



STC Test Report

Date : 2009-11-12

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No. : MH183478

Applicant(C00055): GTO Inc.
3121 Hartsfield Road, Tallahassee, Florida 32303, USA

Description of Samples: Product: FM202/FM200 Control Board
Model Number: FM202/FM200
Brand Name: MIGHTY MULE
FCC ID: I6HGTOFM200202

Date Samples Received: 2009-10-14

Date Tested: 2009-10-19, 2009-11-11

Investigation Requested: FCC Part 15 Subpart B

Conclusions: The submitted product COMPLIED with the requirements of Federal Communications Commission [FCC] Rules and Regulations Part 15. The tests were performed in accordance with the standards described above and on Section 2.2 in this Test Report.

Remarks: For additional model(s) details, see page 5.
The Description of Sample(s) are given by the applicant / manufacturer. STC shall bear no responsibility of its correctness and truthfulness.

Dr. LEE Kam Chuen
Authorized Signatory
ElectroMagnetic Compatibility Department
For and on behalf of
The Hong Kong Standards and Testing Centre Ltd.

The Hong Kong Standards and Testing Centre Ltd.

10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong
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Appendix A

List of Measurement Equipment

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Appendix B

Photographs of EUT

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1.0 General Details

1.1 Test Laboratory

The Hong Kong Standards and Testing Centre Ltd.
EMC Laboratory
10 Dai Wang Street, Taipo Industrial Estate
New Territories, Hong Kong

Telephone: 852 2666 1888
Fax: 852 2664 4353

1.2 Applicant Details Applicant

GTO Inc.
3121 Hartsfield Road, Tallahassee, Florida 32303, USA

Manufacturer

SMART TECHNOLOGIES & INVESTMENT LTD
Suites C&D, 18/F Spectrum Tower, 53 Hung To Road,
Kwun Tong, Kowloon, Hong Kong

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1.3 Equipment Under Test [EUT]

Description of Sample

Product: FM202/FM200 Control Board
Manufacturer: SMART TECHNOLOGIES & INVESTMENT LTD
Brand Name: MIGHTY MULE
Model Number: FM202/FM200
Additional Model Number: MM202/MM200
Additional Brand Name: SMARTEC
Rating: 5Vd.c. (powered by 12V car battery) and 14Va.c. with Jack
The AC/AC adaptor was provided by the applicant with following details:
Model no.: ADU140072; Input: 120Va.c. 60Hz 16W, Output: 14Va.c. 720mA.

1.3.1 Description of EUT Operation

The Equipment Under Test (EUT) is a GTO Inc., FM202/FM200 Control Board. The EUT is a receiver build in a digital board, operating at 318MHz. The EUT is power by 5Vd.c. (Powered by 12V car battery) and 14Va.c. (Powered by transformer) after it has received control signal from remote transmitter, the digital board would demodulate the signal data.

1.4 Date of Order

2009-10-14

1.5 Submitted Sample(s):

1 Sample

1.6 Test Duration

2009-10-19, 2009-11-11

1.7 Country of Origin

China

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2.0 Technical Details

2.1 Investigations Requested

Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2008 and ANSI C63.4: 2003 for FCC Certification.

2.2 Test Standards and Results Summary Tables

EMISSION Results Summary						
Test Condition	Test Requirement	Test Method	Class / Severity	Test Result		
				Pass	Failed	N/A
Radiated Emissions	FCC 47CFR 15.109	ANSI C63.4:2003	Class B	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Conducted Emissions on AC, 0.15MHz to 30MHz	FCC 47CFR 15.107	ANSI C63.4:2003	Class B	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Remark:

Note: N/A - Not Applicable

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3.0 Test Results

3.1 Emission

3.1.1 Radiated Emissions (30 – 1000MHz)

Test Requirement:	FCC 47CFR 15.109 Class B
Test Method:	ANSI C63.4:2003
Test Date:	2009-10-19
Mode of Operation:	Communication mode and Charge mode

Test Method:

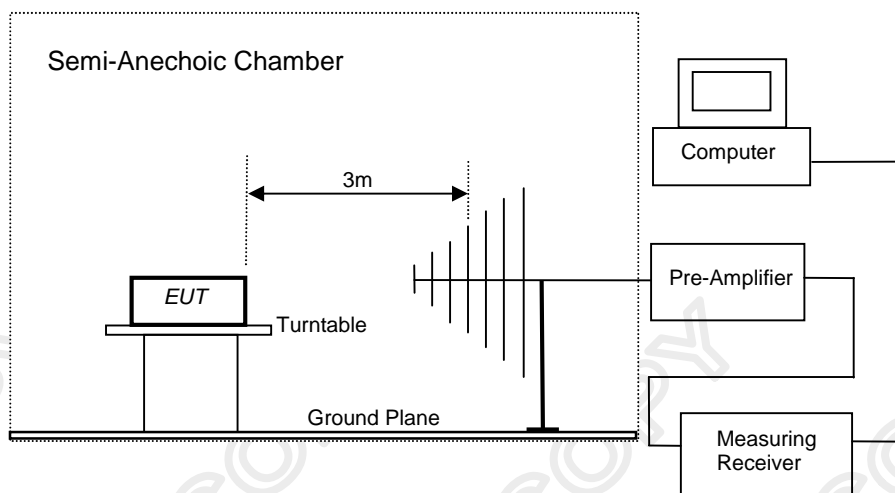
The sample was placed 0.8m above the ground plane of semi-anechoic chamber*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

*: Semi-anechoic chamber located on the STC (Dongguan) Company Ltd. 68 Fumin Nan Road, Dalang, Dongguan, Guangdong, PRC with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 629686.

Test Procedure:

The EUT is a FM202/FM200 control board; the test was conducted during the communication function to simulate the normal usage as well as to produce the maximum electromagnetic disturbances.

Test Setup:



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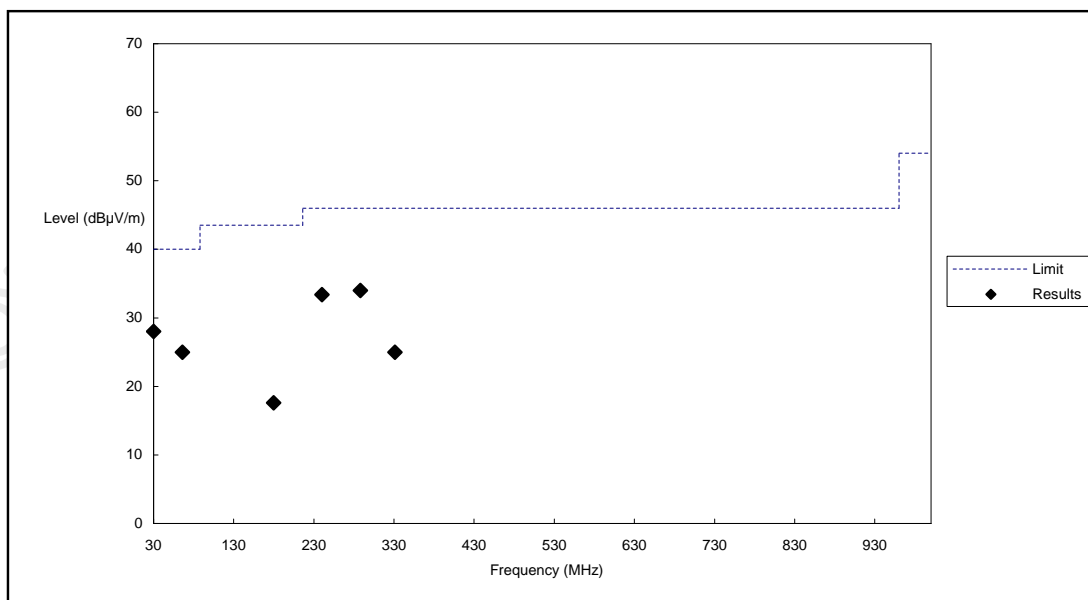
Limits for Radiated Emissions [FCC 47 CFR 15.109 Class B]:

Frequency Range [MHz]	Quasi-Peak Limits	
	[$\mu\text{V/m}$]	[$\text{dB}\mu\text{V/m}$]
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
Above960	500	54.0

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Results of Communication mode: PASS

Please refer to the following table for result details



Remark:

Calculated measurement uncertainty: 5.1dB

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Results of Communication mode: PASS

Radiated Emissions Quasi-Peak					
Emission Frequency MHz	E-Field Polarity	Level @3m dB μ V/m	Limit @3m dB μ V/m	Level @3m μ V/m	Limit @3m μ V/m
30.0	Vertical	28.0	40.0	25.1	100
66.1	Vertical	25.0	40.0	17.8	100
180.0	Vertical	17.6	43.5	7.6	150
240.0	Horizontal	33.4	46.0	46.8	200
288.0	Horizontal	34.0	46.0	50.1	200
331.1	Horizontal	25.0	46.0	17.8	200

Remark:

Calculated measurement uncertainty: 5.1dB

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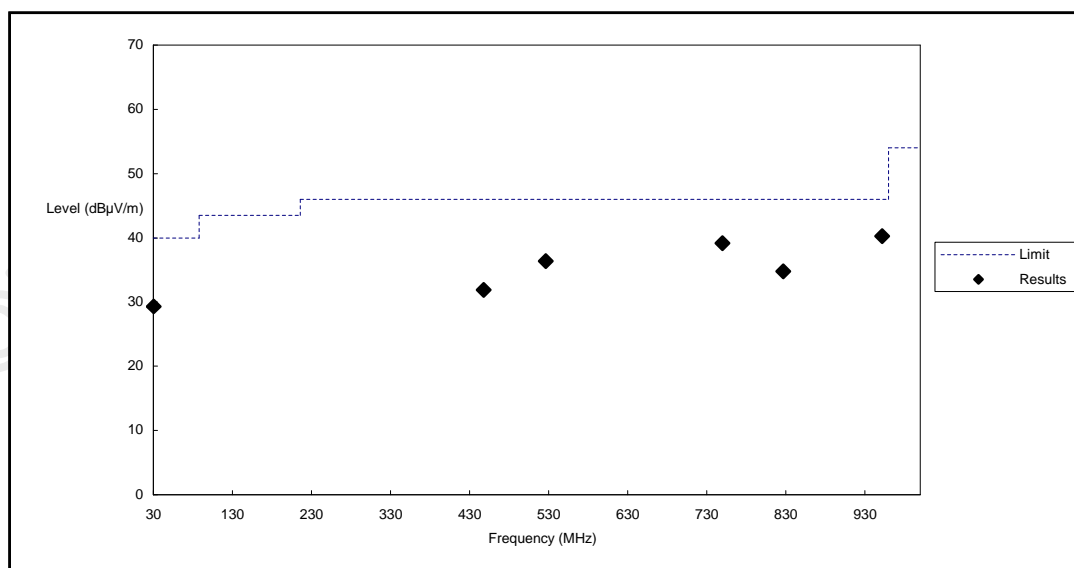
Limits for Radiated Emissions [FCC 47 CFR 15.109 Class B]:

Frequency Range [MHz]	Quasi-Peak Limits	
	[$\mu\text{V/m}$]	[$\text{dB}\mu\text{V/m}$]
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
Above960	500	54.0

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Results of Charge mode: PASS

Please refer to the following table for result details



Remark:

Calculated measurement uncertainty: 5.1dB

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Results of Charge mode: PASS

Radiated Emissions Quasi-Peak					
Emission Frequency MHz	E-Field Polarity	Level @3m dB μ V/m	Limit @3m dB μ V/m	Level @3m μ V/m	Limit @3m μ V/m
30.3	Vertical	29.3	40.0	29.2	100
447.7	Vertical	31.9	46.0	39.4	200
526.5	Vertical	36.4	46.0	66.1	200
749.6	Vertical	39.2	46.0	91.2	200
826.9	Horizontal	34.8	46.0	55.0	200
951.8	Vertical	40.3	46.0	103.5	200

Remark:

Calculated measurement uncertainty: 5.1dB

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3.1.2 Conducted Emissions (0.15MHz to 30MHz)

Test Requirement: FCC 47CFR 15.107 Class B
Test Method: ANSI C63.4:2003
Test Date: 2009-11-11
Mode of Operation: Charge mode

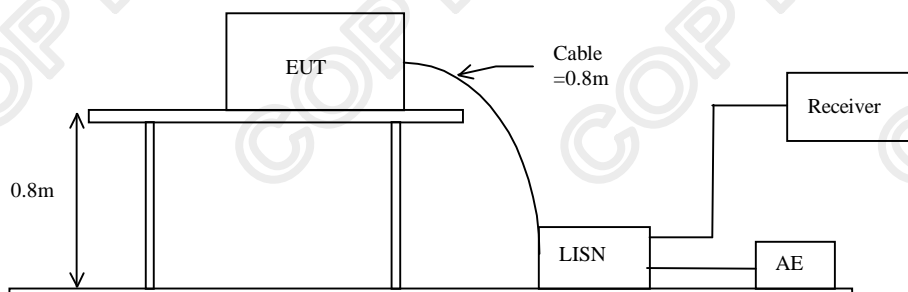
Test Method:

The test was performed in accordance with ANSI C63.4: 2003, with the following: initial measurements were performed in peak and average detection modes on the live line, any emissions recorded within 30dB of the relevant limit lines were re-measured using quasi-peak and average detection on the live and neutral lines with the worst case recorded in the table of results.

Test Procedure:

The EUT is a FM202/FM200 control board; the test was conducted during the charge function to simulate the normal usage as well as to produce the maximum electromagnetic disturbances.

Test Setup:



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Limits for Conducted Emissions (FCC 47 CFR 15.107):

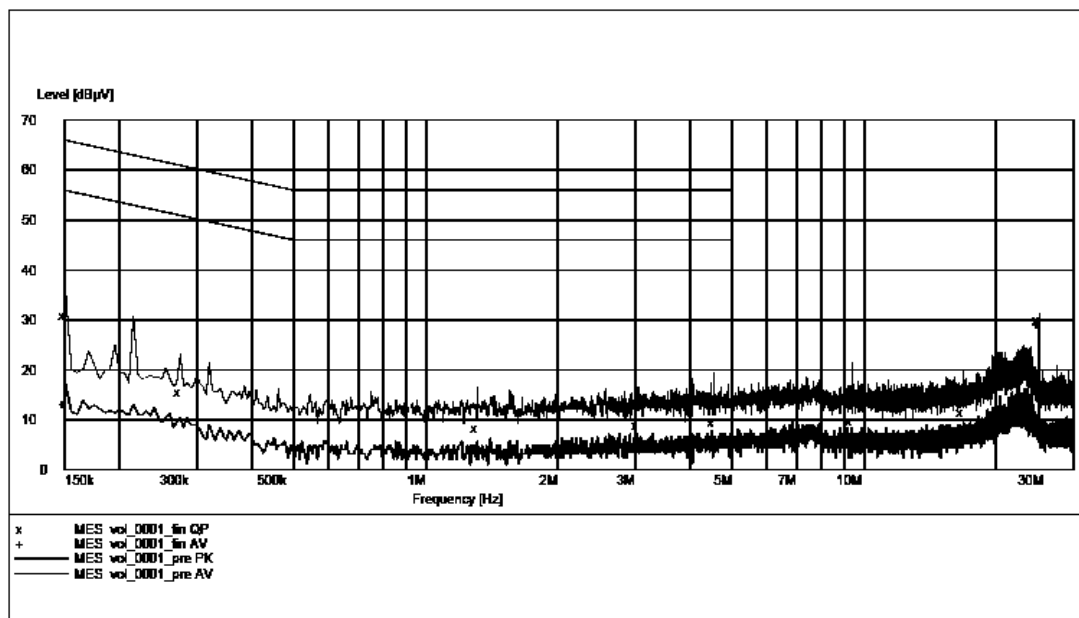
Frequency Range [MHz]	Quasi-Peak Limits [dB μ V]	Average [dB μ V]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

* Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.

Results of Charge mode(L): PASS

Please refer to the following diagram for individual results.



Conductor Live or Neutral	Frequency MHz	Quasi-peak		Average	
		Level dB μ V	Limit dB μ V	Level μ V	Limit μ V
Live	0.150	30.9	66.0	-*-	-*-
Live	4.475	-*-	-*-	5.1	46.0
Live	6.885	-*-	-*-	6.3	50.0
Live	16.845	11.6	60.0	-*-	-*-
Live	25.060	30.1	60.0	29.1	50.0

Remarks:

Calculated measurement uncertainty : 3.97dB

-*- Emission(s) that is far below the corresponding limit line.

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Limits for Conducted Emissions (FCC 47 CFR 15.107):

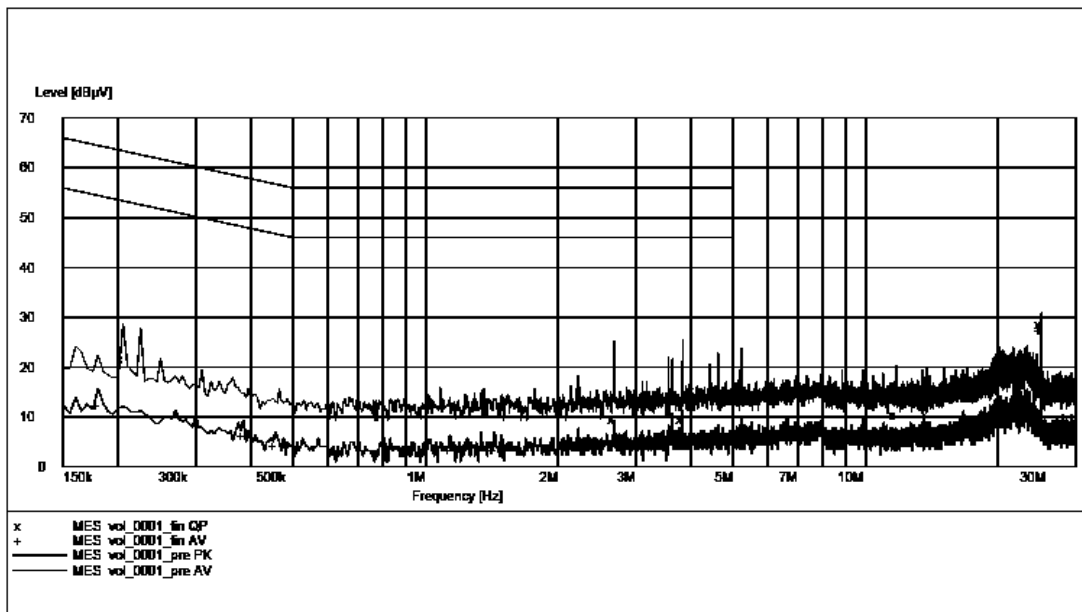
Frequency Range [MHz]	Quasi-Peak Limits [dB μ V]	Average [dB μ V]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

* Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.

Results of Charge mode(N): PASS

Please refer to the following diagram for individual results.



Conductor Live or Neutral	Frequency MHz	Quasi-peak		Average	
		Level dB μ V	Limit dB μ V	Level μ V	Limit μ V
Neutral	3.840	9.5	56.0	-*-	-*-
Neutral	6.610	-*-	-*-	7.2	50.0
Neutral	11.735	10.3	60.0	-*-	-*-
Neutral	16.710	-*-	-*-	7.4	50.0
Neutral	25.060	28.7	60.0	27.5	50.0

Remarks:

Calculated measurement uncertainty : 3.97dB

-*- Emission(s) that is far below the corresponding limit line.

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Appendix A

List of Measurement Equipment

Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM215	MULTIDEVICE CONTROLER	EMCO	2090	00024676	N/A	N/A
EM216	MINI MAST SYSTEM	EMCO	2075	00026842	N/A	N/A
EM217	ELECTRIC POWERED TURNTABLE	EMCO	2088	00029144	N/A	N/A
EM218	ANECHOIC CHAMBER	ETS-Linggren	FACT-3	--	2008/12/01	2011/12/01
EM174	BICONILOG ANTENNA	EMCO	3142C	00029071	2008/01/24	2010/01/24
EM229	EMI TEST RECEIVER	R&S	ESIB40	100248	2009/09/27	2010/09/27

Line Conducted

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM197	LISN	EMCO	4825/2	1193	2009/05/15	2010/05/15
EM181	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB7	100072	2009/06/29	2010/06/29
EM154	SHIELDING ROOM	SIEMENS MATSUSHITA COMPONENTS	N/A	803-740-057-99A	2009/01/23	2010/01/23

Remarks:-

CM Corrective Maintenance
N/A Not Applicable or Not Available
TBD To Be Determined

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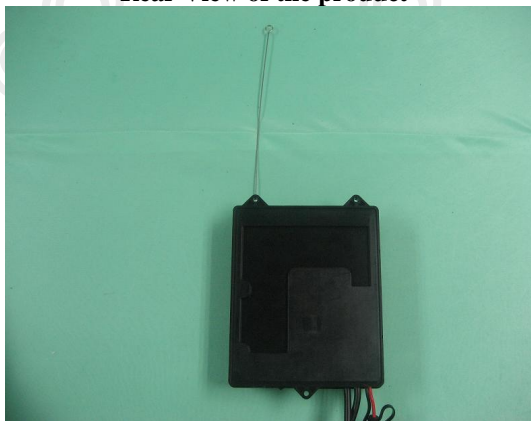
Appendix B

Photographs of EUT

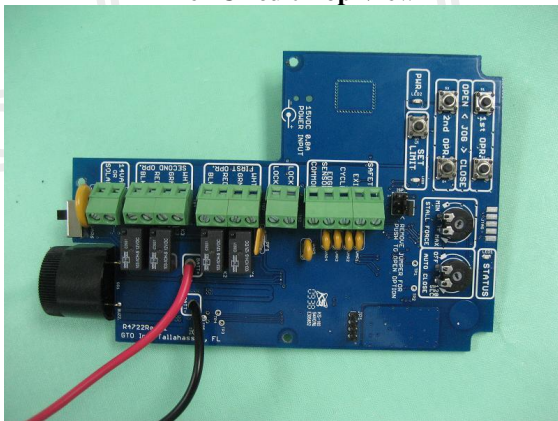
Front View of the product



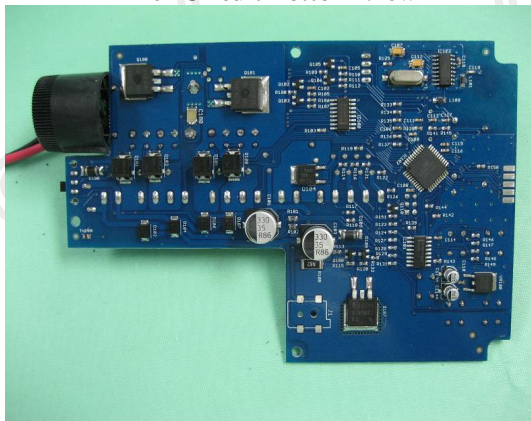
Rear View of the product



Inner Circuit Top View



Inner Circuit Bottom View



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Photographs of EUT

Measurement of Radiated Emission Test Set Up



Measurement of Conducted Emission Test Set Up



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