

Step Down DC - DC Converter Power IC

MD3221R

Small
footprint

Output
adjustable

Remote
On/Off

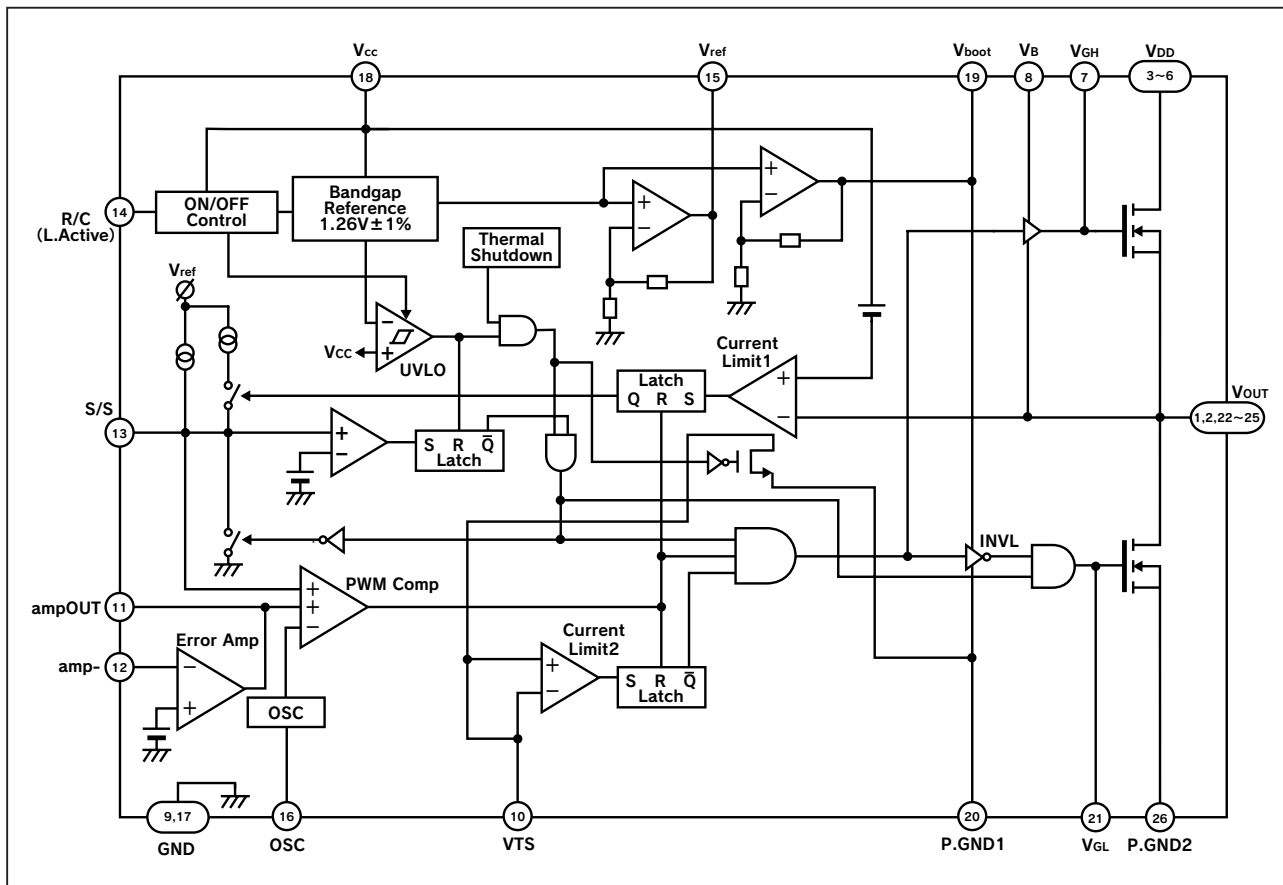
Synchronous
Rectification

5V Input

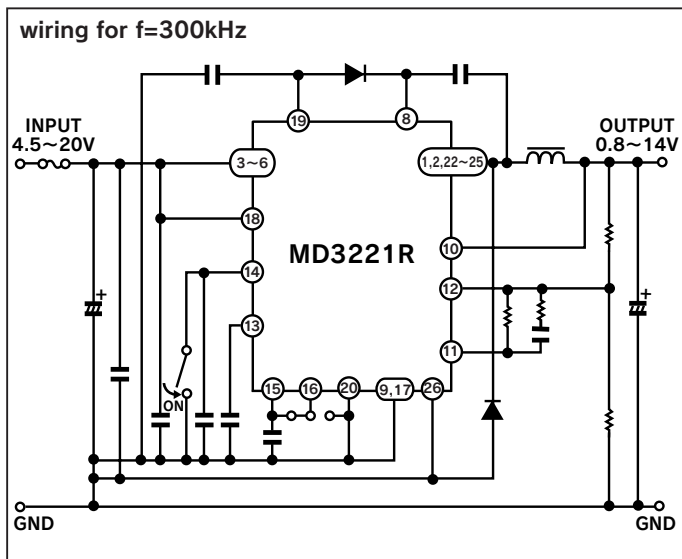
Feature

- Input Voltage range 4.5V to 20V
 - Maximum Output Current 3A
 - Built_in MOSFETs for main switch and synchronous rectification
 - Adjustable output from 0.8V to 14V with external resistors
 - High Efficiency typ. 96% (at:Vin=5V, Vout=3.3V, Iout=1A, f=100kHz)
 - 100kHz / 300kHz selectable switching frequency
 - Over Current Protection
 - Under Voltage Lockout
 - Thermal Shut Down
 - Remote On / Off
- Supply current at remote off 25μA typ.

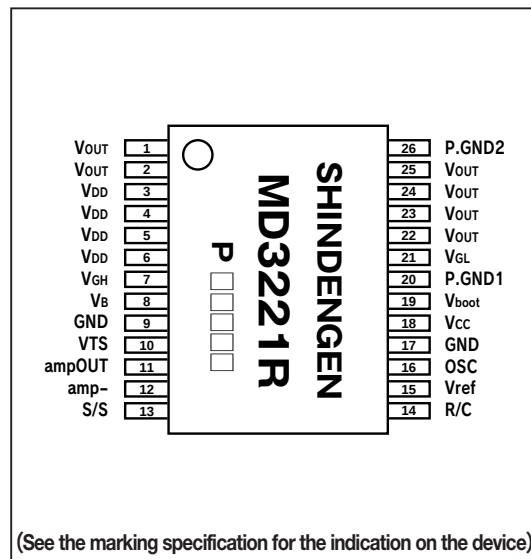
Block Diagram



Standard Connection Diagram



Pin Assignment (LSSOP26)



(See the marking specification for the indication on the device)

Absolute Maximum Ratings

Unless otherwise specified : Ta=25°C

Item	Symbol	Ratings	Units
Input/Output Ratings			
Input voltage	V _{CC}	22	V
Main MOSFET input voltage	V _{DD}	22	V
Output current (ave)	I _{OUTave}	3	A
Output current (peak)	I _{OUTpeak}	4	A
Input voltage between V _B and V _{OUT}	V _B	5.5	V
V _{boot} sink current	I _{boot}	−30	mA
Remote control voltage	V _{RC}	V _{CC}	V
OSC input voltage	V _{OSC}	V _{ref}	V
Amp− input voltage	V _{amp−}	V _{ref}	V
V _{ref} sink current	I _{ref}	−3	mA
Thermal Ratings			
Power dissipation max ※1	PD1 ※3	1.1	W
	PD2 ※3	1.5	W
Operating temperature	Ta−ope	−30 to 85	°C
Storage temperature	Tstg	−40 to 150	°C
Junction temperature	Tj	150	°C
Thermal resistance ※1	θja1 ※3	110	°C/W
	θja2 ※3	87	°C/W
	θjc1 ※2, ※3	55	°C/W
	θjc2 ※2, ※3	30	°C/W

※1 CEM-3 Board : 50.8×50.8mm², Thickness : 1mm, Copper Pattern : 300mm² (Top Side), There is no through-hole.

※2 The measurement result in the center of case.

※3 PD1, θja1, θjc1 are the values of the power dissipation and thermal resistance when electifying to a single internal element.

PD2, θja2, θjc2 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	Tj	−30 to 125	°C
Input voltage	V _i ※4	4.5 to 20	V
Output voltage setting range	V _O ※5	0.8 to 1.4	V

※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 _{DSS_H}	I _D =1mA, V _{GS} =0V	22	—	—	V
Zero gate voltage drain current	I _{DSS_H}	V _{DS} =22V, V _{GS} =0V	—	—	10	μA
Static drain-source on-state resistance	R _{ON_H}	I _D =1.2A, V _{GS} =4.5V	—	22	55	mΩ
Source-drain diode forward voltage	V _{SD_H}	I _S =1.2A, V _{GS} =0V	—	—	1.5	V
Low Side MOSFET						
Drain-source breakdown voltage	V _{DSS_L}	I _D =1mA, V _{GS} =0V	22	—	—	V
Zero gate voltage drain current	I _{DSS_L}	V _{DS} =22V, V _{GS} =0V	—	—	10	μA
Static drain-source on-state resistance	R _{ON_L}	I _D =1.2A, V _{GS} =4.5V	—	22	55	mΩ
Source-drain diode forward voltage	V _{SD_L}	I _S =1.2A, V _{GS} =0V	—	—	1.5	V
Control IC						
Supply current (f=100kHz)	I _{cc_L}	V _{CC} =4.5V to 20V	—	3.3	3.9	mA
Supply current (f=300kHz)	I _{cc_H}	V _{CC} =4.5V to 20V	—	5	5.9	mA
Supply current at remote OFF	I _{cc_off}	V _{CC} =4.5V to 20V	—	25	50	μA
Undervoltage lockout threshold (start)	V _{CC_start}	—	4.1	4.3	4.5	V
Undervoltage lockout hysteresis	V _{CC_hys}	—	0.4	0.5	0.6	V
Bootstrap voltage	V _{boot}	V _{CC} =5V	3.84	4	4.16	V
Line regulation	V _{B-IN}	V _{CC} =4.5V to 20V	—	—	30	mV
Load regulation	V _{B-L}	V _{CC} =5V	—	—	30	mV
Reference voltage	V _{ref}	V _{CC} =5V	3.84	4	4.16	V
Line regulation	REG-IN	V _{CC} =4.5V to 20V	—	—	30	mV
Load regulation	REG-L	V _{CC} =5V	—	—	30	mV
Initial frequency1 accuracy	fosc_1	V _{CC} =5V	85	100	115	kHz
Initial frequency2 accuracy	fosc_2	V _{CC} =5V	255	300	345	kHz
Maximum duty cycle	Dty_max	V _{CC} =5V	85	90	95	%
Remote control ON input voltage	V _{R/C_ON}	V _{CC} =5V	−0.2	—	0.7	V
Remote control OFF input voltage	V _{R/C_OFF}	V _{CC} =5V	2	—	V _{CC}	V
Remote control source current	I _{RC}	V _{CC} =5V	—	2	10	μA
Soft-start source current	I _{s/s}	V _{CC} =5V	−3	−2.5	−2	μA
Error amplifier reference voltage	V _{amp}	V _{CC} =5V	0.784	0.8	0.816	V
Threshold of over current limit at Ron detection	I _{th_OCL1}	V _{CC} =5V	3	—	—	A
Timer current	I _{timer}	V _{CC} =5V	−40	−33	−26	μA
Soft-start input voltage before timer starting	V _{s/s}	V _{CC} =5V	2.75	2.9	3.05	V
Threshold of latch	V _{th_lat}	V _{CC} =5V	3.3	3.45	3.6	V
Output voltage accuracy (V _O =0.8V)	V _{F/B_1}	V _{CC} =4.5V to 20V	0.784	0.800	0.816	V
Thermal shutdown temperature	T _{TSD}	—	—	140	—	°C