

HYUNDAI CALIBRATION & CERTIFICATION TECH. CO., LTD.

PRODUCT COMPLIANCE TEAM
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CERTIFICATION

Manufacture; IMAGEQUEST CO., LTD. SAN 136-1, AMI-RI, BUBAL-EUP, ICHEON-SI, KYOUNKI-DO, 467-701, KOREA IMAGEQUEST FRN : 0005-8664-39	Date of Issue: OCTOBER 9, 2002 Test Report No.: HCT-F02-1003 Test Site: HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD. HCT FRN : 0005-8664-21
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FCC ID :

PJIL17C0D081

MODEL / TYPE :

Q17

FCC Rule Part(s):	Part 15 & 2; ET Docket 95-19
Classification:	FCC Class B Peripheral Device (JBP)
Standard(s):	FCC Class B: 1998 (CISPR 22)
Equipment(EUT) Type:	17" LCD Monitor
Max Resolution:	1280 X 1024 (@80KHz/ 75Hz)
Port/ Connector(s)	15-pin D-sub VGA connector, 20-pin DVI-D (Digital RGB) USB 1 upstream port and 2 downstream ports, AUDIO IN/OUT
LCD PANEL	Hyundai Display Technology,INC (HT17E11-300)

The device bearing the trade name and model specified above, has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-1992.(See Test Report if any modifications were made for compliance)

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

HYUNDAI C-Tech. certifies that no party to application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse of 1988,21 U.S.C.853(a).



Report prepared by : Ki-Soo Kim
Manager of EMC Tech. Part



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1. GENERAL INFORMATION

1.1 Product Description

The ImageQuest CO., LTD. Model Q17 (referred to as the EUT in this report) is a 17" LCD Monitor HOR. Freq. 80KHz w/max. Resolution of 1280 X 1024 . Product specification information described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	PLASTIC
LIST OF EACH OSC. OR XTAL. FREQ.(FREQ.≥ 1MHz)	6MHz , 12MHz , 20MHz
POWER REQUIREMENT	100-240V AC
NUMBER OF LAYERS	MAIN BOARD 4 LAYER USB & AUDIO BOARD 1 LAYER POWER BOARD 1 LAYER INVERTER BOARD 1 LAYER
MAX. RESOLUTION	Analog RGB : 1280 X 1024 @ 75 Hz Digital TMDS : 1280 X 1024 @ 60 Hz
H-SYNC FREQUENCY RANGE	31.0KHz ~ 80.0KHz
V-SYNC FREQUENCY RANGE	56Hz ~ 75Hz
LCD TYPE	17" (LCD Type NO : HT17E11-300)

1.2 Related Submittal(s) / Grant(s)

ORIGINAL SUBMITTAL ONLY

1.3 Tested System Details

The Model names for all equipment, plus descriptions used in the tested system (including inserted cards) are:

DEVICE TYPE	MANUFACTURER	MODEL NUMBER	FCC ID / DoC	CONNECTED TO
MONITOR (EUT)	IMAGEQUEST CO., LTD.	Q17	PJIL17C0D081	HOST
PC(HOST)	H/P	KR20803647	DoC	N/A
VIDEO CARD	ATI	ATI RADEON VE DDR	DoC	HOST
KEY BOARD	H/P	5181	DoC	HOST
MOUSE	MicroSoft	IntelliMouse	DoC	HOST
PRINTER	H/P	C6410A	DoC	HOST
MODEM	3COM CORPORATION	56K FAX MODEM	DoC	HOST
USB MOUSE	LOGITECH	M-BE55	DoC	EUT
USB FLASH DRIVE	Jung Myung Telecom Co.,Ltd	E-D900-00-4988	DoC	EUT
EAR PHONE	H/P	Tsound	-	EUT

1.4 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4/1992. Radiated testing was performed at an antenna to EUT distance of 10 meters.

1.5 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data are located at the 254-1, MAEKOK-RI, HOBUP-MYUN, ICHON-SI, KYOUNGKI-DO, 467-701, KOREA. The site is constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated July 24, 2000 (Confirmation Number: EA90661)

2.SYSTEM TEST CONFIGURATION

2.1 Justification

The device was configured for testing in a typical fashion (as a customer would normally use it). During the tests, the following components and I/O cards inside the E.U.T were used.

DEVICE TYPE	MANUFACTURE	MODEL/PART NUMBER
MAIN BOARD	ImageQuest CO., Ltd.	3041001049
POWER BOARD	IPT CO.,LTD.	3610200107
USB & AUDIO BOARD	ImageQuest CO., Ltd.	3010700815
INVERTOR BOARD	ImageQuest CO., Ltd	3610400253
LCD BOARD	HYUNDAI DISPLAY TECHNOLOGY.INC	HT17E11-300

2.2 EUT exercise Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The software, contained on a 3-1/2 inch disc, was inserted into drive A and is auto starting on power-up. Once loaded, the program sequentially exercises each system component in turn. The sequence used is : (1) Display test, (2) RS 232 test (3) Key board test, (4) Printer test, (5) FDD test, (6) HDD test. The complete cycle takes about 20 seconds and is repeated continuously. As the keyboard and mouse are strictly input devices, no data is transmitted to them during test. They are however, continuously scanned for data input activity. The video resolution modes setup and change program was used during the radiated and conducted emission testing.

2.3 Cable Description

The marked "(D)" means the Data Cable and "(P)" means the Power Cable.

	Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (M)
MONITOR(EUT)	N	Y	1.8(P), 1.5(D), 1.5(D)
PC(HOST)	N	N/A	1.8(P)
KEY BOARD	N/A	Y	2.0(D)
MOUSE	N/A	Y	1.8(D)
PRINTER	N	Y	2.0(P),1.8(D)
MODEM	N	Y	2.0(P),0.8(D)
UPLOAD	N/A	Y	1.8(D)
USB MOUSE	N/A	N/A	0.8(D)
USB FRESH DRIVE	N/A	N/A	N/A
AUDIO IN	N/A	N	1.5(D)
AUDIO OUT	N/A	N	3.0(D)

2.4 Noise Suppression Parts on Cable. (I/O CABLE)

	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
MONITOR(EUT)	Y	BOTH END	Y	BOTH END
PRINTER	Y	PC END	Y	BOTH END
KEY BOARD	Y	PC END	Y	PC END
MOUSE	N	N/A	Y	PC END
MODEM	Y	PC END	Y	BOTH END
UPLOAD	Y	BOTH END	Y	BOTH END
USB MOUSE	N	N/A	Y	EUT END
USB FRESH DRIVE	N	N/A	Y	EUT END
AUDIO IN	Y	BOTH END	Y	BOTH END
AUDIO OUT	N	EAR PHONE	Y	PC END

2.5 Equipment Modifications

N/A

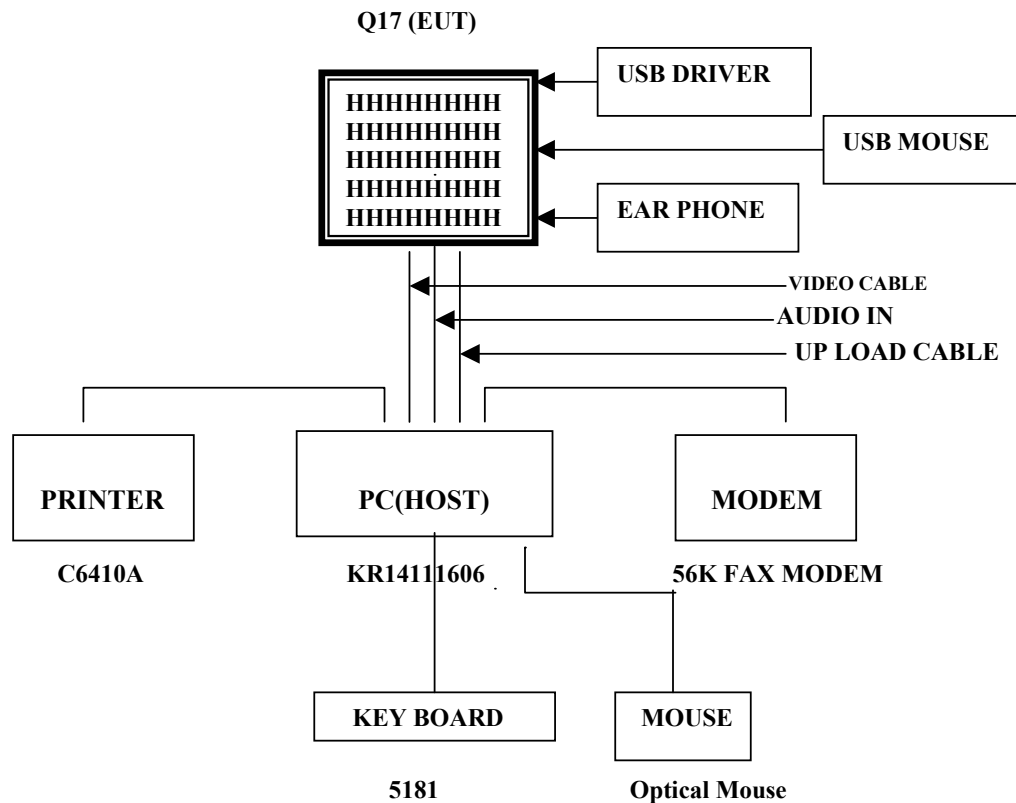
2.6 Configuration of Test system

Line Conducted Test : EUT was connected to LISN, all other supporting equipment were connected to another LISN.

Preliminary Power line Conducted Emission tests were performed by using the procedure in ANSI C63.4/1992 7.2.3 to determine the worse operating conditions.

Radiated Emission Test : Preliminary Radiated Emissions tests were conducted using the procedure in ANSI C63.4/1992 8.3.1.1 to determine the worse operating condition. Final Radiated Emission tests were conducted at 10 meter open area test site.

[Configuration of Tested System]



3. PRELIMINARY TESTS

3.1 AC Power line Conducted Emission Tests

During Preliminary Tests, the following operating mode were investigated

Processor Speed (MHz)	Video Resolution (w/max)	The worst operating condition
Pentium 1GHz	1280 x 1024 (80KHz/75Hz)	X
	1024X768 (60KHz/75Hz)	
	1024X768 (56.5KHz/70Hz)	
	800X600 (37.9KHz/60Hz)	
	800X600 (35.2 KHz/56Hz)	
	640X480 (31.5KHz/70Hz)	

4.2 Radiated Emission Tests

During Preliminary Tests, the following operating mode were investigated

Processor Speed (MHz)	Video Resolution (w/max)	The worst operating condition
Pentium 1GHz	1280 x 1024 (80KHz/75Hz)	X
	1024X768 (60KHz/75Hz)	
	1024X768 (56.5KHz/70Hz)	
	800X600 (37.9KHz/60Hz)	
	800X600 (35.2 KHz/56Hz)	
	640X480 (31.5KHz/70Hz)	

NOTE:

The monitor(EUT) has video interface ports(15-pin D-sub VGA connector and 20-pin DVI-D (Digital RGB), to support graphics.

So the test were performed with each video interface port. The final measurement was performed with VGA 15 pin D-sub video interface port that produce the worst case emission.

Tested by Kyoung-Houn SEO / Engineer

Date : SEPTEMBER 16, 2002

4. FINAL CONDUCTED AND RADIATED EMISSION TESTS SUMMARY

4.1 Conducted Emission Test

The following table shows the highest levels of conducted emissions on both polarization of hot and neutral line.

Humidity Level	: 43 %	Temperature	: 28 °C
Limit apply to	: CISPR 22		
Type of Tests	: CLASS B		
Date	: SEPTEMBER 24, 2002		
Result	: PASSED BY 9.6 dB		
EUT	: 17" LCD MONITOR		

Operating Condition : 1280 X 1024 (Hf : 80KHz, Vf : 75Hz)
Detector : CISPR Quasi-Peak (6 dB Bandwidth : 9 KHz)
CISPR Average(6 dB Bandwidth : 9 KHz)

Line Conducted Emission Tabulated Data

Power Line Conducted Emissions			CISPR 22		
Frequency (MHz)	Amplitude (dBuV)	Conductor	Limit (dBuV)	Margin (dB)	Detector Mode
1.900	36.4	NEUTRAL	46.0	9.6	Average
0.200	43.9	NEUTRAL	54.0	9.8	Average
1.400	36.1	NEUTRAL	46.0	9.9	Average
2.400	35.8	NEUTRAL	46.0	10.2	Average

Measured by : Kyoung-Houn SEO / Engineer

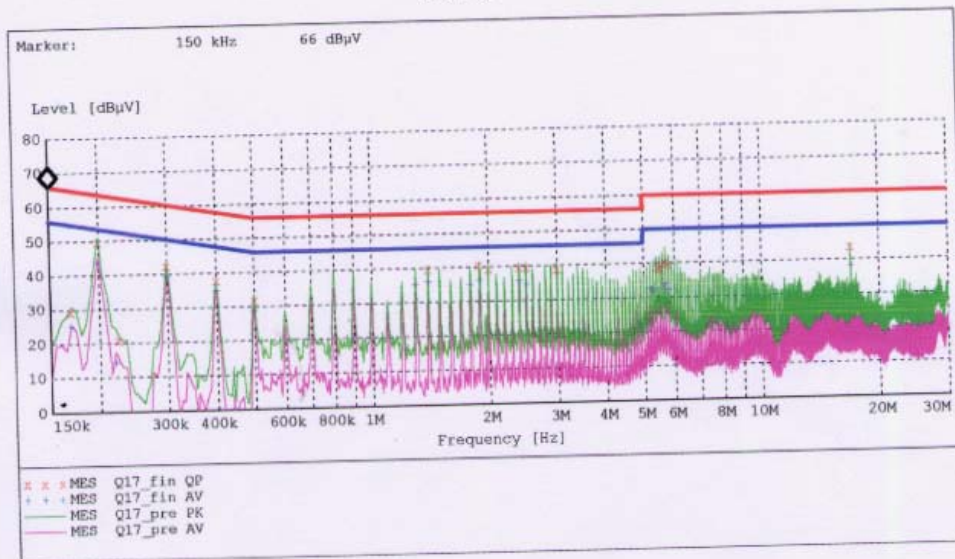
Date : SEPTEMBER 24, 2002

HYUNDAI C TECH
EMC Testing Laboratory

EUT: Q17
Manufacturer: IMAGEQUEST
Operating Condition: 1280 X 1024 75Hz
Test Site: SHIELD ROOM
Operator: KH-SEO
Test Specification: CISPR22 CLASS B
Comment: N
Start of Test: 9/24/02 / 6:17:01PM

SCAN TABLE: "EN 55022 Voltage"

Short Description:			EN 55022 Voltage			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency	Width				
150.0 kHz	500.0 kHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	old-C/E FACTOR
			Average			
500.0 kHz	5.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	old-C/E FACTOR
			Average			

**MEASUREMENT RESULT: "Q17_fin QP"**

9/24/02 6:22PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Line	PE
0.170000	29.20	0.1	65	35.8	L1	GND
0.200000	49.70	0.2	64	13.9	L1	GND
0.225000	20.90	0.2	63	41.7	L1	GND
0.300000	42.50	0.2	60	17.8	L1	GND
0.400000	37.80	0.2	58	20.0	L1	GND
0.500000	31.80	0.2	56	24.2	L1	GND
1.400000	39.70	0.3	56	16.3	L1	GND
1.900000	40.60	0.3	56	15.4	L1	GND
2.000000	39.50	0.3	56	16.5	L1	GND
2.400000	39.80	0.3	56	16.2	L1	GND
2.500000	39.70	0.3	56	16.3	L1	GND
3.000000	39.00	0.3	56	17.0	L1	GND
5.400000	38.80	0.5	60	21.2	L1	GND
5.500000	38.40	0.5	60	21.6	L1	GND

MEASUREMENT RESULT: "Q17_fin QP"
(continued)

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
5.595000	39.80	0.5	60	20.2	L1	GND
5.700000	40.30	0.5	60	19.7	L1	GND
5.800000	39.60	0.5	60	20.4	L1	GND
16.990000	43.70	1.0	60	16.3	L1	GND

MEASUREMENT RESULT: "Q17_fin AV"
9/24/02 6:22PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.170000	25.10	0.1	55	29.9	L1	GND
0.200000	43.90	0.2	54	9.8	L1	GND
0.220000	14.50	0.2	53	38.4	L1	GND
0.300000	39.40	0.2	50	10.9	L1	GND
0.400000	35.00	0.2	48	12.8	L1	GND
0.500000	29.00	0.2	46	17.0	L1	GND
1.300000	35.40	0.3	46	10.6	L1	GND
1.400000	36.10	0.3	46	9.9	L1	GND
1.800000	35.10	0.3	46	10.9	L1	GND
1.900000	36.40	0.3	46	9.6	L1	GND
2.400000	35.80	0.3	46	10.2	L1	GND
2.500000	34.80	0.3	46	11.2	L1	GND
5.195000	32.70	0.5	50	17.3	L1	GND
5.300000	31.90	0.5	50	18.1	L1	GND
5.600000	33.40	0.5	50	16.6	L1	GND
5.695000	34.20	0.5	50	15.8	L1	GND
5.795000	32.20	0.5	50	17.8	L1	GND
16.990000	38.30	1.0	50	11.7	L1	GND

MEASUREMENT RESULT: "Q17_fin QP"
(continued)

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
5.800000	36.70	0.5	60	23.3	L1	GND
5.900000	35.60	0.5	60	24.4	L1	GND
7.995000	34.70	0.6	60	25.3	L1	GND
16.995000	41.30	1.0	60	18.7	L1	GND

MEASUREMENT RESULT: "Q17_fin AV"
9/24/02 6:28PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.170000	24.90	0.1	55	30.1	L1	GND
0.200000	39.10	0.2	54	14.5	L1	GND
0.220000	14.30	0.2	53	38.5	L1	GND
0.300000	34.70	0.2	50	15.5	L1	GND
0.400000	31.70	0.2	48	16.2	L1	GND
0.500000	26.40	0.2	46	19.6	L1	GND
0.900000	30.10	0.2	46	15.9	L1	GND
1.400000	29.70	0.3	46	16.3	L1	GND
1.900000	29.50	0.3	46	16.5	L1	GND
2.000000	28.70	0.3	46	17.3	L1	GND
2.500000	29.10	0.3	46	16.9	L1	GND
3.000000	28.70	0.3	46	17.3	L1	GND
14.565000	29.40	0.9	50	20.6	L1	GND
14.750000	30.20	0.9	50	19.8	L1	GND
14.845000	30.80	0.9	50	19.2	L1	GND
14.940000	30.40	0.9	50	19.6	L1	GND
15.035000	29.30	0.9	50	20.7	L1	GND
16.995000	38.30	1.0	50	11.7	L1	GND

4.2 Radiated Emissions Tests

The following table shows the highest levels of Radiated Emissions on both polarization of horizontal and vertical.

Humidity Level : 39 % Temperature : 22 °C
 Limit apply to : CISPR 22
 Type of Tests : CLASS B
 Date : OCTOBER 2, 2002
 Result : PASSED BY -3.0dB

EUT : 17" LCD MONITOR
 Operating Condition : 1280 X 1024 (Hf : 80 kHz, Vf : 75 Hz)
 Detector : CISPR Quasi-Peak (6 dB Bandwidth : 120 KHz)

Frequency MHz	Reading dBuV	Ant. Factor dB	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
43.2	11.24	13.96	1.30	V	26.5	30.0	-3.5
67.8	16.30	6.30	1.70	V	24.3	30.0	-5.7
108.3	9.57	11.53	2.20	V	23.3	30.0	-6.7
126.5	9.34	13.76	2.40	H	25.5	30.0	-4.5
144.4	9.86	14.64	2.50	V	27.0	30.0	-3.0
198.6	8.39	15.61	3.00	V	27.0	30.0	-3.0
326.3	10.18	16.02	3.90	V	30.1	37.0	-6.9
363.0	12.13	16.57	4.10	H	32.8	37.0	-4.2
406.8	13.08	16.62	4.20	V	33.9	37.0	-3.1
462.8	10.73	17.87	4.80	V	33.4	37.0	-3.6
489.0	9.23	18.17	4.80	V	32.2	37.0	-4.8
543.0	9.26	19.14	5.30	V	33.7	37.0	-3.3

NOTE:

1.All video modes and resolutions were investigated and the worst-case emissions are reported.

Measured by Kyoung-Houn SEO / Engineer

Date : OCTOBER 2, 2002

5. Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor.

The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF$$

where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

Assume a receiver reading of 21.5 dBuV is obtained. The Antenna Factor of 7.4 and a Cable Factor of 1.1 is added. The 30 dBuV/m value was mathematically converted to its corresponding level in uV/m.

$$FS = 21.5 + 7.4 + 1.1 = 30 \text{ dBuV/m}$$

$$\text{Level in uV/m} = \text{Common Antilogarithm} [(30 \text{ dBuV/m})/20] = 31.6 \text{ uV/m}$$

6. LIST OF TEST EQUIPMENT

<u>TYPE</u>	<u>MANUFACTURE</u>	<u>MODEL</u>	<u>CAL. DATE</u>
EMI Test Receiver	Rohde & Schwarz	ESH3	2002.7.16
EMI Test Receiver	Rohde & Schwarz	ESVP	2002.7.16
EMI Test Receiver	Rohde & Schwarz	ESI40	2001.11.5
EMI Test Receiver	Rohde & Schwarz	ESVS30	2002.7.16
Spectrum Monitor	Rohde & Schwarz	EZM	N.A
Graphic Plotter	Rohde & Schwarz	DOP2	N.A
Printer	Rohde & Schwarz	PDN	N.A
Spectrum Analyzer	H.P	8591EM	2002.9.1
LISN	EMCO	3825/2	2002.2.7
LISN	Rohde & Schwarz	ESH2-Z5	2002.8.12
Amplifier	Hewlett-Packard	8447E	2002.9.1
Dipole Antennas	Rohde & Schwarz	VHAP	2002.7.16
Dipole Antennas	Rohde & Schwarz	UHAP	2002.7.16
Biconical Antenna	Rohde & Schwarz	BBA-9106	2002.7.12
Log-Periodic Antenna	Rohde & Schwarz	UHALP-9107	2002.7.12
Antenna Position Tower	EMCO	1051-12	N.A
Turn Table	EMCO	1060-06	N.A
Line Filter	KEENE	ULW 2X30-60	N.A
Power Analyzer	Voltech	PM 3300	2002.2.20
Reference Network Impedance	Voltech	IEC 555	N.A
AC Power Source	PACIFIC	Magnetic Module	N.A
AC Power Source	PACIFIC	360AMX	N.A

