Package Options Include Plastic Small-Outline (D) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) DIPs

description

These devices contain four independent 2-input OR gates. They perform the Boolean functions Y = A + B or $Y = \overline{A} \bullet \overline{B}$ in positive logic.

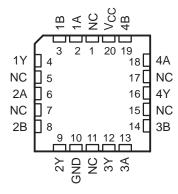
The SN54F32 is characterized for operation over the full military temperature range of -55°C to 125°C. The SN74F32 is characterized for operation from 0°C to 70°C.

FUNCTION TABLE (each gate)

INP	JTS	OUTPUT
Α	В	Y
Н	Χ	Н
Χ	Н	Н
L	L	L

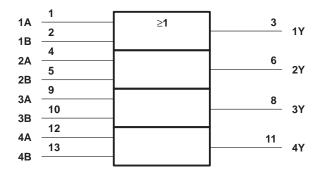
SN54F32...J PACKAGE SN74F32...D OR N PACKAGE (TOP VIEW) V_{CC} 1A 1B 4B 13 1Y 12 4A 2A ∏ 4Y 11 2B 5 10 3B 2Y 3A 9 **GND** 3Y 8

SN54F32 . . . FK PACKAGE (TOP VIEW)



NC - No internal connection

logic symbol†



[†] This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12. Pin numbers shown are for the D, J, and N packages.

logic diagram, each gate (positive logic)





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.



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

Supply voltage range, V _{CC}	0.5 V to 7 V
Input voltage range, V _I (see Note 1)	-1.2 V to 7 V
Input current range	-30 mA to 5 mA
Voltage range applied to any output in the high state	. -0.5 V to V _{CC}
Current into any output in the low state	
Package thermal impedance, θ _{JA} (see Note 2): D package	127°C/W
N package	78°C/W
Storage temperature range, T _{stg}	−65°C to 150°C

[†] 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 voltage ratings may be exceeded provided the input current ratings are observed.

recommended operating conditions (see Note 3)

		SN54F32			S	UNIT		
		MIN	NOM	MAX	MIN	NOM	MAX	UNIT
Vcc	Supply voltage	4.5	5	5.5	4.5	5	5.5	V
VIH	High-level input voltage	2			2			V
VIL	Low-level input voltage			0.8			0.8	V
ΙK	Input clamp current			-18			-18	mA
ІОН	High-level output current			-1			-1	mA
loL	Low-level output current			20			20	mA
TA	Operating free-air temperature	-55		125	0		70	°C

NOTE 3: All unused inputs of the device must be held at V_{CC} 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)

PARAMETER	TES	T CONDITIONS	;	SN54F32			UNIT		
PARAMETER	IES	TEST CONDITIONS				MIN	TYP‡	MAX	UNIT
VIK	$V_{CC} = 4.5 \text{ V},$	$I_{I} = -18 \text{ mA}$			-1.2			-1.2	V
Voн	$V_{CC} = 4.5 \text{ V},$	$I_{OH} = -1 \text{ mA}$	2.5	3.4		2.5	3.4		V
VOH	$V_{CC} = 4.75 \text{ V},$	$I_{OH} = -1 \text{ mA}$				2.7			V
V _{OL}	$V_{CC} = 4.5 \text{ V},$	$I_{OL} = 20 \text{ mA}$		0.3	0.5		0.3	0.5	V
l _l	$V_{CC} = 5.5 V,$	V _I = 7 V			0.1			0.1	mA
lіН	$V_{CC} = 5.5 V,$	V _I = 2.7 V			20			20	μΑ
I _Ι L	$V_{CC} = 5.5 V,$	V _I = 0.5 V			-0.6			-0.6	mA
los§	$V_{CC} = 5.5 \text{ V},$	V _O = 0	-60		-150	-60		-150	mA
^I CCH [¶]	V _{CC} = 5.5 V			6.1	9.2		6.1	9.2	mA
lccl	$V_{CC} = 5.5 V,$	V _I = 0		10.3	15.5		10.3	15.5	mA

[‡] All typical values are at $V_{CC} = 5 \text{ V}$, $T_A = 25^{\circ}\text{C}$.



^{2.} The package thermal impedance is calculated in accordance with JESD 51, except for through-hole packages, which use a trace length of zero.

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

 $[\]P$ I_{CCH} is measured with one input per gate at 4.5 V and all others grounded.

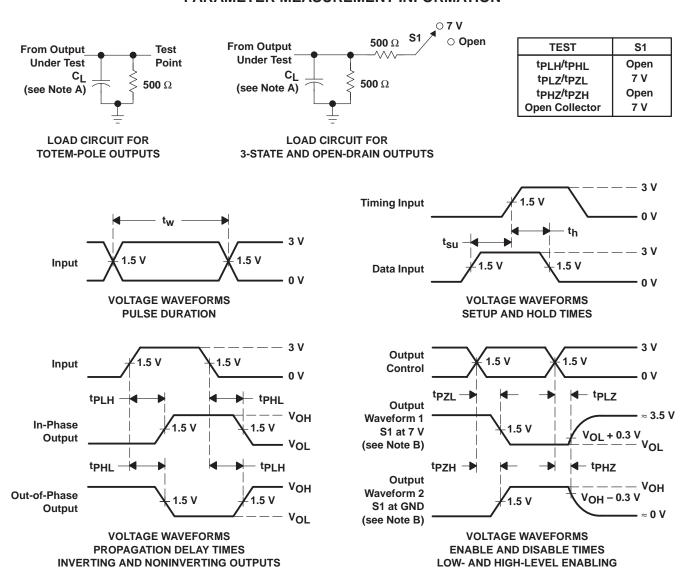
SN54F32, SN74F32 QUADRUPLE 2-INPUT POSITIVE-OR GATES

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switching characteristics over recommended operating free-air temperature range (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 5 V, T _A = 25°C			SN54	F32	SN74F32		UNIT
	(IIII O1)	(0011 01)	MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t _{PLH}	A or B	V	2.2	3.8	5.6	2.2	7.5	2.2	6.6	no
t _{PHL}	AUIB	Y	2.2	3.6	5.3	1.7	7.5	2.2	6.3	ns

PARAMETER MEASUREMENT INFORMATION



NOTES: A. C_L includes probe and jig 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. All input pulses are supplied by generators having the following characteristics: PRR \leq 1 MHz, $Z_Q = 50 \Omega$, $t_f \leq$ 2.5 ns, $t_f \leq$ 2.5 ns, duty cycle = 50%.
- D. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms







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PACKAGING INFORMATION

Orderable Device	Status	Package Type	Package Drawing	Pins	Package Qty	Eco Plan	Lead/Ball Finish (6)	MSL Peak Temp	Op Temp (°C)	Device Marking (4/5)	Samples
5962-9758801Q2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962- 9758801Q2A SNJ54F 32FK	Sample
5962-9758801QCA	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9758801QC A SNJ54F32J	Sample
5962-9758801QDA	ACTIVE	CFP	W	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9758801QD A SNJ54F32W	Sample
SN54F32J	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	SN54F32J	Sample
SN74F32D	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	F32	Sample
SN74F32DG4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	F32	Sample
SN74F32DR	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	F32	Sample
SN74F32DRE4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	F32	Sample
SN74F32DRG4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	F32	Sample
SN74F32N	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	0 to 70	SN74F32N	Sample
SN74F32N3	OBSOLETE	PDIP	N	14		TBD	Call TI	Call TI	0 to 70		
SN74F32NE4	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	0 to 70	SN74F32N	Sample
SN74F32NSR	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	74F32	Sample
SNJ54F32FK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962- 9758801Q2A SNJ54F 32FK	Sample
SNJ54F32J	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9758801QC A	Sample



PACKAGE OPTION ADDENDUM

10-Jun-2014

Orderable Device	Status	Package Type	•	Pins	_	Eco Plan	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Device Marking	Samples
	(1)		Drawing		Qty	(2)	(6)	(3)		(4/5)	
										SNJ54F32J	
SNJ54F32W	ACTIVE	CFP	W	14	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9758801QD A SNJ54F32W	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

OTHER QUALIFIED VERSIONS OF SN54F32, SN74F32:

Catalog: SN74F32

Military: SN54F32

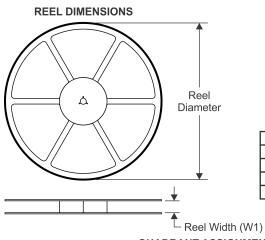
NOTE: Qualified Version Definitions:

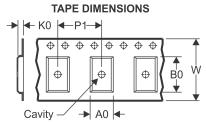
- Catalog TI's standard catalog product
- Military QML certified for Military and Defense Applications

PACKAGE MATERIALS INFORMATION

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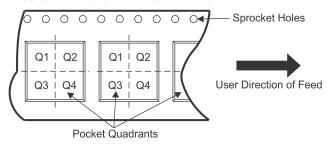
TAPE AND REEL INFORMATION





A0	Dimension designed to accommodate the component width
B0	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

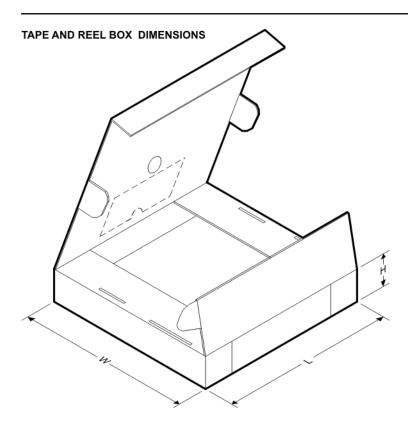
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions 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
SN74F32DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74F32NSR	SO	NS	14	2000	330.0	16.4	8.1	10.4	2.5	12.0	16.0	Q1

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*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74F32DR	SOIC	D	14	2500	367.0	367.0	38.0
SN74F32NSR	SO	NS	14	2000	367.0	367.0	38.0

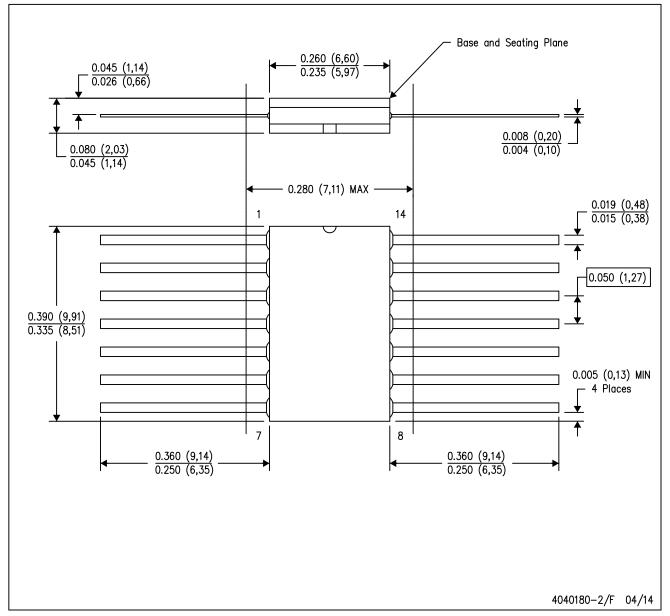
14 LEADS SHOWN



- 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-F14)

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 GDFP1-F14



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-PDSO-G14)

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 AB.



D (R-PDSO-G14)

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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