

The logo for SAFIRAL, featuring a stylized blue icon of three horizontal bars on the left and the word "SAFIRAL" in blue uppercase letters on the right, all contained within a white rectangular box.


SAFIRAL

A list item consisting of two horizontal white bars on the left side, followed by the text "Tester with manual probes" in white.

**Tester with
manual probes**

What is MPT tester?

MPT – „Multi Purpose Tester“

- universal, open and customer oriented tester platform
- set of devices controlled by
- *funTEST*  SW in order to meet the product test specification



WHY funTEST?

- Easy to use
- Full control
- Adaptation to needs
- Many extensions



Optimal Characteristics

- Clear operator-interface
- Comfortable programming interface
- Unlimited process sequence control
- Open interface for HW device
- Customer solution in the form of plugins

The screenshot displays the funTEST software interface. At the top, there are logos for FPC and funTEST, along with user roles: Operator, Programátor, Administrátor, and Přihlášení. A status bar shows four colored boxes: 1 (green, DOBŘE), 2 (red, ŠPATNĚ), 3 (yellow, Testování), and 4 (grey, Připraven). To the right, a summary table shows: OK (2641), NG (19), and Package (26). Below this, a yellow box indicates 'Doba testu: 0 min, 20 sec'. The main section is titled 'Měření napětí a proudu napájecího zdroje'. A table below lists test results for various components.

Čas	Jméno kroku	Výsledek	Jednotka: Dolní limit	Horní limit	Přifaz
9:47:26.46	Supply current	49.72 mA	49.5	50.5	3
9:47:26.43	Supply voltage	3.3 V	3.27	3.33	3
9:47:26.41	C10	9.90 nF	9.9	10.1	3
9:47:26.39	C9	10.01 nF	9.9	10.1	3
9:47:26.37	C8	9.99 nF	9.9	10.1	3
9:47:26.34	C7	9.96 nF	9.9	10.1	3
9:47:26.31	C6	99.64 nF	99	101	3
9:47:26.29	C5	99.08 nF	99	101	3
9:47:26.27	C4	99.22 nF	99	101	3
9:47:26.25	C3	0.99 uF	0.99	1.01	3
9:47:26.22	C2	1 uF	0.99	1.01	3
9:47:26.20	C1	10.11 uF	9.9	10.1	3
9:47:26.18	R10	0.99 Ohm	0.99	1.01	3
9:47:26.15	R9	1.01 kOhm	0.99	1.01	3
9:47:26.13	R8	1.01 kOhm	0.99	1.01	3
9:47:26.11	R7	1.01 kOhm	0.99	1.01	3

At the bottom, a status bar shows: Projekt: Testovací soubor: PCB PCB-2020-09-A, Operátor: FPC. A progress bar at the bottom right shows a red 'X' and the text 'Zavít'.

Easy programming

- Based on spreadsheets
- Sequences
- Easy editation
- Canned commands

Label	Exec	Step name	Comment (Error message)	Judge	Target value	Unit	Lo limit	Hi limit	Result	Show	Return status	Return value	Delay ID	Matrix	Command (Device)
17											0				#cont
18	1										1				#cont
19	main										3				#panel
20											9				#cont
21	cycle										9				#panel
22	1										9				#cont
23	1		R1		100kOhm	99	101	100.53	1	OK	128285				#pget
24	1		R2		100kOhm	99	101	99.67	1	OK	128281				#pget
25	1		R3		100kOhm	99	101	100.26	1	OK	128296				#pget
26	1		R4		10kOhm	9.9	10.1	10.07	1	OK	128312				#pget
27	1		R5		10kOhm	9.9	10.1	10.09	1	OK	128343				#pget
28	1		R6		10kOhm	9.9	10.1	9.97	1	OK	128359				#pget
29	1		R7		1kOhm	0.99	1.01	0.99	1	OK	128390				#pget
30	1		R8		1kOhm	0.99	1.01	1.01	1	OK	128406				#pget
31	1		R9		1kOhm	0.99	1.01	1	1	OK	128421				#pget
32	1		R10		10m	0.99	1.01	1.01	1	OK	128453				#pget
33															
34	1		C1		10uF	9.9	10.1	9.97	1	OK	128486				#pget
35	1		C2		1uF	0.99	1.01	1	1	OK	128500				#pget
36	1		C3		1uF	0.99	1.01	0.99	1	OK	128515				#pget
37	1		C4		100nF	99	101	99.97	1	OK	128546				#pget
38	1		C5		100nF	99	101	100.23	1	OK	128562				#pget
39	1		C6		100nF	99	101	101.03	1	OK	128593				#pget
40	1		C7		10nF	9.9	10.1	9.92	1	OK	128609				#pget
41	1		C8		10nF	9.9	10.1	9.91	1	OK	128625				#pget
42	1		C9		10nF	9.9	10.1	10.04	1	OK	128656				#pget
43	1		C10		10nF	9.9	10.1	10.03	1	OK	128687				#pget
44															
45	1		Supply voltage		3.3V	3.27	3.33	3.28	1	OK	128703				#pget
46	1		Supply current		50mA	49.5	50.5	49.75	1	OK	128718				#pget
47															
48	1										4				#cont
49	0										OK				#goto
50	1										5				#cont
51	0										OK				#goto
52															
53															
54															
55	1										OK				#goto
56															
57	nothing														#return
58															
59															
60															
61															

Wide hardware support

- Equipped basic package
- (I/O, DMM, converters, cameras, ...)
- Optional plugins
- Tuning and graphical control

The screenshot displays the funTEST software interface, which is designed for managing test stations. The main window, titled "Administrace", shows a list of connected test stations with their respective hardware details and status indicators. The hardware supported includes:

- MatrixBox MX2400**: A series of test boxes with various interfaces like IO interface, Matrix, and Multimeter.
- DSO-X 2000 Oscilloscope**: An Agilent Technologies oscilloscope.
- Keysight Technologies 34465A**: A digital multimeter.
- Serial COM**: A serial communication module.

Below the hardware list, there are two data tables showing IO status for a specific MatrixBox MX2400IO. The "Vstupy" (Inputs) table shows status for pins 15 through 8, and the "Výstupy" (Outputs) table shows status for pins 7 through 0. The status is indicated by green circles (0) and red circles (1).

Vstupy	15	14	13	12	11	10	9	8
Value	0	0	0	0	0	0	0	0

Výstupy	7	6	5	4	3	2	1	0
Value	0	0	0	0	redbín	p33ín	p16ín	future

At the bottom, a detailed schematic diagram of a test setup is visible, showing the connection of various components like the MatrixBox and the oscilloscope to a test board.

Extendability

- Device integration (API)
- Customer plug SW options
- Open plugin-interface

The screenshot displays the FPC funTEST software interface. The main window shows the 'Správce plug-inů' (Plugin Manager) window, which lists installed and available plugins. Below it, the 'Systém plug-inů zařizení' (System Plug-in Device) window shows the status of various hardware components. In the foreground, a color calibration chart is visible, showing a color gradient from blue to red with numerical labels for color values.

Správce plug-inů
Seznam a správa načtených plug-inů
C:\Program Files\FunTEST\plugins\

Typ	Podtyp	Jméno	Vyžadovaná licence	Verze knihovny
FunTest.Plugin.Login	standard	Standard local-file based login	Ne	1.3.2003.1717
FunTest.Plugin.Login	nvision	NVision HTTP-based login	Ne	1.1.2003.1815
FunTest.Plugin.Login	terfid	TE Connectivity RFID login	Ne	1.0.2003.1915

Systém plug-inů zařizení
C:\Program Files\FunTEST\plugins\devices\

Jméno	Titulek	Externí proces	Licence	Verze	Zařizení	Popis
FpcMatrixBoxV2	MatrixBox MX400 series	Není spuštěn		2.4.1812.312		FPC USB MatrixBox MX400 series (F...
<input checked="" type="checkbox"/>	FpcMx2400	MatrixBox MX2400	▶ Spuštěn, PID: 6344, spuštěn v 09.08.21 (132/613ms)	Ne	1.1.2009.1513	4 Ethernet MatrixBox MX2400 series wit...
<input checked="" type="checkbox"/>	FpcRelayBoard	Relay Boards	▶ Spuštěn, PID: 1860, spuštěn v 09.08.22 (130/289ms)	Ne	1.2.1812.608	1 FPC RS-232/USB 40x24/40x6A relay...
<input checked="" type="checkbox"/>	Keylight	Keylight I/O devices	▶ Spuštěn, PID: 3748, spuštěn v 09.08.23 (109/846ms)	Ne	2.2.2009.1816	3 VISA COM I/O compatible devices su...
<input type="checkbox"/>	Lipowsky	Lipowsky Baby-LIN interfaces	○ Není spuštěn	2.0.1902.1112		1 InvenSense, Inc. Interconnect, I.M.I.C.4...
<input type="checkbox"/>	PowerSupplies	Power supplies	○ Není spuštěn			
<input checked="" type="checkbox"/>	SerialCom	Serial communication	▶ Spuštěn, PID: 6464, spuštěn v 09.08.21 (132/613ms)	Ne	1.1.2009.1513	4 Ethernet MatrixBox MX2400 series wit...
<input checked="" type="checkbox"/>	TcpCom	TCP COM	○ Není spuštěn			

Color Calibration Chart

The chart shows a color gradient from blue (top-left) to red (bottom-right). Numerical labels for color values are provided at various points on the chart:

- 520 (top-left)
- 540 (top)
- 560 (top-right)
- 580 (right)
- 600 (right)
- 620 (right)
- 700 (bottom-right)
- 490 (left)
- 480 (bottom-left)
- 470 (bottom-left)
- 380 (bottom)

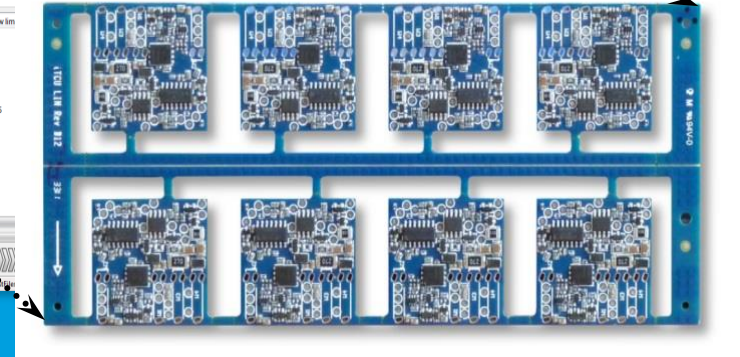
Project: PCB PCB-2020-09-A Operator: Administrator

Optional modules

- Panel test
- Multitest
- Batch test
- Dummy test
- Shared config option

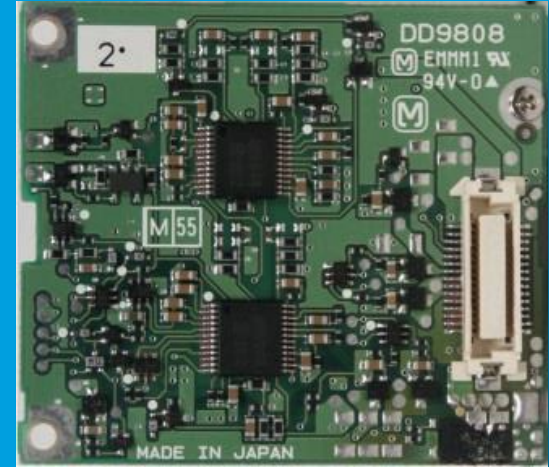
The screenshot shows the funTEST software interface. At the top, there are logos for FPC, funTEST, and FT. Below the logos is a dashboard with eight colored boxes representing test results: 1 PASS (green), 2 PASS (green), 3 FAIL (red), 4 PASS (green), 5 PASS (green), 6 PASS (green), 7 Testing (yellow), and 8 Ready (grey). To the right of the dashboard, there is a 'Counter name' section with 'OK' (3228) and 'NG' (25) counts. Below the dashboard, the text 'Check of LIN transceiver, part #7' is displayed.

Time	Step name	Result	Unit	Low lim
14:57:08.20	Load resistor voltage test	31.29	[R]	26
14:57:10.25	D2 zener voltage test	9.45	[V]	8
14:57:12.30	Check of basic LIN communication	0x0012,0x00,0x00		
14:57:13.32	Sensor 1 temperature - temperature value	22.62	[°C]	15
14:57:13.64	Sensor 1 temperature - temperature value	22.97	[°C]	15
14:57:13.66	Sensor 1 & Sensor 2 difference	0.35		
14:57:14.99	BV measure - median	394	[I]	375
14:57:15.13	BV measure MSB readback	1	[I]	
14:57:15.22	BV measure LSB readback	1	[I]	



What a MPT tester can do?

- PCB and electronic product subassemblies tests
- Automatic programming of circuits
- Final product EOL tests
- Optical tests and controls
- Automatic testing and assembly processes with intermediate control in cooperation with PLC
- High-voltage tests



What can a MPT tester look like?

- simplest option – operator's table with the devices and PC control
- complex option – 19" rack with interface for quick adapter replacement and contacting
- Customization, including possible connection to third-party devices, typically a connection to an In-Line handler




How to test small series?


Frequent objection: investment to bed-of-nails fixture is not economical for small series

FPC solution:
MPT with manual probes



MPT with manual probes – test without the adapter

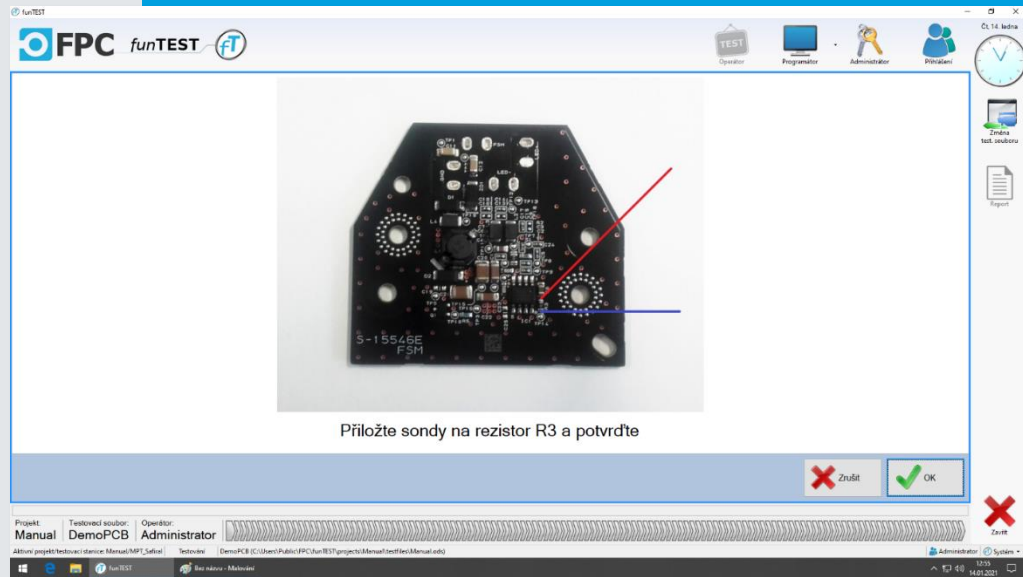
MPT with *funTEST* 
+ modul with connectors and
manual probes + foot pedal

Program block in *funTEST* 
easy na intuitive steps

Spustit	Jméno procedury	Jméno měření	Instrukce pro obsluhu	Ilustrační obrázek	Minimum	Maximum	Jednotka	Násobitel	Nastavení přístroje	Retest	Uložit
1	infoDialog		Připojte testovaný výrobek dle obrázku	Connect1.jpg							
1	measDmm	Odpor R1	Přiložte sondy na tyto body a potvrďte	R1.jpg	1,2	1,5	kOhm	1,00E-03	RES 10000	1	1
1	measDmm	Odpor R2	Přiložte sondy na tyto body a potvrďte	R2.jpg	100	120	Ohm	1,00E+00	RES 1000	1	1
1	measDmm	Kapacita C1	Přiložte sondy na tyto body a potvrďte	C1.jpg	10	15	uF	1,00E+06	CAP 1E-4	1	1
1	measDmm	Kapacita C2	Přiložte sondy na tyto body a potvrďte	C2.jpg	100	150	nF	1,00E+09	CAP 1E-6	1	1
1	measDmm	Napeti V1	Přiložte sondy na tyto body a potvrďte	V1.jpg	3,2	3,3	V	1,00E+00	VOLT:DC 10	1	1
1	measDmm	Napeti V2	Přiložte sondy na tyto body a potvrďte	V2.jpg	1,2	1,3	V	1,00E+00	VOLT:DC 10	1	1
1	powerOn								VOLTAGE 3.6		
1	measPsuI	Napajeci proud			10	25	mA	1,00E+03		0	1
1	infoDialog		Připojte testovaný výrobek k programát	Connect2.jpg							
1	flashMcu	Programovani								1	1
1	powerOff										

MPT with manual probes – test without the adapter

- „electronic guide“
- Pictures (photos) with positions for placing probes
- Text instructions
- Step confirmation with foot pedal



MPT with manual probes – test without the adapter

The screenshot displays the funTEST software interface. The main window title is "funTEST". The top left corner features the FPC funTEST logo. The top right corner includes user role icons for Operator, Programator, Administrator, and Přihlášení, along with a clock showing "Út, 14. ledna".

The central area is titled "Testování" (Testing) on a green background. A dialog box is overlaid on this area, containing the text: "Hodnota mimo limit. Opakovat měření?" (Value out of limit. Repeat measurement?) and "51,278 Ohm vs. 5100 až 5300 Ohm". The dialog has two buttons: "Zrušit" (Cancel) and "Opakovat" (Repeat).

On the right side, there is a summary table:

OK	1
NG	1
Dávka	DemoPCB01
Velikost	20

Below the table are icons for "Změna test. souboru" (Change test file) and "Report".

At the bottom, there is a status bar with fields for "Projekt: Manual", "Testovací soubor: DemoPCB", and "Operátor: Administrator". A progress bar is visible below these fields. The Windows taskbar at the very bottom shows the system tray with the date "14.01.2021" and time "12:35".

MPT with manual probes – test without the adapter

The screenshot displays the funTEST software interface. At the top left, the FPC funTEST logo is visible. The main area features a large green banner with the word "DOBŘE" (Good) in white text. To the right of the banner, a summary table shows 2 OK results and 1 NG result. Below this, a table lists test parameters: "Dávka" (Batch) as "DemoPCB01" and "Velikost" (Size) as "20". The central message reads "Test úspěšný, pokračujte pedálem" (Test successful, press the pedal). A detailed test results table is shown below, listing components like C12, C11, D2, D1, L4, L1, R5, and R3 with their respective values and limits. The bottom status bar shows the project name "Manual", test station "DemoPCB", and operator "Administrator". The Windows taskbar at the bottom indicates the date and time as 12:57 on 14.01.2021.

Čas	Jméno kroku	Výsledek	Jednotka	Dolní limit	Horní limit
12:57:21.09	C12	100.34	nF	80	120
12:57:16.27	C11	98.95	nF	80	120
12:57:11.10	D2	0.37	V	0.3	0.4
12:57:05.78	D1	0.61	V	0.5	0.7
12:56:55.65	L4	0.59	Ohm	0.5	1.2
12:56:48.05	L1	0.84	Ohm	0.7	1.4
12:56:43.11	R5	51.28	Ohm	48	54
12:56:30.63	R3	5174.37	Ohm	5100	5300

MPT with manual probes – test without the adapter

Test report

Created: 14.01.2021 13:04:05 by Administrator


Product: DemoPCB

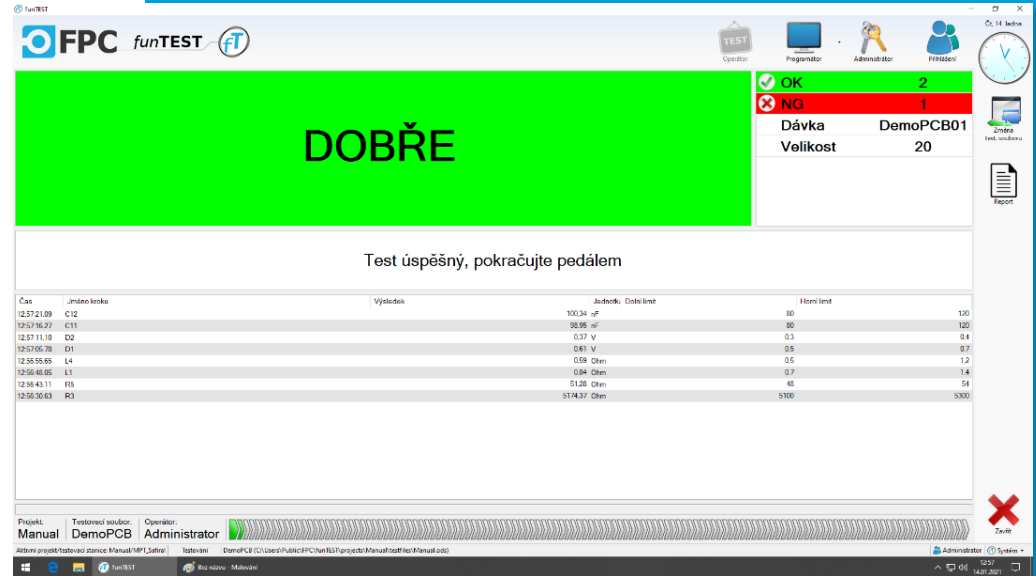
Batch: DemoPCB01 (4 pcs)

Serial number: 2

Test step	Measured value	Unit	Result
R3	5192,8	Ohm	Pass
R5	51,25	Ohm	Pass
L1	0,83	Ohm	Pass
L4	0,59	Ohm	Pass
D1	0,61	V	Pass
D2	0,37	V	Pass
C11	98,94	nF	Pass
C12	98,94	nF	Pass

MPT with manual probes – test without the adapter

- MPT with *funTEST* 
- automation, visualization
- Reduction of operator qualification requirements
- Recording of test results
- report for the customer
- FPC service
- Easy addition of an adapter when production increases



The screenshot displays the funTEST software interface. At the top, there are logos for FPC, funTEST, and the funTEST logo. The main area features a large green banner with the word "DOBŘE" (Good) in white. Below this, a message reads "Test úspěšný, pokračujte pedálem" (Test successful, press the pedal). To the right, a summary table shows the test results:


OK	2
NG	1
Dávka	DemoPCB01
Velikost	20

Below the message is a table of test results:

Čas	Jedno kroužek	Výsledek	Jednotka	Dolní limit	Horní limit	
12:57:21.09	C12		100.34	9F	80	120
12:57:30.29	C11		98.95	9F	80	120
12:57:11.19	D2		0.37	V	0.3	0.4
12:57:06.78	D1		0.61	V	0.5	0.7
12:56:58.85	L4		0.59	Ohen	0.5	1.2
12:56:40.85	L1		0.94	Ohen	0.7	1.4
12:56:43.11	F5		51.28	Ohen	48	54
12:56:30.63	R3		374.37	Ohen	5100	5300

At the bottom, the interface shows the project name "Manual", test board "DemoPCB", and operator "Administrator". The Windows taskbar at the very bottom shows the date and time as 12:23 on 14.01.2021.

MPT with manual probes – test without the adapter

- FPC service
- Tester proposal after the consultation with the customer – parameters according to needs
- Installation and activation of the tester
- Installation at customer's place, connection to the database
- Sample test programs
- *fun***TEST**  training



Who already uses MPT testers from FPC?

- 100 satisfied customers from all over the world
- 400 installations from simple to complex testers, including automated lines and carousels
automatizovaných linek a karuselů
- companies from EMS, Automotive, Industry, Aerospace, Wire Harness fields of application



**Test equipment purchased from FPC
s.r.o.**

Contact person: Luboš Bejček / e-mail:
lubos.bejcek@fpc.cz





**We are looking forward
to our cooperation.**

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