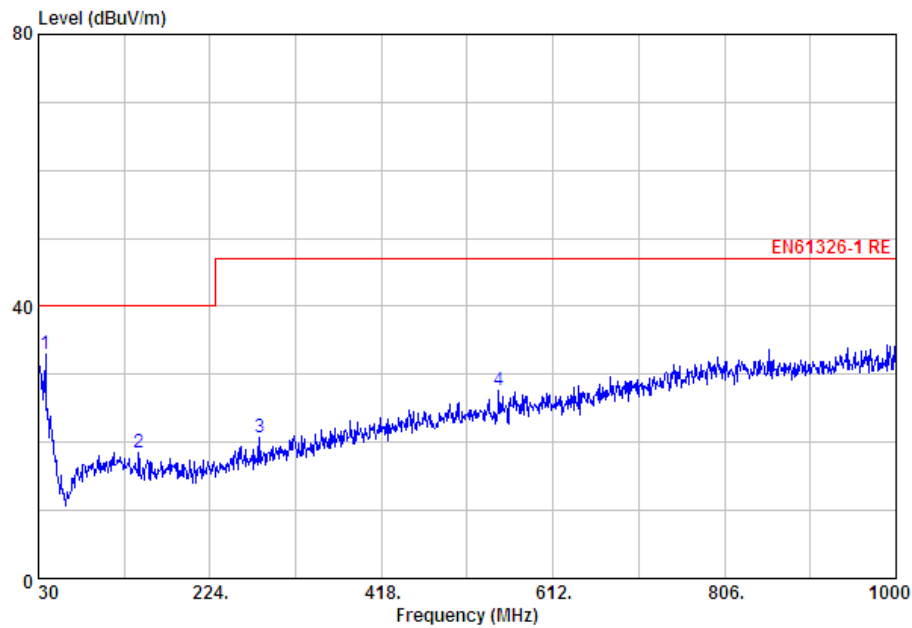
Condition:

: RBW:9.000KHz VBW:300.000KHz

|       | Freq  | Level | Limit | Over   | Remark | Pol/Phase |
|-------|-------|-------|-------|--------|--------|-----------|
|       | MHz   | dBuV  | dBuV  | dB     |        |           |
| 1 Max | 0.17  | 39.34 | 64.72 | -25.38 | Peak   | NEUTRAL   |
| 2     | 0.26  | 35.34 | 61.42 | -26.08 | Peak   | NEUTRAL   |
| 3     | 1.94  | 30.31 | 56.00 | -25.69 | Peak   | NEUTRAL   |
| 4     | 2.98  | 28.40 | 56.00 | -27.60 | Peak   | NEUTRAL   |
| 5     | 22.30 | 22.05 | 60.00 | -37.95 | Peak   | NEUTRAL   |

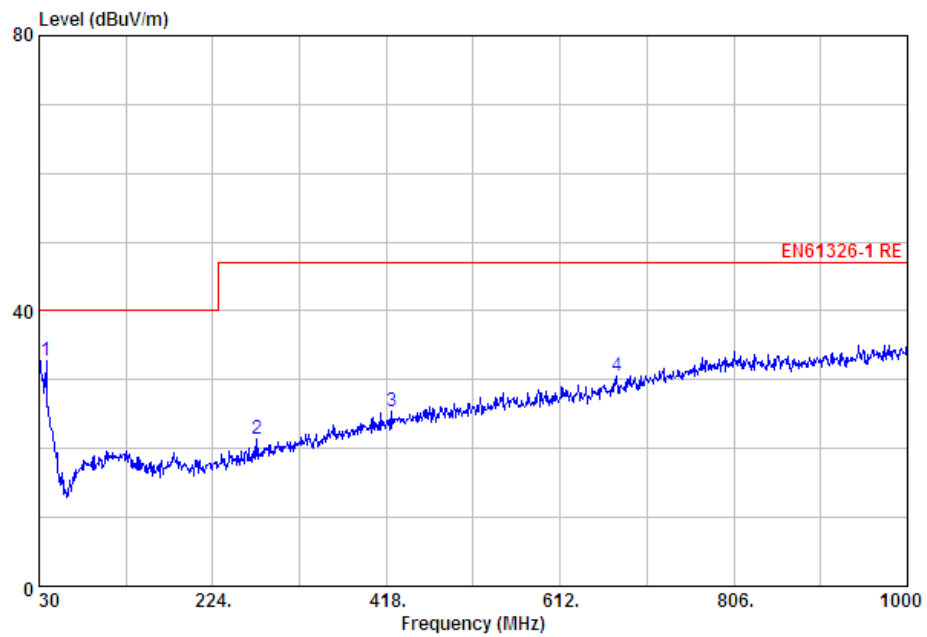


## APPENDIX II



Condition : EN61326-1 RE 3m HORIZONTAL  
: RBW:120.000KHz VBW:300.000KHz SWT:Auto

|       | Freq   | Level  | Limit  |        | Over | Remark | Pol/Phase  |
|-------|--------|--------|--------|--------|------|--------|------------|
|       |        |        | Line   | Line   |      |        |            |
|       | MHz    | dBuV/m | dBuV/m | dB     |      |        |            |
| 1 max | 37.76  | 33.06  | 40.00  | -6.94  | Peak |        | HORIZONTAL |
| 2     | 143.49 | 18.50  | 40.00  | -21.50 | Peak |        | HORIZONTAL |
| 3     | 280.26 | 20.65  | 47.00  | -26.35 | Peak |        | HORIZONTAL |
| 4     | 550.89 | 27.54  | 47.00  | -19.46 | Peak |        | HORIZONTAL |



Condition : EN61326-1 RE 3m VERTICAL  
: RBW:120.000KHz VBW:300.000KHz SWT:Auto

|       | Freq   | Level  | Limit  | Over   | Remark | Pol/Phase |
|-------|--------|--------|--------|--------|--------|-----------|
|       | MHz    | dBuV/m | dBuV/m | dB     |        |           |
| 1 max | 37.76  | 32.82  | 40.00  | -7.18  | Peak   | VERTICAL  |
| 2     | 273.47 | 21.38  | 47.00  | -25.62 | Peak   | VERTICAL  |
| 3     | 423.82 | 25.31  | 47.00  | -21.69 | Peak   | VERTICAL  |
| 4     | 675.05 | 30.58  | 47.00  | -16.42 | Peak   | VERTICAL  |



## APPENDIX III

**Photo 1 General Appearance of the EUT****Photo 2 General Appearance of the EUT**

**Photo 3 General Appearance of the EUT**



**Photo 4 General Appearance of the EUT**

