

ABSOLUTE MAXIMUM RATINGS

V_{DD} to GND	-0.5V to 17V
V_{REF} to GND	$\pm 25V$
R_{FB} to GND	$\pm 25V$
Digital Inputs to GND	-0.5V to ($V_{DD} + 0.5V$)
OUT 1, OUT 2 to GND	-0.5V to ($V_{DD} + 0.5V$)
Power Dissipation	450mW (Derate 6mW/°C Above 75°C)
Maximum Junction Temperature	-65°C to 125°C
Operating Temperature Range	
Commercial (J, K Versions)	0°C to 70°C
Industrial (B Version)	-40°C to 85°C
Storage Temperature Range	-65°C to 150°C
Lead Temperature (Soldering, 10 sec)	300°C

PACKAGE/ORDER INFORMATION

TOP VIEW		ORDER PART NUMBER
OUT 1 [1]	[18] R_{FB}	LTC7541ABN
OUT 2 [2]	[17] V_{REF}	LTC7541ABSW
GND [3]	[16] V_{DD}	LTC7541AJN
BIT 1 (MSB) [4]	[15] BIT 12 (LSB)	LTC7541AKN
BIT 2 [5]	[14] BIT 11	LTC7541AJSW
BIT 3 [6]	[13] BIT 10	LTC7541AKSW
BIT 4 [7]	[12] BIT 9	
BIT 5 [8]	[11] BIT 8	
BIT 6 [9]	[10] BIT 7	
N PACKAGE SW PACKAGE		
18-LEAD PDIP 18-LEAD PLASTIC SO WIDE		
$T_{JMAX} = 150^{\circ}C$, $\theta_{JA} = 100^{\circ}C/W$ (N)		
$T_{JMAX} = 150^{\circ}C$, $\theta_{JA} = 130^{\circ}C/W$ (SW)		

Consult factory for Military grade parts.

ELECTRICAL CHARACTERISTICS

 $V_{DD} = 15V$, $V_{REF} = 10V$, OUT 1 = OUT 2 = GND = 0V, $T_A = T_{MIN}$ to T_{MAX} , unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	LTC7541AJ			LTC7541AK/LTC7541AB			UNITS	
			MIN	TYP	MAX	MIN	TYP	MAX		
Accuracy										
	Resolution		●	12		12			Bits	
INL	Integral Nonlinearity (Relative Accuracy)	(Note 1)	●	±1		±0.5			LSB	
DNL	Differential Nonlinearity	Guaranteed Monotonic, T _{MIN} to T _{MAX}	●	±1		±0.5			LSB	
GE	Gain Error	(Note 2)		±6		±1			LSB	
		T _A = 25°C T _{MIN} to T _{MAX}	●	±8		±2			LSB	
	Gain Temperature Coefficient	(Note 3)	●	1	5	1	5		ppm/°C	
I _{LKG}	Output Leakage Current	(Note 4)		±5		±5			nA	
		T _A = 25°C T _{MIN} to T _{MAX}	●	±10		±10			nA	
PSRR	Power Supply Rejection	V _{DD} = 15V ±5%	●	±0.002		±0.002			%/%	
Reference Input										
R _{REF}	V _{REF} Input Resistance		●	7	11	15	7	11	15	kΩ
	V _{REF} Input Resistance Temperature Coefficient			−100		−100				ppm/°C

ELECTRICAL CHARACTERISTICS

$V_{DD} = 15V$, $V_{REF} = 10V$, $OUT\ 1 = OUT\ 2 = GND = 0V$, $T_A = T_{MIN}$ to T_{MAX} , unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	ALL GRADES			UNIT	
			MIN	TYP	MAX		
Power Supply							
V _{DD}	Operating Supply Range		●	5	15	16	V
I _{DD}	Supply Current	Digital Inputs = V _{IH} or V _{IL}	●			2	mA
		Digital Inputs = 0V or V _{DD}	●			100	μA
Digital Inputs							
V _{IH}	Digital Input High Voltage		●	2.4			V
V _{IL}	Digital Input Low Voltage		●			0.8	V
I _{IN}	Digital Input Current		●		0.001	±1	μA
C _{IN}	Digital Input Capacitance	(Note 3), V _{IN} = 0V	●			8	pF
AC Performance							
	Propagation Delay	(Notes 5, 6)			100		ns
	Digital-to-Analog Glitch Impulse	(Notes 5, 7)			1000		nV-sec
	Multiplying Feedthrough Error	V _{REF} = ±10V, 10kHz Sinewave			1.0		mV _{P-P}
	Output Current Settling Time	(Note 5), To 0.01% for Full-Scale Change			0.6		μs
C _{OUT}	Output Capacitance (Note 3)	Digital Inputs = V _{IH}	●			200	pF
		C _{OUT1}	●			70	pF
		C _{OUT2}	●			70	pF
		Digital Inputs = V _{IL}	●			200	pF

The ● denotes specifications which apply over the full operating temperature range.

Note 1: $\pm 0.5LSB = \pm 0.012\%$ of full scale.

Note 2: Using internal feedback resistor.

Note 3: Guaranteed by design, not subject to test.

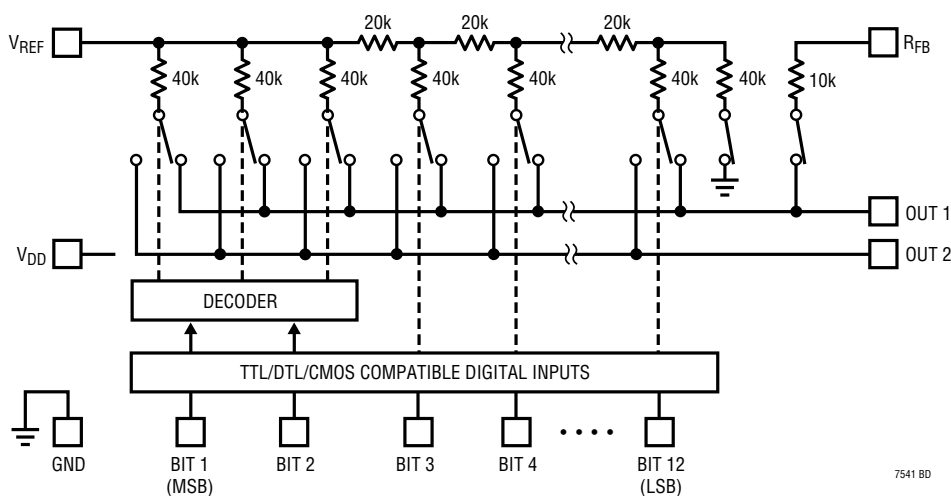
Note 4: I_{OUT1} with all digital inputs = 0V or I_{OUT2} with all digital inputs = V_{DD} .

Note 5: $OUT\ 1$ load = 100Ω in parallel with 13pF.

Note 6: Measured from digital input change to 90% of final analog value. Digital inputs = 0V to V_{DD} or V_{DD} to 0V.

Note 7: $V_{REF} = 0V$. All digital inputs 0V to V_{DD} or V_{DD} to 0V. Measured using LT1363 as output amplifier.

BLOCK DIAGRAM



7541 BD

TYPICAL APPLICATIONS

Unipolar Operation (2-Quadrant Multiplication)

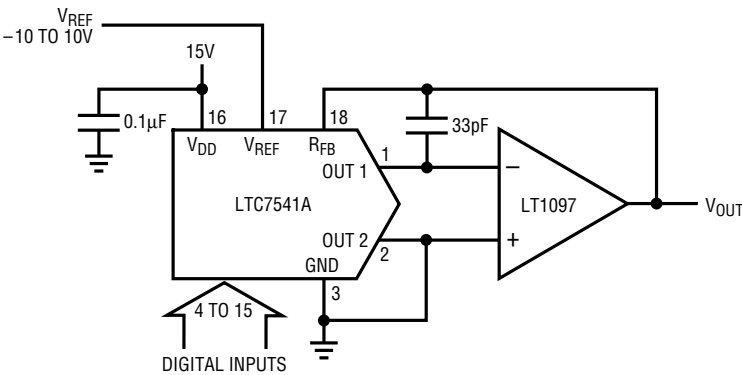


Table 1. Unipolar Binary Code Table

DIGITAL INPUT		ANALOG OUTPUT V _{OUT}
MSB	LSB	
1111	1111 1111	-V _{REF} (4095/4096)
1000	0000 0000	-V _{REF} (2048/4096) = -V _{REF} /2
0000	0000 0001	-V _{REF} (1/4096)
0000	0000 0000	0V

7541 TA03

Bipolar Operation (4-Quadrant Multiplication)

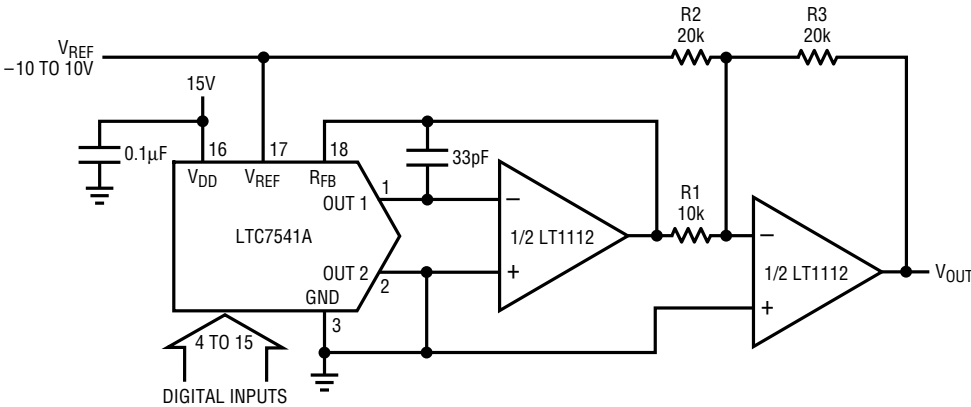


Table 2. Bipolar Offset Binary Code Table

DIGITAL INPUT		ANALOG OUTPUT V _{OUT}
MSB	LSB	
1111	1111 1111	V _{REF} (2047/2048)
1000	0000 0001	V _{REF} (1/2048)
1000	0000 0000	0V
0111	1111 1111	-V _{REF} (1/2048)
0000	0000 0000	-V _{REF}

7541 TA04

RELATED PARTS

PART NUMBER	DESCRIPTION	COMMENTS
LTC1257	Complete Serial I/O V _{OUT} 12-Bit DAC	5V to 15V Single Supply in 8-Pin SO and PDIP
LTC1451/LTC1452/LTC1453	Complete Serial I/O V _{OUT} 12-Bit DACs	3V/5V Single Supply in 8-Pin SO and PDIP
LTC7543/LTC8143	Serial I/O Multiplying 12-Bit DACs	Clear Pin, Serial Data Output (LTC8143)
LTC8043	Serial Multitplying 12-Bit DAC	8-Pin SO and PDIP