

Voice Switched Speakerphone circuit

■ GENERAL DESCRIPTION

The NJW1124 is a Voice Switched Speakerphone Circuit. NJW1124 includes all of functions processing a high quality hands-free speakerphone system, such as the necessary amplifiers (Microphone , Receive ,Line), attenuators, level detectors functions.

All external capacitors are sufficient small so that ceramic capacitors are applied.

■ PACKAGE OUTLINE



NJW1124V

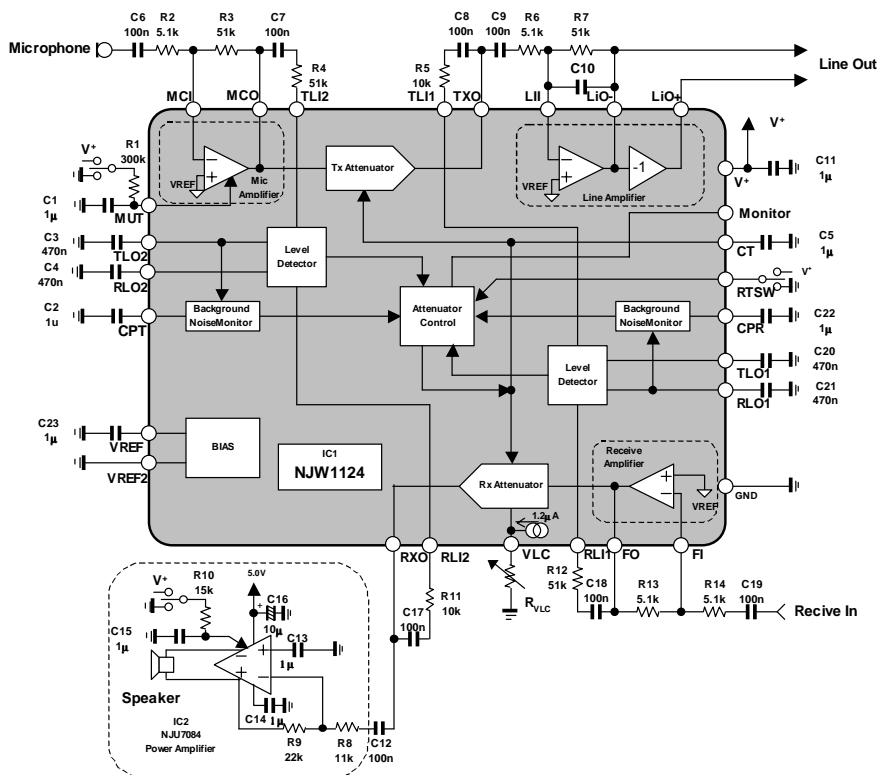
■ APPLICATION

- Video Door Phone
- Conference System
- Wireless Application
- Security System

■ FEATURES

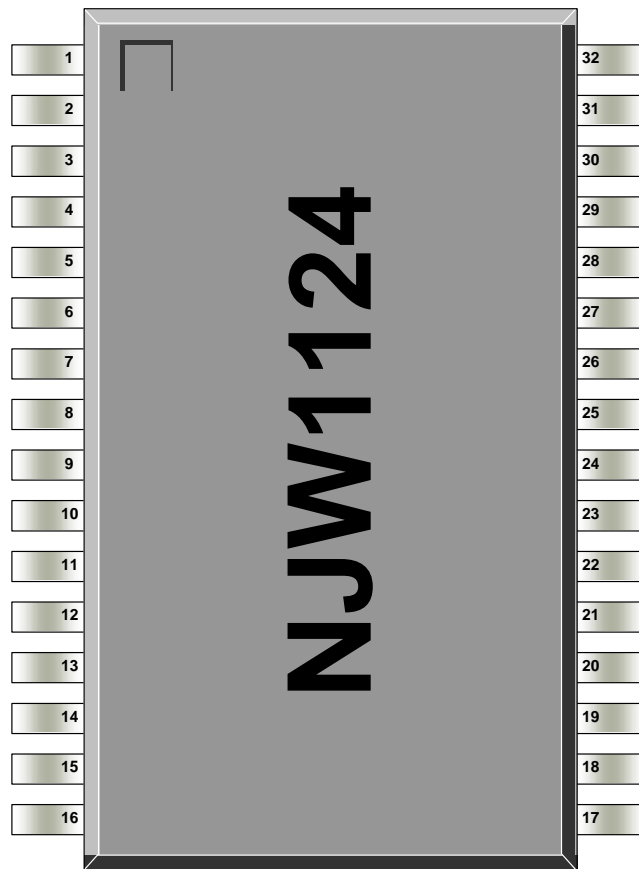
- Operating voltage range 2.9 to 4.5V
- Force to Receive, Transmit, or Idle modes
- Mode -watching monitor
- Attenuator gain range between Transmit and Receive 52dB
- Microphone amplifier with mute function
- Background noise monitor for each path
- Volume control range 40dB
- 4-point signal sensing
- Microphone and Receive Amplifiers pinned out for flexibility
- Package Outline SSOP32

■ BLOCK DIAGRAM



NJW1124

■PIN CONFIGURATION



1	VREF2	32	MON
2	MUT	31	RTSW
3	NC	30	VREF
4	CPT	29	CPR
5	TLO2	28	RLO1
6	RLO2	27	TLO1
7	CT	26	VLC
8	MCI	25	FI
9	MCO	24	FO
10	TLI2	23	RLI1
11	TLI1	22	RLI2
12	TXO	21	R XO
13	LII	20	NC
14	LIO-	19	NC
15	LIO+	18	NC
16	GND	17	V+

■ **ABSOLUTE MAXIMUM RATING** (Ta=25°C)

PARAMETER	SYMBOL	RATING	UNIT
Power Supply Voltage	V ₊	5.5	V
Power Dissipation	P _D	800 (Note1)	mW
Operating Temperature Range	Topr	-40 ~ +85	°C
Storage Temperature Range	Tstg	-40 ~ +125	°C
Maximum Input Voltage	V _{IMAX}	0 ~ V ⁺	V

(Note1) EIA/JEDEC STANDARD Test board (76.2x114.3x1.6mm, 2layer, FR-4) mounting

(Note2) Don't apply the input voltage that exceeds supply voltage.

■ **OPERATING VOLTAGE**

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V ⁺	-	2.9	4.0	4.5	V

■ **ELECTRICAL CHARACTERISTICS** (Ta=25°C, V⁺=4V, MUT=ACTIVE, RTSW=OPEN, R_{VLC}=0Ω, G_{VM}=0dB, Receive Amplifier G_V=0dB)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Current 1	I _{CC1}	RX-mode (Receive)	0.7	2.0	4.0	mA
Operating Current 2	I _{CC2}	TX-mode (Transmit)	0.7	2.0	4.0	mA
Operating Current 3	I _{CC3}	Idle-mode	0.7	2.0	4.0	mA
Reference Voltage	V _{REF}	Idle-mode	1.7	2.0	2.3	V

● **Receive Attenuator** (RxIN=100Vrms, Receive Amplifier G_V=0dB)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Receive Attenuator Gain 1	G _{R1}	RX-mode (Receive)	3.0	6.0	9.0	dB
Receive Attenuator Gain 2	G _{R2}	TX-mode (Transmit)	-43	-46	-50	dB
Receive Attenuator Gain 3	G _{R3}	Idle-mode (Standby), CPT=CPR=V ⁺	-17	-20	-23	dB
Range R to T mode	ΔG _R	RX-mode – TX-mode	47	52	57	dB
Dynamic DC offset	G _{RDC}	RX-mode – TX-mode (DC)	-50	-	50	mV
Volume control range	G _{RVr}	RX-mode, R _{VLC} =0Ω-100kΩ	30	40	50	dB
Maximum DetectorSink Current	I _{RSINKMAX}	RLI1, TLI1, Maximum Sink Current	-	-	200	μA

● **Transmit Attenuator** (TxIN=100Vrms, Mic. amplifier G_V=0dB)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Transmit Attenuator Gain 1	G _{T1}	TX-mode (Transmit)	3.0	6.0	9.0	dB
Transmit Attenuator Gain 2	G _{T2}	RX-mode (Receive)	-43	-46	-50	dB
Transmit Attenuator Gain 3	G _{T3}	Idle-mode CPT=CPR=V ⁺	-17	-20	-23	dB
Range R to T mode	ΔG _T	TX-mode – RX-mode	47	52	57	dB
Dynamic DC offset	G _{TDC}	TX-mode – RX-mode (DC)	-50	-	50	mV
Volume control range	G _{TVr}	RX-mode, R _{VLC} =0Ω-100kΩ	31	40	46	dB
Maximum DetectorSink Current	I _{RSINKMAX}	RLI1, TLI1, Maximum Sink Current	-	-	200	μA

●MIC Amplifier (TxIN=1mVrms, Gv=40dB, RL=5.1kΩ)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Offset Voltage	V _{MOS}	R5=300kΩ, V _{MOS} =V _{MCI} -V _{MCO}	-30	0.0	30	mV
Input Bias Current	I _{MBIAS}	-	-	0.0	-	nA
Voltage Gain 1	G _{VM1}	f=1kHz	-	40	-	dB
Voltage Gain 2	G _{VM2}	f=20kHz	-	38	-	dB
Maximum Output Voltage	V _{MMAX}	THD=1%	0.9	-	-	Vrms
Maximum Output Current	I _{MOMAX}	-	-	1.5	-	mA
Maximum Attenuation	G _{MMUTE}	R5=300kΩ	70	73	-	dB

●Receive Amplifier (RxIN=1mVrms, Gv=40dB, RL=5.1kΩ)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Offset Voltage	V _{ROS}	RF=300kΩ, V _{FOS} =V _{FI} -V _{FO}	-30	0.0	30	mV
Input Bias Current	I _{RBIAS}	-	-	30	-	nA
Voltage Gain 1	G _{VR1}	f=1kHz	-	40	-	dB
Voltage Gain 2	G _{VR2}	f=20kHz	-	38	-	dB
Maximum Output Voltage	V _{RMAX}	THD=1%	0.9	-	-	mVrms
Maximum Output Current	I _{ROMAX}	-	-	1.5	-	mA

●Line Amplifier (LINEIN=50mVrms, Gv=26dB, RL=1.2kΩ)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Offset Voltage	V _{LOS}	R9=51kΩ	20	0.0	20	mV
Input Bias Current	I _{LBIAS}	-	-	0.0	-	nA
Voltage Gain 1	G _{VL1}	f=1kHz	-	26	-	dB
Voltage Gain 2	G _{VL2}	f=20kHz	-	25	-	dB
Closed Loop Gain	G _{LC}	LIO- to LIO+	-0.5	0	0.5	dB
Maximum Output Voltage	V _{LMAX}	THD=1%	1.5	-	-	Vrms
Total Harmonic Distortion	THD _{LN}	f=1kHz	-	-	0.5	%
Maximum Output Current	I _{LOMAX}	-	-	4.0	-	mA

●Monitor Terminal (32Pin) Output Voltage

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
R _x -mode	Rx	-	V ⁺ -0.3	-	-	V
T _x -mode	Tx	-	-	-	0.3	V
Idle-mode	Idle	No Signal	-	V ⁺ /2	-	V
Maximum Output Current	I _{MON}	Rx-mode / Tx-mode	-	1.0	-	mA

■ CONTROL CHARACTERISTICS (MUT)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Low Level Input Voltage	V_{IL1}	-	-	-	0.3	V
High Level Input Voltage	V_{IH1}	-	1.5	-	-	V

■ CONTROL CHARACTERISTICS (RTSW)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Low Level Input Voltage	V_{IL2}	-	-	-	0.3	V
High Level Input Voltage	V_{IH2}	-	$V^+ - 0.3$	-	-	V

■ FUNCTION

●MUT (2pin)

INPUT VOLTAGE	STATUS	OPERATION
V_{IH}	MUTE	The microphone input is made a mute.
V_{IL}	ACTIVE	The microphone input is active.

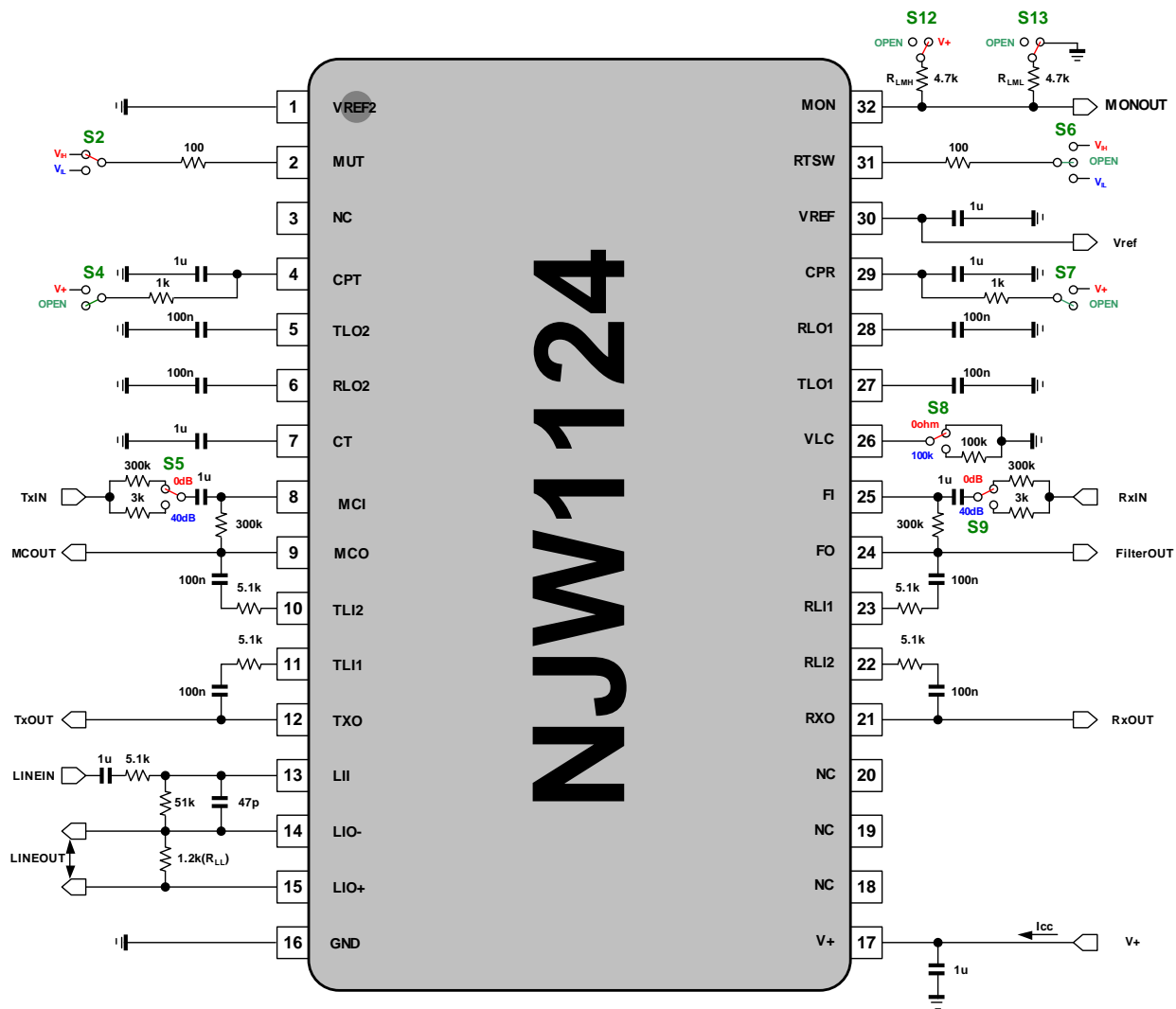
●RTSW (31pin)

INPUT VOLTAGE	STATUS	OPERATION
V_{IH}	Receive	Force to Receive mode.
OPEN	AUTO	Receive mode and Transmit mode are automatically switched.
V_{IL}	Transmit	Force to Transmit mode.

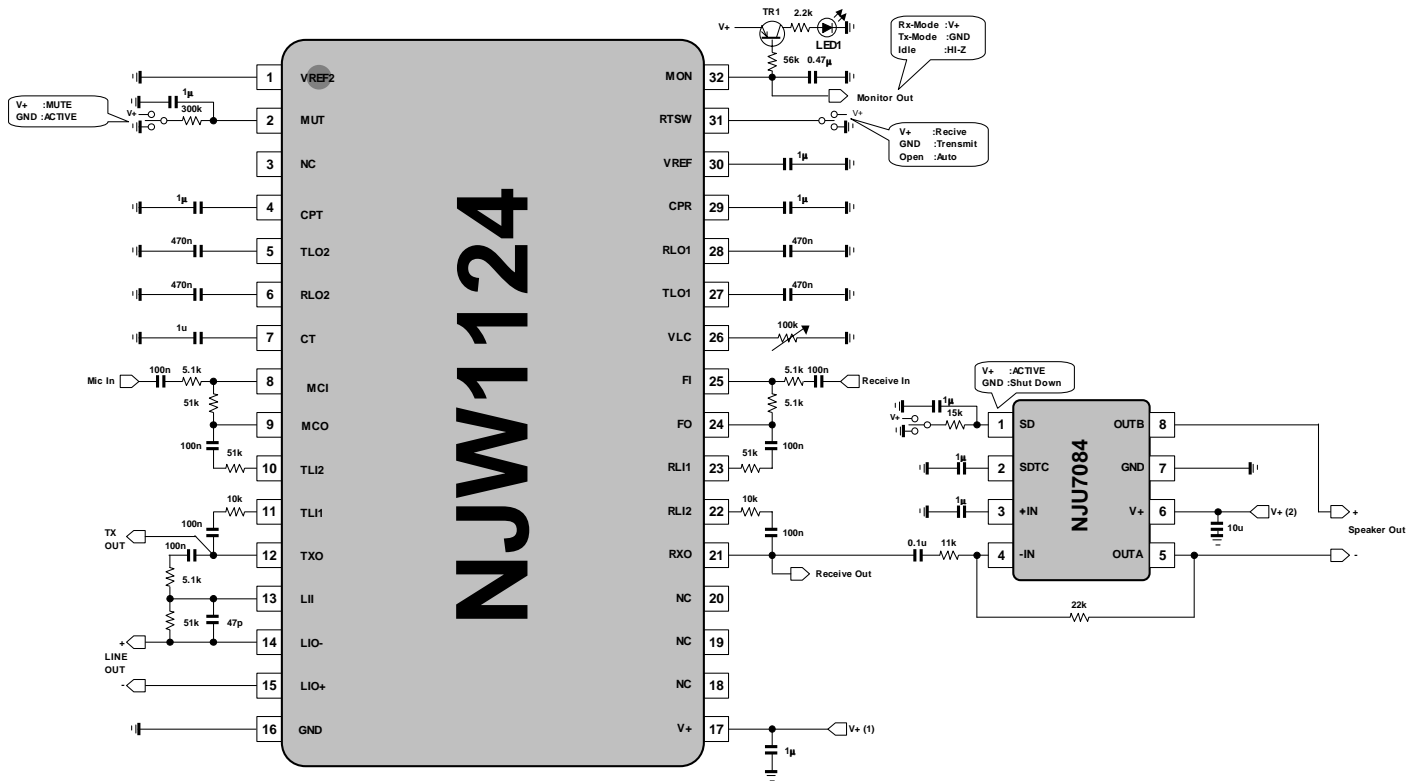
● R_{VLC} (26pin)

IMPEDANCE	STATUS	OPERATION
0	Vol_{MAM}	The Receive attenuator Volume is maximum.
100k Ω	Vol_{MIN}	The Receive attenuator Volume is minimum.

MEASUREMENT CIRCUIT

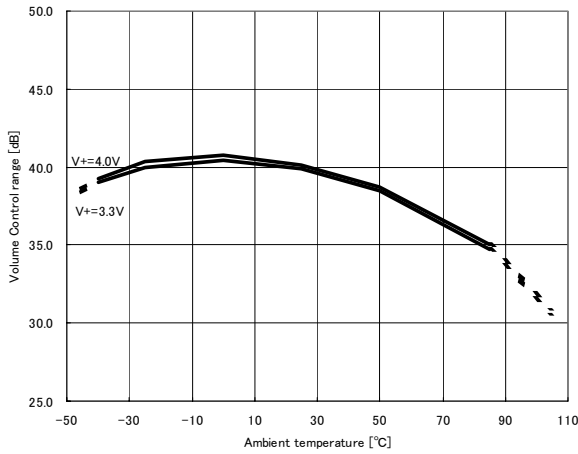


APPLICATION CIRCUIT

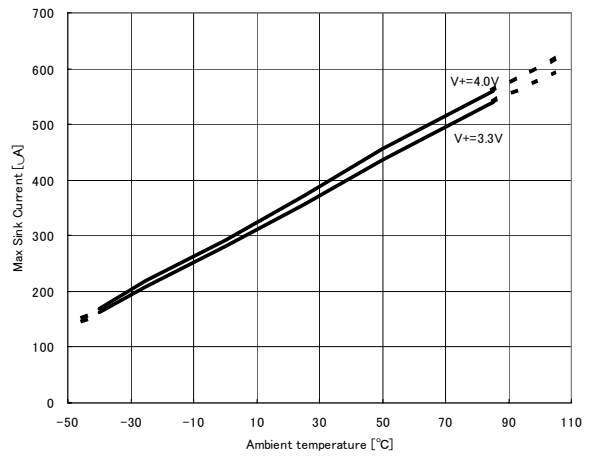


TYPICAL CHARACTERISTICS

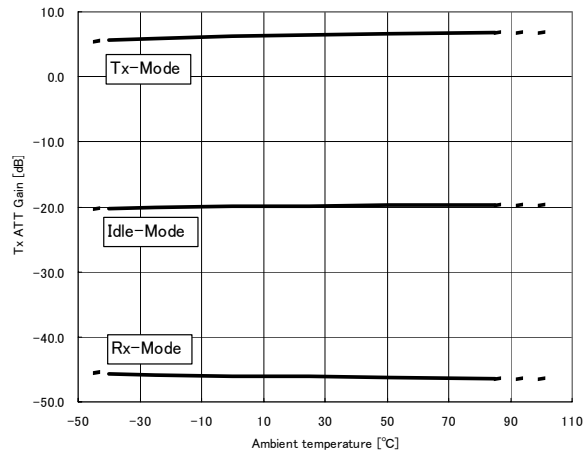
Volume control range vs ambient temperature
(VLC=0Ω/100kΩ)



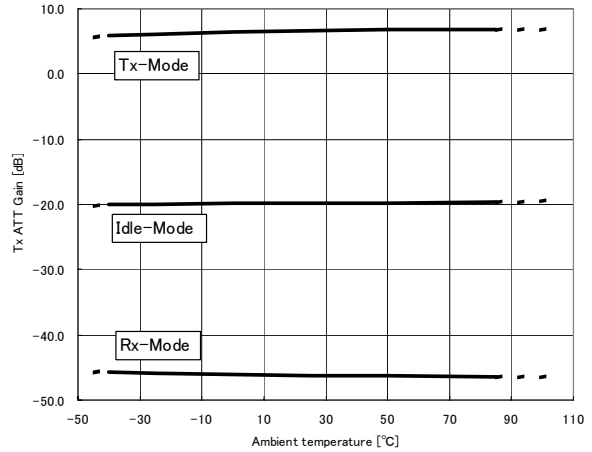
Detector Max Sink Current vs ambient temperature
(TL11, TL12, RL11, RL12 Max Sink Current)



Tx ATT Gain vs ambient temperature
(V+=3.3V, Receive Amp Gain = 0dB, VLC=0Ω)

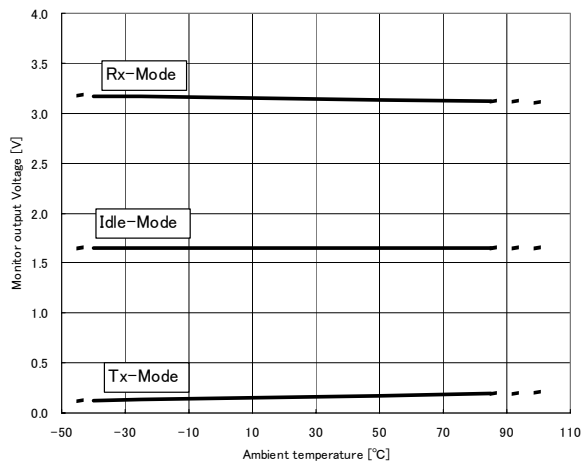


Tx ATT Gain vs ambient temperature
(V+=4.0V, Receive Amp Gain = 0dB, VLC=0Ω)



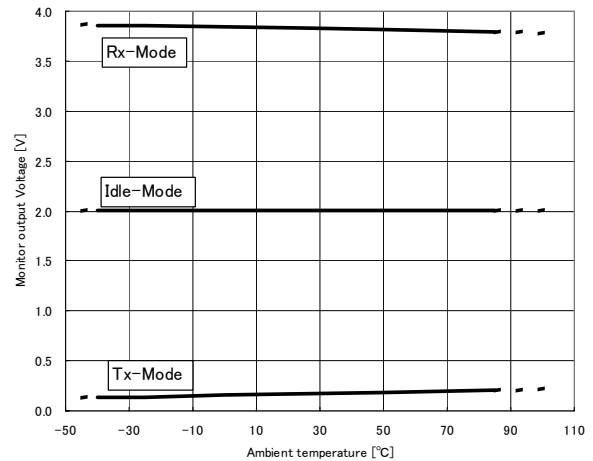
Monitor Out vs ambient temperature
(V+=3.3V, RLMH=RLML=4.7kΩ)

note: The MONITOR OUT(@idle-mode) is Hi-Z when there are neither RLMH and RLML.

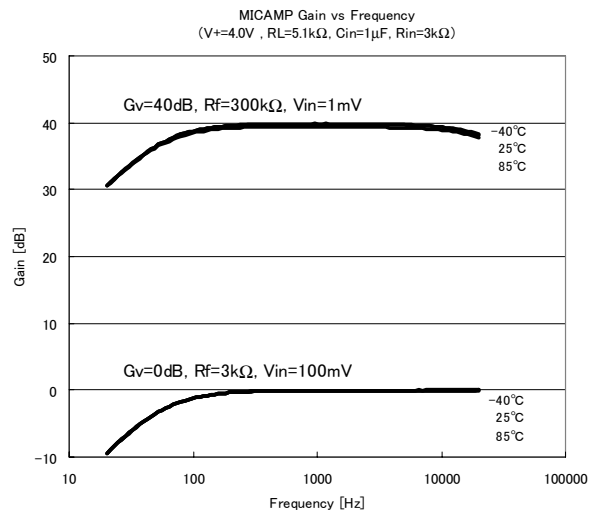
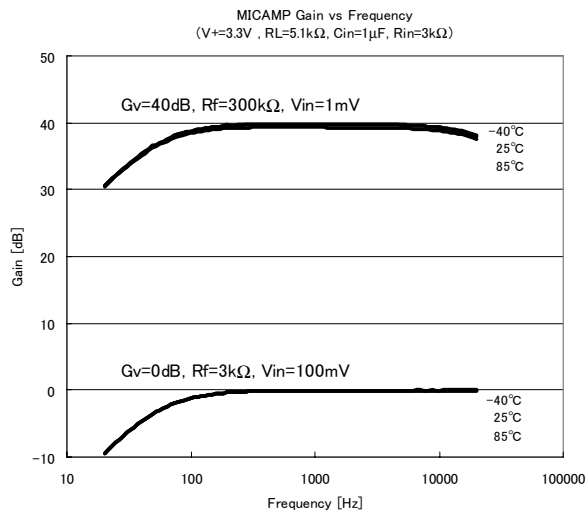
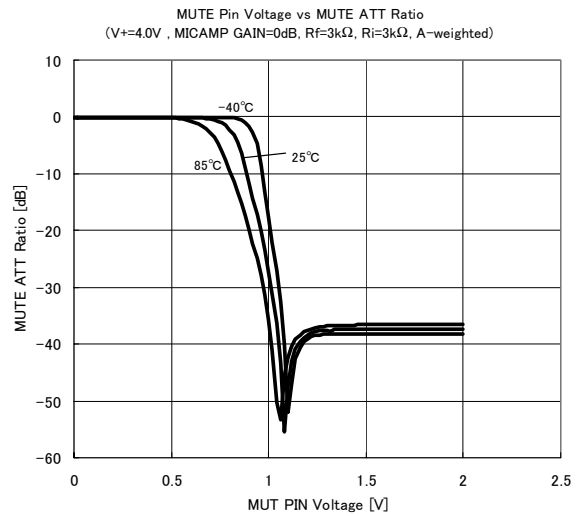
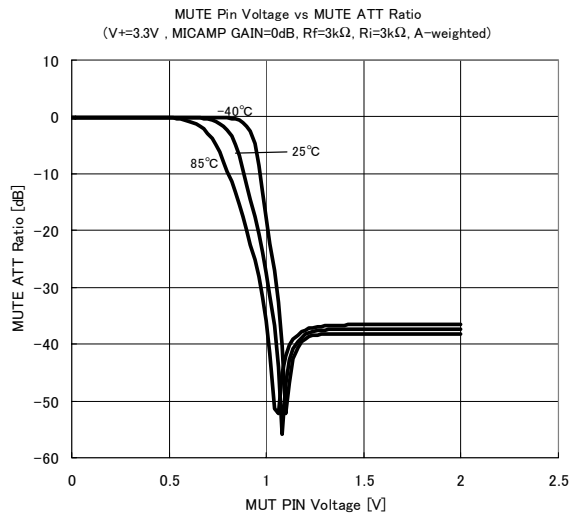
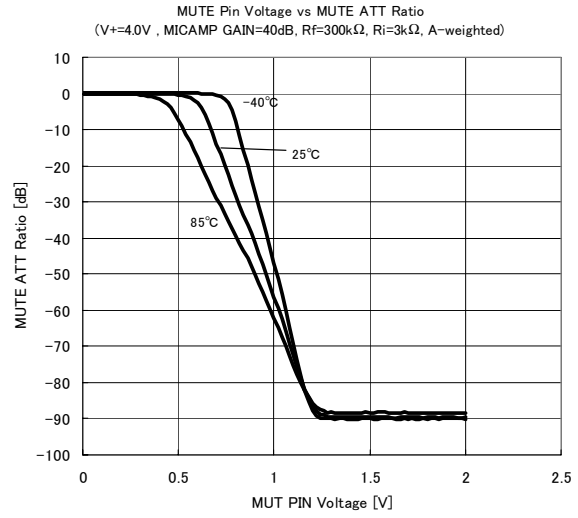
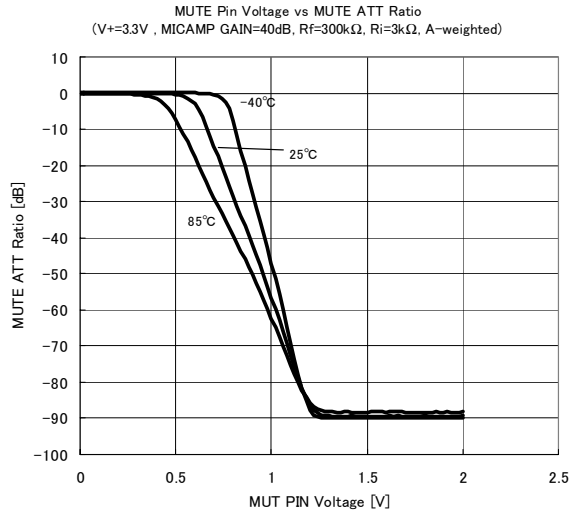


Monitor Out vs ambient temperature
(V+=4.0V, RLMH=RLML=4.7kΩ)

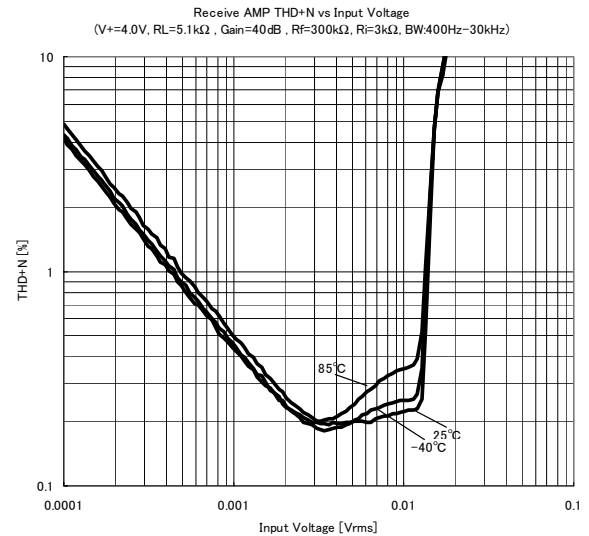
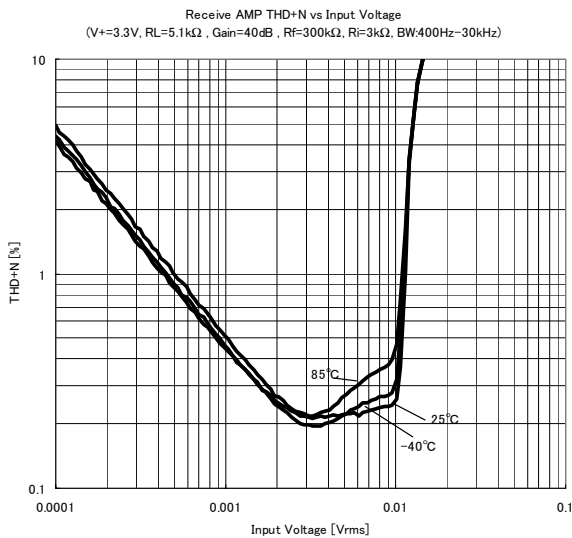
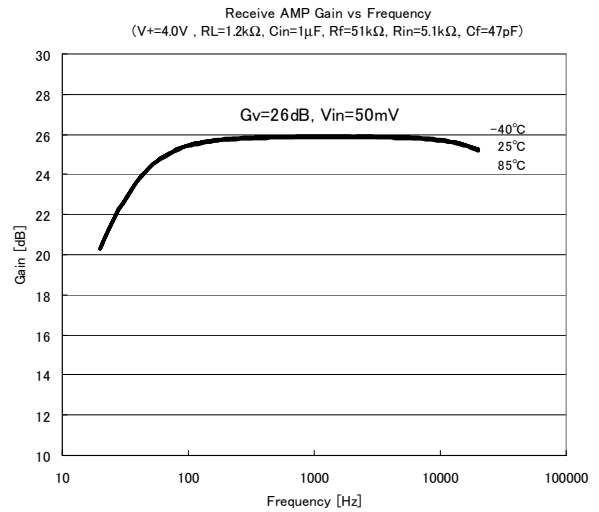
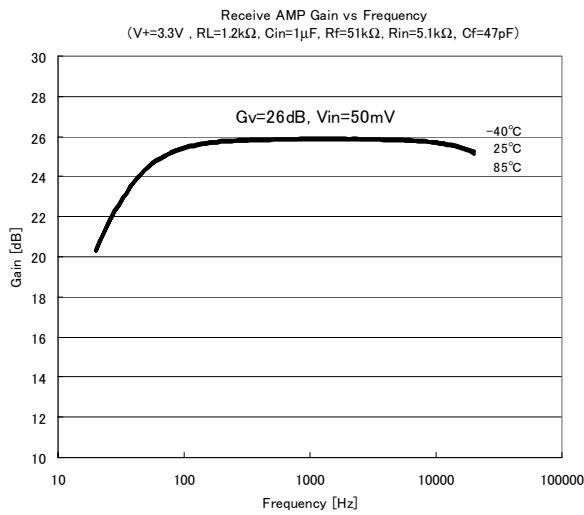
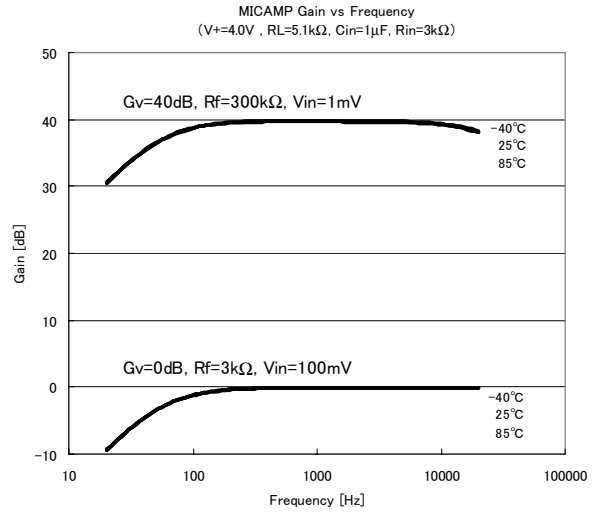
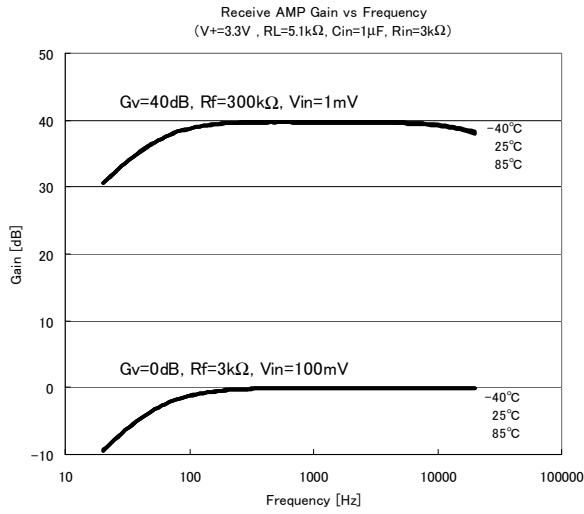
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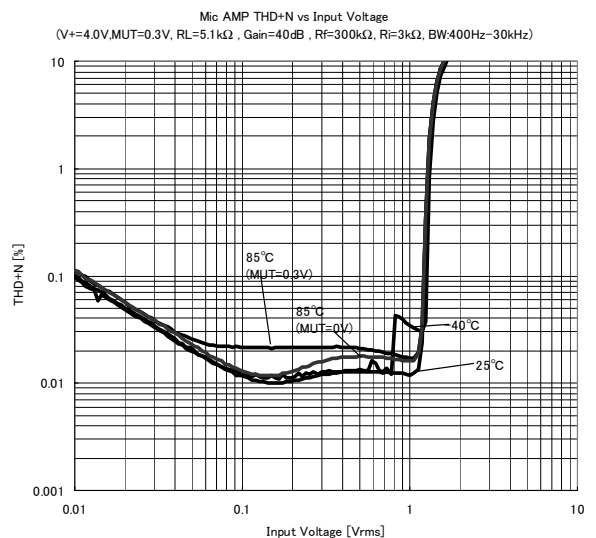
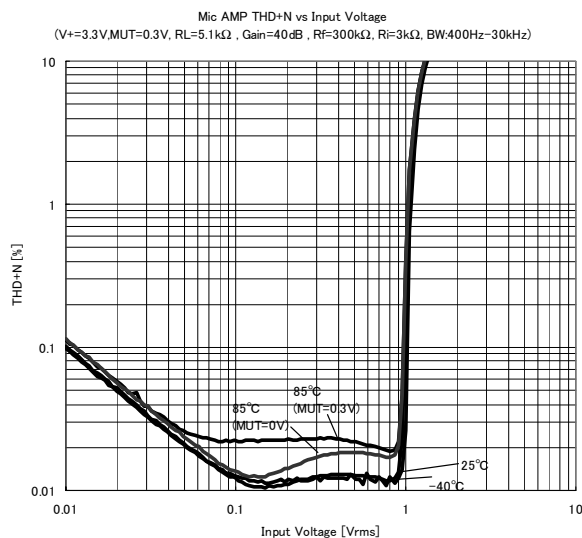
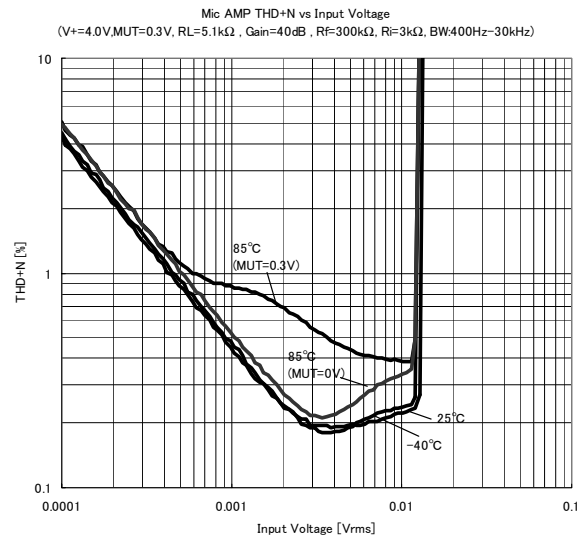
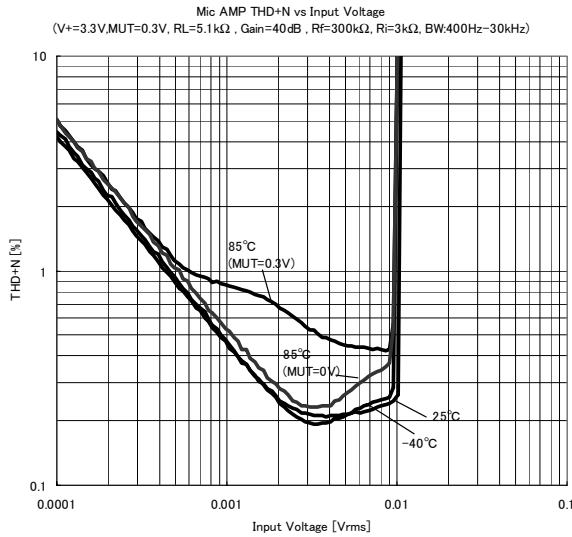
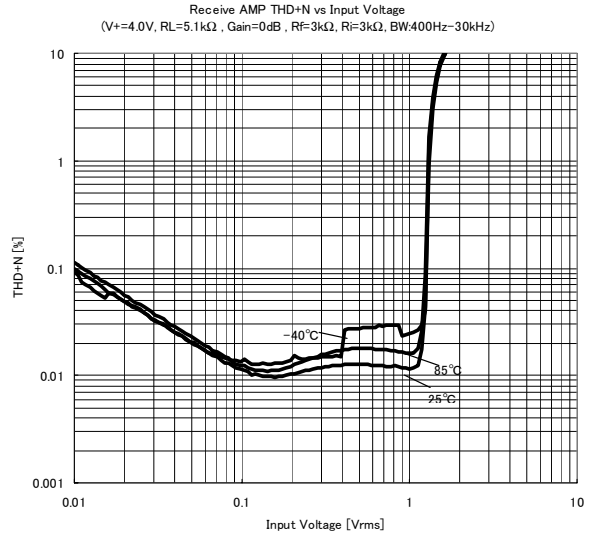
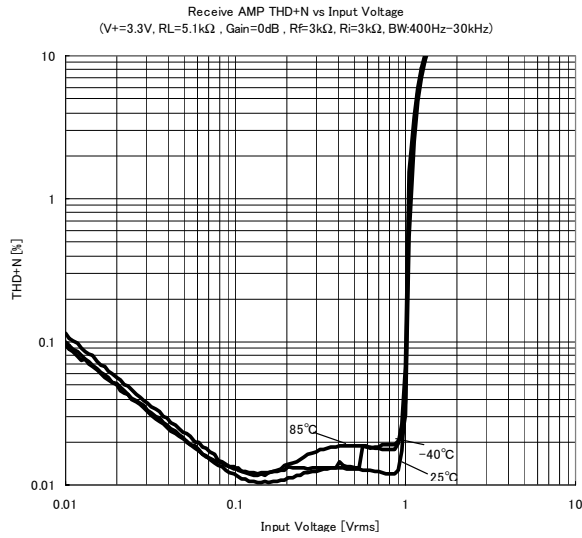
■ TYPICAL CHARACTERISTICS



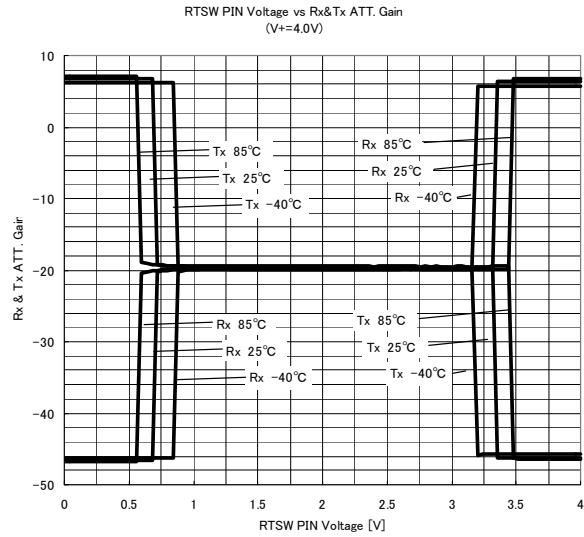
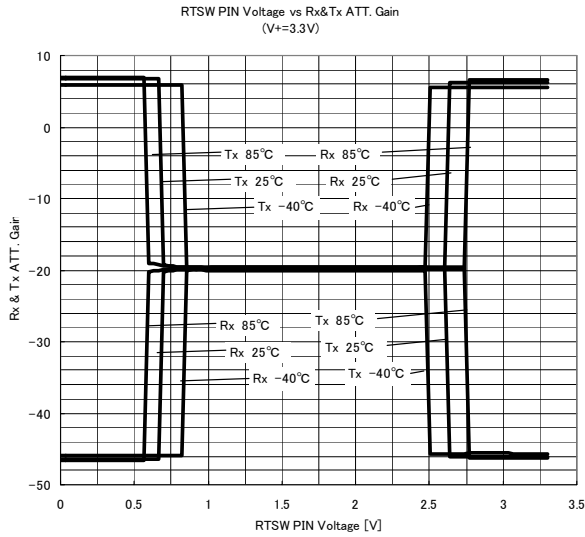
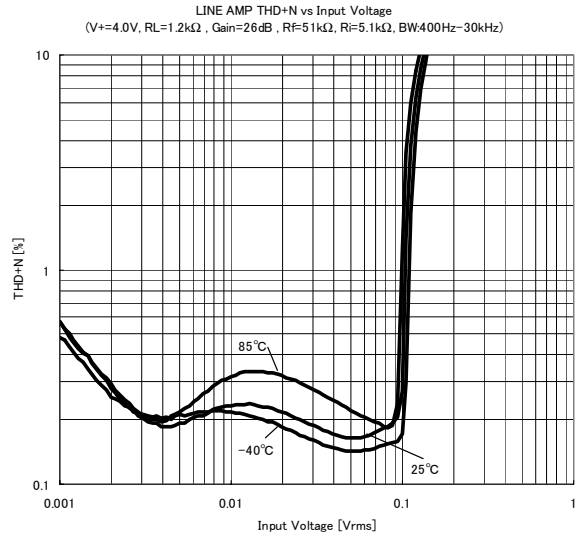
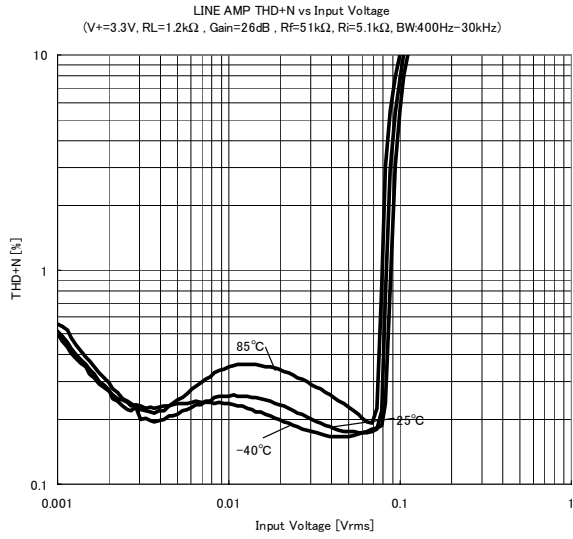
TYPICAL CHARACTERISTICS



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TYPICAL CHARACTERISTICS



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