DB-85015-940

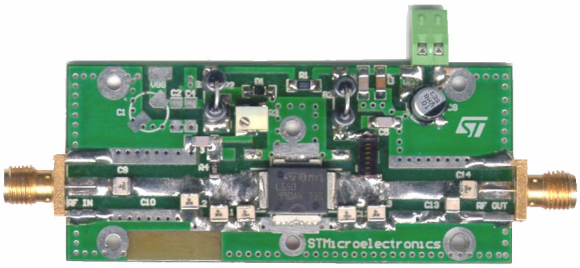
RF power amplifier using 1 x PD85015-E N-channel enhancement-mode lateral MOSFETs

Features

- Excellent thermal stability
- Frequency: 860 - 940 MHz
- Supply voltage: 13.6 V
- Output power: 10 W
- Power gain: 15.7 ± 0.4 dB
- Efficiency: 60% - 62%
- Load mismatch: 20:1
- BeO free amplifier

Description

The DB-85015-940 is a common source N-channel enhancement-mode lateral field effect RF power amplifier designed for UHF radio applications.



AM02199v1

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

Table 1. Device summary

Order codes
DB-85015-940

Contents

1 Electrical data

1.1 Maximum ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DD}	Supply voltage	24	V
I_D	Drain current	3	A
P_{DISS}	Power dissipation	25	W
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

Table 3. Electrical specification

Symbol	Test conditions	Min.	Typ.	Max.	Unit
Freq	Frequency range	860		940	MHz
P_{OUT}	@ P_{IN} = 25 dBm	10			W
Gain	@ P_{IN} = 25 dBm		15.7 ± 0.4		dB
ND	@ P_{IN} = 25 dBm		60 - 62		%
H2	2^{ND} harmonic @ P_{IN} = 25 dBm			-40	dBc
H3	3^{RD} harmonic @ P_{IN} = 25 dBm			-50	dBc
VSWR	Load mismatch all phases @ P_{IN} = 25 dBm			20:1	

3 Impedance

Figure 1. Impedance graphic

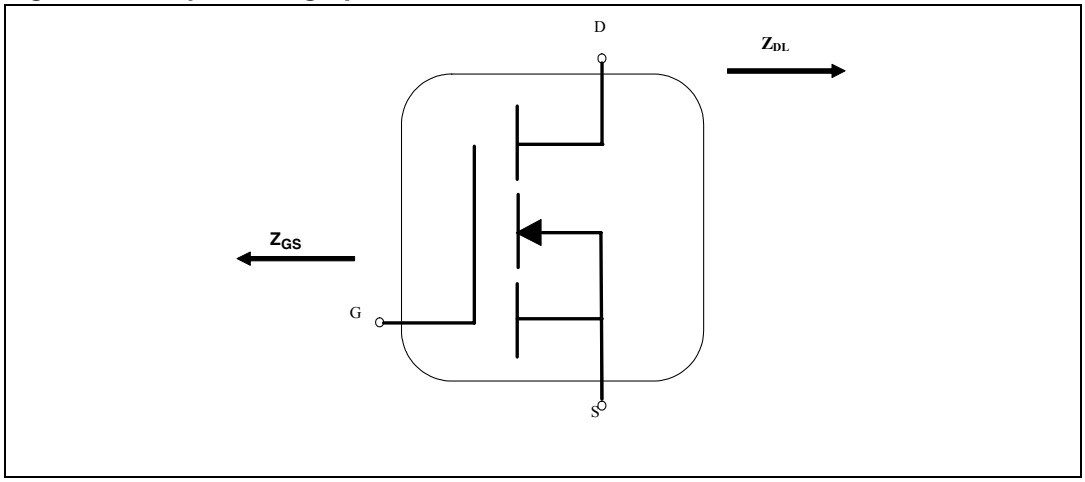


Table 4. Impedance data

f(MHz)	Z_{GS} (Ω)	Z_{DL} (Ω)
860	1,61 + j1,43	2,67 + j3,62
870	1,60 + j1,67	2,62 + j3,76
880	1,49 + j1,82	2,58 + j3,91
890	1,43 + j2,05	2,52 + j4,05
900	1,37 + j2,23	2,49 + j4,19
910	1,31 + j2,41	2,43+ j4,29
920	1,28 + j2,58	2,36 + j4,46
930	1,19 + j2,77	2,28 + j4,59
940	1,14 + j2,96	2,18 + j 4,67

4 Typical performance

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

Figure 2. Output power and drain current vs frequency_Vdd = 13.6 V, Idq = 200 mA, Pin = 25 dBm

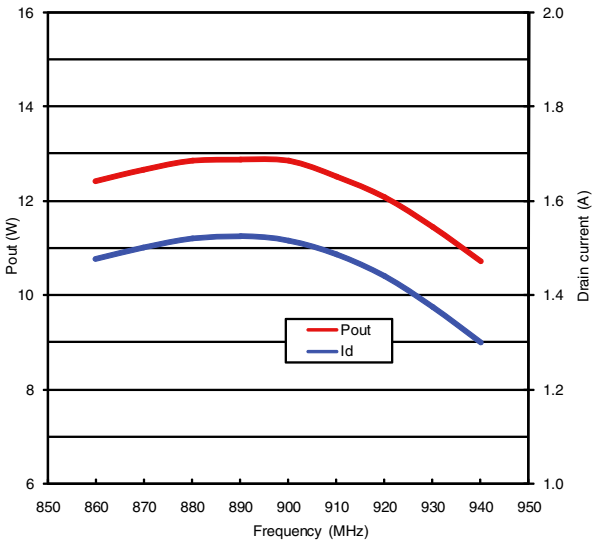


Figure 3. Gain and efficiency vs frequency_Vdd = 13.6 V, Idq = 200 mA, Pin = 25 dBm

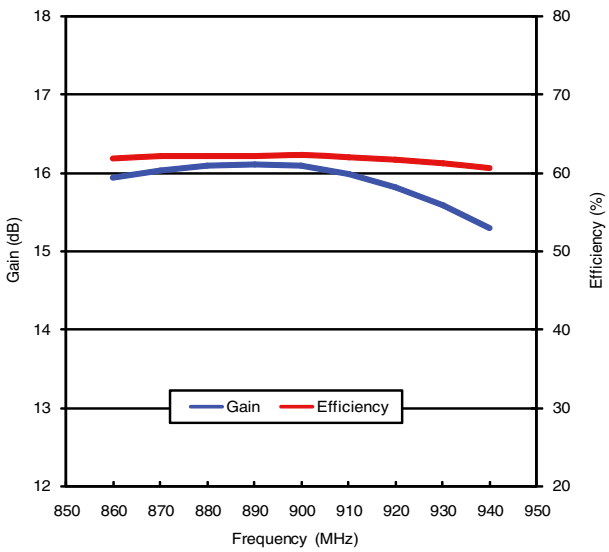


Figure 4. Input return loss vs frequency_Vdd = 13.6 V, Idq = 200 mA, Pin = 25dBm

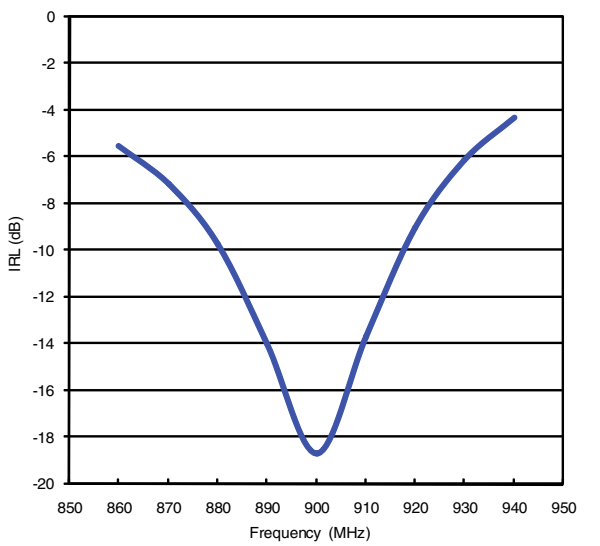
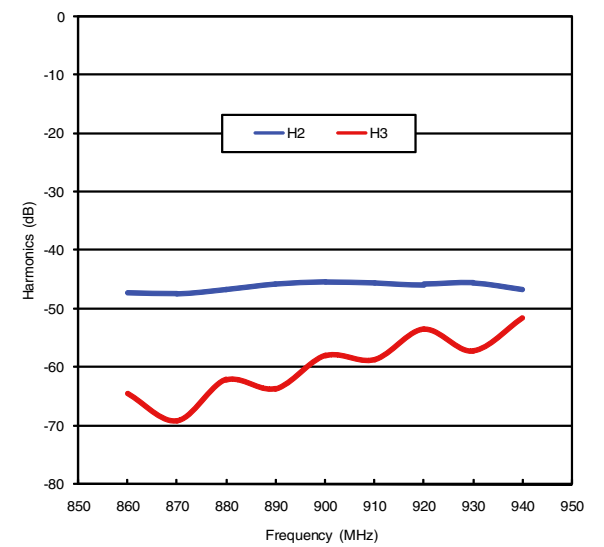
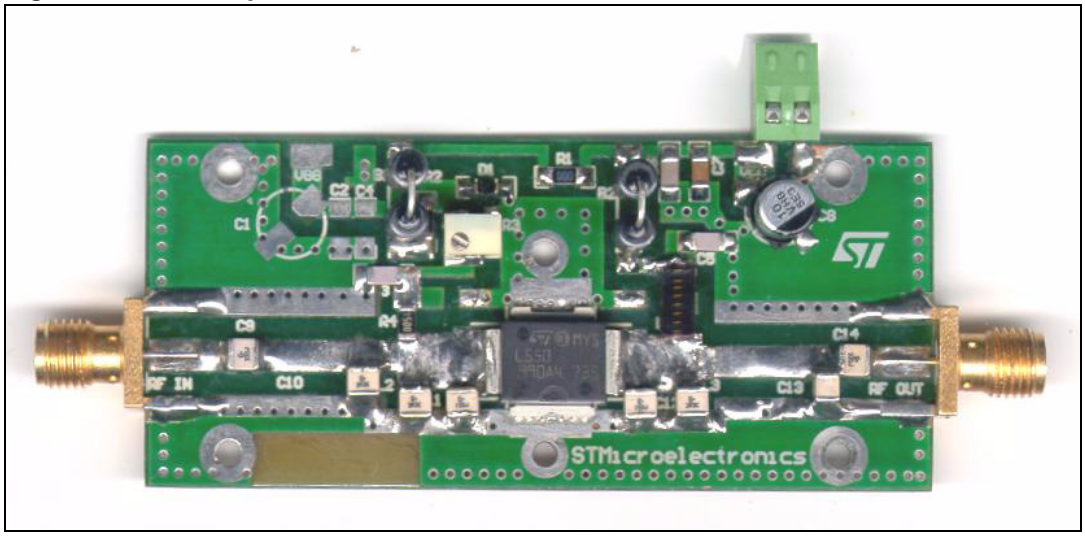


Figure 5. Harmonics vs frequency_Vdd = 13.6 V, Idq = 200 mA, Pin = 25 dBm



5 Circuit photo

Figure 6. Circuit photo



6 Test circuit

Table 5. Test circuit schematic

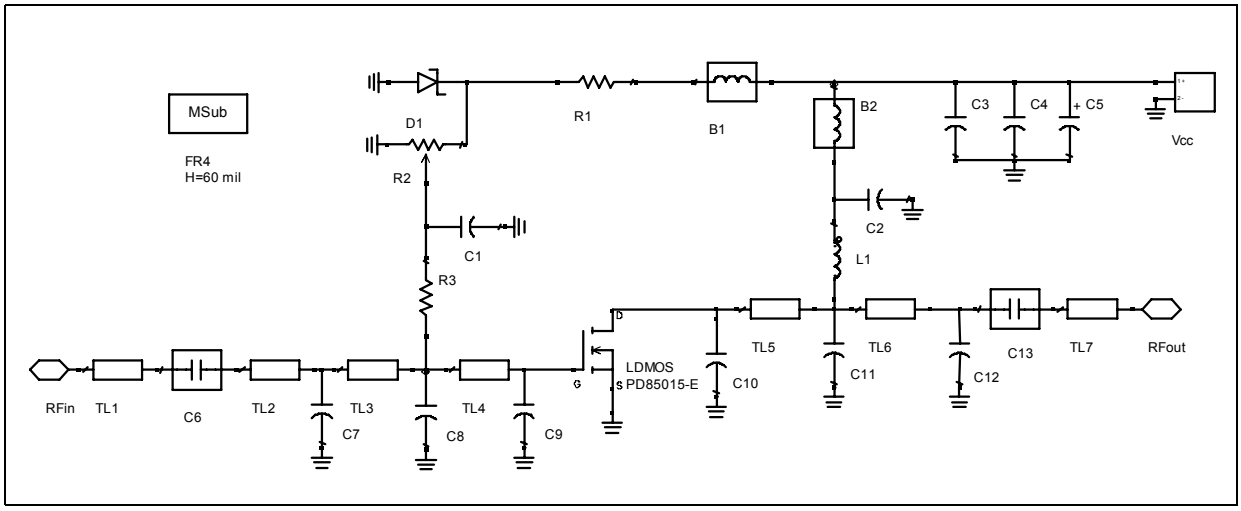


Table 6. Components part list for DB-85015-940

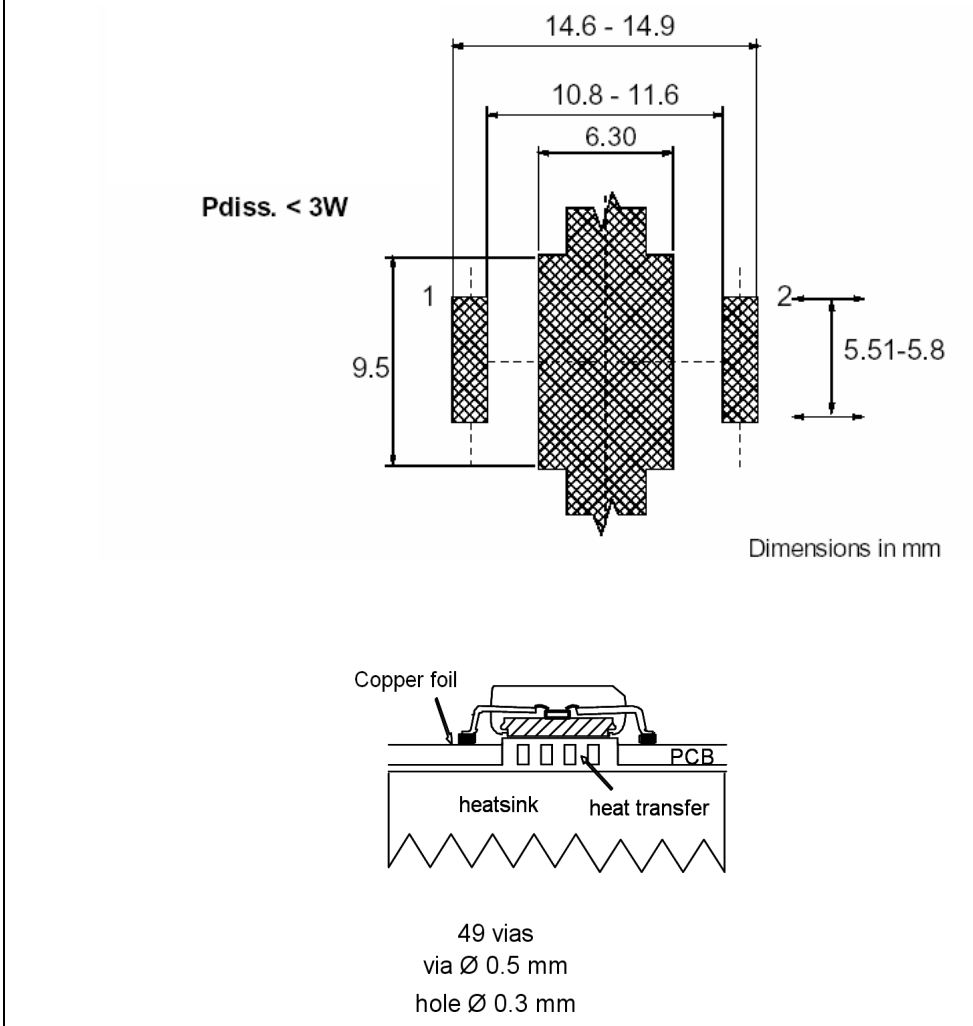
Component ID	Description	Value	Case size	Manufacturer	Part code
B1	Ferrite bead			Panasonic	EXCELDRC35C
B2	Ferrite bead			Panasonic	EXCELDRC35C
C1, C2	Capacitor	120 pF	1206	Murata	GRM42-6 COG 121J 50
C3	Capacitor	1 nF	1206	Murata	GRM42-6 COG 102J 50
C4	Capacitor	100 nF	1206	Murata	GRM42-6_X7R 104K 50
C5	Capacitor	10 µF	SMT	Panasonic	EEVHB1V100P
C6, C13	Capacitor	33 pF	1111	Murata	MA69330JAB
C7	Capacitor	2.2 pF	1111	Murata	MA692R2CAB
C8, C11	Capacitor	3.3 pF	1111	Murata	MA693R3CAB
C9, C10	Capacitor	15 pF	1111	Murata	MA69150JAB
C12	Capacitor	4.7 pF	1111	Murata	MA694R7CAB
D1	Zener diode	5.1 V	SOD110	Philips	BZX284C5V1
L1	Inductor	28 nH		Coilcraft	B08T
R1	Resistor	1 kΩ	1206	Tyco electronics	01623440-1
R2	Potentiometer	10 kΩ		Bourns electronics	3214W-1-103E
R3	Resistor	150 Ω	1206	Bourns electronics	
TL1	Transmission line	W=2.87 mm	L=7.4 mm		
TL2	Transmission line	W=2.87 mm	L=8,0 mm		
TL3	Transmission line	W=4.98 mm	L=1,4 mm		

Table 6. Components part list for DB-85015-940 (continued)

Component ID	Description	Value	Case size	Manufacturer	Part code
TL4	Transmission line	W=4.98 mm	L=1,2 mm		
TL5	Transmission line	W=4.98 mm	L=1,3 mm		
TL6	Transmission line	W=2.87 mm	L=9,5 mm		
TL7	Transmission line	W=2.87 mm	L=5,8 mm		
PD85015-E	LDMOS			STMicroelectronics	PD85015-E
Board	FR-4 THk=0.060" 2 OZ Cu both sides				

7 Mounting indications

Figure 7. PowerSO-10 mounting indications



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. PowerSO-10RF formed lead (gull wing) mechanical data

Dim.	mm.			Inch		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A1	0	0.05	0.1	0.	0.0019	0.0038
A2	3.4	3.5	3.6	0.134	0.137	0.142
A3	1.2	1.3	1.4	0.046	0.05	0.054
A4	0.15	0.2	0.25	0.005	0.007	0.009
a		0.2			0.007	
b	5.4	5.53	5.65	0.212	0.217	0.221
c	0.23	0.27	0.32	0.008	0.01	0.012
D	9.4	9.5	9.6	0.370	0.374	0.377
D1	7.4	7.5	7.6	0.290	0.295	0.298
E	13.85	14.1	14.35	0.544	0.555	0.565
E1	9.3	9.4	9.5	0.365	0.37	0.375
E2	7.3	7.4	7.5	0.286	0.292	0.294
E3	5.9	6.1	6.3	0.231	0.24	0.247
F		0.5			0.019	
G		1.2			0.047	
L	0.8	1	1.1	0.030	0.039	0.042
R1			0.25			0.01
R2		0.8			0.031	
T	2 deg	5 deg	8 deg	2 deg	5 deg	8 deg
T1		6 deg			6 deg	
T2		10 deg			10 deg	

Note: Resin protrusions not included (max value: 0.15 mm per side)

Figure 8. Package dimensions

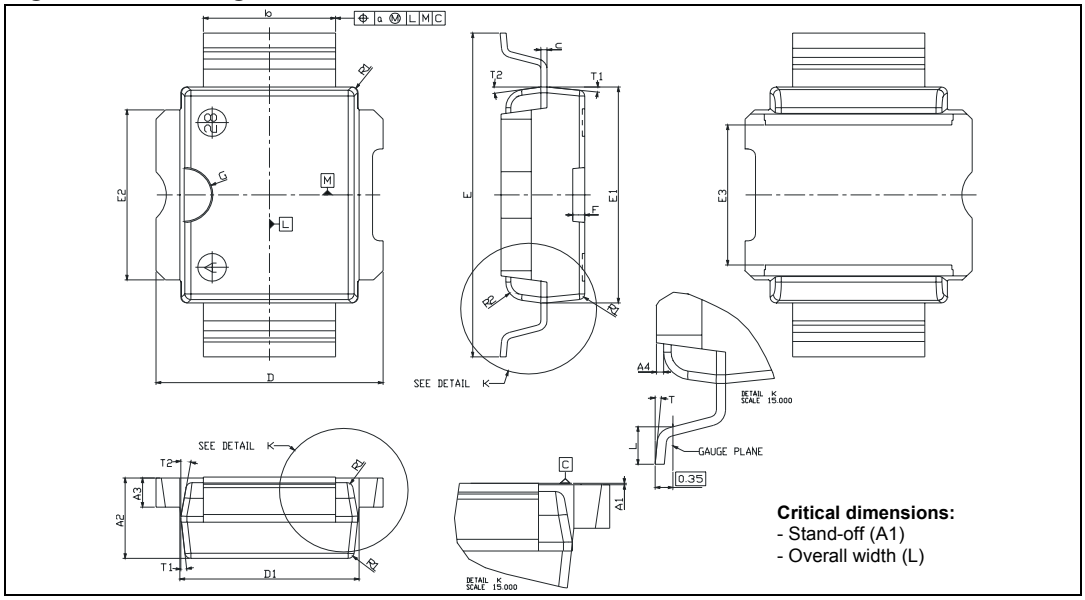
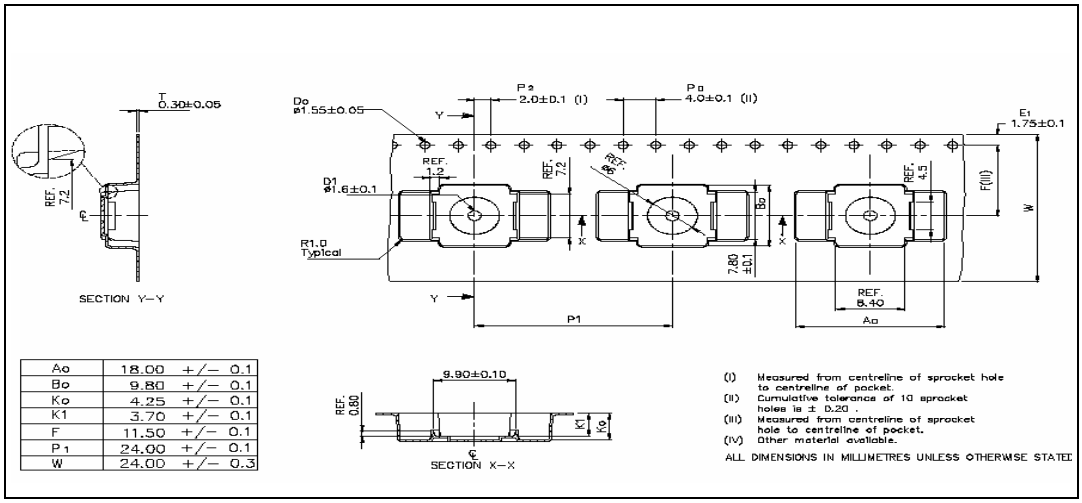


Figure 9. PowerSO-10RF tape and reel



Ao	18.00	+/– 0.1
Bo	9.80	+/– 0.1
Ko	4.25	+/– 0.1
K1	3.70	+/– 0.1
F	11.50	+/– 0.1
P1	24.00	+/– 0.1
W	24.00	+/– 0.3

9 Revision history

Table 8. Document revision history

Date	Revision	Changes
25-Mar-2009	1	Initial release

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