



## LA5691D, 5691S

### Voltage Regulator Driver with Watchdog Timer (with Output ON/OFF Function)

#### Overview

The LA5691 is a single-chip voltage regulator for micro-computer system monitor use that performs the functions of 5V output voltage control, watchdog timer, and voltage detector. Since the LA5691 is capable of exercising output ON/OFF controls it is especially suited for use in battery-powered equipment.

#### 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.
- The enable pin can be used to exercise output ON/OFF control (Active-low).

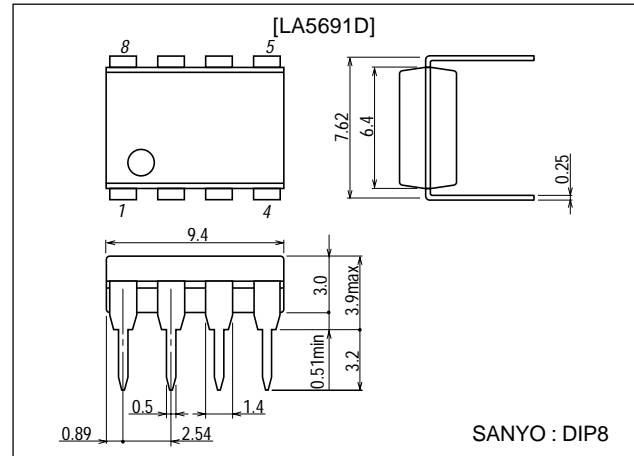
#### Features

- An external PNP transistor can be used to provide a low-saturation voltage regulator.
- Capable of reducing of power dissipation at standby mode ( $I_{Q\ OFF}=300\text{mA typ}$ ).
- CK input with edge detector.
- Variable detection voltage.

#### Package Dimensions

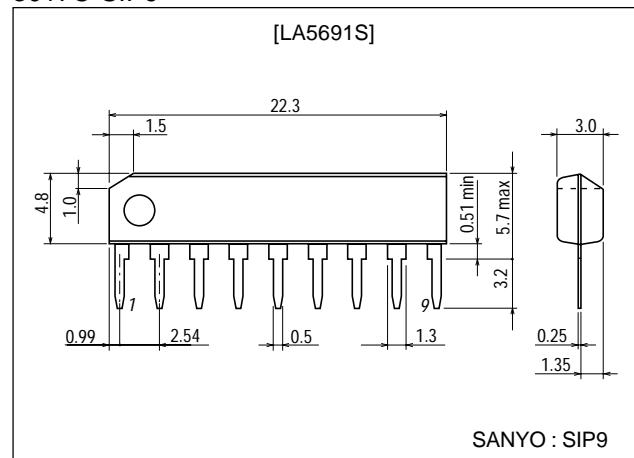
unit:mm

3001B-DIP8



unit:mm

3017C-SIP9



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# LA5691D, 5691S

## Specifications

### Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Control pin voltage	V <sub>CONT</sub> max	1s	60	V
Control pin voltage	V <sub>CONT</sub> max		41	V
Control pin current	I <sub>CONT</sub> max	*V <sub>CC</sub> ≥6V	11	mA
Enable pin voltage	V <sub>EN</sub> max		41	V
CK input voltage	V <sub>CK</sub> max		25	V
Reset pin voltage	V <sub>RES</sub> 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 LA5691D, 5691S externally to provide a low-saturation voltage regulator. Therefore, I<sub>CONT</sub>≈100mA will flow, as starting current, in the V<sub>CC</sub> range where the output cannot be regulated.

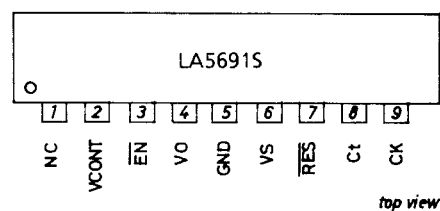
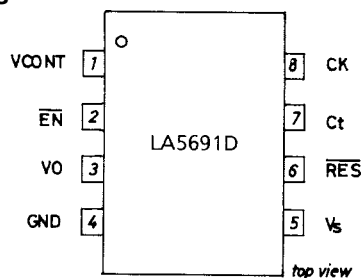
### Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Control pin voltage	V <sub>CONT</sub>		6 to 40	V
Control pin current	I <sub>CONT</sub> max		10	mA
Reset output current	I <sub>RES</sub> max	External R pull-up (with pull-up R 10kΩ)	8	mA
Reset detection voltage	V <sub>S</sub> min		4	V

### Operating Characteristics at Ta = 25°C, V<sub>CC</sub>=14V, I<sub>O</sub>=50mA, unless otherwise specified. See specified Test Circuit.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output voltage	V <sub>O</sub>		4.8	5.0	5.2	V
Line regulation	ΔV <sub>OLN1</sub>	9V≤V <sub>CC</sub> ≤16V		2	10	mV
	ΔV <sub>OLN2</sub>	6V≤V <sub>CC</sub> ≤40V		4	30	mV
Load regulation	ΔV <sub>OLD</sub>	1mA≤I <sub>O</sub> ≤50mA		4	30	mV
Current drain	I <sub>CC</sub>	I <sub>O</sub> =0		4.1	6.5	mA
Output noise voltage	V <sub>NO</sub>	10Hz≤f≤100kHz, V <sub>CK</sub> =0		200		μV
Temperature coefficient of output voltage	ΔV <sub>O</sub> /ΔTa	I <sub>O</sub> =5mA, -40°C≤Ta≤+85°C		±0.2		mV/°C
Reference voltage	V <sub>REF</sub>		1.13	1.18	1.23	V
H-level CK input voltage	V <sub>IH</sub>		2			V
L-level CK input voltage	V <sub>IL</sub>				0.8	V
H-level CK input current	I <sub>IH</sub>	V <sub>CK</sub> =5V		0.3	0.7	mA
L-level CK input current	I <sub>IL</sub>	V <sub>CK</sub> =0	-1.0	-0.1		μA
H-level reset output voltage	V <sub>ORH</sub>		4.8	5.0	5.2	V
L-level reset output voltage 1	V <sub>ORL1</sub>			40	200	mV
L-level reset output voltage 2	V <sub>ORL2</sub>	I <sub>RES</sub> =8mA		0.16	0.8	V
CK input pulse width	t <sub>CKW</sub>	V <sub>CK</sub> =5V	3			μs
Reset output delay time	t <sub>d</sub>	C <sub>t</sub> =1μF	7.5	10	12.5	ms
Watchdog time	t <sub>WD</sub>	C <sub>t</sub> =1μF	3.8	5.0	6.2	ms
Watchdog reset time	t <sub>WR</sub>	C <sub>t</sub> =1μF	0.1	0.25	0.4	ms
Reset hysteresis voltage	V <sub>hys</sub>	V <sub>S</sub> =4.5V	100	200	300	mV
L-level output voltage	V <sub>O OFF</sub>	V <sub>EN</sub> =5V		150	300	mV
Quiescent current	I <sub>Q OFF</sub>	V <sub>EN</sub> =5V		300	600	μA
Output OFF control voltage	V <sub>EN H</sub>	Output OFF	2			V
Output ON control voltage	V <sub>EN L</sub>	Output ON			0.8	V

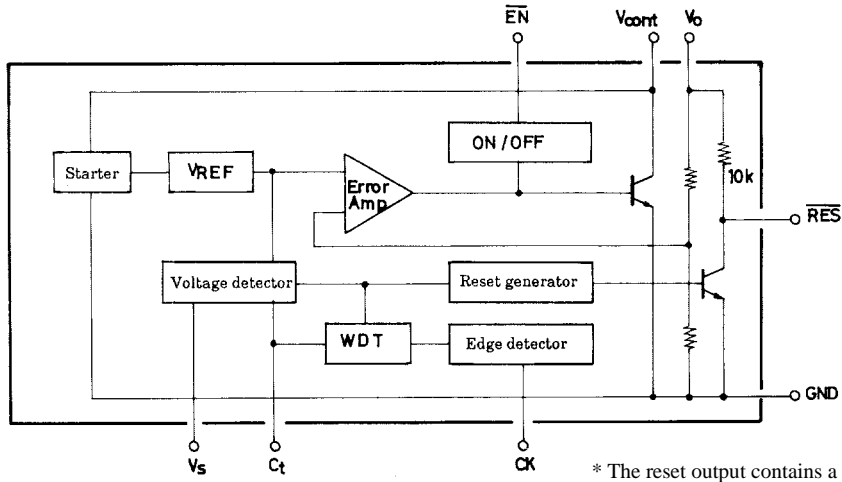
### Pin Assignments



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

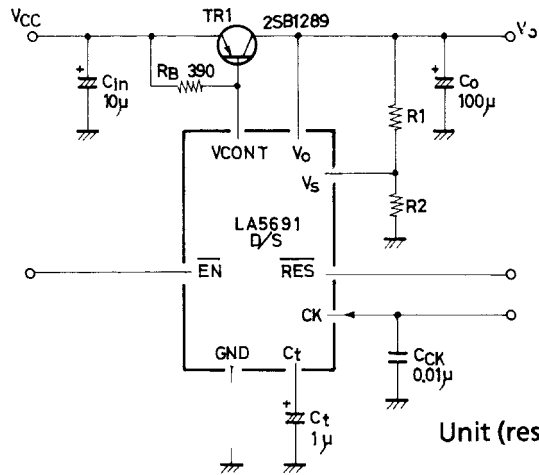
# LA5691D, 5691S

## Equivalent Circuit Block Diagram

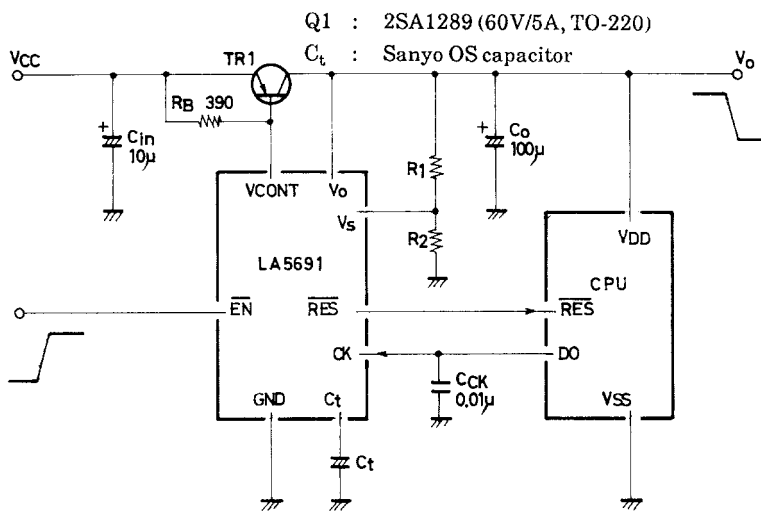


Unit (resistance: Ω)

## Test Circuit

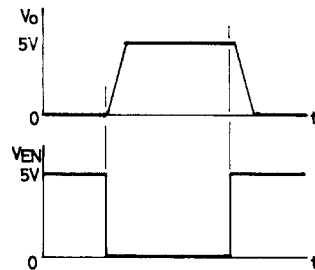


## Sample Application Circuit



Function Table

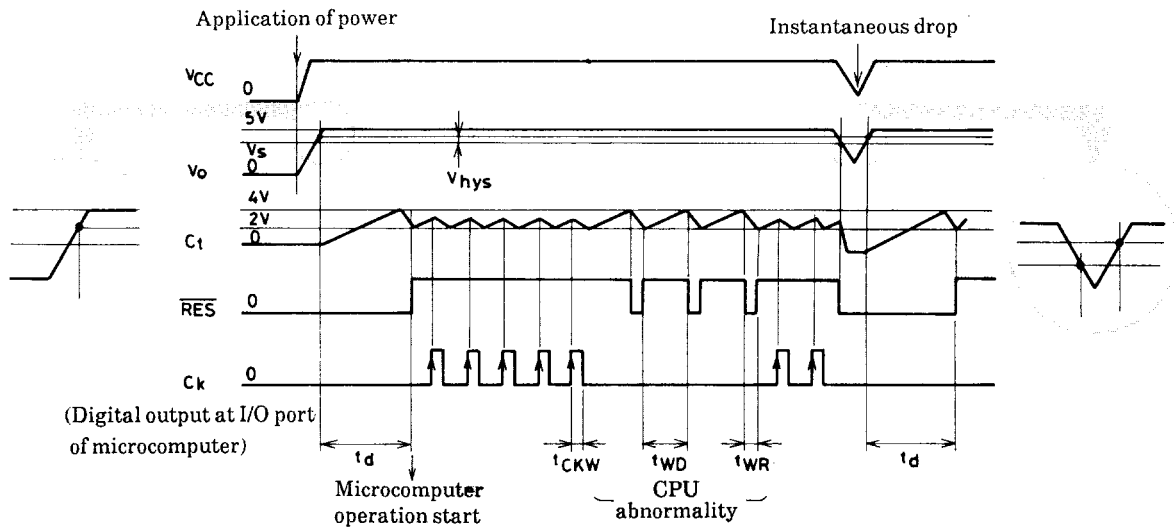
VEN	Vo
L	H
H	L



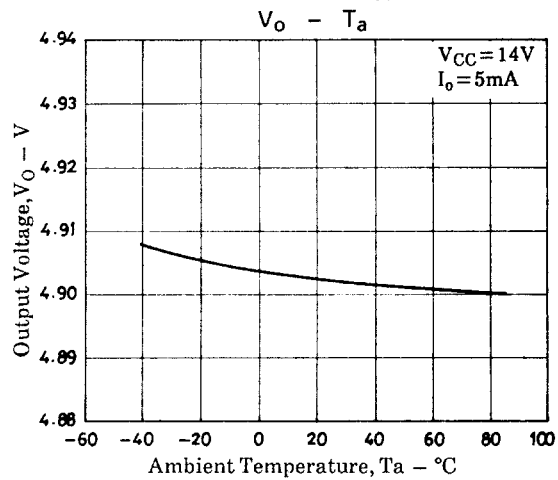
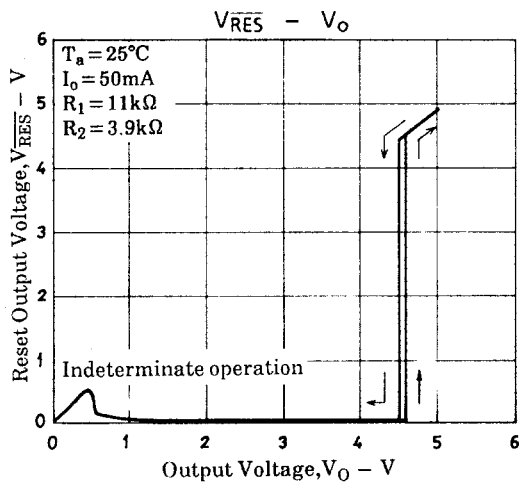
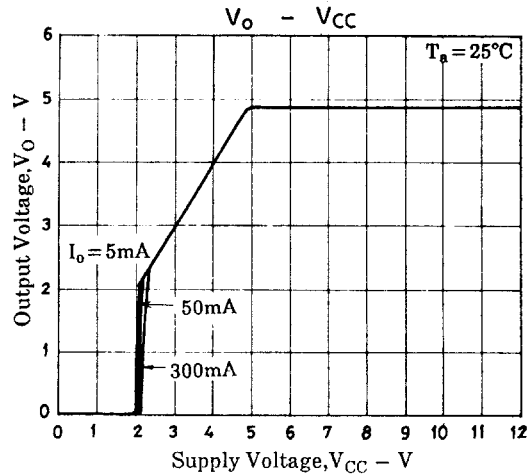
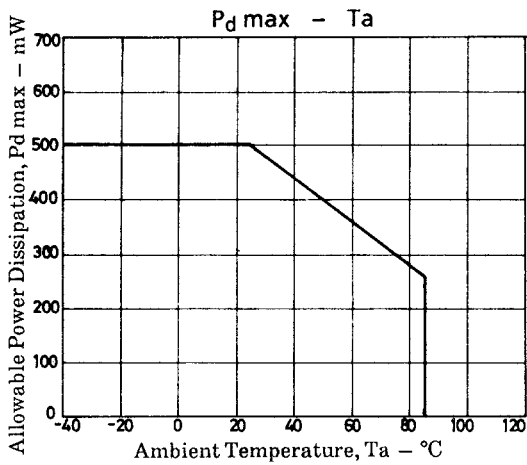
Unit (resistance: Ω, capacitance: F)

- Ct, Co : Capacitors whose value does not vary with temperature very much.
- CCK : Must be used to eliminate noise in the reset output.

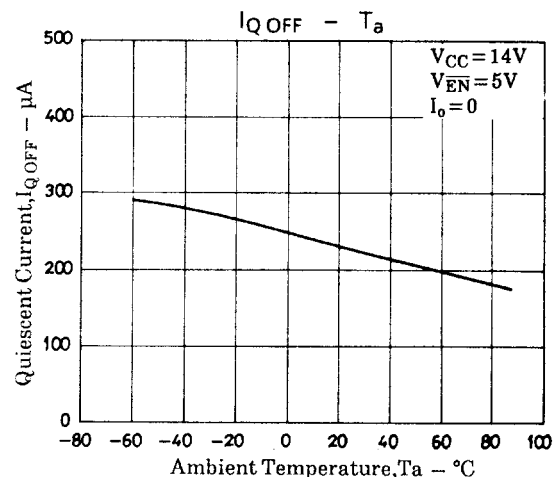
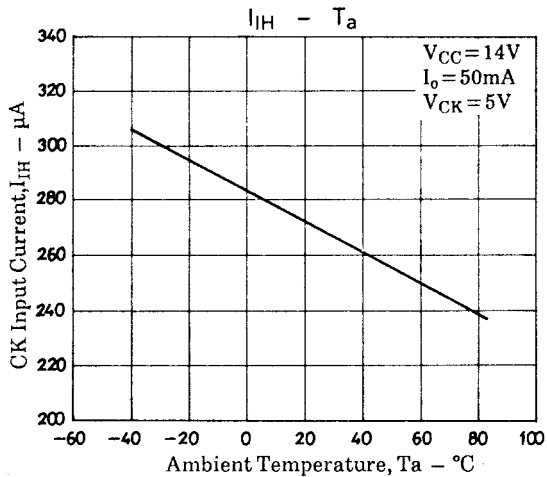
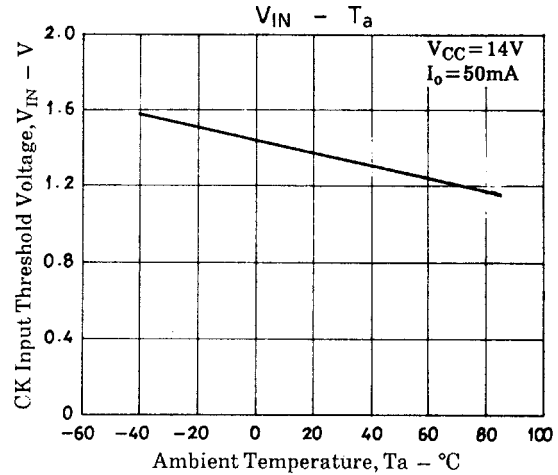
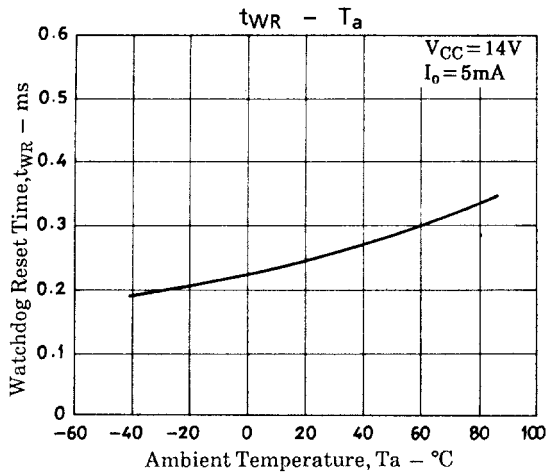
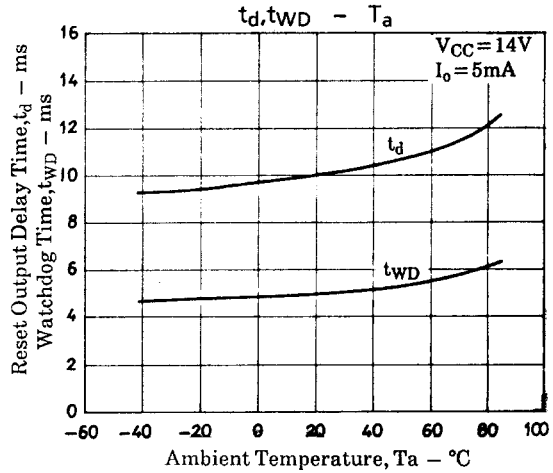
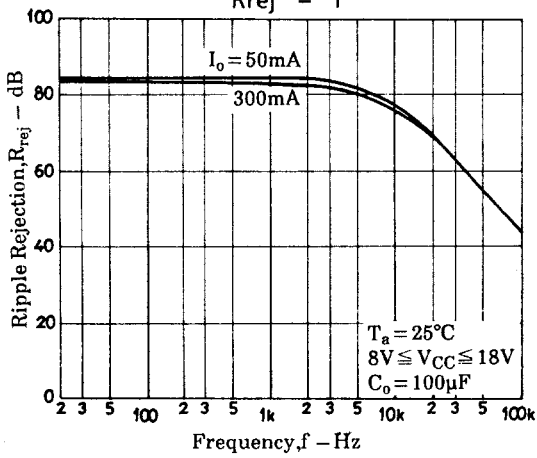
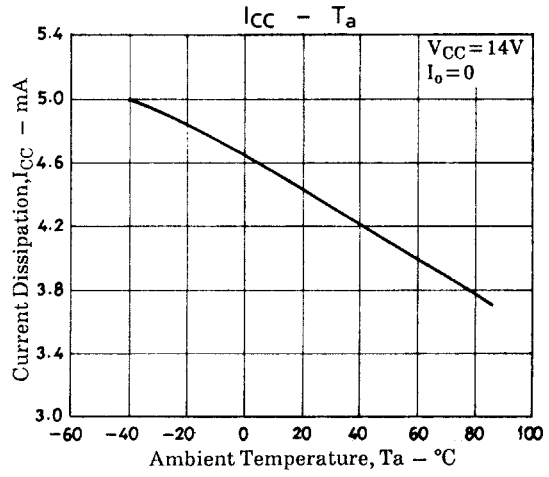
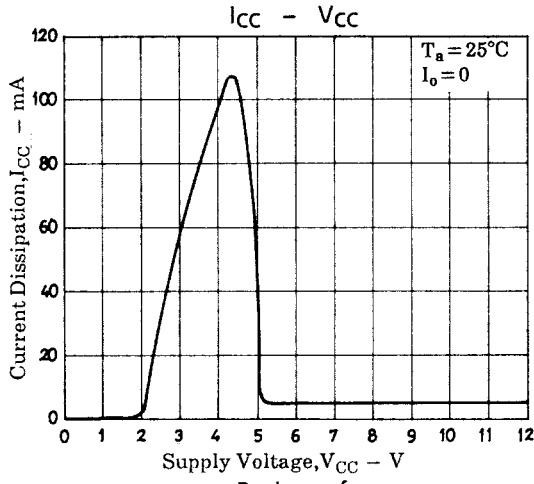
Timing Chart



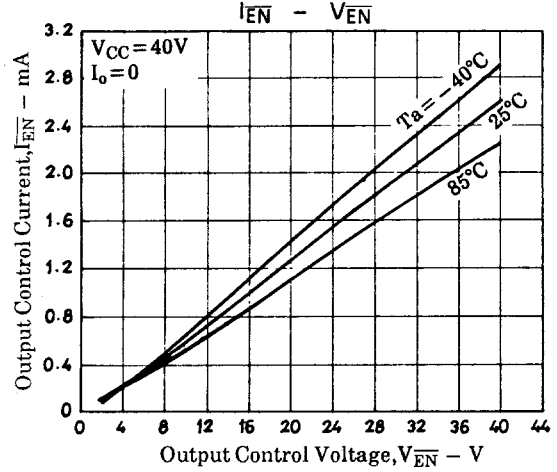
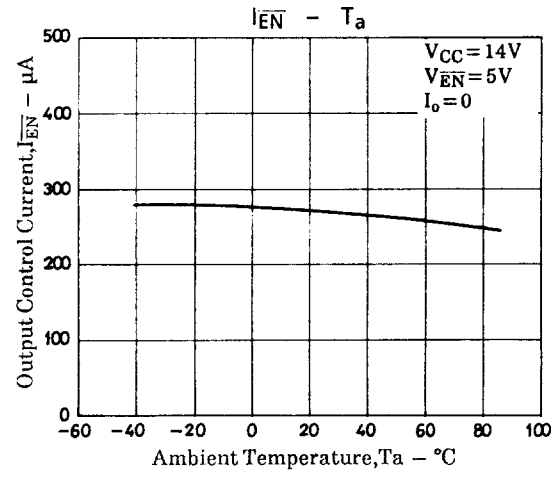
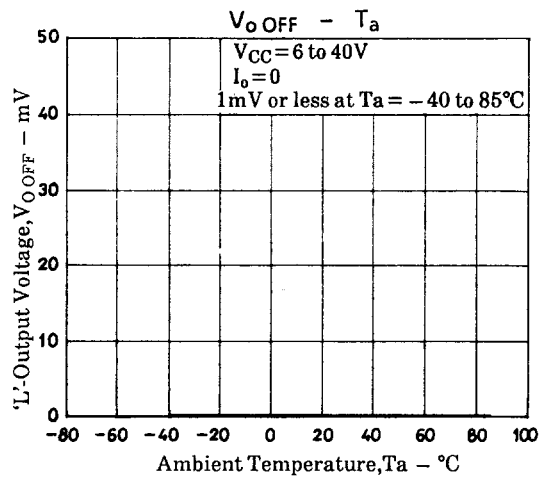
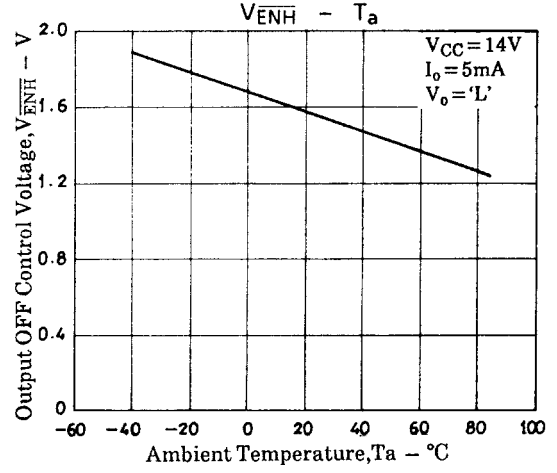
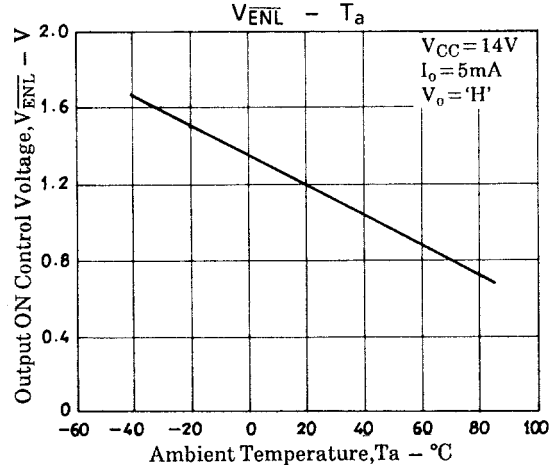
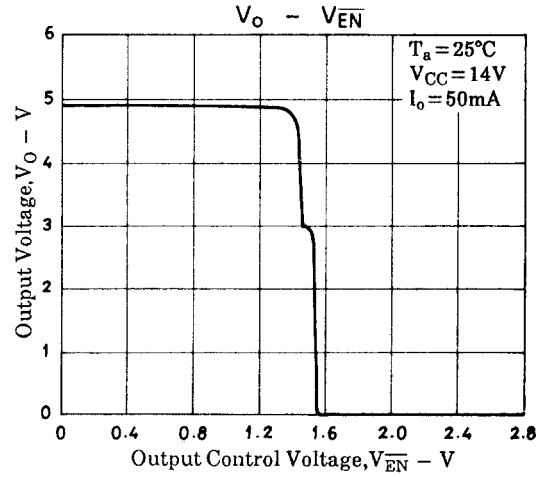
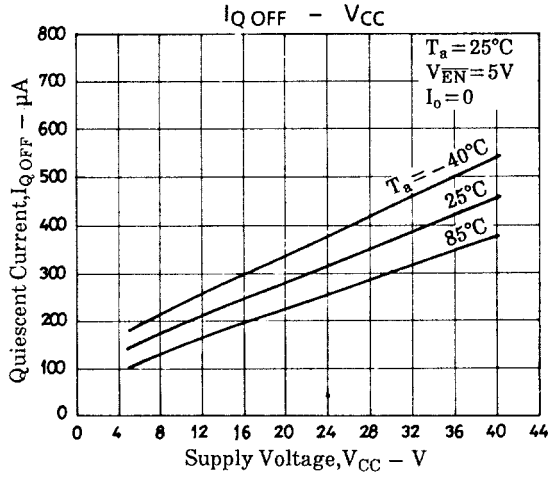
Note : Edge-triggered at the point indicated by the arrow of C<sub>K</sub> signal.



# LA5691D, 5691S



# LA5691D, 5691S



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