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# HA12134A, HA12135A, HA12136A

## Dolby B-Type Noise Reduction System

# HITACHI

ADE-207-016B (Z)

3rd Edition  
Jun. 1999

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### Description

The HA12134A, HA12135A, HA12136A are silicon monolithic bipolar IC series providing dual channel Dolby B-type noise reduction system\* in one chip. The circuit is used primarily to reduce the level of background noise introduced during recording and playback of audio signals on magnetic tape.

HA12134A series provide the following functions and features.

### Functions

- Dual Dolby B-type NR processor
- NR ON/OFF control switch.
- Record (encode)/playback (decode) control switch.

### Features

- Separate record/playback input and output.  
Unprocessed signal output available in the encode and decode modes.
- Reduction of external components count.
- Small capacitor value for the reference voltage.
- NR ON/OFF switching and REC/PB switching are provided internally.
- 2-type package (DP-16, FP-16DA)
- Wide range of operating supply voltage.

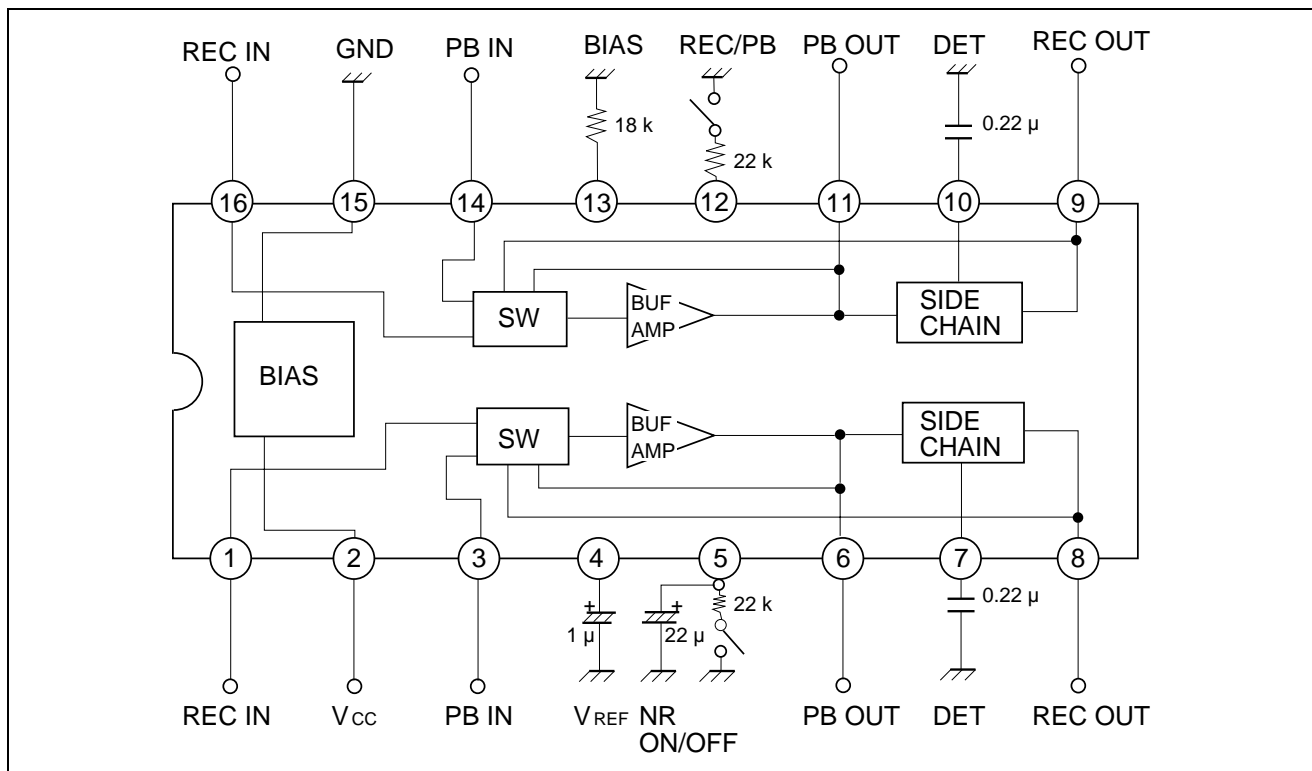
\* Dolby is a trademark of Dolby Laboratories Licensing Corporation.  
A license from Dolby Laboratories Licensing Corporation is required for the use of this IC.

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## Ordering Information

Type No	Dolby Level (mVrms)	Package
HA12134A	300	DP-16
HA12134AF		FP-16DA
HA12135A	450	DP-16
HA12135AF		FP-16DA
HA12136A	580	DP-16
HA12136AF		FP-16DA

## Block Diagram



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## HA12134A, HA12135A, HA12136A

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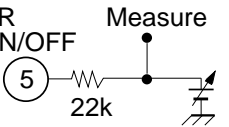
**Absolute Maximum Ratings** (Ta = 25°C, Unless otherwise specified.)

Item	Symbol	Rating	Unit	Note
Supply voltage	Vccmax	16	V	
Power dissipation	Pd	250	mW	Ta ≤ 85°C
Operating temperature	Topr	-40 to +85	°C	
Storage temperature	Tstg	-55 to +125	°C	
Lead temperature	TI	260	°C	Note 1

Note: 1. Soldering 10 sec.

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**Electrical Characteristics** ( $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 12\text{ V}$ , Unless otherwise specified.)

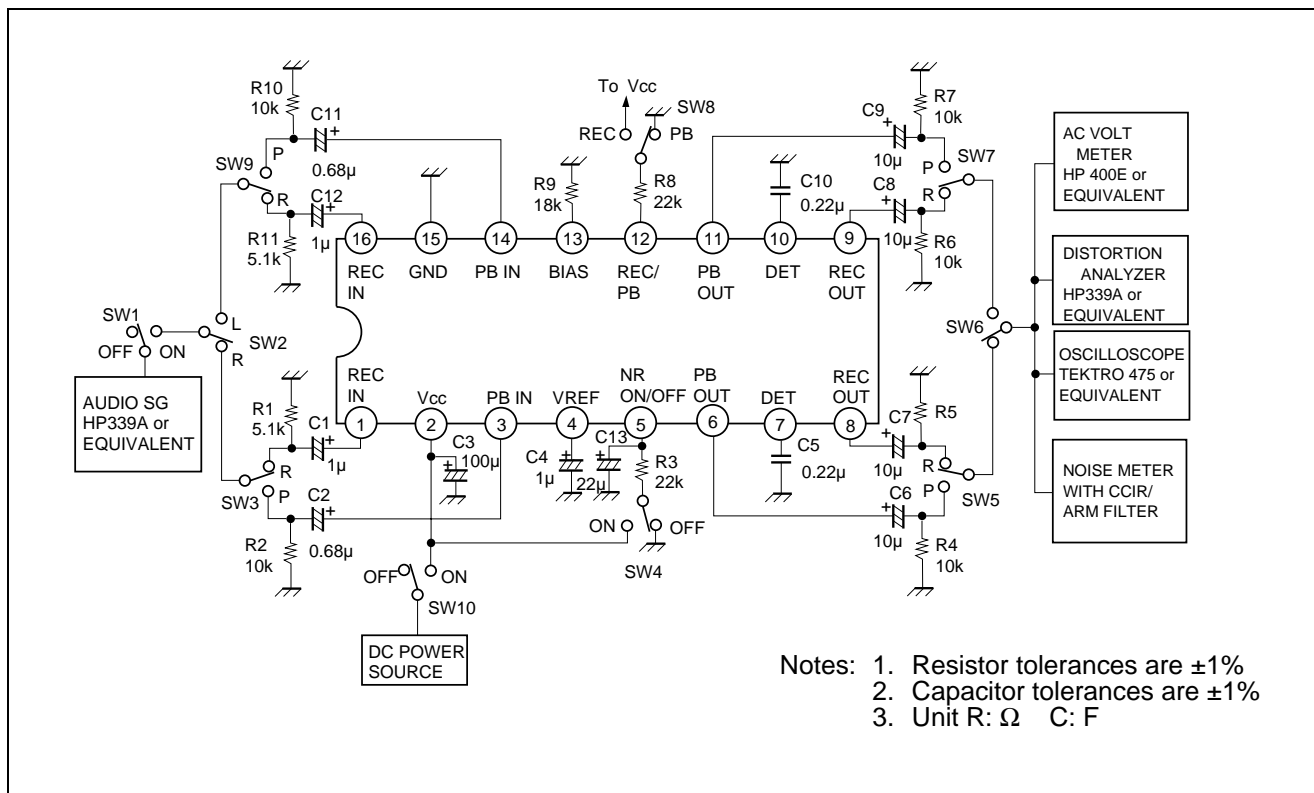
Item	Symbol	Min	Typ	Max	Unit	Test conditions	
Operating voltage	HA12134A	Vo <sub>pe</sub>	6.5	12.0	16.0	V	Enable functional operations
	HA12135A		8.0	12.0	16.0		
	HA12136A		9.5	12.0	16.0		
Quiescent current	$I_o$	—	7	—	mA	No signal, REC NR-ON	
Voltage gain of input amp	HA12134A	$G_{VIA}$	21.0	23.0	25.0	dB	Pin 1→Pin 6 (Pin 16→Pin 11) V <sub>out</sub> = 0 dB, f = 1 kHz
	HA12135A		24.5	26.5	28.5		
	HA12136A		26.5	28.5	30.5		
NR encode boost V 8 (9) (NR ON) V 8 (9) (NR OFF)	ENC-1.4 k (1)	2.9	4.4	5.9	dB	f = 1.4 kHz V 8 (9) (NR OFF) = -20 dB	
	ENC-1.4 k (2)	6.0	7.5	9.0	dB	f = 1.4 kHz V 8 (9) (NR OFF) = -30 dB	
	ENC-5 k (1)	1.7	3.2	4.7	dB	f = 5 kHz V 8 (9) (NR OFF) = -20 dB	
	ENC-5 k (2)	6.7	8.2	9.7	dB	f = 5 kHz V 8 (9) (NR OFF) = -30 dB	
	ENC-10 k (1)	-1.1	0.4	1.9	dB	f = 10 kHz V 8 (9) (NR OFF) = 0 dB	
	ENC-10 k (2)	9.8	10.4	11.8	dB	f = 10 kHz V 8 (9) (NR OFF) = -40 dB	
T.H.D (REC)	T.H.D (REC)	—	0.05	0.3	%	f = 1 kHz V 8 (9) (NR ON) = 0 dB	
Signal handling	HA12134A	V <sub>omax</sub>	12.0	13.0	—	dB	f = 1 kHz, $V_{CC} = 6.5\text{ V}$
	HA12135A	(REC)					T.H.D = 1% $V_{CC} = 8.0\text{ V}$
	HA12136A						$V_{CC} = 9.5\text{ V}$
Signal/noise ratio (REC)	S/N (REC)	62.0	68.0	—	dB	R <sub>g</sub> = 5.1 k $\Omega$ weighted CCIR/ARM	
Crosstalk (ENC) (Pin 8 – Pin 9)	CT R→L L→R	52.0	60.0	—	dB	f = 1 kHz NR OFF	
Control voltage for REC/PB	REC	2.5	—	$V_{CC}$	V	REC/PB 	
	PB	0.0	—	0.5			
Control voltage for NR ON/OFF	ON	2.5	—	$V_{CC}$	V	NR ON/OFF 	
	OFF	0.0	—	0.5			
Channel balance	$\Delta G_{VIA}$	-1.0	0.0	1.0	dB		

# HA12134A, HA12135A, HA12136A

## Electrical Characteristics (Ta = 25°C, V<sub>cc</sub> = 12 V, Unless otherwise specified.) (cont)

Item	Symbol	Min	Typ	Max	Unit	Test conditions
Offset voltage V <sub>8</sub> (9) (NR-ON) – V <sub>8</sub> (9) (NR-OFF)	$\Delta V_{orec}$	-50	0.0	50	mV	REC mode V <sub>cc</sub> = 16.0 V

## Test Circuit



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**Pin Description** ( $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 12\text{ V}$ , No signal, The value in the table show typical value.)

Pin No.	Symbol	R (in)	VDC	Equivalent circuit	Description
1, 16	REC IN	56 k $\Omega$	6.0 V		Recording (encode) input
2	$V_{CC}$	—	12.0 V		Power supply
3, 14	PB IN	100 k $\Omega$	6.0 V		Playback (decode) input
4	$V_{REF}$	—	6.0 V		Reference voltage
5	NR ON/OFF	—	—		Mode control pin for NR ON/OFF "H" → NR ON "L" → NR OFF
6, 11	PB OUT	—	6.0 V		Playback (decode) output

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**Pin Description** ( $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 12\text{ V}$ , No signal, The value in the table show typical value.) (cont)

Pin No.	Symbol	R (in)	VDC	Equivalent circuit	Description
7, 10	DET	—	1.3 V		Time constant pin for the level detector
8, 9	REC OUT	—	6.0 V		Recording (encode) output
12	REC/PB	—	—		Mode control pin for REC/PB (encode/decode) “H” → REC (encode) “L” → PB (decode)
13	BIAS	—	1.0 V		Reference current input pin for the active filters
15	GND	—	0 V	—	Ground

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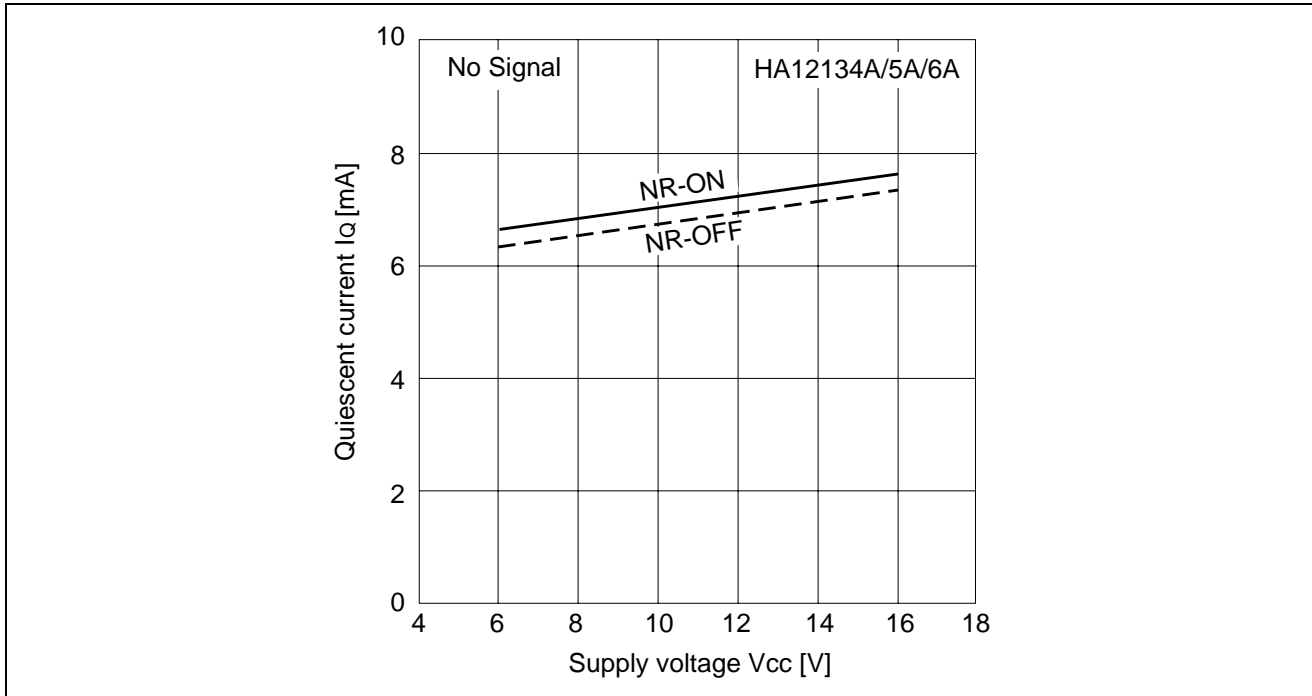


Figure 1 Quiescent Current vs. Supply Voltage

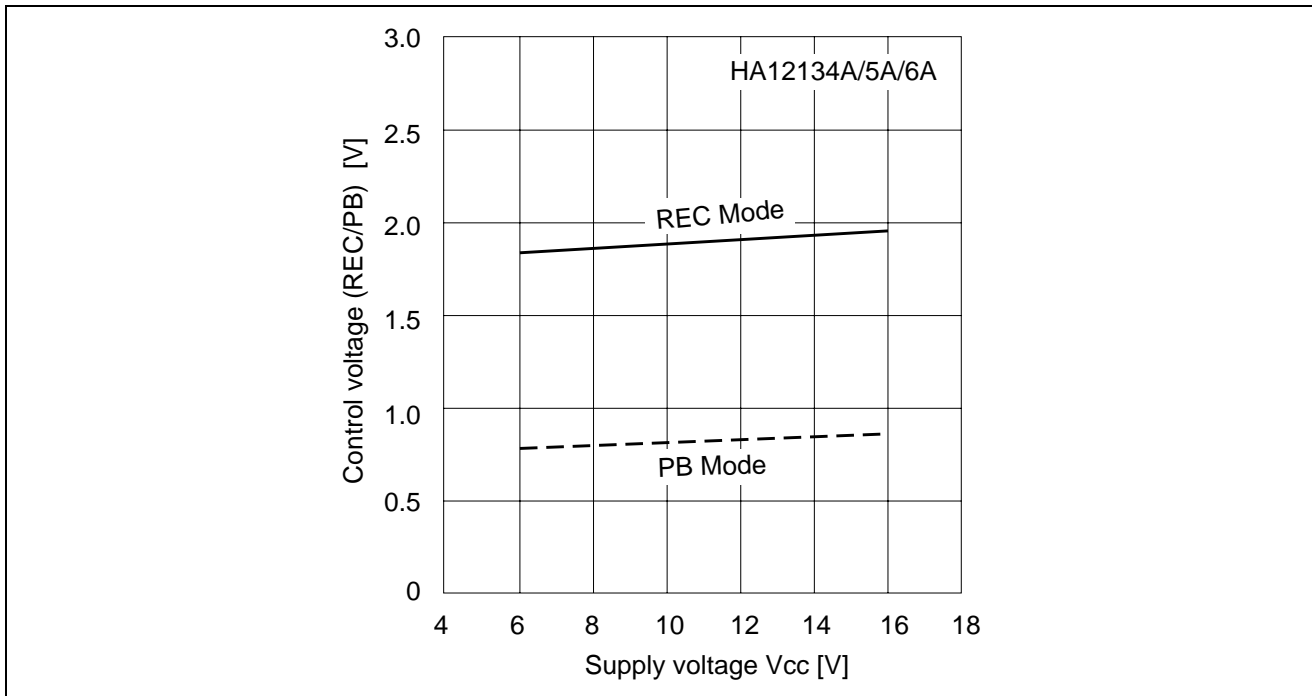


Figure 2 REC/PB Control Voltage vs. Supply Voltage



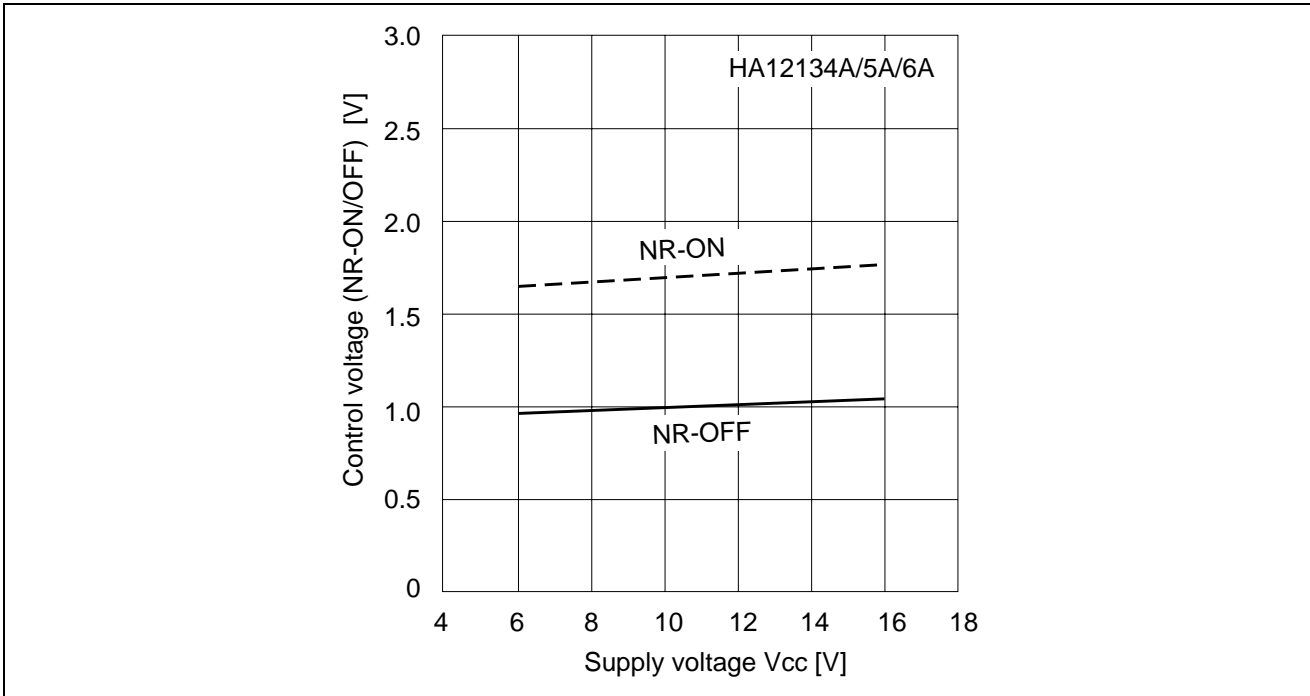


Figure 3 NR-ON/OFF Control Voltage vs. Supply Voltage

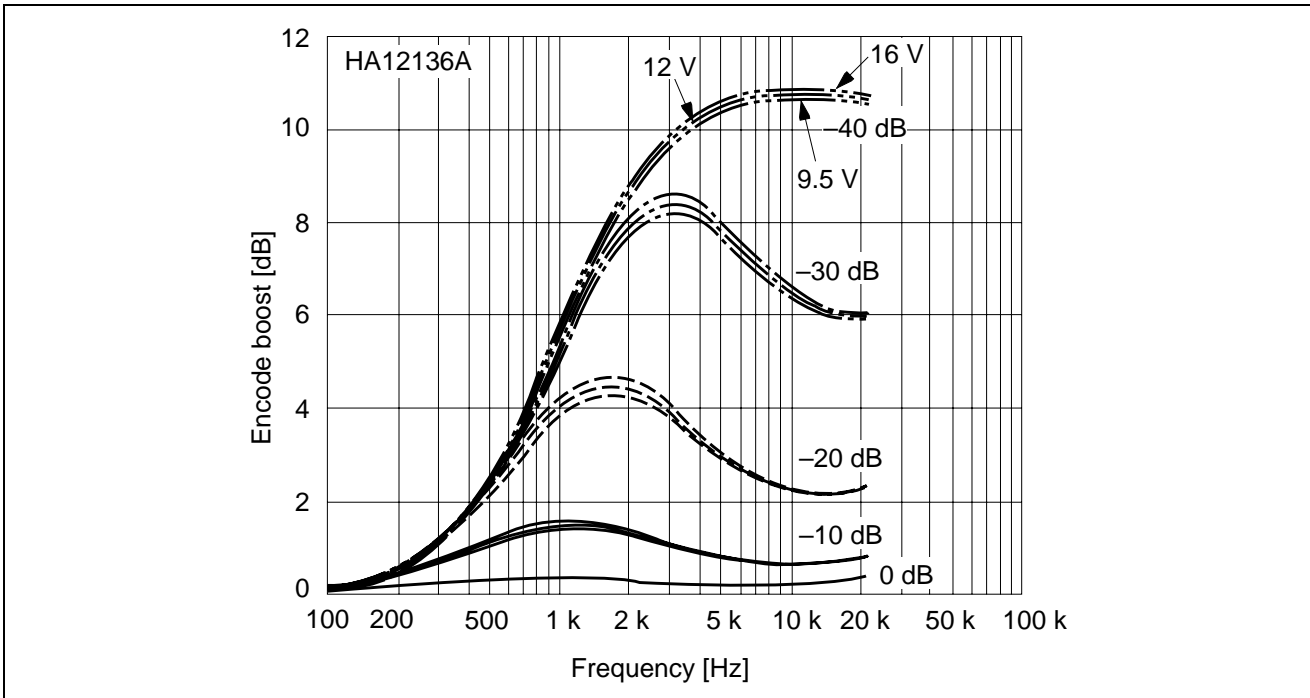
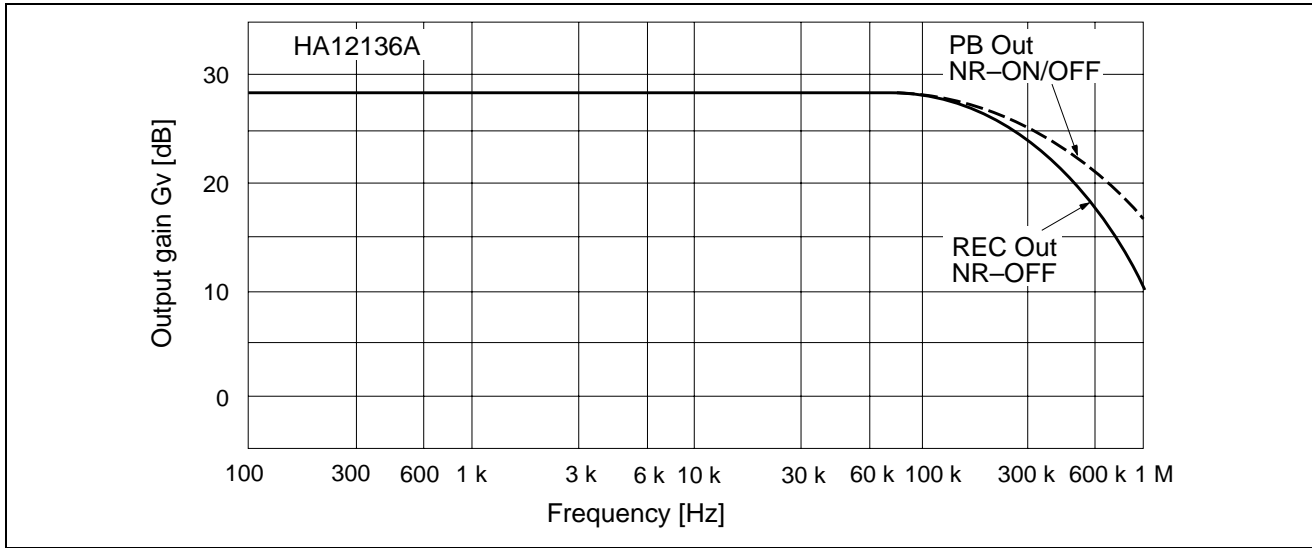
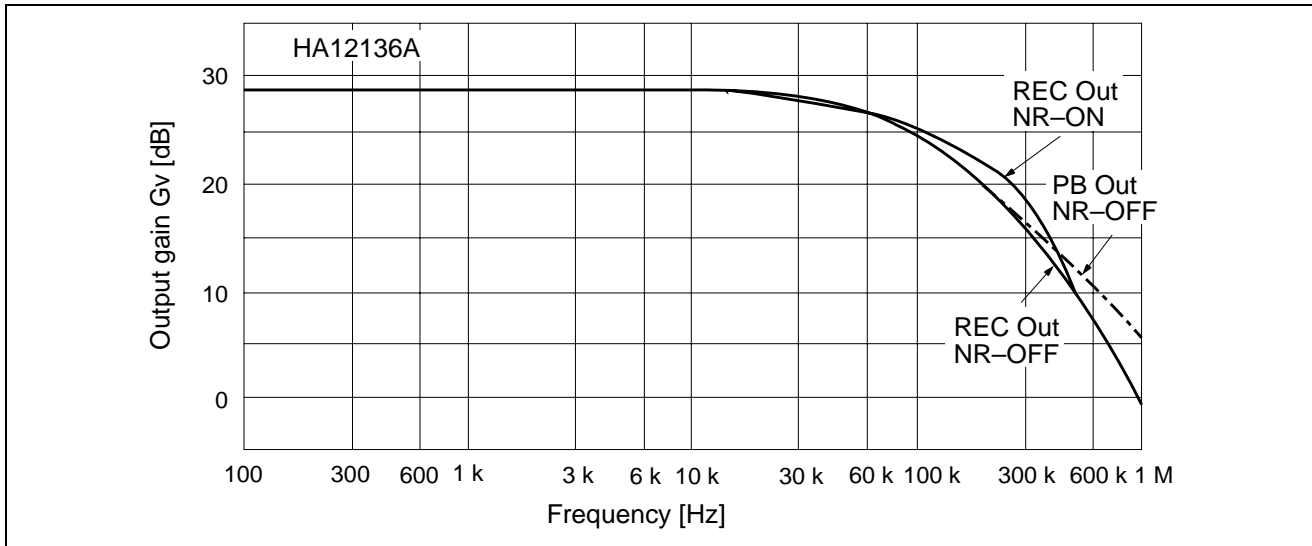


Figure 4 Encode Boost vs. Frequency

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**Figure 5 REC Mode Output Gain vs. Frequency**



**Figure 6 PB Mode Output Gain vs. Frequency**

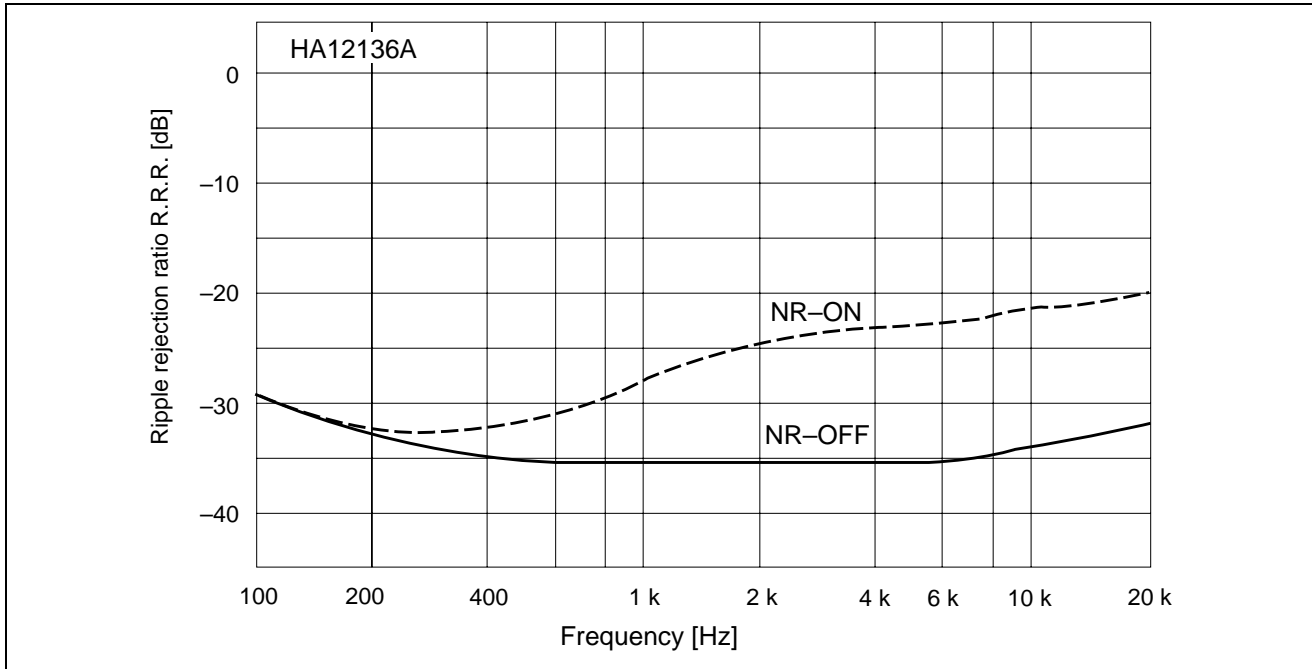


Figure 7 REC Mode Ripple Rejection Ratio vs. Frequency

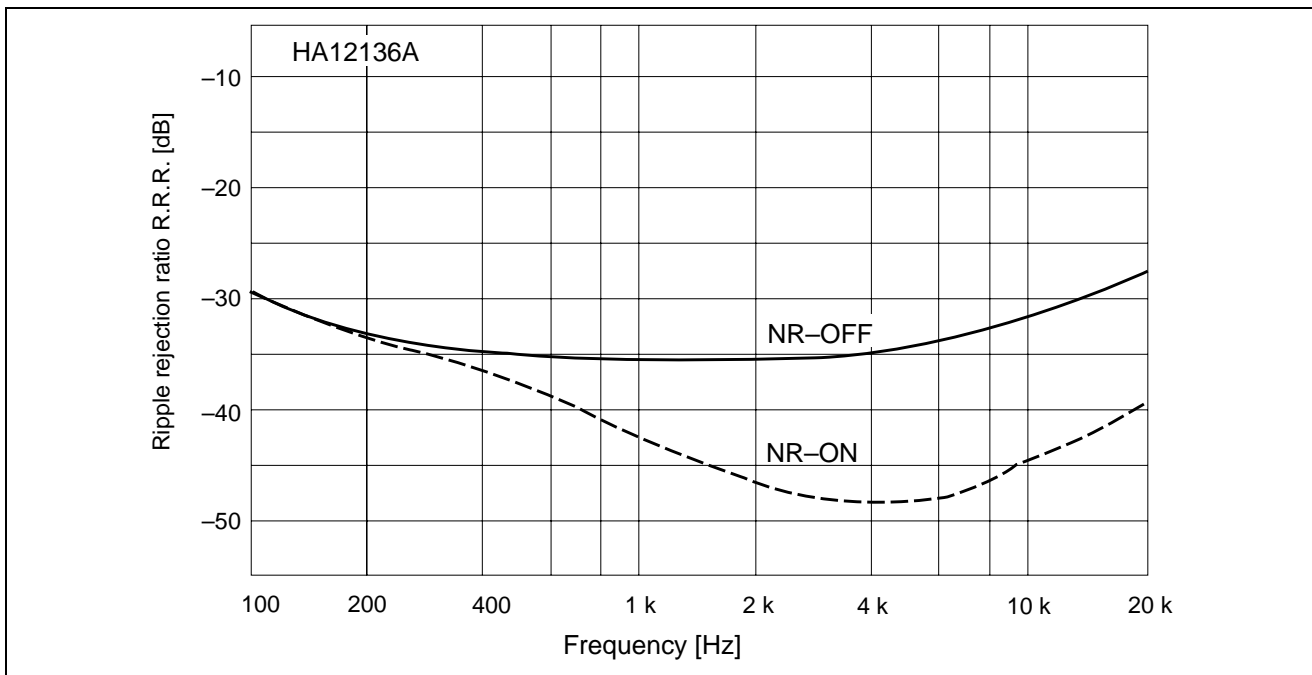


Figure 8 PB Mode Ripple Rejection Ratio vs. Frequency

# HA12134A, HA12135A, HA12136A

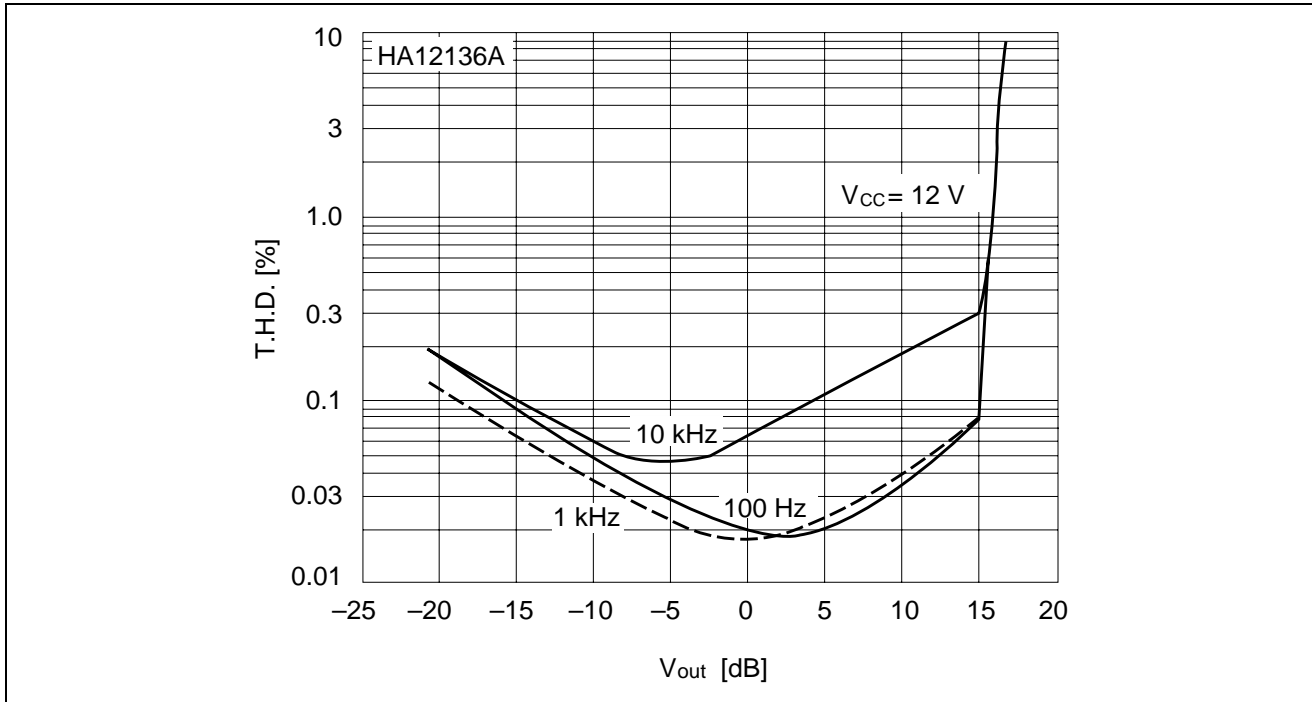


Figure 9 REC NR-OFF Total Harmonic Distortion vs. Output Level

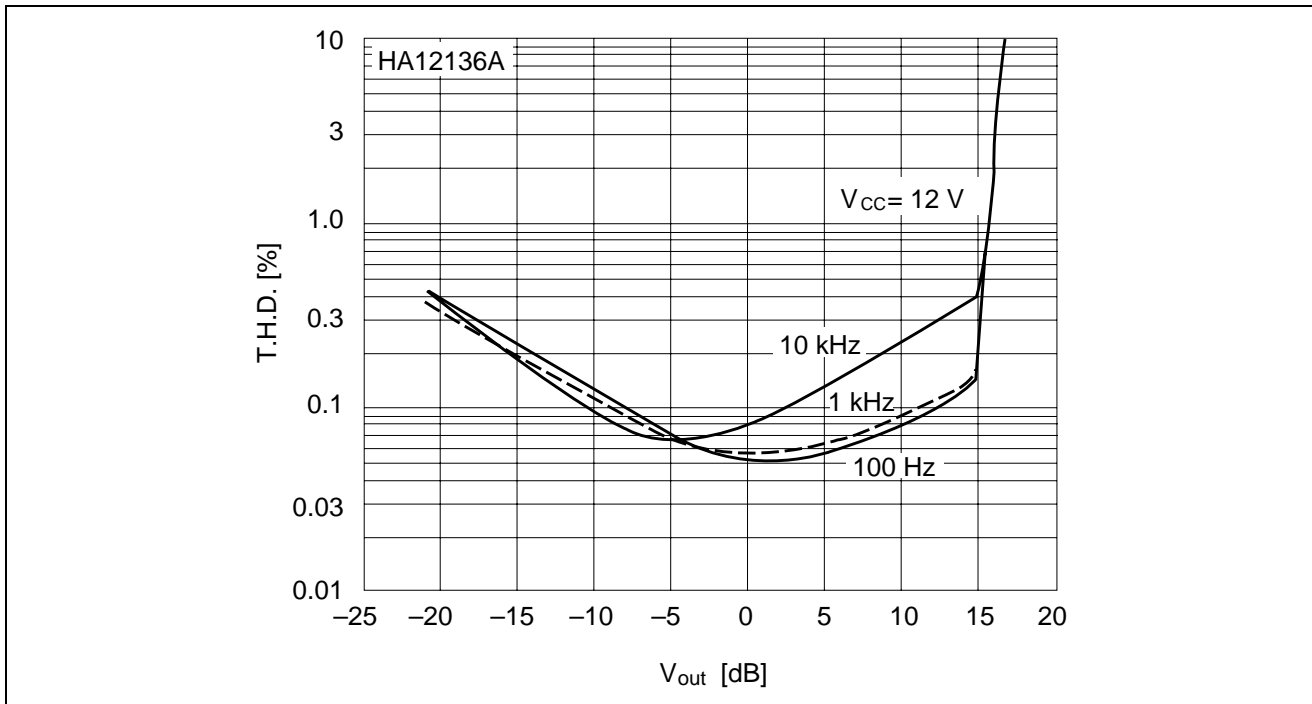


Figure 10 REC NR-ON Total Harmonic Distortion vs. Output Level

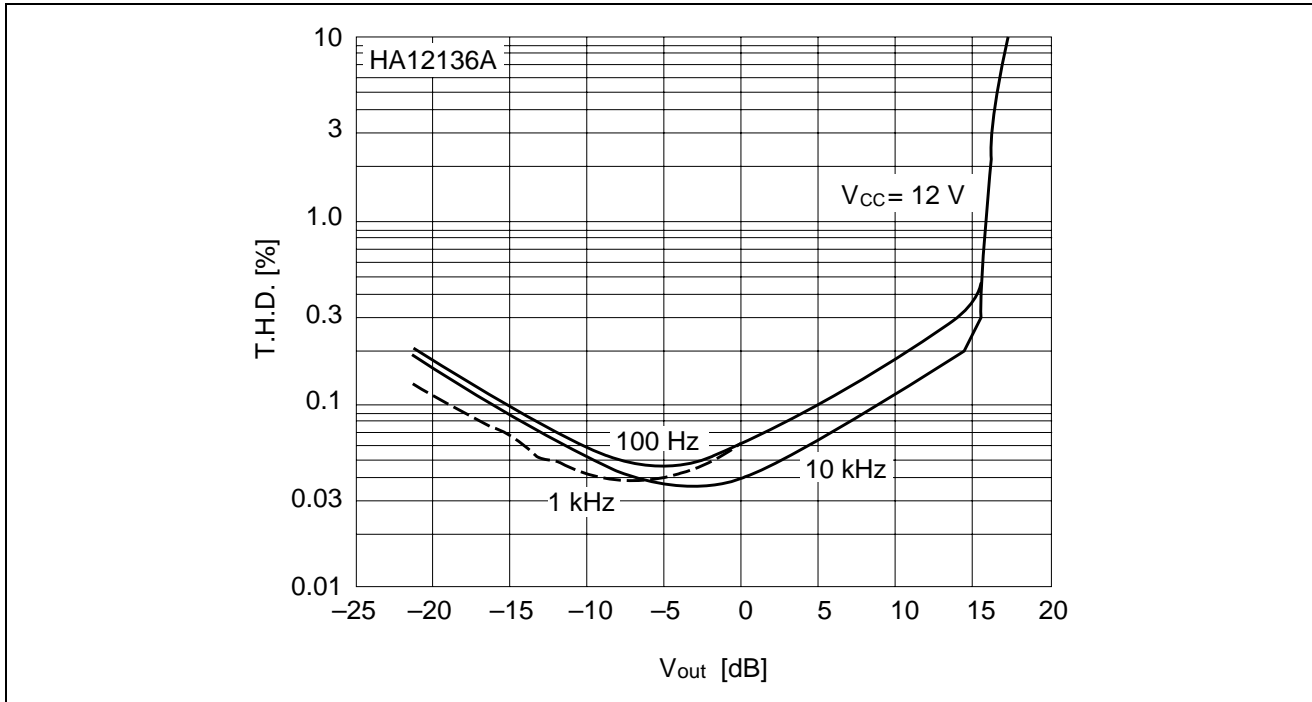


Figure 11 PB NR-OFF Total Harmonic Distortion vs. Output Level

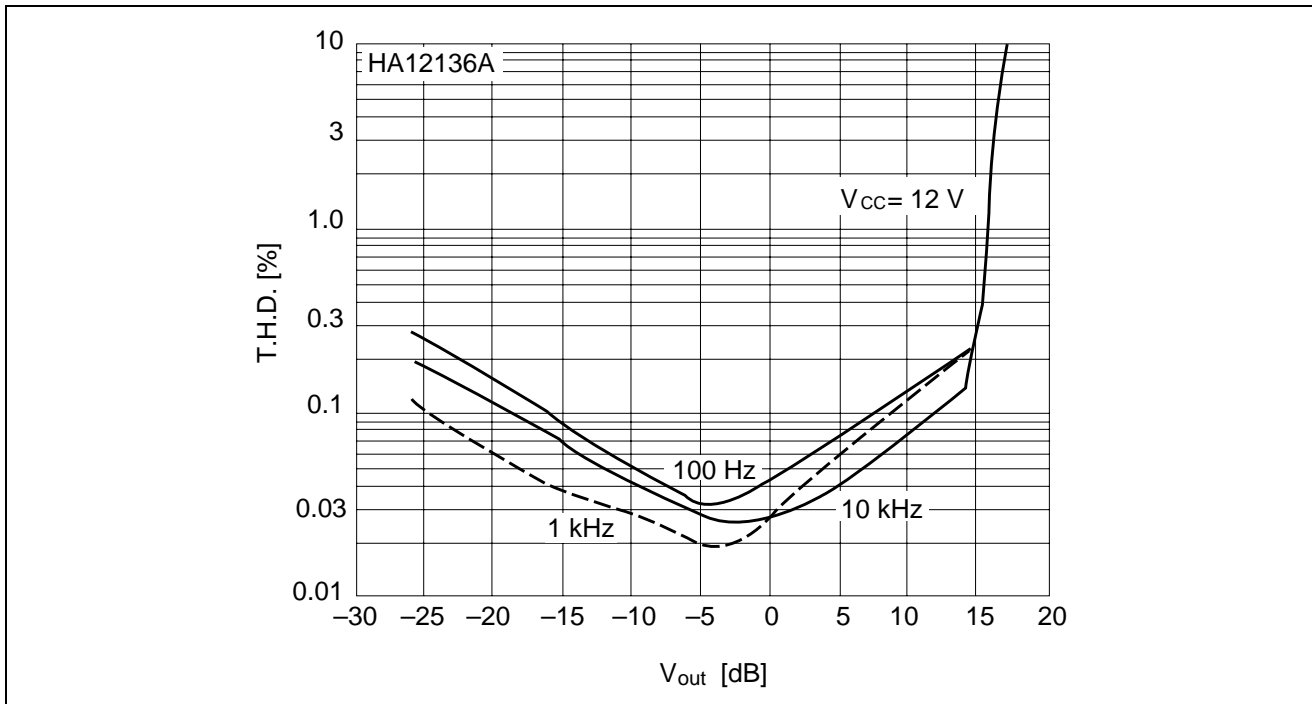


Figure 12 PB NR-ON Total Harmonic Distortion vs. Output Level

# HA12134A, HA12135A, HA12136A

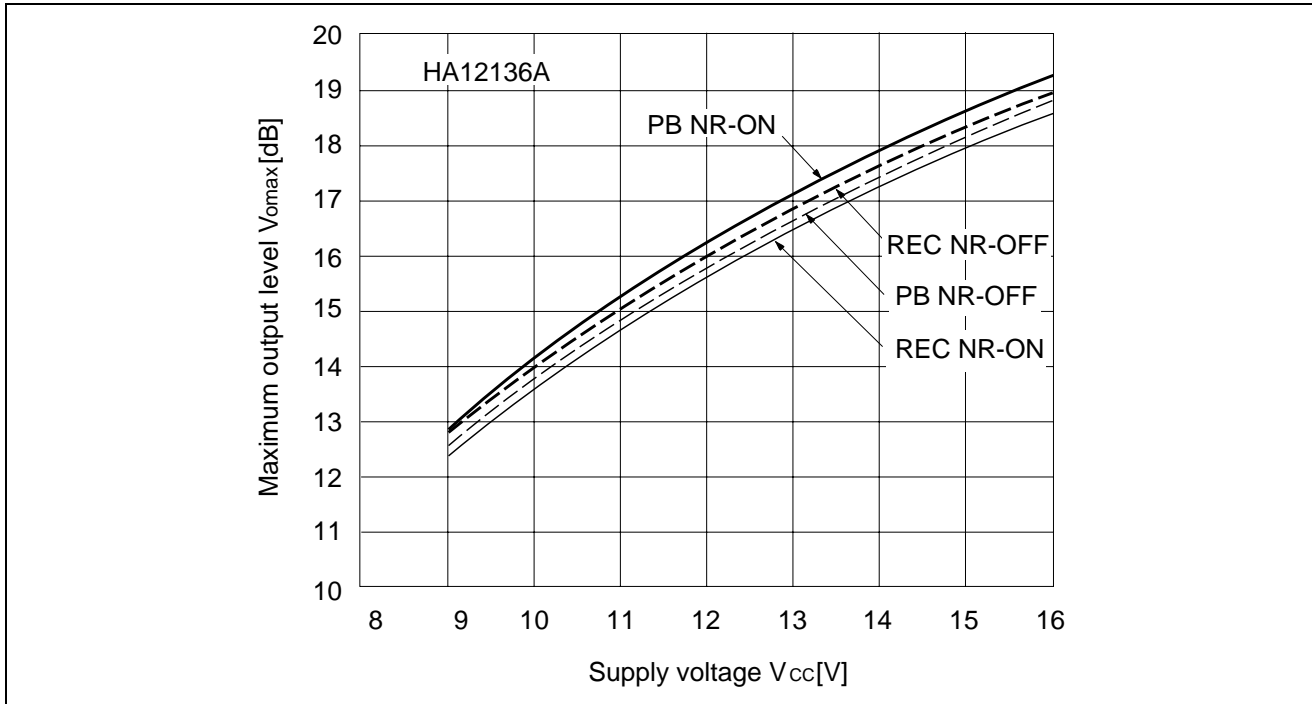


Figure 13 Maximum Output Level vs. Supply Voltage

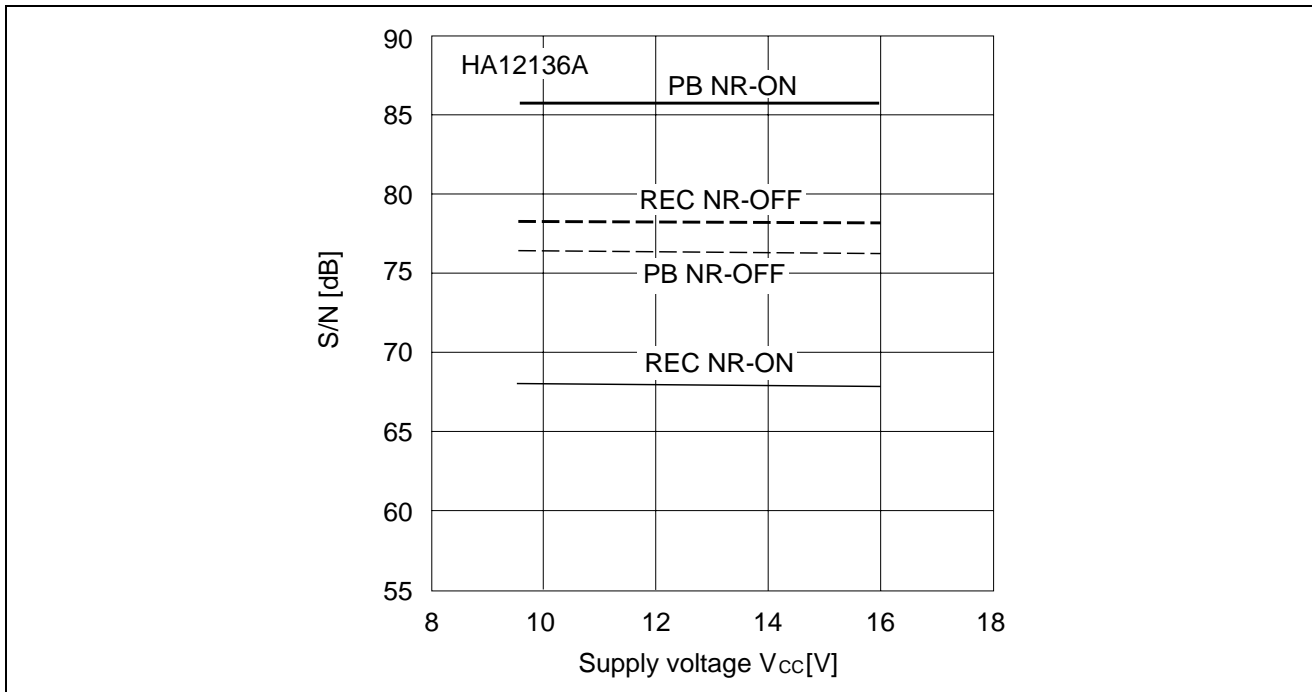


Figure 14 REC/PB Signal To Noise Ratio vs. Supply Voltage

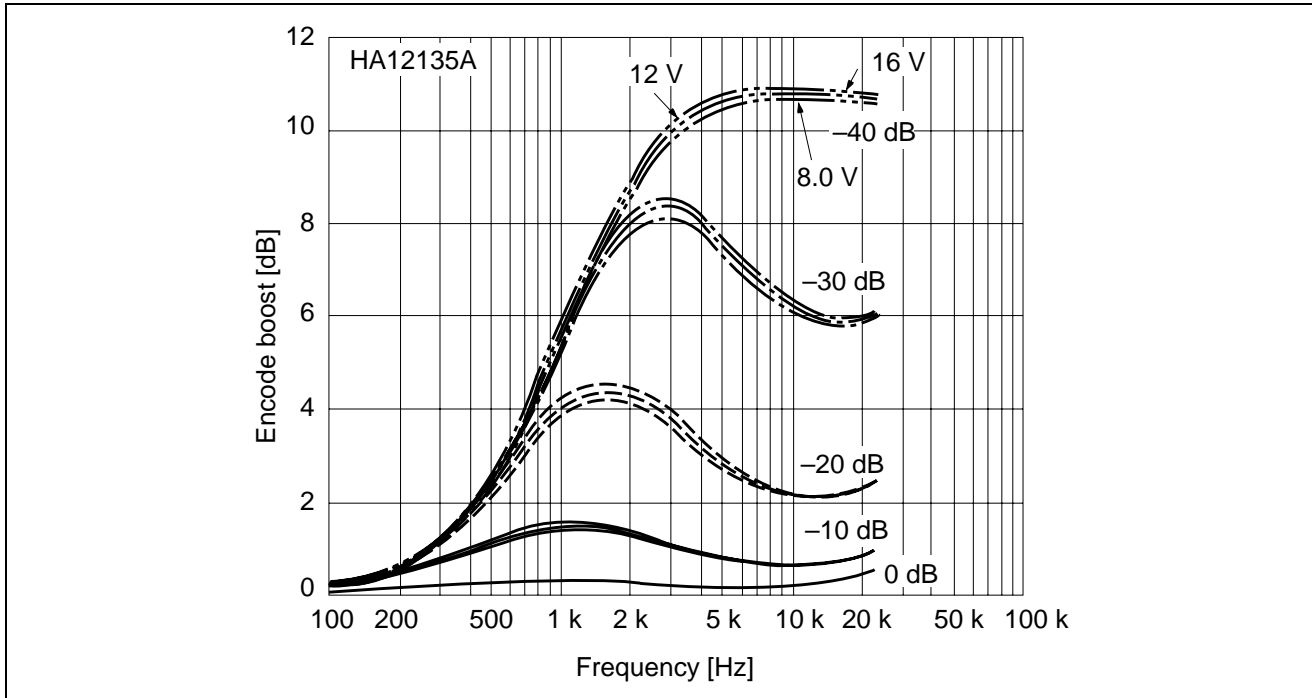


Figure 15 Encode Boost vs. Frequency

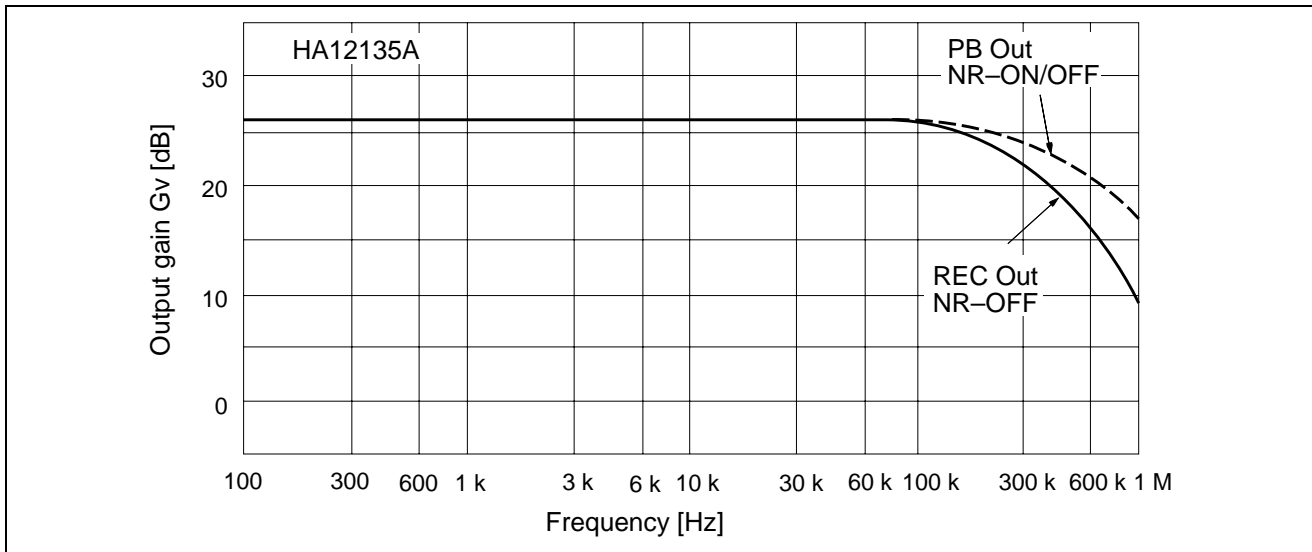


Figure 16 REC Mode Output Gain vs. Frequency

# HA12134A, HA12135A, HA12136A

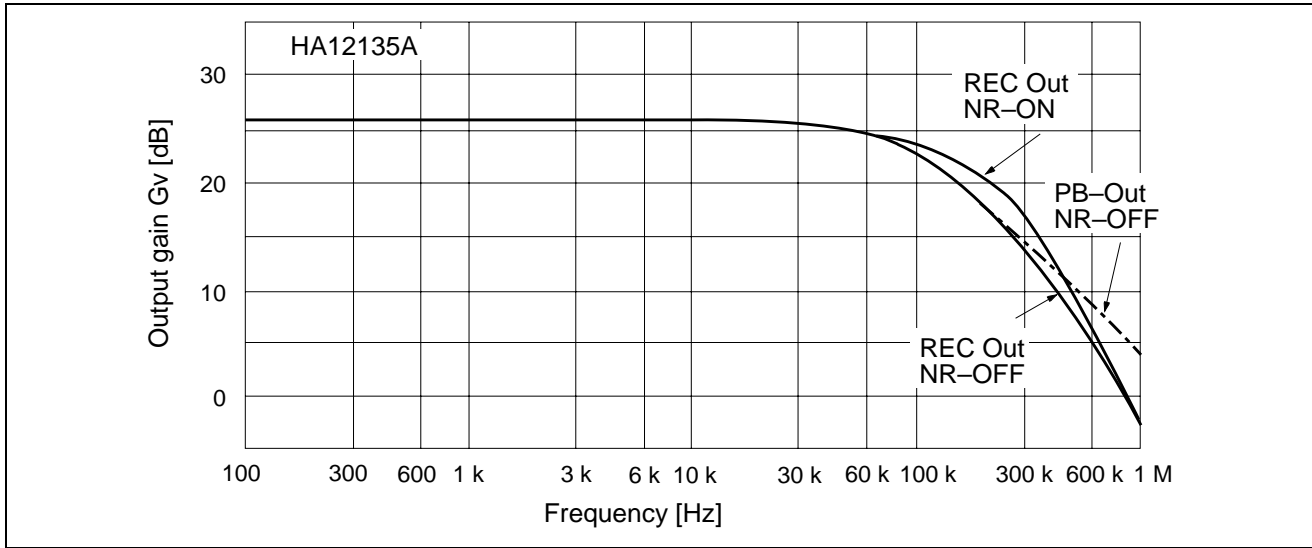


Figure 17 PB Mode Output Gain vs. Frequency

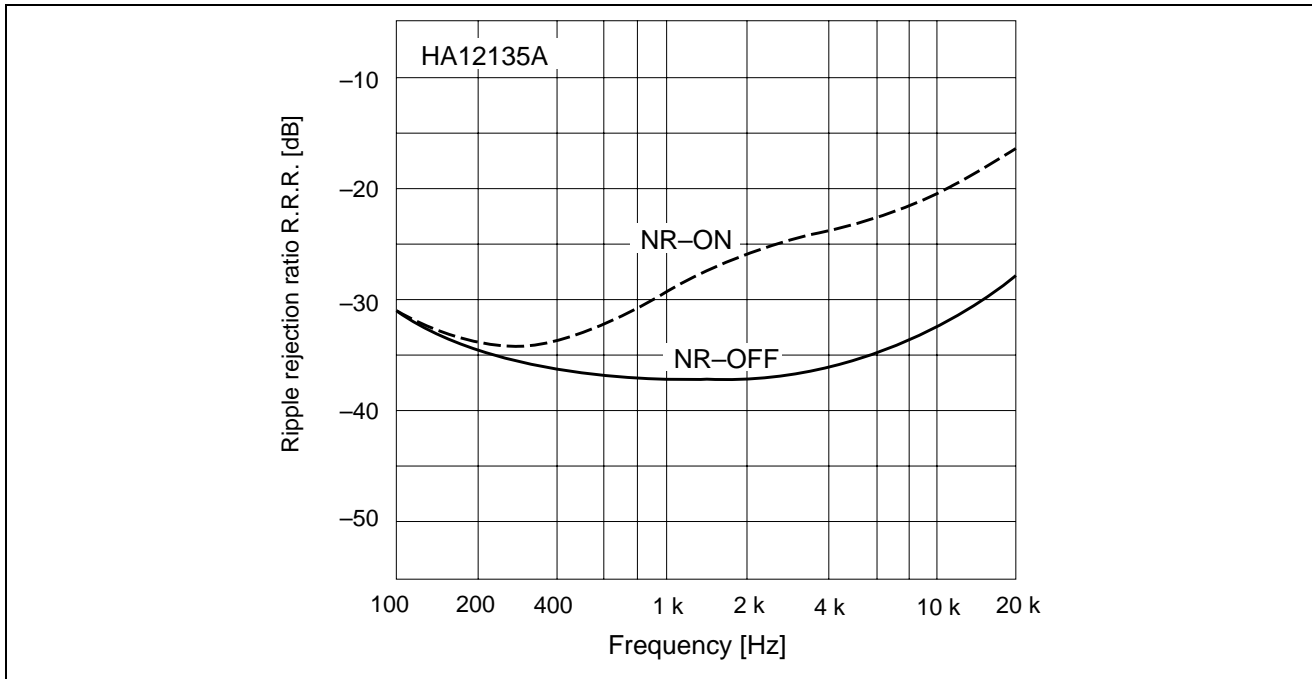


Figure 18 REC Mode Ripple Rejection Ratio vs. Frequency



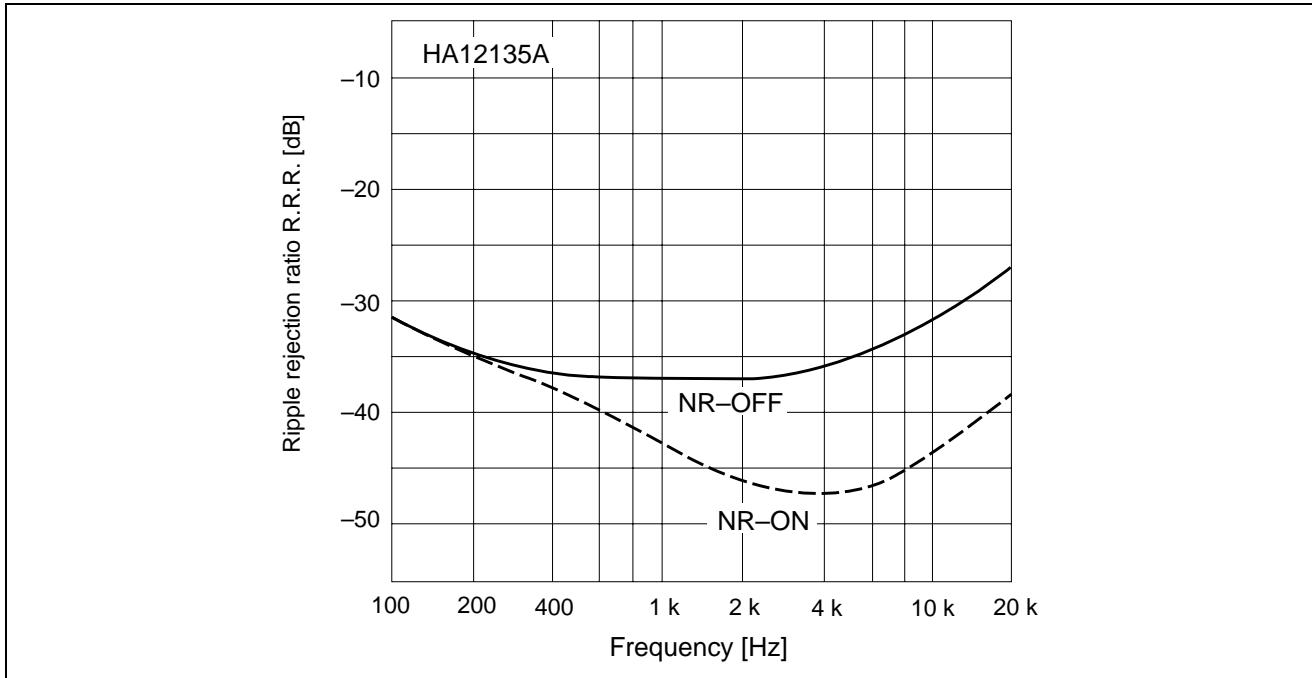


Figure 19 PB Mode Ripple Rejection Ratio vs. Frequency

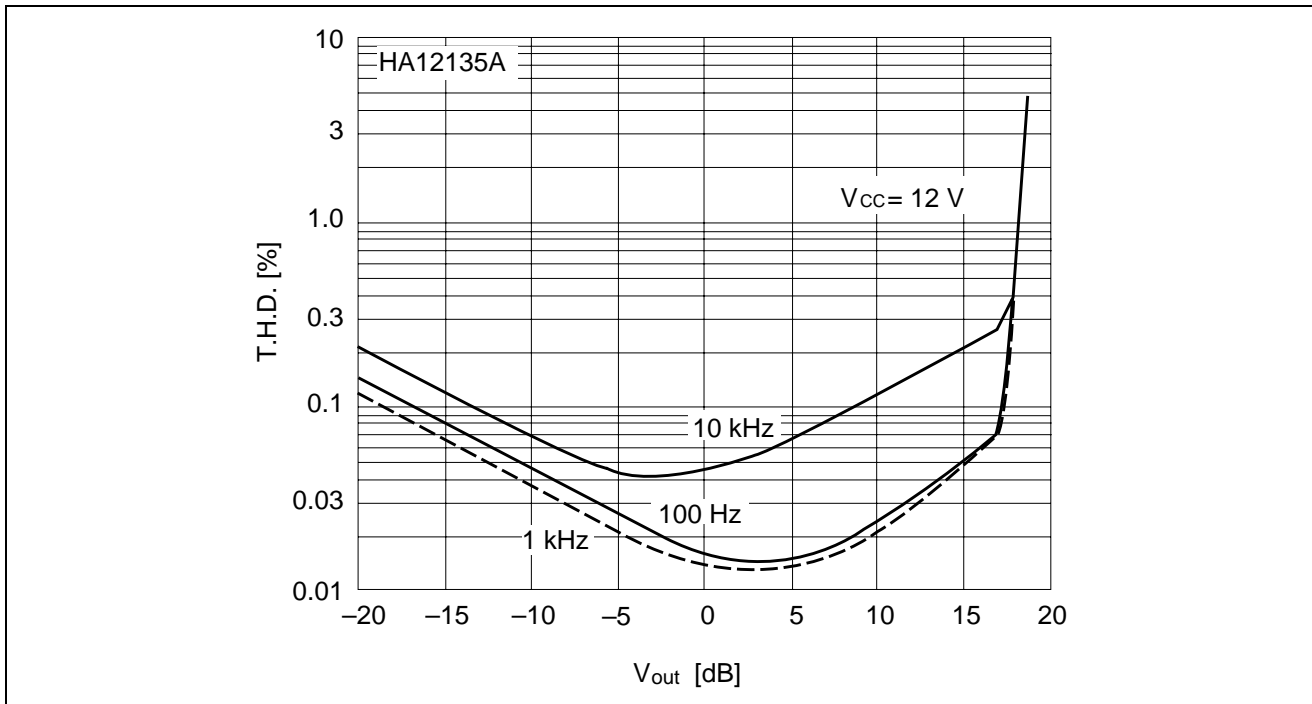


Figure 20 REC NR-OFF Total Harmonic Distortion vs. Output Level

# HA12134A, HA12135A, HA12136A

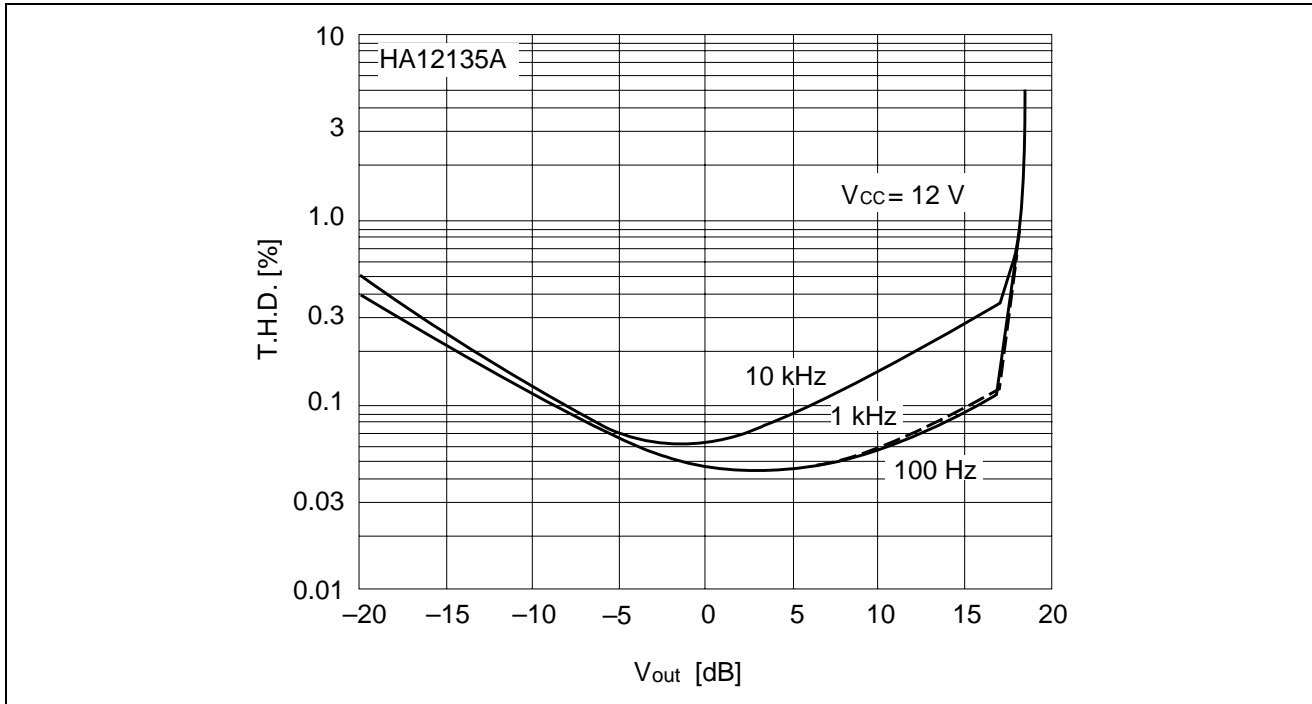


Figure 21 REC NR-ON total Harmonic Distortion vs. Output Level

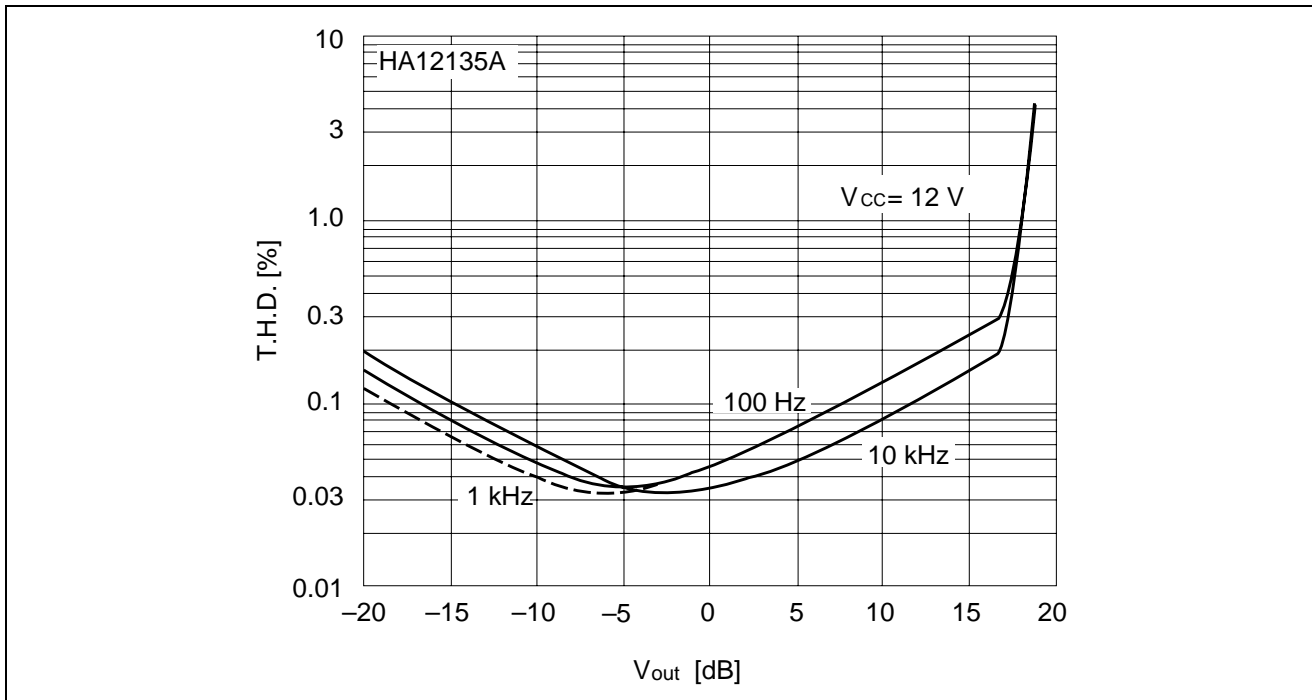


Figure 22 PB NR-OFF Total Harmonic Distortion vs. Output Level

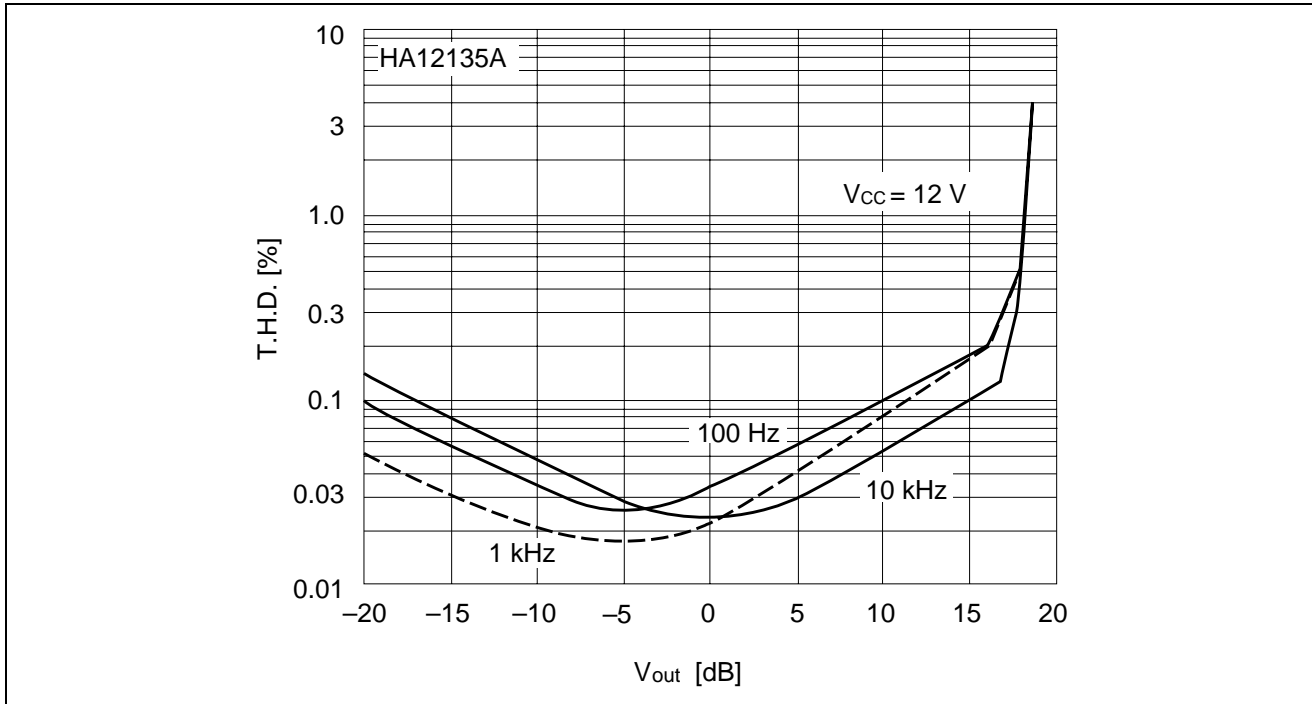


Figure 23 PB NR-ON Total Harmonic Distortion vs. Output Level

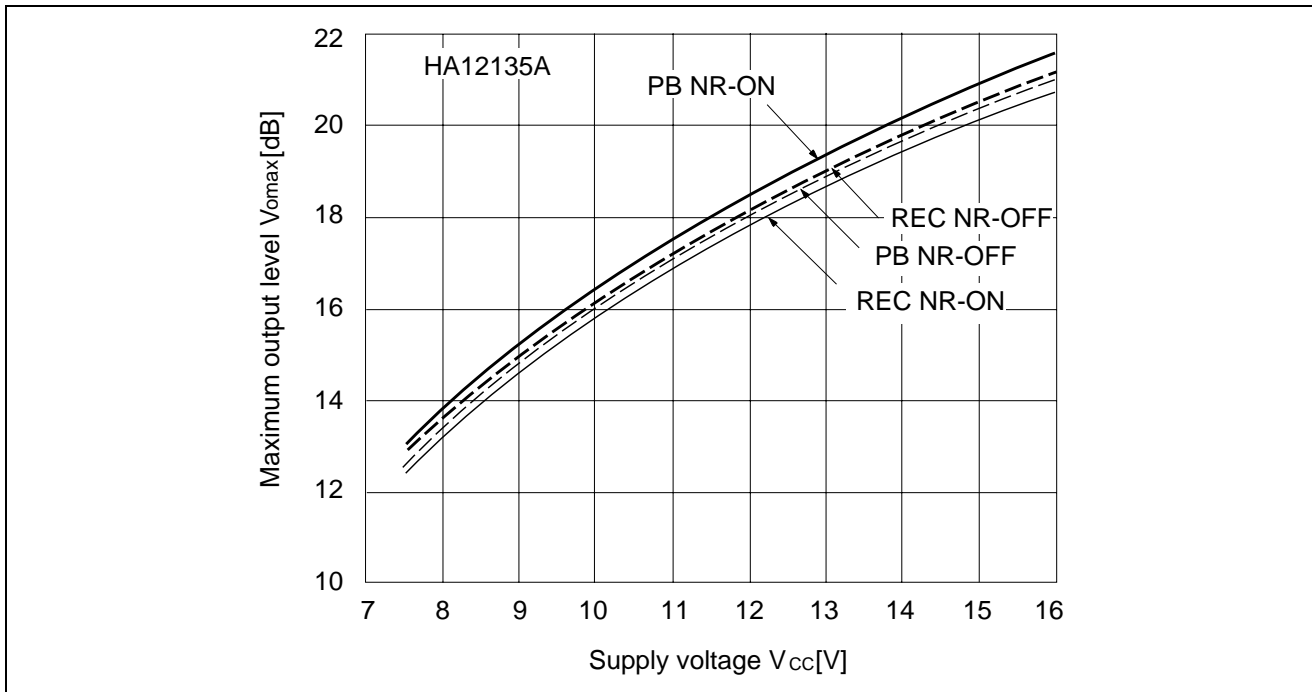


Figure 24 Maximum Output Level vs. Supply Voltage

# HA12134A, HA12135A, HA12136A

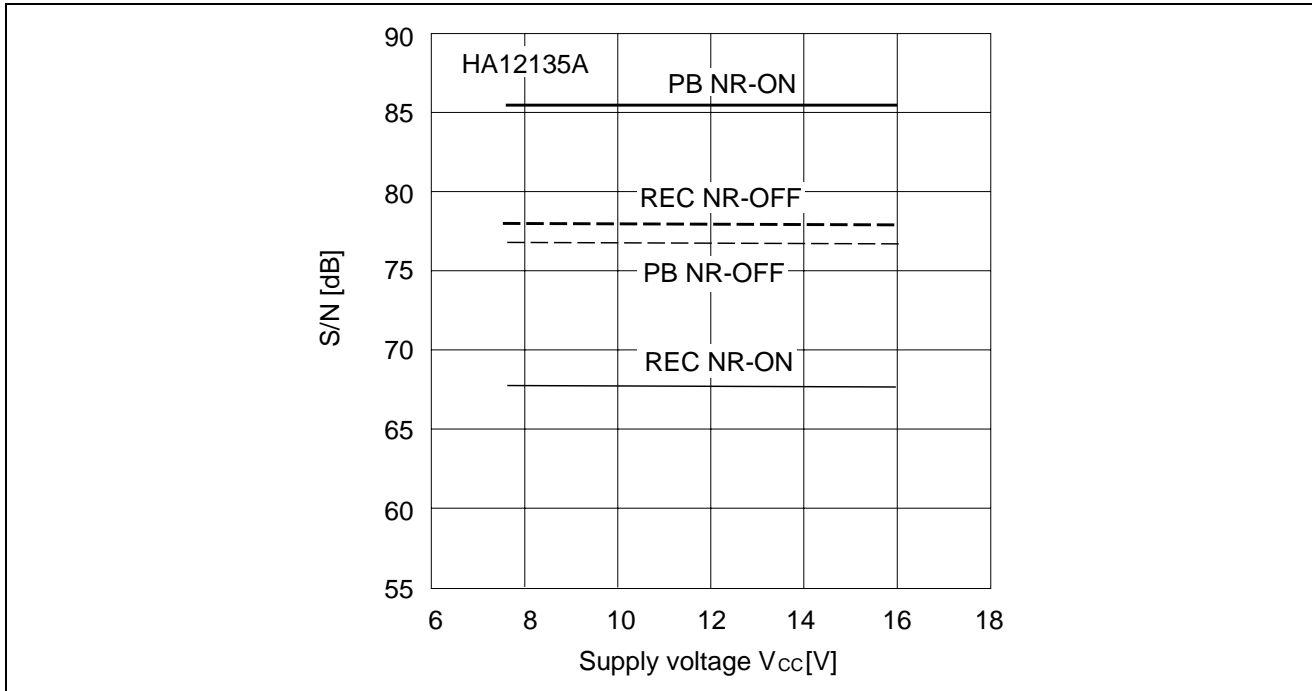


Figure 25 REC/PB Signal to Noise Ratio vs. Supply Voltage

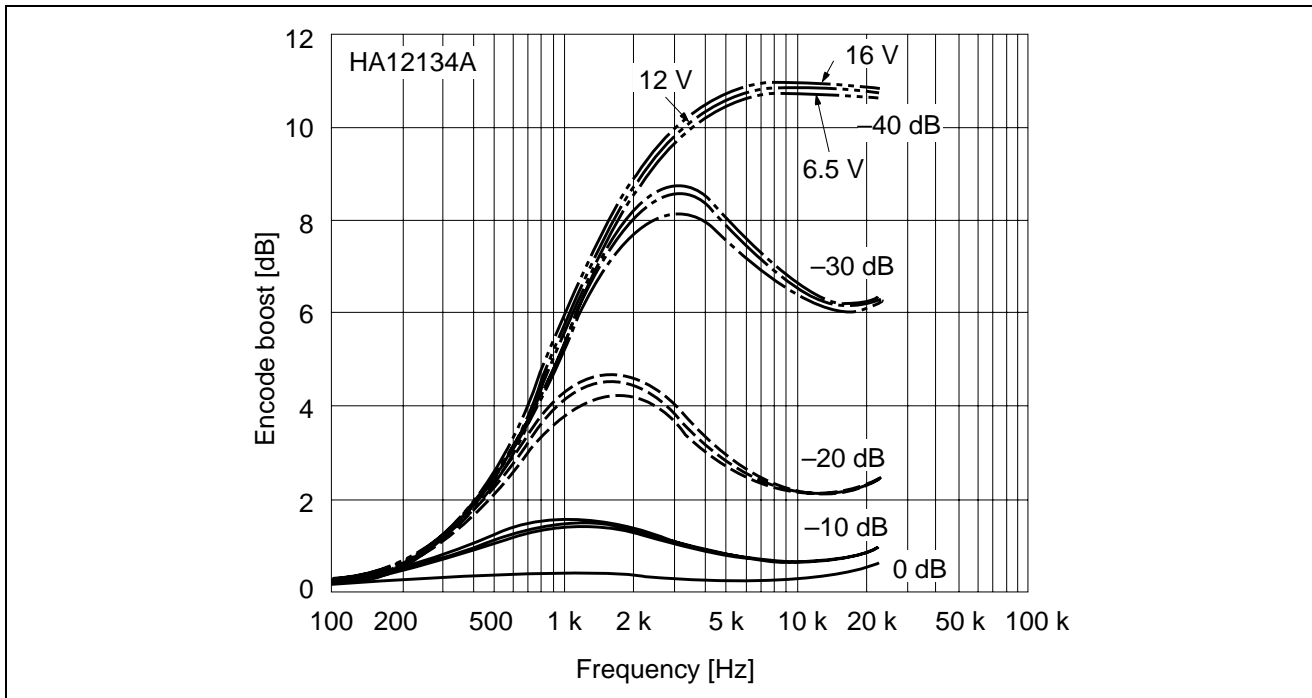


Figure 26 Encode Boost vs. Frequency

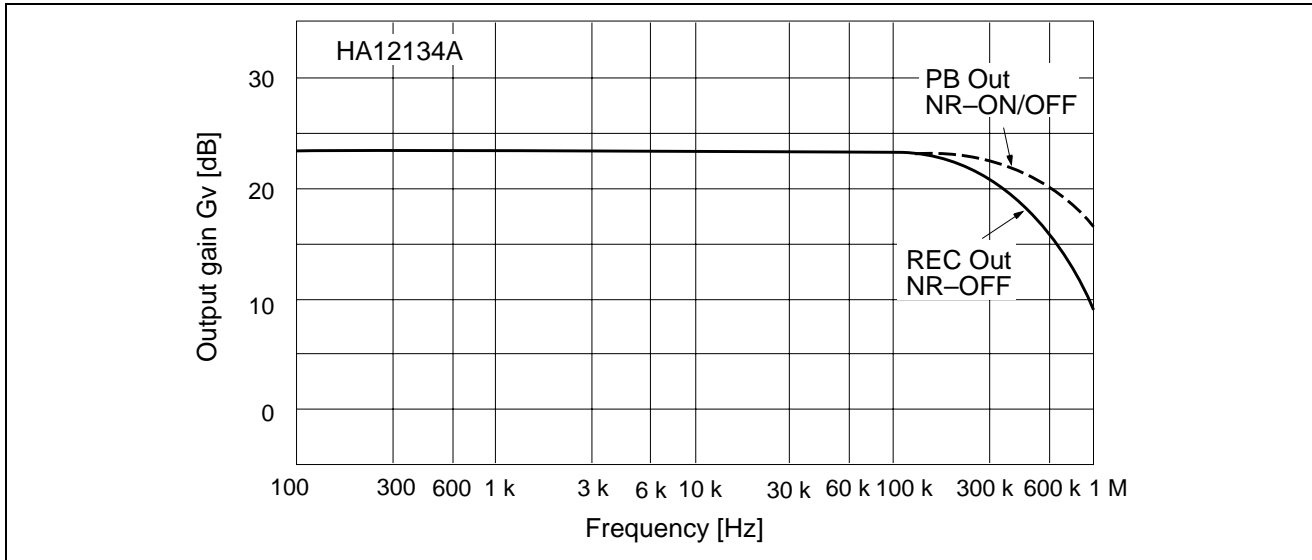


Figure 27 REC Mode Output Gain vs. Frequency

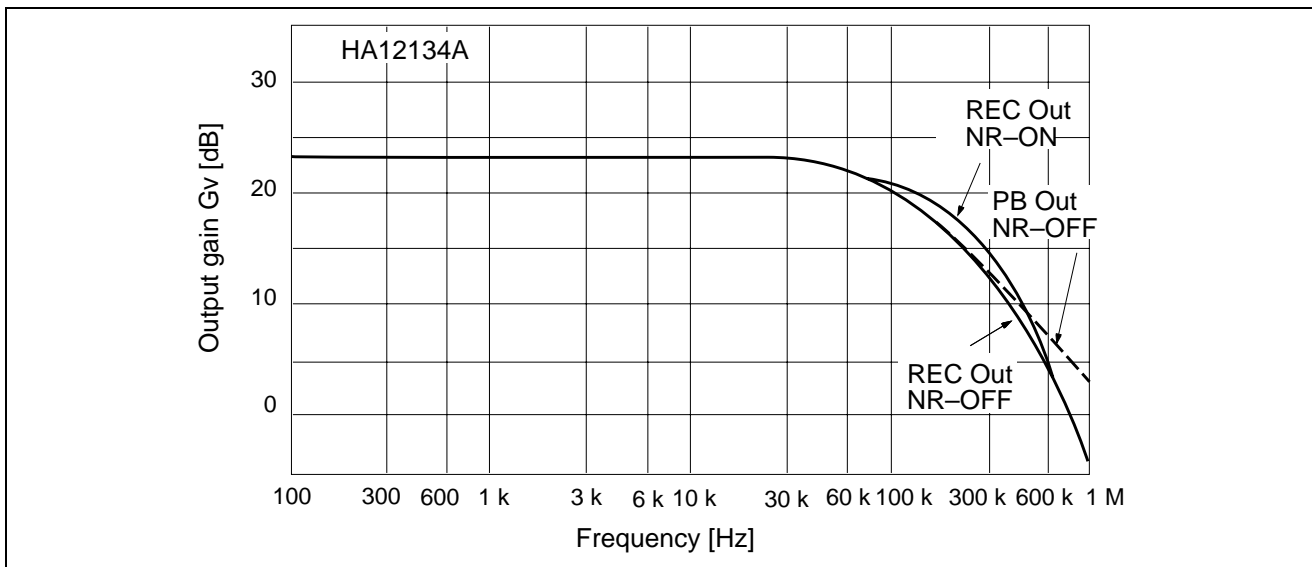


Figure 28 PB Mode Output Gain vs. Frequency

# HA12134A, HA12135A, HA12136A

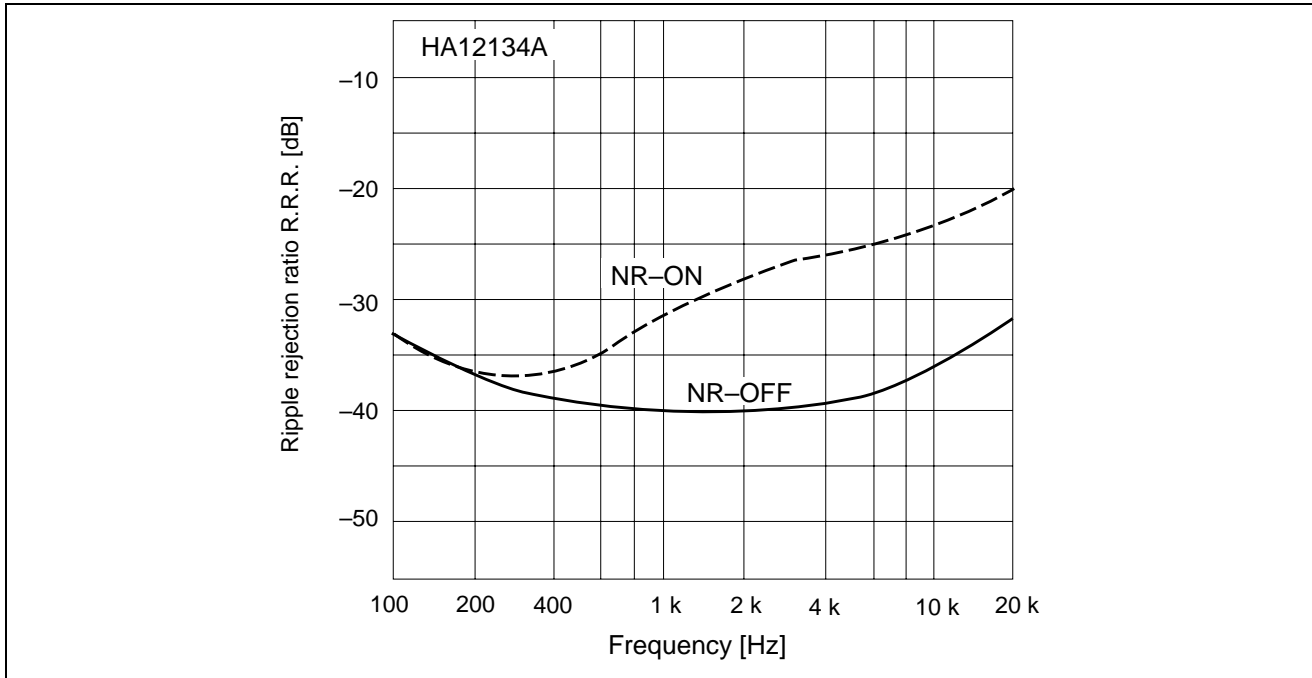


Figure 29 REC Mode Ripple Rejection Ratio vs. Frequency

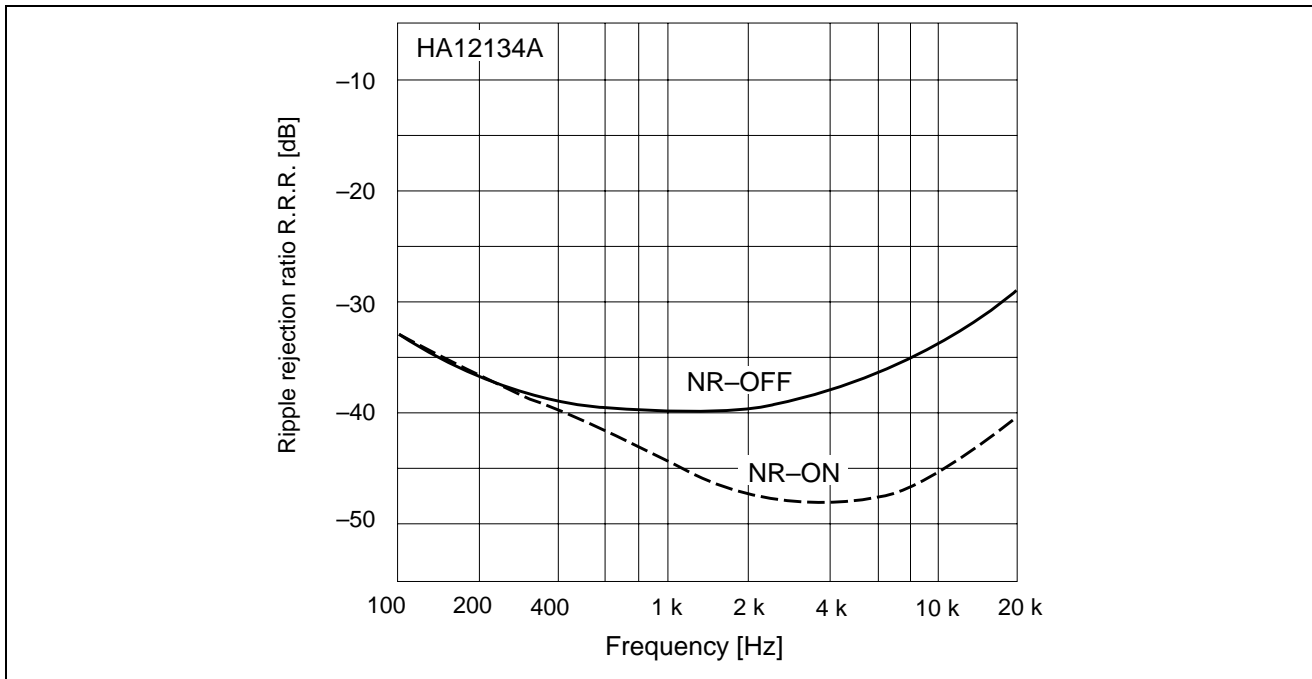


Figure 30 PB Mode Ripple Rejection Ratio vs. Frequency

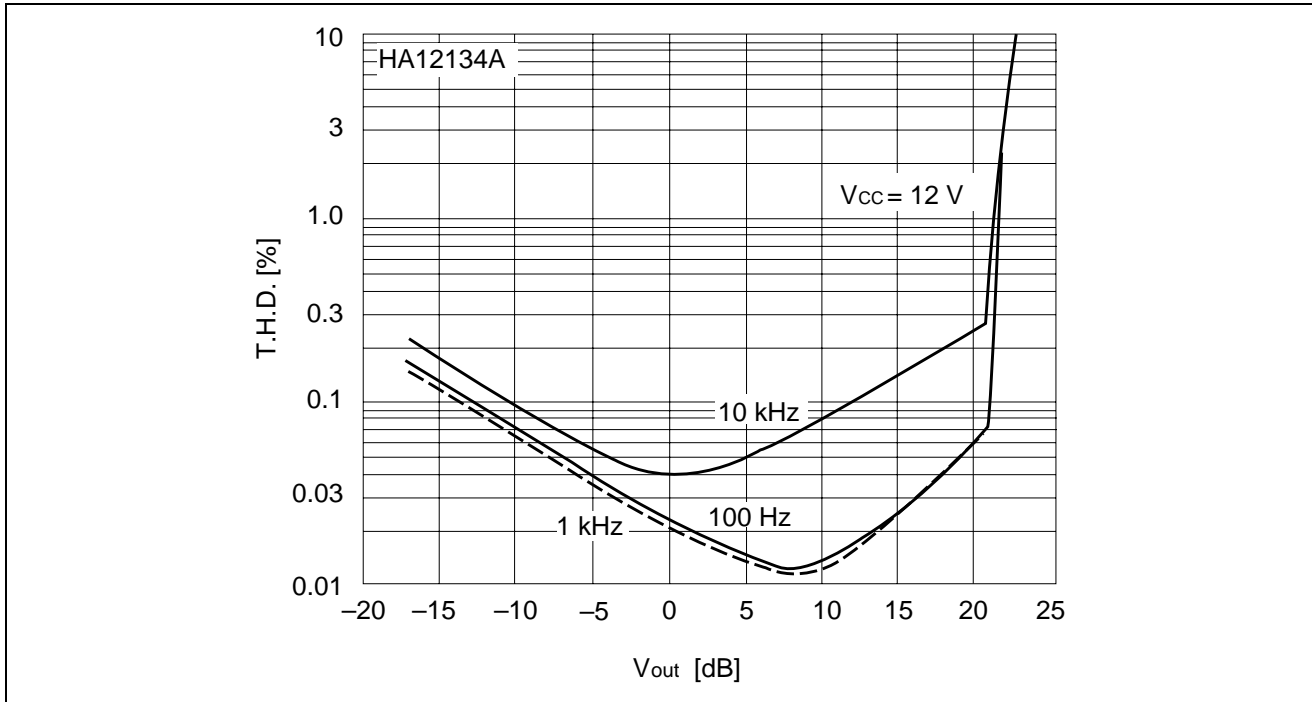


Figure 31 REC NR-OFF Total Harmonic Distortion vs. Output Level

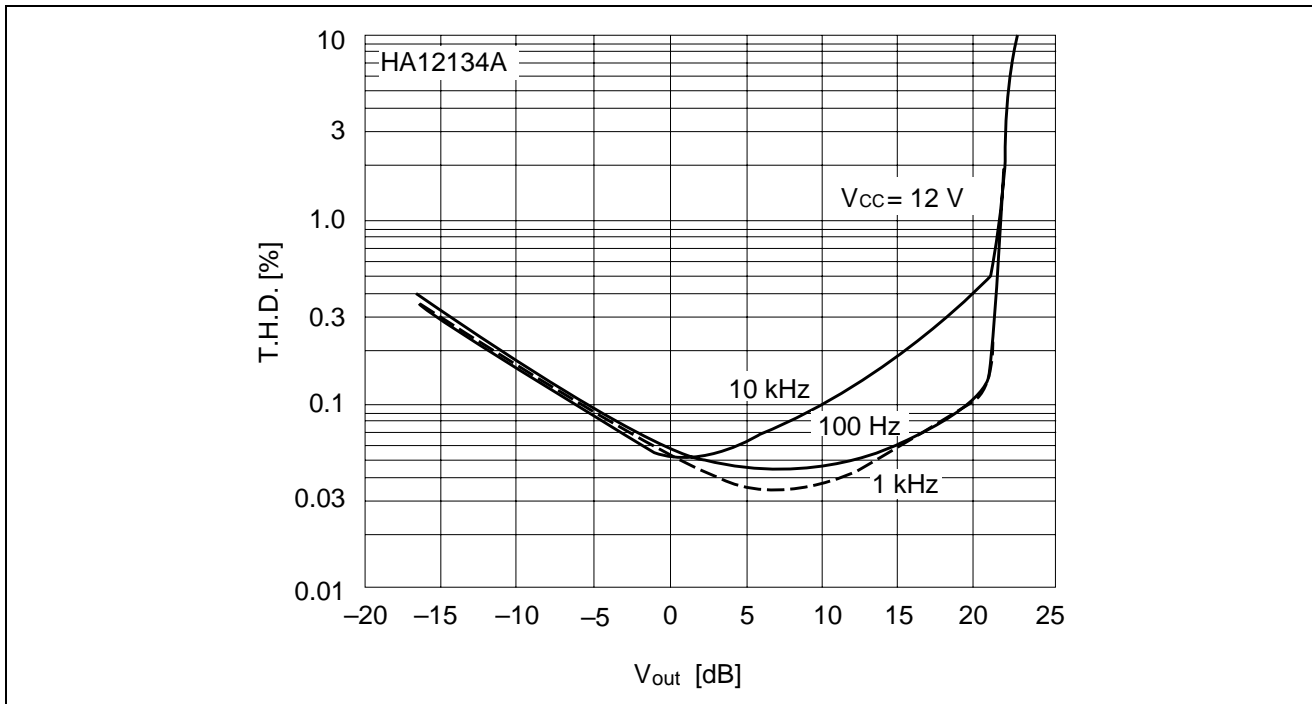


Figure 32 REC NR-ON Total Harmonic Distortion vs. Output Level

# HA12134A, HA12135A, HA12136A

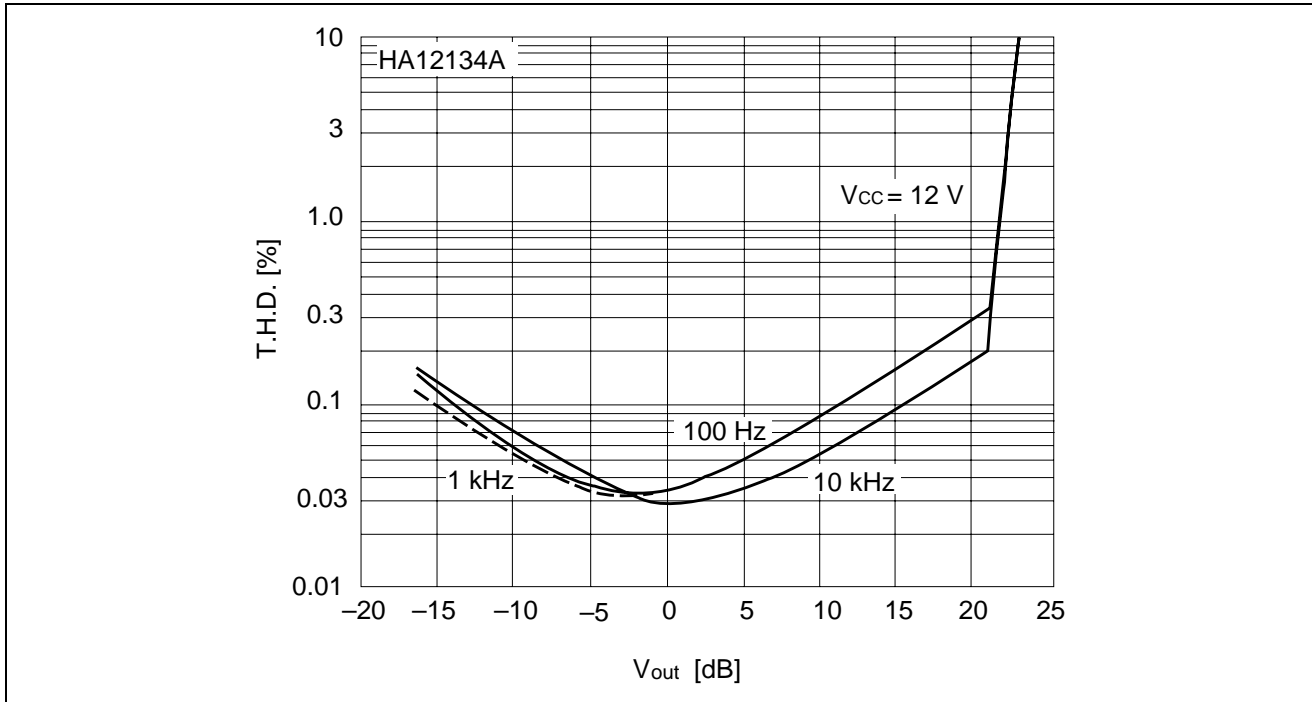


Figure 33 PB NR-OFF Total Harmonic Distortion vs. Output Level

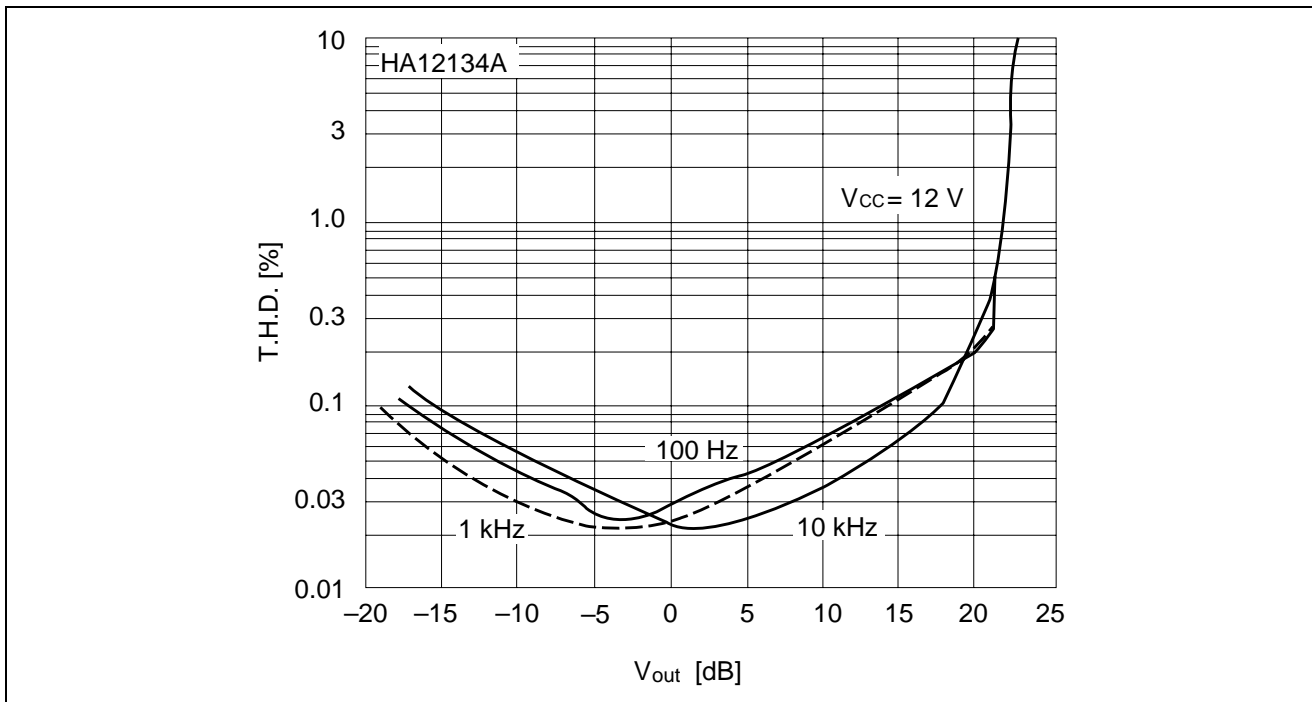


Figure 34 PB NR-ON Total Harmonic Distortion vs. Output Level



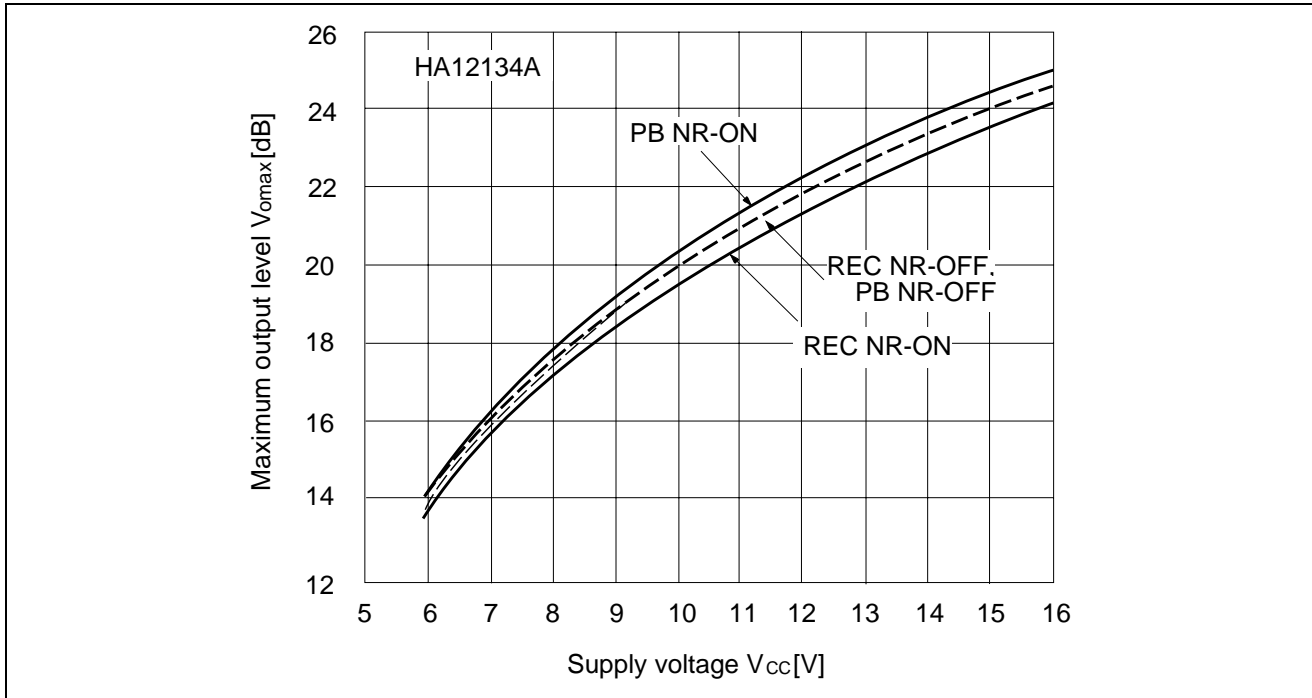


Figure 35 Maximum Output Level vs. Supply Voltage

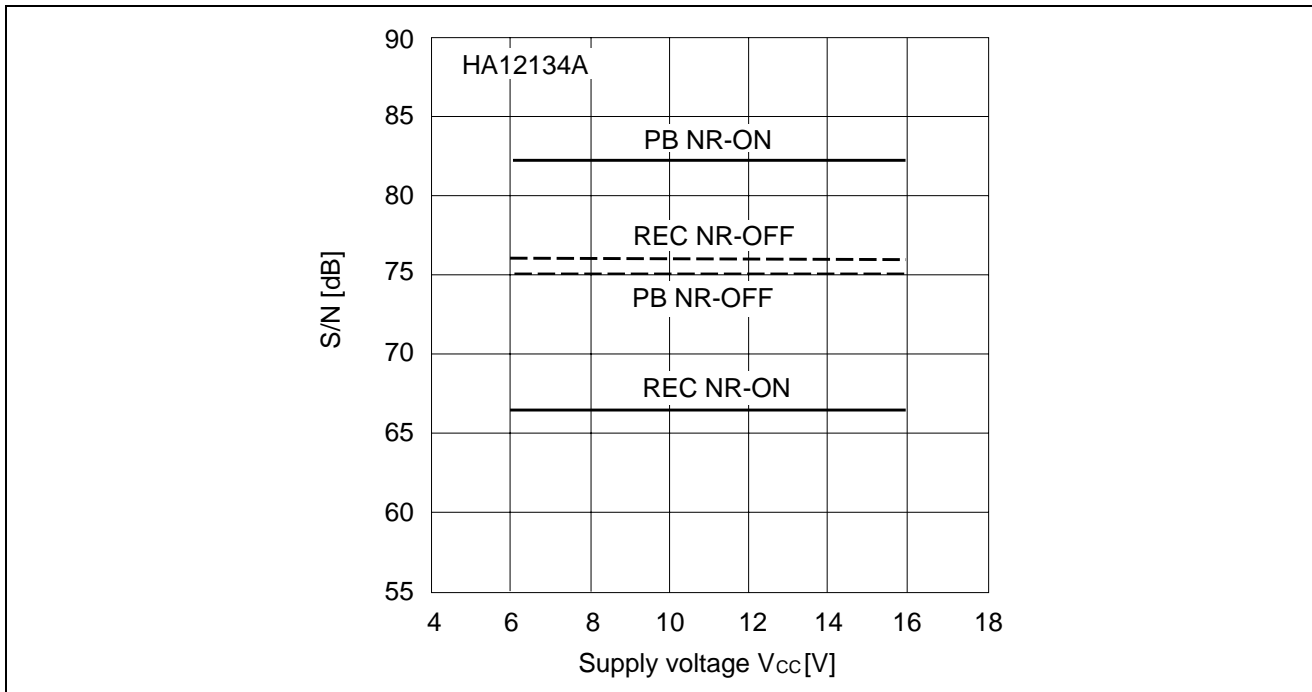
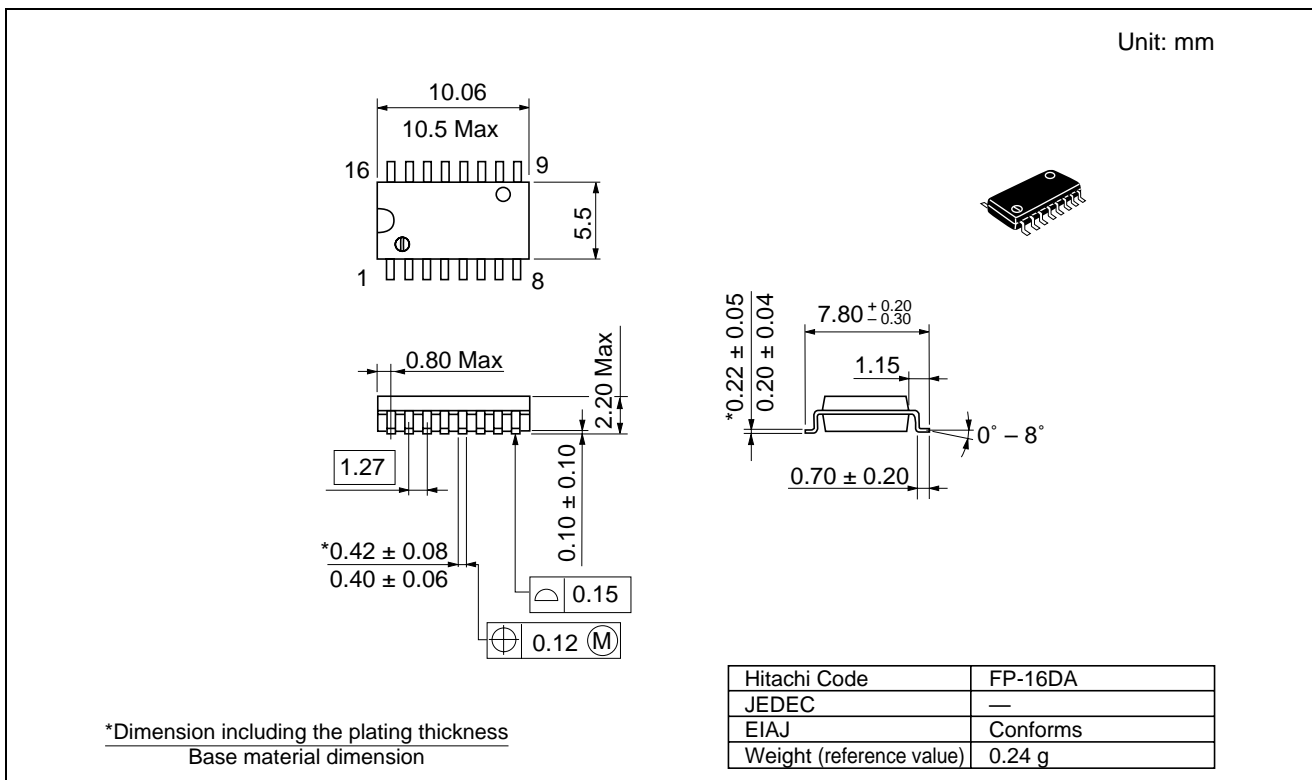
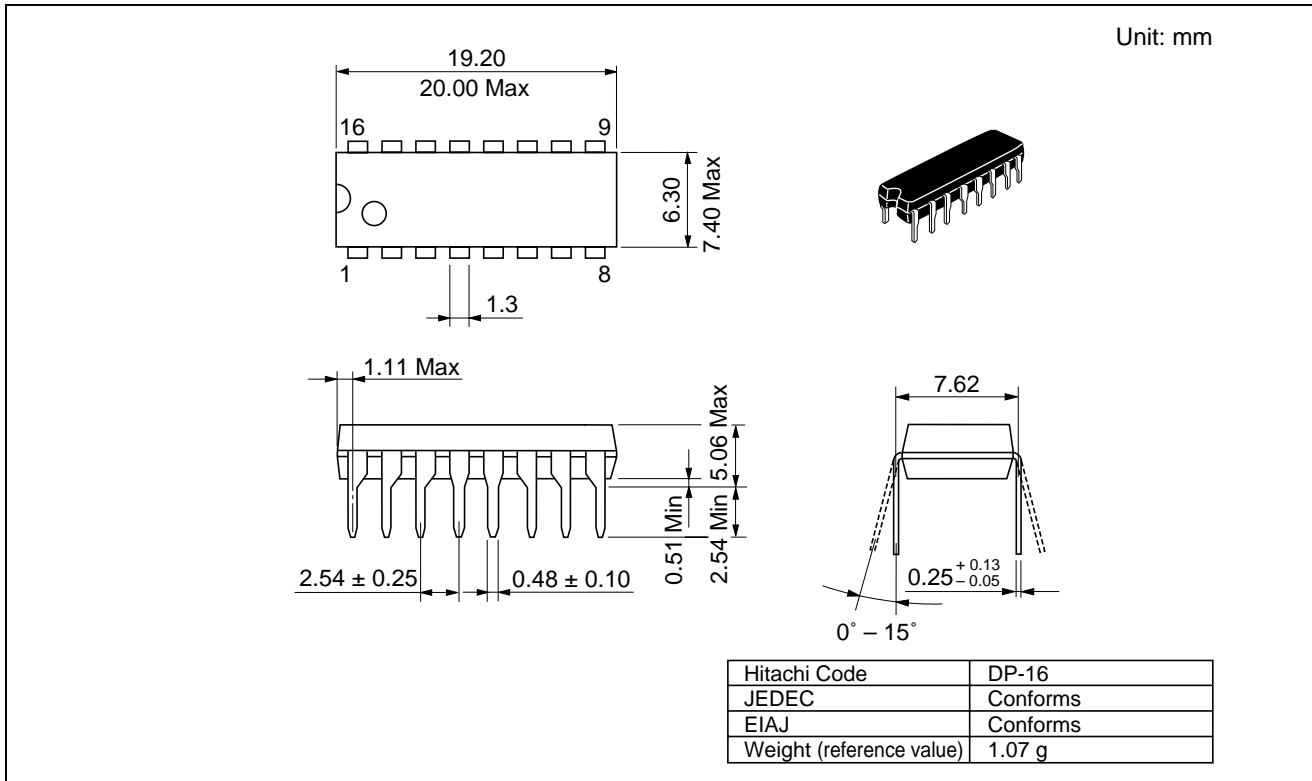


Figure 36 REC/PB Signal To Noise Ratio vs. Supply Voltage

# HA12134A, HA12135A, HA12136A

## Package Dimensions



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