TECHNICAL DATA
Datasheet 4171, Rev. -

Three-Phase MOSFET BRIDGE, With Gate Driver and Optical Isolation

DESCRIPTION: A 200 VOLT, 70 AMP, THREE PHASE MOSFET BRIDGE

ELECTRICAL CHARACTERISTICS PER MOSFET DEVICE (Tj=25^{0}C UNLESS OTHERWISE SPECIFIED)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
MOSFET SPECIFICATIONS					
Drain-to-Source Breakdown Voltage I_D = 500 µA, V_{GS} = 0V	BV_{DSS}	200	-	-	V
Continuous Drain Current T_C = 25 ^{O}C T_C = 90 ^{O}C	I_D	-	-	70 60	A
Pulsed Drain Current, Pulse Width limited by T_{jMax}	I_{DM}	-	-	300	A
Gate to Source Voltage	V_{GS}	-	-	+/-20	V
Gate- Source Leakage Current , V_{GE} = +/-20V	I_{GSS}	-	-	+/- 200	nA
Zero Gate Voltage Drain Current V_{DS} = 200 V, V_{GS}=0V T_i=25^{o}C V_{DS}= 160 V, V_{GS}=0V T_i=125^{o}C	I_{CSS}	-	-	 1 3	 mA mA
Static Drain-to-Source On Resistance, T_j = 25 ^{O}C T_j = 125 ^{O}C I_D= 50A, V_{GS} = 15V,	R_{DSon}	-	0.023 0.050	0.025 -	V
Maximum Thermal Resistance	$R_{\theta JC}$	-	-	0.35	^{o}C/W
Maximum operating Junction Temperature	T_{jmax}	-40	-	150	^{o}C
Maximum Storage Junction Temperature	T_{jmax}	-55	-	150	^{o}C

Over-Temperature Shutdown					
Over-Temperature Shutdown	Tsd	90	100	115	^{o}C
Over-Temperature Output	Tso		10		10mV/^{o}C
Over-Temperature Shutdown Hysteresis			20		^{o}C

DIODES CHARACTERISTICS					
Continuous Source Current, T_C = 90 ^{O}C	I_S	-	-	60	A
Diode Forward Voltage, I_S = 50A, T_j = 25 ^{O}C	V_{SD}	-		1.5	V
Diode Reverse Recovery Time (I_S=50A, V_{DD}=100V , di/dt=100 A/µs)	t_{rr}	-	220	-	nsec
Gate Driver					
Supply Voltage	VCC	10	15	20	V
Input On Current	HIN, LIN	2		5.0	mA
Opto-Isolator Logic High Input Threshold	I_{th}	-	1.6	-	mA
Input Reverse Breakdown Voltage	BV_{in}	5.0	-	-	V
Input Forward Voltage @ I_{in} = 5mA	V_F	-	1.5	1.7	V
Under Voltage Lockout	VCCUV	11.5	-	12.5	V
ITRIP Reference Voltage (1)	Itrip-ref	2.5	2.6	2.7	V
Input-to-Output Turn On Delay	t_{ond}	-	TBD	-	nsec
Output Turn On Rise Time	t_r	-	TBD	-	
Input-to-Output Turn Off Delay	t_{offd}	-	TBD	-	
Output Turn Off Fall Time @ VCC=100V, ID=50A, T_C = 25	t_f	-	TBD	-	
Input-Output Isolation Voltage	-	1500	-	-	V

(1) ITRIP Cycle-by cycle current limit is internally set to 70A peak. The set point can be lowered by connecting a resistor between Itrip-ref and Gnd. The set point can be increased by connecting a resistor between Itrip-ref and +5V ref

SENSITRON

TECHNICAL DATA

Datasheet 4171, Rev. -

Pin Description

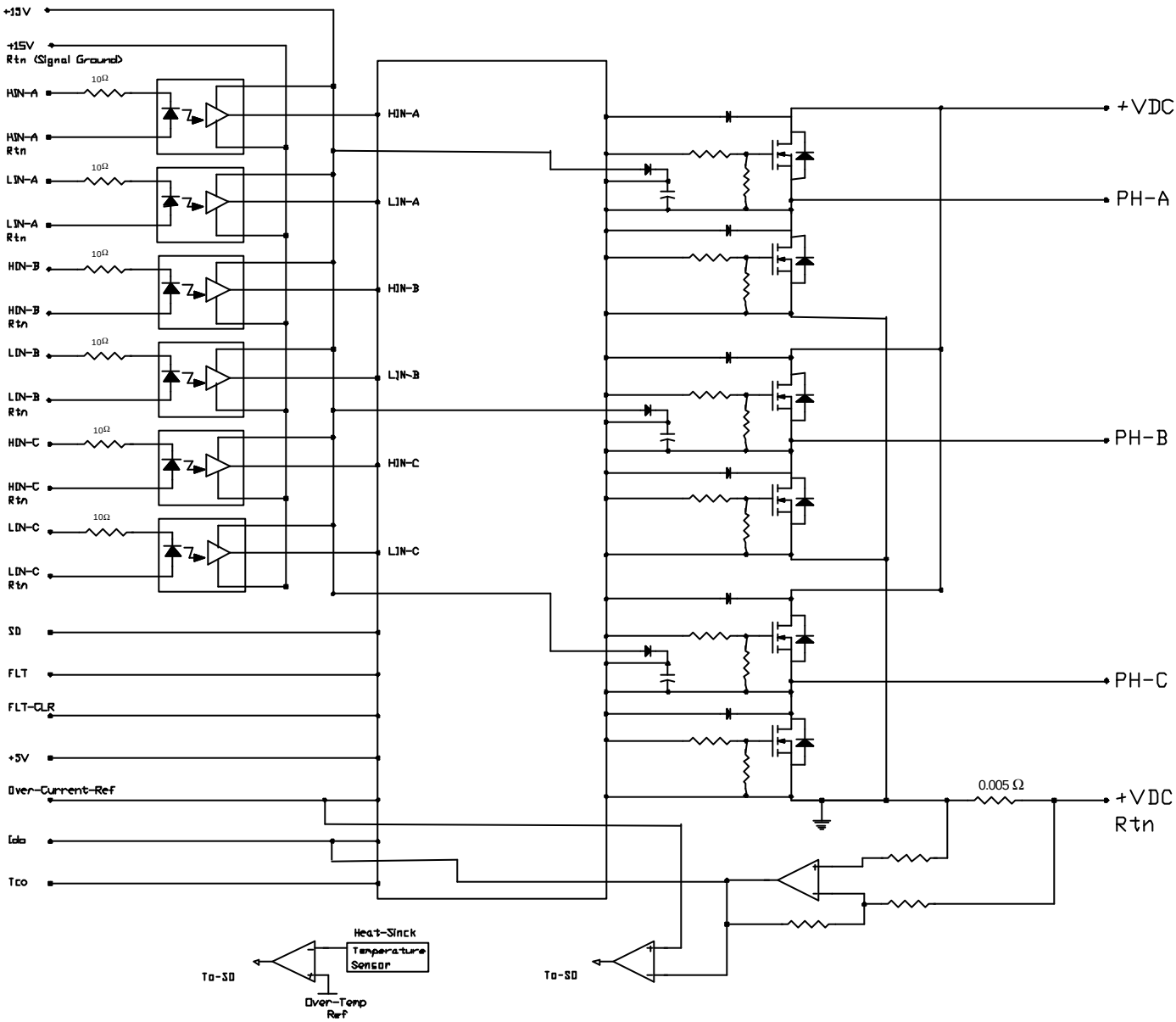
Pin Number	Function		Pin Number	Function
1	Isolated Input for High-side MOSFET of Phase A		18	NC
2	Return for Input at 1		19	+15V Input
3	NC		20	+15V Rtn (Signal Ground) (3)
4	Isolated Input for Low-side MOSFET of Phase A		21	SD (3)
5	Return for Input at 4		22	Fault Output (3)
6	NC		23	Fault Clear Input (3)
7	Isolated Input for High-side MOSFET of Phase B		24	+5V Output
8	Return for Input at 7		25	Over-Current Trip Set Point (3)
9	NC		26	DC Bus Current Output with Total Gain of 0.06 V/A
10	Isolated Input for Low-side MOSFET of Phase B		27	Case Temperature Output with Gain of 0.010 V/^{o}C
11	Return for Input at 10		28 &29	Phase A Output
12	Isolated Input for High-side MOSFET of Phase C		30 & 31	Phase B Output
13	Return for Input at 12		32 & 33	Phase C Output
14	Isolated Input for Low-side MOSFET of Phase C		34 & 35	DC Bus “+VDC Return”
15	Return for Input at 14		36 & 37	DC Bus “+VDC” Input
16	NC		Case	Isolated From All Terminals
17	NC			

SENSITRON

TECHNICAL DATA

Datasheet 4171, Rev. -

Schematic Diagram:

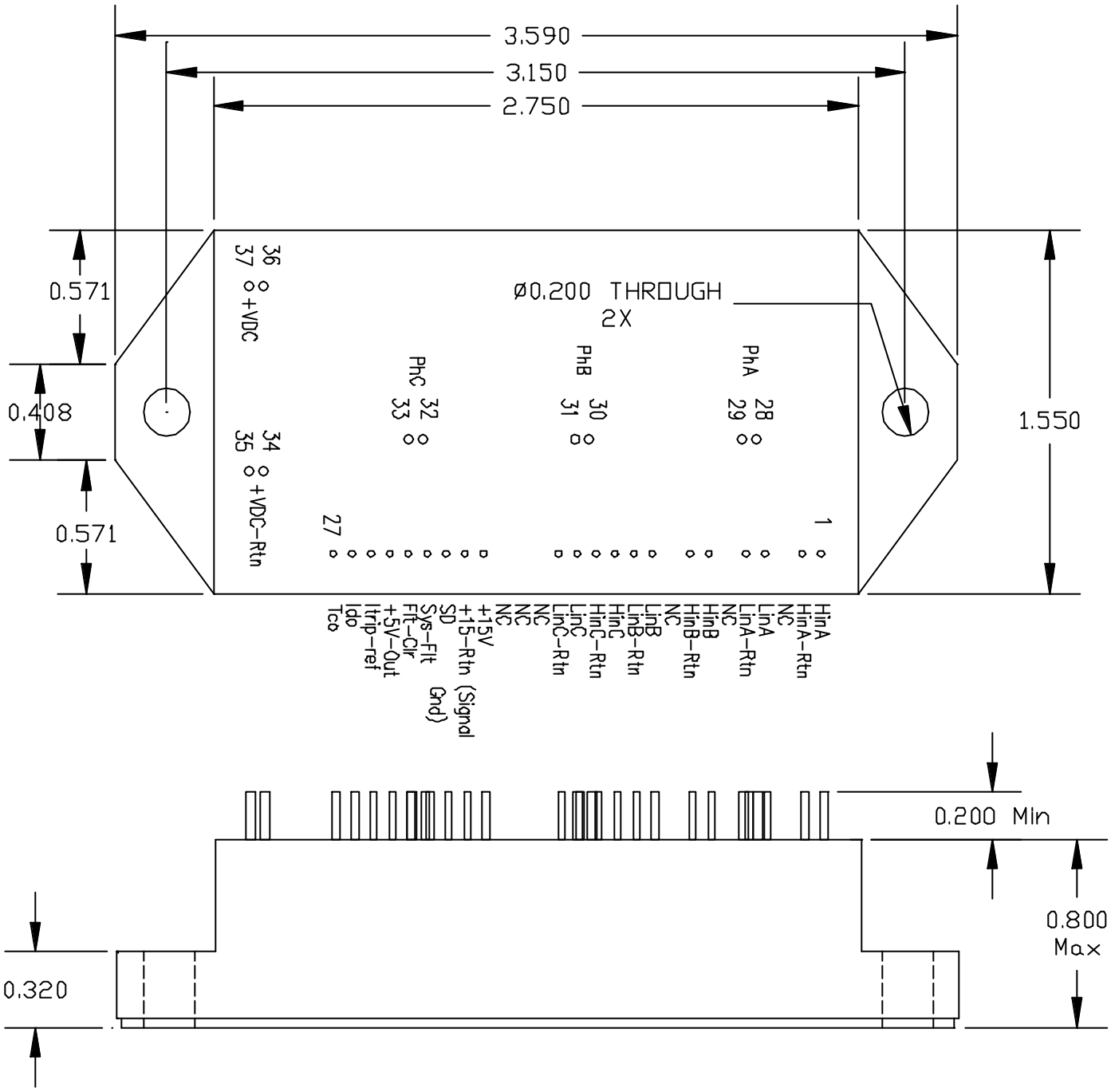


SENSITRON

TECHNICAL DATA

Datasheet 4171, Rev. -

Package Drawing Top View
(All dimensions are in inches, tolerance is +/- 0.010")

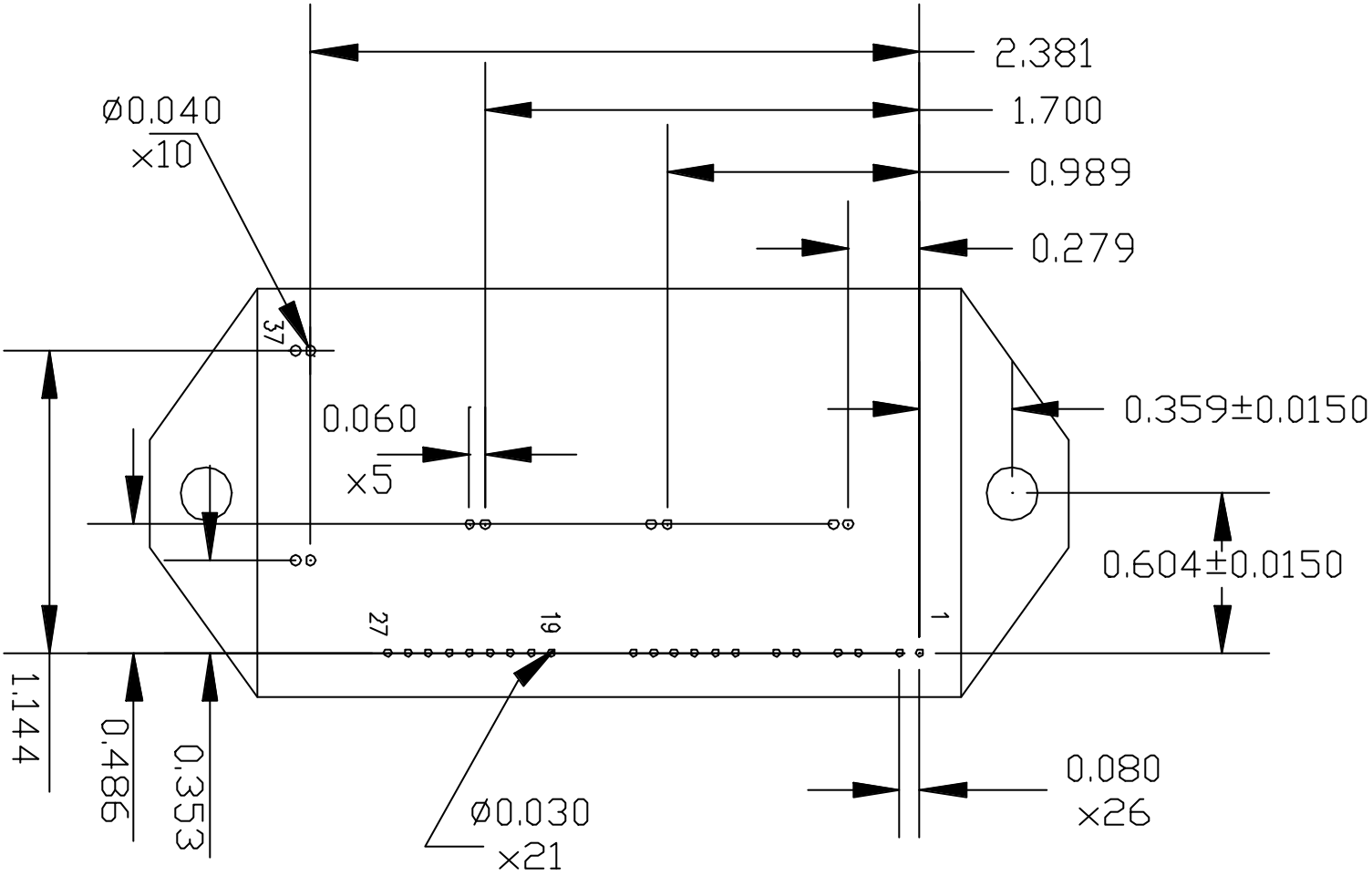


SENSITRON

TECHNICAL DATA

Datasheet 4171, Rev. -

Package Pin Locations
(All dimensions are in inches; tolerance is +/- 0.005” except otherwise specified)



Application Notes:

a- Shutdown Feature:

1- Pin 21, SD is a dual function input/output, active low input. It is internally pulled high. As a low input, it shuts down all MOSFETs regardless of the Hin and Lin signals.
2- SD is also internally activated by the over-temperature shutdown, over-current limit, under-voltage shutdown, and desaturation protection.
3- Over-temperature shutdown, and over-current limit are not latching features.
4- Under-voltage shutdown is automatically reset once the VCC rises above the 12.1V threshold limit.
5- Desaturation shutdown is a latching feature and internally reset.
6- When any of the internal protection features are activated, SD is pulled down.
7- SD can be used to shutdown all MOSFETs by an external command. An open collector switch shall be used to pull down SD externally.
8- Also, SD can be used as a fault condition output. Low output at SD indicates a fault situation.

b- Fault Output Feature:

1- Pin 22, Flt is a dual function pin. It is internally pulled high. If pulled down, it will freeze the status of all the six MOSFETs regardless of the Hin and Lin signals
2- Pin 22 as an output reports desaturation protection activation. When desaturation protection is activated a low output for about 9 μsec is reported.
3- If any other protection feature is activated, it will not be reported by Pin 22.

c- Fault Clear Output:

1- Pin 23, Flt-Clr is a fault clear input. It can be used to reset a latching fault condition, due to desaturation protection.
2- Pin 23 is internally pulled down. A latching fault due to desaturation can be cleared by pulling high this input.
3- An internal fault clear is activated after 100 μsec delay. If desired to clear the fault earlier, this input can be used.

d- Signal Ground:

Pin 20, Signal Gnd is the signal ground for all signals at Pins 19 through 27. This ground is internally connected to the +VDC Rtn**. No external connection shall be established between Signal Gnd and +VDC Rtn.**

TECHNICAL DATA

DISCLAIMER:

1- The information given herein, including the specifications and dimensions, is subject to change without prior notice to improve product characteristics. Before ordering, purchasers are advised to contact the Sensitron Semiconductor sales department for the latest version of the datasheet(s).
2- In cases where extremely high reliability is required (such as use in nuclear power control, aerospace and aviation, traffic equipment, medical equipment, and safety equipment), safety should be ensured by using semiconductor devices that feature assured safety or by means of users' fail-safe precautions or other arrangement.
3- In no event shall Sensitron Semiconductor be liable for any damages that may result from an accident or any other cause during operation of the user's units according to the datasheet(s). Sensitron Semiconductor assumes no responsibility for any intellectual property claims or any other problems that may result from applications of information, products or circuits described in the datasheets.
4- In no event shall Sensitron Semiconductor be liable for any failure in a semiconductor device or any secondary damage resulting from use at a value exceeding the absolute maximum rating.
5- No license is granted by the datasheet(s) under any patents or other rights of any third party or Sensitron Semiconductor.
6- The datasheet(s) may not be reproduced or duplicated, in any form, in whole or part, without the expressed written permission of Sensitron Semiconductor.
7- The products (technologies) described in the datasheet(s) are not to be provided to any party whose purpose in their application will hinder maintenance of international peace and safety nor are they to be applied to that purpose by their direct purchasers or any third party. When exporting these products (technologies), the necessary procedures are to be taken in accordance with related laws and regulations.