IR2429 12-Segment LCD Driver

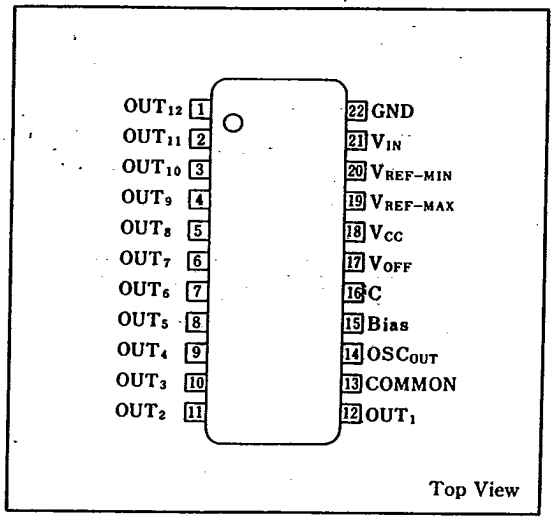
Description

The IR2429 is a 12-segment LCD level meter driver IC.

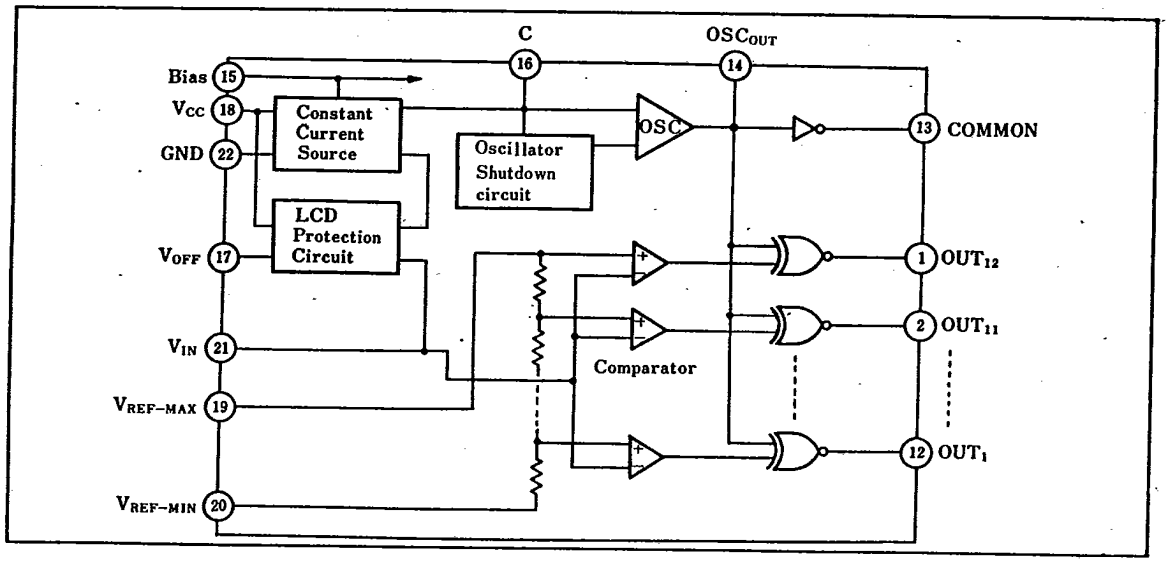
Features

1. Bar display
2. Linear-scale display
3. Cascaded connection is possible
4. Internal LCD protection circuit
5. 22-pin dual-in-line package

Pin Connections



Block Diagram



■ Absolute Maximum Ratings

(Ta=25℃)

Parameter	Symbol	Condition	Rating	Unit
Supply voltage	V_{CC}		15	V
Input voltage	V_{IN}	Take V_{Cc} for the maximum when V_{CC} is less than 10V	10	V
	$V_{REF-MAX}$		10	
	$V_{REF-MIN}$		10	
Power dissipation	P_D	Ta≦25℃	650	mW
P_D derating ratio	ΔP_D/℃	Ta>25℃	6.5	mW/℃
Operating temperature	T_{opr}		−30～+80	℃
Storage temperature	T_{stg}		−55～+150	℃

■ Electrical Characteristics

(V_{CC}=6V, Ta=25℃)

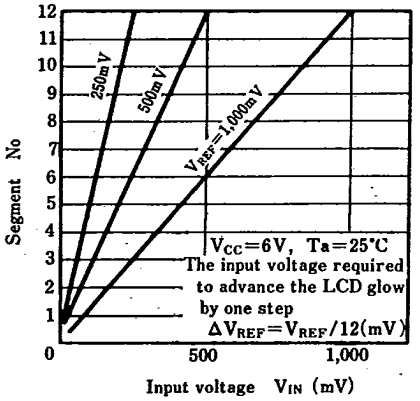
Parameter		Symbol	Condition	MIN.	TYP.	MAX.	Unit
Supply voltage		I_{CC}			14	20	mA
Input current		I_{IN}	V_{CC}=6.0V $V_{REF-MAX}$=0.5V, $V_{REF-MIN}$=0V V_{IN}=0.5V, no load		0.5	1.0	μA
		$I_{REF-MAX}$					
		$I_{REF-MIN}$					
Min. operating voltage		V_{OFF}	Internal LCD protection circuit operating voltage		3.7		V
Input voltage		V_{IN}		0		6.5	V
Change-over voltage deviation			The difference between the voltage it changes over to and the voltage defined by the formula: When $V_{REF-MAX}$=0.5 and $V_{REF-MIN}$=0V $N\times\frac{V_{REF-MAX}-V_{REF-MIN}}{12}$ (N=1～12)		±3	±10	mV
Reference voltage		$V_{REF-MAX}$	When V_{CC} 10V, let(V_{CC}−3.5V) be the maximum.			6.5	V
Reference voltage difference		$V_{REF-MAX}$ −$V_{REF-MIN}$	When the change-over voltage error is smaller than either 20mV or $0.5\times\frac{V_{REF-MAX}-V_{REF-MIN}}{12}$	0.25		The lower of 6.5V and V_{CC}−3.5V	V
Output voltage		V_{OH}			2.8		V
		V_{OL}			0.1		
Output current	Flow out	Common	V_{CC}=6V, V_{REF}=500mV output voltage Flow out=2.7V Flow in=0.3V	0.24	0.4		mA
		Segment		0.08	0.13		
	Flow in	Common		2.4	3.0		
		Segment		0.8	1.0		

Description of Operation

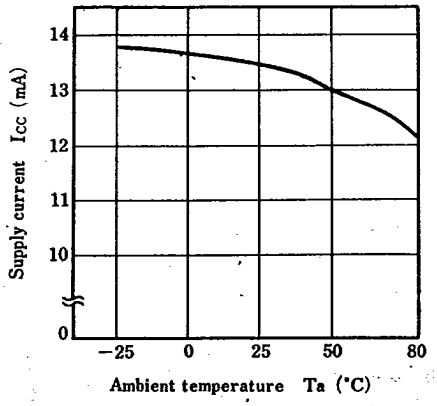
With the V_{REF} given, each input transistor for V_{IN}, $V_{REF-MAX}$, $V_{REF-MIN}$ will be provided with an equal amount of collector current and the 12-divided reference voltage will be applied to each comparator where this voltage is compared with the input voltage to produce the "High" or "Low" output voltage that enters the Exclusive-NOR circuit. The Exclusive-NOR circuit with two input terminals can generate from the input signal an output signal which is inverted or non-inverted depending on the condition in which the other input by the other terminal has entered this circuit. Threfore a symmetrical AC waveform for IC drive generated in the oscillation frequency dividing circuit will be applied to the other input terminal. As for the common output and the segment output in their relation to each other, when the comparator output is in "High" they are anti-phase and when in "Low", they are in-phase thus turning the LCD on and off respectively. On this principle, this IC will act as a level meter which displays the input level by lighting the LCD as it compares the analog input voltage with the 12-graded reference voltage.

Electrical Characteristic Curves (Unless otherwise specified, Ta=25℃)

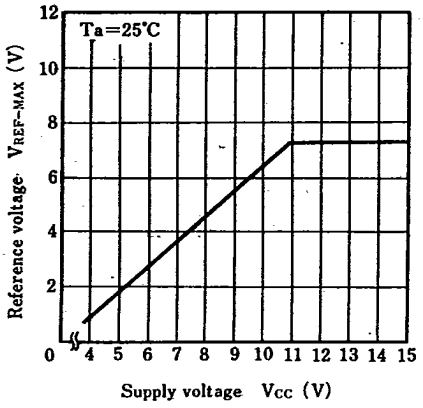
Switching characteristics for each segment output



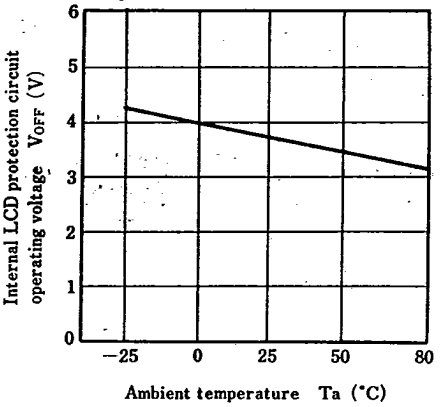
Supply current—Ambient temperature Characteristics



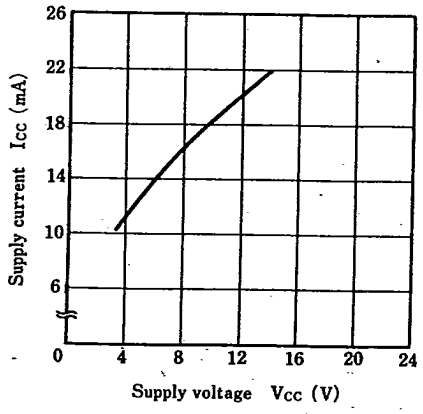
Reference voltage—Supply voltage Characteristics



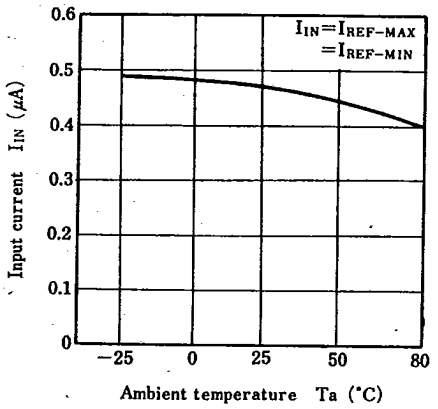
Internal LCD protection circuit operating voltage—Ambient temperature Characteristics



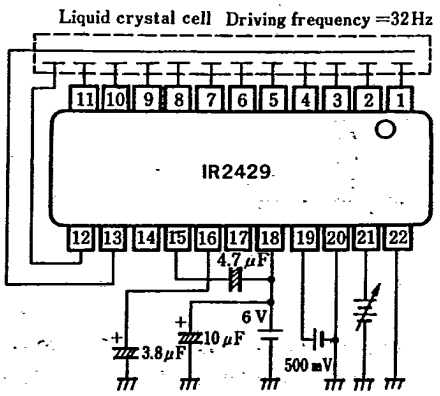
Supply current—Supply voltage Characteristics



Input current—Ambient temperature Characteristics



■ Application Circuit Example.



The input voltage that lights the lowest level LCD.

$$V_{REF\text{-}MIN} + \Delta V_{REF} = 41.7mV$$

The input voltage differential required to advance the lighting of the LCD by one step.

$$\Delta V_{REF} = \frac{V_{REF\text{-}MAX} - V_{REF\text{-}MIN}}{12}$$

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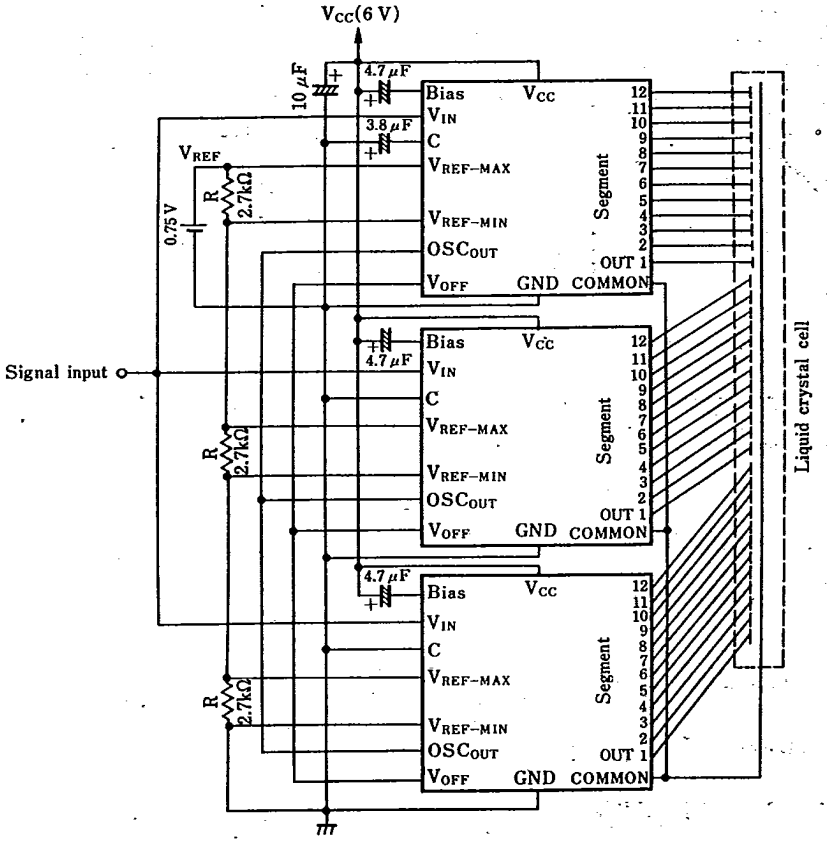

Only one of the three oscillation circuits is actuated to produce the output to be supplied to the other two.

The OR connection is made to the LC protection circuits so that if even one of them acts, the other two will also act.