承永資訊科技
CYRUSTEK CO.

ES5128
4-1/2 digit with LED

Features

- Max. ±19,999 counts
- QFP-44L package
- Input full scale range: 200mV or 2V
- Built-in multiplexed **LED** display driver: 4-1/2 digits, 4 decimal points and polarity
- Underrange/Overrange outputs
- 10μV resolution on 200mV scale
- Display Hold
- Precise 10:1 range select
- True differential input and reference
- Built-in inverters for RC oscillation circuit.

Application

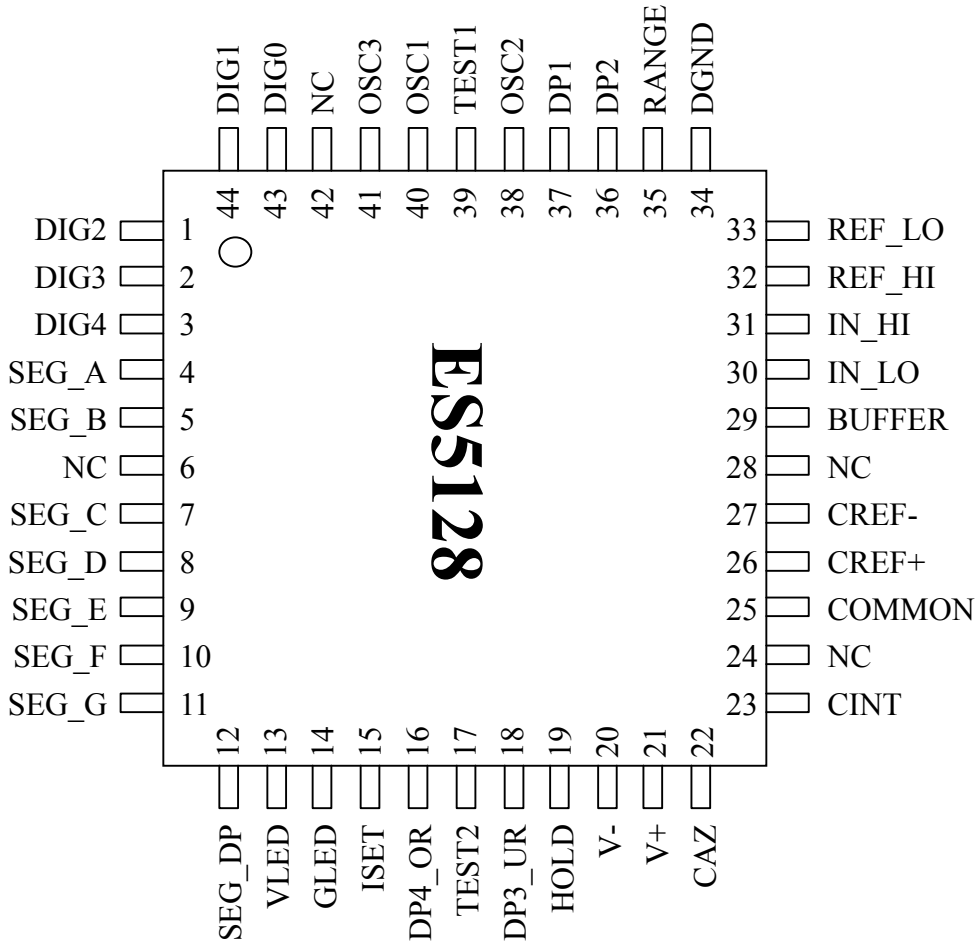
Panel Meter

Description

ES5128 is a 19,999-count analog-to-digital converter (ADC) with multiplexed **LED** display driver. It drives 4-1/2 digits, 4 decimal points and polarity segments. It typically requires a dual +5V/-5V power supply or a 10V single power with 5V regulator, like 7905 series ICs, for ADC operation. ES5128 has a ±19,999 counts resolution on both 200.00mV and 2.0000V ranges. It features high impedance inputs, excellent differential linearity, true ratiometric operation and auto polarity. The underrange and overrange outputs and the 10:1 range changing inputs facilitate the design of autoranging systems. Other features include Display Hold and controllable decimal points.

Pin Assignment

QFP-44L



Pin Description

QFP-44L

Pin No	Symbol	Type	Description
1	DIG2	O	LED backplane signal for DIG2
2	DIG3	O	LED backplane signal for DIG3
3	DIG4	O	LED backplane signal for most significant digit
4	SEG_A	O	LED segment signal for all A segments
5	SEG_B	O	LED segment signal for all B segments
6	NC		
7	SEG_C	O	LED segment signal for all C segments
8	SEG_D	O	LED segment signal for all D segments
9	SEG_E	O	LED segment signal for all E segments
10	SEG_F	O	LED segment signal for all F segments
11	SEG_G	O	LED segment signal for all G segments
12	SEG_DP	O	LED segment signal for all decimal point segments
13	VLED	P	Positive power supply for LED driver circuit
14	GLED	P	Negative power supply for LED driver circuit
15	ISET	O	Adjust the bright(current) of LED segment.
16	DP4_OR	I/O	Input: Turns on most significant decimal point when HI. Output: Pulled HI when result count exceeds ±19,999.
17	TEST2	-	TEST pin. Not Connect.
18	DP3_UR	I/O	Input: Turn on the 2nd significant decimal point when HI. Output: Pulled HI when result count is less than ±1,000.
19	HOLD	I/O	Input: when floating, ES5128 operates in the free-run mode. When pulled high, the last display reading is held. When pulled LO, the result counter contents are shown incrementing during the de-integrate phase of cycle. Output: Negative going edge occurs when the data latches are upgraded. Can be used as a converter status signal.
20	V-	P	Negative power supply terminal
21	V+	P	Positive power supply terminal
22	CAZ	I/O	Integrator amplifier input
23	CINT	I/O	Integrator amplifier output
24	NC		
25	COMMON	O	Set common-mode voltage of 3.2V below V+.
26	CREF+	O	Positive connection to external reference capacitor
27	CREF-	O	Negative connection to external reference capacitor
28	NC		
29	BUFFER	O	Buffer amplifier output
30	IN_LO	I	Negative input voltage terminal
31	IN_HI	I	Positive input voltage terminal
32	REF_HI	I	Positive reference voltage terminal
33	REF_LO	I	Negative reference voltage terminal
34	DGND	O	Ground reference for digital section

35	RANGE	I	Pulled HIGH externally for 2V scale.
36	DP2	I	When HI, decimal point 2 will be on.
37	DP1	I	When HI, decimal point 1 will be on.
38	OSC2	I/O	Output of first clock inverter. Input of second clock inverter.
39	TEST1	-	TEST pin. Not connect.
40	OSC1	I/O	Input of first clock inverter.
41	OSC3	O	Output of second clock inverter.
42	NC		
43	DIG0	O	LED backplane signal for DIG0
44	DIG1	O	LED backplane signal for DIG1

Absolute Maximum Ratings

Characteristic	Rating
Supply Voltage (V+ to V-)	15V
Analog Input Voltage	V- -0.6 to V+ +0.6
Digital Input	DGND -0.6V to V+ +0.6V
Power Dissipation. Flat Package	500mW
Operating Temperature	0℃ to 70℃
Storage Temperature	-25℃ to 125℃

Electrical Characteristics

TA=25℃, 10V between V+ and V-

Parameter	Test Condition	Min.	Typ.	Max	Units
Zero input reading	Vin=0, 200mV scale	-1	0	1	counts
Ratiometric reading	Vin=Vref=1V Range=2V	9998	9999	10000	counts
Rollover Error	+Vin=-Vin=199mV	—	—	2	counts
Linearity Error	200mV Scale	—	—	1	counts
Common Voltage	V+ to Common	2.8	3.2	3.5	V
Common Sink Current	△common=+0.1V	0.1	2		mA
Common Source Current	△common=-0.1V	10	200		μA
Supply Current excluding LED display current	V+ to V- = 10V	—	0.9	1.4	mA
Supply Voltage Range	V+ to V-	7	10	14	V

Function Description

1. Normal Operation

When ES5128 operates at the oscillation frequency of 120KHz, the conversion period will be 500ms. And the less frequency it has, the longer time it takes to complete one conversion. ES5128 takes input signal from pins IN_LO and IN_HI differentially, and take reference from pins REF_LO and REF_HI. The typical reference voltage is about 1V. A filter capacitor and a protective resistor are recommended at IN_HI and IN_LO terminal as the test circuit of page7.

2. Range Change Function

ES5128 has 2 operation ranges such as 200.00mV and 2.0000V. When the pin RANGE is pulled to DGND or keep floating, ES5128 operates at 200.00mV full-scale range. When it is pulled to V+, ES5128 change the input full-scale range to 2.0000V. And the output data still remain the maximum counting number ±19,999.

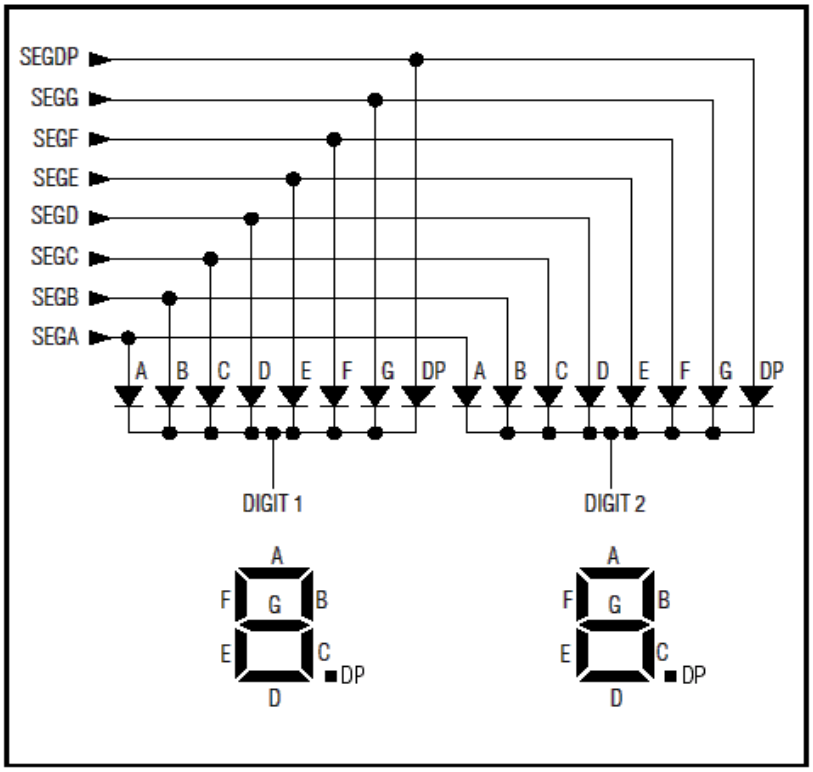
3. Data Hold Function

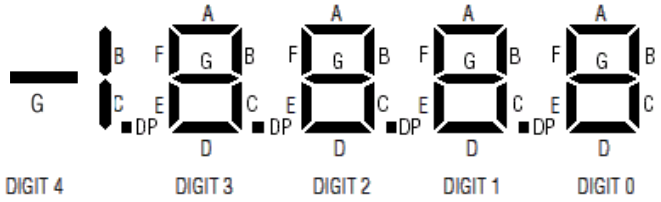
ES5128 support a data hold function to stop the LED panel upgrading and hold the final data. When the pin HOLD keeps floating, ES5128 operates in free run mode, and the data upgrades after every conversion. When it is pulled to V+, ES5128 enters HOLD mode, the LED panel stops upgrading the output data, And the final data before the HOLD mode is activated is held.

4. Decimal Points Controlled

ES5128 can drive 4 decimal points on LED panel. It provides four pins DP1, DP2, DP3 and DP4 to control the decimal points. Connect the pins DP1~DP4 to V+ will turn on the relative decimal points. To turn it off, keep it floating or connect it to DGND.

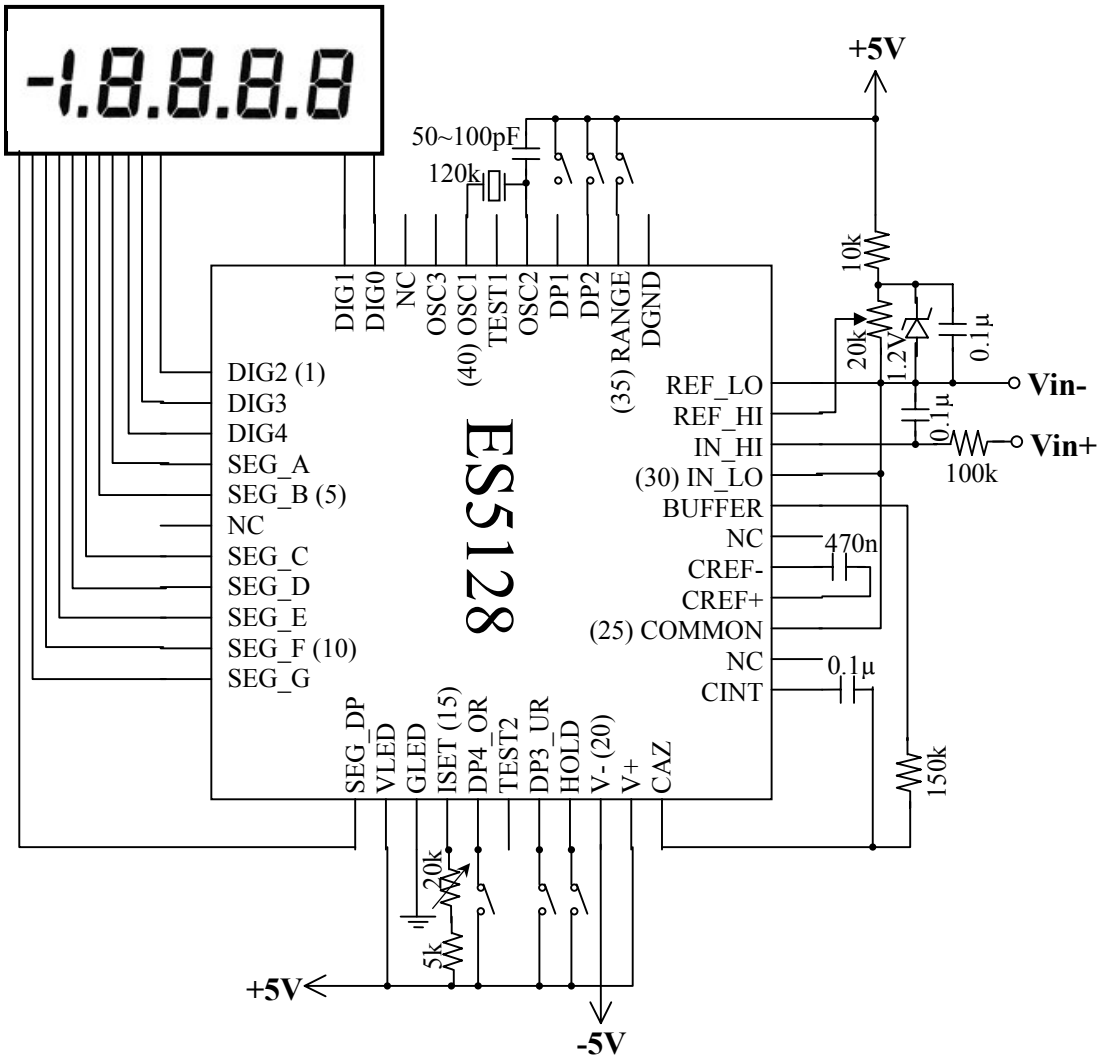
5. LED Display Configuration



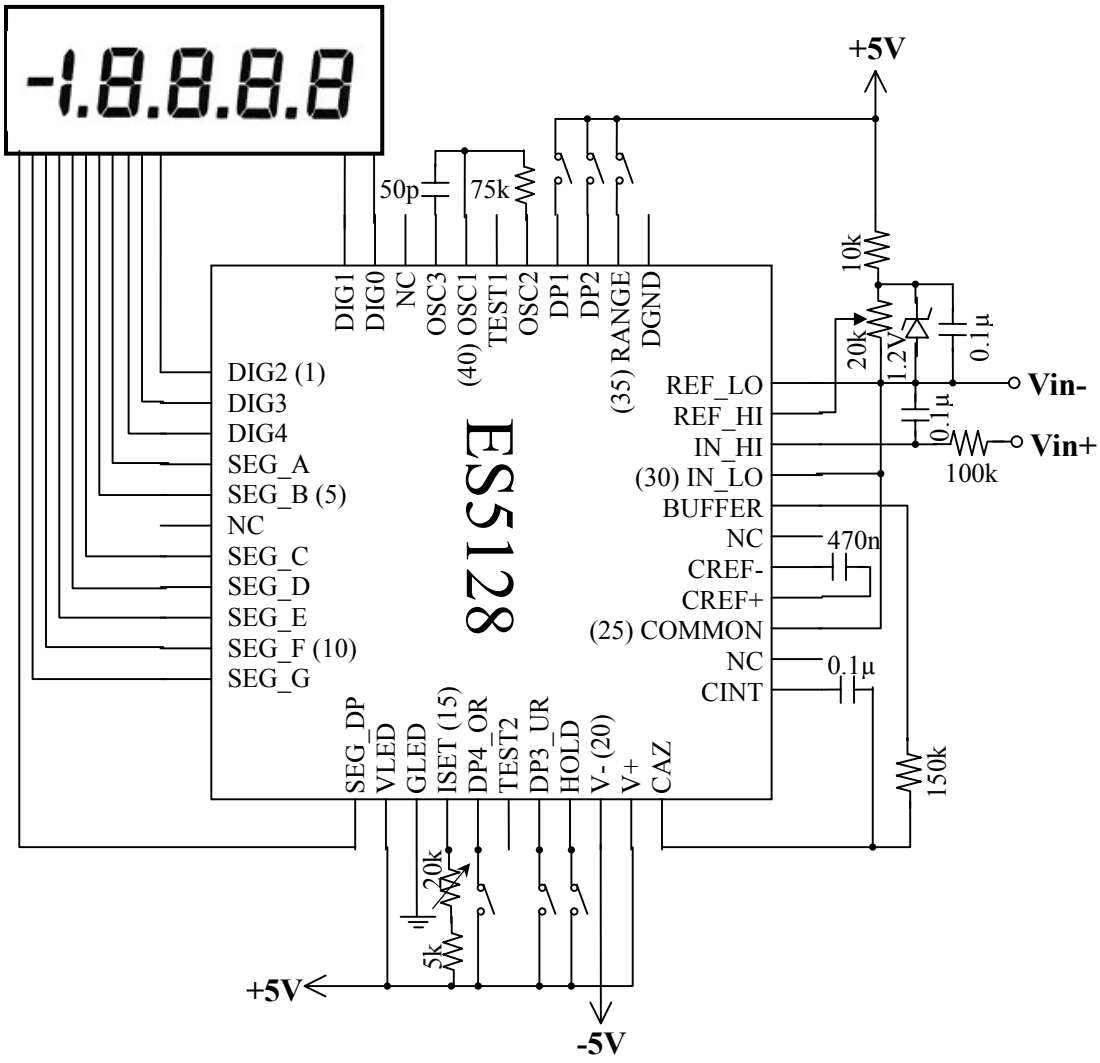


	SEG_A	SEG_B	SEG_C	SEG_D	SEG_E	SEG_F	SEG_G	SEG_DP
DIG0	0A	0B	0C	0D	0E	0F	0G	
DIG1	1A	1B	1C	1D	1E	1F	1G	DP1
DIG2	2A	2B	2C	2D	2E	2F	2G	DP2
DIG3	3A	3B	3C	3D	3E	3F	3G	DP3
DIG4		4B	4C				SIGN	DP4

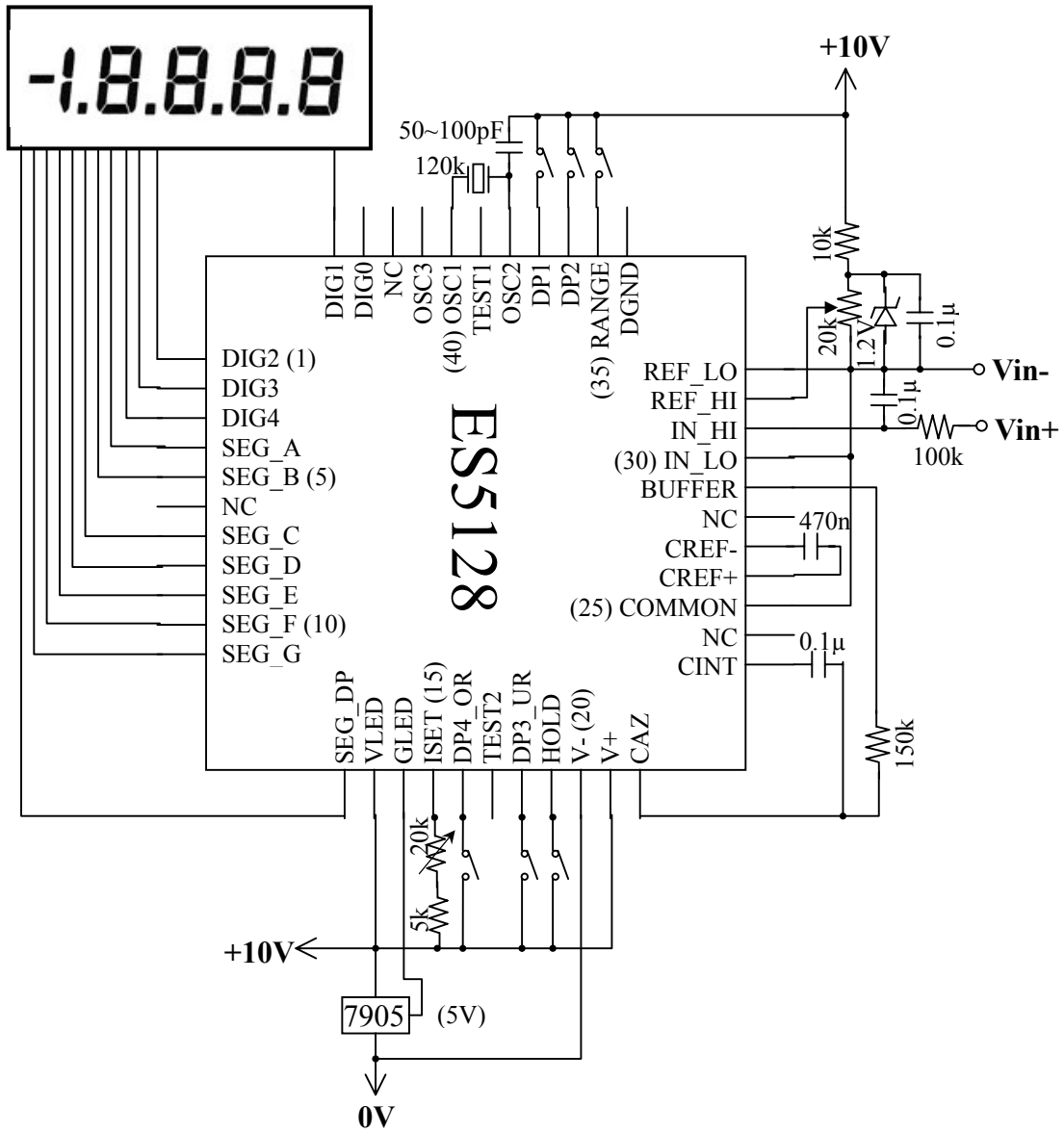
Test Circuit – 120KHz Crystal Oscillator



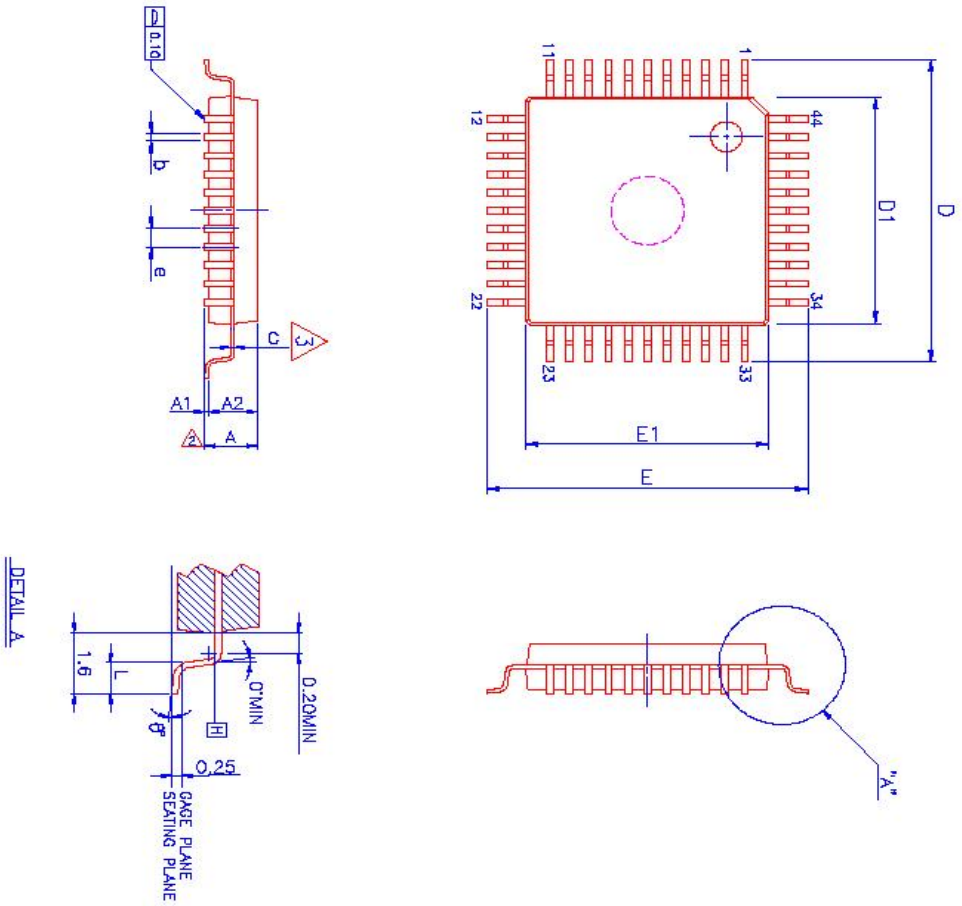
Test Circuit – RC Oscillation Circuit



Test Circuit – Single Power operation



Product Outline: QFP-44



	SYMBOLS	MIN.	NOM	MAX.
	A	–	–	2.7
3	A1	0.25	0.30	0.35
	A2	1.9	2.0	2.2
	b		0.3 (TYP.)	
	D	13.00	13.20	13.40
	D1	9.9	10.00	10.10
	E	13.00	13.20	13.40
	E1	9.9	10.00	10.10
	L	0.73	0.88	0.93
	e		0.80 (TYP.)	
	θ°	0	–	7
3	C	0.1	0.15	0.2

UNIT : mm

NOTES:

1.JEDEC OUTLINE:MO-108 AA-1

2.DATUM PLANE H IS LOCATED AT THE BOTTOM OF THE MOLD PARTING LINE COINCIDENT WITH WHERE THE LEAD EXITS THE BODY.

3.DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 mm PER SIDE. DIMENSIONS D1 AND E1 DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE H.

4.DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION.