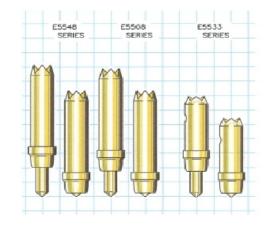


FEATURES

- <-1db insertion loss to 14.5GHz
- <2:1VSWR to 11.5GHz
- 20-39g operating spring force
- $Z0 = 35.7\Omega$
- <30ps risetime
- 25milliOhms contact resistance
- 7 Amps max. drive current



GENERAL DESCRIPTION

The E5548 spring probe from Signal Integrity Inc. is designed to meet the rigorous test requirements driven by the ultra fast risetimes in the digital domain, and high bandwidth, high frequency RF / microwave specifications for the wireless market. Along with speed and accuracy, these probes are designed to operate at pitches to 1.0mm, specifically for the fine pitch packaging these markets demand.

The very high bandwidth of these probes provides low insertion loss up to 14.5GHz. These probes will provide transparent operation on Bluetooth, 802.11b and 3G wireless protocol devices as well as exceed the test probe demands of proprietary microwave communications devices and systems.

With an impulse risetime of less than 30ps and a propagation delay of 25.5ps, the E5548 has more than enough performance for probe applications and interconnection solutions in broadband digital. These probes are ideal for building transparent test channels or interconnection solutions that must address data communication and source synchronous memory busses.

SERIES E5548 MODELS: ORDERING INFORMATION

A Series 1.0mm (.0394) Pitch							
Model	Length Operating / initial	DUT Plunger and Plating	Spring	Operating Spring Force			
E5548-A1		Reduced Crown - Gold		28 Grams			
E5548-N5		Reduced Crown - Gold		36 Grams			
E5548-J1		Red Crown - Gold (Crown I'F)		28 Grams			
E5548-B2		Conical – Gold		28 Grams			
E5548-C3	.156 [3.96] / .180 [4.57] (inch [mm])	Reduced Crown - Gold		20 Grams			
E5548-D4		Conical – Gold		20 Grams			
E5548-E5		Reduced Crown - Palladium Stainless Steel		28 Grams			
E5548-F6		Reduced Crown - Gold	Stanness Steel	32 Grams			
E5548-G7		Red Crown - Gold (Crown I'F)		28 Grams			
E5548-K2		Conical - Gold		32 Grams			
Е5548-Н8		Conical – Gold (Crown I'F)		32 Grams			
E5548-M4		Reduced Crown - Palladium		36 Grams			
E5548-T2		Crown - Palladium		28 Grams			
E5548-U3		Crown - Gold		28 Grams			
E5548-V4		Reduced Crown - Palladium		39 Grams			
E5548-W5		Conical - Gold	Music Wire	39 Grams			



FUNCTIONAL SPECIFICATIONS

Model $EFS48-VV$ Max. Units TDT Risetime into 50Ω Jam. Jam. ps TDR Risetime open circuit Jam. Jam. ps TDR Risetime short circuit Jam. Jam. ps Signal Delay into 50Ω Jam. Jam. ps Frequency Domain Jam. Jam. GHz A-1db 14.5 Jam. GHz A-3db 39.6 GHz GHz A-3db 39.6 GHz GHz A-10db 11.0 Jam. GHz A-20db 30.0 GHz GHz A-20db 30.0 GHz GHz A-20db 3.0 GHz GHz VSWR 3.0 GHz GHz Equivalent Circuit Parameters Jam. Jam. Jam. Pin Capacitance Jam. Jam. <th colspan="7">FUNCTIONAL SPECIFICATIONS</th>	FUNCTIONAL SPECIFICATIONS						
TDT Risetime into 50Ω	Model E5548-V4						
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Time Domain	Min.	Тур.	Max.	Units		
TDR Risetime open circuit TDR Risetime short circuit Signal Delay into 50Ω Torequency Domain Insertion Loss <-1db -1db -1db -1db -1db -1db -1db -1db	TDT Risetime						
open circuit TDR Risetime short circuit Signal Delay into 50Ω 43.5 39.0psFrequency DomainInsertion Loss < -1db < -3db Return Loss, S11 <-10db <-20db VSWR <2:1	into 50Ω			30.0	ps		
TDR Risetime short circuit Signal Delay into 50Ω 25.5 ps Frequency Domain Insertion Loss <-1db 14.5 GHz	TDR Risetime						
short circuit Signal Delay into 50Ω 39.0psFrequency DomainInsertion Loss <-1db				43.5	ps		
Signal Delay into 50Ω 25.5psFrequency DomainInsertion Loss <-1db <-3db Return Loss, S11 <-10db <-20db <-20db <-20db <-221 Tiles 11.0 <-21 	15 5 5 5						
Into 50Ω 25.5 ps				39.0	ps		
Trequency Domain	Č ,						
Insertion Loss	into 50Ω		25.5		ps		
<-1db	Frequency Domain						
<-3db	Insertion Loss						
Return Loss, S11 <-10db11.0 GHz<-20db	<-1db				GHz		
<-10db	<-3db	39.6			GHz		
<-20db	Return Loss, S11						
VSWR <2:111.56GHzEquivalent Circuit ParametersPin Inductance Pin Capacitance to ground1.04 0.32nHMutual Inductance Mutual Capacitance Transmission Line Zo T10.23 0.06 0	<-10db	11.0			GHz		
<2:1 11.56 GHz Equivalent Circuit Parameters Pin Inductance 1.04 nH Pin Capacitance 0.32 pF Mutual 0.23 nH Mutual 0.06 pF Transmission Line 35.7 Ω Zo 35.7 Ω T1 25.5 ps DC Parameters Contact Resistance 25 mΩ Maximum Rating	. =	3.0			GHz		
Equivalent Circuit Parameters Pin Inductance 1.04 nH Pin Capacitance 0.32 pF Mutual 0.23 nH Inductance 0.23 nH Mutual 0.06 pF Transmission Line 0.06 pF Transmission Line 0.25.5 ps DC Parameters 0.06 pS Contact Resistance 0.06 pS Maximum Rating 0.06 pS	VSWR						
Pin Inductance 1.04 nH Pin Capacitance 0.32 pF Mutual 0.23 nH Inductance 0.23 nH Mutual 0.06 pF Transmission Line 0.06 pF Transmission Line 0.06 pS To 25.5 ps DC Parameters 0.06 0.06 Contact Resistance 0.06 0.06 Maximum Rating 0.06 0.06 0.06	<2:1	11.56			GHz		
Pin Capacitance to ground 0.32 pF Mutual 0.23 nH Inductance Mutual 0.23 nH Capacitance Transmission Line Zo Solution 35.7 Ω DC Parameters 25.5 ps Maximum Rating 25 mΩ	Equivalent Circuit Pa	rameters	8				
$ \begin{array}{c cccc} to ground & 0.32 & pF \\ \hline Mutual & & & \\ Inductance & 0.23 & nH \\ Mutual & & & \\ Capacitance & 0.06 & pF \\ Transmission Line & & & \\ Zo & 35.7 & \Omega \\ Tl & 25.5 & ps \\ \hline {\bf DC Parameters} & & & \\ \hline {\bf Contact Resistance} & 25 & m\Omega \\ \hline {\bf Maximum Rating} & & & \\ \hline $			1.04		nΗ		
Mutual 0.23 nH Inductance 0.23 nH Mutual 0.06 pF Transmission Line 35.7 Ω To 25.5 ps DC Parameters 25 mΩ Maximum Rating Maximum Rating	Pin Capacitance						
Inductance 0.23 nH			0.32		pF		
Mutual Capacitance0.06pFTransmission Line35.7ΩZo Tl25.5psDC ParametersContact Resistance25mΩMaximum Rating	Mutual						
Capacitance 0.06 pF Transmission Line 35.7 Ω Zo 35.7 Ω Tl 25.5 ps DC Parameters Contact Resistance 25 mΩ Maximum Rating	Inductance		0.23		nΗ		
Transmission Line 35.7 Ω Zo 35.7 Ω Tl 25.5 ps DC Parameters Contact Resistance 25 mΩ Maximum Rating							
$egin{array}{c cccc} Zo & 35.7 & \Omega \\ Tl & 25.5 & ps \\ \hline \textbf{DC Parameters} \\ \hline Contact Resistance & 25 & mΩ \\ \hline \textbf{Maximum Rating} \\ \hline \end{array}$			0.06		pF		
Tl25.5psDC ParametersContact Resistance25mΩMaximum Rating	Transmission Line						
DC Parameters Contact Resistance 25 mΩ Maximum Rating	·				Ω		
Contact Resistance 25 mΩ Maximum Rating			25.5		ps		
Maximum Rating	DC Parameters						
	Contact Resistance		25		mΏ		
Drive Current 7 A	Maximum Rating						
	Drive Current		7		A		

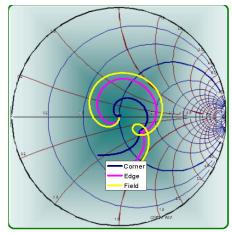


Figure 2: Measurement into 50Ω , E5548-V4

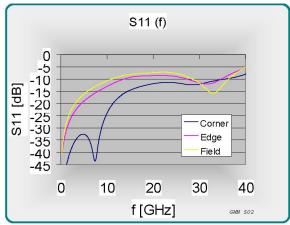


Figure 3: Return Loss, S11, E5548-V4

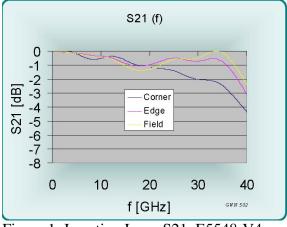


Figure 1: Insertion Loss, S21, E5548-V4

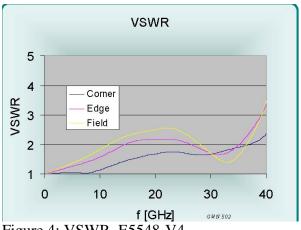


Figure 4: VSWR, E5548-V4



EQUIVALENT CIRCUITS / SPICE MODELS

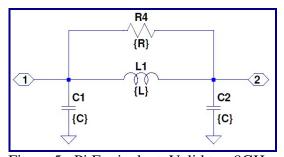


Figure 5 : Pi Equivalent, Valid to <9GHz

C1, C2	0.316	pF
L1	1.04	nН

35.7

25.5

1,500

Ohms

ps

Ohms

Z0

L

R4

R4 T1 2

Figure 6: Transmission Line Model

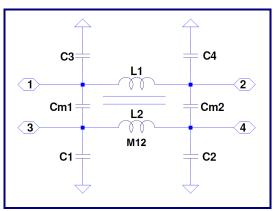


Figure 7: Lumped, Mutual Elements

C1,2,3,4	0.316	pF
Cm1, Cm2	0.061	pF
L1, L2	1.04	nН
M12	0.23	nН

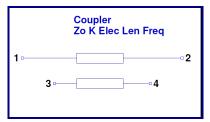


Figure 8: Transmission Line Equivalent for Crosstalk

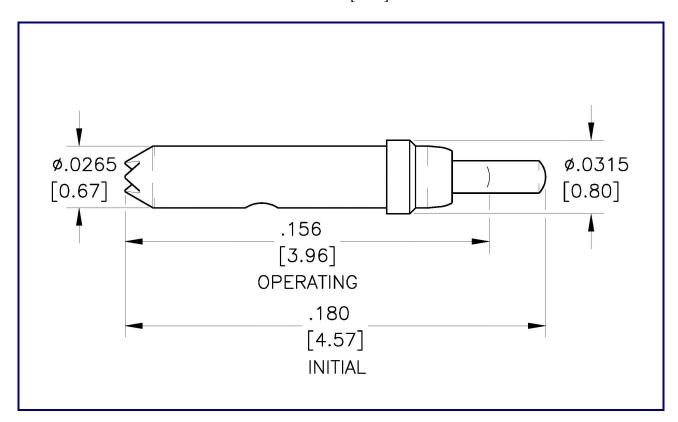
Z0	35.7	Ohms
T1	25.5	ps



E SERIES MODELS

E Series 1.0mm (.0394) pitch									
Probe Series	Initial l	al Length Operating Position		Operating	Self	Insertion Loss	Typical Contact	Maximum	
Selles	inch/mm		incl	n/mm	Spring Force	Inductance	< -1db to	Resistance	Current
<u>E5566</u>	.121"	3.08	.098"	2.49	24-35 g	0.49 nH	>40 GHz	20 mOhms	4.3 A
<u>E5533</u>	.144"	3.66	.119"	3.02	25-40 g	0.72 nH	25.3 GHz	20 mOhms	8.5 A
E5544	.124"	3.15	.098"	2.49	25 g	0.70 nH	>40 GHz	30 mOhms	2.7 A
E5548			4.5.00		20-39 g	1.04 nH	14.5 GHz	25 mOhms	7.0 A
E5593	.180"	.180" 4.57 .156'	.180" 4.57 .156" 3.96	27 g	1.14 nH	31.5 GHz	20 mOhms	6.0 A	
E5656					28-36 g	0.90 nH	13.9 GHz	20 mOhms	6.0 A

MECHANICAL DIMENSIONS INCHES [MM]



Signal Integrity, Inc.

104 County Street, Ste. 210, Attleboro, MA 02703

Tel: 1-508-226-6480 Email: sales@signalin.com Internet: www.signalin.com

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