NIPPON PRECISION CIRCUITS INC.

SM8140A

EL Driver IC

OVERVIEW

The SM8140A is designed for using as EL (Electronic Luminescence) sheet driver require very low external parts counts, this result that very compact and thin EL driver units can be made.
Also this device has the features to use in wider range of applications demanding low quiescent current, low supply voltages, low operating supply currents, simple brightness control and low EMI (Electro-Magnetic Interference) emission due to the inherent smooth driver wave forms.

FEATURES

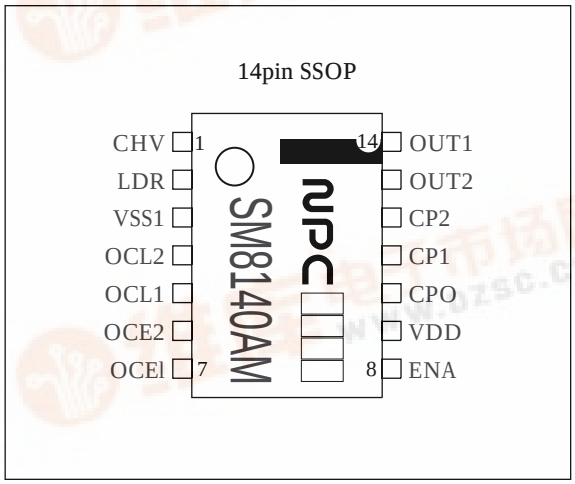
- Specially providing EL driver functions
- Non-transformer for compact outline
- Bipolar driving for high power efficiency
- Very low noise smooth driver wave forms
- Brightness control with driving frequency change (An external resistance determines the driving frequency)
- Low power consumption by quiescent current control
- ON-chip high voltage output MOS transistor
- Large EL sheet (Exceeding 100 cm^2) drivable
- supply voltage
  V_{DD} = 2.4V to 3.6V or 5.0V
- 1.5V and 3V power applicable
  (Refer to APPLICATION HINTS)
- Maximum output driver voltage:200V_{P-P}
- Typical driver frequency:250Hz
- 14 pin SSOP
- chip form

ORDERING INFOMATION

Device	Package
SM8140AM	14pin SSOP
CF8140A	Chip in tray

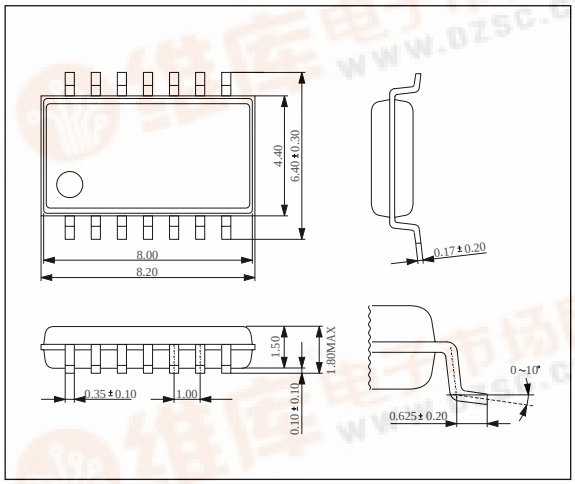
PIN OUT

(Top View)



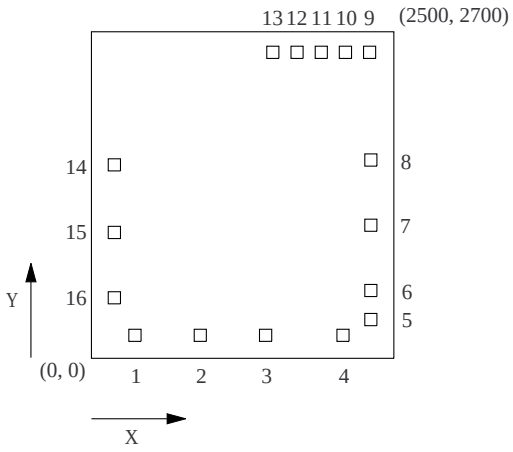
PIN OUT

(Unit : mm)



PAD DIMENSIONS

(UNIT:µm)



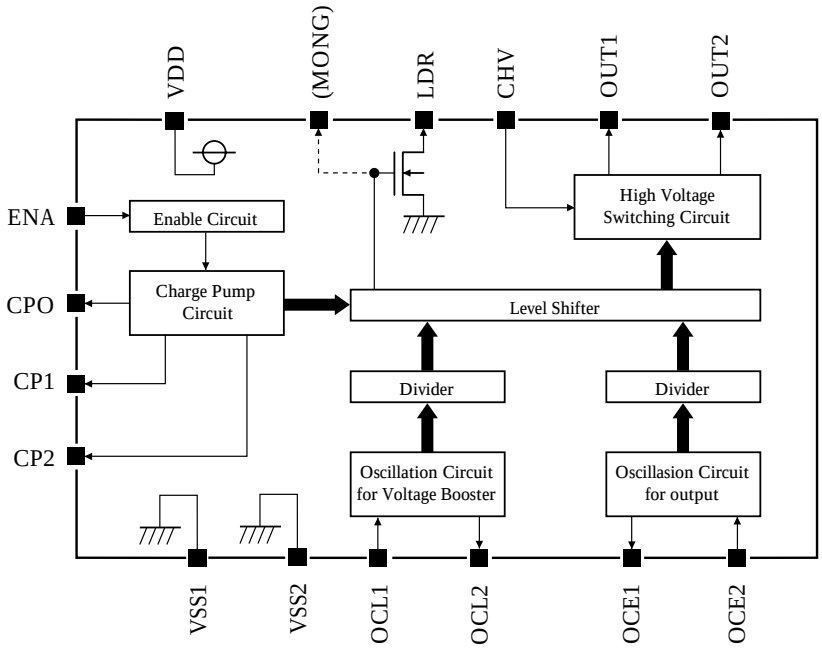
Chip size : 2.50 × 2.70mm
Chip thickness : 4000 ± 30µm
Pad size : 100 × 100µm
Chip reverse side : V_{SS}

PAD COORDINATES

No.	NAME	X	Y
1	OCE2	360	190
2	OCE1	900	190
3	ENA	1440	190
4	VSS2	2080	190
5	VDD	2310	320
6	CPO	2310	560
7	CP1	2310	1100
8	CP2	2310	1640
9	OUT2	2300	2530
10	OUT1	2100	2530
11	CHV	1900	2530
12	MONG	1700	2530
13	LDR	1500	2530
14	VSS1	190	1600
15	OCL2	190	1040
16	OCL1	190	500

Note : MONG is test pin.
MONG and VSS2 are not bonding.

BLOCK DIAGRAM



PIN DESCRIPTION

SSOP	chip	Pin Name	i / o	Function
1	11	CHV	i	DC high voltage pin
–	12	MONG	o	Monitor gate
2	13	LDR	o	Step – up inductor driver output
3	14	VSS1	–	GND
–	4	VSS2	–	GND
4	15	OCL2	o	CR oscillator pin for step – up inductor and charge pump. External resistor at this pin determines oscillator frequency.
5	16	OCL1	i	
6	1	OCE2	i	CR oscillator pin for output
7	2	OCE1	o	External resistor at this pin determines oscillator frequency
8	3	ENA	ip[1]	Output control pin. Output from OUT1 and OUT2 pins are stopped When "L".
9	5	VDD	–	Power supply pin
10	6	CPO	o	Charge pump output (Voltage output for driving high voltage MOS)
11	7	CP1	o	Charge pump external capacitor pin
12	8	CP2	o	Charge pump external capacitor pin
13	9	OUT2	o	Output for EL
14	10	OUT1	o	Output for EL

1. "ip" defines input pin with pull down internal resistor

ABSOLUTE MAXIMUM RATINGS

V_{SS} = 0V, Unless otherwise noted

Parameter	Symbol	Condition	Rating	unit
Supply voltage range	V_{DD}		– 0.3 to + 8.0	V
Input voltage range	V_{IN}	All input pins	V_{SS} – 0.3 to V_{DD} + 0.3	V
Output voltage	V_{CHV}	CHV pins	0.5 to 120	V
	V_{LDR}	LDR pins	0.5 to 120	
	V_{OUT1}	OUT1 pins	0.5 to 120	
	V_{OUT2}	OUT2 pins	0.5 to 120	
Power dissipation	P_D	Ta ≤ 70°C	200	mW
Storage temperature range	T_{STG}		– 55 to 125	°C
Soldering temperature	T_{SLD}	Package only	255	°C
Soldering time	t_{SLD}	Package only	10	sec

RECOMMENDED OPERATING CONDITIONS

V_{SS} = 0V, Unless otherwise noted

Parameter	Symbol	Condition	Rating			unit
			min	typ	max	
Supply voltage range	V_{DD1}		2.4	–	3.6	V
	V_{DD2}	CPO = V_{DD}[1]	4.5	–	5.5	V
Operating temperature range	T_{OPR}		– 30	–	70	°C
Operating current[2]	I_{DD2}	Including inductor current, V_{DD} = 3.0V	–	20	100	mA
	I_{DD3}	Including inductor current, V_{DD} = 5.0V	–	25	100	mA
Using inductor	L_{LDR1}	f_{LDR} = 32kHz, V_{DD} = 3.0V	–	1.0	–	mH
	L_{LDR2}	f_{LDR} = 32kHz, V_{DD} = 5.0V	–	1.5	–	mH

1. 5V Application hints is different from 3V ones (Refer to APPLICATION HINTS)
2. Max value is as same as Absolute Maximum Ratings

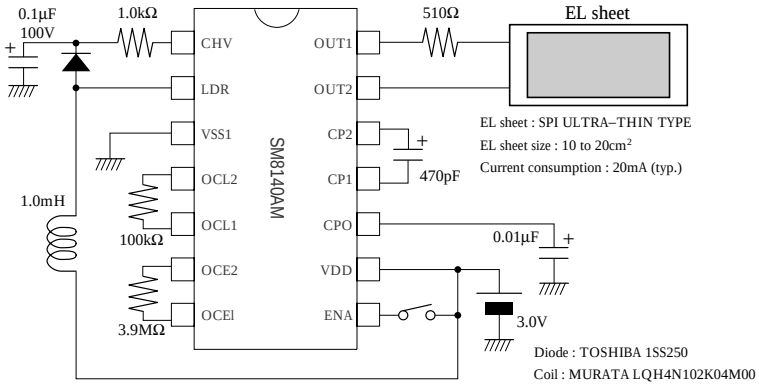
ELECTRICAL CHARACTERISTICS

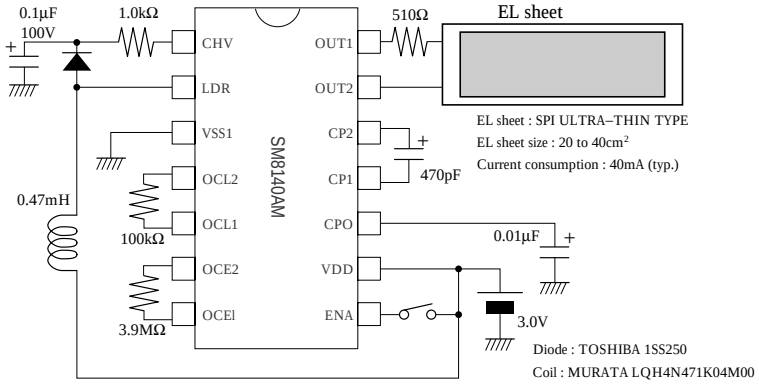
Ta = 25 °C, V_{SS} = 0V, V_{DD} = 3.0V, unless otherwise noted

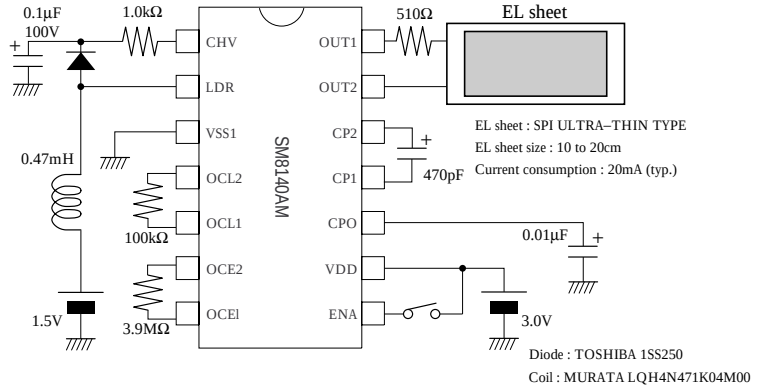
Parameter	Pin	Symbol	Condition	Rating			unit
				min	typ	max	
Supply voltage range	VDD	V_{DD}		2.4	–	3.6	V
Output voltage	CPO	V_{CPO}	$V_{CPO} \leq 2 \times V_{DD}$	4.5	5.5	–	V
	CHV	V_{CHV}		0.5	–	100	
	OUT1/2	V_{OUTH}		–	–	100	
	OUT1/2	V_{OUTL}		–	–	0.5	
Output resistance	LDR	R_{LDR}	V_{CPO} = 6.0V	–	5.0	10.0	Ω
Oscillation frequency	OCE1/2	f_{OCE}	R_{OCE} = 3.9MΩ	5.6	8.0	10.4	kHz
	OCL1/2	f_{OCL}	R_{OCL} = 100kΩ[1]	179	256	332	
Driving frequency	OUT1/2	f_{OUT}	R_{OCE} = 3.9MΩ[2]	175	250	325	Hz
Output frequency	LDR	f_{LDR}	R_{OCL} = 100kΩ	22.4	32	41.6	kHz
Input voltage	ENA	V_{ENAH}	ENA = "H"	V_{DD} + 1.0	–	V_{DD} + 0.3	V
		V_{ENAL}	ENA = "L"	V_{SS} – 0.3	–	V_{SS} + 1.0	
Input current	ENA	I_{ENAH}	V_{ENAH} = 3.0V	0.45	0.75	1.05	µA
Operating current	VDD	I_{DD1}	Excluding inductor current	–	–	1	mA
Stand – by current	VDD	I_{STB}	ENA = "L"	–	–	1	µA

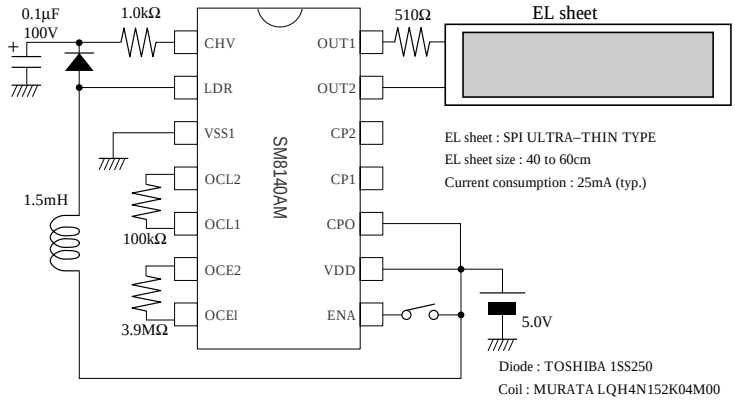
1. R_{OSC} determines EL driver frequency 20k to 100kHz
2. R_{OSC} determines EL driver frequency 200 to 500Hz

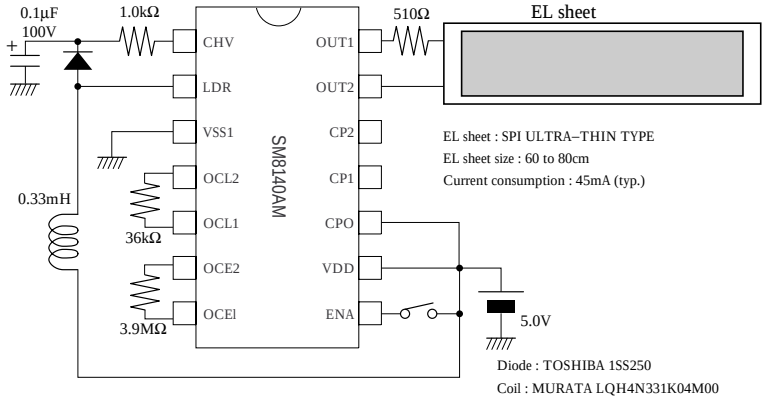
APPLICATION HINTS

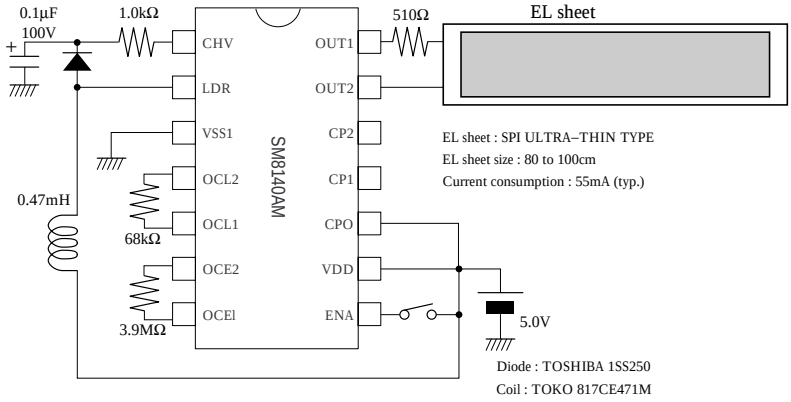












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