

TECHNICAL DATA
Datasheet 4165, Rev. B**Three-Phase IGBT BRIDGE, With Gate Driver and Optical Isolation****DESCRIPTION:** A 1200 VOLT, 60 AMP, THREE PHASE IGBT BRIDGE**ELECTRICAL CHARACTERISTICS PER IGBT DEVICE**(T_j=25°C UNLESS OTHERWISE SPECIFIED)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
IGBT SPECIFICATIONS					
Collector to Emitter Breakdown Voltage I _C = 500 μA, V _{GE} = 0V	BV _{CES}	1200	-	-	V
Continuous Collector Current T _C = 25 °C T _C = 90 °C	I _C	-	-	60 40	A
Pulsed Collector Current, Pulse Width limited by T _{jMax}	I _{CM}	-	-	100	A
Gate to Emitter Voltage	V _{GE}	-	-	+/-20	V
Gate-Emitter Leakage Current , V _{GE} = +/-20V	I _{GES}	-	-	+/- 200	nA
Zero Gate Voltage Collector Current V _{CE} = 1200 V, V _{GE} =0V T _i =25°C V _{CE} = 800 V, V _{GE} =0V T _i =125°C	I _{CES}	-	-	1 10	mA mA
Collector to Emitter Saturation Voltage, I _C = 40A, V _{GE} = 15V, T _j = 25 °C T _j = 125 °C	V _{CE(SAT)}	-	1.9 2.1	2.3 -	V
Maximum Thermal Resistance	R _{θJC}	-	-	0.6	°C/W
Maximum operating Junction Temperature	T _{jmax}	-40	-	150	°C
Maximum Storage Junction Temperature	T _{jmax}	-55	-	150	°C

SENSITRON**TECHNICAL DATA****Datasheet 4165, Rev. B**

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

ULTRAFAST DIODES RATING AND CHARACTERISTICS					
Diode Peak Inverse Voltage	PIV	1200	-	-	V
Continuous Forward Current, $T_C = 90^\circ\text{C}$	I_F	-	-	40	A
Forward Pulse Current, Pulse Width limited by $T_{j\text{Max}}$	I_{FP}	-	-	100	A
Diode Forward Voltage, $I_F = 40\text{A}$, $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	V_F	-	1.8 1.8	2.3	V
Diode Reverse Recovery Time ($I_F = 40\text{A}$, $V_{RR} = 600\text{V}$, $di/dt = 800\text{ A}/\mu\text{s}$)	t_{rr}	-	240	-	nsec
Maximum Thermal Resistance	$R_{\theta JC}$	-	-	1.0	°C/W
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=400V, IC=40A, $T_C = 25$					
Input-Output Isolation Voltage	-	1500	-	-	V

(1) ITRIP Cycle-by cycle current limit is internally set to 43A 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

SENSITRON**TECHNICAL DATA****Datasheet 4165, Rev. B****Pin Description**

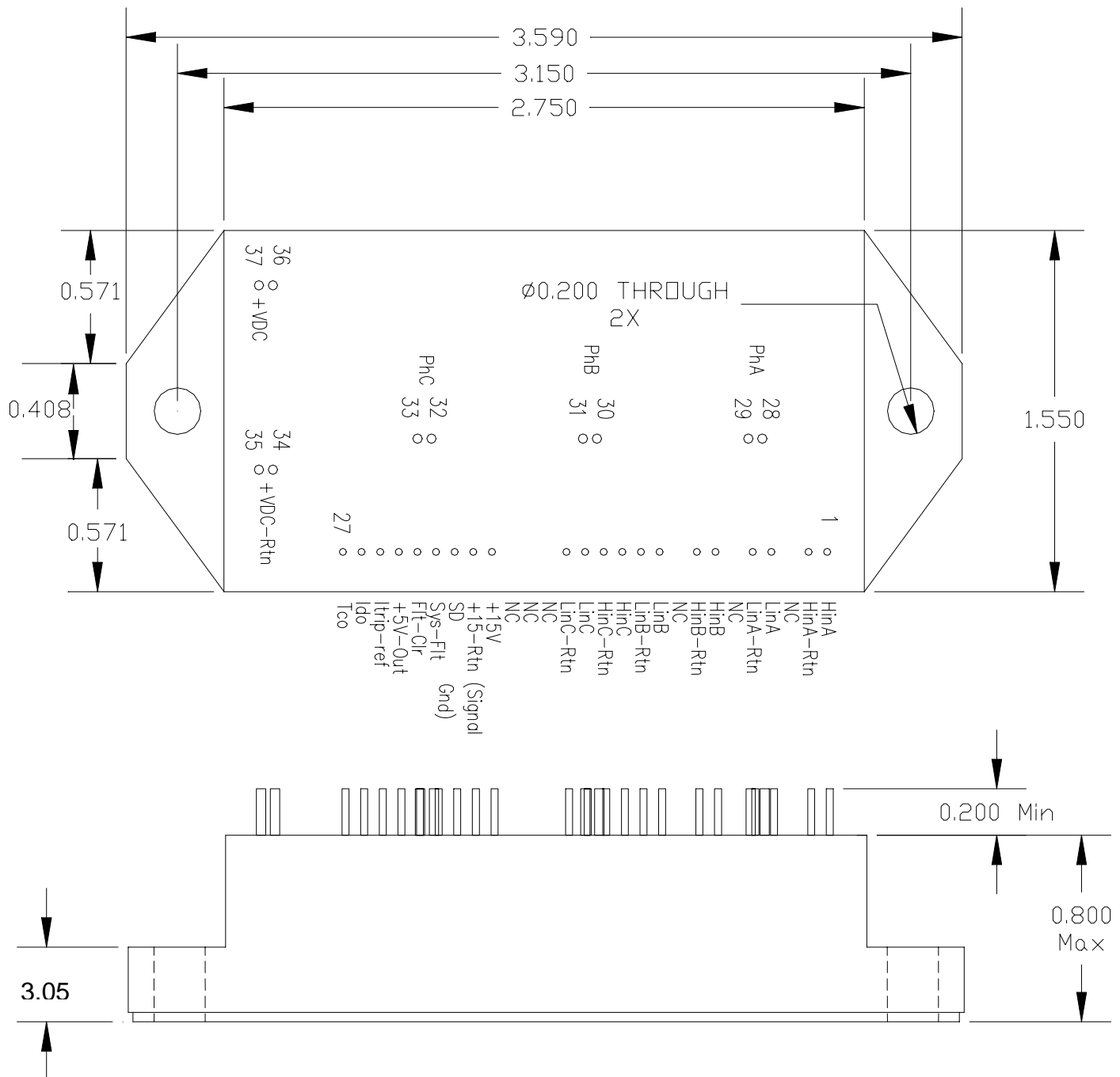
Pin Number	Function	Pin Number	Function
1	Isolated Input for High-side IGBT of Phase A	18	NC
2	Return for Input at 1	19	+15V Input
3	NC	20	+15V Rtn (Signal Ground) ⁽³⁾
4	Isolated Input for Low-side IGBT of Phase A	21	SD ⁽³⁾
5	Return for Input at 4	22	Fault Output ⁽³⁾
6	NC	23	Fault Clear Input ⁽³⁾
7	Isolated Input for High-side IGBT 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 IGBT 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 IGBT 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 IGBT 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

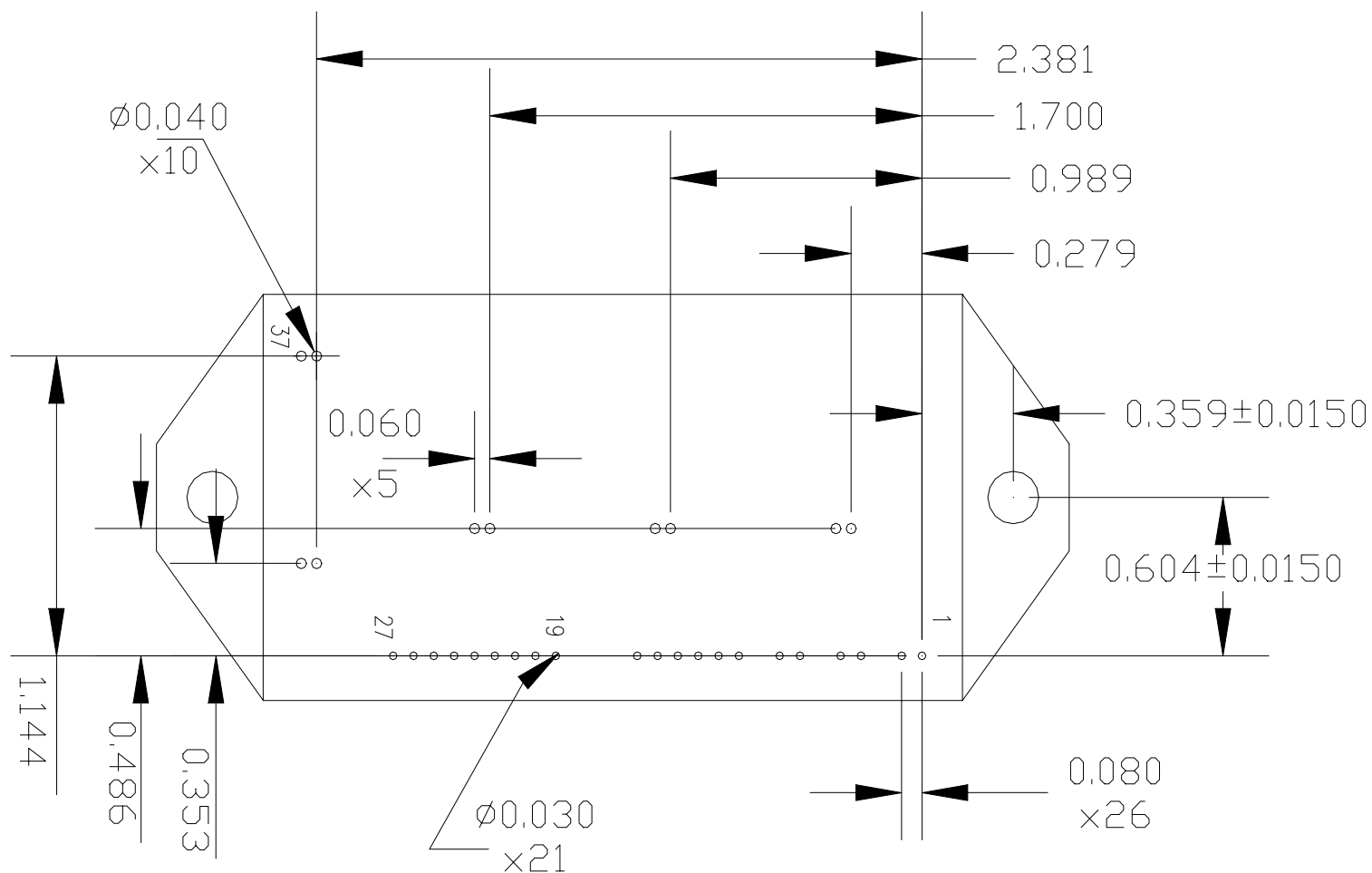
Datasheet 4165, Rev. B

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



SENSITRON**TECHNICAL DATA**

Datasheet 4165, Rev. B

Package Pin Locations(All dimensions are in inches; tolerance is ± 0.005 " unless otherwise specified)

SENSITRON**TECHNICAL DATA****Datasheet 4165, Rev. B**

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 IGBTs 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 is activated, SD is pulled down.
- 7- SD can be used to shutdown all IGBTs 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 IGBTs 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 a 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.**