



Test Report

For a
TCP Fluorescent Lamps
ES20 & ES27
Series

Manufacturer:

Technical Consumer Products, Inc.
300 Lena Drive
Aurora, Ohio 44202

Testing Facility:

F-Squared Laboratories
16740 Peters Road
Middlefield, Ohio 44062

The Technical Consumer Products, Inc., models ES 27W & ES 20W, were tested and found to comply with the requirements of the Federal Communications Commission outlined in the Federal Register CFR 47, Part 18 for Sub. Part B Equipment. Testing was performed by F-Squared Laboratories personnel using the facilities that was formerly Compliance Laboratories which is on file with the FCC (FCC file 31040/SIT, 1300F2). The product was received on 08/03/00 and testing was completed on 08/10/00.

Evaluation Conducted By:

Jim Church
EMC Technician

Report Reviewed By:

Frank Gonzales
EMC Engineer

Client: Technical Consumer Products, Inc.
Model: ES-20 & ES 27W

Report #: CLE072000-01
Issue Date: 8/10/00



F-Squared Laboratories
16740 Peters Road
Middlefield, Ohio 44062
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This report shall not be duplicated except in full without the written approval of F-Squared Laboratories.

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Exhibit I

Engineering Statement

This report has been prepared on behalf of Technical Consumer Products, Inc. to provide documentation for the testing described herein. This equipment has been tested and found to comply with Part 18 of the FCC Rules for authorization under the Declaration of Conformity procedure, using ANSI C63.4 1992 standards. The test results found in this report relate only to the items tested.

EQUIPMENT UNDER TEST: TCP FLUORESCENT LAMPS
Trade Name: Spring lamp
Models#: ES 27W & ES 20W

APPLICABLE RULES: CFR 47 Part 18

MEASUREMENT PROCEDURE: All measurements were performed according to the 1992 version of ANSI C63.4. A list of the measurement equipment can be found in Exhibit II.

UNCERTAINTY BUDGET: Conducted Emission
Combined Uncertainty (+ or -) 1.13 dB
Expanded Uncertainty (+ or -) 2.26 dB

ENGINEERING STATEMENT: I hereby state that: The measurements shown in this application were made in accordance with the procedures indicated and the energy emitted by this equipment was found to be within the limits. I assume full responsibility for the accuracy and completeness of these measurements.

I further state that: On the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Part 18 of the FCC Rules under normal use and maintenance.

Client: Technical Consumer Products, Inc.
Model: ES-20 & ES 27W

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Certified by: _____
Tony Masone EMC Manager

Exhibit II

List of Measurement Instrumentation

Equipment	Num.	Manufacturer	Model #	Serial #	Cal. Req'd	Cal. Due Date
Shield Room	CL014	Shielding Resources	3 meter	001	Yes	3/17/01
AC Power System	CL062	California Instruments	5001IX-CTS	52840	No	Not required
Receiver	CL013	Dynamic Sciences	DSI-2020	604/002	Yes	8/23/01
LISN	CL008	Fisher Custom Comm	50/250-25-4	9600	Yes	8/24/01
Antenna 1	CL002	EMC Test Systems	3143 Biconilog	1229	No	Not required
OATS	CL017	Compliance Labs		001	Yes	8/09/01
PLDCN	CL010	Fisher Custom Comm	801-M3-16A	97-12	Yes	9/05/01
Antenna 2	CL018	EMC Test Systems	3143 Biconilog	9609-1306	Yes	7/06/01
ESD generator	CL004	Haefely Trench	PESD 1600	N/A	Yes	12/19/00
Humidity/Temp G	CL022	Thermo-Hygro		N/A	Yes	12/21/00
Surge Generator	CL046	EM Test	VCS 500	21527	Yes	12/21/00
EFT generator	CL003	Haefely Trench	PEFT Junior	83818	Yes	12/26/00
Signal Generator	CL007	Giga-tronics	6061A	9618911	Yes	1/30/01
Field Probe	CL006	Chase	EMC 20	2244/29	Yes	3/28/01
Computer	CL019	Tech	6X86 MX	N/A	No	Not required
Computer	CL020	EXPO	AMD-K6	N/A	No	Not required
PIA	CL042	Fischer Custom Comm	801-150-50-CDN	97-24	No	Not required
PIA	CL043	Fisher Custom Comm	801-150-50-CDN	97-23	No	Not required
Oscilloscope	CL047	Goldstar	OS-90206	5091208	No	Not required
Computer	CL049	S.E.G. Technologies	ALULA P-150	N/A	No	Not required
Amplifier	CL001	Instruments for Industry	SMX 1000	1984-0796	No	Not required
SLDCN	CL011	Fisher Custom Comm	801-S9	97-08	Yes	9/04/01
Antenna Mast	CL015	A. H. Systems	AMSC-4	N/A	No	Not required
Turn Table	CL016	A. H. Systems	TTC-4	001	No	Not required
Power Meter	CL083	Bird Electronic	4304A-1	14018	No	Not required
Injection Probe	CL065	Fisher Custom Comm	F-120-9A	68	No	Self Calibration
Current Probe	CL066	Fisher Custom Comm	F-51	200	No	Self Calibration
Calibration Fixture	CL067	Fisher Custom Comm	FCC-BCICF-4	59	No	Self Calibration
Antenna 3	CL084	Solar Electronics	7334-1	002302	Yes	9/18/01
Oscilloscope	CL085	Tektronix	TDS3052	R014540	Yes	8/06/01

Exhibit III

Equipment Under Test Information and Data

TEST ITEM CONDITION: The equipment to be tested was received in good condition.

CONDUCTED EMISSION TESTING: The EUT was placed on a 0.8 meter high, 1 X 1.5 meter non-conductive table. Power was provided to the EUT through a LISN bonded to a 3 X 2 meter ground plane. The LISN and peripherals were supplied power through a filtered AC power source. The output of the LISN was connected to the input of the receiver and emissions in the range 150kHz to 30 MHz were measured. The measurements were recorded using the quasi-peak values, and the resolution bandwidth during testing was 9kHz. All data for conducted emissions is found in Exhibit V.

CALCULATION OF DATA: **RADIATED EMISSIONS** – The antenna factors (included cable losses) of the biconical antennas used, and the pre-amplifier gain, are input into the memory of the receiver. The receiver then corrects the reading for amplitude automatically. The field strength reading can then be taken directly from the receiver and compared to the FCC limits in dBuV/m. The following equation is used to convert to uV/m:

$$E_u \text{ V/m} = \text{antilog} (E_{\text{dBuV/m}}^{/20})$$

SAMPLE OF FIELD STRENGTH CALCULATION:

$$E_a = V_a + AF + A_e + (-AG)$$

Where E_a = Field Strength (dBuV/m)

$V_a = 20 \times \log_{10}$ (measure RF voltage, uV)

A_e = Cable Loss Factor, dB

AG = Amplifier Gain, dB

AF = Antenna Factor dB (m-1)

i.e. if the reading is 57.0 dBuV, the antenna factor 8.0 dB, cable loss factor 1.0 dB and Amplifier gain is 25.0 dB, so the field strength will be:

$$\begin{aligned} E_a \text{ (dBuV/m)} &= 57 + 8 + 1 + (-25) \\ &= 41 \text{ dBuV/m} \end{aligned}$$

OR

$$\begin{aligned} E_a \text{ (uV/m)} &= 10^{(41/20)} \\ &= 112.20 \text{ uV/m} \end{aligned}$$

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Exhibit IV

EUT INFORMATION

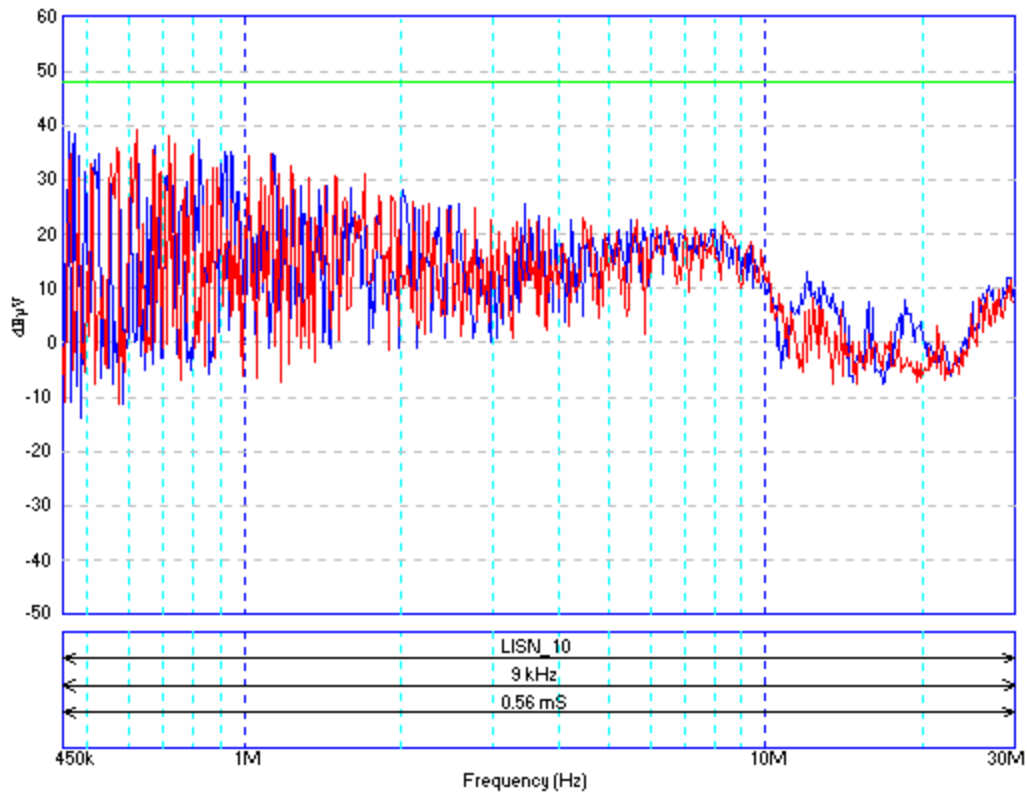
EUT:

Device	Manufacturer	Model #
Spring Light	Technical Consumer Products, Inc.	ES 27W &ES 20W

Exhibit V

Conducted Emissions:

Phase Line ES 20W Sample #1



PASS



FAIL

Signed by Testing Engineer:

Tony Masone EMC Manager

Client: Technical Consumer Products, Inc.
Model: ES-20 & ES 27W

Report #: CLE072000-01
Issue Date: 8/10/00

Observed Conducted Emissions Phase Line ES 20W Sample #1

Datalog file: ES20L-1.DL

Measurement Units: dBµV

Num	Atten	Delta	Gain	Limit	Lim Type	Transducer
Frequency	Bandwidth	Corr	Peak	QPeak	Date	

1	30.0	-9.8	50.0	48.0	Q-Peak	LISN_10
464.241 kHz	9 kHz	10.0	40.8	38.1	08/04/00	
2	30.0	-12.6	50.0	48.0	Q-Peak	LISN_10
567.801 kHz	9 kHz	10.0	38.6	35.3	08/04/00	
3	30.0	-11.0	50.0	48.0	Q-Peak	LISN_10
621.207 kHz	9 kHz	10.0	39.8	36.8	08/04/00	
4	30.0	-18.3	50.0	48.0	Q-Peak	LISN_10
666.718 kHz	9 kHz	10.0	36.1	29.6	08/04/00	
5	30.0	-20.8	50.0	48.0	Q-Peak	LISN_10
716.253 kHz	9 kHz	10.0	33.8	27.1	08/04/00	
6	30.0	-11.1	50.0	48.0	Q-Peak	LISN_10
733.900 kHz	9 kHz	10.0	40.1	36.8	08/04/00	
7	30.0	-17.1	40.0	48.0	Q-Peak	LISN_10
797.389 kHz	9 kHz	10.0	36.3	30.8	08/04/00	

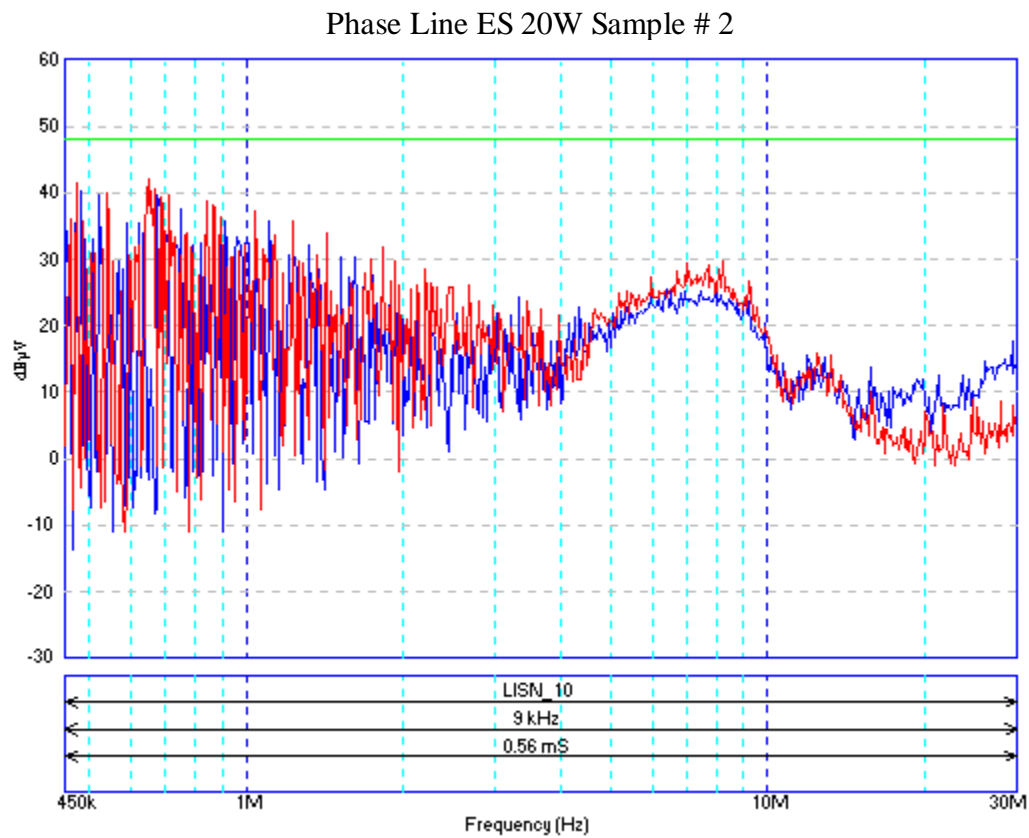
Observed Conducted Emissions Neutral ES 20W Sample #1

Datalog file: ES20N-1.DL

Measurement Units: dBµV

Num	Atten	Delta	Gain	Limit	Lim Type	Transducer
Frequency	Bandwidth	Corr	Peak	QPeak	Date	

1	30.0	-10.8	50.0	48.0	Q-Peak	LISN_10
459.567 kHz	9 kHz	10.0	39.6	37.1	08/04/00	
2	30.0	-13.0	40.0	48.0	Q-Peak	LISN_10
473.148 kHz	9 kHz	10.0	39.8	35.0	08/04/00	
3	30.0	-14.8	40.0	48.0	Q-Peak	LISN_10
670.987 kHz	9 kHz	10.0	37.0	33.1	08/04/00	
4	30.0	-13.4	40.0	48.0	Q-Peak	LISN_10
819.753 kHz	9 kHz	10.0	38.6	34.6	08/04/00	
5	30.0	-11.5	50.0	48.0	Q-Peak	LISN_10
914.197 kHz	9 kHz	10.0	39.0	36.3	08/04/00	
6	30.0	-17.6	40.0	48.0	Q-Peak	LISN_10
945.679 kHz	9 kHz	10.0	36.8	30.3	08/04/00	



PASS



FAIL

Signed by Testing Engineer:

Tony Masone EMC Manager

Client: Technical Consumer Products, Inc.
Model: ES-20 & ES 27W

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Observed Conducted Emissions Phase Line ES 20W Sample #2
Datalog file: ES20L-2.DL

Measurement Units: dBµV

Num	Atten	Delta	Gain	Limit	Lim Type	Transducer
Frequency	Bandwidth		Corr	Peak	QPeak	Date

1	30.0	-7.0	50.0	48.0	Q-Peak	LISN_10
473.219 kHz	9 kHz	10.0	43.2	40.8	08/04/00	
2	30.0	-18.3	50.0	48.0	Q-Peak	LISN_10
540.712 kHz	9 kHz	10.0	33.3	29.6	08/04/00	
3	30.0	-17.1	50.0	48.0	Q-Peak	LISN_10
644.427 kHz	9 kHz	10.0	35.3	30.8	08/04/00	
4	30.0	-17.3	50.0	48.0	Q-Peak	LISN_10
653.096 kHz	9 kHz	10.0	35.3	30.6	08/04/00	
5	30.0	-8.6	50.0	48.0	Q-Peak	LISN_10
684.674 kHz	9 kHz	10.0	42.1	39.3	08/04/00	
6	30.0	-13.6	50.0	48.0	Q-Peak	LISN_10
711.919 kHz	9 kHz	10.0	39.8	34.3	08/04/00	
7	30.0	-19.3	50.0	48.0	Q-Peak	LISN_10
841.975 kHz	9 kHz	10.0	33.0	28.6	08/04/00	

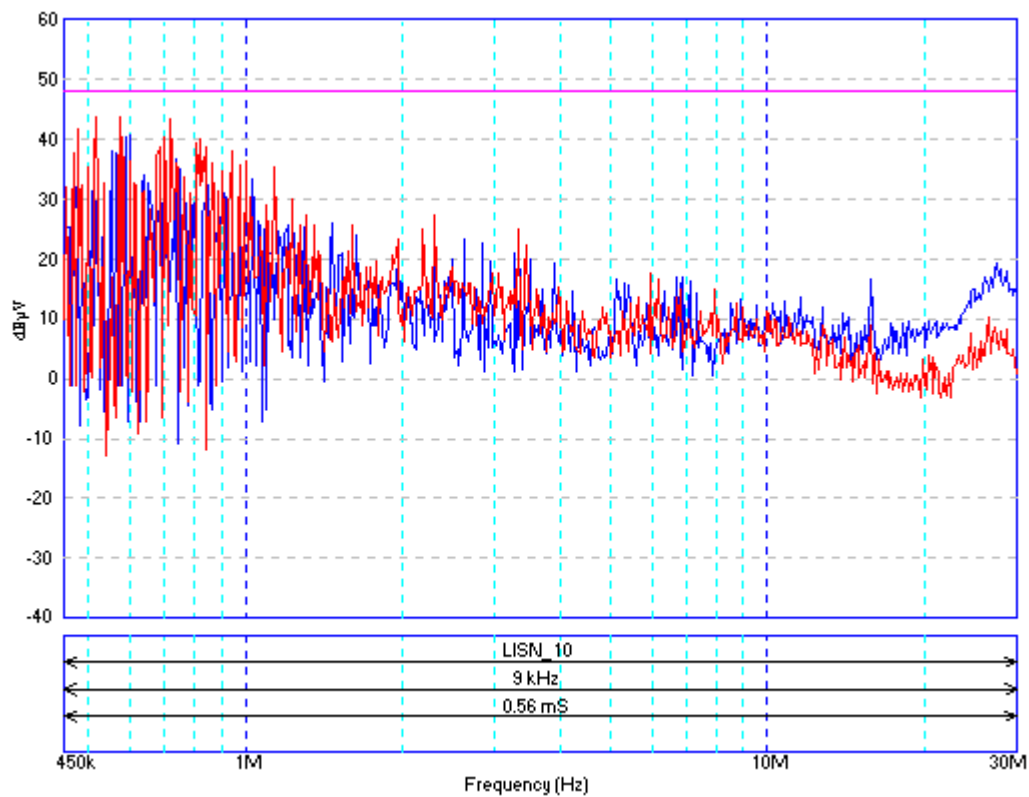
Observed Conducted Emissions Neutral ES 20W Sample #2
Datalog file: ES20N-2.DL

Measurement Units: dBµV

Num	Atten	Delta	Gain	Limit	Lim Type	Transducer
Frequency	Bandwidth		Corr	Peak	QPeak	Date

1	30.0	-6.9	40.0	48.0	Q-Peak	LISN_10
472.769 kHz	9 kHz	10.0	43.1	41.1	08/04/00	
2	30.0	-9.5	40.0	48.0	Q-Peak	LISN_10
482.000 kHz	9 kHz	10.0	42.5	38.3	08/04/00	
3	30.0	-12.0	50.0	48.0	Q-Peak	LISN_10
522.615 kHz	9 kHz	10.0	39.1	36.0	08/04/00	
4	30.0	-16.5	50.0	48.0	Q-Peak	LISN_10
621.384 kHz	9 kHz	10.0	36.3	31.5	08/04/00	
5	30.0	-8.5	50.0	48.0	Q-Peak	LISN_10
676.153 kHz	9 kHz	10.0	41.8	39.3	08/04/00	
6	30.0	-11.4	40.0	48.0	Q-Peak	LISN_10
752.061 kHz	9 kHz	10.0	39.3	36.6	08/04/00	

Phase Line ES 27W Sample # 1



PASS



FAIL

Signed by Testing Engineer:

Tony Masone EMC Manager

Client: Technical Consumer Products, Inc.
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Observed Conducted Emissions Phase Line on ES 27W sample #1

Datalog file: ES27L-1.DL

Measurement Units: dBµV

Num	Atten	Delta	Gain	Limit	Lim Type	Transducer
Frequency	Bandwidth		Corr	Peak	QPeak	Date

1	30.0	-12.1	50.0	48.0	Q-Peak	LISN_10
477.623 kHz	9 kHz		10.0	41.1	35.8	08/03/00
2	20.0	-17.5	50.0	48.0	Q-Peak	LISN_10
517.901 kHz	9 kHz		10.0	33.1	30.5	08/03/00
3	20.0	-9.4	40.0	48.0	Q-Peak	LISN_10
572.222 kHz	9 kHz		10.0	40.5	38.6	08/03/00
4	30.0	-13.9	50.0	48.0	Q-Peak	LISN_10
716.049 kHz	9 kHz		10.0	38.3	34.1	08/03/00
5	20.0	-14.0	40.0	48.0	Q-Peak	LISN_10
819.444 kHz	9 kHz		10.0	38.0	33.8	08/03/00
6	30.0	-13.8	50.0	48.0	Q-Peak	LISN_10
945.370 kHz	9 kHz		10.0	37.8	34.1	08/03/00

Observed Conducted Emissions Neutral on ES 27W sample #1

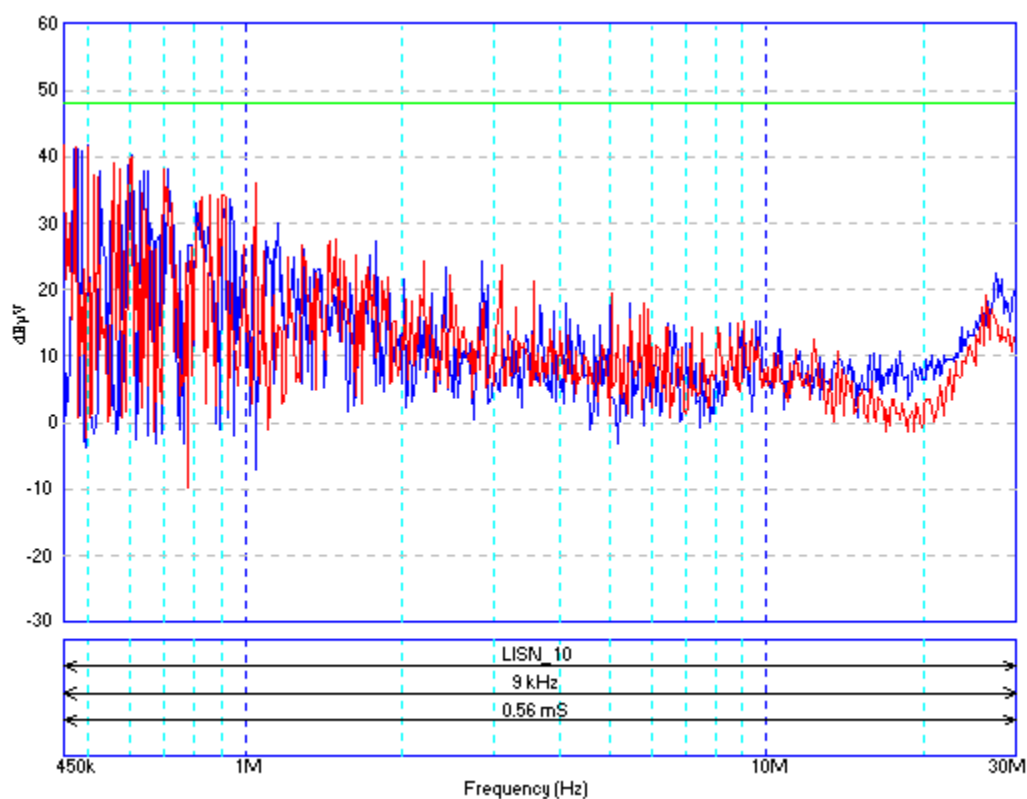
Datalog file: ES27N-1.DL

Measurement Units: dBµV

Num	Atten	Delta	Gain	Limit	Lim Type	Transducer
Frequency	Bandwidth		Corr	Peak	QPeak	Date

1	30.0	-13.0	40.0	48.0	Q-Peak	LISN_10
468.461 kHz	9 kHz		10.0	40.0	35.0	08/03/00
2	30.0	-11.0	40.0	48.0	Q-Peak	LISN_10
590.000 kHz	9 kHz		10.0	41.5	36.8	08/03/00
3	30.0	-11.6	40.0	48.0	Q-Peak	LISN_10
603.538 kHz	9 kHz		10.0	41.3	36.3	08/03/00
4	30.0	-16.5	40.0	48.0	Q-Peak	LISN_10
698.000 kHz	9 kHz		10.0	37.1	31.5	08/03/00
5	30.0	-13.0	40.0	48.0	Q-Peak	LISN_10
738.307 kHz	9 kHz		10.0	38.6	34.8	08/03/00
6	30.0	-21.6	40.0	48.0	Q-Peak	LISN_10
1.030769 MHz	9 kHz		10.0	35.5	26.3	08/03/00

Phase Line ES 27W Sample # 2



PASS

FAIL

Signed by Testing Engineer:

Tony Masone EMC Manager

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Model: ES-20 & ES 27W

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Observed Conducted Emissions Phase Line on ES 27W sample #2

Datalog file: ES27L-2.DL

Measurement Units: dBµV

Num	Atten	Delta	Gain	Limit	Lim Type	Transducer
Frequency	Bandwidth	Corr	Peak	QPeak	Date	

1	30.0	-9.5	40.0	48.0	Q-Peak	LISN_10
450.774 kHz	9 kHz	10.0	42.7	38.3	08/04/00	
2	30.0	-11.1	40.0	48.0	Q-Peak	LISN_10
473.065 kHz	9 kHz	10.0	41.8	36.8	08/04/00	
3	30.0	-9.3	40.0	48.0	Q-Peak	LISN_10
500.092 kHz	9 kHz	10.0	41.8	38.6	08/04/00	
4	30.0	-14.6	40.0	48.0	Q-Peak	LISN_10
558.668 kHz	9 kHz	10.0	38.6	33.3	08/04/00	
5	30.0	-8.3	40.0	48.0	Q-Peak	LISN_10
607.585 kHz	9 kHz	10.0	42.5	39.6	08/04/00	
6	30.0	-14.5	40.0	48.0	Q-Peak	LISN_10
697.987 kHz	9 kHz	10.0	39.0	33.3	08/04/00	

Observed Conducted Emissions Neutral on ES 27W sample #2

Datalog file: ES27N-2.DL

Measurement Units: dBµV

Num	Atten	Delta	Gain	Limit	Lim Type	Transducer
Frequency	Bandwidth	Corr	Peak	QPeak	Date	

1	30.0	-11.0	40.0	48.0	Q-Peak	LISN_10
468.518 kHz	9 kHz	10.0	42.2	36.8	08/04/00	
2	30.0	-11.3	40.0	48.0	Q-Peak	LISN_10
477.469 kHz	9 kHz	10.0	41.8	36.6	08/04/00	
3	30.0	-10.8	40.0	48.0	Q-Peak	LISN_10
486.419 kHz	9 kHz	10.0	42.2	37.1	08/04/00	
4	30.0	-9.6	40.0	48.0	Q-Peak	LISN_10
500.185 kHz	9 kHz	10.0	41.1	38.3	08/04/00	
5	30.0	-12.1	40.0	48.0	Q-Peak	LISN_10
594.444 kHz	9 kHz	10.0	40.6	35.8	08/04/00	
6	30.0	-7.5	40.0	48.0	Q-Peak	LISN_10
608.333 kHz	9 kHz	10.0	43.2	40.5	08/04/00	

Exhibit VI



TEST SET-UP

&

EUT PHOTOS

CONDUCTED EMISSIONS TEST:



Exhibit VII

Modifications

EUT COMPLIES

WITHOUT MODIFICATIONS

Client: Technical Consumer Products, Inc.
Model: ES-20 & ES 27W

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