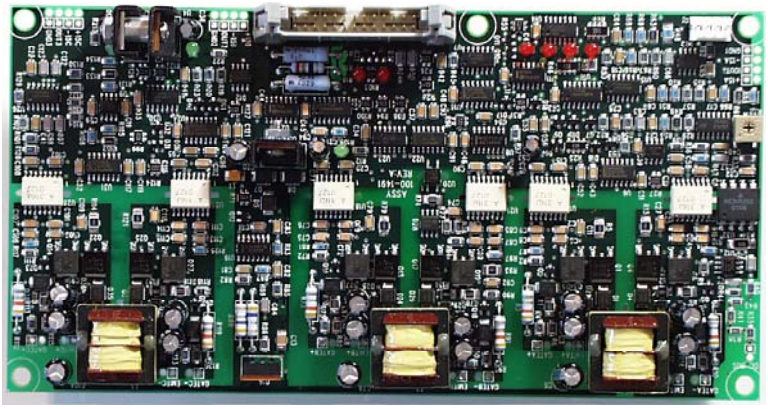
APPLIED POWER SYSTEMS, INC.

AP-1491 IGBT Gate Drive Board

Three Phase and Full Bridge Inverters



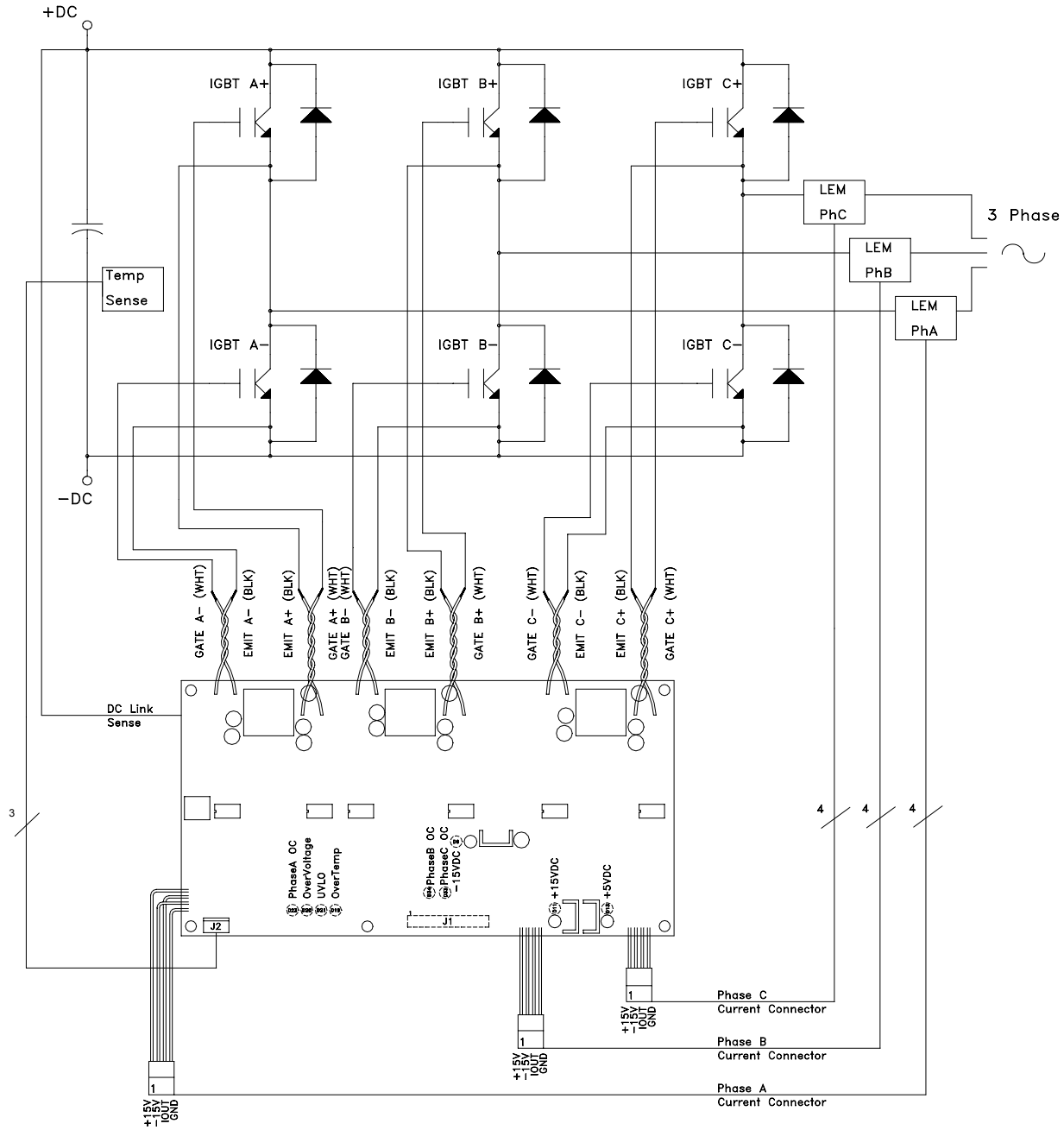
Features:

- Current sensing and heatsink temperature sensing capability
- Over voltage protection
- Includes all power supplies
- DC link voltage sensing
- Over current protection
- Single 26 pin header for all I/O and input power
- Under voltage lock-out
- Diagnostic LEDs
- Automatic dead time generation
- Shoot through protection

The AP-1491 IGBT Gate Drive Board is a fully integrated IGBT driver for three-phase bridge or full bridge circuit applications. It integrates all of the required power supplies and protection features recommended by most manufacturers of IGBT modules. It is capable of driving four or six switches (transistors) at currents up to 1200 Amps. The AP-1491 provides a safe, reliable, isolated interface between control logic and the IGBT power stage.

The APS IGBT GDB is a robust design (see Block diagram on page 2) offering the necessary protection features to ensure a reliable power stage including: two forms of over current protection, DC link over voltage protection, over temperature protection, and under voltage lockout. Also provided as feedback signals to the control logic are isolated, analog, real-time representations of each phase output current, the DC link voltage and a temperature sensor interface that can be mounted on a heatsink.

The AP-1491 is designed for robust reliable operation. It has been used and qualified in many applications including: under car municipal transit inverters and converters, industrial frequency converters, 750Hp motor drives, uninterruptible power supplies, battery chargers and many others.



Typical connection diagram for a 3-phase bridge application.

AP-1491 IGBT Gate Drive Board

ABSOLUTE MAXIMUM RATINGS (Voltages referenced to GND of GDB Power Supply)

Parameter	Value	Units
Unregulated 24 VDC Power Supply	30	V
Regulated 15 VDC Power Supply	15.5	V
PWM Input High	20	V
PWM Input Low	-5	V
Fault Output Supply Voltage	30	V
Fault Output Current (sink)	50	mA
DC Link Voltage Input	1000	V
Switching Frequency	20,000*	Hz

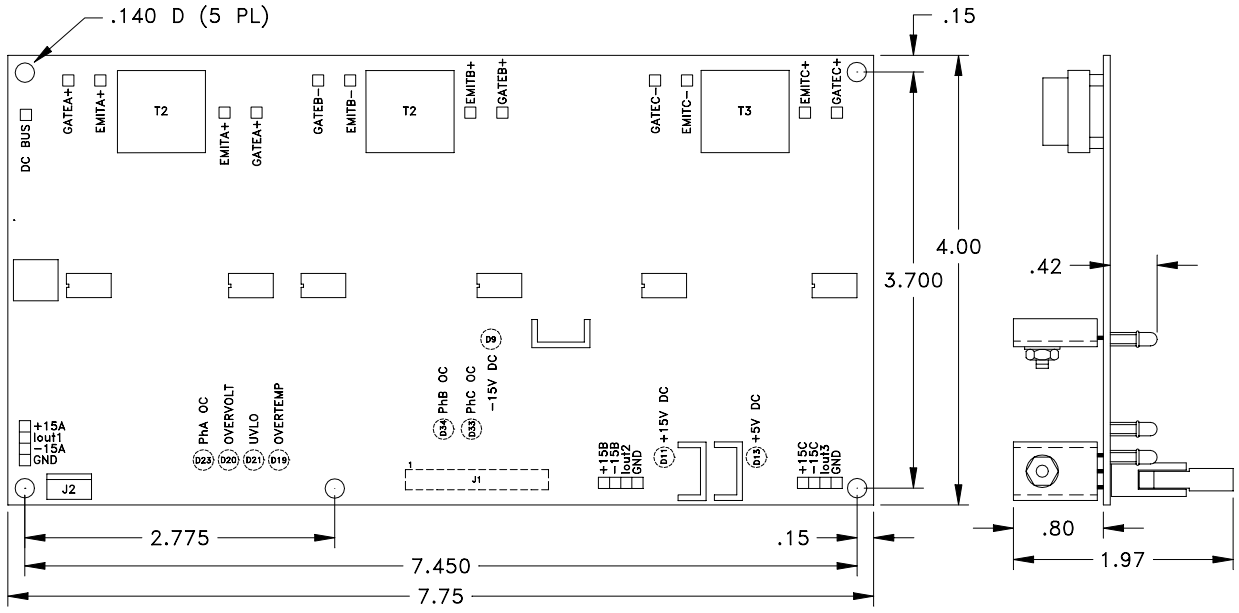
* See full datasheet/application note for details.

ELECTRICAL CHARACTERISTICS

Characteristic	Min	Typ	Max	Unit
Unregulated 24 VDC Power Supply	20	24	30	V
Regulated 15 VDC Power Supply	14.5	15	15.5	V
PWM Input ON Threshold*	12	15		V
PWM Input OFF Threshold		0	2	V
Gate Drive Output Voltage High	13	15	18	V
Gate Drive Output Voltage Low	-6	-5	-3.5	V
Gate Drive Output Current**			8.5	A
OverTemp Threshold	98	100	102	°C
OverVoltage Threshold	890	900	910	V

* The AP-1491 can be modified to accept TTL level PWM control signals.
** Peak current is determined by the IGBT and gate resistor.

MECHANICAL DIMENSIONS:



J1 (See complete datasheet/applications note for details)

Pin	Signal Name	Description
1	Shield	Connected to circuit ground
2	PWM A-	0-15 V signal controls the duty cycle of A- IGBT
3	Phase A Error[1]	Open collector output, external pull-up resistor required; LOW = No Error; Floating = Phase A overcurrent or short circuit
4	PWM A+	0-15 V signal controls the duty cycle of A+ IGBT
5	PWM B-	0-15 V signal controls the duty cycle of B- IGBT
6	Phase B Error	Open collector output, external pull-up resistor required; LOW = No Error; Floating = Phase B overcurrent or short circuit
7	PWM B+	0-15 V signal controls the duty cycle of B+ IGBT
8	PWM C-	0-15 V signal controls the duty cycle of C- IGBT
9	Phase C Error	Open collector output, external pull-up resistor required; LOW = No Error; Floating = Phase C overcurrent or short circuit
10	PWM C+	0-15 V signal controlling the duty cycle of C+ IGBT
11	Overtemp, Over Voltage, or UVLO Error	Open collector output, external pull-up resistor required; LOW = No Error; Floating = Overtemp, DC link over voltage ,or UVLO
12	Not Connected	
13	DC Link Voltage	Scaled analog representation of DC link voltage
14	24 VDC input power	20 – 30 VDC input voltage range, unregulated
15	24 VDC input power	20 – 30 VDC input voltage range, unregulated
16	15 VDC input power	14.4 – 15.6 VDC input voltage range, regulated
17	15 VDC input power	14.4 – 15.6 VDC input voltage range, regulated
18	GND	Ground reference for 15 or 24 VDC inputs
19	GND	Ground reference for 15 or 24 VDC inputs
20	Heatsink Temperature	Analog voltage representation of heatsink temperature; 0V represents 0°C, 10V represents 120°C
21	GND	Tied to pins 18 and 19
22	I_{out} Phase A	Analog voltage representation of phase A output current; current feedback scaling is dependent on customer selected transducer and gain of signal conditioning circuitry on GDB
23	GND	Tied to pins 18 and 19
24	I_{out} Phase B	Analog voltage representation of phase B output current; current feedback scaling is dependent on customer selected transducer and gain of signal conditioning circuitry on GDB
25	GND[3]	Tied to pins 18 and 19
26	I_{out} Phase C	Analog voltage representation of phase C output current; current feedback scaling is dependent on customer selected transducer and gain of signal conditioning circuitry on GDB

J2

1	+15 Volts	15 volts from GDB
2	Temp Sense Output	Analog Temp Sense output
3	GND	GND reference for +15 Volts, tied to ground of 15 or 24 volt supply
4	NC	No connection

Current Feedback Connectors (2 for full bridge and 3 for 3-phase bridge applications)

1	+15 Volts	15 volts from GDB
2	-15 Volts	-15 volts from GDB
3	I_{out} (A, B, & C)	Voltage proportional to output current
4	GND	GND of GDB control logic

There are three sets of pads available on the board to interface with up to three separate Hall effect sensors (LEMs). Headers are not installed on the board to allow for the strain relief hook-up detailed in the datasheet/application note. However, the pads are separated by standard .100 inch spacing to allow for the installation of headers with .100 inch spacing. **Note:** The wiring for the B and C phase connectors is 1 to 1, i.e. pin 1 on the GDB goes to pin 1 on the LEM, pin 2 goes to pin 2, etc. Pin 2 and pin 3 are reversed at the GDB for the phase A connector. This is illustrated in the diagram on page 2.