

NTE1570 (NPN Tuner) & NTE1572 (FET Tuner) Integrated Circuit TV Video IF, Sound IF

Functions:

PIF

- Three Controlled IF Amplifier Stages
- Video Demodulator Controlled by Picture Carrier
- Black Noise and White Noise Inverter
- Peak AGC
- DC Amplifier for RF AGC Out

SIF

- Three Differential IF Amplifier Stages
- Phase Detector
- DC Controlled Attenuator
- Audio Amplifier Stage with NFB Terminal

Features:

- PIF, SIF, ATT Audio Driver
- 2 Chip Color TV System is Possible with NTE1547

PIF

- High Gain, Wide Band IF Amplifier
- AGC Characteristics with Excellent Stability
- Excellent DG/DP Characteristics
- Excellent S/N Characteristics due to Delayed 3 Stage AGC Action
- Negative Video Output Signal
- Switch Off the Video Part with VTR Switch

SIF

- Excellent Limiter Characteristics
- Excellent Attenuator Characteristics

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

Supply Voltage, V_{CC}	15V
Pin11 Open Voltage, V_{11}	15V
Video DC Output Current, I_{15}	6mA
Audio DC Output Current, I_3	3mA
Pin2 Voltage, V_2	15V
Power Dissipation, P_D	1.6W
Derate Above 25°C	12.8mW/ $^\circ\text{C}$
Operating Temperature Range, T_{opr}	-20° to $+65^\circ\text{C}$
Storage Temperature range, T_{stg}	-55° to $+150^\circ\text{C}$

Electrical Characteristics: ($T_A = +25^{\circ}\text{C}$, $V_{CC} = 12\text{V}$, $f_p = 58.75\text{MHz}$, $f_S = 54.25\text{MHz}$)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
PIF Section						
Recommended Supply Voltage	V_{CC}		10.8	12.0	13.2	V
Supply Current	I_{CC}		50	72	95	mA
Video DC Output Voltage NTE1570	V_{15}	$SW_1: 2, SW_2: 2$	5.2	5.5	5.8	V
NTE1572		$SW_1: 1, SW_2: 2$				
AFT DC Output Voltage NTE1570	V_{13}	$SW_1: 2, SW_2: 2$	5.3	6.8	8.3	V
NTE1572		$SW_1: 1, SW_2: 2$				
NTE1570	V_{14}	$SW_1: 2, SW_2: 2$				
NTE1572		$SW_1: 1, SW_2: 2$				
AFT DC Offset Voltage NTE1570	ΔV_{13-14}	$SW_1: 2, SW_2: 2$	-1.5	0	+1.5	V
NTE1572		$SW_1: 1, SW_2: 2$				
RF AGC Residual Output Voltage NTE1570	$V_{11(\text{sat})}$	$SW_1: 2, SW_2: 2$	-	-	0.5	V
NTE1572		$SW_1: 1, SW_2: 2$				
RF AGC Leakage Current NTE1570	$I_{11(\text{leak})}$	$SW_1: 2, SW_2: 1$	-	-	1.0	μA
NTE1572		$SW_1: 1, SW_2: 1$				
Video Sensitivity (Pin7–Pin8)	v_i	Note 1	60	150	250	μV_{rms}
AGC Range	ΔA_{PIF}	Note 2	60	64	-	dB
Sync Tip Level Voltage (V_{15})	V_{SYNC}	Note 3	2.3	2.5	2.7	V
Maximum IF Input Voltage (PIF)	$i_{\text{IN}(\text{MAX})}$	Note 4	100	120	-	mV_{rms}
White Noise Threshold Level (V_{15})	V_{WTH}	Note 5	5.8	6.2	6.6	V
White Noise Clamp Level (V_{15})	V_{WCL}	Note 5	3.7	4.1	4.5	V
Black Noise Threshold Voltage (V_{15})	V_{BTH}	Note 5	1.4	1.6	1.8	V
Black Noise Clamp Level (V_{15})	V_{BCL}	Note 5	2.9	3.3	3.7	V
Video Frequency Response	f_{BW}	Note 6	4.5	5.5	-	MHz
Suppression of Carrier	CL	Note 7	40	50	-	dB
Suppression of 2 nd Carrier	$I_{2\text{nd}}$	Note 8	40	50	-	dB
920kHz Beat Level	I_{920}	Note 9	33	38	-	dB
Differential Phase	DP	Note 10	-	3.5	5.0	deg
Differential Gain	DG	Note 10	-	7	10	%
PIF Input Impedance	$R_{\text{IN}(\text{PIF})}$	Note 11	1.5	3.0	6.0	$\text{k}\Omega$
PIF Input Capacitance	$C_{\text{IN}(\text{PIF})}$	Note 11	-	3	10	pF
AFT Output Voltage Upper	$V_{13\text{U}}, V_{14\text{U}}$	Note 13	11.7	11.9	12.0	V
Lower	$V_{13\text{L}}, V_{14\text{L}}$		1.8	2.3	2.8	V

Electrical Characteristics (Cont'd): ($T_A = +25^{\circ}\text{C}$, $V_{CC} = 12\text{V}$, $f_p = 58.75\text{MHz}$, $f_S = 54.25\text{MHz}$)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
RF AGC Maximum Available Current NTE1570	$I_{4(\text{max})}$	SW ₁ : 2, SW ₂ : 1	7.0	–	–	mA
NTE1572		SW ₁ : 1, SW ₂ : 1	0.3	–	–	mA
RF AGC Delay Setting Range (Delay)	V_{IN}	Note 14	5	7	9	V
AFT Band Width	ΔF_W	Note 13	1.4	–	–	MHz
Video Output Voltage	V_{OUT}	Note 15	2.25	2.50	2.75	V
SIF Output Voltage	S_{OUT}	Note 16	200	400	600	mV _{rms}
SIF Section						
Input Limiting Voltage	$V_{IN(\text{LIM})}$	$R_D = \infty$, Note 17	–	200	400	μV_{rms}
AM Rejection Ratio	AMR	SIF IN: $f = 4.5\text{MHz}$, $f_m = 400\text{Hz}$, $\Delta f = \pm 25\text{kHz}$, AM: 30%, $v_{in} = 100\text{dB}\mu$	40	45	–	dB
Recovered Output Voltage	V_{OD}	SIF IN: $f = 4.5\text{MHz}$, $f_m = 400\text{Hz}$, $\Delta f = \pm 25\text{kHz}$, $v_{in} = 80\text{dB}\mu$, $R_D = 12\text{k}\Omega$	0.5	0.75	–	V_{rms}
Total Harmonic Distortion	THD	SIF IN: $f = 4.5\text{MHz}$, $f_m = 400\text{Hz}$, $\Delta f = \pm 25\text{kHz}$, $v_{in} = 80\text{dB}\mu$	–	1.0	–	%
Max. Audio Output Voltage	V_{OM}	SIF IN: $f = 4.4$ to 4.6MHz	4.0	–	–	V_{P-P}
SIF Input Impedance	$R_{IN(\text{SIF})}$	$f = 4.5\text{MHz}$	10	20	30	$\text{k}\Omega$
SIF Input Capacitance	$C_{IN(\text{SIF})}$	$f = 4.5\text{MHz}$	–	3.0	–	pF
DET Output Impedance	$R_{O(\text{DET})}$	Note 18	10	15	20	$\text{k}\Omega$
DC Voltage, Pin21 NTE1570	V_{21}	SW ₁ : 2, SW ₂ : 2	3.5	4.4	5.3	V
NTE1572		SW ₁ : 1, SW ₂ : 2	3.5	4.4	5.3	V
DC Voltage, Pin23 NTE1570	V_{23}	SW ₁ : 2, SW ₂ : 2	4.8	6.0	7.2	V
NTE1572		SW ₁ : 1, SW ₂ : 2	4.8	6.0	7.2	V
DC Voltage, Pin1 NTE1570	V_1	SW ₁ : 2, SW ₂ : 2	6.0	6.7	7.4	V
NTE1572		SW ₁ : 1, SW ₂ : 2	6.0	6.7	7.4	V
Max. Attenuation	ATT MAX	Note 19	60	–	–	dB
DC Volume Gain	$G_{ATT \text{ MAX}}$	$R_A = 0$	4	6	8	dB
ATT Characteristics	V_1	Note 22	3.4	3.8	4.2	V
		Note 23	4.5	4.9	5.3	V
Signal Leakage	V_{PT}	Note 20	–	1.0	3.0	mV _{rms}
AF Amp Gain	$G_V \text{ AF}$	Note 21	–	20	–	dB
AF Amp Distortion	THD AF	$P_{23A} = 1V_{PP}$, 400Hz, SW ₃ : ON, ATT: –26dB Setting	–	1.5	–	%
AF Amp Max. Output Voltage	$V_{OAF \text{ MAX}}$	THD _{AF} = 5%, Note 21	1.5	2.0	–	V_{rms}
AF Output DC Voltage NTE1570	V_3	SW ₁ : 2, SW ₂ : 2	6.7	7.7	8.8	V
NTE1572		SW ₁ : 1, SW ₂ : 2	6.7	7.7	8.8	V

Notes:

- Note 1. V_{AGC} (P5 EXT. Applying Voltage) = 11.5V, PIF IN: $f = 58.75\text{MHz}$ 1kHz 30% AM Modulation. Adjust PIF input level (v_i) so that the detected output of P_{15A} with high impedance probe will be $0.8V_{P-P}$ and measure the input level.
- Note 2. $V_{AGC} = 4V$. Measure PIF input level (v_i) same as Note 1.
- Note 3. PIF IN: $f = 58.75\text{MHz}$ CW $15mV_{rms}$. Measure DC level of P_{15} .
- Note 4. PIF IN: $f = 58.75\text{MHz}$, APL 100%, 87.5% AM modulation. P_5 : Ppen.
(1) Adjust PIF input level $50mV_{P-P}$ and measure the detected output level v_{01P-P} .
(2) Then increase the input level so that the detected output level will be $1.1 \times v_{01P-P}$ and measure the input level.
- Note 5. $V_{AGC} = 8V$. PIF IN: $58.75\text{MHz} \pm 10\text{MHz}$ variable or sweep $15mV_{rms}$ measure DC level of P_{15} .
- Note 6. $V_{AGC} = 8V$ (GR = 30dB). SG_1 : 58.75MHz CW, SG_2 : 58.65 to 40MHz variable.
(1) Setting output of SG_1 so that DC level of P_{15} will be $4V$.
(2) Setting output of SG_2 (58.65MHz) so that AC level of P_{15} will be $0.5V_{P-P}$.
(3) Decreasing frequency of SG_2 until AC level of P_{15} will be $0.35V_{P-P}$ (-3dB of $0.5V_{P-P}$) then read $f_{SG2} = F$, $f_{BW} = 58.75 - F$ MHz
- Note 7. SG_1 : 58.75MHz , 1kHz 80% AM modulation $100mV_{rms}$. SG_2 , SG_3 : OFF. Setting V_{AGC} so that output AC level of P_{15} will be $2.7V_{P-P}$. Measure CL of P_{15} after setting to 0% AM of SG_1 .
- Note 8. Measure I_{2nd} of P_{15} same as Note 7.
- Note 9. $V_{AGC} = 8V$. SG_1 : 58.75MHz (P = Picture) $100mV_{rms}$. SG_2 : 54.25MHz (S = Sound) $32mV_{rms}$ (-10dB of SG_1). SG_3 : 55.17MHz (C = Chroma) $32mV_{rms}$ (-10dB of SG_1).
(1) Setting V_{AGC} so that the output tip level (lower) of P_{15} will be $3V$ DC.
(2) Measure the level difference (dB) between c-level and 920kHz level.
- Note 10. $V_{AGC} = 8V$. PIF IN: $f = 58.75\text{MHz}$ video signal (ramp) 87.5% AM $100mV_{P-P}$. Setting ATT so that the sync tip level of P_{15} will be $2.5V$ DC. Measure DP and DG.
- Note 11. $V_{AGC} = 5V$, $f = 58.75\text{MHz}$. Measure R_{IN} , C_{IN} .
- Note 12. AFT sensitivity $\Delta F / \Delta(V_{13} - V_{14})$
(1) INT, AGC (P_5 Open)
(2) PIF Input: $58.75\text{MHz} \pm 1\text{MHz}$, CW $15mV_{rms}$.
(3) Read the frequency (f_1) of PIF when $V_{13} - V_{14} = -1V$.
(4) Read the frequency (f_2) of PIF when $V_{13} - V_{14} = 1V$.
Then calculate $\Delta F / \Delta(V_{13} - V_{14}) = |f_1 - f_2|$
- Note 13. ΔF_W , V_{13U} , V_{14U} , V_{13L} , V_{14L}
(1) INT AGC (P_5 Open)
(2) PIF IN: $58.75\text{MHz} \pm 10\text{MHz}$ CW $15mV_{rms}$
(3) $9pF$ at Pin16 should be shorted
(4) Read the frequency (f_1 or f_2) when the V_5 or V_6 reduced to 90% level of A or B with varying the frequency. Then band width is the difference from center frequency (f_0).
- Note 14. P_5 : Open. PIF IN: 58.75MHz CW $20mV_{rms}$.
(1) Adjust the voltage of Pin3 so that the voltage of Pin4 will be $6V$ DC.
(2) Measure the voltage at Pin3.
- Note 15. P_5 : Open. PIF IN: 58.75MHz , 100% APL 87.5% AM modulation signal amplitude $50mV_{P-P}$. Measure detected output voltage (White peak to sync tip).
- Note 16. P_5 : Open. SG_1 : 58.75MHz CW $100mV_{rms}$. SG_2 : 54.25MHz CW $25mV_{rms}$. Measure SIF (4.5MHz) output voltage at P_{15} .
- Note 17. SIF IN: $f = 4.5\text{MHz}$, FM $f_{MOD} = 400\text{Hz}$, $\Delta f = \pm 25\text{kHz}$.
(1) Adjust SIF input level $100mV_{P-P}$ and measure the detected output level v_{OS} .
(2) Then decrease the input level so that the detected output level will be 3dB down of v_{OS} and measure the input level.

Notes (cont'd):

Note18. Output Impedance

- (1) SIF IN: $f = 4.5\text{MHz}$, FM $f_{\text{MOD}} = 400\text{Hz}$, $\Delta f = \pm 25\text{kHz}$, $80\text{dB}\mu$.
- (2) At P_{23} read the V_{O1} at $R_X = \infty$, then read the R_X when recovered output become $V_{O1}/2$ with varying the R_X . The R_X is the output impedance.

Note19. ATT MAX.

- (1) SIF IN: $f = 4.5\text{MHz}$, FM $f_{\text{MOD}} = 400\text{Hz}$, $\Delta f = \pm 25\text{kHz}$, $80\text{dB}\mu$.
- (2) Read the 400Hz component of V_{A1} at P_2 with $R_A = 0$, then read $V_{A1'}$ with $R_A = \infty$.

Note20. V_{PT}

- (1) SIF IN: $f = 4.5\text{MHz}$, FM $f_{\text{MOD}} = 400\text{Hz}$, $\Delta f = \pm 25\text{kHz}$, $80\text{dB}\mu$.
- (2) Read the 400Hz component at P_3 .

Note21. G_V AF

- (1) Apply 400Hz $0.1V_{\text{rms}}$ signal to P_2 .
- (2) Read the output voltage at P_3 .

Note22. Read the 400Hz component of V_{A1} at P_2 with $R_A = 0$. Set R_A so that $V_{A1'} = 1/2V_{A1}$ (-6dB), then read DC voltage of Pin1 (V_1).

Note23. Read the 400Hz component of V_{A1} at P_2 with $R_A = 0$. Set R_A so that $V_{A1'} = 3.16 \times 10^{-3}V_{A1}$ (-50dB), then read DC voltage of Pin1 (V_1).

Pin Connection Diagram

