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NTE1790
Integrated Circuit
Video IF, Chroma Deflection

Description:

The NTE1790 combines all the functions required for an NTSC color TV system on a 64–Lead DIP shrink type plastic package. This device is designed to have wide application capability, from a fundamental CTV application to a high–end MPX CTV with quasi–parallel SIF system, with minimal external parts and adjustments. A quasi–parallel SIF system assures buzz free sound reproduction.

Features:

PIF Section

- 3–Stage Variable Gain PIF Amplifier
- High Speed Peak AGC with Dual Time Constants
- Single End AFT Output with Defeat Function
- A Delayed RF AGC Output (Reverse AGC)
- Sync Positive Detected Video Output Polarity
- Internal Black/White Noise Inverter

Quasi–Parallel Inter Carrier Detector

- 3–Stage Variable Gain Intercarrier IF Amplifier
- Independent Peak AGC
- Intercarrier Detector with 90 deg. Carrier Shifter

SIF Section:

- 3–Stage Limiter Amplifier
- Differential Peak Detector
- Separated Detector Output and Electronic Attenuater Input for Multiplex TV Sound Reception
- Excellent Electronic Attenuater
- Preamplifier with an NF Terminal

Video Section:

- 2nd Order Picture Sharpness (DC Control)
- Contrast Control with Uni–Color Function
- Brightness Control with Pedestal Clamping Circuit (Adjustable DC Restoration Ratio)
- Internal Vertical Blanking

Chroma Section:

- ACC Circuit
- Color Control Circuit
- Uni–Color Control Circuit
- Adjustment Free APC Circuit
- Tint Control Circuit With Sync Pulse Output
- Color Differential Outputs

Deflection Section:

- Excellent Sync Separator
- Adjustment Free Count Down System
- Stable Vertical Synchronization
- Saw–Tooth Type AFC
- Horizontal Pre–Driver
- X–Ray Protector
- Vertical Drive Amplifier

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

Supply Voltage, V_{CC} 12V
Input Signal Level, e_{in} . . . . . $5V_{p-p}$
RF AGC Voltage, $V_{RF}AGC$ 15V
Horizontal Section Supply Voltage, $V_{CC}H$ 12V
Power Dissipation, P_D 2660mW
Derate Above 25°C . . . . . 212mW/°C
Operating Temperature Range, T_{opr} . . . . . –20° to +65°C
Storage Temperature Range, T_{stg} . . . . . –55° to +150°C

Recommended Supply Voltage:

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
PIF Section (Pin19)			8.5	9.0	9.5	V
QIF, SIF Section (Pin37)			8.5	9.0	9.5	V
Video, Chroma, Deflection Section (Pin16)			8.5	9.0	9.5	V
Horizontal Section (Pin58)			6.3	6.8	7.3	V

AC Characteristics: (T_A = +25°C, V_{CC} = 9V, 6.8V unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
PIF Section						
Input Sensitivity	v_{in}		70	120	200	μV_{rms}
IF AGC Gain Reduction	GR		60	64	–	dB
Video Bandwidth	BW		4.5	–	–	MHz
Video Ripple			–	0	±1	dB
Differential Phase	DP		–	–	5	deg.
Differential Gain	DG		–	–	10	%
Video White Peak	V_{47}		3.2	3.7	4.4	V
Noise Inverter White Inverter	$V_W TH$		2.7	3.0	3.3	V
White Clamp	$V_W CL$		4.6	5.0	5.4	V
Black Inverter	$V_B TH$		6.4	6.8	7.2	V
Black Clamp	$V_B CL$		4.8	5.2	5.6	V
Carrier Suppression			40	–	–	dB
Harmonics Suppression	I_{2nd}		40	–	–	dB
Input Impedance	$R_i PIF$		1.75	2.5	3.25	kΩ
Input Capacitance	$C_i PIF$		2	4	8	pF
AFT Center Voltage No Signal			5.1	6.5	10.3	V
Offset			–	–	±3	V

AC Characteristics (Cont'd): (T_A = +25°C, V_{CC} = 9V, 6.8V unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
PIF Section (Cont'd)						
AFT Sensitivity			–	15	25	kHz/V
AFT Voltge Swing	A		6	11	–	V
920kHz Beat	I_{920}		32	–	–	dB
QIF Section						
Input Sensitivity	$v_{in}Q$		70	120	200	μV_{rms}
4.5MHz Output Level			1.0	1.5	2.0	V_{P-P}
AGC Gain Reduction	GR Q		60	64	–	dB
Input Impedance	R_iQIF		1.75	2.5	3.25	kΩ
Input Capacitance	C_iQIF		2	4	10	pF
SIF Section						
Limiting Sensitivity	v_{LIM}		115	140	180	μV_{rms}
Detected Output	v_{OD}		130	155	–	mV_{rms}
AM Rejection	AMR		20	–	–	dB
SIF Bandwidth	BW SIF		120	160	–	kHz
THD Bandwidth	BD THD	THD = 1.5%	100	140	–	kHz
Attenuation AC Gain	G_VATT		4	6	8	dB
Maximum Attenuation	ATT_{max}		70	–	–	dB
AF Amp AC Gain	G_VAF		–	18	–	dB
Video Section						
Input Impedance, Pin52	z_{i52}		1.8	2.5	3.2	kΩ
Input Impedance, Pin53	z_{i53}		14	19	24	kΩ
Video Output Impedance	z_{o13}		15	30	100	Ω
Brightness Control Voltage	V_{BR}		3.9	4.3	4.7	V
Brightness Sensitivity	G_{BR}		3.0	3.4	3.8	
Minimum Linear Video Input	V_{di1}		–	2.3	2.7	V
Maximum Linear Video Input	V_{di2}		5.0	5.5	–	V
Video Input Dynamic Range	V_{di}		2.7	3.2	–	V_{P-P}
Minimum Video Output	V_{do1}		0	0.3	1.1	V
Maximum Video Output	V_{do2}		7.5	7.9	9.0	V
2nd Order Differential Input Dynamic Range	V_{diP}		0.3	0.4	0.5	V_{P-P}
Video Gain	G_V		3.2	4.2	4.9	
Frequency Response	G_f		–3.2	–1.0	–0.8	dB
Contrast Control Voltage Range	dVct		0.71	1.4	2.09	V
Contrast Control Range	dGct		11	12	13	dB
Contrast Control Center Voltage	V_{cto}		4.2	4.5	4.8	V
Frequency Response Dependence	dG_f		–	0	0.9	dB
Frequency Response at Minimum Picture Control	dG_{ps}min		–10	–6	–3.4	dB
Maximum Control	dG_{ps}max		10	11	12	dB
Center Control	dG_{ps}0		–3.0	–1.7	0	dB
Picture Control Voltage Range	dV_{ps}		0.68	1.2	1.43	V

AC Characteristics (Cont'd): (T_A = +25°C, V_{CC} = 9V, 6.8V unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Video Section (Cont'd)						
Vertical Blanking Pulse Output Level	V_V		8.0	8.9	9.0	V
Horizontal Blanking Pulse Detection Level	V_H		8.0	8.4	8.8	V
Horizontal Blanking Input Current	I_H		1.5	2.5	4.0	mA
Chroma Section						
ACC Characteristics	e_a		0.72	1.54	–	V_{P-P}
	A		–	1.0	1.3	V_{P-P}
Demodulator Color Differential Output	e_{R1}		1.0	1.47	2.0	V_{P-P}
	e_{G1}		0.35	0.51	0.71	V_{P-P}
	e_{B1}		1.19	1.75	2.44	V_{P-P}
Color Killer Residual	e_{KR}		–	–	10	mV
	e_{KG}		–	–	10	mV
	e_{KB}		–	–	10	mV
Color Control Residual	e_{CR}		–	–	10	mV
	e_{CG}		–	–	10	mV
	e_{CB}		–	–	10	mV
Color Control Voltage	V_3		4.1	4.6	5.1	V
Color Control Range	dV_3		0.7	1.4	2.1	V
Uni–Color Control Range	e_U		10.5	12.0	13.5	dB
Uni–Color Control Voltage	V_8		4.1	4.6	5.1	V
Uni–Color Control Range	dV_8		0.7	1.4	2.1	V
Color Control Phase Change	$d0_C$		–	–	5	deg.
Uni–Color Control Phase Change	$d0_U$		–	–	7	deg.
Maximum Input of Bandpass Amplifier	e_M		0.48	0.6	–	V_{P-P}
Tint Control Range	d0		78	100	131	deg.
Tint Control Range	$d0_1$		35	55	–	deg.
	$d0_2$		31	45	–	deg.
Tint Control Voltage	V_2		4.0	4.6	5.1	V
Tint Control Voltage Range	dV_2		0.25	0.5	0.75	V
Sync Pulse Width	S_t		–	4.5	–	µs
Sync Pulse, High	V_{S1}		–	5.42	–	V
Sync Pulse, Low	V_{S2}		–	3.6	–	V
APC Frequency Control Sensitivity	β		–	7.0	–	Hz/mV
APC Pull–In Range	f_P		–	1.3	–	Hz
APC Hold Range	f_{Hld}		–	2.5	–	Hz
Sweeper Amplitude	SEV1		–	4.0	–	V
	SEV2		–	3.0	–	V
	SEV		0.8	1.0	1.2	V_{P-P}
Sweeper Period	tE1		4	7	10	ms
	tE2		35	55	77	ms
	tE		39	62	87	ms
Killer Level	e_K		0.4	1.0	–	mV_{P-P}

AC Characteristics (Cont'd): (T_A = +25°C, V_{CC} = 9V, 6.8V unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Chroma Section (Cont'd)						
Demod Output DC Voltage	R.G.B		4.9	5.6	6.4	V
Maximum Demod Output	E_R		3.9	4.6	5.9	V_{P-P}
	E_G		1.3	1.54	2.0	V_{P-P}
	E_B		3.9	4.6	5.9	V_{P-P}
Demod Relative Amplitude	R/B		0.71	0.84	0.97	
	G/B		0.23	0.29	0.35	
Demod Relative Phase	R–B		102	109	116	deg.
	G–B		227	242	252	deg.
Demod Output Residual Carrier	ECR		–	–	300	mV_{P-P}
	ECG		–	–	300	mV_{P-P}
	ECB		–	–	300	mV_{P-P}
Deflection Section						
Pin57 Input Current	I_{R57}		–	–	1	µA
Sync Signal Delay Time	t_{pdr}		0	40	100	ns
	t_{pdf}		0	60	100	ns
Pin56 Terminal Voltage	V_{56}		5.2	5.7	6.2	V
Pin56 Output Current	I_{O56}		2.0	3.0	4.9	µA
Gate Pulse Width	T_{pw8}		2.7	3.0	3.6	µs
Gate Pulse Delay	t_{pd8}		0.2	0.4	0.6	µs
Chroma Sweep Pulse Width	T_{cwt}		–	8H	–	
Vertical Masking Pulse (Gate)			256.25H to 10.25H			
Vertical Masking Pulse (Horizontal AFC)			256.25H to 10.25H			
Vertical Sync Integrating Time Constants	T_{VS}		12	16	34	µs
Vertical Retrace Pulse Width	T_{VO55}		10H / 11H			
Vertical Amp Gain	G_{VA54}		8.7	9.5	10.7	dB
Vertical Amp Input Dynamic Range	V_{i55}		1.1	1.6	–	V
Vertical Amp Output Dynamic Range	V_{H55}		5.1	6.2	7.3	V
	V_{L55}		1.1	1.9	3.1	V
Vertical Amp Maximum Output Current	I_{O54}		11.2	16.8	25.0	mA
Horizontal $32f_H$ Oscillator Starting Voltage	$V_{CC58}1$		1.7	2.0	2.5	V
Horizontal Drive Output Starting Voltage	$V_{CC58}2$		2.7	3.0	3.2	V
Horizontal Drive Output Starting Current	I_{CC58}		4.0	5.4	6.8	mA
Horizontal Oscillator Frequency	f_H		15654	15734	15814	Hz
f_H temperature Drift	df_{HT}		40	70	100	Hz
f_H V_{CC} Coefficient	df_{HV}		0	–20	–40	Hz
Horizontal Output Duty	T_{O64}		39	41	43	%
Horizontal Output Saturation Voltage	V_{OL64}		0	0.2	0.3	V
f_H Pull–In Range	df_{pull}		±550	±750	±880	Hz
f_H Hold Range	df_{hold}		±550	±750	±880	Hz
X'Ray Sense Voltage	V_{in1}		1.1	1.3	1.5	V
X'Ray Sense Current	I_{in1}		0.05	0.4	1.0	µA

AC Characteristics (Cont'd): (T_A = +25°C, V_{CC} = 9V, 6.8V unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Deflection Section (Cont'd)						
X'Ray Protector Recovering Voltage	V_{Hold}		1.0	1.4	1.7	V
Vertical Sync Pull–In Range	f_{PV1}		–	232.5H	–	
	f_{PV2}		–	296.5H	–	

Pin Connection Diagram

X–Ray Protect	1	64	Horiz Driver Output
Tint Control	2	63	$32f_H$ VCO
Color Control	3	62	$32f_H$ VCO
f_{SC} VCO	4	61	$32f_H$ VCO
Killer Filter	5	60	AFC Time Constant
f_{SC} VCO	6	59	Flyback Pulse Input
APC Filter	7	58	H V_{CC} (6.8V)
Contrast Control	8	57	Sync Sep Input
R – Y Output	9	56	Sync Sep Time Constant
G – Y Output	10	55	Vertical NFB
B – Y Output	11	54	Vertical Output
GND	12	53	Video Input
–Y Output	13	52	Differential Input
Pedestal Clamp	14	51	Picture Sharpness
Brightness	15	50	GND
9V V_{CC} V/C/D	16	49	Chroma Input
Bypass	17	48	ACC Filter
RF AGC Delay	18	47	Video Output
9V V_{CC} PIF	19	46	RF AGC Output
PIF Input	20	45	Video Detector Tank
PIF Input	21	44	Video Detector Tank
PIF AGC Time Constant	22	43	AFT Tank/Defeat
PIF AGC Time Constant	23	42	AFT Output
GND	24	41	4.5MHz Output
QIF Input	25	40	GND
QIF Input	26	39	I/C Detector
QIF AGC Time Constant	27	38	I/C Detector
Preamp Output	28	37	9V V_{CC} Q–SIF
NFB	29	36	SIF Input
Volume Control	30	35	SIF Bias
Audio Input	31	34	Detector Output
FM Detector Tank	32	33	FM Detector Tank