

8-BIT μ P-COMPATIBLE D/A CONVERTER—CURRENT OUTPUT

SE/NE5118

DESCRIPTION

The NE5118 is a high-speed 8-bit digital to analog converter subsystem on one monolithic chip. The data inputs have input latches, controlled by a latch enable pin. The data and latch enable inputs are ultra-low loading for easy interfacing with all logic systems. The latches appear transparent when the $\overline{LE}$ input is in the low state. When $\overline{LE}$ goes high, the input data present at the moment of transition is latched and retained until $\overline{LE}$ again goes low. This feature allows easy compatibility with most microprocessors.

The chip also comprises a stable voltage reference (5V nominal). The voltage reference may be externally trimmed with a potentiometer for easy adjustment of full scale, while maintaining a low temperature co-efficient.

The output has high voltage compliance in-creasing versatility.

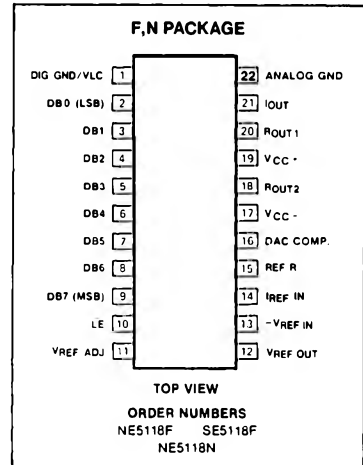
FEATURES

- 8-bit resolution
- Input latches
- Low-loading data inputs
- On-chip voltage reference
- Fast settling output current—200ns
- Accurate to $\pm 1/2$ LSB (.19%)
- Monotonic to 8 bits
- Reference short-circuit protected
- Compatible with 8086, 6800 and many other μ P's

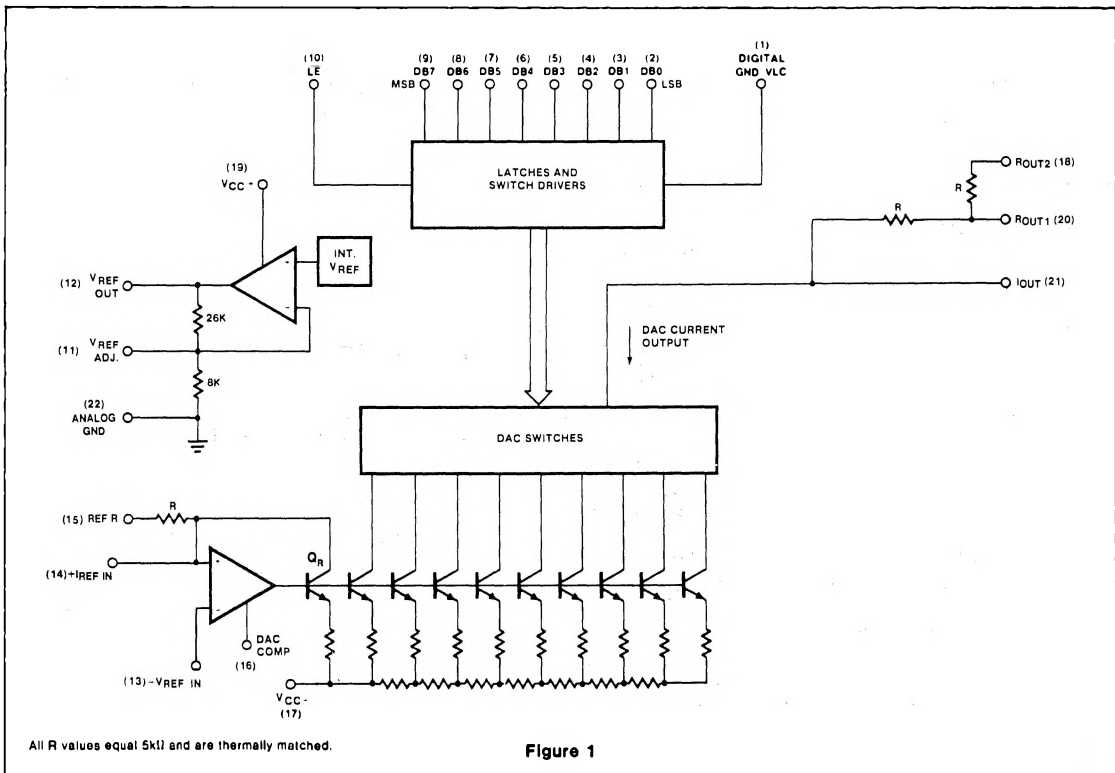
APPLICATIONS

- Precision 8-bit D/A converters
- A/D converters
- Programmable power supplies
- Test equipment
- Measuring instruments
- Analog-digital multiplication
- CRT display drivers
- High-speed modems

PIN CONFIGURATION



BLOCK DIAGRAM



8-BIT μ P-COMPATIBLE D/A CONVERTER—CURRENT OUTPUT

SE/NE5118

ABSOLUTE MAXIMUM RATINGS

PARAMETER	RATING	UNIT	
V _{CC+}	Positive supply voltage	18	V
V _{CC-}	Negative supply voltage	-18	V
V _{IN}	Logic input voltage	0 to 18	V
V _{REFIN}	Voltage at R _{REF} input	12	V
V _{REFADJ}	Voltage at V _{REF} adjust	0 to V _{REF}	V
V _{SUM}	Voltage at sum node	12	V
I _{REFSC}	Short-circuit current to ground at V _{REF} OUT	Continuous	
I _{REFIN}	Reference input current (Pin 14)	3	mA
P _D	Power dissipation *		
	-N package	800	mW
	-F package	1000	mW
T _A	Operating temperature range		
	SE5118	-55 to +125	°C
	NE5118	0 to +70	°C
T _{STG}	Storage temperature range	-65 to +150	°C
T _{SOLD}	Lead soldering temperature (10 seconds)	300	°C

*NOTES

For N package, derate at 120°C/W above 35°C

For F package, derate at 75°C/W above 75°C

DC ELECTRICAL CHARACTERISTICS

 $V_{CC+} = +15V$, $V_{CC-} = -15V$, SE5118, $-55^\circ C \leq T_A \leq 125^\circ C$,NE5118, $0^\circ C \leq T_A \leq 70^\circ C$ unless otherwise specified.

Typical values are specified at 25°C

PARAMETER	TEST CONDITIONS	SE5118			NE5118			UNIT	
		Min	Typ	Max	Min	Typ	Max		
Resolution		8	8	8	8	8	8	Bits	
Monotonicity		8	8	8	8	8	8	Bits	
Relative accuracy				±0.19			±0.19	%FS	
V _{CC+}	Positive supply voltage	11.4	15		11.4	15		V	
V _{CC-}	Negative supply voltage	-11.4	-15		-11.4	-15		V	
V _{IN(1)}	Logic "1" input voltage	2.0			2.0			V	
V _{IN(0)}	Logic "0" input voltage			0.8			0.8	V	
I _{IN(1)}	Logic "1" input current	Pin 1 = 0V, 2V<V _{IN} <18V	0.1	10		0.1	10	μA	
I _{IN(0)}	Logic "0" input current	Pin 1 = 0V, -5V<V _{IN} <0.8V	-2.0	-10		-2.0	-10	μA	
I _{FS}	Full scale output current	Unipolar operation V _{REF IN} = 5.000V, T _A = 25°C	1.90	1.992	2.10	1.90	1.992	2.10	mA
I _{ZS}	Zero scale current		-6	1	+6	-6	1	+6	μA
V _{REF}	Reference voltage	I _{REF} = 1mA T _A = 25°C	4.9	5.0	5.25	4.9	5.0	5.25	V
PSR ⁺ (out)	Output power supply rejection (+)	V ⁻ = -15V, 13.5V≤V ⁺ ≤16.5V, external V _{REF IN} = 5.000V		.001	.01		.001	.01	%FS/ %VS
PSR ⁻ (out)	Output power supply rejection (-)	V ⁺ = 15V, -13.5V≤V ⁻ ≤-16.5V, external V _{REF IN} = 5.000V		.001	.01		.001	.01	%FS/ %VS
TC _{FS}	Full scale temperature coefficient	V _{REF IN} = 5.000V ¹		20			20		ppm / °C
TC _{ZS}	Zero scale temperature coefficient	I _{REF IN} = 1.00mA ²		5			5		ppm / °C

NOTES

1. This is for voltage out only. See Unipolar Voltage Output schematic.

2. This is for current output mode.

DC ELECTRICAL CHARACTERISTICS (Cont'd) $V_{CC+} = +15V$, $V_{CC-} = -15V$, SE5118. $-55^{\circ}C \leq T_A \leq 125^{\circ}C$,
NE5118. $0^{\circ}C \leq T_A \leq 70^{\circ}C$ unless otherwise specified.
Typical values are specified at $25^{\circ}C$

PARAMETER	TEST CONDITIONS	SE5118			NE5118			UNIT
		Min	Typ	Max	Min	Typ	Max	
I_{REF} Reference output current	Note 1 $T_A = 25^{\circ}C$ $V_{REF OUT} = 0V$		15	3		15	3	mA
I_{REFSC} Reference short circuit current				30			30	mA
PSR+(REF) Reference power supply rejection (+)	$V- = -15V$, $13.5V \leq V+ \leq 16.5V$, $I_{REF} = 1.0mA$		.003	.01		.003	.01	%VR/ %VS
PSR-(REF) Reference power supply rejection (-)	$V+ = 15V$, $-13.5V \leq V- \leq 16.5V$, $I_{REF} = 1.0mA$		.003	.01		.003	.01	%VR/ %VS
TCREF Reference voltage temperature coefficient	$I_{REF} = 1.0mA$		60			60		ppm/ $^{\circ}C$
Z_{IN} DAC R_{REFIN} input impedance			5.0			5.0		k Ω
I_{CC+} Positive supply current	$V_{CC+} = 15V$		7	14		7	14	mA
I_{CC-} Negative supply current	$V_{CC-} = -15V$		-10	-15		-10	-15	mA
P_D Power dissipation	$I_{REF} = 1.0mA$, $V_{CC} = \pm 15V$		255	435		255	435	mW

AC ELECTRICAL CHARACTERISTICS $V_{CC} = \pm 15V$, $T_A = 25^{\circ}C$

PARAMETER	TO	FROM	TEST CONDITIONS	SE/NE5118			UNIT
				Min	Typ	Max	
T_{SLH} Settling time	$\pm \frac{1}{2}$ LSB	Input	All bits Low-to-high		200		ns
T_{SHL} Settling time	$\pm \frac{1}{2}$ LSB	Input	All bits High-to-low		200		ns
t_{PLH} Propagation delay	Output	Input	All bits switched Low-to-high		60		ns
t_{PHL} Propagation delay	Output	Input	All bits switched High-to-low		60		ns
t_{PLSB} Propagation delay	Output	Input	1 LSB change		60		ns
t_{PLH} Propagation delay	Output	$\overline{LE}$	Low-to-high transition		60		ns
t_{PHL} Propagation delay	Output	$\overline{LE}$	High-to-low transition		60		ns
t_s Set-up time	$\overline{LE}$	Input		100			ns
t_h Hold time	Input	$\overline{LE}$		50			ns
t_{pw} Latch enable pulse width				150			ns

NOTES

1. For reference currents $> 3mA$, use of an external buffer is required.

