



ELECTRONICS, INC.  
 44 FARRAND STREET  
 BLOOMFIELD, NJ 07003  
 (973) 748-5089  
<http://www.nteinc.com>

## NTE1860 Integrated Circuit TV Stereo Multiplexing Decoder

**Description:**

The NTE1860 is a bipolar IC for use in TV stereo multiplexing decoding, filters for stereo, and SAP (Separate Audio Program) demodulation applications.

**Features:**

- Low number of external parts
- Excellent channel separation characteristics for stereo applications. Min. 46dB at 1kHz.
- Selection of individual modes of MAIN/SAP/BOTH.
- Direct driving mode for LED display.

**Absolute Maximum Ratings:** ( $T_A = 25^\circ\text{C}$ )

Power Supply Voltage,  $V_{CC}$  ..... 17V  
 Allowed Power Dissipation,  $P_D$  ..... 1800mW  
 Individual Controlling Pins,  $V_{14 \text{ to } 17}, V_{20}$  .....  $V_{CC} + 0.3V$   
 LED Driving Current,  $I_{LED}$  ..... 25mA  
 Operating Temperature,  $T_{opr}$  .....  $-10^\circ$  to  $+65^\circ\text{C}$   
 Storage Temperature,  $T_{stg}$  .....  $-55^\circ$  to  $+150^\circ\text{C}$

**Recommended Operating Condition:**

Power Supply Voltage,  $V_{CC}$  .....  $9.0 \pm 0.5V$

**Electrical Characteristics:** ( $V_{CC} = 9V, \text{dBs} = 0.775V_{rms}, T_A = 25^\circ\text{C}$ )

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
SAP Noise Level	$V_{SAP,N}$	Pin1 Input $5f_H$ (-14.4dBs) Pin25 Output 15kHz LPF is attached.	-	-40	-36	dB
SAP Carrier Leakage	$CL_{SAP}$	Pin1 Input $5f_H$ (-14.4dBs) Pin25 Output	-	-33	-30	dB
SAP Carrier Detecting Sensitivity	$S_{CARR}$	Pin1 Input $5f_H$ Input level during LED of Pin18 is lighting on	-29.0	-25.0	-21.5	dB
SAP Frequency Characteristics 10kHz	$A_{SAP}$	Pin1 Input SAP 10kHz 100% (-14.4dBs) Pin25 Output 15kHz IPF is attached	-4.0	-1.5	2.0	dB

**Electrical Characteristics (Cont'd):** ( $V_{CC} = 9V$ ,  $dBs = 0.775V_{rms}$ ,  $T_A = 25^{\circ}C$ )

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
SAP Output Level	$V_{SAP}$	Pin1 Input SAP 1kHz 100% (-14.4dBs) Pin25 Output 15kHz LPF is attached	-0.8	-0.1	0.6	dB
SAP Distortion Ratio	$THD_{SAP}$	Pin1 Input SAP 1kHz 100% (-14.4dBs) Pin25 Output 15kHz LPF is attached	-	4.0	8.0	%
SAP BPF Frequency Characteristics $5f_H$	A BPF $5f_H$	Pin1 Input $5f_H$ (-14.4dBs) Pin6 Output	-16	-13.5	-12.5	dB
SAP BPF Frequency Characteristics $3f_H$	A BPF $3f_H$	Pin1 Input $3f_H$ (-14.4dBs) Pin6 Output	-	-32.5	-29.5	dB
SAP BPF Frequency Characteristics $6.5f_H$	A BPF $6.5f_H$	Pin1 Input $6.5f_H$ (-14.4dBs) Pin6 Output	-	-31.6	-29.5	dB
SAP Detecting Characteristics	$V_{SAP FM}$	Pin8 Input 63.37kHz (-14.4dBs) 93.67kHz (-14.4dBs) Pin25 Output	100	110	118	mV/kHz
SAP Muting Attenuation Amount	$AT_{SAP}$	Pin8 Input SAP 1kHz 100% (-14.4dBs) Pin25 Output	-	-68	-65	dB
MONAURAL Noise Level	$V_{ST NM}$	Non-input Pin23 Output 15kHz LPF is attached	-	-75	-70	dB
STEREO Noise Level	$V_{ST NS}$	Pin1 $f_H$ (-24dBs) Pin40 to Pin41 -6dB ATT Pin24 Output 15kHz LPF is attached	-	-70	-66	dB
MAIN Output Level	$V_{MAIN}$	Pin1 Input 1kHz (-10dBs) 75 $\mu$ s de-emphasis is attached Pin23 Output 15kHz LPF is attached	-5.6	-5.0	-4.6	dB
SUB Detecting Level	$V_{SUB}$	Pin1 Input SUB 1kHz 100% Pin40 to Pin41 -6dB ATT Pin24 Output 15kHz LPF is attached	-12	-	-9	dB
MONAURAL Distortion Ratio	$THD_{MONO}$	Pin1 Input 1kHz (-10dBs) Pin23 Output 15kHz LPF is attached	-	0.25	0.50	%
STEREO Distortion	$THD_{STE}$	Pin1 Input SUB 1kHz 100% Pin24 Output 15kHz LPF is attached	-	0.75	1.20	%
Pilot Cancel (L + R)	$PC_{L+R}$	Pin1 Input $f_H$ (-24dBs) 75 $\mu$ s de-emphasis is attached Pin23 Output $f_H$ BPF is attached	-	-57.0	-51.5	dB
Pilot Cancel (L - R)	$PC_{L-R}$	Pin1 Input $f_H$ (-24dBs) Pin40 to Pin41 -6dB ATT Pin24 Output $f_H$ BPF is attached	-	-41	-35	dB

**Electrical Characteristics (Cont'd):** ( $V_{CC} = 9V$ ,  $dBs = 0.775V_{rms}$ ,  $T_A = 25^{\circ}C$ )

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
MAIN Balance Between Channels	$CB_{MAIN}$	Pin34 Input $f_H$ (-18dBs) Input 1kHz (-4dBs) to Pin28 and find the output level difference between Pin22 and Pin23 by measuring the outputs of Pin22 and Pin23 independently	-0.3	0	0.3	dB
SUB Balance Between Channels	$CB_{SUB}$	Input 1kHz (-4dBs) to Pin27 and find the output level difference between Pin22 and Pin23 by measuring the outputs of Pin22 and Pin23 independently. The above applicable to Pin28 ex- cept that non-input to Pin28.	-0.3	0	0.3	dB
Separation Check 1kHz	$SEP_{1k}$	Pin1 input L Ch 100% DSB 1kHz Measure phase difference be- tween the outputs of Pin24 and Pin23.	46	60	-	dB
Crosstalk (L - R) $\leftrightarrow$ $\square$ SAP	$CT_{L-R\ SAP}$	Pin26 and Pin41 Input 1kHz (-4dBs) Pin24 Output +1kHz BPF	-	-80	-67	dB
Crosstalk L $\leftrightarrow$ $\square$ SAP	$CT_{LSAP}$	Pin27 and Pin28 Output 1kHz (-4dBs) Pin23 Output + 1kHz BPF	-	-80	-74	dB
Crosstalk R $\leftrightarrow$ $\square$ SAP	$CT_{RSAP}$	Pin27 and Pin28 Input 1kHz (-4dBs) Pin22 Output + 1kHz BPF	-	-80	-74	dB
Stereo LPF Frequency Characteristics ( $6f_H$ )	$ALP1\ 6f_H$	Pin1 Input $6f_H$ (-10dBs) Pin37 Output	-	-45	-36	dB
(L + R) LPF Frequency Characteristics (12kHz)	$ALP2\ 12k$	Pin34 Input 12kHz (-4dBs) Pin29 Output	-5.2	-4.3	-2.8	dB
(L + R) LPF Frequency Characteristics ( $2f_H$ )	$ALP2\ 2f_H$	Pin34 Input $2f_H$ (-4dBs) Pin29 Output	-	-52	-43	dB
L - R LPF Frequency Characteristics (12kHz)	$ALP3\ 12k$	Pin26 Input 12kHz (-4dBs) Pin24 Output	-6.5	-5.3	-4.0	dB
L - R LPF Frequency Characteristics ( $2f_H$ )	$ALP3\ 2f_H$	Pin26 Input $2f_H$ (-4dBs) Pin24 Output	-	-52	-43	dB
Stereo Capture Range LOW	$CR_{LO}$	Pin34 Input $f_H$ vicinity (-18dBs) Measure the input frequency when the LED of Pin19 goes on and off by changing the burst signal frequency	-	-	14.95	kHz
Stereo Capture Range HIGH	$CR_{HI}$	Pin35 and Pin36, $1\mu F$ and $4.7\mu F$ $560\Omega$	16.52	-	-	kHz

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
During Forced Monaural Crosstalk (L)	CT <sub>L</sub>	Pin27 Input 1kHz (-4dBs) Pin23 Output +1kHz BPF	-	-80	-74	dB
During Forced Monaural Crosstalk (R)	CT <sub>R</sub>	Pin27 Input 1kHz (-4dBs) Pin22 Output +1kHz BPF	-	-80	-74	dB

**Electrical Characteristics (Cont'd):** ( $V_{CC} = 9V$ ,  $dBs = 0.775V_{rms}$ ,  $T_A = 25^{\circ}C$ )

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Muting SW V15 High Muting Attenuation Amount (L) (R)	AT <sub>ST L</sub>	Pin27 Input 1kHz (-4dBs) Pin22 and Pin23 Output +15kHz LPF	-	-80	-74	dB
DC Offset Voltage while Muting and Stereo are turned on	VO <sub>MU ST</sub>	During no-input	-50	5	50	mV
DC Offset Voltage while Muting and SAP are turned on	VO <sub>MU SAP</sub>	During no-input	-120	-20	120	mV
DC Offset Voltage while SAP and Monaural are turned on	VO <sub>SAP MO</sub>	During no-input	-50	0	50	mV
DC Offset Voltage while SAP and Stereo are turned on	VO <sub>SAP ST</sub>	During no-input	-120	0	120	mV
DC Offset Voltage while Stereo and Monaural are turned on	VO <sub>ST MO</sub>	During no-input	-120	-20	120	mV
Circuit Current	I <sub>CC</sub>	Value of inflowing current into Pin42	25	36	48	mA
V <sub>14</sub> , V <sub>15</sub> , V <sub>16</sub> and V <sub>17</sub> Controlling Voltage (L)	V <sub>X L</sub>		GND	-	1.0	V
V <sub>14</sub> , V <sub>15</sub> , V <sub>16</sub> , and V <sub>17</sub> Controlling Voltage (H)	V <sub>X H</sub>		2.5	-	V <sub>CC</sub>	V
V <sub>13</sub> and V <sub>20</sub> Controlling Voltage (L)	V <sub>Z L</sub>		GND	-	1.0	V
V <sub>13</sub> and V <sub>20</sub> Controlling Voltage (M)	V <sub>Z M</sub>		2.5	-	5.5	V
V <sub>13</sub> and V <sub>20</sub> Controlling Voltage (H)	V <sub>Z H</sub>		8.0	-	V <sub>CC</sub>	V
Stereo Discriminating Level	STE V <sub>th</sub>	Pin30 and Pin31 10 $\mu$ F f <sub>H</sub> level is variable	12	26	39	mV <sub>rms</sub>
Regulator Voltage	V <sub>REG</sub>	Pin9 DC	6.7	-	-	V

Note 1. This device is for *REPLACEMENT ONLY!* No design information is available.

## Pin Connection Diagram

MPX Input	<b>1</b>		<b>42</b>	V <sub>CC</sub>
N.C.	<b>2</b>		<b>41</b>	(L+R) Switch Input
Stereo Filter Adjust	<b>3</b>		<b>40</b>	(L+R) Detector Output
SAP Filter Adjust	<b>4</b>		<b>39</b>	TP
Bias	<b>5</b>		<b>38</b>	N.C.
SAP BPF Output	<b>6</b>		<b>37</b>	Stereo LPF Output
N.C.	<b>7</b>		<b>36</b>	Phase Det (+)
SAP Detector Input	<b>8</b>		<b>35</b>	Phase Det (-)
Reg Out 6.7V	<b>9</b>		<b>34</b>	Stereo Input
SAP VCO Adjust	<b>10</b>		<b>33</b>	Stereo GND
Car Det	<b>11</b>		<b>32</b>	ST VCO Adjust
SAP GND	<b>12</b>		<b>31</b>	Pilot Det (+)
SAP SQU Inhibit	<b>13</b>		<b>30</b>	Pilot Det (-)
SAP Mute	<b>14</b>		<b>29</b>	L+R Output
Mute	<b>15</b>		<b>28</b>	Matrix L+R Input
MS 1	<b>16</b>		<b>27</b>	Matrix L+R/SAP Input
MS 0	<b>17</b>		<b>26</b>	SAP Switch Input
SAP Ind Drive	<b>18</b>		<b>25</b>	SAP Det Output
Stereo Ind Drive	<b>19</b>		<b>24</b>	(L+R) SAP Output
Forced Monaural	<b>20</b>		<b>23</b>	Line Output L
LED GND	<b>21</b>		<b>22</b>	Line Output R

