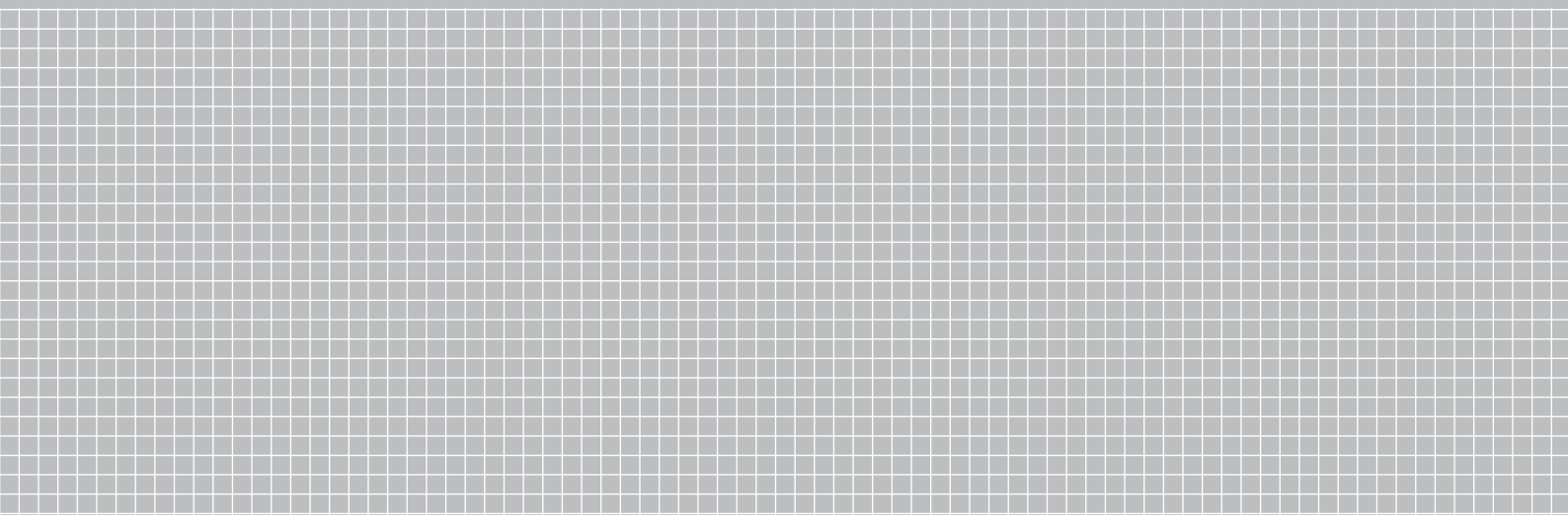




# OUTLANDER PHEV

PRODUCT INFORMATION  
21 March 2014



# Mitsubishi Outlander PHEV

## Product Information

### Quick Facts:

- The world's first plug-in hybrid SUV.
- Most fuel efficient SUV in Australia at 1.9L/100km (ADR 81/02).
- Affordable, Capable and Efficient.
- Twin motor 4WD and S-AWC drivetrain performance and the practicality of an SUV.
- 52kms pure electric driving range.
- Selectable battery management, self-charging and battery save modes.
- Three driving modes: EV Drive Mode, Series Hybrid Mode and Parallel Hybrid Mode.
- Six selectable levels of regenerative braking (B0 – B5).
- ECO Mode switch: activates energy-saving climate control function and throttle response.
- Charging times (Approx.): Plug-in 15A 240V AC ~ 5 hours. Self-Charging Mode ~ 40 minutes.
- Power output: Oil-cooled front motor: 60kW/137Nm. Liquid-cooled rear motor: 60kW/196Nm.

## INTRODUCTION

The Mitsubishi Outlander PHEV re-defines affordability, SUV 4WD capability and fuel efficiency.

The world's first plug-in hybrid SUV, Outlander PHEV is an innovative "electric vehicle (EV) that charges itself," representing a fusion of the EV technologies developed by Mitsubishi Motors (MMC) for models such as the i-MiEV, 4WD technologies honed with the Lancer Evolution and SUV know-how gained from the Pajero. The result is a ground breaking new model that brings together the superior environmental performance and quietness of an EV, the stability and handling performance of a 4WD and the practicality of a family sized SUV.



## **PLUG-IN HYBRID EV SYSTEM**

### **Drive Modes**

The Outlander PHEVs default operation is EV Drive mode, but the system will automatically select the ideal driving mode based on performance and speed demands to optimise efficiency. The engine will start to either act as a generator or provide drive directly to the front wheels, with assistance from the electric motors.

### **EV Drive Mode: Drive by front and rear electric motors**

EV Drive mode is an all-electric mode in which the front and rear motors drive the vehicle using only electric power from the drive battery. Zero CO2 emissions and petrol consumption up to a maximum of 120km/h

### **Series Hybrid Mode: Engine generator assists electric motors**

The electric motors power the vehicle using engine-generated electric power to supplement the energy provided by the drive battery. The system switches to this mode when the remaining battery charge falls below a predetermined level or more performance is required, such as accelerating to pass a vehicle or climbing steep inclines.

### **Parallel Hybrid Mode: Motors assist engine drive**

The PHEV switches to Parallel mode when the vehicle reaches higher speeds with assistance from the electric motors when extra power is required for overtaking manoeuvres or steep inclines. In this mode the high-efficiency petrol engine provides direct drive to the front wheels, assisted by the electric motors.





**EV MODE**

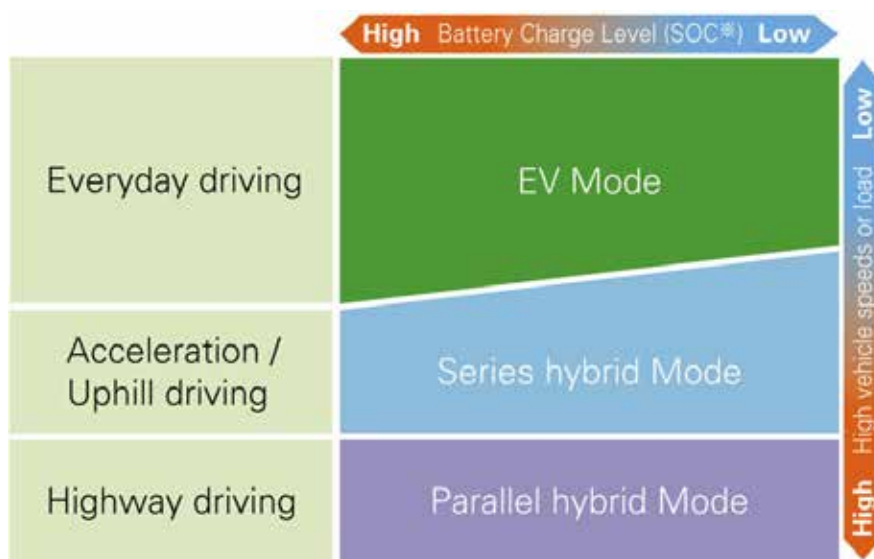
1. **Start** – All-motor drive, responsive take-off and fast acceleration characteristic of EV's.
2. **Urban Driving (remaining battery charge)** – Quiet ECO all-motor driving.
3. **Highway speeds (remaining battery charge)** – All-motor drive at 100km/h.
4. **Deceleration** – Regenerative braking function uses the motors as generators to charge the drive battery.

**Series Hybrid Mode**

5. **Incline/Accelerating** – Hard acceleration starts the engine generator, drive is by electric motors powered by the drive battery supplemented by engine-generated electric power.
6. **Urban Driving (low remaining battery charge)** – Engine generator starts, drive is by electric motors powered by the drive battery supplemented by engine-generated electric power.

**Parallel Hybrid Mode**

7. **Highway (low remaining battery charge)** – The engine provides direct drive to the front wheels and charges the drive battery as required.
8. **Accelerating to overtake** – The engine drives the front wheels, assisted by the motors.



※ State of Charge



## SELECTABLE BATTERY MANAGEMENT

The Outlander PHEV features a Battery Save/Charge Mode, unique functions only to be found on an EV that charges itself.

### **Battery Save Mode: Reduces Drive Battery Power Consumption**

The 'SAVE' button is located on the centre console behind the joystick selector lever. When activated the drive battery remains in its current state of charge and switches the PHEV to HV (Hybrid Vehicle) mode. This feature allows the driver to save battery power during highway driving and use the more efficient EV mode in a city driving environment and quiet areas.

### **Battery Charge Mode: Using Engine as a Generator**

The 'CHRG' button is located to the left of the Battery Save button. When activated the engine starts up and charges the drive battery regardless of whether the car is stationary or moving. With the car stationary, for example, the driver can charge the drive battery to around 80% capacity in \*40 minutes. During this time the engine will consume approx. 3 litres of petrol.

*\*Charging time can vary depending on conditions such as air temperature and climate control settings.*

## REGENERATIVE BRAKING

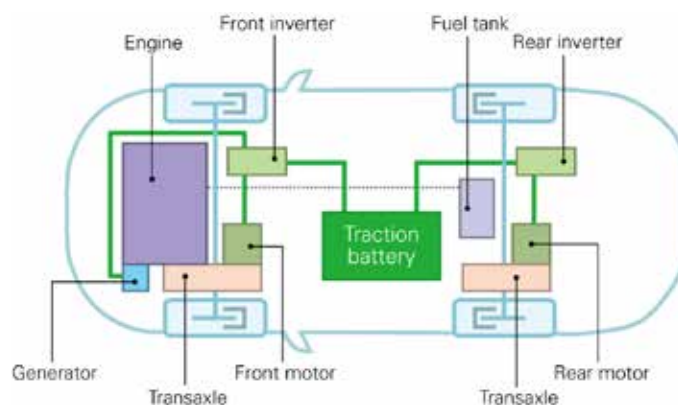
The electric motors act as generators during deceleration. The drive battery is charged when the driver releases the accelerator and when the brake pedal is applied. The degree of energy recovered through regenerative braking can be controlled using the selector lever or paddle selectors on the steering wheel.

**Lever:** Moving the selector lever from the D position to the B position increases regenerative braking strength and provides two settings, B3 or B5.

**Paddles:** The degree of regenerative braking can be adjusted to any of the six levels by using the plus and minus paddles, B0 is the lowest setting and B5 the highest. Regenerative braking selection position is displayed on the dash.

## ECO MODE SWITCH

Turning on the ECO button, located below the MMCS (Mitsubishi Multi Communication System) display screen, sets the climate control and throttle calibration to an efficient energy-saving mode.



## PHEV COMPONENTS

### **Motors**

The Outlander PHEV uses smaller, lighter and higher output versions of the permanent magnet synchronous electric motor used in the i-MiEV. These have a maximum output of 60kW and maximum torque of 137Nm (front) and 195Nm (rear), they provide 4WD performance with more powerful acceleration response than many high output ICE powered vehicles. The front motor/generator heat management is controlled by oil-cooling which enables the unit size to be reduced while boosting power output. Compared to i-MiEV's front motor for example, the PHEV is 20 – 30% smaller and lighter and delivers 30 – 40% more power.

### **Generator**

In Series/Parallel Hybrid mode and battery Charge/Save mode, the generator produces electrical power through motive power from the engine, this energy is then stored in the drive battery and delivered to the motors on demand.

### **Power Drive Unit (PDU)**

The front motor and generator control units have been integrated into a single more compact component which also contains the air conditioning compressor branch-circuit.

### **Motor Control Unit (MCU)**

The efficient and compact motor control unit provides optimum luggage space. It also houses the on-board charger.

## **ENGINE**

The 4B11 2.0 litre in-line four-cylinder petrol engine has undergone significant development upgrades to fuel efficiency and noise reduction for the PHEV application. It incorporates Mitsubishi's MIVEC (Mitsubishi Innovative Valve timing Electronic Control system) technology, which maintains optimal efficiency by continuously varying the timing of the air intake valves according to engine operating conditions in Parallel Hybrid mode. Additionally, engine speed is optimised, exhaust note reduced and additional sound deadening applied to the engine bay areas.

### **Asymmetrical Piston Skirts**

The asymmetrical design features a large skirt area on the major thrust side and a smaller skirt area on the minor thrust side, this enables reduced liner contact. In addition, the resin coated and surface texture pattern of the skirt promotes optimum oil feed, the overall result is a significant reduction in surface friction.

### **Resin Coated Bearings**

The crankshaft and con rod bearings are resin coated to further reduce friction when the engine initially starts and during normal operating speeds.

### **Redesigned Oil Pump**

The oil pump now uses a dual-step relief valve which reduces energy losses and improves fuel efficiency.

### **Redesigned Crankshaft Oil Seal**

The application of a low-friction coating to the crankshaft oil seal also reduces friction and improves fuel efficiency.

### **Balancer Shafts**

Balancer shafts are incorporated in this engine design to reduce engine noise and vibrations.

### **Redesigned Induction System**

Optimisation of the resonator has reduced induction noise, making for a quieter engine.

### **Redesigned Exhaust System**

The spherical joint and pipe mounting point locations have been optimised to reduce vibrations and overall noise levels the exhaust system. In addition, the main muffler has also undergone structural changes.

### **Engine Mounts**

Outlander PHEV retains the engine mount design and strategy from the Outlander family. Vertical inputs are controlled by large hydro-mounts supporting the engine at its principal axis of inertia while roll-rod stoppers dampen longitudinal engine vibration. The roll-rod stoppers comprise of two layers of bushings, the larger outer vibration-damping bush seals the inner bush to act as double vibration damping and rumble reduction.

## **TRANSAXLES**

The Outlander PHEV uses new transaxles developed to meet the requirements of its three motor/engine drives modes. Without the propeller shaft found in conventional 4WD systems, the Outlander PHEV uses an independent drive configuration with transaxles at the front and rear. Exploiting the characteristics of the motors and engine, each transaxle incorporates a simple single-speed fixed, reduction gear. This high precision reduction gear gives a smooth and quiet operation even when the motors are spinning at high speeds.

### **Front Transaxle**

The front transaxle is a compact and light weight design employing a configuration in which the differential drive gear takes up the motive power from either the front motor or the engine. It has an in-built clutch that, with the engine running in Series mode, automatically engages to transfer drive from the engine directly to the wheels when the Outlander PHEV switches to Parallel mode. The single-speed fixed ratio reduction gear layout for both motors and engine means that the vehicle is driven by the motors at slower speeds when they work most efficiently and by the engine at higher speeds when the engine provides the most efficient motive power. The result is high-efficiency motoring from low to high road speeds without the need for a complex bulky multi-gear transmission.

### **Rear Transaxle**

Employed only to transmit power from the rear motor, the rear transaxle is of a simple construction using a single-speed fixed ratio reduction gear that makes the most of the inherent characteristic of the electric motor. Open axle ball bearings provide high-efficiency in the unit and the countershaft is located in the upper section of the transaxle to reduce oil agitation losses.

### **Power Parking Lock**

For the first time on a Mitsubishi model, the Outlander PHEV has a power parking lock mechanism, integrated in the front transaxle. The lock is engaged using the parking (P) button located in front of the selector lever.

## DRIVE BATTERY

The Outlander PHEV is powered by a high-capacity lithium-ion battery, development based on technology used in the i-MiEV. Its construction consists of 80 cells arranged in series, has a total voltage of 300V and storage capacity of 12.0kWh. It powers the motors and climate control system.

### Drive Battery Safety

The drive battery is a fully water-tight, sealed pack structure with a high-strength steel protection plate to provide superior strength, rigidity, durability and improve electromagnetic wave isolation.

### BMS (Battery Management System)

The BMS is an electronic system that manages the battery pack, it includes the following features:

- Battery state monitoring on a real-time basis using sensors fitted to each cell.
- Cooling system management regulates individual cells to maximise the battery's capacity and optimise energy availability.

## CHARGING SYSTEM

The drive battery can be charged through the on-board charger unit using 15A domestic power outlet. The charging port is located on the right side rear area of the vehicle with easy access via a cover flap. When the port flap is opened a lamp will illuminate to facilitate charging at night. The light flashes to indicate that charging has commenced.

### Charging Cable

The Outlander PHEV comes with a five meter charging cable. To make charging a simple as possible, the cable uses a connector that slots into the vehicle socket in a one-action operation, while the cable control box houses a charger indicator and an overheat shut-off device. The vehicle will not start with the cable connected.

### Charging Methods and Times

**Plug-in Charging** – The drive battery takes approximately five hours to fully charge using a domestic 15A power outlet. Charging occurs once the charge cable is connected and stops automatically when charging is complete. Up to 3 pre-set charge time periods can be set through the MMCS (Mitsubishi Multi Media Control System).

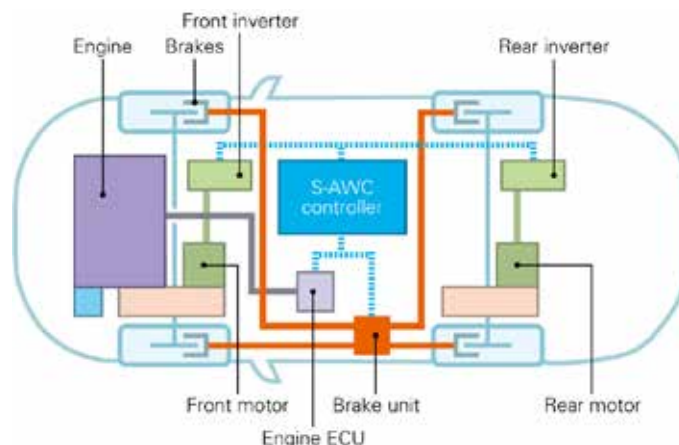


For the Aspire model, the charge timer and many other vehicle settings can also be set with the 'Mitsubishi Remote Control' smart phone App.

**Battery Charge Mode** – Using the in-vehicle self-charging mode, the drive battery will charge to around 80% capacity in 40 minutes (with the vehicle stationary). This mode can also be used during normal driving.

## TWIN MOTOR 4WD and S-AWC

As the world's first plug-in hybrid EV SUV, the Outlander PHEV uses the Mitsubishi Motor Corporation developed Twin Motor 4WD and S-AWC drivetrain system to provide safe and secure all terrain performance.



### Twin Motor 4WD

The twin motor system uses independent 60kW electric motors located directly on each axle. This alleviates the need for propeller shafts and other mechanical linkages found in conventional 4WD systems, therefore friction loss is significantly reduced. The high-torque nature of electric motors also delivers instant response and throttle control.

### S-AWC (Super All-Wheel Control)

As a fully integrated vehicle dynamics system, the S-AWC incorporates: AYC (Active Yaw Control), ASC (Active Stability Control) and ABS. This system uses the brakes, power steering and regenerative braking to ensure maximum vehicle stability during dynamic or emergency manoeuvres.

**Stability:** Yaw movement is controlled using the brakes and power steering with rapid torque transfer response to regulate both front/rear and left/right torque splits.

**Traction Control:** Front wheel slip is controlled by a combination of a limited-slip differential function within the AYC system plus front and rear wheel torque split optimisation. In 4WD LOCK, the system increases the wheel speed differential limiting force and the front/rear torque transfer response to improve traction. All automatically and instantly managed by the S-AWC system.

**Emergency Braking:** On the threshold of brake lock-up, regenerative braking torque and front/rear torque split is used to ensure maximum braking and stability.

### 4WD LOCK

The driver can engage 4WD lock function by pressing the 4WD LOCK button located in the centre console. In this mode, the drivetrain system optimises traction with rapid responses to wheel spin by managing torque distribution on low grip surfaces.





## PRODUCT DESCRIPTION

### EXTERIOR

The Outlander PHEV continues the design theme of the new Outlander family while using advanced highlights, premium quality and a high-stability silhouette that defines the PHEV.

At the more prominent front end a new twin-blade horizontal grille sits flush with the bonnet edge with a bolder Mitsubishi diamond badge at the centre. Black gloss-finished mid grille complements the new twin-blade design. A silver skid plate and fog lamps with chrome bezels strengthen the sculptural form of the front guards and bumper bar.

Outlander PHEV also gains a rear silver skid plate, along with black wheel arches that highlight the alloy wheels and link the new front and rear styling. Silver painted roof rails complete the Outlander's distinctive new look.

The Aspire models are fitted with 10-spoke 18-inch grey machine-faced alloy wheels and LED tail lamps.

### INTERIOR

The Outlander PHEV interior also continues the design theme of the new Outlander family while the selector lever, power gauge and other display features show its unique identity.

#### **Instrument Cluster**

The instrument cluster retains Outlander's twin dial layout with a power meter replacing the rev counter. The two dials are separated by a 4.2 inch LCD Multi-information Display.

#### **Power Meter**

The power meter has three zones, Power, Eco and Charge which change with accelerator input to indicate motor and engine drive output. By keeping the needle in the Eco zone the driver can maintain minimum battery/fuel consumption. When the needle swings to the Charge zone it shows that the drive battery is being charged from regenerative braking.

#### **Multi-information Display**

On starting the PHEV system the display shows a four second animation, welcoming the driver and creating a sense of expectation about driving the Outlander PHEV.

#### **Joystick Selector Lever**

A joystick-shape selector lever replaces the conventional gear selector. It's designed to return to its central position after selecting the required drive function.

#### **Packaging**

The optimal layout of system components, including the use of a slimmer drive battery pack and a slim-line on-board charger, allows the Outlander PHEV to retain a spacious interior and generous luggage compartment,

The fuel tank is located neatly under the floor to the rear of the drive battery pack and the double action folding mechanism for the 60/40-split rear seats provides convenient and generous occupant space.

With the rear seats folded down, the luggage compartment length extends to 1741mm, a completely flat layout of 463 litres of cargo volume. A generously-sized floor box provides space for the charging cable and other small items.



## NOISE INSULATION

To achieve superior quietness from all drive modes, the Outlander PHEV employs a number of noise isolation and sound proofing technologies. The unique windscreen is made from isolation glass and the wiper blades are an aerodynamic design, both contribute to low wind noise levels at high speed. Extra sound absorbing and isolating materials are used in the engine bay and wheel arches. New rear suspension cross member has additional bushes to further reduce mechanical and road noise.

## RIDE AND HANDLING

Packaging of the PHEV system components has resulted in a low centre of gravity (30mm lower than ICE powered Outlander). The Outlander PHEV delivers a smooth, compliant ride and responsive vehicle dynamic behaviour. For added dynamic control, an internal rebound spring is fitted in the rear dampers.

## SAFETY

### **e-Assist**

Mitsubishi's advanced active safety technology system, e-Assist with seven SRS airbags is a standard feature on all Outlander PHEVs. The system detects the potential risk of an accident and operates to assist and warn the driver. It comprises of two functions: Adaptive Cruise Control (ACC) and Forward Collision Mitigation (FCM).

### **Active Stability Control**

Standard on all models, the ASC controls delivery and distribution of braking force to the four wheels to prevent loss of grip and traction on slippery surfaces or when rapid steering changes are made. Through the integrated control of S-AWC working with ABS (with EBD and brake assist), ASC delivers optimum lane change stability in an emergency situation. Hill Start Assist is also a standard feature on both models.

### **SRS Airbags**

All models come standard with seven airbags to provide multi-area occupant protection in a collision: driver and front passenger, side and curtain and driver's knee SRS airbags.

### **Body Structure**

Very high levels of safety are brought to the Outlander PHEV with MMC's RISE (Reinforced Impact Safety Evolution) body structure. To protect and strengthen around the under-floor drive battery pack, the body is reinforced with four welded cross frames to the under-body side members.

### **High-voltage Component Protection**

The high-voltage components are located within the body frame for protection from impacts in all directions. In addition, in the event of a frontal, side or rear impact collision, an in-built system will cut off the high-voltage power source and protect occupants and rescuers from potential electric shock.

## MITSUBISHI REMOTE CONTROL

### (Aspire only)

The Mitsubishi Remote Control system allows the owner to use a smartphone or tablet device to set the battery charging timer, set the climate control, check vehicle status and operate various other vehicle functions.

**Scheduled battery charging:** Allows a daily schedule set-up for battery start/stop times covering a full week. The schedule can also be cancelled and a one-time charging initiated. Simulated animation display to check charging status. Enables charging during off-peak rate time periods.

**On-demand air conditioning:** Air conditioning can be activated for 10 minutes prior to entering the vehicle, with or without the charge cable connected.

**Scheduled climate control:** Allows a daily schedule set-up for climate control activation times covering a full week. Activation is for 10 minutes only to avoid battery drain. The electric heater is used when setting for warm air, engine start is not required.

**Vehicle information:** Used to check status of the doors, headlights, hazard lamps and power on/off button.

**Vehicle operation:** Headlights can be activated to check position of the vehicle or illuminate the surround area before entering. Automatically turns off after 30 seconds.





## **EQUIPMENT**

### **Climate Control**

The fully automatic climate control has individual temperature controls for drive and front passenger and integrated pollen filter. Using an electric air conditioning compressor, the system can be operated even when the engine is not running.

### **Electric Heater**

The climate control system uses an electric heater to warm the vehicles interior, this negates the need to run the petrol engine.

### **Heated Front Seats (Aspire only)**

Two settings: HI or LO

### **Acoustic Vehicle Alerting System (AVAS)**

Fitted with an approach warning device, in EV mode a sound will emit to alert pedestrians at speeds below 35km/h. The warning sound changes in pitch to let pedestrians know whether the vehicle is accelerating or decelerating.

### **Keyless Entry and Power Switch**

With key fob in the drivers pocket or handbag, the vehicle can be unlocked by pressing the door request button and start or stop the PHEV system by pressing the button on the dash.

### **Power Tailgate (Aspire only)**

The tailgate can be opened and closed using a button on the key fob or button on the right of the steering column. To close, there is also a button on the tailgate itself. For added safety, a reversing mechanism prevents the tailgate closing when an obstruction is detected.

## **NAVIGATION**

The Outlander's MMCS (Mitsubishi Multi Communication System) on-board navigation and entertainment system gains a PHEV-dedicated menu which provides access to functions and displays for EV motoring.

### **7-inch WVGA Display Memory Navigation**

MMCS features a memory navigation system for easier map database updates.

### **EV Short-cut Menu**

- Charging station search
- Charging cost
- Scheduled charging and air cooling
- Remaining cruising area display

### **PHEV Driving Information Display**

- Energy flow
- Energy monitoring
- ECO information



## Specifications and Features

Overall length x width x height (mm)		4655 x 1800 (not incl mirrors) x 1680
Luggage space (VDA) (Litres)		463
Wheelbase (mm)		2670
Approach/departure angle (degrees)		21.5/22.5
Ground clearance (mm)		190
Weight distribution front/rear (%)		55/45
Tyres		225/55R18
Vehicle mass and capacities (kg)	Kerb	1810
	GVM	2310
	Max Towing capacity	1500
	Max Trailer nose mass	150
	Max Roof load	80
Seating capacity		5
Drivetrain		Twin Motor 4WD
Motors	Type	Permanent magnet synchronous
	Quantity	2 (front x 1, rear x 1)
	Max. output	Front: 60 kW Rear: 60 kW
	Max. torque	Front: 137 Nm Rear: 195 Nm
Battery	Type	Lithium-ion
	Total voltage	300 V
	Rated capacity	12 kWh
Engine	Type	2.0L 4-cyl. DOHC MIVEC Petrol engine
	Fuel	91 RON
	Max. Power DIN – kW @ rpm	87 @ 4500
	Max. torque DIN – Nm @ rpm	186 @ 4500
Fuel tank capacity (litres)		45
Power steering		Electric
Estimated charging times	240V AC (15 A)	Approx. 5 hours (full charge)
Fuel consumption (ADR81/02)	Combined (L/100km)	1.9
EV range (km)		52
CO2 Emissions (gm/km)		44
Green Vehicle Guide Rating		5 Stars



**OUTLANDER  
PHEV**



## Warranty

The PHEV benefits from Mitsubishi's five year/100,000km new car warranty.

## Capped Price Servicing

PHEV also qualifies for Mitsubishi's four-year Capped Price Servicing, which is \$360.00 RRP for the first service and \$470.00 RRP for the second, third and fourth services, which are scheduled every 15,000km or 12 months, whichever comes first. Included with Capped Price Servicing as part of the Mitsubishi's Diamond Advantage, customers get a Roadside Assist package.

The Mitsubishi Outlander PHEV will be available from selected Mitsubishi dealers when it goes on sale on 31 March, 2014. Further details about Mitsubishi's PHEV dealer network are located at Mitsubishi Motors Australia website: [www.mitsubishi-motors.com.au](http://www.mitsubishi-motors.com.au)

## Place of Manufacture

Okazaki, Japan

