5 Dynamic Data Exchange (DDE)

5.1 General

DDE (Dynamic Data Exchange) enables to dynamically exchange data between two Windows applications, provided both applications support the DDE functionality of Windows.
Applications that support DDE are MS WORD for WINDOWS as well as MS EXCEL, SUPERBASE, SQL and WordPro and many others.
Different from data transfer via the clipboard, DDE represents a direct communication between two applications. Therefore for DDE transfers both applications (ES-K1 as well as e.g. MS WORD) must have been started from Windows.
The advantage of DDE over the clipboard is that data transfers can be automated. This way data transfers and data updates can be done with minimum user effort.
One of the two applications, the so called "client" (e.g. MS WORD) controls the communication. The other application (ES-K1) works as the "server", which on request delivers data to the client application. The ES-K1 transfers these data as pure text, except the graphics which will be delivered in a vector format.

Note: Office XP does not support DDE any more!

5.1.1 DDE Commands

Generally a DDE command consists of three parts:
Syntax: *Service* **Name**   *Topic* **Name**   *Item* **Name**
The preparation of a DDE transfer is done via the client application through providing of the server application name (ES-K1 in this case), the topic name and the item name. The kind of available data depends on the server application (see chapter 5.3)
The exact Syntax of DDE commands depends on the client application. A detailed description of the command syntax for MS WORD follows.

5.2 DDE with MS WORD for Windows™

DDE enables to use all the presentation functionality in MS WORD for the creation of user defined test reports based on data from the application ES-K1. The automation of this process can be achieved through design of suitable document templates (also see chapter 5.2.2). The WORD ducument then works as the client which controls the transfers.

5.2.1 General Command Syntax with WORD for Windows™

The buildup of a DDE connection from MS WORD is done by making use of the field functions "DDE" and "DDEAuto".
Syntax: **{DDE** *Service Topic Item***}**
　　　　{DDEAuto *Service Topic Item***}**
　　　　DDE, DDEAuto:　　　WORD field function for dynamic data transfer
　　　　Service :　　　　　　The service name. Here the name **ES-K1** has to be given.
　　　　Topic :　　　　　　　The topic name. Could be e.g. a file type.
　　　　Item:　　　　　　　　The item name. Should be the name of the data to be transferred.
Example:　　　**{DDE** ES-K1 System Topics**}**
　　　　This command lists all topics that are available from the server application ES-K1.
　　　　The item name consists of the ES-K1 database name and - if necessary - a subitem name which must be separated from the database name by a '$' character.
First an empty function field must be inserted by pressing **STRG+F9**. The cursor will be positioned between the brackets that work as field indicators. Now a field function DDE or DDEAuto can be entered, along with the required names. Pressing **F9** updates the field. WORD then automatically changes to the display of the field's result, provided that the global settings of the fields allow to do so.
The field function DDEAuto works different from DDE in that the data will be automatically updated, i.e., a change in the ES-K1 file immediately leads to a change in the WORD document.

5.2.2 Creating a Test Report

For creating a test report via DDE it is a good idea to make use of the powerful table and style functions of MS WORD.
In a first step the layout of the report has to be designed in a WORD document or document template. To do so, tables should be assigned to the topics.
In a second step the items and subitems have to be inserted into the rows and columns of the table.
The style of the function fields can be defined as with normal text. So any kind of style (character font and size, etc.) can be used. The style will also be valid for the result of the field after updating. A resulting graphical diagram can be modified like any other graphics in MS WORD.

Example:

{company logo as a bitmap}

{DDE ES-K1 RPH "vol_0001$HDR_HEAD1"}

{DDE ES-K1 RPH "vol_0001$HDT_EUT"}	{DDE ES-K1 RPH "vol_0001 $HDR_EUT"}
{DDE ES-K1 RPH "vol_0001$HDT_MANU"}	{DDE ES-K1 RPH "vol_0001 $HDR_MANU"}
{DDE ES-K1 RPH "vol_0001$HDT_OP_COND"}	{DDE ES-K1 RPH "vol_0001 $HDR_OP_COND"}
{DDE ES-K1 RPH "vol_0001$HDT_OPER"}	{DDE ES-K1 RPH "vol_0001 $HDR_OPER"}
{DDE ES-K1 RPH "vol_0001$HDT_TEST_SPEC"}	{DDE ES-K1 RPH "vol_0001 $HDR_TEST_SPEC"}
{DDE ES-K1 RPH "vol_0001$HDT_COM1"}	{DDE ES-K1 RPH "vol_0001 $HDR_COM1"}

Comment: *If the device under test is used in the operating mode then the supply lines have to fulfill the regulation ABC123 ...*

Start	Stop	Step	IFBW	Detector	Meastime	RF-ATTN	Preampl.
{DDE ES-K1 SCT "EN 55022 Voltage finS_START_FREQS1"}	{DDE ES-K1 SCT "EN 55022 Voltage finS_STOP_FREQS1"}	{DDE ES-K1 SCT "EN 55022 Voltage finS_STEP_FREQS1"}	{DDE ES-K1 SCT "EN 55022 Voltage finS_IFBWS1"}	{DDE ES-K1 SCT "EN 55022 Voltage finS_DET_CURVE1S1"}	{DDE ES-K1 SCT "EN 55022 Voltage fin$S_MEASTIME$S1"}	{DDE ES-K1 SCT "EN 55022 Voltage finS_RF_ATTNS1"}	{DDE ES-K1 SCT "EN 55022 Voltage finS_PREAMPS1"}

{DDE ES-K1 GRC "vol_0001"}

Measurement Results (QP Detector)

Frequency	Level	Limit	Margin	Exceed	Line	PE
{DDE ES-K1 MES "vol_0001_fin$R1C1:R99C1"}	{DDE ES-K1 MES "vol_0001_fin$R1C2:R99C2"}	{DDE ES-K1 MES "vol_0001_fin$R1C3:R99C3"}	{DDE ES-K1 MES "vol_0001_fin$R1C4:R99C4"}	{DDE ES-K1 MES "vol_0001_fin$R1C5:R99C5"}	{DDE ES-K1 MES "vol_0001_fin$R1C6:R99C6"}	{DDE ES-K1 MES "vol_0001_fin$R1C7:R99C7"}

Result: With updating of the marked function fields the style settings will be used for the resulting elements.Graphics will always be inserted with minimum size (can be streched to desired size). Graphics can then be modified like any other graphics imported e.g. with the clipboard.

A result of the final example report is shown on the following pages.

ROHDE&SCHWARZ
TEST

EUT   E.u.T.
Manufacturer
Operating Condition
Operator   Donald Duck
Test Specification
Comment

Comment: *If the device under test is used in the operating mode then the supply lines have to fulfill the regulation ABC123 ...*

Start	Stop	Step	IFBW	Detector	Meastime	RF-ATTN	Preampl.
150.0 kHz	30.0 MHz	6.0 kHz	10 kHz	MaxPeak	10.0 ms	0 dB	Off

Level [dBµV]
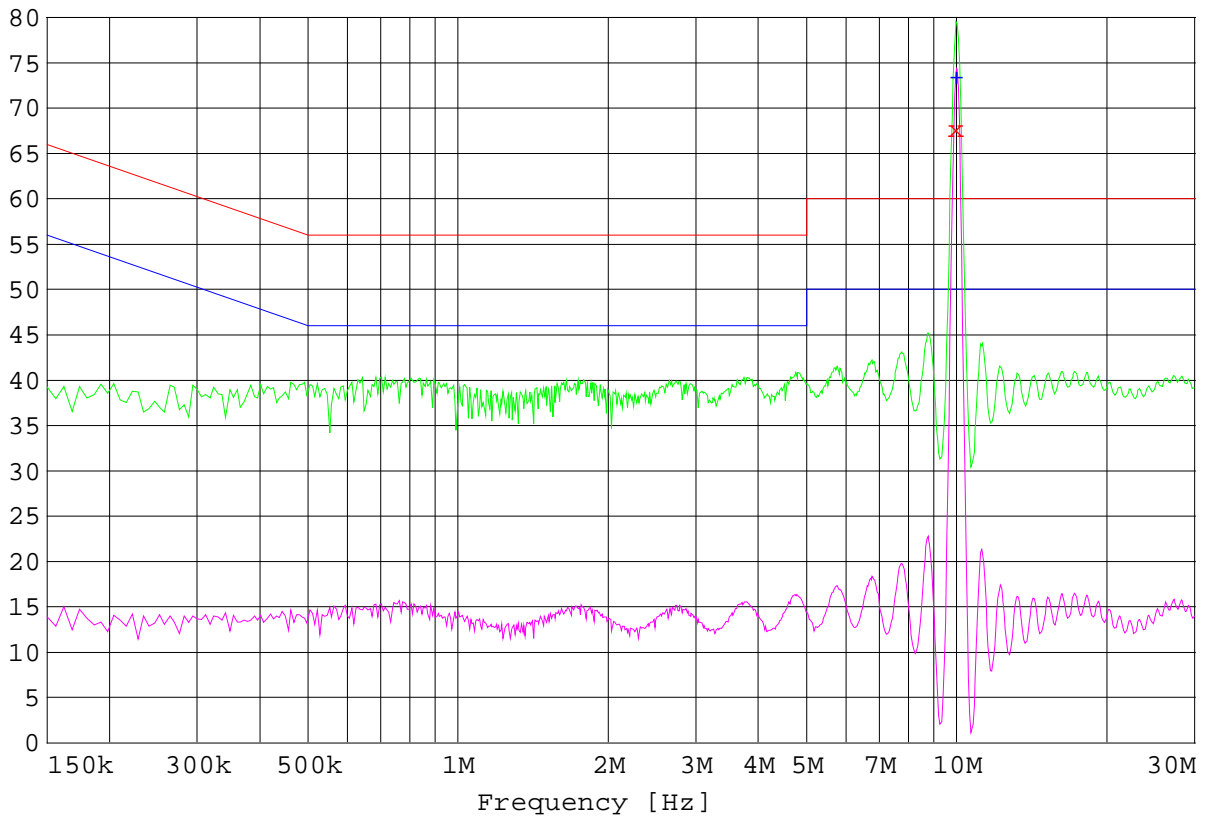
x x MESvol_0001_fin QP
+ + MESvol_0001_fin AV
——— MESvol_0001_pre PK
——— MESvol_0001_pre AV
——— LIMEN 55022 V QP
——— LIMEN 55022 V AV

Measurement Results (QP Detector)

Frequency	Level	Limit	Margin	Exceed	Line	PE
9.978000	67.79	60.00	-7.79	*	L3	FLO

Measurement Results (AV Detector)

Frequency	Level	Limit	Margin	Exceed	Line	PE
10.008000	73.49	50.00	-23.49	*	L2	FLO

5.3 DDE Commands of the Application ES-K1

5.3.1 ES-K1 DDE Topics

The following topics are available:

System	general state of the system
MES	measurement result
LIM	limit line
XTP	probe transducer
XTS	system transducer
GRC	graphics configuration
FRL	frequency list
RPH	report header
RPC	report configuration
SCT	scan table
SWT	sweep table

Note: The use of database names or codes for table elements works case sensitive. If a database name holds spaces then the whole item name has to be put between " " characters.

5.3.1.1 General State of the System

If the topic System is used then the DDE connection does not refer to a specific file. It can be used to get general information on the data in the ES-K1.

Topic name: **SYSTEM**

The following items can be retrieved:

Topics   lists all available topics in the format <name><tab>

SysItems   lists all available items to the current topic in the format <name><tab>

Formats   lists all available data formats in the format <name><tab>

Example with MS WORD:

  {DDE ES-K1 System Formats}

5.3.1.2 Lists

Topic name: **MES**   (measurement results)
Topic name: **LIM**   (limit line)
Topic name: **XTP**   (probe transducer)
Topic name: **XTS**   (system transducer)
Topic name: **FRL**   (frequency list)

The following items can be retrieved:

SysItems   lists all available items to the current topic in the format <name><tab>

FileType   gives the description of the data type

FileNames   gives a list of database names, separated through tabs

SubItems   lists all available subitems (commands after *<database name>*$) in the format *<subitem name><tab>*

Database name   If no subitem is given after the database name then the whole table will be transferred in the following format:
<text line 1><CR><LF>
<text line 2><CR><LF>
<text line 3><CR><LF>
<text line 4><CR><LF>
<value lines 1...n><CR><LF>
<CR><LF><CR><LF>
<Tab><additional data elements 1...n><CR><LF>

The item name consists of an ES-K1 database name and optionally of a subitem name, separated through a '$' character. No spaces are allowed between database name and subitem name.

The following subitems can be retrieved:

Name   delivers the name of the database element

Time   delivers the time (last modification) of the database element

Date   delivers the date (last modification) of the database element

TabSize   delivers the size of the table in the format
$RrCc$<tab>Ss
r number of rows (including text lines)
c number of columns
s number of additional (single) values

R[H]$r1Cc1$:**R**$rnCcn$

delivers a rectangular portion from the table, rows r1 to rn, columns c1 to cn; the columns are separated by *<tab>*, the rows by *<tab><linefeed>*
with **R** only the values will be transferred; no text lines will appear
with **RH** the four text lines (description, units, etc.) come before the values

S$s1$:**S**sn delivers additional single values in the format
<tab><description><CR><LF>.
$s2$ delivers the name of the range table (scan/sweep table) in measurement results

Example with MS WORD:
{DDE ES-K1 MES "Example Result$RH1C1:R8C2"}

5.3.1.3 Graphics Configuration

Topic name: **GRC**

The following items can be retrieved:

SysItems   lists all available items to the current topic in the format <name><tab>

FileType   gives the description of the data type

FileNames   gives a list of database names, separated through tabs

SubItems   lists all available subitems (commands after *<database name>*$) in the format <subitem name><tab>

Database name   If no subitem is given after the database name then the whole graphics will be transferred in a vector format.

The item name consists of an ES-K1 database name and optionally of a subitem name, separated through a '$' character. No spaces are allowed between database name and subitem name.

The following subitems can be retrieved:

Name   delivers the name of the database element

Time   delivers the time (last modification) of the database element

Date   delivers the date (last modification) of the database element

Example with MS WORD:

{DDE ES-K1 GRC "Example Graphics"}

5.3.1.4 Report Header

Topic name: **RPH**
The following items can be retrieved:
SysItems   lists all available items to the current topic in the format <name><tab>
FileType   gives the description of the data type
FileNames   gives a list of database names, separated through tabs
SubItems   lists all available subitems (commands after *<database name>*$) in the format <subitem name><tab>
Database name   If no subitem is given after the database name then the whole report header will be transferred in the following format:
                <subitem description>:*<tab><subitem text>*
                <CR><LF>
The item name consists of an ES-K1 database name and optionally of a subitem name, separated through a '$' character. No spaces are allowed between database name and subitem name.
With the subitems those with a name **HDT...** give the description of the referring element, those with a name **HDR...** the text of the element.
The following subitems can be retrieved:
Name   delivers the name of the database element
Time   delivers the time (last modification) of the database element
Date   delivers the date (last modification) of the database element
HDR_HEAD1, HDT_HEAD1
                1st top line
HDR_HEAD2, HDT_HEAD2
                2nd top line
HDR_EUT, HDT_EUT
                description of the E.u.T.
HDR_MANU, HDT_MANU
                description of the manufacturer
HDR_OP_COND, HDT_OP_COND
                description of the operating conditions
HDR_TEST_SITE, HDT_TEST_SITE
                description of the test site
HDR_OPER, HDT_OPER
                description of the operator
HDR_TEST_SPEC, HDT_TEST_SPEC
                description of the test specification
HDR_COM1, HDT_COM1
                1st comment line
HDR_COM2, HDT_COM2
                2nd comment line
Example with MS WORD:
                {DDE ES-K1 RPH "Example Header$HDT_HEAD1"}

5.3.1.5 Report Configuration

Topic name: **RPC**
The following items can be retrieved:

SysItems   lists all available items to the current topic in the format <name><tab>
FileType   gives the description of the data type
FileNames   gives a list of database names, separated through tabs
SubItems   lists all available subitems (commands after *<database name>*$) in the format <subitem name><tab>
Database name   If no subitem is given after the database name then the whole report configuration will be transferred in the following format:
<subitem description>:
<tab><subitem text1>   *<tab>...*   *<tab><subitem-textn>*
<CR><LF>

The item name consists of an ES-K1 database name and optionally of a subitem name, separated through a '$' character. No spaces are allowed between database name and subitem name.
The following subitems can be retrieved:

Name   delivers the name of the database element
Time   delivers the time (last modification) of the database element
Date   delivers the date (last modification) of the database element
RPH   delivers the database name of the report header that belongs to this report configuration
LIM   delivers a list holding the database names (separated by tabs) of the limit lines that belong to this report configuration
MES   delivers a list holding the database names (separated by tabs) of the measurement results that belong to this report configuration
SCT   delivers a list holding the database names (separated by tabs) of the scan tables that belong to this report configuration
SWT   delivers a list holding the database names (separated by tabs) of the sweep tables that belong to this report configuration
XTS   delivers a list holding the database names (separated by tabs) of the system transducers that belong to this report configuration
XTP   delivers a list holding the database names (separated by tabs) of the probe transducers that belong to this report configuration
GRC   delivers a list holding the database names (separated by tabs) of the graphics configurations that belong to this report configuration
REP_FOOTNOTE delivers the setting of the report footnote that belongs to this report configuration
REP_FTNOTETXT   delivers the report footnote text that belongs to this report configuration
REP_PICTURE   delivers the setting of the graphics output (full or half)
Example with MS WORD:
          {DDE ES-K1 RPC "Example Report"}

5.3.1.6 Scan/Sweep Table

Topic name: **SCT**   (scan table)
Topic name: **SWT**   (sweep table)
The following items can be retrieved:
SysItems   lists all available items to the current topic in the format <name><tab>
FileType   gives the description of the data type
FileNames   gives a list of database names, separated through tabs
SubItems   lists all available subitems (commands after *<database name>***$**) in the format *<subitem name><tab>*
Database name   If no subitem is given after the database name then the whole table will be transferred in the following format:
S*s***:***<subitem description>***:**   *<tab><subitem text>*
<CR><LF>
s: number of the range; range 0 is used for elements that are not dependent on the ranges
The item name consists of an ES-K1 database name and optionally of a subitem name, separated through a '$' character. No spaces are allowed between database name and subitem name.
To retrieve the single values of a scan/sweep table the subitem name will be extended through a subrange description, separated through a '$' character.
A subrange can be defined either through an index or through the frequency:
            S*s*   selection of the subrange through an index
            s   index
            F*f*   selection of the subrange through a frequency
            f   frequency in *Hz.*
            K*f*   frequency in *kHz.*
            M*f*   frequency in.*MHz.*
            G*f*   frequency in.*GHz.*
A subrange with index 0 is used for elements that are not dependent on the subranges. If the surange information is not given although the value of the item depends on the subrange, then an item will be transferred for all subranges. Single elements are transferred in the following format:
            <tab><subitem value>
In all other cases the format is as follows:
            S***s***:***<subitem description>***:***<tab><subitem value><CR><LF>*
The following subitems can be retrieved:
Name   delivers the name of the database element
Time   delivers the time (last modification) of the database element
Date   delivers the date (last modification) of the database element
ALL<s>   delivers all elements of a subrange in the following format:
            S***s***:** *<subitem description>***:***<tab><subitem value>*
            <CR><LF>.
Subitems that are valid for all subranges:
S_COUNT_SUB   delivers the number of subranges

Example with MS WORD:
        {DDE ES-K1 SCT "Example Scan TableALLS1"}
        delivers all elements of the 1st subrange
        {DDE ES-K1 SCT " Example Scan Table $S_UNIT"}
        delivers the level unit of the scan table
        {DDE ES-K1 SCT " Example Scan Table $S_START_FREQ"}
        delivers the start frequency for each of the subranges
        {DDE ES-K1 SCT " Example Scan Table S_START_FREQS2"}
        delivers the start frequency of the 2nd subrange