2-Channel Audio Limiter

■ GENERAL DESCRIPTION

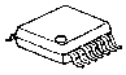
NJM2762 is a **2-channel** audio limiter IC that will consistently monitor the amplitude of the input audio signals and prevent them from exceeding a certain limit level.

NJM2762 will sense both input channels separately and when either input signals exceeded the preset limit level, it will reduce the gain of both channels together, such that the output is always balanced and limited to the desired level. The amount of attenuation will depend on the channel that has the worst overshoot condtion.

The limit level of **NJM2762** can be adjustable by external resistor - making it is suitable for PC application and any audio products that required speaker protection at the back-end.

■ PACKAGE OUTLINE

NJM2762RB2
MSOP10 (TVSP10)



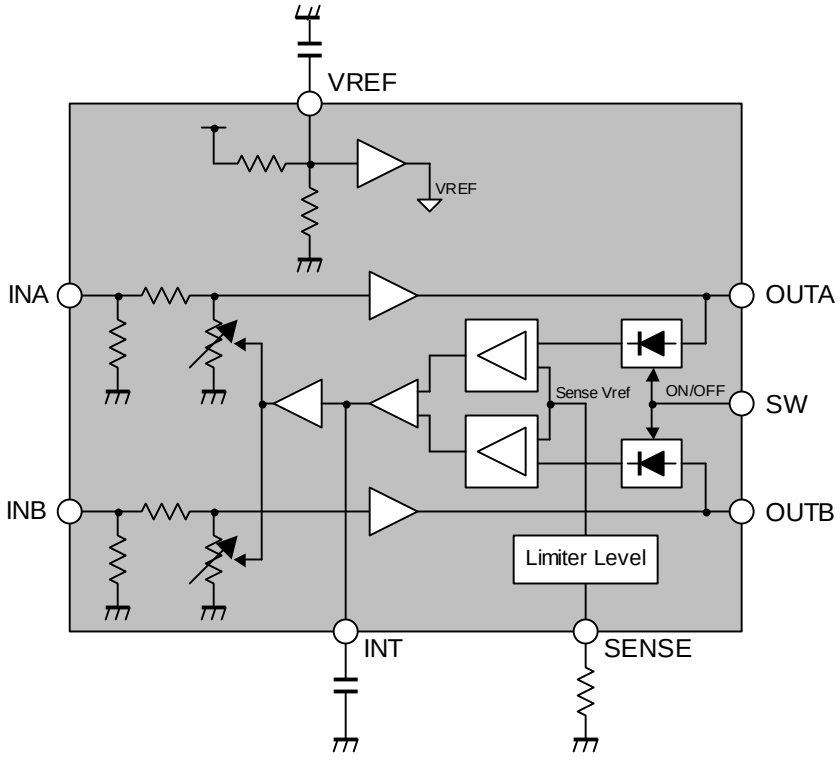
NJM2762V
(SSOP14)

■ FEATURES

● Wide Operating Voltage	2.7V to 13.0V
● Variable Limit Level by external resistor	180mVrms to 1Vrms
● Low Output Noise	-90dBV max.
● Bipolar Technology	
● Package Outline	MSOP10 (TVSP10)*
	SSOP14

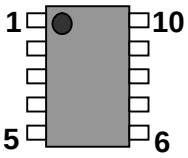
*MEET JEDEC MO-187-DA / THIN TYPE

■ BLOCK DIAGRAM



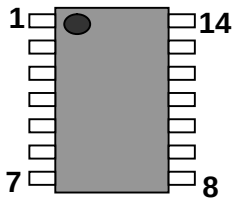
■ PIN CONFIGURATION

MSOP10 (TVSP10)



No.	Symbol	Function
1	V+	Power Supply Terminal
2	OUTa	Ach Output Terminal
3	INa	Ach Input Terminal
4	INT	Ach Smoothing Capacitor Terminal
5	VREF	Reference Voltage Terminal
6	SENSE	Preset Limit Level Terminal
7	SW	Limiter On/Off Control Terminal
8	INb	Bch Output Terminal
9	OUTb	Bch Input Terminal
10	GND	Ground

SSOP14



No.	Symbol	Function
1	V+	Power Supply Terminal
2	OUTa	Ach Output Terminal
3	INa	Ach Input Terminal
4	INT	Ach Smoothing Capacitor Terminal
5	VREF	Reference Voltage Terminal
6	NC	Not Connected
7	NC	Not Connected
8	NC	Not Connected
9	NC	Not Connected
10	SENSE	Preset Limit Level Terminal
11	SW	Limiter On/Off Control Terminal
12	INb	Bch Output Terminal
13	OUTb	Bch Input Terminal
14	GND	Ground

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

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V^+	+14	V
Power Dissipation	P_D	320 [MSOP10(TVSP10)] 300 [SSOP14]	mW
Maximum Input Voltage	V_{IMAX}	0 ~ V^+ (Note1)	V
Operating Temperature Range	Topr	-40 ~ +85	°C
Storage Temperature Range	Tstg	-40 ~ +125	°C

(Note1) Don't put Input Voltage more than Power Supply Voltage.

■ **ELECTRICAL CHARACTERISTICS**

● **POWER SUPPLY** (Ta=25°C, V^+=5V, SW=0 unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V^+		2.7	5	13.0	V
Operating Current	I_{CC}	No signal	-	2.5	3	mA
Reference Voltage	V_{ref}	No signal	2.2	2.5	2.8	V

● **AC CHARACTERISTICS**

(Ta=25°C, V^+=5V, V_{IN}=1Vrms, f=1kHz, R_{sense}=8kΩ, BW=400Hz–30kHz, SW=0 unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Limit Level 1	G_{LIM1}		130	180	230	mVrms
Limit Level 2	G_{LIM2}	V^+=13V, V_{IN}=2Vrms, R_{sense}=40kΩ,	0.7	1.0	1.3	Vrms
Limit Off	G_{OFF}	SW=2V	0.9	1.0	1.1	Vrms
Output Noise	V_{NO}	R_S=0Ω, A-weighting	-	-100 (10)	-90 (31.6)	dBV (μVrms)
Total Harmonic Distortion	THD+N		-	-	1	%
Cross Talk	CT		-	-	-70	dB
Ripple Rejection	RR	V_{ripple}=100mVrms	-	-	-70	dBV

● **CONTROL CHARACTERISTICS** (Ta=25°C, V^+=5V, unless otherwise specified)

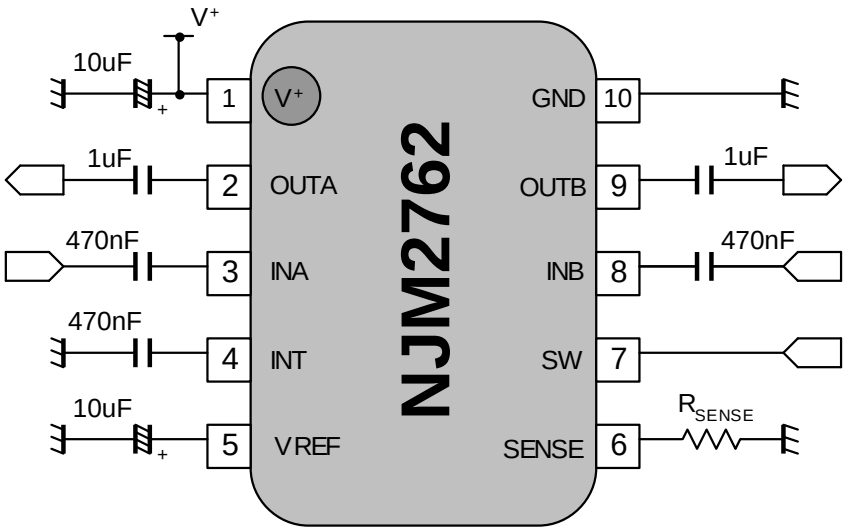
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Low Level Input Voltage	V_{IL}		0	-	0.5	V
High Level Input Voltage	V_{IH}		2.0	-	V^+	V

■ **CONTROL TERMINAL EXPLANATION – SW Terminal (TVSP10(MSOP10): Pin7 / SSOP14: Pin11)**

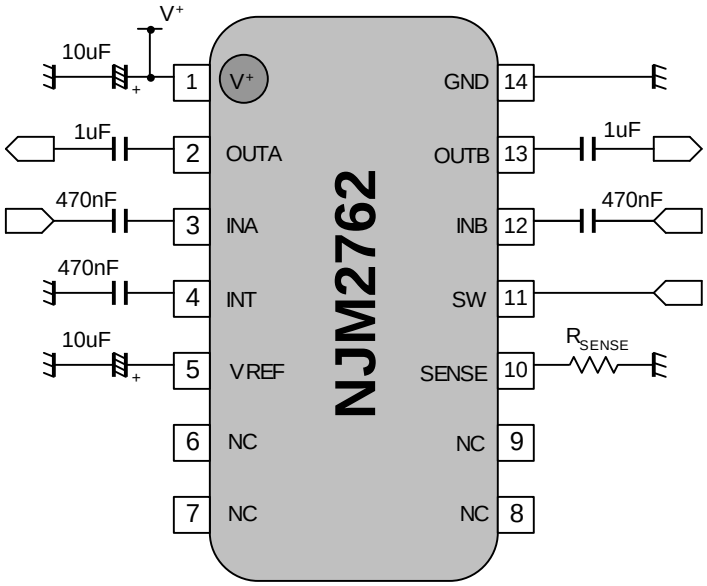
MODE	STATUS	TEST CONDITION
Limiter ON	L	Limiter is Active
Limiter OFF	H	Limiter is NOT Active

■ APPLICATION CIRCUIT

MSOP10(TVSP10)

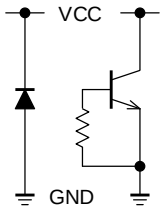
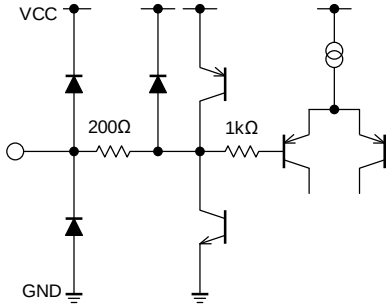
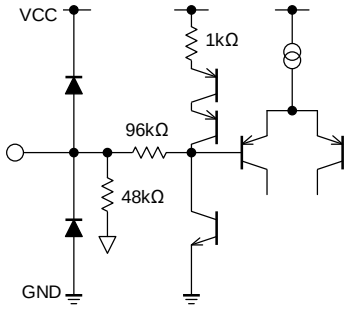
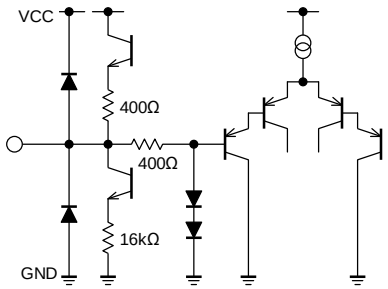


SSOP14

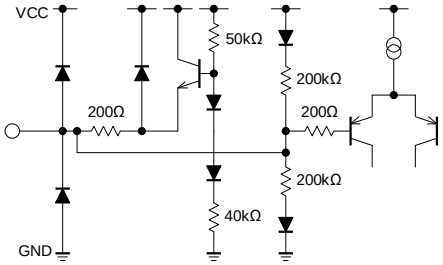
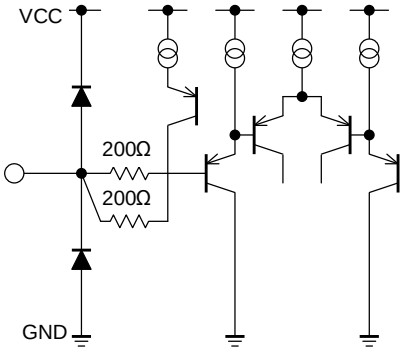
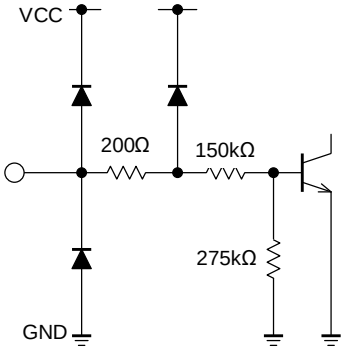


R_{SENSE} Setting => See graph on page 9

■ **TERMINAL DESCRIPTION (MSOP10)**

Terminal	SYMBOL	FUNCTION	EQUIVALENT CIRCUIT	VOLTAGE
1	VCC	Supply Voltage		VCC
2 9	OUTa OUTb	AC Output		VCC/2
3 8	INa INb	AC Input		VCC/2
4	INT	Smoothing Capacitor		-

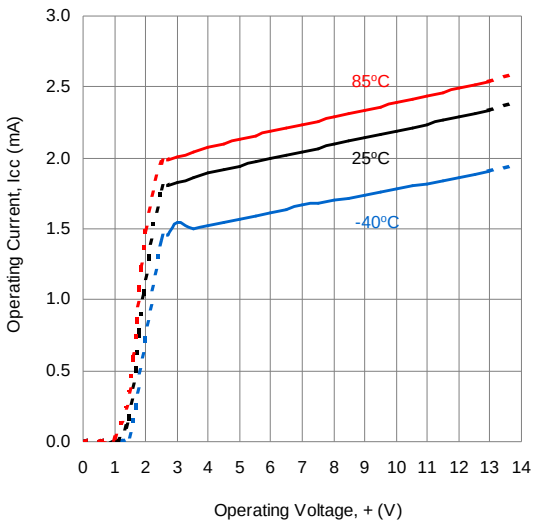
■ **TERMINAL DESCRIPTION (MSOP10)**

Terminal	SYMBOL	FUNCTION	EQUIVALENT CIRCUIT	VOLTAGE
5	VREF	Reference Voltage		VCC/2
6	SENSE	Preset Limit Level		28uA x R_{SENSE}
7	SW	Limiter ON/OFF		0V

■ TYPICAL CHARACTERISTICS

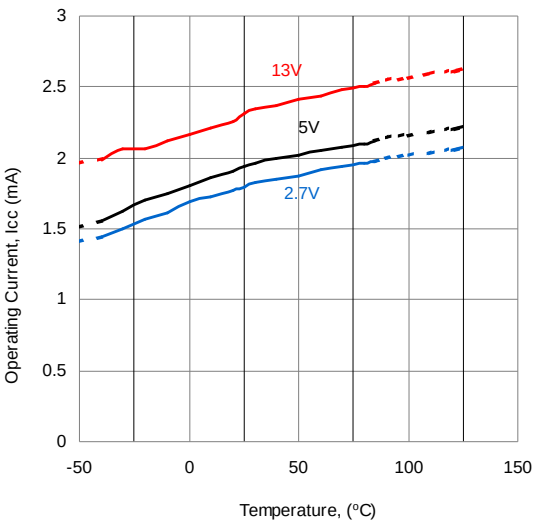
Operating current Vs Operating Voltage

No-Signal, Limiter ON, Rsense =8kΩ



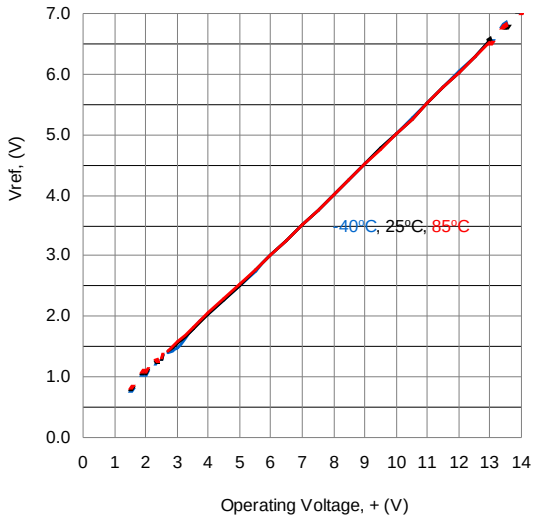
Operating current Vs Temperature

No-Signal, Limiter ON, Rsense =8kΩ



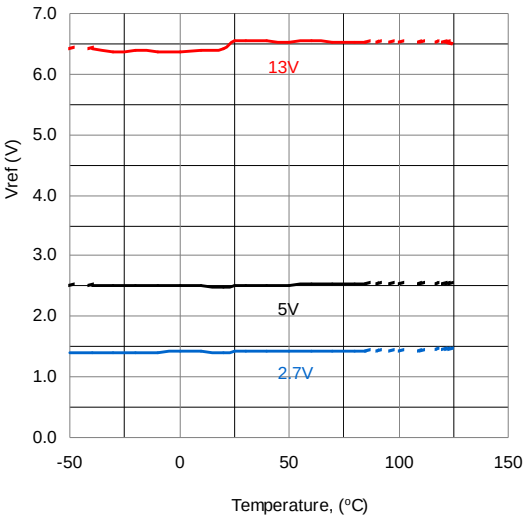
Vref Vs Operating Voltage

No-Signal, Limiter ON, Rsense =8kΩ



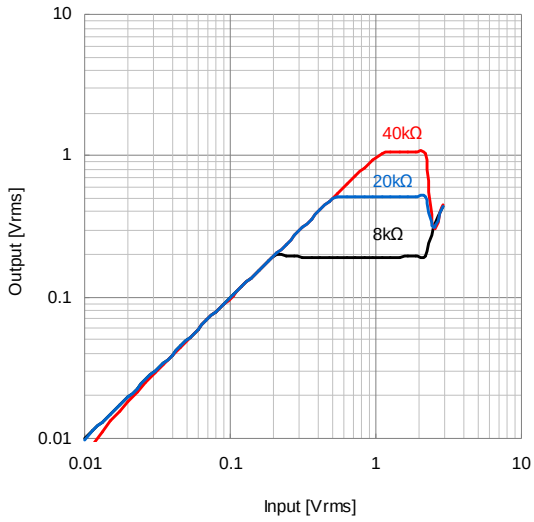
Vref Vs Temperature

No-Signal, Limiter ON, Rsense =8kΩ



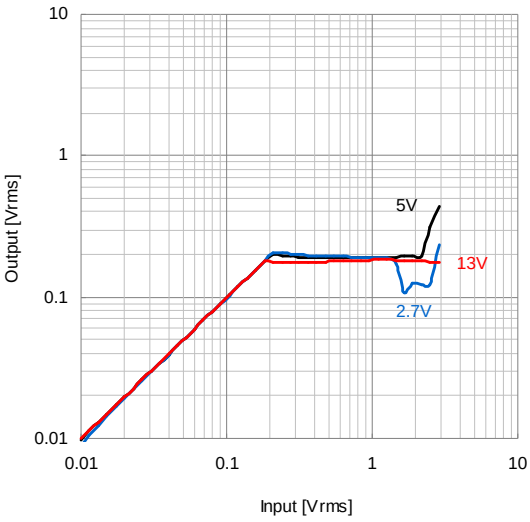
Limit Response - Rsense

V+=5V, Temp=25°C, f=1kHz, Limiter = ON



Limit Response - V+

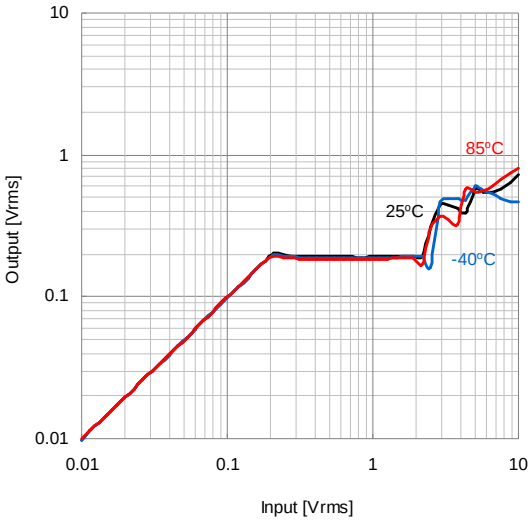
Temp=25°C, f=1kHz, Limiter = ON, Rsense = 8kΩ



■ TYPICAL CHARACTERISTICS

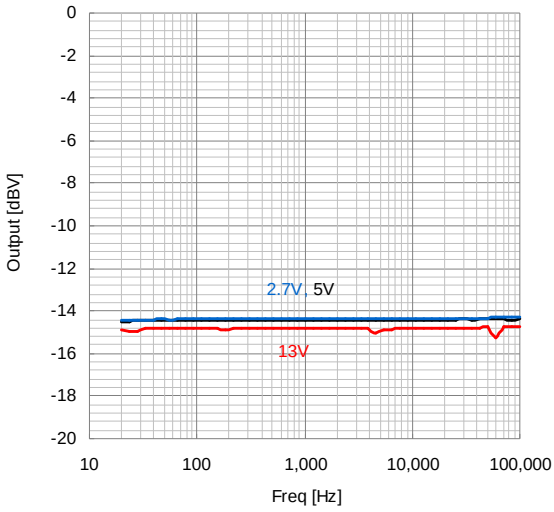
Limit Response - Temperature

V+=5V, f=1Khz, Limiter = ON, Rsense = 8kΩ



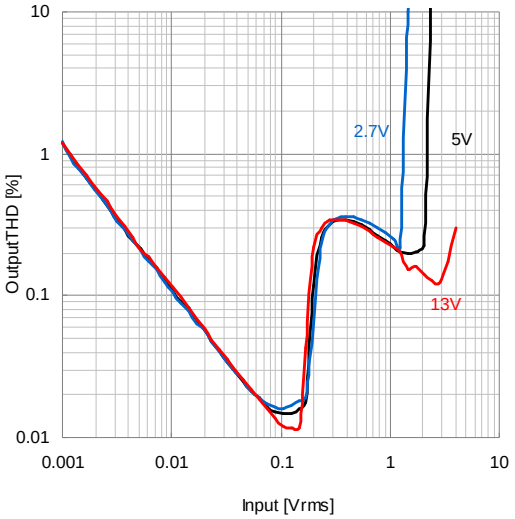
Freq Response - V+

Limiter = ON, Vin =0dBV Rsense = 8kΩ, Limit=0.2Vrms



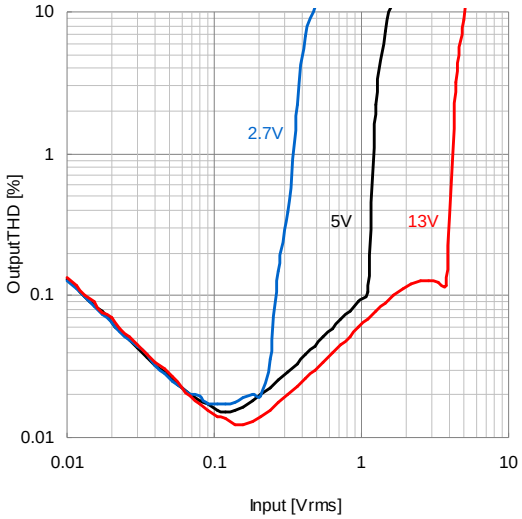
THD - V+

V+=5V, f=1Khz, Limiter = ON, Rsense = 8kΩ



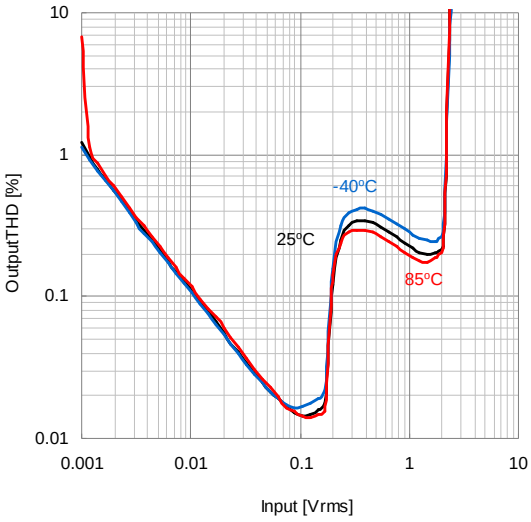
THD - V+

V+=5V, f=1Khz, Limiter = OFF, Rsense = 8kΩ



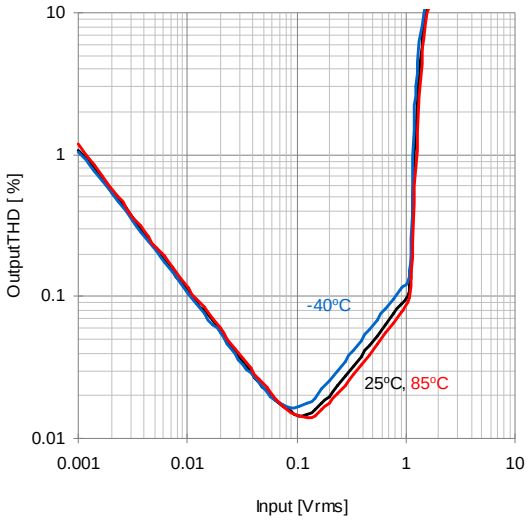
THD - Temperature

V+=5V, f=1Khz, Limiter = ON, Rsense = 8kΩ



THD - Temperature

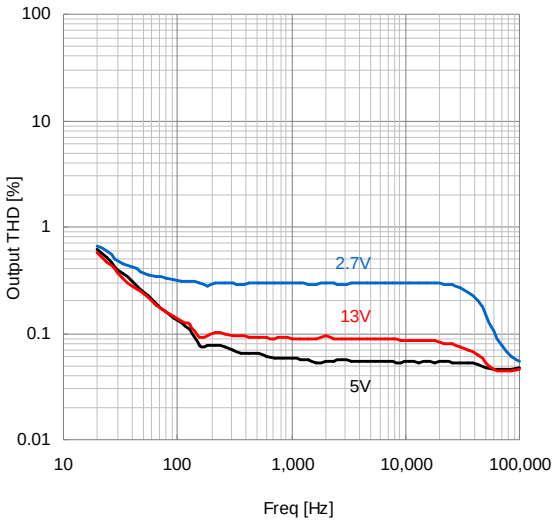
V+=5V, f=1Khz, Limiter = OFF, Rsense = 8kΩ



■TYPICAL CHARACTERISTICS

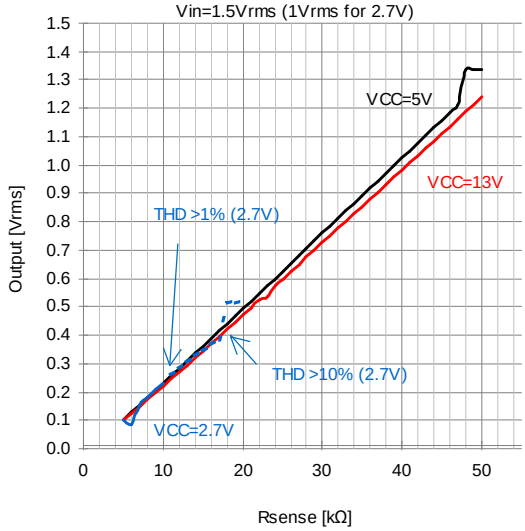
THD Vs Freq

Temp=25°C, Vin=0dBV, Limiter = ON, Rsense = 8kΩ



Vout Vs Rsense

Temp=25°C, f=1kHz, Limiter = ON,
Vin=1.5Vrms (1Vrms for 2.7V)



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