

# Test Procedure for the LC05132C01NMTGEVB Evaluation Board

## 1. Test Setup

### 1.1 Test Equipment

- Voltage Current Source: ADVANTEST R6243 x 2
- Electronic LOAD: FUJITSU DENSO EUL-150αXL
- Synthesized Function Generator: YOKOGAWA FG120
- Oscilloscope: LeCroy WaveRunner LT374
- Operating Temperature: 25°C
- Current probe :Lecroy AP015
- Battery: Which are commercially available.

### 1.2 Recommended Test Setup

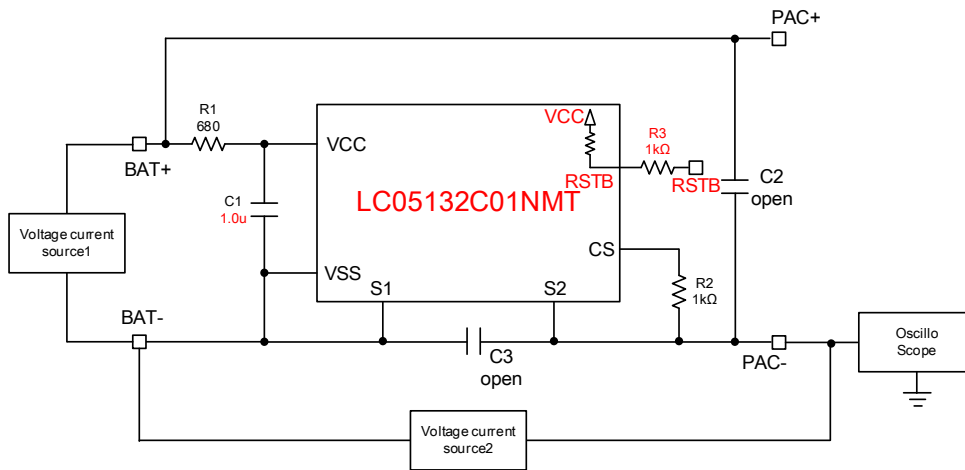


Figure1. LC05132C01NMTGEVB Recommended Test Set Up for Charge/Discharge Voltage detection

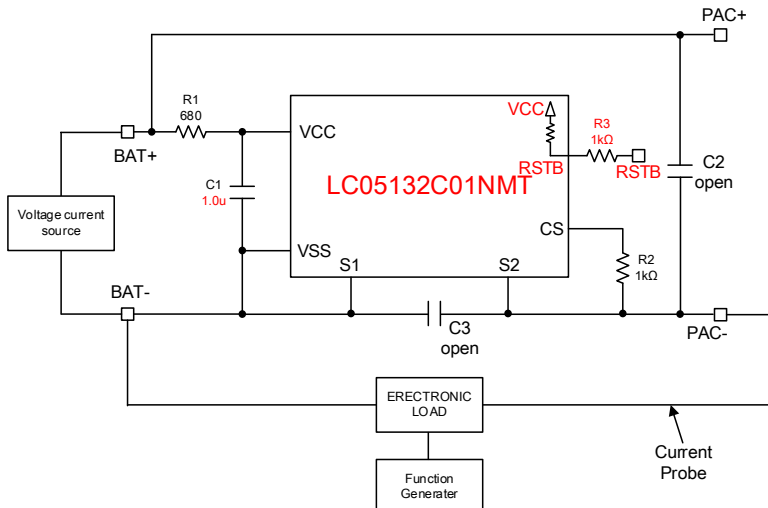


Figure2. LC05132C01NMTGEVB Recommended Test Set Up for Charge/Discharge Current detection

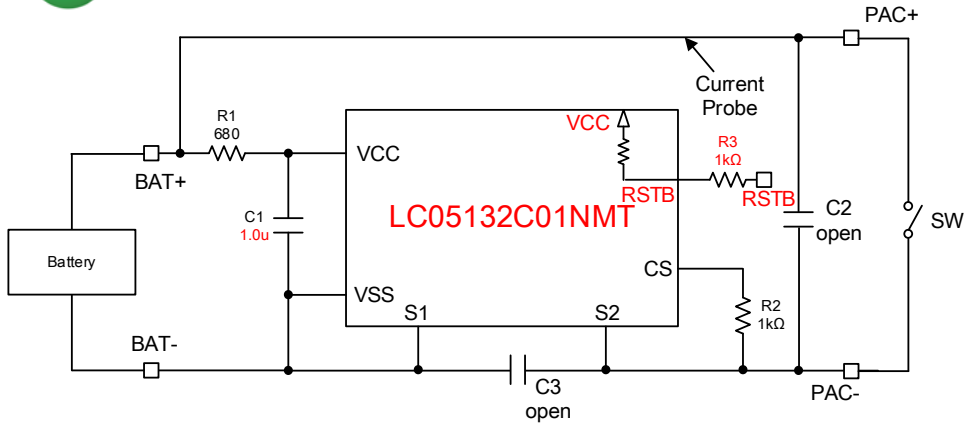


Figure3. LC05132C01NMTGEVB Recommended Test Set Up for Discharge Current2(short current)detection

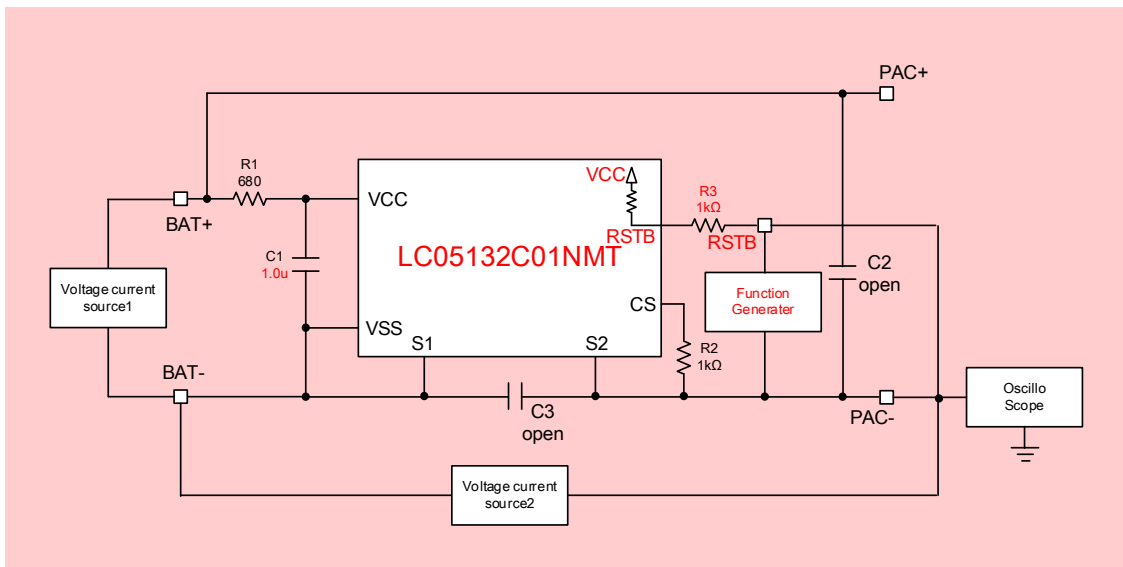


Figure4. LC05132C01NMTGEVB Recommended Test Set Up for Reset detection/release time

### 1.3 List of Test Points

Table1. Test Points Functions

TEST POINTS NAME	DESCRIPTION
BAT+ or PAC+	Battery Voltage
PAC-	Detection state of Battery Voltage and discharge current and charge current
RSTB	Reset detection/release



## **2. Instruction**

### **2.1 Over-charge detection/release voltage Procedure**

1. Connect **LC05132C01NMTGEVB** like upper Figure1.
2. Set to 3.7V Voltage Current Source1. Set to 10mA at Current limit.  
"MEASURE FUMCTION" is the "IM" (AUTO MODE). Check that the IM is less than 0.1uA.
3. Set to -10mA Voltage Current Source2. Set to 2V at Voltage limit.  
Check that the IM is 2.5uA~3.5uA.
4. Monitor the voltage of the PAC-terminal with increasing voltage.
5. The PAC- voltage is cramped at the overcharge detection voltage.
6. Set to +10mA Voltage Current Source2. Set to 2V at Voltage limit.
7. Monitor the voltage of the PAC-terminal with decreasing voltage.
8. The voltage at the PAC- is clamped at the overcharge release voltage detection.

### **2.2 Over-discharge detection/release voltage Procedure**

1. Connect **LC05132C01NMTGEVB** like upper Figure1.
2. Set to 3.7V Voltage Current Source1. Set to 10mA at Current limit.  
"MEASURE FUMCTION" is the "IM" (AUTO MODE). Check that the IM is less than 0.1uA.
3. Set to 10mA Voltage Current Source2. Set to 2V at Voltage limit.  
Check that the IM is 2.5uA~3.5uA.
4. It monitors the voltage of the PAC-terminal with decreasing voltage.
5. The PAC- voltage is clamped at the over-discharge detection voltage.
6. Set to -10mA Voltage Current Source2. Set to 2V at Voltage limit.
7. Monitor the increasing voltage of the PAC-terminal.
8. The PAC- voltage increase to about 0V at the over-discharge release voltage.

### **2.3 Over-discharge current detection/release Procedure**

1. Connect **LC05132C01NMTGEVB** like upper Figure2.
2. Set to 3.7V Voltage Current Source1. Set to 10mA at Current limit.  
"MEASURE FUMCTION" is the "IM" (AUTO MODE).
3. Check that the IM is less than 0.1uA. Short-circuit PAC- and BAT- and open.  
Check that the IM is 2.5uA~3.5uA.
4. Synthesized Function Generator set1 shot pulse of 25ms.
5. Electronic LOAD set Over-discharge current at A, set 0A at B.
6. Monitor the current through BAT- to PAC- with current probe.
7. When the protection IC detects the discharge overcurrent, the current pulse width becomes (TYP) 12ms.
8. When the protection IC releases the discharge overcurrent, the pulse width becomes (TYP) 4ms.



## 2.4 Over-charge current detection/release Procedure

1. Connect **LC05132C01NMTGEVB** like upper Figure2.
2. Set to 3.7V Voltage Current Source1. Set to 10mA at Current limit.  
“MEASURE FUMCTION” is the “IM” (AUTO MODE).
3. Check that the IM is less than 0.1uA. Short-circuit PAC- and BAT- and open.  
Check that the IM is 2.5uA~3.5uA.
4. Synthesized Function Generator set1 shot pulse of 25ms.
5. Electronic LOAD set Over-charge current at A, set 0A at B.
6. Monitor the current through BAT- to PAC- with current probe.
7. When the protection IC detects the charge overcurrent, the pulse width becomes (TYP) 16ms.
8. When the protection IC releases the charge overcurrent, the pulse width becomes (TYP) 4ms.

## 2.5 Over-discharge current2(short current) detection Procedure

1. Connect **LC05132C01NMTGEVB** like upper Figure3.
2. Connects the Battery between BAT- and BAT +.
3. Measure the voltage between BAT- and PAC-.  
If the voltage is near to BAT+, short-circuit PAC- and BAT- and open.
4. When the voltage is near to 0V, take off the voltmeter.
5. Monitors the current through the BAT+ and PAC- with current probe.
6. Turns on the short cricuit SW.
7. At this moment, We can measure the short circuit detection delay time and the short circuit current.

## 2.6 Reset detection/release time Procedure

1. Connect **LC05132C01NMTGEVB** like upper Figure4.
2. Set to 3.7V Voltage Current Source1. Set to 10mA at Current limit.  
“MEASURE FUMCTION” is the “IM” (AUTO MODE). Check that the IM is less than 0.1uA.
3. Set to -10mA Voltage Current Source2. Set to 2V at Voltage limit.  
Check that the IM is 2.5uA~3.5uA.
4. Set the amplitude to 3.7V, the offset to 1.85V and the frequency to 0.25Hz Synthesized Function Generator.
5. Monitor the voltage of the RSTB-terminal and the PAC-terminal.
6. The RSTB-voltage becomes Low(T1) from High and the PAC- voltage becomes 2V(T2) from 0V. It is (TYP) 20ms from T1 to T2.
7. The RSTB-voltage becomes High(T1) from Low and the PAC- voltage becomes 0V(T2) from 2V. It is (TYP) 1sec from T1 to T2.

Vov/Vovr/Ioch は LC05112 のデータを  
センタリングしたグラフ

**3. Performance Data** (It substitutes the characteristics of LC05132C01NMTG.)

