

TECHNICAL DATA
Datasheet 4171, Rev. A

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

(T_J=25°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 °C T _C = 90 °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°C V _{DS} = 160 V, V _{GS} =0V T _i =125°C	I _{CSS}	-	-	1 3	mA mA
Static Drain-to-Source On Resistance, I _D = 50A, V _{GS} = 15V, T _j = 25 °C T _j = 125 °C	R _{DSon}	-	0.023 0.050	0.025 -	V
Maximum Thermal Resistance	R _{θJC}	-	-	0.35	°C/W
Maximum operating Junction Temperature	T _{jmax}	-40	-	150	°C
Maximum Storage Junction Temperature	T _{jmax}	-55	-	150	°C

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TECHNICAL DATA

Datasheet 4171, Rev. A

Over-Temperature Shutdown					
Over-Temperature Shutdown	Tsd	90	100	115	°C
Over-Temperature Output	Tso		10		10mV/°C
Over-Temperature Shutdown Hysteresis			20		°C

DIODES CHARACTERISTICS					
Continuous Source Current, $T_C = 90^\circ\text{C}$	I_S	-	-	60	A
Diode Forward Voltage, $I_S = 50\text{A}, T_j = 25^\circ\text{C}$	V_{SD}	-		1.5	V
Diode Reverse Recovery Time ($I_S=50\text{A}, V_{DD}=100\text{V}, di/dt=100\text{A}/\mu\text{s}$)	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 @ $I_{in} = 5\text{mA}$	V_F	-	1.5	1.7	V
Under Voltage Lockout	VCCUV	11.5	-	12.5	V
ITRIP Reference Voltage ⁽¹⁾	$I_{trip-ref}$	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	t_f	-	TBD	-	
@ VCC=100V, ID=50A, $T_C = 25$					
Input-Output Isolation Voltage	-	1500	-	-	V

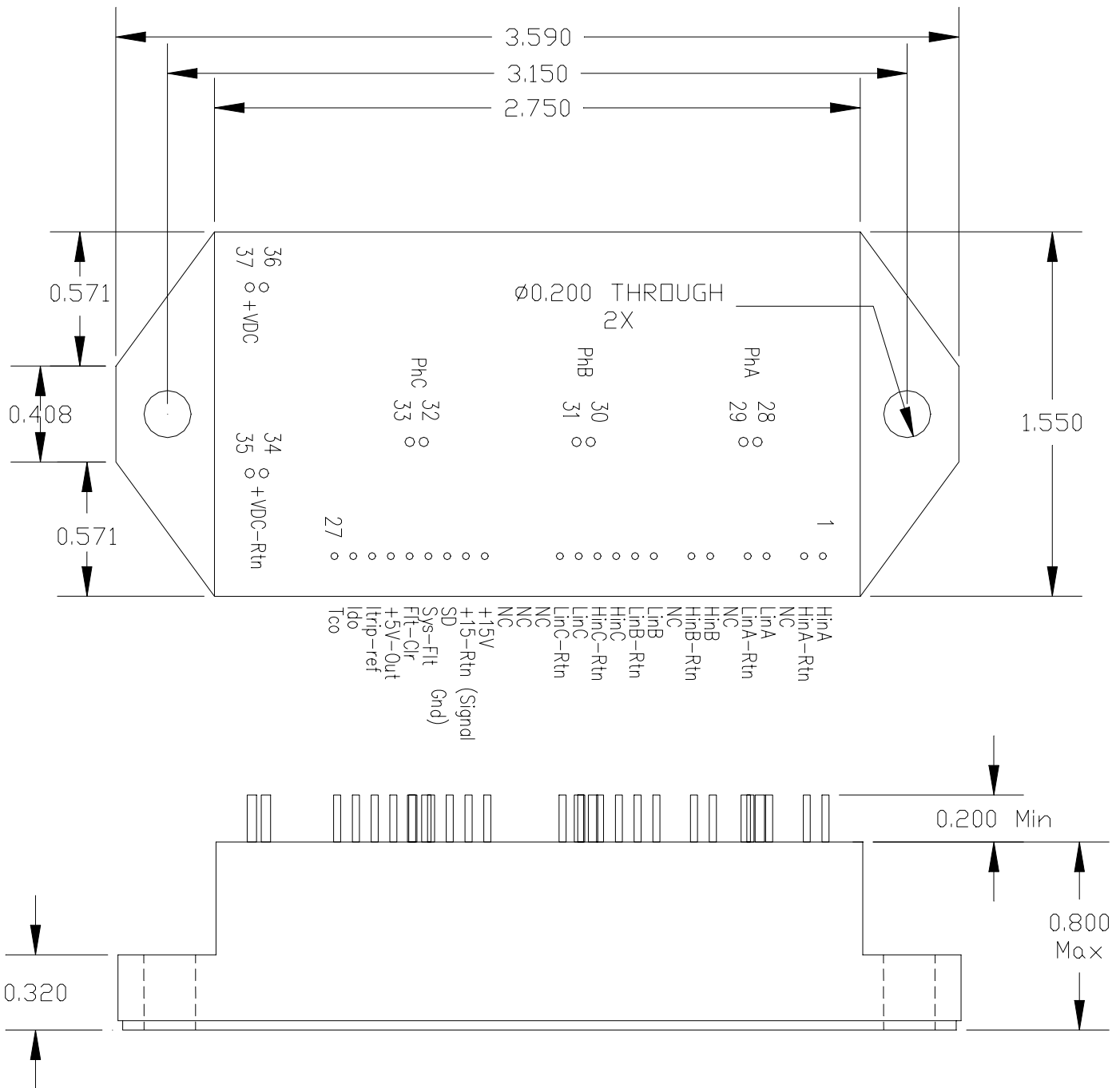
(1) ITRIP Cycle-by cycle current limit is internally set to 70A peak. The set point can be lowered by connecting a resistor between $I_{trip-ref}$ and Gnd. The set point can be increased by connecting a resistor between $I_{trip-ref}$ and +5V ref

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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/°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		

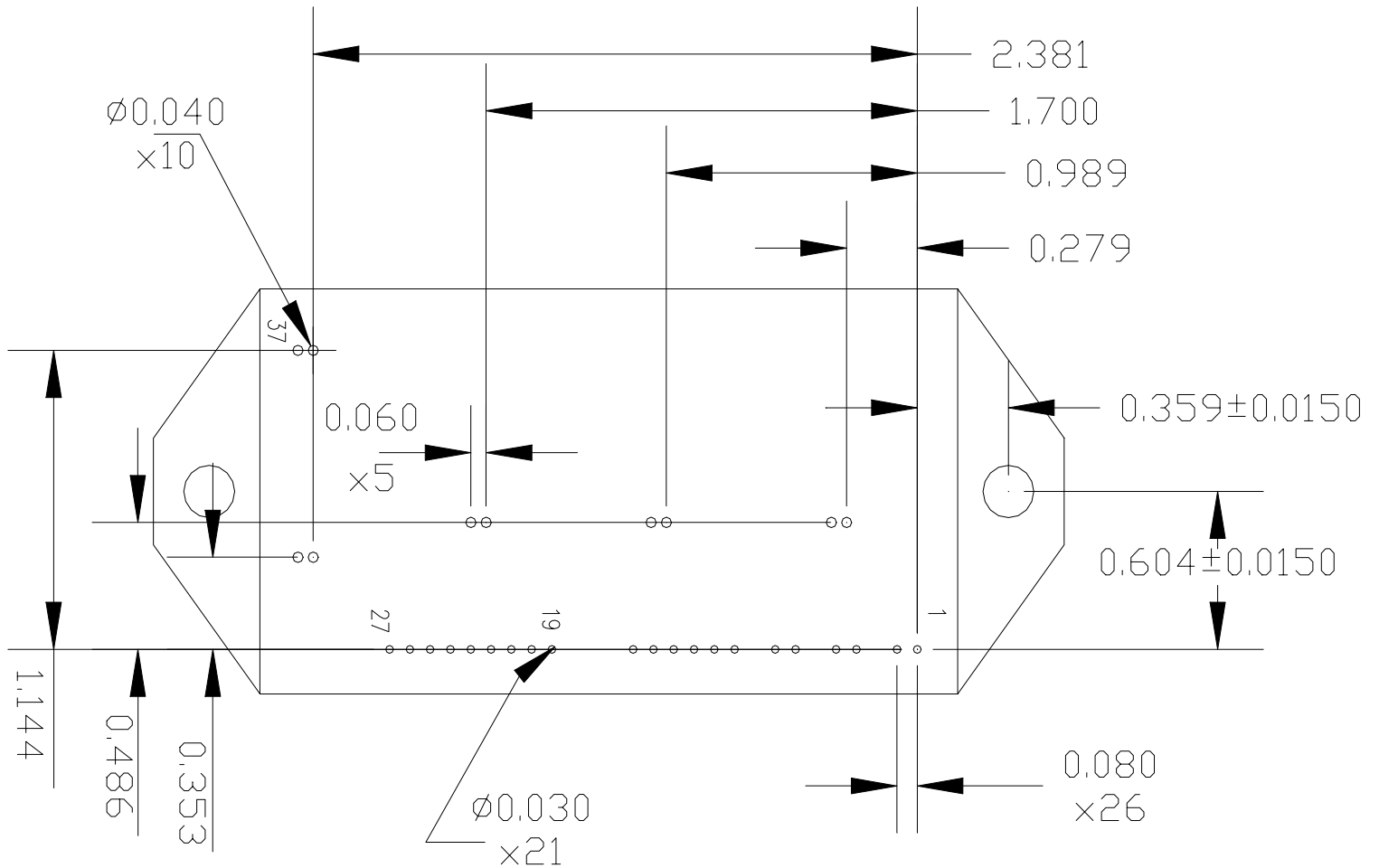
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Datasheet 4171, Rev. A

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



Package Pin Locations

(All dimensions are in inches; tolerance is +/- 0.005" except otherwise specified)



SENSITRON**TECHNICAL DATA****Datasheet 4171, Rev. A**

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 μ sec 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 μ sec 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.**

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Suggested precaution following cleaning procedure:

If the parts are to be cleaned in an aqueous based cleaning solution, it is recommended that the parts be baked immediately after cleaning. This is to remove any moisture that may have permeated into the device during the cleaning process. For aqueous based solutions, the recommended process is to bake for at least 2 hours at 125°C.

Do not use solvents based cleaners.

Soldering Procedure:

Recommended soldering procedure

Signal pins 1 to 27: 210C for 10 seconds max

Power pins 28 to 37: 260C for 10 seconds max. Pre-warm module to 125C to aid in power pins soldering.

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