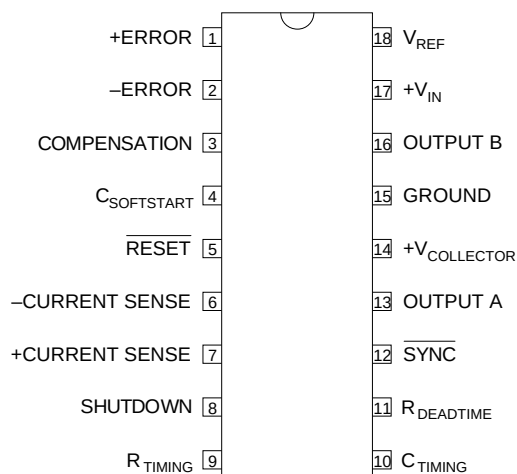


TOP VIEW



J Package – 18 Pin Ceramic DIP

N Package – 18 Pin Plastic DIP

DW Package – 18 Pin Plastic (300) SOIC

Order Information

Part Number	J-Pack 18 Pin	N-Pack 18 Pin	D-18 18 Pin	Temp. Range
IP1526	✓			-55 to +125°C
IP3526	✓	✓	✓	0 to +70°C
Note: To order, add the package identifier to the part number. eg. IP1526J IP3526DW-18				

REGULATING PULSE WIDTH MODULATOR

FEATURES

- 8 to 35V operation
- 5V reference trimmed to $\pm 1\%$
- 1Hz to 400kHz oscillator range
- Dual 100mA source/sink outputs
- Digital current limiting
- Double pulse suppression
- Programmable deadtime
- Undervoltage lockout
- Single Pulse metering
- Programmable soft start
- Wide current limit common mode range
- TTL/CMOS compatible logic ports
- Symmetry correction capability
- Guaranteed 6 unit synchronisation

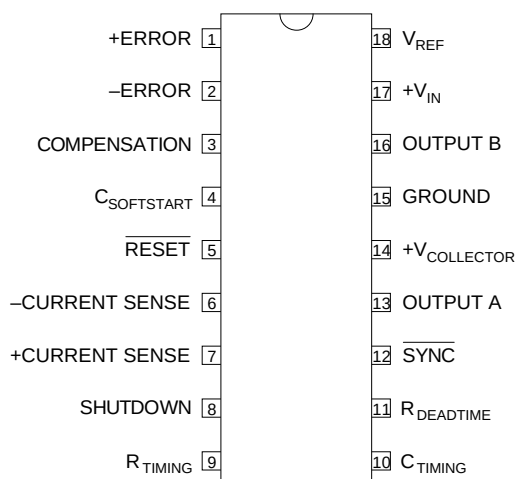
ABSOLUTE MAXIMUM RATINGS ($T_{case} = 25^{\circ}\text{C}$ unless otherwise stated)

$+V_{IN}$	Input Voltage		+40V
	Collector Supply Voltage		+40V
	Logic Inputs		-0.3 to +5.5V
	Analogue Inputs		-0.3 to $+V_{IN}$
	Source / Sink Load Current		200mA
	Reference Load Current		Internally Limited
	Logic Sink Current		15mA
P_D	Power Dissipation	$T_A = 25^{\circ}\text{C}$ Derate @ $T_A > 50^{\circ}\text{C}$	1W 10mW/ $^{\circ}\text{C}$
P_D	Power Dissipation	$T_C = 25^{\circ}\text{C}$ Derate @ $T_C > 25^{\circ}\text{C}$	3W 24mW/ $^{\circ}\text{C}$
T_J	Operating Junction Temperature		See Ordering Information
T_{STG}	Storage Temperature Range		-65 to +150°C
T_L	Lead Temperature	(soldering, 10 seconds)	+300°C

DESCRIPTION

The IP1526 and IP3526 high performance monolithic pulse width modulator circuits are designed for fixed-frequency switching regulators and other power control applications. Included in an 18-pin dual-in-line package are a temperature compensated voltage reference, sawtooth oscillator, error amplifier, pulse width modulator, pulse metering and steering logic, and two low impedance power drivers. Also included are protective features such as soft-start and under-voltage lockout, digital current limiting, double pulse inhibit, a data latch for single pulse metering, adjustable deadtime, and provision for symmetry correction inputs. For ease of interface, all digital control ports are TTL and B-series CMOS compatible. Active LOW logic design allows wired-OR connections for maximum flexibility. This versatile device can be used to implement single-ended or push-pull switching regulators of either polarity, both transformerless and transformer coupled.

BLOCK DIAGRAM



RECOMMENDED OPERATING CONDITIONS

V _{IN}	Input Voltage		+8 to +35V
	Collector Voltage		+4.5 to +35V
	Sink/Source Load Current (Each Output)		0 to 100mA
	Reference Load Current		0 to 20mA
	Oscillator Frequency Range		1Hz to 400kHz
R _T	Oscillator Timing Resistor		2kΩ to 150kΩ
C _T	Oscillator Timing Capacitor		470pF to 20μF
	Available Deadtime Range @ 40kHz		3% to 50%
	Operating Ambient Temperature Range	IP1526	-55 to +125°C
		IP3526	0 to +70°C

ELECTRICAL CHARACTERISTICS (T_J = Over Operating Temperature Range unless otherwise stated)

Parameter	Test Conditions	IP1526			IP3526			Units
		Min.	Typ.	Max.	Min.	Typ.	Max.	
REFERENCE SECTION								
Output Voltage	T _J = 25°C	4.95	5.0	5.05	4.9	5.0	5.1	V
Line Regulation	V _{IN} = 8 to 35V		2	20		2	30	mV
Load Regulation	I _L = 0 to 20mA		5	30		5	50	
Temperature Stability			15	50		15	50	mV
Total Output Voltage Range		4.9	5.0	5.1	4.85	5.0	5.15	V
Short Circuit Current	V _{REF} = 0	25	80	140	25	80	140	mA
UNDERVOLTAGE LOCKOUT								
$\overline{\text{RESET}}$ Output Voltage	V _{REF} = 3.8V		0.2	0.4		0.2	0.4	V
	V _{REF} = 4.8V	2.4	4.8		2.4	4.8		
OSCILLATOR SECTION ²								
Initial Accuracy	T _J = 25°C		±3	±8		±3	±8	%
Voltage Stability	V _{IN} = 8 to 35V		0.5	1		0.5	1	
Temperature Stability			3	10		7	10	
Minimum Frequency	R _T = 150kΩ C _T = 0.2μF			100			100	Hz
Maximum Frequency	R _T = 2kΩ C _T = 470pF	400			400			kHz
Sawtooth Peak Voltage	V _{IN} = 35V		3	3.5		3	3.5	V
Sawtooth Valley Voltage	V _{IN} = 8V T _J = 25°C	0.5	1			1		
ERROR AMPLIFIER SECTION ³								
Input Offset Voltage	R _S ≤ 2kΩ		2	5		2	10	mV
Input Bias Current			–350	–1000		–350	–2000	nA
Input Offset Current			35	100		35	200	
DC Open Loop Gain	R _L ≥ 10MΩ	64	72		60	72		dB
High Output Voltage	V _{PIN1} – V _{PIN2} ≥ 150mV I _{SOURCE} = 100μA	3.6	4.2		3.6	4.2		V
Low Output Voltage	V _{PIN1} – V _{PIN2} ≥ 150mV I _{SINK} = 100μA		0.2	0.4		0.2	0.4	V
Common Mode Rejection	R _S ≤ 2kΩ	70	94		70	94		dB
Supply Voltage Rejection	V _{IN} = 12V to 18V	66	80		66	80		

NOTES

1. Test Conditions unless otherwise stated:

$$V_{IN} = 15V$$

$$T_J = -55 \text{ to } +125^\circ\text{C} \quad \text{for IP1526}$$

$$T_J = 0 \text{ to } +70^\circ\text{C} \quad \text{for IP3526}$$

2. Oscillator / PWM Section Test Conditions:

$$f_{OSC} = 40\text{kHz}$$

$$(R_T = 4.12\text{k}\Omega, C_T = 0.01\mu\text{F} \pm 1\%, R_D = 0)$$

3. Error Amplifier Section Test Condition:

$$V_{CM} = 0 \text{ to } 5.2V$$

ELECTRICAL CHARACTERISTICS (T_J = Over Operating Temperature Range unless otherwise stated)

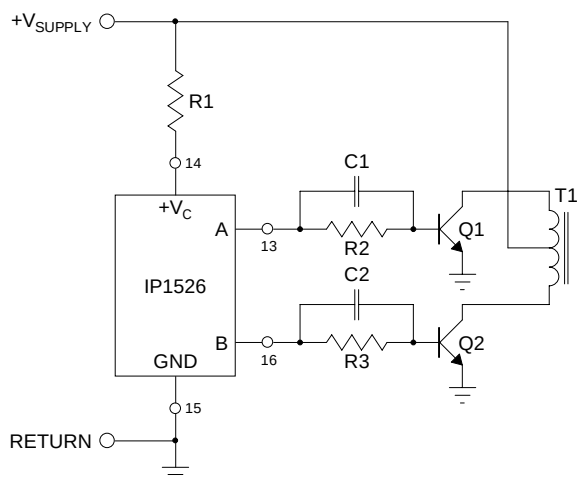
Parameter	Test Conditions	IP1526			IP3526			Units
		Min.	Typ.	Max.	Min.	Typ.	Max.	
PWM COMPARATOR ²								
Minimum Duty Cycle	V _{PIN2} – V _{PIN1} ≥ 150mV	0			0			%
Maximum Duty Cycle	V _{PIN1} – V _{PIN2} ≥ 150mV	45	49		45	49		
DIGITAL PORTS (SYNC, SHUTDOWN & RESET)								
HIGH Output Voltage	I _{SOURCE} = 40μA	2.4	4.0		2.4	4.0		V
LOW Output Voltage	I _{SINK} = 3.6mA		0.2	0.4		0.2	0.4	
HIGH Input Current	V _{IH} = 2.4V		–125	–200		–125	–300	μA
LOW Input Current	V _{IL} = 0.4V		–225	–360		–225	–500	
CURRENT LIMIT COMPARATOR ⁴								
Sense Voltage	R _S ≤ 50Ω	90	100	110	80	100	120	mV
Input Bias Current			–3	–10		–3	–10	μA
SOFT-START SECTION								
Error Clamp Voltage	RESE _T = 0.4V		0.1	0.4		0.1	0.4	V
C _S Charging Current	RESE _T = 2.4V	50	100	150	50	100	150	μA
OUTPUT DRIVERS (each output) ⁵								
HIGH Output Voltage	I _{SOURCE} = 20mA	12.5	13.5		12.5	13.5		V
	I _{SOURCE} = 100mA	12	13		12	13		
LOW Output Voltage	I _{SINK} = 20mA		0.2	0.3		0.2	0.3	V
	I _{SINK} = 100mA		1.2	2.0		1.2	2.0	
Collector Leakage	V _C = 40V		50	150		50	150	μA
Rise Time	C _L = 1000pF		0.3	0.6		0.3	0.6	μs
Fall Time	C _L = 1000pF		0.1	0.2		0.1	0.2	
POWER CONSUMPTION								
Standby Current	V _{IN} = 35V R _T = 4.12kΩ SHUTDOWN = 0.4V		18	30		18	30	mA

NOTES

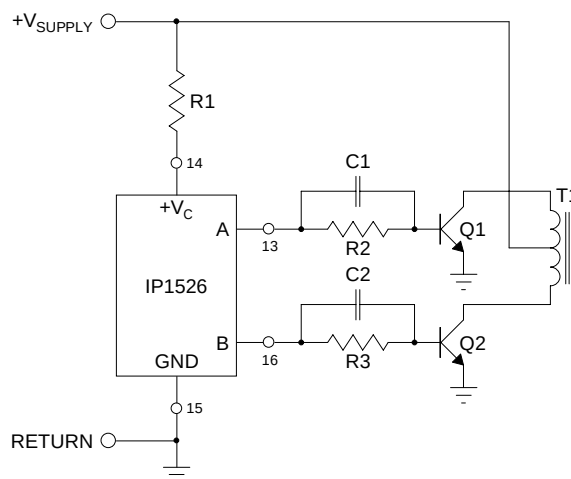
- Test Conditions unless otherwise stated:
V_{IN} = 15V
T_J = –55 to +125°C for IP1526
T_J = 0 to +70°C for IP3526
- Oscillator / PWM Section Test Conditions:
f_{OSC} = 40kHz
(R_T = 4.12kΩ, C_T = 0.01μF ±1%, R_D = 0)
- Error Amplifier Section Test Conditions:
V_{CM} = 0 to 5.2V
- Current Limit Comparator Section Test Conditions:
V_{CM} = 0 to 12V
- Output Driver Section Test Conditions:
V_C = 15V

APPLICATIONS INFORMATION

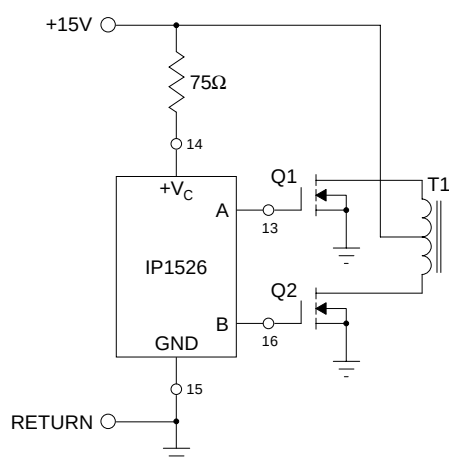
Push-Pull Configuration



Single-Ended Configuration

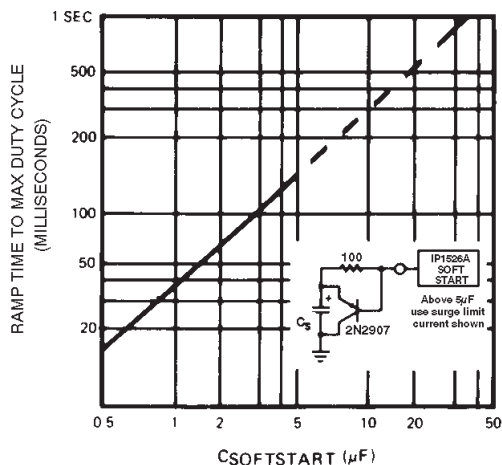


Driving N-Channel Power MOSFETs

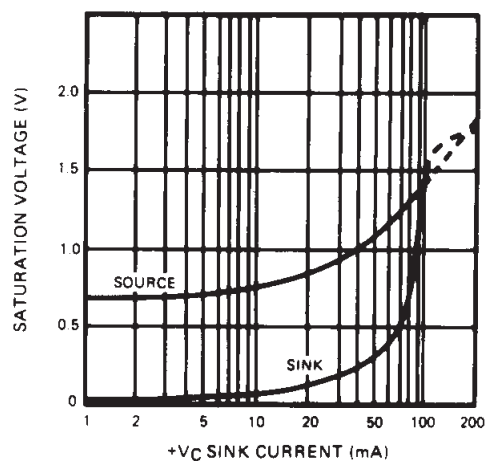


TYPICAL PERFORMANCE CHARACTERISTICS

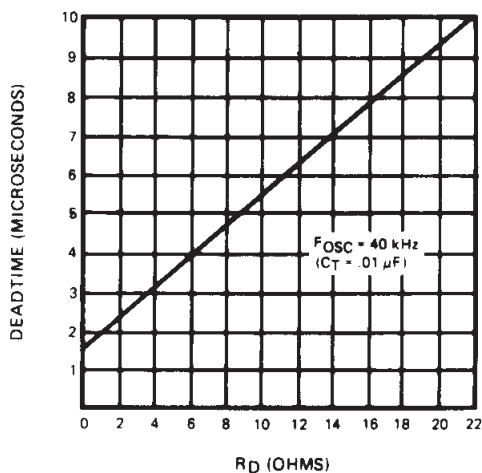
Soft Start Time vs C_S



Output Driver Saturation Voltage



Output Driver Deadtime vs R_D Value



Oscillator Period vs R_T and C_T

