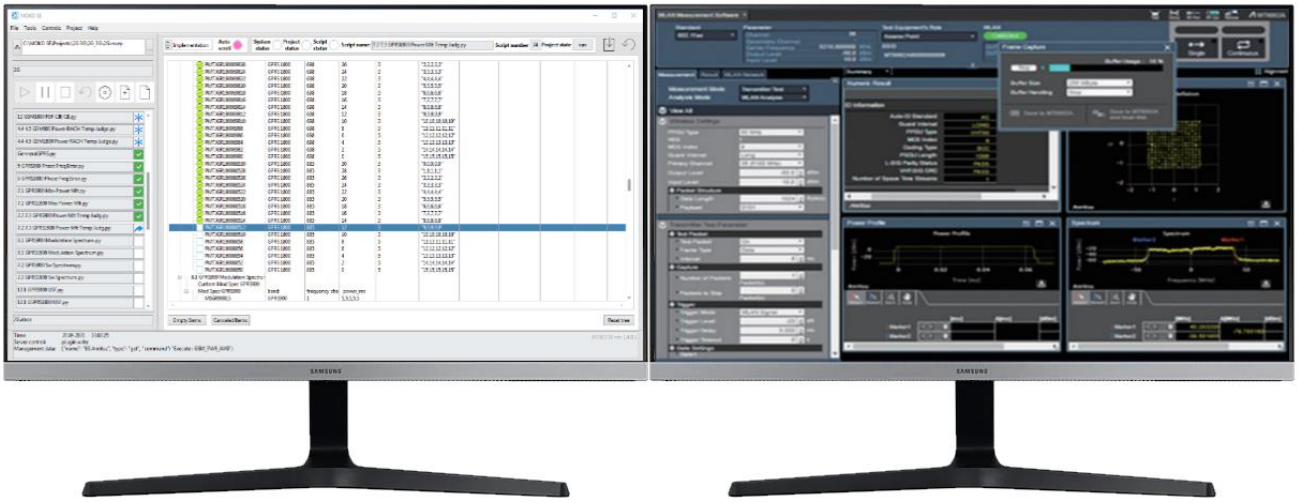
MOKO

development of electronics and software

MOKO SE

Automation of measurements in production and laboratories



MOKO SE

MOKO NMEA

MOKO MODEM

MOKO SA R&S

MOKO BS ANRITSU

MOKO CLICK

MOKO FMC v2

MOKO LM

MOKO TM

MOKO ULC

MOKO WPC

MOKO ExPlugin

Moko.by

Content

Introduction

MOKO SE software is a software product that allows you to quickly develop automated workstations for testing and certification laboratories, as well as set up workflows in production, automated lines, etc.

MOKO SE software allows:
- create, edit scenarios for controlling technological processes and combine them into complex projects;
- control devices if there is an interface and third-party programs if they have an open control system;
- control the input of information and connection to various databases if you have access to them;
- edit auxiliary windows of the program for registration of samples, environmental conditions, etc.
- display the stages of testing, verification, technological processes;
- automatically generate and edit protocol templates in Microsoft Word, including filling in string fields and tables, inserting images (graphs);
- save the results of verification, calibration, tests.

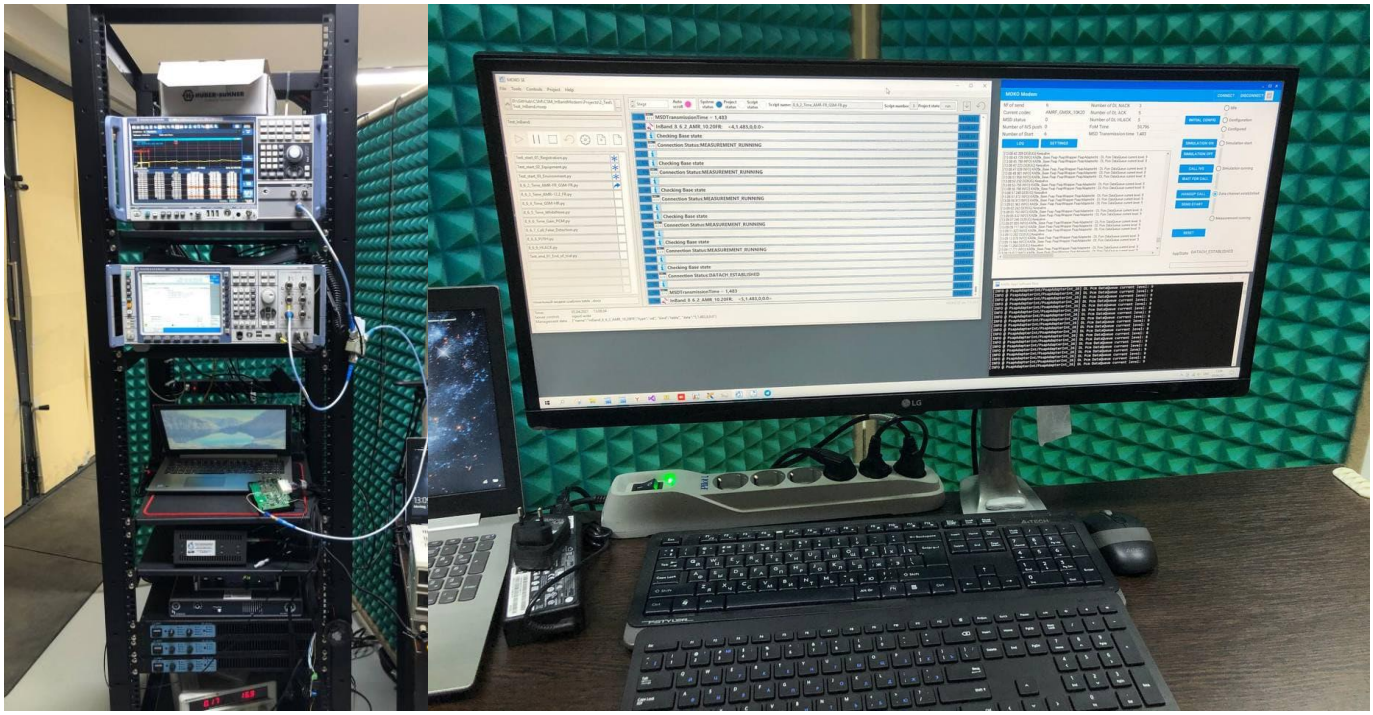


Figure 1 - AWS for testing wireless communication modules of in-vehicle emergency call systems / devices in accordance with GOST 33470-2015.

The solution based on MOKO SE software complies with modern and future trends in the field of testing communications and provides automatic display of measurement results in protocols in the form of images (graphs, screenshots, diagrams, spectrograms, photographs).

Architecture

MOKO SE software architecture has no development restrictions and is capable of solving problems of any complexity.

Due to its flexible modular architecture, **MOKO SE software** is able to adapt to the tasks of any scale and customer: from small factories or small enterprises to corporations with many years of experience in the development and production of control and measurement instruments (such as Keysight, Anritsu, Rohde & Schwarz, Fluke, etc.).

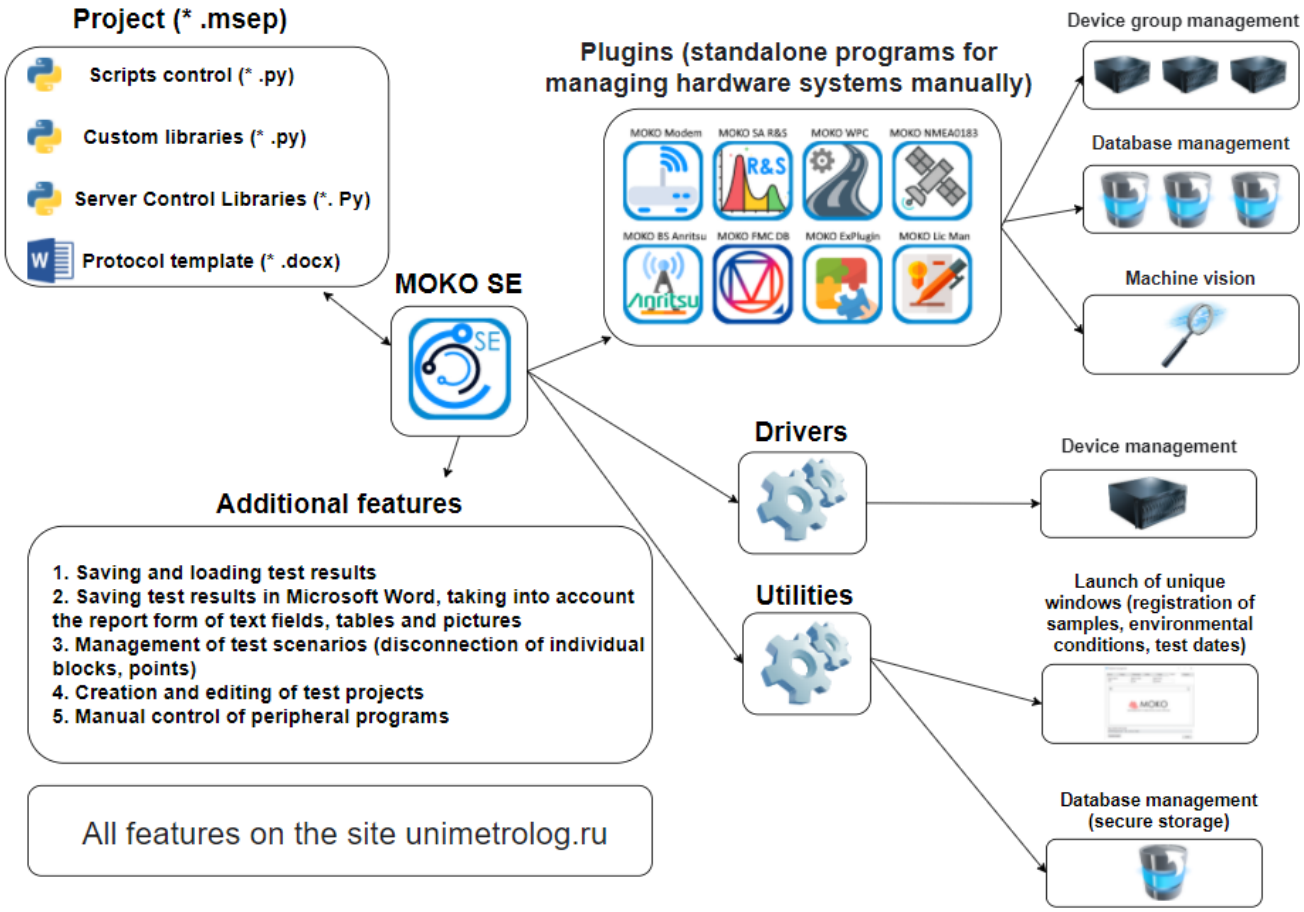


Figure 2 - **MOKO SE software** architecture.

MOKO SE software allows you to change the smallest requirements in the tests being carried out, since the source code of the test scripts is written in the Python programming language and can be opened by any text editor or development environment.

Together with **MOKO SE software** examples are supplied for developing your own drivers, plug-ins and utilities, as well as patterns in the Python programming language for creating your own measurement and device control scripts.

Table 1 - List of basic possibilities for programming in the software "MOKO SE"

1	Creation of scripts for control of technological processes in the Python programming language and combining them into complex projects
2	Controlling devices and third-party programs through drivers and plugins
3	Control of entered information and connection to various databases through utilities
4	Development of your own drivers, plugins and utilities
5	Automatic generation of reporting Microsoft Word documents containing information in the form of separate lines, tables and images, according to user-specified templates
6	Debugging programs using popular IDEs
7	Connection of the MOKO TM mobile application and the MOKO DB database

Reviews

Reviews of automated workstations based on MOKO SE software were provided by the following organizations (copies are attached):

- Public corporation "Testing and certification of household and industrial products" BELLIS ", Republic of Belarus, Minsk;

- Limited Liability Company "CENTER FOR CERTIFICATION OF MICROELECTRONICS" (LLC "TsSM"), Russian Federation, the city of Moscow;

- Limited Liability Company “First Metrological Center” (LLC “PMTs”), Russian Federation, city of Moscow;

Additional questions about MOKO SE software:
Mail: **info@moko.by**
Phone: +375 29 610 55 55

Translation

Review

Within three months, the specialists of the MOKO company were able to implement the MOKO SE software platform at our enterprise and prepare, according to the customer's specifications:

Automated workstation for testing communications equipment for compliance with clauses 5.10, clause 5.13 STB 1356-2011 “Land mobile service. Mobile telecommunication systems. Requirements for radio equipment "

The MOKO SE software platform has many useful features:

- Creation, editing of the test scenario, integration into an integrated system;

Controlling Anritsu MT8820C using a plugin;

Formation of graphs of measured values, for argumentation of the solution of controversial issues;

Automatic generation of a report in Microsoft Word containing information in the form of separate lines, image tables (graphs), according to user-specified templates;

Debugging programs through popular IDEs;

Connection of the mobile application "MOKO TM" and the database "MOKO DB".

Thanks to the implementation of the MOKO SE software platform, the speed of testing has significantly accelerated, which in the future will definitely be reflected in the form of a positive economic effect.

Head of an accredited testing laboratory **V.V. Savchenko**

Translation

Review

As a result of the implementation of the **MOKO SE software** at our enterprise, MOKO specialists in the shortest possible time developed and adapted the following automated workstations to the needs of our testers:

- automated workstation for testing GNSS modules in accordance with GOST 55534-2013 and GOST 33471-2015;
- an automated workstation for testing wireless communication modules of a device / system of calling emergency services in accordance with GOST 33470-2015 in part “8 Test methods for a device / calling system emergency operational services in terms of implementing the functions of a tone modem ”;
- automated workstation for testing wireless communication modules of a device / system calling emergency services in accordance with GOST 33470-2015 in part 6, 7 “Test methods for a device / call system emergency services regarding the implementation of GSM and UMTS modem functions ”.

The MOKO SE software platform has many useful features:

- Creation of scripts for control of technological processes in the Python programming language and combining them into complex projects;
- Controlling devices and third-party programs through drivers and plugins;
- Control of the entered information and connection to various databases through utilities;
- Development of your own drivers, plugins and utilities;
- Automatic generation of reporting documents in Microsoft Word containing information in the form of separate lines, tables and images (graphs), according to user-specified templates;
- Debugging programs through popular IDEs;
- Connection of the mobile application "MOKO TM" and the database "MOKO DB".

As a result of the implementation of the software platform "MOKO SE" the work of the laboratory, which affected the profit, and also not to increase the staff, since

the software "MOKO SE" was easily integrated into the business processes of the laboratory.

Chief Executive Officer **Romadin Vladimir Olegovich**

Translation

Review

After the implementation of the **MOKO FMC DB software**, compatible with the MS SQL database, and adaptation to the business processes of our organization, the following tasks were automated for us:

- accounting of the customer base, the base of verified measuring instruments, the reference base;
- registration of applications for work;
- accounting of measuring instruments coming into verification with the preparation of accompanying documents;
- accounting of the work carried out on the verification of measuring instruments and the transfer of the verification results to the Federal Information Fund for Ensuring the Uniformity of Measurements;
- registration of certificates of verification and notices of unsuitability based on the results of verification;
- preparation of the verification protocol according to the user form;
- registration of journals on the performed verifications, on the control of environmental conditions.

Among the capabilities of MOKO FMC DB software, the following can be noted, which are especially useful for the implementation of business processes of our organization:

- work with software on several computers in an organization's network;
- using passwords to restrict access to software;
- secure storage and access to documents, application files, issued invoices;
- formation of an xml file based on information from the database for transferring the results to the FIF OEI;
- generation and secure storage of doc and xls files of verification and testing according to custom templates;
- storage of all data in a single database, which allows convenient backup and archiving;

As a result of the implementation of the **MOKO FMC DB software**, the efficiency of the work of employees has increased, the time spent on the activity of accepting measuring instruments for verification, registration and transfer of verification results, and the formation of reporting documents has significantly decreased.

Deputy General Director LLC "PMC" for metrology **Kofiadi I.A.**

Creation, editing of scenarios, control of test processes

The main feature of **MOKO SE software** is the creation of process control scripts in the Python programming language and their integration into complex projects.

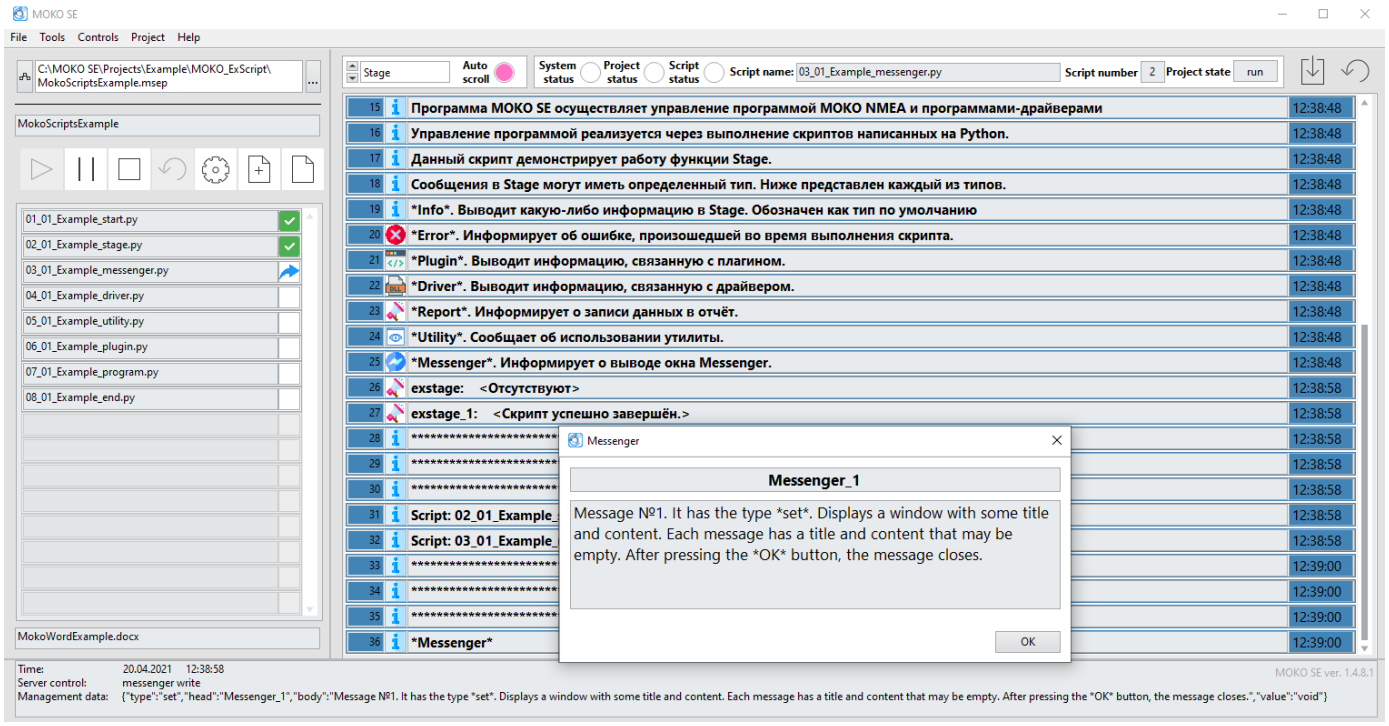


Figure 3 - Front panel of **MOKO SE software** with a running project, consisting of several demo scripts.

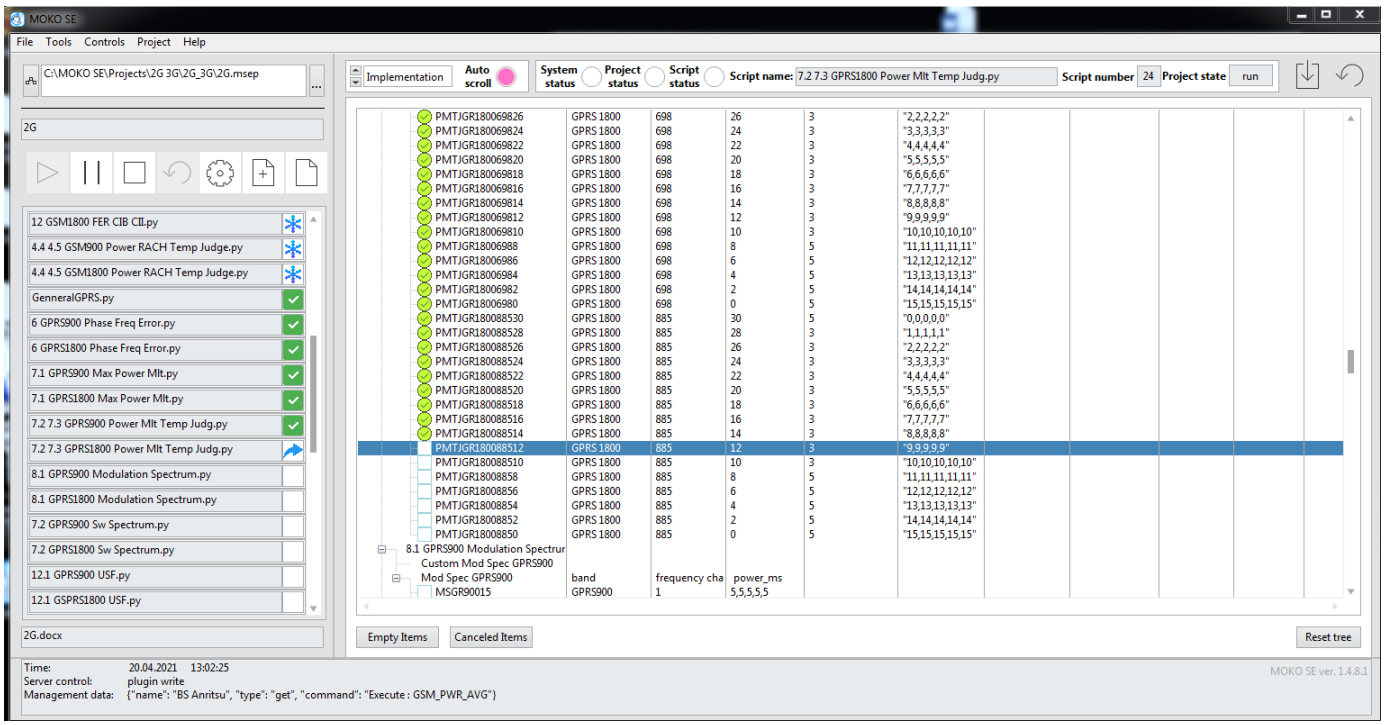
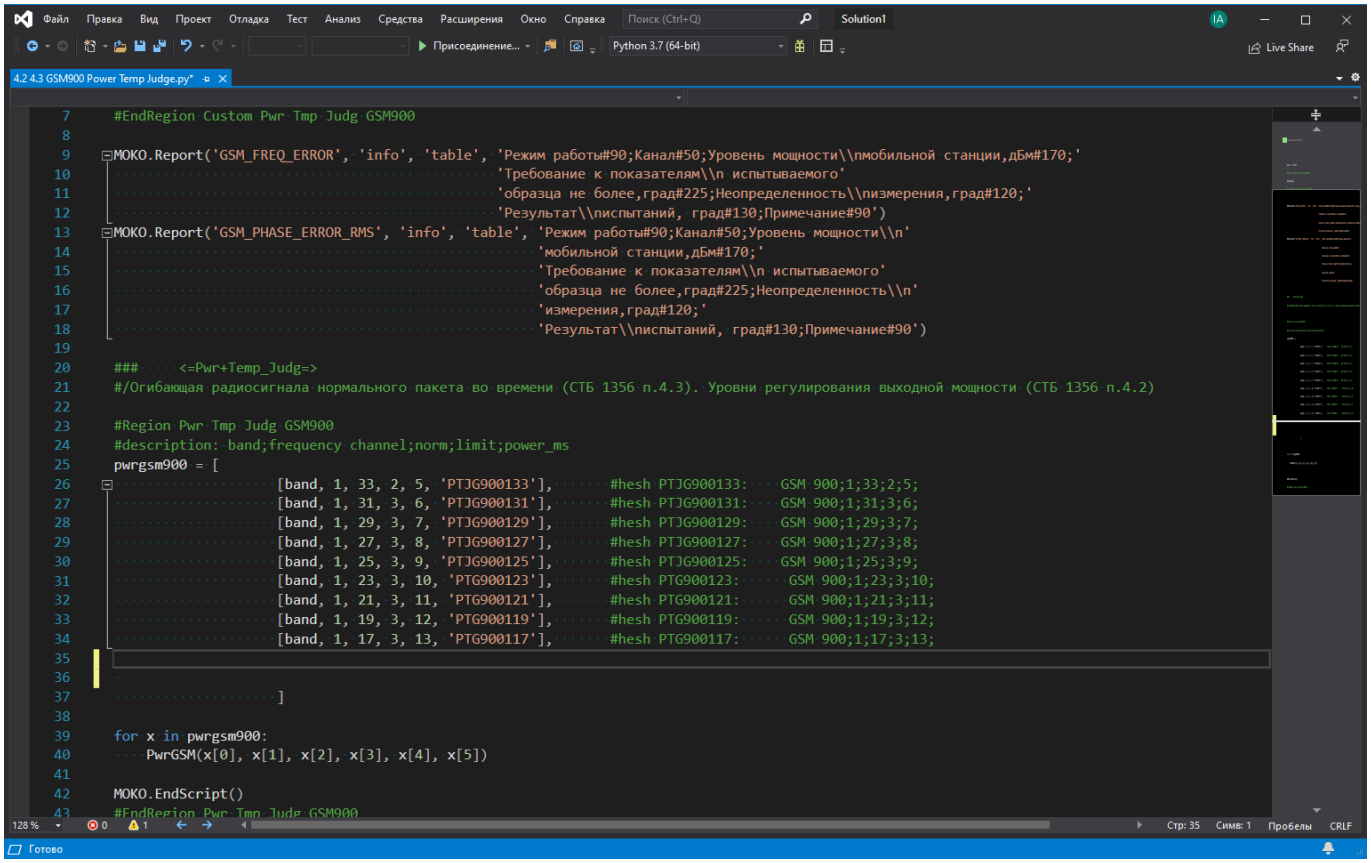


Figure 4 - Front panel of **MOKO SE software** with a running test project devices / systems of mobile radio communication for compliance with STB 1356-2011 “Systems of cellular mobile telecommunications 2G / 3G”, consisting of several demo scripts.



```
#EndRegion Custom Pwr Tmp Judg GSM900

MOKO.Report('GSM_FREQ_ERROR', 'info', 'table', 'Режим работы#90;Канал#50;Уровень мощности\\nмобильной станции,дБм#170;'
                                               'Требование к показателям\\n испытываемого'
                                               'образца не более,град#225;Неопределенность\\nизмерения,град#120;'
                                               'Результат\\nиспытаний, град#130;Примечание#90')
MOKO.Report('GSM_PHASE_ERROR_RMS', 'info', 'table', 'Режим работы#90;Канал#50;Уровень мощности\\n'
                                                    'мобильной станции,дБм#170;'
                                                    'Требование к показателям\\n испытываемого'
                                                    'образца не более,град#225;Неопределенность\\n'
                                                    'измерения,град#120;'
                                                    'Результат\\nиспытаний, град#130;Примечание#90')

###    <=Pwr+Temp_Judg=>
#/Огибающая радиосигнала нормального пакета во времени (СТБ 1356 п.4.3). Уровни регулирования выходной мощности (СТБ 1356 п.4.2)

#Region Pwr Tmp Judg GSM900
#description: band;frequency channel;norm;limit;power_ms
pwrgsm900 = [
                [band, 1, 33, 2, 5, 'PTJG900133'],      #hesh PTJG900133:    GSM 900;1;33;2;5;
                [band, 1, 31, 3, 6, 'PTJG900131'],      #hesh PTJG900131:    GSM 900;1;31;3;6;
                [band, 1, 29, 3, 7, 'PTJG900129'],      #hesh PTJG900129:    GSM 900;1;29;3;7;
                [band, 1, 27, 3, 8, 'PTJG900127'],      #hesh PTJG900127:    GSM 900;1;27;3;8;
                [band, 1, 25, 3, 9, 'PTJG900125'],      #hesh PTJG900125:    GSM 900;1;25;3;9;
                [band, 1, 23, 3, 10, 'PTG900123'],      #hesh PTG900123:     GSM 900;1;23;3;10;
                [band, 1, 21, 3, 11, 'PTG900121'],      #hesh PTG900121:     GSM 900;1;21;3;11;
                [band, 1, 19, 3, 12, 'PTG900119'],      #hesh PTG900119:     GSM 900;1;19;3;12;
                [band, 1, 17, 3, 13, 'PTG900117'],      #hesh PTG900117:     GSM 900;1;17;3;13;


                ]

for x in pwrgsm900:
    PwrGSM(x[0], x[1], x[2], x[3], x[4], x[5])

MOKO.EndScript()
#EndRegion Pwr Tmp Judg GSM900
```

Figure 5 - Script for testing the level of output power regulation (STB 1356 clause 4.2), opened in Microsoft Visual Studio

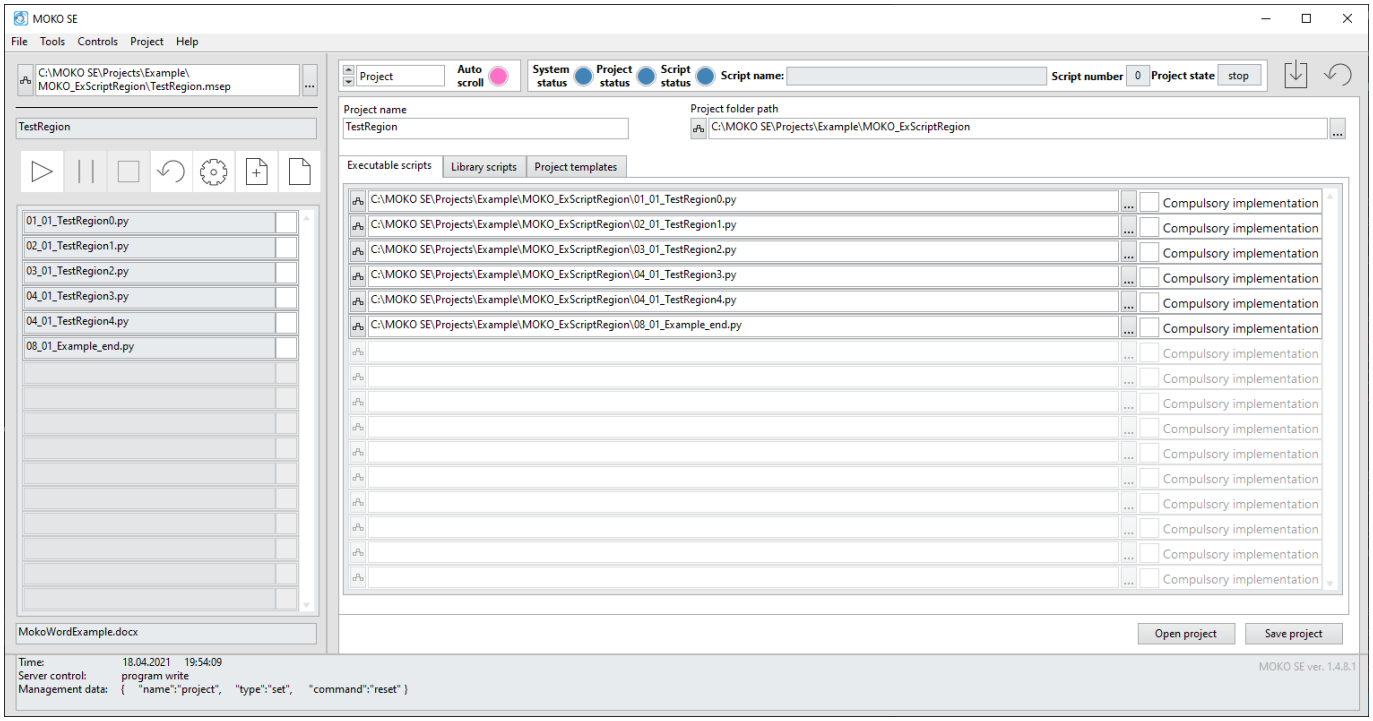
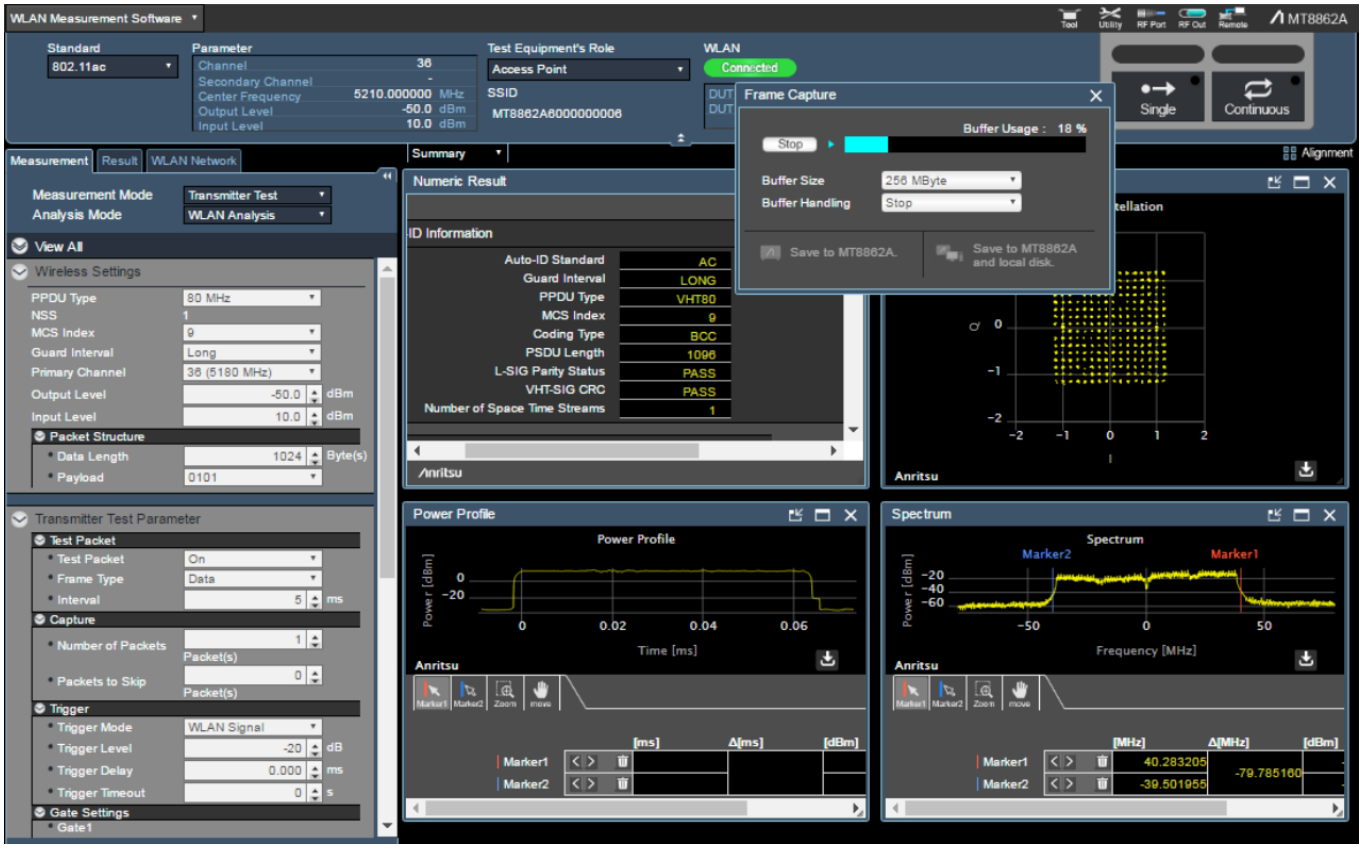


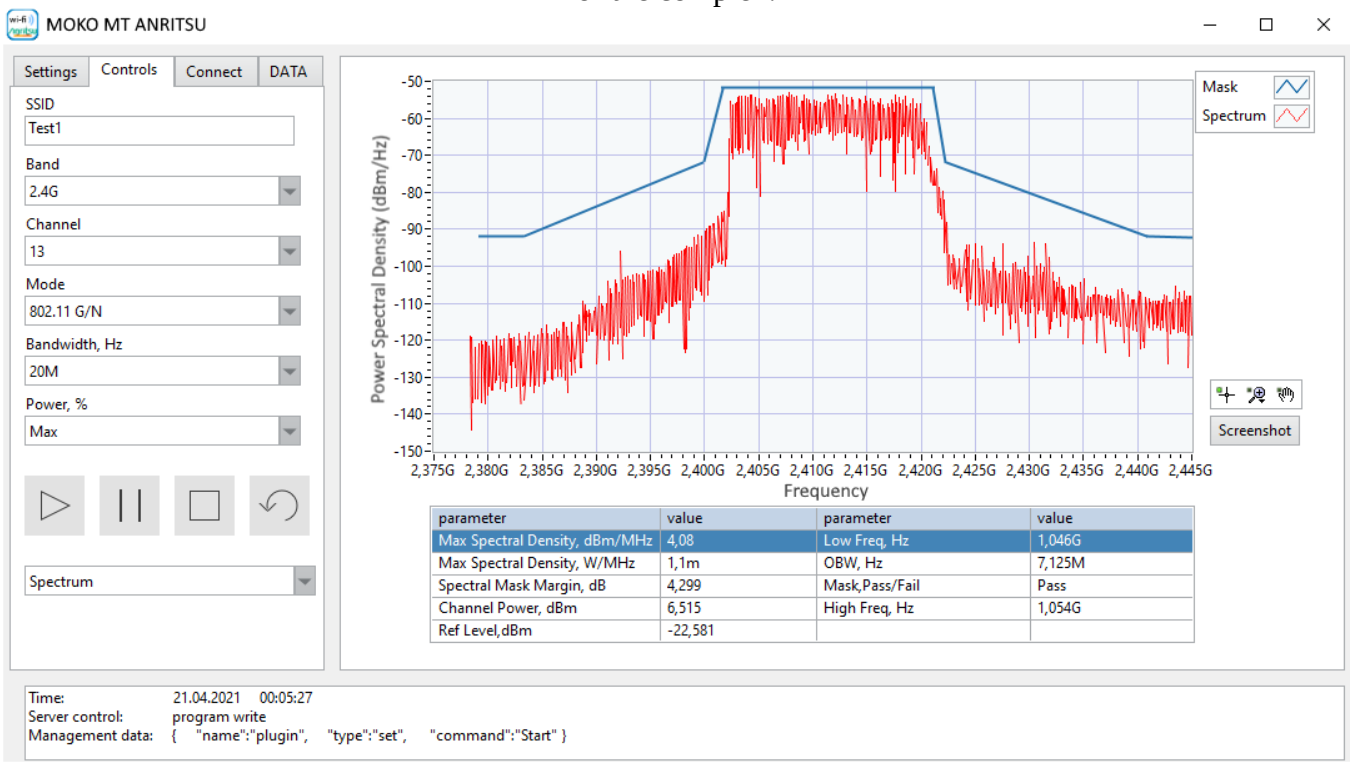
Figure 6 - Front panel of **"MOKO SE" software** with an open project editing tab (inclusion or removal of scripts, libraries and protocol templates required for testing).

Manual control of the hardware complex through the program interface

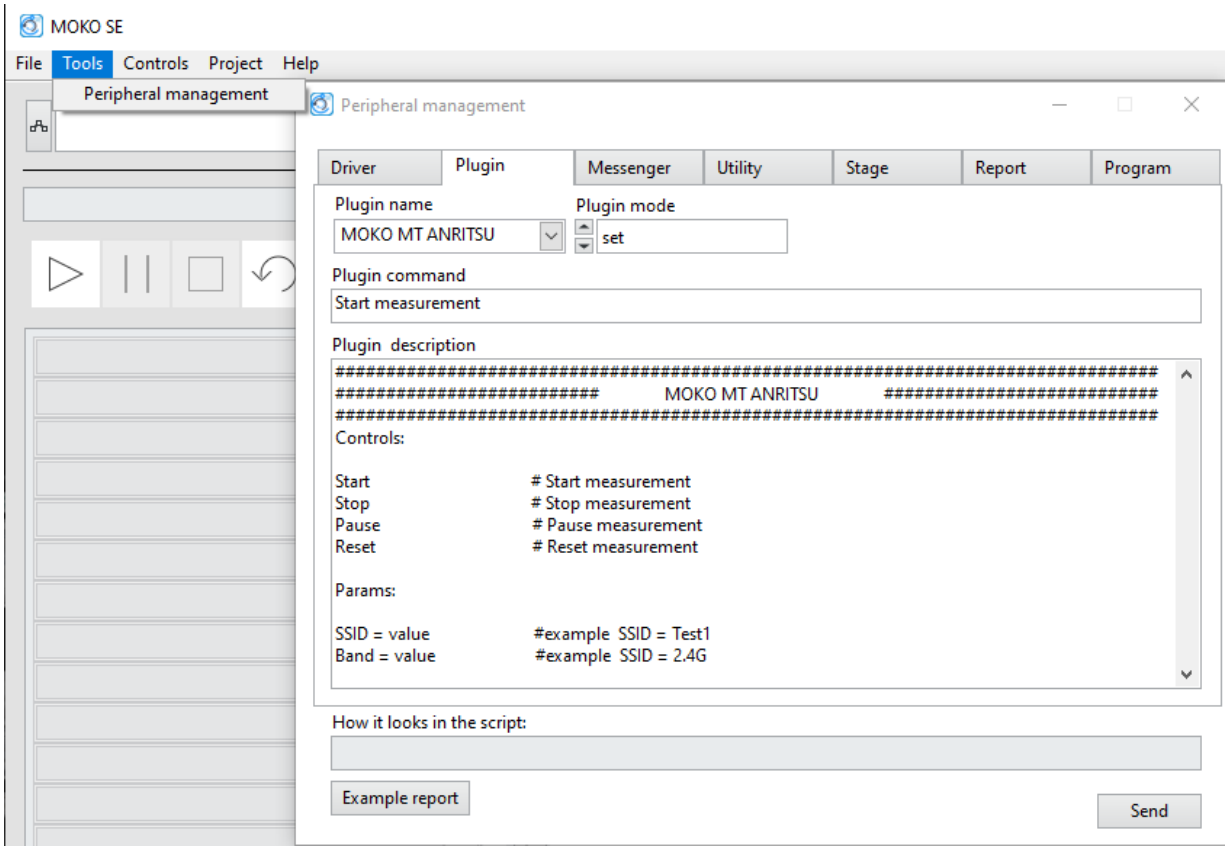
The plug-ins connected to the **MOKO SE software** are completely independent programs, with the help of which you can control various devices, other programs or databases.



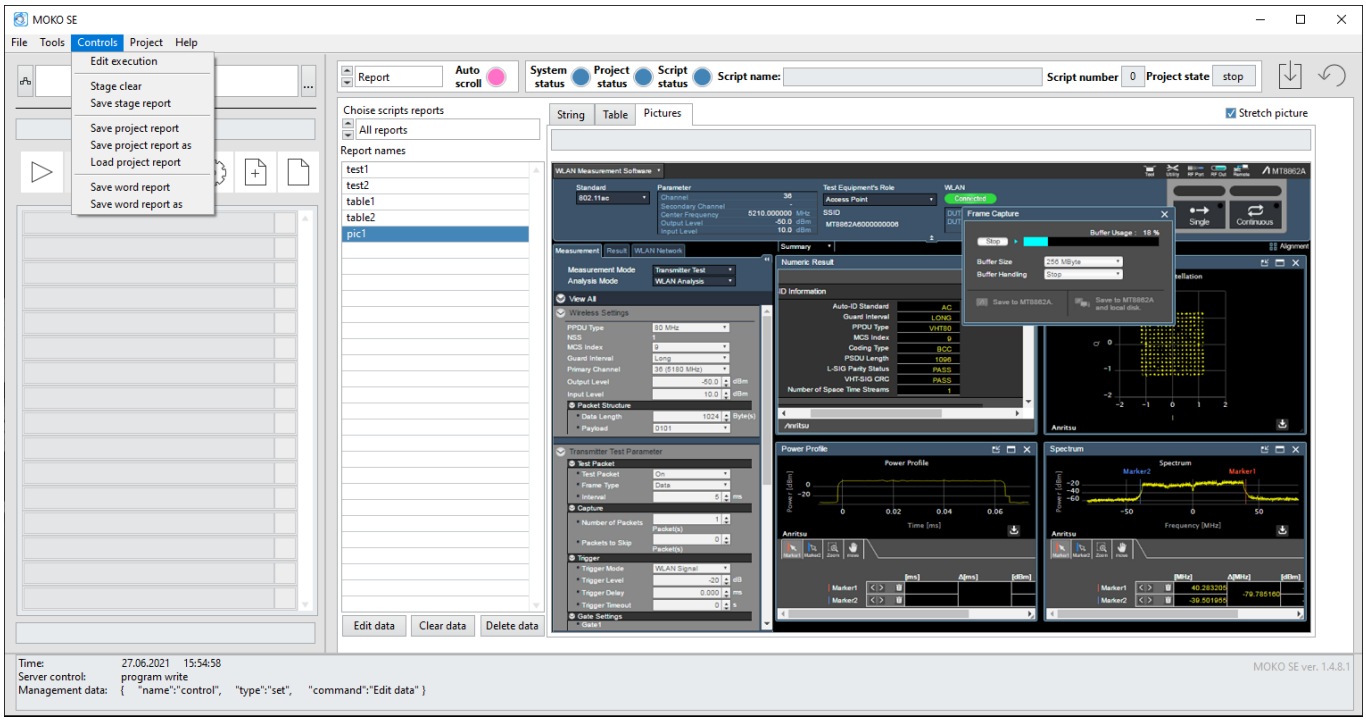
Drawing 7 - Appearance of the WEB interface of the “ANRITSU MT 8862A” device for manual control of the complex.



Drawing8 - Appearance of the plug-in “MOKO MT ANRITSU” for controlling the device “ANRITSU MT 8862A”. Manual control of starting measurements and setting parameters.



Drawing 9 - Window "Peripheral management" in the **software "MOKO SE"**, which allows manually manage drivers, plugins, pop-up messages, utilities, the “Stage” field (system logging), reports in “Microsoft Word” and by the **software “MOKO SE”** itself. The figure shows the control plugin “MOKO MT ANRITSU”.



Drawing 10 - Data management and editing in the “Report” tab in the **MOKO SE software**, allows you to manually manage the measurement data.

Database connection, data upload, secure storage

The architecture of the **MOKO SE software** allows you to connect to various databases through utilities or directly from scripts in the Python programming language.

Uploading data on test results can be carried out at any time using a command from a script or by clicking the “Save project report” or “Save project report as” buttons.

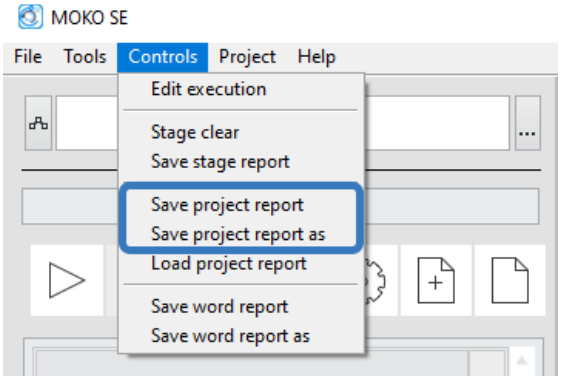


Figure 11 - Buttons for saving test results in MOKO SE software.

The data can be saved both on the personal computer of the APK and on the customer's server.

Data encryption can be done using standard means **MOKO SE software** (as agreed with the customer, with the signing of a bilateral agreement between the customer and the developer on non-disclosure of the encryption key). Additional information is available upon request.

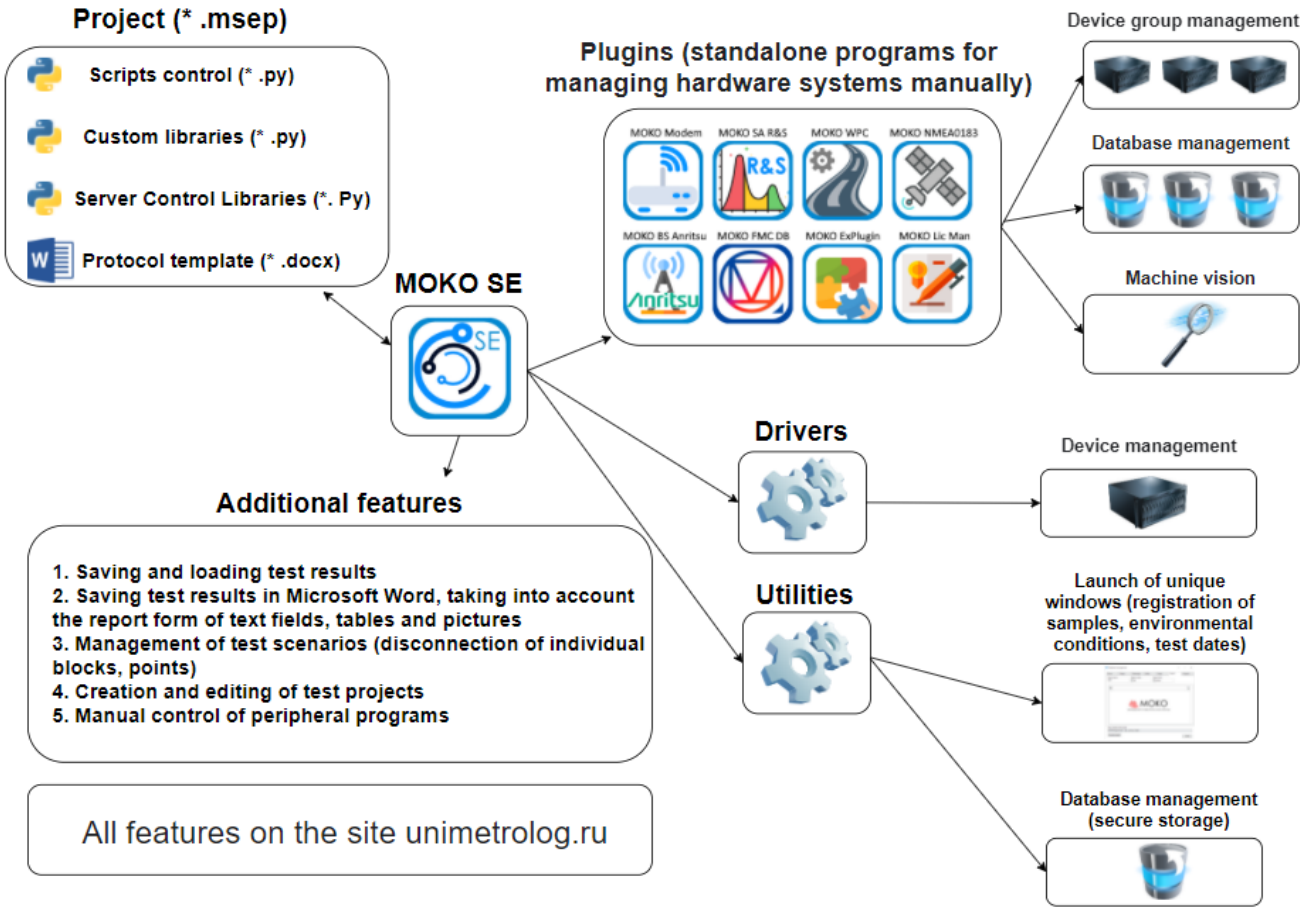
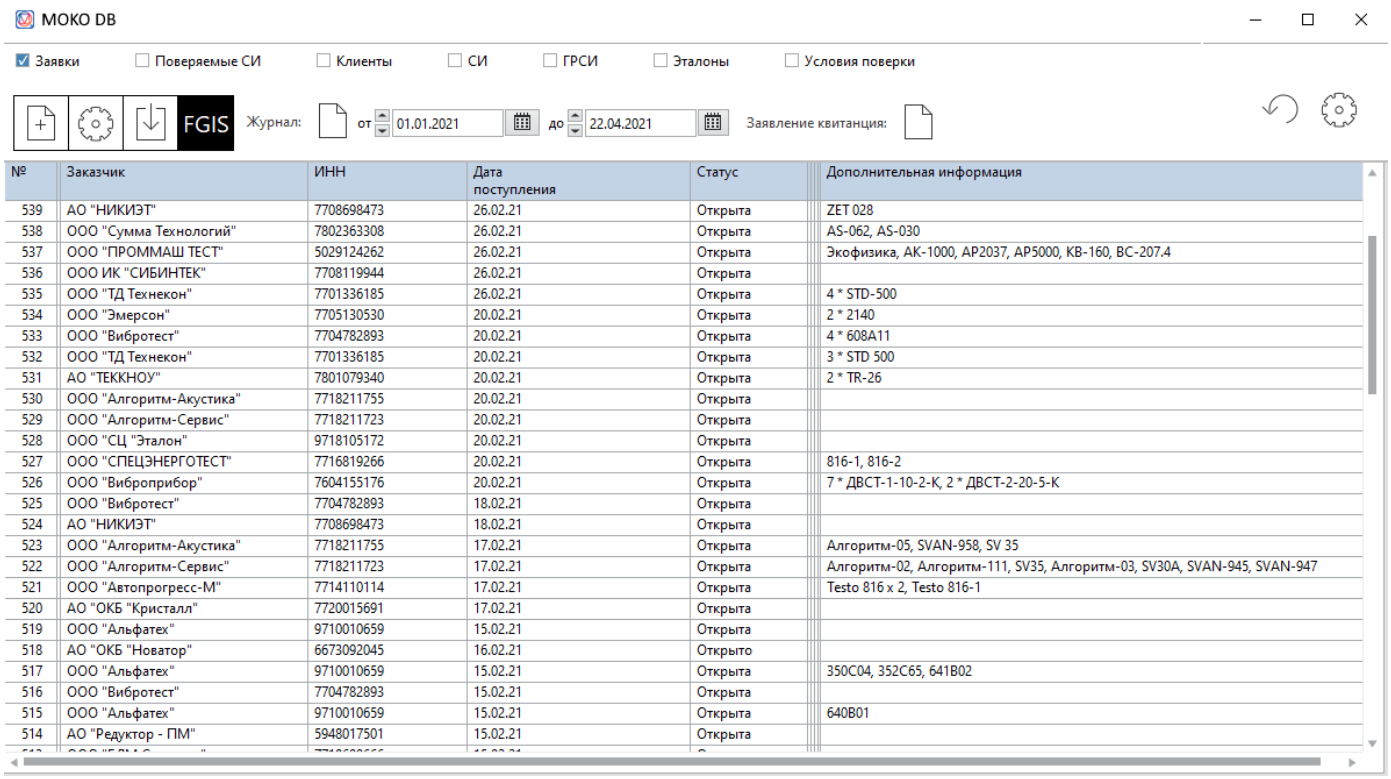


Figure 12 - Architecture of **MOKO SE software** with the ability to connect to databases through utilities and other functions.



№	Заказчик	ИНН	Дата поступления	Статус	Дополнительная информация
539	АО "НИКИЭТ"	7708698473	26.02.21	Открыта	ZET 028
538	ООО "Сумма Технологий"	7802363308	26.02.21	Открыта	AS-062, AS-030
537	ООО "ПРОММАШ ТЕСТ"	5029124262	26.02.21	Открыта	Экофизика, АК-1000, АР2037, АР5000, КВ-160, ВС-207.4
536	ООО ИК "СИБИНТЕК"	7708119944	26.02.21	Открыта	
535	ООО "ТД Технекон"	7701336185	26.02.21	Открыта	4 * STD-500
534	ООО "Эмерсон"	7705130530	20.02.21	Открыта	2 * 2140
533	ООО "Вибротест"	7704782893	20.02.21	Открыта	4 * 608A11
532	ООО "ТД Технекон"	7701336185	20.02.21	Открыта	3 * STD 500
531	АО "ТЕККНОУ"	7801079340	20.02.21	Открыта	2 * TR-26
530	ООО "Алгоритм-Акустика"	7718211755	20.02.21	Открыта	
529	ООО "Алгоритм-Сервис"	7718211723	20.02.21	Открыта	
528	ООО "СЦ "Эталон"	9718105172	20.02.21	Открыта	
527	ООО "СПЕЦЭНЕРГОТЕСТ"	7716819266	20.02.21	Открыта	816-1, 816-2
526	ООО "Виброприбор"	7604155176	20.02.21	Открыта	7 * ДВСТ-1-10-2-К, 2 * ДВСТ-2-20-5-К
525	ООО "Вибротест"	7704782893	18.02.21	Открыта	
524	АО "НИКИЭТ"	7708698473	18.02.21	Открыта	
523	ООО "Алгоритм-Акустика"	7718211755	17.02.21	Открыта	Алгоритм-05, SVAN-958, SV 35
522	ООО "Алгоритм-Сервис"	7718211723	17.02.21	Открыта	Алгоритм-02, Алгоритм-111, SV35, Алгоритм-03, SV30A, SVAN-945, SVAN-947
521	ООО "Автопрогресс-М"	7714110114	17.02.21	Открыта	Testo 816 x 2, Testo 816-1
520	АО "ОКБ "Кристалл"	7720015691	17.02.21	Открыта	
519	ООО "Альфатех"	9710010659	15.02.21	Открыта	
518	АО "ОКБ "Новатор"	6673092045	16.02.21	Открыто	
517	ООО "Альфатех"	9710010659	15.02.21	Открыта	350C04, 352C65, 641B02
516	ООО "Вибротест"	7704782893	15.02.21	Открыта	
515	ООО "Альфатех"	9710010659	15.02.21	Открыта	640B01
514	АО "Редуктор - ПМ"	5948017501	15.02.21	Открыта	

Figure 13 - Front panel of “MOKO DB” software designed for laboratory database management.

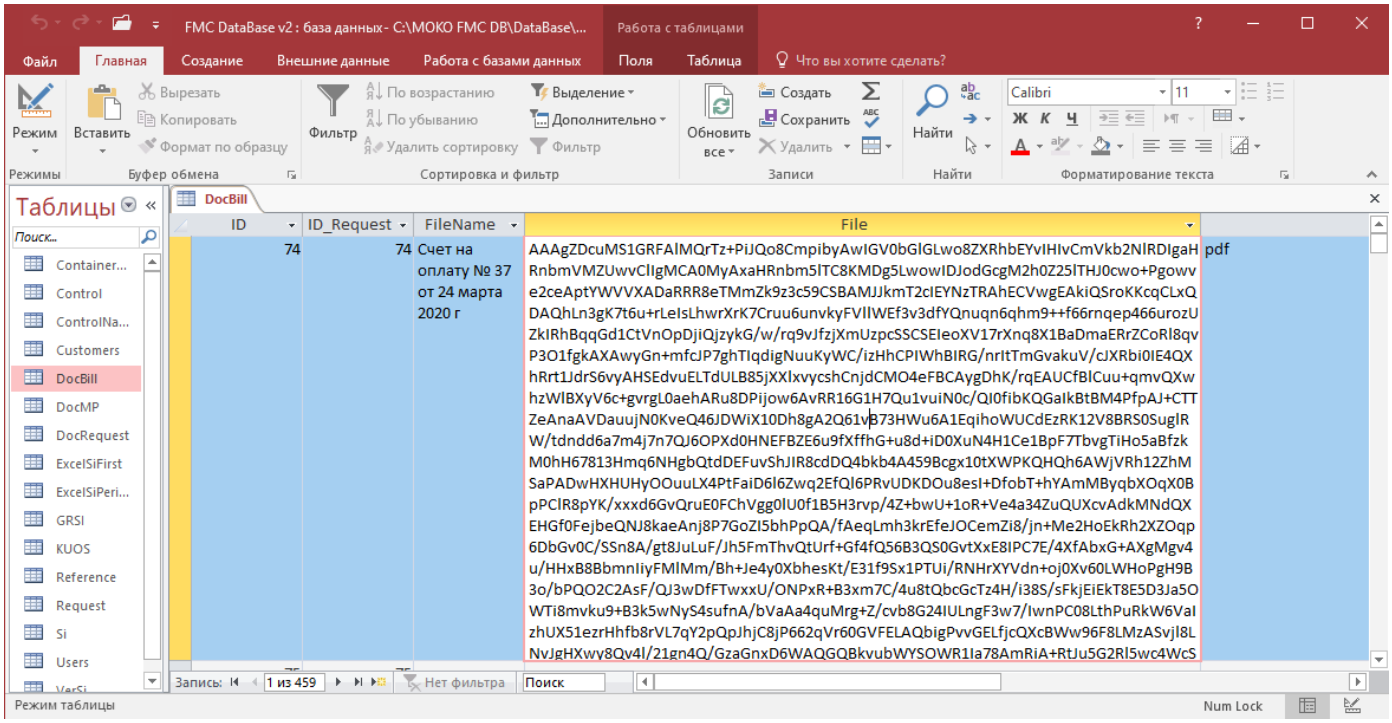


Figure 14 - Displaying an encrypted file in the “MS SQL” database.

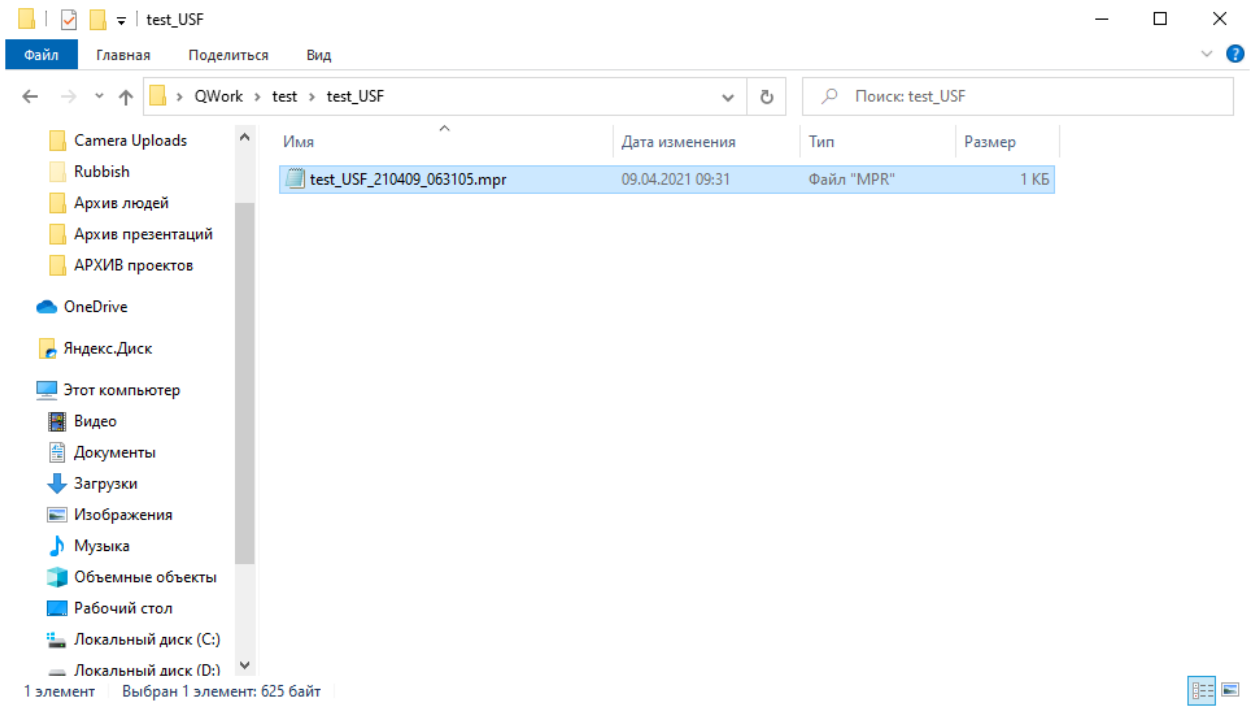


Figure 15 - Display of a * .mpr file with test results data in the file system.

Figure 16 - Opened * .mpr file in notepad.

Auxiliary functions: registration of samples, environmental conditions, start dates of tests

In the **MOKO SE software**, auxiliary functions are implemented using utilities. These can be of various types of program windows, which are used to register samples, environmental conditions, and the date of the start of tests.

You can also use the standard "Messenger" input fields that are present by default in the "MOKO SE" software.

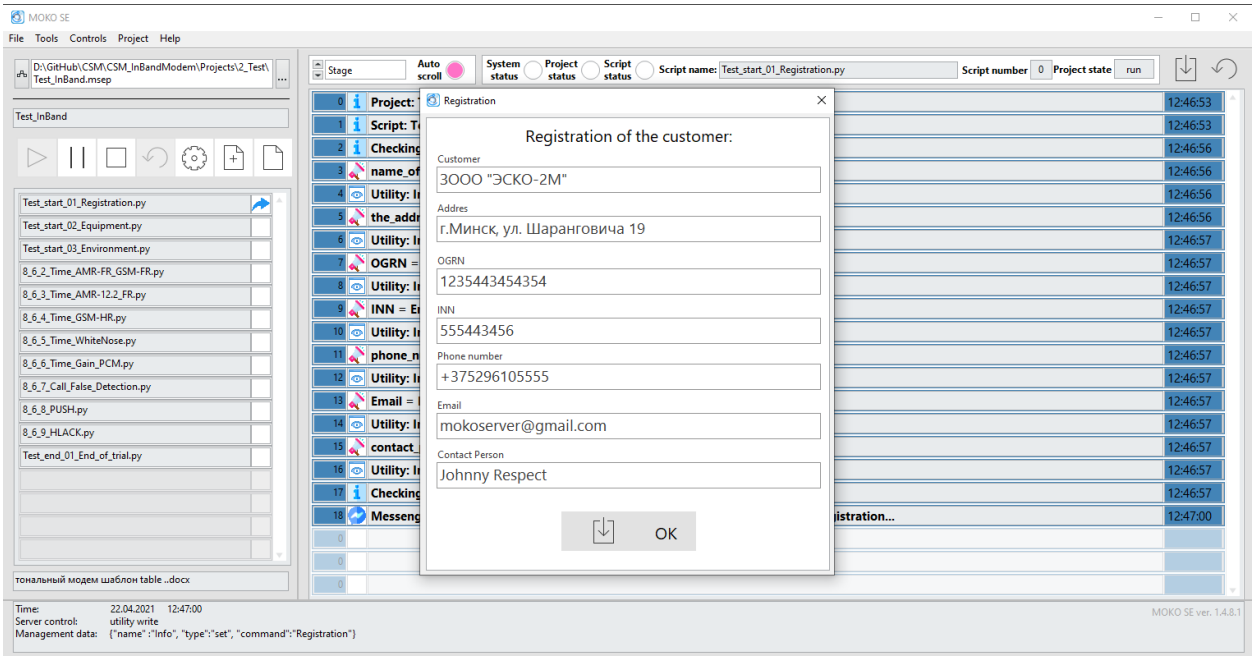


Figure 17 - Field of the info.dll utility for registering a customer.

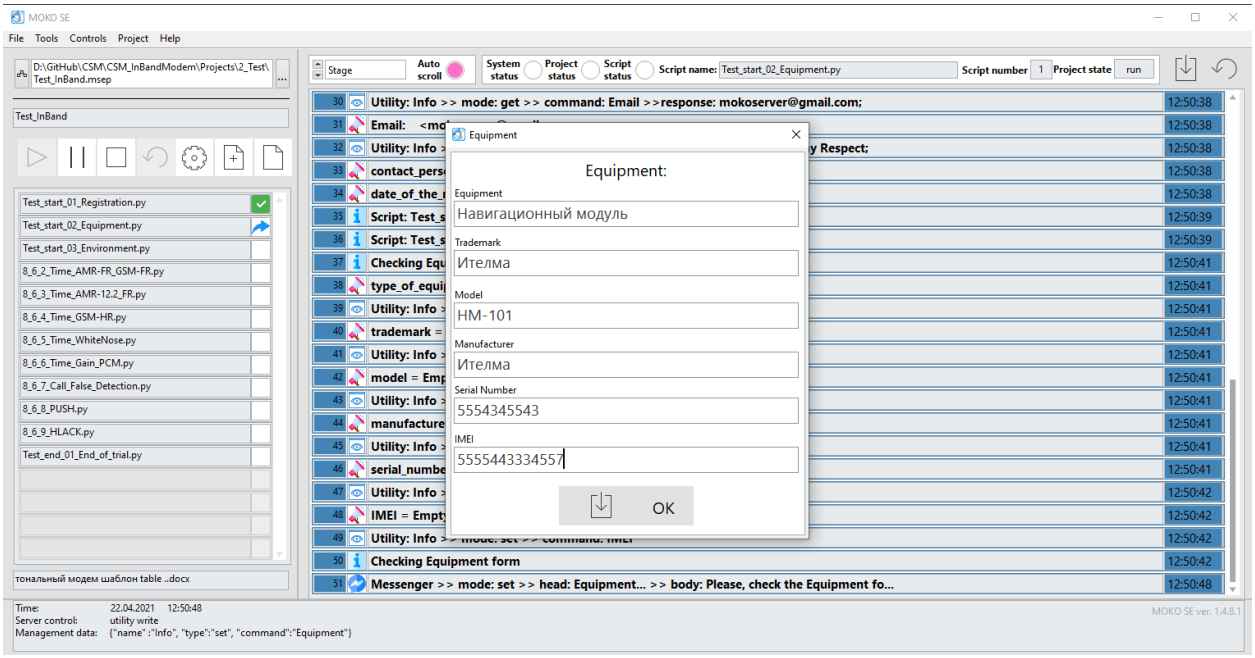


Figure 18 - Field of the info.dll utility for registering equipment.

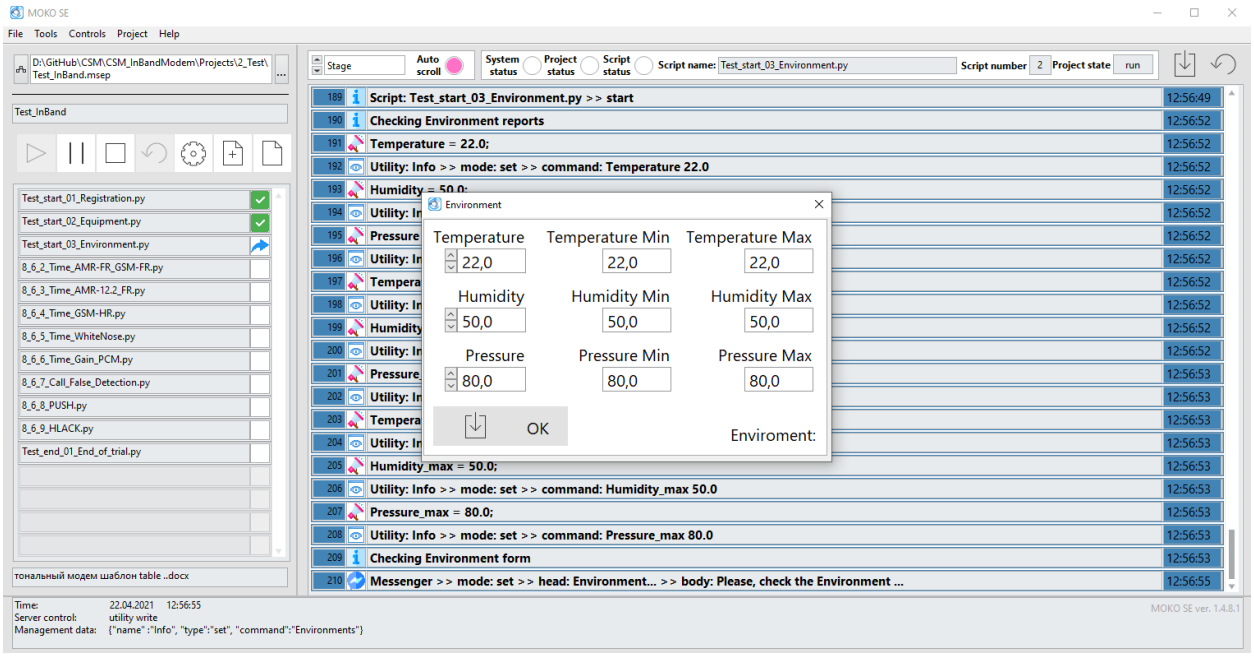


Figure 19 - Field of the info.dll utility for registering environmental conditions.

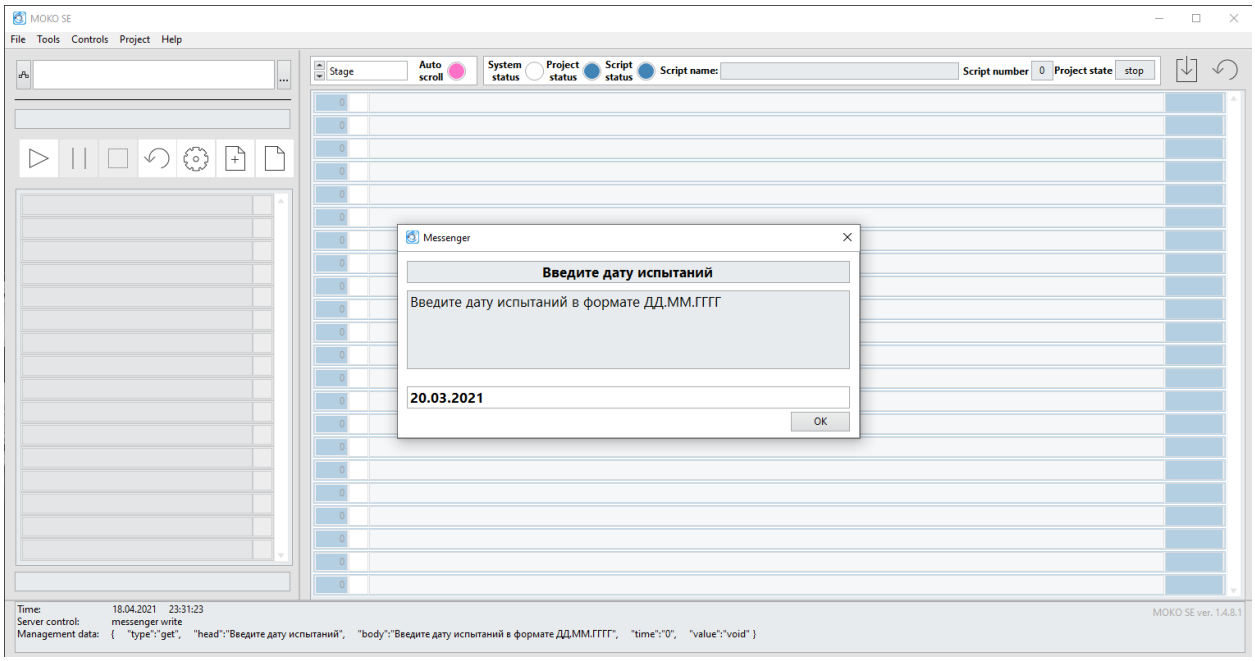


Figure 20 - The "Messenger" input field in this example is used to account for the start date of the tests....

Formation of graphs of measured values in vector format

Formation of graphs in vector form is implemented in plug-ins for a unique device, or in the standard program plug-in "MOKO GRAPH", controlled both manually and with the help of scripts through the software "MOKO SE".

The main features of the program:
- displaying an array of points of the graph and the graph itself;
- saving graphs as a project;
- loading, unloading, editing a project with graphs;
- saving screenshots and automatic uploading to the protocol through the standard functions of the MOKO SE software.

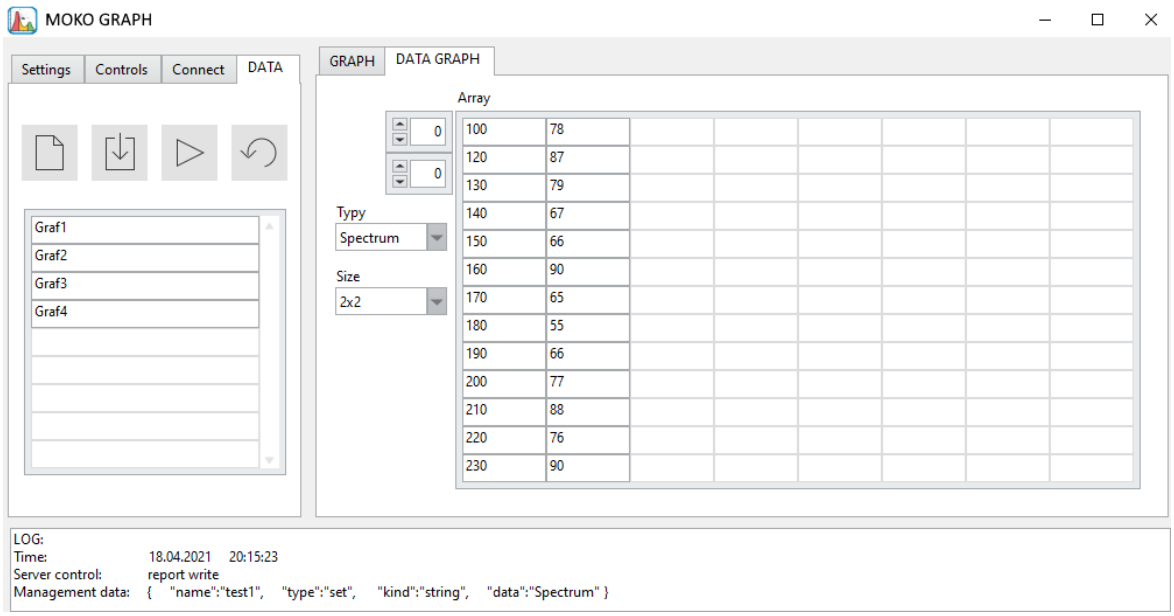


Figure 21 - Displaying an array of plot points in **ON "MOKO GRAPH "**...

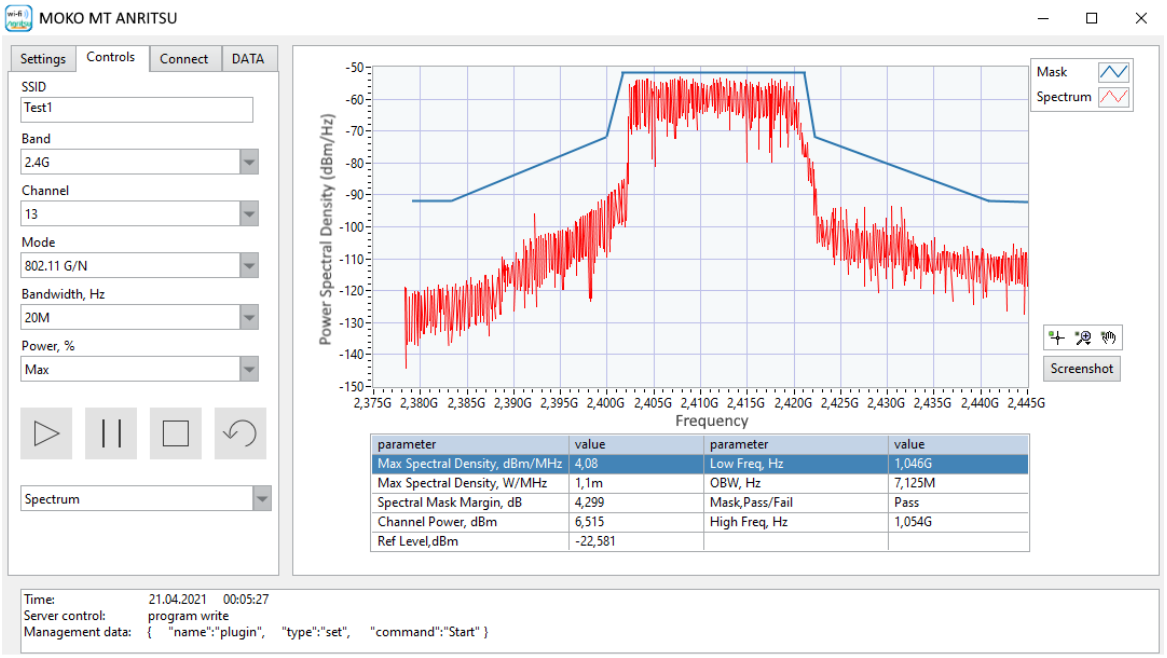


Figure 22 - Appearance of the plug-in "MOKO MT ANRITSU" device control “ANRITSU MT 8862A”. On the right side of the program window there are implemented buttons control the scaling of the graph in vector format.

Saving test results in a Microsoft Word document in the form of a report

The storage of test results is carried out by standard methods of the **software "MOKO SE"** andcan be carried out at any time using a command from a script or by clicking on the “Save word report” or “Save word report as” button.

There are three options for automated uploading of test results to reserved tags of a Microsoft Word template and saving them in PDF format:
- filling in lines;
- filling in tables;
- filling with images.

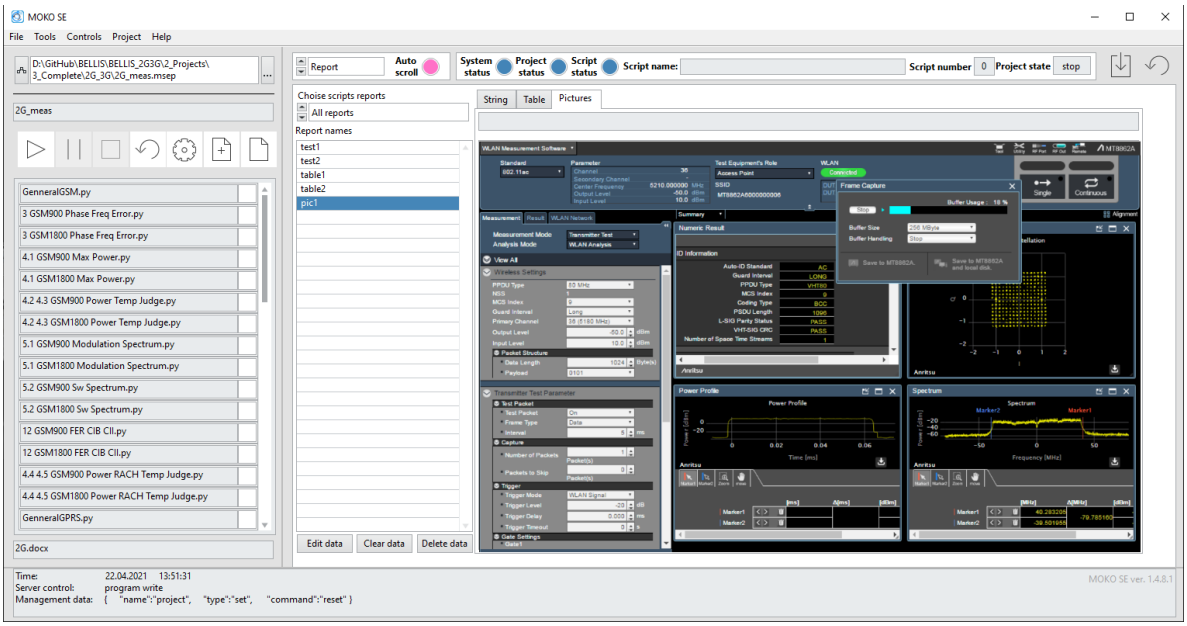


Figure 23 - "Report" tab in **"MOKO SE" software**, where data is displayed progress of tests.

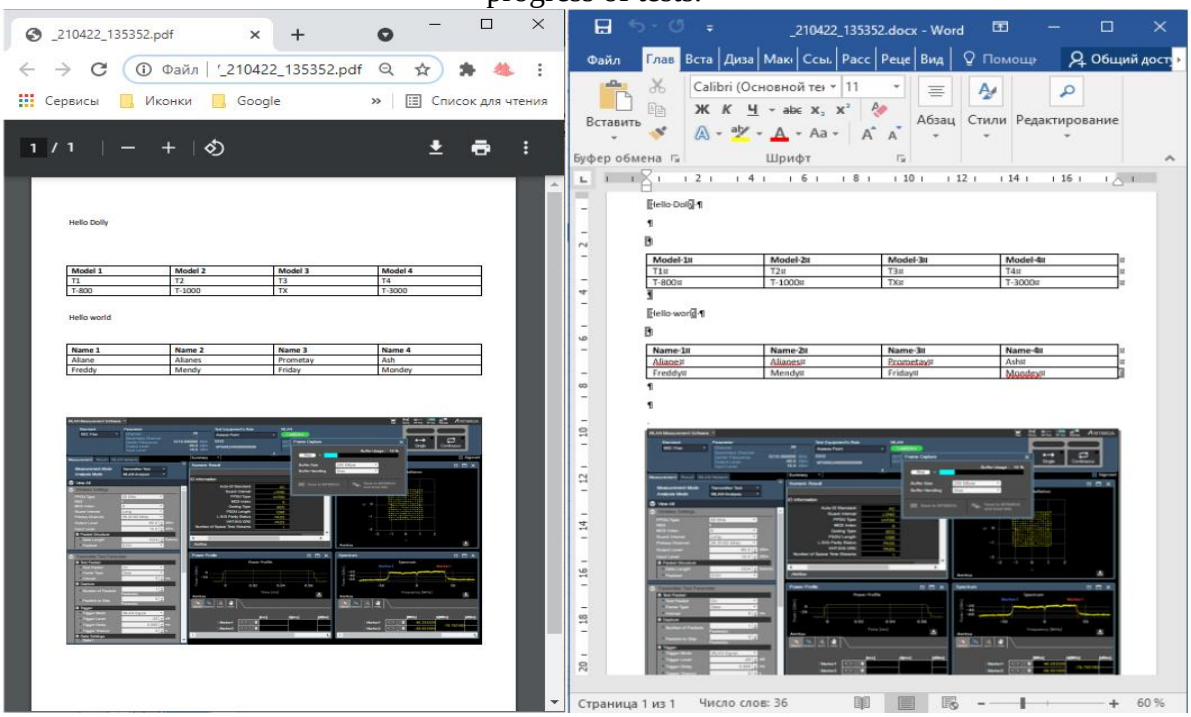


Figure 24 - Documents with line entries, tables and images, saved in PDF and Microsoft Word formats.

Documentation and support

Documentation on **MOKO SE software** presented on the website unimetrolog.ru, where you can download a demo version of the software.

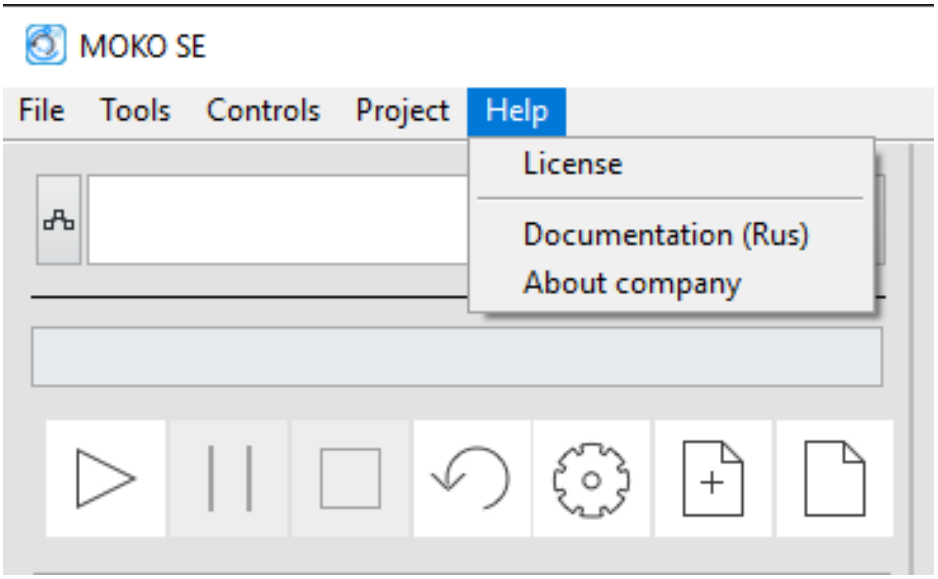


Figure 25 - Convenient access to documentation from **MOKO SE software**.

Additional information can be found on the moko.by website in the documentation section.

The training videos are published on the YouTube channel:https://www.youtube.com/mokoserver

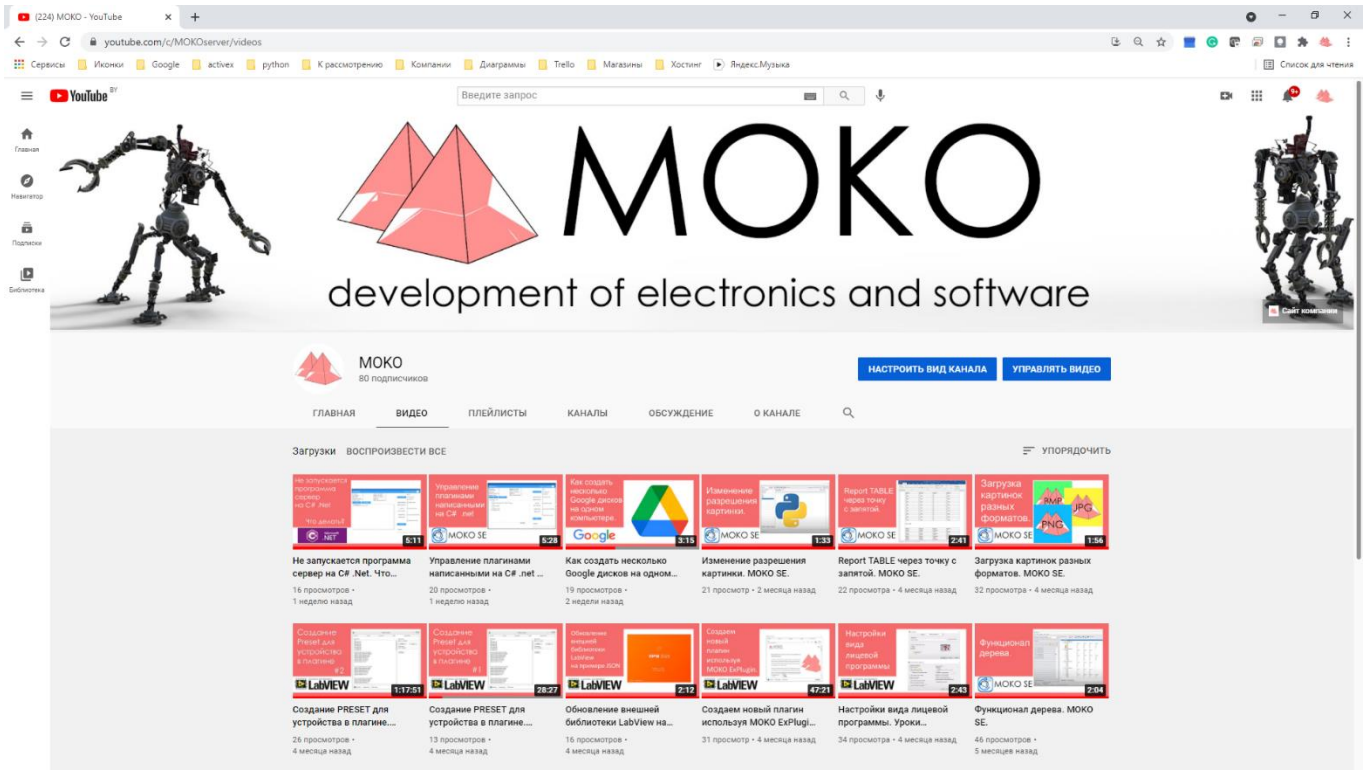


Figure 26 - YouTube channel of **MOKO SE software** with training video.

Abbreviations

APK - hardware and software complex.
AWP - automated workstation.