LTM4668A
Tiny Quad 1.2A Output Step-Down µModule Regulator

DESCRIPTION

Demonstration circuit 2785A-B features the LTM®4668A µModule® regulator, a Quad 1.2A high efficiency step-down regulator. DC2785A-B has an operating input voltage range of 2.7V to 17V and can provide an output current of up to 1.2A. The output voltage can be programmed from 1.8V up to 5V. The LTM4668A is a complete DC/DC point of load regulator in a thermally enhanced 6.25mm × 6.25mm × 2.1mm BGA package requiring only a few input and output capacitors.

External clock synchronization is available through the CLKIN turret. The LTM4668A data sheet must be read in conjunction with this demo manual for working on or modifying demo circuit 2785A-B.

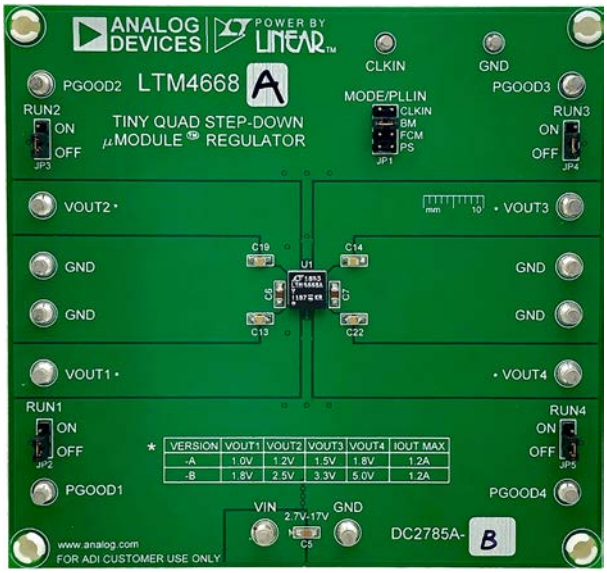
Design files for this circuit board are available.

PERFORMANCE SUMMARY

Specifications are at T_A = 25°C

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Voltage Range		2.7		17	V
Output Voltage V_{OUT}			1.8 2.5 3.3 5		V_{DC} V_{DC} V_{DC} V_{DC}
Maximum Continuous Output Current	De-rating is necessary for certain operating conditions. See data sheet for details.		1.2		A_{DC}
Default Operating Frequency			2.25		MHz
Efficiency	V_{IN} = 12V, V_{OUT} = 5V, I_{OUT} = 1.2A		89.2 See Figure 2		%

BOARD PHOTO



QUICK START PROCEDURE

Demonstration circuit 2785A-B is an easy way to evaluate the performance of the LTM4668A. Please refer to Figure 1 for test setup connections and follow the procedure below.

1. With power off, place the jumpers in the following positions:

JP1	JP2	JP3	JP4	JP5
MODE	RUN1	RUN2	RUN3	RUN4
FCM	ON	ON	ON	ON

2. Before connecting input supply, load and meters, preset the input voltage supply to be between 2.7V to 17V. Preset the load current to 0A.
3. With power off, connect the loads, input voltage supply and meters as shown in Figure 1.
4. Turn on input power supply. The output voltage meter should display the selected output voltage ±2%.
5. Once the proper output voltage is established, adjust the load current within the 0A to 1.2A range and observe the load regulation, efficiency, and other parameters.
6. To observe light load efficiency, place the Mode pin jumper (JP1) in the BM/PS position.
7. An external clock can be added to the CLKIN terminal when the CLKIN function is used (JP1 on the CLKIN position). Please ensure the chosen sync switching frequency is ±50% of the default switching frequency.

QUICK START PROCEDURE

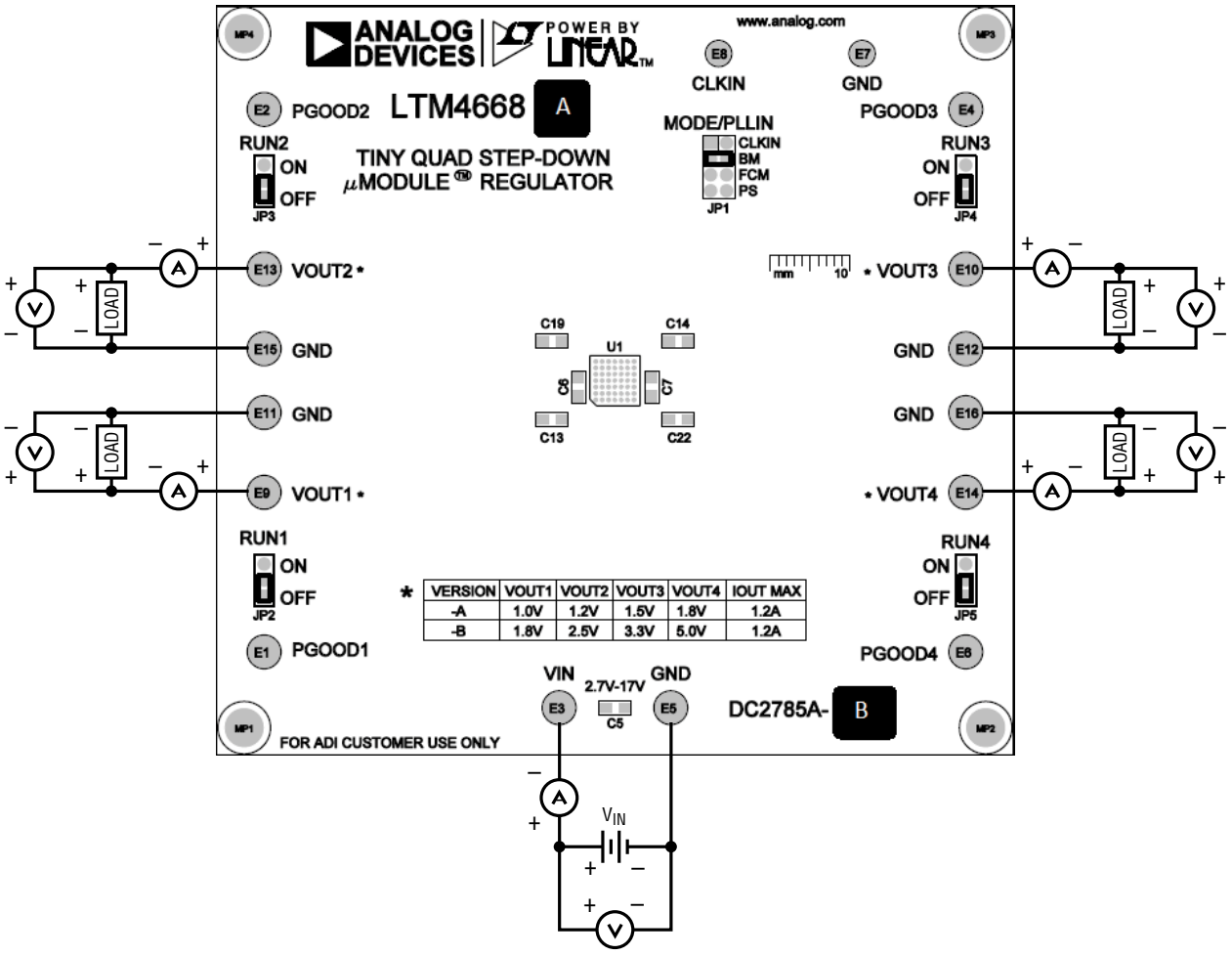


Figure 1. Test Setup

QUICK START PROCEDURE

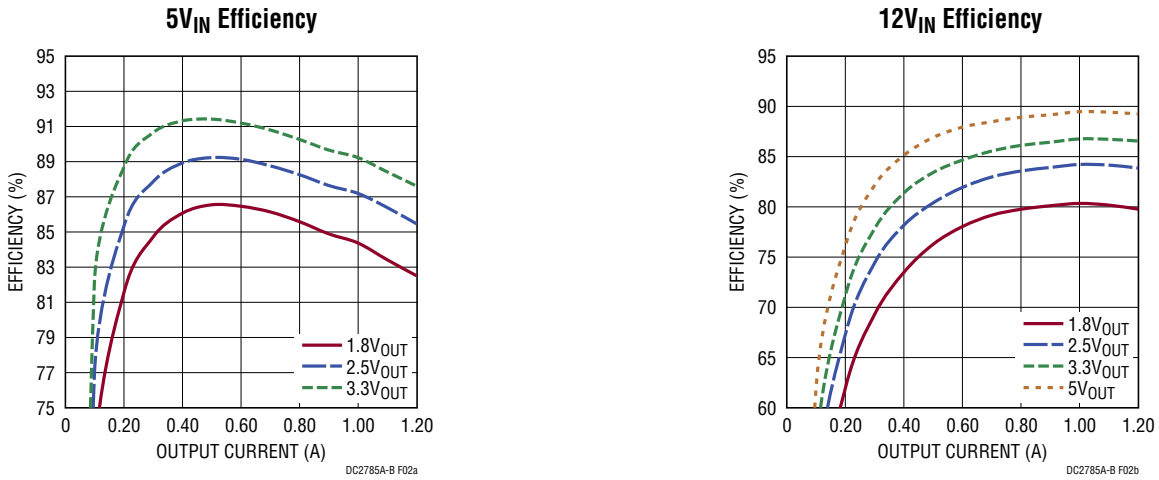
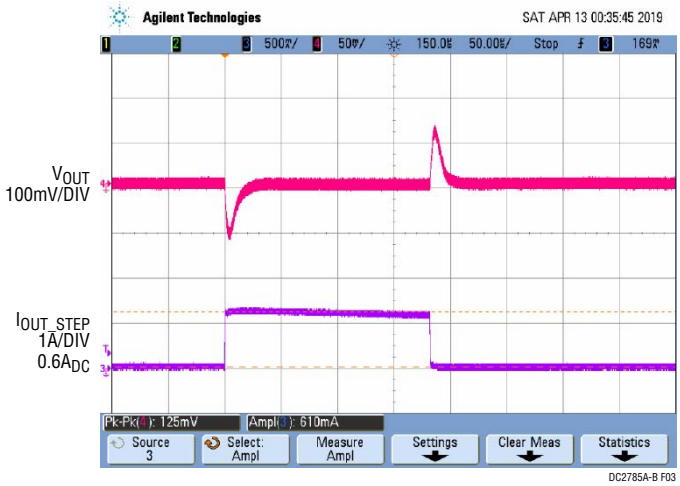
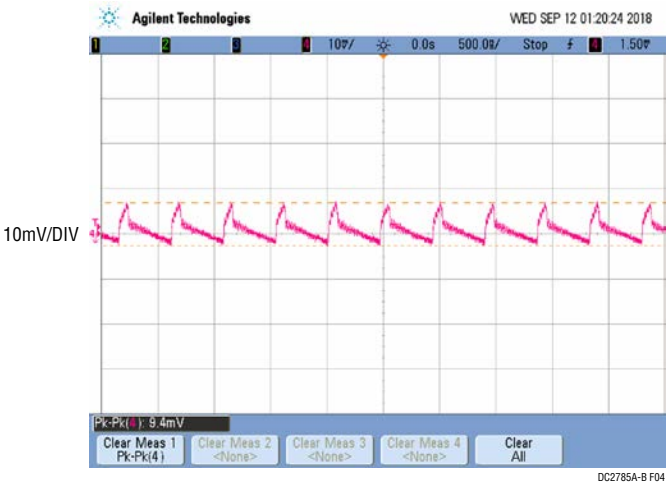


Figure 2. Measured Supply Efficiency at $5V_{IN}$ and $12V_{IN}$



V_{IN} (V)	V_{OUT} (V)	C_{OUT}
12	1.8	1 • 47µF/16V

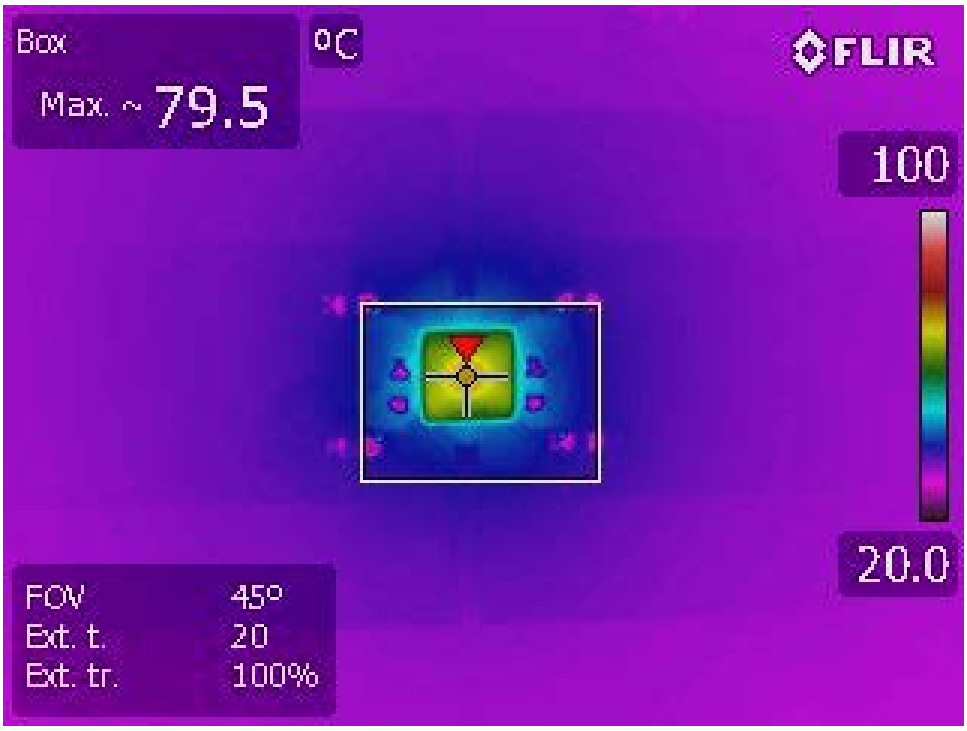
Figure 3. Measured Load Transient Responses for V_{OUT1} = 1.8V (0A to 0.6A Load Step)



V_{IN} (V)	V_{OUT} (V)	C_{OUT}
12	1.8	1 • 47µF/16V

Figure 4. Output Voltage Ripple for V_{OUT1} = 1.8V at 1.2A Full Load

QUICK START PROCEDURE



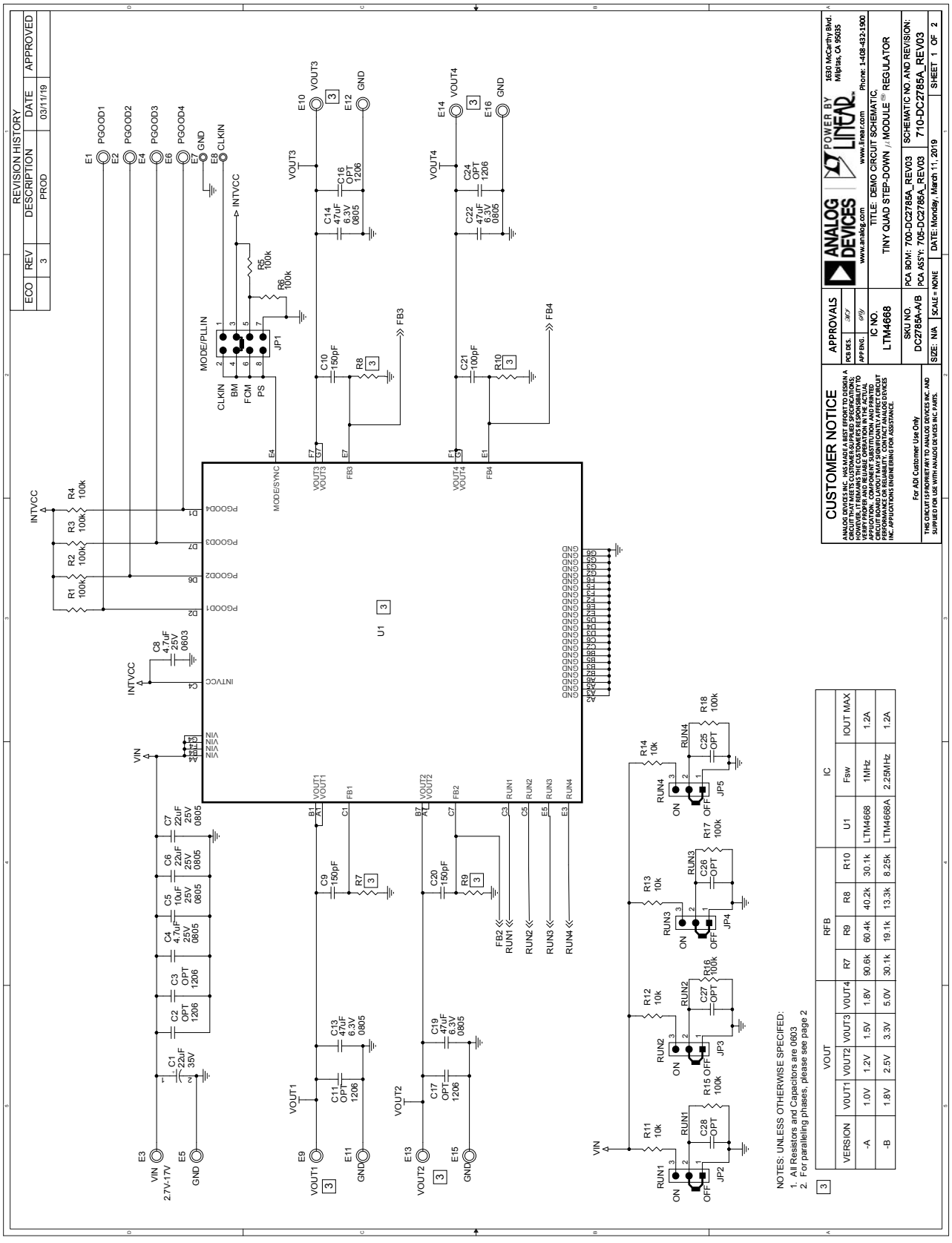
V_{IN} (V)	V_{OUT1} (V)	V_{OUT2} (V)	V_{OUT3} (V)	V_{OUT4} (V)	$T_{AMBIENT}$ (°C)	FORCED AIRFLOW (LFM)
12	1.8	2.5	3.3	5	25	0

Figure 5. Measured Thermal Capture with All Phase at Full Load (1.2A Each)

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	2	C6, C7	CAP., 22µF, X5R, 25V, 20%, 0805	MURATA, GRM21BR61E226ME44L
2	4	C13, C14, C19, C22	CAP., 47µF, X5R, 16V, 20%, 1206	TDK, C3216X5R1C476M160AB
3	1	R7	RES., AEC-Q200, 30.1k, 1%, 1/10W, 0603	VISHAY, CRCW060330K1FKEA
4	1	R8	RES., AEC-Q200, 13.3k, 1%, 1/10W, 0603	VISHAY, CRCW060313K3FKEA
5	1	R9	RES., AEC-Q200, 19.1k, 1%, 1/10W, 0603	PANASONIC, ERJ3EKF1912V
6	1	R10	RES., AEC-Q200, 8.25k, 1%, 1/10W, 0603	VISHAY, CRCW06038K25FKEA
7	1	U1	IC, QUAD DC/DC 1.2A µMODULE REG., 49-PINS BGA	ANALOG DEVICES, LTM4668AEY#PBF
Additional Demo Board Circuit Components				
1	1	C1	CAP., 22µF, TANT., 35V, 20%, 7343, TPSE	AVX, TPSE226M035R0125
2	1	C4	CAP., 4.7µF, X7R, 25V, 10%, 0805	TDK, C2012X7R1E475K125AB
3	1	C5	CAP., 10µF, X5R, 25V, 10%, 0805	MURATA, GRM219R61E106KA12D
4	3	C9, C10, C20	CAP., 150pF, NP0, 50V, 5%, 0603	AVX, 06035A151JAT2A
5	1	C21	CAP., 100pF, C0G, 50V, 5%, 0603, AEC-Q200	TDK, CGA3E2C0G1H101J080AA
6	6	R5, R6, R15-R18	RES., 100k, 1%, 1/10W, 0603	VISHAY, CRCW0603100KFKEA
7	4	R11-R14	RES., AEC-Q200, 10k, 1%, 1/10W, 0603	VISHAY, CRCW060310K0FKEA
8	4	R1-R4	RES., 100k, 5%, 1/10W, 0603	PANASONIC, ERJ3GEYJ104V
9	1	C8	CAP., 4.7µF, X5R, 25V, 20%, 0603	TDK, C1608X5R1E475M080AC
Hardware: For Demo Board Only				
1	14	E1-E6, E9-E16	TEST POINT, TURRET, 0.094", MTG. HOLE	MILL-MAX, 2501-2-00-80-00-00-07-0
2	2	E7, E8	TEST POINT, TURRET, 0.064", MTG. HOLE	MILL-MAX, 2308-2-00-80-00-00-07-0
3	5	XJP1-XJP5	CONN., SHUNT, FEMALE, 2 POS, 2mm	WURTH ELEKTRONIK, 60800213421
4	4	STAND-OFFS	STANDOFF, NYLON, SNAP-ON, 0.250"	KEYSTONE, 8831

SCHEMATIC DIAGRAM



ESD Caution

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

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