

GENERAL DESCRIPTION

The BCT1203S is a step down monolithic regulator with a built-in internal power MOSFET, capable of driving up to 3A continuous output current with excellent line and load regulation. The output voltage can be set from 0.8V to 16V.

Requiring a minimum number of external components, it offers simple to use, but high efficiency and advanced protection features including pulse-by-pulse current limiting and thermal shutdown. Adjustable soft-start reduces the stress on the input source at turn-on and the regulator draws only 20uA in shutdown mode.

BCT1203S is available in a Pb-Free SOIC8 with Exposed Pad package.

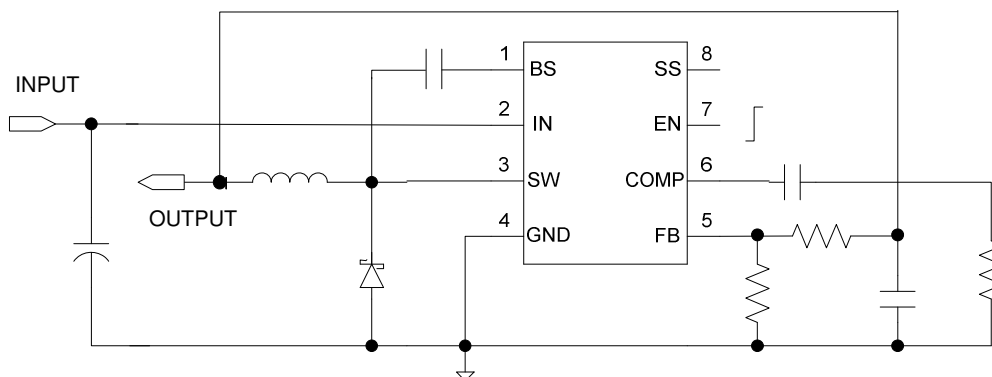
FEATURES

- Wide Vin Range: 4.5 to 20V
- Typical 0.5% Reference Accuracy
- 3A Output Current
- High Efficiency up to 95%
- Output Adjustable from 0.8 to 16V
- 500KHz Fixed Frequency internal oscillator
- 20uA Shutdown Mode
- Pulse-to-Pulse Over Current Protection
- Thermal Shutdown
- Automatic Start-Up when EN floating
- Controllable Soft Start
- Compact SOIC8 with Exposed Pad

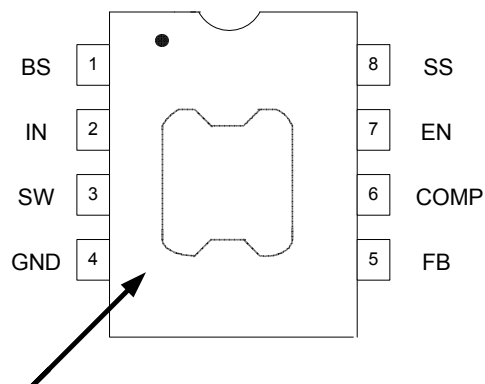
APPLICATIONS

- Simple High Efficiency Step-down
- Flat Panel LCD/PDP TV, Monitor
- Consumer: STB, DVD, VCR
- Car Audio/PMP/Navigation
- Battery Charger
- Pre-Regulator for Linear Regulators

Typical Application



Pin Assignment

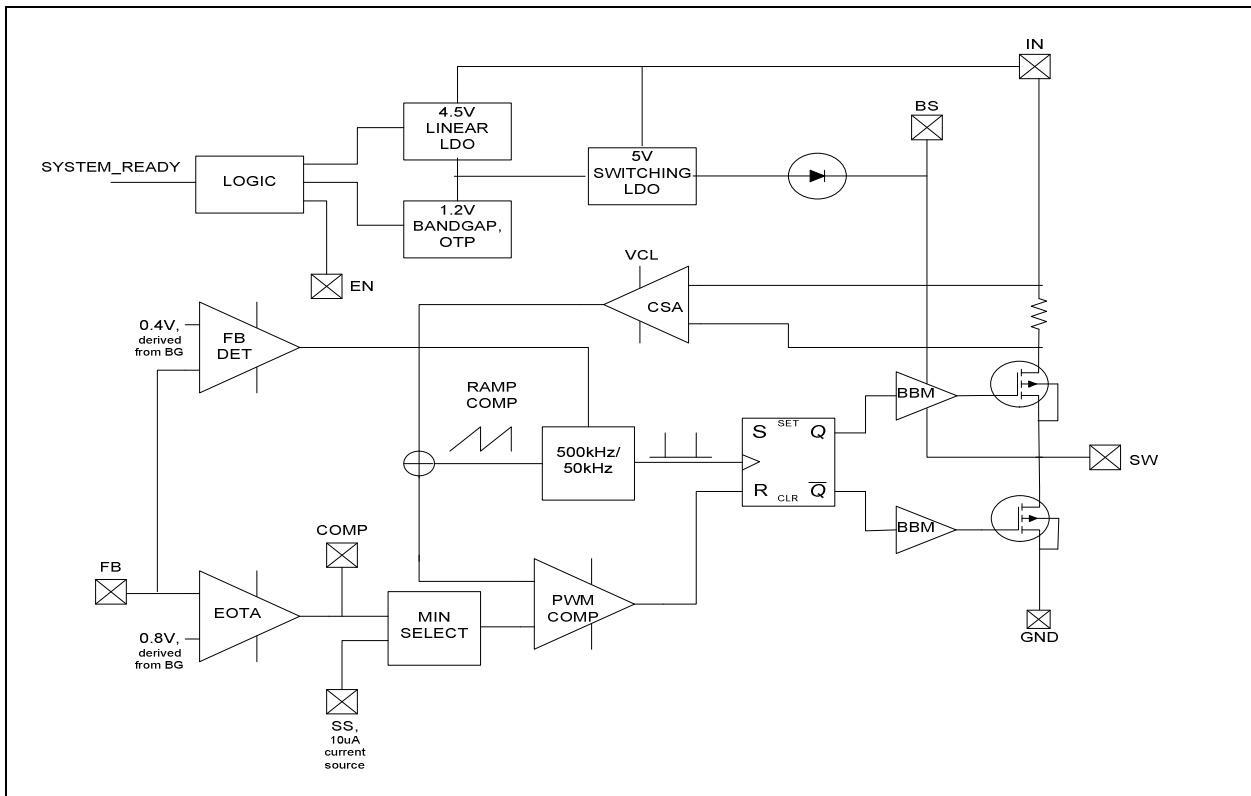


Exposed Pad on
Backside Connect
to GND

Pin Descriptions

Pin #	Pin Name	Description
1	BS	High Side Gate Drive Boost Input
2	IN	Power Input
3	SW	Power Switching Output
4	GND	Ground
5	FB	Feedback Input
6	COMP	Compensation Node
7	EN	Enable Input (H : Step-down Operation, L : All circuits deactivated)
8	SS	Soft Start Control Input

Block Diagram



Absolute Maximum Specifications

Rating	Symbol	Value	Unit
Supply Voltage Range	V_{IN}	-0.3 to 23	Volts
Switch Voltage Range	V_{SW}	-1 to $V_{IN}+0.3$	Volts
Boost Voltage Range	V_{BS}	$V_{sw}-0,3$ to $V_{sw}+6$	Volts
All Other Pins		-0.3 to 6	Volts
Storage Temperature Range	T_{STR}	-65 to 150	$^{\circ}C$
Maximum Operating Junction Temp	T_J	150	$^{\circ}C$
Minimum ESD Rating	C=100pF R=1.5K Ω	2K	Volts

Recommended Operating Ratings

Rating	Symbol	Value	Unit
Supply Voltage Range	V_{IN}	4.5 to 20	Volts
Ambient Operating Temperature	T_{OP}	-40 to 125	$^{\circ}C$
High Temp Storage Life	HTOL @150 $^{\circ}C$	1000	Hours

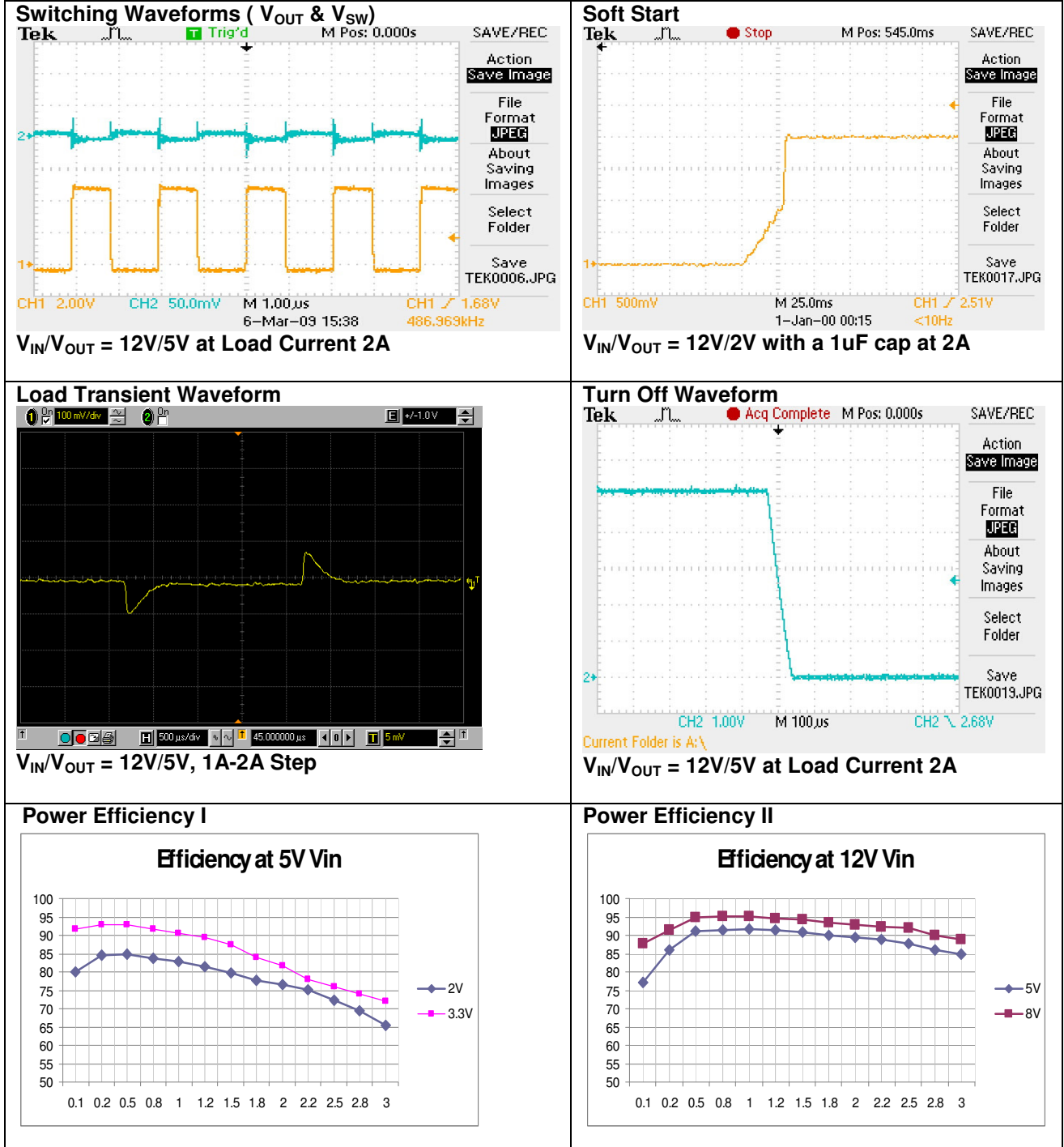
Electrical Specifications

All electrical specifications are specified at $T_{AMBIENT} = 25^{\circ}C$, $V_{IN} = 12V$, unless otherwise specified.

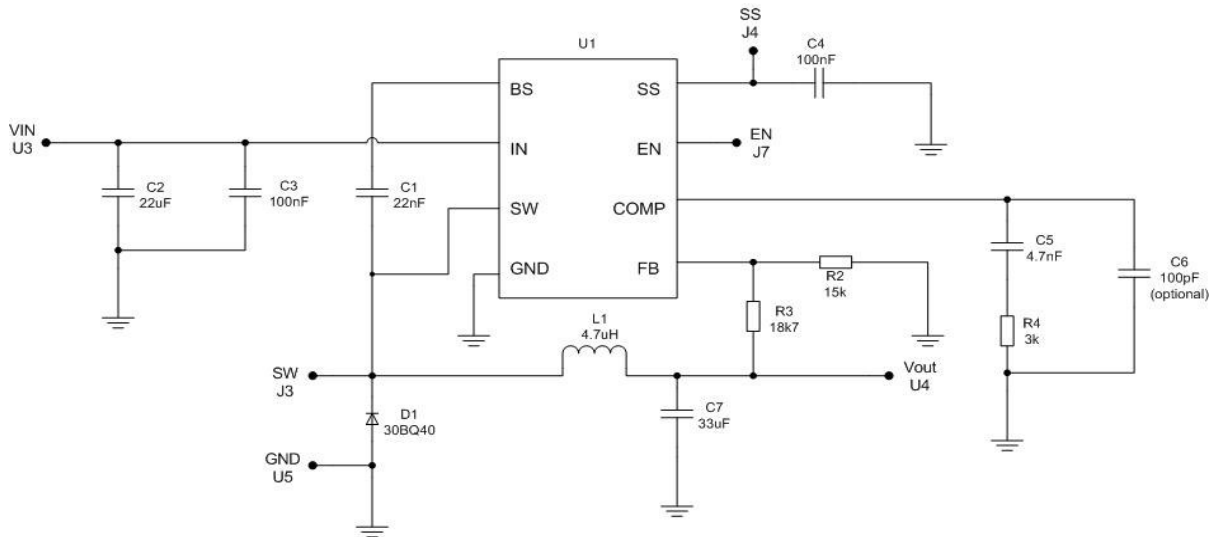
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
	Shutdown Supply Current	$V_{EN}=0V$		20	100	μA
	Supply Current	$V_{EN}=4V$		1.0	1.2	mA
V_{FB}	Feedback Voltage (Simulated over all corners and temperature)	$4.5V \leq V_{IN} \leq 20V$	0.784	0.8	0.816	V
A_{EA}	Error Amplifier Voltage Gain			400		V/V
G_{EA}	Error Amplifier Transconductance			800		$\mu A/V$
$R_{DS(ON)1}$	High Side Switch-On Resistance			150		m Ω
$R_{DS(ON)2}$	Low Side Switch-On Resistance			10		Ω
	High Side Switch Leakage Current	$V_{EN}=0V$, $V_{SW}=0V$		0	10	μA
	Upper Switch Current Limit			4.5		A
G_{CS}	Current Sense to COMP Transconductance			3.8		A/V

F _{OSC1}	Oscillation Frequency			500		KHz
F _{OSC2}	Short Circuit Oscillation Frequency	V _{FB} =0V		50		KHz
D _{MAX}	Maximum Duty Cycle	0.4V < V _{FB} < 0.8V		80		%
D _{MIN}	Minimum Duty Cycle	V _{FB} > 0.8V			0	%
	EN Threshold Voltage			2.8		V
	EN Pull-up Current			4		μA
	Under-Voltage Lockout Threshold	Rising V _{IN}		4.0		V
	Under-Voltage Lockout Threshold Hysteresis			600		mV
	Soft Start Period	C _{SS} =0.1μF		10		mS
	Thermal Shutdown			160		°C

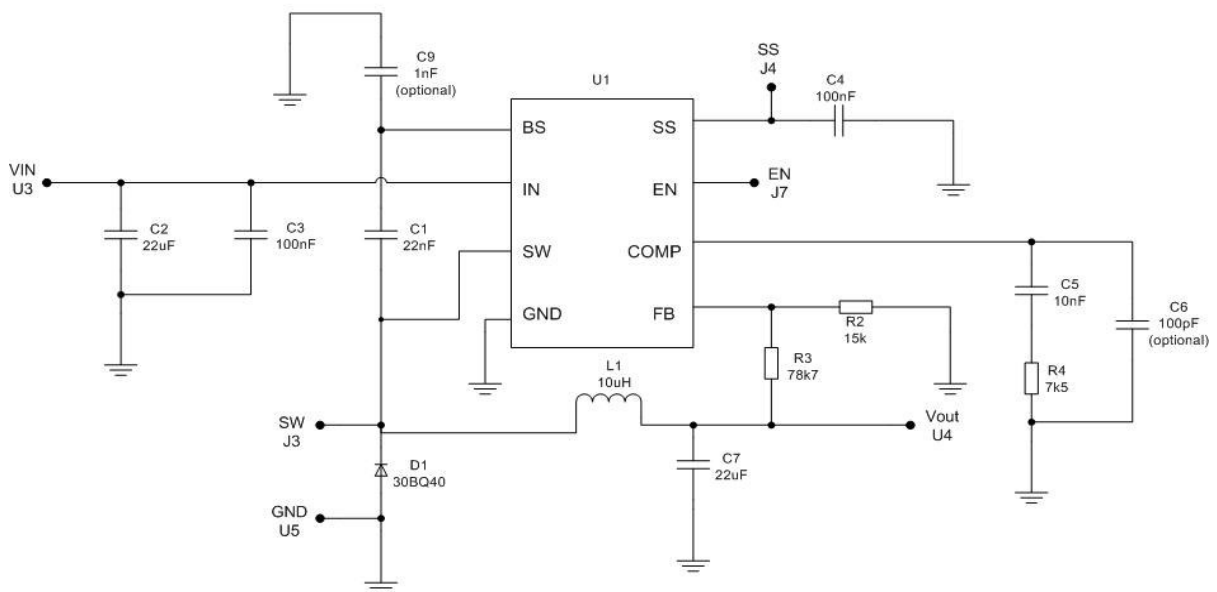
Performance Characteristics



Typical Application Circuits



$$V_{IN} = 5V, V_{OUT} = 1.8V, I_{OUT} = 0A \sim 3A$$



$$V_{IN} = 12V, V_{OUT} = 5V, I_{OUT} = 0A \sim 3A$$

Configuration Table

V _{OUT}	R3	R4	C5	L1
1.8 V	18.7 kΩ	3 kΩ	4.7 nF	4.7 μH
2.5 V	31.6 kΩ	3.9 kΩ	5.6 nF	4.7 – 6.8 μH
3.3 V	46.4 kΩ	5.6 kΩ	8.2 nF	6.8 – 10 μH
5 V	78.7 kΩ	7.5 kΩ	10 nF	10 – 15 μH
12 V	210 kΩ	10 kΩ	3.3 nF	15 – 22 μH

Design Note

1. **The voltage divider network formed by R2 and R3 sets the output voltage regulation point.** It is simply calculated by the equation below:

$$R3 = R2 \times (V_{OUT} - V_{REF}) / V_{REF}$$

Where: V_{REF} = 0.8 V, R2=15K Ohms (Can be 10K ~ 100K ohms)

From this equation the closest standard (E96) resistance values were chosen. V_{OUT} can be further trimmed by adding a resistor across R3. Metal film resistors with 1% or less tolerance are recommended.

2. **For Automatic Start-up, please leave EN pin unconnected.**

The EN pin provides an enabling feature and has the following turn-on/off characteristic:

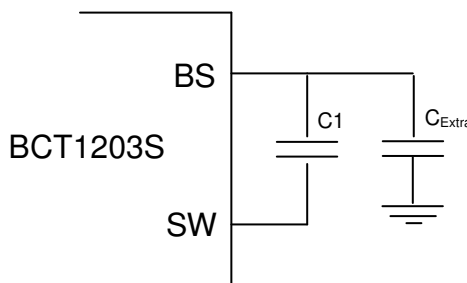
ON Threshold = 2.8 V

OFF Threshold = 0.7 V

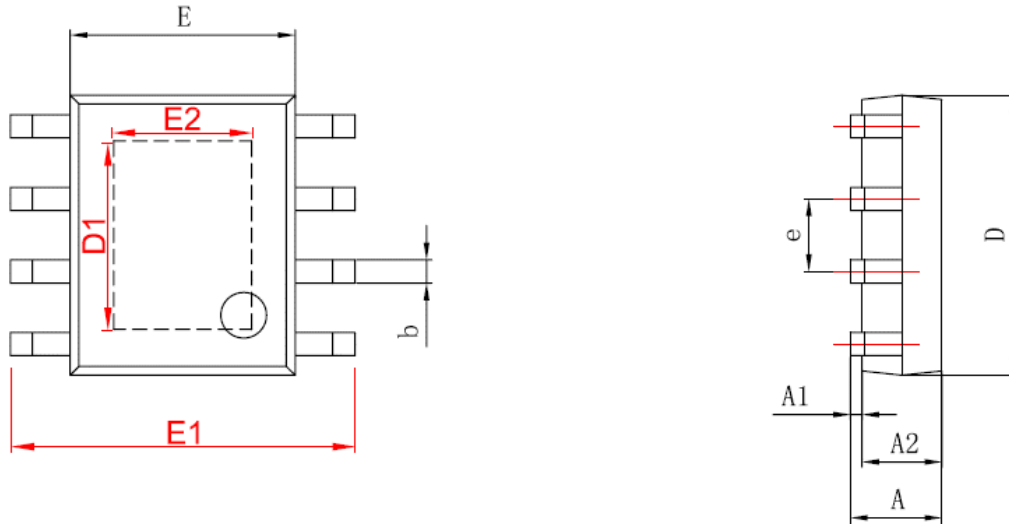
3. **An additional Bootstrap cap is recommended when V_{IN} > 12V & I_{OUT} < 1.5A.**

This tiny 1nF will help to generate high efficiency & ease powering the high side switch.

In most cases,
C1 = 22nF and C_{Extra} = 1nF will assure the reliable stability of Bootstrap voltage level.

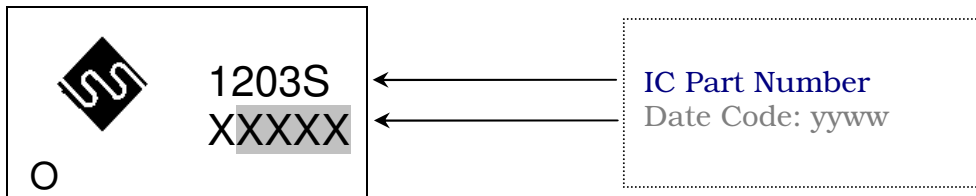


Package Information: SO8 (Exposed Pad)



SYMBOL	MIN (Millimeter)	MAX (Millimeter)
A	1.350	1.750
A1	0.050	0.150
A2	1.350	1.550
b	0.330	0.510
c	0.170	0.250
D	4.700	5.100
D1	3.202	3.402
E	3.800	4.000
E1	5.840	6.240
E2	2.313	2.513
e	1.270 (BSC)	
L	0.400	1.270
θ	0°	8°

Marking Notation



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