

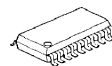
Band Pass Filter for Spectrum Analyzer Display

■ GENERAL DESCRIPTION

The **NJM2760** is a band pass filter for spectrum analyzer display. It includes 4-band BPF amplifier, 4-band detector and recording level indicator output.

It is suitable for mini-components, CD radio cassette and other audio components.

■ PACKAGE OUTLINE

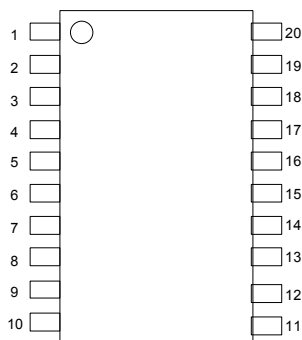


NJM2760V

■ FEATURES

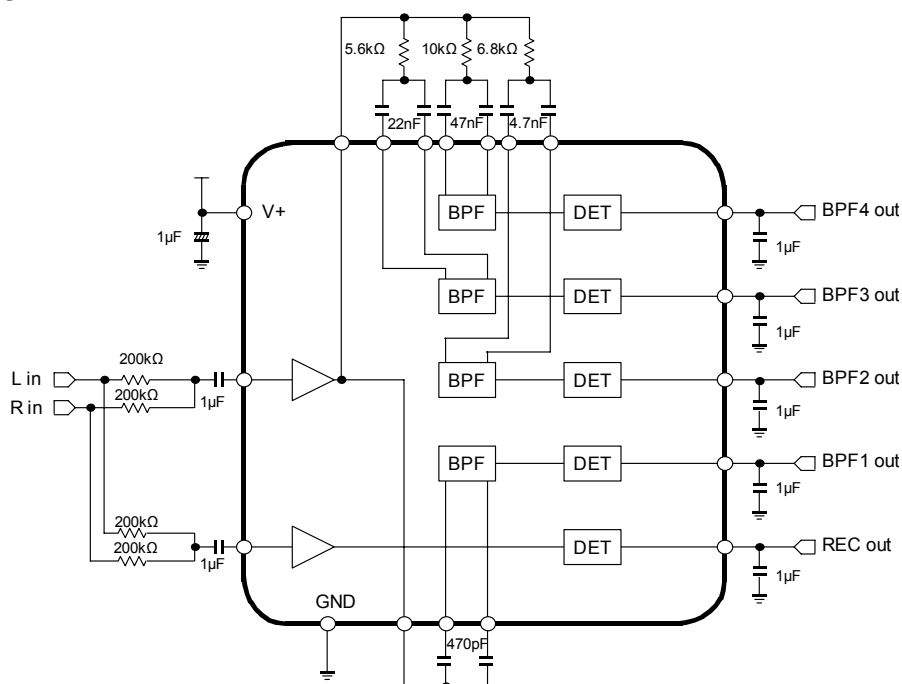
- Operating Voltage +2.7V to +9V
- 4 Band Pass Filters & Detector
- Recording Level Indicator Output
- Low Offset Voltage 5mV typ.
- Adjustable Input Sensitivity
- Bipolar Technology
- Package Outline SSOP20

■ PIN CONFIGURATION



1. IN1	20. BUF2OUT
2. IN2	19. BPF1IN2
3. BUF1OUT	18. BPF1IN1
4. BPF2IN1	17. RECOUT
5. BPF2IN2	16. BPF1OUT
6. BPF3IN1	15. BPF2OUT
7. BPF3IN2	14. BPF3OUT
8. BPF4IN1	13. BPF4OUT
9. BPF4IN2	12. N.C.
10. GND	11. V+

■ BLOCK DIAGRAM



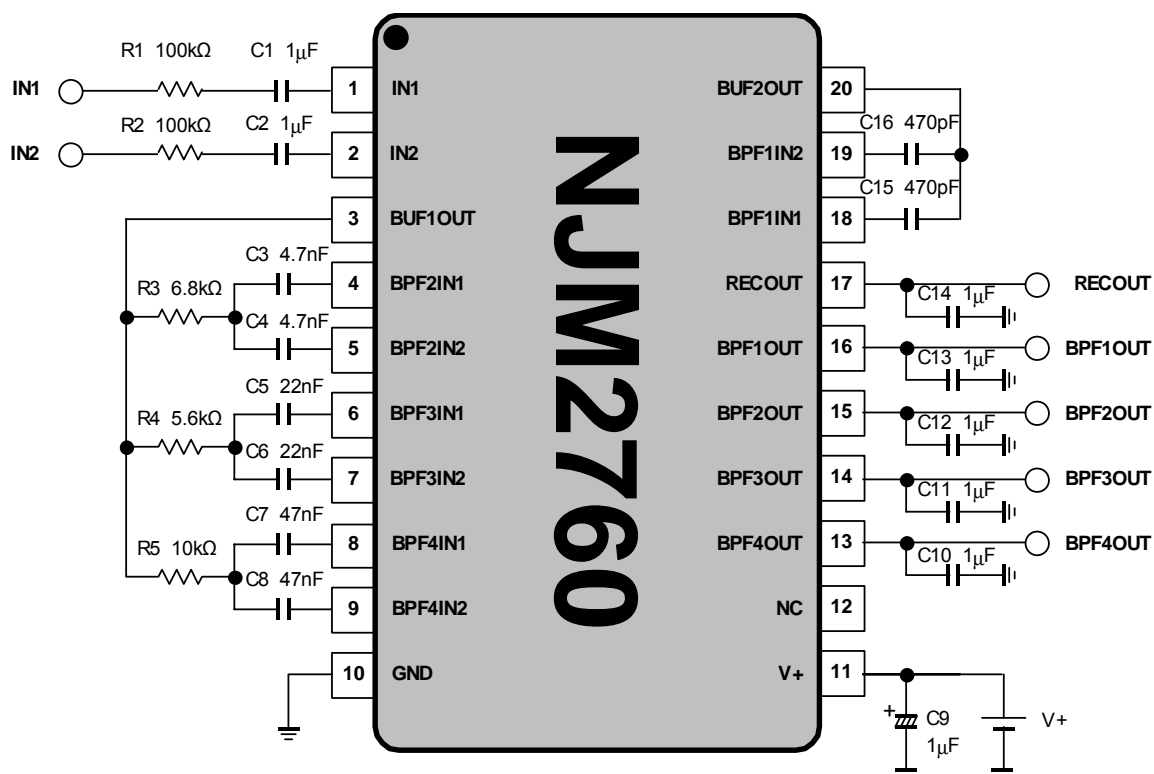
■ ABSOLUTE MAXIMUM RATING (Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V ⁺	14	V
Power Dissipation	P _D	300	mW
Operating Temperature Range	Topr	-20 to +75	°C
Storage Temperature Range	Tstg	-40 to +125	°C

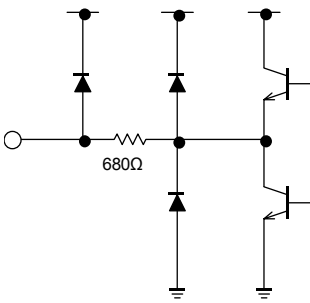
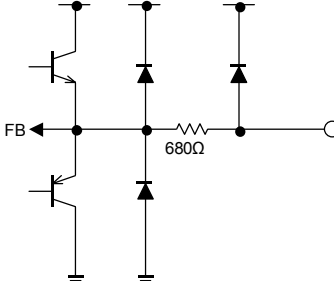
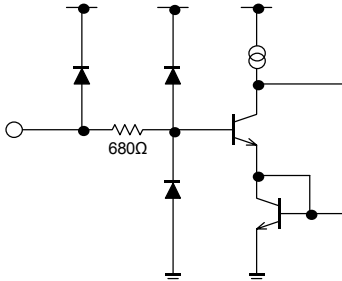
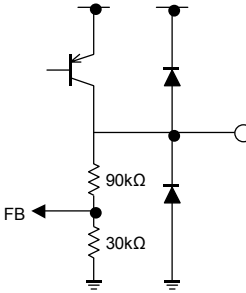
■ ELECTRICAL CHARACTERISTICS (Ta=25°C, V⁺=3.3V, V_{IN}=1V_{PEAK} unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
◆ Power Supply						
Operating Voltage	V ⁺	-	2.7	3.3	9.0	V
Operating Current	I _{CC}	No Signal	-	1.4	3.0	mA
◆ AC CHARACTERISTICS						
Typical Output Voltage	V _{OT}	V _{IN} =1V _{peak} , f=Center Frequency of BPF	0.7	1.0	1.42	V
Maximum Output Voltage	V _{OM}	V _{IN} =3V _{peak} , f=Center Frequency of BPF	2.1	3.0	-	V
BPF1 Center Frequency Level	G _{VBPF1}	f=8kHz	-3	0	+3	dB
BPF2 Center Frequency Level	G _{VBPF2}	f=1.2kHz	-3	0	+3	dB
BPF3 Center Frequency Level	G _{VBPF3}	f=300Hz	-3	0	+3	dB
BPF4 Center Frequency Level	G _{VBPF4}	f=80Hz	-3	0	+3	dB
DC Offset Voltage	V _{OS}	No Signal	-	5	30	mV

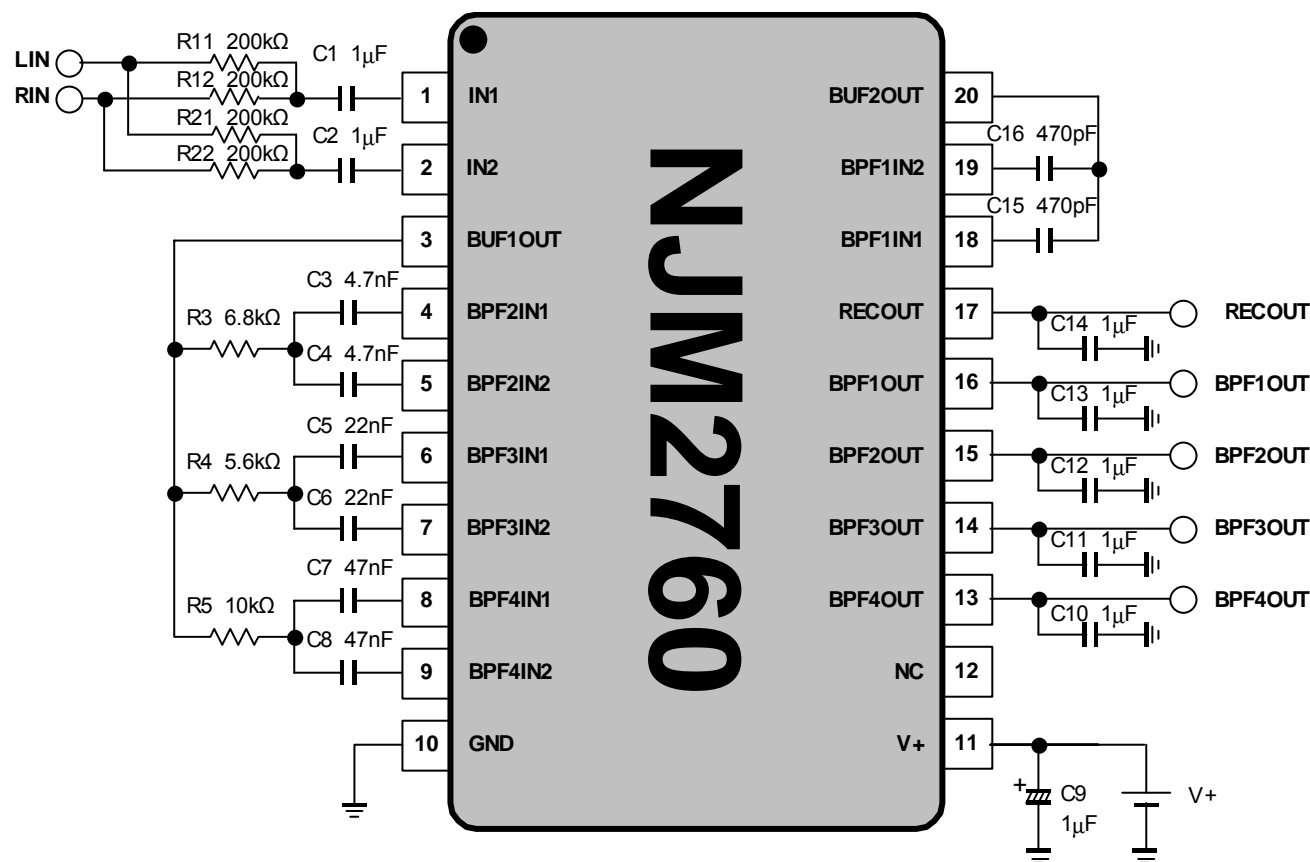
◆ TEST CIRCUIT



■ TERMINAL DESCRIPTION

No.	SYMBOL	FUNCTION	EQUIVALENT CIRCUIT	VOLTAGE
1 2 5 7 9 19	IN1 IN2 BPF2IN2 BPF3IN2 BPF4IN2 BPF1IN2	Input for BPF1-4 Input for recording level detector Capacitor terminal for BPF2 Capacitor terminal for BPF3 Capacitor terminal for BPF4 Capacitor terminal for BPF1		1.4V
3 20	BUF1OUT BUF2OUT	Buffer output Buffer output		1.4V
4 6 8 18	BPF2IN1 BPF3IN1 BPF4IN1 BPF1IN1	Capacitor terminal for BPF2 Capacitor terminal for BPF3 Capacitor terminal for BPF4 Capacitor terminal for BPF1		1.4V
13 14 15 16 17	BPF4OUT BPF3OUT BPF2OUT BPF1OUT RECOUT	BPF4 output BPF3 output BPF2 output BPF1 output Recording level detector output		0V
10	GND	Ground terminal	—	-
11	V+	Power supply terminal	—	-

■ APPLICATION CIRCUIT



APPLICATION NOTE

1. Center Frequency Setting for Band Pass Filters

Band pass filters equivalent circuits as follows.

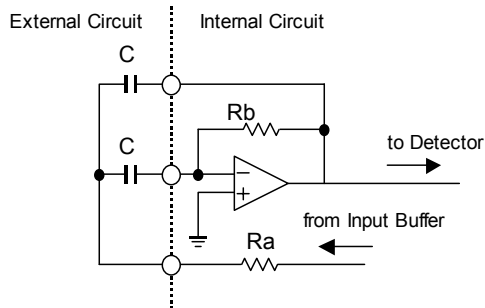


Fig.1-a. BPF1's Equivalent Circuit

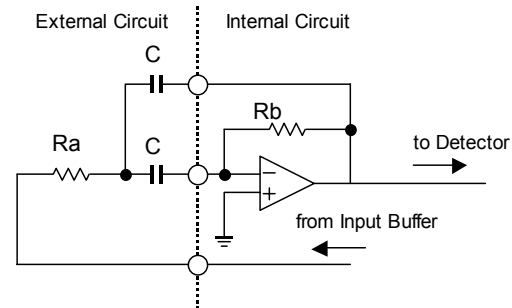


Fig.1-b. BPF2-4's Equivalent Circuit

Center Frequency (f_0) can be formulated as follows.

$$f_0 = \frac{2Q}{2\pi C R_b} \quad [\text{Hz}], \quad Q=2$$

Table 1. Center frequency setting example

	Ra	Rb	C
BPF1 (8kHz)	10 kΩ ^{*)}	169 kΩ ^{*)}	470pF
BPF2 (1.2kHz)	6.8 kΩ	113 kΩ ^{*)}	4.7nF
BPF3 (300Hz)	5.6 kΩ	96.5 kΩ ^{*)}	22nF
BPF4 (80Hz)	10 kΩ	169 kΩ ^{*)}	47nF

*) As regards the BPF1, the values of Ra and Rb are fixed. Also as regards the BPF2-4, the values of Rb is fixed.

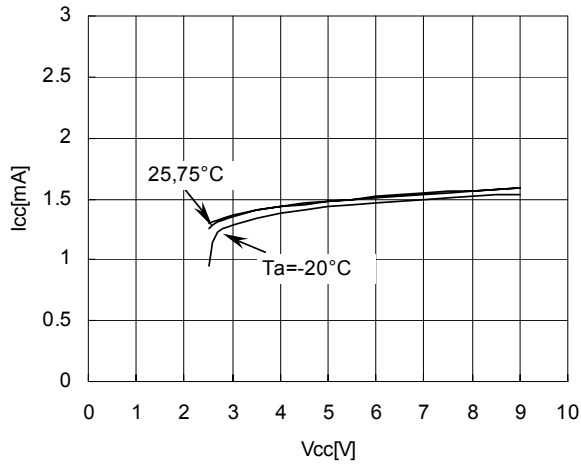
2. Output Gain Setting for RECut.

Output Voltage of RECut is adjustable by external resistor: R2
Voltage Gain (G_v) is defined as follows.

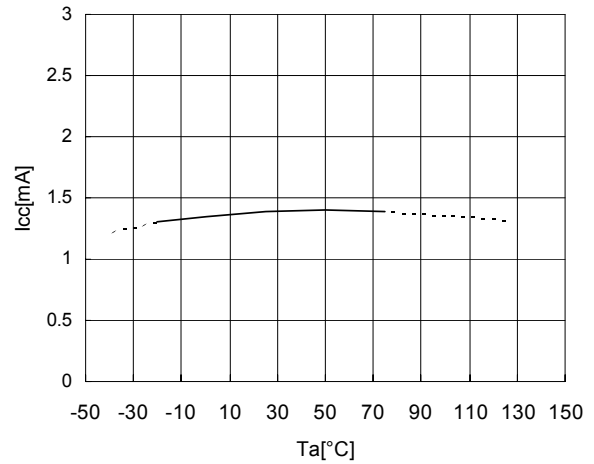
$$\frac{V_{out}[\text{Vdc}]}{V_{in}[\text{Vpeak}]} = G_v = \frac{R_2[\text{k}\Omega]}{100[\text{k}\Omega]}$$

■ TYPICAL CHARACTERISTICS

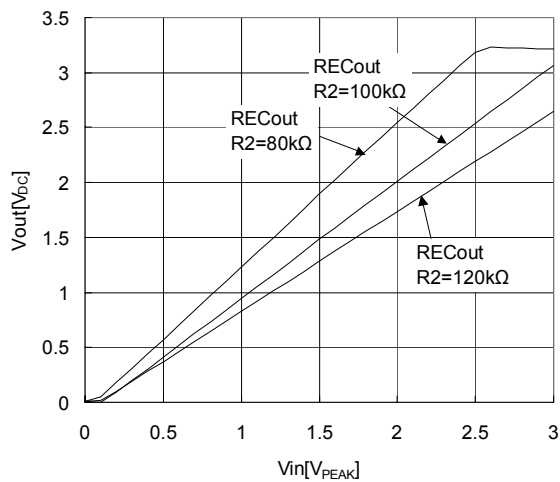
Supply Current vs. Supply Voltage
Ta=-40, 25, 75°C



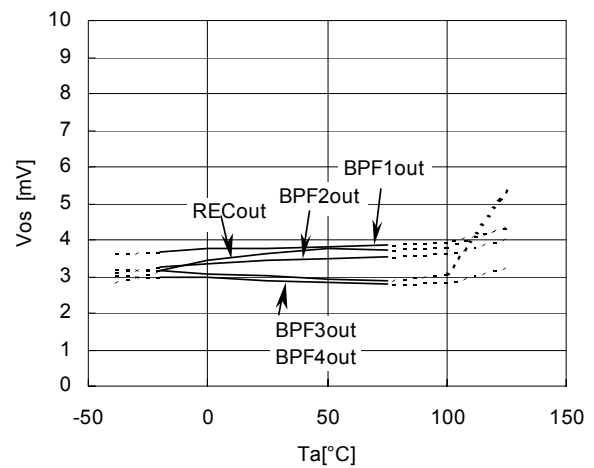
Supply Current vs. Temperature
V+=3.3V



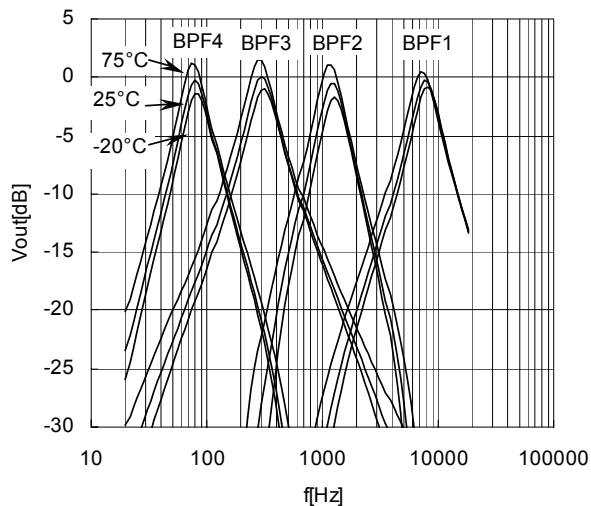
INPUT vs. OUTPUT
Vcc=3.3V, Ta=25°C, f=8kHz, R2=R21/ /R22



DC Offset Voltage vs. Temperature
V+=3.3V

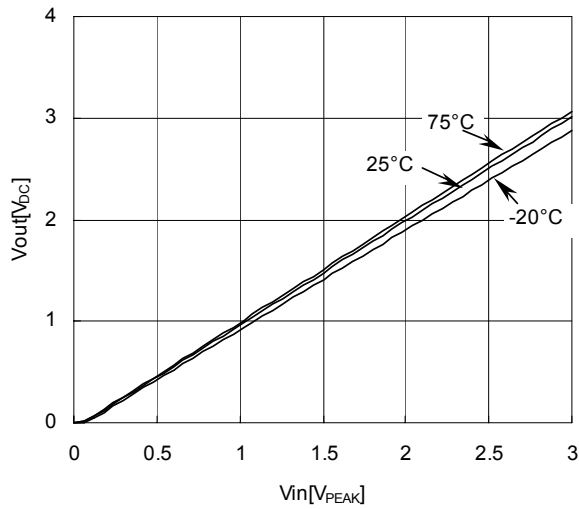


Output vs. Frequency
V+=3.3V, Vin=1VPEAK

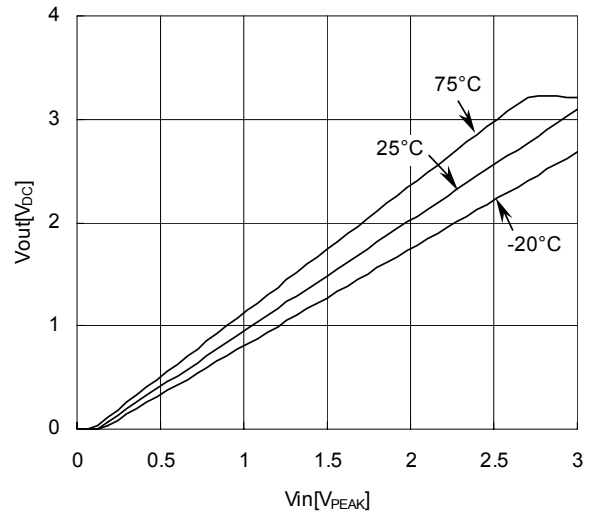


■ TYPICAL CHARACTERISTICS

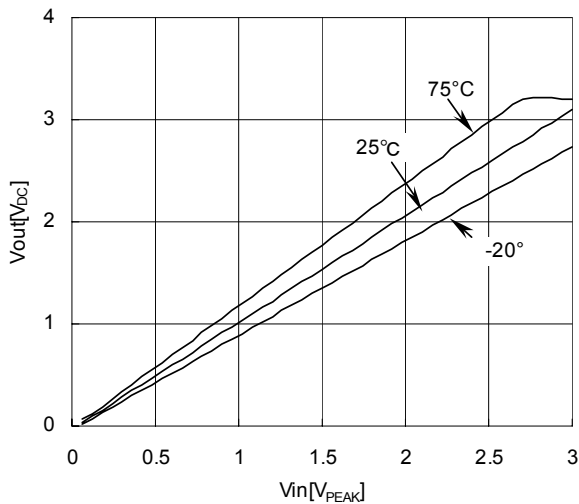
Input vs. Output Level
 $V_+ = 3.3\text{V}$, $V_{\text{out}} = \text{BPFout1}$, $f_o = 8\text{kHz}$



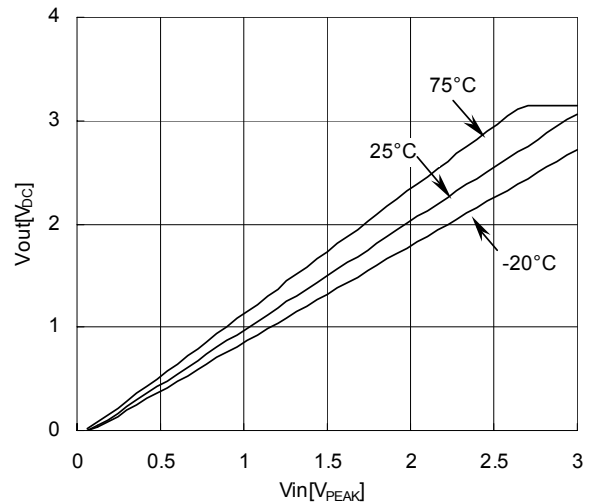
Input vs. Output Level
 $V_+ = 3.3\text{V}$, $V_{\text{out}} = \text{BPFout2}$, $f_o = 1.2\text{kHz}$



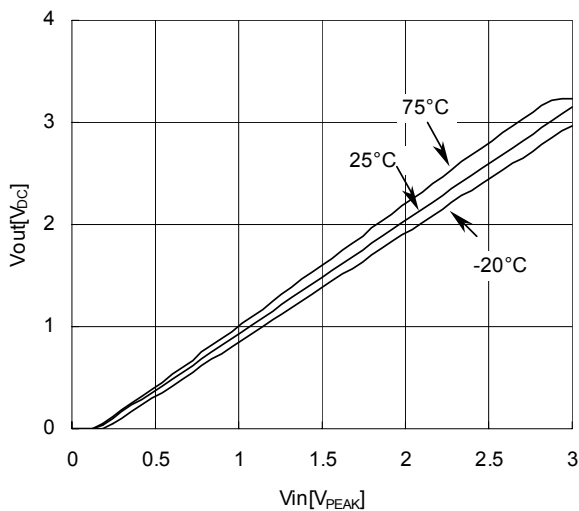
Input vs. Output Level
 $V_+ = 3.3\text{V}$, $V_{\text{out}} = \text{BPF3out}$, $f_o = 300\text{Hz}$



Input vs. Output Level
 $V_+ = 3.3\text{V}$, $V_{\text{out}} = \text{BPF4out}$, $f_o = 80\text{Hz}$



Input vs. Output Level
 $V_+ = 3.3\text{V}$, $V_{\text{out}} = \text{RECout}$, $f_o = 8\text{kHz}$



[CAUTION]

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