

SECTION 417-01: Exterior Lighting
DIAGNOSIS AND TESTING

2014 F-150 Workshop Manual
Procedure revision date: 10/25/2013

Headlamps

Special Tool(s)

 ST3093-A	Fluke 77-1V Digital Multimeter FLU77-4 or equivalent
 ST2834-A	Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool
 ST2574-A	Flex Probe Kit NUD105-R025D or equivalent

Principles of Operation

Exterior Lighting

The Steering Column Control Module (SCCM) monitors the headlamp switch position by sending voltage signals on multiple circuits to the headlamp switch. There is one circuit for each headlamp switch position. At any given time, one of the signal circuits is switched to ground. The SCCM sends a message to the Body Control Module (BCM) over the High Speed Controller Area Network (HS-CAN), indicating the headlamp switch status.

When the BCM receives input requesting the headlamps on, it supplies voltage to the headlamp bulbs.

If the SCCM does not detect any active inputs from the headlamp switch for 5 seconds, or if the SCCM detects multiple headlamp switch input circuits are active, the SCCM sends a message to the BCM to indicate the fault. The BCM then turns the parking lamps and headlamps on and keeps them on until the battery saver times out.

Refer to [Exterior Lighting](#) in the Description and Operation portion of this section for information regarding the battery saver function.

If either situation occurs, the SCCM and the BCM **cannot** be ruled immediately as being at fault. This is normal behavior for the SCCM and the BCM when a fault has been detected with the inputs from the headlamp switch.

High Beam and Flash-to-Pass

The SCCM monitors the multifunction switch for a flash-to-pass and high beam request. When the multifunction switch is in the FLASH-TO-PASS or HIGH BEAM position, the SCCM sends a message to the BCM to indicate the request.

On vehicles with halogen headlamps, when the BCM receives a request for high beams (the low beams must be on), the BCM supplies voltage to the high beam bulbs.

On vehicles with HID headlamps, when the BCM receives a request for high beams (the low beams must be on), the headlamps remain powered on, and the BCM supplies voltage to the shutter (located within each headlamp). This changes the headlamp beam pattern to illuminate a greater distance.

When the flash-to-pass is requested, the high beams are illuminated as long as the multifunction switch is held in the FLASH-TO-PASS position (regardless if the low beams are on or off).

Field-Effect Transistor (FET) Protection

A Field-Effect Transistor (FET) is a type of transistor that, when used with module software, monitors and controls current flow on module outputs. The FET protection strategy prevents module damage in the event of excessive current flow.

The BCM utilizes a FET protective circuit strategy for many of its outputs (such as a headlamp output circuit). Output loads (current level) are monitored for excessive current (typically short circuits) and are shut down when a fault event is detected. A short circuit DTC is stored at the fault event and a cumulative counter is started.

When the demand for the output is no longer present, the module resets the FET protection, allowing the circuit to function. If the circuit is still shorted the next time the driver requests a circuit to activate that has been shut down by a previous short (FET protection), the FET protection shuts off the circuit again and the cumulative counter advances.

When the excessive circuit load occurs often enough, the module shuts down the output until a repair procedure is carried out. Each FET protected circuit has 3 predefined levels of short circuit tolerance based on the harmful effect of each circuit fault on the FET and the ability of the FET to withstand it. A module lifetime level of fault events is established based upon the durability of the FET. If the total tolerance level is determined to be 600 fault events, the 3 predefined levels would be 200, 400 and 600 fault events.

When a tolerance level is reached, the short circuit DTC that was stored on the first failure cannot be cleared by the clear the continuous DTCs command. The module does not allow this code to be cleared or the circuit restored to normal operation until a successful self-test proves that the fault has been repaired. After the self-test has successfully completed (no on-demand DTCs present), DTC U1000:00 and the associated DTC (the DTC related to the shorted circuit) automatically clears and the circuit function returns. The module never resets the fault event counter to zero and continues to advance the fault event counter as short circuit fault events occur.

If the number of short circuit fault events reach the third level, then DTCs U1000:00 and U3000:49 set along with the associated short circuit DTC. DTC U3000:49 cannot be cleared and the module must be replaced after the repair.

The BCM FET protected output circuits for the headlamp system are both low and high beam output circuits.

Inspection and Verification

1. Verify the customer concern.
2. Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection Chart

Mechanical	Electrical
• Headlamp switch • Multifunction switch	• Body Control Module (BCM) fuse(s): ■ 16 (10A) (RH low beam) ■ 17 (10A) (LH low beam) ■ 39 (15A) (high beams) • BJB fuse(s): ■ 16 (20A) RH ballast (<u>HID</u> headlamps) ■ 35 (20A) LH ballast (<u>HID</u> headlamps) • Bulb • Wiring, terminals or connectors

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

4. **NOTE:** Make sure to use the latest scan tool software release.

If the cause is not visually evident, connect the scan tool to the Data Link Connector (DLC).

5. **NOTE:** The Vehicle Communication Module (VCM) LED prove-out confirms power and ground from the DLC are provided to the VCM.

If the scan tool does not communicate with the VCM:

- check the VCM connection to the vehicle.
- check the scan tool connection to the VCM.
- refer to [Section 418-00](#), No Power To The Scan Tool, to diagnose no power to the scan tool.

6. If the scan tool does not communicate with the vehicle:

- verify the ignition is on.
 - The air bag warning indicator prove-out confirms ignition on (other indicators may not prove ignition on). If the ignition does not turn on, refer to [Section 211-05](#) to diagnose no power in run.
- verify the scan tool operation with a known good vehicle.
- refer to [Section 418-00](#), The PCM Does Not Respond To The Scan Tool, to diagnose no response from the PCM.

7. Carry out the network test.

- If the scan tool responds with no communication for one or more modules, refer to [Section 418-00](#).
- If the network test passes, retrieve and record the continuous memory DTCs.

8. Clear the continuous DTCs and carry out the self-test diagnostics for the BCM and the SCCM.

9. If the DTCs retrieved are related to the concern, refer to [Diagnostic Trouble Code \(DTC\) Chart](#) in this section. For all other DTCs, refer to the Diagnostic Trouble Code (DTC) Chart in [Section 419-10](#).

10. If no DTCs related to the concern are retrieved, GO to [Symptom Chart](#).

Symptom Chart

Symptom Chart

Condition	Possible Sources	Action
One or both low beams are inoperative	- Fuse - Bulb - Wiring, terminals or connectors - Ballast (<u>HID</u> headlamps) - Body Control Module (BCM)	VERIFY the bulbs are OK. If OK, GO to Pinpoint Test A.
One or both high beams are inoperative	- Fuse - Bulb - Wiring, terminals or connectors - Multifunction switch - Headlamp assembly (<u>HID</u> headlamps) - Steering Column Control Module (SCCM) <u>BCM</u>	VERIFY the bulbs are OK. If OK, GO to Pinpoint Test B.
The low beam(s) are always on	- Wiring, terminals or connectors - Headlamp switch <u>SCCM</u> <u>BCM</u>	GO to Pinpoint Test C.
The high beam(s) are always on	- Wiring, terminals or connectors - Multifunction switch - Headlamp assembly (<u>HID</u> headlamps) <u>SCCM</u> <u>BCM</u>	GO to Pinpoint Test D.
The flash-to-pass feature is inoperative	- Multifunction switch <u>SCCM</u>	GO to Pinpoint Test E.

Pinpoint Tests

Pinpoint Test A: One Or Both Low Beams Are Inoperative

Refer to Wiring Diagrams Cell [85](#), Headlamps/Autolamps for schematic and connector information.

Normal Operation

When the Body Control Module (BCM) receives a message that the headlamp switch is in the HEADLAMPS ON position and the multifunction switch is in the LOW BEAM position (or the autolamps feature has requested the headlamps on), the BCM provides voltage through the headlamp output circuits to the LH and RH low beam headlamps.

The BCM also provides an overload protection of the low beam output circuits. When an excessive current draw is detected, the BCM disables the affected low beam circuit driver.

DTC Description	Fault Trigger Conditions
B1D00:11 — Left Low Beam: Circuit Short To Ground	This DTC sets when the <u>BCM</u> detects a short to ground from the LH low beam output circuit.
B1D01:11 — Right Low Beam: Circuit Short To Ground	This DTC sets when the <u>BCM</u> detects a short to ground from the RH low beam output circuit.
U1000:00 — Solid State Driver Protection Active - Driver Disabled: No Sub Type Information	This DTC sets when the <u>BCM</u> has temporarily shut down the output driver. The module has temporarily disabled a low beam output because an excessive current draw exists (such as a short to ground). The <u>BCM</u> cannot enable the low beam output until the cause of the short is corrected, the DTCs have been cleared and a successful self-test is run.
U3000:49 — Control Module: Internal Electronic Failure	This DTC sets when the <u>BCM</u> has permanently shut down the output driver. The module has permanently disabled a low beam output because an excessive current draw fault (such as a short to ground) has exceeded the limits that the <u>BCM</u> can withstand. CORRECT the cause of the excessive current draw before installing a new <u>BCM</u>.

This pinpoint test is intended to diagnose the following:

- Fuse
- Bulb
- Ballast (HID headlamps)
- Wiring, terminals or connectors
- BCM

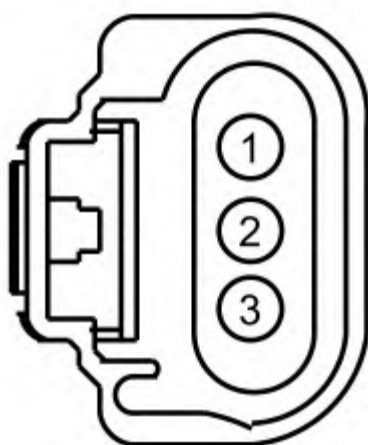
PINPOINT TEST A: ONE OR BOTH LOW BEAMS ARE INOPERATIVE

NOTE: Due to varying wattage ratings and the resulting current draw differences of certain aftermarket halogen headlamp bulbs, the BCM may activate its short circuit protection strategy, resulting in the low beam output circuit becoming inoperative. Verify the bulbs meet Ford specifications. If the bulbs do not meet Ford specifications, install the correct bulbs. Run the self-test (required to clear certain DTCs and reset the BCM). Correct any unresolved DTCs. Clear all DTCs. Test the system for normal operation.

Test Step	Result / Action to Take
A1 CHECK FOR VOLTAGE TO THE HEADLAMP ASSEMBLY	
• Ignition OFF. • Disconnect: Inoperative LH Headlamp C1021 or RH Headlamp C1041 (Halogen headlamps). • Disconnect: Inoperative LH Headlamp C1284 or RH Headlamp C1285 (<u>HID</u> Headlamps). • Place the headlamp switch in the headlamps on position.	Yes GO to A2. No VERIFY the <u>BCM</u> fuse 17 (10A) (LH low beam) or fuse 16 (10A) (RH low beam) is OK. If OK, GO to A6. If not OK, REFER to the

- For halogen headlamps, measure the **voltage** between:

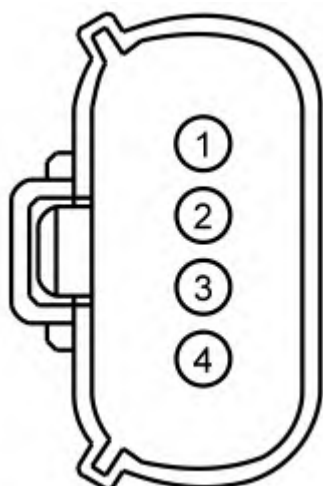
Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
LH Headlamp			
C1021-1	CLF04 (BN/BU)	—	Ground
RH Headlamp			
C1041-1	CLF05 (BU/GN)	—	Ground



- For HID headlamps, measure the **voltage** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
LH Headlamp			
C1284-1	CLF04 (BN/BU)	—	Ground
RH Headlamp			
C1285-1	CLF05 (BU/GN)	—	Ground

Wiring Diagrams manual to identify the possible causes of the circuit short.

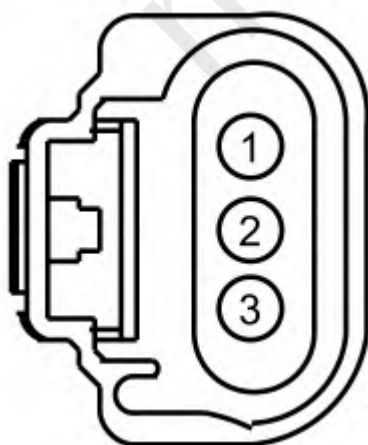


- Is the voltage greater than 11 volts?

A2 CHECK THE HEADLAMP ASSEMBLY GROUND CIRCUIT FOR AN OPEN

- For halogen headlamps, measure the **voltage** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
LH Headlamp			
C1021-1	CLF04 (BN/BU)	C1021-2	GD120 (BK/GN)
RH Headlamp			
C1041-1	CLF05 (BU/GN)	C1041-2	GD123 (BK/GY)



- For HID headlamps, measure the **voltage** between:

Yes

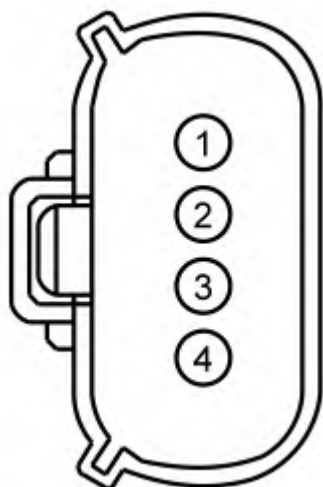
For halogen headlamps, INSTALL a new headlamp bulb. REFER to [Headlamp Bulb — Halogen](#).

For HID headlamps, GO to [A3](#).

No

REPAIR the circuit.

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
LH Headlamp			
C1284-1	CLF04 (BN/BU)	C1284-4	GD120 (BK/GN)
RH Headlamp			
C1285-1	CLF05 (BU/GN)	C1285-4	GD123 (BK/GY)



- Is the voltage greater than 11 volts?

A3 CHECK FOR BALLAST SUPPLY VOLTAGE TO THE HEADLAMP ASSEMBLY

- Measure the **voltage** between:

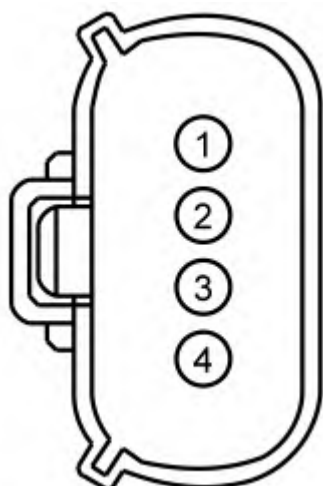
Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
LH Headlamp			
C1284-2	SBB35 (BU/RD)	—	Ground
RH Headlamp			
C1285-2	SBB16 (VT/RD)	—	Ground

Yes

GO to [A4](#).

No

VERIFY the BJB fuse 35 (20A) (LH headlamp) or fuse 16 (20A) (RH headlamp) is OK. If OK, REPAIR the affected circuit. If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short.



- Is the voltage greater than 11 volts?

A4 CHECK THE BALLAST

- Place the headlamp switch in the off position.
- Substitute a known good ballast.
- Place the headlamp switch in the headlamps on position.
- Does the inoperative headlamp illuminate?

Yes

REMOVE the known good ballast. INSTALL a new ballast. REFER to [Ballast](#).

No

REMOVE the known good ballast. GO to [A5](#).

A5 CHECK THE HID BULB

- Place the headlamp switch in the off position.
- Substitute a known good HID bulb.
- Place the headlamp switch in the headlamps on position.
- Does the inoperative headlamp illuminate?

Yes

REMOVE the known good HID bulb. INSTALL a new HID bulb. REFER to [Headlamp Bulb — HID](#).

No

REMOVE the known good HID bulb. REPAIR or INSTALL a new headlamp assembly. REFER to [Headlamp Assembly](#).

A6 REPEAT THE BCM SELF-TEST AND CHECK FOR VOLTAGE TO THE HEADLAMP

- Place the headlamp switch in the off position.
- Ignition ON.
- Using a scan tool, clear the DTCs and perform the BCM self-test.
- Place the headlamp switch in the headlamps on position.
- For halogen headlamps, measure the **voltage** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
LH Headlamp			
C1021-1	CLF04 (BN/BU)	—	Ground
RH Headlamp			
C1041-1	CLF05 (BU/GN)	—	Ground

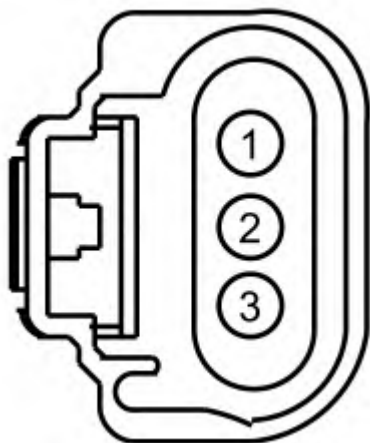
Yes

For halogen headlamps, INSTALL a new headlamp bulb. REFER to [Headlamp Bulb — Halogen](#).

For HID headlamps, GO to [A7](#).

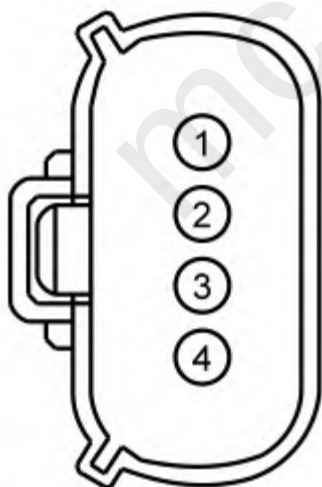
No

GO to [A8](#).



- For HID headlamps, measure the **voltage** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
LH Headlamp			
C1284-1	CLF04 (BN/BU)	—	Ground
RH Headlamp			
C1285-1	CLF05 (BU/GN)	—	Ground



- Is the voltage greater than 11 volts?

A7 CHECK THE HEADLAMP HARNESS

- Ignition OFF.
- Place the headlamp switch in the off position.
- Check the headlamp harness for an internal short to the ground circuit.
- Is the headlamp harness OK?**

Yes

INSTALL a new ballast. REFER to [Ballast](#).

No

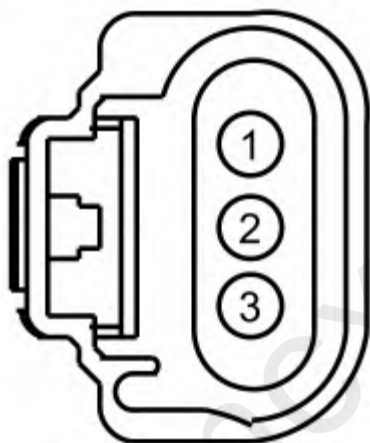
REPAIR or INSTALL a new headlamp

assembly. REFER to [Headlamp Assembly](#).

A8 CHECK THE BCM LOW BEAM VOLTAGE SUPPLY CIRCUIT FOR A SHORT TO GROUND

- Ignition OFF.
- Place the headlamp switch in the off position.
- Disconnect: BCM C2280E.
- For halogen headlamps, measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
LH Headlamp			
C1021-1	CLF04 (BN/BU)	—	Ground
RH Headlamp			
C1041-1	CLF05 (BU/GN)	—	Ground

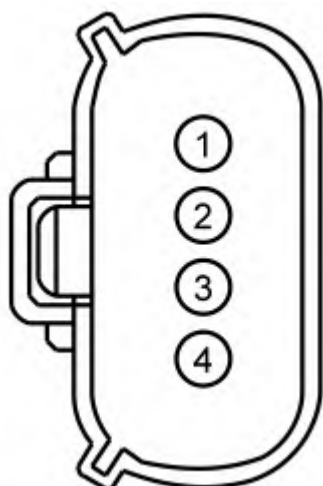


- For HID headlamps, measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
LH Headlamp			
C1284-1	CLF04 (BN/BU)	—	Ground
RH Headlamp			
C1285-1	CLF05 (BU/GN)	—	Ground

Yes
GO to [A9](#).

No
REPAIR the circuit.



- Is the resistance greater than 10,000 ohms?

A9 CHECK THE BCM LOW BEAM VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

- For halogen headlamps, measure the **resistance** between:

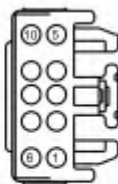
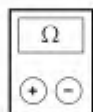
Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
LH Headlamp			
C1021-1	CLF04 (BN/BU)	C2280E-2	CLF04 (BN/BU)
RH Headlamp			
C1041-1	CLF05 (BU/GN)	C2280E-1	CLF05 (BU/GN)

Yes
GO to [A10](#).

No
REPAIR the circuit.



C1021/C1041



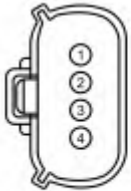
C2280E

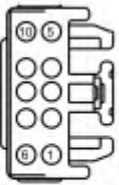
N0139803

- For HID headlamps, measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
LH Headlamp			
C1284-	CLF04	C2280E-	CLF04

1	(BN/BU)	2	(BN/BU)
RH Headlamp			
C1285-1	CLF05 (BU/GN)	C2280E-1	CLF05 (BU/GN)





C1284/C1285 C2280E

N0148956

- Is the resistance less than 3 ohms?

A10 CHECK FOR CORRECT BCM OPERATION	
• Disconnect and inspect all the <u>BCM</u> connectors. • Repair: • corrosion (install new connector or terminals – clean module pins) • damaged or bent pins – install new terminals/pins • pushed-out pins – install new pins as necessary • Reconnect the <u>BCM</u> connectors. Make sure they seat and latch correctly. • Operate the system and determine if the concern is still present. • Is the concern still present?	Yes CHECK On-Line Automotive Service Information System (OASIS) for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new <u>BCM</u>. REFER to Section 419-10. No The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test B: One or Both High Beams are Inoperative

Refer to Wiring Diagrams Cell [85](#), Headlamps/Autolamps for schematic and connector information.

Normal Operation

The Steering Column Control Module (SCCM) monitors input from the multifunction and headlamp switches. When the headlamp switch is in the HEADLAMPS ON position and the multifunction switch is placed in the HIGH BEAM position, the SCCM sends a message to the Body Control Module (BCM) over the High Speed Controller Area Network (HS-CAN), indicating a high beam request.

On vehicles with halogen headlamps, when the BCM receives a request for high beams (the low beams must be on), the BCM supplies voltage to the high beam bulbs.

On vehicles with HID headlamps, when the BCM receives a request for high beams (the low beams must be on), the headlamps remain powered on, and the BCM supplies voltage to the shutter (located within each headlamp). This changes the headlamp beam pattern to illuminate a greater distance.

The BCM provides an overload protection of the high beam output circuits. When an excessive current draw is detected, the BCM disables the affected high beam circuit driver.

The Instrument Panel Cluster (IPC) also receives a message over the HS-CAN to illuminate the high beam indicator when a request for the high beams is received.

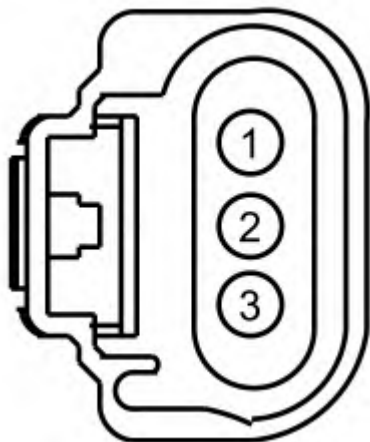
DTC Description	Fault Trigger Conditions
B1007:09 — High-Beam Headlamp Switch: Component Failure	This DTC sets when the <u>SCCM</u> detects a fault from the multifunction switch input.
B1D02:11 — Left High Beam Circuit: Circuit Short To Ground	This DTC sets when the <u>BCM</u> detects a short to ground from the LH high beam output circuit.
B1D02:15 — Left High Beam Circuit: Circuit Short To Battery or Open	This DTC sets when the <u>BCM</u> detects an open from the LH high beam output circuit.
B1D03:11 — Right High Beam Circuit: Circuit Short To Ground	This DTC sets when the <u>BCM</u> detects a short to ground from the RH high beam output circuit.
B1D03:15 — Right High Beam Circuit: Circuit Short To Battery or Open	This DTC sets when the <u>BCM</u> detects an open from the RH high beam output circuit.
U1000:00 — Solid State Driver Protection Active - Driver Disabled: No Sub Type Information	This DTC sets when the <u>BCM</u> has temporarily shut down the output driver. The module has temporarily disabled a high beam output because an excessive current draw exists (such as a short to ground). The BCM cannot enable the high beam output until the cause of the short is corrected, the DTCs have been cleared and a successful self-test is run.
U3000:49 — Control Module: Internal Electronic Failure	This DTC sets when the <u>BCM</u> has permanently shut down the output driver. The module has permanently disabled a high beam output because an excessive current draw fault (such as a short to ground) has exceeded the limits that the BCM can withstand. CORRECT the cause of the excessive current draw before installing a new BCM.

This pinpoint test is intended to diagnose the following:

- Fuse
- Bulb
- Wiring, terminals or connectors
- Multifunction switch
- Headlamp assembly (HID headlamps)
- SCCM
- BCM

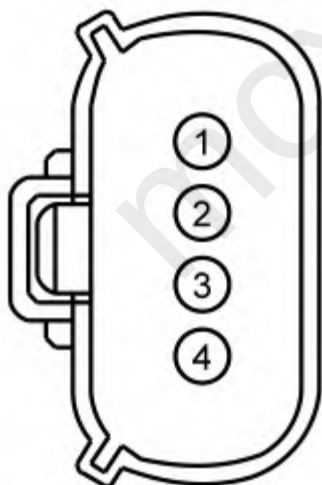
PINPOINT TEST B: ONE OR BOTH HIGH BEAMS ARE INOPERATIVE

Test Step	Result / Action to Take																								
B1 CHECK THE LOW BEAM OPERATION - Ignition OFF. - Place the headlamp switch in the headlamps on position and observe the headlamps. - Place the multifunction switch in the HIGH BEAM position and observe the headlamps. - Place the multifunction switch in the LOW BEAM position and observe the headlamps. Do the low beams illuminate?	Yes If an individual high beam is inoperative, GO to B3 . If both high beams are inoperative, VERIFY the BCM fuse 39 (15A) is OK. If OK, GO to B2 . If not OK, REFER to the Wiring Diagrams manual to identify the possible causes of the circuit short. No GO to Pinpoint Test A.																								
B2 CHECK THE MULTIFUNCTION SWITCH INPUT - Ignition ON. - Using a scan tool, view SCCM PIDs. - Monitor the SCCM HEADLAMP_SW PID while placing the multifunction switch in the flash-to-pass and high beam positions. Do the PID states agree with the multifunction switch positions?	Yes GO to B8 . No INSTALL a new multifunction switch. REFER to Section 211-05 . If the concern still exists, INSTALL an new SCCM . REFER to Section 211-05 .																								
B3 CHECK FOR VOLTAGE TO THE HEADLAMP - Place the headlamp switch in the off position. - Disconnect: Inoperative LH Headlamp C1021 or RH Headlamp C1041 (Halogen headlamps). - Disconnect: Inoperative LH Headlamp C1284 or RH Headlamp C1285 (HID Headlamps). - Place the headlamp switch in the headlamps on position and the multifunction switch in the HIGH BEAM position. - For halogen headlamps, measure the voltage between: <table border="1"><thead><tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr><tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr></thead><tbody><tr><td colspan="4">LH Headlamp</td></tr><tr><td>C1021-3</td><td>CLF02 (GY/BN)</td><td>—</td><td>Ground</td></tr><tr><td colspan="4">RH Headlamp</td></tr><tr><td>C1041-3</td><td>CLF03 (VT/OG)</td><td>—</td><td>Ground</td></tr></tbody></table>	Positive Lead		Negative Lead		Pin	Circuit	Pin	Circuit	LH Headlamp				C1021-3	CLF02 (GY/BN)	—	Ground	RH Headlamp				C1041-3	CLF03 (VT/OG)	—	Ground	Yes GO to B4 . No GO to B5 .
Positive Lead		Negative Lead																							
Pin	Circuit	Pin	Circuit																						
LH Headlamp																									
C1021-3	CLF02 (GY/BN)	—	Ground																						
RH Headlamp																									
C1041-3	CLF03 (VT/OG)	—	Ground																						



- For HID headlamps, measure the **voltage** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
LH Headlamp			
C1284-3	CLF02 (GY/BN)	—	Ground
RH Headlamp			
C1285-3	CLF03 (VT/OG)	—	Ground



- Is the voltage greater than 11 volts?

B4 CHECK THE HEADLAMP GROUND CIRCUIT FOR AN OPEN

- For halogen headlamps, measure the **voltage** between:

Positive Lead		Negative Lead	

Yes

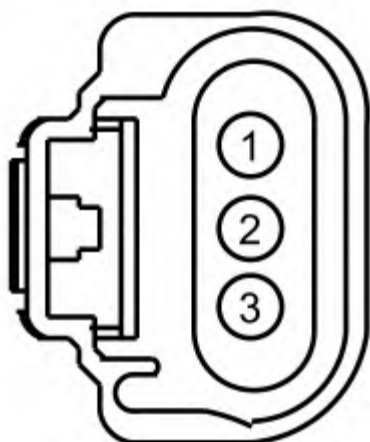
For halogen headlamps, INSTALL a new headlamp bulb. REFER to [Headlamp Bulb — Halogen](#).

For HID headlamps, INSTALL a new

Pin	Circuit	Pin	Circuit
LH Headlamp			
C1021-3	CLF02 (GY/BN)	C1021-2	GD120 (BK/GN)
RH Headlamp			
C1041-3	CLF03 (VT/OG)	C1041-2	GD123 (BK/GY)

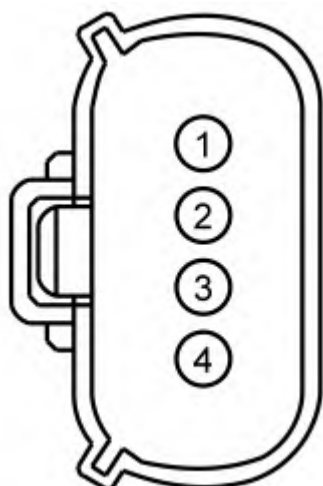
headlamp assembly. REFER to [Headlamp Assembly](#).

No
REPAIR the circuit.



- For HID headlamps, measure the **voltage** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
LH Headlamp			
C1284-3	CLF02 (GY/BN)	C1284-4	GD120 (BK/GN)
RH Headlamp			
C1285-3	CLF03 (VT/OG)	C1285-4	GD123 (BK/GY)



- Is the voltage greater than 11 volts?

B5 REPEAT THE ON-DEMAND SELF-TEST AND CHECK FOR VOLTAGE TO THE HEADLAMP

- Place the headlamp switch in the off position.
- Ignition ON.
- Using a scan tool, clear the DTCs and perform the BCM self-test.
- Place the headlamp switch in the headlamps on position and the multifunction switch in the HIGH BEAM position.
- For halogen headlamps, measure the **voltage** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
LH Headlamp			
C1021-3	CLF02 (GY/BN)	—	Ground
RH Headlamp			
C1041-3	CLF03 (VT/OG)	—	Ground

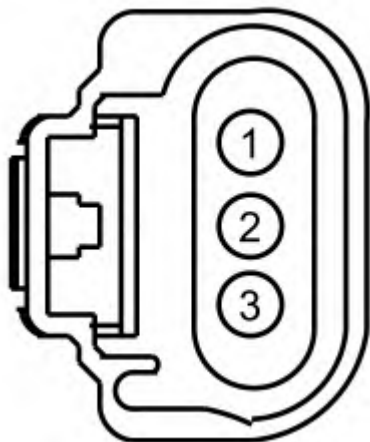
Yes

For halogen headlamps, INSTALL a new headlamp bulb. REFER to [Headlamp Bulb — Halogen](#).

For HID headlamps, INSTALL a new headlamp assembly. REFER to [Headlamp Assembly](#).

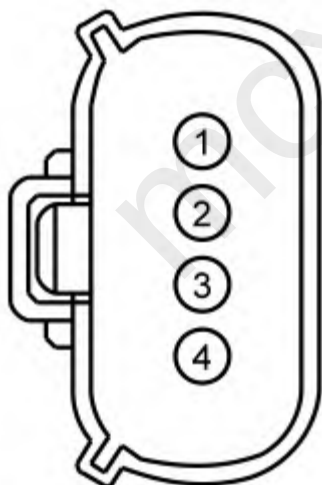
No

GO to [B6](#).



- For HID headlamps, measure the **voltage** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
LH Headlamp			
C1284-3	CLF02 (GY/BN)	—	Ground
RH Headlamp			
C1285-3	CLF03 (VT/OG)	—	Ground



- Is the voltage greater than 11 volts?

B6 CHECK THE BCM HIGH BEAM VOLTAGE SUPPLY CIRCUIT FOR A SHORT TO GROUND

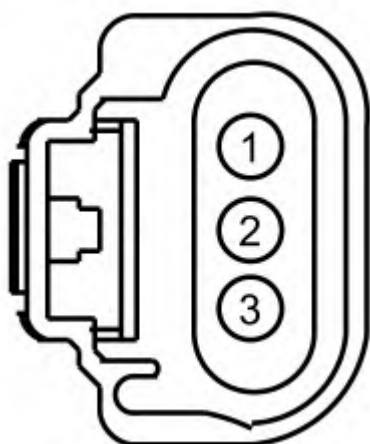
- Ignition OFF.
- Disconnect: BCM C2280E.
- For halogen headlamps, measure the **resistance** between:

--	--

Yes
GO to [B7](#).

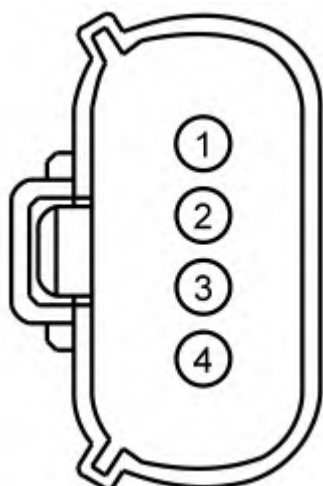
No
REPAIR the circuit.

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
LH Headlamp			
C1021-3	CLF02 (GY/BN)	—	Ground
RH Headlamp			
C1041-3	CLF03 (VT/OG)	—	Ground



- For HID headlamps, measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
LH Headlamp			
C1284-3	CLF02 (GY/BN)	—	Ground
RH Headlamp			
C1285-3	CLF03 (VT/OG)	—	Ground



- Is the resistance greater than 10,000 ohms?

B7 CHECK THE BCM HIGH BEAM VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

- For halogen headlamps, measure the **resistance** between:

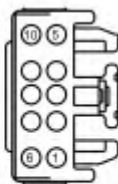
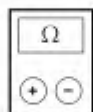
Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
LH Headlamp			
C1021-3	CLF02 (GY/BN)	C2280E-8	CLF02 (GY/BN)
RH Headlamp			
C1041-3	CLF03 (VT/OG)	C2280E-7	CLF03 (VT/OG)

Yes
GO to [B8](#).

No
REPAIR the circuit.



C1021/C1041



C2280E

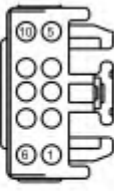
N0139803

- For HID headlamps, measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
LH Headlamp			
C1284-	CLF02	C2280E-	CLF02

3	(GY/BN)	8	(GY/BN)
RH Headlamp			
C1285-3	CLF03 (VT/OG)	C2280E-7	CLF03 (VT/OG)





C1284/C1285 C2280E

N0148956

- Is the resistance less than 3 ohms?

B8 CHECK FOR CORRECT <u>BCM</u> OPERATION	
• Disconnect and inspect all the <u>BCM</u> connectors. • Repair: • corrosion (install new connector or terminals – clean module pins) • damaged or bent pins – install new terminals/pins • pushed-out pins – install new pins as necessary • Reconnect the <u>BCM</u> connectors. Make sure they seat and latch correctly. • Operate the system and determine if the concern is still present. • Is the concern still present?	Yes CHECK On-Line Automotive Service Information System (OASIS) for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new <u>BCM</u>. REFER to Section 419-10. No The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test C: The Low Beam(s) Are Always On

Refer to Wiring Diagrams Cell [85](#), Headlamps/Autolamps for schematic and connector information.

Normal Operation

The Steering Column Control Module (SCCM) sends voltage signals to the headlamp switch through the headlamp switch input circuits (off, parking lamps, headlamps). At any given time, the headlamp switch routes one of the input circuits to ground, indicating the headlamp switch position to the SCCM. The SCCM sends a message to the Body Control Module (BCM) over the High Speed Controller Area Network (HS-CAN), indicating the headlamp switch position. When the BCM receives a message from the SCCM indicating the headlamp switch in the HEADLAMPS ON position, the BCM provides voltage to the LH and RH low beams.

If the SCCM detects multiple or no active headlamp switch inputs, the BCM receives a message from the SCCM indicating a fault with the headlamp switch input and the BCM defaults the parking lamps and headlamps on.

If the BCM loses communication with the SCCM, the BCM defaults the parking lamps and headlamps on.

- DTC B10A6:09 (Main Light Switch: Component Failure) — a continuous and on-demand DTC that sets when the SCCM detects a fault from the headlamp switch input circuit(s).

This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- Headlamp switch
- SCCM
- BCM

PINPOINT TEST C: THE LOW BEAM(S) ARE ALWAYS ON

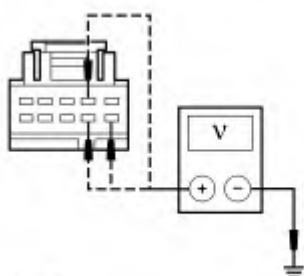
NOTICE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

Test Step	Result / Action to Take
C1 CHECK THE COMMUNICATION NETWORK	
• Ignition ON. • Enter the following diagnostic mode on the scan tool: Network Test. • Carry out the network test. • Does the <u>SCCM</u> module pass the network test?	Yes If equipped with autolamps, GO to C2. If not equipped with autolamps, GO to C4. No REFER to Section 418-00.
C2 CHECK FOR LIGHT SENSOR DTCs	
• Review the DTCs recorded from the <u>BCM</u> self-test. • Is DTC B1A85:11 or DTC B1A85:13 present?	Yes GO to Pinpoint Test H. No GO to C3.
C3 CHECK THE <u>SCCM</u> AUTOLAMP ON REQUEST PID	
• Ignition ON. • Enter the following diagnostic mode on the scan tool: <u>SCCM</u> DataLogger. • While placing the headlamp switch in the AUTOLAMPS ON and then OFF position, monitor the <u>SCCM</u> headlamp switch PID (EXT_LMP_SW). • Does the PID agree with the headlamp switch when it is in the AUTOLAMPS ON position and indicate it is not in the AUTOLAMPS ON position when the headlamp switch is in the OFF position?	Yes GO to C4. No GO to Pinpoint Test H.
C4 CHECK THE <u>SCCM</u> HEADLAMP SWITCH PIDs	
NOTE: Make sure the headlamp switch is aligned in the correct position when monitoring the PID. • Enter the following diagnostic mode on the scan tool: <u>SCCM</u> DataLogger. • While moving the headlamp switch through all positions (OFF, PARKING LAMPS and HEADLAMPS), monitor the <u>SCCM</u> headlamp switch input PID (EXT_LMP_SW). • Do the headlamp switch positions agree with the PID?	Yes GO to C9. No GO to C5.

C5 CHECK FOR VOLTAGE TO THE HEADLAMP SWITCH

- Ignition OFF.
- Disconnect: Headlamp Switch C205.
- Measure the voltage between the headlamp switch, harness side and ground as follows:

Headlamp Switch Connector-Pin	Circuit
C205-6	CLF23 (WH/VT)
C205-2	CLS34 (GY)
C205-7	CLF24 (YE)

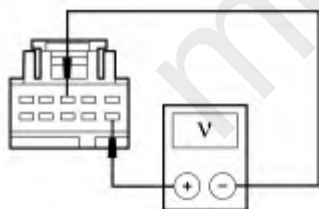


N0099675

- Are the voltages greater than 5 volts?

YesGO to [C6](#).**No**GO to [C7](#).**C6 CHECK THE HEADLAMP SWITCH GROUND CIRCUIT FOR AN OPEN**

- Measure the voltage between the headlamp switch C205-6, circuit CLF23 (WH/VT), harness side and headlamp switch C205-3, circuit GD133 (BK), harness side.



N0099676

- Is the voltage greater than 5 volts?

Yes

INSTALL a new headlamp switch. REFER to [Headlamp Switch](#) in this section. TEST the system for normal operation.

No

REPAIR circuit GD133 (BK) for an open. TEST the system for normal operation.

C7 CHECK THE HEADLAMP SWITCH INPUT CIRCUITS FOR A SHORT TO GROUND

- Disconnect: SCCM C2414A.
- Measure the resistance between the headlamp switch, harness side and ground as follows:

Headlamp Switch Connector-Pin	Circuit
C205-6	CLF23 (WH/VT)
C205-2	CLS34 (GY)

YesGO to [C8](#).**No**

REPAIR the circuit in question for a short to ground. TEST the system for normal operation.

C205-7 CLF24 (YE)														
N0090404 Are the resistances greater than 10,000 ohms?														
C8 CHECK THE HEADLAMP SWITCH INPUT CIRCUITS FOR AN OPEN - Measure the resistance between the headlamp switch, harness side and the <u>SCCM</u>, harness side as follows: <table><tr><th>Headlamp Switch Connector-Pin</th><th>SCCM Connector-Pin</th><th>Circuit</th></tr><tr><td>C205-6</td><td>C2414A-21</td><td>CLF23 (WH/VT)</td></tr><tr><td>C205-2</td><td>C2414A-22</td><td>CLS34 (GY)</td></tr><tr><td>C205-7</td><td>C2414A-18</td><td>CLF24 (YE)</td></tr></table> N0112015 - Are the resistances less than 5 ohms?		Headlamp Switch Connector-Pin	SCCM Connector-Pin	Circuit	C205-6	C2414A-21	CLF23 (WH/VT)	C205-2	C2414A-22	CLS34 (GY)	C205-7	C2414A-18	CLF24 (YE)	Yes GO to C10. No REPAIR the circuit in question for an open. TEST the system for normal operation.
Headlamp Switch Connector-Pin	SCCM Connector-Pin	Circuit												
C205-6	C2414A-21	CLF23 (WH/VT)												
C205-2	C2414A-22	CLS34 (GY)												
C205-7	C2414A-18	CLF24 (YE)												
C9 CHECK THE <u>BCM</u> OUTPUT - Ignition OFF. - Disconnect: <u>BCM</u> C2280E. - Ignition ON. - Does the LH or RH headlamp continue to illuminate?		Yes REPAIR circuit CLF04 (BN/BU) (LH headlamp) or circuit CLF05 (BU/GN) (RH headlamp) for a short to voltage as necessary. TEST the system for normal operation. No GO to C11.												

C10 CHECK FOR CORRECT <u>SCCM</u> OPERATION • Disconnect all the <u>SCCM</u> connectors. • Check for: ■ corrosion ■ damaged pins ■ pushed-out pins • Connect all the <u>SCCM</u> connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • Is the concern still present?	Yes INSTALL a new <u>SCCM</u> . REFER to Section 211-05 . TEST the system for normal operation. No The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.
C11 CHECK FOR CORRECT <u>BCM</u> OPERATION • Disconnect all the <u>BCM</u> connectors. • Check for: ■ corrosion ■ damaged pins ■ pushed-out pins • Connect all the <u>BCM</u> connectors and make sure they seat correctly. • Operate the system and verify the concern is still present. • Is the concern still present?	Yes INSTALL a new <u>BCM</u> . REFER to Section 419-10 . TEST the system for normal operation. No The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

Pinpoint Test D: The High Beam(s) Are Always On

Refer to Wiring Diagrams Cell [85](#), Headlamps/Autolamps for schematic and connector information.

Normal Operation

The Steering Column Control Module (SCCM) monitors input from the multifunction switch. When the multifunction switch is placed in the FLASH-TO-PASS position (first detent when pulled towards the operator) or the headlamp switch is in the HEADLAMPS ON position and the multifunction switch is placed in the HIGH BEAM position (second detent), the SCCM sends a message to the Body Control Module (BCM) over the High Speed Controller Area Network (HS-CAN), indicating a flash-to-pass or high beam request.

On vehicles with halogen headlamps, when the BCM receives a request for high beams (the low beams must be on), the BCM supplies voltage to the high beam bulbs.

On vehicles with HID headlamps, when the BCM receives a request for high beams (the low beams must be on), the headlamps remain powered on, and the BCM supplies voltage to the shutter (located within each headlamp). This changes the headlamp beam pattern to illuminate a greater distance.

The multifunction switch returns to a rest position when released. The switch positions for the flash-to-pass and high beam features are momentary contact.

- DTC B1007:09 (High-Beam Headlamp Switch: Component Failure) — this DTC sets when the SCCM detects a fault from the multifunction switch input.
- DTC B1D02:15 (Left High Beam Circuit: Circuit Short To Battery or Open) — this DTC sets when the BCM detects a short to voltage from the LH high beam output circuit.

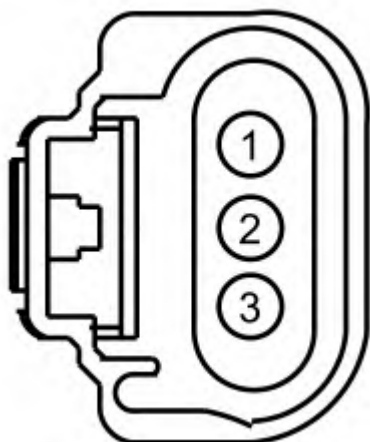
- DTC B1D03:15 (Right High Beam Circuit: Circuit Short To Battery or Open) — this DTC sets when the BCM detects a short to voltage from the RH high beam output circuit.

This pinpoint test is intended to diagnose the following:

- Wiring, terminals or connectors
- Multifunction switch
- SCCM
- BCM

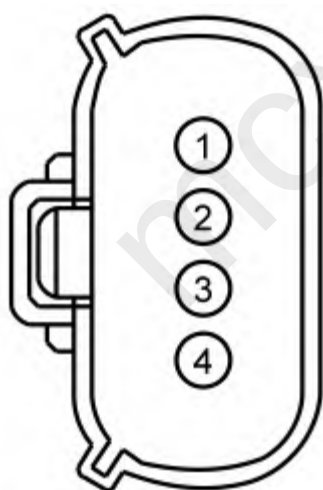
PINPOINT TEST D: THE HIGH BEAMS ARE ON CONTINUOUSLY

Test Step	Result / Action to Take																								
D1 CHECK THE MULTIFUNCTION SWITCH INPUT																									
• Ignition ON. • Using a scan tool, view <u>SCCM</u> PIDs. • Monitor the <u>SCCM</u> FLASH-to-PASS and HIGH_BEAM_SW PIDs while placing the multifunction switch in the flash-to-pass, high beam and rest positions. • Do the PID values agree with the multifunction switch position?	Yes GO to D2. No INSTALL a new multifunction switch. REFER to Section 211-05. If the concern still exists, INSTALL a new <u>SCCM</u>. REFER to Section 211-05.																								
D2 CHECK THE HIGH BEAM VOLTAGE SUPPLY CIRCUIT FOR VOLTAGE																									
• Ignition OFF. • Disconnect: Incorrectly Operating LH Headlamp C1021 or RH Headlamp C1041 (Halogen headlamps). • Disconnect: Incorrectly Operating LH Headlamp C1284 or RH Headlamp C1285 (<u>HID</u> Headlamps). • Ignition ON. • Make sure the multifunction switch in the rest position. • For halogen headlamps, measure the voltage between: <table border="1"><thead><tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr><tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr></thead><tbody><tr><td colspan="4">LH Headlamp</td></tr><tr><td>C1021-3</td><td>CLF02 (GY/BN)</td><td>—</td><td>Ground</td></tr><tr><td colspan="4">RH Headlamp</td></tr><tr><td>C1041-3</td><td>CLF03 (VT/OG)</td><td>—</td><td>Ground</td></tr></tbody></table>	Positive Lead		Negative Lead		Pin	Circuit	Pin	Circuit	LH Headlamp				C1021-3	CLF02 (GY/BN)	—	Ground	RH Headlamp				C1041-3	CLF03 (VT/OG)	—	Ground	Yes GO to D3. No INSTALL a new headlamp assembly. REFER to Headlamp Assembly.
Positive Lead		Negative Lead																							
Pin	Circuit	Pin	Circuit																						
LH Headlamp																									
C1021-3	CLF02 (GY/BN)	—	Ground																						
RH Headlamp																									
C1041-3	CLF03 (VT/OG)	—	Ground																						



- For HID headlamps, measure the **voltage** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
LH Headlamp			
C1284-3	CLF02 (GY/BN)	—	Ground
RH Headlamp			
C1285-3	CLF03 (VT/OG)	—	Ground



- Is any voltage present?

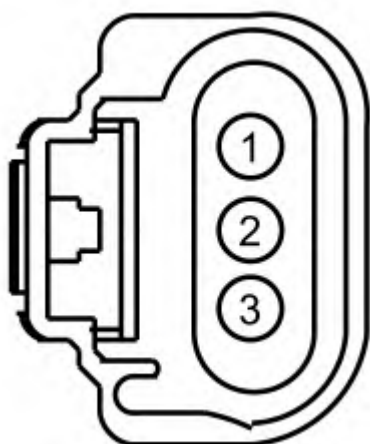
D3 CHECK THE BCM HIGH BEAM OUTPUT CIRCUIT FOR A SHORT TO VOLTAGE

- Ignition OFF.
- Disconnect: BCM C2280E.
- Ignition ON.
- For halogen headlamps, measure the **voltage** between:

Yes
REPAIR the circuit.

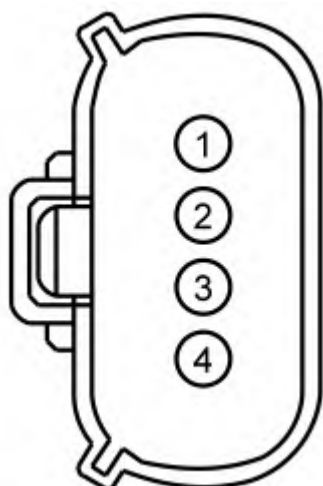
No
GO to [D4](#).

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
LH Headlamp			
C1021-3	CLF02 (GY/BN)	—	Ground
RH Headlamp			
C1041-3	CLF03 (VT/OG)	—	Ground



- For HID headlamps, measure the **voltage** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
LH Headlamp			
C1284-3	CLF02 (GY/BN)	—	Ground
RH Headlamp			
C1285-3	CLF03 (VT/OG)	—	Ground



- Is any voltage present?

D4 CHECK FOR CORRECT BCM OPERATION

- Disconnect and inspect all the BCM connectors.
- Repair:
 - corrosion (install new connector or terminals – clean module pins)
 - damaged or bent pins – install new terminals/pins
 - pushed-out pins – install new pins as necessary
- Reconnect the BCM connectors. Make sure they seat and latch correctly.
- Operate the system and determine if the concern is still present.
- Is the concern still present?

Yes

CHECK On-Line Automotive Service Information System (OASIS) for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new BCM. REFER to [Section 419-10](#).

No

The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Pinpoint Test E: The Flash-To-Pass Feature Is Inoperative

Normal Operation

The Steering Column Control Module (SCCM) monitors input from the multifunction switch. When the multifunction switch is placed in the FLASH-TO-PASS position, the SCCM sends a message to the Body Control Module (BCM) over the High Speed Controller Area Network (HS-CAN), indicating a flash-to-pass request. The BCM then provides voltage to the high beams.

This pinpoint test is intended to diagnose the following:

- Multifunction switch
- SCCM

PINPOINT TEST E: THE FLASH-TO-PASS FEATURE IS INOPERATIVE

NOTICE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

Test Step	Result / Action to Take
E1 VERIFY THE HIGH BEAM HEADLAMP OPERATION	
• Ignition ON. • Place the headlamp switch in the HEADLAMPS ON position and activate the high beams. • Do the high beam headlamps illuminate?	Yes INSTALL a new multifunction switch. REFER to Section 211-05. TEST the system for normal operation. If the concern still exists, INSTALL a new <u>SCCM</u>. REFER to Section 211-05. TEST the system for normal operation. No GO to Pinpoint Test B.
