



SANYO Semiconductors

# DATA SHEET

An ON Semiconductor Company

Bi-CMOS IC

## LV5066V — Low power consumption and high efficiency Step-down Switching Regulator Controller

### Overview

LV5066V is 1ch step-down switching regulator. The operation current is about 80μA, and low power consumption is achieved.

### Functions

- 1ch diode rectification controller IC
- Maximum value of light load mode current is 80μA.
- Built-in OCP circuit with P-by-P method
- When P-by-P is generated continuously, it shifts to the HICCUP operation.
- If connect C-HICCUP to GND pin, then latch-off when over current.
- The oscillatory frequency can be set by the external pin. The oscillatory frequency is 300 kHz to 2.2MHz
- Built-in UVLO, TSD
- Synchronous driving with external signal

### Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Input voltage	V <sub>IN</sub> max		22	V
Allowable power dissipation	Pd max	Specified substrate *1	0.74	W
Operating temperature	Topr		-40 to +85	°C
Storage temperature	Tstg		-55 to +150	°C

\*1: Specified substrate 114.3mm×76.1mm×1.6mm<sup>3</sup> glass-epoxy

Caution 1) Absolute maximum ratings represent the value which cannot be exceeded for any length of time.

Caution 2) Even when the device is used within the range of absolute maximum ratings, as a result of continuous usage under high temperature, high current, high voltage, or drastic temperature change, the reliability of the IC may be degraded. Please contact us for the further details.

Recommended Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Input voltage range	V <sub>IN</sub>		4.5 to 18	V

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# LV5066V

## Electrical Characteristics at Ta = 25°C, VIN = 15V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
<b>Reference voltage</b>						
Internal reference voltage	Vref		1.247	1.260	1.273	V
Pch drive voltage	VPDR	IOUT=0 to -5mA	VIN-5.5	VIN-5.0	VIN-4.5	V
<b>Saw wave oscillator</b>						
Oscillatory frequency	FOSC	RT=470kΩ	280	330	380	kHz
<b>ON/OFF circuit</b>						
IC start-up voltage	VCNT_ON		1.5		VIN	V
Disable voltage	VCNT_OFF				0.3	V
<b>Soft start circuit</b>						
Soft start source current	ISS_SC	EN>1.5V	1.3	2.0	2.7	μA
Soft start sink current	ISS_SK	EN<0.3V, SS=4V	1.0	1.6	2.2	mA
<b>UVLO circuit</b>						
UVLO release voltage	VUVLON	FB=COMP	3.0	3.4	3.8	V
UVLO lock voltage	VUVLOF	FB=COMP	2.5	2.9	3.3	V
<b>Error amplifier</b>						
Input bias current	IEA_IN		-100	-50	100	nA
Error amplifier gain	GEA		100	250	400	μA/V
Output sink current	IEA_OSK	FB=1.75V	-40	-20	-10	μA
Output source current	IES_OSC	FB=0.75V	10	20	40	μA
<b>Over current limit circuit</b>						
Reference current	ILIM1		49.3	55	60.7	μA
Over current detection comparator offset voltage	VLIM_OFS		-7		+7	mV
RSNS pin input range	VRSNS		VIN-0.15		VIN	V
HICCUP timer start-up cycle	NLCYCLES			15		cycle
HICCUP comparator threshold voltage	VtHIC		1.2	1.26	1.32	V
HICCUP timer change current	IHIC		1	2	3	μA
<b>PWM comparator</b>						
Maximum On-duty	D max		95			%
<b>Logic output</b>						
Power good "L" sink current	IPWRGD_L	PG=5V	4	5	6	mA
Power good "H" leakage current	IPWRGD_H	PG=5V			1	μA
Power good threshold voltage	VtPG		1.0	1.1	1.2	V
Power good hysteresis	VPG_H		40	50	60	mV
<b>Output</b>						
Output on-resistance (High)	RONH			3		Ω
Output on-resistance (Low)	RONL			2		Ω
Output on-current (High)	IONH		500			mA
Output on-current (Low)	IONL		500			mA
<b>The entire device</b>						
Stand-by current	ICCS	EN<0.3V			1	μA
Light load mode consumption current	ISLEEP1	EN>1.5V, No switching	30	55	80	μA
Thermal shutdown	TSD	*2		170		°C

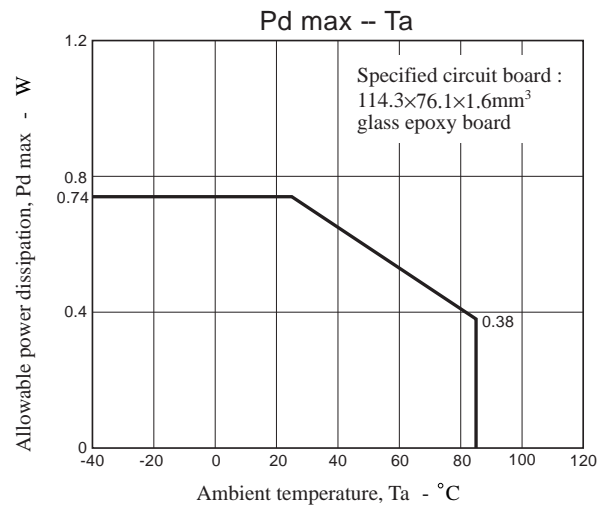
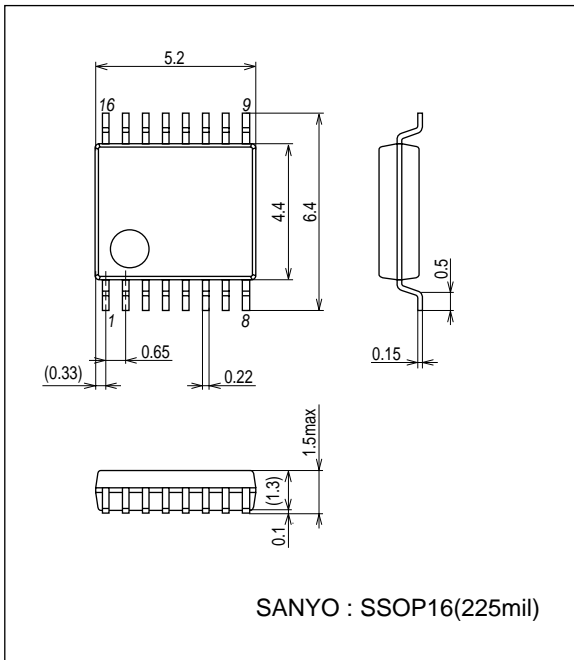
\*2: Design certification

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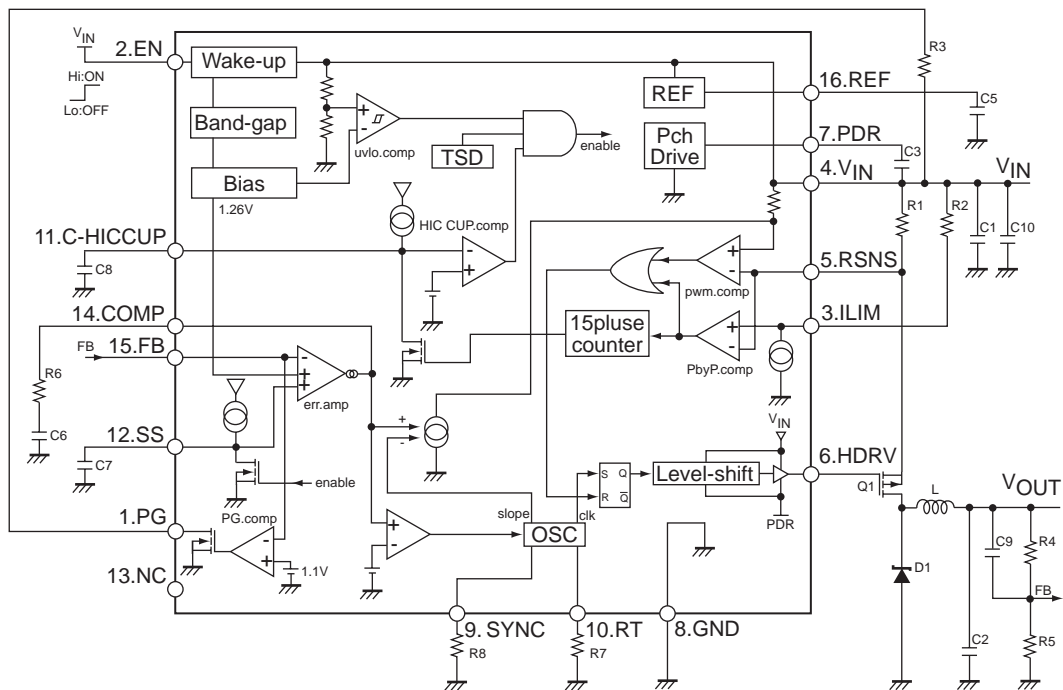
## Package Dimensions

unit : mm (typ)

3178B

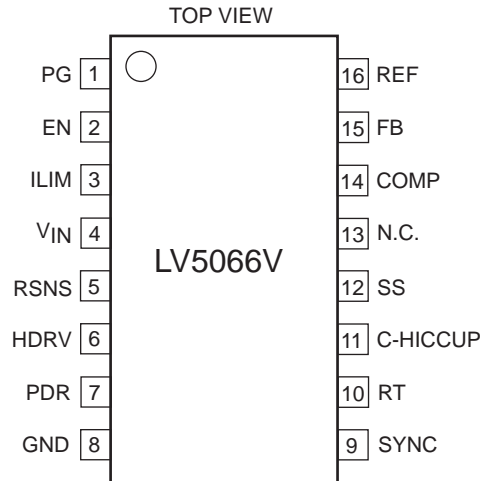


## Block Diagram



# LV5066V

## Pin Assignment

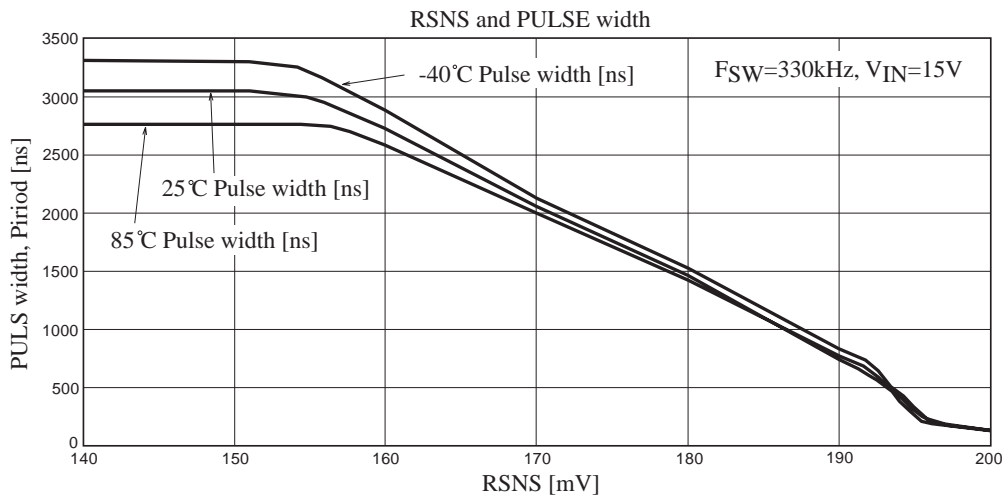


## Pin Descriptions

Pin No.	Pin name	Descriptions
1	PG	Power good pin. Connect to open drain of MOS-FET in ICs inside. Setting output voltage to "L", when FB voltage is 1.05V or less
2	EN	ON/OFF pin
3	ILIM	For current detection. Sink current is about 55μA. The current limiter comparator works when an external resistor is connected between this pin and V <sub>IN</sub> , and if the voltage of this resistor is less than the voltage of RSNS then Pch MOS is turned off. This operation is reset each PWM pulse.
4	V <sub>IN</sub>	Supply voltage pin It is observed by the UVLO function. When its voltage becomes 3.4V or more, ICs startup in soft start.
5	RSNS	Current detection resistor connection pin. Resistor is connected between V <sub>IN</sub> and this pin, and the current flows to MOSFET are measured.
6	HDRV	The external high-side MOSFET gate drive pin
7	PDR	Gate drive voltage of the external Pch MOSFET. Meanwhile, the bypass capacitor is connected between V <sub>IN</sub> and this pin.
8	GND	Ground Pin Ground pin voltage is reference voltage.
9	SYNC	Pin of using combined of external synchronous signal input pin
10	RT	Oscillation frequency setting pin. Resistor is connected between this pin and GND.
11	C-HICCUP	It is capacitor connection pin for setting re-startup cycle in HICCUP mode If connect it to GND pin, then latch-off when over current.
12	SS	Capacitor connection pin for soft start. About 2μA current charges the soft start capacitor.
13	NC	NC pin.
14	COMP	Error Amplifier Output Pin The phase compensation network is connected between GND pin and COMP pin Thanks to current-mode control, COMP pin voltage would tell you the output current amplitude. COMP pin is connected internally to an int.comparator which comparators with 0.9V reference. If COMP pin voltage is larger than 0.9V, IC operates in "continuous mode". If COMP pin voltage is smaller than 0.9V, IC operates in "discontinuous mode (low consumption mode)".
15	FB	Error amplifier reverse input pin ICs make its voltage keep 1.26V. Output voltage is divided by external resistors and it across FB.
16	REF	Reference voltage.

## Reference data

Relations (change of the pulse width when COMP changed RSNS at the upper limit to work) of RSNS and the pulse width



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