Datasheet for 144 pins FPGA board PCB

EVD17I009

EVD17I014

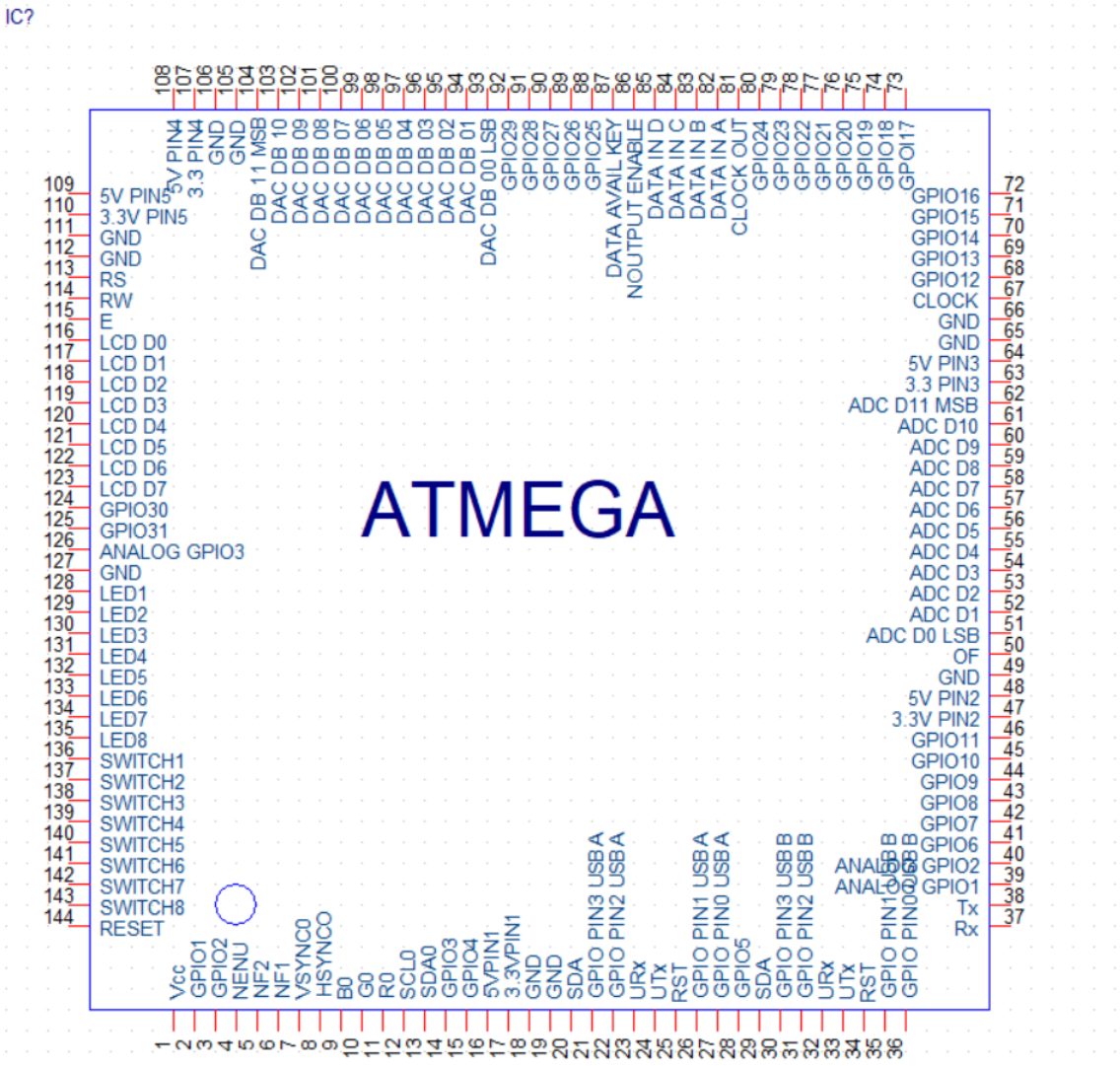
ESD17I012

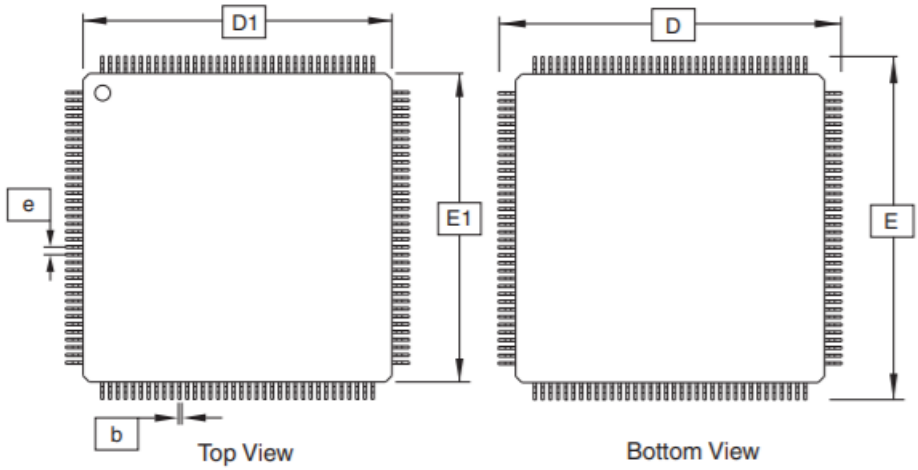
EVD17I020

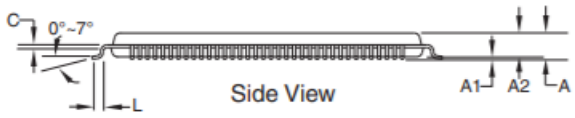
ESD17I009

List of Contents:

1.Fpga core IC







Notes:
1. This package conforms to JEDEC reference MS-026, Variation BFB.
2. Dimensions D1 and E1 do not include mold protrusion. Allowable protrusion is 0.25 mm per side. Dimensions D1 and E1 are maximum plastic body size dimensions including mold mismatch.
3. Lead coplanarity is 0.10 mm maximum.

COMMON DIMENSIONS
(Unit of Measure = mm)

SYMBOL	MIN	NOM	MAX	NOTE
A	–	–	1.60	
A1	0.05	–	0.15	
A2	1.35	1.40	1.45	
D		22.00 BSC		
D1		20.00 BSC		Note 2
E		22.00 BSC		
E1		20.00 BSC		Note 2
b	0.17	0.22	0.27	
C	0.09	–	0.20	
L	0.45	0.60	0.75	
e		0.50 TYP		

Pin no	Name	Function
1	Vcc	Supply voltage 3.3v
2	GPi/o1/GND	General purpose input output, also dedicated to ic ground
3	GPi/o2	General purpose input output
4	NENU($\overline{\text{ENU}}$)	USB Enable Input. Drive ENU low to enable the USB power-supply outputs.(Active Low)

5	NF2($\overline{F2}$)	Fault Output 2. F2 is an active-low, open-drain output that asserts when a fault condition is detected on USB2
6	NF1($\overline{F1}$)	Fault Output 1. F1 is an active-low, open-drain output that asserts when a fault condition is detected on USB1
7	VSYNC0	Vertical Sync Input
8	HSYNC0	Horizontal Sync Input
9	B0	RGB Analog Input
10	G0	RGB Analog Input
11	R0	RGB Analog Input
12	SCL0	DDC(digital down converter) Input/Output
13	SDA0	DDC(digital down converter) Input/Output
14	GPI/O3	General purpose input output
15	GPI/O4	General purpose input output
16	5V Pin1	5V output
17	3.3V Pin1	3.3V output
18	GND	Dedicated Ground Pin
19	GND	Dedicated Ground Pin
20	SDA	I^2C Data line
21	GPi/o Pin3 USBA	General-purpose I/O or alternate function pin
22	GPi/o Pin2 USBA	General-purpose I/O or alternate function pin
23	URx	UART RX pin (input)
24	UTx	UART TX pin (Output)
25	RST	reset
26	GPi/o Pin1 USBA	General-purpose I/O or alternate function pin
27	GPi/o Pin0 USBA	General-purpose I/O or alternate function pin
28	GPI/O5/Not Connected	General purpose input output/ not connected
29	SDA	I^2C Data line
30	GPi/o Pin3 USBA	General-purpose I/O or alternate function pin

31	GPi/o Pin 2 USBA	General-purpose I/O or alternate function pin
32	URx	UART RX pin (input)
33	UTx	UART TX pin (Output)
34	RST	General purpose input output
35	GPi/o Pin 1 USBA	General-purpose I/O or alternate function pin
36	GPi/o Pin 0 USBA	General-purpose I/O or alternate function pin
37	Rx	Serial receiver
38	Tx	Serial transmitter
39	Analog GP i/o1	Analog General purpose input output
40	Analog GP i/o 2	Analog General purpose input output
41	GP I/O 6	General purpose input output
42	GP I/O 7	General purpose input output
43	GP I/O 8	General purpose input output
44	GP I/O 9	General purpose input output
45	GP I/O 10	General purpose input output
46	GP I/O 11	General purpose input output
47	3.3V Pin2	3.3V output
48	5V Pin2	5V output
49	GND	Dedicated Ground Pin
50	OF	Overflow Output. This signal is high when the digital output is 011111111111 or 100000000000.
51	ADC D0 LSB	Data Outputs. The output format is two's complement.
52	ADC D1	Data Outputs. The output format is two's complement.
53	ADC D2	Data Outputs. The output format is two's complement.
54	ADC D3	Data Outputs. The output format is two's complement.
55	ADC D4	Data Outputs. The output format is two's complement.
56	ADC D5	Data Outputs. The output format

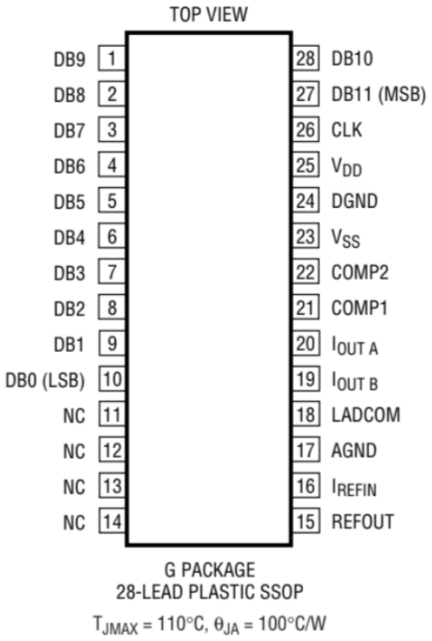
		is two's complement.
57	ADC D6	Data Outputs. The output format is two's complement.
58	ADC D7	Data Outputs. The output format is two's complement.
59	ADC D8	Data Outputs. The output format is two's complement.
60	ADC D9	Data Outputs. The output format is two's complement.
61	ADC D10	Data Outputs. The output format is two's complement.
62	ADC D11 MSB	Data Outputs. The output format is two's complement.
63	3.3V Pin3	3.3V output
64	5V Pin3	5V output
65	GND	Dedicated Ground Pin
66	GND	Dedicated Ground Pin
67	CLOCK	Crystal oscillator input (upto 50Mhz)
68	GPI/O12	General purpose input output
69	GPI/O13	General purpose input output
70	GPI/O14	General purpose input output
71	GPI/O15	General purpose input output
72	GPI/O16	General purpose input output
73	GPI/O17	General purpose input output
74	GPI/O18	General purpose input output
75	GPI/O19	General purpose input output
76	GPI/O20	General purpose input output
77	GPI/O21	General purpose input output
78	GPI/O22	General purpose input output
79	GPI/O23	General purpose input output
80	GPI/O24	General purpose input output
81	Clock Out	50Mhz clock out
82	DATAINA	Data channel b/w encoder and core ICs
83	DATAINB	Data channel b/w encoder and core ICs
84	DATAINC	Data channel b/w encoder and core ICs
85	DATAIND	Data channel b/w encoder and core ICs

86	NOUTPUT ENABLE	Active low, output enabler for keypad encoder
87	DATA AVAIL KEY	Active high for no data passing(indicates that input is possible)
88	GPI/O 25	General purpose input output
89	GPI/O 26	General purpose input output
90	GPI/O 27	General purpose input output
91	GPI/O 28	General purpose input output
92	GPI/O 29	General purpose input output
93	DAC DB00 LSB	Digital Output Data Bits.
94	DAC DB01	Digital Output Data Bits.
95	DAC DB02	Digital Output Data Bits.
96	DAC DB03	Digital Output Data Bits.
97	DAC DB04	Digital Output Data Bits.
98	DAC DB05	Digital Output Data Bits.
99	DAC DB06	Digital Output Data Bits.
100	DAC DB07	Digital Output Data Bits.
101	DAC DB08	Digital Output Data Bits.
102	DAC DB09	Digital Output Data Bits.
103	DAC DB10	Digital Output Data Bits.
104	DAC DB11 MSB	Digital Output Data Bits.
105	GND	Dedicated Ground Pin
106	GND	Dedicated Ground Pin
107	3.3V PIN4	3.3V output
108	5V PIN4	5V output
109	5V PIN5	5V output
110	3.3V PIN5	3.3V output
111	GND	Dedicated Ground Pin
112	GND	Dedicated Ground Pin
113	Rs	Boolean(H/L) H: DATA, L: Instruction code
114	Rw	Boolean(H/L) H: Read (MPU(Module) L: Write (MPU(Module)
115	E	Chip enable signal (Output)

116	LCD D0	Data bit 0 (H/L)
117	LCD D1	Data bit 1 (H/L)
118	LCD D2	Data bit 2 (H/L)
119	LCD D3	Data bit 3 (H/L)
120	LCD D4	Data bit 4 (H/L)
121	LCD D5	Data bit 5 (H/L)
122	LCD D6	Data bit 6 (H/L)
123	LCD D7	Data bit 7 (H/L)
124	GPI/O 30	General purpose input output
125	GPI/O 31	General purpose input output
126	Analog GPI/O 3	Analog General purpose input output
127	GND	Dedicated Ground Pin
128	LED 1	LED in common cathode controlled by active high output pin
129	LED 2	LED in common cathode controlled by active high output pin
130	LED 3	LED in common cathode controlled by active high output pin
131	LED 4	LED in common cathode controlled by active high output pin
132	LED 5	LED in common cathode controlled by active high output pin
133	LED 6	LED in common cathode controlled by active high output pin
134	LED 7	LED in common cathode controlled by active high output pin
135	LED 8	LED in common cathode controlled by active high output pin
136	SWITCH 1	Reads input from active high switch
137	SWITCH 2	Reads input from active high switch
138	SWITCH 3	Reads input from active high switch
139	SWITCH 4	Reads input from active high switch
140	SWITCH 5	Reads input from active high switch
141	SWITCH 6	Reads input from active high switch
142	SWITCH 7	Reads input from active high switch
143	SWITCH 8	Reads input from active high switch

144	RESET	Resets the FPGA

2. DAC



G PACKAGE
28-LEAD PLASTIC SSOP

T_{JMAX} = 110°C, θ_{JA} = 100°C/W

Pin Functions

LTC1666

REFOUT (Pin 15): Internal Reference Voltage Output. Nominal value is 2.5V. Requires a 0.1µF bypass capacitor to AGND.

I_{REFIN} (Pin 16): Reference Input Current. Nominal value is 1.25mA for I_{FS} = 10mA. $I_{FS} = I_{REFIN} \bullet 8$.

AGND (Pin 17): Analog Ground.

LADCOM (Pin 18): Attenuator Ladder Common. Normally tied to GND.

$I_{OUT\ B}$ (Pin 19): Complementary DAC Output Current. Full-scale output current occurs when all data bits are 0s.

$I_{OUT\ A}$ (Pin 20): DAC Output Current. Full-scale output current occurs when all data bits are 1s.

COMP1 (Pin 21): Current Source Control Amplifier Compensation. Bypass to V_{SS} with 0.1µF.

COMP2 (Pin 22): Internal Bypass Point. Bypass to V_{SS} with 0.1µF.

V_{SS} (Pin 23): Negative Supply Voltage. Nominal value is –5V.

DGND (Pin 24): Digital Ground.

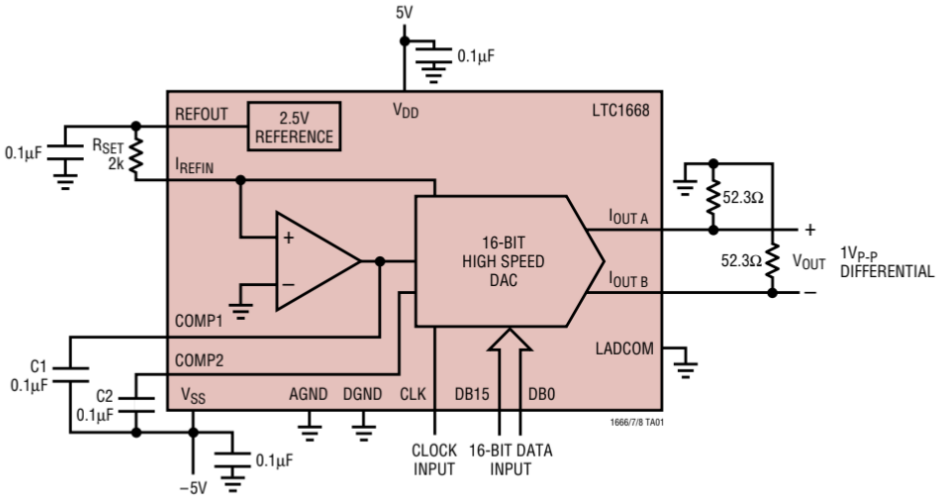
V_{DD} (Pin 25): Positive Supply Voltage. Nominal value is 5V.

CLK (Pin 26): Clock Input. Data is latched and the output is updated on positive edge of clock.

DB11 to DB0 (Pins 27, 28, 1 to 10): Digital Input Data Bits.

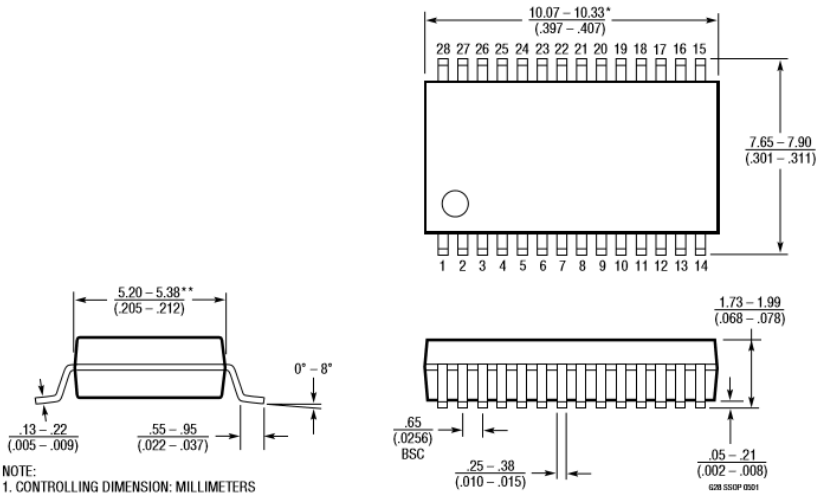
TYPICAL APPLICATION

LTC1668, 16-Bit, 50Msps DAC



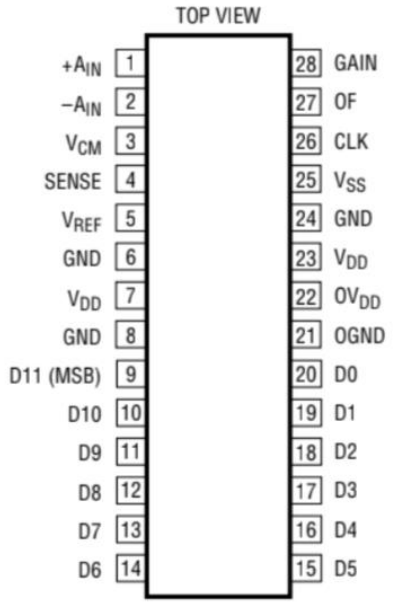
PACKAGE DESCRIPTION

G Package
28-Lead Plastic SSOP (5.3mm)
(Reference LTC DWG # 05-08-1640)



NOTE:
1. CONTROLLING DIMENSION: MILLIMETERS
2. DIMENSIONS ARE IN $\frac{\text{MILLIMETERS}}{(\text{INCHES})}$
3. DRAWING NOT TO SCALE
*DIMENSIONS DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .152mm (.006") PER SIDE
**DIMENSIONS DO NOT INCLUDE INTERLEAD FLASH. INTERLEAD FLASH SHALL NOT EXCEED .254mm (.010") PER SIDE

3.ADC



T_{JMAX} = 125°C, θ_{JA} = 80°C/W

Pin Functions

$+A_{IN}$ (Pin 1): Positive Analog Input.

$-A_{IN}$ (Pin 2): Negative Analog Input.

V_{CM} (Pin 3): 2.5V Reference Output.Optional input common mode for single supply operation. Bypass to GND with a 1µF to 10µF ceramic.

SENSE (Pin 4): Reference Programming Pin. Ground selects V_{REF} = 4.096V. Short to V_{REF} for 2.048V. Connect SENSE to V_{DD} to drive V_{REF} with an external reference.

V_{REF} (Pin 5): DAC Reference. Bypass to GND with a 1µF to 10µF ceramic.

GND (Pin 6): DAC Reference Ground.

V_{DD} (Pin 7): Analog 5V Supply. Bypass to GND with a 1µF to 10µF ceramic.

GND (Pin 8): Analog Power Ground.

D11 to D0 (Pins 9 to 20): Data Outputs. The output format is two's complement.

OGND (Pin 21): Output Logic Ground. Tie to GND.

OV_{DD} (Pin 22): Positive Supply for the Output Logic. Connect to Pin 23 for 5V logic. If not shorted to Pin 23, bypass to GND with a 1µF ceramic.

V_{DD} (Pin 23): Analog 5V Supply. Bypass to GND with a 1µF ceramic.

GND (Pin 24): Analog Power Ground.

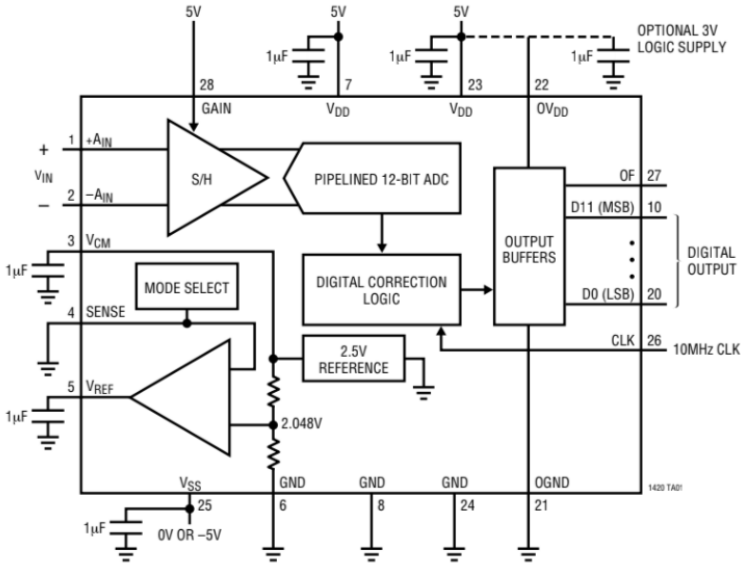
V_{SS} (Pin 25): Negative Supply. Can be –5V or 0V. If V_{SS} is not shorted to GND, bypass to GND with a 1µF ceramic.

CLK (Pin 26): Conversion Start Signal. This active high signal starts a conversion on its rising edge.

OF (Pin 27): Overflow Output. This signal is high when the digital output is 011111111111 or 100000000000.

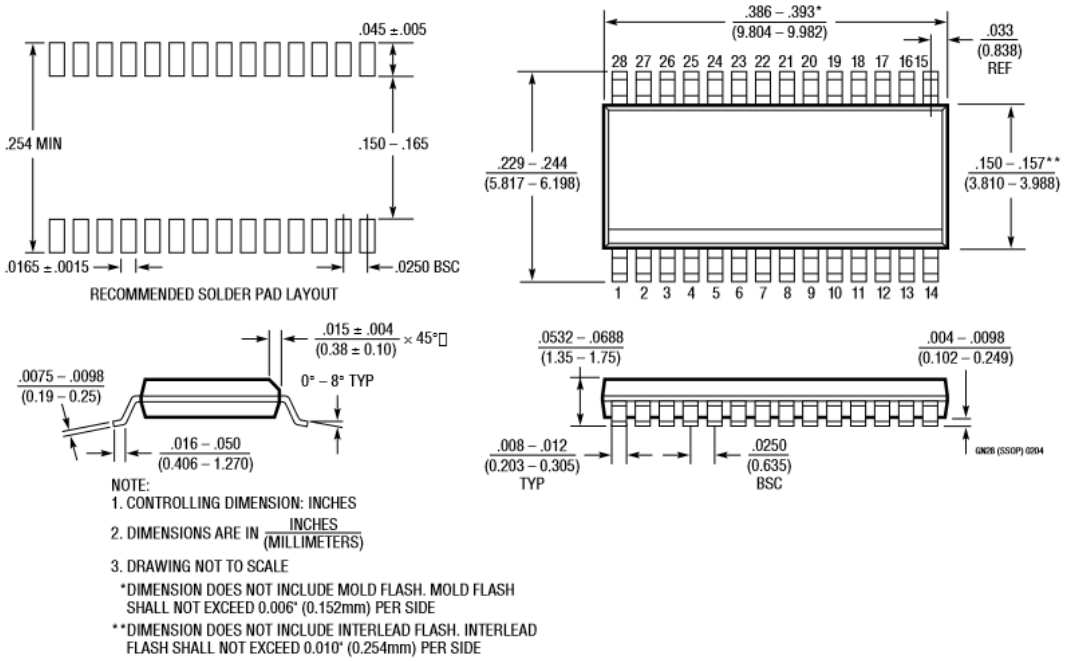
GAIN (Pin 28): Gain Select for Input PGA. 5V selects an input gain of 1, 0V selects a gain of 2.

TYPICAL APPLICATION



PACKAGE DESCRIPTION

GN Package
28-Lead Plastic SSOP (Narrow 0.150)
(LTC DWG # 05-08-1641)

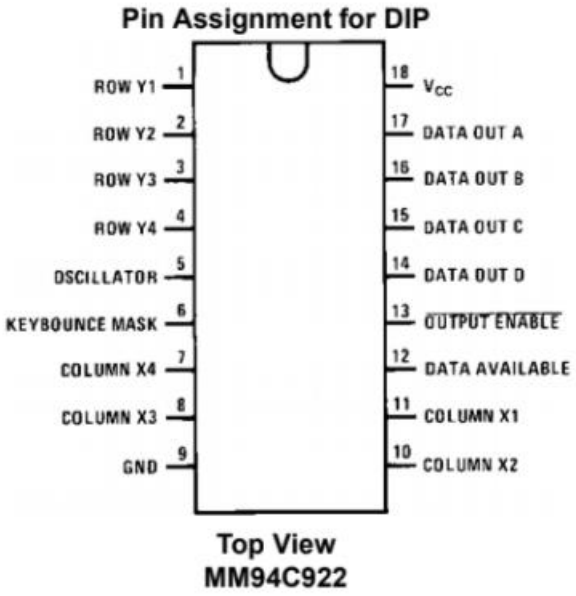


NOTE:
1. CONTROLLING DIMENSION: INCHES
2. DIMENSIONS ARE IN INCHES (MILLIMETERS)
3. DRAWING NOT TO SCALE

*DIMENSION DOES NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.006" (0.152mm) PER SIDE

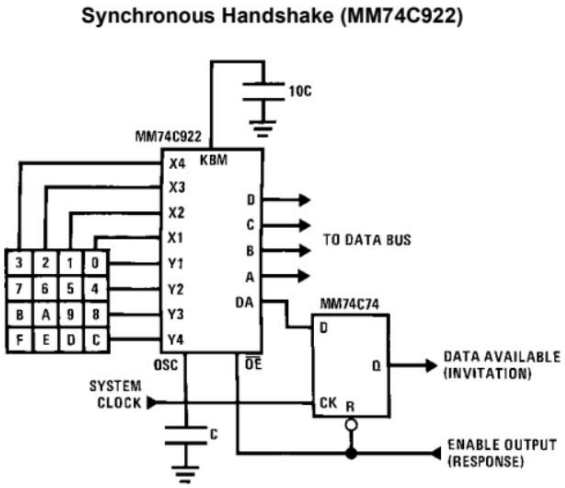
**DIMENSION DOES NOT INCLUDE INTERLEAD FLASH. INTERLEAD FLASH SHALL NOT EXCEED 0.010" (0.254mm) PER SIDE

4.Keypad Encoder

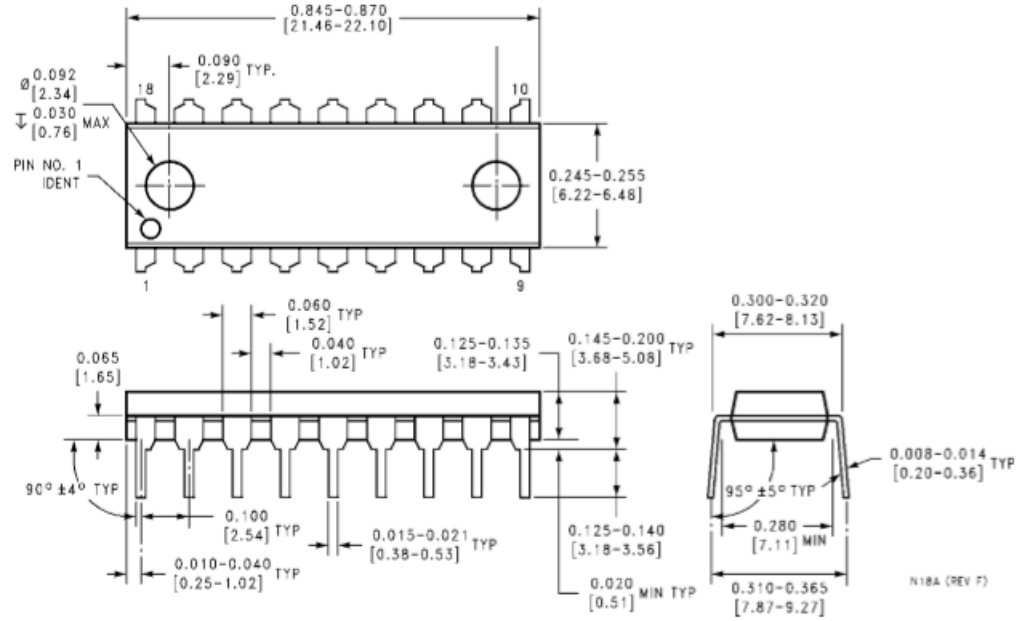


Pin Functions

DATA out A	Data channel b/w encoder and core ICs
DATA out B	Data channel b/w encoder and core ICs
DATA out C	Data channel b/w encoder and core ICs
DATA out D	Data channel b/w encoder and core ICs
$\overline{\text{Output Enable}}$	Active low, output enabler for keypad encoder
DATA AVAIL KEY	Active high for no data passing (indicates that input is possible)

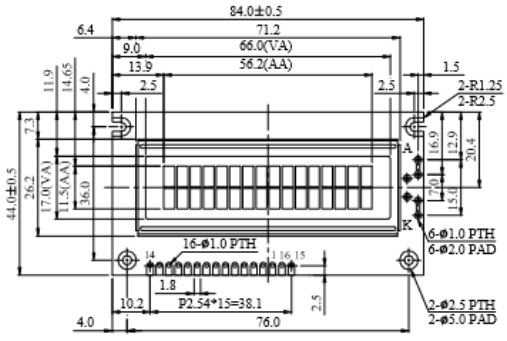


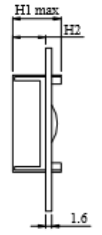
Physical Dimensions inches (millimeters) unless otherwise noted



5. LCD

Pin No.	Symbol	Level	Description
1	V_{SS}	0V	Ground
2	V_{DD}	5.0V	Supply Voltage for logic
3	VO	(Variable)	Operating voltage for LCD
4	RS	H/L	H: DATA, L: Instruction code
5	R/W	H/L	H: Read(MPU→Module) L: Write(MPU→Module)
6	E	H,H→L	Chip enable signal
7	DB0	H/L	Data bit 0
8	DB1	H/L	Data bit 1
9	DB2	H/L	Data bit 2
10	DB3	H/L	Data bit 3
11	DB4	H/L	Data bit 4
12	DB5	H/L	Data bit 5
13	DB6	H/L	Data bit 6
14	DB7	H/L	Data bit 7
15	A	—	LED +
16	K	—	LED −

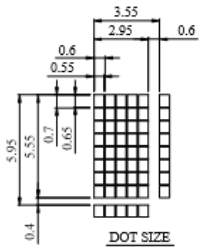




LED-H/L B/L

	High	Low
H1	13.5	12.1
H2	8.9	7.5

PIN NO.	SYMBOL
1	Vss
2	Vdd
3	Vo
4	RS
5	R/$\overline{W}$
6	E
7	DB0
8	DB1
9	DB2
10	DB3
11	DB4
12	DB5
13	DB6
14	DB7
15	A/Vee
16	K



The non-specified tolerance of dimension is ±0.3mm.

6.USB (type A and type B)

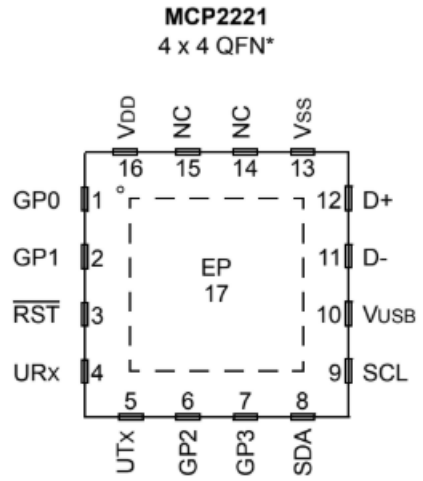
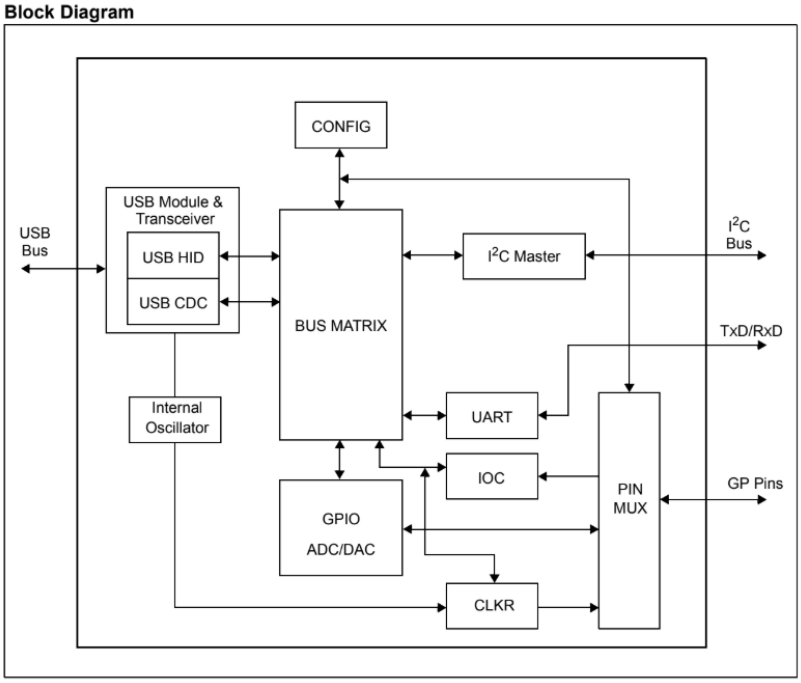
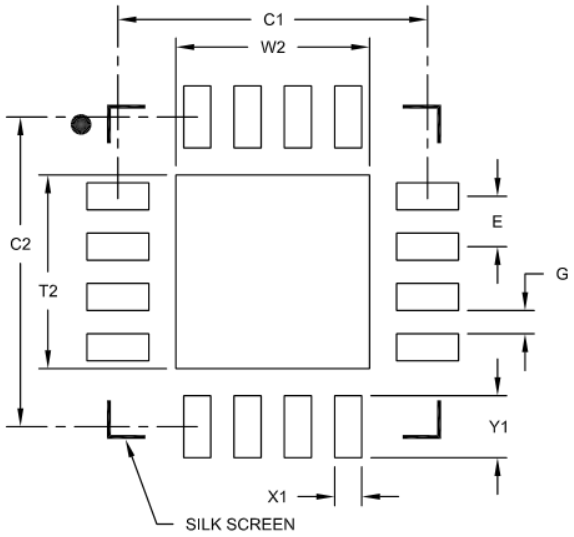


TABLE 1-1: PINOUT DESCRIPTION

Pin Name	PDIP, SOIC, SSOP	QFN	Pin Type	Standard Function	Alternate Functions	
GP0	2	1	I/O	General-purpose I/O or alternate function pin	SSPND (OUT) LED_URX (OUT)	Signals when the host has entered Suspend mode UART Rx LED activity output (factory default)
GP1	3	2	I/O	General-purpose I/O or alternate function pin	CLKR (OUT) ADC1 (IN) LED_UTX (OUT) IOC (IN)	Clock Reference Output ADC Channel 1 UART Tx Led activity output (factory default) External interrupt edge detector
$\overline{RST}$	4	3	I	Reset input (with internal pull-up)	N/A	
URX	5	4	I	UART Rx pin (input)	N/A	
UTX	6	5	O	UART Tx pin (output)	N/A	
GP2	7	6	I/O	General-purpose I/O or alternate function pin	USBCFG (OUT) ADC2 (IN) DAC1 (OUT)	USB device configured status (factory default) ADC Channel 2 DAC Output 1
GP3	8	7	I/O	General-purpose I/O or alternate function pin	LED_I2C (OUT) ADC3 (IN) DAC2 (OUT)	USB-I^2C traffic indicator (factory default) ADC Channel 3 DAC Output 2
SDA	9	8	I/O	I^2C Data line	N/A	
SCL	10	9	I/O	I^2C Clock line	N/A	
VUSB	11	10	USB	USB Power pin (internally connected to 3.3V) Should be locally bypassed with a high-quality ceramic capacitor		
D-	12	11	USB	USB D-		
D+	13	12	USB	USB D+		
VSS	14	13	P	Ground		
NC	—	14 15	—	Not Connected		
VDD	1	16	P	Power		
EP	—	17	—	Exposed Thermal Pad (EP) Do not electrically connect.		

Block Diagram





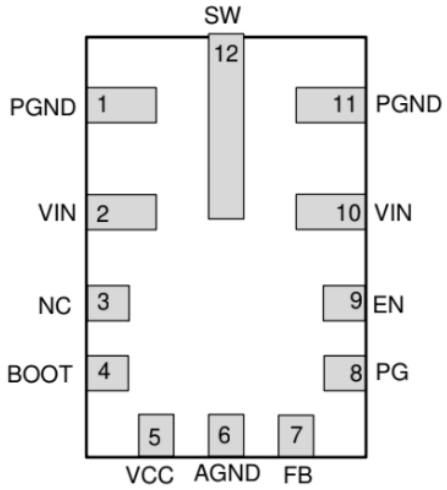
RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E		0.65 BSC	
Optional Center Pad Width	W2			2.50
Optional Center Pad Length	T2			2.50
Contact Pad Spacing	C1		4.00	
Contact Pad Spacing	C2		4.00	
Contact Pad Width (X16)	X1			0.35
Contact Pad Length (X16)	Y1			0.80
Distance Between Pads	G	0.30		

7.Power Supply

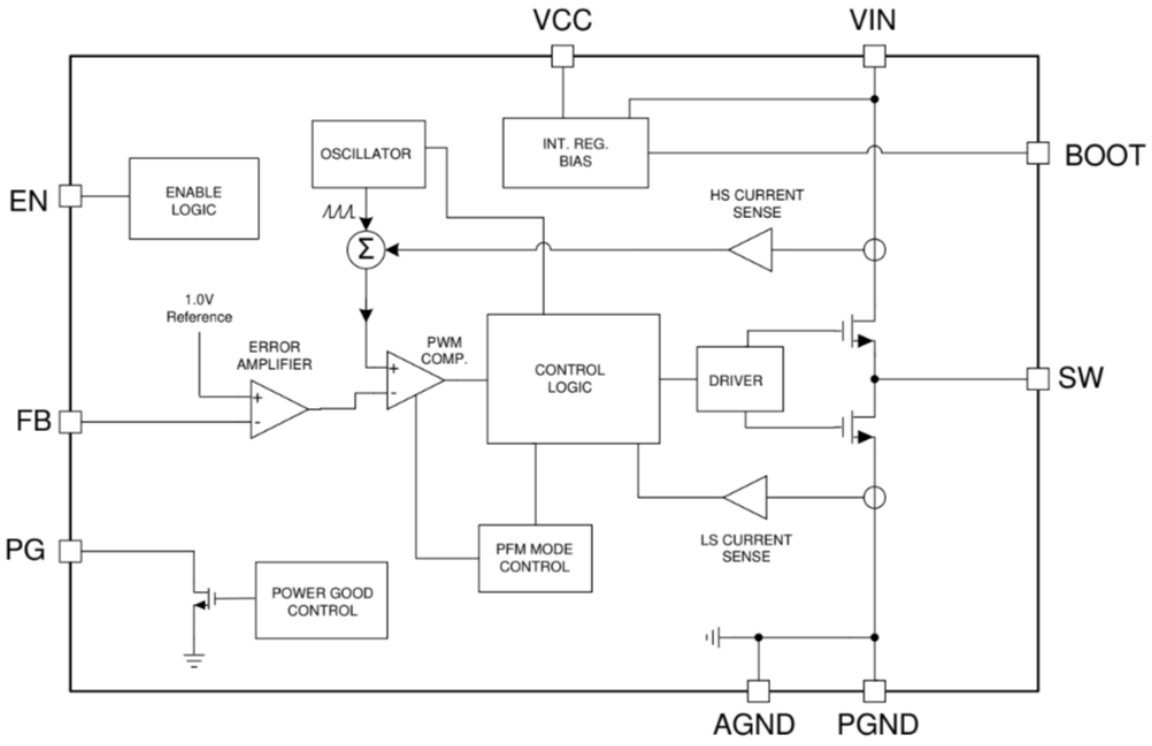
a.12V to 5V

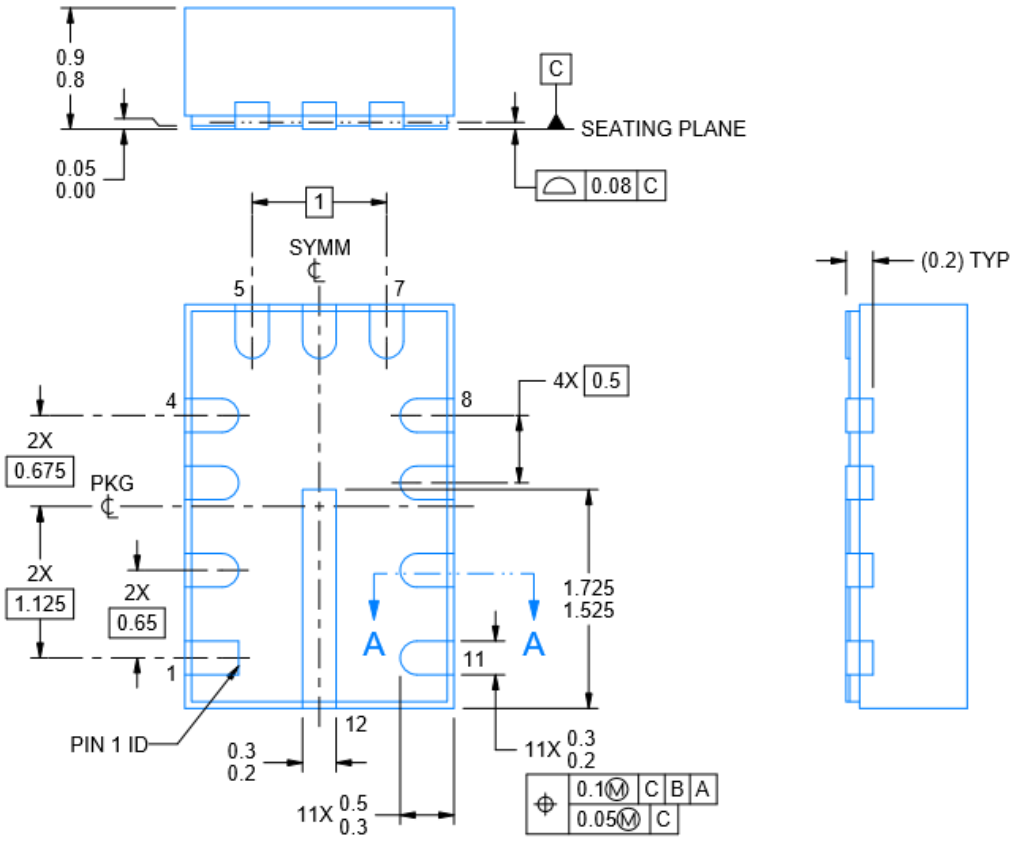
RNX Package
12-Pin VQFN-HR
Top View



Pin Functions

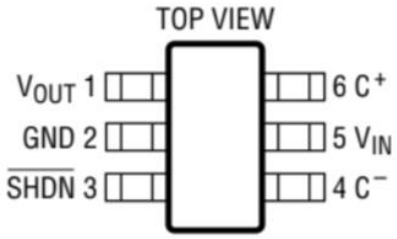
NO.	NAME	TYPE	DESCRIPTION
1, 11	PGND	G	Power ground terminal. Connect to system ground and AGND. Connect to C_{IN} with short wide traces.
2, 10	VIN	P	Input supply to regulator. Connect to C_{IN} with short wide traces.
3	NC	—	Connect the SW pin to NC on the PCB. This simplifies the connection from the C_{BOOT} capacitor to the SW pin. This pin has no internal connection to the regulator.
4	BOOT	P	Boot-strap supply voltage for internal high-side driver. Connect a high-quality 100-nF capacitor from this pin to the SW pin. Connect the SW pin to NC on the PCB. This simplifies the connection from the C_{BOOT} capacitor to the SW pin.
5	VCC	P	Internal 5-V LDO output. Used as supply to internal control circuits. Do not connect to external loads. Can be used as logic supply for power-good flag. Connect a high-quality 1-µF capacitor from this pin to GND.
6	AGND	G	Analog ground for regulator and system. Ground reference for internal references and logic. All electrical parameters are measured with respect to this pin. Connect to system ground on PCB.
7	FB	A	Feedback input to regulator. Connect to tap point of feedback voltage divider. DO NOT FLOAT. DO NOT GROUND.
8	PG	A	Open drain power-good flag output. Connect to suitable voltage supply through a current limiting resistor. High = power OK, low = power bad. Goes low when EN = Low. Can be open or grounded when not used.
9	EN	A	Enable input to regulator. High = ON, low = OFF. Can be connected directly to VIN; DO NOT FLOAT.
12	SW	P	Regulator switch node. Connect to power inductor. Connect the SW pin to NC on the PCB. This simplifies the connection from the C_{BOOT} capacitor to the SW pin.
A = Analog, P = Power, G = Ground			





4223969/C 10/2018

b.5Vto3.3V



S6 PACKAGE
6-LEAD PLASTIC SOT-23

T_{JMAX} = 150°C, θ_{JA} = 230°C/W

PIN FUNCTIONS

V_{OUT} (Pin 1): Regulated Output Voltage. For best performance, V_{OUT} should be bypassed with a 6.8µF (min) low ESR capacitor as close as possible to the pin.

GND (Pin 2): Ground. Should be tied to a ground plane for best performance.

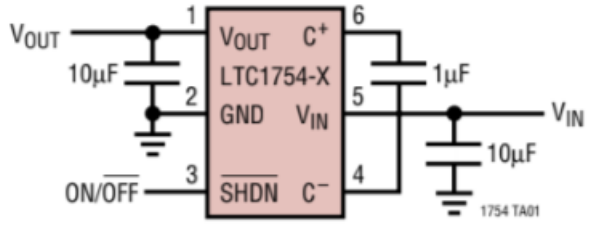
$\overline{SHDN}$ (Pin 3): Active Low Shutdown Input. A low on $\overline{SHDN}$ disables the LTC1754. $\overline{SHDN}$ must not be allowed to float.

C^- (Pin 4): Flying Capacitor Negative Terminal.

V_{IN} (Pin 5): Input Supply Voltage. V_{IN} should be bypassed with a 6.8µF (min) low ESR capacitor.

C^+ (Pin 6): Flying Capacitor Positive Terminal.

TYPICAL APPLICATION



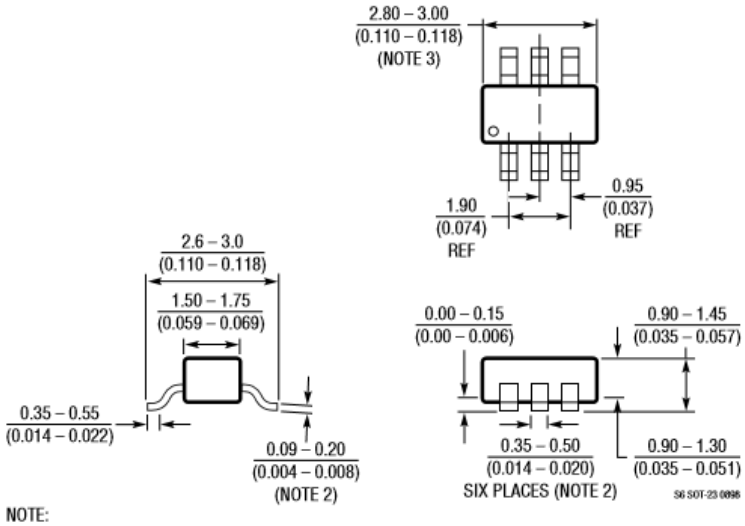
Regulated 3.3V Output from 2V to 4.4V Input

V_{OUT} = 3.3V ±4%
I_{OUT} = 0mA TO 20mA, V_{IN} > 2.0V
I_{OUT} = 0mA TO 40mA, V_{IN} > 2.5V

PACKAGE DESCRIPTION

Dimensions in inches (millimeters), unless otherwise noted.

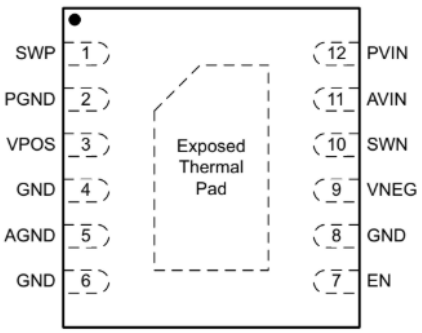
S6 Package
6-Lead Plastic SOT-23
(LTC DWG # 05-08-1634)



NOTE:
1. DIMENSIONS ARE IN MILLIMETERS
2. DIMENSIONS ARE INCLUSIVE OF PLATING
3. DIMENSIONS ARE EXCLUSIVE OF MOLD FLASH AND METAL BURR
4. MOLD FLASH SHALL NOT EXCEED 0.254mm
5. PACKAGE EIAJ REFERENCE IS SC-74A (EIAJ)

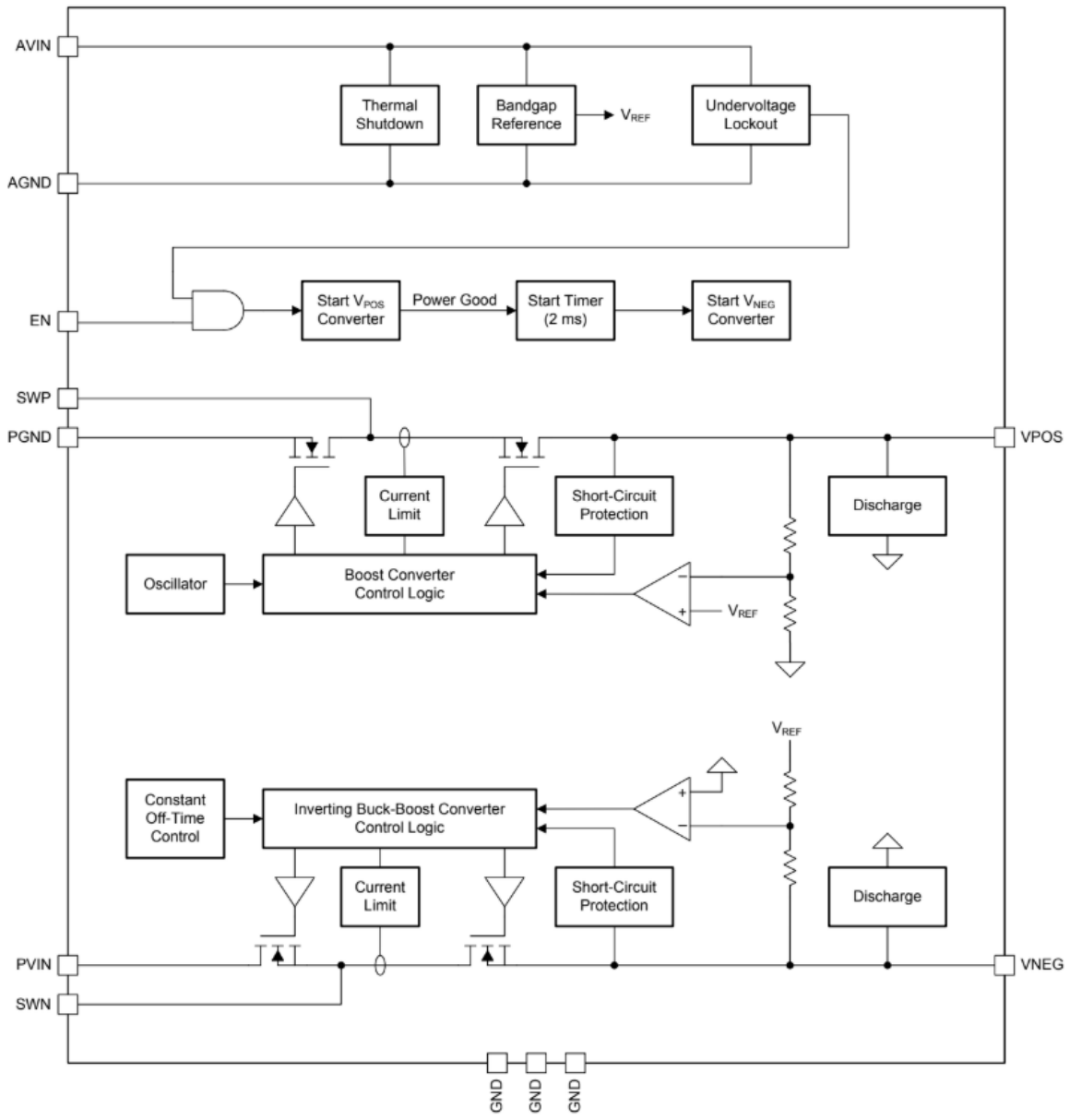
c.5Vto-5V

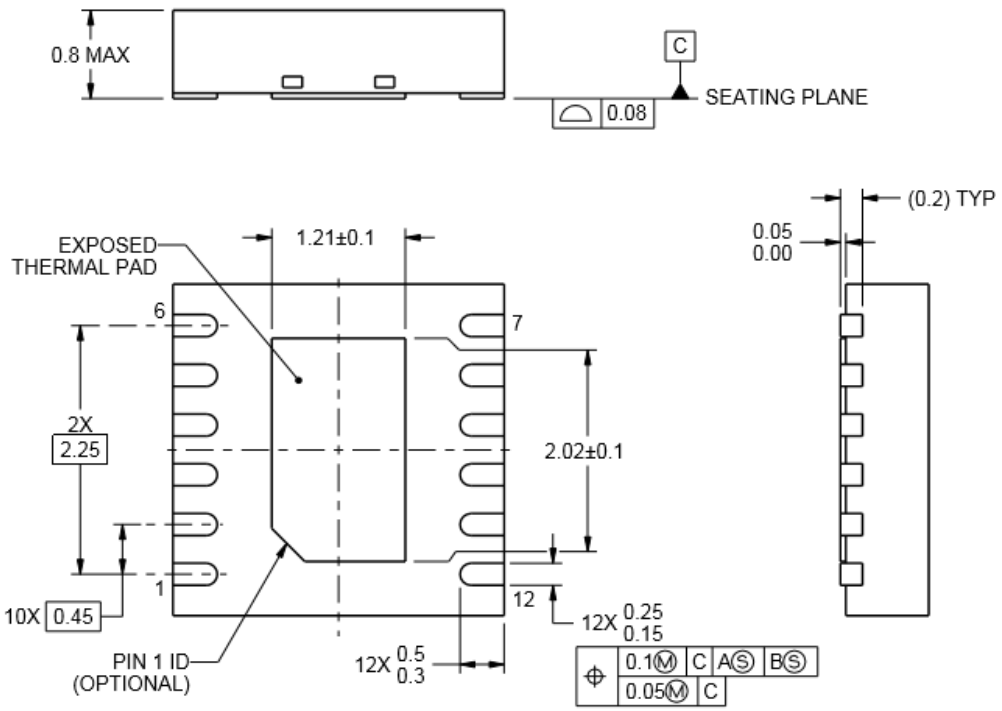
DPD Package
12-Pin WSON
(Top View)



Pin Functions

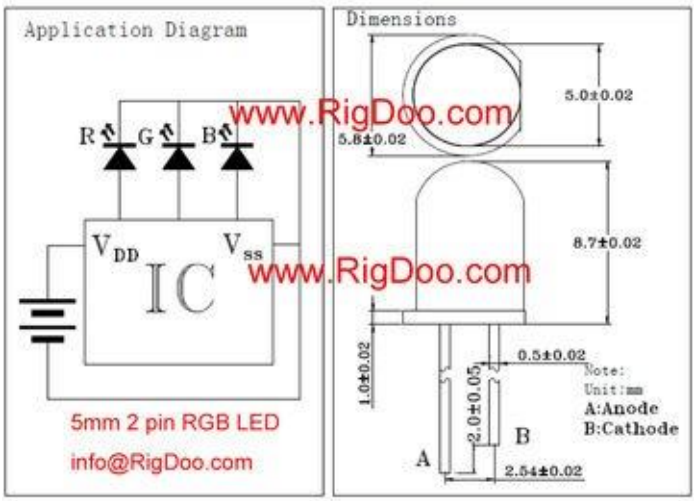
PIN		DESCRIPTION
NAME	NO.	
AGND	5	Analog ground
AVIN	11	Internal logic supply pin
EN	7	Enable of boost and buck-boost converter
GND	4, 6, 8	Ground
SWP	1	Switch pin of the boost converter
PGND	2	Power ground of the boost converter
PVIN	12	Supply pin for the negative buck-boost converter. Place a capacitor close to this pin.
SWN	10	Switch pin of the negative buck-boost converter
VNEG	9	Output of the negative buck-boost converter (V_{NEG}), place a capacitor close to this pin.
VPOS	3	Output of the boost converter (V_{POS}), place a capacitor close to this pin.
Exposed thermal pad		Exposed thermal pad. Connect this pad to all GND pins.





8. LEDs and Switches

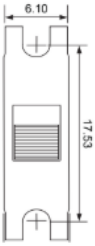
a. LED

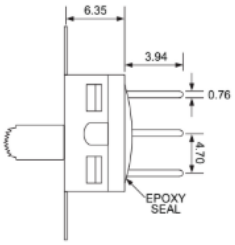


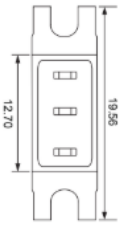
b.Switch

SPDT

	Toggle Position		
Function			
1	ON	NONE	ON
2	ON	NONE	(ON)
3	ON	OFF	ON
Terminals	2-3	n/a	2-1

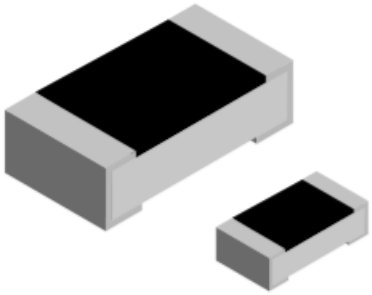






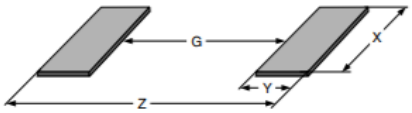
9.Miscellaneus

1. Resistors



TECHNICAL SPECIFICATIONS	
DESCRIPTION	**RCS0402 e3**
Imperial size	0402
Metric size code	RR1005M
Resistance range	
Resistance tolerance	
Temperature coefficient	
Rated dissipation, P_{70} (1)	0.2 W
Operating voltage, $U_{max.}$ AC_{RMS}/DC	50 V
Permissible film temperature, $\vartheta_{F\ max.}$ (1)	
Operating temperature range	
Max. resistance change at P_{70} for resistance range, $\lvert\Delta R/R\rvert$ after: 1000 h 8000 h	
Permissible voltage against ambient (insulation): 1 min, U_{ins}	 75 V

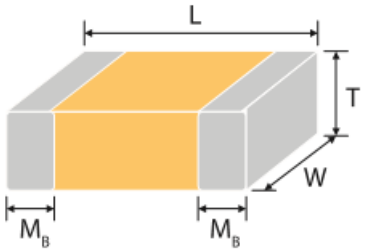
SOLDER PAD DIMENSIONS



RECOMMENDED SOLDER PAD DIMENSIONS								
TYPE / SIZE	WAVE SOLDERING				REFLOW SOLDERING			
	G (mm)	Y (mm)	X (mm)	Z (mm)	G (mm)	Y (mm)	X (mm)	Z (mm)
RCS0402 e3	-	-	-	-	0.45	0.6	0.6	1.65
RCS0603 e3	0.65	1.10	1.25	2.85	0.75	0.75	1.00	2.15
RCS0805 e3	0.90	1.30	1.60	3.50	1.00	0.95	1.45	2.90
RCS1206 e3	1.40	1.40	1.95	4.20	1.50	1.05	1.80	3.60

2 Capacitors

External Dimensions:



The outline of MLCC

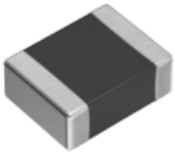
General Electrical Data:

Dielectric	NP0	X7R	Y5V
Size	0402, 0603, 0805, 1206, 1210, 1812		
Capacitance*	0.5pF to 0.1μF	100pF to 0.82μF	10nF to 0.68μF
Capacitance tolerance**	Cap≤5pF: B (±0.1pF), C (±0.25pF) 5pF<Cap<10pF: C (±0.25pF), D (±0.5pF) Cap≥10pF: F (±1%), G (±2%), J (±5%), K (±10%)	J (±5%), K (±10%), M (±20%)	M (±20%), Z (-20/+80%)
Rated voltage (WVDC)	10V, 16V, 25V, 50V, 100V	6.3V, 10V, 16V, 25V, 50V, 100V	
DF (Tan δ)*	Cap<30pF: Q≥400+20C Cap≥30pF: Q≥1000	Note 1	
Operating temperature	-55°C to +125°C		-55°C to +85°C
Capacitance change	±30ppm	±15%	
Termination	Ni/Sn (lead-free termination)		

Size Inch (mm)	L (mm)	W (mm)	T (mm)/Symbol		Remark	MB (mm)
0402 (1005)	1 ±0.05	0.5 ±0.05	0.5 ±0.05	N	#	0.25 +0.05/-0.1
0603 (1608)	1.6 ±0.1	0.8 ±0.1	0.8 ±0.07	S	-	0.4 ±0.15
	1.6 +0.15/-0.1	0.8 +0.15/-0.1	0.8 +0.15/-0.1	X	-	
0805 (2012)	2 ±0.15	1.25 ±0.1	0.6 ±0.1	A	-	0.5 ±0.2
			0.8 ±0.1	B	-	
			1.25 ±0.1	D	#	
	2 ±0.2	1.25 ±0.2	1.25 ±0.2	I	#	
1206 (3216)	3.2 ±0.15	1.6 ±0.15	0.8 ±0.1	B	-	0.6 ±0.2
			0.95 ±0.1	C	-	
			1.15 ±0.15	J	#	
			1.25 ±0.1	D	#	
			1.6 ±0.2	G	#	
	3.2 +0.3/-0.1	1.6 +0.3/0.1	1.6 +0.3/-0.1	P	#	
1210 (3225)	3.2 ±0.3	2.5 ±0.2	0.95 ±0.1	C	#	0.75 ±0.25
			1.25 ±0.1	D	#	
	3.2 ±0.4	2.5 ±0.3	1.6 ±0.2	G	#	
			2 ±0.2	K	#	
			2.5 ±0.3	M	#	
1812 (4532)	4.5 ±0.4	3.2 ±0.3	1.25 ±0.1	D	#	0.75 ±0.25
			2 ±0.2	K	#	

3. Inductors

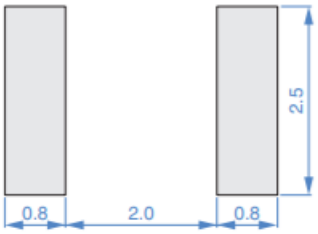
TFM322512ALMA



CHARACTERISTICS SPECIFICATION TABLE

L		L measuring frequency	DC resistance		Rated current*				Rated voltage	Part No.
					Isat		Itemp			
(µH)	Tolerance	(MHz)	(mΩ)max.	(mΩ)typ.	(A)max.	(A)typ.	(A)max.	(A)typ.	(V)max.	
1.0	±20%	1	37	30	4.6	5.1	4.0	4.4	20	TFM322512ALMA1R0MTAA
1.5	±20%	1	57	46	4.0	4.5	3.2	3.5	20	TFM322512ALMA1R5MTAA
2.2	±20%	1	77	64	3.3	3.6	2.7	3.0	20	TFM322512ALMA2R2MTAA
3.3	±20%	1	113	97	2.5	2.8	2.3	2.5	20	TFM322512ALMA3R3MTAA
4.7	±20%	1	151	127	2.2	2.5	1.9	2.1	20	TFM322512ALMA4R7MTAA
6.8	±20%	1	260	220	1.8	2.1	1.4	1.6	20	TFM322512ALMA6R8MTAA
10	±20%	1	360	305	1.6	1.8	1.2	1.4	20	TFM322512ALMA100MTAA

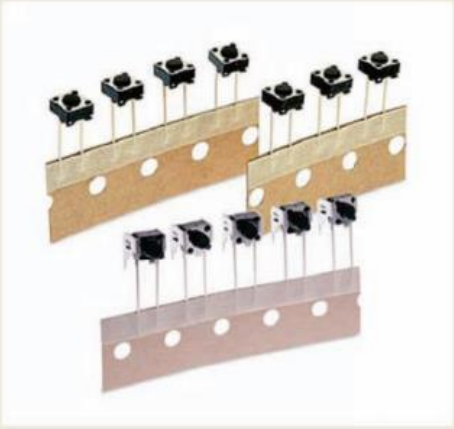
RECOMMENDED LAND PATTERN



Dimensions in mm

4. Keypad(switches)

TACT SWITCHES RADIAL LEAD



SPECIFICATIONS	
Contact Rating:	50mA @ 12 VDC
Life Expectancy:	100,000 cycles
Contact Resistance:	100mΩ max., typical @ 2-4 VDC 100mA for both silver plated contacts
Insulation Resistance:	100MΩ min.
Dielectric Strength:	250 VAC
Actuation Force:	100 ± 50 gf, 160 ± 50 gf, 260 ± 50 gf
Operating Temperature:	-20°C to 70°C
Travel:	0.25 Typ

FEATURES & BENEFITS

- Designed for automatic feed
- Radial lead packaging

APPLICATIONS/MARKETS

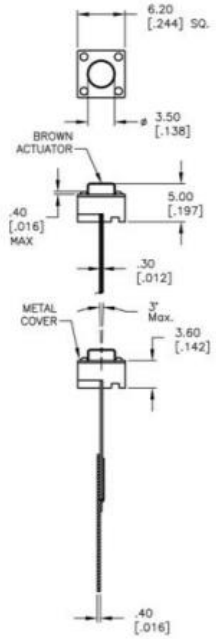
- Telecommunications
- Consumer Electronics
- Audio/visual
- Medical
- Testing/instrumentation
- Computer/servers/peripherals

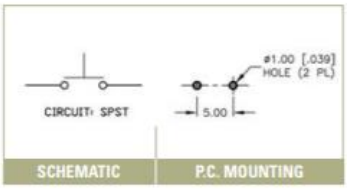
TL 59

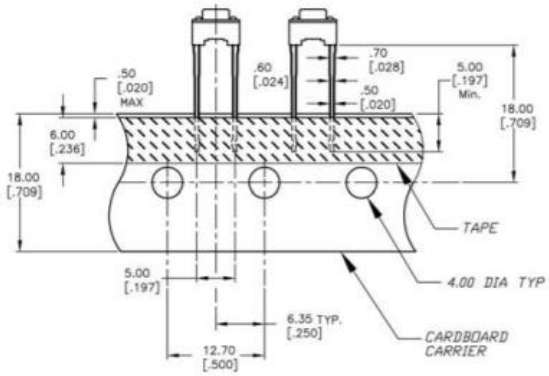
STANDARD
RADIAL LEAD

Actuator Length (L) in mm		
N = 4.3	C = 8.0	P = 8.5
A = 5.0	F = 7.0	SP = 2.8 ☐
B = 9.5	E = 7.3	

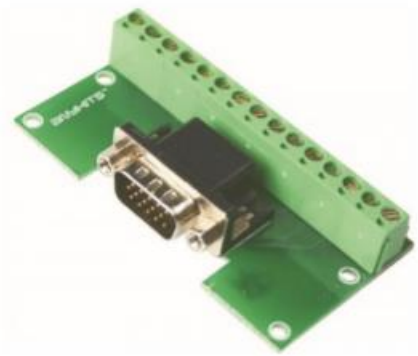
Operating Force
F100 = 100 ± 50gf
F160 = 160 ± 50gf
F260 = 260 ± 50gf

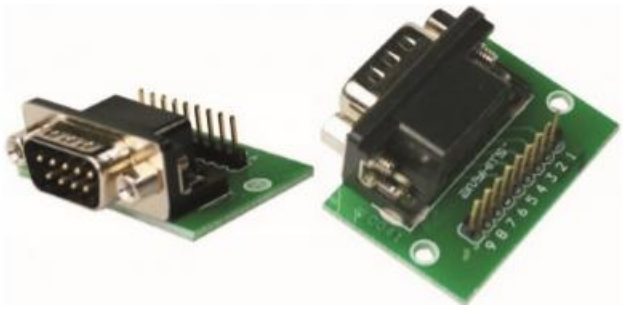


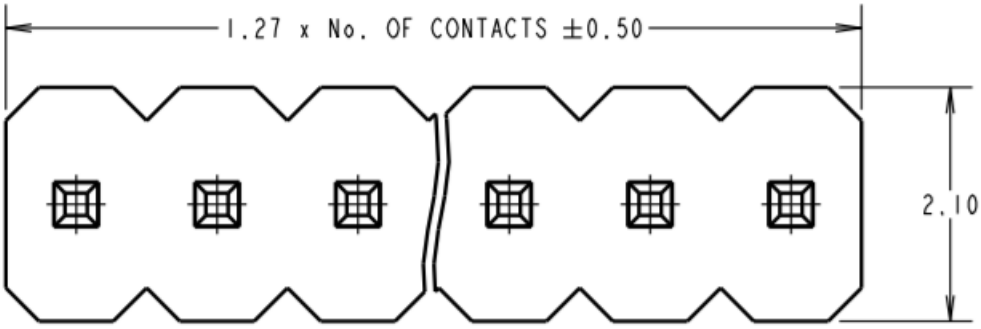




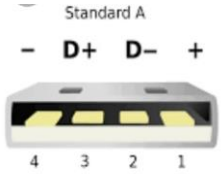
5. Vga port



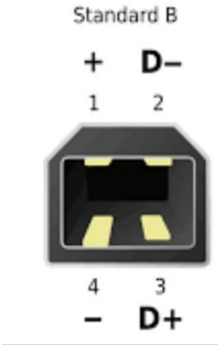




6. Usb port A



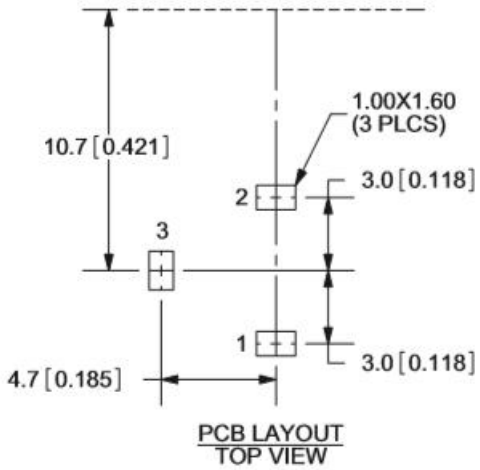
7. Usb port B



8. Power supply port

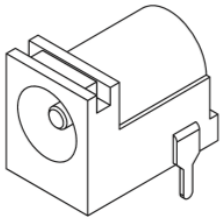
MODEL: PJ-102A | **DESCRIPTION:** DC POWER JACK

FEATURES
- 2.0 mm center pin
- 2.5 A rating
- right-angle orientation
- through hole
- tapered pins



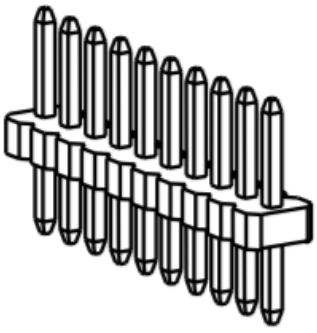
MECHANICAL DRAWING

units: mm[inches]
tolerance:
X.X ±0.2mm
X.XX ±0.1mm
X.XXX ±0.05mm

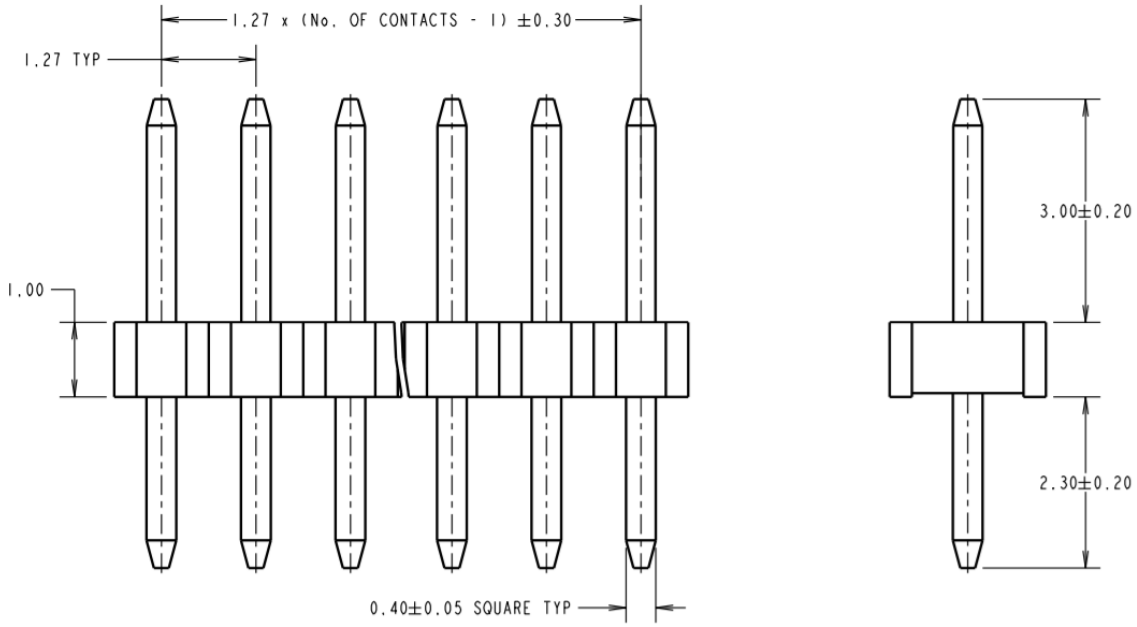


	MATERIAL	PLATING
center pin	copper	nickel
terminal 1	brass	tin
terminal 2	copper alloy	tin
terminal 3	brass	tin
plastic	PBT	

9.Berg Connector



SPECIFICATION:
MATERIAL:
MOULDING = PA9T, UL94V-0, BLACK
CONTACT = BRASS
FINISH = 0.76-1.52µ NICKEL ALL OVER,
0.012µ MIN GOLD ON CONTACT AREA,
2.54-5.08µ 100% TIN ON TAILS
ELECTRICAL:
CURRENT RATING = 1A
CONTACT RESISTANCE = 20mΩ MAX
INSULATION RESISTANCE = 1000MΩ MAX
VOLTAGE PROOF = 500V AC FOR ONE MINUTE
MECHANICAL:
DURABILITY = 500 CYCLES
ENVIRONMENTAL:
OPERATING TEMPERATURE = -40°C TO +105°C
PACKING:
BOX
FOR COMPLETE SPECIFICATION, SEE COMPONENT
SPECIFICATION C029XX (LATEST ISSUE)


1.27 x (No. OF CONTACTS - 1) ±0.30
1.27 TYP
1.00
3.00±0.20
2.30±0.20
0.40±0.05 SQUARE TYP