

SPLC2475A

Reference Voltage and Driver IC for LCD

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Version 1.1

Table of Contents

	<u>PAGE</u>
1. GENERAL DESCRIPTION	3
2. FEATURES	3
3. STRUCTURE	3
4. APPLICATIONS	3
5. BLOCK DIAGRAM	3
6. SIGNAL DESCRIPTIONS	4
7. ELECTRICAL SPECIFICATIONS	6
7.1. ABSOLUTE MAXIMUM RATINGS (TA = 25°C)	6
7.2. OPERATING CONDITIONS	6
7.3. DC CHARACTERISTICS (VCC = COMVCC = 5.0V, COMGND = 0V, TA = 25°C)	7
7.4. MEASUREMENT CIRCUITS	8
8. APPLICATION CIRCUIT	9
9. PACKAGE/PAD LOCATIONS	10
9.1. PACKAGE OUTLINE	10
10. DISCLAIMER	11
11. REVISION HISTORY	12

REFERENCE VOLTAGE AND DRIVER IC FOR LCD

1. GENERAL DESCRIPTION

The SPLC2475A is suitable IC for applying reference voltage for gamma correction which is necessary for TFT liquid crystal display. This IC has a built-in 9 channels of rail-to-rail buffer circuit and a common driver circuit.

2. FEATURES

- Built-in 9 channels of rail-to-rail buffer circuit
- Built-in common driver circuit
- Current consumption: 2.6mA (typ.)
- Package: 48pin LQFP

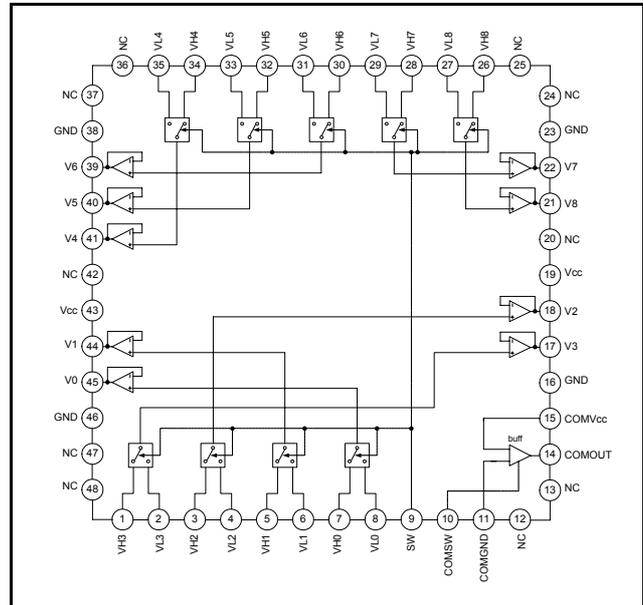
3. STRUCTURE

- CMOS IC

4. APPLICATIONS

- Small liquid crystal monitor

5. BLOCK DIAGRAM



6. SIGNAL DESCRIPTIONS

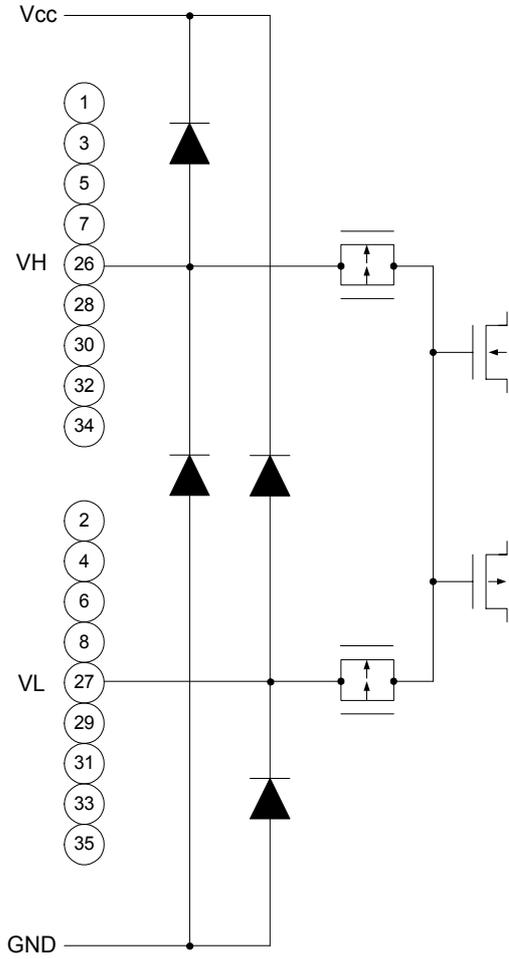
Mnemonic	PIN No.	PIN Voltage	Equivalent Circuit	Description
VH3	1	0.2V to 4.8V	Note1	DC input when SW is high.
VL3	2			DC input when SW is low.
VH2	3			DC input when SW is high.
VL2	4			DC input when SW is low.
VH1	5			DC input when SW is high.
VL1	6			DC input when SW is low.
VH0	7			DC input when SW is high.
VL0	8			DC input when SW is low.
VH8	26			DC input when SW is high.
VL8	27			DC input when SW is low.
VH7	28			DC input when SW is high.
VL7	29			DC input when SW is low.
VH6	30			DC input when SW is high.
VL6	31			DC input when SW is low.
VH5	32			DC input when SW is high.
VL5	33			DC input when SW is low.
VH4	34			DC input when SW is high.
VL4	35			DC input when SW is low.
V3	17	0.2V to 4.8V	Note2	V3 output.
V2	18			V2 output.
V8	21			V8 output.
V7	22			V7 output.
V6	39			V6 output.
V5	40			V5 output.
V4	41			V4 output.
V1	44			V1 output.
V0	45			V0 output.
SW	9		Note3	Input switch. VL is output for low; VH for high.
COMSW	10			COM output switch. COMVCC level is output for low; COMGND level for high.
COMGND	11	0Vto 1.0V	Note4	COM output ground.
COMOUT	14			COM output.
COMVCC	15	4.0V to VCC		COM power supply.
VCC	19, 43	5.0V		5.0V power supply.
GND	16, 23 38, 46			GND
NC	12, 13 20, 24 25, 36 37, 42 47, 48			No connected.

Notes:

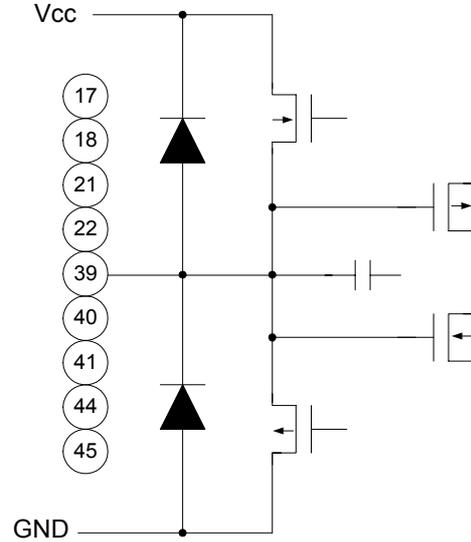
- 1). GND: Make sure that PINs 16, 23, 38 and 46 are connected to GND potential, and do not release them.
- 2). Decoupling capacitor: Locate decoupling capacitor connected between power supply and GND as near IC pin as possible.



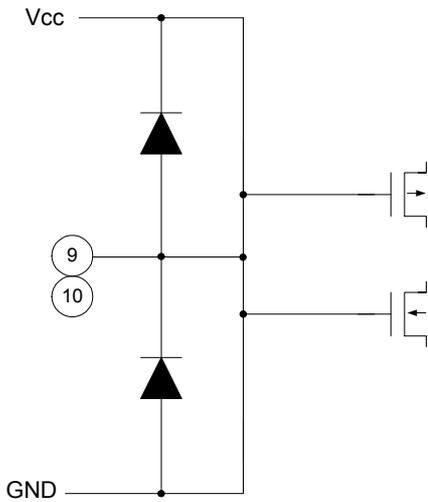
Note1:



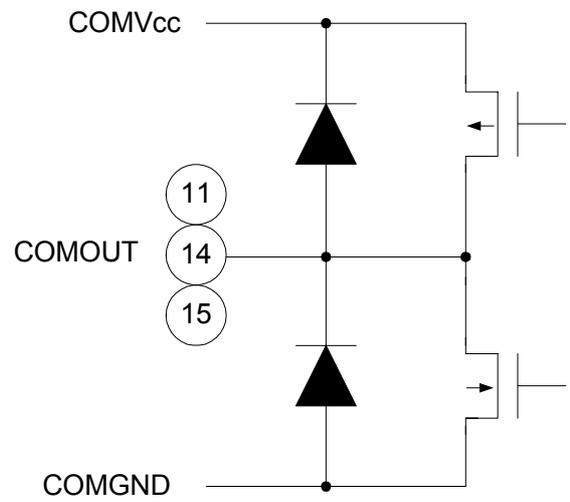
Note2:



Note3:



Note4:



7. ELECTRICAL SPECIFICATIONS

7.1. Absolute Maximum Ratings (TA = 25°C)

Item	Symbol	Ratings	Unit
Supply voltage	VCC*1	7.0	V
	V _{VG} *2	7.0	V
	V _{VC} *3	≦ VCC + 0.2	V
	V _{VG} *4	≧ GND - 0.2	V
Operating temperature	Topr	-25 to +85	°C
Storage temperature	Tstg	-55 to +150	°C
Allowable power dissipation (TA ≤ 25°C)	Pd	1.25	W

Note: Stresses beyond those given in the Absolute Maximum Rating table may cause operational errors or damage to the device. For normal operational conditions see AC/DC Electrical Characteristics.

7.2. Operating Conditions

Item	Symbol	Ratings	Unit
Supply voltage	VCC*1	4.5 to 5.0 to 5.5	V
	V _{VG} *2	4.0 to VCC	V
	V _{VC} *3	4.0 to VCC	V
	V _{VG} *4	0 to 1.0	V

Note*1: Applied to VCC - GND

Note*2: Applied to COMVCC - COMGND

Note*3: Applied to COMVCC - GND

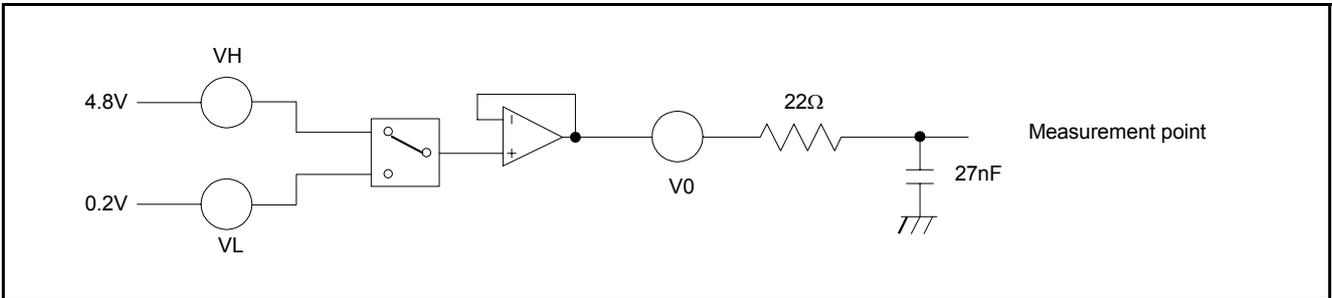
Note*4: Applied to COMGND - GND

7.3. DC Characteristics (VCC = COMVCC = 5.0V, COMGND = 0V, T_A = 25°C)

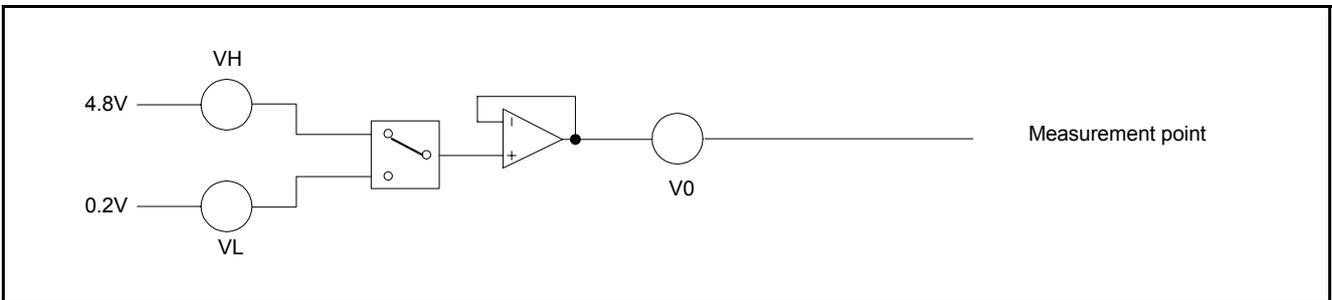
Item	Symbol	Limit			Unit	Condition
		Min.	Typ.	Max.		
Current consumption (VCC + COMVCC)	ICC	-	2.6	5.0	mA	Input voltage = 2.5V
VH, VL input current high	I _{IH}	-0.1	-	0.1	μA	Input voltage = 4.8V
VH, VL input current low	I _{IL}	-0.1	-	0.1	μA	Input voltage = 0.2V
SW, COMSW input current high	I _{ISH}	-0.1	-	0.1	μA	Input voltage = 5.0V
SW, COMSW input current low	I _{ISL}	-0.1	-	0.1	μA	Input voltage = 0V
VREF voltage gain	A _V	0.985	-	-	V/V	Input voltage = 0.2V to 4.8V
VREF output voltage high	V _{OH}	VCC-0.2	-	-	V	I _{SOURCE} = 10mA
VREF output voltage low	V _{OL}	-	-	0.2	V	I _{SINK} = 10mA
COMOUT output voltage high	V _{COH}	COMVCC-0.1	-	-	V	I _{SOURCE} = 10mA
COMOUT output voltage low	V _{COL}	-	-	COMGND+0.1	V	I _{SINK} = 10mA
VREF_H offset voltage	V _{OFF_H}	-35	-	+35	mV	Input voltage = 4.8V
VREF_L offset voltage	V _{OFF_L}	-5.0	-	+55	mV	Input voltage = 0.2V
SW, COMSW input voltage high	V _{IH}	2.0	-	-	V	
SW, COMSW input voltage low	V _{IL}	-	-	0.8	V	
VREF transient time (1)	t _{tvLH1}	-	5.0	8.0	μs	Measurement circuit 1
	t _{tvHL1}					
VREF transient time (2)	t _{tvLH2}	-	3.5	6.0	μs	Measurement circuit 2
	t _{tvHL2}					
VREF propagation delay time (1)	t _{pvLH1}	-	3.5	6.0	μs	Measurement circuit 1
	t _{pvHL1}					
VREF propagation delay time (2)	t _{pvLH2}	-	2.5	5.0	μs	Measurement circuit 2
	t _{pvHL2}					
VREF propagation delay time difference (1)	Δt _{pv1}	-	-	±1.6	μs	t _{pvLH1} - t _{pvHL1}
VREF propagation delay time difference (2)	Δt _{pv2}	-	-	±0.8	μs	t _{pvLH2} - t _{pvHL2}
COM transient time	t _{tcLH}	-	3.0	5.0	μs	Measurement circuit 3
	t _{tcHL}					
COM propagation delay time	t _{pcLH}	-	1.6	3.0	μs	Measurement circuit 3
	t _{pcHL}					
COM propagation delay time difference	Δt _{pc}	-	-	±1.0	μs	t _{pcLH} - t _{pcHL}

7.4. Measurement Circuits

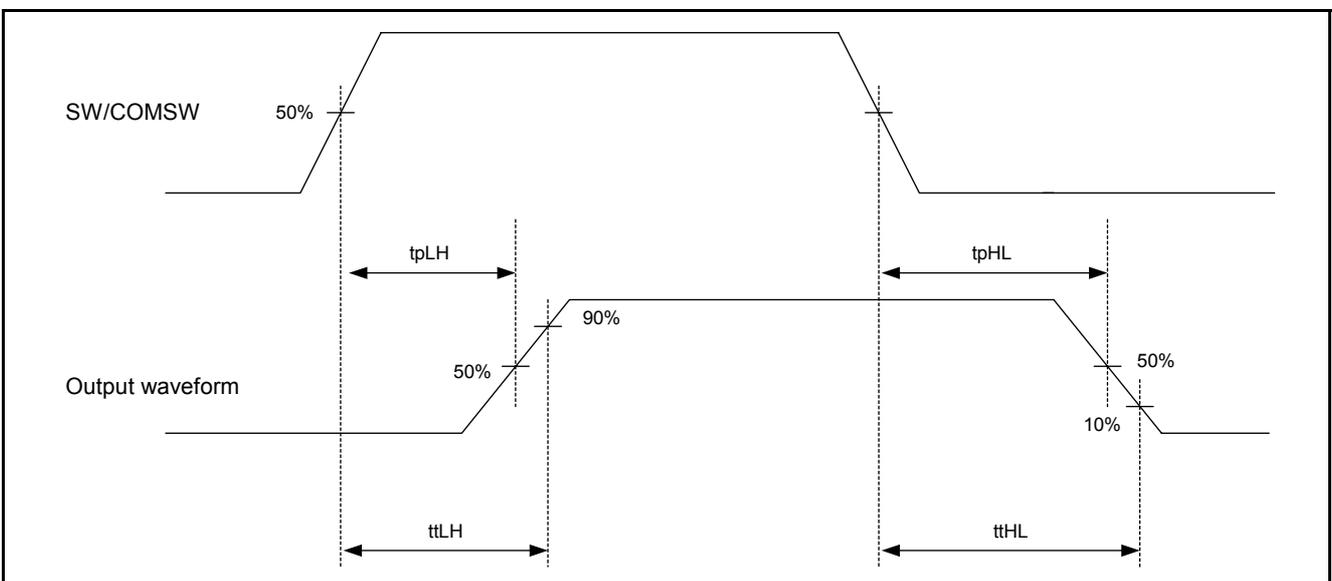
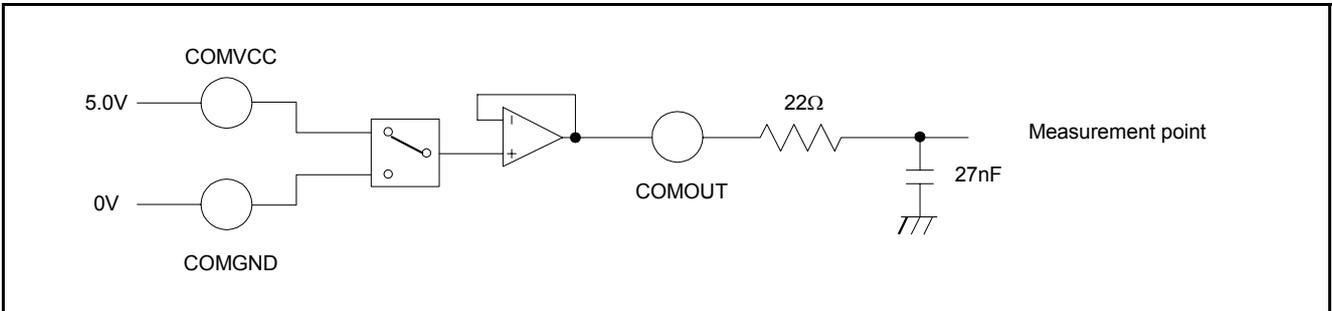
7.4.1. Measurement circuit - (1)



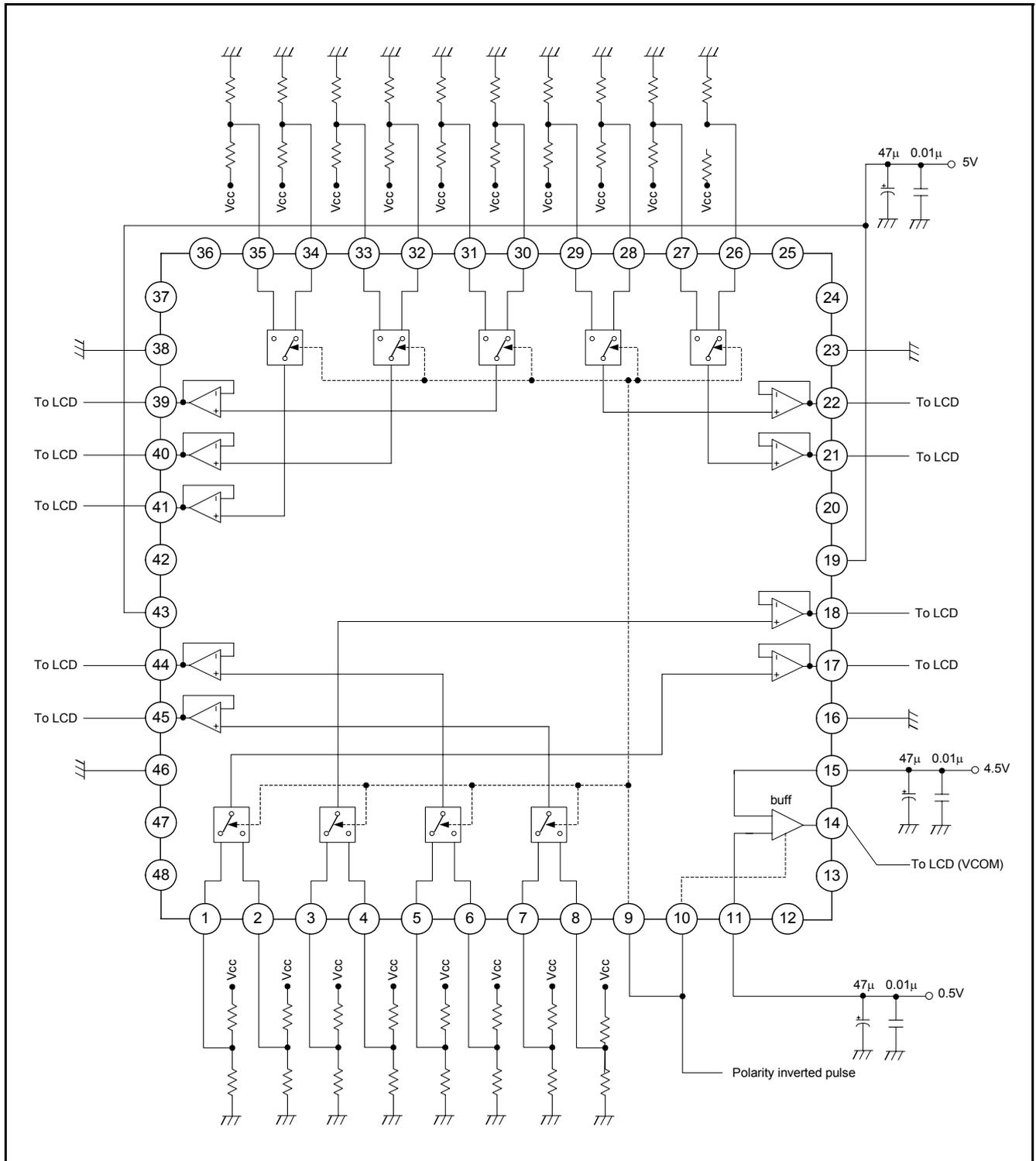
7.4.2. Measurement circuit - (2)



7.4.3. Measurement circuit - (3)



8. APPLICATION CIRCUIT



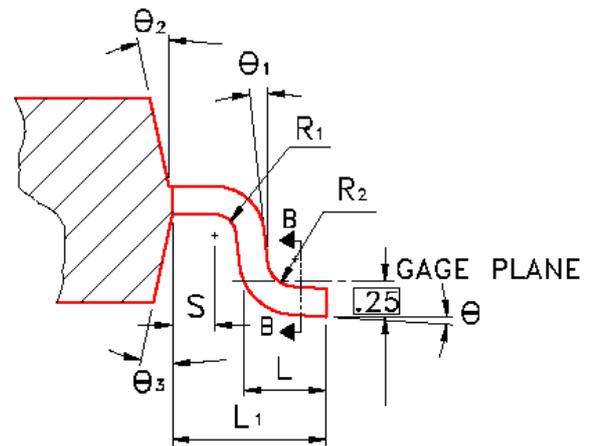
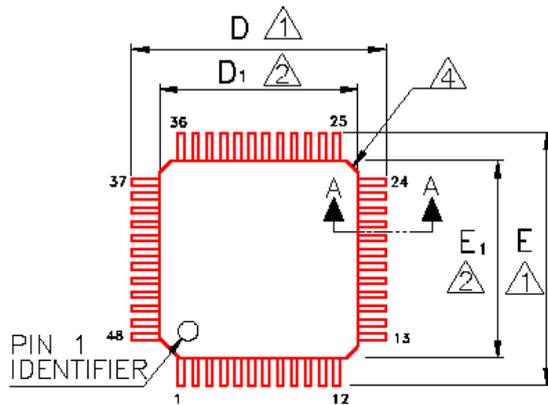
Application circuits shown are typical examples illustrating the operation of the devices. Sunplus cannot assume responsibility for any problems arising out of the use of these circuits or for any infringement of third party patent and other right due to same.

9. PACKAGE/PAD LOCATIONS

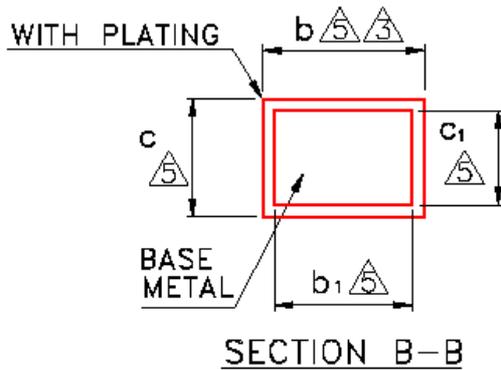
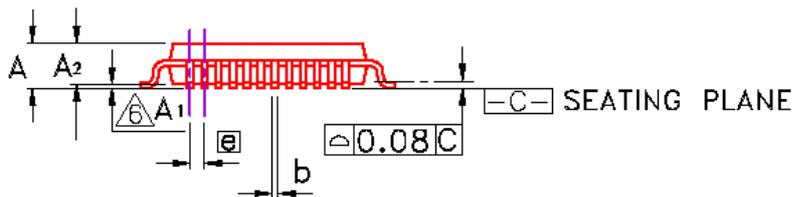
9.1. Package Outline

48PIN LQFP (PLASTIC)

Unit: mm



SECTION A-A



SECTION B-B

Symbol	Dimension in mm			Dimension in inch		
	Min	Nom	Max	Min	Nom	Max
A	—	—	1.60	—	—	0.063
A ₁	0.05	—	0.15	0.002	—	0.006
A ₂	1.35	1.40	1.45	0.053	0.055	0.057
b	0.17	0.22	0.27	0.007	0.009	0.011
b ₁	0.17	0.20	0.23	0.007	0.008	0.009
c	0.09	—	0.20	0.004	—	0.008
c ₁	0.09	—	0.16	0.004	—	0.006
D	9.00 BSC			0.354 BSC		
D ₁	7.00 BSC			0.276 BSC		
E	9.00 BSC			0.354 BSC		
E ₁	7.00 BSC			0.276 BSC		
⊖	0.50 BSC			0.020 BSC		
L	0.45	0.60	0.75	0.018	0.024	0.030
L ₁	1.00 REF			0.039 REF		
R ₁	0.08	—	—	0.003	—	—
R ₂	0.08	—	0.20	0.003	—	0.008
S	0.20	—	—	0.008	—	—
θ	0°	3.5°	7°	0°	3.5°	7°
θ ₁	0°	—	—	0°	—	—
θ ₂	12°TYP			12°TYP		
θ ₃	12°TYP			12°TYP		

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11. REVISION HISTORY

Date	Revision #	Description	Page
SEP. 26, 2000	0.1	Original	
OCT. 12, 2000	1.0	Delete " <u>PRELIMINARY</u> "	
OCT. 02, 2001	1.1	Renew to a new document format	