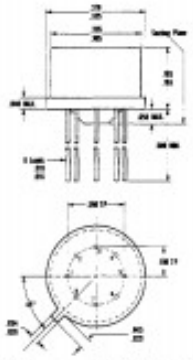
CμL 9958
DECADE COUNTER
COUNTER MICROLOGIC® INTEGRATED CIRCUITS

GENERAL DESCRIPTION - The CμL9958 is a complete Decade Counter consisting of four cascaded binary triggered flip-flops modified by a feedback loop to count in the familiar 8-4-2-1 code. Provision is made for clearing and presetting any one of the possible decimal states. The monolithic structure employs only resistors and transistors and is manufactured with Fairchild Planar* Epitaxial process to assure maximum performance and reliability.

The Decade Counter is designed to operate in the 0° to +75°C temperature range with nominal power supply voltage of 3.3 to 5.5 volts. It is also available in the -55°C to +125°C temperature range with power supply voltage of 4.0 to 4.4 volts.

The CμL9985 is available in the hermetically sealed 14 pin Dual In-line ceramic package, and in the 8 pin modified TO-5 metal can.

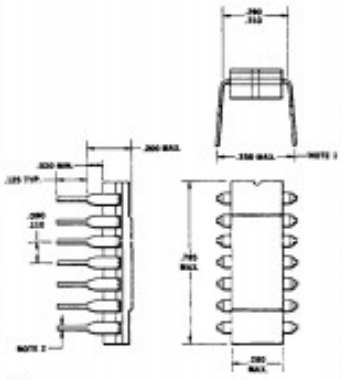
PHYSICAL DIMENSIONS
(SIMILAR TO TO-5)



NOTES: Dimensions as per latest JEDEC convention.
All dimensions in inches.
Leads are gold-plated kovar.
Package weight is 1.12 grams.

(PRODUCT CODE: U5B9958791X)

TYPICAL DUAL IN-LINE PACKAGE



NOTES:
1. Leads are intended for insertion in hole rows on .300" centers. They are provided clipped with "positive" 1.350 misalignment to facilitate insertion.
2. Board-drilling dimensions should match your practice for a conventional .029 inch diameter lead.

(PRODUCT CODE: U6A9958791X)

ABSOLUTE MAXIMUM RATINGS (Note 1)

Storage Temperature	-55°C to +150°C
Voltage at pin 7 (0°C 14 on Dip (0°C to +75°C)	+6.0 V
Count Input Pin Voltage	+4.0 V, -2.0 V
Reset Input Pin Voltage	+4.0 V, -2.0 V
Current into Each Output Terminal	± 5.0 mA

ELECTRICAL CHARACTERISTICS (25°C Free Air Temperature unless otherwise noted)

Parameter	Min.	Typ.	Max.	Units	Conditions
Supply Voltage	3.3		5.5		
Count Input-Low			0.45	V	
Count Input-High	1.2			V	
Count Input Pulse Width-High	150			ns	
Count Input Slope-Positive Going	1.0			V/μs	
Maximum Count Input Frequency			2.0	MHz	
Reset Input-Low			0.45	V	
Reset Input-High	1.2			V	
Output-Low			0.35	V	I_{out} = 0.4 mA V_{CC} = 4.0 V
Output-High	1.4			V	I_{out} = -0.7 mA V_{CC} = 3.6 V
Power Consumption		140		mW	V_{CC} = 4.0 V
Count Input Impedance	2 kΩ in series with a transistor base-emitter diode				
Reset Input Impedance	300 Ω in series with a transistor base-emitter diode				
Maximum Delay from Count Input to Z_8 Output (count 7 to 8)	300 ns (Load: 2 kΩ parallel with 50 pF from each output to ground)				

*Planar is a patented Fairchild process.

NOTE:
(1) These ratings are limiting values above which serviceability of unit may be impaired.

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RESET/PRESET

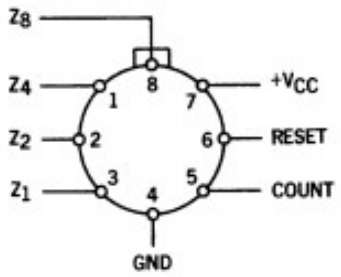
The circuit is reset to count 0 (all outputs high) with a high level at the reset input pin.

To preset an arbitrary count:

1. Reset to count 0 and then return the reset pin to a low level.
2. Ground (below 0.45 V) the appropriate outputs.

TO-5 CONNECTION DIAGRAM

(Top View)



14 PIN DUAL IN-LINE CONNECTION DIAGRAM (TOP VIEW)

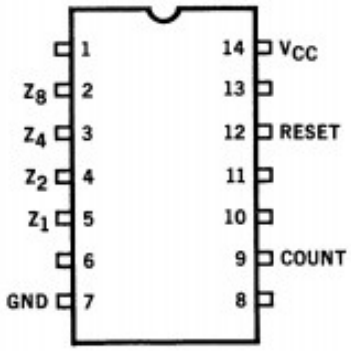
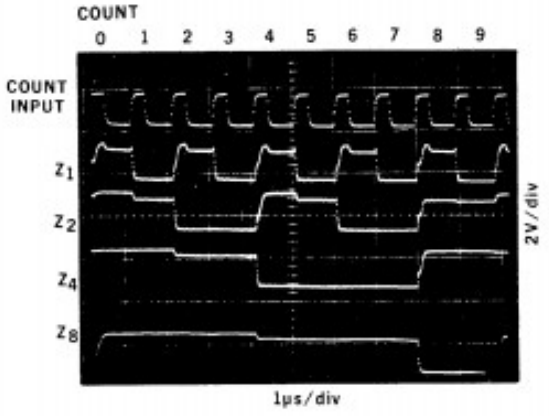


TABLE OF OUTPUT STATES

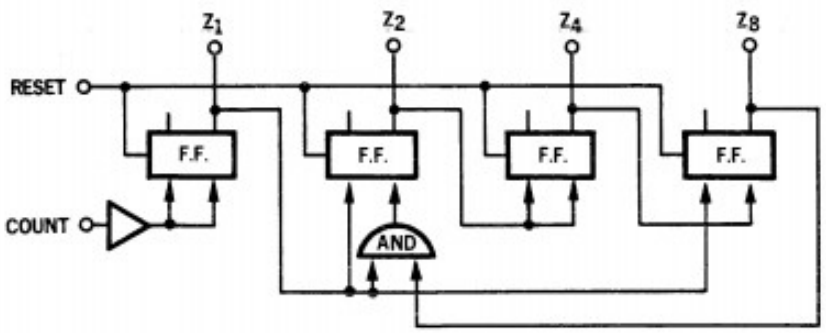
COUNT (H=High, L=Low)

	0	1	2	3	4	5	6	7	8	9
Z_1	H	L	H	L	H	L	H	L	H	L
Z_2	H	H	L	L	H	H	L	L	H	H
Z_4	H	H	H	H	L	L	L	L	H	H
Z_8	H	H	H	H	H	H	H	H	L	L

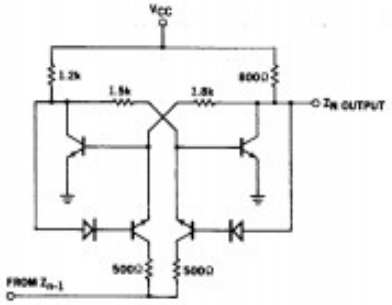
OUTPUT WAVEFORMS



BLOCK DIAGRAM

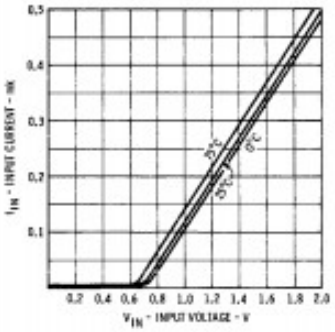


SCHEMATIC DIAGRAM OF DECADE FLIP-FLOP

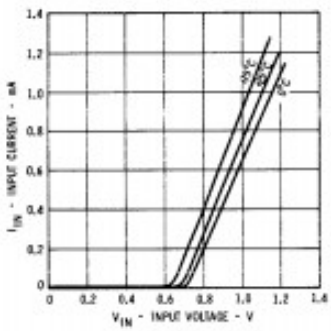


TYPICAL ELECTRICAL CHARACTERISTICS

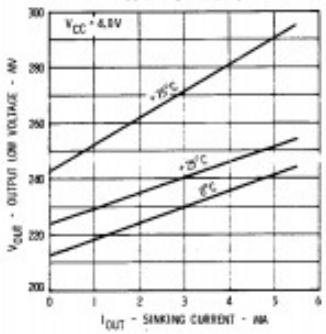
COUNT INPUT CHARACTERISTIC



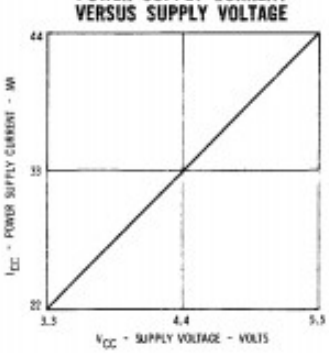
RESET INPUT CHARACTERISTIC



OUTPUT CHARACTERISTICS (OUTPUT LOW)



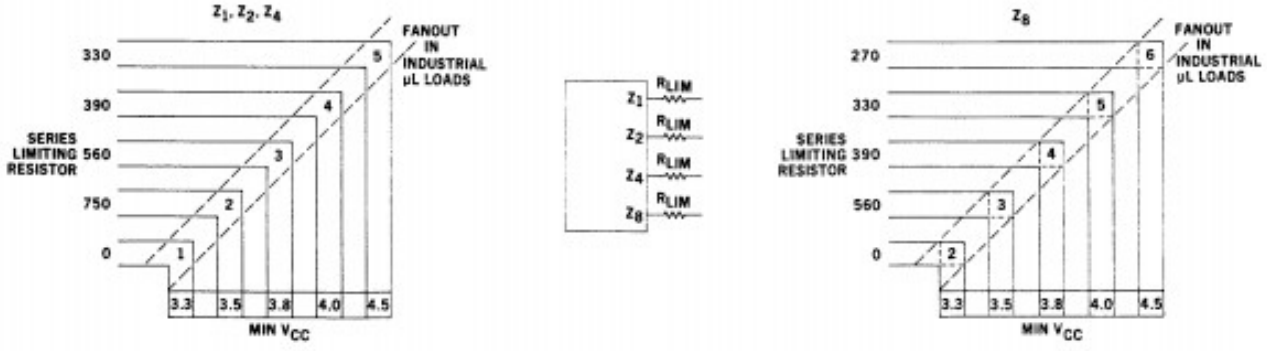
POWER SUPPLY CURRENT VERSUS SUPPLY VOLTAGE



LOADING RULES

DRIVING DEVICE	AT V_{CC} OF	CAN DRIVE
CμL 9958:		
Z_1, Z_2, Z_4	3.3 Min.	1 CμL 9959
Z_8	3.3 Min.	1 CμL9959 plus 1 CμL 9958 Count Input
Z_1, Z_2, Z_4	4.0 Min.	2 CμL 9959
Z_8	4.0 Min.	2 CμL9959 plus 1 CμL 9958 Count Input
Z_1, Z_2, Z_4	4.0 V Min. and one 390 Ω current limiting resistor in series with each output	4 CμL 9959
Z_8	4.0 V Min. and one 330 Ω current limiting resistor in series with Z_8 output	4 CμL9959 plus 1 CμL 9958 Count Input
Z_1, Z_2, Z_4	3.3 Min.	1 CμL 9960
Z_8	3.3 Min.	1 CμL9960 plus 1 CμL 9958 Count Input
Z_1, Z_2, Z_4	4.0 Min.	2 CμL 9960
Z_8	4.0 Min.	2 CμL9960 plus 1 CμL 9958 Count Input
Z_1, Z_2, Z_4	4.0 Min. and one 330 Ω current limiting resistor in series with each output	5 CμL 9960
Z_8	4.0 Min. and one 270 Ω current limiting resistor in series with Z_8 output	5 CμL9960 plus 1 CμL 9958 Count Inputs
Industrial Range Milliwatt RTL:	3.6 V ± 10%	1 CμL9958 Count Input
Industrial Range RTL:	3.6 V ± 10%	6 CμL9958 Count Inputs, or 1 CμL 9958 Reset Input
Industrial Range DTL 6k Family:	4.5 Min.	1 CμL9958 Count Input
Industrial Range DTL 2k Family:	4.5 Min.	3 CμL9958 Count Inputs, or 1 CμL 9958 Reset Input

CμL 9958 FAN-OUT VERSUS V_{CC} AND SERIES LIMITING RESISTORS



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