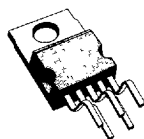


3A POWER OPERATIONAL AMPLIFIER

- OUTPUT CURRENT UP TO 3A
- LARGE COMMON-MODE AND DIFFERENTIAL MODE RANGES
- SOA PROTECTION
- THERMAL PROTECTION
- $\pm 18V$ SUPPLY

The L165 is a monolithic integrated circuit in Pentawatt[®] package, intended for use as power operational amplifier in a wide range of applications, including servo amplifiers and power supplies. The high gain and high output power capability provide

superior performance wherever an operational amplifier/power booster combination is required.



Pentawatt[®]

ORDER CODE : L165V

ABSOLUTE MAXIMUM RATINGS

V_s	Supply voltage	± 18	V
$V_5 - V_4$	Upper power transistor V_{CE}	36	V
$V_4 - V_3$	Lower power transistor V_{CE}	36	V
V_i	Input voltage	V_s	
V_i	Differential input voltage	± 15	V
I_o	Peak output current (internally limited)	3.5	A
P_{tot}	Power dissipation at $T_{case} = 90^\circ C$	20	W
T_{stg}, T_j	Storage and junction temperature	-40 to 150	$^\circ C$

APPLICATION CIRCUITS

Figure 1 : Gain > 10.

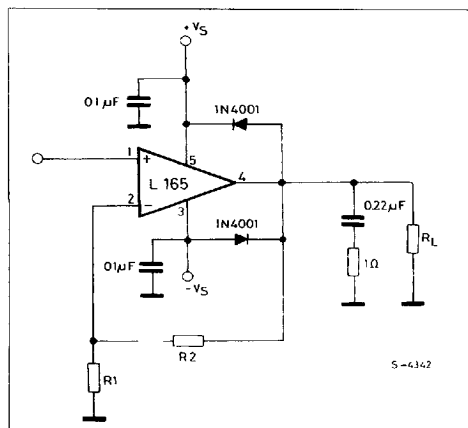
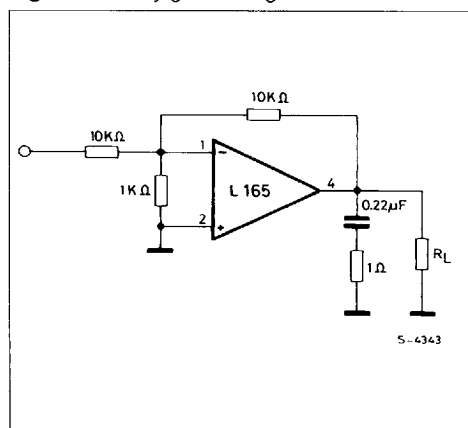
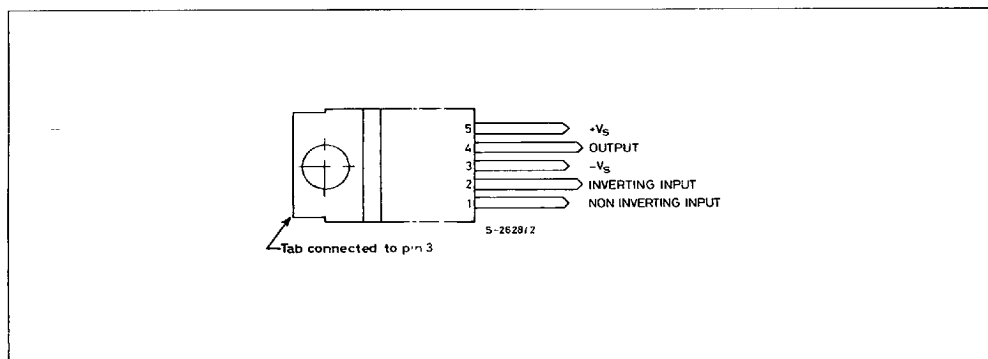


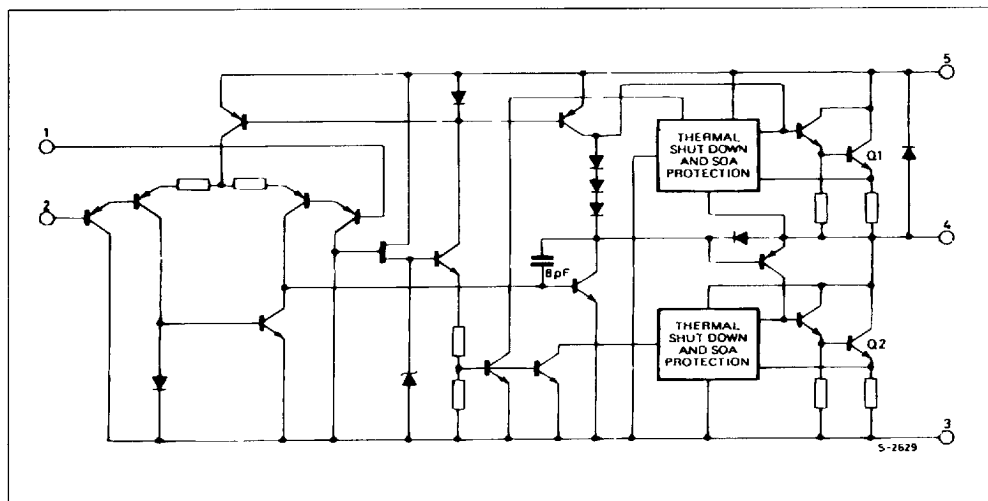
Figure 2 : Unity gain configuration.



CONNECTION DIAGRAM (top view)



SCHEMATIC DIAGRAM



THERMAL DATA

$R_{th j-case}$	Thermal resistance junction-case	max	3	$^{\circ}C/W$
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ELECTRICAL CHARACTERISTICS ($V_S = \pm 15\text{ V}$, $T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_S	Supply Voltage		± 6		± 18	V
I_d	Quiescent Drain Current	$V_S = \pm 18\text{ V}$		40	60	mA
I_b	Input Bias Current			0.2	1	μA
V_{os}	Input Offset Voltage			± 2	± 10	mV
I_{os}	Input Offset Current			± 20	± 200	nA
SR	Slew-rate	$G_v = 10$		8		V/ μs
		$G_v = 1\text{ }^\circ$		6		
V_o	Output Voltage Swing	$f = 1\text{ kHz}$ $I_p = 0.3\text{ A}$ $I_p = 3\text{ A}$		27 24		V_{pp}
		$f = 10\text{ kHz}$ $I_p = 0.3\text{ A}$ $I_p = 3\text{ A}$		27 23		V_{pp}
R	Input Resistance (pin 1)	$f = 1\text{ kHz}$	100	500		$\text{K}\Omega$
G_v	Voltage Gain (open loop)			80		dB
e_N	Input Noise Voltage	$B = 10\text{ to }10\,000\text{ Hz}$		2		μV
i_N	Input Noise Current			100		pA
CMR	Common-mode Rejection	$R_g \leq 10\text{ K}\Omega$ $G_v = 30\text{ dB}$		70		dB
SVR	Supply Voltage Rejection	$R_g = 22\text{ K}\Omega$ $G_v = 10$ $V_{\text{ripple}} = 0.5\text{ V}_{\text{rms}}$ $f_{\text{ripple}} = 100\text{ Hz}$ $\text{dBG}_v = 100$		60	dB	dB
				40		dB
	Efficiency	$f = 1\text{ kHz}$ $I_p = 1.6\text{ A}$; $P_o = 5\text{ W}$		70		%
		$R_L = 4\text{ }\Omega$ $I_p = 3\text{ A}$; $P_o = 18\text{ W}$		60		%
T_{sd}	Thermal Shut-down Case Temperature	$P_{\text{tot}} = 12\text{ W}$		110		$^\circ\text{C}$
		$P_{\text{tot}} = 6\text{ W}$		130		

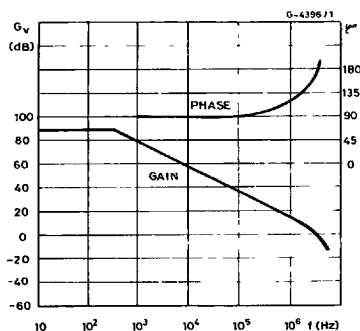
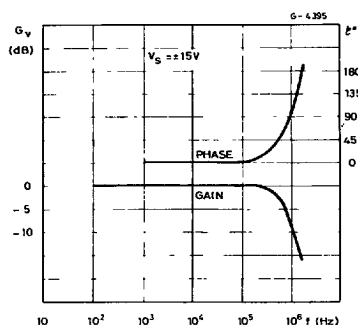
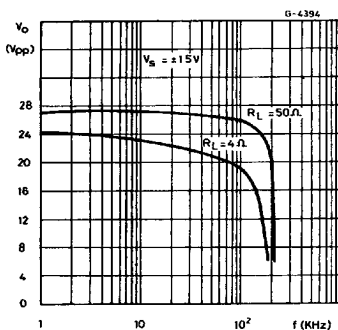
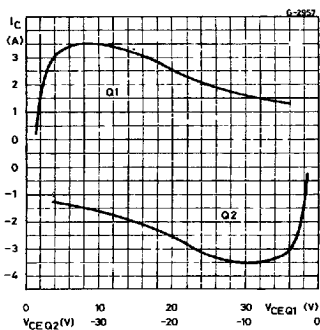
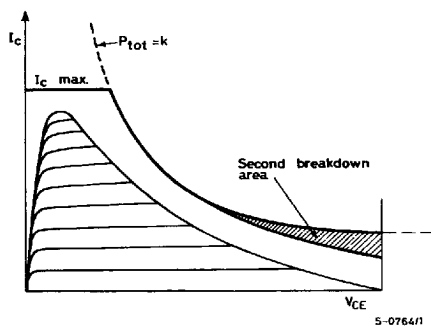
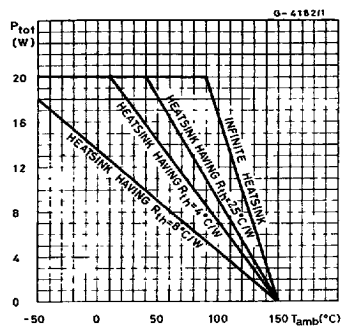
Figure 3 : Open loop frequency response.**Figure 4 :** Closed loop frequency response (circuit of figure 2).**Figure 5 :** Large signal frequency response.**Figure 6 :** Maximum output current vs. voltage [VCE] across each output transistor.**Figure 7 :** Safe operating area and collector characteristics of the protected power transistor.**Figure 8 :** Maximum allowable power dissipation vs. ambient temperature.

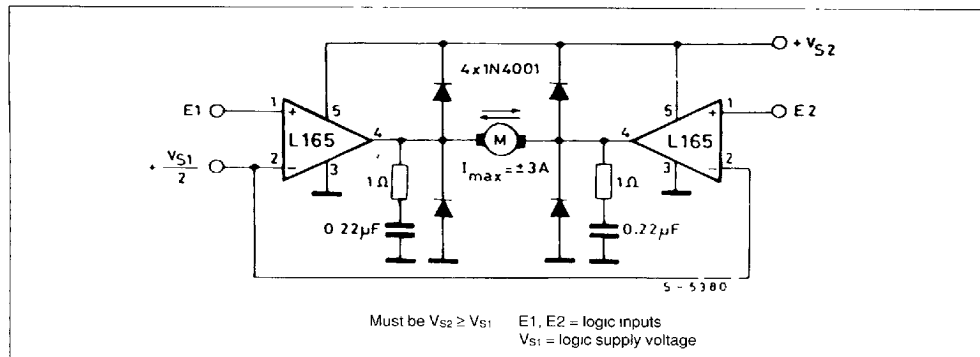
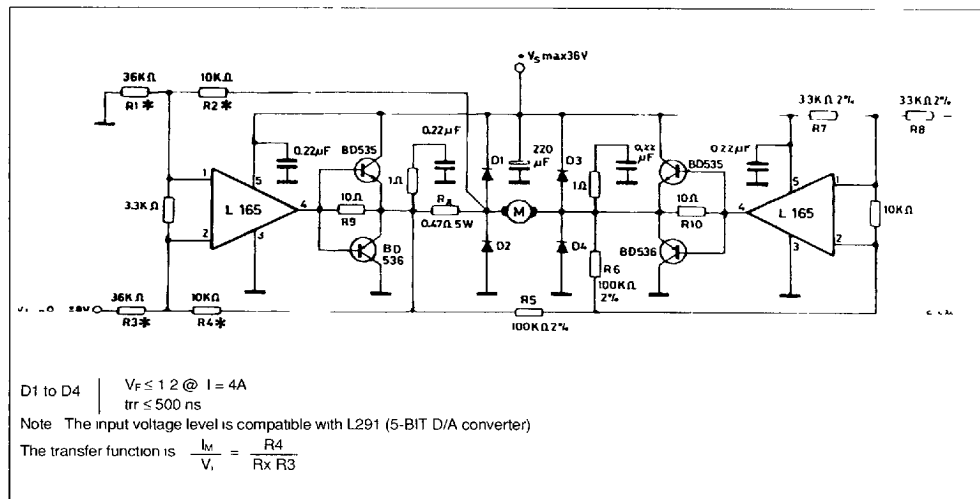
Figure 9 : Bidirectional DC motor control with TTL/CMOS/ μ P compatible inputs.**Figure 10 :** Motor current control circuit with external power transistors ($I_{\text{motor}} > 3.5\text{A}$).

Figure 14 : Power squarewave oscillator with independent adjustments for frequency and duty-cycle.

