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NTE7096–1
Integrated Circuit
High Performance Mode Pulse Width Modulator (PWM) Controller
8–Lead DIP Type Package

Description:

The NTE7096–1 is a high performance pulse width modulator controller in an 8–Lead DIP type package that provides the necessary features to implement off–line or DC to DC fixed frequency current mode control schemes with a minimal external parts count. Internally implemented circuits include a trimmed oscillator for precise DUTY CYCLE CONTROL, under voltage lockout featuring start–up current less than 0.5mA, a precision reference trimmed for accuracy at the error amp input, logic to insure latched operation, a PWM comparator which also provides current limit control, and a totem pole output stage designed to source or sink high peak current. The output stage, suitable for driving N–Channel MOSFETs, is low in the off–state.

The NTE7096–1 has a UVLO threshold of 16V (on) and 10V (off), ideally suited for off–line applications and can operate to duty cycles approaching 100%.

Features:

- Trimmed Oscillator for Precise Frequency Control
- Oscillator Frequency Guaranteed at 250kHz
- Current Mode Operation to 500kHz
- Automatic Feed Forward Compensation
- Latching PWM for Cycle–by–Cycle Current Limiting
- Internally Trimmed Reference with Undervoltage Lockout
- High Current Totem Pole Output
- Undervoltage Lockout with Hysteresis
- Low Start–Up and Operating Current

Absolute Maximum Ratings:

Supply Voltage (Low Impedance Source), V_I 30V
Supply Voltage (Ii < 30mA), V_I . . . . . Self Limiting
Output Current, I_O . . . . . ±1A
Output Energy (Capacitive Load), E_O 5μJ
Analog Inputs (Pin2, Pin3) . . . . . –0.3 to 5.5V
Error Amplifier Output Sink Current 10mA
Power Dissipation ($T_A \le +25°C$), P_{tot} 1.25W
Operating Junction Temperature Range, T_J . . . . . –40° to +150°C
Storage Temperature Range, T_{stg} . . . . . –65° to +150°C
Maximum Thermal Resistance, Junction–to–Ambient, R_{thJA} . . . . . +100°C/W
Lead Temperature (During Soldering, 10sec), T_L . . . . . +300°C

Note 1. All voltages are with respect to Pin5, all currents are positive into the specified terminal.

RoHS

Electrical Characteristics: (Note 2, $0° \le T_A \le +70°C$, V_I = 15V (Note 6), R_T = 10K, C_T = 3.3nF, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Reference Section						
Output Voltage	V_{REF}	T_J = +125°C, I_O = 1mA	4.9	5.0	5.1	V
Line Regulation	ΔV_{REF}	$12V \le V_I \le 25V$	–	2	20	mV
Load Regulation	ΔV_{REF}	$1mA \le I_O \le 20mA$	–	3	25	mV
Temperature Stability	$\Delta V_{REF}/\Delta T$	Note 3	–	0.2	–	mV/°C
Total Output Variation		Line, Load, Temperature	4.82	–	5.18	V
Output Noise Voltage	e_N	$10Hz \le f \le 10kHz$, T_J = +25°C, Note 3	–	50	–	μV
Long Term Stability		T_A = +125°C, 1000 Hrs, Note 3	–	5	25	mV
Output Short Circuit	I_{SC}		–30	–100	–180	mA
Oscillator Section						
Frequency	f_{OSC}	T_J = +25°C	49	52	55	kHz
		$T_A = T_{low}$ to T_{high}	48	–	56	kHz
		T_J = +25°C (R_T = 6.2k, C_T = 1nF)	225	250	275	kHz
Frequency Change with Vltg	$\Delta f_{OSC}/\Delta V$	V_{CC} = 12V to 25V	–	0.2	1	%
Frequency Change with Temp	$\Delta f_{OSC}/\Delta T$	$T_A = T_{low}$ to T_{high}	–	0.5	–	%
Oscillator Voltage Swing	V_{OSC}	(Peak–to–Peak)	–	1.6	–	V
Discharge Current (V_{OSC} = 2V)	I_{dischg}	T_J = +25°C	7.8	8.3	8.8	mA
		$T_A = T_{low}$ to T_{high}	7.6	–	8.8	mA
Error Amp Section						
Input Voltage	V_2	V_{PIN1} = 2.5V	2.42	2.50	2.58	V
Input Bias Current	I_b	V_{FB} = 5V	–	–0.1	–2.0	μA
A_{VOL}		$2V \le V_O \le 4V$	65	90	–	dB
Utility Gain Bandwidth	BW	T_J = +25°C	0.7	1.0	–	MHz
Power Supply Rejection Ratio	PSRR	$12V \le V_I \le 25V$	60	70	–	dB
Output Sink Current	I_O	V_{PIN2} = 2.7V, V_{PIN1} = 1.1V	2	12	–	mA
Output Source Current	I_O	V_{PIN2} = 2.3V, V_{PIN1} = 5V	–0.5	–1.0	–	mA
V_{OUT} High		V_{PIN2} = 2.3V, R_L = 15kΩ to GND	5.0	6.2	–	V
V_{OUT} Low		V_{PIN2} = 2.7V, R_L = 15kΩ to Pin8	–	0.8	1.1	V
Current Sense Section						
Gain	G_V	Note 4, Note 5	2.85	3.00	3.15	V/V
Maximum Input Signal	V_3	V_{PIN1} = 5V, Note 4	0.9	1.0	1.1	V
Supply Voltage Rejection	SVR	$12V \le V_I \le 25V$, Note 4	–	70	–	dB
Input Bias Current	I_b		–	–2	–10	μA
Delay to Output			–	150	300	ns

Note 2. Max. package power dissipation limits must be respected; low duty cycle pulse techniques are used during test. Maintain T_J as close to T_A as possible.

Note 3. These parameters, although guaranteed, are not 100% tested in production.

Note 4. Parameter measured at trip point of latch with V_{PIN2} = 0.

Note 5. Gain defined as: $A = \Delta V_{PIN1} / \Delta V_{PIN3}$; $0 \le V_{PIN3} \le 0.8V$.

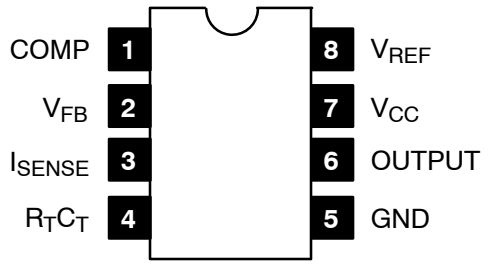
Note 6. Adjust V_I above the start threshold before setting at 15V.

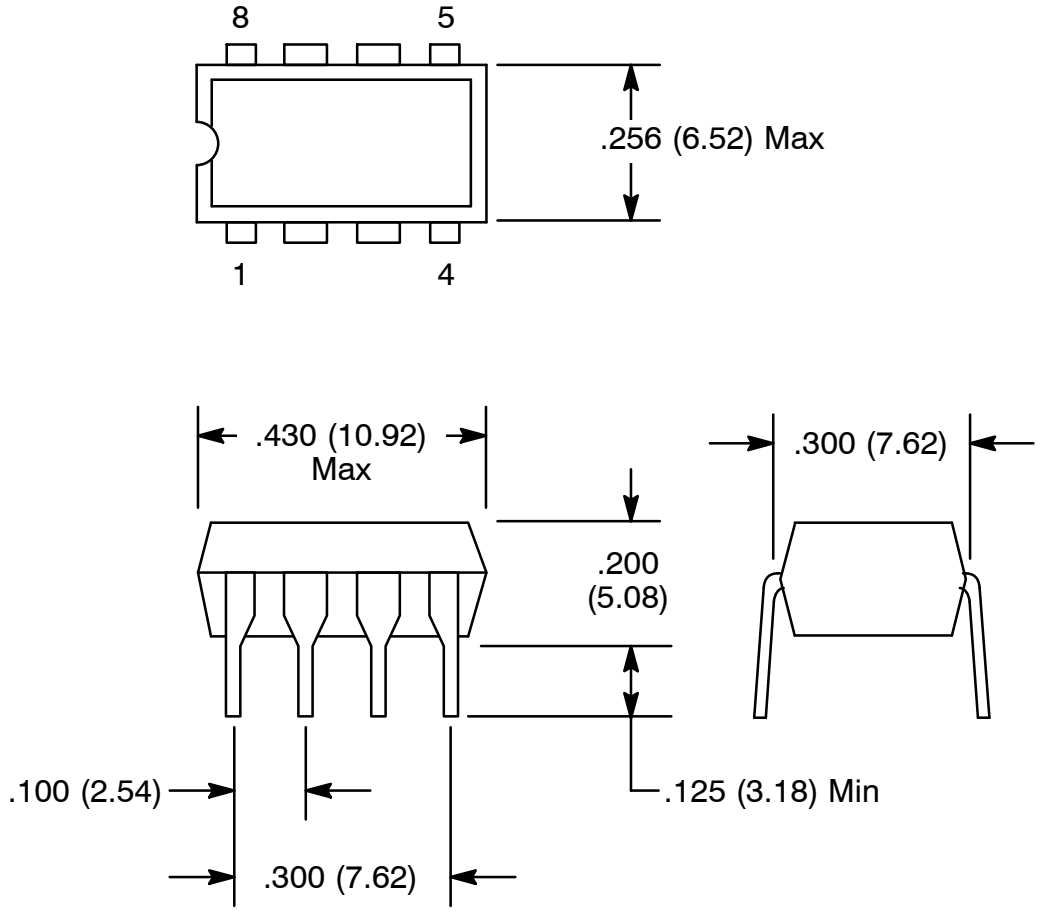
Electrical Characteristics (Cont'd): (Note 2, $0° \le T_A \le +70°C$, V_I = 15V (Note 6), R_T = 10K, C_T = 3.3nF, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Section						
Output Low Level	V_{OL}	I_{SINK} = 20mA	–	0.1	0.4	V
		I_{SINK} = 200mA	–	1.6	2.2	V
Output High Level	V_{OH}	I_{SOURCE} = 20mA	13.0	13.5	–	V
		I_{SOURCE} = 200mA	12.0	13.5	–	V
UVLO Saturation	V_{OLS}	V_{CC} = 6V, I_{SINK} = 1mA	–	0.1	1.1	V
Rise Time	t_r	T_J = +25°C, C_L = 1nF, Note 3	–	50	150	ns
Fall Time	t_f		–	50	150	ns
Undervoltage Lockout Section						
Start Threshold			14.5	16.0	17.5	V
Min. Operating Voltage after Turn–On			8.5	10.0	11.5	V
PWM Section						
Maximum Duty Cycle			94	96	100	%
Minimum Duty Cycle			–	–	0	%
Total Standby Current						
Start–Up Current	I_{st}	V_I = 14V	–	0.3	0.5	mA
Operating Supply Current	I_I	$V_{PIN2} = V_{PIN3}$ = 0V	–	12	17	mA
Zener Voltage	V_{iz}	I_I = 258mA	30	36	–	V

Note 2. Max. package power dissipation limits must be respected; low duty cycle pulse techniques are used during test. Maintain T_J as close to T_A as possible.
Note 3. These parameters, although guaranteed, are not 100% tested in production.
Note 4. Parameter measured at trip point of latch with V_{PIN2} = 0.
Note 5. Gain defined as: $A = \Delta V_{PIN1} / \Delta V_{PIN3}$; $0 \le V_{PIN3} \le 0.8V$.
Note 6. Adjust V_I above the start threshold before setting at 15V.

Pin Connection Diagram




8
5
.256 (6.52) Max
1
4
.430 (10.92)
Max
.300 (7.62)
.200
(5.08)
.100 (2.54)
.125 (3.18) Min
.300 (7.62)