



High Channel Count External Instrument Integration with J750

Gerko de Roo, Salland Engineering Europe BV
gerko.deroo@salland.com

Paul van Ulsen, Salland Engineering Europe BV
paul.vanulsen@salland.com

Ground Rules



- This presentation will handle various areas in a J750 IGXL test program that require attention when integrating a third party instrument.
- This presentation describes the challenges when integrating a third party instrument in the 'closed' J750 IGXL environment.
- J750 basic programming knowledge is assumed while writing this presentation.
- Where examples were needed the X750 DPS instrument is chosen.

Target Systems

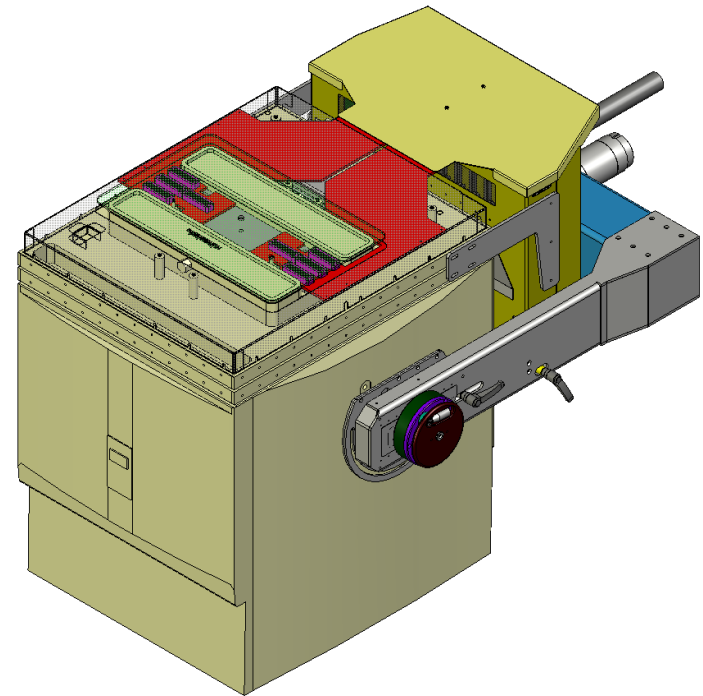


Goal of the IGXL Extension

- Keep track of channel allocations
 - DUT pins and Sites
- Offer IGXL style of programming
 - Instrument behaves as integrated instrument.

Example Target system

- Salland X750 DPS
- High channel count
 - 640 Additional DPS
 - Waveform source and capture
 - IDDq sequencer



Instruments and Sheets



- J750 instruments definition and settings are programmed in sheets, the area's of interest for 3rd party instruments
 - Pin Map Sheet →
 - definition of DUT pins and connected instruments
 - Channel Map Sheet →
 - Physical connection definition and site control
 - Pin Level Sheet →
 - Instrument levels and settings based on conditions (DCSpec)
 - Instance Sheet →
 - Definition of the test
 - Flow Sheet
 - Programming the order of the tests



Pin Map Sheet integration



Teradyne IG-XL DataTool - Offline Mode - D:\userdata\SE_Products\X750\workbook1 - Functional_Check.xls

File Edit View Insert Format Tools Data IG-XL Window X750 Help

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Test Chans_Test X750DPS_FV10p_VR

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Pin Map			
Group Name	Pin Name	Type	Comment
	J750MeasPin	I/O	
	J750Dps	Power	
	J750Bpmu	Power	
	X750DPS1_0	Unknown	XDPS 0,G1
	X750DPS1_1	Unknown	XDPS 1,G1
	X750DPS1_2	Unknown	XDPS 2,G1
	X750DPS1_3	Unknown	XDPS 3,G1
	X750DPS2_0	Unknown	XDPS 4,G1
	X750DPS2_1	Unknown	XDPS 5,G1
	X750DPS2_2	Unknown	XDPS 6,G1
	X750DPS2_3	Unknown	XDPS 7,G1
	X750DPS3_0	Unknown	XDPS 8,G1
	X750DPS3_1	Unknown	XDPS 9,G1
	X750DPS3_2	Unknown	XDPS 10,G1
	X750DPS3_3	Unknown	XDPS 11,G1

- Use Standard PinMap
 - Add standard IGXL type pins
 - Add X750 type pins
- ### Requirements

- Site number must be part of PinName. Only one (1) “_” allowed in the name!
- Comment field is used for instrument recognition
- Channel number and maximum merge setting must be listed here, (no need for Channel map)

- Type has to be set to Unknown

Pin Map Sheet integration (Cont.)



- Grouping:
 - Pins with similar names before the “_” will be grouped as a power domain groups by the IGXL Integration Software.
 - Since IGXL does not support grouping of pins with type unknown, grouping of power domain groups is not possible.
- Validation:
 - IGXL will accept type unknown for third party instruments.
 - The IGXL Extension Software will validate the user input of the PinMap sheet.
- This format can be used with:
 - Normal style PinMap definition (test programs ≤ 32 sites)
 - HPT style PinMap definition (test programs >32 sites)

Channel Map Sheet Integration



- X750 pins in the Channel Map sheet?
 - The channels are already defined in the PinMap.
 - The number of sites are already defined in the PinMap
- X750 pins in the Channel Map is not needed!
- Validation:
 - When X750 channels are listed the “tester channel type” must to be set to N/C.
 - IGXL software will regard these entries as comment if the tester channel type is N/C.
 - IGXL software will not raise a validation error if the pins are not listed, since they are marked as unknown in the PinMap

Pin Level Sheet Integration



Teradyne IG-XL DataTool - Offline Mode - D:\user\data\SE_Products\X750\workbook\ - Functional_Check.xls

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Test Chans_Test FV_X750DPS

Pin/Group	Seq.	Parameter	Value	Comment
Pin Levels				
J750Bpmu	3	Vps	5	
J750Bpmu		Isc	0.2	
J750Bpmu		Tdelay	0	
Pin Levels X750				
X750DPS1	S:4	Vps	=_X750DPS_FV	
X750DPS1		VRange	4	
X750DPS1		ForceMode	FV Norma	
X750DPS1		Slew rate	Norma	
X750DPS1		Compensation	Slow	
X750DPS1		Isc	0.1	
X750DPS1		Tdelay	0	
X750DPS2	S:4	Vps	3	
X750DPS2		VRange	4	
X750DPS2		ForceMode	FV Norma	
X750DPS2		Slew rate	Norma	
X750DPS2		Compensation	Slow	
X750DPS2		Isc	0.8	
X750DPS2		Tdelay	0.1	
X750DPS3	5	Vps	7.5	
X750DPS3		VRange	8	
X750DPS3		ForceMode	FV Norma	
X750DPS3		Slew rate	Norma	
X750DPS3		Compensation	Slow	
X750DPS3		Isc	0.5	
X750DPS3		Tdelay	0.3	

- Use the Standard Level Sheet
- Add the standard J750 instruments
- Autoformatting of the X750 section
- X750 pingroups can be added
- The field values can be constants, equations holding DC Spec items, global specs and cell references.
- Sequencer column to control power on/off sequence

Pin Level Sheet Integration Cont.



- Level Sheet:
 - Multiple Level Sheet supported.
 - All parameter values will be uniquely identified:
 - Using the Level Sheet name, environment, category and selector of the active DC Spec sheet. *)
 - Parameter values will be stored in the IGXL Extension for fast access
- Validation:
 - IGXL software will regard these entries as comments due to the mandatory empty lines spaces.
 - The IGXL Extension will validate the user input of the Level Sheet(s)

*) The use of a DCSpec sheet is mandatory

Instance Sheet integration



Microsoft Excel - Functional_Check.xls

File Edit View Insert Format Tools Data Window X750 Help

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X750DEMO Chans_4sites SHUTDOWN_SUPPLY Range4V

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Test Instances		TERADYNE					
Test Name	Type	Test Procedure		DC Specs		AC Specs	
		Name	Called As	Category	Selector	Category	Selector
VLOAD_RESISTOR	Template	X750Sup.xlaX750DPS_T	Excel Macro	DC Normal	Typ		
CONTACT_IO_FUNC	Template	X750Sup.xlaX750DPS_Functional_T	Excel Macro	Contact	Min	AC Normal	Typ
CONTACT_IO_PARAM	Template	X750Sup.xlaX750DPS_PinPmu_T	Excel Macro	Contact	Min	AC Normal	Typ
SHUTDOWN_SUPPLY_CURRENT1	Template	X750Sup.xlaX750DPS_T	Excel Macro	DC Normal	Typ	AC Normal	Typ
SHUTDOWN_SUPPLY_CURRENT2	Template	X750Sup.xlaX750DPS_T	Excel Macro	DC Normal	Max	AC Normal	Typ
LEAKAGE_ANALOG_AIN2	Template	X750Sup.xlaX750DPS_PinPmu_T	Excel Macro	DC Normal	Typ	AC Normal	Typ
LEAKAGE_DIGITAL_LOW	Template	X750Sup.xlaX750DPS_PinPmu_T	Excel Macro	DC Normal	Typ	AC Normal	Typ
LEAKAGE_DIGITAL_HIGH	Template	X750Sup.xlaX750DPS_PinPmu_T	Excel Macro	DC Normal	Typ	AC Normal	Typ
LEAKAGE_DIGITAL_CS_HIGH	Template	X750Sup.xlaX750DPS_PinPmu_T	Excel Macro	DC Normal	Typ	AC Normal	Typ
VIX_VOX	Template	X750Sup.xlaX750DPS_Functional_T	Excel Macro	VIX_VOX	Typ	AC Normal	Typ

Ready

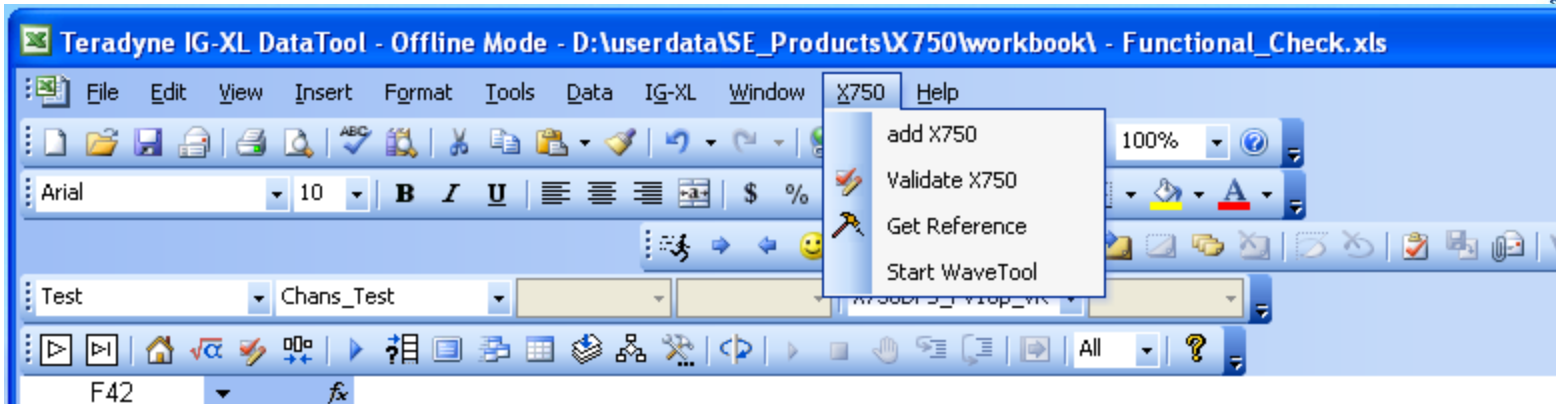
- Minimal adaptations needed to existing templates to support X750 DPS (User Test Templates)
- Make Use of User Test Templates with X750 support

Flow Sheet integration



- Test as defined in the instance sheet can be added to the flow sheet.
- No changes needed to Flow Sheet for 3rd party instruments.

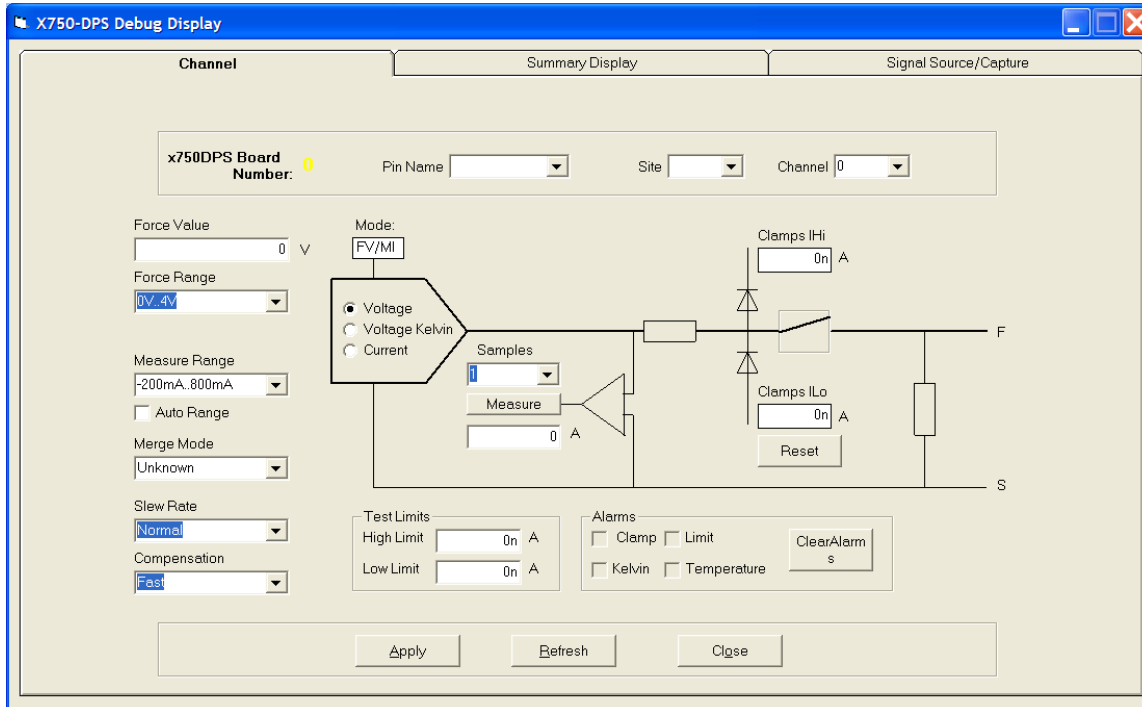
Extra's: X750 Menu section



Main Functions

- Add X750 →
 - Add the Level Sheet formatting to the Level Sheets
- Validate X750 →
 - Does a validation of the X750 entries in the Pin Map and Level Sheet. In case of syntax errors a X750 Errors sheet will be raised.

Extra's: Debug Screen



- Instrument debug screen

Extra: X750 Instrument Test Template



SE X750 Power Supply Instance Editor -FV_X750DPS- Instance Arguments

Required Arguments

x750-DPS | Source/Capture |

Power Pins: X750DPS1

Force

Mode: FV/MI(default)

Force Cond: =_X750DPS_For 3.2

Force Range: 0V..8V

Gang Mode: 1

Relay Mode: Unpowered(defa)

Slew Rate: NORMAL(default)

Compensation: FAST(default)

Measure

Samples: 1

Measure Range: -128mA..128mA

Settling Time: =0

IClampHi

IClampLo

HiLimit: =0.127 0.127

LoLimit: =0 0

Enable Iddq: 0 IddqNr

Test Control: Single Test(def.)

Optional Arguments

Levels&Timing | Patterns | Pins | Interpose Functions | IDDO_Settings

TimeSet

EdgeSet

Levels: Level_4V

Overlay

AC Selector

AC Category

DC Selector: Range4V

DC Category: 80Perc

Comments: FV Setup

Maximum Index: 0

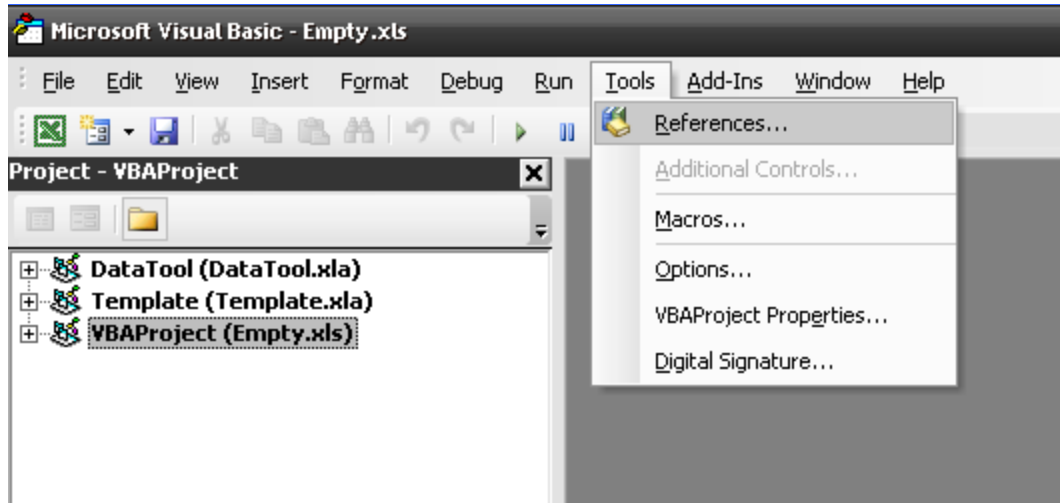
Member Index: 0

Copy Paste Add Delete

Help OK Cancel Apply

- Test template that handles the measurements of the 3rd party instrument.

Installing and using the software



- During installation of the X750 software package the software will be located in the folder:
C:\Program Files\Salland Engineering\X750DPS
- Add the references using the VBT environment of your J750 Project.

Installing and using the software cont.



These libraries need to be attached using the references

- X750Application.dll
 - This DLL handles the Pin Map and the Level Sheet integration as described on previous slides.
- X750_Core.dll and X750_DPS.dll
 - These DLL handles the communication to the instrument.
- X750Sub.xla
 - This XLA holds the custom templates where the X750 is integrated and the required user functions.
- X750SubHPT.xla
 - This XLA holds the custom templates where the X750 is integrated and the required user functions with regards to HPT.

Activating the software



- Use standard interpose functions like “OnProgramLoaded”
- Example code:

```
Public X750DPSapps As X750Class
Public X750 As X750_Obj
Public Function OnProgramLoaded()
    Set X750DPSapps = New X750Class
    If X750 Is Nothing Then Set X750 = New X750_Obj
    Pin_Select = get_x750DPS_pingroup_info
    OnProgramLoaded = TL_SUCCESS
End Function
```

Summary



- The Salland Integration Library to support the X750 DPS system in the J750 IGXL environment:
 - IGXL style programming for X750.
 - Independency of IGXL versions.
 - HPT ready.
 - Easy adaptation of custom made test-templates for X750.
 - IGXL style validation of X750 parameters.

