SP6850
Green-Mode PWM Controller

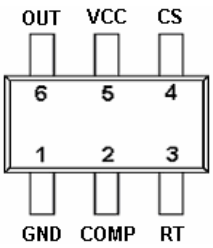
DESCRIPTION
The SP6850 is the current mode PWM controller with green-mode power-saving operation, to meet the low standby-power needs of low-power SMPS. This green-mode function enables the power supply to easily meet even the strictest power conservation requirements. The functions such as the leading-edge blanking of the current sensing, internal slope compensation and the small package provide the high efficiency / low cost for SMPS power applications. SP6850 is processed by BiCMOS fabrication, that enables reducing the start-up current and the operating current. SP6850 is available by SOT-23-6L / DIP-8P packages.

APPLICATIONS
- AC/DC Switching Power Adaptor
- Battery Charger
- PC 5V Standby Power.
- Open-Frame Switching Power Supply

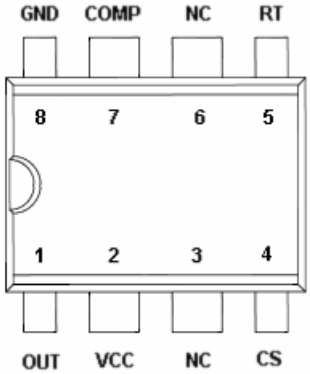
FEATURES
- High-Voltage BiCMOS Process
- Very Low Startup Current (Typ≡ 8μA)
- Under Voltage Lockout (UVLO)
- Current Mode Control with Cycle Peak
- Current Limiting
- Leading-Edge Blanking
- Programmable Switching Frequency
- Internal Slope Compensation
- Green-Mode Control for Power Saving
- Non-audible-noise Green Mode Control
- 300mA Driving Capability
- OVP (Over Voltage Protection) on Vcc Pin

PIN CONFIGURATION

SOT-23-6L

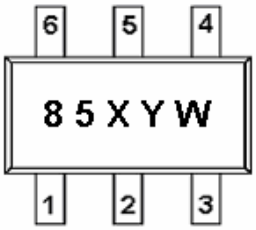


DIP-8P



PART MARKING

SOT-23-6L

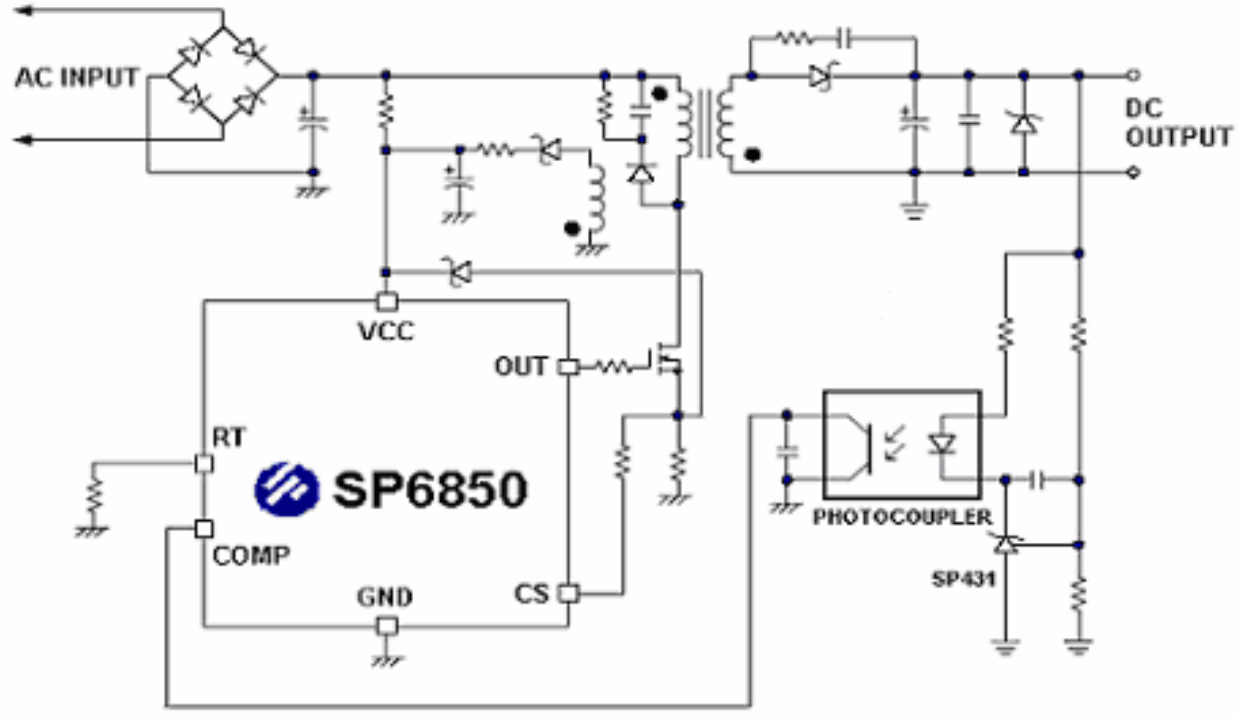


Y : Year Code
W : Week Code
X : Parts Code

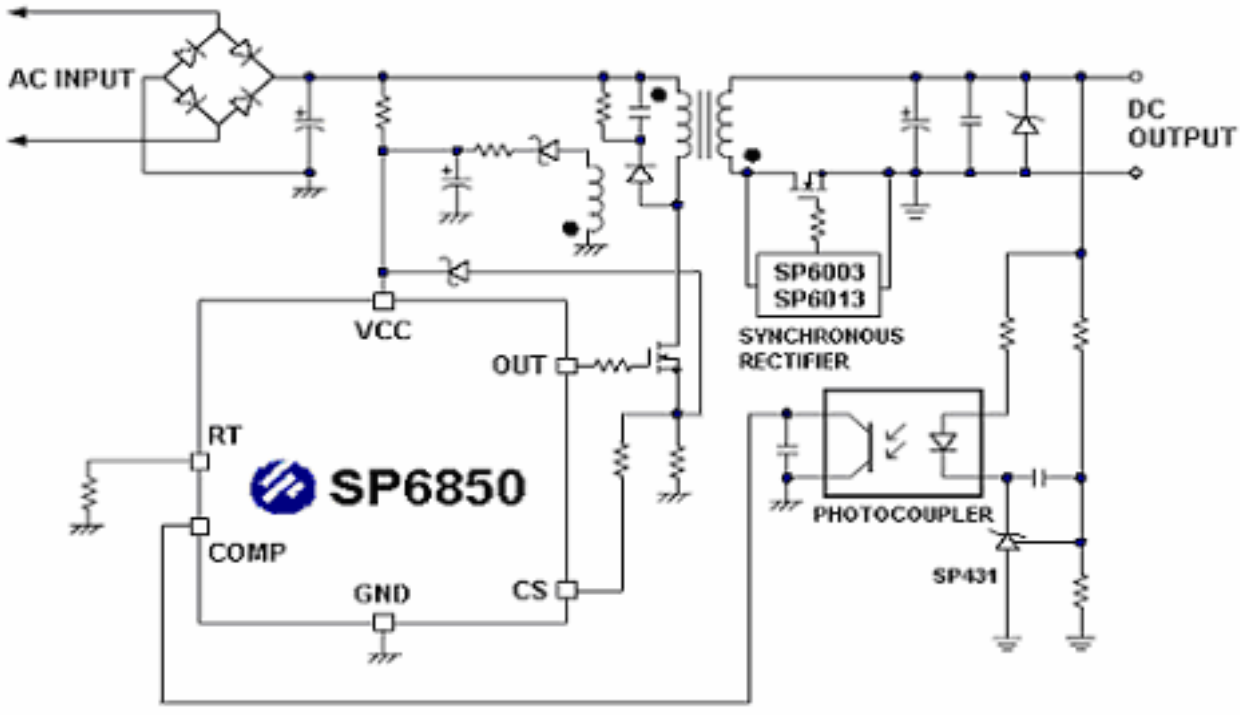
DIP-8P

A : Lot Code
B : Date Code

TYPICAL APPLCATION CIRCUIT



TYPICAL APPLCATION CIRCUIT (High Efficiency SMPS + Synchronous Rectifier)



PIN DESCRIPTION

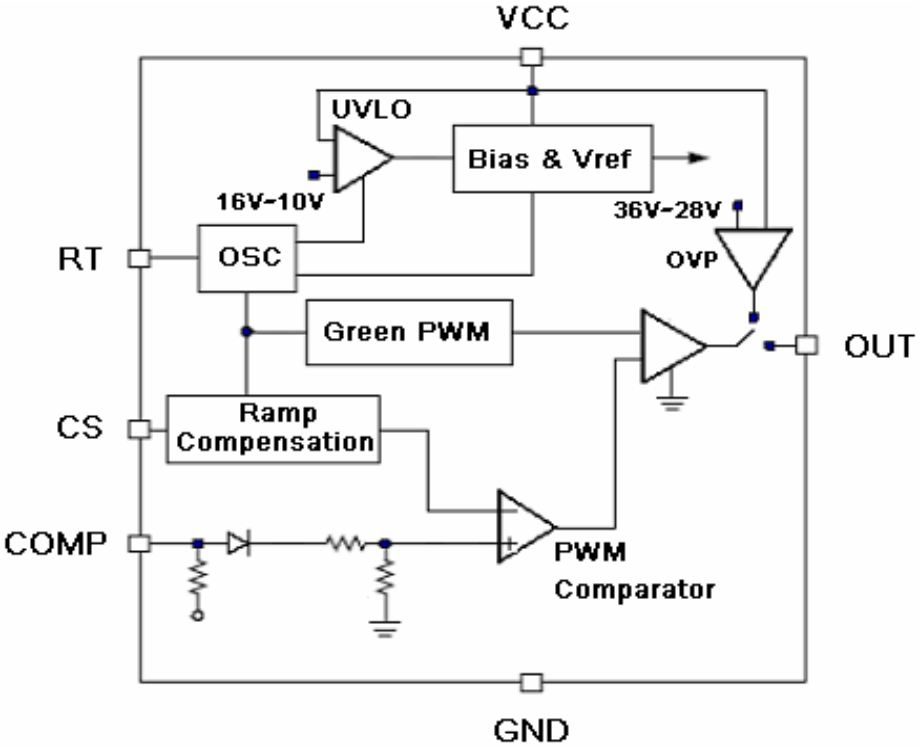
SP6850D8TG

Pin	Symbol	Description
1	OUT	Gate driver output to drive the external MOSFET
2	VCC	Supply Voltage in
3	NC	Unconnected pin
4	CS	Current sense. This pin senses the voltage across a resistor, to control PWM output. This pin also provides current amplitude information for current-mode control.
5	RT	This current is used to charge an internal capacitor, to determine the switching frequency.
6	NC	Unconnected pin
7	COMP	Voltage feedback. The pin provides the output voltage regulation signal., it provides feedback to the internal PWM comparator, so that the PWM comparator can control the duty cycle.
8	GND	Ground

SP6850S26RG

Pin	Symbol	Description
1	GND	Ground
2	COMP	Voltage feedback. The pin provides the output voltage regulation signal., it provides feedback to the internal PWM comparator, so that the PWM comparator can control the duty cycle
3	RT	This current is used to charge an internal capacitor, to determine the switching frequency.
4	CS	Current sense. This pin senses the voltage across a resistor, to control PWM output. This pin also provides current amplitude information for current-mode control
5	VCC	Supply Voltage in
6	OUT	Gate driver output to drive the external MOSFET

BLOCK DIAGRAM



ORDERING INFORMATION

Part Number	Package	Part Marking
SP6850AD8TG	DIP-8P	SP6850**I**
SP6850BD8TG	DIP-8P	SP6850**I**
SP6850AS26RG	SOT-23-6L	85AYW
SP6850BS26RG	SOT-23-6L	85BYW

※ SP6850AD8TG / SP6850BD8TG : Tube ; Pb – Free

※ SP6850AS26RG / SP6850BS26RG : Tape Reel ; Pb – Free

ABSOULTE MAXIMUM RATINGS (T_A=25℃, unless otherwise specified.)

The following ratings designate persistent limits beyond which damage to the device may occur.

Symbol	Parameter		Value	Unit
V_{CC}	DC Supply Voltage		36	V
$V_{COMP\,/\,RT\,/\,CS}$	SYNC Voltage		-0.3 ~ 7.0	V
P_D	Power Dissipation @ T_A=85℃ (*)		0.3	W
ESD	Human Body Model		4	KV
	Machine Model		300	V
T_J	Operating Junction Temperature Range		150	℃
T_{STG}	Storage Temperature Range		150	℃
T_{LEAD}	Pb-Free Lead Soldering Temperature for 5 sec.		260	℃
$R_{\Theta JC}$	Thermal Resistance Junction – Case (*)	SOT-23-6L	210	℃/W
		DIP-8P	95	

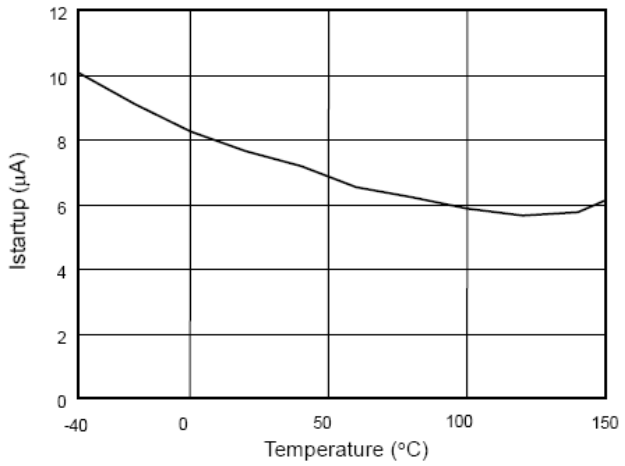
(*) The power dissipation and thermal resistance are evaluated under copper board mounted with free air conditions.

ELECTRICAL CHARACTERISTICS

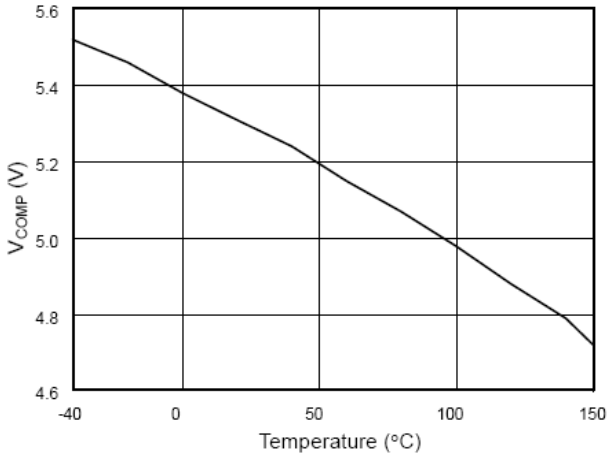
(T_A=25℃, V_{CC}=15V, unless otherwise specified.)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Supply Voltage (Vcc Pin)						
Istt	Startup Current			8	20	uA
Iop	Operating Current	VCOMP = 3V		2	4	mA
UVLO (off)	Min. Operating Voltage		9.0	10.0	11.0	V
UVLO (on)	Start Threshold Voltage		15.0	16.0	17.0	V
OVP Level	Over Voltage Protection		28		36	V
Voltage Feedback (Comp Pin)						
Isc	Short Circuit Current			2.2	3.0	mA
Vop	Open Loop Voltage			5.0		V
VTH(GM)	Green Mode Threshold VCOMP			2.35		V
Oscillator (RT Pin)						
FOSC	Frequency	RT=100KΩ	60.0	65.0	75.0	KHz
FOSC(GM)	Green Mode Frequency	Fs=65.0KHz		20		KHz
Fdt	Frequency Variation versus Temp. Deviation	(-40°C ~105°C)			3	%
Fdv	Frequency Variation versus VCC Deviation	(VCC=11V-25V)			1	%
Current Sensing (CS Pin)						
Vcs(off)	Maximum Input Voltage	SP6850BD8TG SP6850BS26RG	0.8	0.85	0.9	V
		SP6850AD8TG SP6850AS26RG	0.7	0.75	0.8	
Zcs	Input impedance			50		KΩ
TPD	Delay to Output			150		nS
Gate Driver Output (OUT Pin)						
VOL	Output Low Level	VCC=15V, Io=20mA			1	V
VOH	Output High Level	VCC=15V, Io=20mA	8			V
Tr	Rising Time	Load Cap=1000pF		50	200	nS
Tf	Falling Time	Load Cap=1000pF		30	120	nS

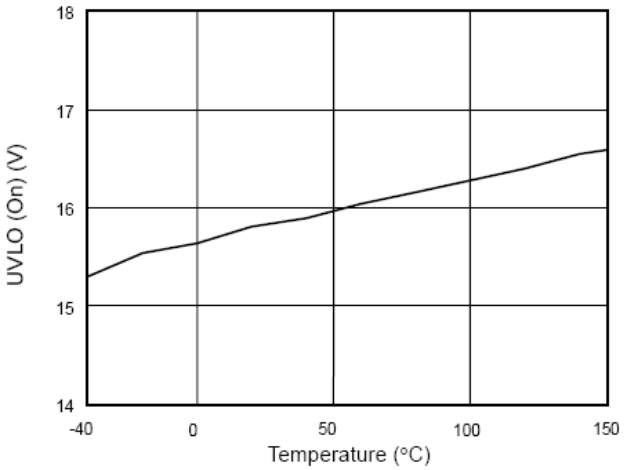
PERFORMANCE CHARACTERISTICS (T_A=25℃, unless otherwise specified.)



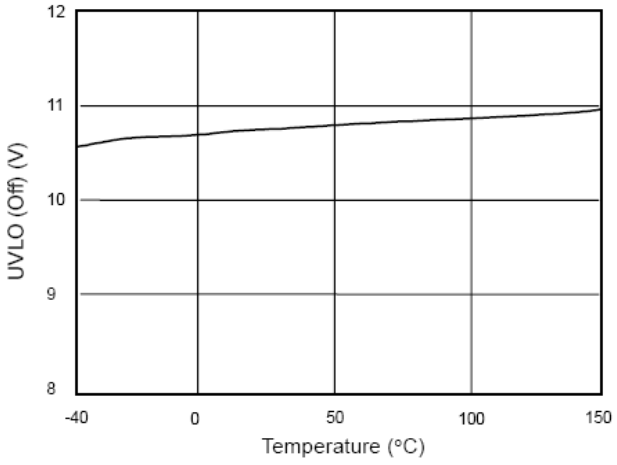
Startup Current (Istartup) vs. Temperature



V_{COMP} open loop voltage v.s. Temperature

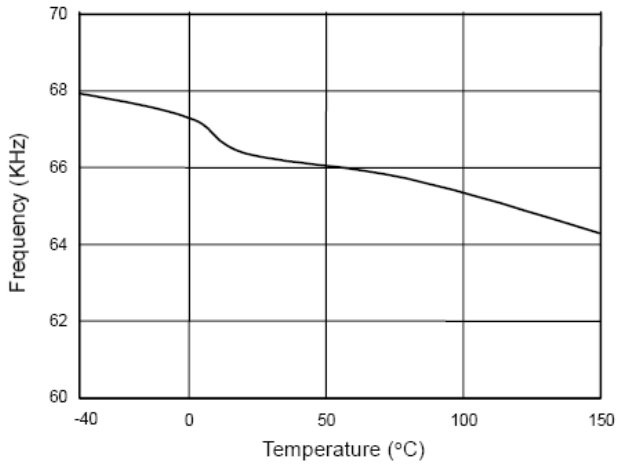


UVLO (On) vs. Temperature

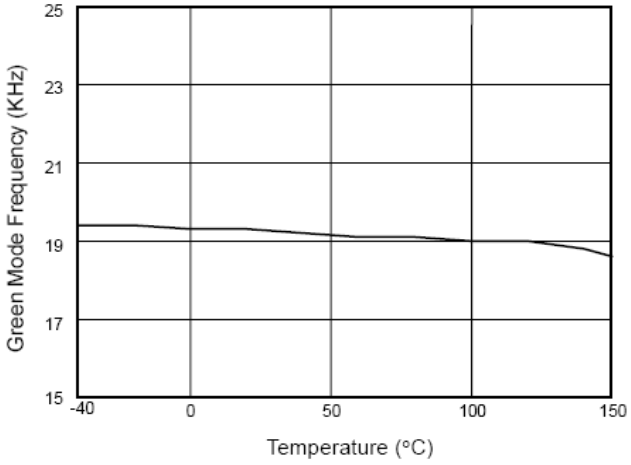


UVLO Off v.s. Temperature

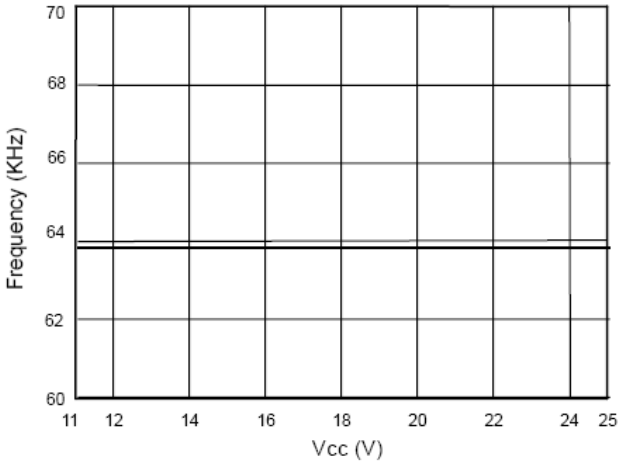
PERFORMANCE CHARACTERISTICS (T_A=25℃, unless otherwise specified.)



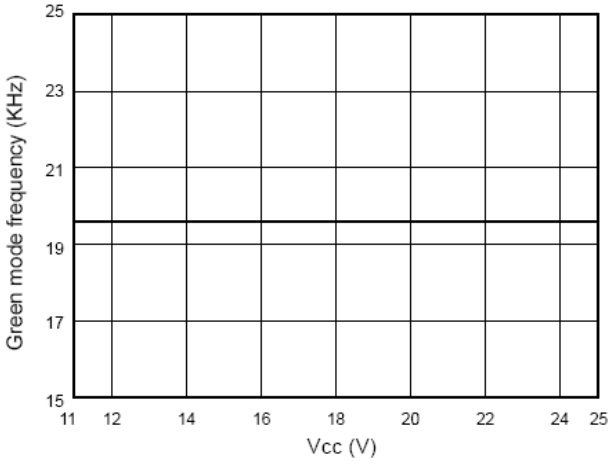
Frequency v.s. Temperature



Green Mode Frequency v.s. Temperature

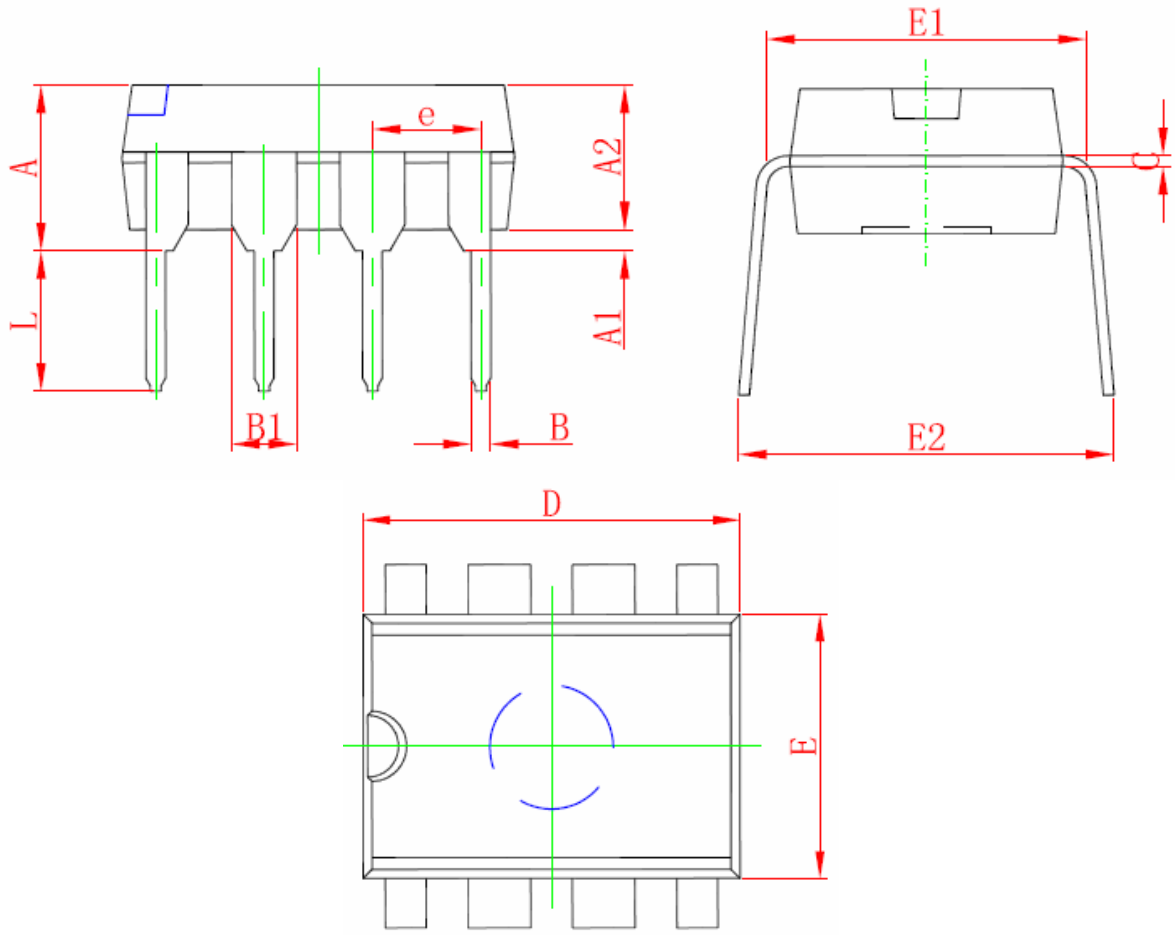


Frequency v.s. Vcc



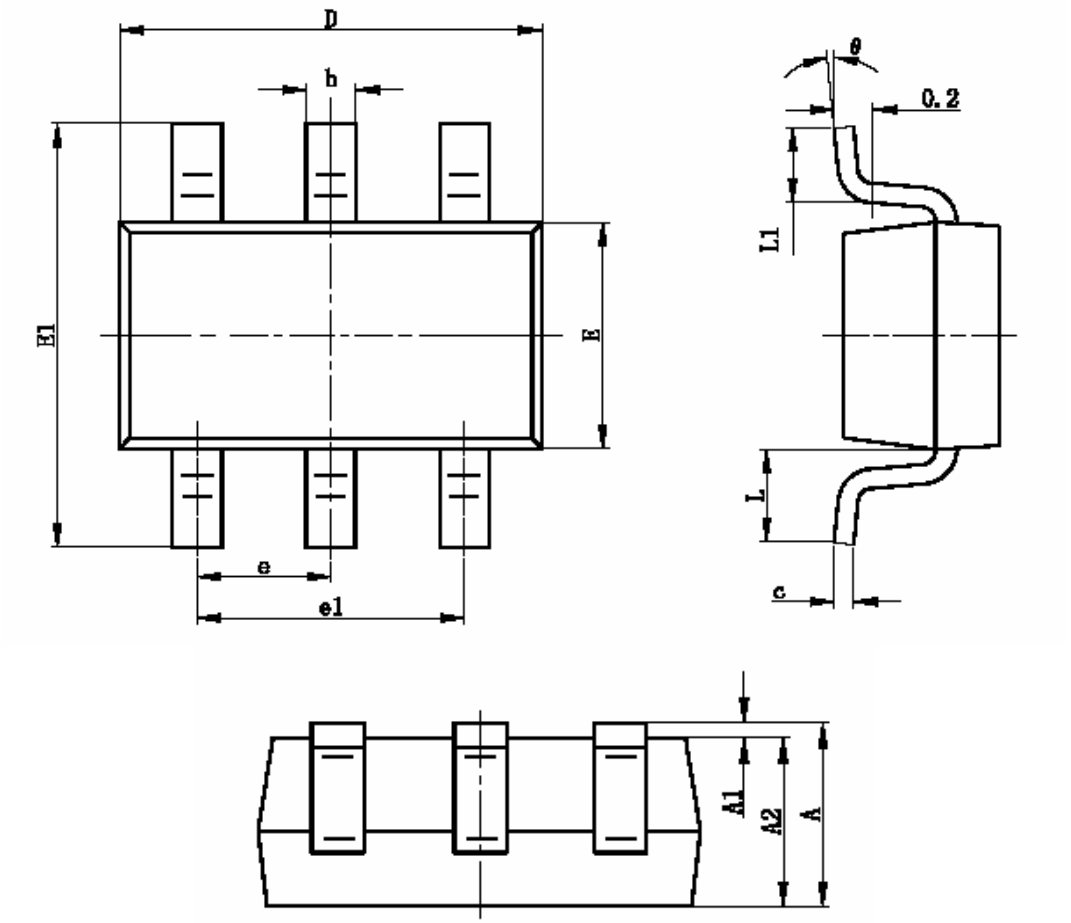
Green mode frequency v.s. Vcc

DIP- 8P PACKAGE OUTLINE



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	0.380	0.570	0.015	0.022
B1	1.524 (BSC)		0.060 (BSC)	
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	7.320	7.920	0.288	0.312
e	2.540 (BSC)		0.100 (BSC)	
L	3.000	3.600	0.118	0.142
E2	8.400	9.000	0.331	0.354

SOT-23-6L PACKAGE OUTLINE



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.400	0.012	0.016
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950TYP		0.037TYP	
e1	1.800	2.000	0.071	0.079
L	0.700REF		0.028REF	
L1	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

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