# **Measurement Report**

FCC ID: H8GRBW80N

This report concerns (check one): Original Grant Class II Change

Issued Date: Jul. 13, 2005 Project No.: 0506133 Equipment: RF Mouse Model No.: RBW-80

Applicant: A-FOUR TECH CO., LTD.

6F, No.108, Min-Chuan Rd., Hsin-Tien, Taipei, Taiwan, R.O.C.

Tested by:

Neutron Engineering Inc. EMC Laboratory

Data of Test:

Jun. 24, 2005 ~ Jul. 01, 2005

**Testing Engineer** 

(Jeff Yang)

**Technical Manager** 

(James Chiu)

Authorized Signatory:

(Andy Chiu)

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CNLA 0659 II AC MRA

Lab Code: 200145-0

#### Declaration

**Neutron** represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with the standards traceable to National Measurement Laboratory (**NML**) of **R.O.C.**, or National Institute of Standards and Technology (**NIST**) of **U.S.A.** 

**Neutron**'s reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **Neutron** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **Neutron** issued reports.

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**Neutron**'s laboratory quality assurance procedures are in compliance with the **ISO Guide 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

#### Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

#### Assessment Authorities



CNLA 0659

#### Test Standard/Scope/Item Acceptance

FCC Part 15 Subpart B IEC/CISPR22 AS/NZS CISPR 22 CNS 13438

FCC Part 15 Subpart B

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#### 1. General Information

#### 1.1 Applicant

Name: A-FOUR TECH CO., LTD.

Address: 6F, No.108, Min-Chuan Rd., Hsin-Tien, Taipei, Taiwan, R.O.C.

#### 1.2 Manufacturer

Name : N/A Address : N/A

#### 1.3 Equipment Under Tested

Name : RF Mouse Trade Name : A4TECH Model No. : RBW-80

#### 1.4 OEM Brand/Model (if applicable)

OEM Brand(s)/Model(s) except the basic model in sub-clause 1.3 is (are) the follows:

OEM Brand: N/A Model No. : N/A

#### 1.5 Model Difference (Series, Versions, if any)

Except the basic model no. (model designation of the sample tested in this test report), additional model no. covered is(are):

N/A

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#### 1.6 Product Descriptions (Application/Features/Specification)

The EUT is a RF Mouse. A major technical descriptions of EUT is described as following:

A. Operation Frequency	CH1: 27.045 MHz and CH2: 27.145 MHz
B. Modulation Type	FSK
C. Antenna Designation	Integral
D. Number Of Channel	2

Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.

#### 1.7 Connecting I/O Port(s)

Please refer to the User's Manual.

#### 1.8 Power Supplied

DC 3 V, 28mA

#### 1.9 Products Covered (if applicable)

The sample tested including the following sub-system/module/accessory:

Sub-system/ Module/ Accessory Model/Type No. Int. Inst./ Ext. Cont.

N/A N/A N/A

#### 1.10 Description of Test Mode(s)

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Mode 1 CH1

Mode 2 CH2

The EUT system operated Mode 1/2, mentioned above was found to be the worst case during the pre-scanning test.

These operation modes were used for final testing and collecting test data included in this report.

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## 1.11 Summary of Test Results

Test procedures according to the technical standards: (Antenna to EUT distance is 3 m)

	FCC Part15 (15.227), Subpart C					
Section	Test Item	Limit	Frequency Range (MHz)	Result		
15.207	Conducted Emission	Class B	0.15-30	PASS		
15.209	Radiated Emission	Class B	30-1000	PASS		
15.227	Radiated Emission	10000 μV/m (80dBμV/m) @ 3 m	26.96-27.28	PASS		

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#### 2. RFI Emissions Measurement

#### 2.1Test Facility

The test facilities used to collect the test data in this report located at No.132-1, Lane 329, Sec. 2, Palain Road, Shijr City, Taipei, Taiwan.

#### 2.2 Standard Compliance

The test data contained in this report relate only to the item(s) listed below:

FCC Part15, Subpart C / ANCI C63.4: 2003

#### 2.3 Test Methodolog

Only radiated testing was performed during the max. EMI emission evaluation. Conducted testing excepted because of the EUT is a battery operating device and no any other cable connection to PC device.

Test procedures according to the technical standards:

FCC Part15, Subpart C / ANSI C63.4: 2003.

#### 2.4 Deviations from Standard Test Method

N/A

#### 2.5 Sample(s) Tested

The representative sample tested in this reports is(are): RBW-80

Test results in this test report relate only to the sample(s) tested.

The EUT has been tested according to the following environmental condition:

Input Power	DC: 3V
Environmental Conditions	Please refer to the measurement data.

#### 2.6 Measurement Instruments

Valid measurement instruments used in this report refer to Table-1 enclosed.

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#### 2.7 Measurement Uncertainty

The reported uncertainty of measurement  $\mathbf{y} \pm \mathbf{U}$ , where expended uncertainty  $\mathbf{U}$  is based on a standard uncertainty multiplied by a coverage factor of  $\mathbf{k=2}$ , providing a level of confidence of approximately 95 %  $^{\circ}$ 

A. Conducted Measurement :5.05dB

#### B. Radiated Measurement:

Test Site	Method	Measurement Frequency Range	Ant. H / V	U , (dB)	NOTE
OS-01	ANSI	30MHz ~ 200MHz	Н	4.59	
		30MHz ~ 200MHz	V	4.80	
		200MHz ~ 1,000MHz	Н	4.47	
		200MHz ~ 1,000MHz	V	5.03	

#### 2.8 Tested System Set-Up/Configuration Details

The system was configured for testing in a typical fashion (as a user would normally use) or in-accordance with the operating configuration specified in the user's manual. A Block Diagram(please refer to the Diagram - 1) and Photos(please refer to the attachment - A) showing the set-up/configuration of system tested. In addition, **Table-2** and **Table-3** provide a detail of all equipment items and cables information used in the system tested.

**Table -1 Measurement Instruments List** 

LISN	Item	Instruments	Mfr/Brand	Model/Type No.		Calibrated Date	Next Cali Date	Note
LISN   Rolf Heine   NNB-2/16Z   98083   2004-08-03   2005-08-02								
A								Ť
4         4L-V-LISN         Rolf Heine         NNB-4/63TL         02/10040         2005-04-08         2006-04-07         ✓           5         LISN         EMCO         3816/2         00042991         2005-01-12         2007-01-11         —           6         LISN         EMCO         4825/2         00028234         2005-04-01         2006-03-31         —           7         ISN         SCHAFFNER         ISN T400         16017         2004-12-07         2005-12-06         —           8         Pulse Limiter         Electro-Metrics         EM-7600         112644         2004-12-07         2005-12-06         ✓           9         50Ω Terminator         N/A         N/A         N/A         2005-05-12         2007-05-11         ✓           10         Test Cable         N/A         C01         N/A         2004-12-08         2005-12-07         ✓           11         Log-Bicon Antenna         MESS-ELEKTRONIK         VULB 9160         3177         2005-02-07         2007-02-06         —           13         Log-Bicon Antenna         MESS-ELEKTRONIK         VULB 9161         4022         2004-07-15         2005-07-14         —           14         Test Cable         N/A         10M_OS								
5         LISN         EMCO         3816/2         00042991         2005-01-12         2007-01-11           6         LISN         EMCO         4825/2         00028234         2005-04-01         2006-03-31           7         ISN         SCHAFFNER         ISN T400         16017         2004-12-07         2005-12-06           8         Pulse Limiter         Electro-Metrics         EM-7600         112644         2004-12-07         2005-12-06         ✓           9         50Ω Terminator         N/A         N/A         N/A         2005-05-12         2007-05-11         ✓           10         Test Cable         N/A         C01         N/A         2004-12-08         2005-12-07         ✓           11         Log-Bicon Antenna         MESS-ELEKTRONIK         VULB 9160         3058         2004-10-20         2005-10-19         ✓           12         Log-Bicon Antenna         MESS-ELEKTRONIK         VULB 9161         4022         2004-07-15         2005-07-01         10         1         4         1         1         1         1         1         1         1         1         1         1         2005-02-07         2007-02-06         1         1         1         1         1								./
6         LISN         EMCO         4825/2         00028234         2005-04-01         2006-03-31           7         ISN         SCHAFFNER         ISN T400         16017         2004-12-07         2005-12-06           8         Pulse Limiter         Electro-Metrics         EM-7600         112644         2004-12-07         2005-12-06         ✓           9         50Ω Terminator         N/A         N/A         N/A         2005-05-12         2007-05-11         ✓           10         Test Cable         N/A         C01         N/A         2004-12-08         2005-12-07         ✓           11         Log-Bicon Antenna         MESS-ELEKTRONIK         VULB 9160         3058         2004-10-20         2005-10-19         ✓           12         Log-Bicon Antenna         MESS-ELEKTRONIK         VULB 9161         4022         2004-07-15         2005-07-014            13         Log-Bicon Antenna         MESS-ELEKTRONIK         VULB 9161         4022         2004-07-15         2005-07-014            14         Test Cable         N/A         10M_OS01         N/A         2004-12-08         2005-12-07            15         Test Cable         N/A         10M_OS02         N/A <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>•</td>								•
SCHAFFNER								
8         Pulse Limiter         Electro-Metrics         EM-7600         112644         2004-12-07         2005-12-06         ✓           9         50 Ω Terminator         N/A         N/A         N/A         2005-05-12         2007-05-11         ✓           10         Test Cable         N/A         C01         N/A         2004-12-08         2005-12-07         ✓           11         Log-Bicon Antenna         MESS-ELEKTRONIK         VULB 9160         3177         2005-02-07         2007-02-06            13         Log-Bicon Antenna         MESS-ELEKTRONIK         VULB 9160         3177         2005-02-07         2007-02-06            13         Log-Bicon Antenna         MESS-ELEKTRONIK         VULB 9160         3177         2005-02-07         2007-02-06            14         Test Cable         N/A         10M_OS01         N/A         2004-07-15         2005-07-14            15         Test Cable         N/A         10M_OS01         N/A         2004-12-08         2005-12-07            16         Test Cable         N/A         10M_OS02         N/A         2004-12-08         2005-12-07         ✓           17         Test Cable         N/A								
9         50Ω Terminator         N/A         N/A         N/A         2005-05-12         2007-05-11         ✓           10         Test Cable         N/A         C01         N/A         2004-12-08         2005-12-07         ✓           11         Log-Bicon Antenna         MESS-ELEKTRONIK         VULB 9160         3058         2004-10-20         2005-10-19         ✓           12         Log-Bicon Antenna         MESS-ELEKTRONIK         VULB 9161         4022         2004-07-15         2005-07-14         ✓           13         Log-Bicon Antenna         MESS-ELEKTRONIK         VULB 9161         4022         2004-07-15         2005-07-14         ✓           14         Test Cable         N/A         10M_OS01         N/A         2004-12-08         2005-12-07         ✓           15         Test Cable         N/A         10M_OS02         N/A         2004-12-08         2005-12-07         ✓           16         Test Cable         N/A         10M_OS02         N/A         2004-12-08         2005-12-07         ✓           17         Test Cable         N/A         0S02-1/-2/-3         N/A         2004-12-08         2005-12-07         ✓           18         RF Switch         Anritsu <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>								
10         Test Cable         N/A         C01         N/A         2004-12-08         2005-12-07         ✓           11         Log-Bicon Antenna         MESS-ELEKTRONIK         VULB 9160         3058         2004-10-20         2005-10-19         ✓           12         Log-Bicon Antenna         MESS-ELEKTRONIK         VULB 9160         3177         2005-02-07         2007-02-06           13         Log-Bicon Antenna         MESS-ELEKTRONIK         VULB 9161         4022         2004-07-15         2005-07-14           14         Test Cable         N/A         10M_OS01         N/A         2004-12-08         2005-12-07           15         Test Cable         N/A         0S01-17-2         N/A         2004-12-08         2005-12-07           16         Test Cable         N/A         10M_OS02         N/A         2004-12-08         2005-12-07         ✓           17         Test Cable         N/A         OS02-17-2/3         N/A         2004-12-08         2005-12-07         ✓           18         RF Switch         Anritsu         MP59B         M65982         2004-12-07         2005-12-07         ✓           19         Pre-Amplifier         Anritsu         MH648A         M09961         2004-11-24								
11         Log-Bicon Antenna         MESS-ELEKTRONIK         VULB 9160         3058         2004-10-20         2005-10-19         ✓           12         Log-Bicon Antenna         MESS-ELEKTRONIK         VULB 9160         3177         2005-02-07         2007-02-06         ✓           13         Log-Bicon Antenna         MESS-ELEKTRONIK         VULB 9161         4022         2004-07-15         2005-07-14         ✓           14         Test Cable         N/A         10M_OS01         N/A         2004-12-08         2005-12-07         ✓           15         Test Cable         N/A         0S01-1/-2         N/A         2004-12-08         2005-12-07         ✓           16         Test Cable         N/A         10M_OS02         N/A         2004-12-08         2005-12-07         ✓           17         Test Cable         N/A         OS02-1/-2/-3         N/A         2004-12-08         2005-12-07         ✓           18         RF Switch         Anritsu         MP59B         M65982         2004-12-07         2005-12-07         ✓           19         Pre-Amplifier         Anritsu         MH648A         M09961         2004-11-24         2005-01-23         ✓           20         Spectrum Analyzer <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>								
12         Log-Bicon Antenna         MESS-ELEKTRONIK         VULB 9160         3177         2005-02-07         2007-02-06           13         Log-Bicon Antenna         MESS-ELEKTRONIK         VULB 9161         4022         2004-07-15         2005-07-14           14         Test Cable         N/A         10M_OS01         N/A         2004-12-08         2005-12-07           15         Test Cable         N/A         0S01-1/-2         N/A         2004-12-08         2005-12-07           16         Test Cable         N/A         10M_OS02         N/A         2004-12-08         2005-12-07           17         Test Cable         N/A         0S02-1/-2/-3         N/A         2004-12-08         2005-12-07         ✓           18         RF Switch         Anritsu         MP59B         M65982         2004-12-07         2005-12-06            19         Pre-Amplifier         Anritsu         MH648A         M09961         2004-11-24         2005-11-23         ✓           20         Spectrum Analyzer         ADVAN TEST         R3132         81700025         2005-02-23         2006-02-22           22         EMI Test Receiver         R&S         ESCI         1166.5950.03         2005-02-22         2007-02-01		Test Cable	N/A					
13         Log-Bicon Antenna         MESS-ELEKTRONIK         VULB 9161         4022         2004-07-15         2005-07-14           14         Test Cable         N/A         10M_OS01         N/A         2004-12-08         2005-12-07           15         Test Cable         N/A         OS01-1/-2         N/A         2004-12-08         2005-12-07           16         Test Cable         N/A         10M_OS02         N/A         2004-12-08         2005-12-07         ✓           17         Test Cable         N/A         OS02-1/-2/-3         N/A         2004-12-08         2005-12-07         ✓           18         RF Switch         Anritsu         MP59B         M65982         2004-12-07         2005-12-06           19         Pre-Amplifier         Anritsu         MH648A         M09961         2004-12-07         2005-12-06           19         Pre-Amplifier         Anritsu         MH648A         M09961         2004-09-01         2005-01-2-06           19         Spectrum Analyzer         ADVAN TEST         R3261C         81720298         2004-09-01         2005-02-23         2006-02-22           21         Spectrum Analyzer         R&S         ESCI         1166.5950.03         2005-02-23         2006-02-22	11	Log-Bicon Antenna	MESS-ELEKTRONIK	VULB 9160	3058	2004-10-20	2005-10-19	✓
14         Test Cable         N/A         10M_OS01         N/A         2004-12-08         2005-12-07           15         Test Cable         N/A         OS01-1/-2         N/A         2004-12-08         2005-12-07           16         Test Cable         N/A         10M_OS02         N/A         2004-12-08         2005-12-07         ✓           17         Test Cable         N/A         OS02-1/-2/-3         N/A         2004-12-08         2005-12-07         ✓           18         RF Switch         Anritsu         MP59B         M65982         2004-12-07         2005-12-06           19         Pre-Amplifier         Anritsu         MH648A         M09961         2004-11-24         2005-11-23         ✓           20         Spectrum Analyzer         ADVAN TEST         R3261C         81720298         2004-09-01         2005-08-31            21         Spectrum Analyzer         ADVAN TEST         R3132         81700025         2005-02-23         2006-02-22           22         EMI Test Receiver         R&S         ESCI         1166.5950.03         2005-02-23         2006-02-22           23         Test Receiver         R&S         ESH3         860156/018         2004-12-31         2005-12-30	12	Log-Bicon Antenna	MESS-ELEKTRONIK	VULB 9160	3177	2005-02-07	2007-02-06	
15         Test Cable         N/A         OS01-1/-2         N/A         2004-12-08         2005-12-07           16         Test Cable         N/A         10M_OS02         N/A         2004-12-08         2005-12-07         ✓           17         Test Cable         N/A         OS02-1/-2/-3         N/A         2004-12-08         2005-12-07         ✓           18         RF Switch         Anritsu         MP59B         M65982         2004-12-07         2005-12-06           19         Pre-Amplifier         Anritsu         MH648A         M09961         2004-11-24         2005-11-23         ✓           20         Spectrum Analyzer         ADVAN TEST         R3261C         81720298         2004-09-01         2005-08-31         _           21         Spectrum Analyzer         ADVAN TEST         R3132         81700025         2005-02-23         2006-02-22           22         EMI Test Receiver         R&S         ESCI         1166.5950.03         2005-02-02         2007-02-01         ✓           23         Test Receiver         R&S         ESH3         860156/018         2004-12-31         2005-12-30           24         Test Receiver         R&S         ESVP         860687/009         2004-12-31	13	Log-Bicon Antenna	MESS-ELEKTRONIK	VULB 9161	4022	2004-07-15	2005-07-14	
16         Test Cable         N/A         10M_OS02         N/A         2004-12-08         2005-12-07         ✓           17         Test Cable         N/A         OS02-1/-2/-3         N/A         2004-12-08         2005-12-07         ✓           18         RF Switch         Anritsu         MP59B         M65982         2004-12-07         2005-12-06           19         Pre-Amplifier         Anritsu         MH648A         M09961         2004-11-24         2005-11-23         ✓           20         Spectrum Analyzer         ADVAN TEST         R3261C         81720298         2004-09-01         2005-08-31	14	Test Cable	N/A	10M_OS01	N/A	2004-12-08	2005-12-07	
17         Test Cable         N/A         OS02-1/-2/-3         N/A         2004-12-08         2005-12-07         ✓           18         RF Switch         Anritsu         MP59B         M65982         2004-12-07         2005-12-06           19         Pre-Amplifier         Anritsu         MH648A         M09961         2004-11-24         2005-11-23         ✓           20         Spectrum Analyzer         ADVAN TEST         R3261C         81720298         2004-09-01         2005-08-31         _           21         Spectrum Analyzer         ADVAN TEST         R3132         81700025         2005-02-23         2006-02-22         _           22         EMI Test Receiver         R&S         ESCI         1166.5950.03         2005-02-23         2006-02-22         _           23         Test Receiver         R&S         ESH3         860156/018         2004-12-31         2005-12-30         _           24         Test Receiver         R&S         ESVP         860687/009         2004-12-31         2005-12-30         _           25         Test Receiver         MEB         SMV41         130         2004-12-06         2005-12-05         ✓           26         Test Receiver         PMM         PMM 900	15	Test Cable	N/A	OS01-1/-2	N/A	2004-12-08	2005-12-07	
18         RF Switch         Anritsu         MP59B         M65982         2004-12-07         2005-12-06           19         Pre-Amplifier         Anritsu         MH648A         M09961         2004-11-24         2005-11-23         ✓           20         Spectrum Analyzer         ADVAN TEST         R3261C         81720298         2004-09-01         2005-08-31           21         Spectrum Analyzer         ADVAN TEST         R3132         81700025         2005-02-23         2006-02-22           22         EMI Test Receiver         R&S         ESCI         1166.5950.03         2005-02-02         2007-02-01         ✓           23         Test Receiver         R&S         ESH3         860156/018         2004-12-31         2005-12-30            24         Test Receiver         R&S         ESVP         860687/009         2004-12-31         2005-12-30            25         Test Receiver         MEB         SMV41         130         2004-12-31         2005-12-30         ✓           26         Test Receiver         PMM         PMM 9000         4310,01002         2005-02-25         2006-02-24            27         Horn Antenna         EMCO         3115         9605-4803	16	Test Cable	N/A	10M_OS02	N/A	2004-12-08	2005-12-07	✓
19 Pre-Amplifier Anritsu MH648A M09961 2004-11-24 2005-11-23 ✓ 20 Spectrum Analyzer ADVAN TEST R3261C 81720298 2004-09-01 2005-08-31 21 Spectrum Analyzer ADVAN TEST R3132 81700025 2005-02-23 2006-02-22 22 EMI Test Receiver R&S ESCI 1166.5950.03 2005-02-02 2007-02-01 ✓ 23 Test Receiver R&S ESH3 860156/018 2004-12-31 2005-12-30 24 Test Receiver R&S ESVP 860687/009 2004-12-31 2005-12-30 25 Test Receiver MEB SMV41 130 2004-12-31 2005-12-30 ✓ 26 Test Receiver PMM PMM 9000 4310J01002 2005-02-25 2006-02-24 27 Horn Antenna EMCO 3115 9605-4803 2005-06-15 2006-06-14 28 Absorbing Clamp R&S MDS-21 841077/011 2004-09-09 2005-09-08 29 Voltage Probe R&S ESH2-Z3 841.800/023 2004-09-07 2005-09-06 30 Antenna Mast Chance Most CMTB-1.5 N/A N/A N/A √ 31 Turn Table Chance Most CMTB-1.5 N/A N/A N/A √ 32 Loop Ant R&S HFH2-Z2 830749/020 2004-10-01 2005-09-30	17	Test Cable	N/A	OS02-1/-2/-3	N/A	2004-12-08	2005-12-07	✓
20 Spectrum Analyzer ADVAN TEST R3261C 81720298 2004-09-01 2005-08-31 21 Spectrum Analyzer ADVAN TEST R3132 81700025 2005-02-23 2006-02-22 22 EMI Test Receiver R&S ESCI 1166.5950.03 2005-02-02 2007-02-01 ✓ 23 Test Receiver R&S ESH3 860156/018 2004-12-31 2005-12-30 24 Test Receiver R&S ESVP 860687/009 2004-12-31 2005-12-30 25 Test Receiver MEB SMV41 130 2004-12-06 2005-12-05 ✓ 26 Test Receiver PMM PMM 9000 4310J01002 2005-02-25 2006-02-24 27 Horn Antenna EMCO 3115 9605-4803 2005-06-15 2006-06-14 28 Absorbing Clamp R&S MDS-21 841077/011 2004-09-09 2005-09-08 29 Voltage Probe R&S ESH2-Z3 841.800/023 2004-09-07 2005-09-06 30 Antenna Mast Chance Most CMTB-1.5 N/A N/A N/A N/A 31 Turn Table Chance Most CMTB-1.5 N/A N/A N/A N/A ✓ 32 Loop Ant R&S HFH2-Z2 830749/020 2004-10-01 2005-09-30	18	RF Switch	Anritsu	MP59B	M65982	2004-12-07	2005-12-06	
21         Spectrum Analyzer         ADVAN TEST         R3132         81700025         2005-02-23         2006-02-22           22         EMI Test Receiver         R&S         ESCI         1166.5950.03         2005-02-02         2007-02-01         ✓           23         Test Receiver         R&S         ESH3         860156/018         2004-12-31         2005-12-30           24         Test Receiver         R&S         ESVP         860687/009         2004-12-31         2005-12-30           25         Test Receiver         MEB         SMV41         130         2004-12-06         2005-12-05         ✓           26         Test Receiver         PMM         PMM 9000         4310J01002         2005-02-25         2006-02-24           27         Horn Antenna         EMCO         3115         9605-4803         2005-06-15         2006-06-14           28         Absorbing Clamp         R&S         MDS-21         841077/011         2004-09-09         2005-09-08           29         Voltage Probe         R&S         ESH2-Z3         841.800/023         2004-09-07         2005-09-06           30         Antenna Mast         Chance Most         CMTB-1.5         N/A         N/A         N/A           31<	19	Pre-Amplifier	Anritsu	MH648A	M09961	2004-11-24	2005-11-23	✓
22       EMI Test Receiver       R&S       ESCI       1166.5950.03       2005-02-02       2007-02-01       ✓         23       Test Receiver       R&S       ESH3       860156/018       2004-12-31       2005-12-30          24       Test Receiver       R&S       ESVP       860687/009       2004-12-31       2005-12-30          25       Test Receiver       MEB       SMV41       130       2004-12-06       2005-12-05       ✓         26       Test Receiver       PMM       PMM 9000       4310J01002       2005-02-25       2006-02-24         27       Horn Antenna       EMCO       3115       9605-4803       2005-06-15       2006-06-14         28       Absorbing Clamp       R&S       MDS-21       841077/011       2004-09-09       2005-09-08         29       Voltage Probe       R&S       ESH2-Z3       841.800/023       2004-09-07       2005-09-06         30       Antenna Mast       Chance Most       CMTB-1.5       N/A       N/A       N/A         31       Turn Table       Chance Most       CMTB-1.5       N/A       N/A       N/A         32       Loop Ant       R&S       HFH2-Z2       830749/020       2004-10-01	20	Spectrum Analyzer	ADVAN TEST	R3261C	81720298	2004-09-01	2005-08-31	
23         Test Receiver         R&S         ESH3         860156/018         2004-12-31         2005-12-30           24         Test Receiver         R&S         ESVP         860687/009         2004-12-31         2005-12-30           25         Test Receiver         MEB         SMV41         130         2004-12-06         2005-12-05         ✓           26         Test Receiver         PMM         PMM 9000         4310J01002         2005-02-25         2006-02-24           27         Horn Antenna         EMCO         3115         9605-4803         2005-06-15         2006-06-14           28         Absorbing Clamp         R&S         MDS-21         841077/011         2004-09-09         2005-09-08           29         Voltage Probe         R&S         ESH2-Z3         841.800/023         2004-09-07         2005-09-06           30         Antenna Mast         Chance Most         CMTB-1.5         N/A         N/A         N/A           31         Turn Table         Chance Most         CMTB-1.5         N/A         N/A         N/A           32         Loop Ant         R&S         HFH2-Z2         830749/020         2004-10-01         2005-09-30	21	Spectrum Analyzer	ADVAN TEST	R3132	81700025	2005-02-23	2006-02-22	
24         Test Receiver         R&S         ESVP         860687/009         2004-12-31         2005-12-30           25         Test Receiver         MEB         SMV41         130         2004-12-06         2005-12-05         ✓           26         Test Receiver         PMM         PMM 9000         4310J01002         2005-02-25         2006-02-24           27         Horn Antenna         EMCO         3115         9605-4803         2005-06-15         2006-06-14           28         Absorbing Clamp         R&S         MDS-21         841077/011         2004-09-09         2005-09-08           29         Voltage Probe         R&S         ESH2-Z3         841.800/023         2004-09-07         2005-09-06           30         Antenna Mast         Chance Most         CMTB-1.5         N/A         N/A         N/A           31         Turn Table         Chance Most         CMTB-1.5         N/A         N/A         N/A           32         Loop Ant         R&S         HFH2-Z2         830749/020         2004-10-01         2005-09-30	22	EMI Test Receiver	R&S	ESCI	1166.5950.03	2005-02-02	2007-02-01	✓
25         Test Receiver         MEB         SMV41         130         2004-12-06         2005-12-05         ✓           26         Test Receiver         PMM         PMM 9000         4310J01002         2005-02-25         2006-02-24           27         Horn Antenna         EMCO         3115         9605-4803         2005-06-15         2006-06-14           28         Absorbing Clamp         R&S         MDS-21         841077/011         2004-09-09         2005-09-08           29         Voltage Probe         R&S         ESH2-Z3         841.800/023         2004-09-07         2005-09-06           30         Antenna Mast         Chance Most         CMTB-1.5         N/A         N/A         N/A         ✓           31         Turn Table         Chance Most         CMTB-1.5         N/A         N/A         N/A         ✓           32         Loop Ant         R&S         HFH2-Z2         830749/020         2004-10-01         2005-09-30	23	Test Receiver	R&S	ESH3	860156/018	2004-12-31	2005-12-30	
26         Test Receiver         PMM         PMM 9000         4310J01002         2005-02-25         2006-02-24           27         Horn Antenna         EMCO         3115         9605-4803         2005-06-15         2006-06-14           28         Absorbing Clamp         R&S         MDS-21         841077/011         2004-09-09         2005-09-08           29         Voltage Probe         R&S         ESH2-Z3         841.800/023         2004-09-07         2005-09-06           30         Antenna Mast         Chance Most         CMTB-1.5         N/A         N/A         N/A         ✓           31         Turn Table         Chance Most         CMTB-1.5         N/A         N/A         N/A         ✓           32         Loop Ant         R&S         HFH2-Z2         830749/020         2004-10-01         2005-09-30	24	Test Receiver	R&S	ESVP	860687/009	2004-12-31	2005-12-30	
27         Horn Antenna         EMCO         3115         9605-4803         2005-06-15         2006-06-14           28         Absorbing Clamp         R&S         MDS-21         841077/011         2004-09-09         2005-09-08           29         Voltage Probe         R&S         ESH2-Z3         841.800/023         2004-09-07         2005-09-06           30         Antenna Mast         Chance Most         CMTB-1.5         N/A         N/A         N/A         ✓           31         Turn Table         Chance Most         CMTB-1.5         N/A         N/A         N/A         ✓           32         Loop Ant         R&S         HFH2-Z2         830749/020         2004-10-01         2005-09-30	25	Test Receiver	MEB	SMV41	130	2004-12-06	2005-12-05	✓
28       Absorbing Clamp       R&S       MDS-21       841077/011       2004-09-09       2005-09-08         29       Voltage Probe       R&S       ESH2-Z3       841.800/023       2004-09-07       2005-09-06         30       Antenna Mast       Chance Most       CMTB-1.5       N/A       N/A       N/A       √         31       Turn Table       Chance Most       CMTB-1.5       N/A       N/A       N/A       √         32       Loop Ant       R&S       HFH2-Z2       830749/020       2004-10-01       2005-09-30	26	Test Receiver	PMM	PMM 9000	4310J01002	2005-02-25	2006-02-24	
29         Voltage Probe         R&S         ESH2-Z3         841.800/023         2004-09-07         2005-09-06           30         Antenna Mast         Chance Most         CMTB-1.5         N/A         N/A         N/A         √           31         Turn Table         Chance Most         CMTB-1.5         N/A         N/A         N/A         √           32         Loop Ant         R&S         HFH2-Z2         830749/020         2004-10-01         2005-09-30	27	Horn Antenna	EMCO	3115	9605-4803	2005-06-15	2006-06-14	
30         Antenna Mast         Chance Most         CMTB-1.5         N/A         N/A         N/A         √           31         Turn Table         Chance Most         CMTB-1.5         N/A         N/A         N/A         √           32         Loop Ant         R&S         HFH2-Z2         830749/020         2004-10-01         2005-09-30	28	Absorbing Clamp	R&S	MDS-21	841077/011	2004-09-09	2005-09-08	
31         Turn Table         Chance Most         CMTB-1.5         N/A         N/A         N/A         ✓           32         Loop Ant         R&S         HFH2-Z2         830749/020         2004-10-01         2005-09-30	29	Voltage Probe	R&S	ESH2-Z3	841.800/023	2004-09-07	2005-09-06	
32 Loop Ant R&S HFH2-Z2 830749/020 2004-10-01 2005-09-30	30	Antenna Mast	Chance Most	CMTB-1.5	N/A	N/A	N/A	✓
·	31	Turn Table	Chance Most	CMTB-1.5	N/A	N/A	N/A	✓
33 Loop Ant EMCO 6502 00042960 2005-01-14 2008-01-13	32	Loop Ant	R&S	HFH2-Z2	830749/020	2004-10-01	2005-09-30	
	33	Loop Ant	EMCO	6502	00042960	2005-01-14	2008-01-13	

Remark:

<sup>(1)&</sup>quot; ✓" indicates the instrument used in Test Report.

<sup>(2)&</sup>quot; N/A" denotes No Model No. / Serial No. and No Calibration specified.

NEUTRON EMC LAB.	

# Diagram - 1 Block diagram showing the configuration of system tested

E-1 EUT(Tx)

NEI	ITDI	7//	EI/	r	IΛR

## Table - 2 Equipments Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
E-1	RF Mouse	A4TECH	RBW-80	H8GRBW80N	N/A	EUT

#### Note:

- (1) Unless otherwise denoted as EUT in 『Remark』 column, device(s) used in tested system is a support equipment.
- (2) Unless otherwise marked as % in  $^{\mathbb{F}}$  Remark  $_{\mathbb{F}}$  column, Neutron consigns the support equipment to the tested system.
- (3) The support equipment was authorized by Declaration of Confirmation.

**Table - 3** Information of Interface Cable

Item	Shielded Type	Ferrite Core	Length	Note
	N/A	N/A	N/A	

#### Note:

- (1) Unless otherwise marked as \*\* in Remark column, Neutron consigns the support equipment to the tested system.
- (2) For detachable type I/O cable should be specified the length in cm in <code>"Length\_"</code> column.

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	Report No. : NEI- FCCP-1-0506133

#### 2.9 EUT Operating Conditions

- (a) Only radiated testing was performed during the max. EMI emission evaluation. Conducted testing excepted because of the EUT is a battery operating device and no any other cable connection to PC device.
- (b) The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

#### 3. Justification

- 3.1 Limitations
- 3.1.1 Power Line Conducted Emission

Measurement	Mains T	erminal	Mains Te	erminals	Note
Frequency	Class A	A Limits	Class E	B Limits	CISPR
Range	(dB	uV)	(dB	uV)	FCC
(MHz)	QP Mode	AV Mode	QP Mode	AV Mode	Std.
0.15 - 0.50	79.00	66.00	66 - 56 *	56 - 46 *	CISPR
0.50 - 5.00	73.00	60.00	56.00	46.00	CISPR
5.00 - 30.0	73.00	60.00	60.00	50.00	CISPR
0.15 - 0.50	79.00	66.00	66 - 56 *	56 - 46 *	FCC
0.50 - 5.00	73.00	60.00	56.00	46.00	FCC
5.00 - 30.0	73.00	60.00	60.00	50.00	FCC

#### Notes:

- (1). The tighter limit applies at the band edges.
- (2). The limit of " \* " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

#### 3.1.2 Radiated Emission Limits (Frequency Range 30MHz-1000MHz)

Measurement	Quasi-Pe	ak Mode	Quasi-Pe	ak Mode	Note
Frequency	Class A	\ Limits	Class E	3 Limits	CISPR
Range	(dBu	V/m)	(dBu	V/m)	FCC
(MHz)	10m	30m	10m	3m	Std.
30.00 -230.00	40.00	30.00	30.00	40.00	CISPR
230.0 -1000.0	47.00	37.00	37.00	47.00	CISPR
30.00 - 88.00	39.00	N/A	30.00	40.00	FCC
88.00 - 216.0	43.50	N/A	33.50	43.50	FCC
216.0 -960.0	46.00	N/A	36.00	46.00	FCC
above 960.0	49.50	N/A	46.00	54.00	FCC

#### Notes:

- (1). The tighter limit applies at the band edges.
- (2). Emission level (dBuV/m)=20log Emission level (uV/m).
- (3). A measuring distance 0f 10m is a primary used. However, either 3m or 10m (instead of 10m) distance my be allowed. If the distance is 3m, add 10dB to the QP-limit above. If the distance is 10m, subtract 10dB from the QP-limit above.

A/E/	ITRO	$\Lambda I = I$	IC	IAD
IVI-I	IIKUI	/V <i>F</i> /V	// ( . /	I AK

#### 3.2 Measurement Justification

#### 3.2.1 Conducted Emission

The EUT is a placed on as table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4-2003. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz were made with a Spectrum Analyzer using CISPR Quasi-Peak detector mode.

The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and these signals are then Quasi Peak detector mode and/or Average detector mode re-measured.

Data of **Table - 4**. lists the significant emission frequencies, measured levels, limits and safe margins. All readings are Peak Mode measured unless otherwise stated as QP or AV in column of "Remark".

If the Peak Mode measured value lower than both QP Mode and AV Mode Limit, EUT shall be deemed to compliance with both QP & AV Limits and then no additional QP Mode or AV Mode measurement performed.

If additional QP or AV Mode measurement needed, and if the QP Mode measured value compliance with the QP Mode Limit and lower than AV Mode Limit, the EUT shall be deemed to meet both QP & AV Limits and then only QP Mode was measured, but AV Mode was not performed  $^{\circ}$ 

#### 3.2.2 Radiated Emission

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4-2003.

The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak, Peak or Average detector mode re-measured.

Data of **Table – 5** lists the significant emission frequencies, measured levels, limits and safe margins. All readings are Peak Mode measured unless otherwise stated as QP or AV in column of "Remark".

If the Peak Mode measured value compliance with and lower than Quasi Peak or Average Mode Limit, the EUT shall be deemed to meet QP/AV Limits and then no additional QP/AV Mode measurement performed.

NFI	ITRO	N FM	CI	ΔR
/V/ C	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	/u / ///	W - L	MD.

#### 3.2.3 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as FS = RA + AF + CL - AG

Where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor (1)

CL = Cable Attenuation Factor(Cable Loss) (1)

AG = Amplifier Gain (1)

Remark:

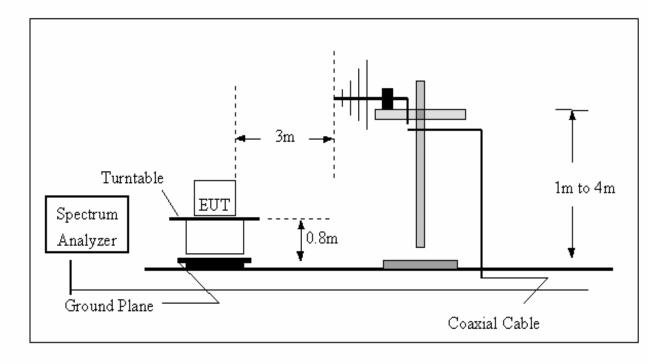
(1) The Correction Factor = AF + CL - AG, as shown in the data tables' Correction Factor column.

#### 3.3 Measurement Data

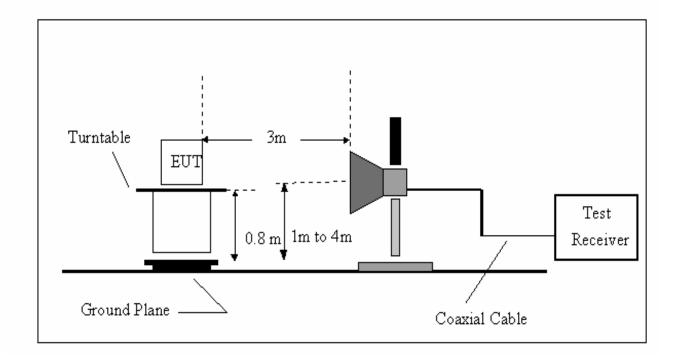
Table - 4. Conducted Emission Data (0.15-30MHz)- Not Applicable

Table - 5. Radiated Emission Data (30-1000MHz)

## (A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



# (B) Radiated Emission Test Set-UP Frequency Over 1 GHz



## Table 4 Conducted Emission Data - Not Applicable

### Table 5 Radiated Emission Data (30-1000MHz)

EUT: RF Mouse Model/Type No.: RBW-80

Temperature: 25.6 °C Relative Humidity: 79 % Pressure: 1010 hPa

Special Notes: (EUT Operation Mode or Test Configuration Mode, if applicable)

Mode 1

#### Minimum passing margin is -7.84dB at 54.02MHz

Freq.	Ant.Pol.	DetectorMode	Reading	Ant./CL/	Actual FS	Limit-3m	Safe Margii	าร
(MHz)	H/V	(PK/AV)	(dBuV)	Amp. CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	Note
27.05	V	Peak	50.36	- 16.35	34.01	80.00	- 45.99	F
26.96	V	Peak	19.12	- 16.33	2.79	69.50	- 66.71	E
27.28	V	Peak	22.91	- 16.40	6.51	69.50	- 62.99	Е
54.02	V	Peak	38.30	- 6.14	32.16	40.00	- 7.84	Н
84.59	V	Peak	30.65	- 10.09	20.56	40.00	- 19.44	Н
97.96	V	Peak	36.32	- 9.10	27.22	43.50	- 16.28	Н
143.76	V	Peak	34.00	- 5.37	28.63	43.50	- 14.87	Н
172.32	V	Peak	30.50	- 5.22	25.28	43.50	- 18.22	Н
27.05	Н	Peak	47.37	- 16.35	31.02	80.00	- 48.98	F
26.96	Н	Peak	17.82	- 16.33	1.49	69.50	- 68.01	Е
27.28	Н	Peak	23.62	- 16.40	7.22	69.50	- 62.28	Ε
54.14	Н	Peak	33.54	- 6.15	27.39	40.00	- 12.61	Н
82.03	Н	Peak	30.91	- 10.09	20.82	40.00	- 19.18	Н
99.36	Н	Peak	34.00	- 8.93	25.07	43.50	- 18.43	Н
119.80	Н	Peak	30.50	- 6.64	23.86	43.50	- 19.64	Н
190.16	Н	Peak	29.60	- 7.34	22.26	43.50	- 21.24	Н

#### Remark:

- (1) Spectrum Setting:
  - 9 KHz 150 KHz, RBW= 1 KHz, VBW=1 KHz, Sweep time = 200 ms. 150 K Hz 30 MHz, RBW= 9 KHz, VBW=9 KHz, Sweep time = 200 ms.
  - 30 MHz 1000 MHz, RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms.
- (2) All readings are Peak unless otherwise stated QP in column of  ${}^{\mathbb{F}}$  Note  $_{\mathbb{J}}$  . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measure-ment didn't perform  $\circ$
- (3) Measuring frequency range from 30MHz to 1000MHz o
- (4) If the peak scan value lower limit more than 20dB, then this signal data does not how in table  $\circ$

## Table 5 Radiated Emission Data (30-1000MHz)

EUT: RF Mouse Model/Type No.: RBW-80

Temperature: 25.6 °C Relative Humidity: 79 % Pressure: 1010 hPa

Special Notes: (EUT Operation Mode or Test Configuration Mode, if applicable)

Mode 2

## Minimum passing margin is -7.39dB at 54.10MHz

Freq.	Ant.Pol.	DetectorMode	Reading	Ant./CL/	Actual FS	Limit-3m	Safe Margin	ns
(MHz)	_H/V	(PK/AV)	(dBuV)	Amp. CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	Note
27.15	V	Peak	50.44	- 16.37	34.07	80.00	- 45.93	F
26.96	V	Peak	17.88	- 16.33	1.55	69.50	- 67.95	Е
27.28	V	Peak	18.74	- 16.40	2.34	69.50	- 67.16	Е
54.02	V	Peak	35.30	- 6.14	29.16	40.00	- 10.84	Н
71.40	V	Peak	30.00	- 8.42	21.58	40.00	- 18.42	Н
98.14	V	Peak	31.28	- 9.07	22.21	43.50	- 21.29	Н
120.95	V	Peak	31.12	- 6.61	24.51	43.50	- 18.99	Н
144.80	V	Peak	34.44	- 5.34	29.10	43.50	- 14.40	Н
27.15	Н	Peak	52.02	- 16.37	35.65	80.00	- 44.35	F
26.96	Н	Peak	23.08	- 16.33	6.75	69.50	- 62.75	Ε
27.28	Н	Peak	19.14	- 16.40	2.74	69.50	- 66.76	Е
54.10	Н	Peak	38.76	- 6.15	32.61	40.00	- 7.39	Н
83.13	Н	Peak	33.50	- 10.09	23.41	40.00	- 16.59	Н
99.12	Н	Peak	39.00	- 8.96	30.04	43.50	- 13.46	Н
120.10	Н	Peak	35.40	- 6.62	28.78	43.50	- 14.72	Н
189.98	Н	Peak	39.00	- 7.33	31.67	43.50	- 11.83	Н

#### Remark:

- (1) Spectrum Setting:
  - 9 KHz 150 KHz, RBW= 1 KHz, VBW=1 KHz, Sweep time = 200 ms. 150 K Hz 30 MHz, RBW= 9 KHz, VBW=9 KHz, Sweep time = 200 ms. 30 MHz 1000 MHz, RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms.
- (2) All readings are Peak unless otherwise stated QP in column of  ${}^{\mathbb{F}}$ Note  ${}_{\mathbb{J}}$ . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measure-ment didn't perform  ${}^{\circ}$
- (3) Measuring frequency range from 30MHz to 1000MHz o
- (4) If the peak scan value lower limit more than 20dB, then this signal data does not how in table  $\circ$

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## **Attachment**

# **Table Contents**

- A. EUT Test Photos
- B. Product Labeling
- C. Bandwidth Requirement (Plot)

NEUTRON EMC LAB.	
NEUTRON EING LAB.	

Attachment - A

**EUT Test Photos** 

NEUTRON EMC LAB.	

Attachment - B

**Product Labeling** 

NEUTRON EMC LAB.
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# Attachment - C

# **Bandwidth Requirement**

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IVI-I	IIKU	/V F/L	//(	I AK

Project No. : 0506133

# **ATTACHMENT**

# 0506133

# **PHOTOGRAPHS OF EUT**