HA12206NT

Audio Signal Processor for Cassette Deck

HITACHI

ADE-207-198B (Z)

3rd Edition
Jun. 1999

Description

HA12206NT is silicon monolithic bipolar IC providing music sensor system, ALC, REC equalizer system and each electronic control switch in one chip.

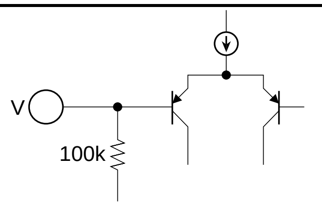
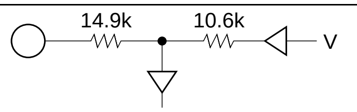
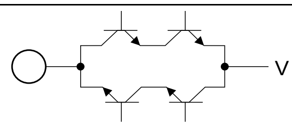
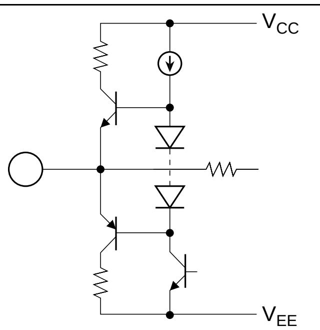
Functions

- REC equalizer × 2 channel
- Line Amp. × 2 channel
- ALC (Automatic Level Control)
- MS (Music Sensor)
- Each electronic control switch to change REC equalizer, bias, etc.
- REC mute

Features

- REC equalizer is very small number of external parts, built-in 2 types of frequency characteristics.
- Correspondence with normal position (TYPE I) / high position (TYPE II).
- TYPE I / TYPE II and PB equalizer fully electronic control switching built-in.
- Controllable from direct micro-computer output.
- Available to reduce substrate-area because of high integration and small external parts.

Pin Description, Equivalent Circuit (V_{CC} = 7.0V, V_{EE} = –7.0V, Ta = 25°C, No signal, The value in the table show typical value.)

Pin No.	Pin Name	Note	Equivalent Circuit	Pin Description
2	PB-Ain (R)	V=0		A Deck PB input
29	PB-Ain (L)			
4	PB-Bin (R)			B Deck PB input
27	PB-Bin (L)			
5	REC-in (R)			REC input
26	REC-in (L)			
9	EQ-in (R)			Equalizer input
22	EQ-in (L)			
12	MIMS			MS Gain control
3	AB out (R)	V = 0		Time constant for NAB standard
28	AB out (L)			
6	ATT (R)	V = 0		Variable impedance for attenuation
25	ATT (L)			
7	RPOUT (R)			REC or PB output
24	RPOUT (L)			

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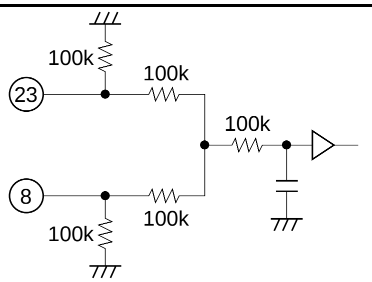
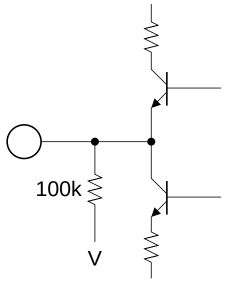
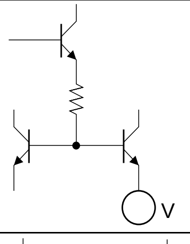
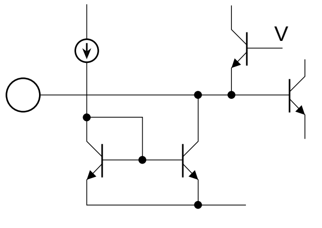
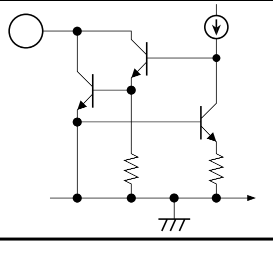
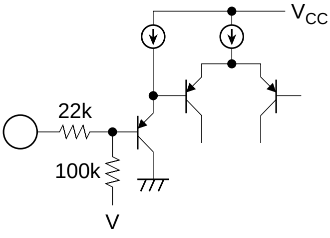
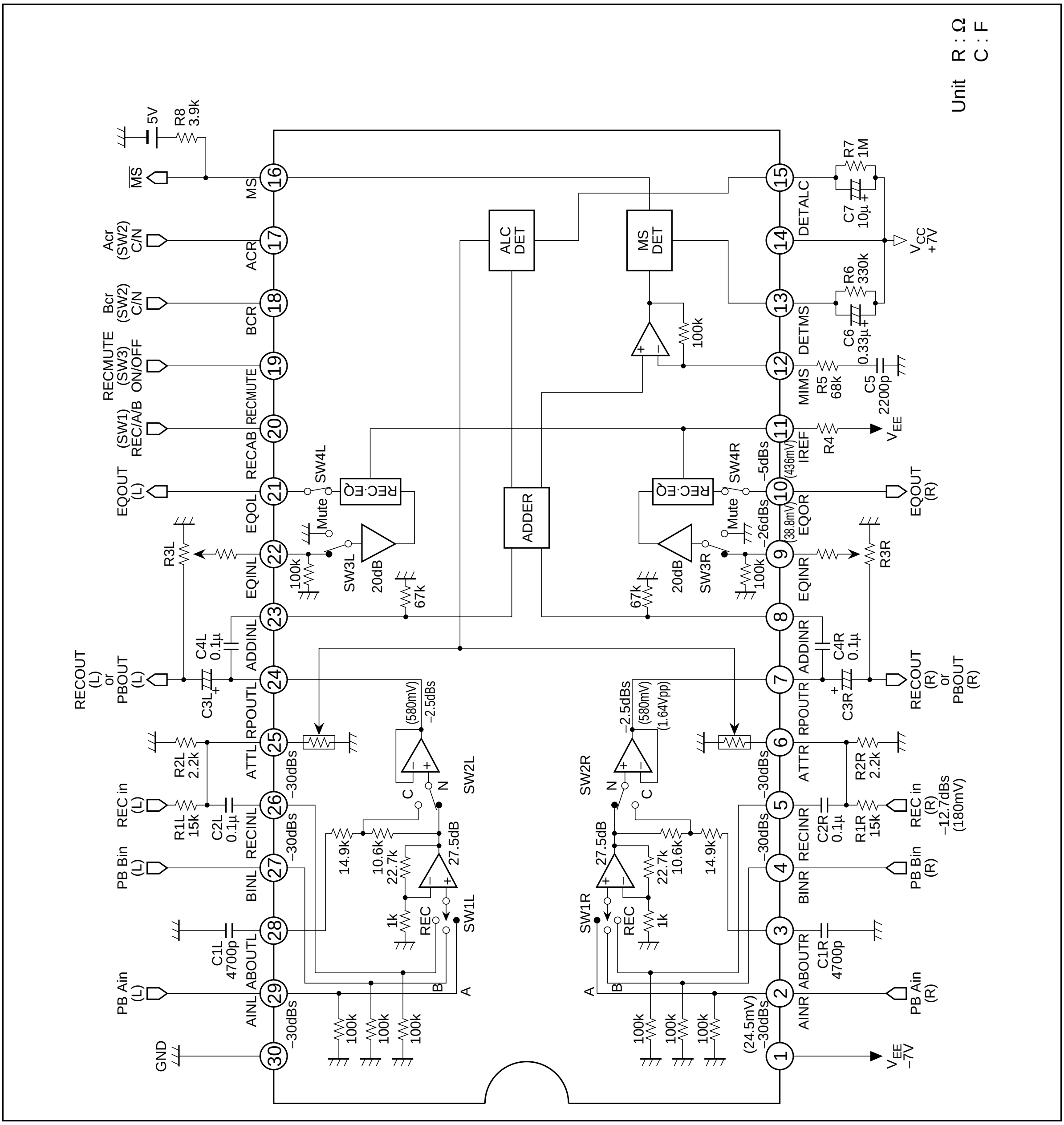
Pin Description, Equivalent Circuit (V_{CC} = 7.0V, V_{EE} = –7.0V, Ta = 25°C, No signal, The value in the table show typical value.) (cont)

Pin No.	Pin Name	Note	Equivalent Circuit	Pin Description
8	ADD in (R)			Adder input
23	ADD in (L)			
10	EQOUT (R)	V = 0V		Equalizer output
21	EQOUT (L)			
11	IREF	V = 1.2V		Equalizer reference current input
13	DET MS	V = V_{CC} – 4.2V		Time constant for rectifier
15	DET ALC	V = 2.3V		
16	MS			MS output

Pin Description, Equivalent Circuit (V_{CC} = 7.0V, V_{EE} = –7.0V, Ta = 25°C, No signal, The value in the table show typical value.) (cont)

Pin No.	Pin Name	Note	Equivalent Circuit	Pin Description
17	Acr	V = 0V		Mode control
18	Bcr			
19	REC MUTE			
20	REC / A / B	V = 2.5V		
1	V_{EE}			V_{EE} pin
14	V_{CC}			V_{CC} pin
30	GND			GND pin

Block Diagram



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Truth Table

Parallel Data Format

		NAB SW Position (SW 2)			
		REC / $\overline{A}$ / $\overline{B}$ (Pin 20)			
Acr (Pin 17)	**Bcr (Pin 18)**	**L**	**M**	**H**	**REC-EQ Mode**
L	L	TYPE I	TYPE I	TYPE I	TYPE I
L	H	TYPE II	TYPE I	TYPE I	TYPE II
H	L	TYPE I	TYPE II	TYPE I	TYPE I
H	H	TYPE II	TYPE II	TYPE I	TYPE II

Line Amp (SW 1)	B	A	REC
ALC	OFF	OFF	*1
REC-EQ Behind (SW 4)	OFF	ON	ON

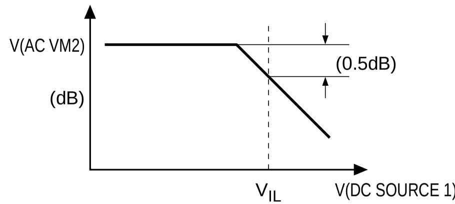
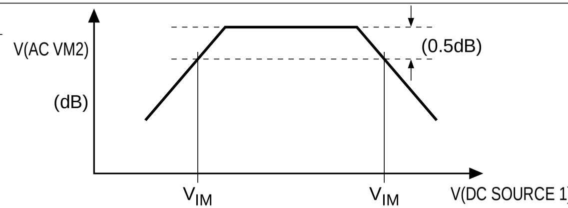
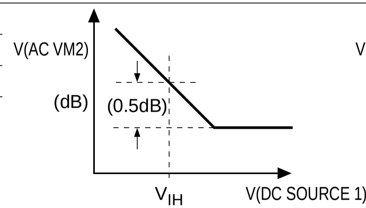
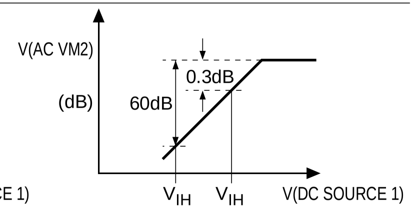
Note: 1. Follow the position of REC-MUTE pin.

REC-MUTE (Pin 19)	REC-EQ Before (SW 3)	ALC
L	Active	ON
H	MUTE	OFF

Control Pin Position Under the Open Case

Acr (Pin 17)	L
Bcr (Pin 18)	L
REC-MUTE (Pin 19)	L
REC / A / B (Pin 20)	M

Test Conditions

Test No.	Symbol	Set No.	SG.	Input	Output	Measure	Other
1	I_Q	1	—	—	—	—	I_Q=I (DC SOURCE 3)
2-1 (VIL)	Acr	2	10kHz, –30dBs	Ain	PBOUT	AC VM2	
	Bcr	3	10kHz, –30dBs	Bin	PBOUT	AC VM2	
	REC-MUTE	4	1kHz, –26dBs	EQin	EQOUT	AC VM2	
	RECAB	5	1kHz, –30dBs	Bin	RPOUT	AC VM2	
2-2 (VIM)	RECAB	5	1kHz, –30dBs	Ain	RPOUT	AC VM2	
2-3 (VIH)	Acr	2	10kHz, –30dBs	Ain	RPOUT	AC VM2	 (Acr, Bcr)  (REC-MUTE) (RECAB)
	Bcr	3	10kHz, –30dBs	Bin	RPOUT	AC VM2	
	REC-MUTE	4	1kHz, –26dBs	EQin	EQOUT	AC VM2	
	RECAB	5	1kHz, –30dBs	RECin	RPOUT	AC VM2	
3-1	G_V(1)	6	1kHz, –30dBs	Ain	RPOUT	AC VM1 AC VM2	G_V=20 log {V(AC VM2) / V(AC VM1)}
3-2	G_V(2)	7	1kHz, –30dBs	Bin	RPOUT	AC VM1 AC VM2	G_V=20 log {V(AC VM2) / V(AC VM1)}
3-3	G_V(3)	8	10kHz, –30dBs	Bin	RPOUT	AC VM1 AC VM2	G_V=20 log {V(AC VM2) / V(AC VM1)}
3-4	G_V(4)	9	1kHz, –30dBs	RECin	RPOUT	AC VM2	Vi=V(AC VM2) at SW5, SW6=REC G_V=20 log {V(AC VM2 / Vi)}
4	Vomax	6	1kHz	Ain	RPOUT	AC VM2	Vo=V(AC VM2) at T.H.D=1% Vomax=20 log (Vo / 580mV)
5-1	THD(1)	6	1kHz, –30dBs	Ain	RPOUT	Distortion Analyzer	400 to 30kHz BPF
5-2	THD(2)	9	1kHz, –0.7dBs	RECin	RPOUT	Distortion Analyzer	400 to 30kHz BPF

Test Conditions (cont)

Test No.	Symbol	Set No.	SG.	Input	Output	Measure	Other
6-1	S/N (1)	6	—	—	RPOUT	—	S/N=20 log {580mV / V(Noise)} CCIR / ARM
6-2	S/N (2)	9	—	—	RPOUT	—	S/N=20 log {580mV / V(Noise)} CCIR / ARM
7	CT R/L	10	1kHz, –18dBs*	Ain	RPOUT	AC VM2	CT=20 log {580mV / V(AC VM2)}
8	CT A/B	11	1kHz, –18dBs*	Ain/Bin	RPOUT	AC VM2	CT=20 log {580mV / V(AC VM2)}
9	ALC	12	1kHz, –0.7dBs	RECin	RPOUT	AC VM2	ALC=20 log {V(AC VM2) / 580mV}
10	V_{ON}	6	5kHz	Ain	RPOUT	AC VM2 DC VM	V_{ON}=20 log {V(AC VM2) / 580mV} at DC VM=⌉↓⌊
11	V_{OL}	6	1kHz, –30dBs	Ain	RPOUT	DC VM	
12-1	G_V REC N1	13	1kHz, –46dBs	EQin	EQout	AC VM2	G_V REC=20 log {V(AC VM2) / V(AC VM1)}
12-2	G_V REC N2	13	8kHz, –46dBs	EQin	EQout	AC VM2	G_V REC=20 log {V(AC VM2) / V(AC VM1)}
12-3	G_V REC N3	13	12kHz, –46dBs	EQin	EQout	AC VM2	G_V REC=20 log {V(AC VM2) / V(AC VM1)}
13-1	G_V REC C1	13	1kHz, –46dBs	EQin	EQout	AC VM2	G_V REC=20 log {V(AC VM2) / V(AC VM1)}
13-2	G_V REC C2	13	8kHz, –46dBs	EQin	EQout	AC VM2	G_V REC=20 log {V(AC VM2) / V(AC VM1)}
13-3	G_V REC C3	13	12kHz, –46dBs	EQin	EQout	AC VM2	G_V REC=20 log {V(AC VM2) / V(AC VM1)}
14	R-MUTE ATT	14	1kHz, –14dBs*	EQin	EQout	AC VM2	R-MUTE ATT=20 log {436mV / V(AC VM2)}
15	Vomax REC	13	1kHz	EQin	EQout	AC VM2	at T.H.D=1%
16	THD REC	13	1kHz, –26dBs	EQin	EQout	Distortion Analyzer	400 to 30kHz BPF
17	S/N REC	13	—	—	EQout	Noise Meter	S/N=20 log {436mV / V(AC VM2)}

Note: or large level without dipping

Test Conditions (cont)

SW Position (Pre-Set for Each TEST)

Set No.	SW-Position 1	2	3	4	5	6	7	8	9	10	DC-SOURCE(V) 1	2	3	4
1	OFF	*1	*1	*1	*1	*1	L	L	L	M	2.5V	5V	–7V	–7V
2	*2	A	A	*2	RP	RP	M	L	L	OFF	0 to V_{CC}	5V	–7V	–7V
3	*2	B	B	*2	RP	RP	L	M	L	L	0 to V_{CC}	5V	–7V	–7V
4	*2	EQ	EQ	*2	EQ	EQ	L	L	M	H	0 to V_{CC}	5V	–7V	–7V
5	*2	B	B	*2	RP	RP	L	L	L	M	0 to V_{CC}	5V	–7V	–7V
6	*2	A	A	*2	RP	RP	L	L	H	M	2.5V	5V	–7V	–7V
7	*2	B	B	*2	RP	RP	L	L	H	L	*1	5V	–7V	–7V
8	*2	B	B	*2	RP	RP	L	H	H	L	*1	5V	–7V	–7V
9	*2	REC	REC	*2	RP	RP	L	L	H	H	*1	5V	–7V	–7V
10	R⇔L	A	A	L⇔R	RP	RP	L	L	H	M	2.5V	5V	–7V	–7V
11	*2	A⇔B	A⇔B	*2	RP	RP	L	L	H	L⇔M	2.5V	5V	–7V	–7V
12	*2	REC	REC	*2	RP	RP	L	L	L	H	*1	5V	–7V	–7V
13	*2	EQ	EQ	*2	EQ	EQ	L	L	L	M	2.5V	5V	–7V	–7V
14	*2	EQ	EQ	*2	EQ	EQ	L	L	H	M	2.5V	5V	–7V	–7V
15	*2	A	A	*2	RP	RP	L	L	H	M	2.5V	5V	–6V	–6V
16	*2	EQ	EQ	*2	EQ	EQ	L	L	L	M	2.5V	5V	–6V	–6V

Note: 1. Either will do
2. Measured channel Lch or Rch

Functional Description

Power Supply Range

Table 1 Supply Voltage

Item	Power Supply Range		
	V_{CC}	V_{EE}	$\vert V_{CC} \vert - \vert V_{EE} \vert$
Single Supply	6.0V to 7.5V	–7.5V to –6.0V	Inside 1.0V

Note: HA12206NT is designed to operate on split supply.

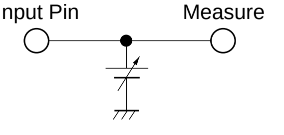
As V_{EE} pin is joined the substrate of chip, there is the possibility of latch-up in such case that the other pin is supplied a voltage and V_{EE} pin is open.

Therefore please use as V_{EE} pin become the lowest voltage of low impedance all the time. When power supply is thrown into this IC, that caution is necessary especially.

Operating Mode Control

HA12206NT provides fully electronic switching circuits. And each operating mode control is controlled by parallel data (DC voltage).
Table 2 shows the control voltage of each control input pin.

Table 2 Control Voltage

Pin No.	Lo	Mid	Hi	Unit	Test Condition
17, 18, 19	0.0 to 1.0	—	4.0 to V_{CC}	V	
20	0.0 to 1.0	2.0 to 3.0	4.0 to V_{CC}	V	

Note: 1. Each pin is pulled down with 100kΩ internal resistor. 17 to 19 pins are low-level, 20 pin is mid-level, when each pin is open.
2. Over shoot level and under shoot level of input signal must be the standardized.
(High: Less than V_{CC}, Low: More than –0.2V)

PB Equalizer

By switching logical input level of pin17 (for Ain) or pin18 (for Bin), you can equalize corresponding to tape position at play back mode.

Frequency characteristics of high position (TYPE II) depends on capacitor C1 on the block diagram figure.

Figure 1 is shown by a motive of the NAB standard.

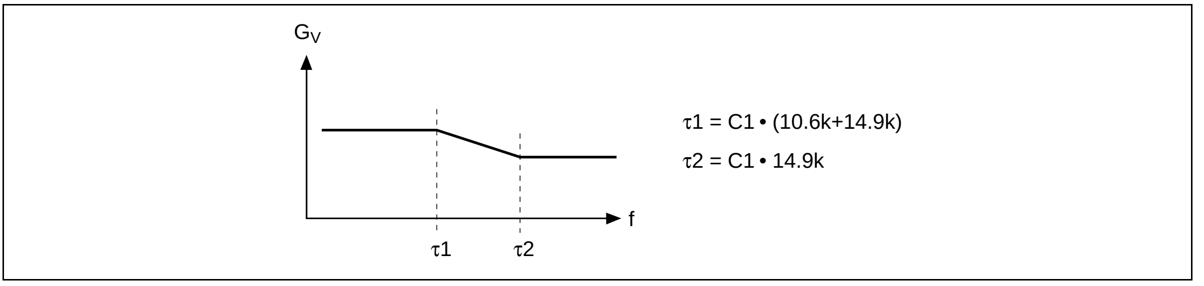


Figure 1 Frequency Characteristics of PB Equalizer

Music Sensor

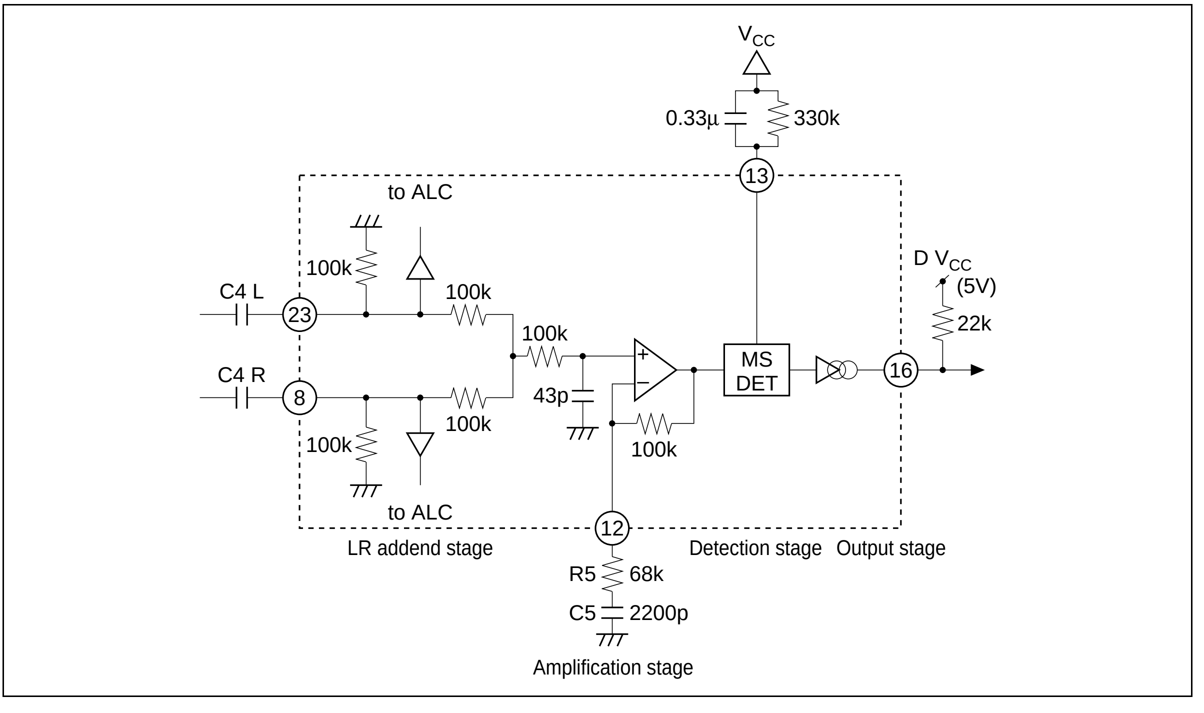
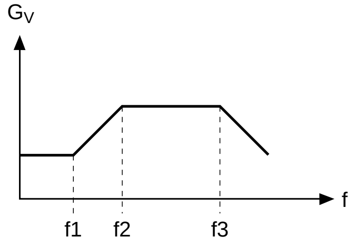


Figure 2 Music Sensor Block Diagram

The Sensitivity of Music Sensor

Frequency characteristics of MS amplification stage is shown by figure 3.



$$f1 = \frac{1}{2\pi \bullet C5 \bullet (R5 + 100k)} \quad [Hz]$$

$$f2 = \frac{1}{2\pi \bullet C5 \bullet R5} \quad [Hz]$$

$$f3 = 25k \quad [Hz]$$

Figure 3 Frequency Characteristic of MS AMP

Occasion of the external component of figure 2, f1 is 430Hz and f2 is 1.1kHz.
As the MS sensitivity is prescribed at 5kHz, this stage's gain is 7.9dB. But in only one-sided channel input case, this gain is considered as –6dB down, because the other channel input pin is imaginary earth. That is, the gain from RPOUT to MSDET is 1.86dB.
As the detection sensitivity at MSDET is fixed 130mVrms, the sensitivity at RPOUT (8 pin or 23 pin) is calculated by the following formula.

$$\frac{130mV}{10 \text{ ^ } \frac{1.86}{20}} = 105mV$$

Because of RPOUT=580mVrms=0dB, therefore, the MS sensitivity becomes –14.8dB.
That is the detection level.

Time Constant of Detection

Figure 4 (1) generally shows that detection time is in proportion to value of capacitor C16. But, with Attack*[1] and Recovery*[2] the detection time differs exceptionally.

Note: 1. Attack : Non-music → Music
2. Recovery : Music → Non-music

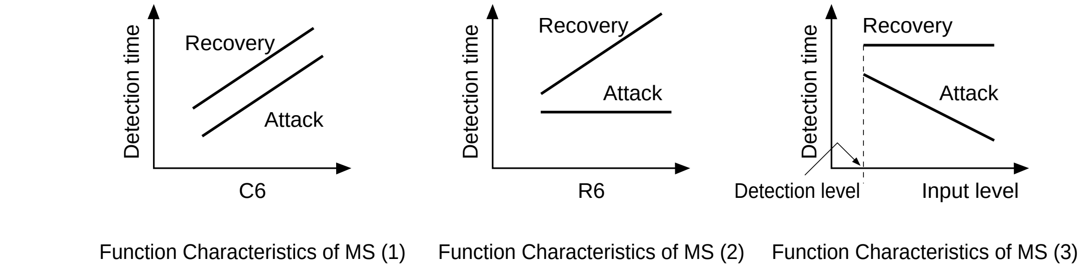


Figure 4 Function Characteristic of MS

Like the figure 4 (2), Recovery time is variably possible by value of resistor R6. But Attack time gets about fixed value. Attack time has dependence by input level. When a large signal is inputted, Attack time is short tendency.

Music Sensor Output (MSOUT)

Because MS out pin is connected to the collector of NPN type directly, it is requested to use pull up resistor (RL=10k to 22kΩ)
Output level is “High” sensing no signal. And output level is “Low” sensing signal.
Please take notice of MS Low level voltage (GND+0.9V).
The connected supply voltage must be less than V_{CC} voltage, with MSOUT pull up resistor.

Automatic Level Control (ALC)

ALC is the input decay rate variable system.
It has internal variable resistors of pin6 (pin25) by RECOUT signal that is inputted to pin8 (pin23).
The operation is similitude to MS, detected by pin15.
The signal input pin is pin5 (pin26). Resistor R1, R2 and capacitor C2, external components, for the input circuit are commended as figure 6. These are requested to use value of the block diagram figure for performance maintenance of S/N, T.H.D. etc.
Figure 5 shows the relation with R1 front REC IN point and RPOUT.
ALC operation level is 775mVrms {standard level (580mVrms) +2.5dB}. And it is designed to operate from 0dB to +15dB as 775mVrms=0dB.
Adopted maximum value circuit, ALC is operated by a large channel of a signal.
ALC on/off is linked with REC mute. When REC mute is on, ALC is off.

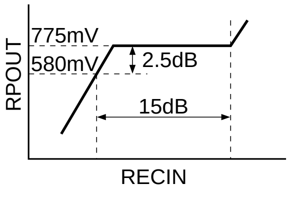


Figure 5 ALC Operation Level

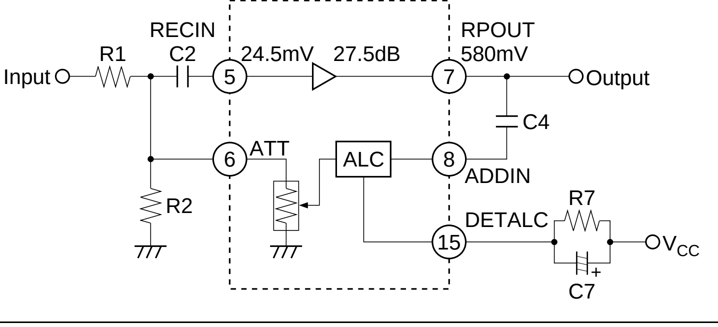


Figure 6 ALC Block Diagram

REC-Equalizer

REC mute is located at input-part of REC-equalizer. Therefore it has realized low pop noise.
But because there is deference DC offset at the each mode of REC-equalizer, it is necessary for a coupling capacitor between EQOUT pin and recording head.

Absolute Maximum Rating (Ta = 25°C)

Item	Symbol	Rating	Unit	Note
Max supply voltage	V_{CC} max	+8	V	
Max supply voltage	V_{EE} max	–8	V	
Power dissipation	Pd	500	mW	Ta≤75°C
Operating temperature	Topr	–40 to +75	°C	
Storage temperature	Tstg	–55 to +125	°C	
Operating voltage	Vopr	V_{CC}=–V_{EE}=6 to 7.5	V	

Electrical Characteristics (Ta=25°C, V_{CC}=±7.0V (V_{EE}), 0dB=580mVrms=–2.52dBs (Vout))

Item	Symbol	Min	Typ	Max	Unit	Test Condition: IC Condition: REC/A/B	REC MUTE	Acr	Bcr	fin (Hz)	Vin (dBs)	Other	Application Terminal: Input R	Input L	Output R	Output L	COM	Note
Quiescent current	I_Q	10.0	16.0	22.0	mA	A	Active	TYPE I	TYPE I	—	—	No signal					14	
Logical threshold	V_{IL}	–0.2	—	1.0	V	—	—	—	—	—	—						17 to 20	
	V_{IM}	2.0	—	3.0	V	—	—	—	—	—	—						20	
	V_{IH}	4.0	—	V_{CC}	V	—	—	—	—	—	—						17 to 20	
Line amp. gain	$G_V(1)$	26.0	27.5	29.0	dB	A	Mute	TYPE I	TYPE I	1k	–30	0dB	2	29	7	24		
	$G_V(2)$	26.0	27.5	29.0	dB	B	Mute	TYPE I	TYPE I	1k	–30	0dB	4	27	7	24		
	$G_V(3)$	20.9	22.9	24.9	dB	B	Mute	TYPE I	TYPE II	10k	–30	0dB	4	27	7	24		
	$G_V(4)$	26.0	27.5	29.0	dB	REC	Mute	TYPE I	TYPE I	1k	–30	0dB	5	26	7	24		
Maximum output	Vomax	12.0	13.0	—	dB	A	Mute	TYPE I	TYPE I	1k	—	THD=1%	2	29	7	24		1
THD	THD(1)	—	0.05	0.3	%	A	Mute	TYPE I	TYPE I	1k	–30	0dB, BW 400Hz to 30kHz	2	29	7	24		
	THD(2)	—	1.0	3.0	%	REC	Active	TYPE I	TYPE I	1k	–0.7	+12dB (ALC ON) BW 400Hz to 30kHz	5	26	7	24		2
Signal to noise ratio	S/N(1)	70	78	—	dB	A	Mute	TYPE I	TYPE I	—	—	Rg=10kΩ, CCIR/ARM S=580mVrms	2	29	7	24		
	S/N(2)	73	81	—	dB	REC	Mute	TYPE I	TYPE I	—	—	Rg=2.2kΩ, CCIR/ARM S=580mVrms	2	29	7	24		
Channel separation	CT R/L	70	80	—	dB	A	Mute	TYPE I	TYPE I	1k	–18	+12dB	2	29	24	7		
Crosstalk	CT A/B	60	70	—	dB	A/B	Mute	TYPE I	TYPE I	1k	–18	+12dB	2 4	29 27	7	24		
ALC operation level	ALC	0.0	2.5	5.5	dB	REC	Active	TYPE I	TYPE I	1k	–0.7	+12dB (ALC ON)	5	26	7	24		2, 3
MS sensing level	V_{ON}	–18.7	–14.7	–10.7	dB	A	Mute	TYPE I	TYPE I	5k	—		2	29	7	24		3
MS output low level	V_{OL}	—	1.0	1.5	V	A	Mute	TYPE I	TYPE I	—	—		2	29	7	24	16	

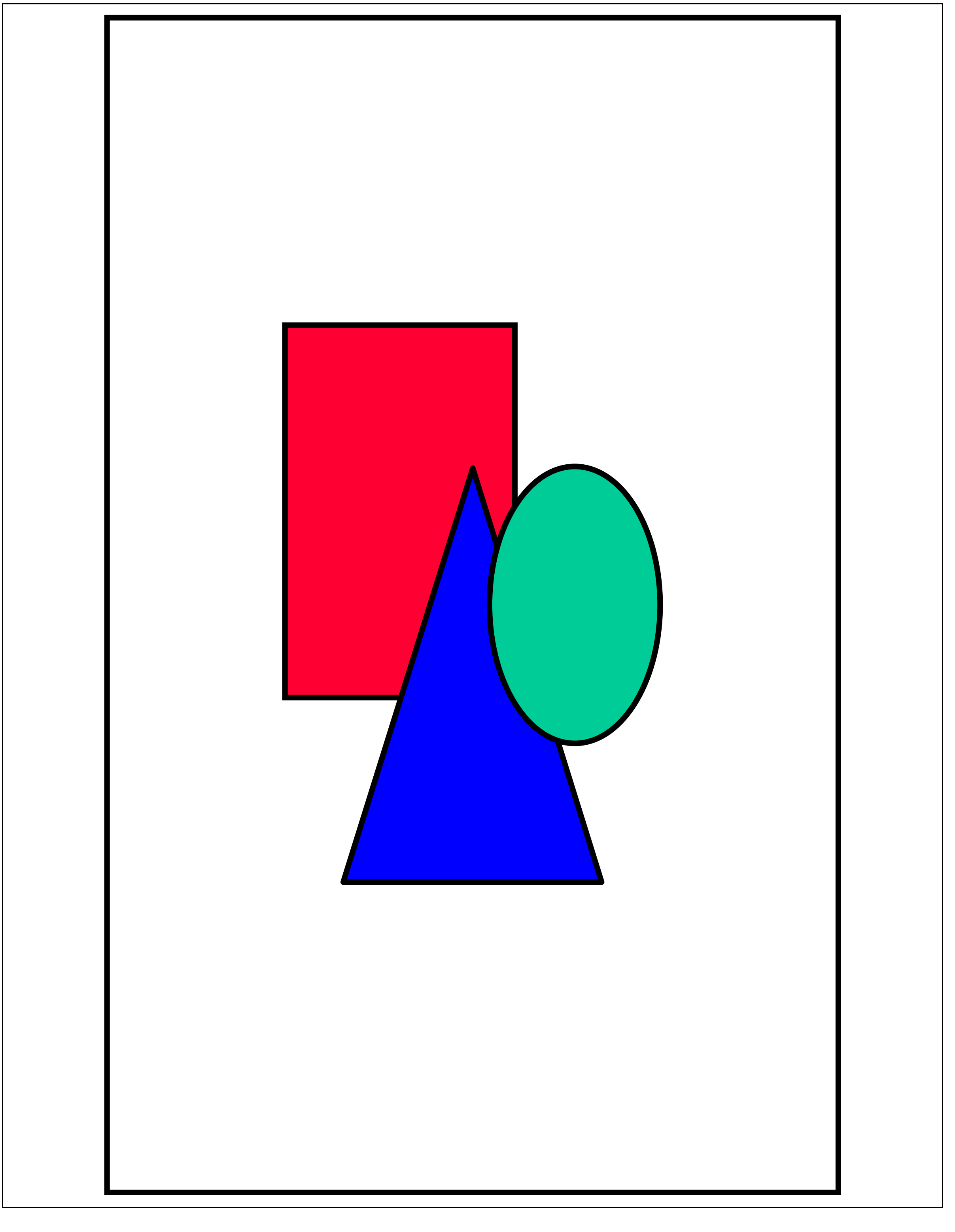
Note: 1. $V_{CC}(V_{EE})$ = ±6.0V
2. From REC in point
3. For inputting signal to one side channel

Electrical Characteristics (Ta=25°C, V_{CC}=±7.0V (V_{EE}), 0dB=580mVrms=–2.52dBs (Vout)) (cont)

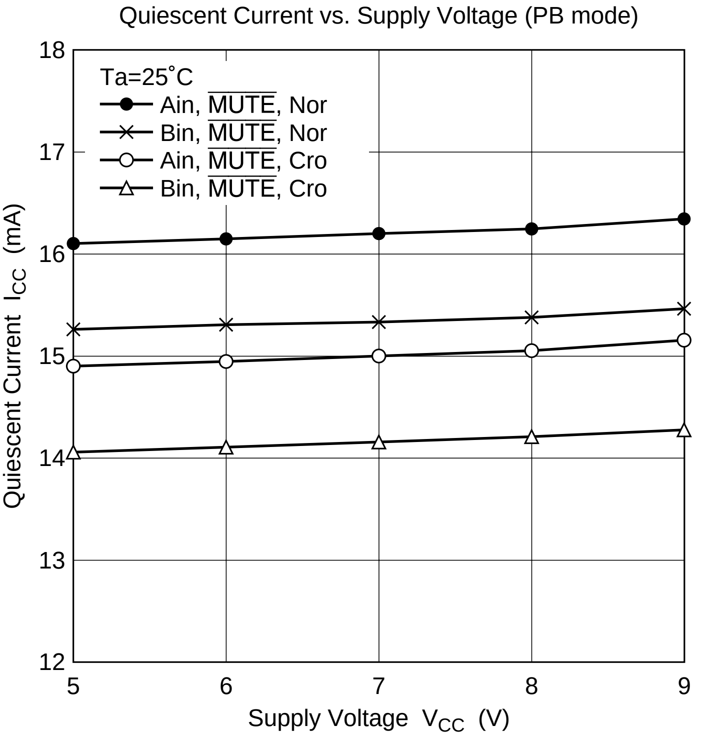
Item	Symbol	Min	Typ	Max	Unit	Test Condition: IC Condition: REC/ A/B	REC-MUTE	Acr	Bcr	fin (Hz)	EQin (dBs)	Other	Application Terminal: Input R	Input L	Output R	Output L	COM	Note
REC-EQ frequency response Normal speed Normal tape	G_V REC-N1	18.7	20.2	21.7	dB	A	Active	TYPE I	TYPE I	1k	–46		9	22	10	21		
	G_V REC-N2	23.1	25.1	27.1	dB	A	Active	TYPE I	TYPE I	8k	–46		9	22	10	21		
	G_V REC-N3	28.4	31.4	34.4	dB	A	Active	TYPE I	TYPE I	12k	–46		9	22	10	21		
REC-EQ frequency response Normal speed Chrom tape	G_V REC-C1	22.6	24.1	25.6	dB	A	Active	TYPE I	TYPE II	1k	–46		9	22	10	21		
	G_V REC-C2	28.5	30.5	32.5	dB	A	Active	TYPE I	TYPE II	8k	–46		9	22	10	21		
	G_V REC-C3	33.2	36.4	39.4	dB	A	Active	TYPE I	TYPE II	12k	–46		9	22	10	21		
REC-MUTE attenuation	R-MUTE ATT	70	80	—	dB	A	Mute	TYPE I	TYPE I	1k	–14	+12dB	9	22	10	21		
REC-EQ maximum output	Vomax REC	4.0	7.0	—	dBs	A	Active	TYPE I	TYPE I	1k	—	THD=1%	9	22	10	21		4
REC-EQ THD	THD REC	—	0.35	0.7	%	A	Active	TYPE I	TYPE I	1k	–26		9	22	10	21		
REC-EQ S/N	S/N REC	52	60	—	dB	A	Active	TYPE I	TYPE I	—	—	Rg=5.1kΩ, A-WTG S=–5dBs	9	22	10	21		

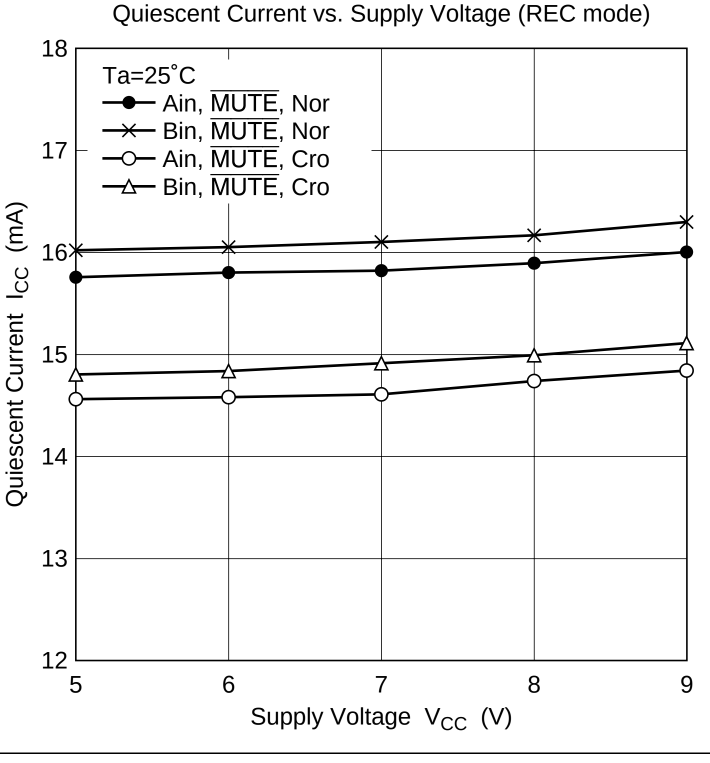
Note: 4. V_{CC}=±6.0V (V)

Test Circuit

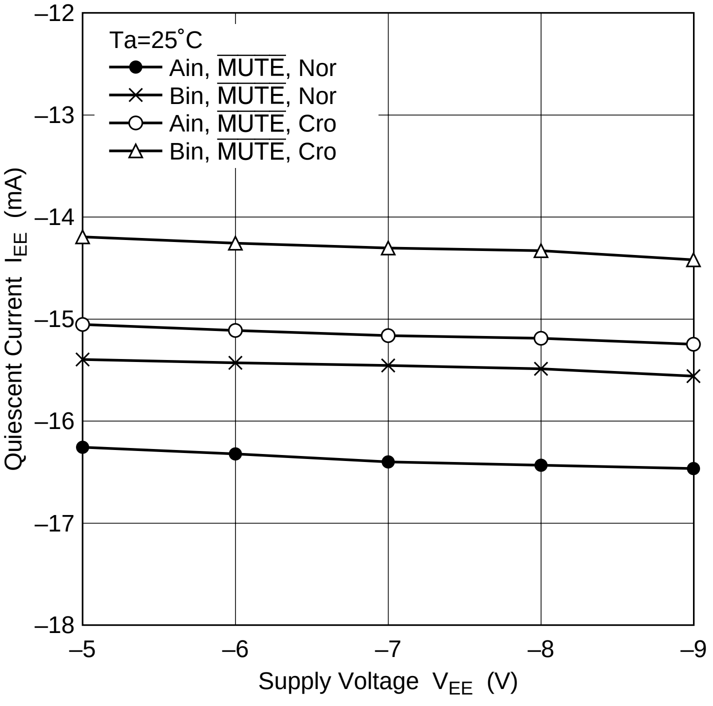


Characteristic Curves

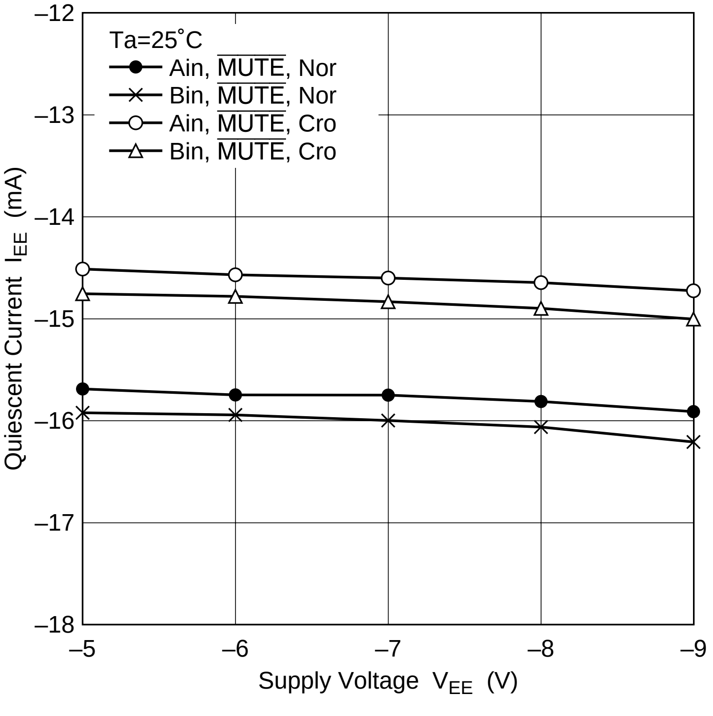




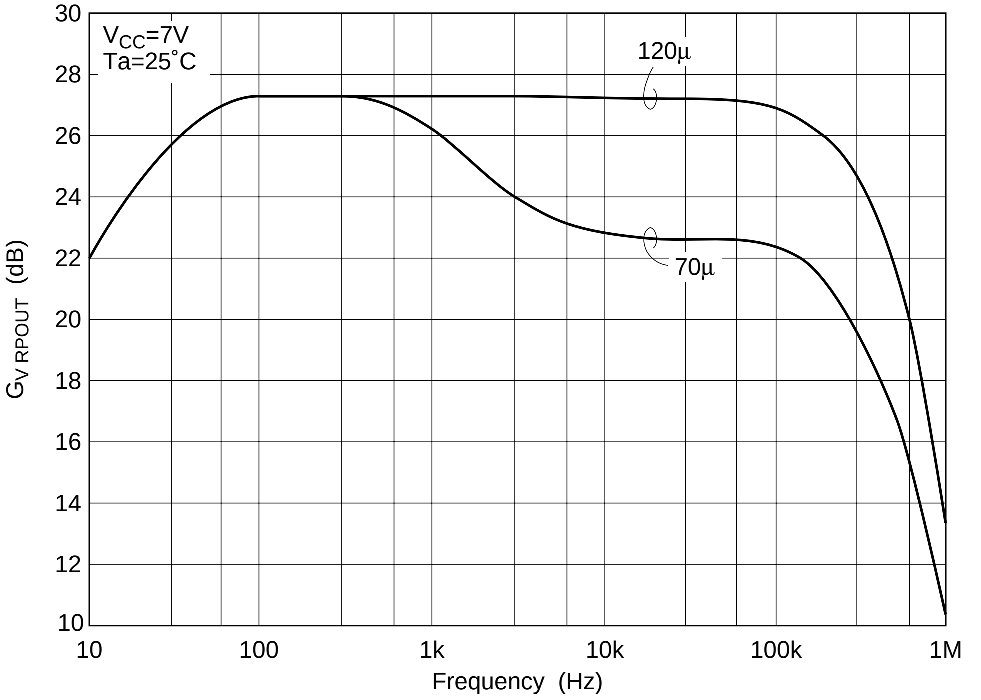
Quiescent Current vs. Supply Voltage (PB mode)



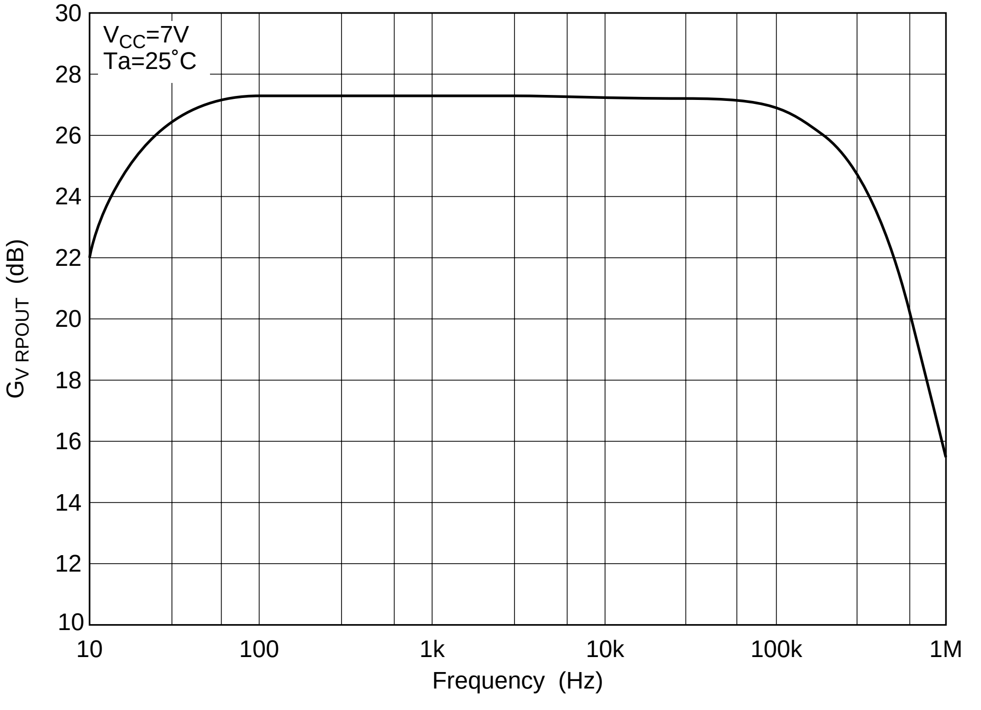
Quiescent Current vs. Supply Voltage (REC mode)



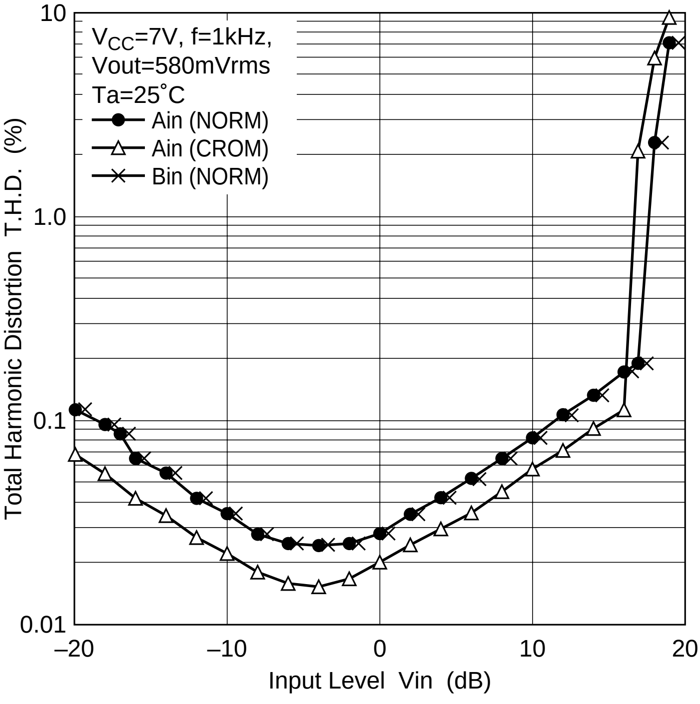
RPOUT vs. Frequency (1) Ain mode



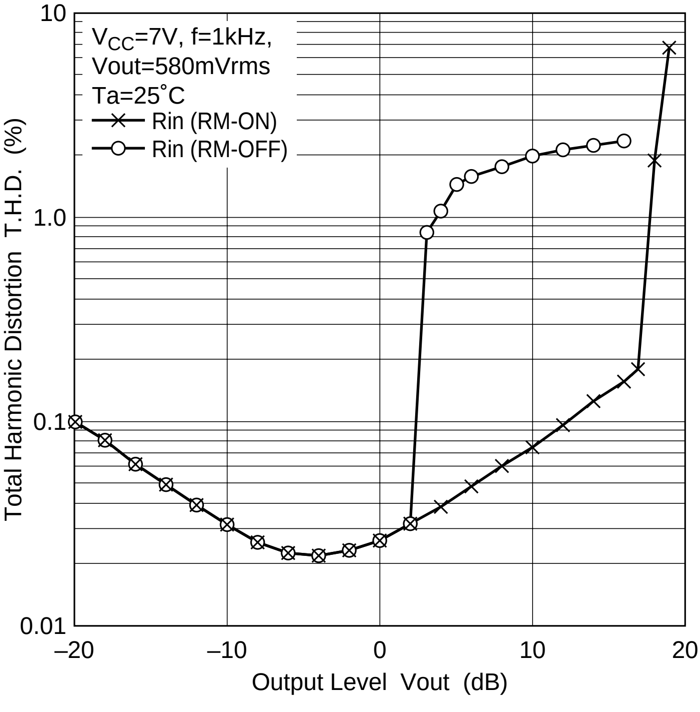
RPOUT vs. Frequency (2) Rin mode

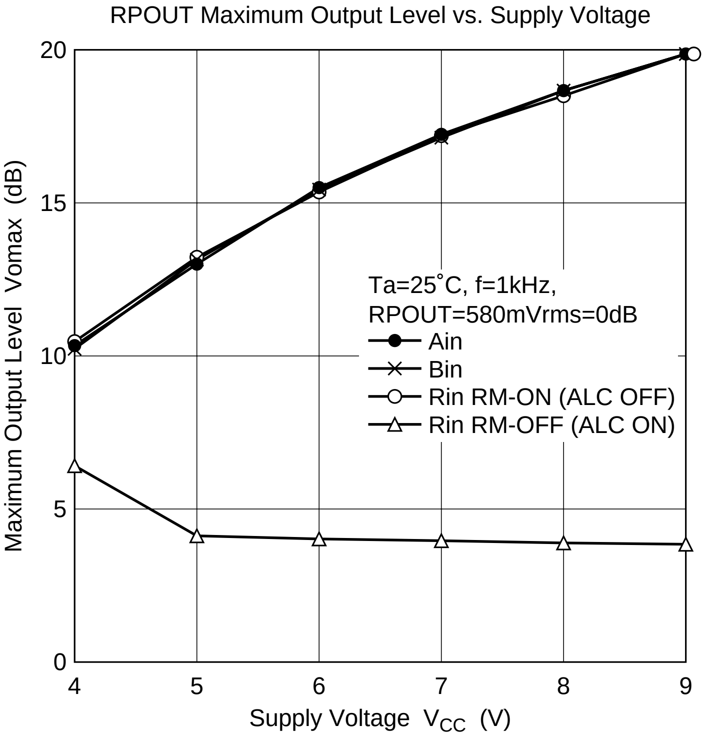


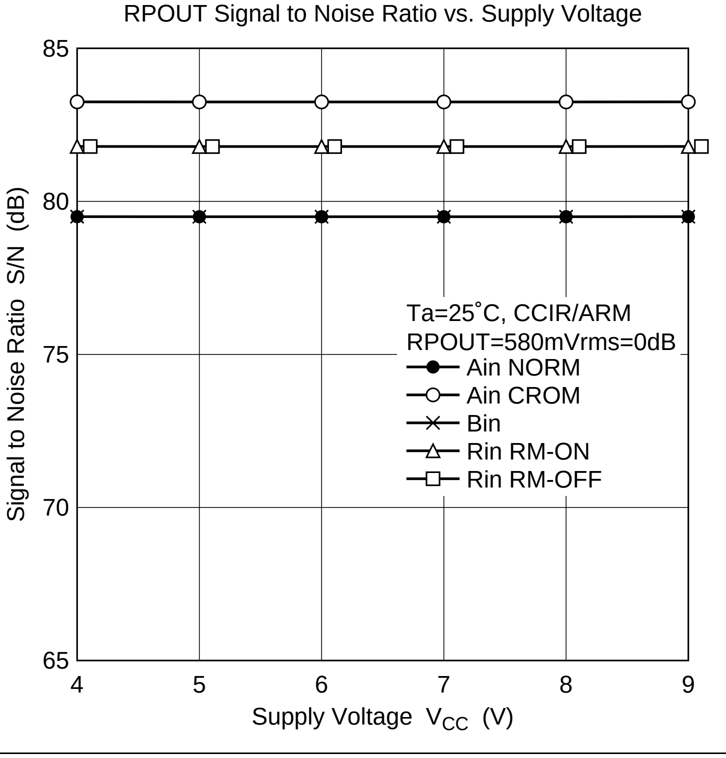
RPOUT Total Harmonic Distortion vs. Input Level

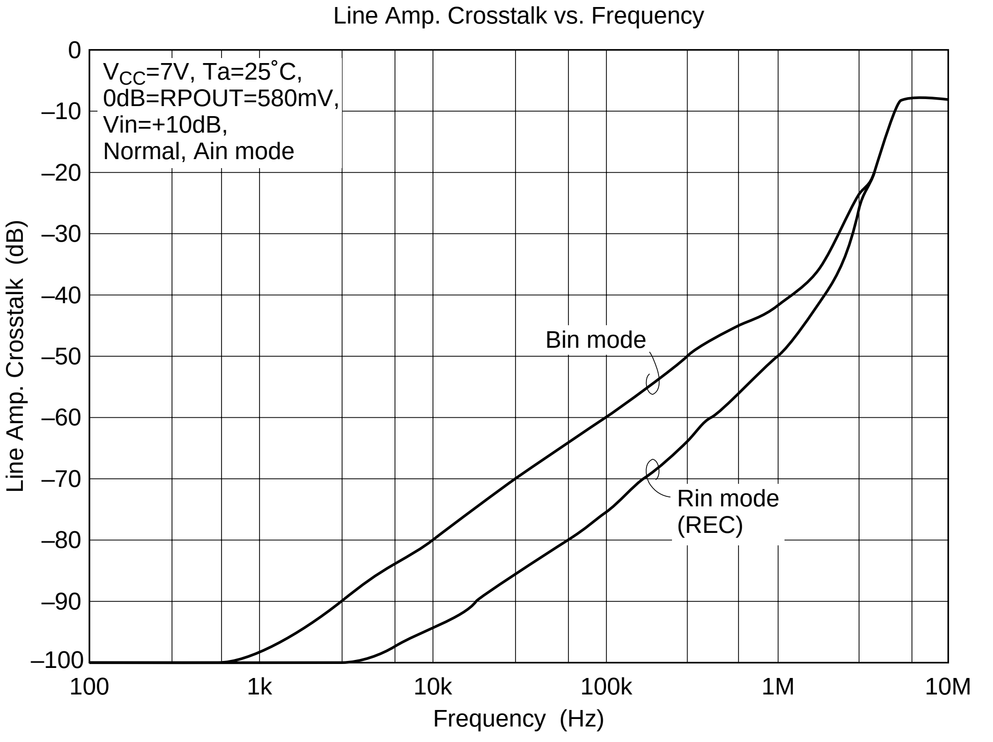


RPOUT Total Harmonic Distortion vs. Output Level

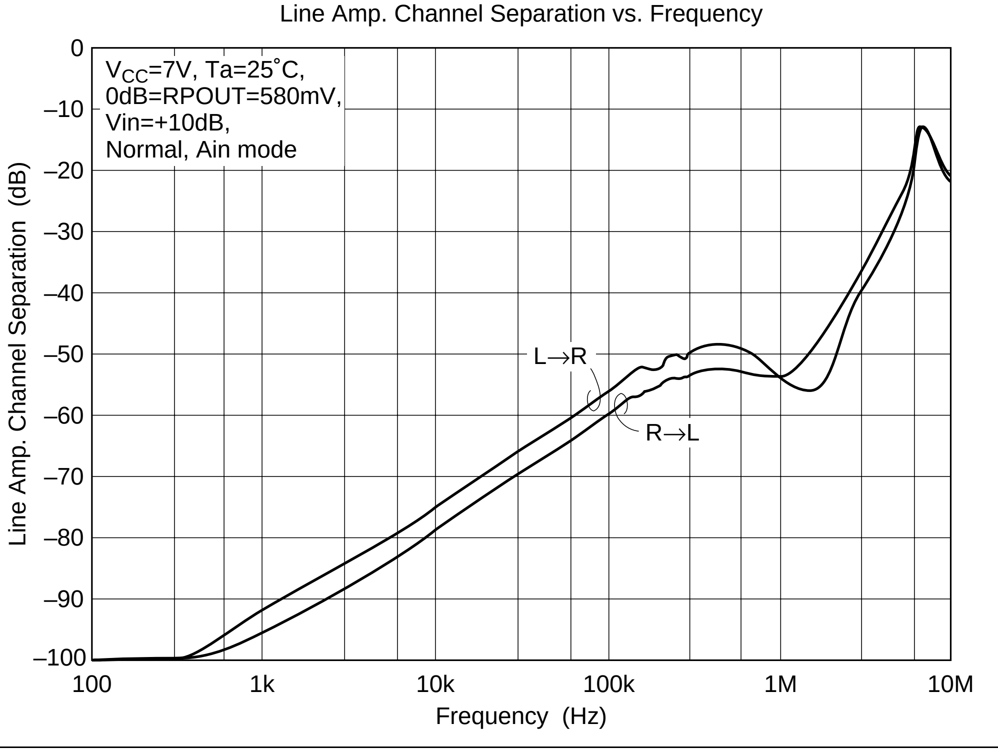



RPOUT Maximum Output Level vs. Supply Voltage
Maximum Output Level Vomax (dB)
20
15
10
5
0
4
5
6
7
8
9
Supply Voltage V_{CC} (V)
Ta=25˚C, f=1kHz,
RPOUT=580mVrms=0dB
Ain
Bin
Rin RM-ON (ALC OFF)
Rin RM-OFF (ALC ON)


RPOUT Signal to Noise Ratio vs. Supply Voltage
Signal to Noise Ratio S/N (dB)
85
80
75
70
65
4
5
6
7
8
9
Supply Voltage V_{CC} (V)
Ta=25˚C, CCIR/ARM
RPOUT=580mVrms=0dB
Ain NORM
Ain CROM
Bin
Rin RM-ON
Rin RM-OFF

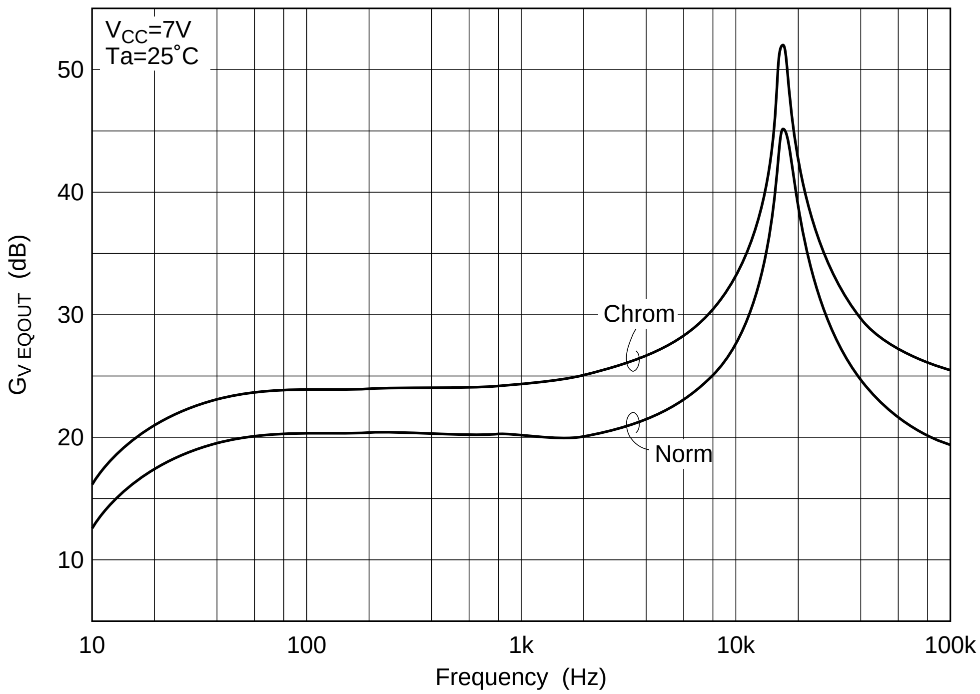


Line Amp. Crosstalk vs. Frequency
V_{CC}=7V, Ta=25˚C,
0dB=RPOUT=580mV,
Vin=+10dB,
Normal, Ain mode
Bin mode
Rin mode
(REC)
Line Amp. Crosstalk (dB)
0
–10
–20
–30
–40
–50
–60
–70
–80
–90
–100
100
1k
10k
100k
1M
10M
Frequency (Hz)

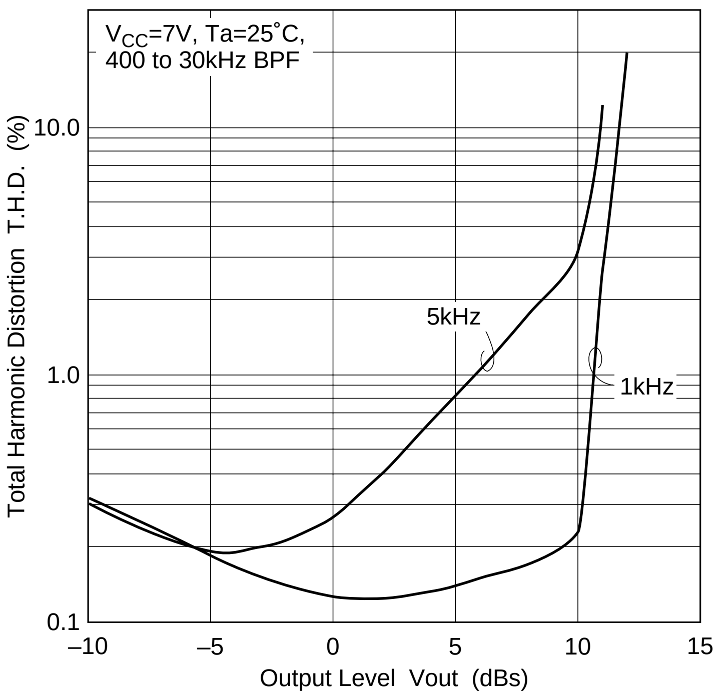


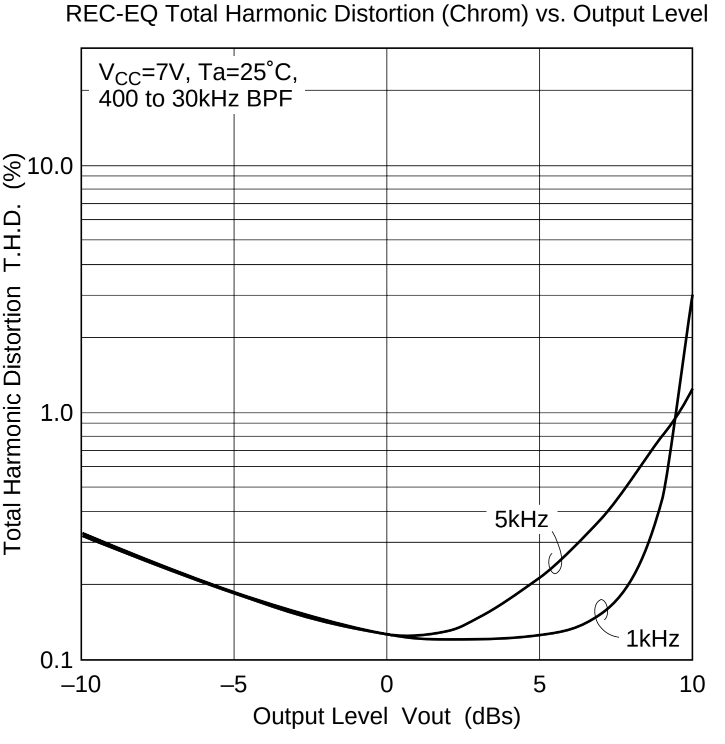
Line Amp. Channel Separation vs. Frequency
V_{CC}=7V, Ta=25˚C,
0dB=RPOUT=580mV,
Vin=+10dB,
Normal, Ain mode
L→R
R→L
Line Amp. Channel Separation (dB)
0
–10
–20
–30
–40
–50
–60
–70
–80
–90
–100
100
1k
10k
100k
1M
10M
Frequency (Hz)

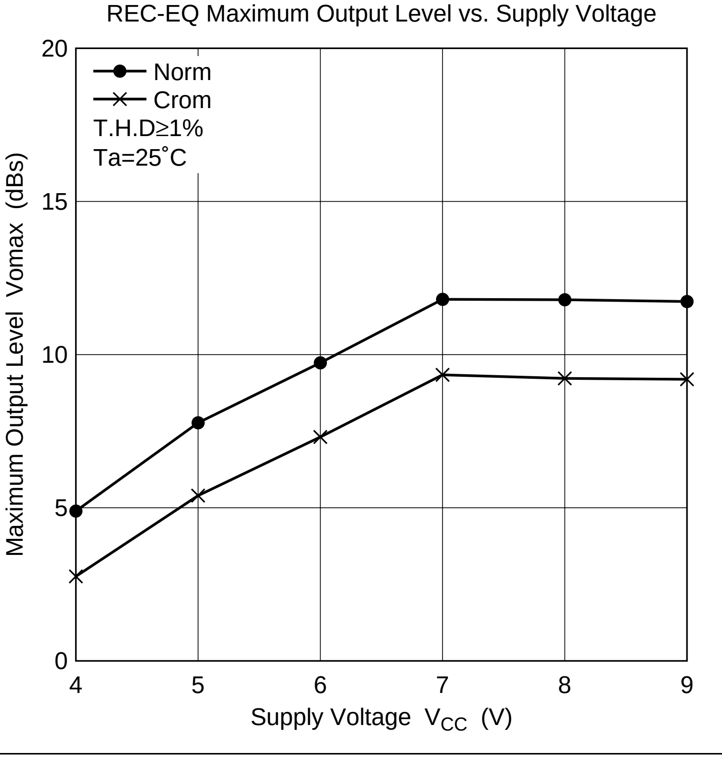
EQOUT vs. Frequency

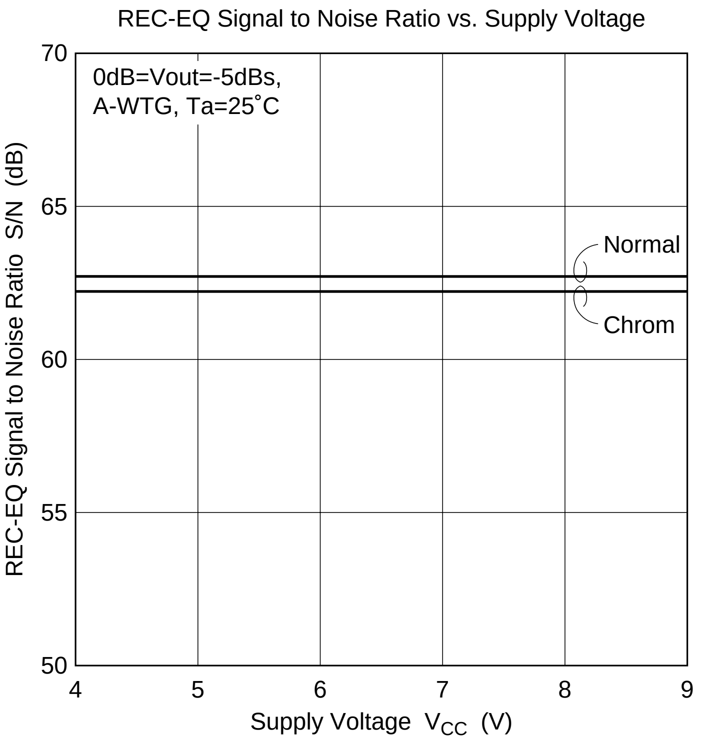


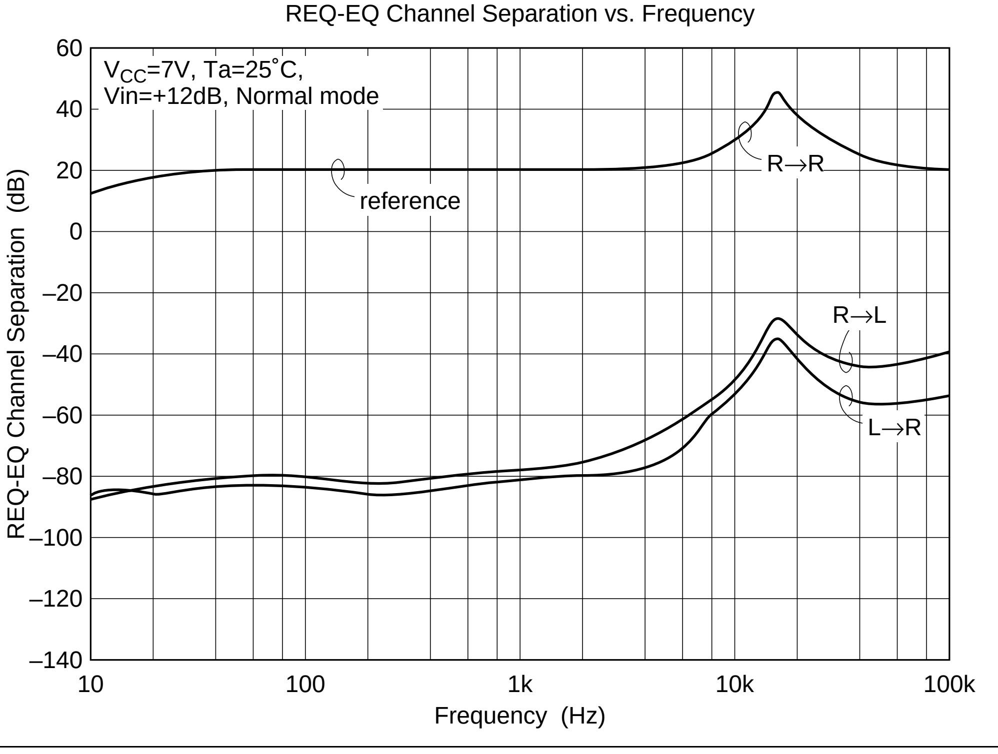
REC-EQ Total Harmonic Distortion (Normal) vs. Output Level

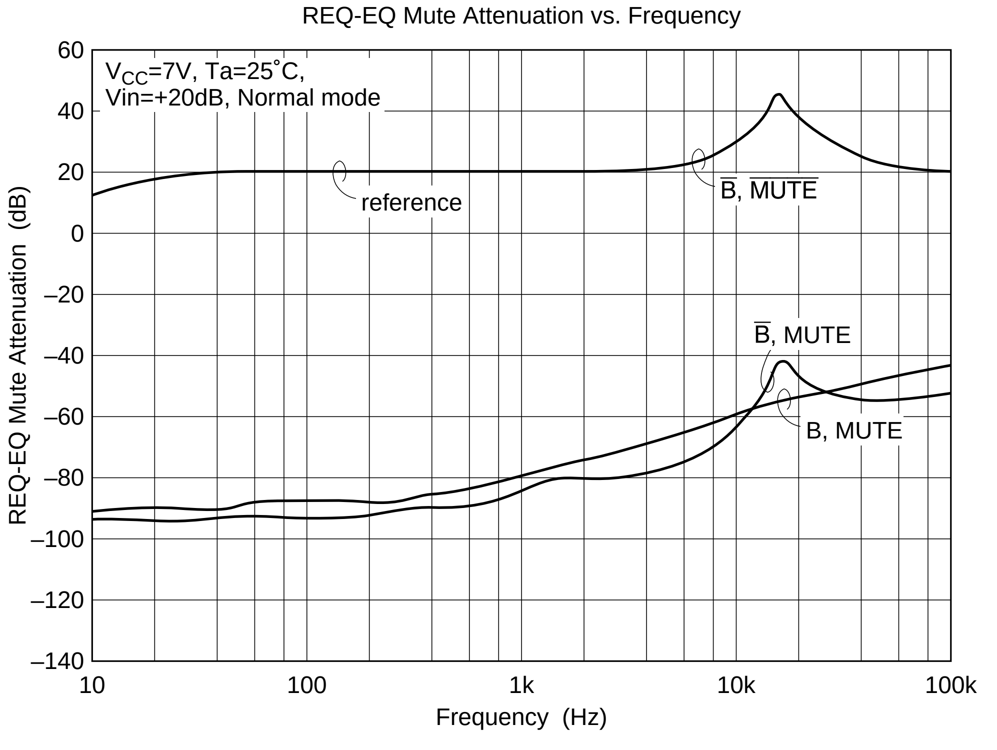


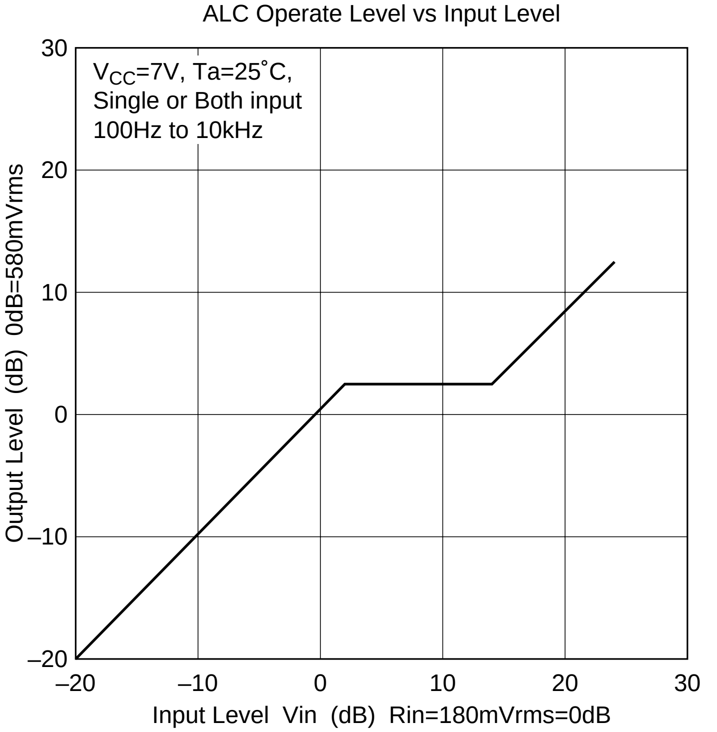

REC-EQ Total Harmonic Distortion (Chrom) vs. Output Level
VCC=7V, Ta=25˚C,
400 to 30kHz BPF
5kHz
1kHz
Total Harmonic Distortion T.H.D. (%)
10.0
1.0
0.1
–10
–5
0
5
10
Output Level Vout (dBs)


REC-EQ Maximum Output Level vs. Supply Voltage
Norm
Crom
T.H.D≥1%
Ta=25˚C
Maximum Output Level Vomax (dBs)
20
15
10
5
0
4
5
6
7
8
9
Supply Voltage VCC (V)

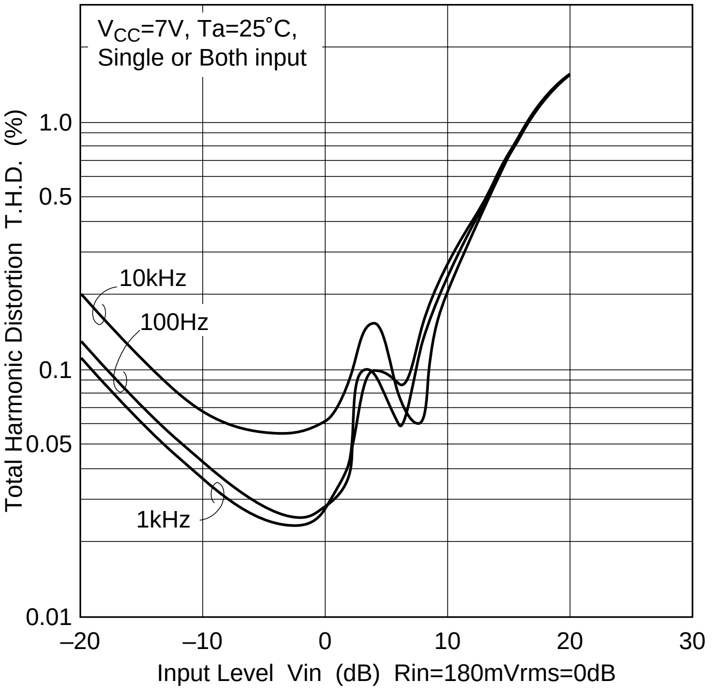

REC-EQ Signal to Noise Ratio vs. Supply Voltage
0dB=Vout=-5dBs,
A-WTG, Ta=25˚C
Normal
Chrom
REC-EQ Signal to Noise Ratio S/N (dB)
70
65
60
55
50
4
5
6
7
8
9
Supply Voltage VCC (V)


REQ-EQ Channel Separation vs. Frequency
VCC=7V, Ta=25˚C,
Vin=+12dB, Normal mode
R→R
reference
R→L
L→R
REQ-EQ Channel Separation (dB)
60
40
20
0
–20
–40
–60
–80
–100
–120
–140
10
100
1k
10k
100k
Frequency (Hz)

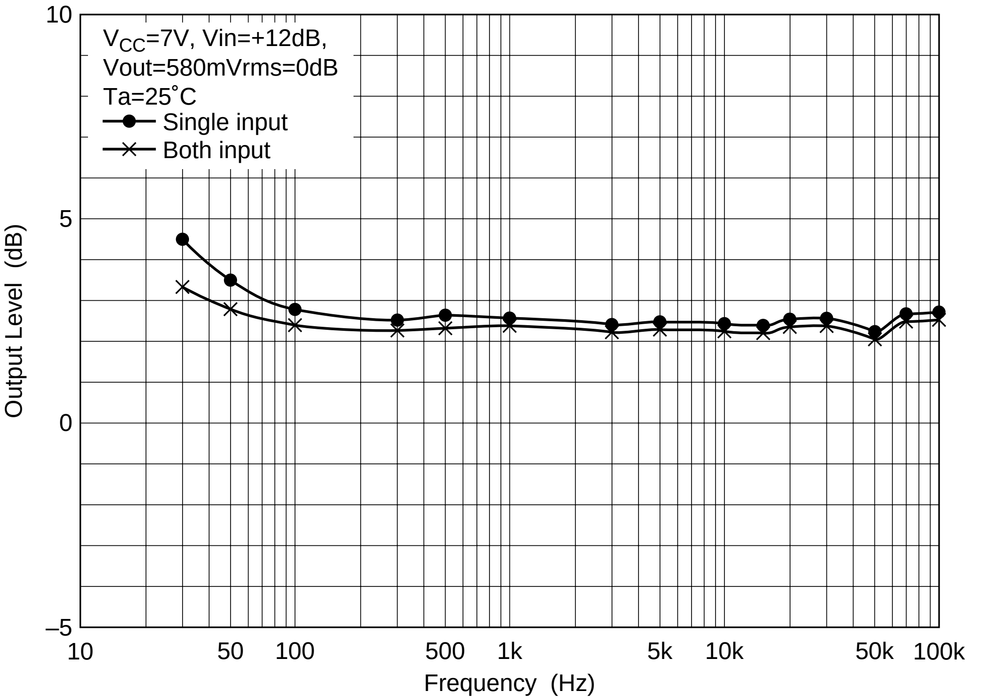

REQ-EQ Mute Attenuation vs. Frequency
VCC=7V, Ta=25˚C,
Vin=+20dB, Normal mode
reference
B, MUTE
B, MUTE
B, MUTE
REQ-EQ Mute Attenuation (dB)
Frequency (Hz)
60
40
20
0
–20
–40
–60
–80
–100
–120
–140
10
100
1k
10k
100k


ALC Operate Level vs Input Level
VCC=7V, Ta=25˚C,
Single or Both input
100Hz to 10kHz
Output Level (dB) 0dB=580mVrms
Input Level Vin (dB) Rin=180mVrms=0dB
30
20
10
0
–10
–20
–20
–10
0
10
20
30

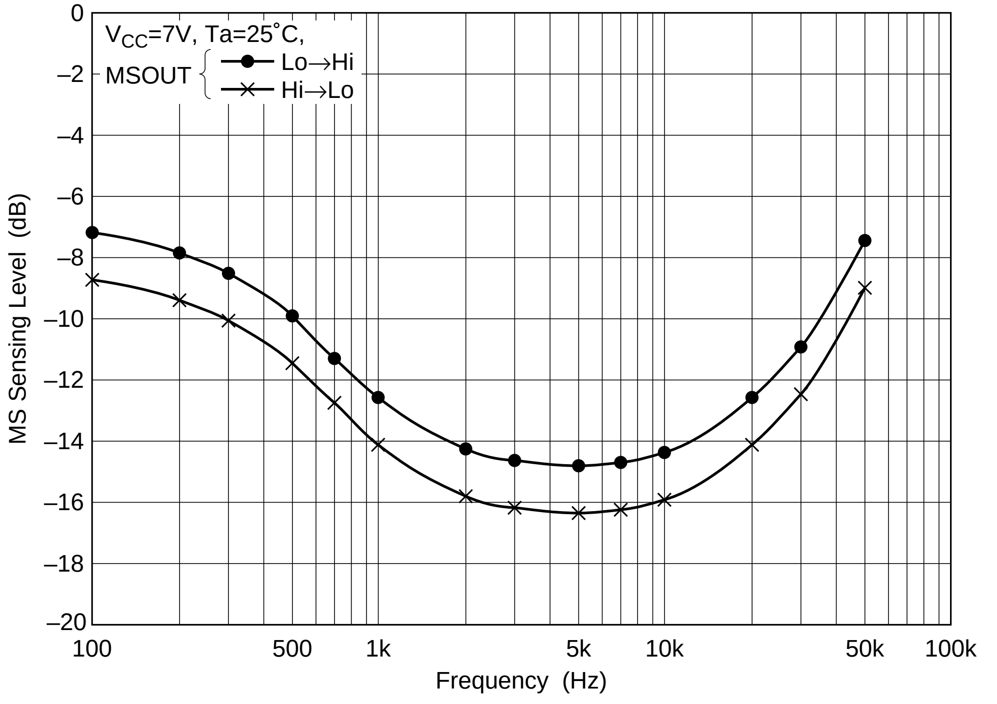
ALC Total Harmonic Distortion vs. Input Level



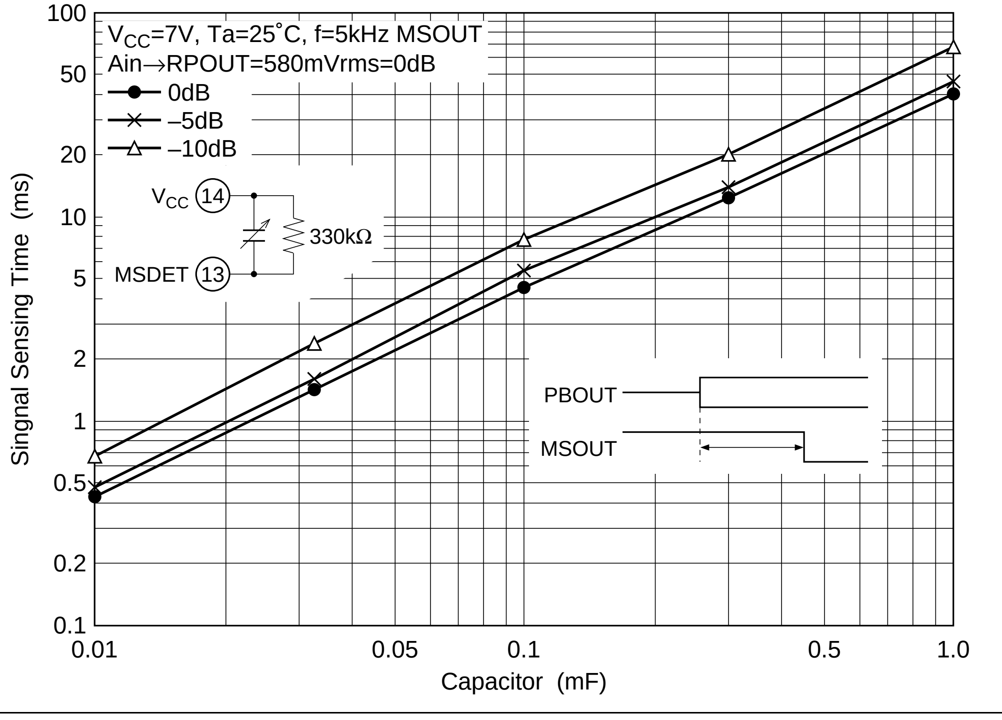
ALC Operate Level vs. Frequency



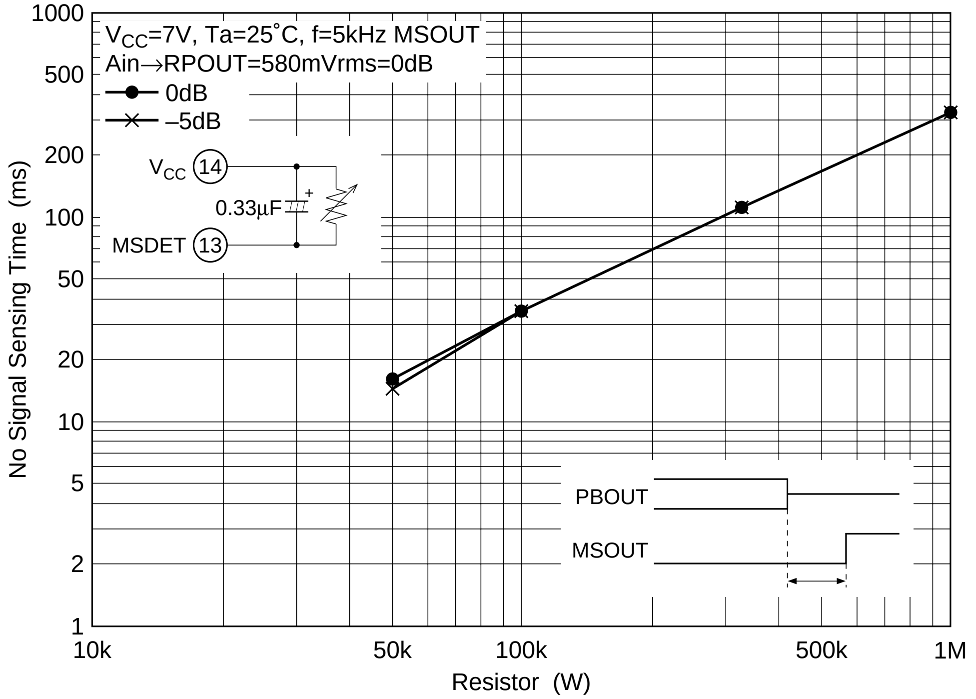
MS Sensing Level vs Frequency



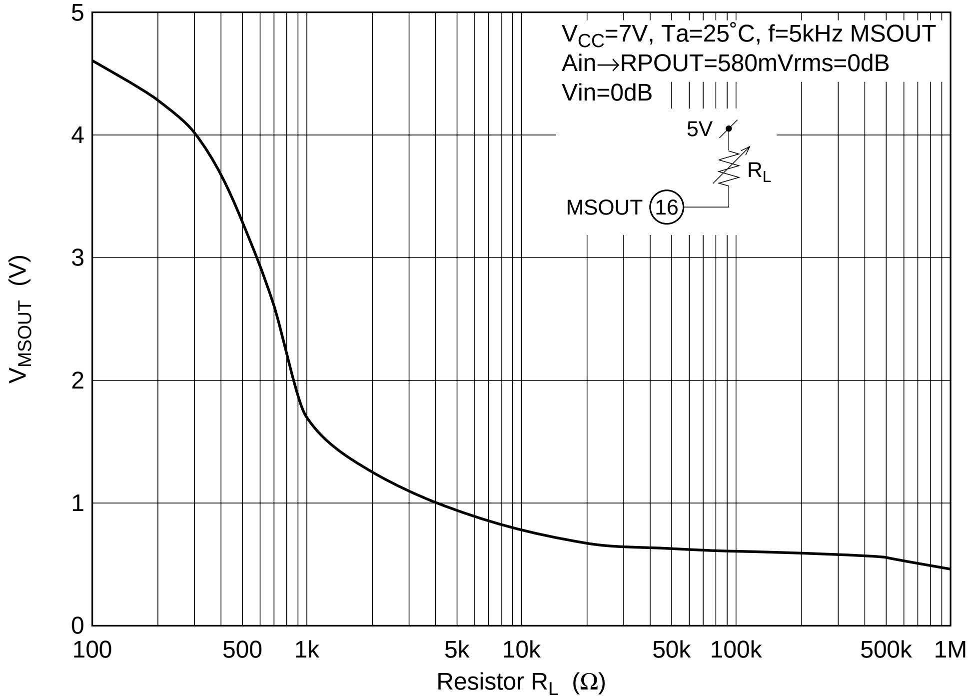
Singnal Sensing Time vs. Capacitor



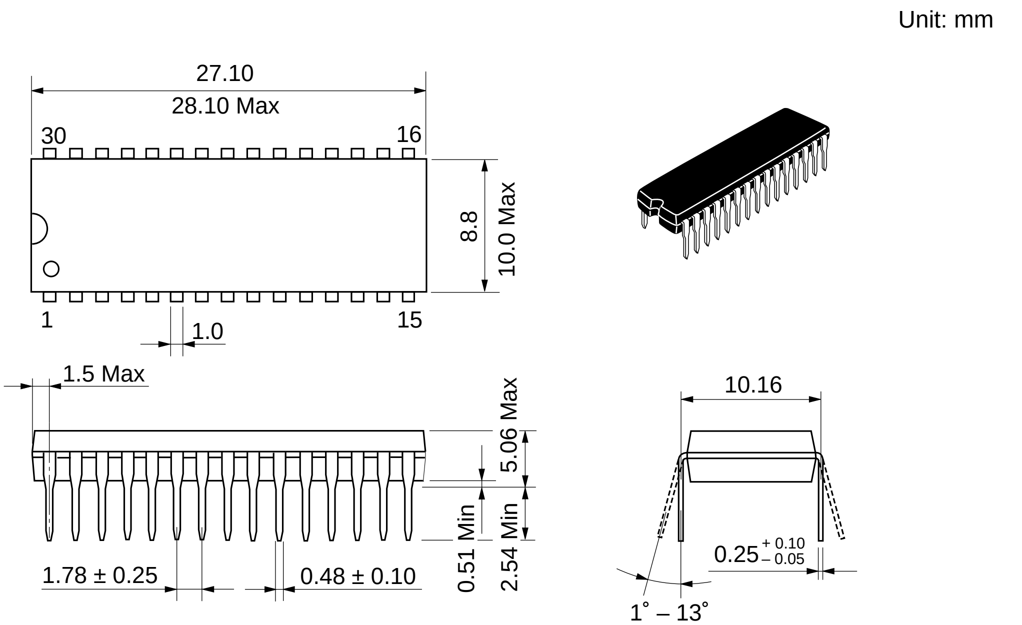
No Signal Sensing Time vs. Resistor



V_{MSOUT} vs. Resistor R_L



Package Dimensions



Hitachi Code	DP-30S
JEDEC	—
EIAJ	Conforms
Weight (reference value)	1.98 g

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