

**Isolated Low-Noise Amplifier Based on AD8331 for Current Measurement Using External Shunt**

The circuit is designed for current measurement using an external shunt resistor. It consists of several key sections:

- Input Stage:** The input signal from the shunt resistor (J2,  $\pm 200$  mV) is coupled through a 0.14 pF capacitor (D1) and a 100 nF capacitor (C6) to the LNA (U1A, AD8331ARQZ). The input impedance is 6 kOhm (LNA is not terminated). A feedback capacitor (C1, CFB) is needed for active impedance matching.
- LNA Power & Control:** The LNA is powered by a +5V supply through a 100 nF capacitor (C9). The control signal (ENBL) is provided by a +5V supply through a 100 nF capacitor (C14).
- VGA Stage:** The LNA output is coupled through a 100 nF capacitor (C7) to the VGA (U1C, AD8331ARQZ). The VGA output is matched to 50 ohms and requires empirical testing. The VGA is powered by a +5V supply through a 100 nF capacitor (C8).
- VGA Power & Control:** The VGA is powered by a +5V supply through a 100 nF capacitor (C8). The control signal (ENBL) is provided by a +5V supply through a 100 nF capacitor (C14).
- Power Management:** The power input is 3...3.5V. The output is full range  $\pm 2.5$  V. The power management section includes a 100 kHz notch filter and a low-noise high-PSRR linear regulator (U3, ADM7150ARDZ-5.0).

**Components and Values:**

- Resistors: R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R57, R58, R59, R60, R61, R62, R63, R64, R65, R66, R67, R68, R69, R70, R71, R72, R73, R74, R75, R76, R77, R78, R79, R80, R81, R82, R83, R84, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R98, R99, R100.
- Capacitors: C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38, C39, C40, C41, C42, C43, C44, C45, C46, C47, C48, C49, C50, C51, C52, C53, C54, C55, C56, C57, C58, C59, C60, C61, C62, C63, C64, C65, C66, C67, C68, C69, C70, C71, C72, C73, C74, C75, C76, C77, C78, C79, C80, C81, C82, C83, C84, C85, C86, C87, C88, C89, C90, C91, C92, C93, C94, C95, C96, C97, C98, C99, C100.
- Inductors: L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L12, L13, L14, L15, L16, L17, L18, L19, L20, L21, L22, L23, L24, L25, L26, L27, L28, L29, L30, L31, L32, L33, L34, L35, L36, L37, L38, L39, L40, L41, L42, L43, L44, L45, L46, L47, L48, L49, L50, L51, L52, L53, L54, L55, L56, L57, L58, L59, L60, L61, L62, L63, L64, L65, L66, L67, L68, L69, L70, L71, L72, L73, L74, L75, L76, L77, L78, L79, L80, L81, L82, L83, L84, L85, L86, L87, L88, L89, L90, L91, L92, L93, L94, L95, L96, L97, L98, L99, L100.
- Diodes: D1, D2, D3, D4, D5, D6, D7, D8, D9, D10, D11, D12, D13, D14, D15, D16, D17, D18, D19, D20, D21, D22, D23, D24, D25, D26, D27, D28, D29, D30, D31, D32, D33, D34, D35, D36, D37, D38, D39, D40, D41, D42, D43, D44, D45, D46, D47, D48, D49, D50, D51, D52, D53, D54, D55, D56, D57, D58, D59, D60, D61, D62, D63, D64, D65, D66, D67, D68, D69, D70, D71, D72, D73, D74, D75, D76, D77, D78, D79, D80, D81, D82, D83, D84, D85, D86, D87, D88, D89, D90, D91, D92, D93, D94, D95, D96, D97, D98, D99, D100.
- Transistors: TR1, TR2, TR3, TR4, TR5, TR6, TR7, TR8, TR9, TR10, TR11, TR12, TR13, TR14, TR15, TR16, TR17, TR18, TR19, TR20, TR21, TR22, TR23, TR24, TR25, TR26, TR27, TR28, TR29, TR30, TR31, TR32, TR33, TR34, TR35, TR36, TR37, TR38, TR39, TR40, TR41, TR42, TR43, TR44, TR45, TR46, TR47, TR48, TR49, TR50, TR51, TR52, TR53, TR54, TR55, TR56, TR57, TR58, TR59, TR60, TR61, TR62, TR63, TR64, TR65, TR66, TR67, TR68, TR69, TR70, TR71, TR72, TR73, TR74, TR75, TR76, TR77, TR78, TR79, TR80, TR81, TR82, TR83, TR84, TR85, TR86, TR87, TR88, TR89, TR90, TR91, TR92, TR93, TR94, TR95, TR96, TR97, TR98, TR99, TR100.

**Notes:**

- Requires empirical testing
- Output is matched to 50 ohms
- Power Input 3...3.5V
- Output Full range  $\pm 2.5$  V
- Use low-ESR capacitors!

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