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NTE7148
Integrated Circuit
Color TV Single–Chip Signal Processor for NTSC Systems (PLL Detection)

Description:

The NTE7148 is an integrated circuit in a 52–Lead DIP type package designed for use in color TVs based on the NTSC (National Television System Committee) system with an on–chip circuit for all VIF, SIF, video, chroma, and deflection signal processing.

Functions and Features:

VIF

- PLL Detection (High Video and Audio Quality)
- High–Gain VIF Amplifier
- High Speed AGC
- On–Chip APC Time Constant Switch

SIF

- Simultaneous Sound IN/OUT
- Video/Audio Simultaneous Muting, or Audio–Only Muting Possible

Audio–Visual Switch

- Internal/External Audio–Visual Switch (V_{CC} = 9V)

Delay Line	Video External, Audio External	Switch Rating
OFF	IN	6.9V to 9.0V
OFF	EXT	4.7V to 6.6V
ON	EXT	2.4V to 4.3V
ON	IN	0V to 2.1V

OSD

- RGB 3 Input
- RGB Linear Amplifier (–6dB Input: 2V to 5V)
- Fast Blanking (B Input Combined Use)

Chroma

- On–Chip ACC Filter
- On–Chip Killer Filter
- Killer–Circuit Hysteresis Operation
- On–Chip Carrier Filter

Video

- Black Enhancement
- DC Playback
- On–Chip Delay Line
- Wideband Width (9MHz): Delay Line Short
- Dual Rank On–Chip Differential Circuit Also Available for Soft Also
- S Input Supported (VCR Application)
- Variable DC Transmission Volume Available

Deflection

- Adjustment–Free Horizontal, Vertical Synchronization
- Dual AFC System with Excellent Anti–Noise Characteristics
- External Adjustmant of Vertical Synchronization Sensitivity
- Vertical Size is Constant with No–Signal
- Highly Stable Image During Playback of Copy Protected tapes (Macro–Vision Tape etc.)
- High Stability Against VCR Skew Distortion

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

Maximum Supply Voltage, V_{11}max 11V
Maximum Supply Voltage, V_{14}max 11V
Maximum Supply Current, I_{30}max 16mA
Circuit Current, I_{44} . . . . . –6mA
Circuit Current, I_6 . . . . . –3mA
FBP Input Current (Peak Current), I_{22}max 5mA
FBP Input Current (Peak Current), I_{21}max 10mA
Allowable Power Dissipation ($T_A \leq$ +60°C), $P_D$max 1.35W
Operating Temperature Range, T_{opr} . . . . . –10° to +65°C
Storage Temperature Range, T_{stg} . . . . . –55° to +150°C

Recommended Operating Conditions: (T_A = +25°C unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Supply Voltage	V_{11}		–	9	–	V
	V_{14}		–	9	–	V
Supply Current	I_{30}		–	13	–	mA
Operating Voltage Range	V_{11}op		8.0	–	9.5	V
	V_{14}op		8.0	–	9.5	V
Operating Current Range	I_{30}op		10	–	16	mA

Electrical Characteristics: (T_A = +25°C, V_{CC} = V_{11} = V_{14} = 9V, I_{CC} = I_{30} = 13mA unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Circuit Voltage and Current						
Horizontal Supply Voltage	V_{30}	V_{CC} = 9V, I_{CC} = 13mA	7.3	7.8	8.3	V
Supply Current	$I_{11 + 14}$	V_{CC} = 9V, I_{CC} = 13mA, I_F AGC 4V	102	120	138	mA
VIF						
Quiescent Video Output Voltage	V_{44}	Quiescent	4.3	4.7	5.1	V
Quiescent AFT Output Voltage	V_{47}	Quiescent	3.1	4.7	6.1	V
Maximum RF AGC Voltage	V_{49H}	CW = 85dBμ, RF AGC VR = Min	7.6	8.0	8.3	V
Minimum RF AGC Voltage	V_{49L}	CW = 85dBμ, RF AGC VR = Max	0	0.01	0.3	V
Input Sensitivity	V_i	VIF input level for video output at $0.9V_{P–P}$ (40% MOD)	33	39	45	dBμ
AGC Range	GR	Max input ($V_0 = 0.8V_{P–P}$) – input sensitivity	54	62	70	dB
Maximum Permissible Input	$V_i$max	VIF input level for video output at +1dB	97	104	111	dBμ
Video Output Detection	V_O44	V_i = 80dBμ, AM = 78% MOD	1.7	2.0	2.3	$V_{P–P}$
Differential Gain	DG	V_i = 80dBμ, AM = 87.5%, video MOD	–	3.0	10	%
Differential Phase	DP	V_i = 80dBμ, AM = 87.5%, video MOD	–	1.0	10	DEG
Video S/N	S/N	V_i = 80dBμ, 20 log $\frac{1.46\ (V_{P–P})}{\text{noise}\ (V_{rms})}$	47	54	61	dB
Synchronization Signal Tip Level	V_{44} TIP	CW = 80dBμ	2.1	2.4	2.7	V
Frequency Characteristics	f_C	Frequency at video output of –3dB	6	9	12	MHz
9200kHz VIF Intermodulation	I_{920}	V3.58MHz/V920kHz, V_i = 80dBμ	35	42	49	dB

Electrical Characteristics (Cont'd): (T_A = +25°C, V_{CC} = V_{11} = V_{14} = 9V, I_{CC} = I_{30} = 13mA unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
VIF (Cont'd)						
Maximum AFT Output Voltage	V_{47H}	CW = 80dBµ, frequency change	8.3	8.7	9.0	V
Minimum AFT Output Voltage	V_{47L}	CW = 80dBµ, frequency change	0.1	0.3	0.8	V
AFT Detection Sensibility	S_f	CW = 80dBµ, frequency change	45	70	100	mV/kHz
AFT Switch Operation Start Voltage	V_{AFTSW}	Measuring with sweep signal	0.5	1.0	1.5	V
Black Noise Threshold Level	V_{BTH}	Measuring with sweep signal	1.1	1.4	1.7	V
APC Pull–In Range (U)2	$f_{PU–2}$	CW = 80dBµ, f_P = 53MHz to 64MHz	0.8	1.7	4.0	MHz
APC Pull–In Range (L)2	$f_{PL–2}$	CW = 80dBµ, f_P = 53MHz to 64MHz	–	–2	–1	MHz
VCO Maximum Variable Range	Δf_U	Quiescent	0.9	1.7	4.0	MHz
	Δf_L	Quiescent	–4	–2	–1	MHz
VCO Control Sensitivity	β	Quiescent	1.5	3.0	5.5	kHz/mV
Audio–Visual Switches						
Video Output DC Voltage	V_{38}	Quiescent	3.0	3.4	3.8	V
Internal Video Input Voltage	V_{42}	Quiescent	4.4	4.8	5.2	V
External Video Input Voltage	V_{40}	Quiescent	4.4	4.8	5.2	V
External Audio Input Voltage	V_3	Quiescent	5.2	5.6	6.0	V
SIF AF						
SIF Limiting Voltage	$V_i$lim	SIF output level for detection output at –3dB	33	40	47	dBµ
FM Detection Output Voltage	V_O1	V_i = 100dBµ, Δf = ±25kHz	440	550	670	mV_{rms}
FM Detection Output Distortion Ratio	THD	V_i = 100dBµ, Δf = ±25kHz	0	0.4	1.0	%
AM Rejection	AMR	V_i = 80dBµ, $\frac{\text{FM: } \Delta f = \pm 25\text{kHz}}{\text{AM: } 30\%}$	40	60	80	dB
AF Amplifier Voltage Gain	G_{AF}	V_i = 100mV_{rms}, f = 400Hz	18	20	22	dB
AF Maximum Output Voltage	V_o6 max	Output level for AF amplifier output distortion at 10%	2.0	2.8	3.6	V_{rms}
AF Electronic Attenuator Range	ATT	V_i = 200mV_{rms}, f = 400Hz	70	80	100	dB
Video						
Black Enhancement Threshold	B_{STH}	APL variable	40	50	60	IRE
Maximum Black Enhancement Gain	$B_S$max	APL variable	–35	–27	–20	IRE
Soft Video Tone Variable Range	ΔSoft	f = 2MHz, 100$mV_{P–P}$, video tone VR: 4V → 0V	–6	–4	–2	dB
Sharp Video Tone Variable Range	ΔSharp	f = 2MHz, 100$mV_{P–P}$, video tone VR: 4V → 9V, contrast VR: 6V	7	10	13	dB
Video Voltage Gain Audio–Visual Switch 9V	GV9V	f = 100MHz, 100$mV_{P–P}$ contrast VR: 9V, video, tone VR: 4V	15	18	21	dB
Video Voltage Gain Audio–Visual Switch 0V	GV0V	f = 100MHz, 100$mV_{P–P}$, contrast VR: 0V, video tone VR: 4V	15	18	21	dB

Electrical Characteristics (Cont'd): (T_A = +25°C, V_{CC} = V_{11} = V_{14} = 9V, I_{CC} = I_{30} = 13mA unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Video (Cont'd)						
Contrast Control Center	C_{CEN}	f = 100MHz, 100mV_{P-P}, contrast VR: 6V	0.40	0.48	0.57	V_{P-P}
Contrast Variable Control Range	ΔC_V	Contrast VR: 3V → 9V	18	20	22	dB
Bright Control	B R_H	Bright VR: 2V	5.5	6.5	7.5	V
	B R_{CEN}	Bright VR: 4.5V	3.1	3.6	4.1	V
	B R_L	Bright VR: 7.5V	–	0.3	1.2	V
D.L. Off Frequency Characteristics	f_V 9V	Contrast VR: 6V, video tone VR: 4V, 3dB down	7	8	–	MHz
D.L. On Frequency Characteristics	f_V 0V	Contrast VR: 6V, video tone VR: 4V, 3dB down	2.5	3.0	4.0	MHz
DC Transmission	R_{DC}	Input: stair step signal, 500mV_{P-P}	100	103	106	%
Delay Line Delay	T_{DL}	Input: white 100%	290	340	390	ns
Chroma						
ACC Amplitude Characteristics	$A_{CC}1$	+6dB	–3	0	+3	dB
	$A_{CC}2$	–20dB	–7	0	+2	dB
ACC Phase Characteristics	$A_{CCP}1$	+6dB	–3	0	+3	°C
	$A_{CCP}2$	–20dB	–7	0	+7	°C
Killer Operation Point	E_K		–35	–28	–21	dB
Color Control Color Residual	E_C min	Color VR: 0V, contrast VR: 9V	–	–	50	mV_{P-P}
Color Control Center	$E_{C\ CEN}$	Color VR: 4.5V, contrast VR: 6V	1.2	1.8	2.4	V_{P-P}
Maximum Demodulator Output	E_C max	Color VR: 9V, contrast VR: 9V	3.2	4.0	4.8	V_{P-P}
Color Contrast Variable Range	ΔC_C	Color VR: B–Y = 2.5V_{P-P}, contrast VR: 3V → 9V	17.5	19.5	21.5	dB
Tint Color Center	T_{CEN}	Tint VR: 4.5V, color VR: 4.5V, contrast VR: 6V	0	12	24	°C
Tint Variable Range	ΔT	Tint VR: 0V ← 4.5V → 8V, color VR: 4.5V, contrast VR: 6V	±40	±55	±70	°C
APC Pull–In Range	Δf_{APC}		±300	±500	–	Hz
Demodulator Output Ratio	R/B	Monochrome signal, contrast VR: 6V, color VR: B–Y = 1V_{PO}	0.81	0.90	0.98	
	G/B		0.24	0.30	0.38	
Demodulator Phase Angle	RB		97	105	113	DEG
	GB		–130	–120	–110	DEG
Demodulator Output DC Voltage	V_{C-Y}	Burst signal only, color VR: 0V	4.7	5.2	5.7	V
Demodulator Output DC Offset Voltage	ΔV_{C-Y}	Burst signal only, color VR: 0V	–200	0	+200	mV
Demodulator Output Residual Carrier	E car	Quiescent, killer off, color VR: 0V	–	–	0.05	V_{P-P}
OSD						
Blanking Pulse Threshold Level	TH_{BL}	C – IN: color bar, B – IN: variable	0.5	0.8	1.1	V
–Y Out DC Voltage (OSD Mode)	V_{-Y}	B – IN: 1.5V	2.5	2.8	3.1	V

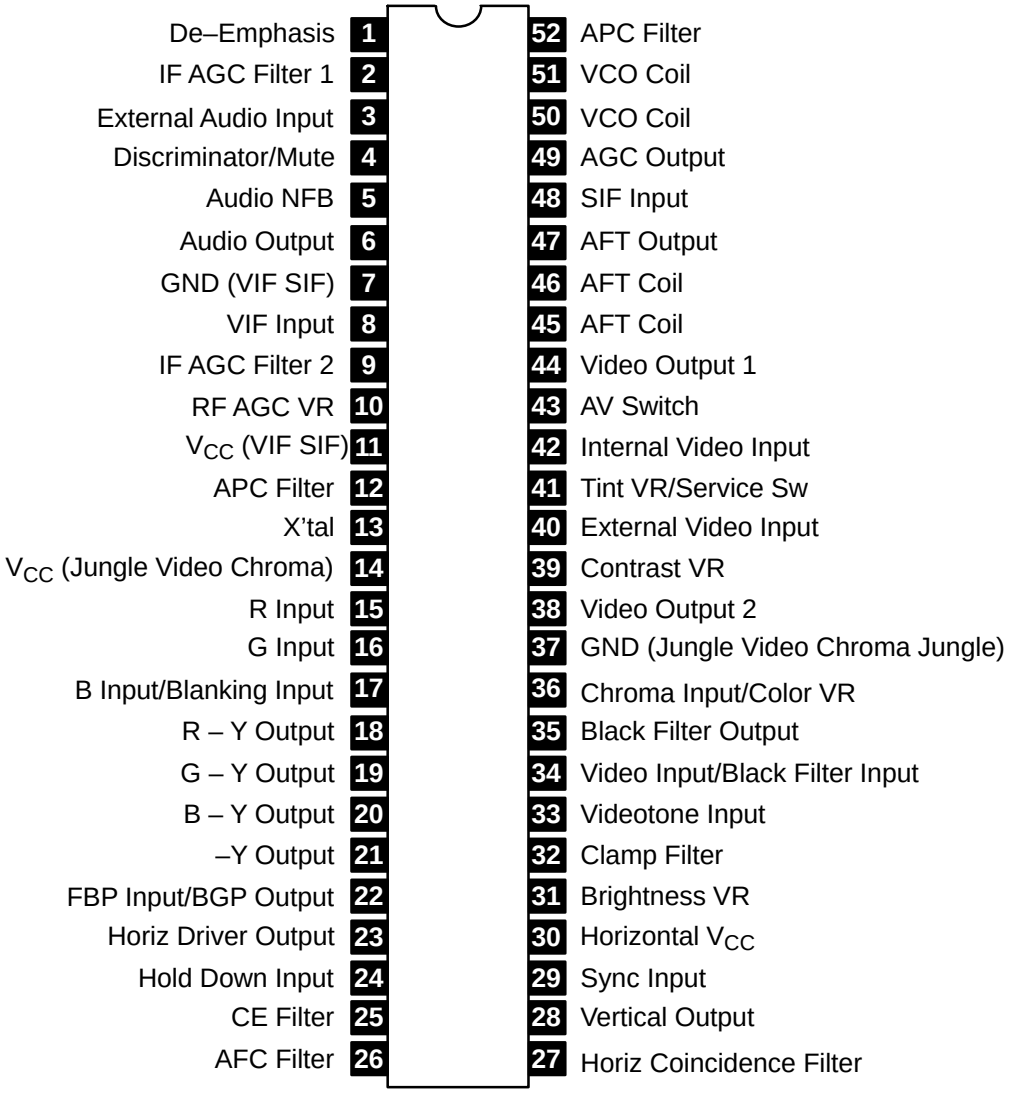
Electrical Characteristics (Cont'd): (T_A = +25°C, V_{CC} = V_{11} = V_{14} = 9V, I_{CC} = I_{30} = 13mA unless otherwise specified)

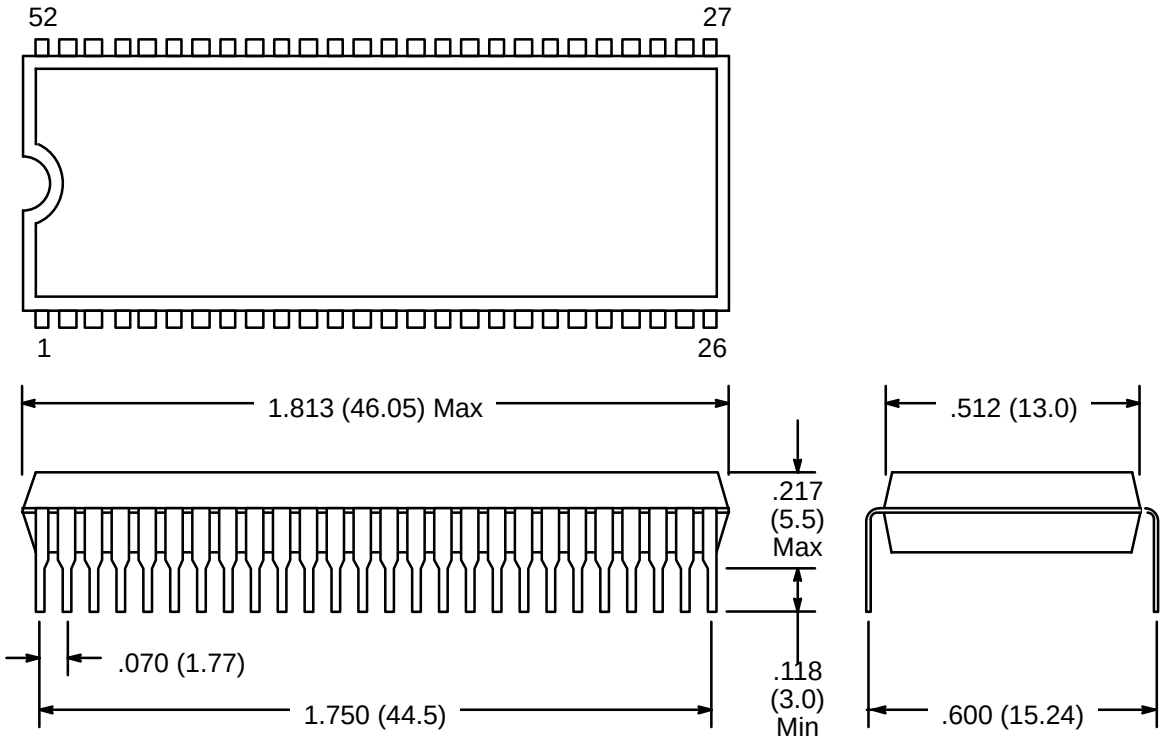
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OSD (Cont'd)						
RGB – In Threshold Level	TH_R	R – IN: variable, B – IN: 1.5V	1.9	2.2	2.5	V
	TH_G	G – IN: variable, B – IN: 1.5V				
	TH_B	B – IN: variable				
RGB –Y Out DC Voltage (3V)	V_{R3V}	R, G, B – IN: 3V	5.2	5.5	5.8	V
	V_{G3V}					
	V_{B3V}					
RGB –Y Out DC Voltage (4V)	V_{R4V}	R, G, B – IN: 4V	5.7	6.0	6.3	V
	V_{G4V}					
	V_{B4V}					
RGB –Y Out DC Voltage (5V)	V_{R5V}	R, G, B – IN: 5V	6.2	6.5	6.8	V
	V_{G5V}					
	V_{B5V}					
Deflection						
Sync Separator Input DC Level	V_{SDC}		6.0	6.3	6.6	V
Vertical Free–Running Period	T_V free		262.0	262.5	263.0	H
Maximum Vertical Synchronization Period	T_V max	Input: horizontal synchronization signal only	296.5	297.0	297.5	H
Minimum Vertical Synchronization Period	T_V min		224.5	225.0	225.5	H
Vertical Blanking Pulse Width	$P_{W\ VBL}$		20.25	20.50	20.75	H
Vertical Blanking Pulse Wave Height Value	$P_{H\ VBL}$		7.0	7.5	–	V
Vertical Output Pulse Width	$P_{W\ VOUT}$		8.25	8.50	8.75	H
Vertical Output Voltage	$V_{OUT\ H}$		5.7	6.0	6.3	V
	$V_{OUT\ M}$		4.2	4.5	4.8	V
	$V_{OUT\ L}$		–	0.1	0.3	V
Vertical External Trigger Load Resistance	R_{TR}		2.7	3.6	–	kΩ
Vertical Automatic Synchronization Stop Voltage	V_{SAS}		–	1.9	2.4	V
Vertical Output Pulse Start V_{CC} Voltage	S_{VV}		–	3	4	V
Horizontal Free–Running Frequency Deviation	Δf_H	Deviation from 15.734kHz	–90	+30	+150	Hz
Horizontal Pull–In Range	$f_{H\ PULL}$	Deviation from 15.734kHz	±400	±500	–	Hz
Horizontal Output Pulse Width	$P_{WH\ OUT}$		21.8	23.8	25.8	µs
Horizontal Output Pulse Phase	H_{PF}		15	17	19	µs
	$H_{P\ CEN}$		3.4	4.4	5.4	µs
	H_{PR}		0	3	6	µs
Horizontal Output Pulse Start V_{CC} Voltage	S_{HV}		–	4.5	5.3	V

Electrical Characteristics (Cont'd): (T_A = +25°C, V_{CC} = V_{11} = V_{14} = 9V, I_{CC} = I_{30} = 13mA unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Deflection (Cont'd)						
AFC II FBP Peak Voltage	F_{BPH}		4.1	4.6	5.1	V
Burst Gate Pulse Delay Time	Td_{BGP}		0.2	0.6	1.2	µs
Burst Gate Pulse Width	$P_{W\ BGP}$		2.7	3.7	4.7	µs
VCR SW Input Voltage	VCR		–	1.3	2.0	V
X–Ray Protector Circuit Operation Input Voltage	V_{HD}		0.64	0.74	0.84	V
Horizontal Synchronization Detection Threshold Level	H coin		4.2	4.5	4.8	V
Horizontal Output Current	H_{OUT}	I_{CC} = 13mA	3.8	4.7	5.5	mA

Pin Connection Diagram




52
27
1
26
1.813 (46.05) Max
.512 (13.0)
.217
(5.5)
Max
.070 (1.77)
.118
(3.0)
Min
1.750 (44.5)
.600 (15.24)