



# PD55003L

## RF POWER TRANSISTORS

### The LdmoST Plastic FAMILY

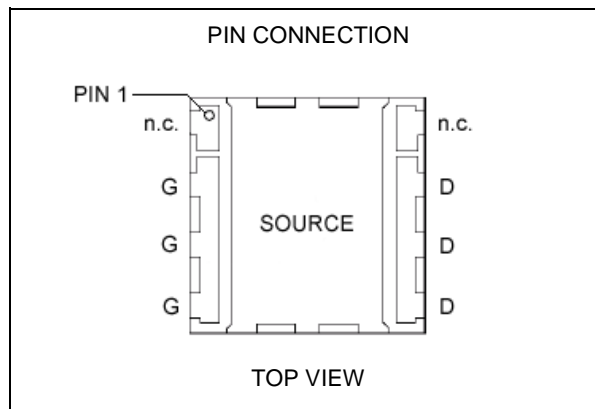
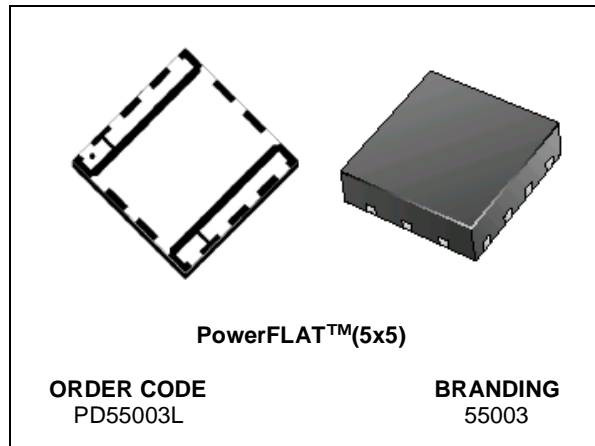
#### N-CHANNEL ENHANCEMENT-MODE LATERAL MOSFETs

- EXCELLENT THERMAL STABILITY
- COMMON SOURCE CONFIGURATION
- $P_{OUT} = 3\text{ W}$  with 17 dB gain @ 500 MHz / 12.5 V
- NEW LEADLESS PLASTIC PACKAGE
- ESD PROTECTION
- SUPPLIED IN TAPE & REEL OF 3K UNITS

#### DESCRIPTION

The PD55003L is a common source N-Channel, enhancement-mode lateral Field-Effect RF power transistor. It is designed for high gain, broadband commercial and industrial applications. It operates at 12 V in common source mode at frequencies of up to 1 GHz. PD55003L boasts the excellent gain, linearity and reliability of STH1LV latest LDMOS technology mounted in the innovative leadless SMD plastic package, PowerFLAT™.

PD55003L's superior linearity performance makes it an ideal solution for car mobile radio.



#### ABSOLUTE MAXIMUM RATINGS ( $T_{CASE} = 25\text{ }^{\circ}\text{C}$ )

Symbol	Parameter	Value	Unit
$V_{(BR)DSS}$	Drain-Source Voltage	40	V
$V_{GS}$	Gate-Source Voltage	-0.5 to +15	V
$I_D$	Drain Current	2.5	A
$P_{DISS}$	Power Dissipation (@ $T_c = 70\text{ }^{\circ}\text{C}$ )	14	W
$T_j$	Max. Operating Junction Temperature	150	$^{\circ}\text{C}$
$T_{STG}$	Storage Temperature	-65 to +150	$^{\circ}\text{C}$

#### THERMAL DATA

$R_{th(j-c)}$	Junction -Case Thermal Resistance	5.7	$^{\circ}\text{C/W}$
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# PD55003L

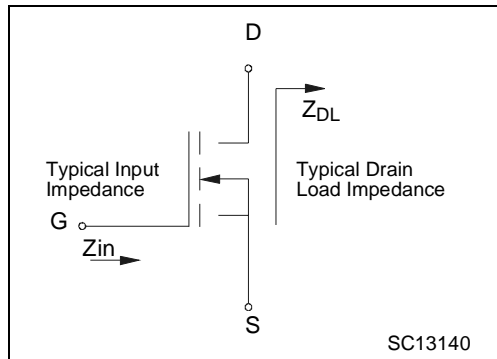
## ELECTRICAL SPECIFICATION (T<sub>CASE</sub> = 25 °C)

### STATIC

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
I <sub>DSS</sub>	V <sub>GS</sub> = 0 V	V <sub>DS</sub> = 28 V			1	μA
I <sub>GSS</sub>	V <sub>GS</sub> = 20 V	V <sub>DS</sub> = 0 V			1	μA
V <sub>GS(Q)</sub>	V <sub>DS</sub> = 10 V	I <sub>D</sub> = 50 mA	2.0		5.0	V
V <sub>DS(ON)</sub>	V <sub>GS</sub> = 10 V	I <sub>D</sub> = 0.5 A			0.36	V
G <sub>FS</sub>	V <sub>DS</sub> = 10 V	I <sub>D</sub> = 1 A		1.0		mho
C <sub>ISS</sub>	V <sub>GS</sub> = 0 V	V <sub>DS</sub> = 12.5 V		34		pF
C <sub>OSS</sub>	V <sub>GS</sub> = 0 V	V <sub>DS</sub> = 12.5 V		23		pF
C <sub>RSS</sub>	V <sub>GS</sub> = 0 V	V <sub>DS</sub> = 12.5 V		1.8		pF

### DYNAMIC

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
P <sub>1dB</sub>	V <sub>DD</sub> = 12.5 V	I <sub>DQ</sub> = 50 mA	f = 500 MHz	3		W
G <sub>P</sub>	V <sub>DD</sub> = 12.5 V	I <sub>DQ</sub> = 50 mA	P <sub>OUT</sub> = 3 W	17	19	dB
η <sub>D</sub>	V <sub>DD</sub> = 12.5 V	I <sub>DQ</sub> = 50 mA	P <sub>OUT</sub> = 3 W	50	52	%
Load mismatch	V <sub>DD</sub> = 15.5 V	I <sub>DQ</sub> = 50 mA	P <sub>OUT</sub> = 3 W	20:1		VSWR
	ALL PHASE ANGLES					



### IMPEDANCE DATA

FREQ. MHz	Z <sub>IN</sub> (Ω)	Z <sub>DL</sub> (Ω)
480	1.79 - j 4.96	10.68 + j 7.45
500	1.88 - j 5.93	10.28 + j 8.92
520	2.10 - j 7.03	9.86 + j 10.18

### ESD PROTECTION CHARACTERISTICS

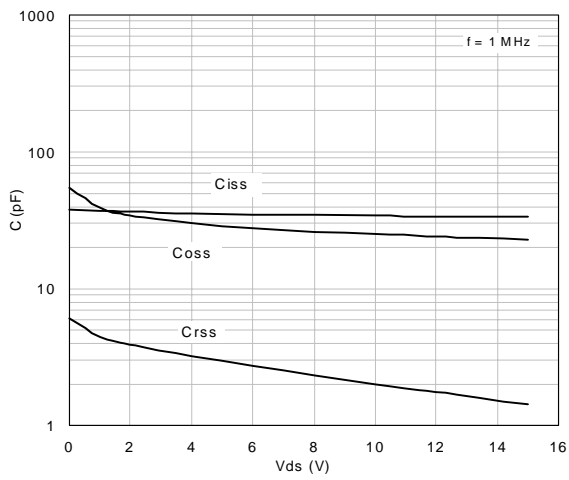
Test Conditions	Class
Human Body Model	2
Machine Model	M3

### MOISTURE SENSITIVITY LEVEL

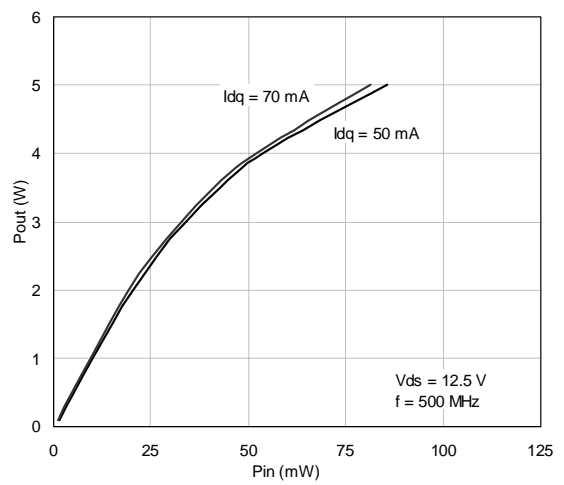
Test Methodology	Rating
J-STD-020B	MSL 3

TYPICAL PERFORMANCE

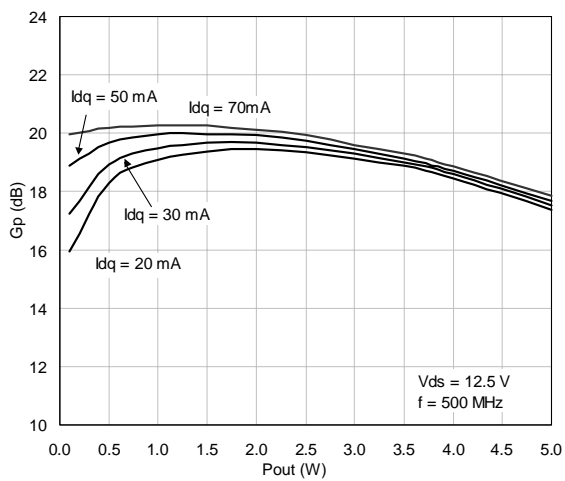
Capacitance Vs Supply Voltage



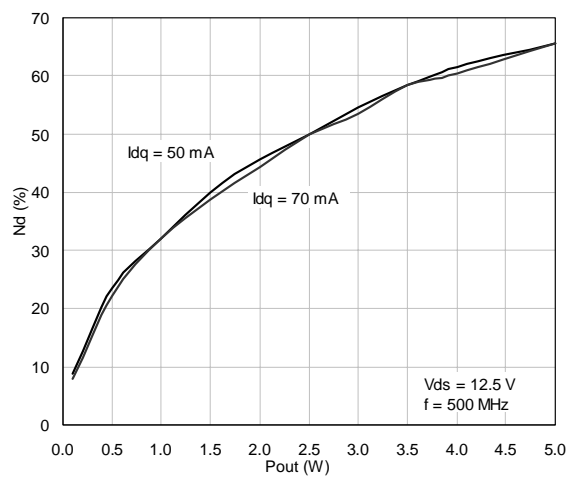
Output Power Vs Input Power



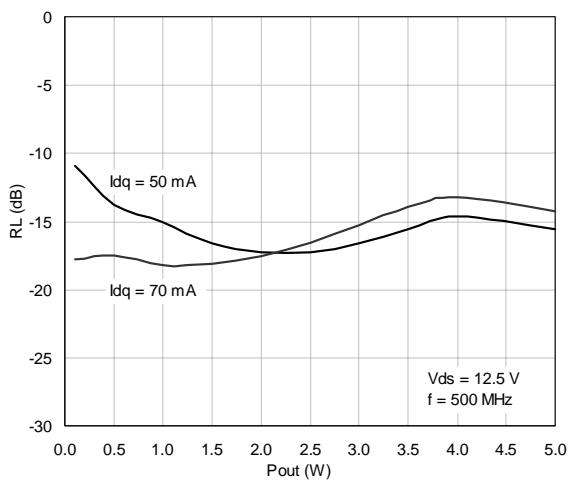
Power Gain Vs Output Power



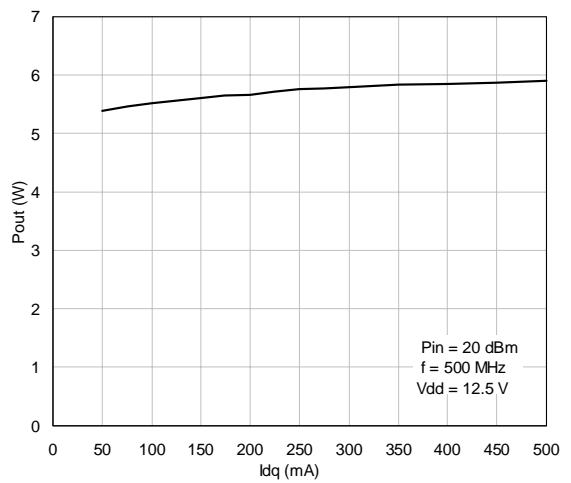
Efficiency Vs Output Power



Input Return Loss Vs Output Power



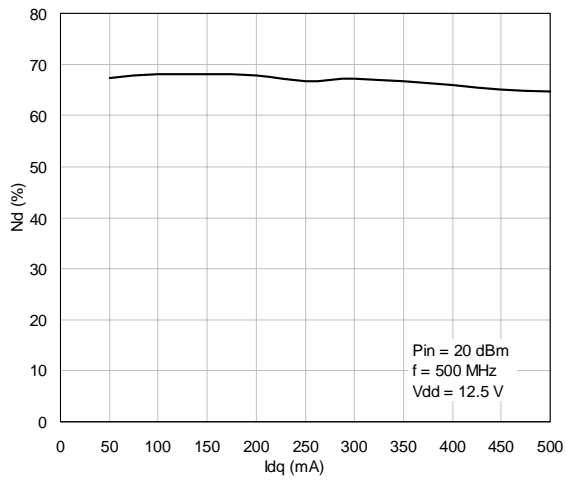
Output Power Vs Bias Current



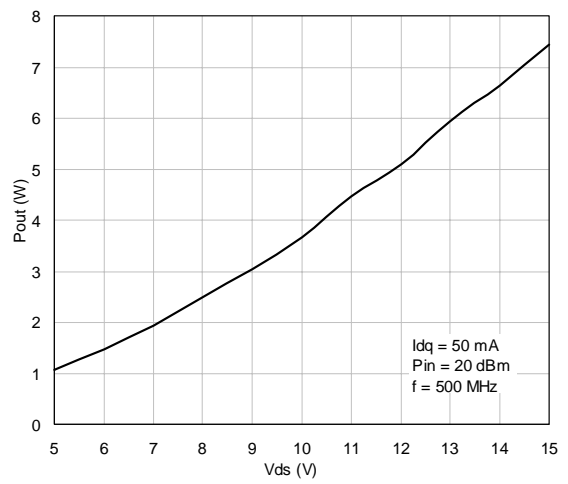
# PD55003L

## TYPICAL PERFORMANCE

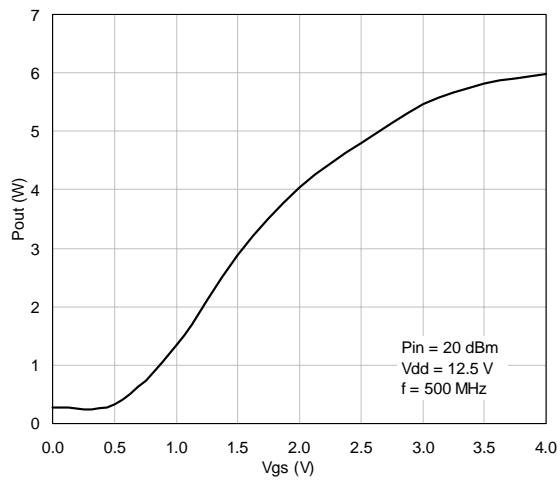
### Efficiency Vs Bias Current



### Output Power Vs Supply Voltage

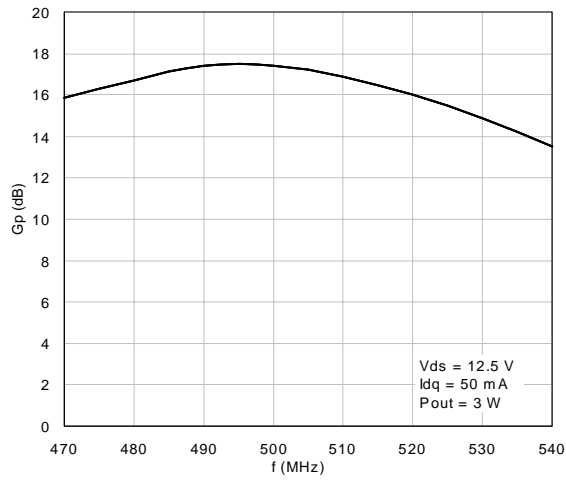


### Output Power Vs Gate-Source Voltage

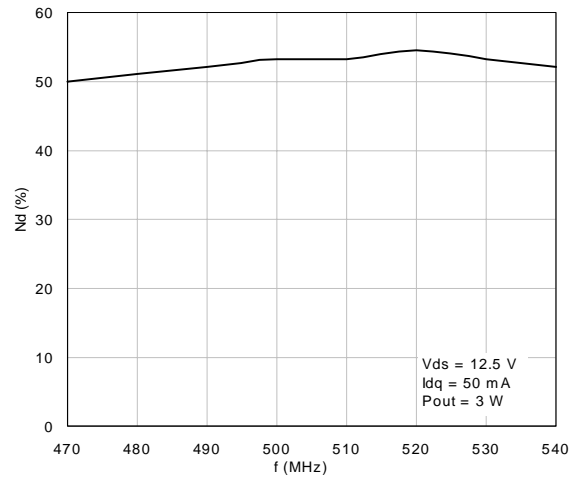


TYPICAL PERFORMANCE (BROADBAND)

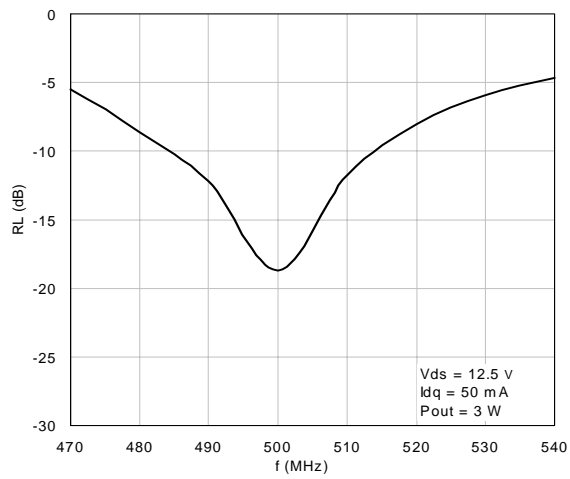
Power Gain Vs Frequency



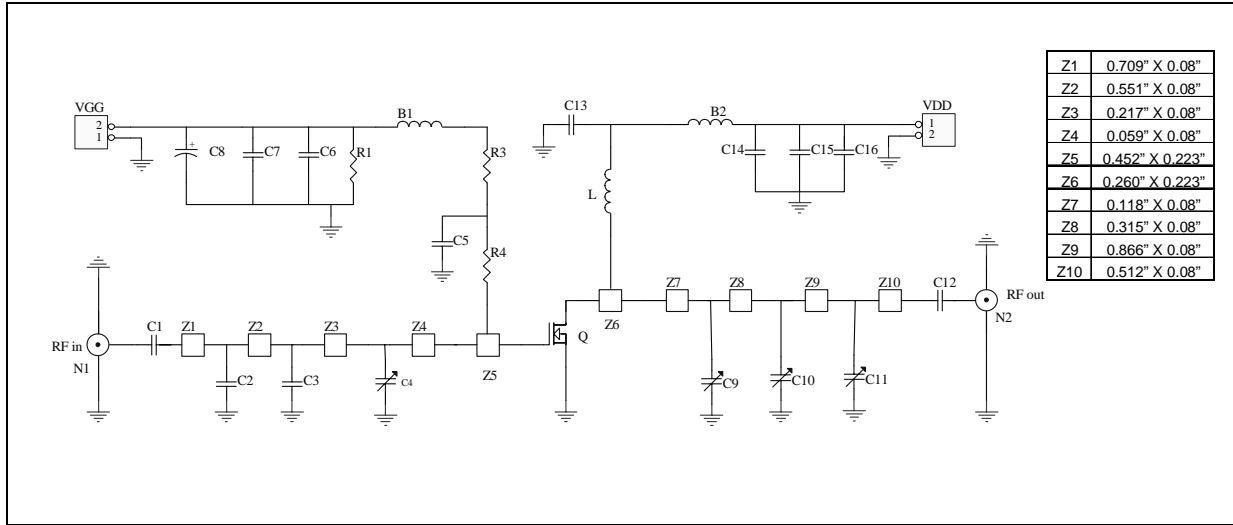
Efficiency Vs Frequency



Return Loss Vs Frequency



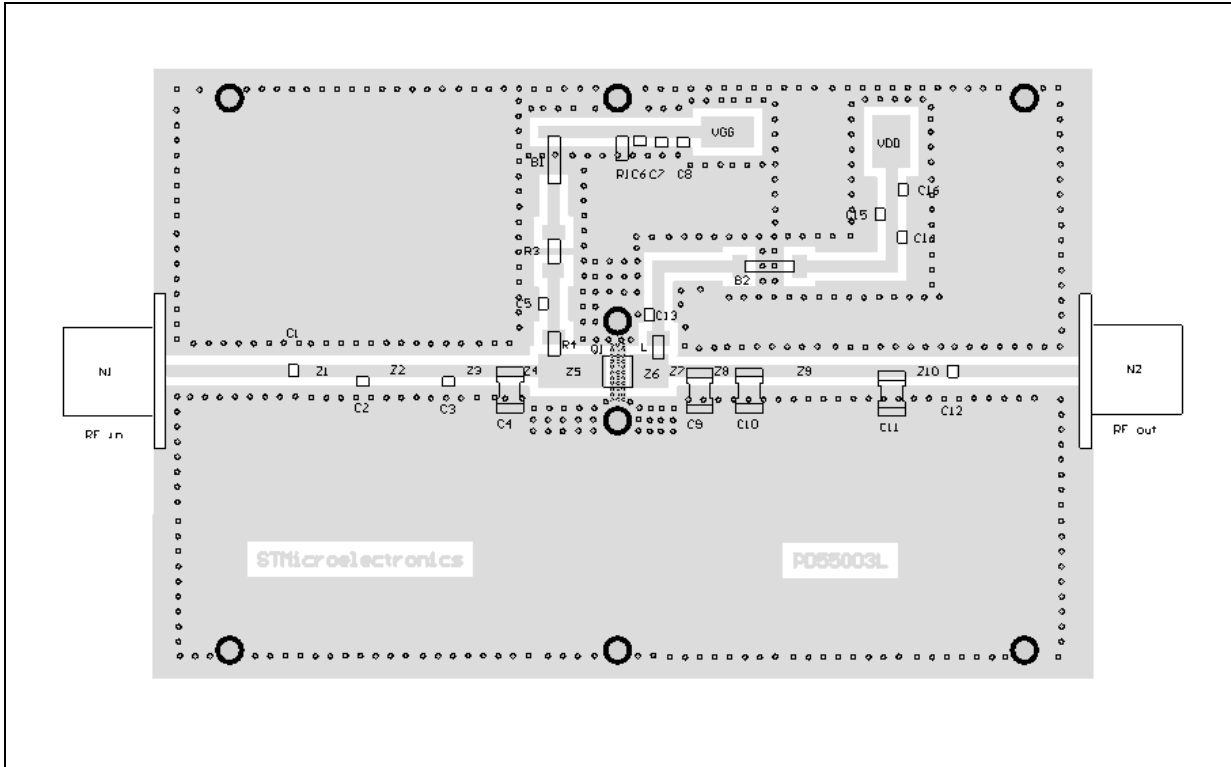
TEST CIRCUIT SCHEMATIC



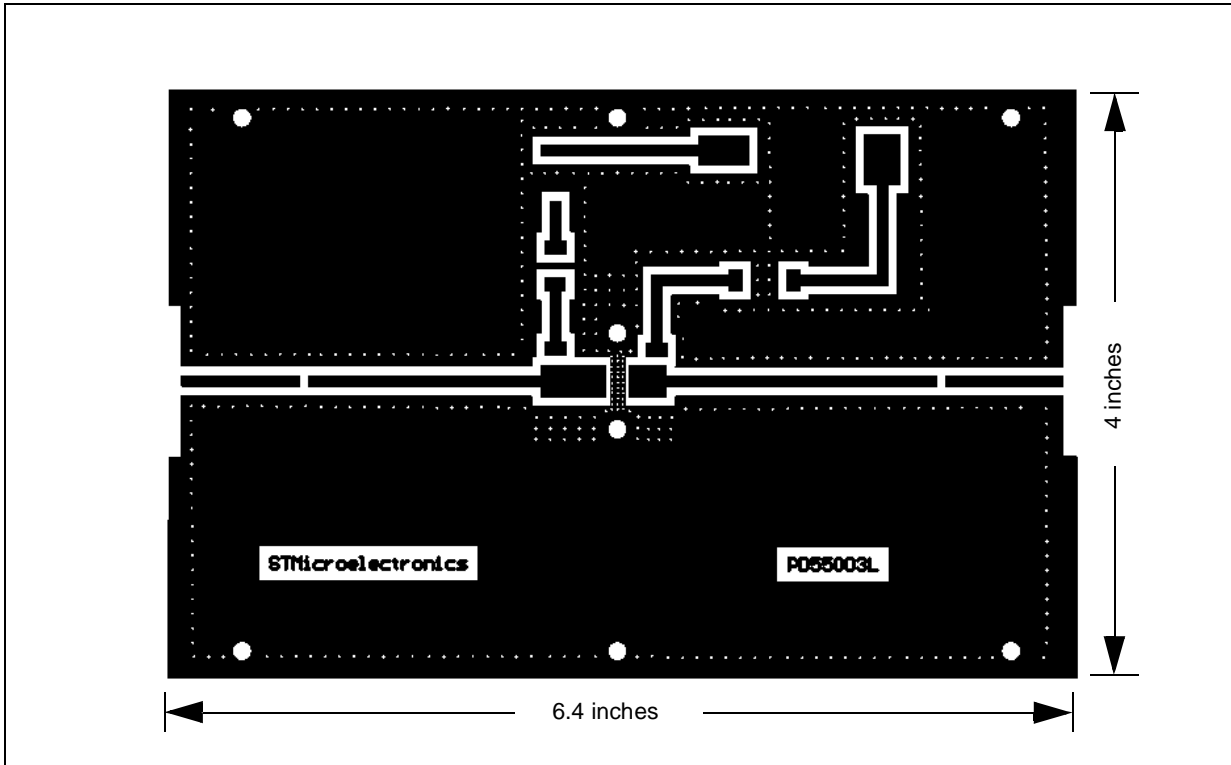
TEST CIRCUIT COMPONENT PART LIST

COMPONENT	DESCRIPTION
B1,B2	FERRITE BEAD
C1,C12,	300pF, 100B ATC CHIP CAPACITOR
C2,C3	15pF 100B ATC CHIP CAPACITOR
C4, C9	0 -:- 20 pF VARIABLE CAPACITOR JOHANSON
C5, C13	120pF 100B ATC CHIP CAPACITOR
C6, C14	0.1 mF 100B ATC CHIP CAPACITOR
C7, C15	1200pF 100B ATC CHIP CAPACITOR
C8, C16	10uF, 35V, SMD ELECTROLYTIC CAPACITOR
C10	0.5 -:- 5 pF VARIABLE CAPACITOR JOHANSON
C11	0.8 -:- 10 pF VARIABLE CAPACITOR JOHANSON
R1	33 Kohm CHIP RESITOR 1W
R2, R3	15 ohm MELF RESITOR 1W
R4	1 Kohm CHIP RESITOR 1W
N1, N2	TYPE N FLANGE MOUNT
BOARD	ROGER ULTRA LAM 2000 THK 0.030" $\epsilon_r = 2.55$ 2OZ ED Cu BOTH SIDES

TEST CIRCUIT



TEST CIRCUIT PHOTOMASTER



**PD55003L****S-PARAMETER (PD55003L)** $(V_{DS} = 12.5V \quad I_{DS} = 0.15A)$ 

FREQ (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
50	0.808	-110	20.14	112	0.039	22	0.672	-109
100	0.772	-141	11.77	93	0.042	5	0.633	-138
150	0.771	-152	7.86	82	0.041	-5	0.642	-147
200	0.779	-157	5.80	73	0.040	-11	0.665	-151
250	0.794	-161	4.50	66	0.038	-17	0.694	-154
300	0.809	-163	3.62	60	0.035	-22	0.721	-155
350	0.824	-165	2.98	54	0.033	-26	0.750	-157
400	0.839	-166	2.50	49	0.031	-30	0.774	-159
450	0.853	-168	2.13	44	0.028	-32	0.796	-160
500	0.865	-169	1.83	40	0.025	-34	0.818	-161
550	0.874	-171	1.59	36	0.023	-36	0.837	-163
600	0.885	-172	1.39	33	0.021	-36	0.852	-164
650	0.894	-173	1.23	29	0.018	-37	0.867	-165
700	0.901	-174	1.10	26	0.016	-37	0.880	-166
750	0.906	-175	0.97	23	0.015	-36	0.890	-167
800	0.911	-176	0.88	20	0.012	-32	0.902	-169
850	0.916	-177	0.79	18	0.011	-28	0.909	-169
900	0.918	-178	0.72	15	0.010	-22	0.918	-171
950	0.922	-179	0.65	13	0.008	-13	0.922	-171
1000	0.925	180	0.59	11	0.007	-7	0.928	-172
1050	0.925	179	0.54	9	0.007	8	0.934	-173
1100	0.928	178	0.50	7	0.006	21	0.938	-174
1150	0.927	177	0.46	5	0.007	38	0.941	-175
1200	0.928	176	0.43	4	0.008	51	0.944	-176
1250	0.929	175	0.40	2	0.010	56	0.947	-176
1300	0.927	175	0.37	1	0.011	61	0.953	-177
1350	0.927	174	0.34	-1	0.011	65	0.951	-178
1400	0.925	173	0.32	-2	0.012	68	0.952	-178
1450	0.922	172	0.30	-4	0.014	72	0.954	-179
1500	0.922	172	0.28	-5	0.016	73	0.957	-180



**S-PARAMETER (PD55003L)**(V<sub>DS</sub> = 12.5V I<sub>DS</sub> = 0.8A)

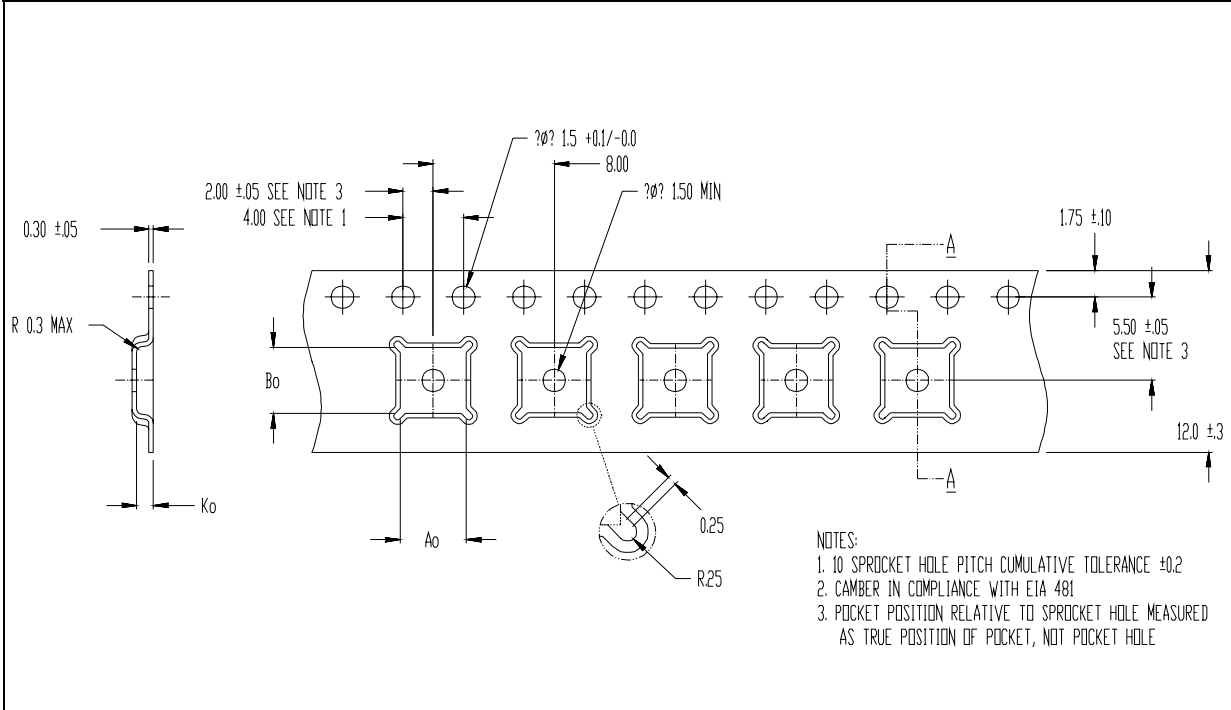
FREQ (MHz)	S <sub>11</sub>	∠S <sub>11</sub> Φ	S <sub>21</sub>	∠S <sub>21</sub> Φ	S <sub>12</sub>	∠S <sub>12</sub> Φ	S <sub>22</sub>	∠S <sub>22</sub> Φ
50	0.841	-124	22.20	107	0.029	21	0.651	-130
100	0.800	-150	12.84	92	0.031	6	0.654	-153
150	0.800	-159	8.59	83	0.031	-2	0.666	-159
200	0.803	-163	6.38	76	0.030	-8	0.684	-161
250	0.812	-166	5.00	70	0.028	-11	0.702	-163
300	0.822	-168	4.07	64	0.027	-15	0.721	-163
350	0.830	-169	3.39	59	0.025	-17	0.740	-164
400	0.837	-170	2.87	55	0.024	-20	0.760	-165
450	0.848	-172	2.47	50	0.022	-23	0.777	-166
500	0.857	-172	2.15	46	0.020	-23	0.795	-166
550	0.866	-174	1.89	42	0.018	-25	0.813	-167
600	0.874	-174	1.67	39	0.017	-23	0.825	-168
650	0.882	-175	1.49	35	0.015	-24	0.839	-168
700	0.887	-176	1.33	32	0.013	-22	0.853	-169
750	0.893	-177	1.19	29	0.012	-16	0.863	-170
800	0.898	-178	1.08	26	0.011	-15	0.875	-171
850	0.903	-179	0.98	23	0.010	-11	0.885	-172
900	0.904	-180	0.89	21	0.009	-1	0.893	-173
950	0.909	179	0.82	19	0.008	7	0.901	-173
1000	0.911	179	0.75	16	0.008	16	0.904	-174
1050	0.914	178	0.69	14	0.008	27	0.911	-175
1100	0.916	177	0.64	12	0.008	35	0.916	-175
1150	0.917	176	0.59	10	0.009	43	0.919	-176
1200	0.917	176	0.55	8	0.010	48	0.923	-177
1250	0.918	175	0.51	6	0.010	57	0.929	-177
1300	0.917	174	0.47	5	0.012	62	0.929	-178
1350	0.917	173	0.44	3	0.013	63	0.934	-179
1400	0.914	173	0.42	1	0.013	67	0.936	-179
1450	0.912	172	0.39	0	0.015	71	0.938	-180
1500	0.911	171	0.36	-2	0.016	72	0.941	179

**PD55003L****S-PARAMETER (PD55003L)** $(V_{DS} = 12.5V \quad I_{DS} = 1.5A)$ 

FREQ (MHz)	$ S_{11} $	$\angle S_{11}$	$ S_{21} $	$\angle S_{21}$	$ S_{12} $	$\angle S_{12}$	$ S_{22} $	$\angle S_{22}$
50	0.837	-114	18.43	111	0.030	24	0.588	-132
100	0.799	-143	10.49	93	0.033	6	0.632	-152
150	0.801	-154	6.99	82	0.032	-3	0.656	-158
200	0.809	-159	5.15	74	0.031	-9	0.680	-160
250	0.823	-163	4.00	67	0.029	-14	0.701	-162
300	0.835	-165	3.22	61	0.028	-18	0.726	-163
350	0.845	-167	2.66	56	0.025	-20	0.750	-164
400	0.855	-169	2.23	52	0.024	-24	0.768	-165
450	0.866	-170	1.91	47	0.022	-26	0.789	-166
500	0.876	-171	1.65	43	0.020	-24	0.812	-167
550	0.882	-173	1.44	39	0.018	-25	0.828	-167
600	0.892	-174	1.26	36	0.016	-25	0.836	-168
650	0.898	-175	1.12	33	0.015	-25	0.844	-169
700	0.903	-176	1.00	29	0.013	-20	0.857	-170
750	0.907	-177	0.90	27	0.011	-17	0.868	-171
800	0.909	-178	0.81	24	0.010	-10	0.883	-171
850	0.912	-179	0.73	21	0.009	-6	0.889	-172
900	0.915	-180	0.67	19	0.009	1	0.894	-173
950	0.917	179	0.61	17	0.008	17	0.905	-174
1000	0.917	178	0.56	15	0.008	24	0.907	-174
1050	0.918	178	0.51	13	0.008	32	0.908	-175
1100	0.920	177	0.47	11	0.009	40	0.912	-176
1150	0.920	176	0.44	9	0.010	48	0.919	-177
1200	0.920	175	0.41	7	0.010	57	0.922	-177
1250	0.919	174	0.38	6	0.012	59	0.926	-178
1300	0.919	174	0.35	4	0.013	61	0.931	-179
1350	0.918	173	0.33	3	0.014	63	0.928	-179
1400	0.917	172	0.31	1	0.015	68	0.929	-180
1450	0.914	172	0.29	0	0.016	70	0.933	180
1500	0.912	171	0.27	-1	0.018	71	0.935	179

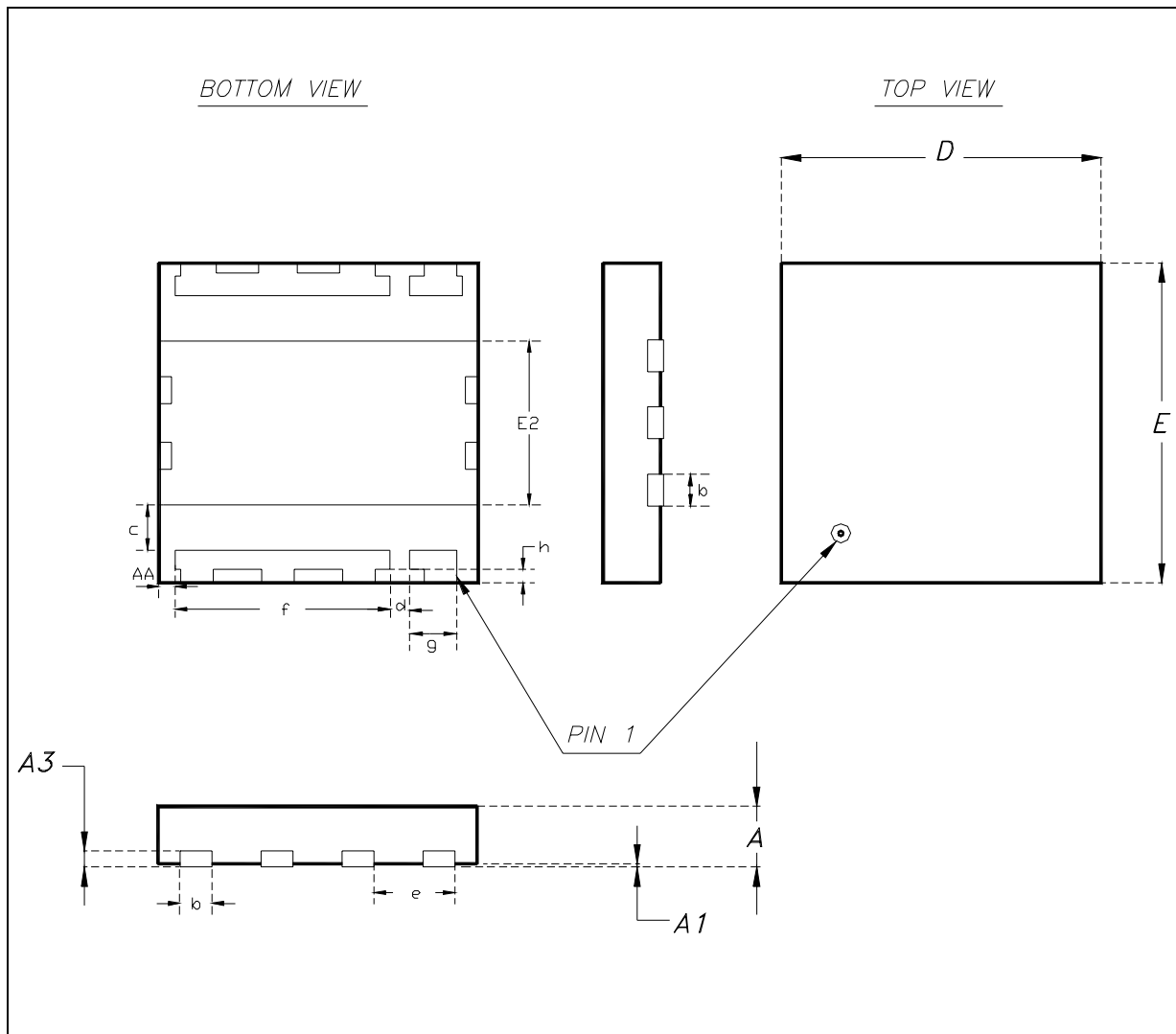
PowerFLAT™ TAPE & REEL DIMENSIONS

	mm		
	MIN.	TYP.	MAX
Ao	5.15	5.25	5.35
Bo	5.15	5.25	5.35
Ko	1.0	1.1	1.2



PowerFLAT™ MECHANICAL DATA

DIM.	mm			Inch		
	MIN.	TYP.	MAX	MIN.	TYP.	MAX
A		0.90	1.00		0.035	0.039
A1		0.02	0.05		0.001	0.002
A3		0.24			0.009	
AA	0.15	0.25	0.35	0.006	0.01	0.014
b	0.43	0.51	0.58	0.017	0.020	0.023
c	0.64	0.71	0.79	0.025	0.028	0.031
D		5.00			0.197	
d		0.30			0.011	
E		5.00			0.197	
E2	2.49	2.57	2.64	0.098	0.101	0.104
e		1.27			0.050	
f		3.37			0.132	
g		0.74			0.03	
h		0.21			0.008	



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