

## PART NUMBER

### 9307FMB-ROCV

#### 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 re-creations are done with the approval of the Original Component Manufacturer. (OCM)

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

#### Quality Overview

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-38535
  - 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 OCM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.*

# 9307

## 7-SEGMENT DECODER

**DESCRIPTION** — The '07 7-segment decoder is designed to accept four inputs in 8421 BCD code and provide the appropriate outputs to drive a 7-segment numerical display. The decoder can be used with 7-segment incandescent lamp, neon, electro-luminescent, or CRT numeric displays.

- AUTOMATIC RIPPLE BLANKING FOR SUPPRESSION OF LEADING-EDGE ZEROS
- LAMP INTENSITY MODULATION CAPABILITY
- LAMP TEST FACILITY
- BLANKING INPUT
- ACTIVE HIGH OUTPUTS

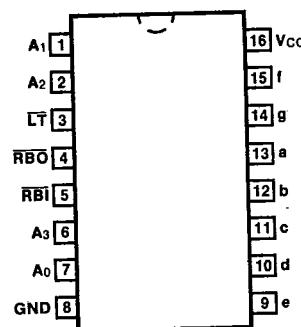
**ORDERING CODE:** See Section 9

PKGS	PIN OUT	COMMERCIAL GRADE	MILITARY GRADE	PKG TYPE
Plastic DIP (P)	A	9307PC	V <sub>CC</sub> = +5.0 V ±5%, T <sub>A</sub> = 0°C to +70°C	9B
Ceramic DIP (D)	A	9307DC	9307DM	6B
Flatpak (F)	A	9307FC	9307FM	4L

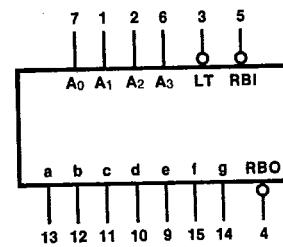
**INPUT LOADING/FAN-OUT:** See Section 3 for U.L. definitions

PIN NAMES	DESCRIPTION	93XX (U.L.) HIGH/LOW
A <sub>0</sub> — A <sub>3</sub>	BCD Inputs	0.25/1.0
RBI	Ripple Blanking Input (Active LOW)	0.25/0.5
LT	Lamp Test Input (Active LOW)	1.25/4.0
RBO	Ripple Blanking Output (Active LOW)	1.75/1.5
a — g	Segment Outputs (Active HIGH)	0/6.25

### CONNECTION DIAGRAM PINOUT A



### LOGIC SYMBOL



V<sub>CC</sub> = Pin 16  
GND = Pin 8

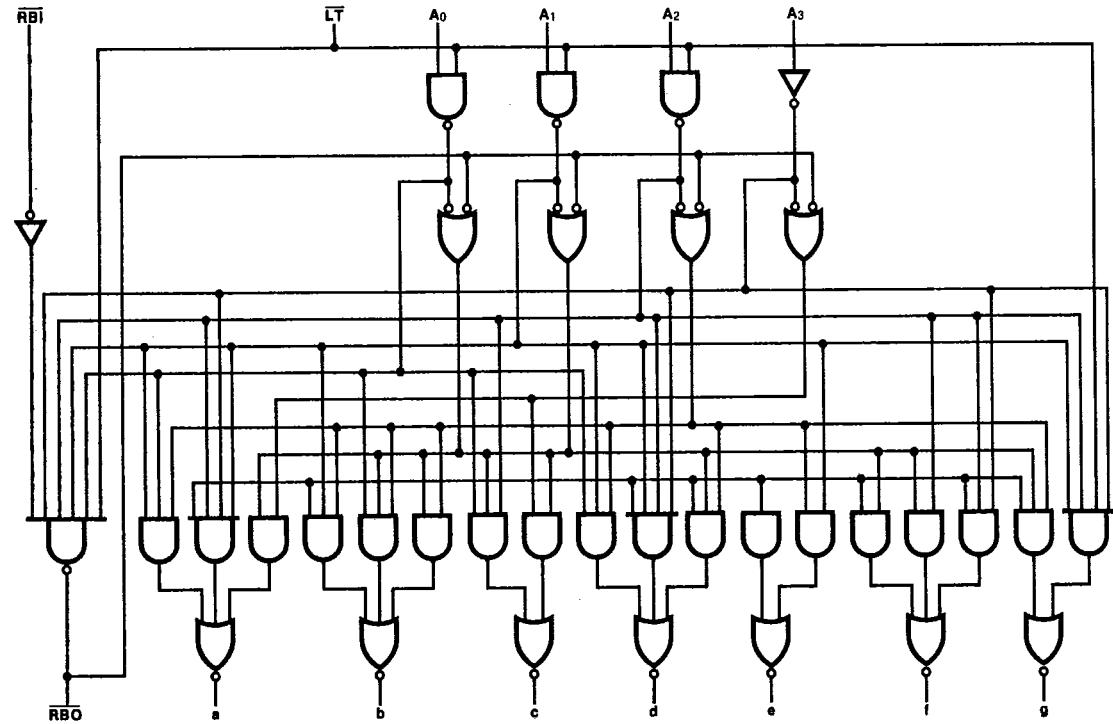
**FUNCTIONAL DESCRIPTION** — The '07 7-segment decoder accepts a 4-bit BCD 8421 code input and produces the appropriate outputs for selection of segments in a 7-segment matrix display used for representing the decimal numbers 0-9. The seven outputs (a, b, c, d, e, f, g) of the decoder select the corresponding segments in the matrix shown in *Figure a*. The numeric designations chosen to represent the decimal numbers are shown in *Figure b*, together with the resulting displays for input code configurations in excess of binary nine.

The decoder has active HIGH outputs so that a buffer transistor may be used directly to provide the high currents required for incandescent displays. If additional base drive current is required external resistors may be added from the supply voltage to the seven segment outputs of the decoders. If additional base drive current is required external resistors may be added from the supply voltage to the seven segment outputs of the decoders. The value of this resistor is constrained by the 10 mA current sinking capability of the output transistors of the circuit.

The device has provision for automatic blanking of the leading and/or trailing-edge zeroes in a multidigit decimal number, resulting in an easily readable decimal display conforming to normal writing practice. In an eight digit mixed integer fraction decimal representation, using the automatic blanking capability, 0060.0300 would be displayed as 60.03. Leading-edge zero suppression is obtained by connecting the Ripple Blanking Output (RBO) of a decoder to the Ripple Blanking Input (RBI) of the next lower stage device. The most significant decoder stage should have the RBI input grounded; and, since suppression of the least significant integer zero in a number is not usually desired, the RBI input of this decoder stage should be left open. A similar procedure for the fractional part of a display will provide automatic suppression of trailing-edge zeroes.

The decoder has an active LOW Input Lamp Test which overrides all other input combinations and enables a check to be made on 'possible display malfunctions. The RBO terminal of the decoder can be OR-tied with a modulating signal via an isolating buffer to achieve pulse duration intensity modulation. A suitable signal can be generated for this purpose by forming a variable frequency multivibrator with a cross coupled pair of TTL gates.

## LOGIC DIAGRAM



6

7-51-17

## TRUTH TABLE

LT	RBI	INPUTS				OUTPUTS							RBO
		A <sub>0</sub>	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	a	b	c	d	e	f	g	
L	X	X	X	X	X	H	H	H	H	H	H	H	H
H	L	L	L	L	L	L	L	L	L	L	L	L	0
H	L	L	L	L	L	H	H	H	H	H	H	L	0
H	X	H	L	L	L	L	H	H	L	L	L	L	H
H	X	L	H	L	L	H	H	L	H	H	L	H	2
H	X	H	H	L	L	H	H	H	H	L	L	H	3
H	X	L	L	H	L	L	H	H	L	L	H	H	4
H	X	H	L	H	L	H	L	H	H	L	H	H	5
H	X	L	H	H	L	H	L	H	H	H	L	H	6
H	X	H	H	H	L	H	H	H	H	L	L	H	7
H	X	L	L	L	H	H	H	H	H	H	L	H	8
H	X	H	L	L	L	H	H	H	H	L	H	H	9
H	X	L	H	L	H	L	L	H	H	L	H	H	10
H	X	H	H	L	H	L	L	H	L	L	H	H	11
H	X	L	L	H	H	L	H	H	L	L	H	H	12
H	X	H	L	H	H	H	L	H	H	L	H	H	13
H	X	L	H	H	H	L	L	L	H	H	H	H	14
H	X	H	H	H	H	L	L	L	L	L	L	H	15

H = HIGH Voltage Level

L = LOW Voltage Level

X = Immaterial

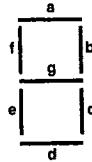


Fig. a Segment Designation

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5

Fig. b Numerical Designations

## DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

SYMBOL	PARAMETER	93XX		UNITS	CONDITIONS	
		Min	Max			
VOH	Output HIGH Voltage	at a-g	4.3	V	V <sub>CC</sub> = Min I <sub>OH</sub> = 0 mA	
		at <u>RBO</u>	XM XC	3.0 2.7	V <sub>CC</sub> = Min I <sub>OH</sub> = -70 $\mu$ A	
VOL	Output LOW Voltage	at a-g	XM XC	0.4 0.45	V	I <sub>OL</sub> = 12.5 mA I <sub>OL</sub> = 11.5 mA
		at <u>RBO</u>	XM XC	0.4 0.45	V	I <sub>OL</sub> = 3.1 mA I <sub>OL</sub> = 2.75 mA
		at a-g	XM XC	0.4 0.45	V	I <sub>OL</sub> = 10 mA
		at <u>RBO</u>	XM XC	0.4 0.45	V	I <sub>OL</sub> = 2.4 mA
						V <sub>CC</sub> = Min
IA	Available Output Current at a-g	XM XC	-1.0 -1.1	mA	V <sub>OUT</sub> = 0.85 V V <sub>OUT</sub> = 0.75 V	V <sub>CC</sub> = Min TA = Max
Ios	Output Short Circuit Current at a-g	XM XC		mA	V <sub>CC</sub> = Max, TA = +25°C V <sub>OUT</sub> = 0 V	
Icc	Power Supply Current	XM XC	73 82	mA	V <sub>CC</sub> = Max	

AC CHARACTERISTICS: V<sub>CC</sub> = +5.0 V, TA = +25°C (See Section 3 for waveforms and load configurations)

SYMBOL	PARAMETER	93XX		UNITS	CONDITIONS		
		CL = 30 pF					
		Min	Max				
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay A <sub>0</sub> — A <sub>3</sub> or <u>RBI</u> to a-g or <u>RBO</u>	750 750	750 750	ns	Fig. 3-20		