In [1]:
```
import pandas as pd
from math import sqrt
from os import listdir
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

In [2]:
```
def load_zscores(battery: str, filename: str):
    return pd.read_csv("zscores/" + battery + "/" + filename, header=Nor

def calc_norm(zscores: list[float]) -> float:
    total = 0
    for zscore in zscores:
        total += zscore ** 2
    return sqrt(total)

class Test:
    def __init__(self, battery: str, name: str ):
        self.name = name
        self.scores = list(load_zscores(battery, name)[0].values.tolist(
        self.norm = calc_norm(self.scores)
        self.max = max(self.scores)
        self.min = min(self.scores)

    def get_norm(self):
        return self.norm

def load_battery(battery: str) -> list[Test]:
    tests = []
    for file in listdir("zscores/" + battery):
        tests.append(Test(battery, file))
    return tests

def sort_battery(tests: list[Test]):
    return sorted(tests, key=Test.get_norm)

def print_battery(tests: list[Test]):
    for test in tests:
        print("{:.2f}".format(test.norm), " ", test.name)
```

In [3]:

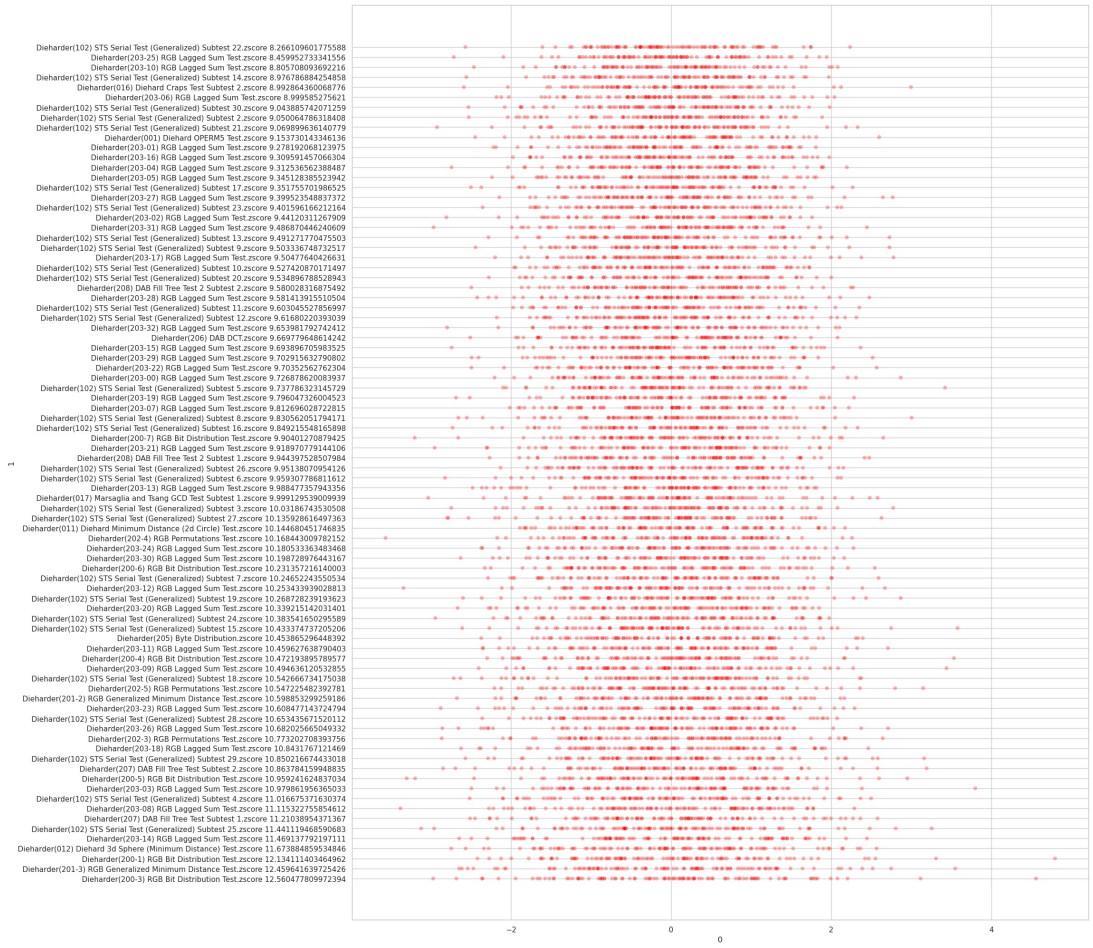
```
def graph_test(battery: str, filename: str, ax, i: int, height):
    zscores = load_zscores(battery, filename)
    zscores[1] = filename
    zscores.plot(kind="scatter",
                 y=1,
                 x=0,
                 color="Red",
                 rot=0,
                 figsize=(20,height),
                 ax=ax,
                 alpha=0.15,
                 grid=True)

def graph_test_fst(battery: str, filename: str, height):
    zscores = load_zscores(battery, filename)
    zscores[1] = filename

    return zscores.plot(kind="scatter",
                 y=1,
                 x=0,
                 color="Red",
                 rot=0,
                 figsize=(20,height),
                 alpha=0.15,
                          grid=True)

def get_battery_min_max(battery: list[Test]) -> tuple[float, float]:
    min_b, max_b = 0, 0
    for test in battery:
        if test.min < min_b:
            min_b = test.min
        if test.max > max_b:
            max_b = test.max
    return min_b, max_b


def graph_battery(battery: str, height,  left, right):
    directory = "zscores/" + battery + "/"
    i = 0
    for filename in listdir(directory):
        if i == 0:
            ax = graph_test_fst(battery, filename, height)
        else:
            graph_test(battery, filename, ax, i, height)
        i += 1
    plt.xlim([left, right])
    plt.show()


def graph_battery_sns(battery: list[Test], height: int) -> None:
    combined = pd.DataFrame()
    for test in battery:
        zscores = pd.DataFrame(test.scores)
        zscores[1] = test.name + " " + str(test.norm)

        combined = pd.concat([combined, zscores], ignore_index=True)

    sns.set(rc={"figure.figsize":(20, height)}, style="whitegrid") #widt
```

```
    p = sns.scatterplot(
    data=combined,
    x=0,
    y=1,
    hue=1,
    palette={"red"},
    legend=False,
    alpha=0.3,
)


def split_battery(battery: list[Test], pivot: float) -> tuple[list[Test]
    low = []
    high = []
    for test in battery:
        if test.norm < pivot:
            low.append(test)
        else:
            high.append(test)
    return low, high

def slice_battery(battery: list[Test], low: float, high: float) -> list[
    new = []
    for test in battery:
        if low <= test.norm <= high:
            new.append(test)
    return new
```

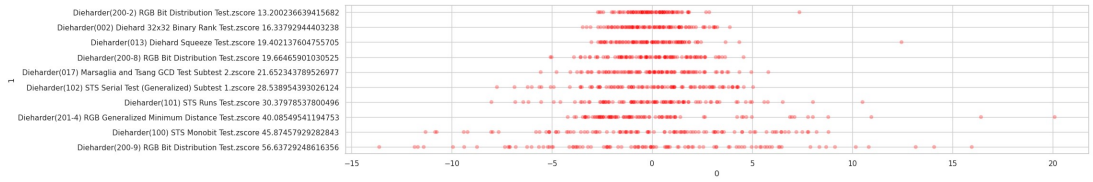
In [39]:

```
dieharder = sort_battery(load_battery("dieharder"))

dieharder_1 = slice_battery(dieharder, 0, 13)
dieharder_2 = slice_battery(dieharder, 13, 57)
dieharder_3 = slice_battery(dieharder, 57, 100)
dieharder_4 = slice_battery(dieharder, 100, 430)
dieharder_5 = slice_battery(dieharder, 430, 10000)
```

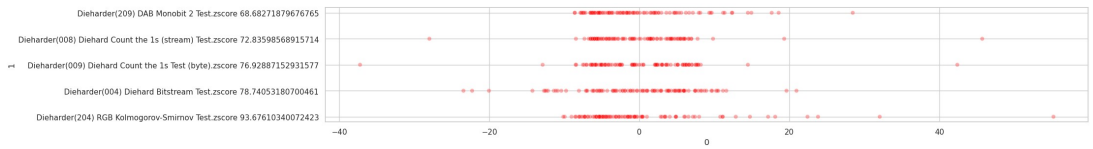
In [40]:
```
graph_battery_sns(dieharder_1, 25)
```



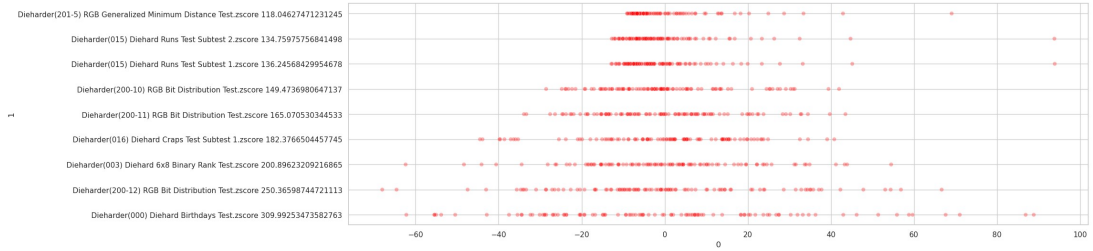
In [41]:
```
graph_battery_sns(dieharder_2, 4)
```



In [42]:
```
graph_battery_sns(dieharder_3, 2)
```



In [43]:
```
graph_battery_sns(dieharder_4, 6)
```

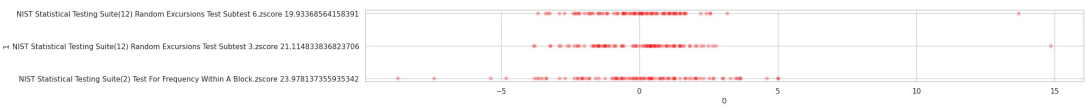


In [44]:
```
graph_battery_zscs(dieharder_5, 1)
```

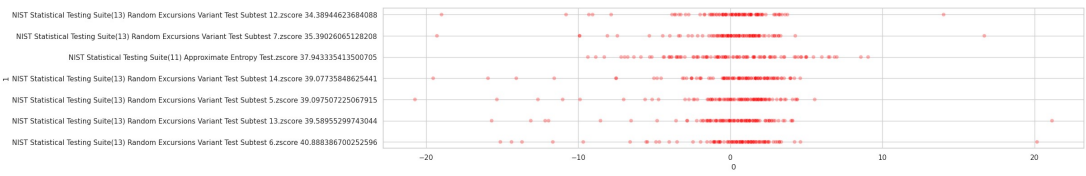
In [4]:
```
nist = sort_battery(load_battery("nist"))

nist_1 = slice_battery(nist, 0, 19.9)
nist_2 = slice_battery(nist, 19.9, 24)
nist_3 = slice_battery(nist, 24, 41)
nist_4 = slice_battery(nist, 41, 47)
nist_5 = slice_battery(nist, 47, 67 )
nist_6 = slice_battery(nist, 69, 170)
nist_7 = slice_battery(nist, 170, 10000)
```

In [5]:
```
graph_battery_zscs(nist_1, 70)
```

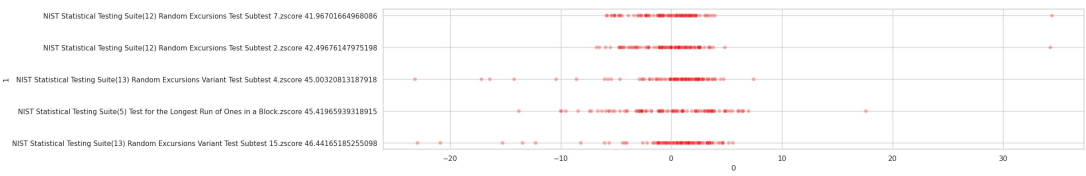
In [6]:
```
graph_battery_zscs(nist_2, 2)
```



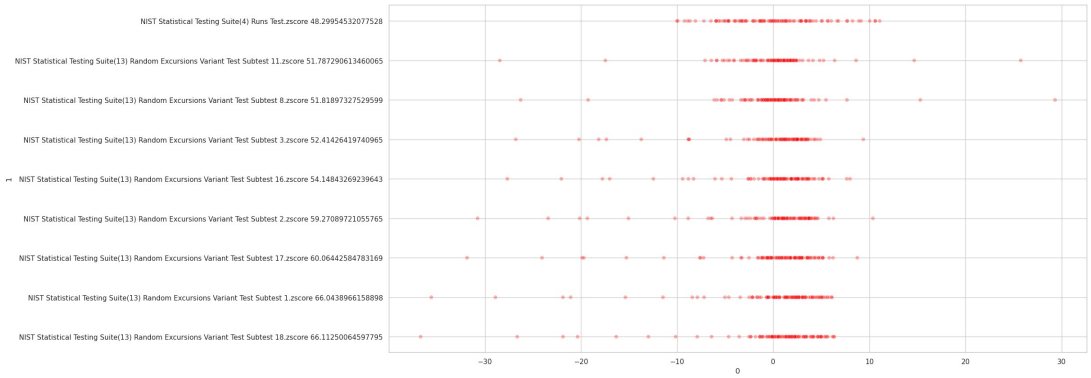
In [7]:
```
graph_battery_zscs(nist_3, 4)
```



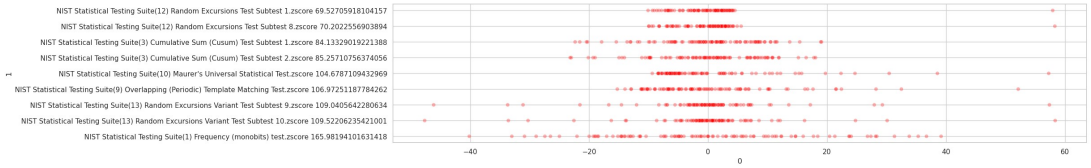
In [8]:
```
graph_battery_zscs(nist_4, 4)
```



In [9]:
```
graph_battery_zps(nist_5, 10)
```



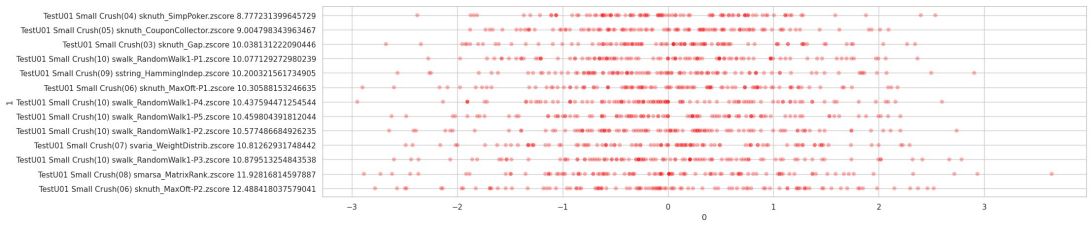
In [10]:
```
graph_battery_zps(nist_6, 4)
```



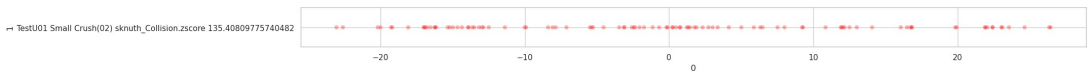
In [11]:
```
graph_battery_zps(nist_7, 1)
```

In [53]:
```
smallcrush = sort_battery(load_battery("testu01-smallcrush"))

smallcrush_1 = slice_battery(smallcrush, 0, 13)
smallcrush_2 = slice_battery(smallcrush, 13, 140)
smallcrush_3 = slice_battery(smallcrush, 140, 10000)
```

In [54]:
```
graph_battery_zps(smallcrush_1, 5)
```



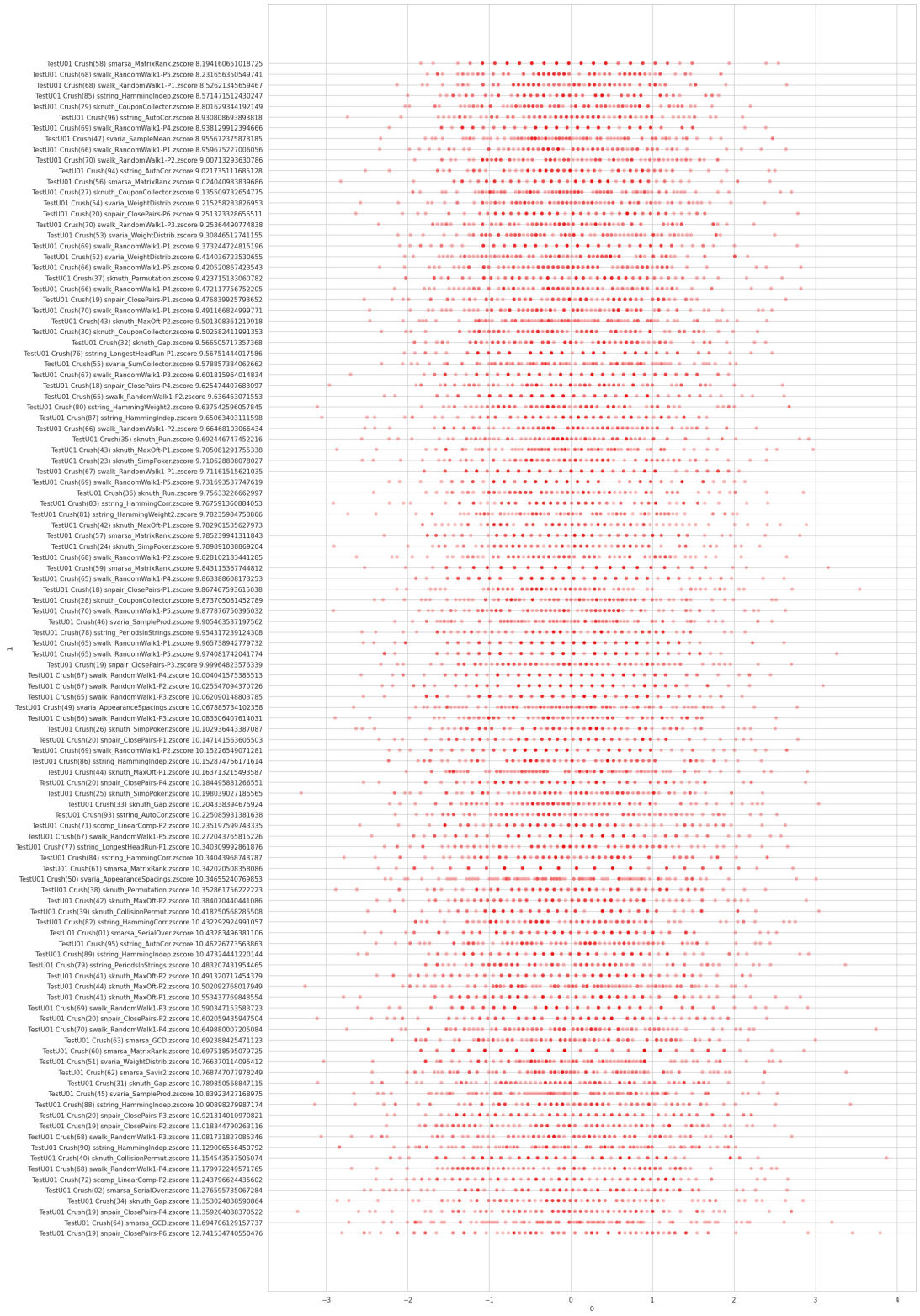
In [55]:
```
graph_battery_zps(smallcrush_2, 1)
```



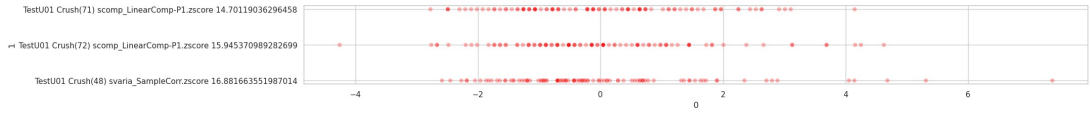
In [56]:
```
graph_battery_zps(smallcrush_3, 1)
```

In [112]:
```
crush = sort_battery(load_battery("testu01-crush"))

crush_1 = slice_battery(crush, 0, 14)
crush_2 = slice_battery(crush, 14,  17)
crush_3 = slice_battery(crush, 17, 50)
crush_4 = slice_battery(crush, 50, 100)
crush_5 = slice_battery(crush, 100, 160)
crush_6 = slice_battery(crush, 160, 10000)
```

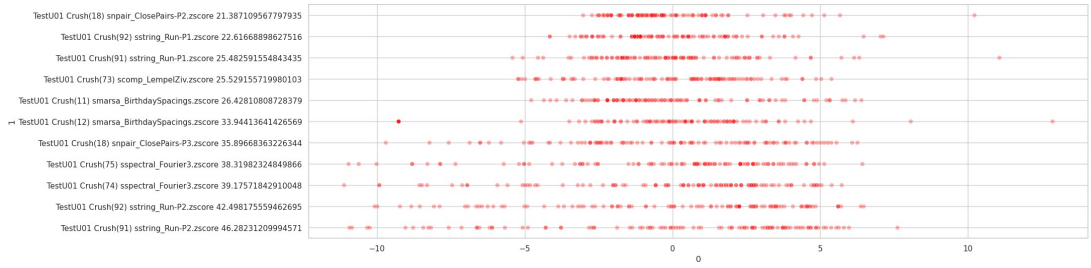
In [113]:
```
graph_battery_sns(crush_1, 40)
```



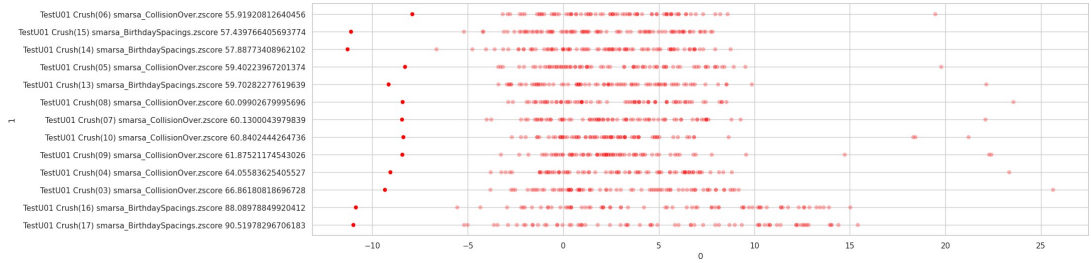
In [114]:



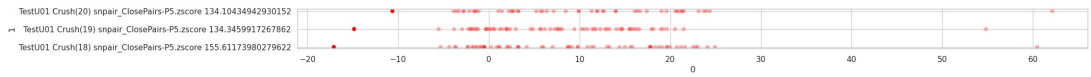
In [110]:



In [111]:



In [60]:

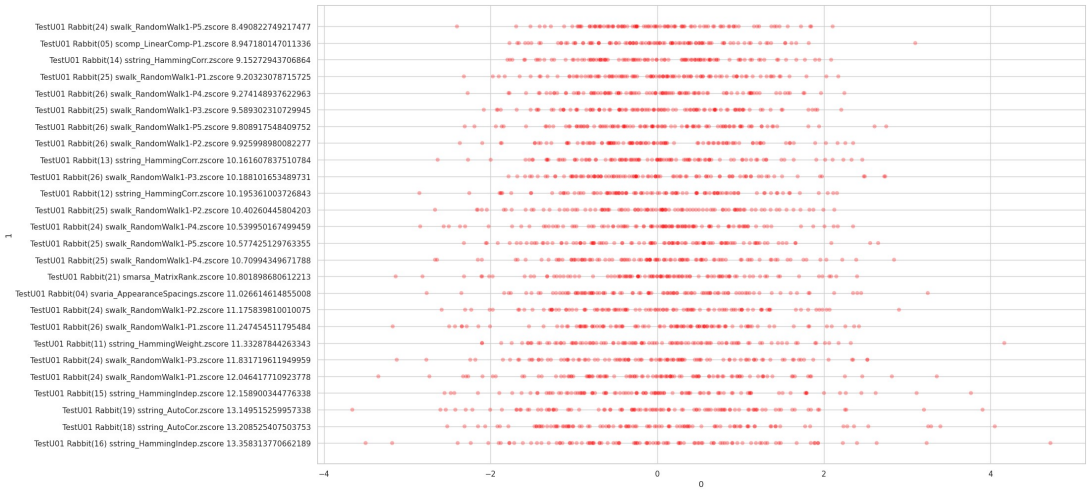


In [61]:

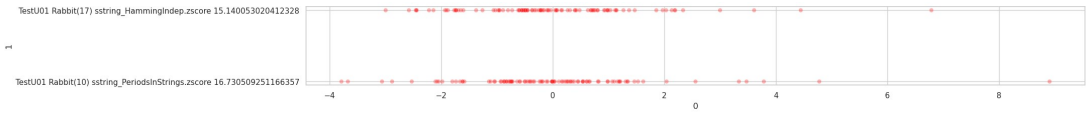
In [105]:

```
rabbit = sort_battery(load_battery("testu01-rabbit"))

rabbit_1 = slice_battery(rabbit, 0, 14)
rabbit_2 = slice_battery(rabbit, 14,17)
rabbit_3 = slice_battery(rabbit, 17, 260)
rabbit_4 = slice_battery(rabbit, 260, 1000)
rabbit_5 = slice_battery(rabbit, 1000, 2000)
```

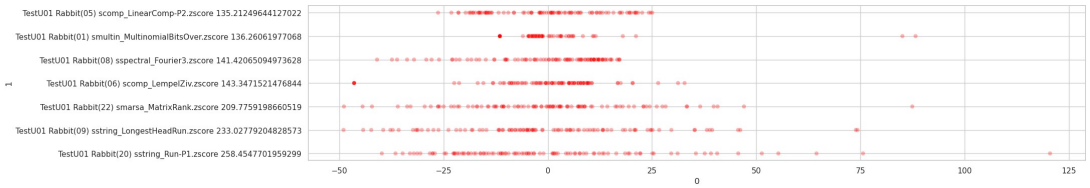
In [106]:
```
graph_battery_sns(rabbit_1, 12)
```



In [107]:
```
graph_battery_sns(rabbit_2, 2)
```

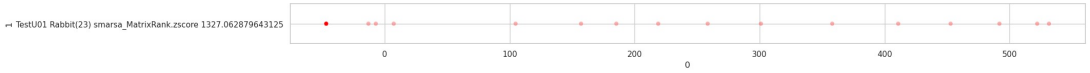


In [98]:
```
graph_battery_sns(rabbit_3, 4)
```



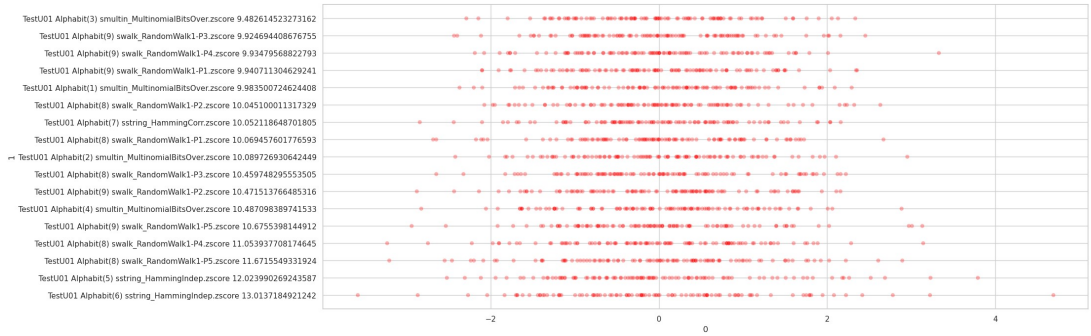
In [101]:
```
graph_battery_sns(rabbit_4, 1)
```

In [102]:
```
graph_battery_sns(rabbit_5, 1)
```

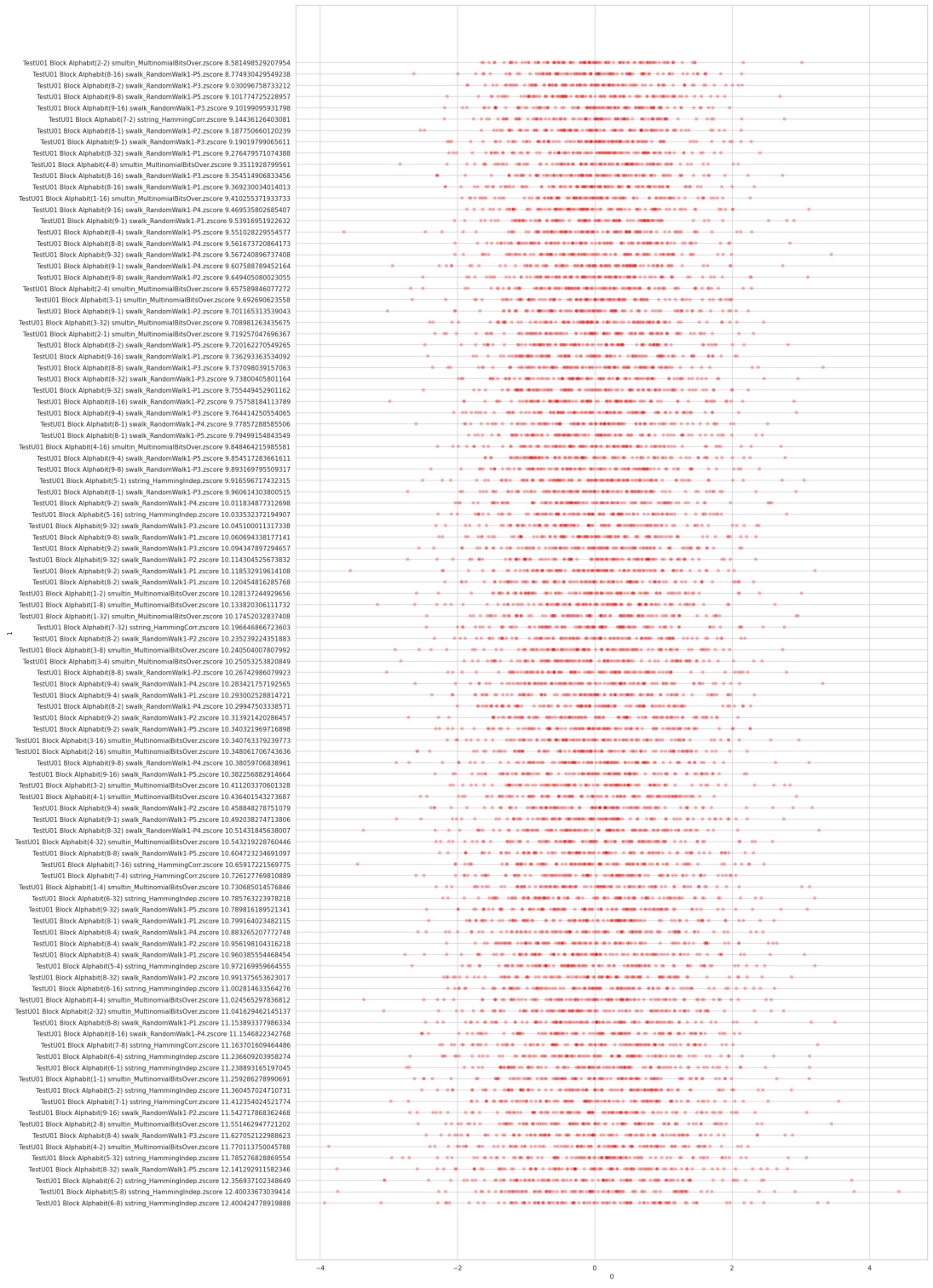


In [103]:
```
graph_battery_sns(rabbit_6, 1.5)
```

In [65]:
```
alphabit = sort_battery(load_battery("testu01-alphabit"))
graph_battery_sns(alphabit, 8)
```



In [66]:
```
blockalphabit = sort_battery(load_battery("testu01-blockalphabit"))
graph_battery_sns(blockalphabit, 40)
```



In [ ]:
```
```