ELECTRONICS, INC.
44 FARRAND STREET
BLOOMFIELD, NJ 07003
(973) 748–5089

NTE789
Integrated Circuit
Stereo Multiplex Decoder

Description:

The NTE789, a monolithic silicon integrated circuit, is a stereo multiplex decoder intended for FM multiplex systems.

This stereo multiplex decoder requires only one low–inductance tuning coil (requires only one adjustment for complete alignment), provides automatic stereo switching, energizes a stereo indicator lamp, and operates from a wide range of voltage supplies.

Figure 1 shows the block diagram for the NTE789. The input signal form the detector is amplified by a low–distortion preamplifier and simultaneously applied to both signal, generated by a local voltage–controlled oscillator (VCO), is counted down by two frequency dividers to a 38kHz signal and to two 19–kHz pilot–tone supplied by the FM detector is compared to the locally generated 19–kHz signal in a synchronous detector.

The resultant signal controls the voltage controlled oscillator (VC)) so that it produces an output signal to phase–lock the stereo decoder with the pilot tone. A second sychronous detector compares the locally generated 19–kHz signal with the 19–kHz pilot tone. If the pilot tone exceeds and externally adjustable threshold voltage, a Schmitt trigger circuit is energized. The signal from the Schmitt trigger lights the stereo indicator, enables the 38–kHz synchronous detector, and automatically switches the NTE789 form monaural to stereo operation. The output signal from the 38–kHz detector and the composite signal from the preamplifier are applied to a matrixing circuit from which emerge the resultant left and right channel audio signals. These signals are applied to their respective left and right post amplifiers for amplification to a level sufficient to drive most audio amplifiers.

The NTE789 utilizes the 16–lead quad–in–line plastic package and operates over the ambient temperature range of –40°C to +85°C.

Features:

- Requires the use of only one low–inductance tuning coil
- Automatic stereo switching
- Directly drives a stereo indicator lamp up to 100mA
- Includes driver for stereo–lamp indicator
- Operates from a wide range of power supplies: 10 to 16 volts
- Requires only one adjustment for alignment
- Switching from monaural to stereo and stereo to monaural produces no audible thumps
- Low distortion: under 0.5%
- Separate dc input permits stereo defeat or enable
- High signal output: directly drives audio amplifiers
- Excellent SCA (storecast) rejection: 55dB typ.
- High audio channel separation: 40dB typ.

Absolute Maximum Ratings: (T_A = +25°C unless otherwise specified)

DC Supply Voltage 16V
Current at Pin12 . . . . . 100mA
Input Signal Voltage (Composite)(Note 1) 400mV
Operating Ambient Temperature Range . . . . . –40 to +85°C
Storage Ambient Temperature Range . . . . . –65 to +150°C
Lead Temperature (During Soldering, 1/32" (0.79mm) from case,10s max.) . . . . . +265°C

Note 1. For stereo operation, a minimum input signal voltage (composite) of 40mV is required.

Electrical Characteristics: (T_A = +25°C, V+ = 12 unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static Characteristics						
Total Current (Pin9, Pin10,Pin11)	I_{total}	Lamp OFF	–	22	27	mA
DC Voltage Pin1	V_1		1.6	2.3	3.1	V
Pin6 (Indicator Lamp OFF)	V_6		–	2.1	3.6	V
Pin9 and Pin10	V_9, V_{10}		3.7	5.4	7.4	V
Pin12 (Indicator Lamp OFF)	V_{12}	V+ = 16V	12.7	–	–	V
Voltage Differential (Pin2 – Pin1)	$V_2 – V_1$		–	0	0.1	V
Current at Pin12 (In actual use external circuit resistance (e.g. lamp should limit Pin12 to the maximum rated value of 100mA)		V_{IN} (at f = 19kHz) = 18mV	75	100	–	mA
Static Characteristics						
Input Impedance	Z_{in}		–	50k	–	Ω
Channel Separatiom (L + R Reference)		V_{IN} = 180mV, Note 3	25	40	–	dB
Channel Balance (Monaural)		V_{IN} = 180mV	–	0.3	3.0	dB
Monaural Gain		V_{IN} = 180mV	3	6	9	dB
Stereo/Monaural Gain Ratio		V_{IN} = 180mV, Note 3	–	±0.3	±3.0	dB
Indicator Lamp – Turn–ON Voltage		19kHz pilot–tone at Pin1	–	4	–	mV
Capture Range (Deviation from 76kHz center frequency)		19kHz pilot–tone voltage = 18mV	±6.6	±10	–	%
Distortion (75µs De–emphasis) 2^{nd} Harmonic		V_{IN} = 240mV	–	0.2	–	%
3^{rd}, 4^{th}, and 5^{th} Harmonic			–	< 0.1	–	%
19kHz Rejection			–	35	–	dB
38kHz Rejection			–	25	–	dB
SCA (Storecast) Rejection			–	55	–	dB
Stereo Defeat Voltage (V_4)			–	–	< 0.9	V
Stereo Enable Voltage (V_4)			> 1.6	–	–	V

Note 2. For improved pilot sensitivity and overload characteristics, replace the .039µF capacitor between Pin7 and Pin8 with a Series L–C Network (L = 4.7mH, C = 0.015µF). Under these conditions, Indicator Lamp Sensitivity: "ON" = 3.3mV, "OFF" = 2.0mV.

Note 3. For stereo operation, test conditions require a composite stereo input signal (modulated at 1kHz) including a 19kHz (18mV) pilot–tone signal.

Pin Connection Diagram