



## Typical Characteristics ON P4T-100M52G-100-R-RD

PMI MODEL P4T-100M52G-100-R-RD IS A REFLECTIVE, SINGLE POLE FOUR THROW PIN DIODE SWITCH THAT OPERATES OVER THE 100 MHz TO 52 GHz FREQUENCY RANGE. IT FEATURES LOW INSERTION LOSS AND HIGH ISOLATION IN A SLIMLINE PACKAGE. THIS MODEL ALSO INCORPORATES A TTL COMPATIBLE DRIVER FOR EASE OF SYSTEM INTEGRATION.



**November 5, 2020**

**Designed By:**

**Dr. Ashok Gorwara**

**Tested and Reported By:**

**Alfredo Lopez**



# Typical Characteristics ON P4T-100M52G-100-R-RD

## Technical specifications

### DESCRIPTION

PMI MODEL P4T-100M52G-100-R-RD IS A REFLECTIVE, SINGLE POLE FOUR THROW PIN DIODE SWITCH THAT OPERATES OVER THE 100 MHz TO 52 GHz FREQUENCY RANGE. IT FEATURES LOW INSERTION LOSS AND HIGH ISOLATION IN A SLIMLINE PACKAGE. THIS MODEL ALSO INCORPORATES A TTL COMPATIBLE DRIVER FOR EASE OF SYSTEM INTEGRATION.

### SPECIFICATIONS

- FREQUENCY: 100 MHz TO 52 GHz
- INSERTION LOSS: 5.0 dB (100MHz TO 18 GHz) Max.  
7.0 dB (18 TO 40 GHz) Max.  
10.0 dB (40 TO 50 GHz) Max.  
14.0 dB (50 TO 52 GHz) Typ.
- VSWR Input/ Output: 2.0:1 (100 MHz TO 10 GHz) Typ.  
2.2:1 (10 TO 18 GHz) Typ.  
2.5:1 (18 TO 30 GHz) Typ.  
3.0:1 (30 TO 50 GHz) Typ.  
3.5:1 (50 TO 52 GHz) Typ.
- ISOLATION: 80 dB (100 MHz TO 1 GHz) Min.  
85 dB (1 TO 18 GHz) Min.  
70 dB (18 TO 40 GHz) Min.  
70 dB (40 TO 50 GHz) Min.  
70 dB (50 TO 52 GHz) Typ.
- AMPLITUDE BALANCE: ± 1.0 dB (100 MHz 18 GHz) Max.  
± 1.5 dB (18 TO 40 GHz) Max.  
± 1.5 dB (40 TO 50 GHz) Max.  
± 1.5 dB (50 TO 52 GHz) Typ.

### ENVIRONMENTAL RATINGS

- TEMPERATURE: -40 °C TO +85 °C (OPERATING)  
-65 °C TO +125 °C (STORAGE)
- HUMIDITY: MIL-STD-202, METHOD 103B COND. B
- SHOCK: MIL-STD-202, METHOD 213B COND. B
- VIBRATION: MIL-STD-202, METHOD 204D COND. B
- ALTITUDE: MIL-STD-202, METHOD 105C COND. B
- TEMPERATURE CYCLE: MIL-STD-202, METHOD 107D COND. A

NOTE: SPECIFICATIONS WILL VARY OVER OPERATING TEMPERATURE  
NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

ALL DIMENSIONS ARE IN INCHES  
TOLERANCES:  
X.XX ±0.020  
X.XXX ±0.010

PMI CONFIDENTIAL AND PROPRIETARY

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	1	ORIGINAL RELEASE	09/26/16	

### MECHANICAL OUTLINE

### SPECIFICATIONS

- PHASE BALANCE: ± 10° (100 MHz 18 GHz) Typ.  
± 15° (18 TO 40 GHz) Typ.  
± 15° (40 TO 50 GHz) Typ.  
± 20° (50 TO 52 GHz) Typ.
- INPUT POWER: +20 dBm CW (100 MHz TO 40 GHz) Max.  
\*Theoretically it can handle +20 dBm up to 52 GHz\*
- SWITCHING SPEED: 50 ns Max.
- VIDEO TRANSIENTS: 1 V. Peak to Peak Typ.
- CONTROL SIGNAL: SEE TTL LOGIC TABLE
- DC VOLTAGE: +5 V @ 200 mA MAX  
-5 V @ 200 mA MAX
- RF CONNECTORS: 2.4 mm FEMALE
- SIZE: 1.25" X 1.25" X 0.40"
- FINISH: GOLD PLATED

### TTL LOGIC CONTROL TABLE

CTL 2	CTL 1	FUNCTION
0	0	J1 TO J2
0	1	J1 TO J3
1	0	J1 TO J4
1	1	J1 TO J5

### PLANAR MONOLITHICS INDUSTRIES, INC.

7311-F GROVE ROAD  
FREDERICK, MARYLAND 21704 USA  
TEL: (301)-662-5019, FAX: (301)-662-1731  
WEB: www.pmi-rf.com, EMAIL: sales@pmi-rf.com  
ISO 9001 CERTIFIED



APPROVALS		DATE	TITLE			
		11/05/16	PRODUCT FEATURE P4T-100M52G-100-R-RD			
DRAWN	ASB		SIZE	FIG. NO.	DWG. NO.	REV.
CHECKED			A	05XQ0		A1
ISSUED			SCALE	N:S	PRELIMINARY	SHEET 1 OF 2



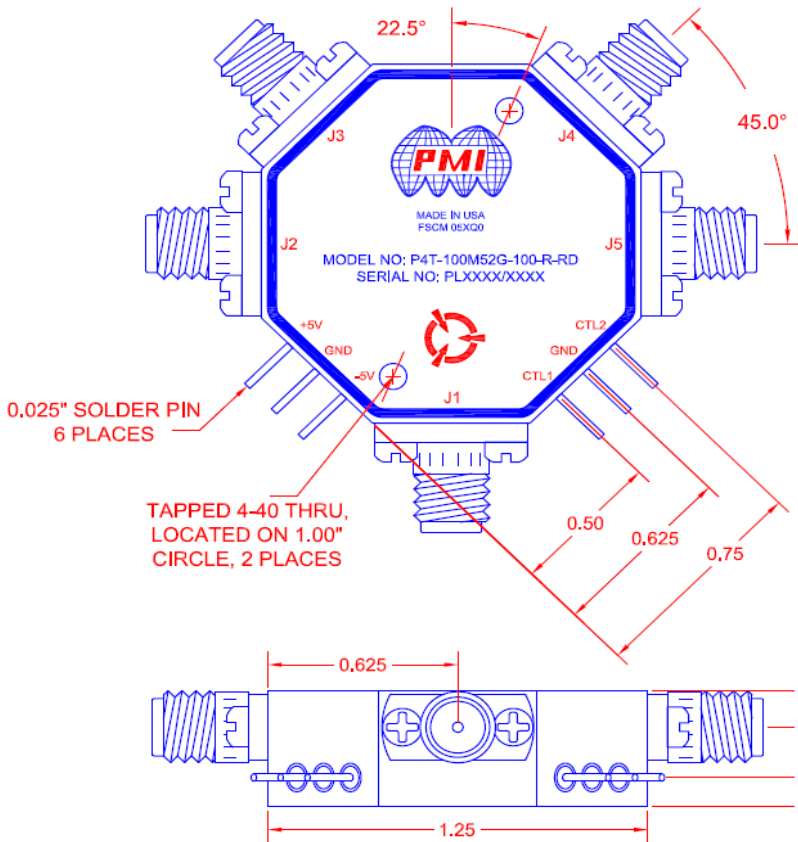
# Typical Characteristics ON P4T-100M52G-100-R-RD

## Mechanical Outline

### DESCRIPTION

PMI MODEL P4T-100M52G-100-R-RD IS A REFLECTIVE, SINGLE POLE FOUR THROW PIN DIODE SWITCH THAT OPERATES OVER THE 100 MHz TO 52 GHz FREQUENCY RANGE. IT FEATURES LOW INSERTION LOSS AND HIGH ISOLATION IN A SLIMLINE PACKAGE. THIS MODEL ALSO INCORPORATES A TTL COMPATIBLE DRIVER FOR EASE OF SYSTEM INTEGRATION.

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	1	ORIGINAL RELEASE	09/26/16	
	A1	ECN # 17-0299	12/19/17	



### MECHANICAL OUTLINE

ALL DIMENSIONS ARE IN INCHES  
TOLERANCES:  
X.XXX ±0.005  
X.XXXX ±0.010

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PRODUCT FEATURE  
P4T-100M52G-100-R-RD

DATE	11/05/20	REV.	A1
SCALE	N/S	SHEET	2 OF 2



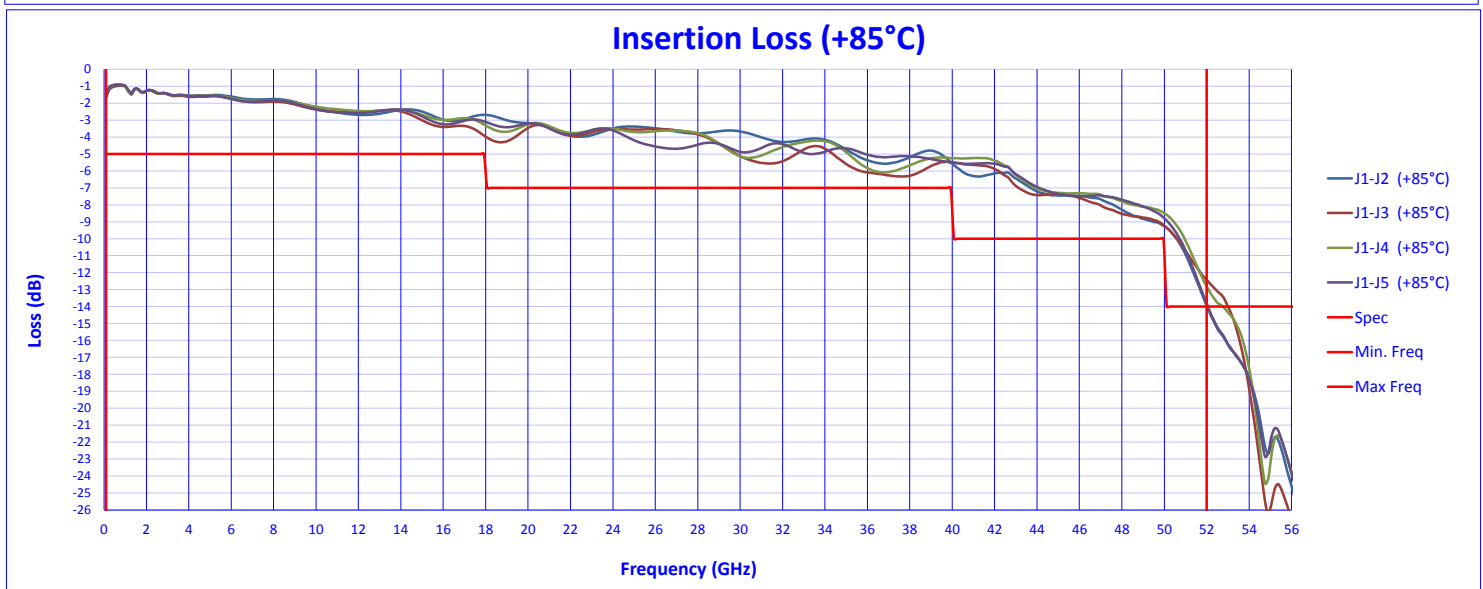
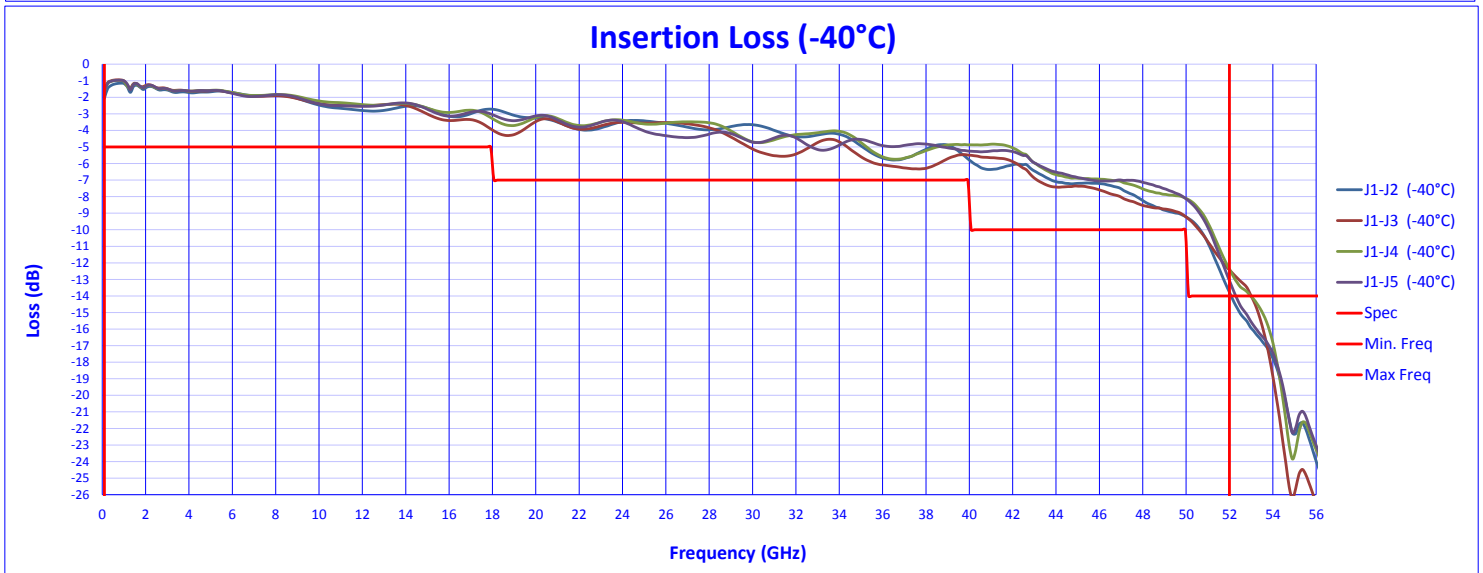
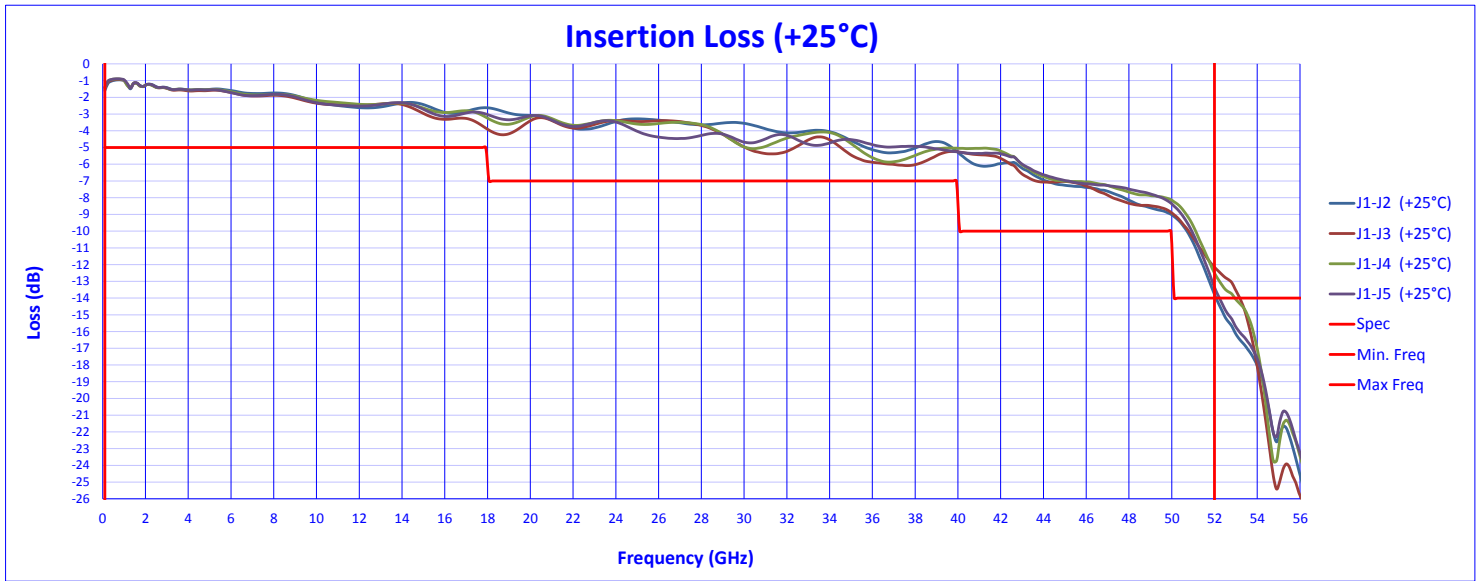
# Typical Characteristics ON P4T-100M52G-100-R-RD

## Technical Specifications

TEST ITEM NO.	PARAMETERS	SPECIFIED VALUE	TEST RESULTS			QA QC
			+25°C	-40°C	+85°C	
1	Frequency Range:	100 MHz to 52 GHz	100 MHz to 52 GHz	100 MHz to 52 GHz	100 MHz to 52 GHz	
2	Insertion Loss:	5.0 dB (100MHz to 18GHz) Max. 7.0 dB (18 to 40GHz) Max. 10.0 dB (40 to 50GHz) Max. 14.0 dB (50 to 52GHz) Typ.	3.96 dB	4.03 dB	4.03 dB	
			6.08 dB	6.33 dB	6.33 dB	
			9.13 dB	9.35 dB	9.37 dB	
			13.97 dB	13.95 dB	14.12 dB	
			See Graphs	See Graphs	See Graphs	
3	VSWR Input	2.0:1 (100MHz to 10GHz) Typ. 2.2:1 (10 to 18GHz) Typ. 2.5:1 (18 to 30GHz) Typ. 3.0:1 (30 to 50GHz) Typ. 3.5:1 (50 to 52GHz) Typ.	1.67 :1	1.82 :1	1.72 :1	
			2.04 :1	2.04 :1	2 :1	
			2.48 :1	2.48 :1	2.48 :1	
			2.98 :1	3.02 :1	3.03 :1	
			2.98 :1	3 :1	2.85 :1	
			See Graphs	See Graphs	See Graphs	
			See Graphs	See Graphs	See Graphs	
4	VSWR Output	2.0:1 (100MHz to 10GHz) Typ. 2.2:1 (10 to 18GHz) Typ. 2.5:1 (18 to 30GHz) Typ. 3.0:1 (30 to 50GHz) Typ. 3.5:1 (50 to 52GHz) Typ.	1.78 :1	1.91 :1	1.78 :1	
			2.32 :1	2.28 :1	2.28 :1	
			2.46 :1	2.42 :1	2.42 :1	
			2.69 :1	2.71 :1	2.61 :1	
			3.63 :1	3.42 :1	3.32 :1	
			See Graphs	See Graphs	See Graphs	
			See Graphs	See Graphs	See Graphs	
5	Isolation:	80 dB (100MHz to 1GHz) Min. 85 dB (1 to 18GHz) Min. 70 dB (18 to 40GHz) Min. 70 dB (40 to 50GHz) Min. 70 dB (50 to 52GHz) Typ.	86.49 dB	83.81 dB	82.43 dB	
			90.04 dB	90.26 dB	85.54 dB	
			80.63 dB	78.94 dB	78.91 dB	
			74.18 dB	73.25 dB	72.62 dB	
			73.41 dB	71.46 dB	65.97 dB	
			See Graphs	See Graphs	See Graphs	
6	Insertion Loss Flatness (Variation from a Best Fit Straight Line)	± 1 dB (100MHz to 18GHz) Max ± 1.2 dB (18 to 40GHz) Max. ± 2.0 dB (40 to 50GHz) Max. ± 5 dB (50 to 52GHz) Typ.	0.66 dB (±)	0.65 dB (±)	0.67 dB (±)	
			1.13 dB (±)	1.13 dB (±)	1.13 dB (±)	
			1.47 dB (±)	1.68 dB (±)	1.48 dB (±)	
			4.41 dB (±)	4.37 dB (±)	4.44 dB (±)	
			See Graphs	See Graphs	See Graphs	
7	Amplitude Balance	± 1.0 dB (100MHz to 18GHz) Max. ± 1.5 dB (18 to 40GHz) Max. ± 1.5 dB (40 to 50GHz) Max. ± 1.5 dB (50 to 52GHz) Typ.	0.76 dB (±)	0.91 dB (±)	0.78 dB (±)	
			0.94 dB (±)	1.3 dB (±)	0.98 dB (±)	
			0.73 dB (±)	1.02 dB (±)	0.78 dB (±)	
			0.82 dB (±)	0.77 dB (±)	0.8 dB (±)	
			See Graphs	See Graphs	See Graphs	
8	Phase Balance	± 10° (100MHz to 18GHz) Typ. ± 15° (18 to 40GHz) Typ. ± 15° (40 to 50GHz) Typ. ± 20° (50 to 52GHz) Typ.	9.42 ° (±)	10.25 ° (±)	10.13 ° (±)	
			17.01 ° (±)	15.21 ° (±)	16.56 ° (±)	
			15.94 ° (±)	12.51 ° (±)	17.78 ° (±)	
			14.6 ° (±)	15.45 ° (±)	20.31 ° (±)	
			See Graphs	See Graphs	See Graphs	
9	Switching Speed	50 ns Max.	Rise Time = 3.30 ns	Rise Time = 3.30 ns	Rise Time = 3.30 ns	
			Fall Time = 7.80 ns	Fall Time = 7.80 ns	Fall Time = 7.80 ns	
			Speed ON = 34.40 ns	Speed ON = 34.40 ns	Speed ON = 34.40 ns	
			Speed OFF = 37.70 ns	Speed OFF = 37.70 ns	Speed OFF = 37.70 ns	
			See Graphs	See Graphs	See Graphs	
10	Input Power:	+20 dBm CW Max. (100 MHz to 40 GHz) "Theoretically it can handle 20dBm up to 52GHz" +	Pass +20dBm 100 MHz to 40GHz (See Graph)	Pass +20dBm 100 MHz to 40GHz (See Graph)	Pass +20dBm 100 MHz to 40GHz (See Graph)	
11	Video Transients	1V Peak to Peak Typ.	7.20 mV Max.	7.20 mV Max.	7.20 mV Max.	
			690 mV Min.	690 mV Min.	690 mV Min.	
			See Plots	See Plots	See Plots	
12	DC Supply:	+5 VDC @ 200 mA Max. -5 VDC @ 200 mA Max.	+5 VDC @ 128 mA -5 VDC @ 70 mA	+5 VDC @ 116 mA -5 VDC @ 70mA	+5 VDC @ 145mA -5 VDC @ 75 mA	



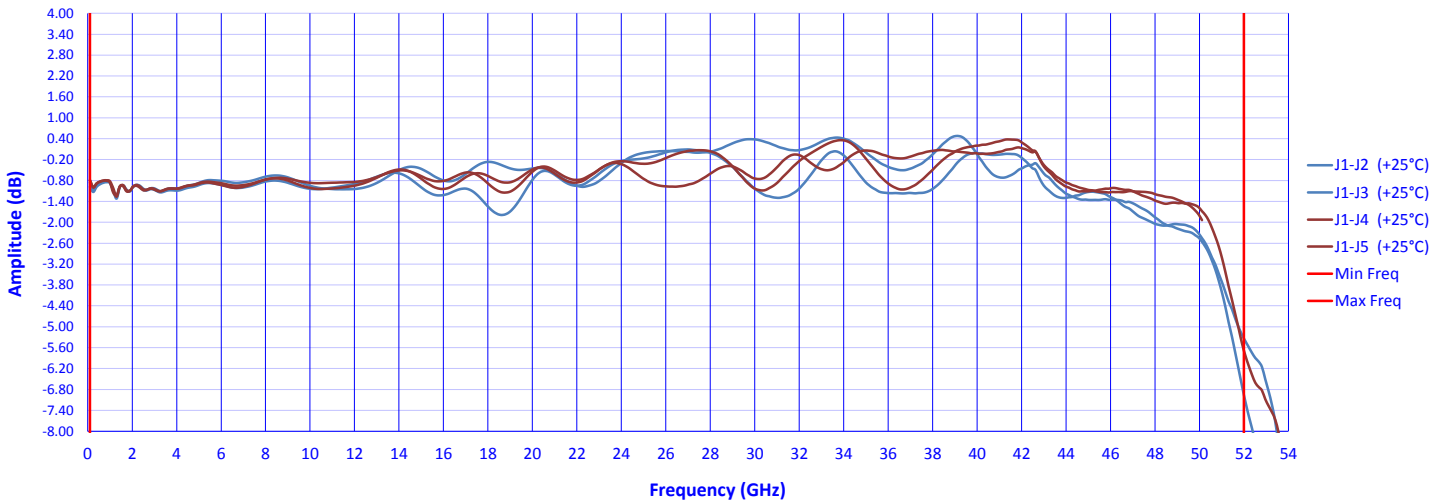
# Typical Characteristics ON P4T-100M52G-100-R-RD



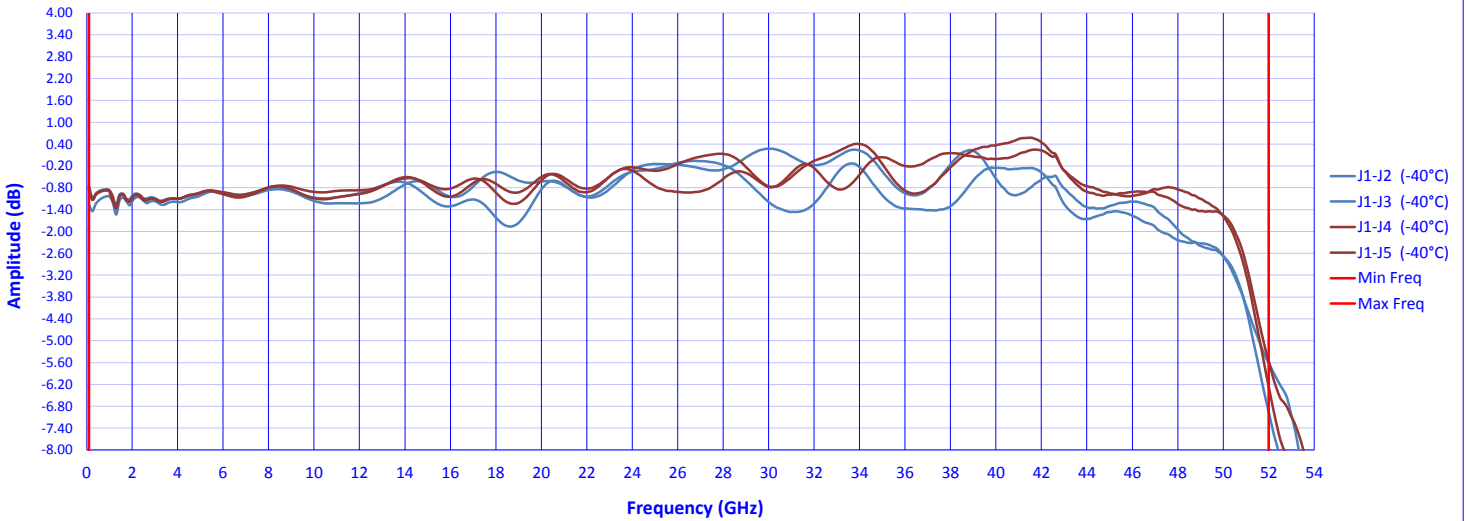


# Typical Characteristics ON P4T-100M52G-100-R-RD

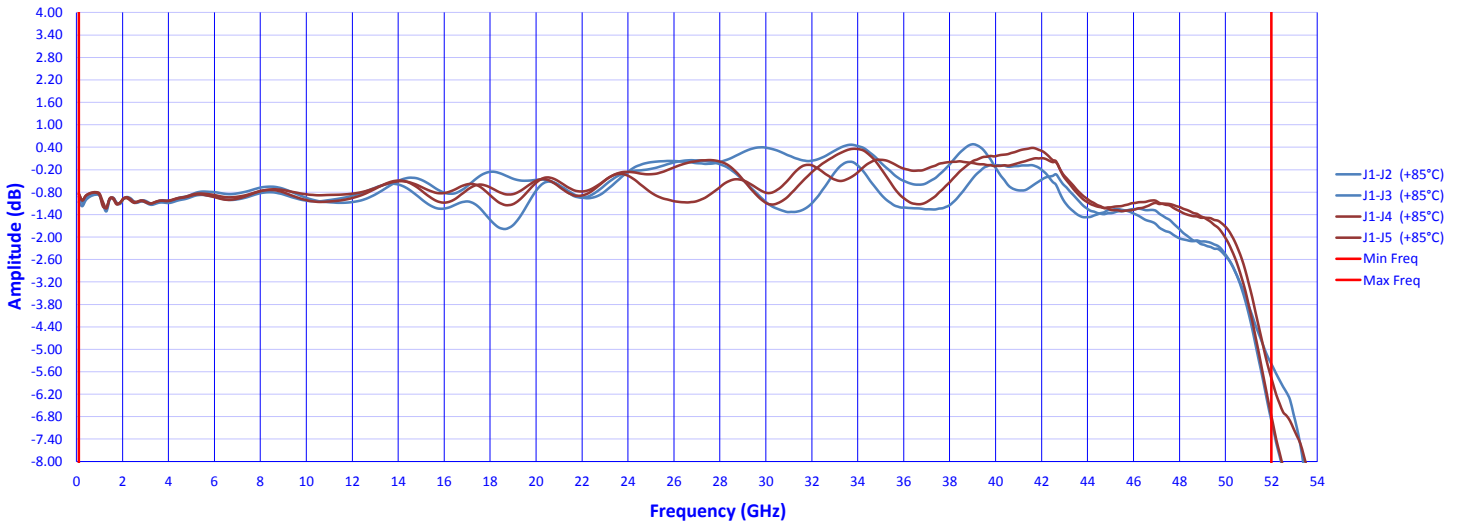
### Insertion Loss Flatness (Variation from a Best Fit Straight Line) +25°C



### Insertion Loss Flatness (Variation from a Best Fit Straight Line) -40°C



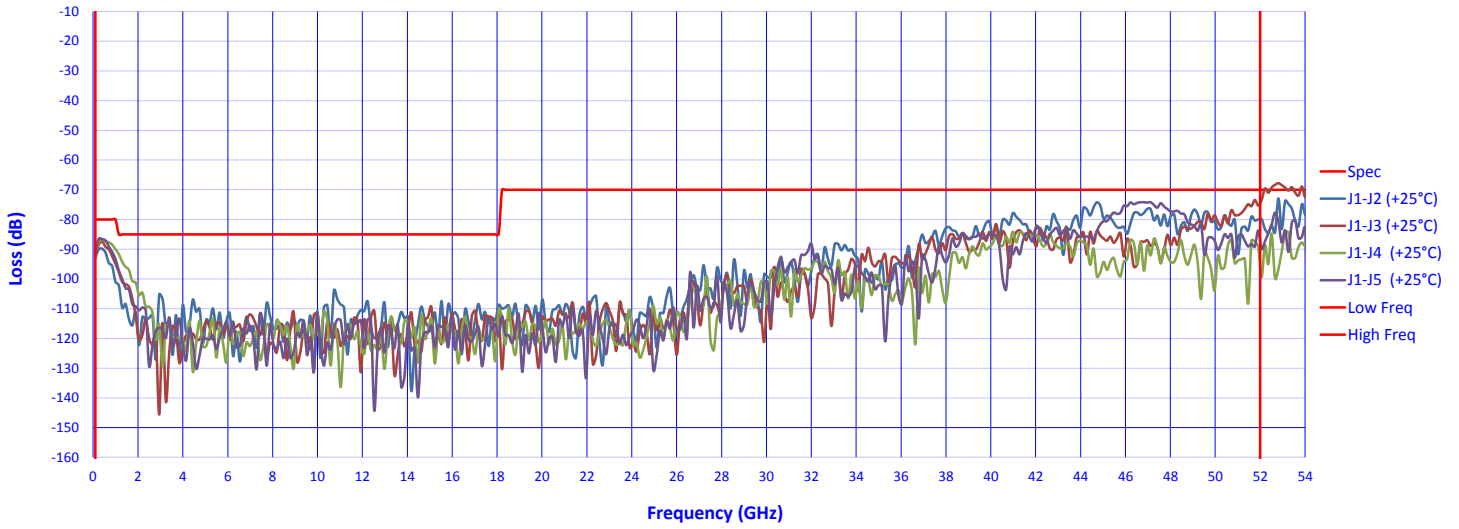
### Insertion Loss Flatness (Variation from a Best Fit Straight Line) +85°C



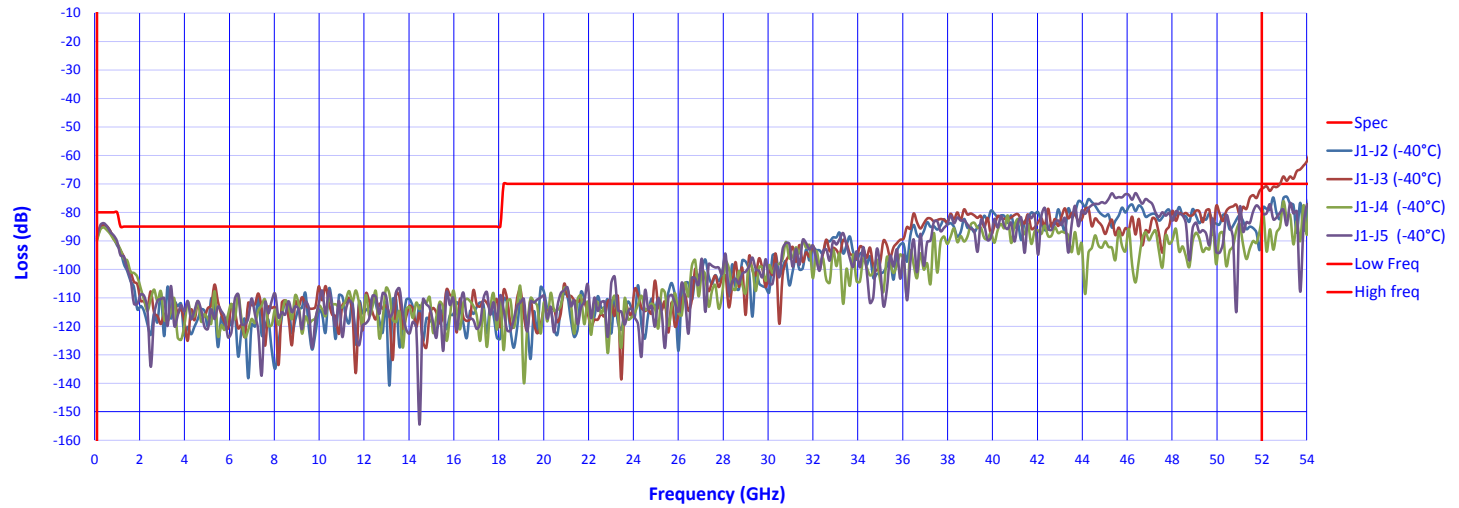


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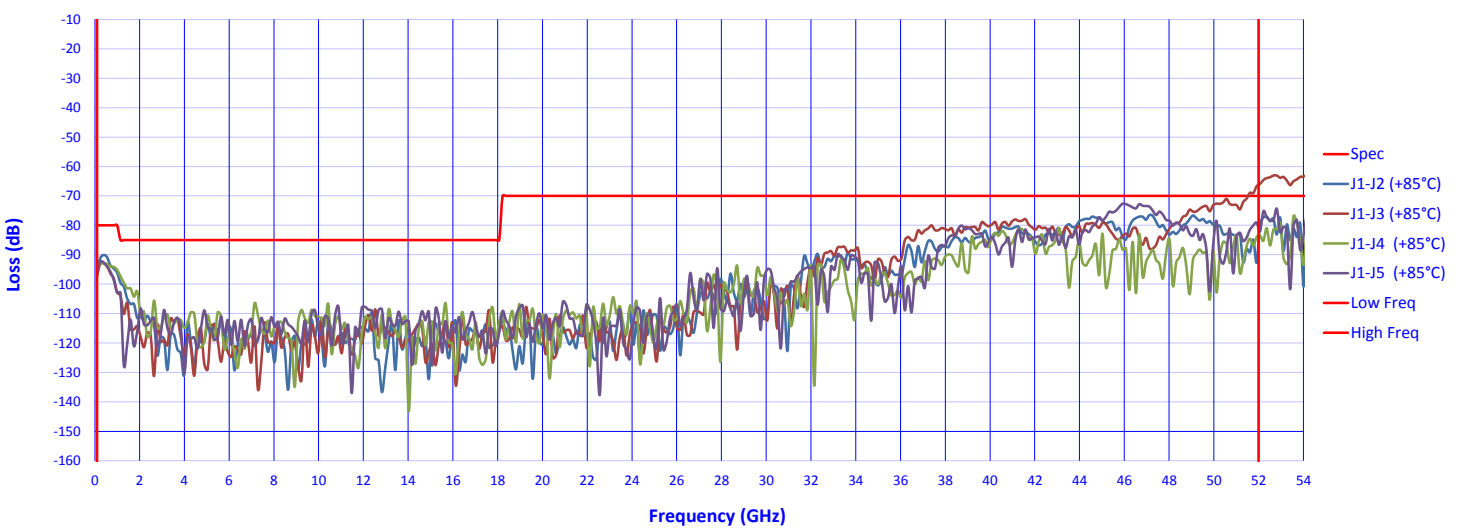
### Isolation (+25°C)



### Isolation (-40°C)

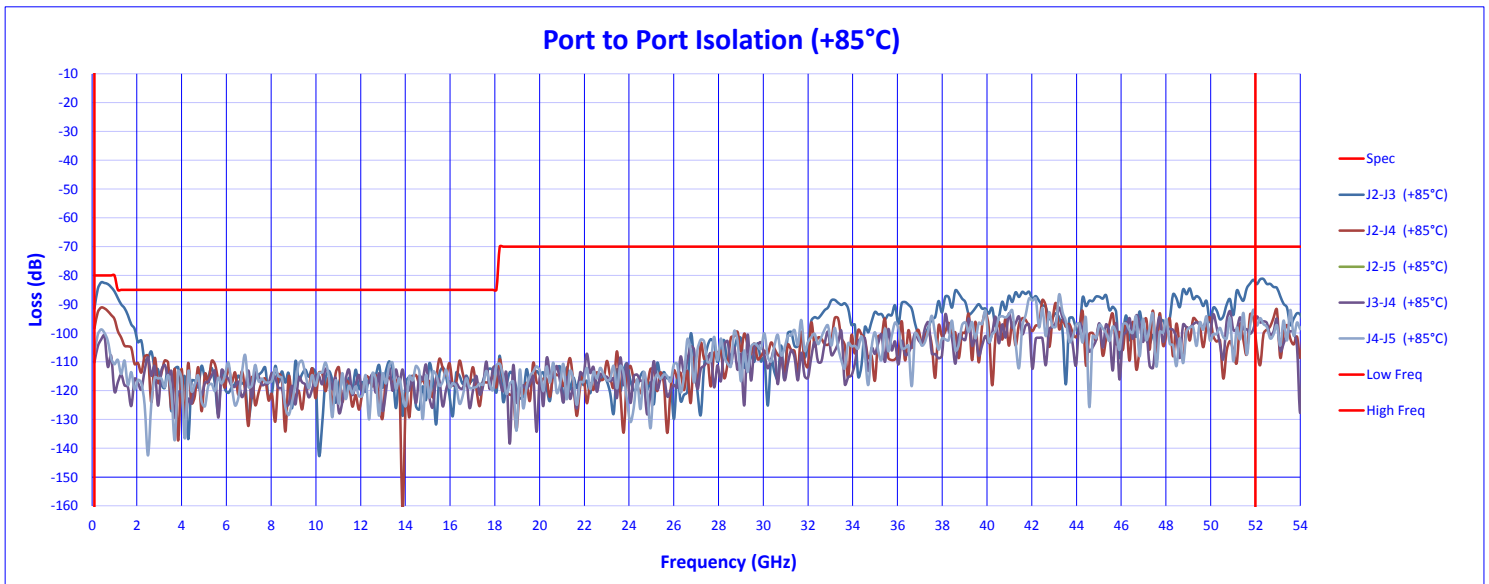
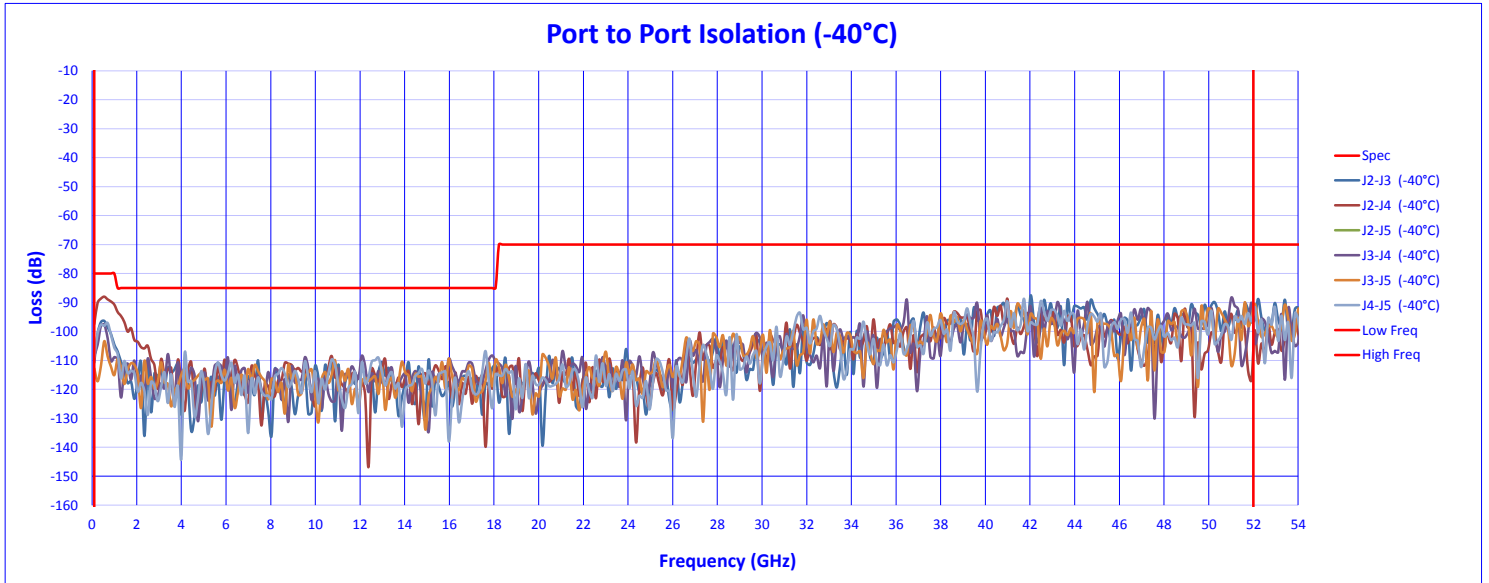
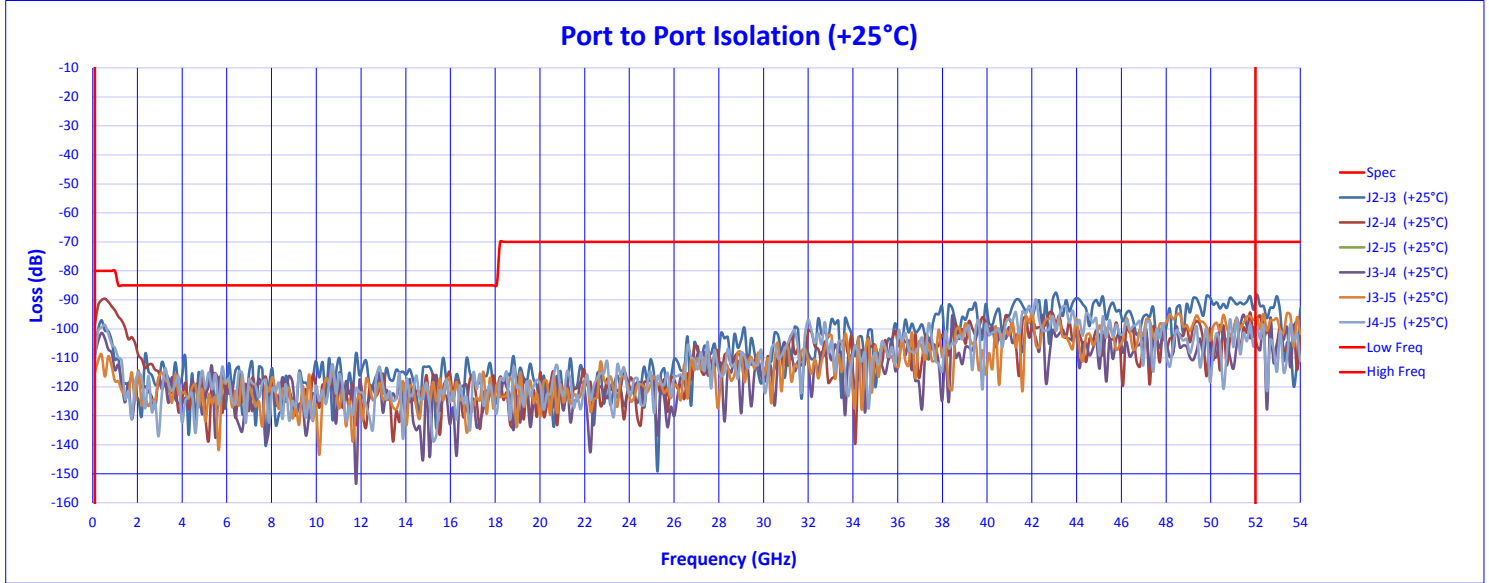


### Isolation (+85°C)





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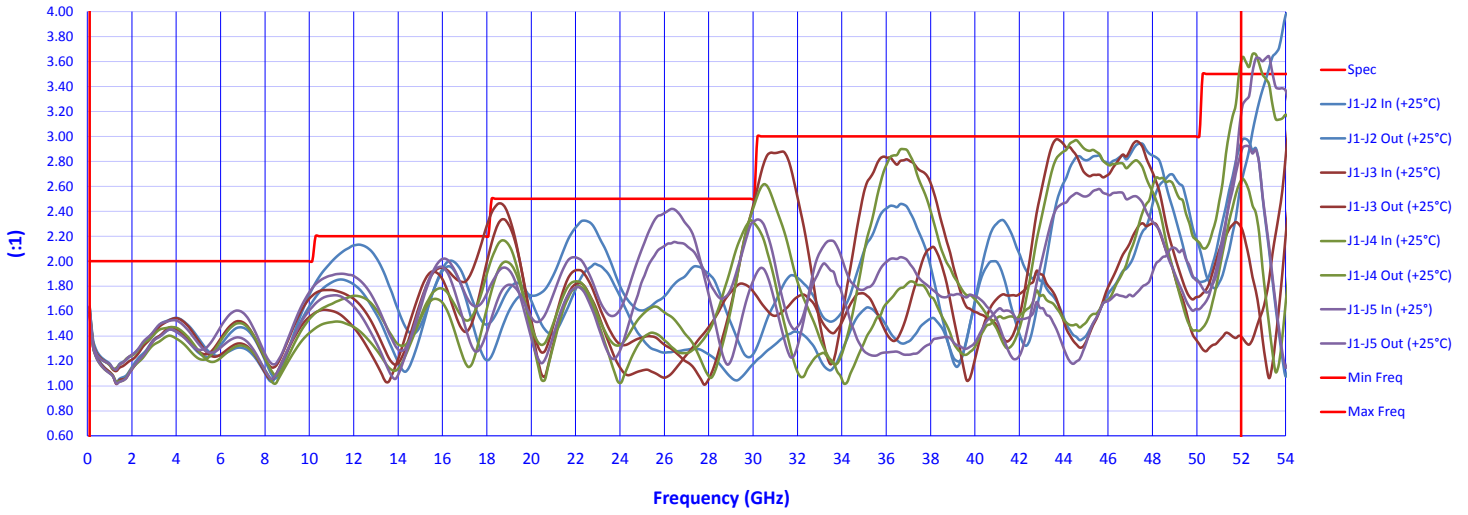




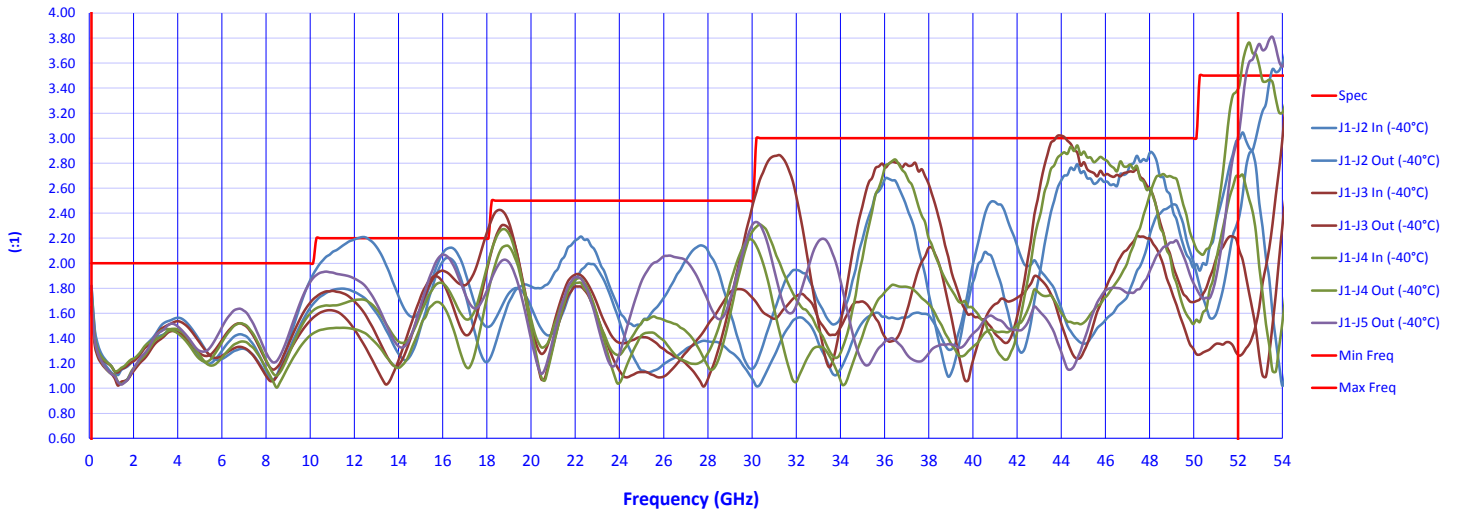


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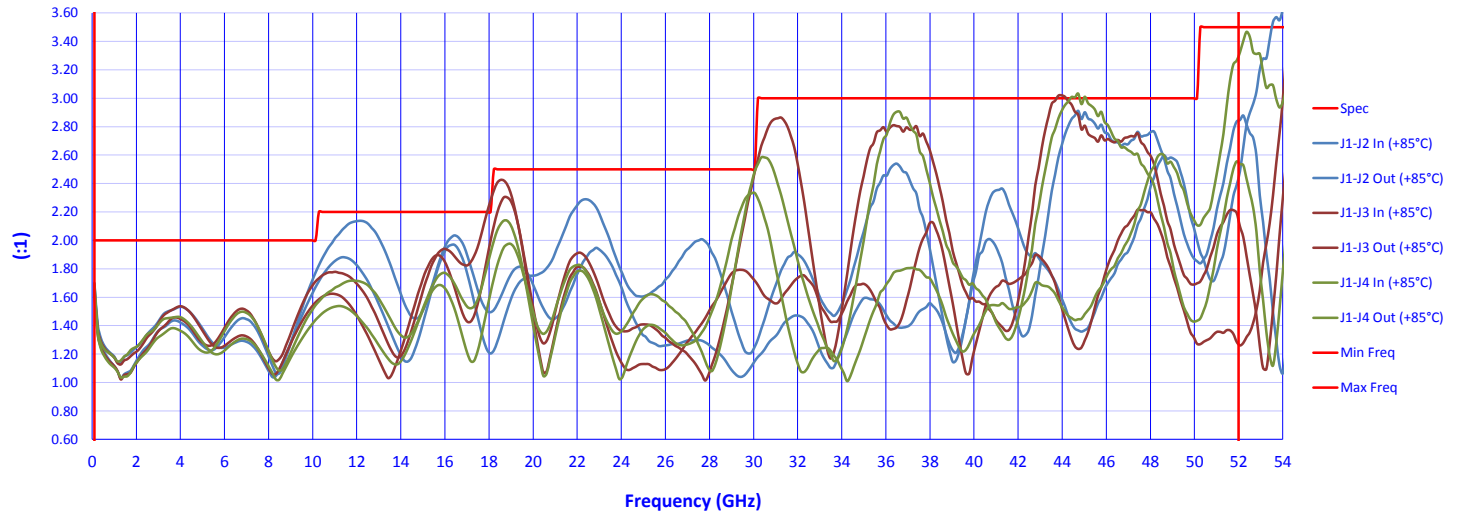
### VSWR In/Out (+25°C)



### VSWR In/Out (-40°C)



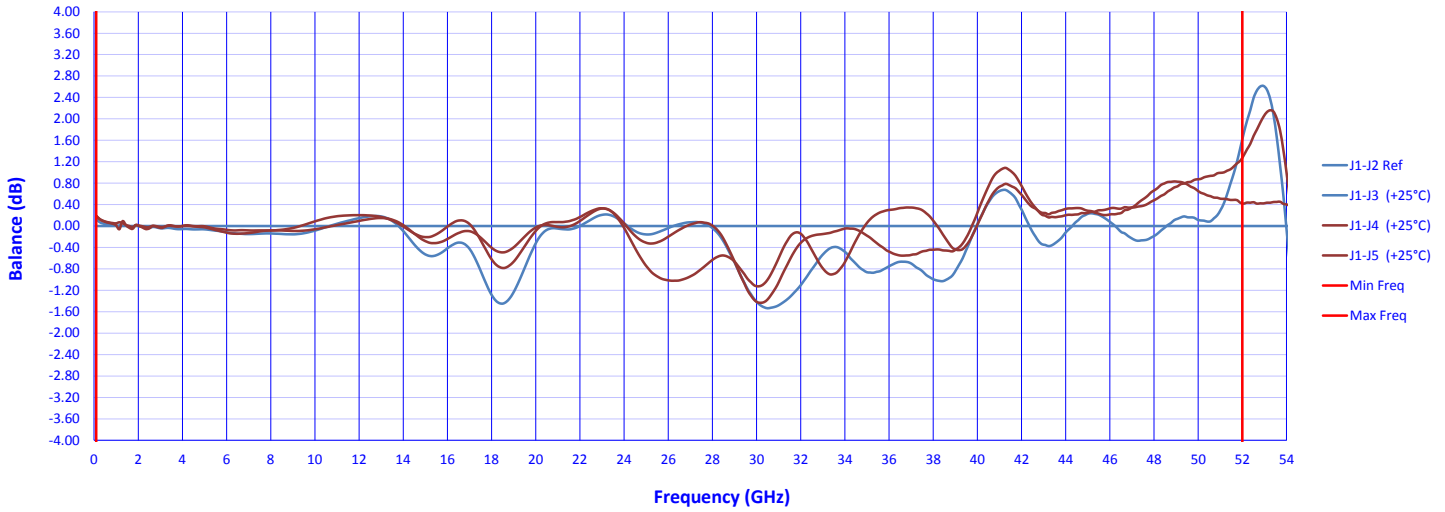
### VSWR In/Out (+85°C)



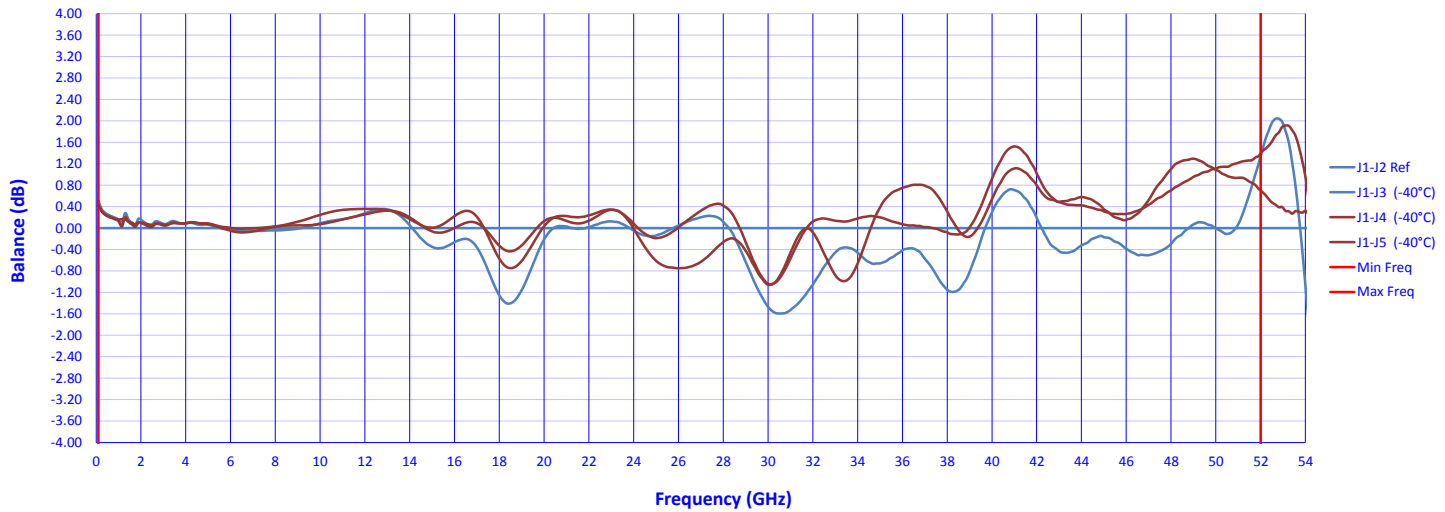


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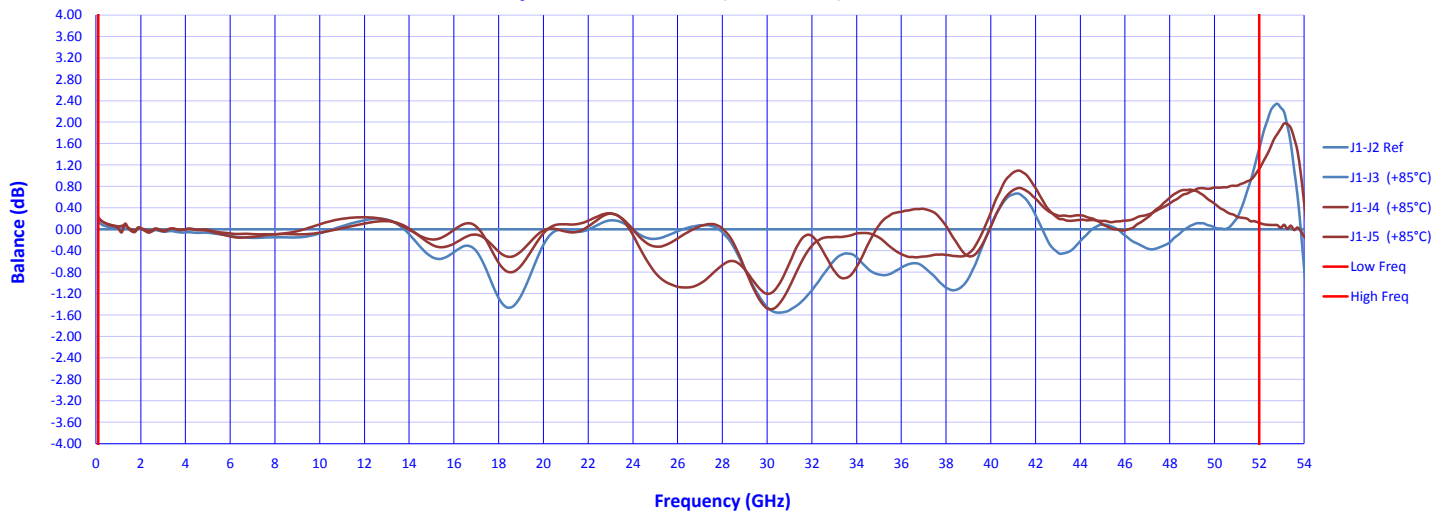
### Amplitude Balance (Ref J1-J2) +25°C



### Amplitude Balance (Ref J1-J2) -40°C



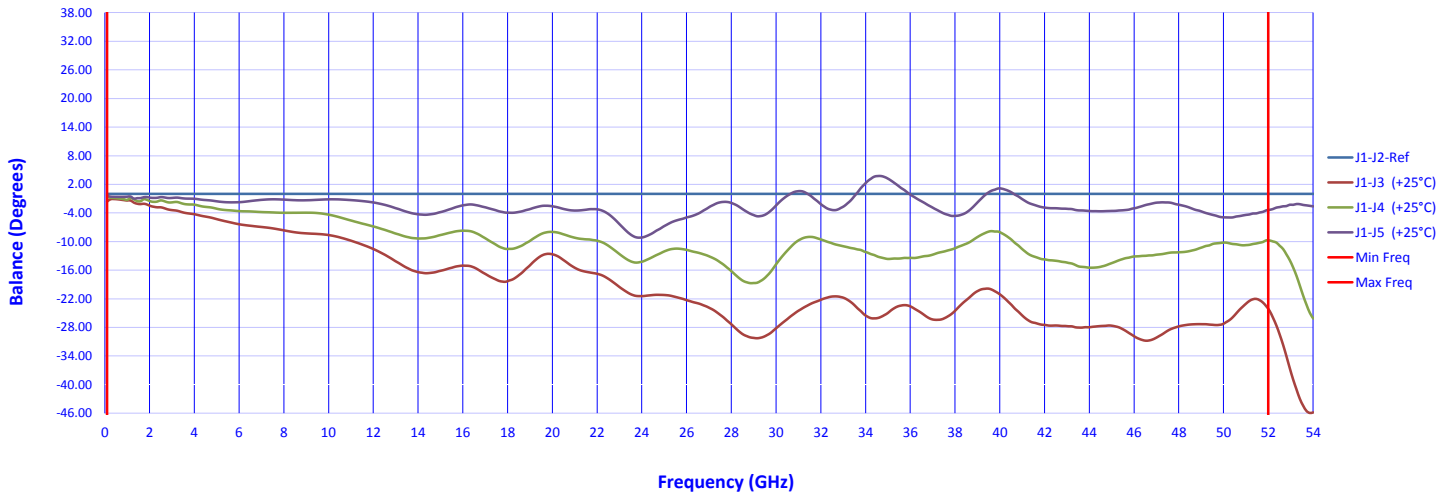
### Amplitude Balance (Ref J1-J2) +85°C



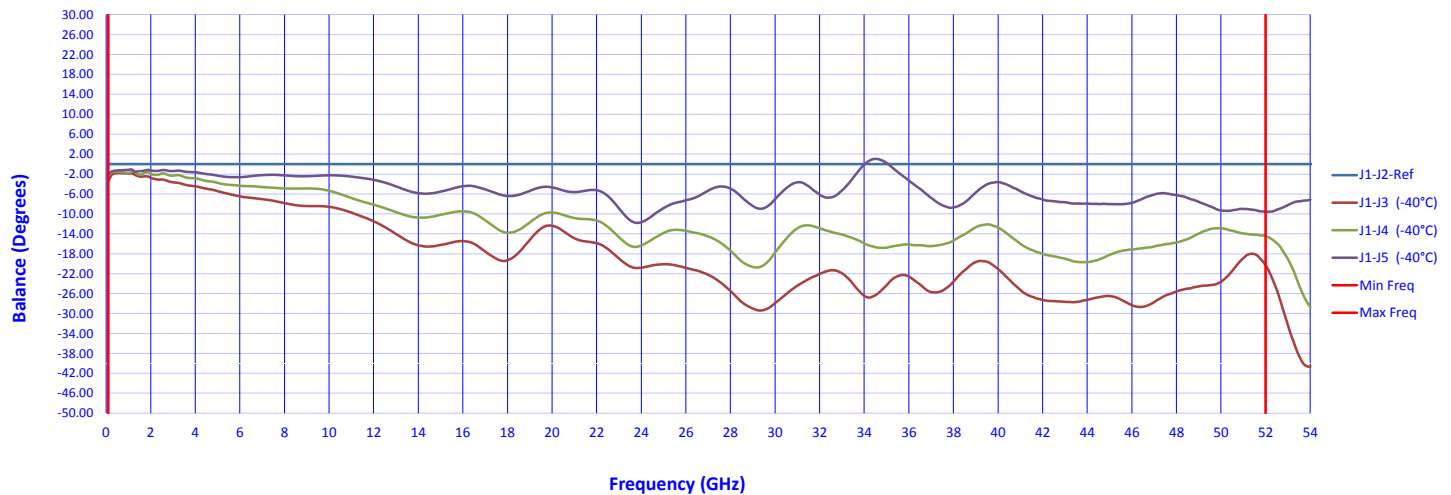


# Typical Characteristics ON P4T-100M52G-100-R-RD

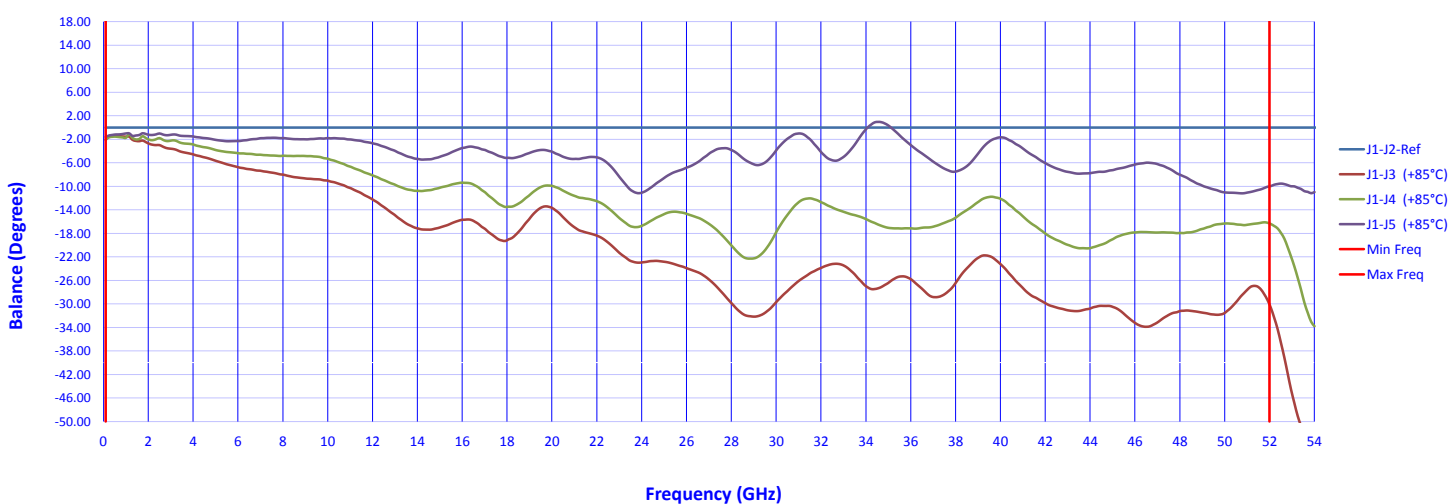
### Phase Balance (+25°C)



### Phase Balance (-40°C)



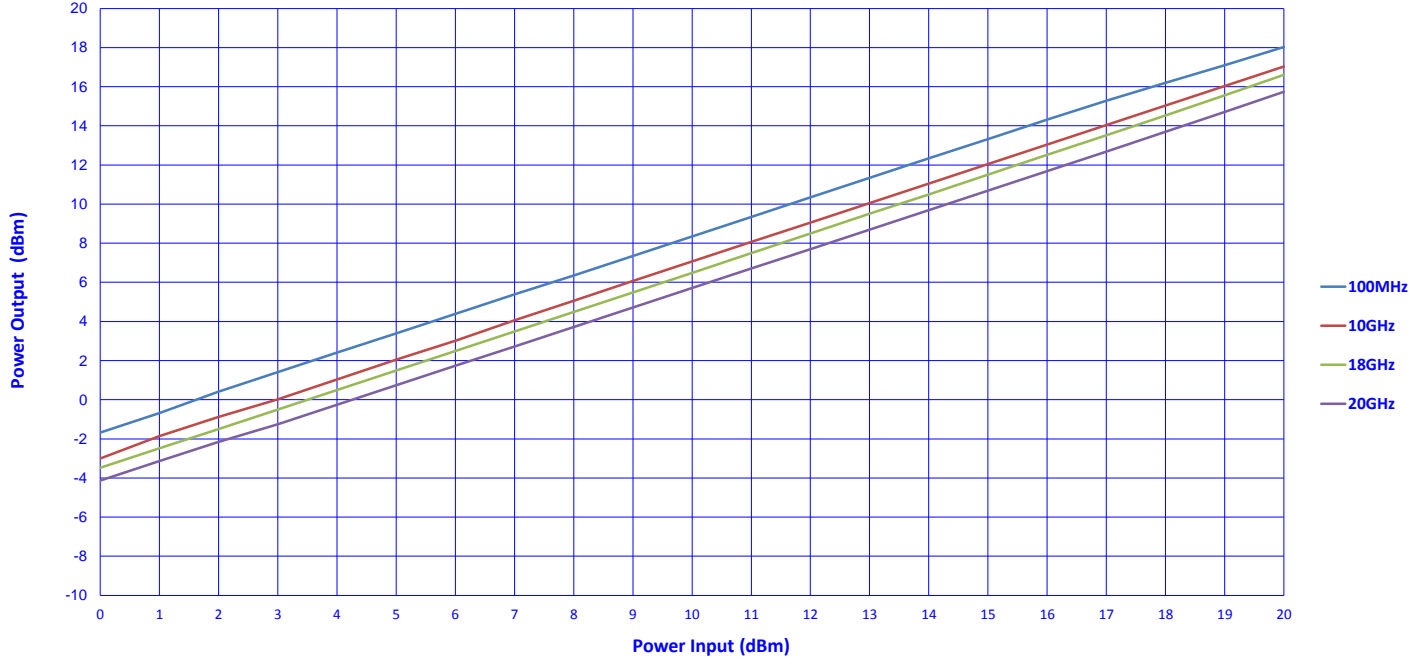
### Phase Balance (+85°C)





# Typical Characteristics ON P4T-100M52G-100-R-RD

### High Power Test Graph (100MHz to 20 GHz)



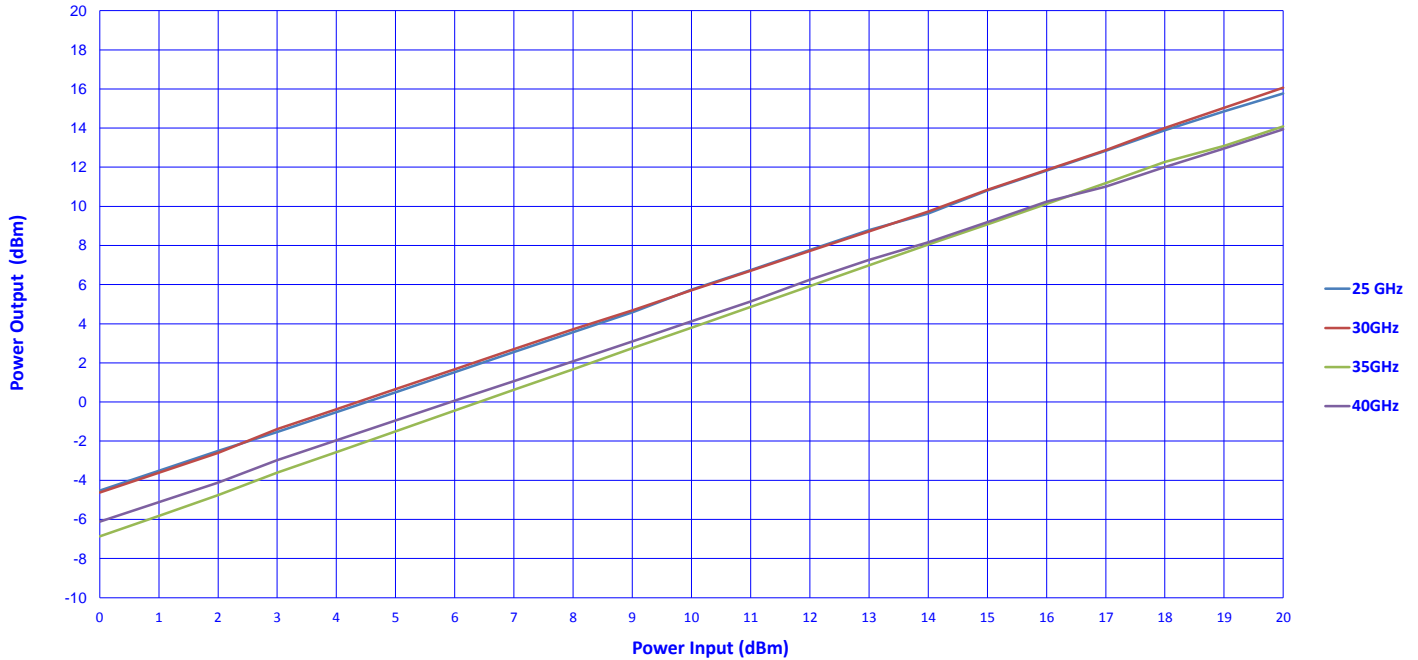
### High Power Test Data 100MHz to 20 GHz (CW)

100MHz				10GHz				18GHz				20GHz			
Pin (dBm)	Pout (dBm)	Loss	Compression (dBm)	Pin (dBm)	Pout (dBm)	Loss	Compression (dBm)	Pin (dBm)	Pout (dBm)	Loss	Compression (dBm)	Pin (dBm)	Pout (dBm)	Loss	Compression (dBm)
0	-1.675	1.675	0.116	0	-2.998	2.998	0.000	0	-3.482	3.482	0.000	0	-4.136	4.136	0.000
1	-0.686	1.686	0.105	1	-1.868	2.868	0.130	1	-2.488	3.488	0.006	1	-3.143	4.143	0.007
2	0.407	1.594	0.198	2	-0.871	2.871	0.127	2	-1.496	3.496	0.014	2	-2.152	4.152	0.017
3	1.411	1.589	0.202	3	0.027	2.973	0.025	3	-0.499	3.499	0.017	3	-1.252	4.252	0.117
4	2.403	1.597	0.194	4	1.039	2.961	0.037	4	0.495	3.505	0.023	4	-0.261	4.261	0.126
5	3.390	1.610	0.181	5	2.046	2.954	0.044	5	1.497	3.503	0.021	5	0.734	4.266	0.130
6	4.382	1.619	0.173	6	3.022	2.978	0.020	6	2.496	3.504	0.022	6	1.731	4.269	0.133
7	5.381	1.619	0.172	7	4.054	2.946	0.052	7	3.490	3.510	0.028	7	2.725	4.275	0.140
8	6.354	1.646	0.145	8	5.059	2.941	0.057	8	4.490	3.510	0.028	8	3.720	4.280	0.144
9	7.353	1.647	0.144	9	6.067	2.933	0.065	9	5.485	3.515	0.033	9	4.715	4.285	0.150
10	8.354	1.646	0.145	10	7.069	2.931	0.067	10	6.485	3.515	0.033	10	5.710	4.290	0.154
11	9.353	1.647	0.144	11	8.065	2.935	0.063	11	7.490	3.510	0.028	11	6.706	4.294	0.159
12	10.349	1.651	0.140	12	9.050	2.950	0.048	12	8.493	3.507	0.025	12	7.699	4.301	0.166
13	11.348	1.652	0.139	13	10.051	2.949	0.049	13	9.505	3.495	0.013	13	8.694	4.307	0.171
14	12.341	1.659	0.132	14	11.050	2.950	0.048	14	10.497	3.503	0.021	14	9.684	4.316	0.181
15	13.326	1.674	0.117	15	12.049	2.951	0.047	15	11.505	3.495	0.013	15	10.680	4.320	0.185
16	14.310	1.690	0.101	16	13.045	2.955	0.043	16	12.515	3.485	0.003	16	11.683	4.317	0.182
17	15.277	1.723	0.068	17	14.039	2.961	0.037	17	13.520	3.480	0.002	17	12.681	4.319	0.184
18	16.202	1.798	0.007	18	15.037	2.963	0.035	18	14.529	3.471	0.011	18	13.691	4.309	0.173
19	17.098	1.902	0.111	19	16.041	2.959	0.039	19	15.563	3.437	0.045	19	14.709	4.291	0.156
20	18.027	1.973	0.182	20	17.036	2.964	0.034	20	16.601	3.399	0.083	20	15.740	4.260	0.124



# Typical Characteristics ON P4T-100M52G-100-R-RD

### High Power Test Graph (25 to 40 GHz)



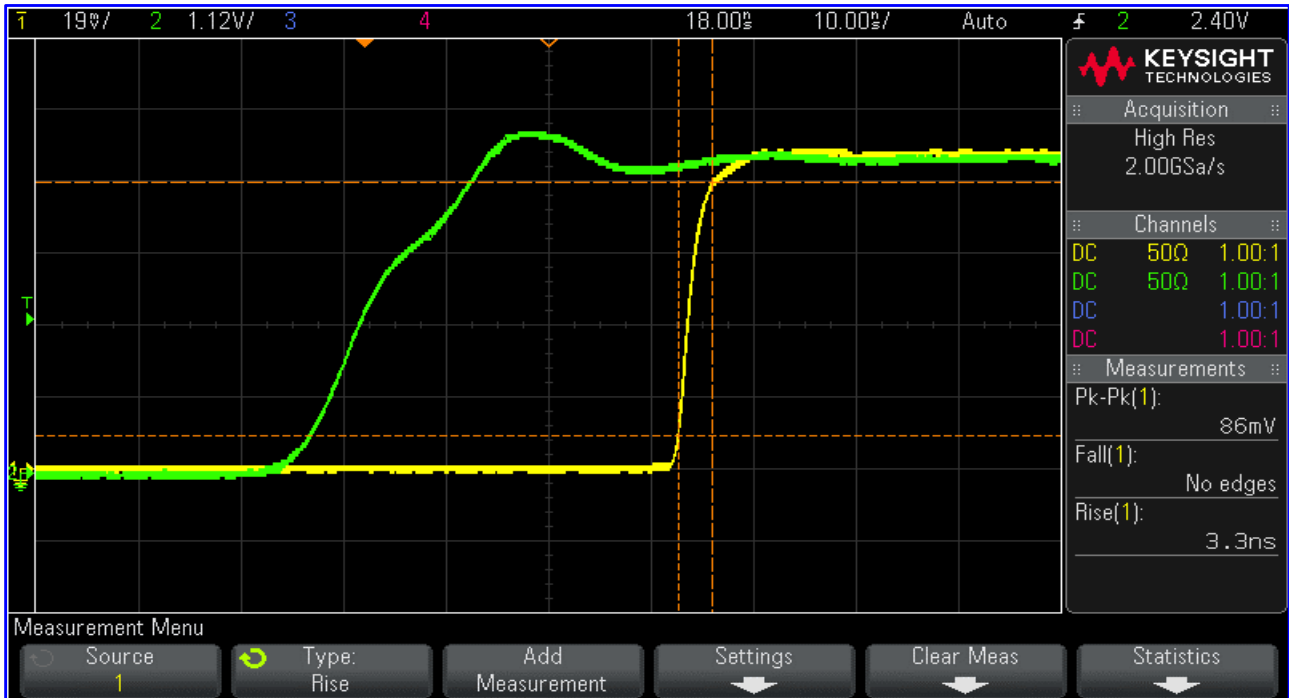
High Power Test Data 25 to 40 GHz (CW)															
25 GHz				30GHz				35GHz				40GHz			
Pin (dBm)	Pout (dBm)	Loss	Compression (dBm)	Pin (dBm)	Pout (dBm)	Loss	Compression (dBm)	Pin (dBm)	Pout (dBm)	Loss	Compression (dBm)	Pin (dBm)	Pout (dBm)	Loss	Compression (dBm)
0	-4.530	4.530	0.000	0	-4.630	4.630	0.000	0	-6.860	6.860	0.000	0	-6.119	6.119	0.000
1	-3.515	4.515	0.015	1	-3.610	4.610	0.020	1	-5.814	6.814	0.046	1	-5.119	6.119	0.000
2	-2.499	4.499	0.031	2	-2.597	4.597	0.033	2	-4.763	6.763	0.097	2	-4.112	6.112	0.007
3	-1.539	4.539	0.009	3	-1.394	4.394	0.236	3	-3.615	6.615	0.245	3	-2.973	5.973	0.146
4	-0.520	4.520	0.010	4	-0.373	4.373	0.257	4	-2.560	6.560	0.300	4	-1.962	5.962	0.158
5	0.501	4.499	0.031	5	0.651	4.349	0.281	5	-1.502	6.502	0.358	5	-0.946	5.946	0.173
6	1.528	4.472	0.058	6	1.675	4.325	0.305	6	-0.444	6.444	0.416	6	0.061	5.939	0.180
7	2.550	4.450	0.080	7	2.700	4.300	0.330	7	0.618	6.382	0.478	7	1.069	5.931	0.188
8	3.570	4.430	0.100	8	3.719	4.281	0.349	8	1.679	6.321	0.539	8	2.082	5.919	0.201
9	4.588	4.413	0.118	9	4.680	4.320	0.310	9	2.745	6.255	0.605	9	3.102	5.898	0.221
10	5.738	4.262	0.268	10	5.703	4.297	0.333	10	3.802	6.198	0.662	10	4.119	5.881	0.238
11	6.747	4.253	0.277	11	6.710	4.290	0.340	11	4.866	6.134	0.726	11	5.138	5.862	0.257
12	7.763	4.237	0.293	12	7.725	4.275	0.355	12	5.929	6.071	0.789	12	6.247	5.753	0.366
13	8.785	4.216	0.315	13	8.721	4.279	0.351	13	6.988	6.012	0.848	13	7.262	5.738	0.381
14	9.643	4.357	0.173	14	9.729	4.271	0.359	14	8.056	5.945	0.916	14	8.170	5.830	0.289
15	10.806	4.194	0.336	15	10.847	4.153	0.477	15	9.079	5.921	0.939	15	9.200	5.800	0.319
16	11.823	4.177	0.353	16	11.861	4.139	0.491	16	10.128	5.872	0.988	16	10.242	5.758	0.361
17	12.847	4.153	0.377	17	12.874	4.126	0.504	17	11.195	5.805	1.055	17	11.015	5.985	0.134
18	13.880	4.120	0.410	18	14.000	4.000	0.630	18	12.277	5.723	1.137	18	12.015	5.985	0.134
19	14.849	4.151	0.379	19	15.030	3.970	0.660	19	13.087	5.913	0.947	19	12.952	6.048	0.071
20	15.776	4.224	0.306	20	16.065	3.935	0.695	20	14.081	5.919	0.941	20	13.931	6.069	0.050



# Typical Characteristics ON P4T-100M52G-100-R-RD

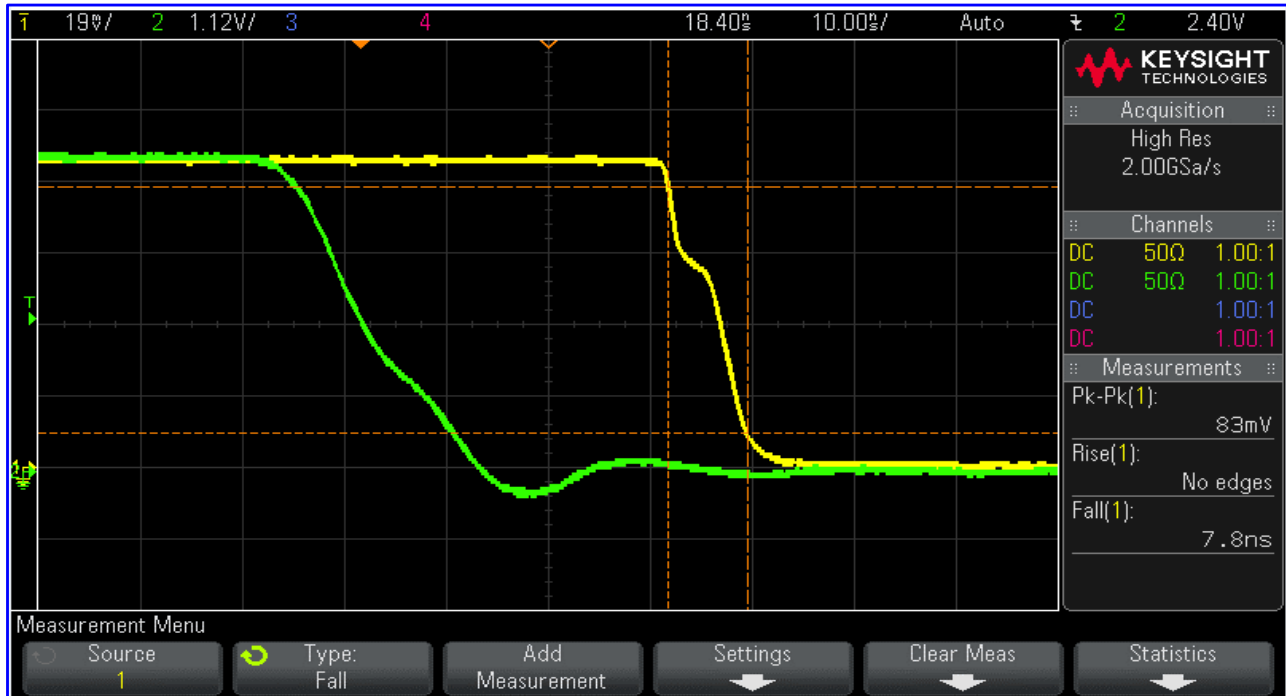
Rise Time  
10 ns Per Div.

Measured Value (3.3 ns)



Fall Time  
10 ns Per Div.

Measured Value (7.8 ns)



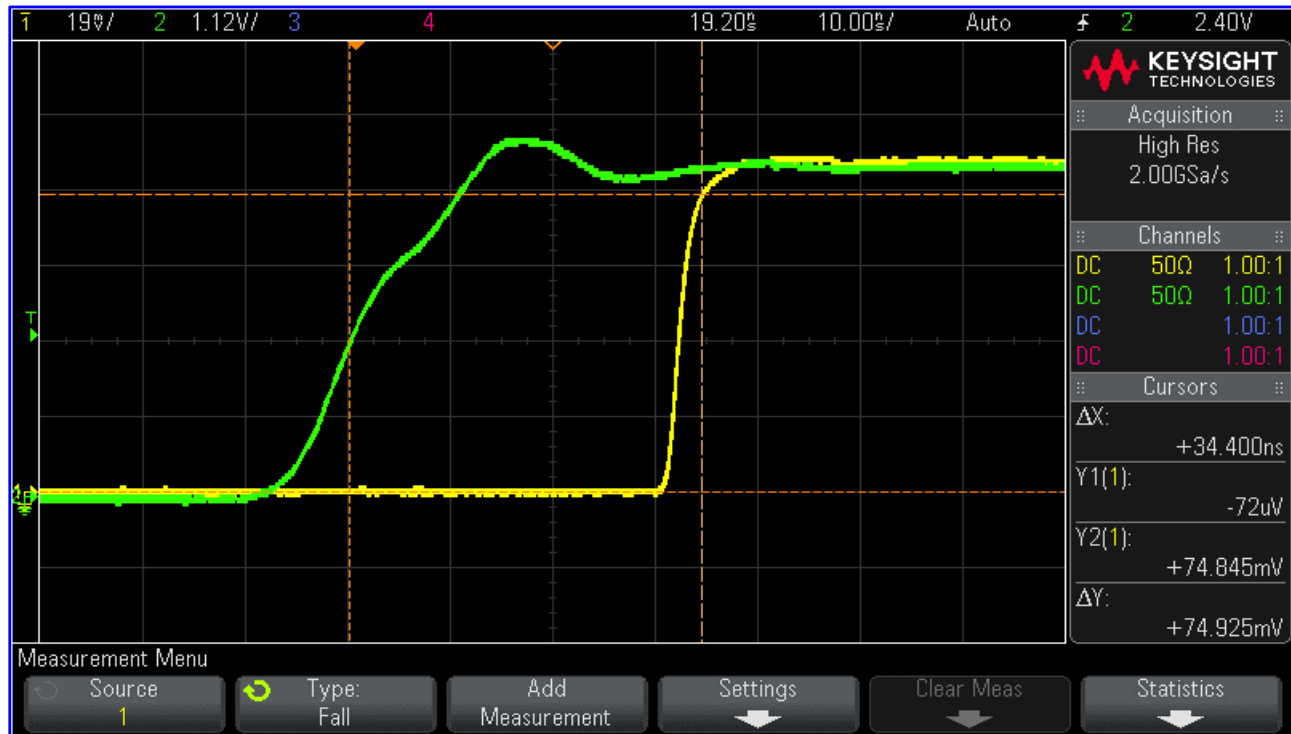
Green Trace = TTL Signal  
Yellow Trace = RF Signal



# Typical Characteristics ON P4T-100M52G-100-R-RD

Switching Speed ON  
10 ns Per Div.

Measured Value (34.40ns)



Switching Speed OFF  
20 ns Per Div.

Measured Value (37.60 ns)

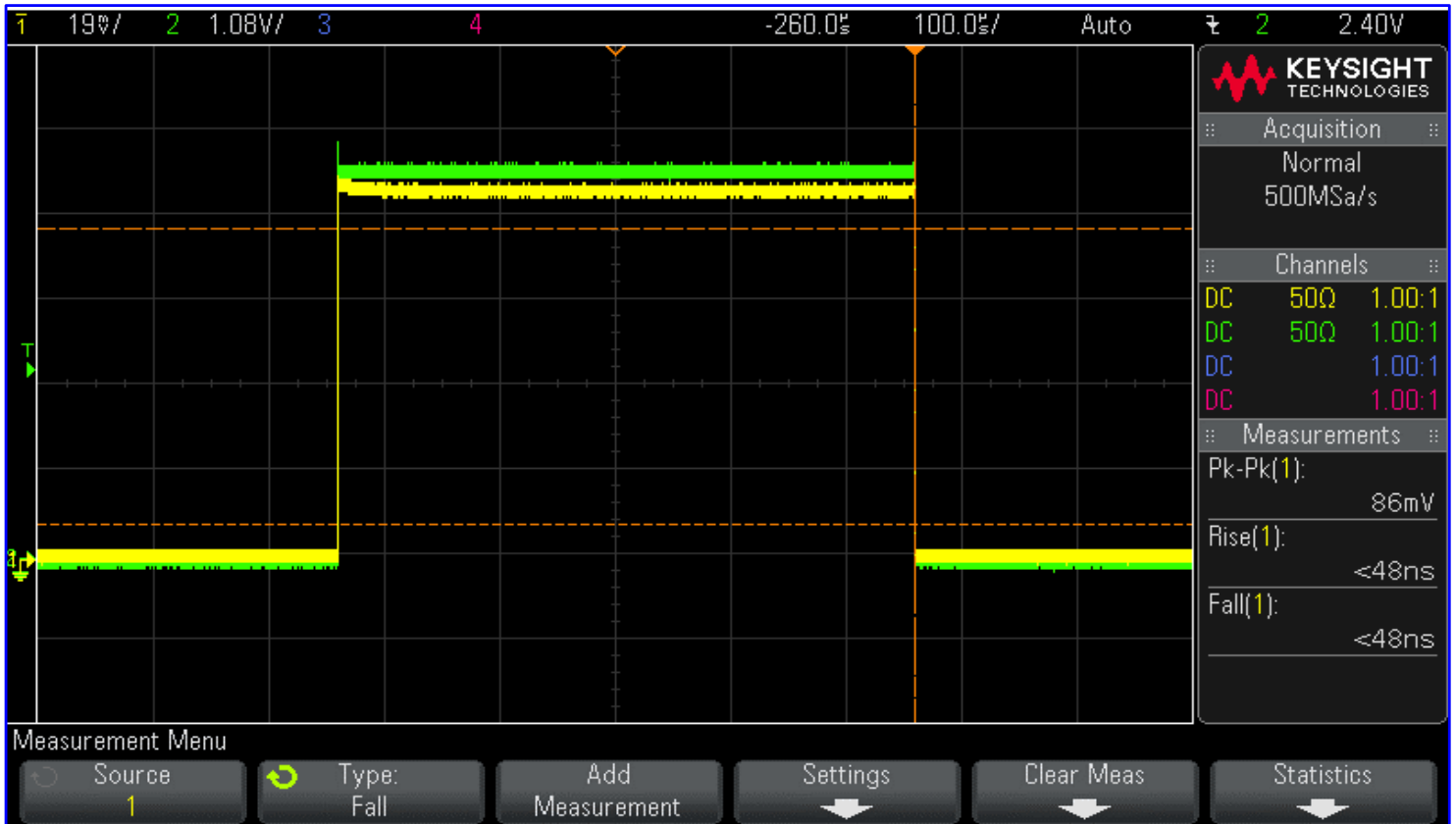


Green Trace = TTL Signal  
Yellow Trace = RF Signal



# Typical Characteristics ON P4T-100M52G-100-R-RD

Full Pulse  
10  $\mu$ s Per Div.



Green Trace = TTL Signal  
Yellow Trace = RF Signal





# Typical Characteristics ON P4T-100M52G-100-R-RD

Output Video Transients  
BW = 350MHz, 50Ω  
Measured Value (720 mV P-P)



Output Video Transients  
BW = 350MHz, 50Ω  
Measured Value (690 mV P-P)



Green Trace = TTL Signal  
Yellow Trace = RF Signal