BSPD (Brake System Plausability Device)

Op-Amp Timer

VCC

U1
SN74LVC1G0B

BRAKELIGHT_GATE
BSPD_CURRENT_SENSE
BSPD_TEST_SWITCH

R4
R_100K
GND

GND
GND

R7
R_71.5K

R5
R_200

C5
C_10uF

GND

R8
R_10K
VCC

R11
R_10K
GND

C8
C_0.1uF
GND

MCP6001
U2

R13
R_10K

C10
C_1uF
GND

VCC
SN74LVC1G02
U6

R17
R_200
LED_0805
D4

R18
R_10K
GND

BSPD_RELAY_LSD
Q2
SSM3K333R

GND

D1
LED_0805
GND

BSPD_RELAY_INTENTION

Set-Reset Latch

VCC
R_100K
R9

R6
R_10K

C6
C_0.1uF
GND

Q1
SSM3K333R

Set-Reset NOR Gates

VCC
U5

SN74LVC1G02

GND

Explanation for NOR Latch functionality
http://hyperphysics.phy-astr.gsu.edu/hbase/Electronic/norlatch.html

Connector

J2
MM_F_RA_20

GND +12V

1
2
3 CAN_HIGH
4 CAN_LOW
5 VCC
6 MISO
7 MOSI
8 SCK
9 RESET
10 BRAKE_PRESSURE+
11 BRAKE_PRESSURE_SENSE
12 BRAKE_PRESSURE-
13 BRAKELIGHT_LSD
14 BSPD_TEST_SWITCH
15 RJ45_LED_G
16 RJ45_LED_O
17 BSPD_RELAY_LSD
18 SHUTDOWN_SENSE_BSPD
19 BSPD_CURRENT_SENSE
20 GND

VCC
GND

Brake_Pressure_Sense is an off board component that measures the pressure being applied to the brakes.

Atmega 16 (Main Microcontroller)

VCC
IC1
ATMEGA16M1

C_0.1uF R1
R_100
GND
C1
C2
C_100pF
GND
AREF(ISRC)
GND

VCC
AVCC

8 (PCINT0/MISO/PSCOUT2A)PB0
1 (PCINT1/MOSI/PSCOUT2B)PB1
16 (PCINT2/ADC5/INT1/ACMPN0)PB2
23 (PCINT3/AMP0-)PB3
24 (PCINT4/AMP0+)PB4
27 (PCINT5/ADC6/INT2/ACMPN1/AMP2-)PB5
26 (PCINT6/ADC7/PSCOUT1B)PB6
25 (PCINT7/ADC4/SCK/PSCOUT0B)PB7

30 (PCINT8/INT3/PSCOUT1A)PC0
6 (PCINT9/PSCIN1/OC1B/SS_A)PC1
7 (PCINT10/T0/TXCAN)PC2
17 (PCINT11/T1/ICP1B/RXCAN)PC3
18 (PCINT12/ADCB/ACMPN3/AMP1-)PC4
22 (PCINT13/ADC9/ACMP3/AMP1+)PC5
(PCINT14/ADC10/ACMP1)PC6
(PCINT15/D2A/AMP2+)PC7

29 (PCINT16/PSCOUT0A)PD0
(PCINT17/CLKO/PSCIN0)PD1
(PCINT18/PSCIN2/OC1A/MISO_A)PD2
(PCINT19/TXD/TXLIN/OC0A/SS_A/MOSI_A)PD3
(PCINT20/ADC1/RXD/RXLIN/ICP1A/SCK_A)PD4
(PCINT21/ADC2/ACMP2)PD5
(PCINT22/ADC3/INT0/ACMPN2)PD6
(PCINT23/ACMPO)PD7

31 (PCINT24/OCD/RESET)PE0
10 (PCINT25/OC0B/XTAL1)PE1
(PCINT26/ADC0/XTAL2)PE2

20 AGND
5 GND
21
19
4

BSPD_RELAY_INTENTION
DEBUG_LED_3
R_200
R41
RJ45_LED_G
R_200
R42
RJ45_LED_O

TXCAN
RXCAN
BSPD_CURRENT_SENSE
BRAKELIGHT_GATE
BRAKE_PRESSURE_SENSE

MISO
MOSI
SCK
SHUTDOWN_SENSE_BSPD_PIN
DEBUG_LED_1
DEBUG_LED_2

R_10K
R3
RESET
VCC

Y1
Crystal_SMD
C3
C4
C_30pF C_30pF
GND GND
GND

Shutdown Sense

VCC
R23
R_10K
SHUTDOWN_SENSE_BSPD
SHUTDOWN_SENSE_BSPD_PIN

R21
R_10K
R22
R_100K
Q3
SSM3K333R

D2
LED_0805
GND GND

Programming Header

MISO
SCK
RESET
J3
MOSI
VCC
GND
CONN_02X03

Debugging LEDs

DEBUG_LED_3
R44
R_200
D5
LED_0805
GND

DEBUG_LED_2
R45
R_200
D12
LED_0805
GND

DEBUG_LED_1
R46
R_200
D13
LED_0805
GND

CAN Transceiver

VCC
C_0.1uF
C9
U3
TXCAN
RXCAN
TXD
RXD
VDD
CANH
SPLIT
CANL
VSS
STBY
R24
R_120_DNP
CAN_HIGH
CAN_LOW
GND
GND
CAN_Transceiver

Brake Light

VCC
R15
R_10K
C13
C_0.1uF
GND SHORT DETECTION
0.45V
R16
R_1K
GND
U4
MCP6001
GND
R_10K
R2
C14
C_0.1uF
C7
C_1uF
BRAKELIGHT_GATE
VCC
U8
SN74LVC1G32
R33
R_0
BRAKELIGHT_LSD
(To brake light connector)
Q6
SSM3K333R

OPEN CIRCUIT DETECTION
R14
R_0
BRAKE_PRESSURE_SENSE
0.5-4.5V
VCC
R10
R_10K
GND
C12
C_0.1uF
U7
MCP6001
R_10K
R20
C11
C_1uF
GND
R34
R_10K
GND

VCC
R12
R_2.2K
R19
R_499
0.92V
GND

BUCK CONVERTER

+12V
F_500mA_16V
F101
Protection
D_Zener_18V
D101
12V Indicator
D102
LED_0805
GND

Input Capacitors
C_0.1uF C_2.2uF
R101
R_1K
C101 C102
GND

U101
TPS560430YF
VIN
EN
CB
SW
FB
GND

Bootstrap Capacitor
C_0.1uF
C103

Inductor
L_100uH
L101

Output Capacitors
COUT101 COUT102 COUT103
C_22uF C_33uF C_47uF
GND GND GND

VCC Jumper
R_0_2512
R104
VCC 5V
R105
R_200
5V Indicator
D103
LED_0805
GND

R_25K
R102
R_100K
R103
Feedback Divider
GND

PWR_FLAG PWR_FLAG PWR_FLAG
+12V VCC
GND GND