

## RF TEST REPORT

**Test report No.:** EMC- FCC- R0010

**FCC ID:** WMJ-FG101C

**Type of equipment:** RFID System

**Brand Name:** IL SUNG PRECISION

**Model Name:** FG-101C

**Applicant:** IL SUNG PRECISION

**FCC Rule Part(s):** FCC Part Subpart C: 2008

**Frequency Range:** 13.56 MHz


**Test result:** Complied


The above equipment was tested by EMC compliance Testing Laboratory for compliance with the requirements of FCC Rules and Regulations.

The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

**Date of test:** October 8, 2008 ~ October 14, 2008

**Issued date:** October 15, 2008

  
**Tested by:** \_\_\_\_\_  
NA, KAB JIN

  
**Approved by:** \_\_\_\_\_  
YOO, SUNG YOUNG

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## 1. Client information

**Applicant:** IL SUNG PRECISION  
**Address:** 182-2, Jegi-ri, Jeongnam-Myeon, Hwaseong-si,  
Geonggi-do, Korea  
**Telephone number:** +82-31-354-1031  
**Facsimile number:** +8231-354-1035  
**Contact person:** Charles Park / Director

**Manufacturer:** IL SUNG PRECISION  
**Address:** 182-2, Jegi-ri, Jeongnam-Myeon, Hwaseong-si,  
Geonggi-do, Korea  
**Telephone number:** +82-31-354-1031  
**Facsimile number:** +8231-354-1035  
**Contact person:** Charles Park / Director

## 2. Laboratory information

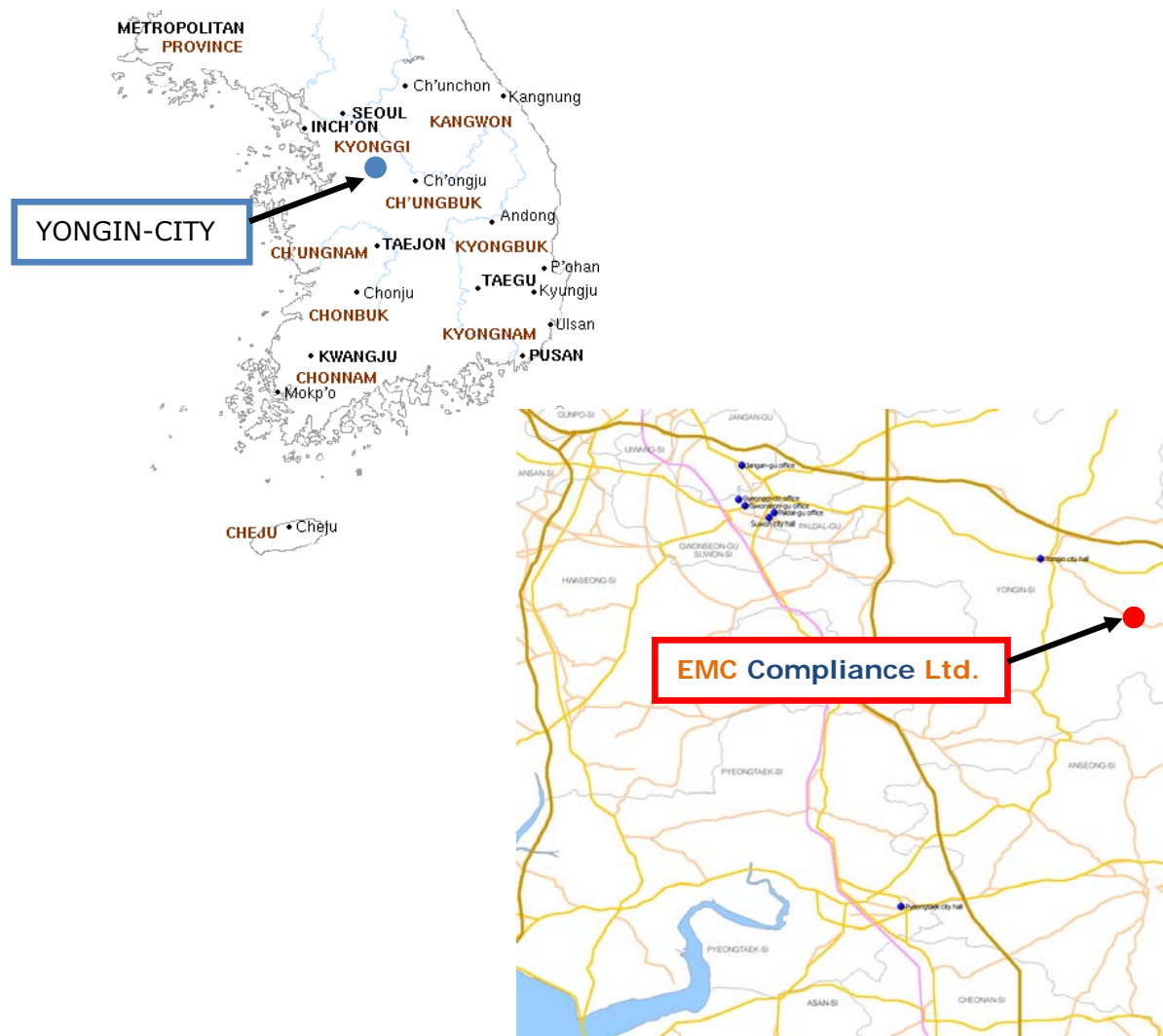
### Address

EMC Compliance Ltd.  
82-1, JEIL-RI, YANGJI-MYUN, CHURINGU, YONGIN-CITY, KYUNGKI-DO,  
KOREA 449-825  
Telephone Number: 82 31 336 9919 Facsimile Number: 82 31 336 4767

### Certificate

CBTL Testing Laboratory, KOLAS NO.: 231  
FCC Filing No.: 793334  
VCCI Registration No.: C-1713, R-1606, T-258

### SITE MAP



### 3. Description of E.U.T.

#### 3.1 Product description

<b>Applicant :</b>	IL SUNG PRECISION
<b>Address of Applicant:</b>	182-2, Jegi-ri, Jeongnam-Myeon, Hwaseong-si, Gyeonggi-do, Korea
<b>Type of equipment:</b>	RFID System
<b>Basic Model:</b>	FG-101C
<b>CPU</b>	ARM9 2442 32Bits 400MHz 256M memory
<b>Memory Module</b>	Flash(BIOS):128kByte, Flash(APP):128kByte RAM(Working):256kByte,RAM(Data):512kByte Flash
<b>LCD</b>	3.5 inch COLOR TFT LCD Graphic display
<b>LED</b>	OK, Error 2 lamp(red, green)
<b>keyboard</b>	0,1,2,3,4,5,6,7,8,9,<,>, Clear, Enter, Setup, IN, OUT, F1, F2
<b>Communication</b>	Host[COM1] : comm[RS-232C/RS-485], TCP/IP, WIEGEND
<b>Fingerprint Registration</b>	Max 100,000 person registration
<b>Voice</b>	Message :12 language
<b>Log data</b>	Max 2,000,000 data
<b>LAN Convertor</b>	Built in TCP/IP LAN Convertor
<b>Operating Time</b>	Card reading :30 ms(13.56MHz), Verification :Less then 0.3 sec
<b>Operating Temperature</b>	Fingerprint Module : -20° to +60° , LCD : -20° to +70° RF Reader :-35° to+65°
<b>Operating Humidity</b>	10% to 90% relative humidity non-condensing
<b>I/O port</b>	In port:2 port(Exit button, Door sensor) Out port: 4 port (Door NC/NO,Siren NC/NO)
<b>Input power</b>	12V / 600mA
<b>Humidity</b>	10% ~90% RH
<b>Dimension /Weight</b>	170mm[W] * 130mm[L] * 40mm[H] / 490g

### 3.2 Basic description

<b>Frequency Range</b>	13.56 MHz
<b>Frequency alignment range</b>	13.110 ~ 14.010 MHz
<b>Channel switching Frequency range</b>	Fixed frequency :13.56 MHz
<b>Channel spacing</b>	Wide band
<b>Duty Cycle</b>	Up to 100%
<b>Antenna Type</b>	Internal (pattern antenna)
<b>Type of Modulation</b>	ASK
<b>Number of channel</b>	1 ch
<b>Type of Unit</b>	Radio equipment for Fixed use

## 4. Summary of test results

### 4.1 Standards & results

Rule Reference	Parameter	Status
Part 15 Subpart C		
15.225 (a)	In-band Emission	C
15.225 (b)	In-band Emission	C
15.225 (c)	In-band Emission	C
15.225 (d) 15.209	Out-of –band Emission	C
15.225 (e)	Frequency Stability Tolerance	C
15.207	Conducted Emissions	C
Note: C=complies NC= Not complies NT=Not tested NA=Not Applicable		

## 5. Test results

### 5.1 In-band Emission (15.225 (a))

#### 5.1.1 Minimum Standard

15.225 (a) The field strength of any emission within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

#### 5.1.2 Test Result

- Complies

EUT	RFID System		
Operating Frequency	13.56MHz	Model Name	FG-101C
Operating Mode	Transmitter Mode	Modulation Technology	ASK
Environmental Condition	18℃/45%	Test Channel	1ch
Tested By	Na Kab Jin	Power Rate	110 V AC

Frequency	Reading (dBuV)	Correction Factor		field strength dBμV/m at 3 m
		Ant(dB)	Cable(dB)	
13.56MHz	41.30	9.58	0.74	51.62
Maximum Level(dBμA/m)				51.62
Limit(dBuV/m) at 3m				124 dBuV/m
margin				72.38
Uncertainty				±3.8dB

Note: Field strength limit was calculated with 40dB/decade linear distance extrapolation factor.



## 5.2 In-band Emission (15.225 (b)(c))

### 5.2.1 Minimum Standard

15.225 (b) With in the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

15.225 (c) With in the bands 13.110-13.410 MHz and 13.710-14.010 MHz, the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

### 5.2.2 Test Result

- Complied

Measurement Distance :3m (OATS)

Freq (MHz)	Reading (dBuV)	Correction Factor (dB)	Emission level (dBuV/m)	Limit at 3m (dBuV/m)	Margin (dB)
13.353	18.9	10.32	29.22	80.50	51.28
13.774	23.0	10.32	33.32	80.50	47.18

### 5.3 Out-of-band Emission (15.225 (d),15.209)

#### 5.3.1 Minimum Standard

15.225 (d) The Field Strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in 15.209

Frequency (MHz)	Field Strength (uV/m)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30(29.54dBuV/m)	30
30.0-88.0	100(40 dBuV/m)	3
88-216	150(43.5 dBuV/m)	3
216-960	200 (46 dBuV/m)	3
Above 960	500 (53.98 dBuV/m)	

### 5.3.2 Test Result

- Complied

Measurement Distance :3m (OATS)

Freq (MHz)	POL	Reading (dBuV)	Correction Factor (dB)	Emission level (dBuV/m)	Limit at 3m (dBuV/m)	Margin (dB)
125.01	H	8.5	13.93	22.43	43.5	21.07
125.01	V	8.3	10.93	22.23	43.5	21.27
377.49	H	16.0	19.62	35.62	46.0	10.38
377.49	V	15.8	19.62	35.42	46.0	10.58
383.04	H	20.2	19.77	39.97	46.0	6.03
383.04	V	14.4	19.77	34.17	46.0	11.83
705.25	H	13.3	26.16	39.46	46.0	6.54
705.25	V	11.8	26.16	37.96	46.0	8.04
949.27	H	3.6	30.27	33.87	46.0	12.13
949.27	V	2.2	20.27	32.47	46.0	13.53

## 5.4 Frequency tolerance (15.225 (e))

### 5.4.1 Minimum Standard

15.225 (e) The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency over a temperature variation of  $-20$  degrees to  $+50$  degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

### 5.4.2 Test Result

- Complied

VOLTAGE (%)	POWER (V)	TEMP (°C)	FREQ (Hz)	FREQ.DEV (Hz)	Deviation (%)
100	110	20	13560602	2	0.00002
		-20	13560543	-57	-0.00042
		-10	13560457	-143	-0.00105
		0	13560677	77	0.00057
		10	13560610	10	0.00007
		20	13560560	-40	-0.00029
		25	13560606	6	0.00004
		30	13560735	135	0.00100
		40	13560689	89	0.00066
		50	13560478	-122	-0.00090
85	93.5	20	13560523	-77	-0.00057
115	126.5	20	13560530	-70	-0.00052

## 5.5 Conducted Emissions (15.207)

### 5.5.1 Minimum Standard

Frequency [MHz]	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66-56 *	56-46*
0.5 - 5	56	46
5 - 30	60	50

\*The limit decreases linearly with the logarithm of frequency.

### 5.5.2 Test Result

- Complied

Frequency [MHz]	Correction Factor		Line	Quasi-peak			Average		
	LISN	Cable		Limit [dBuV]	Reading [dBuV]	Result [dBuV]	Limit [dBuV]	Reading [dBuV]	Result [dBuV]
0.177	0.09	0.4	H	64.63	57.17	57.66	54.63	44.46	44.95
0.237	0.07	0.4	N	62.20	51.25	51.72	52.20	37.04	37.51
0.277	0.09	0.5	H	56.39	38.14	38.73	46.39	32.58	33.17
0.297	0.07	0.5	N	60.33	44.52	45.09	50.33	31.42	31.99
0.474	0.08	0.5	N	56.44	38.94	39.52	46.44	32.19	32.77
0.537	0.08	0.5	N	56.00	37.00	37.58	46.00	29.84	30.42
0.774	0.11	0.5	H		27.92	28.53		22.48	23.09
0.888	0.10	0.5	N		33.19	33.79		23.55	24.15
1.011	0.12	0.5	H		39.92	40.54		25.55	26.17
1.188	0.10	0.5	N		40.29	40.89		29.68	30.28
1.485	0.10	0.5	N		28.60	29.20		21.09	21.69
6.550	0.39	0.5	H	60.00	24.36	25.25	50.00	18.24	19.13
9.390	0.42	0.5	H		25.03	25.95		18.66	19.58
10.580	0.51	0.5	H		25.23	26.24		19.37	20.38
11.529	0.44	0.6	N		27.34	28.38		22.59	23.63
18.660	0.90	0.6	H		26.09	27.59		19.87	21.37
18.860	0.65	0.6	N		26.07	27.32		20.30	21.55

- Minimum limit margin is 6.97 dB at 0.177 MHz. (Quasi-peak)

### 5.5.3 Test plots

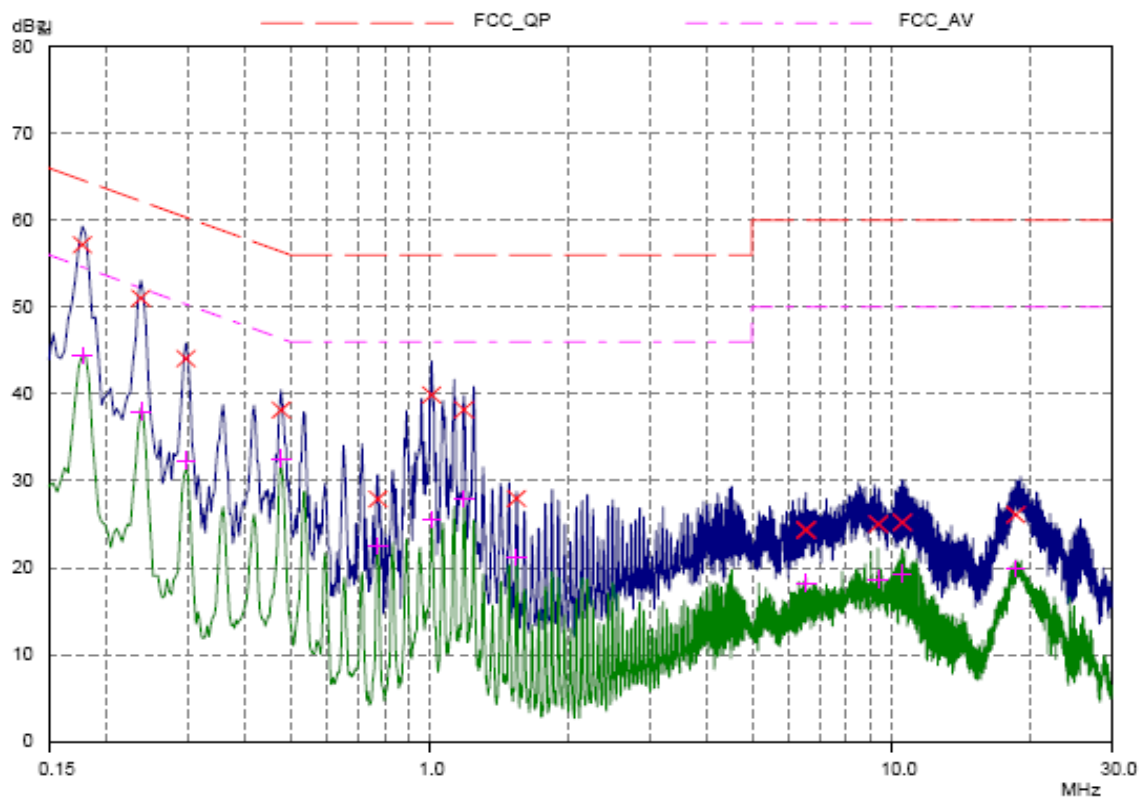
EUT: UNICQ  
Manuf: ILSUNG  
Op Cond: H  
Operator:  
Test Spec: FCC Class B Conducted Emission  
Comment:

Result File: unioqfh.dat : ILSUNG UNICQ H

#### Scan Settings (2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	3MHz	3kHz	10kHz	PK+AV	10msec	Auto	OFF	60dB
3MHz	30MHz	10kHz	10kHz	PK+AV	5msec	Auto	OFF	60dB

Final Measurement: Detectors: X QP / + AV  
Meas Time: 1sec  
Peaks: 8  
Acc Margin: 25 dB



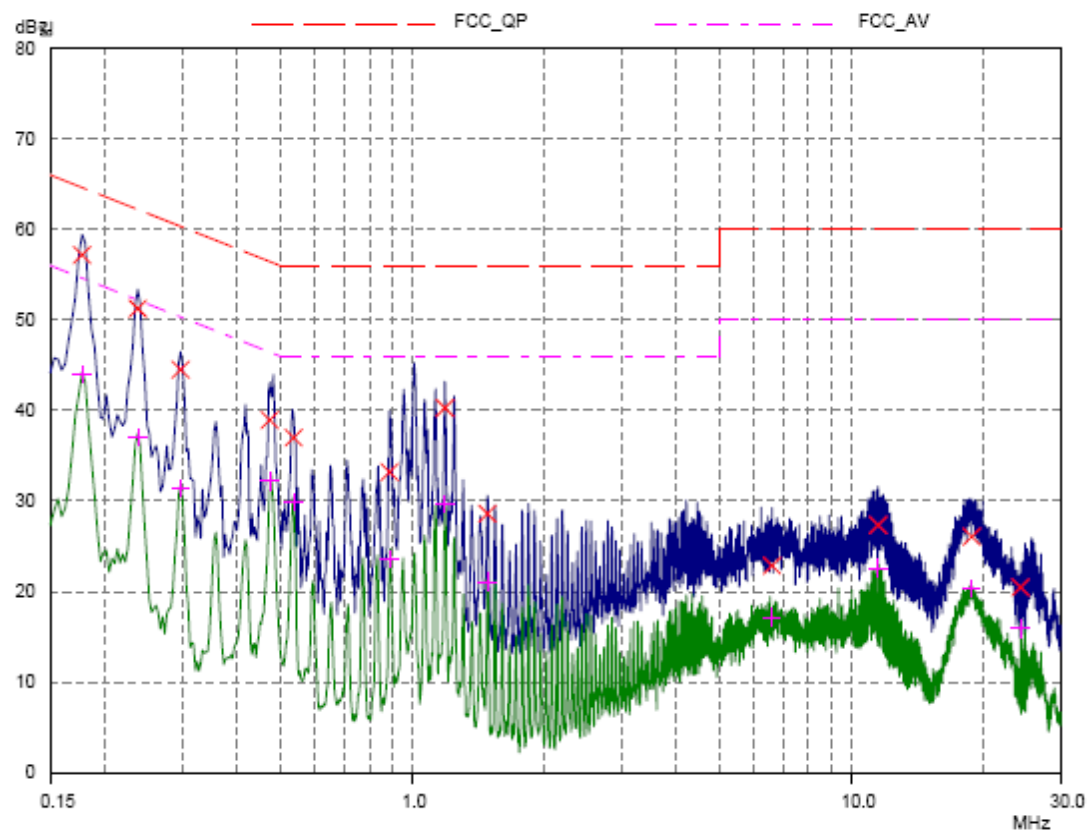
EUT: UNICQ  
Manuf: ILSUNG  
Op Cond: N  
Operator:  
Test Spec: FCC Class B Conducted Emission  
Comment:

Result File: unioqfn.dat : ILSUNG UNICQ N

Scan Settings (2 Ranges)

Frequencies		Step		IF BW		Detector		Receiver Settings	
Start	Stop	Step		IF BW		Detector		M-Time	Atten
150kHz	3MHz	3kHz		10kHz		PK+AV		10msec	Auto
3MHz	30MHz	10kHz		10kHz		PK+AV		5msec	Auto
									Preamp
									OFF
									OpRge
									60dB

Final Measurement: Detectors: X QP / + AV  
Meas Time: 1sec  
Peaks: 8  
Acc Margin: 25 dB



## 6. Test equipment used for test

	Description	Manufacture	Model No.	Serial No.	Next Cal Date.
■	Temp & humidity chamber	taekwang	TK-04	TK001	08.12.12
□	Temp & humidity chamber	taekwang	TK-500	TK002	09.09.09
■	Power Meter	Agilent	E4416A	GB41292365	09.10.30
■	Frequency Counter	HP	5351B	3049A01295	09.10.30
■	Spectrum Analyzer	Agilent	E4407B	US39010142	09.10.30
■	Spectrum Analyzer	R & S	FSP40	100209	09.10.30
■	Signal Generator	HP	E4432B	GB39340611	09.10.30
■	Modulation Analyzer	HP	8901B	3538A05527	09.01.07
■	Audio Analyzer	HP	8903B	3729A18248	09.01.07
□	AC Power Supply	KIKUSUI	PCR2000W	GB001619	09.10.30
■	DC Power Supply	Tektronix	PS2520G	TW50517	09.02.15
□	DC Power Supply	Tektronix	PS2521G	TW53135	09.10.30
□	Dummy Load	BIRD	8141	7560	-
□	Dummy Load	BIRD	8401-025	799	-
■	EMI Test Receiver	R&S	ESCI	100001	09.08.18
■	Attenuator	HP	8494A	2631A09825	09.11.03
■	Attenuator	HP	8496A	3308A16640	09.11.03
■	Attenuator	R&S	RBS1000	D67079	09.11.04
■	Power sensor	Agilent	E9321A	US40390422	09.11.03
□	Power sensor	Agilent	E9325A	US40420186	09.11.03
■	LOOP Antenna	EMCO	EMCO6502	9205-2745	09.05.28
■	BILOG Antenna	Schwarzbeck	VULB 9160	3138	10.02.21
□	HORN Antenna	ETS	3115	00062589	09.12.26
□	Power Divider	HP	11636A	05441	09.08.21
■	Signal Generator	HP	E4421B	GB40052295	09.10.24
□	Power Divider	Weinschel	1580-1	NX375	09.08.21
□	Power Divider	Weinschel	1580-1	NX380	09.08.21
■	Test Receiver	R&S	ESHS10	843276/003	09.05.29
■	LISN	R&S	ESH3-Z5	100267	09.07.04