











Coated Microstrip 1B Edge-Coupled Offset Striptine 1B1AIR Surface Coplanar Strips 2B Diff Coated Microstrip 1B Edge-Coupled Offset Striptine 2B1AT to the first term in the

Speedstack 2018 Introduction

Richard Attrill / John Lee – May 2018 (Rev 5)



Copyright © Polar Instruments 2018



A brief note before you see the major enhancements in Speedstack Si 2018.

The application and licensing changes beneath the surface are significant, and if you are an existing customer – please note that all Speedstack Si and Speedstack PCB users in an organisation will need to simultaneously upgrade in order to use the 2018 license.

Importantly, as Speedstack allows comprehensive bidirectional copy and paste into Si8000m / Si9000e and CGen it is important that all products are updated to the 2018 editions at the same time.



Speedstack has always provided a "container" for all the impedance control information; however, until 2018 edition the Speedstack Si bundle has only supported lossless information within Speedstack.

Speedstack Si 2018 adds significant insertion loss capability into the "Speedstack" side of the bundle.

The following slides offer you a glimpse into the 2018 edition:



Speedstack v18.05 (May 2018)



Cannonball-Huray Surface Roughness Method



5 Copyright © Polar Instruments 2018





Frequency Depend

www.polarinstruments.com

Application Note

Courtesy of Bert Simonovich, Lamsim Enterprises Inc.

Cannonball-Huray Surface Roughness Method

6 Copyright © Polar Instruments 2018

Lossless Calculation

Embedded Microstrip 1B2A

All Structures

polarinstruments.com

x



Online Material Library Enhancements

C:\F	rogram Files\Polar\	\Speedstack\Samples\	\Speedstack Imperial.mlbx		and and a first of the			
		}		- -	Â			
Foils	Prepregs RCCs	Cores Solder Masks	s Ident Inks Peelable Masks Coverlays	Bond Ply Adhesive Flexible Co	res	- Distantia Fisial	d Thisland Distriction Description	Parti Contest
<u> </u>	Supplier	Supplier Description	Description	Stock Number	Dielectric Base Thicknes	s Dielectric Finish	ed I hicknel Dielectric Constant	Resin Content 1
-	ITEQ	11-958G-1037-2mi	PrePreg 1037	11-958G-1037-01	2	2	2.99	73 17
	ITEQ	11-958G-1037-2.2ml	PrePreg 1037	11-958G-1037-02	2.2	2.2		
	ITEQ	IT-958G-106-2mi	PrePreg 106	11-958G-106-01	2	2		
	ITEQ	IT-958G-106-2.3ml	Pre-Preg 100	11-958G-106-02	2.3	2.3	New ITEQ core an	nd prepreg materials
	ITEO	IT 958G-1007-2.5m	PrePreg 1067	IT-558G-1007-01	2.0	2.0	have been added	to the Online Librar
	ITEO	IT-508G-1007-2.9M	PrePreg 1007	IT-998G-1007-02	2.0	2.9	have been added	to the Online Librar
	ITEO	IT-950G-1070-2.8m	PrePreg 1076	IT-959G-1078-01	2.0	2.0		
	ITEO	IT-958G-1070-3.1m	PrePreg 1070	IT-556G-1078-02	3.4	3.4	27	68 17
-	ITEQ	IT-958G-1078-3.4m	ProProg 1070	IT-558G-107804	3.4	3.4	3	70 17
	ITEQ	IT-956G-1076-3.7ml	PrePreg 10%	IT-558G-1078-04	3.7	3.7		52 47
	ITEQ	IT 958G 10	Fierleg 1000	11-358-0-01	2.0	2.0		02 17
	ITEO	UT 95%G 10 Online L	ibrary				V	_
	ITEQ	IT-958G-10						
	ITEO	Filter	by Supplier	File Type	Library Files Available : IT	req.	Existing Data Ta	ble Download
	ITEQ	17-958G-10	A	Foils	ITEQ_IT_140.mlbx		• Clear	Download
	ITEO	IT-958G-21	jeola	RCCs	ITEQ_IT_140G.mlbx			Close
	ITEO	IT-958G-21	ISUIA	PrePregs	ITEQ_IT_140TC.mlbx		C Append	
	ITEO	IT-958G-21		SolderMasks	ITEQ_IT_150.mibx			
	ITEO	IT-958G-33		Idents	ITEQ IT 170GRA1.mlbx			
	ITEO	17-9586-33		Peelables	ITEQ_IT_180.mlbx			
	ITEO	IT-958G-33		Coverlays	ITEQ_IT_958G.mlbx			
	ITEO	IT-958G-21		Adhesives	11EQ_11_968.mbx			
	ITEO	IT-958G-21		FlexCores				
	ITEO	IT-958G-21						
*			LG Chem					
Click on	a material row to edit i	it						1.















Speedstack v18.03 (March 2018)



Speedstack – Frequency Dependent Loss Calculations



In order to calculate frequency dependent loss it is necessary to know the following critical information regarding the transmission line structure:

a.Material properties including dielectric constant and loss tangent b.Conductor properties such as trace conductivity and surface roughness c.Frequency range that the transmission line structure will operate

Once this information has been gathered it is possible to run a detailed analysis of the transmission line structure for both controlled impedance and insertion loss



Speedstack – Frequency Dependent Loss Calculations



Each structure that has been added to the stack up now has a set of Frequency Dependent Properties that are accessible using this new icon.

Selecting this icon will load the following dialog.





Speedstack 2018 Introduction









Speedstack – Material and Surface Roughness properties

-Substrate Causal Extrapolation Reference Points							
Set Er values from Stack Up materials							
	Freq (Hz)	Ref Er	Ref TanD				
H1	1.000E+09	4.2000	0.0195				
H2							
H3							
H4							
REr							
CEr	1.000E+09	4.0000	0.0195				

In order to accurately calculate Dielectric Loss it is important to understand the material / substrate properties.

These substrate properties including dielectric constant (Er) and loss tangent (TanD) are specified here for each structure substrate region.

Speedstack causally extrapolates Er and TanD over the specified frequency range using the Svensson-Djordjevic method, hence the ability to specify the extrapolation reference points for each substrate region. The reference point data is usually available from the material supplier data sheet.

Surface Roughness Compensation								
C Smooth								
C Hammerstad	7	Edit						
 Groisse Huray 		Edit						

		Ratio of Areas	1.0000	Apply
The Star Star		Area of Ball Count (sq µm)	32 0000	Cancel
		Number of Balls in Area	32	
	And and a second se			
		1975		
	and the second second			
	E STAR SEA			
CARD STATE OF A CARD STATE OF		A7		

In order to accurately calculate Conductor Loss it is necessary to specify the surface roughness parameters.

Speedstack supports three different roughness models: Hammerstad, Groisse and Huray. In this example the Huray method is used, the dialog prompts for the required roughness parameters.

17 Copyright © Polar Instruments 2018







Speedstack – Contacting Polar for support



20 Copyright © Polar Instruments 2018



















t t

Speedstack – Technical Report enhancements

File 0	ptions	_	_	_	_			_	_	
	Print Setup Page Setup	a	- 拱 📈		•	(J. 2 2 1	_) oo		
	Stack Data Table	•	Suppress			Г				
	Controlled Impedance Data Table	•	 Stack Data Columns Show Drills (Stack Table) Show Thickness Totals 			ŀ	Units: Mils			
	Frequency Dependent Loss Graphs	• •				h	Supplier	Supplier	Description	
	Drill Data Table	• 🗸	Show Stackup Cost			Polar Samples	SM/001	Liquid PhotoImageable Mask		
	B.O.M. Data Table	• /	Show Hatch Profile Data				Polar Samples	FO/001	Copper Foil	
		1	Charles Charles			E	Polar Samples	PP/001	PrePreg 1080	
	Note Field Aliases		Show Stackup Thickness Tolerance Value As				Polar Samples	CO/005	FR4 Core	
	Print Order									
		. ∠	 Show Stackup Thickness (Solder mask-Solder mask) Show Stackup Thickness (Laminate-Laminate) 			Polar Samples	PP/002	PrePreg 3080 ProProg 1651		
	General				E	Polar Samples	PP/004	PrePreg 1651		
	Restore Default Settin		Stackup Thickness Decimal Accuracy		Polar Samples	CO/020	FR4 Core			
			, v			-	Polar Samples	PP/004	PrePreg 1651	
							Polar Samples	PP/004	PrePreg 1651	
dditional	dditional user-selectable options control the data shown beneath le stack up, for instance, tackup Cost and Hatch Profile						Polar Samples	PP/002	PrePreg 3080	
o control				6 7			Polar Samples	CO/005	FR4 Core	
he stack i						_	Polar Samples	PP/001	PrePreg 1080	
Stackup C							Polar Samples	FO/001	Copper Foil	
				· •			Polar Samples	SM/001	Liquid Photolmageable Mask	



Importantly, Speedstack 2018 allows comprehensive bidirectional copy and paste from Speedstack into Si9000e including all the relevant loss tangent, roughness and roughness method along with frequencies of interest.





•IMPORTANT NOTE:

•Please contact your local Polar office for information regarding evaluation and upgrading.

•As noted earlier – there are significant changes "under the hood" in both Speedstack, its associated Si8000m / Si9000e field solvers and FlexNet license management – it is important you discuss these especially if you are running a network or WAN license.













Thank you



Polar Logo & Pixelated stripe device Copyright Polar Instruments Ltd (c) 2017















For more information: Contact Polar now:	Phone
USA / Canada / Mexico Geoffrey Hazelett	(503) 356 5270
Asia / Pacific <u>Terence Chew</u>	+65 6873 7470
UK / Europe <u>Neil Chamberlain</u>	+44 23 9226 9113
Germany / Austria / Switzerland <u>Hermann Reischer</u>	+43 7666 20041-0
www.polarinstruments.com	

Polar Logo & graphic devices are registered trade marks of Polar Instruments Ltd. Copyright Polar Instruments Ltd (c) 2018