

FREQUENCY COMPENSATED OPERATIONAL AMPLIFIERS

- NO FREQUENCY COMPENSATION REQUIRED
- SHORT CIRCUIT PROTECTION
- OFFSET VOLTAGE NULL CAPABILITY
- LARGE COMMON MODE AND DIFFERENTIAL VOLTAGE RANGE
- NO LATCH-UP

The LS 141 series consists of general purpose operational amplifiers, intended for a wide range of analog applications. High common mode voltage range and absence of "latch-up" tendencies make the LS 141 series ideal for use as a voltage follower. The high gain and wide range of operating voltage provide superior performance in integrators, summing amplifiers, and general feedback applications. The LS 141 series is available with hermetic gold chip (8000 series). This is particularly suitable for professional and telecom applications, wherever very high MTBF are required.

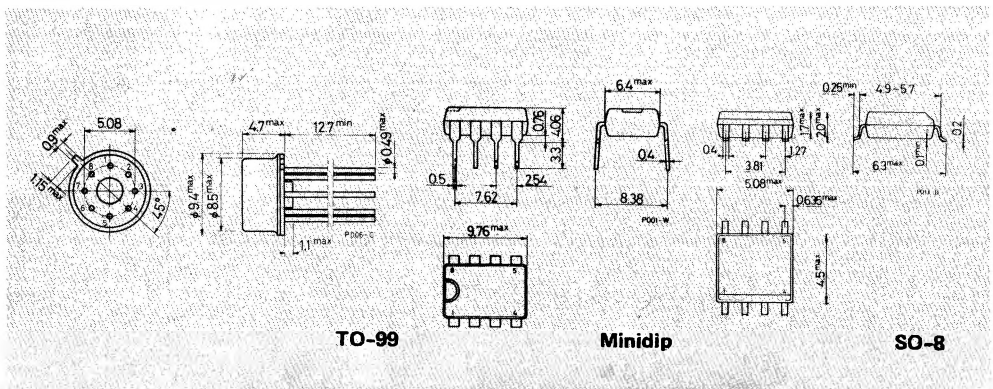
ABSOLUTE MAXIMUM RATINGS

		TO-99	Minidip	μpackage
V_s	Supply voltage for LS 141/LS 141A for LS 141C		$\pm 22V$ $\pm 18V$ $\pm 15V$ $\pm 30V$	
V_i (1)	Input voltage		-55 to $125^\circ C$	
ΔV_i	Differential input voltage		0 to $70^\circ C$	
T_{op}	Operating temperature for LS 141/LS 141A for LS 141C		indefinite	
	Output short circuit duration(2)			
P_{tot}	Power dissipation at $T_{amb} = 70^\circ C$	520 mW	665 mW	400 mW
T_{stg}	Storage temperature	-65 to $150^\circ C$	-55 to $150^\circ C$	-55 to $150^\circ C$
	Lead soldering temperature	$300^\circ C$ (10s)	$260^\circ C$ (12s)	$260^\circ C$ (5s) $235^\circ C$ (11s)

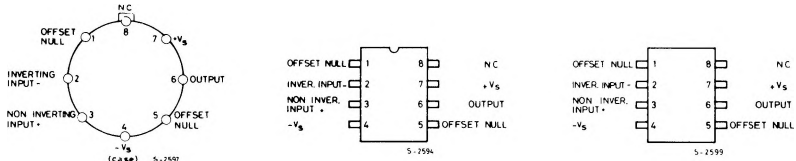
- 1) For supply voltage less than $\pm 15V$, input voltage is equal to the supply voltage
- 2) The short circuit duration is limited by thermal dissipation

MECHANICAL DATA

Dimensions in mm

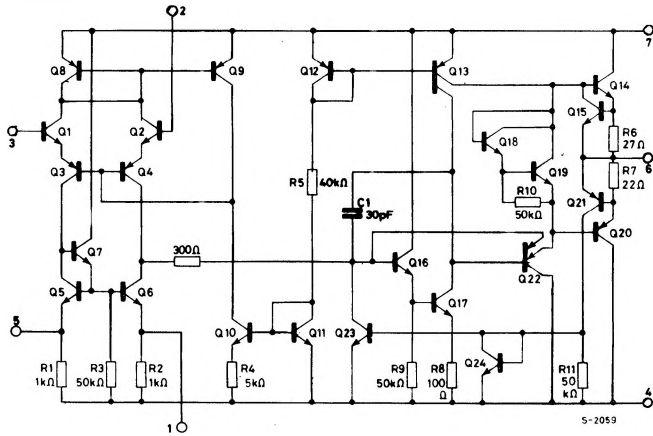


CONNECTION DIAGRAMS AND ORDERING NUMBERS



Type	TO-99	Minidip	SO-8
LS 141	LS 141T	—	—
LS 141A	LS 141 AT	—	—
LS 141C	LS 141 CT	LS 141 CB	LS 141 CM
LS 8141	—	—	LS 8141M
LS 8141A	—	—	LS 8141 AM
LS 8141C	—	—	LS 8141 CM

SCHEMATIC DIAGRAM



THERMAL DATA			TO-99	Minidip	SO-8
R_{th} J-amb	Thermal resistance junction ambient	max	155 °C/W	120 °C/W	200* °C/W
* Measured with the device mounted on a ceramic substrate (25 x 16 x 0.6 mm)					



LS141
LS141A
LS141C

ELECTRICAL CHARACTERISTICS (see note)

Parameter	Test conditions	LS 141			LS 141A			LS 141C			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
V_{os} Input offset voltage	$T_{amb} = 25^{\circ}\text{C}$ $R_g \leq 10 \text{ k}\Omega$ $R_g \leq 50 \Omega$		1	5		0.8	3		2	6	mV mV
	$T_{amb} = T_{min} \text{ to } T_{max}$ $R_g \leq 10 \text{ k}\Omega$ $R_g \leq 50 \Omega$			6			4			7.5	mV mV
ΔV_{os} Input offset voltage adjust. range	$V_s = \pm 20\text{V}$ $V_s = \pm 15\text{V}$ $T_{amb} = 25^{\circ}\text{C}$		± 15			± 10			± 15		mV mV
$\frac{\Delta V_{os}}{\Delta T}$ Average input offset voltage drift							15				$\frac{\mu\text{V}}{^{\circ}\text{C}}$
I_{os} Input offset current	$T_{amb} = 25^{\circ}\text{C}$ $T_{amb} = T_{min} \text{ to } T_{max}$		20 85	200 500		3 30 70			20 200 300		nA nA
							0.5				$\frac{\text{nA}}{^{\circ}\text{C}}$
I_b Input bias current	$T_{amb} = 25^{\circ}\text{C}$ $T_{amb} = T_{min} \text{ to } T_{max}$		80	500 1.5		30 80 0.21			80 500 0.8		nA μA
R_i Input resistance	$T_{amb} = 25^{\circ}\text{C}$ $T_{amb} = T_{min} \text{ to } T_{max}$	0.3	2		1 0.5	6		0.3	2		M Ω M Ω
V_i Input voltage range	$T_{amb} = T_{min} \text{ to } T_{max}$	± 12	± 13		± 12	± 13		± 12	± 13		V
G_v Large signal voltage gain	$T_{amb} = 25^{\circ}\text{C}$ $R_L \geq 2 \text{ k}\Omega$ $V_s = \pm 15\text{V}$ $V_o = \pm 10\text{V}$	94	106		94			86	106		dB
	$T_{amb} = T_{min} \text{ to } T_{max}$ $R_L \geq 2 \text{ k}\Omega$ $V_s = \pm 15\text{V}$ $V_o = \pm 10\text{V}$ $V_s = \pm 5\text{V}$ $V_o = \pm 2\text{V}$	88			90 80			84			dB
V_o Output voltage swing	$V_s = \pm 15\text{V}$ $R_L \geq 10 \text{ k}\Omega$ $R_L \geq 2 \text{ k}\Omega$	± 12 ± 10	± 14 ± 13		± 12 ± 10	± 14 ± 13		± 12 ± 10	± 14 ± 13		V V
I_{sc} Output short circuit current	$T_{amb} = 25^{\circ}\text{C}$ $T_{amb} = T_{min} \text{ to } T_{max}$		25		10 10	25 35 40			25		mA mA
CMR Common mode rejection	$V_s = \pm 20\text{V}$ $R_g \leq 10 \text{ k}\Omega$ $V_{CM} = \pm 12\text{V}$	70	90		80	95		70	90		dB
SVR Supply voltage rejection	$R_g \leq 50\Omega$ $V_s = \pm 5 \text{ to } \pm 20\text{V}$ $R_g \leq 10\text{k}\Omega$ $V_s = \pm 5 \text{ to } \pm 15\text{V}$	77	96		86	96		77	96		dB dB

ELECTRICAL CHARACTERISTICS (continued)

Parameter	Test conditions	LS 141			LS 141A			LS 141C			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
Transient respon. (unity gain) Rise time Overshoot	T _{amb} = 25°C		0.3 5			0.25 6	0.8 20		0.3 5		μs %
B	Bandwidth				0.437	1.5					MHz
SR	Slew rate		0.5		0.3	0.7			0.5		V/μs
I _s	Supply current		1.7	2.8					1.7	2.8	mA
P _{tot}	Power consumption										
						80	150		50	85	mW mW
											mW mW
	V _s = ±20V T _{amb} = T _{min} T _{amb} = T _{max}						165 135				
	V _s = ±15V T _{amb} = T _{min} T _{amb} = T _{max}		60 45	100 75							mW mW

Note: These specifications, unless otherwise specified, apply for V_s = ±15V and T_{amb} = -55 to 125°C for LS 141 and LS 141A. For the LS 141C these specifications apply for T_{amb} = 0 to 70°C

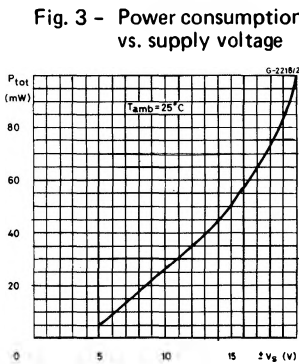
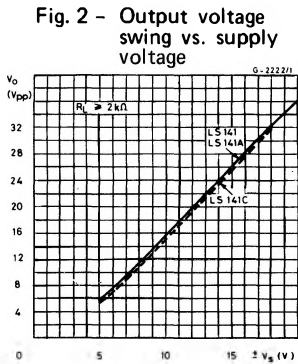
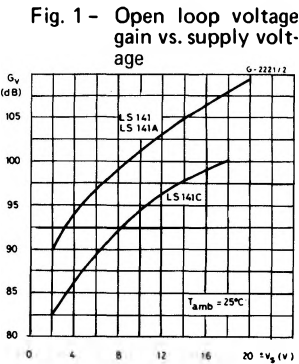




Fig. 4 - Open loop voltage gain vs. frequency

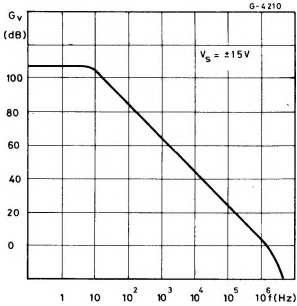


Fig. 5 - Open loop phase response vs. frequency

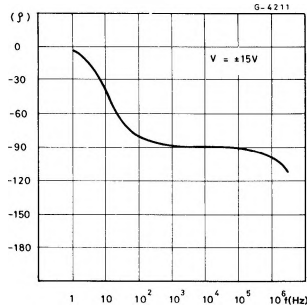


Fig. 6 - Input offset current vs. supply voltage (for LS 141 and LS 141C)

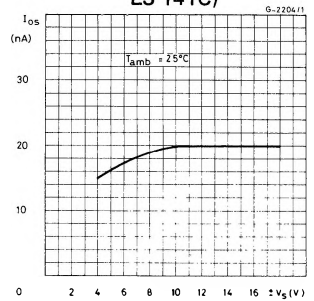


Fig. 7 - Input resistance and capacitance vs. frequency (for LS 141 and LS 141C)

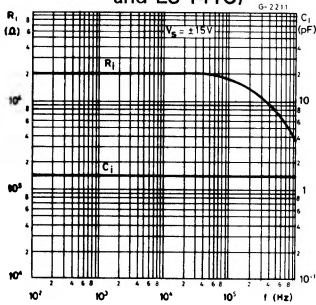


Fig. 8 - Output resistance vs. frequency

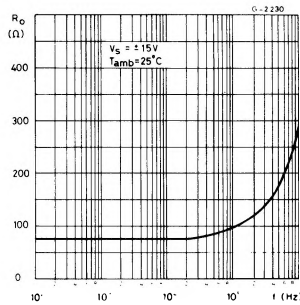


Fig. 9 - Output voltage swing vs. load resistance

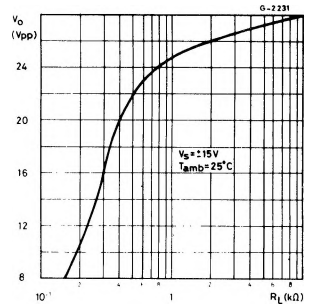


Fig. 10 - Output voltage swing vs. frequency

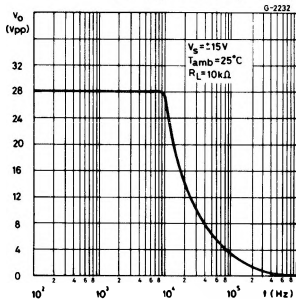


Fig. 11 - Input noise voltage vs. frequency

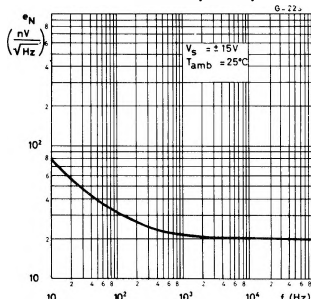


Fig. 12 - Input noise current vs. frequency

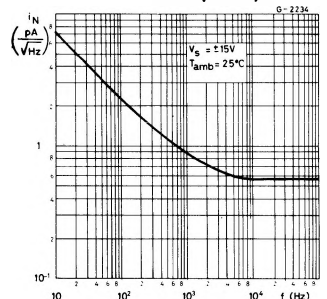


Fig. 13 - Transient response

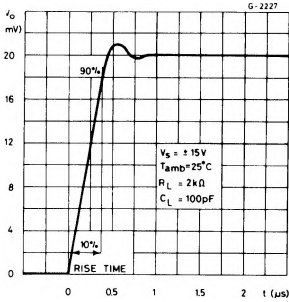


Fig. 14 - Common mode rejection ratio vs. frequency

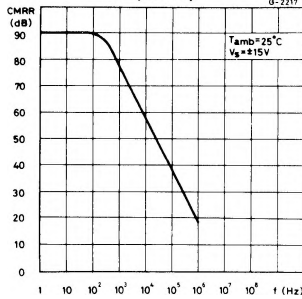
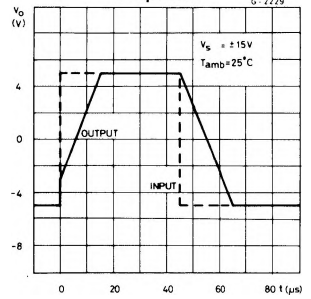


Fig. 15 - Voltage follower large signal pulse response



Typical performance curves for LS 141 and LS 141A

Fig. 16 - Input bias current vs. ambient temperature

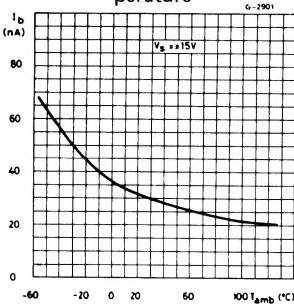


Fig. 17 - Input resistance vs. ambient temperature

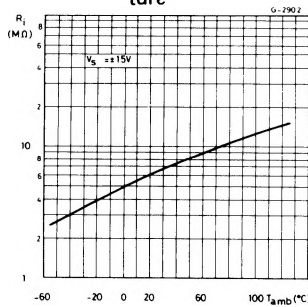


Fig. 18 - Input offset current vs. ambient temperature

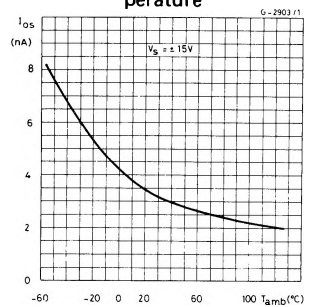


Fig. 19 - Output short-circuit current vs. ambient temperature

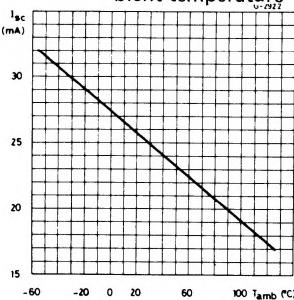


Fig. 20 - Power consumption vs. ambient temperature

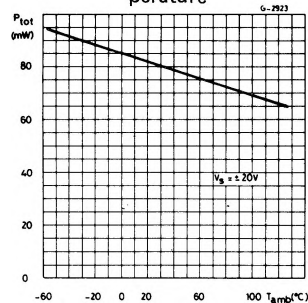
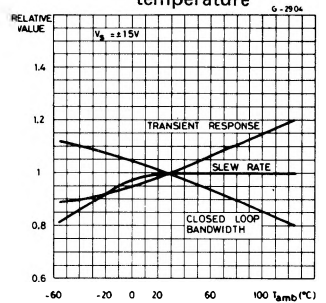


Fig. 21 - Frequency characteristics vs. ambient temperature



Typical performance curves for LS 141C

Fig. 22 - Input bias current vs. ambient temperature

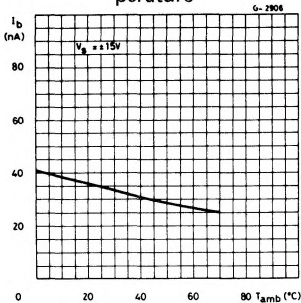


Fig. 23 - Input resistance vs. ambient temperature

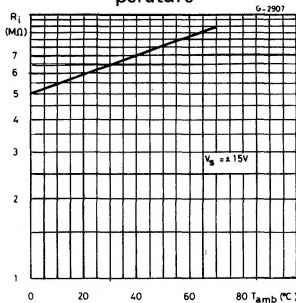


Fig. 24 - Input offset current vs. ambient temperature

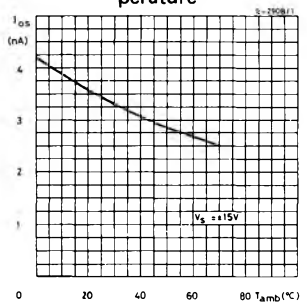


Fig. 25 - Output short circuit current vs. ambient temperature

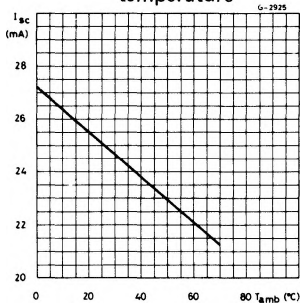


Fig. 26 - Power consumption vs. ambient temperature

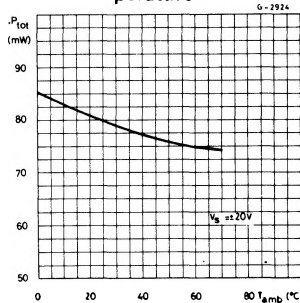
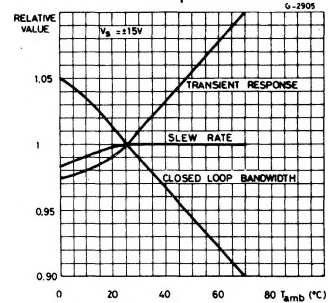


Fig. 27 - Frequency characteristics vs. ambient temperature



TYPICAL APPLICATIONS

Fig. 28 - Clipping amplifier

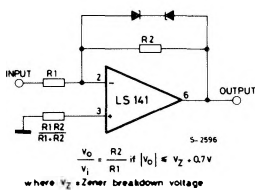


Fig. 29 - Simple integrator

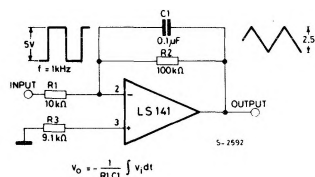


Fig. 30 - Simple differentiator

