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NTE1780 Integrated Circuit 2 Channel Tone/DC Volume/Balance Control Circuit

Description:

The NTE1780 is an integrated circuit in a 12-Lead SIP type package designed for 2-channel volume and tone control circuits.

Features:

- Easier Compact Set Design
- Functions Are: 2-Channel Bass, Treble Control Circuit
- Balance Control Circuit
- DC Volume Control Circuit (Volume Control ^w/Physiological Characteristics)
- All Functions Enable DC Controllable

Absolute Maximum Ratings: ($T_A = +25^\circ\text{C}$ unless otherwise specified)

Supply Voltage, V_{CC}	14.4V
Circuit Voltage, $V_1, 4, 5, 6-7, V_8, 9, 11, 12-7$	0, V_{2-7}
Supply Current, I_2	64mA
Circuit Current, I_3, I_{10}	-40mA
Power Dissipation, P_D	920mW
Operating Ambient Temperature Range, T_{opr}	-20° to +70°C
Storage Temperature Range, T_{stg}	-55° to +150°C

Electrical Characteristics: ($T_A = +25^\circ\text{C}$, $V_{CC} = 12\text{V}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Circuit Current	I_{tot}	$V_{CC} = 12\text{V}$	24	38	50	mA
Circuit Voltage	$V_{3, 10-7}$	$V_i = \text{No Signal}, V_{12} = V_{CC}, V_1 = V_5 = V_8 = V_{CC}/2$	8.0	8.4	8.8	V
Volume Circuit						
Maximum Output	V_{Omax}	$f = 1\text{kHz}, V_i = 400\text{mV}_{rms}, V_{12} = V_{CC},$ $V_1 = V_5 = V_8 = V_{CC}/2$	190	230	270	mV_{rms}
Channel Balance (Note 1)	CB		-	+0.2	± 1.0	
Volume Starting Voltage	$V_{(st)}$	$f = 1\text{kHz}, V_i = 400\text{mV}_{rms}, V_{12} = VR,$ $V_1 = V_5 = V_8 = V_{CC}/2, \text{Note 2}$	0.40	0.60	0.90	V
Residual Tone Level (Volume Minimum)	$V_{min.}$	$f = 1\text{kHz}, V_i = 400\text{mV}_{rms}, V_{12} = 0,$ $V_1 = V_5 = V_8 = V_{CC}/2$	-	25	50	μV_{rms}
Balance Control Circuit						
Attenuation (R-ch)	A_{ttBR}	$f = 1\text{kHz}, V_i = 400\text{mV}_{rms}, V_{12} = V_{CC},$ $V_5 = V_8 = V_{CC}/2, V_{OR1}: V_1 = (5.5/12),$ $V_{CC}(VR-1), V_{OR2}: V_1 = 0\text{V}, \text{Note 3}$	-32	-45	-	dB

Note 1. Deviation between R and L-ch for maximum output.

Note 2. V_{12} voltage when output voltage is 0.1mV_{rms} .

Note 3. $A_{ttBR}: V_{OR2}/V_{OR1}$

Electrical Characteristics (Cont'd): ($T_A = +25^\circ\text{C}$, $V_{CC} = 12\text{V}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Balance Control Circuit (Cont'd)						
Attenuation (L–ch)	A_{ttBL}	$f = 1\text{kHz}$, $V_i = 400\text{mV}_{\text{rms}}$, $V_{12} = V_{CC}$, $V_5 = V_8 = V_{CC}/2$, $V_{\text{OR1}}: V_1 = (6.5/12)$, $V_{CC}(\text{VR}-1)$, $V_{\text{OR2}}: V_1 = 0\text{V}$, Note 4	-32	-45	-	dB
Tone Control Circuit						
Low Frequency Boost Control	V_{40}/V_{1k}	$V_{1k}: f = 1\text{kHz}$, $V_i = 400\text{mV}_{\text{rms}}$ Output voltage when $V_{12} = V_{CC}$, $V_1 = V_5 = V_8 = V_{CC}/2$ $V_{40}: f = 40\text{Hz}$, $V_i = 400\text{mV}_{\text{rms}}$ Output voltage when $V_{12} = V_{CC}$, $V_5 = V_8 = V_{CC}$	8	10	12	dB
Low Frequency Cut Control	V_{40}/V_{1k}	$V_{1k}: f = 1\text{kHz}$, $V_i = 400\text{mV}_{\text{rms}}$ Output voltage when $V_{12} = V_{CC}$, $V_1 = V_5 = V_8 = V_{CC}/2$ $V_{40}: f = 40\text{Hz}$, $V_i = 400\text{mV}_{\text{rms}}$ Output voltage when $V_{12} = V_{CC}$, $V_5 = V_8 = V_{CC}$	-7.5	-12.0	-16.0	dB
High Frequency Boost Control	V_{15}/V_{1k}	$V_{1k}: f = 1\text{kHz}$, $V_i = 400\text{mV}_{\text{rms}}$ Output voltage when $V_{12} = V_{CC}$, $V_1 = V_5 = V_8 = V_{CC}/2$ $V_{15}: f = 15\text{kHz}$, $V_i = 400\text{mV}_{\text{rms}}$ Output voltage when $V_{12} = V_{CC}$, $V_5 = V_8 = V_{CC}$	7.5	10.0	13.0	dB
High Frequency Cut Control	V_{40}/V_{1k}	$V_{1k}: f = 1\text{kHz}$, $V_i = 400\text{mV}_{\text{rms}}$ Output voltage when $V_{12} = V_{CC}$, $V_1 = V_5 = V_8 = V_{CC}/2$ $V_{15}: f = 15\text{kHz}$, $V_i = 400\text{mV}_{\text{rms}}$ Output voltage when $V_{12} = V_{CC}$, $V_5 = V_8 = V_{CC}$	-7.5	-12.0	-18.0	dB
Crosstalk	CT	$f = 1\text{kHz}$, $V_i = 400\text{mV}_{\text{rms}}$, $V_{1q2} = V_{CC}$, $V_1 = V_5 = V_8 = V_{CC}/2$	-65	-80	-	dB
Output Noise Voltage	V_{no}	$V_i = \text{No Signal}$, $V_{12} = V_{CC}$, $V_1 = V_5 = V_8 = V_{CC}/2$	-	80	120	μV_{rms}
Distortion Rate	THD	$f = 1\text{kHz}$, $V_i = 400\text{mV}_{\text{rms}}$, $V_{12} = V_{CC}$, $V_1 = V_5 = V_8 = V_{CC}/2$	-	0.2	0.5	%
Input Resistance	R_i (6), (9)	$f = 1\text{kHz}$	8.2	11.0	13.5	$\text{k}\Omega$
	R_i (4), (11)		11.0	16.0	22.0	$\text{k}\Omega$
Output Resistance	R_o (3), (10)	$f = 1\text{kHz}$	60	110	160	Ω

Note 4. $A_{\text{ttBL}}: V_{\text{OL2}}/V_{\text{OL1}}$

Pin Connection Diagram
(Front View)



