

# TEST REPORT



Testing Certification # 1367-01

## Laboratory ID

PRODUCT SAFETY ENGINEERING, INC.  
12955 Bellamy Brothers Boulevard  
Dade City, Florida 33525 USA  
PH (352) 588-2209 FX (352) 588-2544

Report Issue Date: 03 Oct 2014  
Sample S/N: NA

Sample Receipt Date: 04 Sep 2014

Sample Test Date: see data sheets

Description of non-standard test method or test practice: ***None***

Estimated Measurement Uncertainty: ***See page 9. This uncertainty represents and expanded uncertainty expressed at approximately 95% confidence level using a coverage factor of k=2.***

Special limitations of use: ***None***

Traceability: ***reference standards of measurement have been calibrated by a competent body using standards traceable to the NIST.***

According to testing performed at Product Safety Engineering, Inc., the above-mentioned unit is in compliance with the electromagnetic compatibility requirements defined in regulations indicated on page (3) of the test report. The test results contained herein relate only to the item identified above. It is the manufacturer's responsibility to assure that additional production units are manufactured with identical electrical and mechanical characteristics.

As the responsible EMC Project Engineer, I hereby declare that the equipment tested as specified above conforms to the requirements indicated on page (3) of the test report.

Signature

A handwritten signature in black ink, appearing to read 'David Foerstner'.

Name David Foerstner

Title Engineering Group Leader

Date 03 Oct 2014

***Reviewed by:***

Approved Signatory

A handwritten signature in black ink, appearing to read 'Steve Hoke'.

Date 03 Oct 2014

Steve Hoke (EMC Site Manager)

This report shall not be reproduced except in full, without written approval from Product Safety Engineering, Inc

*Test Report Number 14F477E*

Product Safety Engineering, Inc 12955 Bellamy Brothers Blvd. Dade City, FL 33525  
Tel (352) 588-2209 Fax (352) 588-2544

## DIR ECTOR Y - EMISSIONS

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## EMISSIONS TEST REGULATIONS :

The emissions tests were performed according to following regulations:

- EN 61000-6-3:2007

- EN 61000-6-4:2007

- EN 55011 : 2009/A1:2010

- Group 1

- Group 2

- Class A

- Class B

- EN 55013 : 2001 /A1:2003 /A2:2006

- EN 55014 -1: 2006/A2:2011

- Household appliances and similar

- Portable tools

- Semiconductor devices

- EN 55022:2010/AC:2011

- Class A

- Class B

- CISPR 22:2008

- Class A

- Class B

- AS/NZS CISPR 22:2009

- Class A

- Class B

- ICES-003

- Class A

- Class B

- CNS 13438

- Class A

- Class B

- VCCI V-3/2010.4

- Class A

- Class B

- FCC Part 15 (per ANSI C63.4) 15.249

- Class A

- Class B

- Certification

- Verification

- Declaration of Conformity

- RSS-Gen Issue 4

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## Environmental conditions during testing:

	LAB	OATS
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Temperature: \* \_\_\_\_\_ : \_\_\_\_\_

Relative Humidity: \*\* \_\_\_\_\_ : \_\_\_\_\_

\* The ambient temperature during the testing was within the range of (50° - 104° F) unless indicated above.

\*\* The humidity levels during the testing was within the range of (10% - 90%) relative humidity unless indicated above.

Power supply system : \_\_\_\_\_ Volts \_\_\_\_\_ Hz SINGLE phase

\*\*\* Internal (3) VDC batteries

## Sign Explanations:

- not applicable

- applicable

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## Emissions Test Conditions: CONDUCTED EMISSIONS (Interference Voltage)

The **CONDUCTED EMISSIONS (INTERFERENCE VOLTAGE)** measurements were performed at the following test location:

**■ - Test not applicable**

- Darby Test Site (Open Area Test Site)
- Darby Laboratory

**Test equipment used :**

<b>Model Number</b>	<b>Manufacturer</b>	<b>Description</b>	<b>Serial Number</b>
□ - 8028-50	Solar	50 Ω LISN	829012, 829022
□ - 8012	Solar	50 Ω LISN	924840
□ - EMC-30	Electro-Metrics	EMI Receiver	191
□ - 8566B	Hewlett-Packard	Spectrum Analyzer	2421A00526
□ - 85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00209
□ - 85662A	Hewlett Packard	Analyzer Display	2403A07352
□ - 8028-50	Solar	50 Ω LISN	903725, 903726
□ - FCC-TLISN-T4-02	Fisher Custom Com.	Telecom ISN	20454
□ - FCC-TLISN-T8-02	Fisher Custom Com.	Telecom ISN	20452
□ - LI-125	Com-Power	50 Ω LISN	191080/191081

## Emissions Test Conditions: RADIATED EMISSIONS (Magnetic Field)

The **RADIATED EMISSIONS (MAGNETIC FIELD)** measurements were performed at the following test location:

- - Darby Test Site (Open Area Test Site)**
- 
- 

**at a test distance of :**

- - 3 meters**
- 30 meters

**□ - Test not applicable**

**Test equipment used :**

<b>Model Number</b>	<b>Manufacturer</b>	<b>Description</b>	<b>Serial Number</b>
□ - 3148	EMCO	Log Periodic Antenna	00044783
□ - BIA-25	Electro-Metrics	Biconical Antenna	4283
■ - 8566B	Hewlett-Packard	Spectrum Analyzer	2532A02418
■ - 85662A	Hewlett-Packard	Analyzer Display	2403A07352
■ - 85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00209
■ - ALR-30M	Electro-Metrics	Loop Antenna	824
□ - 8447D	Hewlett Packard	Preamplifier	2944A06901
□ - EMC-30	Electro-Metrics	EMI Receiver	191
□ - ALA-130/A	Antenna Research	Loop Antenna	106

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## Emissions Test Conditions: RADIATED EMISSIONS (Electric Field)

The **RADIATED EMISSIONS (ELECTRIC FIELD)** measurements, in the frequency range of 30 MHz-1000 MHz, were tested in a horizontal and vertical polarization at the following test location :

### - Test not applicable

- Darby Site (Open Area Test Site)

- Darby Lab

-

at a test distance of :

- 3 meters

- 10 meters

- 30 meters

Test equipment used :

Model Number	Manufacturer	Description	Serial Number
<input type="checkbox"/> - HLP 3003C	EMC Automation	Hybrid Periodic Antenna	017501
<input checked="" type="checkbox"/> - 8447D	Hewlett-Packard	Preamplifier (26dB)	2944A06901
<input checked="" type="checkbox"/> - 8566B	Hewlett-Packard	Spectrum Analyzer	2532A02418
<input checked="" type="checkbox"/> - 85662A	Hewlett-Packard	Analyzer Display	2403A07352
<input checked="" type="checkbox"/> - 85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00209
<input type="checkbox"/> - BIA 25	Electro-Metrics	Biconical Antenna	4283
<input type="checkbox"/> - EMC-30	Electro-Metrics	EMI Receiver	191
<input type="checkbox"/> - 8566B	Hewlett Packard	Spectrum Analyzer	2532A02418
<input type="checkbox"/> - 85650A	Hewlett Packard	Quasi-Peak Adapter	2043A00358
<input type="checkbox"/> - 85662A	Hewlett Packard	Analyzer Display	2403A06604
<input type="checkbox"/> - LPA30	Electro-Metrics	Log Periodic	2280
<input checked="" type="checkbox"/> - 3104C	Emco	Biconical Antenna	00075927
<input checked="" type="checkbox"/> - 3148	ETS Lindgren	Log Periodic Antenna	75741

## Emissions Test Conditions): DISTURBANCE POWER

The **DISTURBANCE POWER** measurements were performed by using the absorbing clamp on the mains and interface cables in the frequency range 30 MHz - 300 MHz at the following test location :

### - Test not applicable

- Darby Lab

-

Test equipment used :

Model Number	Manufacturer	Description	Serial Number
<input type="checkbox"/> - MDS-21	Rhode&Schwarz	Absorbing Clamp	8608447020
<input type="checkbox"/> - 8566B	Hewlett-Packard	Spectrum Analyzer	2532A02418
<input type="checkbox"/> - 85662A	Hewlett-Packard	Analyzer Display	2403A07352
<input type="checkbox"/> - 85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00358
<input type="checkbox"/> - 8447D	Hewlett-Packard	Amplifier (26 dB)	2944A06901

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**The *EQUIVALENT RADIATED EMISSIONS* measurements in the frequency range 1 GHz -10 GHz were performed in a horizontal and vertical polarization at the following test location :**

- - Darby Test Site (Open Area Test Site)
- -
- -
- -

**at a test distance of:**

- - 1 meters
- - 3 meters
- - 10 meters

**□ - Test not applicable**

**Test equipment used :**

Model Number	Manufacturer	Description	Serial Number
■ - 8566B	Hewlett-Packard	Spectrum Analyzer	2532A02418
■ - 85662A	Hewlett-Packard	Analyzer Display	2403A07352
■ - 85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00209
■ - 8449B	Hewlett-Packard	Preamplifier	3008A00320
■ - 3115	Electro-Mechanics	Double Ridge Guide Horn	3810

**Emissions Test Conditions): CONDUCTED EMISSIONS - TELECOMMUNICATIONS PORT measurements were performed in the frequency range 0.15 MHz - 30 MHz at the following test location :**

**■ - Test not applicable**

- - Darby Lab
- -

**Test equipment used :**

Model Number	Manufacturer	Description	Serial Number
□ - EMC-30	Electro-Metrics	EMI Receiver	191
□ - FCC-TLISN-T8-02	Fischer Custom Com	T-LISN	20452
□ - FCC-TLISN-T4-02	Fischer Custom Com	T_LISN	20454
□ -			
□ -			

## **Equipment Under Test (EUT) Test Operation Mode - Emission tests :**

**The device under test was operated under the following conditions during emissions testing:**

- Standby
- Test program (H - Pattern)
- Test program (color bar)
- Test program (customer specific)
- Practice operation
- Normal Operating Mode
- 

### **Configuration of the device under test:**

- See System Under Test Information in Appendix B
- Stand-Alone Operation

### **Rationale for EUT setup / configuration:**

ANSI C63.4:2003

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## Emission Test Results:

### Conducted emissions 150 kHz - 30 MHz

The requirements are	<input type="checkbox"/> - MET	<input type="checkbox"/> - NOT MET
Minimum limit margin	dB	at
MU: 5.3 dB		MHz

### Radiated emissions (electric field) 902 - 928 MHz (per 15.249)

The requirements are	<input checked="" type="checkbox"/> - MET	<input type="checkbox"/> - NOT MET
Minimum limit margin	0.1 dB	at
MU: NA		918.8 MHz

### Radiated emissions (electric field) 30 - 1,000 MHz

The requirements are	<input checked="" type="checkbox"/> - MET	<input type="checkbox"/> - NOT MET
Minimum limit margin	6.5 dB	at
MU: 5.2 dB		35.0 MHz

### Radiated emissions (magnetic field) 10 kHz - 30 MHz

The requirements are	<input checked="" type="checkbox"/> - MET	<input type="checkbox"/> - NOT MET
Minimum limit margin	>20 dB	at
MU: NA		MHz

### Radiated emissions 1 GHz - 10 GHz

The requirements are	<input checked="" type="checkbox"/> - MET	<input type="checkbox"/> - NOT MET
Minimum limit margin	10.3 dB	at
MU: 4.9 dB		3.675 GHz

### Emissions Test Conditions): CONDUCTED EMISSIONS - TELECOMMUNICATIONS PORT 0.15 to 30 MHz

The requirements are	<input type="checkbox"/> - MET	<input type="checkbox"/> - NOT MET
Minimum limit margin	dB	at
MU: NA		MHz

**MU = Measurement Uncertainty**

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## GENERAL REMARKS:

**Conducted emissions** - Exploratory measurements are used to identify the frequency of the emission that has the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable positions, and with a typical system equipment configuration and arrangement. For each mode of operation and for each ac power current-carrying conductor, cable manipulation is performed within the range of likely configurations. For this measurement or series of measurements, the frequency spectrum of interest is monitored looking for the emission that has the highest amplitude relative to the limit. Once that emission is found for each current-carrying conductor of each power cord associated with the EUT (but not the cords associated with non-EUT equipment in the overall system), the one and arrangement and mode of operation that produces the emission closest to the limit across all the measured conductors is recorded. Software used is Electro metrics OS-30-CAT ver 1.10

**Radiated emissions** - The equipment under test is oriented at (0) degrees azimuth with respect to the measuring antenna. The antenna is placed in the vertical polarity and the software performs an automated set of measurements across the frequency range of interest. When complete, a database of all signals labeled "suspects" is displayed and the test engineer manually investigates any signal that is within (15) dB of the limit. Those determined to be from the EUT are placed on a separate database labeled "finals" and those not from the EUT are placed in the ambient database. The EUT is then rotated (90) degrees and the process is repeated. Upon completion of (4) scans, the antenna polarity is changed to horizontal, the EUT orientation is set to (45) degrees and the process is repeated (4) additional times. After every scan, the final list is completed re-measured and updated for amplitude and polarity if higher in amplitude.

Once all (8) scans are complete, the highest (6) signals are re-measured by maximizing the amplitude with cable manipulation, antenna height and EUT azimuth. The final (6) six signals are included in the test report. Software used is HP 85870A Opt655/Rev A.02.01.

## SUMMARY:

The requirements according to the technical regulations are

- met
- **not** met.

The device under test does

- fulfill the general approval requirements mentioned on page 3.
- **not** fulfill the general approval requirements mentioned on page 3.

Testing Start Date 17 Sep 2014

Testing End Date: 02 Oct 2014

- PRODUCT SAFETY ENGINEERING INC -

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Test-setup photo(s):

Conducted emission 150 kHz - 30 MHz

NA

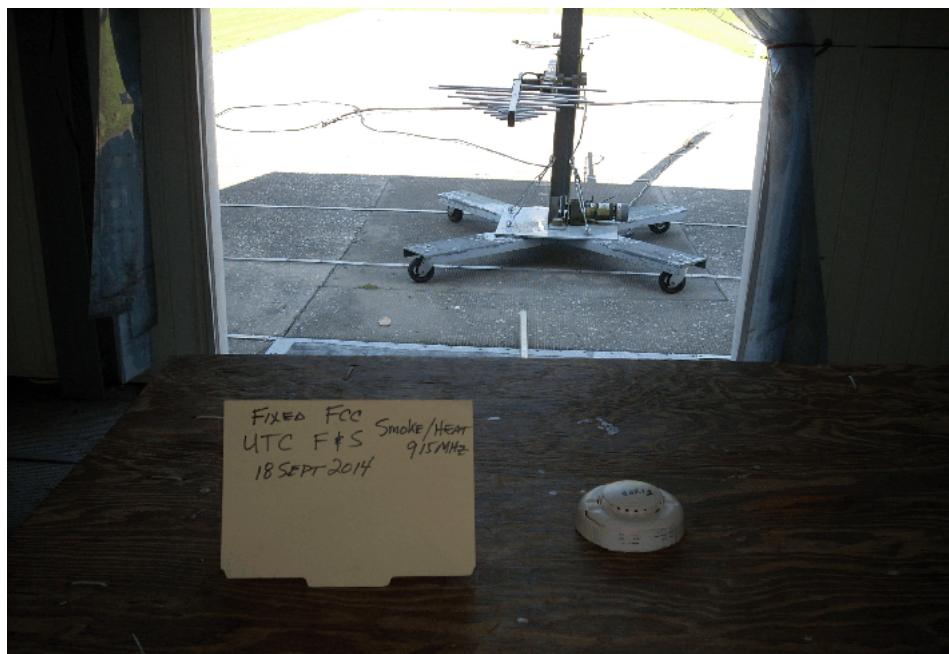
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Test-setup photo(s):

Radiated emission 30 MHz - 1000 MHz



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# **APPENDIX**

## **A**

### **Test Equipment Calibration Information**

**&**

### **Test Data Sheets**

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TEST EQUIPMENT CALIBRATION INFORMATION							
Manufacturier	Model	Description	Serial Number	Cal Due *			
Hewlett Packard	8566B	Spectrum Analyzer	2421A00526				
Hewlett Packard	85662A	Display	2151A03667				
Hewlett Packard	85650A	Quasi-peak Adapter	2043A00209	11/5/2014			
Hewlett Packard	8566B	Spectrum Analyzer	2532A02418	11/5/2014			
Hewlett Packard	85662A	Display	2403A07352	11/5/2014			
Hewlett Packard	85650A	Quasi-peak Adapter	2043A00358				
Hewlett Packard	8447D	Preamp 0.1 - 1,000 MHz	2944A06832				
Hewlett Packard	8447D	Preamp 0.1 - 1,000 MHz	2944A06901	12/10/2014			
Hewlett Packard	8449B	Preamp 1 - 26.5 GHz	3008A00320	6/6/2015			
Hewlett Packard	E7402A	Portable Spectrum Analyzer	US40240204				
ETS Lindgren	3148	Log Periodic Antenna	75741	** 2/7/2016			
Electro-Metrics	BIA-30	Biconical Antenna	3852				
EMCO	3104C	Biconical Antenna	75927	** 5/14/2016			
Electro-Metrics	ALR30M	Magnetic Loop Antenna	824				
Electro-Metrics	EMC-30	EMI Receiver	191				
Electro-Metrics	3115	Double Ridge Guide Antenna	3810	** 7/16/2015			
Solar	8028	LISN	829012/809022				
Com-Power	LI-125	LISN	191180/191181				
Schwartzbeck	MDS-21	Absorbing Clamp	2581				
Fisher Custom	FCC-TLISN-T4-02	T LISN	20454				
Fisher Custom	FCC-TLISN-T8-02	Fisher Custom	20452				
ATM	42-441-6	Stanard Gain Horn Antenna	E531612-01				
Electro-Metrics	3117	Double Ridge Guide Antenna	109296				
Solar	7334-1	Loop Sensor	32317				
Sun Systems	EC127	Enviromental Chamber	EC0154	NA			
Fluke	52	Digital Thermometer	447553				
		* Cal Due Date Format = MM/DD/YYYY					
All equipment was calibrated one year prior to the cal due date listed unless otherwise indicated							
** These devices are on a (2) year calibration cycle							

UTC F&S 915 Transmitter Fixed												
3 Meter Distance												
18-Sep-14			One Low Freq 911.78 and One High Freq 918.78 are Measured									
FUNDAMENTAL EMISSIONS												
Freq. MHz	Quasi peak Measured @ 3 m dBuV	ACF dB/M	CL dB	PA Gain dB	Adj QP dBuV/M	QP Limit dBuV/M	Delta dB	Polarity	Detector	Comments		
911.78	<b>65.3</b>	23.6	4.9	0	93.8	94	-0.2	H	QP	No PA used		
918.78	<b>65.4</b>	23.6	4.9	0	93.9	94	-0.1	H	QP	No PA used		
Harmonics of 911.78 MHz												
Freq. MHz	AVERAGE DET LEVEL Measured @ 3 m dBuV	ACF	System Gain PA - CL dB	Adj AVG dBuV/M	Average Limit dBuV/M	Delta dB	Polarity	Detector	Comments			
									PA = HP 87449B			
1823.5	<b>29.4</b>	27.5	23	33.9	54	-20.1	H	Average				
2735.3	<b>27</b>	29.2	21.7	34.5	54	-19.5	H	Average				
3647.1	<b>31.5</b>	32.1	20.5	43.1	54	-10.9	H	Average				
4558.9	<b>27.5</b>	32.5	18.4	41.6	54	-12.4	V	Average				
5470.7	*								> 10 dB Below			
6382.5	*								> 10 dB Below			
7294.2	*								> 10 dB Below			
8206	*								> 10 dB Below			
9117.8	*								> 10 dB Below			
* All Harmonic Emissions above 5 GHz are greater than 10 dB below the Limit												
Harmonics of 918.78 MHz												
Freq. MHz	AVERAGE DET LEVEL Measured @ 3 m dBuV	ACF	System Gain PA - CL dB	Adj AVG dBuV/M	Average Limit dBuV/M	Delta dB	Polarity	Detector	Comments			
									PA = HP 87449B			
1837.5	<b>29.7</b>	27.5	23	34.2	54	-19.8	H	Average				
2756.4	<b>28.8</b>	29.2	21.7	36.3	54	-17.7	H	Average				
3675.1	<b>32.1</b>	32.1	20.5	43.7	54	-10.3	H	Average				
4593.9	<b>26.2</b>	32.5	18.4	40.3	54	-13.7	V	Average				
5512.7	*								> 10 dB Below			
6431.5	*								> 10 dB Below			
7350.2	*								> 10 dB Below			
8269	*								> 10 dB Below			
9187.8	*								> 10 dB Below			
* All Harmonic Emissions above 5 GHz are greater than 10 dB below the Limit												

## Radiated Fields (900) MHz to (10) GHz

## PRODUCT EMISSIONS

HP 85870A Rev. A.02.00 Data File: UTC F&amp;S SMOKE FCC-B@10M 02OCT14

No	EMISSION	SPEC	MEASUREMENTS			SITE			CORR	COMMENTS
	FREQUENCY	LIMIT	ABS	dLIM	MODE	POL	HGT	AZM	FACTOR	
	MHz					cm	deg			dB
1	34.997	30.0	23.5	-6.5	PK	V	100	225	-17.9	
2	50.003	30.0	17.6	-12.4	PK	V	100	270	-16.9	
3	75.000	30.0	22.3	-7.7	PK	V	100	135	-21.7	
4	100.001	30.0	22.3	-7.7	PK	V	100	90	-16.6	
5	110.011	30.0	19.8	-10.2	PK	V	125	135	-15.6	
6	148.500	30.0	18.7	-11.3	PK	V	125	135	-15.	
7	225.002	30.0	18.3	-11.8	PK	H	300	180	-15.5	
8	352.556	37.0	22.6	-14.4	PK	V	150	270	-12.3	
9	500.002	37.0	26.0	-11.0	PK	H	200	225	-9.3	
10	999.995	37.0	26.4	-10.6	PK	V	100	135	1.2	

# **APPENDIX**

## **B**

### **System Under Test Description**

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# APPENDIX

## C

### Measurement Protocol

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ANSI C63.4 2003 was the guiding document for test procedures as required by 47 CFR Part 15 Subpart A Section 15.31(a)(3).

The data is compared to the FCC Part.249 limits.

The stated limit is (50) mV/m @ (3) meter.  $20 \log (50,000) = (94)$  dB $\mu$ V/m

The "EMI" instrumentation is capable of calculating the final emission level based on the following formula:

Level at the receiver (dB $\mu$ V) + Antenna Correction Factor (dB/M) + Cable Loss (dB) - Preamp Gain (dB) = Actual Level in dB $\mu$ V/M.

The sample calculation below is based on the actual test data collected:

Observed Level	<b>65.4</b>	dB $\mu$ V
ACF	+	<b>23.6</b> dB/M
Cable Loss	+	<b>4.9</b> dB
Preamp Gain	-	<b>0.0</b> dB
Actual Level		<b>93.9</b> dB $\mu$ V/M @ 918.78 MHz

**Please have a company official review this report and sign.**

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