

E60, E61, E63, E64 from 03/2005 - Light module with adaptive headlights

From 03/2005, the adaptive headlights are integrated into the light module.

Installation location

The light module is installed in the dashboard, directly behind the light switch.

Construction

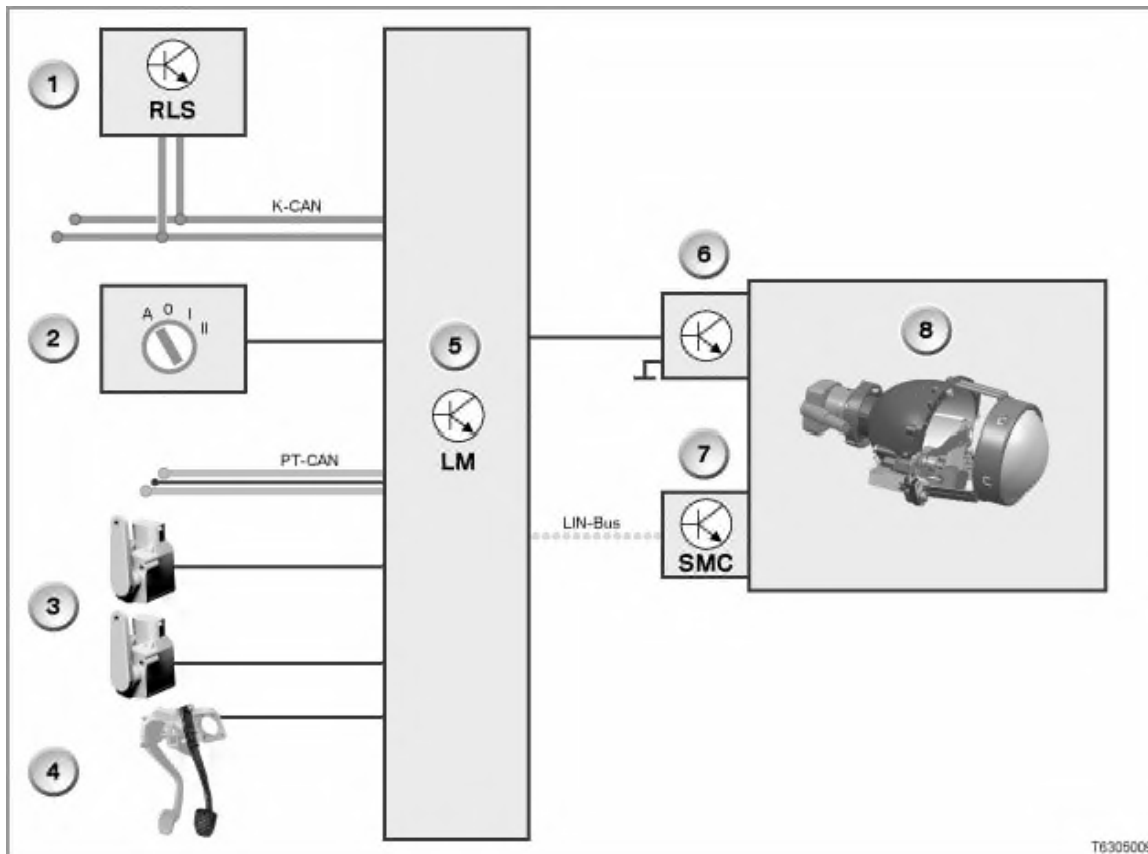
The light module and adaptive headlights components:

- Block diagram of light module with adaptive headlights
- Overview of light module and lighting
- Pin assignment

- Block diagram of light module with adaptive headlights

The block diagram shows the following relationships for the E60, E61, E63,E64, from March 2005:

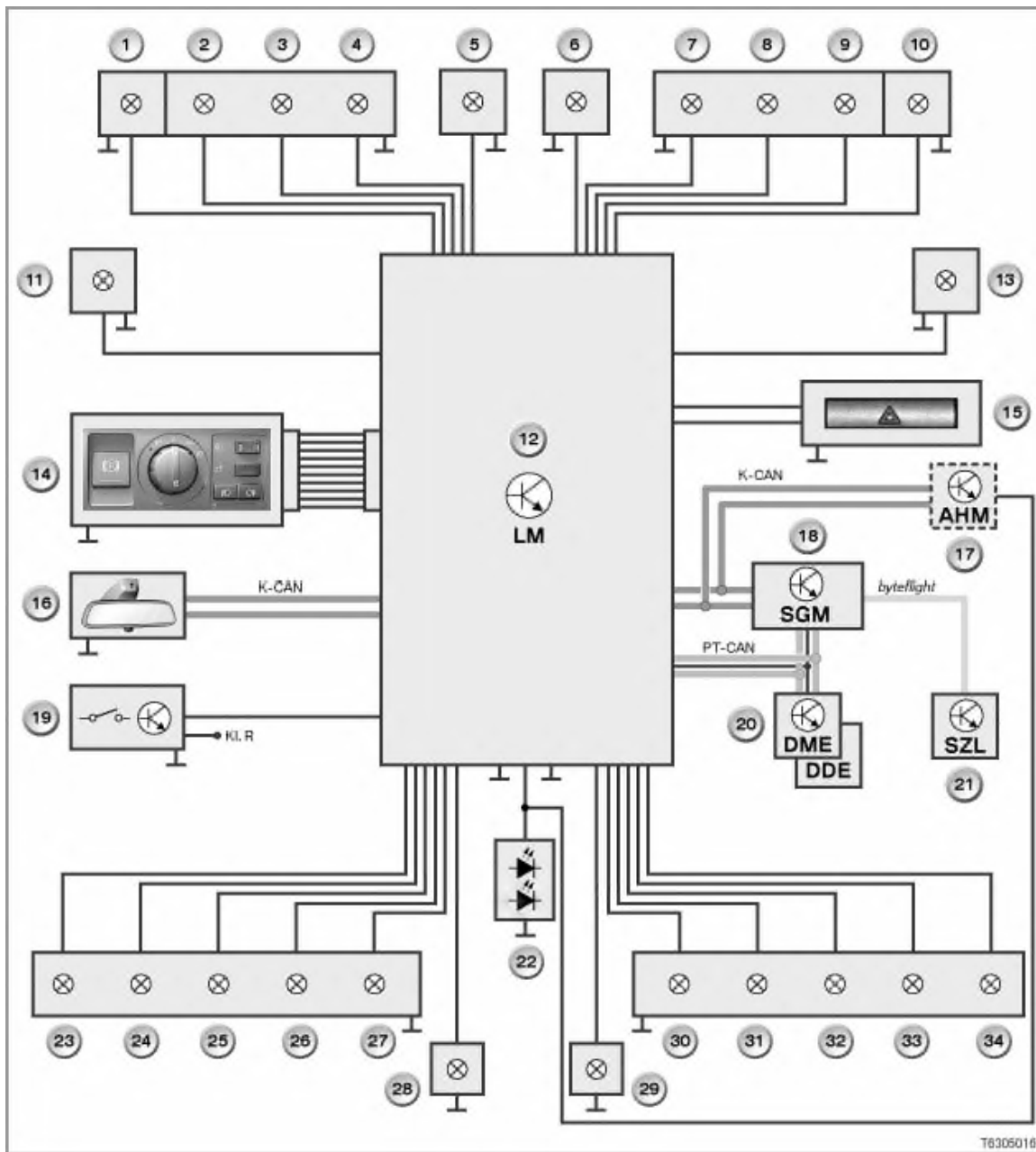
- Components in headlight that are actuated by the light module with adaptive headlights
- Components supplying the necessary signals
- Data buses and direct wire connections



Key	Explanation	Key	Explanation
1	Rain-light sensor (RLS)	2	Light switch
3	Ride-height sensors (one each on front axle, right and rear axle, right)	4	Brake-light switch (brake pedal highlighted in black)

5	Light module with adaptive headlights (LM)	6	Xenon control unit and electronic ballast for bi-xenon headlight bulbs, actuated by the light module
7	Stepper motor controller (SMC), actuated by LM	8	Positioner module
LIN-Bus	Local data bus (Local Interconnect Network)	K-CAN	Body CAN
PT-CAN	Powertrain CAN		

- Overview of light module and lighting



The illustration shows the light module on the E60, E61, E63, E64.

Key	Explanation	Key	Explanation
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1	Turn-signal lamp, front left	2	Main-beam headlight, left
3	Dipped headlight, left	4	Side light, left
5	Front foglight, left	6	Front foglight, right
7	Side light, right	8	Dipped headlight, right
9	Main-beam headlight, right	10	Turn-signal lamp, front right
11	Auxiliary turn signal, left	12	Light module (LM)
13	Auxiliary turn signal, right	14	Light switch
15	Hazard-warning lights switch	16	Rain-light sensor in base of rear-view mirror.
17	Trailer module (AHM, if fitted)	18	Safety and gateway module (SGM)
19	Brake light switch	20	Digital engine electronics (DME) or digital diesel electronics (DDE)
21	Steering column switch cluster (SZL)	22	Additional brake light
23	Turn-signal lamp, rear left	24	Tail light, left, with 2-stage brake light
25	Tail light, left, with 2-stage brake light	26	Rear foglight, left
27	Reversing light, left	28	Licence-plate light
29	Licence-plate light	30	Reversing light, right
31	Rear foglight, right	32	Tail light, right, with 2-stage brake light
33	Tail light, right, with 2-stage brake light	34	Turn-signal lamp, rear right
Byteflight	Fibre optics	Kl. R	Terminal R
K-CAN	Body CAN	PT-CAN	Powertrain CAN

- Pin assignment

Pin assignment for connector X12, 76-pin		
Pin	Type	Description
1	A	US version: Signal for side-marker lamps, front
2	---	---
3	A	Licence-plate light, left
4	A	Turn-signal lamp, left
5	---	---
6	A	Front foglight, right
7	E	Ride-height sensor, rear right
8	---	---
9	E	Power supply, terminal 30 (fuse F5)
10	A	Tail light, right
11	---	---

12	A	Main-beam headlight, left
13	E	Manual transmission: Reversing light, signal from reverse gear
14	A/E	CAN bus High
15	A	Dipped headlight, right
16	---	---
17	---	---
18	---	---
19	---	---
20	---	---
21	---	---
22	A	Auxiliary turn signal lamp, left
23	A	Rear foglight, left
24	A	Turn-signal lamp, front right
25	A	Side light, left
26	A	Reversing light, right
27	E	Ride-height sensor, front right
28	A/E	Steering column switch cluster (SZL)
29	A	Additional brake light
30	A	Brake light, right
31	E	Power supply, terminal 15, from Car Access System (wake-up wire)
32	A/E	CAN Low
33	E	Rear foglights (signal from light switch)
34	E	Front foglights (signal from light switch)
35	E	Dipped headlights (signal from light switch)
36	E	Side lights (signal from light switch)
37	A	Power supply for stepper motor, right
38	A	Power supply for stepper motor, left
39	A	Auxiliary turn signal lamp, right
40	A	Side light, right
41	A	Reversing light, left
42	A	Brake light, left
43	A	Terminal 58g (instrument lighting)
44	A	Front foglight, left
45	A	Hazard-warning lights switch
46	E	Ride-height sensor, rear right

47	E	Power supply, terminal 30 (fuse F6)
48	A	Screen for switching bi-xenon lights to main beam
49	A	Licence-plate light, right
50	A	Main-beam headlight, right
51	E	Brake light switch
52	E	Hazard-warning lights switch
53	A	Dipped headlight, left
54	E	Ride-height sensor, front right
55	E	Ride-height sensor, rear right
56	M	Earth
57	M	Earth
58	---	---
59	---	---
60	A	Indicator light (green) for automatic driving lights control and adaptive headlights
61	A	Turn-signal lamp, rear right
62	---	---
63	---	---
64	A	Tail light, left
65	A	Reversing light signal to electrochromic interior mirror
66	E	Ride-height sensor, front right
67	A	Rear foglight, right
68	A	Turn-signal lamp, front left
69	A	5-volt power supply for light switch
70	E	Earth
71	---	---
72	---	---
73	A	Locating lamp for light switch
74	E	Instrument lighting dimmer, signal from light switch
75	A	LIN bus for headlight, right
76	A	LIN bus for headlight, left
	A = Output E = Input E/A = Input/output M = Earth V = Supply voltage For details of current pin assignment, please refer to BMW diagnosis system	

How it works

Besides actuating the adaptive headlights, the LM also has the following functions:

- Actuation of headlights and exterior lighting on vehicle
- Cold monitoring and hot monitoring
- Actuation and monitoring of the turn signals and hazard warning lights function
- Dimmer for the instrument and locating lighting (terminal 58g) and the function and locating lighting for the hazard-warning lights switch
- Evaluation of messages from the rain-light sensor for the automatic driving lights control and for the adaptive headlights
- Communication with the trailer module, if fitted
- Actuation of the green indicator lamp for the adaptive headlights (on light switch)
- Data exchange via K-CAN (see below)
- With option 522 "Bi-xenon headlights for dipped/high-beam headlights", the light module monitors the bi-xenon headlights.
- Emergency-running characteristic (see below)

Actuation of headlights and exterior lighting on vehicle

All lighting loads are actuated by the light module.

- Output limitation: If the on-board supply voltage exceeds an encoded value, the lights are dimmed to increase the service life of the bulbs.
Each bulb (rear light, brake light etc.) has its own encoded value.
The values are encoded during production at the end of the assembly line.
- Reduced ON current: The light module switches on the individual lights one at a time to prevent the vehicle electrical system from being overloaded unnecessarily by voltage peaks and high currents produced when the lights are switched on.
- Prevents light intensity fluctuations: Systems with a high current draw and short load peaks can cause voltage dips in the vehicle electrical system. These voltage dips can cause fluctuations in the intensity of the vehicle lighting. Corresponding parameters are stored in the light module to prevent visible light intensity fluctuations.

Cold monitoring and hot monitoring

The lighting loads are individually diagnosed via the light module as follows.

- Cold monitoring: For cold monitoring, the lights are switched on briefly without the bulbs glowing (thermal inertia of bulb elements).
Exception: LEDs and bulbs for the bi-xenon headlights are **not** cold monitored. This is because: LEDs respond too quickly. The bulbs for the bi-xenon headlights must not be actuated with voltage pulses on principle.
Cold monitoring starts when terminal 15 is switched ON. This pre-drive-check indicates the condition of the lights before the start of a journey (car symbol in Check-Control display).
Cold monitoring detects either "light available" or "open circuit".
The cold current is a multiple of the rated current.
- Hot monitoring: The rated current of bulb when it is switched on is monitored via the status output of the lamp driver. A defective bulb can be detected within 2 seconds.
Frequency counters count how often a recognised defect occurs. The fault is reported once a certain number has been reached. When the ignition is switched off, all frequency counters are reset to zero to prevent a bulb that has already been replaced from being indicated as still defective.

Data exchange via the K-CAN

The light module receives the following messages via the K-CAN:

- Terminal R and other signals from the Car Access System (CAS)
- 2-stage brake light
- Side lights
- Dipped headlights
- Front foglights
- Rear foglight
- Ride-height sensors

If option 524 "Adaptive headlights" is fitted, the signals from the ride-height sensors are fed directly to the control unit for adaptive headlights.

Emergency-running characteristics

The light module has the following emergency-running characteristics:

- **Power supply failure:** The light module has two terminal 30 power supplies.
If a terminal 30 fails, the following lights will be actuated:
 - Front lighting: Dipped headlights and side lights (one side of vehicle each)
 - Rear lighting: The side lights and outer brake lights are actuated on one side (parking lights). The inner rear lights are actuated on the other side of the vehicle.
The vehicle thus remains lit on both sides. It is thus impossible to confuse the vehicle with a single-track vehicle (motorbike).
 - Brake lights: The brake lights are actuated with normal brightness on one side of the vehicle (encoding-relevant "European version"). This allows "single-track braking", as if, for example, a single brake light had failed.
- **Processor failure:** If the processor fails, the system will switch to emergency operating mode. Emergency operating mode is a hardware feature and thus completely independent of the light module.

Emergency-running characteristics if the processor fails:

- Vehicle lighting: The following are switched on when terminal 15 is switched ON: At the front the dipped headlights, and at the rear the position lights and the left and right outer brake lights (side lights).

The position lights and the left and right outer brake lights are not dimmed to 10% brightness, as is usually the case, but rather operated at full power.
Vehicle lighting is thus assured, regardless of the position of the light switch.
- Brake lights: From terminal 15 ON, the brake lights (left and right) are switched on when the brake pedal is depressed. Signal path via a direct wire from the brake light switch to the lamp drivers.

Malfunctions in the event of processor failure:

- No turn signal, no hazard warning lights
- No main beam, no headlight flasher
- No front foglights, no rear foglights
- No additional centre brake light
- No communication via the K-CAN
- No communication with the trailer module