7I37/7I37T/7I37TA MANUAL

Isolated Anything-IO adapter

V2.1

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GENERAL

DESCRIPTION

This manual applies to the 7I37, 7I37T and 7I37TA. They will referred to as 7I37 unless a distinction is required. The 7I37 is an 8 output, 16 input isolated I/O interface card. The 7I37 provides 8 Isolated 48VDC 1A output drivers and 16 Opto-isolated inputs. All output drivers are low saturation voltage MOSFETS for low power dissipation. Each of the 8 output switches is isolated from the others, allowing high side, low side, push-pull and other output switch configurations. The 16 opto-isolated inputs will operate with input voltages from 4 to 24 V. Reverse protection diodes are provided to allow use with AC inputs. The 7I37 is compatible with the all Mesa 50 pin parallel I/O and FPGA cards.

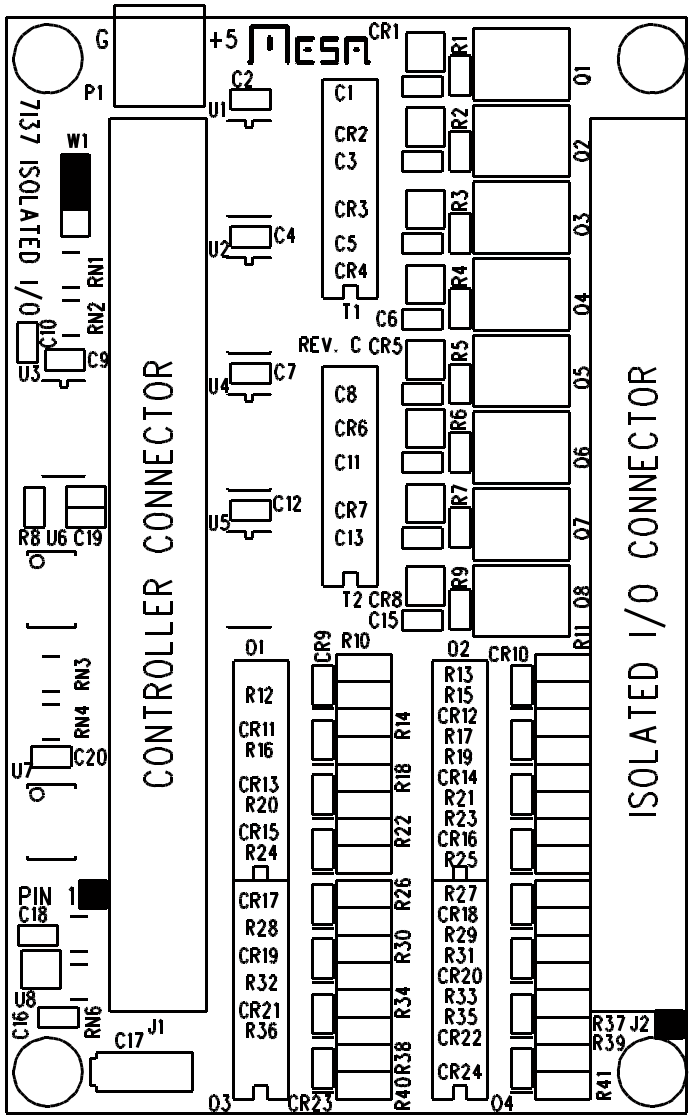
OPTION JUMPERS

The 7I37 has a single option jumper: W1. W1 determines if the 7I37 card gets its power from pin 49 of the controller connector. When W1 is in the up position (default), the 7I37 cards gets its power from pin 49. When W1 is in the down position, The 7I37 is disconnected from pin 49 and must be supplied with 5V power on P1.

CONNECTORS

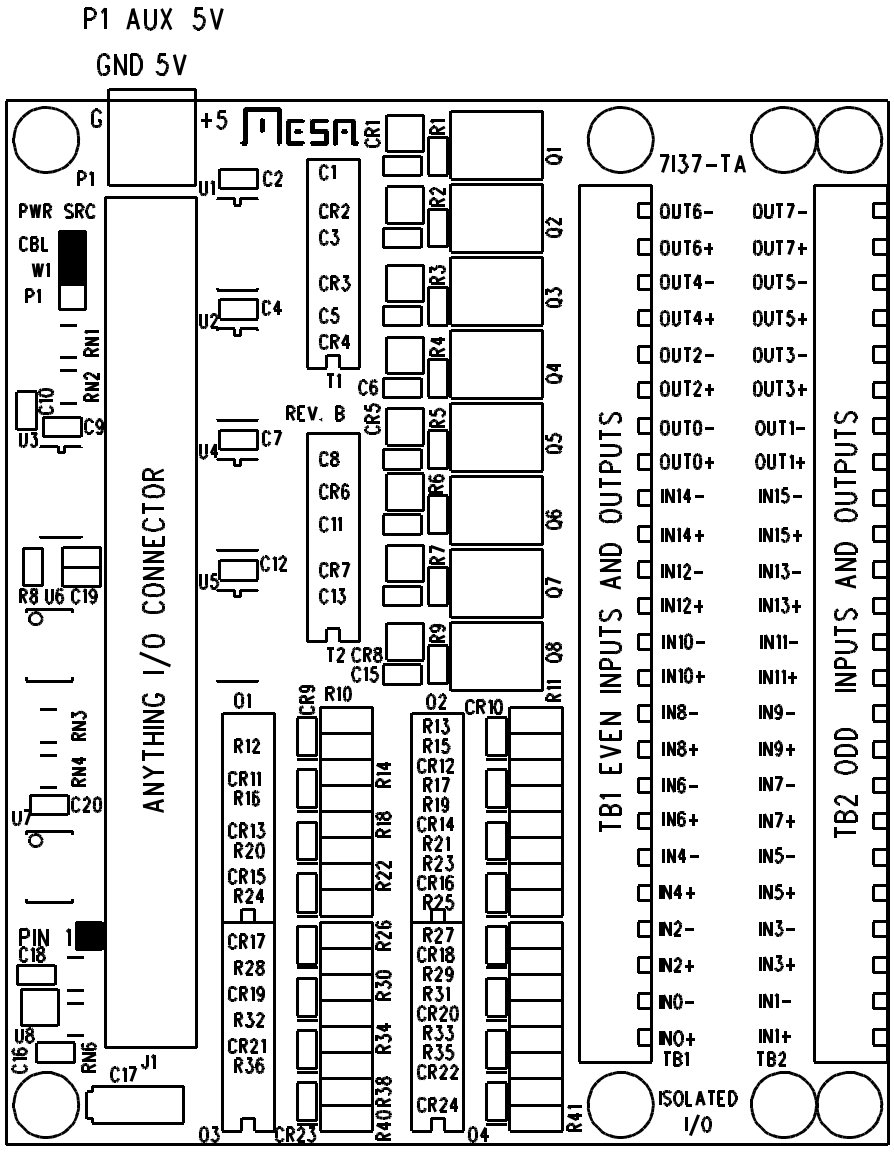
7I37 CONNECTOR LOCATIONS

AUX POWER CONNECTOR



CONNECTORS

7I37TA CONNECTOR LOCATIONS



CONNECTORS

CONTROLLER CONNECTOR

50 pin header connector J1 connects to the IO card that controls the 7I37 isolated I/O card. This can be a male 50 pin header on the top of the 7I37 card or a female 50 conductor header on the bottom side of the 7I37 depending on 7I37 model:

PIN	FUNCTION	DIRECTION	PIN	FUNCTION	DIRECTION
1	IN0	FROM 7I37	25	IN12	FROM 7I37
3	IN1	FROM 7I37	27	IN13	FROM 7I37
5	IN2	FROM 7I37	29	IN14	FROM 7I37
7	IN3	FROM 7I37	31	IN15	FROM 7I37
9	IN4	FROM 7I37	33	OUT0	TO 7I37
11	IN5	FROM 7I37	35	OUT1	TO 7I37
13	IN6	FROM 7I37	37	OUT2	TO 7I37
15	IN7	FROM 7I37	39	OUT3	TO 7I37
17	IN8	FROM 7I37	41	OUT4	TO 7I37
19	IN9	FROM 7I37	43	OUT5	TO 7I37
21	IN10	FROM 7I37	45	OUT6	TO 7I37
23	IN11	FROM 7I37	47	OUT7	TO 7I37
Note: all even pins are grounded.			49	+5V PWR	TO 7I37

AUX 5V POWER

4 pin header P1 or 2 pin terminal block P1 can be used to supply 5V power to the 7I37 if the controller cable is too long and voltage drop too high. P1 has the following pinout:

PIN	FUNCTION	PIN	FUNCTION
1	5V	1	5V (Square pad)
2	GND	2	GND
3	GND		
4	5V		

Four pin header is used on 7I37T, 7I37TA rev. D and earlier and 7I37 rev. B and earlier. Two pin terminal block is used on 7I37TA rev. E and later and 7I37 rev. C and later.

CONNECTORS

50 PIN ISOLATED I/O CONNECTOR

The 7I37 uses 50 pin header J2 for isolated I/O header J2 pinout is as follows:

PIN	FUNCTION	DIRECTION	PIN	FUNCTION	DIRECTION
1	IBIT0+	TO 7I37	2	IBIT0-	TO 7I37
3	IBIT1+	TO 7I37	4	IBIT1-	TO 7I37
5	IBIT2+	TO 7I37	6	IBIT2-	TO 7I37
7	IBIT3+	TO 7I37	8	IBIT3-	TO 7I37
9	IBIT4+	TO 7I37	10	IBIT4-	TO 7I37
11	IBIT5+	TO 7I37	12	IBIT5-	TO 7I37
13	IBIT6+	TO 7I37	14	IBIT6-	TO 7I37
15	IBIT7+	TO 7I37	16	IBIT7-	TO 7I37
17	IBIT8+	TO 7I37	18	IBIT8-	TO 7I37
19	IBIT9+	TO 7I37	20	IBIT9-	TO 7I37
21	IBIT10+	TO 7I37	22	IBIT10-	TO 7I37
23	IBIT11+	TO 7I37	24	IBIT11-	TO 7I37
25	IBIT12+	TO 7I37	26	IBIT12-	TO 7I37
27	IBIT13+	TO 7I37	28	IBIT13-	TO 7I37
29	IBIT14+	TO 7I37	30	IBIT14-	TO 7I37
31	IBIT15+	TO 7I37	32	IBIT15-	TO 7I37

CONNECTORS

50 PIN ISOLATED I/O CONNECTOR

PIN	FUNCTION	DIRECTION	PIN	FUNCTION	DIRECTION
33	OBIT0+	FROM 7I37	34	OBIT0-	FROM 7I37
35	OBIT1+	FROM 7I37	36	OBIT1-	FROM 7I37
37	OBIT2+	FROM 7I37	38	OBIT2-	FROM 7I37
39	OBIT3+	FROM 7I37	40	OBIT3-	FROM 7I37
41	OBIT4+	FROM 7I37	42	OBIT4-	FROM 7I37
43	OBIT5+	FROM 7I37	44	OBIT5-	FROM 7I37
45	OBIT6+	FROM 7I37	46	OBIT6-	FROM 7I37
47	OBIT7+	FROM 7I37	48	OBIT7-	FROM 7I37

Pins 49 and 50 of J2 are unused.

CONNECTORS

TERMINAL BLOCK ISOLATED I/O CONNECTORS

The 7I37TA uses 3.5 mm pluggable screw terminal blocks TB1 and TB2 for isolated I/O. TB1 pinout is as follows:

TB1

PIN	FUNCTION	DIRECTION	PIN	FUNCTION	DIRECTION
1	IBIT0+	TO 7I37	2	IBIT0-	TO 7I37
3	IBIT2+	TO 7I37	4	IBIT2-	TO 7I37
5	IBIT4+	TO 7I37	6	IBIT4-	TO 7I37
7	IBIT6+	TO 7I37	8	IBIT5-	TO 7I37
9	IBIT8+	TO 7I37	10	IBIT8-	TO 7I37
11	IBIT10+	TO 7I37	12	IBIT10-	TO 7I37
13	IBIT12+	TO 7I37	14	IBIT12-	TO 7I37
15	IBIT14+	TO 7I37	16	IBIT14-	TO 7I37
17	OBIT0+	FROM 7I37	18	0BIT0-	FROM 7I37
19	OBIT2+	FROM 7I37	20	OBIT2-	FROM 7I37
21	OBIT4+	FROM 7I37	22	OBIT4-	FROM 7I37
23	OBIT6+	FROM 7I37	24	OBIT6-	FROM 7I37

CONNECTORS

TERMINAL BLOCK ISOLATED I/O CONNECTORS

TB2

PIN	FUNCTION	DIRECTION	PIN	FUNCTION	DIRECTION
1	IBIT1+	TO 7I37	2	IBIT1-	TO 7I37
3	IBIT3+	TO 7I37	4	IBIT3-	TO 7I37
5	IBIT5+	TO 7I37	6	IBIT5-	TO 7I37
7	IBIT7+	TO 7I37	8	IBIT7-	TO 7I37
9	IBIT9+	TO 7I37	10	IBIT9-	TO 7I37
11	IBIT11+	TO 7I37	12	IBIT11-	TO 7I37
13	IBIT13+	TO 7I37	14	IBIT13-	TO 7I37
15	IBIT15+	TO 7I37	16	IBIT15-	TO 7I37
17	OBIT1+	FROM 7I37	18	0BIT1-	FROM 7I37
19	OBIT3+	FROM 7I37	20	OBIT3-	FROM 7I37
21	OBIT5+	FROM 7I37	22	OBIT5-	FROM 7I37
23	OBIT7+	FROM 7I37	24	OBIT7-	FROM 7I37

TERMINAL BLOCK KEYING

The I/O terminal blocks on the 7I37TA are supplied with three 8 pin screw terminal plugs. To prevent accidental misconnection if wired plugs are removed and replaced. It may be desirable to key the plugs so they can only be inserted in their proper receptacle location. The screw terminal plugs are keyed by clipping certain of the small green polarizing tabs on the screw terminal plugs and installing blocking plugs (these are thin orange plastic pieces) in the corresponding slot in the receptacle. A suggested keying pattern for TB1 is keys at pins 2, 8, 12, 16, 21, 24 and for TB2 is keys at pins 1, 4, 9, 13, 17, 22.

OPERATION

CONTROLLER REQUIREMENTS

PINOUT

The 7I37 is intended to operate with I/O cards that have 24 I/O bits and IO module rack type connector pinouts (50 pin connector, all even pins grounded, +5 power on pin 49).

POLARITY

All controller interface pins are active low. This means a low controller output indicates power applied to an opto-isolated input. A low output activates the corresponding output MOSFET.

I/O VOLTAGES

The 7I37 accepts 3.3V or 5V signals and drives the FPGA card with 3.3V signals so is compatible with 5V and 3.3V FPGA cards.

TIMING

MOSFET outputs turn on in ~3 uSec and off in ~7 uSec. Opto-isolated inputs turn on on ~5 uSec and off in ~25 uSec.

INPUT CHARACTERISTICS

The opto-isolated inputs have 4.4K Ohm series resistors and reverse input protection diodes across the opto-isolator LEDS. Input current an the maximum 24V input is approximately 5mA. The isolated inputs will work with input voltages from 4 to 24V.

Note: The reverse input protection diodes are red LEDs. If you see a red LED illuminated, this means you have reverse polarity DC or AC voltage applied to an input.

OUTPUT CHARACTERISTICS

OUTPUT TRANSISTORS

The 7I37 outputs are small MOSFET power transistors with an on resistance of approximately 0.25 Ohms, giving a saturation voltage of ~0.25V at full (1A) load. The OBITx+ pins are the MOSFET drain connections and the OBITx- pins are the MOSFET source connections. The MOSFETs have a built in drain-source diode.

INDUCTIVE LOADS

If the 7I37 outputs are used to switch inductive loads such as relays, some provision for limiting the turn-off spike must be provided, such as a free wheeling diode across the load or a R/C snubber.

OPERATION

OUTPUT CHARACTERISTICS

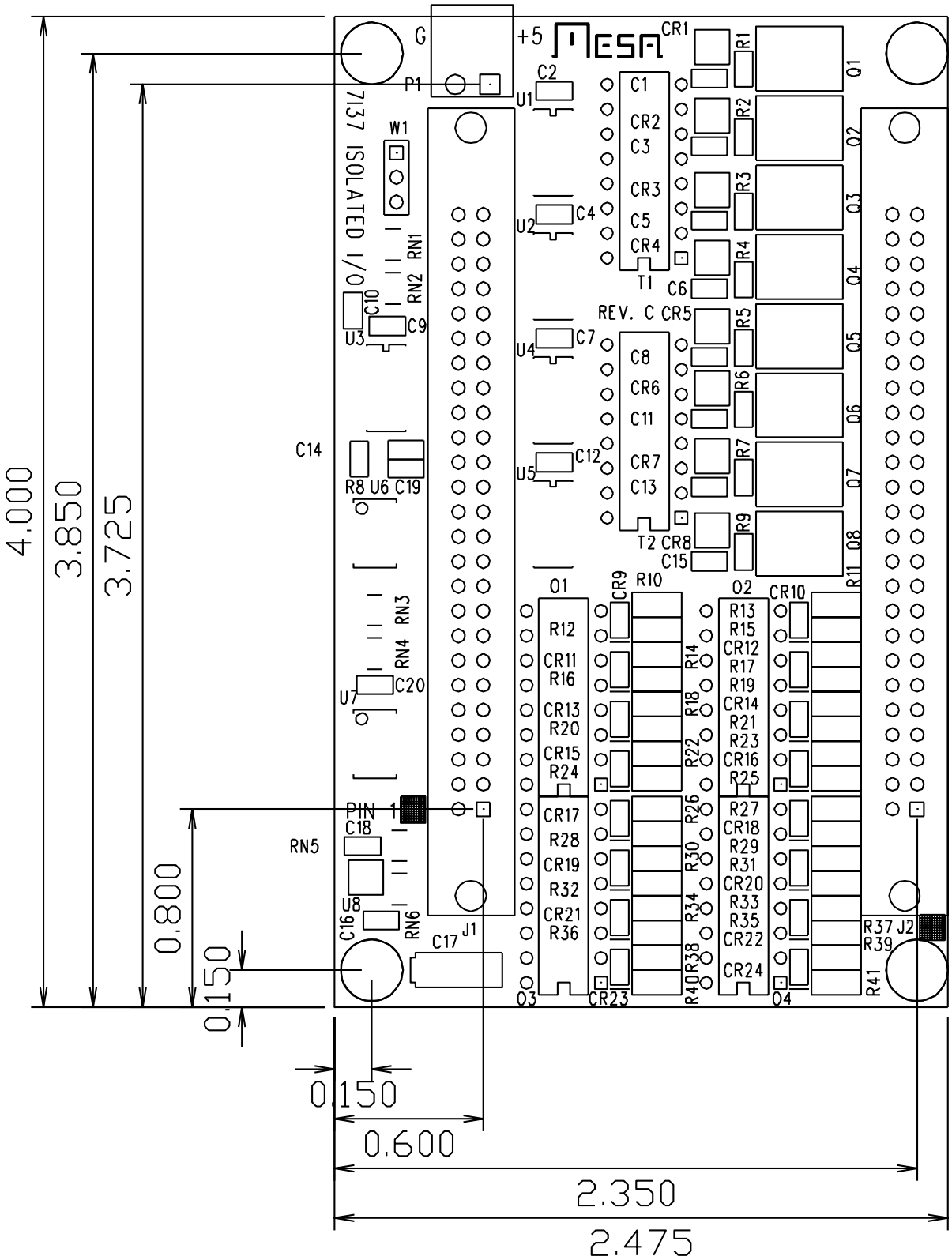
AC LOADS

The 7I37 can drive low voltage (up to 24VAC) AC loads by series connecting two outputs. For example a 24V AC switch could be created by connecting OBIT0+ to OBIT1+ and using OBIT0- and OBIT1- as the output leads. An output snubber circuits should be used across inductive loads. For AC switching, both output bits should change at the same time

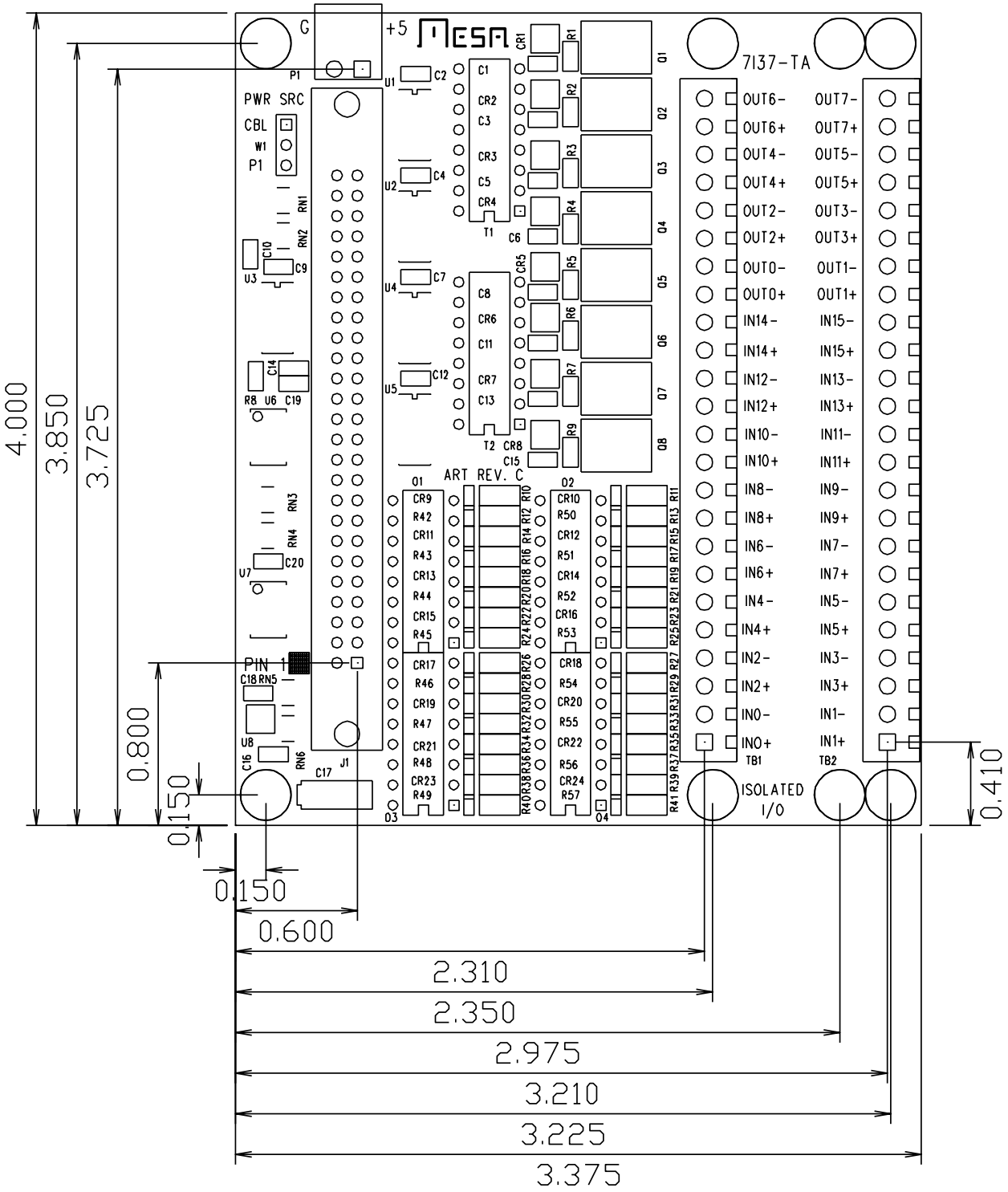
SPECIFICATIONS

	MIN	MAX	UNITS
5V POWER SUPPLY	4.5V	5.5V	VDC
5V POWER CONSUMPTION	---	50	mA
INPUT RANGE	4V	28V	VDC
INPUT CURRENT	---	5	mA
OUTPUT VOLTAGE	---	48V	VDC
OUTPUT CURRENT	---	1A	A
ISOLATION VOLTAGE1	---	500	VDC
(Between controller and any isolated I/O)			
ISOLATION VOLTAGE2	---	100	VDC
(Between any isolated input or output)			
OPERATING TEMP.	0	+70	^{o}C
OPERATING TEMP. (-I version)	-40	+85	^{o}C
OPERATION HUMIDITY	0	95%	NON-COND

DRAWINGS


4.000
3.850
3.725
0.800
0.150
0.150
0.600
2.350
2.475
7I37 ISOLATED I/O
REV. C
MESA
P1
W1
J1
J2
PIN 1

DRAWINGS


7I37-TA
ART REV. C
PWR SRC
CBL
PIN 1
ISOLATED I/O
4.000
3.850
3.725
0.800
0.150
0.410
0.150
0.600
2.310
2.350
2.975
3.210
3.225
3.375