

NTE7001 Integrated Circuit Horizontal Combination Circuit for Color TV & Computer Monitors

Description:

The NTE7001 is a monolithic integrated circuit in a 16-Lead DIP type package intended for use in color television receivers.

Features:

- Horizontal Oscillation Based on the Threshold Switching Principle
- Phase Comparison Between Sync Pulse and Oscillator Voltage (ϕ_1)
- Internal Key Pulse for Phase Detector (ϕ_1) (Additional Noise Limiting)
- Phase Comparison Between Line Flyback Pulse and Oscillator Voltage (ϕ_2)
- Larger Catching Range Obtained by Coincidence Detector (ϕ_3 ; Between Sync and Key Pulse)
- Switch for Changing the Filter Characteristic and the Gate Circuit (VCR Operation)
- Sync Separator
- Noise Separator
- Vertical Sync Separator and Output Stage
- Color Burst Keying and Line Flyback Blanking Pulse Generator
- Phase Shifter for the Output Pulse
- Output Pulse Duration Switching
- Output Stage with Separate Supply Voltage for Direct Drive of Thyristor Deflection Circuits
- Low Supply Voltage Protection

Applications:

- Video Monitors
- TV Receivers

Absolute Maximum Ratings:

Supply Voltage

at Pin1 (Voltage Source), V_{1-16} 13.2V

at Pin2, V_{2-16} 18V

Voltages

Pin4, V_{4-16} 13.2V

Pin9, $\pm V_{9-16}$ 6V

Pin10, $\pm V_{10-16}$ 6V

Pin11, V_{11-16} 13.2V

Absolute Maximum Ratings (Cont'd):

Currents

Pin2 and Pin3 (Thyristor Driving, Peak Value), I_{2M} , $-I_{3M}$	650mA
Pin2 and Pin3 (Transistor Driving, Peak Value), I_{2M} , $-I_{3M}$	400mA
Pin4, I_4	1mA
Pin6, $\pm I_6$	10mA
Pin7, $-I_7$	10mA
Pin11, I_{11}	2mA

Total Power Dissipation, P_{TOT} 800mW

Operating Ambient Temperature Range, T_A -20° to $+70^\circ\text{C}$

Storage Temperature Range, T_{stg} -25°C to $+125^\circ\text{C}$

DC and AC Electrical Characteristics: ($V_{CC} = 12\text{V}$, $T_A = +25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Sync Separator						
Input Switch Voltage	V_{9-16}		–	0.8	–	V
Input Keying Current	I_9		5	–	100	μA
Input Leakage Current	I_9	$V_{9-16} = -5\text{V}$	–	–	1	μA
Input Switching Current	I_9		–	–	5	μA
Switch OFF Current	I_9		100	150	–	μA
Input Signal (Peak-to-Peak Value)	$V_{9-16(P-P)}$	Note 1	3	–	4	V
Noise Separator						
Input Switching Voltage	V_{10-16}		–	1.4	–	V
Input Keying Current	I_{10}		5	–	100	μA
Input Switching Current	I_{10}		100	150	–	μA
Input Leakage Current	I_{10}	$V_{10-16} = -5\text{V}$	–	–	1	μA
Input Signal (Peak-to-Peak Value)	$V_{10-16(P-P)}$	Note 1	3	–	4	V
Permissible Superimposed Noise Signal (Peak-to-Peak Value)	$V_{10-16(P-P)}$		–	–	7	V
Line Flyback Pulse						
Input Current	I_6		0.02	1	2	mA
Input Switching Voltage	V_{6-16}		–	1.4	–	V
Input Limiting Voltage	V_{6-16}		–0.7	–	+1.4	V
Switching on VCR						
Input Voltage	V_{11-16}		0 to 2.5			V
			9 to V_{1-16}			V
Input Current	$-I_{11}$		–	–	200	μA
	I_{11}		–	–	2	mA
Pulse Duration Switch [t = 7μs (Thyristor Driving)]						
Input Voltage	V_{4-16}		–	9.4 to V_{1-16}	–	V
Input Current	I_4		200	–	–	μA
Pulse Duration Switch [t = 14μs + t_D (Transistor Driving)]						
Input Voltage	V_{4-16}		0	–	3.5	V
Input Current	$-I_4$		200	–	–	μA

Note 1. Permissible Range 1V to 7V.

DC and AC Electrical Characteristics (Cont'd): ($V_{CC} = 12V$, $T_A = +25^\circ C$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Pulse Duration Switch ($t = 0$, $V_{3-16} = 0$ or Input Pin4 Open)						
Input Voltage	V_{4-16}		5.4	–	6.6	V
Input Current	I_4		–	0	0	μA
Vertical Sync Pulse (Positive-Going)						
Output Voltage (Peak-to-Peak Value)	$V_{8-16(P-P)}$		10	11	–	V
Output Resistance	R_8		–	2	–	$k\Omega$
Delay Between Leading Edge of Input and Output Signal	t_{ON}		–	15	–	μs
Delay Between Trailing Edge of Input and Output Signal	t_{OFF}		–	t_{ON}	–	μs
Burst Gating Pulse (Positive-Going)						
Output Voltage (Peak-to-Peak Value)	$V_{7-16(P-P)}$		10	11	–	V
Output Resistance	R_7		–	70	–	Ω
Pulse Duration	t_p	$V_{7-16} = 7V$	– 3.7	4.0 4.3	– –	μs μs
Phase Relation Between Middle of Sync Pulse at the Input and the Leading Edge of the Burst Gating Pulse	t	$V_{7-16} = 7V$	2.15	2.65	3.15	μs
Output Trailing Edge Current	I_7		–	2	–	mA
Line Flyback-Blanking Pulse (Positive-Going)						
Output Voltage (Peak-to-Peak Value)	$V_{7-16(P-P)}$		4	5	–	V
Output Resistance	R_7		–	70	–	Ω
Output Trailing Edge Current	I_7		–	2	–	mA
Line Drive Pulse (Positive-Going)						
Output Voltage (Peak-to-Peak Value)	$V_{3-16(P-P)}$		–	10.5	–	V
Output Resistance for Leading Edge of Line Pulse	R_3		–	2.5	–	Ω
Output Resistance for Trailing Edge of Line Pulse	R_3		–	20	–	Ω
Pulse Duration (Thyristor Driving)	t_p	$V_{4-16} = 9.4$ to $V_{1-16}V$	5.5	7.0	8.5	μs
Pulse Duration (Transistor Driving)	t_p	$V_{4-16} = 0$ to $4V$, $t_{FP} = 12\mu s$, Note 2	–	$14 + t_D$	–	μs
Supply Voltage for Switching OFF the Output Pulse	V_{1-16}		–	4	–	V
Overall Phase Relation						
Phase Relation Between Middle of Sync Pulse and the Middle of the Flyback Pulse	t	Note 3	–	2.6	–	μs
Tolerance of Phase Relation	$ \Delta t $		–	–	0.7	μs
The Adjustment of the Overall Phase Relation and Consequently the Leading Edge of the Line Drive Occurs Automatically by Phase Control ϕ_2 . If Additional Adjustment is Applied it can be Arranged by Current Supply at Pin5.	$\Delta I_s/\Delta t$		–	30	–	$\mu A/\mu s$

Note 2. t_D = Switch-OFF Delay of Line Output Stage.

Note 3. Line Flyback Pulse Duration $t_{FP} = 12\mu s$.

DC and AC Electrical Characteristics (Cont'd): ($V_{CC} = 12V$, $T_A = +25^{\circ}C$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Oscillator						
Threshold Voltage Low Level	V_{14-16}		–	4.4	–	V
Threshold Voltage High Level	V_{14-16}		–	7.6	–	V
Discharge Current	$\pm I_{14}$		–	0.47	–	mA
Frequency; Free Running	f_O	$C_{OSC} = 4.7nF$, $R_{OSC} = 12k\Omega$	–	15.625	–	kHz
Spread of Frequency	$\Delta f_O/f_O$	Note 4	–	$< \pm 5$	–	%
Frequency Control Sensitivity	$\Delta f_O/\Delta I_{15}$		–	31	–	Hz/ μA
Adjustment Range of Network in Circuit	$\Delta f_O/f_O$		–	± 10	–	%
Influence of Supply Voltage on Frequency	$\frac{\Delta f_O/f_O}{\Delta V/V_{NOM}}$	Note 4	–	$< \pm 0.05$	–	%
Change of Frequency when V_{1-16} Drops to 5V	Δf_O	Note 4	–	$< \pm 10$	–	%
Temperature Coefficient of Oscillator Frequency		Note 4	–	$< \pm 10^{-4}$	–	Hz/ $^{\circ}C$
Phase Comparison ϕ_1						
Control Voltage Range	V_{13-16}		3.8	8.2	–	V
Control Current (Peak Value)	$\pm I_{13M}$		1.9	2.3	–	mA
Output Leakage Current	I_{13}	$V_{13-16} = 4$ to $8V$	–	–	1	μA
Output Resistance	R_{13}	$V_{13-16} = 4$ to $8V$, Note 5	High Ohmic			
		$V_{13-16} < 3.8V$ or $> 8.2V$, Note 6	Low Ohmic			
Control Sensitivity			–	2	–	kHz/ μs
Catching and Holding Range	Δf	$82k\Omega$ Between Pins 13 and 15	–	± 780	–	Hz
Spread of Catching and Holding Range	$\Delta(\Delta f)$	Note 4	–	± 10	–	%
Phase Comparison ϕ_2 and Phase Shifter						
Control Voltage range	V_{5-16}		5.4	–	7.6	V
Control Current (Peak Value)	$\pm I_{5M}$		–	1	–	mA
Output Resistance	R_5	$V_{5-16} = 5.4$ to $7.6V$, Note 7	High Ohmic			
		$V_{5-16} < 5.4$ or $> 7.6V$	–	8	–	k Ω
Input Leakage Current	I_5	$V_{5-16} = 5.4$ to $7.6V$	–	–	5	μA
Permissible Delay Between Leading Edge of Output Pulse and Leading Edge of Flyback Pulse	t_D	$t_{FP} = 12\mu s$	–	–	15	μs
Static Control Error	$\Delta t/\Delta t_D$		–	–	0.2	%
Coincidence Detector ϕ_3						
Output Voltage	V_{11-16}		0.5	0	6.0	V
Output Current (Peak Value)	I_{11M}	Without Coincidence	–	0.1	–	mA
	$-I_{11M}$	With Coincidence	–	0.5	–	mA
Time Constant Switch						
Output Voltage	V_{12-16}		–	6	–	V
Output Current (Limited)	$\pm I_{12}$		–	–	1	mA
Output Resistance	R_{12}	$V_{11-16} = 2.5$ to $7V$	–	0.1	–	k Ω
		$V_{11-16} < 1.5V$ or $> 9V$	–	60	–	k Ω

DC and AC Electrical Characteristics (Cont'd): ($V_{CC} = 12V$, $T_A = +25^\circ C$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Internal Gating Pulse						
Pulse Duration	t_p		-	7.5	-	μs

Note 4. Excluding External Component Tolerances.

Note 5. Current Source.

Note 6. Emitter-Follower.

Note 7. Current Source.

Pin Connection Diagram

