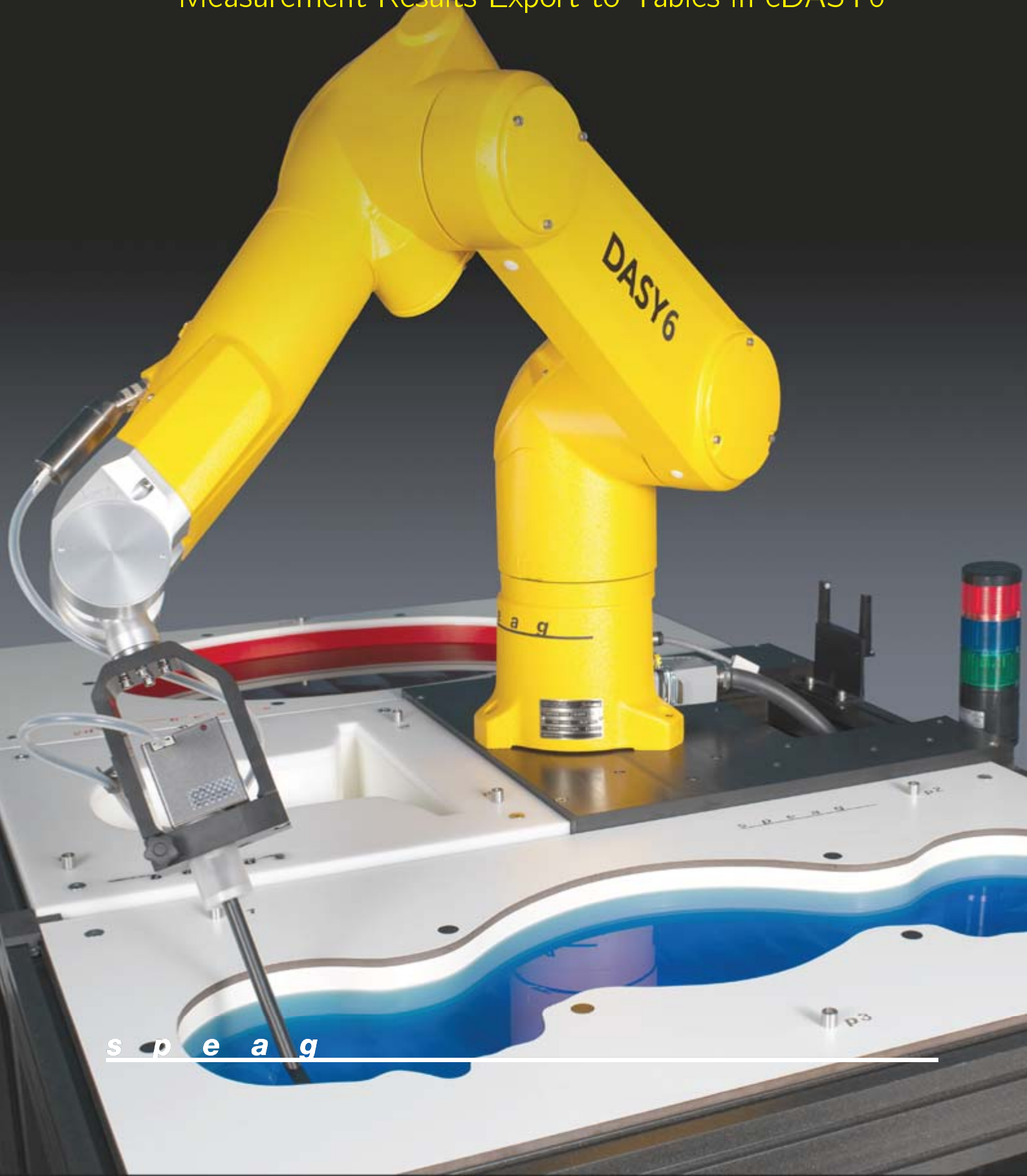SAR Measurements with cDASY6

APPLICATION NOTE

Measurement Results Export to Tables in cDASY6

s p e a g

Advanced Measurement Results Export to Tables

1 Introduction

cDASY6 features an advanced measurement results export function to tables in various file formats. The number and content of the tables is fully defined by the end user in a template file. No programming knowledge is required. The data will be inserted at the user defined locations only; the already existing text or pictures will remain unchanged.

This application note describes firstly the different categories of tables that can be generated. Then, the workflow to generate tables from the measurement data is presented. Finally, the template file customization process is shown.

2 Different Categories of Tables

cDASY6 divides the measurement data into several categories that can be exported into separate tables:

- The SAR Measurements table contains the exposure conditions, communication systems and SAR results for each test conditions defined in the current project.

- The System Performance Checks table summarizes the results of the system verification like SAR deviation from dipole targets and isotropy error

- The Conducted Power Measurements table contains the measured and maximum power as well as the tune-up factor for each test condition

- The Device Description table contains information on the name and dimensions of the DUT (Device Under Test)

- The Samples Description table summarizes information on the samples used in this project

- The Wireless Technologies table contains the technology options and frequency bands supported by the DUT

- The Medium Verification table summarizes the dielectric properties of the TSL (Tissue Simulating Liquid) used in the current project.

Each of the above tables can be split into sub-tables using advanced filtering functions. The exhaustive list of the data that can be exported is given in Appendix A

3 Measurement Results Export Workflow

The procedure below describes how the measurement results can be exported to the tables predefined in the template file:

- If necessary, prepare the template file according to the instructions in section 4

- Open in cDASY6 the project file that contains the measurements to be exported

- Go to Measurement mode and click on the Table tool

- Select the category of table to be exported

- Click on Export and select the table generator to be used

The measurement data will be inserted in the template file filled which will be saved in the same directory as the project file.

4 Word Template Customization

4.1 Overview

The measurement data will be exported in the tables predefined in the Word template file. The other parts of the document will remain unchanged.

Each predefined table contains its category (c.f., section 2), optional filters (i.e., export only measurements performed on Left Head phantom section) and a template row which defines the columns contents (for instance column 1 will contain the phantom section). A header which will not be modified by the exported might be added. During the data export process, the template row is removed and a row is created per measurement.

4.2 Template Preparation

Definitions

The table category and other possible options are defined in the *Description* field located in the *Alternative Text* options of the *Table Properties*. The Table Properties can be accessed in Word via the context menu when a table is selected.

The auto_fill, meas_type and template_lines are required definitions. The measurement data for the table will not be exported if any of the definitions are missing.

The template table will be filled only if the auto_fill option is present and set to the value True. The table category is defined using the meas_type field. The possible values are DUT (Device under test description), WT (Wireless technologies), SD (Samples description), CPM (Conducted power measurements), .MED (Dielectric properties measurements), SPC (System performance checks) and SAR (Specific absorption rate measurements). The template_lines describes how many rows are used for each measurement. Examples of measurements exported on multiple rows are shown in Figure 1.3 The sort and merge are optional definitions. The sort option orders the measurements alphabetically according to the values in the specified columns. The merge option is to be used in combination to sort. If enabled, adjacent cells containing equal values will be merged. Examples are provided in TODO: add reference.

Table 1.1 summarizes the different definitions available

Option	Typical Values	Description
meas_type	SPC, SAR	Category of measurements that will be exported.
auto_fill	True, False	Data will be exported in this table only if set to True.
template_lines	integer	Number of rows used for each measurement.
sort	[Position, Band ...]	Sort the measurements alphabetically according to the values in the specified columns.
merge	[Phantom, Position...]	Merge adjacent cells that contains equial values.

Table 1.1: Definitions which can be specified in the table's *Alternative Text* in the field *Description*.

Figure 1.1 shows how the Definitions can be entered in the *Alternative Text* view. Using this specific example, the exported table will have the following properties:

- It will be filled with data (auto_fill = True)

- It will contain SAR measurement results (meas_type = SAR)

- The adjacent cells having equal values in the column Phantom, Test Distance and Position will be merged

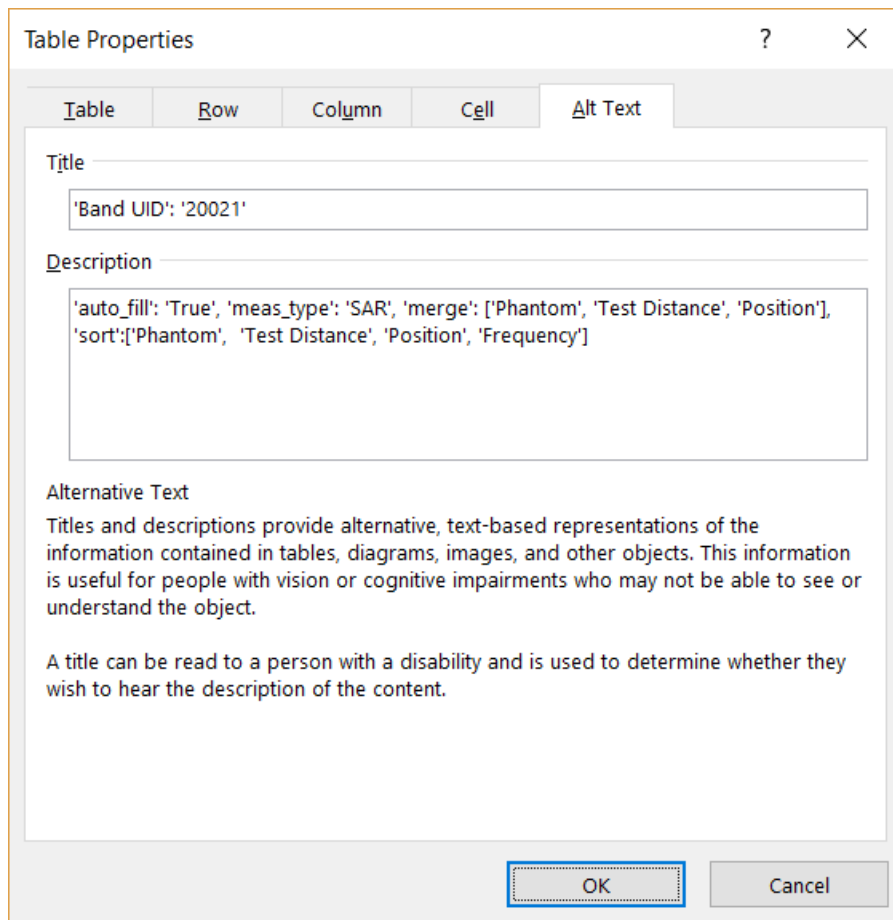- The columns Phantom, Test Distance and Frequency will be sorted alphabetically

Figure 1.1: Example of Definitions and Filters specified in the Alternative Text options

Filters

Measurement data from the same category might be split over several tables in the compliance report. For instance, SAR results for each measured frequency band are usually exported in a separate table. The filter function has been implemented for this purpose. Filters are specified in the *Title* field located in the Alternate Text options of the Table properties. If no filter is specified, all the data belonging to the table category will be exported. Figure 1.5 shows how to export SAR measurements performed on the WCDMA Band I only.

4.2.1 Template Row

The *Template Row* is used to specify the column contents. It consists of one or multiple rows that are automatically deleted once the measurement data have been exported. Each cell contains the name of the quantity to be exported.
The columns width can be fixed by disabling the *Automatically resize to fit contents* feature in *Table Properties » Table » Options...* The ˆ is used to indicate that the cell will not contain any data and must be merged with the one above. This feature is used only if the Template Row has at least two rows. If the text in the cell starts with

the character #, no measurement data will be exported in this column. Instead, the text entered by the user will be duplicated on each row.

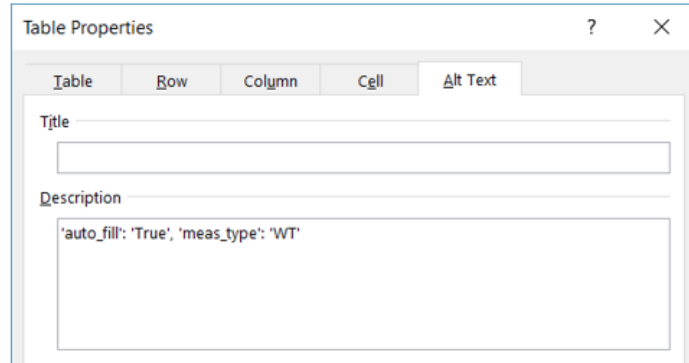The exhaustive list of possible keys for each table category is provided in Appendix A.

Name	Manufacturer	Height [mm]	Width [mm]	Thickness [mm]
DUT Name	DUT Manufacturer	DUT Height	DUT Width	DUT Thickness

Figure 1.2: Example of a Template Row for the DUT Description Table

4.3 Examples of Table Export

4.3.1 Wireless Technologies

Figure 1.3 shows the template settings and exported table for the supported wireless technologies of the device measured in the project.

Figure 1.3: Typical Template Table and Exported Data for Wireless Technologies

4.3.2 System Performance Checks

Figure 1.4 shows the template settings and exported table for the system performance checks measured in the project.
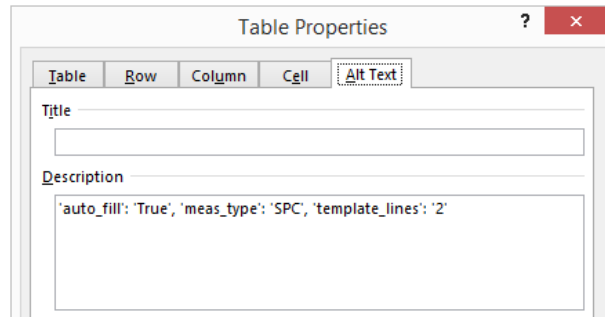
System Performance Checks

Date	Tissue	Freq [MHz]	Dipole	Vol	Power [dBm]	Target (1W) [W/kg]	Meas. [W/Kg]	Dev. [%]
Measurement Date	Medium Type	Frequency [MHz]	Dipole Name	#1g	Feed Power [dBm]	Target 1g [W/Kg/W]	SAR 1g [W/Kg]	Dev. 1g [%]
^	^	^	^	#10g	^	Target 10g [W/Kg/W]	SAR 10g [W/Kg]	Dev. 10g [%]

System Performance Checks

Date	Tissue	Freq [MHz]	Dipole	Vol	Power [dBm]	Target (1W) [W/kg]	Meas. [W/Kg]	Dev. [%]
2017-Oct-24	MSL	2450.0	D2450V2 - SN5678	1g	17.00	51.2	2.50	-2.6
				10g		23.7	1.20	1.0
2017-Oct-24	MSL	5600.0	D5GV2 - SN1234	1g	17.00	76.1	3.92	2.8
				10g		21.2	1.11	4.5
2017-Oct-24	MSL	5800.0	D5GV2 - SN1234	1g	17.00	74.1	3.64	2.0
				10g		20.5	1.06	3.2
2017-Oct-24	MSL	5300.0	D5GV2 - SN1234	1g	17.00	74.2	3.68	-1.1
				10g		20.7	1.07	3.1

Figure 1.4: Typical Template Table and Exported Data for System Performance Checks

4.3.3   SAR Measurements

Figure 1.5 shows the template settings and exported table for the SAR measurements performed in the project. In this specific example, SAR measurement results will be exported for WCDMA Band I only. The measurements will be alphabetically sorted by Phantom, Test Distance and Frequency. Adjacent cells with equal values for the collumns Phantom, Test Distance and Position will be merged.

Figure 1.5: Typical Template Table and Exported Data for SAR Measurements

Appendix A   Keys

The following tables list some of the keywords used to specify the attributes of the measurement data. Keys for SAR and Conducted Power Measurements are given in Table 2, and for System Performance Checks (SPCs) in Table 3, respectively.

Key	Description
Phantom	Phantom section (Left Head, Flat MSL...)
Position	DUT position (FRONT, EDGE TOP, TILT...)
Test Distance	Distance DUT - phantom shell
Job Type	Type of the scans
Job Name	Name of the scans
Group	Communication system group (GSM, LTE-FDD...)
UID	Communication system UID (10021, 10169...)
UID Revision	Revision number of the UID (AAB, AAC...)
Subframe Configuration	Subframe configuration setting for LTE-TDD signals
Uplink Downlink Configuration	Uplink downlink configuration setting for LTE-TDD signals
RB	Number of resource blocks (1, 25, 100...)
RB Location	Position of the resource blocks (Low, Mid, High)
Frame_Length	Signal duration in ms
Channel	Channel number
Frequency	Channel frequency in MHz
Description	Communication system name
Modulation	Modulation scheme (QPSK, 16-QAM...)
Band	Name of the frequency band (GSM850...)
Active Slots	GSM slots on which the signal is transmitted
Subgroup	WLAN subgroup (IEEE 802.11a, IEEE 802.11b...)
Bitrate	Transmitted bitrate for WLAN signals
Duty Cycle	Signal duty cycle
Bandwidth	Signal bandwidth in MHz
MCS	Modulation coding scheme for WLAN
Package	Package name for Bluetooth signals (DH1, DH3...)
Mode	Mode description for WCDMA signals (Rel. 99 RMC, HSDPA...)
SAR unscaled 1g [W/Kg] [1]	Measured SAR with 1g averaging volume in W/Kg
SAR unscaled 10g [W/Kg] [1]	Measured SAR with 10g averaging volume in W/Kg
SAR powerscaled 1g [W/Kg] [1]	Measured SAR scaled by the Power Scaling Factor in W/Kg
SAR powerscaled 10g [W/Kg] [1]	Measured SAR scaled by the Power Scaling Factor in W/Kg
Measured Power [dBm] [2]	Measured conducted power in dBm
Maximum Power [dBm] [2]	Maximum conducted power in dBm
Tune-up Factor [dB] [2]	Difference between maximum and measured conducted power in dB

Table 2: Available Keys for SAR and Conducted Power Measurements

[1] available for SAR measurements only. [2] available for conducted power measurements only

Key	Description
Measurement Date	Date on which the measurement has been performed
Medium Type	Type of tissue simulating liquid used (either HSL or MSL)
Frequency [MHz]	Test frequency
Dipole Name	Name of the dipole used for system verification
Feed Power [dBm]	Power applied to the dipole
Permittivity (Target)	Target TSL permittivity at the test frequency
Permittivity (Measured)	Measured TSL permittivity at the test frequency
Dev. Permittivity [%]	Deviation of measured TSL permittivity from target
Conductivity (Target)	Target TSL conductivity at the test frequency
Conductivity (Measured)	Measured TSL conductivity at the test frequency
Dev. Conductivity [%]	Deviation of measured TSL conductivity from target
SAR 1g [W/Kg]	Measured SAR 1g corrected to nominal TSL targets
SAR 10g [W/Kg]	Measured SAR 10g corrected to nominal TSL targets
Target 1g [W/Kg/W]	SAR 1g target normalized to 1W input power
Target 10g [W/Kg/W]	SAR 10g target normalized to 1W input power
Dev. 1g [%]	Deviation measurement - target for SAR 1g
Dev. 10g [%]	Deviation measurement - target for SAR 10g
Dev. Peak [%]	Deviation measurement - target for peak SAR at the phantom surface
Dev. Peak 20 mm [%]	Deviation measurement - target at peak SAR + 20mm offset location

Table 3: Available Keys for System Performance Checks