

Voltage Mode PWM Controller with EMI Reduction

General Description

ASM8P18xx is a high performance, adjustable frequency, PWM controller with an integrated spread spectrum modulator for EMI reduction. It contains all the functions of a standard PWM controller along with a user configurable spread spectrum modulation with adjustable spread. ASM8P18xx allows significant system cost savings by reducing the number of PCB layers and shielding that are traditionally required to pass EMI regulation.

ASM8P18xx is the industry's first general purpose EMI reduction IC, specifically designed for use in SMPS systems. ASM8P18xx is compatible to any other 3842 PWM controllers.

ASM8P18xx is capable of driving 1A maximum current output and it covers a wide supply voltage range from 7V DC to 30V DC. The PWM frequency is selectable from 40 KHz to 400 KHz.

ASM8P18xx provides under voltage lockout, thermal shutdown, overload, and undercurrent protection. It is available in 8-pin MicroSO, P-DIP and SOIC package.

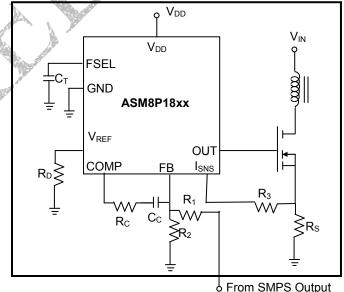
Features

- 30V maximum operating voltage with CMOS technology
- Adjustable PWM frequencies (40 KHz to 400 KHz)
- Maximum Output drive current of 1A.
- Wide duty cycle range (0% minimum to 95% maximum)
- Spread spectrum modulation with adjustable spread.
- Under voltage lockout with hysteresis.
- Low startup current: 275µA maximum
- Pin compatible with industry standard 3842 PWM controller.
- Temperature range –40°C to +85°C.
- Thermal shutdown, overload and undercurrent protection.
- Frequency skip mode.
- Available in 8-pin plastic MicroSO, P-DIP and SOIC packages:

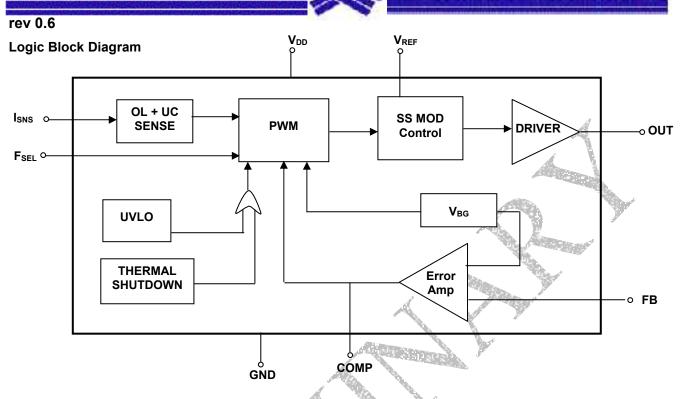
Applications

- Off-line converter
- DC-DC converter
- Monitor power supply
- Computer/DVD/STB power supply
- Wireless base station power supply
- Telecom power supply

Typical Operating Circuit

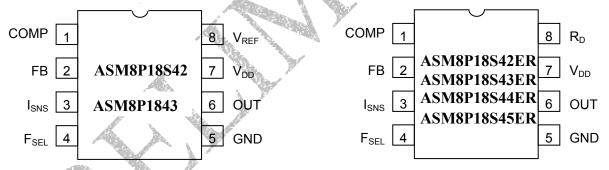






Pin Diagram

8-Pin MicroSO, P-DIP and SOIC



Pin Description

Pin#	Pin Name	Function				
A Park	COMP	Input of the PWM Comparator and output of the error amplifier				
2	FB	Feedback, inverting input of the error amplifier				
3	I _{SNS}	Current sense comparator input				
4	FSEL	External capacitor selects PWM frequency				
5	GND	Ground				
6	OUT	SS modulated PWM output				
7	V_{DD}	Supply voltage				
8		5V output for ASM8PI8S42 and ASM8PI843 parts. External resistor "RD"				
8	V _{REF} / R _D	to GND sets the modulation spread for the parts with ER suffix.				



Application Information

Spread Spectrum Deviation

The deviation can be determined by selecting the proper resistor at V_{REF} to GND for the parts with 'ER' suffix. (Refer " R_D Resistor Vs. % Modulation Depth Plot" for resistor selection)

PWM Frequency

The PWM frequency can be determined by selecting the proper capacitance (C_T) at the FSEL pin.

Start-up Current

ASM8P18xx allows a substantial reduction in the start up current. Low start up current allows high resistance, lower wattage start-up resistor, to supply controller start up power.

Under Voltage Lockout (UVLO)

When the power supply voltage is below the start up threshold voltage, internal circuitry puts the output into low impedance state and sets the output to zero.

Thermal Shutdown

The output of ASM8P18xx goes down to zero when the junction temperature of the device rises above 155°C. The device automatically resumes operation when temperature drops to 126°C. This protects the device from thermal breakdown.

Overload and under current protection

ASM8P18xx provides Cycle by cycle current limit and pulls down PWM output to low as soon as I_{SNS} pin senses a peak voltage of 1V, with a delay to output of 125 nS maximum.

At no load condition when the device senses the peak voltage level of less than 0.1V at I_{SNS} pin for a period of 200mS, the oscillator enters in to cycle skip mode. Normal condition is restored once I_{SNS} increases beyond 0.1V for more than three cycles. Details of cycle skip for different options are provided in the Electrical Characteristics table.

Absolute Maximum Ratings

Symbol	Parameter	Min	Max	Units
V_{DD}	Supply Voltage		30	V
I _{DD}	Supply Current		TBD*	mA
l _{OUT}	Maximum Output Current		1	Α
I _{SNS}	Current Sense Inputs and feedback I _{SNS} , FB, COMP		5	V
V_{REF}	Reference Voltage		6	V
Vosc	Oscillator Voltage		4	V
V _{OUT}	Output Voltage		30	V
	Operation Junction Temperature	-45	150	°C
	Storage Temperature	-65	150	°C
	Lead Soldering Temperature (10 Seconds)		300	°C
	Static Discharge Voltage MIL-STD-883		2	KV

^{*}Maximum output voltage = 30V



Electrical Characteristics

Unless otherwise noted, V_{DD} =15V, Capacitor on F_{SEL} = 330pf, I_{SENS} = 0.5V. Specifications are over the -40°C to +85°C ambient temperature range. Typical values are at 25°C.

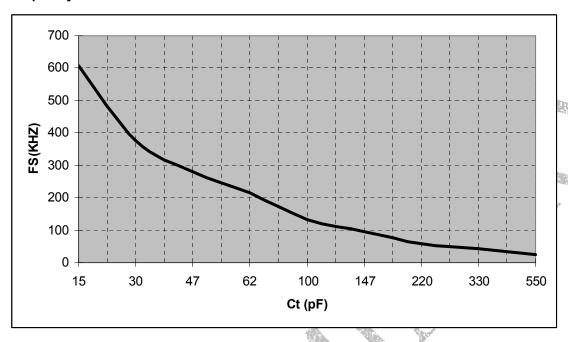
Parameter	Symbol	Conditions	Min	Тур	Max	Units	
REFERENCE SECTION							
ASM8P18S42 & ASM8P1843							
Output voltage	V_{REF}	$T_A = +25^{\circ}C, I_{OUT} = 1n$	4.90	5.00	5.1	V	
Line Regulation	ΔV_{REF}	12V < V _{DD} < 18V, I _{OU}		25		mV	
Total Reference variation		Line, Temperature				0.7	%
Temperature Stability	TC _{REF}			4	0.5	-	mV/°C
Load Regulation (ASM8P1843)		ImA < lo < 20mA		7	25		mV
ERROR AMPLIFIER SECTION				The state of the s	illo-		
Input Bias Current	I _{BIAS}		A		-20	Salar Pr	μA
Input Voltage	Vı	V _{pin1} = 1.25V	The state of the s	1.2	1.25	1.3	V
Open Loop Voltage Gain	A _{VOL}			FREE	65		dB
Power Supply Rejection Ratio	PSRR	V _{START} < V _{CC} < V _{CC} n	nax		80		dB
Output Sink Current	I _{OL}	V _{FB} = 1.32V, V _{COMP} =	0.15V		-1.5		mA
Output Source Current	I _{OH}	V_{FB} = 1.18V, V_{COMP} =	4.17V		0.3		mA
High Output Voltage	V _{OH}	V _{FB} = 1.25V, R _L = 15I	ΚΩ	4.17			V
Low Output Voltage	V _{OL}	V _{FB} = 1.25V			0.15		V
CURRENT SENSE SECTION		The state of the s					
Over Current Protection Threshold	V _{I(MAX)}	FB = 0V (V _{COMP} = 5V)	0.90	1.00	1.10	V
Delay to output	T _{PD}	$V_{FB} = 0V$, $I_{SNS} = 0$ to 2	2V			125	ns
Under Current Sense Period	Tucs				200		ms
Under Current Recovery Period	Tucsp				3		Cycles of PWM Frequency
	Cyclo Skip	ASM8P18S42, ASM8P18S42ER			1/4		
Cycle Skip	Cycle Skip condition: I _{SENS} ≤	ASM8P1843 ASM8P18S43E ASM8P18S44E		1/10		x f _S	
	0.1V	ASM8P18S45ER			No Skip		
OUTPUT SECTION							
Low Output Voltage	V _{OL}	I _{SINK} = 50mA I _{SINK} = 200mA		0.128 0.470		V	
High Output Voltage	V _{OH}	I _{SOURCE} = 50mA =15V I _{SOURCE} = 200mA			14.71 13.77		V
On Resistance, High	R _{DS(ON)H}	I _{SOURCE} = 0.2A			6.5		Ω
On Resistance, Low	R _{DS(ON)L}	I _{SINK} = 0.2A			2.5		Ω



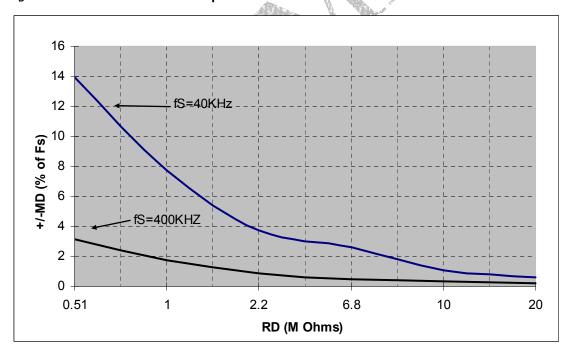
Parameter	Symbol	Conditions	Min	Тур	Max	Units
Rise Time	t _R	$T_A = 25^{\circ}C$, $C_L=1nF$	30			nS
Fall Time	t _F	$T_A = 25$ °C, $C_L = 1$ nF	30			nS
Shoot Through Current				0		4
UVLO SECTION			•		(4
Start threshold	$V_{th(START)}$	ASM8P1843, ASM8P18S43ER, ASM8P18S45ER,		7.8		V
	u(0174(1)	ASM8P18S42, ASM8P18S42ER ASM8P18S44ER		15.4		A series
Stop Threshold	$V_{th(STOP)}$	ASM8P1843, ASM8P18S43ER, ASM8P18S45ER ASM8P18S42,		6.7		V
		ASM8P18S42ER, ASM8P18S44ER		10.2	Mer Assert	
PWM SECTION		***				
PWM frequency	f _S	All the state of t	40	St.	400	kHz
		ASM8P18S44ER, ASM8P18S45ER	0		50	
Duty Cycle Range	لمر	ASM8P18S42, ASM8P18S42ER, ASM8P1843, ASM8P18S43ER	0		95	%
TOTAL DEVICE	A		l.			
Start up Current	I _{ST}				275	μA
Peak Output Current	I _{OUT(PK)}			1000		mA
Operating Current	I _{CC(OPR)}	$V_{FB} = 0$; $I_{SNS} = 0.5$; $V_{DD} = 15V$		5	6	mA
Thermal Shutdown	Vz	Junction Temp		155		°C
Thermal Recovery	, Jan			126		°C
SPREAD SPECTRUM SECTION	To the last of the					
		ASM8P18S43ER, ASM8P18S45ER		1/20		of Switching
Modulation Rate		ASM8P18S42, ASM8P18S42ER, ASM8P18S44ER		1/10		Frequency (KHz)
Modulation Depth Refer R _D Resistor Vs. % Modulation Depth Plot						
OSCILLATOR SECTION						
Frequency change with Voltage	Df/d V _{CC}			0.04	0.05	%
Oscillator Amplitude					1.66	V (Pk-Pk)
Temperature Stability	Tosc			0.1		%/°C



Frequency Selection Curve



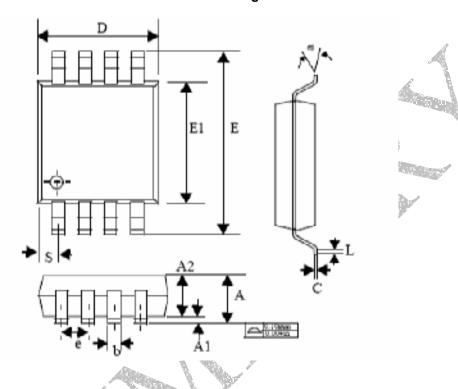
R_D Resistor vs % Modulation Depth Plot





Package Information

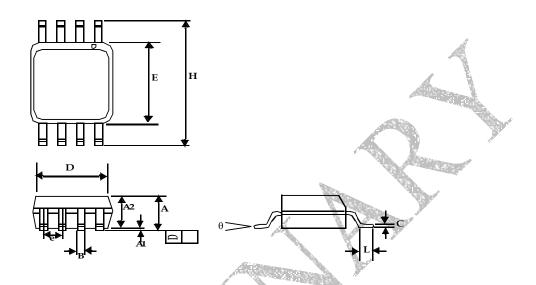
8-lead MSOP Package



	Dimensions						
Symbol	Inc	hes	Millimeters				
	Min	Max	Min	Max			
A A	0.032	0.044	0.81	1.10			
A1	0.002	0.006	0.05	0.15			
A2	0.030	0.038	0.76	0.97			
b	0.012 BSC		0.30	BSC			
C	0.004	0.008	0.10	0.20			
D	0.114	0.122	2.90	3.10			
е	0.025	6 BSC	0.65	BSC			
E1	0.114	0.122	2.90	3.10			
Е	0.184	0.200	4.67	5.08			
L	0.016	0.026	0.41	0.66			
θ	0°	6°	0°	6°			
S	0.020	6 BSC	0.52	BSC			



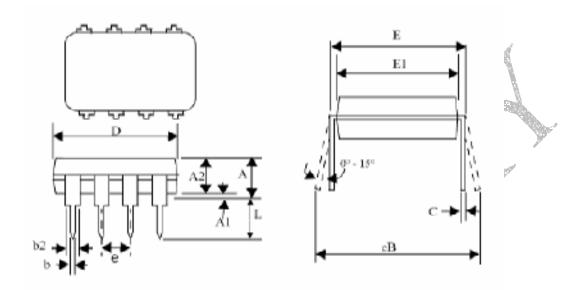
8-lead (150-mil) SOIC Package



	Dimensions						
Symbol	Inc	hes	Millimeters				
	Min Max		Min	Max			
A1	0.004	0.010	0.10	0.25			
Α	0.053	0.069	1.35	1.75			
A2	0.049	0.059	1.25	1.50			
В	0.012	0.020	0.31	0.51			
C	0.007	0.010	0.18	0.25			
D	0.193	BSC	4.90	BSC			
E	0.154	BSC	3.91	BSC			
е	0.050	BSC	1.27 BSC				
Н	0.236	BSC	6.00	BSC			
L	0.016 0.050		0.41	1.27			
θ	0°	8°	0°	8°			



8-lead PDIP Package



	Dimensions						
Symbol	Inc	hes	Millimeters				
	Min Max		Min	Max			
Α		0.210	*	5.33			
A1	0.015		0.38				
A2	0.115	0.195	2.92	4.95			
b b	0.014	0.022	0.36	0.56			
b2	0.045	0.070	1.14	1.78			
C	0.008	0.014	0.20	0.36			
D	0.355	0.400	9.02	10.16			
Е	0.300	0.325	7.62	8.26			
E1	0.240	0.280	6.10	7.11			
е	0.10	BSC	2.54	BSC			
eВ		0.430		10.92			
L	0.115	0.150	2.92	3.81			



Ordering Information

ASM Ordering Part Number	Package	Operating Temp Range	Start-up Voltage	Minimum Operating Voltage	Maximum Duty Cycle	Modulation Depth Control	Peak Output Current	Package Top Mark
ASM8I18S42ERF-08-Px	8-PDIP	-45 to 85°C	15.4V	10.2V	95	External R	1A	8I18S42ERF
ASM8I18S42ERF-08-Mx	8-MSOP	-45 to 85°C	15.4V	10.2V	95	External R	1A 🐬	8I18S42ERF
ASM8I18S42ERF-08-Sx	8-SOIC	-45 to 85°C	15.4V	10.2V	95	External R	1A	8I18S42ERF
ASM8P18S42ERF-08-Px	8-PDIP	0 to 70°C	15.4V	10.2V	95	External R	1A	8P18S42ERF
ASM8P18S42ERF-08-Mx	8-MSOP	0 to 70°C	15.4V	10.2V	95	External R	1A	8P18S42ERF
ASM8P18S42ERF-08-Sx	8-SOIC	0 to 70°C	15.4V	10.2V	95	External R	1A	8P18S42ERF
ASM8I18S43ERF-08-Px	8-PDIP	-45 to 85°C	7.8V	6.7V	95	External R	1A	8I18S43ERF
ASM8I18S43ERF-08-Mx	8-MSOP	-45 to 85°C	7.8V	6.7V	95	External R	1A	8I18S43ERF
ASM8I18S43ERF-08-Sx	8-SOIC	-45 to 85°C	7.8V	6.7V	95	External R	1A	8I18S43ERF
ASM8P18S43ERF-08-Px	8-PDIP	0 to 70°C	7.8V	6.7V	95	External R	1A	8P18S43ERF
ASM8P18S43ERF-08-Mx	8-MSOP	0 to 70°C	7.8V	6.7V 🔑	95	External R	1A	8P18S43ERF
ASM8P18S43ERF-08-Sx	8-SOIC	0 to 70°C	7.8V	6.7V	95	External R	1A	8P18S43ERF
ASM8I18S44ERF-08-Px	8-PDIP	-45 to 85°C	15.4V	10.2V	50	External R	1A	8I18S44ERF
ASM8I18S44ERF-08-Mx	8-MSOP	-45 to 85°C	15.4V	10.2V	50	External R	1A	8I18S44ERF
ASM8I18S44ERF-08-Sx	8-SOIC	-45 to 85°C	15.4V	10.2V	50	External R	1A	8I18S44ERF
ASM8P18S44ERF-08-Px	8-PDIP	0 to 70°C	15.4V	10.2V	50	External R	1A	8P18S44ERF
ASM8P18S44ERF-08-Mx	8-MSOP	0 to 70°C	15.4V	10.2V	50	External R	1A	8P18S44ERF
ASM8P18S44ERF-08-Sx	8-SOIC	0 to 70°C	15.4V	10.2V	50	External R	1A	8P18S44ERF
ASM8I18S45ERF-08-Px	8-PDIP	-45 to 85°C	7.8V	6.7V	50	External R	1A	8I18S45ERF
ASM8I18S45ERF-08-Mx	8-MSOP	-45 to 85°C	7.8V	6.7V	50	External R	1A	8I18S45ERF
ASM8I18S45ERF-08-Sx	8-SOIC	-45 to 85°C	7.8V	6.7V	50	External R	1A	8I18S45ERF
ASM8P18S45ERF-08-Px	8-PDIP	0 to 70°C	7.8V	6.7V	50	External R	1A	8P18S45ERF
ASM8P18S45ERF-08-Mx	8-MSOP	0 to 70°C	7.8V	6.7V	50	External R	1A	8P18S45ERF
ASM8P18S45ERF-08-Sx	8-SOIC	0 to 70°C	7.8V	6.7V	50	External R	1A	8P18S45ERF
ASM8I18S42F-08-Px	8-PDIP	-45 to 85°C	15.4V	10.2V	95	NA	1A	8I18S42F
ASM8I18S42F-08-Mx	8-MSOP	-45 to 85°C	15.4V	10.2V	95	NA	1A	8I18S42F
ASM8I18S42F-08-Sx	8-SOIC	-45 to 85°C	15.4V	10.2V	95	NA	1A	8I18S42F
ASM8P18S42F-08-Px	8-PDIP	0 to 70°C	15.4V	10.2V	95	NA	1A	8P18S42F
ASM8P18S42F-08-Mx	8-MSOP	0 to 70°C	15.4V	10.2V	95	NA	1A	8P18S42F
ASM8P18S42F-08-Sx	8-SOIC	0 to 70°C	15.4V	10.2V	95	NA	1A	8P18S42F
ASM8I1843F-08-Px	8-PDIP	-45 to 85°C	7.8V	6.7V	95	NA	1A	8I1843F
ASM8I1843F-08-Mx	8-MSOP	-45 to 85°C	7.8V	6.7V	95	NA	1A	8I1843F
ASM8I1843F-08-Sx	8-SOIC	-45 to 85°C	7.8V	6.7V	95	NA	1A	8I1843F
ASM8P1843F-08-Px	8-PDIP	0 to 70°C	7.8V	6.7V	95	NA	1A	8P1843F
ASM8P1843F-08-Mx	8-MSOP	0 to 70°C	7.8V	6.7V	95	NA	1A	8P1843F
ASM8P1843F-08-Sx	8-SOIC	0 to 70°C	7.8V	6.7V	95	NA	1A	8P1843F

Note: All Alliance Semiconductor Lead Free Parts are RoHS Compliant. All parts are Lead Free by default. Contact factory for Non Lead Free Parts.

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Part Number: ASM8P18S42 / ASM8P18S42ER ASM8P18S42 / ASM8P18S43ER ASM8P18S44ER / ASM8P18S45ER

Document Version: v0.6

Note: This product utilizes US Patent # 6,646,463 Impedance Emulator Patent issued to Alliance Semiconductor, dated 11-11-2003

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