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NTE7141
Integrated Circuit
Dual BIMOS Operational Amplifier
W/MOSFET Input, Bipolar Output

Description:

The NTE7141 is a dual, operational amplifier in an 8–Lead Mini–DIP type package that combines the advantages of MOS and bipolar transistors on the same monolithic chip. The gate–protected MOSFET (PMOS) input transistors provide high input impredance and a wide common–mode input voltage range (typically to 0.5V below the negative supply rail). The bipolar output transistors allow a wide output voltage swing and provide a high output current capability.

Features:

- Internally Compensated
- MOSFET Input Stage:
  - Very High Input Impedance
  - Very Low Input Current
  - Wide Common–Mode Input Voltage Range
  - Rugged Input Stage – Bipolar Diode Protected
- Directly Replaces Industry Type 1458 in Most Applications
- Operation From 4V–to–36V Single or Dual Supplies
- Characterized for ±15V Operation for TTL Supply Systems with Operation down to 4V
- Wide Bandwidth
- High Voltage–Follower Slew Rate
- Output Swings to Within 0.5V of Negative Supply at V+ = 5V, V– = 0

Applications:

- Ground–Referenced Single–Supply Amplifiers in Automobile and Portable Instrumentation
- Sample and Hold Amplifiers
- Long–Duration Timers/Multivibrators (Microseconds – Minutes – Hours)
- Photocurrent Instrumentation
- Active Filters
- Intrusion Alarm Systems
- Comparators
- Instrumentation Amplifiers
- Function Generators
- Power Supplies

Absolute Maximum Ratings:

DC Supply Voltage (Between V+ and V– Terminals) 36V
Operating Voltage Range . . . . . 4 to 36V or ±2 to ±18V
Differential–Mode Input Voltage . . . . . ±8V
Common–Mode DC Input Voltage . . . . . (V+ +8V) to (V– –0.5V)
Input–Terminal Current 1mA
Device Dissipation, P_D 630mW
Derate Linearly Above +55°C . . . . . 6.67mW/°C
Operating Temperature Range, T_{opr} . . . . . –40° to +85°C
Storage Temperature Range, T_{stg} . . . . . –65° to +150°C
Lead Temperature (During Soldering, 1/16" from case, 10sec max), T_L . . . . . +265°C
Output Short–Circuit Duration (Note 1) . . . . . Unlimited

Note 1. Short circuit may be applied to GND or to either supply. Temperature and/or supply voltages must be limited to keep dissipation within maximum rating.

Electrical Characteristics: (V+ = +15V, V– = –15V unless otherwise specified)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
Input Offset Voltage	$\|V_{IO}\|$	T_A = +25°C		–	5	15	mV
		T_A = –40° to +85°C		–	10	–	mV
Input Offset Current	$\|I_{IO}\|$	T_A = +25°C		–	0.5	30	pA
		T_A = +85°C		–	32	–	pA
Input Current	I_I	T_A = +25°C		–	10	50	pA
		T_A = +85°C		–	640	–	pA
Large–Signal Voltage Gain	A_{OL}	Note 2	T_A = +25°C	20k	100k	–	V/V
				86	100	–	dB
			T_A = –40° to +85°C	–	63k	–	V/V
				–	96	–	dB
Common–Mode Rejection Ratio	CMRR	T_A = +25°C		–	32	320	µV/V
				70	90	–	dB
		T_A = –40° to +85°C		–	32	–	µV/V
				–	90	–	dB
Common–Mode Input–Voltage Range	V_{ICR}	T_A = +25°C		–15	–15.5 to +12.5	+11	V
		T_A = –40° to +85°C		–	–15 to +12.3	–	V
Power Supply Rejection Ratio	$\Delta V_{IO}/\Delta V$	T_A = +25°C		–	100	150	µV/V
	PSSR			76	80	–	dB
	$\Delta V_{IO}/\Delta V$	T_A = –40° to +85°C		–	150	–	µV/V
	PSSR			–	76	–	dB

Note 2. V_O = 26$V_{P–P}$, +12V, –14V and R_L = 2kΩ.

Electrical Characteristics (Cont'd): (V+ = +15V, V– = –15V unless otherwise specified)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
Maximum Output Voltage	V_{OM}+	T_A = +25°C, R_L = 2kΩ		+12	+13	–	V
	V_{OM}–			–14	–14.4	–	V
		T_A = +25°C, Note 3		0.4	0.13	–	V
	V_{OM}+	T_A = –40° to +85°C, R_L = 2kΩ		–	+12.4	–	V
	V_{OM}–			–	–14.2	–	V
Supply Current, For Both Amps	I+	T_A = +25°C		–	8	12	mA
		T_A = –40° to +85°C		–	8.4	–	mA
Total Device Dissipation	P_D	T_A = +25°C		–	240	360	mW
		T_A = –40° to +85°C		–	252	–	mW
Temperature Coefficient of Input Offset Voltage	$\Delta V_{IO}/\Delta T$	T_A = –40° to +85°C		–	15	–	µA/°C
Input Resistance	R_I	T_A = +25°C		–	1.5	–	TΩ
Input Capacitance	C_I	T_A = +25°C		–	4	–	pF
Output Resistance	R_O	T_A = +25°C		–	60	–	Ω
Equivalent Wideband Input Noise Voltage	e_n	T_A = +25°C, R_S = 100Ω	f = 1kHz	–	40	–	nV/√Hz
			f = 10kHz	–	12	–	nV/√Hz
Short–Circuit Current to Opposite Supply Source	I_{OM}+	T_A = +25°C		–	40		mA
Sink	I_{OM}–			–	11	–	mA
Gain–Bandwidth Product	f_T	T_A = +25°C		–	4.5	–	MHz
Slew Rate	SR	T_A = +25°C		–	9	–	V/µs
Transient Response: Rise Time	t_r	T_A = +25°C, R_L = 2kΩ, C_L = 100pF		–	0.08	–	µs
Overshoot				–	10	–	%
Setting Time at $10V_{P–P}$ 1mV	t_s	T_A = +25°C, R_L = 2kΩ, C_L = 100pF, Voltage Follower		–	4.5	–	µs
10mV				–	1.4	–	µs
Crosstalk	CT	T_A = +25°C, f = 1kHz		–	120	–	dB

Note 3. V+ = 5V, V– = GND, I_{Sink} = 200µA.

Electrical Characteristics: (T_A = +25°C, V+ = +5V, V– = –5V unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Offset Voltage	$\lvert V_{IO}\rvert$		–	5	–	mV
Input Offset Current	$\lvert I_{IO}\rvert$		–	0.1	–	pA
Input Current	I_I		–	2	–	pA
Input Resistance	R_I		–	1	–	TΩ
Large–Signal Voltage Gain	A_{OL}		–	100k	–	V/V
			–	100	–	dB
Common–Mode Rejection Ratio	CMRR		–	32	320	µV/V
			70	90	–	dB

Electrical Characteristics (Cont'd): (T_A = +25°C, V+ = +5V, V– = –5V unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Common–Mode Input–Voltage Range	V_{ICR}		–	–0.5	–	V
			–	+2.6	–	V
Power Supply Rejection Ratio	$\Delta V_{IO}/\Delta V$		–	31.6	–	µV/V
	PSSR		–	90	–	dB
Maximum Output Voltage	$V_{OM}+$		–	3.0	–	V
	$V_{OM}–$		–	0.3	–	V
Maximum Output Current: Source	$I_{OM}+$		–	20	–	mA
Sink	$I_{OM}–$		–	1	–	mA
Slew Rate	SR		–	7	–	V/µs
Gain–Bandwidth Product	f_T		–	4.5	–	MHz
Supply Current	I+		–	4	–	mA
Device Dissipation	P_D		–	20	–	mW

Pin Connection Diagram