DB-55008L-450

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

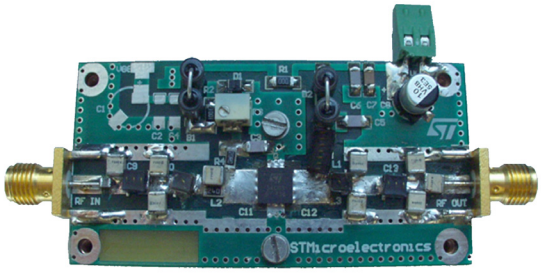
Preliminary Data

Features

- Excellent thermal stability
- Frequency: 318 - 450 MHz
- Supply voltage: 13.6 V
- Output power: 8 W
- Power gain: 14.6 ± 0.6 dB
- Efficiency: 52 % - 73 %
- BeO free amplifier

Description

The DB-55008L-450 is a common source N-channel enhancement-mode lateral field effect RF power amplifier designed for UHF mobile applications.



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

Table 1. Device summary

Order codes
DB-55008L-450

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		318		450	MHz
P_{out}	Output power		7	8		W
G_p	Power gain	P_{IN} = 25 dBm		14.6 ± 0.6		dB
N_D	Efficiency	P_{IN} = 25 dBm		52 - 73		%
H2	2nd harmonic	P_{IN} = 25 dBm			-30	dBc
H3	3rd harmonic	P_{IN} = 25 dBm			-55	dBc

3 Impedance

Figure 1. Impedance graphic

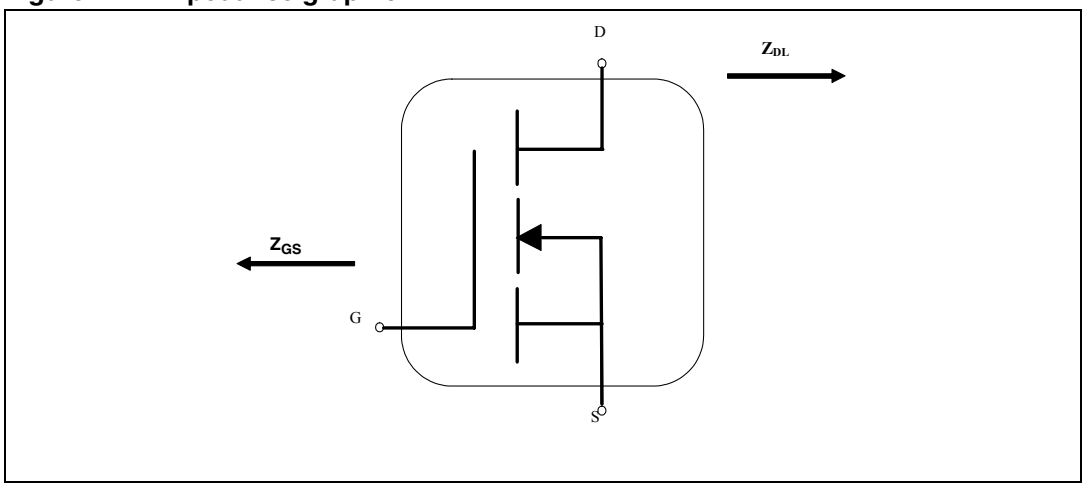


Table 4. Impedance data

f(MHz)	Z_{GS} (Ω)	Z_{DL} (Ω)
310	5.33 + j1.67	3.79 + j4.78
330	5.26 + j2.74	3.87 + j5.75
350	5.54 + j3.39	4.29 + j6.45
370	6.18 + j3.81	5.06 + 7.10
390	6.29 + j3.42	5.57 + j7.07
410	5.26 + j3.00	5.57 + j6.63
430	3.82 + j3.53	4.90 + j6.11
450	2.45 + j4.87	3.30 + j3.39
470	1.75 + j6.52	2.21 + j7.40

4 Typical performance

4.1 V_{DD} = 13.6 V, I_{DQ} = 200 mA, P_{IN} = 25 dBm

Figure 2. Gain vs frequency

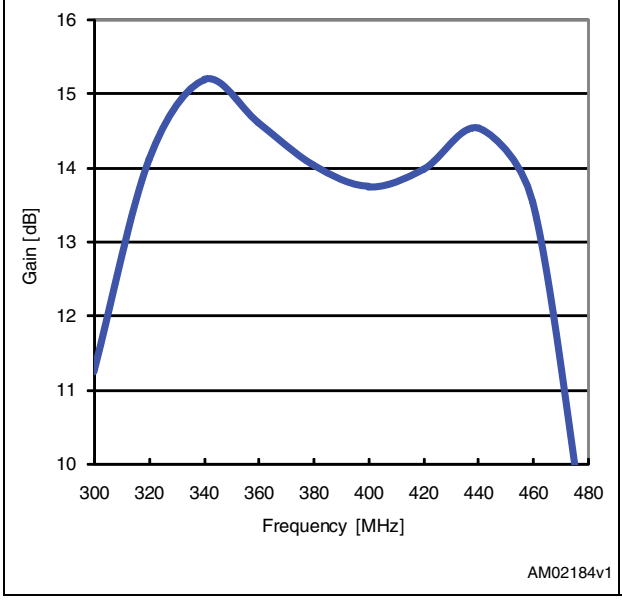


Figure 3. Pout and efficiency vs frequency

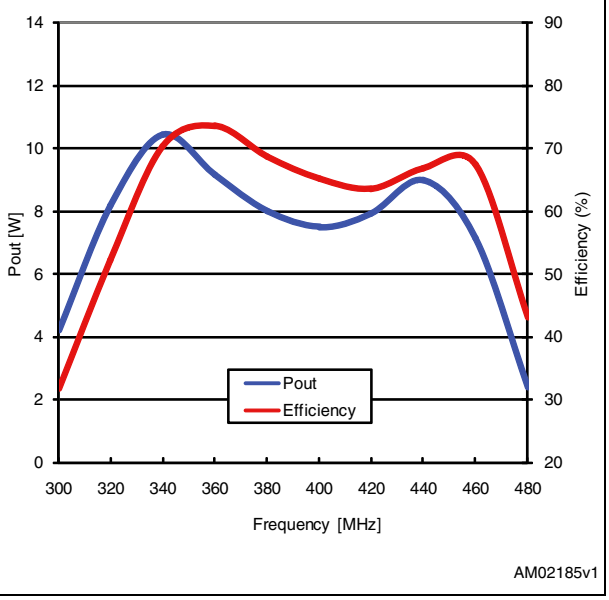


Figure 4. Input return loss vs frequency

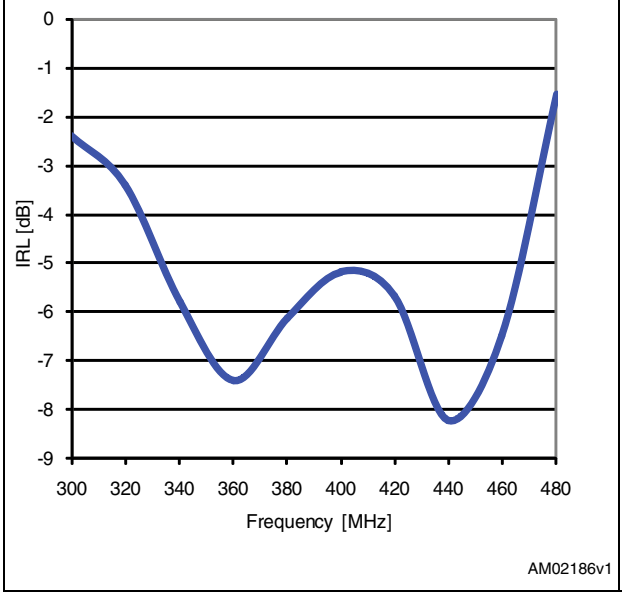


Figure 5. Harmonics vs frequency, Pout = 8 W

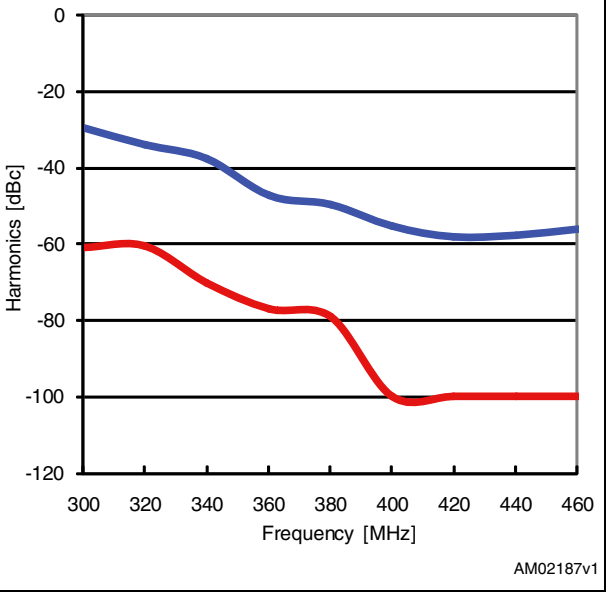
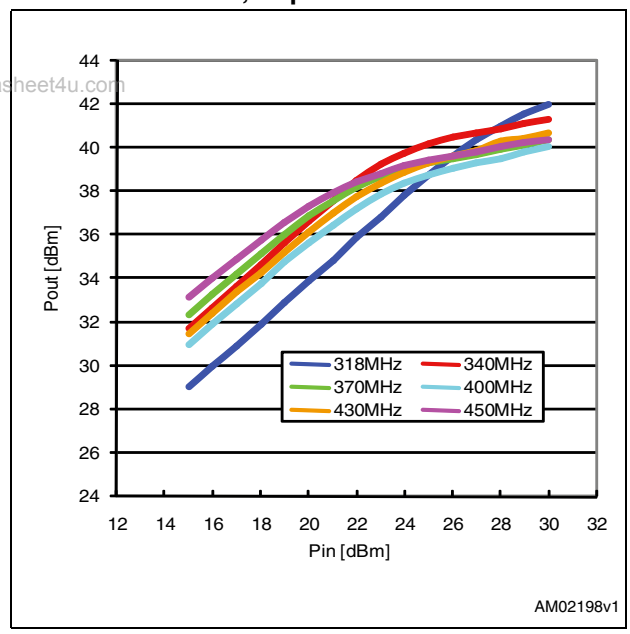


Figure 6. Output power vs input power_Vdd = 13.6 V, Idq = 200 mA



5 Test circuit

Table 5. Test circuit schematic

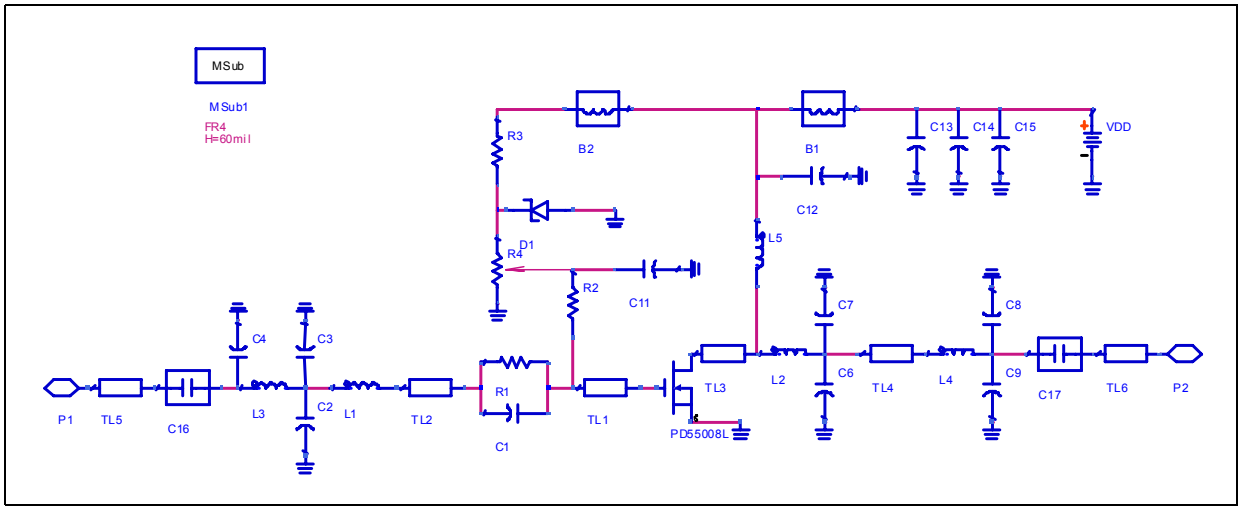


Table 6. Components part list for DB-55008L-450

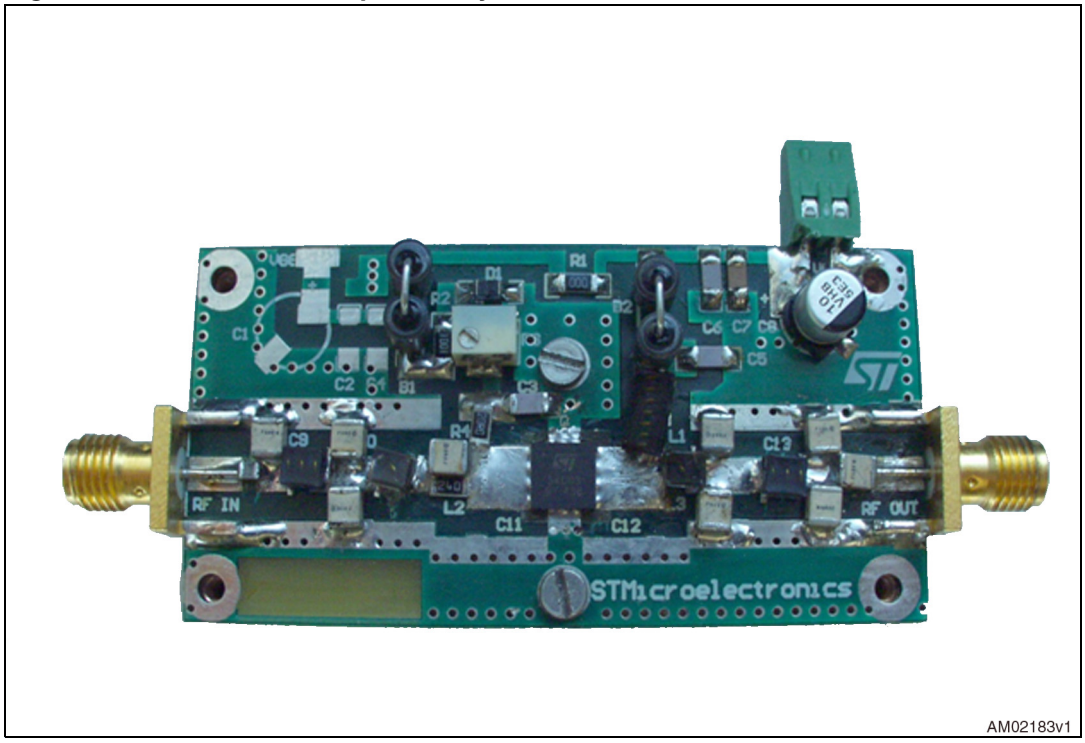
Component ID	Description	Value	Case size	Manufacturer	Part code
B1	Ferrite Bead			Panasonic	EXCELDRC35C
B2	Ferrite Bead			Panasonic	EXCELDRC35C
C1	Capacitor	56 pF	100B	ATC	ATC 100B 560JW
C2,C3	Capacitor	30 pF	100B	ATC	ATC 100B 330JW
C4	Capacitor	20 pF	100B	Murata	ATC 100B 200JW
C6, C7	Capacitor	27 pF	100B	ATC	ATC 100B 270JW
C8	Capacitor	6.8 pF	100B	ATC	ATC 100B 6R8CW
C9	Capacitor	10 pF	100B	ATC	ATC 100B 100JW
C11,C12	Capacitor	120 pF	1206	Murata	GRM42-6C0G121J50
C13	Capacitor	1 nF	1206	Murata	GRM42-6C0G102J50
C14	Capacitor	10 nF	1206	Murata	GRM42-6X7R103K50
C15	Capacitor	10 µF	SMT	Panasonic	EEVHB1V100P
C16	Capacitor	270 pF	100A	ATC	700A271KW150X
C17	Capacitor	220 pF	100B	ATC	ATC 100B 221FW
L1,L2	Inductor	2.5 nH		Coilcraft	A01TJ
L3,L4	Inductor	8 nH		Coilcraft	A03TJ
L5	Inductor	22 nH		Coilcraft	B07TJ
R1	Resistor	24 Ω	1206	Tyco electronics	01623440-1
R2	Resistor	20 Ω	1206	Tyco electronics	01623440-1
R3	Resistor	1kΩ	1206	Tyco electronics	01623440-1

Table 6. Components part list for DB-55008L-450 (continued)

Component ID	Description	Value	Case size	Manufacturer	Part code
R4	Potentiometer	10 kΩ		BOURNS ELECTRONICS	3214W-1-103E
D1	Zener diode	5.1 V		PHILIPS	BZX284C5V1
TL1	Transmission line		W=4.98 mm,L=5.6 mm		
TL2			W=2.8 mm,L=1.3 mm		
TL3			W=4.98 mm,L=5.5 mm		
TL4			W=2.8 mm,L=1.7 mm		
TL5			W=2.8 mm,L=4.6 mm		
TL6			W=2.8 mm,L=4.6 mm		
PD55008L	LDMOS			STMicroelectronics	PD55008L-E
Board	FR-4 THk=0.060" 2OZ Cu both sides				

6 Circuit layout

Figure 7. Test fixture component layout



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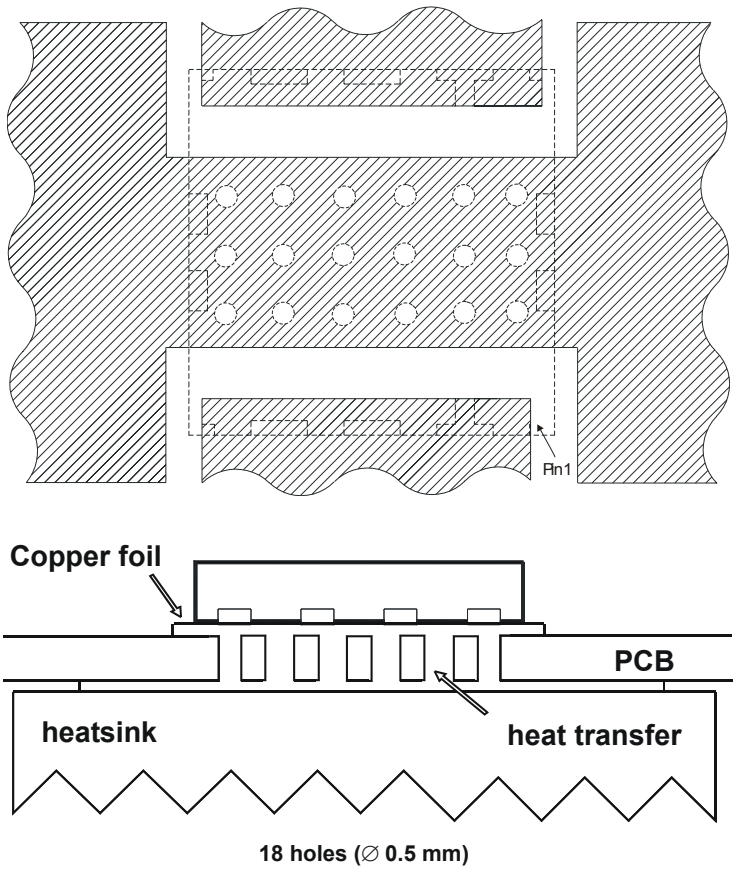
7 Mounting indications

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

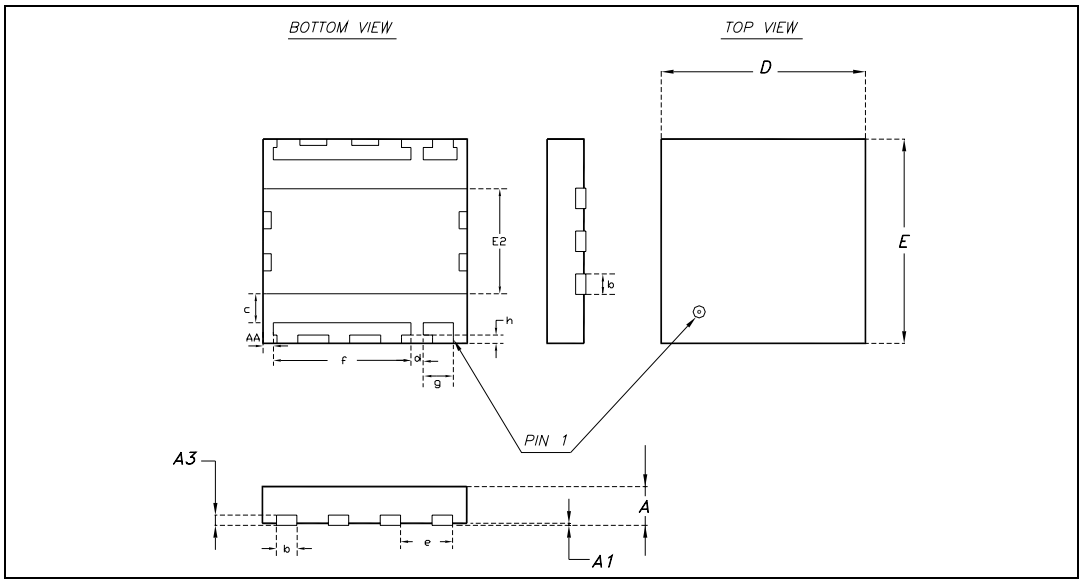
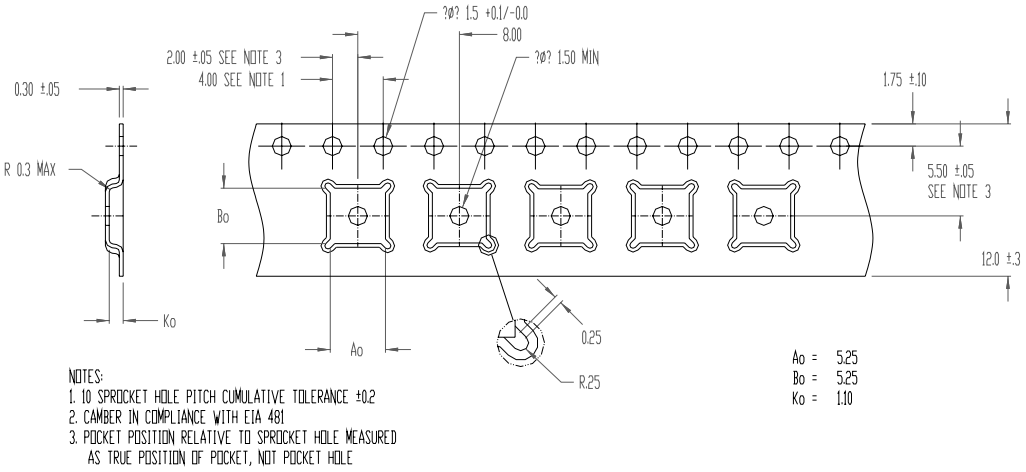


Table 8. PowerFLAT™ tape and reel dimensions

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
18-Mar-2009	1	First release

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