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NTE7154 Integrated Circuit Control Circuit for Switch Mode Power Supplies using MOS Transistors

Description:

The NTE7154 is an integrated circuit in an 8-Lead DIP type package which controls the MOS power transistor and performs all necessary regulation and monitoring functions in free running flyback converters. Since good load regulation over a wide load range is attained, this device is particularly suitable for consumer as well as industrial power supplies.

Features:

- Fold-Back Characteristic Provides Overload Protection for External Diodes
- Burst Operation Under Short-Circuit and No Load Conditions
- Loop Error Protection
- Switch-Off In Case of Too Low Line Voltage (Under Voltage Switch-Off)
- Line Voltage Compensation of Overload Point
- Soft-Start for Smooth Start-Up
- Chip Over-Temperature Protection (Thermal Shutdown)
- On-Chip Parasitic Transformer Oscillation Suppression Circuitry
- Decrease of Regulated Voltage for Low Power Consumption

Absolute Maximum Ratings:

Supply Voltage (Pin1), V_1	-0.3 to +3.0V
Supply Voltage (Pin2, Pin3, Pin4, Pin7), V_2, V_3, V_4, V_7	-0.3V
Supply Voltage (Pin6), V_6	-0.3 to +20V
Supply Current (Pin1, Pin2, Pin3, Pin7), I_1, I_2, I_3, I_7	3mA
Supply Current (Pin4, Note 1), I_4	-1.5A
Supply Current (Pin5, Note 1), I_5	-0.5 to +1.5A
Supply Current (Pin6, Note 1), I_6	0.5A
Supply Current (Pin8), I_8	-3 to +3mA
Operating Junction Temperature, T_J	+125°C
Ambient Temperature Range, T_A	-20° to +85°C
Storage Temperature Range, T_{stg}	-40° to +125°C
Thermal Resistance, Junction-to-Ambient, R_{thJA}	85°C/W
Thermal Resistance, Junction-to-Case, R_{thJC}	45°C/W

Note 1. $t_p \leq 50\mu s, V \leq 0.1$.

Electrical Characteristics: ($V_{CC} = 10V$, $T_A = +25^\circ C$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Start-Up Hysteresis						
Start-Up Current Drain	I_{6E0}	$V_6 = V_{6E}$	–	0.6	0.8	mA
Switch-On Voltage	V_{6E}		11	12	13	V
Switch-Off Voltage	V_{6A}		4.5	5.0	5.5	V
Switch-On Current	I_{6E1}	$V_6 = V_{6E}$	–	11	–	mA
Switch-Off Current	I_{6A1}	$V_6 = V_{6A}$	–	10	–	mA
Voltage Clamp ($V_6 = 10V$, IC Switched Off)						
At Pin2 ($V_6 < V_{6E}$)	$V_{2(Max)}$	$I_2 = 1mA$	5.6	6.6	9.0	V
At Pin3 ($V_6 < V_{6E}$)	$V_{3(Max)}$	$I_3 = 1mA$	5.6	6.6	9.0	V
Control Range						
Control Input Voltage	V_{1R}		400	410	420	mV
Voltage Gain of the Control Circuit in the Control Range	$-V_R$	$V_R = d(V_{2S} - V_{2B})/dV_1$, $f = 1kHz$	–	43	–	dB
Primary Current Simulation Voltage						
Basic Value	V_{sB}		0.955	1.000	1.030	V
Overload Range and Short Circuit Operation						
Peak Value in the Range of Secondary Overload	V_{2O}	$V_1 = V_{1R} = 10mV$	2.80	2.95	3.10	V
Maximum Ramp Amplitude	DV_2	$V_{2O} - V_{2B}$	1.82	1.95	2.08	V
Peak value in the Range of Secondary Short-Circuit Operation	V_{2S}	$V_1 = 0$	2.3	2.5	2.7	V
Foldback Point Correction						
Foldback Point Correction Current	$-I_2$	$V_3 = 3.7V$	300	500	650	μA
Generally Valid Data ($V_6 = 10V$) Voltage of the Zero Transition Detector						
Positive Clamping Voltage	V_{8P}	$I_8 = 1mA$	–	0.75	–	V
Negative Clamping Voltage	V_{8N}	$I_8 = -1mA$	–	-0.2	–	V
Threshold Voltage	V_{8S}		40	50	–	mV
Suppression of Transformer Ringing	TUL		3.0	3.8	4.5	μs
Input Current	$-I_8$	$V_8 = 0$	0	–	4	μV
Push-Pull Output Stage Saturation Voltages						
Pin5 Sourcing	V_{SatU}	$I_5 = -0.1A$	–	1.5	2.0	V
Pin5 Sinking	V_{SatU}	$I_5 = +0.1A$	–	1.0	1.2	V
		$I_5 = +0.5A$	–	1.4	1.8	V
Output Slow Rate						
Rising Edge	$+dV_5/dt$		–	70	–	$V/\mu s$
Falling Edge	$-dV_5/dt$		–	100	–	$V/\mu s$
Reduction of Control Voltage						
Current to Reduce the Control Voltage	$-I_1$	$V_7 = 1V$	–	50	–	μA

Electrical Characteristics (Cont'd): ($V_{CC} = 10V$, $T_A = +25^\circ C$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Protection Circuit						
Undervoltage Protection for V_6 : Voltage at Pin5 = $V_{5(min)}$ if $V_6 < V_{6(Min)}$	$V_{6(Min)}$		7.00	7.25	7.50	V
Overvoltage Protection for V_6 : Voltage at Pin5 = $V_{5(min)}$ if $V_6 > V_{6(Min)}$	$V_{6(Max)}$		15.0	16.0	16.5	V
Undervoltage Protection for V_{AC} : Voltage at Pin5 = $V_{5(min)}$ if $V_3 < V_{3A}$	V_{3A}	$V_2 = 0V$	970	1005	1040	mV
Over Temperature: At the given chip temperature the IC will switch V_5 to $V_{5(Min)}$	O_j		–	150	–	$^\circ C$
Voltage at Pin3 if one of the protection functions was triggered; (V_3 will be clamped until $V_6 < V_{6A}$)	V_{3Sat}	$I_3 = 750\mu A$	–	0.4	0.8	V
Current Drain During Burst Operation	I_6	$V_3 = V_2 = 0V$	–	8	–	mA

Pin Connection Diagram

