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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°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/µs
Falling Edge	$–dV_5/dt$		–	100	–	V/µs
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°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	–	°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 = 750µA	–	0.4	0.8	V
Current Drain During Burst Operation	I_6	$V_3 = V_2$ = 0V	–	8	–	mA

Pin Connection Diagram