FEATURES

- 3.6V to 40V operating input range
  2A output current
- Up to 94% efficiency
- High efficiency (>78%) at light load
- Internal Soft-Start
- Fixed 120kHz Switching frequency
- Input under voltage lockout
- Available in thermally enhanced ESOP8 package
- Start-up current run-away protection
- Short circuit protection
- Thermal protection

APPLICATIONS

- Distributed Power Systems
- Networking Systems
- FPGA, DSP, ASIC Power Supplies
- Green Electronics/ Appliances
- Notebook Computers

DESCRIPTION

The JTM1486. is a current mode monolithic buck switching regulator. Operating with an input range of 3.6-40V, the JTM1486 delivers 2A of continuous output current with two integrated N-Channel MOSFETs. The internal synchronous power switches provide high efficiency without the use of an external Schottky diode. At light loads, regulators operate in low frequency to maintain high efficiency and low output ripple. Current mode control provides tight load transient response and cycle-by-cycle current limit. The JTM1486 guarantees robustness with short-circuit protection, thermal protection, start-up current run-away protection, and input under voltage lockout.

The JTM1486 is available in 8-pin ESOP package, which provides a compact solution with minimal external components. The package has an exposed pad for low thermal resistance.

TYPICAL APPLICATION
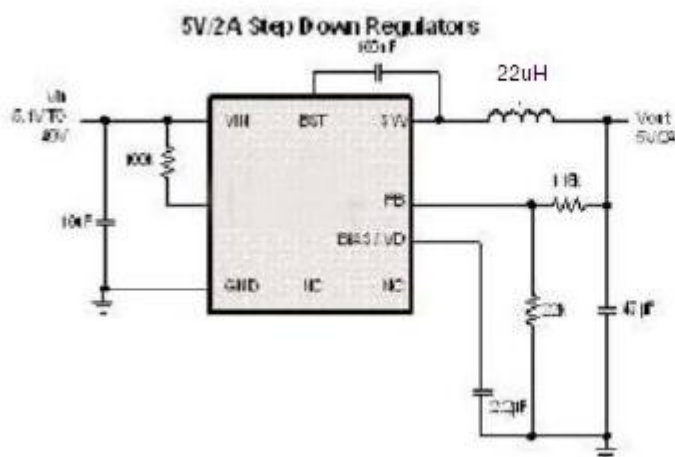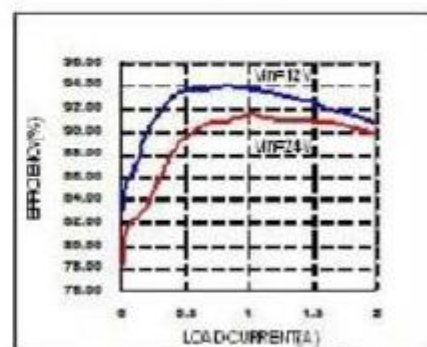
ORDERING INFORMATION

PART MARKING	PACKAGE DESCRIPTION	Top Marking	Package Form
JTM1486	ESOP8	JTM1486 3P059C	Tape and reel packaging: 2500 pieces/tape IC tube: 100 pieces/tube

PIN CONFIGURATION

TOP VIEW

SW1	8 VIN
BST 2	7 EN
BIAS / VD 3	6 NC
FB 4	5 NC

9 GND

ESOP 8
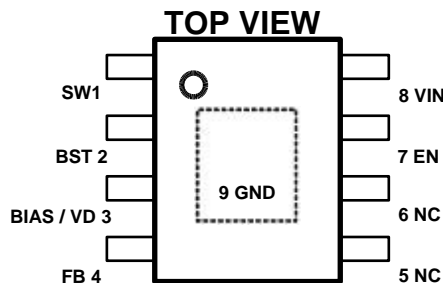
EXPOSED PAD(PIN 9) IS GND,
MUST BE SOLDERED TO PCB

ABSOLUTE MAXIMUM DATING

VIN, EN, SW Pin
.... -0.3V to 40V
BST Pin   .... SW-0.3V to SW+5V
All other pins   .... -0.3V to 6V
Junction Temperature. 125ºC
Lead Temperature .... 260 ºC
Storage Temperature .... －65 ºC to +150 ºC

RECOMMENDED OPERATING RANGE

Input Voltage VIN .... 3.6 to 40V
Output voltage Vout .... 0.8 to 37V
Operating Junction Temperature.... -40 ºC ~80ºC

THERMAL DESISTANCE $\theta_{JA}\theta_{Jc}$

ESOP8 ....50....10..℃/W

NOTE:

1) Exceeding these ratings may damage the device.

2) The JTM1486 guarantees robust performance from -40°C to 150°C junction temperature. The junction temperature range specification is assured by design, characterization and correlation with statistical process controls.

3) The JTM1486 includes thermal protection that is intended to protect the device in overload conditions. Thermal protection is active when junction temperature exceeds the maximum operating junction temperature. Continuous operation over the specified absolute maximum operating junction temperature may damage the device.

4) Measured on JESD51-7, 4-layer PCB.

ELECTRICAL CHARATERISTICS

$V_{IN} = 24V$, $T_A = 25°C$, unless otherwise stated.						
Item	**Symbol**	**Condition**	**Min.**	**Typ.**	**Max.**	**Units**
V_{IN} Undervoltage Lockout Thershold	V_{IN_MIN}	V_{IN} falling		3.6		V
V_{IN} Undervoltage Lockout Hysteresis	$V_{IN\_MIN\_HYST}$	V_{IN} rising		160		mV
Shutdown Supply Current	I_{SD}	V_{EN}=0V		0.07		μA
Supply Current	I_Q	V_{EN}=5V, V_{FB}=1V		74		μA
Feedback Voltage	V_{FB}	3.6V<V_{VIN}<40V		0.8		V
Error Amplifier Transconductance	G_{EA}	V_{comp} = 1.5V		250		uA/V
Maximum COMP Sourcing Current	$I_{COMP\_MAX\_OUT}$	V_{comp} = 1V		25		uA
Maximum COMP Sinking Current	$I_{COMP\_MAX\_IN}$	V_{comp} = 3V		25		uA
Top Switch Resistance	$R_{DS(ON)T}$			126		mΩ
Bottom Switch Resistance	$R_{DS(ON)B}$			63		mΩ
Top Switch Leakage Current	I_{LEAK_TOP}	V_{IN}=40V, V_{EN}=0V, V_{SW}=0V		0.2		uA
Bottom Switch Leakage Current	I_{LEAK_BOT}	V_{IN}= V_{SW} = 40V, V_{EN}=0V		0.7		uA
Top Switch Current Limit	I_{LIM_TOP}	Minimum Duty Cycle		4.5		A
Switch Frequency	F_{SW}	R_{RT} = 180k		120		kHz
Minimum On Time	T_{ON_MIN}			117		ns
Minimum Off Time	T_{OFF_MIN}	V_{FB}=0V		112		ns
EN shut down threshold voltage	V_{EN_TH}	V_{EN} falling, FB=0V		1.2		V
EN shut down hysteresis	V_{EN_HYST}	V_{EN} rising, FB=0V		120		mV
Thermal Shutdown	T_{TSD}			132		°C

PIN DESCRIPTION

SOP8 Pin	Name	Description
1	SW	SW is the switching node that supplies power to the output. Connect the output LC filter from SW to the output load.
2	BST	Bootstrap pin for top switch. A 0.01uF or larger capacitor should be connected between this pin and the SW pin to supply current to the top switch and top switch driver.
3	VD	Output of the internal LDO. A capacitor of 2.2uF or larger should be connected at VD to ground.
4	FB	Output feedback pin. FB senses the output voltage and is regulated by the control loop to 0.8V. Connect a resistive divider at FB.
5	NC	
6	NC	
7	EN	Drive EN pin high to turn on the regulator and low to turn off the regulator.
8	VIN	Input voltage pin. VIN supplies power to the IC. Connect a 3.6V to 40V supply to VIN and bypass VIN to GND with a suitably large capacitor to eliminate noise on the input to the IC.
9	GND	Ground.

BLOCK DIAGRAM
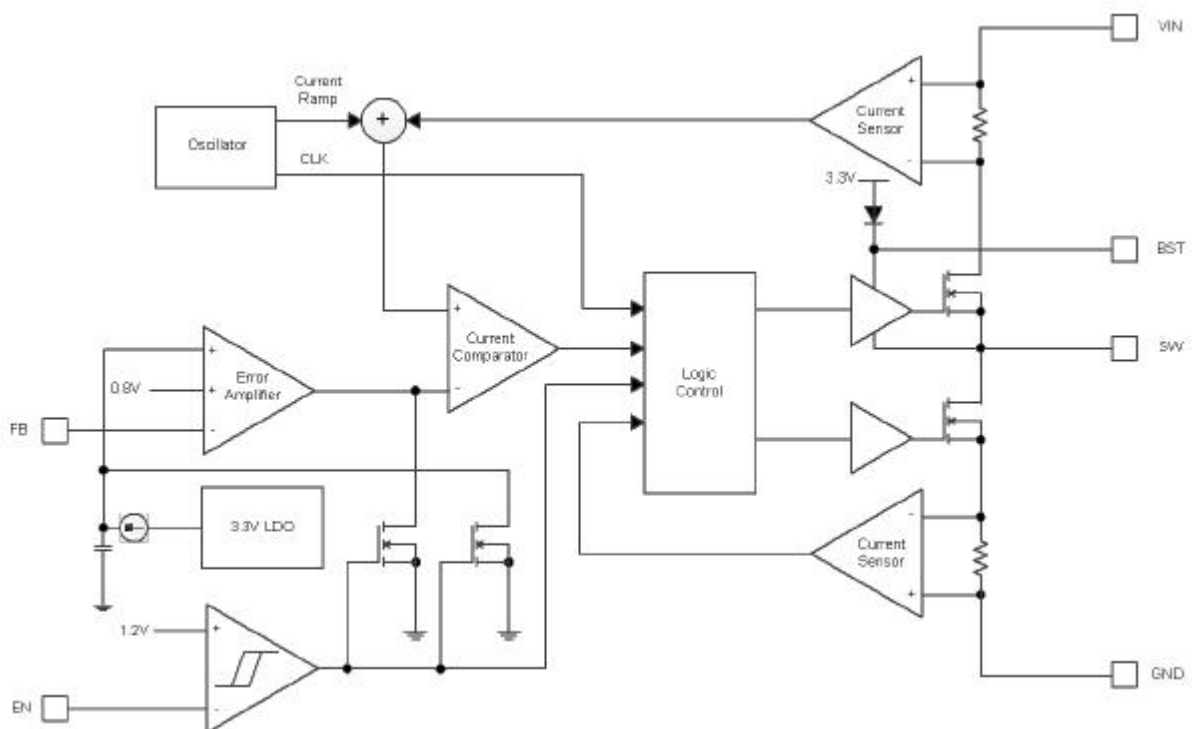
TYPICAL PERFORMANCE CHARACTERISTICS

Vin = 12V, Vo = 5V, L = 10µH, Cout = 10µF, TA = +25°C, unless otherwise noted

Steady State Test

VIN=12V, Vout=5V

Iout=2A,I$_{in}$=0.65A
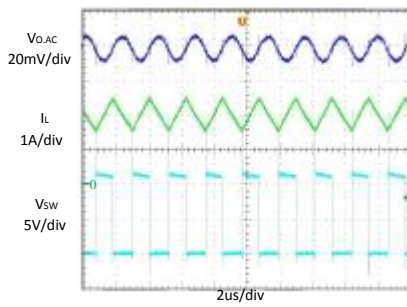
Startup through Enable

VIN=12V, Vout=5V
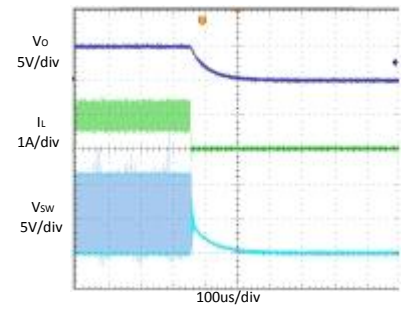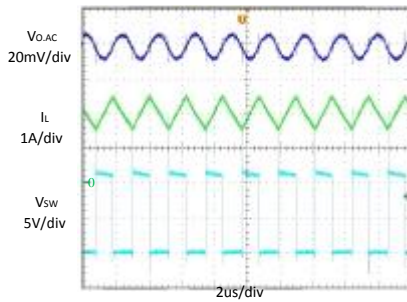
Iout=1A(Resistive load)
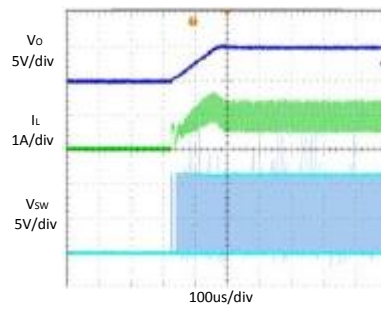
Shutdown through Enable
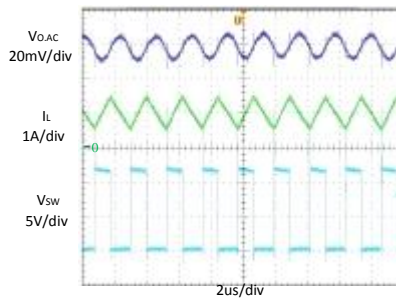
VIN=12V, Vout=5V

Iout=1A(Resistive load)

Heavy Load Operation

2A LOAD

Medium Load Operation
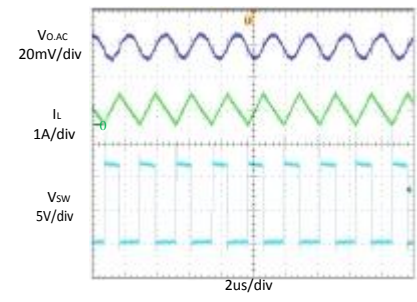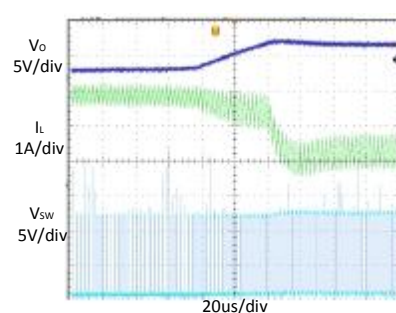
1A LOAD

Light Load Operation

0.3A LOAD

Short Circuit Protection
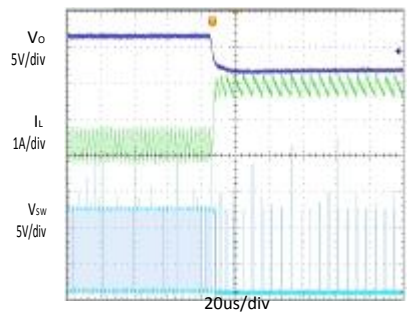
Short Circuit Recovery

Load Transient

1A LOAD → 2A LOAD → 1A LOAD
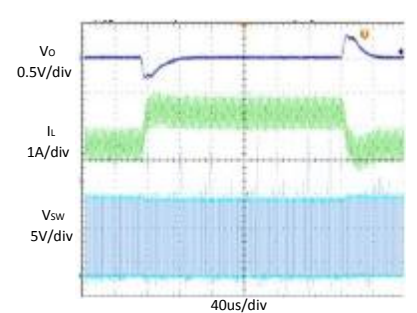
FUNCTIONAL DESCRIPTION

The JTM1486 is a synchronous, current-mode, step-down regulator. It regulates input voltages from 3.6V to 40V down to an output voltage as low as 0.8V, and is capable of supplying up to 2A of load current.

Current-Mode Control

The JTM1486 utilizes current-mode control to regulate the output voltage. The output voltage is measured at the FB pin through a resistive voltage divider and the error is amplified by the internal transconductance error amplifier. COMP pin is output of the internal error amplifier and is compared to the switch current measured internally to control the output current limit.

PFM Mode

The JTM1486 operates in PFM mode at light load. In PFM mode, switch frequency is continuously controlled in proportion to the load current, i.e. switch frequency is decreased when load current drops to boost power efficiency at light load by reducing switch-loss, while switch frequency is increased when load current rises, minimizing both load current and output voltage ripples.

Shut-Down Mode

The JTM1486 operates in shut-down mode when voltage at EN pin is driven below 0.3V. In shut-down mode, the entire regulator is off and the supply current consumed by the JTM1486 drops below 0.1uA.

Power Switch

N-Channel MOSFET switches are integrated on the JTM1486 to down convert the input voltage to the regulated output voltage. Since the top MOSFET needs a gate voltage great than the input voltage, a boost capacitor connected between BST and SW pins is required to drive the gate of the top switch. The boost capacitor is charged by the internal 3.3V rail when SW is low.

Vin Under-Voltage Protection

A resistive divider can be connected between Vin and ground, with the central tap connected to EN, so that when Vin drops to the pre-set value, EN drops below 1.2V to trigger input under voltage lockout protection.

Output Current Run-Away Protection

At start-up, due to the high voltage at input and low voltage at output, current inertia of the output inductance can be easily built up, resulting in a large start-up output current. A valley current limit is designed in the JTM1486 so that only when output current drops below the valley current limit can the bottom power switch be turned off. By such control mechanism, the output current at start-up is well controlled.

Output Short Protection

When output is shorted to ground, output current rapidly reaches its peak current limit and the top power switch is turned off. Right after the top power switch is turned off, the bottom power switch is turned on and stay on until the output current falls below the valley current limit. When output current is below the valley current limit, the top power switch will be turned on again and if the output short is still present, the top power switch is turned off when the peak current limit is reached and the bottom power switch is turned on. This cycle goes on until the output short is removed and the regulator comes into normal operation again.

Thermal Protection

When the temperature of the JTM1486 rises above 132°C , it is forced into thermal shut-down. Only when core temperature drops below 125°C can the regulator becomes active again.
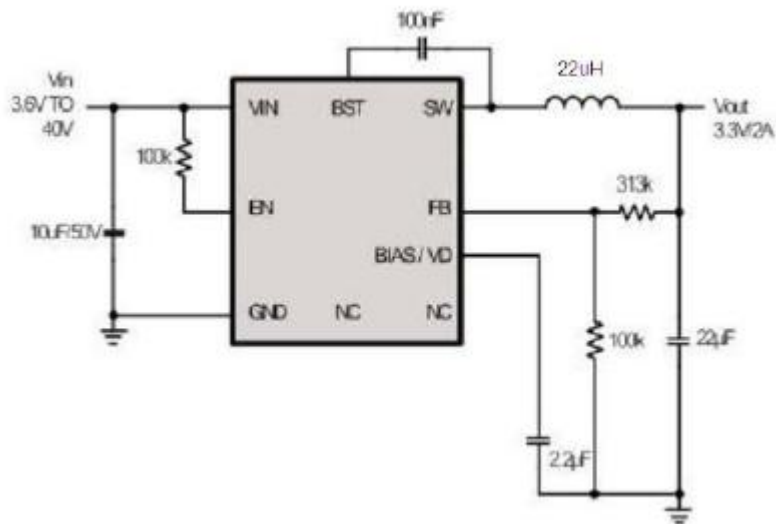
REFFRENCE DESIGN

Reference 1：

V_{IN}:   3.6V ~ 40 V

V_{OUT}: 3.3V

I_{OUT}:   0~2A

Reference 2：

V_{IN}:   5.1V ~ 40 V
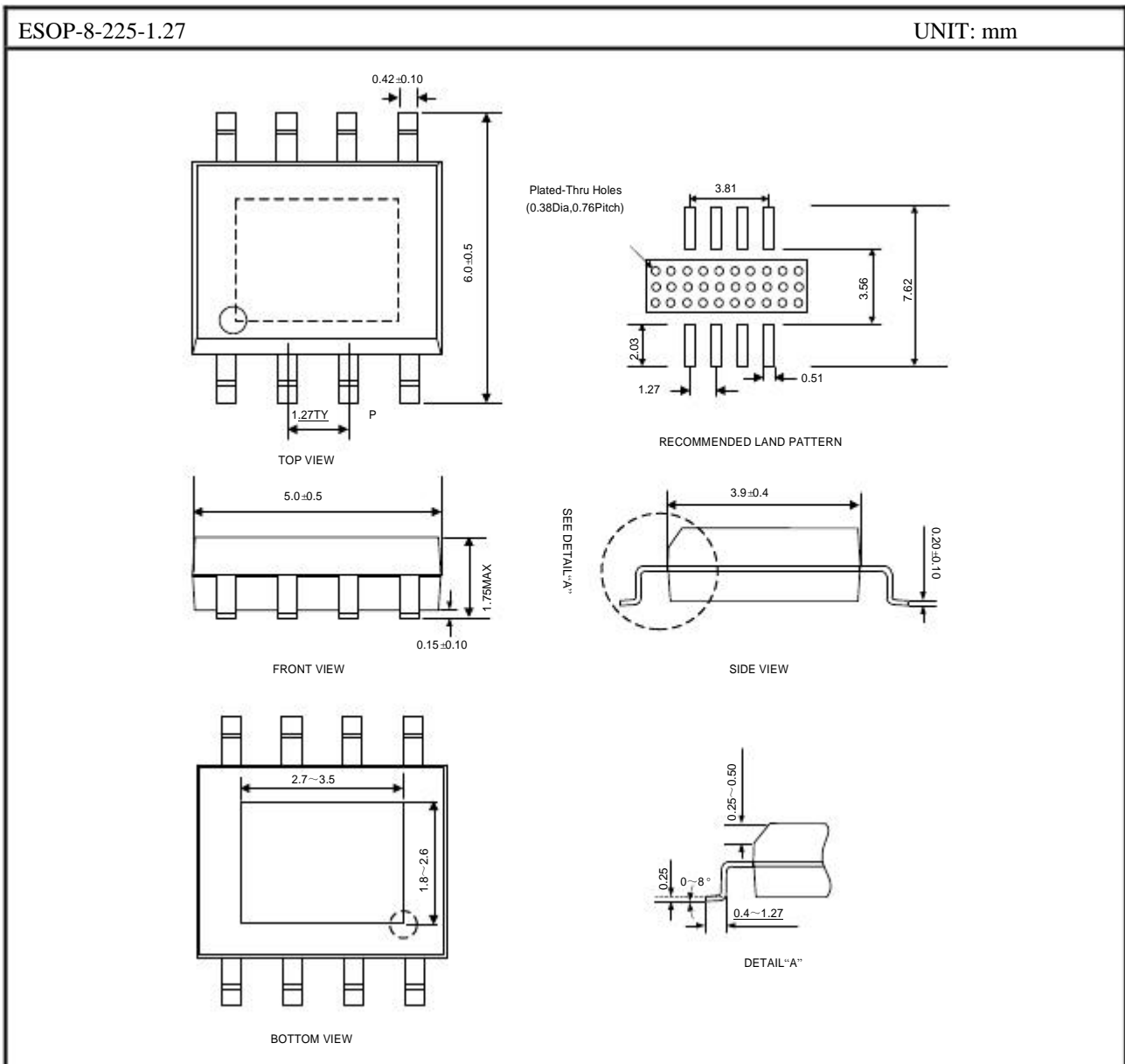
V_{OUT}: 5V

I_{OUT}: 0~2A

PACKAGE OUTLINE

ESOP-8-225-1.27	UNIT: mm

TOP VIEW

FRONT VIEW

BOTTOM VIEW

Plated-Thru Holes
(0.38Dia,0.76Pitch)

RECOMMENDED LAND PATTERN

SEE DETAIL"A"

SIDE VIEW

DETAIL"A"
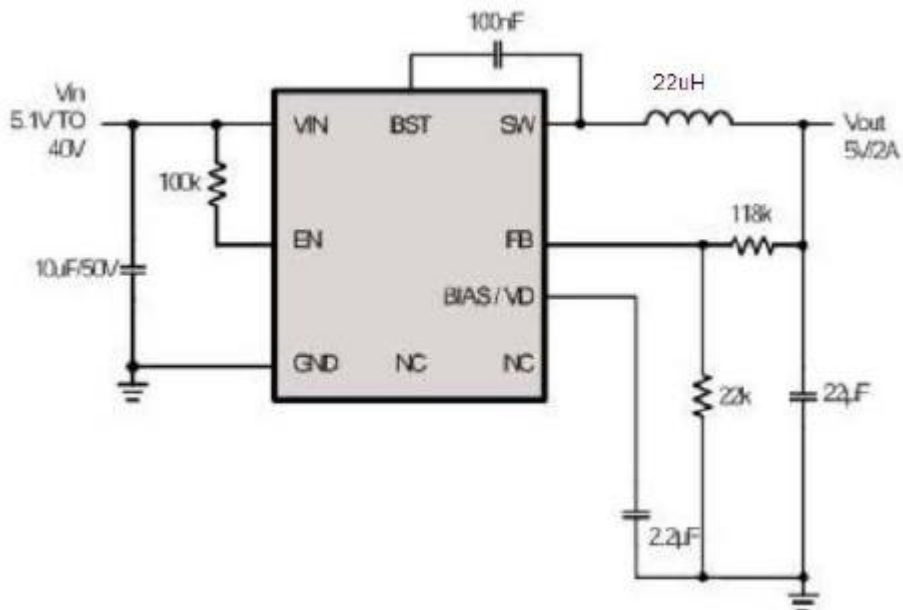
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