

7:29.60 —

# How did the new Camaro ZL1 cut 12 seconds off the old one's Nürburgring time?

Better power, tires, handling, lower mass—and a 10-speed automatic transmission.

ERIC TEGLER - NOV 2, 2016 1:41 PM UTC



[Enlarge](#) / The Camaro ZL1 on the toughest racetrack in the world, the Nürburgring Nordschleife.

Last week Chevrolet announced that the 2017 ZL1 Camaro ran a lap of the Nürburgring Nordschleife in 7:29.60—11.67 seconds quicker than the previous ZL1's fast lap. The Nordschleife course is used by manufacturers to set lap times. The Sport Auto Lap is 14.1 miles (22.8km) long, so the new Camaro gained nearly a second per mile. In performance and racing terms, that is a huge pick-up, one which might give rise to some skepticism. So how did the new car make such a big gain?

As with all things Nürburgring, "if there's no video, it didn't happen," so have a gander at the lap *æ*rst. Camaro ride and handling engineer Drew Cattell is at the wheel.

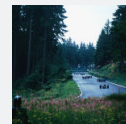
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Try watching this video on [www.youtube.com](http://www.youtube.com), or enable JavaScript if it is disabled in your browser.



Some of the ZL1's hardware has remained the same, including wheel/tire sizes and brakes. But the **2017 ZL1** has aerodynamic differences starting with a smaller proæle and extending to new underbody aero panels borrowed from the Cadillac CTS-V, which keep airçow laminar underneath the Camaro. The smaller car has tighter packaging and requires no less than 11 heat exchangers to ensure reliably cool under-hood temperatures. Above the hood a new supercharger lid improves airçow.

Despite it all, Camaro Chief Engineer Al Oppenheiser says the aero changes did *not* improve the ZL1's lap time. Both the new sixth-generation car and the previous æfth-gen ZL1 are downforce-neutral at 150mph (241km/h) and the top speeds of both are aero-limited.



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What did make the difference? There are six areas that make up the lap-time gain.

## Platform/Weight

The new Camaro is built on GM's Alpha platform which underpins Cadillac's CTS and ATS, a huge improvement over the Holden-derived Zeta platform on which the previous ZL1 rode. "It took 220 pounds of mass out of the car," Oppenheiser aèrms. "It's one of the biggest enablers. It's lighter weight but it's also 28 percent more rigid."

The lighter weight (now 3,944 lbs/1,812kg with automatic transmission) and stiffer structure inçuence every aspect of the new ZL1 from acceleration and braking to turn-in. The Camaro is still no bantamweight but is meaningfully lighter on its feet than before. "That was our 'scarlet letter' with the æfth-gen, the mass that we were saddled with from day one," Oppenheiser admits.

## Power

The sixth-gen ZL1 replaces the previous LSA supercharged V8 which made 580hp/556lb-ft.

(433kW/754Nm) with the LT4 supercharged V8 used in the C7 Corvette Z06 and CTS-V. The 6.2-liter 144

brings real power gains—650hp/650lb-ft (485kW/881Nm)—which translate to better acceleration out of the Nordschleife's many corners and down its two-mile (3.2km) Döttinger Höhe straight, where the 2017 ZL1 reached 181mph compared to the old car's 176 mph.

## Transmission

You can get a six-speed manual in the new ZL1. It's arguably the most enjoyable choice and it's 60 pounds lighter than the automatic. But the Camaro did its Nürburgring lap with Chevy's new 10R90 10-speed automatic.

"I think the ten-speed automatic is going to take the automotive world by storm much like the small-block did in 1955," Al Oppenheiser says.

The Camaro is the first passenger car to feature a ten-speed. In this case it comes with some trick software. The 10R90's Performance Algorithm Shifting (PAS) and track mode maximize gear selection and power delivery in a way that drivers can't.

"If you watch the video, you can see that Drew is just holding onto the steering wheel. He's not using [paddle-shifting]," Oppenheiser points out.

The software includes a lift-foot gear-hold feature which holds the transmission in-gear when the driver lifts off the gas. As a result, there's no unwanted up-shift as in a traditional automatic and no unwanted downshift when you reapply the throttle. The gear, RPM, and engine torque are all held, maximizing on-throttle response.

Smaller gear ratio gaps yield quicker shift times and Chevy claims that the ten-speed is quicker when paddle-shifted or shifting itself than vaunted dual clutch transmissions. In the video, you can see the transmission automatically up-shift at 170mph, taking advantage of the PAS calculations. And yes, Chevy did laps with Drew Cattell shifting himself; letting the trans do all the work was slightly faster.

## Handling

The ZL1's FE4 suspension with Magnetic Ride Control is a good base but it can now leverage the stiffer Alpha platform, advanced software programming, and an electronic limited-slip differential (ELSD).

"It really allows the front corner to bite into turns better than the eighth-gen," Oppenheiser stresses. "The new architecture doesn't have designed-in understeer. We can tune the [magnetorheological shocks] more precisely and utilize the faster processing speed [of the new MR software] to get better body control."

The ELSD is borrowed from the Corvette. While it's heavier than a manual LSD, it's another key enabler.

"Whether you're on a straightaway, corner entry, mid-corner, or corner exit, we can tune the grip from open [differential] to locked," Oppenheiser explains.

The ELSD can be open to maximize corner entry speed, then instantaneously transition to locked at mid-corner and on corner exit, eliminating the tendency to spin the inside rear wheel on corner exit. "If you start adding up all the corners at the Nurburgring, that's a significant improvement in lap time."

Such real-time differential adjustment may be bettered in the future as GPS and artificial intelligence are applied to learn corners and essentially set up the differential before the car arrives at a corner. Is that good thing? We'll let you decide.

## Tires

Tires are always paramount in vehicle performance and Goodyear supplied the fifth-gen car and now the sixth-gen ZL1. But the new Eagle F1 Supercar 3 rubber uses a different compound, offering more grip. Al Oppenheiser estimates the tire change took two seconds off the lap time.

## Driver comfort/concidence

A happy, non-terrified driver is always faster. Credit the Alpha architecture and suspension tuning for bumping concidence. Credit Oppenheiser's team for seeking functional comfort by re-proxelling the ZL1's Recaro seat side bolsters. "Most guys who take their cars to the track on the weekend take a knife to or remove the inboard side bolster of the seat back because as you're shifting, your elbow keeps hitting that side bolster," he said. Chevy engineers factored-in all the test drivers' elbow throws during shifting (the manual) and contoured the side bolsters to prevent interference.

## And that's how you get 12 seconds quicker

To get a read on what the fifth-gen ZL1 could've done better we asked Al Oppenheiser what was first on his unrequited wish-list for the old car. "The biggest thing was that I wanted to include the electronic limited slip differential," he replied. "We knew what capability it gave the Corvette. It was available but the thing we spent money on was electronic power steering."

For the cynics out there we concluded by asking if the lap time improvement was more a factor of new engineering or budget?

"It's the former and the fact that we were able to take advantage of a lighter weight architecture to start with was big. I'm about 230 pounds. Take me out of the fifth-gen and you have the sixth-gen."

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