### **MPI**CORPORATION

## MPI TITAN<sup>™</sup> Probe Calibration for WinCal XE Users

**Quick How-To Reference** 



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## Guide

- This document is a reference guide for user who have bought RF probes from Allstron and MPI TITAN Probes and MPI Calibration Substrates
- Customer who want to use these Probes with WinCal XE Calibration SoEware

## The Goal

- WinCal XE supports RF probes and standards manufactured only by Cascade Microtech
- Probes and standards from other vendors can be described manually by:
  - Chose "Generic" probe type
  - Delete calibration substrate from the substrate list
- Next slides will show how to do it

Click on "System", System setup window will pop up





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### Probes Setup on the System Setup

- Click on "Probes"
- Select VNA Port Number
- Select "<Generic>" on Base Probe

Base Probe	Sig
<generic> 👻</generic>	GS
-NONE-	D
IZI-1MX <generic></generic>	0
ACP EPC	
i110 infinitiv	0
infinity waveguide	







### Probes Setup on the System Setup

• Select Pitch Value



• Select Orientation





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If required, repeat the above steps defining the second probe



	VNA Port 1	NA Port 2 VN	A Port 3 VN	A Port 4			_
	Base Probe	Sign	al Config C	ptions		Pitch	
	<generic></generic>	▼ GSC	i •] [		•][	150 🔻	
	Orientation N	Du	al Probe Signa 1	al	Prope	rties	
Properties			-			×	
Required						-71	
	undefined						
Serial Number	andonnod	Optio	15:				
Body Style:	<generic></generic>	Pitch:	15	D			
Body Style:	<generic></generic>	Pitch:	150	D			
Body Style: Signal Config:	<generic> GSG</generic>	Pitch:	15	D			
Body Style: Signal Config: Optional	<generic> GSG</generic>	Pitch:	15	D			
Body Style: Signal Config: Optional	<generic> GSG</generic>	Pitch:	15	D			
Body Style: Signal Config: Dptional Part Number	<generic> GSG</generic>	Pitch:	15	D			
Body Style: Signal Config: Dptional Part Number Comment	<generic> GSG</generic>	Pitch:	15	D			
Body Style: Signal Config: Dptional Part Number Comment Probe Name	<generic> GSG</generic>	Pitch:	15	D			
Body Style: Signal Config: Dptional Part Number Comment Probe Name	<generic> GSG</generic>	Pitch:	15	D			
Body Style: Signal Config: Dptional Part Number Comment Probe Name Probe S-Par	<generic> GSG ameters</generic>	Pitch:	15	0			
Body Style: Signal Config: Dptional Part Number Comment Probe Name Probe S-Par Probe S-Par	<generic> GSG ameters nple Model (de</generic>	Pitch:	15	0			8
Body Style: Signal Config: Dptional Part Number Comment Probe Name Probe S-Par © From Sin	<generic> GSG ameters nple Model (de</generic>	Pitch:	15	0	Browse		

### This is optional

 If you want to edit the name and probes information, click on "Properties". A Probe Properties Window will pop up for you to key in the information

### Setup Empty Substrate List

- Click "Standards" tab
- Delete all calibration substrates if any presented
- Leave the "Substrate" empty
- Click "OK" to close System setup window

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### **Next Step**

- Define probe correction coefficients, as:
  - Open Capacitance, C0
  - Short Inductance, L0
  - Load (Termination) Inductance, L0
  - Thru Delay and Loss

## **Important Note**

- Open, Short and Load offset have to me omitted, following definitions:
  - Offset impedance, Z0: 50 Ohm
  - Offset delay: 0 ps
  - Offset loss: 0 dB

## **Call Calibration Window**

In Main Menu, Click on "Calibrate". Calibration window will pop up



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## **Call Calibration Window**

Select the "Calibration Method" that you will like to calibrate with



 Click on "Setup" to open up the Calibration Setup Window

mpute 🧭 Validate J	All eas 🚮 Edit 🔚 Move Up 🧔 Move	یں 👻 Down 🗮 Choose Location 🔲 Seco	ond Tie	<< Less	
Repeatability Ca Ca Peperatability Ca Ca User-Defined Repe S-Para port S-Para port S-Para port S-Para port S-Para port S-Para port S-Para port	libration Setup     atability   Calibration   Validation   Monito     Port SOLT     '2-Port SOLT     'S Short (port 1) (Select 1 of 2)     'D' Short (port 2) (Select 1 of 2)     'D' Short     'D' Short (from file)     Open (port 1) (Select 1 of 2)     'D' Short     'D' Short (from file)     'D' Open	Ing Standard Definitions Standard Image: Standard Image: Standard Image: Standard Image: Standard Image: Standard Stan	ndard in tree	T C k	This window is where th calibration coefficient an being input for calibration
Ready	Open (from file) Open (port 2) (Open) Load (port 1) (Load) Load (port 2) (Load) Ioptions ption Click here to see algorithm	Value settings.	Unit		
Syste	m Representation	Selected Structur	re		

# Click on "Short" to input the calibration coefficient in "Standard Definition"

- Key in the Short Inductance Value (pH) in L0
- Set offset ref-delay to "0" ps
- Set offset ref-freq to "0" GHz

Compatible Structures User I	Defined	-
Verride Values		
Parameter	Value	Unit
LO	6.3	pН
L1	0	1e-24 H/Hz
L2	0	1e-33 H/Hz^2
L3	0	1e-42 H/Hz^3
offset line Z0	50	ohm
offset delay	0	ps
offset ref-loss	0	dB
offset ref-delay	0	ps
offset ref-freq	d	GHz

\*Refer to probe or calibration coefficient table in Appendix A

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- Click on "Open" to input the calibration coefficient in "Standard Definition"
  - Key in the Open Capacitance Value (fF) in C0
  - Set offset ref-delay to "0" ps
  - Set offset ref-freq to "0" GHz

Standard Definitions Standard 🚺 Off	set Capacitor (open) t(s): 2	
Compatible Structures Use	r Defined	•
Override Value	s	
Parameter	Value	Unit
C0	5.2	fF
C1	0	1e-27 F/Hz
C2 Open	Capacitance - prop	ortional to freq term
C3	0	1e-45 F/Hz^3
offset line Z0	50	ohm
offset delay	0	ps
offset ref-loss	0	dB
offset ref-delay	0	ps
offset ref-freq	0	GHz

\*Refer to probe or calibration coefficient table in Appendix A



# Click on "Load" to input the calibration coefficient in "Standard Definition"

- Key in the Load Inducatance Value (pH) in C0
- Set offset ref-delay to "0" ps
- Set offset ref-freq to "0" GHz

Standard Definitions Standard Offs Port	et Series RL (load) (s): 1	
Compatible Structures User	Defined	•
Override Values	3	
Parameter	Value	Unit
R	50	ohm
Lt	-2.5	pН
offset line Z0	50	ohm
offset delay	0	ps
offset ref-loss	0	dB
offset ref-delay	0	ps
offset ref-freq	0	GHz

\*Refer to probe or calibration coefficient table in Appendix A

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# Click on "Thru" to input the calibration coefficient in "Standard Definition"

- Base on AC-2, AC-3 and AC-5 datasheet
- Key in the Thru(Line) Calibration Coefficient into the definition
- Key in the **delay(ps)** for Thru
- Key in the ref-loss(dB)
- Key in the **ref-delay(ps)**
- Key in the ref-freq(GHz)

Standard Definition	ns Transmission L Vort(s): 1, 2	ine (thru	)
Compatible Structures	ser Defined		•
Override Val	ues		
Parameter	Value		Unit
Z0		50	ohm
delay		1.1	ps
ref-loss		0.34	dB
ref-delay		25.5	ps
ref-freq		20	GHz

\*Refer to AC-2, AC-3 and AC-5 datasheet

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### **Confirm Modifications**

### Click on "Apply" and then "OK"



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### **Save Project**

Click on "Save As" to save your correction coefficient for future use



## **Calibration Setup**

Setup the filename for this probe setup. In future you can just open the \*.wcf without the need to rekey in the calibration correction information.



## Appendix A. Open, Short, Load

Calibration Coefficient for MPI ASP GSG 100 to 250 Probe with AC-2 Cal-Substrate

Pitch/Parameter	100	125	150	200	250
C-OPEN, fF	5.2	5.25	5.3	5.5	5.7
L-SHORT, pH	6.3	9.8	12.3	16.0	20.0
L-LOAD, pH	-2.5	0	1.5	8.0	11.5

## **Appendix B. Thru**

#### **AC-2 Calibration Substrate**

**Electrical Characteristics of CPW Line Standards** 

Nominal capacitance per unit length, pF/cm	1.492
Nominal characteristic impedance @20 GHz	50 <u>Ω</u>
Effective dielectric constant @20 GHz, real part	4.94
Effective velocity factor @20 GHz	0.45
Parameters of the simplified model of line losses	
Reference loss, dB	0.34
Reference delay, ps	25.5
Reference frequency, GHz	20
Electrical length of line, ps	
Thru	1.10
Line 1 (0309)	3.00
Line 2 (0509)	6.50
Line 3 (0709)	13.00
Line 4 (1309)	25.50
Line 5 (0101)	38.50

#### **AC-3 Calibration Substrate**

**Electrical Characteristics of CPW Line Standards** 

Effective dielectric constant @20 GHz, real part	4.94
Effective velocity factor @20 GHz	0.45
Parameters of the simplified model of line losses	
Reference loss, dB	0.34
Reference delay, ps	25.5
Reference frequency, GHz	20
Electrical length of line, ps	
Thru	1.10
Line 1 (0110)	3.00
Line 2 (0310)	6.50
Line 3 (0510)	13.00
Line 4 (1110)	25.50
Line 5 (0101)	38.50

## **Appendix B. Thru (cont.)**

#### **AC-5 Calibration Substrate**

**Electrical Characteristics of CPW Line Standards** 

E	ffective dielectric constant @10 GHz, real part	6.13
E	ffective velocity factor @10 GHz	0.40
F	Parameters of the simplified model of line losses	
	Reference loss, dB	0.21
	Reference delay, ps	42
	Reference frequency, GHz	10
E	lectrical length of line, ps	
	Thru	5
	Line 1 (0109)	26
	Line 2 (0309)	42
	Line 3 (1009)	47

## Thank you