

# Step-Up IC For EL Backlights Monolithic IC MM1365

## Outline

This is a step-up IC developed for use in EL backlights.

Because of their ability to light the entire panel uniformly, EL backlights are gradually becoming more widespread compared with LEDs.

In particular, recently there has been a strong tendency toward smaller sizes and lighter weights, and more manufacturers are adopting ICs in place of transformers to step up voltages.

This IC was designed to meet these market needs.

## Features

1. Low-voltage driving possible
2. Brightness can be adjusted
3. Can be driven using a small coil
4. On/off control possible

$V_{IN}=0.95V$  min.

The brightness can be adjusted by changing the oscillation frequency through the externally mounted capacitance

Coil inductance of about  $820\mu H$  required

Current consumption while off= $10\mu A$  or less

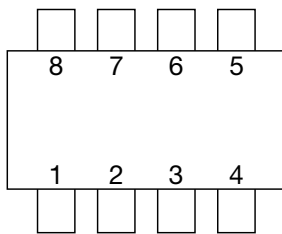
## Package

VSOP-8

## Applications

1. Pagers
2. Portable phones, PHS
3. Wristwatches
4. Display components of remote-controlled minidisks, CD players, headphone stereos, other equipment

## Pin Assignment



VSOP-8

1	GND	GND
2	N.C	
3	CT1	For setting discharge frequency
4	CT2	For setting charging frequency
5	Power supply switch	H to turn on, L to turn off
6	$V_{CC}$	Power supply pin
7	O2	Charging frequency setting; drives external transistor
8	O1	Discharge frequency setting; drives external transistor

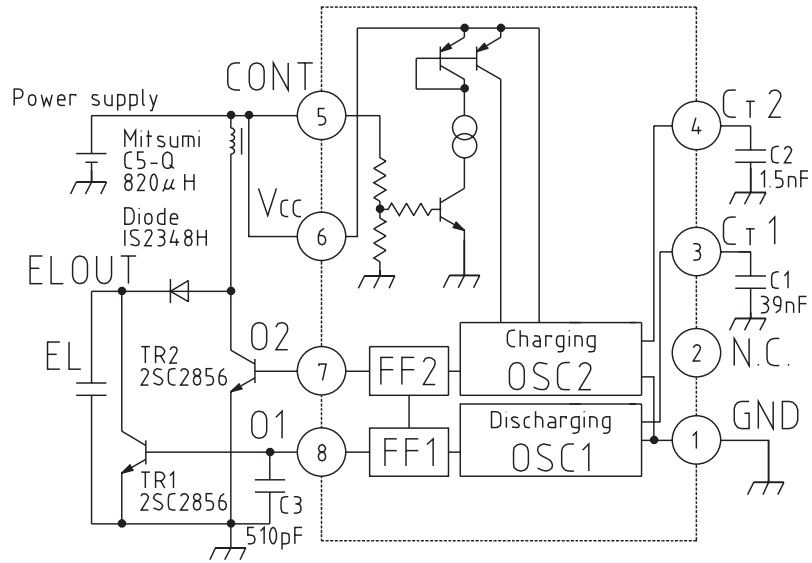
## Absolute Maximum Ratings

Item	Symbol	Ratings	Units
Storage temperature	T <sub>STG</sub>	-40~+125	°C
Operating temperature	T <sub>OPR</sub>	-20~+75	°C
Power supply voltage	V <sub>CC</sub> max.	-0.3~+6	V
Operating power supply voltage	V <sub>CCOP</sub>	0.95~+6	V
Voltage applied to O1, O2 output pins	V <sub>O</sub> max.	-0.3~V <sub>CC</sub>	V
Allowable loss	P <sub>d</sub>	300	mW

## Electrical Characteristics (Except where noted otherwise, Ta=25°C, V<sub>CC</sub>=1.5V, V<sub>CONT</sub>=1.5V)

Item	Symbol	Measurement circuit	Measurement conditions	Min.	Typ.	Max.	Units
Consumption current for complete circuit 1 (under recommended circuit operating conditions for EL)	I <sub>CC1</sub>	1	C1=39nF, C2=1.5nF SW1 OFF, SW2 ON	15	25	35	mA
Consumption current for 2 IC only (under recommended circuit operating conditions for EL)	I <sub>CC2</sub>	1	C1=39nF, C2=1.5nF SW1 ON, SW2 OFF	1.3	2.5	4.5	mA
Current consumption 3 (entire circuit off)	I <sub>CC3</sub>	1	V <sub>CONT</sub> =0V, SW1 ON, SW2 OFF			1.0	μA
O1 pin output current (charge signal)	I <sub>SOU1</sub>	2	V <sub>O1</sub> =0V, V <sub>CT1</sub> =0.8V O1 output current measurement	25	50	75	μA
O1 pin sync current (charge signal)	I <sub>SIN</sub>	2	V <sub>CT1</sub> =0V, V <sub>O1</sub> =0.3V V <sub>CT2</sub> =0V	1.00	2.50		mA
O2 pin output current (discharge signal)	I <sub>SOU2</sub>	2	V <sub>CT1</sub> =0V, V <sub>CT2</sub> =0V	1.00	1.80	3.00	mA
C <sub>T1</sub> charge current (Discharge setting pin)	I <sub>CT1</sub>	2	V <sub>CT1</sub> =0.3V, CT2=OPEN C <sub>T1</sub> output current	1.2	2.0	2.7	μA
C <sub>T2</sub> charge current (charge setting pin)	I <sub>CT2</sub>	2	V <sub>CT1</sub> =0V, V <sub>CT2</sub> =0.3V C <sub>T2</sub> output current	10	18	25	μA
C <sub>T1</sub> pin "H" threshold	V <sub>THH1</sub>	1	SW1 OFF, SW2 ON		0.65		V
C <sub>T2</sub> pin "H" threshold	V <sub>THH2</sub>	1	SW1 OFF, SW2 ON		0.65		V
C <sub>T1</sub> pin "L" threshold	V <sub>THL1</sub>	1	SW1 OFF, SW2 ON		0.15		V
C <sub>T2</sub> pin "L" threshold	V <sub>THL2</sub>	1	SW1 OFF, SW2 ON		0.18		V
Charge signal oscillation frequency (C <sub>T2</sub> measurement)	f <sub>CT2</sub>	1	C1=39nF, C2=1.5nF SW1 OFF, SW2 ON		20		kHz

Block Diagram/Application Circuits

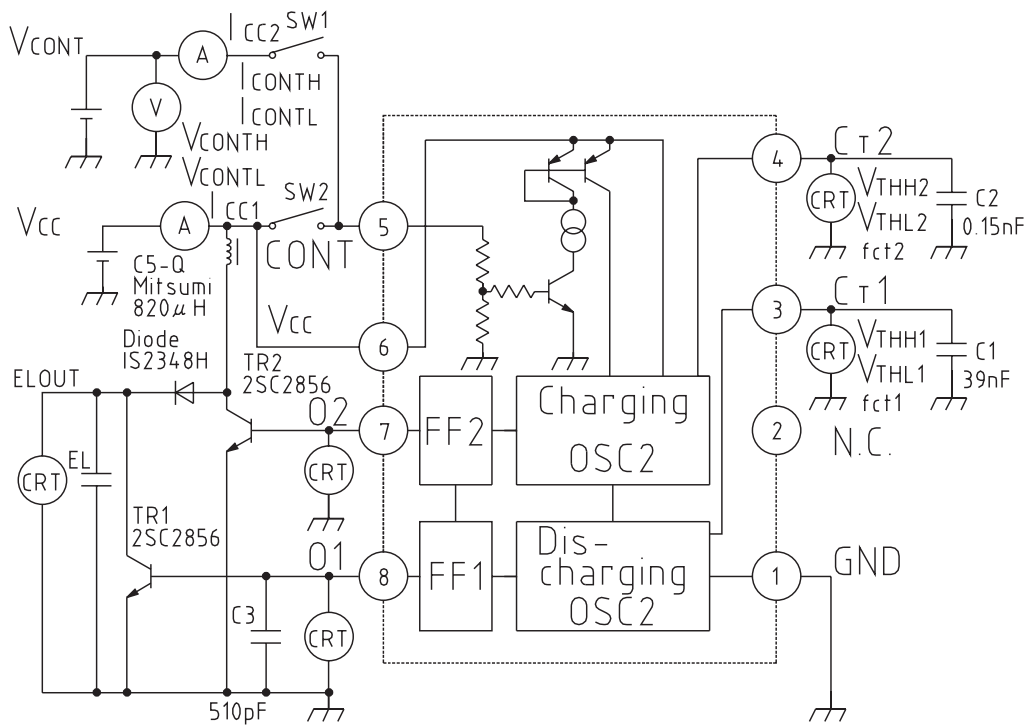


Note 1: C3 is a capacitance used to suppress abnormal voltages at the O1 pin due to the coil.

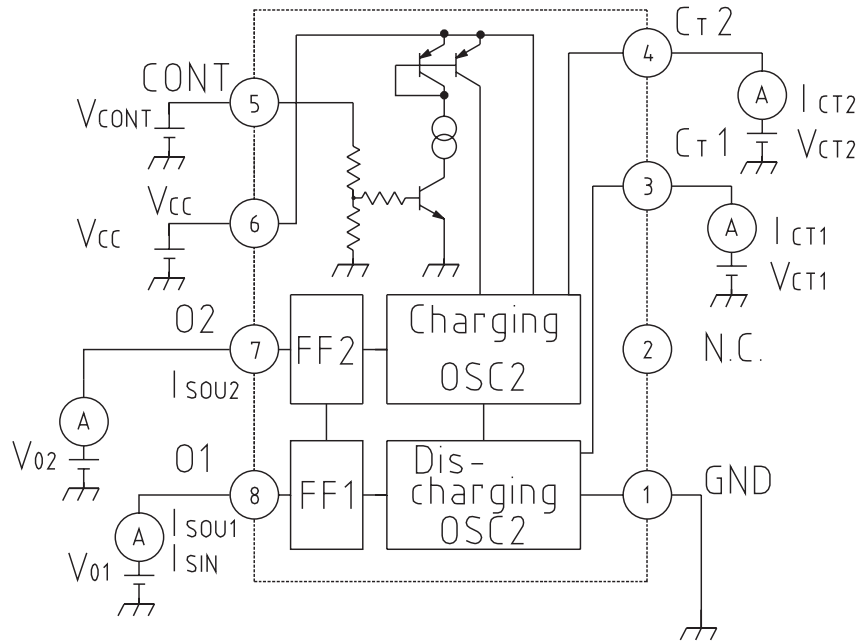
Note 2: The O2 frequency and O1 frequency are set to 20 kHz and 100 Hz respectively.

Measuring Circuit

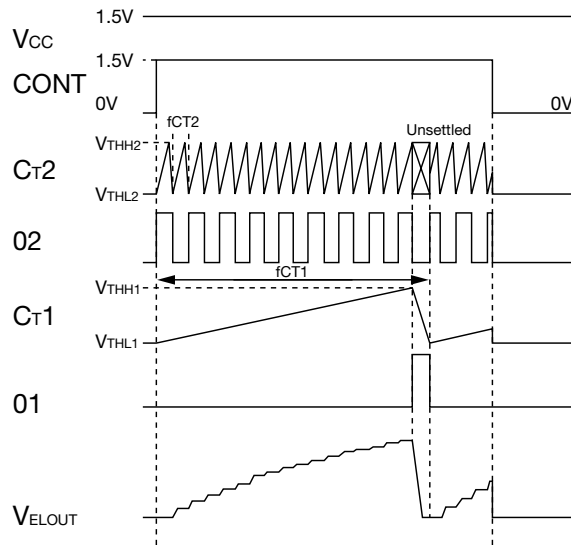
Measuring Circuit 1



Measuring Circuit 2



Timing Chart



Characteristics

O1, O2 capacitances vs. frequency

