INTERIM ISSUE
(Specifications Subject to Change Without Notice)
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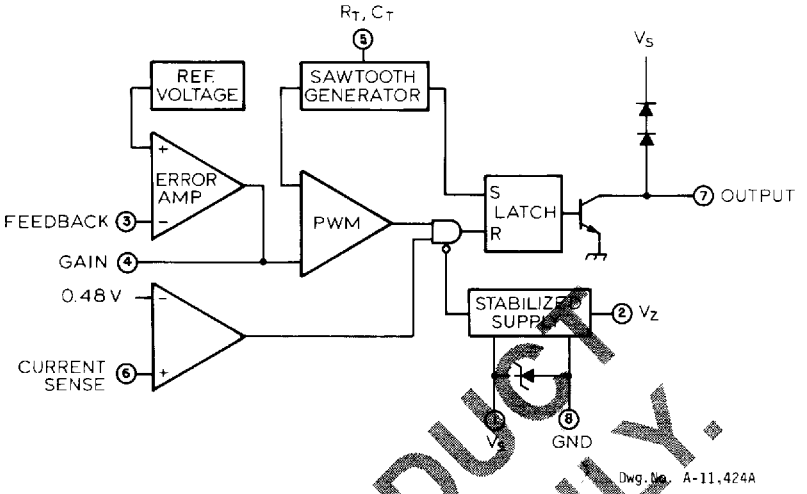
INTEGRATED CIRCUIT
ENGINEERING BULLETIN

ULN-8161M

ULN-8161M (NE5561N)
SWITCHED-MODE POWER SUPPLY CONTROL CIRCUIT

FEATURES

- Stabilized Power Supply
- Current Limiting
- Temperature-Compensated Reference Source
- Sawtooth Generator
- Pulse-Width Modulator
- Double-Pulse Protection
- Applications in:
  —Switched-Mode Power Supplies
  —Motor Controller-Inverters
  —D-C/D-C Converters



FUNCTIONAL BLOCK DIAGRAM

DESIGNED FOR USE in low-cost switched-mode power supplies, the Type ULN-8161M controller excels in applications requiring only limited housekeeping functions.

The integrated circuit has its own temperature-compensated reference source, internal Zener reference, sawtooth waveform generator, error amplifier, pulse-width modulator, output driver, current-sensing, and low-voltage protection.

Type ULN-8161M is supplied in an 8-pin dual in-line plastic package with a copper lead frame that gives it enhanced power dissipation ratings. It is rated for continuous operation over the temperature range of 0°C to +70°C. Similar devices are available for operation over extended temperature ranges. Control circuits with extensive protective functions (ULN-8160A, ULN-8160R, and ULS-8160R) are described in the most recent issue of Sprague Engineering Bulletin 27466.

Type ULN-8161M is normally marked with the original-source part number, NE5561N; however, the Sprague part number should be used in orders and correspondence.

ABSOLUTE MAXIMUM RATINGS
at T_A = +25°C

Supply Voltage, V_S (Voltage-Fed)	18 V
Supply Current, I_S (Current-Fed)	30 mA
Output Current, I_O	40 mA
Output Duty Cycle	98%
Package Power Dissipation, P_D	1.5 W*
Operating Temperature Range, T_A	0°C to +70°C
Storage Temperature Range, T_S	−65°C to +150°C

*Derate at the rate of 12.5 mW/°C above T_A = +25°C.

DISCONTINUED PRODUCT
FOR REFERENCE ONLY.

INTEGRATED CIRCUIT OPERATIONS
SPRAGUE ELECTRIC COMPANY
115 Northeast Cutoff, WORCESTER, MASS. 01606

ULN-8161M SWITCHED-MODE POWER SUPPLY CONTROL CIRCUIT

ENGINEERING BULLETIN 27466.1

ELECTRICAL CHARACTERISTICS at T_A = +25°C, V_S = 12 V (unless otherwise noted)

Characteristic	Test Pin	Test Conditions	Limits			
			Min.	Typ.	Max.	Units
Supply Clamp Voltage	1	I_S = 10 mA, Current-fed	19	—	24	V
		I_S = 30 mA, Current-fed	20	—	30	V
Internal Reference, V_{REF}	—	Over operating temperature range	3.55	—	3.98	V
	—	T_A = +25°C	3.57	3.76	3.96	V
Temperature Coefficient of V_{REF}	—		—	±100	—	ppm/°C
Zener Reference, V_Z	2	I_2 = −7.0 mA	7.8	8.4	9.0	V
Temperature Coefficient of V_Z	2		—	±150	—	ppm/°C
Oscillator Frequency Range	5	Over operating temperature range	50	—	100k	Hz
Initial Oscillator Accuracy	5		—	5.0	—	%
Duty-Cycle Range	5	f_0 = 20 kHz	0	—	98	%
Input Current	6	V_6 = 250 mV, Over operating temperature range	—	—	−20	µA
	6	V_6 = 250 mV, T_A = +25°C	—	−2.0	−10	µA
Inhibit Delay	6	Single pulse, 20% overdrive at I_0 = 20 mA	—	700	800	ns
Trip Level	6	Current limit	400	520	600	mV
Error-Amplifier Gain	3-4	Open loop	—	60	—	dB
Error-Amplifier Feedback Resistance	4		10	—	—	kΩ
Small-Signal Bandwidth	3-4		—	3.0	—	MHz
Output-Voltage Swing	4	Positive limit	6.2	—	—	V
	4	Negative limit	—	—	0.6	V
Output Current	7	Over operating temperature range	20	—	—	mA
Output-Saturation Voltage	7	I_C = 20 mA	—	—	0.5	V
Supply Current	1	I_Z = 0, Over operating temp. range, Voltage-fed	—	—	15	mA
	1	I_Z = 0, T_A = +25°C, Voltage-fed	—	—	9.0	mA

ORDERING INFORMATION

Original Source* Part Number	Sprague Part Number	Operating Temperature Range	Package
NE5561N	ULN-8161M	0°C to +70°C	Plastic

* These devices are manufactured in accordance with a cross-license with Signetics Corp. (a subsidiary of U.S. Philips Corp.).

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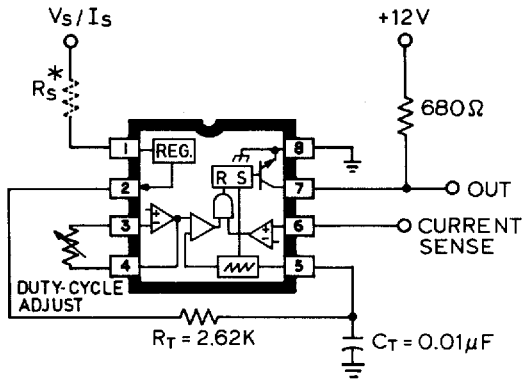
TEST CIRCUIT



* REQUIRED FOR CURRENT-FED OPERATION ONLY

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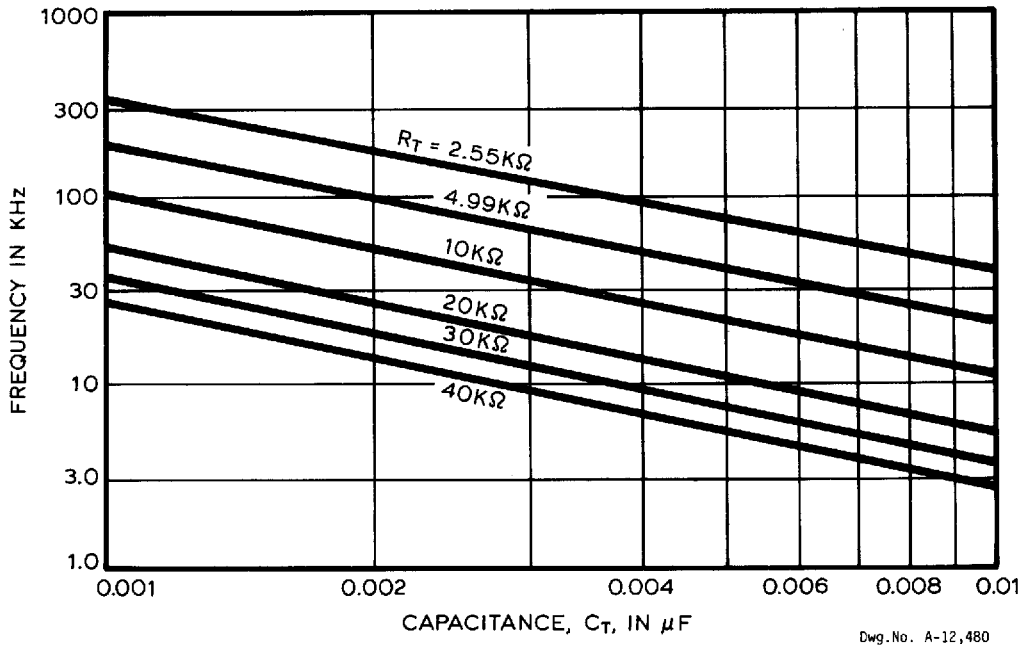
TYPICAL OSCILLATOR FREQUENCY AS A FUNCTION OF TIMING CAPACITANCE



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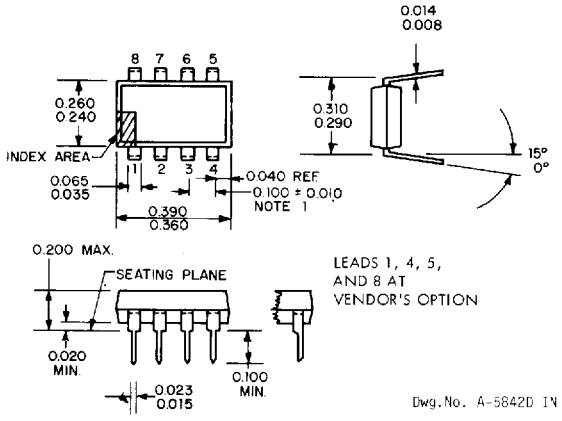
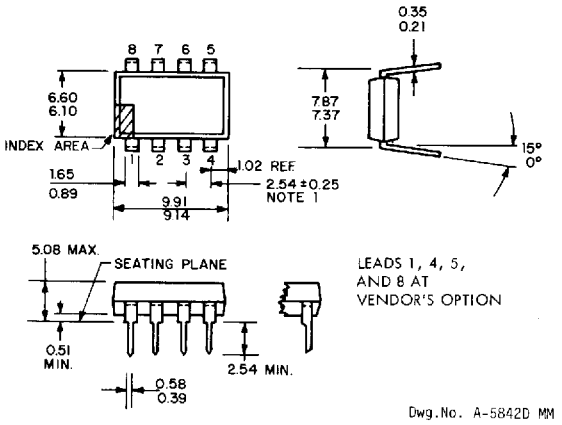
DIMENSIONS IN INCHES



DIMENSIONS IN MILLIMETRES

Based on 1″ = 25.4 mm



NOTES:

1. Lead spacing tolerance is non-cumulative.
2. Exact body and lead configuration at vendor's option within limits shown.
3. Lead gauge plane is 0.030″ (0.76 mm) max. below seating plane.

In the construction of the components described, the full intent of the specification will be met. The Sprague Electric Company, however, reserves the right to make, from time to time, such departures from the detail specifications as may be required to permit improvements in the design of its products. Components made under military approvals will be in accordance with the approval requirements.

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