

2012.04



# 瑞萨 通用IC

单个产品介绍篇

综合产品目录

Renesas General-Purpose ICs General Catalog  
Individual Product Descriptions

# Linear&Logic

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PFC用  
For PFC

开关稳压器用  
For switching regulators

PWM控制  
PWM Controllers

电池用  
For batteries

D/A转换器  
D/A converters

复位IC  
Reset ICs

LED驱动器  
LED drivers

运算放大器、比较器  
Op-Amp. and comparators

临界导通模式单级PFC控制IC  
Critical Conduction mode single PFC control IC

### R2A20113ASP

#### 特点

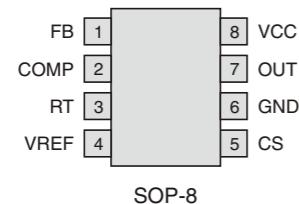
- 最大额定值
- 电源电压 Vcc: 24V
- 工作结温 Tjopr: -40~+150°C
- 功能
  - 高效率-临界导通模式控制
  - AC高压无线
  - ZCD无线
  - 动态、静态OVP功能
  - 反馈开环检测功能
  - 动态UVP功能
  - 关断时间控制功能 (限制频率)
  - 封装: 无铅SOP-8

#### FEATURES

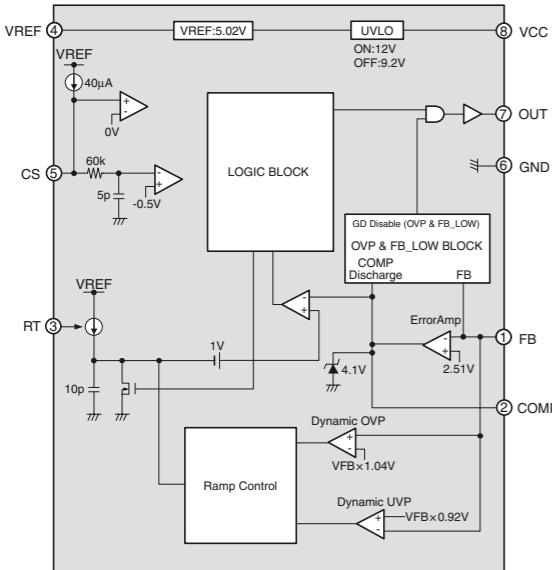
- <Maximum Ratings>
- Supply voltage Vcc: 24V
- Operating junction temperature Tjopr: -40 to +150°C

#### <Functions>

- High Efficiency-Critical Conduction Mode (CRM)
- High voltage line less
- ZCD line less
- Dynamic, Static OVP function
- Feed back loop open detection function
- Dynamic UVP function
- OFF time control function (SW frequency limiter)
- Package: Pb-free SOP-8



#### BLOCK DIAGRAM



临界导通模式单级PFC控制IC  
Critical Conduction mode single PFC control IC

### R2A20133ASP/133BSP

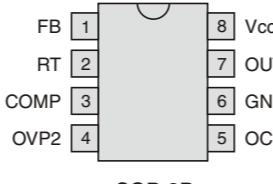
#### 特点

- 最大额定值
- 电源电压 Vcc: 24V
- 工作结温 Tjopr: -40~+150°C
- 功能
  - 高效率-临界导通模式控制
  - AC高压无线
  - ZCD无线
  - 动态、静态OVP功能
  - 反馈开环检测功能
  - 2nd OVP功能
  - 133A: 锁存式
  - 133B: 自动再启动式
  - 动态UVP功能
  - 关断时间控制功能 (限制频率)
  - 封装: 无铅SOP-8

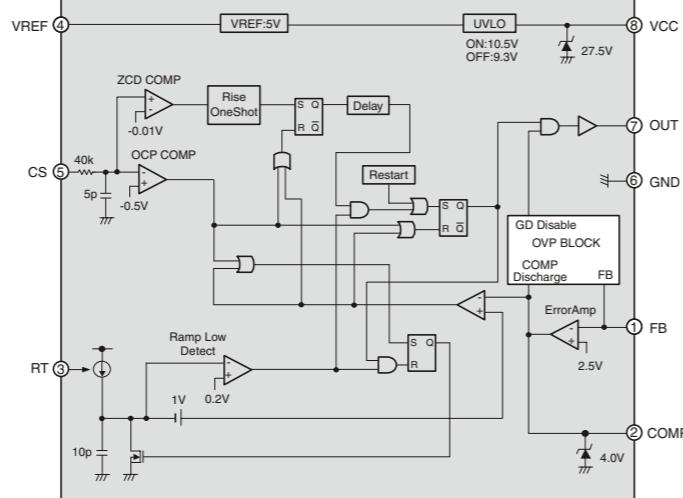
#### FEATURES

- <Maximum Ratings>
- Supply voltage Vcc: 24V
- Operating junction temperature Tjopr: -40 to +150°C
- <Functions>
- High Efficiency-Critical Conduction Mode (CRM)
- High voltage line less
- ZCD line less
- Dynamic, Static OVP function
- Feed back loop open detection function
- 2nd OVP function
- 133A: Latch type
- 133B: Auto restart type
- Dynamic UVP function
- OFF time control function (SW frequency limiter)
- Package Lineup: Pb-free SOP-8

#### PIN ARRANGEMENT (TOP VIEW)



#### BLOCK DIAGRAM



临界导通模式交错PFC控制IC  
Critical conduction mode interleaved PFC control IC

### R2A20112ASP

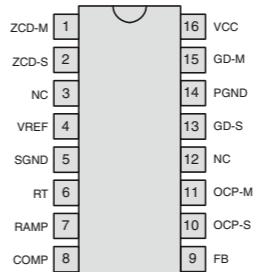
#### 特点

- 最大额定值
- 电源电压 Vcc: 24V
- 工作结温 Tjopr: -40~+150°C
- 功能
  - 临界导通模式升压转换器控制
  - 交错控制
  - 软启动功能
  - 2种模式过电压保护
    - 模式1: 防止负载骤变时电压上升的动态OVP
    - 模式2: 防止稳定状态下过电压的静态OVP
  - PFC输出电压动态电压下降保护 (DUVP)
  - 反馈环断线检测
  - 主从独立过电流保护
  - 280μs再启动定时器
  - 从属ZCD信号断路检测
  - 升压二极管短路时的过电流开/关定时器保护功能
  - 封装产品系列: 无铅SOP-16/DILP-16

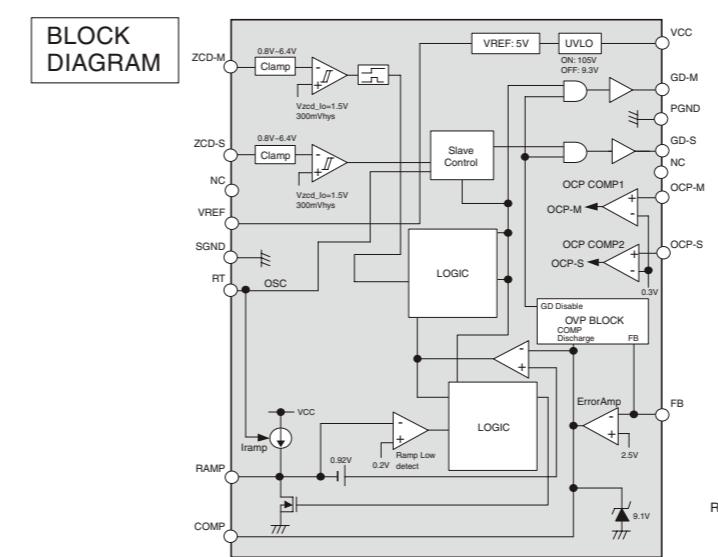
#### FEATURES

- <Maximum Ratings>
- Supply voltage Vcc: 24V
- Operating junction temperature Tjopr: -40 to +150°C
- <Functions>
- Boost converter control with critical conduction mode
- Interleaving control
- Softstart function
- Two mode overvoltage protection
  - Mode1: Dynamic OVP corresponding to a voltage rise by load change
  - Mode2: Static OVP corresponding to overvoltage in stable
- PFC output Dynamic under-voltage-protection (DUVP)
- Feedback loop open detection
- Master and Slave independent overcurrent protection
- 280μs restart timer
- Slave ZCD signal open detection
- Over current ON/OFF timer protection for boost Diode short
- Package lineup: Pb-free SOP-16/DILP-16

#### PIN ARRANGEMENT (TOP VIEW)



#### SOP-16P(FP-16DAV)



临界导通模式交错PFC控制IC  
Critical conduction mode interleaved PFC control IC

### R2A20118ASP

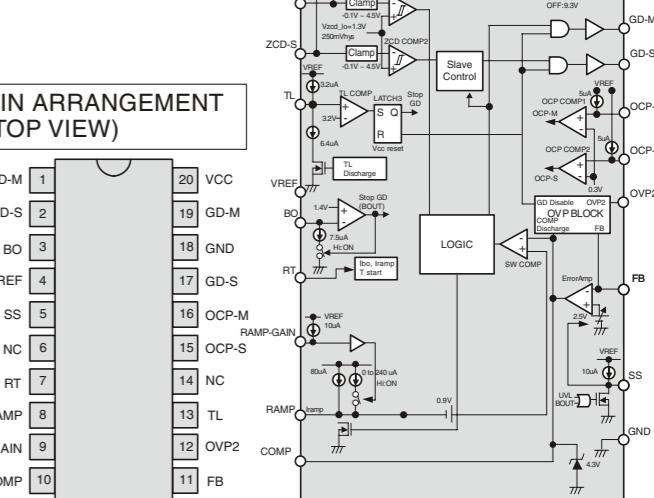
#### 特点

- 最大额定值
- 电源电压 Vcc: 24V
- 工作结温 Tjopr: -40~+150°C
- 功能
  - 临界导通模式升压转换器控制
  - 交错控制
  - 欠压保护
  - 软启动
  - 2种模式过电压保护 + OVP2
    - 模式1: 防止负载骤变时电压上升的动态OVP
    - 模式2: 防止稳定状态下过电压的静态OVP
  - OVP2: 通过独立管脚进行过电压监控保护
  - 反馈环断线检测
  - 主从独立过电流保护
  - 异常负载时定时锁存保护
  - 280μs再启动定时器
  - 封装: 无铅SOP-20

#### FEATURES

- <Maximum ratings>
- Power supply voltage (Vcc) : 24V
- Operating junction temperature (Tjopr) : -40 to +150°C
- <Functions>
- Critical conduction mode boost converter control
- Interleaved control
- Brown-out
- Soft start
- 2 voltage protection modes + OVP2
  - Mode 1: Dynamic OVP to prevent voltage rise during sudden load changes
  - Mode 2 : Static OVP to prevent overvoltage in steady state
  - OVP2 : Overvoltage monitoring and protection using independent pin
- Feedback loop interruption detection
- Mater/slave independent overcurrent protection
- Timer latch protection in case of abnormal load
- 280μs restart timer
- Package : Pb-free SOP-20

#### PIN ARRANGEMENT (TOP VIEW)



**临界导通模式交错PFC控制IC**  
Critical conduction mode interleaved PFC control IC

### R2A20132SP

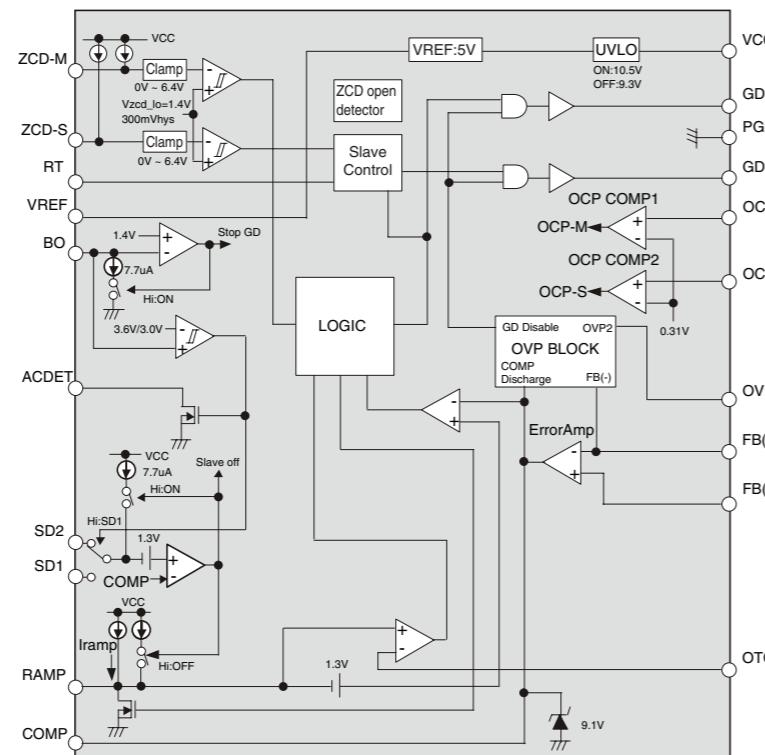
#### 特点

- 最大额定值
- 电源电压VCC: 24V
- 工作结温Tjopr: -40~+150°C
- (功能)
  - 临界导通模式升压转换器控制
  - 配备小负载时从属下降(SD)功能的交错控制
  - 用于改善小负载电力效率的关断时间控制(OTC)功能
  - 欠压保护功能
  - 2种模式过电压保护
    - 模式1: 防止负载骤变时电压上升的动态OVP
    - 模式2: 防止稳定状态下过电压的静态OVP
  - OVP2: 通过其他管脚检测PFC输出电压
  - 输入高压检测功能(ACDET)
  - 反馈环断线检测
  - 从属ZCD断路短路检测
  - 主从独立过电流保护
  - 140μs再启动定时器
  - 软启动功能
  - 封装产品系列: 无铅SOP-20

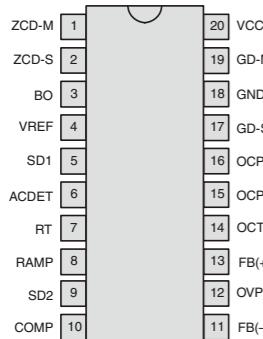
#### FEATURES

- <Maximum Ratings>
- Supply voltage Vcc: 24V
  - Operating junction temperature Tjopr: -40 to +150°C
- <Functions>
- Boost converter control with critical conduction mode
  - Interleaving control with slave drop(SD) function at light load
  - Off time control(OTC) function: Switching loss is decreased at light load.
  - Brownout function
  - Two mode overvoltage protection
    - Mode1: Dynamic OVP corresponding to a voltage rise by load change
    - Mode2: Static OVP corresponding to overvoltage in stable
  - OVP2: Voltage detection of PFC output using other pin
  - AC Hi voltage detection (ACDET)
  - Feedback loop open detection
  - ZCD signal open detection
  - Master and Slave independence over current protection
  - 140μs restart timer
  - Soft start
  - Package line-up: Pb-free SOP-20

#### BLOCK DIAGRAM



#### PIN ARRANGEMENT (TOP VIEW)



**连续导通模式单级PFC控制IC**  
Continuous Conduction mode single PFC control IC

### R2A20131SP

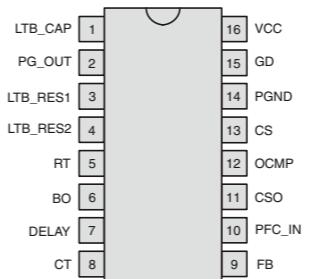
#### 特点

- 最大额定值
- 电源电压 Vcc: 24V
- 工作结温Tjopr: -40~+150°C
- (功能)
  - 负载跟踪升压功能(LTB)
  - 提高100V小负载时的效率
  - 欠压保护功能
  - 过电压保护功能
  - 反馈开环检测功能
  - 过电流保护功能
  - 电源良好信号功能
  - 封装: 无铅SOP-16

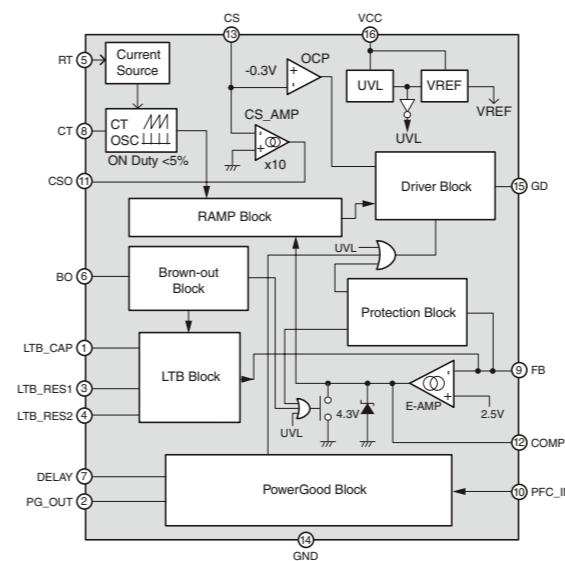
#### FEATURES

- <Maximum Ratings>
- Supply voltage Vcc: 24V
  - Operating junction temperature Tjopr: -40 to +150°C
- <Functions>
- Load Tracing Boost (LTB) function  
Efficiency improvement at light load and AC100V
  - Brownout function
  - Over voltage protection
  - Feed back loop open detection
  - Over current protection
  - Power good signal
  - Package: Pb-free SOP-16

#### PIN ARRANGEMENT (TOP VIEW)



#### BLOCK DIAGRAM



**连续导通模式单级PFC控制IC**  
Continuous Conduction mode single PFC control IC

### R2A20115SP

#### 特点

- 最大额定值
- 电源电压 Vcc: 24V
- 工作结温 Tjopr: -40~+150°C
- (功能)
  - 恒定功率限制功能
  - 电流连续导通模式
  - 瞬间断电时PFC保持运行的功能 (PFC保持功能)
  - 过电压检测
  - 过电流检测
  - 软启动功能
  - 反馈环断线检测
  - IC关断功能
  - 封装产品系列: SOP-16

#### 用途

- 平板显示器
- 投影仪
- 台式PC
- 白色家电

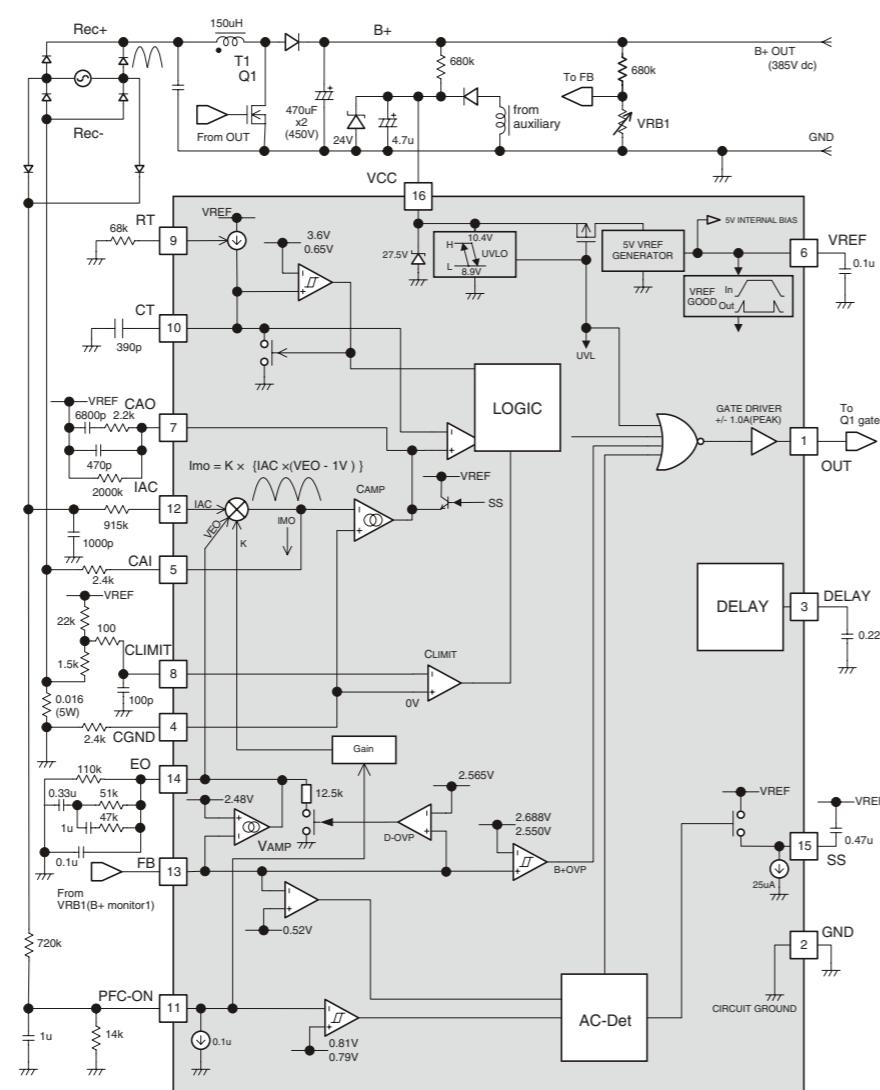
#### FEATURES

- <Maximum ratings>
- Power-supply voltage Vcc: 24 V
  - Operating junction temperature Tjopr: -40 to +150°C
- <Functions>
- Constant power limit function
  - Continuous conduction mode
  - Hold function of PFC operation on momentary outage (PFC hold function)
  - Overvoltage detection
  - Overcurrent detection
  - Soft start
  - Feedback loop disconnection detection
  - IC shutdown function
  - Package lineup: SOP-16

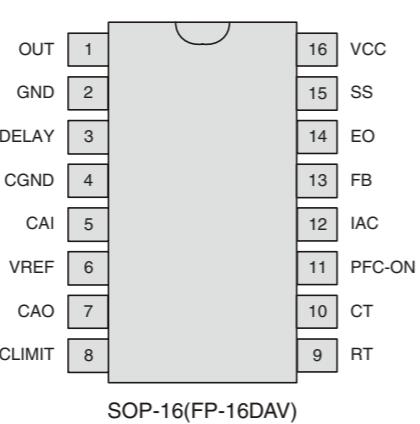
#### APPLICATION

- Flat panel display
- Projector
- Desktop PC
- White goods

#### BLOCK DIAGRAM



#### PIN ARRANGEMENT (TOP VIEW)



**连续导通模式交错PFC控制IC**  
Continuous Conduction mode interleaved PFC control IC

### R2A20104FP/SP, R2A20114FP/SP

#### 特点

- 最大额定值
- 电源电压 Vcc: 24V
- 工作结温 Tjopr: -40~+150°C
- (功能)
  - 连续导通模式升压转换器控制
  - 交错控制
  - 振荡调频功能<sup>\*2</sup>
  - 欠压保护功能
  - 相位下降功能<sup>\*1</sup>
  - 外部同步输入
  - 外部同步输出<sup>\*1</sup>
  - 2种模式过电压保护:
    - 模式1: 防止负载骤变时电压上升的动态OVP
    - 模式2: 防止稳定状态下过电压的静态OVP
  - 2个系统过电压保护<sup>\*1</sup>: FB管脚和OVP2管脚
  - 反馈环断线检测
  - 电流平衡控制
  - Phase1、Phase2独立过电流保护
  - 封装: 无铅LQFP-40 (R2A20104FP, R2A20114FP)  
无铅SOP-20 (R2A20104SP, R2A20114SP)

注) 1. 仅R2A20104FP、R2A20114FP支持。  
2. R2A20104SP、R2A20114SP的调频范围固定。

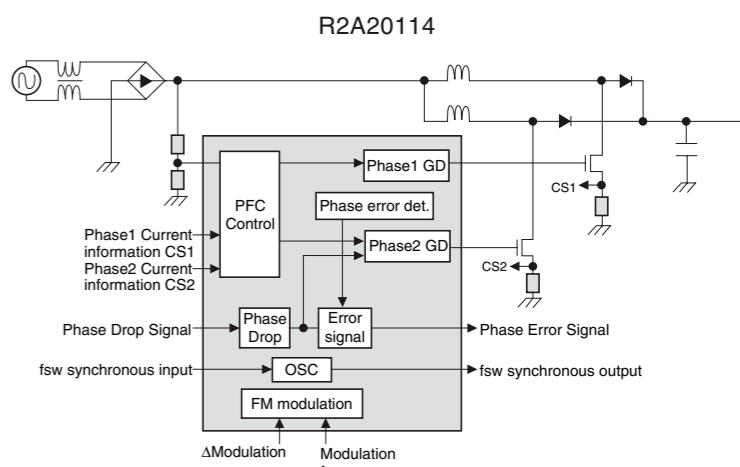
#### FEATURES

- <Maximum Ratings>
- Supply voltage (VCC): 24V
  - Operating junction temperature (Tjopr): -40 to +150°C
- <Functions>
- Boost converter control with continuous conduction mode
  - Interleaving control
  - Frequency modulation<sup>\*2</sup>
  - Brownout
  - Phase drop<sup>\*1</sup>
  - External clock synchronization input
  - External clock synchronization output<sup>\*1</sup>
  - Two overvoltage protection modes
    - Mode 1: Dynamic OVP corresponding to a voltage rise by load change
    - Mode 2: Static OVP corresponding to overcharge in stable condition
  - Dual overvoltage protection:<sup>\*1</sup> FB and OVP2 pins
  - Feedback loop open detection
  - Current balance control
  - Independent phase 1 and phase 2 overcurrent protection
  - Package options: Pb-free LQFP-40 (R2A20104FP, R2A20114FP), Pb-free SOP-20 (R2A20104SP, R2A20114SP)

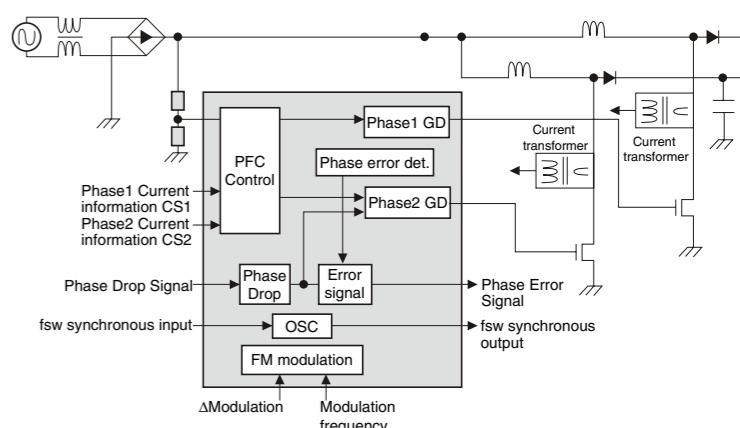
Notes:1. Supported by R2A20104FP and R2A20114FP only.

2. R2A20104SP and R2A20114SP have a fixed frequency modulation width.

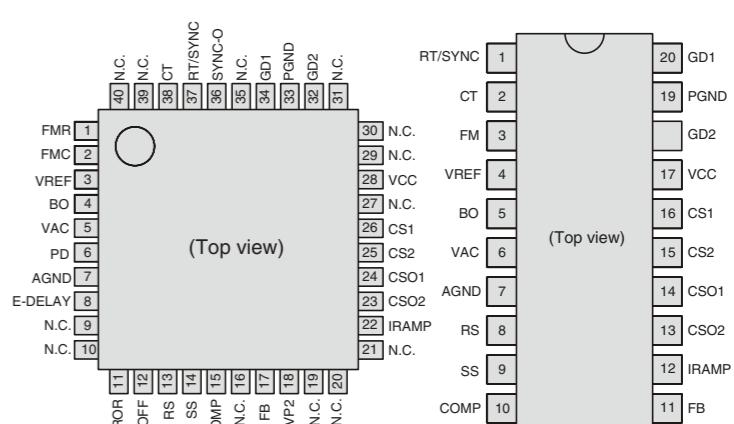
#### BLOCK DIAGRAM



#### R2A20104



#### PIN ARRANGEMENT (TOP VIEW)



PFC用

For PFC

开关稳压器用

For switching regulators

连续导通模式单级PFC控制IC  
Continuous Conduction mode single PFC Control IC

**HA16174P/FP****特点**

- 最大额定值
- 电源电压 Vcc: 24V
- 工作结温 Tjopr: -40~+125°C
- 功能
  - 平均电流模式控制
  - 升压稳压器控制
  - 输入电压全球通用
  - PFC开/关控制
  - 过电压保护
  - 软启动
  - 保持时间调整
  - 可编程电源良好信号输出(开漏输出)
  - 封装: DILP-16、SOP-16

**用途**

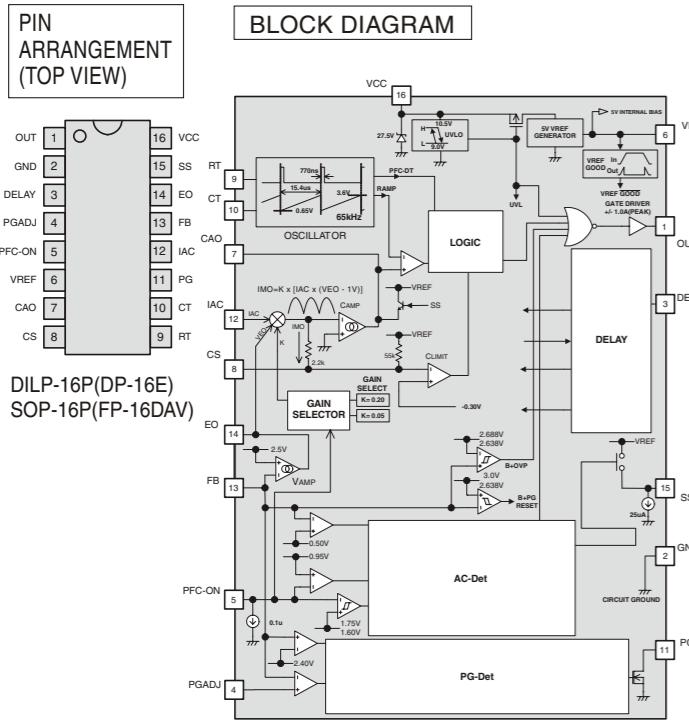
FPD及其他

**FEATURES**

- <Maximum Ratings>
  - Supply voltage Vcc: 24V
  - Operating junction temperature Tjopr: -40 to +125°C
- <Functions>
  - Average Current Mode Control
  - Boost Regulator Control
  - World Wide Input Operation
  - PFC Function ON/OFF Control
  - Over Voltage Protection
  - Soft Start Function
  - Hold Time Adjust Function
  - Programmable Power Good Signal Output (Open Drain Output)
  - Package Lineup: DILP-16, SOP-16

**APPLICATION**

FPD,etc



For PFC

开关稳压器用

For switching regulators

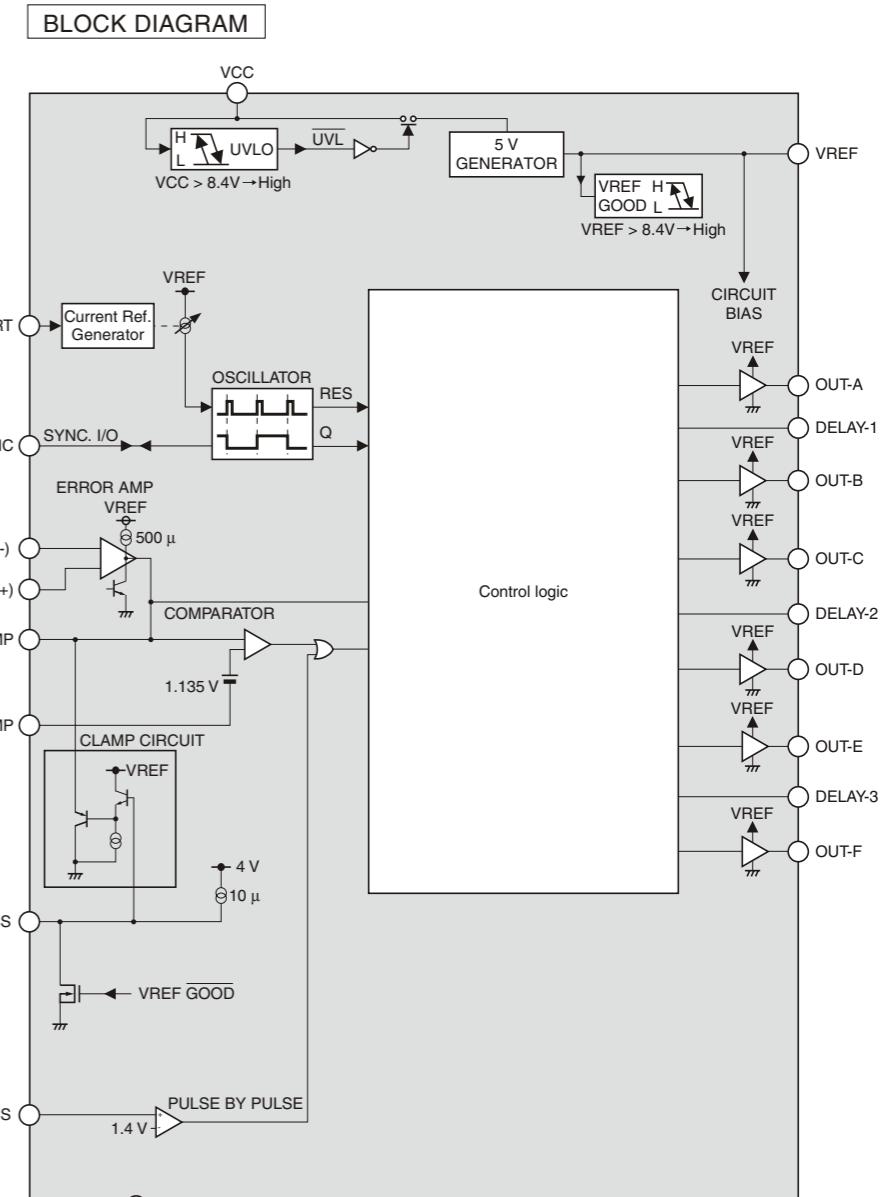
同步整流型相移全桥控制IC  
Synchronous Rectification Type Phase Shift Full-Bridge Control IC

**R2A20121SP****特点**

- 最大额定值
- 电源电压 Vcc: 20V
- 工作结温 Tjopr: -40~+125°C
- 功能
  - 工作频率高: 振荡器频率=2MHz Max
  - 全桥控制电路可延时调整
  - 次级同步整流电路可延时调整
  - 过电流保护功能: 逐脉冲限幅器
  - 封装: 无铅TSSOP-20

**FEATURES**

- <Maximum Ratings>
  - Supply voltage Vcc: 20V
  - Operating junction temperature Tjopr: -40 to +125°C
- <Functions>
  - High operating frequency: Oscillator frequency = 2 MHz max.
  - Full-bridge control circuit with adjustable delay time
  - Secondary synchronous rectifier circuit with adjustable delay time
  - Overcurrent protection function: Pulse-by-pulse limiter
  - Package: Pb-free TSSOP-20

**PIN ARRANGEMENT (TOP VIEW)**

SYNC	1	RT	20	RT
RAMP	2	GND	19	GND
CS	3	OUT-A	18	OUT-A
COMP	4	OUT-B	17	OUT-B
FB (+)	5	OUT-C	16	OUT-C
FB (-)	6	OUT-D	15	OUT-D
SS	7	OUT-E	14	OUT-E
DELAY-1	8	OUT-F	13	OUT-F
DELAY-2	9		12	Vcc
DELAY-3	10		11	VREF

TSSOP-20(TTP-20DAV)

Note: Switches in diagram are on when control signal is high-level.

## 开关稳压器用

For switching regulators

同步整流型相移全桥控制IC  
Synchronous Rectification Type Phase Shift Full-Bridge Control IC

## R2A20124AFP/ASP

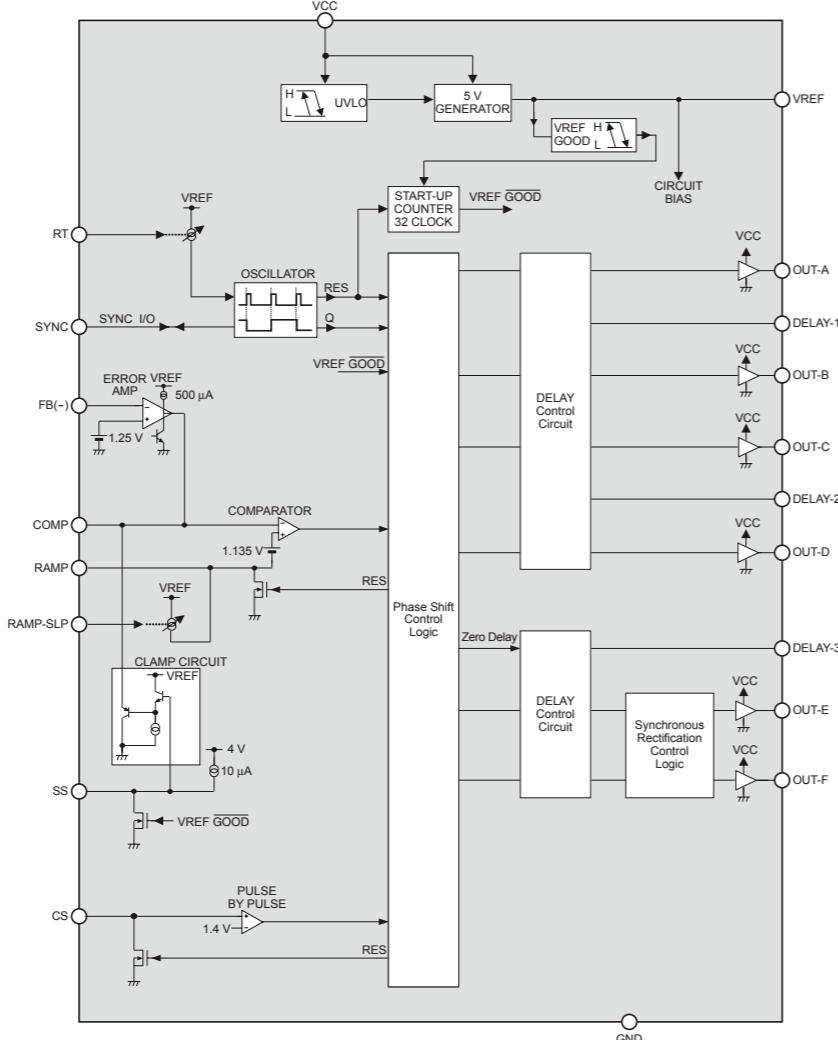
## 特点

- 最大额定值
- 电源电压 Vcc: 20V
- 工作结温 Tjopr: -40~+125°C
- 功能
  - 工作频率高: 振荡频率=1MHz
  - 全桥控制电路可延时调整
  - 次级同步整流电路可延时调整
  - 过电流保护功能: 逐脉冲限幅器
  - 外部同步信号输入/输出管脚
  - 内置Ramp斜坡补偿电路
  - 软启动功能
  - 远程开/关功能\* \*仅APP
  - 次级同步整流开/关功能\*
  - 封装: AFP: 无铅LQFP-40、  
ASP: 无铅SOP-20

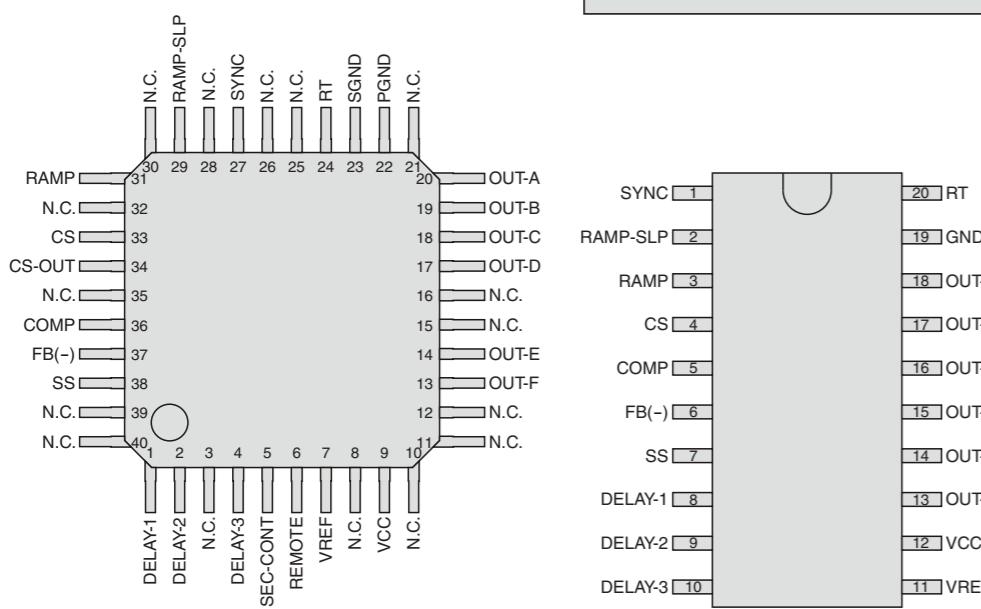
## FEATURES

- <Maximum Ratings>
  - Supply voltage Vcc: 20V
  - Operating junction temperature Tjopr: -40 to +125°C
- <Functions>
  - High operating frequency: 1MHz
  - Full-bridge control circuit with adjustable delay time
  - Secondary synchronous rectifier circuit with adjustable delay time
  - Over current protection: Pulse-by-pulse limiter
  - Synchronization I/O for the external oscillator
  - Built-in Ramp slope compensation circuit
  - Soft start function
  - Remote ON/OFF function\* \*APP only
  - Secondary synchronous rectifier ON/OFF function\*
  - Package: AFP: Pb-free LQFP-40,  
ASP: Pb-free SOP-20

## BLOCK DIAGRAM



## PIN ARRANGEMENT (TOP VIEW)



Outline: LQFP-40 (PLQP0040JB-C)

N.C.: Non-connection

Outline: SOP-20 (PRSP0020DD-B)

带单通道外部同步功能的斩波型DC/DC转换器用PWM控制开关稳压器IC  
Switching Regulator for Chopper Type DC/DC Converter

## HA16114P/FP, HA16120FP

## 特点

- 工作电源电压范围广, 从3.9V到40V\*
- 最高工作频率很高, 达600kHz
- 内置用于直接驱动功率MOS FET的图腾柱型栅驱动电路  
(最大额定值±1A 峰值)
- 外部脉冲同步运行可
- 内带逐脉冲过电流限制 (OCL) 功能
- 内带连续过电流时的间歇工作功能
- 开/关管脚接地时, IC变为关, 可节省消耗电流  
HA16114: IOFF = 10μA Max  
HA16120: IOFF = 150μA Max
- 可在外部调整基准电压 (VREF) (±0.2V)
- 可在IC外部调整欠压锁定点 (对VIN)
- 振荡频率稳定性良好
- 具有软启动、快速关断功能

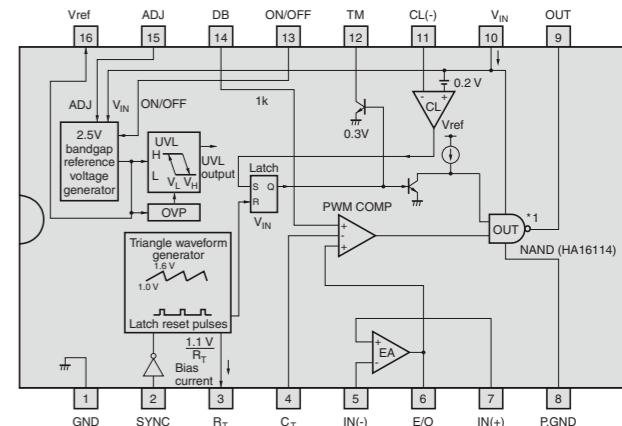
\*1. 但是, 在VIN ≥ 4.5V的条件下才会有VREF = 2.5V。  
因此, 转换前的DC输入电压请考虑4.5V以上的电压。

## FEATURES

- Wide operating supply voltage range: 3.9 V to 40 V\*
- Wide operating frequency range (600 kHz maximum operation)
- Able to drive a power MOS FET (±1 A maximum peak current) by the built-in totem-pole gate pre-driver circuit
- Can operate in synchronization with an external pulse signal, or with another controller IC
- Pulse-by-pulse overcurrent limiting (OCL)
- Intermittent operation under continuous overcurrent
- Low quiescent current drain when shut off by grounding the ON/OFF pin  
HA16114: IOFF = 10μA (max)  
HA16120: IOFF = 150μA (max)
- Externally trimmable reference voltage (VREF): ±0.2 V
- Externally adjustable undervoltage lockout points (with respect to VIN)
- Stable oscillator frequency
- Soft start and quick shut function

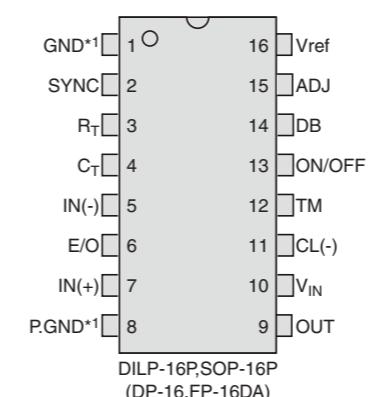
\*1. The reference voltage 2.5 V is under the condition of VIN ≤ 4.5 V.

## BLOCK DIAGRAM



Note: 1. The HA16120 has an AND gate. (D-D)

## PIN ARRANGEMENT (TOP VIEW)



\*1. Pin 1 (GND) and Pin 8 (P.GND) must be connected each other with external wire.



## 开关稳压器用

开关稳压器控制IC  
SWITCHING REGULATOR CONTROL

**M51998P/FP**

## 特点

- 输出电流 $I_o$  (峰值)  $\pm 1A$
- 采用图腾柱型输出
- 启动前电流小  $100\mu A$  (标准)
- 启动开始电压 $\cdots 16V$ , 启动停止电压 $\cdots 10V$
- 输出设定占空比 51% 固定
- 逐脉冲方式限流电路
- 10管脚SOP、14管脚DIP封装

## 用途

回扫稳压器

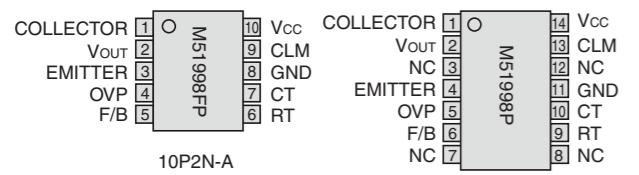
## FEATURES

- Output current peak  $\pm 1A$
- Totem pole output
- Small start-up current  $100\mu A$  (typ.)
- Start-up threshold  $\cdots 16V$ , stop voltage  $\cdots 10V$
- Output duty 51% (internally fixed)
- Pulse-by-pulse current limit
- 10 pin SOP, 14 pin DIP package

## APPLICATION

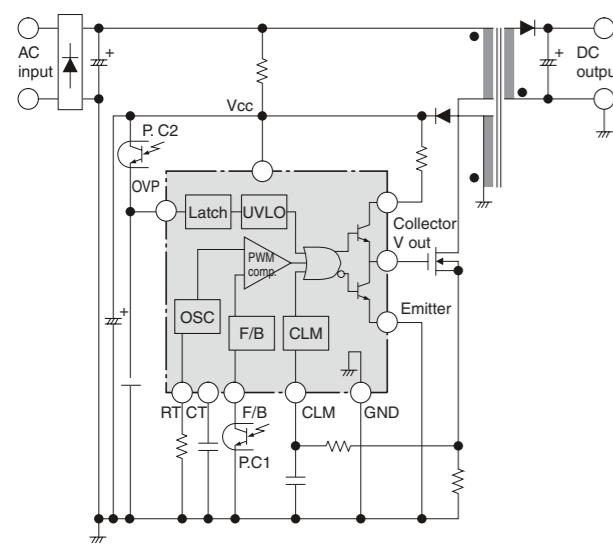
Fly-back regulator

## PIN ARRANGEMENT (TOP VIEW)



14P4  
NC: NO CONNECTION

## APPLICATION EXAMPLE



通用高速电压模式PWM控制IC  
GENERAL HIGH SPEED VOLTAGE MODE PWM CONTROL IC

**M62213P/FP**

## 特点

- 支持700kHz、MOSFET
  - 输出电流 $I_O$  (峰值) 1A
  - 采用图腾柱型输出
- OVP兼用的定时器式锁存电路
- 内置软启动电路 (DTC兼用)
- 内置反馈用OPAmp (可进行光耦合器驱动)
- 逐脉冲方式高速限流电路
- 启动前电路电流小  $130\mu A$
- 启动开始电压 $\cdots 12.5V$ , 启动停止电压 $\cdots 8.3V$
- 采用14管脚DIP和小型10管脚SOP封装

## 用途

各种开关电源、DC/DC转换器等的本地电源

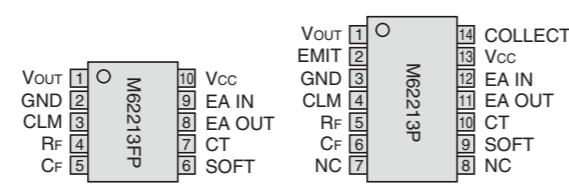
## FEATURES

- 700kHz applicable to MOSFET
  - Output current  $I_O$  (peak) 1A
  - Adoption of totem pole output
- Timer type latch circuit to be used combined with OVP function
- Built-in soft start circuit (used combined with DTC)
- Built-in OPamp for feedback (allowable photocoupler drive)
- High speed pulse-by-pulse system current limit circuit
- Small circuit current before activation  $130\mu A$
- Activation start voltage..12.5V, activation stop voltage 8.3V
- Adoption of 14-pin DIP package and small size 10-pin SOP package

## APPLICATION

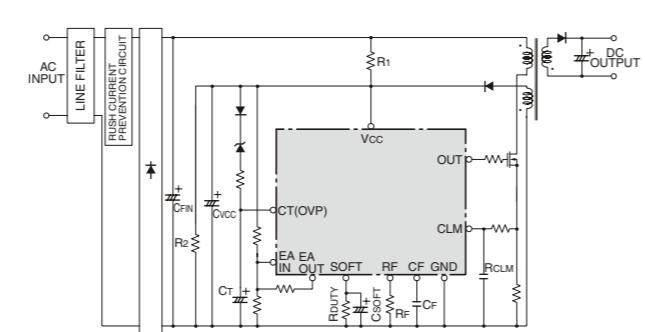
Local power supply for various types of switching power supply,  
DC/DC converter, etc.

## PIN ARRANGEMENT (TOP VIEW)



10P2N-A(FP)  
NC: NO CONNECTION

## APPLICATION EXAMPLE



通用高速电流模式PWM控制IC  
GENERAL HIGH SPEED CURRENT MODE PWM CONTROL IC

**M62281P/FP**

## 特点

- 支持700kHz、MOSFET
  - 输出电流 $I_O$  (峰值) 1A
  - 采用图腾柱型输出
- 由于拥有独立的电流检测管脚, 可构成抗噪能力强的开关电源
- 逐脉冲方式高速限流电路
- OVP兼用的定时器式锁存电路 (可进行外部复位)
- 内置软启动电路 (DTC兼用)
- 内置反馈用OPAmp (可进行光耦合器驱动)
- 启动前电路电流小  $130\mu A$
- 启动开始电压 $\cdots 12.5V$ , 启动停止电压 $\cdots 8.3V$
- 采用14管脚DIP和小型10管脚SOP封装

## 用途

各种开关电源、DC/DC转换器等的本地电源

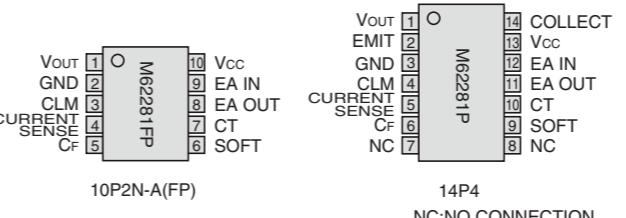
## FEATURES

- 700kHz applicable to MOSFET
  - Output current  $I_o$  (peak) 1A
  - Adoption of totem pole output
- Since this IC provides independent current sense pins, it is capable of forming a SW power supply that is strong against noise.
- High speed pulse-by-pulse system current limit circuit
- Timer type latch circuit to be used combined with OVP (external reset possible)
- Built-in soft start circuit (used combined with DTC)
- Built-in OPamp for feedback (photocoupler drive allowable)
- Small circuit current before activation  $130\mu A$
- Activation start voltage..12.5V, activation stop voltage 8.3V
- Adoption of 14-pin DIP package and small size 10-pin SOP package

## APPLICATION

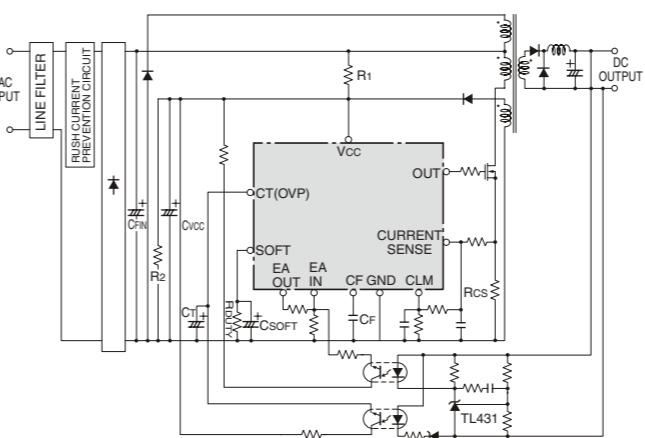
Local power supply for various types of switching power supply,  
DC/DC converter, etc.

## PIN ARRANGEMENT (TOP VIEW)



10P2N-A(FP)  
14P4  
NC: NO CONNECTION

## APPLICATION EXAMPLE



开关电源二级侧控制IC  
SWITCHING POWER SUPPLY SECONDARY SIDE CONTROL IC

**M622235P/FP**

## 特点

- 1个系统的输出电压检测电路 (输出电压可任意设定)
- 内置2个系统的过电压检测电路 (无延迟电路)
- 内置2个系统的过电流检测电路 (有延迟电路)
- PC输出驱动电流 $\cdots 10mA$  (最大)

## 用途

回扫稳压器

## FEATURES

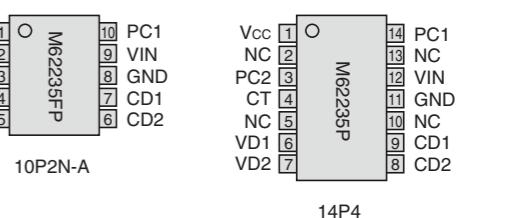
- 1 system output voltage detection  
(Output voltage can be set arbitrary)
- 2 system over voltage detection built-in (without delay circuit)
- 2 system over current detection built-in (with delay circuit)
- PC output drive current ..... 10mA (max)

## APPLICATION

Fly-back regulator

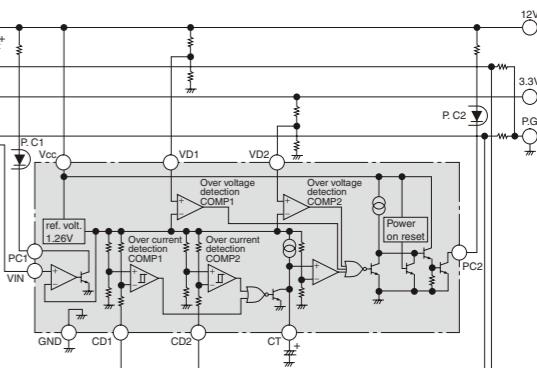
开关稳压器用  
For switching regulators

## PIN ARRANGEMENT (TOP VIEW)



14P4  
NC: NO CONNECTION

## APPLICATION EXAMPLE



## 开关稳压器用

For switching regulators

**通用DC/DC转换器**  
GENERAL PURPOSE DC/DC CONVERTER

**M5291P/FP**

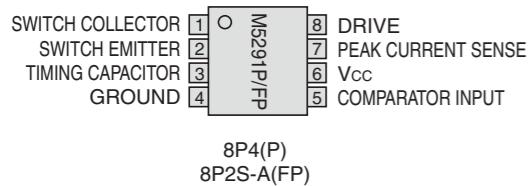
## 特点

- 电源电压范围广 ..... 2.5~40V
- 低消耗电流 ..... 1.4mA
- 输出设定电压范围广 ..... 1.17~40V
- 输出开关电流大 ..... 200mA
- 工作频率范围广 ..... 100Hz~100kHz
- 内置峰值电流限制电路
- 在100mA以下的电源系统下，无需外接晶体管

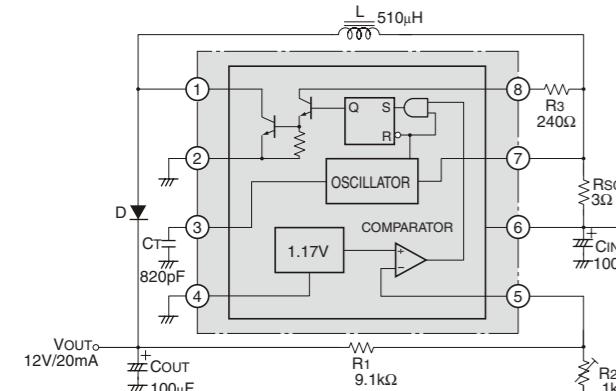
## FEATURES

- Wide supply voltage range ..... 2.5 to 40V
- Low dissipation current ..... 1.4mA
- Wide range of output
  - Voltage adjust ..... 1.17 to 40V
  - Output switch current ..... 200mA
  - Wide range of switching frequency ..... 100Hz to 100kHz
  - Built-in peak current protection circuit
  - External transistor is unnecessary for the power system of 100mA or less

## PIN ARRANGEMENT (TOP VIEW)



## APPLICATION EXAMPLE (12V/20mA)



**通用DC/DC转换器**  
GENERAL PURPOSE DC/DC CONVERTER

**M62212P/FP/GP**

## 特点

- 工作电压范围广 ..... 2.5~18V
- 低消耗电流 ..... 1.3mA typ
- 实现高速开关运行 ..... 300kHz max
- 实现输出短路保护电路、开/关控制、空载时间控制、软启动运行
- 8管脚DIP/SOP/SSOP的各种类型封装

## 用途

便携式设备等一般电子设备用本地电源、DC/DC转换器

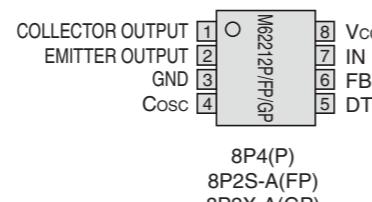
## FEATURES

- Wide operation power supply voltage range ..... 2.5 to 18V
- Low power consumption ..... 1.3mA typ.
- High speed switching is possible. (Max 300 kHz)
- Output short protection circuit and ON/OFF control are used. The dead-time control and the soft-start operation are possible.
- 3 type package variation 8-pin DIP/SOP/SSOP

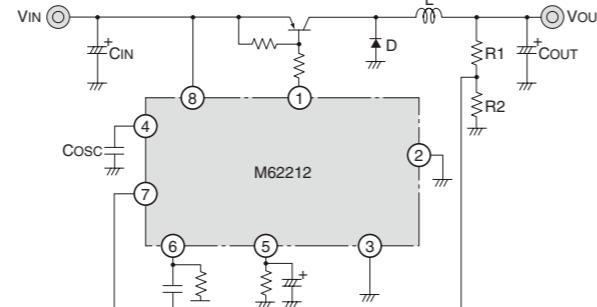
## APPLICATION

Local power supply for general electric equipments, and DC/DC converter

## PIN ARRANGEMENT (TOP VIEW)



## APPLICATION EXAMPLE



**通用HIGH高耐压DC/DC转换器**  
MULTI-FUNCTION HIGH VOLTAGE WITHSTAND DC/DC CONVERTER

**M62211P/FP**

## 特点

- 工作电压范围广 ..... 2.5~35V
- 可通过外部同步信号实现同步运行
- 可进行2个系统的优先控制运行
- 实现高速开关运行 ..... 500kHz max
- 实现输出短路保护电路、开/关控制、空载时间控制、软启动运行
- 采用14管脚DIP和小型10管脚SOP封装

## 用途

笔记本电脑等的背光控制、便携式设备等一般电子设备用本地电源、DC/DC转换器

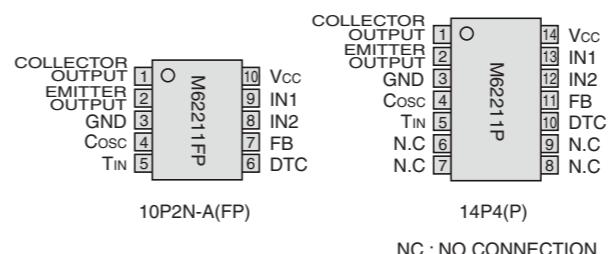
## FEATURES

- Wide operation power supply voltage range ..... 2.5 to 35V
- Operation can be synchronized by the external sync singal
- Operation can be controlled using two prioritized systems (High input has priority)
- High speed switching is possible. (Max 500kHz)
- Output short protection circuit and ON/OFF control are used. The dead-time control and the soft-start operation are possible.
- 14-pin DIP package and small size 10-pin SOP package

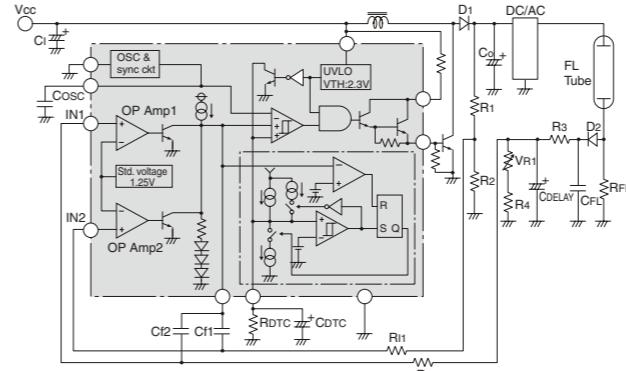
## APPLICATION

Back light control for Note Book type PC and word processor, local power supply for general electronic equipment including portable devices, and DC/DC converter

## PIN ARRANGEMENT (TOP VIEW)



## APPLICATION EXAMPLE



**多功能DC/DC转换器**  
MULTI-FUNCTION DC/DC CONVERTER

**M62215FP**

## 特点

- 工作电源电压范围广 ..... 8.6~25V
- 可进行2个系统的优先控制运行 (输入High侧优先)
- 实现高速开关运行 (500kHz)
- 实现输出短路保护电路、开/关控制、空载时间控制、软启动运行
- 采用小型10管脚SOP封装
- 逐脉冲方式高速限流电路
- 采用图腾柱型输出
- 输出电流IO (峰值) ..... ±1A

## 用途

笔记本电脑等的背光控制  
便携式设备等一般电子设备用

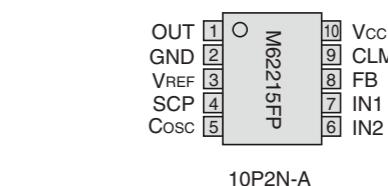
## FEATURES

- Wide operation power supply voltage range 8.6 to 25V
- Operation can be controlled using two prioritized systems (High input has priority)
- High speed switching is possible (500kHz)
- Output shortcircuit protection circuit, ON/OFF control, dead time control, soft-start operation
- Small size 10pin SOP package
- High speed pulse-by-pulse current limit
- Totempole output  
output current IO (peak) ..... ±1A

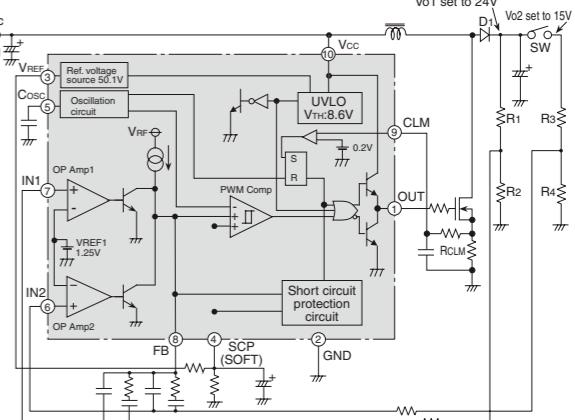
## APPLICATION

Backlight control for Note Book type PC, etc.  
General electronic equipments including portable equipments.

## PIN ARRANGEMENT (TOP VIEW)



## APPLICATION EXAMPLE



## 开关稳压器用

For switching regulators

**低电压工作升压型转换器**  
LOW VOLTAGE OPERATION STEP-UP CONVERTER

**M62216FP/GP**

## 特点

- 低电压工作，1节电池的电压即可构成升压转换器.....0.9~15V
- 低消耗电流PWM控制
- 可进行输出开/关控制
- 采用小型8管脚SOP/SSOP封装

## 用途

CD-ROM、便携式终端、便携式设备等电池驱动设备用  
本地电源、DC/DC转换器

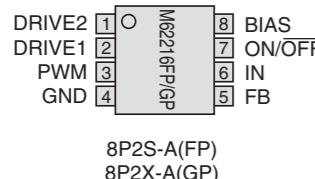
## FEATURES

- Low voltage operation that can form a step-up converter from the voltage of a battery ..... 0.9 to 15V
- Lower current consumption PWM control
- Capable of output ON/OFF control
- Adoption of small 8-pin SOP and SSOP package

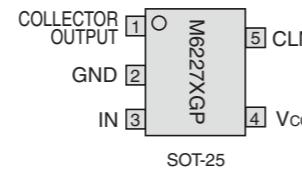
## APPLICATION

Local power supply for battery driving equipment including CD-ROM,  
portable terminal and portable equipment, DC/DC converter

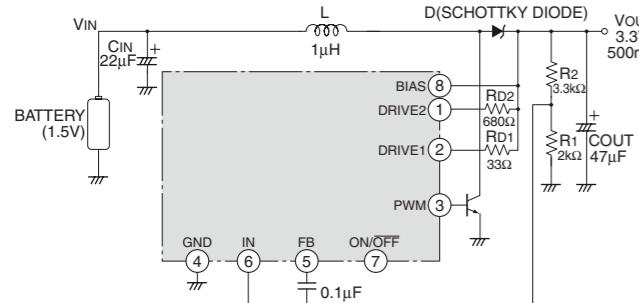
## PIN ARRANGEMENT (TOP VIEW)



## PIN ARRANGEMENT (TOP VIEW)

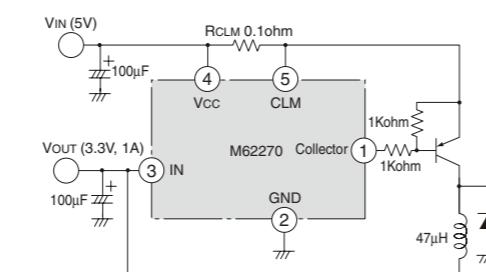


## APPLICATION EXAMPLE



Application example of forming 3.3/500mA output from a battery

## APPLICATION EXAMPLE



**3.3V固定电压DC/DC转换器**  
3.3 V FIXED OUTPUT VOLTAGE DC/DC CONVERTER

**M62220L/FP**

## 特点

- 工作电源电压范围广: 4~15V
- 低消耗电流: 900μA max.
- 内置无需外围元件的振荡电路(110kHz Typ.)
- 内置过电流保护电路
- 采用小型5管脚SIP、8管脚SOP封装

## 用途

CD-ROM、便携式终端、便携式设备等一般电子设备用

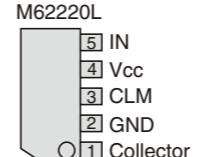
## FEATURES

- Wide operation supply voltage range: 4 to 15V
- Low power dissipation: 900μA (max.)
- Built-in oscillator without external components (110kHz typ.)
- Built-in over current protection circuit
- Small size 5-pin SIP and 8-pin SOP packages

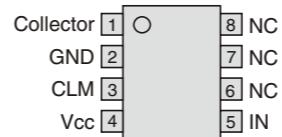
## APPLICATION

CD-ROM, PDA, general purpose electric products

## PIN ARRANGEMENT (TOP VIEW)

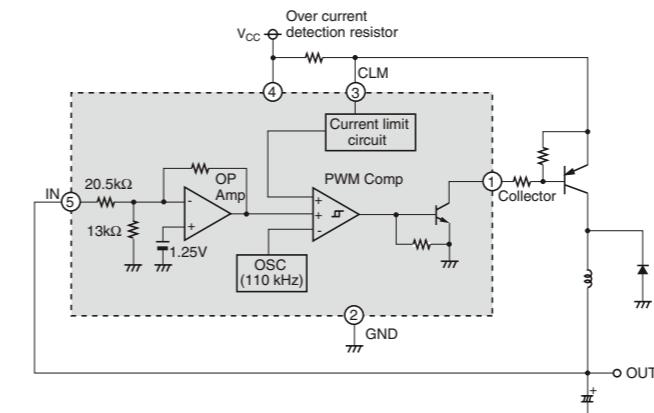


## M62220FP



Outline: PRSP0008DE-C (recommend)  
PRSP0008DA-A (8P2S-A) (not recommend for new design)

## BLOCK DIAGRAM



**5.0V固定电压DC/DC转换器**  
5.0 V FIXED OUTPUT VOLTAGE DC/DC CONVERTER

**M62290L/FP**

## 特点

- 工作电源电压: 6~15V (标准Vcc = 12V)
- 低消耗电流: 最大1.1mA (Vcc = 12V)
- 内置无需外围元件的振荡电路(120kHz Typ.)
- 内置过电流保护电路
- 采用5管脚小型SIP、8管脚SOP封装

## 用途

音响设备的本地电源、其他一般电子设备

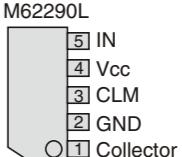
## FEATURES

- Wide operation voltage range: 6 to 15V (typ. Vcc = 12V)
- Low power dissipation: 1.1mA (max., Vcc = 12V)
- Built-in oscillator without external components (120 kHz typ.)
- Built-in over current protection circuit
- Small 5-pin SIP and 8-pin SOP packages

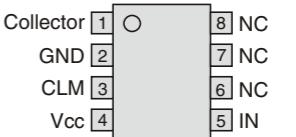
## APPLICATION

Local voltage regulator of audio sets and general electric products

## PIN ARRANGEMENT (TOP VIEW)

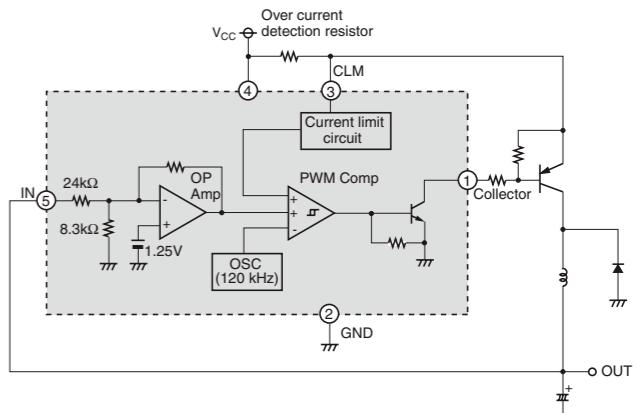


M62290FP



Outline: PRSP0008DE-C (recommend)  
PRSP0008DA-A (8P2S-A) (not recommend for new design)

## BLOCK DIAGRAM



## 开关稳压器用

For switching regulators

MTP-5外形5V固定电压通用DC/DC转换器  
MTP-5 TYPE 5V FIXED OUTPUT VOLTAGE DC/DC CONVERTER FOR GENERAL USE

## M62291GP

## 特点

- 工作电源电压 ..... 6~15V (标准V<sub>cc</sub>=12V)
- 低消耗电流 ..... 400 μA (标准V<sub>cc</sub>=12V, 无负载时)
- 内置无需外围元件的振荡电路 (120kHz 标准)
- 内置过电流保护电路
- 采用超小型5管脚SOT25封装

## 用途

音响设备的本地电源、便携式设备、其他一般电子设备

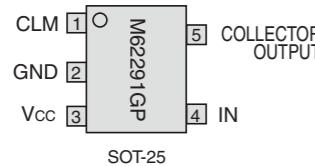
## FEATURES

- Operating supply voltage range ..... 6 to 15V(typ. V<sub>cc</sub>=12V)
- Low power dissipation ..... 400μA (typ.V<sub>cc</sub>=12V, at no load)
- Built-in oscillation circuit with no external components (120kHz typ.)
- Built-in overcurrent protection
- Ultra-small package 5pin SOT-25 applied

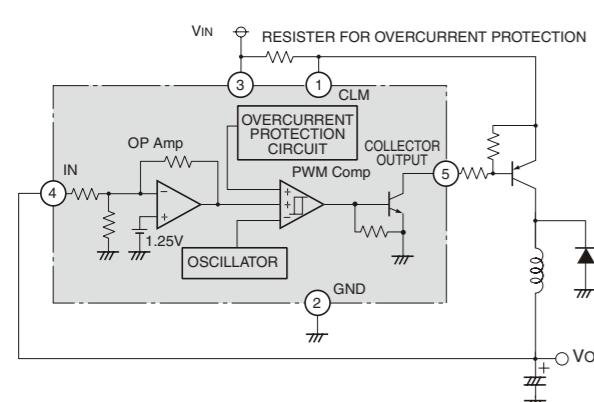
## APPLICATION

Local power source for audio equipments, portable equipments, electronic equipments in general.

## PIN ARRANGEMENT (TOP VIEW)



## APPLICATION EXAMPLE



3.3V、1.8V(2.0V、2.5V)2CH固定电压通用DC/DC转换器  
3.3V,1.8V(2.0V,2.5V)2CH FIXED OUTPUTVOLTAGE DC/DC CONVERTER FOR GENERAL USE

## M62292FP, M62293FP, M62294FP

## 特点

- 工作电源电压范围广 ..... 4~15V (5V 标准)
- 低消耗电流 ..... 1.5mA (V<sub>cc</sub>=5V, 无负载时)
- 内置5V、3.3V两个电压系统检测复位电路
- 内置无需外围元件的振荡电路 (110kHz 标准)
- 采用8管脚SOP封装

## 用途

M32R系列+快速擦写存储器的驱动电源、便携式设备等一般电子设备用等。

## FEATURES

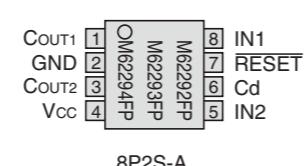
- Wide operation power supply voltage range ..... 4 to 15V(typ.5V)
- Low power dissipation ..... 1.5mA(V<sub>cc</sub>=5V, no load)
- Built-in 2 system voltages (5V,3.3V) detection reset function
- Built-in oscillation circuit with no external components (110kHz typ.)
- 8pin SOP

## APPLICATION

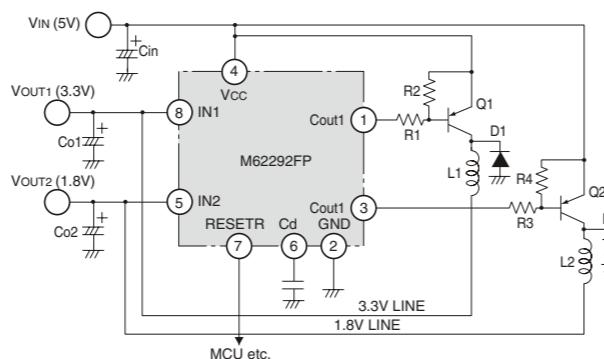
Power supply for M32R + flash memory.  
General electronic equipments such as portable equipments.

Part No.	IN1	IN2
M62292FP	3.3V	1.8V
M62293FP	3.3V	2.5V
M62294FP	3.3V	2.0V

## PIN ARRANGEMENT (TOP VIEW)



## APPLICATION EXAMPLE (M62292FP)



7通道DC/DC转换器  
7ch DC/DC CONVERTER IC

## R2A20016NP

## 特点

- 所有通道内置输出MOS晶体管
- 所有通道内置相位补偿电路
- 所有升压通道内带待机时关断的功能
- 高效率自动升降压电路 (通道4)
- PWM/PFM自动切换功能 (通道1~3)
- 开关频率 (PWM模式时)：  
通道1~3: 2MHz、通道4: 1MHz、  
通道5~7: 500kHz
- 电压检测功能 (通道4)
- 内置启动定序器  
PON1 : 通道1→通道2→通道3→通道4  
PON56: 通道5和通道6同时启动  
(通道5先完成启动)  
PON7 : 通道7
- 数字软启动
- 内置放电电路 (通道2~4、6)
- 各种保护功能 (SCP、OCP、OVP、TSD)
- LCD BL用调光功能 (通道7)
- 工作电压范围: 1.5V~5.5V  
(支持1节锂离子电池、2节五号干电池)
- 封装:  
5mm × 5mm × 0.8mm, 0.40mm pitch,  
40管脚QFN

## 用途

数码相机、数码摄像机

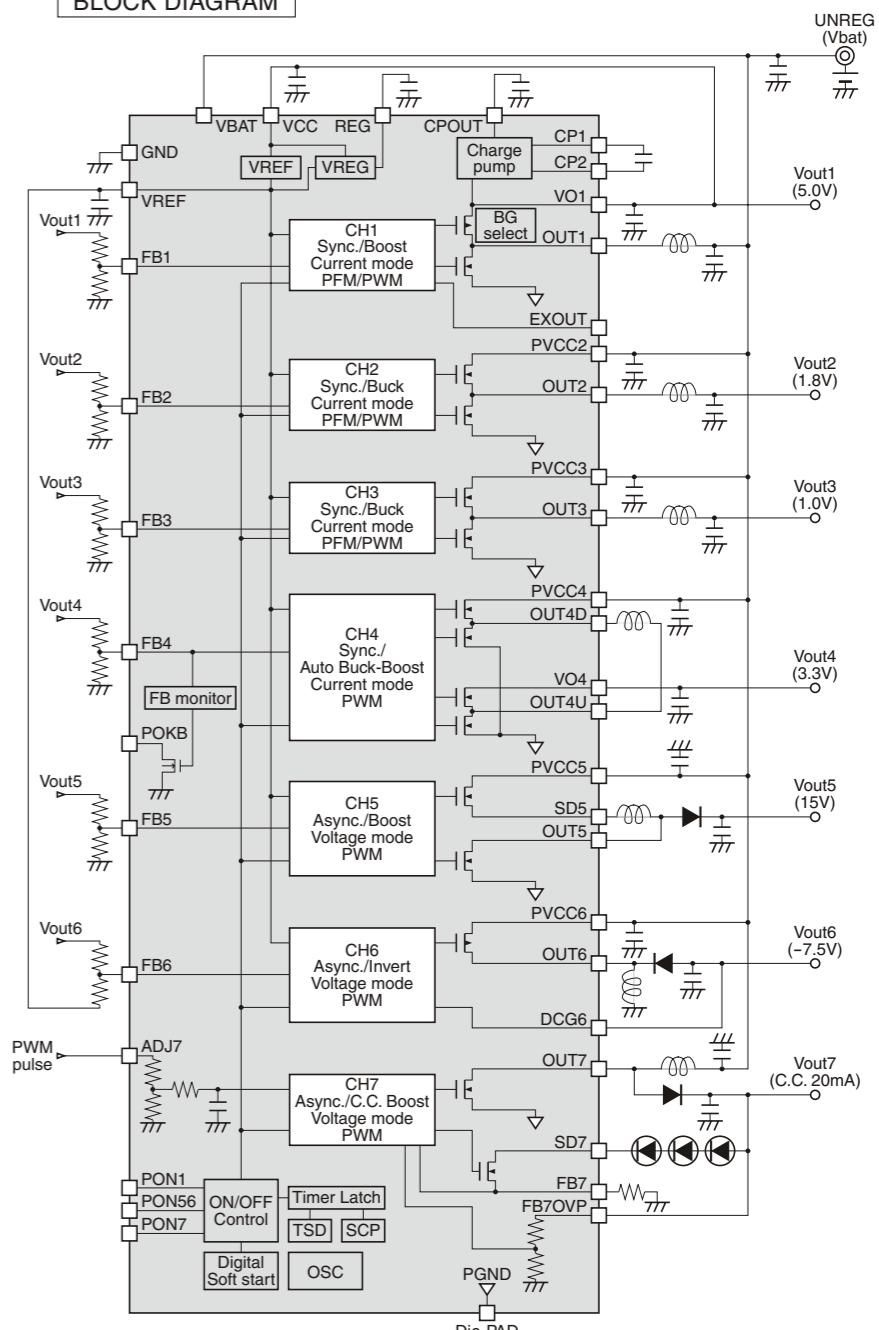
## FEATURES

- Fully integrate output MOSFETs
- Internal phase compensation
- Built-in Shutdown function for all boost converters
- Highly efficient auto Buck-Boost converter (CH4)
- Auto PWM/PFM mode switching for improving efficiency at light load (CH1~3)
- SW frequency (@ PWM mode)  
CH1~3:2MHz, CH4:1MHz, CH5~7:500kHz
- Output voltage detector for system reset (CH4)
- Power-on sequencer  
PON1: CH1 → CH2 → CH3 → CH4  
PON56: CH5 & 6 are starting up at same time (CH5 complete prior.)
- Built-in Digital soft start function
- Built-in discharge circuit (CH2~4, 6)
- Built-in protection circuit (SCP, OCP, OVP and TSD)
- Dimmer control (CH7)
- Operating voltage range 1.5V~5.5V (for 1cell Li-ion and 2cell AA battery)
- Package:  
5mm × 5mm × 0.8mm, 0.40mm pitch, 40pin QFN

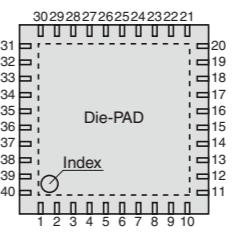
## APPLICATION

Digital Still Camera, Digital Video Camera

## BLOCK DIAGRAM



## PIN ARRANGEMENT (TOP VIEW)



40pin QFN

## 开关稳压器用

8通道DC/DC转换器IC  
8ch DC/DC CONVERTER IC

## R2A20010NP

## 特点

- 8通道结构 (升压电路3通道、降压电路2通道、逆变电路1通道)
- 升压/降压切换电路2通道、逆变电路1通道
- 内置5通道的输出MOS晶体管 (通道1、2、3、4、5)
- 内置相位补偿电路 (所有通道)
- 内置关断电路 (通道1、8)
- 同步整流5通道 (通道1、2、3、4、5)
- 高速响应电流反馈方式 (通道2、3、4、5)
- 自举电路 (通道5)
- 开关频率 通道1~5: 1MHz  
通道0~8: 500kHz
- 开/关控制
- 软启动
- 保护功能 (SCP、OVP、OCP)
- LCD背光用调光功能 (通道8)
- 工作电压范围: 1.4~4.5V (支持1节锂离子、2节五号干电池)
- 封装:  
6mm × 6mm × 0.6mm、0.40mm脚距、48管脚QFN

## 用途

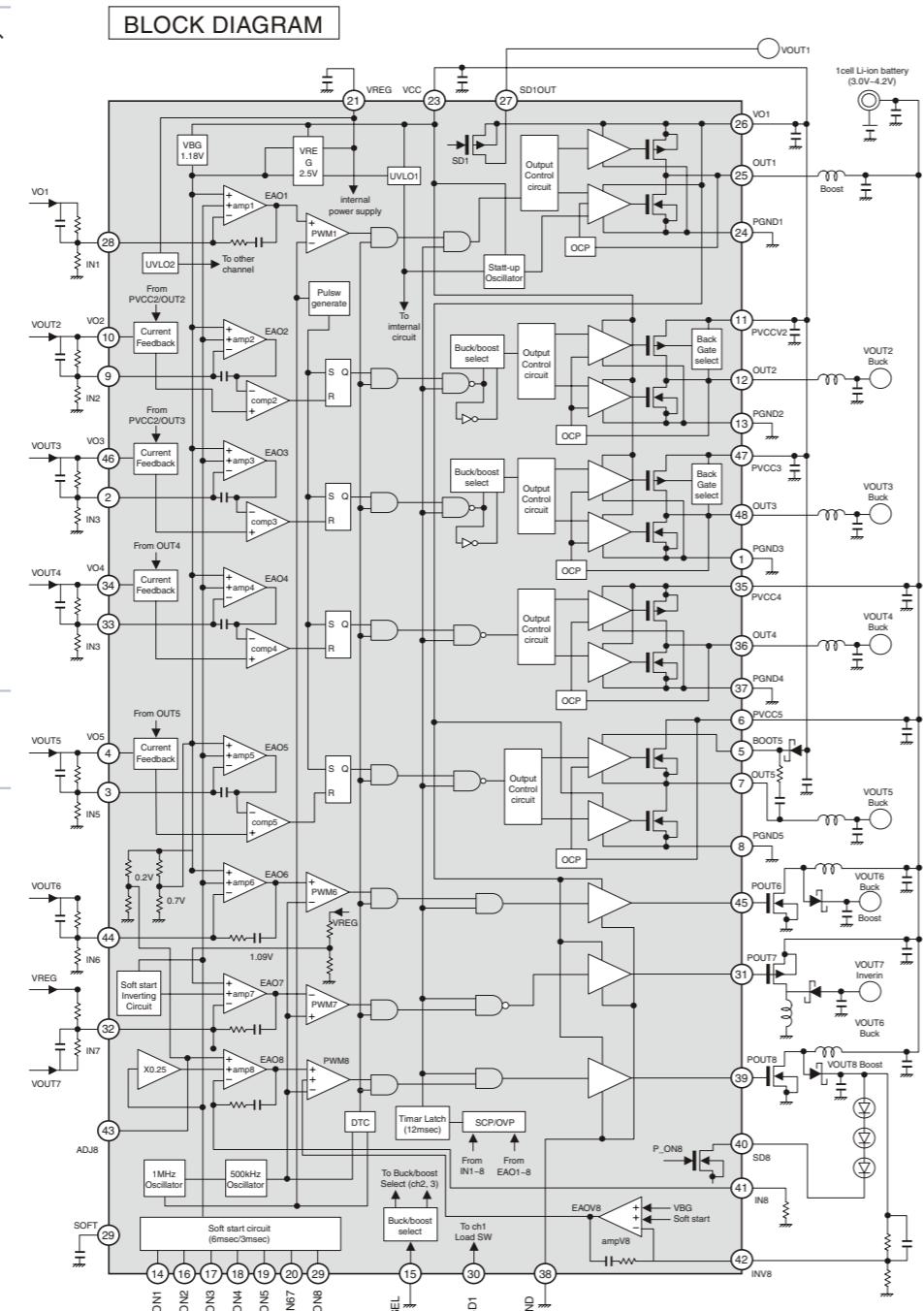
数码相机、数码摄像机

## FEATURES

- 8-channel architecture (3ch step-up, 2ch step-down, 2ch selectable step-up/step-down, and 1ch Inverter)
- Built-in 5ch MOS transistor (ch1, ch2, ch3, ch4, and ch5)
- Built-in phase compensate parts (all channel)
- Built-in shut-down circuit (ch1 and ch8)
- 5ch synchronous rectification (ch1, ch2, ch3, ch4, and ch5)
- High speed response current feedback circuit (ch2, ch3, ch4, and ch5)
- Bootstrap circuit (ch5)
- SW frequency CH1~5.1MHz  
CH0~8.500kHz
- Independent ON/OFF control
- Soft start
- Protect function (SCP, OVP, OCP)
- Dimmer control for LCD BL (ch8)
- Operating voltage range: 1.4~4.5V (for 1cell Li-ion and 2cell AA battery)
- Package:  
6mm × 6mm × 0.6mm, 0.40mm pitch, 48pin QFN

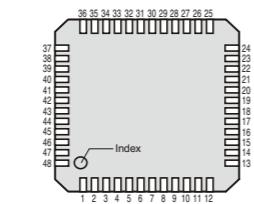
## APPLICATION

Digital Still Camera, Digital Video Camera



## PIN ARRANGEMENT (TOP VIEW)

R2A20010NP (48Pin QFN)



内置IGBT驱动器 闪光灯用电容器充电IC  
PHOTOFLASH CAPACITOR CHARGER WITH IGBT DRIVER

## R2J20071ANS

## 特点

- 使用回扫变压器的自激振荡方式
- 充电结束检测采用从变压器三级侧 (FB绕组) 的间接检测方式
- 配备电源开关用高耐压Nch MOSFET (60V 最大)
- 保护功能
  - 低电压保护功能 (UVLO)
  - 热关断功能
  - Nch MOSFET最大关断时间限制
  - 配备变压器三级侧断路保护功能
- 变压器一级侧电流调整功能
- IGBT驱动器针对瑞萨闪光灯IGBT的特性实现最佳化
- 小型无管脚功率封装: DFN-10 (2.5 × 2.0 × 0.6mm)

## 用途

- 数码相机、数码摄像机、  
卤化银胶片相机
- 手机

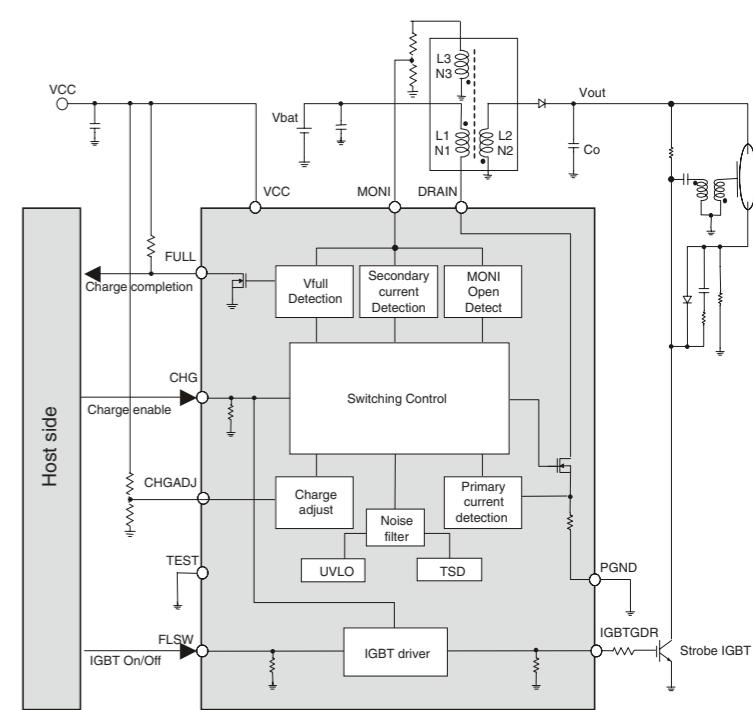
## FEATURES

- Self-oscillation method with fly-back transformer
- The charge completion is detected by indirect detection method with tertiary(FB)-winding
- Built-in high voltage Nch MOSFET for Power SW (60V max)
- Various Protect functions
  - Low voltage protection (UVLO)
  - Thermal shutdown
  - Maximum Off time limitation for Nch MOSFET
  - Overcharge protection for open tertiary(FB)-winding
- Adjustable primary side current
- IGBT driver is adjusted to Renesas's strobe IGBT characteristics.
- Small leadless power package: DFN-10 (2.5 x 2.0 x 0.6mm)

## APPLICATION

- Digital still camera, Digital Video Camera, Optical film camera
- Mobile phone

## BLOCK DIAGRAM



## PIN ARRANGEMENT (TOP VIEW)

DRAIN	1	PGND	10
MONI	2	(TEST)	9
VCC	3	IGBTGDR	8
FULL	4	FLSW	7
CHG	5	CHGADJ	6

10pin DFN

## PWM控制

## PWM Controllers

## 电池用

## For batteries

PWM Controllers

CRT监视器同步偏转用PWM控制器  
PWM CONTROLLER FOR SYNCHRONIZATION  
DEFLECTION SYSTEM CONTROL FOR CRT MONITOR

**M62501P/FP**

## 特点

- PWM输出与外部信号同步
- PWM控制频率范围广 ..... 15kHz~150kHz
- 内置软启动电路
- 内置防低电压输出误动作电路
  - 启动 Vcc > 9V
  - 停止 Vcc > 6V
- 内置控制线的输出过电压保护电路 (OVP)、输出低电压保护电路 (UVP)

## 用途

CRT显示监视器

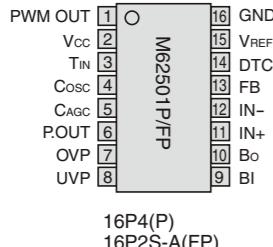
## FEATURES

- PWM output in synchronization with external signals
- Wide range of PWM control frequency ..... 15kHz to 150kHz
- Built-in soft start circuit
- Built-in low voltage output malfunction prevention circuit
  - Start Vcc > 9V
  - Stop Vcc > 6V
- Built-in output overvoltage protection circuit (OVP) in the control line and built-in low voltage protection circuit (UVP)

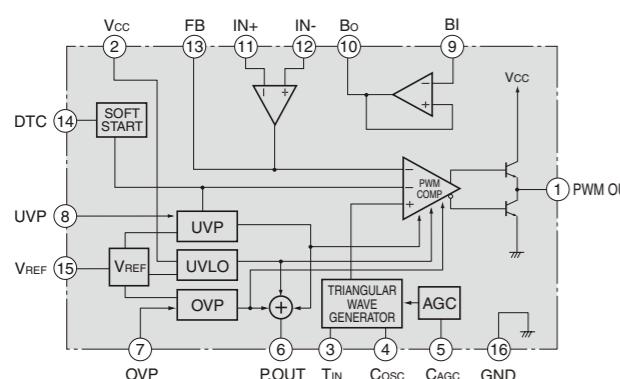
## APPLICATION

CRT display monitor

## PIN ARRANGEMENT (TOP VIEW)

16P4(P)  
16P2S-A(FP)

## BLOCK DIAGRAM



CRT监视器同步偏转用PWM控制器  
PWM CONTROLLER FOR SYNCHRONIZATION  
DEFLECTION SYSTEM CONTROL FOR CRT MONITOR

**M62504P/FP**

## 特点

- PWM输出与外部信号同步
- PWM控制频率范围广 ..... 15kHz~150kHz
- 内置软启动电路
- 内置防低电压输出误动作电路
  - 启动 Vcc > 9V
  - 停止 Vcc < 6V
- 内带逐脉冲方式限流功能
- 内带定时锁存功能

## 用途

CRT显示监视器

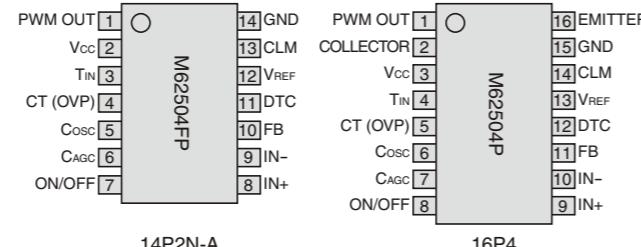
## FEATURES

- PWM output in synchronization with external signals
- Wide range of PWM control frequency ..... 15kHz to 150kHz
- Built-in soft start circuit
- Built-in low voltage output malfunction prevention circuit
  - Start Vcc > 9V
  - Stop Vcc < 6V
- Built-in Pulse-By-Pulse method current limiting circuit
- Built-in Timer latch protection circuit

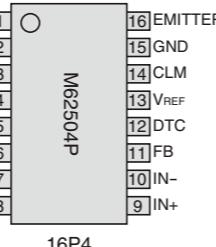
## APPLICATION

CRT display monitor

## PIN ARRANGEMENT (TOP VIEW)

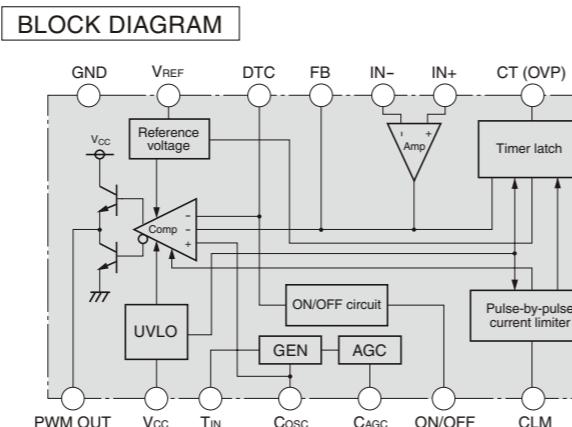


14P2N-A



16P4

## BLOCK DIAGRAM



锂离子电池充电器控制IC  
LITHIUM-ION BATTERY CHARGER CONTROL IC

**M62242FP/AFP**

## 特点

- 内置用于检测充电饱和电压的高精度基准电压
  - (备有 $\pm 30mV$  4.1V (AFP) / 4.2V (FP) 两种)
- 内置单片机用5V电源
- 通过与单片机的对接规格, 可实现各种电荷流
- 封装: 16管脚SSOP

## 用途

个人数字助理等、一般电子设备用电池充电器

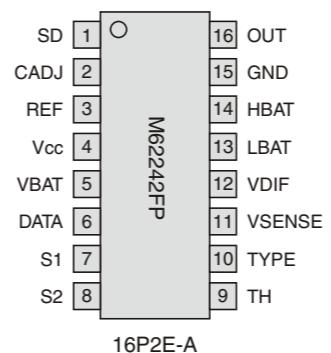
## FEATURES

- High precision reference voltage built-in for full charge voltage detection (4.1V $\pm 30mV$ (AFP), 4.2V $\pm 30mV$ (FP) available)
- 5V power supply for MCU
- Various kinds of charge flows are available by the interface with MCU
- Package : 16 pin SSOP

## APPLICATION

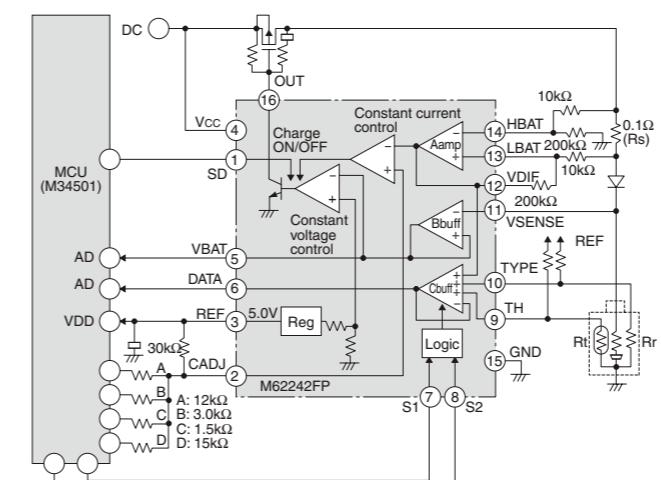
Personal Digital assistant battery charger for general electronic equipments

## PIN ARRANGEMENT (TOP VIEW)



16P2E-A

## BLOCK DIAGRAM



Scale drawing

电池用

For batteries

稳压 / 电流控制IC  
CONSTANT VOLTAGE CONSTANT CURRENT CONTROL IC

**M62237FP****特 点**

- 工作电源电压范围 2.5~15V
- 内置高精度基准电压源 1.25V±1.0%
- PC管脚输出电流 20mA
- 封装：8管脚SOP

**用 途**

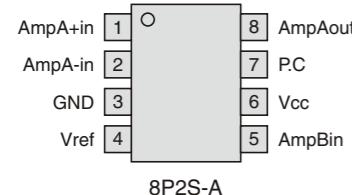
充电器、开关电源二级侧控制

**FEATURES**

- Operating power supply voltage range 2.5 to 15V
- High precision reference voltage 1.25V ±1.0%
- PC terminal output current 20mA
- Package : 8pin SOP

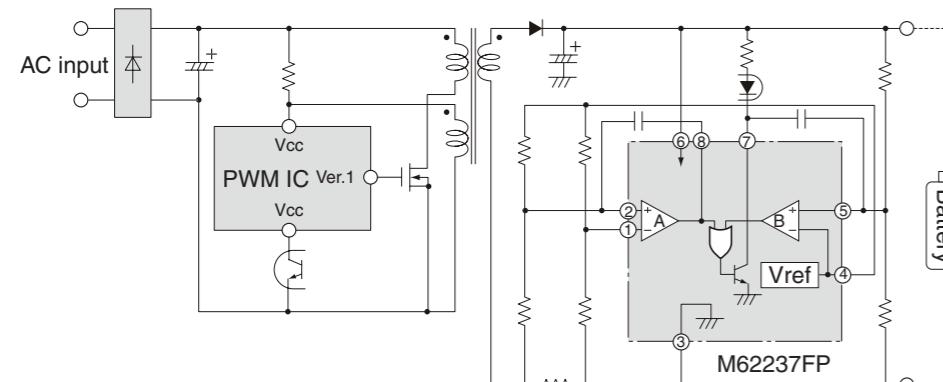
**APPLICATION**

Charger, Switching mode power supply secondary side control

**PIN ARRANGEMENT (TOP VIEW)**

电池用

电源用

**BLOCK DIAGRAM**

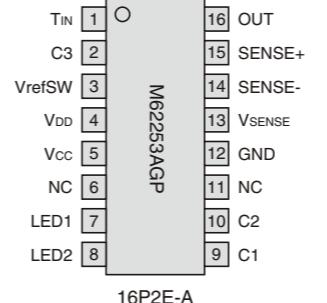
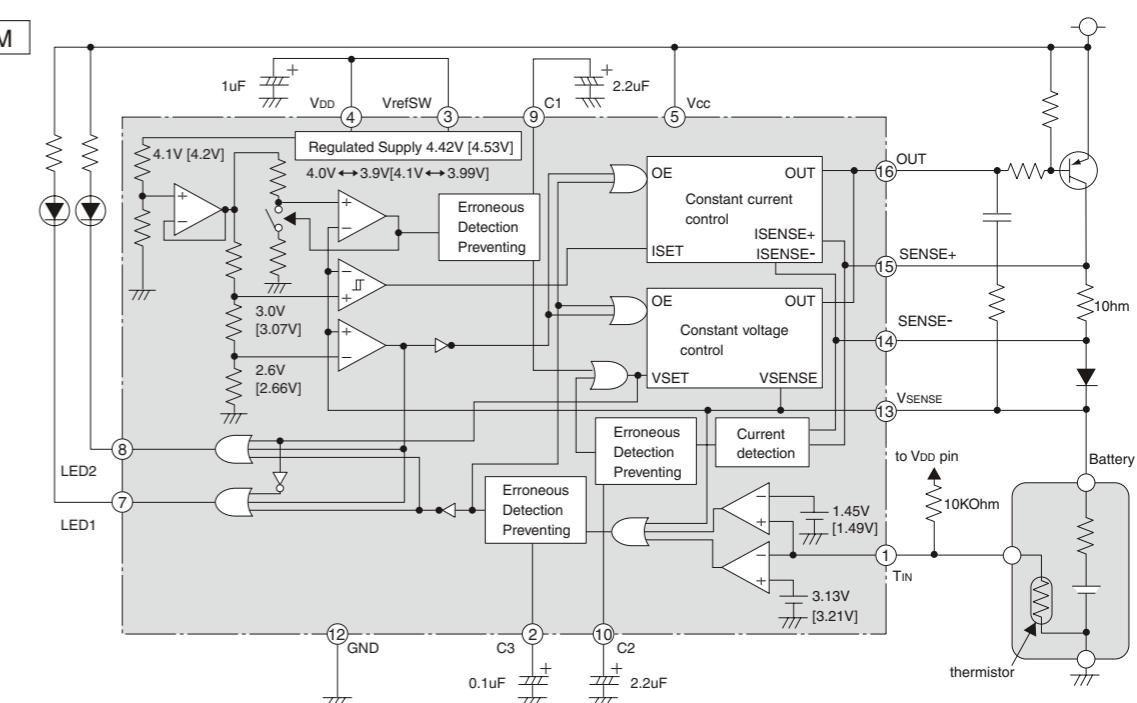
锂离子电池充电器控制IC  
LITHIUM-ION BATTERY CHARGER CONTROL IC

**M62253AGP****特 点**

- 支持4.1V电池、4.2V电池
- 内置高精度基准电压（充电电压）4.2V±30mV
- 支持恒流、恒压充电
- 内带禁止向过放电电池充电的保护功能
- 内带禁止向高温电池、低温电池充电的保护功能
- 内带再充电功能
- 通过2个系统的LED显示充电状态
- 内置震颤防止用延迟电路
- 封装：16管脚SSOP

**用 途**

手机等电子设备的锂离子电池充电器

**PIN ARRANGEMENT (TOP VIEW)****BLOCK DIAGRAM**

**锂离子电池充电器控制IC**  
LITHIUM-ION BATTERY CHARGER CONTROL IC

**M62244FP**

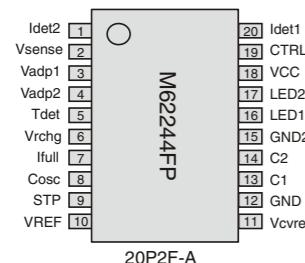
**特点**

- 支持4.2V电池
- 内置高精度基准电压(充电电压)  $4.2V \pm 30mV$
- 内置3种定时器(根据外接可变动)
  - (1)初始设定定时器: 约5分钟 (2)预充电定时器: 约1小时
  - (3)充电定时器: 约4小时
- 内带禁止充电保护功能
  - (1)过放电电池 (2)高温、低温电池
- 内置震颤防止用延迟电路
- 内带充电关闭功能
  - (1)适配器脱落时 (2)适配器电压下降时
- 封装: 20管脚SSOP

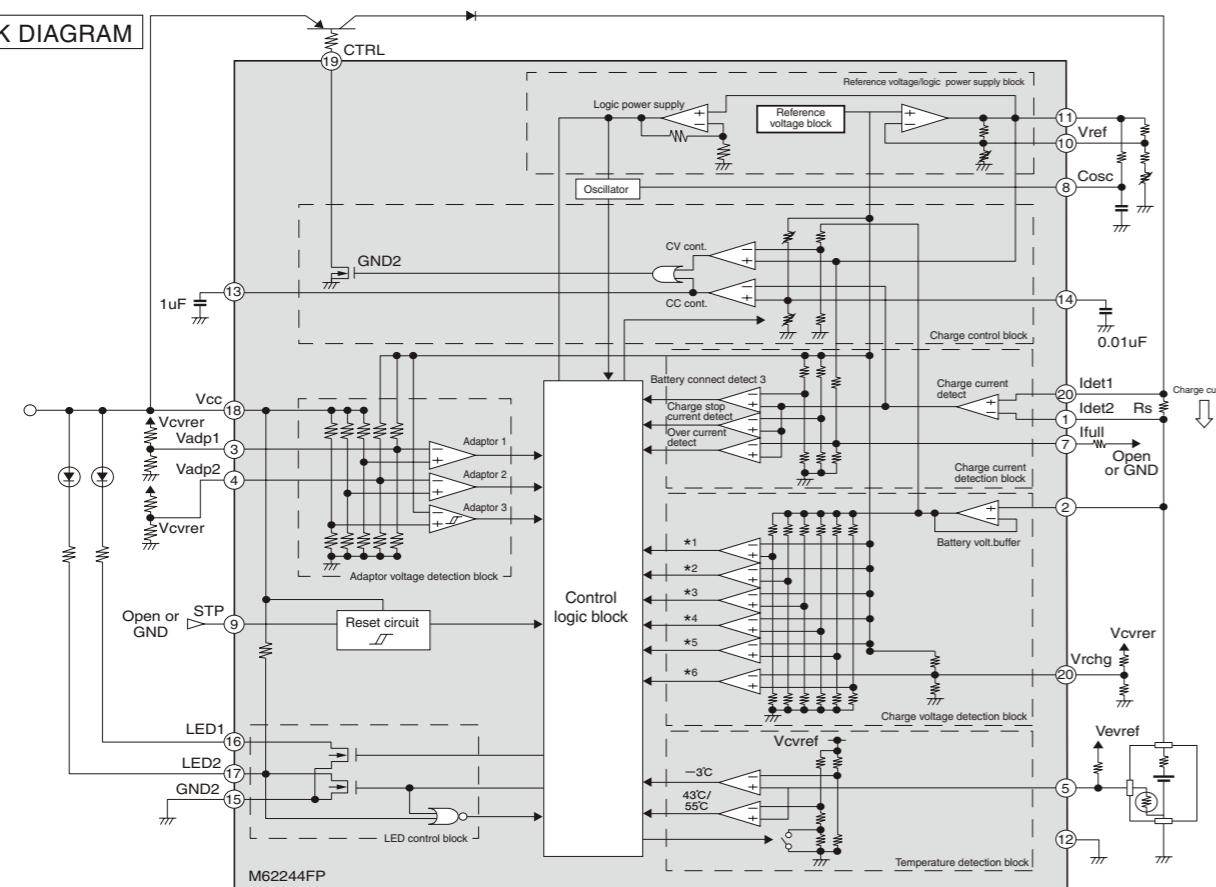
**用途**

锂离子电池充电器

**PIN ARRANGEMENT (TOP VIEW)**



**BLOCK DIAGRAM**



\*1.Over discharge detect  
\*2.Quick charge start volt.detect  
\*3.Over voltage detect  
\*4.Battery connect detect 1  
\*5.Battery connect detect 2  
\*6.Charge stop / recharge detect

**锂离子电池充电器控制IC**  
LITHIUM-ION BATTERY CHARGER CONTROL IC

**M62245FP**

**特点**

- 支持4.2V电池
- 内置高精度基准电压(充电电压)  $4.2V \pm 30mV$
- 支持恒流、恒压充电
- 内带禁止向放电电池充电的保护功能
- 内带防止向高温、低温电池充电的保护功能
- 内带再充电功能
- 通过2个系统的LED显示充电状态
- 内置震颤防止用延迟电路
- 内置3种定时器(根据外接可变动)
  - 初始设定定时器(预充电定时器1): 约5分钟
  - 预充电定时器(预充电定时器2): 约1小时
  - 充电定时器: 约4小时
- 内带发生异常时的LED闪烁功能

**用途**

锂离子电池充电器等

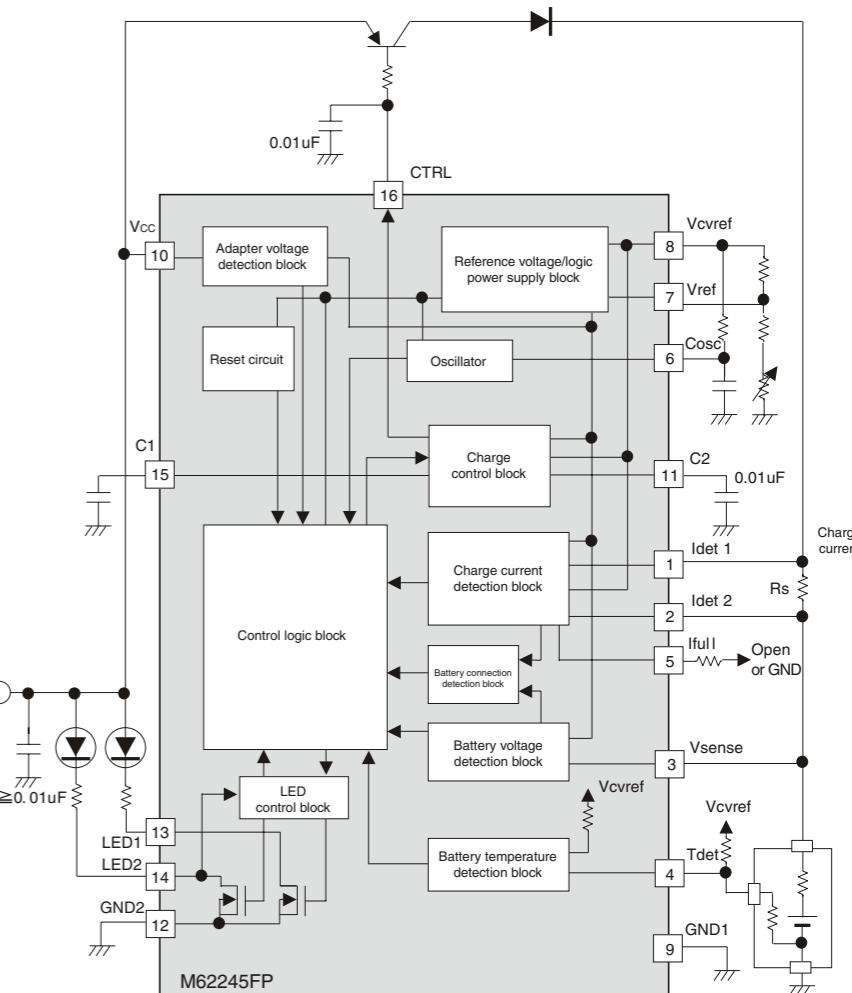
**FEATURES**

- Compatible with 4.2 V batteries
- On-chip high-precision reference voltage (charge voltage),  $4.2 V \pm 30 mV$
- Supports constant current, constant voltage charging
- On-chip protection function to prevent charging of over-discharged batteries
- On-chip protection function to prevent charging of batteries at excessively high or low temperatures
- On-chip recharge function
- 2 LEDs to indicate charging status
- On-chip delay circuit to prevent chattering
- 3 on-chip timers (settings variable by attaching external devices)
  - Initial setting timer (spare charge timer 1): Approx. 5 minutes
  - Spare charge timer (spare charge timer 1): Approx. 1 hour
  - Charge timer: Approx. 4 hours
- On-chip flashing LED malfunction indicator function

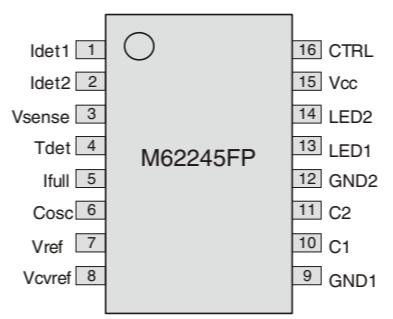
**APPLICATION**

Chargers for lithium-ion batteries, etc.

**BLOCK DIAGRAM**



**PIN ARRANGEMENT (TOP VIEW)**



16P2N-A

电池用

For batteries

内置充电开关的锂离子电池充电器控制IC  
LITHIUM-ION BATTERY CHARGER CONTROL IC BUILT-IN CHARGE SW

**M62249FP****特点**

- 内置高精度基准电压( $\pm 0.5\%$ )
- 内置功率MOSFET充电开关
- 内置3个安全定时器电路
  - 过放电电池充电定时器
  - 预充电定时器
  - 20小时定时器
- 采用小型封装(28管脚QFN)

**用途**

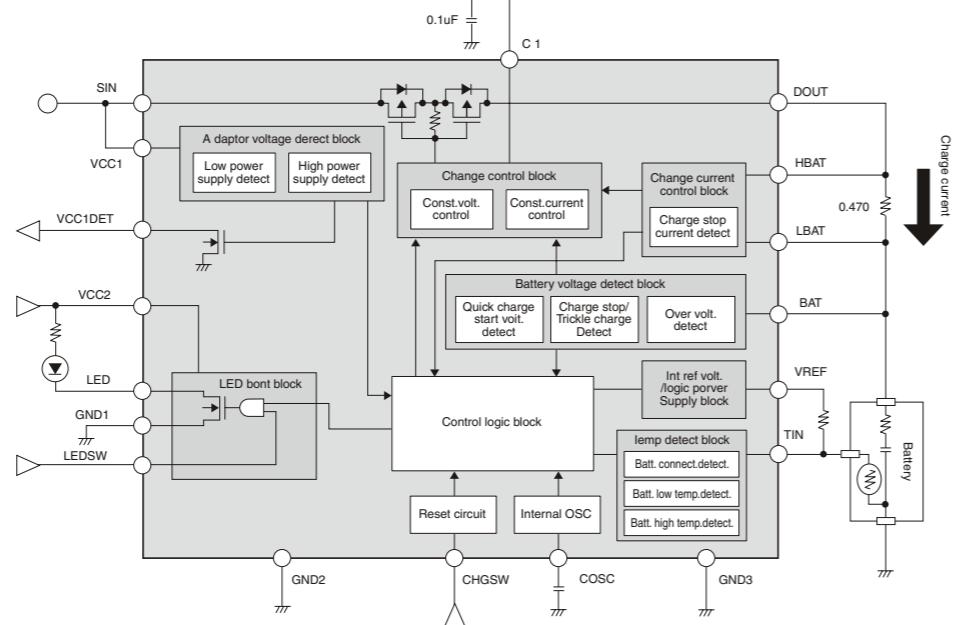
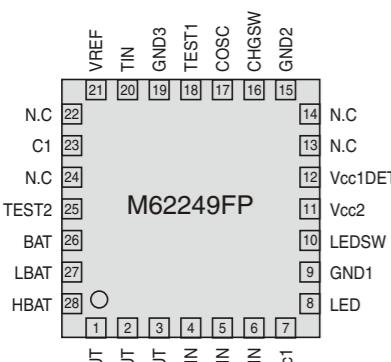
数码相机等小型便携式机器

**FEATURES**

- High precision ref. voltage( $\pm 0.5\%$ )
- Power MOSFET charge SW
- 3 safety timer circuits
  - Charge timer for overdischarged batt.
  - Precharge timer
  - 20hrs timer
- Small package(28pin QFN)

**APPLICATION**

Portable models such as DSC, etc

**BLOCK DIAGRAM****PIN ARRANGEMENT (TOP VIEW)**

28PJW-A

锂离子电池充电器控制IC  
LITHIUM-ION BATTERY CHARGER CONTROL IC

**R2S20030NP****特点**

- 高精度基准电压( $\pm 0.5\%$ )
- 内置功率MOSFET充电开关
- 内置电流检测电阻
- 内置3个安全定时器电路
  - 过放电电池充电定时器
  - 预充电定时器
  - 20小时定时器
- 小型封装(28管脚QFN)

**用途**

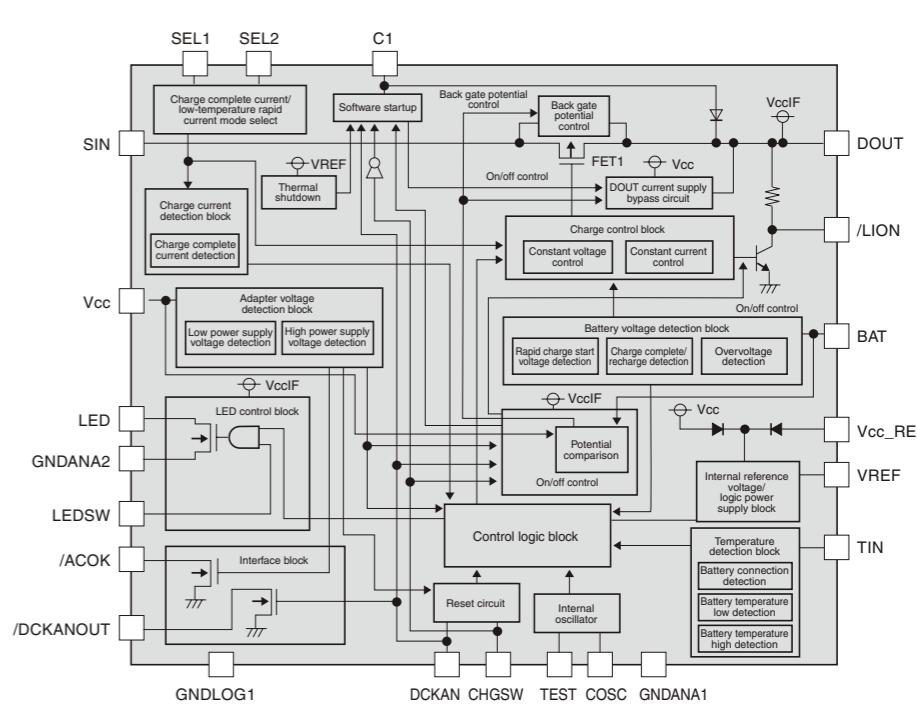
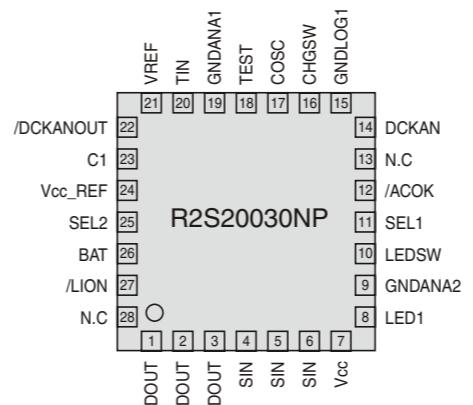
数码相机用等

**FEATURES**

- High precision ref. voltage( $\pm 0.5\%$ )
- Power MOSFET charge SW
- Current sense resistor built-in
- 3 safety timer circuits
  - Charge timer for overdischarged batt.
  - Precharge timer
  - 20hrs timer
- Small package(28pin QFN)

**APPLICATION**

DSC,etc.

**BLOCK DIAGRAM****PIN ARRANGEMENT (TOP VIEW)**

28PJW-A

电池用

For batteries

电池用

For batteries

锂离子电池充电器控制IC  
LITHIUM-ION BATTERY CHARGER CONTROL IC

**R2S20031SP****特点**

- 开关方式恒流、恒压控制充电
- 高精度充电电压控制  $8.4 \pm 60mV$  (2节)
- 过放电、过电压、温度保护、过热保护
- 内置2个系统的LED驱动器
- 内带2个系统的定时器功能 (过放电 / 充电)
- 采用小型20管脚SSOP封装

**用途**

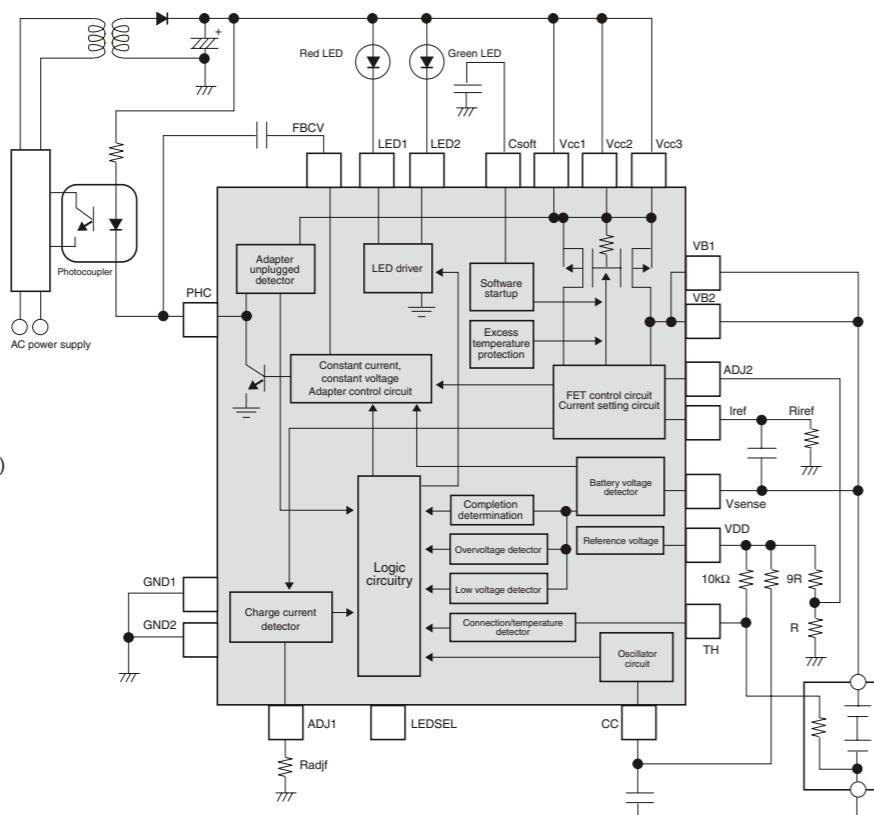
数码相机用等

**FEATURES**

- Switching type constant voltage and constant current control for charging
- High-precision charging voltage control,  $8.4 V \pm 60 mV$  (2 cells)
- Over-discharge, overvoltage, temperature, and excess heat protection
- Built-in drivers for 2 LEDs
- 2 on-chip timer functions (over-discharge, charge)
- Compact 20-pin SSOP package

**APPLICATION**

DSC,etc.

**BLOCK DIAGRAM****PIN ARRANGEMENT (TOP VIEW)**

Vcc1	1	VBAT1	20
Vcc2	2	VBAT2	19
Vcc3	3	VSENSE	18
FBCV	4	Csoft	17
GND1	5	ADJ1	16
PHC	6	ADJ2	15
GND2	7	VDD	14
LED1	8	TH	13
LED2	9	Iref	12
LEDSEL	10	CC	11

20P2F-A

锂离子电池充电器控制IC  
LITHIUM-ION BATTERY CHARGER CONTROL IC

**R2A20035SP****特点**

- 符合电气用品安全法
- 支持4.2V电池
- 内置高精度基准电压 (充电电压)  $4.20V \pm 30mV$  ( $T_a=25^{\circ}C$ 时)
- 内带恒流、恒压控制功能
- 内带电池连接检测功能
- 内带适配器连接检测功能
- 充实的保护功能
  - 内带安全定时器功能
  - 内带过放电检测功能
  - 内带过电压检测功能
  - 内带过热保护电路
  - 内带防误测电路
- 内带LEC显示功能

**用途**

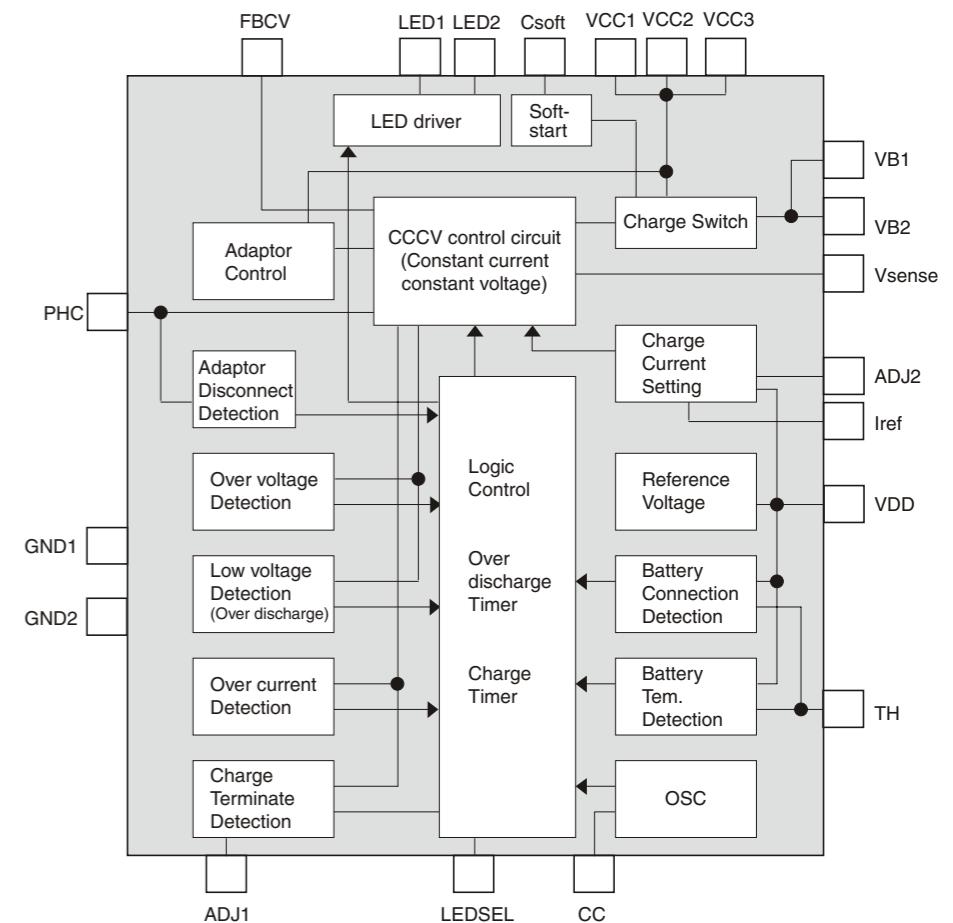
数码相机、数码摄像机等

**FEATURES**

- Respond to PCE (Product Safety Electrical Appliance & Material)
- Respond to 4.2V battery
- Highly accurate reference voltage (charge voltage) built-in  $4.20V \pm 30mV$  ( $T_a=25^{\circ}C$ )
- Constant current constant voltage control function built-in
- Battery connection detection function built-in
- Adaptor connection detection function built-in
- Rich in protection function
  - Safety timer function built-in
  - Over discharge detection function built-in
  - Over voltage detection function built-in
  - Over temperature protection circuit built-in
  - Erroneous detection prevention circuit built-in
- LED driver function built-in

**APPLICATION**

DSC, DVC, and so forth

**BLOCK DIAGRAM****PIN ARRANGEMENT (TOP VIEW)**

VCC1	1	VBAT1	11
VCC2	2	VBAT2	12
VCC3	3	VSENSE	13
FBCV	4	Csoft	14
GND1	5	ADJ1	15
PHC	6	ADJ2	16
GND2	7	VDD	17
LED1	8	TH	18
LED2	9	Iref	19
LEDSEL	10	CC	20

20pin 20P2F

## 电池用

For batteries

锂离子电池充电器控制IC  
LITHIUM-ION BATTERY CHARGER CONTROL IC

## R2A20050ANS

## 特点

- 支持4.2V电池
- 内置高精度基准电压(充电电压)  $4.20V \pm 30mV$  ( $T_a=25^{\circ}C$ 时)
- 内带恒流、恒压控制功能
- 内带电池连接检测功能
- 内带适配器连接检测功能
- 内带再充电功能
- 内带电池温度检测功能
- 内带芯片温度检测功能
- 充实的保护功能
  - 内带安全定时器功能
  - 内带过放电检测功能
  - 内带过电压检测功能
  - 内带禁止向过电压和过放电电池充电的保护功能
  - 内带过热保护电路
  - 内带防误测电路
- 内带LED显示功能

## 用途

数码相机、手机、PDA、便携式内存音频播放器、便携式游戏机等

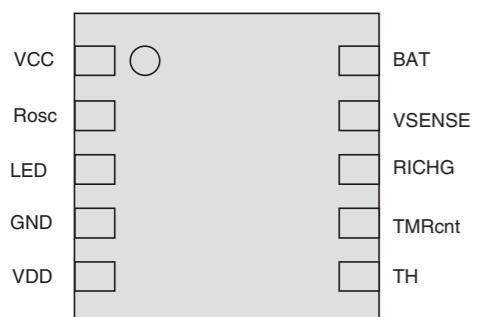
## FEATURES

- Available for 4.2V battery
- Built-in high accuracy reference voltage (charge voltage)  $4.20V \pm 30mV$  (at  $T_a=25^{\circ}C$ )
- Constant current and constant voltage control function
- Battery connection detection function
- Built-in adaptor detection function
- Built-in recharge function
- Built-in thermistor interface for battery temperature detection
- Built-in chip temperature detection function
- Substantial protection functions
  - Safety timer
  - Overdischarge protection
  - Overvoltage protection
  - Charge prohibition protection for overvoltage and overdischarge battery.
  - Thermal shutdown function
  - Erroneous detection protection
- Built-in LED display function

## APPLICATION

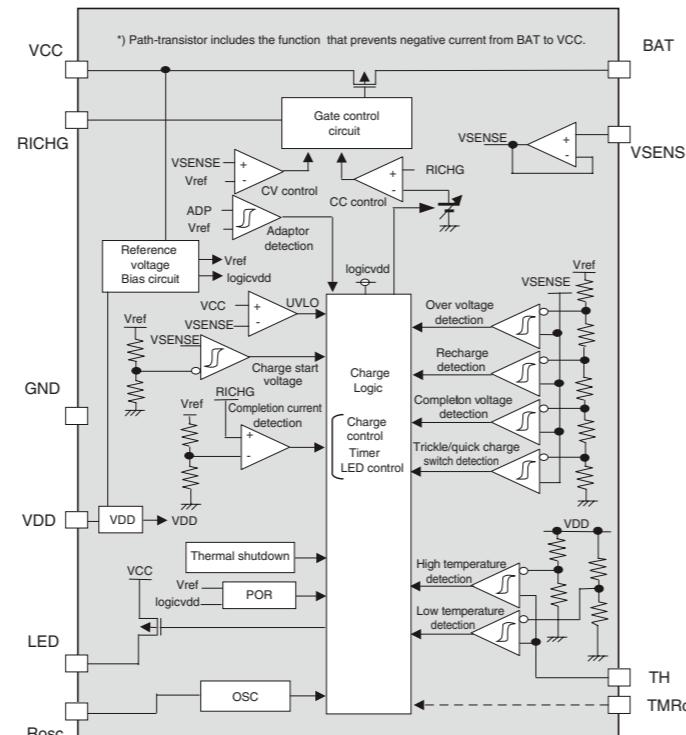
For DSC, cellular phone, PDA, portable memory audio player, handheld game machine, and others.

## PIN ARRANGEMENT (TOP VIEW)



10pin DFN

## BLOCK DIAGRAM



## 支持USB充电的锂离子电池充电和电源切换控制IC

USB-CHARGER-COMPATIBLE LITHIUM-ION BATTERY CHARGER AND POWER SUPPLY SWITCHING CONTROL IC

## R2J20052NS

## 特点

- 支持1节锂离子电池
- USB/ADP输入切换功能
- 系统供给和电池充电的自动负载分配功能
- 连接到系统的AC适配器/USB/电池的电源切换功能
- 内置电池—系统间的低损失MOSFET (HAT1069 38mΩ typ.)
- 输入电流限制功能 (AC适配器max. 2A, USB 100mA/500mA/900mA/1,800mA selectable)
- Compliant with Electrical Appliances and Materials Safety Act (charge current and control voltage switchable by I<sup>2</sup>C)
- 高精度充电控制电压  $4.2V \pm 30mV$
- On-chip constant current and constant voltage control functions
- Chip temperature detection function
- Thermal shutdown function
- Timer function

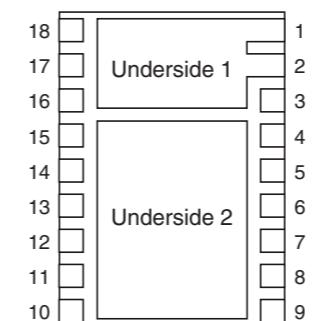
## 用途

- 数码相机
- 手机
- PDA
- 便携式内存音频播放器
- 便携式游戏机

## PIN ARRANGEMENT

BAT	1	SYS
BAT	2	SYS
(NC)	3	(NC)
(NC)	4	ADP
USB	5	RILMTA
USUSP1	6	GND
CEN1	7	SCL
RICHG	8	SDA
UCTL1	9	

## TOP VIEW



PKG DFN-18 3.4mm×4.8mm×0.6mm

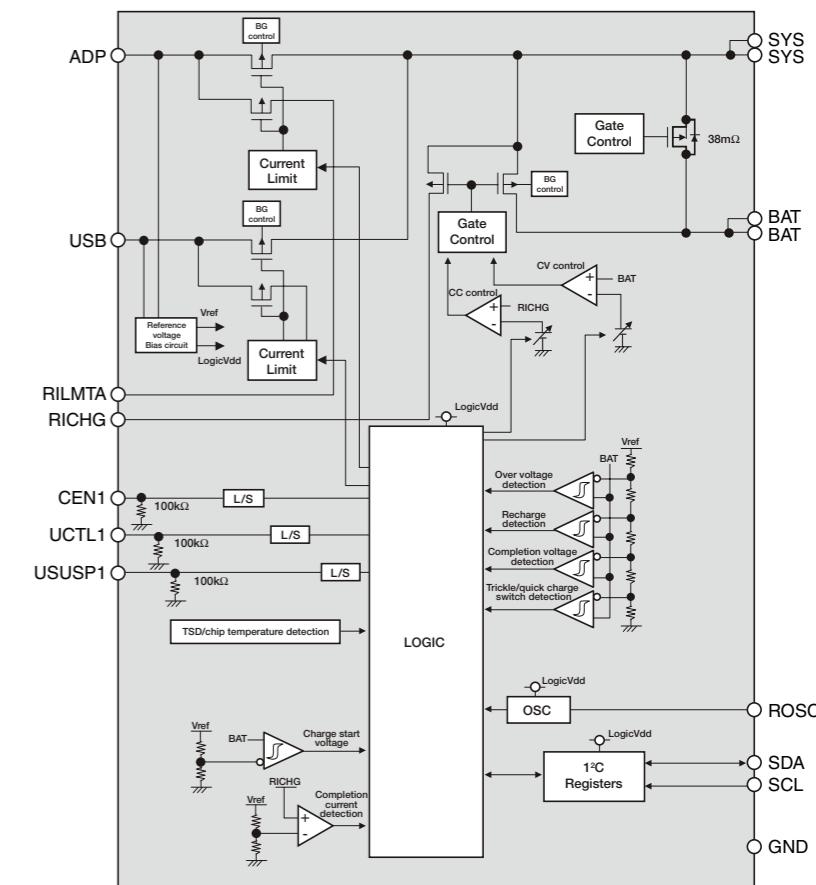
## FEATURES

- Support for single-cell lithium-ion batteries
- USB/ADP input switching function
- System supply/battery charger automatic load distribution function
- AC adapter to system/USB/battery power supply switching function
- On-chip low-loss MOSFET between battery and system (HAT1069, 38mΩ typ.)
- Input current limit function (AC adapter max. 2A, USB 100mA/500mA/900mA/1,800mA selectable)
- Compliant with Electrical Appliances and Materials Safety Act (charge current and control voltage switchable by I<sup>2</sup>C)
- High-precision charge control voltage,  $4.2V \pm 30mV$
- On-chip constant current and constant voltage control functions
- Chip temperature detection function
- Thermal shutdown function
- Timer function

## APPLICATION

- 数码相机
- 手机
- PDA
- 便携式内存音频播放器
- Handheld game consoles

## BLOCK DIAGRAM

I<sup>2</sup>C read/write access is not possible without either ADP or USB input.

## 电池用

## For batteries

锂离子电池保护模拟前端IC  
LITHIUM-ION BATTERY PROTECTION ANALOG FRONT END IC

R2S20020SP

## 特点

- CMOS单片IC
- 内带基于单片机的充放电用FET控制功能
- 内置可用作单片机电源的2.5V输出串联稳压器
- 内置可用作LED电源的3.3V输出串联稳压器
- 内带省电功能
- 内置可调整各个电池单元间单元电压的电池均衡电路
- 内置复位电路，监控稳压器输出并检测电压下降，然后输出复位信号
- 与单片机的接口为三线式
- 高耐压器件（绝对最大额定值28V）

## 用途

智能电池

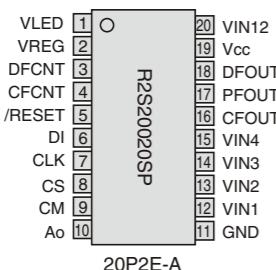
## FEATURES

- CMOS monolithic IC
- All FET's are controlled by MCU
- Linear regulator(2.5V output) for MCU power supply
- Linear regulator(3.3V output) for LED power supply
- Power save function
- Cell balancing circuit for adjusting each cell voltage
- Reset circuit for detecting voltage drop to output reset signal by monitoring regulator voltage
- 3-wire interface with MCU
- High voltage device(Absolute Maximum Rating 28V)

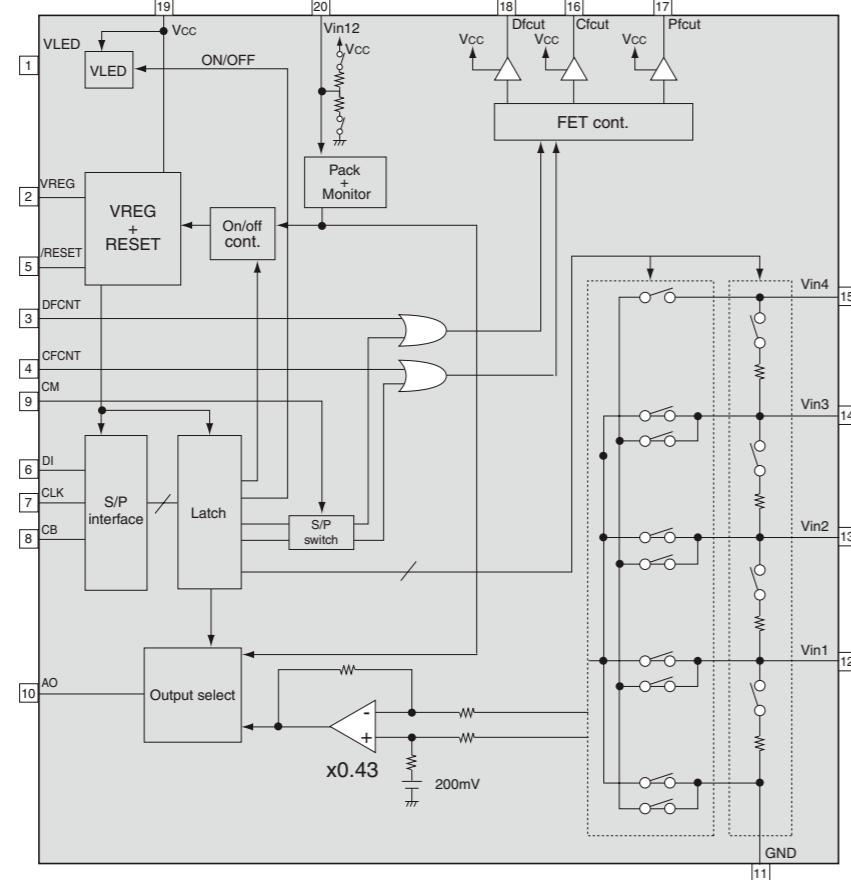
## APPLICATION

Smart battery

## PIN ARRANGEMENT (TOP VIEW)



## BLOCK DIAGRAM



## D/A转换器

## D/A converters

3V TYPE 8-BIT 36CH  
D/A CONVERTER

M62370GP, M62371GP

## 特点

- 电源电压2.7~3.6V
- 16位串行数据输入方式(DI, CLK, LD三线组合)
- 内置8位36通道D/A转换器
- 内置6通道的DAC (Ao31~Ao36)，可通过2个控制管脚选择各自存储的4个数据输出

## 用途

相机一体式VTR、VTR、TV、CRT显示器等民用及工业用设备的控制调整  
※M62371GP是输出驱动能力增强型

## FEATURES

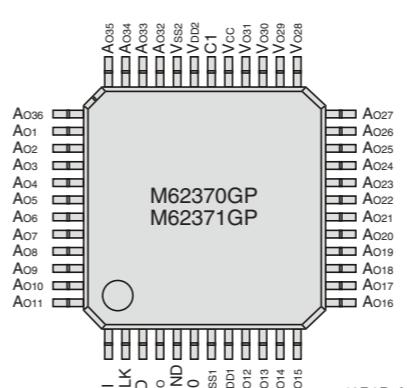
- Low voltage operation (2.7 to 3.6V)
- 16-bit serial data input (connected via 3 pins: DI, CLK, LD)
- 36 channels of 8-bit D/A converter
- 6 channels of D/A converters can select output from 4 data stored in each converter, through 2 control terminals (Ao31 to Ao36)

## APPLICATION

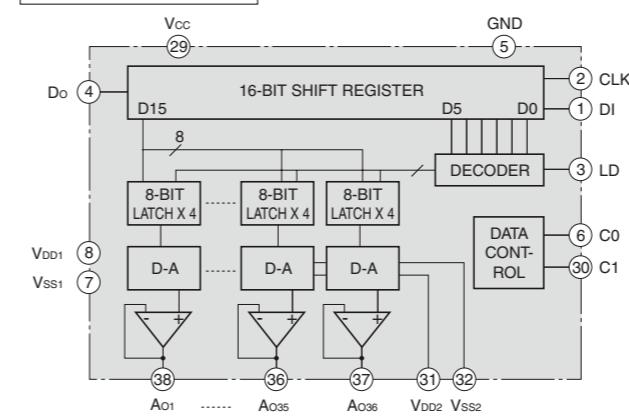
Adjustment/control of industrial or home-use electronic equipment, such as VCR camera, VCR set, TV, and CRT display

※M62371GP is a product with increased output drive capacity.

## PIN ARRANGEMENT (TOP VIEW)



## BLOCK DIAGRAM



3-5V TYPE 8-BIT 12CH  
D/A CONVERTER

R2A20169NP\*/SA\*/SP

## 特点

- 12位串行数据输入方式(DI, CLK, LD三线组合)
- 内置12通道R-2R十分段式的高性能8位D/A转换器
- 完全保证非线性误差: ±1.0LSB、微分非线性误差: ±0.7LSB
- 内置12个输出电压在Vcc-GND间全摆幅的缓冲运算放大器
- 内置上电复位电路
- 对缓冲放大器电容性负载的振荡稳定性高
- 采用超小型QFN-20封装 (4mm×4mm)

## 用途

LCD-TV、打印机、PPC等民用、OA设备以及工业设备的自动调整、控制调整用

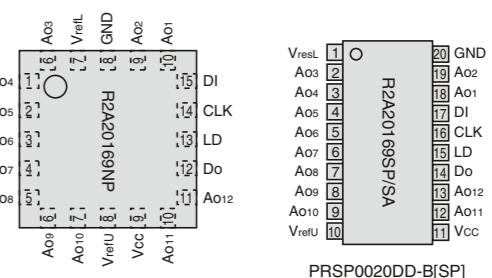
## FEATURES

- 12-bit serial data input (connected via 3 pins: DI, CLK, LD)
- 12 channels of R-2R and segment type high-performance 8-bit D/A converters
- Guarantee ±1.0LSB for Non-linearity error and ±0.7LSB for differential non-linearity error
- 12 buffer operational amplifiers with full swing of output voltage between Vcc and GND
- Built-in power on reset circuit
- High oscillation stability against the capacitive load of buffer operational amplifiers
- Using very small QFN-20 package (4mm×4mm)

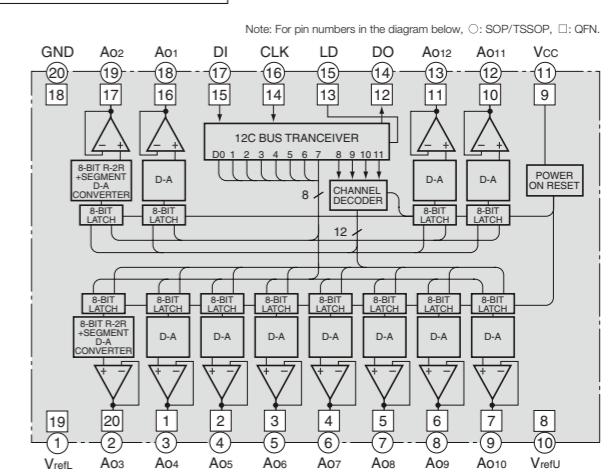
## APPLICATION

Automatic adjustment or control for consumer and Industrial equipment

## PIN ARRANGEMENT (TOP VIEW)



## BLOCK DIAGRAM



\* New Product

## D/A转换器

## D/A converters

3-5V TYPE 8-BIT 8CH  
D/A CONVERTER

R2A20168NP\*/SA\*/SP

## 特点

- 12位串行数据输入方式 (DI、CLK、LD三线组合)
- 内置8通道R-2R+分段式的高性能8位D/A转换器
- 完全保证非线性误差:  $\pm 1.0\text{LSB}$ 、微分非线性误差:  $\pm 0.7\text{LSB}$
- 内置8个输出电压在Vcc-GND间全摆幅的缓冲运算放大器
- 内置上电复位电路
- 对缓冲放大器电容性负载的振荡稳定性高
- 采用超小型QFN-16封装 (3mm×3mm)

## 用途

LCD-TV、打印机、PPC等民用、OA设备以及工业设备的自动调整、控制调整用

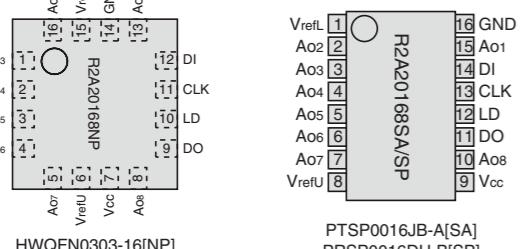
## FEATURES

- 12-bit serial data input (connected via 3 pins: DI, CLK, LD)
- 8 channels of R-2R and segment type high-performance 8-bit D/A converters
- Guarantee  $\pm 1.0\text{LSB}$  for Non-linearity error and  $\pm 0.7\text{LSB}$  for differential non-linearity error
- 8 buffer operational amplifiers with full swing of output voltage between Vcc and GND
- Built-in power on reset circuit
- High oscillation stability against the capacitive load of buffer operational amplifiers
- Using very small QFN-16 package (3mm×3mm)

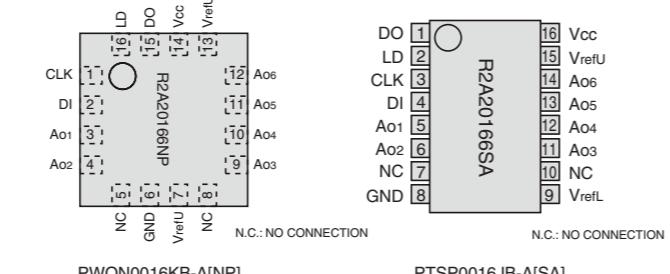
## APPLICATION

Automatic adjustment or control for consumer and Industrial equipment

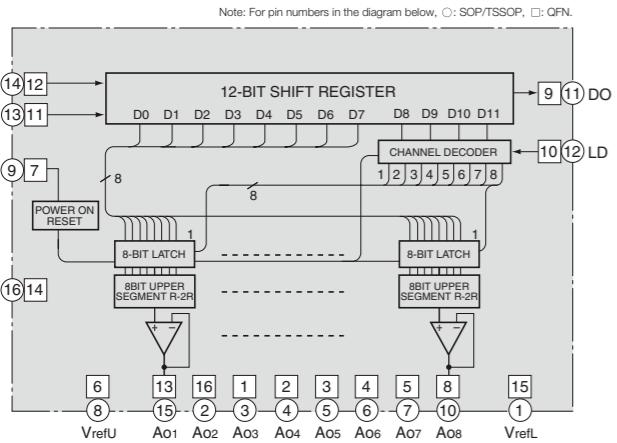
## PIN ARRANGEMENT (TOP VIEW)



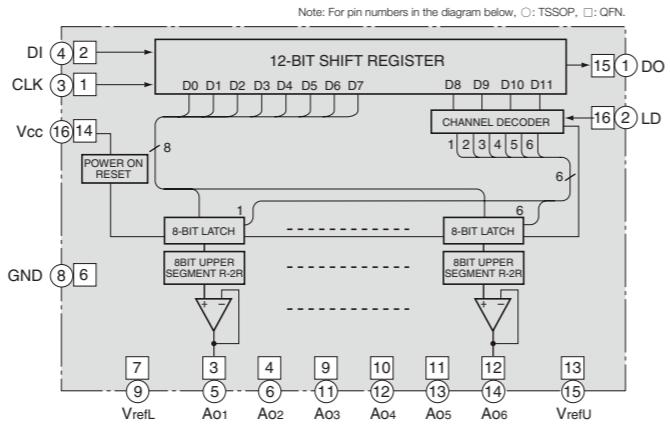
## PIN ARRANGEMENT (TOP VIEW)



## BLOCK DIAGRAM



## BLOCK DIAGRAM



\* New Product

3-5V TYPE 8-BIT 6CH  
D/A CONVERTER

R2A20166NP\*/SA\*

## 特点

- 12位串行数据输入方式 (DI、CLK、LD三线组合)
- 内置6通道R-2R+分段式的高性能8位D/A转换器
- 完全保证非线性误差:  $\pm 1.0\text{LSB}$ 、微分非线性误差:  $\pm 0.7\text{LSB}$
- 内置6个输出电压在Vcc-GND间全摆幅的缓冲运算放大器
- 内置上电复位电路
- 对缓冲放大器电容性负载的振荡稳定性高
- 采用超小型QFN-16封装 (3mm×3mm)

## 用途

LCD-TV、打印机、PPC等民用、OA设备以及工业设备的自动调整、控制调整用

## FEATURES

- 12-bit serial data input (connected via 3 pins: DI, CLK, LD)
- 6 channels of R-2R and segment type high-performance 8-bit D/A converters
- Guarantee  $\pm 1.0\text{LSB}$  for Non-linearity error and  $\pm 0.7\text{LSB}$  for differential non-linearity error
- 6 buffer operational amplifiers with full swing of output voltage between Vcc and GND
- Built-in power on reset circuit
- High oscillation stability against the capacitive load of buffer operational amplifiers
- Using very small QFN-16 package (3mm×3mm)

## APPLICATION

Automatic adjustment or control for consumer and Industrial equipment

3V TYPE 8-BIT 12/8/6CH  
D/A CONVERTER

M62366GP, M62367FP/GP, M62368GP

## 特点

- 2.7~3.6V低电压工作
- 12位串行数据输入方式 (DI、CLK、LD三线组合)
- 内置12/8/6通道R-2R+分段式的高性能8位D/A转换器
- 内置12/8/6个输出电压在Vcc-GND间全摆幅的缓冲运算放大器
- 对缓冲放大器电容性负载的振荡稳定性高

## 用途

相机一体式VTR、VTR、TV、CRT显示器等  
民用及工业用设备的控制调整

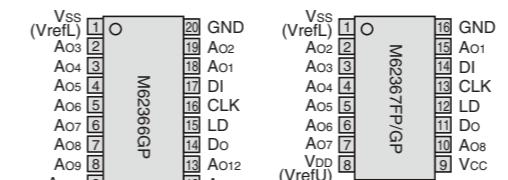
## FEATURES

- Low voltage operation (2.7 to 3.6V)
- 12-bit serial data input (connected via 3 pins: DI, CLK, LD)
- 12/8/6 channels of R-2R and segment type high-performance 8-bit D/A converter
- 12/8/6 buffer operational amplifiers with full swing of output voltage between Vcc and GND
- High oscillation stability against the capacitive load of buffer operational amplifiers

## APPLICATION

Adjustment/control of industrial or home-use electronic equipment,  
such as VCR camera, VCR set, TV, and CRT display

## PIN ARRANGEMENT (TOP VIEW)



20P2E-A

16P2N-A(FP)

16P2E-A(GP)

16P2N-A(GP)

16P2E-A(GP)

16P2N-A(FP)

20P2E-A(GP)

16P2N-A(FP)

16P2E-A(GP)

16P2N-A(GP)

16P2E-A(GP)

16P2N-A(FP)

16P2E-A(GP)

16P2N-A(GP)

## D/A转换器

## D/A converters

3-5V TYPE 8-BIT 4CH  
D/A CONVERTER

R2A20164NP\*/SA\*

## 特点

- 12位串行数据输入方式 (DI, CLK, LD三线组合)
- 内置4通道R-2R+分段式的高性能8位D/A转换器
- 完全保证非线性误差:  $\pm 1.0\text{LSB}$ 、微分非线性误差:  $\pm 0.7\text{LSB}$
- 内置4个输出电压在Vcc-GND间全摆幅的缓冲运算放大器
- 2通道 $\times 2$ 的基准电压配置, 可应用于电子音量控制
- 内置上电复位电路
- 对缓冲放大器电容性负载的振荡稳定性高
- 采用超小型QFN-16封装 (3mm×3mm)

## 用途

LCD-TV、打印机、PPC等民用、OA设备以及工业设备的自动调整、控制调整用

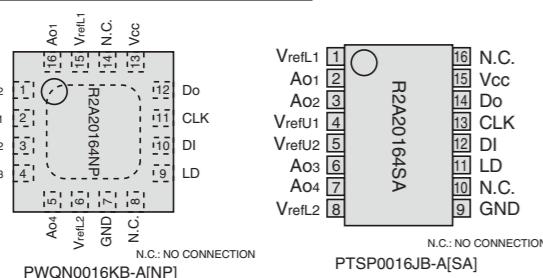
## FEATURES

- 12-bit serial data input (connected via 3 pins: DI, CLK, LD)
- 4 channels of R-2R and segment type high-performance 8-bit D/A converters
- Guarantee  $\pm 1.0\text{LSB}$  for Non-linearity error and  $\pm 0.7\text{LSB}$  for differential non-linearity error
- 4 buffer operational amplifiers with full swing of output voltage between Vcc and GND
- 2-channel  $\times 2$  reference voltage configuration enabling use of electronic variable resistors
- Built-in power on reset circuit
- High oscillation stability against the capacitive load of buffer operational amplifiers
- Using very small QFN-16 package (3mm×3mm)

## APPLICATION

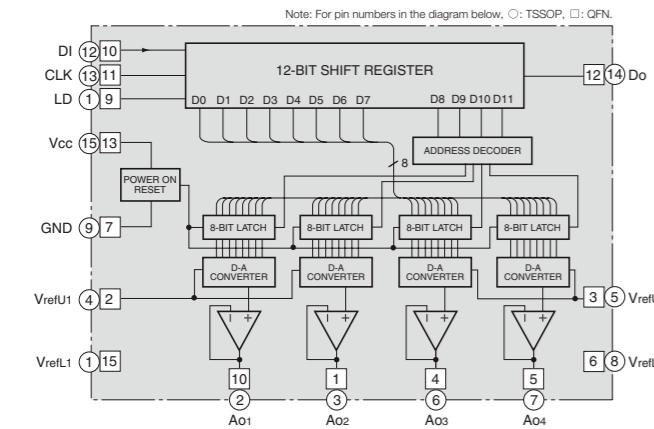
Automatic adjustment or control for consumer and Industrial equipment

## PIN ARRANGEMENT (TOP VIEW)



PWQN0016KB-A[NP]

## BLOCK DIAGRAM

3-5V TYPE 8-BIT 2CH  
D/A CONVERTER

R2A20162NS\*/SA\*/SP\*

## 特点

- 10位串行数据输入方式 (DI, CLK, LD三线组合)
- 内置2通道R-2R+分段式的高性能8位D/A转换器
- 完全保证非线性误差:  $\pm 1.0\text{LSB}$ 、微分非线性误差:  $\pm 0.7\text{LSB}$
- 内置2个输出电压在Vcc-GND间全摆幅的缓冲运算放大器
- 内置上电复位电路
- 对缓冲放大器电容性负载的振荡稳定性高
- 采用超小型SON-8封装 (2.2mm×2.2mm)

## 用途

LCD-TV、打印机、PPC等民用、OA设备以及工业设备的自动调整、控制调整用

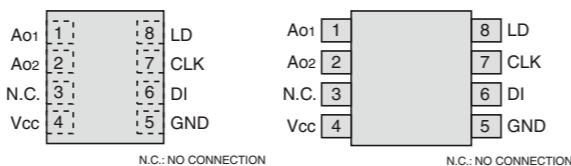
## FEATURES

- 10-bit serial data input (connected via 3 pins: DI, CLK, LD)
- 2 channels of R-2R and segment type high-performance 8-bit D/A converters
- Guarantee  $\pm 1.0\text{LSB}$  for Non-linearity error and  $\pm 0.7\text{LSB}$  for differential non-linearity error
- 2 buffer operational amplifiers with full swing of output voltage between Vcc and GND
- Built-in power on reset circuit
- High oscillation stability against the capacitive load of buffer operational amplifiers
- Using very small SON-8 package (2.2mm×2.2mm)

## APPLICATION

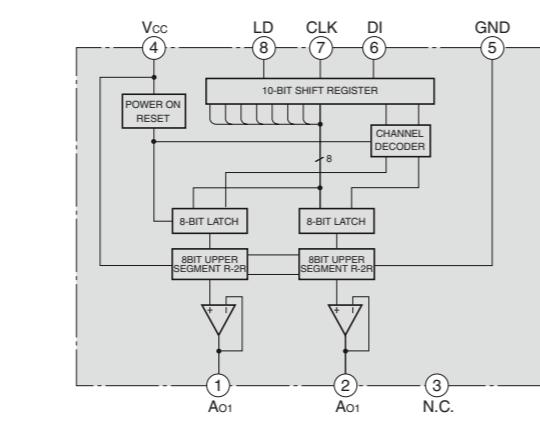
Automatic adjustment or control for consumer and Industrial equipment

## PIN ARRANGEMENT (TOP VIEW)



PWSN0008KA-A[NS] PRSP0008DE-C[SP] PTSP-0008JC-B[SA]

## BLOCK DIAGRAM



## 5V TYPE 8-BIT 12/8/6CH D/A CONVERTER

M62352AGP, M62353AGP, M62354AGP

## 特点

- 12位串行数据输入方式 (DI, CLK, LD三线组合)
- 支持TTL级输入 (3V CMOS输入)
- 内置12/8/6通道R-2R+分段式的高性能8位D/A转换器
- 内置12/8/6个输出电压在Vcc-GND间全摆幅的缓冲运算放大器
- 对缓冲放大器电容性负载的振荡稳定性高

## 用途

相机一体式VTR、VTR、TV、CRT显示器等  
民用及工业用设备的控制调整

## FEATURES

- 12-bit serial data input (connected via 3 pins: DI, CLK, LD)
- Corresponds to TTL input (3V CMOS input)
- 12/8/6 channels of R-2R and segment type high-performance 8-bit D/A converters
- 12/8/6 buffer operational amplifiers with full swing of output voltage between Vcc and GND.
- High oscillation stability against the capacitive load of buffer operational amplifiers

## APPLICATION

Adjustment/control of industrial or home-use electronic equipment, such as VCR camera, VCR set, TV, and CRT display

## 8-BIT 2/3CH D/A CONVERTER

M62342P/FP/GP/HP, M62343P/FP/GP

## 特点

- 电源电压2.7~5.5V
- 数据传送格式 10位串行数据输入方式
- 输出缓冲运算放大器 几乎可在从接地到VCC (0~5V) 的全电压范围内工作
- 输出电流能力高 .....±1mA以上

## 用途

CTV、显示监视器的信号增益设定、自动调整用  
将民用、工业设备的数字数据转变成模拟数据用

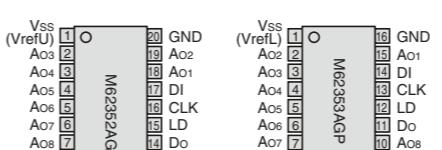
## FEATURES

- Supply voltage 2.7 to 5.5V
- Data transfer format: 10bit serial data input
- Output buffer operational amplifier Operates in the whole voltage range from Vcc to ground. (0 to 5V)
- High output current drive capability over  $\pm 1.0\text{mA}$

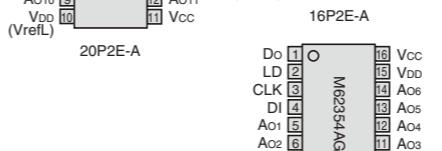
## APPLICATION

Conversion from digital data to analog control data for both consumer and industrial equipment.Gain control and automatic adjustment of DISPLAY-MONITOR or CTV

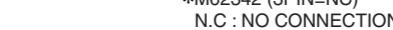
## PIN ARRANGEMENT (TOP VIEW)



16P2E-A



16P2E-A

8P4(P)  
8P2S-A(FP)

8P2J-A (GP)

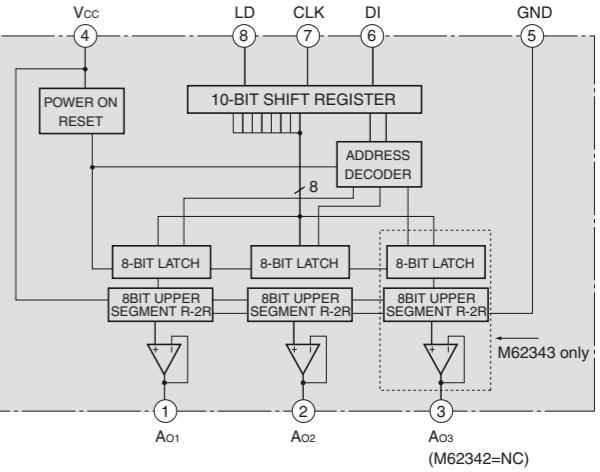
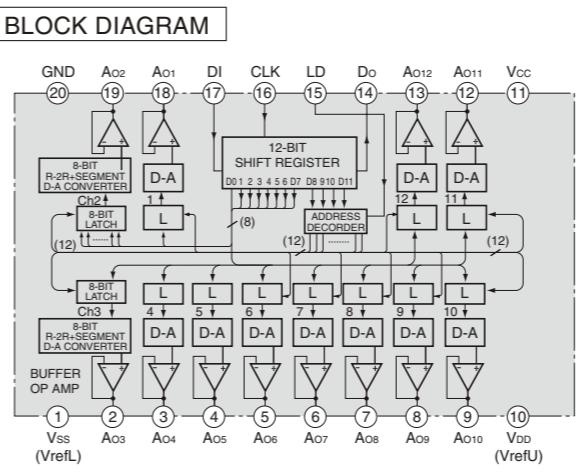


MSOP-8(HP)

\*M62342 (3PIN=NC)

N.C : NO CONNECTION

## BLOCK DIAGRAM



## D/A转换器

## D/A converters

**3~5V TYPE 8BIT 4CH D/A CONVERTER  
M62384FP**

## 特点

- 数据传送格式：三线式串行数据传送方式
- 串行数据传送时钟频率：最大10MHz
- 内置输出缓冲运算放大器：几乎可在从接地到Vcc的全电压范围内工作
- 输出建立时间短
- 带有上电复位及外部复位功能
- 内带芯片选择功能：在同一总线上最多可连接4个
- 电源电压2.7~5.5V

## 用途

用于将民用、工业用设备的数字控制数据转变成模拟控制数据的电子设备的自动调整用

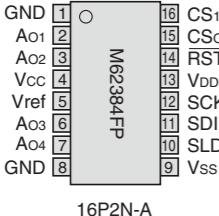
## FEATURES

- Data transfer format: 3-wire serial data transfer method
- Serial data transfer clock frequency: 10MHz (max.)
- Built-in buffer operational amplifiers: operative in almost the whole range of Vcc to GND
- Short output settling time
- Power-on reset, external reset function built-in
- Built-in chip-select function (Up to 4 chips can be connected on the same bus.)
- Supply voltage: 2.7V to 5.5V

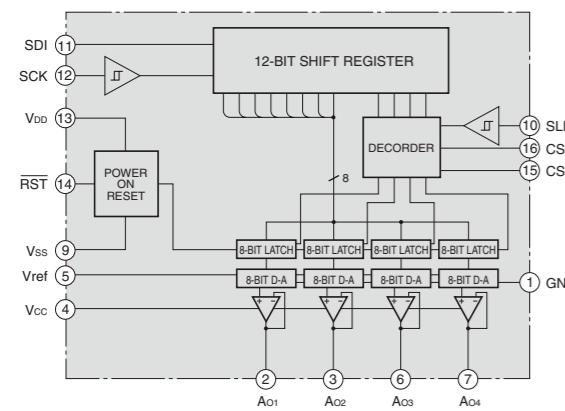
## APPLICATION

Conversion from digital to analog for home-use and industrial equipment, signal gain setting or tuning for CTV, display monitor, and so forth

## PIN ARRANGEMENT (TOP VIEW)



## BLOCK DIAGRAM


**3~5V TYPE 8-BIT 8CH I<sup>2</sup>C BUS D/A CONVERTER  
R2A20158NP\***

## 特点

- 采用I<sup>2</sup>C总线方式
- 内置8通道R-2R+分段式的高性能8位D/A转换器
- 完全保证非线性误差: ±1.0LSB、微分非线性误差: ±0.7LSB
- 内置8个输出电压在Vcc-GND间全摆幅的缓冲运算放大器
- 对缓冲放大器电容性负载的振荡稳定性高
- 采用超小型QFN-20封装 (4mm×4mm)

## 用途

LCD-TV、打印机、PPC等民用、OA设备以及工业设备的自动调整、控制调整用

## FEATURES

- I<sup>2</sup>C BUS serial data method
- 8 channels of R-2R and segment type high-performance 8-bit D/A converters
- Guarantee ±1.0LSB for Non-linearity error and ±0.7LSB for differential non-linearity error
- 8 buffer operational amplifiers with full swing of output voltage between Vcc and GND
- High oscillation stability against the capacitive load of buffer operational amplifiers
- Using very small QFN-20 package (4mm×4mm)

## APPLICATION

Automatic adjustment or control for consumer and Industrial equipment

**5V TYPE 8-BIT 12/8CH  
I<sup>2</sup>C BUS D/A CONVERTER  
M62392P/FP, M62393P/FP**

## 特点

- 数据传送格式：I<sup>2</sup>C总线方式
- 输出缓冲运算放大器：几乎可在从接地到VREFU (0~5V) 的全电压范围内工作
- 输出电流能力高……±1mA以上
- 由于上侧基准电压管脚VREFU有2个系统，因此可设定2个系统的不同电压范围

## 用途

相机一体式VTR、VTR、TV、CRT显示器等民用及工业用设备的控制调整

## FEATURES

- Digital data transfer format
- I<sup>2</sup>C bus serial data method
- Output buffer operational amplifier
- Operates in the whole voltage range from VREFU to ground. (0 to 5V)
- High output current drive capacity
- ±1.0mA over
- Standard two high level reference voltage terminals
- With two high level reference voltage terminals, two differing voltage ranges can be set

## APPLICATION

Adjustment/control of industrial or home-use electronic equipment, such as VCR camera, VCR set, and CRT display

**3~5V TYPE 8-BIT 2/4CH  
I<sup>2</sup>C BUS D/A CONVERTER  
R2A20152NS\*/SP\*, R2A20154NS\*/SP\***

## 特点

- 采用I<sup>2</sup>C总线方式
- 内置2/4通道R-2R+分段式的高性能8位D/A转换器
- 完全保证非线性误差: ±1.0LSB、微分非线性误差: ±0.7LSB
- 内置2/4个输出电压在Vcc-GND间全摆幅的缓冲运算放大器
- 内带上电复位功能
- 对缓冲放大器电容性负载的振荡稳定性高
- 采用超小型SON-8封装 (2.2mm×2.2mm)

## 用途

LCD-TV、打印机、PPC等民用、OA设备以及工业设备的自动调整、控制调整用

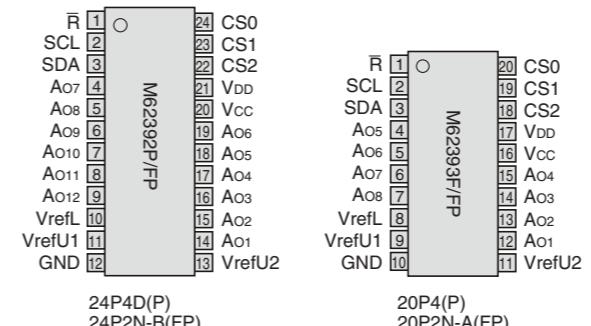
## FEATURES

- I<sup>2</sup>C BUS serial data method
- 2/4 channels of R-2R and segment type high-performance 8-bit D/A converters
- Guarantee ±1.0LSB for Non-linearity error and ±0.7LSB for differential non-linearity error
- 2/4 buffer operational amplifiers with full swing of output voltage between Vcc and GND
- Built-in power on reset circuit
- High oscillation stability against the capacitive load of buffer operational amplifiers
- Using very small SON-8 package (2.2mm×2.2mm)

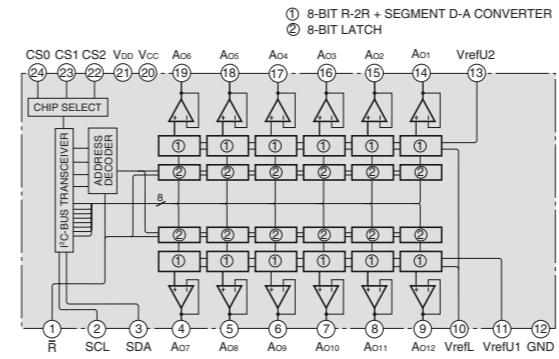
## APPLICATION

Automatic adjustment or control for consumer and Industrial equipment

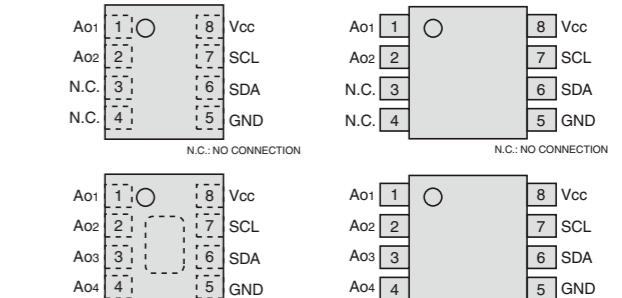
## PIN ARRANGEMENT (TOP VIEW)



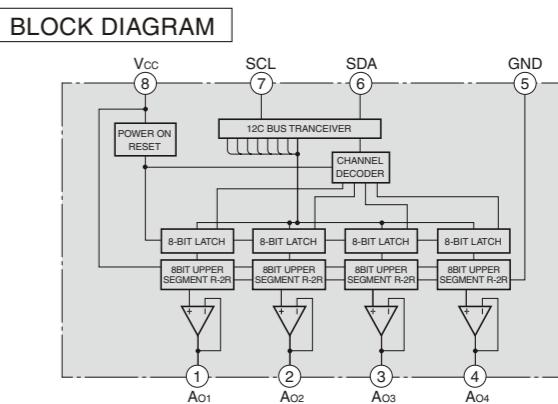
## BLOCK DIAGRAM



## PIN ARRANGEMENT (TOP VIEW)



## BLOCK DIAGRAM



## D/A转换器

## D/A converters

**8-BIT 2/3/4CH I<sup>2</sup>C BUS D/A CONVERTER**  
M62332/337P/FP, M62333/338P/FP,  
M62334/339P/FP

## 特点

- 电源电压2.7~5.5V
- 数据传送格式 ..... I<sup>2</sup>C总线方式
- 输出缓冲运算放大器  
几乎可在从接地到VCC (0~5V) 的全电压范围内工作
- 输出电流能力高 ..... ±1mA以上

## 用途

CTV、显示监视器的信号增益设定、自动调整用  
将民用、工业设备的数字数据转变成模拟数据用

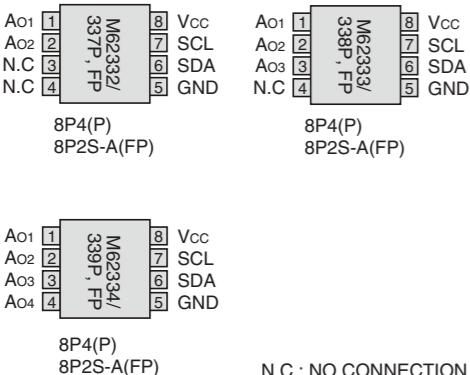
## FEATURES

- Supply voltage 2.7 to 5.5V
- Digital data transfer format  
I<sup>2</sup>C BUS serial data method
- Output buffer operational amplifier  
Operates in the whole voltage range from VCC to ground. (0 to 5V)
- High output current drive capacity  
±1.0mA over

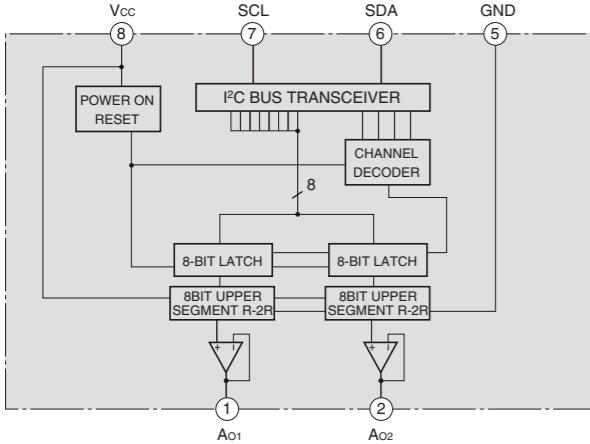
## APPLICATION

Conversion from digital data to analog control data for home-use and  
industrial equipment. Signal gain control or automatic adjustment of  
DISPLAY-MONITOR or CTV

## PIN ARRANGEMENT (TOP VIEW)



## BLOCK DIAGRAM



**5V TYPE 10-BIT 3CH MULTIPLYING D/A CONVERTER**  
M62362P/FP

## 特点

- 数据传送格式  
三线式串行数据传送方式
- 高分辨率  
10位以上的分辨率, 误差在±1LSB以下
- 可四象限工作
- 可在输入范围、输出范围均为0~5V的全电压工作
- 输出建立时间短
- 带复位管脚  
推荐工作条件: VDD = 5V±10%

## 用途

CTV、显示监视器的信号增益设定、自动调整

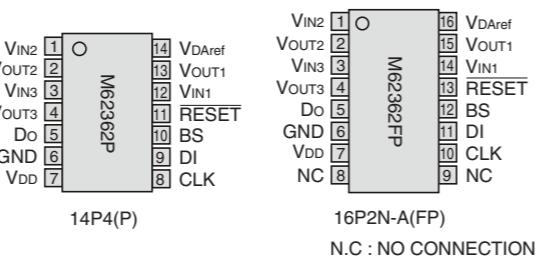
## FEATURES

- Digital data transfer format  
3-wire serial data transfer method
- D/A converter system  
8-channel R-2R + segment type high-performance 8-bit multiplication type D/A converter
- Short setting time
- Capable of 4 quadrant multiplication
- High resolution  
Resolution is more over 10-bit and error is less than ±1LSB
- Capable of full voltage operation ranging from 0 to 5V for both input and output ranges
- With reset terminal  
Recommend operation condition VDD = 5V±10%

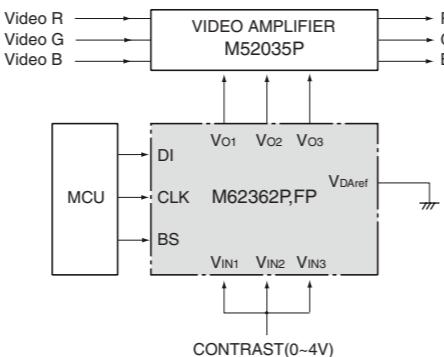
## APPLICATION

Signal gain control of DISPLAY-MONITOR or CTV

## PIN ARRANGEMENT (TOP VIEW)



## APPLICATION EXAMPLE OF CONTRAST CONTROL



In the drawing above, high precision control of 10 bits or more is applicable to 3-channel high speed video amplifier N52035 and, therefore, the IC is available to a high definition monitor as an optimum application.

**5V TYPE 8-BIT 8CH HIGH-SPEED MULTIPLYING D/A CONVERTER**  
M62363FP

## 特点

- 数据传送格式  
三线式串行数据传送方式
- D/A转换部  
内置8通道R-2R+分段式的高性能8位乘法型D/A转换器
- 建立时间短
- 可四象限工作

## 用途

CTV、显示监视器的信号增益设定、自动调整

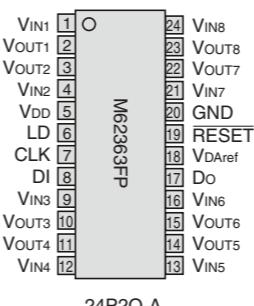
## FEATURES

- Digital data transfer format  
3-wire serial data transfer method
- D/A converter system  
8-channel R-2R + segment type high-performance 8-bit multiplication type D/A converter
- Short setting time
- Capable of 4 quadrant multiplication

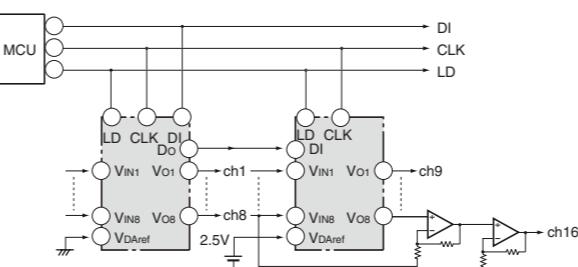
## APPLICATION

Signal gain control of DISPLAY-MONITOR or CTV

## PIN ARRANGEMENT (TOP VIEW)



## APPLICATION EXAMPLE OF CONTRAST CONTROL



**3-5V TYPE 8-BIT 8CH MULTIPLYING D/A CONVERTER**  
R2A20178NP\*/SP\*\*

## 特点

- 电源电压2.7~5.5V
- 内置8通道R-2R+分段式的高性能乘法型8位D/A转换器
- 完全保证非线性误差: ±1.0LSB. 微分非线性误差: ±0.7LSB
- 内置8个输出电压在Vcc-GND间全摆幅的缓冲运算放大器
- 4通道×2的基本偏置电压配置, 可应用于电子音量控制
- 对缓冲放大器电容性负载的振荡稳定性高
- 采用超小型QFN-24封装 (4mm×4mm)

## 用途

LCD-TV、打印机、PPC等民用、OA设备以及工业设备的自动调整、  
控制调整用

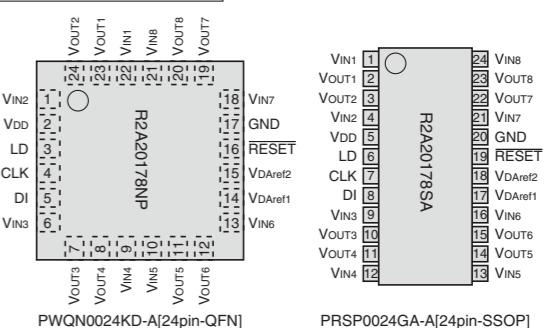
## FEATURES

- Supply voltage 2.7 to 5.5V
- 8 channels of R-2R and segment type high-performance multiplying type 8-bit D/A converters
- Guarantee ±1.0LSB for Non-linearity error and ±0.7LSB for differential non-linearity error
- 8 buffer operational amplifiers with full swing of output voltage between Vcc and GND
- 4-channel × 2 reference voltage configuration enabling use of electronic variable resistors
- High oscillation stability against the capacitive load of buffer operational amplifiers
- Using very small QFN-24 package (4mm×4mm)

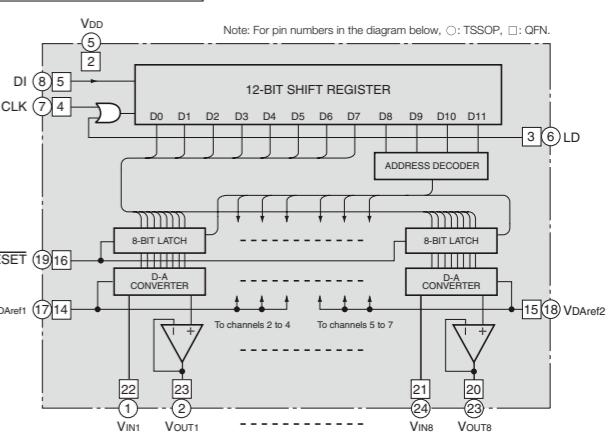
## APPLICATION

Automatic adjustment or control for consumer and Industrial equipment

## PIN ARRANGEMENT



## BLOCK DIAGRAM



\* New Product  
\*\* Under Development

## D/A转换器

## D/A converters

## 3-5V TYPE 8-BIT MULTIPLYING D/A CONVERTER

M62364FP/GP\*

## 特点

- 电源电压2.7~5.5V
- 数据传送格式  
三线式串行数据传送方式
- D/A转换部  
内置R-2R+分段式的高性能8位乘法型D/A转换器
- 内置基准电压调整用8位D/A转换器
- 内置输出电压在VCC-GND间全摆幅的缓冲运算放大器
- 对电容性负载的振荡稳定性高
- 可四象限工作

## 用途

CTV、显示监视器的信号增益设定、自动调整

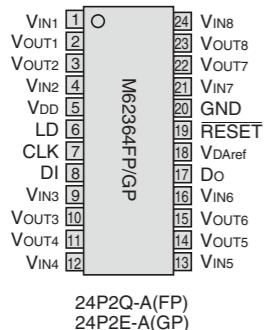
## FEATURES

- Supply voltage 2.7 to 5.5V
- Digital data transfer format  
3-wire serial data transfer method
- D/A converter system  
8-channel R-2R + segment type high-performance 8-bit multiplication type D/A converter
- 8 buffer operational amplifiers with full swing of output voltage between Vcc and GND.
- High oscillation stability against the capacitive load of buffer operational amplifiers
- Capable of 4 quadrant multiplication

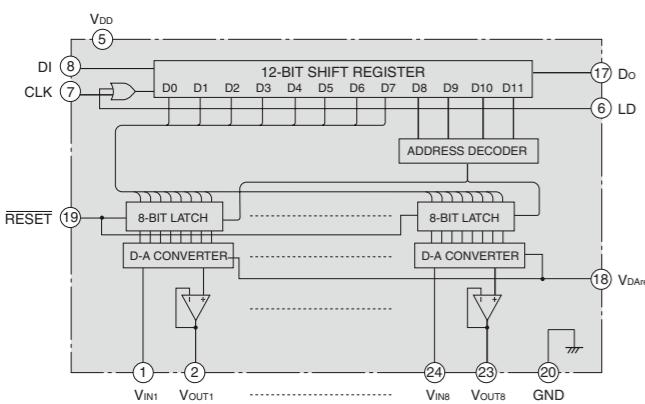
## APPLICATION

Signal gain control of DISPLAY-MONITOR or CTV

## PIN ARRANGEMENT (TOP VIEW)

24P2Q-A(FP)  
24P2E-A(GP)

## BLOCK DIAGRAM



\* New Product

## 5V TYPE 8-BIT 2CH×2 COMPOSITE D/A CONVERTER

M62383FP

## 特点

- 数据传送格式  
三线式串行数据传送方式
- D/A转换部  
内置R-2R+分段式的高性能8位乘法型D/A转换器
- 内置基准电压调整用8位D/A转换器
- 内置输出电压在VCC-GND间全摆幅的缓冲运算放大器
- 输出建立时间快
- 带复位管脚

## 用途

用于将民用、工业用设备的数字控制数据  
转变成模拟控制数据的电子设备的自动调整用

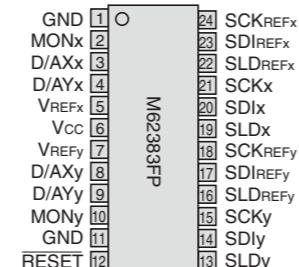
## FEATURES

- Digital data transfer format  
3-wire serial data transfer method
- D/A converter system  
R-2R and segment type high-performance 8-bit multiplying D/A converter
- 8-bit D/A converter for adjusting standard voltage
- Buffer amplifier making full swing between Vcc and GND
- Fast settling time
- Reset terminal provided

## APPLICATION

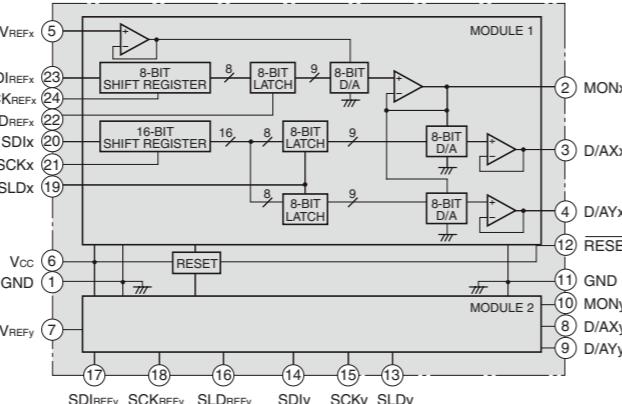
Transformation from digital control data to analogue control data for consumer  
and industrial equipments Automatic adjustment for electrical equipments

## PIN ARRANGEMENT (TOP VIEW)



24P2Q-A

## BLOCK DIAGRAM



## 8-BIT 12CH D/A CONVERTER WITH DIG./ANA. EXPANDER

M62376GP

## 特点

- 电源电压2.7~5.5V
- 可按各个端口为单位设定输入/输出端口的状态
- D/A转换器输出与I/O的专用管脚各4个，可选D/A转换器与I/O的共用端口8个
- 内置上电复位，上电时D/A输出变成[00]、I/O变成输入模式(Hi-Z)
- 0.65mm脚距24管脚小型封装

## 用途

相机一体式VTR、VTR、TV、CRT显示器等民用及工业用设备的控制调整

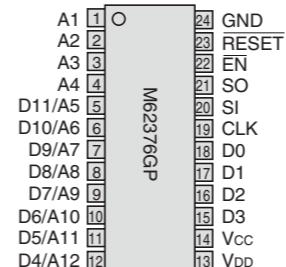
## FEATURES

- Supply voltage 2.7 to 5.5V
- The status of input/output port can be set in individual ports
- Provides 4 pins for each of D/A converter output and I/O and 8 common pins for selectable D/A converter and I/O
- Built-in power-on reset where D/A output is set to [00] and I/O is placed in the input mode (Hi-Z) when power is turned on
- 0.65-mm pitch 24-pin small package

## APPLICATION

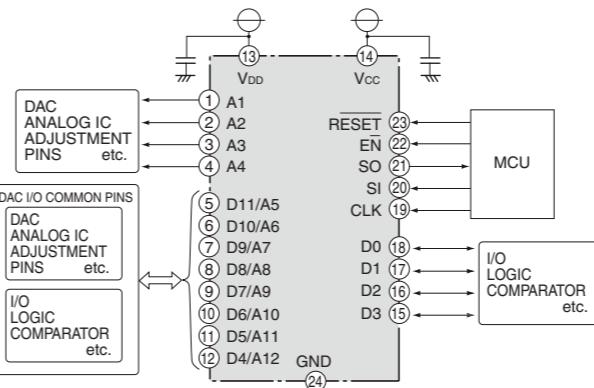
Adjustment/control of industrial or home-use electronic equipment,  
such as VCR camera, VCR set, TV, and CRT display

## PIN ARRANGEMENT (TOP VIEW)



24P2E-A

## APPLICATION EXAMPLE



## 3-5V TYPE 8-BIT I2C BUS EQUIVALENT I/O EXPANDER

R2A20150NP/SA

## 特点

- 为支持I2C总线，可通过SCL、SDA两根线与单片机连接
- 可通过I2C总线进行8位串并转换
- 使用芯片选择数据(C0、C1、C2)，最多可在同一I2C总线上连接8个
- 内带上电复位功能
- 通过串行输出管脚，可将数据转换成三线式
- 采用超小型QFN-16封装(3mm×3mm)

## 用途

●单片机的输入/输出端口扩展

●单片机外围的串行、并行数据转换

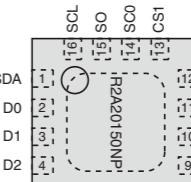
## FEATURES

- Supporting I2C BUS enables to connect microcomputer via two pins of SCL and SDA
- I2C BUS is available for 8-bit serial/parallel conversion
- Up to 8 ICs can be connected to the same I2C BUS with chip select data (C0, C1, C2)
- Built-in power on reset function
- Supporting convert to 3-wire serial data with serial out terminal
- Using very small QFN-16 package (3mm×3mm)

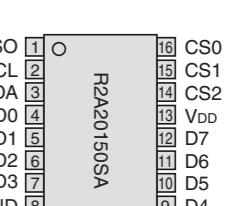
## APPLICATION

Extension of microcomputer input/output port Serial-parallel data conversion and parallel/serial data conversion of Peripheral microcomputer

## PIN ARRANGEMENT (TOP VIEW)

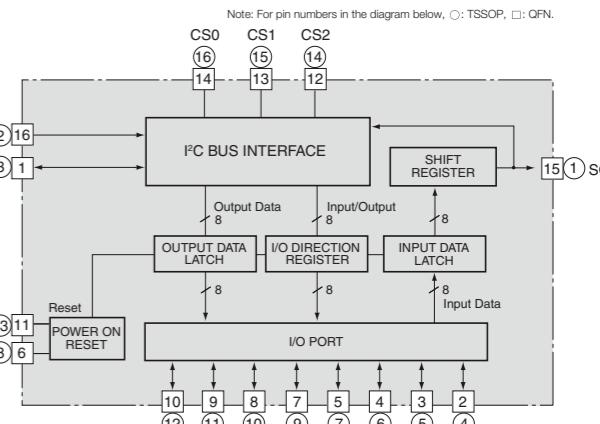


PWQN0016KB-A[NP]



PTSP0016JB-A[SA]

## BLOCK DIAGRAM





## CMOS SYSTEM-RESET IC

## RNA51ABxx Series

## 特点

- 检测电压: 1.4V~5.0V
- 检测电压精度: ±1.0%
- 延迟宽度: 5% typ.
- 低消耗电流: 0.7μA typ.
- 通过外接电容设定延迟时间的功能
- 手动复位输入
- 漏极开路输出方式和CMOS输出方式
- 5管脚MPAK-5封装
- 工作温度范围: -40°C~85°C

## 用途

- 微处理器的电源监控和复位
- 电池驱动产品
- 电脑和笔记本电脑
- 无线通信系统
- 数码相机、数码摄像机、PDA

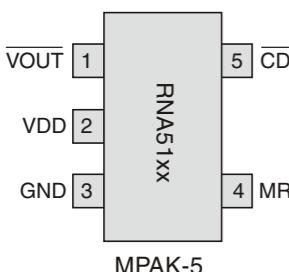
## FEATURES

- Threshold voltage 1.4V to 5.0V (12 types lineup)
- Threshold voltage accuracy ±1.0%
- Threshold voltage hysteresis 5% typ.
- Low supply current 0.7μA typ.
- Capacitor-adjustable output delay time
- Manual reset
- VOUT cmos output, or open-drain output
- 5-pin MPACK-5 package
- Temperature range -40°C to 85°C

## APPLICATION

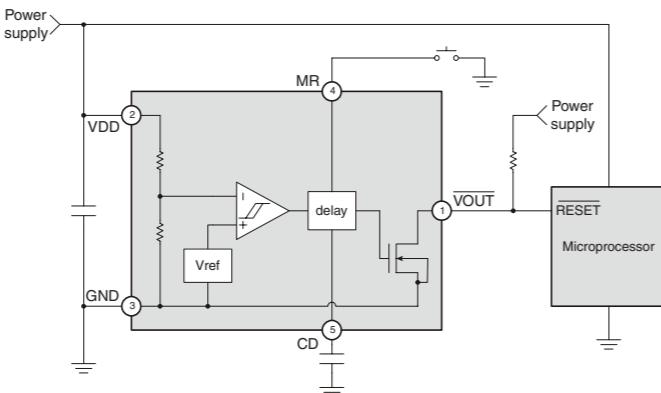
- Power supply voltage monitoring for microprocessors
- Battery-powered portable equipment
- Computers and notebook computers
- Wireless Communication Systems
- Digital still camera, digital video camera, PDA

## PIN ARRANGEMENT (TOP VIEW)

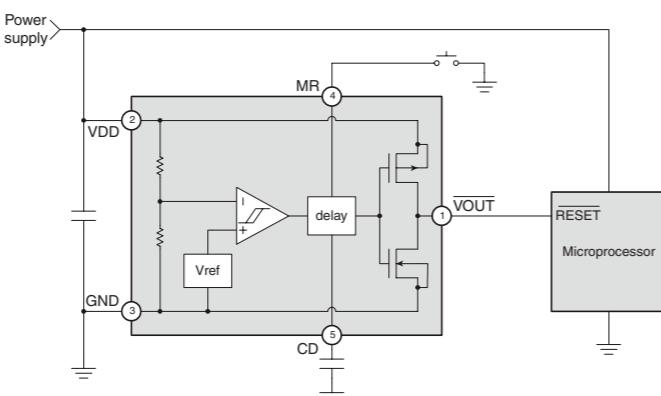


## Functional block diagram &amp; typical application circuit

(1) RNA51Axx Products (Threshold voltage: 2.6V, 2.7V, 2.8V, 2.9V, 3.0V, 3.1V, 4.4V, 4.5V, 4.6V)



(2) RNA51Bxx Products (Threshold voltage: 1.4V, 2.7V, 5.0V)



注) 1. 为保证稳定工作, 请将频率特性优良的电容器尽量靠近VDD管脚与GND管脚之间连接。

2. 请根据系统条件, 选择上述电容器的数值。

Notes: 1. It is good for stable operation to use a decoupling capacitor with excellent high frequency characteristics between VDD and GND pin.

2. Capacitor value is determined by system conditions.

## LOW POWER 2 OUTPUT SYSTEM RESET IC

## RNA52A10MM

## 特点

- 为支持系统的多电源化, 内置有延迟和无延迟的两个电路复位
- 备有监控电压专用输入管脚, 可设定任意的复位电压
- 采用低V<sub>th</sub>工艺, 实现基准电压1.0V±50mV, 也可用于低电压系统
- 采用CMOS工艺, 实现消耗电流1.1μA(typ), 也可用于电池驱动产品

## 用途

OA设备、民用设备等 多电源的电压监控

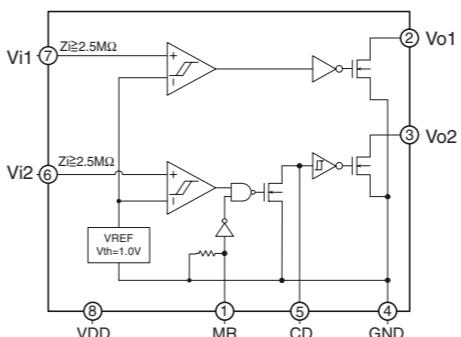
## FEATURES

- To support for the system multi-power supply, a reset with 2 circuits for with delay and without delay is included.
- Input terminal used only for pilot voltage is provided to set any reset voltage.
- Adoption of low V<sub>th</sub> process realizes the reference voltage of 1.0V±50mV, enabling the application on low voltage system.
- Adoption of CMOS process allows for current dissipation of 1.1μA (typ), enabling application on battery-driven products.

## APPLICATION

Voltage monitoring of OA equipment, consumer equipment, and other multi-power sources

## BLOCK DIAGRAM



### SYSTEM ORGANIZER IC RNA53A27FUS

## 特点

- 为最大限度地利用瑞萨单片机的保证工作电压范围，设定检测电压值。
- 检测电压值和精度:  $V_s = 2.745 \text{ (V)} \pm 1.0 \text{ (\%)}$
- 可切换小功耗模式 / 正常模式。  
 $100 \text{ (\mu A)}$  … 正常工作时  $2 \text{ (\mu A)}$  … 待机工作时
- 可输出高精度基准电压。  
 $3.050 \text{ (V)} \pm 0.8 \text{ (\%)}$
- 通过外接管脚，可切换设定  $50 \text{ (ms)}$ 、 $100 \text{ (ms)}$  两种延迟时间。另外，通过改变外接电阻的阻值，可针对各个设定时间的各个区间，设定成任意的延迟时间。
- 配备施密特触发器型 / MR管脚  
 $V_{cc}=3\text{V}$  时  $V_h=0.3\text{Vtyp}$  ( $V_h$ : 施密特触发器电路的滞后电压)
- 漏极开路型的输出形式
- 封装: 8管脚SSOP8 (预定今后开发TSSOP8版)
- 推荐工作电源电压范围  
 $2.5 \text{ (V)} \sim 5.5 \text{ (V)}$  (基准电压输出除外)

## 用途

微处理器等的电源监控、复位、AD/DA转换用基准电压等

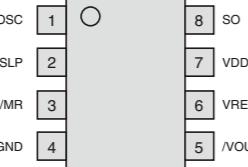
## FEATURES

- The detection voltage is set to cover supply voltage range of RENESAS microcomputer.
- Detection voltage and accuracy  
 $V_s = 2.745 \text{ (V)} \pm 1.0 \text{ (\%)}$
- Normal mode and standby mode switching is enabled.  
 $100(\mu\text{A})$ ...normal mode  $2(\mu\text{A})$ ...standby mode
- High accurate reference voltage is able to output.  
 $3.050(\text{V}) \pm 0.8\text{(\%)}$
- The  $50(\text{ms})$  and  $100(\text{ms})$  delay time are used by switching the terminal. The suitable delay-time is set by adjusting the external register.
- The MR terminal of shunt-trigger type is equipped.  
 $V_{cc}=3\text{V}$   $V_h=0.3\text{Vtyp}$  ( $V_h$ : Hysteresis voltage of shunt-trigger circuit)
- Open-drain type output
- 8pin-SSOP8 package(TSSOP8 package are developing)
- Recommended supply voltage range.  
 $2.5(\text{V}) \sim 5.5(\text{V})$ (Except reference voltage)

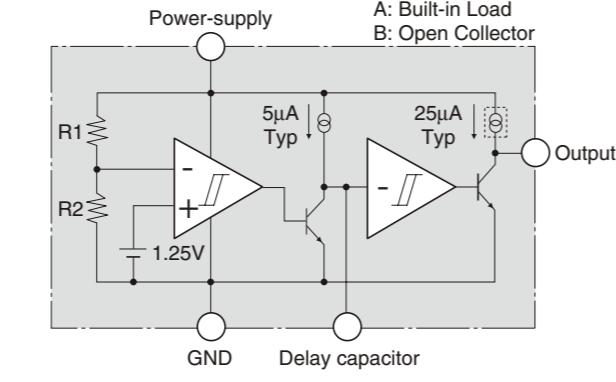
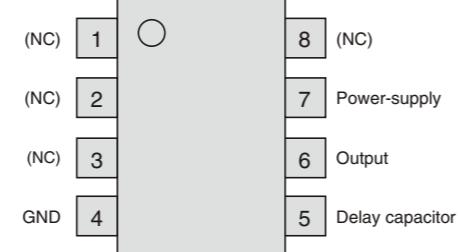
## APPLICATION

- Supervising the supply voltage of microcomputer, reset, reference voltage of AD/DA converter.

## PIN ARRANGEMENT (TOP VIEW)



## PIN ARRANGEMENT (TOP VIEW)



### VOLTAGE DETECTING, SYSTEM RESETTING IC RNA51953A/B

## 特点

- 内置延迟电路，只需附加外接电容，即可轻松获得任意的延迟时间。
- 外接元件少
- 可以用小容量电容器获得较长的延迟时间:  $0.33 \mu\text{F}$  时,  $t_d=100\text{ms}$
- 阈值工作电压低:  $0.6\text{V Typ}$  ( $R_L=22\text{k}\Omega$  时)
- 电源电压范围广:  $2 \sim 17\text{V}$
- 应用范围广

## 用途

Pch、Nch、CMOS、单片机、CPU、MCU的复位电路  
逻辑电路的复位、电池检测电路  
备用电源切换电路、电平检测电路、波形整形电路  
延迟波形发生电路、DC/DC转换器、过电压保护电路

## FEATURES

- Including a built-in delay circuit to provide the desired retardation time simply by adding an external capacitor
- Few external parts
- Large delay time with a capacitor of small capacitance ( $t_d=100\text{ms}$ , at  $0.33\mu\text{F}$ )
- Low threshold operating voltage (Supply voltage to keep low-state at low supply voltage):  $0.6\text{V(Typ)}$  at  $R_L=22\text{k}\Omega$
- Wide supply voltage range:  $2\text{V}$  to  $17\text{V}$
- Wide application range

## APPLICATION

Reset circuit of Pch, Nch, CMOS, microcomputer, CPU and MCU, Reset of logic circuit, Battery check circuit, switching circuit back-up voltage, level detecting circuit, waveform shaping circuit, delay waveform generating circuit, DC/DC converter, over voltage protection circuit

### VOLTAGE DETECTING, SYSTEM RESETTING IC RNA51957A/B

## 特点

- 通过外接电阻可改变检测电压。
- 内置延迟电路，只需附加外接电容，即可轻松获得任意的延迟时间。
- 外接元件少
- 可以用小容量电容器获得较长的延迟时间:  $0.33 \mu\text{F}$  时,  $t_d=100\text{ms}$
- 阈值工作电压低:  $0.6\text{V Typ}$  ( $R_L=22\text{k}\Omega$  时)
- 电源电压范围广:  $2 \sim 17\text{V}$
- 应用范围广

## 用途

Pch、Nch、CMOS、单片机、CPU、MCU的复位电路  
逻辑电路的复位、电池检测电路  
备用电源切换电路、电平检测电路、波形整形电路  
延迟波形发生电路、DC/DC转换器、过电压保护电路

## FEATURES

- The feature of setting the detection voltage by adding external resistance.
- Including a built-in delay circuit to provide the desired retardation time simply by adding an external capacitor
- Few external parts
- Large delay time with a capacitor of small capacitance ( $t_d=100\text{ms}$ , at  $0.33\mu\text{F}$ )
- Low threshold operating voltage (Supply voltage to keep low-state at low supply voltage):  $0.6\text{V(Typ)}$  at  $R_L=22\text{k}\Omega$
- Wide supply voltage range:  $2\text{V}$  to  $17\text{V}$
- Wide application range

## APPLICATION

Reset circuit of Pch, Nch, CMOS, microcomputer, CPU and MCU, Reset of logic circuit, Battery check circuit, switching circuit back-up voltage, level detecting circuit, waveform shaping circuit, delay waveform generating circuit, DC/DC converter, over voltage protection circuit

### VOLTAGE DETECTING, SYSTEM RESETTING IC RNA51958A/B

## 特点

- 通过外接电阻可改变检测电压。
- 内置延迟电路，只需附加外接电容，即可轻松获得任意的延迟时间。
- 外接元件少
- 可以用小容量电容器获得较长的延迟时间:  $0.33 \mu\text{F}$  时,  $t_d=100\text{ms}$
- 阈值工作电压低:  $0.6\text{V Typ}$  ( $R_L=22\text{k}\Omega$  时)
- 电源电压范围广:  $2 \sim 17\text{V}$
- 应用范围广

## 用途

Pch、Nch、CMOS、单片机、CPU、MCU的复位电路  
逻辑电路的复位、电池检测电路  
备用电源切换电路、电平检测电路、波形整形电路  
延迟波形发生电路、DC/DC转换器、过电压保护电路

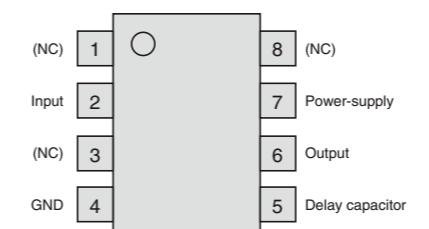
## FEATURES

- The feature of setting the detection voltage by adding external resistance.
- Including a built-in delay circuit to provide the desired retardation time simply by adding an external capacitor
- Few external parts
- Large delay time with a capacitor of small capacitance ( $t_d=100\text{ms}$ , at  $0.33\mu\text{F}$ )
- Low threshold operating voltage (Supply voltage to keep low-state at low supply voltage):  $0.6\text{V(Typ)}$  at  $R_L=22\text{k}\Omega$
- Wide supply voltage range:  $2\text{V}$  to  $17\text{V}$
- Wide application range

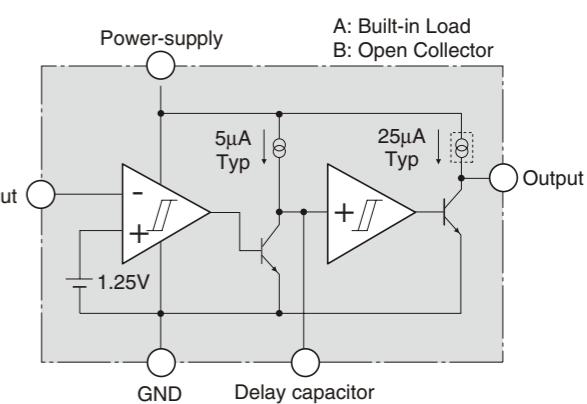
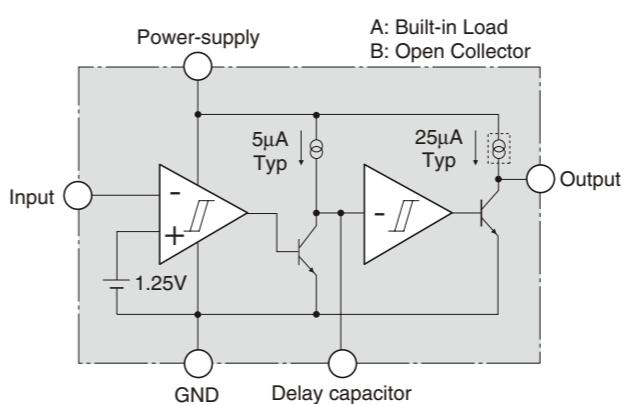
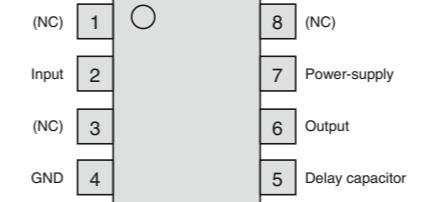
## APPLICATION

Reset circuit of Pch, Nch, CMOS, microcomputer, CPU and MCU, Reset of logic circuit, Battery check circuit, switching circuit back-up voltage, level detecting circuit, waveform shaping circuit, delay waveform generating circuit, DC/DC converter, over voltage protection circuit

## PIN ARRANGEMENT (TOP VIEW)



## PIN ARRANGEMENT (TOP VIEW)



## LED驱动器

## LED drivers

内置PWM辉度控制电路的恒流LED驱动器  
BUILT-IN PWM CONTROLLER FOR GRADATION CONTROL CURRENT LED DRIVER

## RD40LD003

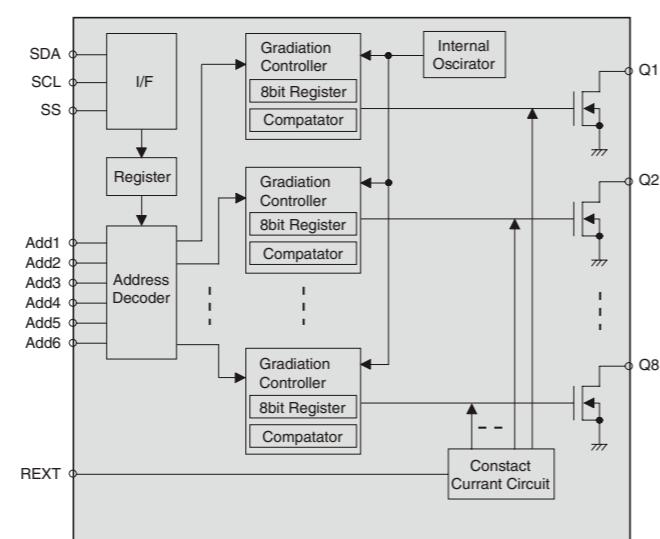
## 特点

- 适用于娱乐设备。
- 电源电压范围: 3.0~5.5V
- 输出耐压: VO (最大) = 40 V
- 恒流输出: IOUT (Typ) = 30mA (@VO = 3.0V)
- 内置PWM电路, 可对8位恒流输出 (Q1~Q8) 进行256级辉度控制。  
(占空比为0% (熄灭状态) 到99.6% (最亮状态))
- 工作温度范围: -40~+85°C

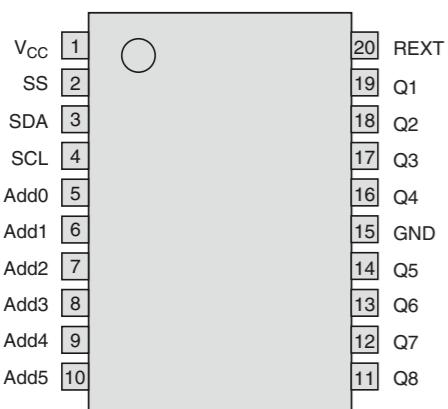
## FEATURES

- Support for amusement application.
- Supply voltage range: 3.0 to 5.5V
- Output standing voltage: Vo (Max) = 40V
- Constant current output:  $I_{out}$  (Typ) = 30mA (@ $V_o$ =3.0V)
- Built-in PWM circuit and controllable 256 step gradations with 8bit constant current output (Q1~Q8)  
(0% (off state) to 99.6% (maximum luminescence))
- Operating temperature range: -40 to 85°C

## BLOCK DIAGRAM



## PIN ARRANGEMENT (TOP VIEW)



LED照明用LED驱动器IC  
LED Driver IC for Lighting and Illumination

## R2A20134SP

## 特点

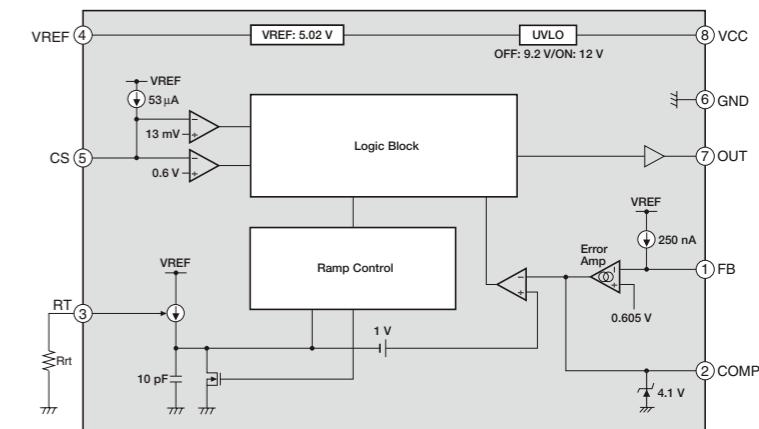
- 最大额定值
- 电源电压  $V_{cc}$ : 24V
- 工作结温  $T_{jopr}$ : -40~+150°C
- (功能)
  - 电流临界控制 (Rrt: 连接GND时)
  - 固定开关频率控制 (Rrt: 连接VREF时)
  - 开关频率可调 (Rrt: 连接Vref时)
  - 配备过电流保护功能

## FEATURES

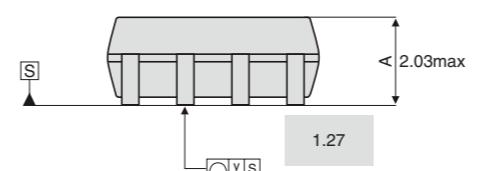
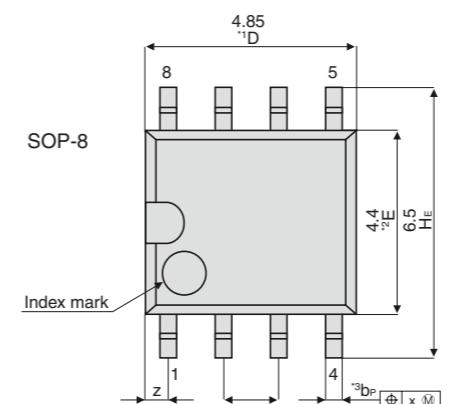
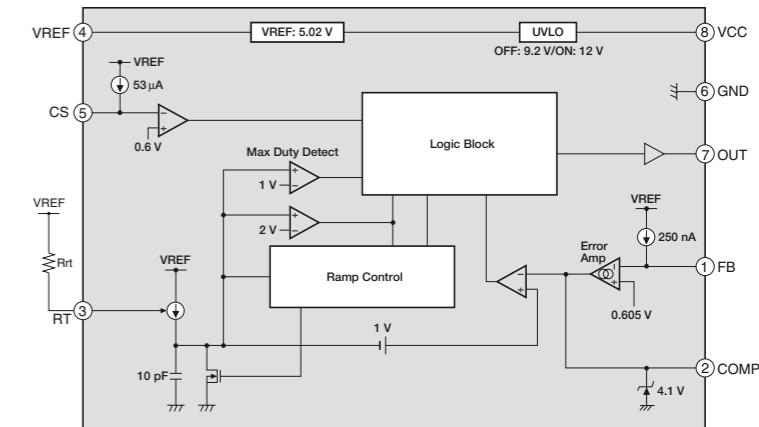
- <Maximum Ratings>
- Supply voltage  $V_{cc}$  : 24V
  - Operating junction temperature  $T_{jopr}$  : -40 to +150°C
  - <Functions>
    - Critical-conduction mode control (Rrt: connected to GND)
    - Fixed switching frequency control (Rrt: connected to VREF)
    - Adjustable switching frequency support (Rrt: connected to Vref)
    - Overcurrent protection function

## BLOCK DIAGRAM

Rrt: Connected to GND (Critical-Conduction Mode)



Rrt: Connected to VREF (Fixed-Frequency Mode)



Package: SOP-8

## 运算放大器、比较器

## Op-Amp. and comparators

小型、低电压CMOS运算放大器  
Small & Low Voltage CMOS Op-Amp.

## HA1630S01-08/D01-08/Q01-06

## 特点

- 装载于超小型封装中，有助于节省空间  
(CMPAK-5、MPAK-5、MMPAK-8、TSSOP-14)
- 低电压工作、低消耗电流，最适合使用电池的设备  
(VDD=1.8~5.5V、IDD(/ch): 15~800μA typ.)
- 即使在手机(RF)噪声环境下也能稳定工作 (fc: 约200MHz)
- 其他
  - 输出全振幅 VOH = 2.9V 最小 (VDD=3V时)
  - 低输入偏移电压 VIO = 4mV 最大
  - 低输入偏流 IIB = 1pAtyp.
  - 工作温度范围 Topr = -40~+85°C

## FEATURES

- Contribute to space-saving by built in ultra-small package.  
(CMPAK-5, MPAK-5, MMPAK-8, TSSOP-14)
- Best support for battery using equipment due to low voltage operation and low consumption current.  
(VDD=1.8 to 5.5V, IDD(/ch): 15 to 800μA typ.)(07/08: 2.7 to 5.5V)
- Operational stability in a noise area of mobile phone (RF). (fc: about 200MHz)
- Others
  - Output full-swing VOH = 2.9V min. (@VDD=3V)
  - Low input offset voltage VIO = 4mV max. (07/08: 6mV max.)
  - Low input bias current IIB = 1pAtyp.
  - Operating temp. range Topr = -40 to +85°C degC
  - HA1630S07/D07 output drive current: 15mA typ.
  - HA1630S08/D08 output drive current: 30mA typ.

单路型：CMPAK-5V, MPAK-5V

SINGLE TYPE: CMPAK-5V, MPAK-5V

HA1630S01/02/03  
HA1630S04/05/06/07/08

双路型：MMPAK-S

DUAL TYPE: MMPAK-8

HA1630D01/02/03  
HA1630D04/05/06/07/08

四路型：TSSOP-14

QUAD TYPE: TSSOP-14

HA1630Q01/02/03  
HA1630Q04/05/06

参数	单位	型号 Part.No.		
		S01/D01/Q01	S02/D02/Q02	S03/D03/Q03
IDD (/ch) typ.	μA	15	50	100
SR typ.	V/μs	0.125	0.5	1

参数	单位	型号 Part.No.				
		S04/D04/Q04	S05/D05/Q05	S06/D06/Q06	S07/D07	S08/D08
IDD (/ch) typ.	μA	200	400	800	60	170
SR typ.	V/μs	2	4	8	1	1.5

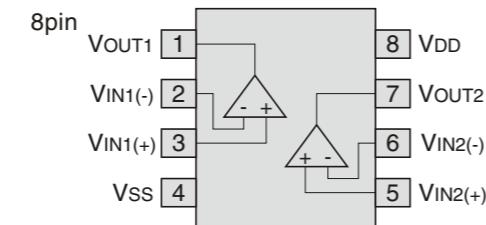
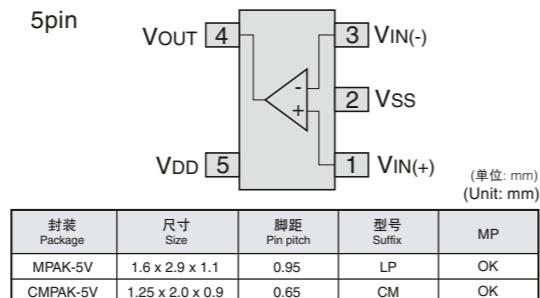
## 用途

- 数码相机、数码摄像机等数码民用设备
- 计量仪器、控制设备、保健器材等的传感器输出放大
- 所有模拟电路的放大、缓冲

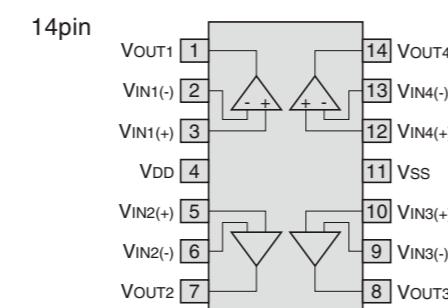
## APPLICATION

- Digital consumer equipment such as DSC and DVC.
- Sensor output amplifier such as measurement equipment, controllers and health appliance.
- Amplification and buffer for various analog circuits.

## PACKAGE AND PIN ARRANGEMENT



封装 Package	尺寸 Size	脚距 Pin pitch	型号 Suffix	MP
MMPAK-8	4.0 x 2.95 x 1.1	0.65	MM	OK



封装 Package	尺寸 Size	脚距 Pin pitch	型号 Suffix	MP
TSSOP-14	6.4 x 5.0 x 1.1	0.65	T	OK

双路运算放大器  
Dual Op-Amps

## HA17358A Series

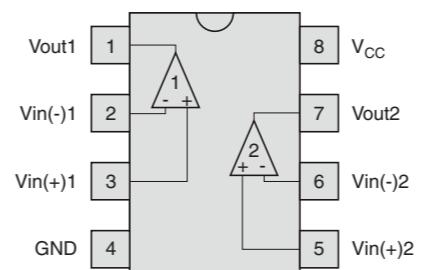
## 特点

- 工作电源电压范围广，可用单电源工作
- 同相输入电压范围广，输入电压接近0伏也可工作，输出电压也可降至0伏附近。
- 对频率特性和输入偏流进行温度补偿
- 高抗RF噪声性

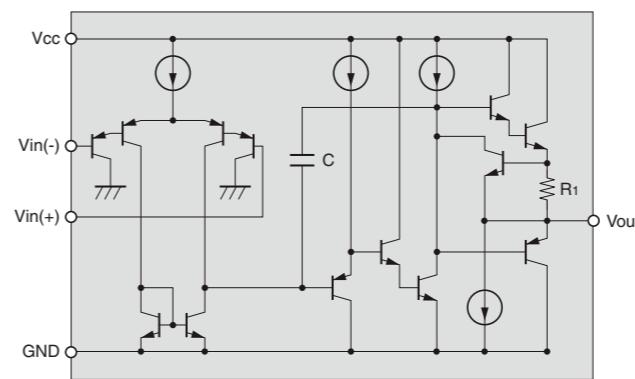
## FEATURES

- Wide operating power supply voltage range, single-power-supply operation possible
- Wide in-phase input voltage range: operation possible for input in vicinity of 0 level, and output voltage can be dropped to vicinity of 0 level
- Temperature compensation of frequency characteristics and input bias current
- High RF noise immunity

## PIN ARRANGEMENT (TOP VIEW)



## CIRCUIT SCHEMATIC (1/2)



## 运算放大器、比较器

## Op-Amp. and comparators

小型、低电压CMOS比较器  
HA1631S01-04/D01-04

**HA1631S01-04/D01-04**

## 特点

- 装载于超小型封装中，有助于节省空间  
(CMPAK-5V、MPAK-5V、MMPAK-8)
- 低电压工作 ( $V_{DD}=1.8\sim 5.5V$ )、低消耗电流 ( $I_{DD}: \mu A$  order)，  
最适合使用电池的设备
- 低输入偏移电压  $V_{IO} = 5mV$  最大
- 即使在手机 (RF) 噪声环境下也能稳定工作 ( $f_c$ : 约200MHz)

## 用途

- 移动设备 (数码相机等)
- 传感器信号检测 (保健器材、防灾器材等)
- 信号控制用开关
- 脉冲发生电路
- 低功耗电源的过电压检测 (监视器)

## FEATURES

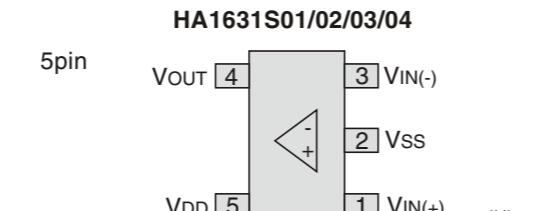
- Contribute to space-saving by built in ultra-small package.  
(CMPAK-5, MPAK-5, MMPAK-8)
- Best support for battery using equipment due to low voltage operation  
( $V_{DD}=1.8$  to  $5.5V$ ) and low consumption current ( $I_{DD}: \mu A$  order)
- Low input offset voltage:  $V_{IO} = 5mV$  max.
- Operational stability in a noise area of mobile phone (RF). ( $f_c$ : about 200MHz)

## APPLICATION

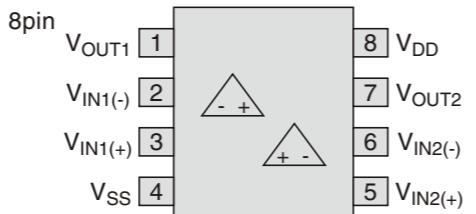
- Mobile equipment (DSC, etc.)
- Sensor signal detection (Health appliances, Disaster-related equipment, etc.)
- Switch for signal control
- Pulse generating circuit
- Over-voltage detection of low power supply (Monitor)

Single	HA1631S01	HA1631S02	HA1631S03	HA1631S04
Dual	HA1631D01	HA1631D02	HA1631D03	HA1631D04
	(低消耗电流) (Low consumption current)	(高速型) (High-speed type)	低消耗电流 (Low consumption current)	(高速型) (High-speed type)
输出方式 Output system	推挽 Push-pull		漏极开路 Open-drain	
工作电压 Operating voltage		$V_{DD} = 1.8 \sim 5.5V$		
消耗电流 ( $/ch$ ) Consumption current ( $/ch$ )	$I_{DD} = 5\mu A$ typ.	$I_{DD} = 50\mu A$ typ.	$I_{DD} = 5\mu A$ typ.	$I_{DD} = 50\mu A$ typ.
输出全振幅 Output full-swing		$V_{OH} = 2.9V$ min. ( $V_{DD} = 3V$ )		
响应时间 Response time	$TP_{HL} = 0.55\mu s$ typ.	$TP_{HL} = 0.17\mu s$ typ.	$TP_{HL} = 0.55\mu s$ typ.	$TP_{HL} = 0.17\mu s$ typ.
	$TP_{LH} = 1.20\mu s$ typ.	$TP_{LH} = 0.33\mu s$ typ.		
输出电流 Output current	ISINK = 14mA typ.			
	$ISOURCE = 13mA$ typ.			
工作温度 Operating Temp.	$-40^\circ C \sim +85^\circ C$			

## PACKAGE AND PIN ARRANGEMENT



封装 Package	尺寸 Size	脚距 Pin pitch	型号 Suffix	MP
MPAK-5V	1.6 x 2.9 x 1.1	0.95	LP	OK
CMPAK-5V	1.25 x 2.0 x 0.9	0.65	CM	OK

**HA1631D01/02/03/04**

封装 Package	尺寸 Size	脚距 Pin pitch	型号 Suffix	MP
MMPAK-8	4.0 x 2.95 x 1.1	0.65	MM	OK

双比较器  
Dual Comparators

**HA17393A Series**

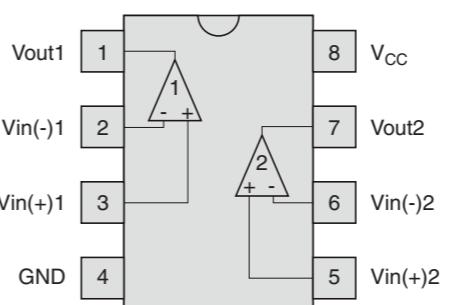
## 特点

- 电源电压范围: 2~36V
- 低电源电流: 0.8mA typ.
- 低输入偏流: 25nA typ.
- 低输入偏置电流: 3nA typ.
- 低输入偏移电压: 2mV typ.
- 高抗RF噪声性

## FEATURES

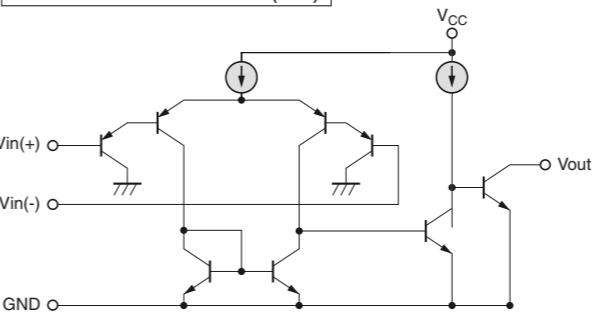
- Wide power supply voltage range: 2 V to 36 V
- Small power supply current: 0.8mA typ.
- Small input bias current: 25nA typ.
- Small input offset current: 3nA typ.
- Small input offset voltage: 2mV typ.
- High RF noise immunity

## PIN ARRANGEMENT (TOP VIEW)

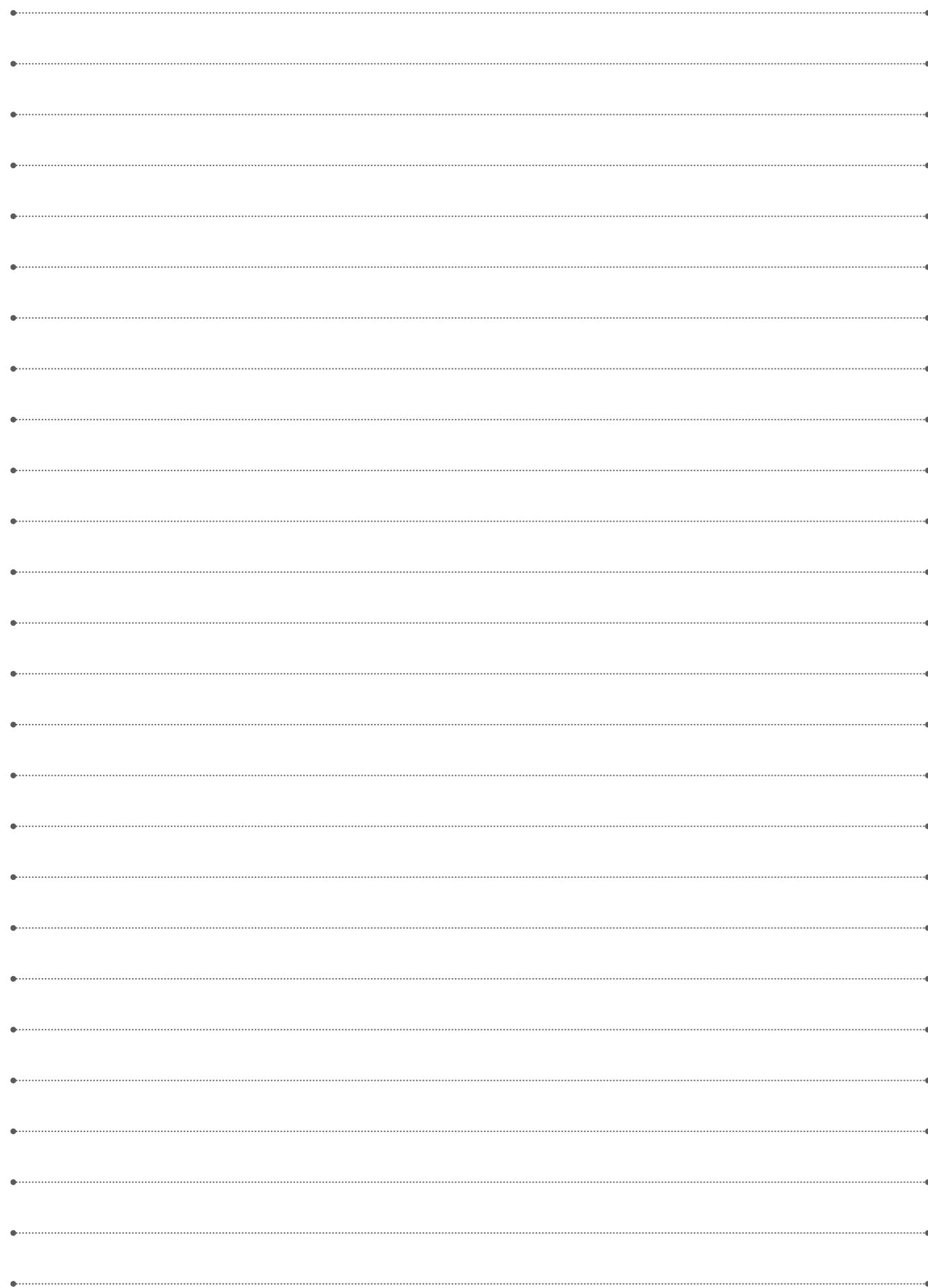


DIL-8P,SOP-8,TSSOP-8P  
(DP-8B,FP-8DGV,FP-8DCV,TTT-8DAV)

## CIRCUIT SCHEMATIC (1/2)



memo



This image shows two sets of horizontal dotted lines for handwriting practice. Each set consists of ten lines, each ending with a small black dot at the right end. The lines are evenly spaced and provide a guide for letter height and placement.

memo



This image shows two sets of horizontal dotted lines for handwriting practice. Each set consists of ten lines, each ending with a small black dot at the right end. The lines are evenly spaced and provide a guide for letter height and placement.

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