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NTE7002 Integrated Circuit Switched Mode Power Supply Control

Description:

The NTE7002 is a bipolar integrated circuit in a 9-Lead SIP type package that drives, regulates, and monitors the switching transistor in a power supply based on the ringing choke flyback principle. Due to the wide regulating range and the high voltage stability during large load changes, SMPS for Hi-Fi equipment and active loudspeakers can be realized as well as applications in TV receivers and video recorders.

Features:

- Wide Operational Range
- High Voltage Stability Even at High Load Changes
- Direct Control of Switching Transistor
- Low Start-Up Current
- Linear Foldback of the Overload Characteristic
- Base Drive Proportional to the Current Through the Power Switching Transistor
- Stand-By Mode 3.5W into the External Load
- Inhibit Capability (TTL Compatible)
- Undervoltage Lockout

Absolute Maximum Ratings:

Supply Voltage, V_9	20V
Sink Output Voltage	
V_7	0 to V_9 V
V_7-V_8	± 6 V
Reference Output, I_1	-10 to +1.0mA
Zero Crossing, I_2	-3.0 to +3.0mA
Control Amplifier, I_3	-3.0 to 0mA
Collector Current, I_4	-2.0 to +5.0mA
Trigger Input, I_5	-2.0 to +3.0mA
Sink Output, I_7	-1.5A
Junction Temperature, T_J	+150°C
Storage Temperature Range, T_{stg}	-40° to +125°C
Thermal Resistance, Junction-to-Ambient, R_{thJA}	+70°C/W
Thermal Resistance, Junction-to-Case, R_{thJC}	+15°C/W

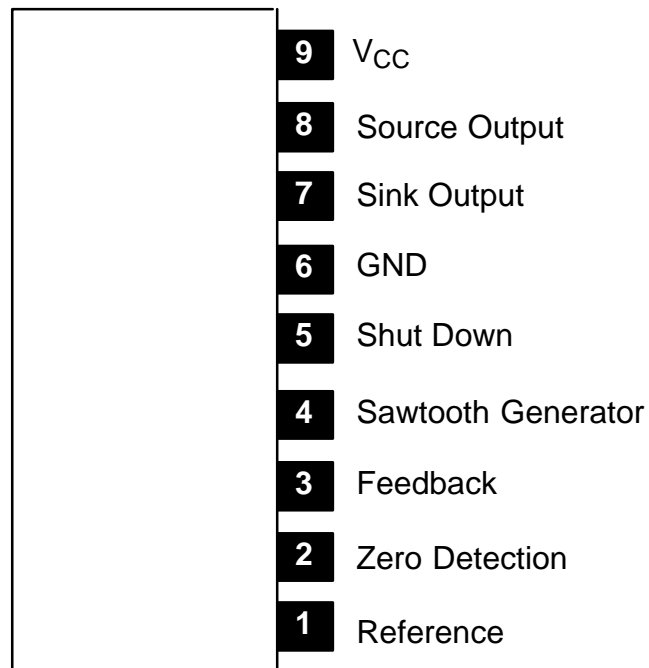
Electrical Characteristics: ($T_A = +25^\circ\text{C}$ unless otherwise specified)

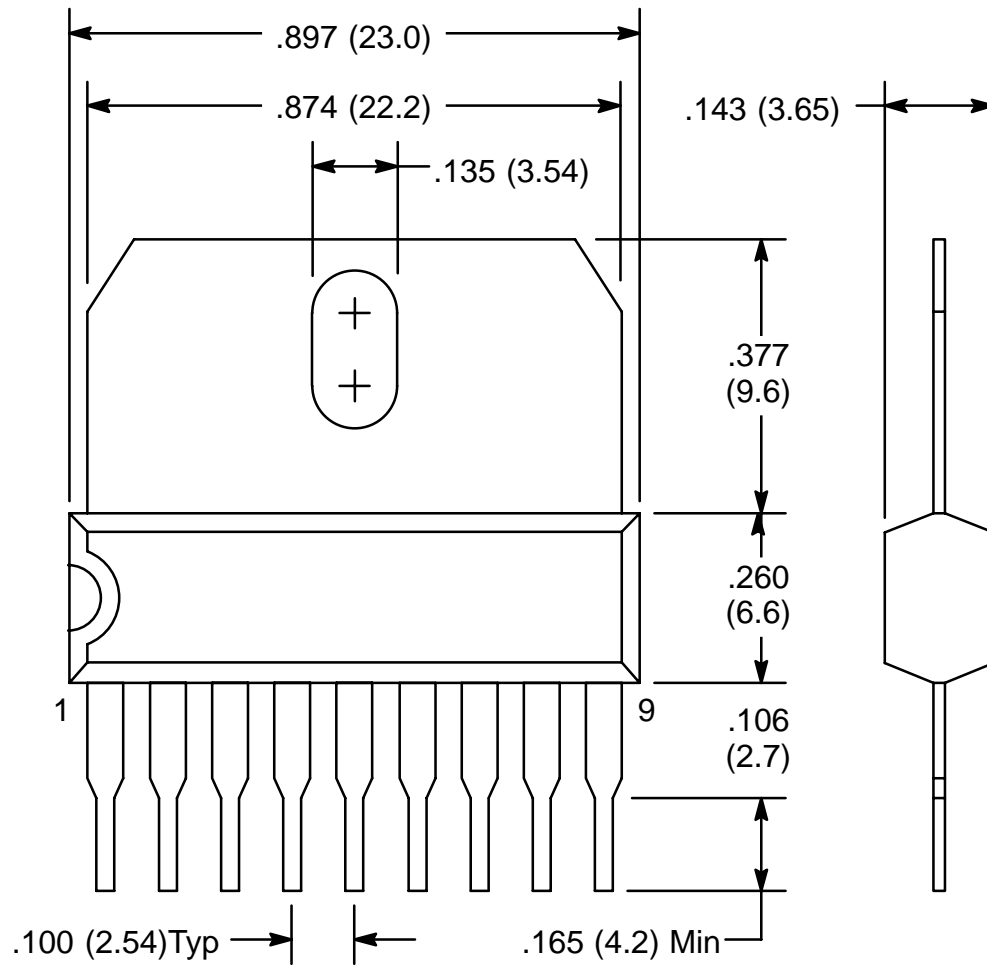
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Supply Voltage	V_9		–	15	18	V
Ambient Temperature	T_A		–15	–	+85	$^\circ\text{C}$
Start Operation ($T_A = +25^\circ\text{C}$)						
Current Consumption (V_1 Not Yet Switched)	I_9	$V_9 = 3.0\text{V}$	–	–	0.5	mA
		$V_9 = 5.0\text{V}$	–	1.5	2.0	
		$V_9 = 10\text{V}$	–	2.0	3.2	
Turn-On Point for V_1	V_9		11.3	11.8	12.3	V
V_4 Before Start-Up ($V_9 < 11.8\text{V}$)	V_4		6.0	6.7	–	V
Regulation Mode ($V_9 = 15\text{V}$, $T_A = +25^\circ\text{C}$)						
Current Consumption	I_9	$V_{\text{reg}} = -10\text{V}$	110	135	160	mA
		$V_{\text{reg}} = 0$	55	85	110	
Reference Voltage	V_1	$I_1 < 0.1\text{mA}$	4.0	4.2	4.5	V
		$I_1 = 5.0\text{mA}$	4.0	4.2	4.4	
Reference Voltage Temperature Coefficient	TC_1		–	100	–	ppm/ $^\circ\text{C}$
V_{Pin4} Low Static Voltage	V_4		1.8	2.08	2.5	V
V_{Pin4} Regulation Peak Voltage	$V_{4(\text{peak})}$	$I_{\text{Pin3}} = 5.0\mu\text{A}$	4.0	4.2	4.5	V
		$I_{\text{Pin3}} = 1.3\text{mA}$	–	2.4	3.0	
V_{Pin3} Full Fold Back	V_3	$I_{\text{Pin3}} = 1.3\text{mA}$	–	3.7	4.0	V
V_{Pin3} Fold Back		$I_{\text{Pin3}} = 0.5\text{mA}$	–	2.5	3.0	
V_{Pin3} Overload Decision		$I_{\text{Pin3}} = 1.0\mu\text{A}$	–	2.4	2.9	
V_{Pin3} Regulation			–	2.11	–	
V_{Pin3} I_{Pin3} Regulation	I_3		–	1.0	–	μA
V_{Pin3} I_{Pin3} Leakage		$V_{\text{Pin3}} = 1.5\text{V}$	–	0.4	–	
V_{Pin7} Peak High	$V_{7(\text{peak})}$	$V_R = 0\text{V}$ (Full Fold Back)	–	3.5	–	V
		$V_R = -10\text{V}$ (Regulation)	–	4.0	–	
		$V_R = -15\text{V}$ (Stand-By)	–	5.0	–	
V_{Pin7} Peak Low	$V_{7(\text{peak})}$	$V_R = 0\text{V}$	–	1.4	–	V
		$V_R = -10\text{V}$	–	1.45	–	
		$V_R = -15\text{V}$	–	1.57	–	
I_{Pin7} Sink Peak	$I_{7(\text{peak})}$	$V_R = -15\text{V}$	–	+0.7	–	A
I_{Pin8} Source Peak	$I_{8(\text{peak})}$	$V_R = -15\text{V}$	–	–0.8	–	A
V_{Pin2}	V_2	$I_{\text{Pin2}} = -3.0\text{mA}$	–	–0.3	–	V
		$I_{\text{Pin2}} = -0.3\text{mA}$	–	–0.2	–	
		$I_{\text{Pin2}} = +3.0\text{mA}$	–	+0.7	–	
		$I_{\text{Pin2}} = +0.3\text{mA}$	–	+0.8	–	
Protective Operation ($V_9 = 15\text{V}$, $T_A = +25^\circ\text{C}$)						
Current Consumption	I_9	$V_5 < 1.8\text{V}$	14	20	26	mA
Turn-Off Voltage	V_7	$V_5 < 1.8\text{V}$	1.3	1.5	1.8	V
	V_4		1.8	2.1	2.5	

Electrical Characteristics (Cont'd): ($T_A = +25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Protective Operation (Cont'd) ($V_9 = 15\text{V}$, $T_A = +25^\circ\text{C}$)						
External Trigger Input	V_5	Enable Voltage, $V_{\text{reg}} = 0\text{V}$	–	2.2	2.4	V
		Disable Voltage, $V_{\text{reg}} = 0\text{V}$	2.0	2.2	–	
Supply Voltage Disabling V_8 and V_1	V_{19}		6.7	7.4	7.8	V
V_{Pin5} Zener Voltage	V_5	Pin5 Open	6.5	7.3	7.8	V
I_{Pin5}	I_5	$V_{\text{Pin5}} = 3.0\text{V}$	–	1.4	–	μA
		$V_{\text{Pin5}} = 0\text{V}$	–	–11	–	
Turn-On Time (Secondary Voltages)	t_{on}		–	350	450	ms
Voltage Change	ΔV_2	$S_3 = \text{Closed}$, $\Delta P_3 = 19\text{W}$	–	100	500	mV
		$S_2 = \text{Closed}$, $\Delta P_2 = 15\text{W}$	–	500	1000	
Stand-By Operation (Minimum Secondary Power: 3W)	ΔV_2	$S_1 = \text{Open}$	–	20	30	V
Switching Frequency During Stand-By Mode	f		70	75	–	kHz
Primary Power Consumption During Stand-By Mode	P_{prim}	The Heat Sink Must Be Optimized, Taking the Maximum Data (T_J , $R_{\theta\text{JC}}$, T_A) into Consideration	–	10	15	VA

Pin Connection Diagram
(Front View)





ALL Dimensions are Max.