#### Orthomode Transducer Test Program User's Guide Larry Wurtz, Phd 1 May 2021



- Procedure for OMT test program was taken from a paper entitled "Cheap Method for Accurate Characterization of Orthomode Transducers" by M. Oldoni and D. Tresoldi, 2016 IEEE
- Additional reference paper: "A Technique for the Measurement of the Generalized Scattering Matrix of Overmoded Waveguide Devices" by Antonio Morini, Marco Guglielmi, and Marco Farina, IEEE Transactions of Microwave Theory and Techniques, Vol. 61, No. 7, July 2013
- Additional reference paper: "A Microwave Measurement Procedure for a Full Characterization of Ortho-Mode Transducers", Oscar Peverini and others, IEEE Transactions on Microwave Theory and Techniques, Vol. 51, No. 4, April 2003
- The following slides provide a step-by-step sequence of instructions to measure the performance of a Millitech OMT22 with SN 132
- A Keysight E8364C network analyzer with 2 hour warm-up and two separate full 2-port calibrations provided the following results.

# Press project directory button as last step

## Main Display

Enter project directory, best to copy and rename existing project directory

P Orthomode Transducer Test Program - Agilent E8	364C - Wurtz, Wednesday, 21 April 2021, 8:03 P.M.		~ ~ ~		
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#### De-embed circular to rectangular transition

Press once to show required network analyzer connection Press twice to take measurement, repeat if needed

P Orthomode Transducer Test Program - Agilent F8364C -	- Wurtz, Wednesday, 21 April 2021, 8:03 P.M.				
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## De-embed circular to rectangular transition



Take Hconfig measurement press once for required setup and twice for measurement Setup shown bottom right and on next slide (repeat if needed)

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#### Hconfig measurement



Take hconfig measurement press once for required setup and twice for measurement Setup shown bottom right and on next slide (repeat if needed)



#### hconfig measurement



## Take vconfig measurement press once for required setup and twice for measurement Setup shown bottom right and on next slide (repeat if needed)

P Orthomode Transducer Test Program - Agilent E8364C - 1	Wurtz, Wednesday, 21 April 2021, 8:03 P.M.					
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#### vconfig measurement



Take Vconfig measurement press once for required setup and twice for measurement Setup shown bottom right and on next slide (repeat if needed)



#### Vconfig measurement



## Take Tconfig measurement press once for required setup and twice for measurement Setup shown bottom right and on next slide (repeat if needed)

Orthomode Transducer Test Program - Agilent E	8364C - Wurtz, Wednesday, 21 April 2021, 8:03 P.M.	
Logo Main Display CR Transition Pha	se Delay Plot CR Transition S11 Plot Port VSWR Plots Transmission Plots Isolation	Plots Cross Polarization Plots
Project Directory	D:\Littrell_delay_line\Ortho_mode_transducer_files\OMT22_SN132_34GHz_36GHz_20	6March2021 Files
De-embed Cir to Rect Transition	Collect S-Parameters	
Process Collected S-Parameters	Save Hconfig Hh S-Parameters Save hconfig Hv S-Parameters	Save Tconfig S-Parameters
Close Console	Save vconfig Vh S-Parameters Save Vconfig Vv S-Parameters	Save Gconfig S-Parameters
	Measurements from an Agilent E8364C PNA	Save Offset Gconfig S-Parameters
File Identification	OMT22_SN132_34GHZ_36GHZ_26March2021	Enable Offset Gconfig S-Parameters
Processing Notes	Clear Processing Notes	Enable (Tau1 + Tau2) / 2 Phase Correction
ShH saved to D:\Littrell_delay_li Files\ OMT22_SN132_34GHZ_36GHZ_2 SHh saved to D:\Littrell_delay_li Files\ OMT22_SN132_34GHZ_36GHZ_2 Shh saved to D:\Littrell_delay_li Files\ OMT22_SN132_34GHZ_36GHZ_2 SVV saved to D:\Littrell_delay_li Files\ OMT22_SN132_34GHZ_36GHZ_2 Shv saved to D:\Littrell_delay_li Files\ OMT22_SN132_34GHZ_36GHZ_2 ShV saved to D:\Littrell_delay_li Files\ OMT22_SN132_34GHZ_36GHZ_2 ShV saved to D:\Littrell_delay_li Files\ OMT22_SN132_34GHZ_36GHZ_2 ShV saved to D:\Littrell_delay_li Files\ OMT22_SN132_34GHZ_36GHZ_2 SvH saved to D:\Littrell_delay_li Files\ OMT22_SN132_34GHZ_36GHZ_2 SvH saved to D:\Littrell_delay_li Files\ OMT22_SN132_34GHZ_36GHZ_2 SvH saved to D:\Littrell_delay_li ShV saved to D:\Littrell_delay	<pre>.ne\ortho_mode_transducer_files\OMT22_SN132_34GHz_36GHz_26March2021 ?6March2021_Shcaph.csv .ne\ortho_mode_transducer_files\OMT22_SN132_34GHz_36GHz_26March2021 ?6March2021_Scaph.csv .ne\ortho_mode_transducer_files\OMT22_SN132_34GHz_36GHz_26March2021 ?6March2021_Scapvcapv.csv .ne\ortho_mode_transducer_files\OMT22_SN132_34GHz_36GHz_26March2021 ?6March2021_Svcapv.csv .ne\ortho_mode_transducer_files\OMT22_SN132_34GHz_36GHz_26March2021 ?6March2021_Svcapv.csv .ne\ortho_mode_transducer_files\OMT22_SN132_34GHz_36GHz_26March2021 ?6March2021_Scapvv.csv .ne\ortho_mode_transducer_files\OMT22_SN132_34GHz_36GHz_26March2021 ?6March2021_Svcapv.csv .ne\ortho_mode_transducer_files\OMT22_SN132_34GHz_36GHz_26March2021 ?6March2021_Stv.csv .ne\ortho_mode_transducer_files\OMT22_SN132_34GHz_36GHz_26March2021 ?6March2021_stv.csv .ne\ortho_mode_transducer_files\OMT22_SN132_34GHz_36GHz_26March2021 ?6March2021_scaphcapv.csv .ne\ortho_mode_transducer_files\OMT22_SN132_34GHz_36GHz_26March2021 ?6March2021_scaphcapv.csv .ne\ortho_mode_transducer_files\OMT22_SN132_34GHz_36GHz_26March2021 ?6March2021_scaphcapv.csv .ne\ortho_mode_transducer_files\OMT22_SN132_34GHz_36GHz_26March2021 ?6March2021_Stransducer_files\OMT22_SN132_34GHz_36GHz_26March2021 ?6March2021_scaph.csv .ne\ortho_mode_transducer_files\OMT22_SN132_34GHz_36GHz_26March2021 ?6March2021_scaph.csv .ne\ortho_mode_transducer_files\OMT22_SN132_34GHz_36GHz_26March2021 ?6March2021_scaph.csv .delay_line\ortho_mode_transducer_files\OMT22_SN132_34GHz_36GHz_36GHz_ ?6Hz_36GHZ_26March2021_s_parameters.s4p</pre>	To VNA Port 1 Matched Matched Matched T config.

Tconfig measurement



Take Gconfig measurement press once for required setup and twice for measurement Setup shown bottom right and on next slide (repeat if needed)

Conthomode Transducer Test Program - Agilent E	3364C - Wurtz, Wednesday, 21 April 2021, 8:03 P.M.			
Logo Main Display CR Transition Pha	se Delay Plot CR Transition S11 Plot Port VSWR	Plots Transmission Plots Isolation F	Plots Cross Polarization Plots	
Project Directory	D:\Littrell_delay_line\Ortho_mode_transducer_file	es\OMT22_SN132_34GHz_36GHz_264	arch2021_Files	
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	Measurements from an Agilent E8364C PNA	A	Save Offset Gconfig S-Parameters	
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#### Gconfig measurement



Take Offset Gconfig measurement press once for required setup and twice for measurement Setup shown bottom right and on next slide (repeat if needed) This measurement needed only if pole condition(s) appear in results

Porthomode Transducer Test Program - Agilent E8364C	- Wurtz, Wednesday, 21 April 2021, 8:03 P.M.		0.0.0		
Logo Main Display CR Transition Phase Delay Plot CR Transition S11 Plot Port VSWR Plots Transmission Plots Isolation Plots Cross Polarization Plots					
Project Directory D:\L	_ittrell_delay_line\Ortho_mode_transducer_fil	es\OMT22_SN132_34GHz_36GHz_26	March2021_Files		
De-embed Cir to Rect Transition	llect S-Parameters				
Process Collected S-Parameters	Save Hconfig Hh S-Parameters	Save bconfig Hy S-Parameters	Save Tconfig S-Parameters		
Close Console	Save yconfig Vh S-Parameters	Save Vconfig Vy S-Parameters	Save Gronfig S-Parameters		
			Save Offset Goopfig S-Parameters	Autors	
	Measurements from an Agilent E8364C PNA		Save Onset aconing 3-1 arameters		
File Identification OM	IT22_SN132_34GHZ_36GHZ_26March2021		Enable Offset Gconfig S-Parameters		
Processing Notes		Clear Processing Notes	Enable (Tau1 + Tau2) / 2 Phase Correctio	n	
$ \begin{array}{c} \mbox{Clear Processing Notes} \\ \label{class} \\ \mbox{Clear Processing Notes} \\ \mbox{ShH saved to D: Littrell_delay_line \Ortho_mode_transducer_files \OMT22_SN132_34GHz_36GHz_26March2021} \\ \mbox{Files \OMT22_SN132_34GHZ_36GHZ_26March2021_sheaph.csv} \\ \mbox{Shh saved to D: Littrell_delay_line \Ortho_mode_transducer_files \OMT22_SN132_34GHz_36GHz_26March2021} \\ \mbox{Files \OMT22_SN132_34GHZ_3GGHZ_26March2021_shh.csv} \\ \mbox{Shr saved to D: Littrell_delay_line \Ortho_mode_transducer_files \OMT22_SN132_34GHz_36GHz_26March2021} \\ \mbox{Files \OMT22_SN132_34GHZ_3GGHZ_26March2021_Shh.csv} \\ \mbox{SvV saved to D: Littrell_delay_line \Ortho_mode_transducer_files \OMT22_SN132_34GHz_36GHz_26March2021} \\ \mbox{Files \OMT22_SN132_34GHZ_3GGHZ_26March2021_Scapvcapv.csv} \\ \mbox{SvV saved to D: Littrell_delay_line \Ortho_mode_transducer_files \OMT22_SN132_34GHz_36GHz_26March2021} \\ \mbox{Files \OMT22_SN132_34GHZ_3GGHZ_26March2021_Scapvv.csv} \\ \mbox{Svv saved to D: Littrell_delay_line \Ortho_mode_transducer_files \OMT22_SN132_34GHZ_36GHz_26March2021} \\ \mbox{Files \OMT22_SN132_34GHZ_3GGHZ_26March2021_Scapvv.csv} \\ \mbox{Shv saved to D: Littrell_delay_line \Ortho_mode_transducer_files \OMT22_SN132_34GHZ_36GHz_26March2021} \\ \mbox{Files \OMT22_SN132_34GHZ_3GGHZ_26March2021_Scapv.csv} \\ \mbox{Shv saved to D: Littrell_delay_line \Ortho_mode_transducer_files \OMT22_SN132_34GHZ_36GHZ_26March2021} \\ \mbox{Files \OMT22_SN132_34GHZ_3GGHZ_26March2021_Scapv.csv} \\ \mbox{Shv saved to D: Littrell_delay_line \Ortho_mode_transducer_files \OMT22_SN132_34GHZ_36GHZ_26March2021} \\ \mbox{Files \OMT22_SN132_34GHZ_3GGHZ_26March2021_Scapv.csv} \\ \mbox{Shv saved to D: Littrell_delay_line \Ortho_mode_transducer_files \OMT22_SN132_34GHZ_36GHZ_26March2021} \\ \mbox{Files \OMT22_SN132_34GHZ_3GGHZ_26March2021_Scappv.csv} \\ \mbox{Shv saved to D: Littrell_delay_line \Ortho_mode_transducer_files \OMT22_SN132_34GHZ_36GHZ_26March2021} \\ \mbox{Files \OMT22_SN132_34GHZ_3GGHZ_26March2021_Scappv.csv} \\ Shv saved to D: Littrell_delay_line \Ortho_m$				$p_{\text{Port 2}}$ thed $p_{\text{D}} = -1$	

Offset Gconfig measurement



#### Process S-parameter measurements

Select Offset Gconfig measurements only if pole condition(s) appear in results





#### Indicates quality of circular to rectangular transition Perfect result should be 1.0 for 100% reflection







To zoom plot:

- 1. Press zoom button (will turn green)
- 2. Click on display start point
- 3. Click on display stop point (display will zoom and button will turn red)
- 4. Press zoom button twice for full display









### Files saved in project directory: OMT22\_SN132\_34GHZ\_36GHZ\_26March2021\_Files

Name	Date modified	Туре	Size
L Documents	4/22/2021 7:32 PM	File folder	
l Pictures	4/22/2021 5:16 PM	File folder	
OMT22_SN132_34GHZ_36GHZ_26March2021_s_parameters.s4p Control Touchstone-	ike <sup>2</sup> S°parame	eter⊧File	11,420 KB
OMT22_SN132_34GHZ_36GHZ_26March2021_Scaphcaph.csv	4/22/2021 5:00 PM	CSV File	1,363 KB
OMT22_SN132_34GHZ_36GHZ_26March2021_Scaphcapv.csv	4/22/2021 5:00 PM	CSV File	1,038 KB
OMT22_SN132_34GHZ_36GHZ_26March2021_Scaphh.csv	4/22/2021 5:00 PM	CSV File	1,052 KB
OMT22_SN132_34GHZ_36GHZ_26March2021_Scapvcapv.csv	4/22/2021 5:00 PM	CSV File	1,364 KB
OMT22_SN132_34GHZ_36GHZ_26March2021_Scapvv.csv	4/22/2021 5:00 PM	CSV File	1,057 KB
OMT22_SN132_34GHZ_36GHZ_26March2021_Shcaph.csv .CSV TILES NOID S-	parameters t	orsteach plot	1,047 KB
OMT22_SN132_34GHZ_36GHZ_26March2021_Shcapv.csv	4/22/2021 5:00 PM	CSV File	1,038 KB
OMT22_SN132_34GHZ_36GHZ_26March2021_Shh.csv	4/22/2021 5:00 PM	CSV File	1,374 KB
OMT22_SN132_34GHZ_36GHZ_26March2021_Shv.csv	4/22/2021 5:00 PM	CSV File	1,039 KB
OMT22_SN132_34GHZ_36GHZ_26March2021_Svcaph.csv	4/22/2021 5:00 PM	CSV File	1,038 KB
OMT22_SN132_34GHZ_36GHZ_26March2021_Svcapv.csv	4/22/2021 5:00 PM	CSV File	1,050 KB
OMT22_SN132_34GHZ_36GHZ_26March2021_Svv.csv	4/22/2021 5:00 PM	CSV File	1,377 KB
Gconfig.dat	3/26/2021 4:58 PM	DAT File	3,126 KB
Hconfig_Hh.dat <	ementsatom	AT File	3,126 KB
hconfig_Hv.dat	3/26/2021 4:41 PM	DAT File	3,126 KB
Griefset_Gconfig.dat	3/10/2021 4:17 PM	DAT File	3,126 KB
offset1_Gconfig.dat	3/10/2021 4:12 PM	DAT File	3,126 KB
offset2_Gconfig.dat	3/10/2021 4:17 PM	DAT File	3,126 KB
s11_transition.dat	3/26/2021 4:39 PM	DAT File	782 KB
samplespersweep.dat	12/11/2020 11:46	DAT File	1 KB
start_frequency.dat < Start Trequency	12/11/2020 11:47	DAT File	1 KB
stop_frequency.dat	12/11/2020 11:47	DAT File	1 KB
	3/26/2021 4:57 PM	DAT File	3,126 KB
vconfig_Vh.dat	3/26/2021 4:47 PM	DAT File	3,126 KB
Vconfig_Vv.dat	3/26/2021 4:49 PM	DAT File	3,126 KB