TABLE 1–DEVICE SPECIFICATIONS FOR OPTIMUM PERFORMANCE

Device	Specification		Purpose
Digital potentiometers (IC_2, IC_3) (MCP42010)	Number of bits	8 bits	Determines the overall LSB and resolution of the circuit.
	Nominal resistance (potentiometer element)	10 kΩ (typical)	Achieve better noise performance by using lower resistance potentiometers. The trade-off for low-noise potentiometers is higher current consumption.
	Differential nonlinearity	±1 LSB (maximum)	Good differential linearity ensures that the circuit exhibits no missing codes.
	Voltage-noise density (for half the resistive element)	9 nV/$\sqrt{Hz}$ at 1 kHz (typical)	If the noise contribution of these devices is too high, it reduces the possibility of achieving 16-bit, noise-free performance. Selecting lower resistance elements can reduce the potentiometer noise.
Operational amplifiers (IC_4, IC_5) (MCP6022)	Input bias current (IB)	1 pA at 25°C (maximum)	Higher input bias current causes a dc error across the potentiometer. CMOS amplifiers are, therefore, good choices.
	Input offset voltage	500 μV (maximum)	A difference in amplifier offset error between IC_{4A} and IC_{4B} could compromise the differential linearity to the overall system; 50 μV is considerably lower than 1 LSB in Stage 1 of the circuit.
	Voltage-noise density	8.7 nV/$\sqrt{Hz}$ at 10 kHz (typical)	If the noise contribution of these devices is too high, it reduces the possibility of achieving 16-bit, noise-free performance. Selecting lower noise amplifiers can reduce overall system noise.