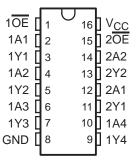
SCLS309D - JANUARY 1996 - REVISED SEPTEMBER 2003

- Wide Operating Voltage Range of 2 V to 6 V
- High-Current 3-State Outputs Drive Bus Lines, Buffer Memory Address Registers, or Drive Up To 15 LSTTL Loads
- True Outputs
- Low Power Consumption, 80-μA Max I<sub>CC</sub>
- Typical t<sub>pd</sub> = 10 ns
- ±6-mA Output Drive at 5 V
- Low Input Current of 1 μA Max

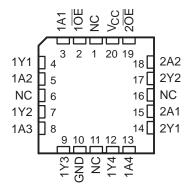
### description/ordering information

These hex buffers and line drivers are designed specifically to improve both the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented receivers and transmitters. The 'HC367 devices are organized as dual 4-line and 2-line buffers/drivers with active-low output-enable (1OE and 2OE) inputs. When OE is low, the device passes noninverted data from the A inputs to the Y outputs. When OE is high, the outputs are in the high-impedance state.

SN54HC367 . . . J OR W PACKAGE SN74HC367 . . . D, N, NS, OR PW PACKAGE (TOP VIEW)



# SN54HC367...FK PACKAGE (TOP VIEW)



NC - No internal connection

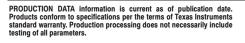
#### **ORDERING INFORMATION**

TA	PACKA	GE†	ORDERABLE PART NUMBER	TOP-SIDE MARKING
	PDIP – N	Tube of 25	SN74HC367N	SN74HC367N
		Tube of 40	SN74HC367D	
	SOIC - D	Reel of 2500	SN74HC367DR	HC367
-40°C to 85°C		Reel of 250	SN74HC367DT	
-40°C to 85°C	SOP - NS	Reel of 2000	SN74HC367NSR	HC367
		Tube of 90	SN74HC367PW	
	TSSOP - PW	Reel of 2000	SN74HC367PWR	HC367
		Reel of 250	SN74HC367PWT	
	CDIP – J	Tube of 25	SNJ54HC367J	SNJ54HC367J
−55°C to 125°C	CFP – W	Tube of 150	SNJ54HC367W	SNJ54HC367W
	LCCC – FK	Tube of 55	SNJ54HC367FK	SNJ54HC367FK

<sup>†</sup> Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

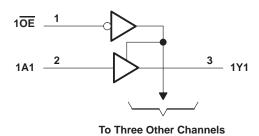


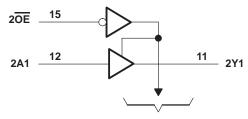


#### **FUNCTION TABLE** (each buffer/driver)

INP	JTS	OUTPUT
OE	Α	Υ
Н	Χ	Z
L	Н	Н
L	L	L

### logic diagram (positive logic)





To One Other Channel

Pin numbers shown are for the D, J, N, NS, PW, and W packages.

### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage range, $V_{CC}$	D package NS package NS package	±20 mA ±20 mA ±35 mA ±70 mA 73°C/W 67°C/W 64°C/W
Storage temperature range, T <sub>stg</sub>	PW package	

<sup>†</sup> Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

2. The package thermal impedance is calculated in accordance with JESD 51-7.



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### recommended operating conditions (see Note 3)

			SN	154HC36	67	SN	174HC36	7	LINUT
			MIN	NOM	MAX	MIN	NOM	MAX	UNIT
VCC	Supply voltage		2	5	6	2	5	6	V
		V <sub>CC</sub> = 2 V	1.5			1.5			
VIH	High-level input voltage	V <sub>CC</sub> = 4.5 V	3.15			3.15			V
		V <sub>CC</sub> = 6 V	4.2			4.2			
		V <sub>CC</sub> = 2 V			0.5			0.5	
٧ <sub>IL</sub>	Low-level input voltage	V <sub>CC</sub> = 4.5 V			1.35			1.35	V
		VCC = 6 V			1.8			1.8	
٧ı	Input voltage		0		VCC	0		VCC	V
VO	Output voltage		0		VCC	0		VCC	V
		V <sub>CC</sub> = 2 V			1000			1000	
Δt/Δν	Input transition rise/fall time	V <sub>CC</sub> = 4.5 V			500			500	ns
		VCC = 6 V			400			400	
TA	Operating free-air temperature		-55		125	-40		85	°C

NOTE 3: All unused inputs of the device must be held at V<sub>CC</sub> or GND to ensure proper device operation. Refer to the TI application report, Implications of Slow or Floating CMOS Inputs, literature number SCBA004.

# electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

				Т	A = 25°C	;	SN54H	IC367	SN74H	C367	
PARAMETER	TEST CO	ONDITIONS	VCC	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
			2 V	1.9	1.998		1.9		1.9		
		I <sub>OH</sub> = -20 μA	4.5 V	4.4	4.499		4.4		4.4		
Voн	VI = VIH or VIL		6 V	5.9	5.999		5.9		5.9		V
		$I_{OH} = -6 \text{ mA}$	4.5 V	3.98	4.3		3.7		3.84		
		$I_{OH} = -7.8 \text{ mA}$	6 V	5.48	5.8		5.2		5.34		
			2 V		0.002	0.1		0.1		0.1	
		I <sub>OL</sub> = 20 μA	4.5 V		0.001	0.1		0.1		0.1	
V <sub>OL</sub>	$V_I = V_{IH}$ or $V_{IL}$		6 V		0.001	0.1		0.1		0.1	V
		I <sub>OL</sub> = 6 mA	4.5 V		0.17	0.26		0.4		0.33	
		$I_{OL} = 7.8 \text{ mA}$	6 V		0.15	0.26		0.4		0.33	
lį	$V_I = V_{CC}$ or 0		6 V		±0.1	±100		±1000	:	±1000	nA
loz	VO = VCC or 0	•	6 V		±0.01	±0.5		±10		±5	μΑ
Icc	$V_I = V_{CC}$ or 0,	IO = 0	6 V			8		160		80	μΑ
C <sub>i</sub>			2 V to 6 V		3	10		10		10	pF

## SN54HC367, SN74HC367 HEX BUFFERS AND LINE DRIVERS WITH 3-STATE OUTPUTS

SCLS309D - JANUARY 1996 - REVISED SEPTEMBER 2003

# switching characteristics over recommended operating free-air temperature range, $C_L$ = 50 pF (unless otherwise noted) (see Figure 1)

	FROM	то	,,	T	λ = 25°C	;	SN54H	C367	SN74H	C367																									
PARAMETER	(INPUT)	(OUTPUT)	VCC	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT																								
			2 V		50	95		145		120																									
<sup>t</sup> pd	Α	Υ	4.5 V		12	19		29		24	ns																								
·			6 V		10	16		25		20																									
			2 V		100	190		285		238																									
t <sub>en</sub>	ŌĒ	Υ	4.5 V		26	38		57		48	ns																								
			6 V		21	32		48		41																									
			2 V		50	175		265		240																									
<sup>t</sup> dis	ŌĒ	Υ	4.5 V		21	35		53		48	ns																								
			6 V		19	30		45		41																									
			2 V		28	60		90		75																									
t <sub>t</sub>		Any	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any	Any	4.5 V		8	12		18		15	ns
			6 V	_	6	10		15		13																									

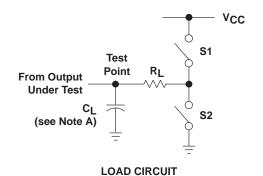
# switching characteristics over recommended operating free-air temperature range, $C_L$ = 150 pF (unless otherwise noted) (see Figure 1)

242445	FROM	то	.,	T,	λ = 25°C	;	SN54H	C367	SN74H	IC367					
PARAMETER	(INPUT)	(OUTPUT)	VCC	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT				
			2 V		70	120		180		150					
<sup>t</sup> pd	Α	Υ	4.5 V		17	24		36		30	ns				
·			6 V		14	20		31		25					
			2 V		140	230		345		285					
t <sub>en</sub>	ŌĒ	Υ	4.5 V		30	46		69		57	ns				
			6 V		28	39		59		48					
			2 V		45	210		315		265					
t <sub>t</sub>		Any	Any	Any	Any	Any	4.5 V		17	42	·	63		53	ns
			6 V		13	36		53		45					

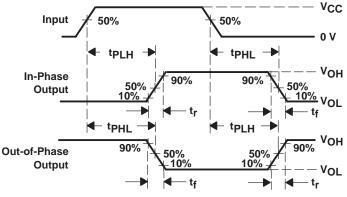
# operating characteristics, $T_A = 25^{\circ}C$

	PARAMETER	TEST CONDITIONS	TYP	UNIT
C <sub>pd</sub>	Power dissipation capacitance per buffer/driver	No load	35	pF

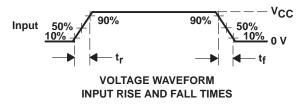
#### PARAMETER MEASUREMENT INFORMATION

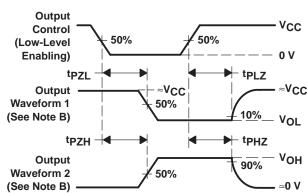


PARAI	METER	RL	CL	S1	S2
	tPZH	<b>1 k</b> Ω	50 pF	Open	Closed
ten	tPZL	1 K22	or 150 pF	Closed	Open
4	tPHZ	1 kΩ	50 pF	Open	Closed
<sup>t</sup> dis	tPLZ	1 K22	50 pr	Closed	Open
t <sub>pd</sub> or	t <sub>t</sub>		50 pF or 150 pF	Open	Open



VOLTAGE WAVEFORMS
PROPAGATION DELAY AND OUTPUT TRANSITION TIMES





VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES FOR 3-STATE OUTPUTS

- NOTES: A. C<sub>L</sub> includes probe and test-fixture capacitance.
  - B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
  - C. Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics: PRR  $\leq$  1 MHz, Z<sub>O</sub> = 50  $\Omega$ , t<sub>f</sub> = 6 ns.
  - D. The outputs are measured one at a time with one input transition per measurement.
  - E. tpLH and tpHL are the same as tpd.
  - F. tpLz and tpHz are the same as tdis.
  - G. tpzL and tpzH are the same as ten.

Figure 1. Load Circuit and Voltage Waveforms







10-Jun-2014

### **PACKAGING INFORMATION**

Orderable Device	Status	Package Type	Package Drawing	Pins	Package Qty	Eco Plan	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Device Marking (4/5)	Samples
85002012A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	85002012A SNJ54HC 367FK	Samples
8500201EA	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	8500201EA SNJ54HC367J	Samples
M38510/65708BEA	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	JM38510/ 65708BEA	Samples
IM38510/65708BFA	ACTIVE	CFP	W	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	JM38510/ 65708BFA	Samples
M38510/65708BEA	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	JM38510/ 65708BEA	Samples
M38510/65708BFA	ACTIVE	CFP	W	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	JM38510/ 65708BFA	Samples
SN54HC367J	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	SN54HC367J	Samples
SN74HC367D	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC367	Samples
SN74HC367DG4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC367	Samples
SN74HC367DR	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC367	Samples
SN74HC367DRE4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC367	Samples
SN74HC367DRG4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC367	Samples
SN74HC367DT	ACTIVE	SOIC	D	16	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC367	Samples
SN74HC367N	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-40 to 85	SN74HC367N	Samples
SN74HC367NSR	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC367	Samples
SN74HC367PW	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC367	Samples
SN74HC367PWR	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC367	Samples



### PACKAGE OPTION ADDENDUM

10-Jun-2014

Orderable Device	Status	Package Type	Package	Pins	Package	Eco Plan	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Device Marking	Samples
	(1)		Drawing		Qty	(2)	(6)	(3)		(4/5)	
SN74HC367PWT	ACTIVE	TSSOP	PW	16	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HC367	Samples
SNJ54HC367FK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	85002012A SNJ54HC 367FK	Samples
SNJ54HC367J	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	8500201EA SNJ54HC367J	Samples

(1) The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

- (3) MSL, Peak Temp. The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.
- (4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.
- (5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.
- (6) Lead/Ball Finish Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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### PACKAGE OPTION ADDENDUM

10-Jun-2014

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In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

#### OTHER QUALIFIED VERSIONS OF SN54HC367, SN74HC367:

Military: SN54HC367

NOTE: Qualified Version Definitions:

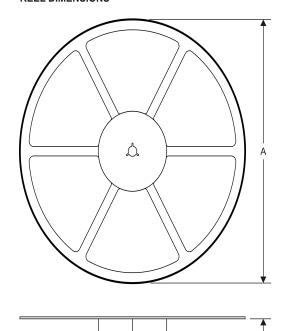
- Catalog TI's standard catalog product
- Military QML certified for Military and Defense Applications

# PACKAGE MATERIALS INFORMATION

www.ti.com 14-Jul-2012

### TAPE AND REEL INFORMATION

### **REEL DIMENSIONS**



### **TAPE DIMENSIONS**



A0	Dimension designed to accommodate the component width
В0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

### TAPE AND REEL INFORMATION

\*All dimensions are nominal

All differisions are nominal												
Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74HC367DR	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
SN74HC367NSR	SO	NS	16	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1
SN74HC367PWR	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74HC367PWT	TSSOP	PW	16	250	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1

www.ti.com 14-Jul-2012



\*All dimensions are nominal

7 till difficilities die fremman							
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74HC367DR	SOIC	D	16	2500	333.2	345.9	28.6
SN74HC367NSR	SO	NS	16	2000	367.0	367.0	38.0
SN74HC367PWR	TSSOP	PW	16	2000	367.0	367.0	35.0
SN74HC367PWT	TSSOP	PW	16	250	367.0	367.0	35.0

### 14 LEADS SHOWN



- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. This package is hermetically sealed with a ceramic lid using glass frit.
- D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
- E. Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

# W (R-GDFP-F16)

### CERAMIC DUAL FLATPACK



- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. This package can be hermetically sealed with a ceramic lid using glass frit.
- D. Index point is provided on cap for terminal identification only.
- E. Falls within MIL STD 1835 GDFP2-F16



# FK (S-CQCC-N\*\*)

### LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. This package can be hermetically sealed with a metal lid.
- D. Falls within JEDEC MS-004



# N (R-PDIP-T\*\*)

### PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
- The 20 pin end lead shoulder width is a vendor option, either half or full width.



# D (R-PDS0-G16)

### PLASTIC SMALL OUTLINE



- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
- Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
- E. Reference JEDEC MS-012 variation AC.



# D (R-PDSO-G16)

# PLASTIC SMALL OUTLINE



- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
- E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



PW (R-PDSO-G16)

### PLASTIC SMALL OUTLINE



- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M—1994.
- B. This drawing is subject to change without notice.
- Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
- Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
- E. Falls within JEDEC MO-153



# PW (R-PDSO-G16)

# PLASTIC SMALL OUTLINE



- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
- E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



### **MECHANICAL DATA**

## NS (R-PDSO-G\*\*)

# 14-PINS SHOWN

### PLASTIC SMALL-OUTLINE PACKAGE



- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.



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