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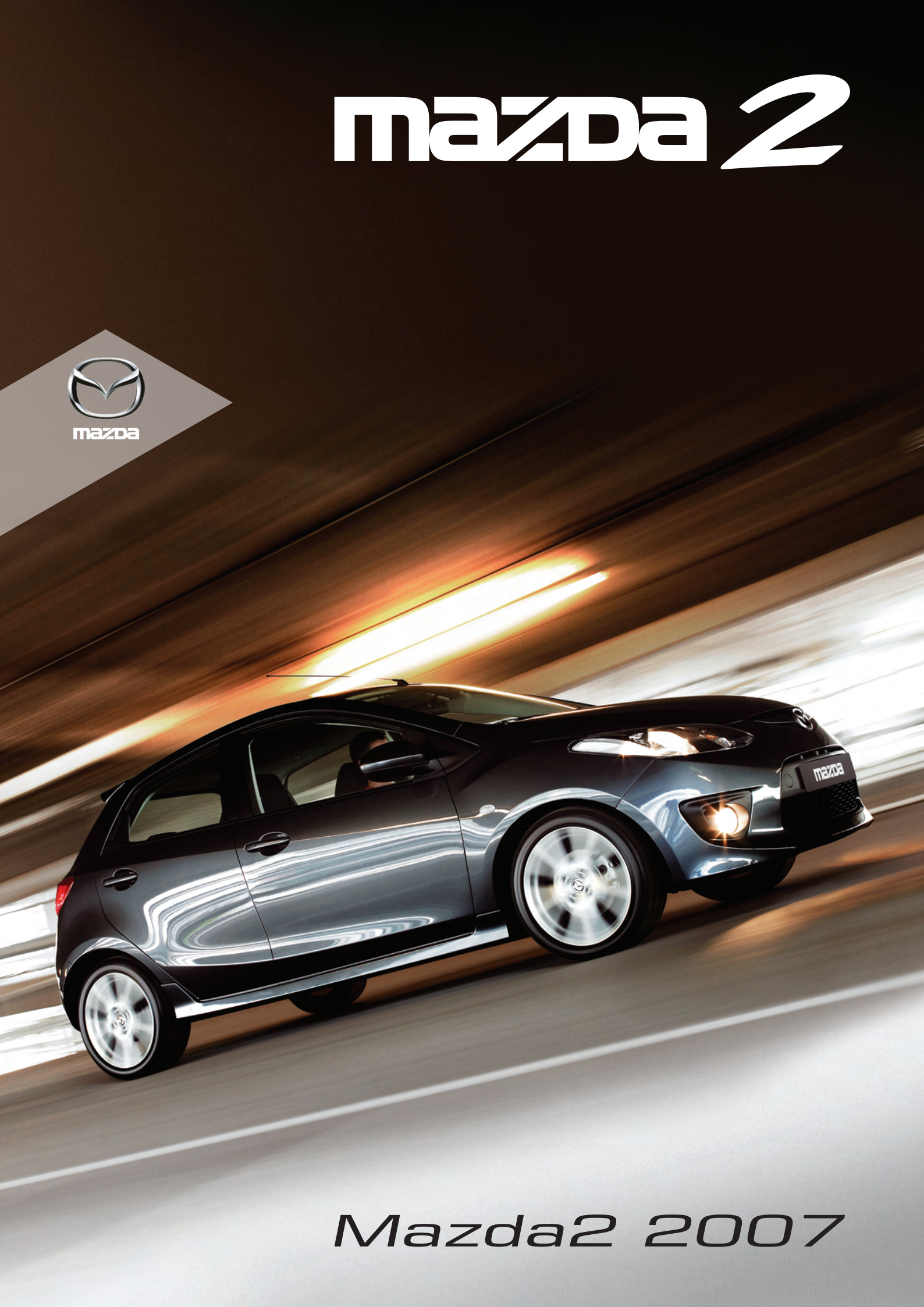

Mazda2 2007

MAZDA 2
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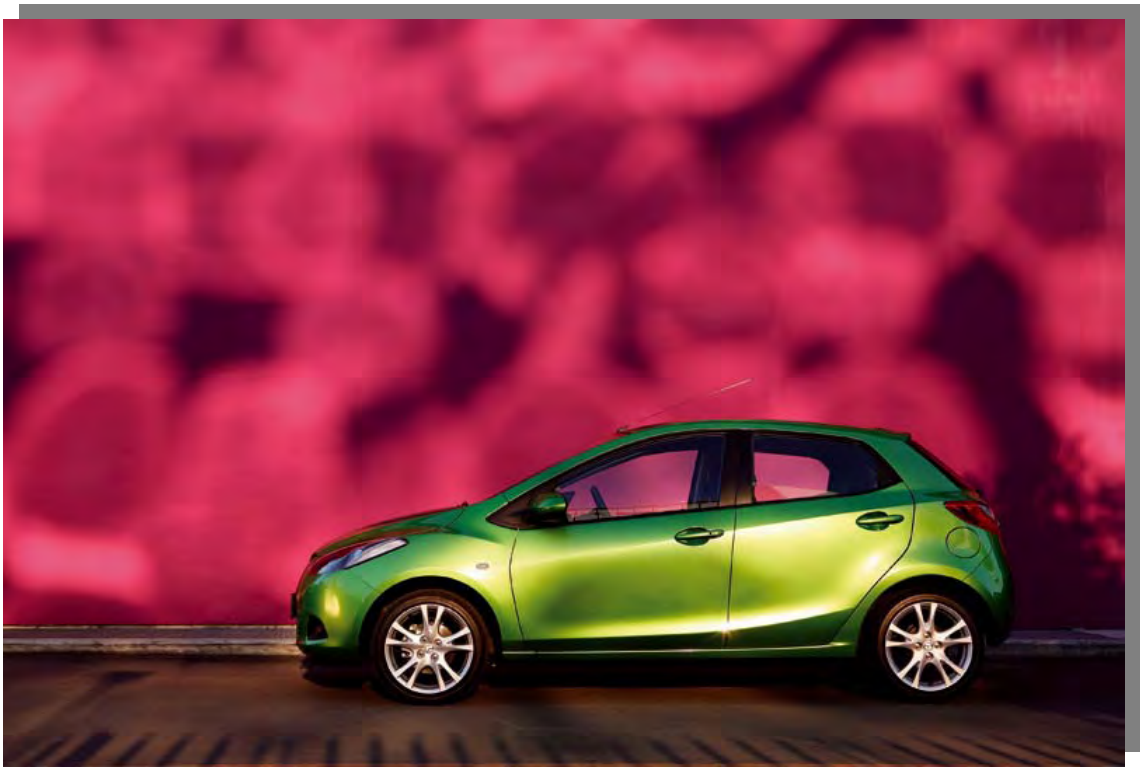

MAZDA2: LIGHTER, STRONGER, SAFER, CUTER

1. Overview

Lighter, stronger, safer, cuter, more fuel efficient and offering better value than ever before. That sums up the new Mazda2, the first example of Mazda's second generation of Zoom-Zoom cars.

At just $16,500, the new Mazda2 Neo is only $165 more than the superseded model yet adds about $1000 of additional value.

New standard features include an anti-lock Braking System (ABS) with Electronic Brake-force Distribution (EBD) and Emergency Brake Assist (EBA), remote locking, driver's seat height adjustment, a centre rear headrest and an AUX jack that enables any MP3 player (including iPod®) to be played through the car's stereo.

Air conditioning, power windows and mirrors and an MP3 compatible CD player with four speakers are also part of the package.

The new Mazda2 becomes the first Mazda and the first Japanese model in the light car class available with Dynamic Stability Control (DSC) across all models. DSC is a state-of-the-art automated anti-skid system that helps prevent front or rear wheel slides.

New Mazda2 is also available in Maxx grade which adds 15 inch alloy wheels, six-disc CD player, steering wheel mounted audio controls and a rear spoiler. It is priced from $18,710.

Boasting a body kit, the range-topping Genki model now comes with 16 inch alloys, unique seat trim, six airbags, leather-trimmed steering wheel and front fog lamps. It is priced from $20,845.

Style is the number one reason for purchase in the so-called Light or B car segment and when it comes to looks the new Mazda2 is a radical departure from the practical boxy shape of the car launched back in late 2002.

While that model was primarily designed for the Japanese domestic market the new Mazda2 is now a global car with Europe, Japan and Australia significant markets for the latest version.

The car's prominent front fenders have a lot of sports car in them. Perhaps that shouldn't be a surprise given that the new Mazda2 was penned by Ikuo Maeda – the man responsible for the RX-8 and whose father designed the original RX-7.

The fenders and the steeply sloping shoulder line are just two elements that ensure the new Mazda2 looks like an athlete in the starting blocks – it looks like its moving even when it's standing still.

This aggressive look also brings practical benefits. With the beltline descending towards the front of the car – it is 40mm lower than the outgoing model – and together with a lower positioning of the side mirrors means increased visibility diagonally to the front and down. This results in increased safety when driving on narrow roads and turning at junctions, where pedestrians could cross the road.

Inside, the cabin was designed to be a space that communicates movement. Unlike interiors with flat surfaces, the architecture selected combines confidence-inspiring solidity with strong visual movement.

By emphasising the horizontal plane, a subjectively large spatial feel is achieved. The contrast between silver accents and an otherwise dark background, along with many round elements, add sportiness and individuality to the cockpit.

The new cabin layout also aids driving enjoyment with the gearbox shift lever integrated into the centre console and mounted 38mm higher and therefore closer to the driver.

The car's new shape is more aerodynamic than before benefiting both fuel economy and wind noise. General noise intrusion into the cabin has been one area where Mazda2 program manager Shigeo Mizuno and his team have worked hard to improve.

Driver fatigue has been reduced with wind and road noise significantly less than that produced by the outgoing model. On a coarse road surface noise inside the new Mazda2 is a significant 2.3 decibels lower than the superseded car.

Overall the new Mazda2 is a little smaller with 41mm cut from its length (now 3885mm), 65mm from its height, although the wheelbase stays the same (2490mm) and width has increased a little (15mm). However, interior space for people and cargo remains very competitive.

This downsizing helped Mazda cut 100kg from the first generation Mazda2's chassis. The car's improved standard feature list means that Australian Neo models are about 60kg lighter than before.

The new Mazda2's shorter dimensions contribute just 40kg to the 100kg weight reduction.

To further reduce flab and therefore improve fuel consumption and performance, the Mazda2 team had to get clever, looking to the MX-5 and its weight saving "gram strategy" for inspiration.

The "gram strategy" ensures that every aspect of the car was checked for excess. That attention to detail meant shaving 0.69kg from the bonnet by making the latch smaller and its hinges thinner.

There are many examples of how weight was trimmed, however the single biggest gain was in the body shell, which was slimmed by 22kg to 215kg.

The Mazda2's body may be lighter but it's also stronger, being the first Mazda to use new generation ultra high-tensile steel, while the proportion of high-tensile steel has jumped from just 5 per cent in the superseded car to 31 per cent.

More rigid than before, the Mazda2's body benefits from localised stiffening such as around the suspension towers. These focused stiffening techniques ensure maximum benefit with minimal weight penalty. Benefits include better handling, improved NVH and a stronger passenger safety cell.

All Mazda2 models now comply with the strict Euro Stage 4 emission regulations and are powered by a 1.5-litre MZR engine that features Sequential Valve Timing (S-VT) to boost cylinder charging efficiency and Tumble Swirl Control Valves in the intake manifold that optimise the air/fuel ratio to promote combustion stability.

The engine develops 76kW at 6000rpm (EEC) and 137Nm at 4000rpm (EEC) and with reduced friction losses and the lower body weight, combines to reduce fuel consumption and therefore $C0_2$ emissions. The new Mazda2 also promises to be quicker than the outgoing model.

The new Mazda2 uses an average of just 6.4L/100km on the ADR 81/01 cycle compared with 6.6L/100km on the outgoing model, while automatic transmission versions now average 6.8L/100km compared with 7.0L/100km previously.

Drive the 1.5-litre Mazda2 and those carefully chosen stiffening techniques and the lighter body are immediately obvious. Mazda has dialled up the Zoom-Zoom factor.

A lower centre of gravity and carefully weighted electric power steering, with just 2.7 turns lock-to-lock, ensures the driver gets a free flow of information from the front wheels.

Match this to agile handling and crisp, linear braking response and the new Mazda2 is sure to sit at the top of its class when it comes to driving fun.

The completely revised and lighter by some 13kg MacPherson strut front and Torsion Beam rear suspension not only boosts handling characteristics but deliver improved ride quality.

That on-road ability - nimble braking, steering and handling - means better primary safety, so Mazda2 buyers will be better able to avoid an accident in the first place. The standard ABS brakes and the availability of DSC on all models further improve accident avoidance.

Mazda2 also offers more protection in a crash thanks to the stiffer chassis, while cars fitted with six airbags (available across the range and standard on the range topping Genki) are expected to earn a top, five-star NCAP rating.

Doug Dickson, managing director of Mazda Australia, said: “The new Mazda2 demonstrates that Mazda is not resting on its laurels. As the first of our second generation of Zoom-Zoom cars it ticks all the boxes and we expect it to sell in much larger numbers than the original car.

“The new Mazda2’s combination of great looks, outstanding value and class leading driving dynamics make it a super little model.”

Mazda Australia expects to sell about 850 Mazda2s a month. The superseded model has averaged 450 a month since its late 2002 launch.

The new Mazda2, like the rest of the Mazda passenger and SUV range, comes with a three year/unlimited kilometre warranty.

2. SALES & MARKETING

The new Mazda2, the first of Mazda's second generation of Stylish, Insightful and Spirited vehicles is expected to appeal to a younger buyer.

Style is the number one reason for purchase in the light car segment and Mazda Australia's in-house research shows that the new Mazda2 is one of the most eye-catching in its class.

The Mazda2, first presented at this year's Geneva Motor Show, begins the next phase in the history of the company. This is not a simple model change, but the first product of a further developed new generation of Mazda automobiles. It not only continues the Zoom-Zoom idea, it stands out in an increasingly competitive environment with clever and fresh technical solutions. To achieve this, Mazda considered customer demands across the globe.

The main goal of the Mazda2 development team was a further sharpening of Mazda's brand values – its distinctive design, exceptional functionality and agile handling.

At the same time, the team aimed at a further improvement in ride comfort and operating smoothness, but always bearing in mind the need for safety and environmental friendliness. With this special combination of virtues, the new Mazda2 will strengthen the brand's DNA and Mazda's presence in the global light car segment.

The car's design appeal, as well as the new Mazda2's other class-leading attributes, is expected to see the percentage of potential buyers aged under 30 years increase to 55 per cent from 30 per cent for the superseded model.

Females buy more light cars than males and are again likely to make up about 75 per cent of Mazda2 sales.

The split between manual and automatic versions is expected to remain unchanged at 40 per cent manual, 60 per cent automatic.

Priced from $16,500, the new Mazda2 Neo offers outstanding value. At just $165 more than the superseded model the new car adds about $1000 of new standard features.

These include but are not limited to ABS with EBD and EBA, remote locking, driver's seat height adjustment, a centre rear headrest and an AUX jack that enables any MP3 player (including iPod®) to be played through the car's stereo.

Air-conditioning, power windows and mirrors, an MP3 compatible CD player with four speakers and whiplash minimising front seats are also part of the package.

Neo sales are expected to make up 55 per cent of new Mazda2 sales over the life of the car.

The new Mazda2 Maxx adds 15 inch alloy wheels, six-disc CD player, steering wheel mounted audio controls, silver trim highlights on the steering wheel and a rear spoiler. It is priced from $18,710 and is likely to account for 25 per cent of sales.

Boasting a body kit, the range-topping Genki model now comes with 16 inch alloys, unique seat trim, six airbags, leather-trimmed steering wheel and front fog lamps.

It is priced from $20,845 and is expected to represent 20 per cent of sales.

The new Mazda2 becomes the first Mazda and the first Japanese model in the light car class available with DSC and Traction Control System (TCS). DSC is a state-of-the-art automated anti-skid system that helps prevent front or rear wheel slides.

Together with front side and head protecting curtain airbags (taking the car's airbag count to six), about 20 per cent of Neo and Maxx customers are likely to tick the safety option box. The safety pack is priced at $1100.

Genki comes standard with six airbags, so DSC will be offered as a stand alone option. It is priced at just $700 and 5 per cent of customers are expected to buy it.

It is available in a range of 11 colours including several new hues. These are Spirited Green, Golden Yellow, Golden Red and Metropolitan Grey. Mazda does not charge extra for mica or metallic paint.

A range of dealer fit accessories will also be available including a Bluetooth hands free phone kit and rear park assist sensors.

Mazda Australia's National Marketing Manager, Alastair Doak, said: "The new Mazda2's great looks, added value, improved active and passive safety credentials and reduced environmental impact will be significant drawcards for the car's younger customer base.

"With a targeted launch campaign themed on fashion and style primarily aimed at younger female buyers, we expect the new car to immediately grab a larger slice of the booming light car market."

Mazda Australia expects to sell about 850 new Mazda2s a month, a significant 89 per cent gain on the 450 a month average life cycle sales of the superseded car.

3. PRICING

Prices listed in this press kit were correct as at the time of launch. For any updates to pricing go to www.autonews.net.au or www.autodeadline.com.au

Pricing – Manufacturer's List Price (MLP)*

Mazda2 Neo	$16,500
Mazda2 Maxx	$18,710
Mazda2 Genki	$20,845
Automatic Transmission	$1,650
Safety Pack Option (Neo & Maxx) [Adds side (front) and curtain (front and rear) airbags, Dynamic Stability Control (DSC) and Traction Control System (TCS)]	$1,100
DSC Option (Genki) [Adds DSC and TCS]	$ 700

4. DESIGN

Sport Car Genes

- **Compact body with dynamic styling**
- **Controlled interplay of motion that is harmonious throughout**
- **The interior combines solidity and movement**

The new Mazda2 looks dynamic despite its compact exterior dimensions. The interplay between soft forms and sharp contours, along with carefully modulated transitions, ensure a controlled variety of reflections across its exterior, which is manufactured with high levels of build quality. Equally eye-catching is its striking wedge shape, its focused placement of contoured edges and strong sculpturing in the area of the doors and fenders. Yet the new Mazda2 not only looks good, it also has aerodynamic virtues: with a drag coefficient (Cd) of 0.31, it is one of the most streamlined models in its class.

The goals set for the Mazda2 designers did not allow for any compromises. No variations of the predecessor model were permitted. A completely new, courageous and trend-setting design was obligatory for the second generation Mazda2. And its design would be executed with a lot of Zoom-Zoom spirit, strong individuality and a more clearly-defined Mazda DNA. Despite the newcomer's more compact outer dimensions, the designers targeted high dynamism and solidity, a rhythmic interplay between soft surfaces and sharp contours, as well as subtle effects of light and shadow at points of intersection.

At the same time, the new design was styled to appeal not only to European consumers, but to customers around the world including Australia. Not an easy task, as light or B-segment vehicles are very popular among women in Japan, for example, who appreciate a soft, friendly design. In Europe, however – with a much more mixed target group – a significantly sportier and more confident design is preferred by many customers.

An important role in finally defining the new design concept was played by the Mazda Sassou, a design study shown at the 2005 Frankfurt Motor Show. With an eye to the future Mazda2, Mazda incorporated the positive Sassou feedback from motor show visitors during the last phases of work on the new production model. The solution for a dynamic design, with a clear Mazda identity, was the combination of sharply cut contours and soft transitions.

Forms with Subtle Beauty and Dynamism

The principles that directed the work of the new Mazda2 designers were 'exquisite and dynamic'. Their main goal was to create the impression of athletic movement despite the car's compact dimensions. 'Exquisite' stands for forms with a carefully designed, subtle beauty, as well as dynamism.
Also important was the balance between the exterior design, a cabin laid out for maximum spatial functionality and the use of forms that appear simple and precise. By using extremely short overhangs and other stylistic details, the designers were also able to emphasise the compactness of the vehicle.

A second design theme for the exterior was dubbed 'coordinated movement'. Mazda2's body lines, and the light effects created by them, combine to produce forms of expression that are many-facetted. As a result, even when parked Mazda's new sub-compact seems like it might drive off at any moment. This impression of movement is further enhanced by the car's wedge shape and by the character line that flows from the front fender to the rear of the car. And the swage line in the lower area of the doors that climbs as it moves towards the rear wheels, plus the front wings echoing the style of the Mazda RX-8, contribute to giving the youngest member of the Mazda family power and dynamism.

A Natural Balance between Organic and Contoured Elements

For the team under Chief Designer Ikuo Maeda, achieving this lively impression despite the car's limited exterior dimensions was a real challenge. It was achieved by emphasising forms that possess natural-seeming movement, and which also express high levels of build quality. The balance between organic and contoured elements is really only harmonious, because the designers consistently followed the primary objective of 'coordinated movement'.
Seen as a whole, the Mazda2 looks both dynamic and solid, because it is free from unnecessary ornamentation or decoration. The design becomes a carefully conceived symbiosis between form and function that makes this light car from Hiroshima appear as if it were cast from a single piece of metal.

Four per cent Aerodynamic Improvement over the Outgoing Model

The new Mazda2 not only looks good, its body is also optimally streamlined. Thanks to a generous underbody cover beneath the engine bay, to bumpers with aerodynamically optimised contours and reduced turbulence in the area of the A-pillar and side mirrors, the Mazda2's Cd value was lowered from 0.32 to 0.31. Even more significant is the result when multiplying the car's Cd value by the frontal area, which reveals a 4 per cent aerodynamic improvement over the somewhat larger first generation Mazda2.

To increase stability on the motorway, Mazda also reduced lift (inherent to all road car designs) at the front and rear axle. The new model's front axle lift coefficient (CLF) is only 0.02.

Very small gaps between body panels and neat rubber seals are details that underscore the very high build quality of the Mazda2. This can be seen, for instance, in the area of the headlamp housings and the rear light clusters. The rear lights have the appearance of LEDs when illuminated at night. To make the body seem as smooth as possible, the washer nozzles are hidden inside the cowl.

A micro-switch on the liftgate makes the need for a visually-disruptive handle unnecessary. And last but not least, even the front grille structure is designed in such a way that the components behind it are difficult to see from outside the car. The result: the new Mazda2 looks very neat and tidy from every angle.

Inside, space that communicates movement

In designing the interior, the guideline for the designers was 'space that communicates movement'. Well-contoured forms combine a confidence-inspiring solidity with strong visual movement. Despite the finite amount of space available, a cabin with a roomy spatial feel was created by skilful design. Visually, the dashboard panel is divided horizontally and thanks to this stylistic technique, the dashboard does not dominate the cabin and the interior seems quite open and airy. The upper dashboard is smooth and uncluttered, while the outer edges taper slightly away from occupants, so they do not feel cramped.

At the same time, the unique, slightly convex shape of the centre stack provides an interesting contrast to the dashboard. The gear shift lever is integrated here, mounted high and close to the driver's hand, in front of minor switches and controls, as well as a central display for audio encased in a silver-coloured bezel.

White Speedometer and Silver Accents Create Striking Contrasts

Even though Mazda2 does without flashy colours and strongly luminous surfaces in the interior, a very contemporary ambience is created by the contrast between silver accents (in the area of the outer air-vents, the steering wheel, the speakers, the gearshift, the cupholder, the stereo, the speedometer and the door panels - depending on model) and the dark keynote colour of the cockpit. Other fresh accents are created by the white speedometer and a repetition of 'rounded' elements. Circular forms are used for the four air-vents, the instruments, centre stack display and the controls for the heating and air-conditioning. These forms have become a true Mazda design signature and are reminiscent of those used in the Mazda3, Mazda6 and the MX-5.

The Mazda2's three-spoke steering wheel, with audio controls in the left spoke (Maxx and Genki), also presents visual parallels to the wheel of the famous roadster. All interior elements communicate high precision and craftsmanship – an example of this is the 'invisible' seamless cover of the front passenger airbag mounted in the dash top. Also the seats are slim and, with their vertical fabric bands and discreetly patterned materials, help to give the cabin a general impression of airiness and friendliness.

5. INTERIOR COMFORT AND EQUIPMENT

A Friendly, Functional Place to Be

- **Excellent packaging ensures a roomy interior feel**
- **Gear shift and parking brake levers moved closer to the driver**
- **NVH performance one of the best in the segment**

High functionality and user friendliness were at the top of the priority list for the interior designers. Though the Mazda2 might seem compact on the outside, on the inside it seems spacious to its occupants.

The relatively long wheelbase (for a car in this class) of 2,490mm, placing the wheels as close to the corners as possible and clever packaging, all make the Mazda2 interior a roomy place to be, despite having slightly smaller outer dimensions. As a result, Mazda2's maximum head room (1,004mm front, 959 mm rear) is one of the best in its class, as is its shoulder room (1,340mm front, 1,300mm rear). Front legroom is 1,068 mm and the 883 mm of legroom in the rear offers lots of space to stretch your legs. And although the new Mazda2's height is 65mm less than its predecessor, the car's slightly thinner roof liner thickness and a lower hip point ensure ample head room.

Whether the driver is 1.85 metres or 1.50 metres tall – the Mazda2 offers just the right seating position for every stature. The driver's seat has fore/aft slide adjustability of 250mm (predecessor 210mm) and the driver's seatback can be adjusted to an angle of up to 104° (72° in the rear-most position). This adjustment can be made applying 20 per cent less effort than before.

The driver's seat is height adjustable (now standard on all models) over a range of 55mm, which is 17mm more than the outgoing model. A ratchet-type lever allows stepless adjustment of the seat, while a steering wheel height adjustment range of 50mm (standard on all models) makes it easy for drivers to find an ergonomically correct position.

The gear shift lever is positioned 38mm higher than on the previous Mazda2 making it easy to reach and operate. The parking brake lever is also placed closer to the driver by 43mm.

Practical Storage Compartments

Mazda2's cabin design meets the increasing demands for practical storage compartments, especially from younger customers. Storage includes a glove box with an open magazine rack which makes retrieving frequently used items such as a road atlas easy. The seven litre glove box can hold up to six CDs and car documents.

The centre console between the front seats has a cupholder and a storage tray behind it for items as large as a handbag. Added to this is a 12-volt socket to power or charge electronic devices. Next to the power socket is a separate AUX jack that allows users to connect digital devices such as an MP3 player like an iPod® to the vehicle's audio system.

The front door pockets have a design that allows storage of a 0.5-litre bottle and an A4 atlas. Across the dashboard area are two storage pockets for small items like coins, packs of gum or keys. Behind the driver's sun visor there is room for maps or other documents.

Class-competitive 250-litre boot

Despite its more compact exterior, new Mazda2 still has 250-litres (VDA) of load volume in the boot. Folding the rear seatbacks down increases the load length from 674mm to 1,313mm and creates a load volume (to the roof, VDA) of 787 litres.

With the rear seats upright, the load space can hold items as big as a large suitcase or a baby buggy. In comparison to the previous generation, the boot threshold is a bit higher to ensure greater body shell rigidity. The boot opening remains nevertheless very practical for daily usage.

Dual Door Seals and Stiffer Doors Lower Wind Noise

Strikingly low levels of cabin noise contribute to making the Mazda2 a comfortable place to travel. At a speed of 60 km/h, for instance, only 71.1 dBA of road noise reaches occupants' ears, which is amongst the lowest in the B-segment. Cabin noise has been significantly reduced versus the outgoing model – especially at engine speeds above 4000rpm. For the new Mazda2, wind noise generated at 128 km/h is just 68.5 dBA, which is also among the lowest in its class. Two technical measures contribute to this result. An unbroken seal around each door opening which, together with all around seals on the doors themselves, give the Mazda2 a complete dual sealing system. Plus, stiffer door panels that resist the effects of aerodynamic suction that can occur on the motorway due to negative pressure outside the doors. As a result, the outer skins of the door deform 33 per cent less than the doors of the previous Mazda2.

And last but not least, the transmission of tyre noise has been reduced as well, by 1.4 dB in the front seats and by 1.7 dB in the rear seats.

An Excellent View to All Sides

Two numbers that say it all: the belt line slopes towards the front of the car and is 40mm lower than the old Mazda2, and at the base of the A-pillar, the belt line height from the drivers hip point is one of the smallest in the class at only 354mm. Combining the low belt line with a significantly lower positioning of the door mirrors, means the driver enjoys improved visibility diagonally to the front and downwards. This results in increased safety when driving on narrow roads, turning at junctions and in city traffic driving where pedestrians could cross the road. And it makes parking much easier. The car's agility in city traffic is enhanced by its small turning circle of only 9.8 metres and its front upward vision angle of 18.9°, which makes it easier to see traffic lights and road signs.

6. POWERTRAIN

Modern, Low-Consumption, Clean Engine

The new Mazda2's engine is both cleaner and uses less fuel than before, while the new lighter car promises to be quicker than before.

All models are powered by a Mazda developed MZR petrol engine: a 1.5-litre unit that produces 76kW (EEC). The engine has sequential valve timing (S-VT), optimised exhaust-valve timing and a variable induction system (VIS) that enhances torque across the entire rev range.

High-tech Mazda Engine

The 1.5-litre MZR series engine operates with sequential valve timing (S-VT) which provides variable valve timing for the intake valves and optimised timing of the exhaust valves. In addition to this, the 1.5-litre adds a variable induction system (VIS) that boosts torque across the entire rev range.

The intake manifold is made of plastic and 'breathes' through 600mm long intake runners, making robust torque available at low engine speeds. The intake manifold also has integrated tumble swirl control valves (TSCVs) that ensure high combustion stability, even during slow driving, and together with the exhaust-gas recirculation, improve fuel consumption and emissions.

The new Mazda2's engine has an electronically controlled throttle that translates pedal input quickly and precisely. It has a displacement of 1,498cc and produces a maximum of 137Nm of torque at 4,000rpm (EEC).

In manual form the new Mazda2 is expected to accelerate from 0-100kmh in about 10 seconds and has a theoretical top speed of about 190km/h.

Mazda engineers worked hard to reduce internal frictional loss. The measures undertaken include changes to the piston rings and lands, fine-tuning the piston skirts, optimising the piston pin offsets and redesigning the oil passages.

Fuel consumption is improved with the new Mazda2 using an average of just 6.4L/100km on the ADR 81/01 cycle compared with 6.6L/100km on the present model, while automatic transmission versions now average 6.8L/100km compared with 7.0L/100km for the superseded model.

Mazda2 offers an easy shifting, precise five-speed manual or a four-speed automatic transmission. The manual gearbox has double-cone synchronization on first and second gears ensuring easy slow gear shifting and shifting during cold weather.

7. CHASSIS

Safety and Environmental Compatibility and Lightweight Engineering

- **Weight of body shell reduced by 22kg**
- **Greater crash resistance from use of high-tensile steel**
- **Survival cell significantly strengthened**

The chassis for the second generation of the Mazda2 is based on a newly-developed architecture that underscores the company's long years of experience engineering small vehicles. In contrast to the Mazda2 introduced in 2002 which prioritised practicality, for new Mazda2 interior space became a shared priority along with delivering a more contemporary design and the same Zoom-Zoom driving fun as the other members of the modern Mazda family.

With a new state-of-the-art chassis as a foundation, Mazda engineers sought to provide outstanding handling for a car of this class, combined with high stability even on highways and a harmonious ride quality. The low weight and high rigidity of the body shell played an important role in optimising handling and comfort. For handling, Mazda focused on manoeuvrability and agility on city streets, on steering that is spontaneous and linear, on achieving high grip on curving country roads and well-tempered reactions during fast lane-changing on the motorway.

An ingenious plan to reduce vehicle weight by as much as 100kg – about 60kg in Australian specification – compared to the former model was seen as the most efficient way to lower fuel consumption and $C0_2$ emissions. At a very early stage in development, a special team began looking for the best diet plan using advanced computer aided design or CAD technologies. After that, the engineers tested the ideas in drivable prototypes – initially in the previous Mazda2 – and examined the effects they had on the dynamic qualities of the car.

Their efforts were successful; once again, as it had done with the MX-5 roadster, Mazda was able to resist the spiral of ever increasing weight. As a result, the new Mazda2 weighs jut a few kilograms over a tonne. But Mazda2's trend-bucking character is also evident by its length, which is now 41mm shorter, at 3885mm.

Use of Ultra High-Tensile Steel Has Several Positive Effects

Thanks to the optimised structure of its body shell and an increased use of new kinds of steel, the new Mazda2 is not only significantly lighter, but also improved when it comes to safety, body shell rigidity and NVH performance – all attributes that normally add weight to a car.

Through smaller dimensions alone, the weight of the body shell would have been cut by only 4kg to 233kg. Measures taken to increase rigidity and crash resistance would have quickly raised it again to 244kg.

Thanks to the altered body structure and new materials, the team under the leadership of Program Manager Shigeo Mizuno was able to decrease weight to 215kg – 22kg less than the old Mazda2 body shell.

Up to 20 Per cent Stiffer for Torsional Rigidity

The use of high and ultra high-tensile steel contributed first and foremost to a reduction in body shell weight. For example, the B-pillars are made of 980 MPa-grade steel sheet (MPa = measurement of tensile strength). They act as central support columns and extend in the form of a 'roll-over bar' into the roof. Despite stronger joint reinforcements in the area of the door openings and the tailgate, the use of high-tensile steel with reduced thickness resulted in a weight saving of 6kg. At the same time, torsional rigidity was increased. By employing additional spot welds and adding new weld-bonded joints in the tailgate opening of the new Mazda2, it is 20 per cent stiffer than the square-edged hatch opening of the outgoing model.

Mazda weight specialists were able to save an impressive 13kg using weight optimising measures in the suspension. These included making the rear trailing arms shorter and the front lower arms lighter. This reduction in unsprung weight promotes better handling and ride comfort, as well as enhanced fuel economy. But Mazda engineers did not stop there. They also eliminated the underfloor catalyst. For the intake system, Mazda engineers modified the intake duct design to the top of the radiator shroud. This new intake system eliminated the resonator and a baffle, which also saved valuable weight, as did fitting a smaller radiator and fan for the cooling system.

Shortened Wiring Harness Saved 2.86kg

Taking inspiration from the MX-5 gram strategy, the Mazda2 calorie-cutting team even found ways to reduce weight in the vehicle electrical system: a shorter wiring harness saved a total of 2.86kg. What sounds like sorcery is in fact the result of an insightful placement of large units and power-supply parts. The bonnet also contributed to a weight saving of exactly 0.69kg, with a smaller striker assembly and slightly thinner

hinges. Even the audio speakers mounted in the doors were engineered to be lightweight: by changing the magnets from a ferrite type to neodymium, and making the frame and protective cover a single-piece plastic moulding, a total weight saving of 0.98kg was achieved.

Acclaimed Suspension Concept Modified and Retuned

The front MacPherson strut suspension and the torsion-beam rear suspension also profited from the use of high-tensile steel in certain areas of the body shell to increase local stiffness and ensure optimal suspension geometry. The suspension system uses the same basic concept as that of the previous model, but the components have been modified in many details and retuned to match the much more agile attributes of the new Mazda2. For example, Mazda made the suspension mounts at the axles 15 per cent stiffer compared to the outgoing model. In the front suspension, new bushes on the A-arms reduce road surface influences on the toe angle, which has a positive effect on ride comfort and improves handling stability and the integrity of steering feel.

The trailing arm bushes of the rear suspension are now less sensitive to side forces. The rear monotube dampers have the same diameter as before, but because of the lower vehicle weight they now are as effective as larger-diameter dampers.

Electric Power Assist Steering Supports Driving Fun

Mazda2's electric power assist steering system is appealing for its very linear and direct response and supports the Mazda goal of oneness between driver and car – the philosophy of Jinba Ittai so completely embodied by the Mazda MX-5.

This new steering system provides very high levels of power assistance when the vehicle is being driven at very low speed, which is especially handy when manoeuvring in tight spots and parking. With only 2.7 turns lock-to-lock, the steering system is very direct. Together with a small turning circle of only 9.8 metres, this makes the Mazda2 an ideal urban vehicle.

The brake system of the Mazda2 includes ABS, EBD, as well as EBA and ventilated front disc brakes. In order to improve pedal feel, the pedal ratio was lowered from 3.79 to 2.85, which means less play in the pedal stroke and a more defined response. At the same time, Mazda reduced the diameter of the master cylinder from 23.8mm to 20.6mm and optimised brake booster characteristics.
By improving the brake piston seal structure, the drag that results from friction between the pads and the discs of the front brakes was significantly reduced.

For the first time on a Mazda in this market segment, DSC and TCS are available on all models.

Testing in Europe

Engineers from the Mazda's European development centre in Oberursel near Frankfurt, Germany gave the new Mazda2's chassis a specifically European assessment on the meandering roads of Germany's mountain region. Alexander Fritsche, Team Leader Chassis/Suspension in Oberursel, says, "Our testing areas feature all conceivable kinds of curves and surfaces – ideal for us testers and the Autobahns there are ideal too, with relatively little traffic."

Together with suppliers, Mazda engineers conducted extensive tests that not only identified the most harmonious damper settings, but also the ideal characteristics for the electric power assist steering.

"This system is speed dependent – a lot of assistance when manoeuvring at parking speeds and driving around town, less when driving fast," Fritsche says. "For this reason it was important for us to always have sufficient road feedback in the city and to tune the steering to be both sporty and comfortable as speed increases."

Mazda not only made a quantum leap when it comes to steering feel and response compared to the outgoing model, but also for driving comfort and NVH.

"We wanted to get away from the typically slightly harsh, B-segment feel and to significantly increase the sense of ride comfort," says Fritsche in outlining the goal of his team. New pancake-type bushes are introduced for the lower arms of the front suspension, which are better at isolating the steering from exterior influences. The trailing arm bushes of the rear suspension are also better at smoothing out bumps and the geometry is designed to reduce roll and dive.

"Europe usually represents the biggest challenge for Mazda's development engineers when it comes to driving comfort. I'm confident that the new Mazda2 is impressive proof of just how consistently those challenges have been met," concludes Fritsche.

Three-way Load Path Keeps Body Deformation Away From Occupants

Mazda2's passive safety package is based on a body shell developed using the highly capable Mazda Advanced Impact Distribution and Absorption System (MAIDAS), which is able to disperse impact energy through the body shell along exactly defined load paths. In order to better absorb the energy from a frontal crash, the front side chassis members are straighter and have a larger cross-section. An ultra-high strength structure in the front bumper and a straight main underbody load path provide effective occupant protection.

During an offset crash, a three-way load path deflects impact energy away from the feet and lower legs of the front occupants. And the brake pedal is designed to collapse down and away from the driver's feet.

Two Impact Beams in the Front Doors Provide Side Protection

During a side impact, B-pillars made of 980 MPa-grade steel, specially strengthened side sills and floor pan cross members provide effective occupant protection. In the front doors there are two side impact beams, which help protect occupants from injury, while a single beam in each rear door limits intrusion. Additional protection from injury is provided by shock-absorbing pads in the door trims, pillars and roof side rails. In case of a rear impact, the back seat passengers and the fuel tank (located below the cabin floor and directly in front of the rear axle) are given increased protection by a large rear bumper beam and new side members, which are also straighter than the old model and are made of 590 MPa grade steel.

This crash-resistant survival cell of the Mazda2 is enhanced by two front airbags and seatbelts with pretensioners and load-limiters, anti-whiplash front seats and a breakaway brake pedal that reduces the chance of lower leg injury in a heavy impact.

Side (front) airbags and curtain (front and rear) airbags, for helping protect all occupants sitting in the outer seats, are standard on Genki models and optional on Neo and Maxx.

Pedestrian safety is also optimised by the special design of the bonnet, fenders and windscreen wipers.

Ultra High-tensile Steel

The use of ultra high-tensile steel materials provides a solution to the seemingly contradictory goal of providing low weight and high crash resistance. By using higher tensile steel, the thickness of the steel sheeting can be reduced, while still retaining the desired body shell strength and structural characteristics.

This saves weight and costs, while simultaneously increasing safety levels for the occupants. For the body shell of the Mazda2, high-tensile and ultra high-tensile steels with strengths of 440, 590, 780 and 980 MPa (mega-Pascal) are used. Varying degrees of strength are obtained through specific chemical and baking processes. Especially strong kinds of steel are used for the A- and B-pillars and the front door sills. Together wit h an increased number of spot welds – especially in the door openings and the side walls of the boot – this gives the Mazda2 a survival cell that truly deserves the name.

Environmentally Friendly Production Methods

Besides making the interior surfaces nice to touch and providing the best ergonomics, the creators of the new Mazda2 also were keen to make sure the cabin does not release unhealthy substances into the air.

The design team's special focus concerned volatile organic substances (VOCs). An example of their efforts to cut VOCs was the reduction of toluene. For the first time, Mazda used a new substance for waterproof sealing the joints between interior panels, which gives off only one tenth of the emissions previously emitted by conventional sealers. By adopting this new substance, the total concentration of toluene has been reduced by around 60 per cent compared to the outgoing model. And not only that, the amount of xylene, formaldehyde, acetoaldehyde and polyvinyl chloride has been significantly lowered.

Lead, cadmium, mercury and chromium were banned completely from the Mazda2.

Mazda2's environmentally friendly character is also evident by its high recyclability. The new Japanese sub-compact meets the ISO 22628 norm and is more than 95 per cent recyclable. The bumpers, for instance, are made of a material that can be recycled into foot rests and splash shields, or can be recycled into new car bumpers.

8. SPECIFICATIONS

		Neo	Maxx	Genki
Powertrain				
Engine type		In-line 4 cylinder DOHC S-VT		
Engine capacity		1,498cc		
Bore and stroke		78.0mm x 78.4mm		
Compression ratio		10.0 : 1		
Maximum power		76kW @ 6,000rpm		
Maximum torque		137Nm @ 4,000rpm		
Throttle control		Electronic (drive-by-wire)		
Fuel system		Electronic fuel injection		
Fuel tank capacity		42-litres		
Recommended fuel		Regular unleaded (91RON)		
Fuel consumption*1	man (combined)	6.4-litres per 100km		
	auto (combined)	6.8-litres per 100km		
Emissions standard		Euro Stage IV		
Manual transmission		5-speed		
Automatic transmission		4-speed		
Gear ratio – man/auto	1st	3.416/2.816		
	2nd	1.842/1.553		
	3rd	1.290/1.000		
	4th	0.972/0.695		
	5th	0.775/-		
	reverse	3.214/2.279		
	final drive	4.105/4.147		
Chassis				
Brake type	front	Ventilated disc		
	rear	Drum		
Steering type		Electric power assist steering		
Steering wheel turns	lock to lock	2.7		
Suspension	front	MacPherson strut		
	rear	Torsion beam		
Turning circle	kerb to kerb	9.8m		
Tyre size		185/55R15 82V	185/55R15 82V	195/45R16 80W
Wheel size		15 x 6.0 JJ	15 x 6.0 JJ	16 x 6.5 JJ
Wheel type		Steel	Alloy	Alloy
Wheel type (spare)		Temporary		

Exterior				
		Neo	**Maxx**	**Genki**
Body kit comprising:	front aero bumper	-	-	x
	side skirts	-	-	x
	rear roof spoiler	-	x	x
Door handles (body coloured)		-	x	x
Fog-lamps (front)		-	-	x
Front and rear bumpers (body coloured)		x	x	x
Front centre roof mounted aerial		x	x	x
Green tinted windscreen, side and rear windows		x	x	x
Halogen headlamps		x	x	x
Mudflaps (front and rear)		x	x	-
Power mirrors (body coloured)		x	x	x
Power windows		x	x	x
Interior				
Air-conditioning		x	x	x
Cigarette lighter and removable ashtray		x	x	x
Cupholders		x	x	x
Digital clock		x	x	x
Door ajar warning light		x	x	x
Door map pockets (front)		x	x	x
Driver's left footrest		x	x	x
Glove box with magazine rack		x	x	x
Illuminated entry system with delayed fade		x	x	x
Instrument panel light dimmer		x	x	x
Interior illumination:	dome lamp	x	x	x
	cargo room lamp	x	x	x
Interior release for fuel filler door		x	x	x
Leather-wrapped:	steering wheel	-	-	x
	gear shift knob	-	-	manual only

Interior Continued				
		Neo	**Maxx**	**Genki**
Lights-left-on audible warning		x	x	x
Low fuel warning light		x	x	x
Passenger assist grip (front)		x	x	x
Rear console tray		x	x	x
Rear window demister		x	x	x
Seat trim upper grade cloth		-	-	x
Seats (front) with:	rake and slide adjustment	x	x	x
	adjustable head restraints	x	x	x
	height adjustment (driver)	x	x	x
Seats (rear) with:	adjustable head restraints	x	x	x
	60/40 split fold backrest	x	x	x
Tachometer and electronic odometer/tripmeter		x	x	x
Tilt adjustable steering wheel		x	x	x
Vanity mirrors (driver and front passenger)		x	x	x
Ventilation pollen filter		x	x	x
Wipers (front) 2-speed with intermittent function		x	x	x
Wipers (rear) with intermittent function		x	x	x

Audio				
		Neo	**Maxx**	**Genki**
AM/FM digital tuner		x	x	x
Auxiliary input (3.5 mm MP3 player compatible)		x	x	x
CD player, single disc (MP3 compatible)		x	-	-
CD player, in-dash 6-disc (MP3 compatible)		-	x	x
Speakers, number of		4	4	4
Steering wheel mounted audio controls		-	x	x
Safety				
Airbags SRS:	front (driver and passenger)	x	x	x
	side (front)	opt 1	opt 1	x
	curtain (front and rear)	opt 1	opt 1	x
Anti-lock Braking System (ABS)		x	x	x
Child restraint anchor points		x	x	x
Childproof rear door locks		x	x	x
Collapsible steering column		x	x	x
Day/night rear vision mirror		x	x	x
Dynamic Stability Control (DSC) - switchable on/off		opt 1	opt 1	opt 2
Electronic Brake-force Distribution (EBD)		x	x	x
Emergency Brake Assist (EBA)		x	x	x
Engine immobiliser		x	x	x
High mount stop lamp		x	x	x
Intrusion-minimising brake pedal		x	x	x
Left-hand-side convex (wide angle) exterior mirror		x	x	x
One touch (up and down) power window (driver)		x	x	x

Safety Continued				
		Neo	**Maxx**	**Genki**
Remote central locking (Two transmitters with retractable key)		x	x	x
Seat-belt warning audible and visual (front)		x	x	x
Seat-belts (front) with pretensioners, load-limiters and height adjustable shoulder anchorages		x	x	x
Seat-belts 3-point lap-sash (all seats)		x	x	x
Side impact door beams		x	x	x
Traction Control System (TCS)		opt 1	opt 1	opt 2
'Triple H' safety construction with front and rear crumple zones		x	x	x
Whiplash-minimising front seats		x	x	x
Dimensions				
Overall length		3,885mm	3,885mm	3,895mm
Overall width		1,695mm	1,695mm	1,695mm
Overall height		1,475mm	1,475mm	1,475mm
Wheelbase		2,490mm	2,490mm	2,490mm
Ground clearance	laden	119mm	119mm	119mm
Track	front	1,475mm	1,475mm	1,465mm
	rear	1,465mm	1,465mm	1,455mm
Cargo room	volume (VDA)	250-litres	250-litres	250-litres
	volume (VDA)*2	469-litres	469-litres	469-litres
Kerb weight	man	1,004-1,011kg	1,012-1,019kg	1,022-1,025kg
	auto	1,025-1,032kg	1,033-1,040kg	1,043-1,046kg
Towing capacity	braked	700kg	700kg	700kg
	unbraked	500kg	500kg	500kg

opt 1 – Safety Pack option (Neo & Maxx). opt 2 – DSC option (Genki).

*1 Fuel consumption figures are based on ADR81/01 test results. They are useful in comparing the fuel consumption of different vehicles. They may not be the fuel consumption achieved in practice. This will depend on traffic and road conditions and how the vehicle is driven.

*2 Measured with rear seats folded down and up to tonneau cover