R&T BiCMOS

Low Noise, Cryogenic Differential Amplifier

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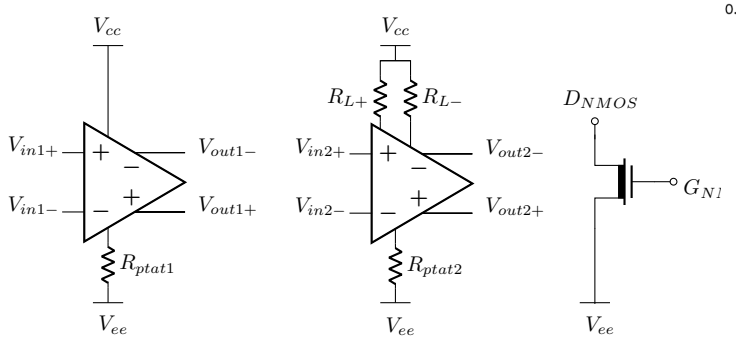
DESCRIPTION

This ASIC, fabricated using IHP technology, integrates three distinct circuits designed for cryogenic operation (77 K). It features two low-noise differential amplifiers: a fully integrated version with on-chip resistors and a flexible version utilizing external resistors. Both amplifiers deliver an ultralow noise floor of $1\,\mathrm{nV}/\sqrt{\mathrm{Hz}}$ and are optimized for promising low flicker noise at cryogenic temperatures. The bandwidth is specified at 25 MHz for the on-chip variant and 50 MHz for the external resistor configuration. Additionally, a large-geometry NMOS transistor ($W/L \approx 190,000$) is included for discrete characterization.

ABSOLUTE MAXIMUM RATINGS

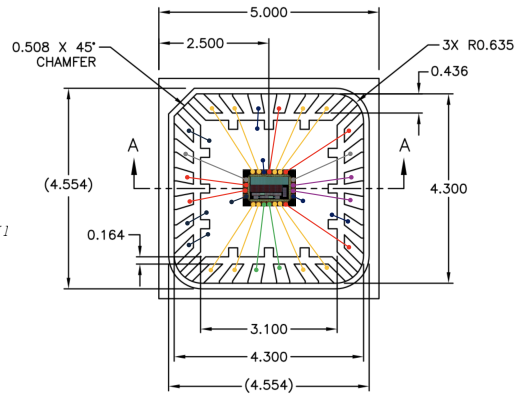
Total Supply Voltage (V^+ to V^-)	5.15V
Input Current (Note 2)	±40mA
Operating Junction Temperature Range (Note 5)	−40°C to 125°C

BLOCK DIAGRAM



LNA 1 LNA 2 NMOS Block

PACKAGE



Bonding diagram with QFN24 package

TABLE 1: ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	NOTES	$T_A = 25°C$			SUB-GROUP	$-55°C \le T_A \le 125°C$			SUB-GROUP	UNITS
				MIN	TYP	MAX		MIN	TYP	MAX		
V_{OS}	Input Offset Voltage	$V_S = 5V, 0V$; $V_{CM} = V^-$ to V^+			0.6	2	1			4	2,3	mV
					2.5	6	1			9	2,3	mV
I_B	Input Bias Current	$V_S = 5V, 0V$; $V_{CM} = V^+$			8	18	1			20	2,3	μA
				-50	-23		1	-100			2,3	μA