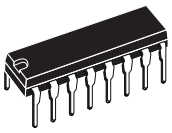
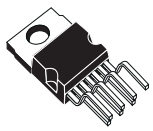
L4962

1.5A POWER SWITCHING REGULATOR

- 1.5A OUTPUT CURRENT
- 5.1V TO 40V OUTPUT VOLTAGE RANGE
- PRECISE (± 2%) ON-CHIP REFERENCE
- HIGH SWITCHING FREQUENCY
- VERY HIGH EFFICIENCY (UP TO 90%)
- VERY FEW EXTERNAL COMPONENTS
- SOFT START
- INTERNAL LIMITING CURRENT
- THERMAL SHUTDOWN



POWERDIP
(12 + 2 + 2)



HEPTAWATT

ORDERING NUMBERS : L4962/A (12 + 2 + 2 Powerdip)
L4962E/A (Heptawatt Vertical)
L4962EH/A (Horizontal Heptawatt)

DESCRIPTION

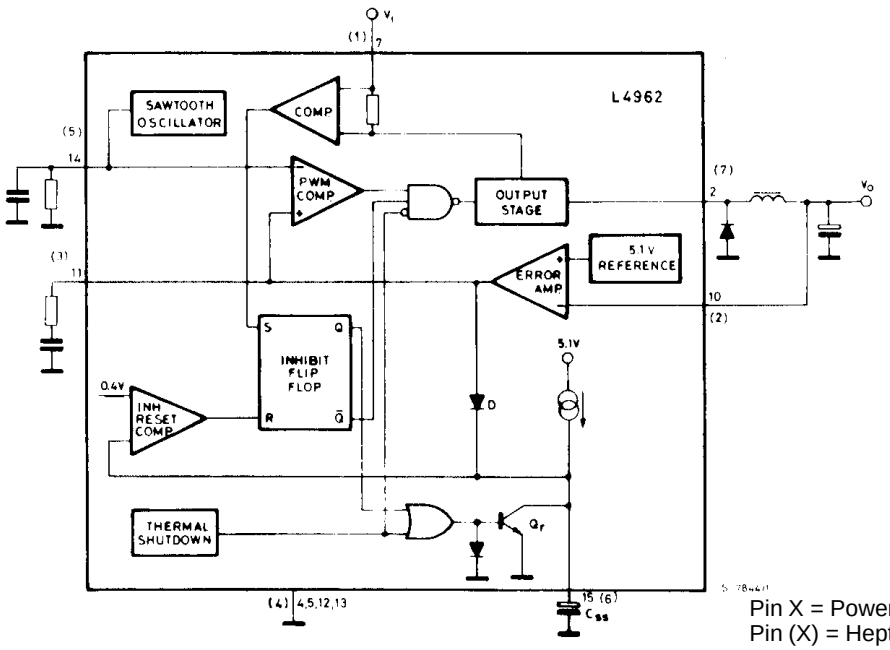
The L4962 is a monolithic power switching regulator delivering 1.5A at a voltage variable from 5V to 40V in step down configuration.

Features of the device include current limiting, soft start, thermal protection and 0 to 100% duty cycle for continuous operating mode.

The L4962 is mounted in a 16-lead Powerdip plastic package and Heptawatt package and requires very few external components.

Efficient operation at switching frequencies up to 150KHz allows a reduction in the size and cost of external filter components.

BLOCK DIAGRAM

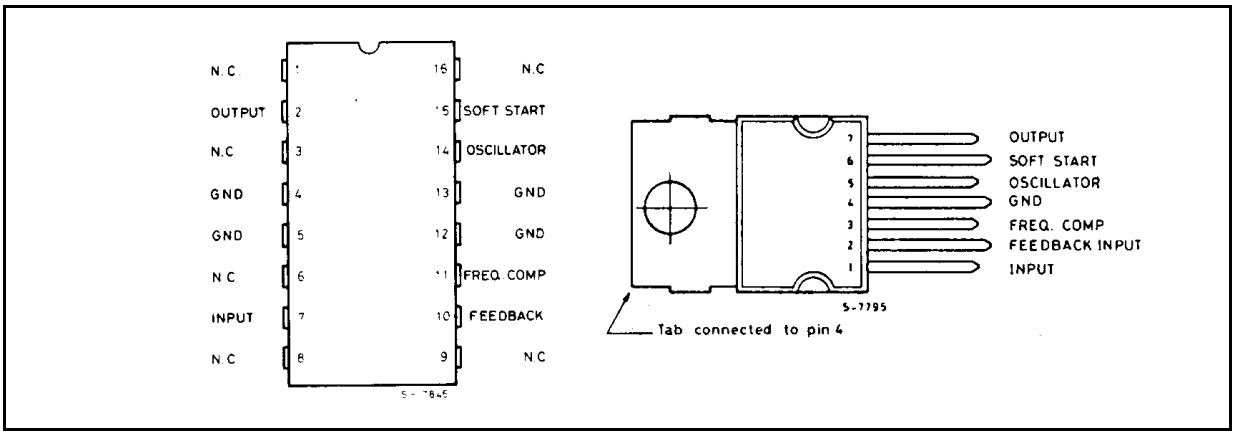


Pin X = Powerdip
Pin (X) = Heptawatt

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_7	Input voltage	50	V
$V_7 - V_2$	Input to output voltage difference	50	V
V_2	Negative output DC voltage	-1	V
	Output peak voltage at t = 0.1μs; f = 100KHz	-5	V
V_{11}, V_{15}	Voltage at pin 11, 15	5.5	V
V_{10}	Voltage at pin 10	7	V
I_{11}	Pin 11 sink current	1	mA
I_{14}	Pin 14 source current	20	mA
P_{tot}	Power dissipation at $T_{pins} \leq 90°C$ (Powerdip) $T_{case} \leq 90°C$ (Heptawatt)	4.3 15	W W
T_j, T_{stg}	Junction and storage temperature	-40 to 150	°C

PIN CONNECTION (Top view)



THERMAL DATA

Symbol	Parameter		Heptawatt	Powerdip
$R_{th\ j\text{-}case}$	Thermal resistance junction-case	max	4°C/W	-
$R_{th\ j\text{-}pins}$	Thermal resistance junction-pins	max	-	14°C/W
$R_{th\ j\text{-}amb}$	Thermal resistance junction-ambient	max	50°C/W	80°C/W*

* Obtained with the GND pins soldered to printed circuit with minimized copper area.

PIN FUNCTIONS

HEPTAWATT	POWERDIP	NAME	FUNCTION
1	7	SUPPLY VOLTAGE	Unregulated voltage input. An internal regulator powers the internal logic.
2	10	FEEDBACK INPUT	The feedback terminal of the regulation loop. The output is connected directly to this terminal for 5.1V operation; it is connected via a divider for higher voltages.
3	11	FREQUENCY COMPENSATION	A series RC network connected between this terminal and ground determines the regulation loop gain characteristics.

PIN FUNCTIONS (cont'd)

HEPTAWATT	POWERDIP	NAME	FUNCTION
4	4, 5, 12, 13	GROUND	Common ground terminal.
5	14	OSCILLATOR	A parallel RC network connected to this terminal determines the switching frequency. This pin must be connected to pin 7 input when the internal oscillator is used.
6	15	SOFT START	Soft start time constant. A capacitor is connected between this terminal and ground to define the soft start time constant. This capacitor also determines the average short circuit output current.
7	2	OUTPUT	Regulator output.
	1, 3, 6, 8, 9, 16		N.C.

ELECTRICAL CHARACTERISTICS (Refer to the test circuit, T_j = 25 °C, V_i = 35V, unless otherwise specified)

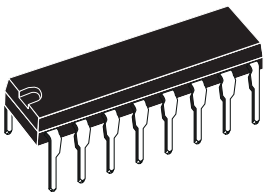
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
DYNAMIC CHARACTERISTICS							
V_o	Output voltage range	V_i = 46V	I_o = 1A	V_{ref}		40	V
V_i	Input voltage range	V_o = V_{ref} to 36V	I_o = 1.5A	9		46	V
ΔV_o	Line regulation	V_i = 10V to 40V V_o = V_{ref}	I_o = 1A		15	50	mV
ΔV_o	Load regulation	V_o = V_{ref}	I_o = 0.5A to 1.5A		8	20	mV
V_{ref}	Internal reference voltage (pin 10)	V_i = 9V to 46V	I_o = 1A	5	5.1	5.2	V
$\frac{\Delta V_{ref}}{\Delta T}$	Average temperature coefficient of refer. voltage	T_j = 0°C to 125°C I_o = 1A			0.4		mV/°C
V_d	Dropout voltage	I_o = 1.5A			1.5	2	V
I_{om}	Maximum operating load current	V_i = 9V to 46V V_o = V_{ref} to 36V		1.5			A
I_{2L}	Current limiting threshold (pin 2)	V_i = 9V to 46V V_o = V_{ref} to 36V		2		3.3	A
I_{SH}	Input average current	V_i = 46V; output short-circuit			15	30	mA
η	Efficiency	f = 100KHz	V_o = V_{ref}		70		%
		I_o = 1A	V_o = 12V		80		%
SVR	Supply voltage ripple rejection	$\Delta V_i = 2V_{rms}$ $_{fripple}$ = 100Hz V_o = V_{ref}	Io = 1A	50	56		dB

ELECTRICAL CHARACTERISTICS (continued)

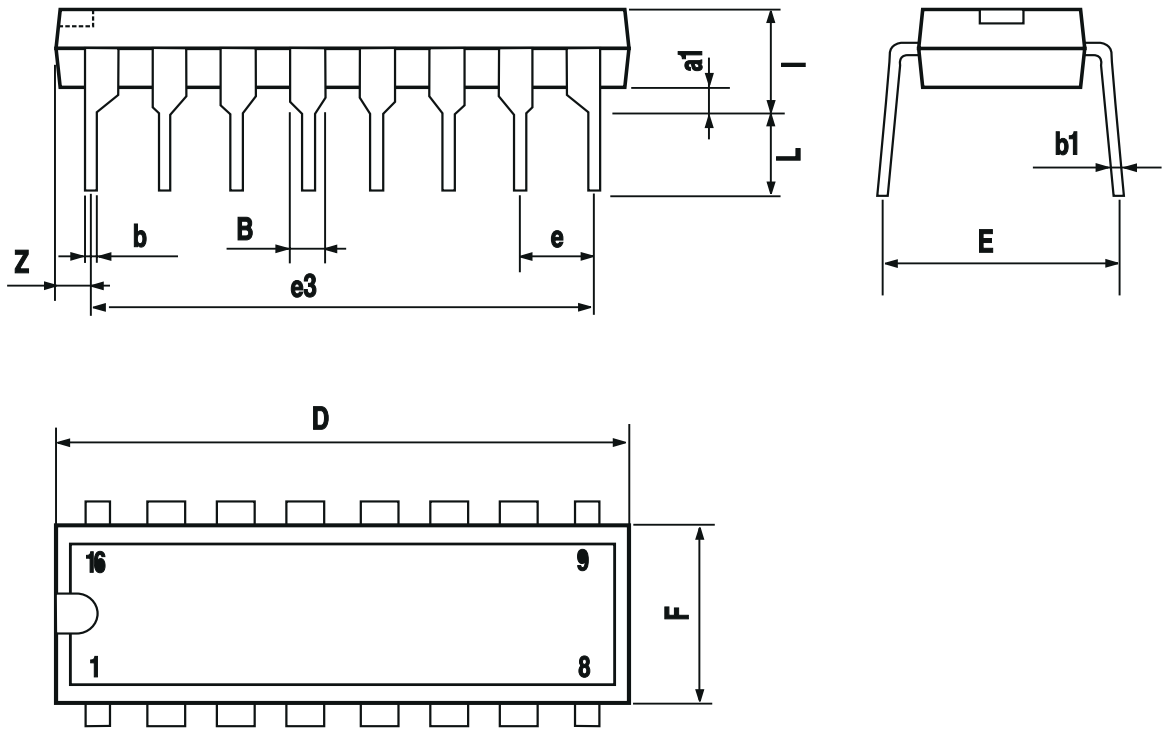
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
DYNAMIC CHARACTERISTICS (cont'd)						
f	Switching frequency		85	100	115	KHz
$\frac{\Delta f}{\Delta V_i}$	Voltage stability of switching frequency	V_i = 9V to 46V		0.5		%
$\frac{\Delta f}{\Delta T_j}$	Temperature stability of switching frequency	T_j = 0°C to 125°C		1		%
f_{max}	Maximum operating switching frequency	$V_o = V_{ref}$ I_o = 1A	120	150		KHz
T_{sd}	Thermal shutdown junction temperature			150		°C
DC CHARACTERISTICS						
I_{7Q}	Quiescent drain current	100% duty cycle pins 2 and 14 open; V_i = 46V		30	40	mA
		0% duty cycle; V_i = 46V		15	20	mA
$-I_{2L}$	Output leakage current	0% duty cycle; V_i = 46V			1	mA
SOFT START						
I_{15SO}	Source current		100	140	180	µA
I_{15SI}	Sink current		50	70	120	µA
ERROR AMPLIFIER						
V_{11H}	High level output voltage	V_{10} = 4.7V I_{11} = 100µA	3.5			V
V_{11L}	Low level output voltage	V_{10} = 5.3V I_{11} = 100µA			0.5	V
I_{11SI}	Sink output current	V_{10} = 5.3V	100	150		µA
$-I_{11SO}$	Source output current	V_{10} = 4.7V	100	150		µA
I_{10}	Input bias current	V_{10} = 5.2V		2	10	µA
G_v	DC open loop gain	V_{11} = 1V to 3V	46	55		dB
OSCILLATOR						
$-I_{14}$	Oscillator source current		5			mA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	0.85		1.40	0.033		0.055
b		0.50			0.020	
b1	0.38		0.50	0.015		0.020
D			20.0			0.787
E		8.80			0.346	
e		2.54			0.100	
e3		17.78			0.700	
F			7.10			0.280
I			5.10			0.201
L		3.30			0.130	
Z			1.27			0.050

OUTLINE AND MECHANICAL DATA

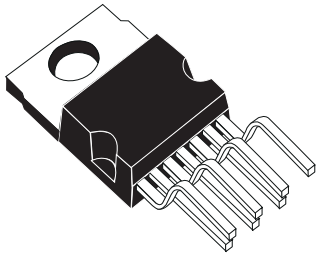


Powerdip 16



DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			4.8			0.189
C			1.37			0.054
D	2.4		2.8	0.094		0.110
D1	1.2		1.35	0.047		0.053
E	0.35		0.55	0.014		0.022
E1	0.7		0.97	0.028		0.038
F	0.6		0.8	0.024		0.031
F1			0.9			0.035
G	2.34	2.54	2.74	0.095	0.100	0.105
G1	4.88	5.08	5.28	0.193	0.200	0.205
G2	7.42	7.62	7.82	0.295	0.300	0.307
H2			10.4			0.409
H3	10.05		10.4	0.396		0.409
L	16.7	16.9	17.1	0.657	0.668	0.673
L1		14.92			0.587	
L2	21.24	21.54	21.84	0.386	0.848	0.860
L3	22.27	22.52	22.77	0.877	0.891	0.896
L4			1.29			0.051
L5	2.6	2.8	3	0.102	0.110	0.118
L6	15.1	15.5	15.8	0.594	0.610	0.622
L7	6	6.35	6.6	0.236	0.250	0.260
L9		0.2			0.008	
M	2.55	2.8	3.05	0.100	0.110	0.120
M1	4.83	5.08	5.33	0.190	0.200	0.210
V4	40° (typ.)					
Dia	3.65		3.85	0.144		0.152

OUTLINE AND MECHANICAL DATA



Heptawatt V