



Výrobní tester

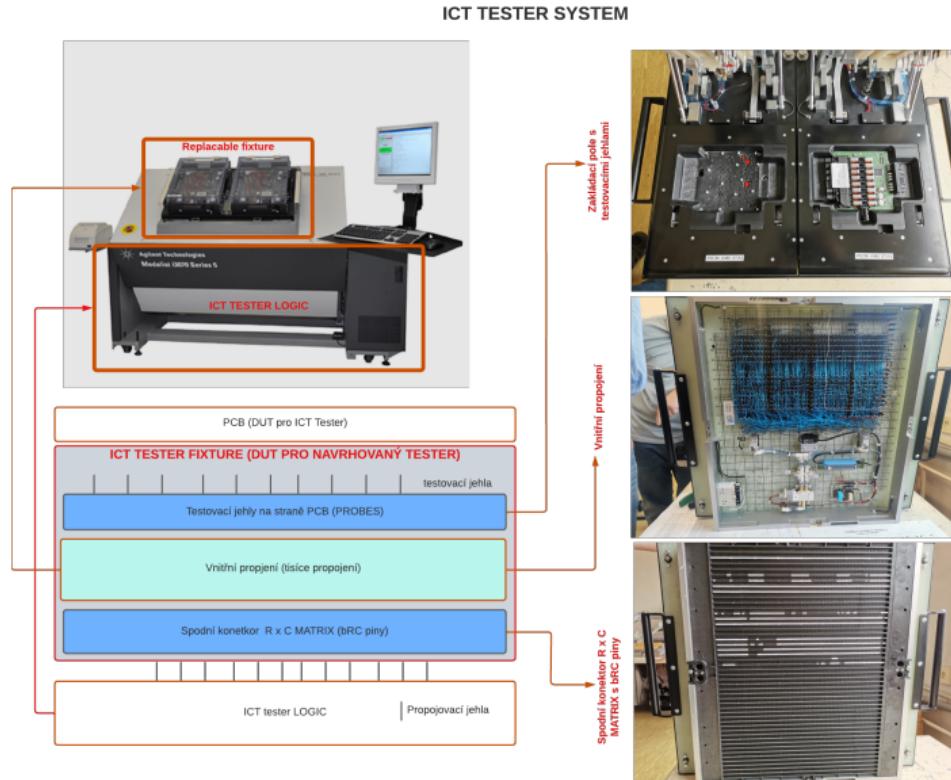
Semestrální práce

Autor práce: Bc. FILIP PAUL

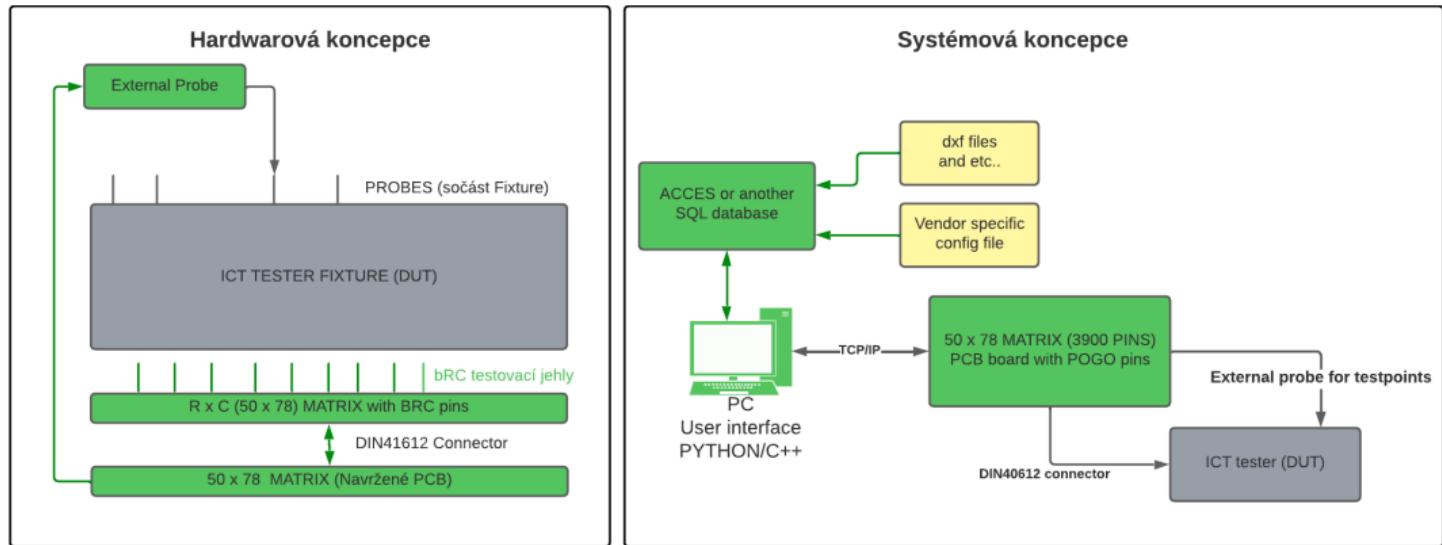
Vedoucí práce: prof. Dr. Ing. ZDENĚK KOLKA

Brno, 6. 1. 2023

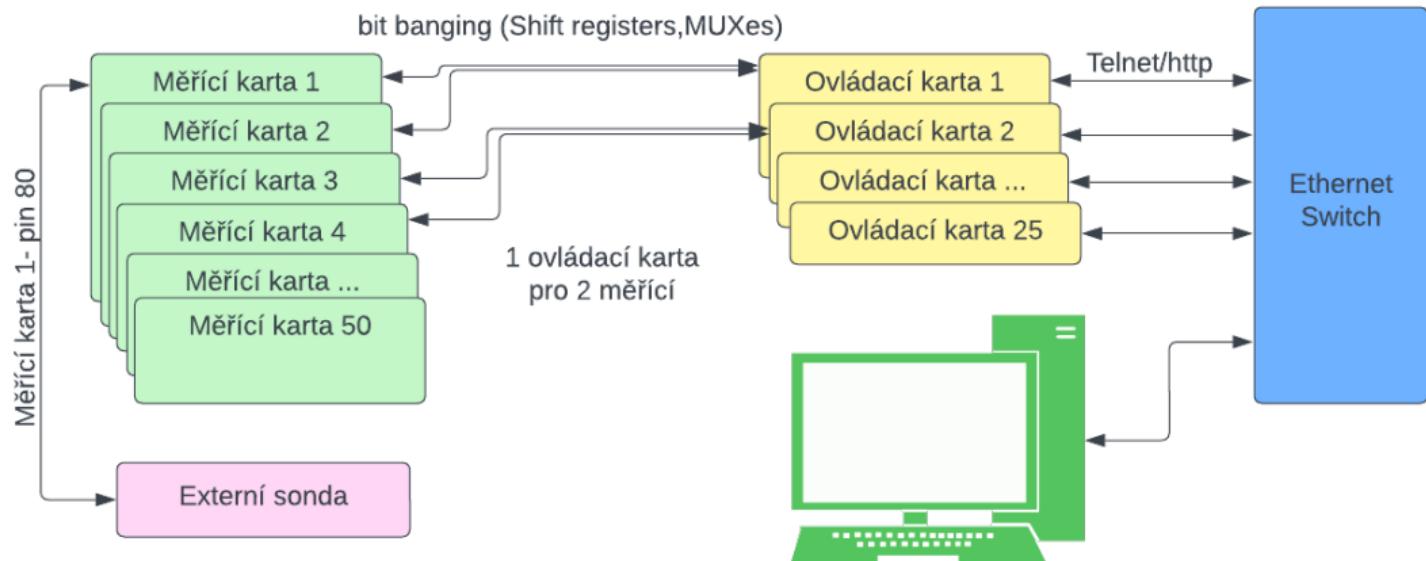
- ICT tester
- Fixture
- Měření odporu
- Testovací jehly
- Probes
- bRC

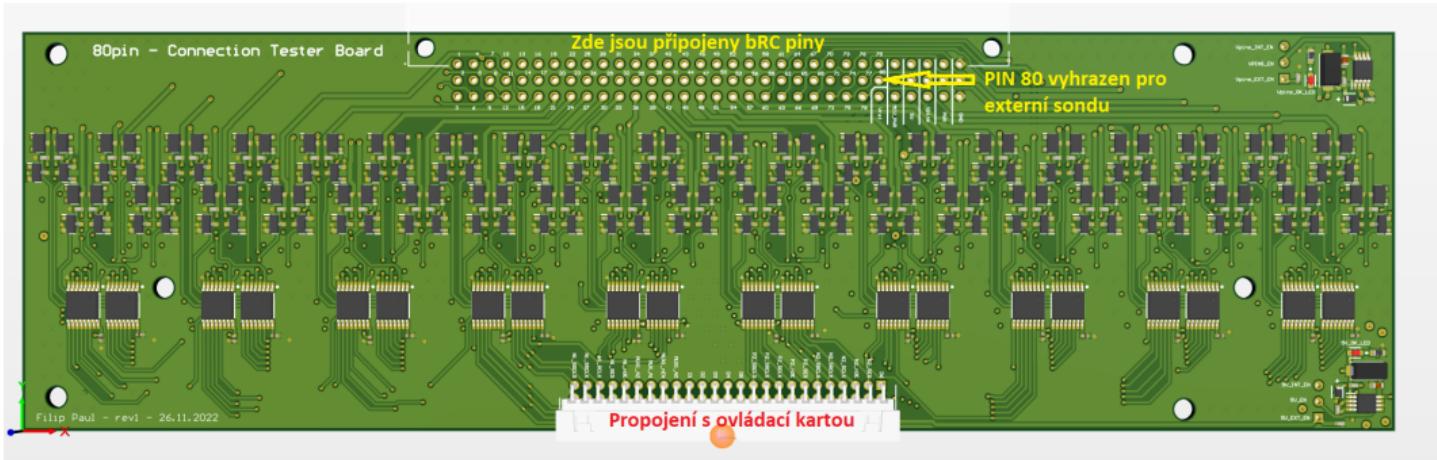


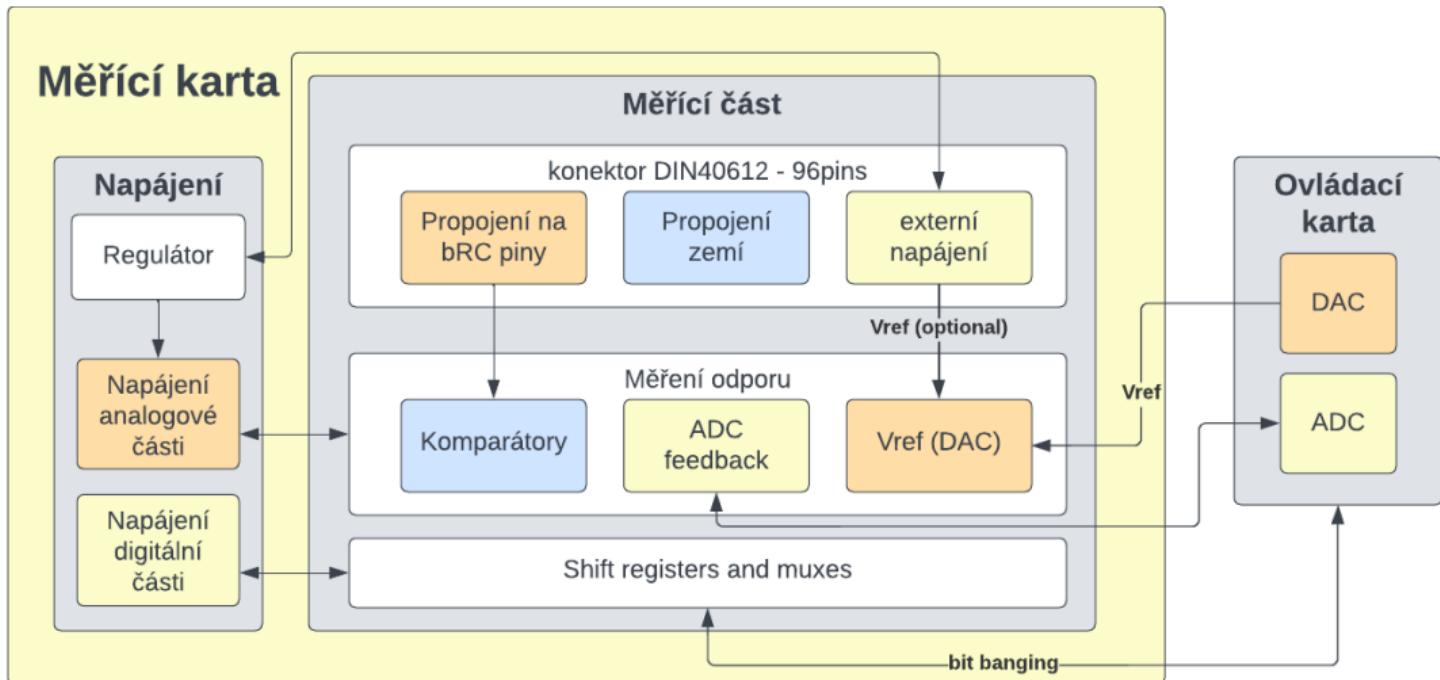
Koncepce testeru 1/2



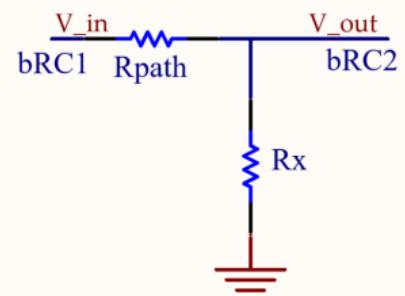
Koncepce testeru 2/2



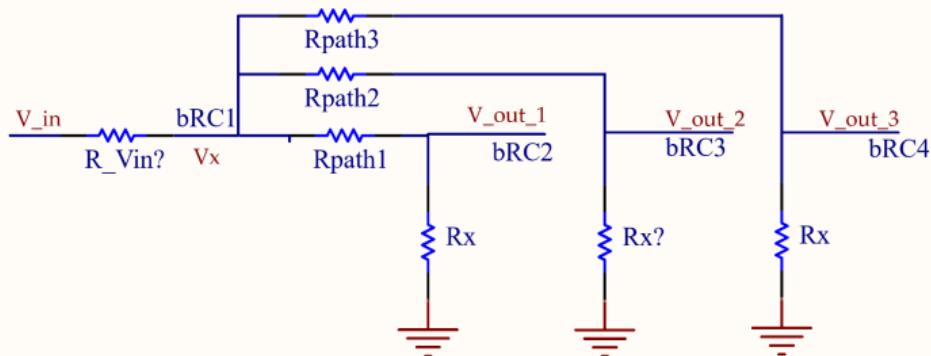


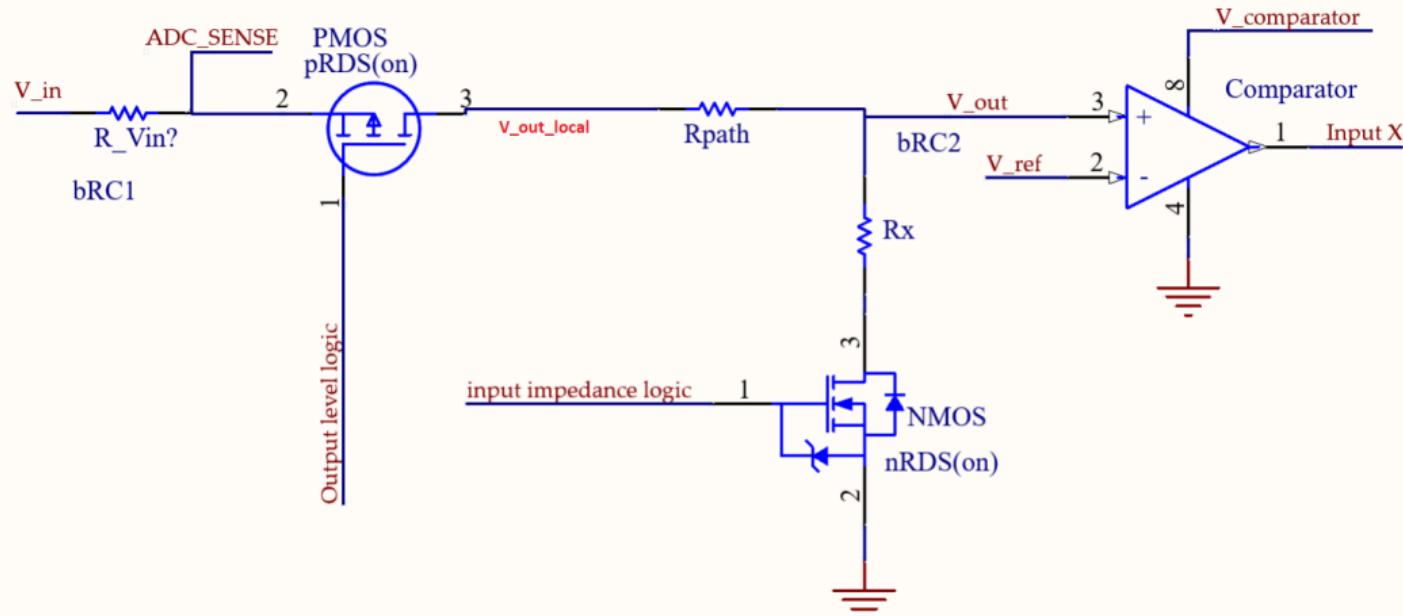


Zapojení 2 pinů



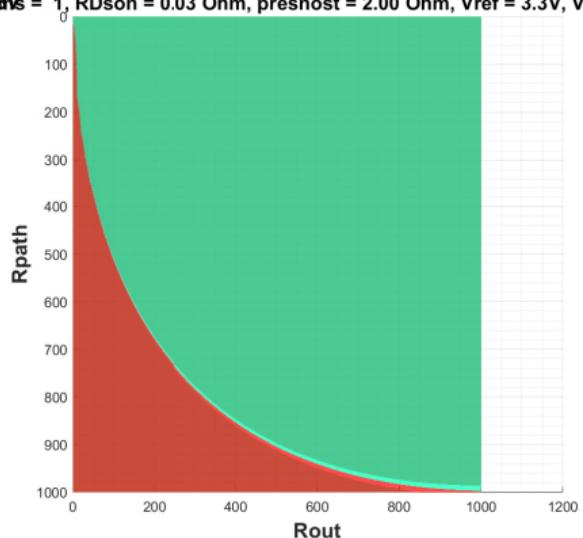
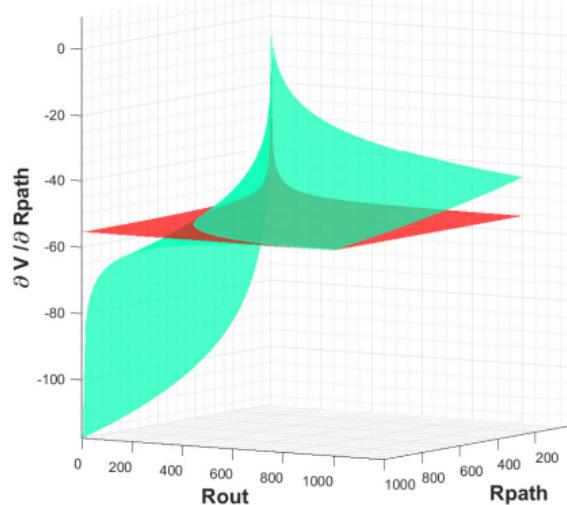
Zapojení 4 pinů





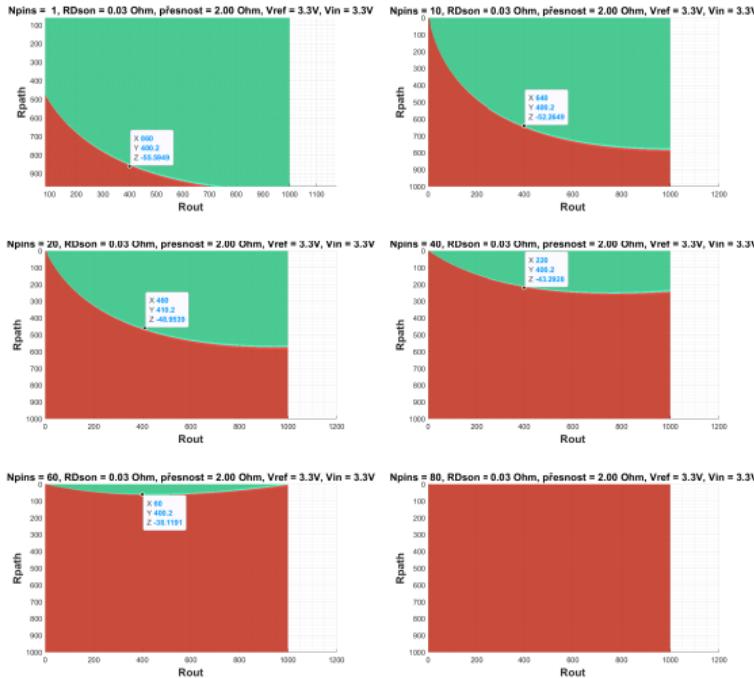
$$\frac{V_{ref}}{2^{12}} + \frac{V_{in} \cdot R_{DSon}^P}{R_{out}/N_{pins} + R_{DSon}^P} < \left| \frac{\partial V_{out}}{\partial R_{path}} \cdot \Delta R_{path} \right|$$

Npins = 1, RDson = 0.03 Ohm, přesnost = 2.00 Ohm, Vref = 3.3V, Vin = 3.3V



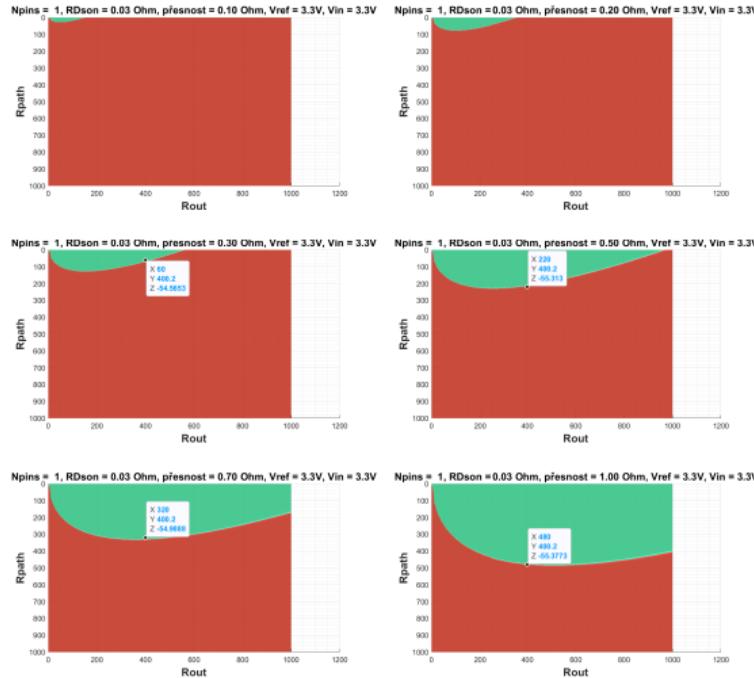
Volba Rx: vliv paralelních cest

- 1 až 80 pinů
- přesnost 2Ω



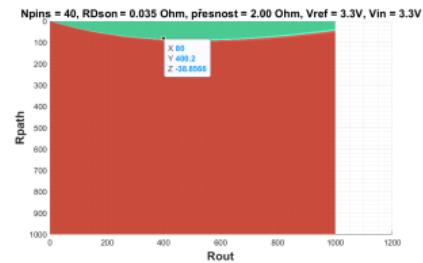
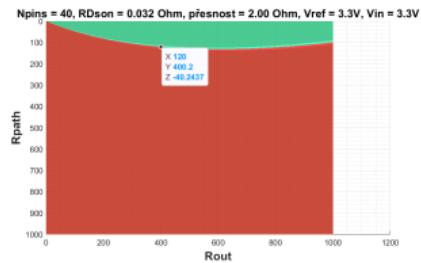
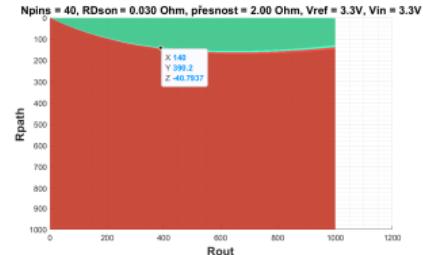
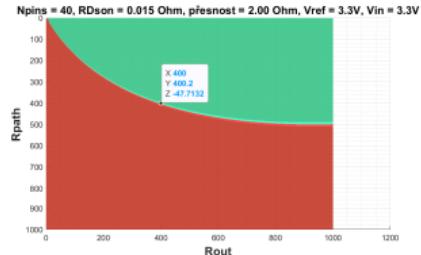
Volba Rx: Maximální přesnost

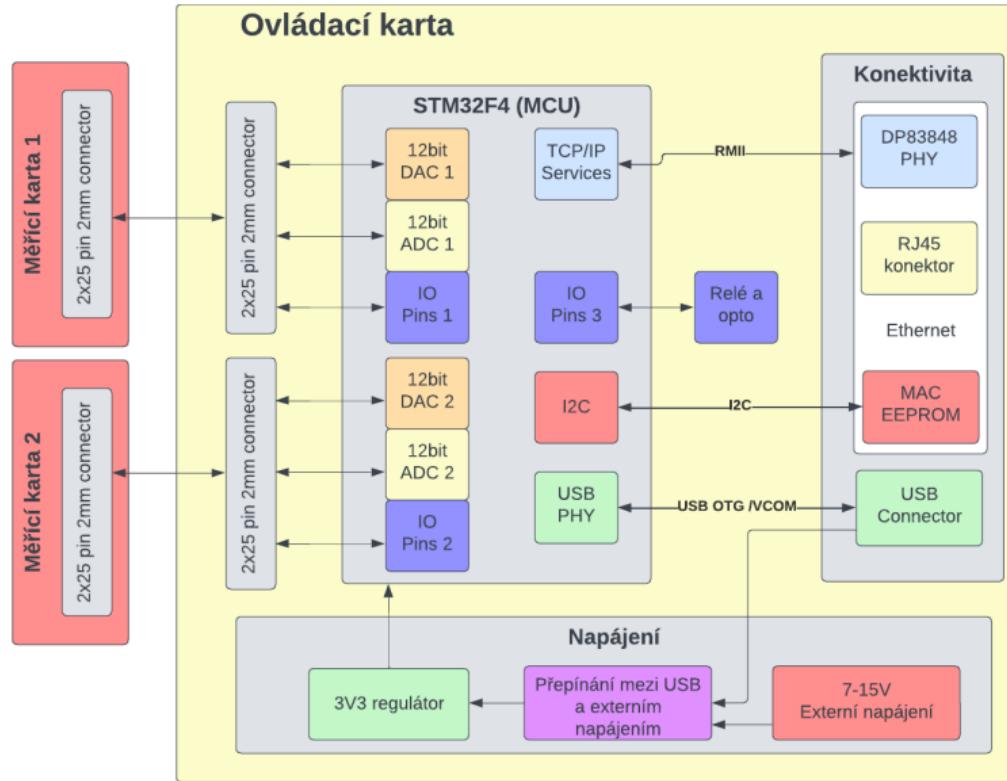
- pouze 1 pin
- přesnost 0.03 - 1Ω



Volba Rx: Vliv RDSOn

- 40 pinů
- přesnost 2Ω
- RDSOn $15-35\text{ m}\Omega$





PC aplikace 1/2

ICT tester of tester

Routing Probe Test Auto Test

Net viewer

ID	B	r	c	x	y	type	spring	testpoint	Node	Testpoint
457	2.0	13.88	69.0	64102.0	21496.0	Pin			1%SIGN452	
458	2.0	13.0	72.0	72672.0	5779.0	Pin				
459	2.0	13.0	75.0	61342.0	5779.0	Pin				
460	2.0	13.89	77.0	59624.0	22394.0	Pin			1%GND	
461	2.0	12.93	74.0	65052.0	44030.0	Pin				
462	2.0	12.89	73.0	68862.0	3996.0	Pin				
463	2.0	12.91	71.0	70482.0	4242.0	Pin				
464	2.0	12.91	5.0	327942.0	4227.0	Pin			1%GND	
465	2.0	12.63	76.0	57432.0	-626.0	Offset				
466	2.0	17.07	1.8	340078.0	-78196.0	100 mil	1 N	2%tp212.1	2%T201	
467	2.0	17.49	1.8	340078.0	-85595.0	100 mil	1 N	2%tp111.1	2%KL30V	
468	2.0	17.5	3.8	332577.0	-85644.0	100 mil	1 N	2%tp109.1	2%GND	
469	2.0	17.08	5.0	327978.0	-78346.0	100 mil	1 N	2%tp222.1	2%SGN449	
470	2.0	17.42	5.0	327978.0	-84970.0	100 mil	1 N	2%tp205.1	2%GN4409	
471	2.0	17.12	6.1	323926.0	-79019.0	100 mil	1 N	2%tp230.1	2%PSL_PWM11	
472	2.0	17.24	6.1	323827.0	-81244.0	100 mil	1 N	2%tp202.1	2%PSL_PWM13	
473	2.0	17.05	6.9	320528.0	-77846.0	100 mil	1 N	2%tp303.1	2%PL_PWM14	
474	2.0	17.15	7.7	317678.0	-79544.0	100 mil	1 N	2%tp207.1	2%SGN4429	
475	2.0	17.38	7.8	317378.0	-83596.0	100 mil	1 N	2%tp198.1	2%T203	
476	2.0	17.4	9.7	310078.0	-83995.0	100 mil	1 N	2%tp112.1	2%GND	
477	2.0	17.07	10.9	305582.0	-78196.0	100 mil	1 N	2%tp217.1	2%T203	

pin viewer

ID	length	Gauge	Color	type_from	r_from	c_from	type_to	r_to	c_to	node_name	OnDevice
23	30.0	28.0	Black	PIN	13.89	77.0	PROBE	13.76	74.8	1%GND	tpf13.1

graphic data viewer

Zoom To Fit

PC aplikace 2/2

Routing Probe Test Auto Test

Všechny průvody a testovací body

Filtrvat

ID	B	R	C	X	Y	type	Spring	testpoint	Node		
454	2.0	13.92	11.0	305082.0	22062.0	Pin			.._SIGN443		
455	2.0	13.0	49.0	160302.0	5779.0	Pin			2%GND		
456	2.0	13.0	50.0	156492.0	5779.0	Pin			2%GND		
457	2.0	13.88	69.0	84102.0	21496.0	Pin			.._SIGN452		
458	2.0	13.0	72.0	72672.0	5779.0	Pin					
459	2.0	13.0	75.0	61342.0	5779.0	Pin					
460	2.0	13.89	77.0	53622.0	22368.0	Pin			1%GND		
461	2.0	12.93	74.0	63052.0	4488.0	Pin					
462	2.0	12.89	73.0	68882.0	3896.0	Pin					
463	2.0	12.91	71.0	75482.0	4242.0	Pin					
464	2.0	12.91	5.0	327942.0	4227.0	Pin			1%GND		
465	2.0	12.63	76.0	57432.0	-826.0	Offset					
466	2.0	17.07	1.8	340078.0	-78196.0	100 mil	1 N	2%tp212.1	2%tp201		
467	2.0	17.49	1.8	340078.0	-85595.0	100 mil	1 N	2%tp211.1	2%KL30V		
468	2.0	17.5	3.8	332577.0	-85844.0	100 mil	1 N	2%tp109.1	2%GND		
469	2.0	17.08	5.0	327978.0	-78346.0	100 mil	1 N	2%tp222.1	.._SIGN430		
470	2.0	17.42	5.0	327978.0	-84397.0	100 mil	1 N	2%tp205.1	.._SIGN409		
471	2.0	17.12	6.1	323926.0	-79019.0	100 mil	1 N	2%tp220.1	.._PWM11		
472	2.0	17.24	6.1	323827.0	-81244.0	100 mil	1 N	2%tp202.1	.._PWM13		
473	2.0	17.06	6.0	323023.0	-77546.0	100 mil	1 N	2%tp203.1	.._PULSE14		
Všechna propojení vybraného testovacího bodu:											
ID	length	Gauge	Color	type_from	r_from	c_from	type_to	r_to	c_to	ode_name	OnDevice
23	30.0	28.0	Black	PIN	13.93	77.0	PROBE	13.76	74.8	1%GND	.._tp413.1

- Osazení měřící karty a odladění firmwaru
- Dokončení návrhu a výroba ovládací karty
- Bezpečnostní prvky (RACK)
- Rozšíření PC aplikace
- Mechanická konstrukce testeru
- Ověření funkčnosti a parametrů

Děkuji za pozornost!

- **Otázka 1:**

Odpověď 1

- **Otázka 2:**

Odpověď 2