

# R2A20101BM/NP

## Monolithic Synchronous Step-Down DC/DC Converter

REJ03D0790-0300

Rev.3.00

May 14, 2008

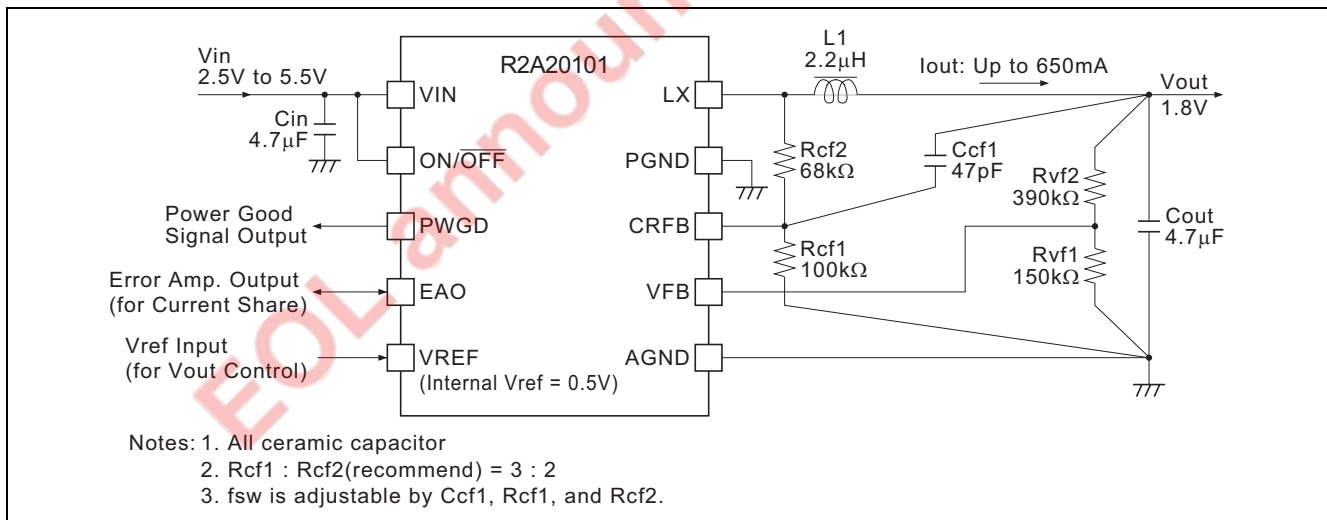
### Features

- Built-in low Ron power MOS FETs  
Pch Ron = 0.30  $\Omega$  (Typ), Nch Ron = 0.14  $\Omega$  (Typ)
- High switching frequency: 2 MHz (Max)
- Output current: 650 mA (Max)
- Output ON/OFF control
- Vout control
- Power good monitor
- Current share for redundant power supply operation
- Vout = 0.5 V to (VIN - 0.5) V

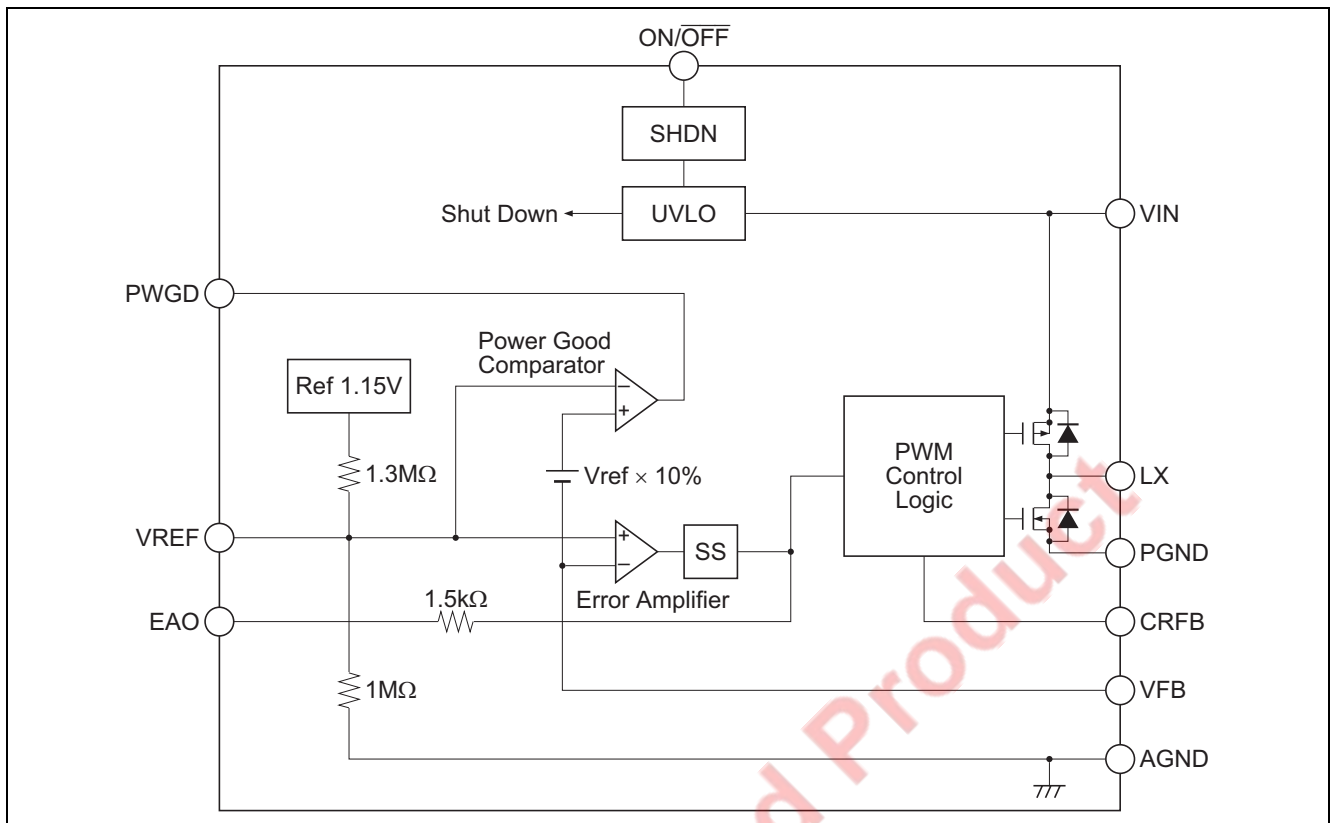
### Application

- POL (Point of Load) power supplies
- Power supply for microcomputer systems  
MCU-Core, I/O, Memory (DDR, SRAM, FLASH, HDD, etc.), FPGA, DSP, Graphic Processor
- Battery powered equipment systems  
Cellular phone (CDMA power amplifier, MCU, DSP, ASIC), PDA, Digital camera, Portable game, Handy terminal

### Operating Circuit Example



## Block Diagram



## Absolute Maximum Ratings

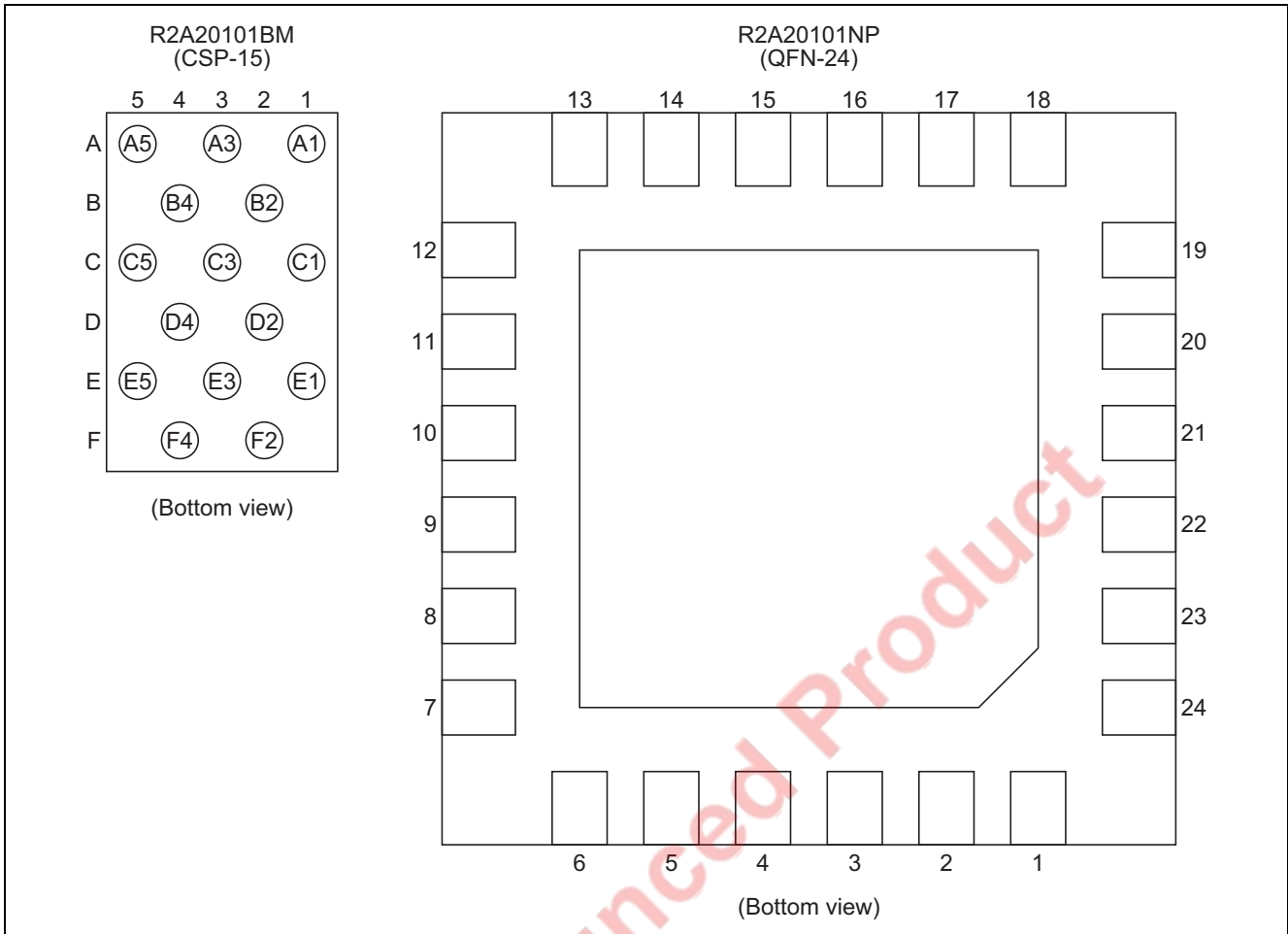
(Ta = 25°C)

Item	Symbol	Ratings	Unit	Note
Power supply voltage	V <sub>IN</sub>	6	V	1
ON/OFF, PWGD, EAO, VREF, LX, CRFB, VFB terminal voltage	V <sub>MAX</sub>	-0.3 to (V <sub>IN</sub> + 0.3)	V	1
PGND terminal voltage	V <sub>PGND</sub>	-0.3 to +0.3	V	1
Operating ambient temperature	T <sub>opr</sub> (Ta)	-40 to +85	°C	
Junction temperature 1	T <sub>jmax1</sub>	+125	°C	
Junction temperature 2	T <sub>jmax2</sub>	+150	°C	2
Storage temperature	T <sub>stg</sub>	-55 to +150	°C	

Notes: 1. Rated voltages are with reference to the AGND pin.

2. Operation by T<sub>jmax2</sub> is made within 24 hours through life.

**Pin Arrangement**



**Pin Description**

Pin No.		Pin Name	Pin Function
R2A20101BM (CSP-15)	R2A20101NP (QFN-24)		
A1, A3, A5	15, 16, 17	PGND	Power ground
B2, B4	11, 20	LX	Inductor connection node
C1, C3, C5	10, 21	VIN	Power supply voltage input
D4	22	ON/OFF	Output on/off control input
D2	9	CRFB	CR feedback input
E5	23	PWGD	Power good monitor output
E1	8	VFB	Feedback voltage input
F4	2	EAO	Error amplifier output (for current share)
E3	5	VREF	Vout control voltage input
F2	4	AGND	Analog ground (IC chip ground voltage)

Note: Please apply solder to pins 1, 3, 6, 7, 12, 13, 14, 18, 19, and 24 even though they are NC pins. Solder on the underside pads improves heat-radiation characteristics.

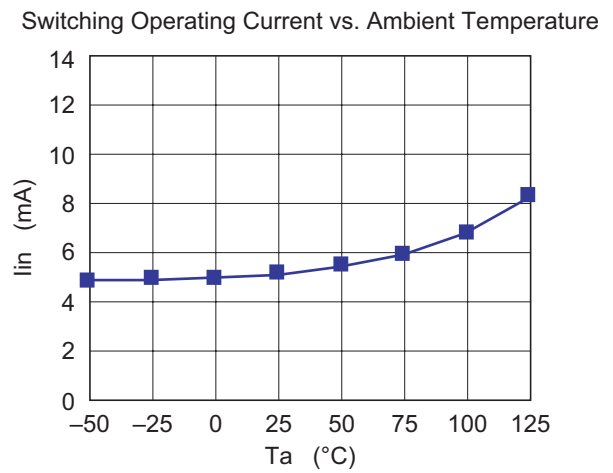
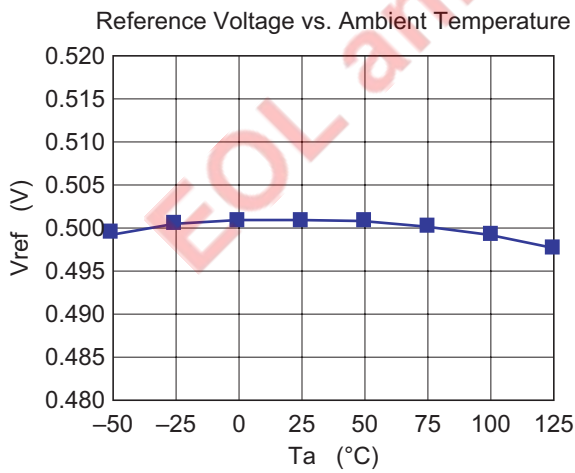
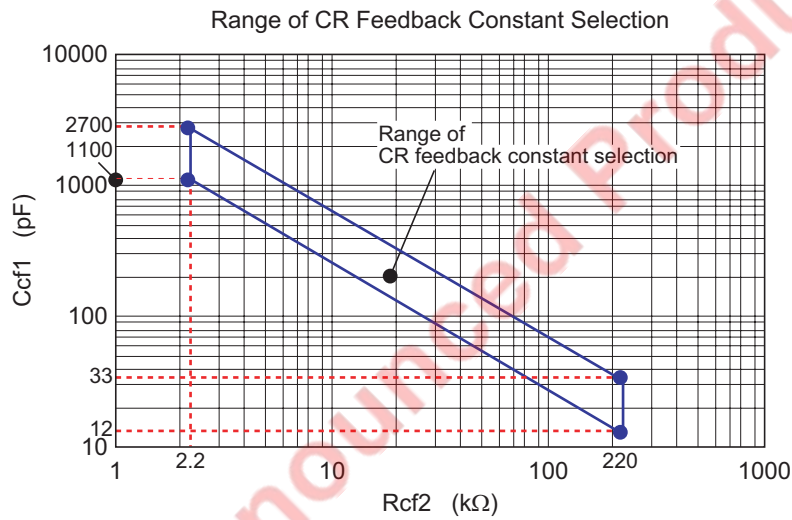
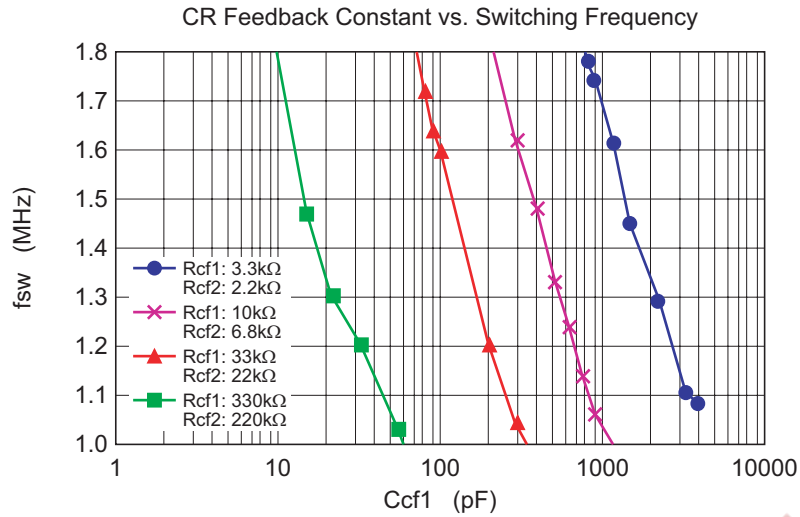
## Electrical Characteristics

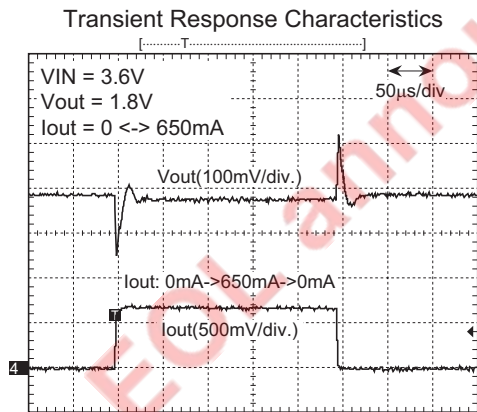
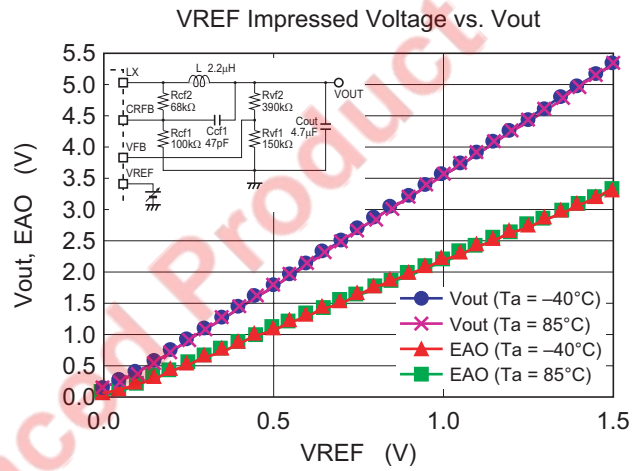
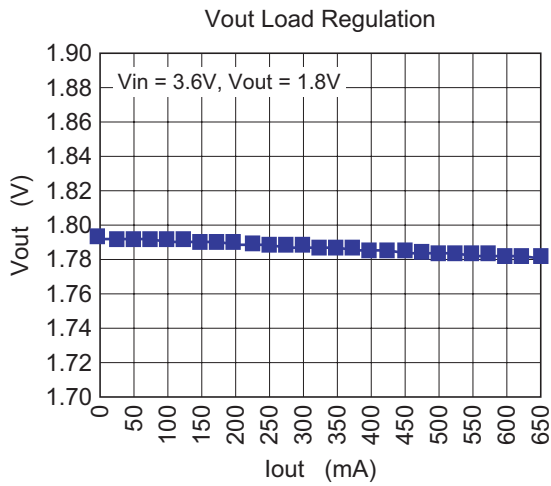
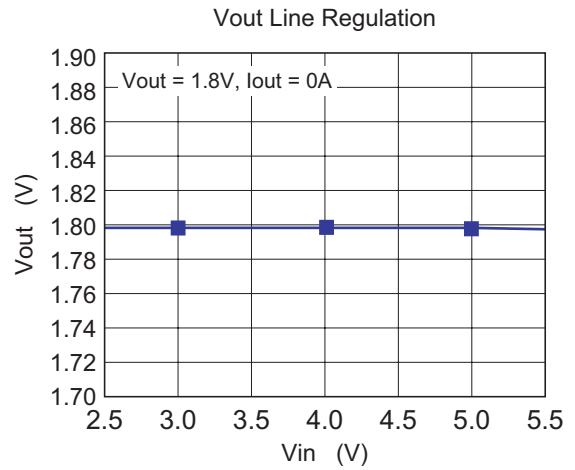
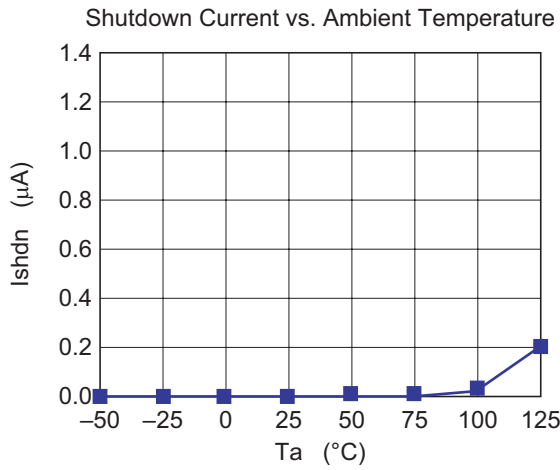
(Ta = 25°C, Vin = 3.6 V, ON/OFF = Vin, unless otherwise specified.)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Input voltage range	Vin	2.5	—	5.5	V	
UVL threshold high	Vuvl-Hi	2.0	2.3	2.5	V	VFB = CRFB = GND, Vin = rising
UVL hysteresis	Vuvl-Hys	0.15	0.22	0.29	V	
Quiescent supply current	I <sub>ss</sub>	20	45	80	μA	
Shutdown supply current	I <sub>shdn</sub>	—	0.0	1.0	μA	ON/OFF = 0V
Reference voltage	V <sub>ref</sub>	0.485	0.500	0.515	V	
V <sub>ref</sub> line regulation	dV <sub>ref</sub> /dVin	(-0.4)	0.1	(0)	%/V	Vin = 2.5 to 5.5V
V <sub>ref</sub> temperature stability	dV <sub>ref</sub> /dT <sub>a</sub>	—	(±100)	—	ppm/°C	T <sub>a</sub> = -40 to +85°C
VREF sink current	I <sub>vref-sink</sub>	1.3	3.7	8.0	μA	V <sub>ref</sub> = 2.5V
VREF source current	I <sub>vref-source</sub>	0.3	0.9	2.0	μA	V <sub>ref</sub> = 0V
VFB leakage current	I <sub>leak-VFB</sub>	-1	0	+1	μA	VFB = 1/2 × Vin
Pch FET on resistance	R <sub>on-Pch</sub>	—	0.30	0.50	Ω	VFB = CRFB = 0V, ILX = -100mA
Nch FET on resistance	R <sub>on-Nch</sub>	—	0.14	0.25	Ω	VFB = CRFB = Vin, ILX = 100mA
Pch FET leakage current	I <sub>leak-Pch</sub>	—	—	1.0	μA	ON/OFF = 0V, LX = 0V
Nch FET leakage current	I <sub>leak-Nch</sub>	—	—	1.0	μA	ON/OFF = 0V, LX = Vin
Peak current limit	I <sub>peak-Limit</sub>	0.7	—	—	A	
ON/OFF threshold high	V <sub>on/off-Hi</sub>	1.0	1.45	1.85	V	ON/OFF = rising
ON/OFF threshold low	V <sub>on/off-Lo</sub>	0.75	1.24	1.65	V	ON/OFF = falling
ON/OFF leakage current	I <sub>leak-on/off</sub>	-1	0	+1	μA	ON/OFF = Vin
ON/OFF input current	I <sub>input-on/off</sub>	—	1.4	5	μA	ON/OFF = 0.9V
Switching frequency	f <sub>sw</sub>	Adjustable by external Ccf1, Rcf1, Rcf2			Hz	
Soft start time	t <sub>ss</sub>	56 × Rcf1/(Rcf1 + Rcf2) × V <sub>out</sub>			μs	
Power good threshold	V <sub>th-PGood</sub>	(-15)	-10	(-5)	%	V <sub>ref</sub> = 0.5V
Power good VOL	I <sub>pg-VOL</sub>	20	—	—	μA	PWGD = 0.2V, VFB = 0V
Power good VOH	I <sub>pg-VOH</sub>	-10	—	—	μA	PWGD = 3.4V, VFB = 0.5V
Output voltage load regulation	dV <sub>out</sub> /dI <sub>out</sub>	—	±0.7	—	%/A	L = 2.2μH, V <sub>out</sub> = 1.8V, I <sub>out</sub> = 0 to 650mA

Note: ( ) is design spec.

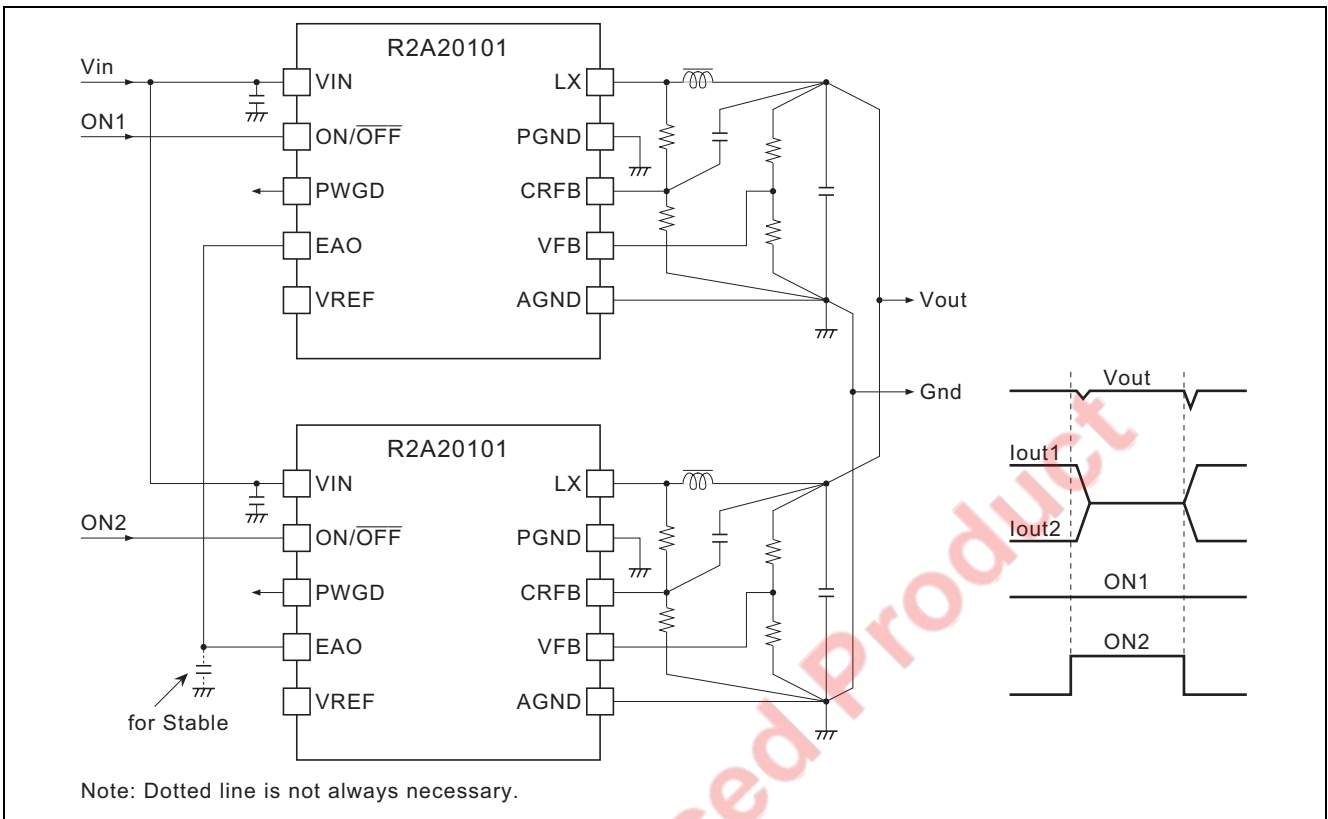
Main Characteristics



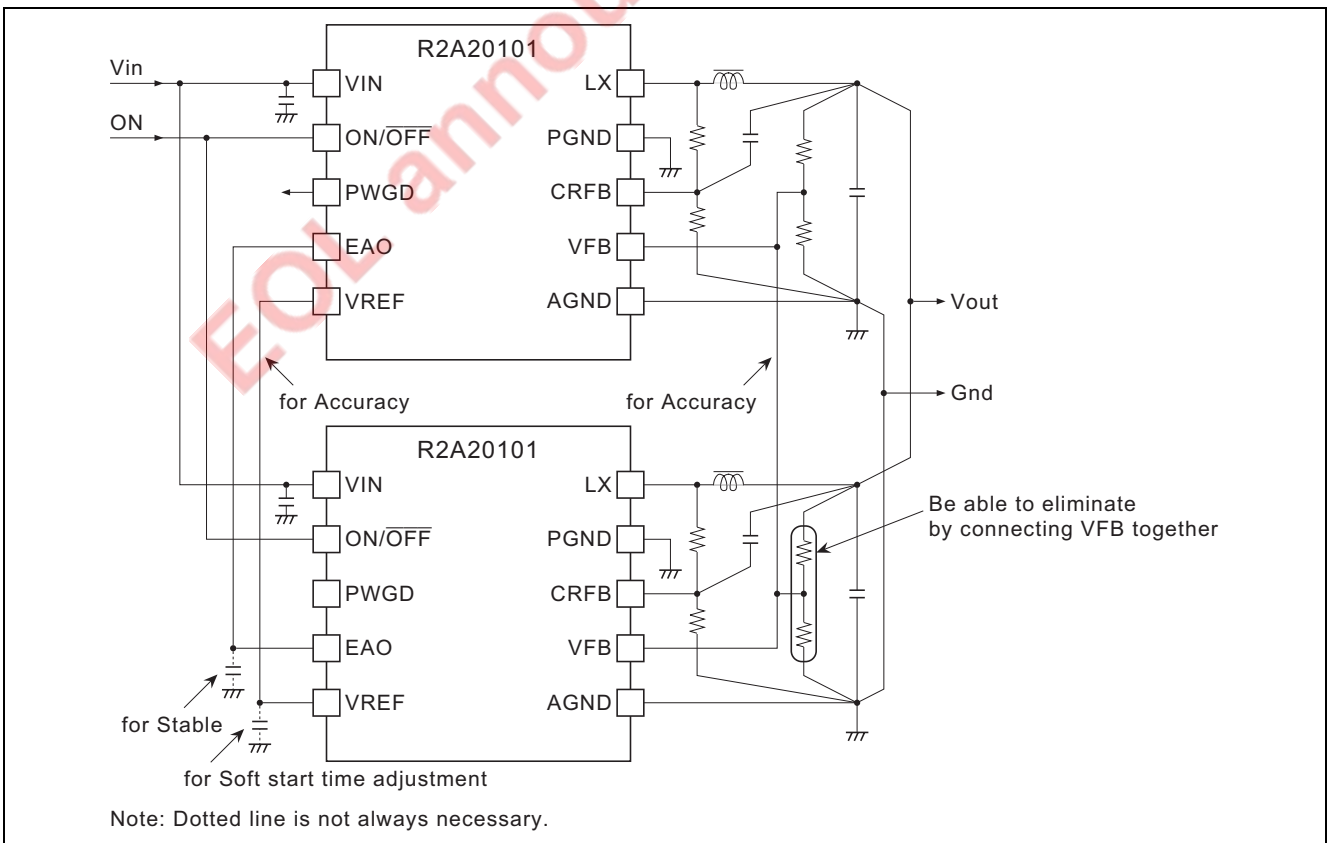


## Application Circuit Example

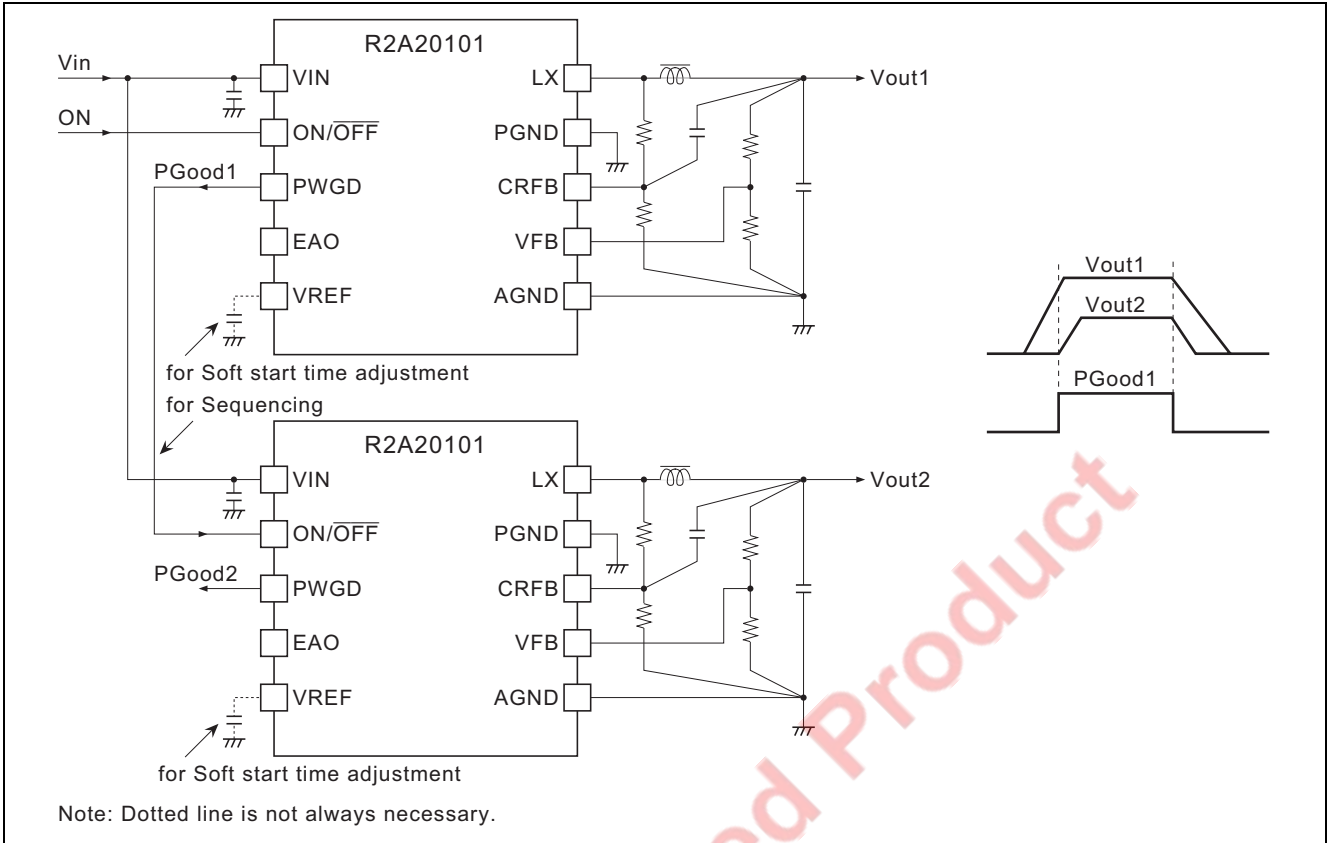
### 1. Current Share 1 (Redundant, Hot Swap type)



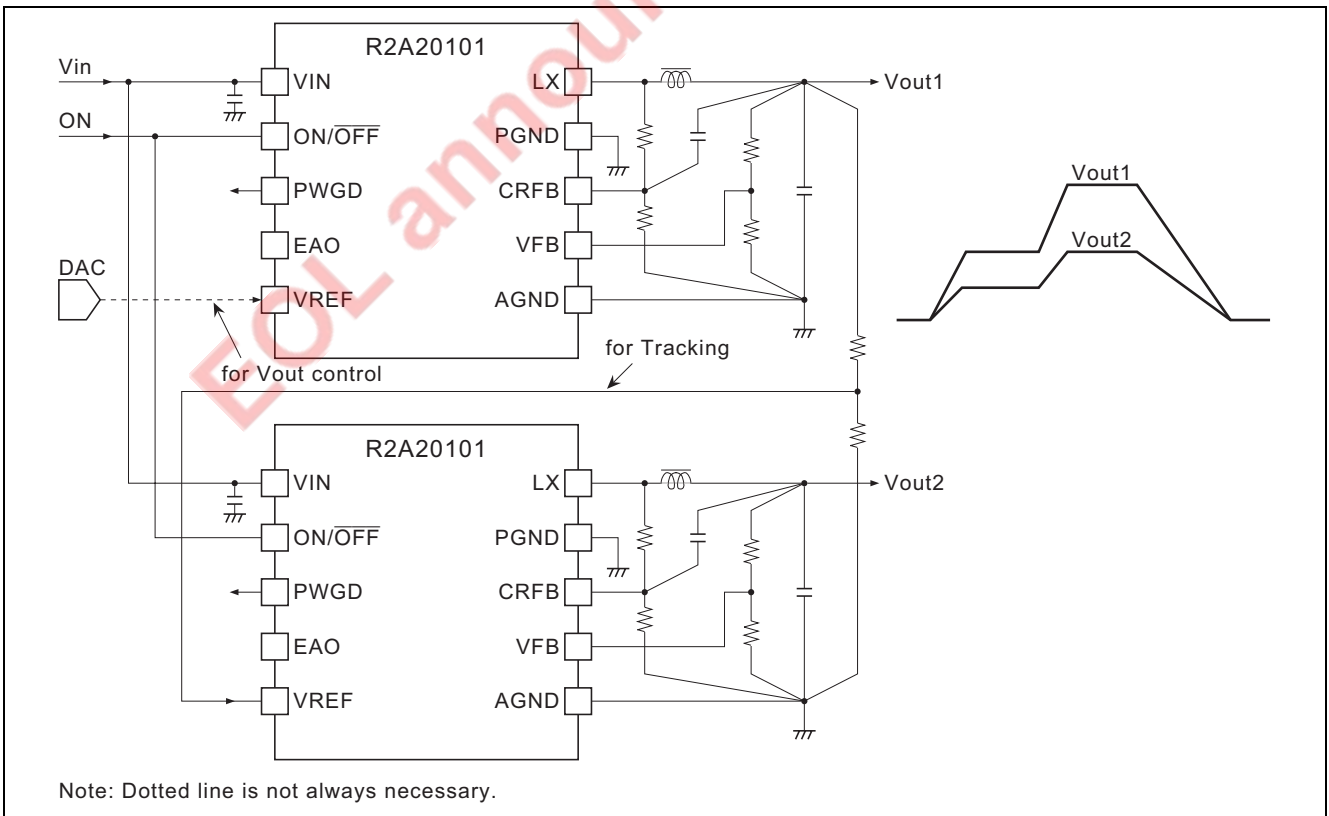
### 2. Current Share 2 (Accuracy type)



### 3. Sequential Start-up



### 4. Tracking





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