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NTE7048
Integrated Circuit
NTSC Decoder W/Fast RGB Blanking

Description:

The NTE7048 is a monolithic integrated decoder for the NTSC color television standard. This device combines all functions required for the identification and demodulation of NTSC signals ina 20–Lead DIP type package. Furthermore, it contains a luminance amplifier, an RGB–matrix and amplifier. These amplifiers supply output signals up to $5V_{P–P}$ (Picture information) enabling direct drive of discrete output stages.

Features:

- Automatic Chrominance Leveling (Avoids Saturation at the Chrominance Input)
- Peaking Circuit with DC Control
- Fast RGB Output Blanking

Absolute Maximum Ratings:

Supply Voltage (Pin1), V_P 13.2V
Total Power Dissipation, P_{tot} 1700mW
Operating Ambient Temperature Range, T_A . . . . . –25° to +65°C
Storage Temperature Range, T_{stg} . . . . . –55° to +150°C
Thermal Resistance, Junction–to–Ambient, R_{thJA} 50K/W

Electrical Characteristics: (T_A = +25°C, V_P = 12V, All voltages referenced to Pin19, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Supply (Pin1)						
Supply Voltage	V_P		10.8	12.0	13.2	V
Supply Current	I_P		–	90	–	mA
Total Power Dissipation	P_{tot}		–	1.08	–	W
Luminance Amplifier (Pin8)						
Input Voltage (Peak–to–Peak Value)	$V_{8(P–P)}$	Note 1	–	450	–	mV
Input Level before Clipping	V_8		–	–	1.0	V
Input Current	I_8		–	0.15	1.0	µA
Contrast Control Range			–	–17 to +3	–	dB
Input Current Contrast Control	I_6	V_6 < 6V	–	0.5	15.0	µA
		V_6 = 2.5V, Note 2	3	7	–	mA

Note 1. Signal with negative going sync; amplitude includes sync. pulse amplitude.
Note 2. Peak white limiter active.

Electrical Characteristics (Cont'd): (T_A = +25°C, V_P = 12V, All voltages referenced to Pin19, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Peaking of Luminance Signal						
Input Impedance (Pin15)	$\|Z_{15}\|$		7	10	13	kΩ
Output Impedance (Pin10)	$\|Z_{10}\|$		50	75	90	Ω
Luminance Gain Ratio		Note 3	–	10	–	
Chrominance Amplifier (Pin3)						
Input Signal Amplitude (Peak–to–Peak Value)	$V_{3(P-P)}$	Note 4	–	550	–	mV
		Note 5	–	–	1100	mV
Minimum Burst Signal Amplitude within the ACC Control Range (Peak–to–Peak Value)			35	–	–	mV
Change of Red Output Signal over 30dB ACC Control Range	ΔV_{12}		–	–	2	dB
Input Impedance (Pin3)	$\|Z_3\|$		6	9	12	kΩ
Input Capactiance	C_3		–	4	6	pF
Saturation Control Range			50	–	–	dB
Saturation Control Input Current (Pin5)	I_5	V_5 < 6V	–	1	20	µA
Input Impedance (Pin5)	$\|Z_5\|$	V_5 = 6V to 10V	1.5	2.1	2.7	kΩ
		Color Killer Active	1.5	2.1	2.7	kΩ
Tracking Between Luminance and Chrominance Contrast Control		For 10dB of Control	–	1	2	dB
ALC Circuit						
Chrominance/Burst Ratio at which ALC Commences		Note 6	–	2.9	–	
Reference Part (Note 7)						
Phase–Locked–Loop						
Phase–Locked–Loop Catching Range	Δf		±300	±400	–	Hz
Phase Shift for 400Hz Deviation of f_{OSC}	$\Delta\varphi$		–	–	5	deg
Oscillator (See Note 7)						
Oscillator Temperature Coefficient of Oscillator Frequency	TC_{OSC}		–	–1.5	–2.5	Hz/K
Frequency Deviation	Δf_{OSC}	ΔV_P = ±10%	–	150	250	Hz
Input Resistance (Pin18)	R_{18}		1.0	1.4	1.8	kΩ
Input Capacitance (Pin18)	C_{18}		–	–	10	pF

Note 3. Pin10 AC short–circuit to GND.

Note 4. Indicated is a signal for color bar with 75% saturation, so the chrominance to burst ratio is 2.2:1.

Note 5. Before clipping occurs in the input stage.

Note 6. The ALC circuit limits the chromunance amplitude to a particular value as soon as the chrominance/burst ratio exceeds 2.9: to 1. The limiting is performed via the ACC function.

Note 7. All frequency variations are referenced to the 3.58MHz carrier frequency.

Electrical Characteristics (Cont'd): (T_A = +25°C, V_P = 12V, All voltages referenced to Pin19, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Reference Part (Cont'd) (Note 7)						
ACC Generation (Pin4)						
Control Voltage at Nominal Input Signal	V_4		–	5.2	–	V
Control Voltage without Burst Input			–	2	–	V
Color–Off Voltage			–	2.6	–	V
ΔColor On/Off Voltage	ΔV_4		100	300	500	mV
Control Voltage at Nominal Input Signal (Pin2)	V_2		–	5.2	–	V
Hue Control						
Input Current (Pin17)	I_{17}	V_{17} < 5V	–	0.5	20.0	μA
Input Impedance (Pin17)	$\lvert Z_{17}\rvert$	V_{15} > 5V	1.5	2.5	3.5	kΩ
Demodulator Part; Ratio of Demodulated Signals ±25% (Note 8)						
(R – Y)/(B – Y)	V_{12}/V_{14}	No (R – Y) Signal	–	–0.29	–	
(G – Y)/(R – Y)	V_{13}/V_{12}	No (B – Y) Signal	–	–0.39	–	
(G – Y)/(B – Y)	V_{13}/V_{14}	No (R – Y) Signal	–	–0.10	–	
Frequency Response between 0 and 0.7MHz	σ_{17}		–	–	–3	dB
RGB Matrix and Amplifiers						
Output Signal Amplitude (Peak–to–Peak Value)	V_{12}, V_{13}, $V_{14(p-p)}$	Note 9	4.0	5.0	6.0	V
Output Signal Amplitude of the "Blue" Channel (B – Y) at Pin14 (Peak–to–Peak Value)	$V_{14(p-p)}$	Note 10	–	3.8	–	V
Maximum Peak–White Level	V_{12}, V_{13}, $V_{14\ (m)}$	Note 11	9.0	9.3	9.6	V
Available Output Current (Pin12, Pin13, Pin14)	I_{12}, I_{13}, I_{14}		10	–	–	mA
Difference in Black Level between the Three Channels	ΔV_{12}, ΔV_{13}, ΔV_{14}		–	–	600	mV
Brightness Control Input Current	$-I_9$		–	–	–50	μA
Variation of Black Level with Temperature	$\Delta V/\Delta T$		–	0.15	1.0	mV/K
Variation of Black Level with Contrast	ΔV	Note 12	–	75	200	mV

Note 7. All frequency variations are referenced to the 3.58MHz carrier frequency.

Note 8. These matrixed values are found when hue is in a normal condition and by measuring the ratio of the various output signals. The values are derived from the following matrix equations:

$$(R - Y)_{matrixed} = 1.29\ (R - Y)_{IN} - 0.29\ (B - Y)_{IN}$$
$$(G - Y)_{matrixed} = -0.50\ (R - Y)_{IN} - 0.10\ (B - Y)_{IN}$$
$$(B - Y)_{matrixed} = (B - Y)_{IN}$$

Note 9. With nominal luminance and contrast (black–to–white), nominal contrast is specified as maximum contrast –4dB and nominal saturation as maximum saturation –9dB.

Note 10. With nominal contrast, saturation and hue, no luminance input.

Note 11. When this level is exceeded the amplifier of the output signal is reduced via a discharge of the capacitor on Pin6 (contrast control). Discharge current is 7mA.

Note 12. Control range: Nominal –10dB.

Electrical Characteristics (Cont'd): (T_A = +25°C, V_P = 12V, All voltages referenced to Pin19, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
RGB Matrix and Amplifiers (Cont'd)						
Relative Spread between the R, G, and B Output Signals (Black–White)			–	–	10	%
Relative Black–Level Variation between the Three Channels During Variation of Contrast		Note 13	–	–	20	mV
Relative Black–Level Variation between the Three Channels During Variation of Brightness		Note 14	–	–	20	mV
Blanking Level at the RGB Outputs	V_{blk}		1.95	2.15	2.35	V
Differential Drift of the Blanking Levels Over a Temperature Range of 40°C	ΔV		–	0	20	mV
Tracking of Output Black Level with Supply Voltage	$\frac{DV_{bl}}{V_{bl}} \times \frac{V_f}{DV_F}$		1.0	1.05	1.1	
Signal–to–Noise Ratio of Output Signals	S/N	Note 15	62	–	–	dB
Residual 3.58MHz Signal at RGB Outputs (Peak–to–Peak Value)	$V_{R(p-p)}$		–	50	75	mV
Residual 7.1MHz Signal at the RGB Outputs (Peak–to–Peak Value)			–	50	75	mV
Output Impedance	$\|Z_{10}\|$		–	–	50	Ω
	$\|Z_{11}\|$		–	–	50	Ω
	$\|Z_{12}\|$		–	–	50	Ω
Frequency Response of Total Luminance and RGB Amplifier Circuits for f = 0 to 5MHz	α	Note 16	–	–	–3	dB
Sandcastle Input						
Level at which the RGB Blanking is Activated	V_7		1.0	1.5	2.0	V
Level at which the Burst Gate Clamping Pulses are Separated	V_7		6.5	7.0	7.5	V
Delay between Black Level Clamping and Burst Gating Pulse	t_d		300	375	450	ns
Input Current	$-I_7$	V_7 = 0 to 0.8V	–	–	–1	mA
	I_7	V_7 = 1V to 8V	–	–	–40	µA
		V_7 = 8.5V to 12V	–	–	2	mA
Fast Blanking						
Level at which the Fast Blanking is Activated (Pin11)	V_{11}		3.5	–	–	V
Allowable Voltage at Blanking Input	V_{11}		–	–	5	V
Delay between Fast Blanking Input and Output	t_d		–	40	–	ns
Input Current	I_{11}	V_{11} = 3.5V	–	160	–	µA
Difference between Normal Black–Level and the Fast Blanking Black–Level			–	–0.9	–	V

Note 13. During variations of contrast (10dB) at nominal saturation.

Note 14. During variations of brightness (±1V) at nominal controls.

Note 15. The signal–to–noise ratio is specified as peak–to–peak signal with respect to RMS noise. The effective bandwidth is 5MHz.

Note 16. Disconnected peaking capacitor.

Pin Connection Diagram