

# **GENESYS<sup>TM</sup> 1kW**

**EN61000**

**DATA**

DWG: IA881-58-01		
APPD	CHK	DWG
<i>Oyanni</i> 02/06/20	<i>So</i> 01.06.2020	Michael Goldsberg 31/05/2020

**TDK-LAMBDA**

## List of equipment used

EQUIPMENT USED		MANUFACTURER	MODEL No.
1	Storage oscilloscope	Yokogawa	DL1740
2	Digital multimeter	HP	34401A
3	Digital power meter	Yokogawa	WT130
4	Autotransformer	Metrel	HSN 260/30
5	Autotransformer	Metrel	HTN 450/20
6	Resistive load	NLI	10V
7	Resistive load	NLI	600V
8	AC source	Chroma	6590
9	ESD simulator system	Schaffner-Chase EMC	NSG435
10	EFT/B Generator	EMV-System Schloder	SFT400
11	Surge Generator	EM Test	UCS 500-M4
12	RF Signal Generator 9kHz-1.2GHz	Marconi Instruments	2023
13	Coupling/Decoupling Network	Hermon Lab	300-M3
14	Coupling/Decoupling Network	Hermon Lab	S-T
15	Power amplifier, 150kHz-250 MHz	Com-Power Cor.	ACS-250-100W
16	Surge Generator	EM TEST	UCS500 -M4
17	AC Power Source	EM TEST	V4070
18	Anechoic test chamber	Hermon Lab	AC-2
19	Antenna, Log Periodic, 200-1000 MHz	Electro-Metrics	LPA 25/30
20	Antenna, biconical, high power 20-300MHz, 1kW	A.H.Systems Inc.	SAS-200/543
21	Antenna, double-ridged waveguide horn, 1-18GHz, 300W	EMC Test Systems	3115
22	RF amplifier, 80MHz to 1000MHz, 500W	Amplifier Research	500W1000A
23	RF amplifier, 1 to 4 GHz, 55W	Milmega AS	0104-55/55B
24	Generator Swept Signal, 10 MHz to 40 GHz, +10 dBm	Hewlett Packard	83640B
25	Antenna mast and Turntable position controller	Sh. I. Machines	CRL-F4
26	Antenna mast with position control	Sh. I. Machines	AM-F4
27	Coupler coaxial bi-directional 1 - 4 GHz, 20 dB	Narda	3022
28	Antenna, 30 MHz - 3.0 GHz	Sunol Sciences Corp.	JB3
29	Hygro Thermometer	Delta TRAK	13301
30	Power Meter, RF, IEEE-48, 100 kHz - 100 GHz	Boonton Eletronics Corp.	4220
31	Horn Antenna, 0.5 to 4 GHz	GTE Sylvania	AN-10E
32	Directional Coupler High Power, 80 to 1000 MHz, 200 W	WERLATONE	C 3910
33	Power Sensor 100 kHz - 18 GHz, -50 to 30 dBm	Boonton Eletronics Corp.	51015 (5E)
34	Precision Fixed Attenuator, 50 Ohm, 5 W, 20 dB	Mini-Circuits	BW-N20W5+
35	Laser Probe Interface	Amplifier Research	FI7000
36	Broadband Amplifier, 80 MHz to 1.0 GHz, 500W	Rohde & Schwarz	BBA150-BC500
37	Broadband Amplifier, 0.69 GHz to 3.2 GHz, 200W	Rohde & Schwarz	BBA150-D200
38	Broadband Amplifier, 2.5 GHz to 6.0 GHz, 200W	Rohde & Schwarz	BBA150-E200
39	Probe, E-field, isotropic, 0.2 MHz to 26 GHz	General Microwave	84C
40	Signal Analyzer System, 4 channels	Data Physic	DP240
41	Thermal Power Sensor, DC to 18 GHz	Rohde & Schwarz	NRP18T

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The above data is typical value.

The values are considered to be actual capability data.

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

## (1) Equipment used:

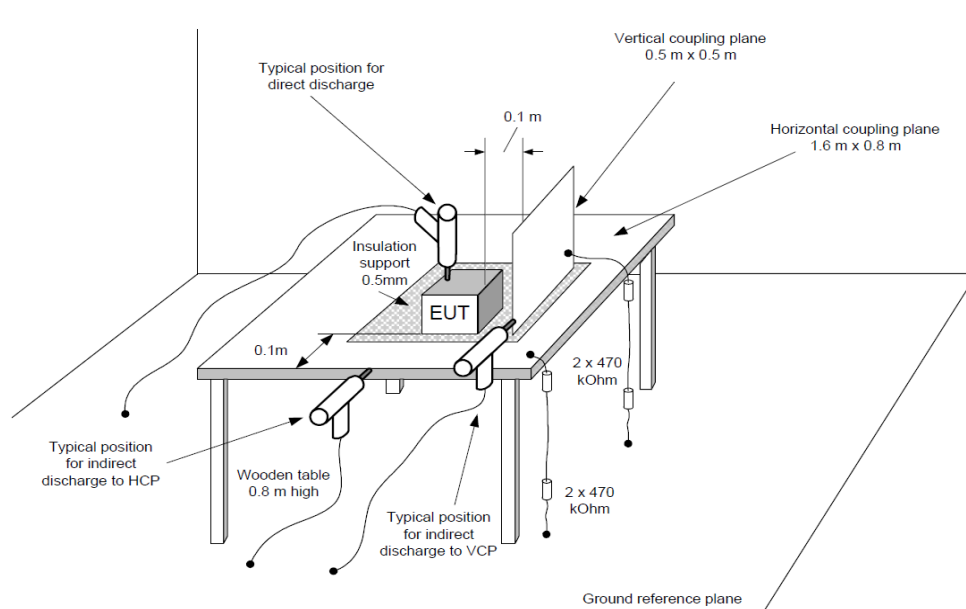
ESD simulator system: Schaffner-Chase EMC NSG435  
 Discharge resistance: 470kΩ X 2

## (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 failre.

## (5) Test result:

Contact discharge			Air discharge		
Discharge (kV)	G100-10	G600-1.7	Discharge (kV)	G100-10	G600-1.7
2	PASS	PASS	2	PASS	PASS
4	PASS	PASS	4	PASS	PASS
			8	PASS	PASS

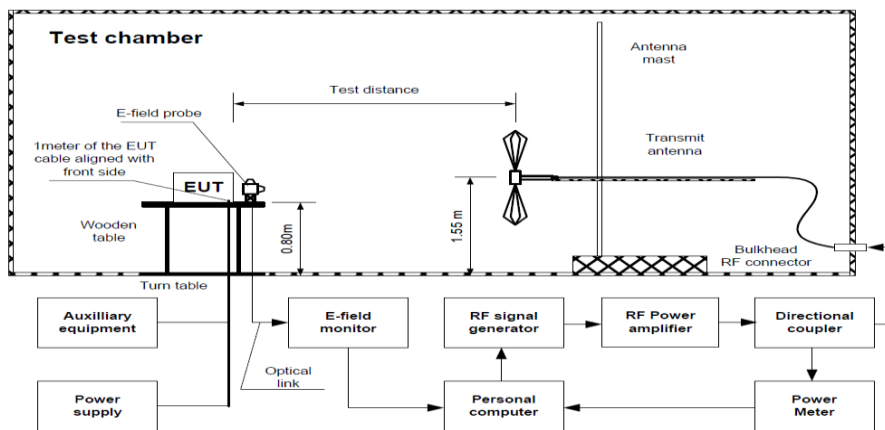
## 2. Radiated immunity to radio frequency electromagnetic field (IEC 61000-4-3; EN 61204-3/ IEC 61204-3)

### (1) Equipment used:

Anechoic test chamber	Hermon Labs AC-2
Antenna, Log Periodic, 200-1000 MHz	Electro-Metrics LPA 25/30
Antenna, biconical, high power 20-300MHz, 1kW	A.H.Systems Inc. SAS-200/543
Antenna, double-ridged waveguide horn, 1-18GHz, 300W	EMC Test Systems 3115
RF amplifier, 80MHz to 1000MHz, 500W	Amplifier Research 500W1000A
RF amplifier, 1 to 4 GHz, 55W	Milmega AS 0104-55/55B
Generator Swept Signal, 10 MHz to 40 GHz, +10 dBm	Hewlett Packard 83640B
Antenna mast and Turntable position controller	Sh. I. Machines CRL-F4
Antenna mast with position control	Sh. I. Machines AM-F4
Coupler coaxial bi-directional 1 - 4 GHz, 20 dB	Narda 3022
Antenna, 30 MHz - 3.0 GHz	Sunol Sciences Corp. JB3
Hygro Thermometer	Delta TRAK 13301
Power Meter,RF, IEEE-48, 100 kHz - 100 GHz	Boonton Eletronics Corp. 4220
Horn Antenna, 0.5 to 4 GHz	GTE Sylvania AN-10E
Directional Coupler High Power, 80 to 1000 MHz, 200 W	WERLATONE C 3910
Power Sensor 100 kHz - 18 GHz, -50 to 30 dBm	Boonton Eletronics Corp. 51015 (5E)
Precision Fixed Attenuator, 50 Ohm, 5 W, 20 dB	Mini-Circuits BW-N20W5+
Laser Probe Interface	Amplifier Research FI7000
Broadband Amplifier, 80 MHz to 1.0 GHz, 500W	Rohde & Schwarz BBA150-BC500
Broadband Amplifier, 0.69 GHz to 3.2 GHz, 200W	Rohde & Schwarz BBA150-D200
Broadband Amplifier, 2.5 GHz to 6.0 GHz, 200W	Rohde & Schwarz BBA150-E200
Probe, E-field, isotropic, 0.2 MHz to 26 GHz	General Microwave 84C
Signal Analyzer System, 4 channels	Data Physics DP240
Thermal Power Sensor, DC to 18 GHz	Rohde & Schwarz NRP18T

### (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 ± 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)	G10-100	G600-1.7
0.08-1	10	PASS	PASS
1.4-2	3	PASS	PASS
2-2.7	1	PASS	PASS

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

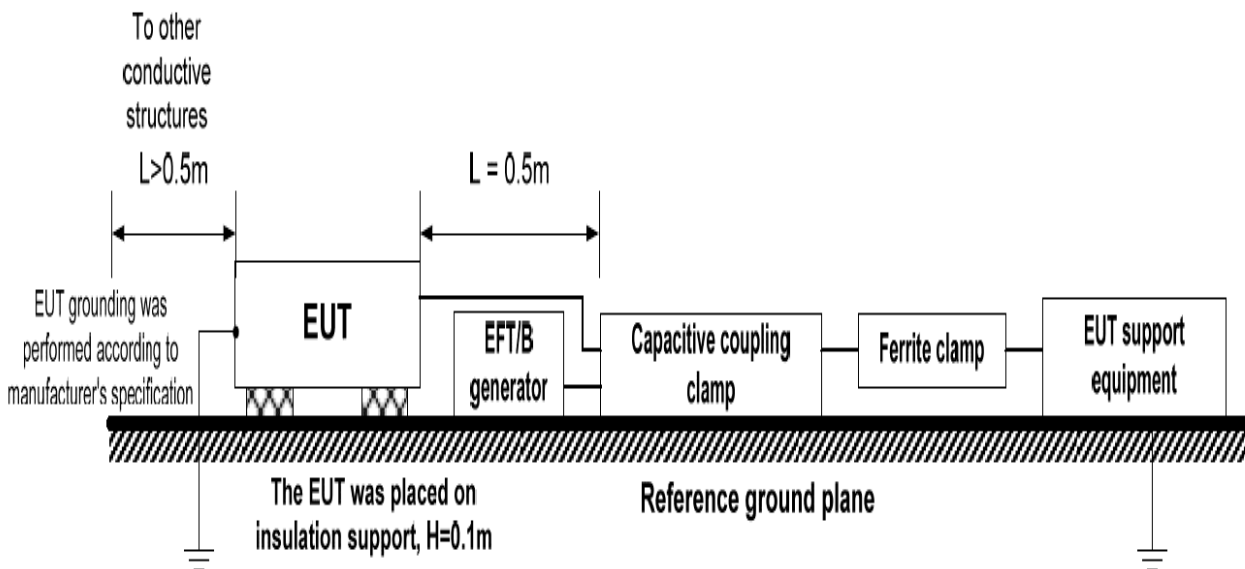
**(1) Equipment used:**

EFT/B Generator: EMV-System Schloder SFT400

**(2) Test conditions:**

Input voltage:	Rated	Output voltage:	Rated
Output current:	100%	Test time:	1 minute
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 failure.

**(5) Test result:**

Test Voltage (kV)	Repetition Rate (kHz)	G10-100	G100-10	G600-1.7
2	5	PASS	PASS	PASS
2	100	PASS	PASS	PASS

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

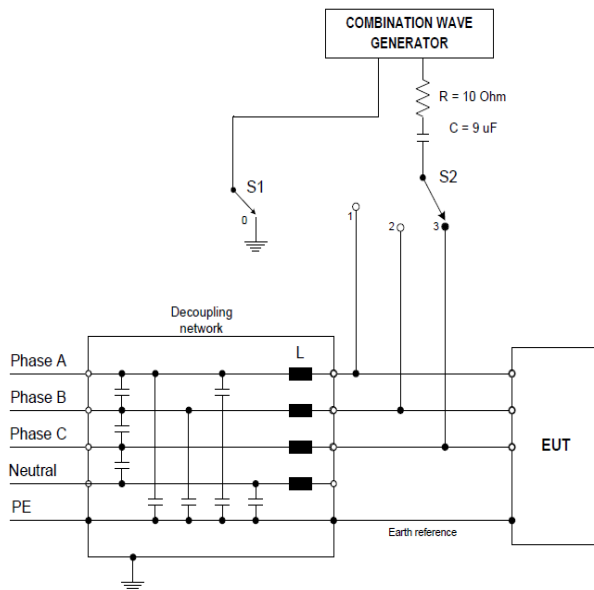
### (1) Equipment used:

Surge Generator:	EM Test UCS 500-M4
Coupling impedance:	Common - 12 OHm
	Normal - 2 OHm
Coupling capacitance:	Common - 9uF
	Normal - 18uF

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

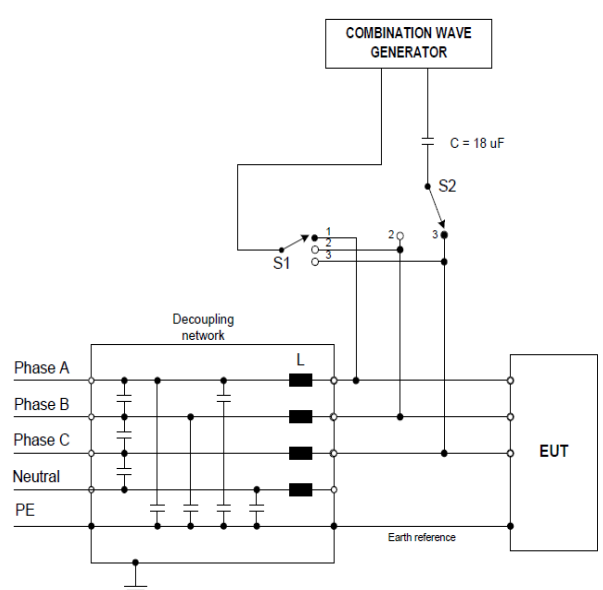
Input voltage:	Rated	Output voltage:	Rated
Output current:	100%	Number of tests:	5 times
Polarity:	-,+	Mode:	Common, Normal
Phase:	0,90 DEG.	Ambient temperature:	25°C

**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) Common	G100-10
2.0	PASS

Test Voltage (kV) Normal	G100-10
1.0	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 9kHz-1.2GHz  
 Coupling/Decoupling Network  
 Coupling/Decoupling Network  
 Power amplifier, 150kHz-250 MHz 100

Marconi Instruments 2023  
 Hermon Lab 300-M3  
 Hermon Lab S-T  
 Com-Power Cor. ACS-250-100W

### (2) Test condition:

Ambient temperature: 25°C

Input voltage: Rated

Output current: 100%

Output voltage: Rated

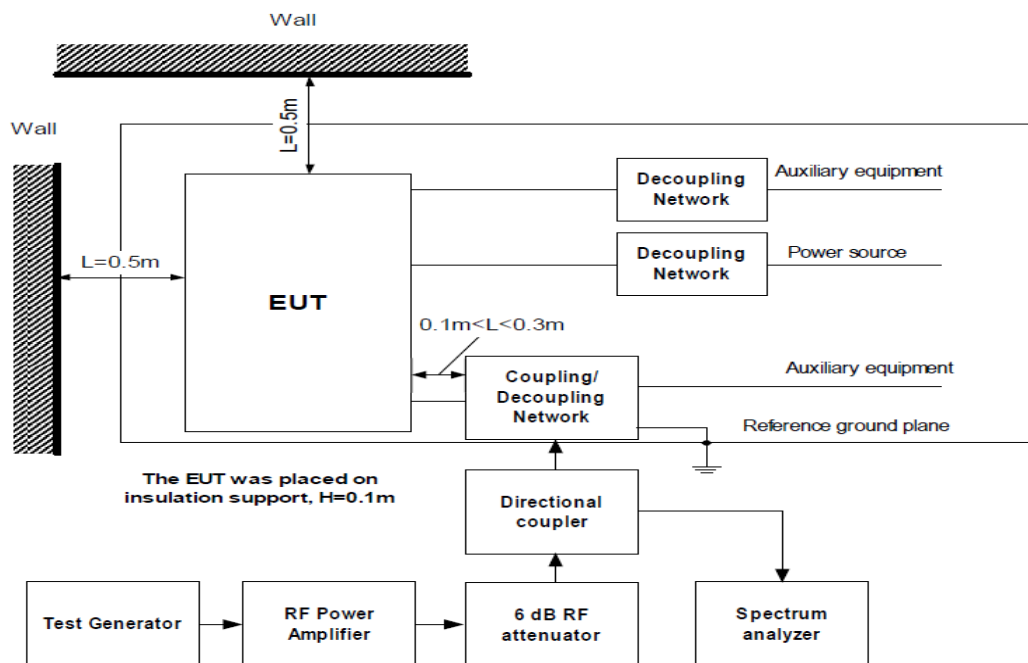
Freq. range: 0.15 ~ 80MHz

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)	G10-100	G100-10	G600-1.7
10	PASS	PASS	PASS



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

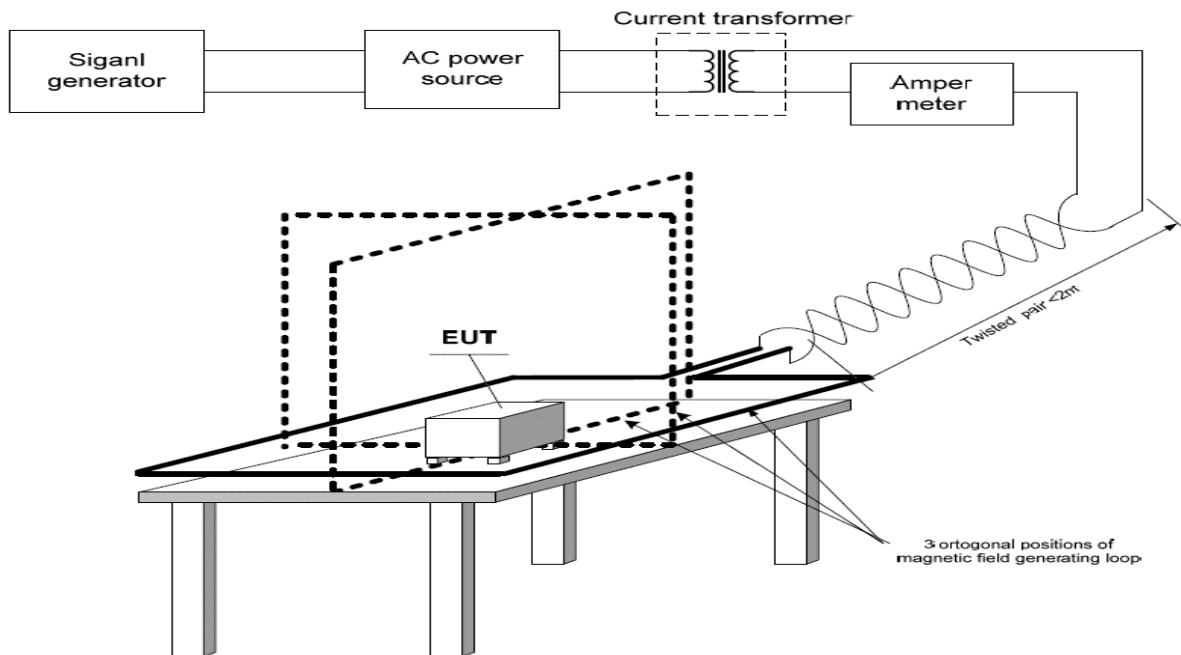
### (1) Equipment used:

Current Generator:	MFG-130A	Hermon Labs
Magnetic Loop:	IC-2	Hermon Labs

### (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)	G100-10
Vertical	30	PASS
Vertical at $90^0$	30	PASS
Horizontal	30	PASS

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

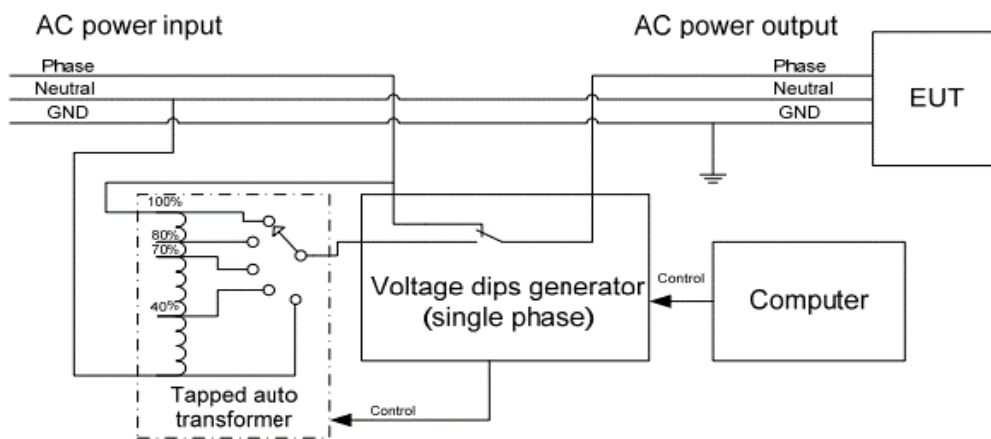
**(1) Equipment used:**

Surge Generator:	UCS500 -M4	EM TEST
AC Power Source:	V4070	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	G100-10	
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)