

# JATCO — Leading Transmission

In a powertrain, which transmits the engine power to the wheels, the transmission constantly plays an important role. As a manufacturer specializing in transmissions for automobiles, JATCO has produced numerous "world firsts" to date. Of these, JATCO is a leading CVT (Continuously Variable Transmission) company with the largest global market share. JATCO will lead the future of mobility through transmissions which think like a human brain, selecting the most suitable gear according to the driver's input and the driving conditions.





- 1-motor, 2-clutch type hybrid vehicle transmission (JR712E) 2010
   Toroidal CVT (JR006E) 1999
- **3** CVT with an auxiliary gearbox (Jatco CVT7) 2009
- 4 Steel belt CVT for 2-liter class engines (F06A) 1997
- **5** CVT for 3.5-liter class engines (JF010E) 2002
- Electronically-controlled 5-speed automatic transmission (JR502E) – 1989
- ⑦ 5-speed transmission for FWD vehicles (F5A5) 1995

CVT for medium / large FWD vehicles



JF016E/JF017E







#### Front housing

The flexibility of the layout is improved through the use of a specially designed ultra-flat torque converter. The low rigidity lock-up damper locks up at low speeds, thereby improving fuel performance and the sense of directness of the drive. Furthermore, hybrid specifications can be achieved just by retrofitting an electric motor unit in the space of the torque converter.

#### Adding "flavor" to a vehicle's drive through control technology

A vehicle drives and performs in accordance with the intentions of the driver by harnessing various forms of vehicle information, such as accelerator position and vehicle speed. Our transmissions provide fine and precise shift control. For example, when the accelerator is not being pressed, the gear ratio is held unchanged in preparation for the next departure; and when the braking Gs are high when braking during a turn, the gear ratio is reduced slightly, and the engine brake is put into operation.

#### Clutch for forward/reverse drive and planetary gear for decelerating

The planetary gear used to switch between forward drive and reverse has been incorporated into the position connected to the torque converter to enable deceleration and the switching of the direction of rotation.

#### Variator

The variator of the JF016E, with a torque capacity of 250 Nm, uses a steel belt, while the JF017E, with a large torque capacity of 380 Nm, uses a chain belt. Usage is split based on the characteristics of each type of belt

The shapes of the elements are reviewed to make the belt position more stable.

## Jatco CVT8: the result of our relentless pursuit of high efficiency, and it brings the fuel efficiency and driving performance of CVTs to even high engine displacement vehicles

Two variations of this CVT exist: a steel belt CVT for 2-liter class engine vehicles, and a CVT for 3.5-liter class engine vehicles, the largest class of any CVT. JATCO, which has always been a leader in CVTs for high-torque vehicles, was strongly determined to consolidate CVTs for medium and large vehicles and to create a standard for the next generation CVT. The Jatco CVT8 (hereafter, CVT8) was developed as a unit with the ability to cover vehicles up to a torque capacity of 380 Nm.

#### Expanding ratio coverage

The first issue was expanding ratio coverage (transmission gear ratio range). Although it would be possible to expand ratio coverage simply by increasing the diameter of the pulley, the overall size of the CVT would increase, and vehicle-mounting performance would decline. Conversely, we focused on the inside of the pulley and explored methods for expanding ratio coverage. First, we reduced the shaft diameter of the pulley and secured space closer to the center for winding the belt. After that, we reviewed the shape of the belt element and adopted a belt that would transmit torque efficiently when wound around a small diameter. This was because transmission efficiency would decline if the winding angle became too small. Through these measures, we succeeded in expanding ratio coverage from the previous 6.0 to 7.0, thereby contributing significantly to striking a balance between powerful drive at low speeds (low gear ratio) and low fuel consumption and quietness at high speeds (high gear ratio).

### Hydraulic control system with numerous improvements

In the mechanism that operates the pulleys for gear shifting, the mechanical losses of the oil seal ring were first reduced, and then the mechanism was changed from a step motor type to a direct acting type through hydraulic pressure. The mechanism for switching between forward drive and reverse was changed to a variable hydraulic system. As a result of thorough efforts to optimize the oil passage in the control valve body, the three-tiered structure was converted to a structure with two-tiers while the number of spool valves was reduced from 12 to 8. Furthermore, by reviewing the clearance of the spool valves and other measures, oil leakage within the control valve was minimized. As a result of all these efforts, it became possible to provide coverage with a small-discharge oil pump. In addition, by reviewing the lubrication system around the differential gear and adding a baffle plate, we succeeded in eliminating the condition where the gear is constantly immersed in oil. As a result, friction was reduced by 40% in total, contributing significantly to fuel efficiency improvement.

## CVT for medium/large FWD vehicles Jatco CVTB JF016E/JF017E



CVT for medium/large FWD vehicles



JF018E/JF019E





## CVT for medium/large FWD vehicles





#### Clutch 2 Clutch 1





#### Electric Motor

### Functions of a dry multi-plate clutch built into the motor

There are three functions of a dry multi-plate clutch installed into the motor. 1. When the engine stops, it disconnects the engine from the motor and eliminates friction on the engine side. 2. When the engine is started up, it transmits motor torque to the engine to start the engine. 3. It transmits power from the engine to the transmission. In addition, this dry multi-plate clutch optimizes the position for pushing the piston in order to prevent uneven abrasion of the friction material. It also has a structure that efficiently discharges abrasion powder to the outer perimeter by analyzing airflow.

#### Addition of a motor while minimizing the extension of overall length

A unique 1-motor, 2-clutch system has been adopted. In this system, the driving/ regenerative motor and the dry multiplate clutch, which is used to disconnect the engine and motor, are placed into the space previously occupied by the torque converter. This helps to minimize the impact on the mounting space in the car.

## Dedicated electric oil pump for cooling the clutch used to start up the vehicle

SUVs in North America are often driven over sand or used to tow trailers and boats. The transmission controls driving force while letting the clutch used for starting up the vehicle slip under such tough conditions. In order to cool down the heat that is generated when this slippage is occuring, a dedicated electric oil pump has been installed. This minimizes the damage to the clutch even under driving situations that impose a strong burden on the transmission systems.

#### Jatco CVT8 HYBRID\*: a hybrid vehicle transmission that implements a 1-motor, 2-clutch system

When developing a hybrid version of a vehicle model, it would not be necessary to make significant revisions to the car if the size of the transmission (in particular, its length) could be maintained at the same level. For the Jatco CVT8 HYBRID (hereafter, CVT8 HYBRID), the torque converter is simply taken out of the Jatco CVT8, originally developed for medium and large vehicles, and replaced in that compact space with a driving and regenerative motor as well as a dry multi-plate clutch that connects the engine with the motor.

## Driving/regenerative motor and intermittent clutch of the engine

To disconnect the engine and motor, a dry multi-plate clutch (Clutch 1) has been adopted instead of a wet clutch that tends to increase drag torque to a larger extent when the range of speed is lower. This is a first in the world for hybrid systems. Although the transmission for RWD hybrid vehicles that was developed before CVT8 HYBRID utilized a dry singleplate clutch, transmissions for FWD vehicles need to be more compact to fit into a narrower mounting space. Not only does the CVT8 HYBRID consist of a simple arrangement of the motor and the clutch, it also succeeds in minimizing the length in the axial direction by placing the dry multi-plate clutch inside the hollow portion of the donut-shaped motor.

### Use the clutch for switching between forward drive and reverse as the clutch for starting up

In the base CVT8 unit, the clutch positioned in front of the pulley takes the role of switching between forward drive and reverse. This clutch (Clutch 2) has been re-purposed to use for starting the vehicle. However, this system creates a new problem that must be solved. In this system, the required start-up torque is obtained by letting the clutch slip. If this continues for a long time, a large amount of heat would be generated, and the clutch surface temperature would rise gradually. With regard to the CVT8 HYBRID, efforts have been made to place a dedicated electric oil pump on the exterior and improve cooling performance, with a view to using this transmission in medium-class SUVs and other vehicles to be sold in the North American market. It comprises a system that cools down the starting-up clutch effectively when necessary and has been finished as a tough transmission that can survive even in long periods of high-load operations.

\*Jointly developed by Nissan Motor Co, Ltd. and JATCO Ltd

CVT for mini/small FWD vehicles



JF015E



CVT for small FWD vehicles



JF020E







#### Achieving a ratio coverage of 7.3

In the case of compact class vehicles in which the CVT7 is supposed to be used, it would be desirable to use a low gear ratio when starting and accelerating the car in order to compensate for inadequate engine torgue. However, if the gear ratio is lowered without expanding ratio coverage, fuel performance may be influenced if the engine rotation speed is not reduced during high-speed drives.

Conventional CVTs face limitations with regard to increasing pulley diameter, making it impossible to increase the ratio coverage above a certain level. However, through the use of an auxiliary gearbox, the CVT7 has achieved a ratio coverage of 7.3, significantly exceeding previous figures.

The planetary gear for switching between forward drive and reverse is equipped with a two-step output that allows it to take in the

output from the secondary pulley and output it either directly or with a reduction ratio of 1.8. In order to prevent shift shock during

the shifting of the auxiliary gearbox, the rotational speed of the pulley and the gear ratio change are precisely controlled by the

#### LOW ngine Jatco CVTZ Previous CVT rota transmission gear ratio width HIGH Vehicle speed

#### More compact

Through the adoption of an auxiliary gearbox, the outer diameter of the pullev is reduced. Thus the length of the unit is reduced by 10% and the weight by 13%. For compact FWD vehicles with less space in the engine compartment, reduction of the transmission size causes a huge benefit.



#### Reducing the resistance due to stirring of the transmission oil

The idler gear is used to move the primary pulley one level higher. The pulley, part of which was immersed in oil, no longer interferes with the oil, which significantly reduces the stirring resistance, thereby reducing friction loss by about 30% compared to before.



#### Jatco CVT7: A simple vet revolutionary idea made practical with an auxiliary gearbox that expands the potential of a CVT

shift the gear ratio toward the low end and gain powerful driving force. During high-speed cruising, we want to shift the gear ratio toward the high end and achieve quiet driving with good fuel performance. The lower displacement and less powerful the engine is, the greater the role of the transmission is, and the greater the required range of ratio coverage (transmission gear ratio range) is. Generally, when ratio coverage was expanded, the size of the transmission would increase. As a result, a transmission would no longer fit into a small engine compartment. The Jatco CVT7 (hereafter.

#### Expanding the ratio coverage of CVT with a two-step AT

Wide ratio coverage is even more vital for compact vehicles with low engine displacement and low torque. The simplest way to expand ratio coverage in a CVT is to increase the diameter of the pulley. However, this does not resolve the issue of available mounting space for the CVT in the car. "If we were to combine a twostep AT (auxiliary gearbox) with a compact CVT, it would be possible to expand ratio coverage." This idea became the starting point for developing the CVT7.

#### Utilization of the gear for switching between forward drive and reverse as an auxiliary gearbox

CVTs normally have planetary gears used for switching between forward drive and reverse. Those gears are

utilized as an auxiliary gearbox by adding two-step shift transmission elements. On top of the original CVT function of shifting from low gear to high gear, this new function makes it possible to shift from first gear to second gear as necessary. In order to ensure that the driver does not experience any discomfort through shift shock, the pulley controls the gear change to minimize gear ratio variance before and after shifting. This high level of control technology for carrying out smooth two-step gear changes is one of the important advancements of the CVT with an auxiliary gearbox. JATCO's high level of control technologies and knowhow cultivated over many years makes this product possible.

CVT for small FWD vehicles

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CVT for mini/small FWD vehicles

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#### Jatco CVT7 W/R : for improved fuel performance and better drivability

Jatco CVT7 W/R\* (hereafter, CVT7 W/R) was developed to maintain the outstanding mounting performance of the CVT7 while improving transmission efficiency in order to meet the demand for better fuel consumption and also creating a more direct driving feeling. \* This is an abbreviation for "Wide Range"

#### Ratio coverage of 8.7 realizes high fuel performance

A new belt & pulley are used for CVT7 W/R. The maximum high position has been extended to realize a ratio coverage of 8.7, the largest in the world for a

CVT. Furthermore, we have narrowed the groove pitch of the contact surface of the belt's metal element with the pulley to improve the torque transfer efficiency. In addition, in the oil pump, which is one contributor to frictional losses, we changed the shape of the suction port for the oil in order to eliminate the oil pump flow control valve, thereby reducing friction by approximately 30%. These changes have resulted in a transmission that greatly improves fuel economy, not only in the fuel economy testing modes, but also in real-life situations, like driving at a fixed highspeed, and can therefore meet the needs of diverse markets.

#### Pursuit of outstanding drivability

In order to realize not only the smooth feel possessed by CVTs but also to take the direct driving feeling to the next level, we instigate lock-up immediately after the vehicle starts moving, to suppress excessive engine rotation which will increase the sense of acceleration when the vehicle starts moving. Furthermore, we have created a driving experience that has a truly direct driving feeling by controlling the increase in engine rotations and vehicle speed so that they match in accordance with acceleration needs.

# connection and release of the multi-plate clutch.

for switching between forward drive and reverse

Auxiliary gearbox that utilizes the planetary gears used

When starting a vehicle and accelerating, we want to

CVT7) solves this problem by making a simple yet revolutionary idea practical for the first time ever: the CVT with an auxiliary gearbox.

9-speed automatic transmission for medium/large RWD vehicles

## **JR913E**





## Use of a Full Bearing Support Structure

All rotating elements are positioned on the long input shaft, and the support structure has been changed from a conventional bushing-supported structure to a bearing-supported structure, thereby reducing friction.

#### Reduced Circuit Leakage -

Oil leakage volume was reduced and hydraulic accuracy and responsiveness were improved by reducing the clearance between the control valve's bore and spool.

#### Use of a Waved Drive Plate

A waved drive plate is used for all coupling elements, and, when not coupled, is separated from the drive plate to reduce drag torque.

#### Improved Clutch Control Pressure Responsiveness and Stability

A small-diameter nickel-plated spool is used for the clutch valve, and variable dither control is incorporated over the entire range, ensuring approximately 5 times the hydraulic response speed and approximately 10 times the response stability when compared to existing 7-speed ATs.

#### Shift Patterns Selected in Beal-Time

Detects the driver's accelerator operation in realtime and generates the required driving force.



Even with only a 9th to 4th shift pattern, the JR913E has nine shift patterns:

 9-4
 9-5-4
 9-7-4
 9-7-5-4
 9-7-6-5-4

 9-8-7-4
 9-8-6-5-4
 9-8-7-5-4
 9-8-7-6-5-4

It selects, in real-time, the shift pattern that matches the driving force required by the driver.

#### With the Slogan of "Ultimate Efficiency and Ultimate Response," Maximizing the Benefits of a Higher-Gear Transmission

If a transmission is the same size and weight even after more speeds have been added, then the car's performance will dramatically improve. In pursuit of "ultimate efficiency and ultimate response," the JR913E is just that—a 9-speed automatic transmission (AT) for RWD vehicles that achieves world-class fuel efficiency and world-class driving performance.

#### **Rhythmic Shifting, Despite Being a 9-Speed AT**

By adding speeds to a transmission, the types of shifting will increase. From the driver's perspective, it may feel like there are too many shifts, or that it takes a long time for the car to respond after torque application by stepping on the accelerator. Therefore, the JR913E has realized rhythmic shifting by having smaller differences between the preceding and following speeds, with close gear ratios on the frequently-used low gear ratio side.

The JR913E also adds shifting innovations. The rate of change in the driver's accelerator inputs is constantly monitored, not only during shift judgement, but also when shifting. In addition to regular sequential shifts

that shift one step at a time, the JR913E can skip gears in real-time while shifting according to the rate of change in the driver's accelerator inputs, thereby making it possible to quickly shift to the optimal driving force required by the driver.

### Realizing Outstanding Fuel Efficiency via Optimal Design

In order to ensure high fuel efficiency, we have been working on reducing the vehicle speed for the torque converter's conventional lockup area. However, this is also a battle against in-vehicle noise that is caused by vibration, also known as booming noise. The JR913E is newly using a pendulum dampener, and, by operating the pendulum in the opposite phase according to the input vibration cycle, vibrations are attenuated and lock-up from the low rotational speed of 800 rpm is possible.

The JR913E also has a mechanism to control lubrication flow rates within the transmission and, by optimizing the flow rate of lubrication as it spreads to each part of the transmission according to the driving situation, such as for torque and RPM, we have created a system that does not circulate unnecessary lubrication. Furthermore, there is also the benefit of the JR913E being a 9-speed transmission. Thanks to its wide 9.1 ratio coverage, it achieves outstanding fuel efficiency via powerful acceleration at engine start and via low rotational speeds during high-speed cruising.

#### **Smaller and Lighter**

We absolutely do not condone increases in size or weight for our existing 7-speed ATs, and the JR913E, a 9-speed AT, must fit within the same space in a vehicle as our 7-speed ATs. What makes the "lighter" part of this goal possible is material replacement weight reduction technologies. Magnesium alloy is being used in the transmission's case for the first time, the oil pan is made out of resin, and the bolts are made out of aluminum. Additionally, we are contributing to the goal of "smaller and lighter" by thoroughly paying attention to details of the transmission, such as by utilizing thin-wall pressed parts that use high-strength steel plates and by utilizing rotation detection via magnetic encoders.

9-speed automatic transmission for medium/large RWD vehicles





Transmission for medium/large RWD hybrid vehicles

## **JR712E**







**JR712E** 







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Clutch 2 serves the same role as the transmission clutch of the 7-speed AT for RWD vehicles, which its development was based on.

 Motor driving with the motor alone (driving as an electric vehicle)



Clutch 1 is released, and the movement of the engine is disconnected from the electric motor. With the engine suspended, battery power is used to drive the car solely through motor output. 2 Engine driving driving as a normal gasoline-powered vehicle



Clutch 1 is connected, and the vehicle is driven by output from the engine. The powerful torque from the engine drives the tires in the most optimal way via the transmission. Ower shift driving (hybrid driving)



Clutch 1 is connected, and output from the engine is transmitted. At the same time, the motor is driven by battery power, resulting in hybrid driving through two power sources for the vehicle. Thanks to the motor characteristics of fast response and high output, the driver is able to accelerate the vehicle with good response.

#### 4 Energy regeneration (during deceleration)



Clutch 1 is released, and the movement of the engine is disconnected from the motor. The regenerated energy that is produced through deceleration is not lost as a result of the drag resistance on the engine side but rather can be efficiently utilized for generation, and the energy is charged in the battery.

## JR712E\*: a transmission for RWD hybrid vehicles that implements a 1-motor, 2-clutch system without changing the transmission size

The JR712E, a transmission for RWD hybrid vehicles, represents the culmination of JATCO's knowhow and control technology. If we were to pursue new packaging for a hybrid system from the beginning, the production cost would not meet the expected cost for the vehicles. Conversely, an easier method would be to replace the existing torque converter in the transmission with a motor. However, this method offers limited benefits for a hybrid transmission system. JATCO has pursued the ideal balance between the two by taking the perspective of its users.

### Birth of this packaging realized by an ideal balance between production cost and performance

"We want to keep production costs lower and allow as many people as possible to enjoy the benefits of a hybrid system." This desire became the starting point for the concept. If we were able to maintain the mountability for vehicles, we would be able to minimize the change of the base vehicle. The JR712E holds the electric motor and clutch in the space created by removing the torque converter from the existing 7-speed AT for RWD vehicles. It is the world's first 1-motor, 2-clutch transmission for hybrid vehicles, with the newly added clutch serving as Clutch 1 and the original gearshift clutch in the 7-speed AT serving as Clutch 2.

Originally, a torque converter plays the roles of increasing torque width when the vehicle is started up and accelerating and of easing shift shock. The issue of inadequate torque when the vehicle is started up, which arises as a result of the omission of the torque converter, is countered through a newly added electric motor. In addition, shift shock is absorbed through the more advanced control of the gearshift operation of Clutch 2 that comes after motor output. The ability to execute timely connection and release of the two clutches (switch shifting) is a result of the shift control technology for step ATs that JATCO has developed to date.

#### Reason for using two clutches

Of course, there is a significant reason for adding not only the motor but also the clutch. In typical hybrid driving modes, such as "motor driving" or "energy regeneration in deceleration," if the engine remains connected, energy would be lost as a result of excessive drag resistance. With an additional clutch, the engine can be disconnected when necessary to realize an even more efficient hybrid system.

\*Jointly developed by Nissan Motor Co, Ltd. and JATCO Ltd

## Continuously Variable Transmission

#### Continuously evolving JATCO CVTs

The evolution of CVTs, such as through ratio coverage expansion and friction reduction, enables a balance between excellent fuel performance and comfortable driving at an even higher level.

This high potentiality has been recognized, and JATCO's CVTs are spreading across markets around the world.



In order to realize start-up and acceleration at even lower gear ratios, as well as quietness and low fuel consumption at high gear ratios, the ratio coverage (range of transmission gear ratios) of step ATs has been expanded through an increase in the number of steps. In the case of CVTs, differently from step ATs, the ratio coverage can be increased without increasing the number of parts because the basic structure for shifting gear ratios is through a belt and a pair of pulleys. Despite no big change in appearance, CVTs are steadily evolving.

#### Ratio coverage comparison\*: step AT and CVT

Referencing benchmarks for step ATs in the market, it can be seen that ratio coverage is expanded through an increase in the number of steps, from 4-speed to 5-speed, to 6-speed. If you were to plot the ratio coverage of JATCO's CVTs against this, it would be clear that conventional CVTs were equivalent to 7-speed step ATs while the CVT7 and CVT8 have a ratio coverage that is even wider than that of an 8-speed AT.



#### The CVTs recognized by global markets

In the beginning, a CVT's performance was particularly noted in urban areas, where drivers had to repeatedly start up and accelerate their vehicles. Thus, CVTs were getting popular in the Japanese market first and are now well accepted by automobile users in global markets including North America, where environmental regulations are stringent, and China, where chronic congestion and air pollution are becoming increasingly serious in urban areas. JATCO's three overseas production bases produce CVTs, and this proves that CVTs have been recognized in the global market.





# JATCO's Transmission Lineup

#### Taking the global lead with a wide-ranging and unique product lineup as a manufacturer specializing in the production of transmissions

JATCO's CVTs have the highest market share in the world. JATCO is the only CVT manufacturer in the world with a lineup that covers vehicles ranging from mini to 3.5-liter engine class vehicles. In addition, it offers a rich lineup of conventional step ATs. Various vehicles manufactured around the world today are equipped with JATCO products, and JATCO has won the strong support and high esteem of many of its customers. As a manufacturer that specializes in transmissions, JATCO will continue leading the world forward.

	FWD				FWD		RWD		
	сvт	СVТ	СVТ	HYBRID	AT	AT	Т	AT	HYBRID
	Jatco Saras JF021E	Jatco Gana / Jatco Gana JF015E / JF020E	<i>Jatco ⊑⊽т≣</i> JF016E∕JF017E	<b>Jatco کی پیری</b> JF018E ⁄ JF019E	JF414E	JF613E	JR711E JR710E	JR913E	JR712E
7 0 0 6 0 0 5 0 0 4 0 0 2 0 0 1 0 0	A CVT developed exclusively for mini vehicles. Its ratio coverage has been optimized for the functionality of such vehicles, and by relentlessly pursuing small size and low weight, good driving performance and high fuel efficiency have both been achieved. This transmission brings out the best performance possible from mini vehicles.	<text></text>	A CVT for medium and large FWD periods. The maintains the smooth driving qualities of a CVT, while reducing friction by as much as 40% through the relentless pursuit of efficiency for even the smallest parts. It strikes a balance between a sporty and powerful drive and outstanding environmental performance.	A transmission for medium and large FWD hybrid vehicles. The driving/ regenerative motor, as well as the dry multi-plate clutch for disconnecting the engine from the motor, is built info the torque converter housing of the Jatco CVTB. A unique 1-motor, 2-dlutch structure has been adopted to create this compact system.	<text></text>	A 6-speed AT for medium and large FVD vehicles. It achieves a balance between driving and fuel performance by harnessing its wide transmission gear ratio coverage. This transmission, which can be adapted even up to the high torque range for FVD vehicles. has not orgay in engines, but diesel engines as well.	A 7-speed AT for medium and large RWD vehicles. It realizes excellent driving and didition, optimal luning has been carried out for the shift controls down to finest details. By adding 'flavor' in a way that matches the character of the vehicle, this transmission can be used in a wide range of vehicles.	A 9-speed AT for RWD vehicles with high efficiency and high response. By taking advantage of its 9 gear-ratios, this transmission achieves both an unprecedented powerful and direct driving feel and tow noise level. In addition, mechanical losses in areas such as the gears and oil pumps are minimized to achieve excellent fuel efficiency. Finally, the speed of its response when shifting is maximized to realize high-quality driving performance.	A transmission for medium and large RWD hybrid vehicles. Through the adoption of a 1-motor. 2-clutch system, it strikes a balance between powerful drive in line with the driver's intentions in all situations and high fuel performance through electric motor drive and efficient energy regeneration in ways that are possible only for hybrid cars.
Capacity (Nm)	Mini class vehicles	Mini/small class vehicles	Medium/large class vehicles	Medium/large class vehicles	Small class vehicles	Medium/large class vehicles	Medium/large class vehicles	Medium/large class vehicles	Medium/large class vehicles

CVT AT HYBRID



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