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

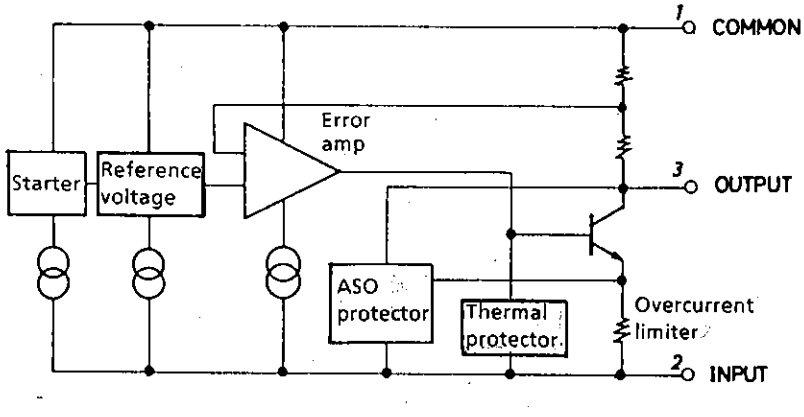
			unit
Input Voltage	V_{IN}	−20 to −7.5	V
Output Current	I_{OUT}	5 to 500	mA

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

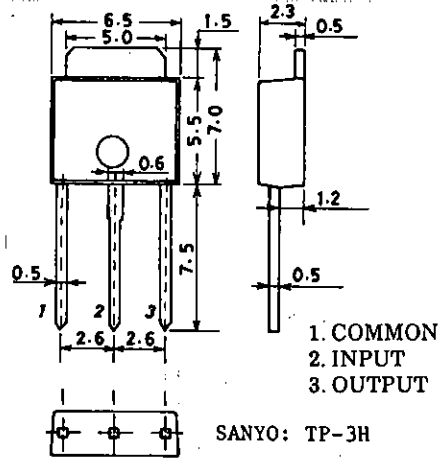
			min	typ	max	unit
Output Voltage	V_{OUT}	Tj = 25°C	−5.2	−5.0	−4.8	V
Line Regulation	ΔV_{oline}	Tj = 25°C, −25V ≦ V_{IN} ≦ −7V		7.0	50	mV
		Tj = 25°C, −18V ≦ V_{IN} ≦ −8V		3.0	30	mV
Load Regulation	ΔV_{oload}	Tj = 25°C, 5mA ≦ I_{OUT} ≦ 500mA		10	100	mV
		Tj = 25°C, 5mA ≦ I_{OUT} ≦ 350mA		5		mV

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

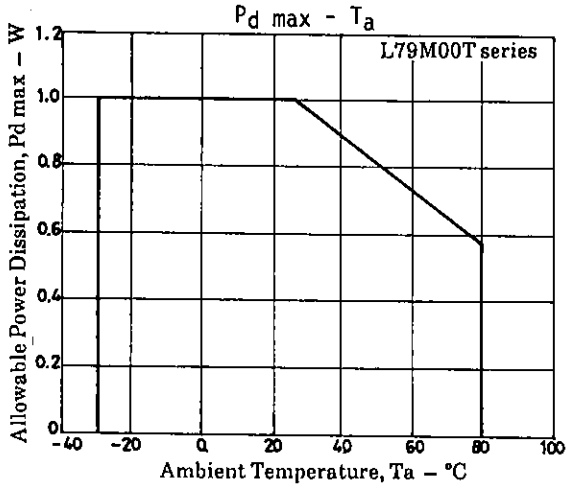
[L79M12T]

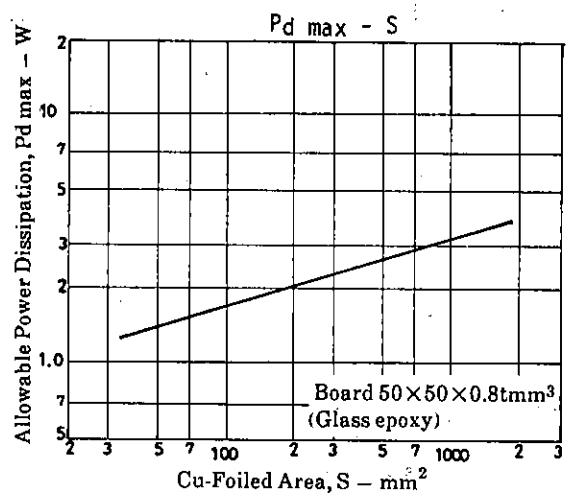
Recommended Operating Conditions at Ta = 25°C

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

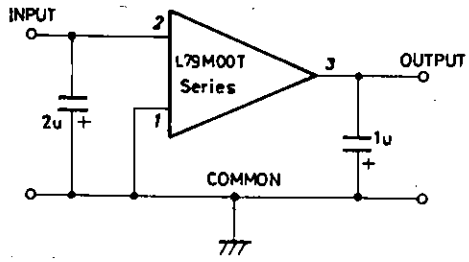
Operating Characteristics at Ta = 25°C, V_{IN} = −19V, I_{OUT} = 350mA, C_{IN} = 2μF, C_{OUT} = 1μF

				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 2895A

Monolithic Linear IC

SANYO No.2895A

LA5690D, 5690S

Voltage Regulator Driver with Watchdog Timer

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 5Vcontrol
- 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

Maximum Ratings at Ta = 25°C

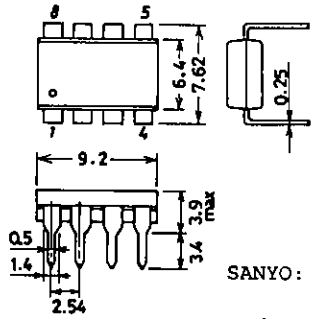
				unit
Control Pin Voltage	V_{CONT} max	1sec	60	V
Control Pin Voltage	V_{CONT} max		41	V
Control Pin Current	I_{CONT} max	*$V_{CC} \geqq 6V$	11	mA
CK Input Voltage	V_{CK} max		25	V
Reset Pin Voltage	$V_{\overline{RES}}$ max, V_{RES} max		41	V
Allowable Power Dissipation	Pd max		500	mW
Operating Temperature	**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, $I_{CONT} \fallingdotseq 100mA$ will flow, as starting current, in the V_{CC} range where the output cannot be regulated.

Operating Conditions at Ta = 25°C

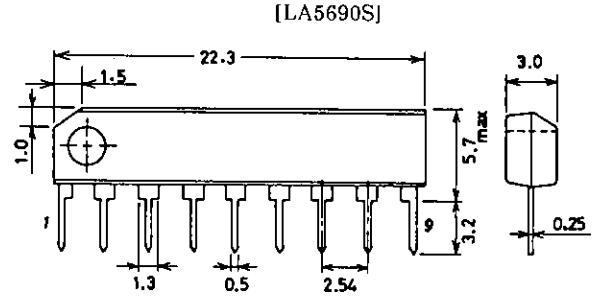
				unit
Control Pin Voltage	V_{CONT}		6 to 40	V
Control Pin Current	I_{CONT} max		10	mA
Reset Output Current	$I_{\overline{RES}}$ max, I_{RES} max	External R pull-up	8	mA
Reset Detection Voltage	V_S min		4	V

Package Dimensions (unit: mm) **3001B** [LA5690D]



SANYO: DIP8

Package Dimensions (unit: mm) **3017B** [LA5690S]



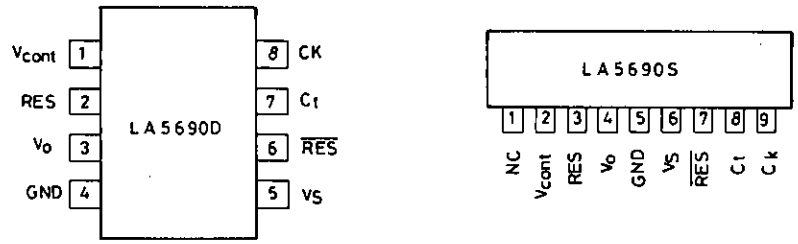
SANYO: SEP9

SANYO Electric Co., Ltd. Semiconductor Business Headquarters
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110 JAPAN

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

			min	typ	max	unit
Operating 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		4.9	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

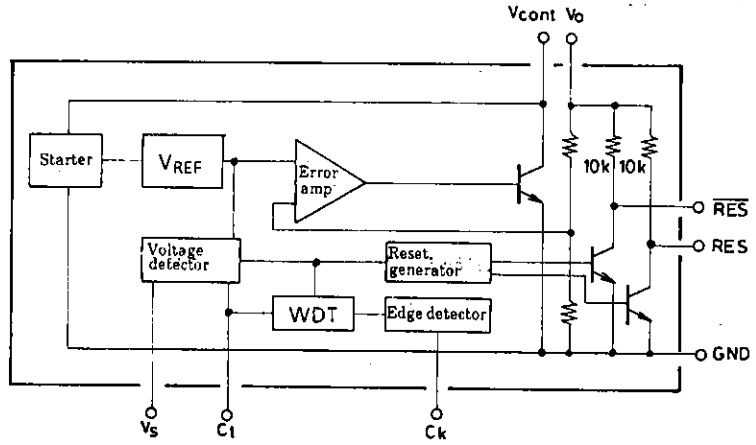
Pin Assignment



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

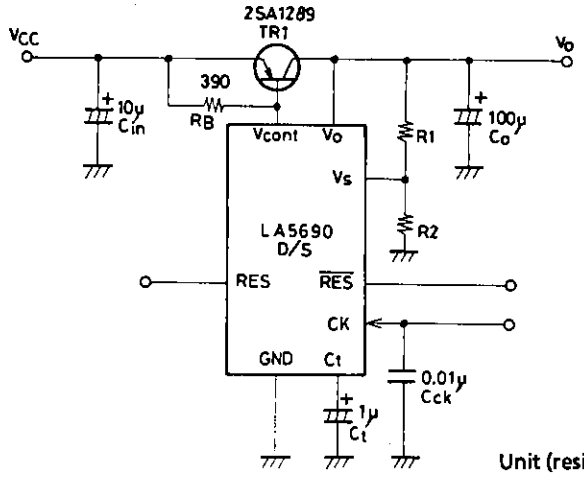
Equivalent Circuit Block Diagram

Unit (resistance: Ω)



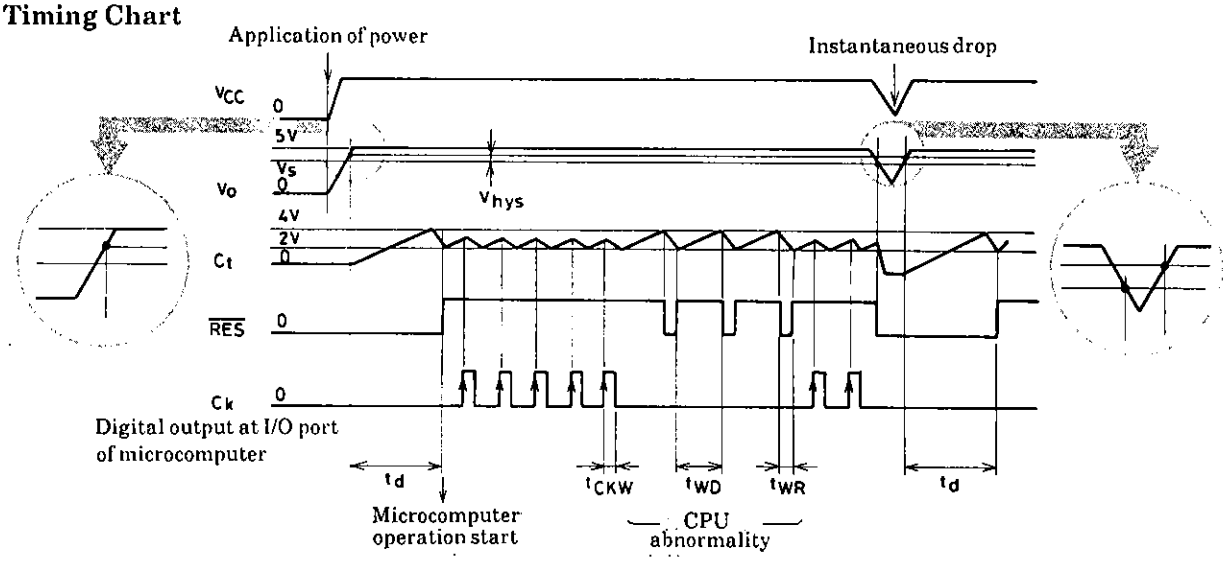
The reset output contains a pull-up resistor of 10kΩ.

Test Circuit



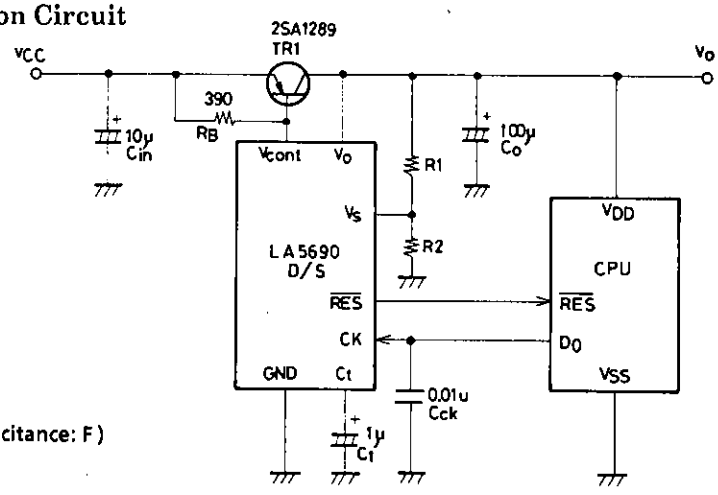
Unit (resistance: Ω, capacitance: F)

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

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

$V_{REF} \fallingdotseq 1.18(V)$

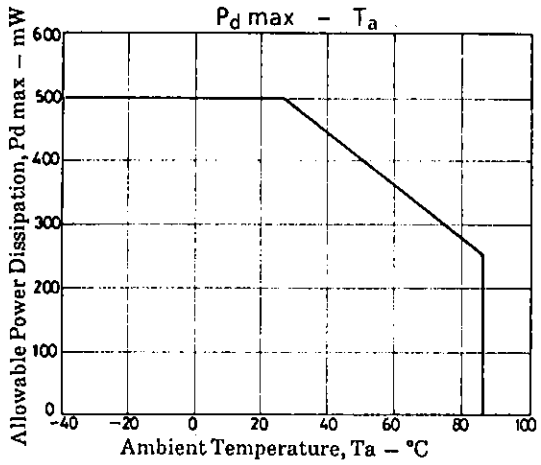
$t_d = 10 \times C_t(\mu F)[ms]$

$t_{WD} = 5 \times C_t(\mu F)[ms]$

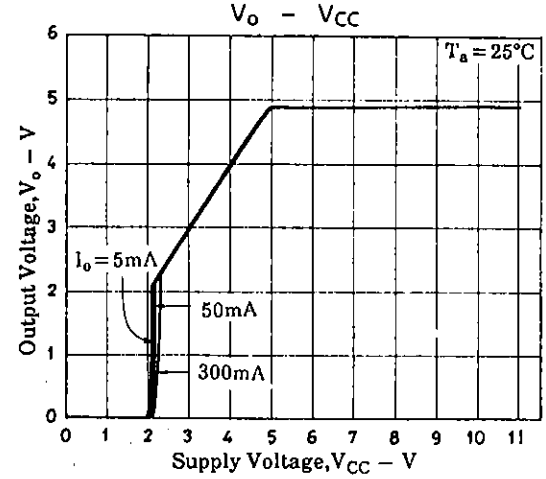
$t_{WR} = 0.25 \times C_t(\mu F)[ms]$

- 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.

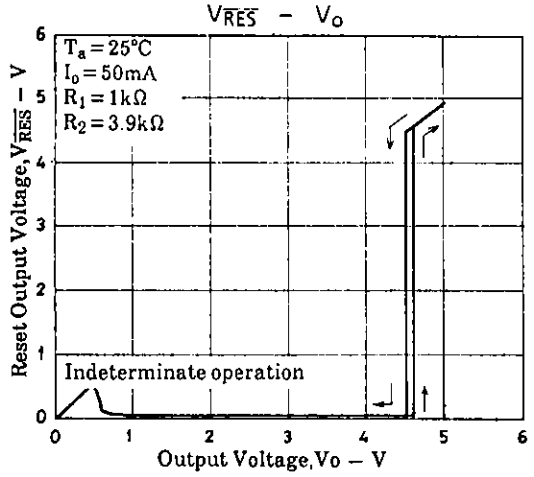
P_d max – T_a



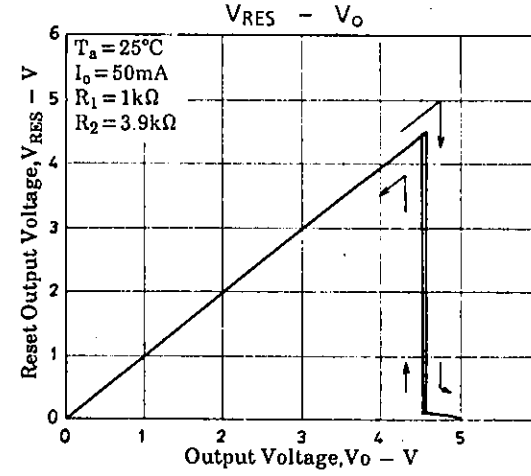
V_o – V_{CC}



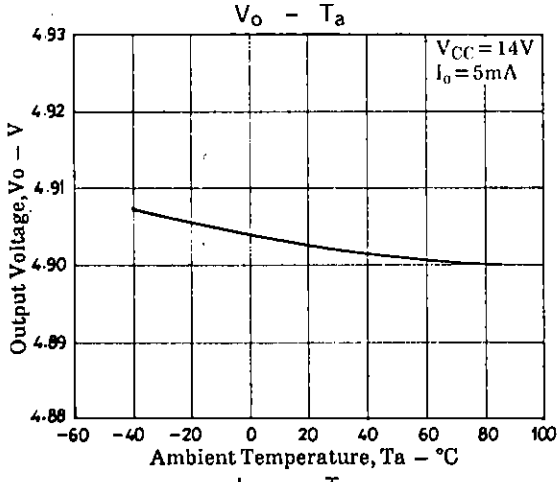
$V_{\overline{RES}}$ – V_o



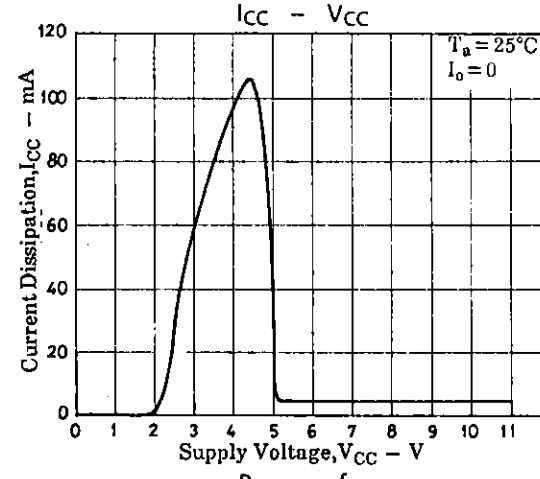
V_{RES} – V_o



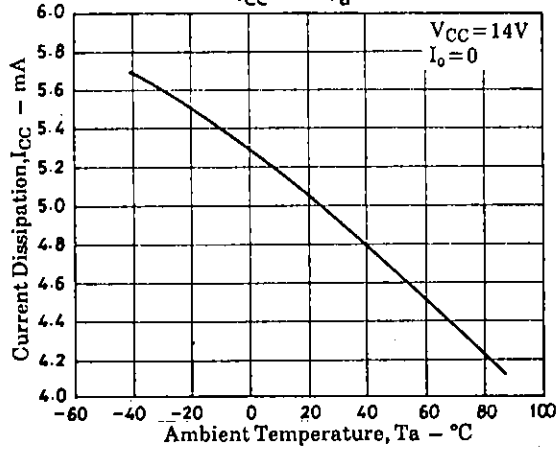
V_o – T_a



I_{CC} – V_{CC}



I_{CC} – T_a



R_{rej} – f