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## NTE7166 Integrated Circuit Flyback Switching Regulator

### **Description:**

The NTE7166 is an integrated circuit in a 5-Lead Staggered TO3P type package and is specifically designed to satisfy the requirements for increased integration and reliability in off-line quasi-resonant flyback converters. This device incorporates a primary control and drive circuit with discrete avalanche-rated power MOSFETs.

Cycle-by-cycle current limiting, under-voltage lockout with hysteresis, over-voltage protection, and thermal shutdown protects the power supply during th normal overload an fault conditions. Over-voltage protection and thermal shutdown are latched after a short delay. The latch may be reset by cycling the input supply. Low-current startup and a low-power standby mode selected from the secondary circuit completes a comprehensive suite of features.

### **Features:**

- Flyback Operation with Quasi-Resonant Soft Switching for Low Power Dissipation and EMI
- Rugged Avalanche-Rated MOSFET
- Full Over-Current Protection (No Blanking)
- Under-Voltage Lockout with Hysteresis
- Over-Voltage Protection
- Direct Voltage Feedback
- Low Start-Up Current
- Low-Frequency, Low-Power Standby Operation

### **Absolute Maximum Ratings:** ( $T_A = +25^\circ\text{C}$ unless otherwise specified)

Control Supply Voltage, $V_{IN}$ .....	35V
Drain-Source Voltage, $V_{DS}$ .....	450V
Drain Switching Current, $I_D$ .....	16A
Peak Drain Current, $I_{DM}$ .....	26A
Avalanche Energy, $E_{AS}$ .....	327mJ
OCP/FB Voltage Range, $V_{OCP}$ .....	-0.3V to +6V
Power Dissipation ( $V_{IN} \times I_{IN(ON)}$ ), $P_D$ .....	0.8W
FET Channel Temperature, $T_J$ .....	+150°C
Internal Case Temperature, $T_C$ .....	+125°C
Operating Temperature Range, $T_A$ .....	-20° to +125°C
Storage Temperature Range, $T_{stg}$ .....	-40° to +125°C
Thermal Resistance, Junction-to-Case, $R_{thJC}$ .....	1.75°C/W

**Electrical Characteristics:** ( $T_A = +25^{\circ}\text{C}$ ,  $V_{IN} = 18\text{V}$  unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
On-State Voltage	$V_{INT}$	Turn-On, Increasing $V_{IN}$	14.4	16.0	17.6	V
Under-Voltage Lockout	$V_{INQ}$	Turn-Off, Decreasing $V_{IN}$	9	10	11	V
Over-Voltage Threshold	$V_{OVP(th)}$	Turn-Off, Increasing $V_{IN}$	20.5	22.5	24.5	V
Drain-Source Breakdown Voltage	$V_{BR(DSS)}$	$I_D = 300\mu\text{A}$	$V_{DSmax}$	-	-	V
Drain Leakage Current	$I_{DSS}$	At $V_{DSmax}$	-	-	300	$\mu\text{A}$
On-State Resistance	$r_{DS(ON)}$	$V_S = 10\text{V}$ , $I_D = 0.9\text{A}$ , $T_J = +25^{\circ}\text{C}$	-	-	0.58	$\Omega$
Output Power	$P_{OUT}$	$V_{IN} = 100V_{rms}$	-	-	145	W
		$V_{IN} = 120V_{rms}$	-	-	190	W
Maximum Off Time	$t_{off}$	Drain Waveform High	45	-	55	$\mu\text{s}$
Minimum Pulse Duration for Input of Quasi-Resonant Signals	$t_{w(th)}$	Drain Waveform High, Note 1	-	-	1.0	$\mu\text{s}$
Minimum Off Time	$t_{off}$	Drain Waveform High, Note 1	-	-	1.5	$\mu\text{s}$
Feedback Threshold Voltage	$V_{FDBK}$	Drain Waveform Low to High, Note 1	0.68	0.73	0.78	V
		Oscillator Synchronized, Note 2	1.30	1.45	1.60	V
Over-Current Protection/Feedback Sink Current	$I_{OCP/FB}$	$V_{OCP/FB} = 1.0\text{V}$	1.20	1.35	1.50	mA
Latch Holding Current	$I_{IN(OVP)}$	$V_{IN}$ Reduced from 24.5V to 8.5V	-	-	400	$\mu\text{A}$
Latch Release Voltage	$V_{IN}$	$I_{IN} \leq 20\mu\text{A}$ , $V_{IN}$ Reduced from 24.5V	6.6	-	8.4	V
Switching Time	$t_f$	$V_{DD} = 200\text{V}$ , $I_D = 0.9\text{A}$	-	-	250	ns
Supply Current	$I_{IN(ON)}$	Operating, Note 3	-	-	30	mA
		Increasing $V_{IN}$ Prior to Oscillation	-	-	100	$\mu\text{A}$
Insulation RMS Voltage	$V_{WM(RMS)}$	All Terminals Simultaneous reference to a Metal Plate Against the backside	2000	-	-	V
Thermal Shutdown	$T_J$		140	-	-	$^{\circ}\text{C}$

Note 1. Feedback is square wave,  $V_{IM} = 2.2\text{V}$ ,  $t_h = 1\mu\text{s}$ ,  $t_l = 35\mu\text{s}$ .

Note 2. For quasi-resonant operation, the input signal must be longer than  $t_{w(th)}$  and greater than  $V_{FDBK}$ .

Note 3. Feedback is square wave,  $V_{IM} = 2.2\text{V}$ ,  $t_h = 4\mu\text{s}$ ,  $t_l = 1\mu\text{s}$ .

**Pin Connection Diagram**  
(Front View)



