

**INTEGRATED
POWER
SEMICONDUCTORS, LTD.**

Regulating Pulse Width Modulators

7-58-11-31

Description

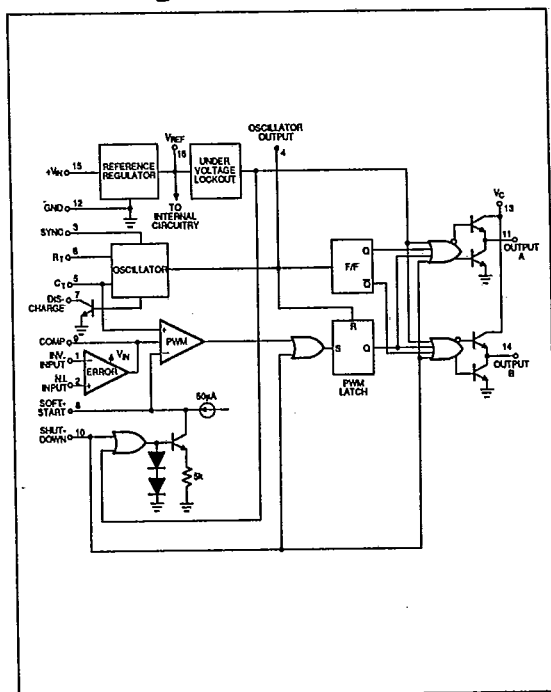
The IP1P125 series of pulse width modulator integrated circuits offers high speed performance optimized for MOSFET drive. Pin compatible with the SG1525A, the IP1P125 features low crossover current through the output transistors as well as 95% total usable output pulse width up to 500KHz. High speed latched shutdown is included as well as a precision 5.1 volt reference, error amp, oscillator, latched PWM comparator, totem-pole output drivers, soft-start and undervoltage lockout.

Features

- Pin compatible with 1525A series
- Low output crossover current
- Fixed 100ns deadtime
- 100ns response latched shutdown
- 50Hz to 500KHz operating frequency
- 5.1 volt $\pm 1\%$ reference
- Oscillator sync. terminal
- Soft-start
- Undervoltage lockout
- Latching PWM

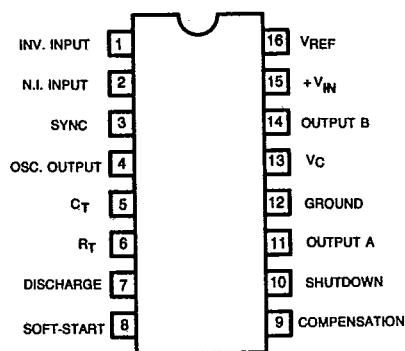
Section 2 - Pulse Width Modulators

Block Diagram



Connections

(Top View)



N, J and D Package

4825898 INTEGRATED POWER

82D 00139 D

T-58-11-31

Electrical Characteristics (Note 1)

Parameter			Conditions			IP1P125/IP2P125			IP3P125			Units
						Min	Typ	Max	Min	Typ	Max	
Turn-on Characteristics												
Undervoltage Threshold, V_{IN}	V_{IN} Rising	•	5.0	6.5	8.5	5.0	6.5	8.5	V			
Turn-on Hysteresis		•	0.2	0.5	0.9	0.2	0.5	0.9	V			
Operating Current	$V_{IN} = 8$ to 35V	•		10	20		10	20	mA			
Reference Section												
Output Voltage			5.05	5.10	5.15	5.00	5.10	5.20	V			
Output Voltage	$V_{IN} = 8$ to 35V, $I_L = 0$ to 20mA	•	5.00		5.20	4.95		5.25	V			
Line Regulation	$V_{IN} = 8$ to 35V	•		1	10		1	15	mV			
Load Regulation	$I_L = 0$ to 20mA	•		5	15		5	25	mV			
Temperature Stability (Note 2)	Over Operating Range	•		15	50		15	50	mV			
Short Circuit Current	$V_{REF} = 0$ Volts	•	25	70	120	25	70	120	mA			
Output Noise Voltage	10Hz $\leq f \leq$ 10KHz			40	200		40	200	μV_{rms}			
Long Term Stability (Note 2)				1	10		1	50	mV/kHr			
Oscillator Section (Note 3)												
Initial Accuracy			37.6	40	42.4	37.6	40	42.4	kHz			
Voltage Stability	$V_{IN} = 8$ to 35V	•		0.1	0.5		0.1	2	%			
Temperature Stability (Note 3)	Over Operating Range	•		1	4		1	6	%			
Minimum Frequency	$R_T = 200k\ \Omega$, $C_T = 0.1\ \mu F$	•		80	120		80	120	Hz			
Maximum Frequency	$R_T = 1.5k\ \Omega$, $C_T = 470\ pF$, $R_D = 0\ \Omega$			900			900		kHz			
Current Mirror	$I_{RT} = 2.0\ mA$	•	1.7	2.0	2.2	1.7	2.0	2.2	mA			
Clock Amplitude	Output, PIN 4, $C_T = 0.01\ \mu f$	•	3.0	4.0		3.0	4.0		V			
Clock Pulse Width	Output, PIN 4, $C_T = 0.01\ \mu F$	•	0.3	0.5	1.3	0.3	0.5	1.3	μs			
Sync Threshold		•	1.2	2.0	2.8	1.2	2.0	2.8	V			
Sync Input Current	Sync Voltage = 3.5V	•		1.0	2.5		1.0	2.5	mA			
Error Amplifier Section												
Input Offset Voltage	$V_{cm} = 1.5$ to 5.2V	•		0.1	5		2	10	mV			
Input Bias Current	$V_{cm} = 1.5$ to 5.2V	•		1	5		1	10	μA			
Input Offset Current	$V_{cm} = 1.5$ to 5.2V	•		0.1	1		0.1	1	μA			
DC Open Loop Gain	$\Delta V_O = 1$ to 3V, $R_L \geq 10M\ \Omega$	•	60	80		60	80		dB			
Common Mode Rejection	$V_{cm} = 1.5$ to 5.2V	•	60	90		60	90		dB			
Supply Voltage Rejection	$V_{IN} = 8$ to 35V	•	50	90		50	90		dB			
Output Low Level		•		0.2	0.5		0.2	0.5	V			
Output High Level		•	3.8	5.6	7.0	3.8	5.6	7.0	V			
Gain-Bandwidth Product (Note 2)			1	3.5		1	3.5		MHz			
PWM Comparator												
Minimum Duty Cycle	$V_{PIN\ 1} - V_{PIN\ 2} \geq 150mV$	•			0			0	%			
Maximum Duty Cycle	$V_{PIN\ 2} - V_{PIN\ 1} \geq 150mV$	•	45	49		45	49		%			
Input Threshold Low	Zero Duty Cycle	•	0.6	0.9		0.6	0.9		V			
Input Threshold High	Max Duty Cycle	•		3.3	3.6		3.3	3.6	V			
Input Bias Current				.05			.05		μA			

4825898 INTEGRATED POWER

82D 00140 D

7-58-11-31

Electrical Characteristics (Cont.)

Parameter	Conditions		IP1P125/IP2P125			IP3P125			Units
			Min	Typ	Max	Min	Typ	Max	
Shutdown Section									
Soft Start Current	V _{SHUTDOWN} = 0V	•	25	50	80	25	50	100	μA
Soft Start Low Level	V _{SHUTDOWN} = 2.5V	•		0.4	0.6		0.4	0.6	V
Shutdown Threshold	To Outputs	•	0.6	1.3	2.0	0.6	1.3	2.0	V
Shutdown Input Current	V _{SHUTDOWN} = 2.5V	•		0.1	1.0		0.1	1.0	mA
Shutdown Delay	T _J = 25°C, PIN 10 to Output	T _J		50	300		50	300	ns
Output Section (Each Transistor)									
Collector Leakage Current	V _C = 35Volts	•			200			200	μA
Output Low Level	I _{SINK} = 20mA	•		0.2	0.4		0.2	0.4	V
	I _{SINK} = 100mA	•		1.0	2.5		1.0	2.5	V
Output High Level	I _{SOURCE} = 20mA	•	18	19		18	19		V
	I _{SOURCE} = 100mA	•	17	18		17	18		V
Rise Time	C _L = 1nF, T _J = 25°C			100	600		100	600	ns
Fall Time	C _L = 1nF, T _J = 25°C			50	300		50	300	ns

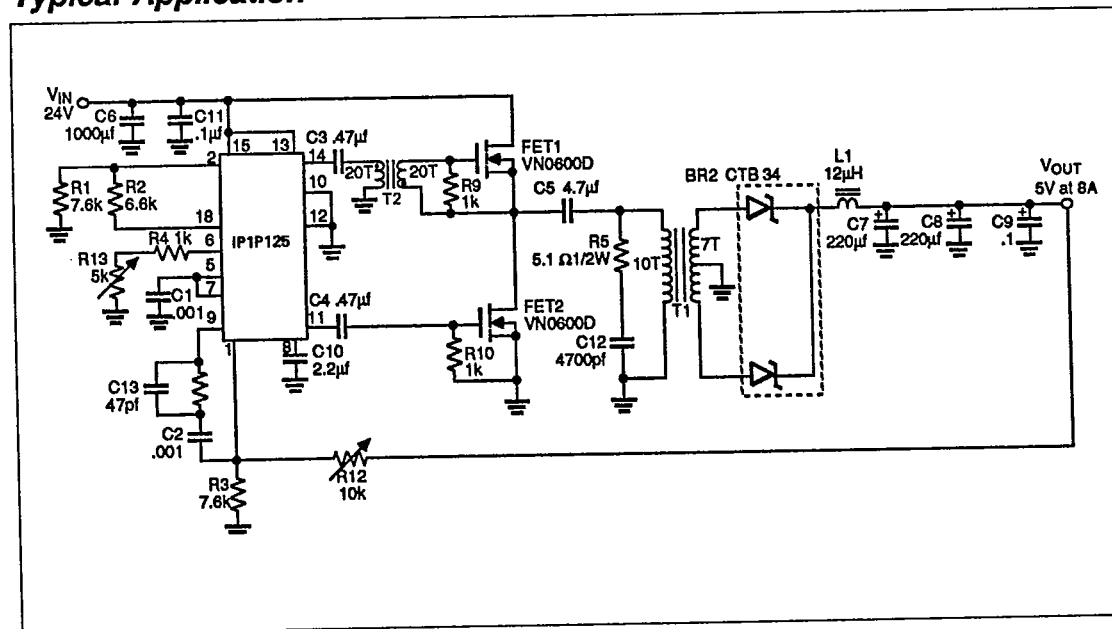
The • denotes the specifications which apply over the full operating temperature range, all others apply at $T_J = 25^\circ C$ unless otherwise specified.

Note 1: $V_{IN} = 20V$, $I_{REF} = 0mA$ unless otherwise specified.

Note 2: These parameters, although guaranteed over the recommended conditions, are not 100% tested in production.

Note 3: $R_T = 3.6K\Omega$, $C_T = 0.01\mu F$ unless otherwise specified.

Typical Application



IPS

4825898 INTEGRATED POWER

82D 00141 D

7-58-11-31

Order Information

Part Number	Temperature Range	Package
IP1P125J	-55°C to +125°C	16 Pin Ceramic DIP
IP2P125D	-25°C to +85°C	16 Pin Plastic SOIC
IP2P125J	-25°C to +85°C	16 Pin Ceramic DIP
IP2P125N	-25°C to +85°C	16 Pin Plastic DIP
IP3P125D	0°C to +70°C	16 Pin Plastic SOIC
IP3P125J	0°C to +70°C	16 Pin Ceramic DIP
IP3P125N	0°C to +70°C	16 Pin Plastic DIP

Section 2 - Pulse Width Modulators
IP1P125, IP2P125, IP3P125

Integrated Power Semiconductors, Ltd. cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in an Integrated Power product. No circuit patent licenses are implied. Integrated Power reserves the right to change the circuitry and specifications without notice at any time.

Integrated Power Semiconductors, Ltd.

2727 Walsh Avenue, Suite 201, Santa Clara, CA 95051 • Telephone: 408-727-2772 • Telex: 350073 (IPS SNTA) • FAX: 408-988-6185
 8 Quaker Drive, West Warwick, RI 02893 • Telephone: 401-821-4260 • Telex: 332948 (IPS RI) • FAX: 401-823-7260
 2081 Business Center Drive, Suite 140, Irvine, CA 92715 • Telephone: 714-752-0188 • FAX: 714-752-5019
 789 Turnpike Street, North Andover, MA 01845 • Telephone: 617-683-9042 • FAX: 617-975-0193