

NE/SE5118/5119 8-Bit Microprocessor- Compatible D/A Converter — Current Output

Linear Products

Product Specification

DESCRIPTION

The NE/SE5118/19 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 \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 coefficient.

The output has high voltage compliance, increasing versatility.

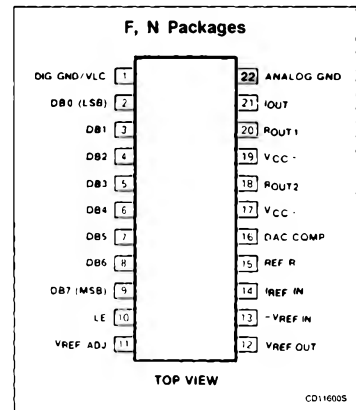
FEATURES

- 8-bit resolution
- Input latches
- Low-loading data inputs
- On-chip voltage reference
- Fast settling output current — 200ns
- Accurate to $\pm 1/4$ LSB (0.1%)
- Monotonic to 8 bits
- Reference short-circuit protected
- Compatible with 8086, 6800 and many other microprocessors

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



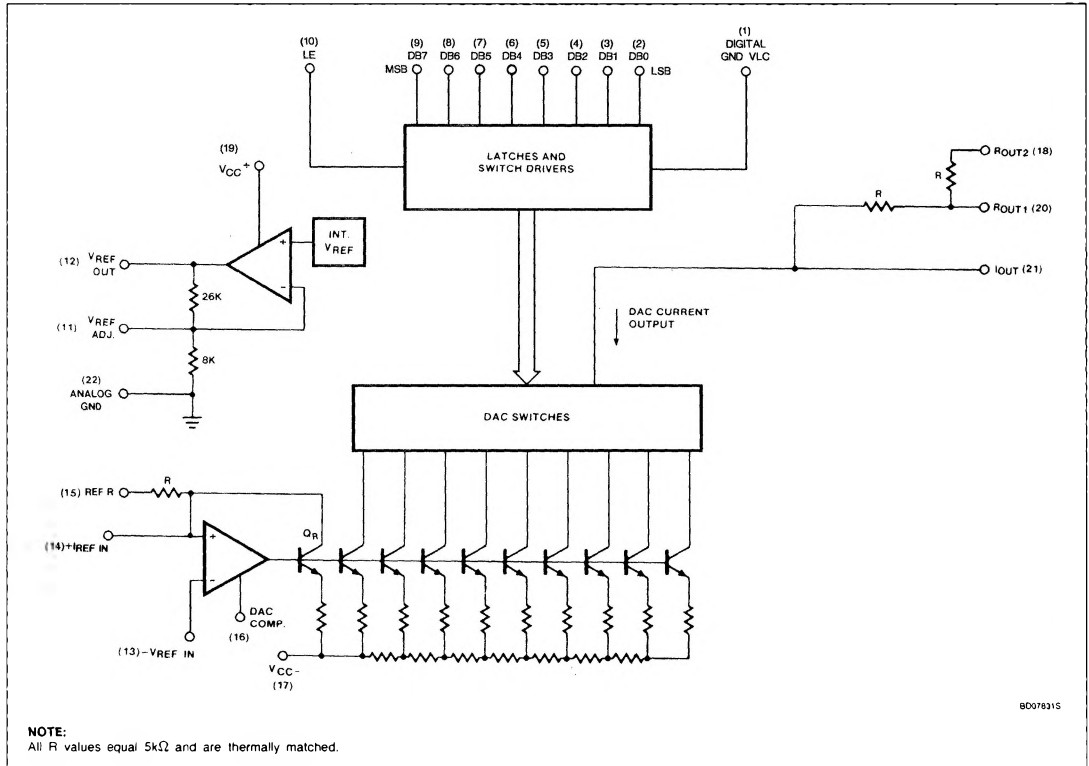
ORDERING INFORMATION

DESCRIPTION	TEMPERATURE RANGE	ORDER CODE
22-Pin Plastic DIP	0 to +70°C	NE5119N
22-Pin Ceramic DIP	0 to +70°C	NE5119F
22-Pin Ceramic DIP	-55°C to +125°C	SE5119F

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BLOCK DIAGRAM



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ABSOLUTE MAXIMUM RATINGS

SYMBOL	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
$V_{REF IN}$	Voltage at V_{REF} input	12	V
$V_{REF ADJ}$	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	
$I_{REF IN}$	Reference input current (Pin 14)	3	mA
P_D	Maximum power dissipation $T_A = 25^\circ\text{C}$ (still-air) ¹ F package N package	1740 2190	mW mW
T_A	Operating ambient temperature range SE5119 NE5119	-55 to +125 0 to +70	$^\circ\text{C}$ $^\circ\text{C}$
T_{STG}	Storage temperature range	-65 to +150	$^\circ\text{C}$
T_{SOLD}	Lead soldering temperature (10sec max)	300	$^\circ\text{C}$

NOTE:

1. Derate above 25°C , at the following rates:
F package at $13.9\text{mW}/^\circ\text{C}$.
N package at $17.5\text{mW}/^\circ\text{C}$.

DC ELECTRICAL CHARACTERISTICS

$V_{CC+} = +15\text{V}$, $V_{CC-} = -15\text{V}$, SE5119. $-55^\circ\text{C} \leq T_A \leq 125^\circ\text{C}$, NE5119.
 $0^\circ\text{C} \leq T_A \leq 70^\circ\text{C}$, unless otherwise specified. Typical values are specified at 25°C .

SYMBOL	PARAMETER	TEST CONDITIONS	NE/SE5118			NE/SE5119			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	16.5	11.4	15	16.5	V
V_{CC-}	Negative supply voltage		-11.4	-15	-16.5	-11.4	-15	-16.5	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, $2\text{V} < V_{IN} < 18\text{V}$		0.1	10		0.1	10	μA
$I_{IN(0)}$	Logic "0" input current	Pin 1 = 0V, $-5\text{V} < V_{IN} < 0.8\text{V}$		-2.0	-10		-2.0	-10	μA
I_{FS}	Full-scale output current	Unipolar operation $V_{REF IN} = 5.000\text{V}$, $T_A = 25^\circ\text{C}$	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	$I_{REF} = 1\text{mA}$, $T_A = 25^\circ\text{C}$	4.9	5.0	5.25	4.9	5.0	5.25	V
$PSR+(OUT)$	Output power supply rejection (+)	$V_- = -15\text{V}$, $13.5\text{V} \leq V_+ \leq 16.5\text{V}$ external $V_{REF IN} = 5.000\text{V}$		0.001	0.01		0.001	0.01	%FS/ %VS

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DC ELECTRICAL CHARACTERISTICS (Continued) $V_{CC+} = +15V$, $V_{CC-} = -15V$, 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 $25^{\circ}C$.

SYMBOL	PARAMETER	TEST CONDITIONS	NE/SE5118			NE/SE5119			UNIT
			Min	Typ	Max	Min	Typ	Max	
RSR _(OUT)	Output power supply rejection (-)	$V+ = 15V$, $-13.5V \leq V- \leq -16.5V$ external $V_{REF IN} = 5.000V$		0.001	0.01		0.001	0.01	%FS/ %VS
TC _{FS}	Full-scale temperature coefficient	$V_{REF IN} = 5.000V$ (Pin 15)		20			20		ppm/ $^{\circ}C$
TC _{ZS}	Zero-scale temperature coefficient	$I_{REF IN} = 1.00mA$ (Pin 14)		5			5		ppm/ $^{\circ}C$
I _{REF}	Reference output current	$T_A = 25^{\circ}C$			3			3	mA
I _{REFSC}	Reference short circuit current ¹	$V_{REF OUT} = 0V$		15	30		15	30	mA
PSR _(REF)	Reference power supply rejection (+)	$V- = -15V$, $13.5V \leq V+ \leq 16.5V$, $I_{REF} = 1.0mA$		0.003	0.01		0.003	0.01	%VR/ %VS
PSR _(REF)	Reference power supply rejection (-)	$V+ = 15V$, $-13.5V \leq V- \leq 16.5V$, $I_{REF} = 1.0mA$		0.003	0.01		0.003	0.01	%VR/ %VS
TC _{REF}	Reference voltage temperature coefficient	$I_{REF} = 1.0mA$		60			60		ppm/ $^{\circ}C$
Z _{IN}	DAC R _{REF IN} 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

NOTE:

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

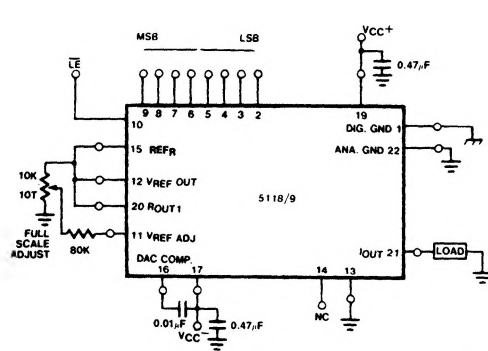
AC ELECTRICAL CHARACTERISTICS $V_{CC} = \pm 15V$, $T_A = 25^{\circ}C$, unless otherwise specified.

SYMBOL	PARAMETER	TO	FROM	TEST CONDITIONS	NE/SE5118/19			UNIT
					Min	Typ	Max	
t _{SLH}	Settling time	$\pm 1/2$ LSB	Input	All bits Low-to-High		200		ns
t _{SHL}	Settling time	$\pm 1/2$ 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	LE	Low-to-High transition		60		ns
t _{PHL}	Propagation delay	Output	LE	High-to-Low transition		60		ns
t _S	Setup time	LE	Input		100			ns
t _H	Hold time	Input	LE		50			ns
t _{PW}	Latch enable pulse width				150			ns

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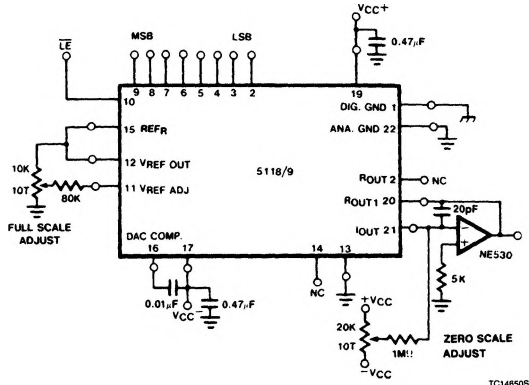
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TYPICAL APPLICATIONS



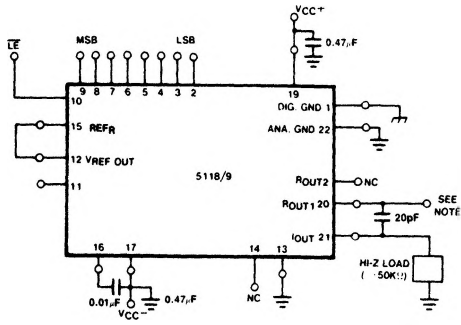
TC146405

Bipolar Output Operation (-1mA to +1mA)



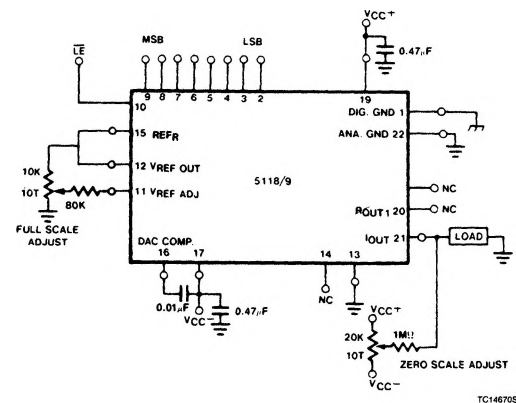
TC146505

Unipolar Voltage Output (0 to +10V)



TC147005

Fast Voltage Output



TC146705

Basic Unipolar Current Output (0 to -2mA)

NOTE:

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