

# MIP803, MIP804

## Silicon MOS IC

### ■ Features

- Allowing downsizing of the sets through the reduction of a parts count resulting from the voltage step-up utilizing a coil instead of a transformer and employing the thin surface mounting package.
- Allowing low voltage drive (adaptable to a small and low-voltage battery), or  $V_{CC} = 3V$  or  $1.5V$  drive
- Allowing to adjust the EL light brightness responding to changes in oscillation frequency which can be changed by the external resistor.

### ■ Applications

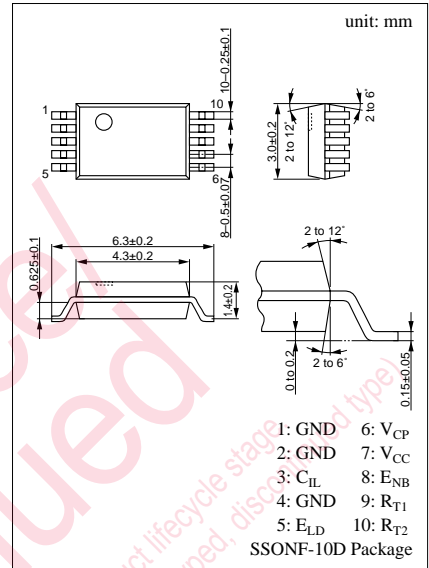
- EL drive

### ■ Recommended Set

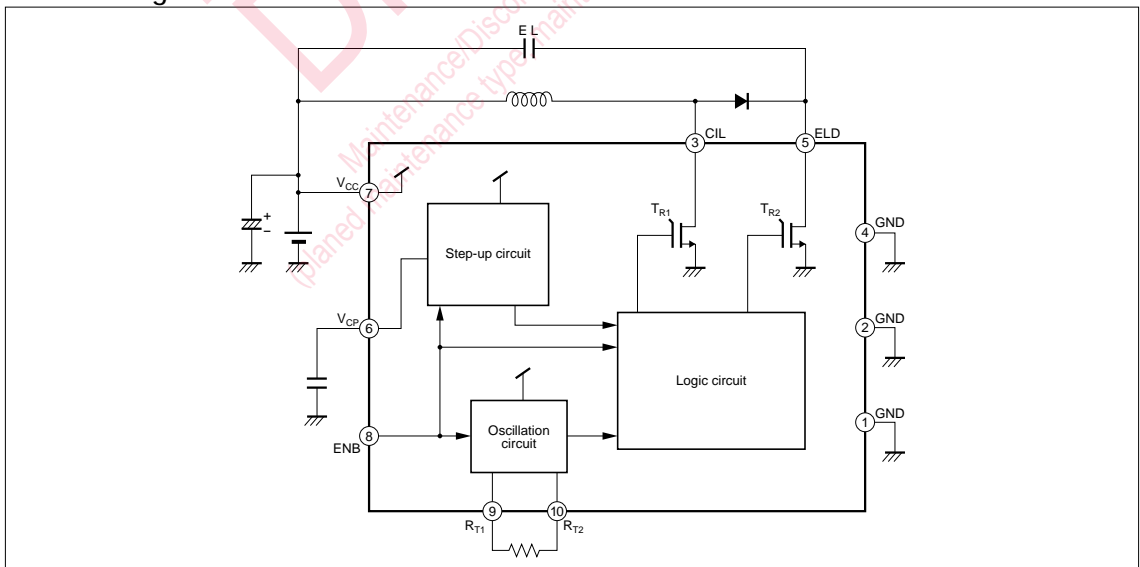
- Watches, pagers, portable CD players, cellular phones, MD players, display panels of remote controllers, and etc.

### ■ Absolute Maximum Ratings ( $T_a = 25^\circ C$ )

Parameter	Symbol	Ratings	Unit
Power supply voltage	$V_{CC}$	- 0.5 to 4	V
Input voltage (ENB)	$V_{ENB}$	- 0.5 to $V_{CC} + 0.5$	V
Output voltage (CIL)	$V_{CIL}$	- 0.5 to 220	V
Output voltage (ELD)	$V_{ELD}$	- 0.5 to 220	V
Output current (CIL)	$I_{CIL}$	60	mA
Output current (ELD)	$I_{ELD}$	120	mA
Allowable power dissipation	$P_D$	150	mW
Operating ambient temperature	$T_{opr}$	-20 to +70	$^\circ C$
Channel temperature	$T_{ch}$	-20 to +125	$^\circ C$
Storage temperature	$T_{stg}$	-55 to +125	$^\circ C$



### ■ Block Diagram



**■ Electrical Characteristics** ( $V_{CC} = 2.5V/1.2V$ ,  $V_{ENB} = 2.5V/1.2V$ ,  $GND = 0$ ,  $T_C = 25 \pm 2^\circ C$ )

Parameter		Symbol	Conditions	min	typ	max	Unit	
Supply voltage	MIP803	$V_{CC}$		1.5	2.5	3.5	V	
	MIP804			0.9		3.5		
Output frequency	MIP803	$f_{OSC}$	$R_T = 390k\Omega$	119	140	161	kHz	
	MIP804		$R_T = 240k\Omega$	195	230	265		
Change of output frequency	MIP803	$\Delta f_v$ (Note)	$R_T = 390k\Omega$	-7		7	%	
	MIP804		$R_T = 240k\Omega$	-15		15		
High level input voltage (ENB)	MIP803	$V_{IH}$	$V_{CC} = 1.5$ to $3.5V$	1			V	
	MIP804		$V_{CC} = 0.9$ to $3.3V$	0.8				
Low level input voltage (ENB)	MIP803	$V_{IL}$	$V_{CC} = 1.5$ to $3.5V$			0.3	V	
	MIP804		$V_{CC} = 0.9$ to $3.3V$			0.1		
Output ( $T_{R1}$ )	Breakdown voltage		$V_{DSS}$	$I_{OFF(TR1)} = 0.1mA$	200		V	
	Saturation current	MIP803	$I_{DS}$	$V_{DS(TR1)} = 20V$	70		mA	
		MIP804			60			
	ON-state resistance	MIP803	$R_{ON}$	$I_{DS(TR1)} = 10mA$		6.5	10	$\Omega$
		MIP804					15	
Off-leakage current		$I_{OFF}$	$V_{DS(TR1)} = 160V$			2	$\mu A$	
Output ( $T_{R2}$ )	Breakdown voltage		$V_{DSS}$	$I_{OFF(TR2)} = 0.1mA$	200		V	
	Saturation current	MIP803	$I_{DS}$	$V_{DS(TR2)} = 20V$	15		mA	
		MIP804			10			
	ON-state resistance	MIP803	$R_{ON}$	$I_{DS(TR2)} = 10mA$	0.5	0.75	1	k $\Omega$
		MIP804			0.7	1	1.4	
Off-leakage current		$I_{OFF}$	$V_{DS(TR2)} = 160V$			2	$\mu A$	
Clime power the inside voltage	MIP803	$V_{CP}$	$V_{CC} = V_{ENB} = 1.5V$ , $C_{CP} = 1000pF$ , $R_T = 390k\Omega$	2			V	
	MIP804		$V_{CC} = V_{ENB} = 0.9V$ , $C_{CP} = 1000pF$ , $R_T = 240k\Omega$	2				
Statically consumption current	MIP803	$I_C$	$V_{CC} = 3.5V$ , $V_{ENB} = 0$			0.1	$\mu A$	
	MIP804		$V_{CC} = 3.3V$ , $V_{ENB} = 0$			0.1		
Consumption current	MIP803	$I_{CC}$	$V_{CC} = V_{ENB} = 3.5V$ , $R_T = 390k\Omega$		1	1.5	mA	
	MIP804		$V_{CC} = V_{ENB} = 3.3V$ , $R_T = 240k\Omega$		1	1.5		

Note:  $\Delta f_v$ : Calculation is made as follows:

$$\Delta f_v = (f_{osc} / \frac{f_1 + f_2}{2} - 1) \times 100$$

MIP803  $f_1$ :  $f_{osc}$  at  $V_{CC} = 1.5V$ ,  $f_2$ :  $f_{osc}$  at  $V_{CC} = 3.5V$

MIP804  $f_1$ :  $f_{osc}$  at  $V_{CC} = 0.9V$ ,  $f_2$ :  $f_{osc}$  at  $V_{CC} = 3.5V$

**■ Pin Descriptions**

Pin No.	Symbol	Pin Name	Description
1	GND	GND pin	GND pin
2	GND	GND pin	GND pin
3	$C_{IL}$	Output for voltage step-up	Drain pin of the voltage step-up MOS FET
4	GND	GND pin	GND pin
5	$E_{LD}$	Output for EL driving	Drain pin of the EL drive MOS FET
6	$V_{CP}$	Internal voltage step-up pin	Capacitor connection pin for internal voltage step-up power supply
7	$V_{CC}$	Power input pin	Power input pin
8	$E_{NB}$	ENABLE pin	ENABLE signal input pin for controlling the EL driver (if ENB = H, the EL driver becomes ON and if ENB = L/OPEN, it becomes OFF)
9	$R_{T1}$	Internal oscillation output	Internal oscillation circuit output pin
10	$R_{T2}$	OSC resistor connecting pin	OSC resistor connection pin for connecting the OSC resistor between $R_{T1}$ and $R_{T2}$

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Attached table "IPD availability by customer"

Parts No.			Companies/areas to which products can be sold	Companies/areas to which products cannot be sold	Application
MIP13□ MIP14□ MIP15□ MIP16□	MIP17□ MIP18□ MIP01□□ MIP02□□	MIP2□□□ MIP3□□□ MIP4□□□ MIP9A□□	· Japanese companies in Japan · Japanese companies in Asia (50% or more owned)	· Companies in European and American countries · Asian companies in Asia · Other local companies	· For power supply · For DC-DC converter
MIP10□ MIP11□ MIP803/804/806 MIP9E□□	MIP811/812 MIP814/815/816 MIP82□ MIP55□		· Japanese companies in Japan · Japanese companies in Asia (50% or more owned) · Asian companies in Asia	· Companies in European and American countries · Other local companies	· For power supply · For EL driver · For LED lighting driver
MIP50□ MIP51□	MIP7□□		· No restrictions in terms of contract	· No restrictions in terms of contract	· For lamp driver/ car electronics accessories

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