

Step Down DC - DC Converter Power IC

MD3221R

Small footprint

Output adjustable

Remote On/Off

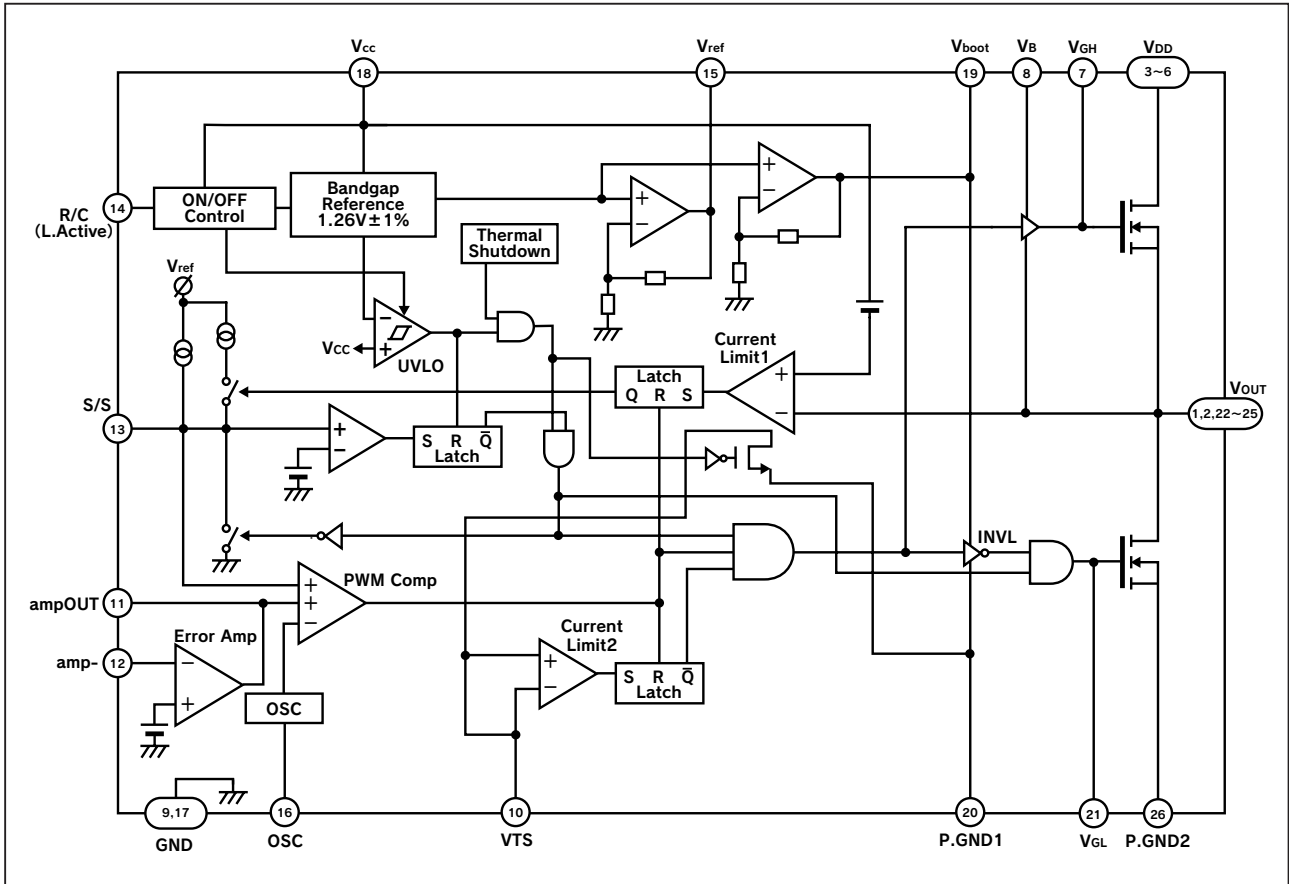
Synchronous Rectification

5V Input

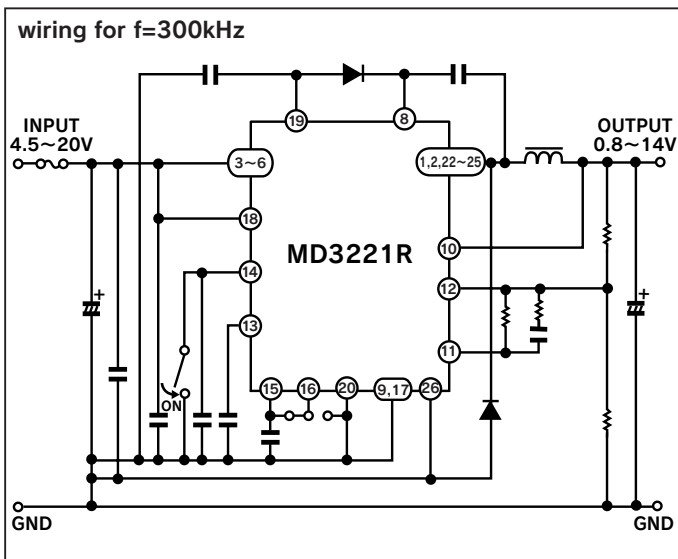
Feature

- 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.

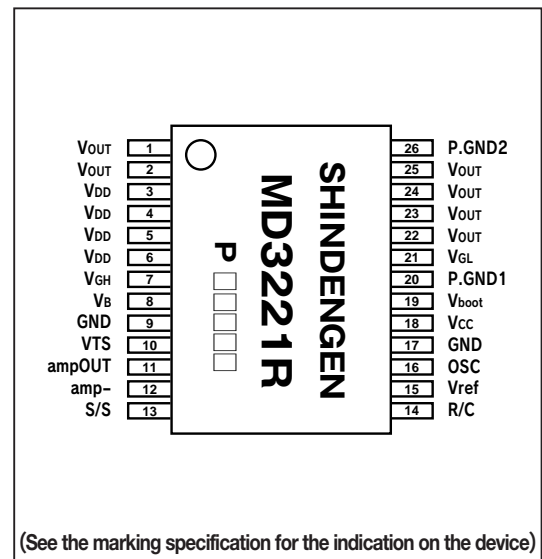
Block Diagram



Standard Connection Diagram



Pin Assignment (LSSOP26)



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
Vboot 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
Vref sink current	I _{REF}	-3	mA
Thermal Ratings			
Power dissipation max ※1	PD1 ※3	1.1	W
	PD2 ※3	1.5	W
Operating temperature	T _{a-ope}	-30 to 85	°C
Storage temperature	T _{stg}	-40 to 150	°C
Junction temperature	T _j	150	°C
Thermal resistance ※1	θ _{ja1} ※3	110	°C/W
	θ _{ja2} ※3	87	°C/W
	θ _{jc1} ※2, ※3	55	°C/W
	θ _{jc2} ※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, θ_{ja1}, θ_{jc1} are the values of the power dissipation and thermal resistance when electifying to a single internal element.

PD2, θ_{ja2}, θ_{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 _j	-30 to 125	°C
Input voltage	V _i ※4	4.5 to 20	V
Output voltage setting range	V _O ※5	0.8 to 14	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	f _{OSC_1}	V _{CC} =5V	85	100	115	kHz
Initial frequency2 accuracy	f _{OSC_2}	V _{CC} =5V	255	300	345	kHz
Maximum duty cycle	D _{TY_MAX}	V _{CC} =5V	85	90	95	%
Remote control ON input voltage	V _{RC_ON}	V _{CC} =5V	-0.2	-	0.7	V
Remote control OFF input voltage	V _{RC_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