TECHNICAL DATA
Data Sheet 4098, Rev. D.1

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

DESCRIPTION: A 600 VOLT, 80 AMP, THREE PHASE IGBT BRIDGE

ELECTRICAL CHARACTERISTICS PER IGBT DEVICE ($Tj=25^0C$ UNLESS OTHERWISE SPECIFIED)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
IGBT SPECIFICATIONS					
Collector to Emitter Breakdown Voltage I_C = 250 μA, V_{GE} = 0V	BV_{CES}	600	-	-	V
Continuous Collector Current T_C = 25 °C T_C = 90 °C	I_C	-	-	80 70	A
Pulsed Collector Current, 1mS	I_{CM}	-	-	170	A
Gate to Emitter Voltage	V_{GE}	-	-	+/-20	V
Gate-Emitter Leakage Current , V_{GE} = +/-20V	I_{GES}	-	-	+/- 100	nA
Zero Gate Voltage Collector Current V_{CE} = 600 V, V_{GE}=0V T_i=25°C V_{CE} = 480 V, V_{GE}=0V T_i=125°C	I_{CES}	-	-	 1 10	 mA mA
Collector to Emitter Saturation Voltage, T_C = 25 °C I_C = 60A, V_{GE} = 15V,	$V_{CE(SAT)}$	-	1.7	2.0	V
Maximum Thermal Resistance	$R_{\theta JC}$	-	-	0.45	°C/W
Brake IGBT SPECIFICATIONS					
Continuous Collector Current T_C = 25 °C T_C = 90 °C	I_C	-	-	40 25	A
Pulsed Collector Current, 0.5mS	I_{CM}	-	-	120	A
Brake Resistor SPECIFICATIONS					
Maximum Continuous power dissipation	Pd			2	watt
Impulse Energy				80	Joules
Maximum operating Junction Temperature	T_{jmax}	-40	-	150	°C
Maximum Storage Junction Temperature	T_{jmax}	-55	-	150	°C

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Over-Temperature Shutdown					
Over-Temperature Shutdown	Tsd	100	110	120	^{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	600	-	-	V
Continuous Forward Current, T_C = 90 ^{O}C	I_F	-	-	60	A
Forward Surge Current, t_p = 10 msec	I_{FSM}	-	-	300	A
Diode Forward Voltage, I_F = 60A	V_F	-	1.4	1.7	V
Diode Reverse Recovery Time (I_F=60A, V_{RR}=300V , di/dt=200 A/μs)	t_{rr}	-	90	160	nsec
Maximum Thermal Resistance	$R_{\theta JC}$	-	-	0.8	^{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	2.9	3.0	3.1	V
Input-to-Output Turn On Delay	t_{ond}	-		800	nsec
Output Turn On Rise Time	t_r	-		100	
Input-to-Output Turn Off Delay	t_{offd}	-		1000	
Output Turn Off Fall Time @ VCC=300V, IC=50A, T_C = 25	t_f			100	
Input-Output Isolation Voltage	-	1000	-	-	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

Data Sheet 4098, Rev. D.1

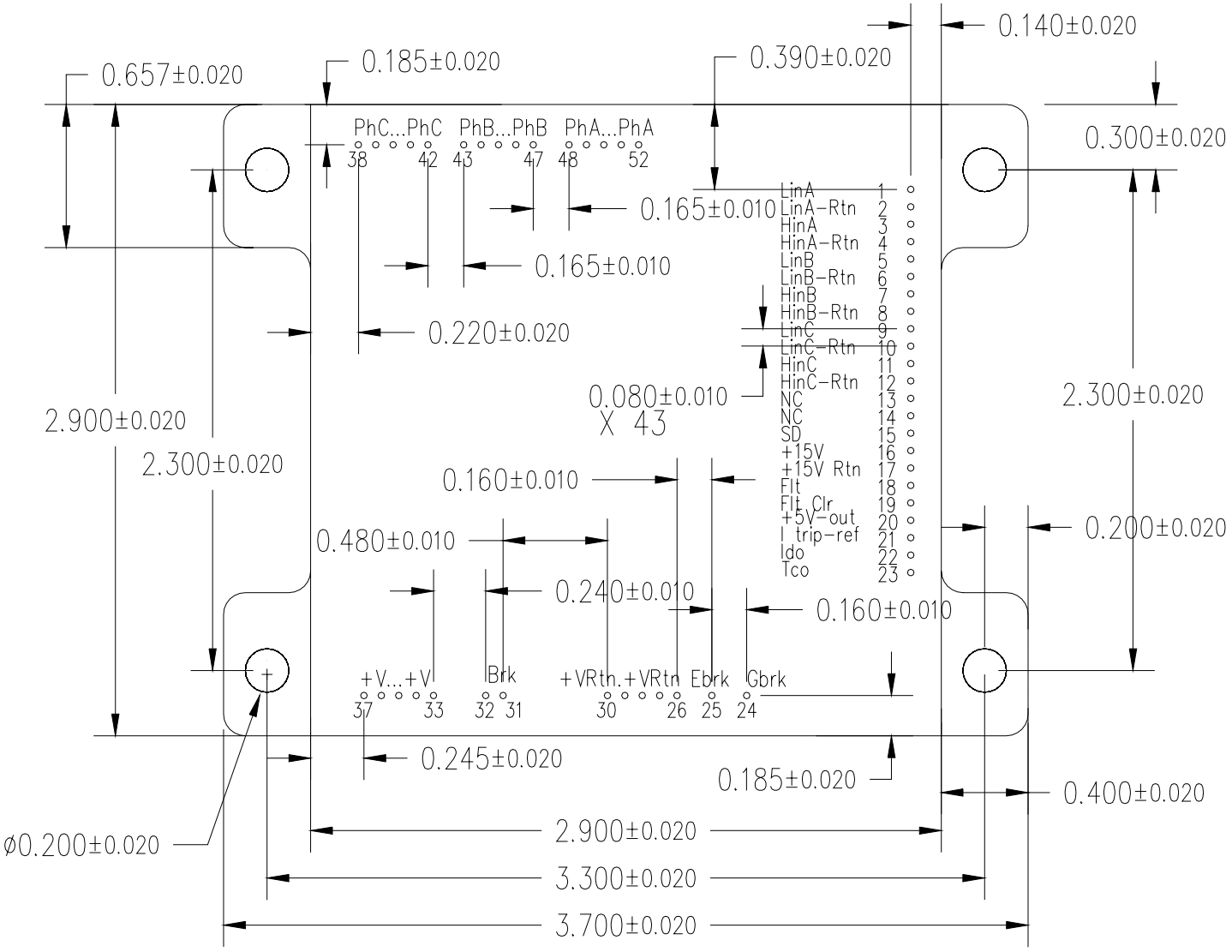
Pin Description

Pin Number	Function		Pin Number	Function
1	Isolated Input for Low-side IGBT of Phase A		17	+15V Rtn (Signal Ground)
2	Return for Input at 1		18	Fault Output (3)
3	Isolated Input for High-side IGBT of Phase A		19	Fault Clear Input (3)
4	Return for Input at 3		20	+5V Output
5	Isolated Input for Low -side IGBT of Phase B		21	Over-Current Trip Set point (3)
6	Return for Input at 5		22	DC Bus Current Output with Total Gain of 0.0365 V/A
7	Isolated Input for High-side IGBT of Phase B		23	Case Temperature Output with a gain of 0.010 V/^{o}C
8	Return for Input at 7		24	Brake IGBT Gate Input
9	Isolated Input for Low-side IGBT of Phase C		25	Brake IGBT Emitter Input. This input is internally connected to Signal Ground
10	Return for Input at 9		26 to 30	DC Bus return
11	Isolated Input for High-side IGBT of Phase C		31 , 32	Brake Resistor Terminal. Brake Resistor Shall be Connected Between These Terminals and +VDC
12	Return for Input at 11		33 to 37	DC Bus “+VDC” input
13	NC		38 to 42	Phase C output
14	NC		43 to 47	Phase B output
15	SD (3)		48 to 52	Phase A output
16	+15V Input		Case	Isolated

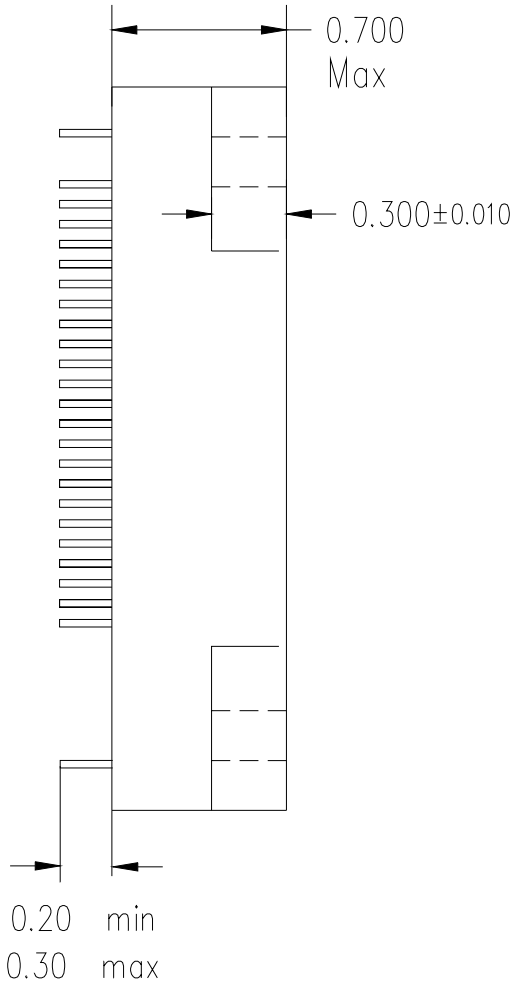
SENSITRON

TECHNICAL DATA
Data Sheet 4098, Rev. D.1

Package Drawing Top View:



Package Drawing Side View:



SENSITRON

TECHNICAL DATA
Data Sheet 4098, Rev. D.1

Application Notes:

a- Shutdown Feature:

1- SD is a dual function input/output, active low input. It is internally pulled high. As a low input 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 after 300 msec once the VCC rises above the threshold limit.
5- Desaturation shutdown is a latching feature and internally reset after 300 msec.
6- When any of the internal protection features is activated, SD is pulled down.
7- SD can be used to shutdown all IGBTs except the brake IGBT 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 18 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 18 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 18.

c- Fault Clear Output:

1- Pin 19 is a fault clear input. It can be used to reset a latching fault condition, due to desaturation protection.
2- Pin 19 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 300 msec delay. If desired to clear the fault earlier, this input can be used.

SENSITRON

TECHNICAL DATA
Data Sheet 4098, Rev. D.1

Cleaning Process:
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^{o}C.
Do not use solvents based cleaners.

Recommended Soldering Procedure:
Signal pins 1-24: 210C for 10 seconds max
Power pins 25 to 52: 260C for 10 seconds max. Pre-warm module to 125C to aid in power pins soldering.