

MNLM6181AM-X REV 0A0

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100mA, 100MHz Current Feedback Amplifier

General Description

The LM6181 current-feedback amplifier offers an unparalleled combination of bandwidth, slew-rate and output current. The amplifier can directly drive up to 100pF capacitive loads without oscillating and a 10V signal into a 50 Ohm or 75 Ohm back-terminated coax cable system over the full military temperature range. This represents a radical enhancement in output drive capability for an 8-pin high-speed amplifier making it ideal for video applications.

Built on National's advanced high-speed VIP(TM) II (Vertically Integrated PNP) process, the LM6181's dynamic performance makes it ideal for data acquisition, high speed ATE, and precision pulse amplifier applications.

Industry Part Number

LM6181AM

NS Part Numbers

LM6181AMJ/883

Prime Die

LM6181

Controlling Document

5962-9081802MPA

Processing

MIL-STD-883, Method 5004

Quality Conformance Inspection

MIL-STD-883, Method 5005

Subgrp	Description	Temp (°C)
1	Static tests at	+25
2	Static tests at	+125
3	Static tests at	-55
4	Dynamic tests at	+25
5	Dynamic tests at	+125
6	Dynamic tests at	-55
7	Functional tests at	+25
8A	Functional tests at	+125
8B	Functional tests at	-55
9	Switching tests at	+25
10	Switching tests at	+125
11	Switching tests at	-55

(Absolute Maximum Ratings)

(Note 1)

Supply Voltage	±18V
Differential Input Voltage	±6V
Input Voltage	±Supply Voltage
Inverting Input Current	15mA
Soldering Information Soldering (10 sec.)	260 C
Output Short Circuit (Note 2)	
Storage Temperature Range	-65 C ≤ TA ≤ +150 C
Maximum Junction Temperature	150 C
Thermal Resistance ThetaJA (Still Air) (500LF/Min Air flow)	115 C/W 57 C/W
ThetaJC	18.1 C/W
ESD Rating (Note 3)	±3500V

Note 1: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating ratings indicate conditions the device is intended to be functional, but device parameter specifications may not be guaranteed under these conditions. For guaranteed specifications and test conditions, see the Electrical Characteristics.

Note 2: Continuous short circuit operation at elevated ambient temperature can result in exceeding the maximum allowed junction temperature of 150 C. Output currents in excess of ±130mA over a long term basis may adversely affect reliability.

Note 3: Human body model 100pF and 1.5K Ohms.

Recommended Operating Conditions

Supply Voltage Range	7V to 32V
Junction Temperature Range	-55 C ≤ TA ≤ +125 C

Electrical Characteristics

DC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)

DC: $V_{CC} = \pm 15V$, $R_L = 1K \Omega$

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Vio	Input Offset Voltage					3.0	mV	1
						5.0	mV	2, 3
		$V_{CC} = \pm 5V$				2.0	mV	1
		$V_{CC} = \pm 5V$				3.0	mV	2, 3
-Iib	Inverting Input Bias Current					5.0	uA	1
						20.0	uA	2, 3
		$V_{CC} = \pm 5V$				10.0	uA	1
		$V_{CC} = \pm 5V$				22.0	uA	2, 3
+Iib	Non-Inverting Input Bias Current					1.5	uA	1
						3.0	uA	2, 3
		$V_{CC} = \pm 5V$				1.5	uA	1, 2, 3
-Iib PSRR	Inverting Input Bias Current Power Supply Rejection	$\pm 4.5V \leq V_{CC} \leq \pm 16V$				0.5	uA/V	1
		$\pm 4.5V \leq V_{CC} \leq \pm 16V$				3.0	uA/V	2, 3
		$\pm 4.0V \leq V_{CC} \leq \pm 6.0V$				0.5	uA/V	1
		$\pm 4.0V \leq V_{CC} \leq \pm 6.0V$				0.6	uA/V	2, 3
+Iib PSRR	Non-Inverting Input Bias Current Power Supply Rejection	$\pm 4.5V \leq V_{CC} \leq \pm 16V$				0.5	uA/V	1
		$\pm 4.5V \leq V_{CC} \leq \pm 16V$				1.5	uA/V	2, 3
		$\pm 4.0V \leq V_{CC} \leq \pm 6.0V$				0.5	uA/V	1
		$\pm 4.0V \leq V_{CC} \leq \pm 6.0V$				0.6	uA/V	2, 3
-Iib CMRR	Inverting Input Bias Current Common Mode Rejection	$-10V \leq V_{CM} \leq +10V$				0.5	uA/V	1
						0.75	uA/V	2, 3
		$-2.5V \leq V_{CM} \leq +2.5V$				0.5	uA/V	1
						1.0	uA/V	2, 3
+Iib CMRR	Non-Inverting Input Bias Current Common Mode Rejection	$-10V \leq V_{CM} \leq +10V$				0.5	uA/V	1, 2, 3
		$-2.5V \leq V_{CM} \leq +2.5V$				0.5	uA/V	1
						1.0	uA/V	2, 3
CMRR	Common Mode Rejection Ratio	$-10V \leq V_{CM} \leq +10V$			50.0		dB	1, 2, 3
		$-2.5V \leq V_{CM} \leq +2.5V$			50.0		dB	1
					47.0		dB	2, 3

Electrical Characteristics

DC PARAMETERS(Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)

DC: $V_{CC} = \pm 15V$, $R_L = 1K \text{ Ohm}$

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
PSRR	Power Supply Rejection Ratio	$\pm 4.5V \leq V_{CC} \leq \pm 16V$			70.0		dB	1, 2, 3
		$\pm 4.0V \leq V_{CC} \leq \pm 6.0V$			70.0		dB	1, 2, 3
Rin	Non-Inverting Input Resistance				1.0		MOhm	1
					0.5		MOhm	2, 3
		$V_{CC} = \pm 5V$			1.0		MOhm	1
		$V_{CC} = \pm 5V$			0.5		MOhm	2, 3
Isc	Output Short Circuit Current	Vout to Rail, $R_L = 10 \text{ Ohms}$ to Ground	1		100.0		mA	1
			1		75.0		mA	2, 3
		$V_{CC} = \pm 5V$, Vout to Rail, $R_L = 10 \text{ Ohms}$ to Ground	1		75.0		mA	1
		$V_{CC} = \pm 5V$, Vout to Rail, $R_L = 10 \text{ Ohms}$ to Ground	1		70.0		mA	2, 3
Zt	Transimpedance				1.0		MOhm	1
					0.6		MOhm	2, 3
		$R_L = 100 \text{ Ohms}$			0.8		MOhm	1
					0.5		Mohm	2, 3
		$V_{CC} = \pm 5V$			0.75		MOhm	1
		$V_{CC} = \pm 5V$			0.5		MOhm	2, 3
		$V_{CC} = \pm 5V$, $R_L = 100 \text{ Ohms}$			0.5		MOhm	1
		$V_{CC} = \pm 5V$, $R_L = 100 \text{ Ohms}$			0.23		MOhm	2, 3
Icc	Supply Current	No Load, $V_{in} = 0V$				10.0	mA	1, 2, 3
		$V_{CC} = \pm 5V$, No Load, $V_{in} = 0V$				8.5	mA	1, 2, 3
Vop	Output Voltage Swing				11.00		V	4, 5, 6
		$R_L = 100 \text{ Ohm}$			10.00		V	4
					7.20		V	5, 6
		$V_{CC} = \pm 5V$			2.25		V	4
		$V_{CC} = \pm 5V$			2.20		V	5, 6
		$V_{CC} = \pm 5V$, $R_L = 100 \text{ Ohms}$			2.00		V	4, 5, 6

Electrical Characteristics

DC PARAMETERS(Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)

DC: $V_{CC} = \pm 15V$, $R_L = 1K \text{ Ohm}$

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
A _{vol}	Gain				50		K	4, 5, 6
		$R_L = 100 \text{ Ohm}$			40		K	4
					25		K	5, 6
		$V_{CC} = \pm 5V$			30		K	4
		$V_{CC} = \pm 5V$			15		K	5, 6
		$V_{CC} = \pm 5V$, $R_L = 100 \text{ Ohms}$			20		K	4
		$V_{CC} = \pm 5V$, $R_L = 100 \text{ Ohms}$			7.5		K	5, 6
V _{cm}	Input Common Mode Voltage Range		2		-10	10	V	4, 5, 6
		$V_{CC} = \pm 5V$	2		-2.5	2.5	V	4, 5, 6

AC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)

AC: $V_{CC} = \pm 15V$, $R_L = 1K \text{ Ohm}$

B _w	Closed Loop Bandwidth -3 dB	$A_{VS} = -1$			75		MHz	7
					65		MHz	8, 8A
		$A_{VS} = -10$			35		MHz	7, 8, 8A
		$V_{CC} = \pm 5V$, $A_{VS} = -1$			30		MHz	7, 8, 8A
		$V_{CC} = \pm 5V$, $A_{VS} = -10$			20		MHz	7, 8, 8A
S _r	Slew Rate	$A_{VS} = -1$, $V_O = \pm 10V$	3		1000		V/uS	7, 8, 8A
		$V_{CC} = \pm 5V$, $A_{VS} = -1$, $V_O = \pm 2V$	3		375		V/uS	7, 8, 8A
t _S	Settling Time (0.1%)	$A_{VS} = -1V$, $V_O = \pm 5V$, $R_L = 150 \text{ Ohm}$				85	nS	7
		$A_{VS} = -1V$, $V_O = \pm 5V$, $R_L = 150 \text{ Ohm}$				115	nS	8, 8A
		$V_{CC} = \pm 5V$, $A_{VS} = -1V$, $V_O = \pm 2V$, $R_L = 150 \text{ Ohm}$				85	nS	7
		$V_{CC} = \pm 5V$, $A_{VS} = -1V$, $V_O = \pm 2V$, $R_L = 150 \text{ Ohm}$				125	nS	8, 8A

Graphics and Diagrams

GRAPHICS#	DESCRIPTION
See attached graphics following this page.	

Graphics and Diagrams (Continued)

GRAPHICS#	DESCRIPTION
6278HRA2	CERDIP (J), 8 LEAD (B/I CKT)
J08ARL	CERDIP (J), 8 LEAD (P/P DWG)
P000105A	CERDIP (J), 8 LEAD (PIN OUT)

See attached graphics following this page.

