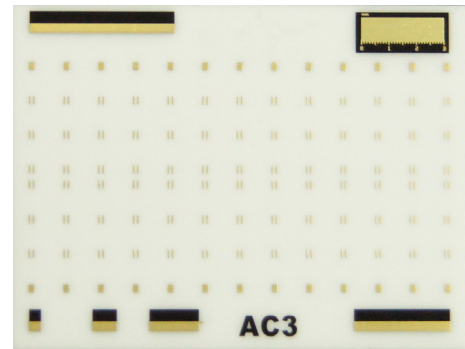


AC-3 Calibration Substrate

AC-3 calibration substrate is designed to provide accurate probe tip calibration of MPI TITAN™ RF probe family with ground-signal (GS) and signal-ground (SG) probe tips configuration and can accommodate 50 to 250 μm probe pitch variation.

It supports industry standard short-open-load-thru (SOLT) calibration method, as well as advanced line-reflect-match (LRM), thru-reflect-line (TRL). AC-3 contains 26 groups of the lumped standard elements, as well as a set of coplanar transmission lines for multiline TRL calibration and calibration accuracy verification.



Map of AC-3 substrate

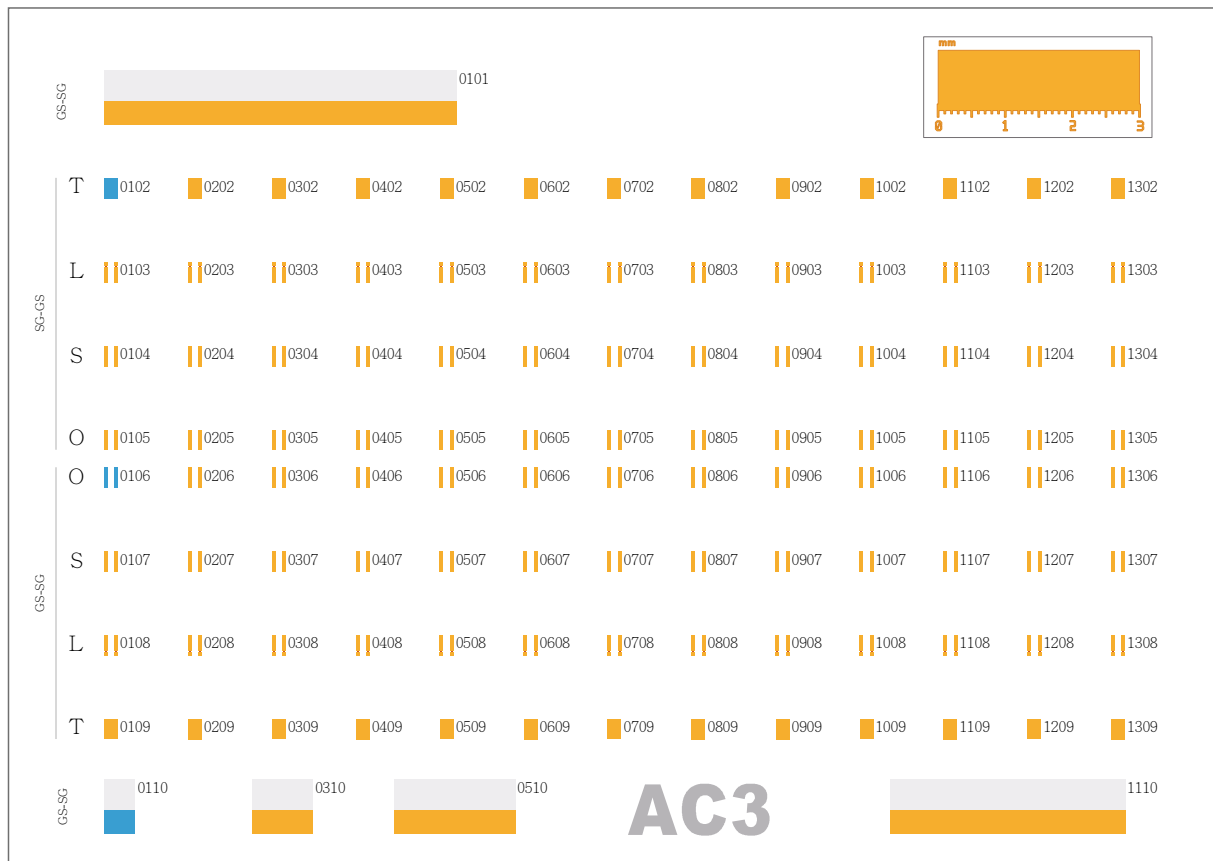
Substrate Characteristics

Material	Alumina
Size	16.5 mm x 12.5 mm
Thickness	635 μm
Design or standards	Coplanar
Probe configuration	GS and SG
Supported probe pitch	50 to 250 μm
Number of lumped standard groups	26
Number of calibration and verification lines	5
Calibration verification elements	yes
Supported calibration methods	SOLT, LRM, TRL and multiline TRL
Typical resistance of the load	50 Ω
Typical load trimming accuracy error	$\pm 0.3\%$
Open standard	Au pads on substrate
Ruler scale	0 to 3 mm
Ruler step size	100 μm
Recommended overtravel for TITAN™ probes	10 μm

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

Substrate Layout



SG-GS Elements



Short



Open



Load



Thru

GS-SG Elements



Short



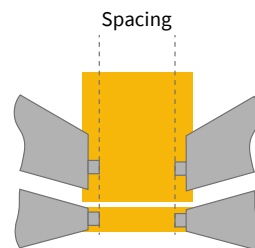
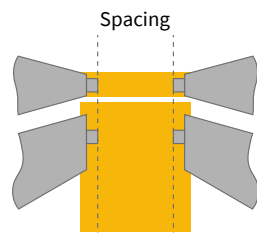
Open



Load



Thru



Probes contacting thru standard: SG-GS (left) and GS-SG (right) configurations

Reference Elements

Name	X μm	Y μm	Location Reference	Spacing μm	Note
0102	0	0	0102	150	Reference for SOLT/LRM SG-GS elements
0106	0	-4304	0102	150	Reference for SOLT/LRM GS-SG elements
0110	0	-9399	0102	400	Reference for TRL line elements

SG-GS Standard Groups

Line Standard

Name	Type	X μm	Y μm	Location Reference	Spacing μm	Length μm
0102	THRU	0	0	0102	150	200
0202	THRU	1250	0	0102	150	200
0302	THRU	2500	0	0102	150	200
0402	THRU	3750	0	0102	150	200
0502	THRU	5000	0	0102	150	200
0602	THRU	6250	0	0102	150	200
0702	THRU	7500	0	0102	150	200
0802	THRU	8750	0	0102	150	200
0902	THRU	10000	0	0102	150	200
1002	THRU	11250	0	0102	150	200
1102	THRU	12500	0	0102	150	200
1202	THRU	13750	0	0102	150	200
1302	THRU	15000	0	0102	150	200

Load Standard

Name	Port 1	Port 2	X μm	Y μm	Location Reference	Spacing μm
0103	LOAD SG	LOAD GS	0	-1250	0102	150
0203	LOAD SG	LOAD GS	1250	-1250	0102	150
0303	LOAD SG	LOAD GS	2500	-1250	0102	150
0403	LOAD SG	LOAD GS	3750	-1250	0102	150
0503	LOAD SG	LOAD GS	5000	-1250	0102	150
0603	LOAD SG	LOAD GS	6250	-1250	0102	150
0703	LOAD SG	LOAD GS	7500	-1250	0102	150
0803	LOAD SG	LOAD GS	8750	-1250	0102	150
0903	LOAD SG	LOAD GS	10000	-1250	0102	150
1003	LOAD SG	LOAD GS	11250	-1250	0102	150
1103	LOAD SG	LOAD GS	12500	-1250	0102	150
1203	LOAD SG	LOAD GS	13750	-1250	0102	150
1303	LOAD SG	LOAD GS	15000	-1250	0102	150

Short Standard

Name	Port 1	Port 2	X μm	Y μm	Location Reference	Spacing μm
0104	SHORT	SHORT	0	-2498	0102	150
0204	SHORT	SHORT	1250	-2498	0102	150
0304	SHORT	SHORT	2500	-2498	0102	150
0404	SHORT	SHORT	3750	-2498	0102	150
0504	SHORT	SHORT	5000	-2498	0102	150
0604	SHORT	SHORT	6250	-2498	0102	150
0704	SHORT	SHORT	7500	-2498	0102	150
0804	SHORT	SHORT	8750	-2498	0102	150
0904	SHORT	SHORT	10000	-2498	0102	150
1004	SHORT	SHORT	11250	-2498	0102	150
1104	SHORT	SHORT	12500	-2498	0102	150
1204	SHORT	SHORT	13750	-2498	0102	150
1304	SHORT	SHORT	15000	-2498	0102	150

Open Standard

Name	Port 1	Port 2	X μm	Y μm	Location Reference	Spacing μm
0105	OPEN SG	OPEN GS	0	-3748	0102	150
0205	OPEN SG	OPEN GS	1250	-3748	0102	150
0305	OPEN SG	OPEN GS	2500	-3748	0102	150
0405	OPEN SG	OPEN GS	3750	-3748	0102	150
0505	OPEN SG	OPEN GS	5000	-3748	0102	150
0605	OPEN SG	OPEN GS	6250	-3748	0102	150
0705	OPEN SG	OPEN GS	7500	-3748	0102	150
0805	OPEN SG	OPEN GS	8750	-3748	0102	150
0905	OPEN SG	OPEN GS	10000	-3748	0102	150
1005	OPEN SG	OPEN GS	11250	-3748	0102	150
1105	OPEN SG	OPEN GS	12500	-3748	0102	150
1205	OPEN SG	OPEN GS	13750	-3748	0102	150
1305	OPEN SG	OPEN GS	15000	-3748	0102	150

GS-SG Standard Groups

Line Standard

Name	Type	X μm	Y μm	Location Reference	Spacing μm	Length μm
0109	THRU	0	-8052	0106	150	200
0209	THRU	1250	-3748	0106	150	200
0309	THRU	2500	-3748	0106	150	200
0409	THRU	3750	-3748	0106	150	200
0509	THRU	5000	-3748	0106	150	200
0609	THRU	6250	-3748	0106	150	200
0709	THRU	7500	-3748	0106	150	200
0809	THRU	8750	-3748	0106	150	200
0909	THRU	10000	-3748	0106	150	200
1009	THRU	11250	-3748	0106	150	200
1109	THRU	12500	-3748	0106	150	200
1209	THRU	13750	-3748	0106	150	200
1309	THRU	15000	-3748	0106	150	200
0101	LINE	0	1405	0102	5200	5250
0110	LINE	0	-9399	0110	400	450
0310	LINE	2275	0	0110	850	900
0510	LINE	4325	0	0110	1750	1800
1110	LINE	11700	0	0110	3450	3500

Load Standard

Name	Port 1	Port 2	X μm	Y μm	Location Reference	Spacing μm
0108	LOAD GS	LOAD SG	0	-6800	0106	150
0208	LOAD GS	LOAD SG	1250	-2496	0106	150
0308	LOAD GS	LOAD SG	2500	-2496	0106	150
0408	LOAD GS	LOAD SG	3750	-2496	0106	150
0508	LOAD GS	LOAD SG	5000	-2496	0106	150
0608	LOAD GS	LOAD SG	6250	-2496	0106	150
0708	LOAD GS	LOAD SG	7500	-2496	0106	150
0808	LOAD GS	LOAD SG	8750	-2496	0106	150
0908	LOAD GS	LOAD SG	10000	-2496	0106	150
1008	LOAD GS	LOAD SG	11250	-2496	0106	150
1108	LOAD GS	LOAD SG	12500	-2496	0106	150
1208	LOAD GS	LOAD SG	13750	-2496	0106	150
1308	LOAD GS	LOAD SG	15000	-2496	0106	150

Short Standard

Name	Port 1	Port 2	X μm	Y μm	Location Reference	Spacing μm
0107	SHORT	SHORT	0	-5552	0106	150
0207	SHORT	SHORT	1250	-1248	0106	150
0307	SHORT	SHORT	2500	-1248	0106	150
0407	SHORT	SHORT	3750	-1248	0106	150
0507	SHORT	SHORT	5000	-1248	0106	150
0607	SHORT	SHORT	6250	-1248	0106	150
0707	SHORT	SHORT	7500	-1248	0106	150
0807	SHORT	SHORT	8750	-1248	0106	150
0907	SHORT	SHORT	10000	-1248	0106	150
1007	SHORT	SHORT	11250	-1248	0106	150
1107	SHORT	SHORT	12500	-1248	0106	150
1207	SHORT	SHORT	13750	-1248	0106	150
1307	SHORT	SHORT	15000	-1248	0106	150

Open Standard

Name	Port 1	Port 2	X μm	Y μm	Location Reference	Spacing μm
0106	OPEN GS	OPEN SG	0	-4304	0102	150
0206	OPEN GS	OPEN SG	1250	0	0106	150
0306	OPEN GS	OPEN SG	2500	0	0106	150
0406	OPEN GS	OPEN SG	3750	0	0106	150
0506	OPEN GS	OPEN SG	5000	0	0106	150
0606	OPEN GS	OPEN SG	6250	0	0106	150
0706	OPEN GS	OPEN SG	7500	0	0106	150
0806	OPEN GS	OPEN SG	8750	0	0106	150
0906	OPEN GS	OPEN SG	10000	0	0106	150
1006	OPEN GS	OPEN SG	11250	0	0106	150
1106	OPEN GS	OPEN SG	12500	0	0106	150
1206	OPEN GS	OPEN SG	13750	0	0106	150
1306	OPEN GS	OPEN SG	15000	0	0106	150

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