TEXAS INSTRUMENTS

(EVM) EVALUATION MODULE DOCUMENTATION

TUSB4KHUB (USB 4-Port Hub)
&
TUSB7KHUB (USB 7-Port Hub)

The majority of the enclosed information is supplied by Selectron Texas as documentation for the test boards designed and built by Selectron Texas for Texas Instruments, Inc.

Published 5/11/97

Texas Instruments USB Products

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Texas Instruments USB Products

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TUSBK7HUB

Schematics
Bill of Materials and Components List
Part Placement Diagram
Board Description
Board Layer Plots

TUSB4KHUB

(4-Port USB EVM Board)

REVISIONS			
REV	ECN NO / CLASS / DRAFTER / DATE	DATE	APPROVED

QTY	ITEM NO	PART OR IDENTIFYING NUMBER	NOMENCLATURE II DESCRIPTION	NOTES
NEXT ASSY	USED ON			
APPLICATION				

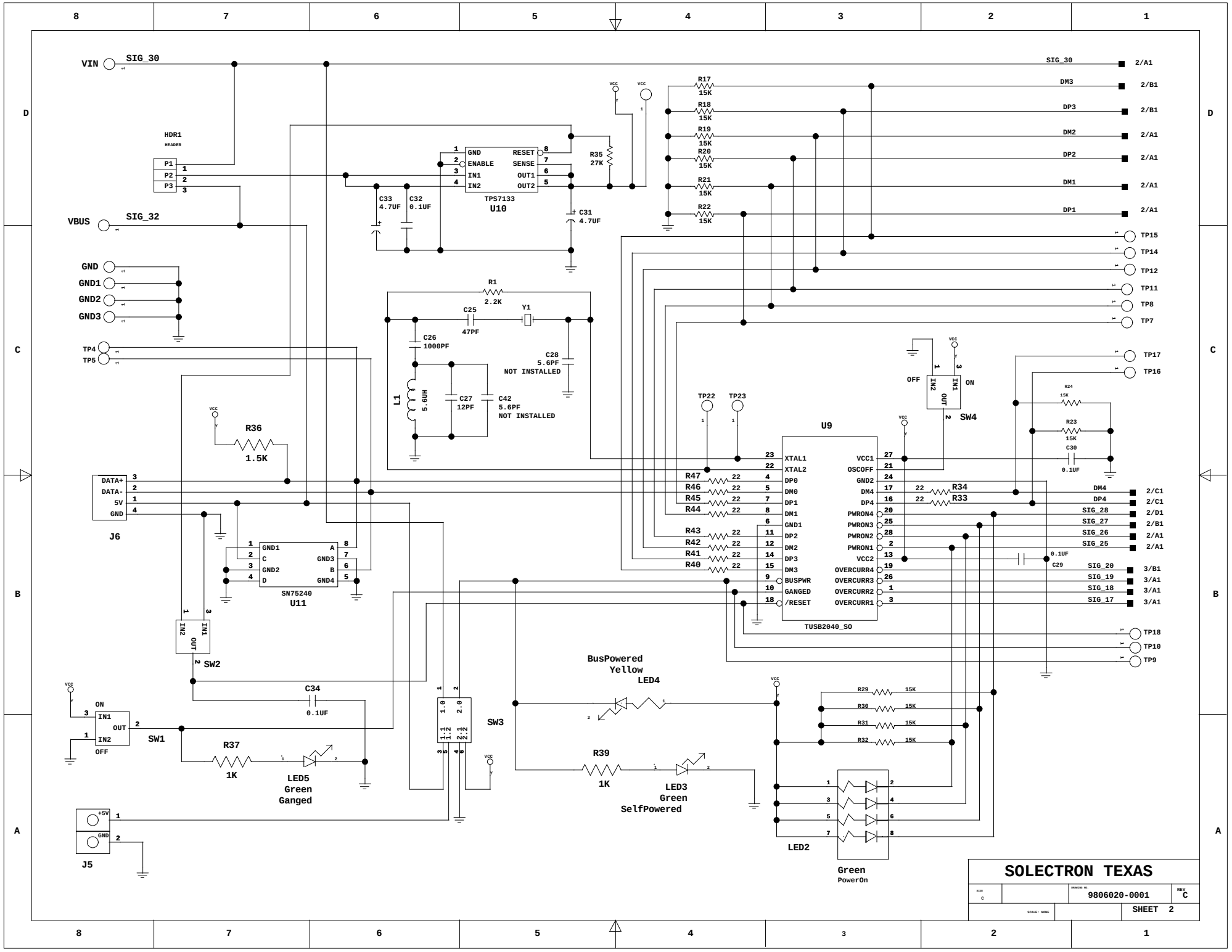
DWN:	TOMMY MEDRANO
CHK	
ENGR-DSGN	
ENGR-MGR	
QA	
MFG	
PROD SAF	
PLSE	

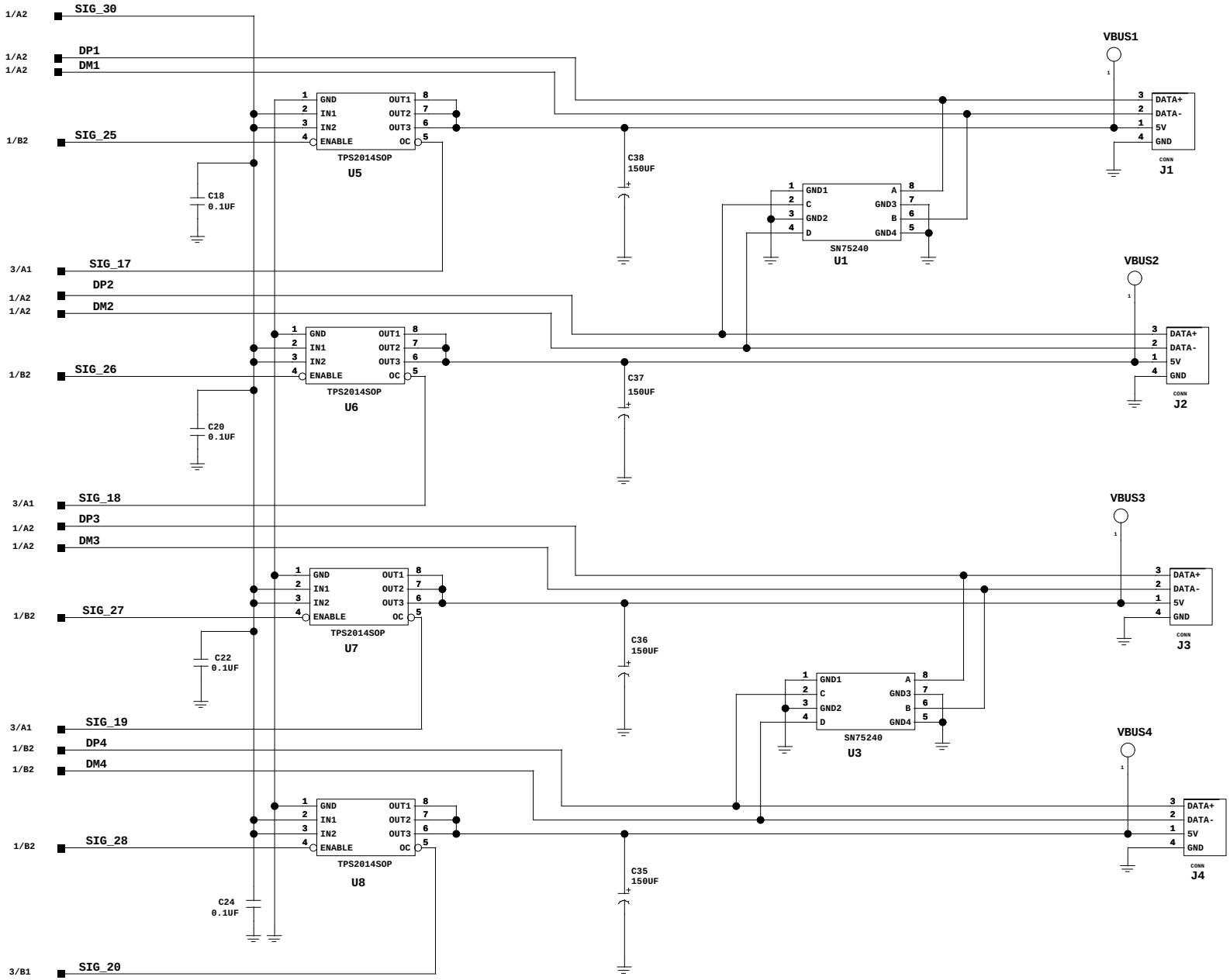
SOLECTRON TEXAS

LOGIC DIAGRAM

TUSBK4HUB

SIZE		DRAWING NO.
C		9806020-9901
SCALE:	10-14-1997_7:49	SHEET 1 OF 4


VIN
SIG_30
VBUS
SIG_32
GND
GND1
GND2
GND3
TP4
TP5
HDR1
HEADER
P1
P2
P3
TPS7133
U10
GND
ENABLE
IN1
IN2
RESET
SENSE
OUT1
OUT2
R35
27K
C33
4.7UF
C32
0.1UF
C31
4.7UF
R17
15K
R18
15K
R19
15K
R20
15K
R21
15K
R22
15K
SIG_30
2/A1
DM3
2/B1
DP3
2/B1
DM2
2/A1
DP2
2/A1
DM1
2/A1
DP1
2/A1
TP15
TP14
TP12
TP11
TP8
TP7
R1
2.2K
C25
47PF
Y1
C26
1000PF
C28
5.6PF
NOT INSTALLED
L1
5.6UH
C27
12PF
C42
5.6PF
NOT INSTALLED
TP22
TP23
U9
TUSB2040_SO
XTAL1
XTAL2
DP0
DM0
DP1
DM1
GND1
DP2
DM2
DP3
DM3
BUSPWR
GANGED
/RESET
VCC1
OSCOFF
GND2
DM4
DP4
PWRON4
PWRON3
PWRON2
PWRON1
VCC2
OVERCURR4
OVERCURR3
OVERCURR2
OVERCURR1
R47
R46
R45
R44
R43
R42
R41
R40
22
OFF
ON
SW4
R24
15K
R23
15K
C30
0.1UF
TP17
TP16
R34
R33
DM4
2/C1
DP4
2/C1
SIG_28
2/D1
SIG_27
2/B1
SIG_26
2/A1
SIG_25
2/A1
0.1UF
C29
SIG_20
3/B1
SIG_19
3/A1
SIG_18
3/A1
SIG_17
3/A1
TP18
TP10
TP9
R36
1.5K
DATA+
DATA-
5V
GND
J6
SN75240
U11
GND1
C
GND2
D
A
GND3
B
GND4
SW2
SW1
C34
0.1UF
R37
1K
LED5
Green
Ganged
SW3
BusPowered
Yellow
LED4
R39
1K
LED3
Green
SelfPowered
R29
R30
R31
R32
15K
LED2
Green
PowerOn
J5
+5V
GND
SOLECTRON TEXAS
9806020-0001
REV
C
SHEET 2



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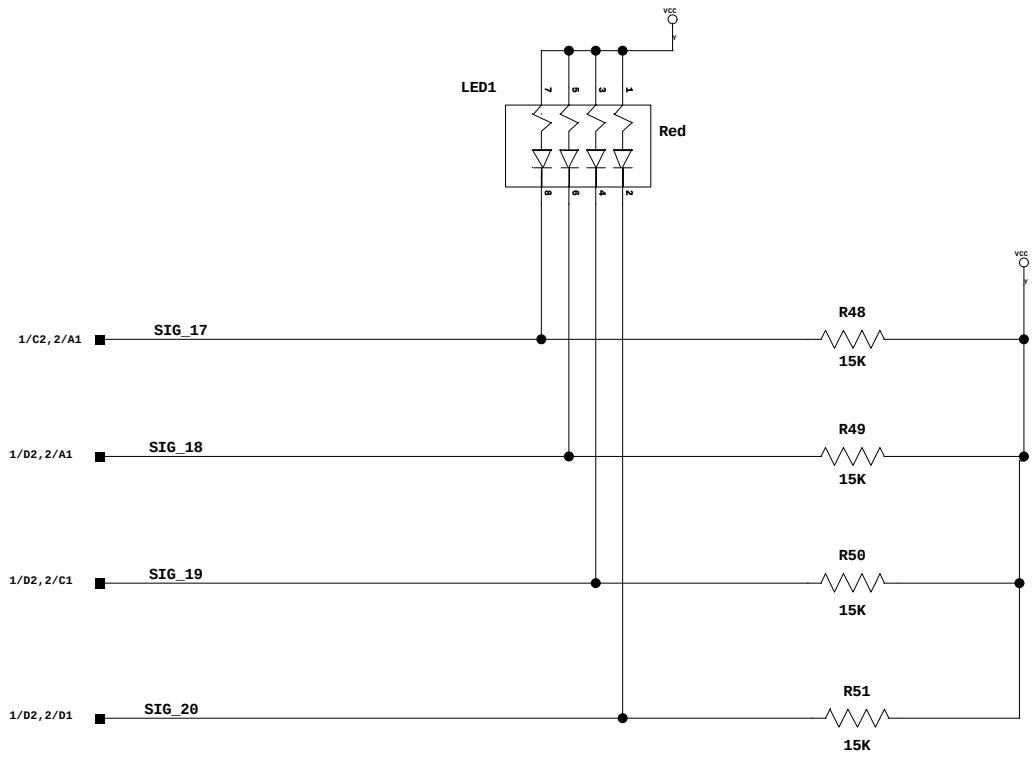
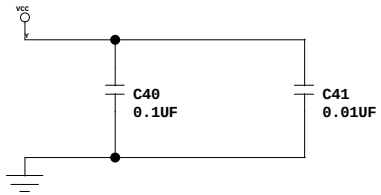
SCALE: NONE			SHEET 3





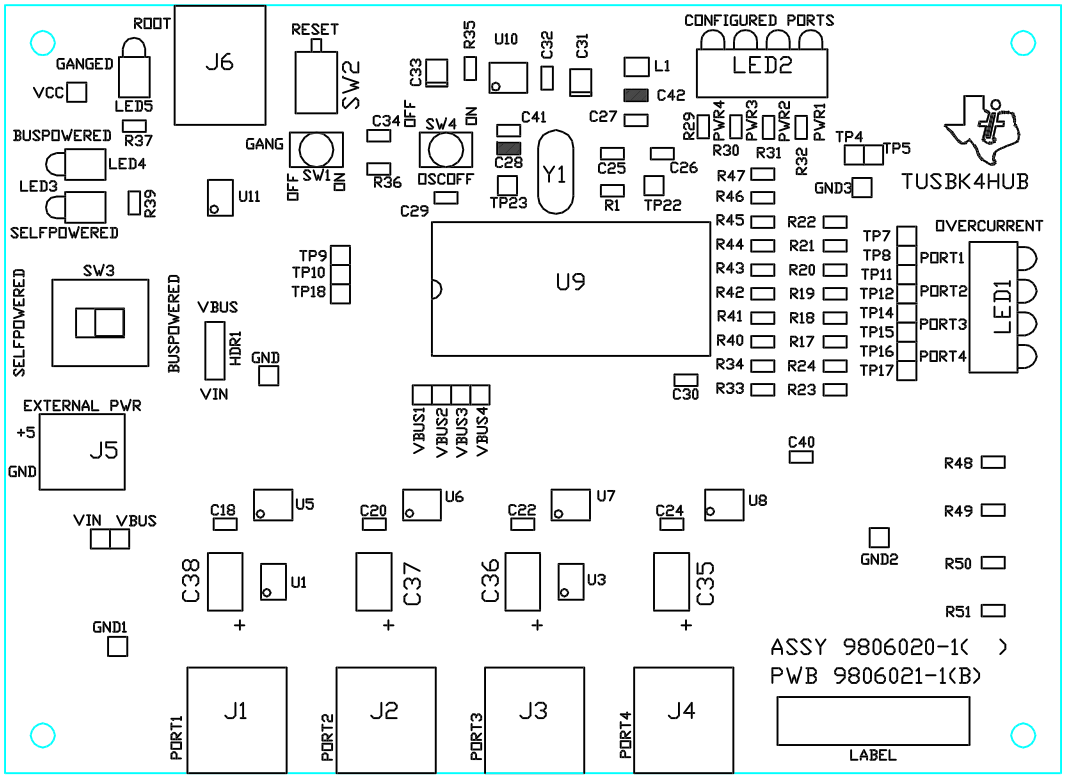
SOLECTRON TEXAS			
SIZE C		DRAWING NO 9806020-0001	REV C
SCALE: NONE		SHEET 4	

TUSBK4HUB EVM Card P/N 9806020-1 Rev B Assembly / Rev B PWB
(made for Texas Instruments by Solectron Texas)

DESCRIPTION	Supplier	Part Number	Pkg	Qty	Reference Designator
USB connector, series A	AMP	787616-2	th_con_1x4	4	J1 J2 J3 J4
USB connector, series B	AMP	787780-1	th_con_2x2	1	J6
Power connector	Phoenix Contact	MKDS 3/2-5,08	th_con_1x2	1	J5
Socket 28-DIP .300 mil	AMP	2-641605-3	dip-28	1	XU9
Switch, SPDT	C&K	GS01MCKE	switch_1x3	2	SW1 SW4
Switch, pushbutton, SPDT	C&K	GP12MV3KE	switch_1x3_v3	1	SW2
slide switch, 2PDT	C&K	CKN5003-ND	th_sw_dpdt6	1	SW3
LED - red (4 w/Res)	Dialight	551-0507-004	led_4	1	LED1
LED - green (4/Res)	Dialight	551-0607-004	led_4	1	LED2
LED - yellow (w/Resistor)	NEWARK	50F1584	led_1	1	LED4
LED Grn	Dialight	551-0207	led_1	2	LED3 LED5
47pF CAP	KEMET	C1206C470M5RAC	1206	1	C25
.1uF CAP	KEMET	C1206C104K5RAC	1206	9	C18 C20 C22 C24
					C29 C30 C32 C34 C40
4.7uF CAP, Elect, 10V	KEMET	T491B475K010AS	3528	2	C31 C33
22 ohm, RES 1206	KOA	RM73B2BT220J	1206	10	R33 R34 R40-R47
1K, 5% ohm, RES 1206	KOA	RM73B2BT102J	1206	2	R37 R39
1.5K,1%	KOA	RK73H2BT1521F	1206	1	R36
15K, 2%	KOA	RM73B2BT153G	1206	16	R17-R24 R29-R32 R48-R51
27K RES, 5% 1206	KOA	RM73B2BT273J	1206	1	R35
48MHz crystal	US Crystal	HC-18/U 48MHz	th_rad_192	1	Y1
Header, 8-pin single row	SAMTEK	TSW-108-07-G-S	th_hdr_8	1	TP7-17
Header, 3-pin single row	Samtec	TSW-103-07-G-S	th_hdr_3	3	hdr1 tp9,10,18 vbus1-3
Power module	TI	TPS2014D	so8_288	4	U5 U6 U7 U8
TPS7133	TI	TPS7133QD	so8_288	1	U10
Transient suppressor	TI	SN75240PWLE	ssop-8	3	U1 U3 U11
TUSB2040	TI	TUSB2040N	dip-28	1	U9
Header, 1-pin	Samtek	TSW-101-07-G-S	th_hdr_1	12	Vin Vbus Gnd Gnd1 Gnd2 Gnd3
					Vcc vbus4 TP4 TP5 TP22 TP23
2.2K RES, 5% 1206	KOA	RM73B2BT222J	1206	1	R1
5.6pF CAP,1206	KEMET	C1206C569K5RAC	1206	2	**NO LOAD C28 C42**
12pF CAP,1206	KEMET	C1206C120K5RAC	1206	1	C27
1000pF CAP, 1206	KEMET	C1206C102K5RAC	1206	1	C26
5.6uH INDUCTOR	TDK	NL322522T-5R6K	1210	1	L1
150uF CAP, Elect, 10V	KEMET	T491X157K010AS	7343	4	C35 C36 C37 C38
0.01uF CAP	KEMET	C1206C103K5RAC	1206	1	C41
Jumper Plug - shunt	Samtek	SNT-100-BK-G	jmpr	1	hdr1

DESIGNED AND MANUFACTURED FOR:

TEXAS INSTRUMENTS BY SOLECTRON TEXAS



INDICATES THIS COMPONENT NOT POPULATED FOR THIS DASH NUMBER.

TUSBK4HUB CARD
ASSY 9806020-0001 REV '*'
PWB 9806021-0001 REV 'B'

TUSBK4HUB - TUSB2040 EVM BOARD DESCRIPTION

PART#	BOARD LABEL	BOARD LOCATION	FUNCTIONAL DESCRIPTION
U9	N/A	28-pin dip package	TI USB hub chip (TUSB2040N)
J6	Root	Square female silver connector	Root port (type B connector) which provides USB input from upstream device
J5	EXTERNAL PWR +5 ; GND	Large green connector with two screws	+5V & GRD (0.0V) connector for external power supply
SW3	SELFPOWERED BUSPOWERED	Large red switch with silver top	Switch pulls pin#9 of the TI USB hub chip to VCC for Self-power & to 0.0V for Bus-power mode
Y1	N/A	Next to TI USB hub chip (U9)	Crystal in tall, slim silver can
U10	N/A	Next to crystal (Y1)	TI 3.3V Low Dropout Voltage Regulator (TPS7133QD)
U11	N/A	Next to USB root port (J6)	TI Dual USB Port Transient Suppresser (SN75240PWLE) for USB root port (J6)
U1	N/A	Next to USB downstream port (J1)	TI Dual USB Port Transient Suppresser (SN75240PWLE) for USB downstream ports J1 & J2
U3	N/A	Next to USB downstream port (J3)	TI Dual USB Port Transient Suppresser (SN75240PWLE) for USB downstream ports J3 & J4
U5,U6, U7,U8	N/A	Next to USB downstream ports	TI Power Distribution Switches (TPS2014D)
J1 - J4	PORT1 - PORT4	Rectangular silver USB connector	USB downstream port (type A connector)
HDR1	VBUS	Next to green power connector (J5)	When jumper is VBUS & center pin, the USB hub chip is powered through pin #1 of the USB root port
HDR1	VIN	Next to green power connector (J5)	When jumper is VIN & center pin, the USB hub chip is externally powered though J5
SW2	RESET	Push button switch next to USB root port (J6)	Pushing this switch resets all LEDs & USB hub logic NOTE: First disconnect cable from USB Root Port (J6)
SW1	GANG ON ; OFF	Next to USB root port (J6)	Switch pulls pin#10 of the USB hub chip to 3.3 V for Ganged mode & 0.0 V for individual port power management mode (ON=GANGED)
SW4	OSCOFF ; ON	Next to crystal (Y1)	Switch turns the internal oscillator in the USB hub chip on & off
LED5	GANGED	Green LED next to USB root port (J6)	Illuminated when chip is in GANGED mode
LED4	BUSPOWERED	Yellow LED next to USB root port (J6)	Illuminated when TI USB hub chip power is supplied by USB cable (Bus-Powered)
LED3	SELFPOWERED	Green LED next to BUSPOWERED LED	Illuminated when TI USB hub chip power is supplied by green power connector J5 (Self-Powered)
LED2	CONFIGURED PORTS PWR1 - PWR4	Set of 4 green LEDs	Illuminated when corresponding ports are configured by USB host
LED1	OVERCURRENT PORT1 - PORT4	Set of 4 red LEDs	Illuminated if corresponding ports are in an over-current condition ; PORT1-PORT4 corresponds to USB downstream ports 1,2,3,4 respectively
Test Point	TP22	Next to TI USB hub chip (U9)	XTAL2 crystal positive feedback from the TI USB hub chip (U9)
Test Point	TP23	Next to TI USB hub chip (U9)	XTAL1 input from crystal (Y1) to TI USB hub chip (U9)
Test Point	TP4-TP18	N/A	Each point corresponds to the input/output pins of the TI USB hub chip (U9)
Test Point	VCC	Next to GANGED LED (LED5)	3.3 V power for the TI USB hub chip
Test Point	VIN	Part of HDR1 jumper header	VIN is connected to +5 pin of the green power connector (J5)
Test Point	VBUS	Part of HDR1 jumper header	VBUS is connected to pin #1 of the USB root port (J6)
Test Point	GND, GND1, GND2, GND3	N/A	Ground (0.0 V) plane test points
Test Point	VBUS1 - VBUS4	Next to USB hub chip (U9)	Signal test points for USB output signals with each test point corresponding to pin #1 of the USB type A connector

USB Root Input Port (J6)

Pin #1	Pin#2	Pin #3	Pin #4
Power (+5V)	DM (-)	DM (+)	Ground (0.0V)

DWG. NO 9806021 SHT. 1

NOTES: UNLESS OTHERWISE SPECIFIED

1. HOT AIR SOLDER LEVEL PER PROCESS 1.
2. FINISHED BOARD SHALL MEET UL 94V-0 FLAMMABILITY RATING AND BE MARKED WITH THE REQUIRED UL CODE NUMBER.
3. FINISHED BOARD SHALL MEET THE REQUIREMENTS OF ITEM 4.
4. THICKNESS SELECTED AT FABRICATION TO MEET THE TOTAL BOARD THICKNESS SPECIFIED ON THIS DRAWING.
5. MINIMUM COPPER WALL THICKNESS .001
6. RECOMMEND DRILL AT .013 NO BREAKOUT ALLOWED ON INTERNAL LAYERS.
7. ALL HOLES ARE WITHIN .014 TRUE POSITION OF DATUM "0" WHEN PINNED TO PLANE "A".
8. BOARD IS TO BE ELECTRICALLY TESTED BY VENDOR.
9. SOLDERMASK TO BE APPLIED OVER BARE COPPER TO BOTH SIDES OF BOARD PER ARTWORK SUPPLIED AND PROCESS 2.
10. MARK PER PROCESS 3, HEIGHT TO BE CONTROLLED BY ITEM 3. COLOR TO BE CONTRASTING TO THAT OF SUBSTRATE.
11. INTERNAL AND/OR EXTERNAL CORNERS TO BE .06 RADIUS MAXIMUM AT SHOP OPTION.
12. SURFACE LANDS OF THE FINE PITCH DEVICES MUST BE +/- .001 TOLERANCE TO SUPPLIED ARTWORK AT LOCATION

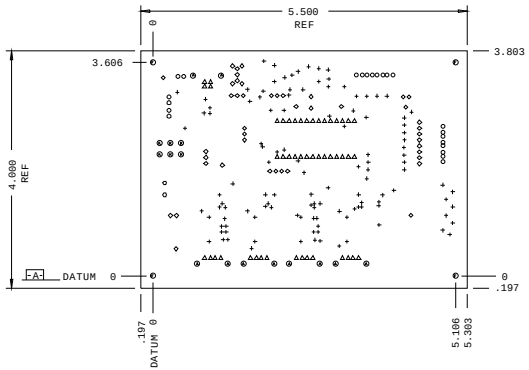
.025 PITCH LOCATION: U1,U3,U11

REVISION LEVEL CONTROL					
THIS DRAWING	A	B			
DRILL TEMPLATE	A	B			
MARKING(TOP)	A	B			
SOLDER PASTE (TOP)	A	B			
8 CONTINUITY TEST	A	B			
LAYER 1 (TOP SIDE)	A	B			
LAYER 2 (GND LAYER)	A	B			
LAYER 3 (VCC LAYER)	A	B			
LAYER 4 (BOTTOM SIDE)	A	B			
SOLDERMASK (TOP SIDE)	A	B			
SOLDERMASK (BOTTOM SIDE)	A	B			

REVISIONS

REV	DESCRIPTION	DATE	APPROVAL
*	PROTOTYPE	09/18/96	
A	ENGINEERING CHANGE	12/13/96	
B	ENGINEERING CHANGE	02/11/97	

	SYM	FINISHED HOLE DIAMETER UNSUPPORTED	FINISHED HOLE DIAMETER PLATED THRU ± .003 [5]	QTY	REMARKS
6	+		.013	119	
	◇		.035	44	
	○		.038	16	
7	△		.039	48	
	◯		.043	6	
	⬭		.051	2	
	Ⓚ		.073	6	
	Ⓐ		.090	10	
	Ⓕ	.120		4	



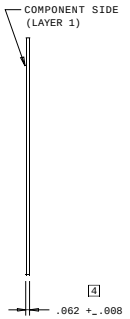


TABLE OF LAYERS			
NO	DESCRIPTION	REMARKS	COPPER WT
L1	TOP LAYER	PADS/ROUTING	1/2 OZ/FT2
L2	PLANE	GROUND	1 OZ/FT2
L3	PLANE	VCC/SPLIT	1 OZ/FT2
L4	BOTTOM LAYER	PADS/ROUTING	1/2 OZ/FT2

QTY	ITEM NO	PART OR IDENTIFYING NUMBER	DESCRIPTION	NOTES
REF	4	IPC-RB-276	PERFORMANCE SPEC. FOR RIGID MULTILAYER PWB	3
REF	3	MP-9806021	MASTER PATTERN (ARTWORK)	10
AR	2	IPC-L-109	GLASS COLTH, PREIMPREGNATED RESIN, (B STAGE)	
AR	1	IPC-L-130	THIN LAMINATE, COPPER CLAD (UL APVD)	2

SEQ NO	IDENT	ADDITIONAL	NOTES
3	MARK	MIL-STD 883(LATEST) METHOD 2015.8	10
2	SDRMSK	IPC-SM-840 L.P.I. TYPE B	9
1	SLDRCT	IPC-D-949(LATEST),CLASS 2 THKNS. .0001 MIN. .002 MAX.	1
	IDENT	CLASSIFICATION	

REV STATUS OF SHEETS: REV B; SH 1

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES +/- 1 °
2 PL DECIMALS +/- .01
3 PL DECIMALS +/- .005

REMOVE ALL BURRS AND SHARP EDGES
CONCENTRICITY MACHINED DIAMETERS .010 FIM
DIMENSIONAL LIMITS APPLY AFTER PROCESSES

HOLE DIAMETER TOLERANCE

.013 +.004 -.001 THRU .125	.126 +.005 -.001 THRU .250	.251 +.006 -.001 THRU .500	
.501 +.008 -.001 THRU .750	.751 +.010 -.001 THRU 1.000	1.001 +.012 -.001 THRU 2.000	

NEXT ASSEMBLY 9806020 USED ON
APPLICATION

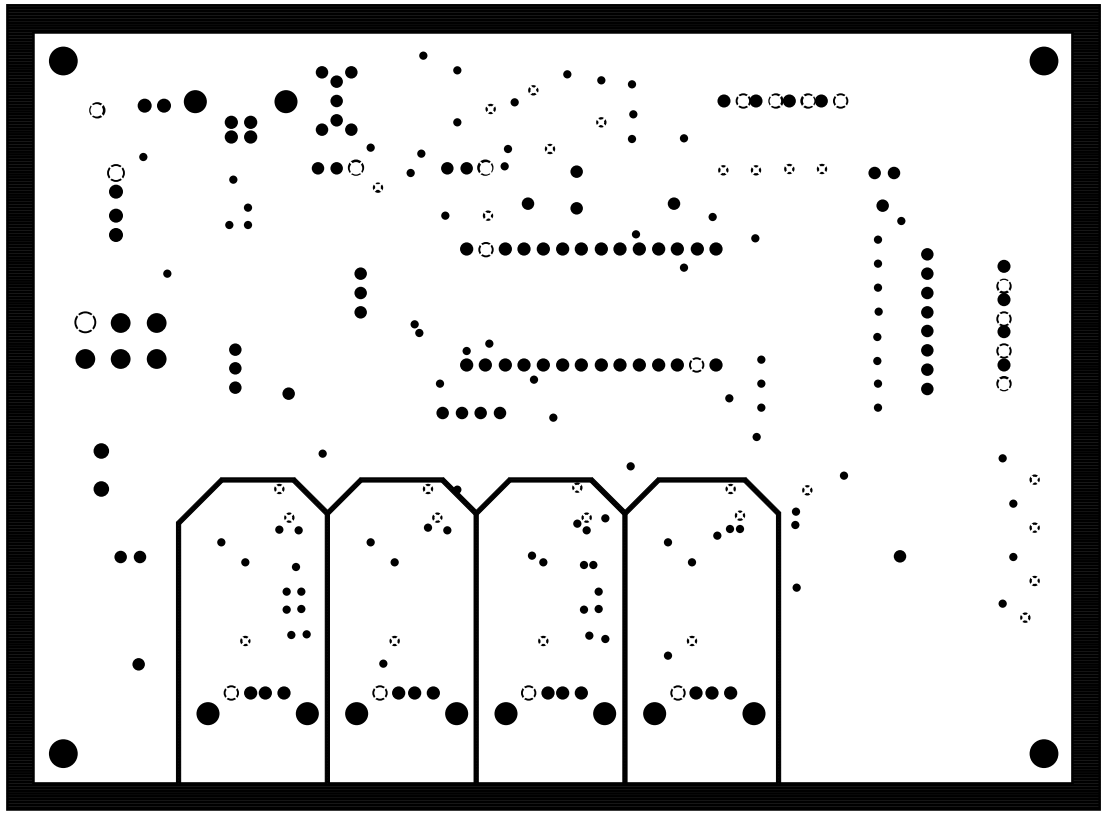
APPROVAL DATE
DRAWN J. RAMOS 09/18/96
CHECKED
RELEASED
RELEASED
RELEASED
PROJ. MGR.

SOLECTRON TEXAS

FABRICATION DRAWING

TUSBK4HUB

SIZE D DWG NO 9806021 REV B
SCALE 1:1 SHEET 1 OF 1



SIGNAL VCC LAYER 3

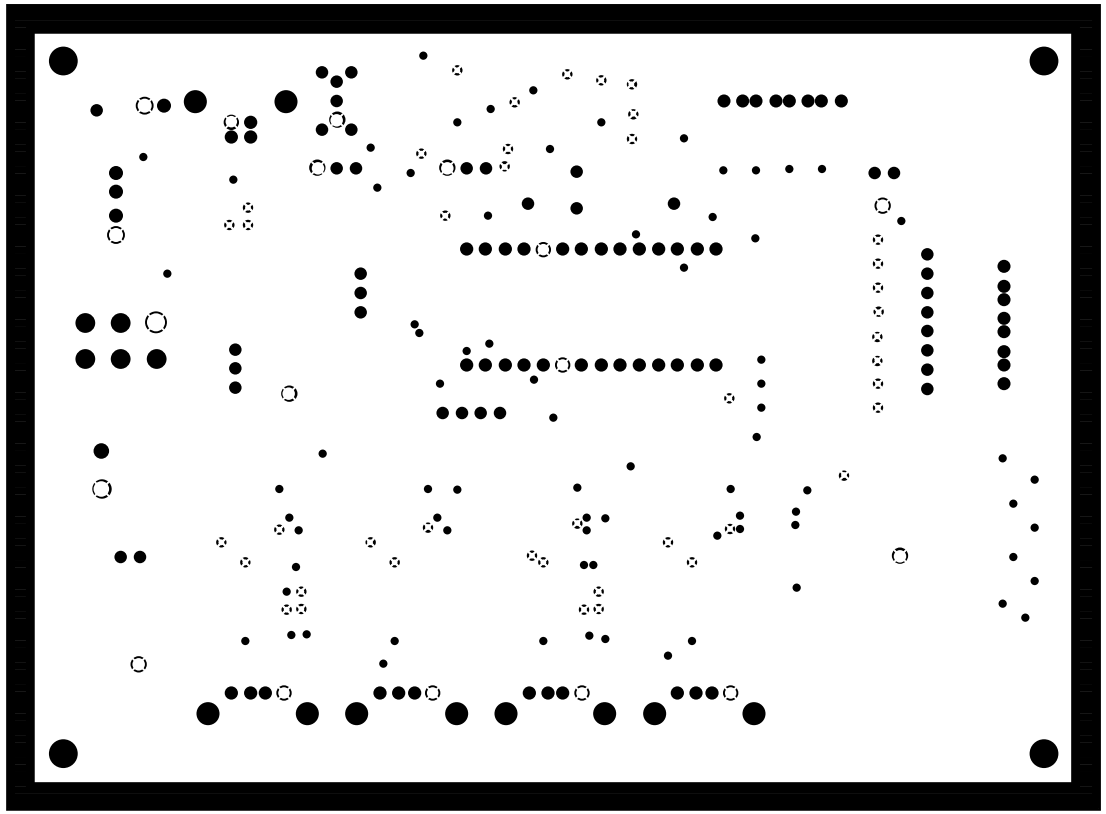
SOLECTRON
TEXAS

CUSTOMER:
TI-MSP

DATE: 02/11/97

BOARD NAME:
TUSBK4HUB

BOARD PART NUMBER AND REVISION:
9806021 REV-B



SIGNAL GND LAYER 2

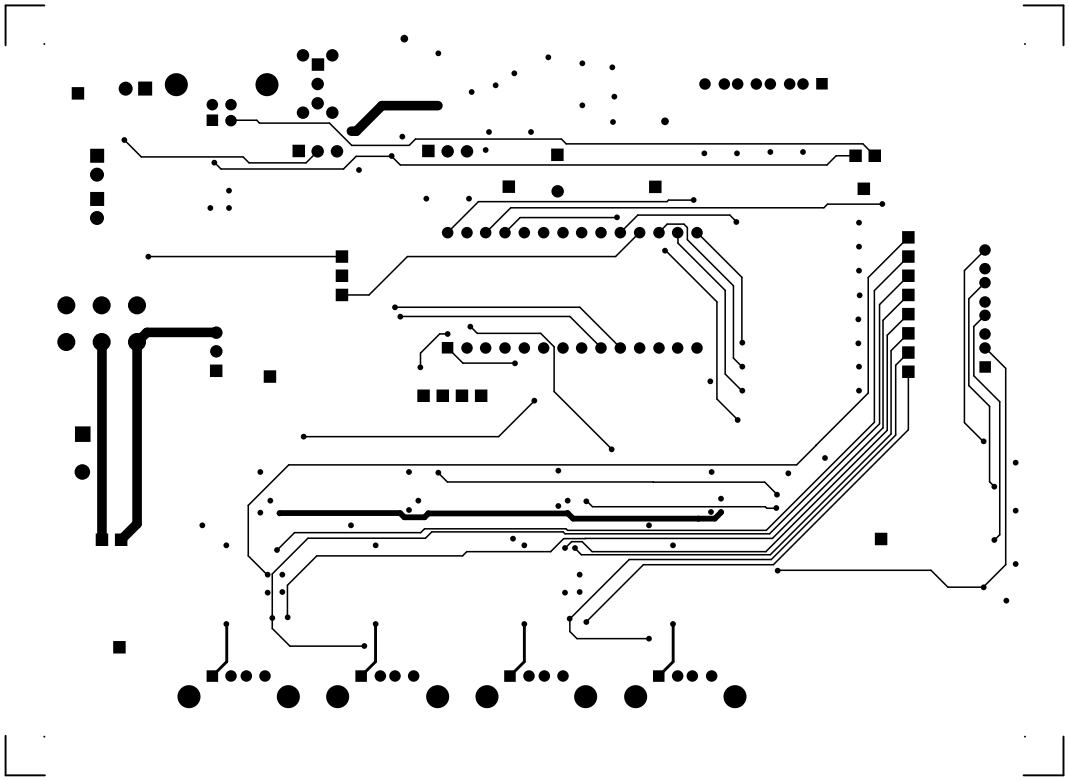
SOLECTRON
TEXAS

CUSTOMER:
TI-MSP

DATE: 02/11/97

BOARD NAME:
TUSBK4HUB

BOARD PART NUMBER AND REVISION:
9806021 REV-B



BOTTOM SIDE LAYER 4

SOLECTRON
TEXAS

CUSTOMER:

TI-MSP

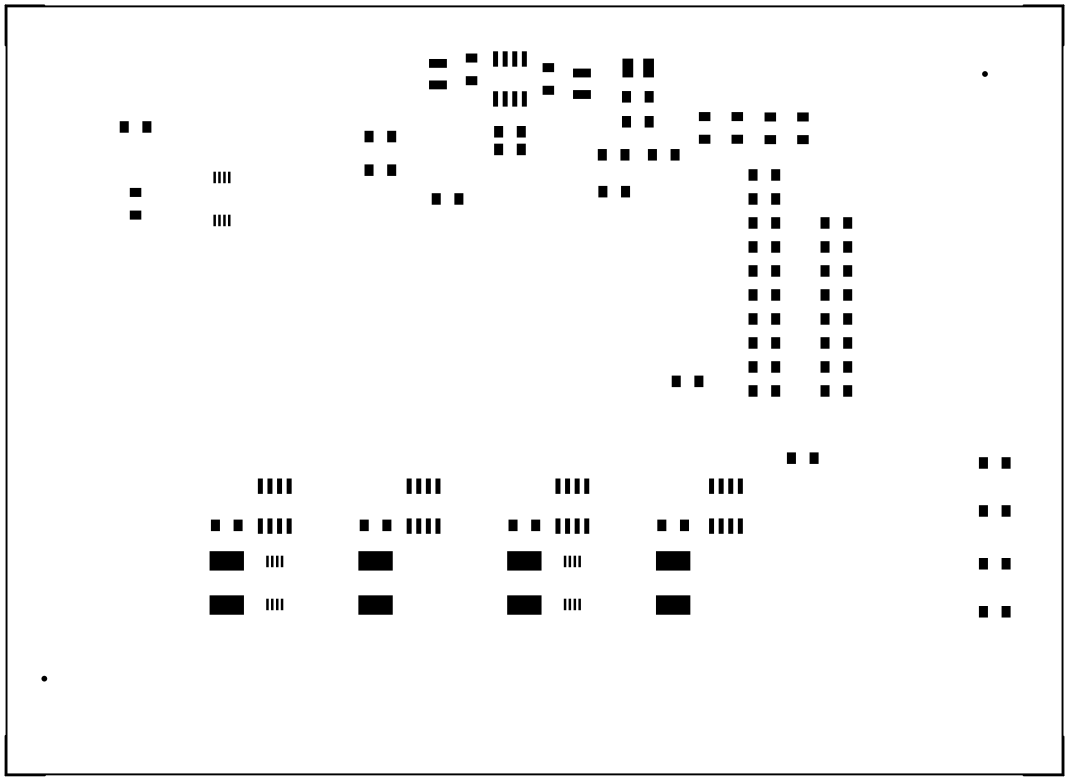
DATE: 02/11/97

BOARD NAME:

TUSBK4HUB

BOARD PART NUMBER AND REVISION:

9806021 REV-B



PASTEMASK TOP SIDE

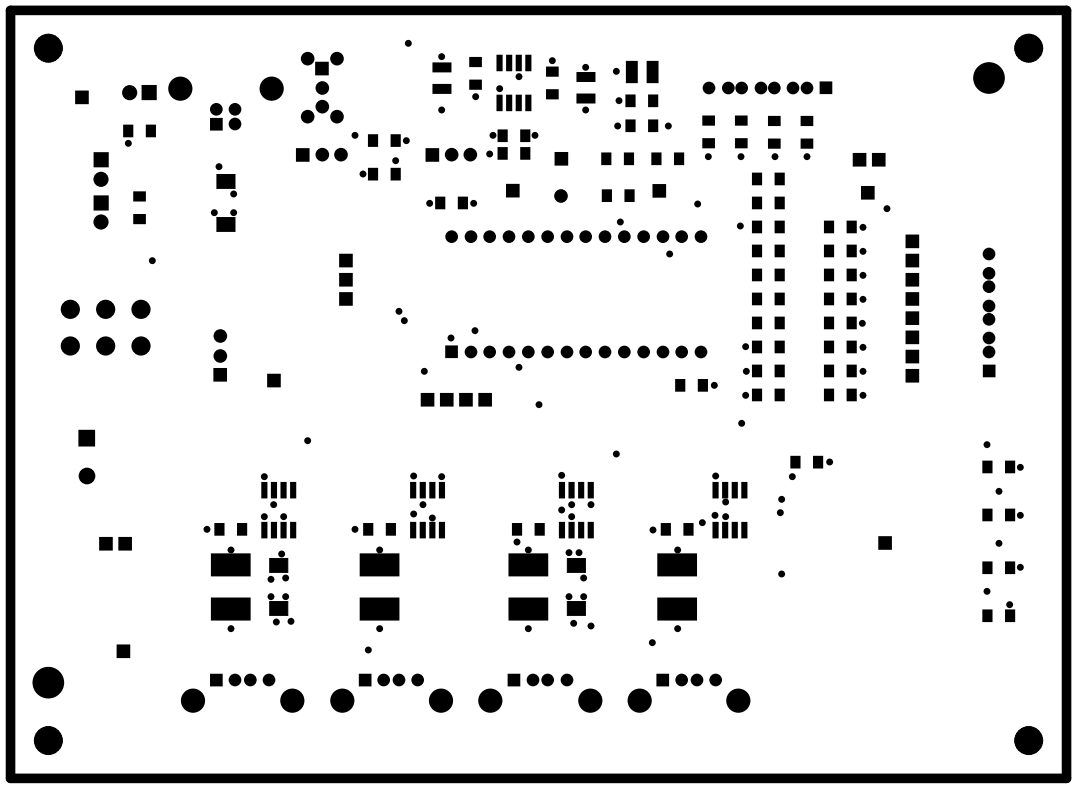
SOLECTRON
TEXAS

CUSTOMER: TI-MSP

DATE: 02/11/97

BOARD NAME:
TUSBK4HUB

BOARD PART NUMBER AND REVISION:
9806021 REV-B



SOLDERMASK TOP SIDE

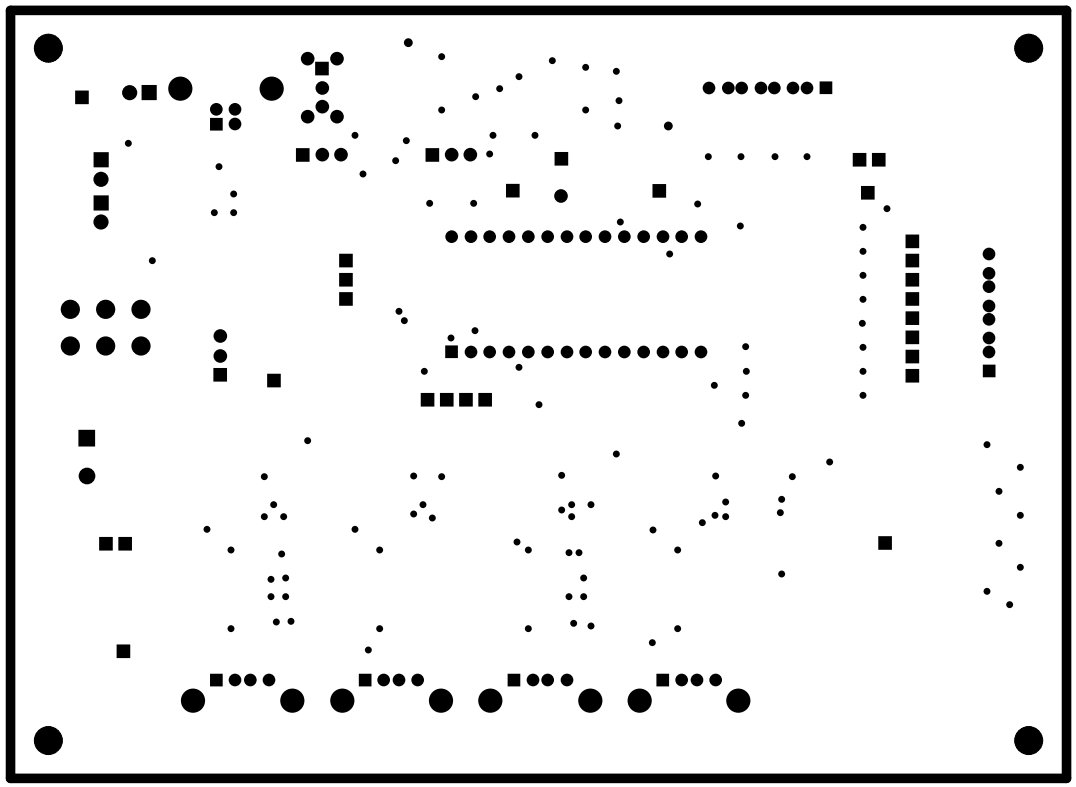
SOLECTRON
TEXAS

CUSTOMER: TI-MSP

DATE: 02/11/97

BOARD NAME: TUSBK4HUB

BOARD PART NUMBER AND REVISION: 9806021 REV-B



SOLDERMASK BOTTOM SIDE

SOLECTRON
TEXAS

CUSTOMER: TI-MSP

DATE: 02/11/97

BOARD NAME:
TUSBK4HUB

BOARD PART NUMBER AND REVISION:
9806021 REV-B

TUSB7KHUB

(7-Port USB EVM Board)

REVISIONS			
REV	ECN NO / CLASS / DRAFTER / DATE	DATE	APPROVED

# QTY	ITEM NO	PART OR IDENTIFYING NUMBER	NOMENCLATURE II DESCRIPTION	NOTES

NEXT ASSY	USED ON
APPLICATION	

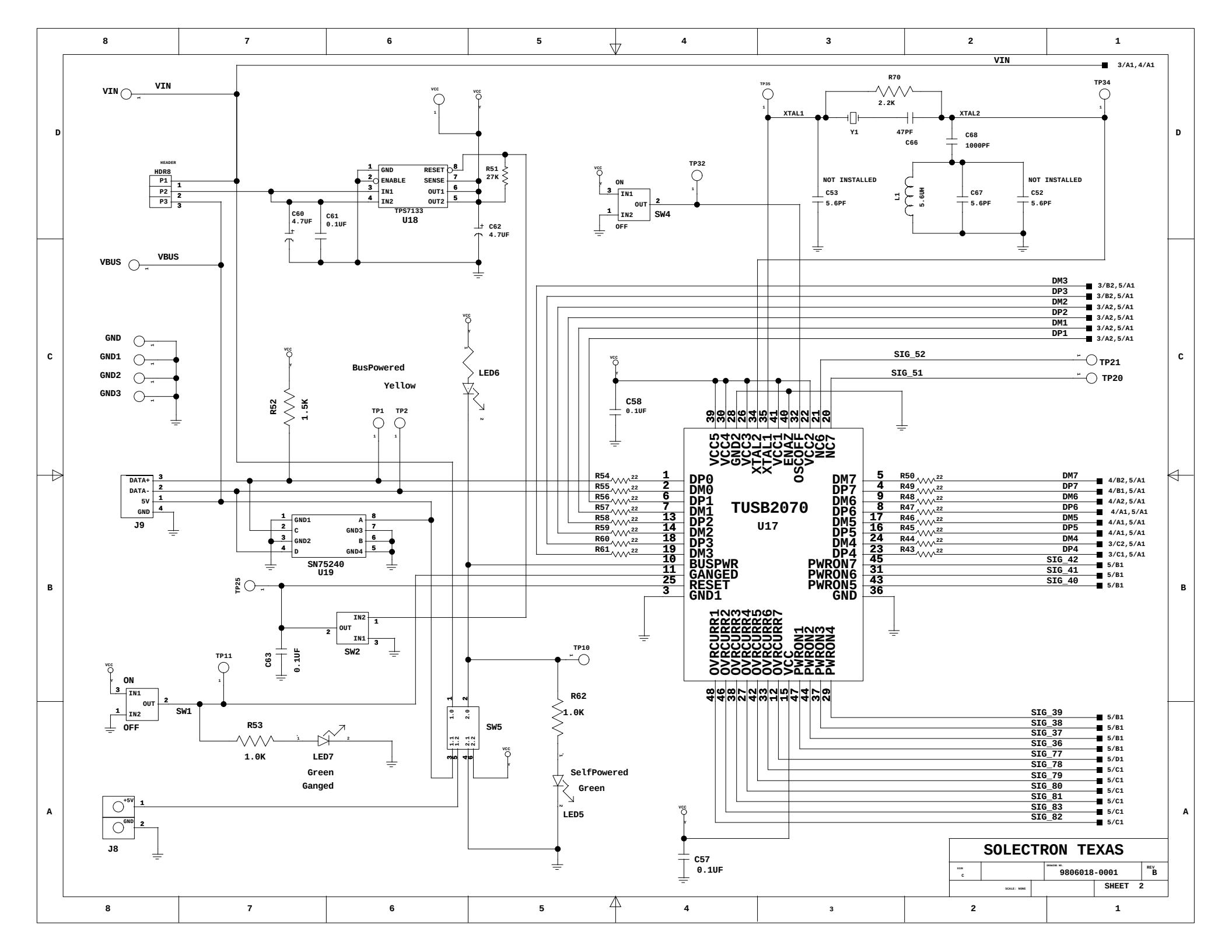
DWN: TOMMY MEDRANO	
CHK	
ENGR-DSGN	
ENGR-MGR	
QA	
MFG	
PROD SAF	
PLSE	

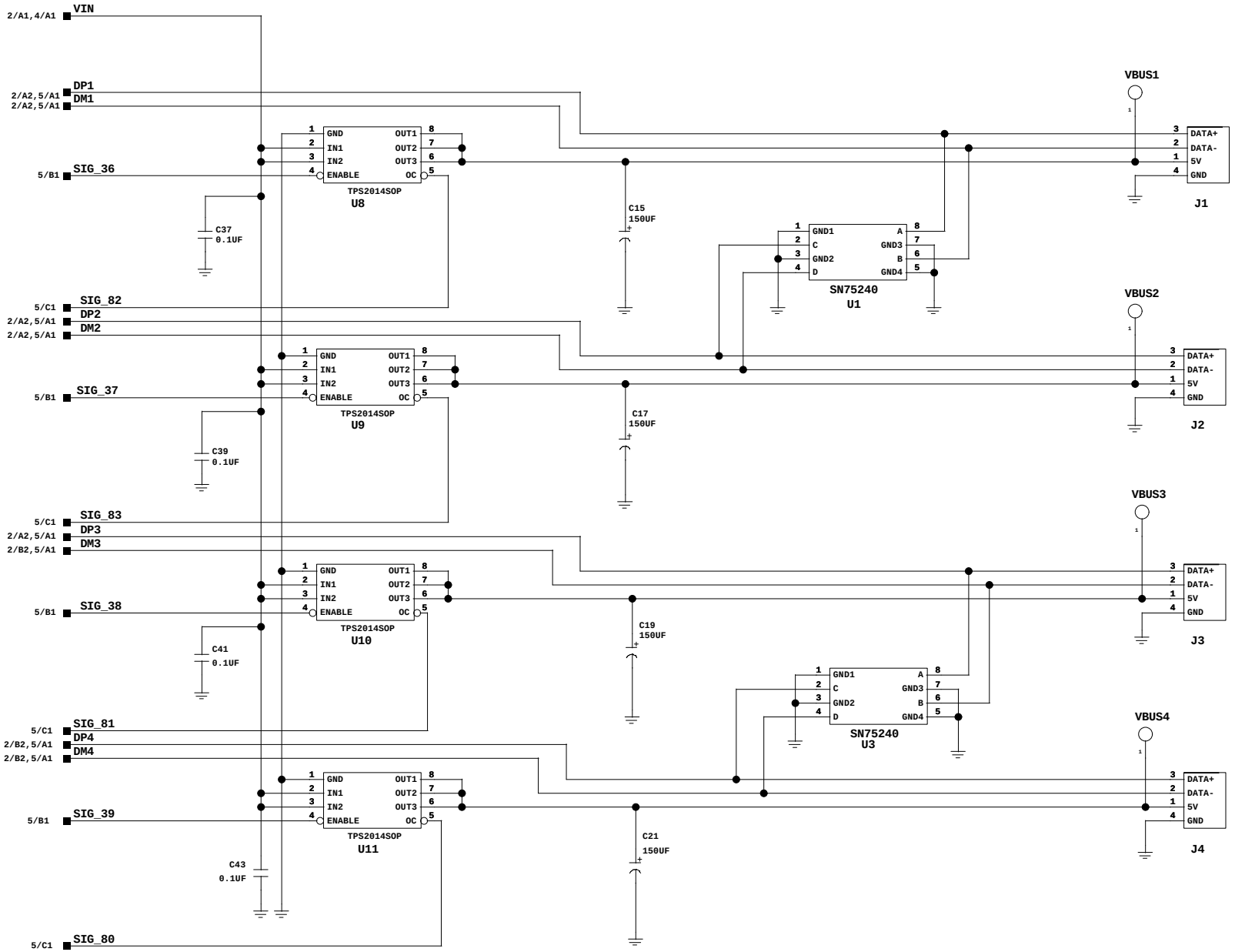
SOLECTRON TEXAS

LOGIC DIAGRAM

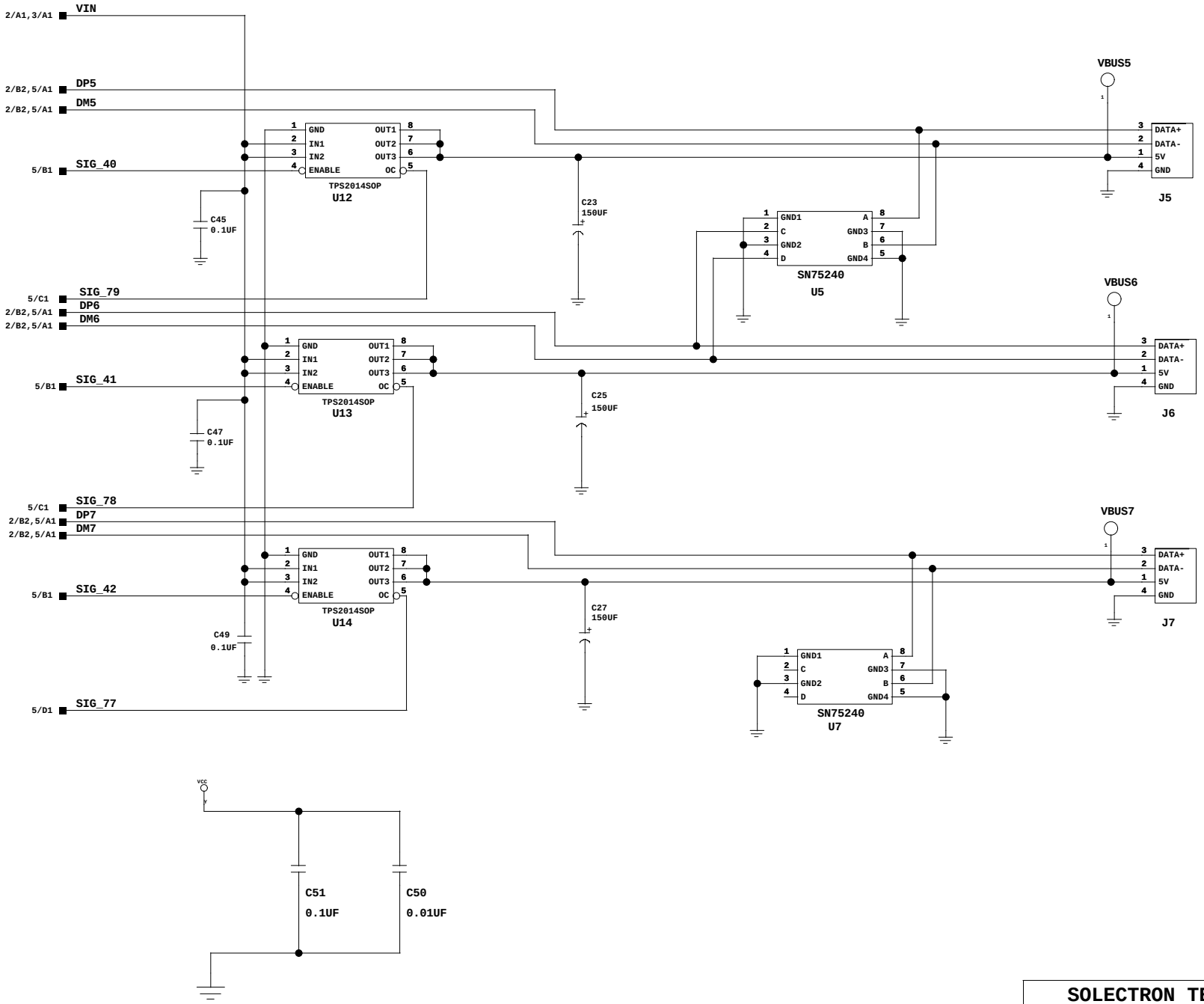
TUSBK7HUB

SIZE		DRAWING NO.
C		9806018-9901
SCALE:	10-13-1997_11:51	SHEET 1 OF 5

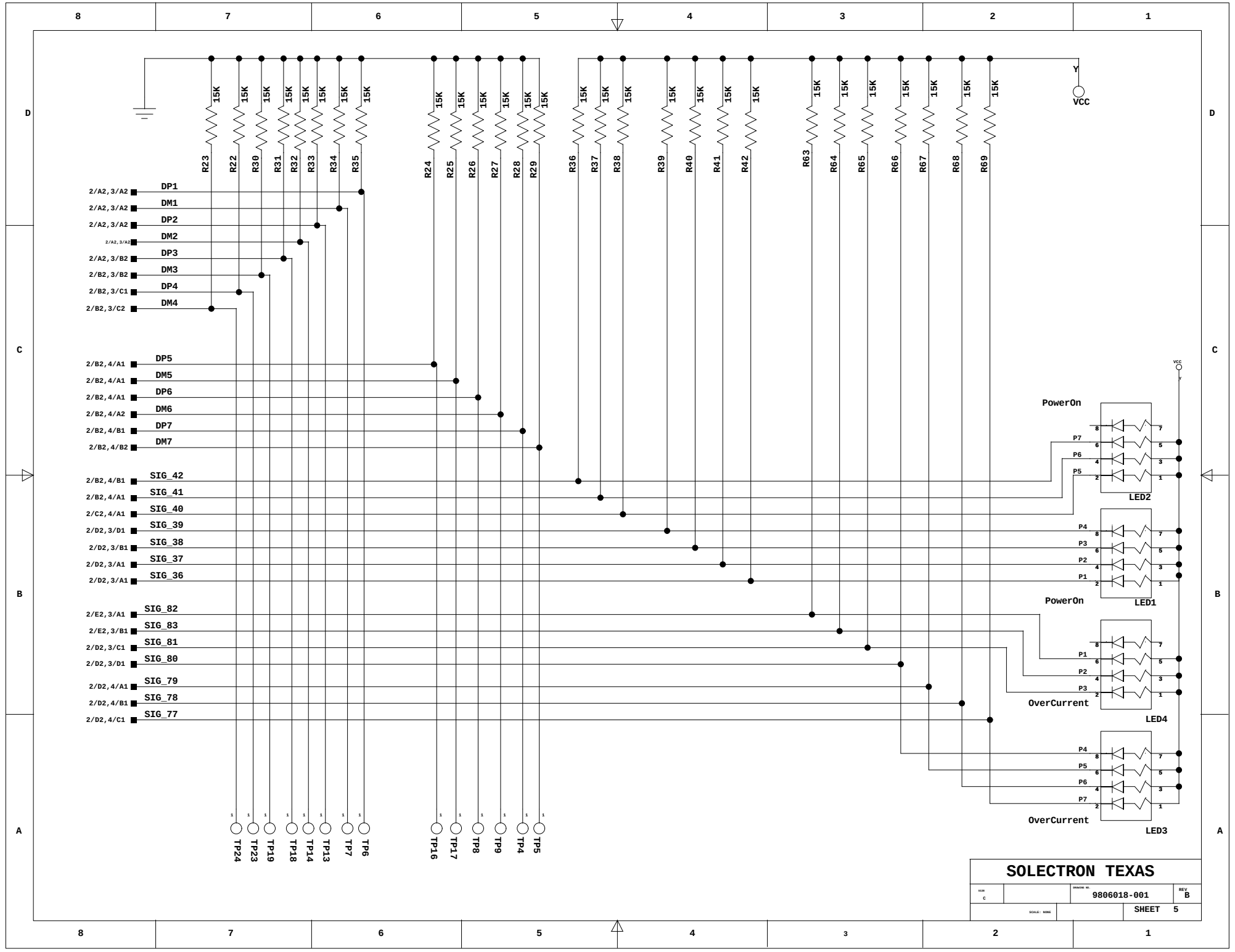

VIN
VBUS
GND
GND1
GND2
GND3
HDR8
P1
P2
P3
TPS7133
U18
GND
ENABLE
IN1
IN2
RESET
SENSE
OUT1
OUT2
C60
4.7UF
C61
0.1UF
C62
4.7UF
R51
27K
R52
1.5K
BusPowered
Yellow
LED6
TP1
TP2
TP32
SW4
ON
OFF
R70
2.2K
XTAL1
XTAL2
Y1
47PF
C66
C68
1000PF
NOT INSTALLED
C53
5.6PF
L1
5.6UH
C67
5.6PF
NOT INSTALLED
C52
5.6PF
DM3
DP3
DM2
DP2
DM1
DP1
SIG_52
SIG_51
TP21
TP20
C58
0.1UF
TUSB2070
U17
VCC5
VCC4
GND2
VCC3
XTAL2
XTAL1
VCC1
ENAZ
OSCOFF
VCC2
NC6
NC7
DP0
DM0
DP1
DM1
DP2
DM2
DP3
DM3
BUSPWR
GANGED
RESET
GND1
DM7
DP7
DM6
DP6
DM5
DP5
DM4
DP4
PWRON7
PWRON6
PWRON5
GND
OVRCURR1
OVRCURR2
OVRCURR3
OVRCURR4
OVRCURR5
OVRCURR6
OVRCURR7
VCC
PWRON1
PWRON2
PWRON3
PWRON4
R54
R55
R56
R57
R58
R59
R60
R61
R50
R49
R48
R47
R46
R45
R44
R43
DATA+
DATA-
5V
GND
J9
SN75240
U19
GND1
C
GND2
D
A
GND3
B
GND4
TP25
SW2
IN2
OUT
IN1
C63
0.1UF
TP11
SW1
R53
1.0K
LED7
Green
Ganged
SW5
TP10
R62
1.0K
SelfPowered
Green
LED5
+5V
GND
J8
C57
0.1UF
SIG_39
SIG_38
SIG_37
SIG_36
SIG_77
SIG_78
SIG_79
SIG_80
SIG_81
SIG_83
SIG_82
SIG_42
SIG_41
SIG_40
SOLECTRON TEXAS
9806018-0001
REV B
SHEET 2



SOLECTRON TEXAS			
SIZE C		DRAWING NO 9806018-0001	REV B
	SCALE: NONE		SHEET 3



SOLECTRON TEXAS			
SIZE C		DRAWING NO. 9806018-0001	REV B
SCALE: NONE			SHEET 4

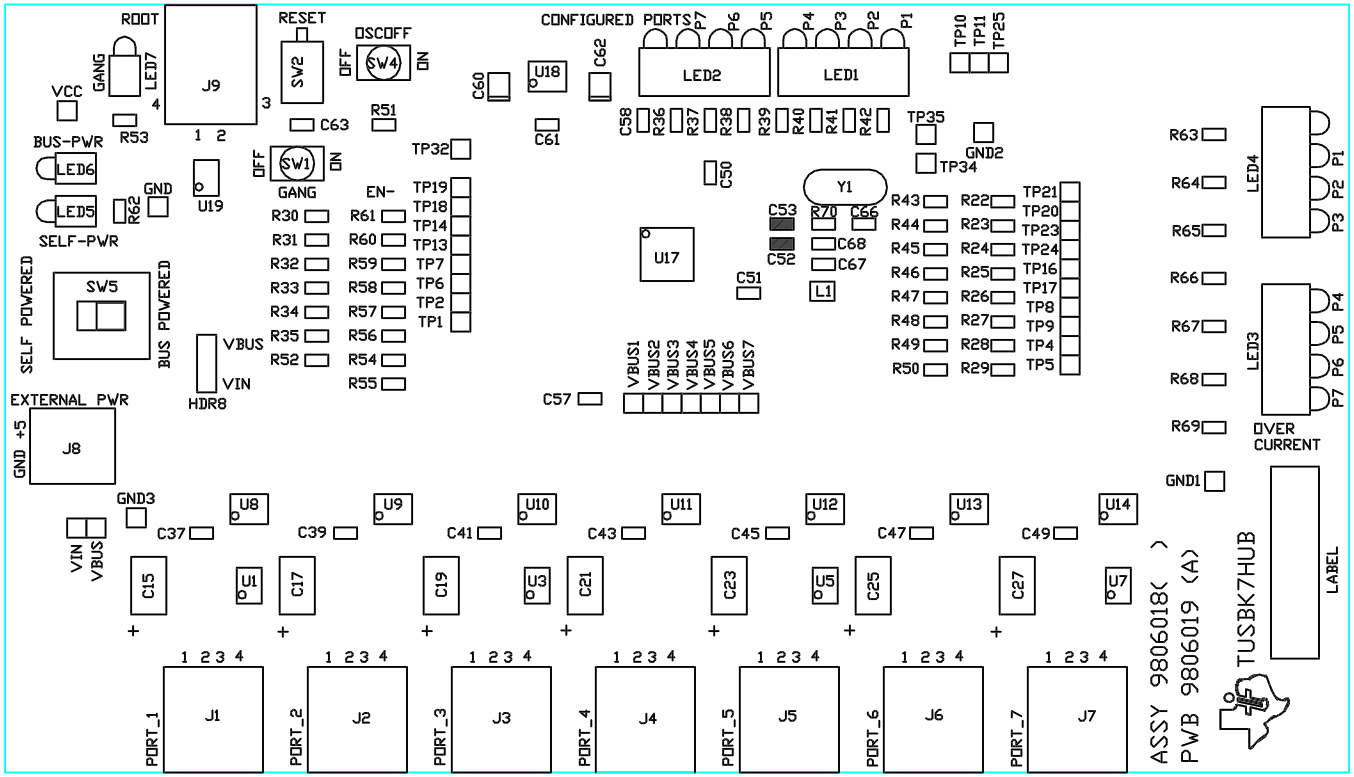

R23 15K
R22 15K
R30 15K
R31 15K
R32 15K
R33 15K
R34 15K
R35 15K
R24 15K
R25 15K
R26 15K
R27 15K
R28 15K
R29 15K
R36 15K
R37 15K
R38 15K
R39 15K
R40 15K
R41 15K
R42 15K
R63 15K
R64 15K
R65 15K
R66 15K
R67 15K
R68 15K
R69 15K
Y
VCC
2/A2,3/A2 DP1
2/A2,3/A2 DM1
2/A2,3/A2 DP2
2/A2,3/A2 DM2
2/A2,3/B2 DP3
2/B2,3/B2 DM3
2/B2,3/C1 DP4
2/B2,3/C2 DM4
2/B2,4/A1 DP5
2/B2,4/A1 DM5
2/B2,4/A1 DP6
2/B2,4/A2 DM6
2/B2,4/B1 DP7
2/B2,4/B2 DM7
2/B2,4/B1 SIG_42
2/B2,4/A1 SIG_41
2/C2,4/A1 SIG_40
2/D2,3/D1 SIG_39
2/D2,3/B1 SIG_38
2/D2,3/A1 SIG_37
2/D2,3/A1 SIG_36
2/E2,3/A1 SIG_82
2/E2,3/B1 SIG_83
2/D2,3/C1 SIG_81
2/D2,3/D1 SIG_80
2/D2,4/A1 SIG_79
2/D2,4/B1 SIG_78
2/D2,4/C1 SIG_77
TP24
TP23
TP19
TP18
TP14
TP13
TP7
TP6
TP16
TP17
TP8
TP9
TP4
TP5
PowerOn
P7
P6
P5
LED2
P4
P3
P2
P1
LED1
PowerOn
P1
P2
P3
OverCurrent
LED4
P4
P5
P6
P7
OverCurrent
LED3
SOLECTRON TEXAS
SIZE C
DRAWING NO 9806018-001
REV B
SCALE: NONE
SHEET 5

TUSB2070 EVM Card P/N 9806018-1 Rev A Assembly / Rev A PWB
(made for Texas Instruments by Solectron Texas)

DESCRIPTION	Supplier	Part Number	Pkg	Qty	Reference Designator
USB connector, series A	AMP	787616-2	th_con_1x4	7	J1 J2 J3 J4 J5 J6 J7
USB connector, series B	AMP	787780-1	th_con_2x2	1	J9
Power connector	Phoenix	MKDS 3/2-5,08	th_con_1x2	1	J8
Switch, SPDT	C&K	GS01MCKE	switch_1x3	2	SW1 SW4
Switch, pushbutton, SPDT	C&K	GP12MV3KE	switch_1x3_v3	1	SW2
slide switch, 2PDT	C&K	CKN5003-ND	th_sw_dpdt6	1	SW5
LED - red (4 w/Res)	Dialight	551-0507-004	led_4	2	LED3 LED4
LED - green (4 w/Res)	Dialight	551-0607-004	led_4	2	LED1 LED2
LED - yellow (w/Resistor)	NEWARK	50F1584	led_1	1	LED6
LED Grn	Dialight	551-0207	led_1	2	LED5 LED7
47pF CAP 1206	KEMET	C1206C470M5RAC	1206	1	C66
.1uF CAP 1206	KEMET	C1206C104K5RAC	1206	12	C37 C39 C41 C43
					C45 C47 C49 C51
					C57 C58 C61 C63
4.7uF CAP, Elect., 10V	KEMET	T491B475K010AS	3528	2	C60 C62
22 ohm, RES 1206	KOA	RM73B2BT220J	1206	16	R43-R50 R54-R61
1.0K 5%, RES 1206	KOA	RM73B2BT102J	1206	2	R53 R62
1.5K,1%	KOA	RK73H2BT1501F	1206	1	R52
15K, 2%	KOA	RM73B2BT153G	1206	28	R22-R42 R63-R69
27K RES, 5% 1206	KOA	RM73B2BT273J	1206	1	R51
48MHz crystal	ECS INC	ECS-480-S-1	th_rad_192	1	Y1
Header, 12-pin single row	Samtec	TSW-112-07-G-S	th_hdr_12	2	tp4,5,8,9,16,17,20,21,23,24 (-1)
					vbus1-4 / TP1,2,6,7,13,14,18,19 (split 4/8)
Header, 3-pin single row	Samtec	TSW-103-07-G-S	th_hdr_3	3	hdr8 tp10,11,25 vbus5,6,7
Power module	TI	TPS2014D	so8_288	7	U8 - U14
TPS7133	TI	TPS7133QD	so8_288	1	U18
USB 7 port Hub	TI	TUSB2070PT	tqfp_48	1	U17
Transient suppressor	TI	SN75240PWLE	ssop8_0256_294	5	U1 U3 U5 U7 U19
HEADER I PIN	SAMTEC	TSW-101-07-G-S	th_hdr_1	10	Vin Vbus Vcc tp32 tp34 tp35
					Gnd Gnd1 Gnd2 Gnd3
jumper plug	SAMTEC	SNT-100-BK-G	jmpr		hdr8
2.2K RES, 5% 1206	KOA	RM73B2BT222J	1206	1	R70
5.6pF CAP,1206	KEMET	C1206C569K5RAC	1206	1	C67 **(NO LOAD C52 C53)**
1000pF CAP, 1206	KEMET	C1206C102K5RAC	1206	1	C68
5.6uH INDUCTOR	TDK	NL322522T-5R6K	1210	1	L1
150uF CAP	KEMET	T491X157K010AS	7343	7	C15 C17 C19 C21
					C23 C25 C27
0.01uF CAP 1206	KEMET	C1206C103K5RAC	1206	1	50

DESIGNED AND MANUFACTURED FOR:

TEXAS INSTRUMENTS BY SOLECTRON TEXAS



INDICATES THIS COMPONENT NOT POPULATED FOR THIS DASH NUMBER.

TUSBK7HUB CARD
ASSY 9806018-0001 REV '*'
PWB 9806019-0001 REV 'A'

TUSBK7HUB - TUSB2070 EVM BOARD DESCRIPTION

PART#	BOARD LABEL	BOARD LOCATION	FUNCTIONAL DESCRIPTION
U17	N/A	48-pin TQFP package	TI USB hub chip (TUSB2070PT)
J9	Root	Square female silver connector	Root port (type B connector) which provides USB input from upstream device
J8	EXTERNAL PWR +5 ; GND	Large green connector with two screws	+5V & GRD (0.0V) connector for external power supply
SW5	SELF POWERED BUS POWERED	Large red switch with silver top	Switch pulls pin#10 of the TI USB hub chip to VCC for Self-power & to 0.0V for Bus-power mode
Y1	N/A	Next to TI USB hub chip (U17)	Crystal in tall, slim silver can
U18	N/A	Next to crystal (Y1)	TI 3.3V Low Dropout Voltage Regulator (TPS7133QD)
U19	N/A	Next to USB root port (J9)	TI Dual USB Port Transient Suppresser (SN75240PWLE) for USB root port (J9)
U1	N/A	Next to USB downstream port (J1)	TI Dual USB Port Transient Suppresser (SN75240PWLE) for USB downstream ports J1 & J2
U3	N/A	Next to USB downstream port (J3)	TI Dual USB Port Transient Suppresser (SN75240PWLE) for USB downstream ports J3 & J4
U5	N/A	Next to USB downstream port (J5)	TI Dual USB Port Transient Suppresser (SN75240PWLE) for USB downstream ports J5 & J6
U7	N/A	Next to USB downstream port (J7)	TI Dual USB Port Transient Suppresser (SN75240PWLE) for USB downstream ports J7
U8 - U14	N/A	Next to USB downstream ports	TI Power Distribution Switches (TPS2014D)
J1 - J7	PORT_1 - PORT_7	Rectangular silver USB connector	USB downstream port (type A connector)
HDR8	VBUS	Next to green power connector (J8)	When jumper is VBUS & center pin, the USB hub chip is powered through pin #1 of the USB root port
HDR8	VIN	Next to green power connector (J8)	When jumper is VIN & center pin, the USB hub chip is externally powered though J8
SW2	RESET	Push button switch next to USB root port (J9)	Pushing this switch resets all LEDs & USB hub logic NOTE: First disconnect cable from USB Root Port (J9)
SW1	GANG ON ; OFF	Next to USB root port (J9)	Switch pulls pin#11 of the USB hub chip to 3.3 V for Gang mode & 0.0 V for individual port power management mode (ON=GANGED)
SW4	OSCOFF ON ; OFF	Next to USB root port (J9)	Switch turns the internal oscillator in the USB hub chip on & off
LED7	GANG	Green LED next to USB root port (J9)	Illuminated when chip is in GANGED mode
LED6	BUS-PWR	Yellow LED next to USB root port (J9)	Illuminated when TI USB hub chip power is supplied by USB cable (Bus-Powered)
LED5	SELF-PWR	Green LED next to BUS-PWR LED	Illuminated when TI USB hub chip power is supplied by green power connector J8 (Self-Powered)
LED 1&2	CONFIGURED PORTS P1 - P7	Set of 8 green LEDs	Illuminated when corresponding ports are configured by USB host ; 1,2,3,4,5,6,7 respectively
LED 3&4	OVERCURRENT P1 - P7	Set of 8 red LEDs	Illuminated if corresponding ports are in an over-current condition ; PORT_1-PORT_7 corresponds to USB downstream ports 1,2,3,4,5,6,7 respectively
Test Point	TP34	Next to Crystal (Y1)	XTAL2 crystal positive feedback from the TI USB hub chip (U17)
Test Point	TP35	Next to Crystal (Y1)	XTAL1 input from crystal (Y1) to TI USB hub chip (U17)
Test Point	TP1-TP32	N/A	Each point corresponds to the input/output pins of the TI USB hub chip (U17)
Test Point	VCC	Next to GANGED LED (LED7)	3.3 V power for the TI USB hub chip
Test Point	VIN	Part of HDR1 jumper header	VIN is connected to +5 pin of the green power connector (J8)
Test Point	VBUS	Part of HDR1 jumper header	VBUS is connected to pin #1 of the USB root port (J9)
Test Point	GND, GND1, GND2, GND3	N/A	Ground (0.0 V) plane test points
Test Point	VBUS1 - VBUS7	Next to USB hub chip (U17)	Signal test points for USB output signal which corresponds to pin #1 (+5V) of the USB type A connector

USB Root Input Port (J9)

Pin #1	Pin#2	Pin #3	Pin #4
Power (+5V)	DM (-)	DM (+)	Ground (0.0V)

DWG. NO	SHT.
9806019	1

NOTES: UNLESS OTHERWISE SPECIFIED

1. HOT AIR SOLDER LEVEL PER PROCESS 1.
2. FINISHED BOARD SHALL MEET UL 94V-0 FLAMMABILITY RATING AND BE MARKED WITH THE REQUIRED UL CODE NUMBER.
3. FINISHED BOARD SHALL MEET THE REQUIREMENTS OF ITEM 4.
4. THICKNESS SELECTED AT FABRICATION TO MEET THE TOTAL BOARD THICKNESS SPECIFIED ON THIS DRAWING.
5. MINIMUM COPPER WALL THICKNESS .001
6. RECOMMEND DRILL AT .013 NO BREAKOUT ALLOWED ON INTERNAL LAYERS.
7. ALL HOLES ARE WITHIN .014 TRUE POSITION OF DATUM "0" WHEN PINNED TO PLANE "A".
8. BOARD IS TO BE ELECTRICALLY TESTED BY VENDOR.
9. SOLDERMASK TO BE APPLIED OVER BARE COPPER TO BOTH SIDES OF BOARD PER ARTWORK SUPPLIED AND PROCESS 2.
10. MARK PER PROCESS 3, HEIGHT TO BE CONTROLLED BY ITEM 3. COLOR TO BE CONTRASTING TO THAT OF SUBSTRATE.
11. INTERNAL AND/OR EXTERNAL CORNERS TO BE .06 RADIUS MAXIMUM AT SHOP OPTION.
12. SURFACE LANDS OF THE FINE PITCH DEVICES MUST BE +/- .001 TOLERANCE TO SUPPLIED ARTWORK AT LOCATION

    .0197 PITCH LOCATION: U17
    .025 PITCH LOCATION: U1 U3 U5 U7 U19

REVISION LEVEL CONTROL						
THIS DRAWING	*	A				
DRILL TEMPLATE	*	A				
MARKING(TOP)	*	A				
SOLDER PASTE (TOP)	*	A				
CONTINUITY TEST	*	A				
LAYER 1 (TOP SIDE)	*	A				
LAYER 2 (GND LAYER)	*	A				
LAYER 3 (VCC LAYER)	*	A				
LAYER 4 (BOTTOM SIDE)	*	A				
SOLDERMASK (TOP SIDE)	*	A				
SOLDERMASK (BOTTOM SIDE)	*	A				

REVISIONS			
REV	DESCRIPTION	DATE	APPROVAL
*	PROTOTYPE	09/18/96	
A	ENG CHANGES	02/12/97	

	SYM	FINISHED HOLE DIAMETER UNSUPPORTED	FINISHED HOLE DIAMETER PLATED THRU ± .003 [5]	QTY	REMARKS
[6]	+		YES	270	
	A		.035	56	
	B		.038	32	
[7]	C		.039	32	
	D		.043	6	
	E		.051	2	
	K		.073	6	
	G		.090	16	
	J	.120		4	

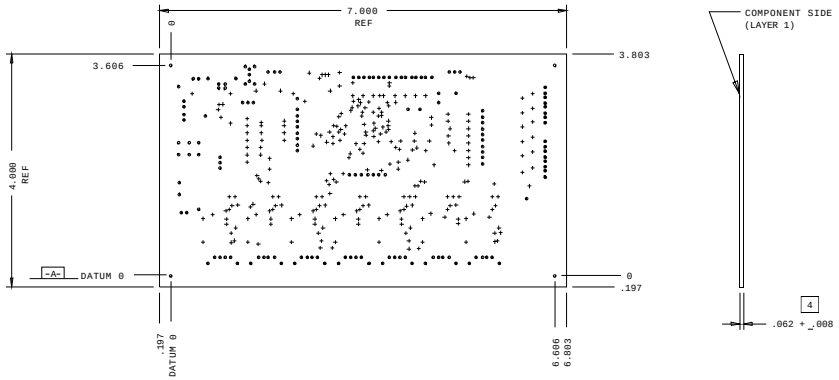


TABLE OF LAYERS			
NO	DESCRIPTION	REMARKS	COPPER WT
L1	TOP LAYER	PADS/ROUTING	1/2 OZ/FT2
L2	PLANE	GROUND	1 OZ/FT2
L3	PLANE	VCC/SPLIT	1 OZ/FT2
L4	BOTTOM LAYER	PADS/ROUTING	1/2 OZ/FT2

QTY	ITEM NO	PART OR IDENTIFYING NUMBER	DESCRIPTION	NOTES
REF	4	IPC-RB-276	PERFORMANCE SPEC. FOR RIGID MULTILAYER PWB	3
REF	3	MP-9806019	MASTER PATTERN (ARTWORK)	10
AR	2	IPC-L-109	GLASS COLTH, PREIMPREGNATED RESIN, (B STAGE)	
AR	1	IPC-L-130	THIN LAMINATE, COPPER CLAD (UL APVD)	2

SEQ NO	IDENT	IDENT	ADDITIONAL CLASSIFICATION	NOTES
3	MARK	MIL-STD 883(LATEST)	METHOD 2015.8	10
2	SDRMSK	IPC-SM-840	L.P.I. TYPE B	9
1	SLDRCT	IPC-D-949(LATEST),CLASS 2	THKNS. .0001 MIN. .002 MAX.	1

REV STATUS OF SHEETS	REV	A
	SH	1

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES +/- 1 °
2 PL DECIMALS +/- .010
3 PL DECIMALS +/- .005

REMOVE ALL BURRS AND SHARP EDGES
CONCENTRICITY MACHINED DIAMETERS .010 FIM
DIMENSIONAL LIMITS APPLY AFTER PROCESSES

HOLE DIAMETER TOLERANCE
.013 +.004 -.001 THRU .125
.129 +.005 -.001 THRU .250
.251 +.006 -.001 THRU .250
.501 +.008 -.001 THRU .750
.751 +.010 -.001 THRU 1.000
1.001 +.012 -.001 THRU 2.000

9806018
NEXT ASSEMBLY | USED ON
APPLICATION

	APPROVAL	DATE
DRAWN	J. RAMOS	09/18/96
CHECKED		
RELEASED		
RELEASED		
PROJ. MGR.		

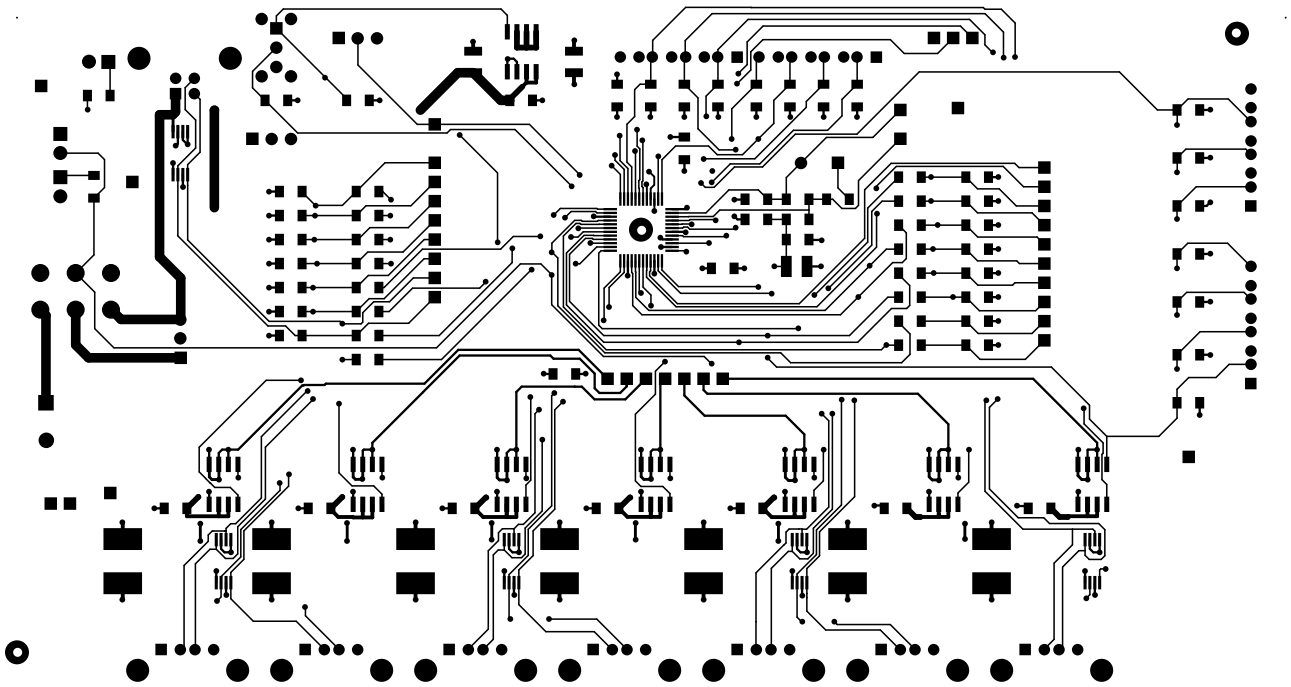
SOLECTRON TEXAS

FABRICATION DRAWING

TUSBK7HUB

SIZE	DWG NO	REV
D	9806019	A

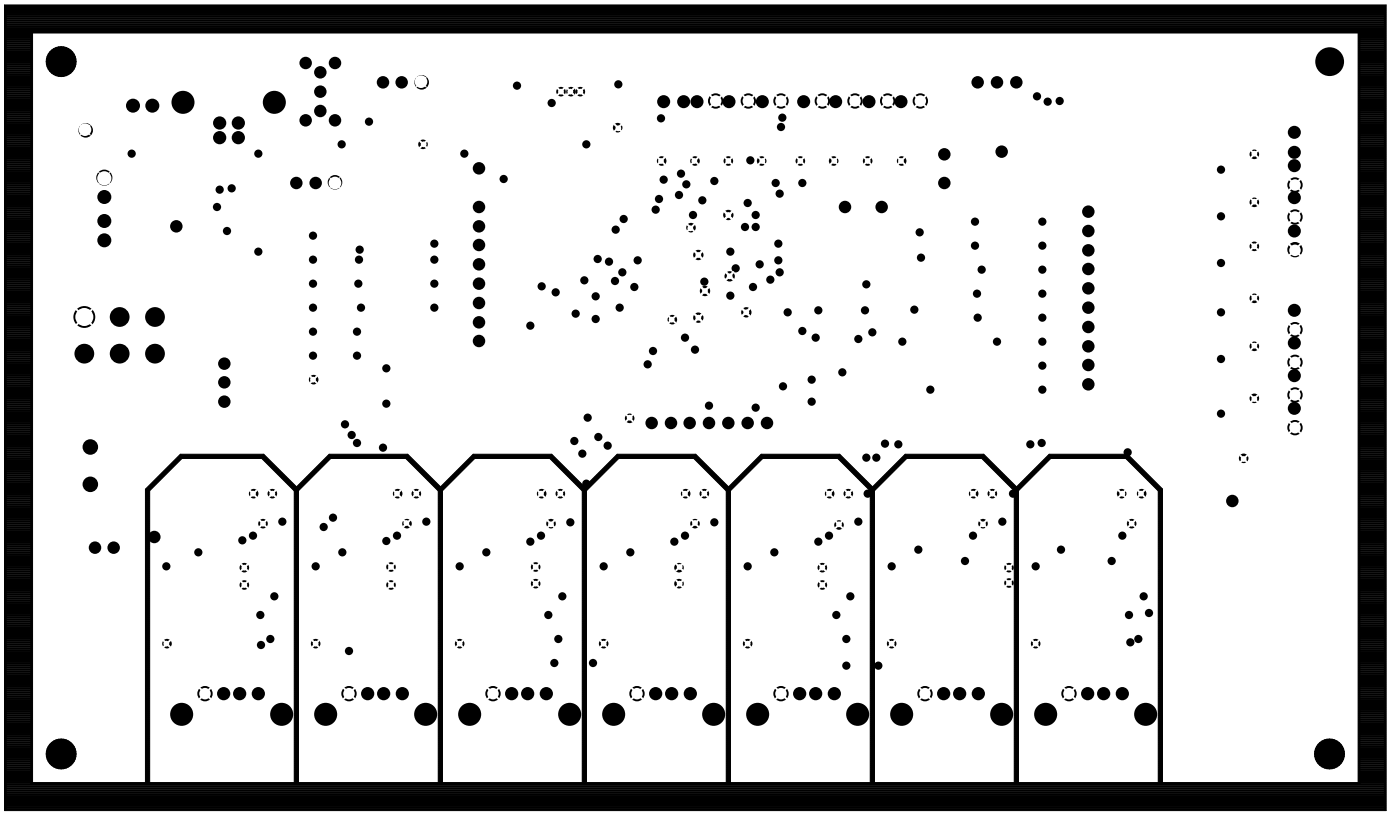
SCALE 1:1 | SHEET 1 OF 1



COMPONENT SIDE LAYER 1

SOLECTRON
TEXAS

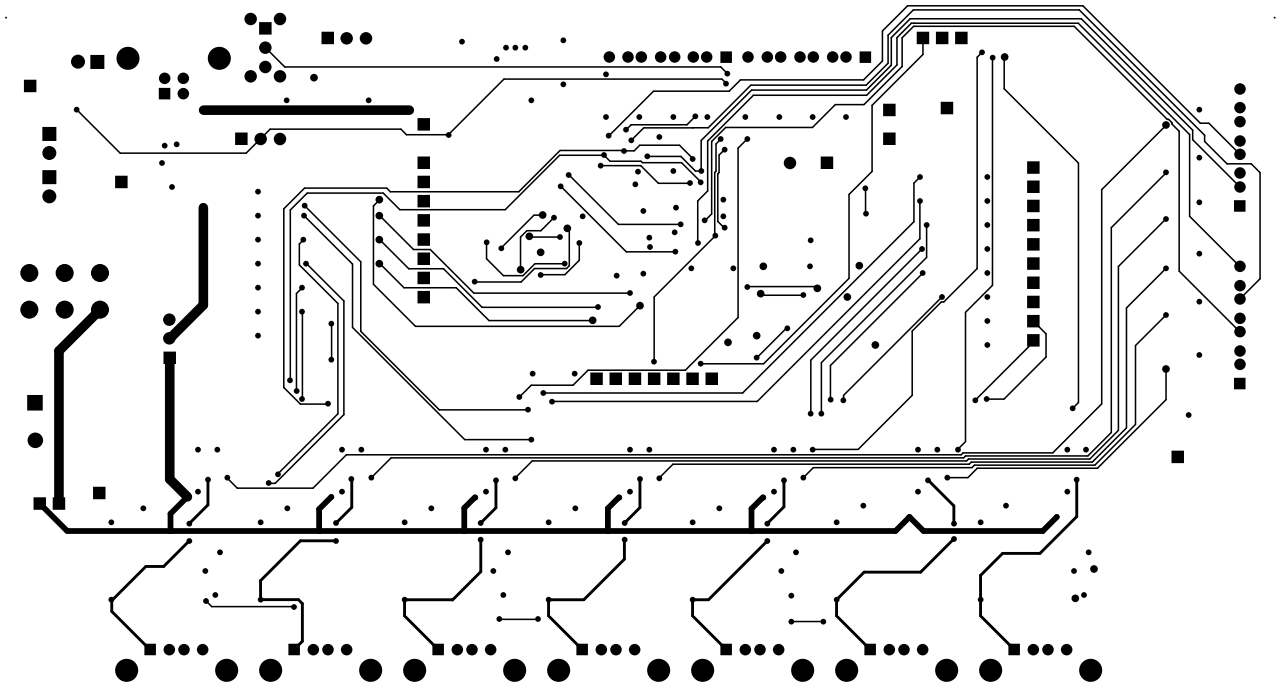
CUSTOMER: TIMSP	
BOARD NAME: TUSBK7HUB	
BOARD PART NO: 9806019	
BOARD REVISION: A	DATE: 02/12/97



VCC LAYER LAYER 3

SOLECTRON
TEXAS

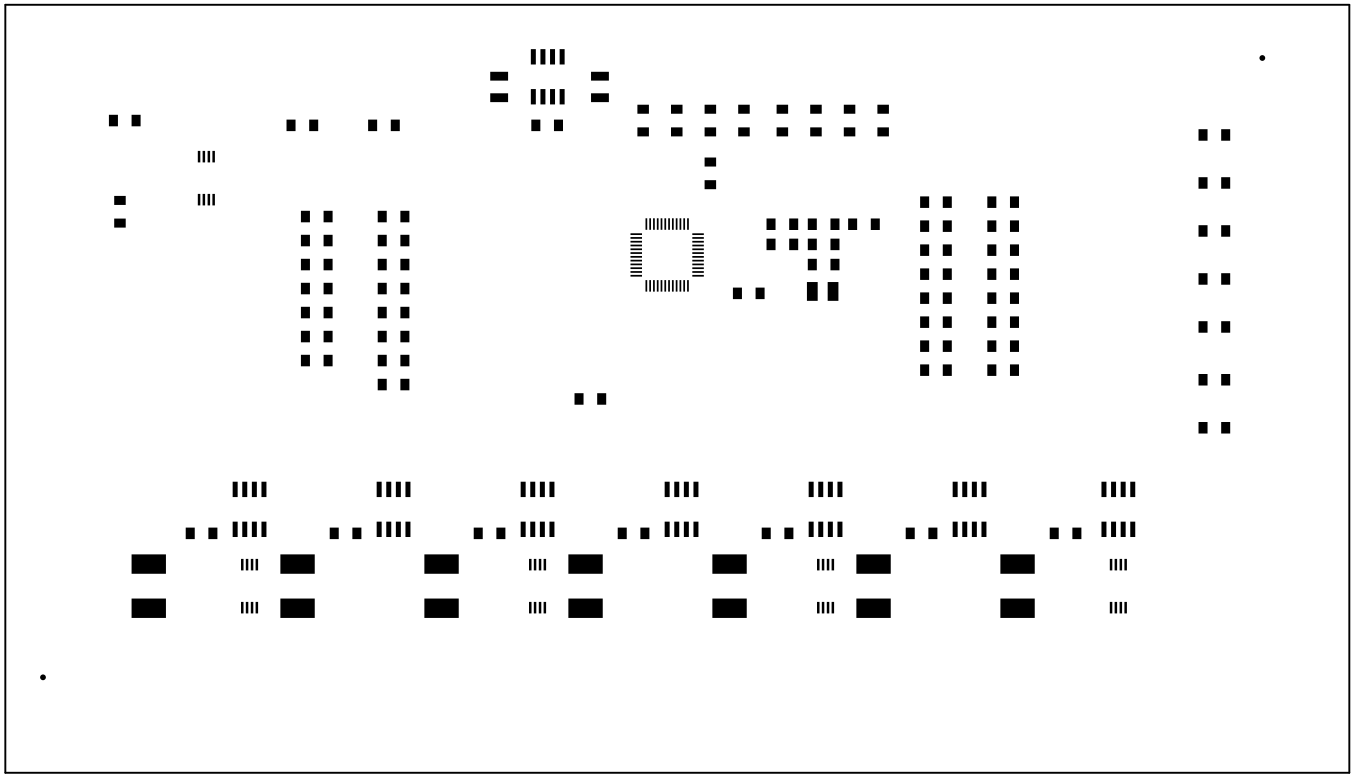
CUSTOMER: TIMSP
BOARD NAME: TUSBK7HUB
BOARD PART NO: 9806019
BOARD REVISION: A DATE: 02/12/97



BOTTOM SIDE LAYER 4

SOLECTRON
TEXAS

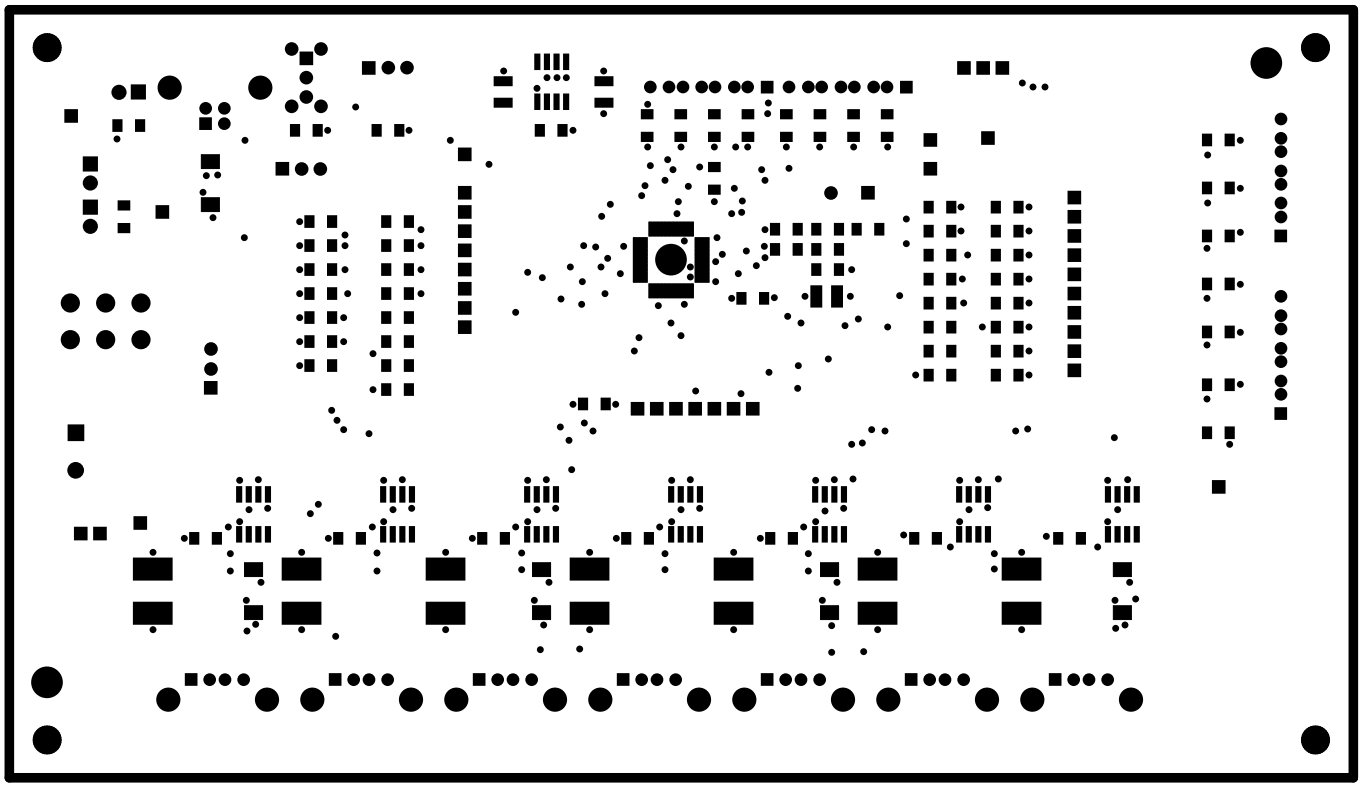
CUSTOMER: TIMSP
BOARD NAME: TUSBK7HUB
BOARD PART NO: 9806019
BOARD REVISION: A DATE: 02/12/97



TOP SIDE PASTEMASK

SOLECTRON
TEXAS

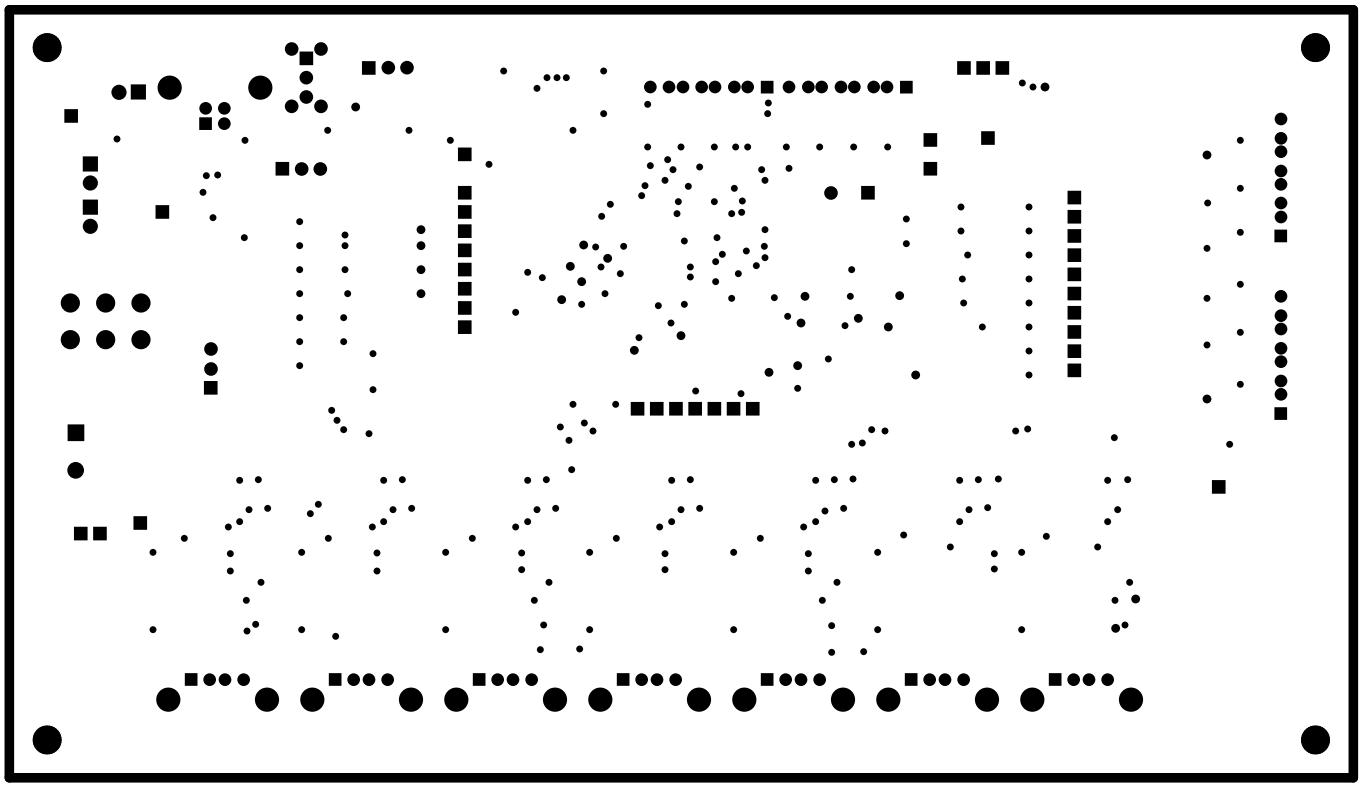
CUSTOMER: TIMSP
BOARD NAME: TUSBK7HUB
BOARD PART NO: 9806019
BOARD REVISION: A DATE: 02/12/97



TOP SIDE SOLDERMASK

SOLECTRON
TEXAS

CUSTOMER: TIMSP
BOARD NAME: TUSBK7HUB
BOARD PART NO: 9806019
BOARD REVISION: A DATE: 02/12/97



BOTTOM SIDE SOLDERMASK

SOLECTRON
TEXAS

CUSTOMER: TIMSP
BOARD NAME: TUSBK7HUB
BOARD PART NO: 9806019
BOARD REVISION: A DATE: 02/12/97