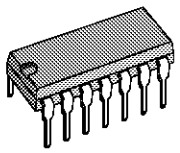
SGS-THOMSON MICROELECTRONICS

L6504

SOLENOID CONTROLLER

PRELIMINARY DATA

- SWITCH MODE CURRENT REGULATION
- TTL COMPATIBLE LOGIC INPUTS
- DRIVES ONE OR TWO EXTERNAL POWER TRANSISTORS
- VERY PRECISE ON-CHIP REFERENCE
- ANALOG CURRENT CONTROL INPUT
- ADJUSTABLE CURRENT RISE AND FALL TIME CONTROL INDEPENDENT OF SOLENOID SUPPLY VOLTAGE
- UNDERVOLTAGE LOCKOUT



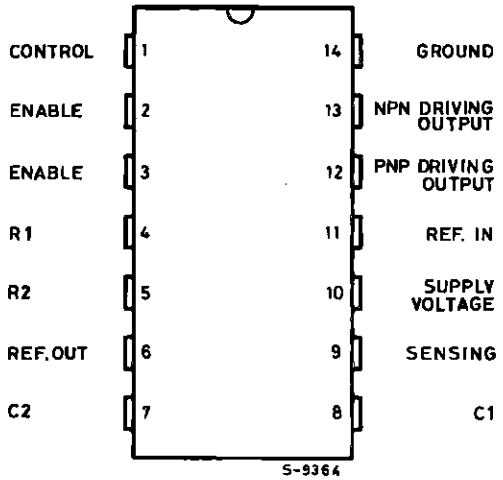
N
DIP14
(Plastic Package)
(0.25)

ORDERING NUMBER : L6504

DESCRIPTION

Designed for use with one external power transistor, the L6504 drives the hammer solenoid in daisy-wheel printers and typewrites. The device is controlled by three logic inputs and features switchmode regulation of the load current. A key feature of the device is that the rise and fall time of the load current can be set by external components. Additionally an analog input allows the load current to be set by an external DC voltage. An undervoltage lockout circuit guarantees the output off state for switch on phase.

PIN CONNECTION (top view)

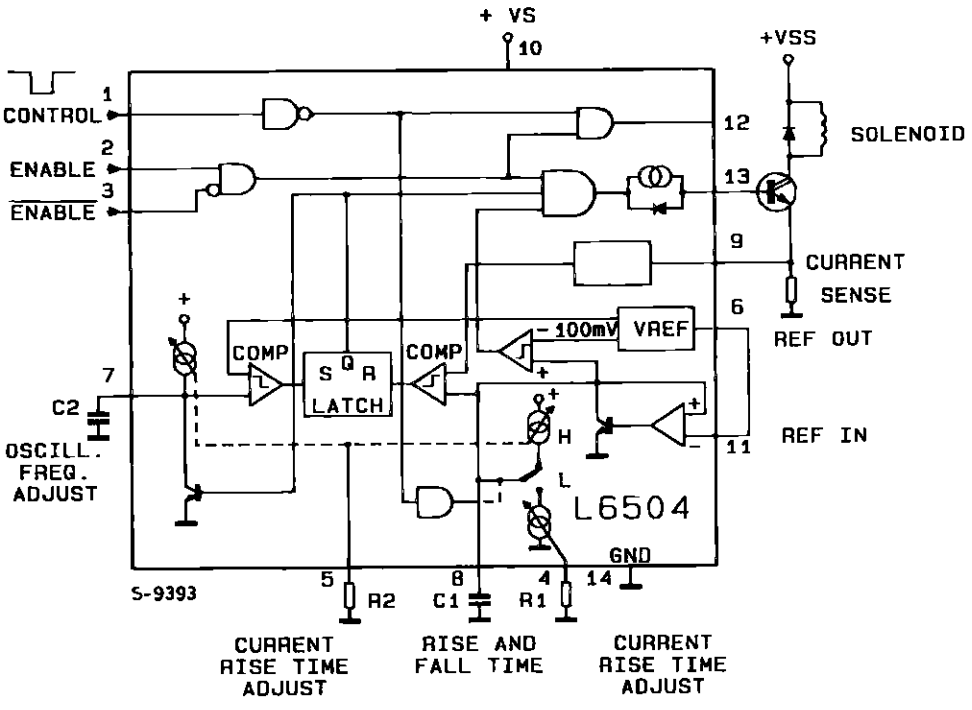


PIN FUNCTION

N°	Name	Function
1	CONTROL	TTL Compatible Control Input. A low level activates the output, driving the load. Internal Pull-up Resistor.
2	ENABLE	TTL Compatible Enable Input. A low level disables the output stage.
3	ENABLE	TTL Compatible Enable Input. A high level disables the output stage.
4	R1	The value of this resistor (*) sets slope of trailing edge of load current.
5	R2	The value of this resistor (*) sets slope of leading edge of load current.
6	REFERENCE OUT	Output for Internal Reference Voltage.
7	C2	The value of this capacitor set the duration of power transistor switch off time.
8	C1	The value of this capacitor sets slope of leading and trailing edge of load current.
9	SENSING	Connection for Load Current Sense Resistor. Value sets the maximum load current : $I = V_{ref}/R_S$.
10	SUPPLY VOLTAGE	Supply Voltage Input.
11	REFERENCE IN	Input for External Reference Voltage to Control Load Current by DC-level.
12	PNP DRIVING OUTPUT	Output to Control External PNP-transistor for Fast Current Discharge.
13	NPN DRIVING OUTPUT	Output for Basecharge and Discharge of External Power Transistor.
14	GROUND	Ground

(*) Value between 10 kΩ and 200 kΩ (or open).

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Test Conditions	Unit
V_S	DC Supply Voltage	10	V
$V_{2, 3}$	Enable Input Voltage Range	–0.3 to 7	V
V_1	Control Input Voltage Range	–0.3 to 7	V
V_9	Sense Voltage	–0.3 to 2	V
I_6	Reference Output Current	2	mA
V_{11}	External Reference Voltage	2	V
T_{stg}	Storage Temperature	–55 to 150	°C
T_j	Junction Temperature	–55 to 150	°C
T_{op}	Operating Temperature	0 to 85	°C

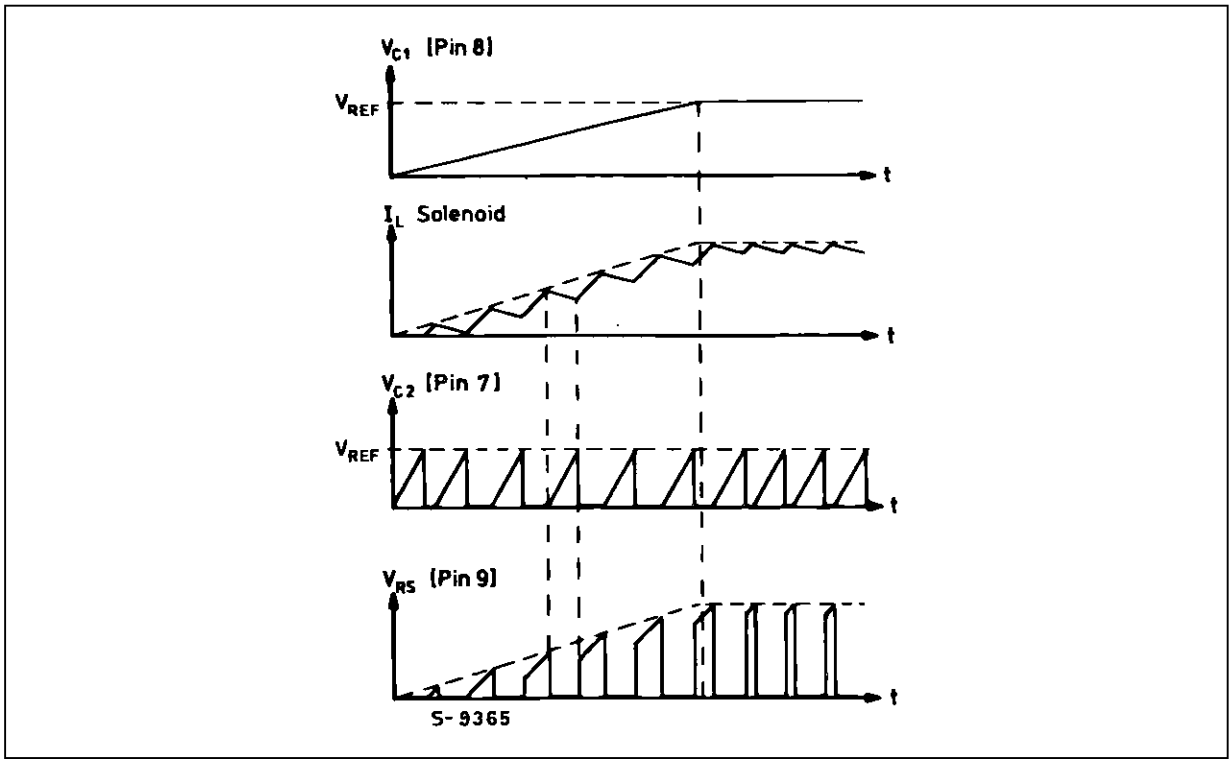
THERMAL DATA

Symbol	Parameter		Test Conditions	Unit
$R_{th\ j\text{-}amb}$	Thermal Resistance Junction-ambient	Max.	100	°C/W

ELECTRICAL CHARACTERISTICS

N°	Symbol	Parameter	Pin	Test Conditions	Min.	Typ.	Max.	Unit
1	V_s	Operating Supply Voltage	10		4.5		10	V
2	V_{sth}	Supply Voltage Threshold For Output Switch-off	10	V_{CH} = LOW, V_E = HIGH	2.96	3.7	4.45	V
3	I_s	Quiescent Current	10	Pin1 Highstate		7	12	mA
4	V_{CL}	Control Voltage	1	Low State			1.5	V
5	V_{CH}	Control Voltage	1	High State	2.3			V
6	I_{CL}	Control Input Current	1	V_1 Low State	–1		0	mA
7	I_{CH}	Control Input Current	1	V_1 High State	–0.6		5	uA
8	V_{EL}	Enable Voltage	2/3	Low State			1.5	V
9	V_{EH}	Enable Voltage	2/3	High State	2.3			V
10	I_{IN}	Input Current	2/3	$V_{2, 3}$ Low State	–10		1	µA
11	I_{IN}	Input Current	2/3	$V_{2, 3}$ High State	–1		5	µA
12	V_{DL}	Driving Voltage Low	13	$R_{13, 14}$ = 5kΩ, Low State			0.5	V
13	I_D	Driving Current	13	V_{13} = 2V	6.5	10	16	mA
14	V_{SE}	Sense Voltage	9		0		2	V
15	V_{ref}	Reference Voltage	6	I_6 = 0. . . 2mA	1.28	1.33	1.38	V
16	I_{ref}	Reference Current	6				2	mA
17	V_{RIN}	Reference Input	11		0.3		2	V
18	I_{C8}	Charge Current	8	$R_{2\ (Pin\ 5)}$ = 20kΩ, Pin1L	58	65	72	µA
19	I_{D8}	Discharge Current	8	$R_{1\ (Pin\ 4)}$ = 20kΩ, Pin1H	28	32.5	37	µA
20	I_{SD}	Source Current	12	V_{12} = 2V	0.5	1	1.6	mA
21	V_{sats}	Source Saturation Voltage	12	I_{SOURCE} = 0.5mA			1.2	V
22	V_{sats}	Sink Saturation Voltage	12	I_{SINK} = 2mA			0.4	V
23	$V_{V\text{-}I}$	VI-Converter Voltage	4/5	10kΩ< $R_{1, 2}$ < 200kΩ, $R_1 = R_2$	1.26	1.32	1.4	V
24	t_r	Recirculation Time of Load Current	7	C_2 = 1.5ns, R_2 = 20kΩ	27	30	33	µs
25	t_D	Current Sense Delay Time	9		0.3	1	2.5	µs

Figure 1 : Timing Diagram Start Phase



APPLICATION INFORMATION

Figure 2 : Free Running Load Current Leading and Trailing Edge

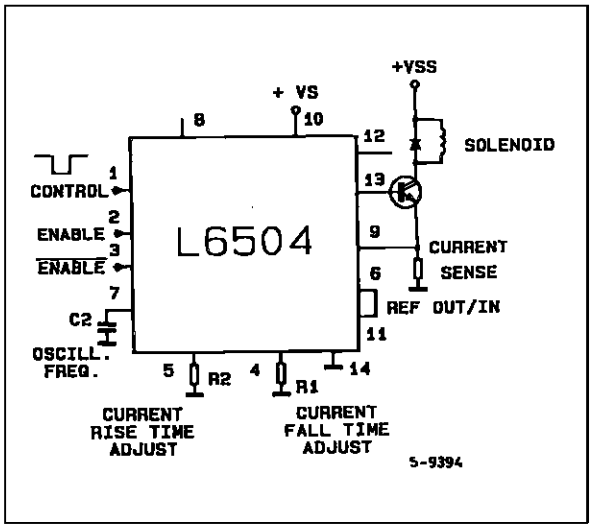


Figure 3 :

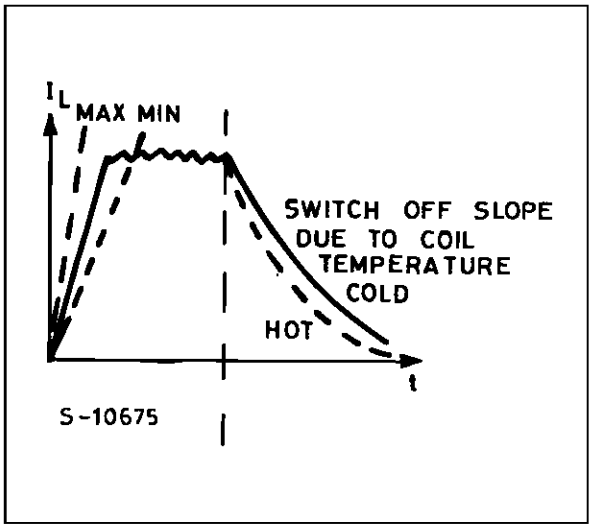


Figure 4 : Slew Rate of Loading Edge Controlled

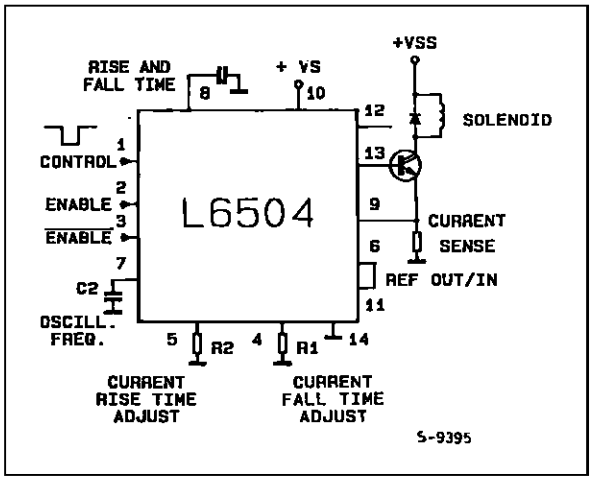


Figure 5 :

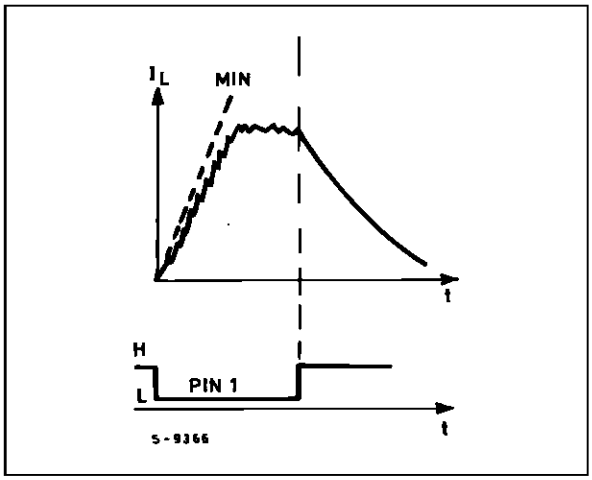


Figure 6 : Slew Rate Leading and Trailing Edge Controlled

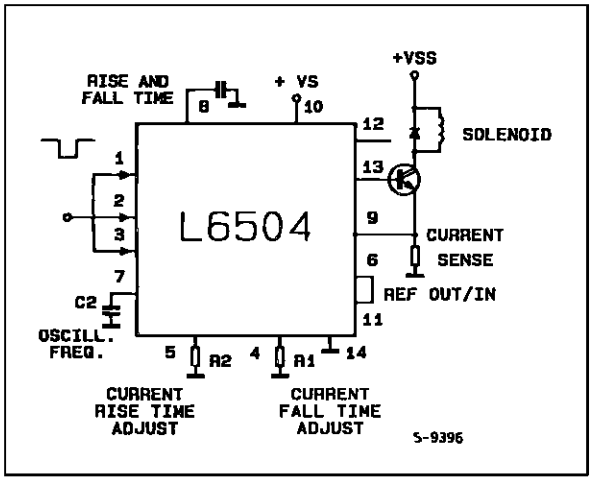


Figure 7 :

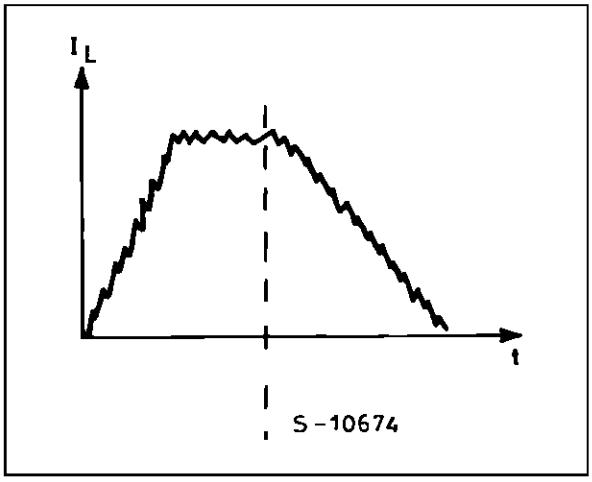


Figure 8 : Free Running Leading Edge Fast Current Slope at Trailing Edge

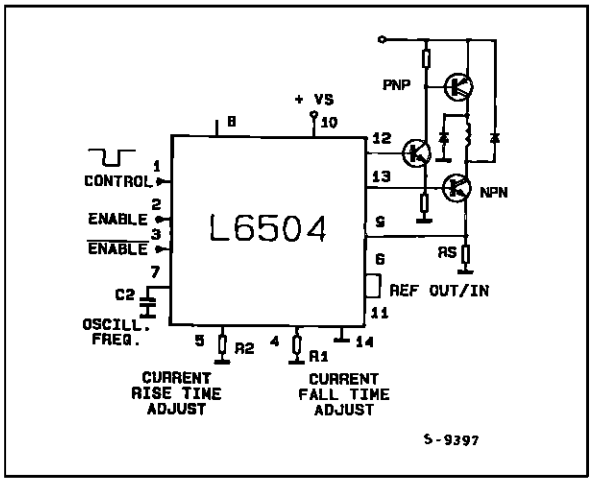
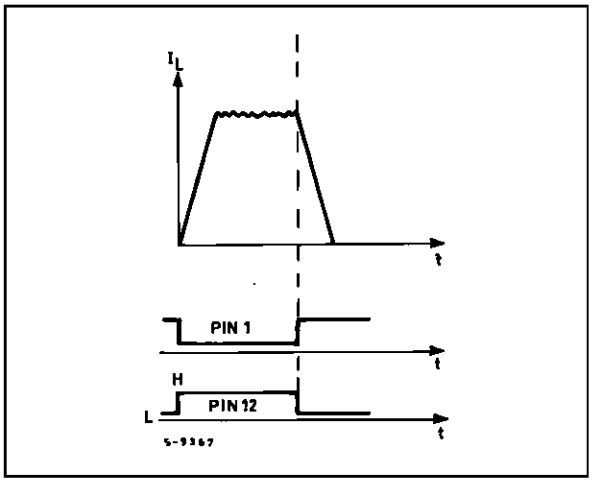


Figure 9 :



DIP14 PACKAGE MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	1.39		1.65	0.055		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		15.24			0.600	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z	1.27		2.54	0.050		0.100