BM SEMI

# BM0853

## Green-Mode PWM Controller

### DESCRIPTION

The BM0853 is a low cost , low startup current , current mode PWM controller with green-mode power-saving operation. The integrated functions include the leading-edge blanking of the current sensing, internal slope compensation. It would provide the users a superior DC/DC power application of higher efficiency, low external component counts, and lower cost solution for applications.

The BM0853 features more protections or functions for the following characteristics :

※Add OLP (Over Load Protection) function to provide better protection performance for fault conditions like short circuit or over load.

※Modify the OVP (Over Voltage Protection) mechanism from the cycle-by-cycle mode to the hiccup mode.

BM0853 is available by SOT-23-6L and DFN8L packages.

### APPLICATIONS

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

BM0853A-升压控制器（非隔离）

BM0853 S-降压控制器（隔　离）

### FEATURES

- High-Voltage BiCMOS Process
- Very Low Startup Current (<20μA)
- Under Voltage Lockout (UVLO )
- Current Mode Control
- Non-audible-noise Green Mode Control
- Current Limiting
- LEB (Leading-Edge Blanking) on CS Pin
- OLP (Over Load Protection)
- OVP (Over Voltage Protection) on Vcc Pin
- Leading-Edge Blanking
- Programmable Switching Frequency
- Internal Slope Compensation
- Green-Mode Control for Power Saving
- 300mA Driving Capability
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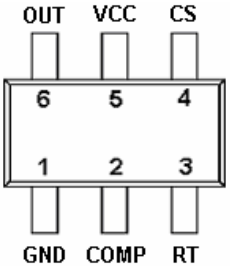
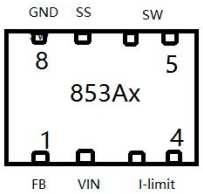
### PIN CONFIGURATION

**SOT-23-6L**




DFN8




| 型号PART NO | Function | Efficiency | INPUT | Describe | Replace |
|---|---|---|---|---|---|
| BM0853S | 降压控制器 | 85%-max | 12-100V输入 | 隔离的 | 昂宝 |
| BM0853A | 升压控制器 | 93%效率特高 | +2.8V-28V输入 | 非隔离 | XL6008、6009 |
| | | | | | |
| 型号PART NO | Package | OUTPUT 功率 | OUTPUT Voltage | Describe | Support |
| BM0853S | SOT23-6 | 10W-max | 12V或15V输出 | 隔离的 | 有隔离变压器设计样品 |
| BM0853A | DFN8 3*3 | 50W-max | 9V-80V输出 | 非隔离 | 有DEMO，大电流大功率输出 |

# BM0853
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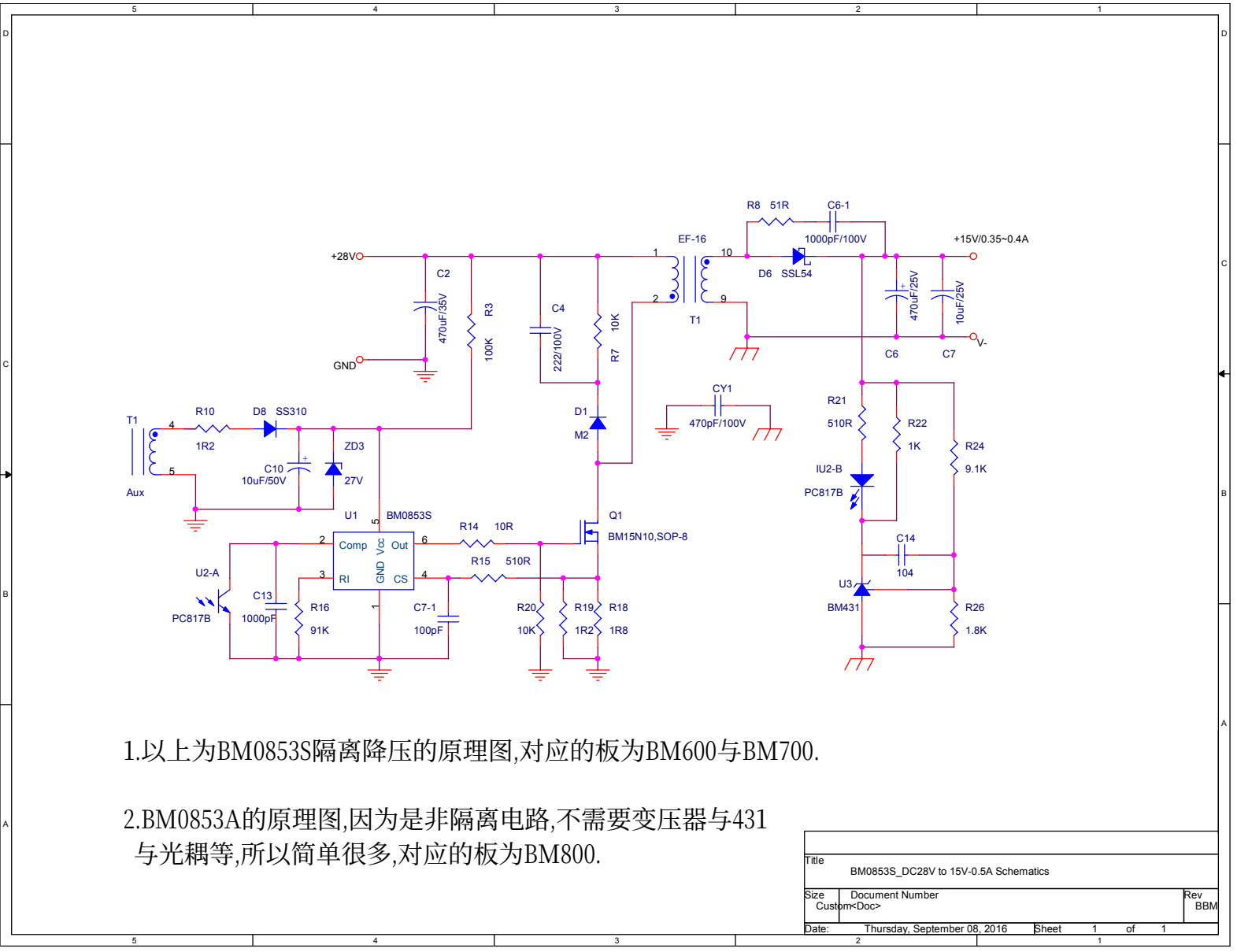
# Typical Application




1.以上为BM0853S隔离降压的原理图,对应的板为BM600与BM700.

2.BM0853A的原理图,因为是非隔离电路,不需要变压器与431与光耦等,所以简单很多,对应的板为BM800.

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**ORDERING INFORMATION**

| Part Number | Package | Part Marking |
|---|---|---|
| BM0853S | SOT-23-6L | 0853S |
| BM0853A | DFN8 (3*3) | 853Ax |

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

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

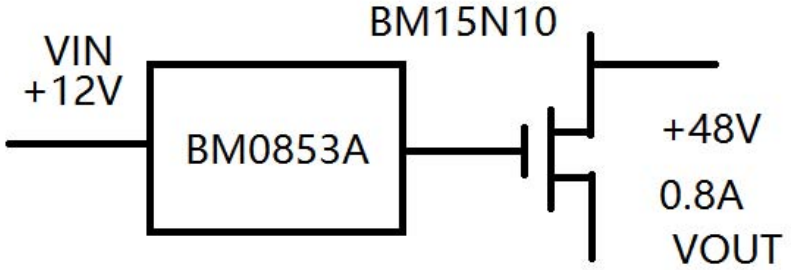
| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $V_{CC}$ | DC Supply Voltage | | 36 | V |
| $V_{COMP\,/\,RT\,/\,CS}$ | COMP / RT / CS Voltage | | -0.3 ~ 7.0 | V |
| $P_D$ | Power Dissipation @ $T_A$=85℃ (*) | | 0.3 | W |
| ESD | Human Body Model | | 4 | KV |
| | Machine Model | | 300 | V |
| $T_{ope}$ | Operating Ambient Temperature | | -40 ~ 85 | ℃ |
| $T_J$ | Operating Junction Temperature Range | | -40 ~ 150 | ℃ |
| $T_{STG}$ | Storage Temperature Range | | -40 ~ 150 | ℃ |
| $T_{LEAD}$ | Pb-Free Lead Soldering Temperature for 5 sec. | | 260 | ℃ |
| $R_{\Theta JC}$ | Thermal Resistance Junction – Case (*) | SOT-23-6L | 210 | ℃/W |
| | | | | |

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

| 型号PART NO | PIN1 | PIN2 | PIN3 | PIN4 | PIN5, PIN6 | PIN7 | PIN8 | DFN8, 3*3 |
|---|---|---|---|---|---|---|---|---|
| BM0853A | FB | VIN | I-limit1 | I-limit2 | SW | SS | GND | bottom metal |
| BM0853A | 1.25V基准 | 输入 | 限流点1 | 限流点2 | SW输出驱动MOS | 软启动 | 地 | 底部金属焊盘接地 |

输出电压Vout = 1.25*(1+R2/R3), R3 = 1K ~ 4.7k

Input peak current limit 输入峰值限流点 I = 0.3/R1



# BM0853
## Green-Mode PWM Controller

**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 | | | 10 | 20 | uA |
| Iop | Operating Current | VCOMP = 0V | | 2.7 | 4 | mA |
| | | VCOMP = 3V | | 2.4 | | mA |
| | | Protection tripped (OLP, OVP) | | 1.0 | | 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 | | 24 | 26 | 29.5 | V |
| **Voltage Feedback ( Comp Pin )** | | | | | | |
| Isc | Short Circuit Current | | | 1.25 | 2.2 | mA |
| Vop | Open Loop Voltage | | | 6 | | V |
| VTH(GM) | Green Mode Threshold VCOMP | | | 2.35 | | V |
| **Oscillator ( RT Pin )** | | | | | | |
| FOSC | Frequency | RT=100KΩ | 60.0 | 68.0 | 75.0 | KHz |
| FOSC(GM) | Green Mode Frequency | Fs=65.0KHz | | 22 | | 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 | | 0.8 | 0.85 | 0.9 | V |
| TLEDD | Leading Edge Blanking Time | | | 280 | | nS |
| Zcs | Input impedance | | 1 | | | MΩ |
| TPD | Delay to Output | | | 100 | | nS |
| **Gate Driver Output ( OUT Pin )** | | | | | | |
| DC (Max) | Maximum Duty Cycle | | 70 | 75 | 80 | % |
| DC (Min) | Minimum Duty Cycle | | | 0 | | % |
| 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 |
| **OLP ( Over Load Protection )** | | | | | | |
| TLOLP | OLP Trip Level | | | 5.0 | | V |
| TDOLP | OLP Delay Time (note) | | | 60 | | mS |

Note: The OLP delay time is proportional to the period of switching cycle. So that, the lower RT value will set the higher switching frequency and the shorter OLP delay time.

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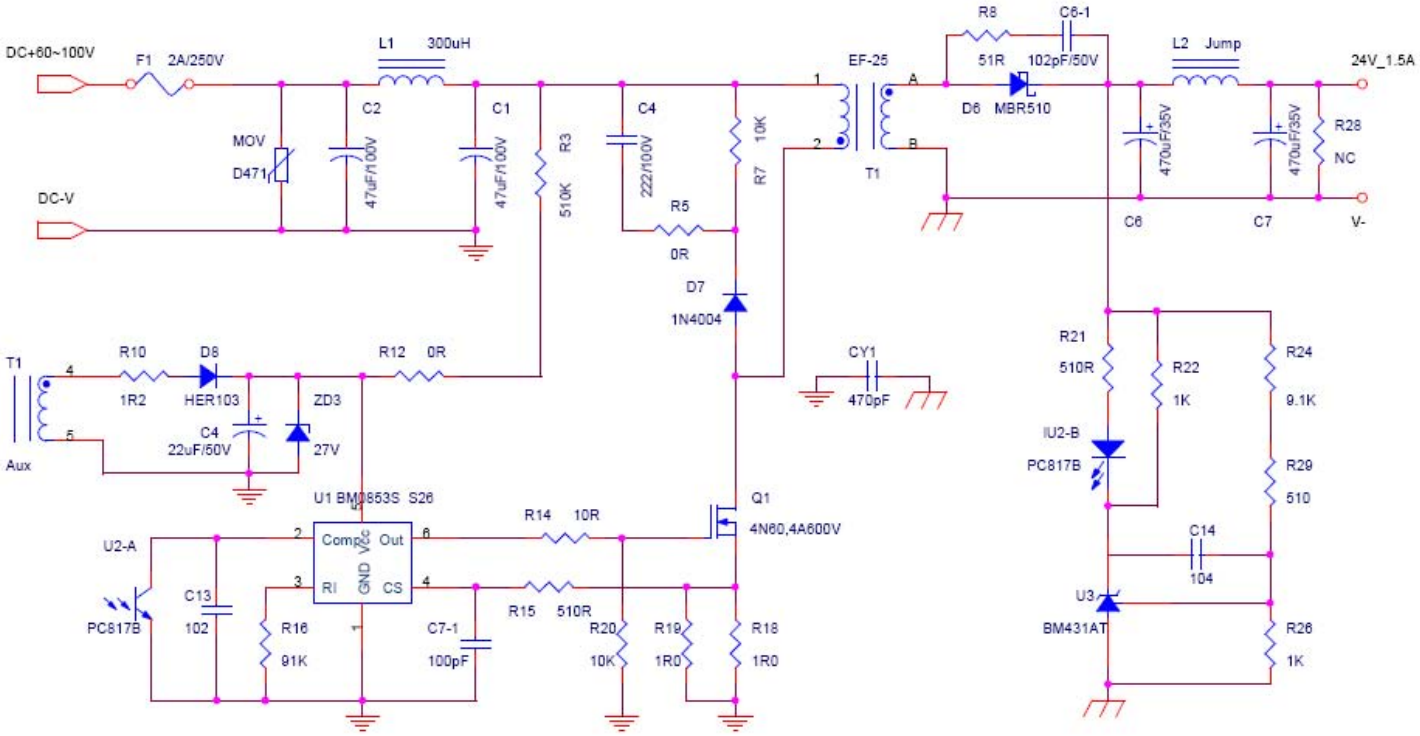
## BM0853S TYPICAL APPLICATION



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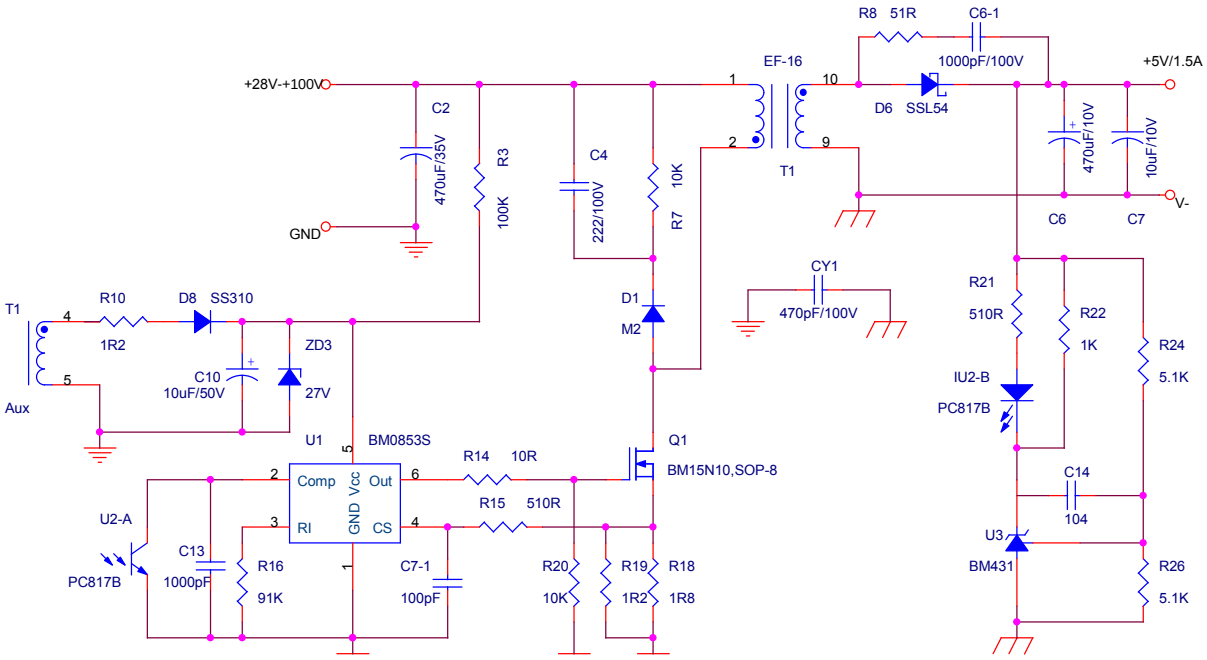
## Green-Mode PWM Controller

BM0853S Schematics



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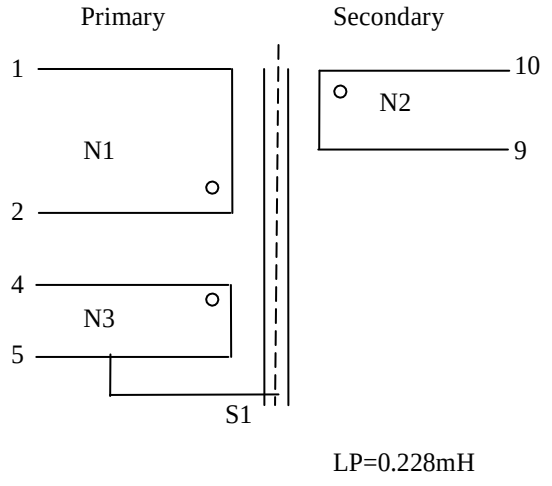
## Green-Mode PWM Controller

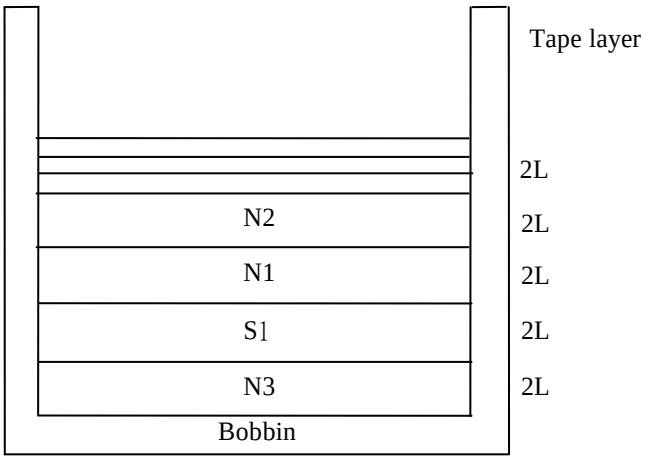
+5V-2A输出开关变压器参数

SCHEMATIC: ( 线路图 )




LP=0.228mH

WINDING: ( 剖面图 )




WINDING TABLE:

| Winding No | Margin Tape | PIN | Wire &Wire Copper | Turns | Winding Tape | Tape Layer | Tube |
|---|---|---|---|---|---|---|---|
| N 3 | 0 | 4 ~ 5 | 0.19Φ*1P | 28 Ts | 中间密绕 | 2 L | |
| S 1 | 0 | 5 ~ X | 0.05x 9.6mm | 1.1Ts | 背胶 | 2 L | |
| N 1 | 0 | 2 ~ 1 | 0.19Φ*1P | 41 Ts | 密绕 | 2 L | |
| N 2 | 0 | 10 ~ 9 | 0.6 § x 1P | 9 Ts | 密绕 | 2 L | |
| | | | | | | | |

NOTE: 1. N2 为三层绝缘线。
2. S1 为内铜，头尾须绝缘相叠。
3. BOBBIN 为 EE-16，10pin CORE 请用PC40或同等级材质。
4. Pin 1~2初级测感量 :0.228mH±15%
5. 变压器请含浸。
6. 漏感量 Leakage inductance at 1KHz, 0.25Vrms (short Pin 4,5 ,10,9)
LK: (1-2) 80uH (max)
7. HI- POT =(60Hz/5mA/2 SET )

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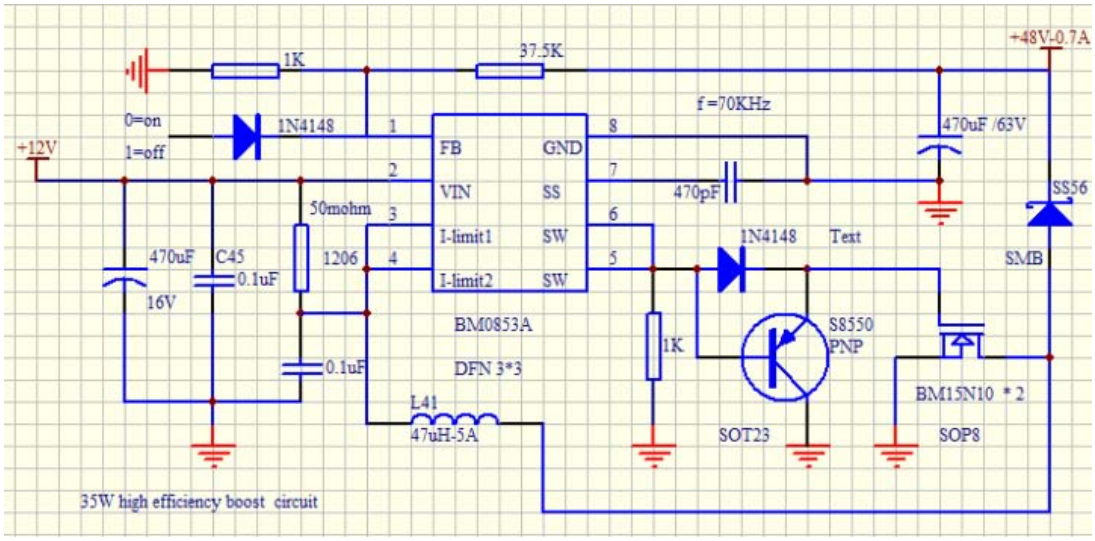
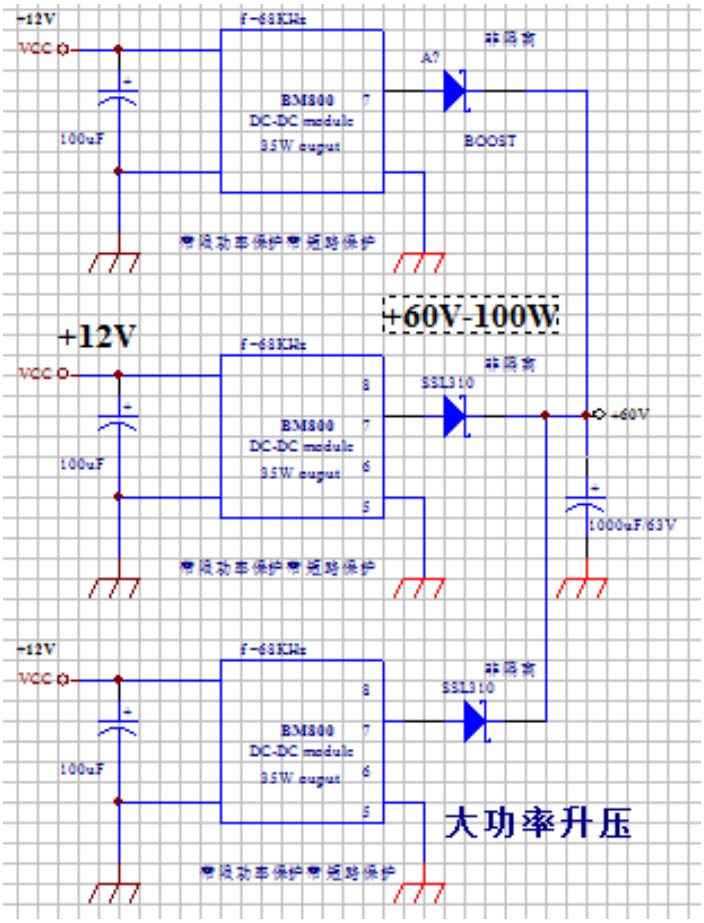
## BM0853A TYPICAL APPLICATION

如果低压输入，如3V转12V， 请选用低压MOS，如9926，效率更高。




BM853A+2*BM15N10组成一个35W的升压单元（名称BM800）， 三个单元并联实现100W输出



# BM0853
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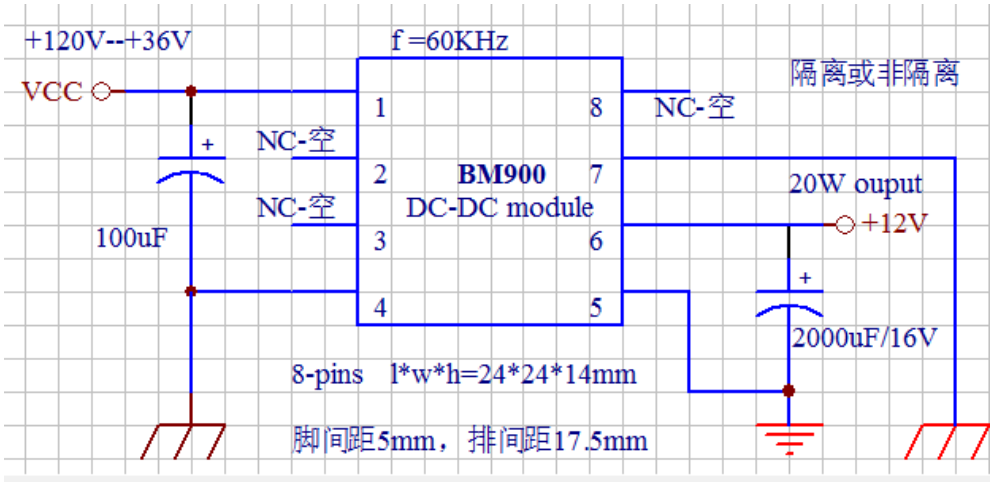
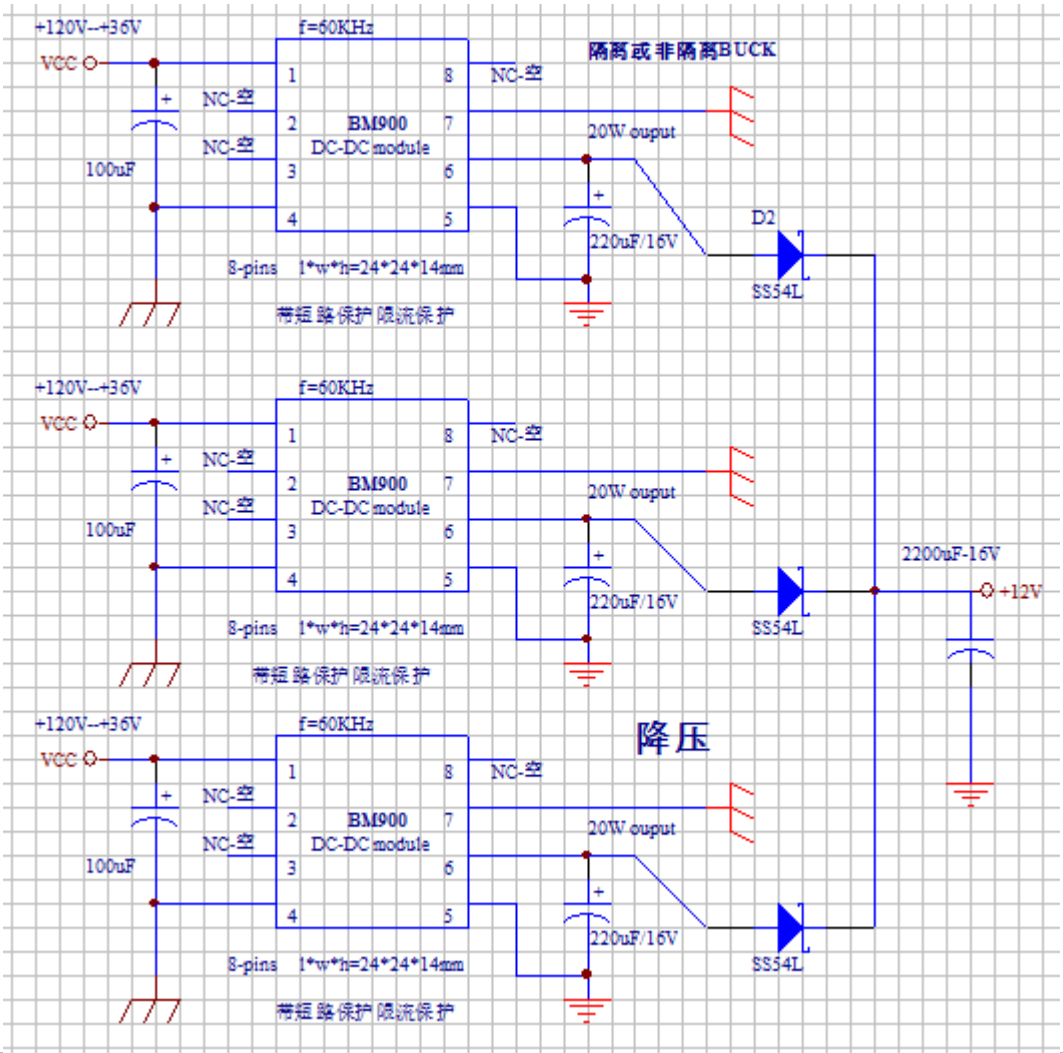
为了减轻客户设计负担与时间， BM设计了一个模块，名称BM900：
集成了MOS，BM0853S与电感，阻容。 可以实现非隔离， 实现120V转12V输出20W输出。
GND1与GND2在外面连起来就是非隔离，不连就是隔离。多个模组并联可以组成大功率50W。



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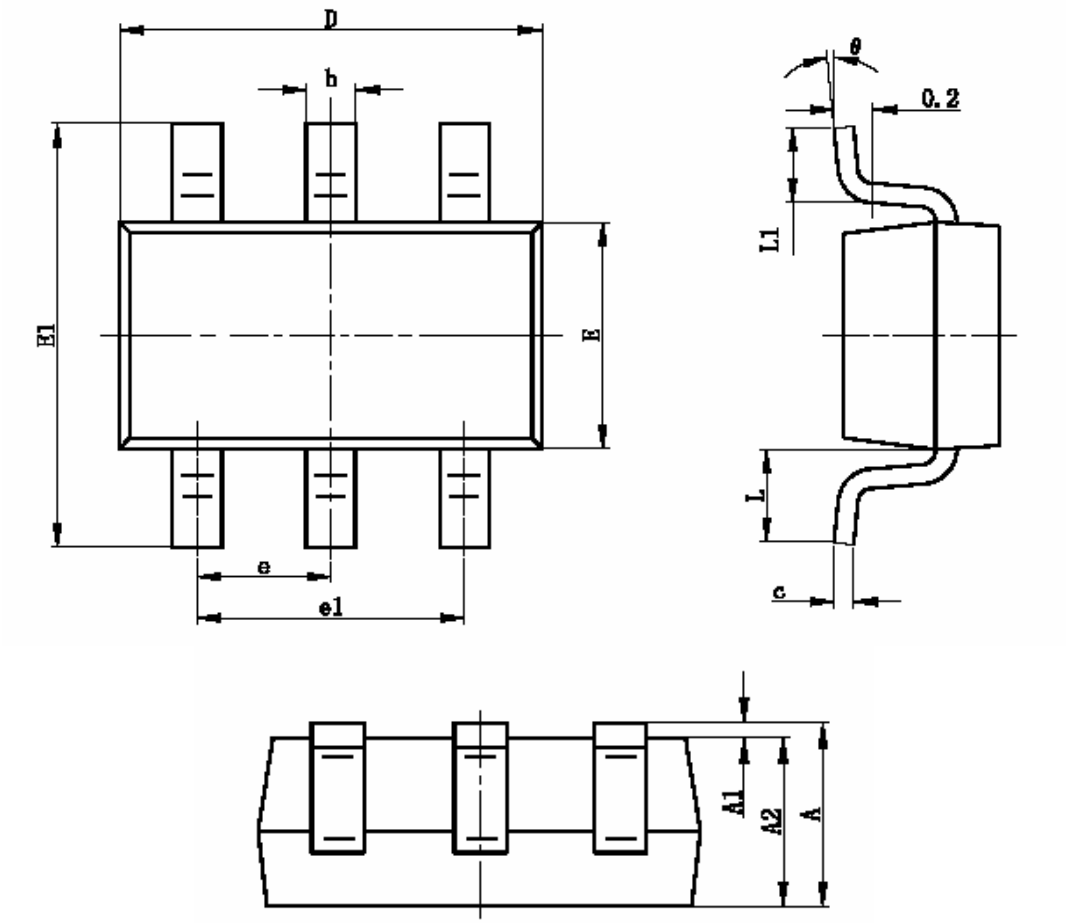
## Green-Mode PWM Controller

**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° |

# BM0853
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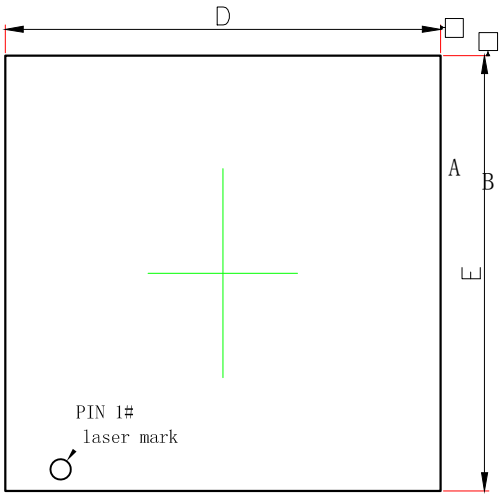
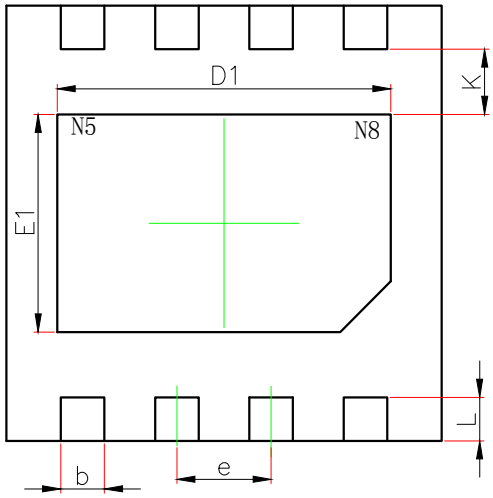
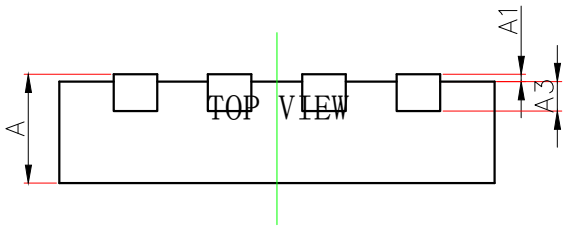
DFN3×3-8L-A(P0.65T0.75)

PACKAGE OUTLINE DIMENSIONS




N4 N1

BOTTOM VIEW

SIDE VIEW

| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 0.700 | 0.800 | 0.028 | 0.031 |
| A1 | 0.000 | 0.050 | 0.000 | 0.002 |
| A3 | 0.203REF. | | 0.008REF. | |
| D | 3.000BSC. | | 0.118BSC. | |
| E | 3.000BSC. | | 0.118BSC. | |
| D1 | 2.200 | 2.450 | 0.087 | 0.096 |
| E1 | 1.400 | 1.600 | 0.055 | 0.063 |
| k | 0.250MIN. | | 0.010MIN. | |
| b | 0.250 | 0.350 | 0.010 | 0.014 |
| e | 0.650TYP. | | 0.026TYP. | |
| L | 0.250 | 0.450 | 0.01 | 0.018 |