

LIGHTING SYSTEM CONTROL ADAPTIVE HIGH-BEAM SYSTEM (AHS)

1. FUNCTION OF MAIN COMPONENTS

Component	Function
Integration Control and Panel Assembly <ul style="list-style-type: none">Adaptive High Beam System Switch	Outputs an adaptive high beam system switch on signal to the No. 1 headlight ECU sub-assembly LH.
Forward Recognition Camera	Captures an image of the area in front of the vehicle and uses the image to determine the position of preceding and oncoming vehicles and to determine the brightness of the surrounding area. This data is then sent to the No. 1 headlight ECU sub-assembly LH via CAN communication.
Main Body ECU (Multiplex Network Body ECU)	<ul style="list-style-type: none">Receives signals from the headlight dimmer switch assembly and automatic light control sensor.Controls the No. 1 headlight ECU sub-assembly LH and No. 1 headlight ECU sub-assembly RH based on signals from various sensors and switches.
Skid Control ECU Assembly	Sends vehicle speed signals to the No. 1 headlight ECU sub-assembly LH.
No. 1 Headlight ECU Sub-assembly LH/RH	<ul style="list-style-type: none">Receives signals from various sensors and controls the headlight brightness and illumination area based on the conditions of the vehicle and surroundings.Sends adaptive high beam system control request signals to the light control LED ECU.Stores DTCs when a malfunction is detected in the adaptive high beam system.
Light Control LED ECU LH/RH	Receives signals from various sensors and controls the headlight illuminations based on the conditions of the vehicle and surroundings.
Headlight Leveling Motor LH/RH	Controls the vertical alignment of the headlight beam according to control signals from the No. 1 headlight ECU sub-assembly LH or No. 1 headlight ECU sub-assembly RH.
Combination Meter Assembly	<ul style="list-style-type: none">Illuminates the adaptive high beam indicator light to inform the driver when the adaptive high beam system is activated.Illuminates the high beam indicator light to inform the driver when the high beams are on.

Component	Function
Headlight Dimmer Switch Assembly <ul style="list-style-type: none"> • Light Control Switch • Headlight Dimmer Switch 	Transmits the light control switch and dimmer switch signal to the main body ECU (multiplex network body ECU).
Steering Sensor	Sends the light control switch signal, headlight dimmer switch signal and adaptive high beam switch signals to the main body ECU (multiplex network body ECU).
Automatic Light Control Sensor	Detects the ambient light level and sends a signal to the main body ECU (multiplex network body ECU).
Rear Height Control Sensor Sub-assembly RH	Detects the height of the vehicle and sends the signal to the No. 1 headlight ECU sub-assembly LH.

2. SYSTEM CONTROL

a. Operation Conditions of the Adaptive High Beam System

i. The adaptive high beam system operates when all of the following conditions are met. While the adaptive high beam system is on, the adaptive high beam indicator light illuminates.

- The power switch is on (IG).
- The light control switch is in the HEAD position and AUTO position and the headlights are operating.
- The dimmer switch is in the LO position.
- The adaptive high beam system switch is on.
- The vehicle speed is approximately 15 km/h (10 mph) or more.*1
- The vehicle speed is approximately 60 km/h (38 mph) or more.*2

*1: Except models for Europe

*2: Models for Europe

b. High Beam Light Distribution Control Function

i. In high beam light distribution control function, the light control LED ECU control the brightness and illumination area of the high beam.

ii. The high beam light distribution control function, changes the intensity and illumination area according to 3 vehicle speed ranges:

Illumination Mode	Description of Function	Vehicle Speed
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Low Speed Mode (Town Mode)	<ul style="list-style-type: none"> • Widens the illuminated area. • The brightness of the headlights is adjusted to ensure that pedestrians are visible while not being dazzled. • Reduces illumination of the side of the road. 	<ul style="list-style-type: none"> • 15 - 30 km/h (10 - 19 mph)*1 • -*2
Normal Mode	<ul style="list-style-type: none"> • At medium speeds, the illuminated area in front of the vehicle is extended and necessary areas to the left and right of the vehicle are illuminated. 	<ul style="list-style-type: none"> • 30 - 80 km/h (19 - 50 mph)*1 • 60 - 100 km/h (38 - 63 mph)*2
High Speed Mode	<ul style="list-style-type: none"> • The illuminated area in front of the vehicle is narrowed. • Adjusts the high beams to ensure visibility far in front of the vehicle. • Illuminates the outer LED unit to enhance the intensity of the headlights. 	<ul style="list-style-type: none"> • 80 km/h (50 mph) or more*1 • 120 km/h (75 mph) or more*2

*1: Except models for Europe

*2: Models for Europe

Figure 1. Low Speed Mode (Town Mode)

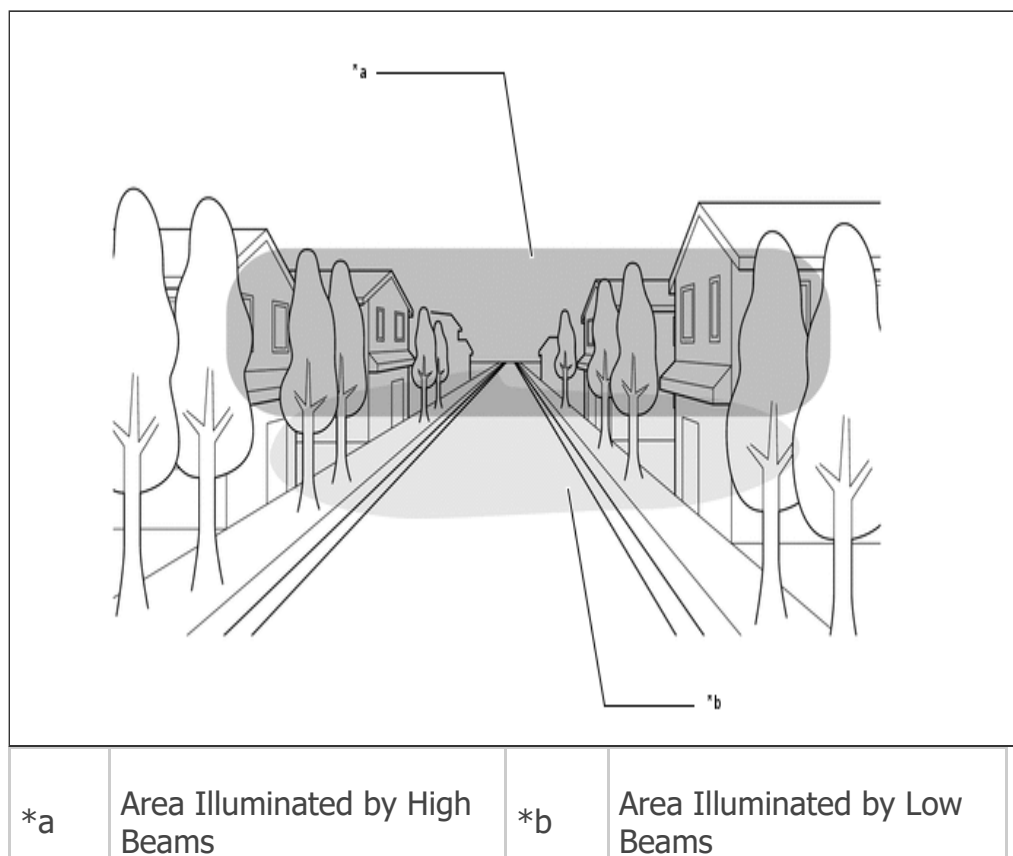


Figure 2. Normal Mode

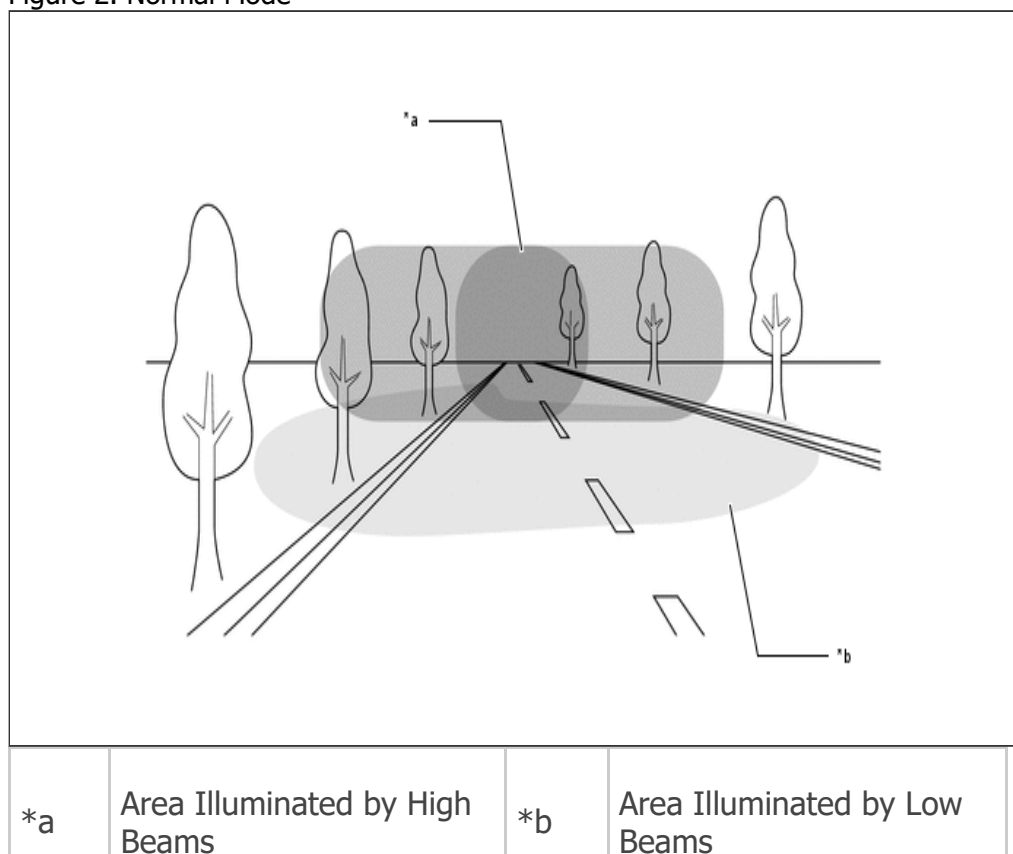
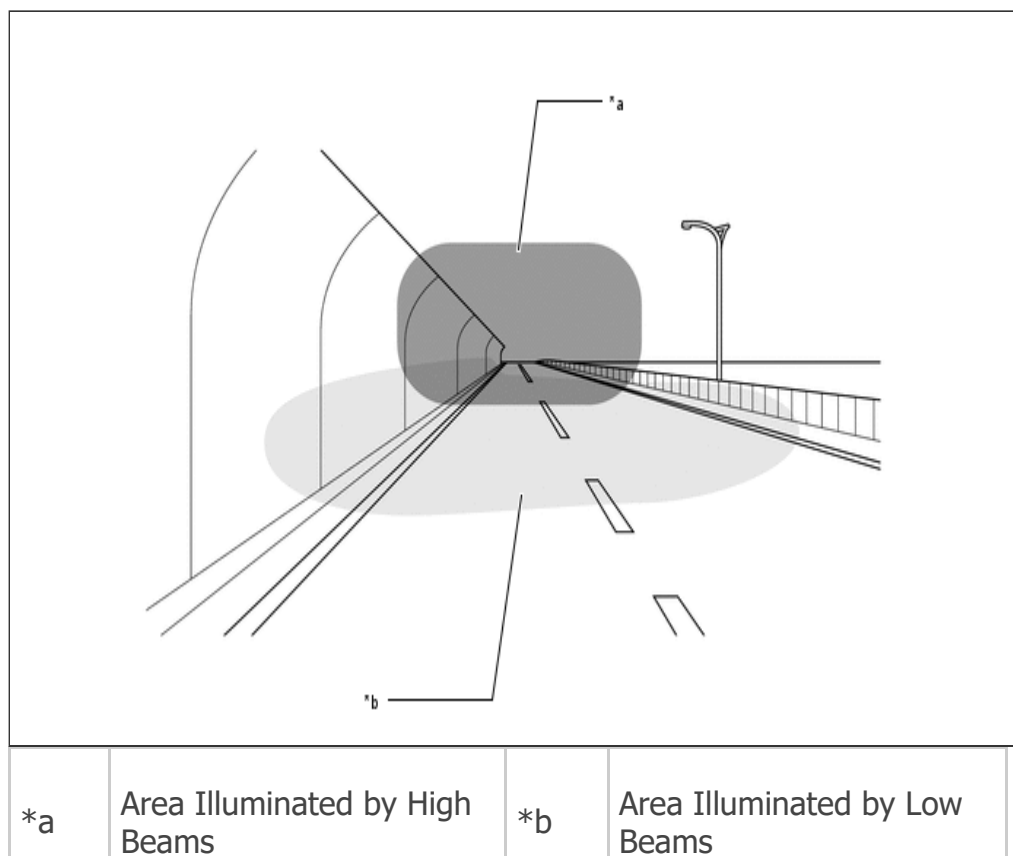
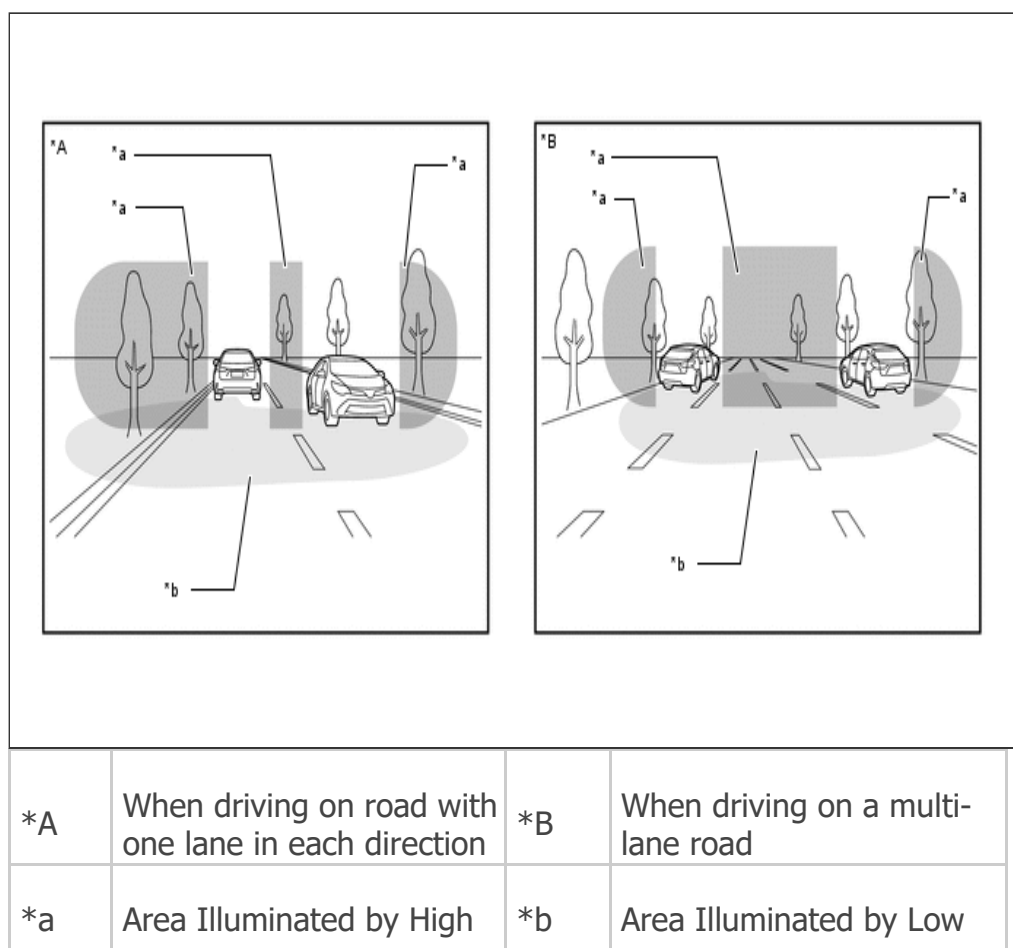


Figure 3. High Speed Mode



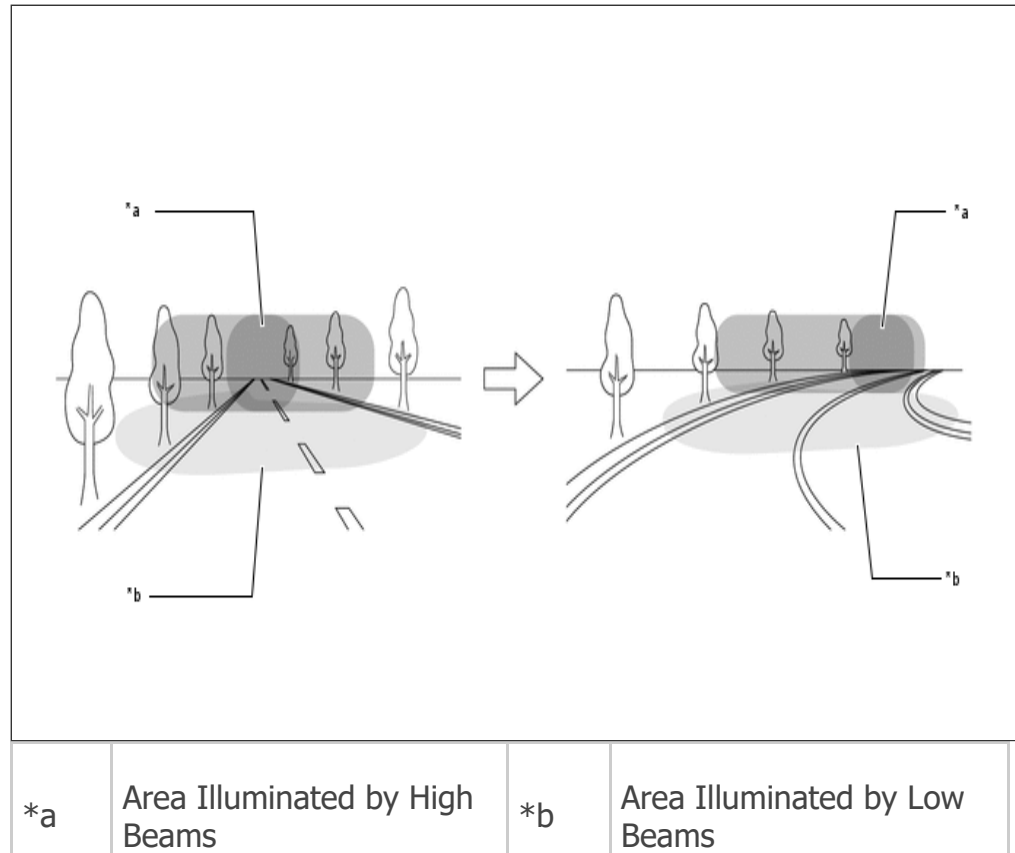
c. Light Disable Control Function

- i. The light disable control function dims LEDs in the high beam headlight accordingly when the forward recognition camera assembly detects a preceding vehicle or an oncoming vehicle.
- ii. The light control LED ECU and LED unit enable the LEDs of the headlight assembly to be dimmed independently as necessary.



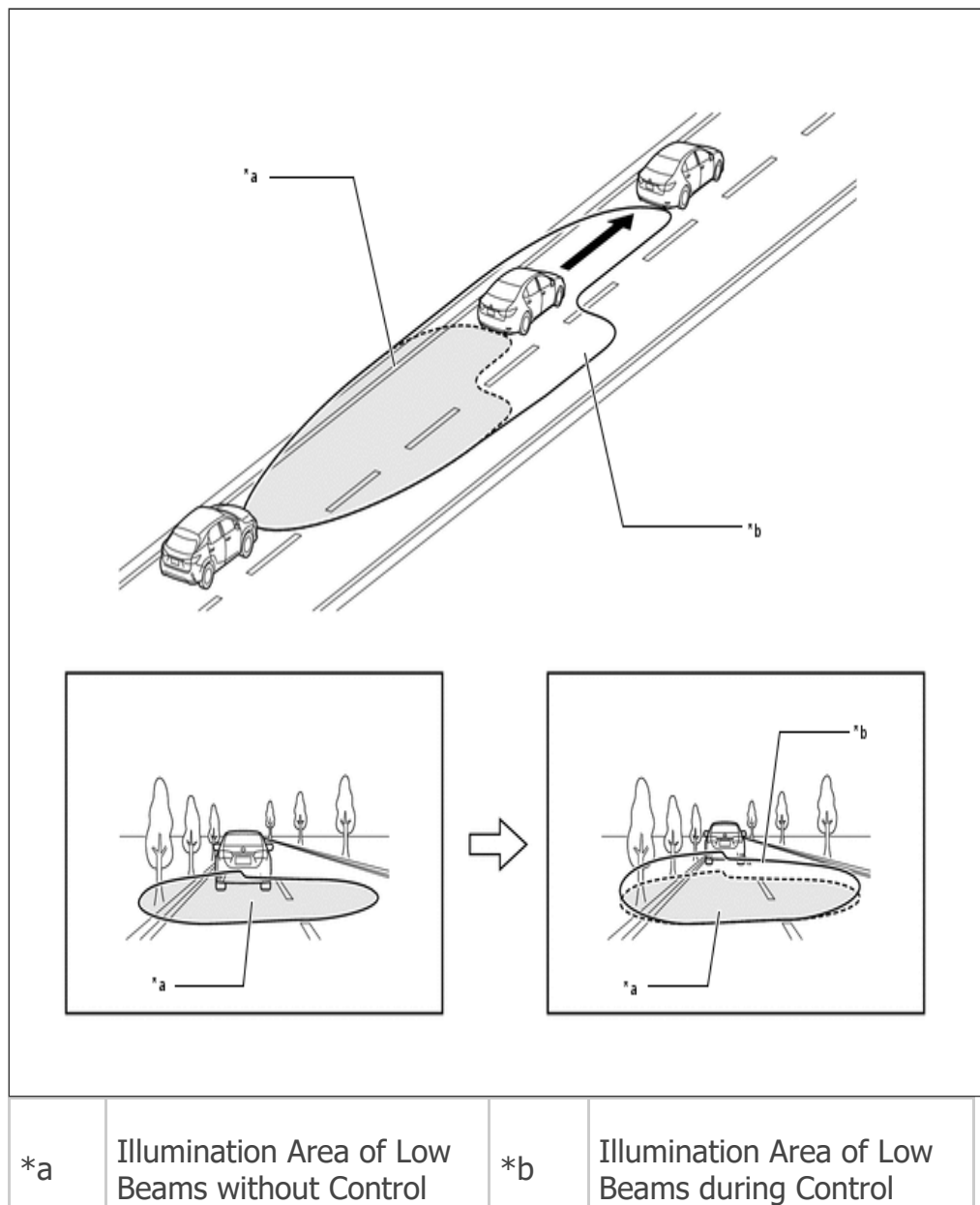
d. Headlight Swivel Control Function

- i. The headlight swivel control function adjusts the brightness of headlights while turning a corner to ensure excellent visibility.



e. Cut-off Line Tilt Control Function

- i. The cut-off line tilt function controls the leveling motor built into the headlight assembly to optimize the illumination area of the low beams in accordance with the distance to the preceding vehicle detected by the forward recognition camera.



3. FUNCTION

- The adaptive high beam system operates when the adaptive high beam system switch is on, the light control switch is in the HEAD or AUTO position and the dimmer switch is set to LO. The adaptive high beam system uses the forward recognition camera to detect the headlights of oncoming vehicles and the taillights of preceding vehicles and to determine the brightness of the surrounding area in order to automatically adjust the light distribution from the headlights.
- The No. 1 headlight ECU sub-assemblies control the adaptive high beam system.
- When the adaptive high beam system is on, the adaptive high beam indicator light in the combination meter assembly illuminates.

4. FAIL-SAFE

- The light control LED ECU prohibit operation of the adaptive high beam system if a malfunction is detected in the system.