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Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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R2A20101BM/NP

Monolithic Synchronous Step-Down DC/DC Converter

REJ03D0790-0300

Rev.3.00

May 14, 2008

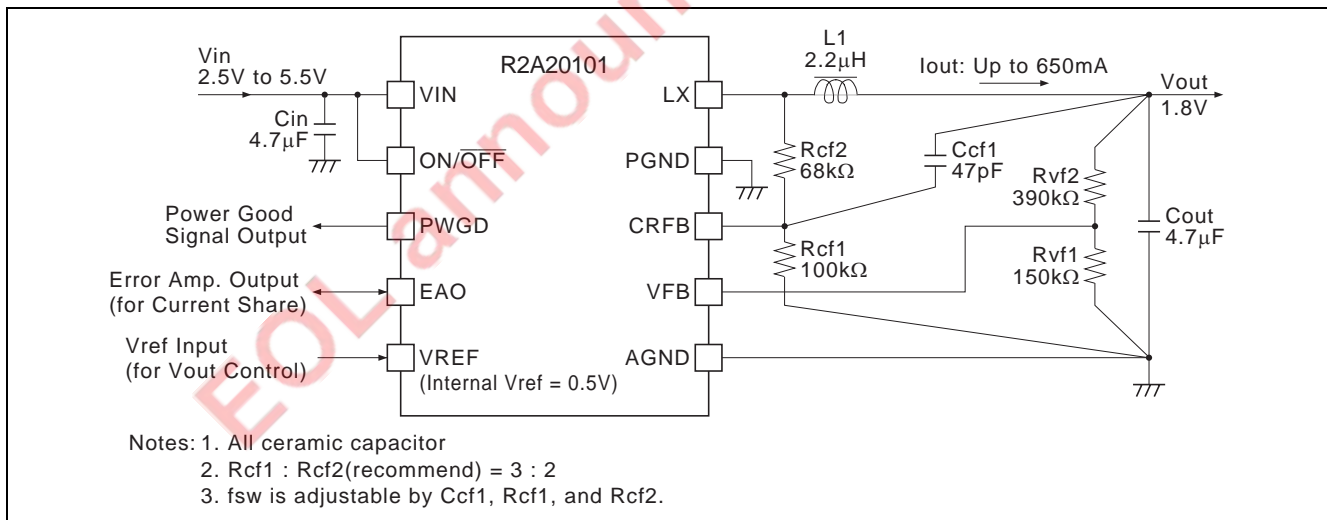
Features

- Built-in low Ron power MOS FETs
Pch Ron = 0.30 Ω (Typ), Nch Ron = 0.14 Ω (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

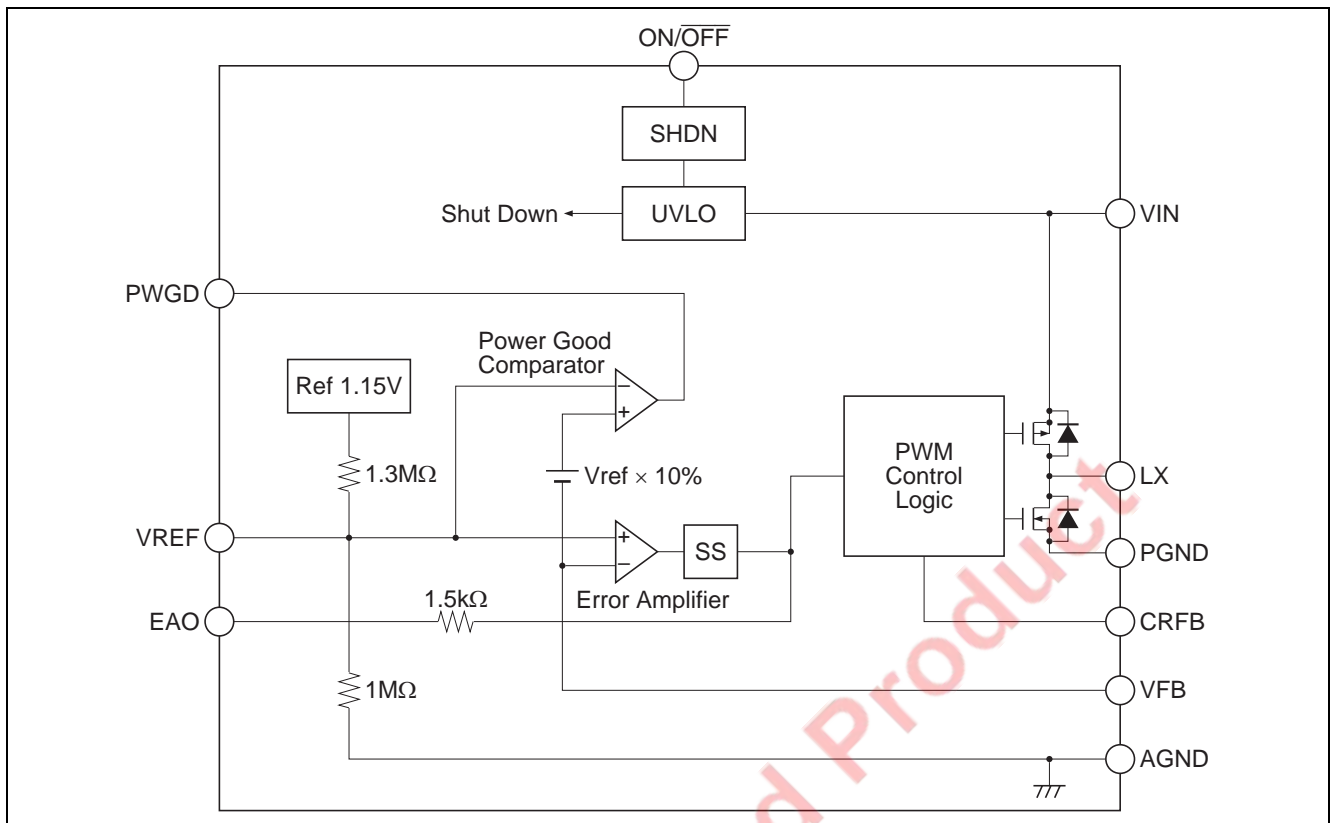
Application

- 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

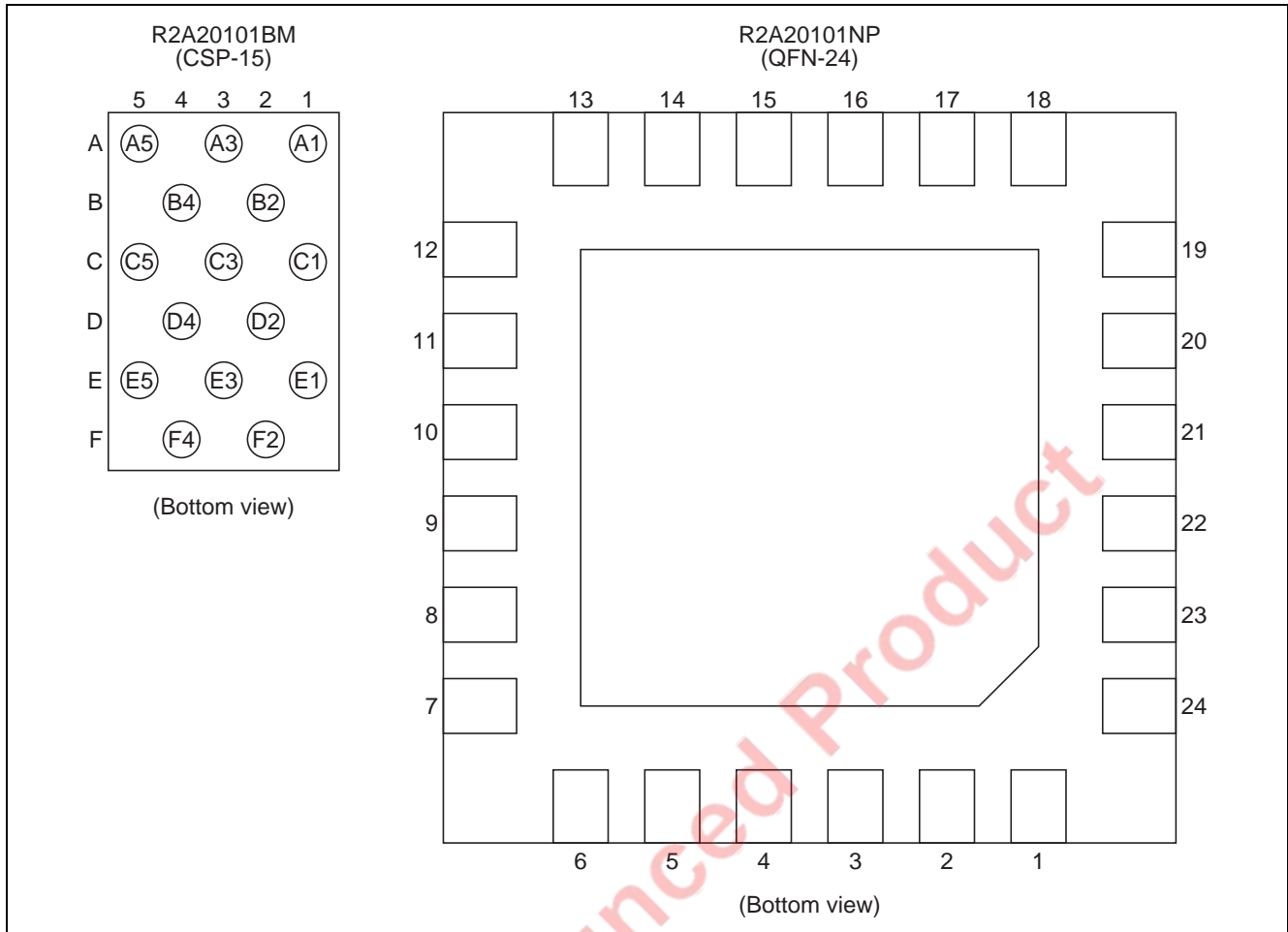
(Ta = 25°C)

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

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

2. Operation by T_{jmax2} 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.

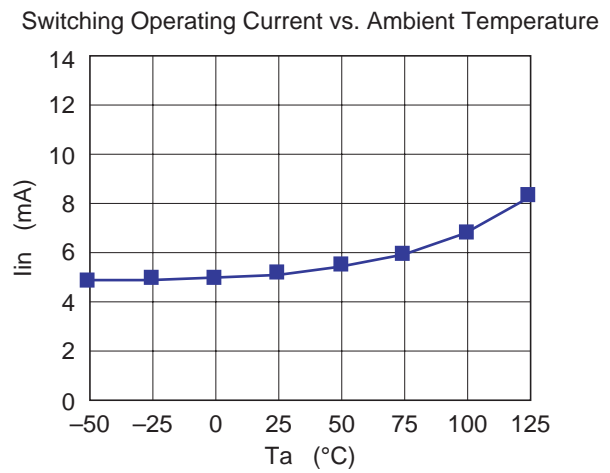
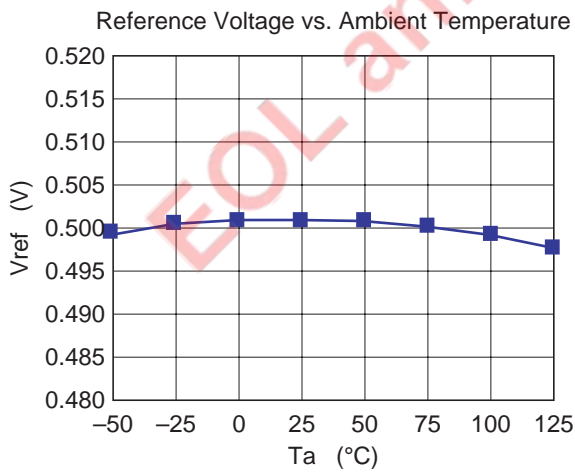
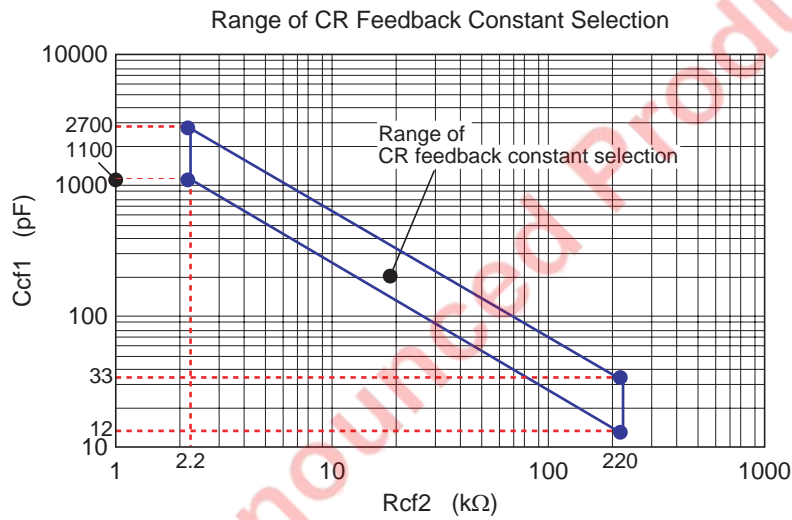
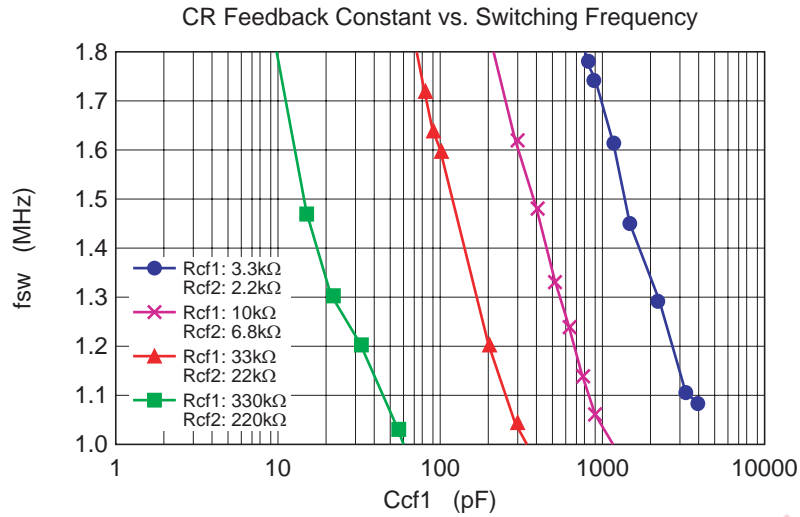
Electrical Characteristics

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

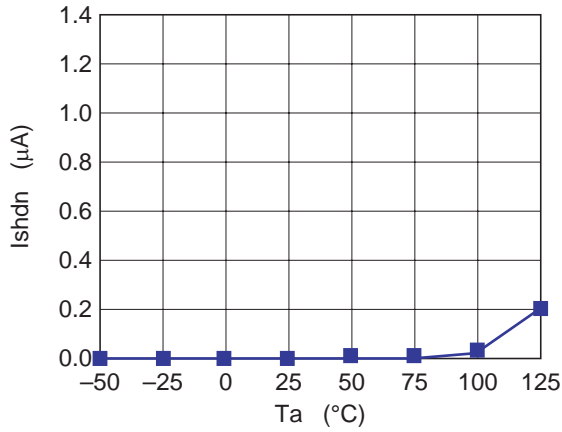
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Input voltage range	Vin	2.5	—	5.5	V	
UVL threshold high	Vuvl-Hi	2.0	2.3	2.5	V	VFB = CRFB = GND, Vin = rising
UVL hysteresis	Vuvl-Hys	0.15	0.22	0.29	V	
Quiescent supply current	I _{ss}	20	45	80	μA	
Shutdown supply current	I _{shdn}	—	0.0	1.0	μA	ON/OFF = 0V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

Note: () is design spec.

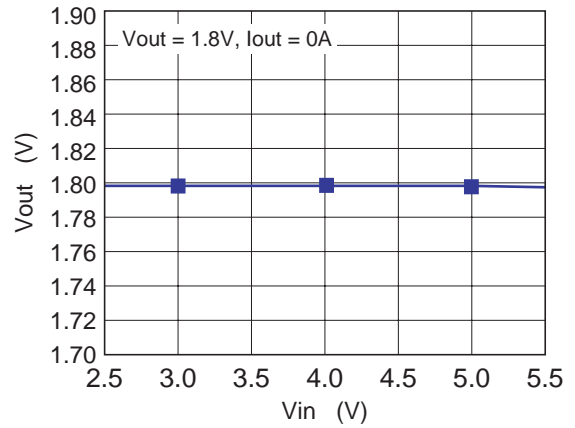
Main Characteristics



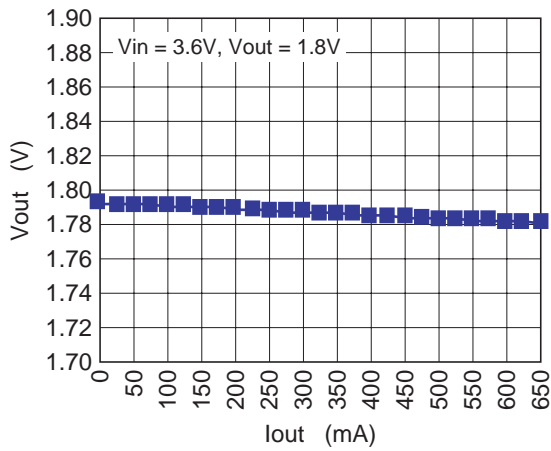
Shutdown Current vs. Ambient Temperature



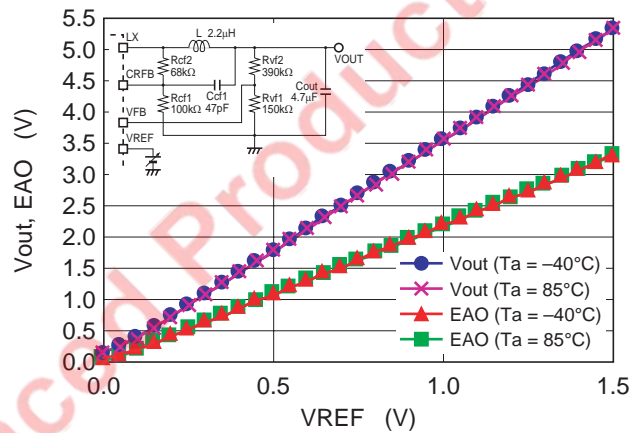
Vout Line Regulation



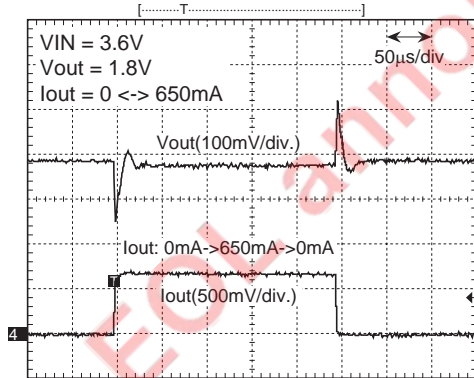
Vout Load Regulation



VREF Impressed Voltage vs. Vout

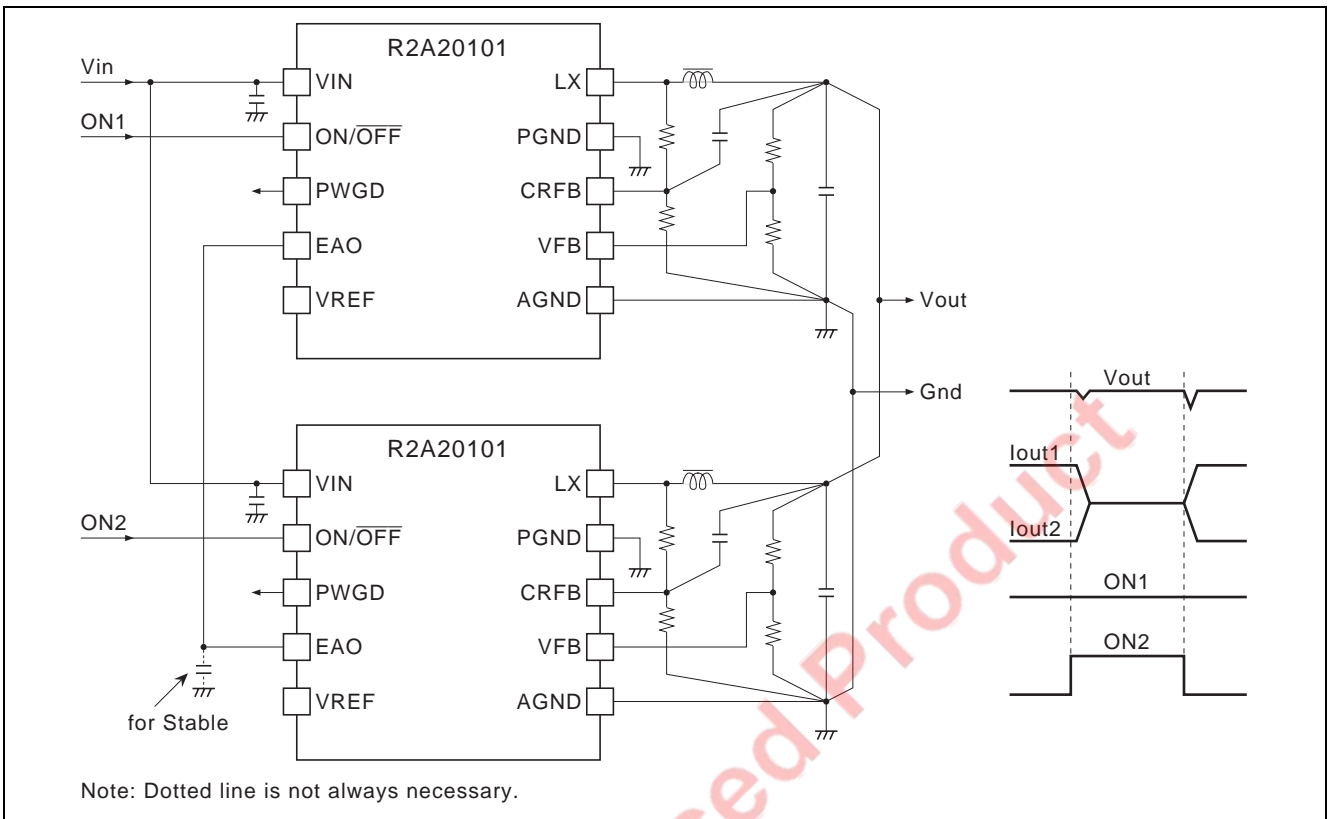


Transient Response Characteristics

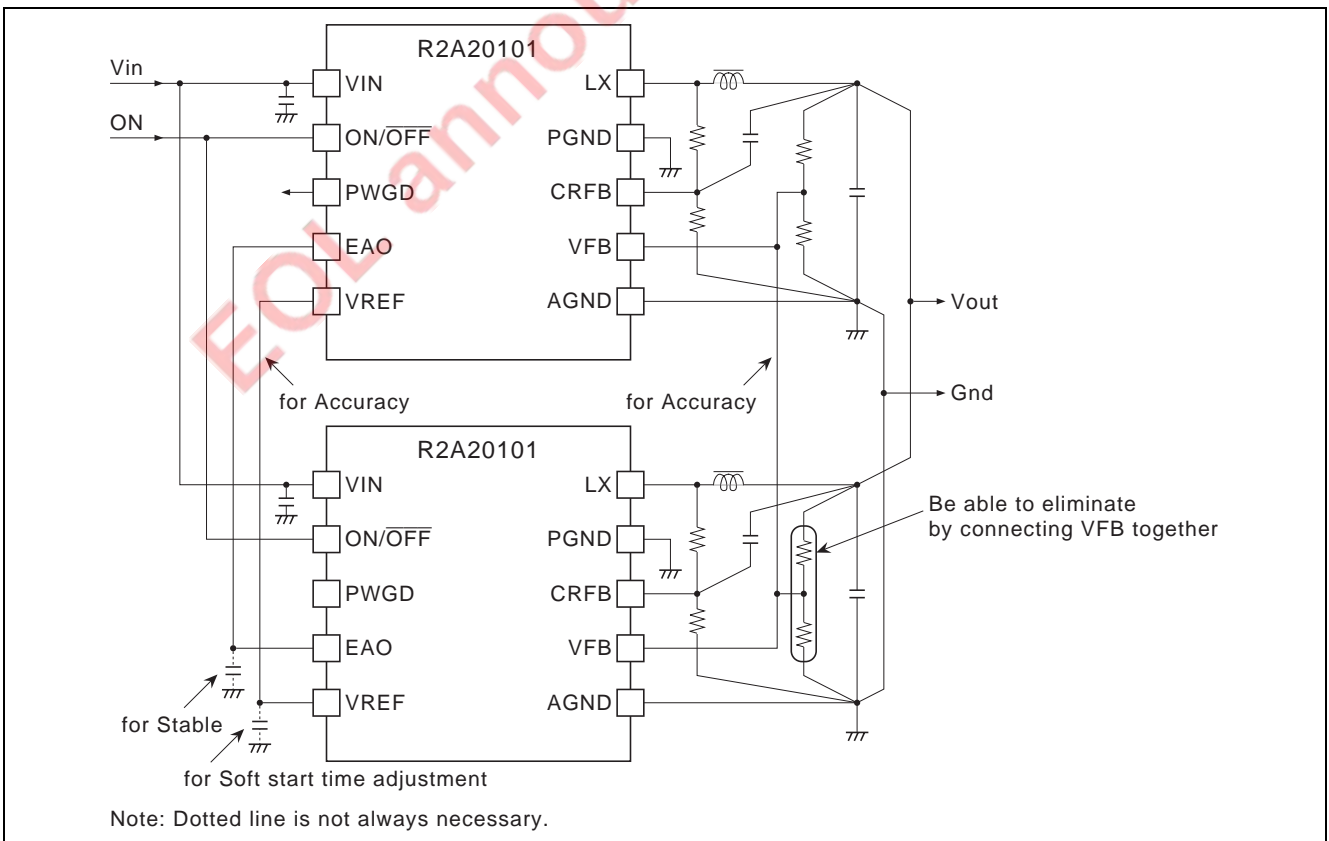


Application Circuit Example

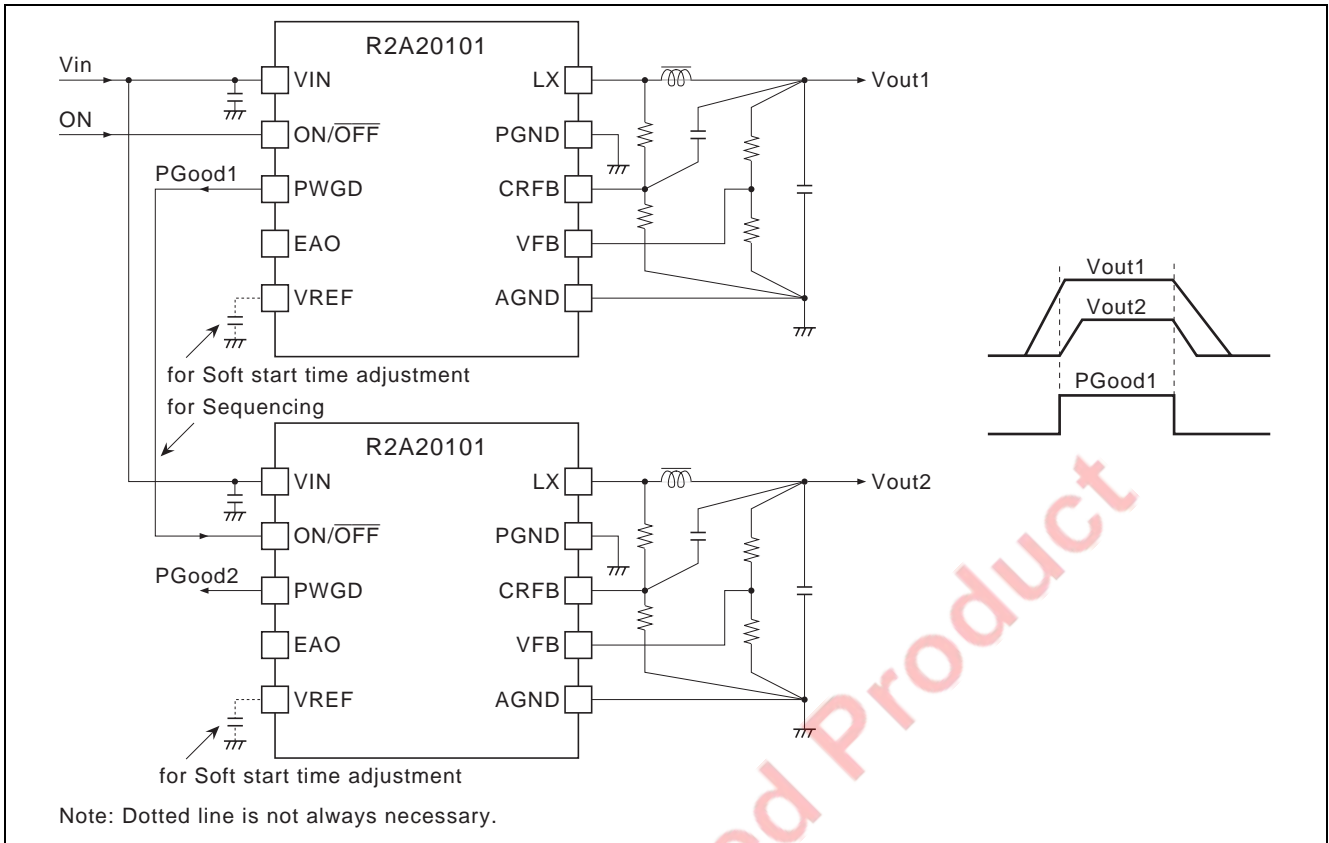
1. Current Share 1 (Redundant, Hot Swap type)



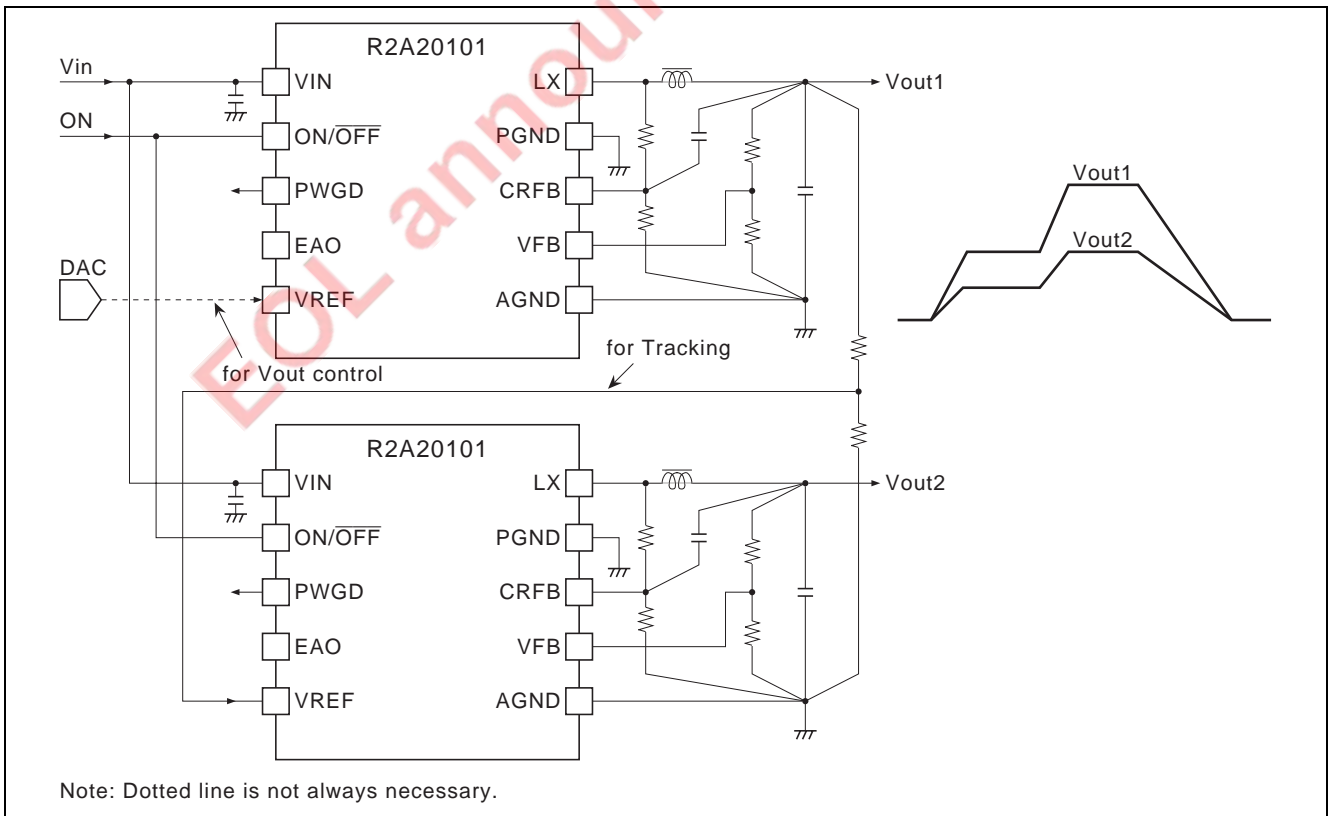
2. Current Share 2 (Accuracy type)



3. Sequential Start-up



4. Tracking



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