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NTE1547 Integrated Circuit Video Chroma Deflection System for Color TV

Description:

The NTE1547 combines the video-chroma subsystem and the deflection combination on a single monolithic integrated integrated circuit to provide a color television video-chroma-deflection system. This device includes a video amplifier, color demodulator that is designed to provide color differential output, and improved sync-separator, horizontal oscillator with saw tooth wave type AFC, horizontal pre-driver in a 42-Lead DIP type plastic package.

Features:

Video-Chroma Section

- Minimum number of external parts required
- Stabilized with respect to variation of temperature and supply voltage
- A few initial adjustments required

Deflection System

- Excellent temperature stability of horizontal oscillator
- Exact 50% duty cycle output due to the 2-f_H oscillator and flip-flop circuit
- Excellent inter-race
- Stable sync separator with V/H input terminals.

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

Supply Voltage, V ₃ max	15V
Supply Current, I ₃₃ max	40mA
Input Signal Level, e _{IN}	5V _{P-P}
Demodulator Min Load Resistance, R _{LD}	1.8kΩ
Horizontal Drive Peak Current, -I ₂₄	30mA
Horizontal Drive Operating Current, -I ₂₄	15mA
Vertical Ouptut Current, I ₂₆ max	-5mA
Sync Separator Input Level, V ₃₈ max/V ₃₉ max	3V _{P-P}
Pin7 Max Operating Current, I ₇	5mA
Pin2 Max Operating Current, I ₂	4mA
Power Dissipation, P _D	2.2W
Derate Above 25°C	17.6mW/°C
Operating Temperature Range, T _{opr}	-20° to +65°C
Storage Temperature Range, T _{stg}	-55° to +150°C

Electrical Characteristics: ($V_3 = 12V$, $T_A = +25^\circ C$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Video Section						
12v Supply Current	I_{CC3}	Measure Pin3 Currnt	60	82	100	mA
Video Gain	v_{22}/v_6	$V_6 = 4.25V$, $v_6 = 4MHz$, $1V_{P-P}$, $V_5 = 10V$, $V_B = 8V$	2.0	3.5	5.0	dB
Contrast Gain Control Range	ΔG_V	$V_6 = 4.25V$, $v_6 = 500kHz$, $1V_{P-P}$, $V_5 = 5$ to $10V$	11.2	12.3	13.4	dB
Video Frequency Characteristics	ΔG_{Vf}	$V_6 = 4.25V$, $V_5 = 10V$, $V_B = 8V$, $v_6 = 4MHz$, $0.5MHz$, $1V_{P-P}$, $20\log(22(4MHz)/22(0.5MHz))$	-3.5	-1.5	0.5	dB
DC Restoration Ratio	K	$V_{41} = 4.1V$, Change APL 10% to 90%, measure pedestal level change of Pin22	63	70	77	%
Max. Video Output		Pin5 OPEN, Change V_{40} DC Voltage, Measure 90% of Voltage Change at Pin22	5.0	7.5	-	V_{P-P}
Video DC Output Temperature Coefficient		$V_6 = 3.25V$, $V_{41} = 4.1V$, $T_A = -20^\circ$ to $+65^\circ C$	-2.5	0	+2.5	mV/ $^\circ C$
Inv. Amp Gain	v_7/v_6	$V_6 = 4.25V$, $v_6 = 4MHz$, $1V_{P-P}$, $v_5 = 10V$, $V_B = 8V$	2.2	3.5	4.6	dB
Inv. Amp Differential Gain	DG_R	$V_6 = 3.3$ to $5.2V$, $v_6 = 3.58MHz$, $100mV_{P-P}$	-	2.5	10.0	%
Inv. Amp Frequency Characteristics	ΔG_{Rf}	$V_6 = 4.25V$, $V_5 = 10V$, $V_B = 8V$, $v_6 = 4MHz$, $500kHz$, $1V_{P-P}$, $20\log(v_7(4MHz)/v_7(0.5MHz))$	-3.5	-0.1	0.5	dB
Inv. Amp 3.58MHz Linearity	L_7	$V_6 = 4V$, $v_6 = 3.58MHz$	1.6	-	-	V_{P-P}
Chroma (1) (Gate Pulse and Blanking Pulse is applied)						
Max. Chroma Output	e_{CH}	$V_1 = 12V$, $V_5 = 10V$, V_8 : OPEN, v_9 : $120mV_{P-P}$ (B:C = 1:1), $V_G = 8V$, $V_B = 15V$, Measure Pin12	0.5	0.75	1.05	V_{P-P}
Burst Output	e_B		0.45	0.70	0.95	V_{P-P}
ACC Characteristics (1)	e_a	$V_1 = 12V$, $V_5 = 10V$, V_8 : OPEN, $v_9 = 1.5mV_{P-P}$ (B:C = 1:1), measure Chroma Amplitude Pin12	0.16	0.34	-	V_{P-P}
ACC Characteristics (2)	A	$v_9 = 100mV_{P-P}$, $300mV_{P-P}$ (B:C = 1:1), Chroma Amplitude Ratio at Pin12 $A = v_{12}(v_9 = 300mV_{P-P})/v_{12}(v_9 = 100mV_{P-P})$	-	1.0	1.3	
Color Control Residual Signal	e_{CS}	$V_1 = 0V$, $V_5 = 10V$, V_8 : OPEN, S_1 : 1, S_2 : 1, $V_G = 5V$, $V_B = 15V$, $v_9 = 120mV_{P-P}$ (B:C = 1:1)	-	-	3	mV_{P-P}
Uni Color Control Gain Range	Δe_{cu}	$V_1 = 12V$, $V_5 = 5$ to $10V$, V_8 : OPEN, S_1 : 1, S_2 : 1, $V_G = 8V$, $V_B = 15V$, $v_9 = 120mV_{P-P}$ (B:C = 1:1)	7.5	8.5	9.5	dB
Uni Color Control Phase Range	$\Delta \phi_{cu}$	Same as above. Burst Chroma Phase Change at Pin12	-	4	10	deg.
HUE Phase Control Range (1)	$\Delta \phi_{bH1}$	$V_1 = 12V$, $V_5 = 10V$, $V_8 = 0$ to $12V$, $v_9 = 120mV_{P-P}$, $V_G = 8V$, $V_B = 15V$, Burst Chroma Phase Change at Pin12, S_1 : 1, S_2 : 1	75	105	-	deg
HUE Phase Control Range (2)	$\Delta \phi_{bH2}$	Same as above. Phase cahnge from V_8 OPEN	37	51	62	deg

Electrical Characteristics (Cont'd): ($V_3 = 12V$, $T_A = +25^\circ C$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Chroma (2) (Gate Pulse and Blanking Pulse is applied)						
Color Control Phase Change	$\Delta\phi_{CC}$	$V_1 = 0$ to $12V$, V_5 : OPEN, V_8 : OPEN, $v_9 = 120mV_{P-P}$ (B:C = 1:1), $V_G = 8V$, $V_B = 15V$, S_1 : 1, S_2 : 1	–	3	5	deg
Burst–Chroma Phase Difference	$\Delta\phi_{bc}$	Same as above. V_1 : OPEN	–8	0	+8	deg
APC Pull–In Range	f_P	$v_{14} = 0.6V_{P-P}$ (Burst), Measure Pin16 Frequency Difference between f_C and f_O when APC is Out	± 250	± 350	–	Hz
Killer Sensivity	e_{bk}	v_{14} Burst Amplitude when $V_1 = 2V$, S_1 : 1, S_2 : 2	18	29	45	mV_{P-P}
Residual Carrier of Demodulator Output	$e_{car R}$ $e_{car G}$ $e_{car B}$	v_{14} : AC GND, 3.58MHz Component at Pin19, Pin20, and Pin21, S_1 : 1, S_2 : 2	–	–	300	mV_{P-P}
Color Diff. Signal Output	e_{OR}	S_1 : 1, S_2 : 2, $v_{14} = 3.56945MHz$, $0.2V_{P-P}$, CH: 3.579549MHz	1.45	1.85	2.30	V_{P-P}
	e_{OG}		0.49	0.62	0.77	V_{P-P}
	e_{OB}		1.55	1.95	2.42	V_{P-P}
Color Diff. Signal Relative Output	R–Y/B–Y	Same as above	0.85	0.95	1.05	V_{P-P}
	G–Y/B–Y		0.25	0.31	0.38	V_{P-P}
Color Diff. Signal Max. Output	e_{ORM}	S_1 : 1, S_2 : 2, $v_{14} = 3.56945MHz$, $1.2V_{P-P}$, CW: 3.579545MHz	4.5	5.5	–	V_{P-P}
	e_{OGM}		1.4	1.8	–	V_{P-P}
	e_{OBM}		4.5	5.5	–	V_{P-P}
Relative Phase	ϕ_{R-Y}	S_1 : 1, S_2 : 2, v_{14} : Burst $0.6V_{P-P}$, Chroma $0.2V_{P-P}$	100	107	112	deg
	ϕ_{G-Y}		230	240	250	deg
Chroma (3) (Gate Pulse and Blanking Pulse is applied)						
Demodulator Bandwidth	f_{BR} f_{BG} f_{BB}	S_1 : 1, S_2 : 2, v_{14} : 10kHz to 5MHz, $0.2V_{P-P}$, –3dB Frequency (0db: 10kHz)	1.13	1.77	3.16	MHz
Blanking Operation Voltage		S_1 : 1, S_2 : 2, v_{14} : Burst $0.6V_{P-P}$, Chroma $0.2V_{P-P}$, Blanking Pulse Height when Demodulator Output is Disappear	10.4	11.1	–	V
Demodulator Output DC Voltage	E_{OR} E_{OG} E_{OB}	S_1 : 1, S_2 : 2, v_{14} : AC GND	7.00	7.71	8.35	V
Demodulator Output Difference Voltage	$E_{O(R-G)}$ $E_{O(R-B)}$ $E_{O(B-G)}$	Same as above	–0.3	–	+0.3	V
Demodulator DC Output Thermal Coefficient	$\Delta E_{OR\phi}$ $\Delta E_{OG\phi}$ $\Delta E_{OB\phi}$	Same as above. $T_A = -20^\circ$ to $+65^\circ C$	–3	0	2	$mV/^\circ C$
DC Output Voltage Difference Component Thermal Coefficient	$\Delta E_{O(R-G)\phi}$ $\Delta E_{O(R-B)\phi}$ $\Delta E_{O(B-G)\phi}$	Same as above	–2	0	+2	$mV/^\circ C$
Color Control Pin Voltage	V_1	Measure Pin1 Open Circuit Voltage	5.4	6.0	6.52	V
Uni Color Control Pin Voltage	V_5	Measure Pin5 Open Circuit Voltage	6.9	7.5	8.02	V
Hue Control Pin Voltage	V_8	Measure Pin8 Open Circuit Voltage	5.4	6.0	6.52	V

Electrical Characteristics (Cont'd): ($V_3 = 12V$, $T_A = +25^\circ C$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Horizontal (1)						
Horizontal V_{CC}	V_{33}	$V_B = 20.3V$	7.4	8.2	9.0	V
Recommended Supply Current	I_{33}		22	26	30	mA
Horizontal Frequency	f_H	$S_{39}: b, S_{38}: b, S_{35}: ON, V_X = 4V$	150.69	15.569	16.069	kHz
f_H Thermal Drift	Δf_{HT}	Same as above. $T_A = -20^\circ$ to $+65^\circ C$	-70	80	230	Hz
AFC Clamping Voltage	V_{CL}	Measure Pin35 Open, Circuit Voltage $S_1: ON$	3.71	4.2	4.75	V
AFC Input Current	I_{IN35}	$S_1: ON, S_5: 2$	2.2	3.42	5.1	mA
AFC Output Current	I_{O35}	$S_1: ON, S_5: 2$	2.4	3.99	5.6	mA
Horizontal Drive Saturation Voltage	V_{OL24}	$S_1: ON, S_3: ON, \text{Measure } V_{24}$	-	-	0.3	V
Horizontal Drive Output Duty Cycle	T_{O24}	$S_{39}: b, S_{38}: b, S_{35}: OPEN, V_X = 4V, \text{H Level Period/1 Cycle Period} = 100, \text{Measure } v_{24} \text{ Wave Form}$	45	50	55	%
Oscillator Starting Voltage	V_{33min}	Minimum V_{33} when Output Duty of Pin24 is 50%	-	-	4.0	V
Starting Supply Current	I_{33min}	$V_{33} = 4V, \text{Measure } I_{33}$	5.5	8.8	11.5	mA
AFC Pull-In Range	Δf_{HPULL}	$S_{38}: a, S_{35}: ON, S_{39}: a, \text{Changing } V_X, \text{Measure Pull-In Range}$	-	± 600	-	Hz
Horizontal (2)						
AFC Hold-In Range	$\Delta f_{H HOLD}$	Same as Pull-In Range, Measure Hold-In Range	-	± 1000	-	Hz
X-Ray Protector Voltage Range	V_{IN23}	Measure V_{23} when v_{24} Output becomes L Level, $T_A = +25^\circ C$	0.50	0.88	1.10	V
X-Ray Protector Current Sensitivity	I_{IN23}	Measure I_{23} when v_{23} Output becomes L Level, $T_A = +25^\circ C$	0.060	0.178	1.000	μA
X-Ray Protector Operating Voltage	$V_{IN23\phi}$	Same as $V_{IN23}, T_A = -20^\circ$ to $+65^\circ C$	0.30	0.84	1.28	V
X-Ray Protector Operating Current	$I_{IN23\phi}$	Same as $I_{IN23}, T_A = -20^\circ$ to $+65^\circ C$	0.030	0.178	2.000	μA
Sync Separator						
Sync Separator Sensitivity (1)	I_{IN39}	Pin38: OPEN, Measure I_{39} when V_{37} is Low-to-High	18.1	35.0	11.3	μA
Sync Separator Sensitivity (2)	I_{IN38}	Pin39: OPEN, Measure I_{38} when V_{37} is Low-to-High	13.3	21.4	54.2	μA
Sync Output High Level	V_{OH37}	Pin38: OPEN	7.04	8.19	9.34	V
Sync Output Low Level	V_{OL37}		0	1.5	2.4	V
Sync Clamp Voltage	V_{CL31}	Measure V_{31} at $I_{31} = -1mA$	-0.85	-0.63	-0.5	V
Vertical						
Vertical Free-Running Frequency	f_V	$S_{31}: ON, \text{Measure Pin28}$	56	60	64	Hz
Retrace Time	T_r	Pin28 Output Pulse	500	690	850	μs

Electrical Characteristics (Cont'd): ($V_3 = 12V$, $T_A = +25^\circ C$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Vertical (Cont'd)						
f_V Pull-In Range	$\Delta f_{V\ PULL}$	S_{31} : ON/OFF, Pin31 to V_R , S_{31} : OFF, $f_{OSC28} = 60Hz$, S_{31} : ON, Measure f_{OSC28} , $\Delta f_{V\ PULL} = f_{OSC28} = 60Hz$	11.1	12.1	12.9	Hz
Ramp Max. Voltage	V_{O28}	$V_{30} = 6V$, Measure V_{28}	7.05	7.65	8.25	V
Ramp Max. Current	I_{O28}	$V_{30} = 6V$, Measure I_{28} , S_6 : ON	16.7	26.8	48.4	mA
Max. Common Mode Input Voltage	V_{IH28}	S_{26} , S_{27} : ON, $V_{30} = 0V$, $V_{28} = 6$ to $12V$, Measure V_{28} when V_{27} is saturated	11.9	–	–	V
Min. Common Mode Input Voltage	V_{IL28}	Same as above. $V_{28} = 6$ to $0V$	–	2.86	3.7	V
Pin28 Input Current	I_{I28}	S_{26} , S_{27} : ON, $V_{30} = 0V$, Measure I_{28} at $V_{28} = 6V$	0.25	0.98	4.50	μA
Pin27 Input Current	I_{I27}	Same as above. Measure I_{27} at $V_{28} = 4V$	0.18	0.94	6.21	μA
Max. Vertical Output Voltage	V_{OH26}	S_{26} : OFF, S_{27} : ON, $V_{30} = 6V$, Measure V_{26}	5.6	6.3	7.2	V
Min. Vertical Output Voltage	V_{OL26}	S_{26} , S_{27} : OFF, $V_{30} = 6V$, Measure V_{26}	–	–	0.3	V
Pin29 Bias Voltage	V_{29}	Measure V_{29} when $I_{29} = -0.2mA$	3.7	3.9	4.1	V

Pin Connection Diagram

Color Control	1	42	C-Contrast Output
E-Contrast Output	2	41	Brightness Control
V_{CC}	3	40	Clamp Input
Delay Input	4	39	Horiz Sync Separator
Contrast Control	5	38	Vert Sync Separator
Video Inv Input	6	37	Sync Output
Video Inv Output	7	36	Horiz OSC Discharge
Hue Control	8	35	AFC
Chroma Input	9	34	Horiz OSC Timing
ACC Filter	10	33	Horiz V_{CC} (8V)
GND	11	32	GND
Chroma Output	12	31	Vert Sync Input
Killer Filter	13	30	Timing
Demodulator Input	14	29	Height Control
APC Filter	15	28	Ramp Capacitor
X'tal Drive	16	27	NFB Input
X'tal Input	17	26	Vert Drive Output
$-\pi/4$ Input	18	25	Phase Compensation
B-Y Output	19	24	Horiz Drive Output
G-Y Output	20	23	X-Ray Protect
R-Y Output	21	22	Y Output

