

Product Specification

XBLW SG3525

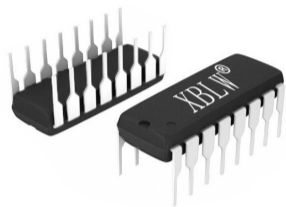
Pulse Width Modulator Control Circuit

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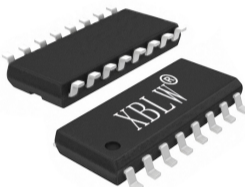


Descriptions

The SG3525 pulse width modulator control circuit offers improved performance and lower external parts count when implemented for controlling all types of switching power supplies. The on-chip +5.1 V reference is trimmed to $\pm 1\%$ and the error amplifier has an input common-mode voltage range that includes the reference voltage, thus eliminating the need for external divider resistors. A sync input to the oscillator enables multiple units to be slaved or a single unit to be synchronized to an external system clock. A wide range of deadtime can be programmed by a single resistor connected between the CT and Discharge pins. This device also features built-in soft-start circuitry, requiring only an external timing capacitor. A shutdown pin controls both the soft-start circuitry and the output stages, providing instantaneous turn off through the PWM latch with pulsed shutdown, as well as soft-start recycle with longer shutdown commands. The under voltage lockout inhibits the outputs and the changing of the soft-start capacitor when VCC is below nominal. The output stages are totem-pole design capable of sinking and sourcing in excess of 150mA. The output stage of the SG3525 features NOR logic resulting in a low output for an off-state.



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Feature

- 8.0 V to 35 V Operation
- 5.1 V Reference Trimmed to $\pm 1\%$
- 100 Hz to 500 kHz Oscillator Range
- Separate Oscillator Sync Terminal
- Adjustable Deadtime Control
- Input Undervoltage Lockout With Hysteresis
- Latching PWM to Prevent Multiple Pulses
- Pulse-by-Pulse Shutdown
- Dual Source/Sink Output Drivers
- Internal Soft-Start

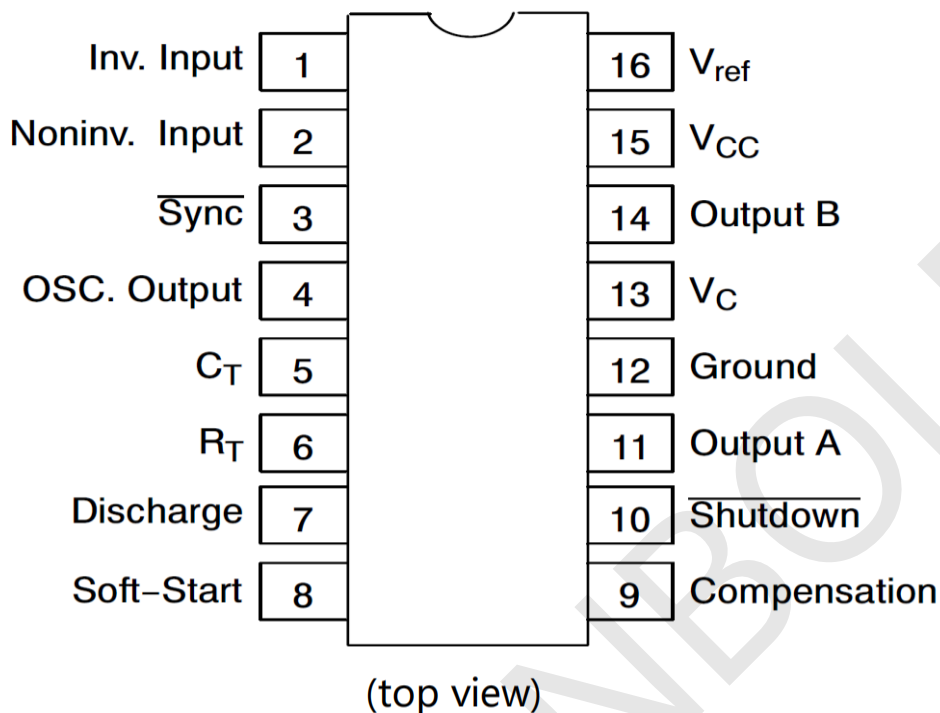
Applications

- Welding Inverters
- Solar Inverters
- Motor Control
- Battery Chargers
- Converters Using Voltage Mode
- Off-Line and DC/DC Power Supplies
- Single-Ended or Two-Switch Topology Designs

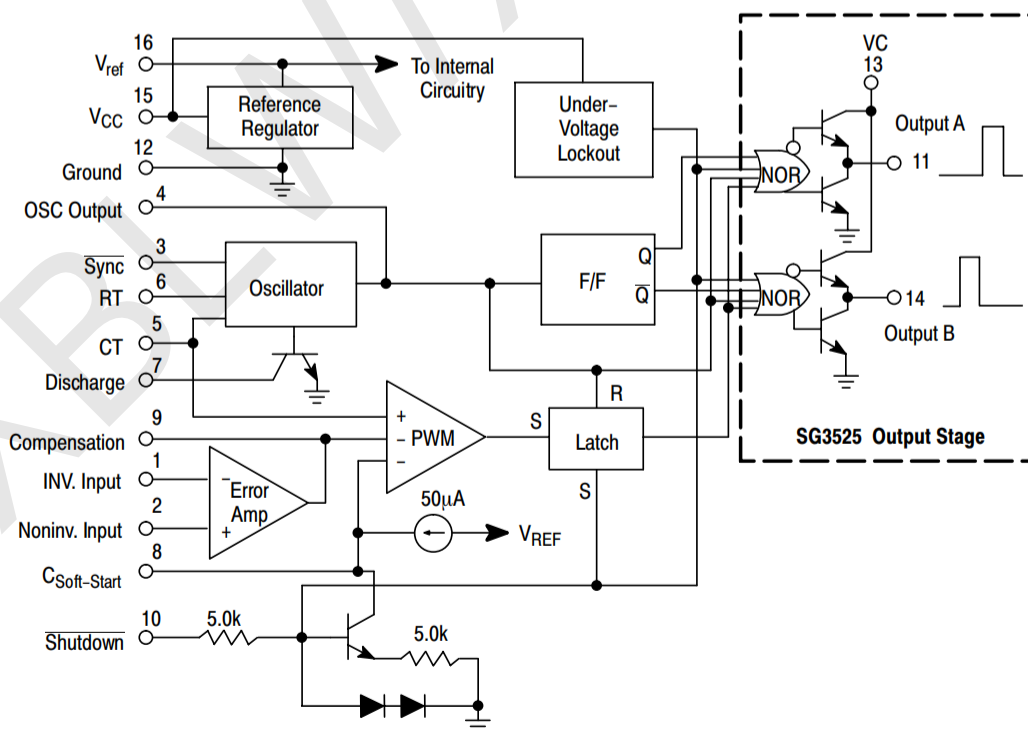
Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
XBLW SG3525AN	DIP-16	SG3525AN	Tube	1000pcs/Box
XBLW SG3525ADTR	SOP-16	SG3525A	Tape	2500pcs/Reel

Pin Connections



Representative Block Diagram



Maximum Ratings

Symbol	Parameter	Value	Unit
V_i	Supply Voltage	40	V
V_c	Collector Supply Voltage	40	V
I_{osc}	Oscillator Charging Current	5	mA
I_o	Output Current, Source	400	mA
I_R	Reference Output Current	50	mA
P_{tot}	Total Power Dissipation at $T_{amb} = 70\text{ }^{\circ}\text{C}$	1000	mW
T_{op}	Operating Temperature	0 to 70	$^{\circ}\text{C}$
T_j	Junction Temperature Range	- 55 to 150	$^{\circ}\text{C}$
T_{stg}	Storage Temperature Range	- 65 to 150	$^{\circ}\text{C}$

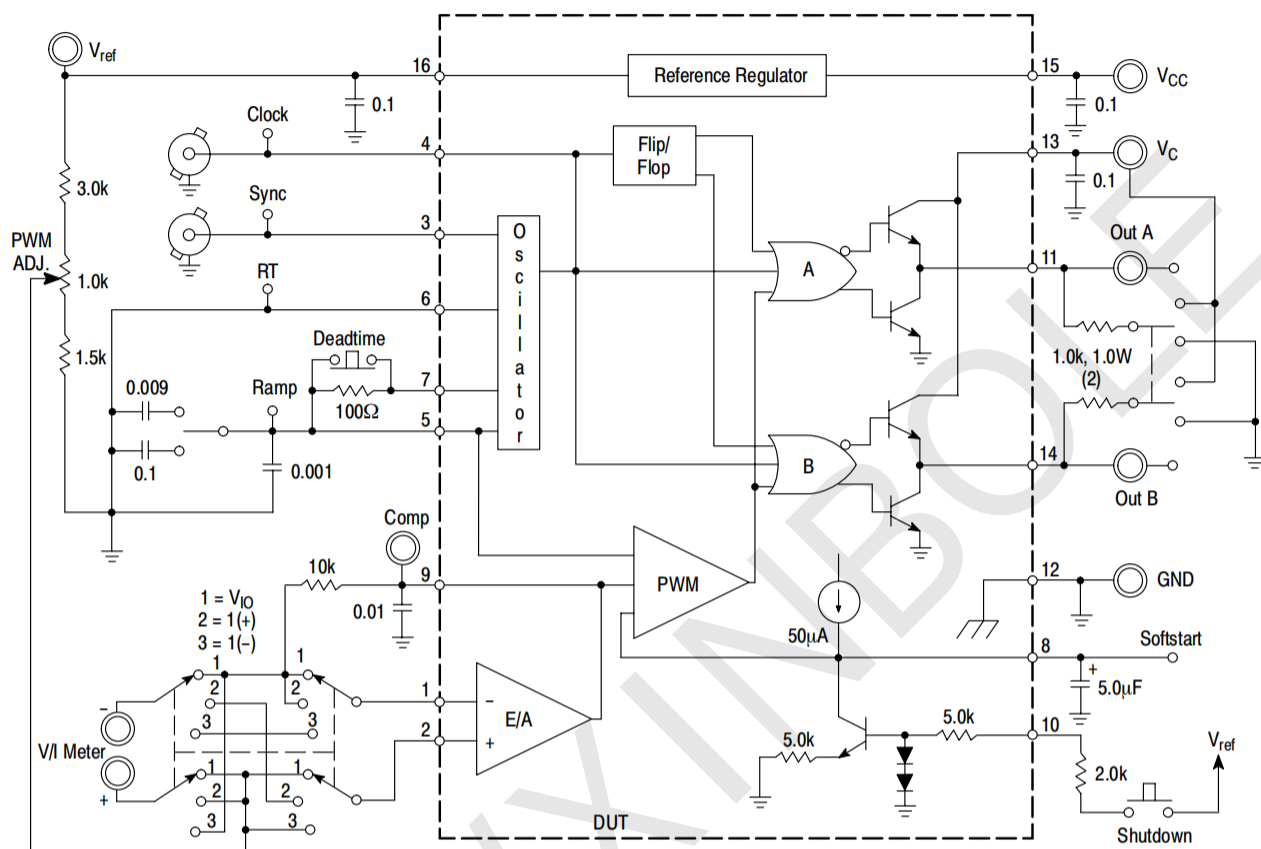
Recommended Operating Conditions

Characteristics	Symbol	Min	Max	Unit
Supply Voltage	V_{cc}	8.0	35	V
Collector Supply Voltage	V_c	4.5	35	V
Output Sink/Source Current (Steady State)	I_o	0	± 100	mA
(Peak)		0	± 400	
Reference Load Current	I_{ref}	0	20	mA
Oscillator Frequency Range	f_{osc}	0.1	400	kHz
Oscillator Timing Resistor	R_T	2.0	150	k Ω
Oscillator Timing Capacitor	C_T	0.001	0.2	μF
Deadtime Resistor Range	R_D	0	500	Ω
Operating Ambient Temperature Range	T_A	0	+70	$^{\circ}\text{C}$

Electrical Characteristics

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
REFERENCE SECTION						
Reference Output Voltage	V _{REF}	T _J = 25°C	5.0	5.1	5.2	V
Line Regulation	Δ V _{REF}	V _{CC} = 8 to 35V	-	9	20	mV
Load Regulation	Δ V _{REF}	I _{REF} = 0 to 20mA	-	20	50	mV
Short Circuit Output Current	I _{SC}	V _{REF} = 0, T _J = 25°C	-	80	100	mA
Total Output Variation	Δ V _{REF}	Line, Load and Temperature	4.95	-	5.25	V
Temperature Stability	STT	-	-	20	50	mV
Long Term Stability	ST	T _J = 125°C, 1 KHRS	-	20	50	mV
OSCILLATOR SECTION						
Initial Accuracy	ACCUR	T _J = 25°C	-	±3	±6	%
Frequency Change With Voltage	Δ f/Δ V _{CC}	V _{CC} = 8 to 35V (Note 1, 2)	-	±0.8	±2	%
Maximum Frequency	f _(MAX)	R _T = 2KΩ, C _T = 470pF	400	430	-	KHz
Minimum Frequency	f _(MIN)	R _T = 200KΩ, C _T = 0.1uF	-	60	120	Hz
Clock Amplitude	V _(CLK)	-	3	4	-	V
Clock Width	t _{w(CLK)}	T _J = 25°C	0.3	0.6	1	us
Sync Threshold	V _{TH(SYNC)}	-	1.2	2	2.8	V
Sync Input Current	I _{I(SYNC)}	Sync = 3.5V	-	1.3	2.5	mA
ERROR AMPLIFIER SECTION (V_{CM} = 5.1V)						
Input Offset Voltage	V _{IO}	-	-	1.5	10	mV
Input Bias Current	I _{BIAS}	-	-	1	10	μA
Input Offset Current	I _{IO}	-	-	0.1	1	μA
Open Loop Voltage Gain	G _{VO}	R _L ≥ 10MΩ	60	80	-	dB
Common Mode Rejection Ratio	CMRR	V _{CM} = 1.5 to 5.2V	60	90	-	dB
Power Supply Rejection Ratio	PSRR	V _{CC} = 8 to 3.5V	50	60	-	dB
PWM COMPARATOR SECTION						
Minimum Duty Cycle	DC _{MIN}	-	-	-	0	%
Maximum Duty Cycle	DC _{MAX}	-	45	49	-	%
Input Threshold Voltage	V _{TH1}	Zero Duty Cycle	0.7	0.9	-	V
Input Threshold Voltage	V _{TH2}	Max Duty Cycle	-	3.2	3.6	V
SOFT-START SECTION						
Soft Start Current	I _{SOFT}	V _{SD} = 0V, V _{SS} = 0V	25	51	80	μA
Soft Start Low Level Voltage	V _{SL}	V _{SD} = 25V	-	0.3	0.7	V
Shutdown Threshold Voltage	V _{TH(SD)}	-	0.6	0.8	1	V
Shutdown Input Current	I _{N(SD)}	V _{SD} = 2.5V	-	0.3	1	mA
OUTPUT SECTION						
Low Output Voltage I	V _{OL I}	I _{SINK} = 20mA	-	0.1	0.4	V
Low Output Voltage II	V _{OL II}	I _{SINK} = 100mA	-	0.05	2	V
High Output Voltage I	V _{OH I}	I _{SOURCE} = 20mA	18	19	-	V
High Output Voltage II	V _{OH II}	I _{SOURCE} = 100mA	17	18	-	V
Under Voltage Lockout	V _{UL}	V ₈ and V ₉ = High	6	7	8	V
Collector Leakage Current	I _{C(leak)}	V _{CC} = 35V	-	80	200	μA
Rise Time	t _R	C _L = 1uF, T _J = 25°C	-	80	600	ns
Fall Time	t _F	C _L = 1uF, T _J = 25°C	-	70	300	ns
STANDBY CURRENT						
Supply Current	I _{CC}	V _{CC} = 35V	-	12	20	mA

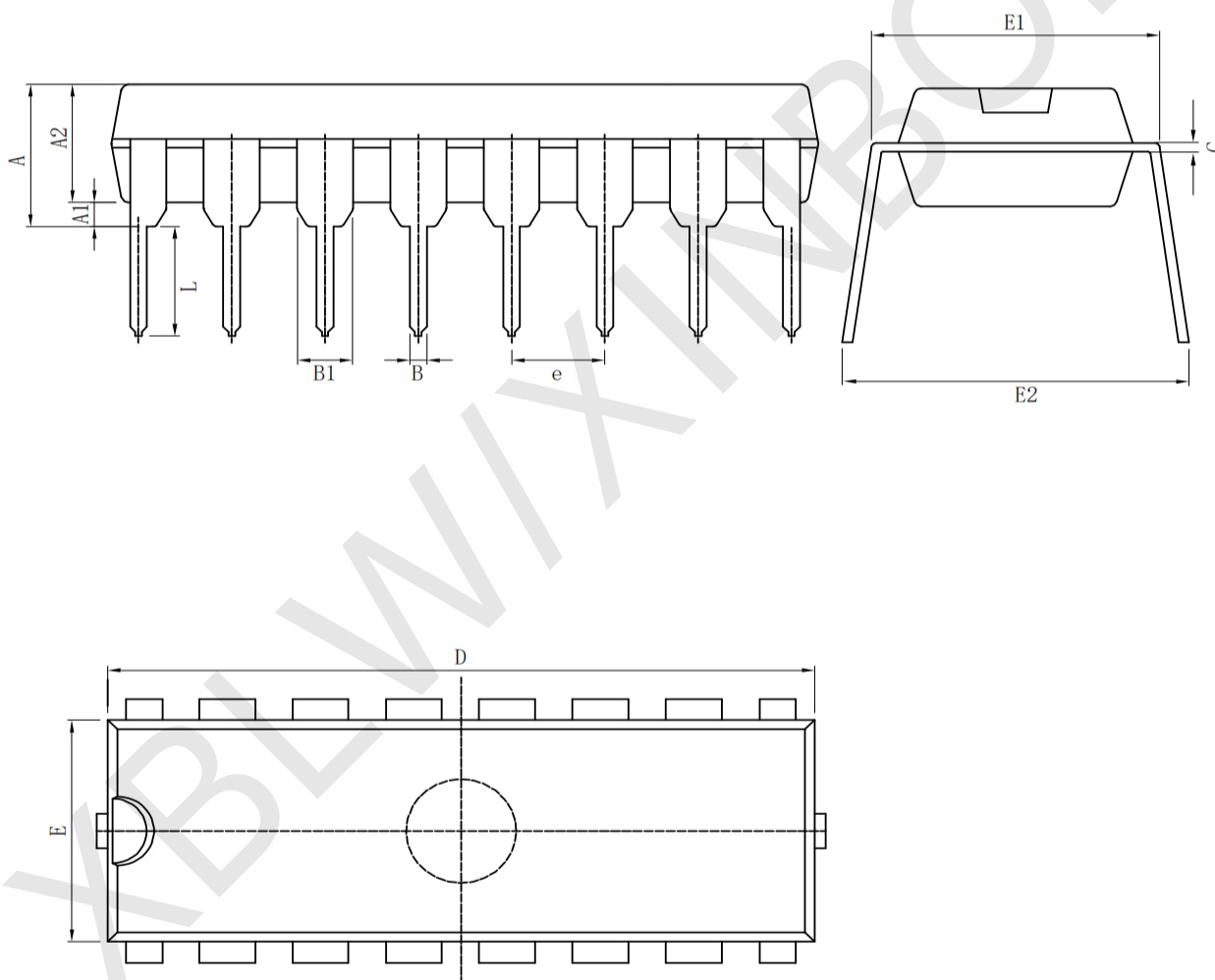
Lab Test Fixture



Package Information

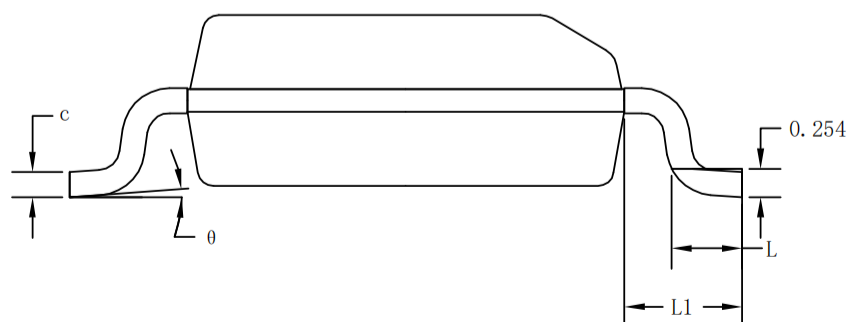
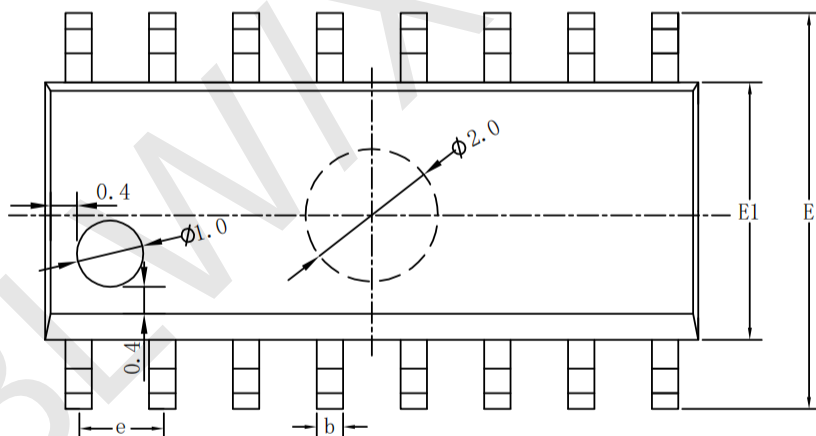
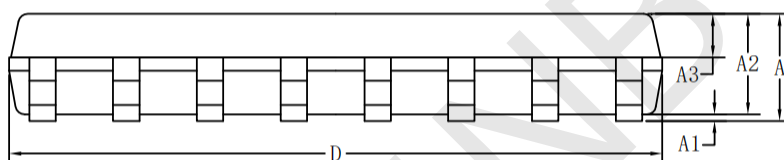
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Size Symbol	Dimensions In Millimeters		Size Symbol	Dimensions In Inches	
	Min(mm)	Max(mm)		Min(in)	Max(in)
A	3.710	4.310	A	0.146	0.170
A1	0.510		A1	0.020	
A2	3.200	3.600	A2	0.126	0.142
B	0.380	0.570	B	0.015	0.022
B1	1.524(BSC)		B1	0.060(BSC)	
C	0.204	0.360	C	0.008	0.014
D	18.80	19.20	D	0.740	0.756
E	6.200	6.600	E	0.244	0.260
E1	7.320	7.920	E1	0.288	0.312
e	2.540(BSC)		e	0.100(BSC)	
L	3.000	3.600	L	0.118	0.142
E2	8.400	9.000	E2	0.331	0.354



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Symbol	Size	Dimensions In Millimeters			Symbol	Size	Dimensions In Inches		
		Min(mm)	Nom(mm)	Max(mm)			Min(in)	Nom(in)	Max(in)
A		1.500	1.600	1.700	A		0.059	0.063	0.067
A1		0.100	0.150	0.250	A1		0.004	0.006	0.010
A2		1.400	1.450	1.500	A2		0.055	0.057	0.059
A3		0.600	0.650	0.700	A3		0.024	0.026	0.028
b		0.300	0.400	0.500	b		0.012	0.016	0.020
c		0.150	0.200	0.250	c		0.006	0.008	0.010
D		9.800	9.900	10.00	D		0.386	0.390	0.394
E		5.800	6.000	6.200	E		0.228	0.236	0.244
E1		3.850	3.900	3.950	E1		0.152	0.154	0.156
e		1.27 (BSC)			e		0.050 (BSC)		
L		0.500	0.600	0.700	L		0.020	0.024	0.028
L1		1.05 (BSC)			L1		0.041 (BSC)		
θ		0°	4°	8°	θ		0°	4°	8°



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