

New Product

TENTATIVE

M62255FP

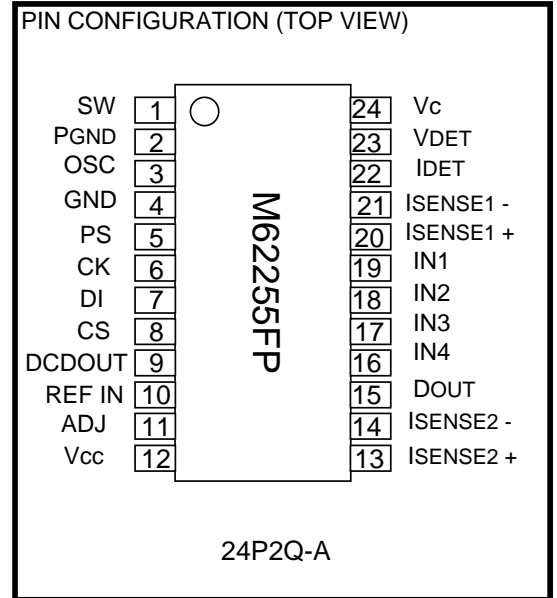
GENERAL PURPOSE BATTERY CHARGER CONTROL IC

Notice: This is not a final specification.
Some parametric limits are subject to change.

DESCRIPTION

The M62255FP is intended to be used a general purpose battery charger control for Note PC. The M62255FP contains the functions which are required for the battery charge control ,on single chip using low peripheral component requirement . The M62255FP can handle battery charge control, monitor battery temperature and prevent from over current and voltage with microcomputer. It contains DC-DC converter circuit which can be used for the feedback control of the charge current and the output voltage.

It is the best fit for **Smart Battery Charger**.

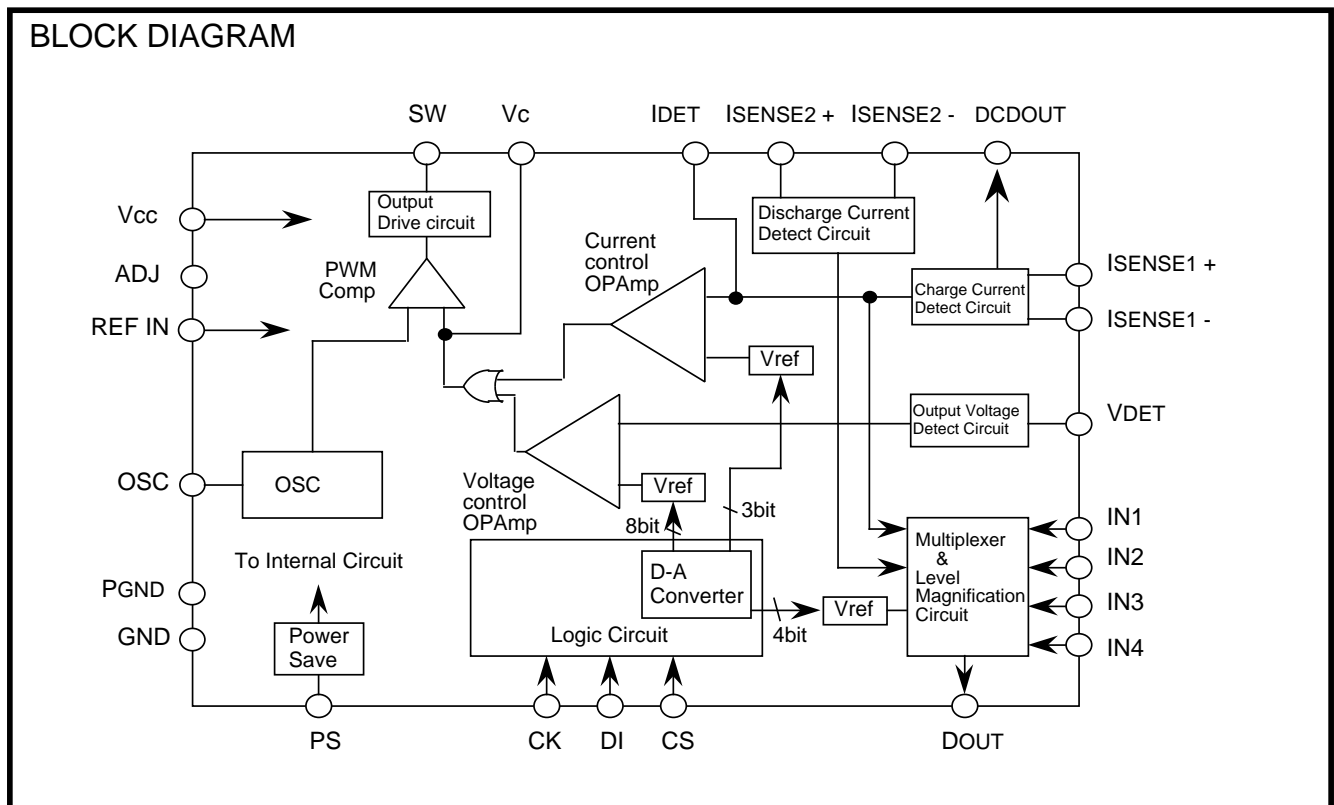


FEATURES

- Built-in 3 wire serial data interface for MCU.
- Built-in multiplexer and level magnification circuit with 4 input ports.
- Built-in DC-DC converter circuit for PWM function
- Built-in two current detection circuits. These circuits can detect charge current and discharge current
- ON/OFF control with low power dissipation mode. (Power save)

APPLICATION

Note.P.C, Video camera and general battery charger for other digital equipment



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TENTATIVE

MITSUBISHI<Dig./Ana. INTERFACE>

M62255FP

GENERAL PURPOSE BATTERY CHARGER CONTROL IC

<DESCRIPTION OF TERMINALS>

Pin No.	Symbol	Function
7	DI	The serial data input pin which used to receive 8-Bit wide serial data
6	CK	The shift clock input pin which input signal from DI pin to 8-Bit shift register by the rising edge of clock signal
8	CS	When this pin is "Low", DI pin can receive the data into the 8-Bit shift register. The each bit will be latched at rising edge of the clock signal
15	DOUT	The output pin of the amplified A-D data
11	ADJ	The voltage output pin for adjusting A-D reference voltage
10	REF IN	The reference voltage input pin of the A-D converter
19	IN1	The A-D converter input pin
18	IN2	The A-D converter input pin
17	IN3	The A-D converter input pin
16	IN4	The A-D converter input pin
20	ISENSE1+	The charge current sense input pin for high side voltage
21	ISENSE1-	The charge current sense input pin for low side voltage
13	ISENSE2+	The discharge current sense input pin for high side voltage
14	ISENSE2-	The discharge current sense input pin for low side voltage
9	DCDOUT	The discharge current detect circuit output pin
23	VDET	The voltage detection input pin
22	IDET	The current detection input pin
24	Vc	This pin is used to make connection with capacitor and resistor which are used for phase compensation
1	SW	The pre-drive pin which used to connect the external Pch Tr
3	OSC	The pin used to connect capacitor to determine the frequency of ocelot
5	PS	The control pin of power save mode (H : power save mode, L : normal mode)
12	Vcc	The power supply pin
4	GND	The ground pin
3	PGND	The ground pin of power unit

New Product

TENTATIVE

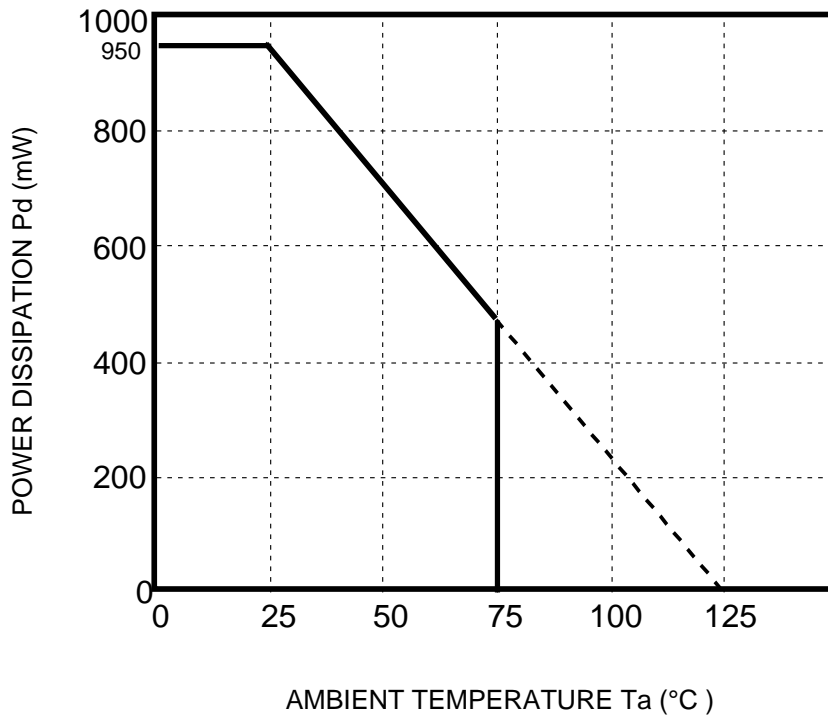
M62255FP

GENERAL PURPOSE BATTERY CHARGER CONTROL IC

<ABSOLUTE MAXIMUM RATINGS>

Symbol	Parameter	Conditions	Ratings	Unit
Vcc	Supply voltage		28	V
Isw	SW drive current		50	mA
Vsw	SW max. voltage		Vcc	V
VPS	PS max. voltage		7	V
Pd	Power dissipation	Ta=25°C	950	mW
K _{THETER}	Thermal derating ratio	Ta>25°C	9.5	mW/°C
Topr	Operating temperature		-20 – +75	°C
Tstg	Storage temperature		-40 – +125	°C

THERMAL DERATING (MAXIMUM RATING)



New Product

TENTATIVE

<ELECTRICAL CHARACTERISTICS> (Ta=25°C, Vcc=15V)

Block	Symbol	Parameter	Test condition	Limits			Unit
				Min	Typ	Max	
All block	Vcc	Supply voltage		7.5		22	V
	Icc1	Circuit current		4.0	7.0	10.0	mA
	Icc2	Circuit current at power save	PS input voltage Vps=2.0v	—	50	80	μA
	Vref	Input reference voltage			5.0		V
PWM	VsatM	Main-SW output saturation voltage	Isw=50mA	—	0.9	1.2	V
	IswL	SW output leak current		-1		1	μA
Charge detection block	VDET-IN	VDET input voltage range		0.6		5.0	μA
	IDETB	VDET input bias current		-1		0	μA
	VISENSE1+	ISENSE1+ input voltage range		2.0		Vcc-0.5	V
	VISENSE1-	ISENSE1- input voltage range		2.0		Vcc-0.5	V
	VISENSE2+	ISENSE2+ input voltage range		2.0		Vcc+1.5	V
	VISENSE2-	ISENSE2- input voltage range		2.0		Vcc+1.5	V
	VCH	Charge voltage of fixed voltage	Vref=5.0v, Voltage control data is 4.2v selected at Reset	4.18	4.20	4.22	V
	VICH	Charge current detection voltage of fixed current	Vref=5.0v, Current control data is 160mV selected	140	160	180	mV
	DNL	Differential nonlinearity at 8 bit DAC	Vref=5.0v	-1		1	LSB
Level Mag.	VIN-IN	IN input voltage range		0.3		5	V
	IIN	IN input current		-100		0	nA
	VDOUT	DOUT output voltage range		0.5		5	V
OSC	fosc	Oscillation frequency	Cosc = 390pF	70	100	130	KHz
	Ioscch	Oscillation charge current		-150	-120	-90	μA
	Ioscds	Oscillation discharge current		20	30	40	μA
	TDUTY	Maximum ON duty			95		%
	Vosch	Oscillation output high level		0.85	0.95	1.05	V
	Voscl	Oscillation output low level		0.35	0.4	0.45	V
Inter Face	V DIH	DI input high level		3.5		6.0	V
	V DIL	DI input low level		0		0.5	V
	V CSH	CS input high level		3.5		6.0	V
	V CSL	CS input low level		0		0.5	V
	V CKH	CK input high level		3.5		6.0	V
	V CKL	CK input low level		0		0.5	V
	V PSH	PS input high level		1.0	1.5		V
	V PSL	PS input low level		0		0.3	V

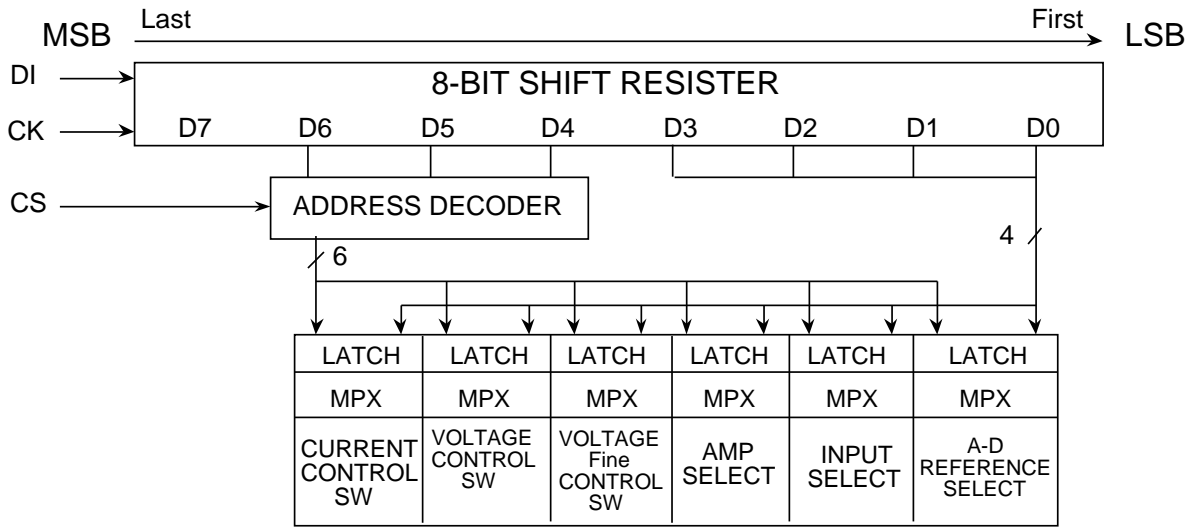
New Product

TENTATIVE

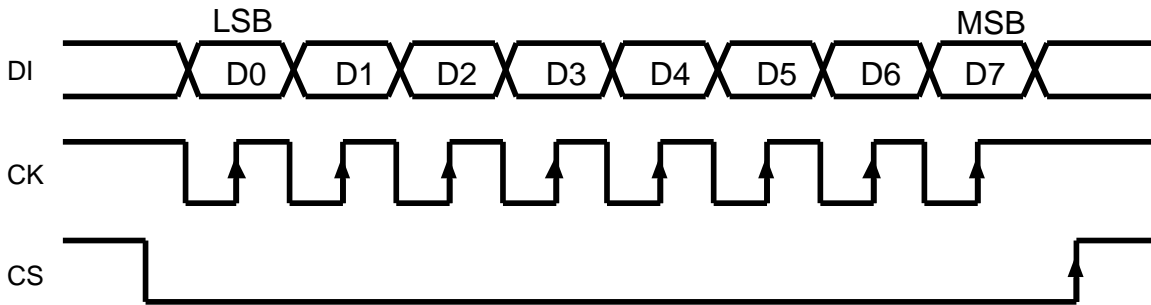
M62255FP

GENERAL PURPOSE BATTERY CHARGER CONTROL IC

<DIGITAL DATA FORMAT>



<DATA TIMING CHART > (MODEL)



<DATA SETTING>

Control function	Address				Data				Description
	D7	D6	D5	D4	D3	D2	D1	D0	
RESET	0	0	0	0	-	-	-	-	A-D Reference voltage = 2.5V Voltage control setting = 4.2V Voltage fine control setting = 0V Current control setting = 20mV
Current control	0	0	0	1	-	-	-	-	See Table 1
Voltage control	0	0	1	0	-	-	-	-	See Table 2
Voltage fine control	0	0	1	1	-	-	-	-	See Table 3
Amp. select	0	1	0	0	-	-	-	-	See Table 4
A-D Input select	0	1	0	1	-	-	-	-	See Table 5
A-D Reference select	0	1	1	0	-	-	-	-	See Table 6

New Product

TENTATIVE

M62255FP

GENERAL PURPOSE BATTERY CHARGER CONTROL IC

<CONTROL DATA>

Table 1 ; Current control data

D3	D2	D1	D0	Current control input voltage	Current ratio
0	0	0	0	0V	0
0	0	0	1	20mV	1/16
0	0	1	0	40mV	1/8
0	0	1	1	80mV	1/4
0	1	0	0	160mV	1/2
0	1	0	1	240mV	3/4
0	1	1	0	320mV	1
0	1	1	1	—	Trickle

• 20mV selected at RESET

Table 2 ; Voltage control data

D3	D2	D1	D0	Ref.voltage
0	0	0	0	select 5.0V
0	0	0	1	select 4.84V
0	0	1	0	select 4.68V
0	0	1	1	select 4.52V
0	1	0	0	select 4.36V
0	1	0	1	select 4.20V
0	1	1	0	select 4.04V
0	1	1	1	select 3.88V
1	0	0	0	select 3.72V
1	0	0	1	select 3.56V
1	0	1	0	select 3.40V
1	0	1	1	select 3.24V
1	1	0	0	select 3.08V
1	1	0	1	select 2.92V
1	1	1	0	select 2.76V
1	1	1	1	select 2.60V

• 4.20V selected at RESET

Table 3 ; Voltage fine control data

D3	D2	D1	D0	fine cntl.voltage
0	0	0	0	select 0V
0	0	0	1	select -10mV
0	0	1	0	select -20mV
0	0	1	1	select -30mV
0	1	0	0	select -40mV
0	1	0	1	select -50mV
0	1	1	0	select -60mV
0	1	1	1	select -70mV
1	0	0	0	select -80mV
1	0	0	1	select -90mV
1	0	1	0	select -100mV
1	0	1	1	select -110mV
1	1	0	0	select -120mV
1	1	0	1	select -130mV
1	1	1	0	select -140mV
1	1	1	1	select -150mV

• 0V selected at RESET

- Set-up voltage of Voltage control is fixed by Ref. voltage (at Table2) and fine cntl. voltage (at Table3). Set-up voltage of Voltage control can be fixed at 10mV step between 2.45V and 5.0V.

Example1.

table 1				table 2			
D3	D2	D1	D0	D3	D2	D1	D0
0	1	0	1	1	0	1	0

Set-up voltage;
 $4.20V(\text{Ref. voltage}) - 100mV(\text{fine cntl. voltage}) = 4.10V$

Example2.

table 1				table 2			
D3	D2	D1	D0	D3	D2	D1	D0
1	0	0	1	1	1	1	1

Set-up voltage;
 $3.56V(\text{Ref. voltage}) - 150mV(\text{fine cntl. voltage}) = 3.41V$

New Product

TENTATIVE

Table 4; Amp select

D3	D2	D1	D0	State
—	0	0	0	select Output of Charge Current Detect Amp
—	0	0	1	select Input of Battery Voltage Detect Amp
—	0	1	0	select Output of Battery Voltage Detect Amp
—	0	1	1	select Output of Discharge Current Detect Amp
—	1	0	0	select Output of A/D reference Voltage

- Output of Battery Voltage Detect Amp is selected at RESET

Table 5; A-D Input select

D3	D2	D1	D0	State
—	—	0	0	select IN1
—	—	0	1	select IN2
—	—	1	0	select IN3
—	—	1	1	select IN4

- IN1 is selected at RESET

Table 6; A-D Reference voltage select

D3	D2	D1	D0	State
0	0	0	0	select 5.0V
0	0	0	1	select 4.69V
0	0	1	0	select 4.38V
0	0	1	1	select 4.06V
0	1	0	0	select 3.75V
0	1	0	1	select 3.44V
0	1	1	0	select 3.13V
0	1	1	1	select 2.81V
1	0	0	0	select 2.50V
1	0	0	1	select 2.19V
1	0	1	0	select 1.88V
1	0	1	1	select 1.56V
1	1	0	0	select 1.25V
1	1	0	1	select 0.94V
1	1	1	0	select 0.63V
1	1	1	1	select 0.31V

- 2.50V is selected at RESET

BLOCK DESCRIPTION

(1) Battery Voltage Detect BLOCK

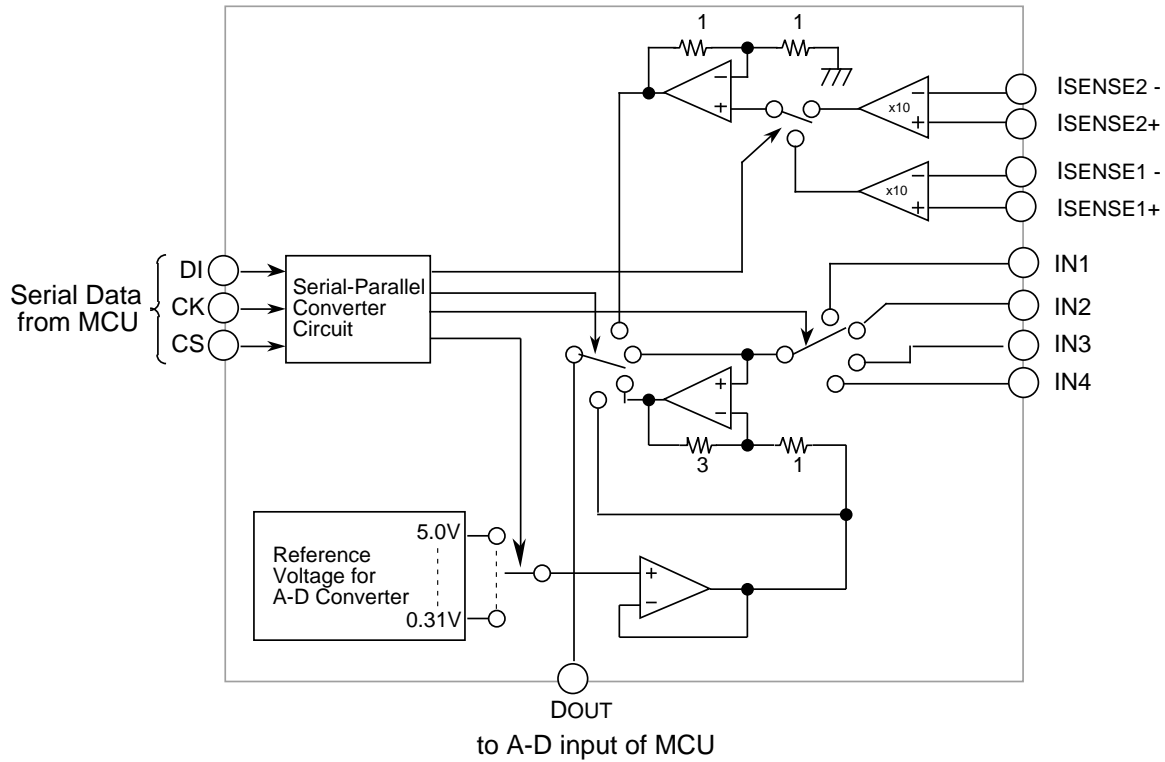


Fig.1 Block Diagram of Multiplexer and Level Magnification Circuit

Multiplexer and Level Magnification Circuit of M62255 consists from Reference Voltage, 4times amplifier, 10times Amplifier and 4input Multiplexer.

When setting the reference voltage correspond to detecting voltage by serial data from MCU, this set voltage supply to reference voltage for A-D converter. The difference between input voltage of IN1 - IN4 and reference voltage is multiplied by 4 at the center of this setting voltage. This multiplied voltage is supplied to A-D input of MCU from DOUT terminal. The resolution of A-D converter of MCU is improved by 2-Bit as against the difference of IN1-IN4 input.

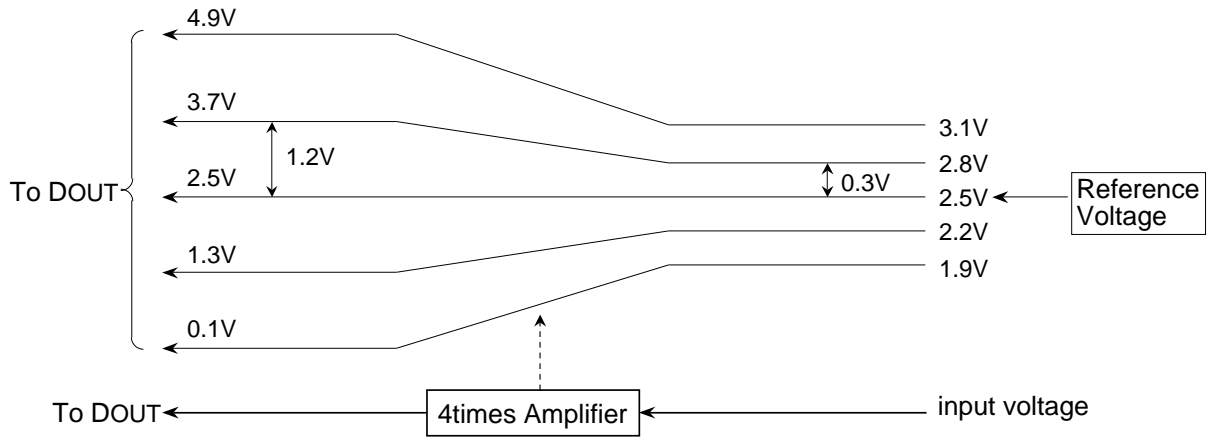


Fig.2 Description of Level Magnification

Output voltage of DOUT is fixed as follows;

$$VDOUT = (VIN - Vref) \times 4 + Vref \quad (V) \quad \text{----- (1)}$$

VDout ; Output voltage of DOUT

VIN ; Voltage of IN1 (or IN2,IN3,IN4)

Vref ; Reference voltage for A-D converter

In Fig.2 Reference Voltage is 2.5V. When Input voltage of IN1 (or IN2,IN3,IN4) is set at 2.8V, the difference between input voltage and Reference Voltage is 0.3V. The difference voltage (0.3V) multiplied by 4 is 1.2V. 1.2V added to Reference Voltage(2.5V) makes 3.7V which is output voltage of VDOUT.

The range of output voltage of VDOUT is between 0V and 5V. So in Fig.2 the range of input voltage of IN1(or IN2,IN3,IN4) is between 1.9V and 3.1V. (This range of input voltage is difference from selected Reference Voltage.)

New Product

TENTATIVE

M62255FP

GENERAL PURPOSE BATTERY CHARGER CONTROL IC

Charge Current of Current Detect R is multiplied by 10 and outputted from DOUT.

M62255 is for the floating detection type. Current Detect R is connected to + terminal of battery. So M62255 is best fit for SMBus system, because the common GND can be given between PC system and the charger circuit.

Discharge current is detected by the same method as charge current. Detecting discharge current can be used for monitoring the current consumption and the remnant of the battery.

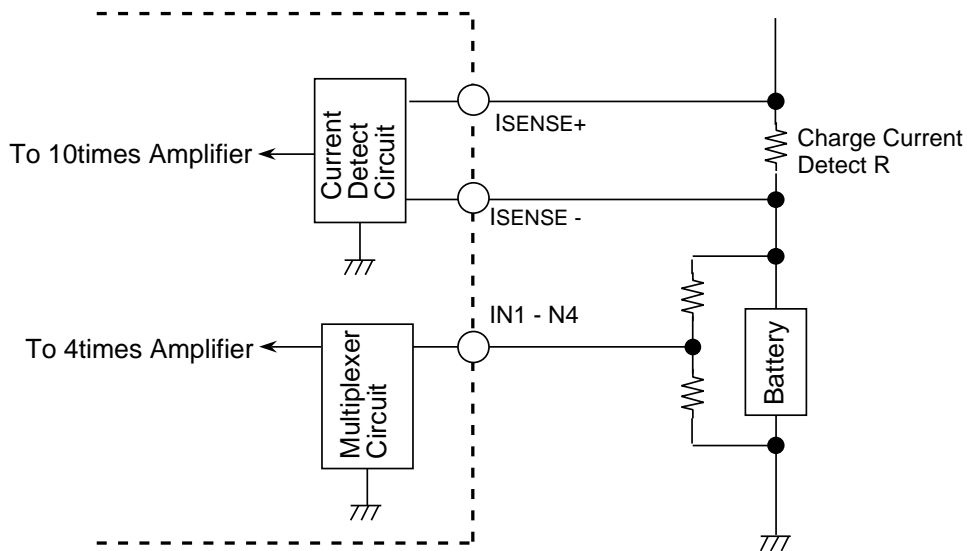


Fig.3 Detector Circuit of Battery Voltage / Charge Current

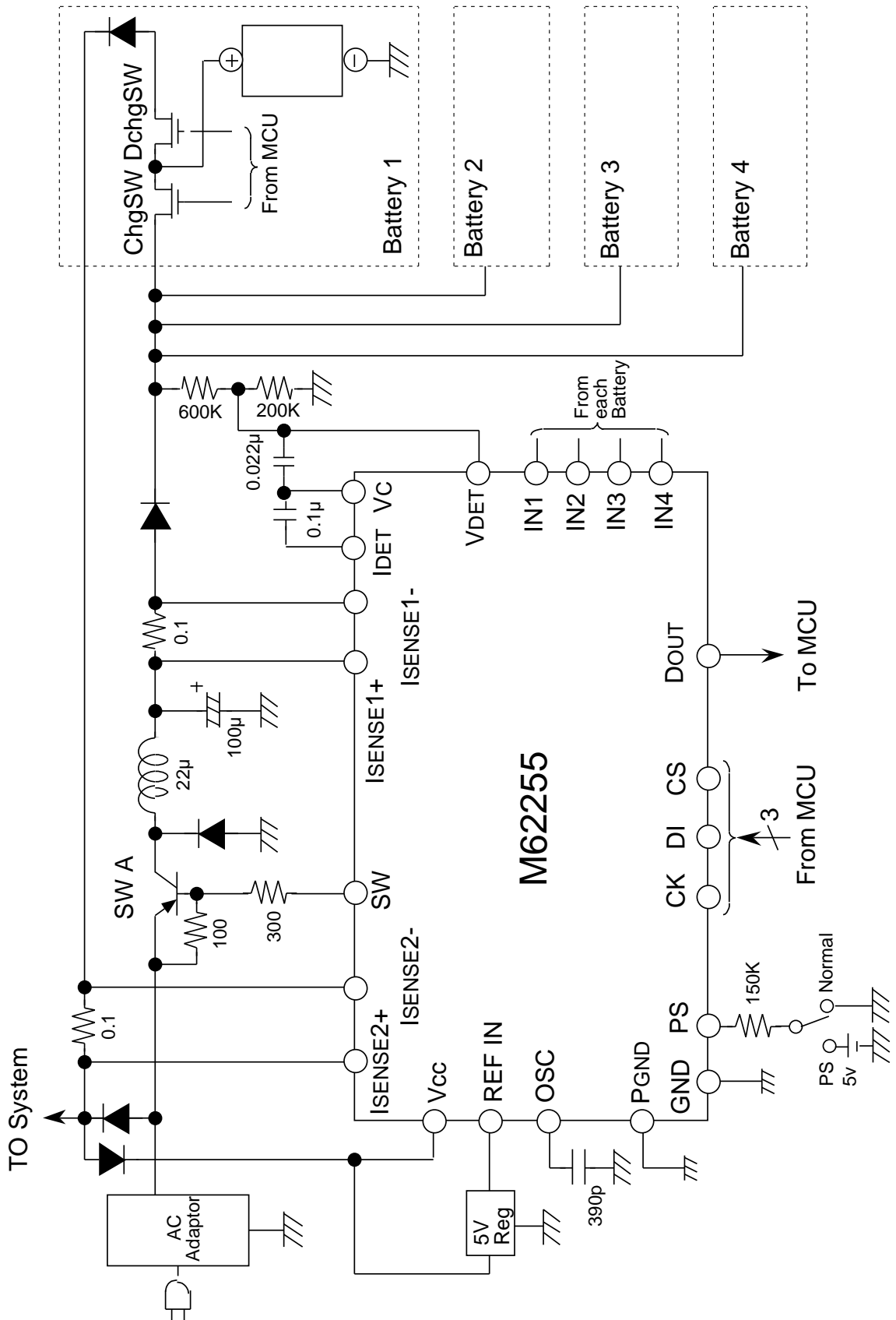
New Product

TENTATIVE

M62255FP

GENERAL PURPOSE BATTERY CHARGER CONTROL IC

<Application Circuit>



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PACKAGE OUTLINE