SEMI F-47 Test Compliance Test Report
Standard:

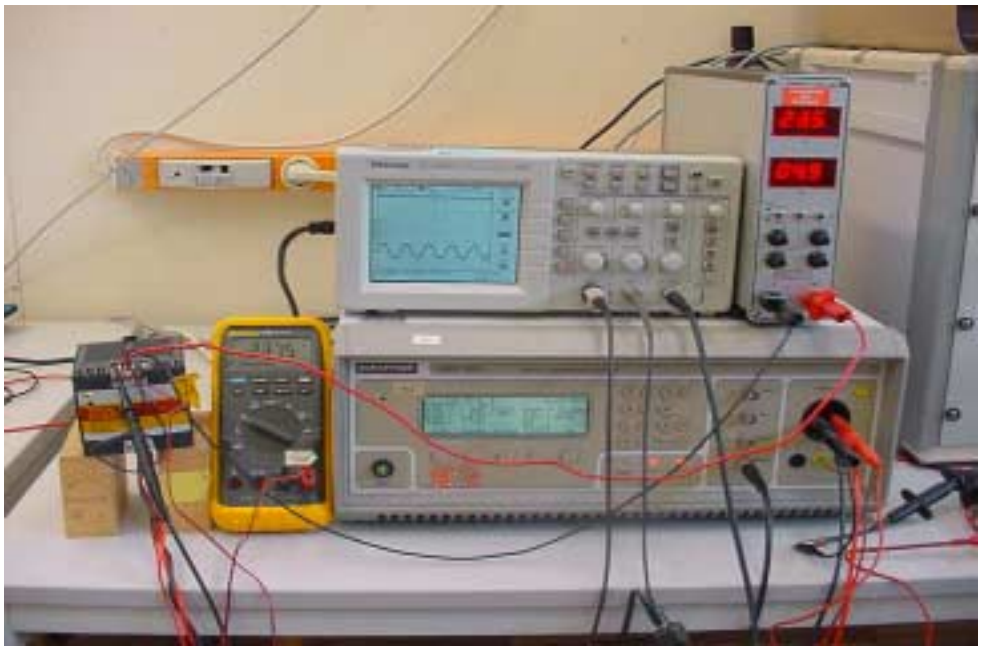
SEMI F47-0200
Specification for Semiconductor Processing Equipment
Voltage Sag Immunity

Test Procedure Standard:

Semi F42 : Test method for Semiconductor Processing Equipment.
Voltage Sag Immunity

1. Test Setup

Sag Generator: Schaffner NSG1003: Dropout and Varation Simulator
Tektronics: TDS1002



2. Test Units

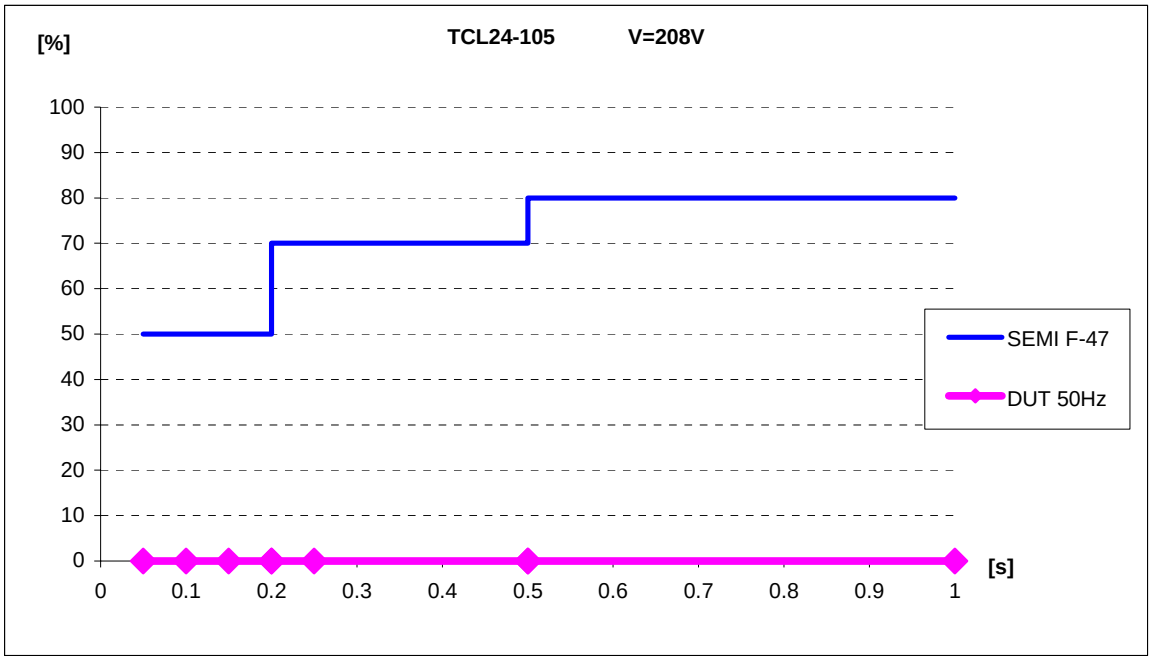
Units Name	Nominal Voltage [VAC]	Output Voltage [V]	Output Current [A]
TCL24-105	100-240	5	4
TCL24-112	100-240	12	2
TCL24-124	100-240	24	1
TCL060-112	100-240	12	4
TCL060-124	100-240	24	2.5
TCL060-148	100-240	48	1.25
TCL120-112	100-240	12	8
TCL120-124	100-240	24	5

3. Test Report

3.1 TCL24-105

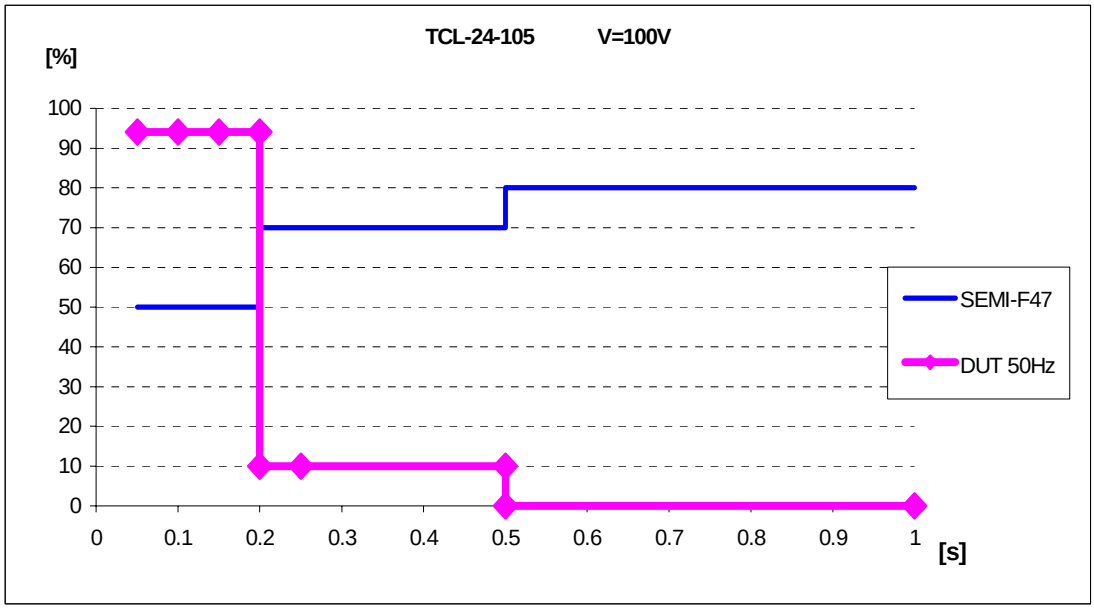
Input Voltage V=208VAC
Output: V=5VDC/4A

Voltage Sag	Duration		Output Voltage	Percent of Nominal		
[V]	[s]	Cycles	[V]	DUT 50Hz [%]	SEMI F47 [%]	Result
166.4	1	50	5	0.0	80	PASS
166.4	0.5	25	5	0.0	80	PASS
145.6	0.5	25	5	0.0	70	PASS
145.6	0.25	12.5	5	0.0	70	PASS
145.6	0.2	12.5	5	0.0	70	PASS
104	0.2	10	5	0.0	50	PASS
104	0.15	7.5	5	0.0	50	PASS
104	0.1	5	5	0.0	50	PASS
104	0.05	2.5	5	0.0	50	PASS
104	0.02	1	5	0.0	50	PASS
0	0.02	1	5	0.0	0	PASS



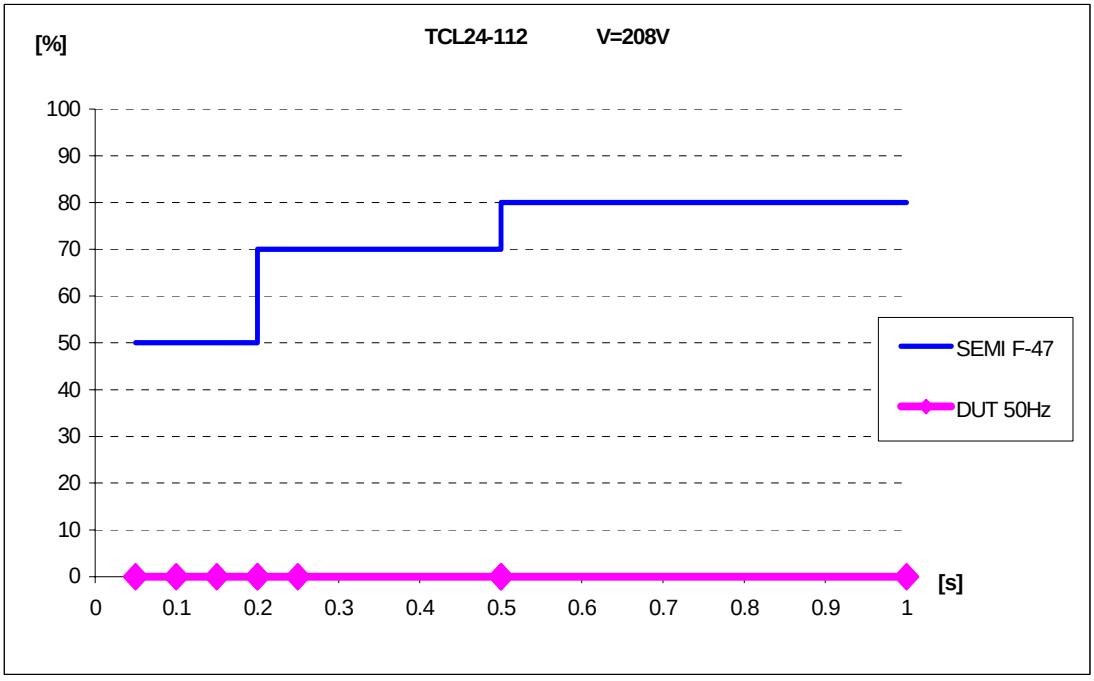
TCL24-105
Input Voltage V=100VAC
Output: V=5VDC/4A

Voltage Sag	Duration		Output Voltage	Percent of Nominal		
[V]	[s]	Cycles	[V]	DUT 50Hz [%]	SEMI F47 [%]	Result
80	1	50	5	0.0	80	PASS
80	0.5	25	5	0.0	80	PASS
70	0.5	25	4.5	10	70	PASS
70	0.25	12.5	4.5	10	70	PASS
70	0.2	12.5	4.5	10	70	PASS
50	0.2	10	0.3	90	50	FAIL
50	0.15	7.5	0.3	90	50	FAIL
50	0.1	5	0.3	90	50	FAIL
50	0.05	2.5	0.3	90	50	FAIL
50	0.02	1	5	0	50	PASS
0	0.02	1	5	0	0	PASS



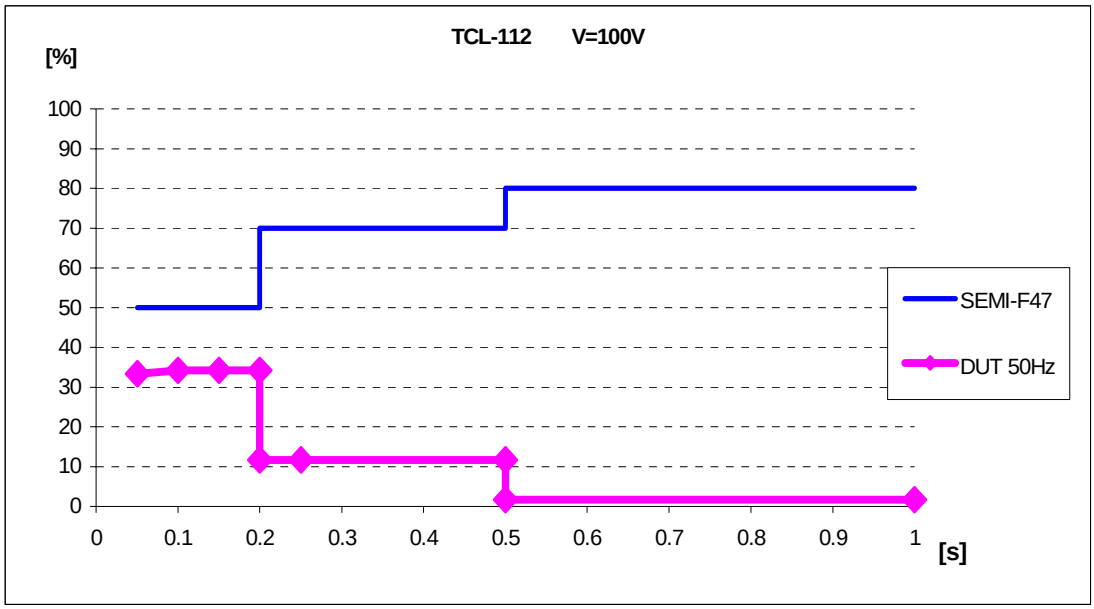
3.2 TCL24-112
Input Voltage V=208VAC
Output: V=12VDC/2.0A

Voltage Sag	Duration		Output Voltage	Percent of Nominal		
[V]	[s]	Cycles	[V]	DUT 50Hz [%]	SEMI F47 [%]	Result
166.4	1	50	12	0.0	80	PASS
166.4	0.5	25	12	0.0	80	PASS
145.6	0.5	25	12	0.0	70	PASS
145.6	0.25	12.5	12	0.0	70	PASS
145.6	0.2	12.5	12	0.0	70	PASS
104	0.2	10	12	0.0	50	PASS
104	0.15	7.5	12	0.0	50	PASS
104	0.1	5	12	0.0	50	PASS
104	0.05	2.5	12	0.0	50	PASS
104	0.02	1	12	0.0	50	PASS
0	0.02	1	12	0.0	0	PASS



TCL24-112
Input Voltage V=100VAC
Output: V=12VDC/2.0A

Voltage Sag	Duration		Output Voltage	Percent of Nominal		
[V]	[s]	Cycles	[V]	DUT 50Hz [%]	SEMI F47 [%]	Result
80	1	50	11.8	1.7	80	PASS
80	0.5	25	11.8	1.7	80	PASS
70	0.5	25	10.6	11.7	70	PASS
70	0.25	12.5	10.6	11.7	70	PASS
70	0.2	12.5	10.6	11.7	70	PASS
50	0.2	10	7.9	34.2	50	PASS
50	0.15	7.5	7.9	34.2	50	PASS
50	0.1	5	7.9	34.5	50	PASS
50	0.05	2.5	8	33.3	50	PASS
50	0.02	1	10.8	10	50	PASS
0	0.02	1	10.8	10	0	PASS

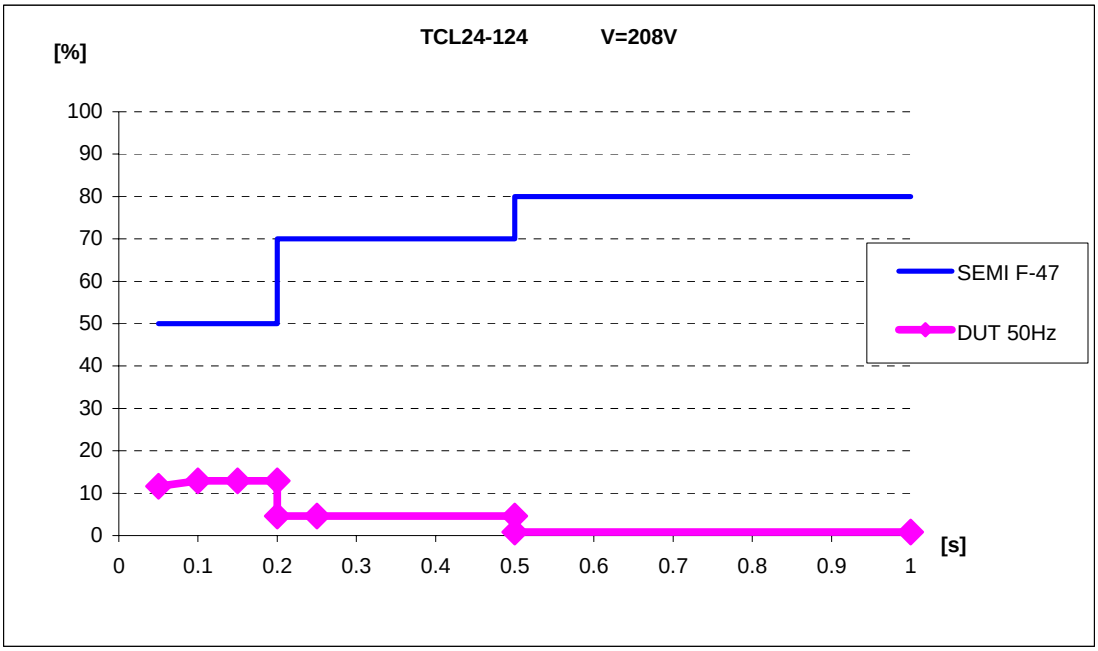


3.3 TCL24-124

Input Voltage V=208VAC

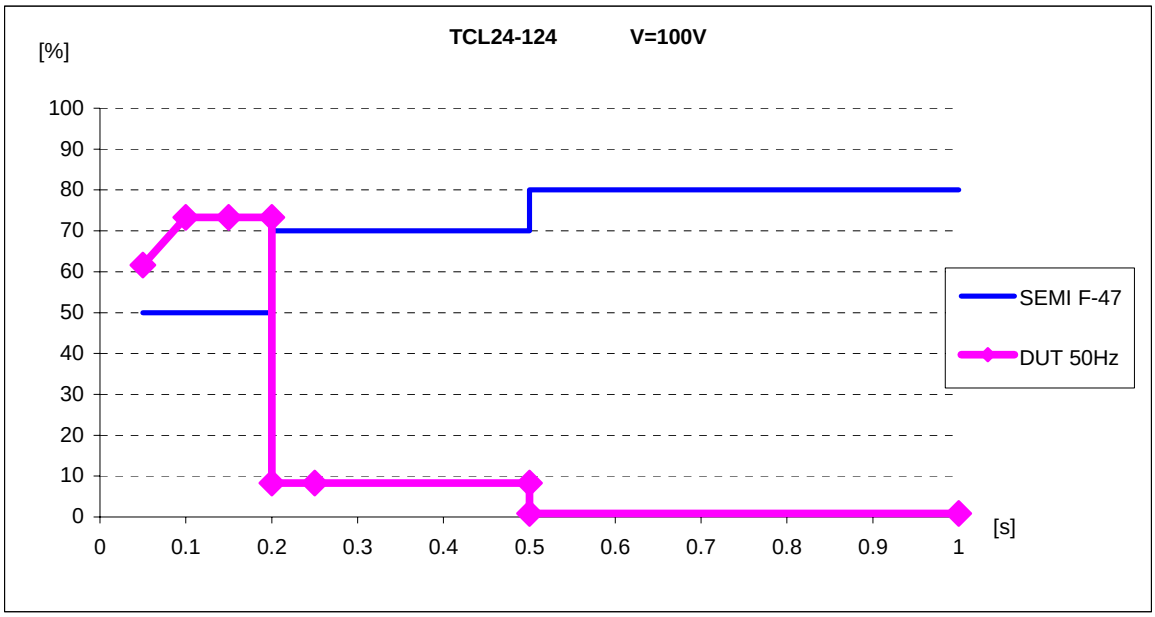
Output: V=24VDC/1.0A

Voltage Sag	Duration		Output Voltage	Percent of Nominal		
[V]	[s]	Cycles	[V]	DUT 50Hz [%]	SEMI F47 [%]	Result
166.4	1	50	24	0	80	PASS
166.4	0.5	25	24	0	80	PASS
145.6	0.5	25	24	0	70	PASS
145.6	0.25	12.5	24	0	70	PASS
145.6	0.2	12.5	24	0	70	PASS
104	0.2	10	24	0	50	PASS
104	0.15	7.5	24	0	50	PASS
104	0.1	5	24	0	50	PASS
104	0.05	2.5	24	0	50	PASS
104	0.02	1	24	0	50	PASS
0	0.02	1	24	0	0	PASS



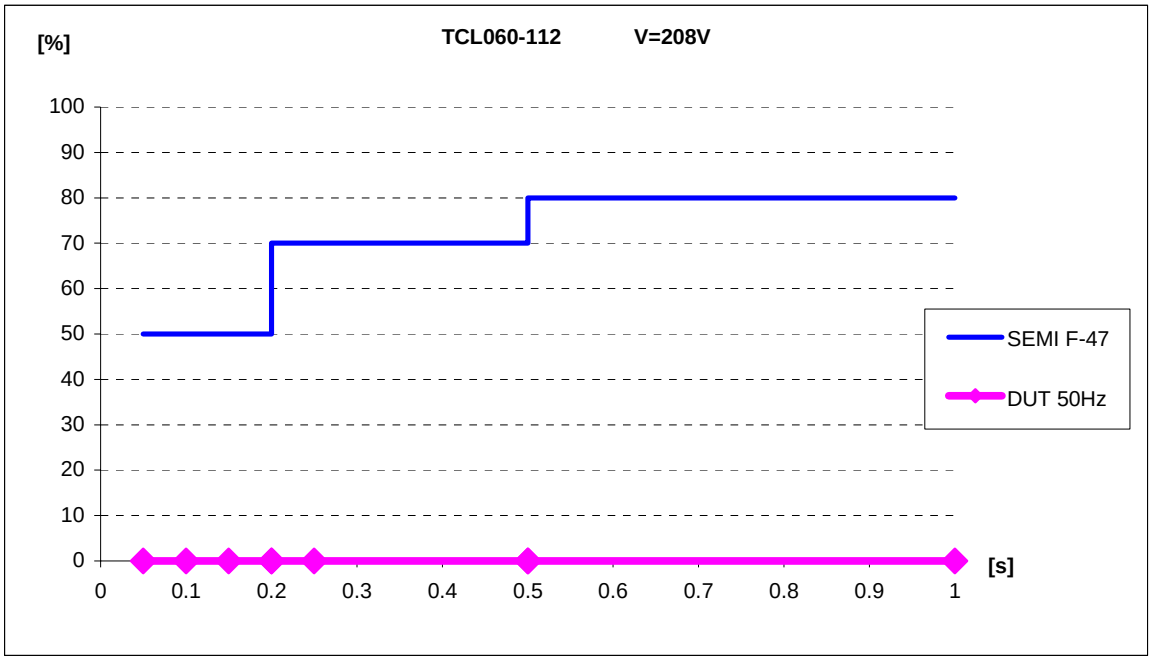
TCL24-124
Input Voltage V=100VAC
Output: V=24VDC/1.0A

Voltage Sag	Duration		Output Voltage	Percent of Nominal		
[V]	[s]	Cycles	[V]	DUT 50Hz [%]	SEMI F47 [%]	Result
80	1	50	23.8	0.8	80	PASS
80	0.5	25	23.8	0.8	80	PASS
70	0.5	25	22	8.3	70	PASS
70	0.25	12.5	22	8.3	70	PASS
70	0.2	12.5	22	8.3	70	PASS
50	0.2	10	6.4	73.3	50	FAIL
50	0.15	7.5	6.4	73.3	50	FAIL
50	0.1	5	6.4	73.3	50	FAIL
50	0.05	2.5	9.2	61.7	50	FAIL
50	0.02	1	22	8.3	50	PASS
0	0.02	1	22	8.3	0	PASS



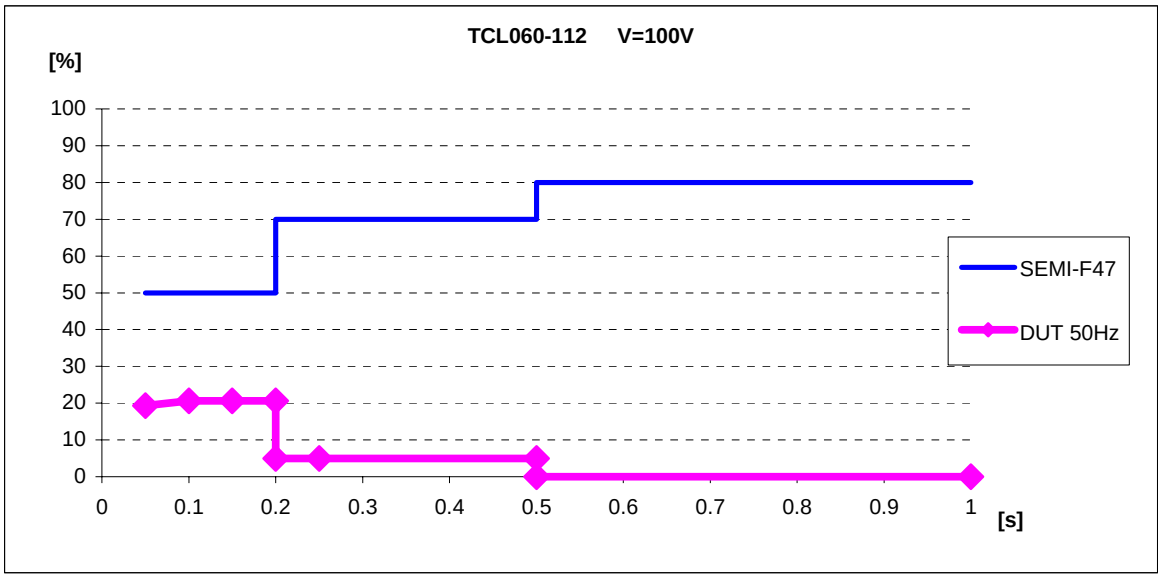
3.4 TCL060-112
Input Voltage V=208VAC
Output: V=12VDC/4.0A

Voltage Sag	Duration		Output Voltage	Percent of Nominal		
[V]	[s]	Cycles	[V]	DUT 50Hz [%]	SEMI F47 [%]	Result
166.4	1	50	12	0	80	PASS
166.4	0.5	25	12	0	80	PASS
145.6	0.5	25	12	0	70	PASS
145.6	0.25	12.5	12	0	70	PASS
145.6	0.2	12.5	12	0	70	PASS
104	0.2	10	12	0	50	PASS
104	0.15	7.5	12	0	50	PASS
104	0.1	5	12	0	50	PASS
104	0.05	2.5	12	0	50	PASS
104	0.02	1	12	0	50	PASS
0	0.02	1	12	0	0	PASS



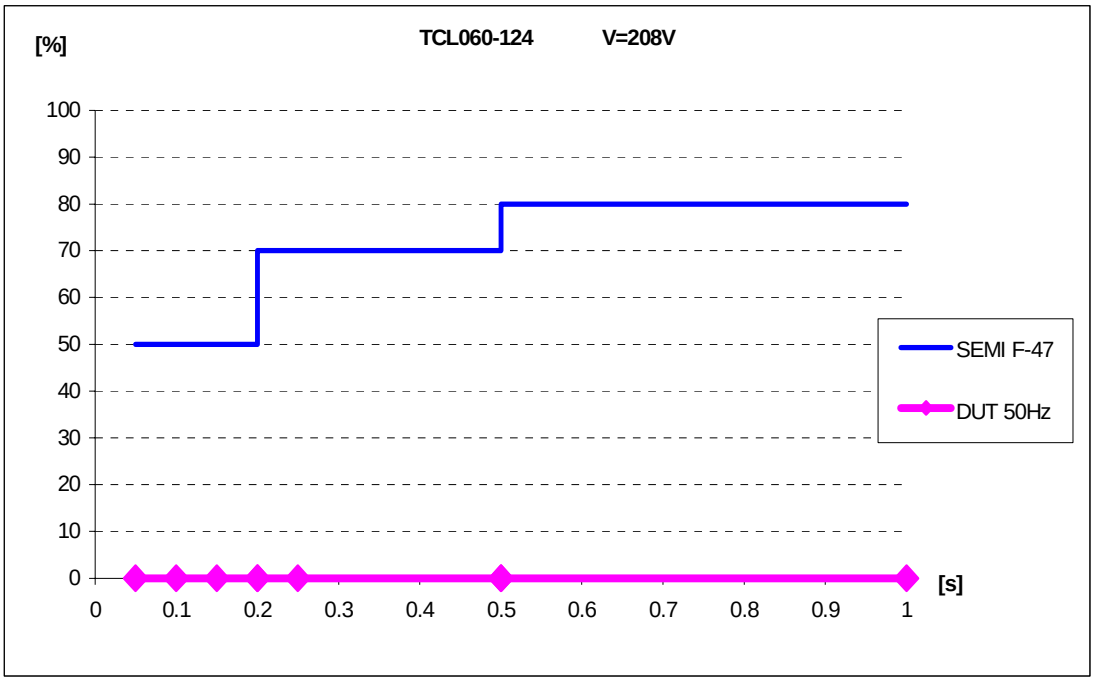
TCL060-112
Input Voltage V=100VAC
Output: V=12VDC/4.0A

Voltage Sag	Duration		Output Voltage	Percent of Nominal		
[V]	[s]	Cycles	[V]	DUT 50Hz [%]	SEMI F47 [%]	Result
80	1	50	12	0	80	PASS
80	0.5	25	12	0	80	PASS
70	0.5	25	11.4	5	70	PASS
70	0.25	12.5	11.4	5	70	PASS
70	0.2	12.5	11.4	5	70	PASS
50	0.2	10	9.52	20.7	50	PASS
50	0.15	7.5	9.52	20.7	50	PASS
50	0.1	5	9.52	20.7	50	PASS
50	0.05	2.5	9.68	19.3	50	PASS
50	0.02	1	12	0	50	PASS
0	0.02	1	12	0	0	PASS



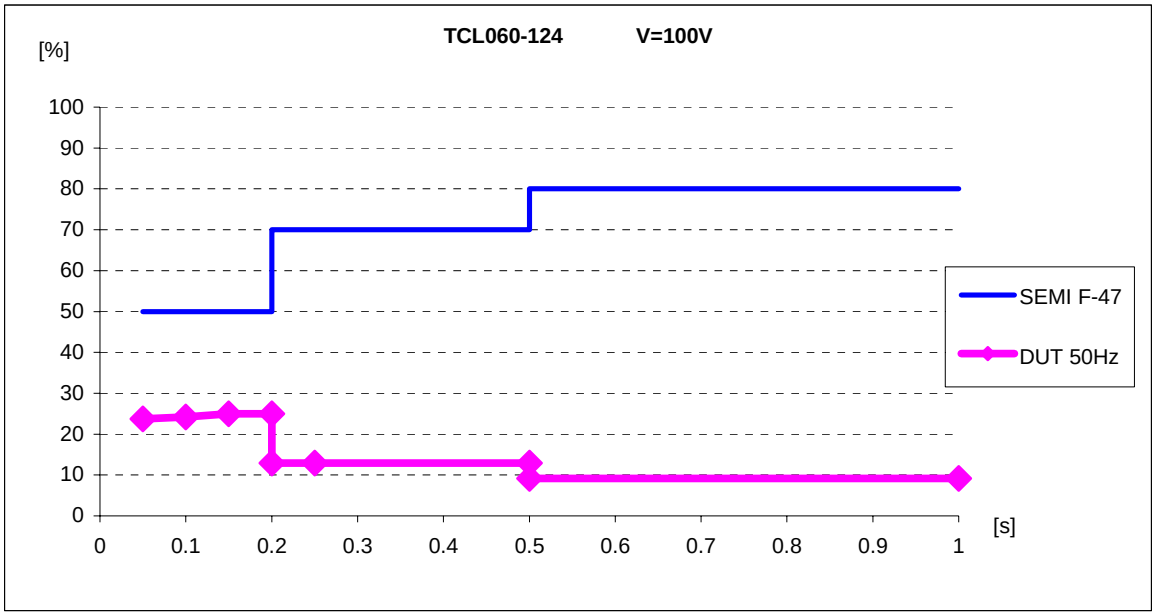
3.5 TCL060-124
Input Voltage V=208VAC
Output: V=24VDC/2.5A

Voltage Sag	Duration		Output Voltage	Percent of Nominal		
[V]	[s]	Cycles	[V]	DUT 50Hz [%]	SEMI F47 [%]	Result
166.4	1	50	24.0	0.0	80	PASS
166.4	0.5	25	24.0	0.0	80	PASS
145.6	0.5	25	24.0	0.0	70	PASS
145.6	0.25	12.5	24.0	0.0	70	PASS
145.6	0.2	12.5	24.0	0.0	70	PASS
104	0.2	10	24.0	0.0	50	PASS
104	0.15	7.5	24.0	0.0	50	PASS
104	0.1	5	24.0	0.0	50	PASS
104	0.05	2.5	24.0	0.0	50	PASS
104	0.02	1	24.0	0.0	50	PASS
0	0.02	1	24.0	0.0	0	PASS



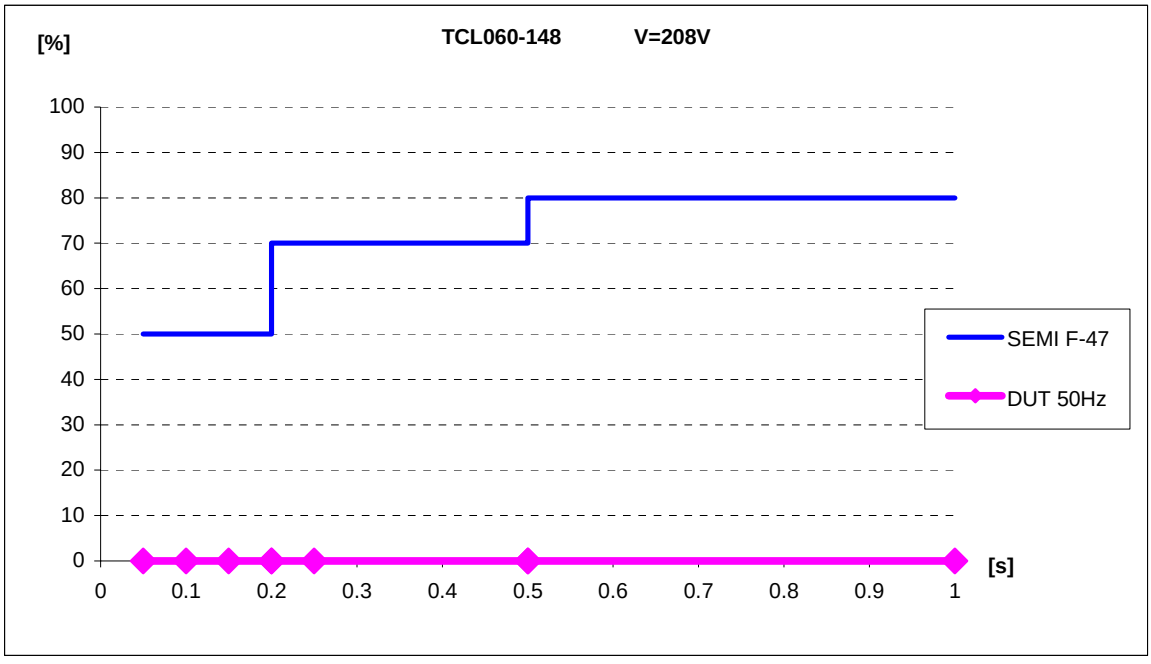
TCL060-124
Input Voltage V=100VAC
Output: V=24VDC/2.5A

Voltage Sag	Duration		Output Voltage	Percent of Nominal		
[V]	[s]	Cycles	[V]	DUT 50Hz [%]	SEMI F47 [%]	Result
80	1	50	21.8	9.2	80	PASS
80	0.5	25	21.8	9.2	80	PASS
70	0.5	25	20.9	12.9	70	PASS
70	0.25	12.5	20.9	12.9	70	PASS
70	0.2	12.5	20.9	12.9	70	PASS
50	0.2	10	18	25	50	PASS
50	0.15	7.5	18	25	50	PASS
50	0.1	5	18.2	24.2	50	PASS
50	0.05	2.5	18.3	23.8	50	PASS
50	0.02	1	21.4	10.8	50	PASS
0	0.02	1	21.4	10.8	0	PASS



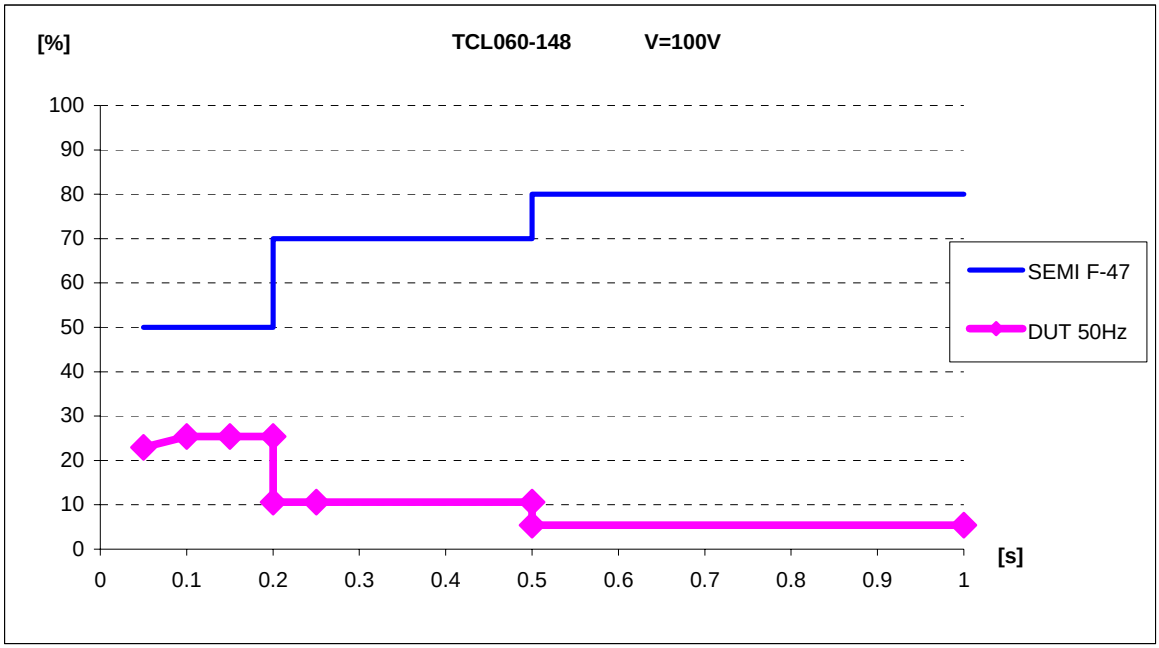
3.6 TCL060-148
Input Voltage V=208VAC
Output: V=48VDC/1.25A

Voltage Sag	Duration		Output Voltage	Percent of Nominal		
[V]	[s]	Cycles	[V]	DUT 50Hz [%]	SEMI F47 [%]	Result
166.4	1	50	48	0	80	PASS
166.4	0.5	25	48	0	80	PASS
145.6	0.5	25	48	0	70	PASS
145.6	0.25	12.5	48	0	70	PASS
145.6	0.2	12.5	48	0	70	PASS
104	0.2	10	48	0	50	PASS
104	0.15	7.5	48	0	50	PASS
104	0.1	5	48	0	50	PASS
104	0.05	2.5	48	0	50	PASS
104	0.02	1	48	0	50	PASS
0	0.02	1	48	0	0	PASS



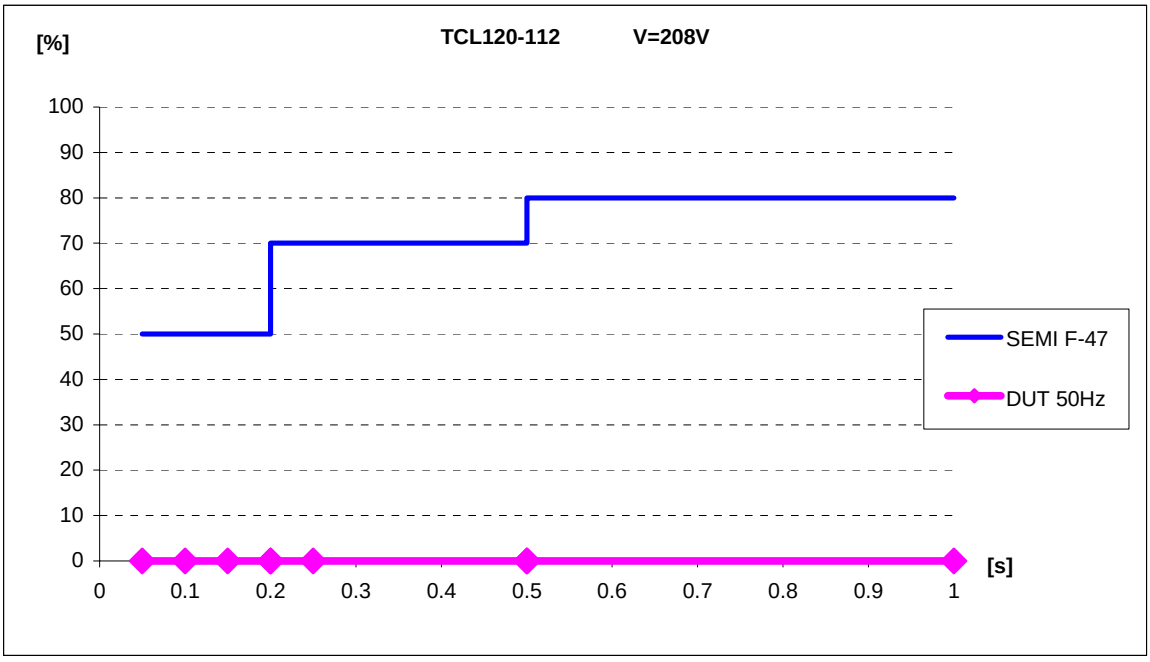
TCL060-148
Input Voltage V=100VAC
Output: V=48VDC/1.25A

Voltage Sag	Duration		Output Voltage	Percent of Nominal		
[V]	**[s]**	**Cycles**	**[V]**	**DUT 50Hz [%]**	**SEMI F47 [%]**	**Result**
80	1	50	45.4	5.4	80	PASS
80	0.5	25	45.4	5.4	80	PASS
70	0.5	25	42.9	10.6	70	PASS
70	0.25	12.5	42.9	10.6	70	PASS
70	0.2	12.5	42.9	10.6	70	PASS
50	0.2	10	35.8	25.4	50	PASS
50	0.15	7.5	35.8	25.4	50	PASS
50	0.1	5	35.8	25.4	50	PASS
50	0.05	2.5	37	22.9	50	PASS
50	0.02	1	44.3	7.7	50	PASS
0	0.02	1	44.3	7.7	0	PASS



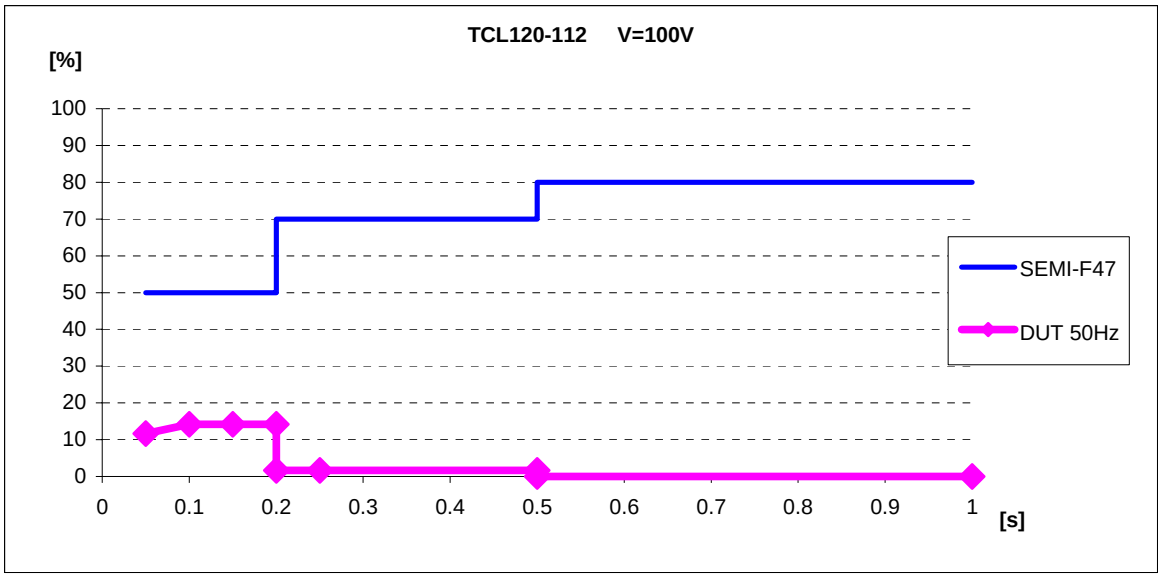
3.7 TCL120-112
Input Voltage V=208VAC
Output: V=12VDC/8.0A

Voltage Sag	Duration		Output Voltage	Percent of Nominal		
[V]	[s]	Cycles	[V]	DUT 50Hz [%]	SEMI F47 [%]	Result
166.4	1	50	12	0	80	PASS
166.4	0.5	25	12	0	80	PASS
145.6	0.5	25	12	0	70	PASS
145.6	0.25	12.5	12	0	70	PASS
145.6	0.2	12.5	12	0	70	PASS
104	0.2	10	12	0	50	PASS
104	0.15	7.5	12	0	50	PASS
104	0.1	5	12	0	50	PASS
104	0.05	2.5	12	0	50	PASS
104	0.02	1	12	0	50	PASS
0	0.02	1	12	0	0	PASS



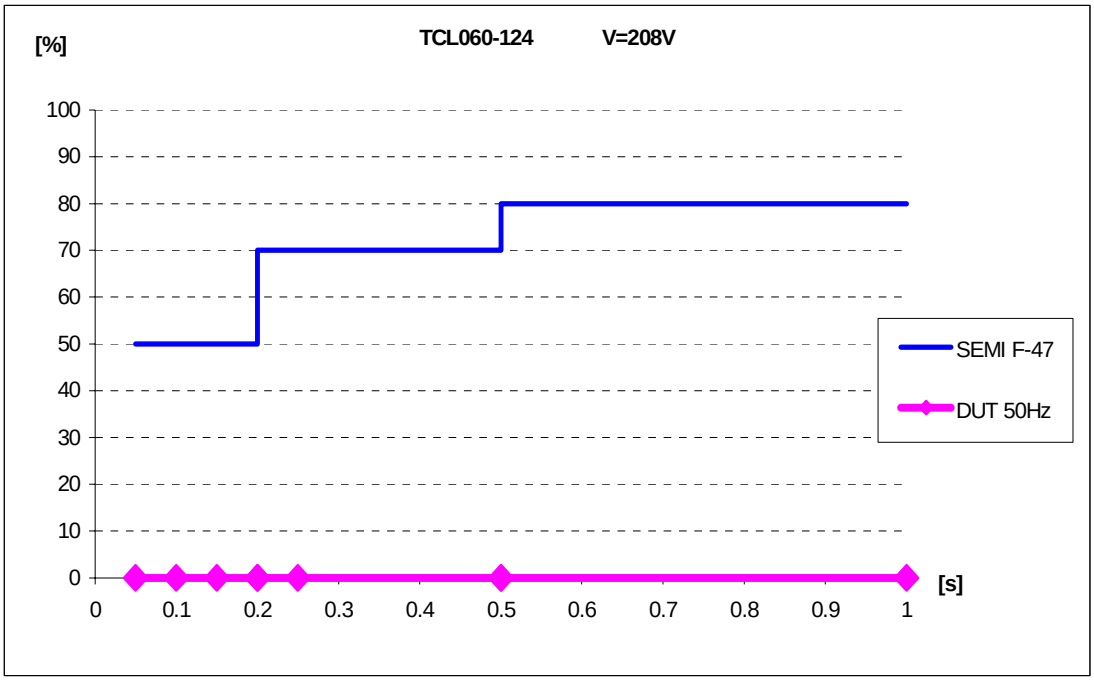
TCL120-112
Input Voltage V=100VAC
Output: V=12VDC/8.0A

Voltage Sag	Duration		Output Voltage	Percent of Nominal		
[V]	[s]	Cycles	[V]	DUT 50Hz [%]	SEMI F47 [%]	Result
80	1	50	12	0	80	PASS
80	0.5	25	12	0	80	PASS
70	0.5	25	11.8	1.7	70	PASS
70	0.25	12.5	11.8	1.7	70	PASS
70	0.2	12.5	11.8	1.7	70	PASS
50	0.2	10	10.3	14.2	50	PASS
50	0.15	7.5	10.3	14.2	50	PASS
50	0.1	5	10.3	14.2	50	PASS
50	0.05	2.5	10.6	11.7	50	PASS
50	0.02	1	12	0	50	PASS
0	0.02	1	12	0	0	PASS



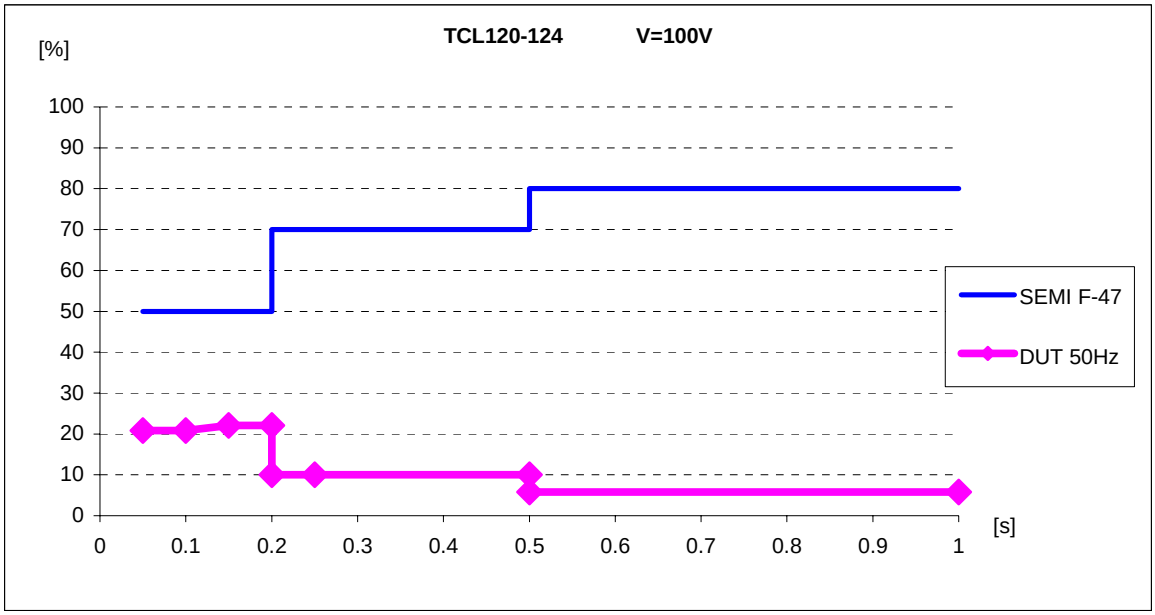
3.8 TCL120-124
Input Voltage V=208VAC
Output: V=24VDC/5.0A

Voltage Sag	Duration		Output Voltage	Percent of Nominal		
[V]	[s]	Cycles	[V]	DUT 50Hz [%]	SEMI F47 [%]	Result
166.4	1	50	24.0	0.0	80	PASS
166.4	0.5	25	24.0	0.0	80	PASS
145.6	0.5	25	24.0	0.0	70	PASS
145.6	0.25	12.5	24.0	0.0	70	PASS
145.6	0.2	12.5	24.0	0.0	70	PASS
104	0.2	10	24.0	0.0	50	PASS
104	0.15	7.5	24.0	0.0	50	PASS
104	0.1	5	24.0	0.0	50	PASS
104	0.05	2.5	24.0	0.0	50	PASS
104	0.02	1	24.0	0.0	50	PASS
0	0.02	1	24.0	0.0	0	PASS



TCL120-124
Input Voltage V=100VAC
Output: V=24VDC/5.0A

Voltage Sag	Duration		Output Voltage	Percent of Nominal		
[V]	[s]	Cycles	[V]	DUT 50Hz [%]	SEMI F47 [%]	Result
80	1	50	22.6	5.8	80	PASS
80	0.5	25	22.6	5.8	80	PASS
70	0.5	25	21.6	10	70	PASS
70	0.25	12.5	21.6	10	70	PASS
70	0.2	12.5	21.6	10	70	PASS
50	0.2	10	18.7	22.1	50	PASS
50	0.15	7.5	18.7	22.1	50	PASS
50	0.1	5	19	20.8	50	PASS
50	0.05	2.5	19	20.8	50	PASS
50	0.02	1	22	8.3	50	PASS
0	0.02	1	22	8.3	0	PASS

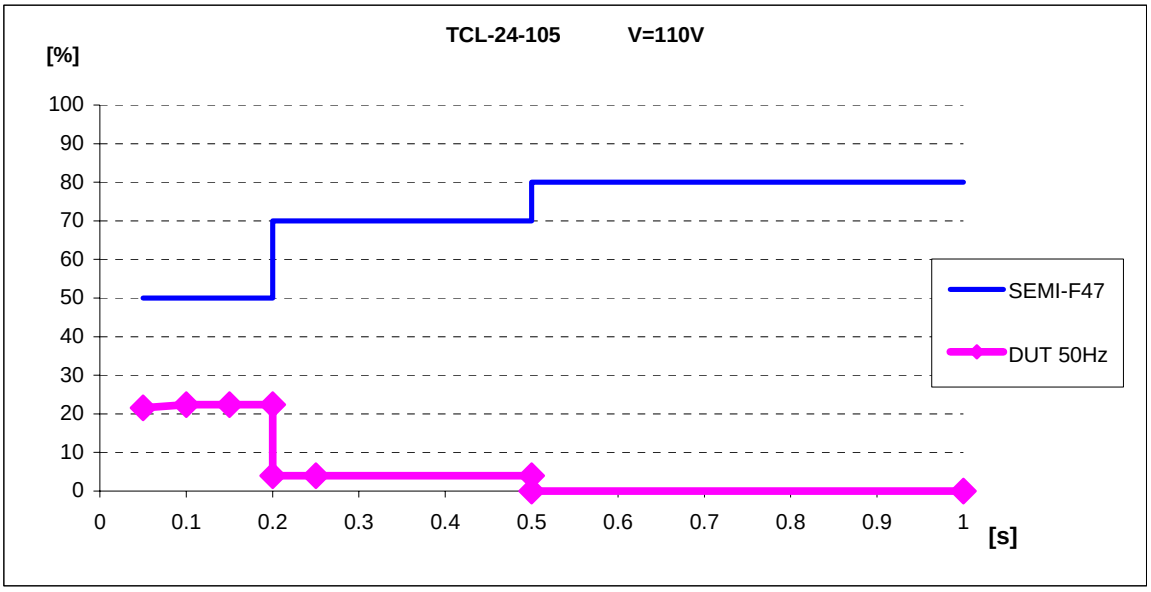


3.9 TCL24-105

Input Voltage V=110VAC

Output: V=5VDC/4A

Voltage Sag	Duration		Output Voltage	Percent of Nominal		
[V]	[s]	Cycles	[V]	DUT 50Hz [%]	SEMI F47 [%]	Result
88	1	50	5	0.0	80	PASS
88	0.5	25	5	0.0	80	PASS
77	0.5	25	4.8	4	70	PASS
77	0.25	12.5	4.8	4	70	PASS
77	0.2	12.5	4.8	4	70	PASS
55	0.2	10	3.88	22.4	50	PASS
55	0.15	7.5	3.88	22.4	50	PASS
55	0.1	5	3.88	22.4	50	PASS
55	0.05	2.5	3.92	21.6	50	PASS
55	0.02	1	5	0	50	PASS
0	0.02	1	5	0	0	PASS

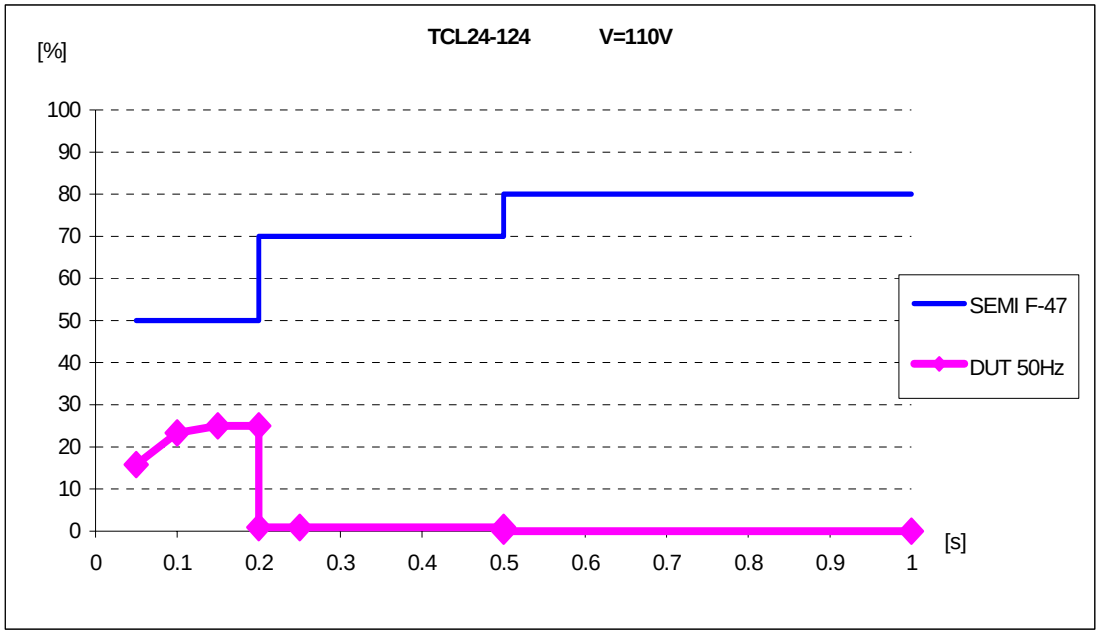


4.0 TCL24-124

Input Voltage V=110VAC

Output: V=24VDC/1.0A

Voltage Sag	Duration		Output Voltage	Percent of Nominal		
[V]	[s]	Cycles	[V]	DUT 50Hz [%]	SEMI F47 [%]	Result
88	1	50	24	0	80	PASS
88	0.5	25	24	0	80	PASS
77	0.5	25	23.8	0.8	70	PASS
77	0.25	12.5	23.8	0.8	70	PASS
77	0.2	12.5	23.8	0.8	70	PASS
55	0.2	10	18	25	50	PASS
55	0.15	7.5	18	25	50	PASS
55	0.1	5	18.4	23.3	50	PASS
55	0.05	2.5	20.2	15.8	50	PASS
55	0.02	1	24	0	50	PASS
0	0.02	1	24	0	0	PASS



Conclusion

All TCL models where tested at the nominal ranges of 230VAC and 115VAC and the applicable voltage tolerances as per specification. The deviation of the output voltage is noted in the tables (DUT50Hz). All units passed the requirements of the F-47 standard with the restriction to nominal voltage only of the TCL24-105 and TCl24-124. These units will pass the standard at 110VAC input voltage. Details are shown on the last two pages of this report.