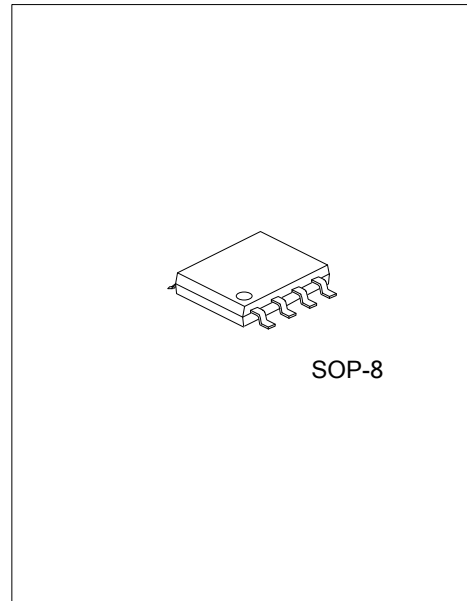




ADVANCED LINEAR AND SWITCH MODE CHARGE MANAGEMENT IC FOR LITHIUM-ION AND LITHIUM-POLYMER



■ DESCRIPTION

UTC **UB2011** used for 1-4 Series Circuit cells charging is designed for portable electronics with lower cost. Its advantages of high-accuracy voltage/current regulation, charging status indication, temperature monitoring. In applications, the battery temperature is continuously under monitor by using an external thermistor, if the temperature is over user-defined threshold; UTC **UB2011** inhibits charge for safety concern.

UTC **UB2011** charges the battery in conditioning, constant voltage and constant current phases. If the battery voltage is lower than the low-voltage threshold, a low current is used for conditioning the battery. After the conditioning phase, the UTC **UB2011** applies a constant current that be set by an external sense-resistor to the battery. The sense-resistor can be on the battery without additional components. The constant current phase continues until the battery reaches the charge-regulation voltage, then the constant voltage phase is beginning. Charge stops when the current tapers to the charge termination threshold.

■ FEATURES

- * Ideal for 1-4 Series Circuit Cell Li-Ion or Li-Pol Packs
- * High Accuracy of Voltage Regulation With Preset Voltages
- * Optional Cell-Temperature Monitoring
- * Current Regulation With Programmable Charge-Current
- * Charge Termination by Minimum Current
- * With Short-Circuit Protection
- * With Thermal Protection
- * Charge Status Output Pin
- * Available for Linear and Switch-Mode charging

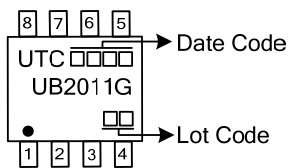
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ORDERING INFORMATION

Ordering Number	Package	Packing
UB2011G-S08-R	SOP-8	Tape Reel

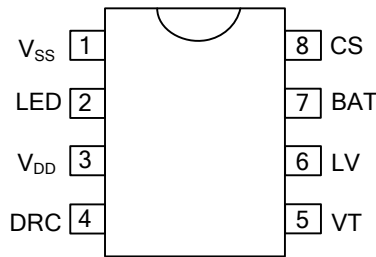
<p>UB2011G-S08-R</p>	<p>(1) R: Tape Reel</p> <p>(2) S08: SOP-8</p> <p>(3) G: Halogen Free and Lead Free</p>
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MARKING



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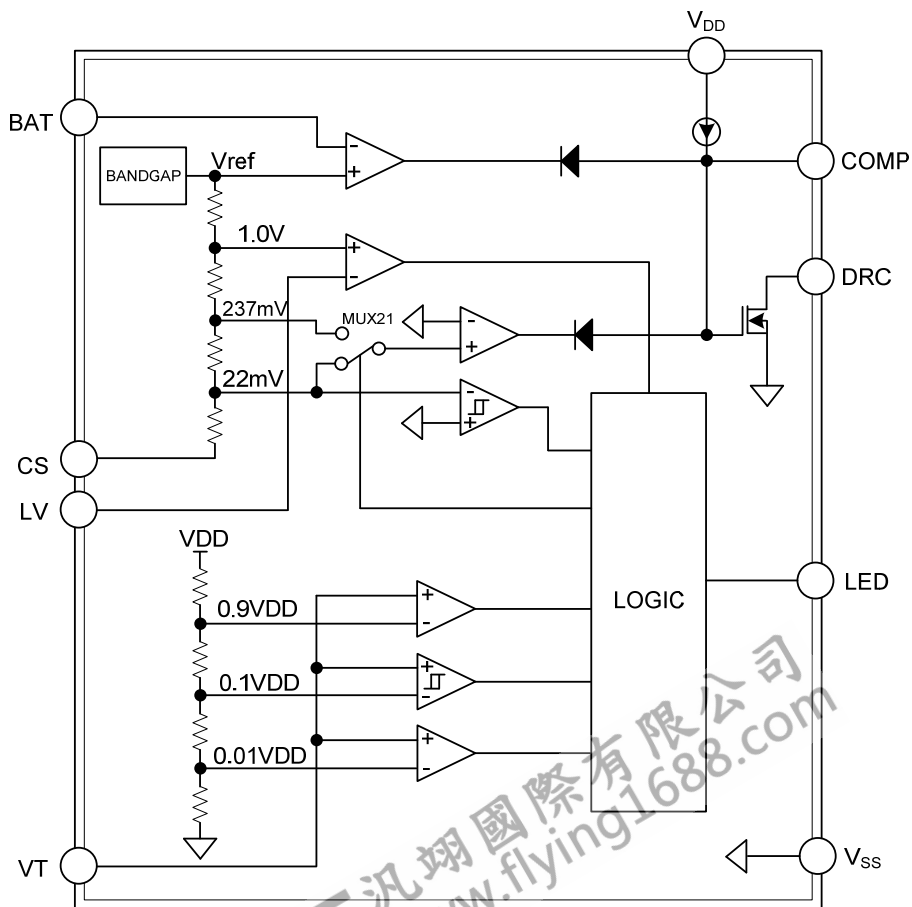
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	V _{SS}	Battery negative, Ground of power
2	LED	Drive LED
3	V _{DD}	Positive input supply voltage, Provides power to the charger
4	DRC	Drive control charge-transistor
5	VT	Temperature sense input
6	LV	Under voltage sense input
7	BAT	Battery positive voltage sense input
8	CS	Charge current sense input, power negative

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{DD}	3.0 ~ 7.0	V
Input Voltage	V_{IN}	7	V
Open Drain Input Voltage	V_{OC}	30	V
Input Offset Voltage	V_{IO}	10	mV
Input Offset Current	I_{IO}	500	nA
Junction Temperature	T_J	-25 ~ +85	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Constant Voltage Comparison	V_{REF}		2.65	2.70	2.75	V
Constant Current Charging Current	I_{CONST}		210mV/Rs	235mV/Rs	260mV/Rs	mA
Trickle Charge Current	I_{PRE}		11mV/Rs	23mV/Rs	35mV/Rs	mA
Charging and Judging Current	I_{FULL}		1mV/Rs	23mV/Rs	35mV/Rs	mA
Control Drive Current	I_{DRC}		50	100		mA
LED Drive Current	I_{LED}		10			mA
LED Flicker Frequency	F_{LED}		0.5		2	Hz
Trickle Charge Voltage	V_{LV}		0.9	1.0	1.1	V
Temperature End	Suspended Judgment Voltage	V_{VT}		0.9 V_{DD}		V
	Over Temperature Voltage			0.1 V_{DD}		V
	Current Judgment Mode			0.01 V_{DD}		V
Supply Current	I_S				350	μ A

■ INDICATOR LIGHT DISPLAY LOGIC

STATE	POWER ON	NO BATTERY (TEMPERATURE)	NO BATTERY (CURRENT)	NORMAL CHARGE	BATTERY FULL	FAULT
LED	1KHz Output for about 1S	H	H	L	H	L+H Resistance Alternating Output

■ OPERATION

The UTC **UB2011** is a lithium-ion battery charge controller using a constant-current/constant-voltage algorithm for 1~4 series circuit cells. If the Battery Voltage is less than V_{MIN} , the charger enters trickle charge mode. In this mode, the UTC **UB2011** supplies trickle current charging. When the Battery Voltage rises above V_{MIN} , the charger enters constant-current mode, where the programmed charge current is supplied to the battery. When the BAT pin approaches the final float voltage (2.7V), the UTC **UB2011** enters constant-voltage mode and the charge current begins to decrease. The pin LED will turn high when the charge current drops to terminal value, but the charging do not stop.

An internal thermal feedback loop reduces the programmed charge current if the die temperature attempts to rise above a preset value. The Charge current will set to $10\%I_{CONST}$ when the pin VT value is less than $10\%VDD$ and more than $1\%VDD$. This feature protects the UTC **UB2011** from excessive temperature. The charge current can be set according to typical (not worst-case) ambient temperature with the assurance that the charger will automatically reduce the current in worst-case conditions.

When the pin VT is used, the value is more than $90\%VDD$, no battery is tested by the UTC **UB2011** and the LED is off, the value is less than $90\%VDD$, the UTC **UB2011** is normal. When the pin VT is connected to ground, The LED is green when the battery is full or no battery.

The charge status output has three different states with LED flash: LED red, LED green and red and green alternately. When the VCC is rising the LED shows red and green alternately (about 1 second).The LED is green when battery is charging. Once the charge cycle has terminated, The LED turns red. The red is flash when IC was wrong. No battery, no light. The LED state indicates that the UTC **UB2011** is in a charge cycle.

■ TYPICAL APPLICATION CIRCUIT

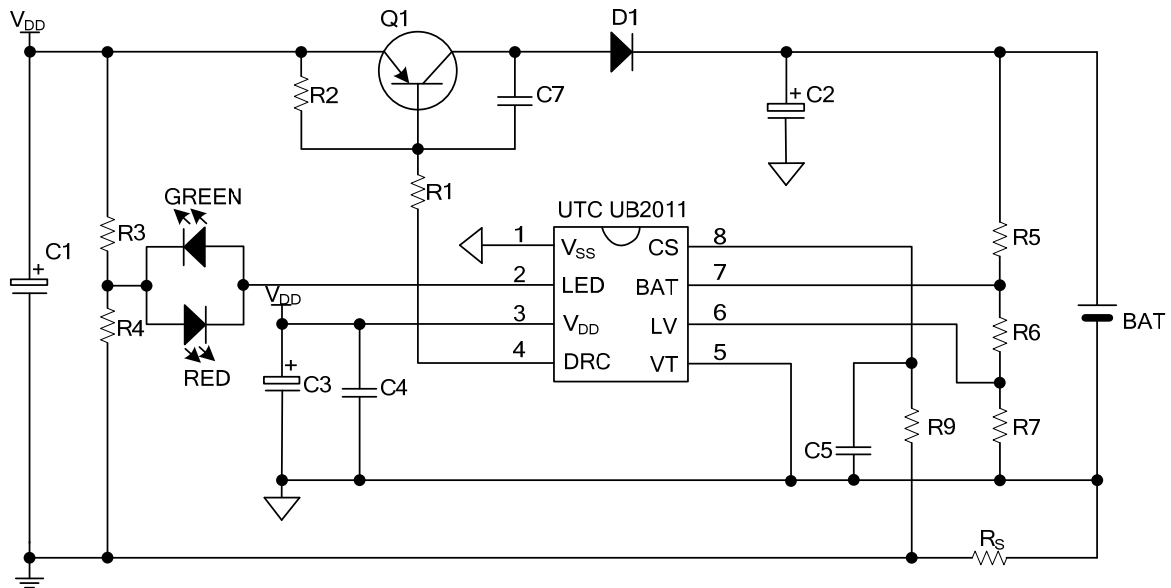


Fig.1 Linear Charge Application Circuit

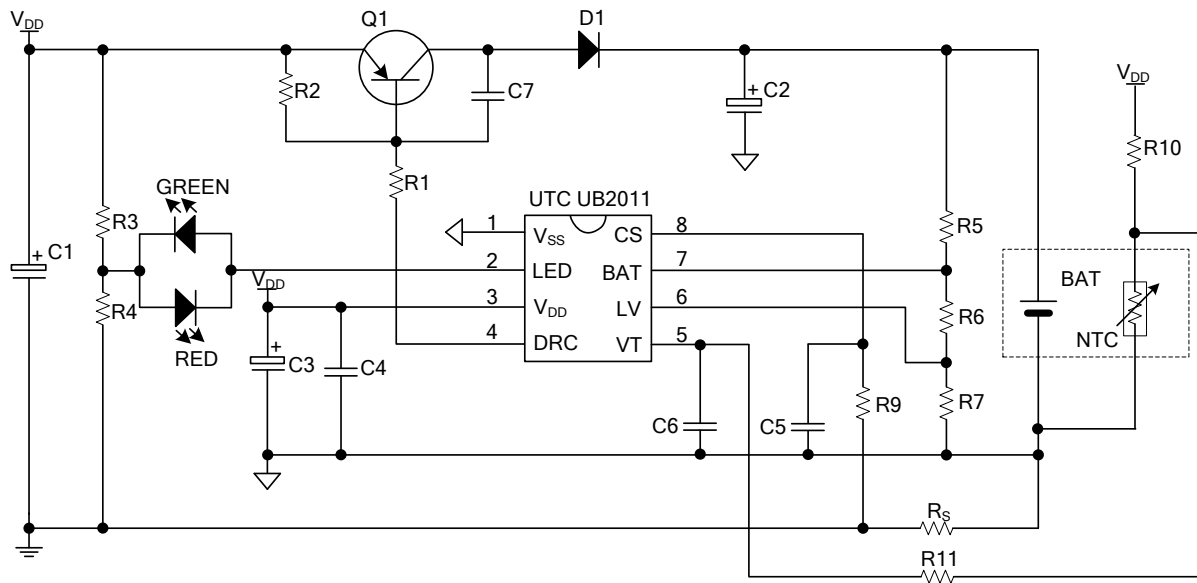


Fig.2 Linear Charge Application Circuit with Thermal Protection

■ TYPICAL APPLICATION CIRCUIT (Cont.)

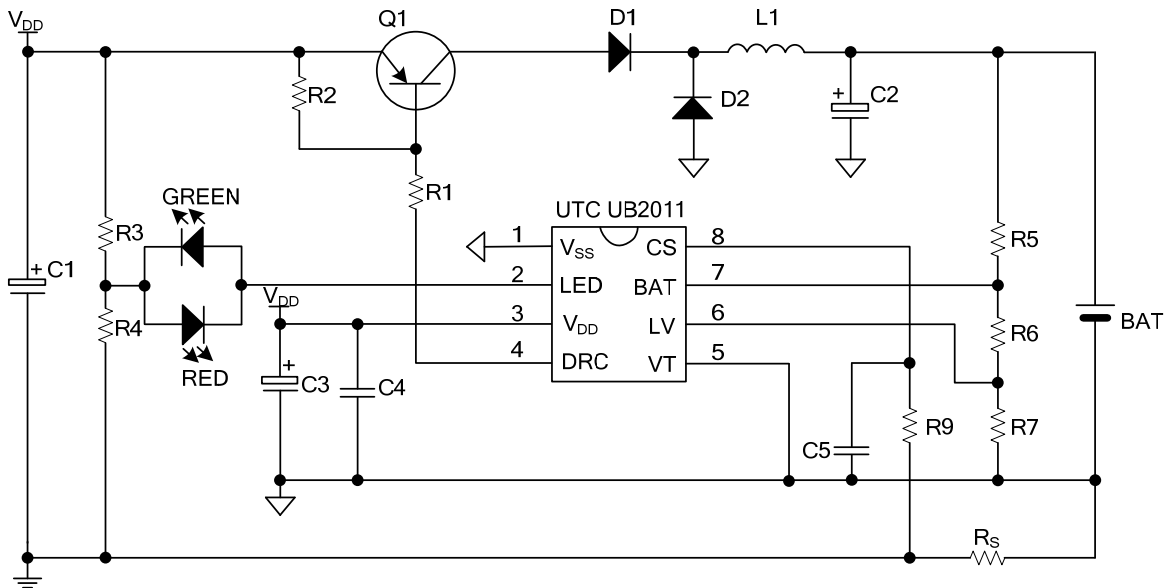


Fig.3 Switch-Mode (PFM) Charge Application Circuit

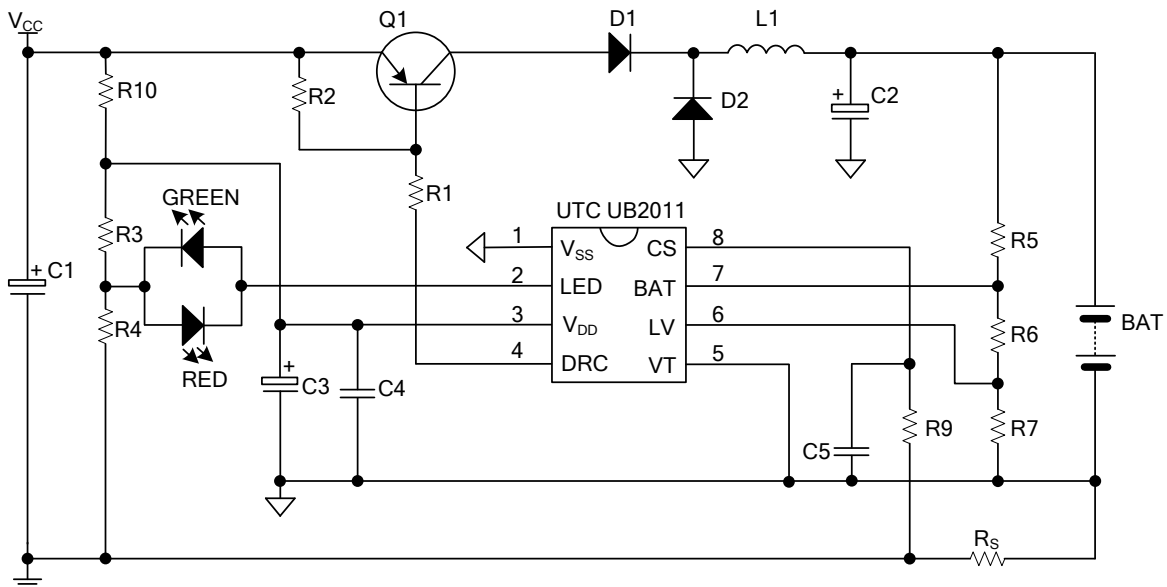


Fig.4 Switch-Mode (PFM) Charge Application Circuit (2~4 Cell)

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