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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 Chracteristics due to Delayed 3 Stage AGC Action
- Negative Video Output Signal
- Switch Off the Video Part with VTR Switch

SIF
- Excellent Limiter Charactristics
- Excellent Attenuato Characteristics

Absolute Maximum Ratings: (T_A = +25°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/°C
Operating Temperature Range, T_{opr} . . . . –20° to +65°C
Storage Temperature range, T_{stg} . . . . –55° to +150°C

Electrical Characteristics: (T_A = +25°C, V_{CC} = 12V, f_p = 58.75MHz, f_S = 54.25MHz)

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	$V_{11(sat)}$	SW_1: 2, SW_2: 2	–	–	0.5	V
NTE1572		SW_1: 1, SW_2: 2				
RF AGC Leakage Current NTE1570	$I_{11(leak)}$	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)	$i_{IN(MAX)}$	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_{2nd}	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	$R_{IN(PIF)}$	Note 11	1.5	3.0	6.0	kΩ
PIF Input Capacitance	$C_{IN(PIF)}$	Note 11	–	3	10	pF
AFT Output Voltage Upper	V_{13U}, V_{14U}	Note 13	11.7	11.9	12.0	V
Lower	V_{13L}, V_{14L}		1.8	2.3	2.8	V

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
RF AGC Maximum Available Current NTE1570	$I_{4(max)}$	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	$v_{IN(LIM)}$	$R_D = \infty$, Note 17	–	200	400	μV_{rms}
AM Rejection Ratio	AMR	SIF IN: f = 4.5MHz, f_m = 400Hz, $\Delta f = \pm 25$kHz, AM: 30%, v_{in} = 100dBμ	40	45	–	dB
Recovered Output Voltage	V_{OD}	SIF IN: f = 4.5MHz, f_m = 400Hz, $\Delta f = \pm 25$kHz, v_{in} = 80dBμ, R_D = 12kΩ	0.5	0.75	–	V_{rms}
Total Harmonic Distortion	THD	SIF IN: f = 4.5MHz, f_m = 400Hz, $\Delta f = \pm 25$kHz, v_{in} = 80dBμ	–	1.0	–	%
Max. Audio Output Voltage	v_{OM}	SIF IN: f = 4.4 to 4.6MHz	4.0	–	–	V_{P-P}
SIF Input Impedance	$R_{IN(SIF)}$	f = 4.5MHz	10	20	30	kΩ
SIF Input Capacitance	$C_{IN(SIF)}$	f = 4.5MHz	–	3.0	–	pF
DET Output Impedance	$R_{O(DET)}$	Note 18	10	15	20	kΩ
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} 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 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}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 = 58.75MHz 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 = 58.75MHz CW 15mV_{rms}. Measure DC level of P_{15}.

Note 4. PIF IN: f = 58.75MHz, 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 x v_{01P-P} and measure the input level.

Note 5. V_{AGC} = 8V. PIF IN: 58.75MHz ±10MHz 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) Decreaseing 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) Seting 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.

Note10. V_{AGC} = 8V. PIF IN: f = 58.75MHz 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.

Note11. V_{AGC} = 5V, f = 58.75MHz. Measure R_{IN}, C_{IN}.

Note12. AFT sensitivity $\Delta F/\Delta(V_{13}-V_{14})$
- (1) INT, AGC (P_5 Open)
- (2) PIF Input: 58.75MHz ±1MHz, 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 $\Delta F/\Delta(V_{13}-V_{14}) = |f_1-f_2|$

Note13. ΔF_W, V_{13U}, V_{14U}, V_{13L}, V_{14L}
- (1) INT AGC (P_5 Open)
- (2) PIF IN: 58.75MHz ±10MHz CW 15mV_{rms}
- (3) 9pF at Pin16 should b 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 varing the frequency. Then band width is the difference from center requency (f_0).

Note14. 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 volatge at Pin3.

Note15. P_5: Open. PIF IN: 58.75MHz, 100% APL 87.5% AM modulation signal amplitude 50mV_{P-P}. Measure detected output voltge (White peak to sync tip).

Note16. 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}.

Note17. SIF IN: f = 4.5MHz, FM f_{MOD} = 400Hz, Δf = ±25kHz.
- (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):

Note 18. Output Impedance

(1) SIF IN: f = 4.5MHz, FM f_{MOD} = 400Hz, $\Delta f = \pm 25kHz$, 80dBμ.

(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.

Note 19. ATT MAX.

(1) SIF IN: f = 4.5MHz, FM f_{MOD} = 400Hz, $\Delta f = \pm 25kHz$, 80dBμ.

(2) Read the 400Hz component of V_{A1} at P_2 with $R_A = 0$, then read $V_{A1'}$ with $R_A = \infty$.

Note 20. v_{PT}

(1) SIF IN: f = 4.5MHz, FM f_{MOD} = 400Hz, $\Delta f = \pm 25kHz$, 80dBμ.

(2) Read the 400Hz component at P_3.

Note 21. G_V AF

(1) Apply 400Hz 0.1V_{rms} signal to P_2.

(2) Read the output voltage at P_3.

Note 22. 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).

Note 23. 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