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NTE15029
Integrated Circuit
2 Channel Tone/DC Volume/Balance Control Circuit

Description:
The NTE15029 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°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 = +25C, V_{CC} = 12V unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Circuit Current	I_{tot}	V_{CC} = 12V	24	38	50	mA
Circuit Voltage	$V_{3, 10–7}$	V_i = 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	$V_O$max	f = 1kHz, V_i = 400mV_{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 = 1kHz, V_i = 400mV_{rms}, V_{12} = VR, $V_1 = V_5 = V_8 = V_{CC}/2$, Note 2	0.40	0.60	0.90	V
Residual Tone Level (Volume Minimum)	$V_{min.}$	f = 1kHz, V_i = 400mV_{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 = 1kHz, V_i = 400mV_{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 = 0V, Note 3	–32	–45	–	dB

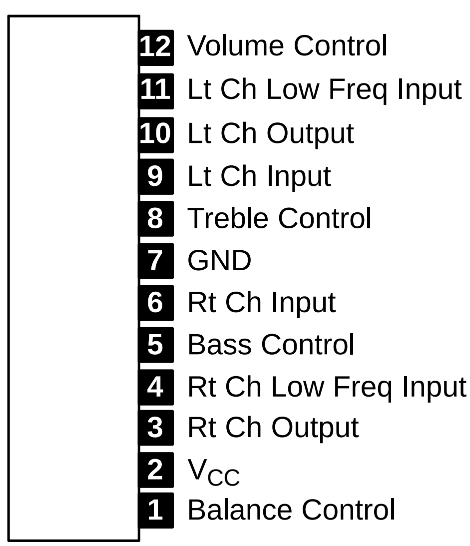
Note 1. Deviation between R and L–ch for maximum output.
Note 2. V_{12} voltage when output voltage is 0.1mV_{rms}.
Note 3. A_{ttBR}: V_{OR2}/V_{OR1}

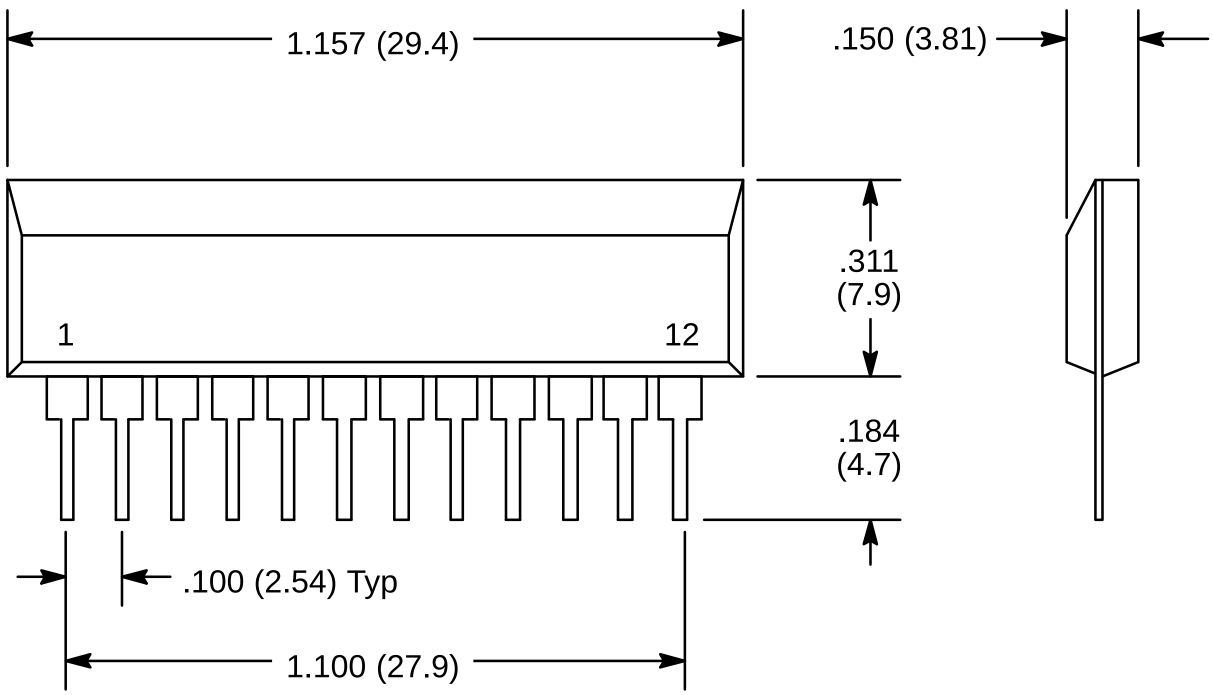
Electrical Characteristics (Cont'd): (T_A = +25C, V_{CC} = 12V unless otherwise specified)

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

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

Pin Connection Diagram
(Front View)




1.157 (29.4)
.150 (3.81)
.311
(7.9)
1
12
.184
(4.7)
.100 (2.54) Typ
1.100 (27.9)