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^{0}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 ^{O}C T_C = 90 ^{O}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^{o}C V_{CE} = 800 V, V_{GE}=0V T_i=125^{o}C	I_{CES}	-	-	 1 10	 mA mA
Collector to Emitter Saturation Voltage, T_j = 25 ^{O}C T_j = 125 ^{O}C I_C = 40A, V_{GE} = 15V,	$V_{CE(SAT)}$	-	1.9 2.1	2.3 -	V
Maximum Thermal Resistance	$R_{\theta JC}$	-	-	0.6	^{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

ULTRAFAST DIODES RATING AND CHARACTERISTICS					
Diode Peak Inverse Voltage	PIV	1200	-	-	V
Continuous Forward Current, T_C = 90 ^{O}C	I_F	-	-	40	A
Forward Pulse Current, Pulse Width limited by T_{jMax}	I_{Fp}	-	-	100	A
Diode Forward Voltage, I_F = 40A, T_j = 25 ^{O}C T_j = 125 ^{O}C	V_F	-	1.8 1.8	2.3	V
Diode Reverse Recovery Time (I_F=40A, V_{RR}=600V , di/dt=800 A/μs)	t_{rr}	-	240	-	nsec
Maximum Thermal Resistance	$R_{\theta JC}$	-	-	1.0	^{o}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} = 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 Output Turn On Rise Time Input-to-Output Turn Off Delay Output Turn Off Fall Time @ VCC=400V, IC=40A, T_C = 25	t_{ond} t_r t_{offd} t_f	- - - -	TBD TBD TBD TBD	- - - -	nsec
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 Itrip-ref and Gnd. The set point can be increased by connecting a resistor between Itrip-ref and +5V ref

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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/^{o}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			

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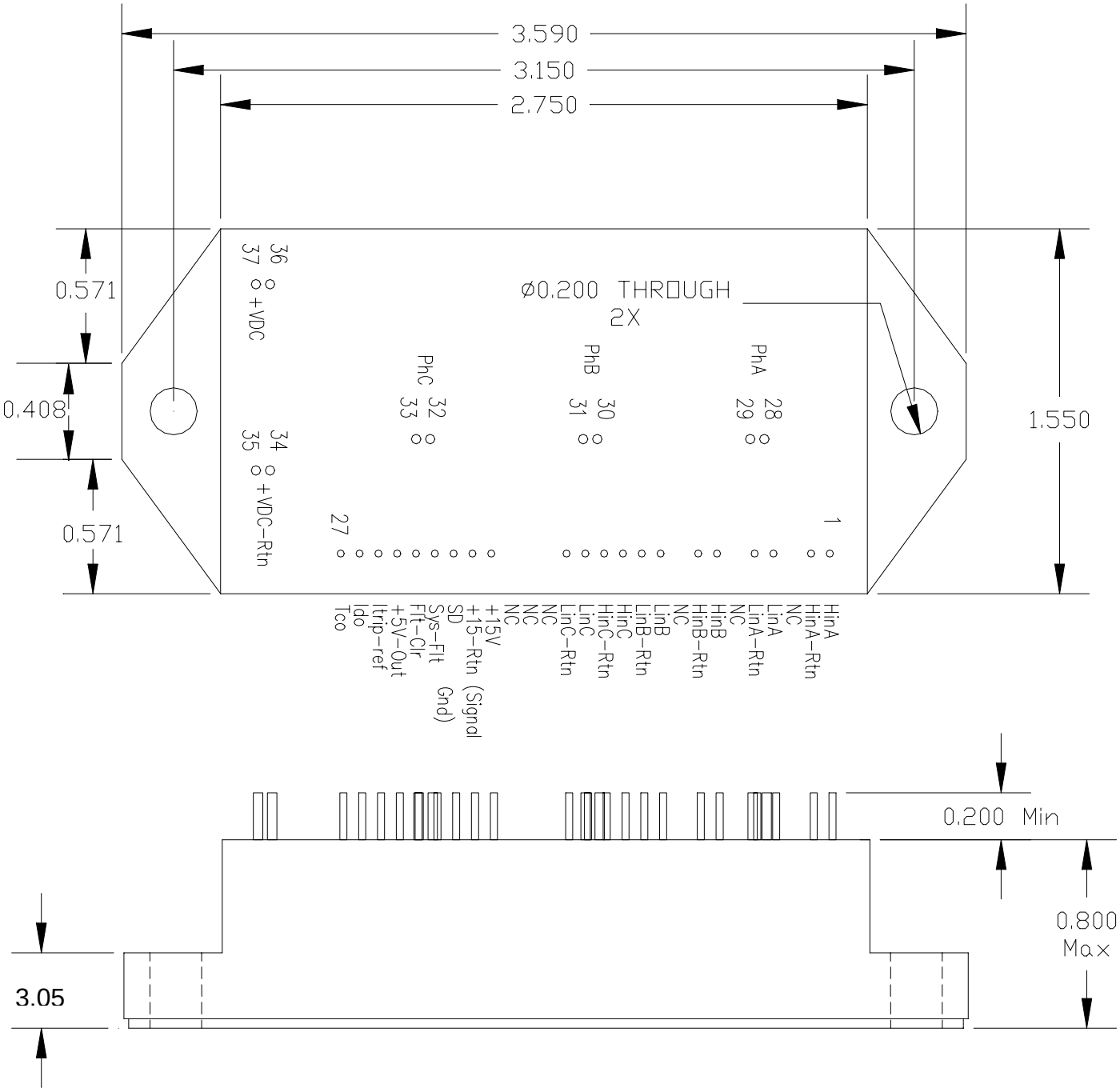
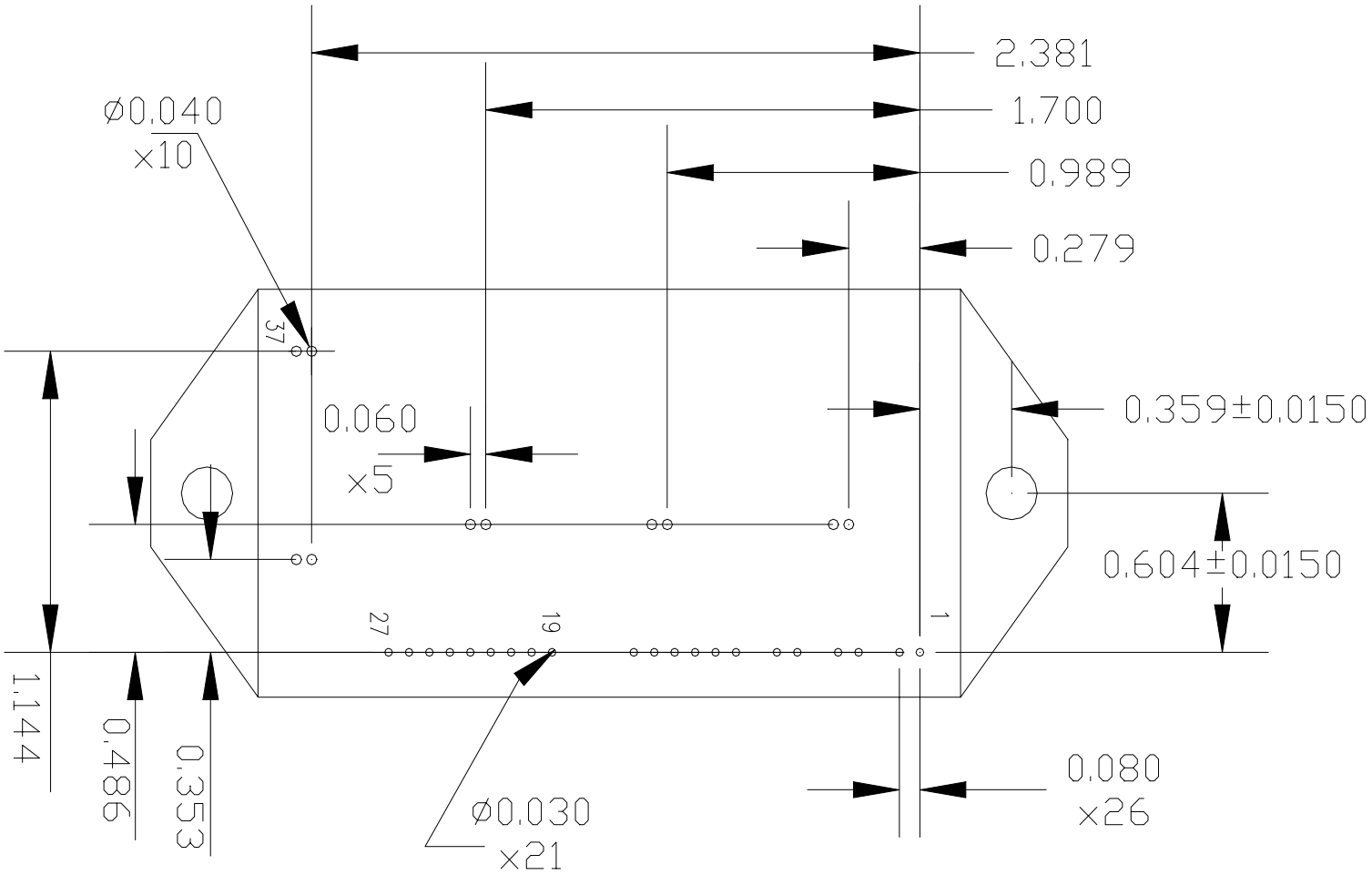
Package Drawing Top View
(All dimensions are in inches, tolerance is +/- 0.010")



Package Pin Locations
(All dimensions are in inches; tolerance is +/- 0.005” unless 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 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 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 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.**