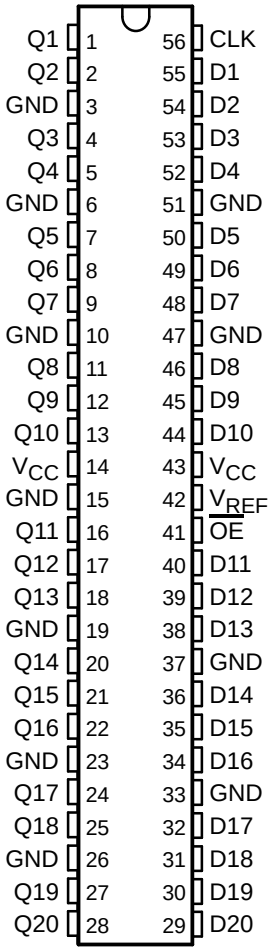
- ***EPIC*-II*B*™ (Enhanced-Performance Implanted CMOS) Submicron Process**
- **Members of the Texas Instruments *Widebus*™ Family**
- **Provide GTL Signals Levels on Both Inputs and Outputs**
- **Distributed V_{CC} and GND Pin Configuration Minimizes High-Speed Switching Noise**
- **Flow-Through Architecture Optimizes PCB Layout**
- **Package Options Include Plastic Shrink Small-Outline (DL) and Thin Shrink Small-Outline (DGG) Packages, and Ceramic Flat (WD) Package**

SN54GTL16921 . . . WD PACKAGE
SN74GTL16921 . . . DGG OR DL PACKAGE
(TOP VIEW)



description

The ′GTL16921 have 20 single-bit flip-flops, which are designed to provide terminated GTL logic levels.

These devices can be used as one 20-bit flip-flop. The 20 flip-flops are edge-triggered D-type flip-flops. The ′GTL16921 provide true data at the Q outputs on the positive transition of the clock (CLK) input.

The output-enable ($\overline{OE}$) input can be used to place the outputs in a high state.The output-enable input does not affect the internal operation of the flip-flops. Old data can be retained or new data can be entered while the outputs are in the high-impedance state.

The SN54GTL16921 is characterized for operation over the full military temperature range of −55°C to 125°C. The SN74GTL16921 is characterized for operation from 0°C to 70°C.

FUNCTION TABLE
(each flip-flop)

INPUTS			OUTPUT
$\overline{OE}$	CLK	D	Q
L	↑	H	H
L	↑	L	L
L	L	X	Q_0
H	X	X	Z

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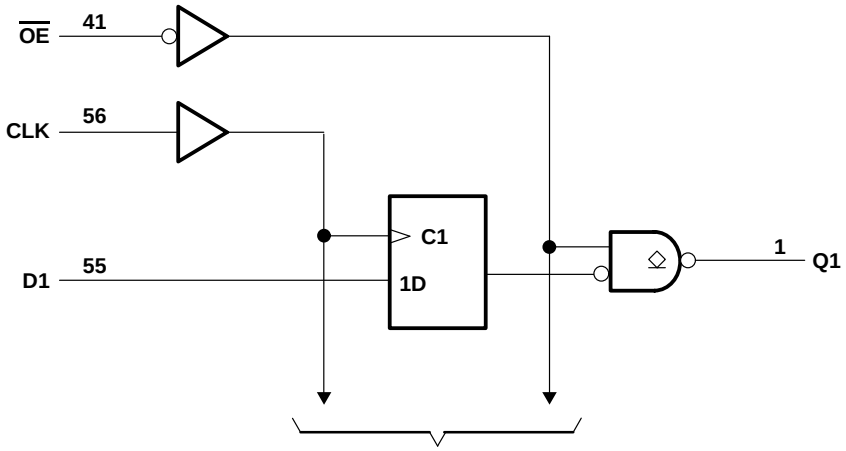
logic diagram (positive logic)



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

Supply voltage range, V_{CC} . . . . . –0.5 V to 4.6 V
Input voltage range, V_I (see Note 1) . . . . . –0.5 V to 4.6 V
Current into any output in the low state, I_O . . . . . 80 mA
Input clamp current, I_{IK} ($V_I < 0$) . . . . . –50 mA
Output clamp current, I_{OK} ($V_O < 0$ or $V_O > 0$) . . . . . ±50 mA
Continuous current through V_{CC} or GND . . . . . ±100 mA
Maximum power dissipation at T_A = 55°C (in still air) (see Note 2): DGG package . . . . . 1 W
DL package . . . . . 1.4 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 and output negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
2. The maximum package power dissipation is calculated using a junction temperature of 150°C and a board trace length of 750 mils. For more information, refer to the *Package Thermal Considerations* application note in the 1994 *ABT Advanced BiCMOS Technology Data Book*, literature number SCBD002B.

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recommended operating conditions

		SN54GTL16921			SN74GTL16921			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	3		3.6	3		3.6	V
V_{REF}	Supply voltage	0.74	0.8	0.87	0.74	0.8	0.87	V
V_I	Input voltage	0		V_{CC}	0		V_{CC}	V
V_{OH}	High-level output voltage			3.6			3.6	V
V_{IH}	High-level input voltage	V_{REF} + 50 mV			V_{REF} + 50 mV			V
V_{IL}	Low-level input voltage			V_{REF} – 50 mV			V_{REF} – 50 mV	V
I_{IK}	Input clamp current			–18			–18	mA
I_{OL}	Low-level output current			40			40	mA
T_A	Operating free-air temperature	–55		125	0		70	°C

electrical characteristics over recommended operating free-air temperature range, V_{REF} = 0.8 V (unless otherwise noted)

PARAMETER		TEST CONDITIONS		SN54GTL16921			SN74GTL16921			UNIT
				MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{IK}		V_{CC} = 3 V,	I_I = –18 mA			–1.2			–1.2	V
V_{OL}		V_{CC} = 3 V,	I_{OL} = 40 mA			0.4			0.4	V
I_I		V_{CC} = 3 V	$V_I = V_{CC}$			5			5	µA
			V_I = 0			–5			–5	
I_{OH}		V_{CC} = 3 V,	V_{OH} = 3.6 V							µA
I_{CC}	Outputs high	V_{CC} = 3 V, $V_I = V_{CC}$ or GND	I_O = 0,							mA
	Outputs low									
C_i		Per IEEE1194.0-1991			4			4		pF
C_o		Per IEEE1194.0-1991			6			6		pF

† All typical values are at V_{CC} = 3.3 V, T_A = 25°C.

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