ELECTRONICS, INC.
44 FARRAND STREET
BLOOMFIELD, NJ 07003
(973) 748–5089

NTE1678
Integrated Circuit
Switching Regulator for TV

Description:

The NTE1687 is a switching regulator integrated circuit in a 14–Lead DIP type package especially designed for TV sets. This device can be used for both types of TV sets, insulated type and non–insulated types.

The NTE1687 operates in synchronizing with the horizontal retrace pulse, so it does not generate any visual noise in the picture on the CRT. The output transistor in the powersupply circuit is protected doubly by the internal protection circuit for over load.

The ON/OFF operation of the power supply is able to operate easily without any mechanical relay using the provided terminal, so timer operation, remote control, etc. are very easy.

Features:

- Wide range of regulating input line voltage: AC 80V to 280V
- The output power transistor is doubly protected by the current limitter and the shut down circuit
- No visual noise due to horizontal synchronous operation
- A terminal for remote control, timer operation and etc. of the power supply is provided
- Shut down circuit is easily resetable using ON/OFF terminal
- Low stand–by and starting current

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

Supply Current, I_8 . . . . . 30mA
Sink of Output Terminal, I_7 . . . . . 10mA
Input Voltages of Current Limitter, V_5 . . . . . 3.0V
Input Voltage ON/OFF Circuit, V_4 . . . . . V_8V
Sink of ON/OFF Circuit, I_3 . . . . . 1.5mA
Input Voltages of Duty Limit Circuit, V_2 . . . . . V_8 V
External Oscillation Resistor, R_O . . . . . 5kΩ to ∞
External Oscillation Capacitor, C_O . . . . . 0μF to 1μF
Input Voltage of Error Amplifier, V_I . . . . . V_8 V
Reference Voltage, V_{14} . . . . . V_8 V
Drain of Error Amplifier, I_{13} . . . . . –2mA to 0mA
Input Voltage of Shut Down Circuit, V_{12} . . . . . V_8 V
Integration Voltage of Shut Down Circuit, V_6 . . . . . V_8 V
Power Dissipation (T_A = +75°C), P_D 150mW
Operating Temperature Range, T_{opr} . . . . . –20° to +75°C
Storage Temperature Range, T_{stg} . . . . . –40° to +125°C

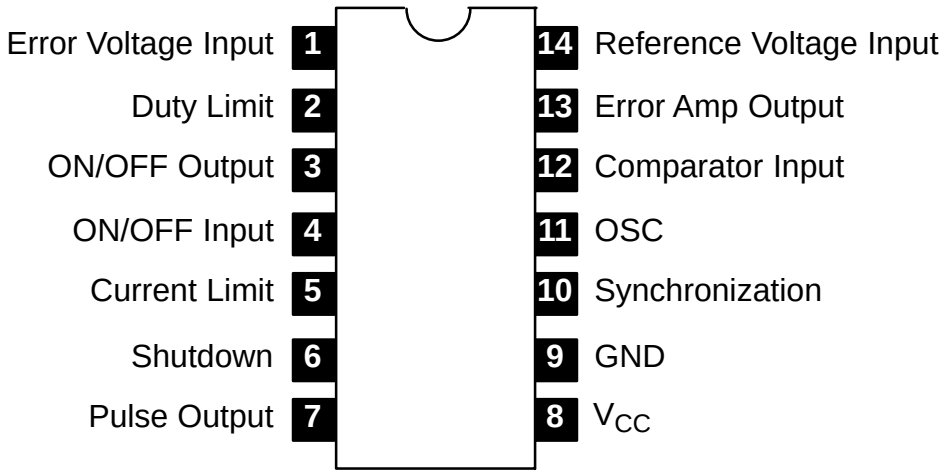
Electrical Characteristics: (T_A = +25°C unless otherwise specified)

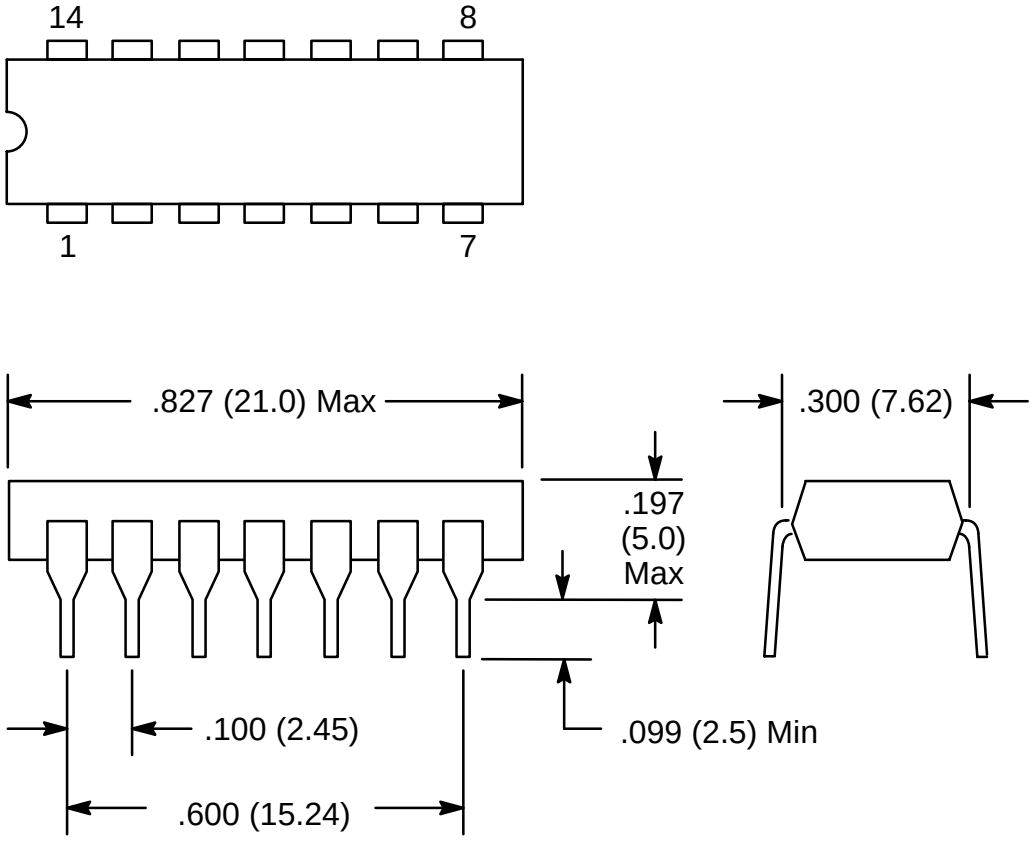
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Supply Terminal Voltage	V_8	I_8 = 12mA	6.1	6.6	7.1	V
Thermal Drift of V_8	$dV_8(T_A)$	Difference of Min. and Max.of V_8 in T_A from –20° to +75°C	–	–	200	mV
Starting Supply Current	I_8	V_8 = 3V, Pin7: Open	–	1.0	1.5	mA
		V_8 = 3V, Pin7: GND	–	3.0	4.2	mA
Starting Pulse Height	$P_{7(S)}$	V_8 = 3V, Pin7: Open, Pin6: GND	1.5	2.3	3.0	V_{pp}
Starting Supply Terminal Voltage	$V_{8(S)}$	Pin7: Open, Pulse of Pin7 = $1.5V_{p–p}$	2.0	2.6	3.0	V
Starting Oscillation Frequency	$f_{o(S)}$	V_8 = 3V, Pin10: Open	10	13	20	kHz
Output Pulse Height	P_7	Pin7: Open, Pin6: GND	5.0	6.0	7.1	$V_{p–p}$
Drain of Output Pin	I_7	Pin7: GND, $V_2 = V_8$	–6.3	–5.0	–3.7	mA
Saturation Voltage of Output Pin	$V_{7(sat)}$	I_7 = 5mA	–	–	0.3	V
Integration Pin Current	$I_{6(1)}$	I_5 = 100µA	–700	–500	–300	µA
		V_5 = 0.8V	–700	–500	–300	µA
Leak of Integration Pin	I_{6L}	V_5 = 0.3V	–10	–	0	µA
Trigger Voltage of Shut Down Circuit	V_{6T}	$P_7 < 100mV_{p–p}$	2.5	–	3.5	V
Drain of Duty Limit Terminal	I_2	V_2 = 3V	–20	–	0	µA
Pulse Width set by Pin 2 Voltage	P_L	V = 2.33V, Frequency: 15.75kHz, Low Level Period	25	30	35	µs
Thermal Drift of P_L	$dP_L(T_A)$	V_2 = 2.33V, Difference of Min & Max. of P_L in T_A from –20° to +75°C	–	–	2	µs
ON Voltage of Pin 4	$V_{4(ON)}$	I_3 = 3mA, V_3 = 0.3V	1.5	2.5	3.5	V
ON Current of Pin 4	$I_{4(ON)}$	I_3 = 3mA, V_3 = 0.3V	–	–	200	µA
Output Saturation of ON/OFF Circuit	$V_{3(Sat)}$	I_3 = 3mA, V_4 = 3.5V	–	–	300	mV
Leak of ON/OFF Output	I_{3L}	V_4 = 1.5V, $V_3 = V_8$	–	–	1	µA
Offset Voltage of Error Amplifier	$V_{(OS)}$	Absolute Value	–	8	20	mV
Opened Gain of Error Amplifier	A_{VO}	f: 1kHz, Signal of Pin13: $1V_{p–p}$	45	53	80	dB
Current of Pin1	I_1	Pin1: GND	–	–	–10	µA
Current of Pin14	I_{14}	Pin14: GND	–	–	–10	µA
Maximum Voltage of Error Amplifier Output	$V_{13(Max)}$	V_1 = 3.5V, V_{14} = 3.0V	5.0	5.7	–	V
Minimum Voltage of Error Amplifier Output	$V_{13(Min)}$	V_1 = 2.5V, V_{14} = 3.0V	–	50	300	mV
Sink of Error Amplifier Output	I_{13}	V_1 = 2.5V, V_{14} = 3.0V, V_{13} = 3.0V	50	100	250	µA
Free Running Oscillation Amplitude	V_{fo}	Pin10: Open	V_{so}	3.3	4.0	$V_{p–p}$
Starting Oscillation Amplitude	$V_{fo(S)}$	V_8 = 3.0V	0.5	1.5	–	$V_{p–p}$
Free Running Oscillation Frequency	f_o	Pin10: Open	12.3	13.3	14.3	kHz
Thermal Drift of f_o	df_o (T_A)	Pin10: Open, Difference of Min & Max of f in T_A from –20° to +75°C	–	–	500	Hz
Synchronous Oscillation Amplitude	V_{so}	Synchronous Frequency: 15.75kHz	2.7	3.0	3.3	$V_{p–p}$
Thermal Drift of V_{SO}	$dV_{so}(T_A)$	Difference of Min & Max of V_{so} in T_A from –20° to +75°C	–	–	150	V

Electrical Characteristics (Cont'd): (T_A = +25°C unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
High Level of Oscillation	V_{OH}		–	3.8	4.5	V
Starting V_{OH}	$V_{OH(s)}$	V_8 = 3.0V	1.0	1.8	–	V
Thermal Drift of V_{OH}	$dV_{OH}(T_A)$	Difference of Min & Max of V_{OH} in T_A from –20° to+75°C	–	–	100	mV
Synchronous Signal Voltage	V_S	Oscillation is Synchronizing (15.75kHz)	–1.0	–	+0.3	V
		Oscillation is Synchronizing (15.75kHz)	–200	–40	–	µA

Pin Connection Diagram





.100 (2.54) .025 (0.65) .099 (2.5) .012 (0.30)