

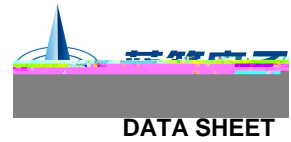


**历史修订 / Revised record**

E	2018-4				
F	2019-3-1	1			
G	2020-4-1	10	正常充电周期中的 <b>Normal Charge Cycle</b> 中的 (Note: The BRCL4054ME does not include this trickle charge feature).		
H	2021-12-23				

# BRCL4054BME

Rev.H Dec.-2021



BRCL4054BME / BRCL4054BME SOT  
BRCL4054BME PMOSFET BRCL4054BME USB  
4.2V  
1/10 BRCL4054BME BRCL4054BME

The BRCL4054BME is a complete constant-current/constant voltage linear charger for single cell lithium-ion batteries. Its Thin SOT package and low external component count make the BRCL4054BME ideally suited for portable applications. Furthermore, the BRCL4054BME is specifically designed to work within USB power specifications.No external sense resistor is needed, and no blocking diode is required due to the internal MOSFET architecture. Thermal feedback regulates the charge current to limit the die temperature during high power operation or high ambient temperature. The charge voltage is fixed at 4.2V, and the charge current can be programmed externally with a single resistor. The BRCL4054BME automatically terminates the charge cycle when the charge current drops to 1/10th the programmed value after the final float voltage is reached.Other features include charge current monitor, under voltage lockout, automatic recharge and a status pin to indicate charge termination and the presence of an input voltage.

- 800mA / Programmable charge current up to 800mA
- MOSFET / No MOSFET, sense resistor or blocking diode required
- SOT23-5

# BRCL4054BME

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DATA SHEET

## - . / O / Marking

See Marking Instructions

## 1 2 3 4 / Absolute Maximum Ratings(Ta=255 )

Parameter	Rating	Unit
Input Supply Voltage ( $V_{CC}$ )	-0.3 to 10	V
PROG	-0.3 to $V_{CC} + 0.3$	V
BAT	-0.3 to 7	V
CHRG	-0.3 to 10	V
BAT Pin Current	800	mA
Operating Ambient Temperature Range	-40~85	°C
Storage Temperature Range	-65~150	°C
Lead Temperature (Soldering,10sec)	300	°C

## 6 7 3 4 / Electrical Characteristics(Ta=255 )

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Supply Voltage	$V_{CC}$		4.25		6.5	V
Input Supply Current	$I_{CC}$	Charge Mode , $R_{PROG}=10k$		300	2000	$\mu A$
		Standby Mode (Charge Terminated)		200	500	$\mu A$
		Shutdown Mode ( $R_{PROG}$ Not Connected $V_{CC}<V_{BAT}$ , or $V_{CC}<V_{UV}$ )		25	50	$\mu A$
Regulated Output (Float) Voltage	$V_{FLOAT}$	0°C $T_A$ 85°C $I_{BAT}=40mA$	4.158	4.20	4.242	V
BAT Pin Current	$I_{BAT}$	$R_{PROG}=10k$ Current Mode	93	100	107	mA
		$R_{PROG}=2k$ Current Mode	465	500	535	mA
		Standby Mode $V_{BAT}=4.2V$	0	-2.5	-6.0	$\mu A$
		Shutdown Mode ( $R_{PROG}$ Not Connected)		$\pm 1.0$	$\pm 2.0$	$\mu A$
		Sleep Mode $V_{CC} = 0V$		$\pm 1.0$	$\pm 2.0$	$\mu A$
Trickle Charge Current	$I_{TRIKL}$	$V_{BAT} < V_{TRIKL}$ $R_{PROG}=2k$	20	45	70	mA
Trickle Charge Threshold Voltage	$V_{TRIKL}$	$R_{PROG}=10k, V_{BAT}$ Rising	2.8	2.9	3.0	V
Trickle Charge Hysteresis Voltage	$V_{TRHYS}$	$R_{PROG} = 10k$	60	80	110	mV

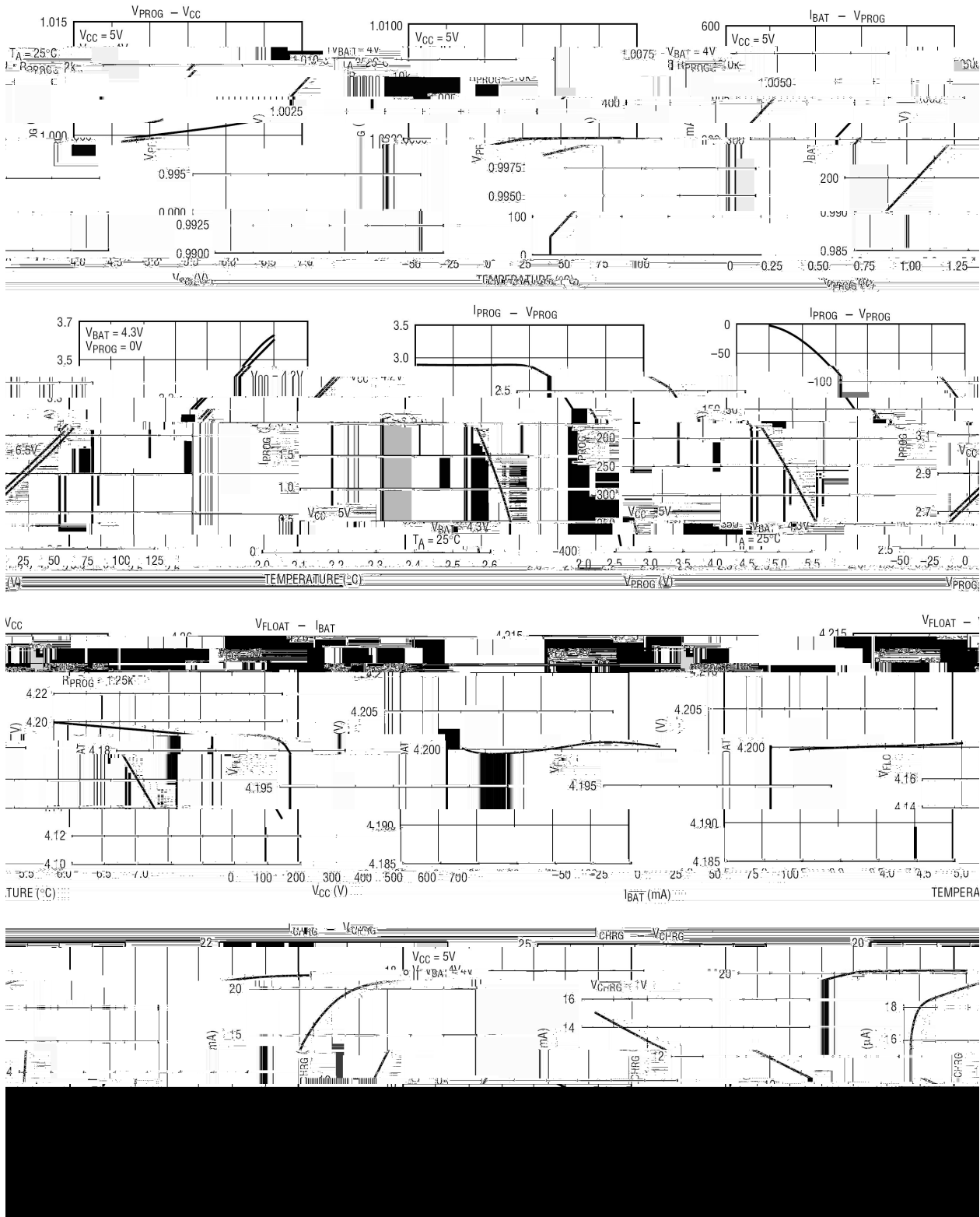
## 6 7 3 4 / Electrical Characteristics(Ta=255 )

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
V <sub>CC</sub> Undervoltage Lockout Threshold	V <sub>UV</sub>	From V <sub>CC</sub> Low to High	3.7	3.8	3.92	V
V <sub>CC</sub> Undervoltage Lockout Hysteresis	V <sub>UVHYS</sub>		150	200	300	mV
Manual Shutdown Threshold Voltage	V <sub>MSD</sub>	PROG Pin Rising	1.15	1.21	1.30	V
		PROG Pin Falling	0.9	1.0	1.1	V
V <sub>CC</sub> – V <sub>BAT</sub> Lockout Threshold Voltage	V <sub>ASD</sub>	V <sub>CC</sub> from Low to High	70	100	140	mV
		V <sub>CC</sub> from High to Low	5.0	30	50	mV
C/10 Termination Current Threshold	I <sub>TERM</sub>	R <sub>PROG</sub> =10k	0.085	0.10	0.115	mA/mA
		R <sub>PROG</sub> =2k	0.085	0.10	0.115	mA/mA
PROG Pin Voltage	V <sub>PROG</sub>	R <sub>PROG</sub> =10k Current Mode	0.93	1.0	1.07	V
CHRG Pin Weak Pull-Down Current	I <sub>CHRG</sub>	V <sub>CHRG</sub> =5V	8.0	20	35	μA
CHRG Pin Output Low Voltage	V <sub>CHRG</sub>	I <sub>CHRG</sub> = 5mA		0.35	0.60	V
Recharge Battery Threshold Voltage	V <sub>RECHRG</sub>	V <sub>FLOAT</sub> -V <sub>RECHRG</sub>	100	150	200	mV
Junction Temperature in Constant Temperature Mode	T <sub>LIM</sub>			120		°C
Soft-Start Time	t <sub>SS</sub>	I <sub>BAT</sub> =0 to I <sub>BAT</sub> =1000V/R <sub>PROG</sub>		100		μs
Recharge Comparator Filter Time	t <sub>RECHARGE</sub>	V <sub>BAT</sub> High to Low	0.75	2.0	4.5	ms
Termination Comparator Filter Time	t <sub>TERM</sub>	I <sub>BAT</sub> Falling Below I <sub>CHG</sub> /10	400	1000	2500	μs
PROG Pin Pull-Up Current	I <sub>PROG</sub>			3.0		μA



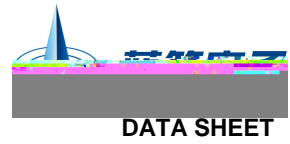


### 3 4 < = ; / Electrical Characteristic Curve



# BRCL4054BME

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**> 7 ž ! / Functional Description**

$V_{CC}$  UVLO PROG 1%  
 BAT 2.9V  
 BRCL4054BME 1/10

A charge cycle begins when the voltage at the  $V_{CC}$  pin rises above the UVLO threshold level and a 1% program resistor is connected from the PROG pin to ground or when a battery is connected to the charger output. If the BAT pin is less than 2.9V, the charger enters trickle charge mode. In this mode, the BRCL4054BME supplies approximately 1/10 the programmed charge current to bring the battery voltage up to a safe level for full current charging.

BAT 2.9V 4.2V BRCL4054BME 1/10

When the BAT pin voltage rises above 2.9V, 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 (4.2V), the BRCL4054BME enters constant-voltage mode and the charge current begins to decrease. When the charge current drops to 1/10 of the programmed value, the charge cycle ends.

BRCL4054BME BAT 4.05V  
 ( $V_{RECHRG}$ )  
 PROG

The BRCL4054BME constantly monitors the BAT pin voltage in standby mode. If this voltage drops below the 4.05V recharge threshold ( $V_{RECHRG}$ ), another charge cycle begins and current is once again supplied to the battery. To manually restart a charge cycle when in standby mode, the input voltage must be removed and reapplied, or the charger must be shut down and restarted using the PROG pin.

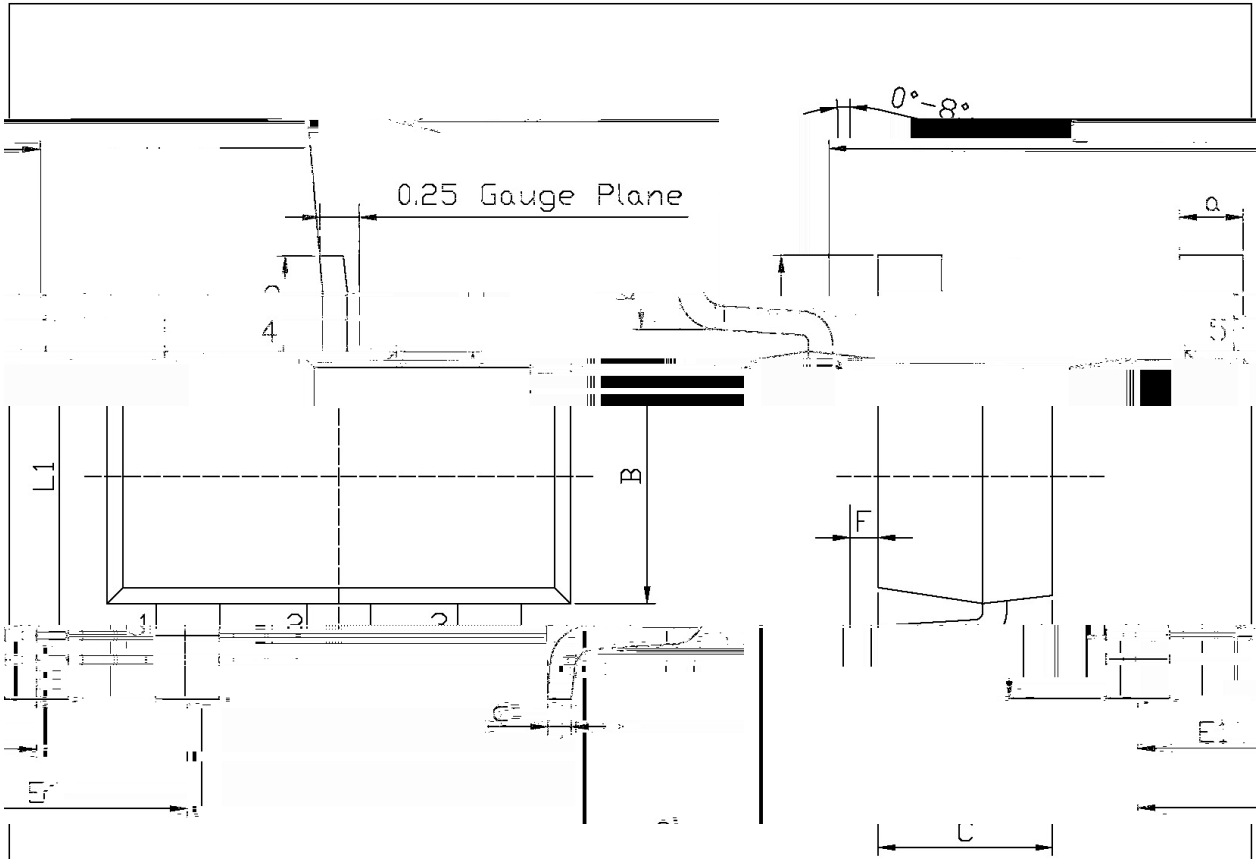
PROG 1000 PROG

The charging current is set by a resistor connected between prog pin and ground. The charging current is 1000 times the output current of prog pin. The setting resistor and charging current are calculated using the following formula





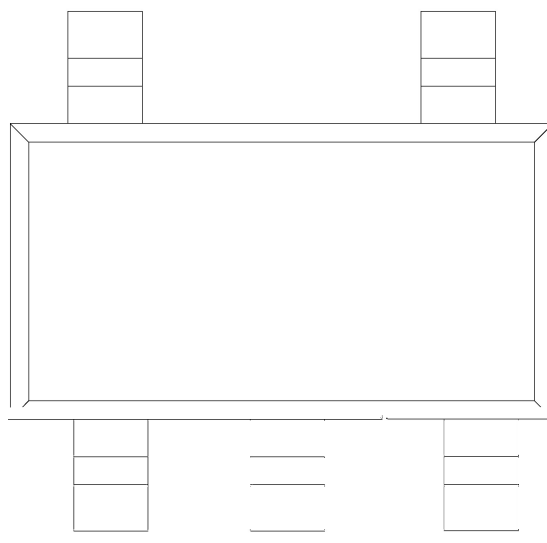
? @ A B ; / Package Dimensions



Unit: mm

Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
A	0.50	0.70	C	0.15	0.25
B	2.60	3.00	D	0.35	0.55
E	1.80	2.00	F	0	0.15

**- . C D / Marking Instructions**





**E F G H I < = ; ( J K ) / Temperature Profile for IR Reflow Soldering(Pb-Free)**


- |   |   |
|---|---|
| <p>1            150 180            60 90sec;</p> <p>2            245±5                    5±0.5sec;</p> <p>3                            2 10°C/sec.</p> | <p>Note:</p> <p>1.Preheating:150~180°C, Time:60~90sec.</p> <p>2.Peak Temp.:245±5°C, Duration:5±0.5sec.</p> <p>3. Cooling Speed: 2~10°C/sec.</p> |
|---|---|

**L G M N O P Q R / Resistance to Soldering Heat Test Conditions**

260±5°C                      10±1 sec.                      Temp.:260±5°C                      Time:10±1 sec

**S T U V / Packaging SPEC.**

/ REEL

Package Type	Units	Dimension	(unit mm <sup>3</sup> )
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