SGS-THOMSON MICROELECTRONICS

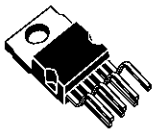
L4955

5A LOW DROP LINEAR REGULATORS FAMILY

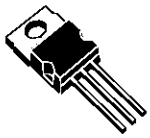
PRODUCT PREVIEW

- 5A OUTPUT CURRENT
- ±1% PRECISE OUTPUT VOLTAGES
- FAST TRANSIENT RESPONSE
- 0.75V TYP. AT 5A DROP OUT VOLTAGE
- OPERATING INPUT VOLTAGE FROM 4.5V
- ADJUSTABLE VERSION:
  - V_O = 1.26V
  - INHIBIT (IQ = 100µA TYP.)
  - POWER GOOD
  - PROGRAMMABLE CURRENT LIMIT
  - HEPTAWATT PACKAGE
- FIXED VERSION:
  - 3.3V, 5.1V, 12V OUTPUTS
  - VERSAWATT PACKAGE
- VERY LOW QUIESCENT CURRENT
- SHORT CIRCUIT PROTECTION
- THERMAL SHUTDOWN

MULTIPOWER BCD TECHNOLOGY



HEPTAWATT



VERSAWATT

ORDERING NUMBERS: L4955 (HEPTAWATT)
L4955VXXX (VERSAWATT)

- CONSTANT CURRENT REGULATOR
- SUITABLE FOR APPLICATION WITH STAND BY FEATURE

APPLICATIONS

- PENTIUM™ AND POWER PC™ SUPPLIES
- POST REGULATOR FOR SMPS
- LOW COST SOLUTION FOR 5V TO 3.3V CONVERSION
- LOW COST BATTERY CHARGER

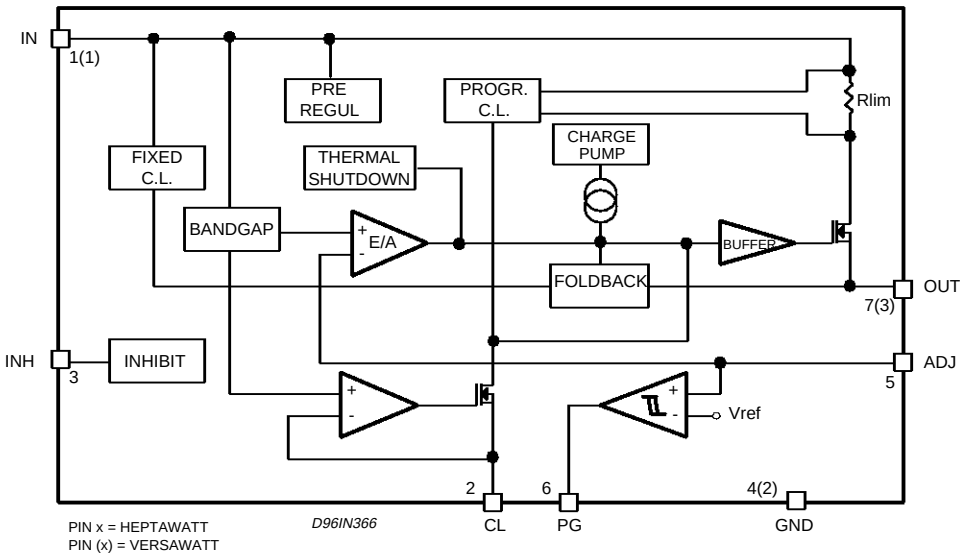
DESCRIPTION

The L4955 is a family of monolithic very low drop linear regulators designed to supply the most recent microprocessors.

The dropout voltage is only 0.75V at 5A, directly dependent on the output current conditions.

Realized in BCDII technology, it has on board a charge pump to properly drive an N-channel

BLOCK DIAGRAM



power Mos Transistor of 150mΩ of R_{DSON}.

It operates from 4.5V of minimum supply, with a very low quiescent current irrespective to the load; a min. of 22µF output capacitor is required for stability.

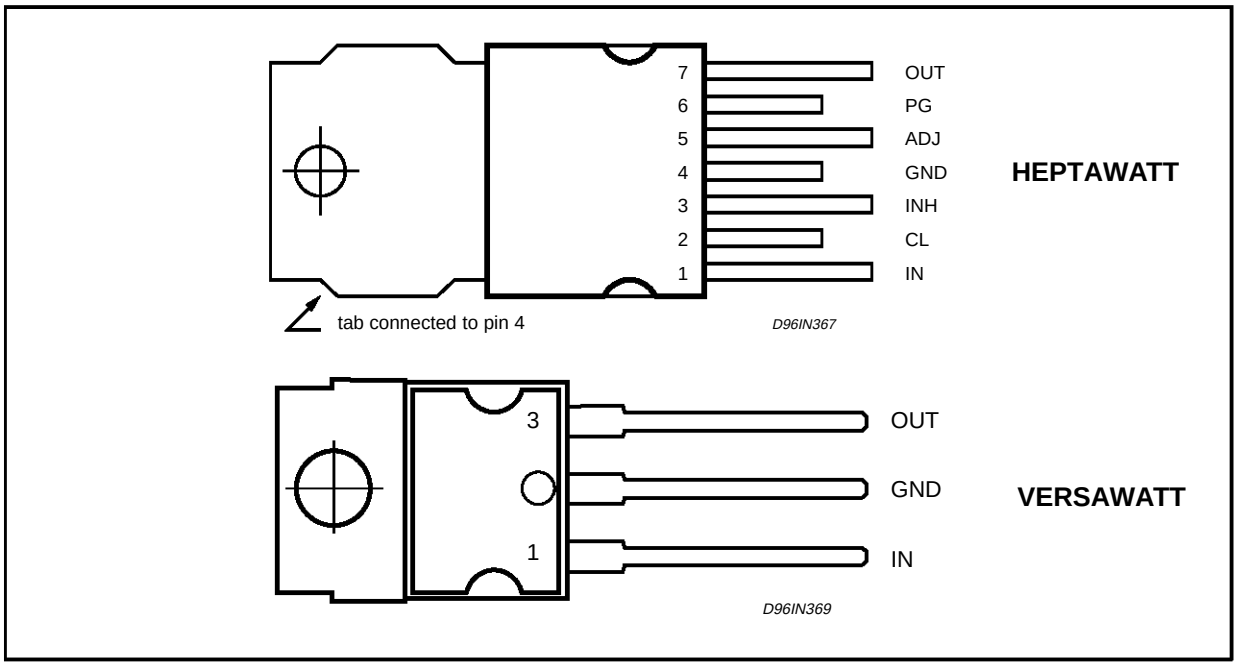
The on-chip trimming techniques improve the precision of the available output voltages at ±1%.

Ancillary funcctions like power good, inhibit with zero consumption, programmable output voltage and limiting current make the heptawatt version flexible to be emploied in applications where power management and stand-by features are reported, post regulation and adjustable current generators for battery chargers.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{IN}	Supply Input Voltage	24	V
	ADJ and CL pins PG and INH pins	-0.3 to 4 0 to V_{IN}	V V
P_{TOT}	Power Dissipation @ T_{amb} = 50°C Power Dissipation @ T_{case} = 90°C	2 15	W W
T_{st}, T_j	Storage Temperature	-40 to +150	°C

PIN CONNECTIONS (Top views)



PIN FUNCTIONS

HW	VW	Name	Function
1	1	IN	Unregulated input voltage; this pin must be bypassed with a capacitor larger than 10µF.
2	–	CL	An external resistor connected between this terminal and ground sets the programmable current limiting threshold. If this pin is grounded the programmable current limiting is disable.
3	–	INH	TTL-CMOS input. A logic level on this input disable the device. An internal pull-down insures full functionally even if the pin is open.
4	2	GND	Ground.
5	–	ADJ	The output is connected directly to this terminal for 1.26V operation; it is connected via divider for higher voltages.
6	–	PG	Open drain output, this signal is low when the output voltage is less tahn 90%, otherwise is high.
7	3	OUT	Regulated output voltage. A bypass capacitor, a minimum of 22µF or larger is required to insure stability.

THERMAL DATA (HEPTAWATT & VERSAWATT packages)

Symbol	Parameter	Value	Unit
$R_{th\ j\text{-}pins}$	Thermal Resistance Junction-case	4	°C/W
$R_{th\ j\text{-}amb}$	Thermal Resistance Junction-ambient	50	°C/W

L4955 - ELECTRICAL CHARACTERISTICS (T_j = 25°C, V_{in} = 12V, unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_{IN}	Operating Voltage		4.5		22	V
V_{OUT}	Output Voltage	Tj = 25°C I_O = 10mA	1.247	1.26	1.273	V
		0.1A < I_O < 5A; 4.5V< V_{IN} <22V	1.235	1.26	1.285	V
		0 < T_j < 125°C 4.5V < V_{IN} < 22V; 0.1A < I_O < 5A	1.222	1.26	1.298	V
ΔV_{OUT}	Line regulation	4.5V < V_{IN} <22V; I_O = 10mA		4	20	mV
ΔV_{OUT}	Load regulation	0.1A < IO < 5A		2	10	mV
	Drop-out Voltage	I_O = 5A I_O = 5A, T_j = 125°C		0.75 1	1 1.5	V V
I_O	Current Limiting	0 < T_j < 125°C	5.1	6.3	7.5	A
	Short Circuit Current	V_O = 0V, 0 < T_j < 125°C		1.8		A
	Programmable Current Limiting	R_{lim} = 13kΩ, 0 < Tj < 125°C R_{lim} = 78kΩ, 0 < Tj < 125°C	2.7 0.45	3 0.5	3.3 0.55	A A
I_Q	Quiescent Current	0.1A < I_O < 5A C_L = 0 C_L = 13k		2 2.7	3 4	mA mA
	Stand By Current	INH = HIGH 4.5V < V_{IN} <22V		100	150	µA
	Inhibit Threshold			1.2		V
	Inhibit Histeresys			0.2		V
	Inhibit Bias Sink Current			5	10	µA
	Power Good Threshold	Active low		0.9 x V_O		V
	Power Good	I_6 = 4mA		0.4		V
	Ripple Rejection	f = 120Hz, I_O = 5A V_{IN} = 6V ΔV_{IN} = $2V_{PP}$	60	75		dB

L4955V3.3 - ELECTRICAL CHARACTERISTICS (T_j = 25°C, V_{in} = 5V, unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_{IN}	Operating Input Voltage		4.5		22	V
V_O	Output Voltage	Tj = 25°C I_O = 10mA	3.270	3.300	3.366	V
		4.5 < V_{IN} < 12; 0.1A < I_O < 5A	3.234	3.300	3.366	V
		0 < T_j < 125°C 4.5 < V_{IN} < 22; 0.1A < I_O < 5A	3.201	3.300	3.399	V
	Drop-out Voltage	I_O = 5A I_O = 5A, T_j = 125°C		0.75 1	1 1.5	V V
ΔV_O	Line regulation	4.5V < V_{IN} <22V; I_O = 10mA		2	10	mV
ΔV_O	Load regulation	0.1A < IO < 5A		3	15	mV
I_O	Current Limiting	0 < T_j < 125°C	5.1	6.3	7.5	A
	Short Circuit Current	V_O = 0V, 0 < T_j < 125°C		1.8		A
I_Q	Quiescent Current	0.1A < I_O < 5A		2	3	mA
	Ripple Rejection	f = 120Hz, I_O = 5A V_{IN} = 6V ΔV_{IN} = $2V_{PP}$	57	70		dB

L4955V5.1 - ELECTRICAL CHARACTERISTICS (T_j = 25°C, V_{in} = 8V, unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_{IN}	Operating Input Voltage				22	V
V_{OUT}	Output Voltage	Tj = 25°C I_O = 10mA	5.050	5.100	5.150	V
		6.5V < V_{IN} < 15V; 0.1A < I_O < 5A	5.000	5.100	5.200	V
		0 < T_j < 125°C 6.5V < V_{IN} < 15V; 0.1A < I_O < 5A	4.950	5.100	5.250	V
	Drop-out Voltage	I_O = 5A I_O = 5A, T_j = 125°C		0.75 1	1 1.5	V V
ΔV_{OUT}	Line regulation	6.5V < V_{IN} <22V; I_O = 10mA		2	10	mV
ΔV_{OUT}	Load regulation	0.1A < IO < 5A		5	20	mV
I_O	Current Limiting	0 < T_j < 125°C	5.1	6.3	7.5	A
	Short Circuit Current	V_O = 0V, 0 < T_j < 125°C		1.8		A
I_Q	Quiescent Current	0.1A < I_O < 5A		2	3	mA
	Ripple Rejection	f = 120Hz, I_O = 5A V_{IN} = 8V ΔV_{IN} = $2V_{PP}$	57	70		dB

L4955V12 - ELECTRICAL CHARACTERISTICS (T_j = 25°C, V_{in} = 15V, unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_{IN}	Operating Input Voltage				22	V
V_{OUT}	Output Voltage	Tj = 25°C I_O = 10mA	11.880	12.00	12.120	V
		13.5V < V_{IN} < 22V; 0.1A < I_O < 5A	11.760	12.00	12.240	V
		0 < T_j < 125°C 13.5V < V_{IN} < 22V 0.1A < I_O < 5A	11.640	12.00	13.360	V
	Drop-out Voltage	I_O = 5A I_O = 5A, T_j = 125°C				V V
ΔV_{OUT}	Line regulation	13.5V < V_{IN} <22V; I_O = 10mA		5	25	mV
ΔV_{OUT}	Load regulation	0.1A < IO < 5A		10	40	mV
I_O	Current Limiting	0 < T_j < 125°C	5.1	6.3	7.5	A
	Short Circuit Current	V_O = 0V, 0 < T_j < 125°C		1.8		A
I_Q	Quiescent Current	0.1A < I_O < 5A		2	3	mA
	Ripple Rejection	f = 120Hz, I_O = 5A V_{IN} = 15V ΔV_{IN} = $2V_{PP}$	50	65		dB

Figure 1: Power Good Function

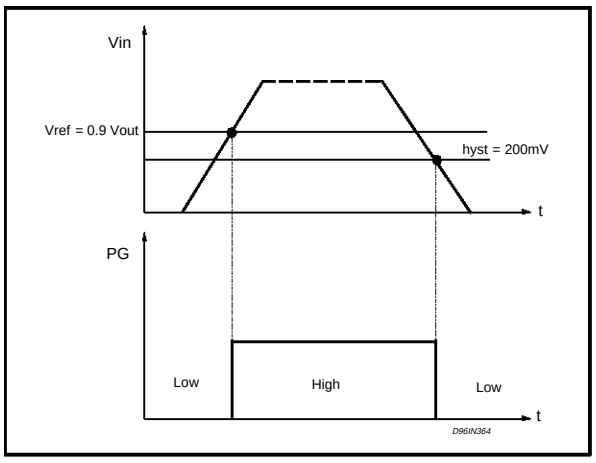


Figure 2: Inhibit Function

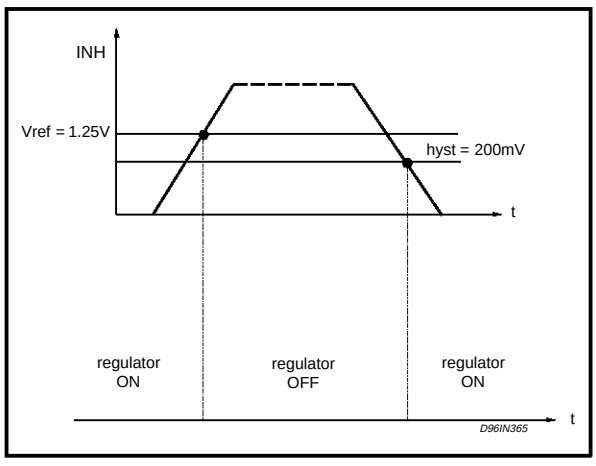
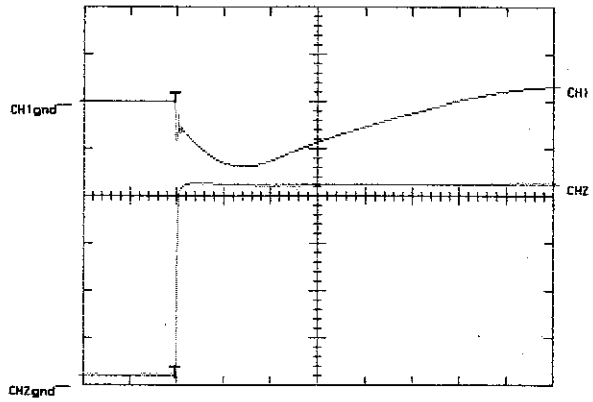
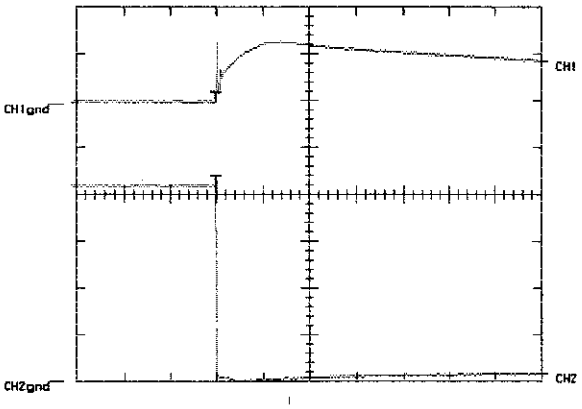


Figure 3: Load Transient Response.



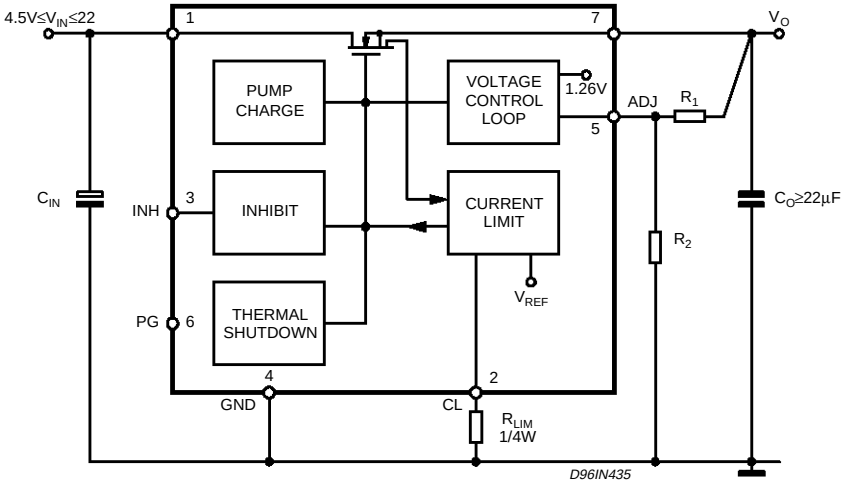
10µs/DIV



10µs/DIV

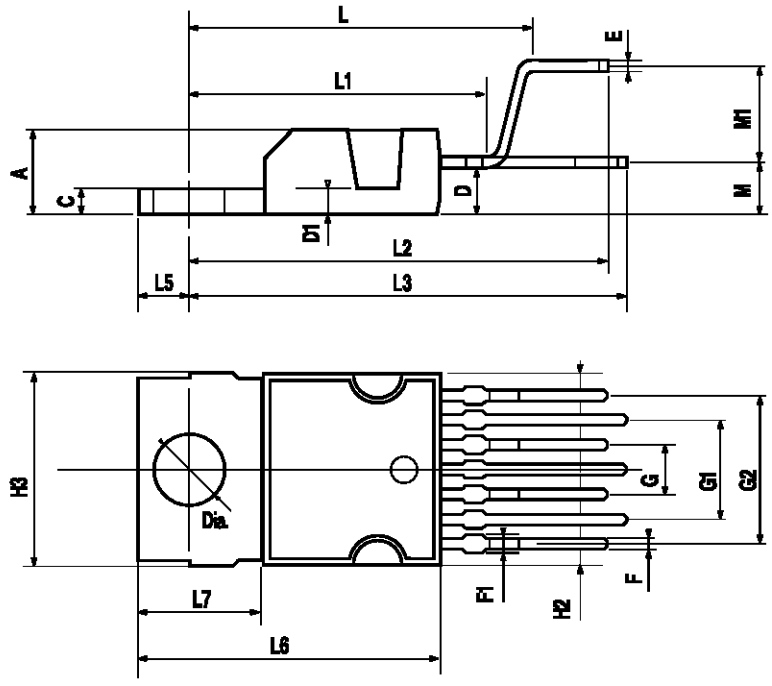
Test conditions: V_i = 5V; V_O = 3.4V; ΔI_O = 4A; I_{Omin} = 0.2A
CH1 = 50mV/DIV; CH2 = 1A/DIV

Typical Application Circuit



HEPTAWATT PACKAGE MECHANICAL DATA

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
F	0.6		0.8	0.024		0.031
F1			0.9			0.035
G	2.41	2.54	2.67	0.095	0.100	0.105
G1	4.91	5.08	5.21	0.193	0.200	0.205
G2	7.49	7.62	7.8	0.295	0.300	0.307
H2			10.4			0.409
H3	10.05		10.4	0.396		0.409
L		16.97			0.668	
L1		14.92			0.587	
L2		21.54			0.848	
L3		22.62			0.891	
L5	2.6		3	0.102		0.118
L6	15.1		15.8	0.594		0.622
L7	6		6.6	0.236		0.260
M		2.8			0.110	
M1		5.08			0.200	
Dia	3.65		3.85	0.144		0.152



VERSAWATT PACKAGE MECHANICHAL DATA

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
F	0.8		1.05	0.031		0.041
F2	1.15		1.4	0.045		0.055
G	4.95	5.08	5.21	0.195	0.200	0.205
H2			10.4			0.409
H3	10.05		10.4	0.396		0.409
L2		16.2			0.638	
L3	26.3	26.7	27.1	1.035	1.051	1.067
L5	2.6		3	0.102		0.118
L6	15.1		15.8	0.594		0.622
L7	6		6.6	0.236		0.260
Dia	3.65		3.85	0.144		0.152