BC20

Power Consumption Report

NB-IoT Module Series

Rev. BC20_Power_Consumption_Report_V1.0

Date: 2019-05-28

Status: Released

Our aim is to provide customers with timely and comprehensive service. For any assistance, please contact our company headquarters:

Quectel Wireless Solutions Co., Ltd.
7th Floor, Hongye Building, No.1801 Hongmei Road, Xuhui District, Shanghai 200233, China
Tel: +86 21 5108 6236
Email: info@quectel.com

Or our local office. For more information, please visit:
http://quectel.com/support/sales.htm

For technical support, or to report documentation errors, please visit:
http://quectel.com/support/technical.htm
Or email to: support@quectel.com

GENERAL NOTES

QUECTEL OFFERS THE INFORMATION AS A SERVICE TO ITS CUSTOMERS. THE INFORMATION PROVIDED IS BASED UPON CUSTOMERS' REQUIREMENTS. QUECTEL MAKES EVERY EFFORT TO ENSURE THE QUALITY OF THE INFORMATION IT MAKES AVAILABLE. QUECTEL DOES NOT MAKE ANY WARRANTY AS TO THE INFORMATION CONTAINED HEREIN, AND DOES NOT ACCEPT ANY LIABILITY FOR ANY INJURY, LOSS OR DAMAGE OF ANY KIND INCURRED BY USE OF OR RELIANCE UPON THE INFORMATION. ALL INFORMATION SUPPLIED HEREIN IS SUBJECT TO CHANGE WITHOUT PRIOR NOTICE.

COPYRIGHT

About the Document

History

Revision	Date	Author	Description
1.0	2019-05-28	Ostrovsky WEI	Initial

Contents

Table Index

Figure Index

1 Introduction

This document describes the power consumption of BC20 module under different states.

2 Power Consumption

The following illustrate the power consumption of BC20 under NB-IoT network.

2.1. NB-IoT Power Consumption under Different Modes

Table 1: NB-IoT Power Consumption under Different States (3.3V Power Supply)

Description	Conditions		Typ.	Max.	Unit
Power off	**AT+QPOWD=0**		2.9	-	μA
Power Saving Mode	PSM @Real Network		3.8	-	μA
Idle Mode	DRX=2.56s @Instrument		440	-	μA
	DRX=1.28s @Instrument		650	-	μA
	eDRX=40.96s, PTW=10.24s @Instrument		260	-	μA
Active Mode	Single-tone (with 15kHz subcarrier)	Band 5, 23dBm @Instrument	85	244	mA
		Band 8, 23dBm @Instrument	87	247	mA
	Single-tone (with 3.75kHz subcarrier)	Band 5, 23dBm @Instrument	193	254	mA
		Band 8, 23dBm @Instrument	188	246	mA

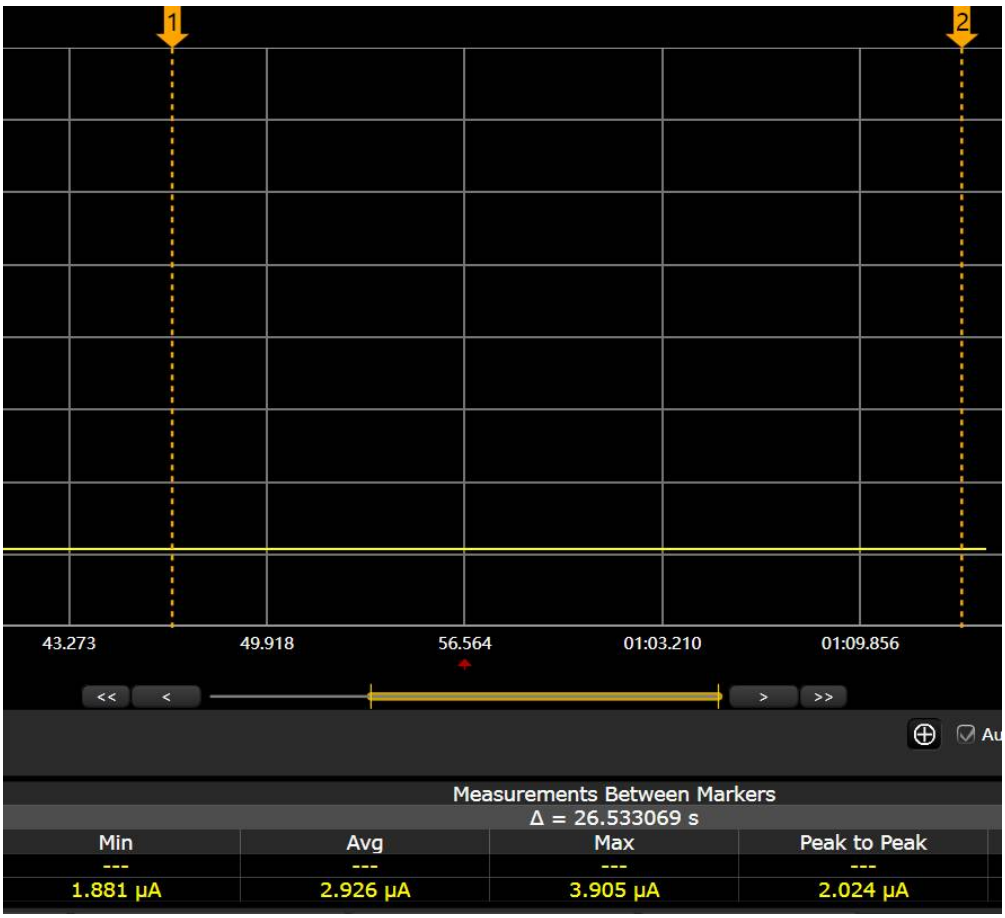

Figure 1: Current Consumption under Power off

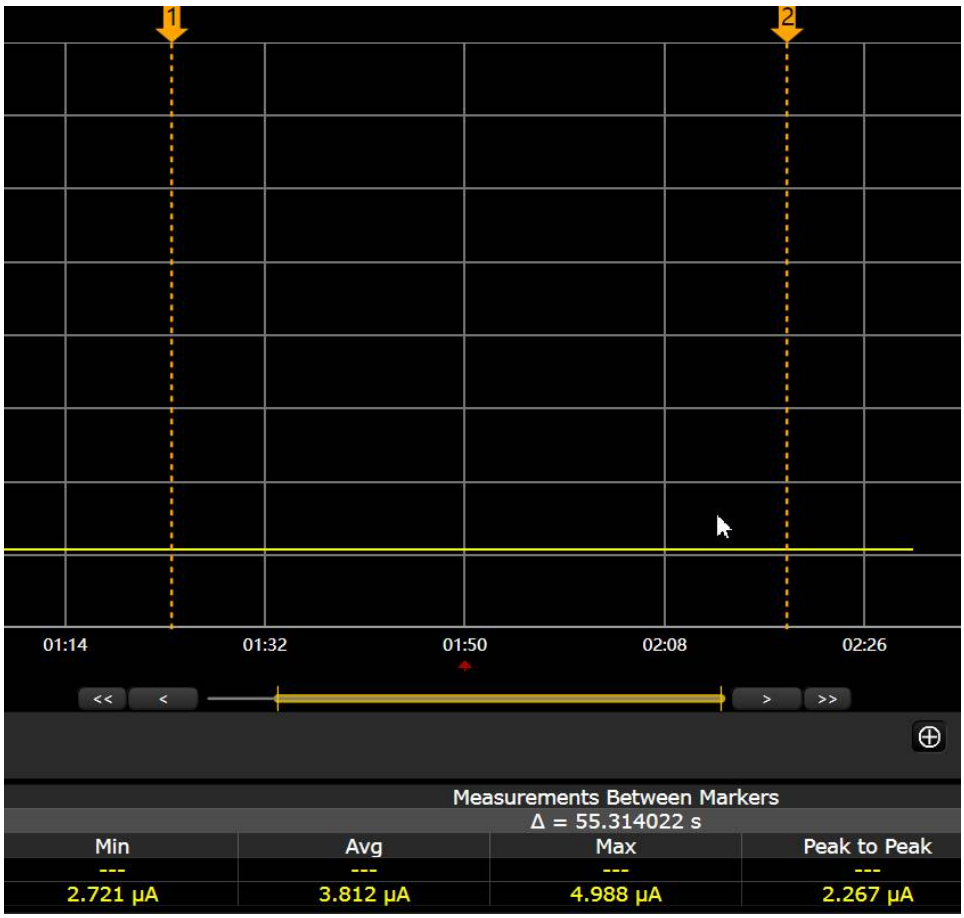

Figure 2: Current Consumption under PSM

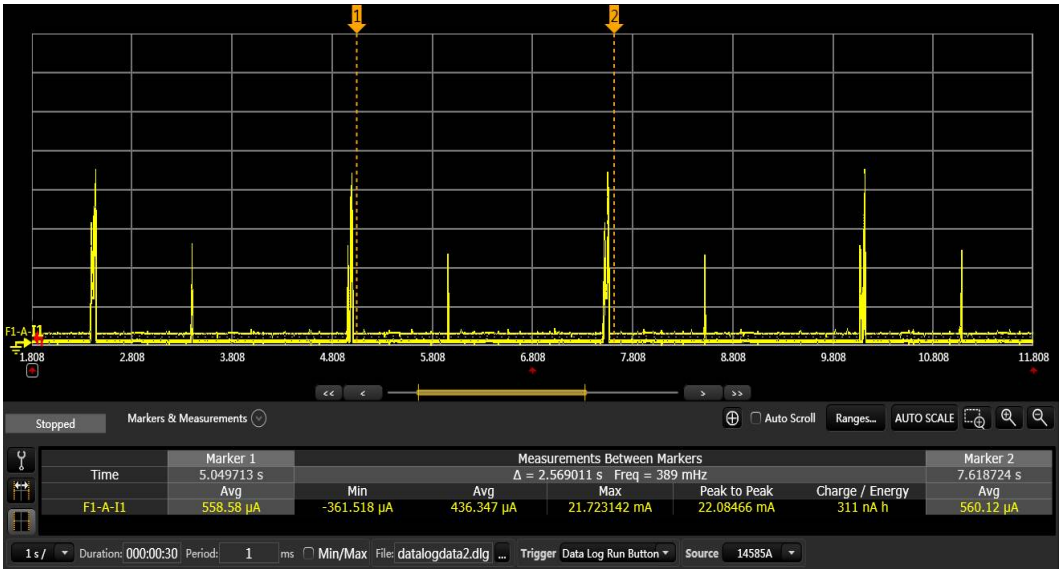

Figure 3: Current Consumption under DRX (Instrument)

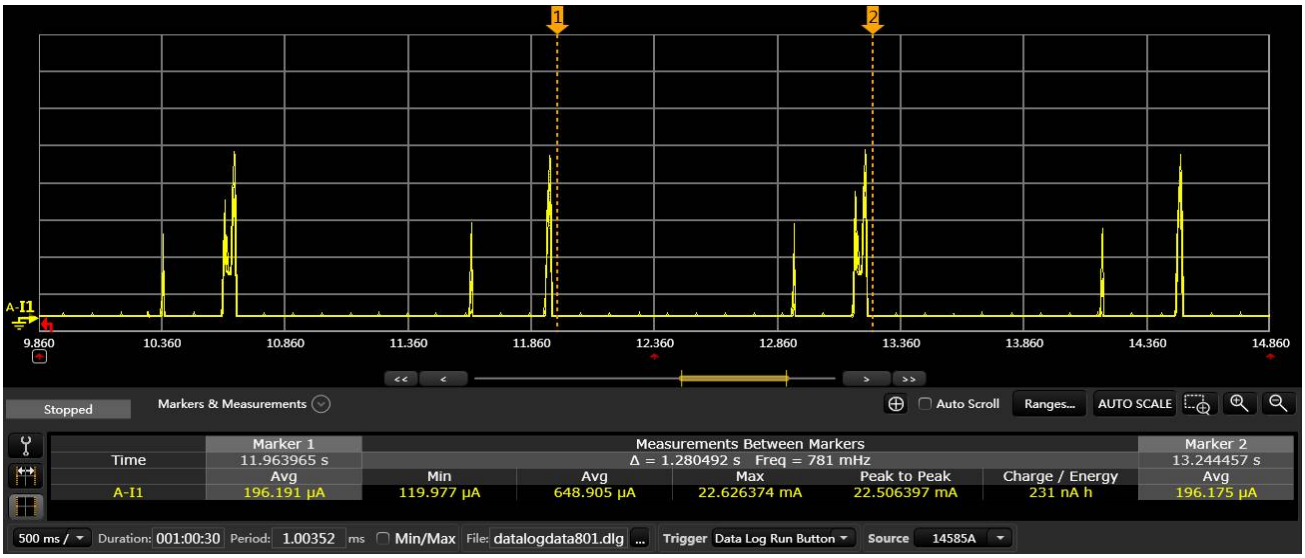

Figure 4: Current Consumption under DRX (Instrument)

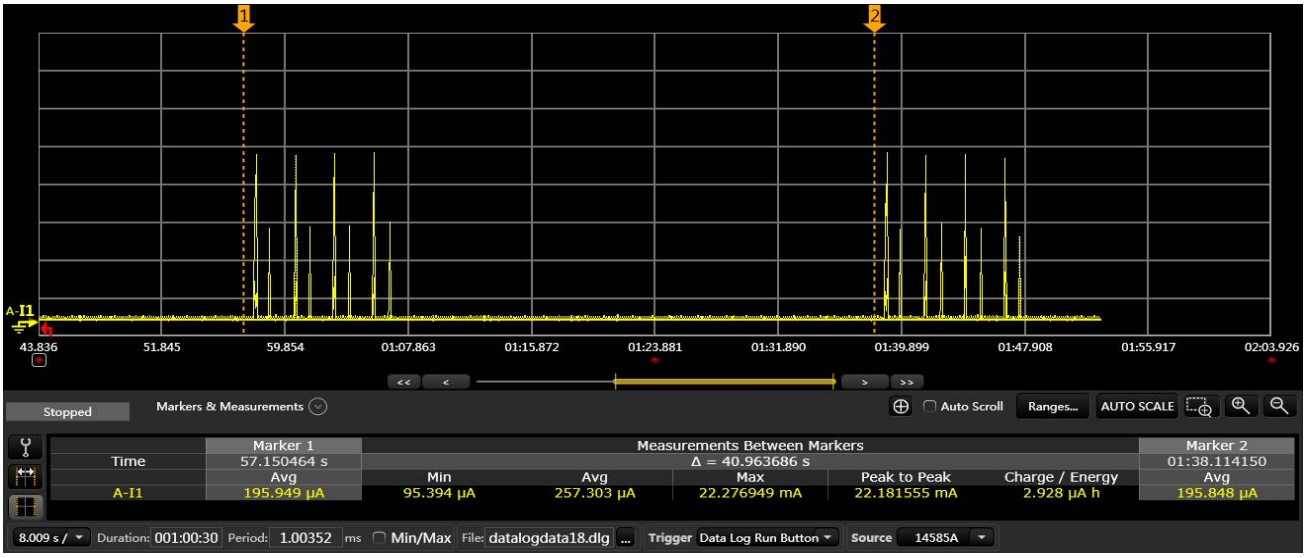

Figure 5: Current Consumption under eDRX

2.1.1. Power Consumption under Real Network Conditions

Table 2: Power Consumption under NB-IoT Real Network Conditions

Description	RSRP	Duration	Consumption
Startup → Idle Mode (DRX) → PSM	-85dBm	30s	139µAh

RRC Progress → Sending 200bytes → Idle Mode (DRX) → PSM	-85dBm	28s	241μAh

NOTES

- DRX time=1.28s
- T3324=2s
- T_{UE}=20s (UE inactive time)

Table 3: Power Consumption under Instrument Conditions

Description	RSRP	Duration	Consumption
PSM → TAU → Idle Mode (DRX) → PSM	-85dBm	22.56s	34μAh

NOTES

- DRX time=1.28s

2.1.2. UE Networking Processes

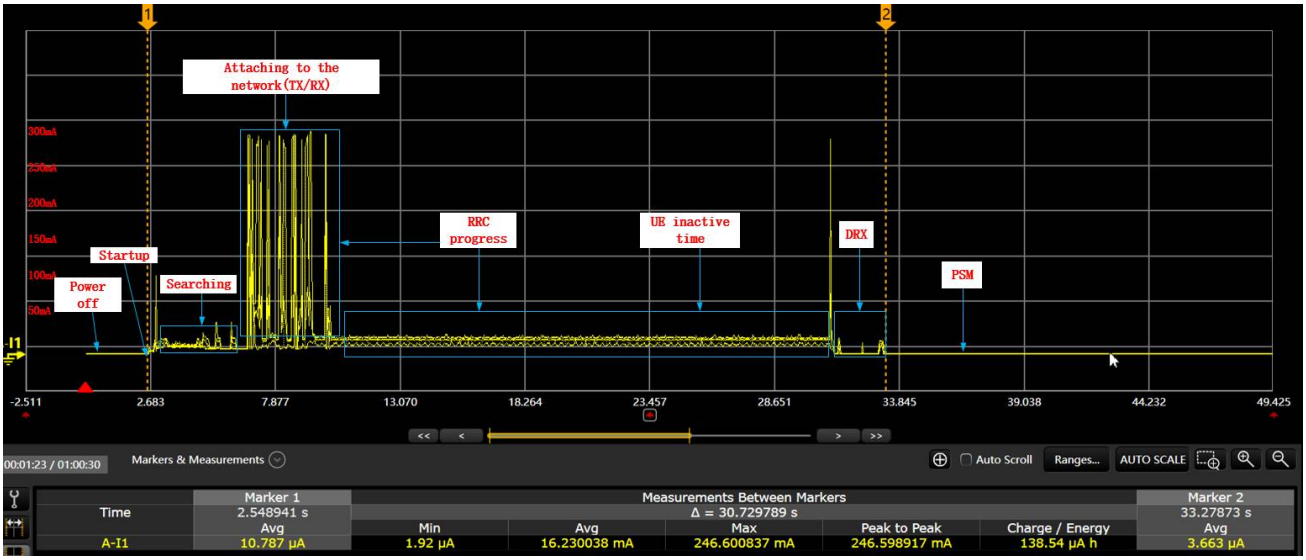

Figure 6: Schematic Diagram of UE Networking Process 1 (Real Network)

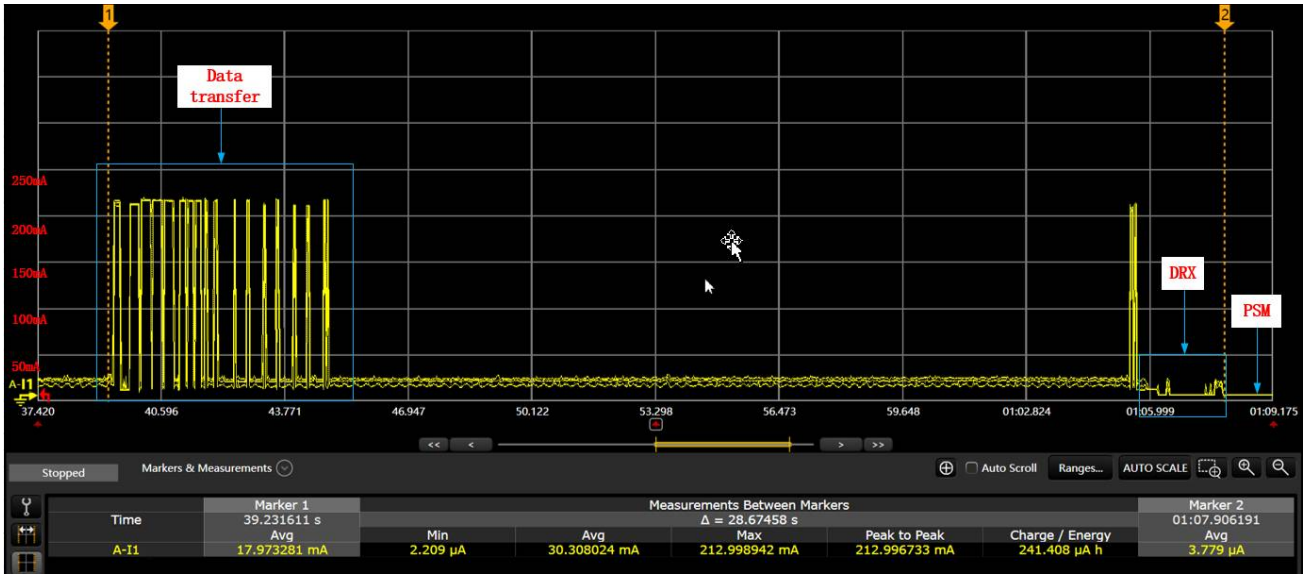

Figure 7: Schematic Diagram of UE Networking Process 2 (Real Network)

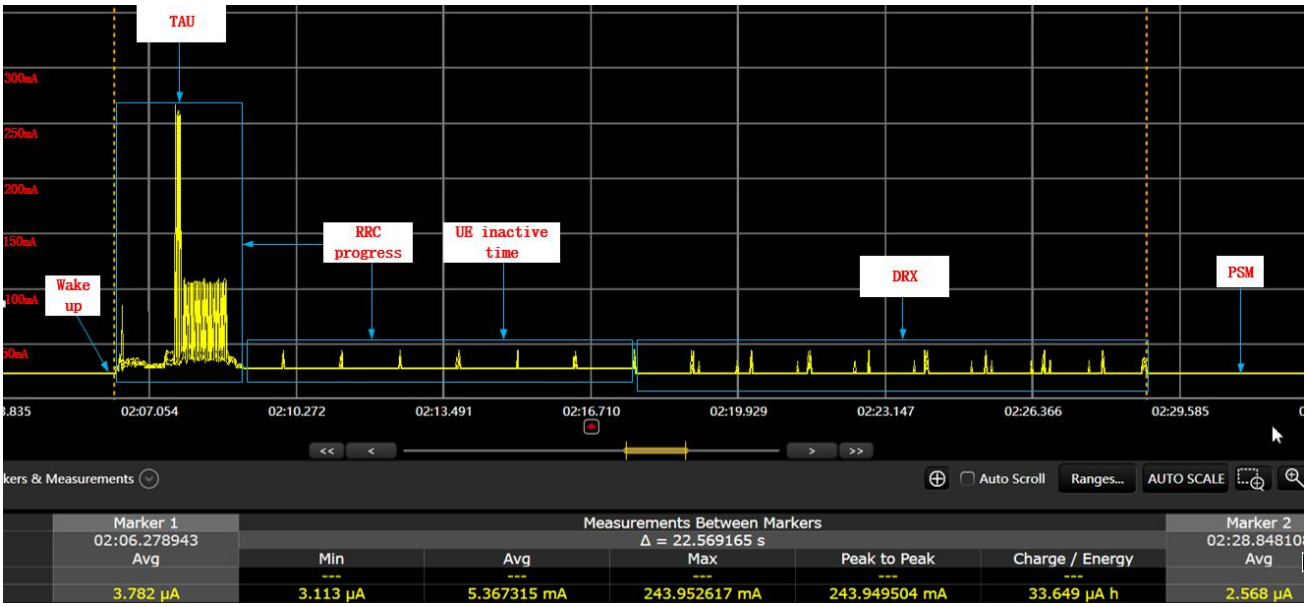

Figure 8: Schematic Diagram of UE Networking Process 3 (Instrument Connected)

2.2. GPS Power Consumption under Different States

Table 4: GPS Power Consumption under Different States (3.3V Power Supply)

Description	Conditions	Typ.	Max.	Unit
Searching	C/N: 40dBm, Cold start (Instrument Connected)	54.9	-	mA
	C/N: 40dBm, Hot start (Instrument Connected)	54.97	-	mA
	C/N: 40dBm, Warm start (Instrument Connected)	54.88		mA
	C/N: 40dBm, Lost state (Instrument Connected)	55.62		mA
Tracking	C/N: 40dBm, (Instrument Connected)	29.76		mA

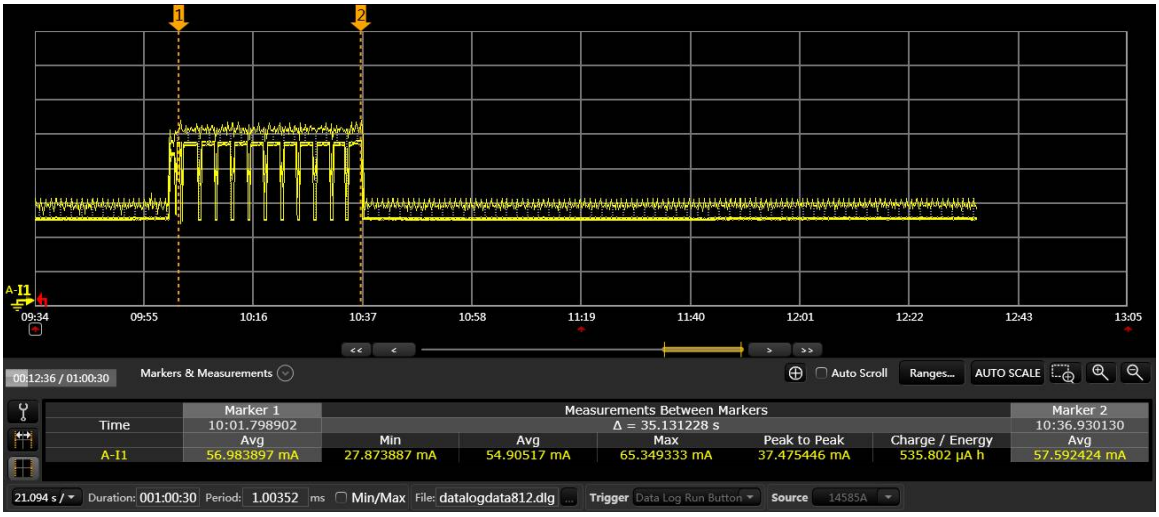

Figure 9: Schematic Diagram of GPS Searching (Clod start, Instrument Connected)

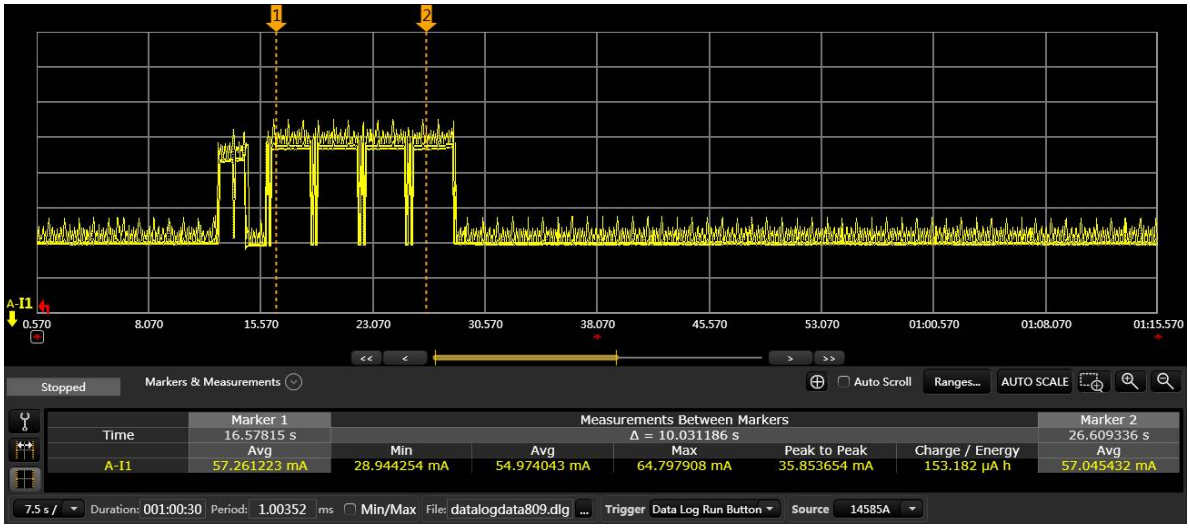

Figure 10: Schematic Diagram of GPS GPS Searching (Hot start, Instrument Connected)

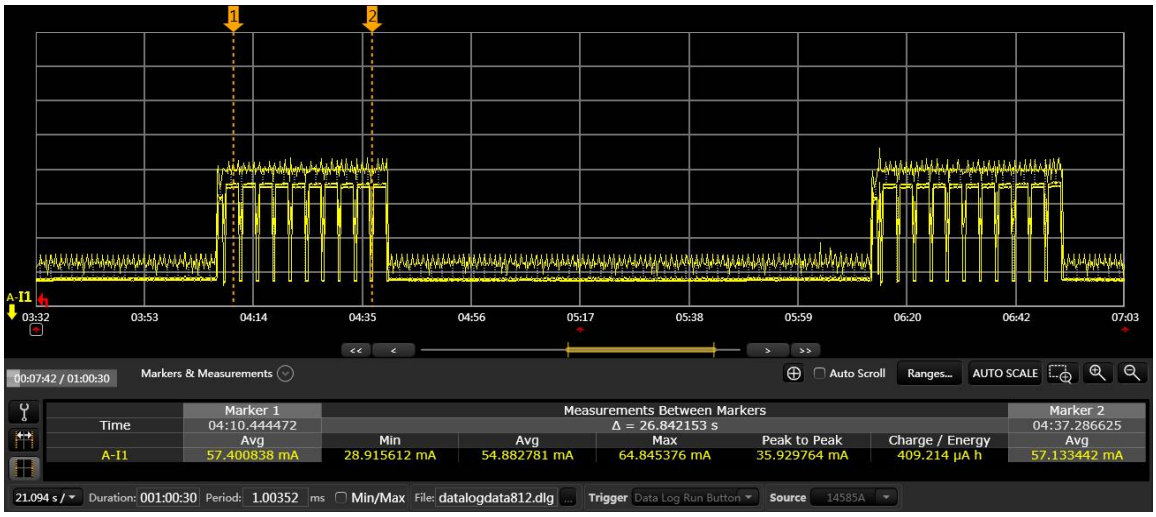

Figure 11: Schematic Diagram of GPS Searching (Warm start, Instrument Connected)

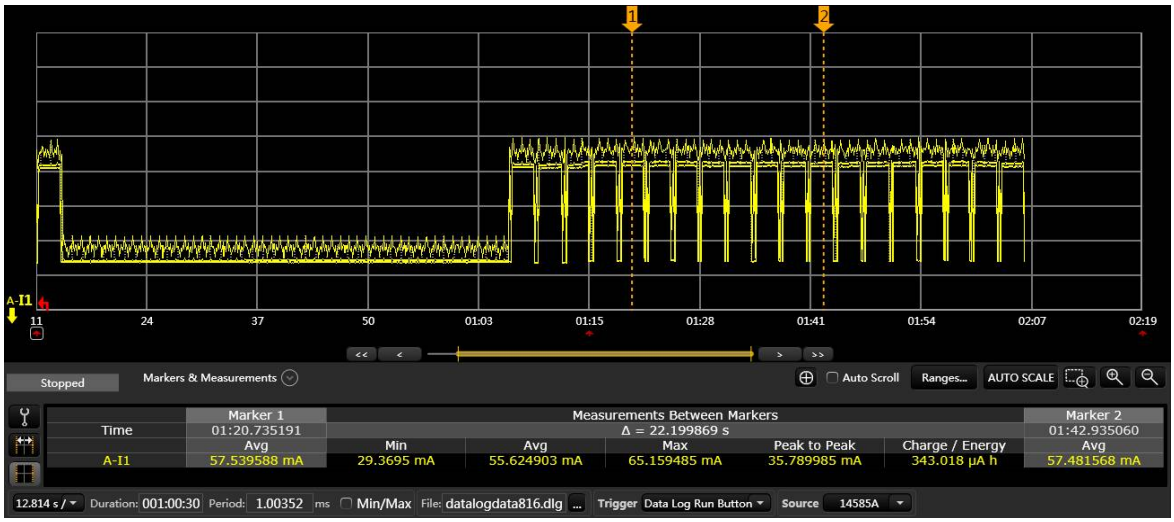

Figure 12: Schematic Diagram of GPS Searching (Lost state, Instrument Connected)

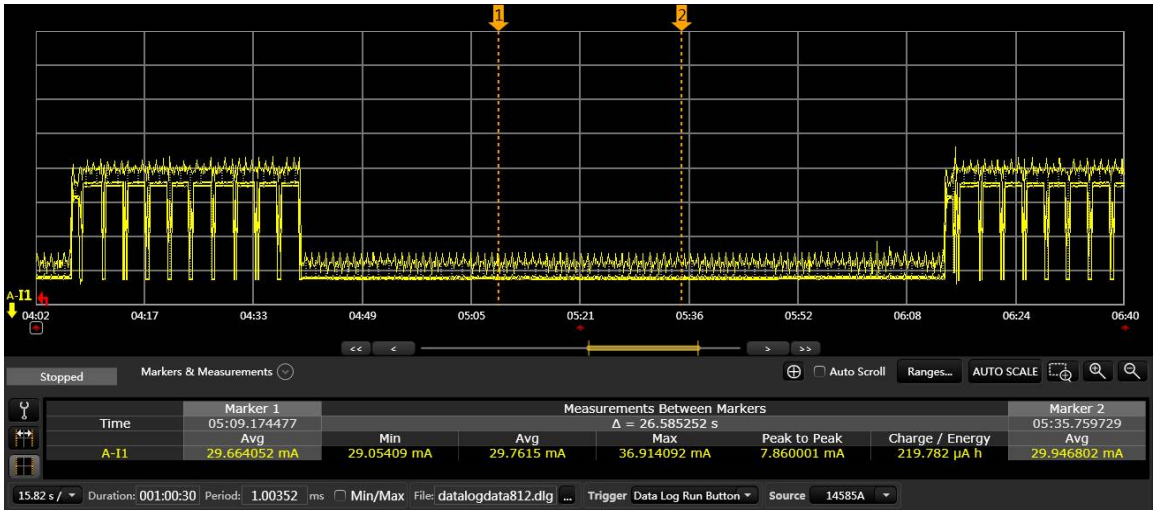

Figure 13: Schematic Diagram of GPS Tracking (Instrument Connected)

Table 5: GNSS Power Consumption under PSM (3.3V Power Supply)

NB-IoT AP	NB-IoT Modem	GNSS 模式	GNSS 系统	平均值	单位
Normal	PSM	捕获	GPS	54.9	mA
			BeiDou	53.8	mA
			GPS+BeiDou	54.4	mA
		跟踪	GPS	29.6	mA
			BeiDou	29	mA
			GPS+BeiDou	30.2	mA
Idle	关闭	待机	\	113	uA

Figure 14: Schematic Diagram of GPS Searching under PSM (Instrument Connected)

Figure 15: Schematic Diagram of BeiDou Searching under PSM (Instrument Connected)

Figure 16: Schematic Diagram of GPS + BeiDou Searching under PSM (Instrument Connected)

Figure 17: Schematic Diagram of GPS Tracking under PSM (Instrument Connected)

Figure 18: Schematic Diagram of BeiDou Tracking under PSM (Instrument Connected)

Figure 19: Schematic Diagram of GPS + BeiDou Tracking under PSM (Instrument Connected)

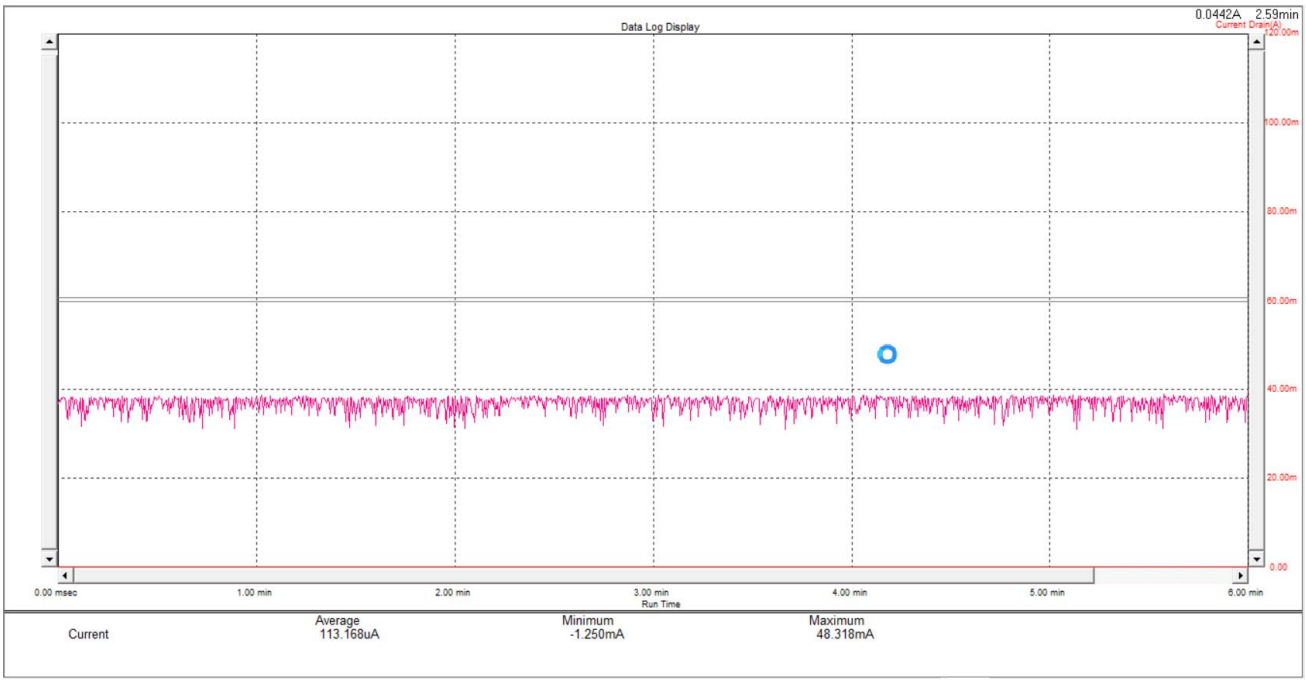

Figure 20: Schematic Diagram of GPS + BeiDou under Standby Mode (Instrument Connected)

3 Appendix A Reference

Table 6: Terms and Abbreviations

Abbreviation	Description
CMCC	China Mobile Communications Corporation
CT	China Telecom
DRX	Discontinuous Reception
eDRX	extended Discontinuous Reception
PSM	Power Saving Mode
PTW	Paging Time Window
RRC	Radio Resource Control
RSRP	Reference Signal Receiving Power
RX	Receive
TAU	Tracking Area Update
TX	Transmit
UE	User Equipment
GNSS	Global Navigation Satellite System
GPS	GlobalPositioning System
BeiDou	BeiDou Navigation Satellite System