

# Step Down DC - DC Converter Power IC

## MD1423R

Frequency adjustable

Small footprint

Output adjustable

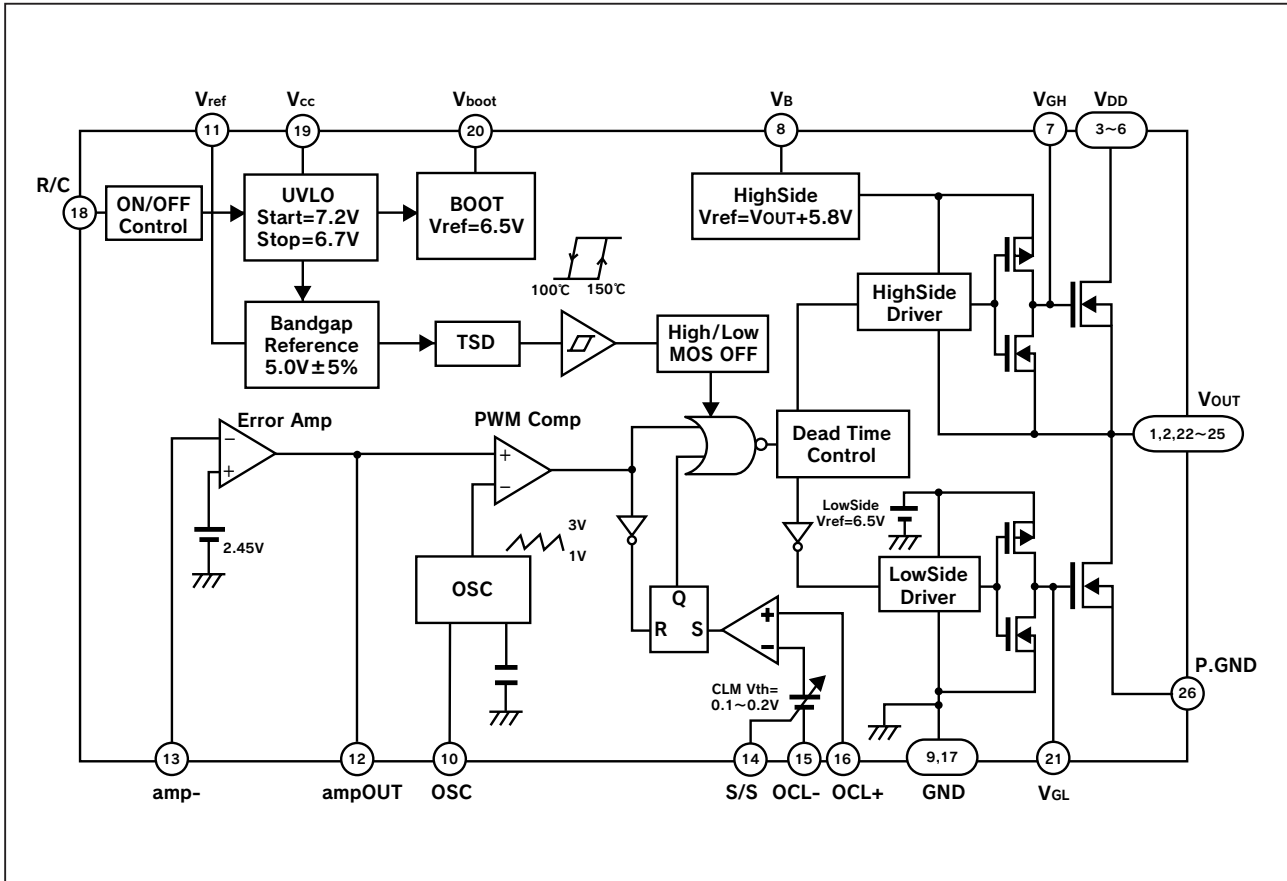
Remote On/Off

Synchronous Rectification

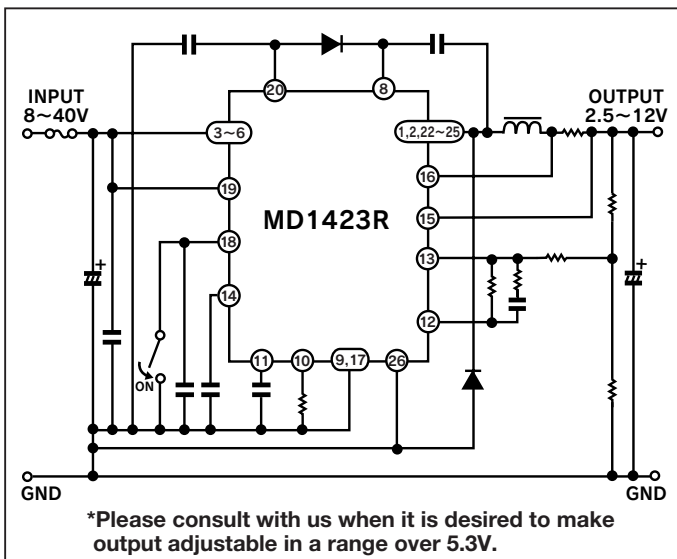
### Feature

- Input Voltage range 8V to 40V
- Maximum Output Current 3A
- Built\_in MOSFETs for main switch and synchronous rectification
- Adjustable output from 2.5V to 12V with external resistors
- Adjustable oscillation frequency from 100kHz to 500kHz with external resistors
- High Efficiency typ. 96% (at:Vin=8V, Vout=5V, Iout=1A, f=100kHz)
- Over Current Protection
- Thermal Shut Down
- Remote On / Off

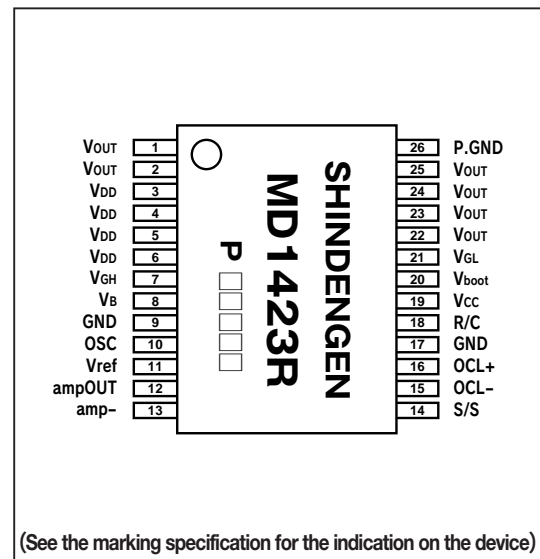
### Block Diagram



### Standard Connection Diagram



### Pin Assignment (LSSOP26)



## Absolute Maximum Ratings

Unless otherwise specified : Ta=25°C

Item	Symbol	Ratings	Units
Input/Output Ratings			
Input voltage	V <sub>CC</sub>	42	V
Main MOSFET input voltage	V <sub>DD</sub>	42	V
Output current (ave)	I <sub>OUTave</sub>	3	A
Output current (peak)	I <sub>OUTpeak</sub>	4	A
OCL-,OCL+ input voltage	V <sub>OCL</sub>	5.5	V
Remote control voltage	V <sub>RC</sub>	5.5	V
Thermal Ratings			
Power dissipation max *1	PD1 *3	1.1	W
	PD2 *3	1.5	W
Operating temperature	T <sub>a-ope</sub>	-30 to 85	°C
Storage temperature	T <sub>stg</sub>	-40 to 150	°C
Junction temperature	T <sub>j</sub>	150	°C
Thermal resistance *1	$\theta_{ja1}$ *3	110	°C/W
	$\theta_{ja2}$ *3	87	°C/W
	$\theta_{jc1}$ *2,*3	55	°C/W
	$\theta_{jc2}$ *2,*3	30	°C/W

\*1 CEM-3 Board : 50.8×50.8mm<sup>2</sup>, Thickness : 1mm, Copper Pattern : 300mm<sup>2</sup> (Top Side), There is no through-hole. \*2 The measurement result in the center of case.

\*3 PD1,  $\theta_{ja1}$ ,  $\theta_{jc1}$  are the values of the power dissipation and thermal resistance when electifying to a single internal element.

PD2,  $\theta_{ja2}$ ,  $\theta_{jc2}$  are the values of the power dissipation and thermal resistance when electifying to two internal element.

## Recommended Operating Conditions

Item	Symbol	Recommendation	Units
Junction temperature	T <sub>j</sub>	-30 to 125	°C
Input voltage (Ta = -10°C to 85°C)	V <sub>i</sub> *4	8 to 40	V
Input voltage (Ta = -30°C to -10°C)	V <sub>i</sub> *4	8.5 to 40	V
Output voltage setting range	V <sub>O</sub> *5	2.5 to 12	V
Oscillation frequency	frq	100 to 500	kHz

\*4 Input voltage at the time of power supply operation.

\*5 Output voltage at the time of power supply operation.

## Electrical Characteristics

Unless otherwise specified : Ta=25°C

Item	Symbol	Condition	MIN	TYP	MAX	Units
High Side MOSFET						
Drain-source breakdown voltage	V <sub>DSS_H</sub>	I <sub>D</sub> =1mA, V <sub>GS</sub> =0V	42	-	-	V
Zero gate voltage drain current	I <sub>DSS_H</sub>	V <sub>DS</sub> =42V, V <sub>GS</sub> =0V	-	-	10	μA
Static drain-source on-state resistance	R <sub>ON_H</sub>	I <sub>D</sub> =1.2A, V <sub>GS</sub> =4.5V	-	33	70	mΩ
Source-drain diode forward voltage	V <sub>SD_H</sub>	I <sub>S</sub> =1.2A, V <sub>GS</sub> =0V	-	-	1.5	V
Low Side MOSFET						
Drain-source breakdown voltage	V <sub>DSS_L</sub>	I <sub>D</sub> =1mA, V <sub>GS</sub> =0V	42	-	-	V
Zero gate voltage drain current	I <sub>DSS_L</sub>	V <sub>DS</sub> =42V, V <sub>GS</sub> =0V	-	-	10	μA
Static drain-source on-state resistance	R <sub>ON_L</sub>	I <sub>D</sub> =1.2A, V <sub>GS</sub> =4.5V	-	33	70	mΩ
Source-drain diode forward voltage	V <sub>SD_L</sub>	I <sub>S</sub> =1.2A, V <sub>GS</sub> =0V	-	-	1.5	V
Control IC						
Undervoltage lockout threshold (start)	V <sub>cc_start</sub>	-	6.5	7.2	7.9	V
Undervoltage lockout threshold (stop)	V <sub>cc_stop</sub>	-	6.0	6.7	7.4	V
Undervoltage lockout hysteresis	V <sub>cc_hys</sub>	-	-	0.5	-	V
Supply current	I <sub>cc</sub>	V <sub>cc</sub> =8 to 40V, f=300kHz	-	10	1.3	mA
Supply current-remote OFF state	I <sub>cc_off</sub>	V <sub>cc</sub> =8 to 40V	-	1.2	1.5	mA
Remote control ON input voltage	V <sub>RC_on</sub>	V <sub>cc</sub> =8 to 40V	-0.2	-	0.45	V
Remote control OFF input voltage	V <sub>RC_off</sub>	V <sub>cc</sub> =8 to 40V	2.5	-	5.3	V
Remote control source current	I <sub>RC</sub>	V <sub>cc</sub> =8 to 40V	-	-	250	μA
Bootstrap voltage	V <sub>boot</sub>	V <sub>cc</sub> =24V	5.4	6.5	7.6	V
Reference voltage	V <sub>ref</sub>	V <sub>cc</sub> =8 to 40V	4.75	5	5.25	V
Frequency1 accuracy	frq_100	V <sub>cc</sub> =24V, R=406.0kΩ	93	100	107	kHz
Frequency2 accuracy	frq_300	V <sub>cc</sub> =24V, R=105.1kΩ	279	300	321	kHz
Frequency3 accuracy	frq_500	V <sub>cc</sub> =24V, R=49.8kΩ	465	500	535	kHz
Threshold of over current limit	V <sub>th_OCL</sub>	V <sub>cc</sub> =24V	0.162	0.19	0.218	V
Softstart source current	I <sub>s/s</sub>	V <sub>cc</sub> =24V	-20	-12.5	-5	μA
Error amp reference voltage	V <sub>vamp</sub>	V <sub>cc</sub> =8 to 40V	2.4	2.45	2.5	V
Thermal shutdown temperature	T <sub>TSD</sub>	-	-	150	-	°C