

M62240FP

Single Chip Battery Charger Control IC

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Rev.2.00

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Description

The M62240FP is a general purpose battery charger control IC. It can control all of the sequence needed for battery charging, it also has functions such as detection of battery temperature, a protection against over-current/voltage, a safety timer and so on. Moreover, it can adapt to charge Ni-Cd, Ni-MH batteries by adding few peripheral components. The IC has the feedback control of the charge current and output voltage.

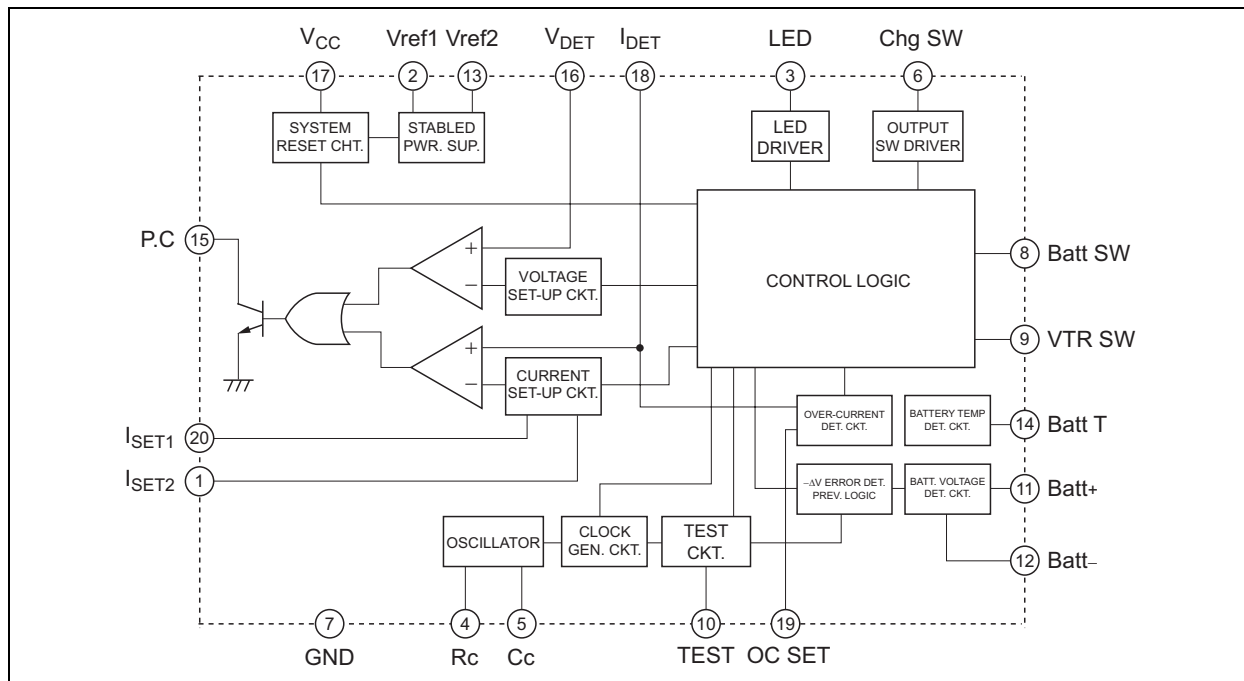
Features

- x Low voltage (3 V) operation
- x Built-in following functions and circuits;
 - CR oscillator for internal logic
 - Initialization timer and safety timer for ' V error detection and over-charging
 - D/A converter and shift registers to maintain the peak voltage of battery
 - Main output SW driving circuits
 - LED driving circuit for displaying the status of the charging
 - System reset circuit for detecting the power supply voltage
 - Temperature detection circuit for the Ni-MH battery
 - Voltage and current control circuits for feedback to the primary side of the SMPS.
 - Protective functions including detection of over-voltage in charge mode and over-current in adapter mode and so on

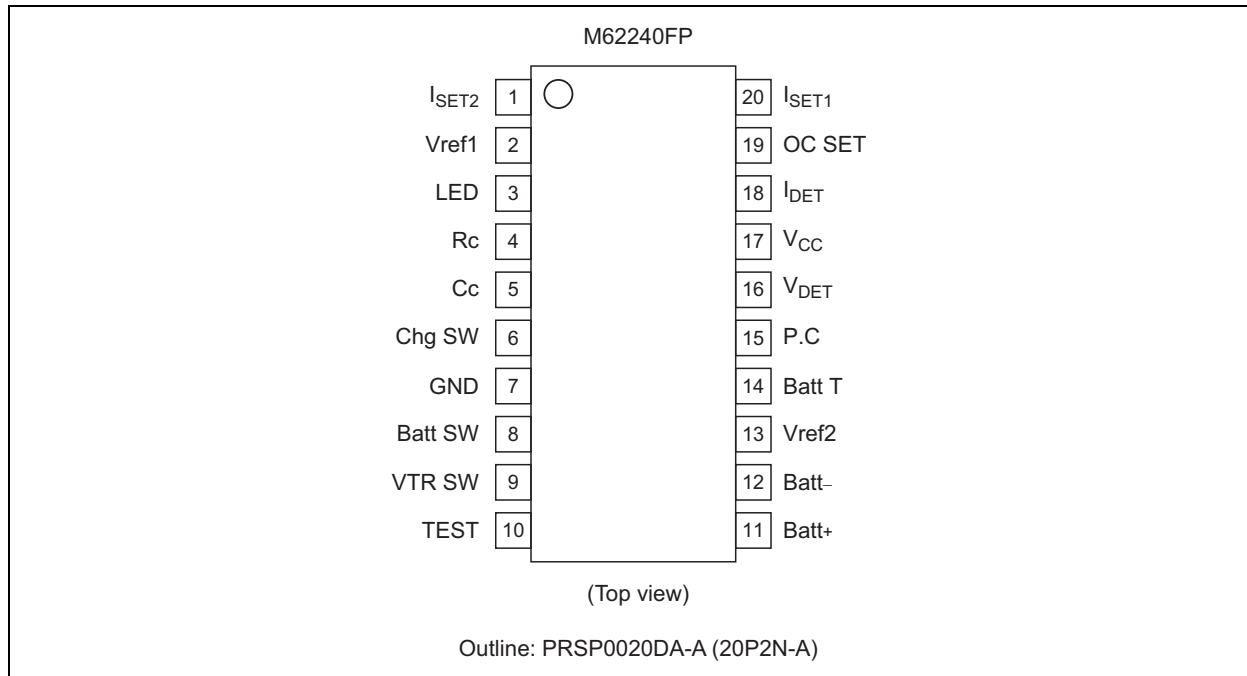
Application

Battery charger for video cameras and handheld telephones, etc.

Block Diagram



Pin Arrangement



Pin Description

Pin No.	Pin Name	Function
3	LED	LED drive (Open collector outputs)
4, 5	Rc, Cc	Setting the oscillating frequency of the internal clocks.
6	Chg SW	The SW drive terminal used for charging battery. (Open collector outputs)
7	GND	Ground
8	Batt SW	Checking whether a battery is mounted or not. (It has a pull-up resistor)
9	VTR SW	Detecting VTR connection. (It has a pull-up resistor)
10	TEST	Test mode set-up. (It has a pull-up resistor)
11	Batt+	This is connected to the + terminal of the battery.
12	Batt-	This is connected to the - terminal of the battery.
14	Batt T	This is connected to the temperature detecting terminal of the battery.
13	Vref2	The voltage reference terminal for temperature detection.
15	P.C	This is connected to the photo-coupler used for feedback. (It has a pull-up resistor)
16	V _{DET}	Monitoring the output voltage.
18	I _{DET}	Detecting the charging current or output current.
19	OC SET	Setting the over-current detection value in the adapter mode.
20, 1	I _{SET1, 2}	These are used to the charging current. (I _{SET1} is for quick charge and I _{SET2} is for trickle charge)
2	Vref1	Setting the standard voltage for over-current set-up value and the charge current set-up.
17	V _{CC}	Power supply.

Absolute Maximum Ratings

(Ta = 25°C, unless otherwise noted)

Item	Symbol	Ratings	Unit	Conditions
Supply voltage	V _{CC}	16	V	
Chg SW terminal drive current	I _{ChgSW}	50	mA	
LED drive current	I _{LED}	20	mA	
P.C drive current	I _{P.C}	20	mA	
Vref1 output current	I _{ref1}	-0.5	mA	
Vref2 output current	I _{ref2}	-1	mA	
Power dissipation	P _d	650	mW	
Thermal derating	KT	6.5	mW/°C	Ta = 25°C
Operating temperature	T _{opr}	-20 to +75	°C	Ta > 25°C
Storage temperature	T _{stg}	-40 to +125	°C	

Note: Polarity of current:

The direction of current flowing into the IC is equivalent to the positive (+). The direction of current flowing out of the IC is equivalent to the negative (-). The voltage applied to the open collector output terminal should be less than the absolute maximum voltage of the power supply.

The voltage difference between the negative terminal of the battery and the GND terminal should be 0 to 0.6 V.

Electrical Characteristics

(V_{CC} = 7 V, Ta = 25°C, unless otherwise noted)

All Device

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Supply voltage	V _{CC}	3.0	—	15.0	V	
Circuit current	I _{CC}	10.0	20.0	30.0	mA	V _{CC} = 7 V, when quick charge
Power supply detecting voltage	V _{THVCC}	2.70	2.80	2.90	V	

Reference

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Vref1 output voltage	V _{ref1}	1.21	1.25	1.30	V	I _{ref1} = 150 PA
Vref2 output voltage	V _{ref2}	1.73	1.80	1.87	V	I _{ref2} = 350 PA

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
OC SET terminal flow out current	I _{OCSET}	-1	—	—	PA	V _{OCSET} = 220 mV
I _{SET1} terminal flow out current 1	I _{SET1-1}	30	50	85	PA	Excluding charging time
I _{SET1} terminal flow out current 2	I _{SET1-2}	-1	—	—	PA	When charging
I _{SET2} terminal flow out current 1	I _{SET2-1}	30	50	85	PA	Excluding trickle charging time
I _{SET2} terminal flow out current 2	I _{SET2-2}	-1	—	—	PA	When trickle charging

Driver

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Chg SW terminal output flow out current	V _{satChgSW}	—	0.3	0.6	V	I _{ChgSW} = 30 mA
LED output low voltage	V _{satLED}	—	0.3	0.6	V	I _{LED} = 10 mA

Control Section

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Range of input voltage	V_{IN}	0	—	V_{CC}	V	
Input bias current	I_{Bias}	-1	—	—	PA	
P.C output low voltage	V_{PCL}	—	0.3	0.6	V	$I_{P,C} = 10 \text{ mA}$

Each SW Detection Terminal

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Batt SW terminal flow out current	I_{BattSW}	-240	-140	-80	PA	$V_{CC} = 7 \text{ V}$, $V_{BattSW} = 0 \text{ V}$
Batt SW terminal threshold voltage	V_{THBatt}	3.0	4.0	5.0	V	$V_{CC} = 7 \text{ V}$
VTR SW terminal flow out current	I_{VTRSW}	-240	-140	-80	PA	$V_{CC} = 7 \text{ V}$, $V_{VTRSW} = 0 \text{ V}$
VTR SW terminal threshold voltage	V_{THVTR}	3.0	4.0	5.0	V	$V_{CC} = 7 \text{ V}$

Internal Voltage Set-up

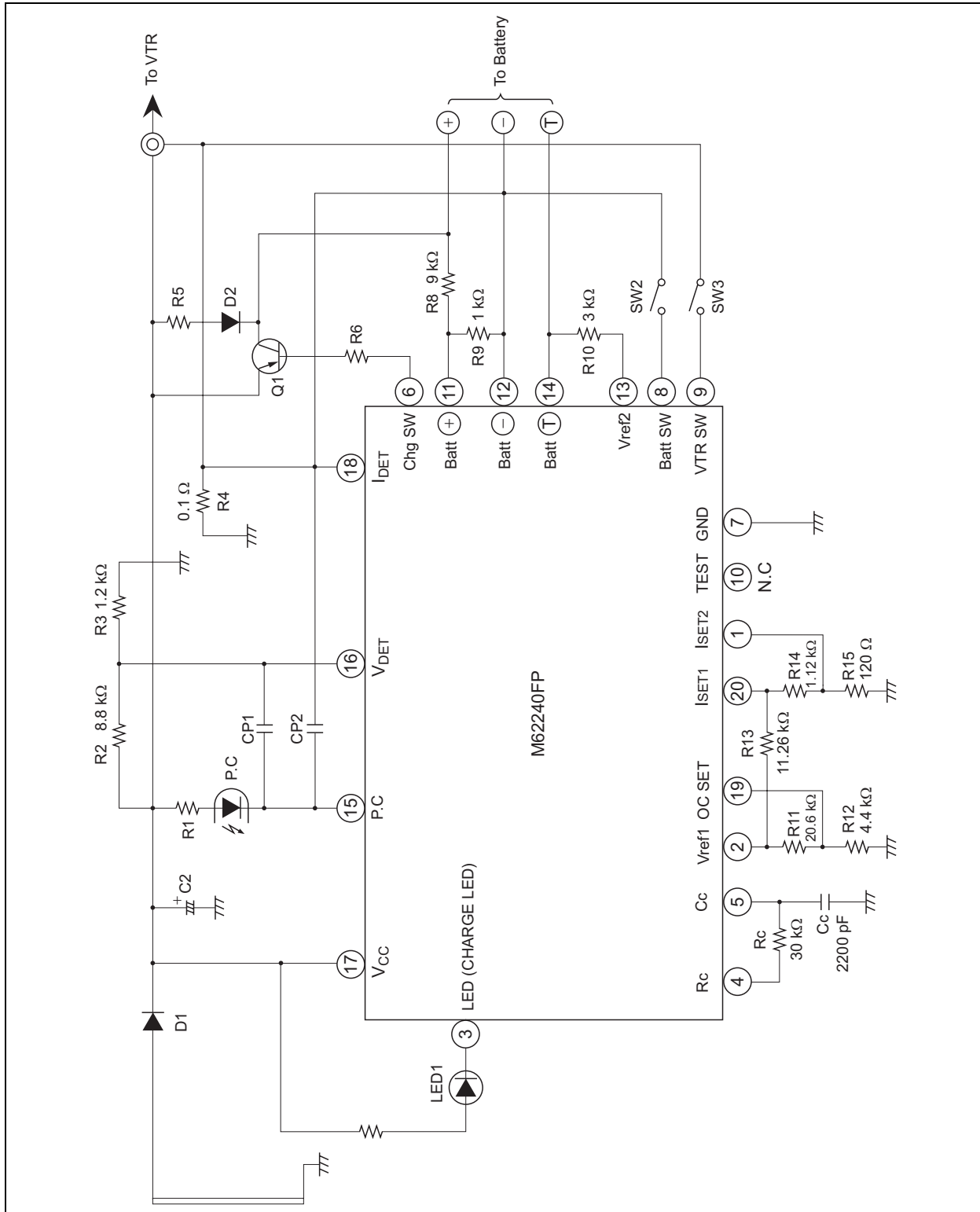
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Set-up output voltage at VTR mode	V_{VTR}	828	864	900	mV	
Set-up output voltage at charge mode	V_{CHG}	1.21	1.26	1.30	V	
I_{SET1} set-up voltage	V_{ISET1}	124.8	130	135.2	mV	When quick charging
I_{SET2} set-up voltage	V_{ISET2}	11.52	12.0	12.48	mV	When trickle charging
OC SET set-up voltage	V_{OCSET}	211.2	220	228.8	mV	When VTR mode
Voltage at the start of quick charging	V_{CHG}	0.40	0.54	0.68	V	
Over-voltage set-up voltage	V_{OVP}	0.91	0.95	0.99	V	
-1 V detection set-up voltage	V_{-1V}	70	100	130	mV	After initialization timer has passed
Temperature detection set-up voltage	V_{VTHH1}	0.91	0.97	1.01	V	Temperature at the start of charging
Over-heating detection set-up voltage	$V_{O/H}$	0.82	0.86	0.90	V	Charge stop temperature

Internal Voltage Set-up

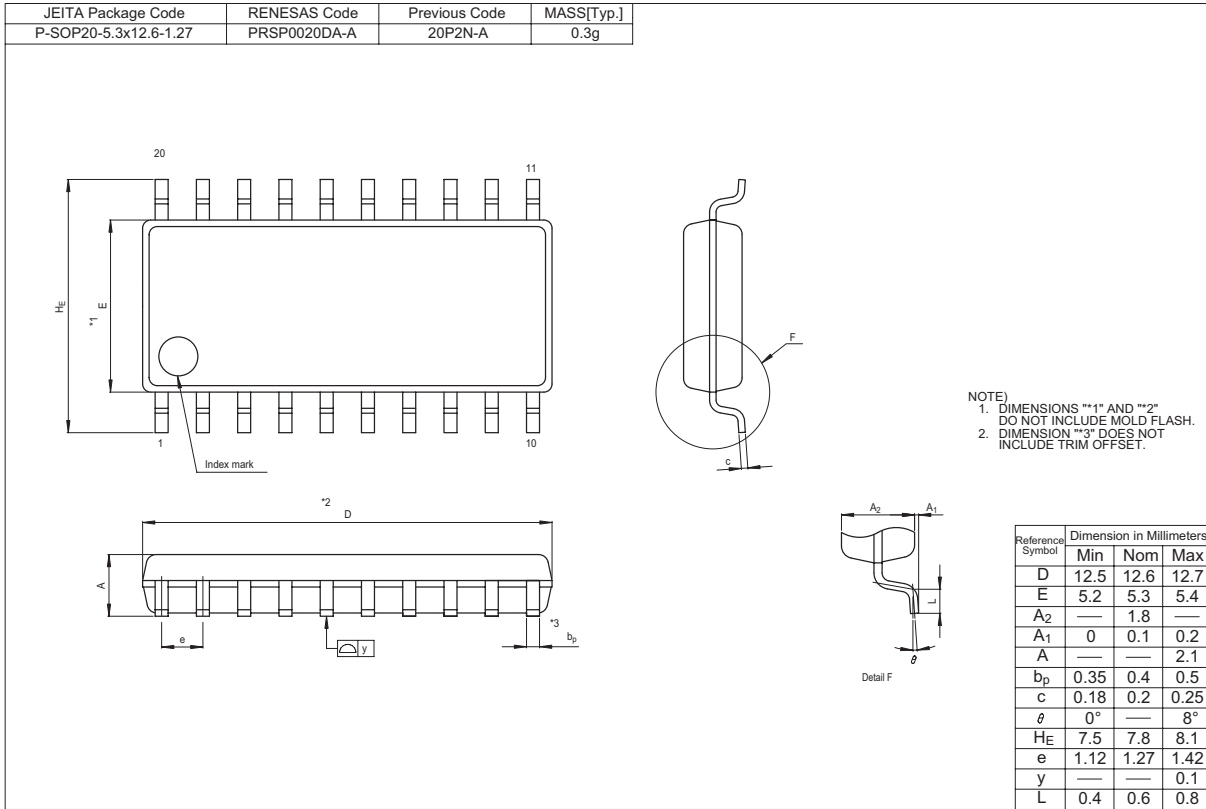
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Oscillation frequency	fosc	9.42	10.24	11.06	kHz	$R_c = 30 \text{ k}\Omega$, $C_c = 2200 \text{ pF}$
Initialization timer 1	T_{m1}	18.4	20.0	21.6	m	Battery voltage < 5 V
Initialization timer 2	T_{m2}	4.6	5.0	5.4	m	Battery voltage $\geq 5 \text{ V}$
Safety timer 1	T_{ms1}	4.6	5.0	5.4	h	When quick charging
Safety timer 2	T_{ms2}	4.6	5.0	5.4	h	When trickle charging
Over-current detection time	T_{oc}	9.2	10.0	10.8	s	When VTR mode

Note: Each timer is set at an oscillation frequency of 10.24 kHz.

Application Example



Package Dimensions



Notes:

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