

TSA-EXT BOARD User's Manual

Tessera Technology Inc.

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Cautionary Notes

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- Please handle this product as you would a CMOS device. The user should be particularly careful to protect him/herself from accumulated static electricity when using this product.
- Make sure all test and measurement equipment, including the work station, is properly grounded.
- The user should wear an ESD wrist strap to prevent any buildup of static electricity.
- Do not touch the device pins with bare hands.

1. Overview

1.1 Document Overview

This document describes the specifications of the hardware of the TSA-EXT BOARD.

1.2 Related Terminology

This manual uses the following terms in explanations of hardware specifications.

Table 1.1 Terminology

用語	説明
Smart Analog	Product lineup with software configurable circuits and characteristics supporting various types of sensors and drivers.
Smart Analog IC	Smart Analog silicon molded in a plastic package.
Smart Analog IC500	Renesas Electronics Smart Analog IC500 - Circuit type: configurable Part number: RAA730500
TSA-IC500	Evaluation board of Smart Analog IC500.
Smart Analog IC300	Renesas Electronics Smart Analog IC300 - Circuit type: configurable - Part number: RAA730300
TSA-IC300	Evaluation board of Smart Analog IC300.
Smart Analog IC301	Renesas Electronics Corp. Smart Analog IC301 - Circuit type: general-purpose instrumentation amplifier - Part number: RAA730301
TSA-IC301	Evaluation board of Smart Analog IC301.
Smart Analog Easy Starter	Renesas Electronics Smart Analog evaluation tool, also called SA Easy Starter
E1 Emulator	Renesas Electronics on-chip debugging emulator, also works as a Flash programmer (sold separately)
CubeSuite+	Integrated development environment for developing and debugging Renesas Electronic MCU software
SA-Designer	Renesas Electronics Smart Analog evaluation tool.

1.3 TSA-EXT BOARD Features

- Use in connection with Smart Analog IC evaluation board.
- Expandable for additional sensors
- Smart Analog IC evaluation board is mounting between simply, it can be removed.

1.4 Product Overview

This product is configured with the following. Parts are not implemented in TSA-EXT BOARD.
Please implement parts before use.

- TSA-EXT BOARD
- 2.54mm pitch 50 pin socket
- 2.54mm pitch 50 pin connector

The board's external picture is shown in Figure1.1.

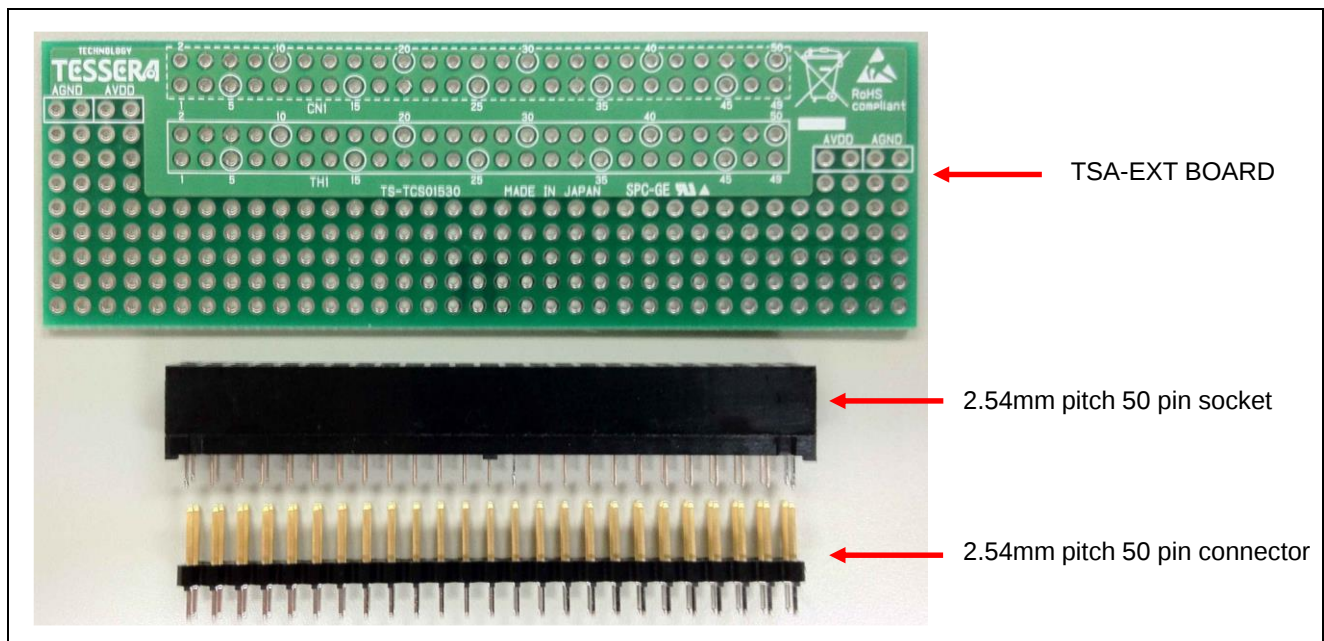


Figure1.1 TSA-EXT BOARD External Picture

1.5 Implement Parts

Parts implementation is necessary before using this board.

- 2.54mm pitch 50 pin socket
Please implement it in TSA-EXT BOARD. Please implement it like a Figure 1.2.

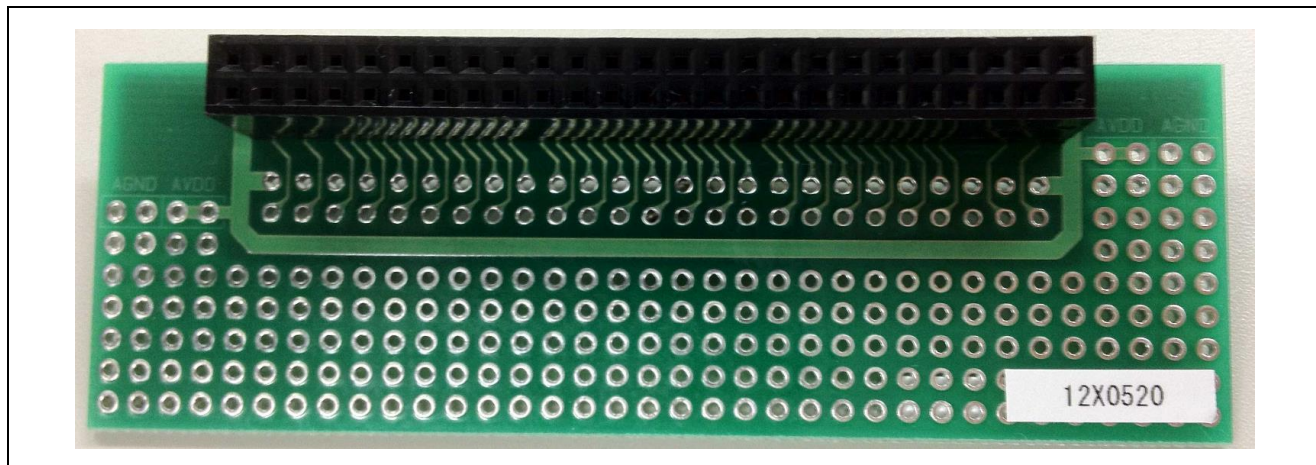


Figure 1.2 PCB socket implementation

- 2.54mm pitch 50 pin connector
Please implement it to Smart Analog IC evaluation board. The implementation place, please see the User's Manual of the Smart Analog IC evaluation board.

Product Name	Product Overview
TSA-IC500	Smart Analog IC500 evaluation board
TSA-IC300	Smart Analog IC300 evaluation board
TSA-IC301	Smart Analog IC301 evaluation board

Figure 1.3 shows an example of TSA-EXT BOARD operations. This board will be able to extend the sensor.

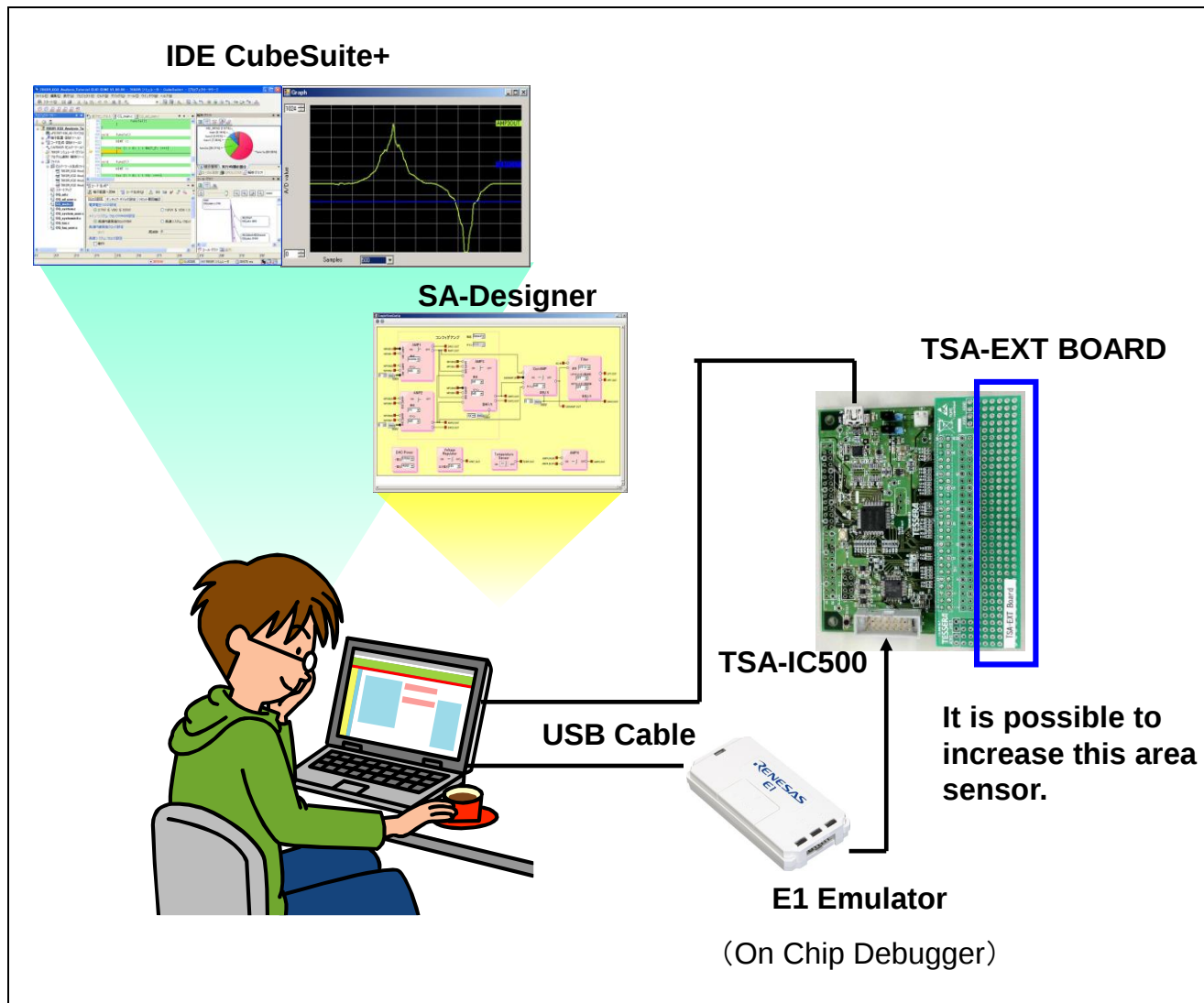


Figure 1.3 TSA Board User Operation Setup

2. Hardware

2.1 Hardware Specifications

Table 2.1 shows the hardware specifications for the TSA-EXT BOARD.

Table 2.1 Hardware Specifications for TSA-EXT BOARD

仕様	内容
Interface	Socket to be connected to the Smart Analog IC evaluation board
Dimensions	Board dimensions 90 x 30mm (W x D)

2.2 Socket and connector

This board provides an implementation of the sockets and connectors.

Table 2.2 List of socket / connector functions

Reference	Shape	Model Name	Function
CN1	2.54mm pitch 50 pin socket	HTK HKP-50FD2 or HIROSE ELECTRIC HIF3H-50DA-2.54DSA(71)	PCB socket to be connected to the Smart Analog IC evaluation board
TH1	2.54mm pitch 50 pin connector	Unimplemented	Sensor extension through-hole

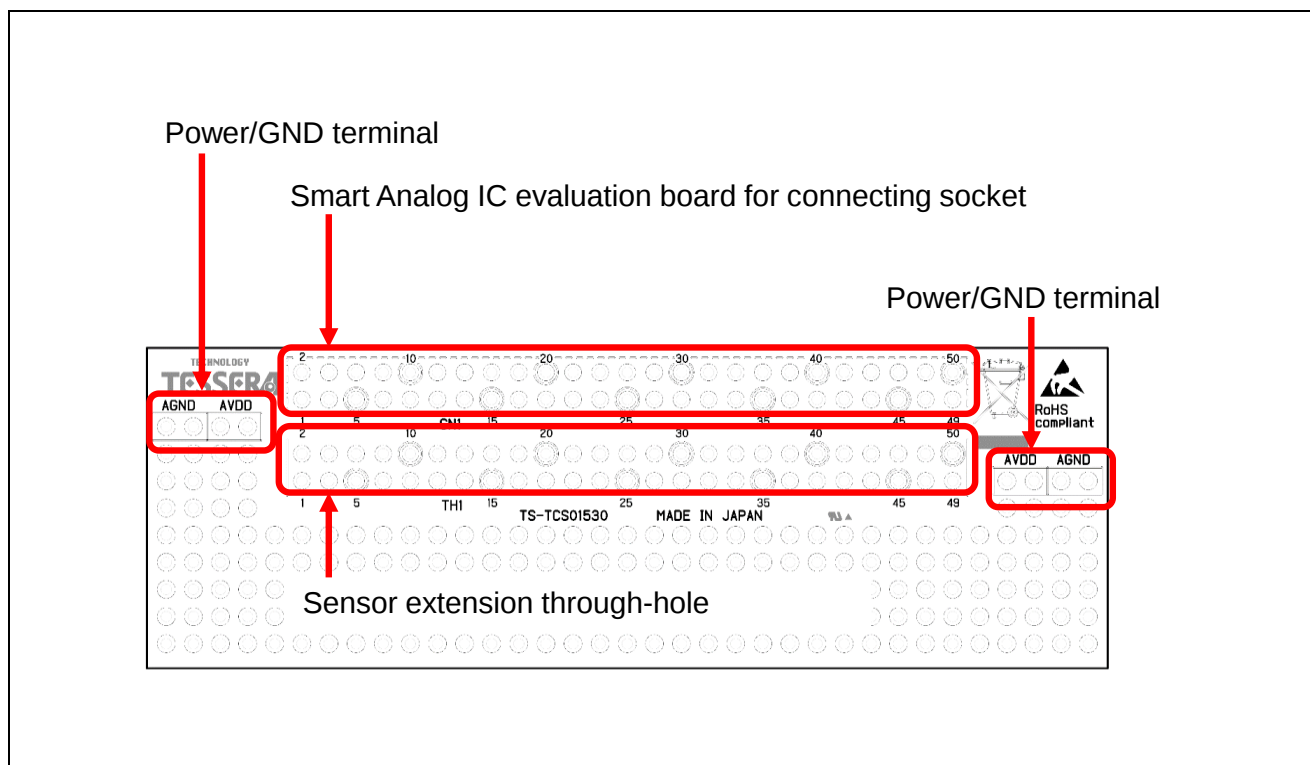


Figure 2.1 Connector / power / GND terminal arrangement

This signal is a list of TSA-IC500 when connected.

Table 2.3 Signal list of TSA-IC500 when connected

TSA-IC500			TSA-EXT BOARD		TSA-IC500			TSA-EXT BOARD	
TH2	Smart Analog IC500				TH2	Smart Analog IC500			
Number	Number	Signal			Number	Number	Signal		
1	19	DAC1OUT	CN1-1	TH1-1	2	Analog Power		CN1-2	TH1-2
3	16	AMP1OUT	CN1-3	TH1-3	4	Analog GND		CN1-4	TH1-4
5	Analog GND		CN1-5	TH1-5	6	Analog GND		CN1-6	TH1-6
7	27	MPXIN10	CN1-7	TH1-7	8	N.C		CN1-8	TH1-8
9	25	MPXIN11	CN1-9	TH1-9	10	N.C		CN1-10	TH1-10
11	26	MPXIN20 *	CN1-11	TH1-11	12	N.C		CN1-12	TH1-12
13	24	MPXIN21	CN1-13	TH1-13	14	- (RL78_AVDD) **		CN1-14	TH1-14
15	18	DAC2OUT	CN1-15	TH1-15	16	- (RL78_AVREFP) **		CN1-16	TH1-16
17	14	AMP2OUT	CN1-17	TH1-17	18	- (RL78_AVREFM) **		CN1-18	TH1-18
19	Analog GND		CN1-19	TH1-19	20	- (RL78_ANI8) **		CN1-20	TH1-20
21	23	MPXIN30	CN1-21	TH1-21	22	- (RL78_ANI9) **		CN1-22	TH1-22
23	21	MPXIN31	CN1-23	TH1-23	24	- (RL78_ANI10) **		CN1-24	TH1-24
25	22	MPXIN40	CN1-25	TH1-25	26	- (RL78_ANI11) **		CN1-26	TH1-26
27	20	MPXIN41	CN1-27	TH1-27	28	- (RL78_ANI12) **		CN1-28	TH1-28
29	13	DAC3OUT	CN1-29	TH1-29	30	35	TEMP_OUT	CN1-30	TH1-30
31	12	AMP3OUT	CN1-31	TH1-31	32	44	HPF_OUT	CN1-32	TH1-32
33	Analog GND		CN1-33	TH1-33	34	48	LPF_OUT	CN1-34	TH1-34
35	11	MPXIN50	CN1-35	TH1-35	36	4	SYNCH_OUT	CN1-36	TH1-36
37	9	MPXIN51	CN1-37	TH1-37	38	6	GAINAMP_OUT	CN1-38	TH1-38
39	10	MPXIN60	CN1-39	TH1-39	40	2	SC_IN	CN1-40	TH1-40
41	8	MPXIN61	CN1-41	TH1-41	42	7	GAINAMP_IN	CN1-42	TH1-42
43	33	AMP4_INN	CN1-43	TH1-43	44	31	LDO_OUT	CN1-44	TH1-44
45	34	AMP4_INP	CN1-45	TH1-45	46	Analog GND		CN1-46	TH1-46
47	43	DAC4OUT	CN1-47	TH1-47	48	Analog GND		CN1-48	TH1-48
49	32	AMP4_OUT	CN1-49	TH1-49	50	Analog Power		CN1-50	TH1-50

* Illuminance sensor has been connected in the initial state. Please mount by replacing the resistance of R61 / R62 If you want to use the MPXIN20 in TSA-IC500.

** It is connected with the RL78 / G1A microcomputer of TSA-IC500.

This signal is a list of TSA-IC300 when connected.

Table 2.4 Signal list of TSA-IC300 when connected

TSA-IC300			TSA-EXT BOARD		TSA-IC300			TSA-EXT BOARD	
TH2	Smart Analog IC300				TH2	Smart Analog IC300			
Number	Number	Signal			Number	Number	Signal		
1	19	DAC1OUT	CN1-1	TH1-1	2	Analog Power		CN1-2	TH1-2
3	16	AMP1OUT	CN1-3	TH1-3	4	Analog GND		CN1-4	TH1-4
5	Analog GND		CN1-5	TH1-5	6	Analog GND		CN1-6	TH1-6
7	27	MPXIN10	CN1-7	TH1-7	8	N.C		CN1-8	TH1-8
9	25	MPXIN11	CN1-9	TH1-9	10	N.C		CN1-10	TH1-10
11	26	MPXIN20 *	CN1-11	TH1-11	12	N.C		CN1-12	TH1-12
13	24	MPXIN21	CN1-13	TH1-13	14	- (SHIELD_AVDD) **		CN1-14	TH1-14
15	18	DAC2OUT	CN1-15	TH1-15	16	- (RL78_AVREFP) **		CN1-16	TH1-16
17	14	AMP2OUT	CN1-17	TH1-17	18	- (RL78_AVREFM) **		CN1-18	TH1-18
19	Analog GND		CN1-19	TH1-19	20	- (RL78_ANI8) **		CN1-20	TH1-20
21	23	MPXIN30	CN1-21	TH1-21	22	- (RL78_ANI9) **		CN1-22	TH1-22
23	21	MPXIN31	CN1-23	TH1-23	24	- (RL78_ANI10) **		CN1-24	TH1-24
25	22	MPXIN40 *	CN1-25	TH1-25	26	- (RL78_ANI11) **		CN1-26	TH1-26
27	20	MPXIN41	CN1-27	TH1-27	28	- (RL78_ANI12) **		CN1-28	TH1-28
29	13	DAC3OUT	CN1-29	TH1-29	30	35	TEMP_OUT	CN1-30	TH1-30
31	12	AMP3OUT	CN1-31	TH1-31	32	44	HPF_OUT	CN1-32	TH1-32
33	Analog GND		CN1-33	TH1-33	34	48	LPF_OUT	CN1-34	TH1-34
35	11	MPXIN50	CN1-35	TH1-35	36	7	AMP5_INP	CN1-36	TH1-36
37	9	MPXIN51	CN1-37	TH1-37	38	4	AMP5_OUT	CN1-38	TH1-38
39	10	MPXIN60	CN1-39	TH1-39	40	2	SC_IN	CN1-40	TH1-40
41	8	MPXIN61	CN1-41	TH1-41	42	6	AMP5_INN	CN1-42	TH1-42
43	33	AMP4_INN	CN1-43	TH1-43	44	31	LDO_OUT	CN1-44	TH1-44
45	34	AMP4_INP	CN1-45	TH1-45	46	Analog GND		CN1-46	TH1-46
47	43	DAC4OUT	CN1-47	TH1-47	48	Analog GND		CN1-48	TH1-48
49	32	AMP4_OUT	CN1-49	TH1-49	50	Analog Power		CN1-50	TH1-50

* Hall sensor has been connected in the initial state. Please set JP1/JP2 for opening, if you want to use the MPXIN20 and MPXIN40 in TSA-IC300.

** It is connected with the RL78 / G1A microcomputer of TSA-IC300.

This signal is a list of TSA-IC301 when connected.

Table 2.5 Signal list of TSA-IC301 when connected

TSA-IC301			TSA-EXT BOARD		TSA-IC301			TSA-EXT BOARD	
TH2	Smart Analog IC301				TH2	Smart Analog IC301			
Number	Number	Signal			Number	Number	Signal		
1	N.C		CN1-1	TH1-1	2	Analog Power		CN1-2	TH1-2
3	N.C		CN1-3	TH1-3	4	Analog GND		CN1-4	TH1-4
5	Analog GND		CN1-5	TH1-5	6	Analog GND		CN1-6	TH1-6
7	N.C		CN1-7	TH1-7	8	N.C		CN1-8	TH1-8
9	N.C		CN1-9	TH1-9	10	N.C		CN1-10	TH1-10
11	22	AMPINM0*	CN1-11	TH1-11	12	N.C		CN1-12	TH1-12
13	24	AMPINM1	CN1-13	TH1-13	14	- (SHIELD_AVDD) **		CN1-14	TH1-14
15	N.C		CN1-15	TH1-15	16	- (RL78_AVREFP) **		CN1-16	TH1-16
17	N.C		CN1-17	TH1-17	18	- (RL78_AVREFM) **		CN1-18	TH1-18
19	Analog GND		CN1-19	TH1-19	20	- (RL78_ANI8) **		CN1-20	TH1-20
21	N.C		CN1-21	TH1-21	22	- (RL78_ANI9) **		CN1-22	TH1-22
23	N.C		CN1-23	TH1-23	24	- (RL78_ANI10) **		CN1-24	TH1-24
25	21	AMPINP0*	CN1-25	TH1-25	26	- (RL78_ANI11) **		CN1-26	TH1-26
27	23	AMPINP1	CN1-27	TH1-27	28	- (RL78_ANI12) **		CN1-28	TH1-28
29	32	DAC_OUT	CN1-29	TH1-29	30	12	TEMP_OUT	CN1-30	TH1-30
31	31	AMP_OUT	CN1-31	TH1-31	32	N.C		CN1-32	TH1-32
33	Analog GND		CN1-33	TH1-33	34	N.C		CN1-34	TH1-34
35	N.C		CN1-35	TH1-35	36	N.C		CN1-36	TH1-36
37	N.C		CN1-37	TH1-37	38	N.C		CN1-38	TH1-38
39	N.C		CN1-39	TH1-39	40	N.C		CN1-40	TH1-40
41	N.C		CN1-41	TH1-41	42	N.C		CN1-42	TH1-42
43	26	AMPINM2	CN1-43	TH1-43	44	16	LDO_OUT	CN1-44	TH1-44
45	25	AMPINP2	CN1-45	TH1-45	46	Analog GND		CN1-46	TH1-46
47	N.C		CN1-47	TH1-47	48	Analog GND		CN1-48	TH1-48
49	N.C		CN1-49	TH1-49	50	Analog Power		CN1-50	TH1-50

* Hall sensor has been connected in the initial state. Please set JP1/JP2 for opening, if you want to use the AMPINP0 and AMPINM0 in TSA-IC301.

** It is connected with the RL78 / G1A microcomputer of TSA-IC301.

2.3 Universal Area

TSA-EXT BOARD includes a universal area for expansion use.

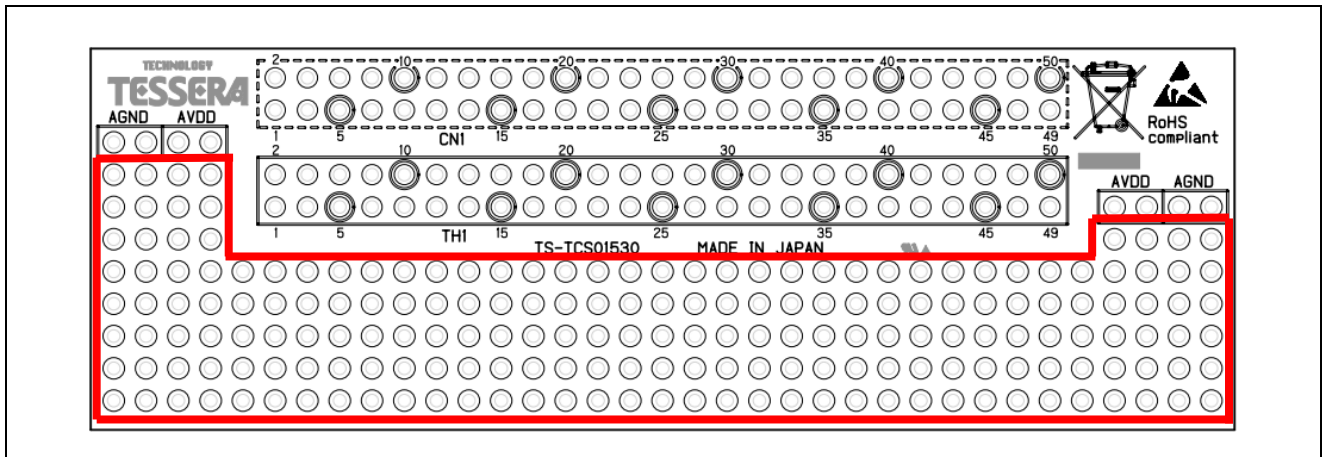
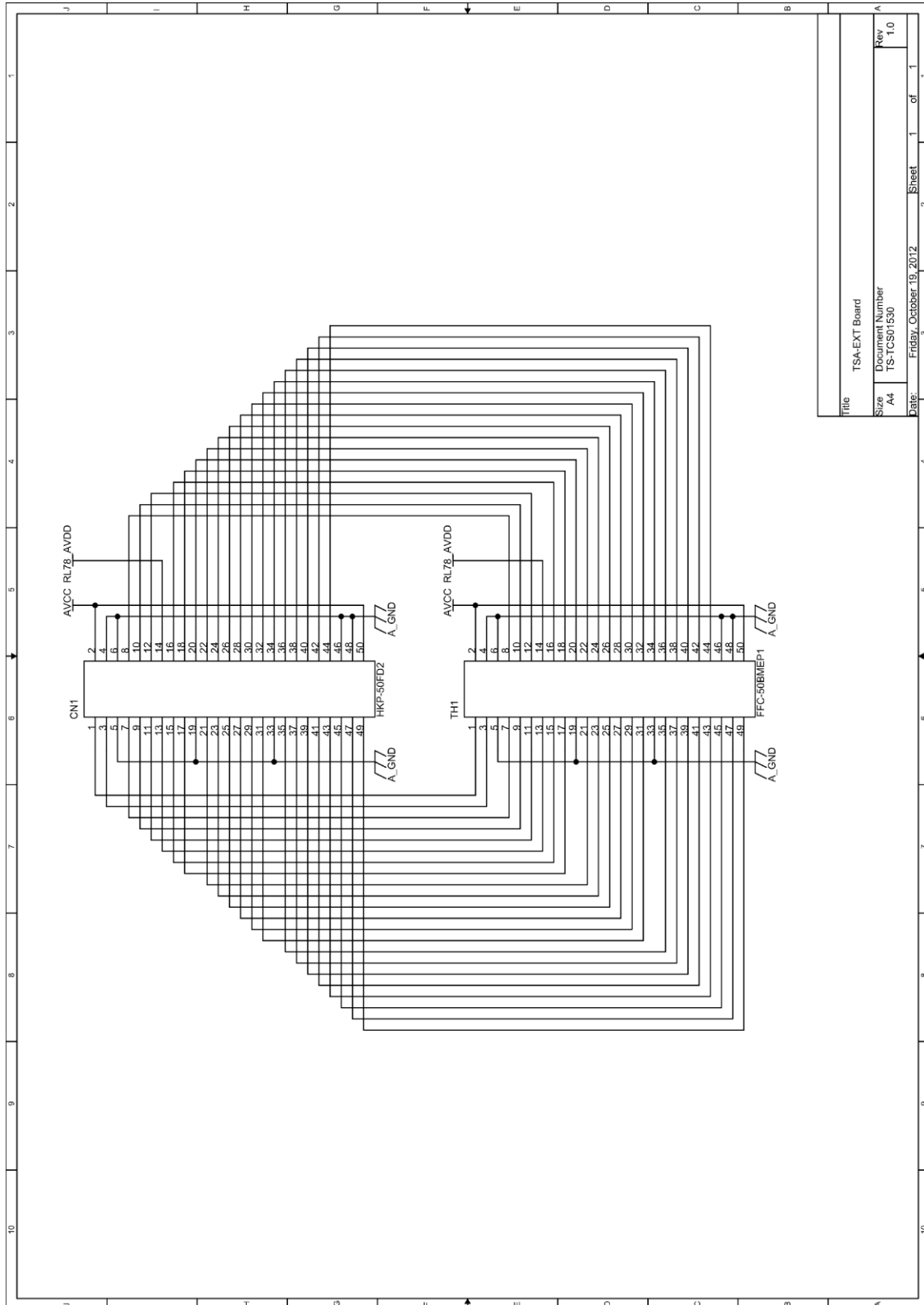


Figure 2.2 Universal Area

3. Hardware Documentation

3.1 Circuit diagrams

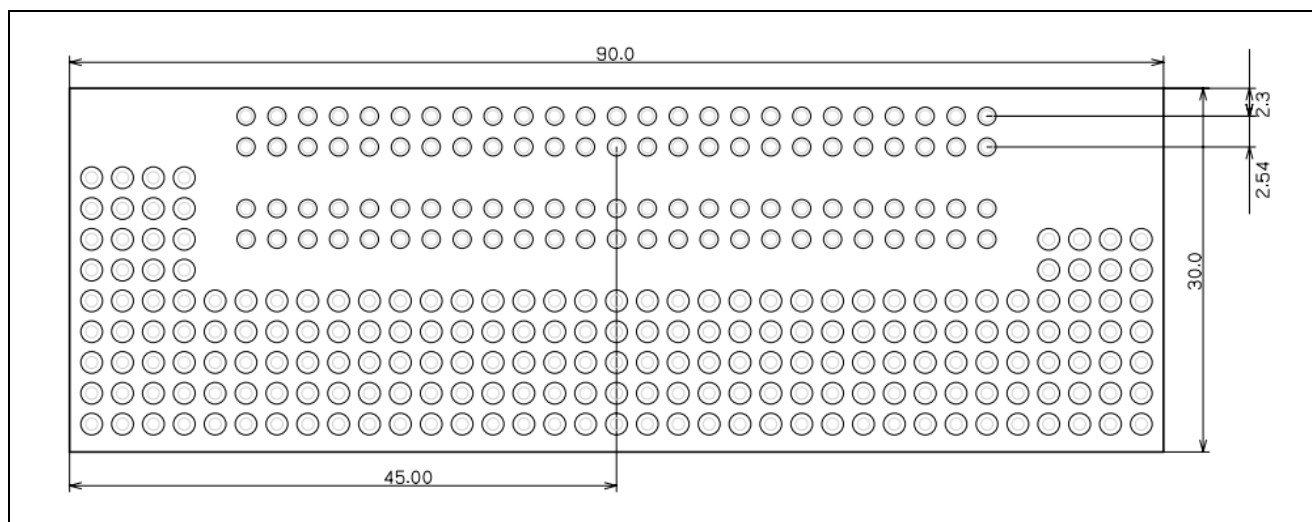
Circuit diagrams are provided on the following pages.



3.2 Component List

Item	Quantity	Reference(Mount parts)	Reference(Unmount parts)	Parts name	Parts kind	Parts model number	Maker	Memo
1	1	CN1		HPK-50FD2	PCB Socket	HKP-50FD2	HTK	Replacement HIF3H-50DA-2.54DSA(71) HIROSE ELECTRIC
2	1		TH1	FFC-50BMEP1	PCB Connector	FFC-50BMEP1	HTK	Replacement A1-50PA-2.54DSA(71) HIROSE ELECTRIC

3.3 Board Dimensions



Unit: mm

Figure 3.1 TSA-EXT BOARD Dimensions

3.4 Component Layout

The following figures show the component layout for each board surface. Refer to circuit diagrams and component lists for component references and part numbers.

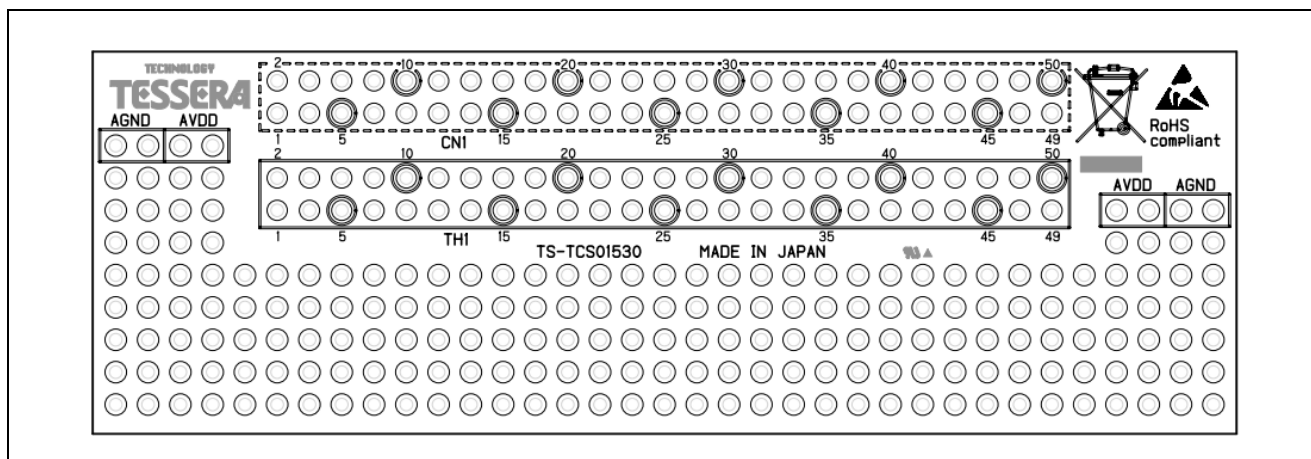


Figure 3.2 TSA-EXT BOARD Component Layout (Front)

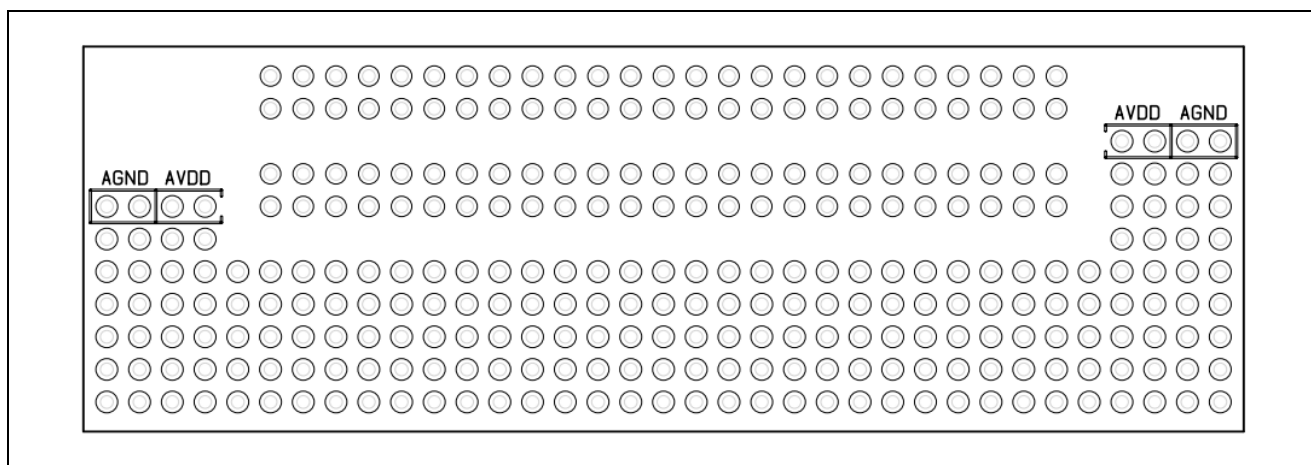


Figure 3.3 TSA-EXT BOARD Component Layout (Back)