Ordering number:ENN2895A

Monolithic Linear IC

LA5690D, 5690S

Voltage Regulator Driver with Watchdog Timer

Overview

The LA5690 is a single-chip voltage regulator for microcomputer system monitor use that performs the functions of 5V output voltage control, watchdog timer, and voltage detector. The LA5690 uses a minimum number of parts to provide the basic functions.

Applications

- Microcomputer system for car equipment, refrigeration/heating equipment, office automation equipment.

Functions

- Output voltage 5V control.
- Watchdog timer.
- Power-ON reset function.
- Positive/negative logic output for reset.

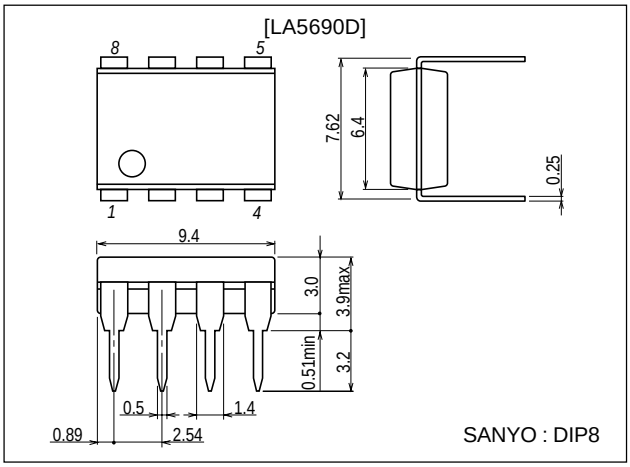
Features

- An external PNP transistor can be used to provide a low-saturation voltage regulator.
- CK input with edge detector.
- Variable detection voltage.
- Reset output with pull-up resistor of 10kΩ.

Package Dimensions

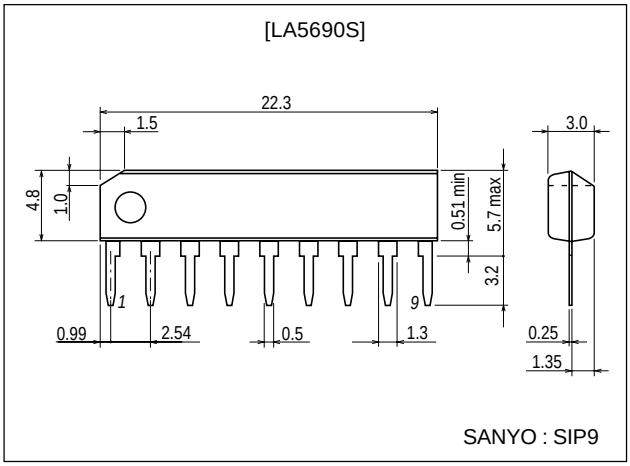
unit:mm

3001B-DIP8



unit:mm

3017C-SIP9



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Specifications

Maximum Ratings at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	Unit
Control pin voltage	V_{CONT} max	1s	60	V
Control pin voltage	V_{CONT} max		41	V
Control pin current	I_{CONT} max	*V_{CC}≥6V	11	mA
CK input voltage	V_{CK} max		25	V
Reset pin voltage	$V_{\overline{RES}}$ max, V_{RES} max		41	V
Allowable power dissipation	Pd max		500	mW
Operating temperature	Topr		–40 to +85	˚C
Storage temperature	Tstg		–55 to +150	˚C

* : A PNP transistor is connected to the LA5690D, 5690S externally to provide a low-saturation voltage regulator. Therefore, I_{CONT}≈100mA will flow, as starting current, in the V_{CC} range where the output cannot be regulated.

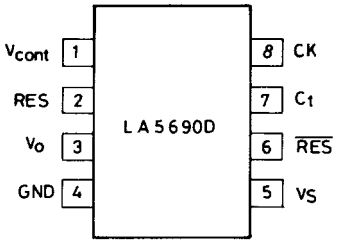
Operating Conditions at Ta = 25˚C

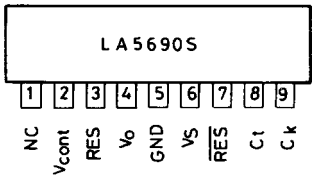
Parameter	Symbol	Conditions	Ratings	Unit
Control pin voltage	V_{CONT}		6 to 40	V
Control pin current	I_{CONT} max		10	mA
Reset output current	$I_{\overline{RES}}$ max, I_{RES} max	External R pull-up	8	mA
Reset detection voltage	V_S min		4	V

Operating Characteristics at Ta = 25˚C, V_{CC}=14V, I_O=50mA, unless otherwise specified.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output voltage	V_O		4.8	5.0	5.2	V
Line regulation	ΔV_{OLN1}	9V≤V_{CC}≤16V		2	10	mV
	ΔV_{OLN2}	6V≤V_{CC}≤40V		4	30	mV
Load regulation	ΔV_{OLD}	1mA≤I_O≤50mA		4	30	mV
Current drain	I_{CC}	I_O=0		4.9	6.5	mA
Output noise voltage	V_{NO}	10Hz≤f≤100kHz, V_{CK}=0		200		µV
Temperature coefficient of output voltage	$\Delta V_O/\Delta Ta$	I_O=5mA, –40°C≤Ta≤+85°C		±0.2		mV/˚C
Reference voltage	V_{REF}		1.13	1.18	1.23	V
H-level CK input voltage	V_{IH}		2			V
L-level CK input voltage	V_{IL}				0.8	V
H-level CK input current	I_{IH}	V_{CK}=5V		0.3	0.7	mA
L-level CK input current	I_{IL}	V_{CK}=0	–1.0	–0.1		µA
H-level reset output voltage	$V_{\overline{ORH}}$/ V_{ORH}		4.8	5.0	5.2	V
L-level reset output voltage	$V_{\overline{ORL1}}$/ V_{ORL1}			40	200	mV
L-level reset output voltage	$V_{\overline{ORL2}}$/ V_{ORL2}	$I_{\overline{RES}}$=I_{RES}=8mA		0.16	0.8	V
CK input pulse width	t_{CKW}	V_{CK}=5V	3			µs
Reset output delay time	t_d	C_t=1µF	7.5	10	12.5	ms
Watchdog time	t_{WD}	C_t=1µF	3.8	5.0	6.2	ms
Watchdog reset time	t_{WR}	C_t=1µF	0.1	0.25	0.4	ms
Reset hysteresis voltage	Vhys	V_S=4.5V	100	200	300	mV

Pin Assignments



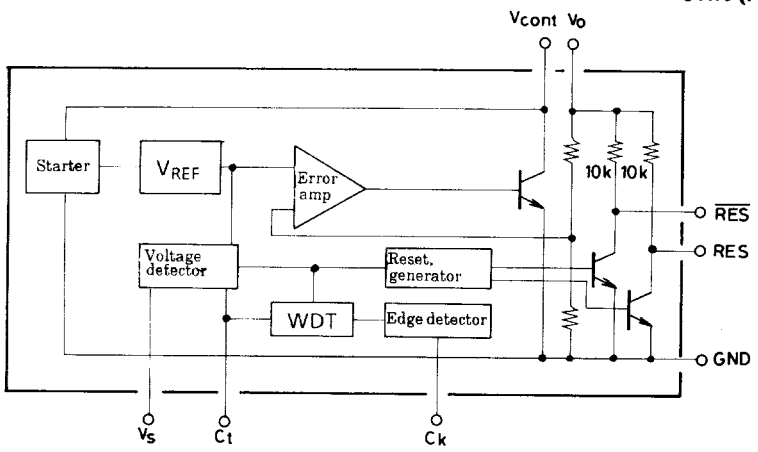


Top view

The NC pin, which is left open, must not be used for wiring.

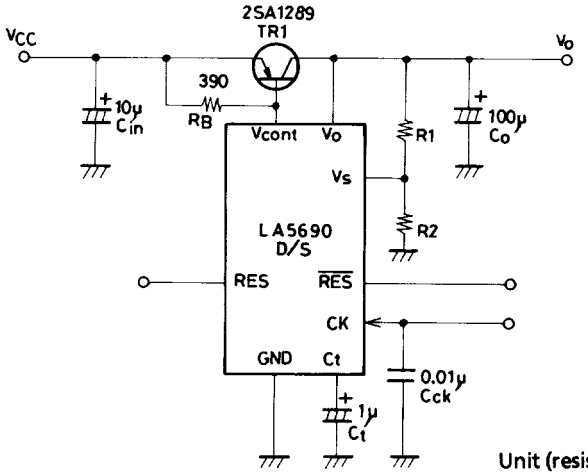
Equivalent Circuit Block Diagram

Unit (resistance: Ω)



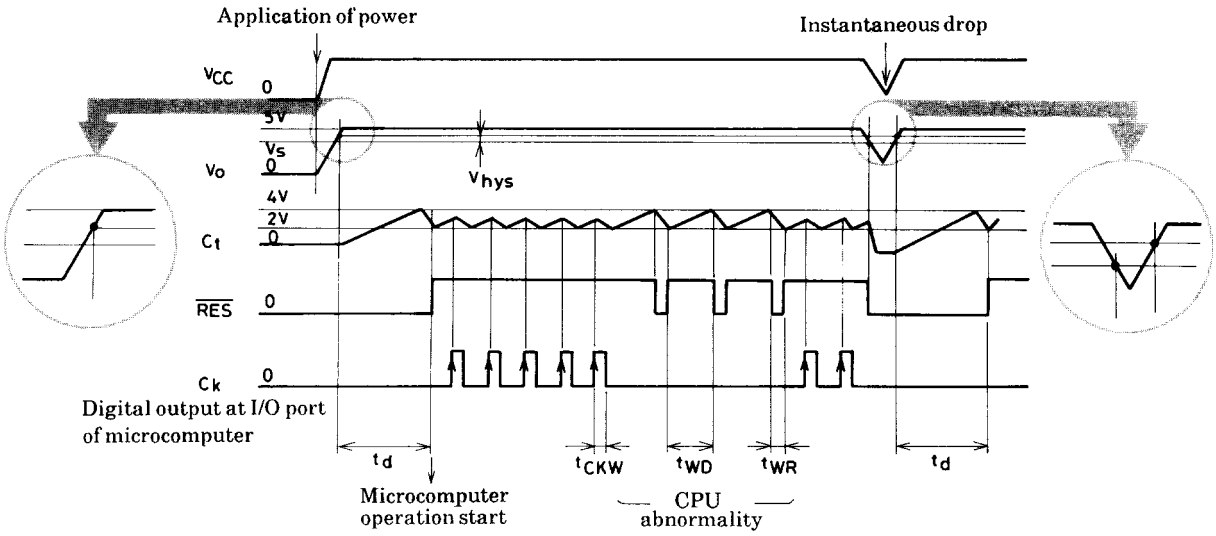
The reset output contains a pull-up resistor of 10kΩ.

Test Circuit



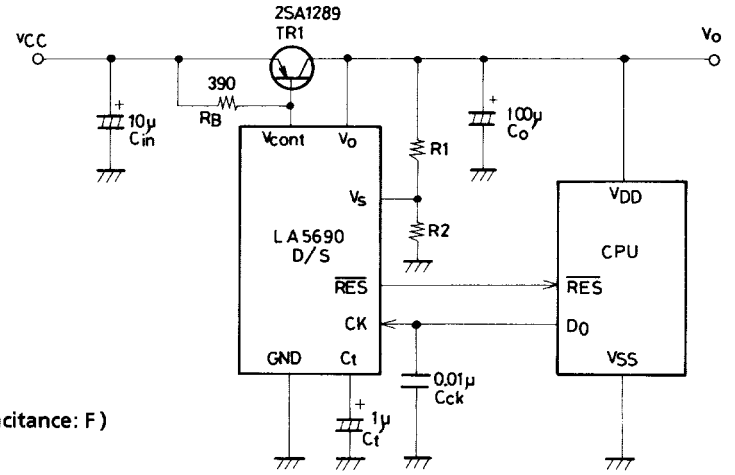
Unit (resistance: Ω, capacitance: F)

Timing Chart



Note : Edge-triggered at the point indicated by the arrow of C_K signal.

Sample Application Circuit



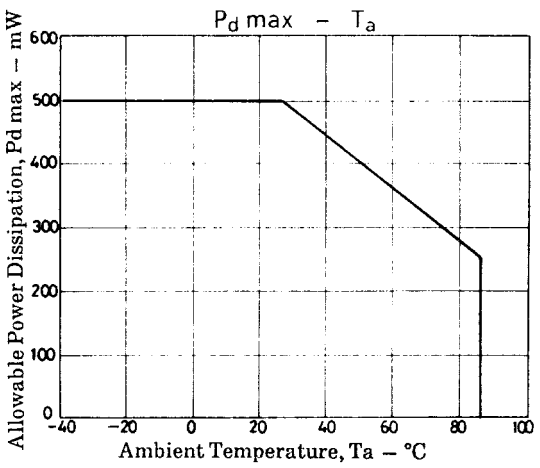
Unit (resistance: Ω, capacitance: F)

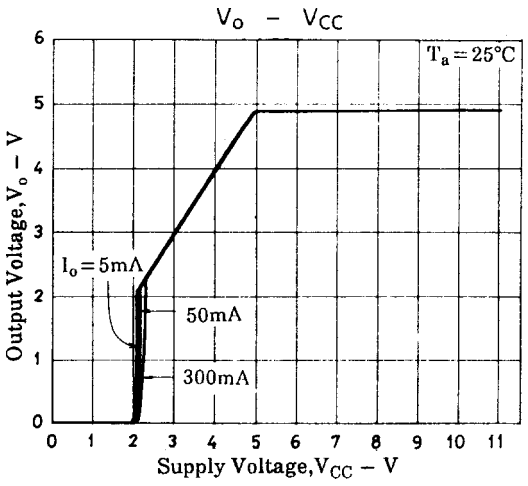
TR1 : 2SA1289 (60V/5A, TO-220)
C_t : Sanyo OS capacitor

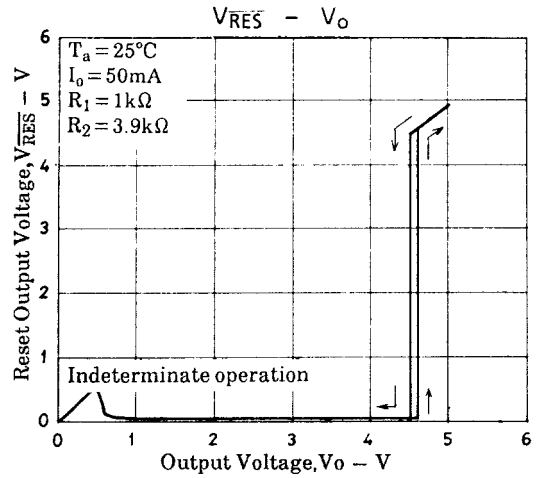
$V_S = V_{REF} \times (\frac{R1}{R2} + 1)$
$V_{REF} \approx 1.18(V)$

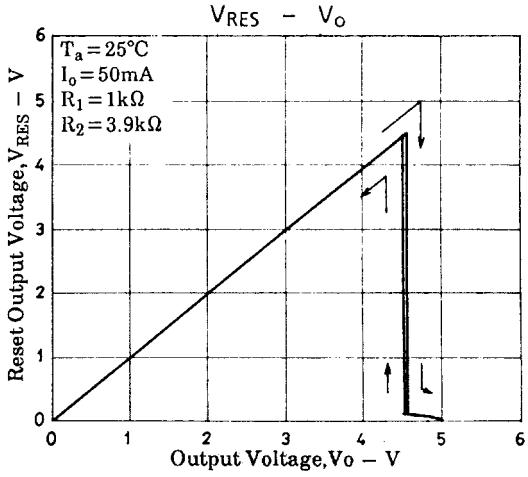
$t_d = 10 \times C_t\,(\mu F)\,[ms]$
$t_{WD} = 5 \times C_t\,(\mu F)\,[ms]$
$t_{WR} = 0.25 \times C_t\,(\mu F)\,[ms]$

· Ct, C_O : Capacitors whose value does not vary with temperature very much.
· C_{CK} : Must be used to eliminate noise in the reset output.

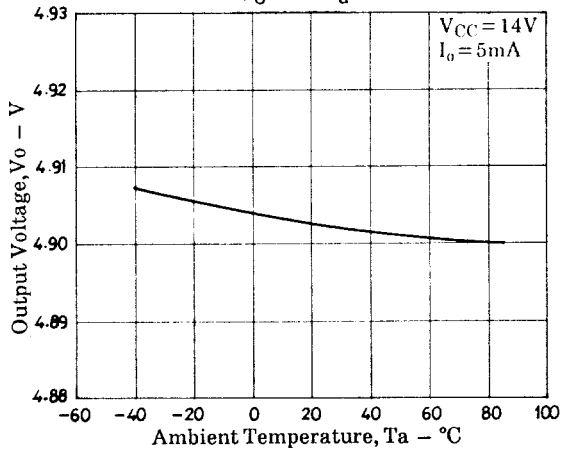




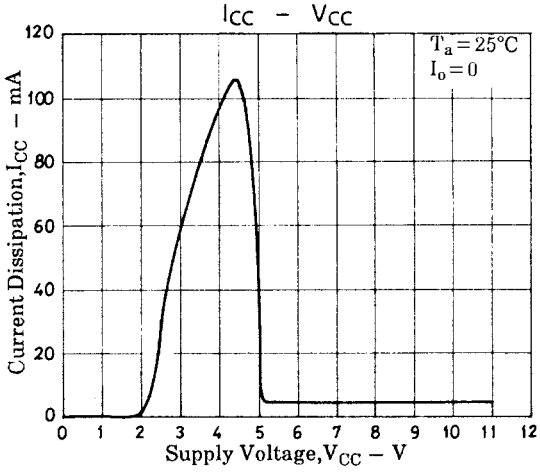




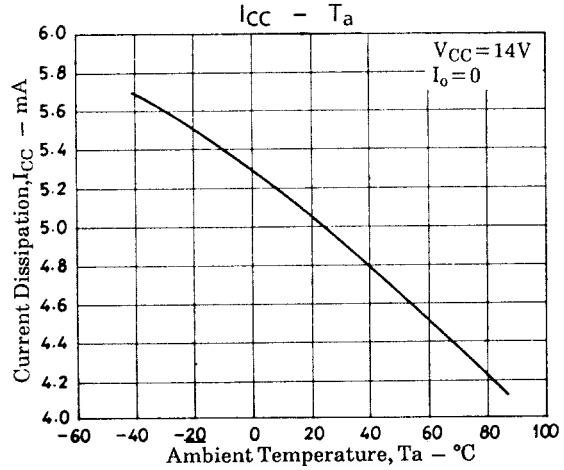
V_o – T_a



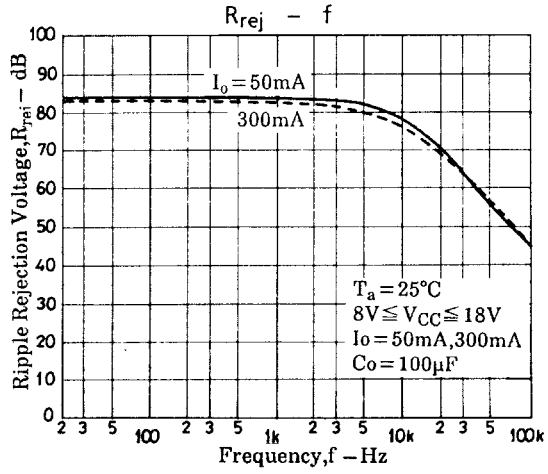
I_{CC} – V_{CC}



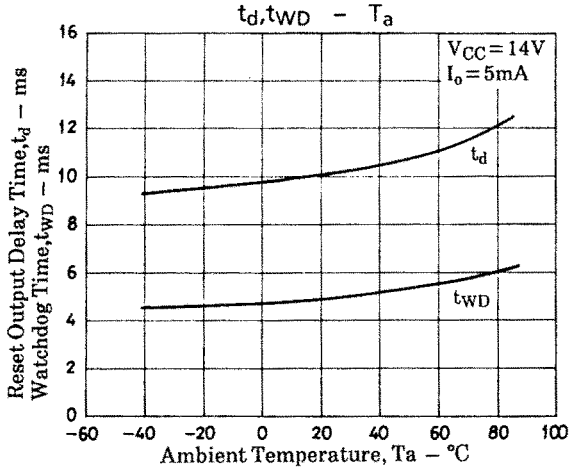
I_{CC} – T_a



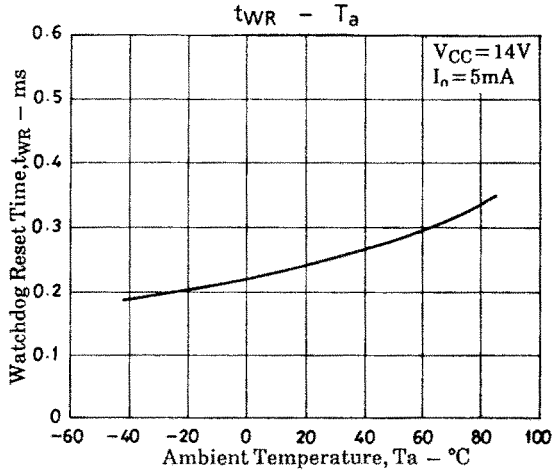
R_{rej} – f



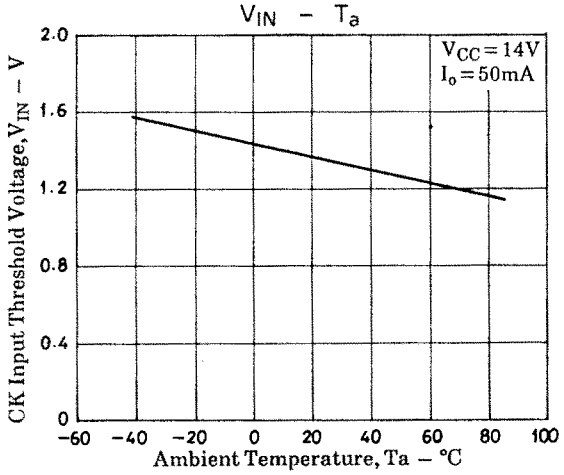
t_d, t_{WD} – T_a



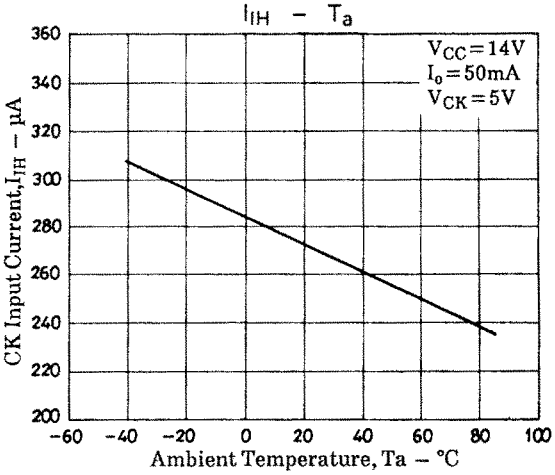
t_{WR} – T_a



V_{IN} – T_a



I_{IH} – T_a



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