

**LA3242**

Preamplifier for Compact Cassette Recorder Recording-only Use

Overview

The LA3242 is a preamp IC for compact cassette recorder recording-only use. The distinctive feature of the LA3242 is that it contains mechanical switches which have been so far connected externally as peripheral parts.

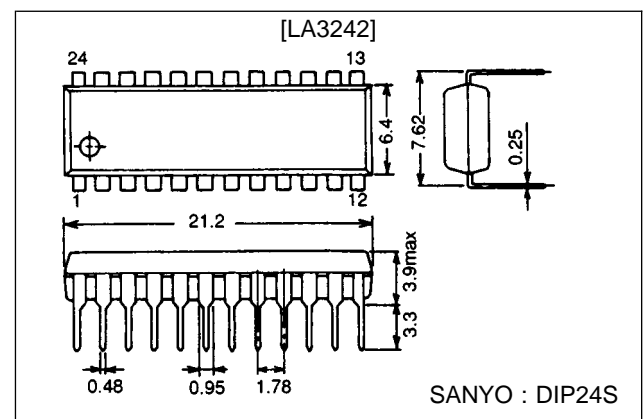
Features

- On-chip electronic select switches permitting selection of normal/higher speed recording and metal(chrome)/normal tape recording mode by using the dedicated control pins.
- Two ALC output pins making it easy to make up a Dolby recording system.
- The control voltage from a microcomputer, etc. can be used to turn ON/OFF the ALC and to set the ALC control voltage to the initial value.
- On-chip microphone amplifier making it easy to provide microphone mixing.
- Wide operating voltage range ($V_{CC} = 4.5$ to 14.0 V).
- Can be used in conjunction with playback-only preamp LA3246 to make up a double-cassette dubbing system.

Package Dimensions

unit : mm

3067-DIP24S



Functions

- Recording preamplifier ×2
- Microphone amplifier ×1
- ALC output ×2
- Electronic switch ×6

Specifications

Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		16	V
Allowable power dissipation	P_d max		720	mW
Operating temperature	T_{op}		-20 to +75	$^\circ\text{C}$
Storage temperature	T_{stg}		-40 to +125	$^\circ\text{C}$

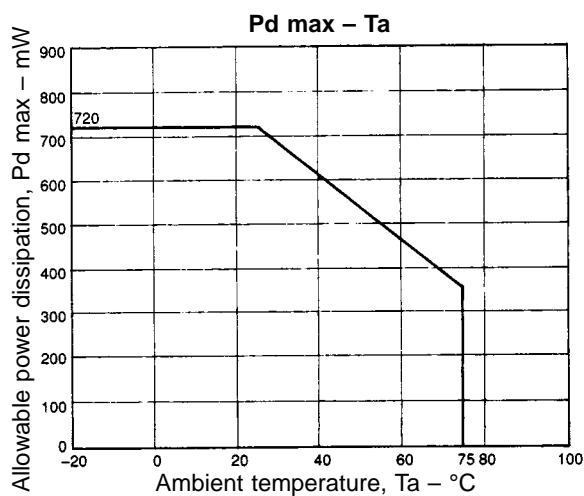
Operating Conditions at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		6	V
Operating voltage range	V_{CC} op		4.5 to 14.0	V

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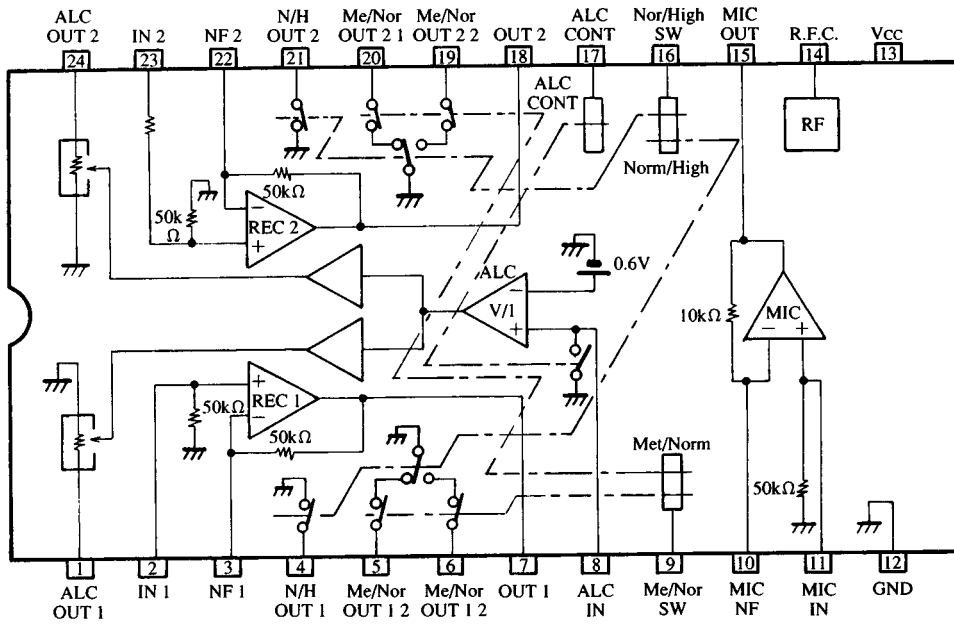
Operating Characteristics at Ta = 25°C, V_{CC} = 6.0 V, R_L = 10 kΩ, f = 1 kHz, 0 dB = 0.775 V

Parameter	Symbol	Conditions	min	typ	max	Unit
Quiescent current	I _{CCO}	Me/Nor, Nor/High SW OFF	5	7.5	12	mA
Quiescent current	I _{CCS}	Me/Nor, Nor/High SW ON	12	16	20	mA
[REC Amp]						
Voltage gain (Open)	VG _{O1}		75	85		dB
Voltage gain (Closed)	VG1	V _O = 0 dBm	42.5	44.5	46.0	dB
Total harmonic distortion	THD 1	V _O = 0.4 V		0.1	0.7	%
Maximum output voltage	V _O max	THD = 1%	0.7	1.0		V
Equivalent input noise voltage	V _{NI1}	R _g = 2.2 kΩ, B.P.F = 20 Hz to 20 kHz		1.1	1.7	μV
Input resistance	R _{I1}		40	50	60	kΩ
Crosstalk	CT1	Between REC amps	50	60		dB
	CT2	REC amp→Microphone amp	50	75		dB
Channel balance	V _{BL}	V _{IN} = -50 dBm		0	2	dB
[Microphone Amp]						
Voltage gain (Open)	VG _{O2}		60	70		dB
Voltage gain (Closed)	VG2	V _O = 0 dBm	23	25	27	dB
Total harmonic distortion	THD2	V _O = 0.4 V		0.05	0.5	%
Maximum output voltage	V _O max	THD = 1%	0.8	1.1		V
Equivalent input noise voltage	V _{NI2}	R _g = 2.2 kΩ, B.P.F = 20 Hz to 20 kHz		1.1	1.7	μV
Input resistance	R _{I2}		40	50	60	kΩ
Crosstalk	CT3	Microphone amp→REC amp	45	60		dB
[ALC]						
ALC range	ALC _W	Input range when output distortion becomes 1% after ALC begins to be applied.	40	45		dB
ALC balance	ALC _B	Output difference between CH1 and CH2		0	2	dB
ALC distortion	ALC _{THD}	V _{IN} = -40 dBm		0.15	0.8	%
ALC output voltage	ALC _{VO}	V _{IN} = -40 dBm	0.33	0.42	0.53	V
Crosstalk	CT4	Between REC amps	45	60		dB
Crosstalk	CT5	REC amp→Microphone amp	50	70		dB
ALC ON-state voltage	ALC _{ON}	Voltage on pin 17			1.0	V
ALC OFF-state voltage	ALC _{OFF}	Voltage on pin 17	1.5			V
[Switch]						
ON-state resistance	R _{ON}			30	70	Ω
DC feedback resistance	R _{F1}		40	50	60	kΩ



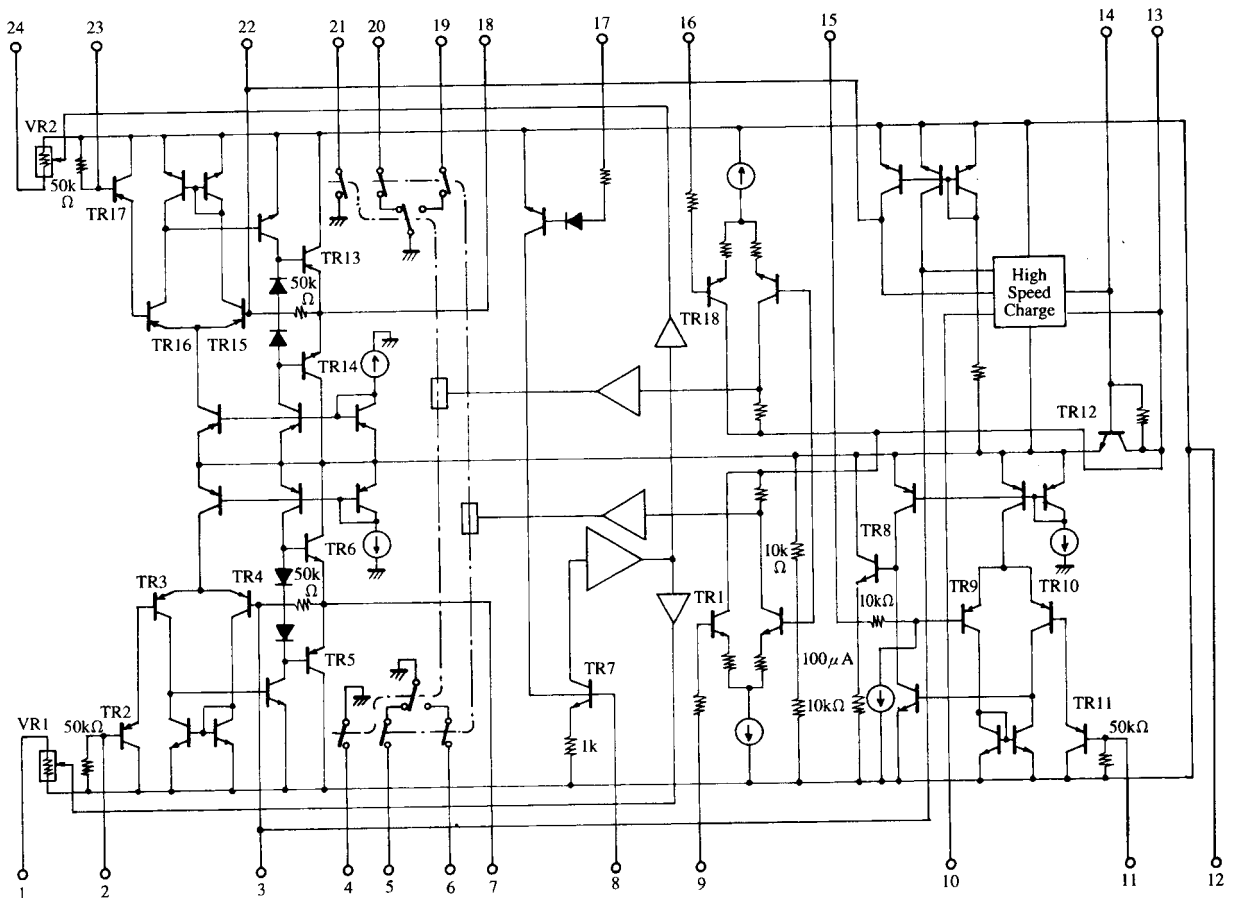
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Equivalent Circuit Block Diagram

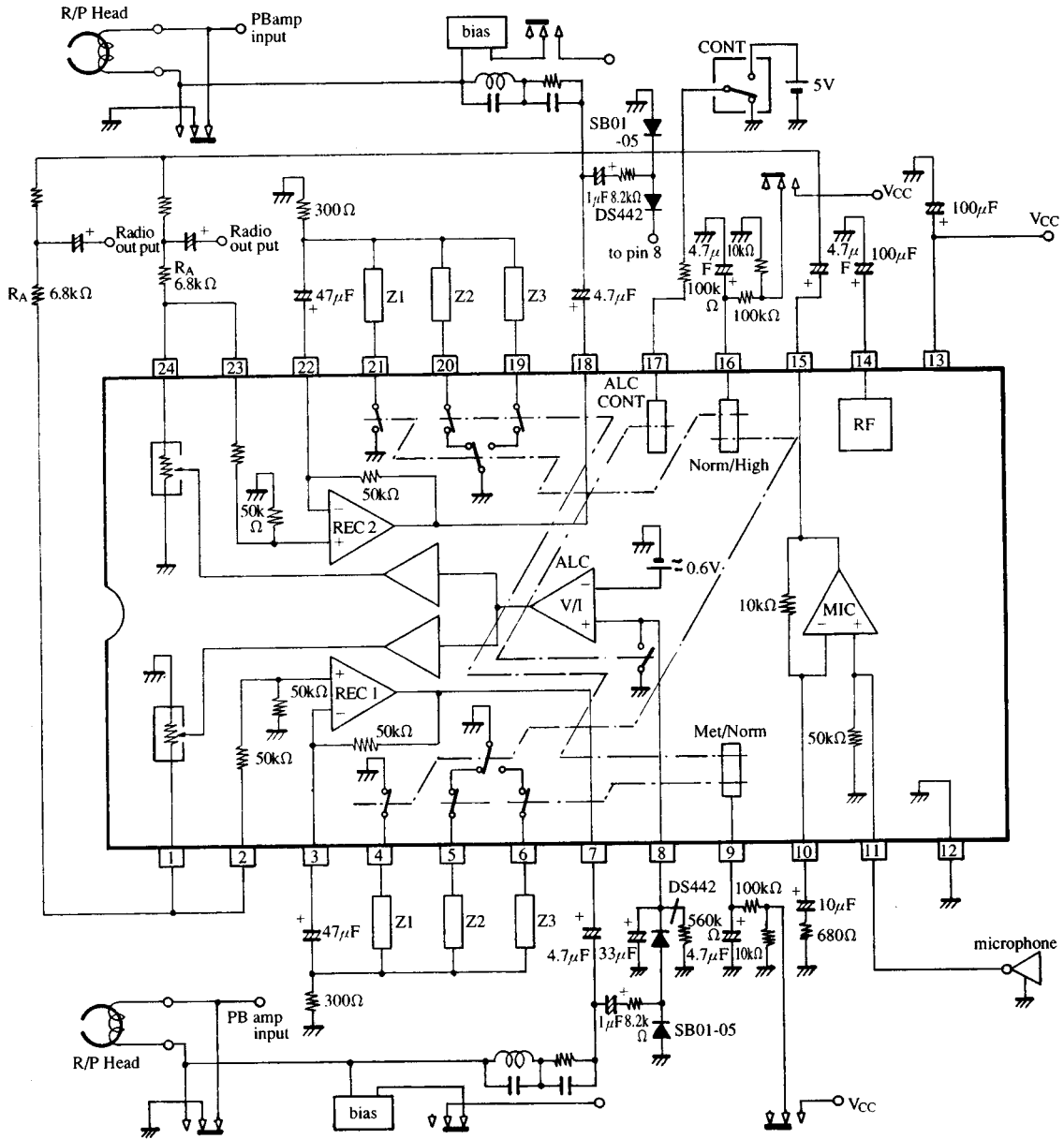


Top view

Equivalent Circuit



Sample Application Circuit

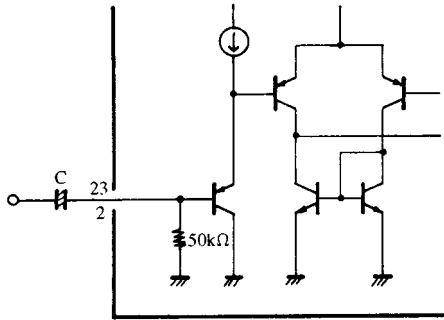


Note:

1. The electronic select switching level is approximately $(V_{CC} - 0.9)/2$.
2. REC amplifier NF parameters Z1 through Z3 should be selected to accommodate the recording level and frequency response that will be required in metal/normal tape and normal/higher speed modes.
3. Z1 through Z3 may be configured with coil "L", capacitor "C", and resistor "R".
4. When electronic control pins 9 and 16 are at the GND level, each electronic switch is turned ON.
5. When ALC ON/OFF control pin 17 is at 1 V or less/1.5 V or greater, the ALC is turned ON/OFF, respectively ($T_a = 25^\circ\text{C}$).
6. The ALC width depends on external resistor R_A .

IC usage Notes

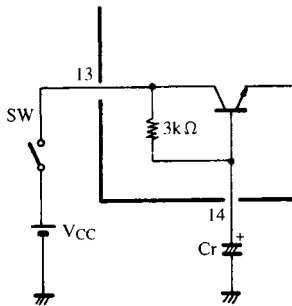
- (1) The base of a PNP transistor is connected to input pins 2 and 23.



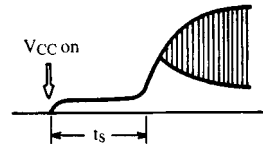
When a voltage is applied to input pins 2 and 23 externally, connect a capacitor to the input pins. The recommended value of capacitor C is 0.1 μF to 10 μF. DC voltage V_{INDC} with input pins 2 and 23 open is 50 mV max ($V_{INDC} = 20$ mV typ).

For the relation between supply voltage V_{CC} and V_{INDC} , refer to the $V_{CC} - V_{INDC}$ characteristic.

- (2) Output waveform starting time (Refer to Data $t_s - C_T$.)

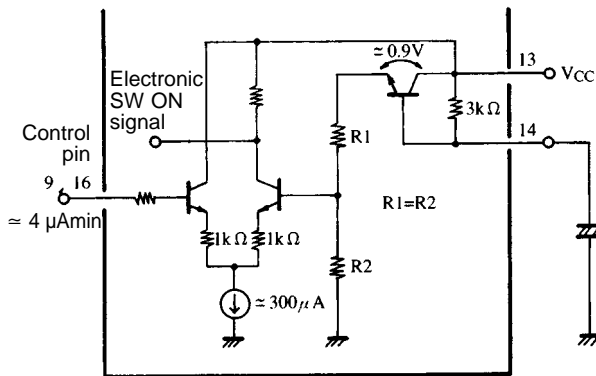


Rise waveform at pin 7 or 18



When supply voltage V_{CC} is switched ON, the amplifier output (pins 7 and 18) will rise. Output waveform ON time t_s can be varied by capacitor C_r connected to pin 12. The minimum value of C_r is 33 μF. If the value of C_r is made less than 33 μF, more pop noise will occur and the ripple rejection will worsen at the time supply voltage V_{CC} is switched ON. ($t_s = 0.7$ s. typ at $C_r = 100$ μF)

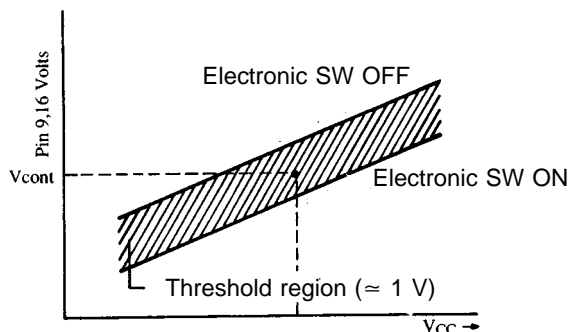
- (3) Electronic switch control circuit



The control circuit for control pins 9 and 16 is configured as shown left.

Control level V_{CONT} of the control circuit is given by:
 $V_{CONT} = 1/2 \times (V_{CC} - 0.9)$ [V]

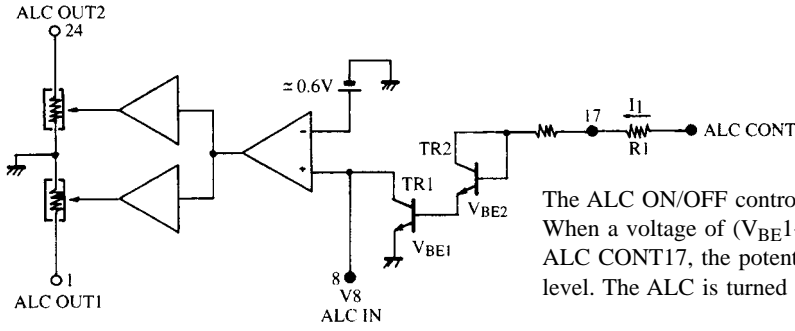
- (4) Relation between control voltage to turn ON/OFF electronic switch and supply voltage (Refer to Data $V_{CONT} - V_{CC}$.)



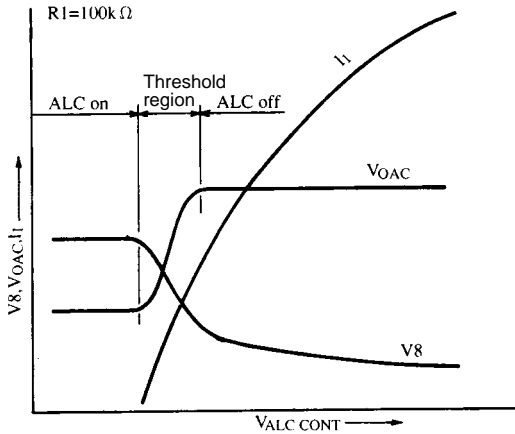
The control level at electronic switch CONT pin 9 and 16 is fixed by supply voltage V_{CC} . The threshold region has a range of approximately 1 V. The middle point of threshold region at a given value of supply voltage V_{CC} is represented by approximately $1/2 \times (V_{CC} - 0.9)$ V.

The electronic switch can be turned ON/OFF by applying a voltage of the middle point voltage ± 0.5 V or more/less, respectively, to electronic switch CONT pins 9 and 16.

(5) ALC control pin and ON/OFF level

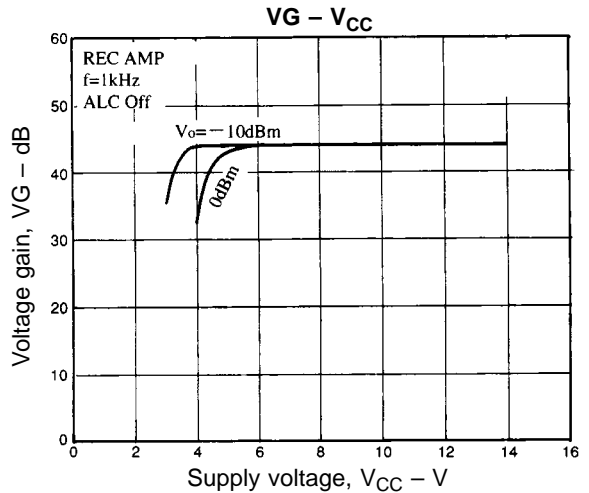
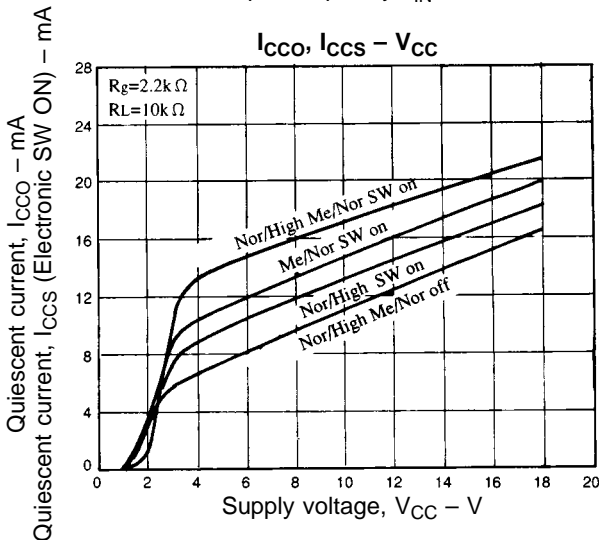
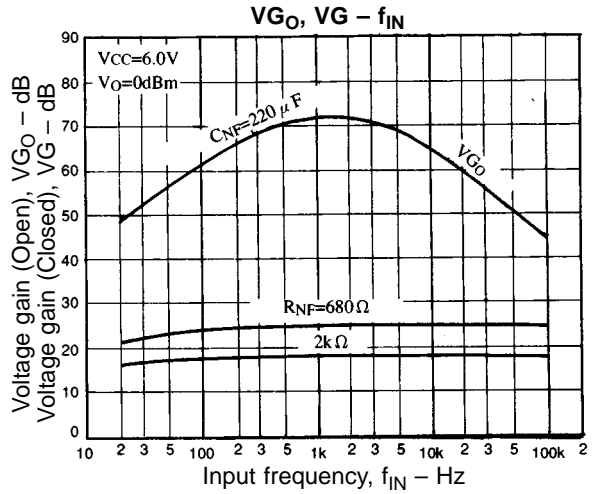
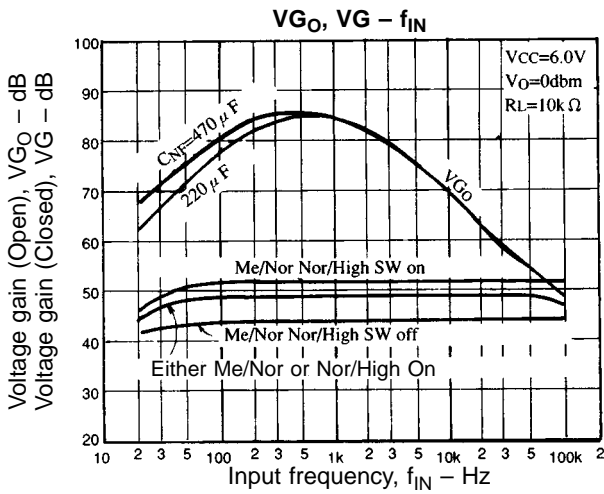


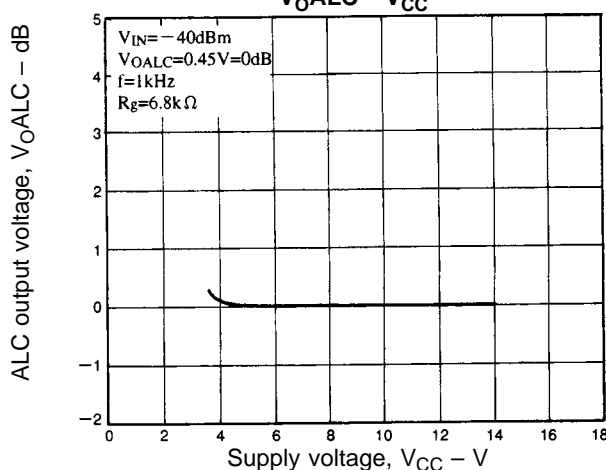
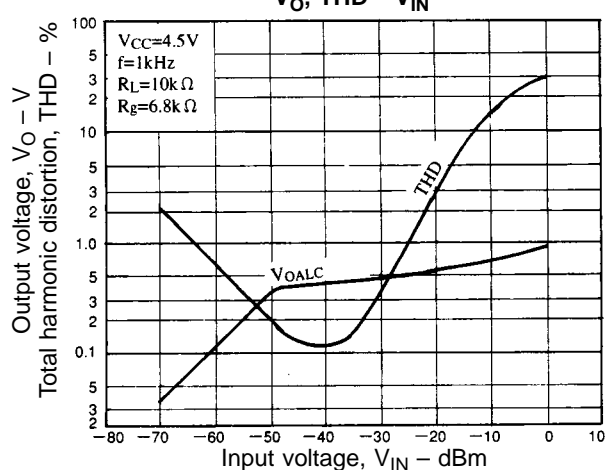
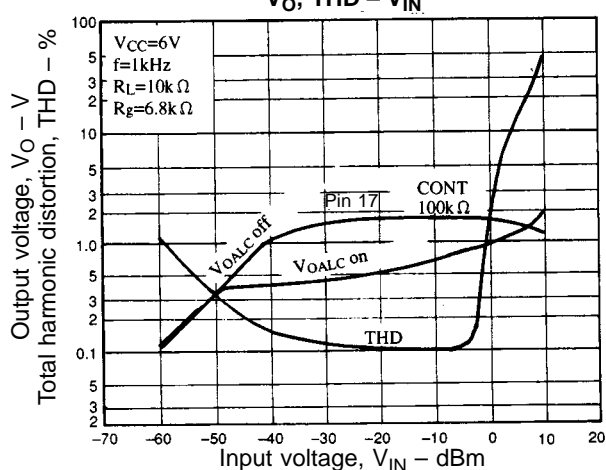
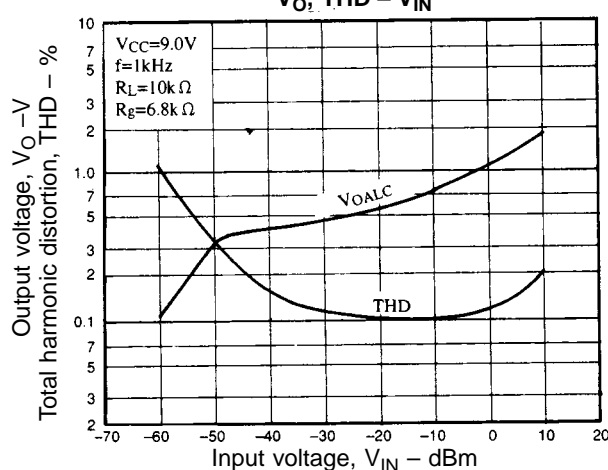
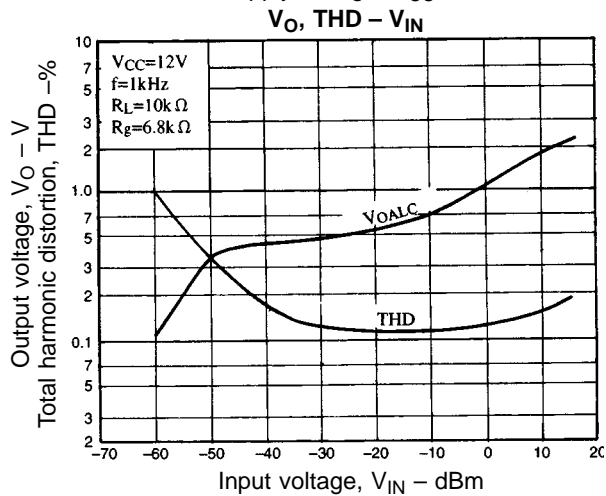
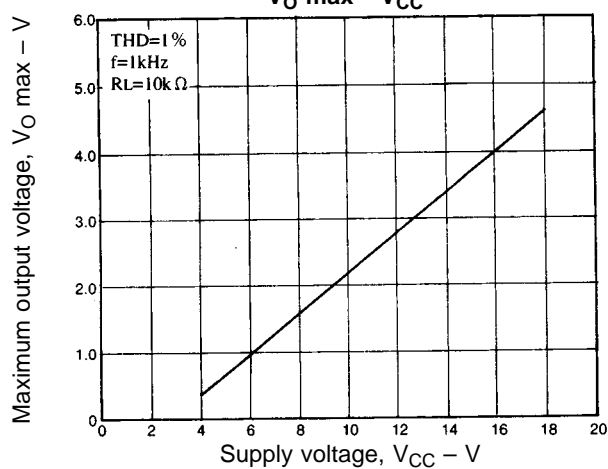
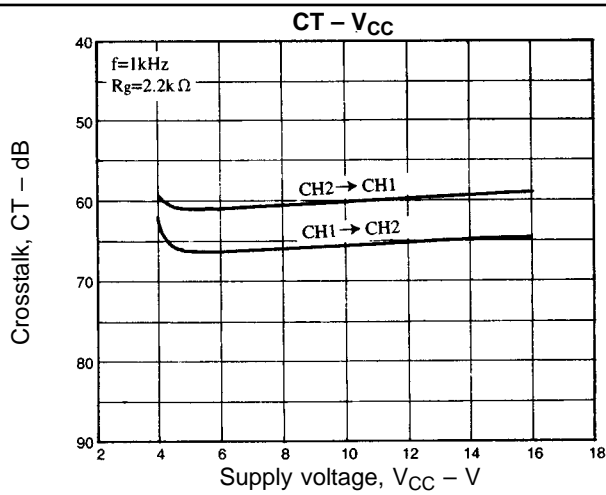
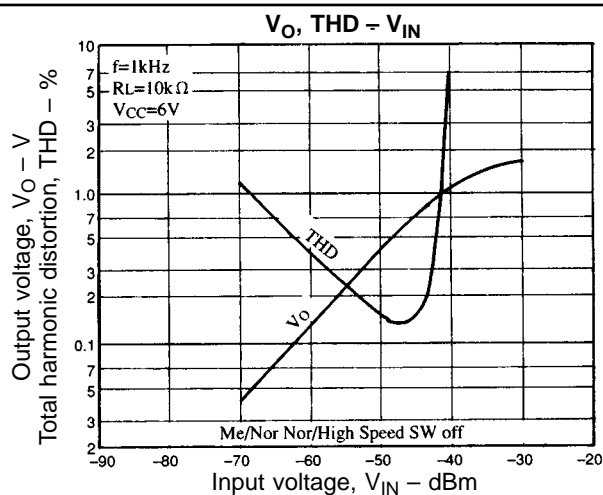
The ALC ON/OFF control circuit is configured as shown left. When a voltage of $(V_{BE1} + V_{BE2}) = 1.5\text{ V}$ or greater is applied to the ALC CONT17, the potential on the ALC IN (pin 8) drops to GND level. The ALC is turned OFF (ALC function release).

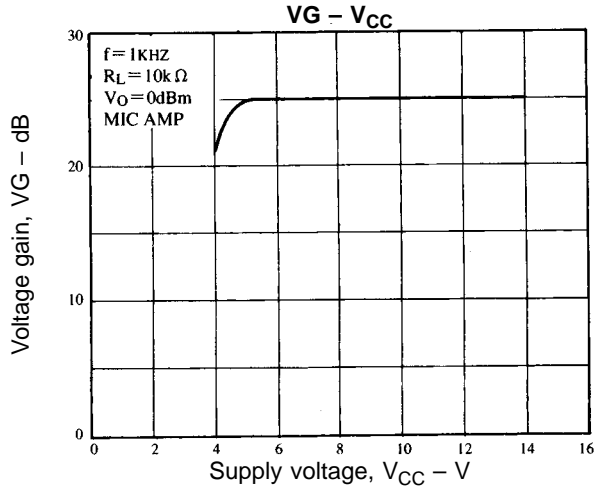
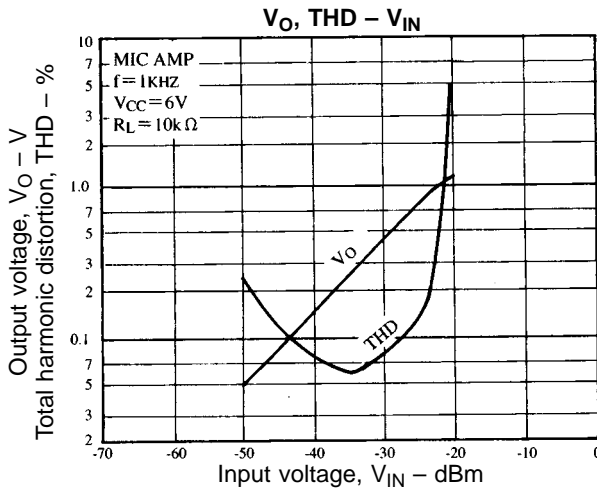
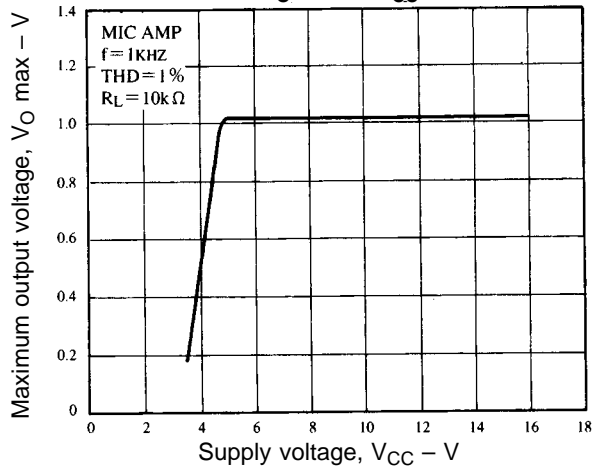
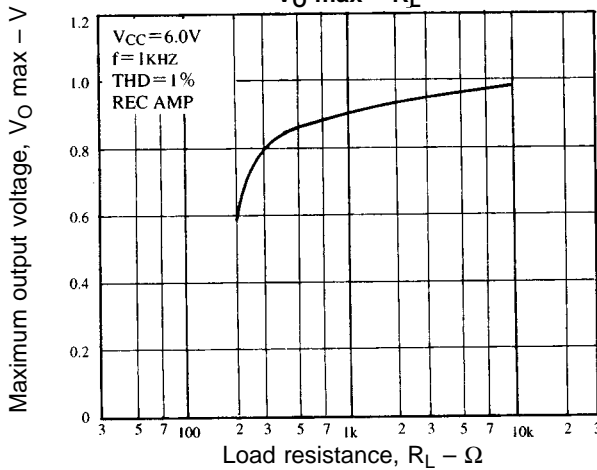
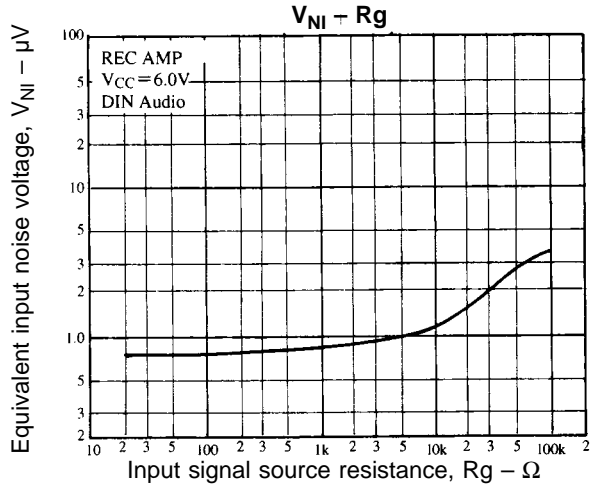
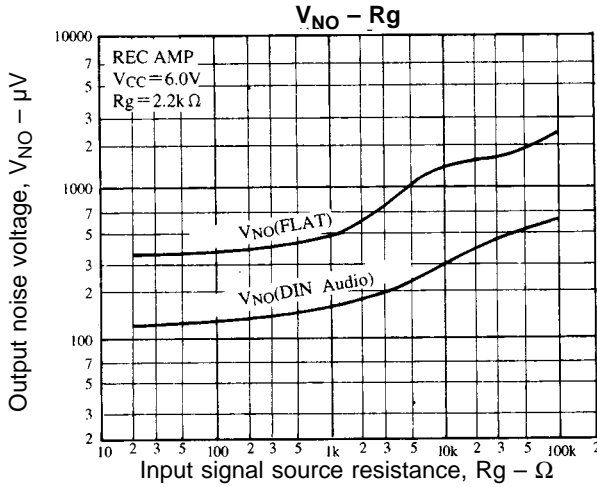
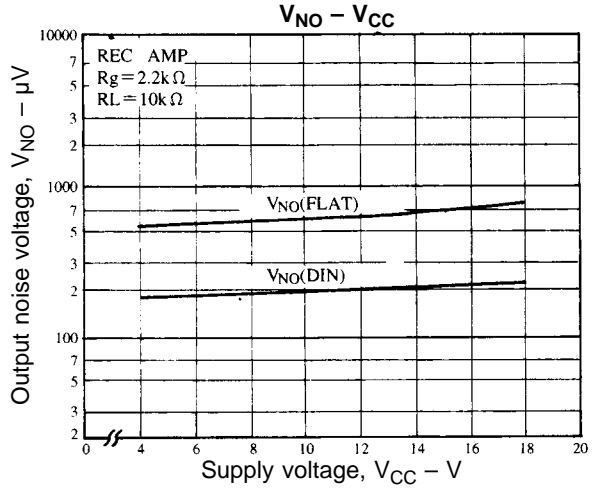
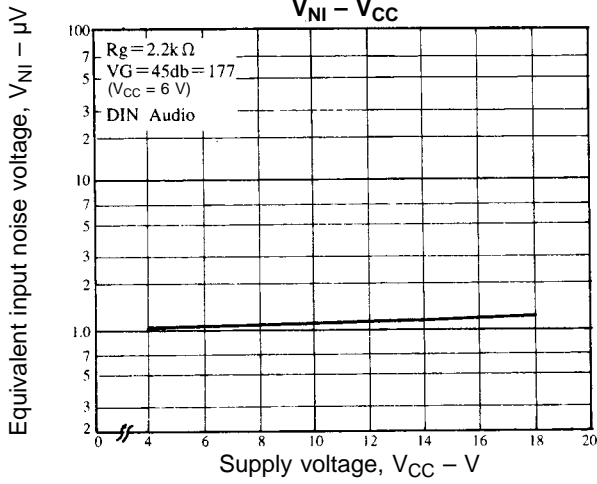


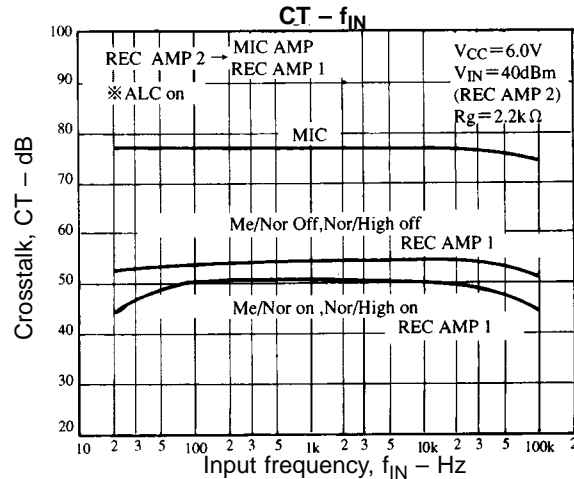
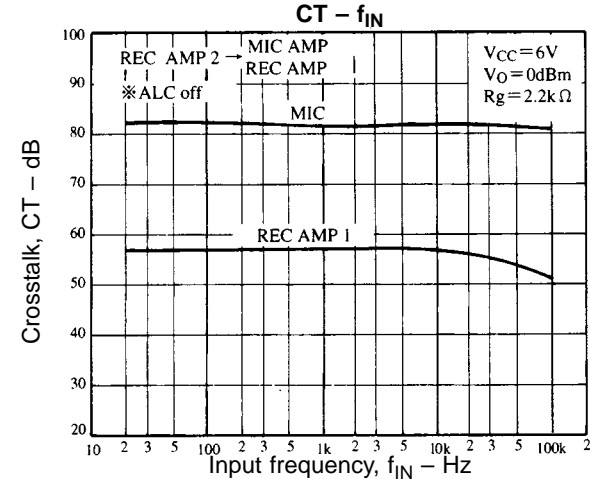
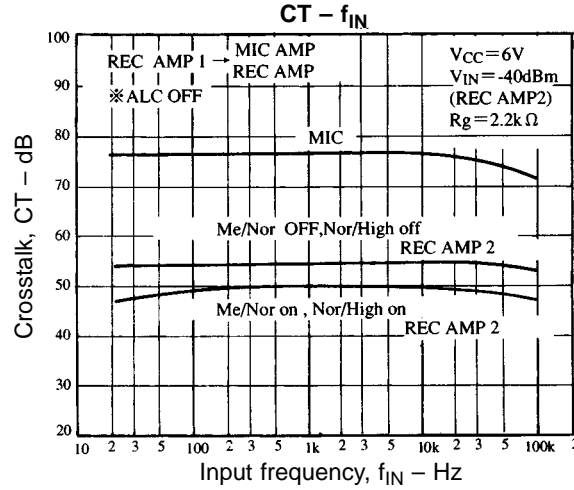
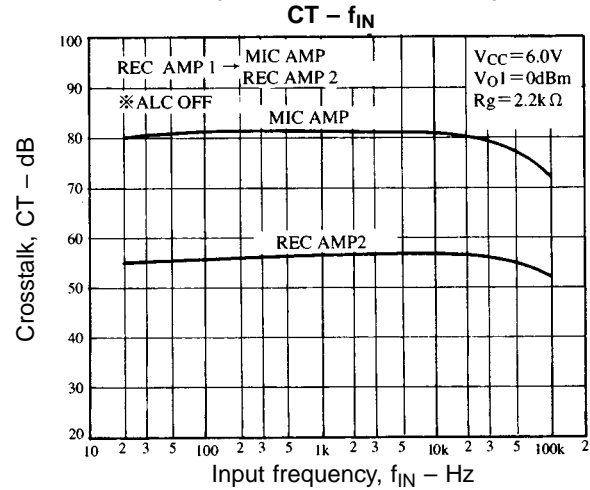
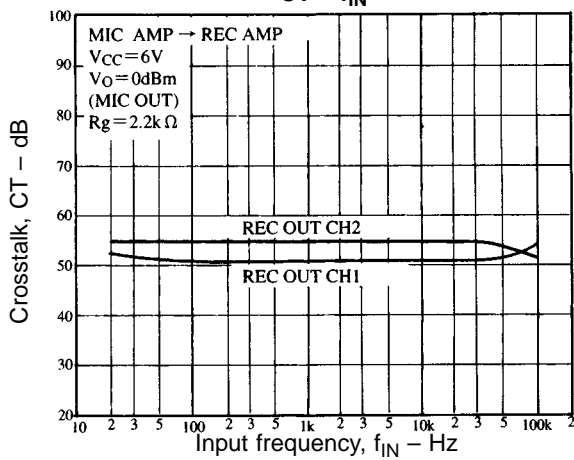
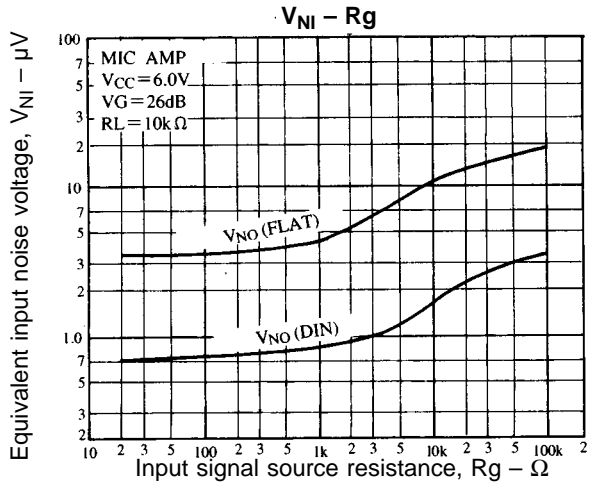
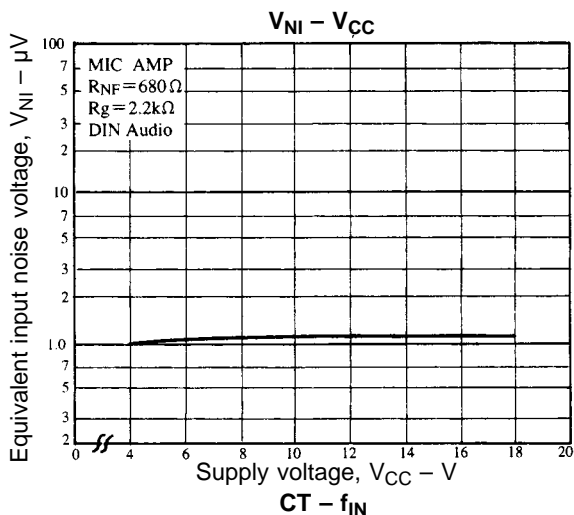
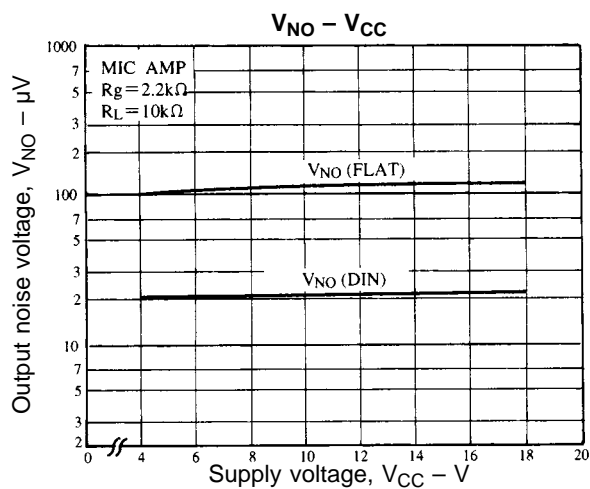
REC amplifier output V_{OAC} is controlled by the ALC CONT voltage and the threshold region has a range of approximately 0.5 V. The ALC CONT voltage is set to 1.0 V or less/1.5 V or greater to turn ON/OFF the ALC, respectively.

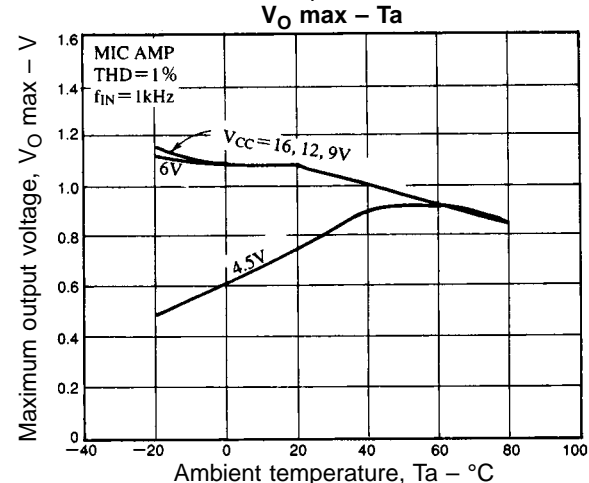
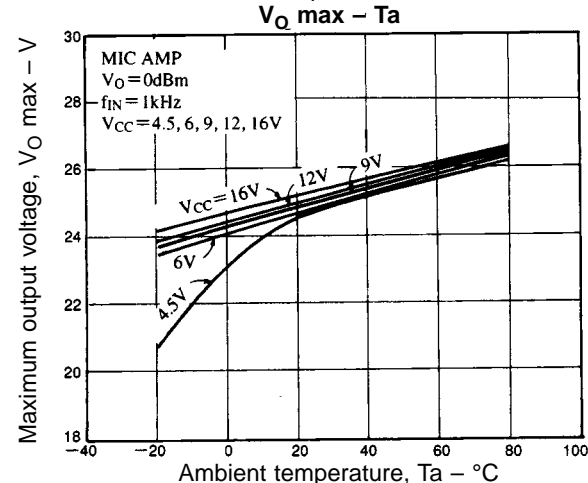
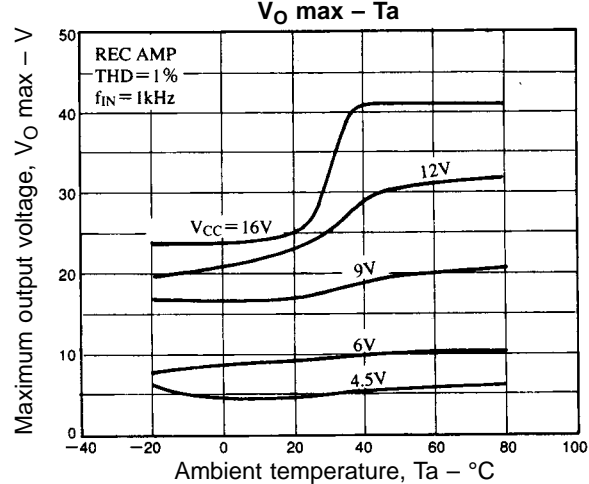
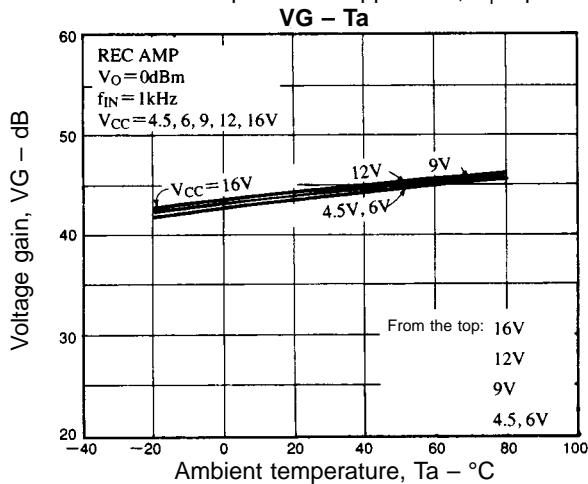
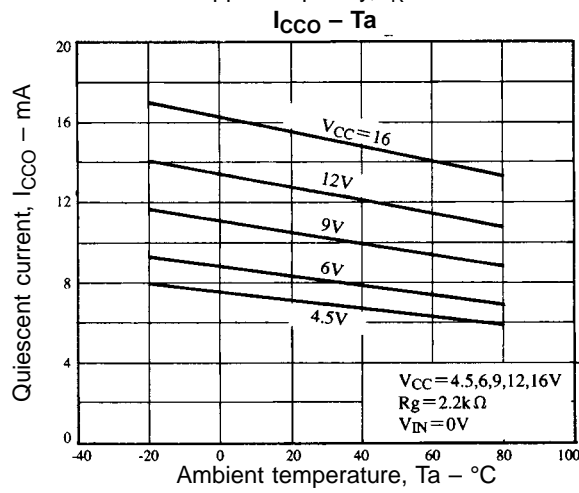
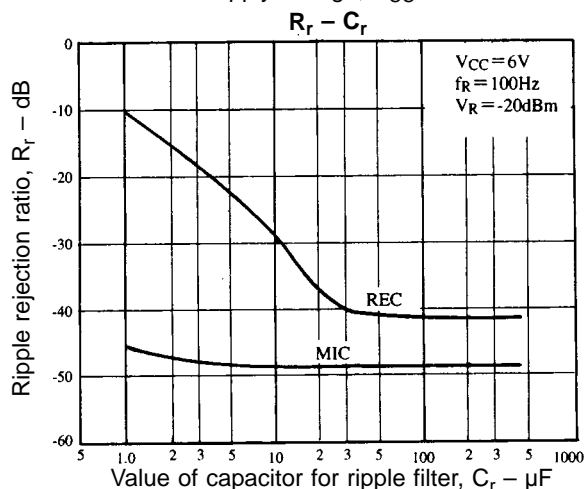
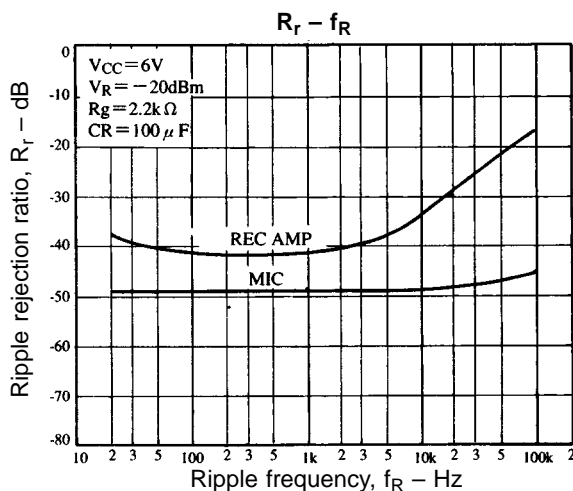
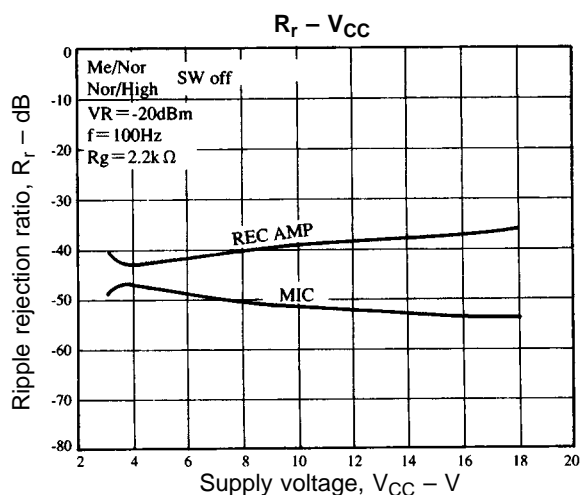
(Refer to Data V_{OAC} , V8, $I_1 - V_{ALC CONT}$.)

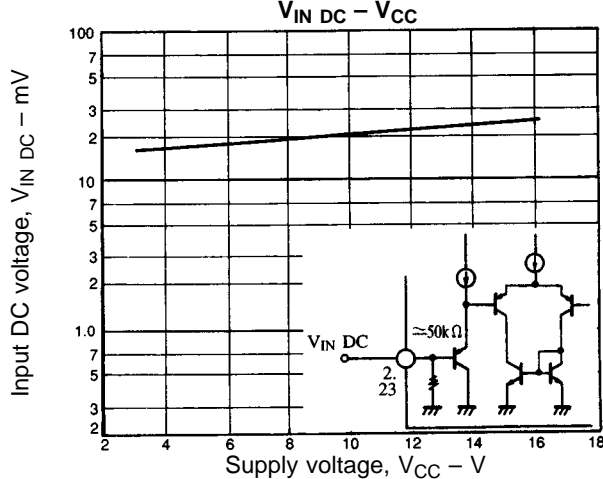
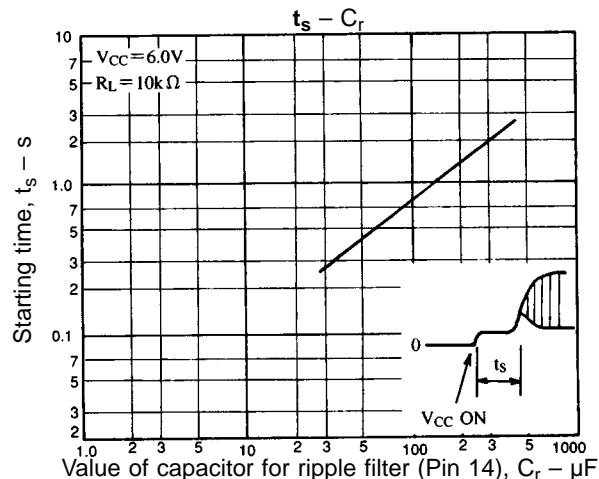
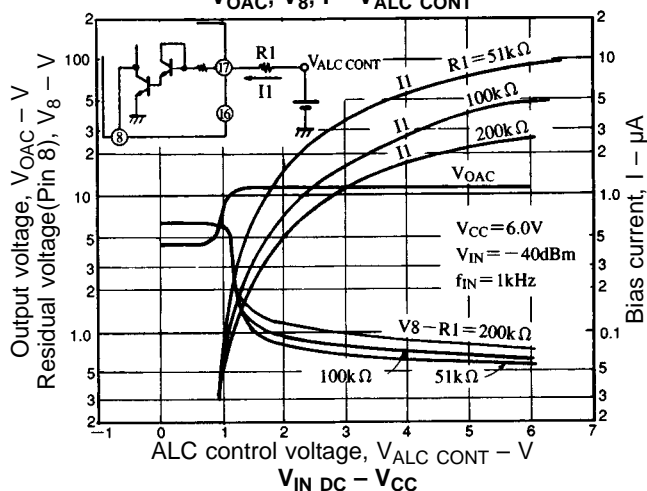
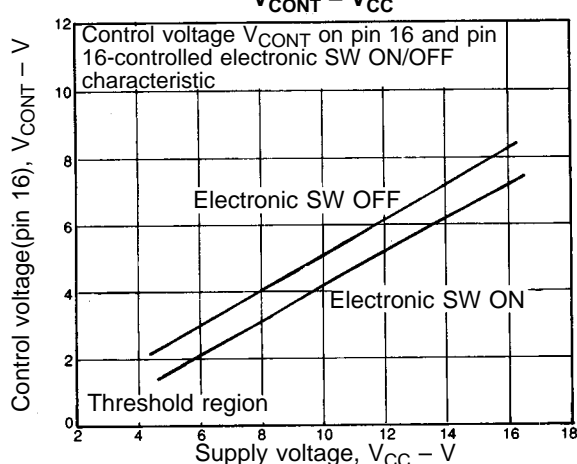
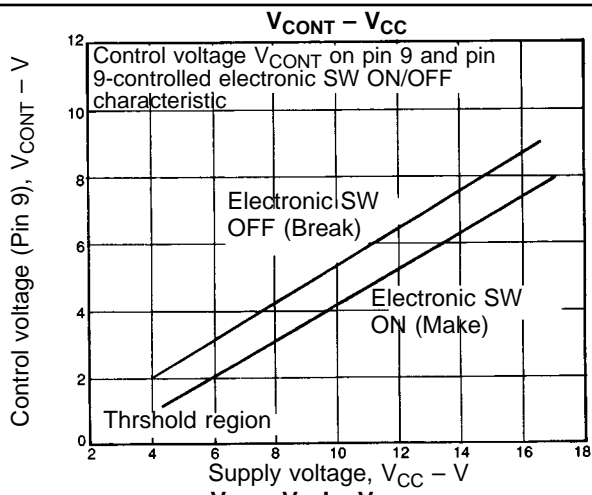
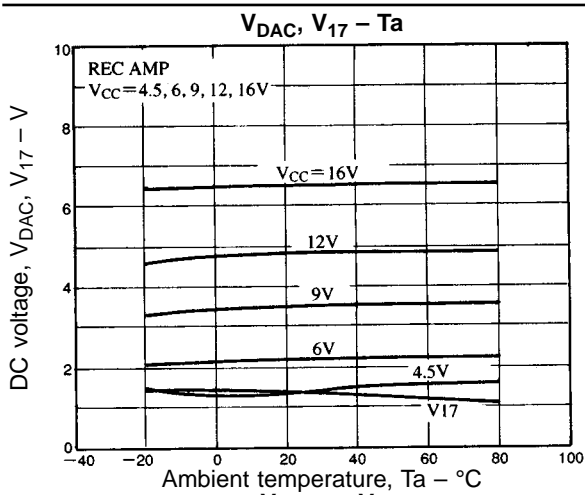












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