DB-55008L-318

RF power amplifier using 1 x PD55008L-E N-channel enhancement-mode lateral MOSFETs

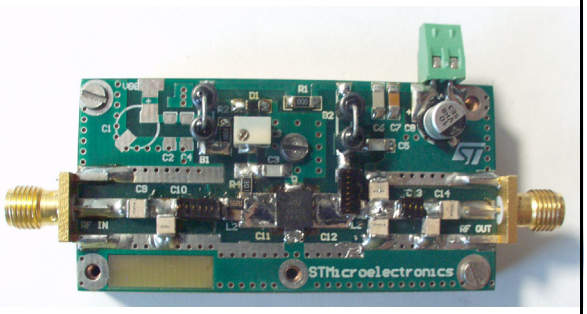
Preliminary Data

Features

- Excellent thermal stability
- Frequency: 225 - 318 MHz
- Supply voltage: 13.6 V
- Output power: 8 W
- Power gain: 13.5 ± 0.7 dB
- Efficiency: 51 % - 79 %
- BeO free amplifier

Description

The DB-55008L-318 is a common source N-channel enhancement-mode lateral field effect RF power amplifier designed for VHF SEISMIC applications.



Mechanical specification:
L = 60 mm, W = 30 mm

Table 1. Device summary

Order codes
DB-55008L-318

Contents

1 Electrical data

1.1 Maximum ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DD}	Supply voltage	13.6	V
I_D	Drain current	1.5	A
T_{CASE}	Operating case temperature	+20 to +85	°C
T_A	Max. ambient temperature	+55	°C

2 Electrical characteristics

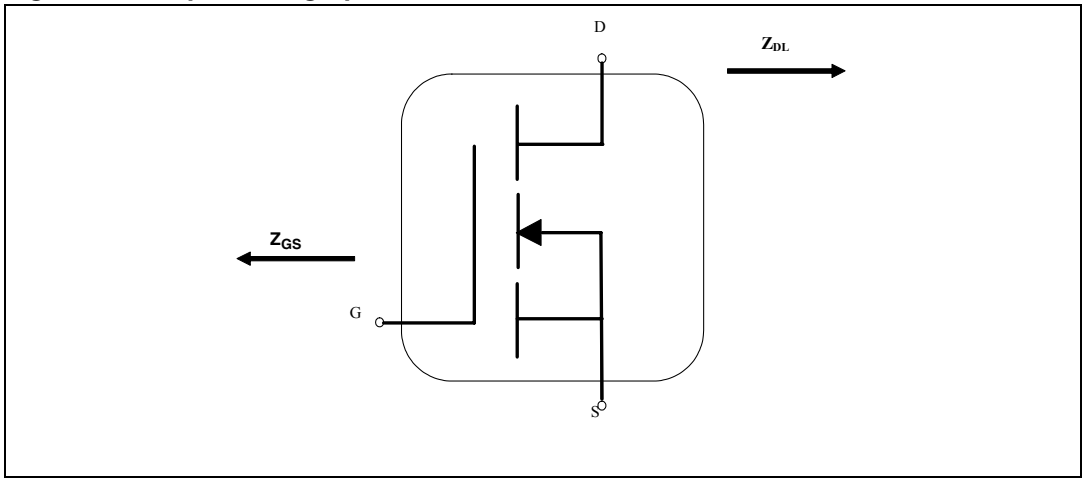
T_A = +25 °C, V_{DD} = 13.6 V, I_{dq} = 200 mA, unless otherwise specified

Table 3. RF data

Symbol	Parameters	Test conditions	Min	Typ	Max	Unit
f	Frequency range		225		318	MHz
P_{out}	Output power	P_{IN} = 26 dBm	7	8		W
G_p	Power gain	P_{IN} = 26 dBm		13.5 ± 0.7		dB
N_D	Efficiency	P_{IN} = 26 dBm		51 - 79		%
H2	2nd harmonic	P_{IN} = 26 dBm			-30	dBc
H3	3rd harmonic	P_{IN} = 26 dBm			-70	dBc

3 Impedance

Figure 1. Impedance graphic



Note: Optimum board impedances for which the DUT operates, at given DC bias and frequency band, to meet application requirements.

Table 4. Impedance data

f(MHz)	Z_{GS} (Ω)	Z_{DL} (Ω)
220	19.5 - j0.48	10.4 - j0.93
230	18.0 - j0.61	8.8 - j0.34
240	16.6 - j0.40	7.5 + j0.51
250	15.3 - j0.02	6.5 + j1.43
260	14.1 + j0.54	5.7 + j2.23
270	12.9 + j1.34	5.0 + j3.18
280	12.1 + j2.10	4.4 + j4.15
290	11.2 + j3.08	4.0 + j4.86
300	10.3 + j3.97	3.6 + j5.81
310	9.6 + j4.87	3.2 + j6.42
320	8.9 + j5.94	2.8 + j7.47

4 Typical performance

4.1 V_{DD} = 13.6 V, I_{DQ} = 200 mA, Pin = 26 dBm

Figure 2. Output power and efficiency vs frequency Vdd = 13.6 V, Idq = 200 mA, Pin = 26 dBm

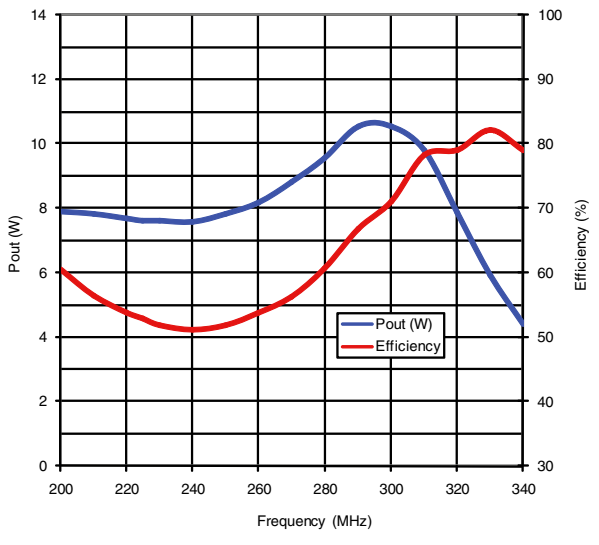


Figure 3. Gain vs frequency Vdd = 13.6 V, Idq = 200 mA, Pin = 26 dBm

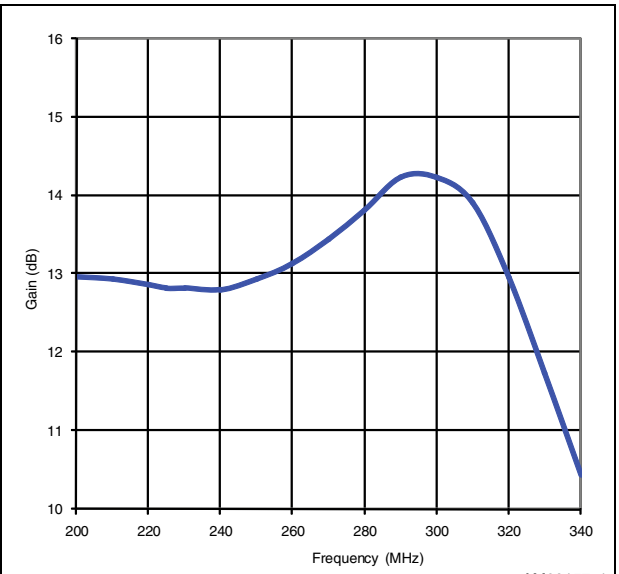


Figure 4. Gain vs output power Vdd = 13.6 V, Idq = 200 mA

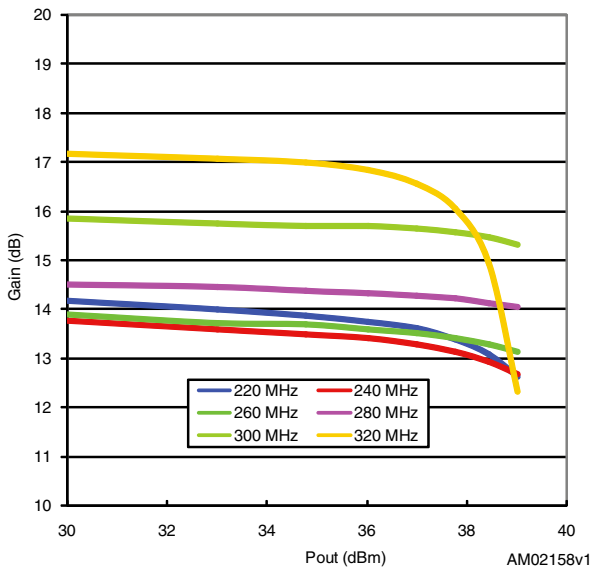


Figure 5. Input return loss vs frequency Vdd = 13.6V, Idq = 20 mA, Pin = 26 dBm

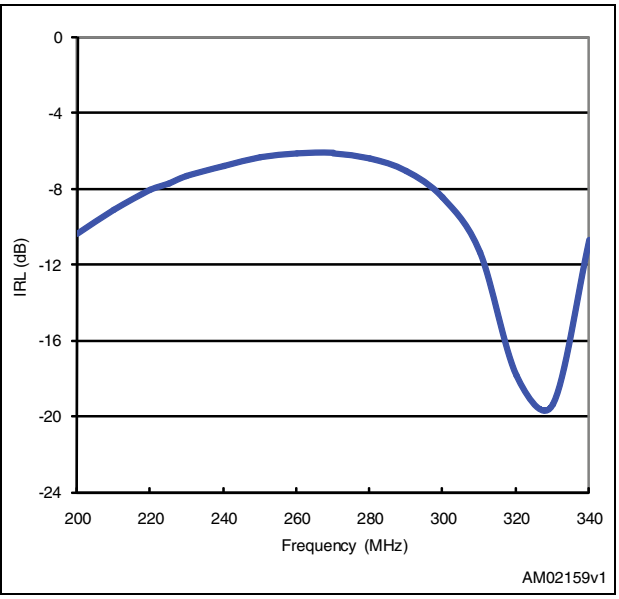
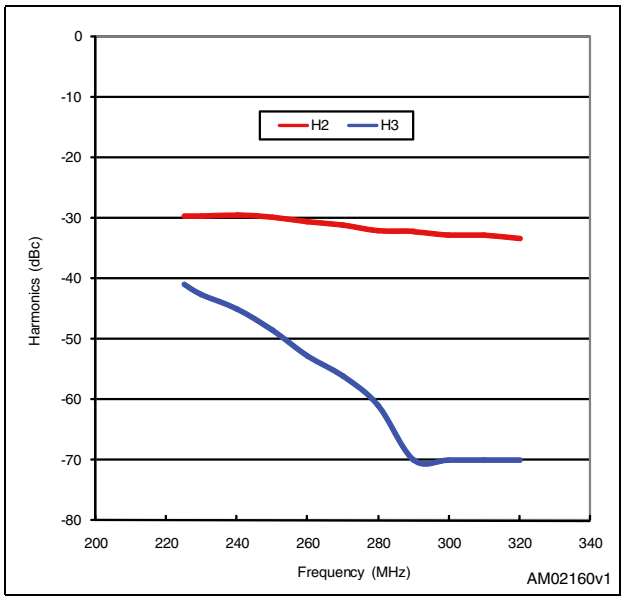


Figure 6. Harmonics vs frequency
Vdd = 13.6 V, Idq = 200 mA,
Pin = 26 dBm



5 Test circuit

Table 5. Test circuit schematic

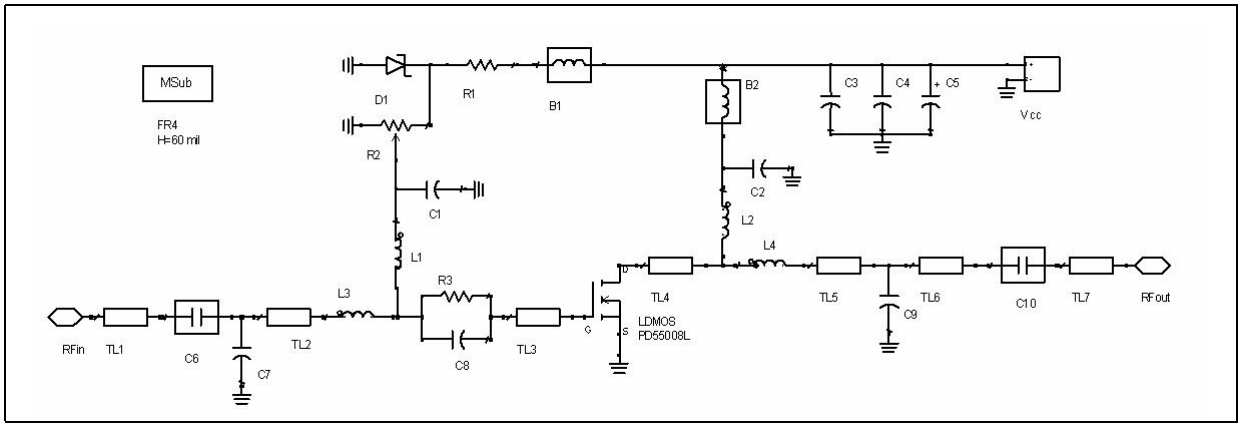


Table 6. Components part list for DB-55008L-318

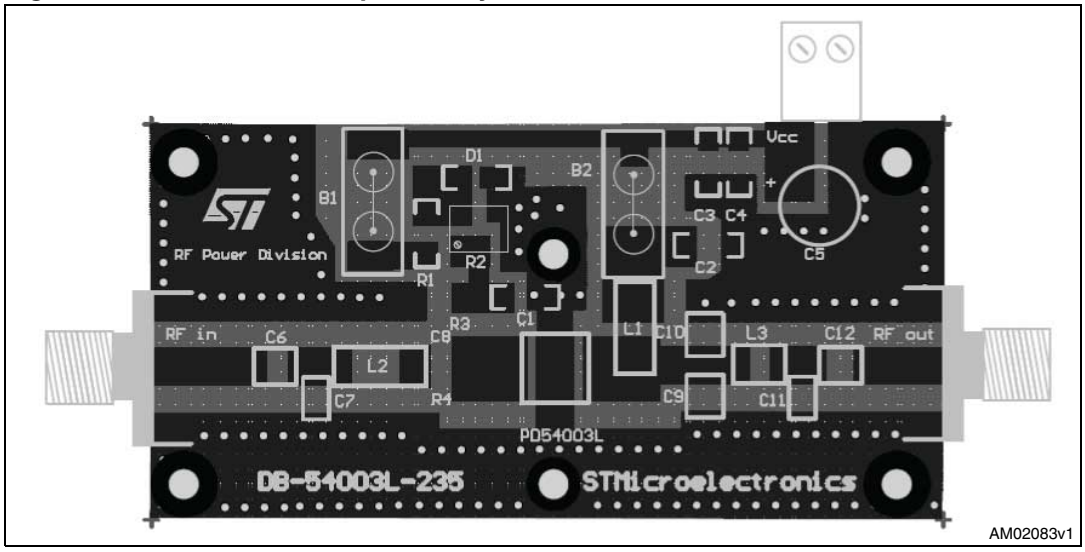
Component ID	Description	Value	Case size	Manufacturer	Part code
B1	Ferrite bead			Panasonic	EXCELDRC35C
B2	Ferrite bead			Panasonic	EXCELDRC35C
C1, C2	Capacitor	120 pF	1206	Murata	GRM42-6 COG 151J 50_
C3	Capacitor	1 pF	1206	Murata	GRM42-6 COG 102J 50
C4	Capacitor	10 pF	1206	Murata	GRM42-6_X7R 104K 50_
C5	Capacitor	10 µF	SMT	Panasonic	EEVHB1V100P
C6, C10	Capacitor	240 pF	100B	ATC	ATC 100B 241JW
C7	Capacitor	20 pF	100B	ATC	ATC 100B 200 JW
C8	Capacitor	47 pF	100B	Murata	GRM42-6 COG
C9	Capacitor	30 pF	100B	ATC	ATC 100B 300 JW
D1	Zener Diode	5.1 V	SOD110	Philips	BZX284C5V1
L1, L2	Inductor	17,5 nH		Coilcraft	B06T
L3	Inductor	12,5 nH		Coilcraft	A04T
L4	Inductor	8 nH		Coilcraft	A03T
R1	Resistor	1 kΩ	1206	Tyco electronics	01623440-1
R2	Potentiometer	10 kΩ		Bourns electronics	3214W-1-103E
R3	Resistor	15 Ω	1206	Bourns electronics	

Table 6. Components part list for DB-55008L-318 (continued)

Component ID	Description	Value	Case size	Manufacturer	Part code
TL1	Transmission line	W=2.87 mm	L=7.4 mm		
TL2		W=2,87 mm	L=3,5 mm		
TL3		W=4.98 mm	L=4,8 mm		
TL4		W=4.98 mm	L=4.0 mm		
TL5		W=2,87 mm	L=1,0 mm		
TL6		W=2.87 mm	L=5,4 mm		
TL7		W=2.87 mm	L=6.7 mm		
PD55008L	LDMOS			STMicroelectronics	PD55008L-E
Board	FR-4 THk = 0.060" 2 OZ Cu both sides				

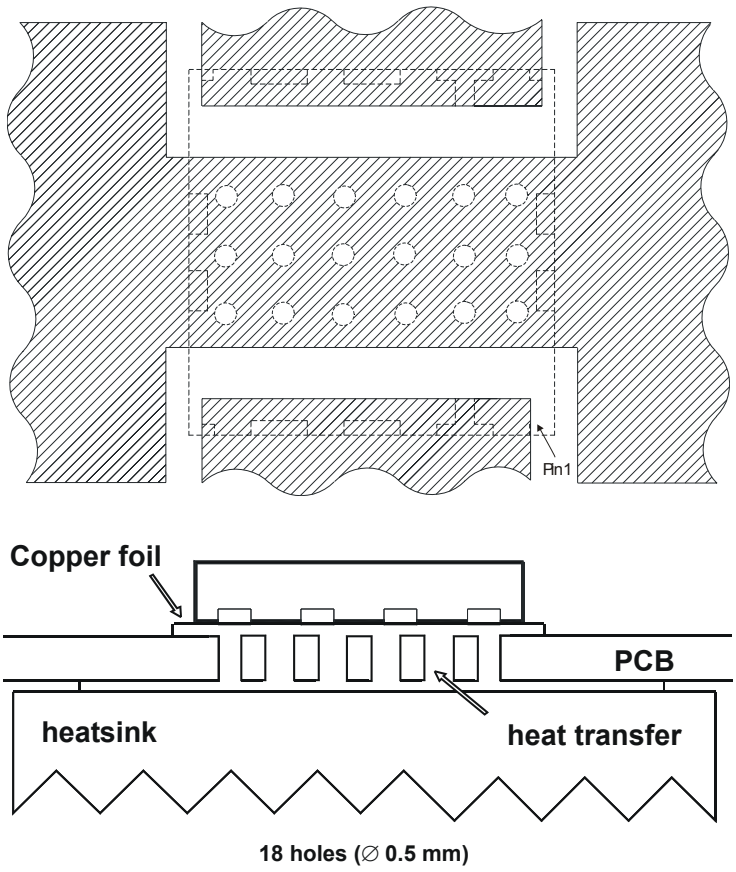
6 Circuit layout

Figure 7. Test fixture component layout



7 Mounting indications

Figure 8. Standard SMD mounting



8 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

Table 7. 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	

Figure 9. PowerFLAT™ package dimensions

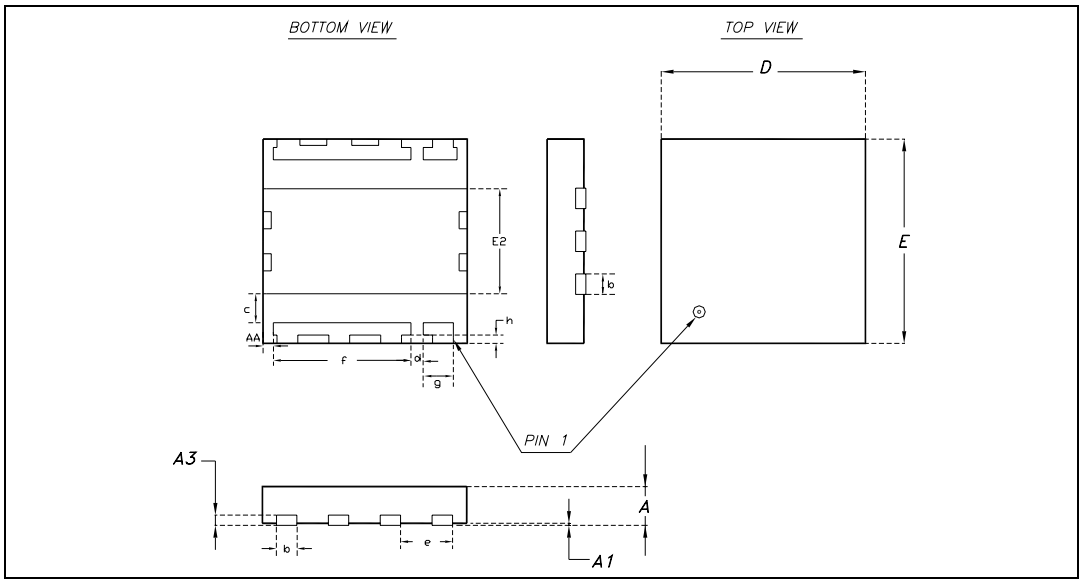
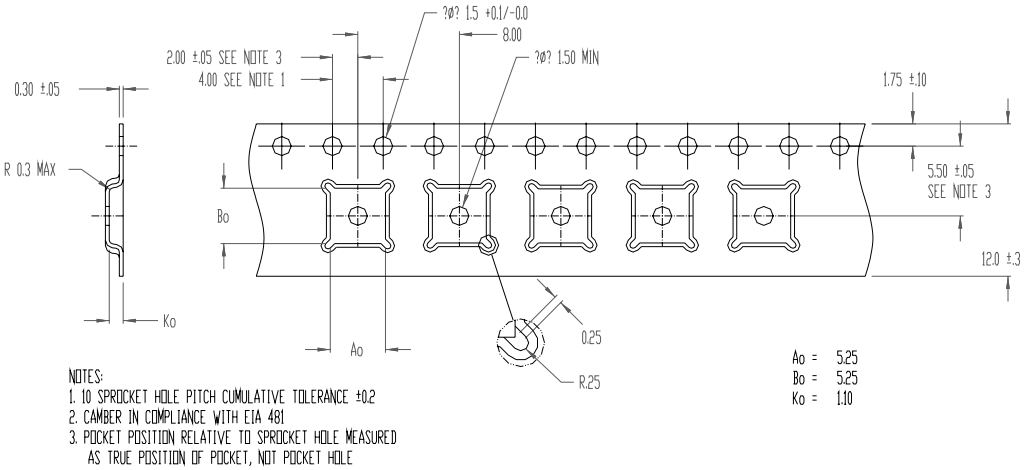


Table 8. PowerFLAT™ tape and reel dimensions

Dim.	mm.			inch		
	Min	Typ	Max	Min	Typ	Max
Ao	5.15	5.25	5.35	0.12	0.13	0.13
Bo	5.15	5.25	5.35	0.12	0.13	0.13
Ko	1.0	1.1	1.2	0.02	0.02	0.02

Figure 10. PowerFLAT™ tape and reel



9 Revision history

Table 9. Document revision history

Date	Revision	Changes
20-Feb-2009	1	First release

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