Hybrid Assistant Report

Info	
Car model	Camry
VIN	JTNBB46K073------
Odometer	177
Generated at	12/07/2018 15:11:02
Version	HA:236 HR:67

Index

Trip summary

Time	
Start	12/07/2018 15:00:04
Finish	12/07/2018 15:09:41

Trip					
	Total	**EV**	**%**	**No Fuel**	**%**
Distance	0.00 km	0.00 km	0%	0.00 km	0%
Time	9:36	5:35	59%	5:35	58%
Moving	0:00	0:00	NaN%	0:00	NaN%

Speed	
Average	0 km/h
Moving Average	NaN km/h
EV Average	0 km/h
Max	0 km/h

Environment	
Start SOC	60.00%
End SOC	50.20%
Avg Ambient Temperature	0°C
Altitude Delta	0

Trip summary values are detailed by Time, Moving and EV.
Time is the total trip time.
Moving stats regards only the fraction of time while the car was not standing still.
EV stats are accounted only when the petrol engine is stopped.
No Fuel sums EV driving with the petrol engine running without fuel like coasting at high speed or driving down a slope.

Device info

Phone	
Manufacturer	LGE
Model	LG-M257
Product	lv517_crk_us
Android SDK	24
Hostname	LG Harmony VSY
Screen	720x1193
Scale	2

OBD	
Connection type	Bluetooth
Model	Vgate iCar 1/G-EZTB-OBDDROID Goliton POWER2
MAC Address	00:1D:A5:1D:9A:30
Name	ELM327 v1.5
Manufacturer	OBDII to RS232 Interpreter
Firmware	?

Requests per second	
Average	9
Start	9
End	9
Delta	0
Min	3
Max	13

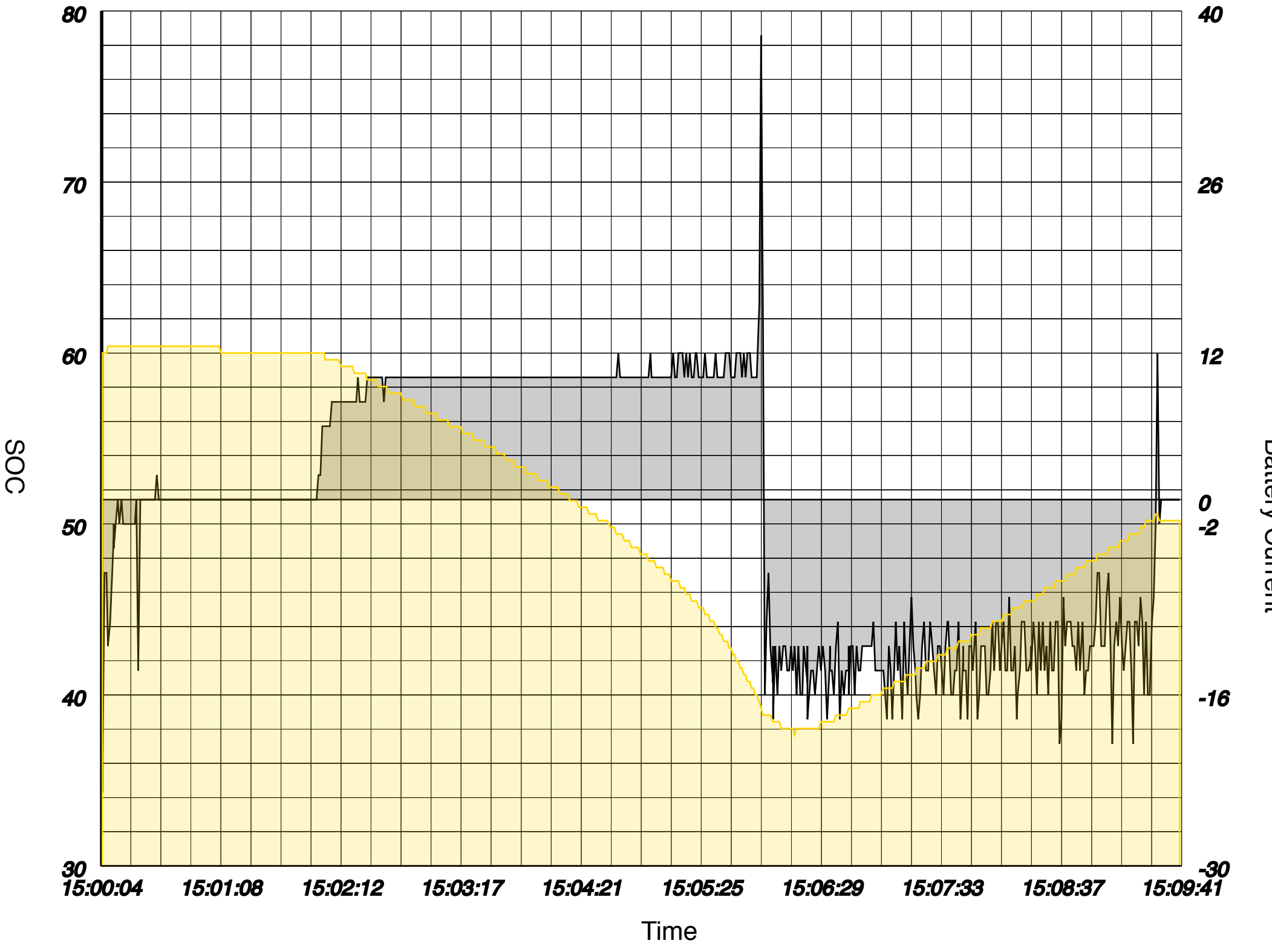
Sampling	
Start time	12/07/2018 15:00:04
End time	12/07/2018 15:09:41
Duration	9:36
Samples	1233
Average	0.47 sec
Standard deviation	0.10 sec
Disconnections	0

Corrupted frames	0/8,608

Information about phone and OBD adapter.
The sampling average is the time taken for reading all sensors, in seconds: the lowest, the fastest Hybrid Assistant will run.
Speed is mainly affected by OBD adapter and by other apps running on the phone.

SOC Statistics

SOC



SOC

Battery Current

SOC	
Average	50.38%
Start	60.00%
End	50.20%
Delta	-9.80%
Min	37.65%
Max	60.39%
Standard deviation	7.54%

Variations	
Difference from optimum	-9.62%
SOC gained from brakings	0.00%
SOC gained from coasting	0.00%
Total SOC gained	0.00%
SOC charged by ICE	13.33%

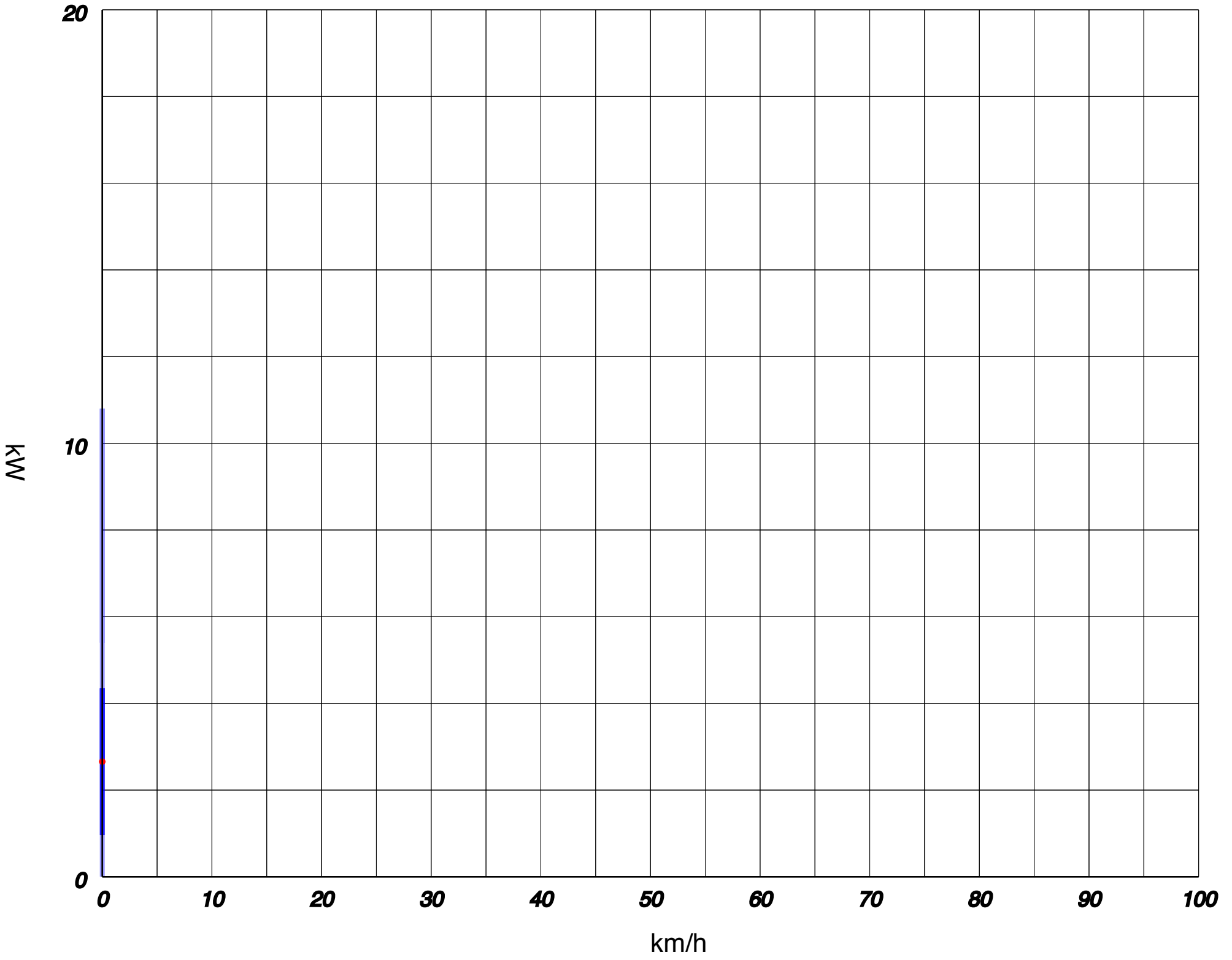
High Voltage Battery Statistics

Levels		
	Current	Voltage
Avg	-0.62 A	270.54 V
Min	-24.00 A	234.00 V
Max	40.00 A	296.00 V

Power			
	Power	Charge Limit	Discharge Limit
Avg	-0.300 kW	-18.307 kW	25.444 kW
Start	2.256 kW	-5.500 kW	25.500 kW
End	0.000 kW	-23.000 kW	25.500 kW
Min	-6.960 kW	-24.000 kW	24.500 kW
Max	10.800 kW	-5.000 kW	25.500 kW

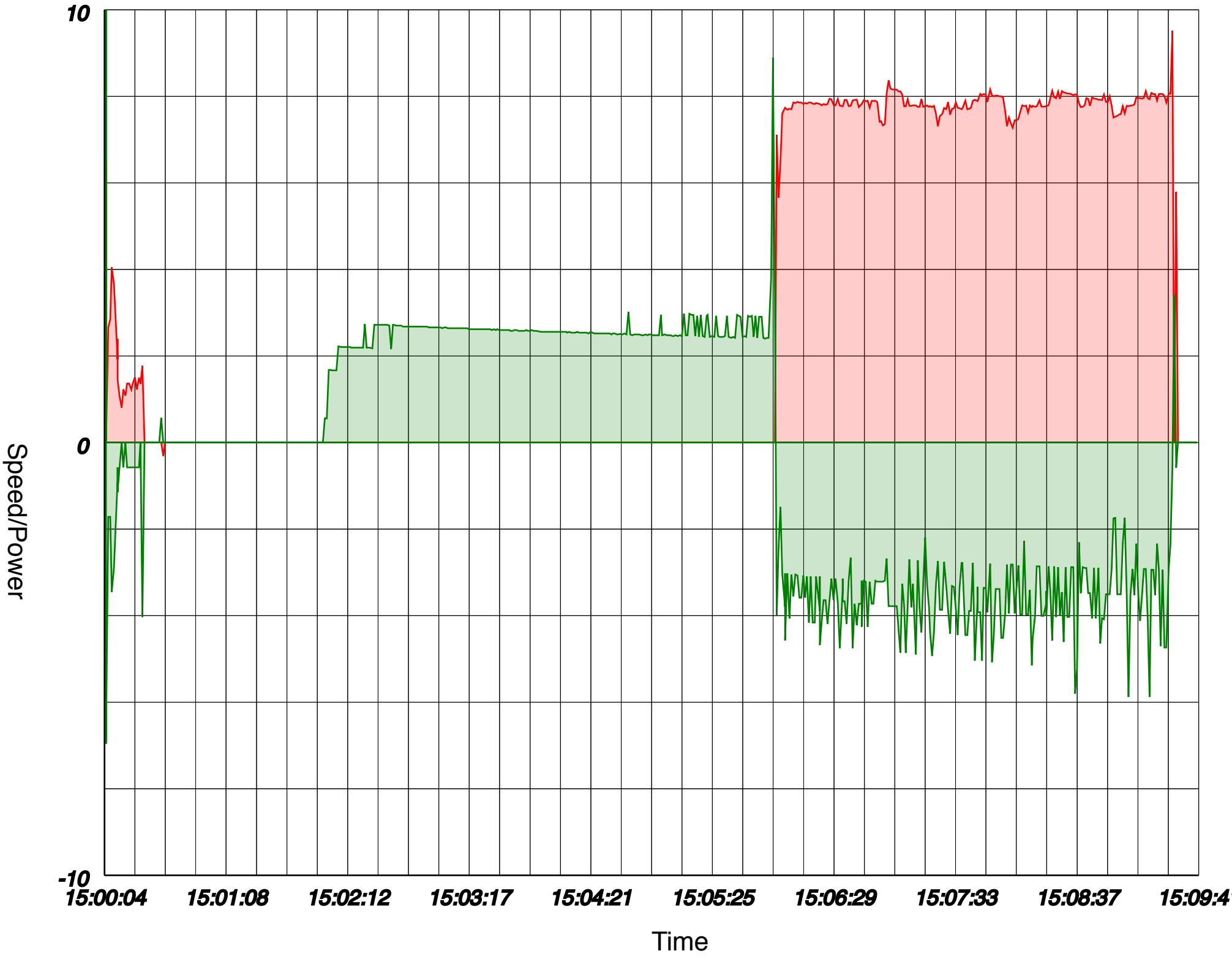
Energy	
Total energy from the battery	0.172 kWh
Total energy to the battery	0.219 kWh
Battery energy balance	0.047 kWh
Average services consumption	1.628 kW

Average Power Usage



Plot of power required to keep a given speed.
Values are collected only when a constant speed is maintained long enough to have a consistent reading, so a trip with many different speeds may not gather enough data to plot.
Since required energy is heavily influenced by road slope, you should drive on a plain road to have a correct reading.

Power Distribution


10
0
-10
Speed/Power
15:00:04
15:01:08
15:02:12
15:03:17
15:04:21
15:05:25
15:06:29
15:07:33
15:08:37
15:09:41
Time

Speed

Engine power

HV Battery Power

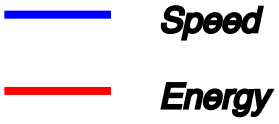
Energy Balance

Energy (kWh)

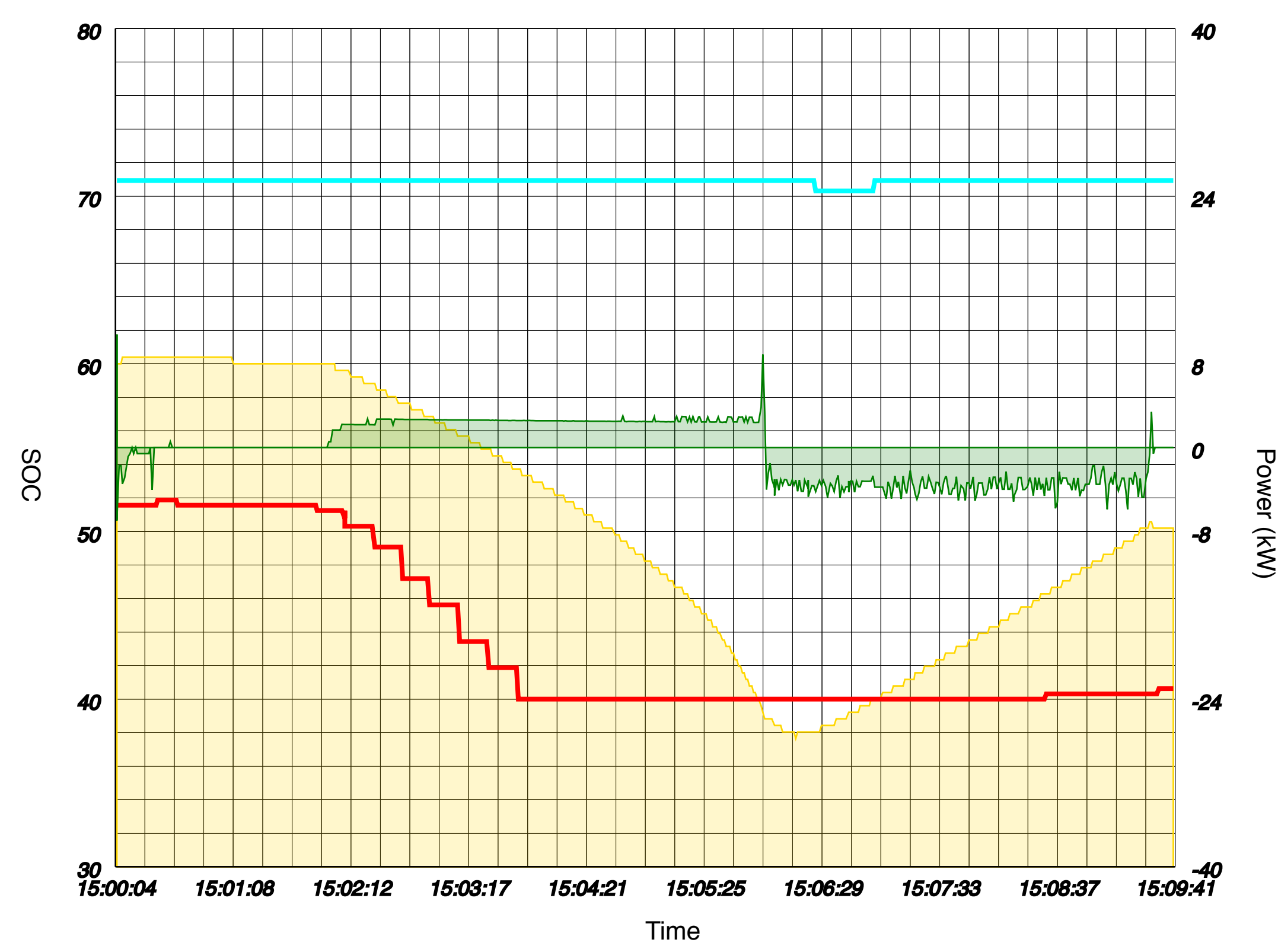
Time

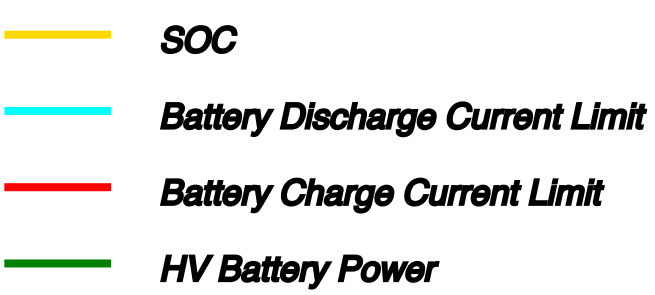
15:00:04
15:01:08
15:02:12
15:03:17
15:04:21
15:05:25
15:06:29
15:07:33
15:08:37
15:09:41

Speed



CCL and DCL


80
70
60
50
40
30
SOC
40
24
8
0
-8
-24
-40
Power (kW)
15:00:04
15:01:08
15:02:12
15:03:17
15:04:21
15:05:25
15:06:29
15:07:33
15:08:37
15:09:41
Time



Charge and discharge kW limits for the battery.
These values may change with battery level and temperature.
When the battery is nearly full, charge limit is reduced.
On low temperatures, charge and discharge limits are reduced to preserve battery life.

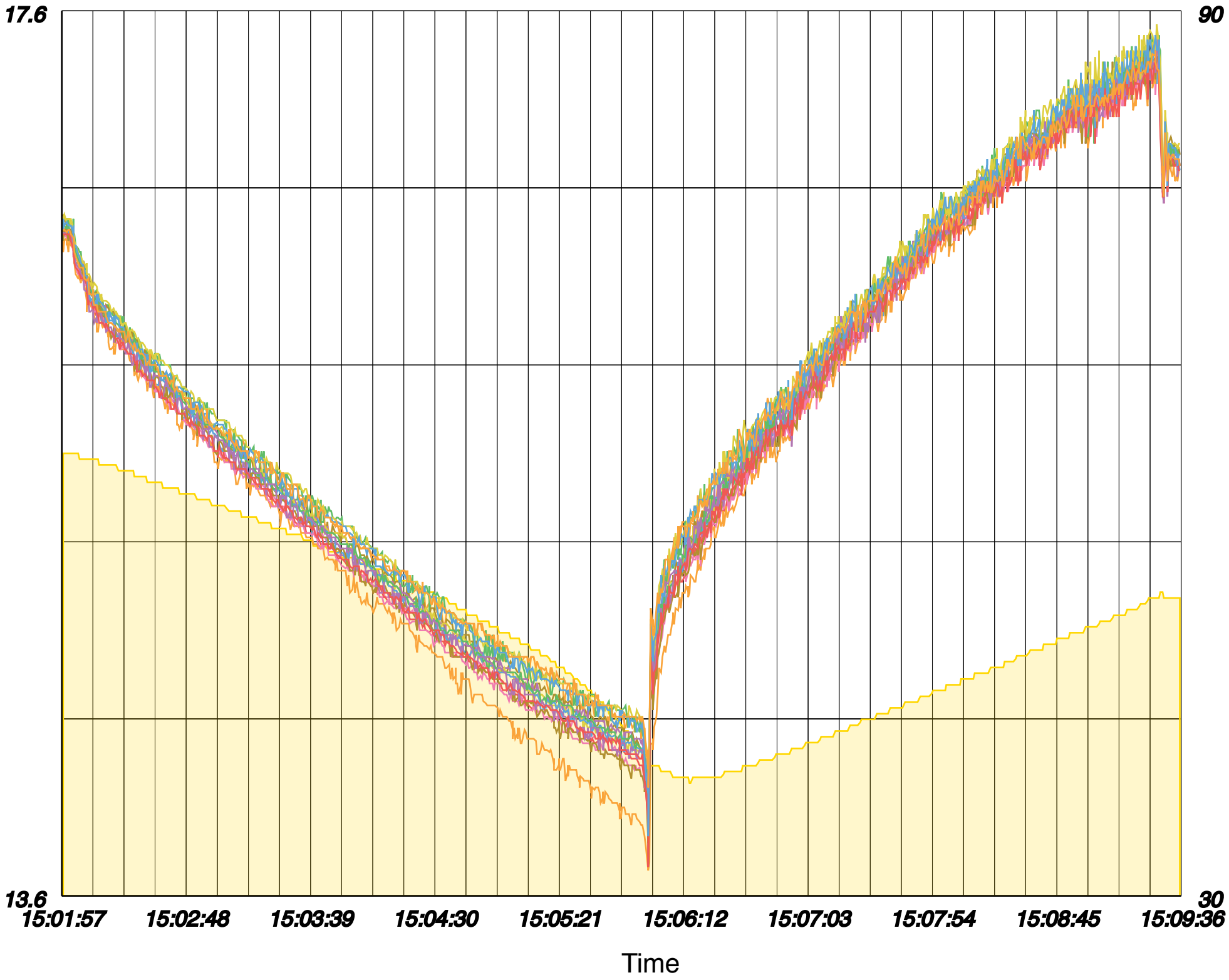
High Voltage Battery Health

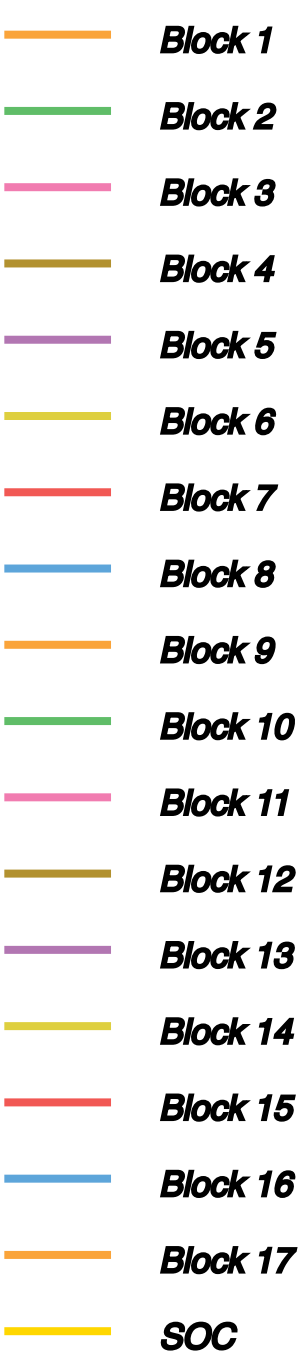
Be sure to follow the guideline for HV Check as specified on the official website.

Note: Statistics from this paragraph are limited to the HV Check time span, not the whole trip

HV Battery	
Number of Blocks	17
Number of samples	900
Average sample time	0.51
Start time	12/07/2018 15:01:57
End time	12/07/2018 15:09:36
Duration	7:39

Block values





Voltage value of each battery block.
A block behaving differently from the others may indicate a degraded element.

Voltage Delta

Delta

2

0

15:09:36

15:08:45

15:07:54

15:07:03

15:06:12

15:05:21

15:04:30

15:03:39

15:02:48

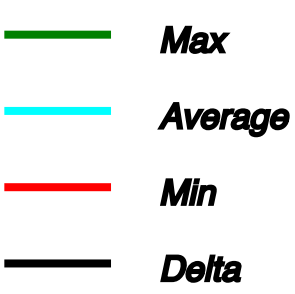
15:01:57

Time

17.6

13.6

V



Min, max and average voltage values are plotted.
Average value should be halfway between min and max; a bias over one value may indicate an unbalanced battery.
Voltage delta between highest and lowest block is also plotted on the bottom of the chart.

Blocks stats						
Block	Min	Max	% Time @ Min V	Avg Bias	Max Bias	Avg Local Delta
1	14.17	17.42	0.78	0.07	0.27	0.12
2	14.17	17.49	0.11	0.04	0.25	0.18
3	13.80	17.39	3.67	0.16	0.37	0.19
4	13.85	17.49	0.11	0.09	0.32	0.11
5	14.14	17.47	0.11	0.09	0.37	0.07
6	14.07	17.51	0.00	0.09	0.27	0.11
7	13.75	17.39	2.89	0.16	0.42	0.13
8	13.79	17.46	0.22	0.11	0.38	0.18
9	13.70	17.42	49.89	0.23	0.61	0.26
10	14.14	17.47	0.00	0.10	0.31	0.22
11	13.80	17.42	4.56	0.18	0.37	0.12
12	13.73	17.44	0.89	0.15	0.44	0.08
13	14.02	17.47	0.44	0.13	0.25	0.16

14	14.17	17.54	0.00	0.02	0.13	0.25
15	13.73	17.42	2.44	0.15	0.44	0.24
16	13.87	17.49	0.00	0.05	0.30	0.14
17	14.09	17.42	0.11	0.06	0.22	0.10

Statistics for each battery block.

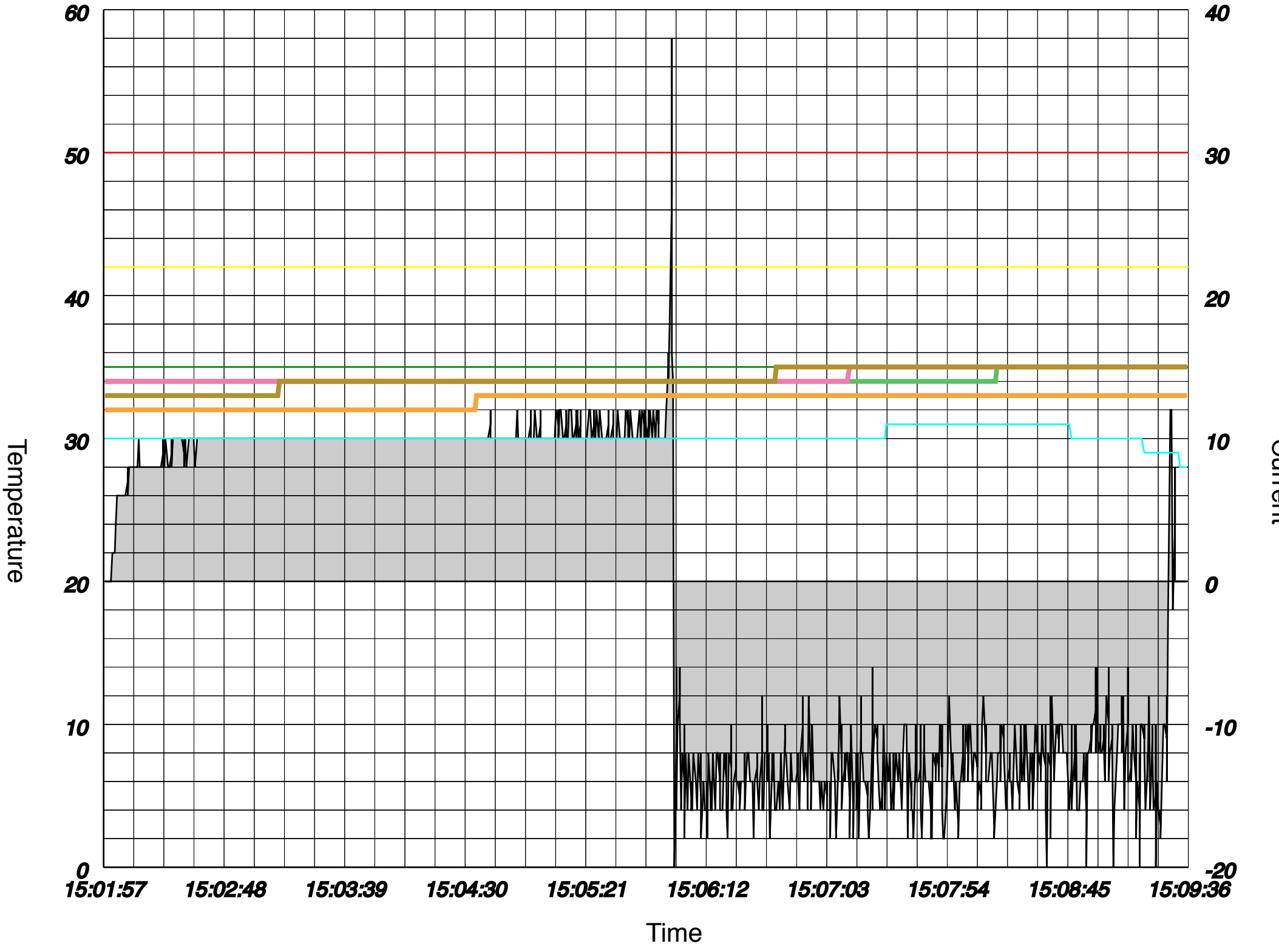
- Min: minimum observed value.
- Max: maximum observed value.
- % Time @ Min V: time percentage the given block was the lowest of the battery; high values may indicate a weak block.
- Bias: difference from the highest block.
- Local Delta: how much a block differs from its immediate neighbours.

Global stats	
Minimum observed battery voltage	237 V
Maximum observed battery voltage	296 V
Minimum observed block voltage	13.70 V
Maximum observed block voltage	17.54 V
Maximum Delta	0.61 V
Average Delta	0.24 V
Minimum observed current	-20.00 A
Maximum observed current	38.00 A
Minimum observed SOC	37.6%
Maximum observed SOC	60.0%
Delta SOC	22.4%
Energy	659mAh
Estimated Capacity	3.11Ah

Delta Thresholds	
Threshold	**Consecutive Samples**
0.2	296
0.45	14
0.7	0
0.95	0
1.2	0

Maximum delta value between highest and lowest block is the most important parameter for battery health: high delta values suggests a weary battery.
Delta values are significant only when repeated over a long time: the table counts consecutive samples where delta value is over the indicated threshold.
Low counts are not an indication of a fault while high counts may be.

HV Battery Temperature


60
50
40
30
20
10
0
40
30
20
10
0
-10
-20
Temperature
Current
15:01:57
15:02:48
15:03:39
15:04:30
15:05:21
15:06:12
15:07:03
15:07:54
15:08:45
15:09:36
Time

Sensor 1

Sensor 2

Sensor 3

Sensor 4

Battery Inhaling Temperature

Battery Current

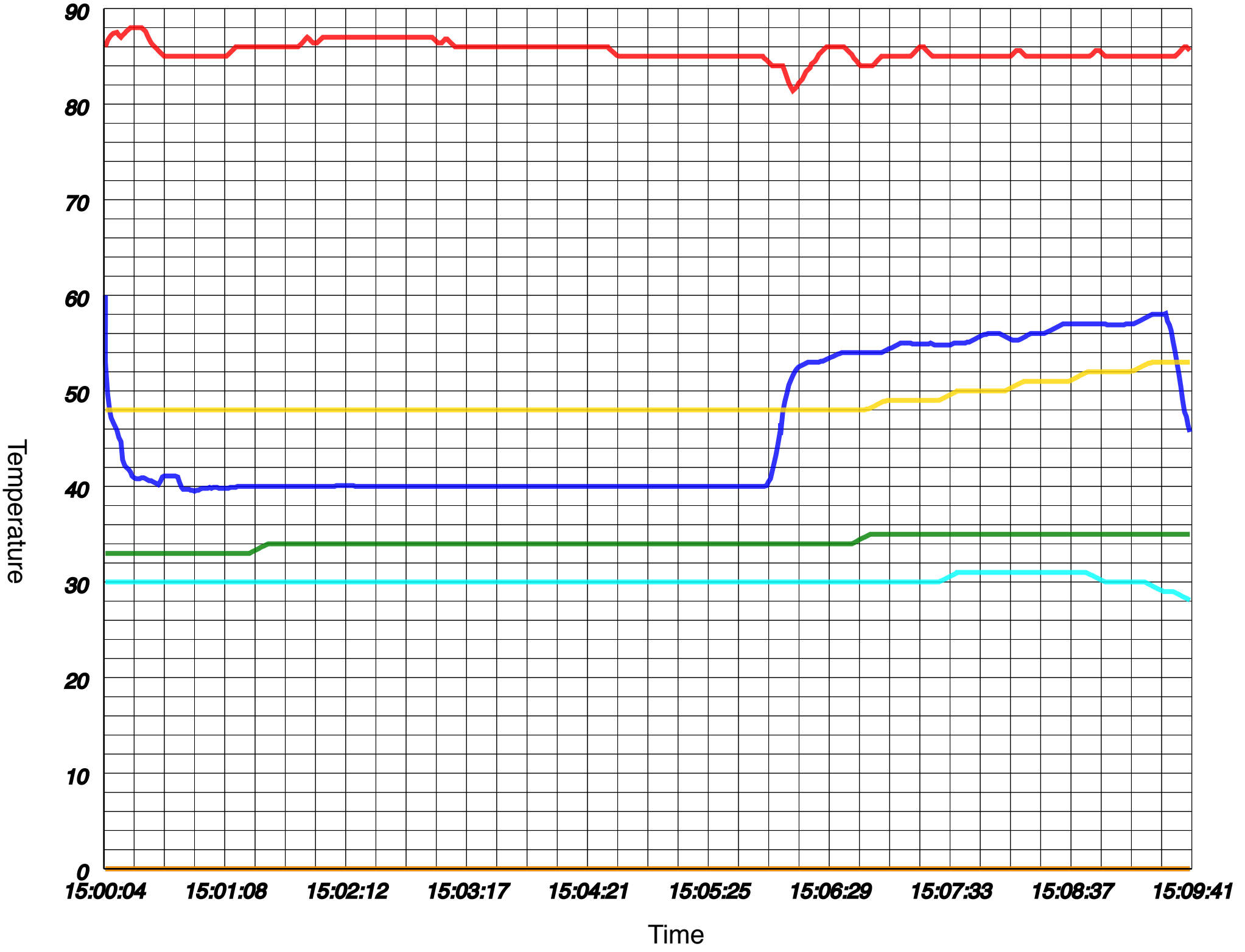
Critical

EV disable

Fan start

Temperature

Powertrain Temperature


90
80
70
60
50
40
30
20
10
0
Temperature
15:00:04
15:01:08
15:02:12
15:03:17
15:04:21
15:05:25
15:06:29
15:07:33
15:08:37
15:09:41
Time

Engine Coolant Temperature

Inverter Temperature

Battery Temperature

MG Temperature

Battery Inhaling Temperature

Room Temperature

Ambient Temperature

Temperature					
	Ambient	Room	Coolant	Inverter	MG
Avg	0°C	0°C	85°C	45°C	48°C
Min	0°C	0°C	81°C	39°C	48°C
Max	0°C	0°C	88°C	60°C	53°C

Time to reach given temperature	
Coolant Temperature	Time

HV Battery Temperature Sensors					
Sensor	In	1	2	3	4
% Max	-	0%	85%	92%	80%
Max	31°C	33°C	35°C	35°C	35°C
Avg	30°C	32°C	33°C	34°C	33°C
Min	28°C	32°C	33°C	33°C	33°C

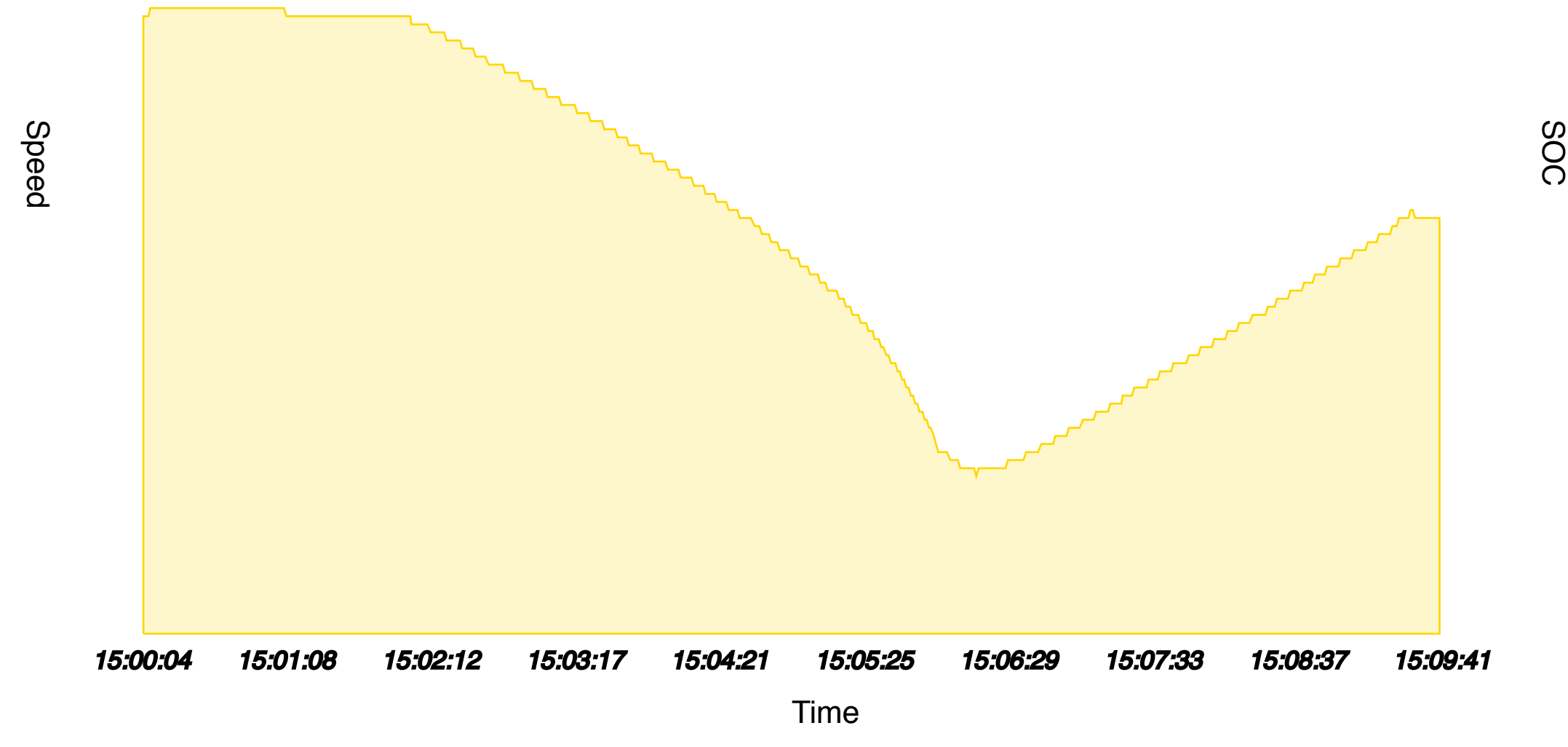
Temperatures for each car component.
Engine coolant temperature is the water temperature, while inverter and MG is the actual component temperature.
For inverters and MGs, only the most significant value among all components is shown.

HV Battery has multiple sensors: usually the inner ones are higher that the outer ones. % Max shows time percentage the specified sensor was the highest of the pack.

Trip

Altitude	
Avg	184
Start	184
End	184
Min	184
Max	184
Upward	0
Downward	0
Altitude Delta	0

Speed



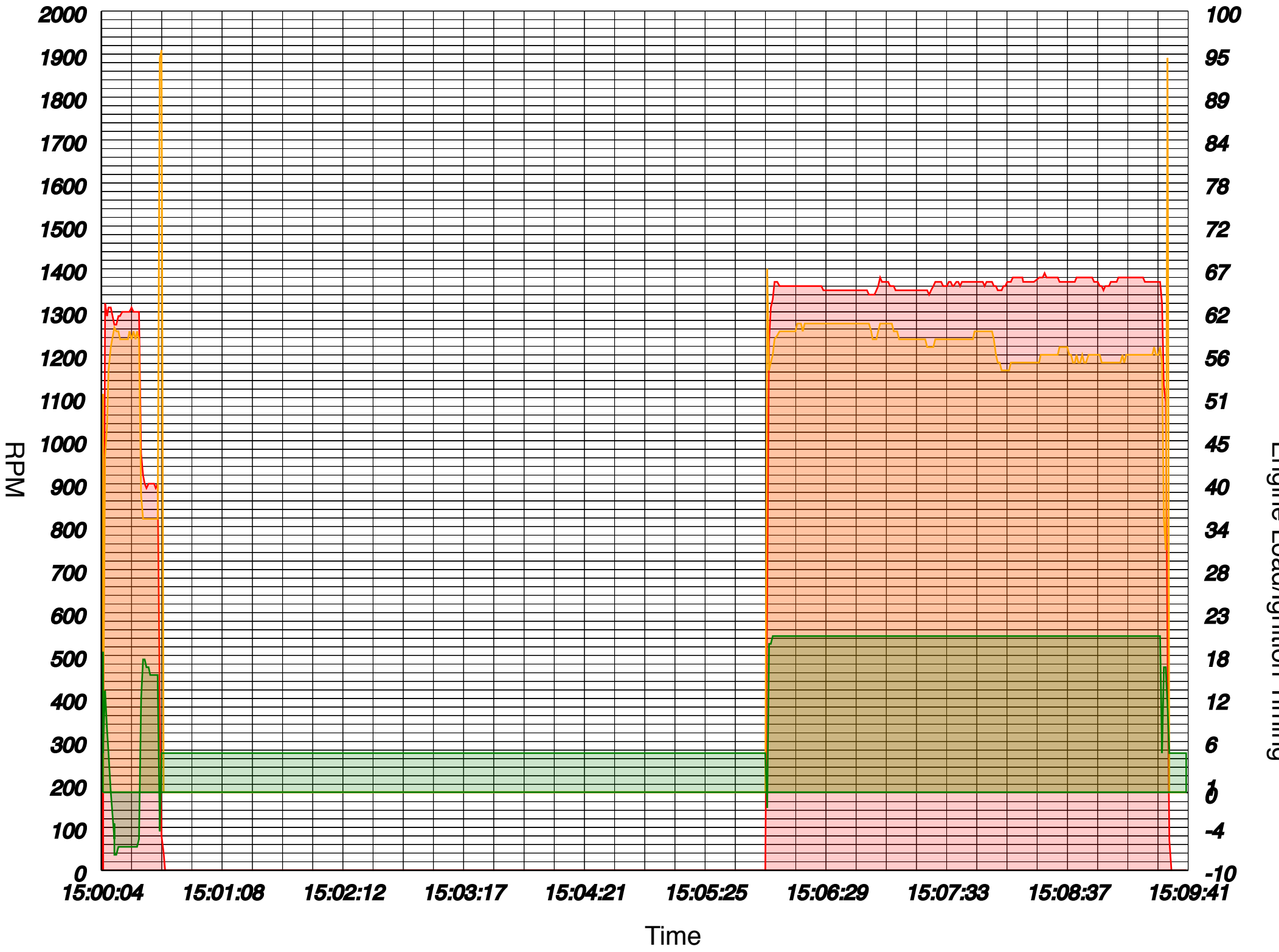
Speed	
Average	0 km/h
Moving Average	NaN km/h
EV Average	0 km/h
Max	0 km/h

Engine

	RPM	Load	Power	Timing
Avg	1,309	57%	7.281kW	10°
Max	1,390	95%	9.516kW	20°
Min	-	-	-	-8°

Ignitions	
Total	3
Inefficients	1

RPM


RPM
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
100
95
89
84
78
72
67
62
56
51
45
40
34
28
23
18
12
6
1
0
-4
-10
Engine Load/Ignition Timing
15:00:04
15:01:08
15:02:12
15:03:17
15:04:21
15:05:25
15:06:29
15:07:33
15:08:37
15:09:41
Time

RPM

Engine Load

Ignition Timing

Instant Fuel Consumption

Instant Fuel Consumption

Time

15:00:04
15:01:08
15:02:12
15:03:17
15:04:21
15:05:25
15:06:29
15:07:33
15:08:37
15:09:41

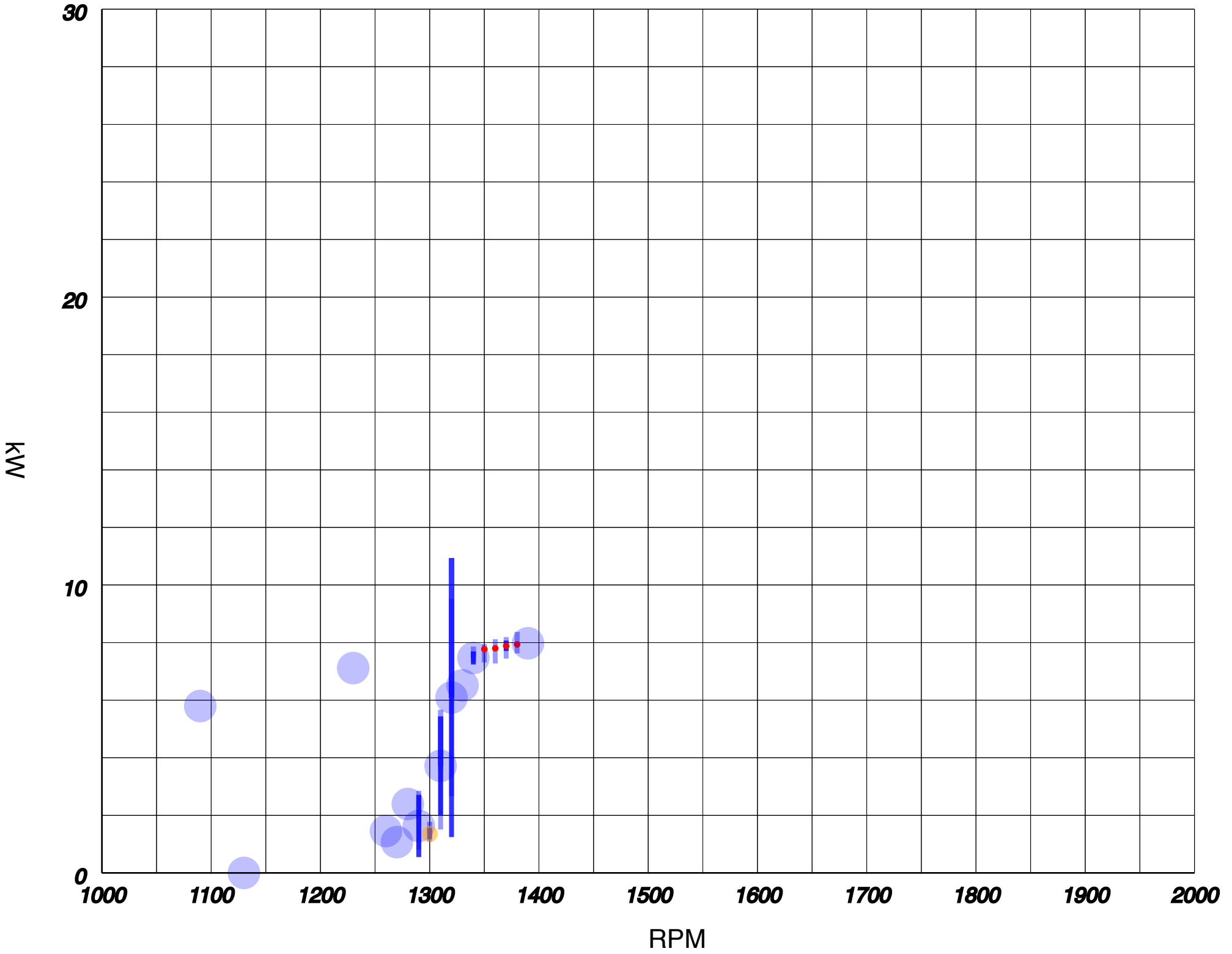
Speed

Speed

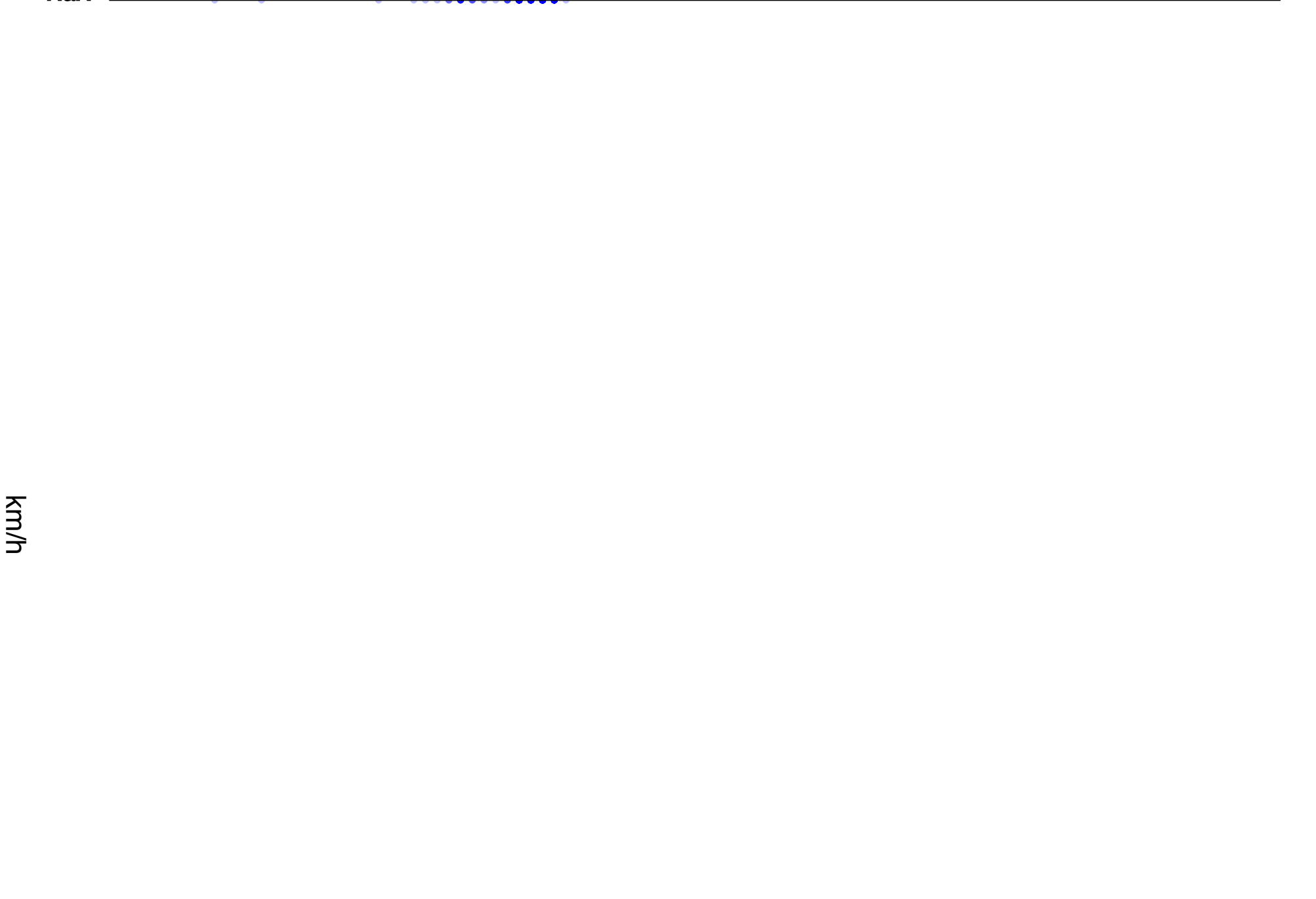
Instant Fuel Consumption

Energy	
Energy from the petrol engine	0.47 kWh

Power Map



RPM Scatter Chart



1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000

RPM

Engine		
State	**%**	**Longest Time**
ICE Running	41%	3:32 sec
ICE Spinning	0%	0:01 sec
ICE Off	59%	5:22 sec

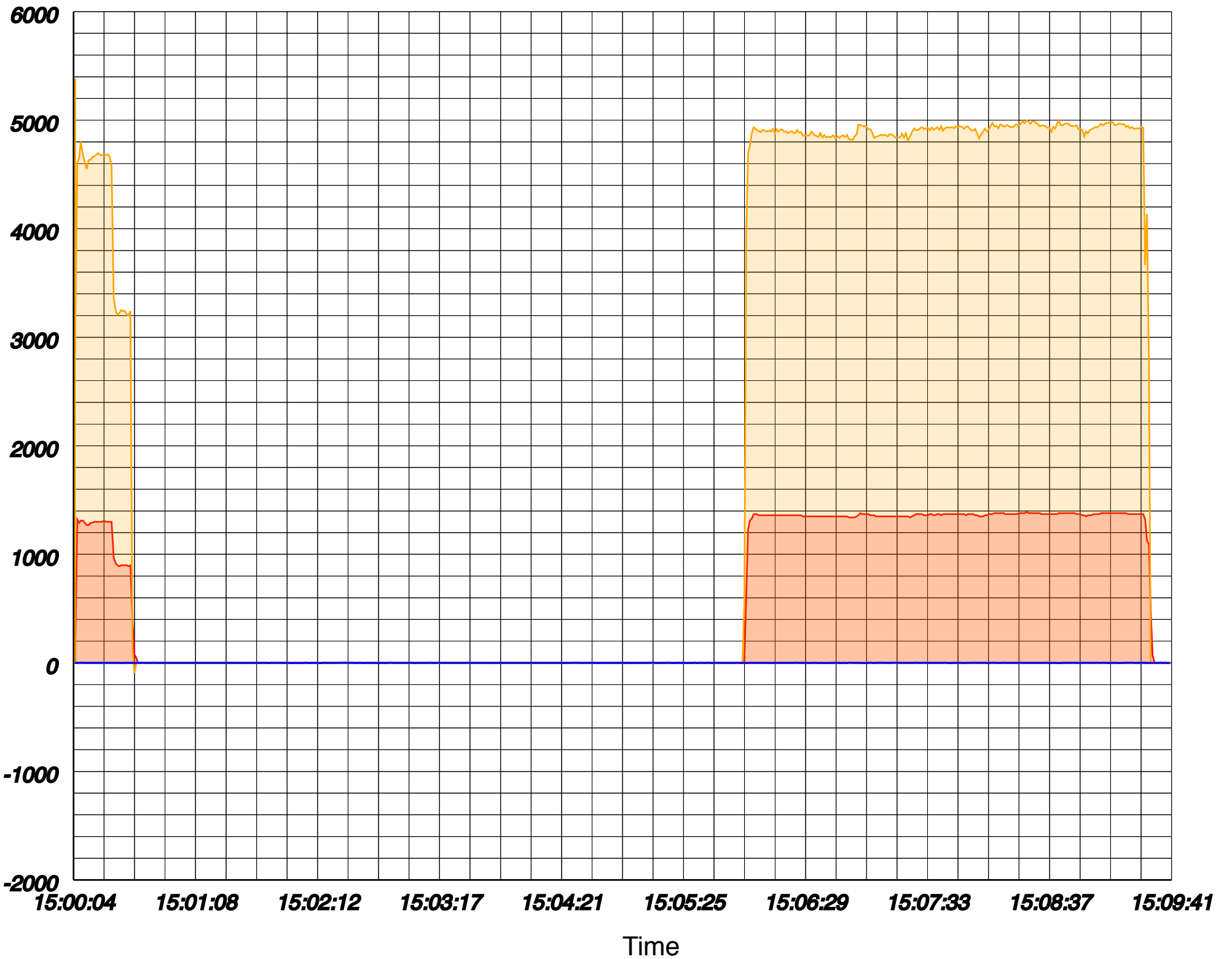
EV Statistics	
Trip Length	0.00 km
EV Range	0.00 km
Excessive EV events	0

EV States		
State	**%**	**Longest Time**
EV	59%	5:22 sec
EV traction	0%	0:00 sec
Excessive EV	0%	0:00 sec

PSD

	ICE	MG1 RPM	MG2 RPM	MG1 Torque	MG2 Torque
Avg	1,309	4,382	0	-14Nm	-14Nm
Max	1,390	5,382	4	64Nm	72Nm
Min	0	-95	-3	-17Nm	-36Nm

RPM

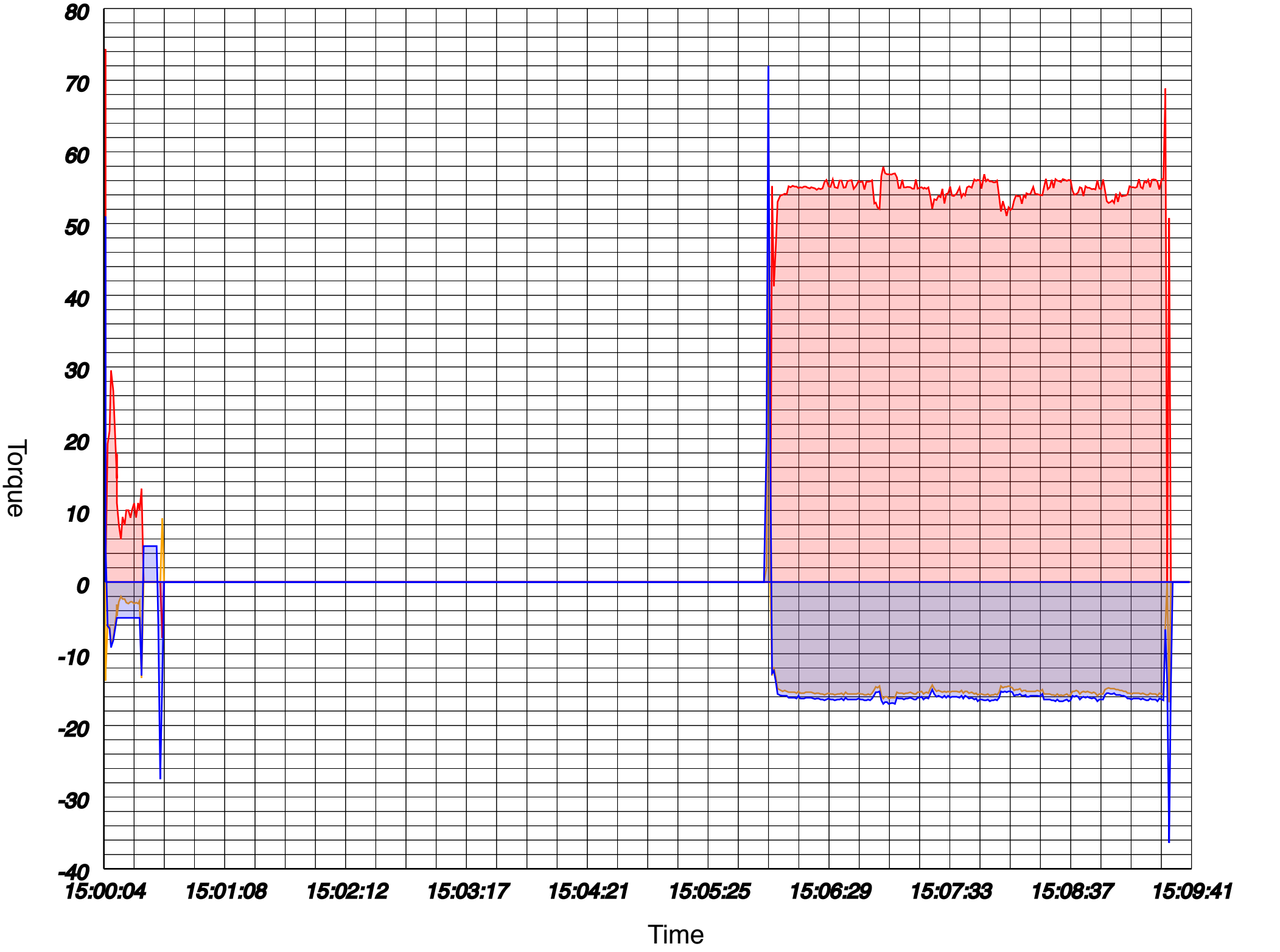


RPM

MG1 RPM

MG2 RPM

Torque

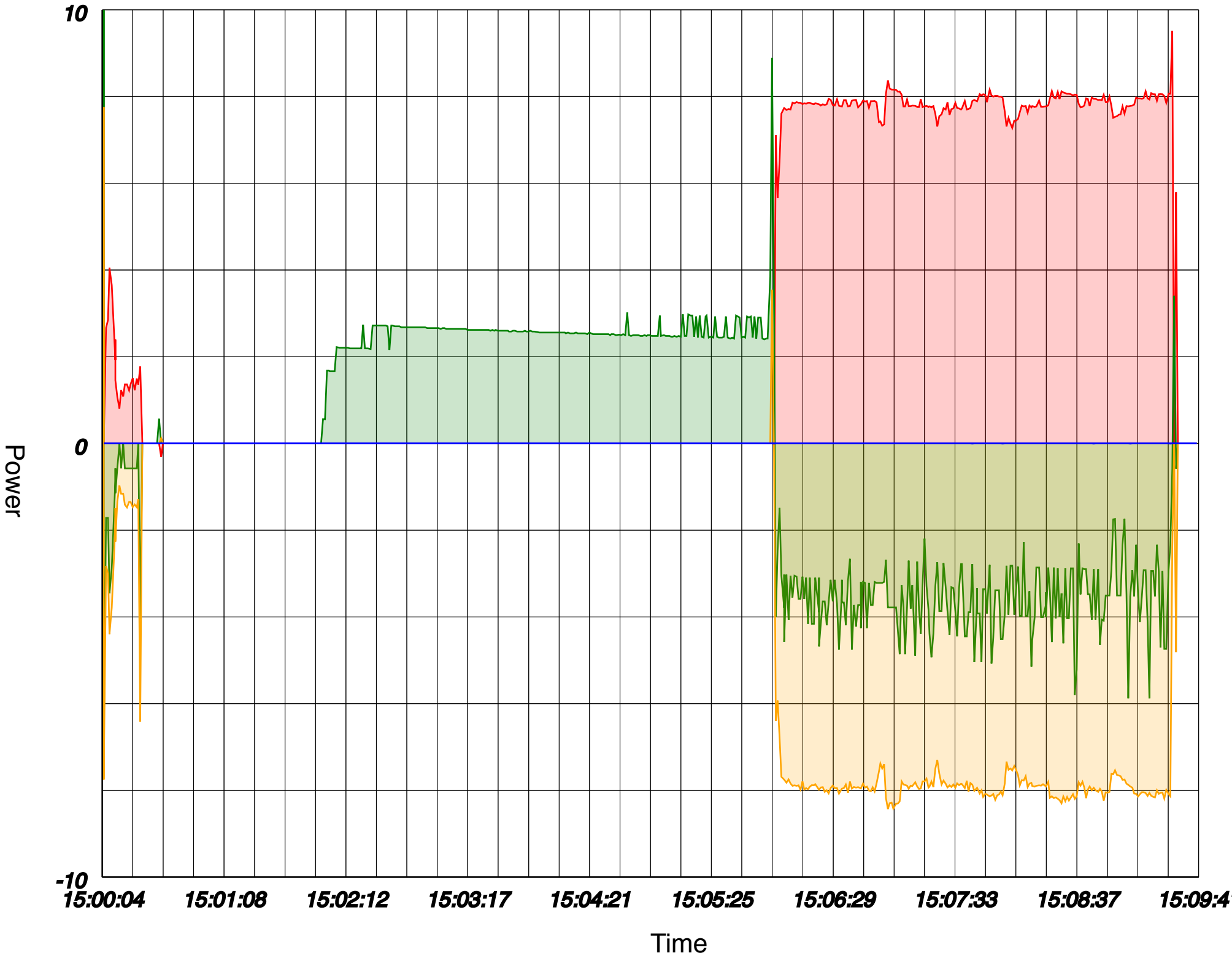

80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
Torque
15:00:04
15:01:08
15:02:12
15:03:17
15:04:21
15:05:25
15:06:29
15:07:33
15:08:37
15:09:41
Time

Engine Torque

MG1 Torque

MG2 Torque

Power


10
0
-10
Power
15:00:04
15:01:08
15:02:12
15:03:17
15:04:21
15:05:25
15:06:29
15:07:33
15:08:37
15:09:41
Time

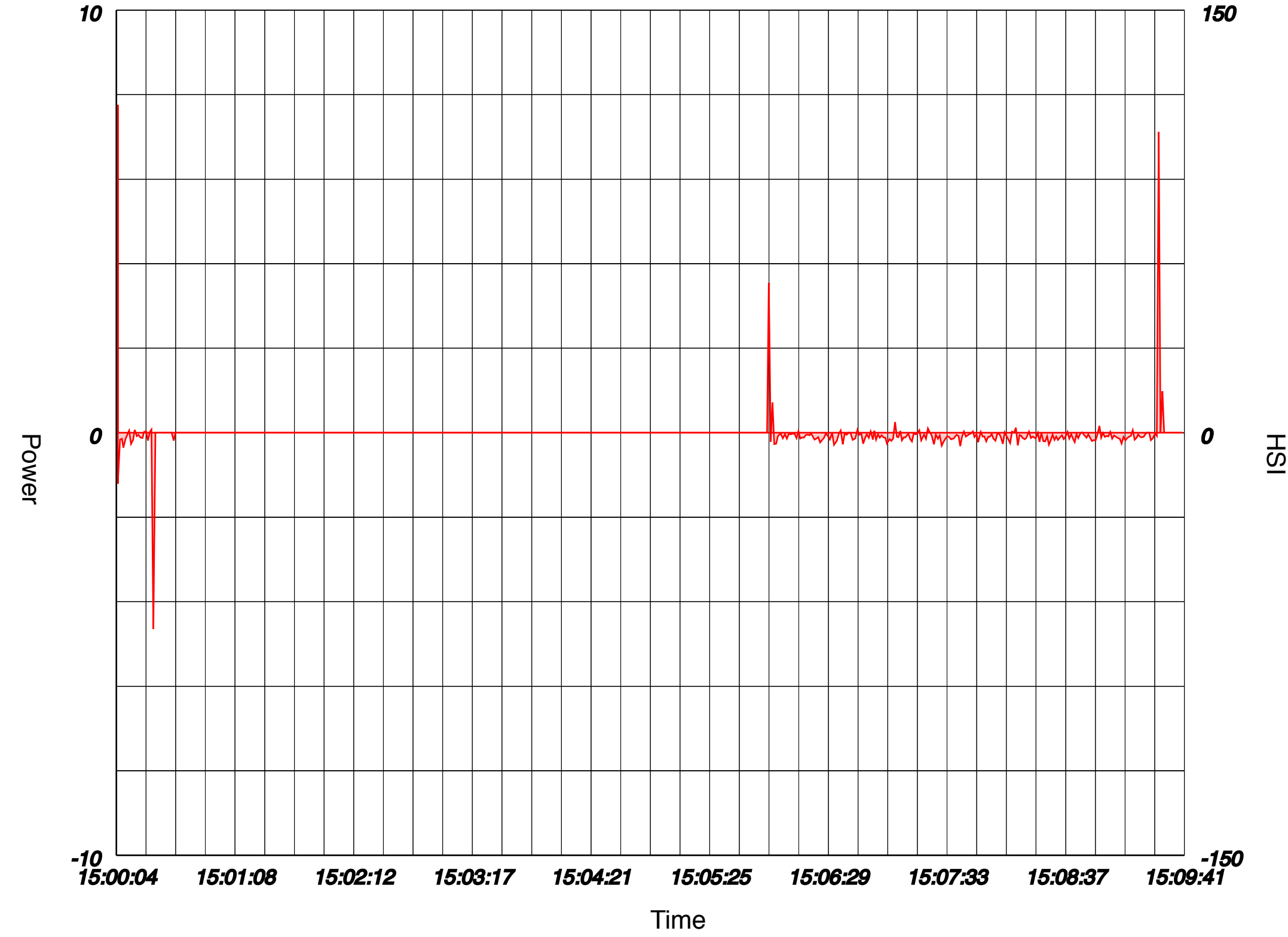
Engine power

HV Battery Power

MG1 Power

MG2 Power

Combined power

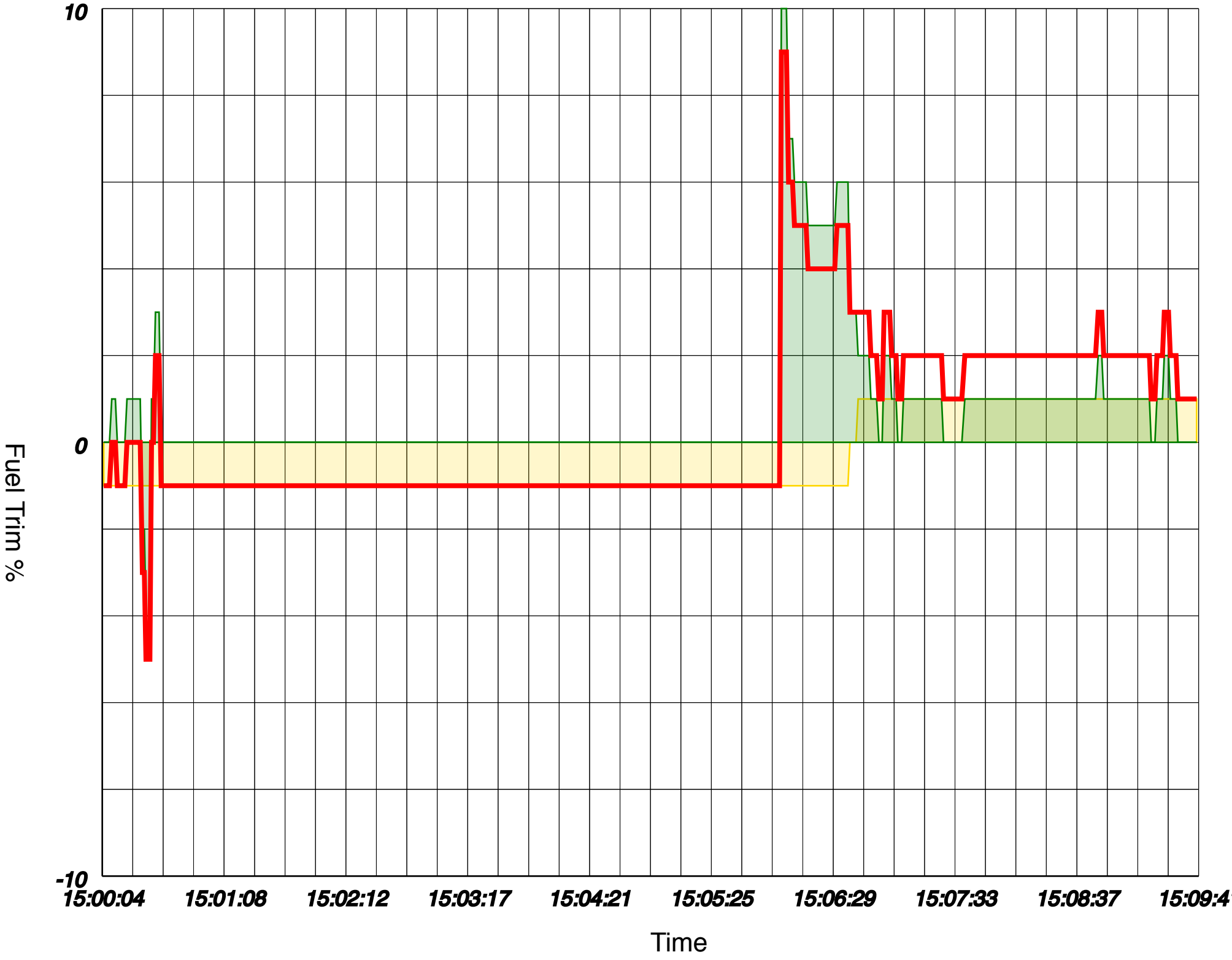

10
0
-10
Power
150
0
-150
HSI
15:00:04
15:01:08
15:02:12
15:03:17
15:04:21
15:05:25
15:06:29
15:07:33
15:08:37
15:09:41
Time

Combined power

Hybrid System Indicator

Fuel Trims

Fuel Trim


10
0
-10
Fuel Trim %
15:00:04
15:01:08
15:02:12
15:03:17
15:04:21
15:05:25
15:06:29
15:07:33
15:08:37
15:09:41
Time

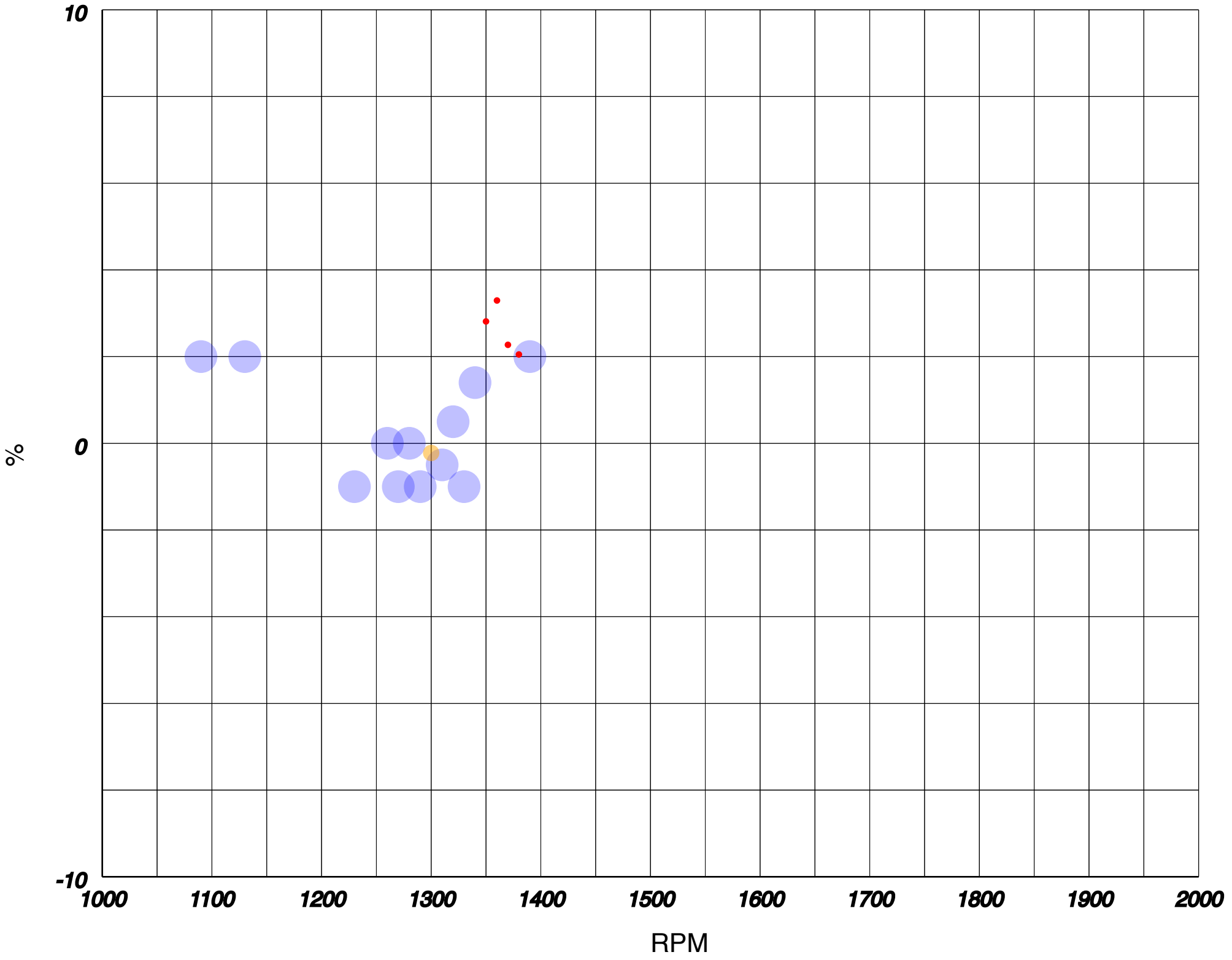
Long Term Fuel Trim

Short Term Fuel Trim

Effective Fuel Trim

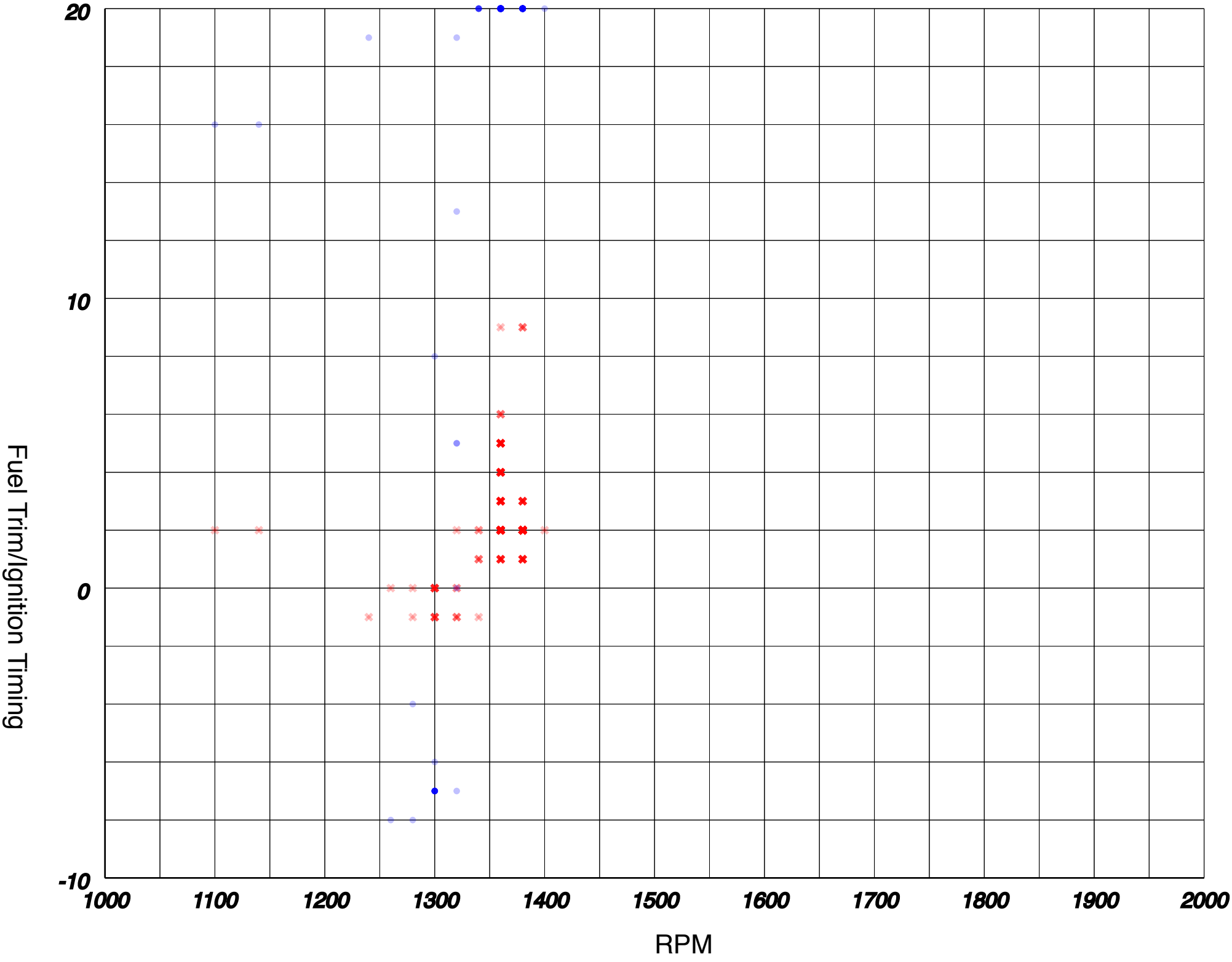
Fuel Trims are the percentage of change in fuel over time.
The engine control unit keeps proper air:fuel ratio by fine-tuning the amount of fuel going into the engine.

Fuel Trim Map



For each RPM value of the petrol engine, the applied Fuel Trim plotted as a dot.
This map can be used to verify LGP-operating engines working condition.

RPM/Fuel Trim/Ignition Timing


20
10
0
-10
Fuel Trim/Ignition Timing
1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
2000
RPM

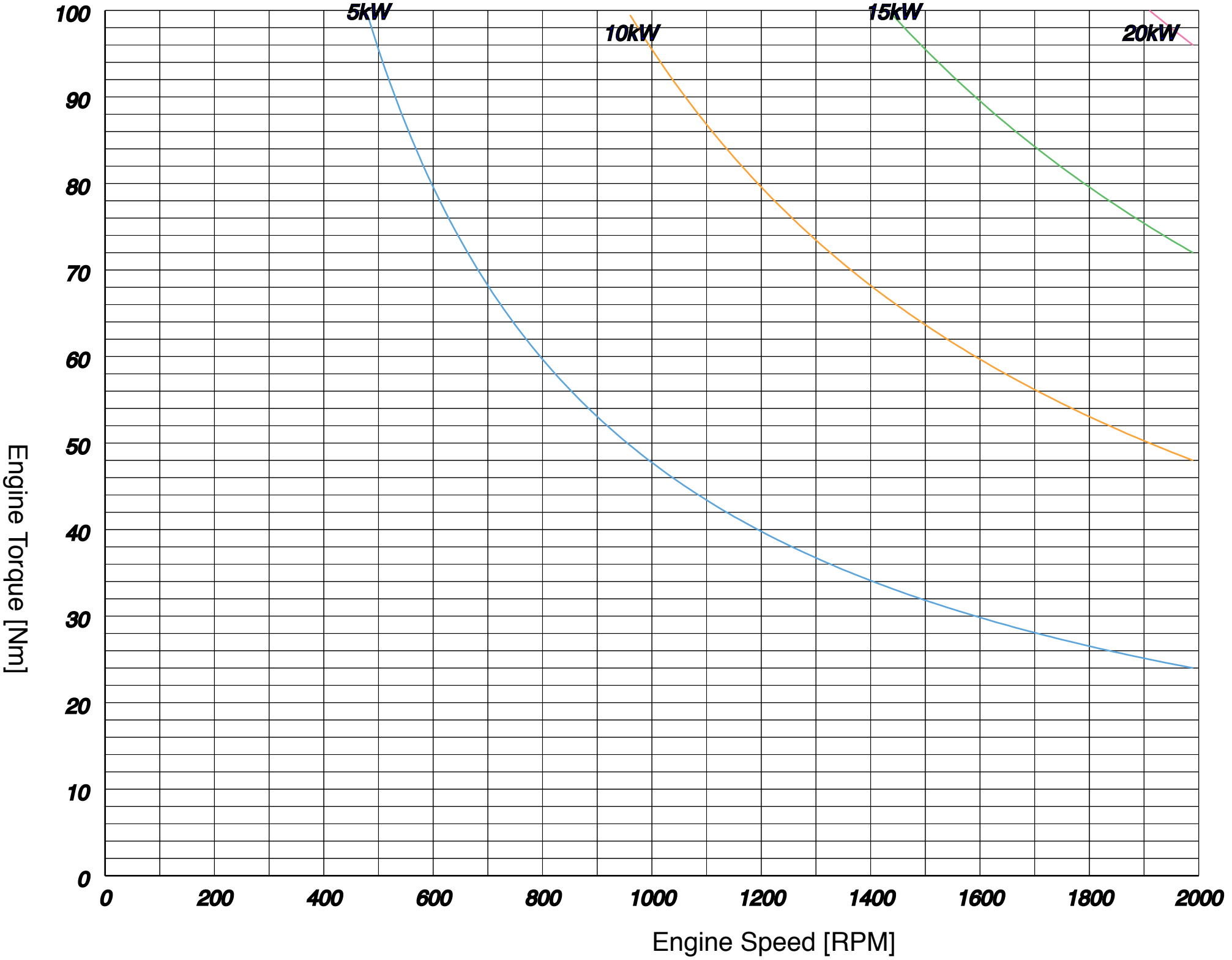
Fuel Trim and Ignition Timings are plotted at various RPM values.
This map can be used to verify LGP-operating engines working condition.

Fuel Trim			
	Short Term	Long Term	Effective
Avg	1%	-0%	0%
Min	-4%	-1%	-5%
Max	10%	1%	9%

BSFC Statistics

Brake specific fuel consumption (BSFC) is a measure of the fuel efficiency of an engine that burns fuel And produces rotational Power.

BSFC


5kW
10kW
15kW
20kW
100
90
80
70
60
50
40
30
20
10
0
Engine Torque [Nm]
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Engine Speed [RPM]

Engine Off

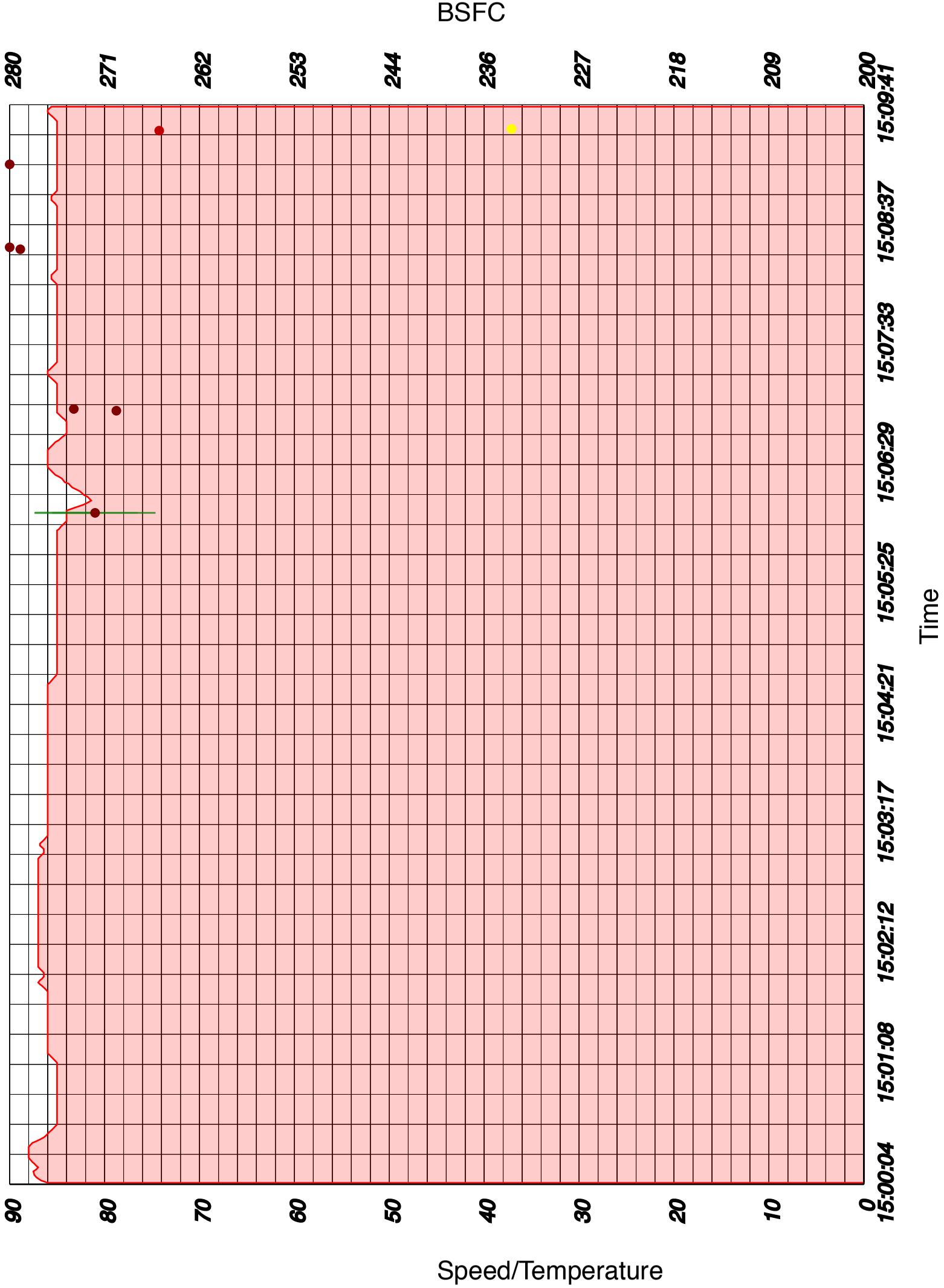
Low Efficiency

Medium Efficiency

High Efficiency

Best Efficiency

BSFC Absolute Value


BSFC
280
271
262
253
244
236
227
218
209
200
15:09:41
15:08:37
15:07:33
15:06:29
15:05:25
15:04:21
15:03:17
15:02:12
15:01:08
15:00:04
Time
90
80
70
60
50
40
30
20
10
0
Speed/Temperature

Speed

Engine Coolant Temperature

BSFC

The average BSFC value is plotted with a colored dot.
Range of BSFC excursion is plotted with a green line, so the shorter the line is, the more precise the BSFC value.

Instant BSFC/Fuel Consumption

Instant Fuel Consumption

Time

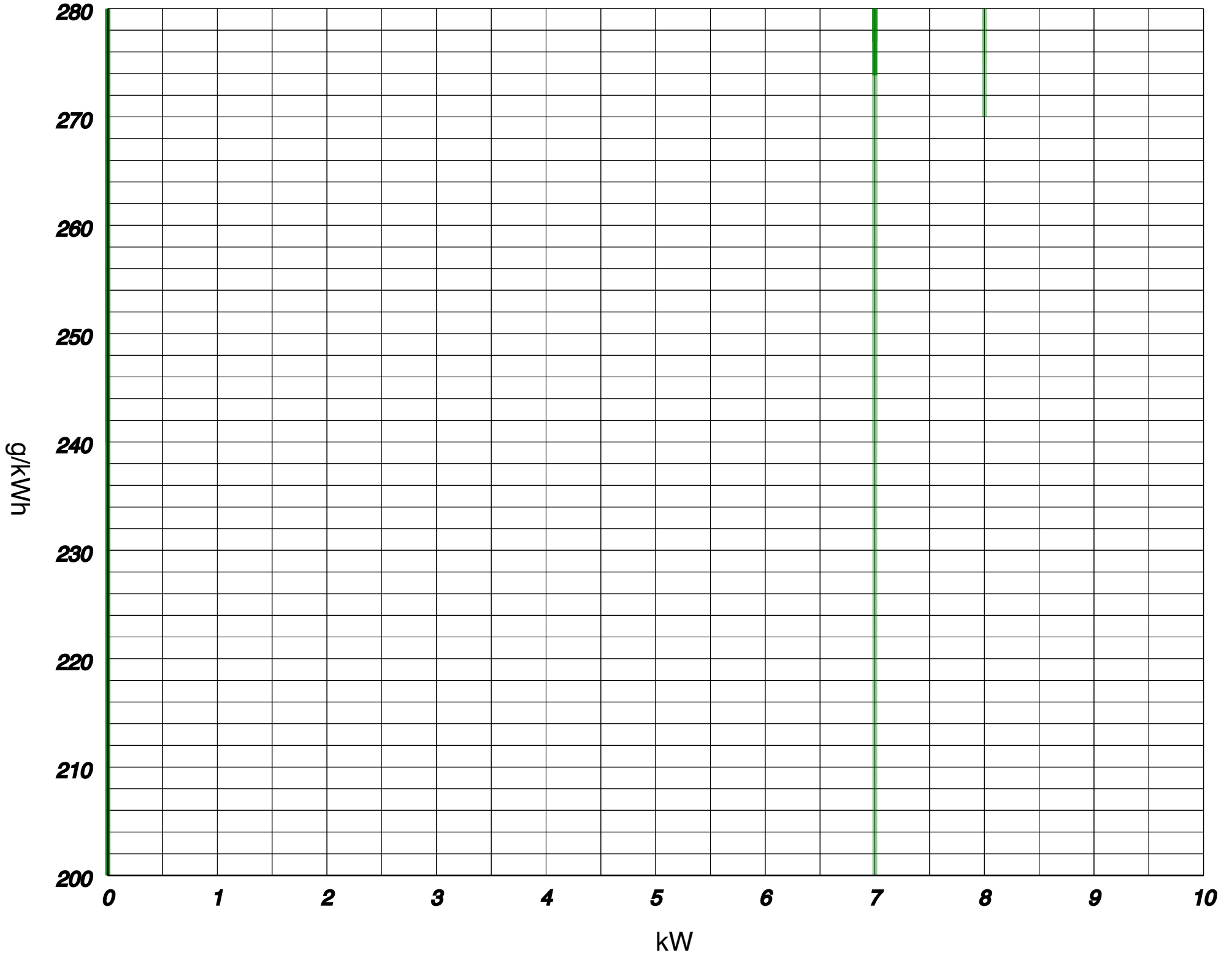
15:00:04
15:01:08
15:02:12
15:03:17
15:04:21
15:05:25
15:06:29
15:07:33
15:08:37
15:09:41

Speed

Speed

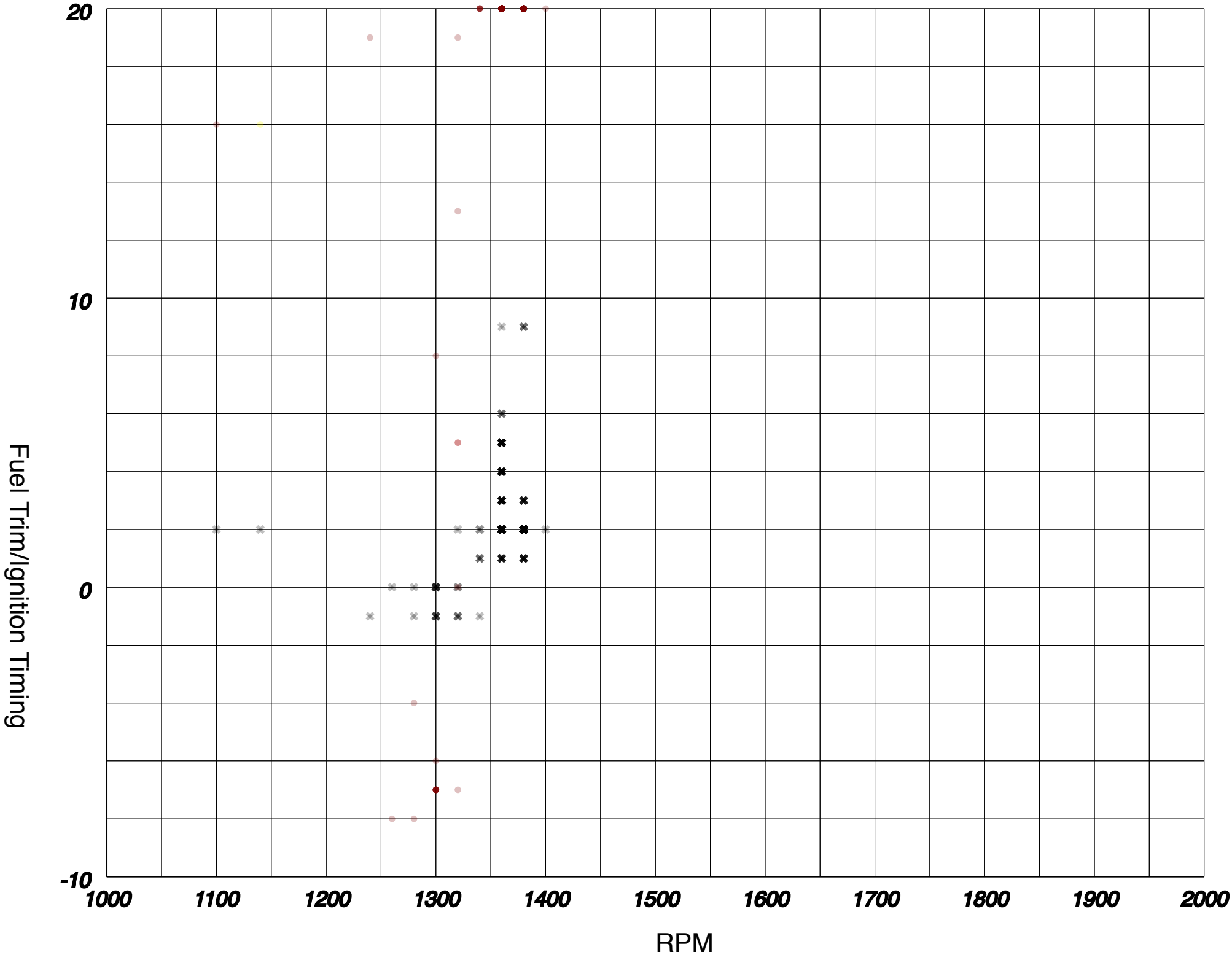
BSFC

BSFC for kW



For each kW range of the petrol engine, the produced BSFC value is plotted as a dot. Light colored range depicts full value excurtion, while darker color plots standard deviation from average.
Values are collected only when engine is at working temperature.

RPM/Fuel Trim/Ignition Timing/BSFC


20
10
0
-10
Fuel Trim/Ignition Timing
1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
2000
RPM

BSFC

Effective Fuel Trim

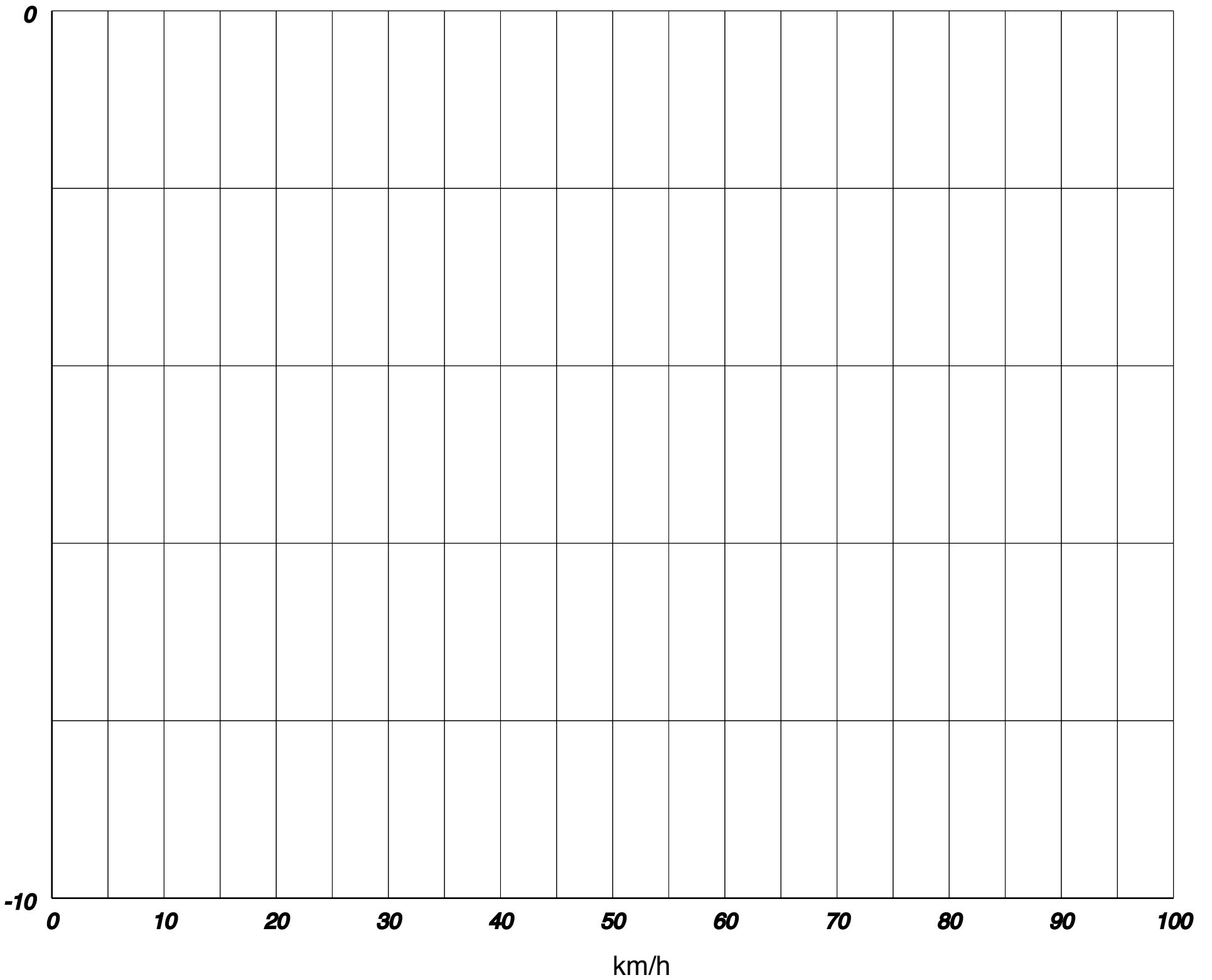
Fuel Trim and Ignition Timings are plotted at various RPM values.
Ignition Timings values are painted with the BSFC value obtained at that specific point.
This map can be used to verify LGP-operating engines working condition.

BSFC	
Average	405
Standard deviation	528

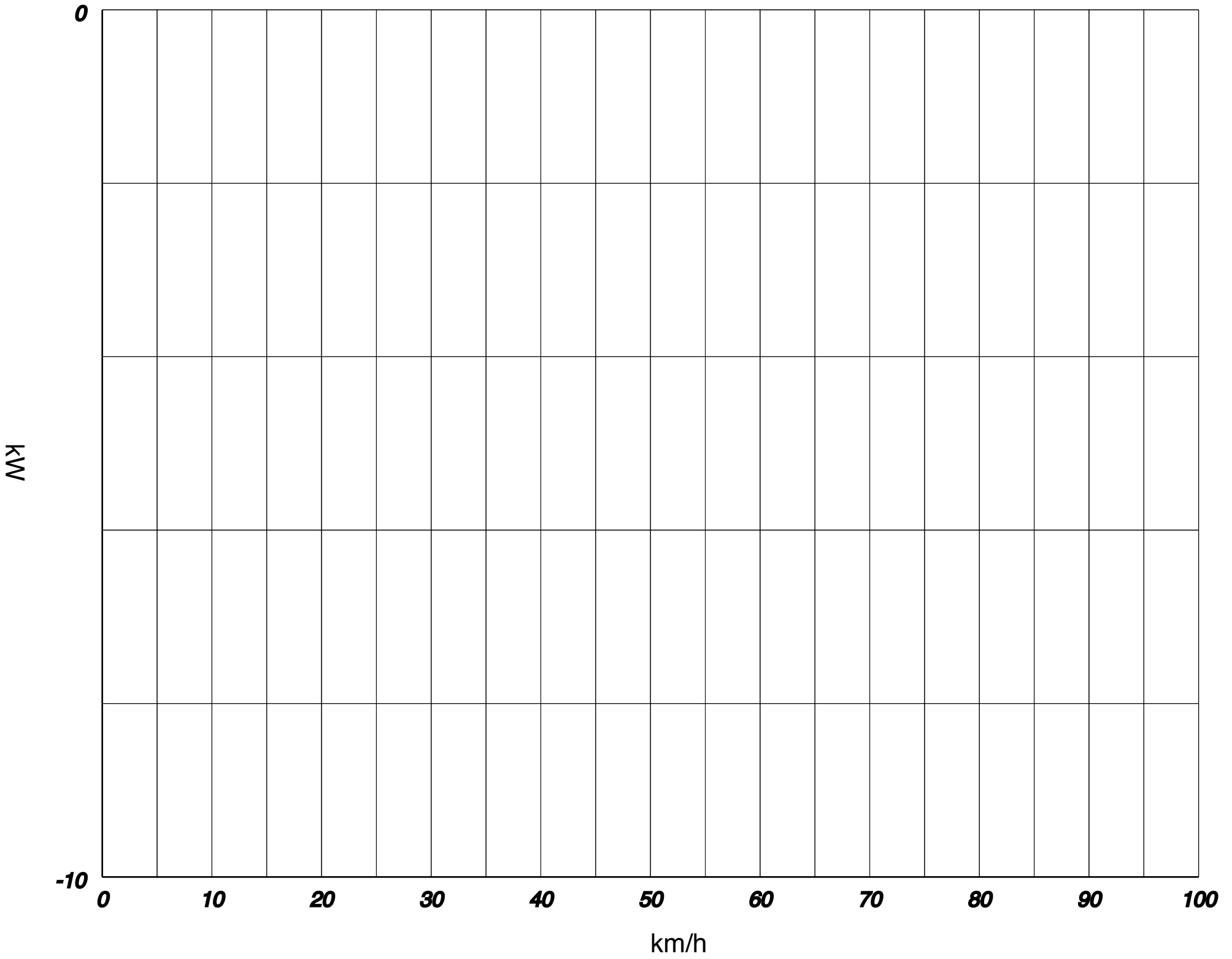
Braking

Brakings	0
Good Brakings	0
Bad Brakings	0
Mixed Brakings	0
Braking Efficiency	0.00 %
Braking while moving	0%
Longest brake event	0:00 sec
Total energy recovered by braking	0.000 kWh

Recovery by braking



Recovery by coasting



Car Driving

State	%	Longest Time
Pulse	0%	0:00 sec
Approximate Glide	0%	0:00 sec
Coasting	0%	0:01 sec
Heretical	0%	0:00 sec
Accelerator pressed	100%	9:38 sec
Accelerating	0%	0:00 sec
Moving	0%	0:00 sec

Car operational state statistics during the trip.
States are expressed as percentage over the entire trip time and longest time span the state persisted.

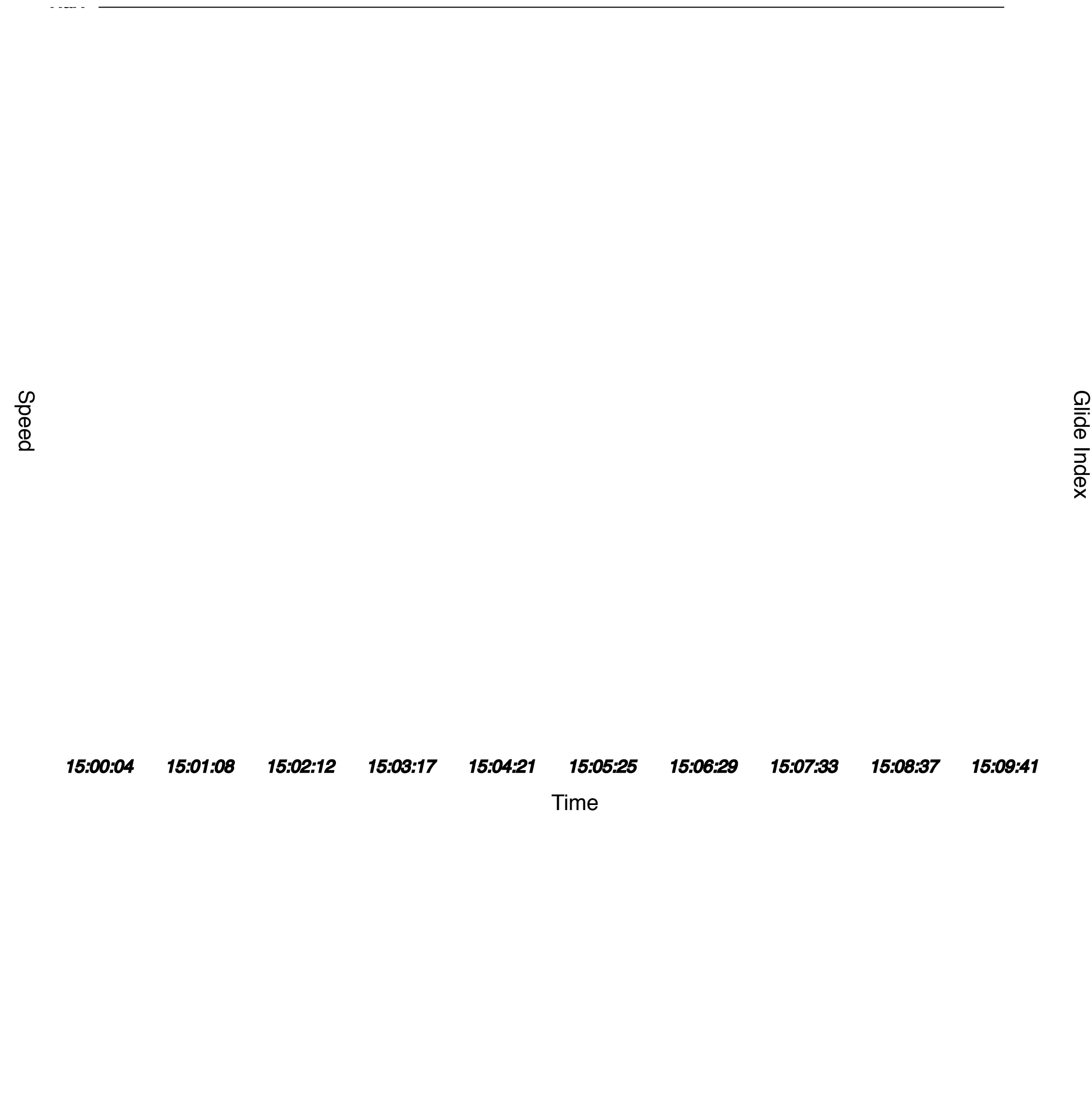
- Pulse: accelerating with nearly all ICE power given to traction.
- Approximate Glide: cruising with no electrical or mechanical traction (approximate evaluation).
- Coasting: cruising with no accelerator or brake applied.
- Heretical: cruising with MG1 electric motor providing traction.
- Accelerator pressed: accerator pedal is pressed, even if not actually accelerating.
- Accelerating: car speed is increasing.

- Moving: car is not stopped.

Glide Evaluation

Glide type	HV Neutral
Glide score	0

Glide Index



Speed

Glide Index

Driver Evaluation

Accelerator Nervousness	1.45
Inefficient Ignitions	1/3

- Accelerator Nervousness: Variability of the accelerator pedal usage. Higher values indicate a nervous driving style
- Braking Efficiency: Ability to use regenerative braking
- Inefficient Ignitions: Number of engine ignitions that lasted less than 5 seconds

Notes

Point size on scatter charts is proportional to number of samples: a small, well defined dot represent a higher confidence value than a bigger, faint dot.