

CLASS TS	DWG NO. 638298
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REVISIONS				
REV	DESCRIPTION	CHECK	ENG	DATE
00	INITIAL BOSE VERSION			28/5/14
02	UPDATE ATS AND EXCEL MACRO TO REV21B			20/12/14

BOSE APPLICABLE DOCUMENTS:




DOC LVL	DRAFTER NOTIO MAEDA @ AUBIT	DATE 28/05/14	 FRAMINGHAM, MA 01701-9168				
3	CHECKER		DESCRIPTION TEST SPEC,CONTROLSpace MIC/LINE INPUT II (Zamboni project)				
2	ENGINEER						
	SAFETY ENGINEER						
1	RLS TO PROD		SIZE A	FSCM 32108	CLASS TS	DWG NO. TS 638298	REV. 02
						SHT 1 OF 23	

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1. Overview

1.1. Purpose

This document describes the manufacturing test procedure for the ControlSpace MIC/LINE INPUT II card (Zamboni project). This document can be applied to the card that wrote the H8 firmware by using IOCardPgm.exe.

1.2. Scope

1.2.1. Identification

This release is identified by the following configuration items:

- ControlSpace Designer 4.1_016
- ESP Firmware espII_v4.130.frm
- ATS-2 Test Macro Rev21b
- (720110-001S)(BSE99A1)Motherboard
- (720112-001S)(BSE98A1)DSP-HIGH-PERFORMANCE
- (720111-001S)(BSE97A1)DSP-STANDARD
- (638298-0010)(BSE50A1)MIC+LINE INPUT II

1.2.2. System Overview

This test procedure is used for production testing of ControlSpace MIC/LINE INPUT II card (Zamboni project :including DSP-high-performance card). This test should be performed on all MIC/LINE INPUT II card and each MIC/LINE INPUT II card shall "PASS" prior to shipping.

This test utilizes an AES3 output card in the test. This card is for the reference.
The switcher system is Accutrex measurement switcher (USB).

1.3. Definitions and Abbreviations

1.3.1. Definitions

Term	Definition
ESP-00 II	ESP-00II frame with : (720110-001S)(BSE99A1)Motherboard (720111-001S)(BSE97A1)DSP-STANDARD (720112-001S)(BSE98A1)DSP-HIGH-PERFORMANCE ASTEC Power supply
Switcher	Accutrex measurement switcher : MS-101 / MS-111
ESP for fixture	The ESP that is used for data converter / Voltmeter.

1.3.2. Acronyms

Term	Definition
ESP	ControlSpace Engineered Sound Processor
CSD	ControlSpace Designer software
MB	ESP Motherboard
DSP-STD card	Main card with digital processing
DSP-HP card	DSP processing card with 3 DSP device
GPIO	8 control inputs and 8 control outputs.
CC-16	Zone Controller with RS485 interface
DUT	Device Under Test
INPUT II	MIC/LINE INPUT II card that has QFP AD converter.
OUTPUT II	LINE OUTPUT II card that has QFP DA converter.

1.4. Change History

Revision	Date	Section	Description	Changed By
A	20/05/22	All	Initial Bose version following Pilot	Notio Maeda @ AuBit
02	02/12/12	All	Update ATS macro and Excel to Rev21b Rev21b can use ESP880/ESP124/ESP412/ESP160 INPUT-II/OUTPUT-II/GPIO-II/PMAES. Correct Test Setup Wiring Diagram.	Notio Maeda @ AuBit

2. References

2.1. Industry Standards

Ref #	Title	By	Rev	URL

2.2. Bose Corporation Documents

Ref	Title	By	Rev	URL

2.3. Project Documents

Ref	Title	By	Rev	URL
	Product specification			

3. Introduction

This INPUT-II card is basic analog input module that accept Microphone of Control Space system. When this card will be utilized with MB-II card, this card can provide +48V for the phantom power supply. Other case like MB-RevC, voltage will be +15V.

3.1. Pre-test Programming

The following devices must be programmed prior to testing:

3.1.1. DSP-II card (For reference)

This should be programmed with the latest ESP firmware before PCB assembling. Once the firmware is programmed in the flash ROM, following update can be done with CSD software.

3.1.2. INPUT-II card (For shipping)

This should be programmed with the latest INPUT -II firmware. INPUT -II can be wrote the firmware by using IOpgm.exe through Ethernet.

3.2. Restrictions

The MB-II , DSP-STD and DSP-HP shall be applied to this Zamboni –ESP-00II.


3.3. Structure of the test

This test is consisted by following tests.

- a) Audio performance test
- b) Phantom test.
- c) LED color test.
- d) Pass/Fail Evaluation and Test Report .

3.4. The files for this test

File name	Software	Notes
ESP88C_Test_Macro_Rev_21b.atsb	ATS 1.60	These files are the modules for these test.
ESP_ESP-00II_AcommandII.atsb	ATS 1.60	
ESP_GPIO-II.atsb	ATS 1.60	
ESP_INPUT-II+OUTPUT-II.atsb	ATS 1.60	
RedlineAudioPerformanceTestingModule.atsb	ATS 1.60	
RedlineMacAddressWritingModule.atsb	ATS 1.60	
RedlinePhantomTestingModule.atsb	ATS 1.60	
ControlSpace_Test_Report_form_Rev_21b.xls	Excel	
ESP-00II-TestConfiguration(V4.020).csp	CSD V4.1	

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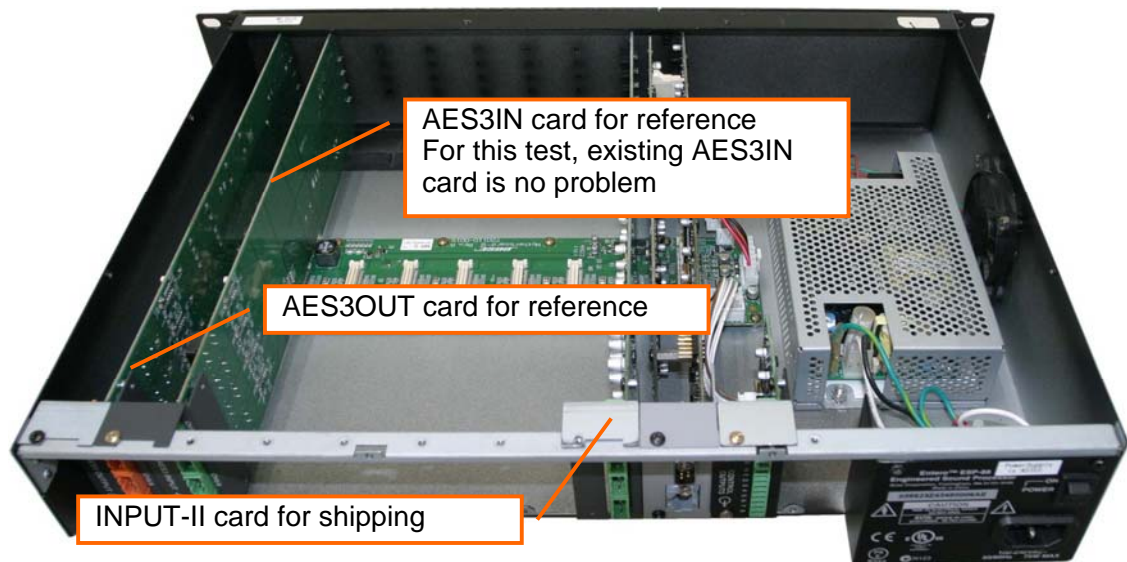
4. Audio performance test

This INPUT-II card is for the purpose of audio system. Therefore, evidence of the audio performance is required for the professional market.

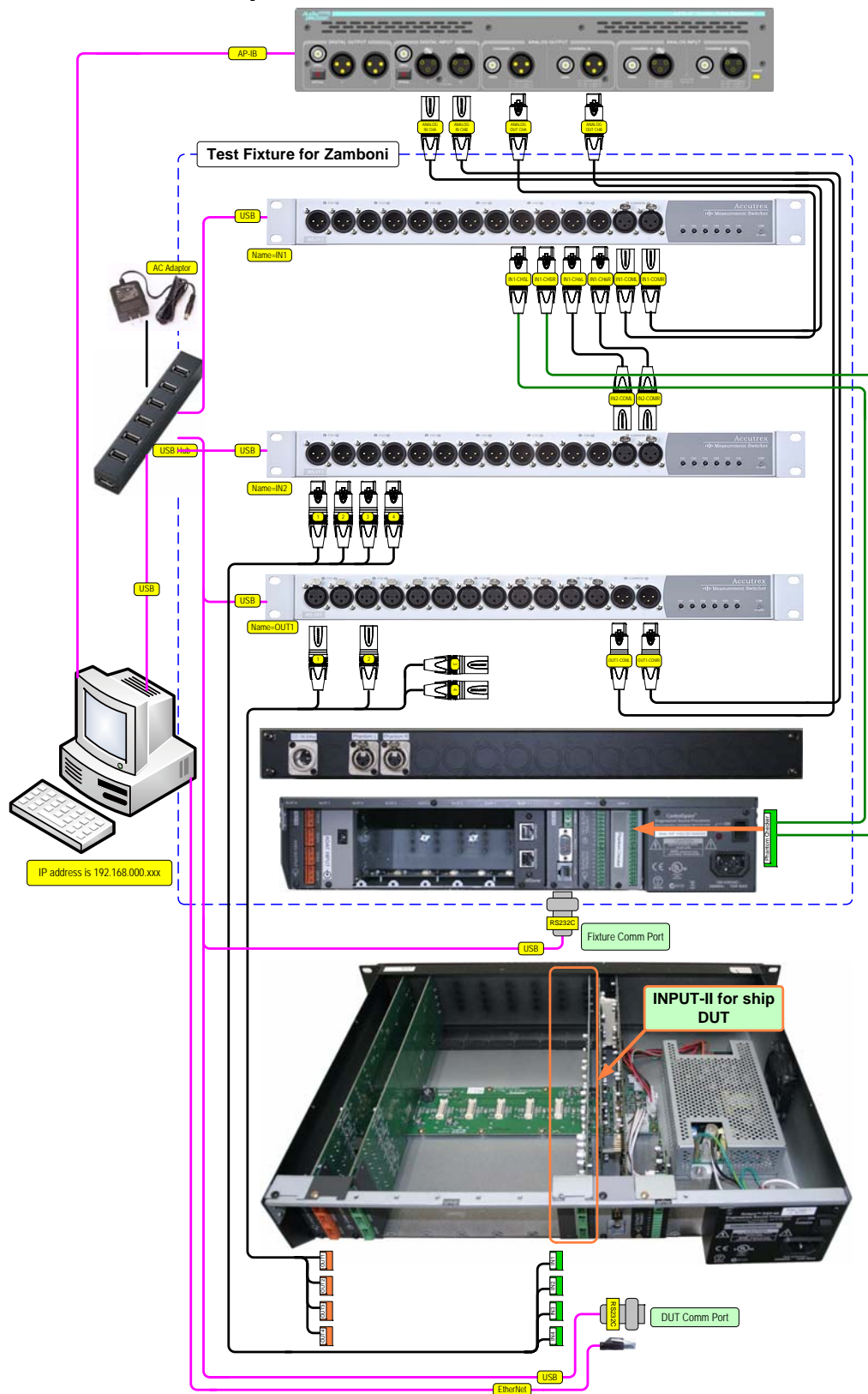
4.1. Equipment requirements and ESP hardware setup

These IO cards. The green marked line is the cards for shipping.
The AES3IN and AES3OUT card is for reference.

Slot Number	Item	Note
GPIO2	No need	
GPIO1	No need	
DSP*	DSP-STD + DSP-HP	This DSP card is for the reference.
SLOT 1	INPUT-II(DUT)	This slot is for the card for shipping.
SLOT 2	No need	
SLOT 3	No need	
SLOT 4	No need	
SLOT 5	No need	
SLOT 6	No need	
SLOT 7	(AES3 IN)	This card is for the reference.
SLOT 8	AES3 OUT	This card is for the reference.
MB	MB-II	This card is for the reference.
Chassis	Chassis	This card is for the reference.
Power Supply	Chassis	T This DSP card is for the reference.



4.2. Connection of audio performance test

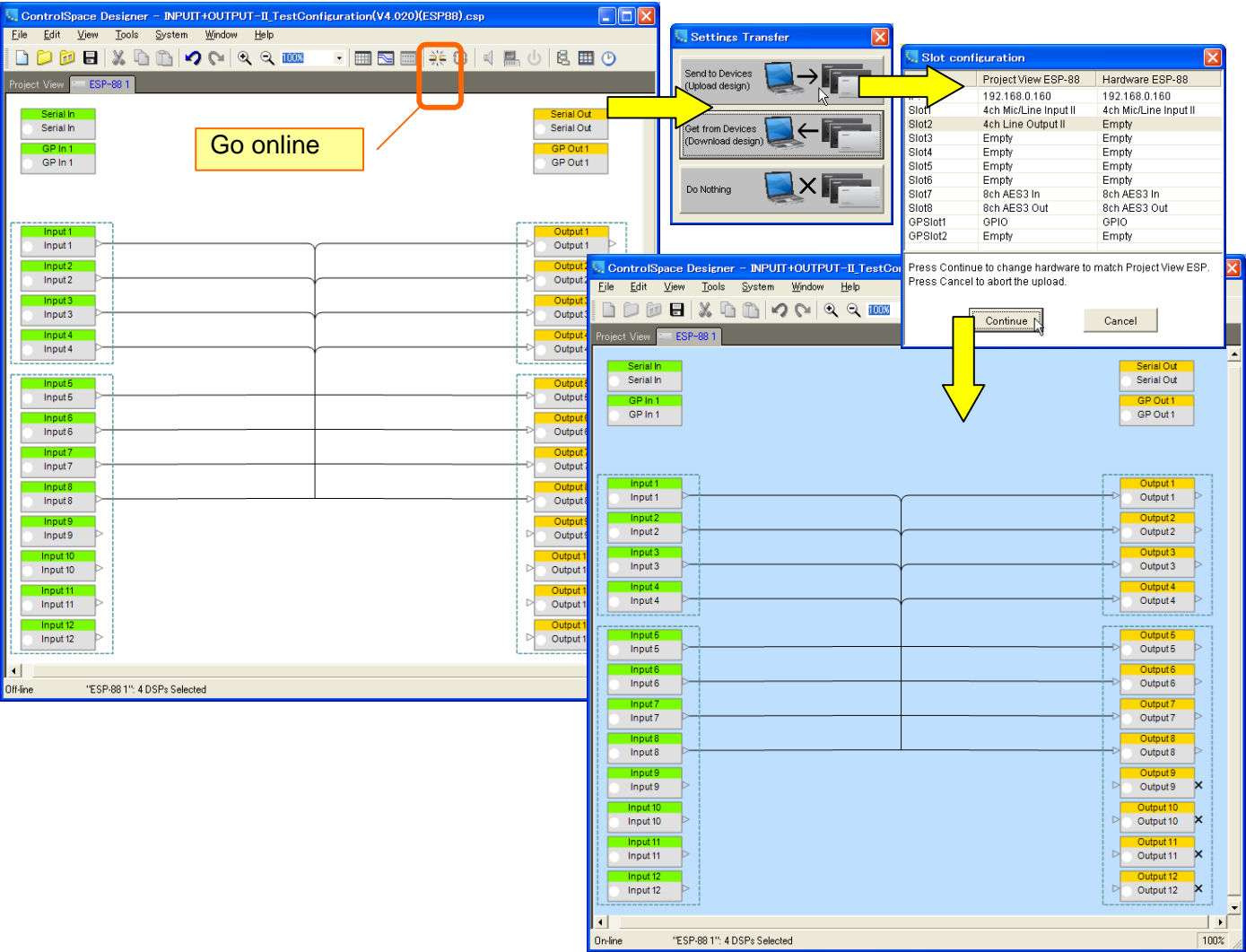


4.3. Upload test configuration file.

Start the Control space designer and load the configuration file.
INPUT+OUTPUT-II_TestConfiguration(ESP00).csp

This file include the other card testing.

When the “Slot configuration” dialog will come up, check the configuration that have the card for test.

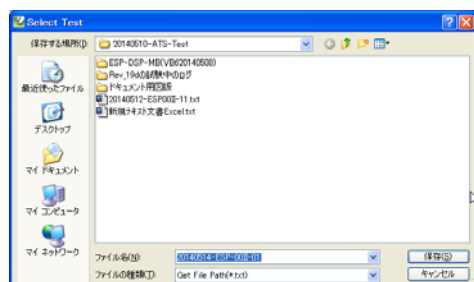
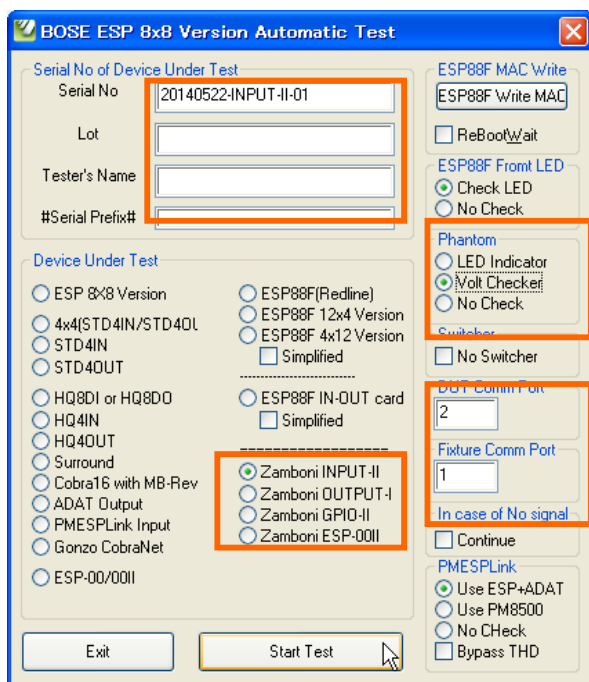
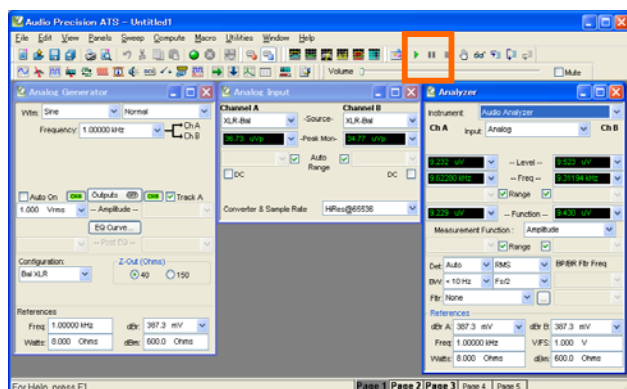


4.4. Starting of audio performance test

This audio performance test is performed by ATS-2 macro.

The filename of the macro is **ESP88C_Test_Macro_Rev_21b.atsb** .

Related files also needed.



Start the Measurement Switcher software.

Start the ATS software and load the macro.

Before running this test, all equipments of the fixture power shall be turned on.

Pushing green triangle button, the macro will start.

The main dialog will come up.

Orange marked part is the function for this test.

Choose [Zamboni INPUT-II]

The [DUT Comm Port] and [Fixture Comm Port] field is for the COM port number to communicate to the INPUT-II for shipping (Device Under Test) and the ESP that in the fixture.

Choose [Volt Checker]

And fill the [Serial number] or other fields.

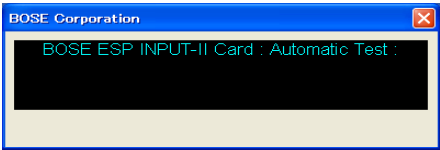
After filling the fields and check the DUT, push the [Start Test] Button.

The file name dialog will come up.

The serial number is utilized for the file name. This file name will be used for the Excel macro.

Note : The [#Serial Prefix#] field will utilize for the beginning of the serial number for following test. For example the serial number for test is 060849Z31400001AE to 060849Z31400099AE Please input [060849Z314000] .

4.5. Procedure of audio performance test



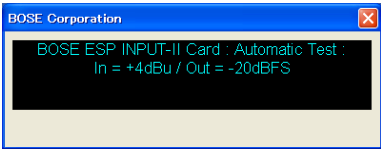
After starting, this dialog will come up to indicate the progress of this test.



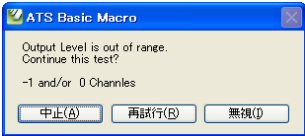
This test needs the Accutrex measurement switcher control software.
When the control software did not started, warning dialog will come up.



ATS macro will setup the gain of the INPUT-II card automatically via com port for DUT.



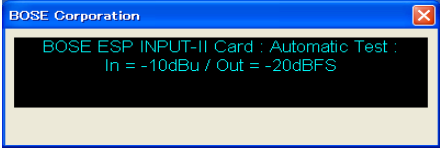
When the measured audio level is not proper, or the audio level can't detect, the ATS macro will ask how to proceed.



When [Abort] is chosen, this macro will return to the beginning.

When [Retry] is chosen, this macro will retry this channel again.

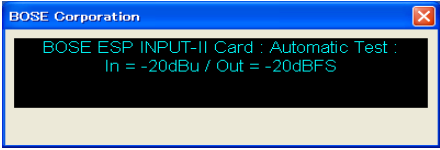
When [Ignore] is chosen, this error will ignored and record as failed.



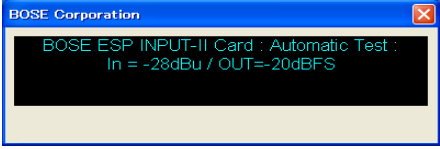
If the measured level is proper, the switcher will be controlled by ATS macro automatically.

The input level of input card is :

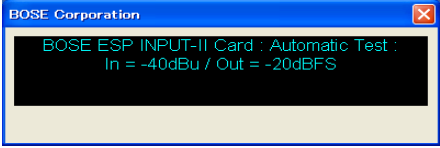
- +4dBu
- 10dBu
- 20dBu
- 28dBu
- 40dBu



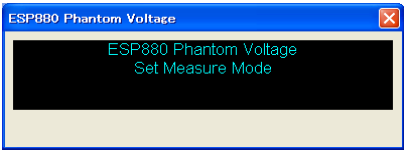
These gain is achieved by hardware, so these setting will be measure .



The other setting is achieved by the DSP algorithm, they will not measure.

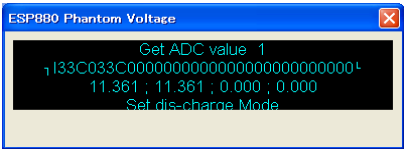


4.6. Procedure of Phantom test



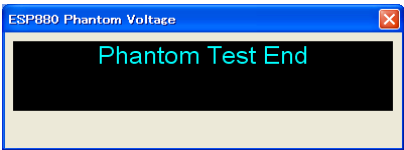
The phantom voltage test also proceed automatically.

This phantom test will measure input terminal pin voltage by using the switcher and the phantom voltage checker that is retrofitted from GPIO.



The testing will performed under this combination.
ON means the phantom power is enabled.
Off means disabled.

	CH1 +	CH1 -	CH2 +	CH2 -
Step 1	ON	On	Off	Off
Step 2	Off	Off	On	On



	CH3 +	CH3 -	CH4 +	CH4 -
Step 3	ON	On	Off	Off
St3p 4	Off	Off	On	On

The measurement timing is 1 second after of the phantom power enabled.
To shorten the measurement, retry will be done when the returning value is not meet with the format. This retry is indicated in dialog by number.

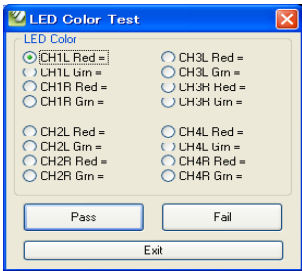


When the phantom voltage cannot detected, the warning dialog will come up. User can choose abort, retry, ignore.

This detection is decided by internal criteria of this macro.

This INPUT-II card is intended to utilize with MB-II, the +48V is expected.

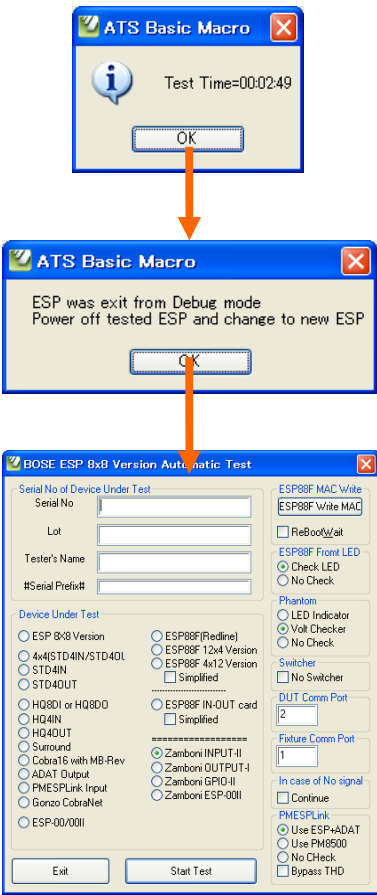
4.7. Procedure of LED color test



When the LED color test will start, this dialog will come up.

See the LED color on the DUT, and choose [Pass] or [Fail]

4.8. Closing test



After all testing, this macro reports the testing time.

To remove the DUT for shipping, power shall be turned off.

The 1 st dialog will come up.

Install new DUT and input new serial number, start again.

If all DUT will be tested , push [End] button.
Dialog will disappear and this test will finish.

5. Pass/Fail Evaluation and Test Report

After retrieving the log file for the test (using the TestLogOpen macro in the ControlSpace_Test_Report_form_Rev_21b.xls file) the, pass/fail evaluation is done automatically. Gray colored cells are not used for pass/fail detection. If the result cell indicates "FAIL", this DUT cannot be shipped.

Microsoft Excel - 20140522-INPUT-II-01(FAIL).xls

ファイル(F) 編集(E) 表示(V) 挿入(I) 書式(O) ツール(T) データ(D) ウィンドウ(W) ヘルプ(H) 質問を入力してください

Arial 11 B I U

F5

1	BOSE®										
3	Device under test										
4	Serial Number	20140522-INPUT-II-01									
5	Lot										
6	Date of test	2014,05,22									
7	Tester's Name										
8						This report sheet = ControlSpace_Test_Report_form_Rev_19a.xls					
9	Zamboni INPUT-II Card TEST					This ATS Macro ID = ESP88C_Test_Macro_Rev_19e					
10			CH1	CH2	CH3	CH4					
11	5-1.(GV=0dB)	AMPL	-20.69	-20.69	-20.70	-20.67					
12		Nois	-120.03	-120.28	-119.82	-120.16					
13		FRQ20K	-20.67	-20.67	-20.68	-20.65					
14		FRQ20	-20.73	-20.73	-20.74	-20.71					
15		THDN	0.0011	0.0011	0.0011	0.0011					
16		19.5dBu	0.0088	0.0083	0.0086	0.0087					
17	5-2.(GV=+14dB)	AMPL	-20.67	-20.67	-20.68	-20.63					
18		Nois	-119.77	-119.67	-119.69	-119.68					
19	5-3.(GV=+24dB)	AMPL	-20.63	-20.67	-20.66	-20.60					
20		Nois	-117.33	-117.51	-117.22	-117.36					
21	5-4.(GV=+32dB)	AMPL	-20.55	-20.58	-20.57	-20.51					
22		Nois	-111.96	-111.88	-112.07	-112.03					
23	5-5.(GV=+44dB)	AMPL	-20.56	-20.58	-20.57	-20.51					
24		Nois	-100.89	-100.73	-100.78	-100.76					
25		FRQ20K	-20.99	-21.01	-21.00	-20.94					
26		FRQ20	-20.60	-20.62	-20.60	-20.55					
27		THDN	0.0094	0.0096	0.0096	0.0095					
28		19.5dBu	0.0035	0.0035	0.0035	0.0035					
29	6.Phantom test	Pass/Fail	Fail	Fail	Fail	Fail					
30	6-6.Phantom test	Volatge	0.00	0.00	0.00	0.00					
31		OFF	0.00	0.00	0.00	0.00					
32	7.LED color	Green	Pass	Pass	Pass	Pass					
33		Red	Pass	Pass	Pass	Pass					
34											
35											
36											
37											

20140522-INPUT-II-01 /

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BOSE Framingham, MA 01701-9168	SIZE A	FSCM 32108	CLASS TS	DWG NO. TS638298	SHEET 13 of 20	REV. 02
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Passed Test report

Microsoft Excel - 20140522-INPUT-II-07(Passed).xls

ファイル(F) 編集(E) 表示(V) 挿入(I) 書式(O) ツール(T) データ(D) ウィンドウ(W) ヘルプ(H) 質問を入力してください

Arial 11 B I U

K34

1	BOSE									
3	Device under test									
4	Serial Number	20140522-INPUT-II-07								
5	Lot									
6	Date of test	2014,05,22								
7	Tester's Name									
8	This report sheet = ControlSpace_Test_Report_form_Rev_19a.xls									
9	Zamboni INPUT-II Card TEST	This ATS Macro ID = ESP88C_Test_Macro_Rev_19e								
10		CH1	CH2	CH3	CH4					
11	5-1.(GV=0dB)	AMPL	-20.67	-20.68	-20.69	-20.66				
12		Nois	-119.86	-120.19	-119.76	-120.20				
13		FRQ20K	-20.66	-20.66	-20.67	-20.64				
14		FRQ20	-20.72	-20.72	-20.73	-20.70				
15		THDN	0.0011	0.0011	0.0011	0.0011				
16		19.5dBu	0.0088	0.0083	0.0087	0.0088				
17	5-2.(GV=+14dB)	AMPL	-20.66	-20.66	-20.67	-20.62				
18		Nois	-119.75	-119.69	-119.59	-119.65				
19	5-3.(GV=+24dB)	AMPL	-20.63	-20.66	-20.65	-20.59				
20		Nois	-117.32	-117.22	-117.22	-117.24				
21	5-4.(GV=+32dB)	AMPL	-20.54	-20.58	-20.56	-20.50				
22		Nois	-111.87	-111.81	-111.90	-112.08				
23	5-5.(GV=+44dB)	AMPL	-20.56	-20.58	-20.57	-20.51				
24		Nois	-100.65	-100.51	-100.70	-100.83				
25		FRQ20K	-21.01	-21.02	-21.01	-20.95				
26		FRQ20	-20.60	-20.62	-20.60	-20.55				
27		THDN	0.0096	0.0097	0.0096	0.0096				
28		19.5dBu	0.0035	0.0035	0.0035	0.0035				
29	6.Phantom test	Pass/Fail	Pass	Pass	Pass	Pass				
30	6-6.Phantom test	Volatge	10.76	11.20	11.31	11.28				
31		OFF	0.00	0.69	0.00	0.74				
32	7.LED color	Green	Pass	Pass	Pass	Pass				
33		Red	Pass	Pass	Pass	Pass				
34										
35										
36										
37										

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6. Testing method and criteria

This section describes the criteria of performance test. Determining if the DUT passes on each test is done automatically by the Excel Macro.

For the INPUT-II, 8 sets of tests are performed to verify the audio paths to the ESP.

6.1. Audio performance

GV=0dB test

AMPL (1 kHz)

ATS-2 Setting

Item	Setting
Frequency	1kHz
Amplitude	+4dBu
B/W	<10HZ / FS/2
Filter	None

Criteria

Item	Upper limit	Lower limit
Level	-19dBFS	-21dBFS

Noise

ATS2 Setting

Item	Setting
Frequency	--
Amplitude	Off
B/W	22HZ / 22KHz LPF
Filter	"A" Weighting

Criteria

Item	Upper limit	Lower limit
Level	-110dBFS	-200dBFS

FRQ20kHz

ATS2 Setting

Item	Setting
Frequency	20kHz
Amplitude	+4dBu
B/W	<10HZ / FS/2
Filter	None

Criteria

Item	Upper limit	Lower limit
Level	+0.75dB	-0.5dB

FRQ20Hz

ATS2 Setting

Item	Setting
Frequency	20Hz
Amplitude	+4dBu
B/W	<10HZ / FS/2
Filter	None

Criteria

Item	Upper limit	Lower limit
Level	+0.5dB	-0.5dB

THDN

ATS2 Setting

Item	Setting
Frequency	1kHz
Amplitude	+4dBu
B/W	22HZ / 22KHz LPF
Filter	"A" Weighting

Criteria

Item	Upper limit	Lower limit
Function(THD+N)	0.002%	0.000%

19.5dBu

ATS2 Setting

Item	Setting
Frequency	1kHz
Amplitude	+23.5dBu
B/W	22HZ / 22KHz LPF
Filter	"A" Weighting

Criteria

Item	Upper limit	Lower limit
Function(THD+N)	0.04%	0.005%

This test is performed on channels 1 through 4.

GV=+14dB test

AMPL (1 kHz)

ATS-2 Setting

Item	Setting
Frequency	1kHz
Amplitude	-10dBu
B/W	<10HZ / FS/2
Filter	None

Criteria

Item	Upper limit	Lower limit
Level	-19dBFS	-21dBFS

Noise

ATS2 Setting

Item	Setting
Frequency	--
Amplitude	Off
B/W	22HZ / 22KHz LPF
Filter	"A" Weighting

Criteria

Item	Upper limit	Lower limit
Level	-110dBFS	-200dBFS

GV=+24dB Test

AMPL (1 kHz)

ATS-2 Setting

Item	Setting
Frequency	1kHz
Amplitude	-20dBu
B/W	<10HZ / FS/2
Filter	None

Criteria

Item	Upper limit	Lower limit
Level	-19dBFS	-21dBFS

Noise

ATS2 Setting

Item	Setting
Frequency	--
Amplitude	Off
B/W	22HZ / 22KHz LPF
Filter	"A" Weighting

Criteria

Item	Upper limit	Lower limit
Level	-110dBFS	-200dBFS

GV=32dB Test.

AMPL (1 kHz)

ATS-2 Setting

Item	Setting
Frequency	1kHz
Amplitude	-28dBu
B/W	<10HZ / FS/2
Filter	None

Criteria

Item	Upper limit	Lower limit
Level	-19dBFS	-21dBFS

Noise
ATS2 Setting

Item	Setting
Frequency	--
Amplitude	Off
B/W	22HZ / 22KHz LPF
Filter	"A" Weighting

Criteria

Item	Upper limit	Lower limit
Level	-105dBFS	-200dBFS

GV=44dB Test.

AMPL (1 kHz)
ATS-2 Setting

Item	Setting
Frequency	1kHz
Amplitude	+40dBu
B/W	<10HZ / FS/2
Filter	None

Criteria

Item	Upper limit	Lower limit
Level	-19dBFS	-21dBFS

Noise
ATS2 Setting

Item	Setting
Frequency	--
Amplitude	Off
B/W	22HZ / 22KHz LPF
Filter	"A" Weighting

Criteria

Item	Upper limit	Lower limit
Level	-90dBFS	-200dBFS

FRQ20kHz
ATS2 Setting

Item	Setting
Frequency	20kHz
Amplitude	+40dBu
B/W	<10HZ / FS/2
Filter	None

Criteria

Item	Upper limit	Lower limit
Level	+0.75dB	-0.5dB

FRQ20Hz

ATS2 Setting

Item	Setting
Frequency	20Hz
Amplitude	+40dBu
B/W	<10HZ / FS/2
Filter	None

Criteria

Item	Upper limit	Lower limit
Level	+0.5dB	-0.5dB

THDN

ATS2 Setting

Item	Setting
Frequency	1kHz
Amplitude	+40dBu
B/W	22HZ / 22KHz LPF
Filter	“A” Weighting

Criteria

Item	Upper limit	Lower limit
Function(THD+N)	0.012%	0.000%

19.5dBu

ATS2 Setting

Item	Setting
Frequency	1kHz
Amplitude	-16.5dBu
B/W	22HZ / 22KHz LPF
Filter	“A” Weighting

Criteria

Item	Upper limit	Lower limit
Function(THD+N)	0.006%	0.000%

6.2. Phantom voltage and load test

This test will test the phantom power supply function of INPUT-II.
GPIO will measure the on voltage and off voltage with discharge.

Condition	Max	Min
ON voltage	-	45V
Off voltahe	5V	

6.3. LED color test

This test is detected color by human eye.

Condition	Result
Green setting	Green
Red Setting	Red

6.4. Overall rating

To detect the failure, this macro calculates these portion.

Meet with the criteria of each tested item.

- 6.1.(GV=0dB)
- 6.1.(GV=+14dB)
- 6.1.(GV=+24dB)
- 6.1.(GV=+32dB)
- 6.1.(GV=+44dB)
- 6.2.Phantom test
- 6.3.LED color