

# **G<sup>+</sup>ENESYS<sup>TM</sup>**

## **EN61000**

## **DATA**

| DWG: IA761-58-01                                                                             |                     |                     |
|----------------------------------------------------------------------------------------------|---------------------|---------------------|
| APPD                                                                                         | CHK                 | DWG                 |
| 16/10/17  | Yaniv<br>10/10/2017 | Yaniv<br>10/10/2017 |

**TDK-LAMBDA**

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The above data is typical value.

The values are considered to be actual capability data.

## 1-2 List of equipment used

| EQUIPMENT USED |                                       | MANUFACTURER       | MODEL No.       |
|----------------|---------------------------------------|--------------------|-----------------|
| 1              | Storage oscilloscope                  | Yokogawa           | DL7100          |
| 2              | Storage oscilloscope                  | Yokogawa           | DL1740          |
| 3              | Digital multimeter                    | HP                 | 34401A          |
| 4              | Digital power meter                   | Yokogawa           | WT130           |
| 5              | Digital power meter                   | Yokogawa           | WT230           |
| 6              | Autotransformer                       | Metrel             | HSN 260/30      |
| 7              | Autotransformer                       | Metrel             | HTN 450/20      |
| 8              | Resistive load                        | NLI                | 10V             |
| 9              | Resistive load                        | NLI                | 600V            |
| 10             | AC source                             | Chroma             | 6590            |
| 11             | ESD simulator system                  | NOISEKEN           | ESS2000         |
| 12             | EFT/B Generator                       | TESEQ              | NSG3060         |
| 13             | Surge Generator                       | TESEQ              | NSG3060 CDN3063 |
| 14             | RF Signal Generator 150kHz-230MHz     | SCHLODER           | CDG-6000        |
| 15             | Coupling/Decoupling Network           | COMPOWER           | ATTN-6-100W     |
| 16             | Coupling/Decoupling Network           | SCHLODER           | CDN-RJ45-S      |
| 17             | Coupling/Decoupling Network           | SCHLODER           | CDN-M4-32A      |
| 18             | Current Injection Probe               | FISCHER            | F-120-9A        |
| 19             | Anechoic test chamber                 | Hermon Labs        | AC-2            |
| 20             | Antenna,biconical, 20-300MHz,1kW      | A.H.Systems inc.   | SAS-200/543     |
| 21             | Antenna,1-18GHz,300W                  | EMC Test Systems   | 3115            |
| 22             | RF signal generator,10kHz-1.05GHz     | Fluke              | 6061A           |
| 23             | Monitor,field,10kHz-1GHz,1-300V/m     | Amplifier Research | FM1000          |
| 24             | Coupling-decoupling network according | Hermon Labs        | 50141S1         |
| 25             | RF amplifier,500MHz -1000MHz,120W     | Hermon Labs        | A-120           |
| 26             | RF amplifier,1 to 4 GHz,55W           | Milmega            | AS 0104-55/55   |
| 27             | RF power meter                        | Boonton            | 4200            |

## 1. Electrostatic discharge (ESD) (IEC 61000-4-2; EN 61204-3/ IEC 61204-3)

### (1) Equipment used:

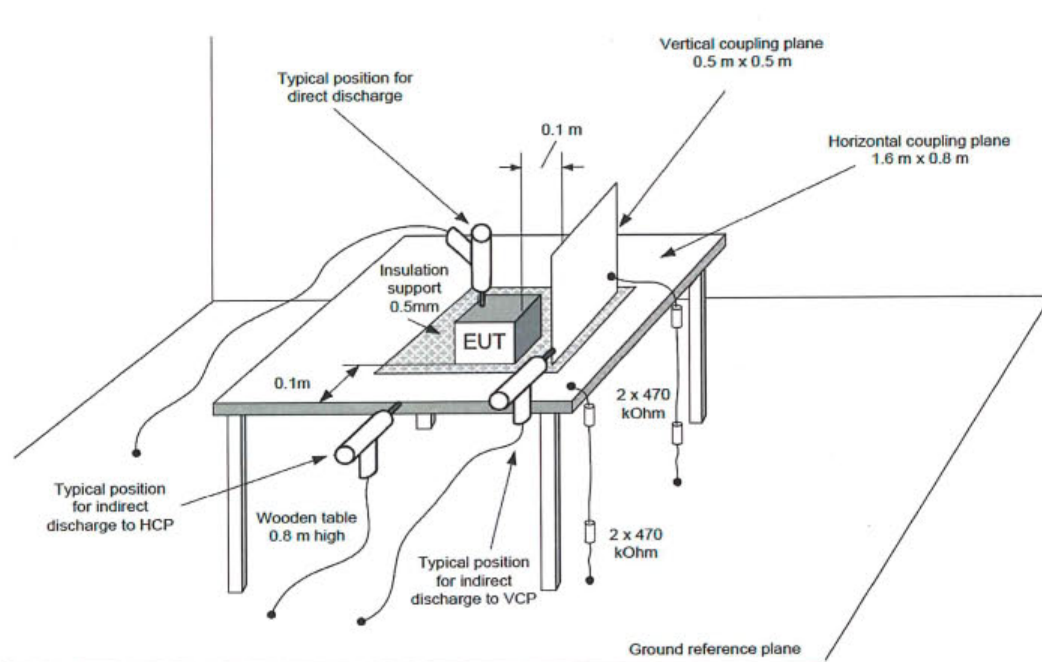
ESD simulator system: NOISEKEN ESS2000  
Discharge resistance: 330Ω Capacitor: 150pF

### (2) Test conditions:

|                  |                          |                     |           |
|------------------|--------------------------|---------------------|-----------|
| Input voltage:   | Rated                    | Output voltage:     | Rated     |
| Output current:  | 100%                     | Polarity:           | -, +      |
| Number of tests: | 10 Positive/ 10 Negative | Discharge interval: | >1 Second |

### (3) Test setup:

Contact discharge: FG, Case screw  
Air discharge: Input and Output terminal



### (4) Acceptable conditions:

1. Output voltage regulation not to exceed  $\pm 5\%$  of initial (before test) value during test.
2. Output voltage to be within regulation specification after the test.
3. Along with 1 and 2, no discharge of fire or smoke, as well as no output failure.

### (5) Test result:

| Contact discharge |         |          | Air discharge  |         |          |
|-------------------|---------|----------|----------------|---------|----------|
| Discharge (kV)    | G10-500 | G600-8.5 | Discharge (kV) | G10-500 | G600-8.5 |
| 2                 | PASS    | PASS     | 2              | PASS    | PASS     |
| 4                 | PASS    | PASS     | 4              | PASS    | PASS     |
|                   |         |          | 8              | PASS    | PASS     |



## 2. Radiated immunity to radio frequency electromagnetic field (IEC 61000-4-3; EN 61204-3/ IEC 61204-3)

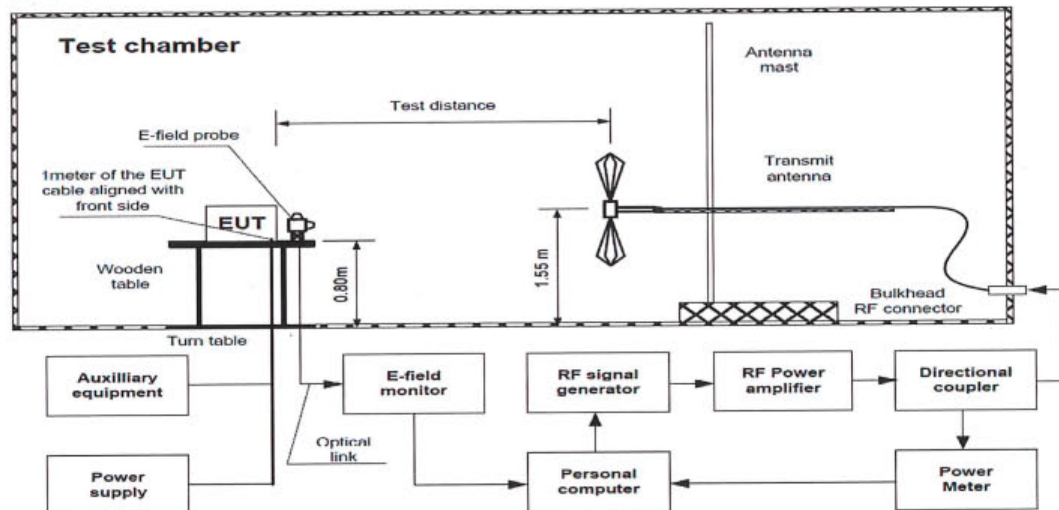
### (1) Equipment used:

Anechoic test chamber  
Antenna, biconical, high power 20-300MHz, 1kW  
Antenna, double-ridged waveguide horn, 1-18GHz, 300W  
Synthesized RF signal generator, 10kHz-1.05GHz  
Monitor, field, 10kHz-1GHz, 1-300V/m, w/fiberoptic  
Coupling-decoupling network according to ENV 50141 (S1)  
RF amplifier, 500MHz to 1000MHz, 120W  
RF amplifier, 1 to 4 GHz, 55W  
RF power meter

Hermon Labs AC-2  
A.H.Systems inc. SAS-200/543  
EMC Test Systems 3115  
Fluke 6061A  
Amplifier Research FM1000  
Hermon Labs 50141S1  
Hermon Labs A-120  
Milmega AS 0104-55/55B  
Boonton 4200

### (2) Test conditions and test setup:

|                            |                                                       |                      |           |
|----------------------------|-------------------------------------------------------|----------------------|-----------|
| Input voltage:             | Rated                                                 | Output voltage:      | Rated     |
| Output current:            | 100%                                                  | Amplitude Modulated: | 80%, 1kHz |
| Electromagnetic Frequency: | 80~2700MHz                                            | Ambient temperature: | 25°C      |
| Sweep Condition:           | 1.5 x 10 <sup>-3</sup> Decade/Second, 1.0 Second Hold |                      |           |



### (3) Acceptable conditions:

1. Output voltage regulation not to exceed  $\pm 5\%$  of initial (before test) value during test.
2. Output voltage to be within regulation specification after the test.
3. Along with 1 and 2, no discharge of fire or smoke, as well as no output failure.

### (4) Test Result:

| Frequency (GHz) | Radiated Field Strength (Vrms/m) | G10-500 | G600-8.5 |
|-----------------|----------------------------------|---------|----------|
| 0.08-1          | 10                               | PASS    | PASS     |
| 1.4-2           | 3                                | PASS    | PASS     |
| 2-2.7           | 1                                | PASS    | PASS     |

### 3. Eelectrical fast transient/ burst (EFT/ B) (IEC 61000-4-4; EN 61204-3/ IEC 61204-3)

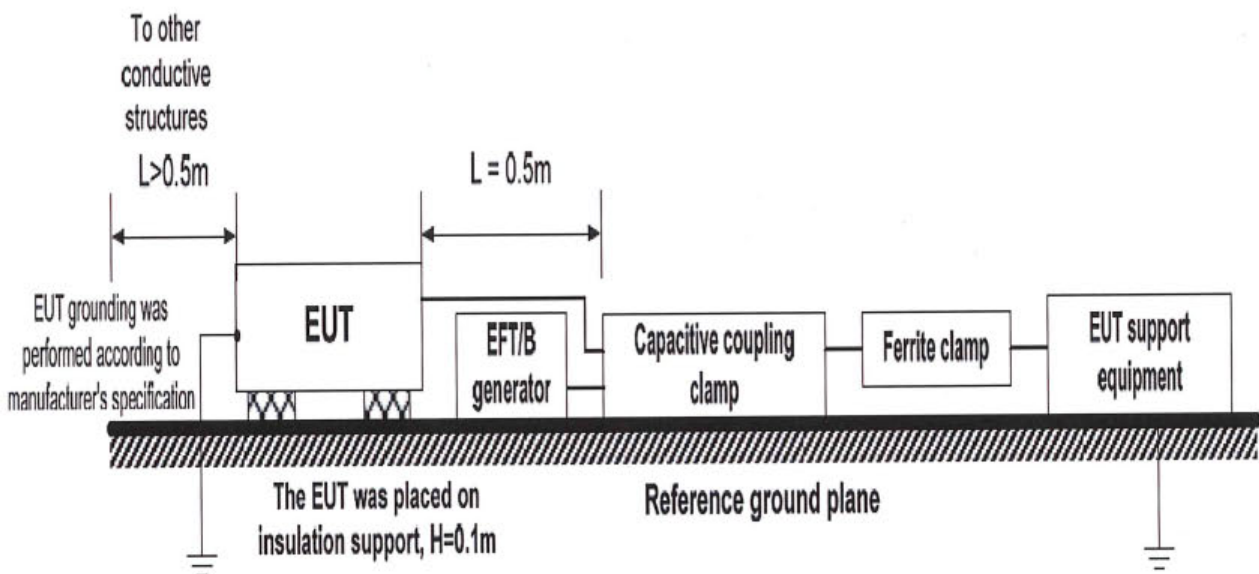
#### (1) Equipment used:

EFT/B Generator: TESEQ NSG3060

#### (2) Test conditions:

|                  |         |                      |         |
|------------------|---------|----------------------|---------|
| Input voltage:   | Rated   | Output voltage:      | Rated   |
| Output current:  | 100%    | Test time:           | 1minute |
| Polarity:        | -, +    | Ambient temperature: | 25°C    |
| Number of tests: | 3 times |                      |         |

#### (3) Test setup



#### (4) Acceptable conditions:

1. Output voltage regulation not to exceed  $\pm 5\%$  of initial (before test) value during test.
2. Output voltage to be within regulation specification after the test.
3. Along with 1 and 2, no discharge of fire or smoke, as well as no output failre.

#### (5) Test result:

| Test Voltage (kV) | Repitition Rate (kHz) | G10-500 | G600-8.5 |
|-------------------|-----------------------|---------|----------|
| 2                 | 5                     | PASS    | PASS     |
| 2                 | 100                   | PASS    | PASS     |

## 4. Conducted immunity to voltage surges (IEC 61000-4-5; EN 61204-3/ IEC 61204-3)

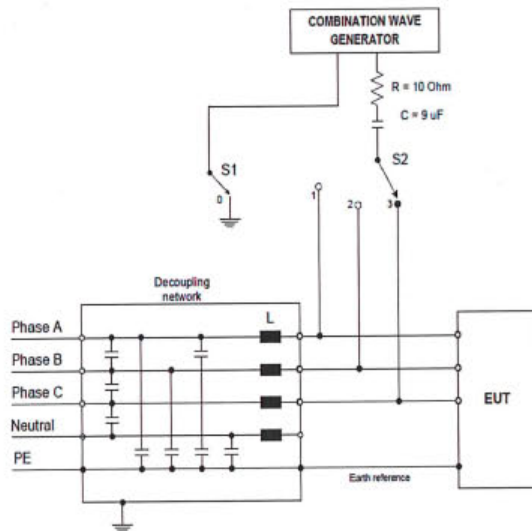
### (1) Equipment used:

Surge Generator: TESEQ - NSG3060 CDN3063  
 Coupling impedance: Common - 12 OHm  
 Normal - 2 OHm  
 Coupling capacitance: Common - 9uF  
 Normal - 18uF  
 Coupling network: SCHLODER - CDN-M4-32A

### (2) Test conditions and test setup:

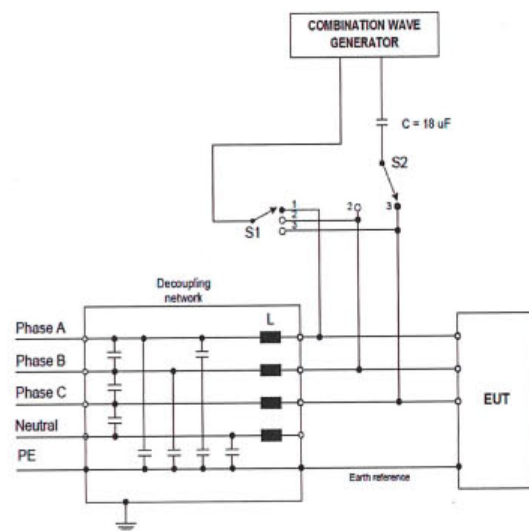
Input voltage: Rated  
 Output current: 100%  
 Polarity: -, +  
 Phase: 0,90 DEG.  
 Output voltage: Rated  
 Number of tests: 5 times  
 Mode: Common, Normal  
 Ambient temperature: 25°C

#### Common mode



1) Switch S1  
 -line to earth: position 0  
 2) Switch S2  
 -during the test positions 1 to 3

#### Differential mode



### (3) Acceptable conditions:

1. Output voltage regulation not to exceed  $\pm 5\%$  of initial (before test) value during test.
2. Output voltage to be within regulation specification after the test.
3. Along with 1 and 2, no discharge of fire or smoke, as well as no output failure.

### (4) Test Result:

| Test Voltage (kV)<br>Common | G10-500 | G600-8.5 |
|-----------------------------|---------|----------|
| 2.0                         | PASS    | PASS     |

| Test Voltage<br>Normal | G10-500 | G600-8.5 |
|------------------------|---------|----------|
| 1.0                    | PASS    | PASS     |

## 5. Conducted immunity to disturbances by radio frequency field (IEC 61000-4-6; EN 61204-3/ IEC 61204-3)

### (1) Equipment used:

RF Signal Generator 150kHz-230MHz  
Coupling/Decoupling Network  
Coupling/Decoupling Network

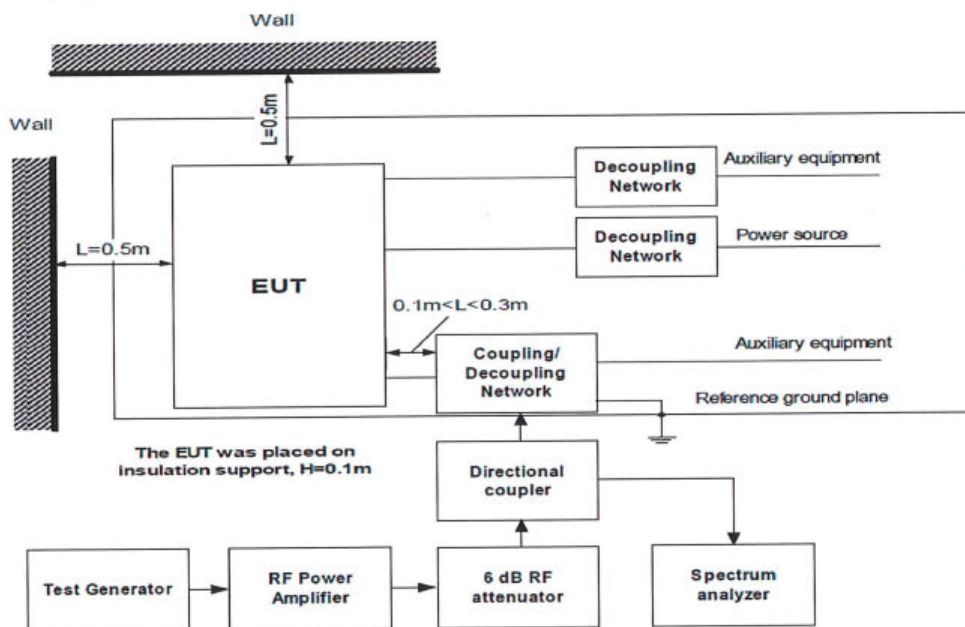
SCHLODER CDG-6000  
SCHLODER CDN-RJ45-S  
SCHLODER CDN-M4-32A

### (2) Test condition:

Ambient temperature: 25°C  
Input voltage: Rated  
Output current: 100%  
Output voltage: Rated

Freq. range: 0.15 ~ 80MHz  
Type of modulation: AM 80% @ 1kHz  
DWELL Time: 2.8s  
Freq. step: 1% of current freq.

### (3) Test setup:



### (4) Acceptable conditions:

1. Output voltage regulation not to exceed  $\pm 5\%$  of initial (before test) value during test.
2. Output voltage to be within regulation specification after the test.
3. Along with 1 and 2, no discharge of fire or smoke, as well as no output failure.

### (5) Test result:

| Voltage Level (Vrms) | G10-500 | G600-8.5 |
|----------------------|---------|----------|
| 10                   | PASS    | PASS     |



## 6. Radiated immunity to power frequency magnetic field (IEC 61000-4-8; IEC 61204-3)

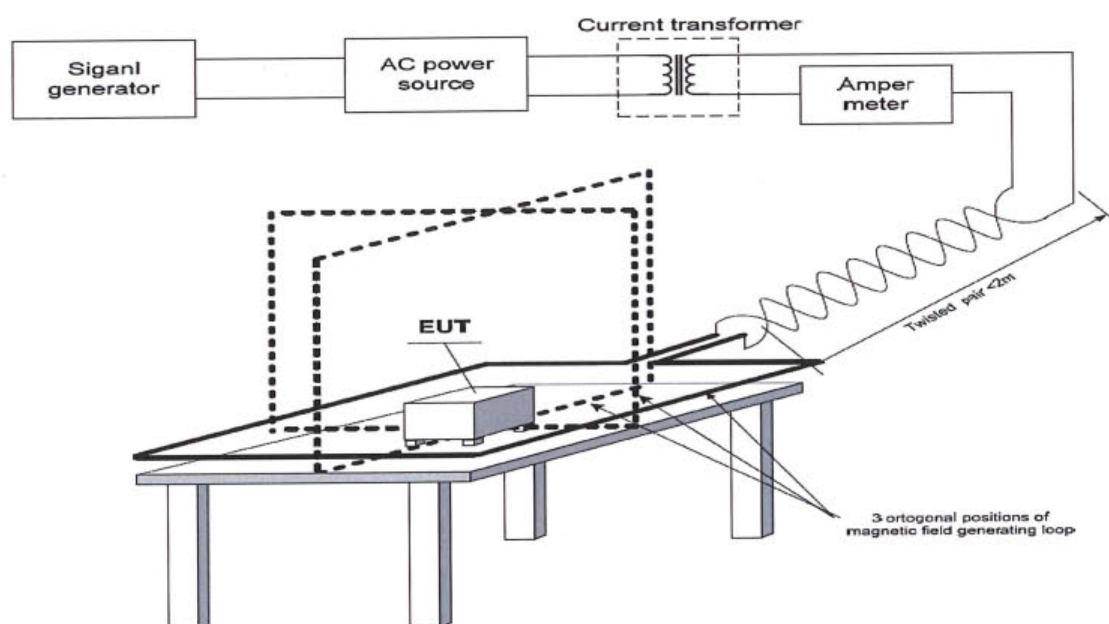
### (1) Equipment used:

|                    |                      |     |
|--------------------|----------------------|-----|
| Current Generator: | F-1000-4-8-125A      | FCC |
| Magnetic Loop:     | F-1000-4-8/9/10-L-1M | FCC |

### (2) Test Condition:

|                      |       |                     |
|----------------------|-------|---------------------|
| Input voltage:       | Rated | Duration: 10 min    |
| Output current:      | 100%  | Freq.: 50Hz & 60 Hz |
| Output voltage:      | Rated |                     |
| Ambient temperature: | 25°C  |                     |

### (3) Test setup:



### (4) Acceptable conditions:

1. Output voltage regulation not to exceed  $\pm 5\%$  of initial (before test) value during test.
2. Output voltage to be within regulation specification after the test.
3. Along with 1 and 2, no discharge of fire or smoke, as well as no output failure.

### (5) Test result:

| Position        | Strenght of magnetic field (A/m) | G10-500/G600-8.5 |
|-----------------|----------------------------------|------------------|
| Vertical        | 30                               | PASS             |
| Vertical at 90° | 30                               | PASS             |
| Horizontal      | 30                               | PASS             |

## 7. Voltage dips and short interruptions (IEC 61000-4-11; EN 61204-3/ IEC 61204-3)

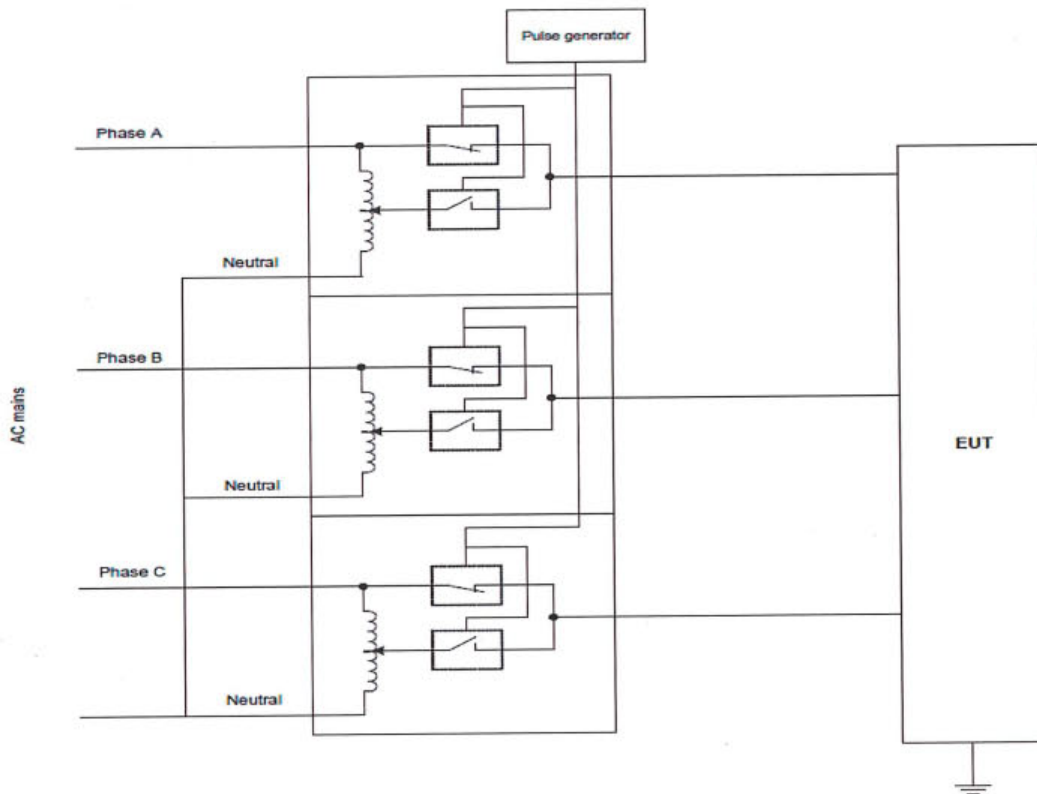
### (1) Equipment used:

|                  |            |         |
|------------------|------------|---------|
| Surge Generator: | UCS500 -M4 | EM TEST |
| AC Power Source: | UCS500 -M4 | EM TEST |

### (2) Test Condition:

|                      |       |                         |
|----------------------|-------|-------------------------|
| Input voltage:       | Rated | Number of dips: 3       |
| Output current:      | 100%  | Repetition rate: 0.1 Hz |
| Output voltage:      | Rated |                         |
| Ambient temperature: | 25°C  |                         |

### (3) Test setup:



### (4) Acceptable conditions:

1. Output voltage to be within output voltage regulation specification after the test.
2. No discharge of fire or smoke.

### (5) Test Result:

| For Phase A, B, C |          |          |                  |              |
|-------------------|----------|----------|------------------|--------------|
| Test level        | DIP rate | Duration | G10-500/G600-8.5 |              |
| 0%                | 100%     | 10ms     | PASS             | (criteria B) |
| 0%                | 100%     | 20ms     | PASS             | (criteria B) |
| 70%               | 30%      | 10ms     | PASS             | (criteria B) |
| 70%               | 30%      | 500ms    | PASS             | (criteria C) |
| 40%               | 60%      | 100ms    | PASS             | (criteria C) |
| 40%               | 60%      | 200ms    | PASS             | (criteria C) |
| 80%               | 20%      | 5000ms   | PASS             | (criteria C) |
| 0%                | 100%     | 5000ms   | PASS             | (criteria C) |

## 6.VIBRATION TEST

MODEL: G10-500 3P400

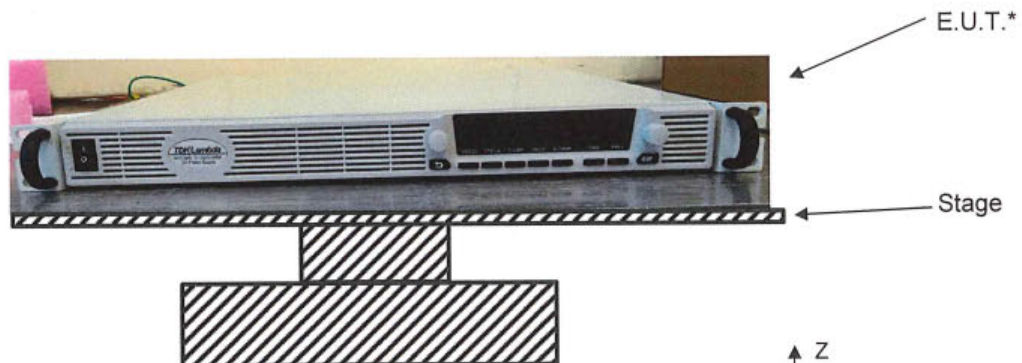
(1) Vibration test class

Frequency variable endurance test

(2) Equipment used

| Name                                                                                                                                                          | Manufaturer                       | Model       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-------------|
| Vibration Test System (Amplifier *SP +93-01111, Remote Control Panel *SP 9 3-00+11, Vibrator *SP +93-00511, Slip Table, Driver Bar, Pump, Fan, Head Expander) | Ling Dynamic Systems              | V875        |
| Precision Barometer, +70 - 1050 hPa                                                                                                                           | LUFFT Mess- und Regeltechnik GmbH | DKD-K-26701 |
| Temp. & Humidity Meter, (-50 - *70) deg, (20 - 99 )% RH                                                                                                       | Mad Electronics                   | HTC-1       |
| APEX SL VIBRATION CONTROLLER                                                                                                                                  | Unholtz-Dickie                    | APEX SL     |
| Isotron Accelerometer 101.2 mVlg                                                                                                                              | Dytran Instruments Inc.           | 3256A2      |
| Isotron Accelerometer 101.7 mVlg                                                                                                                              | Dytran Instruments Inc.           | 3.05E+06    |

(3) Testing method



Test condition:

Random frequency 10Hz~500Hz

Accelerator X: 0.24

Y: 0.89

Z: 1.25

Direction X,Y,Z Y

Test time 1H.each

\*E.U.T. is fixed to vibrator surface by mounting straps

(4)Test Result

OK

NG

Vin=400Vac; Iout=500A

| Check item          | Vout  | Ripple(mVp-p) | E.U.T.state |
|---------------------|-------|---------------|-------------|
| Directions \Initial | 9.992 | 25.4          | O.K.        |
| X                   | 9.993 | 25.4          | O.K.        |
| Y                   | 9.992 | 25.4          | O.K.        |
| Z                   | 9.991 | 26.1          | O.K.        |