

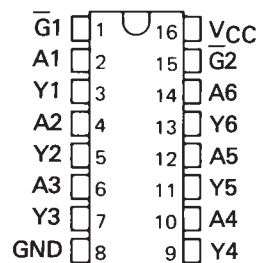
# SN54365A THRU SN54368A, SN54LS365A THRU SN54LS368A SN74365A THRU SN74368A, SN74LS365A THRU SN74LS368A HEX BUS DRIVERS WITH 3-STATE OUTPUTS

DECEMBER 1983—REVISED MARCH 1988

- 3-State Outputs Drive Bus Lines or Buffer Memory Address Registers
  - Choice of True or Inverting Outputs
  - Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers and Flat Packages, and Plastic and Ceramic DIPs
  - Dependable Texas Instruments Quality and Reliability
- '365A, '367A, 'LS365A, 'LS367A True Outputs  
'366A, '368A, 'LS366A, 'LS368A Inverting Outputs

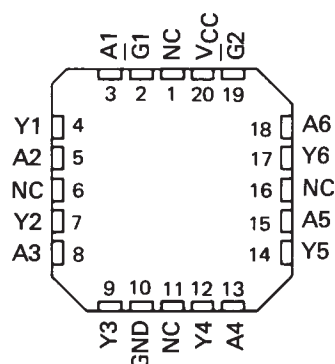
SN54365A, 366A, SN54LS365A, 366A . . . J PACKAGE  
SN74365A, 366A . . . N PACKAGE  
SN74LS365A, SN74LS366A . . . D OR N PACKAGE

(TOP VIEW)



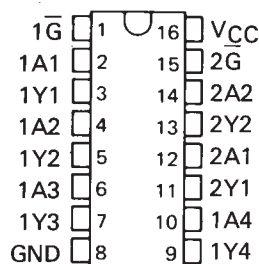
SN54LS365A, SN54LS366A . . . FK PACKAGE

(TOP VIEW)



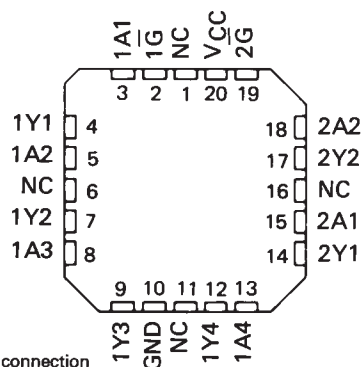
SN54367A, 368A, SN54LS367A, 368A . . . J PACKAGE  
SN74367A, 368A . . . N PACKAGE  
SN74LS367A, SN74LS368A . . . D OR N PACKAGE

(TOP VIEW)



SN54LS367A, SN54LS368A . . . FK PACKAGE

(TOP VIEW)



NC - No internal connection

## description

These Hex buffers and line drivers are designed specifically to improve both the performance and density of three-state memory address drivers, clock drivers, and bus oriented receivers and transmitters. The designer has choice of selected combinations of inverting and noninverting outputs, symmetrical  $\bar{G}$  (active-low control) inputs.

These devices feature high fan-out, improved fan-in, and can be used to drive terminated lines down to 133 ohms.

The SN54365A thru SN54368A and SN54LS365A thru SN54LS368A are characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74365A thru SN74368A and SN74LS365A thru SN74LS368A are characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

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PRODUCTION DATA documents contain information current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

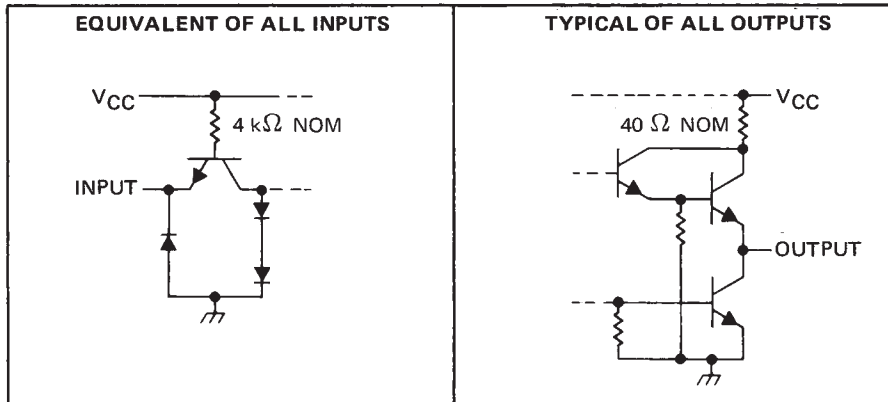


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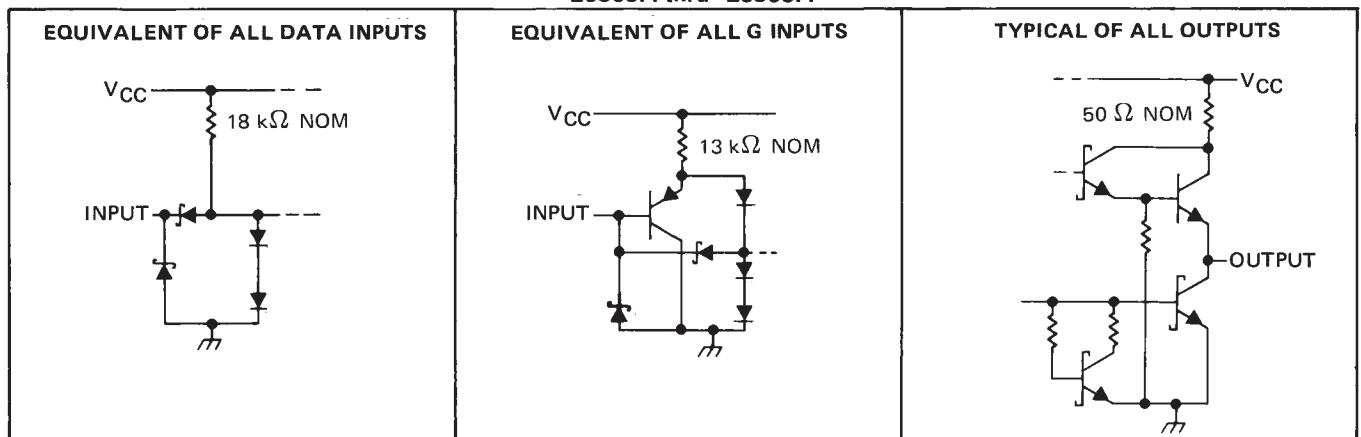
# SN54365A THRU SN54368A, SN54LS365A THRU SN54LS368A SN74365A THRU SN74368A, SN74LS365A THRU SN74LS368A HEX BUS DRIVERS WITH 3-STATE OUTPUTS

schematics of inputs and outputs

'365A thru '368A



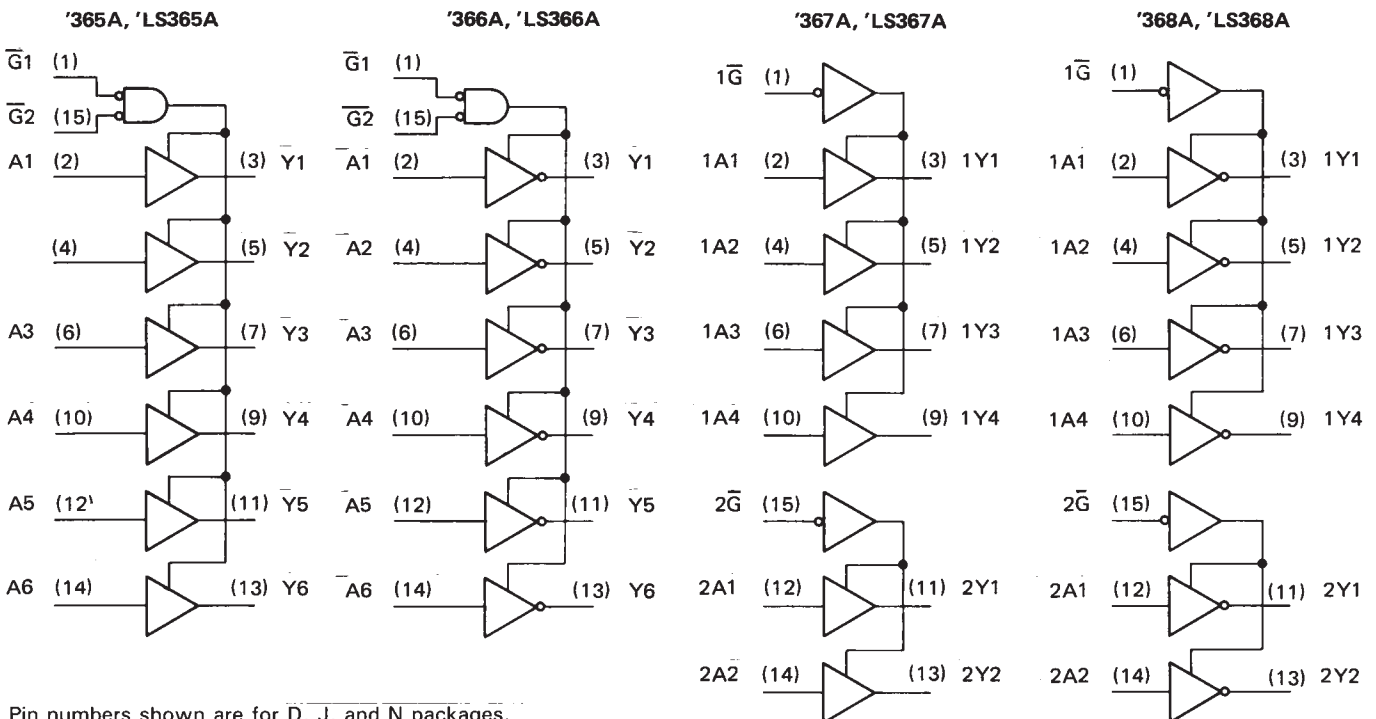
'LS365A thru 'LS368A



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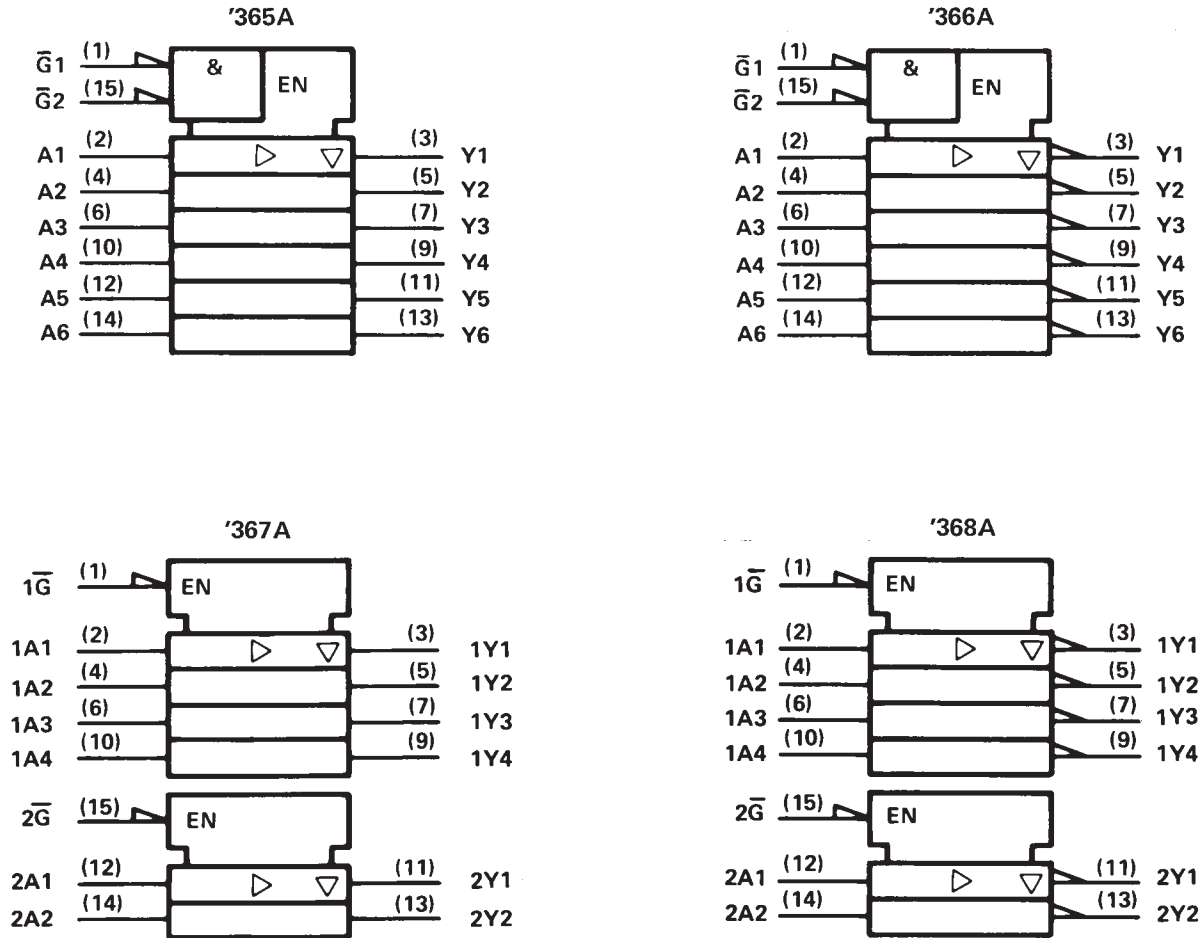
logic diagrams (positive logic)



Pin numbers shown are for D, J, and N packages.

**SN54365A THRU SN54368A, SN54LS365A THRU SN54LS368A  
SN74365A THRU SN74368A, SN74LS365A THRU SN74LS368A  
HEX BUS DRIVERS WITH 3-STATE OUTPUTS**

logic symbols†



†These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.  
Pin numbers shown are for D, J, and N packages.

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

Supply voltage, $V_{CC}$ (see Note 1)	7 V
Input voltage: '365A, '366A, '367A, '368A	5.5 V
'LS365A, 'LS366A, 'LS367A, 'LS368A	7 V
Voltage applied to a disabled 3-state output	5.5 V
Operating free-air temperature: SN54'	-55°C to 125°C
SN74'	0°C to 70°C
Storage temperature range	-65°C to 150°C

NOTE 1: Voltage values are with respect to network ground terminal.

**SN54365A, SN54367A**  
**SN74365A, SN74367A**  
**HEX BUS DRIVERS WITH 3-STATE OUTPUTS**

**recommended operating conditions**

	SN54365A SN54367A			SN74365A SN74367A			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
V <sub>CC</sub> Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V <sub>IH</sub> High-level input voltage	2			2			V
V <sub>IL</sub> Low-level input voltage			0.8			0.8	V
I <sub>OH</sub> High-level output current			-2			-5.2	mA
I <sub>OL</sub> Low-level output current			32			32	mA
T <sub>A</sub> Operating free-air temperature	-55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS†	SN54365A SN54367A			SN74365A SN74367A			UNIT
		MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V <sub>IK</sub>	V <sub>CC</sub> = MIN, I <sub>I</sub> = -12 mA			-1.5			-1.5	V
V <sub>OH</sub>	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = 0.8 V, I <sub>OH</sub> = MAX	2.4	3.3		2.4	3.1		V
V <sub>OL</sub>	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = 0.8 V, I <sub>OL</sub> = 32 mA			0.4			0.4	V
I <sub>OZ</sub>	V <sub>CC</sub> = MAX, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = 0.8 V, V <sub>O</sub> = 2.4 V			40			40	μA
	V <sub>CC</sub> = MAX, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = 0.8 V, V <sub>O</sub> = 0.4 V			-40			-40	
I <sub>I</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 5.5 V			1			1	mA
I <sub>IH</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.4 V			40			40	μA
I <sub>IL</sub>	A Inputs V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.5 V, Either $\bar{G}$ input at 2 V			-40			-40	μA
	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V, Both $\bar{G}$ inputs at 0.4 V			-1.6			-1.6	
$\bar{G}$ Inputs	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V			-1.6			-1.6	mA
I <sub>OS</sub> §	V <sub>CC</sub> = MAX	-40		-130	-40		-130	mA
I <sub>CC</sub>	V <sub>CC</sub> = MAX, Data inputs = 0 V, Output controls = 4.5 V		65	85		65	85	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C.

§ Not more than one output should be shorted at a time.

**switching characteristics, V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C (see note 2)**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
t <sub>PLH</sub>	Any	Y	R <sub>L</sub> = 400 Ω, C <sub>L</sub> = 50 pF			16	ns	
t <sub>PHL</sub>						22	ns	
t <sub>PZH</sub>						35	ns	
t <sub>PZL</sub>						37	ns	
t <sub>PHZ</sub>							11	ns
t <sub>PLZ</sub>						R <sub>L</sub> = 400 Ω, C <sub>L</sub> = 5 pF		

NOTE 2: Load circuits and voltage waveforms are shown in Section 1.

**SN54366A, SN54368A**  
**SN74366A, SN74368A**  
**HEX BUS DRIVERS WITH 3-STATE OUTPUTS**

**recommended operating conditions**

	SN54366A SN54368A			SN74366A SN74368A			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
V <sub>CC</sub> Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V <sub>IH</sub> High-level input voltage	2			2			V
V <sub>IL</sub> Low-level input voltage			0.8			0.8	V
I <sub>OH</sub> High-level output current			-2			-5.2	mA
I <sub>OL</sub> Low-level output current			32			32	mA
T <sub>A</sub> Operating free-air temperature	-55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS†	SN54366A SN54368A			SN74366A SN74368A			UNIT
		MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V <sub>IK</sub>	V <sub>CC</sub> = MIN, I <sub>I</sub> = -12 mA			-1.5			-1.5	V
V <sub>OH</sub>	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = 0.8 V, I <sub>OH</sub> = MAX	2.4	3.3		2.4	3.1		V
V <sub>OL</sub>	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = 0.8 V, I <sub>OL</sub> = 32 mA			0.4			0.4	V
I <sub>OZ</sub>	V <sub>CC</sub> = MAX, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = 0.8 V, V <sub>O</sub> = 2.4 V			40			40	μA
	V <sub>CC</sub> = MAX, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = 0.8 V, V <sub>O</sub> = 0.4 V			-40			-40	
I <sub>I</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 5.5 V			1			1	mA
I <sub>IH</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.4 V			40			40	μA
I <sub>IL</sub>	A Inputs	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.5 V, Either $\bar{G}$ input at 2 V			-40		-40	μA
		V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V, Both $\bar{G}$ inputs at 0.4 V			-1.6		-1.6	
	$\bar{G}$ Inputs	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V			-1.6		-1.6	mA
I <sub>OS</sub> §	V <sub>CC</sub> = MAX	-40		-130	-40		-130	mA
I <sub>CC</sub>	V <sub>CC</sub> = MAX, Data inputs = 0 V, Output controls = 4.5 V,		59	77		59	77	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C.

§ Not more than one output should be shorted at a time.

**switching characteristics, V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C (see note 2)**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
t <sub>PLH</sub>	Any	Y	R <sub>L</sub> = 400 Ω, C <sub>L</sub> = 50 pF			17	ns	
t <sub>PHL</sub>						16	ns	
t <sub>PZH</sub>						35	ns	
t <sub>PZL</sub>						37	ns	
t <sub>PHZ</sub>			R <sub>L</sub> = 400 Ω, C <sub>L</sub> = 5 pF				11	ns
t <sub>PLZ</sub>							27	ns

NOTE 2: Load circuits and voltage waveforms are shown in Section 1.

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TTL Devices



**SN54LS365A, SN54LS367A  
SN74LS365A, SN74LS367A  
HEX BUS DRIVERS WITH 3-STATE OUTPUTS**

**recommended operating conditions**

	SN54LS365A SN54LS367A			SN74LS365A SN74LS367A			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
V <sub>CC</sub> Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V <sub>IH</sub> High-level input voltage	2			2			V
V <sub>IL</sub> Low-level input voltage			0.7			0.8	V
I <sub>OH</sub> High-level output current			-1			-2.6	mA
I <sub>OL</sub> Low-level output current			12			24	mA
T <sub>A</sub> Operating free-air temperature	-55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS†	SN54LS365A SN54LS367A		SN74LS365A SN74LS367A		UNIT		
		MIN	TYP‡	MAX	MIN		TYP‡	MAX
V <sub>IK</sub>	V <sub>CC</sub> = MIN, I <sub>I</sub> = -18 mA			-1.5		-1.5	V	
V <sub>OH</sub>	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = MAX, I <sub>OH</sub> = MAX	2.4	3.3		2.4	3.1	V	
V <sub>OL</sub>	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = MAX, I <sub>OL</sub> = 12 mA		0.25	0.4		0.25	0.4	V
	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = 0.8 V, I <sub>OL</sub> = 24 mA					0.35	0.5	
I <sub>OZ</sub>	V <sub>CC</sub> = MAX, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = MAX, V <sub>O</sub> = 2.4 V			20		20	μA	
	V <sub>CC</sub> = MAX, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = MAX, V <sub>O</sub> = 0.4 V			-20		-20		
I <sub>I</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 7 V			0.1		0.1	mA	
I <sub>IH</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.7 V			20		20	μA	
I <sub>IL</sub>	A Inputs	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.5 V, Either $\bar{G}$ input at 2 V			-20		-20	μA
		V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V, Both $\bar{G}$ inputs at 0.4 V			-0.4		-0.4	
	$\bar{G}$ Inputs	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V			-0.2		-0.2	mA
I <sub>OS</sub> §	V <sub>CC</sub> = MAX	-40		-225	-40		-225	mA
I <sub>CC</sub>	V <sub>CC</sub> = MAX, Data inputs = 0 V, Output controls = 4.5 V,		14	24		14	24	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C.

§ Not more than one output should be shorted at a time, and the duration of the short circuit should not exceed one second.

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**SN54LS365A, SN54LS367A**  
**SN74LS365A, SN74LS367A**  
**HEX BUS DRIVERS WITH 3-STATE OUTPUTS**

switching characteristics,  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$  (see note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
$t_{PLH}$	Any	Y	$R_L = 667\ \Omega$ , $C_L = 45\ \text{pF}$		10	16	ns	
$t_{PHL}$					9	22	ns	
$t_{PZH}$					19	35	ns	
$t_{PZL}$					24	40	ns	
$t_{PHZ}$			$R_L = 667\ \Omega$ , $C_L = 5\ \text{pF}$				30	ns
$t_{PLZ}$							35	ns

NOTE 2: Load circuits and voltage waveforms are shown in Section 1.

**SN54LS366A, SN54LS368A  
SN74LS366A, SN74LS368A  
HEX BUS DRIVERS WITH 3-STATE OUTPUTS**

recommended operating conditions

	SN54LS366A SN54LS368A			SN74LS366A SN74LS368A			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
V <sub>CC</sub> Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V <sub>IH</sub> High-level input voltage	2			2			V
V <sub>IL</sub> Low-level input voltage			0.7			0.8	V
I <sub>OH</sub> High-level output current			-1			-2.6	mA
I <sub>OL</sub> Low-level output current			12			24	mA
T <sub>A</sub> Operating free-air temperature	-55		125	0		70	°C

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

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TTL Devices

PARAMETER	TEST CONDITIONS†	SN54LS366A SN54LS368A			SN74LS366A SN74LS368A			UNIT
		MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V <sub>IK</sub>	V <sub>CC</sub> = MIN, I <sub>I</sub> = -18 mA			-1.5			-1.5	V
V <sub>OH</sub>	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = MAX, I <sub>OH</sub> = MAX	2.4	3.3		2.4	3.1		V
V <sub>OL</sub>	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = MAX, I <sub>OL</sub> = 12 mA		0.25	0.4		0.25	0.4	V
	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = 0.8 V, I <sub>OL</sub> = 24 mA					0.35	0.5	
I <sub>OZ</sub>	V <sub>CC</sub> = MAX, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = MAX, V <sub>O</sub> = 2.4 V			20			20	μA
	V <sub>CC</sub> = MAX, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = MAX, V <sub>O</sub> = 0.4 V			-20			-20	
I <sub>I</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 7 V			0.1			0.1	mA
I <sub>IH</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.7 V			20			20	μA
I <sub>IL</sub>	A Inputs	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.5 V, Either $\bar{G}$ input at 2 V			-20		-20	μA
		V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V, Both $\bar{G}$ inputs at 0.4 V			-0.4		-0.4	
	$\bar{G}$ Inputs	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V			-0.2		-0.2	mA
I <sub>OS</sub> §	V <sub>CC</sub> = MAX	-40		-225	-40		-225	mA
I <sub>CC</sub>	V <sub>CC</sub> = MAX, Data inputs = 0 V, Output controls = 4.5 V,		12	21		12	21	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C.

§ Not more than one output should be shorted at a time, and the duration of the short circuit should not exceed one second.



**SN54LS366A, SN54LS368A**  
**SN74LS366A, SN74LS368A**  
**HEX BUS DRIVERS WITH 3-STATE OUTPUTS**

switching characteristics,  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{ C}$  (see note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_{PLH}$	Any	Y	$R_L = 667\ \Omega$ , $C_L = 45\ \text{pF}$	7		15	ns
$t_{PHL}$				12		18	ns
$t_{PZH}$				18		35	ns
$t_{PZL}$				28		45	ns
$t_{PHZ}$			$R_L = 667\ \Omega$ , $C_L = 5\ \text{pF}$			32	ns
$t_{PLZ}$						35	ns

NOTE 2: Load circuits and voltage waveforms are shown in Section 1.

**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
JM38510/32201B2A	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 32201B2A	<a href="#">Samples</a>
JM38510/32201BEA	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 32201BEA	<a href="#">Samples</a>
JM38510/32201BEA	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 32201BEA	<a href="#">Samples</a>
JM38510/32203B2A	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 32203B2A	<a href="#">Samples</a>
JM38510/32203B2A	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 32203B2A	<a href="#">Samples</a>
JM38510/32203BEA	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 32203BEA	<a href="#">Samples</a>
JM38510/32203BEA	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 32203BEA	<a href="#">Samples</a>
JM38510/32203BFA	ACTIVE	CFP	W	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 32203BFA	<a href="#">Samples</a>
JM38510/32203BFA	ACTIVE	CFP	W	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 32203BFA	<a href="#">Samples</a>
M38510/32201B2A	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 32201B2A	<a href="#">Samples</a>
M38510/32201B2A	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 32201B2A	<a href="#">Samples</a>
M38510/32201BEA	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 32201BEA	<a href="#">Samples</a>
M38510/32201BEA	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 32201BEA	<a href="#">Samples</a>
M38510/32203B2A	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 32203B2A	<a href="#">Samples</a>
M38510/32203B2A	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 32203B2A	<a href="#">Samples</a>
M38510/32203BEA	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 32203BEA	<a href="#">Samples</a>

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
M38510/32203BEA	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 32203BEA	<a href="#">Samples</a>
M38510/32203BFA	ACTIVE	CFP	W	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 32203BFA	<a href="#">Samples</a>
M38510/32203BFA	ACTIVE	CFP	W	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 32203BFA	<a href="#">Samples</a>
SN54LS365AJ	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SN54LS365AJ	<a href="#">Samples</a>
SN54LS365AJ	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SN54LS365AJ	<a href="#">Samples</a>
SN54LS366AJ	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SN54LS366AJ	<a href="#">Samples</a>
SN54LS366AJ	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SN54LS366AJ	<a href="#">Samples</a>
SN54LS367AJ	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SN54LS367AJ	<a href="#">Samples</a>
SN54LS367AJ	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SN54LS367AJ	<a href="#">Samples</a>
SN54LS368AJ	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SN54LS368AJ	<a href="#">Samples</a>
SN54LS368AJ	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SN54LS368AJ	<a href="#">Samples</a>
SN74LS365AD	OBSOLETE	SOIC	D	16		TBD	Call TI	Call TI	0 to 70	LS365A	
SN74LS365AD	OBSOLETE	SOIC	D	16		TBD	Call TI	Call TI	0 to 70	LS365A	
SN74LS365ADR	ACTIVE	SOIC	D	16	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	LS365A	<a href="#">Samples</a>
SN74LS365ADR	ACTIVE	SOIC	D	16	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	LS365A	<a href="#">Samples</a>
SN74LS365AN	ACTIVE	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	SN74LS365AN	<a href="#">Samples</a>
SN74LS365AN	ACTIVE	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	SN74LS365AN	<a href="#">Samples</a>
SN74LS365ANSR	ACTIVE	SO	NS	16	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	74LS365A	<a href="#">Samples</a>
SN74LS365ANSR	ACTIVE	SO	NS	16	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	74LS365A	<a href="#">Samples</a>
SN74LS367AD	OBSOLETE	SOIC	D	16		TBD	Call TI	Call TI	0 to 70	LS367A	

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
SN74LS367AD	OBSOLETE	SOIC	D	16		TBD	Call TI	Call TI	0 to 70	LS367A	
SN74LS367ADR	ACTIVE	SOIC	D	16	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	LS367A	<a href="#">Samples</a>
SN74LS367ADR	ACTIVE	SOIC	D	16	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	LS367A	<a href="#">Samples</a>
SN74LS367AN	ACTIVE	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	SN74LS367AN	<a href="#">Samples</a>
SN74LS367AN	ACTIVE	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	SN74LS367AN	<a href="#">Samples</a>
SN74LS367ANE4	ACTIVE	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	SN74LS367AN	<a href="#">Samples</a>
SN74LS367ANE4	ACTIVE	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	SN74LS367AN	<a href="#">Samples</a>
SN74LS367ANSR	ACTIVE	SO	NS	16	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	74LS367A	<a href="#">Samples</a>
SN74LS367ANSR	ACTIVE	SO	NS	16	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	74LS367A	<a href="#">Samples</a>
SN74LS368AD	ACTIVE	SOIC	D	16	40	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	LS368A	<a href="#">Samples</a>
SN74LS368AD	ACTIVE	SOIC	D	16	40	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	LS368A	<a href="#">Samples</a>
SN74LS368AN	ACTIVE	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	SN74LS368AN	<a href="#">Samples</a>
SN74LS368AN	ACTIVE	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	SN74LS368AN	<a href="#">Samples</a>
SN74LS368ANSR	ACTIVE	SO	NS	16	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	74LS368A	<a href="#">Samples</a>
SN74LS368ANSR	ACTIVE	SO	NS	16	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	74LS368A	<a href="#">Samples</a>
SNJ54LS365AFK	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54LS 365AFK	<a href="#">Samples</a>
SNJ54LS365AFK	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54LS 365AFK	<a href="#">Samples</a>
SNJ54LS365AJ	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54LS365AJ	<a href="#">Samples</a>
SNJ54LS365AJ	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54LS365AJ	<a href="#">Samples</a>
SNJ54LS366AFK	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54LS 366AFK	<a href="#">Samples</a>

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
SNJ54LS366AFK	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54LS366AFK	<a href="#">Samples</a>
SNJ54LS366AJ	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54LS366AJ	<a href="#">Samples</a>
SNJ54LS366AJ	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54LS366AJ	<a href="#">Samples</a>
SNJ54LS367AJ	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54LS367AJ	<a href="#">Samples</a>
SNJ54LS367AJ	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54LS367AJ	<a href="#">Samples</a>
SNJ54LS368AJ	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54LS368AJ	<a href="#">Samples</a>
SNJ54LS368AJ	ACTIVE	CDIP	J	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54LS368AJ	<a href="#">Samples</a>
SNJ54LS368AW	ACTIVE	CFP	W	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54LS368AW	<a href="#">Samples</a>
SNJ54LS368AW	ACTIVE	CFP	W	16	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	SNJ54LS368AW	<a href="#">Samples</a>

(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.

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

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

**RoHS Exempt:** TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

**Green:** TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(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.

<sup>(5)</sup> 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.

<sup>(6)</sup> Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

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**OTHER QUALIFIED VERSIONS OF SN54LS365A, SN54LS367A, SN54LS368A, SN74LS365A, SN74LS367A, SN74LS368A :**

- Catalog : [SN74LS365A](#), [SN74LS367A](#), [SN74LS368A](#)
- Military : [SN54LS365A](#), [SN54LS367A](#), [SN54LS368A](#)

NOTE: Qualified Version Definitions:

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

## TAPE AND REEL INFORMATION



### QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74LS365ADR	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
SN74LS365ANSR	SO	NS	16	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1
SN74LS367ADR	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
SN74LS367ANSR	SO	NS	16	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1
SN74LS368ANSR	SO	NS	16	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1

**TAPE AND REEL BOX DIMENSIONS**


\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74LS365ADR	SOIC	D	16	2500	353.0	353.0	32.0
SN74LS365ANSR	SO	NS	16	2000	356.0	356.0	35.0
SN74LS367ADR	SOIC	D	16	2500	340.5	336.1	32.0
SN74LS367ANSR	SO	NS	16	2000	356.0	356.0	35.0
SN74LS368ANSR	SO	NS	16	2000	356.0	356.0	35.0



**TUBE**


\*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
JM38510/32201B2A	FK	LCCC	20	55	506.98	12.06	2030	NA
JM38510/32203B2A	FK	LCCC	20	55	506.98	12.06	2030	NA
JM38510/32203BF A	W	CFP	16	25	506.98	26.16	6220	NA
M38510/32201B2A	FK	LCCC	20	55	506.98	12.06	2030	NA
M38510/32203B2A	FK	LCCC	20	55	506.98	12.06	2030	NA
M38510/32203BF A	W	CFP	16	25	506.98	26.16	6220	NA
SN74LS365AN	N	PDIP	16	25	506	13.97	11230	4.32
SN74LS365AN	N	PDIP	16	25	506	13.97	11230	4.32
SN74LS367AN	N	PDIP	16	25	506	13.97	11230	4.32
SN74LS367AN	N	PDIP	16	25	506	13.97	11230	4.32
SN74LS367ANE4	N	PDIP	16	25	506	13.97	11230	4.32
SN74LS367ANE4	N	PDIP	16	25	506	13.97	11230	4.32
SN74LS368AD	D	SOIC	16	40	507	8	3940	4.32
SN74LS368AN	N	PDIP	16	25	506	13.97	11230	4.32
SN74LS368AN	N	PDIP	16	25	506	13.97	11230	4.32
SNJ54LS365AFK	FK	LCCC	20	55	506.98	12.06	2030	NA
SNJ54LS366AFK	FK	LCCC	20	55	506.98	12.06	2030	NA
SNJ54LS368AW	W	CFP	16	25	506.98	26.16	6220	NA



# PACKAGE OUTLINE

## NS0016A

### SOP - 2.00 mm max height

SOP



4220735/A 12/2021

#### NOTES:

1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm, per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm, per side.

# EXAMPLE BOARD LAYOUT

NS0016A

SOP - 2.00 mm max height

SOP



4220735/A 12/2021

NOTES: (continued)

- 5. Publication IPC-7351 may have alternate designs.
- 6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

NS0016A

SOP - 2.00 mm max height

SOP



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE:7X

4220735/A 12/2021

NOTES: (continued)

7. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
8. Board assembly site may have different recommendations for stencil design.

D (R-PDSO-G16)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. 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.
  - D. 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



- NOTES:
- All linear dimensions are in millimeters.
  - This drawing is subject to change without notice.
  - Publication IPC-7351 is recommended for alternate designs.
  - 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.
  - Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

# MECHANICAL DATA

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

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



- NOTES:
- 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.

W (R-GDFP-F16)

CERAMIC DUAL FLATPACK



- NOTES:
- 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



## GENERIC PACKAGE VIEW

**FK 20**

**LCCC - 2.03 mm max height**

8.89 x 8.89, 1.27 mm pitch

LEADLESS CERAMIC CHIP CARRIER

This image is a representation of the package family, actual package may vary.  
Refer to the product data sheet for package details.



4229370VA\

J (R-GDIP-T\*\*)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



DIM \ PINS **	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)



4040083/F 03/03

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

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

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- NOTES:
- 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.

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