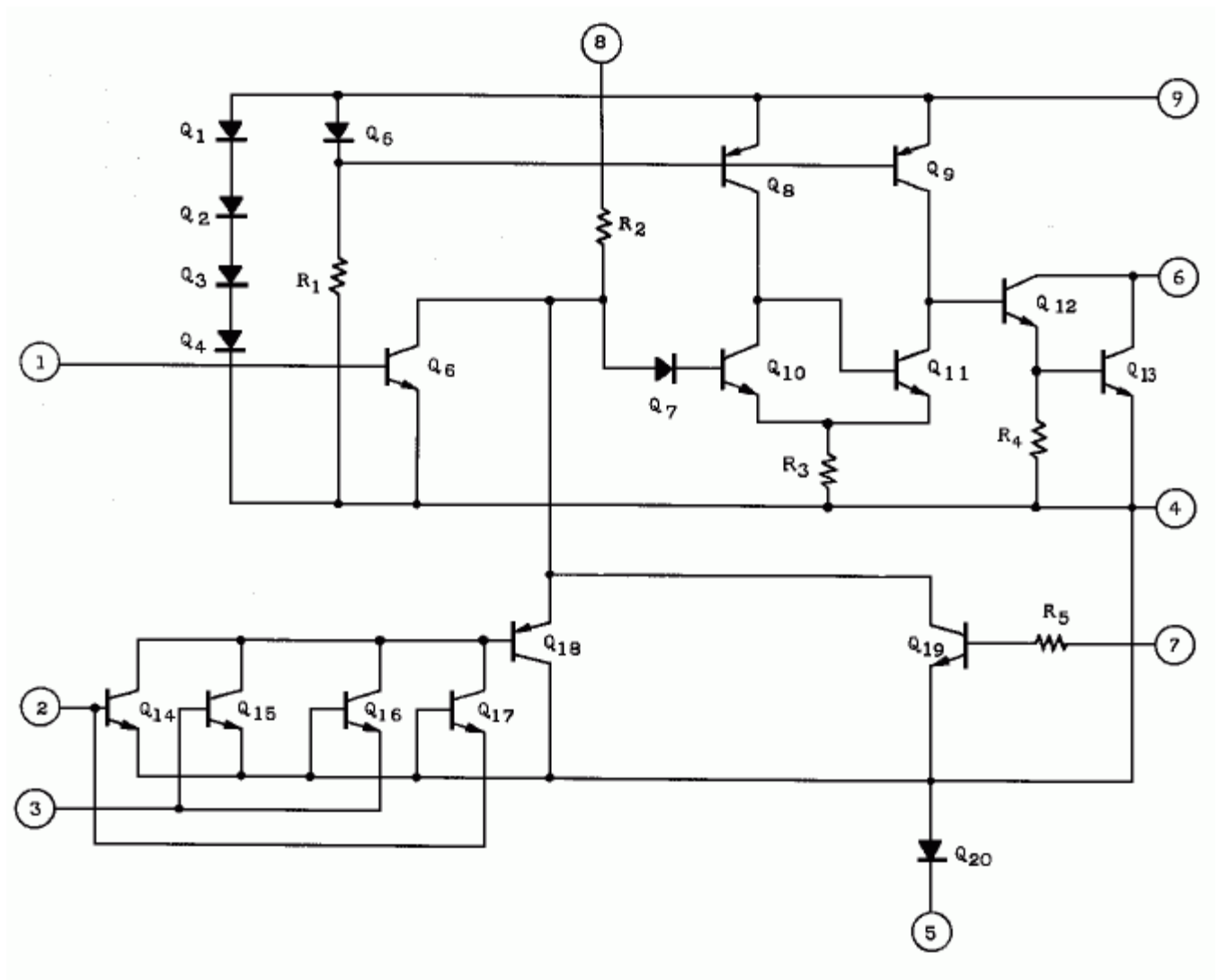


TA7317P Protection Circuit for OCL Power Amplifier and Speaker

to setting of constant, [datasheet part 2](#)

Selection from the original 11- page TOSHIBA datasheet 1989, part 1:

Equivalent Circuit :



Grenzwerte und Kennwerte :

MAXIMUM INTO OR OUT CURRENT

CHARACTERISTIC	SYMBOL	RATING	UNIT
Pin 1 Current	I ₁	±1.0	mA
Pin 2 Current	I ₂	±1.0	mA
Pin 3 Current	I ₃	±1.0	mA
Pin 5 Current	I ₅	-6.0	mA
Pin 7 Current	I ₇	1.0	mA
Pin 9 Current	I ₉	5.0	mA

MAXIMUM RATINGS (Ta=25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V _{CC}	60	V
Relay Driver Output Current	I _{OUT}	130	mA
Power Dissipation	P _D	500	mW
Operating Temperature	T _{opr}	-20 ~ 75	°C
Storage Temperature	T _{stg}	-55 ~ 150	°C

TOSHIBA

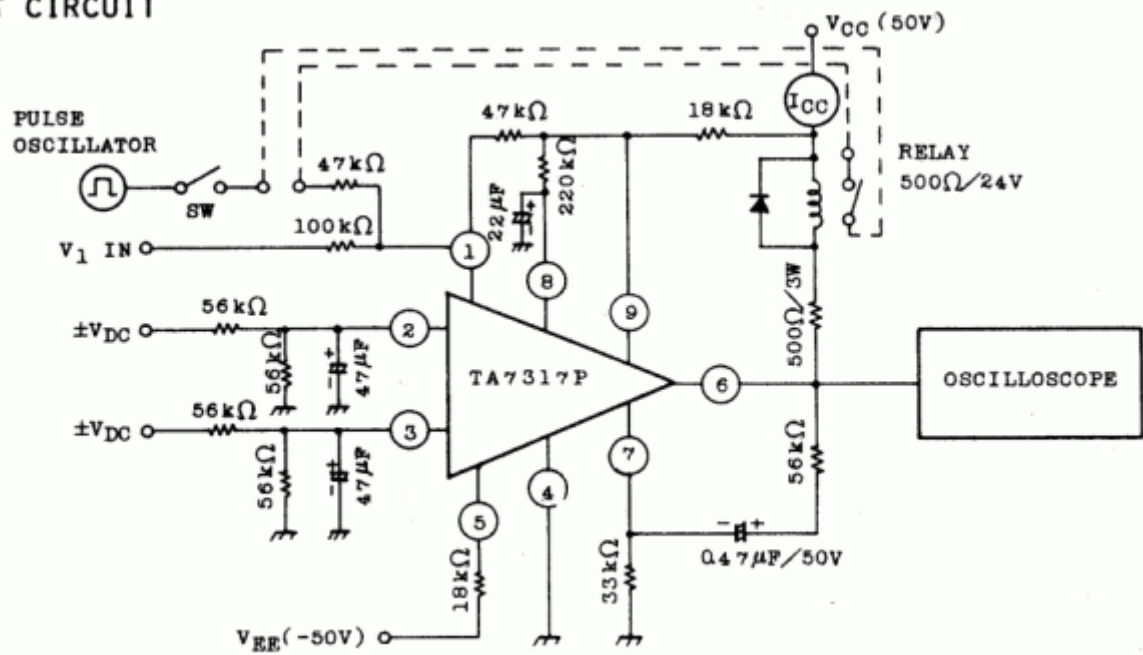
SIP9-P-A

ELECTRICAL CHARACTERISTICS (V_{CC}=±50V, Ta=25°C)

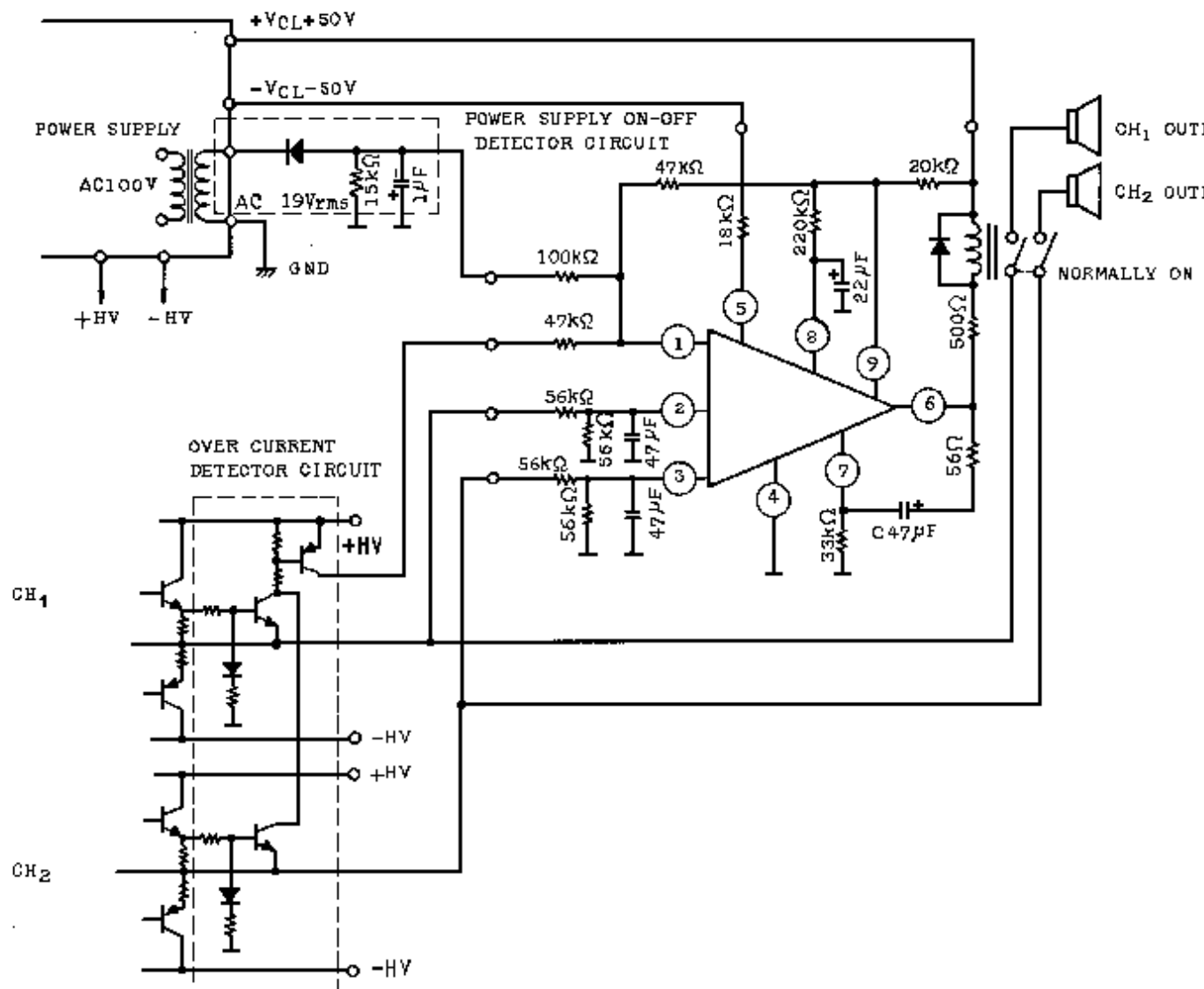
CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Current	I _{CC ON}	-	V ₁ IN=-5V, ±V _{DC} =0V, SW:OFF	-	54	-	mA
	I _{CC OFF}	-	V ₁ IN=0V, ±V _{DC} =0V, SW:OFF	1.5	2.4	4	
DC Detector Voltage	+V _{DC}	-	Note 1	0.9	1.1	1.3	V
	-V _{DC}	-	Note 1	-0.9	-1.1	-1.3	
Output Voltage	V _{OUT(ON)}	-	V ₁ IN=-5V, ±V _{DC} =0V, SW:OFF	-	1	2	V
	V _{OUT(OFF)}	-	V ₁ IN=0V, ±V _{DC} =0V, SW:OFF	-	50	-	
Muting Time at Power ON	M.T (V _{CC ON})	-	Note 2	-	4	-	sec
Muting Time with Load Shorted	M.T	-	Note 3	-	3.5	-	sec
Pin 8 Entering Current	I ₈	-	-	2	8	-	μA
Pin 9 Terminal Voltage	V ₉	-	-	-	3.1	-	V
Pin 1 Terminal Voltage	V ₁	-	-	-	0.75	-	V
Pin 5 Terminal Voltage	V ₅	-	-	-	-0.75	-	V

Note 1 : The value of +/-V DC at the time when the relay is turned from ON to OFF in the condition of V₁ IN = - 5V and SW OFF. **Note 2 :** The time required for the relay being turned from OFF to ON at +V_{CC} ON in the condition of V₁ IN = -5 V, +/- V DC = 0, SW OFF. **Note 3 :** The duration of the relay being able to keep OFF when SW is turned ON in the condition of V₁ IN = - 5V and +/- V DC = 0. At that time input pulse is 3ms, -3 V.

TEST CIRCUIT



Application :



Setting of constant, [datasheet part 2](#)

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[Contact informations](#) (english version). . . [Informationen zur Kontaktaufnahme](#)

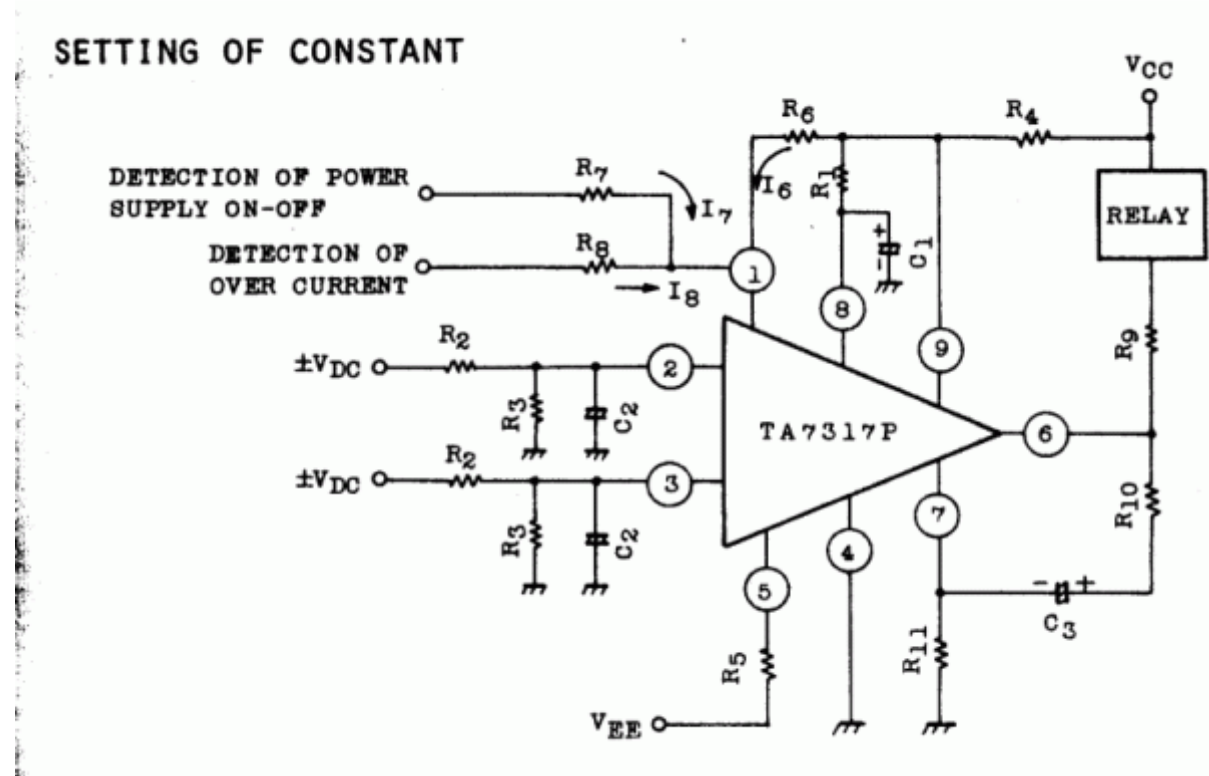
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Stand 20.02.03

TA7317 , Setting of Constant (Datasheet part 2)

[to the datasheet part 1](#)

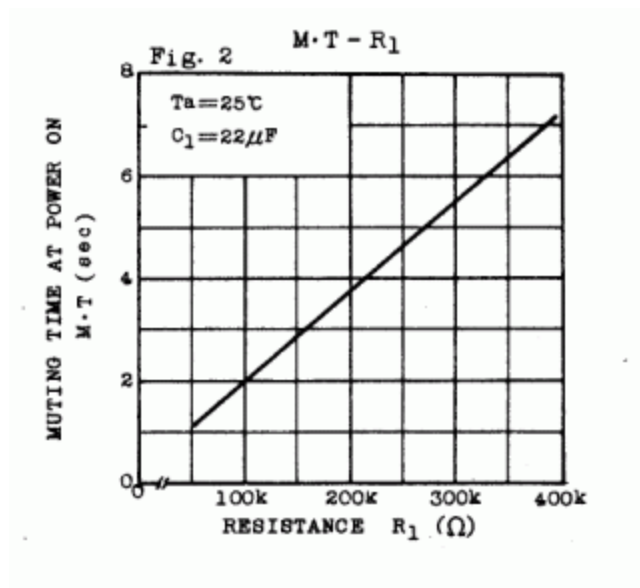
Selection from the original 11- page TOSHIBA datasheet 1989. (No guaranty, result of automatic text recognition).



1. Setting of R1 and C1

The muting time (MT) at the time when the power supply is turned on, is determined by the time constants of R1 and C1. When V8 has become about 1.3V, the relay is turned ON. However, since the discharge circuit connected to pin 7 at the instant the power supply has been turned ON, there is some difference between the actual value and the theoretical value.

Fig.2 shows the measured value of R1 to the muting time (MT) in case of C1=22uF.



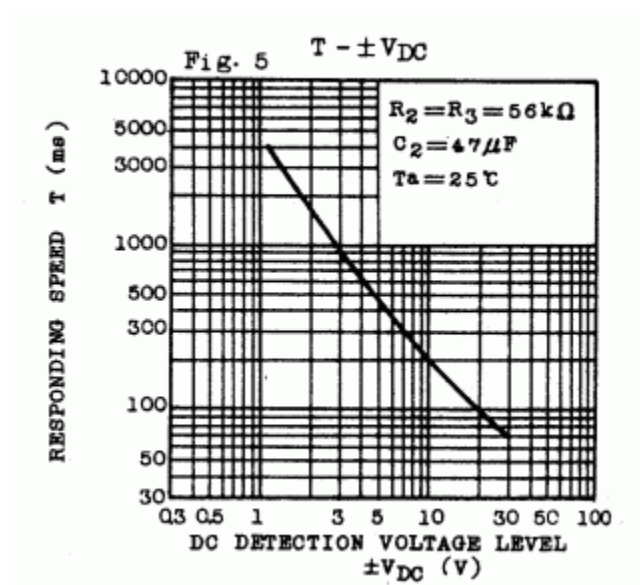
2. Setting of R2, R3 and C2

The R2, R3 and C2 not only determine the level sensitivity (time) detecting the DC voltage, but also operate as a filter bypassing an AC signal. The time constant of this filter is

$$T = C_2 R_2 R_3 / (R_2 + R_3) ;$$

therefore, let the lowest frequency of the desired amplifier be f_L , this time constant should be selected to $f_L \gg 1/2 \pi T$. And, the DC detecting voltage is so set that relay is ON when the absolute value of pin2- voltage (or pin3- voltage) is increased more than about 0.6 V to 0.8 V ; accordingly, the level should be set so that $V_{DC} R_3 / (R_2 + R_3) > 0.6 \text{ V to } 0.8 \text{ V}$

As an example, Fig.5 shows the DC voltage detecting level corresponding sensitivity (with the relay ON).



3. Setting of R4 and R5

R4 is a resistance to determine a current flowing into Pin 9. The current value should be set so as to become 2 ~ 3 mA. V9 is 3.1 V fixed.

R5 determines a current to (pull) draw from the substrate so that the current become 3mA. It is used under the condition that $V_5 = -0.75V$ because V_5 is the value in the forward voltage of Q20.

4. Setting of R6, R7 and R8

R6 and R7 can determine the power supply ON or OFF, and R8 can determine the over current. R6 should be so designed that the current approx. 50 uA fully driving Q8 can be flown.

Since $V_9 = 3.1 V$ and $V_1 = 0.75V$, 47 kOhm should be used for R6.

The currents flowing to R6, R7 and R8 be I_6 , I_7 and I_8 respectively. The current relation at time of the detection of power supply ON and OFF is as follows: The current flowing in Pin 1 is considered as a positive current: $I_1 = I_6 + I_7 + I_8$. *R7 is connected to a negative rectified voltage, see application circuit in the datasheet. Therefore $I_7 \sim 0$ at Power OFF.* At Power ON - $I_7 > I_6$; For example, when detection is made from AC 19Vrms, if I_7 is 260uA, 100 kOhm is used for R7.

Similarly, at time of load detection, the current relation is as follows: $I_6 + I_8 > -I_7$. Compared I_8 with I_6 and I_7 , it is a larger current; therefore, R8 functions a protector for detection circuit input. Here, 47 kOhm is used for R8.

5. Setting of R9

R9 determines the current to flow to the relay. V_{cc} minus the saturation voltage of Q13, $V_6 = V_{ce(sat)} = 1V$ and the relay current and resistance cause R9.

6. Setting of R10, R11 and C3

R10 and C3 are a resistance and a capacitor which function to allow the discharge circuit to operate instantly. The time constants of them should be extremely short. Here, $R_{10} = 56 kOhm$ and $C_3 = 0.47 \mu F$ are used. R11 is a resistance for preventing mis-operating of discharge circuit, in which $R_{11} = 33 kOhm$.

7. Response time of output transistor

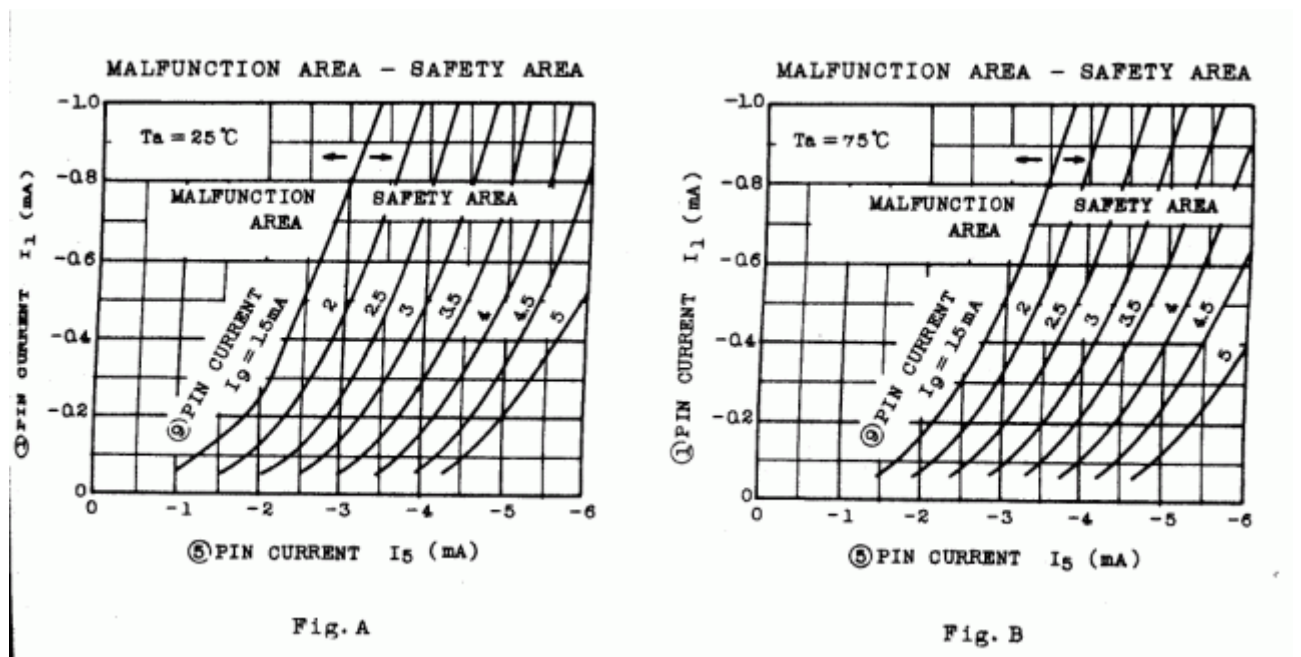
The response time of output transistor (relay driver) is designed so as to operate more quickly and more stably by means of Schmitt circuit; in case of OFF \rightarrow ON, the response time is approx. 0.5 us, while, in case of ON \rightarrow OFF, the response time is approx. 0.2 us

8. Setting of the current I_1 , I_5 , I_9 .

The value of the current I_1 , I_5 , I_9 should be set by following relation to prevent miss operation of the relay action.

1. Set the I_9 ($> 1.5 \text{ mA}$).

2. I_1 , I_5 should be set in the safety area determined by I_9 . The safety area is the right side area of the bound line I_9 (Fig.A, Fig.B, see below). For improvement of the stability against ambient temperature, the point fixed by the relation of I_1 I_5 should be apart from bound line to the right side.



[to the datasheet part 1](#)

[Bemerkungen zum IC in deutscher Sprache](#)

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Stand 30.03.03