

STRUCTURE Silicon Monolithic Integrated Circuit

PRODUCT NAME Flexible Step-Down Switching Regulator

TYPE B D 9 7 8 1 H F P

FEATURES • Wide Input Range: 7~35V • High Precision(Reference Voltage): ±2%

• Integrated 4A Pch Power MOS FET • Adjustable Frequency: $50 \sim 500 \text{kHz}$

(maximum synchronous frequency : 500kHz)

OABSOLUTE MAXIMUM RATINGS (Ta=25°C)

Parameter	Symbol	Limits	Unit
Supply Voltage	V _{IN}	36	V
Output SW Voltage	V _{SW}	V _{IN}	V
Output SW Current	I _{SW}	4 (1)	A
EN/SYNC, INV Pin Voltage	V _{EN/SYNC} , V _{INV}	V _{IN}	٧
RT, FB Pin Voltage	V_{RT}, V_{FB}	7	V
Power Dissipation	P_d	5.5 ⁽²⁾	W
Operating Temperature Range	T _{opr}	-40∼+125	°C
Storage Temperature Range	T_{stg}	−55∼+150	°C
Maximum Junction Temperature	T _{jmax}	150	c

⁽¹⁾ Do not however exceed Pd.

OPERATING CONDITIONS (Ta=25℃)

Parameter	Symbol	Min.	Max.	Unit
Supply Voltage	V _{IN}	5	35	V
Recommend Supply Voltage	V _{IN}	7	35	٧
Output Switch Current	I _{SW}		4	Α
Oscillator Frequency	F _{osc}	50	500	kHz
Oscillator Timing Resistance	RT	39	800	kΩ
Synchronizing Frequency	F _{SYNC}	50	500	kHz
Output Voltage *1	Vo	1 or VIN×6%	V _{IN}	٧

^{*}Electrical characteristics are not guaranteed (especially when operating on reduce voltage)

The Japanese version of this document is the formal specification.

A customer may use this translation version only for a reference to help reading the formal version. If there are any differences in translation version of this document, formal version takes priority.

⁽²⁾ Pd derated at 44mW/°C for temperature above Ta=25°C, Mounted on a double layer PCB 70mm×70mm×1.6mm. (with Thermal vias / Copper area: 70mm×70mm)

^{* 1} This Output Voltage is applied to Recommend Supply Voltage (7~35V)

^{*}The product described in this specification is a strategic product (and/or service) subject to COCOM regulations. It should not be exported without authorization from the appropriate government.

^{*}This product is not designed for normal operation within a radio active environment.

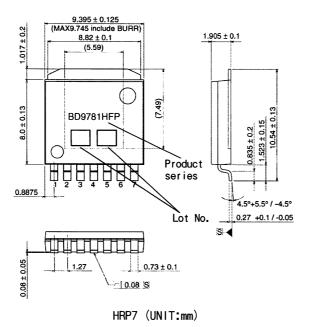
^{*}Status of this document



○ELECTRICAL CHARACTERISTICS (Unless otherwise specified, Ta=-40~125°C, V_{IN}=13.2V, V_{EN/SYM}=5V)

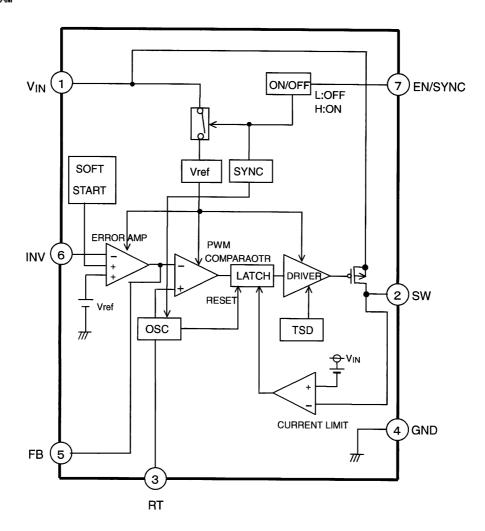
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Parameter	Symbol	Limits		Unit	Condition	
	<u> </u>	Min.	Тур.	Max.		
[Entire Device]						
Stand-by Current	I _{STB}	_	0	10	μΑ	V _{EN/SYNC} =0V, Ta=25℃
Quiescent Current	I _o	_	3	8	mΑ	I ₀ =0A
[Switch]						
Switch On Resistance	R _{on}	-	0.5	0.9	Ω	I _{SW} =50mA
Output Current Limit	IOLIMIT	4	8	-	Α	Design Guarantee
Leakage Current	OLEAK	-	0	30	μΑ	V _{IN} =35V, V _{EN/SYNC} =0V
[Error Amplifier]						
Reference Voltage1	V _{REF1}	0.98	1.00	1.02	٧	V _{FB} =V _{INV} , S:ON, Ta=25℃
Reference Voltage2	V _{REF2}	0.97	1.00	1.03	٧	V _{FB} =V _{INV} , S:ON
Line Regulations	△V _{REF}	-	0.5	_	%	V _{IN} =5~35V, S:0N
Input Bias Current	I _B	-1	-	_	μA	V _{INV} =1.1V
Maximum FB Voltage	V_{FBH}	2.4	2.5	_	٧	V _{INV} =0.5V
Minimum FB Voltage	V _{FBL}	-	0.05	0.10	٧	V _{INV} =1.5V
FB sink current	I _{FBSINK}	-5.0	-3.0	-0.5	mA	V _{FB} =1.5V, V _{INV} =1.5V
FB source current	FBSOURCE	70	120	170	μA	V _{FB} =1.5V, V _{INV} =0.5V
Soft Start Period	T _{ss}	-	5	-	mS	Design Guarantee
[Oscillator Section]						
Switching Frequency	F _{osc}	82	102	122	kHz	RT=390k Ω
Frequency Line Regulation	⊿F _{osc}	_	1	-	%	V _{IN} =5~35V
[Enable/Synchronized Frequency]						
Enable/Synchronous	V _{EN/SYNC}	0.8	1.7	2.6	٧	
Threshold Voltage	EN/ STING					
Sense Current	EN/SYNC	_	35	90	μΑ	V _{EN/SYNC}
Synchronous Frequency	F _{SYNC}		150	-	kHz	F _{EN/SYNC} =150kHZ

OPHYSICAL DIMENSIONS • MARKING



ROHM

OBLOCK DIAGRAM



**Refer to the Technical Note about the details of the application.

OPin No. • Pin Name

Pin No.	Pin Name			
1	VIN			
2	SW			
3	RT			
4	GND			
5	FB			
6	INV			
7	EN/SYNC			
FIN	GND			



NOTES FOR USE

1. Absolute maximum range

Absolute Maximum Ratings are those values beyond which the life of a device may be destroyed we cannot be defined the failure mode, such as short mode or open mode.

Therefore physical security countermeasure, like fuse, is to be given when a specific mode to be beyond absolute maximum ratings is considered.

2. Operation supply voltage range

The circuit functionality is guaranteed within operation of ambient temperature range, as long as it is within operation supply voltage range. The standard electrical characteristic values are guaranteed at the test circuit voltage of VIN=13.2V. They cannot be guaranteed at other voltages in the operating range of 5V-35V. However, the variation will be small.

3. Grounding

It is recommended that every capacitor (bypass and another capacitors) is grounded to PIN4 and FIN using single-point connections.

4. Input supply voltage

Input supply pattern layout should be as short as possible.

5. VIN Termina

For reduce the influence of switching noise, bypass capacitor is connected between VIN and GND.

6. FB Terminal

The FB terminal is for phase margin of the DC/DC system. A capacitor and a resistor or an only capacitor placed between the FB terminal and the INV terminal. The values of the capacitor and the resistor shall be adjusted according to the output current and the output capacitor value. The output may be oscillating if the value of capacitor is not sufficient, also the transient response may become insufficient if the value is too large. Therefore, the value of the capacitor and the resistor shall be adequately set up based on the condition of the temperature, and so on. Since the FB terminal also detects output short condition compulsorily applying an external voltage onto the FB terminal must not be performed because it may activate the timer latch protection circuit.

7. Electromagnetic Fields

The IC is susceptible to strong electromagnetic fields and may cause malfunction. Therefore, caution should be used when placing it on the PCB.

8. Application Design

When designing the external circuit, included adequate margins, including not only steady state but also transient characteristics.

9. Over Output Current Protection

SW Output terminal has over current protection circuit of 8A, with prevents IC from being damage by short circuit at over current.

10. Thermal Shut Down Circuit

A temperature control is built in the IC to prevent the damage due to overheat. Therefore, the output is turned off when the thermal circuit works and are turned on when the temperature goes down to the specified level.

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