Ordering number: EN 2605B

Monolithic Linear IC

SANYO No.2605B

L79M00T Series

−5 to −12V 0.5A 3-Pin Voltage Regulators

Features

- Output voltage: L79M05T: −5V, L79M06T: −6V, L79M08T: −8V, L79M09T: −9V, L79M10T: −10V, L79M12T: −12V
- 500mA output
- Small-sized power package TP-3H permitting the equipment to be made compact
- The allowable power dissipation can be increased by being surface-mounted on the board.
- Capable of being mounted in a variety of methods because of various lead forming versions available
- On-chip protectors (overcurrent limiter, ASO protector, thermal protector)
- Can meet tape-used automatic mounting requirements.

[Common to L79M00T series]

Maximum Ratings at Ta = 25°C

				unit
Maximum Supply Voltage	V_{CC} max	−5 to −12V output	−35	V
Allowable Power Dissipation	Pd max		1.0	W
Operating Temperature	**Topr**		−30 to +80	°C
Storage Temperature	Tstg		−40 to +150	°C

[L79M05T]

Recommended Operating Conditions at Ta = 25°C

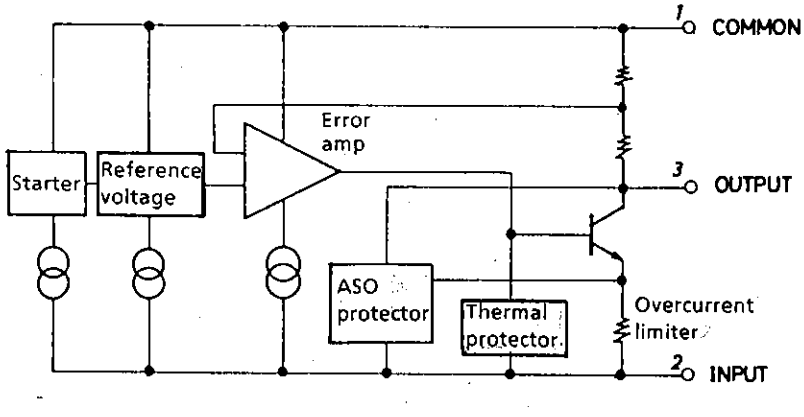
			unit
Input Voltage	V_{IN}	−20 to −7.5	V
Output Current	I_{OUT}	5 to 500	mA

Operating Characteristics at Ta = 25°C, V_{IN} = −10V, I_{OUT} = 350mA, C_{IN} = 2μF, C_{OUT} = 1μF

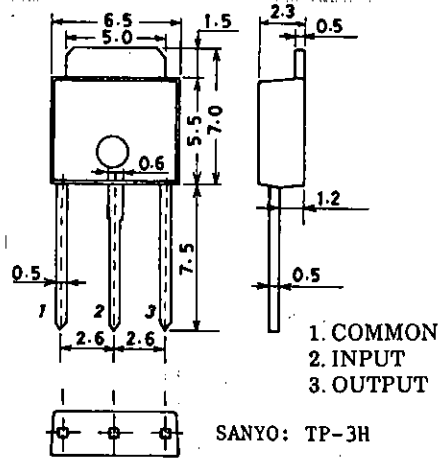
			min	typ	max	unit
Output Voltage	V_{OUT}	Tj = 25°C	−5.2	−5.0	−4.8	V
Line Regulation	ΔV_{oline}	Tj = 25°C, −25V ≦ V_{IN} ≦ −7V		7.0	50	mV
		Tj = 25°C, −18V ≦ V_{IN} ≦ −8V		3.0	30	mV
Load Regulation	ΔV_{oload}	Tj = 25°C, 5mA ≦ I_{OUT} ≦ 500mA		10	100	mV
		Tj = 25°C, 5mA ≦ I_{OUT} ≦ 350mA		5		mV

Continued on next page.

Equivalent Circuit



Package Dimensions (unit: mm) 3110-S3HIC



1. COMMON
2. INPUT
3. OUTPUT

SANYO: TP-3H

Continued from preceding page.

			min	typ	max	unit
Output Voltage	V_{OUT}	$-25V \leqq V_{IN} \leqq -7V$, $5mA \leqq I_{OUT} \leqq 350mA$	−5.25		−4.75	V
Current Dissipation	I_{CC}	Tj=25°C		1.0	2.5	mA
Current Dissipation Variation (Line)	ΔI_{CCline}	$-25V \leqq V_{IN} \leqq -8V$			1.0	mA
Current Dissipation Variation (Load)	ΔI_{CCload}	$5mA \leqq I_{OUT} \leqq 350mA$			0.4	mA
Output Noise Voltage	V_{NO}	$10Hz \leqq f \leqq 100kHz$		125		μV
Ripple Rejection	R_{rej}	f=120Hz, I_{OUT}=100mA	50			dB
		$-18V \leqq V_{IN} \leqq -8V$, I_{OUT}=300mA, Tj=25°C	50	65		dB
Minimum Input-Output Voltage Drop	V_{drop}	Tj=25°C, I_{OUT}=350mA		1.1		V
Short Current	I_{OS}	Tj=25°C, V_{IN}=−30V		130		mA
Peak Output Current	Iop			800		mA

[L79M06T]

Recommended Operating Conditions at Ta=25°C

			unit
Input Voltage	V_{IN}	−21 to −8.5	V
Output Current	I_{OUT}	5 to 500	mA

Operating Characteristics at Ta=25°C, V_{IN}=−11V, I_{OUT}=350mA, C_{IN}=2μF, C_{OUT}=1μF

			min	typ	max	unit
Output Voltage	V_{OUT}	Tj=25°C	−6.25	−6.0	−5.75	V
Line Regulation	ΔV_{oline}	Tj=25°C, $-25V \leqq V_{IN} \leqq -8V$		7.0	60	mV
		Tj=25°C, $-19V \leqq V_{IN} \leqq -9V$		3.0	40	mV
Load Regulation	ΔV_{oload}	Tj=25°C, $5mA \leqq I_{OUT} \leqq 500mA$		10	120	mV
		Tj=25°C, $5mA \leqq I_{OUT} \leqq 350mA$		5		mV
Output Voltage	V_{OUT}	$-25V \leqq V_{IN} \leqq -8V$, $5mA \leqq I_{OUT} \leqq 350mA$	−6.3		−5.7	V
Current Dissipation	I_{CC}	Tj=25°C		1.0	2.5	mA
Current Dissipation Variation (Line)	ΔI_{CCline}	$-25V \leqq V_{IN} \leqq -9V$			1.0	mA
Current Dissipation Variation (Load)	ΔI_{CCload}	$5mA \leqq I_{OUT} \leqq 350mA$			0.4	mA
Output Noise Voltage	V_{NO}	$10Hz \leqq f \leqq 100kHz$		150		μV
Ripple Rejection	R_{rej}	f=120Hz, I_{OUT}=100mA	50			dB
		$-19V \leqq V_{IN} \leqq -9V$, I_{OUT}=300mA, Tj=25°C	50	65		dB
Minimum Input-Output Voltage Drop	V_{drop}	Tj=25°C, I_{OUT}=350mA		1.1		V
Short Current	I_{OS}	Tj=25°C, V_{IN}=−30V		130		mA
Peak Output Current	Iop			800		mA

[L79M08T]

Recommended Operating Conditions at Ta=25°C

			unit
Input Voltage	V_{IN}	−23 to −11	V
Output Current	I_{OUT}	5 to 500	mA

Operating Characteristics at Ta = 25°C, V_{IN} = −14V, I_{OUT} = 350mA, C_{IN} = 2μF, C_{OUT} = 1μF

				min	typ	max	unit
Output Voltage	V_{OUT}	Tj = 25°C		−8.3	−8.0	−7.7	V
Line Regulation	ΔV_{oline}	Tj = 25°C, −25V ≦ V_{IN} ≦ −10.5V			8.0	80	mV
		Tj = 25°C, −21V ≦ V_{IN} ≦ −11V			4.0	50	mV
Load Regulation	ΔV_{oload}	Tj = 25°C, 5mA ≦ I_{OUT} ≦ 500mA			11	160	mV
		Tj = 25°C, 5mA ≦ I_{OUT} ≦ 350mA			6		mV
Output Voltage	V_{OUT}	−25V ≦ V_{IN} ≦ −10.5V, 5mA ≦ I_{OUT} ≦ 350mA		−8.4		−7.6	V
Current Dissipation	I_{CC}	Tj = 25°C			1.0	2.5	mA
Current Dissipation Variation (Line)	ΔI_{CCline}	−25V ≦ V_{IN} ≦ −10.5V				1.0	mA
Current Dissipation Variation (Load)	ΔI_{CCload}	5mA ≦ I_{OUT} ≦ 350mA				0.4	mA
Output Noise Voltage	V_{NO}	10Hz ≦ f ≦ 100kHz			200		μV
Ripple Rejection	R_{rej}	f = 120Hz	I_{OUT} = 100mA	50			dB
		−21.5V ≦ V_{IN} ≦ −11.5V, Tj = 25°C	I_{OUT} = 300mA	50	64		dB
Minimum Input-Output Voltage Drop	V_{drop}	Tj = 25°C, I_{OUT} = 350mA			1.1		V
Short Current	I_{OS}	Tj = 25°C, V_{IN} = −30V			130		mA
Peak Output Current	Iop				800		mA

[L79M09T]

Recommended Operating Conditions at Ta = 25°C

			unit
Input Voltage	V_{IN}	−25 to −12	V
Output Current	I_{OUT}	5 to 500	mA

Operating Characteristics at Ta = 25°C, V_{IN} = −16V, I_{OUT} = 350mA, C_{IN} = 2μF, C_{OUT} = 1μF

				min	typ	max	unit
Output Voltage	V_{OUT}	Tj = 25°C		−9.4	−9.0	−8.6	V
Line Regulation	ΔV_{oline}	Tj = 25°C, −25V ≦ V_{IN} ≦ −11.5V			8.0	80	mV
		Tj = 25°C, −20V ≦ V_{IN} ≦ −12V			4.0	50	mV
Load Regulation	ΔV_{oload}	Tj = 25°C, 5mA ≦ I_{OUT} ≦ 500mA			12	200	mV
		Tj = 25°C, 5mA ≦ I_{OUT} ≦ 350mA			7		mV
Output Voltage	V_{OUT}	−25V ≦ V_{IN} ≦ −11.5V, 5mA ≦ I_{OUT} ≦ 350mA		−9.5		−8.5	V
Current Dissipation	I_{CC}	Tj = 25°C			1.0	2.5	mA
Current Dissipation Variation (Line)	ΔI_{CCline}	−25V ≦ V_{IN} ≦ −11.5V				1.0	mA
Current Dissipation Variation (Load)	ΔI_{CCload}	5mA ≦ I_{OUT} ≦ 350mA				0.4	mA
Output Noise Voltage	V_{NO}	10Hz ≦ f ≦ 100kHz			225		μV
Ripple Rejection	R_{rej}	f = 120Hz	I_{OUT} = 100mA	50			dB
		−22.5V ≦ V_{IN} ≦ −12.5V, Tj = 25°C	I_{OUT} = 300mA	50	63		dB
Minimum Input-Output Voltage Drop	V_{drop}	Tj = 25°C, I_{OUT} = 350mA			1.1		V
Short Current	I_{OS}	Tj = 25°C, V_{IN} = −30V			130		mA
Peak Output Current	Iop				800		mA

[L79M10T]

Recommended Operating Conditions at Ta = 25°C

			unit
Input Voltage	V_{IN}	−25 to −13	V
Output Current	I_{OUT}	5 to 500	mA

Operating Characteristics at Ta = 25°C, V_{IN} = −17V, I_{OUT} = 350mA, C_{IN} = 2μF, C_{OUT} = 1μF

				min	typ	max	unit
Output Voltage	V_{OUT}	Tj = 25°C		−10.4	−10	−9.6	V
Line Regulation	ΔV_{oline}	Tj = 25°C, −25V ≦ V_{IN} ≦ −12.5V			9.0	80	mV
		Tj = 25°C, −22V ≦ V_{IN} ≦ −13V			5.0	50	mV
Load Regulation	ΔV_{oload}	Tj = 25°C, 5mA ≦ I_{OUT} ≦ 500mA			12	200	mV
		Tj = 25°C, 5mA ≦ I_{OUT} ≦ 350mA			7		mV
Output Voltage	V_{OUT}	−25V ≦ V_{IN} ≦ −12.5V, 5mA ≦ I_{OUT} ≦ 350mA		−10.5		−9.5	V
Current Dissipation	I_{CC}	Tj = 25°C			1.0	2.5	mA
Current Dissipation Variation (Line)	ΔI_{CCline}	−25V ≦ V_{IN} ≦ −12.5V				1.0	mA
Current Dissipation Variation (Load)	ΔI_{CCload}	5mA ≦ I_{OUT} ≦ 350mA				0.4	mA
Output Noise Voltage	V_{NO}	10Hz ≦ f ≦ 100kHz			250		μV
Ripple Rejection	R_{rej}	f = 120Hz	I_{OUT} = 100mA	50			dB
		−23.5V ≦ V_{IN} ≦ −13.5V, Tj = 25°C	I_{OUT} = 300mA	50	63		dB
Minimum Input-Output Voltage Drop	V_{drop}	Tj = 25°C, I_{OUT} = 350mA			1.1		V
Short Current	I_{OS}	Tj = 25°C, V_{IN} = −30V			130		mA
Peak Output Current	Iop				800		mA

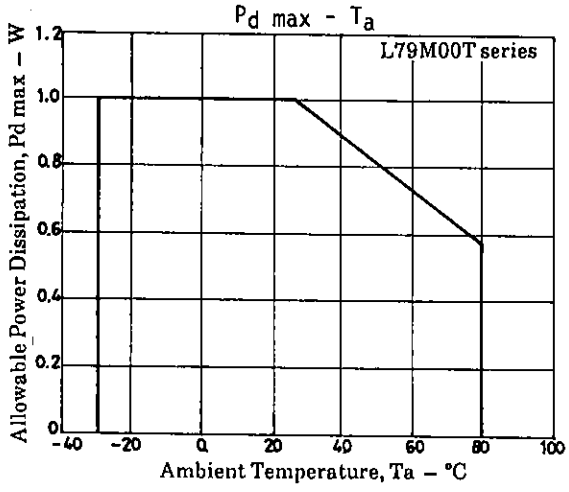
[L79M12T]

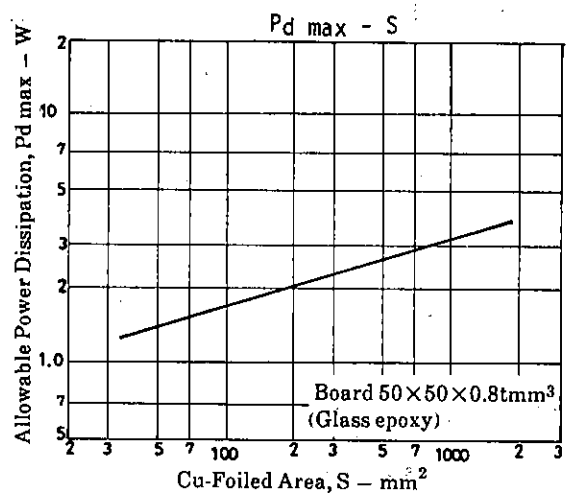
Recommended Operating Conditions at Ta = 25°C

			unit
Input Voltage	V_{IN}	−25 to −15	V
Output Current	I_{OUT}	5 to 500	mA

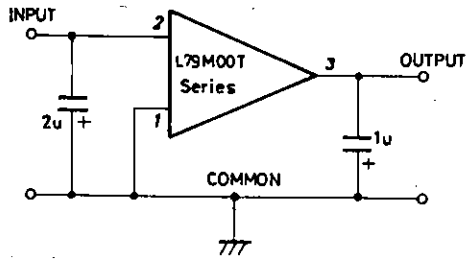
Operating Characteristics at Ta = 25°C, V_{IN} = −19V, I_{OUT} = 350mA, C_{IN} = 2μF, C_{OUT} = 1μF

				min	typ	max	unit
Output Voltage	V_{OUT}	Tj = 25°C		−12.5	−12	−11.5	V
Line Regulation	ΔV_{oline}	Tj = 25°C, −30V ≦ V_{IN} ≦ −14.5V			9.0	80	mV
		Tj = 25°C, −25V ≦ V_{IN} ≦ −15V			5.0	50	mV
Load Regulation	ΔV_{oload}	Tj = 25°C, 5mA ≦ I_{OUT} ≦ 500mA			9	240	mV
		Tj = 25°C, 5mA ≦ I_{OUT} ≦ 350mA			6		mV
Output Voltage	V_{OUT}	−30V ≦ V_{IN} ≦ −14.5V, 5mA ≦ I_{OUT} ≦ 350mA		−12.6		−11.4	V
Current Dissipation	I_{CC}	Tj = 25°C			1.6	3.5	mA
Current Dissipation Variation (Line)	ΔI_{CCline}	−30V ≦ V_{IN} ≦ −14.5V				1.0	mA
Current Dissipation Variation (Load)	ΔI_{CCload}	5mA ≦ I_{OUT} ≦ 350mA				0.4	mA
Output Noise Voltage	V_{NO}	10Hz ≦ f ≦ 100kHz			300		μV
Ripple Rejection	R_{rej}	f = 120Hz	I_{OUT} = 100mA	50			dB
		−25V ≦ V_{IN} ≦ −15V, Tj = 25°C	I_{OUT} = 300mA	50	72		dB
Minimum Input-Output Voltage Drop	V_{drop}	Tj = 25°C, I_{OUT} = 350mA			1.1		V
Short Current	I_{OS}	Tj = 25°C, V_{IN} = −30V			130		mA
Peak Output Current	Iop				800		mA





Specified Test Circuit (Common to L79M00T series)



Unit (capacitance: F)

Note) V_{IN} max must be in the range specified above, with regulation, etc. considered.

Ordering number: EN 3244

Monolithic Linear IC

SANYO No.3244

LA5691D, 5691S

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

The LA5691 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 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 5Vcontrol
- 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 ($I_{Q\,OFF}$=300mA typ)
- CK input with edge detector
- Variable detection voltage

Maximum Ratings at Ta=25°C

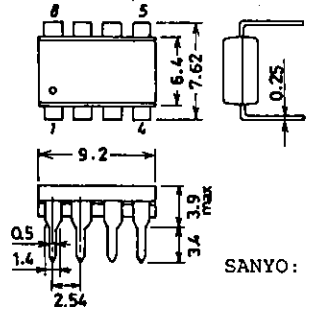
				unit
Control Pin Voltage	V_{CONT} max	1sec	60	V
Control Pin Voltage	V_{CONT} max		41	V
Control Pin Current	I_{CONT} max	*V_{CC}≧6V	11	mA
Enable Pin Voltage	$V_{\overline{EN}}$ max		41	V
CK Input Voltage	V_{CK} max		25	V
Reset Pin Voltage	$V_{\overline{RES}}$ max,		41	V
Allowable Power Dissipation	Pd 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

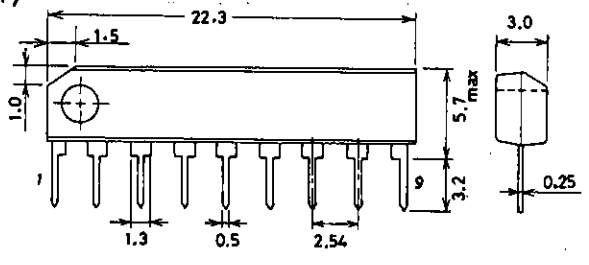
			unit
Control Pin Voltage	V_{CONT}	6 to 40	V
Control Pin Current	I_{CONT} max	10	mA
Reset Output Current	$I_{\overline{RES}}$ max,	External R pull-up (with pull-up R 10kΩ) 8	mA
Reset Detection Voltage	V_S min	4	V

Package Dimensions (unit: mm) **3001B** [LA5691D]



SANYO: DIP8

Package Dimensions (unit: mm) **3017B** [LA5691S]

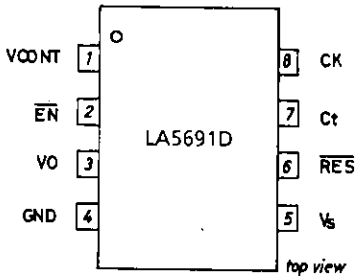


SANYO: SEP9

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

			min	typ	max	unit
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 Dissipation	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	$\Delta V_O / \Delta Ta$	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	$V_{\overline{ORH}}$		4.8	5.0	5.2	V
"L"-Level Reset Output Voltage 1	$V_{\overline{ORL1}}$			40	200	mV
"L"-Level Reset Output Voltage 2	$V_{\overline{ORL2}}$	$I_{\overline{RES}}$ = 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
"L"-Level Output Voltage	$V_{O\,OFF}$	$V_{\overline{EN}}$ = 5V		150	300	mV
Quiescent Current	$I_{Q\,OFF}$	$V_{\overline{EN}}$ = 5V		300	600	μA
Output OFF Control Voltage	$V_{\overline{EN}H}$	Output OFF	2			V
Output ON Control Voltage	$V_{\overline{EN}L}$	Output ON			0.8	V

Pin Assignment



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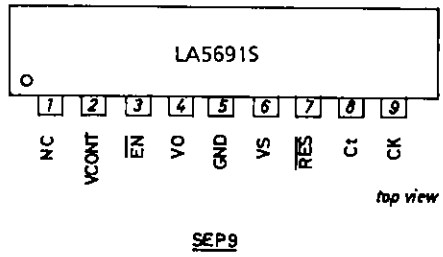
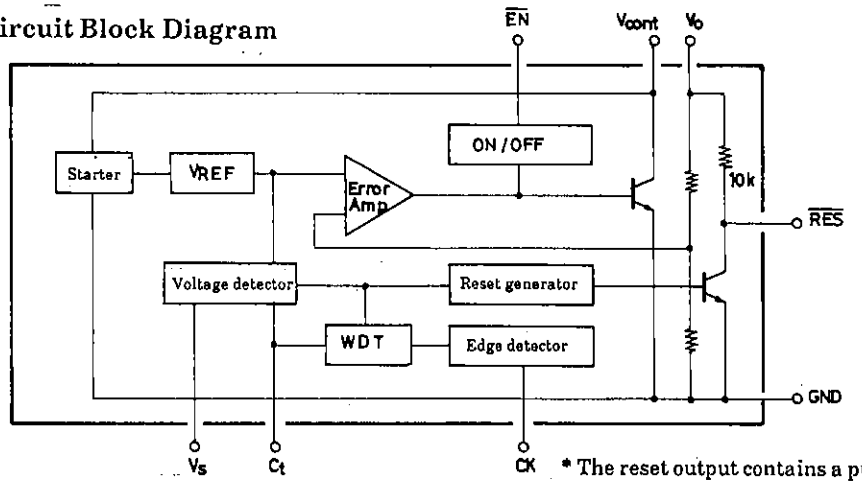


SEP 9

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

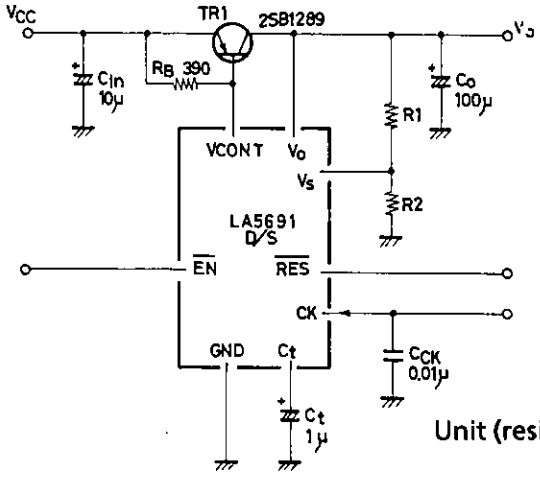
Equivalent Circuit Block Diagram



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

Unit (resistance: Ω)

Test Circuit

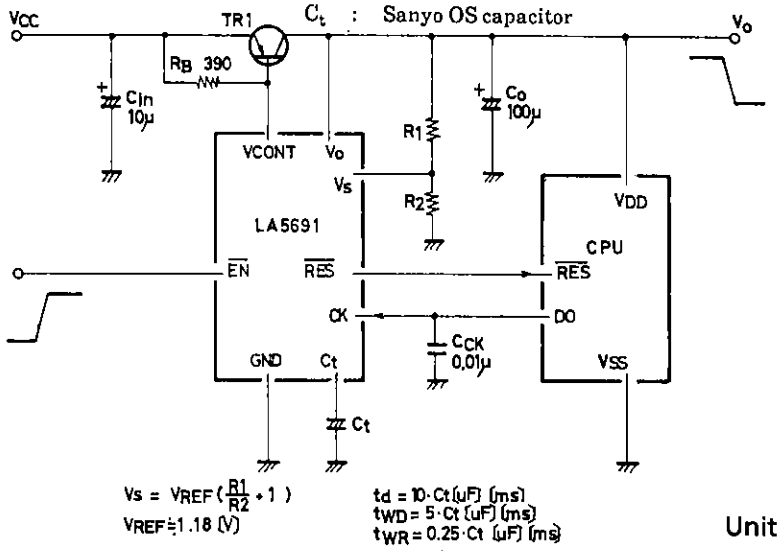


Unit (resistance: Ω, capacitance: F)

Sample Application Circuit

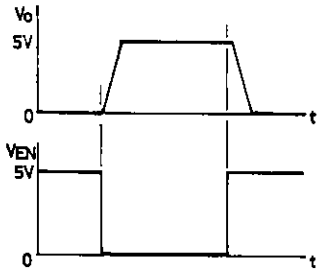
Q1 : 2SA1289 (60V/5A, TO-220)

C_t : Sanyo OS capacitor



Function Table

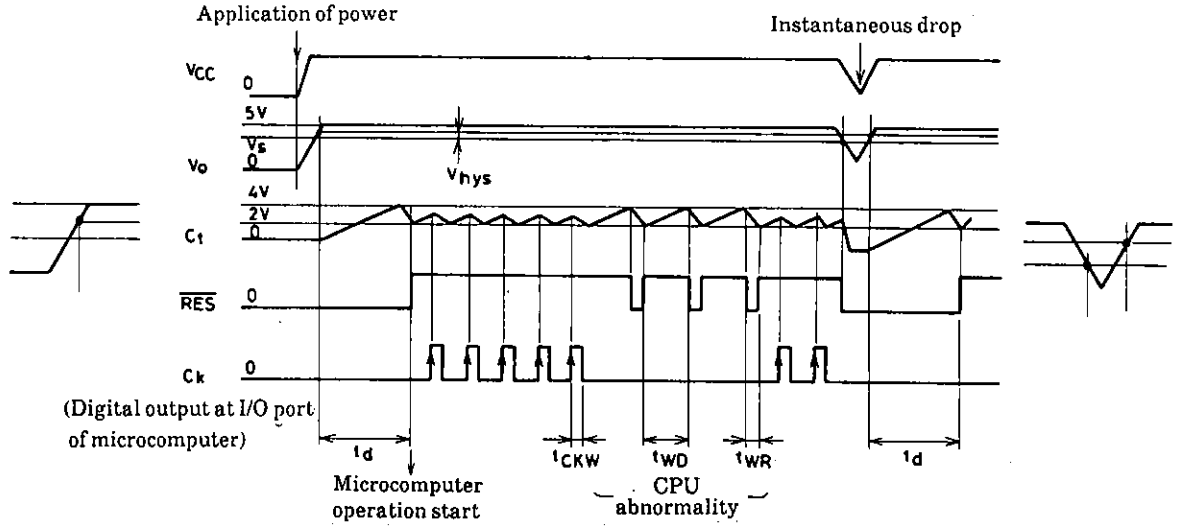
VEN	Vo
L	H
H	L



Unit (resistance: Ω, capacitance: F)

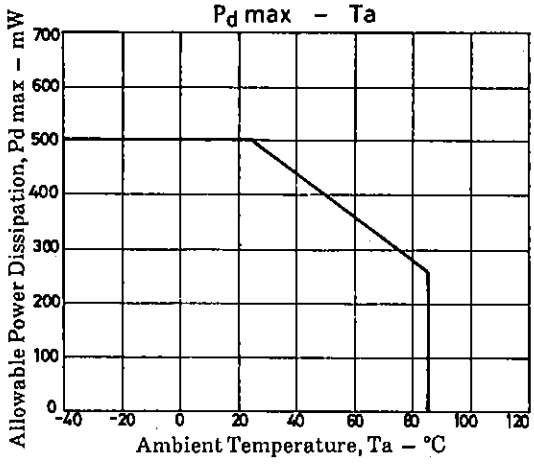
- C_t, C_O : Capacitors whose value does not vary with temperature very much.
- C_{CK} : Must be used to eliminate noise in the reset output.

Timing Chart

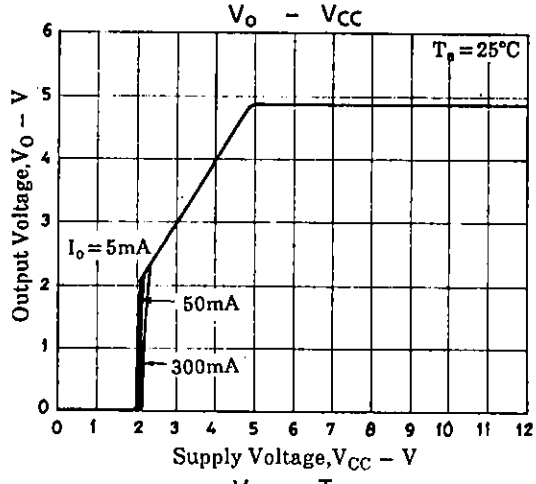


Note : Edge-triggered at the point indicated by the arrow of C_K signal.

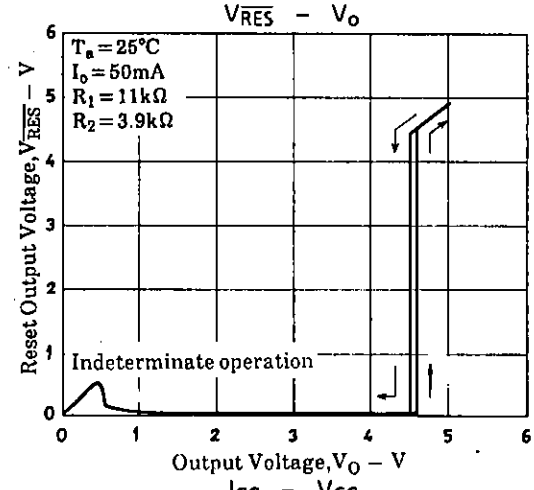
P_d max – Ta



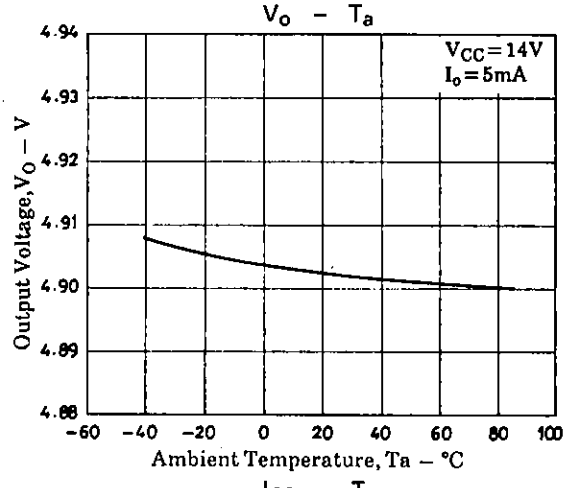
V_O – V_{CC}



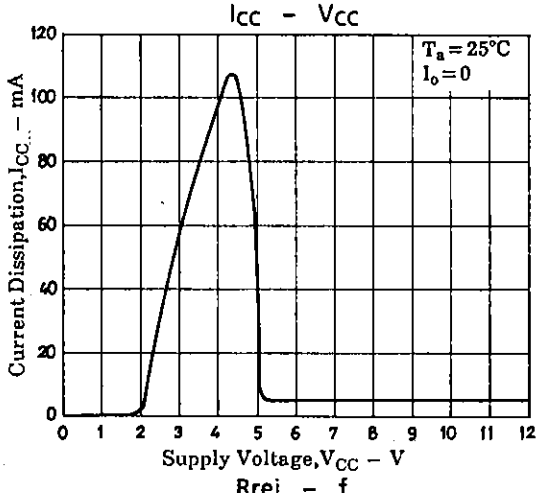
$V_{\overline{RES}}$ – V_O



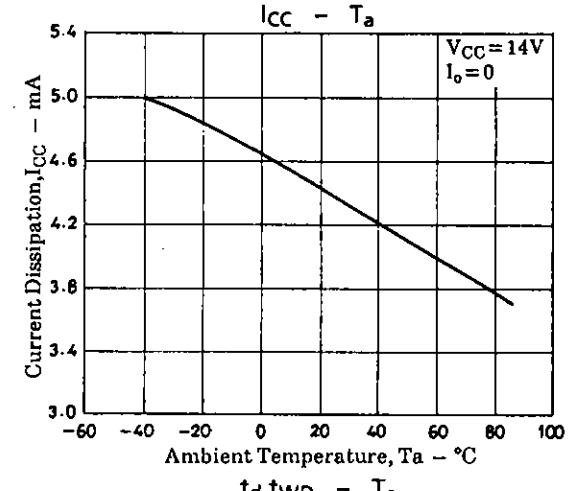
V_O – Ta



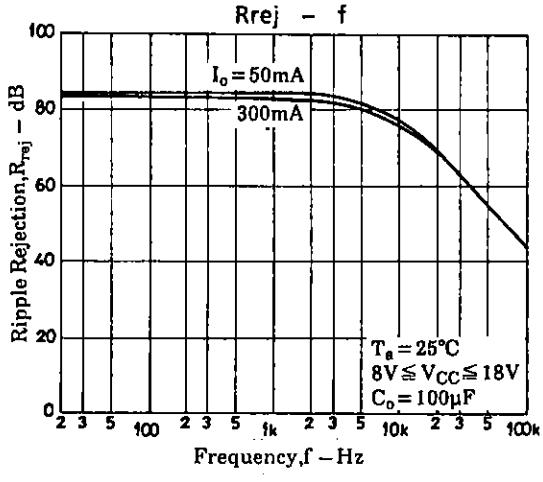
I_{CC} – V_{CC}



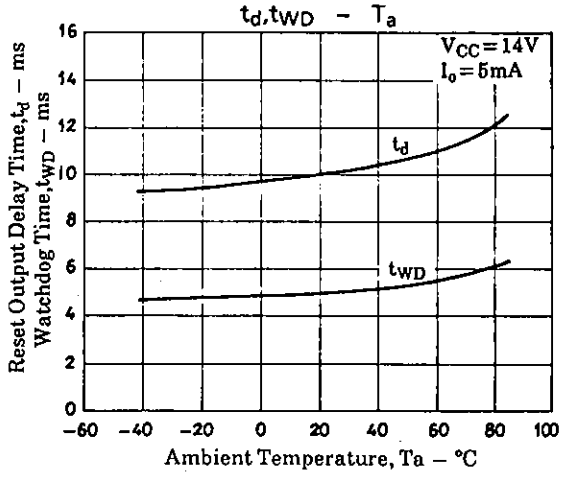
I_{CC} – Ta



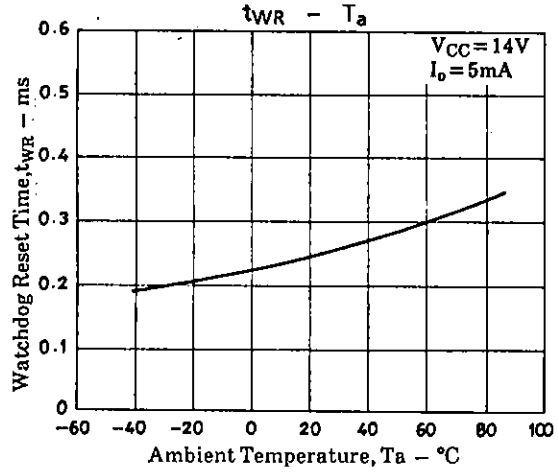
Rrej – f



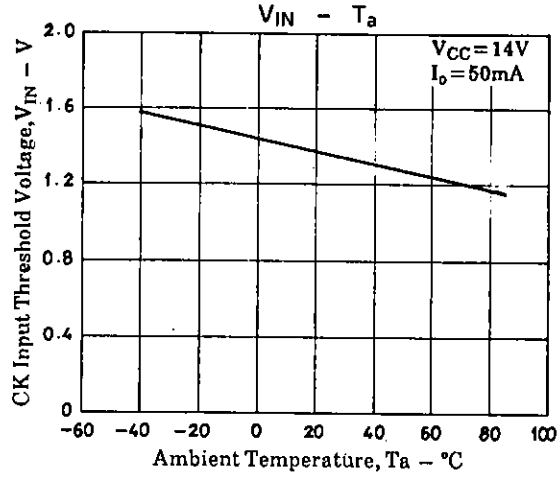
t_d, t_{WD} – Ta



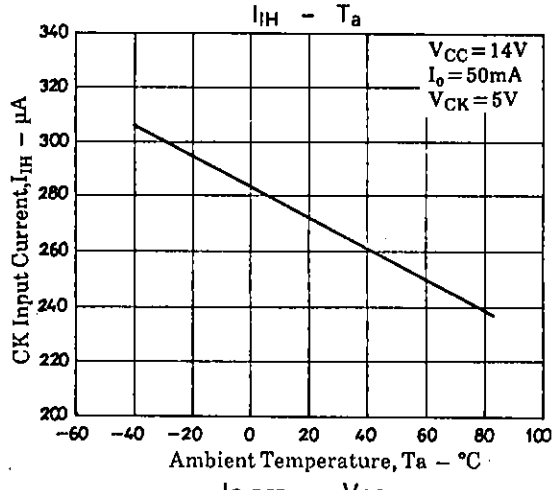
t_{WR} – T_a



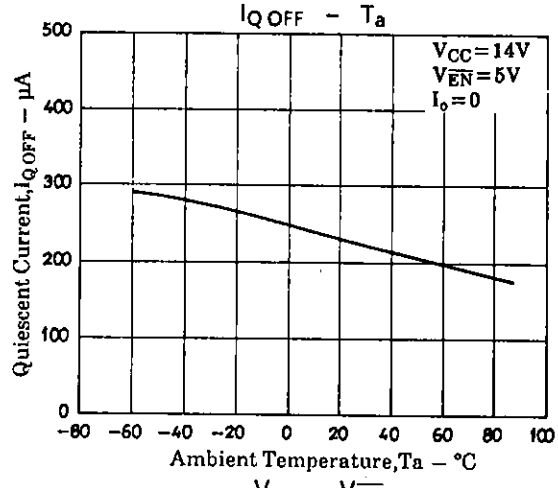
V_{IN} – T_a



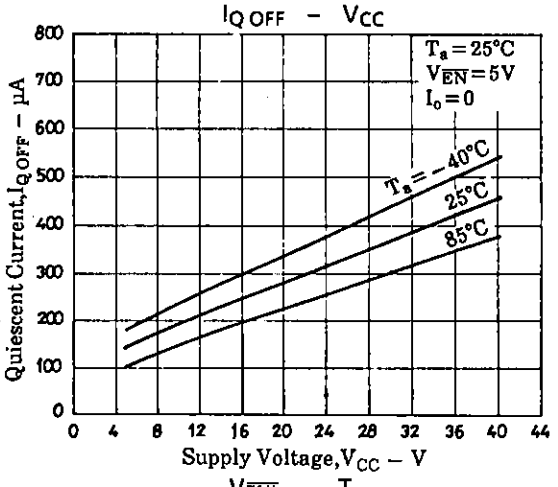
I_{IH} – T_a



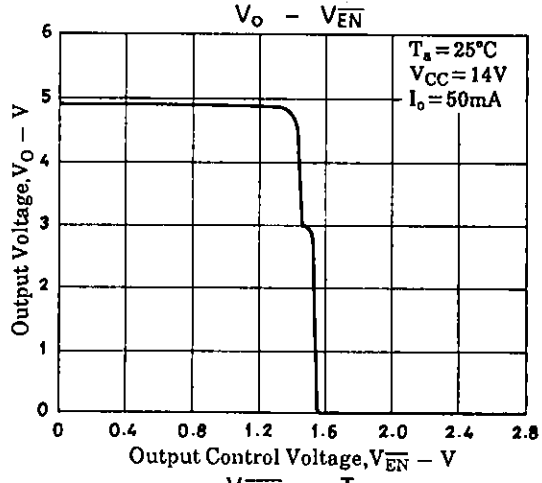
$I_{Q\,OFF}$ – T_a



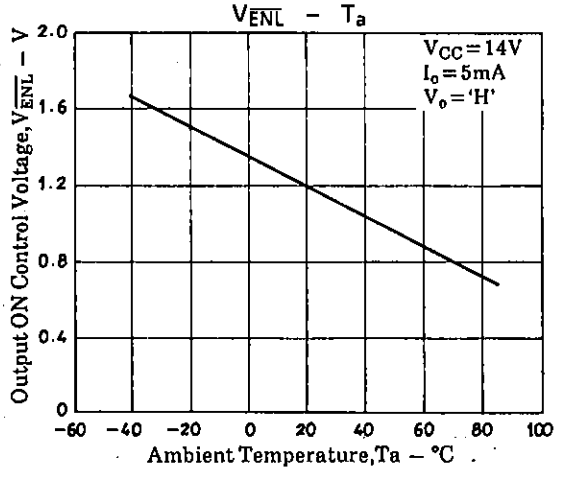
$I_{Q\,OFF}$ – V_{CC}



V_o – $V_{\overline{EN}}$



$V_{\overline{ENL}}$ – T_a



$V_{\overline{ENH}}$ – T_a