SDFS091 - MARCH 1987 - REVISED OCTOBER 1993

- Compares Two 8-Bit Words
- Package Options Include Plastic Small-Outline Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs

#### description

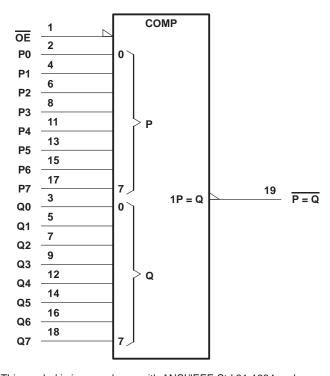
These identity comparators perform comparisons on two 8-bit binary or BCD words. They provide  $\overline{P} = \overline{Q}$  outputs.

The SN54F521 is characterized for operation over the full military temperature range of -55°C to 125°C. The SN74F521 is characterized for operation from 0°C to 70°C.

**FUNCTION TABLE** 

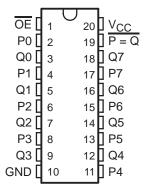
INPU	JTS	OUTPUT
P, Q	OE	P = Q
P = Q	L	L
P≠Q	Χ	Н
Х	Н	Н

### logic symbol†

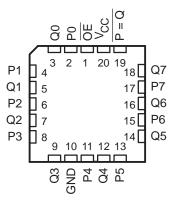


<sup>†</sup> This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

SN54F521 . . . J PACKAGE SN74F521 . . . DW OR N PACKAGE (TOP VIEW)

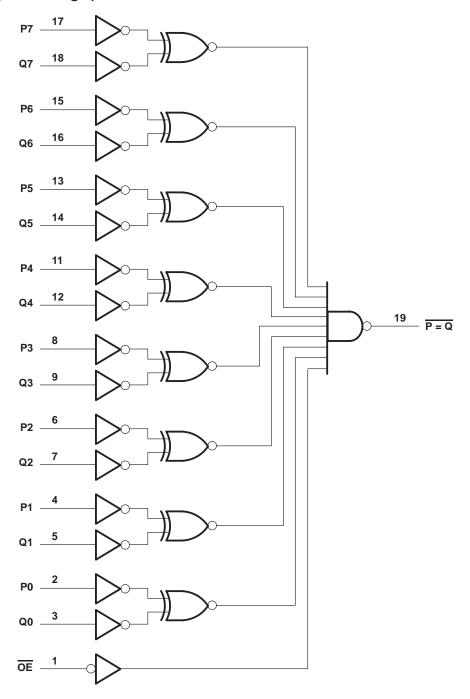


SN54F521 . . . FK PACKAGE (TOP VIEW)





## logic diagram (positive logic)



SDFS091 - MARCH 1987 - REVISED OCTOBER 1993

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

Supply voltage range, V <sub>CC</sub>		$\dots$ $-0.5\ V$ to 7 $V$
Input voltage range, V <sub>I</sub> (see Note 1) .		$\dots$ $$ –1.2 V to 7 V
Input current range		-30 mA to 5 mA
Voltage range applied to any output in	the high state	$\dots$ -0.5 V to V <sub>CC</sub>
Current into any output in the low state	-	40 mA
Operating free-air temperature range:	SN54F521	. $-55^{\circ}\text{C}$ to $125^{\circ}\text{C}$
	SN74F521	0°C to 70°C
Storage temperature range		. −65°C to 150°C

<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.

#### recommended operating conditions

		SN54F521			S			
		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
V <sub>IL</sub>	Low-level input voltage			0.8			0.8	V
liK	Input clamp current			-18			-18	mA
lон	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

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

DADAMETER	TEST CONDITIONS			N54F52	1	S	I	LINUT	
PARAMETER	TES	TEST CONDITIONS			MAX	MIN	TYP <sup>‡</sup>	MAX	UNIT
VIK	V <sub>CC</sub> = 4.5 V,	$I_{I} = -18 \text{ mA}$			-1.2			-1.2	V
V	V <sub>CC</sub> = 4.5 V,	I <sub>OH</sub> = – 1 mA	2.5	3.4		2.5	3.4		V
VOH	$V_{CC} = 4.75 \text{ V},$	I <sub>OH</sub> = – 1 mA				2.7			V
VOL	$V_{CC} = 4.5 \text{ V},$	$I_{OL} = 20 \text{ mA}$		0.3	0.5		0.3	0.5	V
lį	V <sub>CC</sub> = 5.5 V,	V <sub>I</sub> = 7 V			100			100	μΑ
lіН	V <sub>CC</sub> = 5.5 V,	V <sub>I</sub> = 2.7 V			20			20	μΑ
I <sub>I</sub> L	V <sub>CC</sub> = 5.5 V,	V <sub>I</sub> = 0.5 V			- 0.6			- 0.6	mA
l <sub>OS</sub> §	V <sub>CC</sub> = 5.5 V,	VO = 0	-60		-150	-60		-150	mA
lcc	$V_{CC} = 5.5 \text{ V},$	See Note 2		21	32		21	32	mA

<sup>‡</sup> All typical values are at  $V_{CC} = 5 \text{ V}$ ,  $T_A = 25^{\circ}\text{C}$ .

NOTE 2: ICC is measured with all inputs at 4.5 V.

NOTE 1: The input voltage ratings may be exceeded provided the input current ratings are observed.

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

## SN54F521, SN74F521 8-BIT IDENTITY COMPARATORS

SDFS091 - MARCH 1987 - REVISED OCTOBER 1993

### switching characteristics (see Note 3)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	C <sub>I</sub> R <sub>I</sub>	$V_{CC} = 5 \text{ V},$ $C_{L} = 50 \text{ pF},$ $R_{L} = 500 \Omega,$ $T_{A} = 25^{\circ}\text{C}$			$V_{CC}$ = 4.5 V to 5.5 V, $C_L$ = 50 pF, $R_L$ = 500 Ω, $T_A$ = MIN to MAX <sup>†</sup>				
	, ,	(==,	′F521			SN54F521		SN74F521			
			MIN	TYP	MAX	MIN	MAX	MIN	MAX		
<sup>t</sup> PLH	D == 0	P = Q	2.7	6.6	10	2.7	14	2.7	11		
<sup>t</sup> PHL	P or Q	P = Q	3.7	6.6	10	3.2	12	3.2	11	ns	
t <sub>PLH</sub>	ŌĒ	P = Q	2.2	4.6	6.5	2.2	8.5	2.2	7.5	ne	
<sup>t</sup> PHL	OE .	P = Q	2.7	6.1	9	2.7	13.5	2.7	10	ns	

<sup>†</sup> For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions. NOTE 3: Load circuits and waveforms are shown in Section 1.



25-Jan-2012

#### **PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/ Ball Finish	MSL Peak Temp <sup>(3)</sup>	Samples (Requires Login)
5962-9759101Q2A	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Call TI	
5962-9759101QRA	ACTIVE	CDIP	J	20	1	TBD	Call TI	Call TI	
5962-9759101QSA	ACTIVE	CFP	W	20	1	TBD	Call TI	Call TI	
JM38510/34701B2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	
JM38510/34701BRA	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	
JM38510/34701BSA	ACTIVE	CFP	W	20	1	TBD	Call TI	N / A for Pkg Type	
M38510/34701B2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	
M38510/34701BRA	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	
M38510/34701BSA	ACTIVE	CFP	W	20	1	TBD	Call TI	N / A for Pkg Type	
SN54F521J	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	
SN74F521DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74F521DWE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74F521DWG4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74F521DWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74F521DWRE4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74F521DWRG4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74F521N	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN74F521N3	OBSOLETE	PDIP	N	20		TBD	Call TI	Call TI	
SN74F521NE4	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN74F521NSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74F521NSRE4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74F521NSRG4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SNJ54F521FK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	



### PACKAGE OPTION ADDENDUM

25-Jan-2012

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/ Ball Finish	MSL Peak Temp <sup>(3)</sup>	Samples (Requires Login)
SNJ54F521J	ACTIVE	CDIP	J	20	1	TBD	A42	N / A for Pkg Type	
SNJ54F521W	ACTIVE	CFP	W	20	1	TBD	Call TI	N / A for Pkg Type	

(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.

**Important Information and Disclaimer:** The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

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 SN54F521, SN74F521:

Catalog: SN74F521

Military: SN54F521

NOTE: Qualified Version Definitions:



25-Jan-2012

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



#### TAPE AND REEL INFORMATION





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

### QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



#### \*All dimensions are nominal

Device	Package Type	Package Drawing			Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74F521DWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.0	2.7	12.0	24.0	Q1
SN74F521NSR	SO	NS	20	2000	330.0	24.4	8.2	13.0	2.5	12.0	24.0	Q1





\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74F521DWR	SOIC	DW	20	2000	346.0	346.0	41.0
SN74F521NSR	SO	NS	20	2000	346.0	346.0	41.0

### 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-F20)

### 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-F20



# 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.



DW (R-PDSO-G20)

### PLASTIC SMALL OUTLINE



NOTES: A. All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M-1994.

- B. This drawing is subject to change without notice.
- C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
- D. Falls within JEDEC MS-013 variation AC.



DW (R-PDSO-G20)

PLASTIC SMALL OUTLINE



- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Refer to IPC7351 for alternate board design.
- 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
- 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.



#### **IMPORTANT NOTICE**

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

**Applications** 

Automotive and Transportation www.ti.com/automotive

e2e.ti.com

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

		•	
Amplifiers	amplifier.ti.com	Communications and Telecom	www.ti.com/communications
Data Converters	dataconverter.ti.com	Computers and Peripherals	www.ti.com/computers
DLP® Products	www.dlp.com	Consumer Electronics	www.ti.com/consumer-apps
DSP	dsp.ti.com	Energy and Lighting	www.ti.com/energy
Clocks and Timers	www.ti.com/clocks	Industrial	www.ti.com/industrial
Interface	interface.ti.com	Medical	www.ti.com/medical
Logic	logic.ti.com	Security	www.ti.com/security
Power Mgmt	power.ti.com	Space, Avionics and Defense	www.ti.com/space-avionics-defense
Microcontrollers	microcontroller.ti.com	Video and Imaging	www.ti.com/video

RFID <u>www.ti-rfid.com</u>
OMAP Mobile Processors www.ti.com/omap

**Products** 

Audio

Wireless Connectivity www.ti.com/wirelessconnectivity

www.ti.com/audio

TI E2E Community Home Page

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265 Copyright © 2012, Texas Instruments Incorporated