SGS-THOMSON MICROELECTRONICS

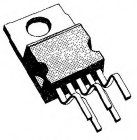
L4920
L4921

VERY LOW DROP ADJUSTABLE REGULATORS

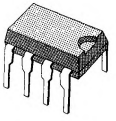
PRELIMINARY DATA

- VERY LOW DROP VOLTAGE
- ADJUSTABLE OUTPUT VOLTAGE FROM 1.25 V TO 20 V
- 400 mA OUTPUT CURRENT
- LOW QUIESCENT CURRENT
- OVERVOLTAGE AND REVERSE VOLTAGE PROTECTION
- + 60/ – 60 V TRANSIENT PEAK VOLTAGE
- SHORT CIRCUIT PROTECTION WITH FOLDBACK CHARACTERISTICS
- THERMAL SHUT-DOWN

These regulators are designed for automotive, industrial and consumer applications where low consumption is particularly important.
In battery backup and standby applications the low consumption of these devices extends battery life.



Pentawatt



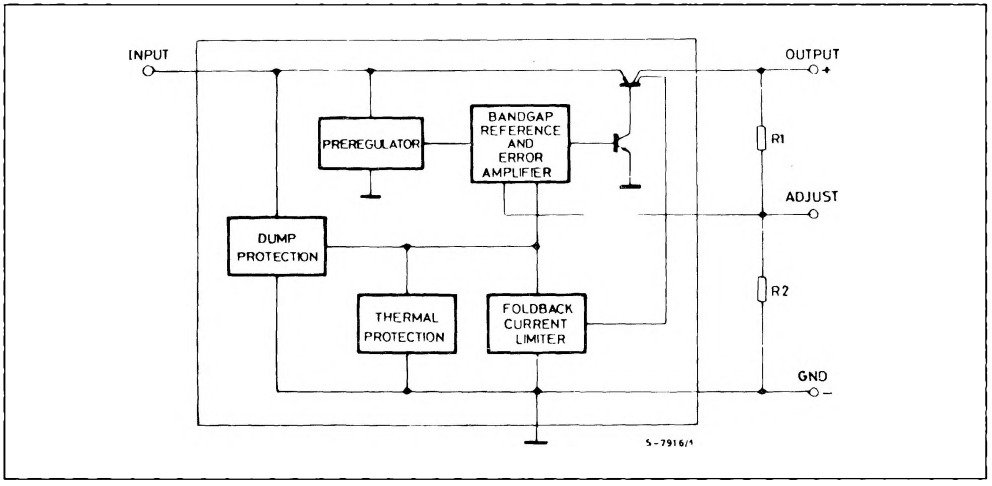
Minidip (4 + 4)

ORDER CODES : L4920
L4921

DESCRIPTION

The L4920 and L4921 are adjustable voltage regulators with a very low voltage drop (0.4 V typ. at 0.4 A T_j = 25 °C), low quiescent current and comprehensive on-chip protection.
These devices are protected against load dump transients of ± 60 V, input overvoltage, polarity reversal and over heating.
A foldback current limiter protects against load short circuits.
The output voltage is adjustable through an external divider from 1.25 V to 20 V. The minimum operating input voltage is 5.2 V (T_J = 25 °C).

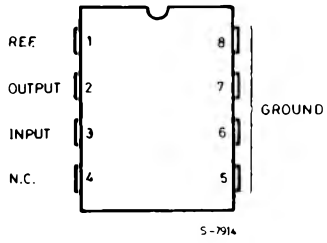
BLOCK DIAGRAM

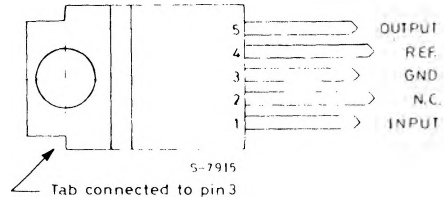


ABSOLUTE MAXIMUM RATINGS

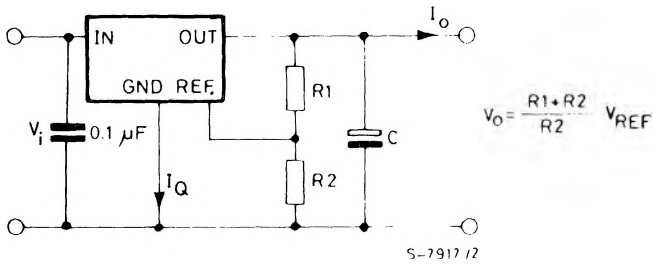
Symbol	Parameter	Value	Unit
V_i	DC Input Operating Voltage	35	V
V_t	Positive Transient Peak Voltage (t = 300 ms 1 % duty cycle)	+ 60	V
V_t	Negative Transient Peak Voltage (t = 100 ms 1 % duty cycle)	− 60	V
V_i	Reverse Input Voltage	− 18	V
T_j, T_{stg}	Junction and Storage Temperature Range	− 55 to 150	°C

PIN CONNECTIONS (top view)





TEST AND APPLICATION CIRCUIT



c = 100 µF is required for stability (ESR ≤ 3 Ω over T range)
R2 = 6.2 KΩ.

THERMAL DATA

			Minidip (4 + 4)	Pentawatt
$R_{th\ j\text{-}amb}$	Thermal Resistance Junction-ambient	Max	80 °C/W	60 °C/W
$R_{th\ j\text{-}pins}$	Thermal Resistance Junction-pins	Max	15 °C/W	–
$R_{th\ j\text{-}case}$	Thermal Resistance Junction-case	Max	–	3 °C/W

ELECTRICAL CHARACTERISTICS (for V_I = 14.4 V; $-40 \leq T_j \leq 125$ °C (note 1), V_o = 5 V ; C_o = 100 µF, unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_i	Operating Input Voltage	$V_o \geq 4.5$ V I_o = 400 mA	V_o + 0.9		26	V
		$V_{REF} \leq V_o < 4.5$ V I_o = 400 mA	5.4		26	V
V_{REF}	Reference Voltage	5.4 V < V_i < 26 V	1.17	1.25	1.33	V
ΔV_o	Line Regulation	V_o + 1.2 V < V_i < 26 V $V_o \geq 4.5$ V I_o = 5 mA		2	15	mV/V
ΔV_o	Load Regulation	5 mA < I_o < 400 mA (*) $V_o \geq 4.5$ V		5	25	mV/V
V_D	Dropout Voltage	 I_o = 150 mA I_o = 400 mA		 0.25 0.5	 0.5 0.9	 V V
I_D	Quiescent Current	I_o = 0 mA V_o + 1.2 V < V_i < 26 V		1.2	3	mA
		I_o = 400 mA (*) V_o + 1.2 V < V_i < 26 V		80	140	mA
I_o	Maximal Output Current			870		mA
I_{OSC}	Short Circuit Output Current (*)			230		mA

(*) Foldback protection.

Note : 1. Design limits are guaranteed (but not 100 % production tested) over the indicated temperature and supply voltage ranges. These limits are not used to calculate outgoing quality levels.

ELECTRICAL CHARACTERISTICS (for V_I = 14.4 V, T_j = 25 °C, V_o = 5 V, C_o = 100 µF, unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_i	Operating Input Voltage	$V_o \geq 4.5$ V I_o = 400 mA	V_o + 0.7		26	V
		$V_{REF} \leq V_o < 4.5$ V I_o = 400 mA	5.2		26	V
V_{REF}	Reference Voltage	5.2 V < V_i < 26 V 5 mA $\leq I_o \leq$ 400 mA (*)	1.20	1.25	1.30	V
ΔV_o	Line Regulation	V_o + 1 V < V_i < 26 V $V_o \geq 4.5$ V I_o = 5 mA		1	10	mV/V
ΔV_o	Load Regulation	5 mA < I_o < 400 mA (*) $V_o \geq 4.5$ V		3	15	mV/V
V_D	Dropout Voltage	I_o = 10 mA I_o = 150 mA I_o = 400 mA		0.05 0.2 0.4	 0.4 0.9	V V V
I_D	Quiescent Current	I_o = 0 mA V_o + 1 V < V_i < 26 V		0.8	2	mA
		I_o = 400 mA (*) V_o + 1 V < V_i < 26 V		65	90	mA
I_o	Maximal Output Current			800		mA
I_{OSC}	Short Circuit Output Current (*)			350	500	mA

(*) Foldback protection.

Figure 1 : Output Voltage vs. Temperature.

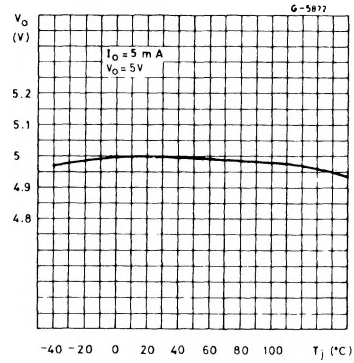


Figure 2 : Foldback Current Limiting.

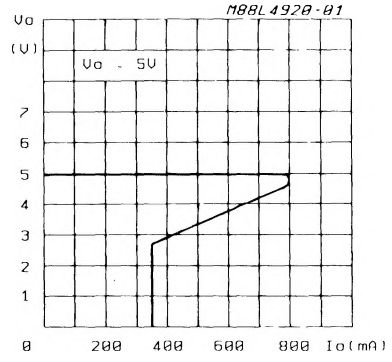
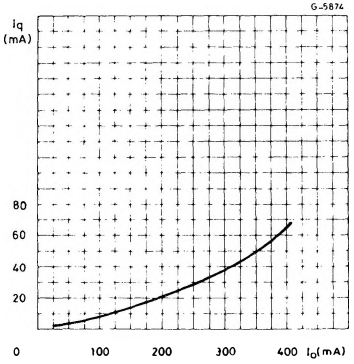


Figure 3 : Quiescent Current vs. Output Current (V_o = 5 V).



APPLICATION INFORMATION

1) The L4920 and L4921 have $V_{REF} \cong 1.25$ V. Then the output voltage can be set down to V_{REF} but V_i must be greater than 5.2 V (T_j = 25 °C).
2) As the regulator reference voltage source works in closed loop, the reference voltage may change in foldback condition.
3) For applications with high V_I, the total power dissipation of the device with respect to the thermal resistance of the package may be limiting the application. The total power dissipation is :

$$P_{tot} = V_i I_q + (V_i - V_o) I_o$$

A typical curve giving the quiescent current I_q as a function of the output current I_o is shown in fig. 3.