Test Report

Product Name : GEAR-LOCK
Model No. : GE-11
FCC ID.: PI3-GE-11

Applicant : SUMMIT AUTOMATION CO., LTD.
Address : 2F., No. 68, Chungkung 1 st. Rd., Taichung City, Taiwan 407, R.O.C.

Date of Receipt : Mar. 19, 2002
Date of Test : Sep. 18, 2002
Report No. : 023H057FI

The Test Results relate only to the samples tested.
The test report shall not be reproduced except in full without the written approval of QuieTek Corporation.
This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

Test Report Certification

Test Date : Sep. 18, 2002
Report No. : 023H057FI

QuieTek Corporation

Accredited by NIST (NVLAP)
NVLAP Lab Code: 200347-0

Product Name	:	GEAR-LOCK
Applicant	:	SUMMIT AUTOMATION CO., LTD.
Address	:	2F., No. 68, Chungkung 1 st. Rd., Taichung City, Taiwan 407, R.O.C.
Manufacturer	:	SUMMIT AUTOMATION CO., LTD.
Model No.	:	GE-11
FCC ID.	:	PI3-GE-11
Rated Voltage	:	DC 12V(Power by Battery)
Trade Name	:	e-力, Summit
Measurement Standard	:	FCC Part 15 Subpart C Paragraph 15.209
Measurement Procedure	:	ANSI C63.4:1992
Test Result	:	Complied

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This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

Documented By : _____
(Zoe Lee)

Tested By : _____
(Vincent Lin)

Approved By : _____
(Kevin Wang)

TABLE OF CONTENTS

Description Page

1. GENERAL INFORMATION 4

1.1. EUT Description 4
1.2. Operation Description 4
1.3. Tested System Details 5
1.4. Configuration of tested System 5
1.5. EUT Exercise Software 5
1.6. Test Facility 6

2. Conducted Emission 7

2.1. Test Equipment 7
2.2. Test Setup 7
2.3. Limits 7
2.4. Test Procedure 8
2.5. Test Data of Conducted Emission 9

3. Radiated Emission 10

3.1. Test Equipment 10
3.2. Test Setup 10
3.3. Limits 11
3.4. Test Procedure 12
3.5. Test Data of Radiated Emission 13

4. EMI Reduction Method During Compliance Testing 16

Attachment 1: EUT Test Photographs
Attachment 2: EUT Detailed Photographs
Reference : Laboratory of License

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	:	GEAR-LOCK
Trade Name	:	e-力, Summit
FCC ID.	:	PI3-GE-11
Model No.	:	GE-11
Channel Number	:	1
Operating Frequency	:	134.2kHz
Type of Modulation	:	FSK, AM
Antenna Type	:	Loop
Power Line	:	Non-shielded, 0.75m
Power Line (Extend)	:	Non-shielded, 0.75m
Key	:	2 sets

Note:

1. This EUT is a GEAR-LOCK.
2. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.209.
3. This device is a composite device in accordance with Part 15 regulations. The function for the receiver was, measured and made a test report that the report number is 023H057F, certified under verification.
4. QuieTek has verified all construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:
   EMI Mode: Mode 1: Normal Operation

1.2. Operation Description

The EUT is a DC operated lock with 134.2kHz transmitter and its associated key with passive tag reflector for code confirmation. The IC TMS3705A from TI was used as the transponder device by 4MHz clock. A 2cm *1cm multi-turn inductive loop was connected to the device as the transmitter antenna. The passive tag will reflect the matched energy to the EUT.

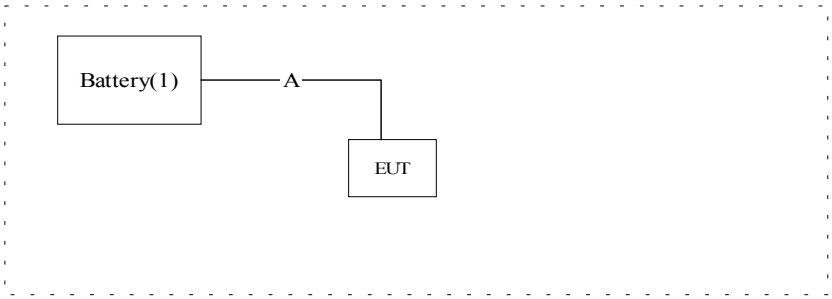
1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
(1)	Battery	YUASA	36B20R	N/A	--

Signal Cable Type		Signal cable Description
A.	Power Line	Non-shielded, 1.5m

1.4. Configuration of tested System



1.5. EUT Exercise Software

(1) Setup the EUT and simulators as shown on 1.4

(2) Turn on the power of all equipment.

(3) Verify the operation is normal.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

Site Description: November 3, 1998 File on
Federal Communications Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
Columbia, MD 21046
Reference 31040/SIT1300F2

August 30, 2001 Accreditation on NVLAP
NVLAP Lab Code: 200347-0

NVLAP Lab Code : 200347-0

Site Name: Quietek Corporation

Site Address: No.75-1, Wang-Yeh Valley, Yung-Hsing,
Chiung-Lin, Hsin-Chu County,
Taiwa, R.O.C.
TEL : 886-3-5928858 / FAX : 886-3-5928859
E-Mail : service@quietek.com

2. Conducted Emission

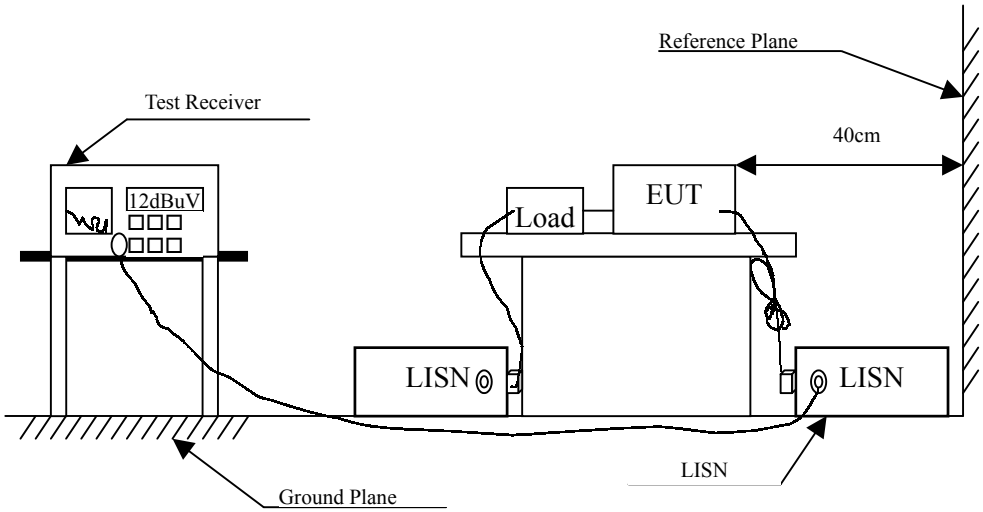
2.1. Test Equipment

The following test equipment are used during the conducted emission test:

Item	Instrument	Manufacturer	Type No./Serial No	Last Cal..	Remark
1	Test Receiver	R & S	ESCS 30/825442/17	May, 2002	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 2002	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 2002	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	N/A	
5	No.2 Shielded Room			N/A	

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

2.2. Test Setup



2.3. Limits

FCC Part 15 Paragraph 15.207 (dBuV)		
Frequency MHz	Limits	
	uV	dBuV
0.45 - 30	250	48.0

2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4:1992 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.45MHz to 30MHz using a receiver bandwidth of 9kHz.

2.5. Test Data of Conducted Emission

Owing to the DC operation of EUT, this test item is not performed.

3. Radiated Emission

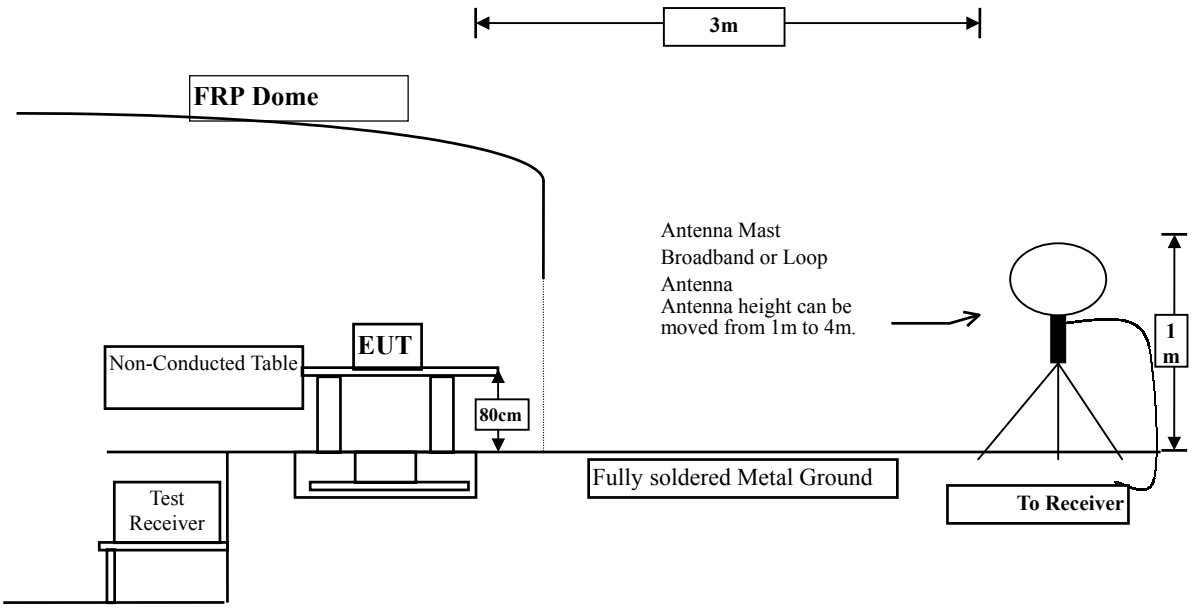
3.1. Test Equipment

The following test equipment are used during the radiated emission test:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Site # 1	X	Test Receiver	R & S	ESCS 30 / 825442/14	May, 2002
	X	Spectrum Analyzer	Advantest	R3261C / 71720140	May, 2002
	X	Pre-Amplifier	HP	8447D/3307A01812	May, 2002
	X	Bilog Antenna	Chase	CBL6112B / 12452	Sep., 2002
	X	Loop Antenna	R&S	HFH2-Z2/833799/004	July, 2002
Site # 2		Test Receiver	R & S	ESCS 30 / 825442/17	May, 2002
		Spectrum Analyzer	Advantest	R3261C / 71720609	May, 2002
		Pre-Amplifier	HP	8447D/3307A01814	May, 2002
		Bilog Antenna	Chase	CBL6112B / 2455	Sep., 2002
		Horn Antenna	EM	EM6917 / 103325	May, 2002

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.
2. Mark "X" test instruments are used to measure the final test results.

3.2. Test Setup



3.3. Limits

FCC Part 15 Paragraph 15.209 Limits		
Frequency MHz	Field Strength (Microvolts/meter)	Distance (Meters)
0.009-0.490	2400/F (kHz)	300
0.490-1.705	24000/F (kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark:
1. The tighter limit shall apply at the edge between two frequency bands.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
3. RF Voltage (dBuV/m) = 20 log RF Voltage (uV/m)
4. When the very low emission of EUT, the 3m measurement distance was performed. Regards to an inverse linear extrapolation 40dB/dec is adopted. The collection factor will be 80dB for this case.

3.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Regard to the characterstic and operation band of EUT, Loop antenna was used for this measurement. The measurement method is hosed or ANSI C63.4 section 8.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4:1992 on radiated measurement.

Radiated emissions were invested over the frequency range from 9kHz to 30MHz using a receive bandwidth of 9kHz and 30MHz to1GHz using a receiver bandwidth of 120kHz.

The emission limit shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000MHz. Radiated emission limit in these three bands are based on measurements employing an average detector.

3.5. Test Data of Radiated Emission

Product : GEAR-LOCK
Test Item : Fundamental Radiated Emission
Test Site : No.1 OATS
Test Mode : Mode 1: Normal Operation

Frequency MHz	Cable Loss dB	Probe Factor dB/m	PreAMP dB	Reading Level dBuV	Emission Level dBuV/m	Margin dB	Limit dBuV/m
Peak Detector:							
0.134	0.04	0.00	0.00	69.80	69.84	55.21	125.05
Average Detector:							
0.134	0.04	0.00	0.00	48.12	48.16	56.89	105.05

Note:

1. All Reading Levels below 1GHz are Quasi-Peak value, except for the frequency bands 9-90kHz and 110-490kHz are Average value.
2. Emission Level = Reading Level + Cable loss.
3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : GEAR-LOCK
Test Item : Harmonic Radiated Emission
Test Site : No.1 OATS
Test Mode : Mode 1: Normal Operation

Frequency MHz	Cable Loss dB	Probe Factor dB/m	PreAMP dB	Reading Level dBuV	Emission Level dBuV/m	Margin dB	Limit dBuV/m
Peak Detector:							
0.268	0.04	0.00	0.00	66.10	66.14	52.89	119.03
0.402	0.04	0.00	0.00	61.50	61.54	53.97	115.51
Average Detector:							
0.268	0.04	0.00	0.00	48.20	48.24	50.79	99.03
0.402	0.04	0.00	0.00	42.30	42.34	53.17	95.51
Quasi-Peak Detector:							
0.537	0.04	0.00	0.00	54.10	54.14	18.87	73.01
0.672	0.04	0.00	0.00	47.20	47.24	23.82	71.06
0.806	0.04	0.00	0.00	54.40	54.44	15.04	69.48
0.949	0.04	0.00	0.00	41.70	41.74	26.32	68.06
1.074	0.04	0.00	0.00	38.30	38.34	28.65	66.99
1.208	0.04	0.00	0.00	49.70	49.74	16.22	65.96
1.342	0.04	0.00	0.00	40.10	40.14	24.91	65.05

Note:

1. All Reading Levels below 1GHz are Quasi-Peak value, except for the frequency bands 9-90kHz and 110-490kHz are Average value.
2. Emission Level = Reading Level + Cable loss.

Product : GEAR-LOCK
Test Item : General Radiated Emission
Test Site : No.1 OATS
Test Mode : Mode 1: Normal Operation

	Frequency MHz	Cable Loss dB	Probe Factor dB/m	PreAMP dB	Reading Level dBuV	Emission Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal								
	75.200	1.59	8.63	0.00	1.19	11.41	28.59	40.00
*	80.000	1.64	9.83	0.00	14.20	25.67	14.33	40.00
	114.400	1.96	12.60	0.00	0.50	15.07	28.43	43.50
	168.100	2.48	10.72	0.00	0.65	13.85	29.65	43.50
	291.600	3.67	13.43	0.00	1.40	18.50	27.50	46.00
	318.200	3.85	14.10	0.00	0.56	18.51	27.49	46.00
Vertical								
	42.500	1.27	10.51	0.00	14.70	26.48	13.52	40.00
	61.650	1.46	7.45	0.00	11.80	20.71	19.29	40.00
*	79.900	1.63	9.44	0.00	24.80	35.87	4.13	40.00
	118.200	2.00	12.06	0.00	8.97	23.03	20.47	43.50
	176.975	2.56	8.09	0.00	6.87	17.52	25.98	43.50
	185.000	2.64	7.71	0.00	5.98	16.34	27.16	43.50
	307.000	3.79	14.07	0.00	1.64	19.49	26.51	46.00

Note:

1. All Reading Levels below 1GHz are Quasi-Peak, above are average value.
2. “ * ”, means this data is the worst emission level.
3. Emission Level = Reading Level + Probe Factor + Cable loss

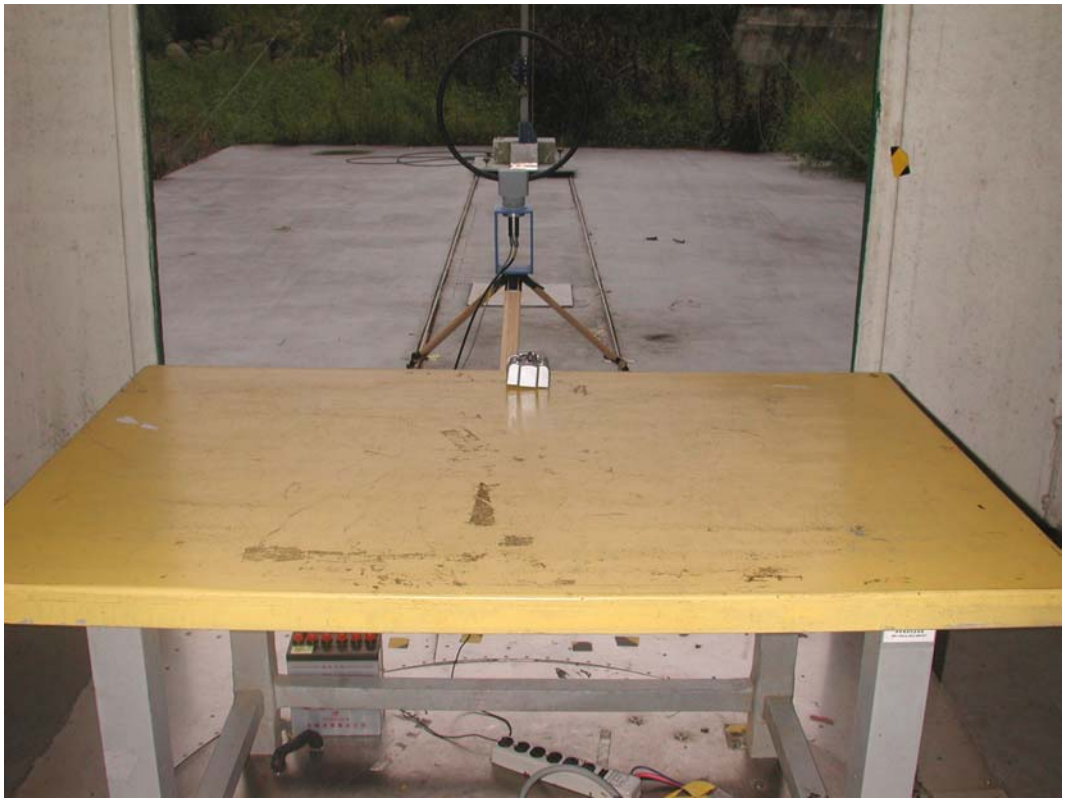
4. EMI Reduction Method During Compliance Testing

No modification was made during testing.

Attachment 1 : EUT Test Photographs

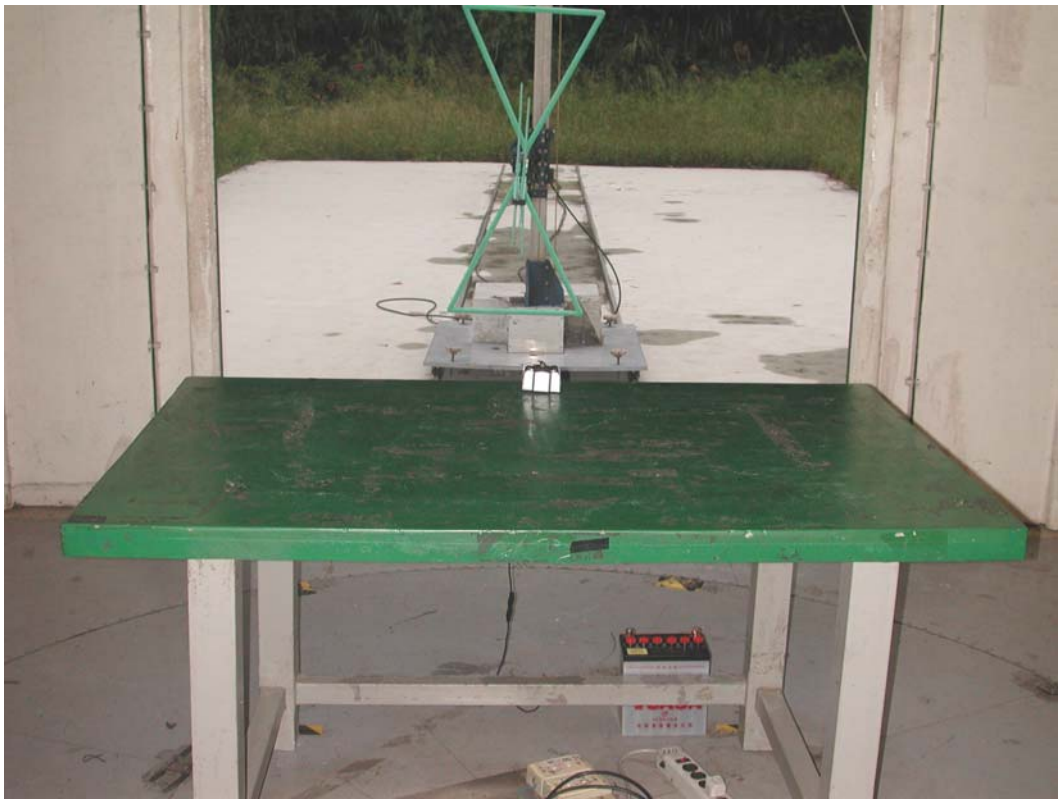
Attachment 1: EUT Test Setup Photographs

Front View of Radiated Test-Loop

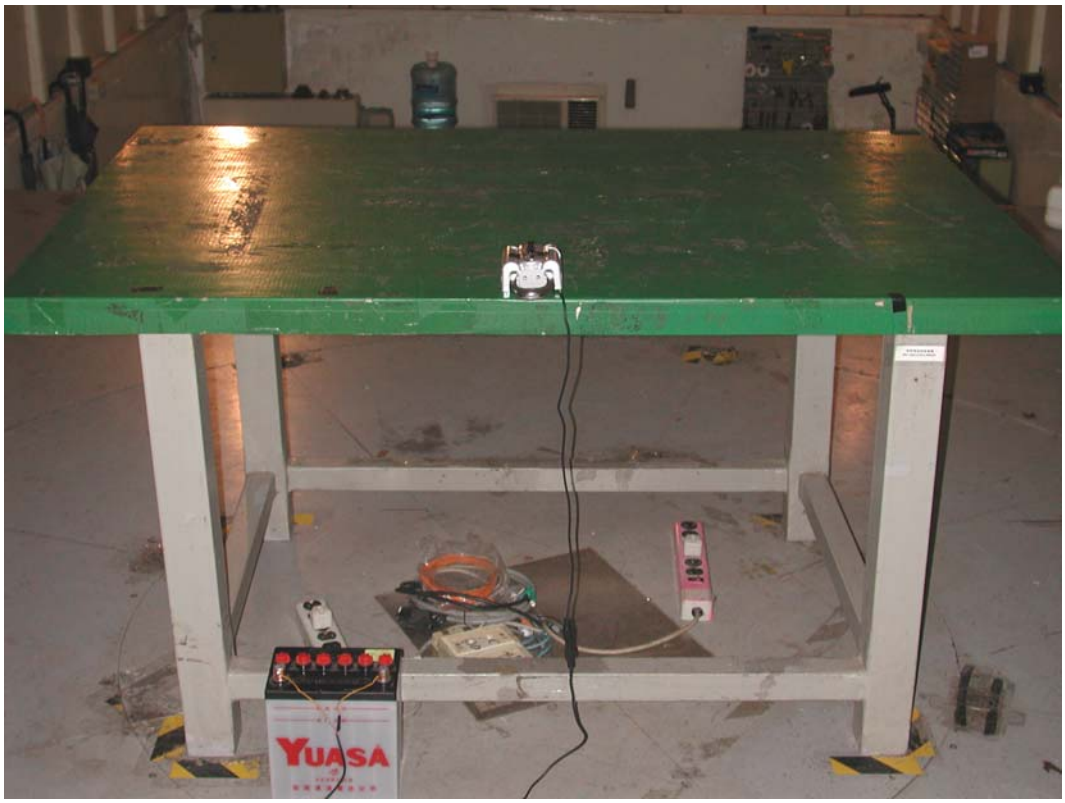


Back View of Radiated Test- Loop

Front View of Radiated Test



Back View of Radiated Test



Attachment 2 : EUT Detailed Photographs

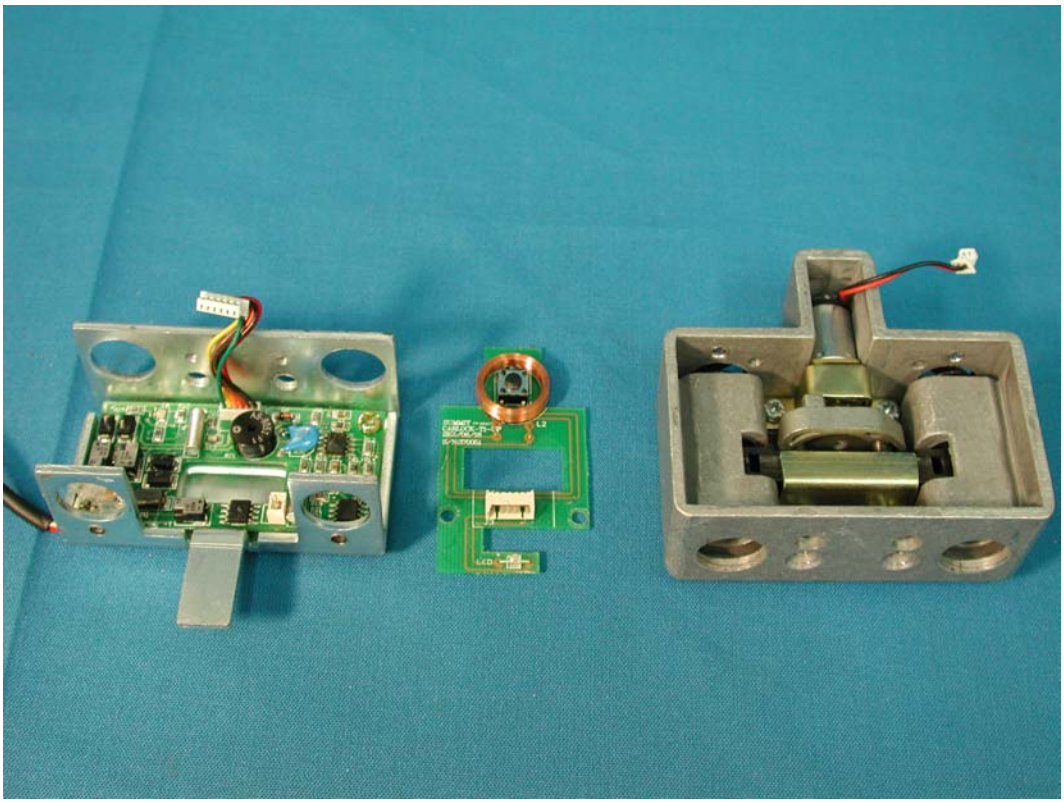
Attachment 2 : EUT Detailed Photographs

(1) EUT Photo

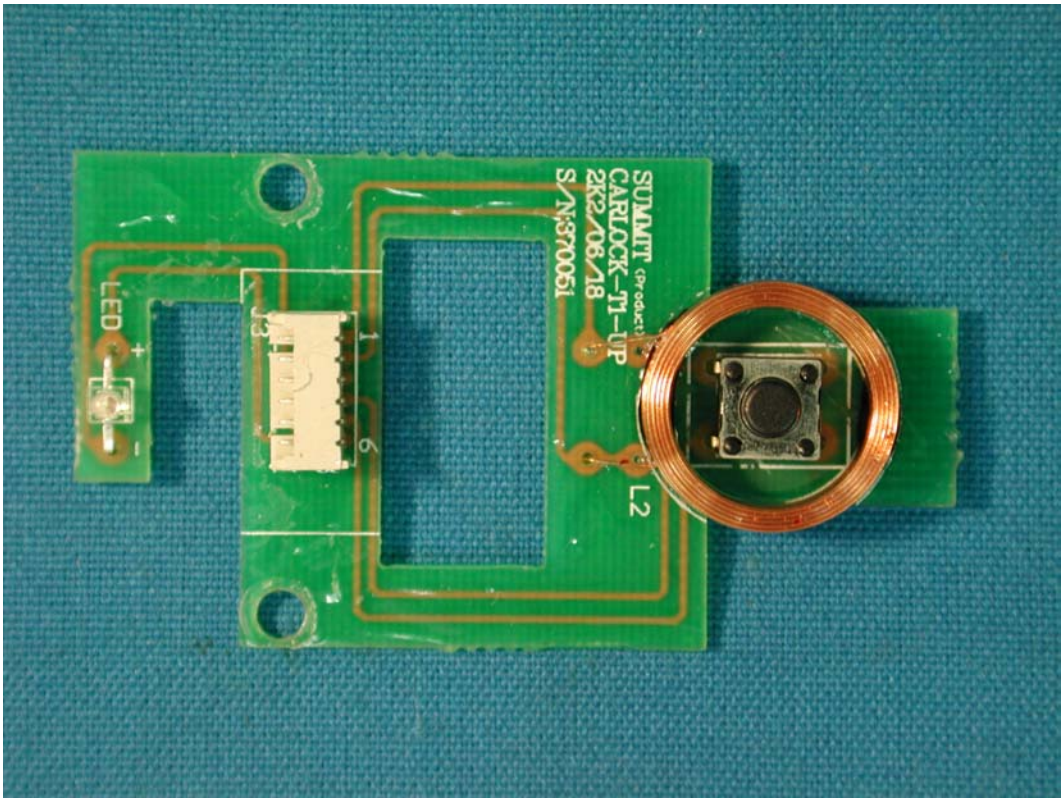
(2) EUT Photo

(3) EUT Photo

(4) EUT Photo



(5) EUT Photo



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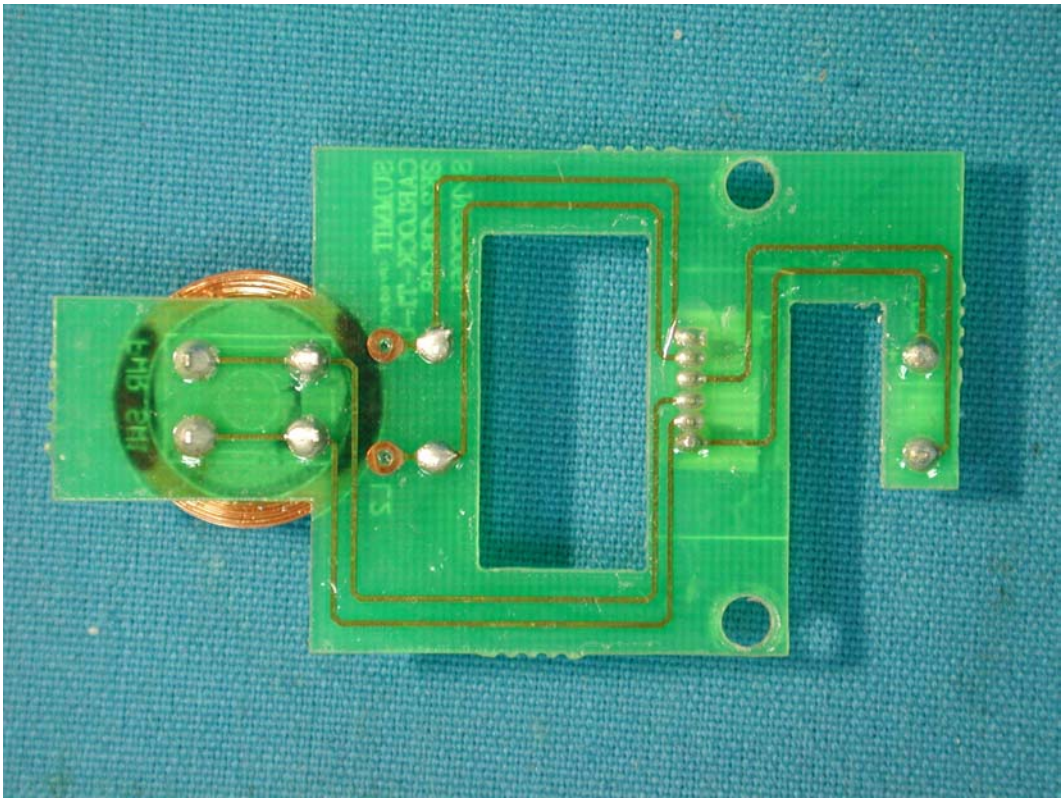

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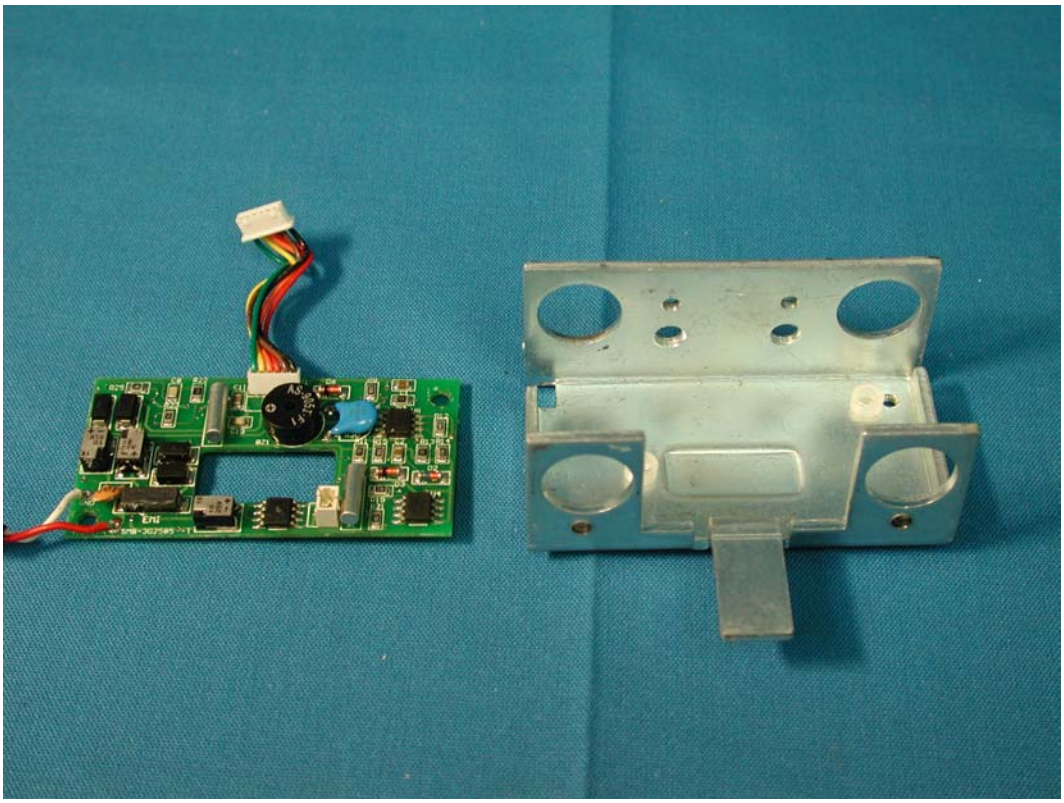

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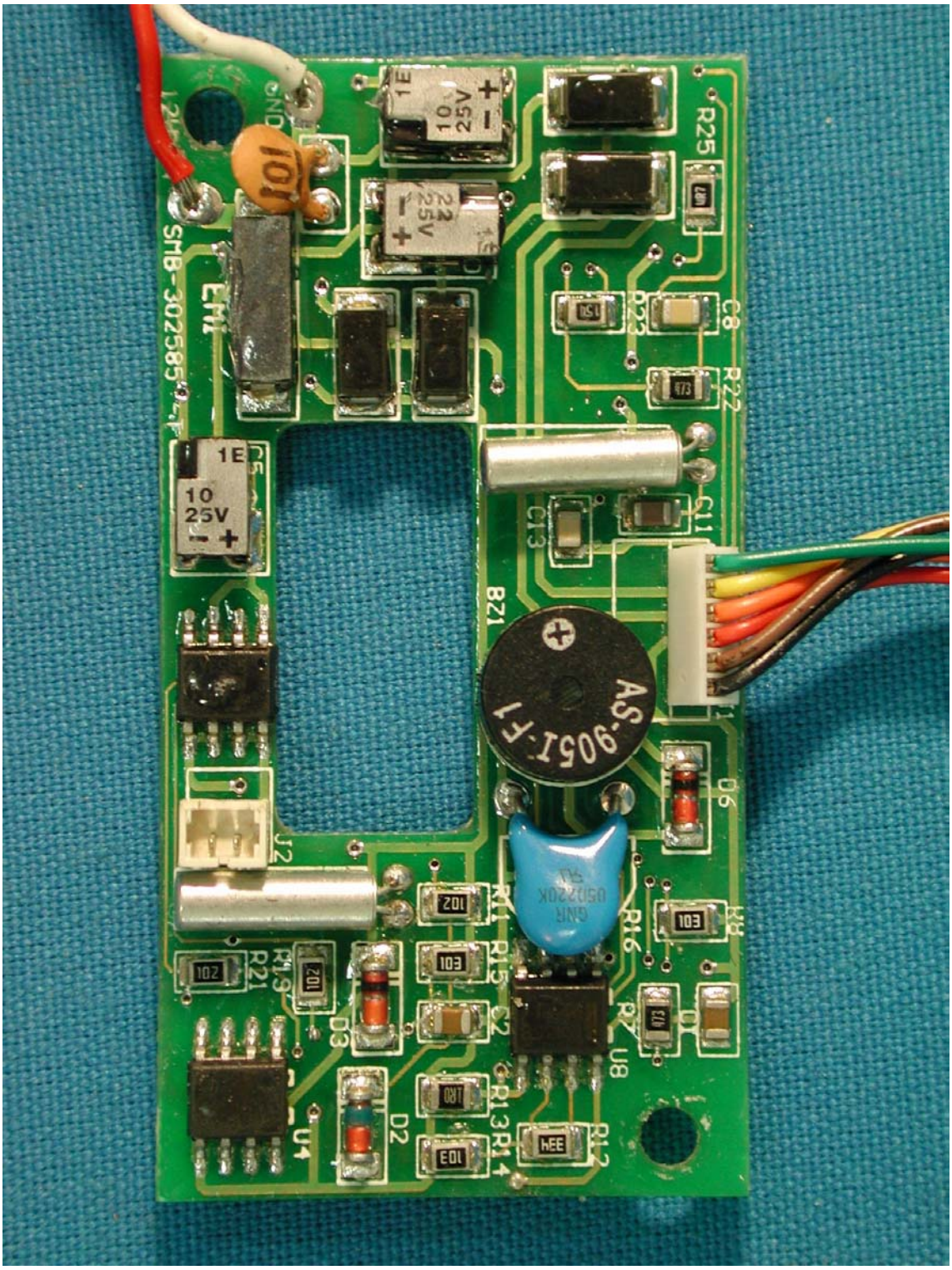
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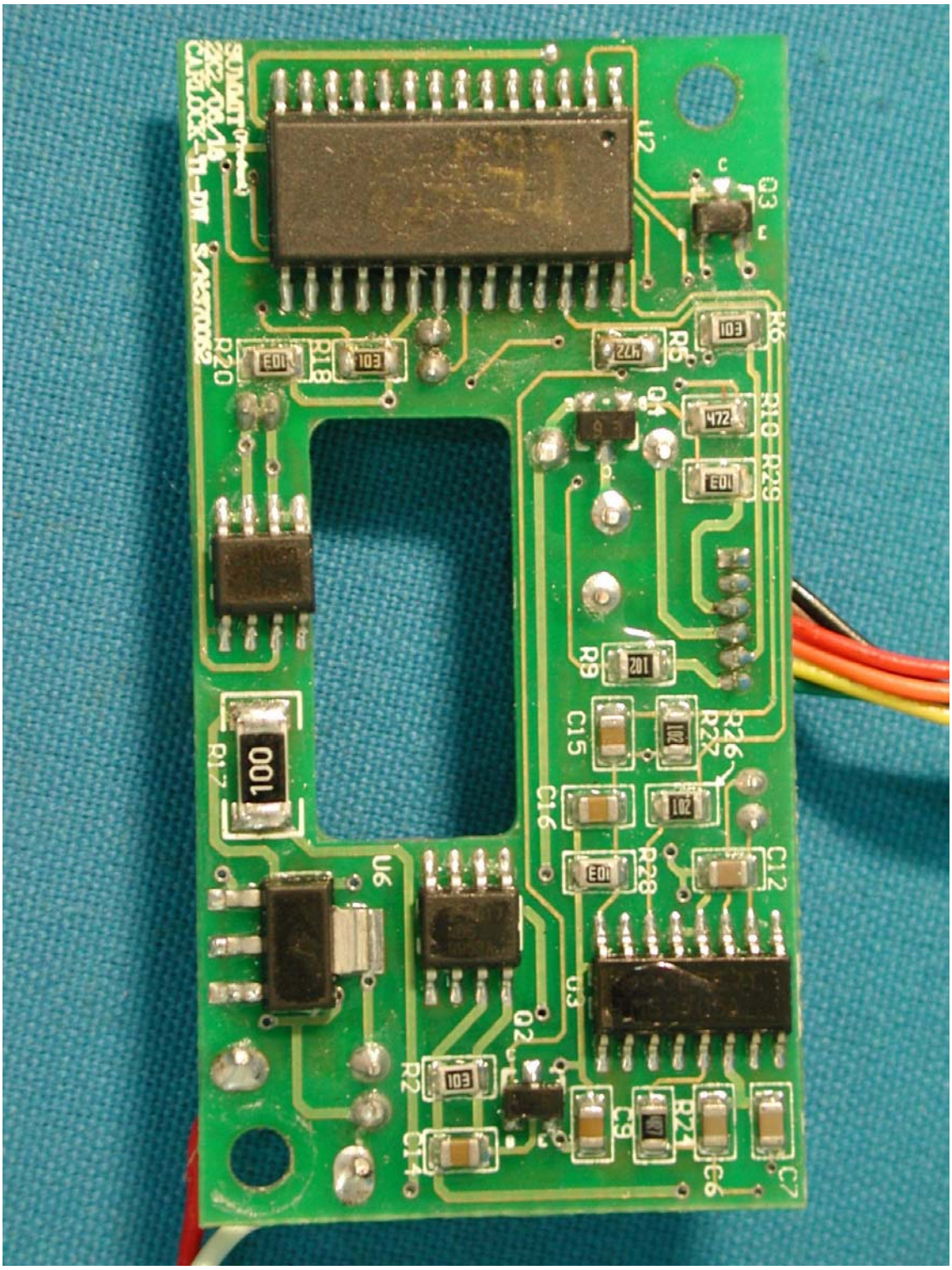
EMI
1E
10
25V
R25
C8
R22
C11
C13
BZ1
AS-905I-F1
D6
J2
R11
R15
R16
R21
D3
C2
U8
D2
U4
R13
R14
R12

(9) EUT Photo


U2
Q3
R6
R5
R20
R18
Q4
R10
R29
R9
C15
R26
R27
R17
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U6
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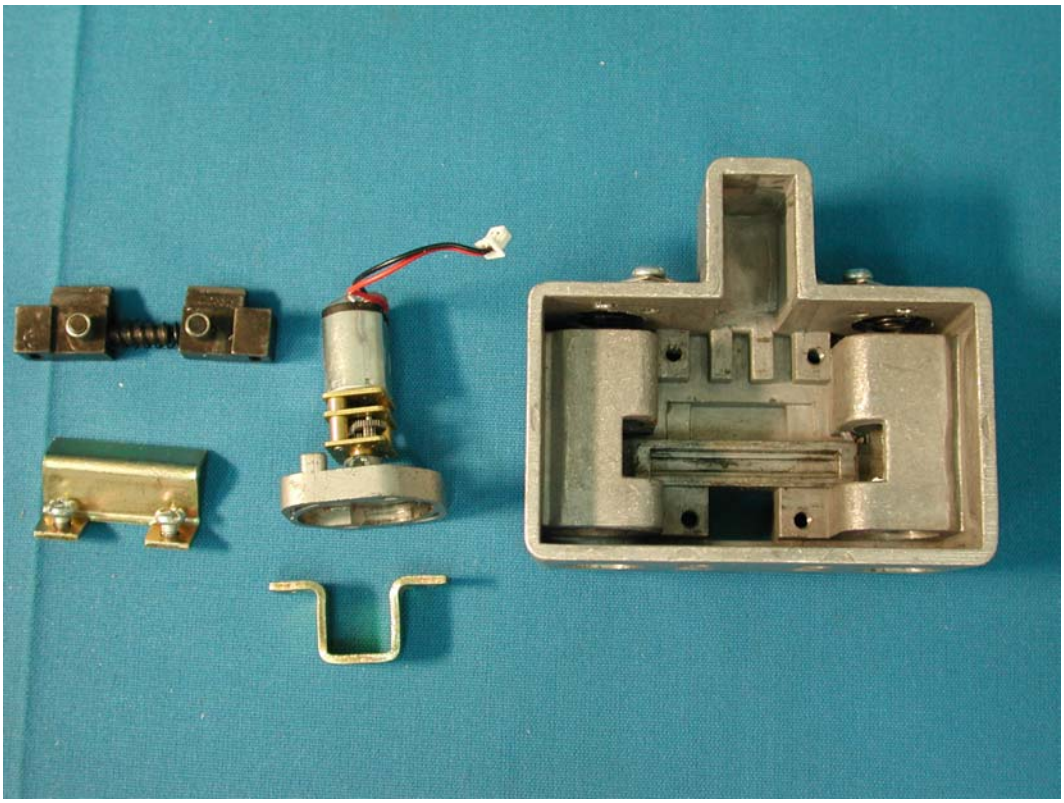
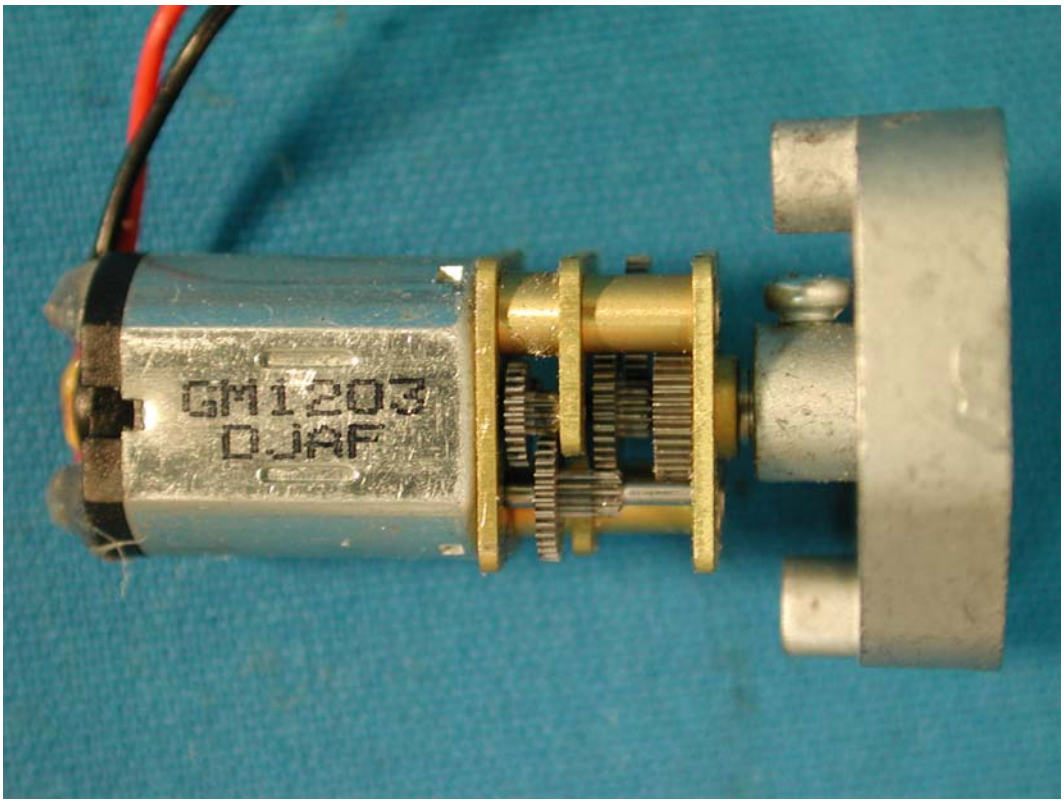
Q2
R2
C14
C9
R24
C6
C7

(10) EUT Photo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