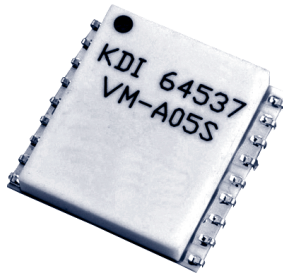


Vector Modulators for MCPA Applications

VM Series

TECHNICAL BULLETIN



Features

- * All bias circuitry components are included
- * Surface mount package suitable for re-flow soldering and aqueous cleaning
- * Full 360 degree phase shift and 14db attenuation range
- * Reliable and cost effective Thick film hybrid technology
- * Standard models for 400-3000 MHz
- * Supplied on tape or reel
- * Two (2) bias input PIN diode current controls

Specifications

FREQUENCY RANGES BY MODEL NUMBER:

Model Number	Frequency (MHz)
VM-A18S	405-495
VM-A12S	420-470
VM-A05S	800-1000
VM-A10S	1200-1600
VM-A11S	1800-2200
VM-A26SC**	1940-2340
VM-A41S	2400-3000

COMMON SPECIFICATIONS:

Phase shift range	0-360 degrees, Min
Attenuation range	0-14dB Min
Maximum rf input power Avg.:	1 Watt Op., 10 survival
Insertion loss*	10dB Max
VSWR	1.25 Max.
Phase vs. attenuation change	+/- 2deg
Phase shift range	0-360 degrees, Min
Attenuation change vs. phase	+/- 0.3dB Max.
Control currents (2 inputs)	50 mA Max. each
Insertion loss flatness	+/- 0.2dB Max./ 40MHz BW
Deviation from linear phase	+/- 1Deg. Max/ 40MHz BW
Output 3d order intercept point	+ 41dBm
Operating temperature range	- 35 to + 85Deg. C

* Insertion loss is typically 5-6dB going CCW from 350 to 80 degrees phase shift.

Notes: Units are supplied on tape and reel for pick & place mounting. Temperature Profiles available upon request.

**MODEL VM-A26SC:

[Frequency flatness at different bandwidth settings]

@ 2140MHz +/- 60MHz

Atten setting@	Amp Flatness +/- dB	Phase Flatness +/- Deg
10dB	0.1	1.5
20dB	0.2	2

@ 2140MHz +/- 100MHz

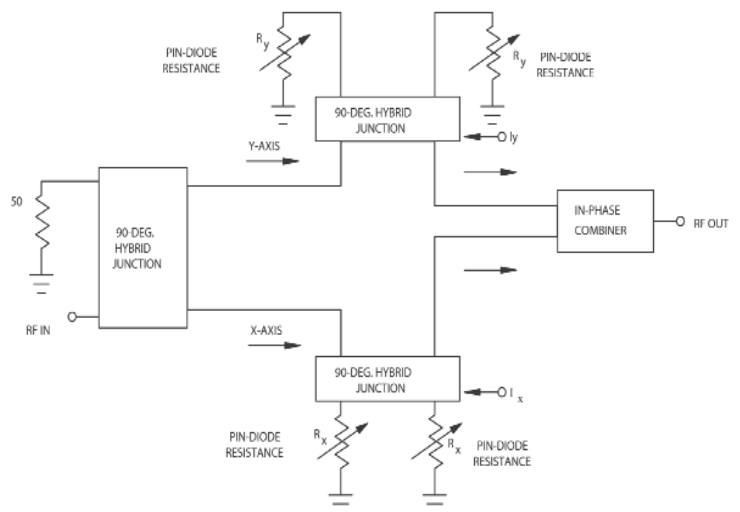
Atten setting@	Amp Flatness +/- dB	Phase Flatness +/- Deg
10dB	0.2	2
20dB	0.3	3

@ 2140MHz +/- 200MHz

Atten setting@	Amp Flatness +/- dB	Phase Flatness +/- Deg
10dB	0.4	4
20dB	0.6	5

ENVIRONMENTAL SPECIFICATIONS

Thermal Shock	(- 20C to + 85C 30 min. Dwell 20 sec. TRANS, 10 CYCLES)
Static Humidity	240 HRS. @+50C 90-95% RH
Random Vibration	10-2000Hz 0.04g/Hz or 6g's 15 min./Plane
Mechanical Shock	3000 g's 0.3 ms, HALF SINE WAVE 3 IMPACTS / AXIS

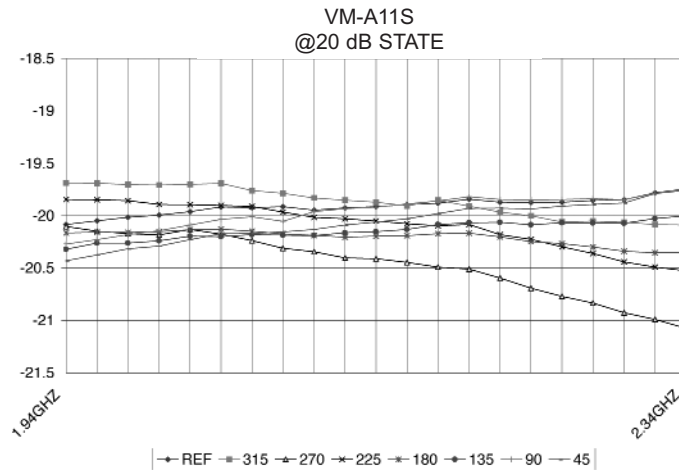
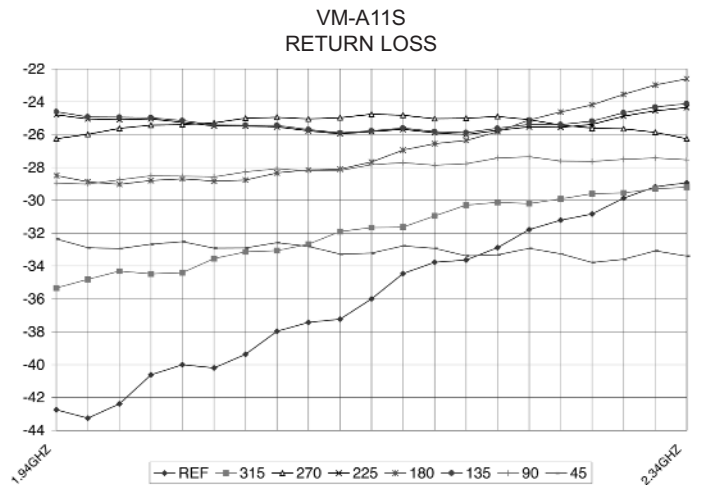
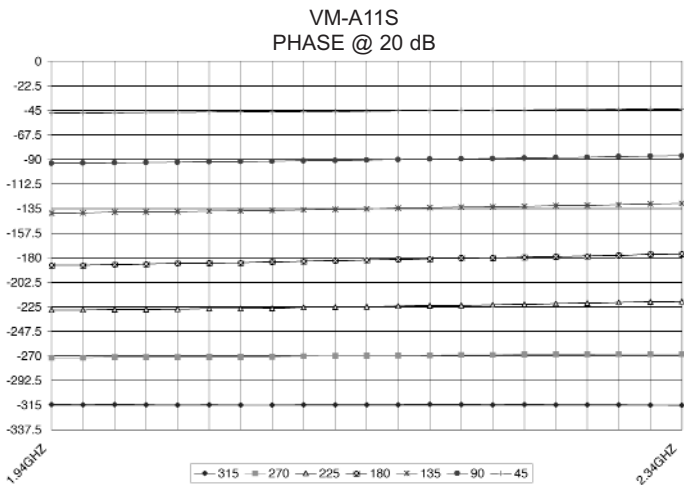
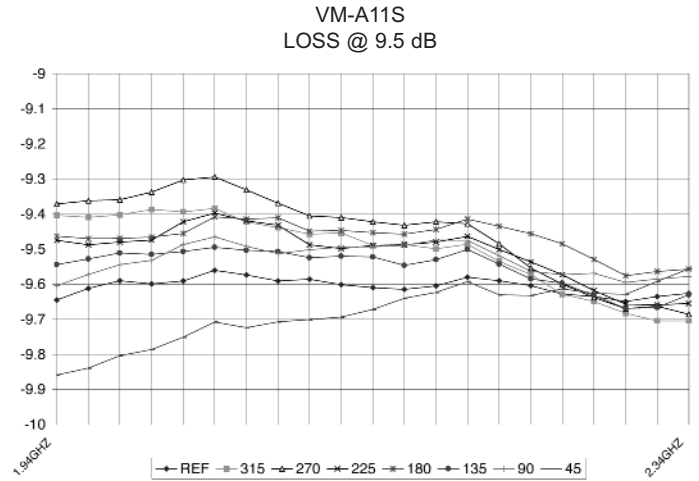
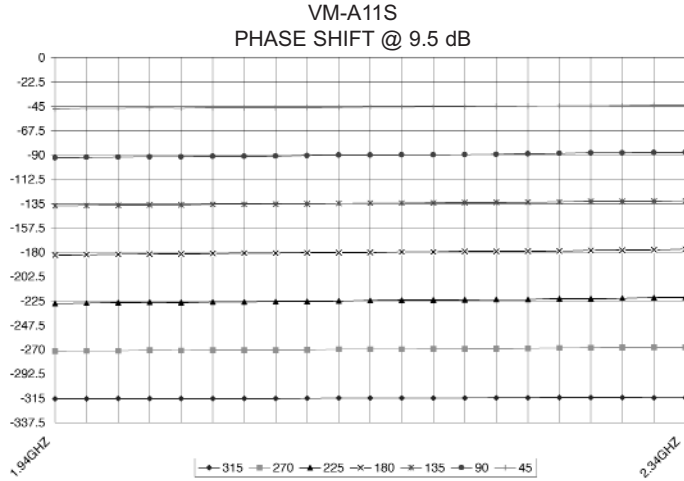


Vector Modulators for MCPA Applications

VM Series

TECHNICAL BULLETIN

Typical Data Measured for Model VM-A11S



Vector Modulators for MCPA Applications

VM Series

TECHNICAL BULLETIN

TYPICAL FUNCTIONAL TEST DATA SHEET
 LABVIEW AUTOMATIC TEST PROGRAM
 TEST FOR 360 DEGREE PHASE SHIFT, AT NOMINAL 10dB ATTENUATION SETTING

(DATA SHOWN IN 40 MHz STEPS)

PHASE

1.940	1.980	2.020	2.060	2.100	2.140	2.180	2.220	2.260	2.300	2.340
0.043	-0.027	0.032	0.073	0.077	-0.081	-0.018	-0.077	-0.052	0.084	0.034
-45.584	-45.633	-45.848	-45.992	-45.865	-45.434	-45.291	-45.092	-44.625	-44.082	-43.955
-93.879	-93.609	-93.859	-94.043	-93.648	-92.918	-92.648	-92.5	-91.773	-90.801	-90.387
-143.367	-142.68	-143.055	-143.109	-142.789	-141.883	-141.336	-140.68	-139.945	-139.031	-138.344
173.312	174.305	174.406	174.453	174.547	175.328	176.141	177.023	177.836	178.906	-179.883
130.609	132.023	132.781	132.547	132.5	133.227	134.187	134.844	135.406	136.594	137.766
91.207	92.562	93.535	93.207	93.191	93.828	94.199	94.418	95.07	96.18	96.652
44.973	45.828	46.465	46.525	46.617	46.937	46.924	47.047	47.252	47.742	47.645

ATTENUATION [dB]

-9.649	-9.798	-9.91	-9.891	-9.897	-9.966	-10.072	-10.069	-10.073	-10.135	-10.268
-10.03	-10.113	-10.159	-10.126	-10.106	-10.117	-10.191	-10.16	-10.132	-10.129	-10.198
-10.37	-10.405	-10.38	-10.366	-10.42	-10.426	-10.474	-10.455	-10.516	-10.504	-10.594
-10.426	-10.433	-10.409	-10.388	-10.429	-10.473	-10.534	-10.511	-10.511	-10.511	-10.605
-9.79	-9.811	-9.748	-9.676	-9.68	-9.78	-9.866	-9.844	-9.828	-9.886	-10.026
-9.397	-9.478	-9.377	-9.25	-9.297	-9.385	-9.468	-9.463	-9.52	-9.601	-9.771
-8.904	-9.027	-8.917	-8.79	-8.837	-8.927	-9.033	-9.09	-9.215	-9.31	-9.471
-9.257	-9.416	-9.455	-9.408	-9.422	-9.513	-9.635	-9.699	-9.801	-9.879	-10.071

RETURN LOSS [dB]

-24.058	-23.156	-22.231	-21.653	-21.013	-20.771	-20.541	-20.78	-20.994	-21.648	-22.422
-23.019	-23.467	-23.59	-23.985	-23.83	-23.902	-24.016	-24.387	-24.766	-25.089	-25.523
-23.445	-24.73	-26.202	-28.277	-29.849	-30.263	-30.646	-29.278	-27.566	-25.684	-24.107
-23.191	-23.507	-23.993	-23.962	-23.577	-23.292	-23.283	-23.359	-23.418	-23.655	-23.95
-19.448	-19.765	-19.768	-19.61	-19.277	-19.326	-19.314	-19.618	-19.809	-20.306	-20.844
-18.021	-18.954	-19.342	-19.767	-20.163	-20.979	-21.702	-22.765	-23.714	-24.931	-26.29
-19.338	-20.717	-21.553	-22.575	-24.062	-26.392	-29.767	-34.994	-43.236	-35.487	-30.651
-24.458	-25.135	-25.192	-25.178	-25.765	-25.928	-26.327	-26.45	-26.329	-26.186	-25.762

DATA CAN BE FORMATTED IN ANY PHASE OR ATTENUATION INCREMENTS

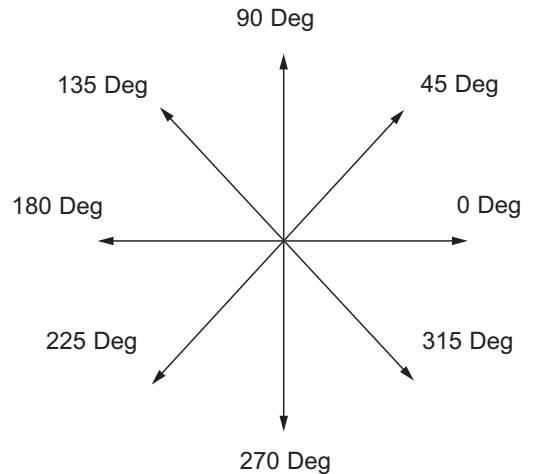
Vector Modulators for MCPA Applications

VM Series

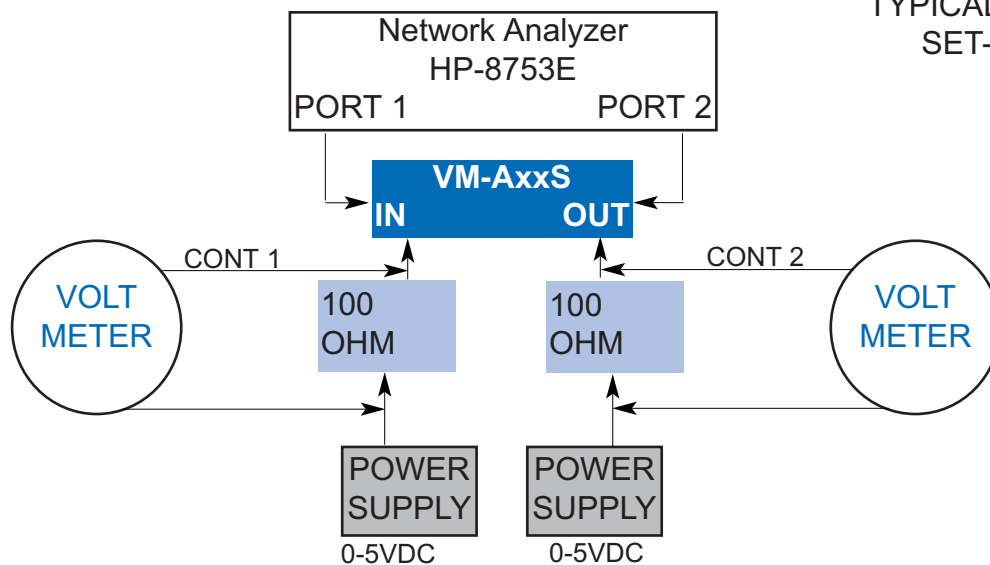
TECHNICAL BULLETIN

Phase	-10dB Attenuation		-15dB Attenuation		Phase
	Cont 1 mA	Cont 2 mA	Cont 1 mA	Cont 2 mA	
0	.49 mA	2.22mA	1.2mA	2.3mA	0
15	.5	1.5	1.24	1.86	15
30	.66	1.02	1.35	1.52	30
45	.91	0.68	1.56	1.26	45
60	1.33	0.49	1.89	1.07	60
75	1.97	0.38	2.3	0.97	75
90	2.9	0.33	2.89	0.95	90
105	4.42	0.37	3.65	0.98	105
120	6.74	0.48	4.52	1.07	120
135	10.61	0.67	5.5	1.26	135
150	15.71	1.01	6.45	1.5	150
165	21.7	1.49	7.37	1.86	165
180	24.7	2.21	7.58	2.31	180
195	23.7	3.28	7.43	2.91	195
210	17.2	4.94	6.87	3.56	210
225	11.95	7.37	5.78	4.34	225
240	7.67	10.8	4.84	5.15	240
255	5.03	14.8	3.91	5.64	255
270	3.27	16.74	3.1	5.95	270
285	2.22	15.34	2.51	5.72	285
300	1.5	11.33	2.14	5.38	300
315	1.03	7.6	1.65	4.4	315
330	0.71	5.09	1.41	3.62	330
345	0.53	3.31	1.25	2.92	345

VM-A11S Phase VS Current



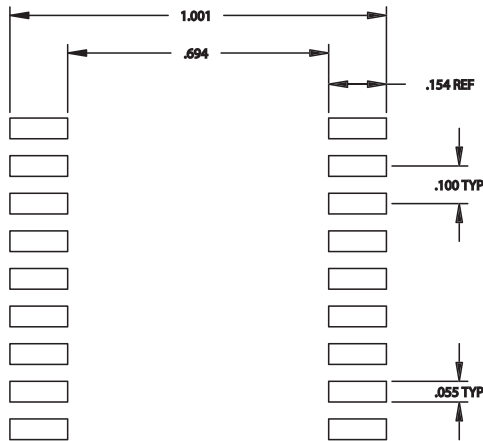
TYPICAL TEST SET-UP



Vector Modulators for MCPA Applications

VM Series

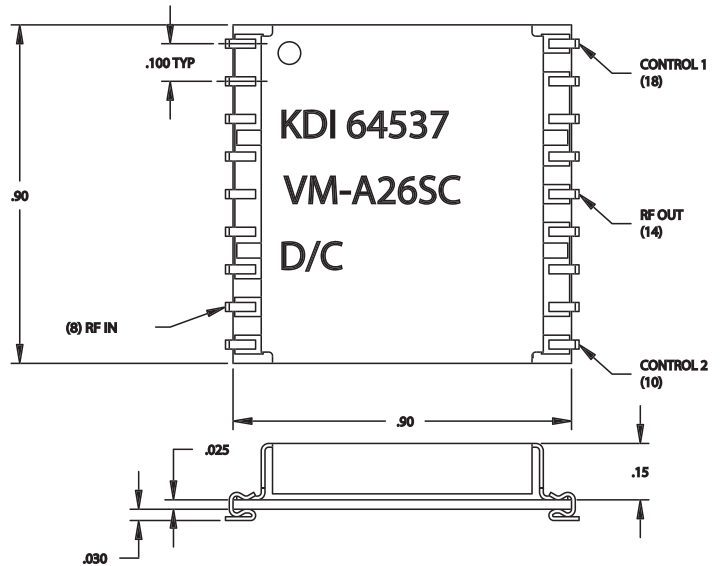
TECHNICAL BULLETIN



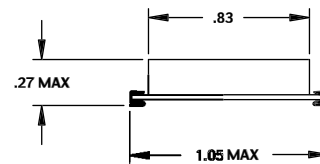
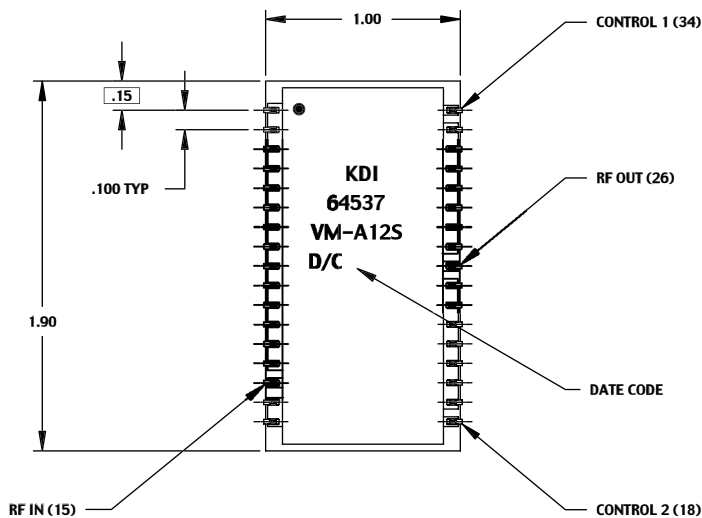
Printed Circuit Board

ELECTRICAL CONNECTIONS	
SIGNAL	PIN NO.'S
RF IN	8
RF OUT	14
CONTROL 1	18
CONTROL 2	10
GND	1-7,9,11-13,15-17

OUTLINES FOR MODELS: VM-A05S, VM-A10S, VM-A11S, VM-A26SC, VM-A41S



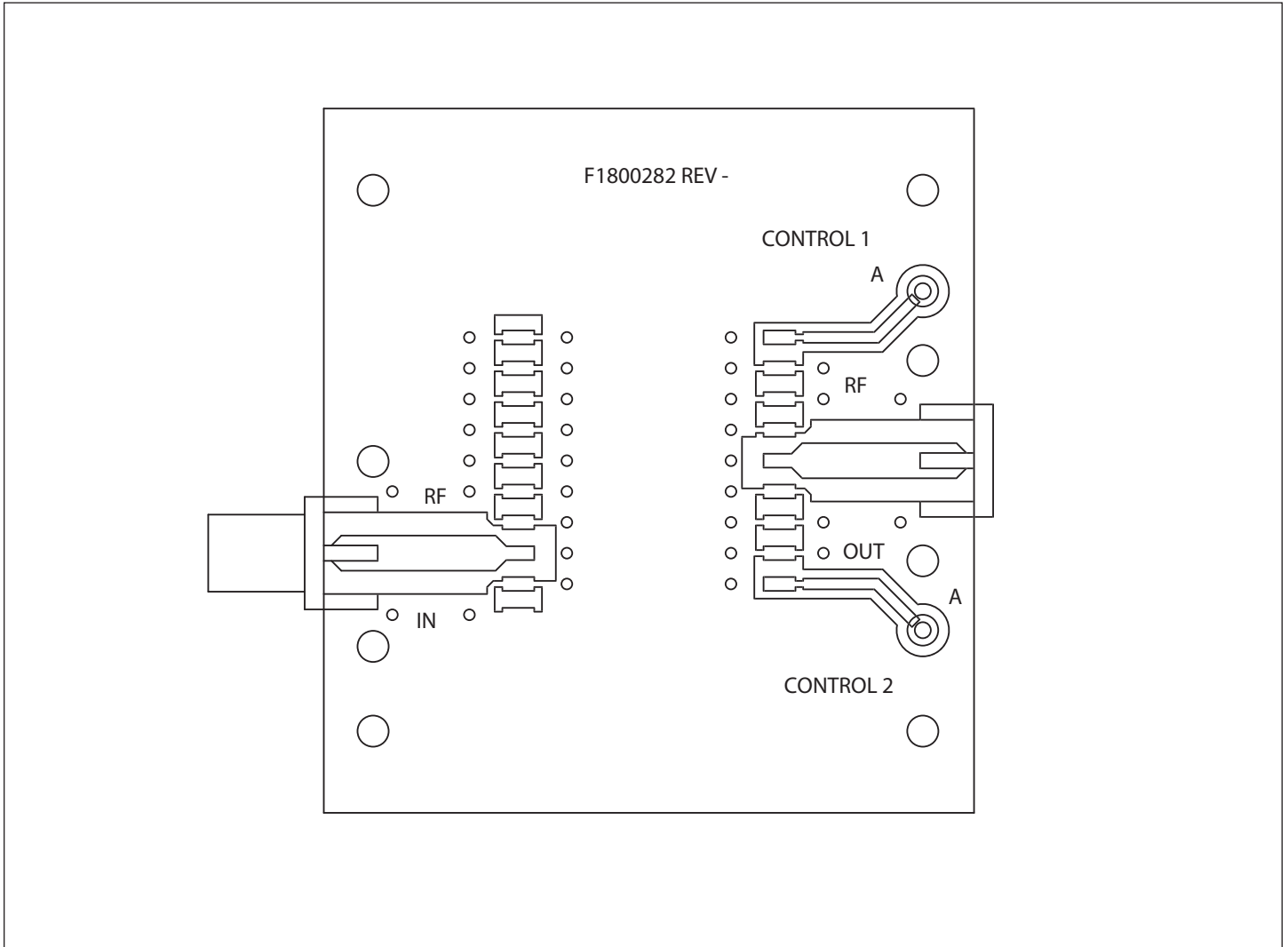
OUTLINES FOR MODELS: VM-A18S, VM-A12S



ELECTRICAL CONNECTIONS	
SIGNAL	PIN NO.'S
RF IN	15
RF OUT	26
CONTROL 1	34
CONTROL 2	18
GND	1-14,16,17,19-25,27-33

**Vector Modulators for MCPA Applications
VM Series**

TECHNICAL BULLETIN



Test fixture for Vector Modulators
(Add "F" to model number to specify Fixture)