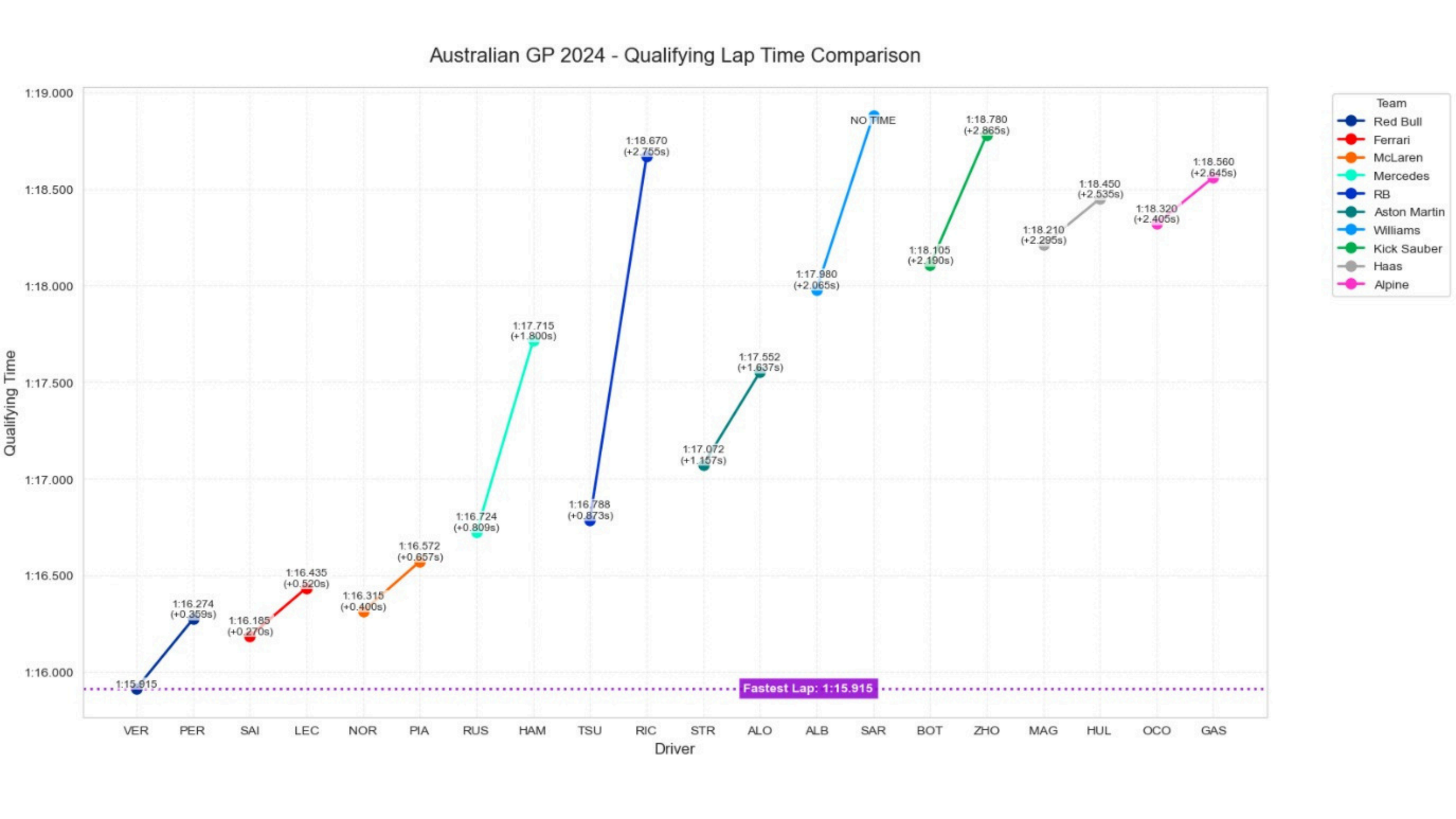
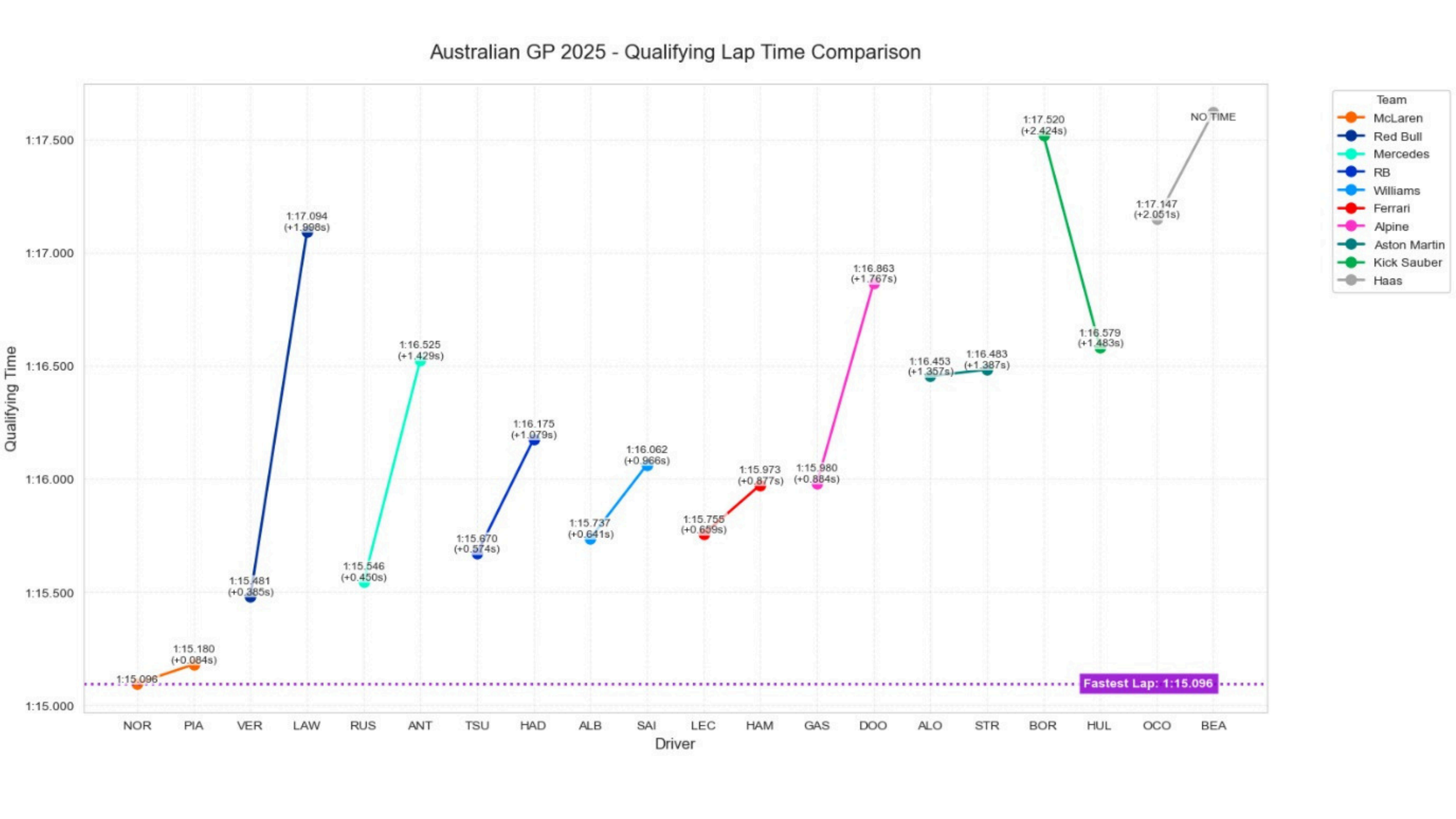

Australian GP 2024 - Qualifying Lap Time Comparison
Qualifying Time
1:19.000
1:18.500
1:18.000
1:17.500
1:17.000
1:16.500
1:16.000
Driver
VER
PER
SAI
LEC
NOR
PIA
RUS
HAM
TSU
RIC
STR
ALO
ALB
SAR
BOT
ZHO
MAG
HUL
OCO
GAS
1:15.915
1:16.274 (+0.359s)
1:16.185 (+0.270s)
1:16.435 (+0.520s)
1:16.315 (+0.400s)
1:16.572 (+0.657s)
1:16.724 (+0.809s)
1:17.715 (+1.800s)
1:16.788 (+0.873s)
1:18.670 (+2.755s)
1:17.072 (+1.157s)
1:17.552 (+1.637s)
1:17.980 (+2.065s)
NO TIME
1:18.105 (+2.190s)
1:18.780 (+2.865s)
1:18.210 (+2.295s)
1:18.450 (+2.535s)
1:18.320 (+2.405s)
1:18.560 (+2.645s)
Fastest Lap: 1:15.915
Team
Red Bull
Ferrari
McLaren
Mercedes
RB
Aston Martin
Williams
Kick Sauber
Haas
Alpine


Australian GP 2025 - Qualifying Lap Time Comparison
Qualifying Time
1:17.500
1:17.000
1:16.500
1:16.000
1:15.500
1:15.000
Driver
NOR
PIA
VER
LAW
RUS
ANT
TSU
HAD
ALB
SAI
LEC
HAM
GAS
DOO
ALO
STR
BOR
HUL
OCO
BEA
1:15.096
1:15.180 (+0.084s)
1:15.481 (+0.385s)
1:17.094 (+1.998s)
1:15.546 (+0.450s)
1:16.525 (+1.429s)
1:15.670 (+0.574s)
1:16.175 (+1.079s)
1:15.737 (+0.641s)
1:16.062 (+0.966s)
1:15.755 (+0.659s)
1:15.973 (+0.877s)
1:15.980 (+0.884s)
1:16.863 (+1.767s)
1:16.453 (+1.357s)
1:16.483 (+1.387s)
1:17.520 (+2.424s)
1:16.579 (+1.483s)
1:17.147 (+2.051s)
NO TIME
Fastest Lap: 1:15.096
Team
McLaren
Red Bull
Mercedes
RB
Williams
Ferrari
Alpine
Aston Martin
Kick Sauber
Haas

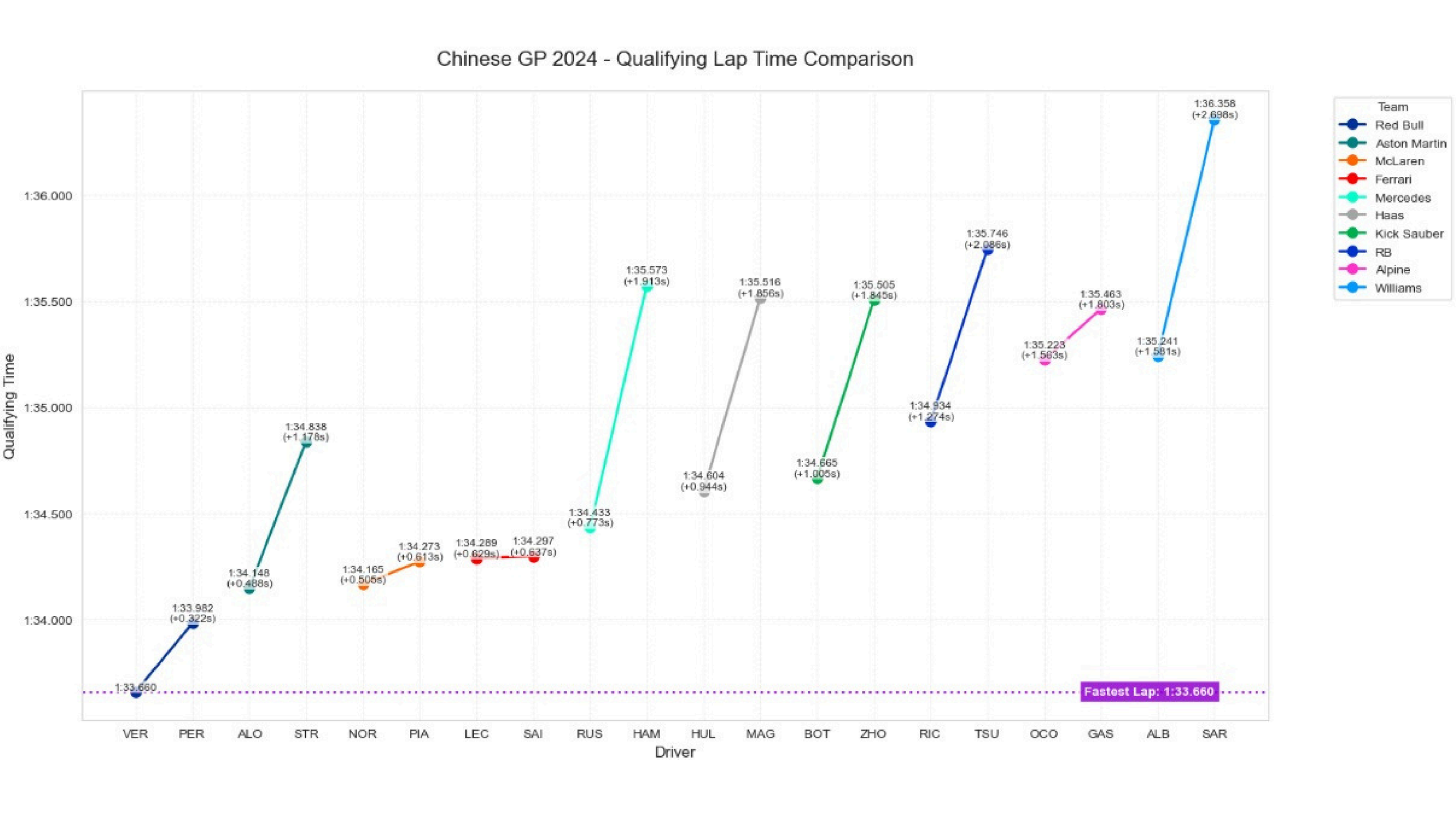
Australian Grand Prix – Qualifying Summary
2024 vs 2025

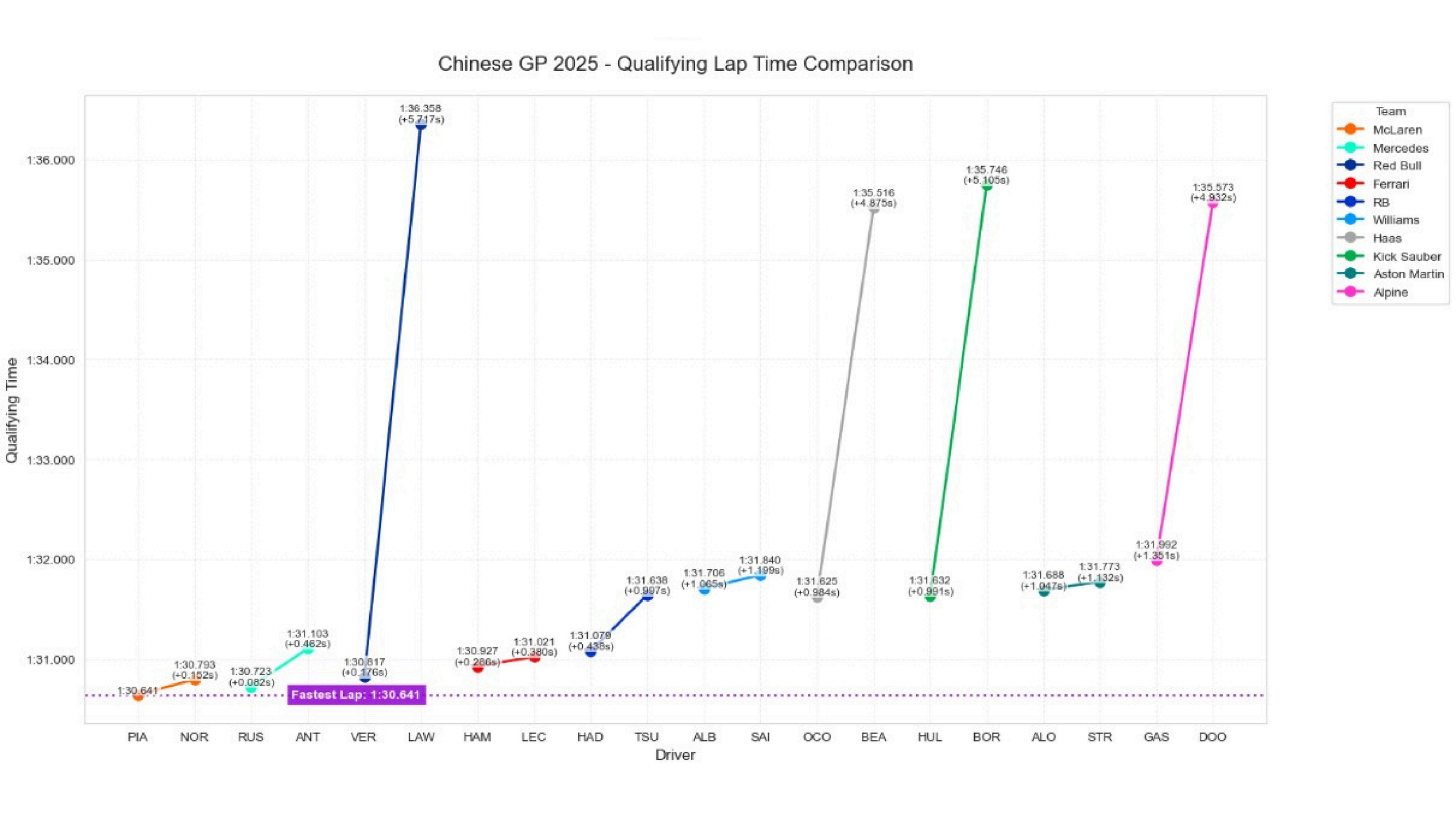
| 22 - 24 Mar 2024 |

- Verstappen got the pole lap ‘1:15.915’ ahead of Sainz and Norris.
- Sainz and Norris are ‘0.270’ and ‘0.400’ slower than Verstappen.
- Perez is ‘0.359’ slower than Verstappen, starting from the 6th with a 3 grid places penalty for impeding another driver during qualifying.
- Sainz is ‘0.250’ faster than Leclerc, who started in the 4th position, Norris is ‘0.257’ faster than Piastri, who started in 5th position.
- Russell started from the 7th, ‘0.236’ faster than Lewis in the 10th.

| 14 - 16 Mar 2025 |

- Norris got the pole lap ‘1:15.096’ ahead of Piastri and Verstappen.
- Norris' pole lap is ‘0.819’ faster than Verstappen's lap last year.
- Norris is ‘0.084’ faster than Piastri.
- Lewis is ‘0.987’ faster than last year.
- Sainz is ‘0.123’ faster than last year.


Chinese GP 2024 - Qualifying Lap Time Comparison
Qualifying Time
1:36.000
1:35.500
1:35.000
1:34.500
1:34.000
Driver
VER
PER
ALO
STR
NOR
PIA
LEC
SAI
RUS
HAM
HUL
MAG
BOT
ZHO
RIC
TSU
OCO
GAS
ALB
SAR
1:33.660
1:33.982 (+0.322s)
1:34.148 (+0.488s)
1:34.838 (+1.178s)
1:34.165 (+0.505s)
1:34.273 (+0.613s)
1:34.289 (+0.629s)
1:34.297 (+0.637s)
1:34.433 (+0.773s)
1:35.573 (+1.913s)
1:34.604 (+0.944s)
1:35.516 (+1.856s)
1:34.665 (+1.005s)
1:35.505 (+1.845s)
1:34.934 (+1.274s)
1:35.746 (+2.086s)
1:35.223 (+1.563s)
1:35.463 (+1.803s)
1:35.241 (+1.581s)
1:36.358 (+2.698s)
Fastest Lap: 1:33.660
Team
Red Bull
Aston Martin
McLaren
Ferrari
Mercedes
Haas
Kick Sauber
RB
Alpine
Williams


Chinese GP 2025 - Qualifying Lap Time Comparison
Qualifying Time
1:36.000
1:35.000
1:34.000
1:33.000
1:32.000
1:31.000
Driver
PIA
NOR
RUS
ANT
VER
LAW
HAM
LEC
HAD
TSU
ALB
SAI
OCO
BEA
HUL
BOR
ALO
STR
GAS
DOO
1:30.641
1:30.793 (+0.152s)
1:30.723 (+0.082s)
1:31.103 (+0.462s)
1:30.617 (+0.176s)
1:36.358 (+5.717s)
1:30.927 (+0.286s)
1:31.021 (+0.380s)
1:31.079 (+0.438s)
1:31.638 (+0.997s)
1:31.706 (+1.065s)
1:31.840 (+1.199s)
1:31.625 (+0.984s)
1:35.516 (+4.875s)
1:31.632 (+0.991s)
1:35.746 (+5.105s)
1:31.688 (+1.047s)
1:31.773 (+1.132s)
1:31.992 (+1.351s)
1:35.573 (+4.932s)
Fastest Lap: 1:30.641
Team
McLaren
Mercedes
Red Bull
Ferrari
RB
Williams
Haas
Kick Sauber
Aston Martin
Alpine

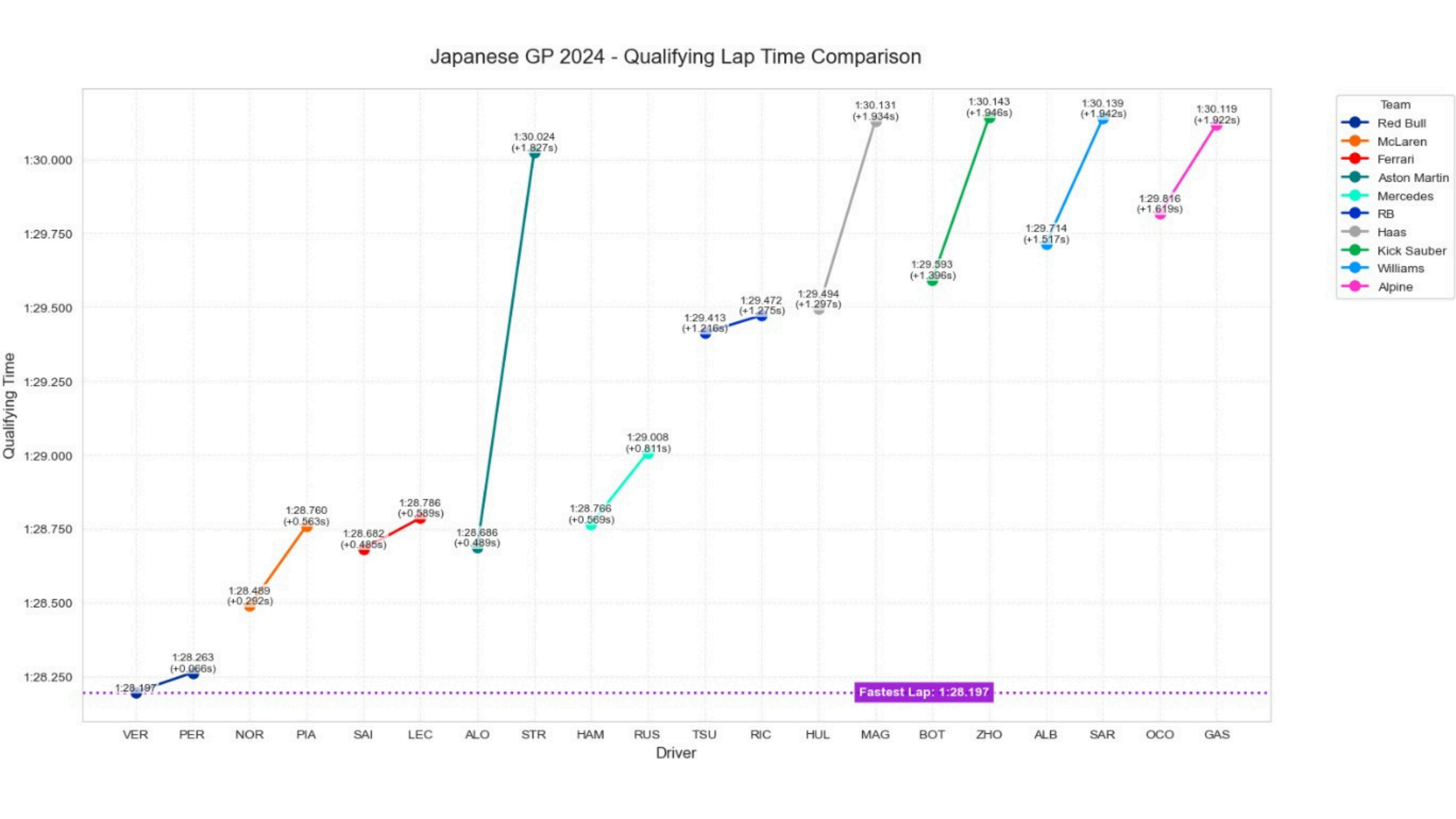
Chinese Grand Prix – Qualifying Summary
2024 vs 2025

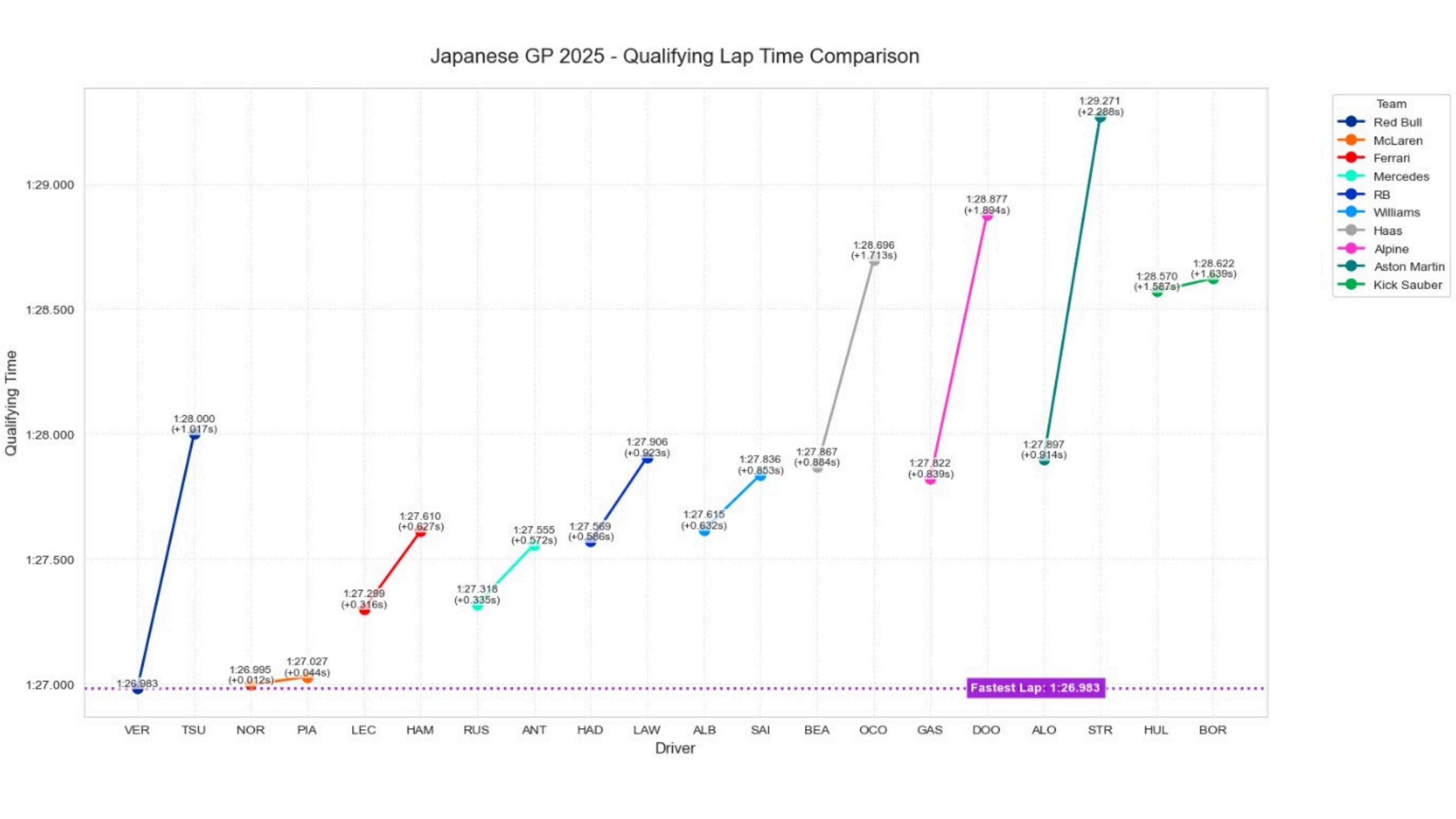
| 19 - 21 Apr 2024 |

- Verstappen got the pole lap ‘1:33.660’ ahead of Perez and Alonso.
- Perez and Alonso are ‘0.322’ and ‘0.488’ slower than Verstappen.
- Norris started from the 4th, ‘0.505’ slower than the pole. Piastri started from the 5th, ‘0.613’ slower than the pole.
- The two Ferraris, Leclerc and Sainz, are ‘0.629’ and ‘0.637’ slower than the pole, achieving 6th and 7th positions.
- Russell started from the 8th, ‘0.773’ slower than the pole.

| 21 - 23 Mar 2025 |

- Piastri got the pole ‘1:30.641’ ahead of Russell and Norris.
- Piastri’s pole lap is ‘3.019’ faster than Verstappen's lap last year.
- Norris is ‘0.152’ slower than Piastri.
- Lewis is ‘0.913’ faster than Sainz, ‘4.646’ faster than last year.
- Albon is ‘3.535’ faster than last year.
- Leclerc is ‘3.268’ faster than last.
- Antonelli is ‘0.915’ faster than Bearman.


Japanese GP 2024 - Qualifying Lap Time Comparison
Qualifying Time
1:30.000
1:29.750
1:29.500
1:29.250
1:29.000
1:28.750
1:28.500
1:28.250
1:28.197
1:28.263 (+0.066s)
1:28.489 (+0.292s)
1:28.760 (+0.563s)
1:28.682 (+0.485s)
1:28.786 (+0.589s)
1:28.686 (+0.489s)
1:30.024 (+1.827s)
1:28.766 (+0.569s)
1:29.008 (+0.811s)
1:29.413 (+1.216s)
1:29.472 (+1.275s)
1:29.494 (+1.297s)
1:30.131 (+1.934s)
1:29.593 (+1.396s)
1:30.143 (+1.946s)
1:29.714 (+1.517s)
1:30.139 (+1.942s)
1:29.816 (+1.619s)
1:30.119 (+1.922s)
Fastest Lap: 1:28.197
VER PER NOR PIA SAI LEC ALO STR HAM RUS TSU RIC HUL MAG BOT ZHO ALB SAR OCO GAS
Driver
Team
Red Bull
McLaren
Ferrari
Aston Martin
Mercedes
RB
Haas
Kick Sauber
Williams
Alpine


Japanese GP 2025 - Qualifying Lap Time Comparison
Qualifying Time
1:29.000
1:28.500
1:28.000
1:27.500
1:27.000
Driver
VER
TSU
NOR
PIA
LEC
HAM
RUS
ANT
HAD
LAW
ALB
SAI
BEA
OCO
GAS
DOO
ALO
STR
HUL
BOR
1:26.983
1:28.000 (+1.017s)
1:26.995 (+0.012s)
1:27.027 (+0.044s)
1:27.299 (+0.316s)
1:27.610 (+0.627s)
1:27.318 (+0.335s)
1:27.555 (+0.572s)
1:27.569 (+0.586s)
1:27.906 (+0.923s)
1:27.615 (+0.632s)
1:27.836 (+0.853s)
1:27.867 (+0.884s)
1:28.696 (+1.713s)
1:27.822 (+0.839s)
1:28.877 (+1.894s)
1:27.897 (+0.914s)
1:29.271 (+2.288s)
1:28.570 (+1.587s)
1:28.622 (+1.639s)
Fastest Lap: 1:26.983
Team
Red Bull
McLaren
Ferrari
Mercedes
RB
Williams
Haas
Alpine
Aston Martin
Kick Sauber

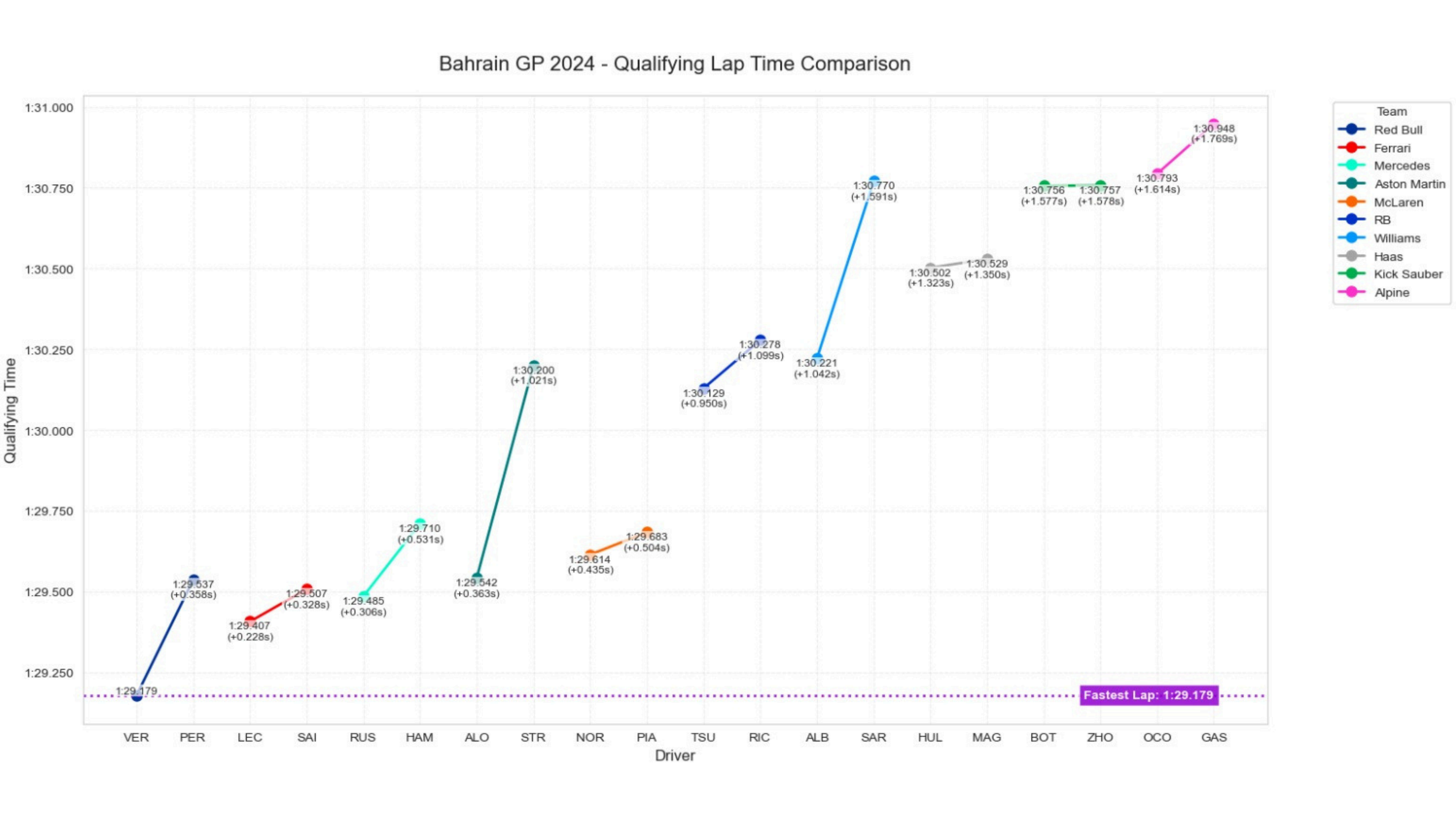
Japanese Grand Prix – Qualifying Summary
2024 vs 2025

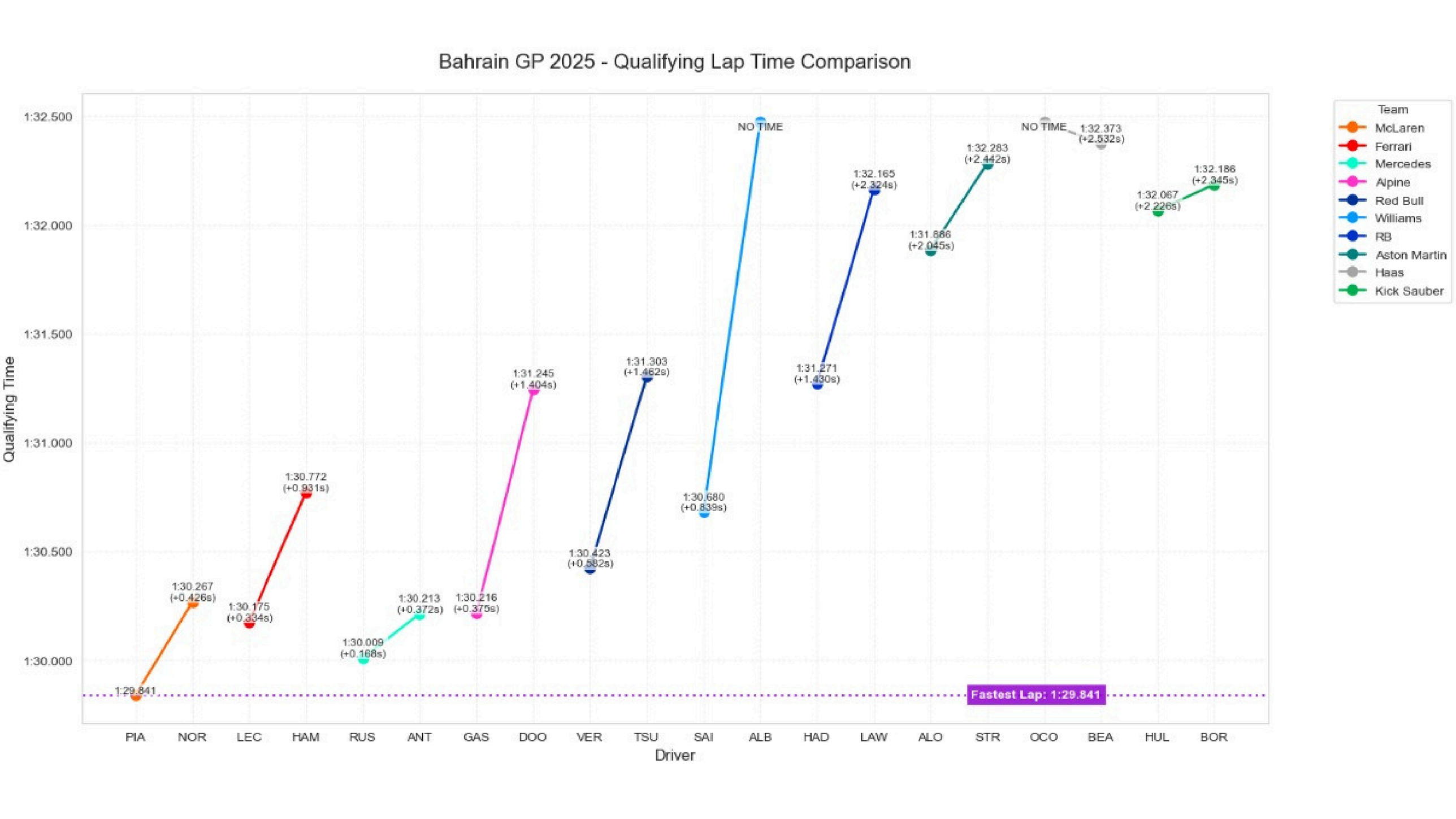
| 05 - 07 Apr 2024 |

- Verstappen got the pole lap ‘1:28.197’ ahead of Perez and Norris.
- Perez and Alonso are ‘0.066’ and ‘0.292' slower than Verstappen.
- Piastri is ‘0.563’ slower than Norris, starting from the 6th.
- Sainz starts from the 4th, ‘0.084’ faster than Hamilton, who started from the 7th.
- Only ‘1.946’ separating the 20 drivers.

| 04 - 06 Apr 2025 |

- Verstappen got the pole lap ‘1:26.983’ ahead of Norris and Piastri.
- Verstappen is ‘1.214’ faster than last year.
- Norris and Piastri are ‘0.012’ and ‘0.044’ slower than Verstappen.
- Mercedes drivers start from the third row, and Russell is ‘0.237’ faster than Antonelli.
- Leclerc is ‘0.311’ faster than Hamilton.
- Bearman starts from 10th, ‘0.884’ slower than Verstappen.


Bahrain GP 2024 - Qualifying Lap Time Comparison
Qualifying Time
1:31.000
1:30.750
1:30.500
1:30.250
1:30.000
1:29.750
1:29.500
1:29.250
Driver
VER
PER
LEC
SAI
RUS
HAM
ALO
STR
NOR
PIA
TSU
RIC
ALB
SAR
HUL
MAG
BOT
ZHO
OCO
GAS
1:29.179
1:29.537 (+0.358s)
1:29.407 (+0.228s)
1:29.507 (+0.328s)
1:29.485 (+0.306s)
1:29.710 (+0.531s)
1:29.542 (+0.363s)
1:30.200 (+1.021s)
1:29.614 (+0.435s)
1:29.683 (+0.504s)
1:30.129 (+0.950s)
1:30.278 (+1.099s)
1:30.221 (+1.042s)
1:30.770 (+1.591s)
1:30.502 (+1.323s)
1:30.529 (+1.350s)
1:30.756 (+1.577s)
1:30.757 (+1.578s)
1:30.793 (+1.614s)
1:30.948 (+1.769s)
Fastest Lap: 1:29.179
Team
Red Bull
Ferrari
Mercedes
Aston Martin
McLaren
RB
Williams
Haas
Kick Sauber
Alpine


Bahrain GP 2025 - Qualifying Lap Time Comparison
Qualifying Time
1:32.500
1:32.000
1:31.500
1:31.000
1:30.500
1:30.000
Driver
PIA
NOR
LEC
HAM
RUS
ANT
GAS
DOO
VER
TSU
SAI
ALB
HAD
LAW
ALO
STR
OCO
BEA
HUL
BOR
1:29.841
1:30.267 (+0.426s)
1:30.175 (+0.334s)
1:30.772 (+0.931s)
1:30.009 (+0.168s)
1:30.213 (+0.372s)
1:30.216 (+0.375s)
1:31.245 (+1.404s)
1:30.423 (+0.582s)
1:31.303 (+1.462s)
1:30.680 (+0.839s)
NO TIME
1:31.271 (+1.430s)
1:32.165 (+2.324s)
1:31.886 (+2.045s)
1:32.283 (+2.442s)
NO TIME
1:32.373 (+2.532s)
1:32.067 (+2.226s)
1:32.186 (+2.345s)
Fastest Lap: 1:29.841
Team
McLaren
Ferrari
Mercedes
Alpine
Red Bull
Williams
RB
Aston Martin
Haas
Kick Sauber

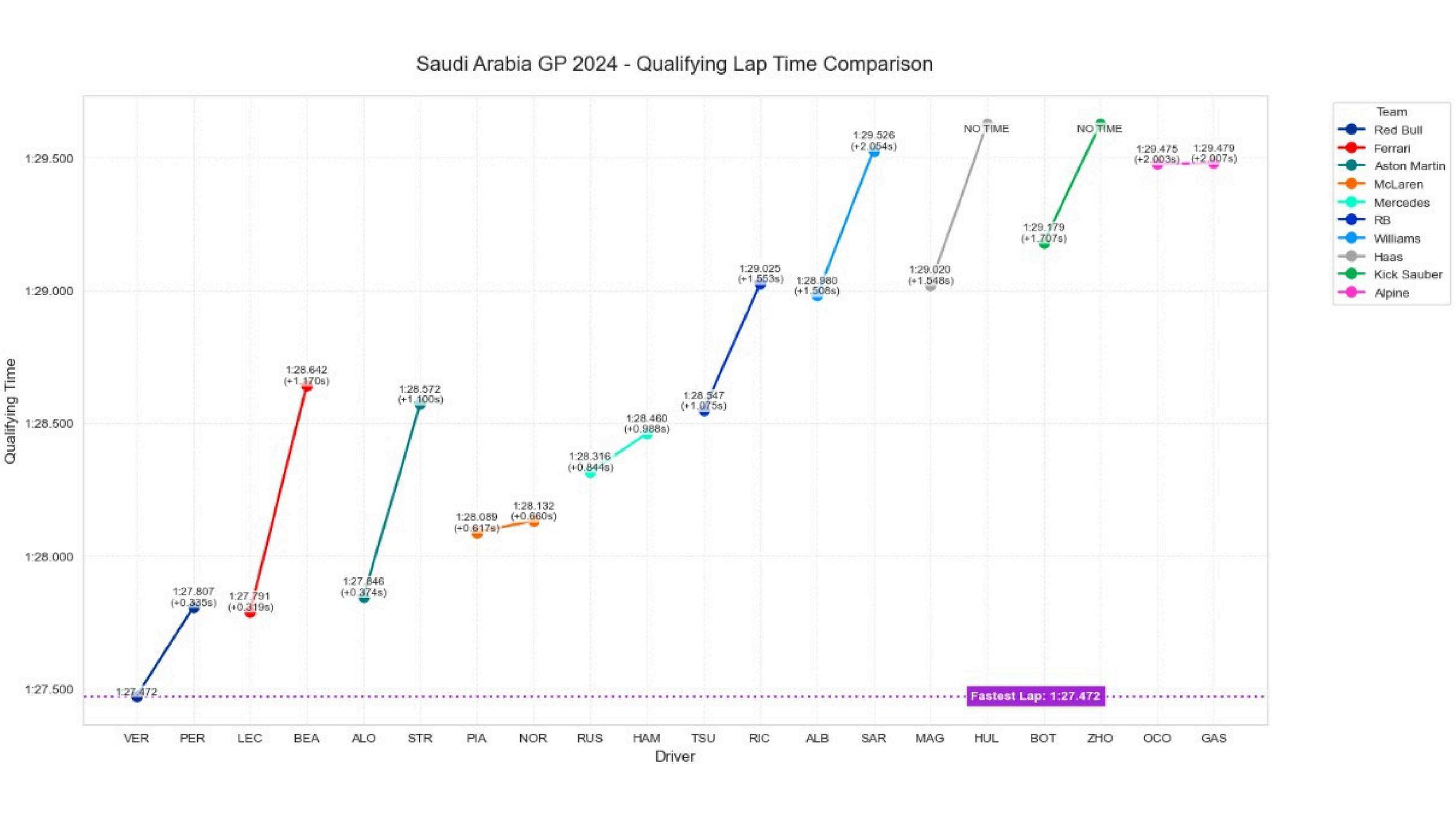
Bahrain Grand Prix – Qualifying Summary
2024 vs 2025

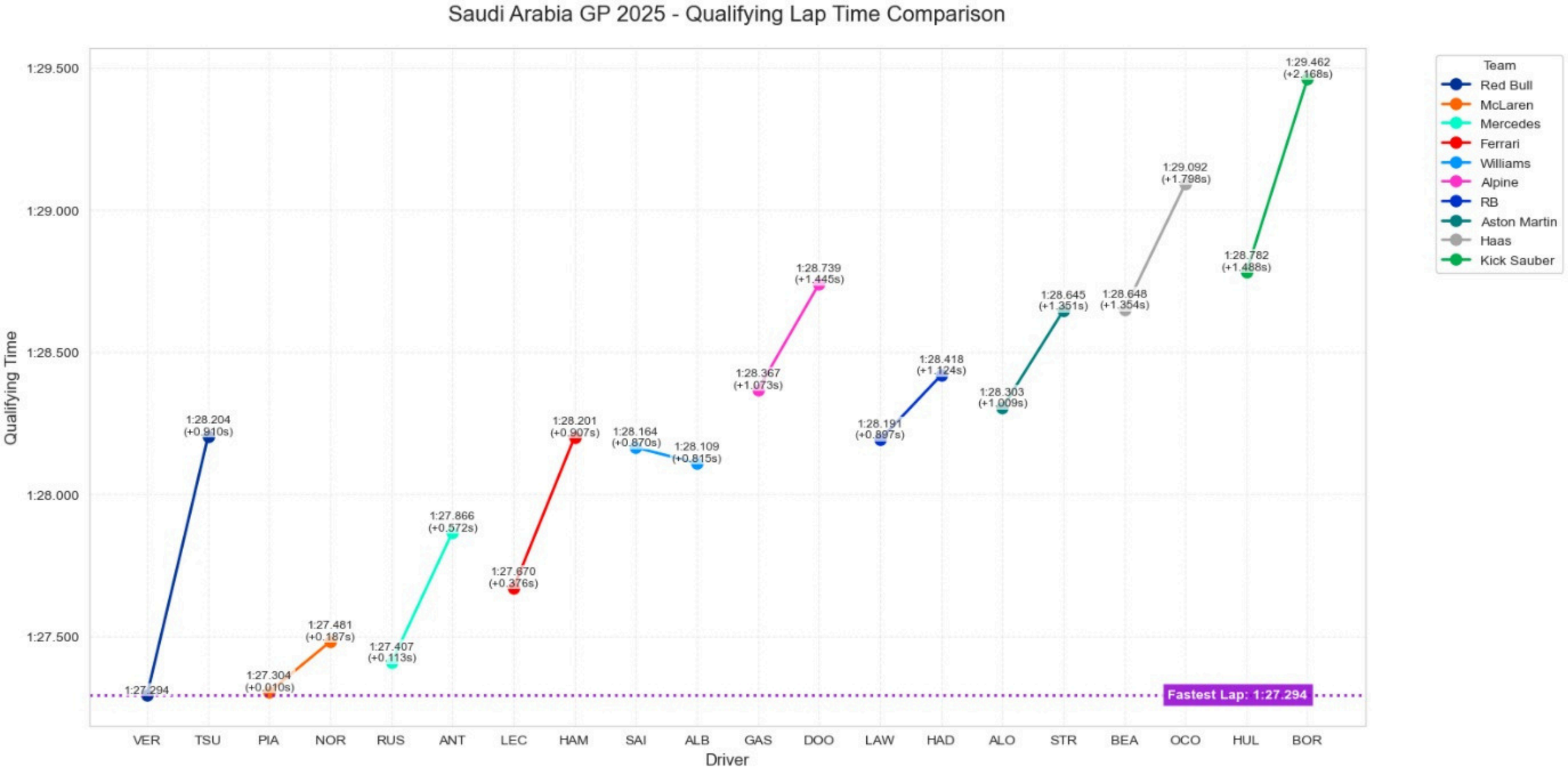
| 29 Feb - 02 Mar 2024 |

- Verstappen got the pole lap ‘1:29.179’ ahead of Leclerc and Russell.
- Leclerc and Russell are ‘0.066’ and ‘0.292’ slower than Verstappen.
- Piastri is ‘0.069’ slower than Norris, and they both started from the 7th and 8th.
- Sainz started from the 4th, ‘0.203’ faster than Hamilton, who started from the 9th.
- Only ‘1.946’ separating the 20 drivers.

| 11 - 13 Apr 2025 |

- Piastri got the pole lap ‘1:29.841’ ahead of Leclerc and Russell.
- Russell is ‘0.166’ faster than Leclerc, but they started in the same qualifying positions as last year due to a one-place penalty for Russell.
- Verstappen is ‘1.244’ slower than last year.
- Mercedes drivers started from the third row, and Russell is ‘0.237’ faster than Antonelli.
- Leclerc is ‘0.311’ faster than Hamilton.
- Bearman started from 10th, ‘0.884’ slower than Verstappen.


Saudi Arabia GP 2024 - Qualifying Lap Time Comparison
Qualifying Time
1:29.500
1:29.000
1:28.500
1:28.000
1:27.500
1:27.472
1:27.807
(+0.335s)
1:27.791
(+0.319s)
1:28.642
(+1.170s)
1:27.846
(+0.374s)
1:28.572
(+1.100s)
1:28.089
(+0.617s)
1:28.132
(+0.660s)
1:28.316
(+0.844s)
1:28.460
(+0.988s)
1:28.547
(+1.075s)
1:29.025
(+1.553s)
1:28.980
(+1.508s)
1:29.526
(+2.054s)
1:29.020
(+1.548s)
NO TIME
1:29.179
(+1.707s)
NO TIME
1:29.475
(+2.003s)
1:29.479
(+2.007s)
Fastest Lap: 1:27.472
VER
PER
LEC
BEA
ALO
STR
PIA
NOR
RUS
HAM
TSU
RIC
ALB
SAR
MAG
HUL
BOT
ZHO
OCO
GAS
Driver
Team
Red Bull
Ferrari
Aston Martin
McLaren
Mercedes
RB
Williams
Haas
Kick Sauber
Alpine


Saudi Arabia GP 2025 - Qualifying Lap Time Comparison
Qualifying Time
1:29.500
1:29.000
1:28.500
1:28.000
1:27.500
Driver
VER
TSU
PIA
NOR
RUS
ANT
LEC
HAM
SAI
ALB
GAS
DOO
LAW
HAD
ALO
STR
BEA
OCO
HUL
BOR
1:27.294
1:28.204 (+0.910s)
1:27.304 (+0.010s)
1:27.481 (+0.187s)
1:27.407 (+0.113s)
1:27.866 (+0.572s)
1:27.670 (+0.376s)
1:28.201 (+0.907s)
1:28.164 (+0.870s)
1:28.109 (+0.815s)
1:28.367 (+1.073s)
1:28.739 (+1.445s)
1:28.191 (+0.897s)
1:28.418 (+1.124s)
1:28.303 (+1.009s)
1:28.645 (+1.351s)
1:28.648 (+1.354s)
1:29.092 (+1.798s)
1:28.782 (+1.488s)
1:29.462 (+2.168s)
Fastest Lap: 1:27.294
Team
Red Bull
McLaren
Mercedes
Ferrari
Williams
Alpine
RB
Aston Martin
Haas
Kick Sauber

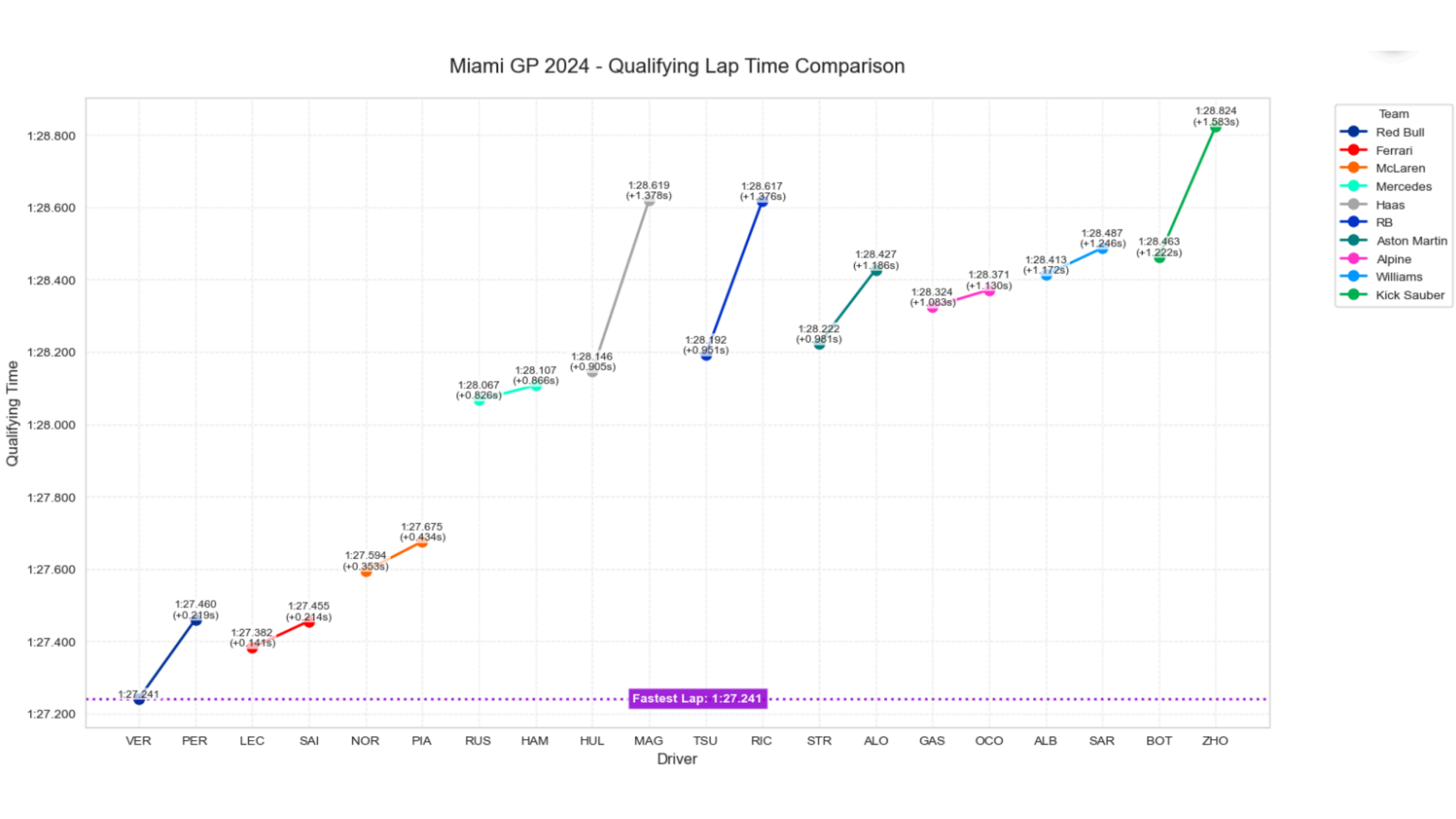
Saudi Arabia Grand Prix – Qualifying Summary
2024 vs 2025

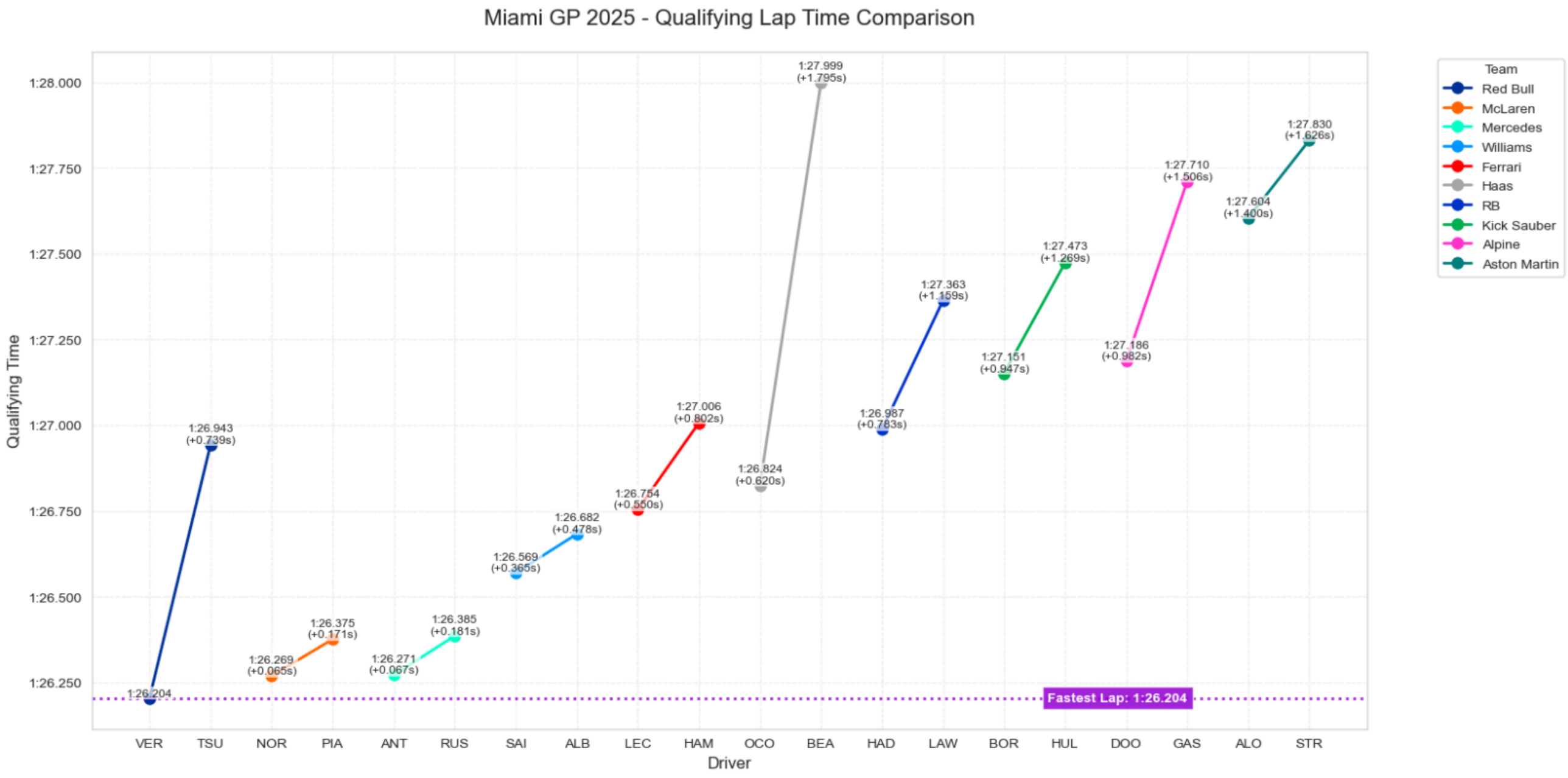
| 07 - 09 Mar 2024 |

- Verstappen got the pole lap ‘1:27.472’ ahead of Leclerc and Perez.
- Leclerc and Perez are ‘0.319’ and ‘0.335’ slower than Verstappen.
- Piastri is ‘0.043’ faster than Norris, and they both started from the 5th and 6th.
- Russell is ‘0.144' faster than Hamilton, and they both started from 7th and 8th.
- Bearman scored ‘1:28.642’ and started from the 11th in his first Formula One race instead of Sainz.

| 18 - 20 Apr 2025 |

- Verstappen got the pole lap ‘1:27.294’ ahead of Piastri and Russell.
- Piastri and Russell are ‘0.010’ and ‘0.113’ slower than Verstappen.
- Norris started from the 10th for the first time this season.
- Antonelli and Sainz are ‘0.335’ and ’0.037’ faster than Hamilton.
- Leclerc is ‘0.531’ faster than Hamilton.


Miami GP 2024 - Qualifying Lap Time Comparison
Qualifying Time
1:28.800
1:28.600
1:28.400
1:28.200
1:28.000
1:27.800
1:27.600
1:27.400
1:27.200
VER
PER
LEC
SAI
NOR
PIA
RUS
HAM
HUL
MAG
TSU
RIC
STR
ALO
GAS
OCO
ALB
SAR
BOT
ZHO
Driver
1:27.241
1:27.460 (+0.219s)
1:27.382 (+0.141s)
1:27.455 (+0.214s)
1:27.594 (+0.353s)
1:27.675 (+0.434s)
1:28.067 (+0.826s)
1:28.107 (+0.866s)
1:28.146 (+0.905s)
1:28.619 (+1.378s)
1:28.192 (+0.951s)
1:28.617 (+1.376s)
1:28.222 (+0.981s)
1:28.427 (+1.186s)
1:28.324 (+1.083s)
1:28.371 (+1.130s)
1:28.413 (+1.172s)
1:28.487 (+1.246s)
1:28.463 (+1.222s)
1:28.824 (+1.583s)
Fastest Lap: 1:27.241
Team
Red Bull
Ferrari
McLaren
Mercedes
Haas
RB
Aston Martin
Alpine
Williams
Kick Sauber


Miami GP 2025 - Qualifying Lap Time Comparison
Qualifying Time
1:28.000
1:27.750
1:27.500
1:27.250
1:27.000
1:26.750
1:26.500
1:26.250
Driver
VER
TSU
NOR
PIA
ANT
RUS
SAI
ALB
LEC
HAM
OCO
BEA
HAD
LAW
BOR
HUL
DOO
GAS
ALO
STR
1:26.204
1:26.943
(+0.739s)
1:26.269
(+0.065s)
1:26.375
(+0.171s)
1:26.271
(+0.067s)
1:26.385
(+0.181s)
1:26.569
(+0.365s)
1:26.682
(+0.478s)
1:26.754
(+0.550s)
1:27.006
(+0.802s)
1:26.824
(+0.620s)
1:27.999
(+1.795s)
1:26.987
(+0.783s)
1:27.363
(+1.159s)
1:27.151
(+0.947s)
1:27.473
(+1.269s)
1:27.186
(+0.982s)
1:27.710
(+1.506s)
1:27.604
(+1.400s)
1:27.830
(+1.626s)
Fastest Lap: 1:26.204
Team
Red Bull
McLaren
Mercedes
Williams
Ferrari
Haas
RB
Kick Sauber
Alpine
Aston Martin

Miami Grand Prix – Qualifying Summary
2024 vs 2025

| 03 - 05 May 2024 |

- Verstappen got the pole lap ‘1:27.241’ ahead of Leclerc and Sainz.
- Leclerc and Sainz are ‘0.141’ and ’0.214’ slower than Verstappen.
- Norris is ‘0.081’ faster than Piastri, and they both started from the 5th and 6th.
- Russell is ‘0.040’ faster than Hamilton, and they both started from the 7th and 8th.
- Piastri is ‘0.434’ slower than Verstappen.
- Hamilton is ‘0.866’ slower than Verstappen.

| 02 - 04 May 2025 |

- Verstappen got the pole lap ‘1:26.204’ ahead of Norris and Antonelli.
- Norris and Antonelli are ‘0.065’ and ’0.067’ slower than Verstappen, and it’s the lowest gap between the first three positions this season.
- Bortoleto started from the 13th, and it’s the best starting position this season.
- Antonelli is ‘0.114’ faster than Russell for the first time this season.
- Russell is ‘0.621’ faster than Hamilton.

DATA COLLECTION & PREPARATION

```python
# =====================
# 1. DATA PREPARATION
# =====================

def load_qualifying_data(grand_prix):
    sample_data = {
        "Australian GP": {
            "DRIVER": ["VER", "SAI", "NOR", "LEC", "PIA",
                       "PER", "RUS", "TSU", "STR", "ALO",
                        "HAM", "ALB", "BOT", "MAG", "OCO",
                        "HUL", "GAS", "RIC", "ZHO", "SAR"],

            "TEAM": ["Red Bull", "Ferrari", "McLaren", "Ferrari", "McLaren",
                     "Red Bull", "Mercedes","RB", "Aston Martin", "Aston Martin",
                      "Mercedes", "Williams", "Kick Sauber", "Haas", "Alpine",
                     "Haas", "Alpine", "RB",  "Kick Sauber", "Williams",],

            "Q_TIME": ["1:15.915", "1:16.185", "1:16.315", "1:16.435", "1:16.572",
                       "1:16.274", "1:16.724", "1:16.788", "1:17.072", "1:17.552",
                        "1:17.715", "1:17.980", "1:18.105", "1:18.210", "1:18.320",
                        "1:18.450", "1:18.560", "1:18.670", "1:18.780", "NO TIME"]

        }
    }
    return pd.DataFrame(sample_data[grand_prix])
```

- Race data is manually inserted using a dictionary for each event.

- Each entry includes:
- "DRIVER" – Driver name
- "TEAM" – Team name
- "Q_TIME" – Qualifying lap time

- Converts the dictionary into a Pandas DataFrame.

DATA PROCESSING

```python
# ======================
# 2. DATA PROCESSING
# ======================

def preprocess_data(df):
    def convert_time_to_sec(x):
        if isinstance(x, str) and ":" in x:
            try:
                m, s = x.split(":")
                return int(m) * 60 + float(s)
            except:
                return None
        return None

    df["TIME_SEC"] = df["Q_TIME"].apply(convert_time_to_sec)
    valid_times = df["TIME_SEC"].dropna()  #TO DROP NULL VALUES.
    slowest_valid = valid_times.max() if not valid_times.empty else 90.0

    # Assign NO TIME drivers the slowest valid time
    df["IS_NO_TIME"] = df["Q_TIME"] == "NO TIME"
    df.loc[df["IS_NO_TIME"], "TIME_SEC"] = slowest_valid + 0.1

    # Calculate GAP only for real lap times
    fastest_time = valid_times.min() if not valid_times.empty else None
    df["GAP"] = df["TIME_SEC"] - fastest_time if fastest_time else None

    return df
```

- Define a helper function to convert lap times into total seconds.
- Adds a new column with the lap time in seconds using the helper function above.
- Replaces missing lap times "NO TIME" with a time just slightly slower than the slowest valid lap.
- Calculates the time gap between each driver and the fastest driver.
- Ensure all data is ready for visualization.

DATA VISUALIZATION

```python
# ======================
# 3. VISUALIZATION
# ======================

def plot_qualifying_comparison(df, grand_prix):
    team_colors = {
        "Red Bull": "#003399",
        "Ferrari": "#FF0000",
        "Mercedes": "#00FFCC",
        "McLaren": "#FF6600",
        "Aston Martin": "#008080",
        "Alpine": "#FF33CC",
        "RB": "#0033CC",
        "Kick Sauber": "#00B050",
        "Haas": "#A6A6A6",
        "Williams": "#0099FF"
    }

    plt.figure(figsize=(16, 8))

    for team in df["TEAM"].unique():
        team_data = df[df["TEAM"] == team]
        color = team_colors.get(team, "gray")
```

- This function plots the final chart comparing lap times by team and driver.
- Custom colours for each team to make the plot look realistic and themed.
- Setting the size of the plot.
- Loops through each team and plots their drivers' lap times as lines with dots.
- Each team is shown in its colour.

DATA VISUALIZATION

```
plt.plot(
    team_data["DRIVER"],
    team_data["TIME_SEC"],
    marker="o",
    linestyle="-",
    color=color,
    label=team,
    linewidth=2,
    markersize=8,
```

Use Matplotlib + Seaborn to:

- Plot lap times per driver and team.

```
for _, row in df.iterrows():
    label = "NO TIME" if row["IS_NO_TIME"] else (
        f"{row['Q_TIME']}\n(+{row['GAP']:.3f}s)" if row["GAP"] > 0 else row["Q_TIME"]
    )
    plt.text(
        row["DRIVER"],
        row["TIME_SEC"],
        label,
        ha="center",
        va="bottom" if not row["IS_NO_TIME"] else "top",
        fontsize=8.6,
        bbox=dict(facecolor="white", alpha=0.7, edgecolor="none", pad=1)
    )
```

- Add driver labels and gap text on each point.

DATA VISUALIZATION

```
def sec_to_time_format(x, pos):
    m = int(x // 60)
    s = x % 60
    return f"{m}:{s:06.3f}"

ax = plt.gca()
ax.yaxis.set_major_formatter(FuncFormatter(sec_to_time_format))

plt.title(f"{grand_prix} 2025 - Qualifying Lap Time Comparison", fontsize=16, pad=20)
plt.xlabel("Driver", fontsize=12)
plt.ylabel("Qualifying Time", fontsize=12)
plt.legend(title="Team", bbox_to_anchor=(1.05, 1), loc="upper left")
```

- Converts the y-axis (seconds) back into M:SS.sss format to make it readable like real F1 lap times.

- Add axis labels and a bold chart title with the race name.

DATA VISUALIZATION

```
if fastest_time := df[~df["IS_NO_TIME"]]["TIME_SEC"].min():
    plt.axhline(y=fastest_time, color="darkviolet", linestyle=":", linewidth=2, alpha=0.85)
    plt.text(
        df["DRIVER"].iloc[-1],
        fastest_time,
        f"Fastest Lap: {int(fastest_time // 60)}:{fastest_time % 60:06.3f}",
        ha="right",
        va="center",
        color="white",
        fontweight="bold",
        bbox=dict(facecolor="darkviolet", alpha=0.85)
    )

plt.grid(True, linestyle="--", alpha=0.3)
plt.tight_layout()
plt.show()
```

- Highlight the fastest lap with a dotted line.
- Add a light grid, adjust spacing, and display the final plot.
- Set the Seaborn chart style and colours to be cleaner and more modern.

```
sns.set_style("whitegrid")  # clean background
sns.set_palette("Set2")     # soft, modern colors
```