SABS

TEST REPORT

EMC TEST REPORT: ELT-151022-00006

Globtek, Inc.
Attention: May Zhu
186 Veterans Dr. Nothrvale
NJ 07647 USA

1	**DESCRIPTION OF SAMPLE**	
	Type of apparatus	ITE Power Supply
	Country of manufacture or assembly	USA and China
	Name of manufacturer	1.GlobTek Inc. 2.Globtek (Suzhou) Co., Ltd.
	Trade name of apparatus	GlobTek
	Model identification of apparatus	GT-41083-4024-T2, GT-41083-4012-T2
	Serial number of apparatus	N/A

2	**TESTS REQUESTED**
	Full EMC tests strictly in accordance with: **SANS 222:2009/SABS CISPR 22:2009** "*Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement*". **SANS 224:2010/SABS CISPR 24:2010** "*Information technology equipment - Immunity characteristics - Limits and methods of measurement Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement*". **SANS 61000-3-2:2006** " Limits for harmonic current emissions (equipment input currents ≤ 16 A per phase)" **SANS 61000-3-3:2006** " Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection."
3	**SUBCONTRACTED TESTS**
	The following tests as indicated in report number 6589/15 were sub-contracted to ITC Services (Pty) Ltd. 1. Radiated and Emissions 2. Electrostatic Discharge 3. Radiated RF Immunity 4. Conducted RF Immunity 5. Voltage variations, dips, interruptions

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sanas Testing Laboratory ilac-MRA
T0066

4	DATE OF TESTS
	Date Started: 11 November 2015 Date Completed: 1 December 2015

5	CONCLUSION
5.1	The sample **COMPLIED** with the requirements of **SANS 222:2009/SABS CISPR 22:2009** "Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement".
5.2	The sample **COMPLIED** with the requirements of **SANS 224:2010/SABS CISPR 24:2010** "Information technology equipment - Immunity characteristics - Limits and methods of measurement Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement".
5.3	The sample **COMPLIED** with the requirements of **SANS 61000-3-2:2006** " Limits for harmonic current emissions (equipment input currents ≤ 16 A per phase)" The sample **COMPLIED** with the requirements of **SANS 61000-3-3:2006** " Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection."

6	TESTED AND CHECKED	
	Tested by: _____	Checked by: _____
	EV NAUDE Principal Test Officer	ML SIBEKO Technical Specialist
	Date 2015-12-07	Date 2015/12/07

7	TEST CONDITIONS		
		Actual Conditions	Limits
	Temperature	26 °C	20 °C – 30 °C
	Relative humidity	26 %	20 % - 75 %
	Air Pressure	86 kPa	86 kPa - 108 kPa
	For tests subcontracted, the tests conditions were as indicated in the attached report No. 6523-2/15		

8	**DESCRIPTION OF MEASURING EQUIPMENT**	
	EQUIPMENT	**SERIAL NO. / SABS NO.**
	Contact / Air discharge tip	None
	Vertical coupling plane	ESD-VCP50-1520
	EMC Partner ESD3000	**ESD3000-1599**
	EMC Partner Tip Holder	ESD3000RM32-1560
	Schwarzbeck HF Interference Receiver FSME 1515	SABS PP&PE0004380
	EMC Partner IMU3000	SABS PP&E00034502
	Equipment used for conducting the tests are calibrated and the calibration certificates are traceable through National Laboratory Accreditation Services.	

9	**TEST SET-UP**
	SANS 61204-3:2012: The EUT was Set-up in accordance with the test set-up described in Figure 1. of SANS 61204:2012. **SANS 222:2009:** The EUT was Set-up in accordance with the test set-up described in annexure C of SANS 222:2009. **SANS 224:2010:** The EUT was Set-up in accordance with the test set-up described in annexure A of SANS 224:2010. **SANS 61000-4-2:2009:** The EUT was Set-up in accordance with the test set-up described in paragraph 7.2 of SANS 61000-4-2:2009. **SANS 61000-4-3:2009:** The EUT was Set-up in accordance with the test set-up described in clause 7 of SANS 61000-4-3:2009. **SANS 61000-4-4:2009**:The EUT was Set-up in accordance with the test set-up described in clause 7 of SANS 61000-4-4:2009. **SANS 61000-4-5:2006:** The EUT was Set-up in accordance with the test set-up described in clause 7 of SANS 61000-4-5:2006. **SANS 61000-4-6:2009:** The EUT was Set-up in accordance with the test set-up described in clause 7 of SANS 61000-4-6:2006. **SANS 61000-4-11:2005:** The EUT was Set-up in accordance with the test set-up described in clause 7 of SANS 61000-4-11:2005. **SANS 61000-3-2:2009:** The EUT was Set-up in accordance with the test set-up described in Figure A.1 of SANS 61000-3-2:2009. **SANS 61000-3-3:2009:** The EUT was Set-up in accordance with the test set-up described in Figure 1 of SANS 61000-3-3:2009.

10	**RESULTS**
10.1	**ELECTROSTATIC DISCHARGE (See Attached report from ITC Report no. R6589/15) This test was repeated at SABS (Not currently accredited for this spec)**

10.1.2	**ESD RESULTS (Contact discharge)**				
	Position on EUT	Voltage	Number of discharges	Result	Verdict
	VCP (Vertical)	± 4 kV	10	Not susceptible	Comply (A)
	HCP (Horizontal)	± 4 kV	10	Not susceptible	Comply (A)
	Power supply connector	± 4 kV	10	Not susceptible	Comply (A)
10.1.3	**ESD RESULTS (Air discharge)**				
	Position on EUT	Voltage	Number of discharges	Result	Verdict
	Power Supply enclosure	± 8 kV	50	No Discharge path	Comply (A)

10	**RESULTS CONTINUED...**					
10.1	**Mains terminal interference**					
	Frequency bands in MHz				**Limit in dBµV**	
	0,15 to 0,5 0,5 to 5,0 5,0 to 30				**66 to 56 56 60**	**Result in dBµV C = Comply' F = 'Fail'**
	Frequency in MHz	**Level in dBµV**	**Correction Factor**	**Final Reading dBµV**	**Limit in dBµV**	
	0,15	58	-2	56	66	C
	0,21	50	-2	48	64	C
	0,61	35	-2	33	56	C
	0,81	27	-2	25	56	C
	2,70	21	-2	19	56	C
	7,70	22	-3	19	60	C
	9,40	21	-3	18	60	C
	30,0	23	+5	28	60	C

10.3	**Surge Immunity**	
	Five positive and five negative 1.2/50µs pulses were directly injected into the supply at 60 second intervals between surges at 0°, 90°, 180° and 270° angles. The pulses were applied in the following sequence:	
		Results Criterion A
	a. Live to Neutral (±1kV)	C
	b. Live to Safety earth (±2kV)	N/A
	c. Neutral to Safety earth (±2kV)	N/A

10.4	**Electrical Fast Transients**	
	The EUT was supplied with the required voltage and subjected to a direct injected 5 kHz Repetition rate 5/50nS wave interference signal to the AC ports.	
		Results Criterion B
	a. Live to Neutral (±1kV)	C
	b. Live to earth (±1kV)	N/A
	c. Neutral to earth (±1kV)	N/A
	d. Live to Neutral to Earth (±1kV)	N/A

10	**RESULTS CONTINUED...**	
10.5.1	**Harmonics**	
		Results
	Although the results shows that the unit fails, it complies as there are no limits for equipment below 75 W See attached printout.	C
10.5.2	**Flicker Emissions**	
	See attached printout.	C

11	**MEASUREMENT UNCERTAINTY (EMISSIONS)**

Measurement Parameter	**Frequency Range**	**Measurement Uncertainty**
Discontinuous conducted disturbance (mains port)	9 kHz – 150 kHz	3,7 dB
Continuous conducted disturbance (mains port)	150 kHz – 30 MHz	4,3 dB
Disturbance power (absorbing clamp)	30 MHz – 300 MHz	5,0 dB
Radiated disturbance (electric field strength on an open area test site or alternative test site)	30 MHz – 1000 MHz	5,0 dB

12	**REMARKS**
	2. See attached photograph on next page

END OF TEST REPORT

protocol

EMC PARTNER AG , Laufen Date : 2015/11/12 08:27:00 V4.20

File : C:\Program Files\EMC-Partner\Harcs\Data\EELT-151022 HARM FAIL.hsu

Operator E Naude
Unit ITE Power Supply Model: GT-41083-****
Serial Number
Remarks Temp 25 deg C Hum 28 %

Urms = 231.1V Freq = 49.987 Range: 5 A
Irms = 0.105A Ipk = 0.571A cf = 5.442
P = 7.363W S = 24.26VA pf = 0.303
THDi = 92.4 % THDu = 0.10 % Class D

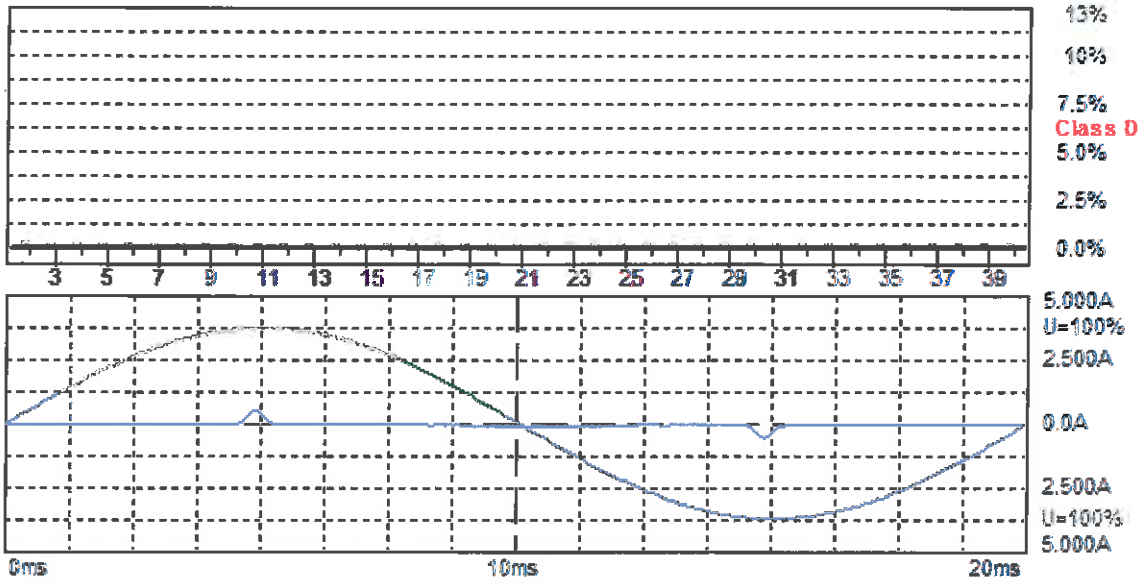
Test - Time : 5min (100 %)

Limit Reference: P = 75.000W

Test completed, Result: FAILED

Order	Freq. [Hz]	Irms [A]	Imax [A]	Limit [A]	Status
1	50	0.0372	0.0372		
2	100	0.0015	0.0015		
3	150	0.0272	0.0275	0.2550	
4	200	0.0015	0.0015		
5	250	0.0269	0.0272	0.1425	
6	300	0.0015	0.0015		
7	350	0.0266	0.0269	0.0750	
8	400	0.0015	0.0015		
9	450	0.0259	0.0262	0.0375	
10	500	0.0015	0.0015		
11	550	0.0253	0.0256	0.0262	
12	600	0.0015	0.0015		
13	650	0.0247	0.0247	0.0222	Fail
14	700	0.0015	0.0015		
15	750	0.0238	0.0238	0.0192	Fail
16	800	0.0015	0.0015		
17	850	0.0226	0.0229	0.0170	Fail
18	900	0.0015	0.0015		
19	950	0.0217	0.0217	0.0152	Fail
20	1000	0.0012	0.0015		
21	1050	0.0204	0.0204	0.0137	Fail
22	1100	0.0012	0.0015		
23	1150	0.0192	0.0192	0.0126	Fail
24	1200	0.0012	0.0015		
25	1250	0.0177	0.0180	0.0115	Fail
26	1300	0.0012	0.0012		
27	1350	0.0165	0.0165	0.0107	Fail
28	1400	0.0012	0.0012		
29	1450	0.0153	0.0153	0.0100	Fail
30	1500	0.0012	0.0012		
31	1550	0.0140	0.0140	0.0093	Fail
32	1600	0.0012	0.0012		
33	1650	0.0125	0.0125	0.0088	Fail
34	1700	0.0012	0.0012		
35	1750	0.0113	0.0113	0.0082	Fail
36	1800	0.0012	0.0012		
37	1850	0.0101	0.0101	0.0078	Fail
38	1900	0.0009	0.0012		
39	1950	0.0089	0.0089	0.0074	Fail
40	2000	0.0009	0.0012		

Important:
- without "Amendment 14"
- without "1000-4-7 Ed. 2" (DFT-window is 16 periods)



Harmonic Emission - IEC 61000-3-2 , EN 61000-3-2 , (EN50565-2) 2015/11/12 08:27:00

Urms =	231.1	V	P =	7.383	W	THD(I) =	92.4	%	Range: 5 A
Irms =	0.105	A	pf =	0.303		H1 (I) =	0.037	A	V-nom: 231 V
									Test Time: 5 min (100%)

*ITE Power Supply Model: GT-41083-***** **Test completed, Result: FAILED**

Temp 25 deg C Hum 28 %

HAR-1000 EMC-Partner

protocol

EMC PARTNER AG , Laufen Date : 2015/11/11 14:47:35 V4.20

File : C:\Program Files\EMC-Partner\Harcs\Data\Waffle Maker Flicker.hsu

Operator E Naude
Unit ITE Power Supply Model: GT-41083-****
Serial Number
Remarks Temp: 25 Deg C Hum 30%

Urms = 50.07V Freq = 34.516 Range: 50 A
Irms = 0.415A Ipk = 2.075A cf = 5.000
P = 6.136W S = 20.78VA pf = 0.295

Test - Time : 12 x 10min = 120min (10000 %)

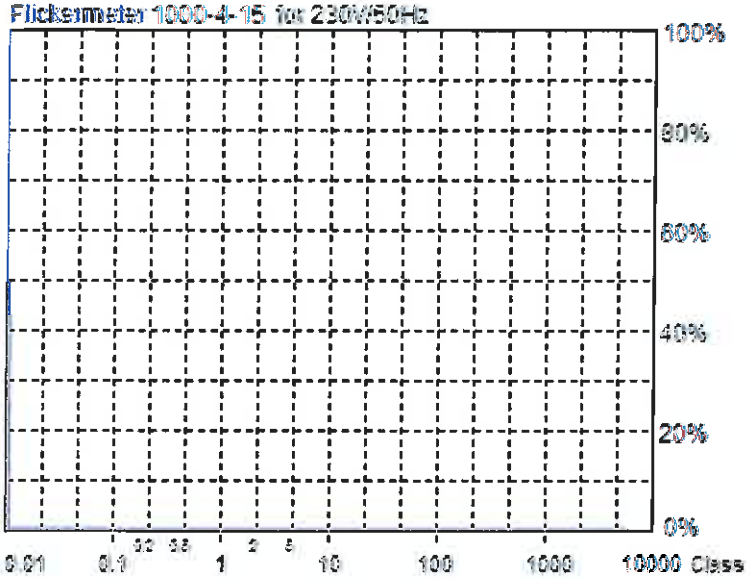
LIN (Line Impedance Network) : L: 0.24ohm +j0.15ohm N: 0.16ohm +j0.10ohm

Limits : Plt : 0.65 Pst : 1.00
dmax : 4.00 % dc : 3.00 %
dtLim: 3.00 % dt>Lim: 200ms

Test completed, Result: PASSED

	dmax [%]
1	0.200
2	0.190
3	0.190
4	0.180
5	0.180
6	0.180
7	0.180
8	0.180
9	0.240
10	0.000
11	0.000
12	0.000

Flickermeter 1000-4-15 for 230V/50Hz



Actual Flicker (Fli):	**0.00**
Short-term Flicker (Pst):	**0.07**
Limit (Pst):	1.00
Long-term Flicker (Plt):	**0.33**
Limit (Plt):	0.65
Maximum Relative Volt. Change (dmax):	**0.00%**
Limit (dmax):	4.00%
Relative Steady-state Voltage Change (dc):	**0.04%**
Limit (dc):	3.00%
Maximum Interval exceeding 3.00% (dt):	**0.00ms**
Limit (dt>Lim):	200ms

Flicker Emission - IEC 61000-3-3 , EN 61000-3-3

2015/11/11 14:47:35

Urms =	50.07	V	P =	6.138	W
Irms =	0.415	A	pf =	0.295	

Range:	50 A
V-nom:	231 V
TestTime:	120 min (100%)

*ITE Power Supply Model: GT-41083-***** **Test completed, Result: PASSED**

Temp: 25 Deg C Hum 30%

HAR-1000 EMC-Partner

Interference Testing And Consultancy Services (Pty) Ltd

ITC SERVICES (PTY) LTD Reg 88/002032/07
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CISPR 22 / 24 AND IEC 61204-3 TESTS ON THE GlobTek Inc SWITCHING POWER ADAPTER GT41083-4024-T2

REFERENCE NUMBER		**R 6589/15**
REVISION	:	**1.0**
DATE	:	**1/12/2015**
COPY	:	**Master**

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ITC SERVICES **Approved By:**	CJ Deysel		2/12/2015
ITC SERVICES **Tested by:**	JJ Joubert		2/12/2015

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LIST OF EFFECTIVE PAGES								CONFIGURATION CONTROL
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2	1.0	10	1.0	18	1.0			
3	1.0	11	1.0	19	1.0			
4	1.0	12	1.0	20	1.0			
5	1.0	13	1.0	21	1.0			
6	1.0	14	1.0	22	1.0			
7	1.0	15	1.0	23	1.0			
8	1.0	16	1.0					

CLIENT INFORMATION	
DESCRIPTION	**INFORMATION**
Name	GlobTek Inc, Submitted by SABS
Eddie Naude	Dr Lategan Road, Groenkloof Pretoria

ACRONYMS AND ABBREVIATIONS

AVE	Average
C	Circular
CSIR	Council for Scientific and Industrial Research
E-Fields	Electric Fields
EFT	Electrical Fast Transients
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
ESD	Electrostatic Discharge
EUT	Equipment Under Test
H	Horizontal
HCP	Horizontal Coupling Plane
NIST	National Institute of Science and Technology
OATS	Open Area Test Site
PC	Personal Computer
QP	Quasi-Peak
RF	Radio Frequency
SANAS	South African National Accreditation System
V	Vertical
VCP	Vertical Coupling Plane

TABLE OF CONTENTS

LIST OF TABLES

1. INTRODUCTION

The GlobTek Inc switching power adapter, GT41083-4024-T2 henceforth referred to as Equipment Under Test (**EUT**), was tested for compliance between 01/12/2015 and 02/12/2015 at the premises of ITC Services (Pty) Ltd to the following specifications:

- SANS 61204-3:2012 (ED. 2.00) / IEC 61204-3:2011: *'Low voltage power supplies, D.C. Output - Part 3 Electromagnetic Compatibility (EMC)'*
- SANS 222 (2009) / CISPR 22 *(2008): 'Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement'*
- SANS 224 (2010) / CISPR 24 (2010): '*Information technology equipment - Immunity characteristics - Limits and methods of measurement'*
  - SANS 61000-4-2 (2009) / IEC 61000-4-2 (2008): *Testing and measurement techniques – Electrostatic discharge immunity test*
  - SANS 61000-4-3 (2008) / IEC 61000-4-3 (2010): *Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*
  - SANS 61000-4-4 (2011) / IEC 61000-4-4 (2011): *Testing and measurement techniques – Electrical Fast Transient / Burst*
  - SANS 61000-4-5 (2006) / IEC 61000-4-5 (2005): *Testing and measurement techniques – Surge immunity test*
  - SANS 61000-4-6 (2009) / IEC 61000-4-6 (2008): *Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*
  - SANS 61000-4-11 (2005) / IEC 61000-4-11(2004): *Testing and measurement techniques – Voltage Dips, Short Interruptions and voltage variations immunity test.*
  - SANS 61000-3-2 (2009) / IEC 61000-3-2 (2009): *Limits for Harmonic Current Emissions (Equipment Input Current ≤16 A per phase)*
  - SANS 61000-3-3 (2009) / IEC 61000-3-3 (2008) *: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems – Equipment with rated current ≤16 A per phase*

2. TEST RESULT SUMMARY

CISPR 22 Radiated Emissions	Pass Class B
CISPR 22 Conducted Emissions (Input power)	Pass Class B
IEC 61000-4-2 Electrostatic discharge immunity test	Pass Criterion A
IEC 61000-4-3: Radiated, radio-frequency, electromagnetic field immunity test	Pass Criterion A
IEC 61000-4-4: Electrical Fast Transient / Burst	Pass Criterion A
IEC 61000-4-5: Surge immunity test	Pass Criterion A
IEC 61000-4-6: Immunity to conducted disturbances, induced by radio-frequency fields	Pass Criterion A
IEC 61000-4-11: Voltage dips	Pass Criterion A
IEC 61000-4-11: Voltage interruptions	Pass Criterion B
IEC 61000-3-2: Harmonic Current Emissions	Pass
IEC 61000-3-3: Voltage changes, voltage fluctuations and flicker	Pass

2.1 EMISSION CLASSES AND IMMUNITY CRITERIA

2.1.1 Emissions

CISPR 22 Classifies ITE as either Class A or Class B.

Class B ITE is a category of apparatus which satisfies the class B ITE disturbance limits.
Class B ITE is intended primarily for use in the domestic environment and may include:
– Equipment with no fixed place of use; for example, portable equipment powered by built-in batteries;
– Telecommunication terminal equipment powered by a telecommunication network;
– Personal computers and auxiliary connected equipment.

NOTE The domestic environment is an environment where the use of broadcast radio and television receivers may be expected within a distance of 10 m of the apparatus concerned.

Class A ITE is a category of all other ITE which satisfies the class A ITE limits but not the class B ITE limits. Such equipment should not be restricted in its sale but the following warning shall be included in the instructions for use:

Warning
This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

2.1.2 Immunity

The Criteria set-out above are defined as follows:

Criterion A: normal performance within limits specified by the manufacturer, requestor or purchaser;

Criterion B: temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention;

Criterion C: temporary loss of function or degradation of performance, the correction of which requires operator intervention;

3. TEST METHODOLOGY

3.1 ENVIRONMENTAL CONDITIONS DURING TEST:

- Temperature: 22 °C
- Relative Humidity: 36 %

4. CALIBRATION OF EQUIPMENT

The computer controlled EMI Measuring system is checked for amplitude and frequency accuracy with a signal generator (calibrated by a SANAS accredited laboratory and is traceable to the national standards maintained by NMISA) on a monthly basis. The calibration of the equipment is performed by Inala Technology. All equipment Calibration Certificates are available on request.

5. MEASUREMENT OF UNCERTAINTY

The uncertainty budget is calculated according to the guidelines of LAB34 and CISPR16-4

5.1 CONDUCTED EMISSIONS

- Compliance is deemed to occur if all measured disturbances are below the CISPR 22 limit.
- Non-compliance is deemed to occur if any measured disturbance is over the CISPR 22 limit.

5.2 RADIATED EMISSIONS

- Compliance is deemed to occur if all measured disturbances are below the CISPR 22 limit.
- Non-compliance is deemed to occur if any measured disturbance exceeds the CISPR 22 limit.

5.3 RADIATED IMMUNITY

- Compliance is deemed to occur for 3 & 10V/m when EUT can withstand xV/m x 1.1

5.4 CONDUCTED IMMUNITY

- Compliance is deemed to occur for 3 & 10V with BCI when EUT can withstand xV x 1.26
- Compliance is deemed to occur for 3 & 10V with CDN when EUT can withstand xV x 1.17

6. TEST SAMPLE DESCRIPTION AND TEST SETUP DETAILS

The specific test methodology will be discussed under each relevant test if different to the general set-up guidelines below.

The EUT was subjected to all tests in the following way:

- The EUT was switched on and operated in accordance with the manufacturer instructions.
- The EUT was connected to a resistive load for a 1.7A output.
- The output voltage was monitored with the use of a Fluke multi-meter.
- Tests were performed while the unit was fully operational.
- Deviations from the above set-up will be noted in each specific case.

7. DEVICE IMAGE

Switching power adapter: Top view

8. EMISSIONS

8.1 SET-UP

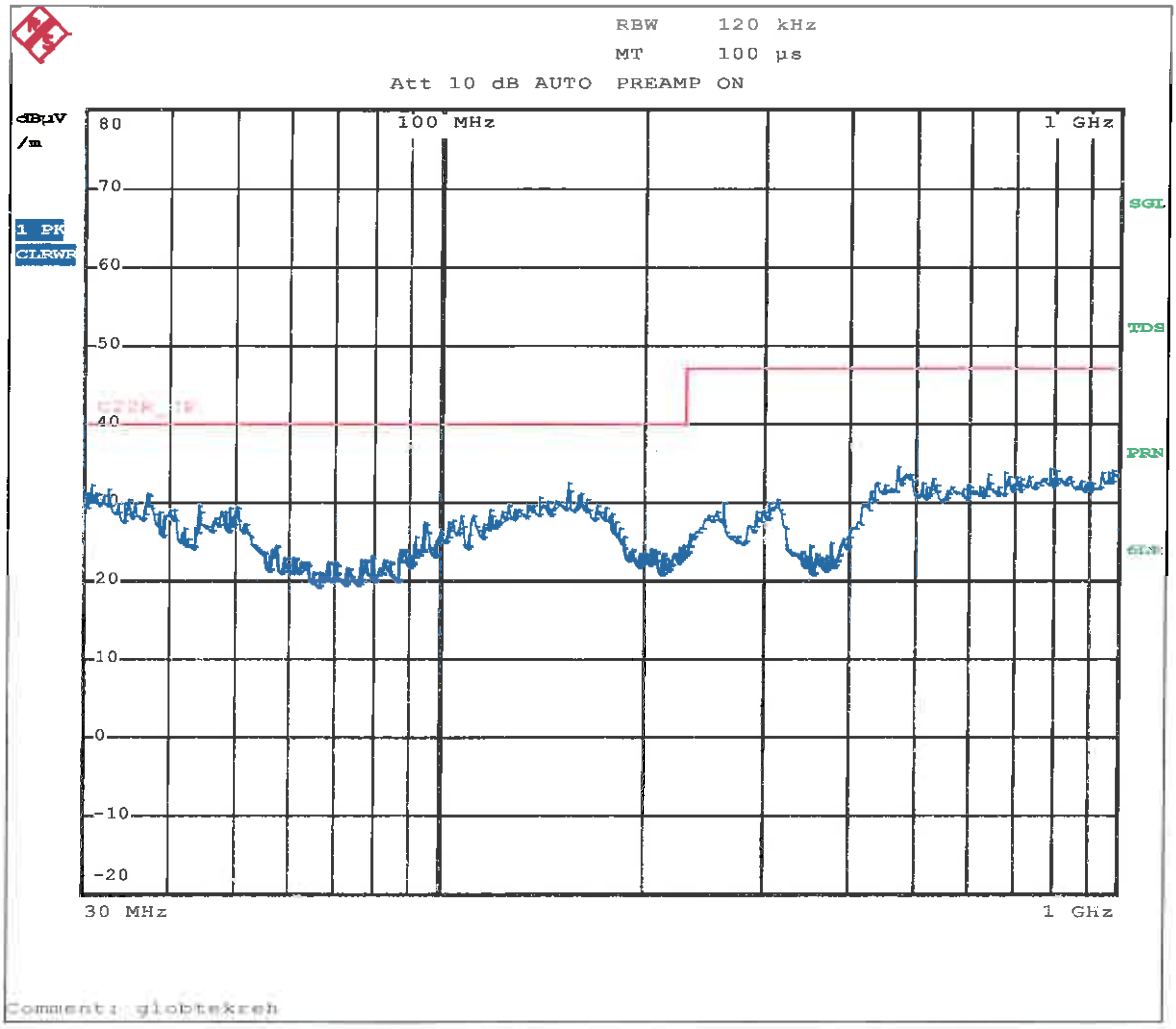
- The EUT was switched on and operated in accordance with the manufacturer instructions.
- Automated scans in the frequency band 30MHz to 1000MHz (radiated emissions) were done in order to determine compliance emission results for the EUT.

Table 8.1-1 Test equipment used for Conducted and Radiated Emission Measurements

EQUIPMENT	SERIAL NO
IBM Compatible PC	Ser No : None
Rohde & Schwarz ESPI	Ser No: 100186
BIA 30 Biconical antenna	Ser No : 3568
EM 6950 Log-P Antenna	Ser No: ITC001
AFJ LS-16 LISN	Ser No: 90038

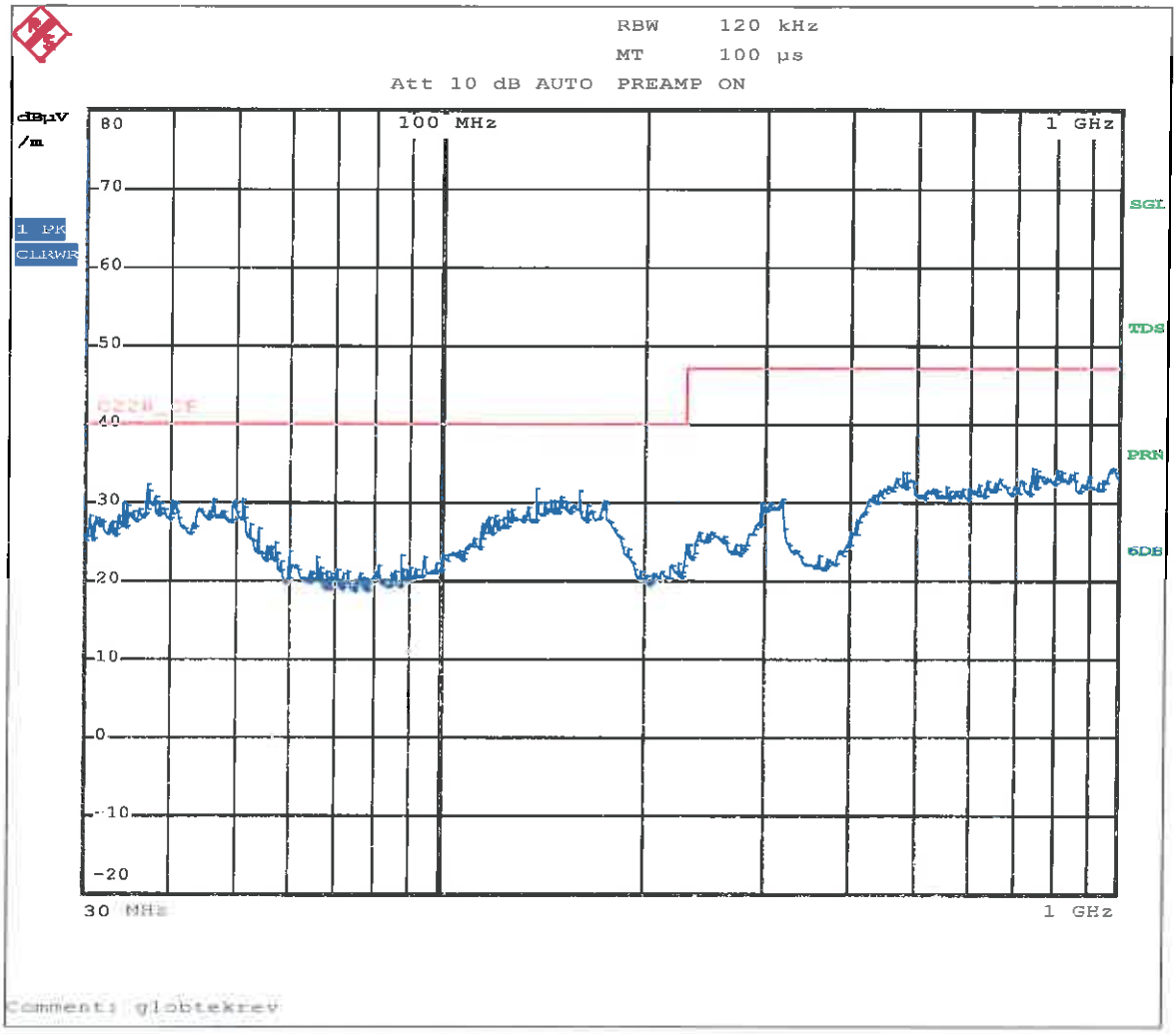
8.1.1 Radiated Emission Results: 30 – 1000MHz, Horizontal

Graph 1: Represents peak radiated emissions measured from the EUT. Emission levels were below the Class B limit. Note that the test distance was 3m. The limit line was adjusted accordingly. The test was performed with the antennas in the Horizontal polarization.



8.1.2 Radiated Emission Results: 30 – 1000MHz, Vertical

Graph 2: Represents peak radiated emissions measured from the EUT. Emission levels were below the Class B limit. Note that the test distance was 3m. The limit line was adjusted accordingly. The test was performed with the antennas in the Vertical polarization.

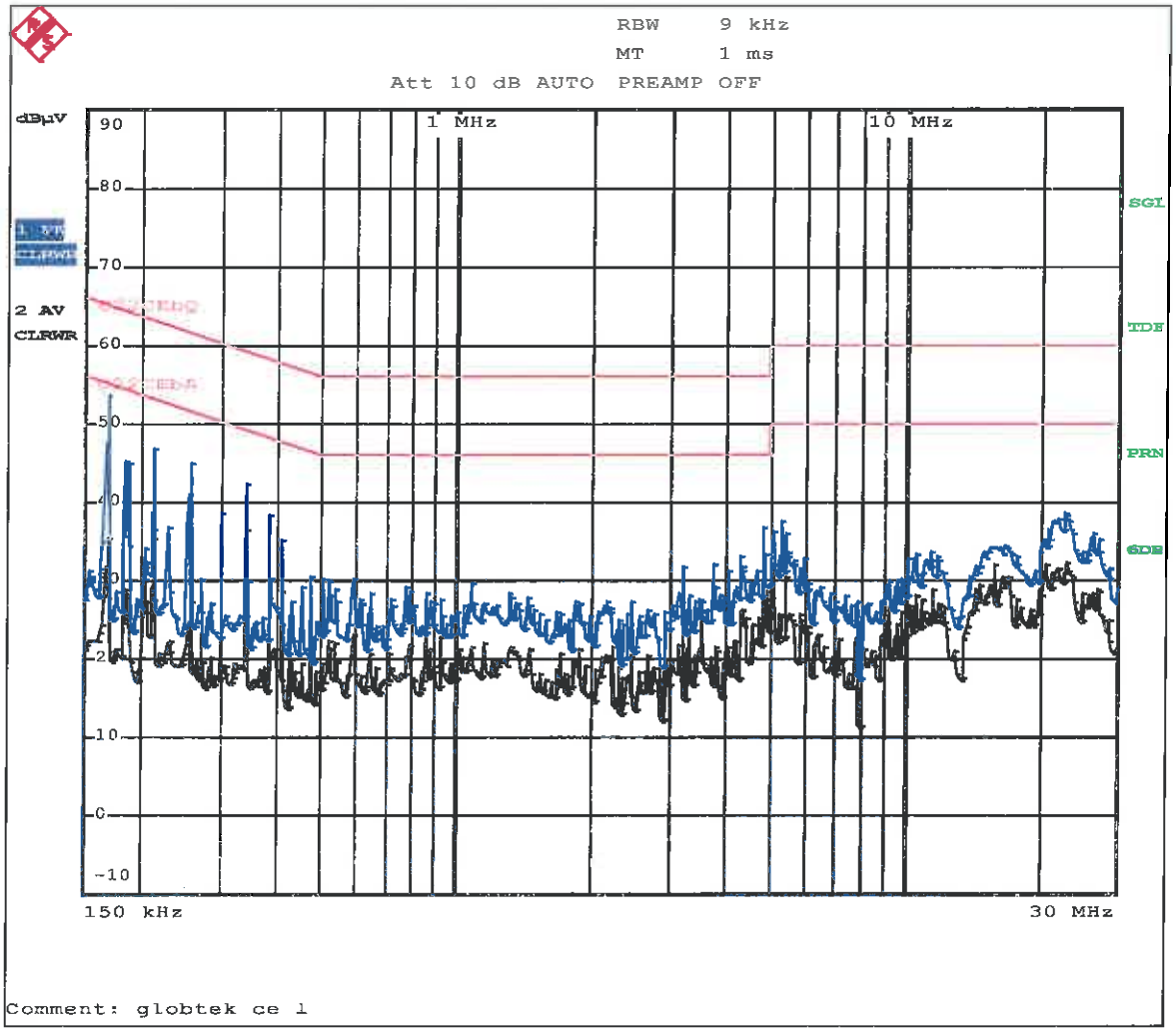


8.1.3 Conclusion

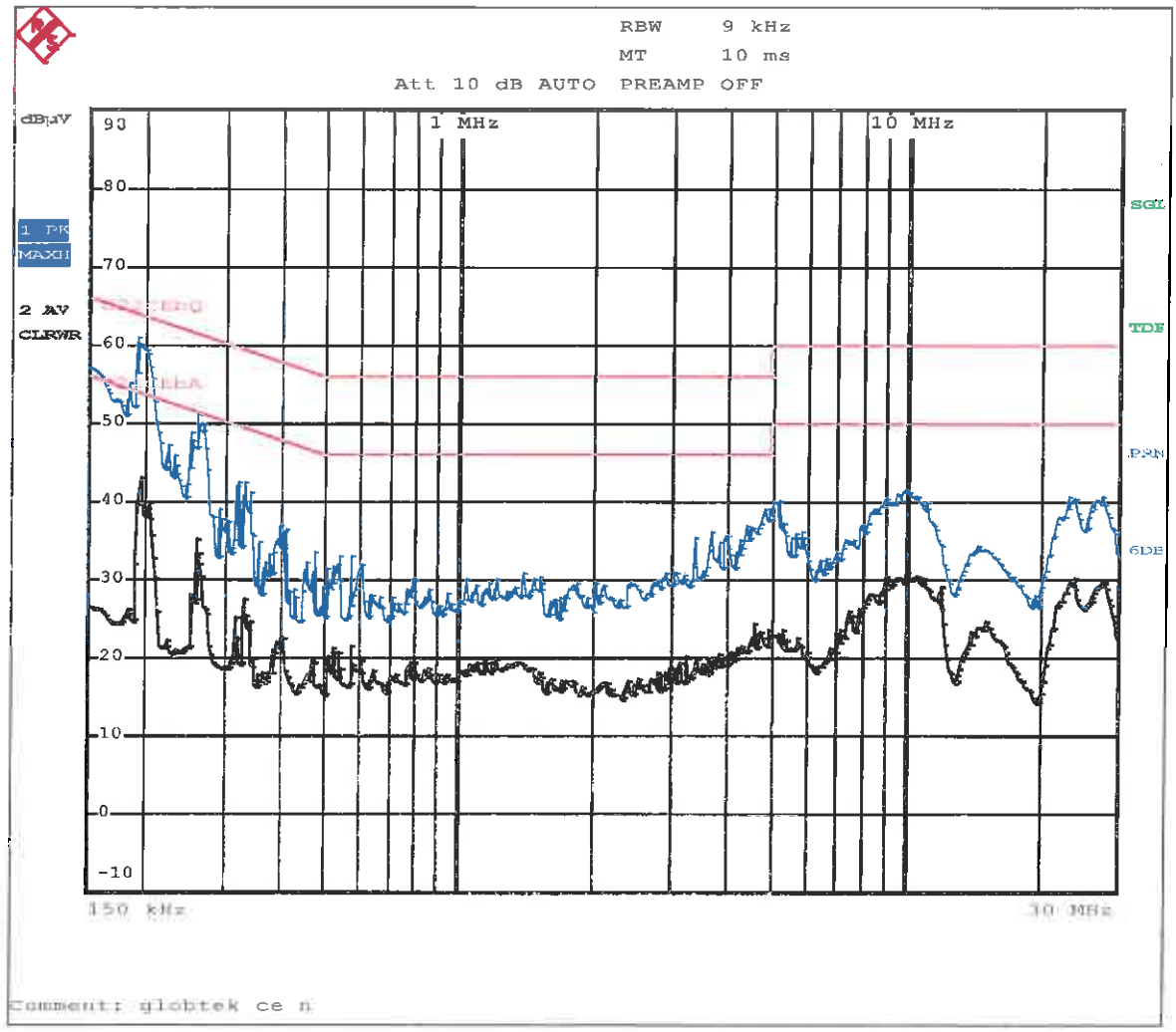
The EUT complies with the radiated emissions requirements of SANS 222 / CISPR 22 Class B.

8.1.4 Conducted Emission Results

Graph CE1: Peak and Average Conducted emissions measured on the live lead of the EUT was below the Class B Quasi peak and Average limits.



Graph CE2: Peak and Average Conducted emissions measured on the Neutral lead of the EUT was below the Class B Quasi peak and Average limits.



8.1.5 Conclusion

The EUT complies with the conducted emissions requirements of SANS 222 / CISPR 22 Class B.

9. IMMUNITY

9.1 ELECTRICAL FAST TRANSIENTS

- The EUT was supplied with the required voltage and subjected to a direct injected 5 kHz repetition rate 5/50nS wave interference signal.
- The EUT was tested as table top equipment.
- The interference signal was applied in the following sequence:

- **AC Power Ports**

a. Live to Neutral: Tests were executed with +1kV and -1kV interference signal amplitudes for a 60 second period for each polarity.

b. Live and Neutral to Ground Reference: Tests were executed with +1kV and -1kV interference signal amplitudes for a 60 second period for each polarity.

Table 9.1-1 Test equipment used for Electrical Fast Transients

EQUIPMENT	SERIAL NO/ REFERENCE NUMBER
TESEQ NSG 3040	Ser No: 1856

9.1.1 Results

AC power port:

- The EUT was resilient to the applied fast transients
- The EUT functioned normally during and after the test.

9.1.2 Conclusion

The EUT comply with criterion A of SANS / IEC 61000-4-4.

(Criterion A: normal performance within limits specified by the manufacturer, requestor or purchaser)

9.2 ELECTROSTATIC DISCHARGE

9.2.1 Set-up

- The EUT was switched on and operated in accordance with the manufacturer instructions.
- The EUT was tested as tabletop equipment.
- 10 positive and 10 negative contact discharges were applied to the VCP and HCP respectively.
- 50 air discharge attempts were made to the enclosure of the switching power adapter.

Table 9.2-1 Test equipment used for ESD

EQUIPMENT	SERIAL NO/ REFERENCE NUMBER
TESEQ NSG 3040	Ser No: 1856
TESEQ NSG 435 ESD gun	Ser No: 6555
Air discharge tip	None
Contact discharge tip	None
Vertical Coupling Plane	None

Table 9.2-2 Results of ESD (Contact discharge)

POSITION ON EUT	VOLTAGE	NUMBER OF DISCHARGES	RESULT	VERDICT
VCP (Vertical)	± 4kV	10	Not susceptible	Comply (A)
HCP (Horizontal)	± 4kV	10	Not susceptible	Comply (A)
Power supply connector (No Load)	± 4kV	10	Not susceptible	Comply (A)

Table 9.2-3 Results of ESD (Air discharge)

POSITION ON EUT	VOLTAGE	NUMBER OF DISCHARGES	RESULT	VERDICT
Power supply enclosure	± 8kV	50	No discharge path	Comply (A)

9.2.2 Results

- The EUT was resilient to the applied ESD pulses and maintained a constant output voltage.

9.2.3 Conclusion

The EUT complies with criterion A of SANS / IEC 61000-4-2.

(Criterion A: normal performance within limits specified by the manufacturer, requestor or purchaser)

9.3 SURGES

9.3.1 Set-up

- The EUT was supplied with the required voltage.
- Five positive and five negative 1.2/50µs pulses were directly injected into the supply at 60 second intervals between surges at 0°, 90°, 180° and 270° angles. The pulses were applied in the following sequence:

- **AC Power Port**
  a. Live to Neutral (±1kV)

Table 9.3-1 Test equipment used for Surges

EQUIPMENT	SERIAL NO/ REFERENCE NUMBER
TESEQ NSG 3040	Ser No: 1856

9.3.2 Results

- The EUT was resilient to the surges applied.

9.3.3 Conclusion

The EUT complies with criterion A of the relevant section of SANS / IEC 61000-4-5.

(Criterion A: normal performance within limits specified by the manufacturer, requestor or purchaser)

9.4 RADIATED IMMUNITY

9.4.1 Set-up

- The EUT was switched on and operated in accordance with the manufacturer instructions.
- The test was performed in an anechoic chamber in the frequency band 80 MHz to 1000 MHz with 80 % AM 1kHz, at a level of 3 V/m according to SANS / IEC 61000-4-3 Clause 8 (Frequency step and dwell method)

- The test was repeated at the following discrete frequencies: 80, 120, 150, 230, 434, 460, 600, 863 and 900 MHz while the unit was active.

Table 9.4-1 Test equipment used for Radiated Immunity.

EQUIPMENT	SERIAL NO/ REFERENCE NUMBER
Olivetti Personal Computer Model PCS 286	Ser No : 00074333
RF Signal Generator HP Model 8657A	Ser No: 2819UO4767
Log Periodic Antenna Model EM6950	Ser No : 1001
RF Amplifier EM Model 4248-1	Ser No : None
Field Strength Meter AR Model FM2000	Ser No: 14021

9.4.2 Results

- The EUT was resilient to the 80% AM 1 kHz signal applied at a level of 3 V/m. The switching power adapter maintained a constant output voltage for the duration of the test.

9.4.3 Conclusion

The EUT complies with criterion A of SANS / IEC 61000-4-3.

(Criterion A: normal performance within limits specified by the manufacturer, requestor or purchaser)

9.5 CONDUCTED IMMUNITY

9.5.1 Set-up

- The EUT was switched on and operated in accordance with the manufacturer instructions.
- The test was performed in a shielded enclosure in the frequency band 150kHz to 80 MHz with 80 % AM 1kHz, at a level of 3 V (un-modulated) on the input power according to SANS / IEC 61000-4-6.
- The test was repeated at the following discrete frequencies: 0.2, 1, 7.1, 13.56, 21, 27.12 and 40.68 MHz while the unit was active.

Table 9.5-1 Test equipment used for Conducted Immunity.

EQUIPMENT	SERIAL NO/ REFERENCE NUMBER
RF Signal Generator HP Model 8657A	Ser No: 2819UO4767
BCI Probe FCC Model F-120-3	Ser No : 52
RF Amplifier EM Model 4248-1	Ser No : None
Lüthi Coupling decoupling network	Ser No : 2555

9.5.2 Results

- The EUT was resilient to the 80% AM 1 kHz signal applied at a level of 3V on the input power. The switching power adapter maintained a constant output voltage for the duration of the test.

9.5.3 Conclusion

The EUT complies with criterion A of the relevant section of SANS / IEC 61000-4-6.

(Criterion A: normal performance within limits specified by the manufacturer, requestor or purchaser)

9.6 VOLTAGE DIPS AND INTERRUPTIONS

9.6.1 Set-up

- The EUT was switched on and operated in accordance with the manufacturer instructions.
- The EUT was subjected to the following voltage dips and interruptions applied to the AC power port of the EUT:

a) 100 % reduction in supply voltage for 0.5 cycle :**Comply criterion A**
b) 70 % reduction in supply voltage for 25 cycles :**Comply criterion A**
c) 100 % reduction in supply voltage for 250 cycles :**Comply criterion B**

Table 9.6-1 Test equipment used for Voltage Dips and Interruptions

EQUIPMENT	SERIAL NO/ REFERENCE NUMBER
Pacific AC Power source Model 140-AMX	0362
TESEQ NSG 3040	Ser No: 1856

9.6.2 Results

- The EUT switched off during application of the 100% reduction in supply for 250 cycles, but resumed normal operation after some user intervention.

9.6.3 Conclusion

The EUT complies with criterion B of the relevant sections of SABS IEC 61000-4-11

(**Criterion B:** temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention)

9.7 HARMONICS

9.7.1 Set-up

- The EUT was switched on and operated in accordance with the manufacturer instructions.
- The unit operated at less than 75 W.

Table 9.7-1 Test equipment used for Harmonic Current Emissions

EQUIPMENT	SERIAL NO/ REFERENCE NUMBER
Pacific AC Power Source Model 140-AMX	0362
Thurlby Thandar Instruments HA1600	227306

9.7.2 Results

- Steady State and Fluctuating Harmonic Current emission results comply with the requirement.

9.7.3 Conclusion

The EUT complies with the Harmonic Current emission requirements of SANS / IEC 61000-3-2.

9.8 VOLTAGE FLUCTUATIONS & FLICKERS

9.8.1 Setup

- The EUT was switched on and operated in accordance with the manufacturer instructions.

Table 9.8-1 Voltage Fluctuations & Flicker test results

```
HA-PC Link Plus. Software v2.02. Firmware v2.81
Report Number          : 108
Tested On              : 01 December 2015 12:39 for 600 Seconds.
Equipment Under Test   : Globtek Inc
Serial Number          :
Tested by              : Hans

Supply Voltage : 230.4 to 230.7 Vrms  326.4 Vpk   Frequency : 49.98 to 50.05 Hz
Load Current   : 0.0 to 5.7 Arms    0.0 to 5.7 Apk Crest Factor: 4.375

Test Method: EN61000-3-3:2008
 Max d(c) Between Adjacent:   0.00%            PASS
Voltage Variations :
             Highest Level:  +1.23%
              Lowest Level:  -1.26%
                   d(max):   2.49%            PASS

     Highest d(t) of 500ms:   1.22%            PASS
   Present d(t) over 3.33%:   0.00 Seconds
   Longest d(t) over 3.33%:   0.02 Seconds
      Highest Steady State:  -0.02%
       Lowest Steady State:  -0.02%
 Max d(c) Between Adjacent:   0.00%            PASS
      Max d(c) Between Any:   0.00%

    Short Term Flicker Pst:   0.05             PASS

          1.5%         0.06
          2.2%         0.02
            3%         0.02
            4%         0.00
            6%         0.00
Flicker Results :
       Pst Classifier          Plt Calculation
       Duration       Flicker    Interval     Pst
          0.1%         0.05
          0.7%         0.01
          1.0%         0.01
          1.5%         0.01
          2.2%         0.01
            3%         0.01
            4%         0.01
            6%         0.00
            8%         0.00
           10%         0.00
           13%         0.00
           17%         0.00
           30%         0.00
           50%         0.00
           80%         0.00
```

9.8.2 Conclusion

The EUT complies with the voltage fluctuations and flicker requirements of SANS / IEC 61000-3-3.

10. COMPLIANCE STATEMENT

The EUT complies with the requirements of the specifications listed in 11 below.

11. CONCLUSION

The GlobTek Inc switching power adapter, GT41083-4024-T2 (In the configuration tested) meets the requirements of the following specifications called for in CISPR 22 / 24 and IEC 61204-3:

- SANS 61204-3:2012 (ED. 2.00) / IEC 61204-3:2011: 'Low voltage power supplies, D.C. Output - Part 3 Electromagnetic Compatibility (EMC)'
- SANS 222 (2009) / CISPR 22 *(2008): 'Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement'*
- SANS 224 (2010) / CISPR 24 (2010): '*Information technology equipment - Immunity characteristics - Limits and methods of measurement'*
  - SANS 61000-4-2 (2009) / IEC 61000-4-2 (2008): *Testing and measurement techniques – Electrostatic discharge immunity test*
  - SANS 61000-4-3 (2003) / IEC 61000-4-3 (2010): *Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*
  - SANS 61000-4-4 (2011) / IEC 61000-4-4 (2011): *Testing and measurement techniques – Electrical Fast Transient / Burst*
  - SANS 61000-4-5 (2006) / IEC 61000-4-5 (2005): *Testing and measurement techniques – Surge immunity test*
  - SANS 61000-4-6 (2009) / IEC 61000-4-6 (2008): *Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*
  - SANS 61000-4-11 (2005) / IEC 61000-4-11(2004): *Testing and measurement techniques – Voltage Dips, Short Interruptions and voltage variations immunity test.*
  - SANS 61000-3-2 (2009) / IEC 61000-3-2 (2009): *Limits for Harmonic Current Emissions (Equipment Input Current ≤16 A per phase)*
  - SANS 61000-3-3 (2009) / IEC 61000-3-3 (2008) : *Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems – Equipment with rated current ≤16 A per phase*