Measurement- protocol -part 1

by: brunowe
Skype: brunowe1

DUT: WELEC W2022A, HW 8C7.0H, FW: 1.3,
Probe: Nr 1 on W2022A

Measurement equipment:
Analog Oscilloscope Hitachi V1050, 100MHz analog bandwidth with Probe: Nr 2 on V1050
Crystal- oscillators (10MHz, 20MHz, 30MHz, 40MHz, 50MHz, 60MHz, 80MHz),Crystal (4MHz, 8MHz, 10MHz, 17,73MHz, 100MHz, 117MHz)
DMM

Table of contents

Notes:

All Measuring points referring to Analog-input-Part_assignment.pdf on: [http://welecw2000a.sourceforge.net/docs/schematics/Analog-Input-Part_assignment.pdf]
The Pinouts of all concerning components could be found on: [http://welecw2000a.sourceforge.net/docs/schematics/Parts.pdf]

Nr.:	Testing signal on BNC	Measuring point (MP)	Values: Ch1/ mV; CH2/ mV			Settings on W2022A; Activity; Notes
			10mV/Div	20mV/Div	50mV/Div	
1	Probe- signal from W2022A	Probe- comp	740			Probe 1 calibration
2	Probe- signal from V1050	Cal. 0.5V	500			Probe 2 on V1050

The following first set of measurements is to declare the

working points (bias) and the common mode offset voltages of the OpAmp .

The special focus is located on the Amplifier chain consisting of the OPA656 (U1), AD8131 (U10) working in single input- differential output mode, AD8131 (U11) single or differential input- differential output mode, AD8131 (U12) single or diff. input- diff. output mode with Level shifting.
Settings on Welec Scope: default setup, calibrate Zero lines, Ch1 and Ch2 on, 10ns/Div, Bw-Limit off, DC-coupling, Trigger: Auto, DC-coupling
Input Signal: none- Input bypassed to GND

Nr.:	Test sig.	MP	Values: Ch1/ mV; CH2/ mV			Settings on W2022A; Activity; Notes
			10mV/Div	20mV/Div	50mV/Div	
3	none	16	0 ; 0	0 ; 0	0 ; 0	
4	"	17	0 ; 0	0 ; 0	0 ; 0	OP1177 (U2)
5	"	18	0 ; 0	0 ; 0	0 ; 0	
6	"	1	18,1 ; -18,0	29,0; -45,7	98,6 ;-90,1	
7	"	2	18,1 ; -18,0	29,2; -45,8	98,6 ;-90,1	OPA656 (U1)
8	"	3	18,6 ; -17,7	29,8; -45,4	99,1; -90,0	
9	"	4	18,8 ; -17,8	30,0; -45,7	124; -112	
10	"	6	17,9; -17,2	28,6; -43,8	118,6; -107,9	AD8131 (U10)
11	"	7	-26,6; 8,4	-37,2; 35,4	-126,7; 99,0	
12	"	8	**10,0; -26,2**	22,0; -52,7	111,5; -116,5	**MP8 and MP9 are connected in 10mV/Div setting**
13	"	9	**10,0; -26,3**	0,0 ; 0,0	0,0 ; 0,0	AD8131 (U11)
14	"	10	30,0; -44,2	29,1; -44,4	118,4; -108,2	
15	"	11	**-46,2; 27,4**	**-45,4; -27,8**	-135,1; 91,0	**MP11 and MP12 are connected in 10mV/Div and 20mV/Div setting**
16	"	12	**-43,8; 29,3**	**-42,9; 30,0**	2,3[1]; 2,3[1]	AD8131 (U12)
17	"	14	1184; 1330	1186; 1332	1142; 1340	
18	"	15	1330; 1185	1331; 1184	1335; 1148	
19	"	13	1265; 1265	1265; 1265	1265; 1265	

[1] This Pin is left floating

Nr.:	Testing signal on BNC	Measuring point	Values: Ch1/ mV; CH2/ mV			Settings on W2022A; Activity; Notes
			10mV/Div	20mV/Div	50mV/Div	
This set is for affirming the previous measurements of Slog2 regarding the **switching conditions of U7AD (U14)* and U7AD (U13)*** Settings on Welec Scope: default setup, calibrate Zero lines, Ch1 and Ch2 on, 10ns/Div, Bw-Limit off, DC-coupling, Trigger: Auto, DC-coupling Input Signal: none- Input bypassed to GND						
20	none	U14- Pin 6	x; -2560[1]	x; 2552[2]	x; 2552[3]	x: no measurement
21	"	U13- Pin 6	x; -2560[1]	x; -2560[2]	x; 2554[3]	x: no measurement

This set is for affirming the previous measurements of Slog regarding the **switching conditions of Relay K1 and K2.**

Settings on Welec Scope: default setup, calibrate Zero lines, Ch1 and Ch2 on, 10ns/Div, Bw-Limit off, DC-coupling, Trigger: Auto, DC-coupling Input Signal: irrelevant, only for detecting of Relay switching.

			1V/Div, 2V/Div, 5V/Div	100mV/Div, 200mV/Div, 500mV/Div	10mV/Div, 20mV/Div, 50mV/Div	
22	rectangle 1 kHz [4]	K1- Pin 2	input level	no signal	no signal	Input on K1 is Pin 3, Output Pin 2 or Pin 4
23	rectangle 1 kHz [4]	K1- Pin 4	no signal	input level	input level	
24	rectangle 1 kHz [4]	K1- Pin 9	1/10 of input level	no signal	no signal	Input on K1 is Pin 8, Output Pin 7 or Pin 9
25	rectangle 1 kHz [4]	K1- Pin 7	no signal	input level	input level	
26	rectangle 1 kHz [4]	K2- Pin 2	1/10 of input level	input level	no signal	Input on K2 is Pin 3, Output Pin 2 or Pin 4
27	rectangle 1 kHz [4]	K2- Pin 4	no signal	no signal	input level	
28	rectangle 1 kHz [4]	K2- Pin 9	1/100 of input level	1/10 of input level	no signal	Input on K2 is Pin 8, Output Pin 7 or Pin 9
29	rectangle 1 kHz [4]	K2- Pin 7	no signal	no signal	input level	
30	rectangle 1 kHz [4]	**MP 16**	**1/100 of input level**	**1/10 of input level**	**input level**	MP16 is input to the following amplifier chain

[1] The measured values with 100mV/Div and 1V/Div settings on the Welec oscilloscope are the same;
[2] The measured values with 200mV/Div and 2V/Div settings on the Welec oscilloscope are the same
[3] The measured values with 500mV/Div and 5V/Div settings on the Welec oscilloscope are the same
[4] Input level adjusted in according to vertical setting on Welec scope

Conclusion:
Relay K1 is only responsible for the prescaling within the 5V/Div, 2V/Div and 1V/Div Ranges. Within this settings on the scope, there is a prescaling from (470+ 430)/ (110 II 1000). Relay K2 is only responsible for the prescaling within the 5V/Div, 2V/Div, 1V/Div and the 500mV/Div, 200mV/Div and the 100mV/Div Ranges. Within this settings, there is a (further) prescaling from (470+ 430)/ 110. The differentiation of the 10mV/Div, 20mV/Div and the 50mV/Div Ranges is done with the U14 and respectively the U13. If the Pin 1 of the following AD8131 is left floating this OpAmp is adjusted to a differential gain of 1. If the Pin 1 of the AD8131 is connected to the Pin 4 of the previous AD8131, the OpAmp is working in differential input mode with a gain of 2. The differentiation of 100mV/Div, 200mV/Div and 500mV/Div is adequate, the differentiation within 1V/Div, 2V/Div and 5V/Div works equal.

The following set of measurement is to declare

the working of the DAC LTC2612.

Settings on Welec Scope: default setup, calibrate Zero lines, Ch1 and Ch2 on, 10ns/Div, Bw-Limit off, DC-coupling, Trigger: Auto, DC-coupling
Input Signal: none- Input bypassed to GND

Nr.:	Test sig.	MP Ch1: 19; Ch2: 20	Values: Ch1/ mV; CH2/ mV			Settings on W2022A; Activity; Notes
			10mV/Div	20mV/Div	50mV/Div	
31	none	19	-17,0; x			Zero level for Ch1 is 2 Div above the center line
32	"	19	-9,3; x			Zero level shifted 1 Div down
33	"	19	0,6; x			Zero level on center line
34	"	19	40,0; x			Zero level on bottom of Display (4 Div. below center)
35	"	20	x; 17,7			Zero level for Ch2 is 2 Div below the center line
36	"	20	x; 27,3			Zero level shifted 1 Div down
37	"	20	x; 37,3			Zero level on bottom of Display (4 Div. below center)
38	"	20	x; -41,0			Zero level on top of Display
39	"	19		6,7; x		Both channels adjusted to center line
40	"	19		-13,4; x		Zero line adjusted to 1 Div above center line
41	"	19		-32,8; x		Zero line adjusted to 2 Div above center line
42	"	19		-71,9; x		Zero line adjusted to 4 Div above center line (= top)
43	"	20			x; -8,8	Both channels adjusted to center line
44	"	20			x; -58,0	Zero line adjusted to 1 Div above center line
45	"	20			x; -106	Zero line adjusted to 2 Div above center line
46	"	20			x; -200	Zero line adjusted to 4 Div above center line (= top)

After the adjustment of LTC2612 Pin 5 (responsible for Ch 1) and LTC2612 Pin 8 (responsible for Ch 2) to 0,0mV with the Level shifting encoder on the Welec Front panel, the Display shows a significant offset on Ch 1 (0,6 Div above center line) however Ch 2 is 0,2 Div below center line.
An offset could also be seen in measurement nr. 39: Δ y= 6,7mV/ (20mV/Div)= 0,34 Div offset in 20 mV/Div setting.
Offset for Ch 2 in 50mV/Div setting (measurement nr.43): Δ y=| -8,8mV/ (50mV/Div)| = 0,17 Div offset

Nr.:	Test sig.	MP	Values: Ch1/ mV; CH2/ mV				Settings on W2022A; Activity; Notes
			500mV/Div	1V/Div	2V/Div	5V/Div	
	none	14	1228; x	x; 1270	1244; x	x; 1260	
	"	15	1289; x	x; 1248	1275; x	x; 1265	