Li-ion Battery Charge Control IC
Monolithic IC MM3658AR

Outline

This IC is a linear charge control IC for 1-cell lithium iron phosphate (LiFePO4) battery.
The chip temperature detection function can limit the temperature rise in the IC during high power charging and the battery temperature detection function enables the Charging by temperature to be controlled.
The package is a small size SSON-10pin.

Features

1. BAT Regulation Voltage 3.6V±30mV(±0.8%)
2. Fast Charge Current 558mA±5%(RICHG=2.32kΩ)
3. The external resistor enables trickle/fast-charge current/charge completion current to be set (Maximum charge current : 1.5A).
4. A charge timer is embedded in this IC. The external resistor enables the charge timer to be set arbitrarily.
5. The chip temperature detection function can limit the temperature rise in the IC during high power charging. It can be charged at an optimal rate.
6. The battery temperature detection function with thermistor input enable Charging by temperature to be controlled.
7. LED Driver (1ch)

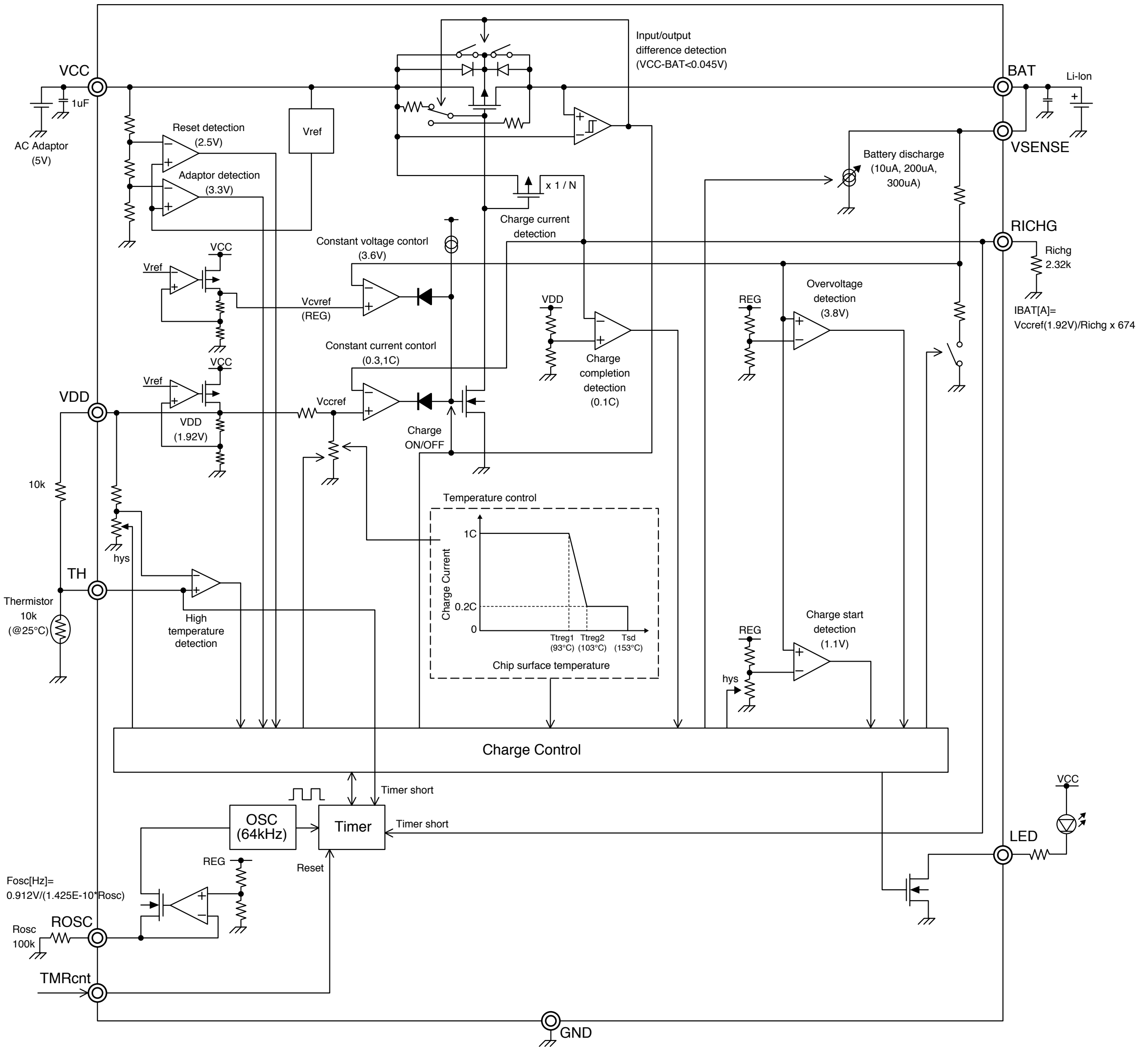
Package

SSON-10A

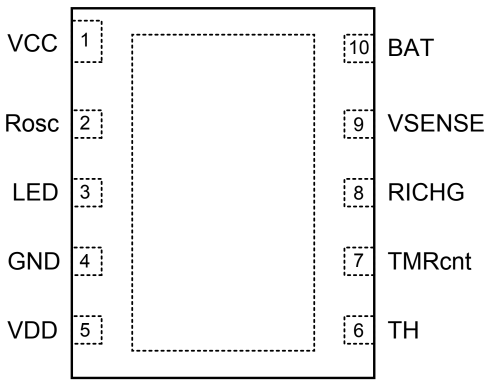
Applications

1. Shavers
2. Portable Devices

Block Diagram



Pin Assignment



(TOP VIEW)

Pin Description

Pin No.	Pin name	Functions
1	VCC	Power supply, charge Tr input pin. Connect to an AC adaptor.
2	Rosc	Oscillation frequency setting resistance connection pin fosc=0.912V/(1.425E-10*Rosc) *Estimation : The fosc value for each Rosc value is referred to following characteristics. (Fosc vs. Rosc external resistor)
3	LED	LED connect pin (Nch open drain output) Turn on during charging.
4	GND	Ground pin
5	VDD	Battery temperature detecting reference voltage pin. * It is not recommended to be used other than as battery temperature detecting reference voltage (resistance connection) since it is also used for internal charge current reference voltage.
6	TH	Battery temperature detection input pin. Connect to a thermistor.
7	TMRcnt	Timer (trickle charge timer, fast charge timer) ON/OFF control pin. H : Timer stops, L/open : Timer is valid.
8	RICHG	Charge current setting resistance connection pin ICHG=674*1.92V/RICHG *Estimation : The Charge Current value for each RICHG value is referred to following characteristics. (Charge current vs. RICHG external resistor)
9	VSENSE	Battery voltage detection, constant voltage charge control pin. Connect to the positive side of a battery pack.
10	BAT	Charge Tr output pin. Connect to the positive side of a battery pack.

Absolute Maximum Ratings (Except where noted otherwise Ta=25°C)

Item	Symbol	Ratings	Units
Storage Temperature	Tstg	-55~+150	°C
Operating Temperature	Topr	-40~+85	°C
Pin Voltage	Vin	-0.3~+6.0	V
BAT Pin Output Current	IBAT	1.5	A
LED Pin Sink Current	ILED	20	mA
Power Dissipation	Pd	1.94 (Note1)	W

Note1 : When mounted on a 40×40×1.6^{t}mm
(epoxy glass ,double-sided, copper layer 90%) PC board.

Recommended Operating Conditions (Except where noted otherwise Ta=25°C)

Item	Symbol	Ratings	Units
Operating Temperature	Topr	0~+45	°C
VCC Operating Voltage	Vop	4.0~6.0	V
BAT Output Current	Vbop	1.1~3.65	V

Electrical Characteristics (Except where noted otherwise VCC=5.0V, Ta=0~45°C)

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units
Supply Current 1	Icc1	During fast charge (Irapchg=500mA setting)		3.0	4.5	mA
Supply Current 2 (Note2)	Icc2	During fast charge (Irapchg=1000mA setting)		3.5	5.2	mA
Leak Current 1	Ileak	Inflow current of BAT/VSENSE pin under the following conditions : 1. BAT (=VSENSE) =3.6V, AC adaptor is unconnected 2. charging is completed		1	2	μA
Reset Detection Voltage	Vpor	Reset when VCC<Vpor	2.3	2.5	2.7	V
ADP Detection Voltage	Vadp	Charging stops when VCC<Vadp	3.1	3.3	3.5	V
VSENSE Pin Discharge Current 1	Idischg1	VSENSE(=BAT)=3.2V, in charge error mode		10.0	20.0	μA
VSENSE Pin Discharge Current 2	Idischg2	VSENSE(=BAT)=3.2V	100	200	300	μA
Charge Start Detection Voltage	Vstart	Used for battery connection detection as well Charging stops when VSENSE (=BAT)<Vstart	1.0	1.1	1.2	V
Charge Start Detection Voltage Hysteresis	Vstarthys	Not applied to battery voltage detection immediately after reset release.	50	100	150	mV
BAT Regulation Voltage	Vchg		3.57	3.60	3.63	V
Charge Stop I/O Potential Difference 1	Vdef1	Charge stops when VCC–BAT<Vdef1 VCC=H→L	5	30	65	mV
Charge Stop I/O Potential Difference 2	Vdef2	Charge stops when VCC–BAT<Vdef2 VCC=L→H	5	45	65	mV
Battery Overvoltage Detection Voltage	Vov	VCC =>Vov+100mV	3.7	3.8	3.9	V
Forced Charge Current	Istart	RICHG=2.32kΩ, 0.3C (1.0C=Irapchg)	116	167	219	mA
Fast-charge Current	Irapchg	RICHG=2.32kΩ, 1.0C BAT=3.2V	530	558	586	mA
Fast-charge Current (Note2)	Irapchg(*)	RICHG=2.32kΩ, 1.0C BAT=Vstart~Vchg	530	558	586	mA
Fast-charge Current2	Irapchg2	RICHG=1.30kΩ, 1.0C BAT=3.2V		1000		mA
Charge Completion Current	Ifc	RICHG=2.32kΩ, BAT>Vstart	40	56	72	mA
Charge Completion Current (Note2)	Ifc(*)	RICHG=2.32kΩ, BAT>Vstart	40	56	72	mA
Chip Temperature Detection1 (Note2)	Ttreg1	Applied to Tj (chip temperature)	83	93	103	°C
Chip Temperature Detection2 (Note2)	Ttreg2	Applied to Tj (chip temperature)		103		°C
Chip Temperature Detection Difference (Note2)	Tdtreg	Applied to Tj (chip temperature) Ttreg2-Ttreg1	5	10	15	°C
Thermal Shutdown Temperature (Note2)	Tsd	Applied to Tj (chip temperature)	143	153	163	°C
Temperature Detecting Reference Voltage	VDD	VDD pin Output Voltage		1.92		V
Temperature Detecting Reference Terminal Current (Note2)	IDD	VDD pin Output Current		3		mA

Note2 : The parameter is guaranteed by design.

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units
Charge Stop Battery Temperature Detection Voltage (High temperature)	VthSH	Charge stop threshold when TH pin falls (76°C)	VDD* 0.1123	VDD* 0.1193	VDD* 0.1266	V
Charge Recovery Battery Temperature Detection Voltage (High temperature)	VthRH	Charge recovery threshold when TH pin rises (76°C)		VDD* 0.1427		V
TMRcnt pin Low-Level Input Voltage	Vtmrl				0.5	V
TMRcnt pin High-Level Input Voltage	Vtmrh		2			V
TMRcnt pin Low-Level Input Current	Itmrl	TMRcnt=0V			1	μA
TMRcnt pin High-Level Input Current	Itmrh	TMRcnt=5.0V			10	μA
LED Output pin Low-Level Voltage	VledL	Iled=10mA			0.4	V
LED Output pin Leak Current	Iledleak	LED=5V	–1		+1	μA
Series Pass Tr On Resistance	Ron	Io=200mA		0.38	0.60	Ω
Oscillator Frequency (Note2)	Fosc	Rosc=100kΩ	57.6	64	70.4	kHz
LED Blinking Cycle (Note2)	Fled	Applied to a LED pin when Rosc=100k and in charge error mode	0.92	1.02	1.13	s
LED Blinking Duty (Note2)	Dled	Applied to a LED pin when Rosc=100kΩ	30	50	70	%
VSENSE Pin Discharge Time (Note2)	Tdischg	Fosc=64kHz	58	64	70	ms
AC ADP Connection Detection Time (Note2, 3)	Tadp	Foc=64kHz, Vpor<VCC<Vadp Applied when VCC=>Vadp detection	24		32	ms
	Tadp2	Applied when VCC=<Vpor detection	32	64	96	μs
Forced Charge Time (Note2)	Tistart	Fosc=64kHz	480	512	544	ms
Forced Charge OFF Time (Note2)	Toff	Fosc=64kHz	115	128	141	ms
Fast Charge Start Voltage Detection Time (Note2, 4)	Tqstart	Fosc=64kHz	96		128	ms
Battery Voltage Detection Time (Note2, 4)	Tcon	Fosc=64kHz	96		128	ms
Charge Completion Current Detection Time (Note2, 5)	Tifc	Fosc=64kHz	192		256	ms
Fast-charge Timer (Note2)	Tchg	Valid when Fosc=64kHz, TMRcnt=L, or Open	270	300	330	min
Battery Overvoltage Detection (Note2, 4)	Tov	Fosc=64kHz	96		128	ms
Charge Stop Battery Temperature Detection Time (Note2, 4)	Tpro	Fosc=64kHz Vth1, VTH=L→H or Vth4, VTH=H→L	96		128	ms
Charge Recovery Battery Temperature Detection Time (Note2, 4)	TproR	Fosc=64kHz Vth1R, VTH=H→L or Vth4R, VTH=L→H				

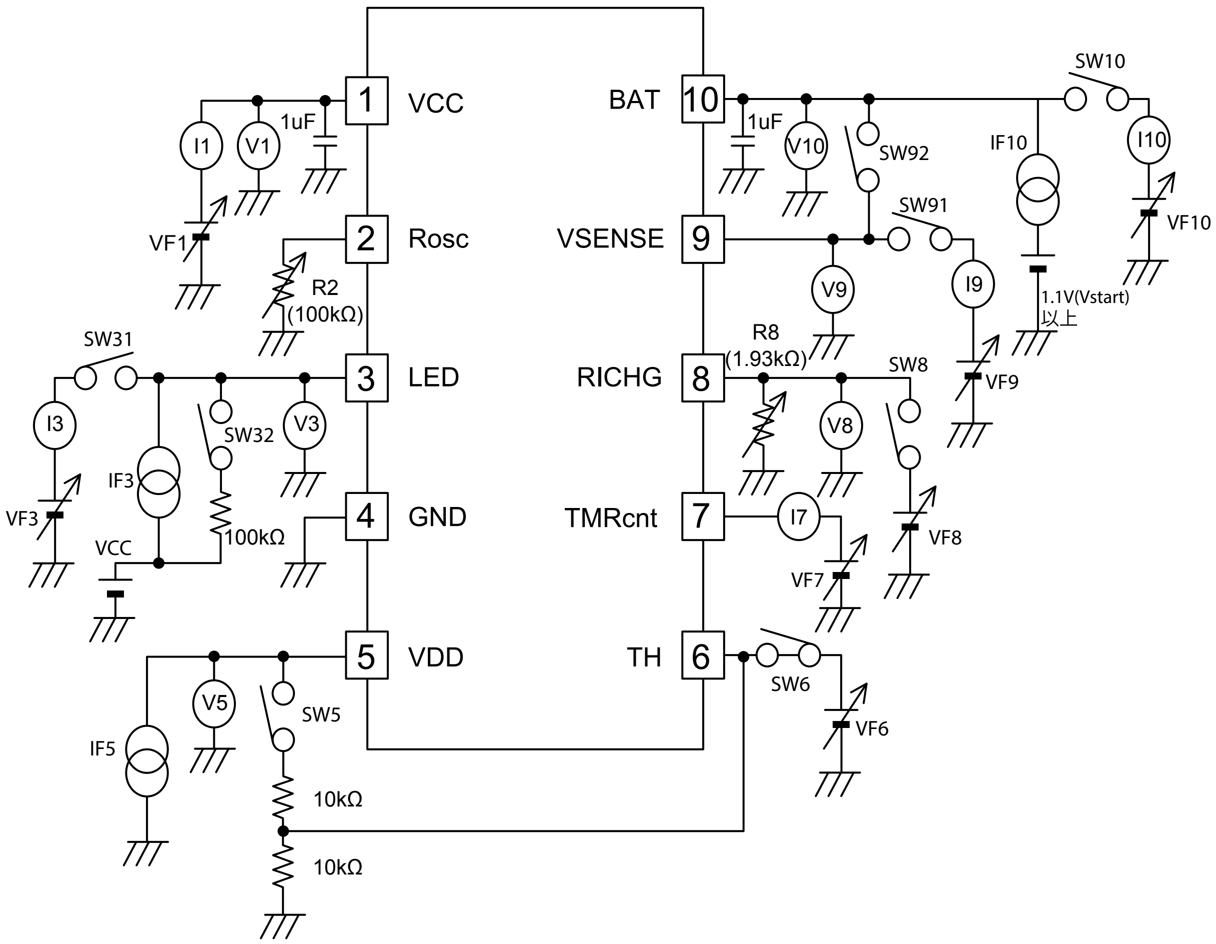
Note2 : The parameter is guaranteed by design.

Note3 : The detection time varies depending on the timing of detection for approximately one clock due to the mode transition system operated when matched 4 times in 8ms.

Note4 : The detection time varies depending on the timing of detection for approximately one clock due to the mode transition system operated when matched 4 times in 32ms.

Note5 : The detection time varies depending on the timing of detection for approximately one clock due to the mode transition system operated when matched 4 times in 64ms.

Test Circuit



• **SW setting condition**

TEST CIRCUIT	SW31	SW32	SW5	SW6	SW8	SW91	SW92	SW10
A	×	×	○	×	×	×	○	○
B	×	×	○	×	×	○	×	○
C	×	○	○	×	×	×	○	○
D	×	○	×	○	×	×	○	○
E	○	×	○	×	×	×	○	○
F	×	○	○	×	×	×	○	×
G	×	×	×	○	×	×	○	×
H	×	×	×	○	○	○	×	○

Test Condition

(Except where noted otherwise VCC=5.0V, Ta=0~45°C)

Parameter	Symbol	Test Circuit	Test Conditions
Supply Current 1	Icc1	A	Measure the current of I1-I10 when R8=(Irapchg=500mA setting) and IF10=500mA.
Supply Current 2 (Note6)	Icc2	A	Measure the current of I1-I10 when R8=(Irapchg=1000mA setting) and IF10=1000mA.
Leak Current 1	Ileak	A	1. Measure the current of I10 when VF1=0V and VF10=3.6V. (charge completion mode). 2. Measure the current of I10 when VF10=3.65V
Leak Current 1 (Note6)	Ileak	A	1. Measure the current of I10 when VF1=0V and VF10=1.0~3.6V.
Reset Detection Voltage	Vpor	B	When gradually increasing VF1 from 2.3V to 2.7V under the condition of VF9 = 3.2V and VF10 = 3.2V, the VF1 when I9 exceeds 100μA should be Vpor.
ADP Detection Voltage	Vadp	C	When gradually increasing VF1 from 2.3V to 3.5V under the condition of VF10 = 3.2V, the VF1 when V3 changes from H→L should be Vadp.
VSENSE Pin Discharge Current 1	Idischg1	B	Measure the current of I9 when VF 9 = 4.0V→3.2V after being kept under the condition of VF10 = 3.2V and VF 9 = 4.0V and entering into error mode.
VSENSE Pin Discharge Current 2	Idischg2	B	Measure the current of I9 immediate after increasing VF1 from 2.3V to 5.0V when VF9 = 3.2V and VF10 = 3.2V.
Charge Start Detection Voltage	Vstart	C	When gradually increasing VF10 from 1.0V to 1.2V under the condition of VF10 = 0.5V, the VF10 when the charging starts (|I10| > 1mA) and V3 = H→L should be Vstart.
Charge Start Detection Voltage Hysteresis	Vstarthys	C	Vstarthys=Vstart-Vstart2 When gradually decreasing VF10 from 1.2V to 0.8V under the condition of VF10 = 1.5V, the VF10 when the charging stops (|I10| < 1mA) and V3 = L→H should be Vstart2. Vstarthys = Vstart-Vstart2
Regulation Voltage BAT	Vchg	A	Measure the voltage of V9 in fast charge mode and when IF10 = –72mA (|IF10| > Ifc).
Charge Stop I/O Potential Difference 1	Vdef1	H	When VF1=3.6V and VF9 = VF10 = 3.5V,fast charge mode, applied to VF8 = 2.5V and gradually decreased to VF1 = 3.6V→3.5V, and V1–V10 when changing to I9<100uA should be Vdef1.
Charge Stop I/O Potential Difference 2	Vdef2	H	After Vdref1, when VF1 = 3.6V and VF9 = VF10=3.5V,fast charge mode, gradually increased to VF1 = 3.6V→3.5V, and V1-V10 when changing to I9>100μA should be Vdef2. (VF8 = 2.5V is maintained.)
Battery Overvoltage Detection Voltage	Vov	C	When gradually increasing VF10 from 3.67V to 3.9V under the condition of VF10 = 3.65V, the VF10 when V3 becomes blinking (repeating H⇔L, charge error mode) should be Vov.
Forced Charge Current	Istart	A	Measure the current of I10 immediately after increasing VF1 from 2.3V to 5.0V when VF10 = 3.2V and R8 = 2.32kΩ.
Fast-charge Current	Irapchg	A	Measure the current of I10 when VF10 = 3.2V and R8 = 2.32kΩ.
Fast-charge Current (Note6)	Irapchg (*)	A	Measure the current of I10 when VF10 = Vstart~Vchg, R8 = 2.32kΩ.
Fast-charge Current2	Irapchg2	A	Measure the current of I10 when VF10 = 3.2V and R8 = 1.30kΩ.

Note6 : The parameter is guaranteed by design.

Parameter	Symbol	Test Circuit	Test Conditions
Charge Completion Current	Ifc	B	When gradually increasing VF9 from 3.5V to 3.6V under the condition of VF9 = 3.2V and VF10 = Vstart, the |I10| immediately before V3 = L→H and the charging stops (|I10| > 1mA) should be Ifc.
Charge Completion Current (Note6)	Ifc(*)	B	When gradually increasing VF9 from 3.5V to 3.6V under the condition of VF9 = 3.2V and VF10 > Vstart, the |I10| immediately before V3 = L→H and the charging stops (|I10| < 1mA) should be Ifc.
Chip Temperature Detection 1 (Note6)	Ttreg1	A	When gradually increasing chip temperature from 83°C to 103°C under the condition of fast charge mode, VF1 = 5V, and VF10 = 3.2V, the chip temperature when I10 drops to the value that is 1C (I10 when chip temperature is 25°C) × 95% should be Ttreg1.
Chip Temperature Detection 2 (Note6)	Ttreg2	A	When gradually increasing chip temperature from 85°C to 120°Cunder the condition of fast charge mode, VF1 = 5V, and VF10 = 3.2V, the chip temperature when I10 drops to the value that is 0.2C (I10 when chip temperature is 125°C) × 105% should be Ttreg2.
Chip Temperature Detection Difference (Note6)	Tdtreg	A	Tdtreg = Ttreg2–Ttreg1
Thermal Shutdown Temperature (Note6)	Tsd	C	When gradually increasing chip temperature from 143°C to 163°C under the condition of fast charge mode, VF1 = 5V, and VF10 = 3.2V, the chip temperature when V3 becomes blinking (repeating H⇔L, charge error mode) and the charging stops (|I10| < 1mA)should be Tsd.
Reference Voltage	VDD	D	Measure the voltage of 5V when VF6 = 1.0V and VF10 = 3.2V.
Temperature Detecting Reference Terminal Current (Note6)	IDD	D	When gradually decreasing IF5 under the condition of VF6 = 1.0V and VF10 = 3.2V, the |IF5| when V5 = VDD × 90% should be IDD.
Charge Stop Battery Temperature Detection Voltage (High temperature)	VthSH	D	When gradually decreasing VF6 from 1.0V to 0V under the condition of fast charge mode, VF6 = 1.0V, and VF10 = 3.2V, the VF6 when V3 = L→H and the charging stops (|I10| < 1mA) should be Vth5.
Charge Recovery Battery Temperature Detection Voltage (High temperature)	VthRH	D	When gradually increasing VF6 from 0V to 1.0V under the condition of charge stop temperature detection mode, VF6 = 0V, and VF10 = 3.2V, the VF6 when V3 = H→L and the charging restarts (|I10| > 1mA) should be Vth5R.
TMRcnt Pin Low-Level Input Voltage	Vtmrl	C	When gradually decreasing from 5.0V to 0V under the condition of fast charge mode, time reduction mode (See PIN DESCRIPTION on page 4), VF7 = 5.0V, and VF10 = 3.2V, the voltage below VF7 should be Vtmrl andthe voltage exceeding VF7 should be VtmrH when V3 becomes blinking (repeating H⇔L, charge error mode) and the charging stops (|I10| < 1mA).
TMRcnt Pin High-Level Input Voltage	Vtmrh		
TMRcnt Pin Low-Level Input Current	Itmrl	A	Measure the current of I7 under the condition of fast charge mode, VF7 = 0V, and VF10 = 3.2V.
TMRcnt Pin High-Level Input Current	Itmrh	A	Measure the current of I7 under the condition of fast charge mode, VF7 = 5V, and VF10 = 3.2V.

Note6 : The parameter is guaranteed by design.

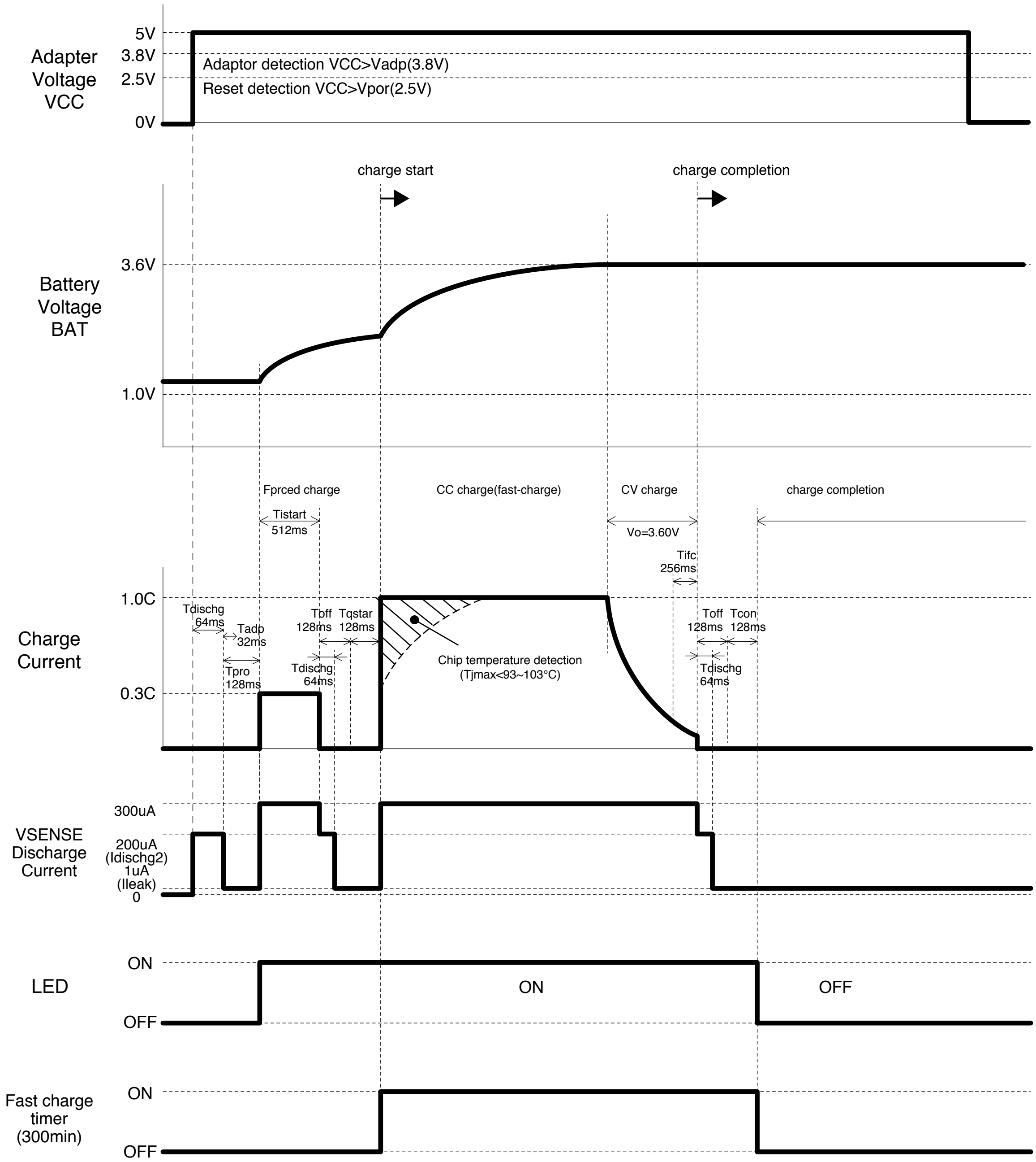
Parameter	Symbol	Test Circuit	Test Conditions
Output Pin Low-Level Voltage	VledL	A	Measure the voltage of V3 under the condition of fast charge mode, IF3 = 10mA, and VF10 = 3.2V.
LED Output Pin Leak Current	Iledleak	E	Measure the current of I3 when VF3 = 5V and VF10 = 3.65V (charge completion mode).
Series Pass Tr On Resistance	Ron	A	Measure the voltage of V1–V10 under the condition of fast charge mode, VF1 = 4.0V, and IF10 = –200mA. Ron = (V1–V10) /200mA
LED Blinking Cycle (Note6)	Fled	C	Measure the blinking cycle (repeating H⇔L) of V3 after being kept under the condition of VF10 = 4.0V and entering charge error mode.
LED Blinking Duty (Note6)	Dled	C	Measure the duty ratio of blinking cycle (repeating H⇔L) Fled of V3 after being kept in the condition of VF10 = 4.0V and entering charge error mode.
VSENSE Pin Discharge Time (Note6)	Tdischg	B	When increasing VF1 from 2.3V to 5.0V under the condition of VF9 = 3.2V and VF10 = 3.2V, measure the time from when VF1 > 2.5V (Vpor) to when the current of I9 drops below 100µA.
AC ADP Connection Detection Time (Note6)	Tadp	C	1. After being kept for 128ms and more (more than Tpro) under the condition of VF10 = 3.0V and VF1 = 2.3V→3.1V, measure the time from when VF1 > 3.4V (Vadp) to when V3 = H→L when increasing VF1 from 3.1V to 5.0V.
			2. When decreasing VF10 from 5.0V to 3.1V under the condition of fast charge mode and VF10 = 3.0V, measure the time from when VF1 < 3.4V (Vadp) to when the fast charge stops (|I10 |< 1mA).
	Tadp2	C	When decreasing VF1 from 5.0V to 2.0V in fast charge mode and when VF10 = 3.0V, measure the time from when VF1 < 2.5V (Vpor) to when V3 = L→H.
Forced Charge Time (Note6)	Tistart	C	When increasing VF1 from 2.3V to 5.0V under the condition of VF10 = 3.2V, measure the time from forced charge start (|I10| > 1mA) to forced charge stop(|I10| < 1mA).
Forced Charge OFF Time (Note6)	Toff	C	After increasing VF1 from 2.3V to 5.0V under the condition of VF10 = 3.2V, the half time from forced charge stop (|I10| < 1mA) to fast charge start(|I10| > 1mA) should be Toff.
Fast Charge Start Voltage Detection Time (Note6)	Tqstart	C	When R8 = 2.32kΩ, after increasing VF1 from 2.3V to 5.0V under the condition of VF10 = 3.2V, the half time from forced charge stop (|I10| < 1mA) to fast charge start(|I10| > 1mA) should be Tqstart.
Battery Voltage Detection Time (Note6)	Tcon	C	When decreasing VF10 from 3.65V to 3.2V after charge complete mode under the condition of VF10 = 3.65V, the half time from when the current of I9 exceeds 100µA to when V3 = L→H and the charging restarts (|I10| > 1mA) should be Tcon.
Charge Completion Current Detection Time (Note6)	Tifc	F	When decreasing IF10 from -80mA to –30mA under the condition of fast charge mode and R8 = 2.32kΩ, measure the time from when IF10 > –56mA(Ifc) to when the charging stops (I10 > –1mA).
Fast-charge Timer (Note6)	Tchg	C	When decreasing VF7 from 5.0V to 0V under the condition of fast charge mode, VF7=5.0V, VF10=3.2V, and time reduction mode (See PIN DESCRIPTION), measure Tchg that is the time from when VF10 < 0.5V (Vtmr) to when V3 starts blinking (V3=H→L, charge error mode) and the charging stops (|I10| < 1mA).
Battery Overvoltage Detection Time (Note6)	Tov	C	When increasing VF10 from 3.2V to 4.0V under the condition of fast charge mode and VF10 = 3.2V, measure the time from when VF10 > 3.8V (Vov) to when V3 starts blinking (V3 = H→L, charge error mode).
Charge Stop Battery Temperature Detection Time (Note6)	Tpro	C	When decreasing VF6 from 1.0V to 0V under the condition of fast charge mode, VF6 = 1.0V, and VF10 = 3.2V, measure the time from when VF6 <VthSH to when V3 = L→H and the charging stops (|I10| < 1mA).
Charge Recovery Battery Temperature Detection Time (Note6)	Tpro	C	When increasing VF6 from 0V to 1.0V under the condition of charge stop detection mode, VF6 = 0V, and VF10 = 3.2V, measure the time from when VF6>VthSL) to when V3 = H→L and the charging restarts (|I10| > 1mA).

Note6 : The parameter is guaranteed by design.

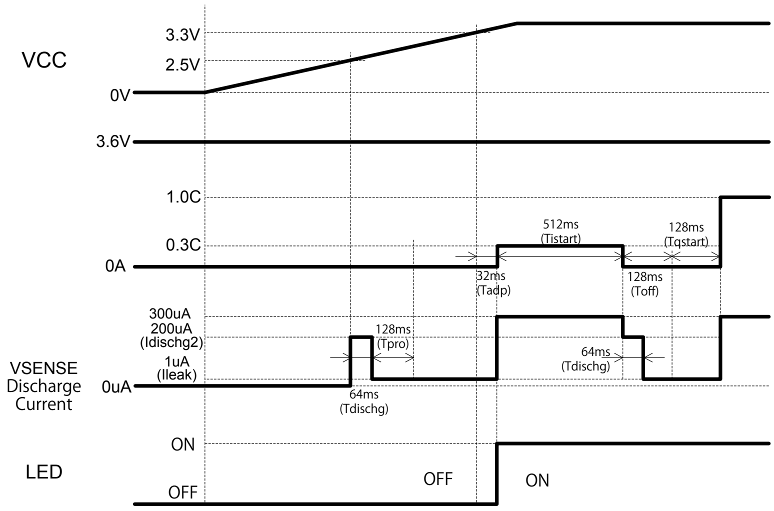
Timing Chart

* All typ numeric value.

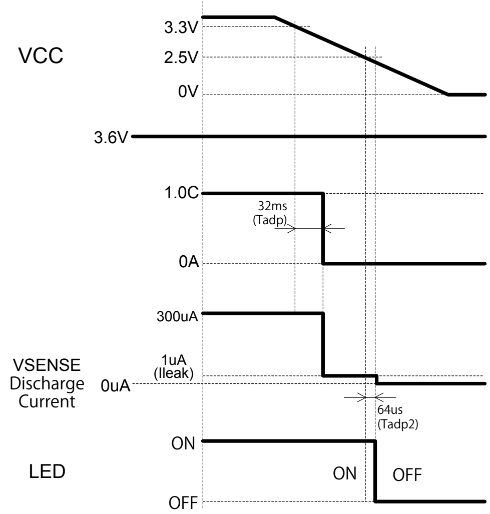
Normal charge



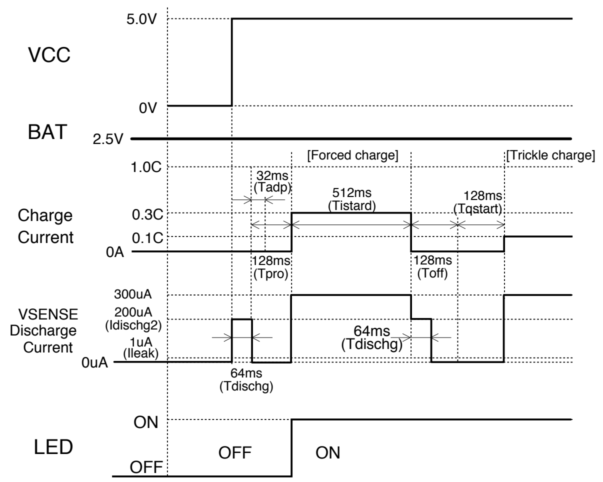
Input Adaptor



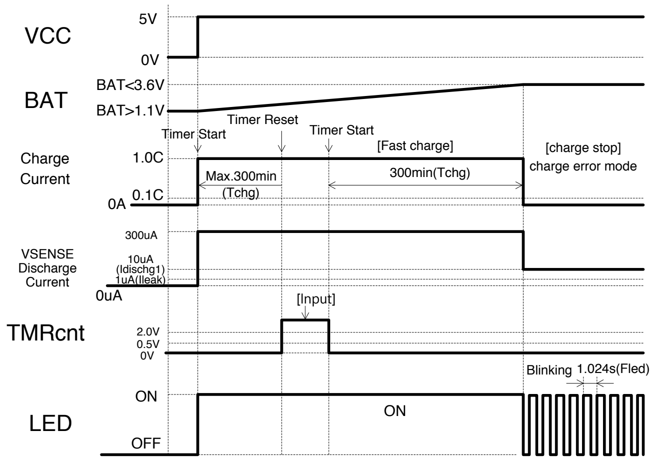
Release Adaptor



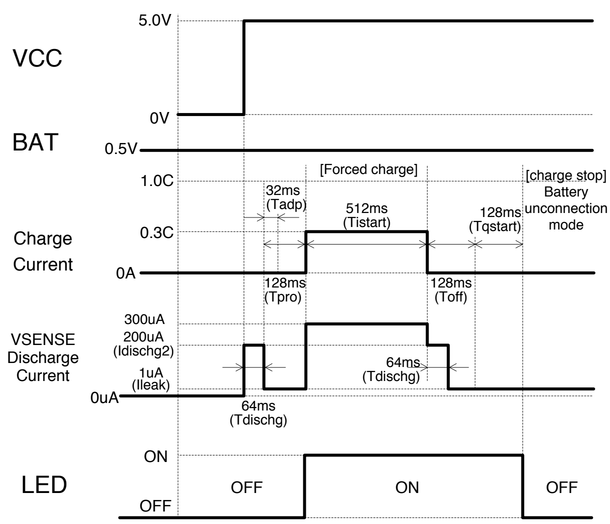
1.1V<BAT<3.6V, Charge Start (Fast Charge)



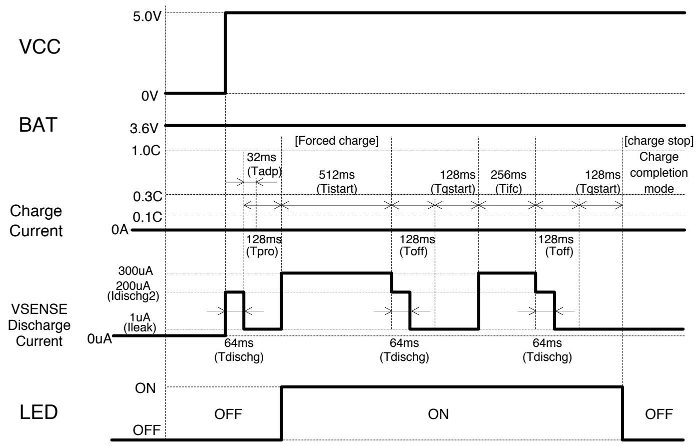
fast Charge Timeup



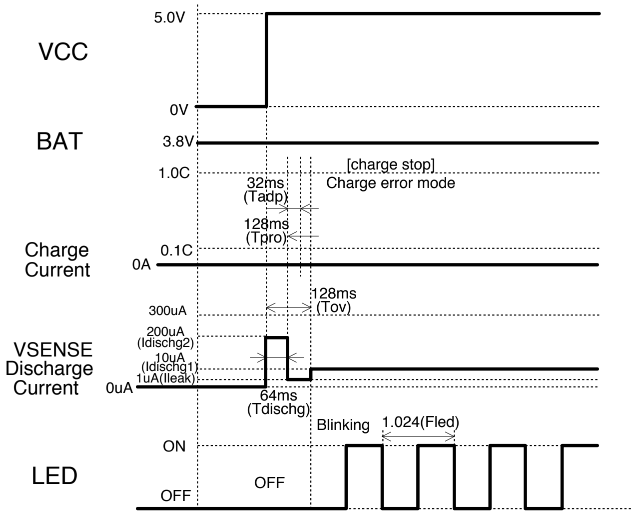
BAT<1.1V, Charge Start (Battery Unconnection)



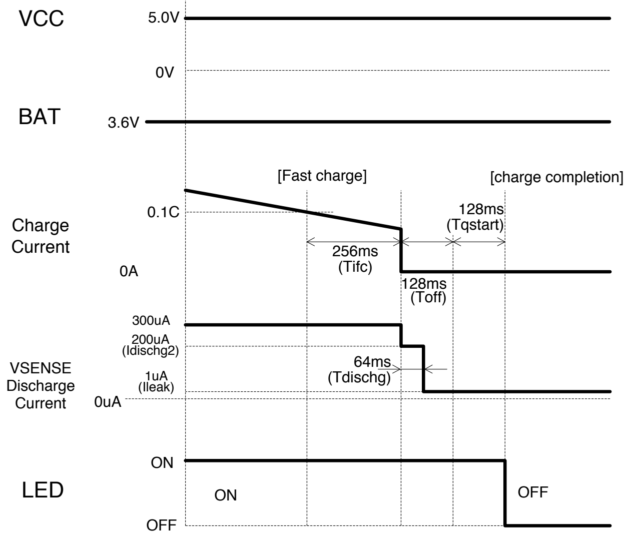
BAT=3.6V, Charge Start (Charge Completion)



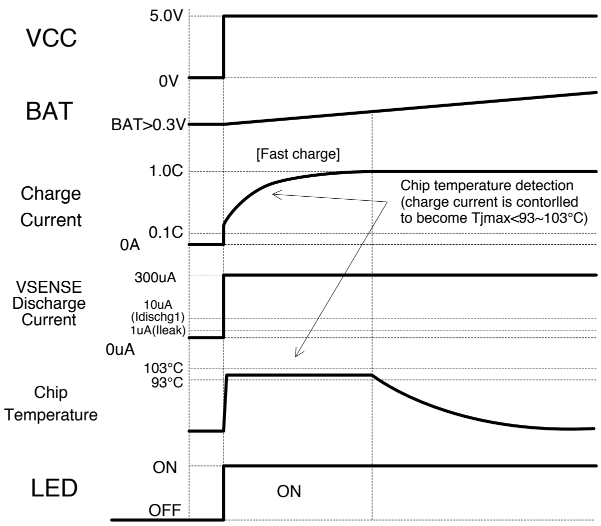
BAT>3.8V, Charge Start (Battery Overvoltage)



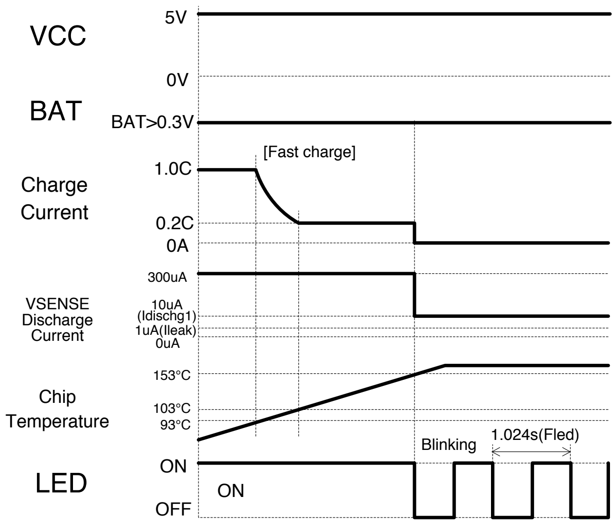
Full Charge Detection



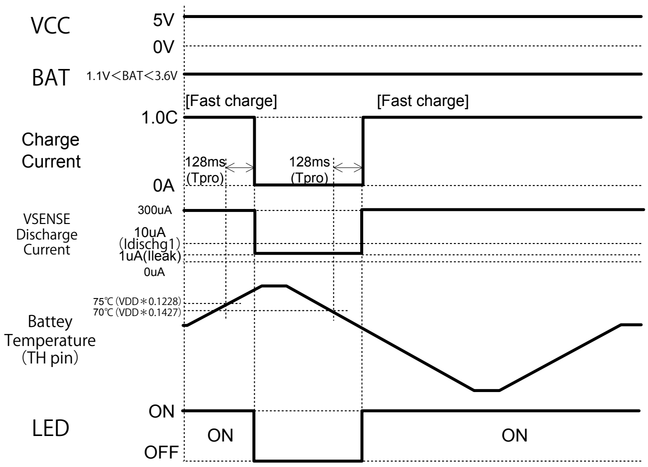
Chip Temperature Detection



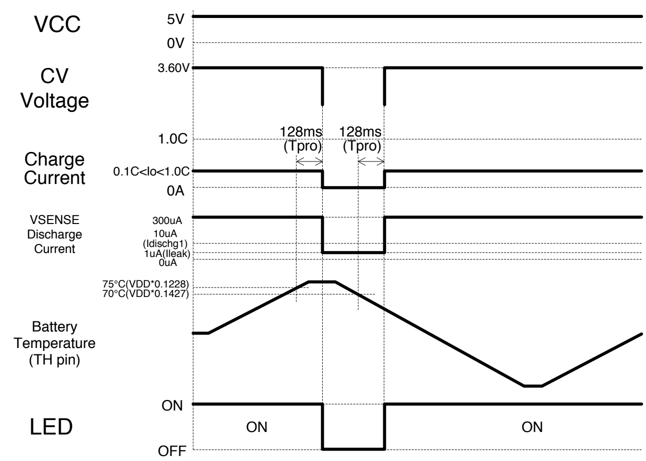
Thermal Shutdown



Battery Temperature Detection (Constant Current Mode)

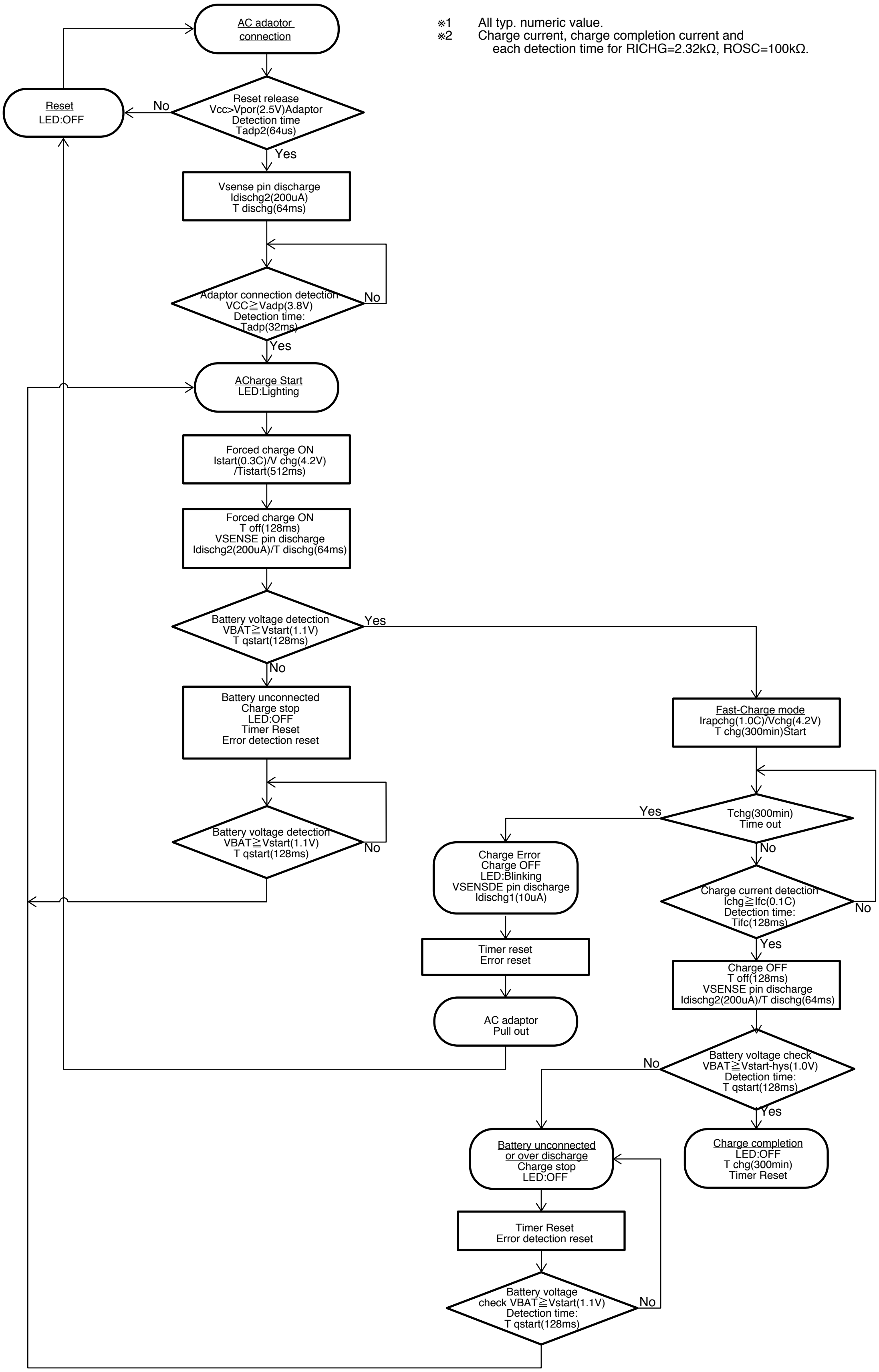


Battery Temperature Detection (Constant Voltage Mode)

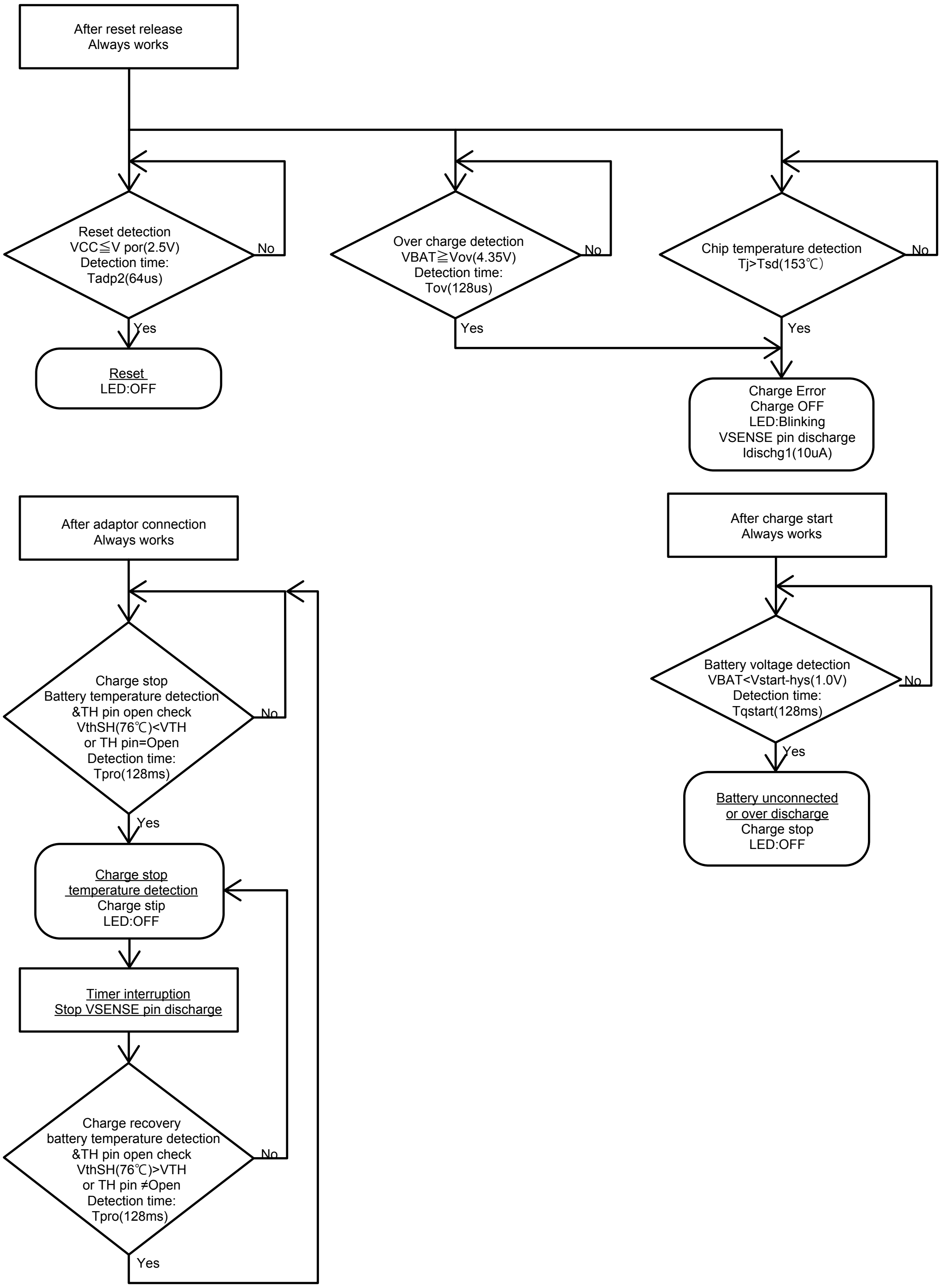


Flow Chart

※1 All typ. numeric value.
※2 Charge current, charge completion current and each detection time for RICHG=2.32kΩ, ROSC=100kΩ.

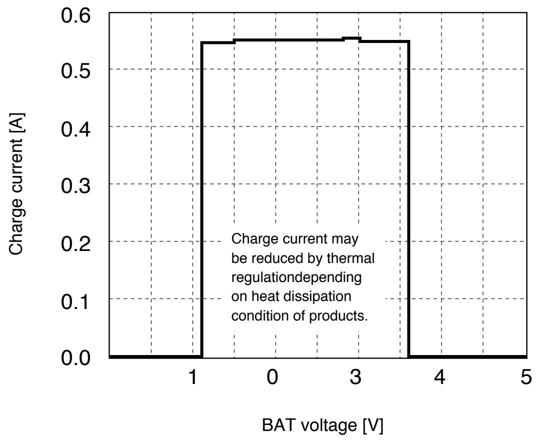


※1 All typ. numeric value.
※2 Charge current, charge completion current and each detection time for RICHG=2.32kΩ, ROSC=100kΩ.

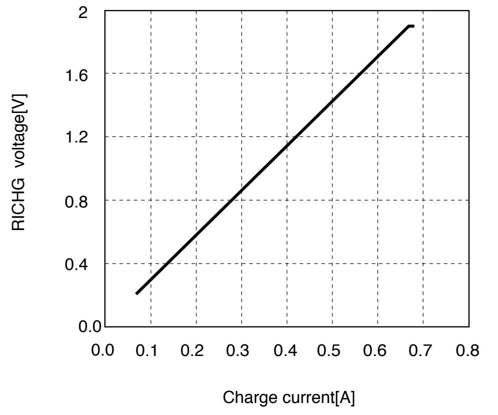


Characteristics (Except where noted otherwise VCC=5.0V, RICHG=2.32kΩ, ROSC=100kΩ, Ta=25°C)

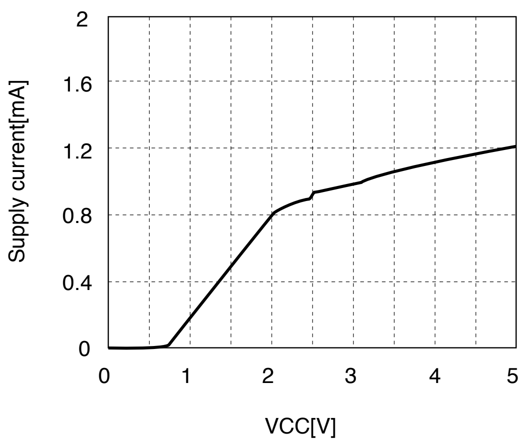
■ Charge current vs.BAT voltage



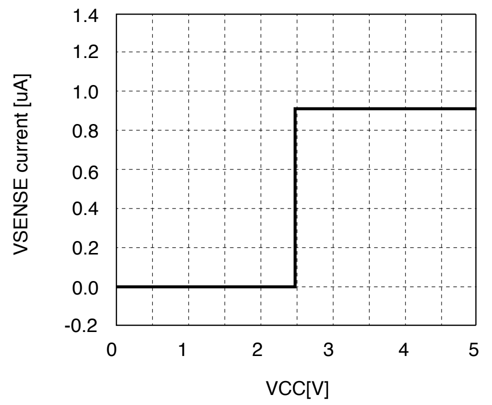
■ RICHG voltage vs. Charge current



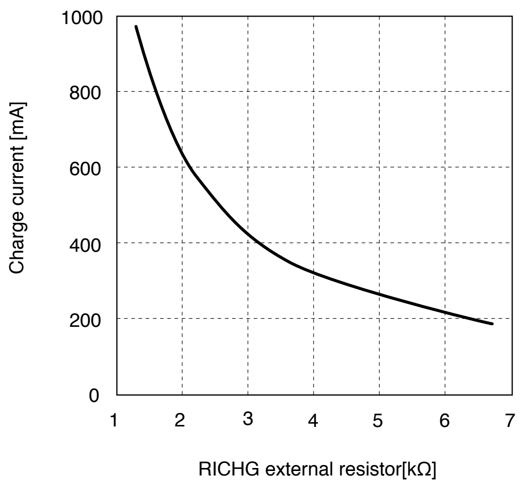
■ Supply current vs. VCC



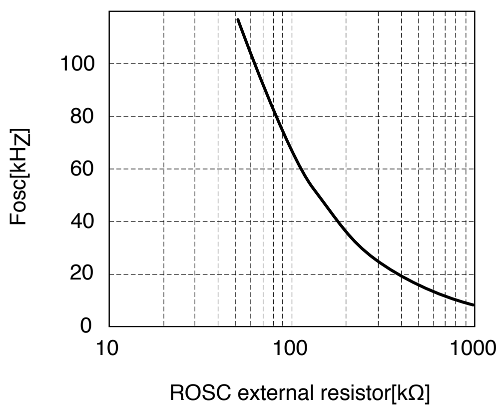
■ VSENSE current vs. VCC



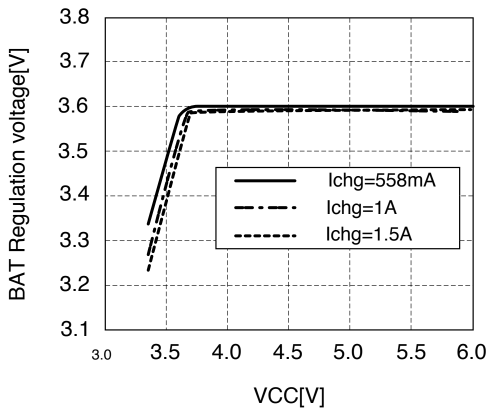
■ Charge current vs. RICHG external resistor



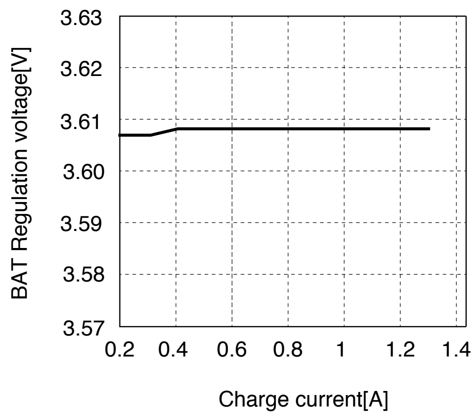
■ Fosc vs. Rosc external resistor



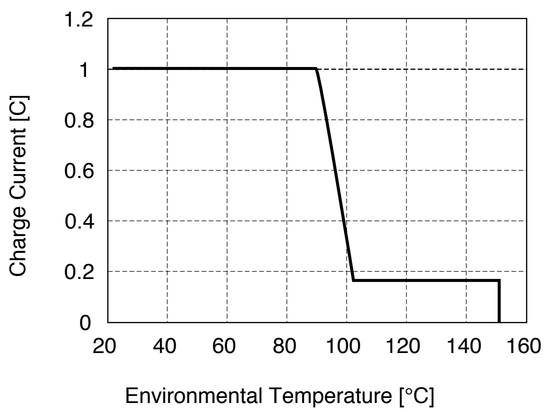
■ Line Regulation



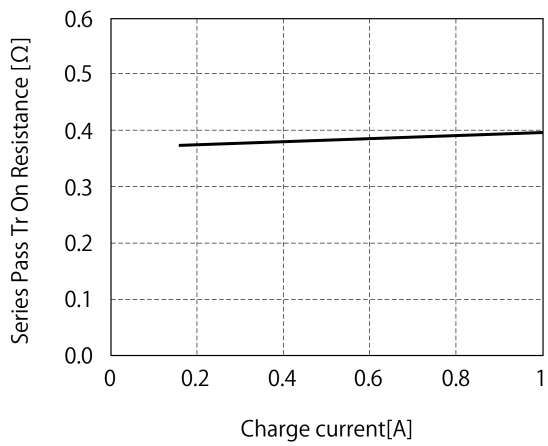
■ Load Regulation



■ Chip Temperature Control・Thermal Shutdown

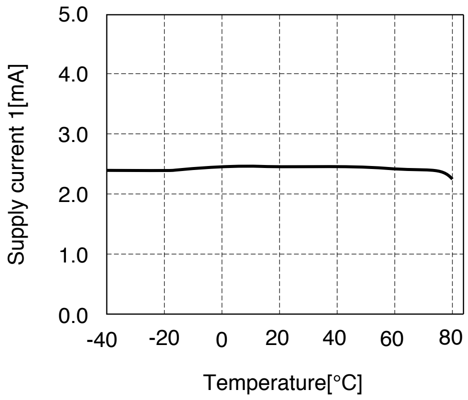


■ Series Pass Tr On Resistance vs. Charge current

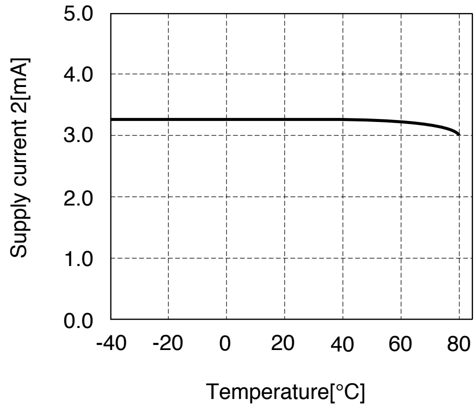


Temperature Dependency

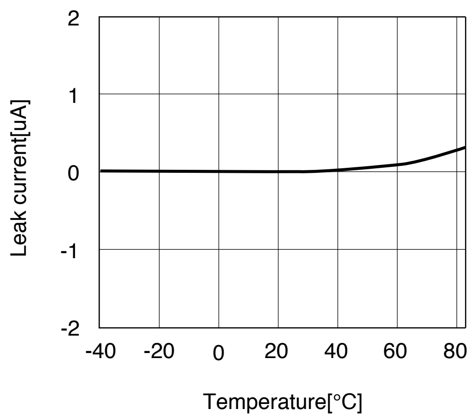
Supply current 1



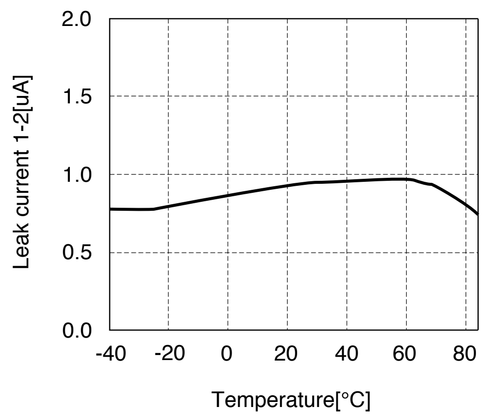
Supply current 2



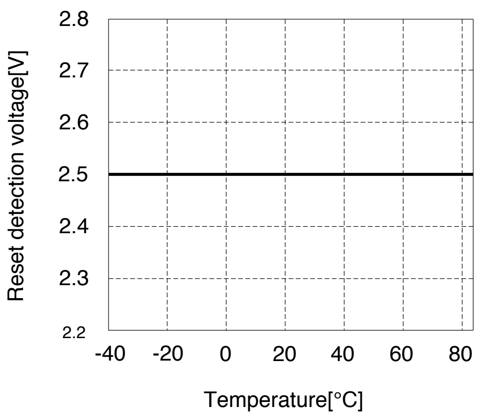
Leak current 1-1



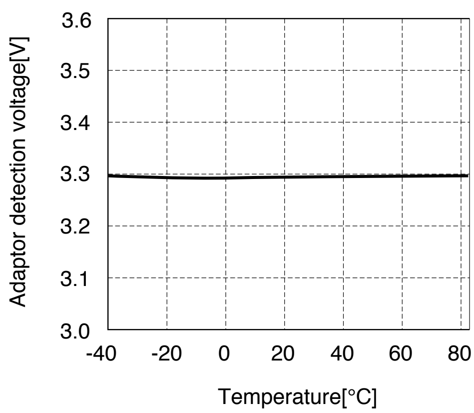
Leak current 1-2



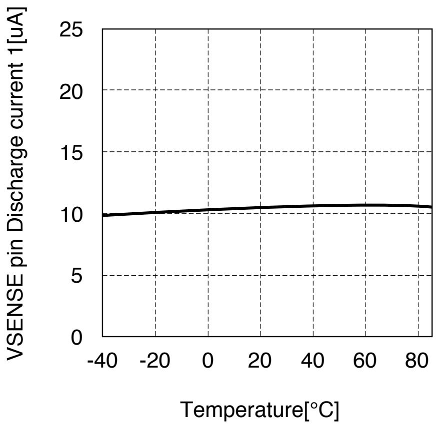
Reset detection voltage



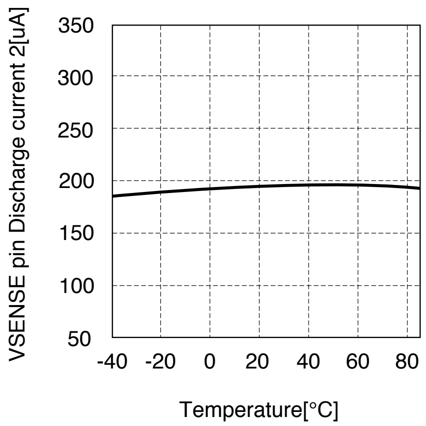
Adaptor detection voltage



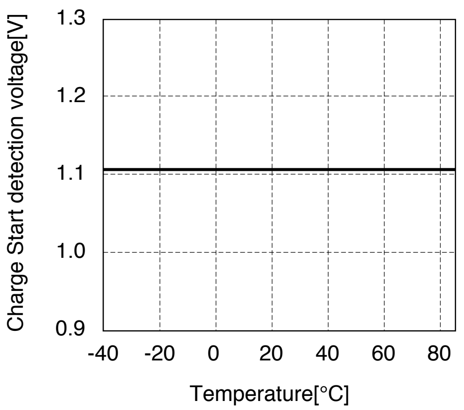
■ VSENSE pin Discharge current 1



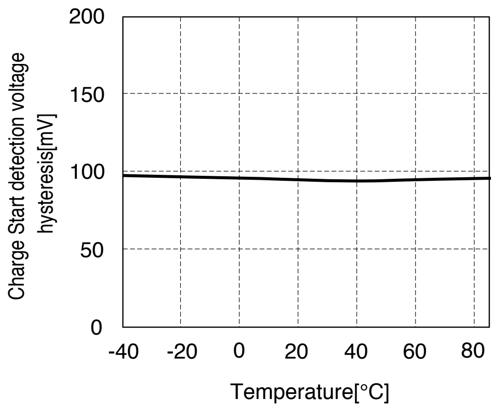
■ VSENSE pin Discharge current 2



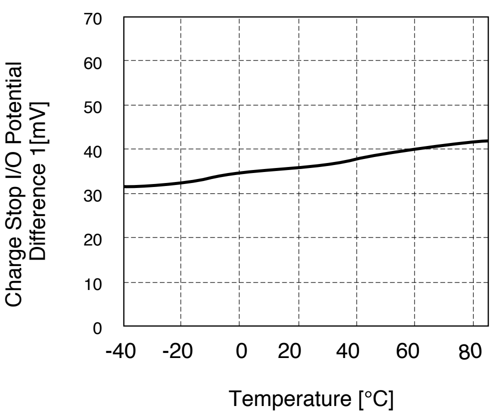
■ Charge Start detection voltage



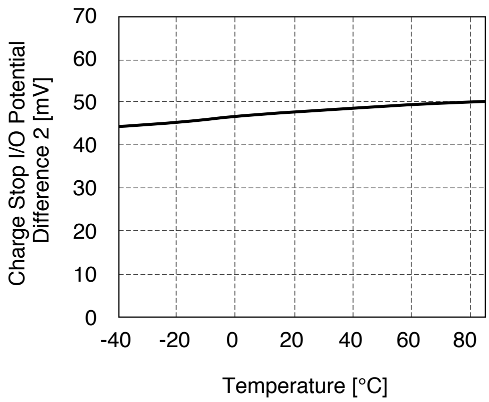
■ Charge Start detection voltage hysteresis



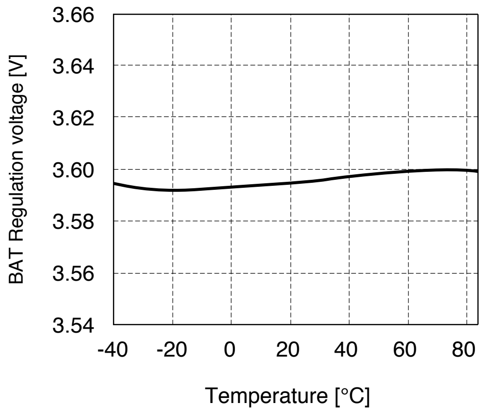
■ Charge Stop I/O Potential Difference 1



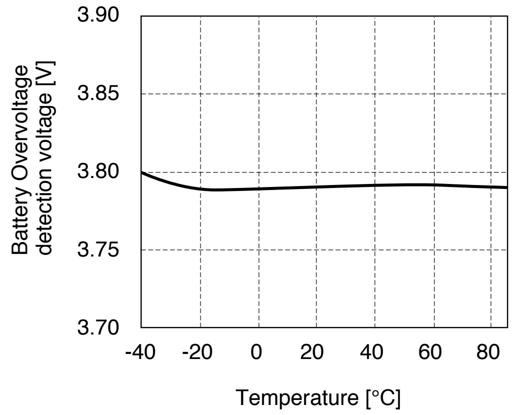
■ Charge Stop I/O Potential Difference 2



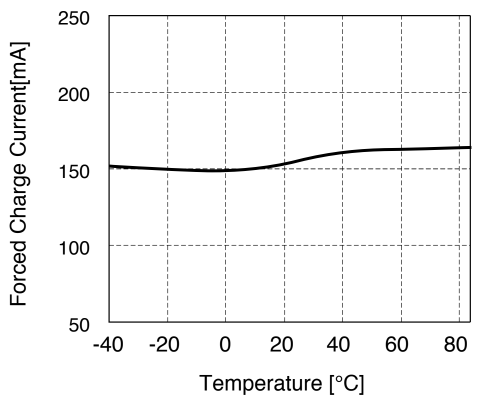
■ BAT Regulation voltage



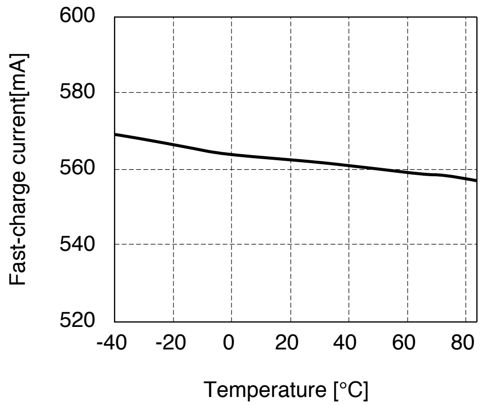
■ Battery Overvoltage detection voltage



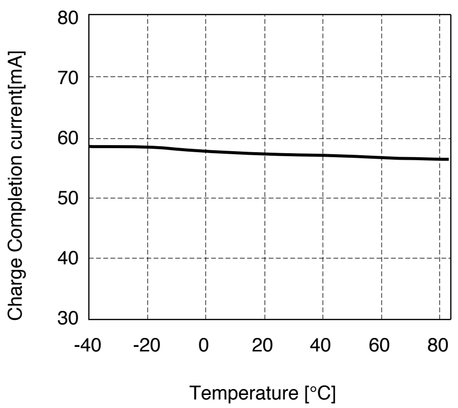
■ Forced Charge Current



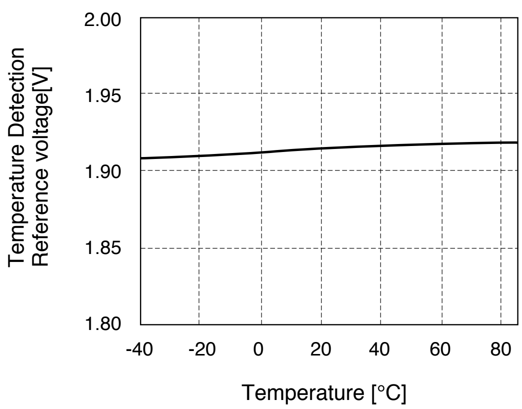
■ Fast-charge current



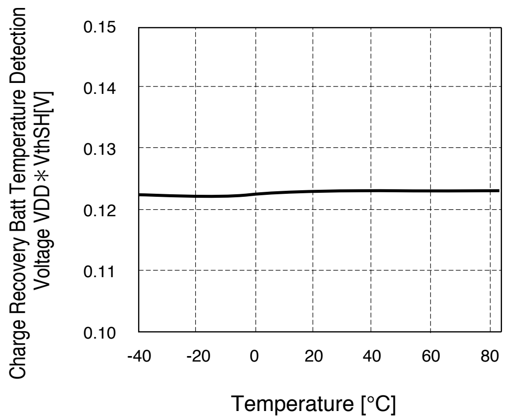
■ Charge Completion current



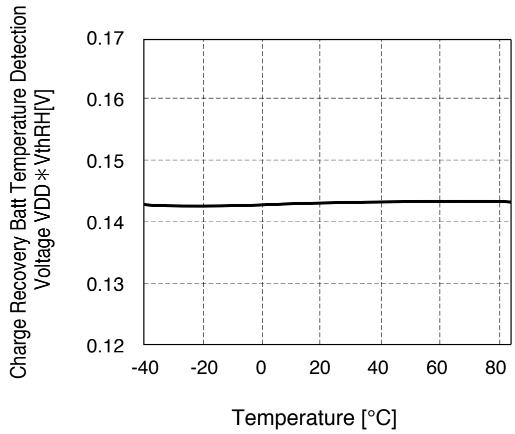
■ Temperature Detection Reference voltage



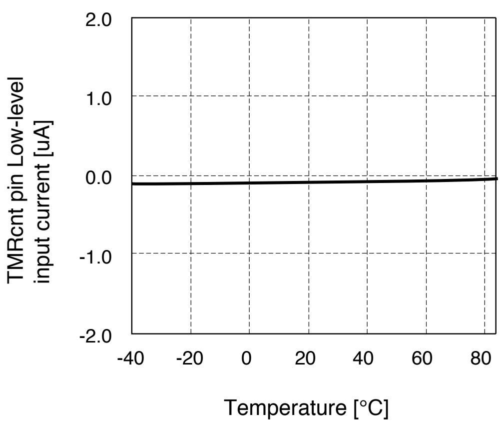
■ Charge Recovery Batt TemperatureDetection Voltage



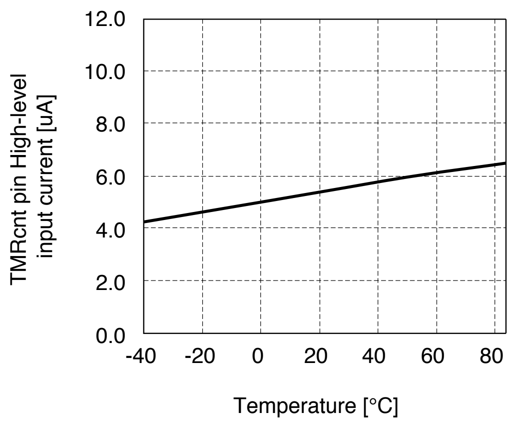
■ Charge Recovery Batt Temperature Detection Voltage



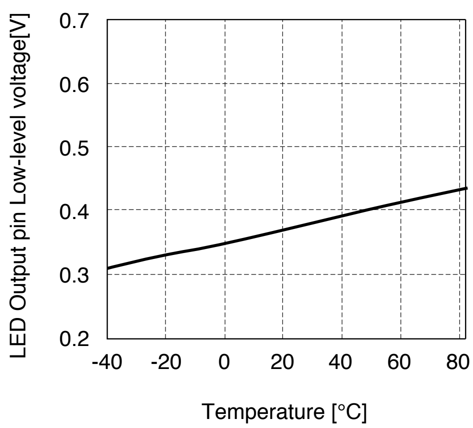
■ TMRcnt pin Low-level input current



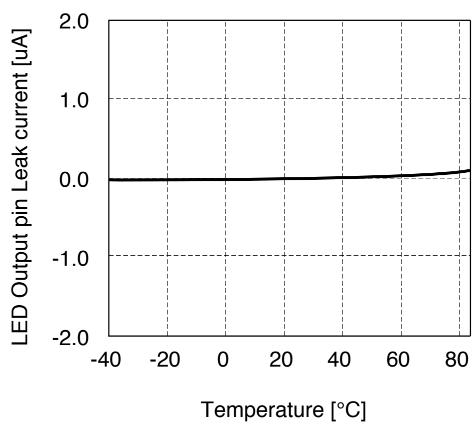
■ TMRcnt pin High-level input current



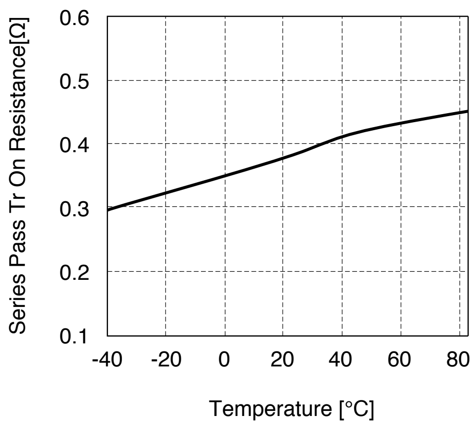
■ LED Output pin Low-level voltage



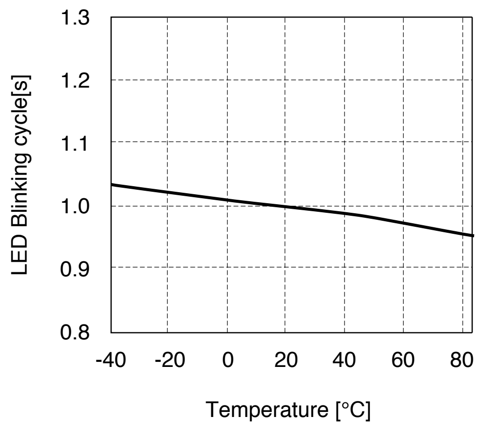
■ LED Output pin Leak current



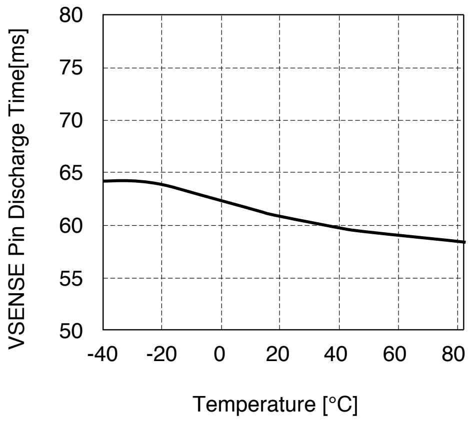
■ Series Pass Tr On Resistance



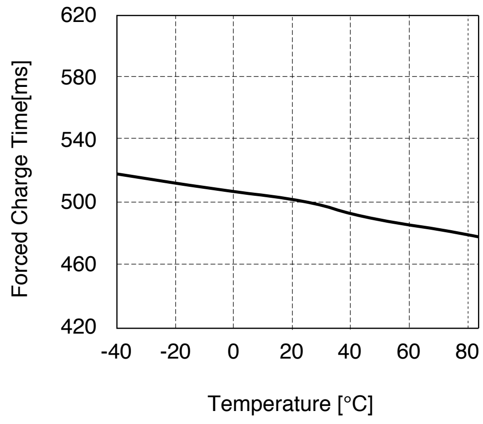
■ LED Blinking cycle



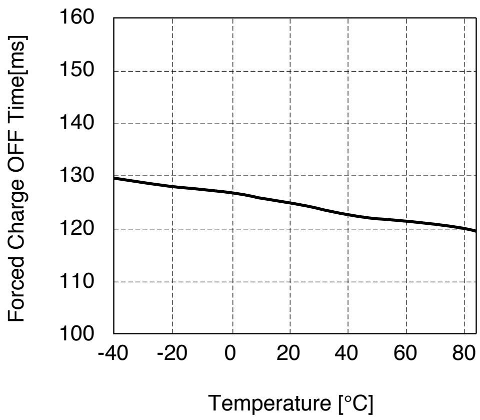
■ VSENSE Pin Discharge Time



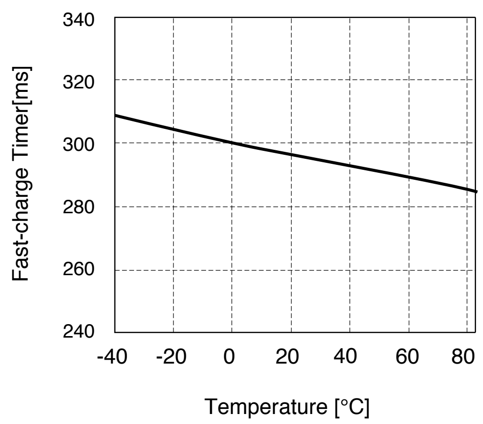
■ Forced Charge Time



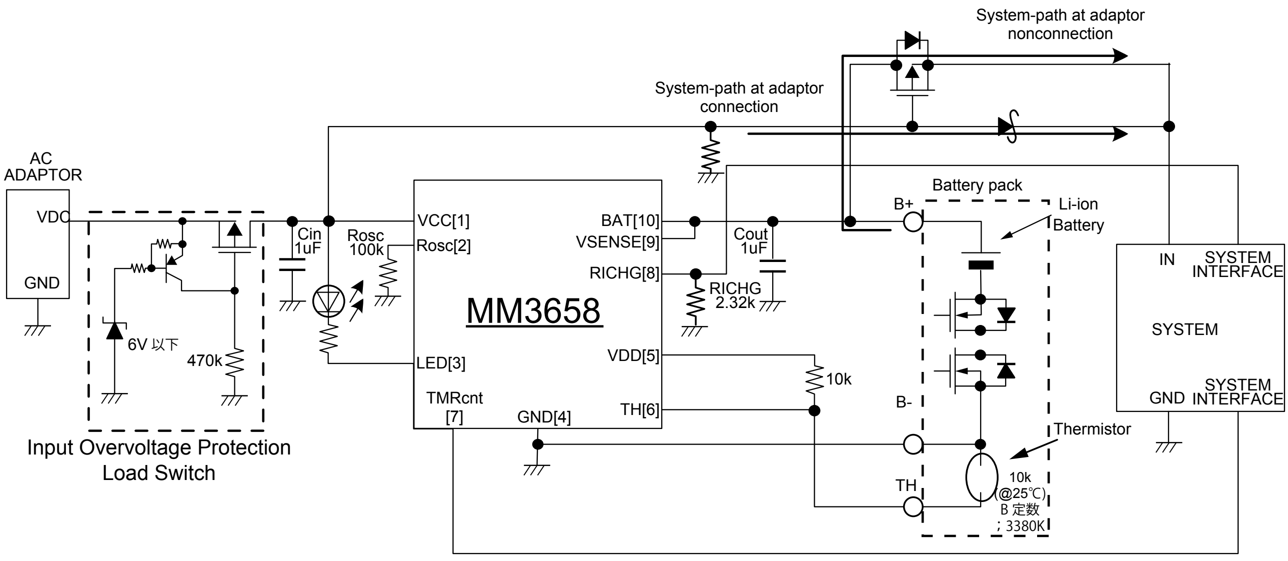
■ Forced Charge OFF Time



■ Fast-charge Timer



Application Circuit



· We shall not be liable for any trouble or damage caused by using this circuit.

· In the event a problem which may affect industrial property or any other rights of us or a third party is encountered during the use of information described in these circuit, we shall not be liable for any such problem, nor grant a license therefore.