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## NTE1633 Integrated Circuit TV Sound Channel w/DC Controls

**Description:**

The NTE1633 is a complete TV sound channel in a 20-Lead DIP type package with DC tone and volume controls plus separate VCR input and output connections. Supplied in a 20-pin DIP, the device delivers an output power of 4W into 16Ω (d = 10%, V<sub>S</sub> = 24V) or 1.5W into 8Ω (d = 10%, V<sub>S</sub> = 12V). Included in the NTE1633 are: IF amplifier limiter, active low-pass filter, AF preamplifier and power amplifier, turnoff muting, mute circuit and thermal protection.

High output, high sensitivity, excellent AM rejection and low distortion make the device suitable for use in TVs of almost any type. Further, no screening is necessary because the device is free of radiation problems.

**Features:**

- Separate VCR Input and Output Pins
- 4W Output Power into 16Ω
- No Screening Required
- High Sensitivity
- Excellent AM Rejection
- Low Distortion
- DC Tone/Volume Controls
- Thermal Protection

**Absolute Maximum Ratings:**

Supply Voltage (Pin18), V <sub>S</sub> .....	28V
Voltage at Pin1, V <sub>i</sub> .....	±V <sub>S</sub>
Input Voltage (Pin2), V <sub>i</sub> .....	1V <sub>pp</sub>
Output Peak Current, I <sub>O</sub>	
Repetitive .....	1.5A
Non-Repetitive .....	2A
Current (Pin4), I <sub>4</sub> .....	10mA
Power Dissipation (T <sub>pins</sub> = +90°C), P <sub>tot</sub> .....	4.3W
Power Dissipation (T <sub>A</sub> = +70°C), P <sub>tot</sub> .....	1.0W
Operating Junction Temperature Range, T <sub>J</sub> .....	-40° to 150°C
Storage Temperature Range, T <sub>stg</sub> .....	-40° to 150°C
Maximum Thermal Resistance, Junction-to-Pins, R <sub>thJPins</sub> .....	14°C/W
Maximum Thermal Resistance, Junction-to-Ambient (Note 1), R <sub>thJA</sub> .....	80°C/W

Note 1. Obtained with GND pins soldered to printed circuit with minimized copper area.

**Electrical Characteristics:**  $V_S = 24V$ , S1: ON,  $\Delta f = \pm 25kHz$ ,  $V_i = 1mV$ ,  $P_1 = 12k\Omega$ ,  $f_o = 4.5MHz$ ,  $f_m = 400Hz$ ,  $T_A = +25^\circ C$  unless otherwise indicated)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>DC Characteristics</b>						
Supply Voltage (Pin18)	$V_S$	$P_2 = 12k\Omega$	10.8	–	27	V
Quiescent Output Voltage (Pin18)	$V_O$		11	12	13	V
DC Voltage (Pin1)	$V_1$	$P_2 = 12k\Omega$ , $R_1 = 270k\Omega$	–	5.3	–	V
DC Voltage (Pin4)	$V_4$	$P_2 = 12k\Omega$	–	3.2	–	V
Quiescent Drain Current (Pin4)	$I_d$		–	32	–	mA
<b>IF Amplifier &amp; Detector</b>						
Input Limiting Voltage @ Pin2 (–3dB)	$V_{i(threshold)}$	$V_O = 4V_{rms}$	–	50	100	$\mu V$
Recovered Audio Voltage (Pin9)	$V_9$	$\Delta f = \pm 7.5kHz$ , $P_2 = 12k\Omega$	140	200	280	mV
Amplitude Modulation Rejection	AMR	$m = 0.3$ , $V_1 = 1mV$ , $V_O = 4V_{rms}$ , Note 2	–	60	–	dB
Input Resistance (Pin2)	$R_i$	$\Delta f = 0$ , $P_2 = 12k\Omega$	–	30	–	$k\Omega$
Input Capacitance (Pin2)	$C_i$		–	6	–	pF
De–Emphasis Resistance	R9	$C_1 = 60$ to $888nF$	0.75	1.1	1.5	$k\Omega$
<b>DC Volume Control</b>						
Volume Attenuation (Resistance Control)	$K_V$	$P_2 = 0\Omega$	–	0	–	dB
		$P_2 = 4.3k\Omega$	20	26	32	dB
		$P_2 = 12k\Omega$	–	88	–	dB
Control Voltage	$V_C$	$K = 0dB$	–	0	–	V
		$K = 26dB$	–	1.3	–	V
		$K = 88dB$	–	2.6	–	V
Volume Attenuation Thermal Drift (Resistance Control)	$\frac{\Delta K_V}{\Delta T_{pins}}$	$T_{pins} = +25^\circ$ to $+85^\circ C$ , $P_2 = 4.3k\Omega$	–	–0.05	–	$\frac{dB}{^\circ C}$
<b>DC Tone Control</b>						
Tone Cut	$K_T$	S1: OFF, $V_{10} = 200mV$ , $P_1 = 12k\Omega$ to $100k\Omega$ , $f_{AF} = 10kHz$	–	14	–	dB
<b>Audio Frequency Amplifier</b>						
Output Power (d = 10%)	$P_O$	$V_S = 24V$ , $R_L = 16\Omega$	3.5	4.1	–	W
		$V_S = 12V$ , $R_L = 8\Omega$	–	1.5	–	
Frequency Response of Audio Amplifier (–3dB)	B	$P_O = 1W$ , $R_L = 16\Omega$ , S1: OFF, $V_{10} = 200mV$ , $V_O = 4V_{rms}$ , @ 400Hz	15	50	–	kHz
Supply Voltage Rejection	SVR	$P_2 = 12k\Omega$ , $\Delta f = 0$ , $f_{ripple} = 120Hz$	–	26	–	dB

Note 2. Test Bandwidth = 20kHz

**Electrical Characteristics (Cont'd):**  $V_S = 24V$ ,  $S1: ON$ ,  $\Delta f = \pm 25kHz$ ,  $V_i = 1mV$ ,  $P_1 = 12k\Omega$ ,  
 $f_o = 4.5MHz$ ,  $f_m = 400Hz$ ,  $T_A = +25^\circ C$  unless otherwise indicated)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>VCR</b>						
Total Harmonic Distortion of Pin9 Output Signal	d	$\Delta f = \pm 7.5kHz$ , $V_i = 1mV$	–	0.5	–	%
Supply Voltage Rejection at Output Pin9	SVR	$\Delta f = 0$ , $f_{ripple} = 120Hz$ , $P_2 = 12k\Omega$	–	66	–	dB
Signal-to-Noise Ratio at Output Pin9	$\frac{S+N}{N}$	$\Delta f = \pm 25kHz$ , $V_i \geq 1mV$	–	70	–	dB
Input Voltage (Playback)	$V_{10}$	$V_o = 4V_{rms}$ , $P_2 = 0$ , $S1: OFF$	50	70	100	mV
Input Resistance (Playback)	$R_{10}$	$S1: OFF$	10	–	–	k $\Omega$
Total Harmonic Distortion for 20dB Overload of $V_{10}$	d	$S1: OFF$ , $V_{10} = 1V_{rms}$ , $V_o = 4V_{rms}$	–	0.5	2.0	%
<b>Overall Circuit</b>						
Signal-to-Noise Ratio	$\frac{S+N}{N}$	$V_i \geq 1mV$ , $V_o = 4V_{rms}$ , $\Delta f = 0$ , Note 2	–	70	–	dB
Distortion	d	$P_o = 50mW$ , $V_S = 24V$ , $R_L = 16\Omega$	–	0.5	–	%
		$\Delta f = \pm 7.5Hz$ , $V_S = 12V$ , $R_L = 8\Omega$ , Note 2	–	0.5	–	%
Muting	M	$V_o = 4V_{rms}$ @ no $V_i$ ; $V_1 = 0$ , Note 2	–	100	–	dB
Deviation Sensitivity	$\Delta f$	$P_2 = 0$ $V_o = 4V_{rms}$	–	3	6	kHz

Note 2. Test Bandwidth = 20kHz



