

CCS Charger based on CCS9620 with External Power Regulator

Component Selection:

Actual component values will strictly depend on the (sensitivity, load, transfer, response, etc.) characteristics for the current control input ($I_{control}$) of the regulated current source.

Therefore the values of $R_1=3k$ (...33k) $C_3=1\mu F$ (100nF) $R_{C3}=0.1*R_1$ can only be given as a figure for starting tests and evaluation. (References taken from page 4 "*CCS9620 Current Shaping: Simplified Block Diagram for CCS9620 Charger with PWM Current Controller*".

Interface Requirements:

If the ($I_{control}$) input of the regulated current source is controlled by low levels (0.7..2V) for Current=ON and high levels (2,5..4V) for current=OFF the above given RC-Circuit will be fine.

Otherwise additional circuits (e.g. OPA=Operation Amplifier) will be required.

Input Requirements	Example	Interface Circuit	Function
Higher Voltage Range	0-10V	OPA	Electrometer-Amplifier
Reverse Polarity	1V=off, 5V=on	OPA	inv. Amplifier
Offset Voltage Range	5V=off, 8V=on	OPA	level shifter
Low Impedance	$R_i=50\Omega$	OPA	Buffer Amp
neg. & rev. Polarity	-5V=off 0V=on	OPA	inv. Amplifier and level shifter
neg. Polarity	0V=off - 5V=on	OPA	level shifter

Support:

If you cannot find the appropriate solution for your specific application, please feel free to contact BTI-Headquarters or your nearest CCS Design-Center without obligation or costs for information or help about interface circuits according to your needs. To assure technical communication on quality levels, all questions should be made in written form by mail, email or FAX and contain the necessary details for the input/output transfer function of the regulator and/or adequate circuit diagrams.

Note: The better the information we get from you, the more precise the answer will be.

Settings for the Power Regulator

- Make sure that the modified (waveform, amplitude, phase, polarity) steering signal of the CCS9620 satisfies the current control input ($I_{control}$) requirements of the current regulator.
- Make the necessary settings to limit the maximum voltage (OVP).
Connect a load (power resistor or lamp) and in parallel a capacitor (e.g. $1000\mu F/Ah$) to the Vbat-output and tune the regulator to the desired maximum voltage at Vbat.
(Note that the current through the load must be less than the maximum current to get the voltage limited by OVP, otherwise voltage will be limited by maximum current).
- Check current limit function with a low resistive load.
- Simulate with a switch (at 4V=current off resp 0V=current on) the CCS9620 steering.
- Disconnect power source.

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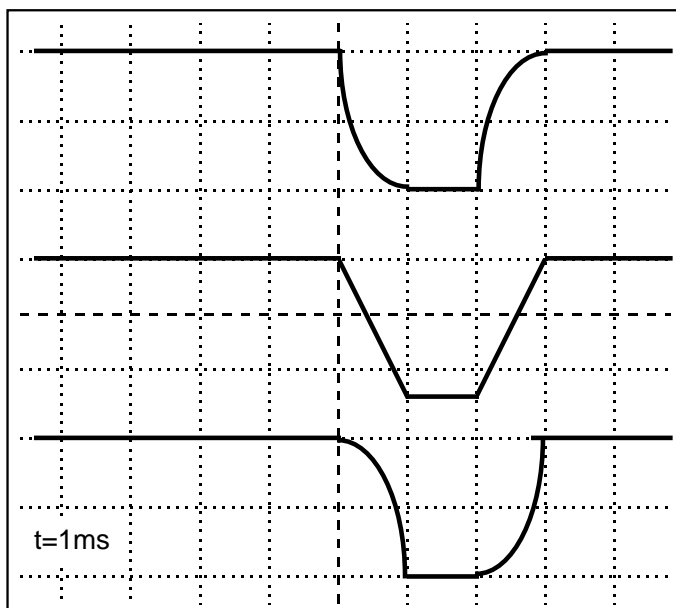
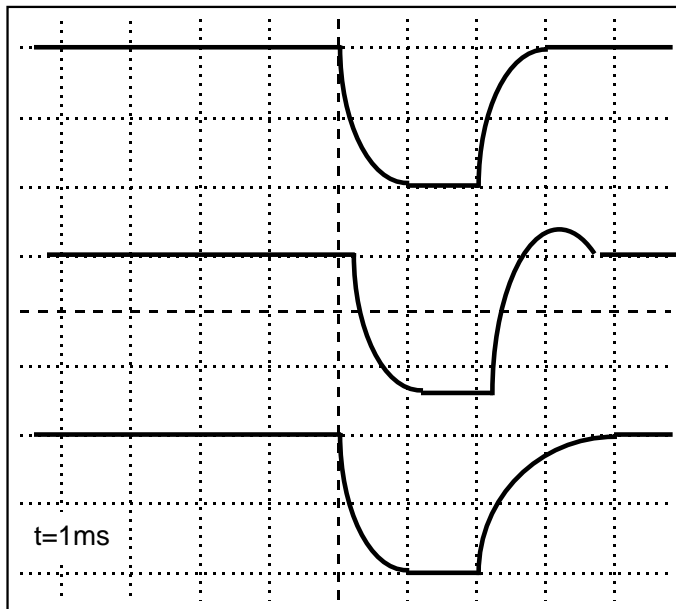
Necessary Changes and Interface-Connections for CCS9620

- Power supply off.
- On CCS9620 check the appropriate voltage and timing (MT1,MT2) settings.
- On both circuits (CCS9620 and current source) connect GND to GND, Vbat to Vbat, Vin.
- Connect the CCS9620- (E/A) to current control interface.

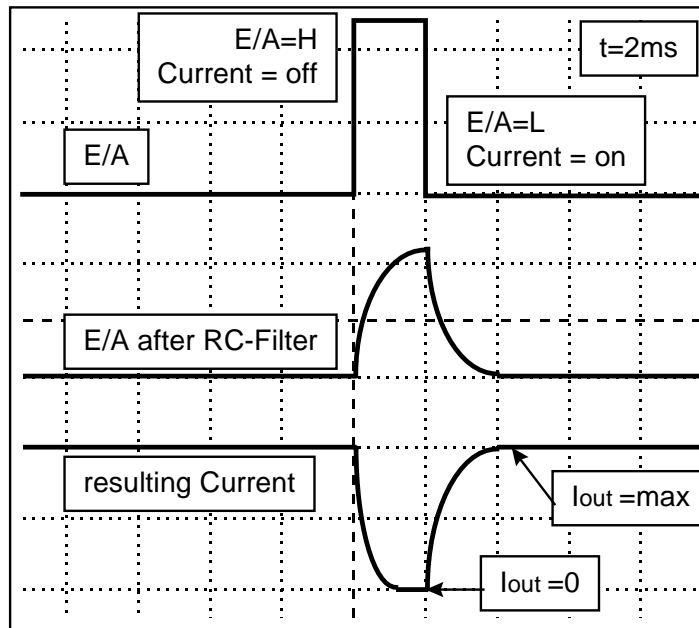
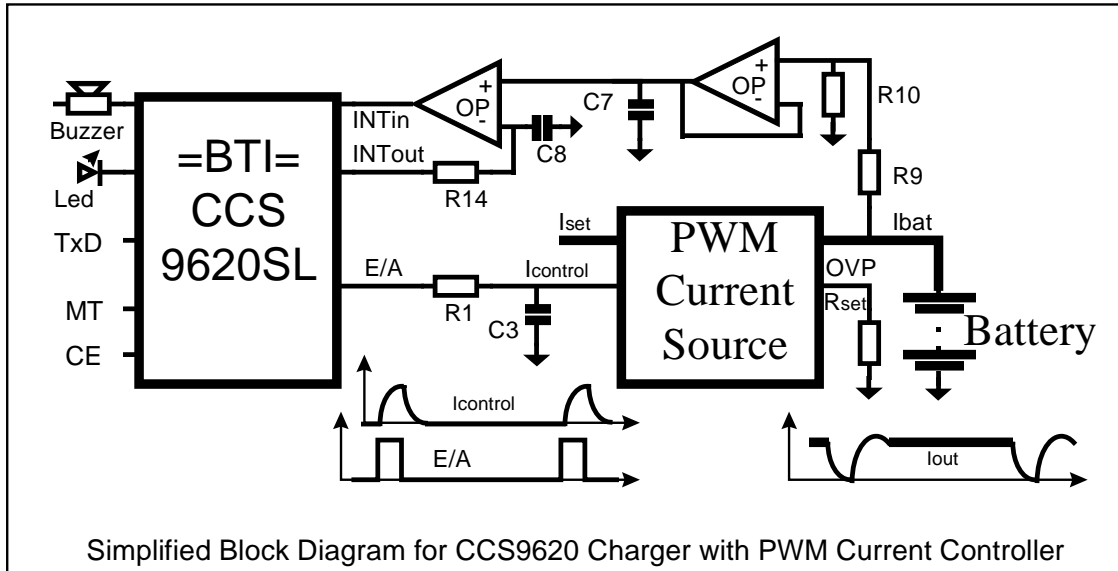
Ready for use

- Check correct function according to CCS9620 Evaluation board with the exceptions made by the regulated current source.

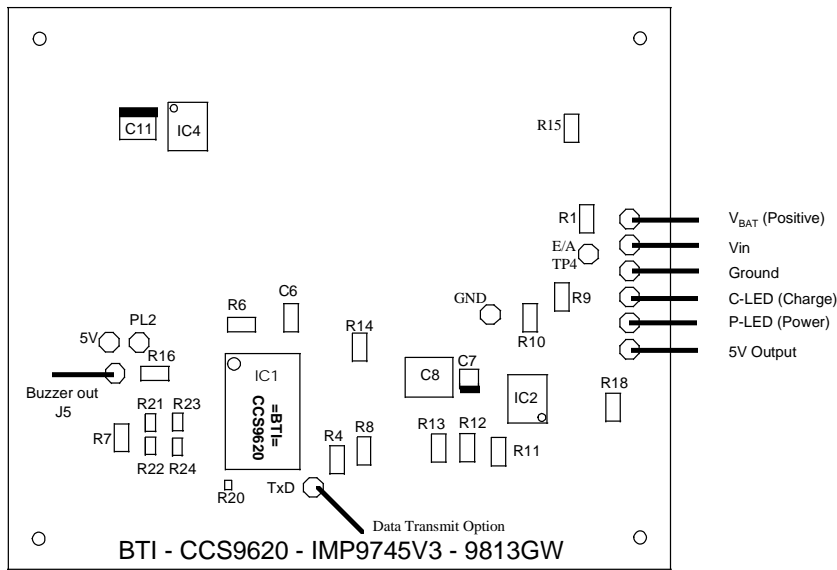
CCS Acceptable Current Waveforms



CCS9620 Current Shaping

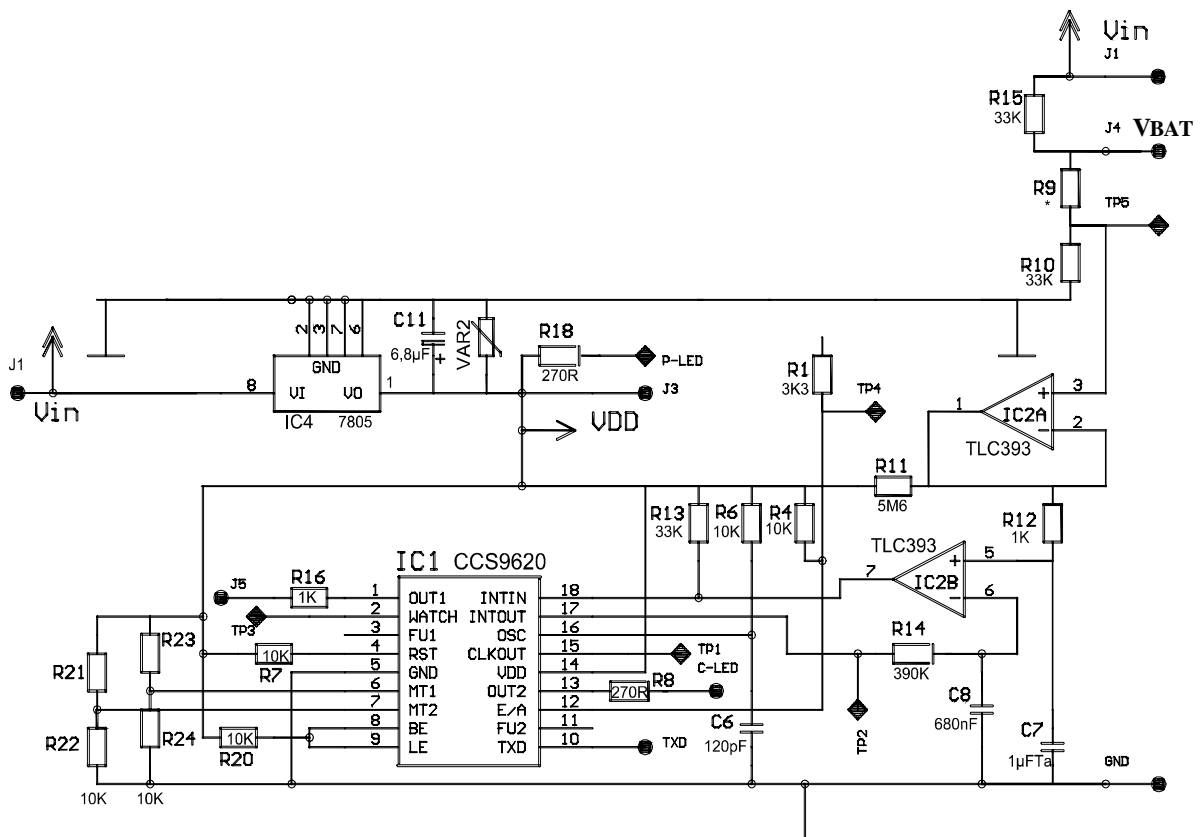


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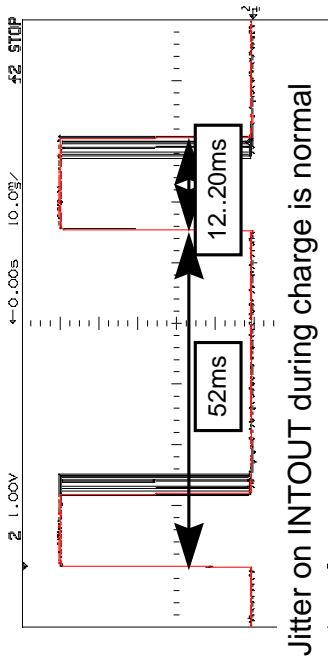
Part List:

Part No.	Value
C8	680nF/XR Mika
C6	120pF
C7	1µF (Ta)
C11	6,8µF
IC1	CCS9620SL
IC2	LM393
IC4	7805
R4	10K
R7	10K
R6	10K
R20	10K
R14	390K
R8	270R
R18	270R
R16	1K
R12	1K
R10	33K
R15	33K
R13	33K
R11	5M6
V1***, V2***	
R9* R1*	
R21*, R22*, R23*, R24*	
* see text, *** not assembled	

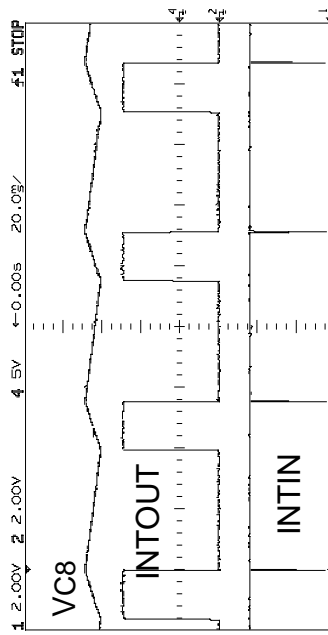


CCS

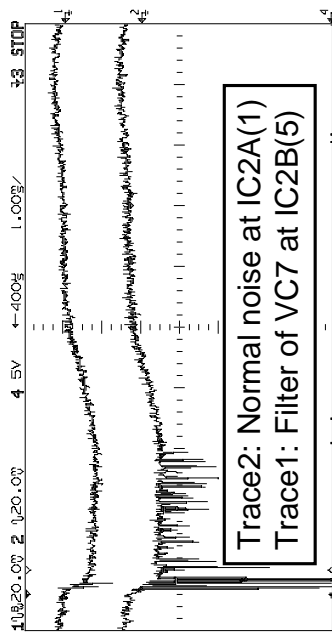
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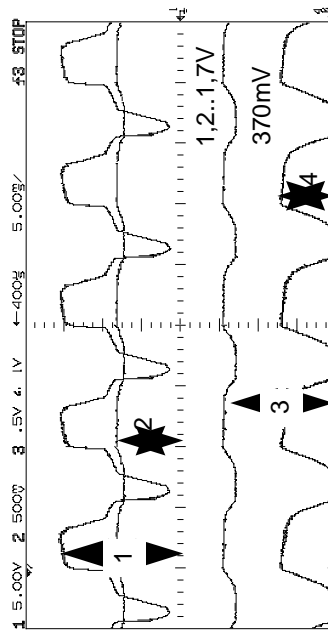
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1 Input Voltage
2 Battery Voltage
3 Voltage at IC2A(3)
4 Voltage at R8/19

Comments: Our aim is to help you best in the design of superior chargers with CCS-technology. This Application Note was carefully composed. However, according to the wide range of solutions not all aspects and possibilities can be covered by this publication. Furthermore errors cannot be completely excluded and we do not provide any responsibility for the given applications. Therefore we welcome your response comments and suggestions for further improving our CCS-Application Notes. **Thank you!**

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