

Power Distribution Switch Panel

Switch/Button Interface to the Power Distribution System

Features

- Toggle each channel on/off
- View on/off/fault status of each channel
- Trigger startup/shutdown scripts
- Change modes (with a key)
- Hidden in center console of Ford vehicles

Applications

- Driverless car research
- Advanced Driver Assist (ADAS) research

Description

The Dataspeed Inc. Power Distribution System Switch Panel Interface enables control of the relay channels and reporting of each channel's status.



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1 Connector Pin Description

1.1 CAN/DB9 Connector

The CAN/DB9 connector is used for power and CAN communication.

Table 1: CAN/DB9 connector pin description.

Pin	Symbol	Description
1	RES	Reserved (leave disconnected)
2	CANL	CAN Low
3	GND	Ground
4	IGNITION	Ignition (12V)
5	RES	Reserved (leave disconnected)
6	GND	Ground
7	CANH	CAN High
8	RES	Reserved (leave disconnected)
9	POWER	Power (12V)

1.2 USB Connector

The USB connector is used for introspection and firmware upgrade.

2 Electrical Characteristics

Table 2: Electrical Characteristics.

Characteristic	Min	Typ	Max	Units	Conditions
VIGNITION ON	9	12	16	V	
VIGNITION OFF	-0.3	0	2	V	
VPOWER	9	12	16	V	
IPOWER		200		mA	VPOWER=12V, VIGNITION>9V, all channels on
IPOWER		40		mA	VPOWER=12V, VIGNITION>9V, all channels off
IPOWER			0.2	mA	VPOWER=12V, VIGNITION<2V
Temperature	-40		+85	°C	

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3 Mechanical Drawings

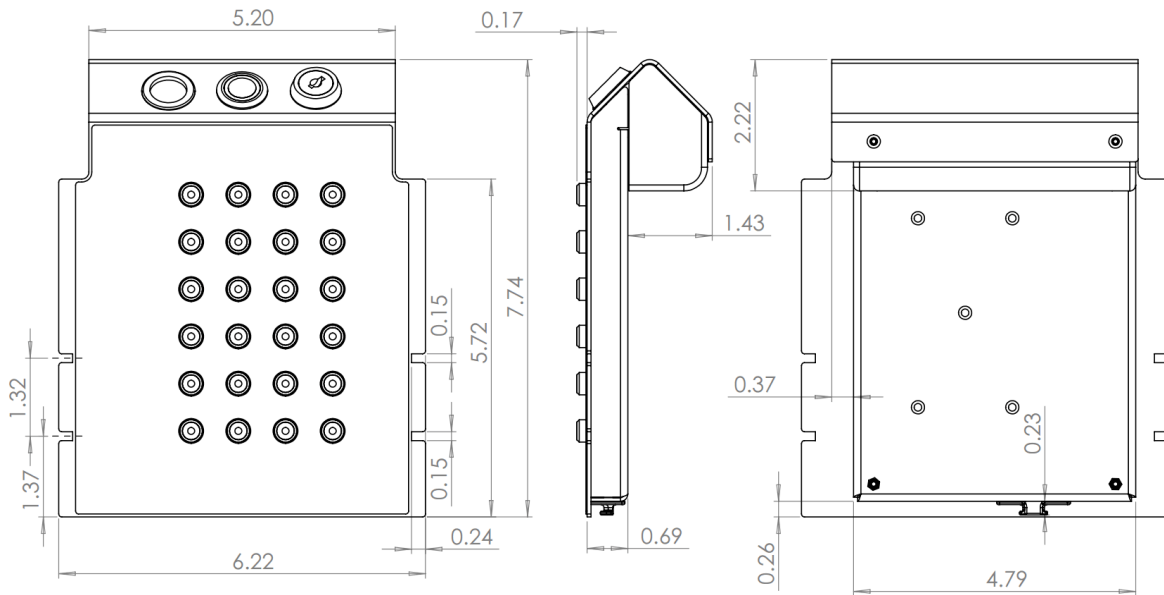


Figure 1: Mechanical Drawing for Lincoln MKZ

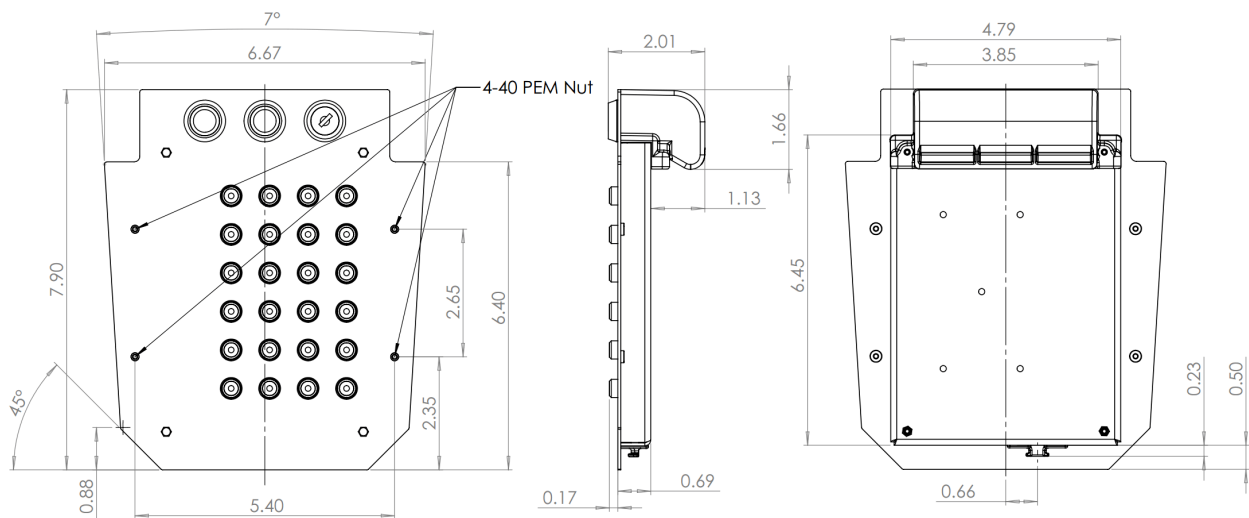


Figure 2: Mechanical Drawing for Ford Fusion

4 LEDs

4.1 Main

The power LED (green) indicates that power and ignition have been applied.
The status LED (red) blinks at a frequency of 1Hz to indicate normal operation.

4.2 Channels

The LEDs in the 4x6 grid indicate the status of the corresponding channels on the Power Distribution Panel.

Table 3: LED channel status enumeration

Solid off	OFF	Channel off
Solid on	ON	Channel on
1 blink	BAD RELAY	Relay failed to contact
2 blinks	BAD FUSE	Fuse is blown
3 blinks	OVER CURRENT	Channel disabled to protect fuse

5 Buttons

5.1 Channels

Pressing the buttons in the 4x6 grid will send a CAN message command to the Power Distribution Panel to toggle the corresponding channel.

5.2 Startup

The startup button LED will illuminate when the startup script is running on the Power Distribution Panel. Pressing this button will run or stop the startup script.

5.3 Shutdown

The shutdown button LED will illuminate when the shutdown script is running on the Power Distribution Panel. Pressing this button will run or stop the shutdown script.

5.4 Mode/Key

The mode can be selected by inserting and turning the key. When the key is turned, the 4x6 grid of buttons no longer corresponds to the channel statuses. The first three buttons select the mode. Normal operation returns after removing the key. See the Power Distribution Panel datasheet for more information on the different modes.

6 CAN Messages

Table 4: CAN bus configuration.

Parameter	Value	Units
Terminated	No	
BitRate	500	k
t _q	200	ns
SyncSeg	1	t _q
PropSeg	3	t _q
PhaseSeg1	3	t _q
PhaseSeg2	3	t _q
SyncJumpWidth	2	t _q

6.1 Request

Message ID: 0x410
Transmit Rate: On Event

Table 5: Request CAN Message Description.

Byte	Bits	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	7:0	INDEX							
1	15:8	REQUEST							

bit 0-7 **INDEX:** Channel Index
 0 = Channel 1
 1 = Channel 2
 2 = Channel 3
 ...
 23 = Channel 24
 —
 48 = Inverter 1
 49 = Inverter 2
bit 8-15 **REQUEST:** Relay Request
 0 = Off
 1 = On
 2 = Toggle

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6.2 Mode

Message ID: 0x411
Transmit Rate: On Event

Table 6: Mode CAN Message Description.

Byte	Bits	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	7:0	MODE							

bit 0-7 **MODE:** Mode Request
0 = Auto
1 = Manual
2 = Valet

6.3 Script

Message ID: 0x412
Transmit Rate: On Event

Table 7: Script CAN Message Description.

Byte	Bits	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	7:0	SCRIPT							

bit 0-7 **SCRIPT:** Script Request
0 = None
1 = Startup
2 = Shutdown

6.4 Reserved

Message ID: 0x430
Receive Rate: 200ms

6.5 Status Master

Message ID: 0x420
Receive Rate: 50ms

6.6 Status Slave

Message ID: 0x421
Receive Rate: 50ms

APPENDIX A: REVISION HISTORY

Revision A-00 (August 2017)

Modifications:

1. Initial release of this document.

Revision A-01 (October 2017)

Modifications:

1. Removed description of CAN messages Status Master/Slave. See Power Distribution Panel datasheet for full definition.