



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).

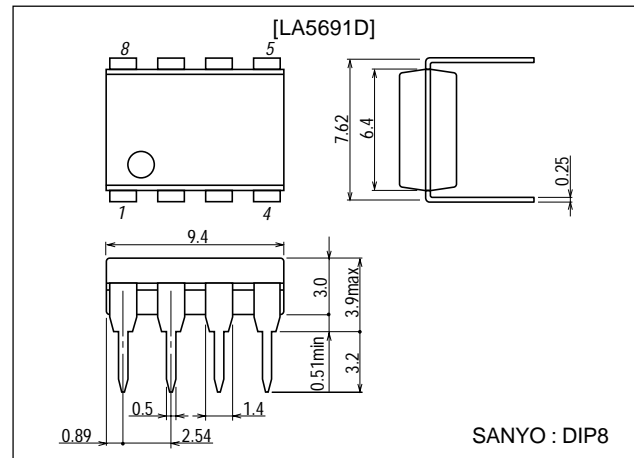
Features

- 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

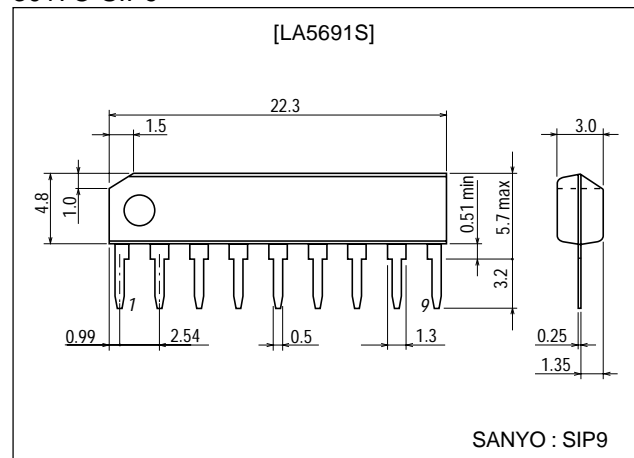
unit:mm

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 _{CONT} max	1s	60	V
Control pin voltage	V _{CONT} max		41	V
Control pin current	I _{CONT} max	*V _{CC} ≥6V	11	mA
Enable pin voltage	V _{EN} max		41	V
CK input voltage	V _{CK} max		25	V
Reset pin voltage	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 LA5691D, 5691S 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.

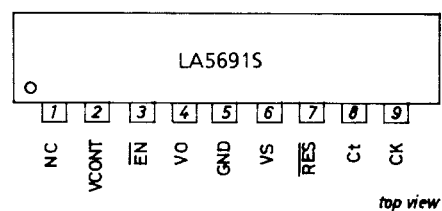
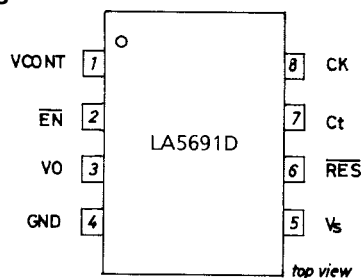
Operating Conditions at Ta = 25°C

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 _{RES} max	External R pull-up (with pull-up R 10kΩ)	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. See specified Test Circuit.

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		4.1	6.5	mA
Output noise voltage	V _{NO}	10Hz≤f≤100kHz, V _{CK} =0		200		μV
Temperature coefficient of output voltage	ΔV _O /ΔTa	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 _{ORH}		4.8	5.0	5.2	V
L-level reset output voltage 1	V _{ORL1}			40	200	mV
L-level reset output voltage 2	V _{ORL2}	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	V _{hys}	V _S =4.5V	100	200	300	mV
L-level output coltage	V _{O OFF}	V _{EN} =5V		150	300	mV
Quiescent current	I _{Q OFF}	V _{EN} =5V		300	600	μA
Output OFF control voltage	V _{EN H}	Output OFF	2			V
Output ON control voltage	V _{EN L}	Output ON			0.8	V

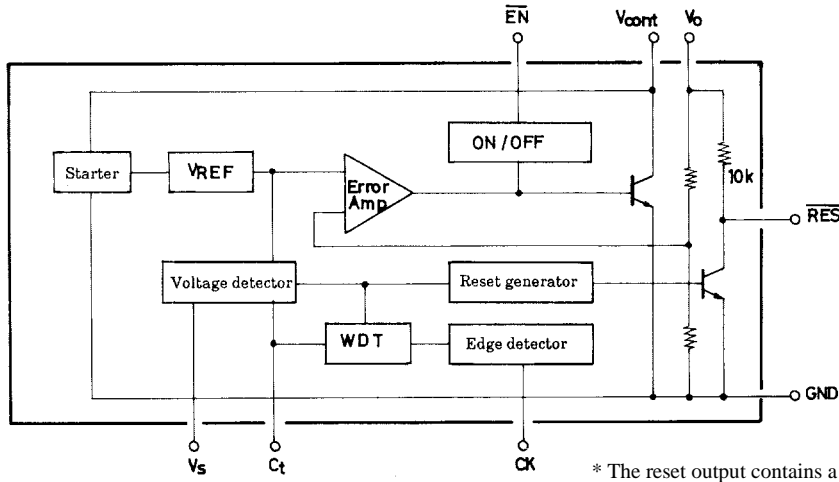
Pin Assignments



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

LA5691D, 5691S

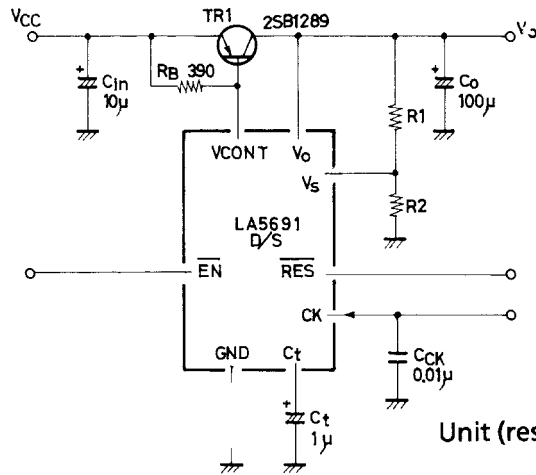
Equivalent Circuit Block Diagram



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

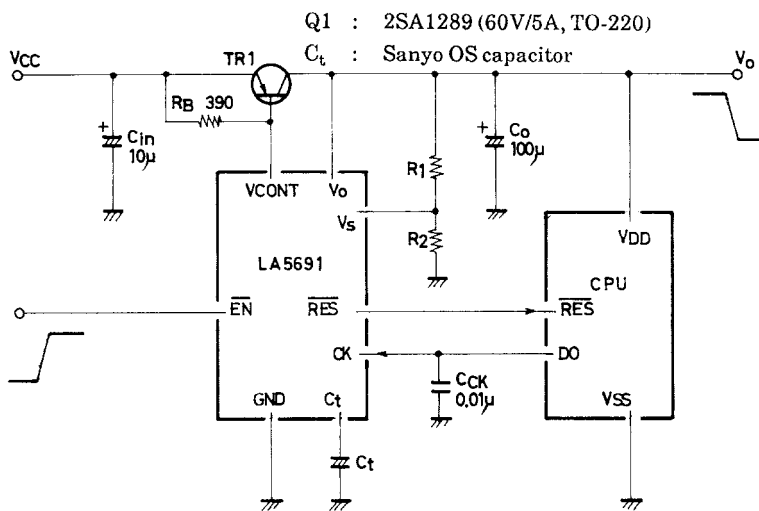
Unit (resistance: Ω)

Test Circuit



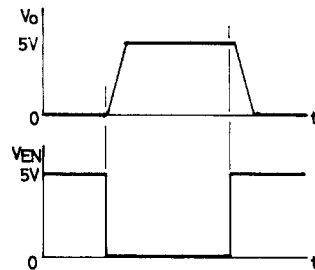
Unit (resistance: Ω, capacitance: F)

Sample Application Circuit



Function Table

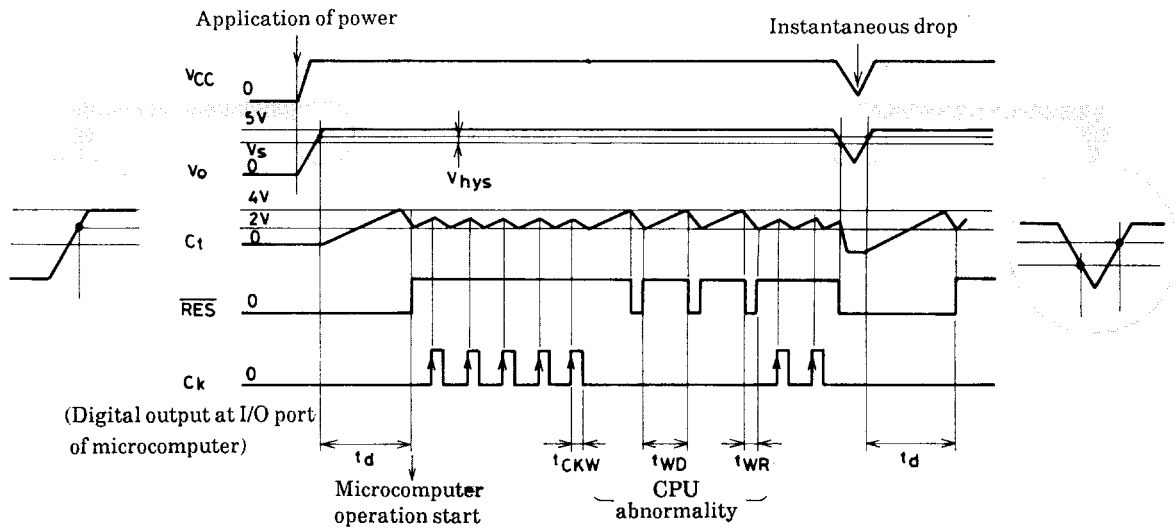
VEN	Vo
L	H
H	L



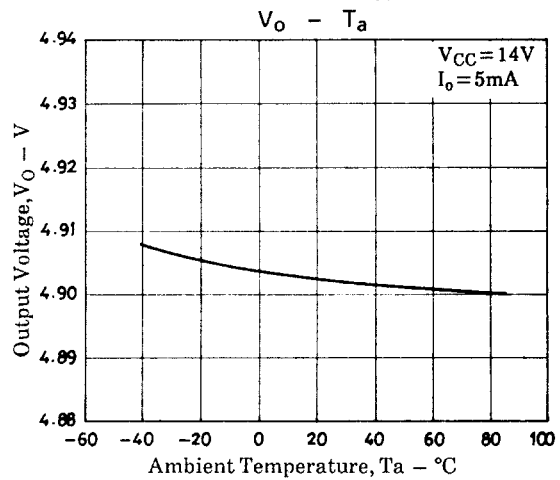
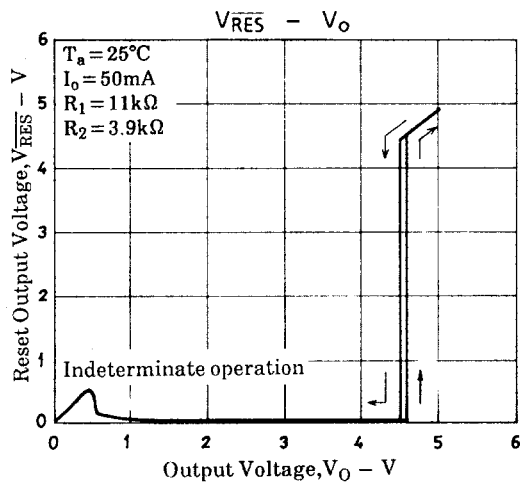
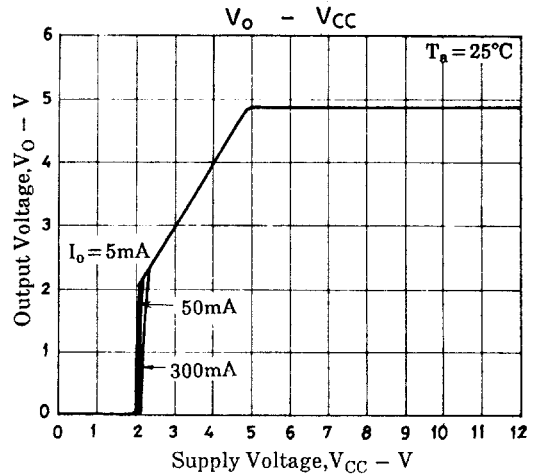
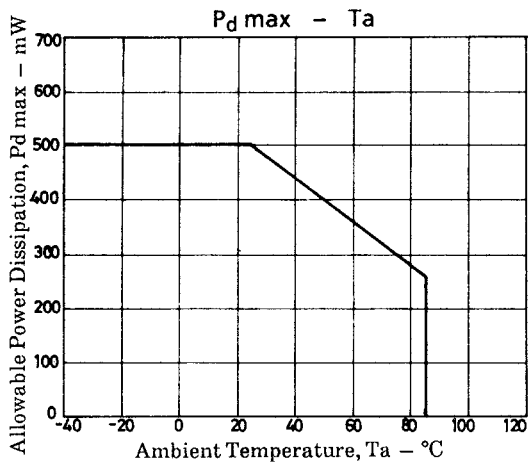
Unit (resistance: Ω, capacitance: F)

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

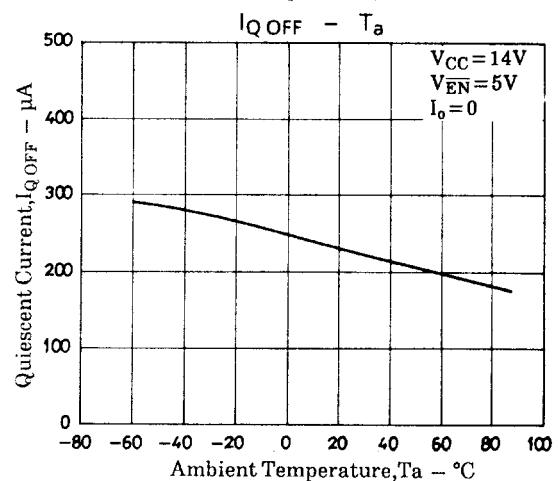
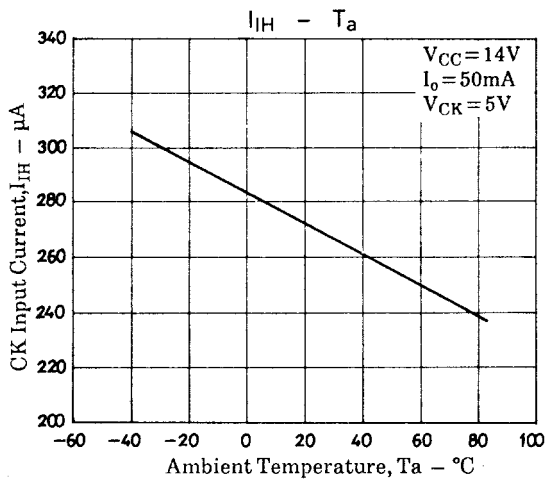
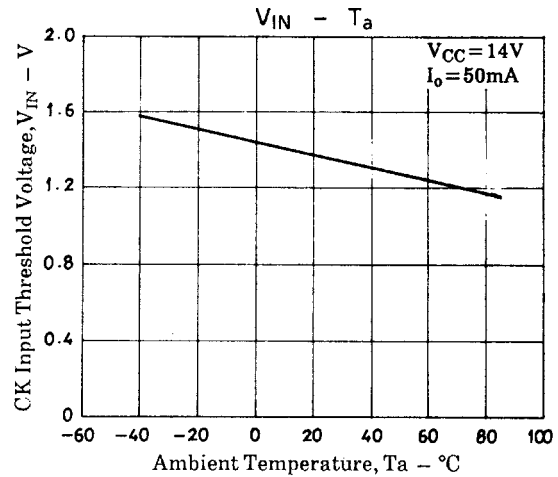
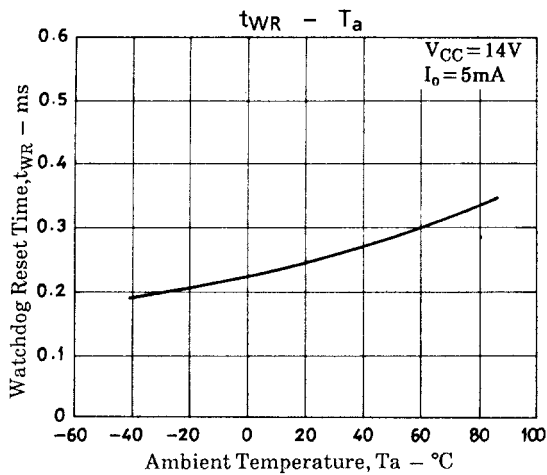
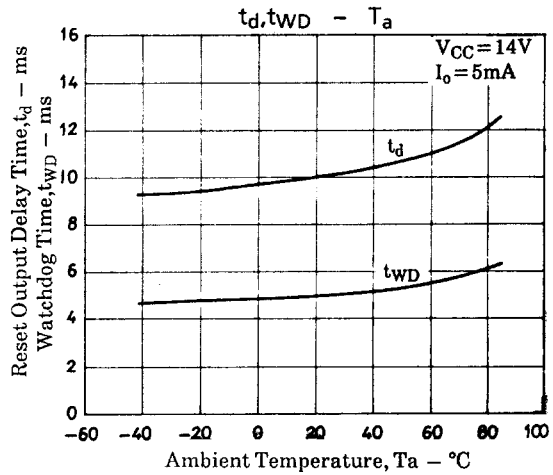
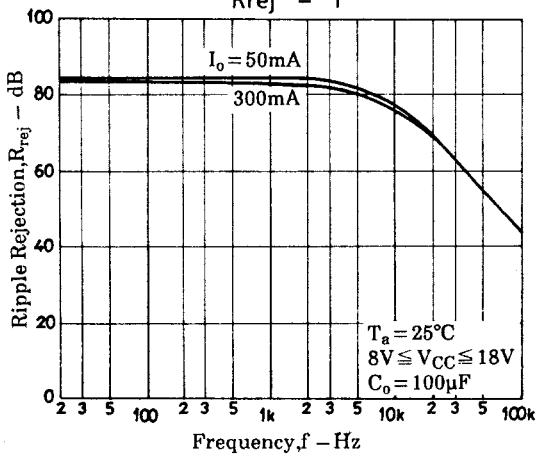
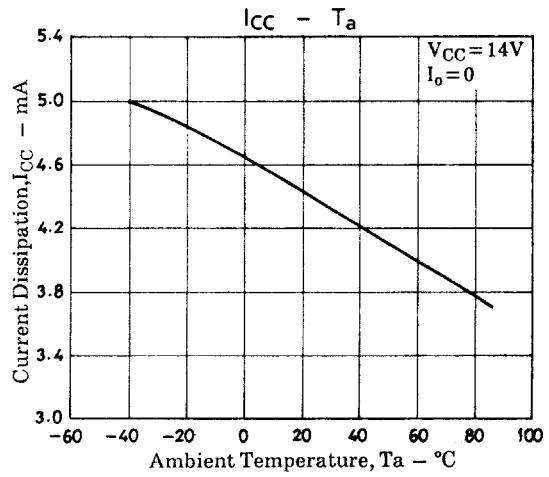
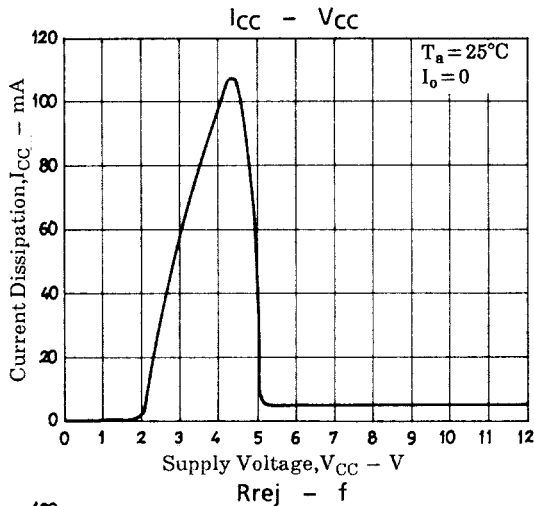
Timing Chart



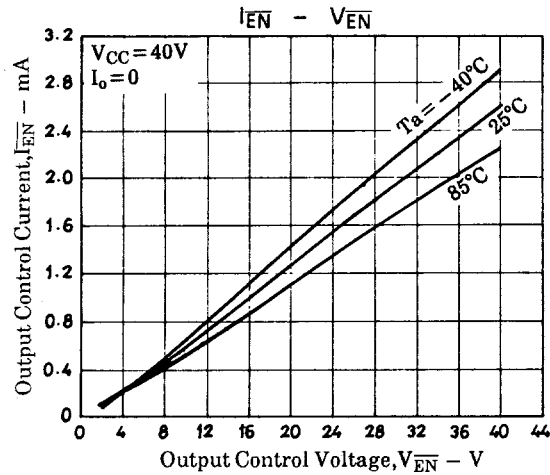
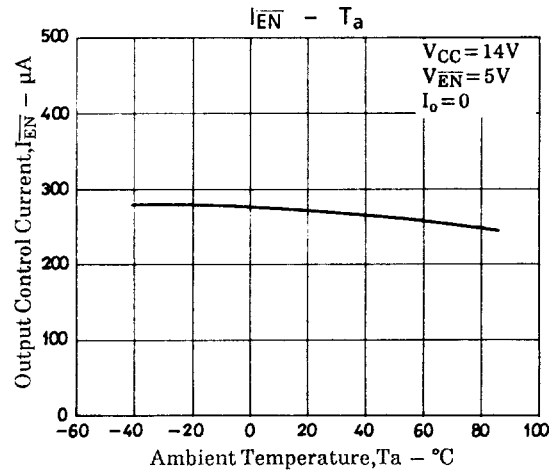
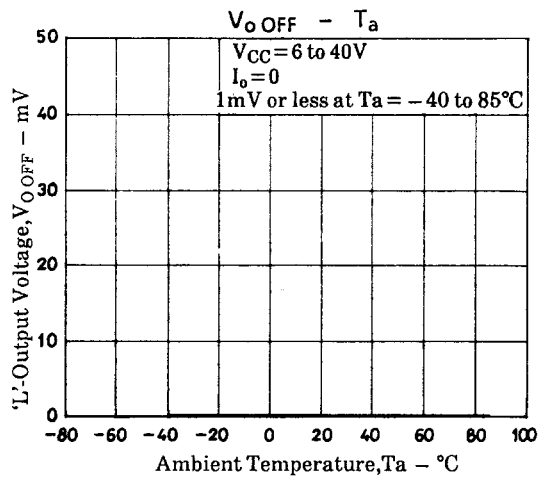
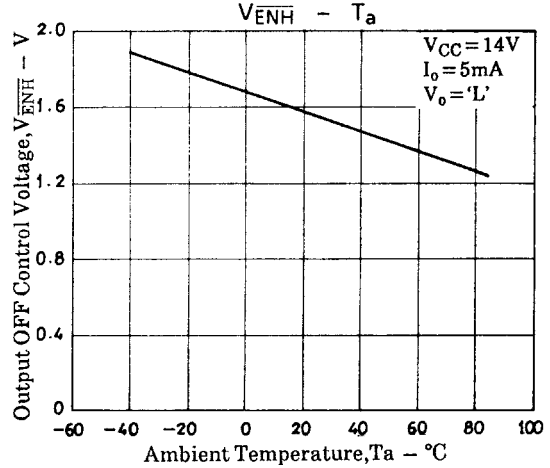
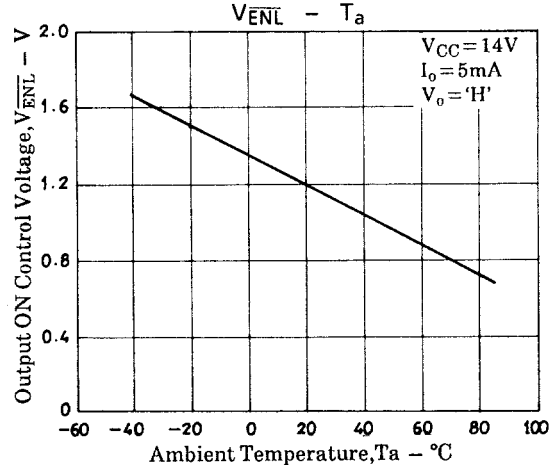
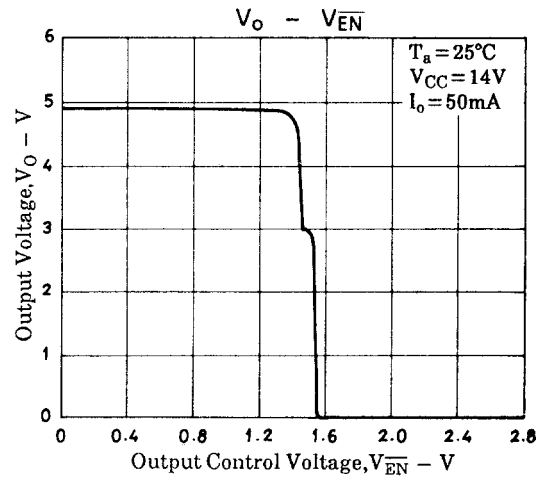
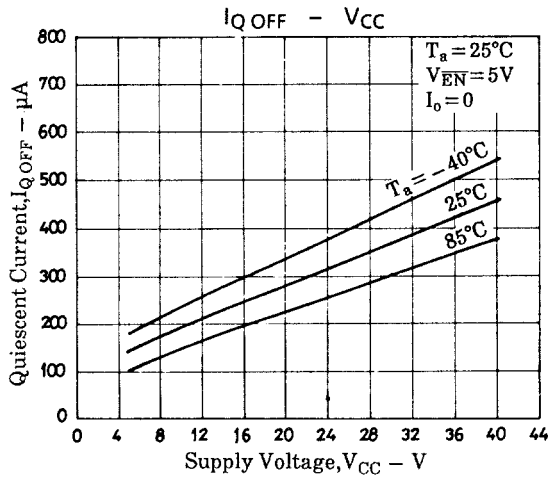
Note : Edge-triggered at the point indicated by the arrow of C_K signal.



LA5691D, 5691S



LA5691D, 5691S



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