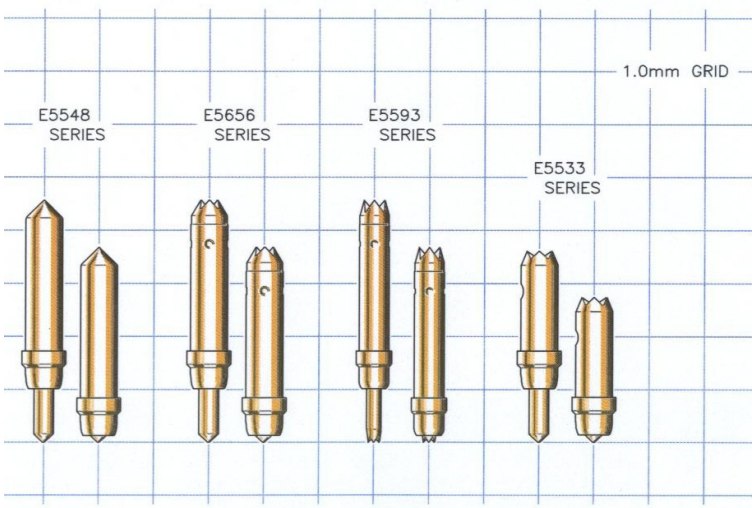
E5593
E Series
1.0mm (.0394inch) Pitch

FEATURES

- **<-1db insertion loss to 31.5 GHz**
- **<2:1VSWR to 22.32 GHz**
- **27g operating spring force**
- **Z0 = 47.8Ω**
- **<27ps risetime**
- **20milliOhms contact resistance**
- **6 Amps max. drive current**



GENERAL DESCRIPTION

The E5593 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 ultra high bandwidth of these probes provides very low insertion loss up to 31.5GHz. 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 34.5ps and a propagation delay of 27ps, the E5593 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. Among others, these include Infiniband, PCI-Express, Source Synchronous DDR, Rambus^{tm}, HyperTransport and 10Gb Ethernet.

SERIES E5593 MODELS: ORDERING INFORMATION

E Series 1.0mm (.0394) Pitch					
Model	**Length Operating / initial inch [mm]**	**DUT Plunger and Plating**	**Interface Plunger**	**Spring**	**Operating Spring Force**
E5593-D4	**.156 [3.96] / .180 [4.57]**	**Reduced Crown - Gold**	**Crown**	**Stainless Steel**	**27 Grams**
E5593-E5		**Red. Crown – Anti-Diffusion**			

FUNCTIONAL SPECIFICATIONS

Model	E5593-D4			
Time Domain	**Min.**	**Typ.**	**Max.**	**Units**
TDT Risetime into 50Ω			34.5	ps
TDR Risetime open circuit			64.5	ps
TDR Risetime short circuit			66.0	ps
Signal Delay into 50Ω		25.5		ps
Frequency Domain				
Insertion Loss				
<-1db	10.4		31.5	GHz
<-3db	25.5		40.05	GHz
Return Loss, S11				
<-10db	10.2			GHz
<-20db	5.4			GHz
VSWR				
<2:1	13.95		22.32	GHz
Equivalent Circuit Parameters				
Pin Inductance		1.14		nH
Pin Capacitance to ground		0.12		pF
Mutual Inductance		1.14		nH
Mutual Capacitance		0.09		pF
Transmission Line				
Zo		47.8		Ω
Tl		20.0		ps
DC Parameters				
Contact Resistance		20		mΩ
Maximum Rating				
Drive Current		6.0		A

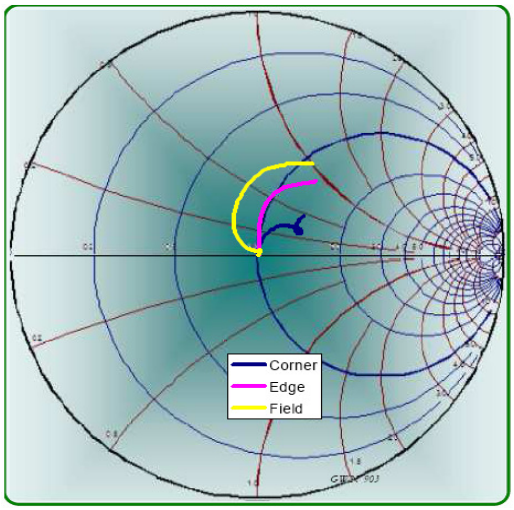


Figure 2: Measurement into 50Ω, E5593-D4

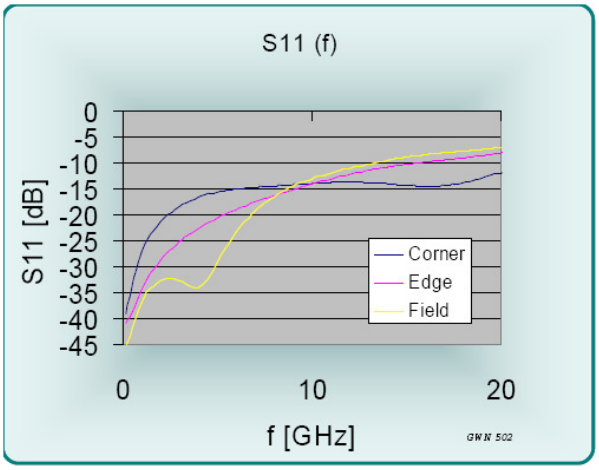


Figure 3: Return Loss, S11, E5593-D4

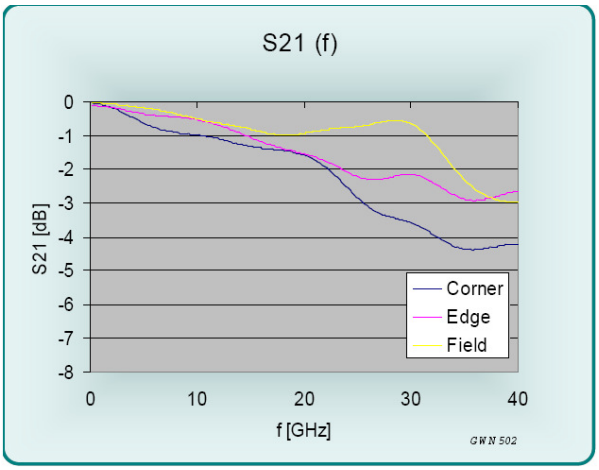


Figure 1: Insertion Loss, S21, E5593-D4

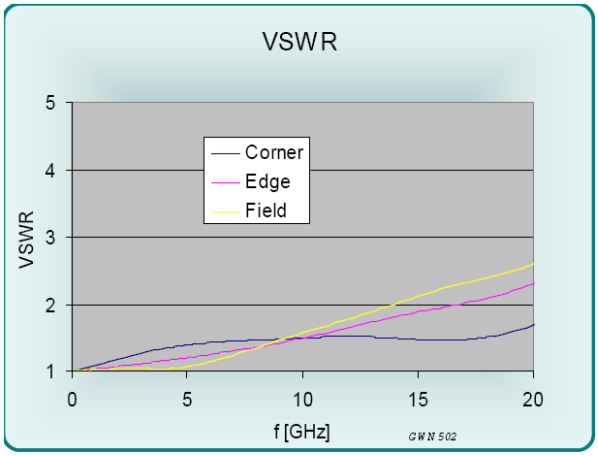


Figure 4: VSWR, E5593-D4

EQUIVALENT CIRCUITS / SPICE MODELS

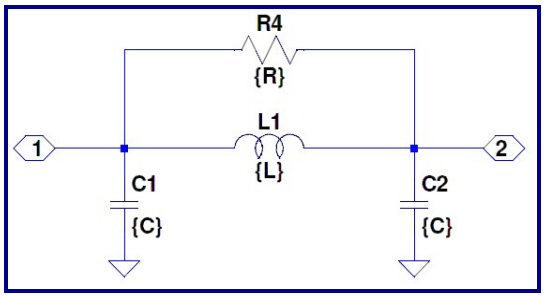


Figure 5 : Pi Equivalent ,Valid to <10GHz

Site	Cg = C1+C2	L1	R4
Corner	0.195 pF	1.54 nH	1000 □Ω
Edge	0.233 pF	1.23 nH	1000□ Ω
Field	0.249 pF	1.14 nH	700□ Ω
Diagonal	0.249 pF	1.14 nH	700□ Ω

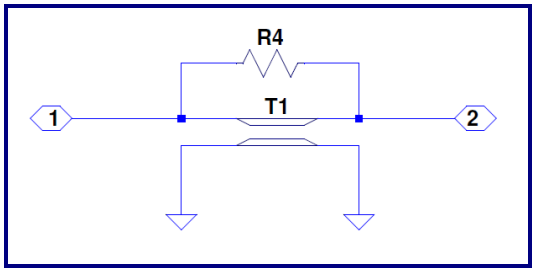


Figure 6: Transmission Line Model

	Zo	L	R4
Corner	62.7 Ω	22.00 ps	1000 Ω
Edge	51.4 Ω	21.00 ps	1000 Ω
Field	47.8 Ω	20.00 ps	1200 Ω

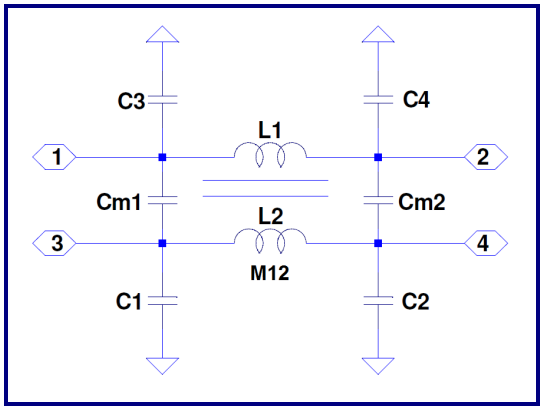


Figure 7: Lumped, Mutual Elements

Site	C1,2,3,4	Cm1,Cm2	L1,L2	M
Corner	0.195	0.120 pF	1.54	0.420 nH
Edge	0.233	0.105 pF	1.23	0.337 nH
Field	0.249	0.090 pF	1.14	0.207 nH
Diagonal	0.249	0.020 pF	1.14	0.052 nH

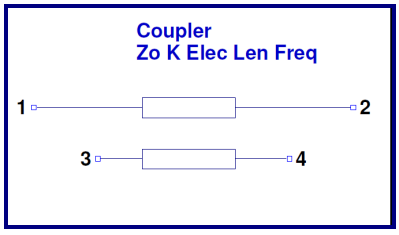


Figure 8: Transmission Line Equivalent for Crosstalk

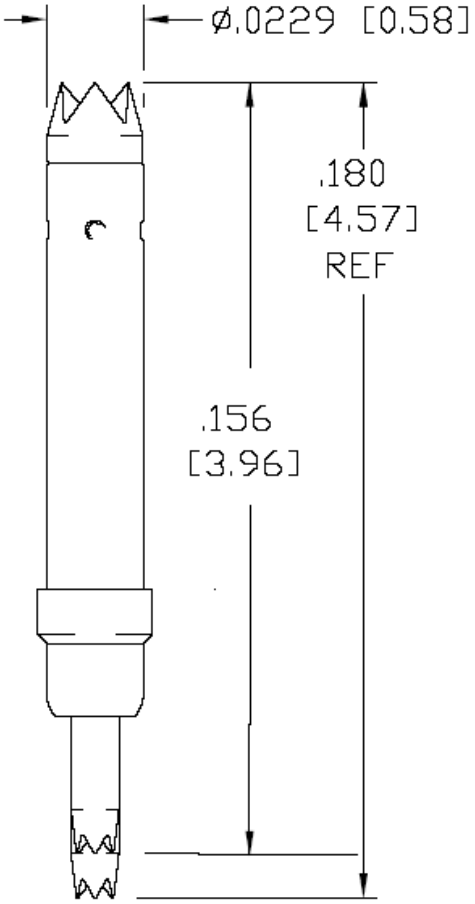
Z0	60.3	Ohms
Lel	25.5	ps
k	0.18	
f	20.8	Ghz

E SERIES MODELS

E Series 1.0mm (.0394) pitch									
Probe Series	Initial Length inch/mm		Operating Position inch/mm		Operating Spring Force	Self Inductance	Insertion Loss < -1db to	Typical Contact Resistance	Maximum Current
E5566	.121”	3.08	.098”	2.49	24-35 g	0.49 nH	>40 GHz	20 mOhms	4.3 A
E5533	.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	.180"	4.57	.156"	3.96	20-39 g	1.04 nH	14.5 GHz	25 mOhms	7.0 A
E5593					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]



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