ACE4056P
100mA, Single Li-ion Battery Charger

Description

The ACE4056P is a complete constant-current/ constant voltage linear charger for single cell Lithium-Ion batteries. No external sense resistor is needed, and no blocking diode is required due to the internal MOSFET architecture. The charge voltage is fixed at 4.2V or 4.35V, and the charge current can be programmed externally with a single resistor.

The ACE4056P automatically terminates the charge cycle when the charge current drops to 1/10 the programmed value after the final float voltage is reached.

When the input supply (wall adapter or USB supply) is removed, the ACE4056P automatically enters a low current state, dropping the battery drain current to less than 0.5uA.

The ACE4056P is available in a small package with SOT-23-5. Standard product is Pb-Free.

Features

- Programmable Charge Current Up to 100mA
- Under Voltage Lockout Protection
- Automatic Recharge Threshold 4.05V(Typ.)
- Charge Status Output Pin
- 3.0V Trickle Charge Threshold
- Soft-Start Limits Inrush Current

Application

- Wearable Devices
- MP3/MP4 Players
- U-key
- Bluetooth, wireless handsets
- Others portable electronic device

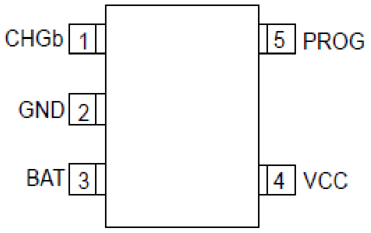
Absolute Maximum Ratings

Symbol	Items		Value	Unit
V_{CC}	Input Voltage		-0.3～6	V
V_{PROG}	PROG Voltage		-0.3～V_{CC}	V
V_{BAT}	BAT Voltage		-0.3～6	V
V_{CHGb}	CHGb Voltage		-0.3～V_{CC}	V
P_{DMAX}	Power Dissipation	SOT23-5	0.3	W
T_J	Junction Temperature		-40~125	℃
Tstg	Storage Temperature		-55 to 150	℃
Tsolder	Package Lead Soldering Temperature		260℃, 10s	

Note: Exceed these limits to damage to the device. Exposure to absolute maximum rating conditions may affect device reliability.

Packaging Type

SOT23-5



Pin Description

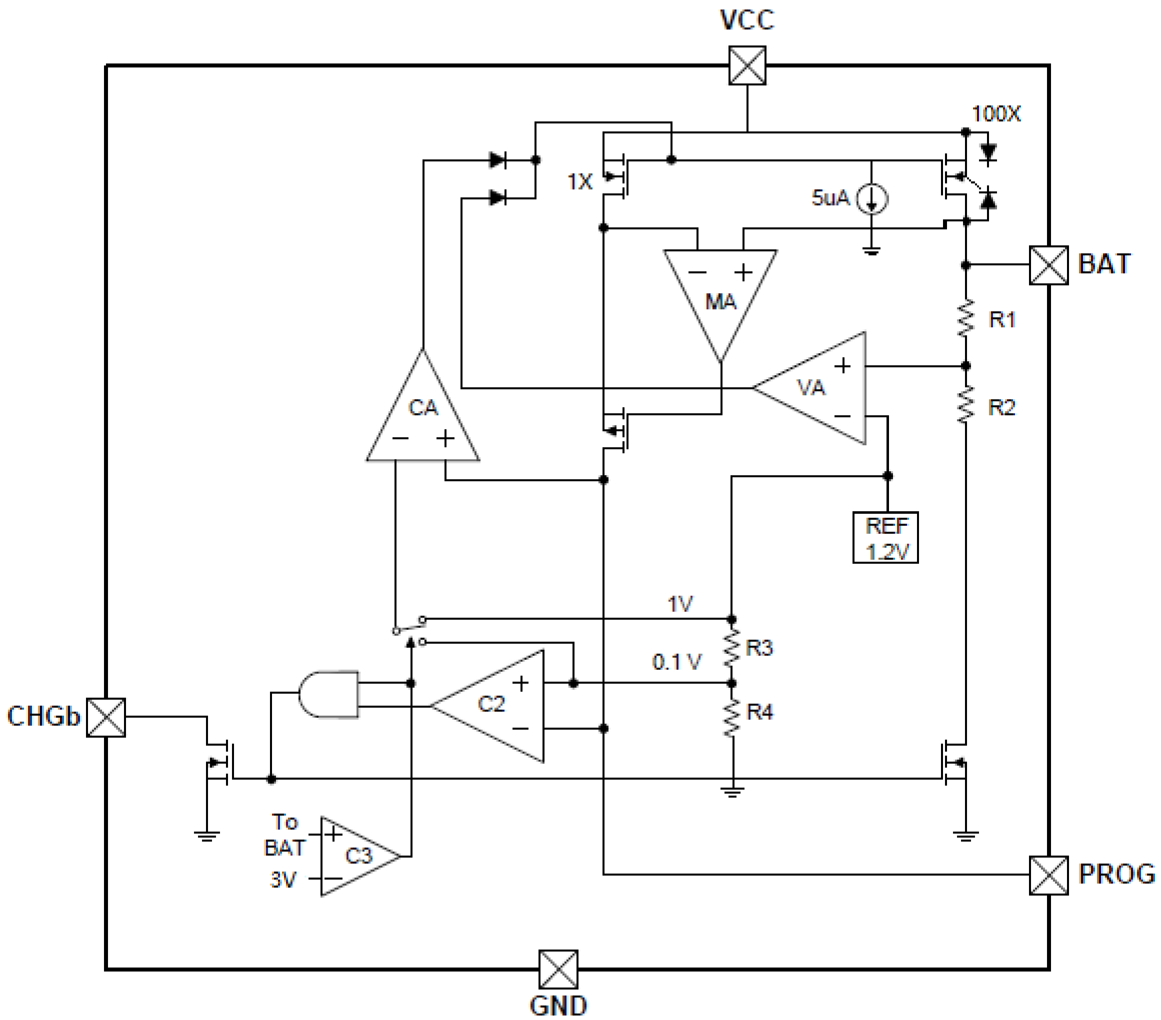
Pin Number	Pin Name	Function
1	CHGb	Open-Drain Charge Status Output. When the battery is charging, the CHGb pin is pulled low. When the charge cycle is completed or VCC is removed, the CHGb is forced high impedance.
2	GND	Ground
3	BAT	Charge Current Output. Provides charge current to the battery and regulates the final float voltage to 4.2V or 4.35V.
4	VCC	Power Supply
5	PROG	Charge current setting, charge current monitor and shutdown pin. The charging current is given by I BAT= (1/RPROG)*100.

Ordering information

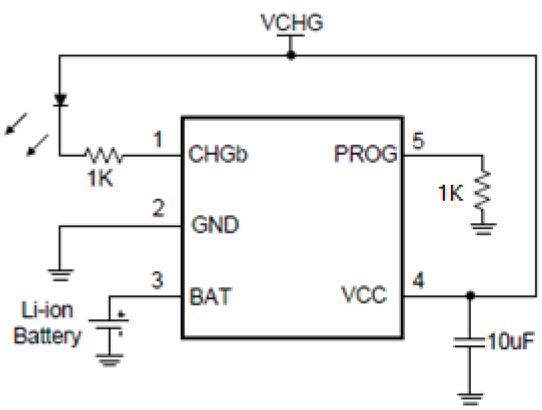
ACE4056P XX XX + H

- Halogen - free
- Pb - free
- BN : SOT23-5
- 4.2V/4.35V

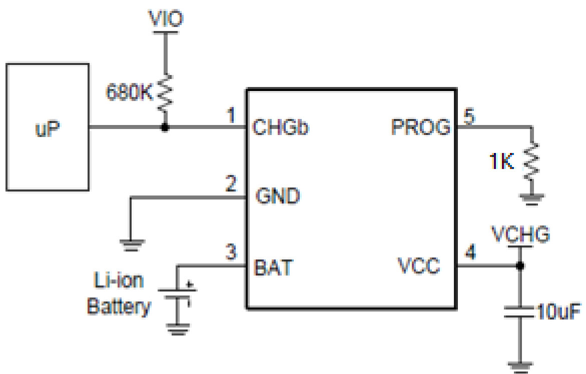
Block Diagram



Typical Application Circuit



Typical applications W/T LED indicate

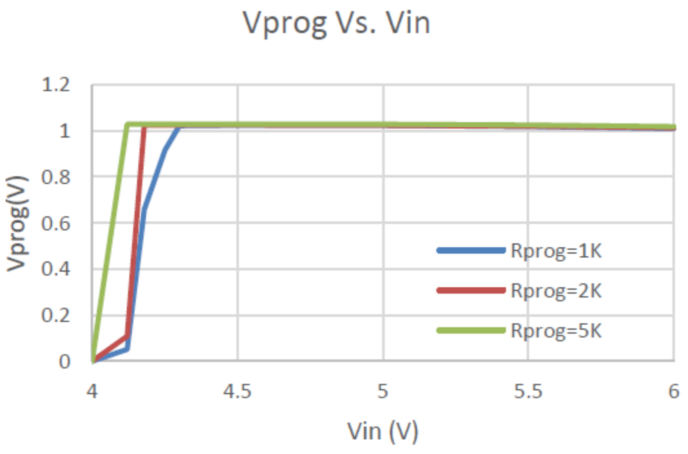


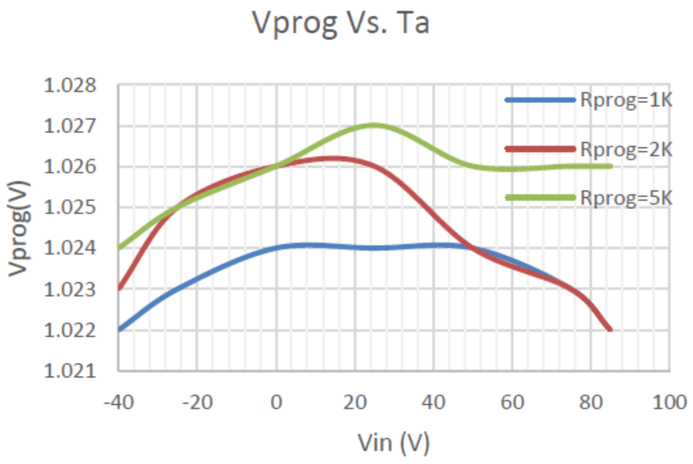
Typical applications W/T microprocessor detect

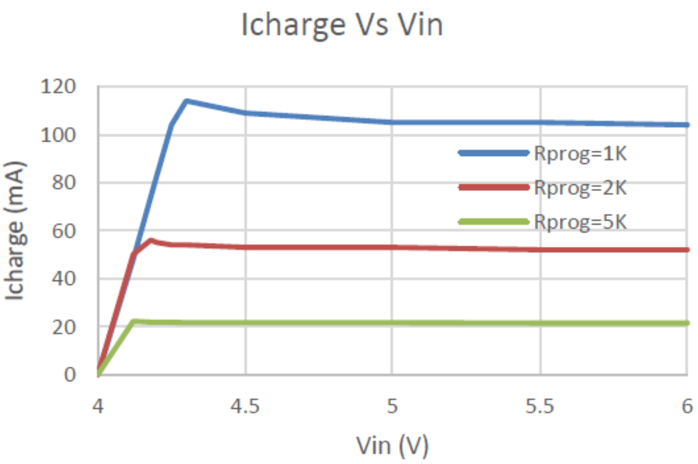
Electrical Characteristics The following specifications apply for V_{CC}=5V T_A=25℃, unless specified otherwise.

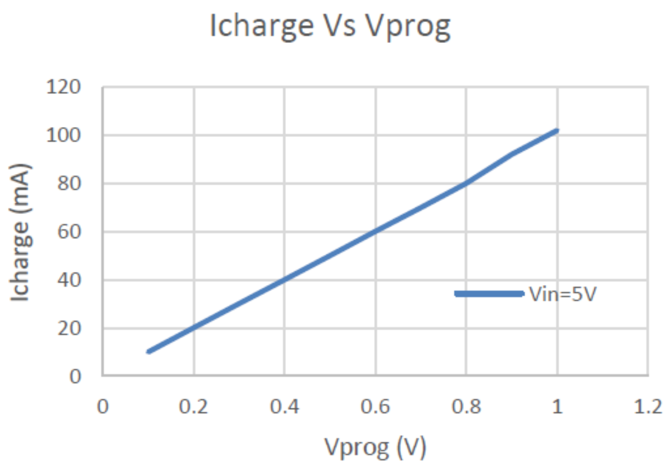
Symbol	Items	Conditions	Min	Typ	Max	Units
$I_{SPLYCHRG}$	Charge Mode GND Current	R_{PROG}=1kΩ		84		μA
$I_{BATCHRG}$	Charge Mode Battery Current	R_{PROG}=1kΩ	96	100	104	mA
		R_{PROG}=2kΩ		50		mA
$V_{PROGCHRG}$	PROG Pin Voltage	R_{PROG}=1kΩ	0.96	1	1.04	V
		R_{PROG}=2kΩ	0.96	1	1.04	V
$I_{SPLYSTBY}$	Standby Mode Supply Current	Charge Terminated		70		μA
$I_{BATSTBY}$	Standby Mode Battery Current	Charge Terminated		2		μA
$I_{SPLYASD}$	Shutdown Mode Supply Current	V_{CC}<VBAT		27		μA
I_{BATASD}	Shutdown Mode BAT Pin Current	V_{CC}<VBAT		0.5		μA
$I_{BATSLEEP}$	Sleep Mode BAT Pin Current	V_{CC}=0V		4.35	0.1	μA
V_{FLOAT}	Float Voltage		4.158	4.2	4.242	V
			4.306	4.35	4.394	
I_{TRIKL}	Trickle Charge Current	R_{PROG}=1kΩ		10		mA
V_{TRIKL}	Trickle Charge Voltage Threshold		2.9	3	3.1	V
$V_{TRIKL, HYS}$	Trickle Charge Voltage Hysteresis			100		mV
V_{UVLO}	UVLO Threshold	V_{CC} from Low to High	3.5	3.7	3.9	V
$V_{UVLO, HYS}$	UVLO Hysteresis			200		mV
V_{ASD}	V_{CC}-V_{BAT} Lockout Threshold Voltage	V_{CC} from High to Low		50		mV
		V_{CC} from Low to High		150		mV
ΔV_{RECHRG}	Auto Recharge Battery Voltage		100	150	200	mV
V_{CHGb}	CHGb Pin Output Low Voltage	ICHGb=8mA		0.3	0.6	V
R_{ON}	Power FET ON Resistance			2.3		Ω
T_{SS}	Soft-Start Time			120		us
T_{RECHRG}	Recharge Comparator Filter Time			2		ms

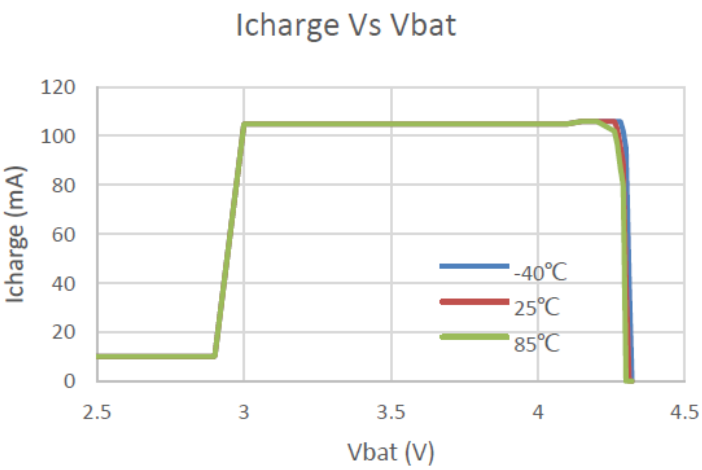
Typical Characteristic

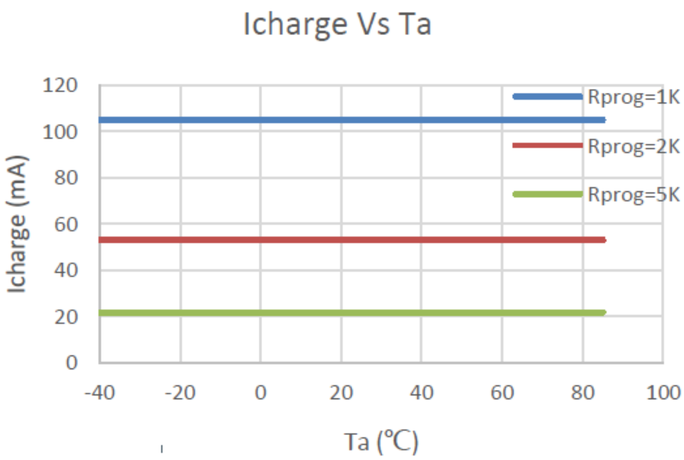


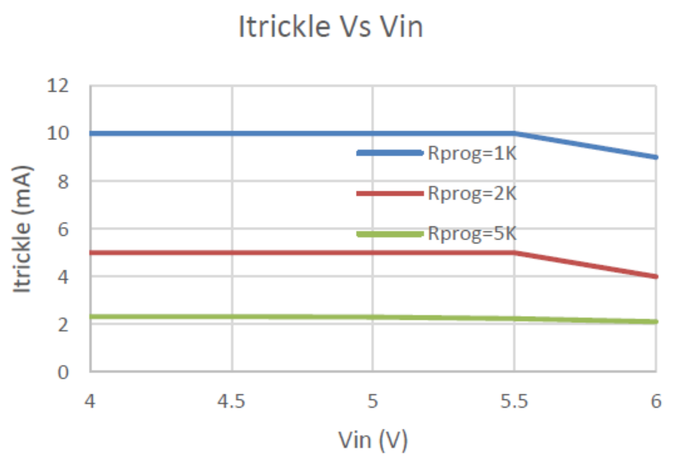




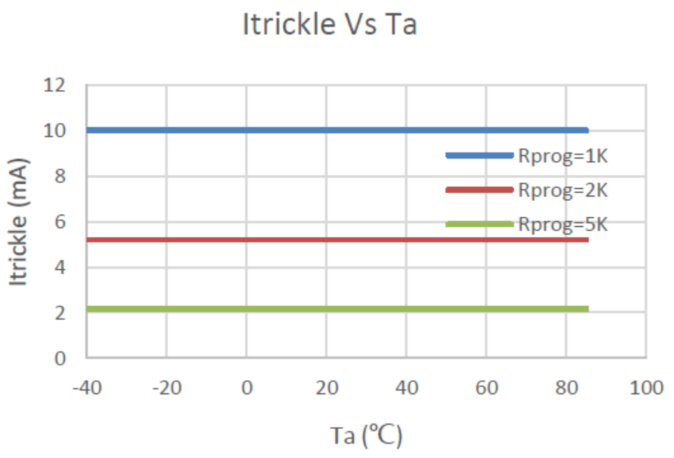




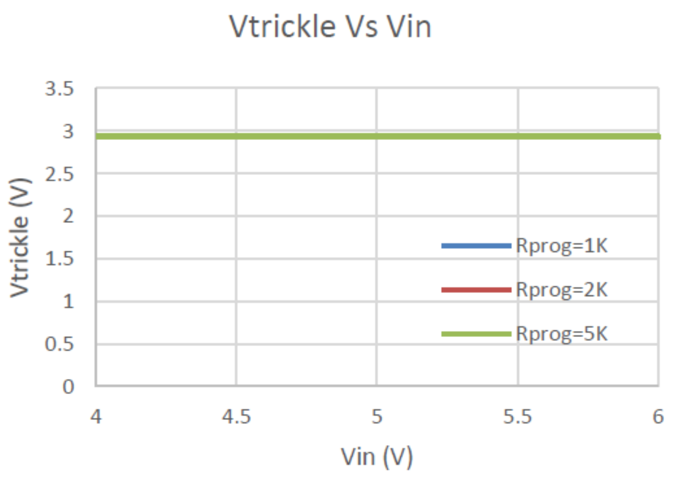




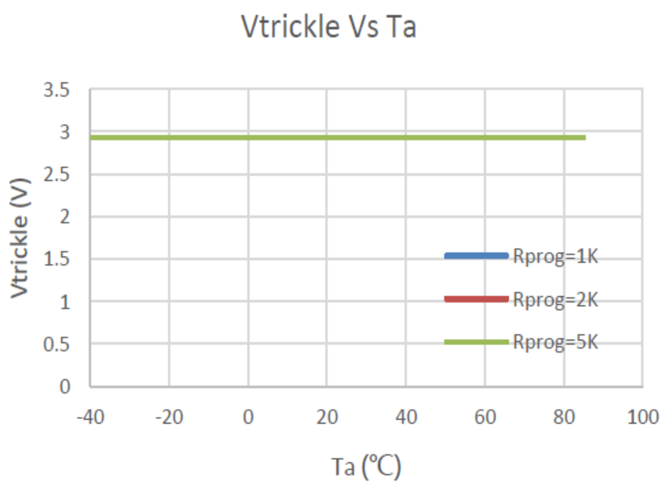
Itrickle Vs Vin
Itrickle (mA)
Vin (V)
Rprog=1K
Rprog=2K
Rprog=5K



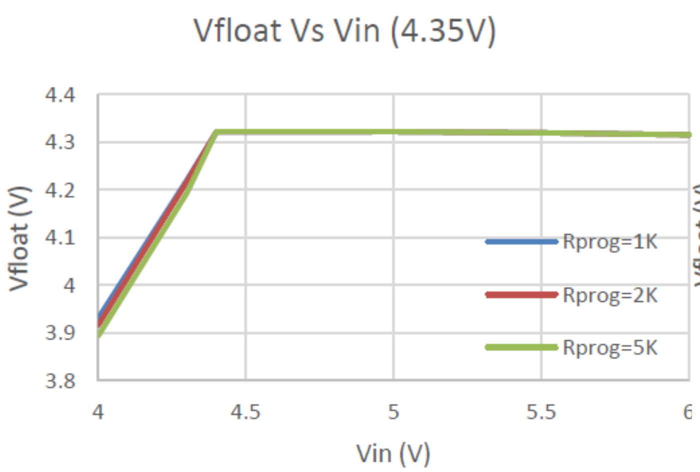
Itrickle Vs Ta
Itrickle (mA)
Ta (℃)
Rprog=1K
Rprog=2K
Rprog=5K



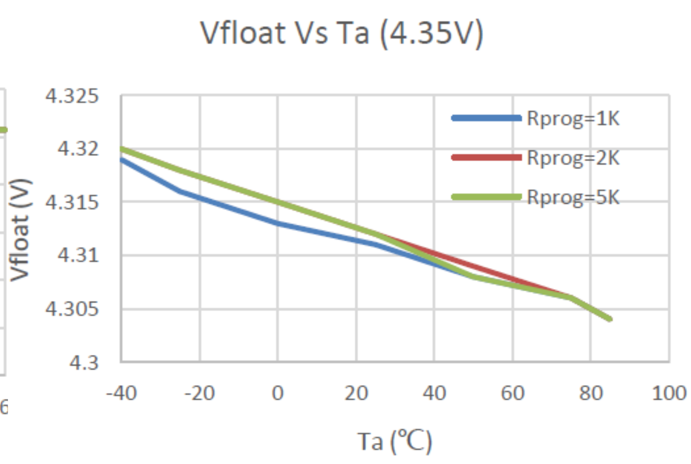
Vtrickle Vs Vin
Vtrickle (V)
Vin (V)
Rprog=1K
Rprog=2K
Rprog=5K



Vtrickle Vs Ta
Vtrickle (V)
Ta (℃)
Rprog=1K
Rprog=2K
Rprog=5K

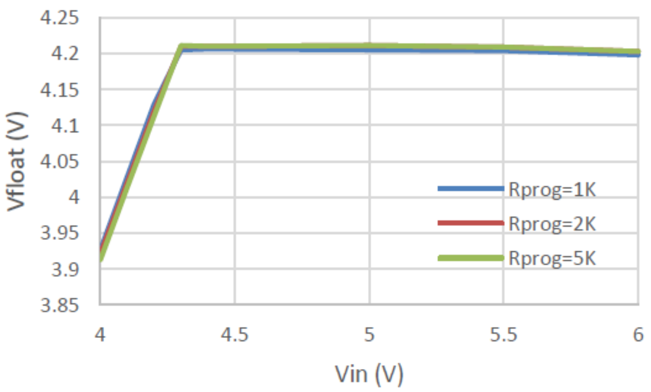


Vfloat Vs Vin (4.35V)
Vfloat (V)
Vin (V)
Rprog=1K
Rprog=2K
Rprog=5K

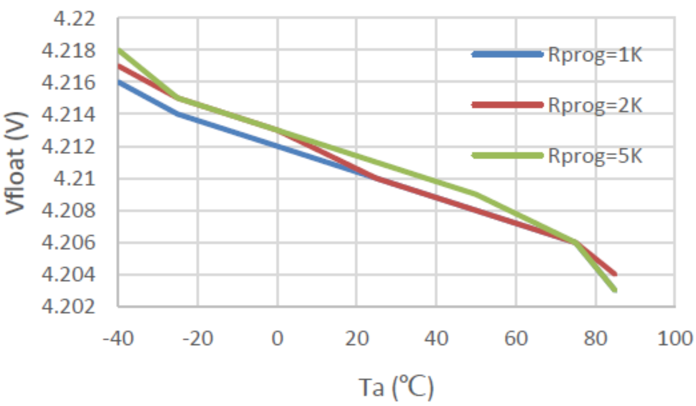


Vfloat Vs Ta (4.35V)
Vfloat (V)
Ta (℃)
Rprog=1K
Rprog=2K
Rprog=5K

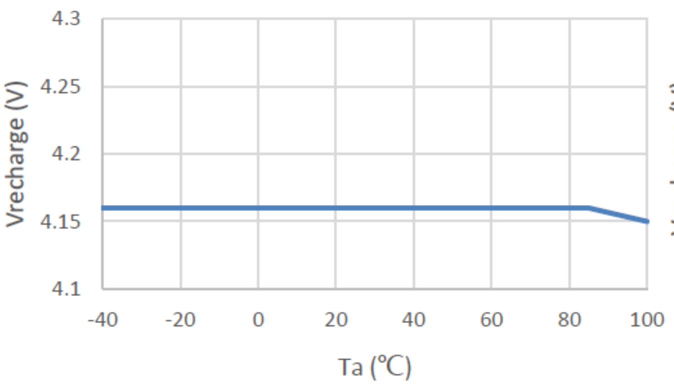
Vfloat Vs Vin (4.2V)



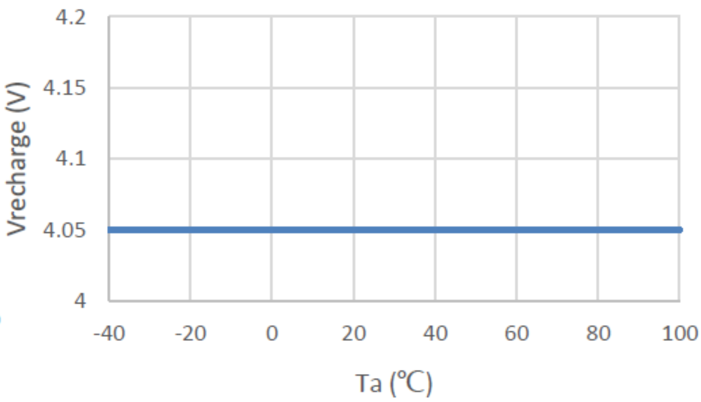
Vfloat Vs Ta (4.2V)



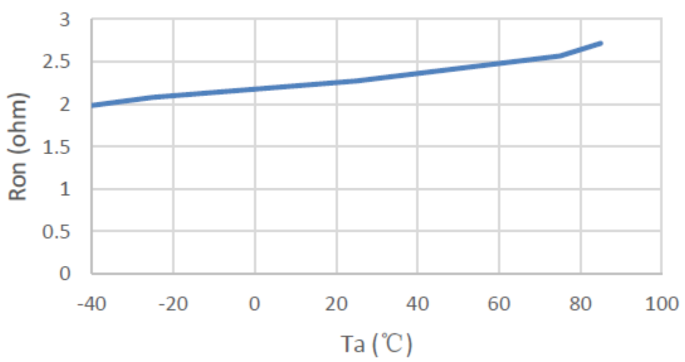
Vrecharge Vs Ta (4.35V)



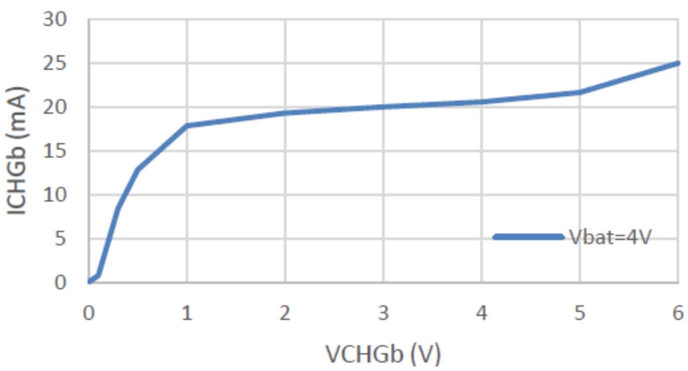
Vrecharge Vs Ta (4.2V)



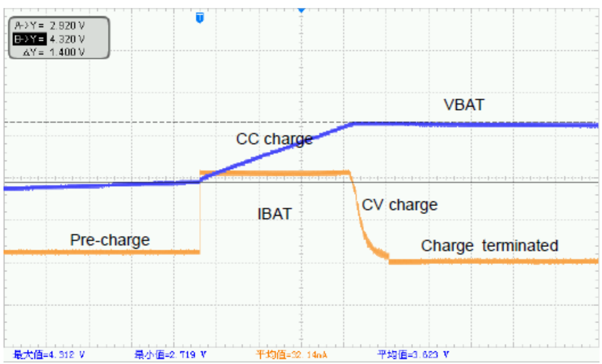
Ron VS Ta



ICHGb Vs VCHGb

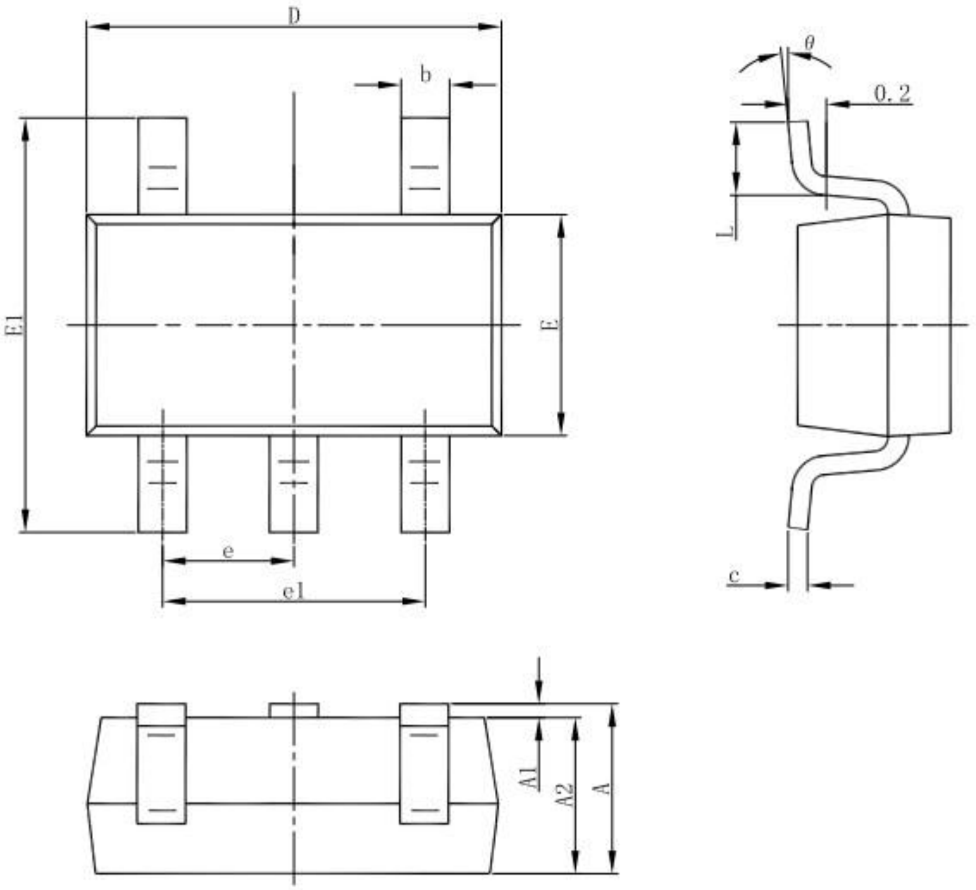


Charging Curve



Packing Information

SOT-23-5



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

Notes

ACE does not assume any responsibility for use as critical components in life support devices or systems without the express written approval of the president and general counsel of ACE Electronics Co., LTD. As sued herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and shoes failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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