Vacuum fluorescent display driver NE/SA594

DESCRIPTION

The NE/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

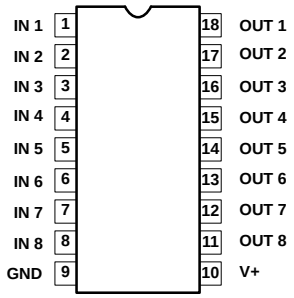
- Digit and/or segment drivers
- Active output pull–down circuitry
- High output breakdown voltage
- Low supply voltage
- Input compatible with all logic outputs

APPLICATIONS

- Digital clocks
- Dashboard displays
- Panel displays

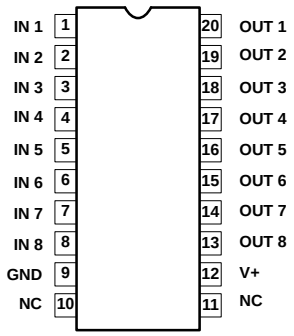
PIN CONFIGURATIONS

N, F Packages



TOP VIEW

D[1] Package



TOP VIEW

NOTE:

1. SOL – Released in large SO package only.

ORDERING INFORMATION

DESCRIPTION	TEMPERATURE RANGE	ORDER CODE	DWG #
18–Pin Plastic DIP	0 to +70°C	NE594N	0407A
18–Pin Ceramic DIP	0 to +70°C	NE594F	0583A
20–Pin Plastic SO	0 to +70°C	NE594D	0408B
18–Pin Plastic DIP	–40°C to +85°C	SA594N	0407A
18–Pin Ceramic DIP	–40°C to +85°C	SA594F	0583A
20–Pin Plastic SO	–40°C to +85°C	SA594D	0408B

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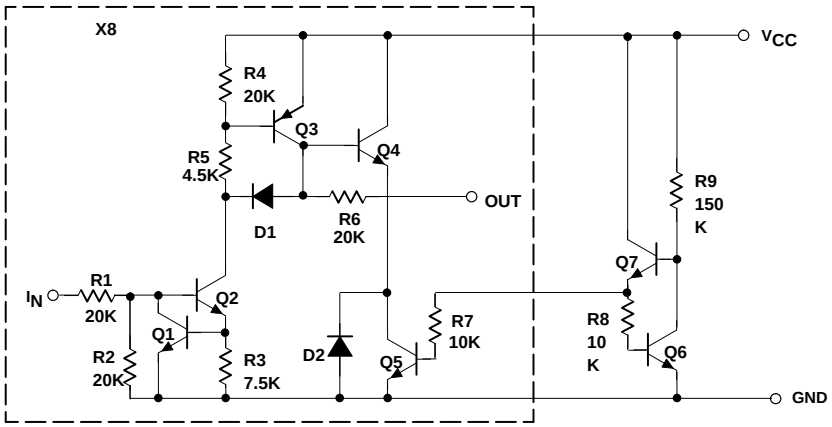
EQUIVALENT SCHEMATIC



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	50	mA
	All outputs	200	mA
P_D	Maximum power dissipation, T_A=25°C (still–air)[1]		
	F package	1500	mW
	N package	1690	mW
	D package	1390	mW
T_A	Operating ambient temperature range		
	NE594	0 to 70	°C
	SA594	–40 to +85	°C
T_{STG}	Storage temperature range	+65 to +150	°C
T_J	Maximum junction temperature	–150	°C
T_{SOLD}	Lead soldering temperature (10sec max)	300	°C

NOTES:
1. Derate above 25°C, at the following rates:
   F package at 12.0mW/°C
   N package at 13.5mW/°C
   D package at 11.1mW/°C

DC ELECTRICAL CHARACTERISTICS

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

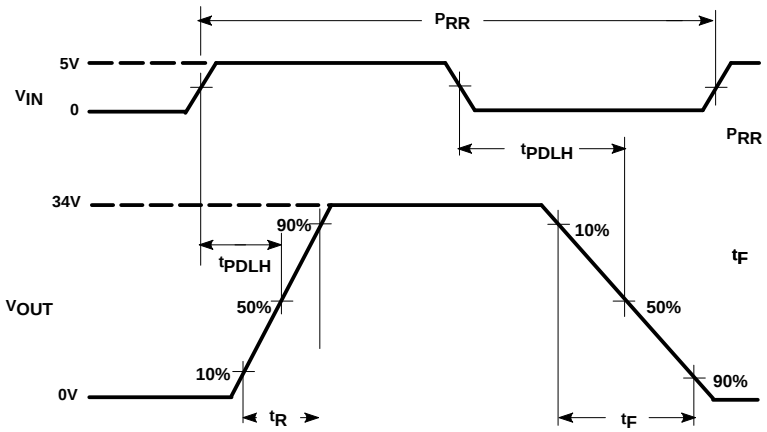
SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			Min	Typ	Max	
V_{CC}	Supply voltage range		4.75	35	40	V
I_{CCH}	Supply current (all outputs high)	V_{CC}=40V, V_{IN}=3.5V		3	6	mA
I_{CCL}	Supply current (all outputs low)	V_{CC}=40V, V_{IN}=0.4V		0.4	1	mA
V_{IN}	Input voltage range		0		15	V
V_{IH}	Input 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}=2.6V		60	130	µA
		V_{IN}=5.0V		180	330	µA
		V_{IN}=15.0V		.68	1.3	mA
V_{OH}	Output high voltage	V_{IN}=3.5V, I_{OUT}=–25mA, T_A=25°C	V_{CC} –1.5	V_{CC} –1.1		V
		V_{IN}=3.5V, I_{OUT}=–25mA, Over temp.	V_{CC} –2	V_{CC} –1.3		V
		V_{OUT} with respect to V_{CC}				
V_{OH}	Output high, no load voltage	V_{IN}=3.5V, I_{OUT}=0, T_A=25°C, V_{OUT} with respect to V_{CC}	V_{CC} –1	V_{CC} –0.8		V
V_{OFF}	Output ‘OFF’ voltage level	V_{IN}=0.8V, I_{OUT}=0		10	200	mV
I_{OH}	Available output current	V_{CC}=35V, V_{IN}=3.5V, V_{OUT}=30V, T_A=25°C	–35			mA
I_{OUT}	Output pull-down current	V_{CC}=V_{OUT}=35V, Inputs open	100	200	400	µA
I_{CEX}	Output leakage current	T_A=25°C, V_{IN}=0.4V V_{CC}=40V, V_{OUT}=0V		–1 –1		µA

AC ELECTRICAL CHARACTERISTICS

V_{CC}=35V, T_A=25°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

SWITCHING TIMES OF DRIVERS



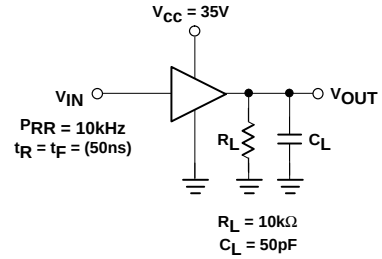
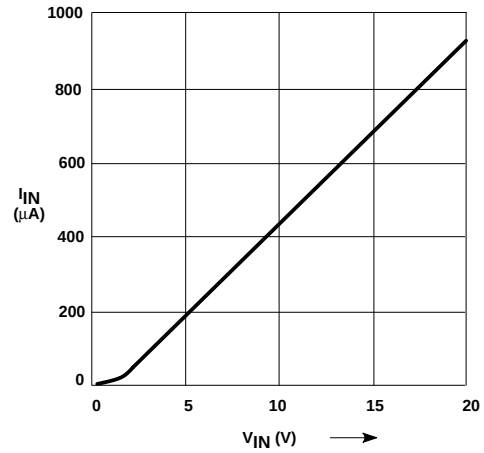


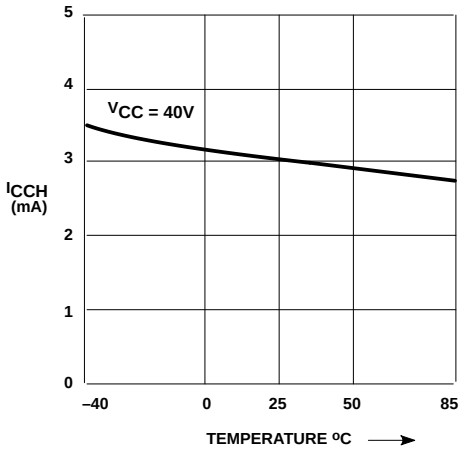
Figure 1. Test Circuit

TYPICAL PERFORMANCE CHARACTERISTICS

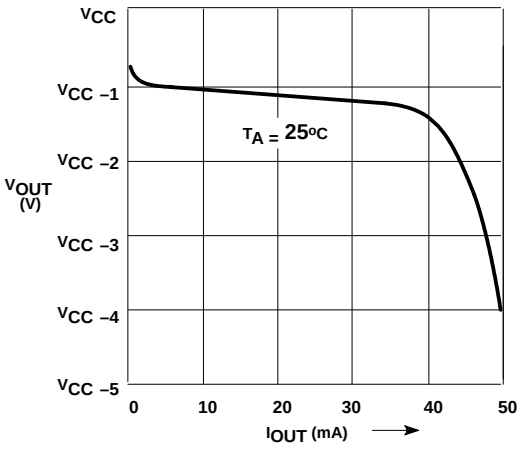
I_{IN} vs V_{IN}



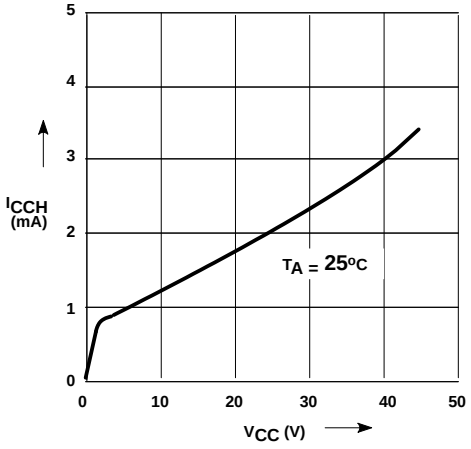
I_{CCH} vs Temperature



Output Voltage vs Output Current



I_{CC} vs V_{CC} (All inputs High)



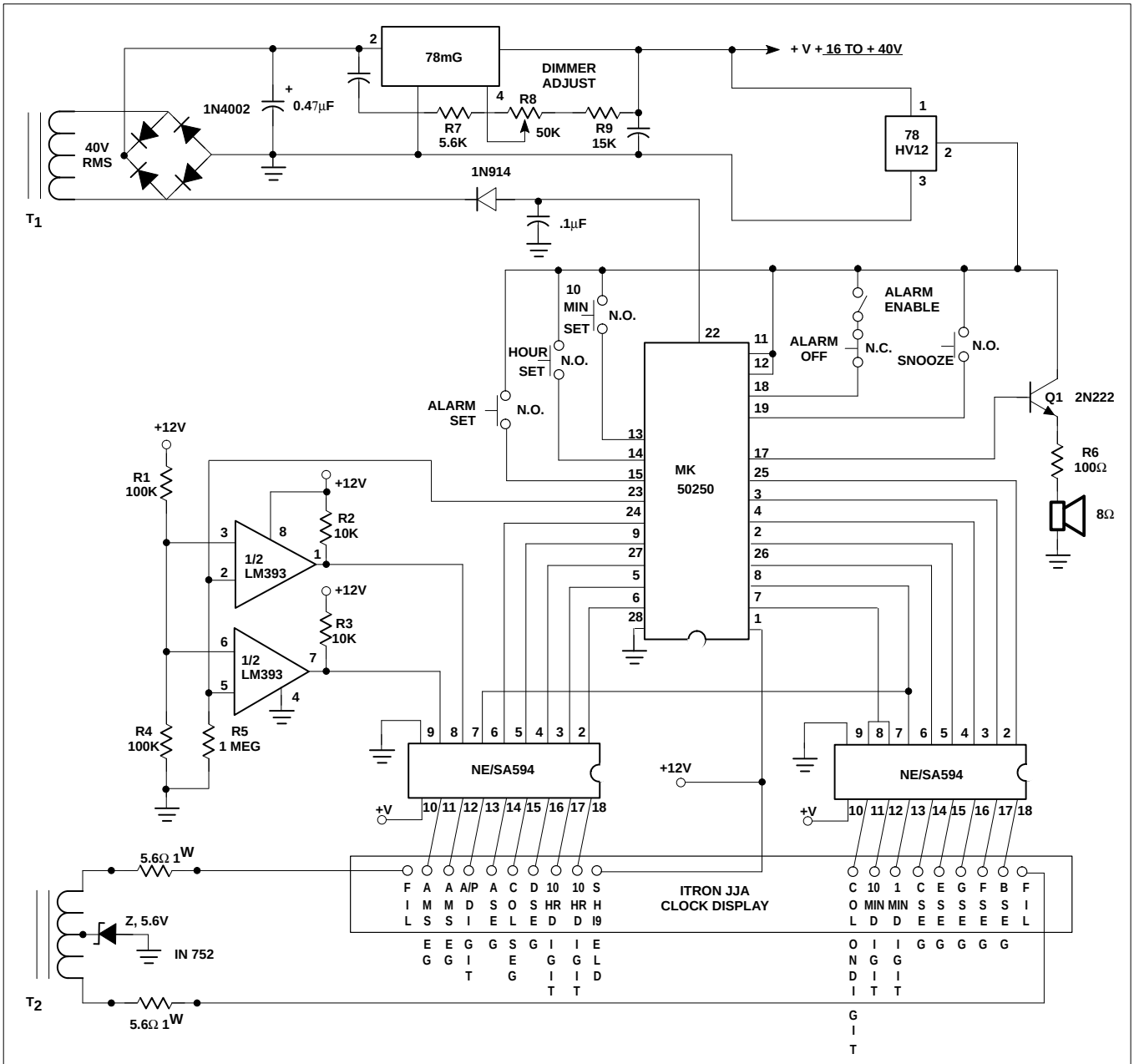


Figure 2. Typical Application: Digital Clock With Alarm