Rochester Electronics Manufactured Components

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All recreations are done with the approval of the OCM.

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceed the OCM data sheet.

Quality Overview

• ISO-9001
• AS9120 certification
• Qualified Manufacturers List (QML) MIL-PRF-35835
 • Class Q Military
 • Class V Space Level
• Qualified Suppliers List of Distributors (QSLD)

 • Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OEM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.

- All Outputs Are High for Invalid Input Conditions

- Also for Application as
  4-Line-to-16-Line Decoders
  3-Line-to-8-Line Decoders

- Diode-Clamped Inputs

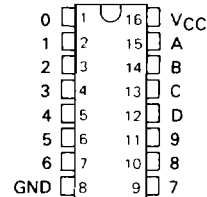| TYPES	TYPICAL POWER DISSIPATION	TYPICAL PROPAGATION DELAYS
'42A	140 mW	17 ns
'LS42	35 mW	17 ns

description

These monolithic BCD-to-decimal decoders consist of eight inverters and ten four-input NAND gates. The inverters are connected in pairs to make BCD input data available for decoding by the NAND gates. Full decoding of valid input logic ensures that all outputs remain off for all invalid input conditions.

The '42A and 'LS42 feature inputs and outputs that are compatible for use with most TTL and other saturated low-level logic circuits. DC noise margins are typically one volt.

The SN5442A and SN54LS42 are characterized for operation over the full military temperature range of −55°C to 125°C. The SN7442A and SN74LS42 are characterized for operation from 0°C to 70°C.
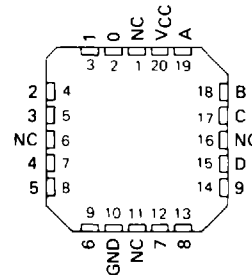
SN5442A, SN54LS42 . . . J OR W PACKAGE
SN7442A . . . N PACKAGE
SN74LS42 . . D OR N PACKAGE
(TOP VIEW)

```
        _____
0 [ 1  U  16 ] VCC
1 [ 2     15 ] A
2 [ 3     14 ] B
3 [ 4     13 ] C
4 [ 5     12 ] D
5 [ 6     11 ] 9
6 [ 7     10 ] 8
GND [ 8    9 ] 7
```

SN54LS42 . . . FK PACKAGE
(TOP VIEW)

```
            NC VCC
         1  0  N  V  A
         3  2  1  20 19
  2 [ 4              18 ] B
  3 [ 5              17 ] C
 NC [ 6              16 ] NC
  4 [ 7              15 ] D
  5 [ 8              14 ] 9
         9 10 11 12 13
         6  GND NC 7  8
```

NC - No internal connection

2

TTL Devices

TEXAS INSTRUMENTS
POST OFFICE BOX 655012 • DALLAS, TEXAS 75265
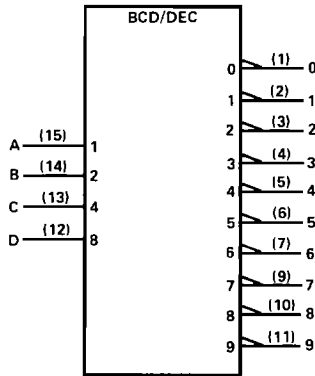
logic symbol[†]

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

2

TTL Devices

logic diagram (positive logic)
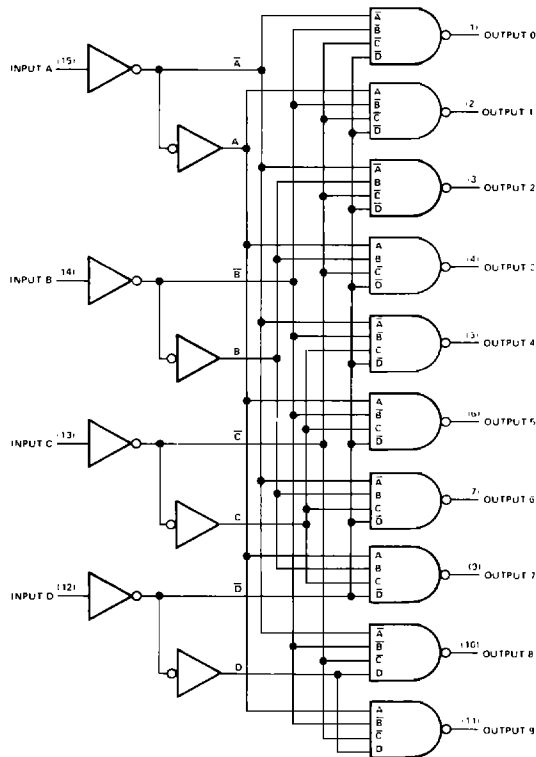
Pin numbers shown are for D, J, N, and W packages

schematics of inputs and outputs
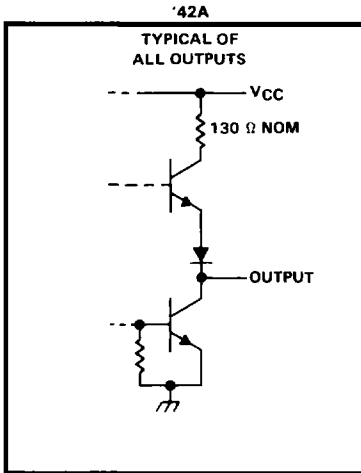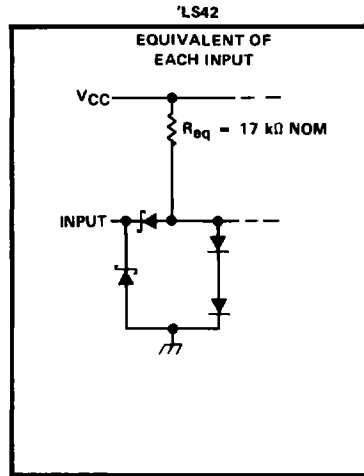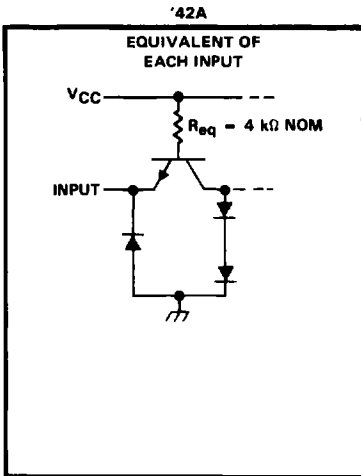
'42A

EQUIVALENT OF
EACH INPUT

V_CC

R_{eq} = 4 kΩ NOM

INPUT

'LS42

EQUIVALENT OF
EACH INPUT

V_CC

R_{eq} = 17 kΩ NOM

INPUT

'42A

TYPICAL OF
ALL OUTPUTS

V_CC

130 Ω NOM

OUTPUT

'LS42

TYPICAL OF
ALL OUTPUTS

V_CC

120 Ω NOM

OUTPUT

TTL Devices

2

FUNCTION TABLE

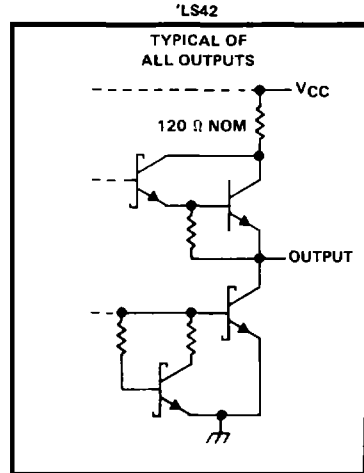| NO.	BCD INPUT				DECIMAL OUTPUT									
	D	C	B	A	0	1	2	3	4	5	6	7	8	9
0	L	L	L	L	L	H	H	H	H	H	H	H	H	H
1	L	L	L	H	H	L	H	H	H	H	H	H	H	H
2	L	L	H	L	H	H	L	H	H	H	H	H	H	H
3	L	L	H	H	H	H	H	L	H	H	H	H	H	H
4	L	H	L	L	H	H	H	H	L	H	H	H	H	H
5	L	H	L	H	H	H	H	H	H	L	H	H	H	H
6	L	H	H	L	H	H	H	H	H	H	L	H	H	H
7	L	H	H	H	H	H	H	H	H	H	H	L	H	H
8	H	L	L	L	H	H	H	H	H	H	H	H	L	H
9	H	L	L	H	H	H	H	H	H	H	H	H	H	L
INVALID	H	L	H	L	H	H	H	H	H	H	H	H	H	H
INVALID	H	L	H	H	H	H	H	H	H	H	H	H	H	H
INVALID	H	H	L	L	H	H	H	H	H	H	H	H	H	H
INVALID	H	H	L	H	H	H	H	H	H	H	H	H	H	H
INVALID	H	H	H	L	H	H	H	H	H	H	H	H	H	H
INVALID	H	H	H	H	H	H	H	H	H	H	H	H	H	H

H = high level, L = low level

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

Supply voltage, V_{CC} (see Note 1) . . . . 7 V
Input voltage: '42A . . . . 5.5 V
                 'LS42 . . . . 7 V
Operating free-air temperature range: SN5442A, SN54LS42 . . . . −55°C to 125°C
                                  SN7442A, SN74LS42 . . . . 0°C to 70°C
Storage temperature range . . . . −65°C to 150°C

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

2

TTL Devices

TEXAS
INSTRUMENTS
POST OFFICE BOX 655012 • DALLAS, TEXAS 75265

recommended operating conditions

	SN5442A MIN	SN5442A NOM	SN5442A MAX	SN7442A MIN	SN7442A NOM	SN7442A MAX	UNIT
Supply voltage, V_{CC}	4 5	5	5 5	4 75	5	5 25	V
High-level output current, I_{OH}			800			800	μA
Low-level output current, I_{OL}			16			16	mA
Operating free air temperature, T_A	−55		125	0		70	C

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

PARAMETER		TEST CONDITIONS†	SN5442A MIN	SN5442A TYP‡	SN5442A MAX	SN7442A MIN	SN7442A TYP‡	SN7442A MAX	UNIT
V_{IH}	High-level input voltage		2			2			V
V_{IL}	Low-level input voltage				0 8			0 8	V
V_{IK}	Input clamp voltage	V_{CC} = MIN, I_I = -12 mA			- 1 5			- 1 5	V
V_{OH}	High-level output voltage	V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = 0 8 V, I_{OH} = - 800 μA	2 4	3 4		2 4	3 4		V
V_{OL}	Low-level output voltage	V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = 0.8 V, I_{OL} = 16 mA		0 2	0 4		0 2	0 4	V
I_I	Input current at maximum input voltage	V_{CC} = MAX, V_I = 5 5 V			1			1	mA
I_{IH}	High-level input current	V_{CC} = MAX, V_I = 2 4 V			40			40	μA
I_{IL}	Low level input current	V_{CC} = MAX, V_I = 0 4 V			−1 6			−1 6	mA
I_{OS}	Short-circuit output current ‡	V_{CC} = MAX	20		- 55	18		−55	mA
I_{CC}	Supply current	V_{CC} = MAX, See Note 2		28	41		28	56	mA

† For conditions shown as MIN or MAX, use the appropriate values specified under recommended operating conditions
‡ All typical values are at V_{CC} = 5 V, T_A = 25 C
‡ Not more than one output should be shorted at a time
NOTE 2 I_{CC} is measured with all outputs open and all inputs grounded

switching characteristics, V_{CC} = 5 V, T_A = 25 °C

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PHL}	Propagation delay time, high-to-low-level output from A, B, C, or D through 2 levels of logic			14	25	ns
t_{PHL}	Propagation delay time, high-to-low-level output from A, B, C, or D through 3 levels of logic	C_L = 15 pF, R_L = 400 Ω, See Note 3		17	30	ns
t_{PLH}	Propagation delay time, low-to-high-level output from A, B, C, and D through 2 levels of logic			10	25	ns
t_{PLH}	Propagation delay time, low-to-high-level output from A, B, C, and D through 3 levels of logic			17	30	ns

NOTE 3   Load circuits and voltage waveforms are shown in Section 1

2

TTL Devices

recommended operating conditions

	SN54LS42 MIN	NOM	MAX	SN74LS42 MIN	NOM	MAX	UNIT
Supply voltage, V_{CC}	4.5	5	5.5	4.75	5	5.25	V
High-level output current, I_{OH}			−400			−400	μA
Low-level output current, I_{OL}			4			8	mA
Operating free-air temperature, T_A	−55		125	0		70	°C

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

PARAMETER		TEST CONDITIONS†		SN54LS42 MIN	TYP‡	MAX	SN74LS42 MIN	TYP‡	MAX	UNIT
V_{IH}	High-level input voltage			2			2			V
V_{IL}	Low-level input voltage					0.7			0.8	V
V_{IK}	Input clamp voltage	V_{CC} = MIN, I_I = −18 mA				−1.5			−1.5	V
V_{OH}	High-level output voltage	V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = V_{IL} max, I_{OH} = −400 μA		2.5	3.5		2.7	3.5		V
V_{OL}	Low-level output voltage	V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = V_{IL} max	I_{OL} = 4 mA		0.25	0.4		0.25	0.4	V
			I_{OL} = 8 mA					0.35	0.5	
I_I	Input current at maximum input voltage	V_{CC} = MAX, V_I = 7 V				0.1			0.1	mA
I_{IH}	High-level input current	V_{CC} = MAX, V_I = 2.7 V				20			20	μA
I_{IL}	Low-level input current	V_{CC} = MAX, V_I = 0.4 V				−0.4			−0.4	mA
I_{OS}	Short-circuit output current §	V_{CC} = MAX		−20		−100	−20		−100	mA
I_{CC}	Supply current	V_{CC} = MAX, See Note 2			7	13		7	13	mA

†For conditions shown as MIN or MAX use the appropriate value specified under recommended operating conditions.
‡All typical values are at V_{CC} = 5 V, T_A = 25°C.
§Not more than one output should be shorted at a time, and duration of the short-circuit should not exceed one second.
NOTE 2. I_{CC} is measured with all outputs open and inputs grounded.

switching characteristics, V_{CC} = 5 V, T_A = 25°C

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PHL}	Propagation delay time, high-to-low-level output from A, B, C, or D through 2 levels of logic			15	25	ns
t_{PHL}	Propagation delay time, high-to-low-level output from A, B, C, or D through 3 levels of logic	C_L = 15 pF, R_L = 2 kΩ, See Note 3		20	30	ns
t_{PLH}	Propagation delay time, low-to-high-level output from A, B, C, and D through 2 levels of logic			15	25	ns
t_{PLH}	Propagation delay time, low-to-high-level output from A, B, C, and D through 3 levels of logic			20	30	ns

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.

2

TTL Devices