



LA5692D, 5692S, 5692M

Voltage Regulator Driver with Watchdog Timer

Overview

The LA5692 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. Since the LA5692 can hold the reset output, it is especially suited for use in peripheral control and monitor output applications (example : valves used in refrigeration equipment, hot water supply system).

Applications

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

Functions

- Output voltage 5V control.
- Watchdog timer.
- Reset generation at power-ON mode.
- Reset hold output [RES (2)] (Cleared with CK reinput).

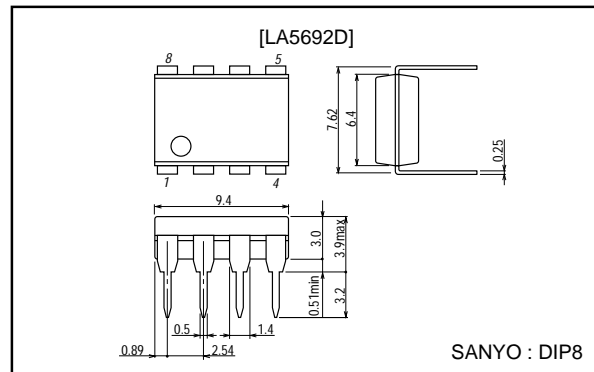
Features

- An external PNP transistor can be used to provide a low-saturation voltage regulator.
- CK input with edge detector.
- Variable detection voltage.
- The watchdog time can be made longer.

Package Dimensions

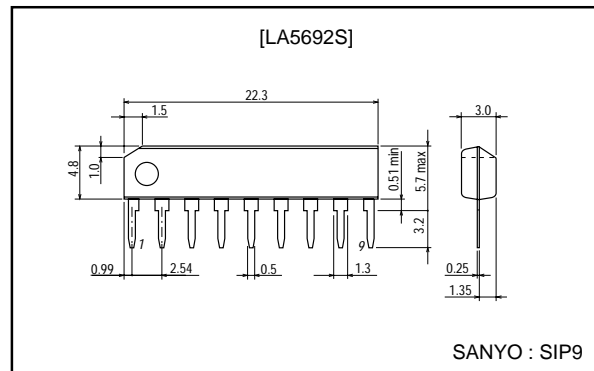
unit: mm

3001B-DIP8



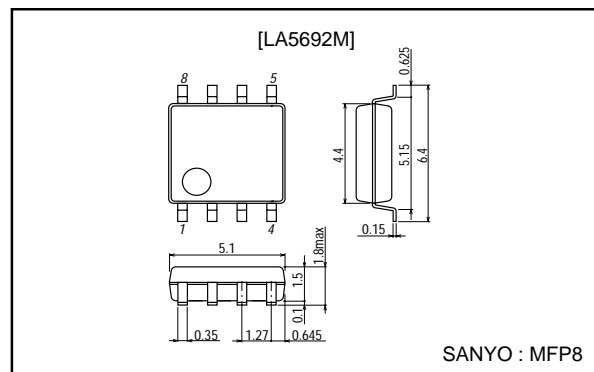
unit: mm

3017B-SIP9



unit: mm

3032B-MFP8



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Specifications

Maximum Ratings at $T_a=25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Control pin voltage	V_{CONTmax}	1s	60	V
Control pin voltage	V_{CONTmax}		41	V
Control pin current	I_{CONTmax}	$*V_{\text{CC}} \geq 6\text{V}$	11	mA
CK input voltage	V_{CKmax}		25	V
Reset pin voltage	$V_{\text{RES}(1)\text{max}}$, $V_{\text{RES}(2)\text{max}}$		41	V
Allowable power dissipation	$P_d \text{ max}$	LA5692D, 5692S	500	mW
		LA5692M	370	mW
Operating temperature	T_{opr}		-40 to +85	$^\circ\text{C}$
Storage temperature	T_{stg}		-55 to +150	$^\circ\text{C}$

* : A PNP transistor is connected to the LA5692D, 5692S externally to provide a low-saturation voltage regulator. Therefore, $I_{\text{CONT}} \approx 100\text{mA}$ will flow, as starting current, in the V_{CC} range where the output cannot be regulated.

Operating Conditions at $T_a=25^\circ\text{C}$

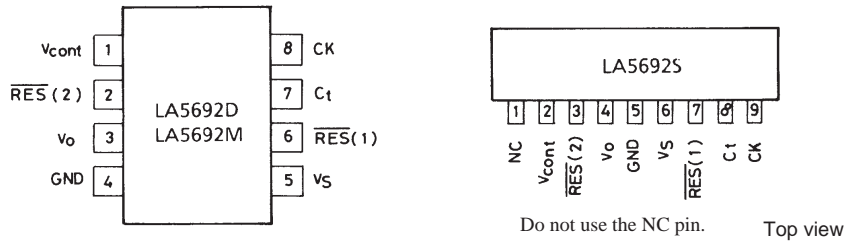
Parameter	Symbol	Conditions	Ratings	Unit
Control pin voltage	V_{CONT}		6 to 40	V
Control pin current	I_{CONTmax}		10	mA
Reset output current	$I_{\text{RES}(1)\text{max}}$, $I_{\text{RES}(2)\text{max}}$	External R pull-up	8	mA
Reset detection voltage	$V_{\text{S min}}$		4	V

Operating Characteristics at $T_a=25^\circ\text{C}$, $V_{\text{CC}}=14\text{V}$, $I_{\text{O}}=50\text{mA}$, unless otherwise specified.

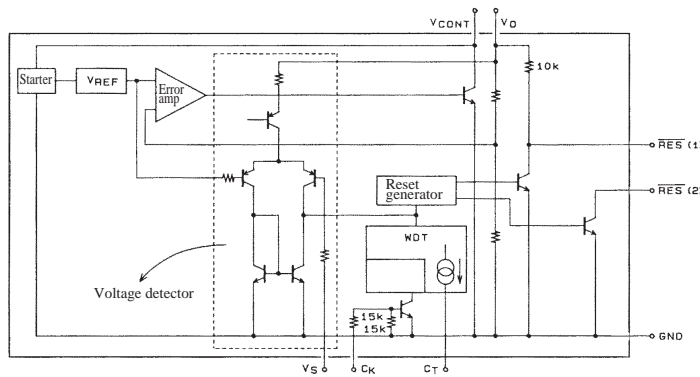
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output voltage	V_{O}		4.8	5.0	5.2	V
Line regulation1	ΔV_{OLN1}	$9\text{V} \leq V_{\text{CC}} \leq 16\text{V}$		2	10	mV
Line regulation2	ΔV_{OLN2}	$6\text{V} \leq V_{\text{CC}} \leq 40\text{V}$		4	30	mV
Load regulation	ΔV_{OLD}	$1\text{mA} \leq I_{\text{O}} \leq 50\text{mA}$		4	30	mV
Current dissipation	I_{CC}	$I_{\text{O}}=0$		4.4	6.5	mA
Output noise voltage	V_{NO}	$10\text{Hz} \leq f \leq 100\text{kHz}$, $V_{\text{CK}}=0$		150		μV
Temperature coefficient of output voltage	$\Delta V_{\text{O}} / \Delta T_a$	$I_{\text{O}}=5\text{mA}$, $-40^\circ\text{C} \leq T_a \leq +85^\circ\text{C}$		± 0.2		$\text{mV}/^\circ\text{C}$
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}	$V_{\text{CK}}=5\text{V}$		0.3	0.7	mA
'L'-level CK input current	I_{IL}	$V_{\text{CK}}=0\text{V}$	-1.0	-0.1		μA
'H'-level reset output voltage	$V_{\text{ORH}(1)}/$ $V_{\text{ORH}(2)}$	$\overline{\text{RES}}(2) : 10\text{k}\Omega$ pull-up	4.8	5.0	5.2	V
'L'-level reset output voltage1	$V_{\text{ORL}(1)1}/$ $V_{\text{ORL}(2)1}$	$\overline{\text{RES}}(2) : 10\text{k}\Omega$ pull-up		40	200	mV
'L'-level reset output voltage2	$V_{\text{ORL}(1)2}/$ $V_{\text{ORL}(2)2}$	$I_{\text{RES}(1)}=I_{\text{RES}(2)}=8\text{mA}$		0.16	0.8	V
CK input pulse width	t_{CKW}	$V_{\text{CK}}=5\text{V}$	3			μs
Reset output delay time	t_{d}	$C_{\text{t}}=1\mu\text{F}$	7.5	10	12.5	ms
Watchdog time	t_{WD}	$C_{\text{t}}=1\mu\text{F}$	30	40	50	ms
Watchdog reset time	t_{WR}	$C_{\text{t}}=1\mu\text{F}$	0.1	0.25	0.4	ms
Reset hysteresis voltage	V_{hys}	$V_{\text{S}}=4.5\text{V}$	100	200	300	mV

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Pin Assignment

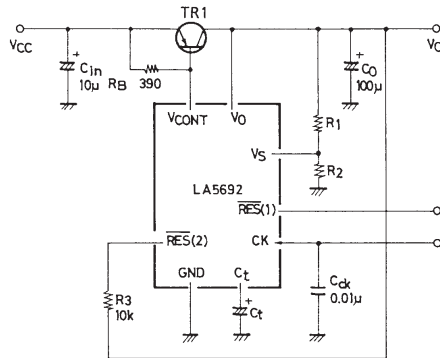


Equivalent Circuit Block Diagram



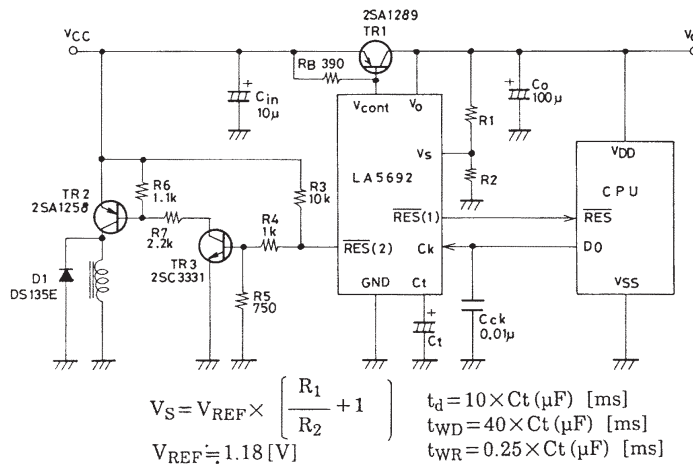
RES(1) : Contains a pull-up resistor of 10kΩ.
 RES(2) : Open collector

Test Circuit



Unit (resistance : Ω, capacitance : F)

Sample Application Circuit

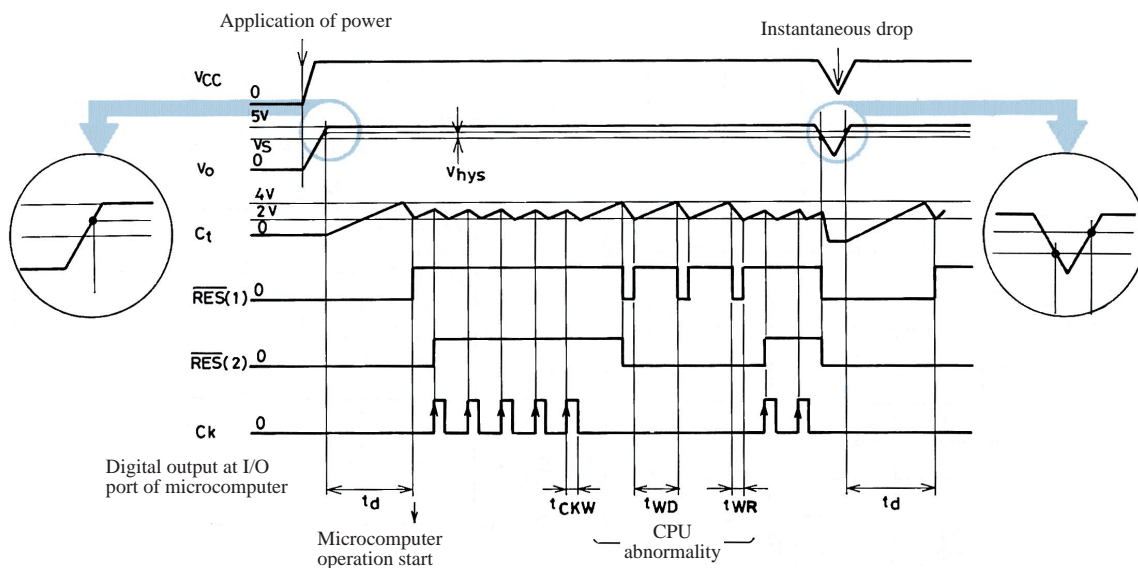


Unit (resistance : Ω, capacitance : F)

Note on application

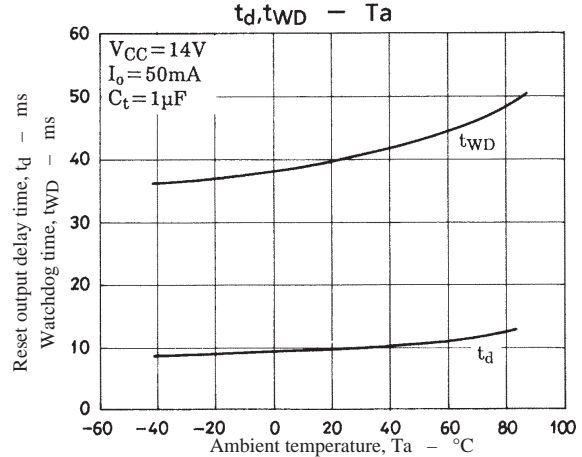
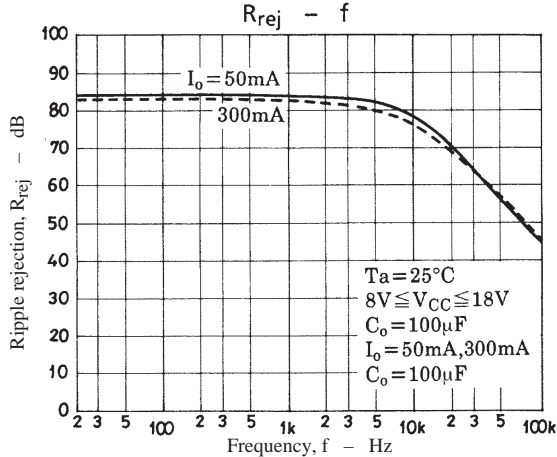
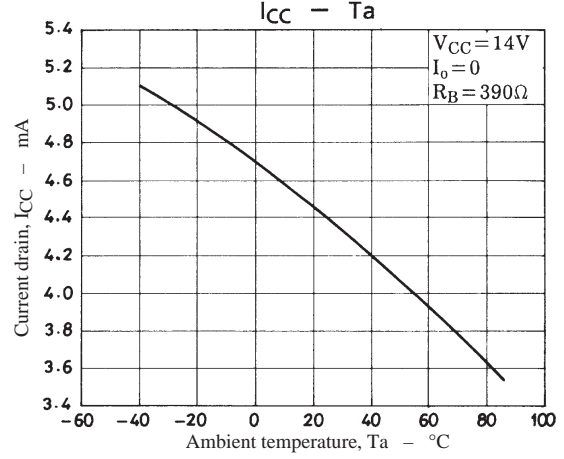
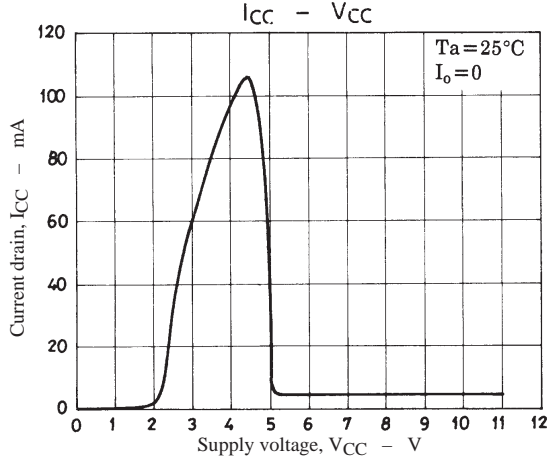
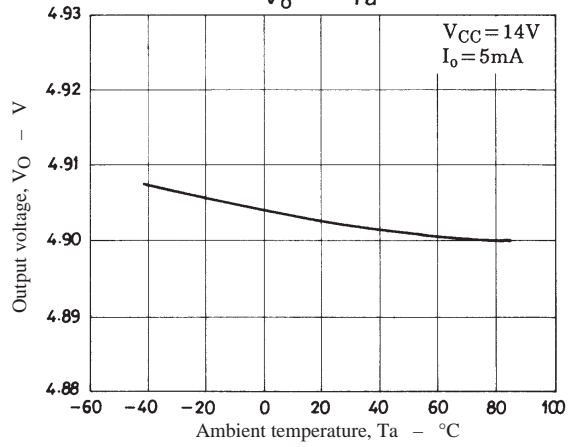
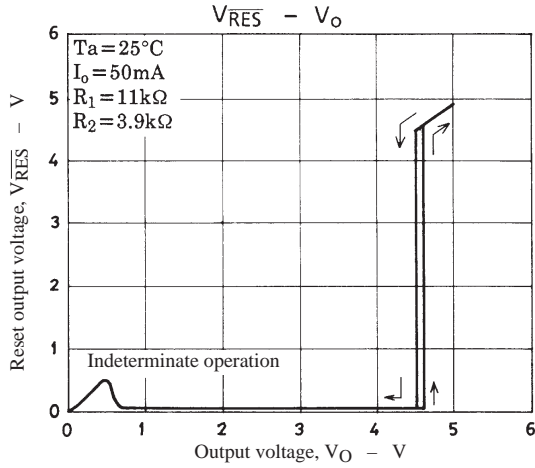
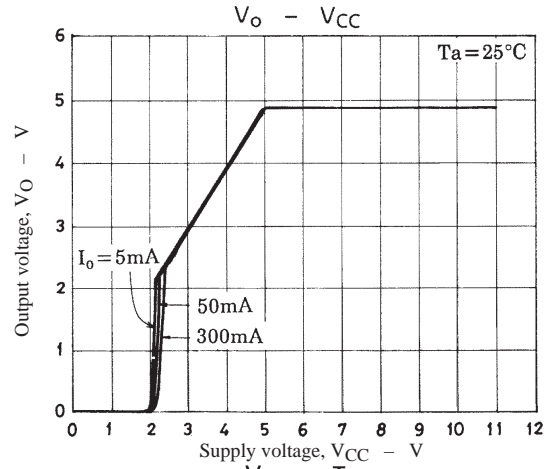
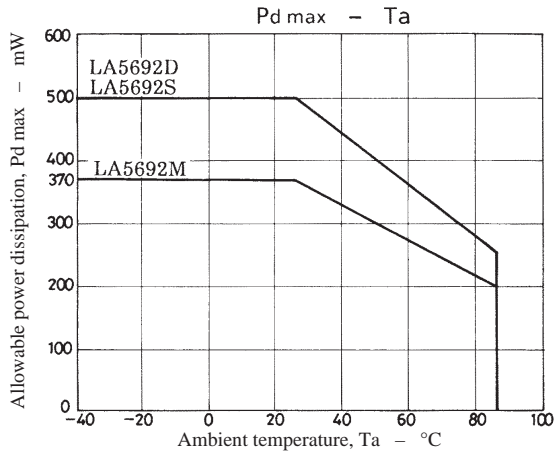
1. For stable operation, place C_{in} , C_O , and TR1 as near to the IC as possible.
2. When used in 0°C or below it, a capacitor of which impedance at high-frequency operation is low and has a good temperature characteristic (such as SANYO OS-CON capacitor or others) should be used to prevent oscillation.
3. Set V_S to the output voltage level where the circuit will be reset using external resistors R1 and R2. V_S should be set to 4V or greater due to internal circuit operation.
4. C_{CK} must be inserted to cut the high range element of clock noise to prevent it from becoming a reset output noise.
5. For C_t , a capacitor which less varies the capacitance according to the temperature should be used.

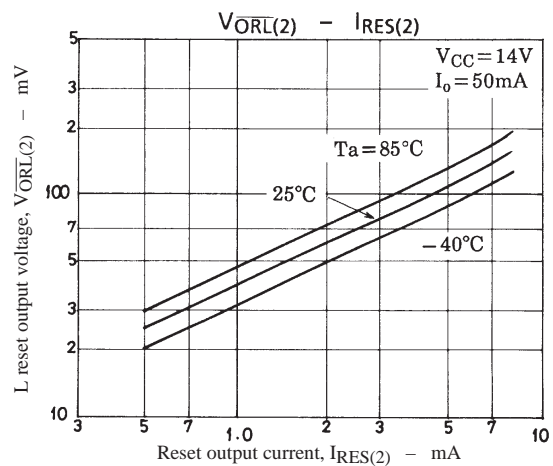
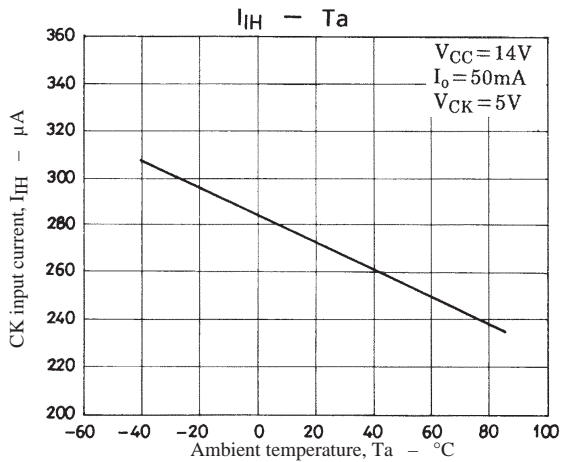
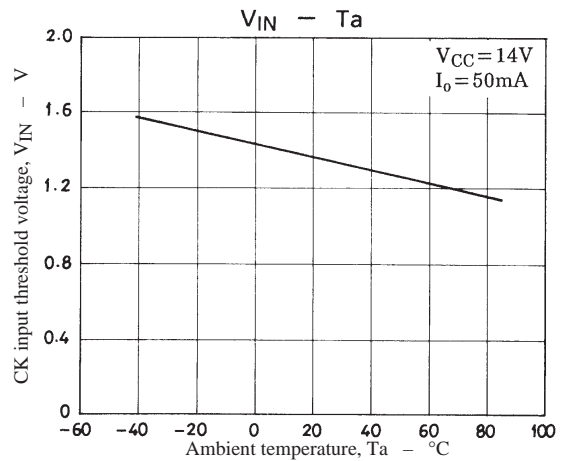
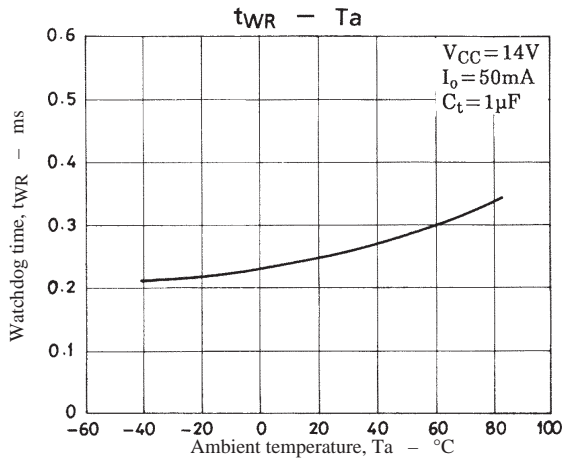
Timing Chart



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

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