EST2800C
Green-Mode PWM Flyback (SSR) Controller

General Description

EST2800C is a higher integrated PWM flyback controller. It provides several features to enhance the efficiency of flyback converters, and the proprietary of green-mode function provides gradually mode of frequency reducing under light-load. For zero-load condition, it also built-in burst mode and several parameters to completely turn off PWM output and minimize the power loss of external resistance.

EST2800C also built-in the leading-edge blanking (LEB) of the current sensing and feedback loop to screen the spike noise form any input signal. The internal slope compensation can limit the constant output over universal AC input range. The sawtooth over frequency function for EMI improved solution. Meanwhile,

EST2800C also provides various protection, such as, OLP (Over Load Protection) and OVP (Over Voltage Protection) to prevent the circuit damage from the abnormal conditions.

EST2800C is available in SOT-23-6 and DIP-8, SOP-8 packages

Features

- High voltage CMOS process with excellent ESD
- protection
- Soft Start Function
- Very low startup current (<20uA)
- Current mode control
- Built-in slope compensation
- LEB (Leading-edge blanking) on CS Pin
- Non-audible-noise Green mode control
- UVLO (Under voltage lockout)
- OVP (Over Voltage Protection)
- OLP (Over load protection)
- Opto coupler short protection
- Feedback open protection
- High noise immunity
- RoHS compliant and Halogen free

Application

- Switching ac/dc adapter and battery charger
- ATX standby power
- Open frame switching power and CD(R)
- Set-top-boxes(STB) 384XreplacementC

Ordering Information

Part Number	Freq.	Protection						
	KHZ	V_{DD} OVP	AUX. OVP	AUX. UVP	OLP	BNI/O	CS Open	SCP
EST.2800C	PWM (Max) 65KHz	Hiccup	Hiccup	Hiccup	Hiccup/65ms	NA	Hiccup	Hiccup

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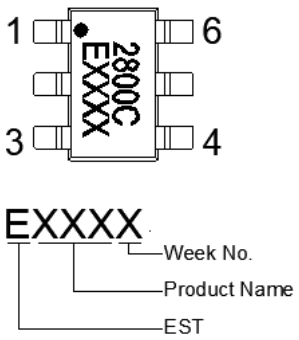
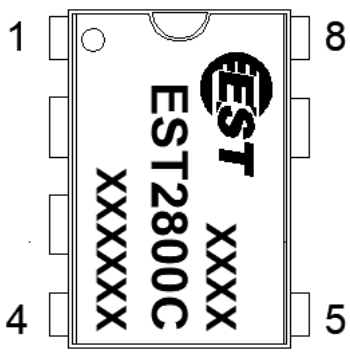
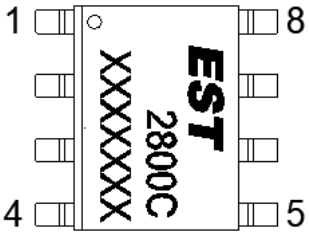


SOT-23-6



DIP-8

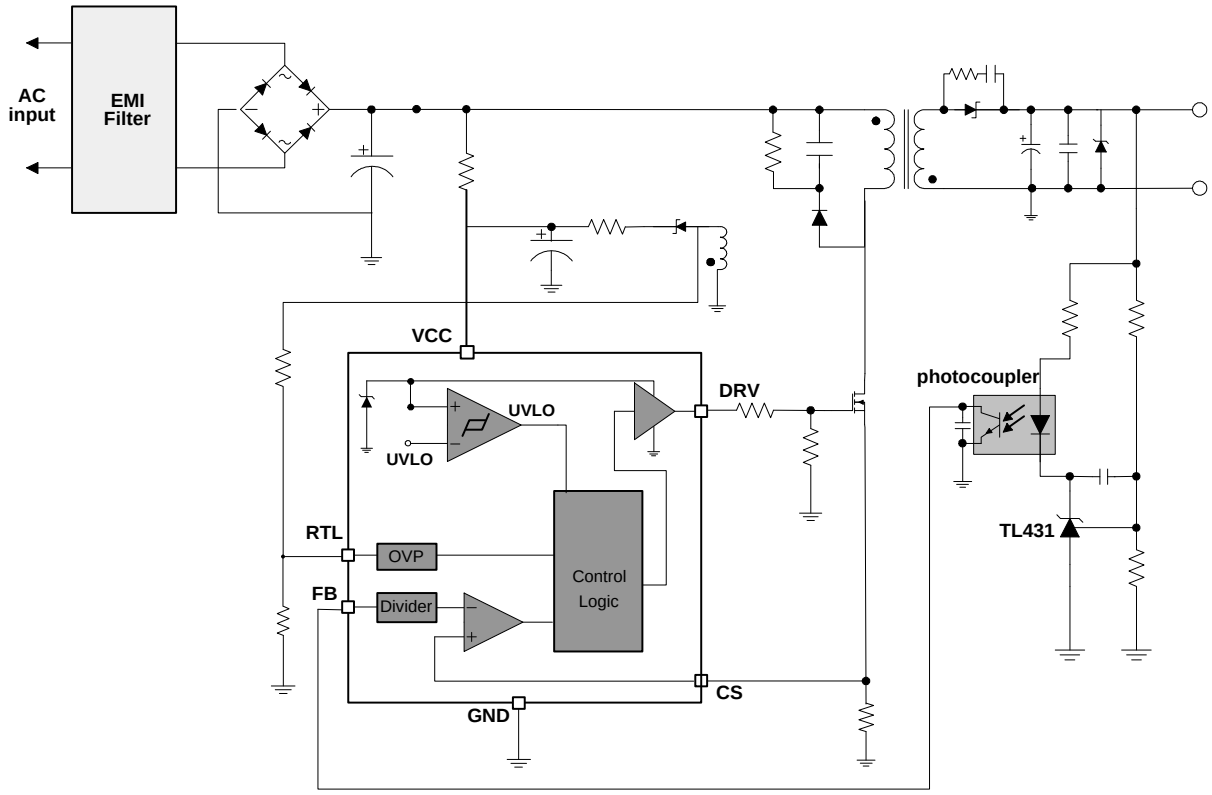


SOP-8

Pin Assignments and Package Type

SOT-23-6	DIP-8/SOP-8	NAME Description	Description
1	8	GND	Ground
2	7	FB	Voltage input pin by connecting a photo-coupler
3	5	RTL	This pin also used for output over voltage protection (Output OVP)
4	4	CS	Current Sense input. The current sense resistor between this pin and GND is used for current limit setting
5	2	VCC	Power supply pin
6	1	DRV	Driver output to driver the external MOSFET
	3/6	NC	No internal connection

Application Circuit



Absolute Maximum Ratings

Parameter Symbol		Symbol	Limit Values		Unit	Remark
			Min.	Max		
Supply Voltage V_{DD}		V_{DD}	-0.3	40	V	
FB,CS,RTL Voltage		V_{RTL},V_{FB},$V_{CS,}$	-0.3	7	V	
Gate Driver Voltage		V_{GATE}	-0.3	V_{DD}+0.3	V	
Operation Junction Temperature		Tj	-40	125	℃	
Operation Ambient Temperature		TA	-25	85	℃	
Storage Temperature		T_{stg}	-55	150	℃	
Power Dissipation	Ta = 25℃	PD	-	408	mW	SOT23-6
Junction-to-Ambient Thermal Resistance*		θ_{JA}		245	℃/W	
Junction-to-Case Thermal Resistance**		θ_{JC}		55	℃/W	
Lead temperature (Soldering, 10 sec)			-	260	℃	
ESD Voltage Protection	HBM	$V_{ESD-HBM}$	-	3.0	KV	
	MM	V_{ESD-MM}	-	300	V	

Stress beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliablity

Recommended Operating Conditions

Parameter Symbol	Symbol	Limit Values		Unit	Remarks
		Min.	Max		
Supply Voltage V_{DD}	V_{DD}	11	29.5	V	
Startup Resistor Value	R_{star}	1	14	MΩ	
Ambient temperature range	T_{opr}	-40	85	℃	

DC Electrical Characteristics (VCC =15V, Ta=25°C)

Supply Voltage (VCC Pin):

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Startup Current	I_{CC-ST}	2.5	4.5	6.5	μA	UVLO ON - 0.1V
Operating Current (with 1nF load on DRV pin)	I_{CC-OP}	0.4	0.6	0.8	mA	VFB=0V
	I_{CC-OP}	1.0	1.6	2.5	mA	VFB=2.5V CL=1nF
	I_{CC-OLP}	0.4	0.5	0.6	mA	OLP
	I_{CC-OVP}	0.4	0.6	0.8	mA	VCC OVP
UVLO (off)	$V_{UVLO-OFF}$	6.5	7.5	8.5	V	
UVLO (on)	$V_{UVLO-ON}$	15.5	16.5	17.5	V	
V_{CC} OVP Level	V_{OVP}	26.5	28	29.5	V	
V_{CC} level in Latch off mode (3Meg start-up resistor)	$V_{CC-LHON}$		6		V	
Latch off mode release voltage	$V_{CC-LHOFF}$		3.5		V	
Holding current at latch off mode	I_{DD-LH}		20		uA	VCC=5V

Voltage Feedback(FB Pin):

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Short Circuit Current	I_{Zero}		0.4		mA	VFB=0V
Open Loop Voltage	V_{FB-OP}		5		V	FB pin open
Burst mode end voltage(off)	V_{BUR_OFF}		1.1		V	
Burst mode start voltage(on)	V_{BUR_ON}		1.0		V	

Current Sensing (CS Pin):

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Maximum Input Voltage Threshold	V_{CSH}	0.8	0.85	0.9	V	
Leading Edge Blanking Time	T_{LEB}		400		ns	
Propagation Delay to Output	T_{PD}		100		ns	

Oscillator for Switching Frequency :

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
PWM Frequency	f_{OSC1}	60	65	70	kHz	
Frequency Jittering Range	f_{jitter}	+/-4	+/-6	+/-8	kHz	
Green Mode frequency	f_{Green}	20	22	26	kHz	
Maximum Duty Cycle	D_{MAX}	70	75	80	%	
Frequency v.s Temp. Stability	f_{DT}		3	5	%	(-40°C ~85°C)
Frequency v.s Voltage Stability	f_{DV}		1	3	%	(VCC=11V-25V)

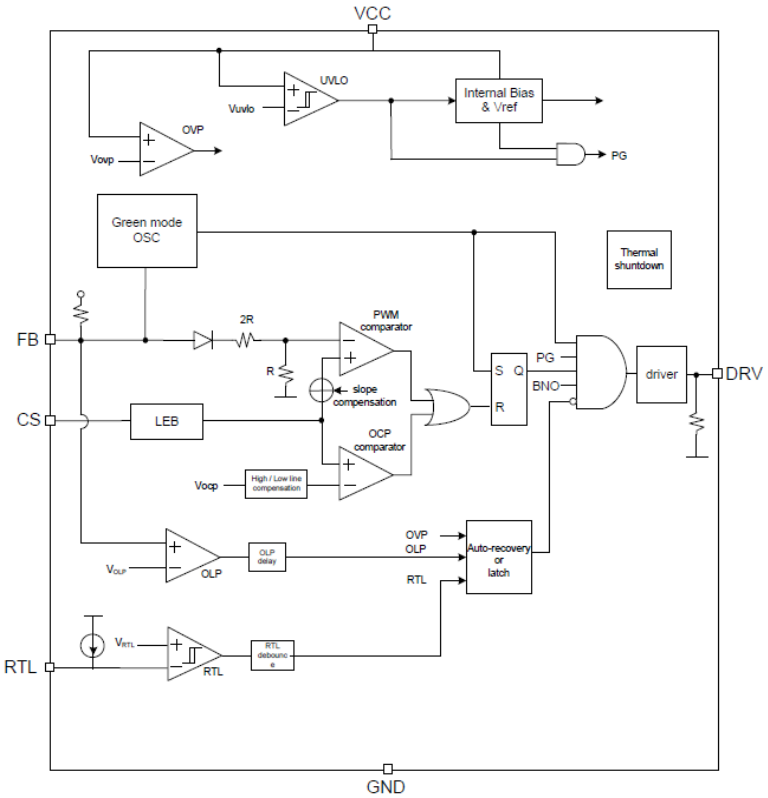
Gate Drive Output (DRV Pin):

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Rising Time	T_R		220		ns	V_{CC} = 15V, C_L= 1nF
Falling Time	T_F		80		ns	V_{CC} = 15V, C_L= 1nF
Vclamp	V_{gate}	12	16			V_{gate} (VCC = 25V)

OLP (Over Load Protection):

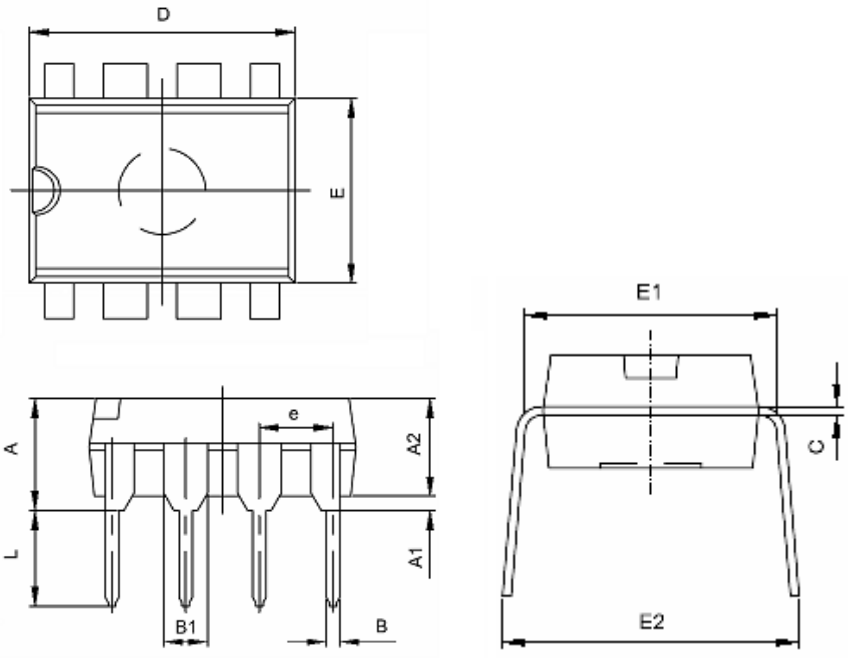
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
OLP Trip Level	V_{FB_OLP}		4.2		V	
OLP Delay Time 1	T_{FB_OLP}		64		ms	2800A/2800R/2800L/2800B/2800M
OLP Delay Time 2	T_{FB_OLP}		30		ms	2800H F_S=135kHz

Block Diagram



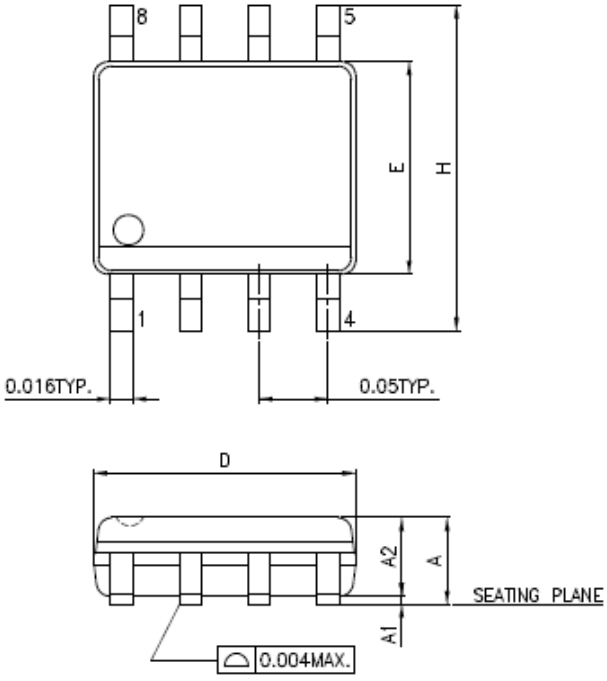
Package Information

DIP-8 Package



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.710	4.310	0.146	0.170
A1	0.510		0.020	
A2	3.200	3.600	0.126	0.142
B	0.360	0.560	0.014	0.022
B1	1.524(TYP)		0.060(TYP)	
C	0.204	0.360	0.008	0.014
D	9.000	9.400	0.354	0.370
E	6.200	6.600	0.244	0.260
E1	7.620(TYP)		0.300(TYP)	
e	2.540(TYP)		0.100(TYP)	
L	3.000	3.600	0.118	0.142
E2	8.200	9.400	0.323	0.370

SOP-8 Package （mm）



Symbols	Dimensions In Inches			Dimensions In millimeters		
	MIN.	NOR.	MAX.	MIN.	NOR.	MAX.
A	0.050	0.061	0.072	1.270	1.549	1.829
A1	0.000	------	0.010	0.000	------	0.254
A2	------	------	0.062	------	------	1.575
D	0.185	0.193	0.200	4.699	4.902	5.080
E	0.147	0.154	0.160	3.734	3.912	4.064
H	0.225	0.237	0.249	5.715	6.020	6.325
L	0.013	0.033	0.053	0.330	0.838	1.346
θ	0°	4°	8°	0°	4°	8°

SOT-23-6L:

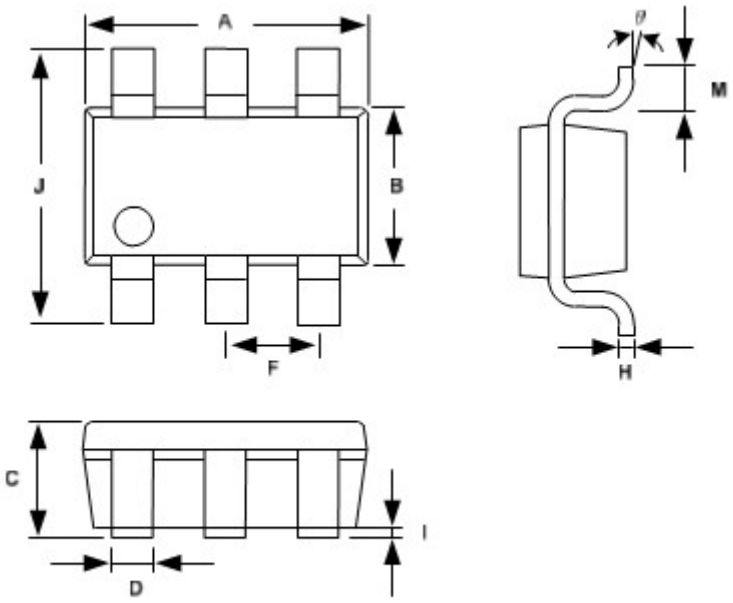
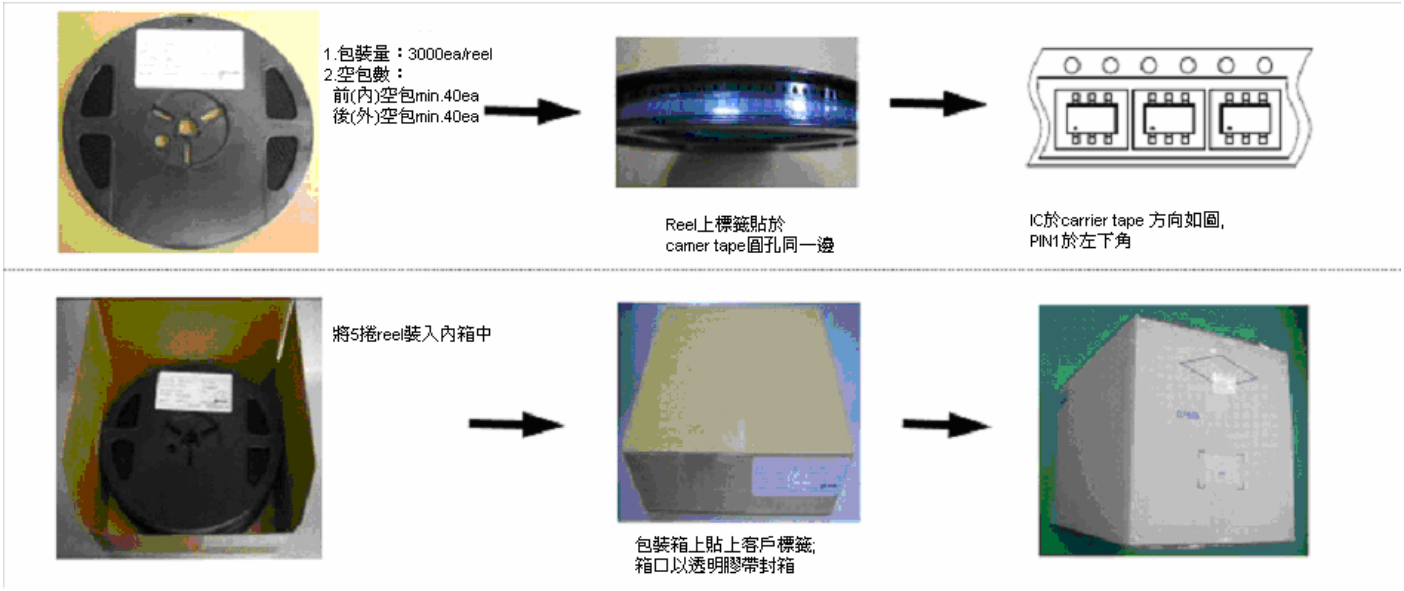


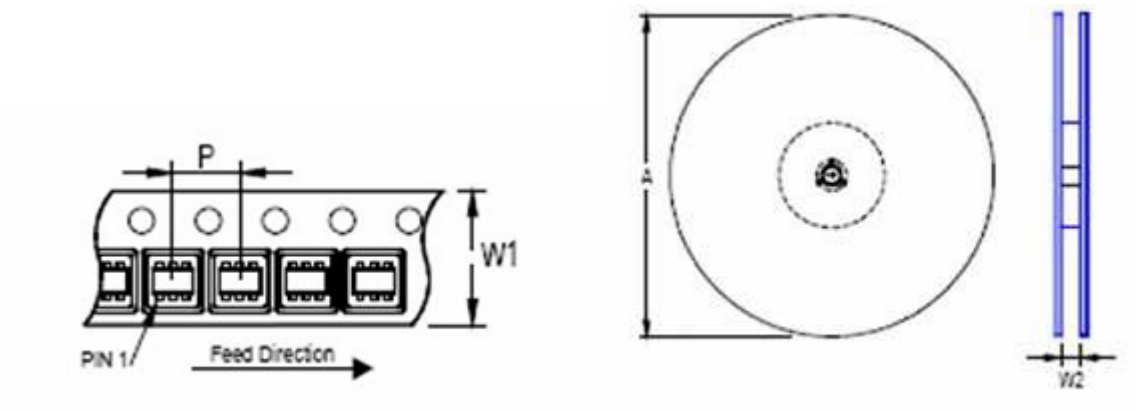
Fig 8

Symbol	Dimension in mm		Dimension in inch	
	MIN.	MAX.	MIN.	MAX.
A	2.692	3.099	0.106	0.122
B	1.397	1.803	0.055	0.071
C	------	1.450	------	0.057
D	0.300	0.550	0.012	0.022
F	0.838	1.041	0.033	0.041
H	0.080	0.254	0.003	0.010
I	0.050	0.150	0.002	0.006
J	2.600	3.000	0.102	0.118
M	0.300	0.600	0.012	0.024
θ	0°	10°	0°	10°

Shipping packing



Tape Reel Data



Package Type SOT-26	Tape Size (W1) (mm)	Pocket Pitch (P) (mm)	Reel Size (A) (mm)	Reel Width (W2) Min./Max. (mm)	Units Per Reel pcs.
6 Lead	8	4	180	8.4/9.9	3000

Update History

Revision	Date	Update
1.00	August 06, 2015	Preliminary version