

DATA SHEET

NE594/SA594

Vacuum fluorescent display driver

Product data
Supersedes data of 1994 Aug 31
File under Integrated Circuits, IC11 Handbook

2001 Aug 03

Vacuum fluorescent display driver

NE594/SA594

DESCRIPTION

The NE594/SA594 is a display driver interface for vacuum fluorescent displays. The device is comprised of 8 drivers and a bias network, and is capable of driving the digits and/or segments of most vacuum fluorescent displays.

The inputs are designed to be compatible with TTL, DTL, NMOS, PMOS or CMOS output circuitry.

There is an active pull-down circuit on each output so that display ghosting is minimized and no external components are required for most fluorescent display applications.

FEATURES

- Digit and/or segment drivers
- Active output pull-down circuitry
- High output breakdown voltage
- Low supply voltage
- Input compatible with all logic outputs

APPLICATIONS

- Digital clocks
- Dashboard displays
- Panel displays

PIN CONFIGURATIONS

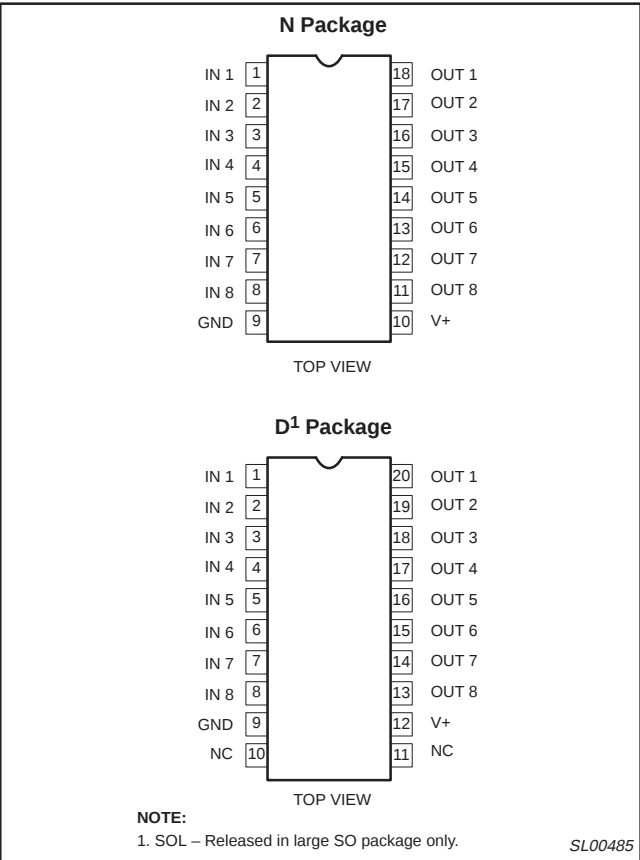


Figure 1. Pin Configurations

ORDERING INFORMATION

DESCRIPTION	TEMPERATURE RANGE	ORDER CODE	DWG #
18-Pin Plastic DIP	0 °C to +70 °C	NE594N	SOT102-4
20-Pin Plastic SO	0 °C to +70 °C	NE594D	SOT163-1
18-Pin Plastic DIP	–40 °C to +85 °C	SA594N	SOT102-4
20-Pin Plastic SO	–40 °C to +85 °C	SA594D	SOT163-1

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EQUIVALENT SCHEMATIC

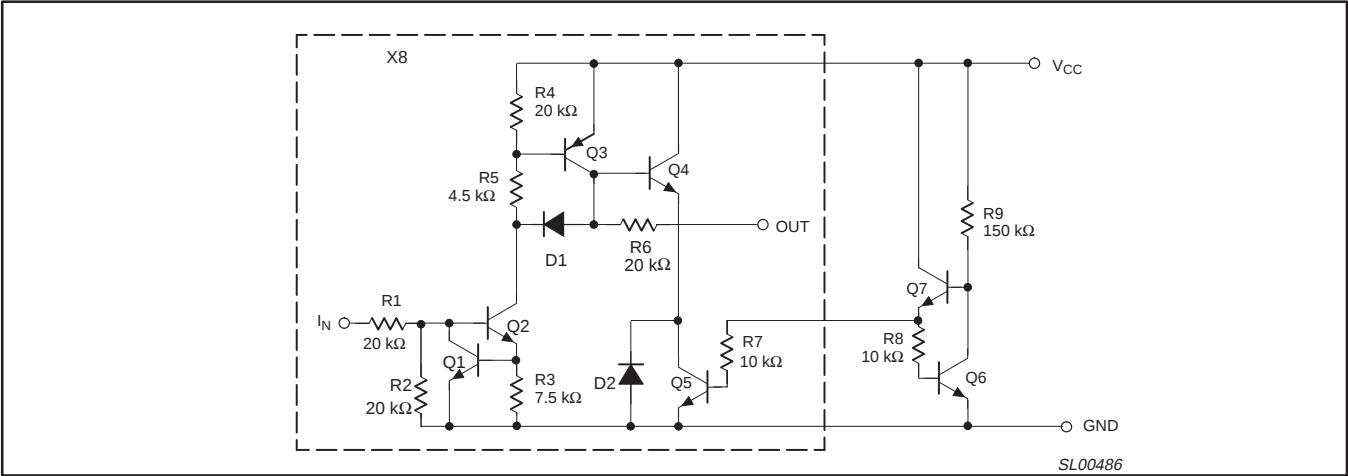


Figure 2. Equivalent Schematic

ABSOLUTE MAXIMUM RATINGS (at 25 °C, unless otherwise noted)

SYMBOL	PARAMETER	RATING	UNIT
V _{CC}	Supply voltage	45	V
V _{OUT}	Output voltage	V _{CC}	
V _{IN}	Input voltage	−0.3, +20	V
I _{OUT}	Output current Each output All outputs	50 200	mA mA
P _D	Maximum power dissipation, T _{amb} = 25 °C (still-air) ¹ N package D package	1690 1390	mW mW
T _{amb}	Operating ambient temperature range NE594 SA594	0 to +70 −40 to +85	°C °C
T _{stg}	Storage temperature range	+65 to +150	°C
T _j	Maximum junction temperature	−150	°C
T _{sld}	Lead soldering temperature (10 sec max)	230	°C

NOTE:

1. Derate above 25 °C, at the following rates:
N package at 13.5 mW/°C
D package at 11.1 mW/°C

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DC ELECTRICAL CHARACTERISTICS

V_{CC} = +4.75 V to +40 V; T_{amb} = 0 °C to +70 °C (NE), T_{amb} = -40 °C to +85 °C (SA), unless otherwise stated.

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			Min	Typ	Max	
V_{CC}	Supply voltage range		4.75	35	40	V
I_{CCH}	Supply current (all outputs HIGH)	$V_{CC} = 40\text{ V}$; $V_{IN} = 3.5\text{ V}$		3	6	mA
I_{CCL}	Supply current (all outputs LOW)	$V_{CC} = 40\text{ V}$; $V_{IN} = 0.4\text{ V}$		0.4	1	mA
V_{IN}	Input voltage range		0		15	V
V_{IH}	Input voltage to ensure logic '1'		2.6			V
V_{IL}	Input voltage to ensure logic '0'				0.8	V
I_{IH}	Input current to ensure logic '1'		100			μA
I_{IL}	Input current to ensure logic '0'				10	μA
I_{IN}	Input current	$V_{IN} = 2.6\text{ V}$		60	130	μA
		$V_{IN} = 5.0\text{ V}$		180	330	μA
		$V_{IN} = 15.0\text{ V}$		0.68	1.3	mA
V_{OH}	Output high voltage	$V_{IN} = 3.5\text{ V}$; $I_{OUT} = -25\text{ mA}$	$T_{amb} = 25\text{ °C}$	$V_{CC} - 1.5$	$V_{CC} - 1.1$	V
		V_{OUT} with respect to V_{CC}	Over temp.	$V_{CC} - 2$	$V_{CC} - 1.3$	V
V_{OH}	Output high, no load voltage	$V_{IN} = 3.5\text{ V}$; $I_{OUT} = 0$; $T_{amb} = 25\text{ °C}$; V_{OUT} with respect to V_{CC}	$V_{CC} - 1$	$V_{CC} - 0.8$		V
V_{OFF}	Output 'OFF' voltage level	$V_{IN} = 0.8\text{ V}$; $I_{OUT} = 0$		10	200	mV
I_{OH}	Available output current	$V_{CC} = 35\text{ V}$; $V_{IN} = 3.5\text{ V}$; $V_{OUT} = 30\text{ V}$; $T_{amb} = 25\text{ °C}$	-35			mA
I_{OUT}	Output pull-down current	$V_{CC} = V_{OUT} = 35\text{ V}$; inputs open	100	200	400	μA
I_{CEX}	Output leakage current	$T_{amb} = 25\text{ °C}$; $V_{IN} = 0.4\text{ V}$; $V_{CC} = 40\text{ V}$; $V_{OUT} = 0\text{ V}$		-1 -1		μA

AC ELECTRICAL CHARACTERISTICS

$V_{CC} = 35\text{ V}$; $T_{amb} = 25\text{ °C}$.

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			Min	Typ	Max	
t_{PLH}	Propagation delay low-to-high output transition	50% V_{IN} to 50% V_{OUT}		1	5	μs
t_{PHL}	Propagation delay high-to-low output transition	50% V_{IN} to 50% V_{OUT}		3	10	μs
t_R	Output rise time	10% V_{OUT} to 90% V_{OUT}		0.5	3	μs
t_F	Output fall time	90% V_{OUT} to 10% V_{OUT}		1.5	5	μs

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SWITCHING TIMES OF DRIVERS

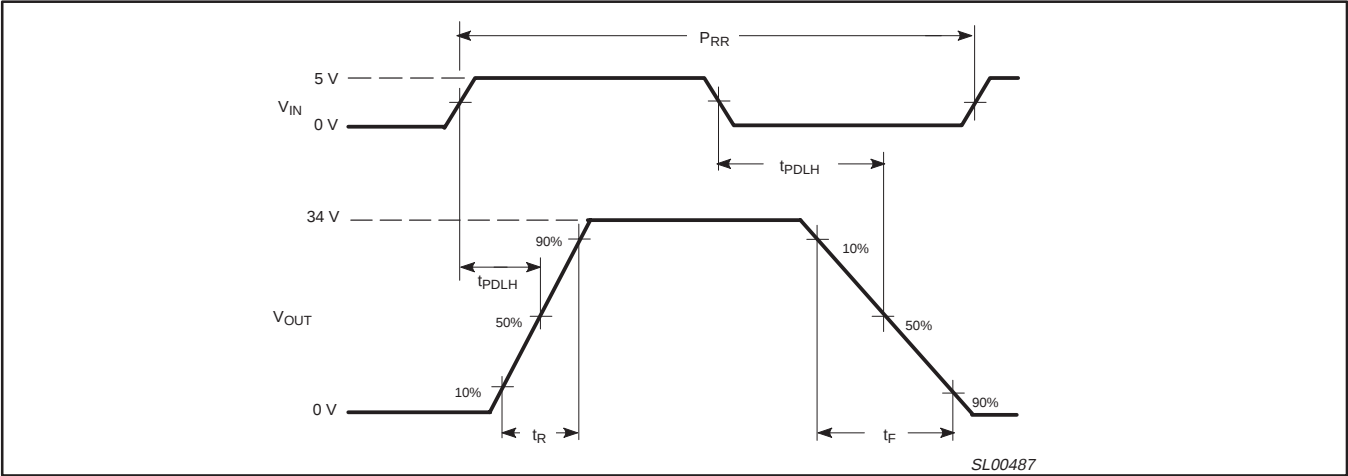


Figure 3. Switching Times of Drivers

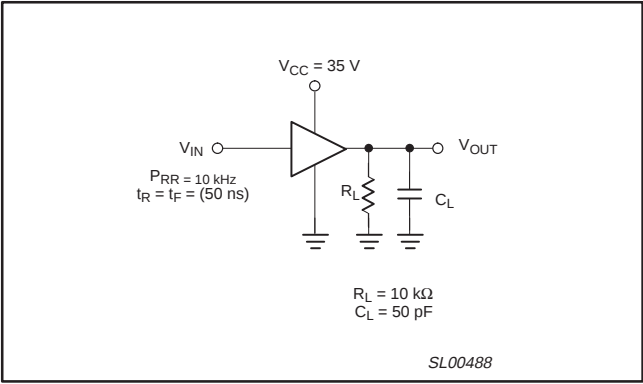


Figure 4. Test Circuit

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TYPICAL PERFORMANCE CHARACTERISTICS

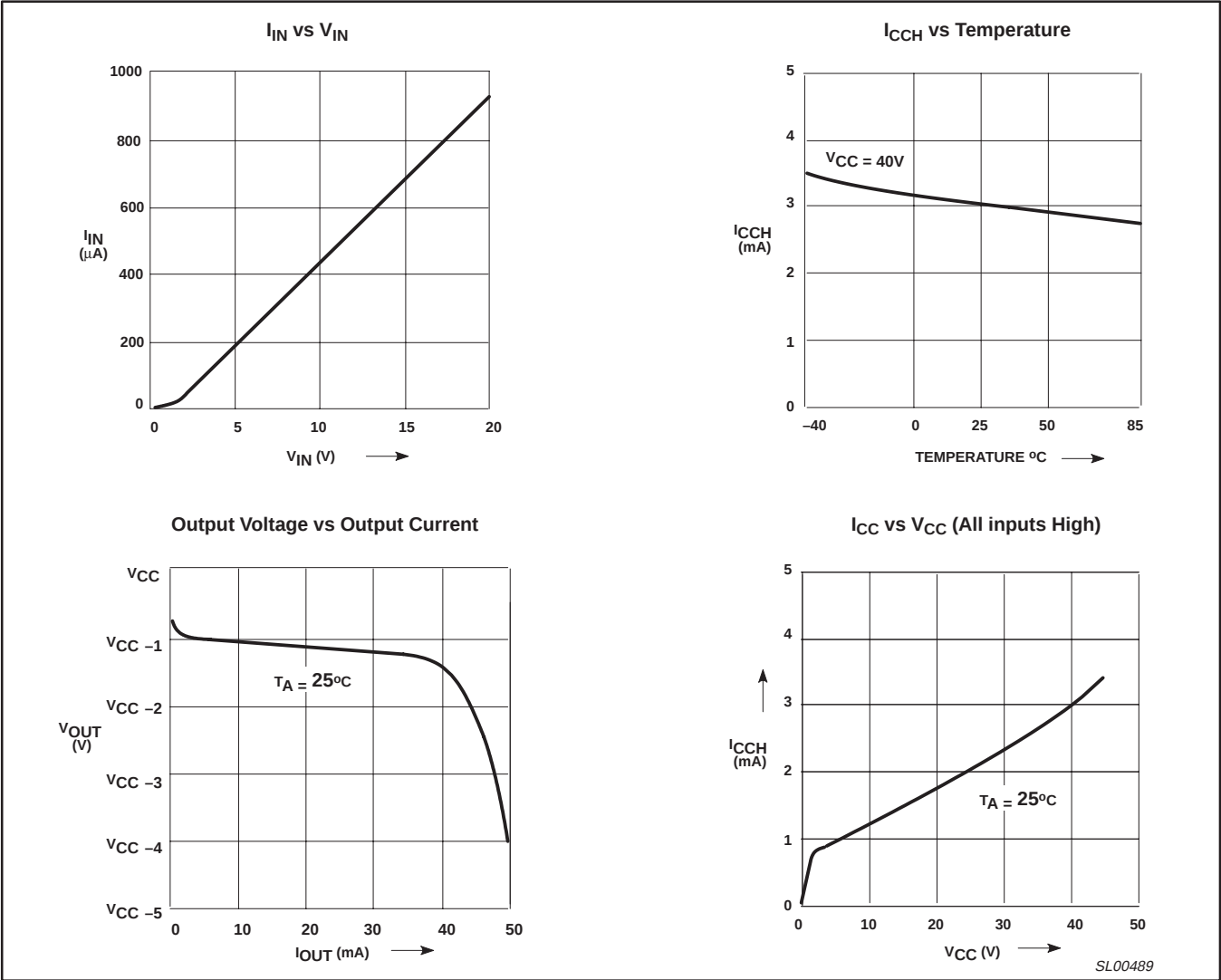


Figure 5. Typical Performance Characteristics

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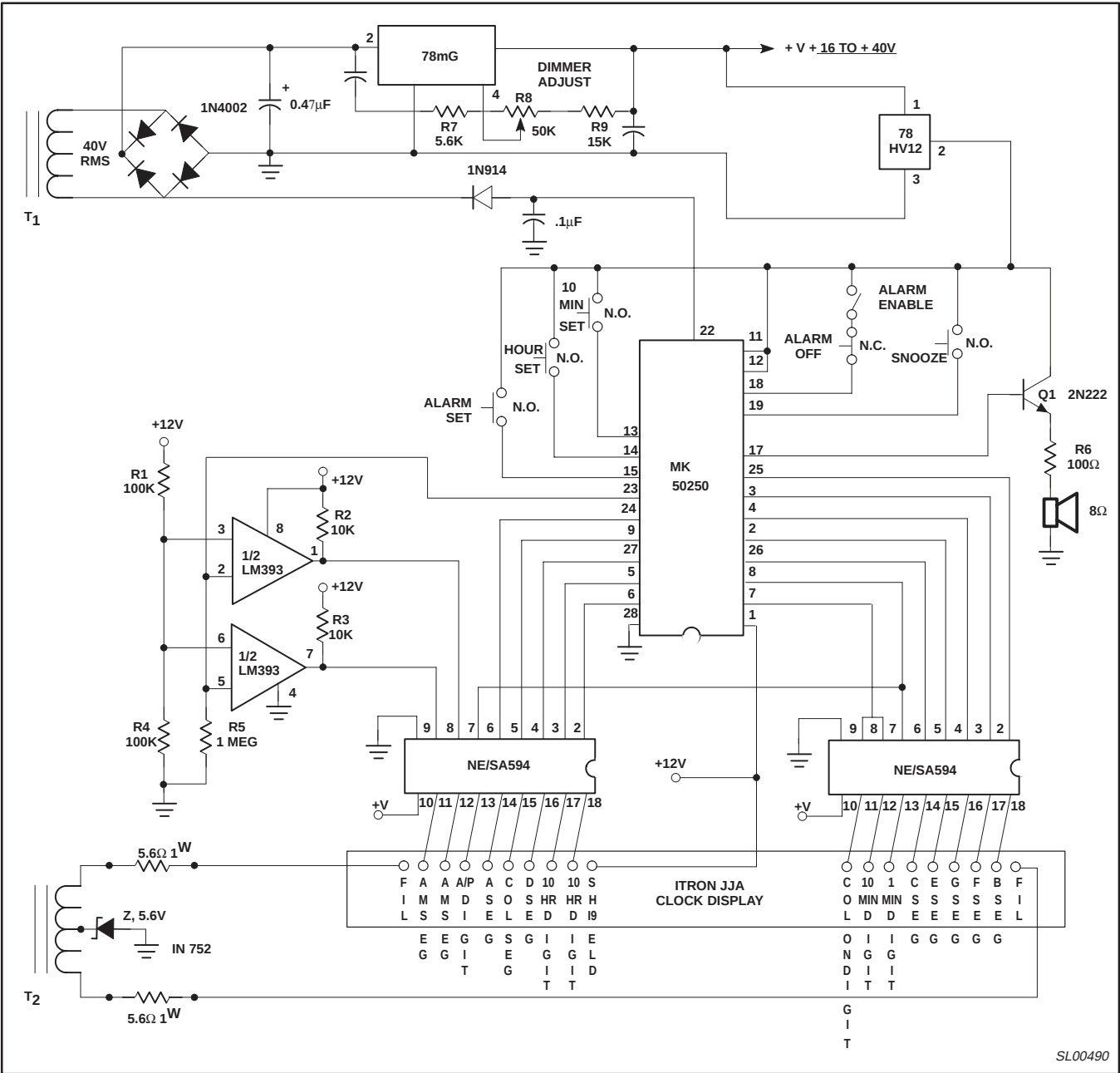


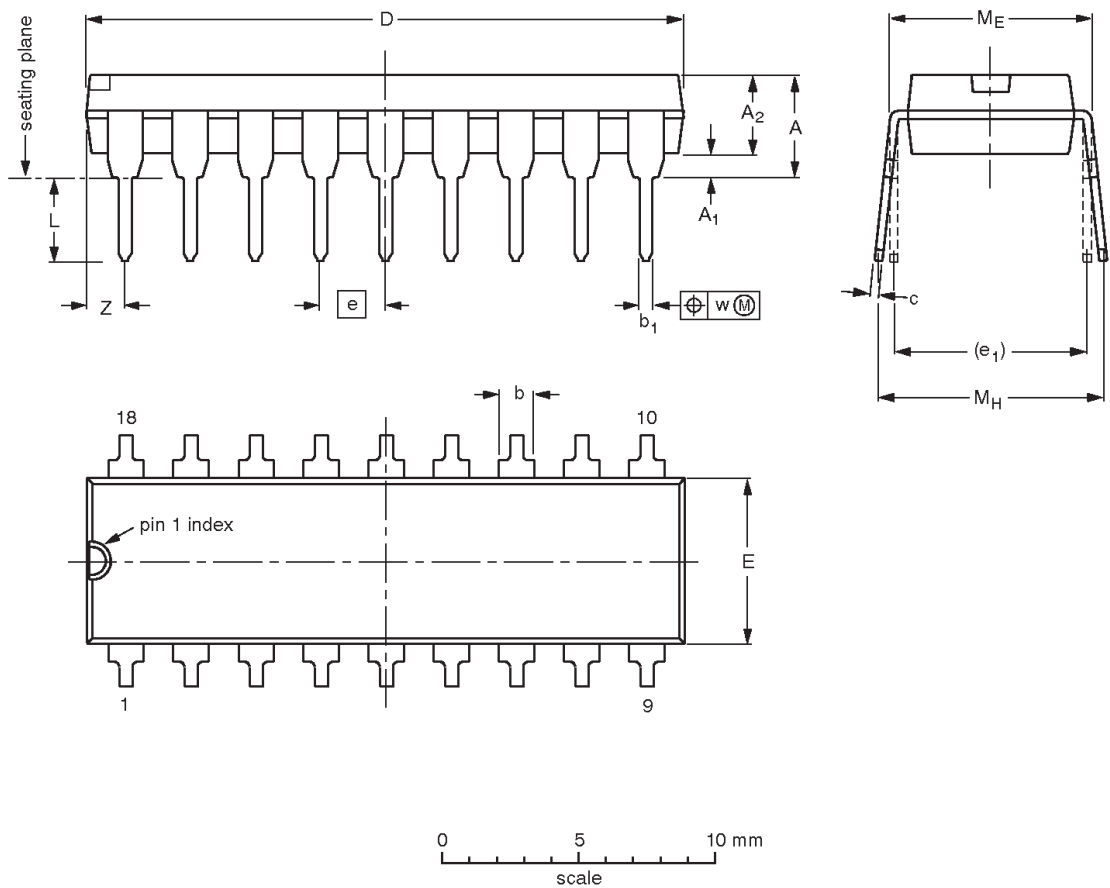
Figure 6. Typical Application: Digital Clock With Alarm

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DIP18: plastic dual in-line package; 18 leads (300 mil); long body

SOT102-4



DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A max.	A ₁ min.	A ₂ max.	b	b ₁	c	D ⁽¹⁾	E ⁽¹⁾	e	e ₁	L	M _E	M _H	w	Z ⁽¹⁾ max.
mm	4.06	0.51	3.38	1.63 1.14	0.56 0.43	0.36 0.25	23.37 22.61	6.48 6.22	2.54	7.62	3.51 3.05	8.13 7.62	10.03 7.62	0.25	1.65
inches	0.160	0.020	0.140	0.064 0.045	0.022 0.017	0.014 0.010	0.920 0.890	0.255 0.245	0.100	0.300	0.138 0.120	0.32 0.30	0.395 0.300	0.01	0.065

Note

1. Plastic or metal protrusions of 0.01 inch maximum per side are not included.

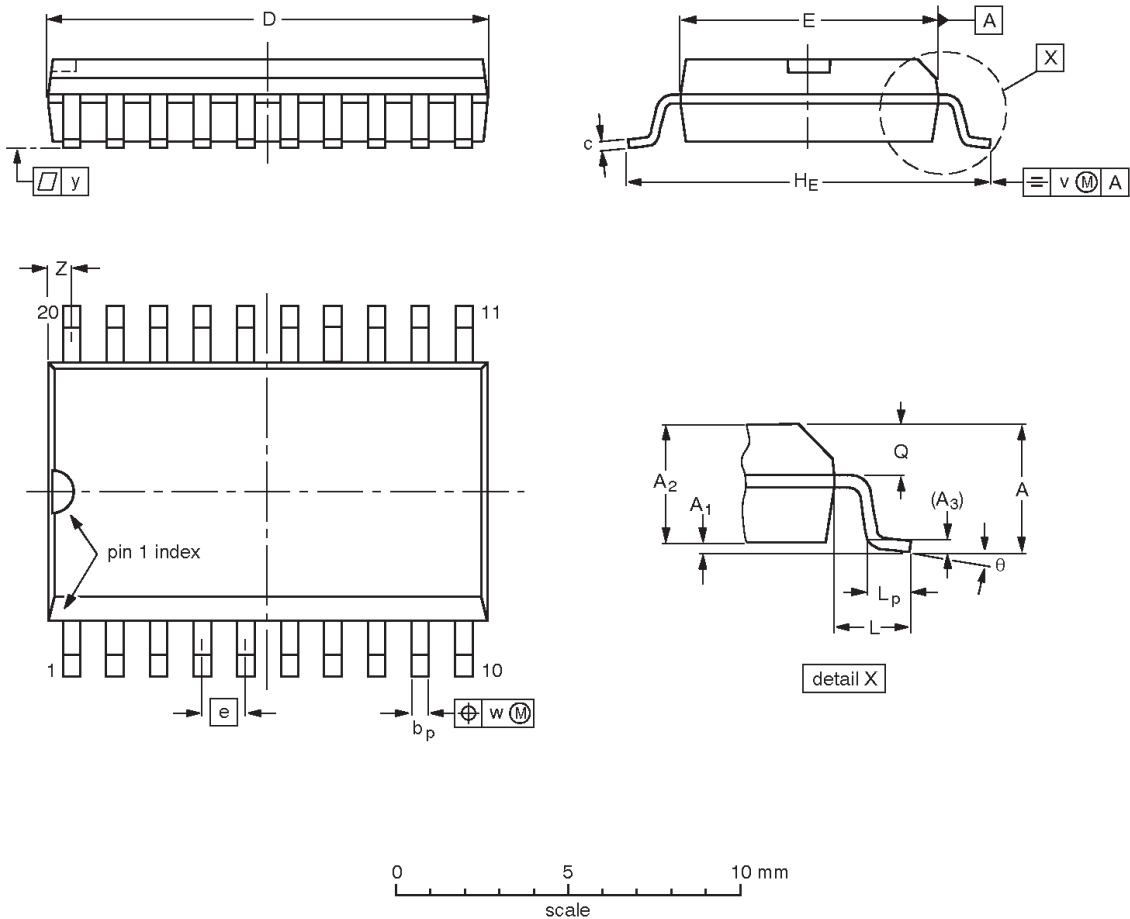
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT102-4		MS-001				99-07-08 99-12-27

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SO20: plastic small outline package; 20 leads; body width 7.5 mm

SOT163-1



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A ₁	A ₂	A ₃	b _p	c	D ⁽¹⁾	E ⁽¹⁾	e	H _E	L	L _p	Q	v	w	y	Z ⁽¹⁾	θ
mm	2.65	0.30 0.10	2.45 2.25	0.25	0.49 0.36	0.32 0.23	13.0 12.6	7.6 7.4	1.27	10.65 10.00	1.4	1.1 0.4	1.1 1.0	0.25	0.25	0.1	0.9 0.4	8° 0°
inches	0.10	0.012 0.004	0.096 0.089	0.01	0.019 0.014	0.013 0.009	0.51 0.49	0.30 0.29	0.050	0.419 0.394	0.055	0.043 0.016	0.043 0.039	0.01	0.01	0.004	0.035 0.016	

Note

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT163-1	075E04	MS-013				-97-05-22 99-12-27

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Data sheet status ^[1]	Product status ^[2]	Definitions
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