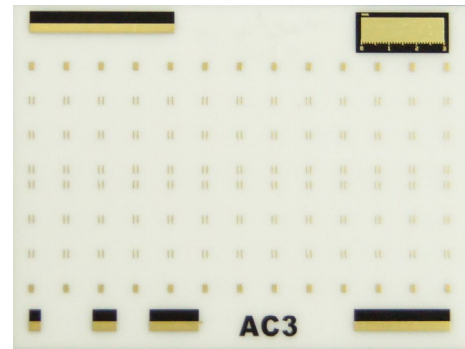


AC-3 Calibration Substrate

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). AC-3 contains 26 groups of the lumped standard elements, as well as a set of coplanar transmission lines for calibration accuracy verification.



Map of AC-3 substrate

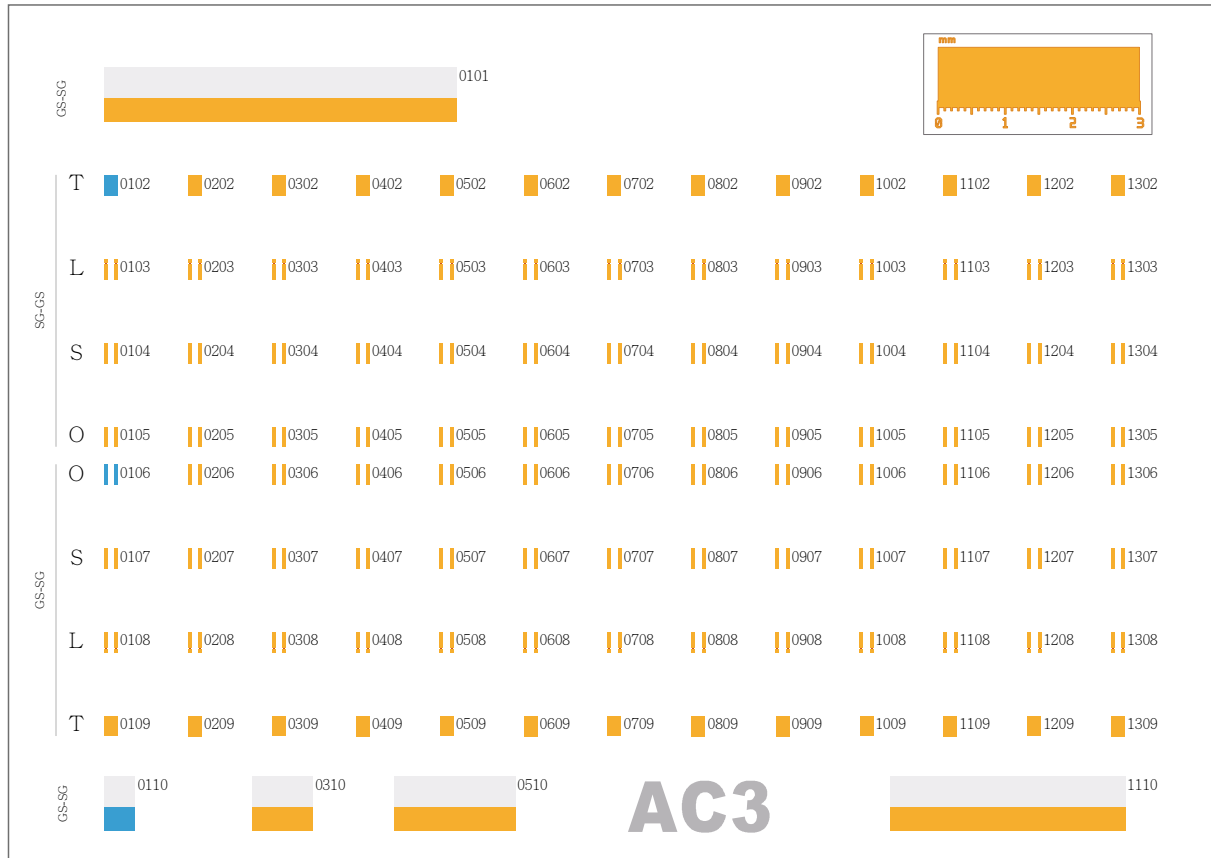
SUBSTRATE CHARACTERISTICS

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 verification lines	5
Calibration verification elements	yes
Supported calibration methods	SOLT, LRM
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



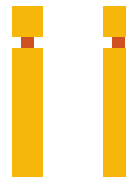
SG-GS Elements



Short



Open



Load



Thru

GS-SG Elements



Short



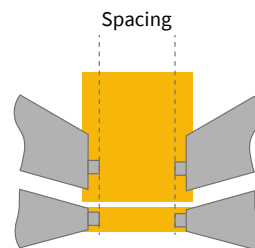
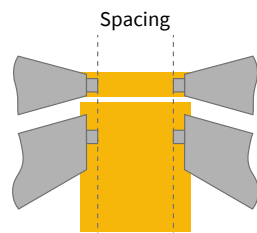
Open



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

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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