

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

SE/NE5119

DESCRIPTION

The SE/NE5119 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 ultralow loading for easy interfacing with all logic systems. The latches appear transparent when the LE input is in the low state. When LE goes high, the input data present at the moment of transition is latched and retained until 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 coefficient.

The output has high voltage compliance increasing versatility.

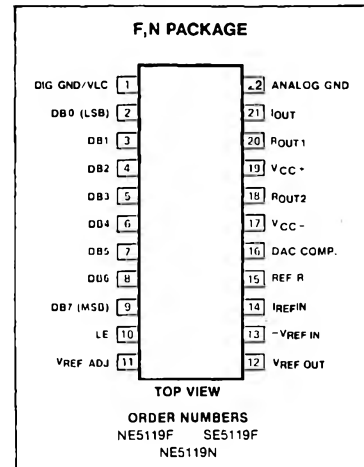
FEATURES

- 8-bit resolution
- Input latches
- Low-loading data inputs
- On-chip voltage reference
- Fast settling output current—200ns
- Accurate to $\pm 1/4$ LSB (.1%)
- Monotonic to 8 bits
- Reference short-circuit protected
- Compatible with 8086, 6800 and many other μ P's

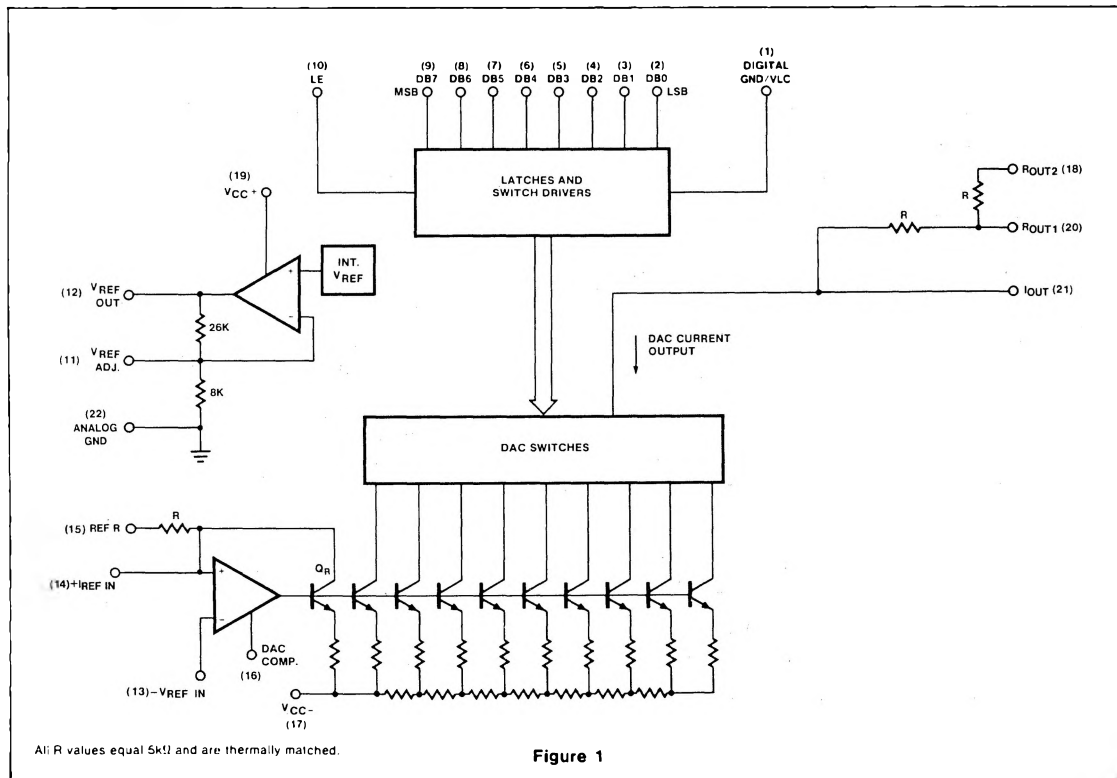
APPLICATIONS

- 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

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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*		
	800	mW
	1000	mW
T_A Operating temperature range		
SE5119	-55 to +125	°C
NE5119	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 $V_{CC+} = +15V$, $V_{CC-} = -15V$, SE5119, $-55^{\circ}C \leq T_A \leq 125^{\circ}C$,
 NE5119, $0^{\circ}C \leq T_A \leq 70^{\circ}C$ unless otherwise specified.
 Typical values are specified at 25°C

PARAMETER	TEST CONDITIONS	SE5119			NE5119			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				± 0.1			± 0.1	%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	Pin 1 = 0V	2.0			2.0			V
$V_{IN(0)}$ Logic "0" input voltage	Pin 1 = 0V			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 $V_{REFIN} = 5.000V$, $T_A = 25^{\circ}C$	1.90	1.992	2.10	1.90	1.992	2.10	mA
I_{ZS} Zero scale current			1			1		μA
V_{REF} Reference voltage	$I_{REF} = 1mA$ $T_A = 25^{\circ}C$	4.9	5.0	5.25	4.9	5.0	5.25	V
$PSR^{+}(\text{out})$ Output power supply rejection (+)	$V_{-} = -15V$, $13.5V \leq V_{+} \leq 16.5V$, external $V_{REFIN} = 5.000V$		.001	.01		.001	.01	%FS/ %VS
$PSR^{-}(\text{out})$ Output power supply rejection (-)	$V_{+} = 15V$, $-13.5V \leq V_{-} \leq -16.5V$, external $V_{REFIN} = 5.000V$		.001	.01		.001	.01	%FS/ %VS
TC_{FS} Full scale temperature coefficient	$V_{REFIN} = 5.000V^1$		20			20		ppm/°C
TC_{ZS} Zero scale temperature coefficient	$I_{REFIN} = 1.00mA^2$		5			5		ppm/°C

NOTES

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

2. This is for current output mode

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DC ELECTRICAL CHARACTERISTICS (Cont'd) $V_{CC+} = +15V$, $V_{CC-} = -15V$, SE5119, $-55^{\circ}C \leq T_A \leq 125^{\circ}C$,
 NE5119, $0^{\circ}C \leq T_A \leq 70^{\circ}C$ unless otherwise specified.
 Typical values are specified at $25^{\circ}C$

PARAMETER	TEST CONDITIONS	SE5119			NE5119			UNIT
		Min	Typ	Max	Min	Typ	Max	
I_{REF} Reference output current	Note 1 $T_A = 25^{\circ}C$ $V_{REF OUT} = 0V$			3			3	mA
I_{REFSC} Reference short circuit current			15	30		15	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
TC_{REF} 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 $V_{CC} = \pm 15V$, $T_A = 25^{\circ}C$

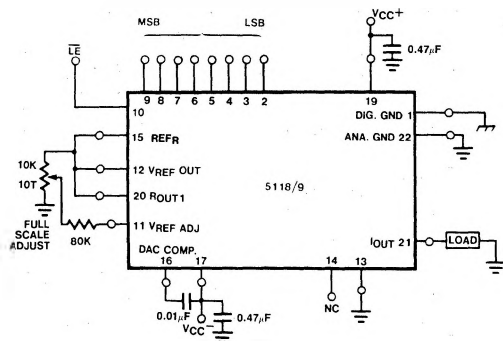
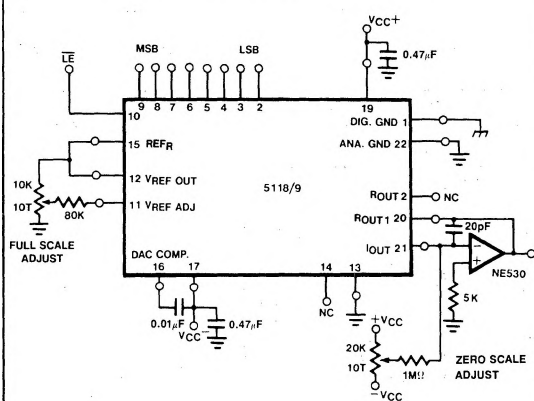
PARAMETER	TO	FROM	TEST CONDITIONS	SE/NE5119			UNIT
				Min	Typ	Max	
T_{SLH} Settling time	$\pm \frac{1}{2}$ LSB	Input	All bits Low-to-high		200		ns
T_{SHL} Settling time	$\pm \frac{1}{2}$ LSB	Input	All bits High-to-low		200		ns
t_{PLH} Propagation delay	Output	Input	All bits switched Low-to-high		60		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

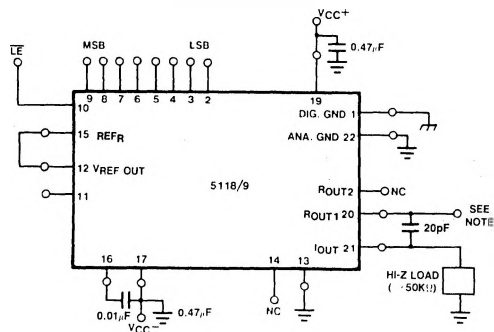
1. For reference currents $> 3mA$, use of an external buffer is required.

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BIPOLAR OUTPUT OPERATION (-1mA TO $+1\text{mA}$)UNIPOLAR VOLTAGE OUTPUT ($0 \rightarrow +10\text{V}$)

FAST VOLTAGE OUTPUT



NOTE

DATA INPUT CODE	VOLTAGE OUTPUT (PIN 21)	
0 0 0 0 0 0 0	+10V	0V
1 1 1 1 1 1 1	0V	-10V
	Pin 20 tied to +10V	Pin 20 tied to 0V

BASIC UNIPOLAR CURRENT OUTPUT ($0 \rightarrow -2\text{mA}$)