

NTE1672 Integrated Circuit Power Supply Control Circuit

Description:

The NTE1672 is a control circuit in a 16-Lead DIP type package designed for use in switched mode power supplies. This single monolithic chip incorporates all the control and housekeeping (protection) functions required in switched mode power supplies, including an internal temperature compensated reference source, internal Zener references, sawtooth generator, pulse width modulator, output stage, and various protection circuits.

Features:

- Stabilized Power Supply
- Temperature Compensated Reference Source
- Sawtooth Generator
- Pulse Width Modulator
- Remote ON/OFF Switching
- Current Limiting
- Low Supply Voltage Protection
- Loop Fault Protection
- Demagnetization/Overvoltage Protection
- Maximum Duty Cycle Clamp
- Feed Forward Control
- External Synchronization

Absolute Maximum Ratings:

Supply

Voltage Forced Mode +18V
Current Fed Mode 30mA

Output Transistor (at 20 – 30V Max)

Output Current 40mA
Collector Voltage (Pin15) $V_{CC} + 1.4V$
Maximum Emitter Voltage (Pin14) +5V

Operating Ambient Temperature Range 0° to +70°C

Storage Temperature Range -65° to +150°C

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

Parameter	Test Conditions	Min	Typ	Max	Unit
Reference Sections					
Internal Reference Voltage (V_{ref})	$T_A = +25^\circ C$	3.57	3.72	3.95	V
	$T_A = 0^\circ \text{ to } +70^\circ C$	3.53	—	4.00	V
Temperature Coefficient of V_{ref}		—	-100	—	ppm/°C
Internal Zener Reference (V_Z)	$I_L = -7mA$	7.8	8.4	8.8	V
Temperature Coefficient of V_Z		—	200	—	ppm/°C

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

Parameter	Test Conditions	Min	Typ	Max	Unit
Oscillator Section					
Frequency Range	$T_A = 0^{\circ}$ to $+70^{\circ}\text{C}$	50	—	100k	Hz
Initial Accuracy Oscillator	$R = 5\text{k}\Omega$	—	5	—	%
Duty Cycle Range	$f_o = 20\text{kHz}$	0	—	98	%
Modulator					
Modulation Input Current	Voltage at Pin5 = 2V $T_A = 0^{\circ}$ to $+70^{\circ}\text{C}$	—	0.2	20	μA
Housekeeping Function					
Pin6, Input Current	at 2V, $T_A = 0^{\circ}$ to $+70^{\circ}\text{C}$	—	0.2	20	μA
Pin6, Duty Cycle Limit Control	For 50% Maximum Duty Cycle, 15kHz to 50kHz/41% of V_Z	40	50	60	% of Duty Cycle
Pin1, Low Supply Voltage Protection Thresholds		8.0	9.0	10.5	V
Pin3, Feedback Loop Protection Trip Threshold		400	600	720	mV
Pin3, Pull-Up Current	at 2V	—7	—15	—35	μA
Pin13, Demagnetization/Over Voltage Protection Trip on Threshold	$T_A = 0^{\circ}$ to $+70^{\circ}\text{C}$	470	600	720	mV
Pin13, Input Current	at 250mV, $T_A = +25^{\circ}\text{C}$	—	—0.6	—10	μA
	at 250mV, $T_A = 0^{\circ}$ to $+70^{\circ}\text{C}$	—	—	—20	μA
Pin16, Feed Forward Duty Cycle Control	Voltage at Pin16 = $2V_Z$	30	40	50	% Original Duty Cycle
Pin16, Feed Forward Input Current (Note 1)	at 16V, $V_{CC} = 18\text{V}$, $T_A = +25^{\circ}\text{C}$	—	0.2	5.0	μA
	at 16V, $V_{CC} = 18\text{V}$, $T_A = 0^{\circ}$ to $+70^{\circ}\text{C}$	—	—	10	μA
External Synchronization					
Pin9 OFF		0	—	0.8	V
Pin9 ON		2	—	V_Z	V
Pin9 Sink Current	Voltage at Pin9 = 0V, $T_A = +25^{\circ}\text{C}$	—	—65	—125	μA
	Voltage at Pin9 = 0V, $T_A = 0^{\circ}$ to $+70^{\circ}\text{C}$	—	—	—125	μA
Remote					
Pin10 OFF		0	—	0.8	V
Pin10 ON		2	—	V_Z	V
Pin10 Sink Current	at = 0V, $T_A = +25^{\circ}\text{C}$	—	—85	—125	μA
	at = 0V, $T_A = 0^{\circ}$ to $+70^{\circ}\text{C}$	—	—	—125	μA
Current Limiting					
Pin11, I_{IN}	at = 250mV, $T_A = +25^{\circ}\text{C}$	—	—2	—20	μA
	at = 250mV, $T_A = 0^{\circ}$ to $+70^{\circ}\text{C}$	—	—	—40	μA
Single Pulse Inhibit Delay	Inhibit Delay Time for 20% Overdrive at 40mA I_{OUT}	—	0.7	0.8	μs
Trip Level: Shut Down, Slow Start, Low Level		0.56	0.60	0.70	V
Current Limit, High Level		0.40	0.48	0.50	V
Low Level in terms of High Level		0.75	0.80	0.85	V

Note 1. Does not include current for timing resistors or capacitors.

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

Parameter	Test Conditions	Min	Typ	Max	Unit
Error Amplifier					
Output Voltage Swing (V_{OH})		6.2	–	9.5	V
Output Voltage Swing (V_{OL})		–	–	0.7	V
Open Loop Gain		54	60	–	dB
Feedback Resistor		10k	–	–	Ω
Small Signal Bandwidth		–	3	–	MHz
Output Stage					
$V_{CE(sat)}$ $I_C = 40\text{mA}$		–	–	0.5	V
Output Current (Pin15)		40	–	–	mA
Maximum Emitter Voltage (Pin14)		5	6	–	V
Supply Voltage/Current					
I_{CC}	$I_Z = 0$, Voltage Forced, $V_{CC} = 12\text{V}$, $T_A = +25^{\circ}\text{C}$	–	–	10	mA
	$I_Z = 0$, Voltage Forced, $V_{CC} = 12\text{V}$, $T_A = 0^{\circ}$ to $+70^{\circ}\text{C}$	–	–	15	mA
V_{CC}	$I_{CC} = 10\text{mA}$ Current Fed	19	–	24	V
	$I_{CC} = 30\text{mA}$ Current Fed	20	–	30	V

Pin Connection Diagram

