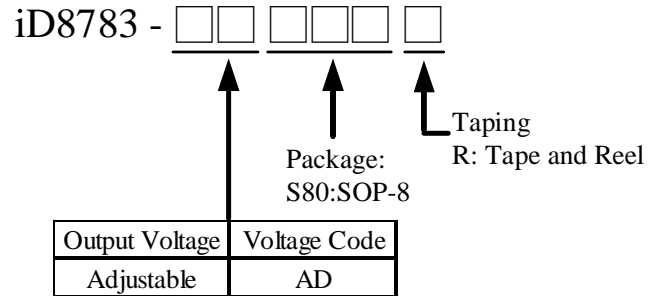


2A, 18V High Efficiency Synchronous Step-Down Converter

General Description

The iD8783 is a wide input range, high-efficiency, DC-to-DC step-down switching regulator, capable of delivering up to 2A of output current. Current mode PWM control allows the use of small external components, such as ceramic input and output caps, as well as small inductors, while still providing low output ripples. On top of the integrated internal synchronous rectifier that eliminates external Schottky diode, iD8783 also employs a proprietary control scheme that switches the device into a power save mode during light load, thereby extending the range of high efficiency operation. Therefore, iD8783 is a much superior solution in comparison to other competitions in terms of efficiency and cost. Overall, iD8783 is a highly efficient and robust solution for DC-DC step-down applications that requires wide input ranges. iD8783 is available SOP8 Packages.

Ordering Information



Applications

- LCD TVs
- Notebook computers
- FPGA power supplies
- LED drivers
- Car Charging Device

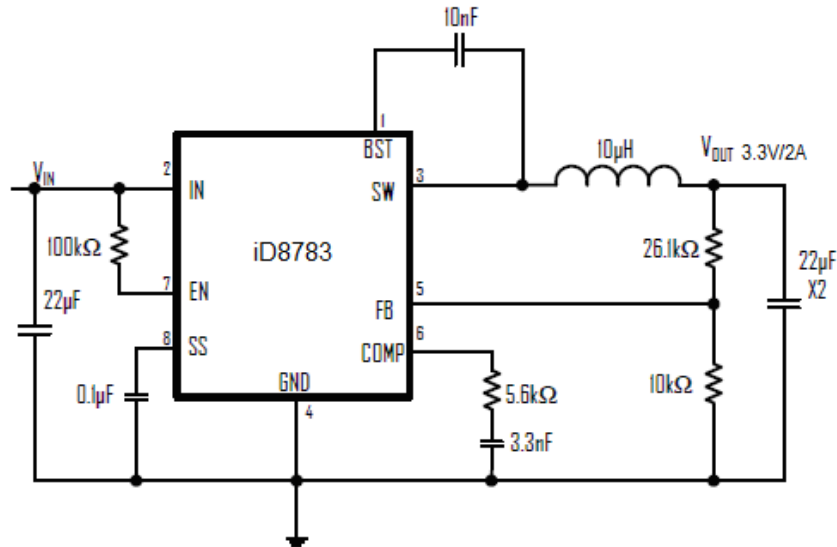
Features

- Wide Input Operating Range from 4.5V to 18V
- High Efficiency:
 - Up to 90% at Light Load
 - Up to 95% at Heavy Load
- Capable of Delivering 2A
- Input OVP at 20V
- No External Schottky Diode Needed
- Current Mode control
- 0.923V Reference for Low Output voltages
- Logic Control Shutdown
- Thermal shutdown and UVLO
- Available in SOP8 Package

Marking Information

For marking information, please contact our sales representative directly or through distributor around your location.

Typical Application Circuit (Adjustable Operation)



Absolute Maximum Ratings (Note 1)

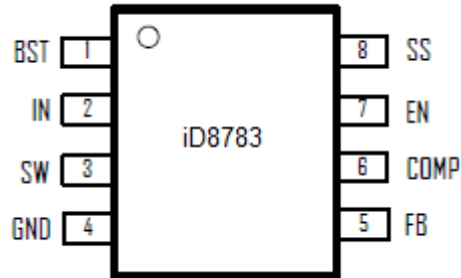
IN Voltage	-0.3V to 20V
SW, EN Voltage	-0.3V to VIN+0.3V
BST Voltage	-0.3V to SW+6V
FB Voltage	-0.3V to 6V
Power Dissipation, P_D @ $T_A=25^\circ\text{C}$	
SOP-8	625mW
Thermal Resistance, θ_{ja}	
SOP-8	160°C/W
Lead Temperature	260°C
Storage Temperature	-65°C to 150°C
ESD Susceptibility	
HBM (Human Body Mode)	2kV
MM (Machine Mode)	200V

Recommended Operating Conditions

Input Voltage V_{IN}	4.5V to 18V
EN Input Voltage	0V to V_{IN}
Junction Temperature	-40°C to 125°C
Ambient Operating Temperature	-40°C to 85°C

Pin Configurations

(Top View)



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Pin Description

	Name	Description
1	BST	Bootstrap pin. Connect a 10nF capacitor from this pin to SW
2	IN	Supply Voltage. Bypass with a 22 μ F ceramic capacitor to GND
3	SW	Inductor Connection. Connect an inductor Between SW and the regulator output.
4	GND	Ground.
5	FB	Feedback Input. Connect an external resistor divider from the output to FB and GND to set VOUT
6	COMP	Regulator Compensation. Connect series RC network to GND.
7	EN	Enable pin for the IC. Drive this pin to high to enable the part, low to disable.
8	SS	Soft start pin. Connect a 0.1 μ F capacitor from this pin to GND

Electrical Characteristics ($V_{IN} = 12V$, unless otherwise specified. Typical values are at $T_A = 25^\circ C$)

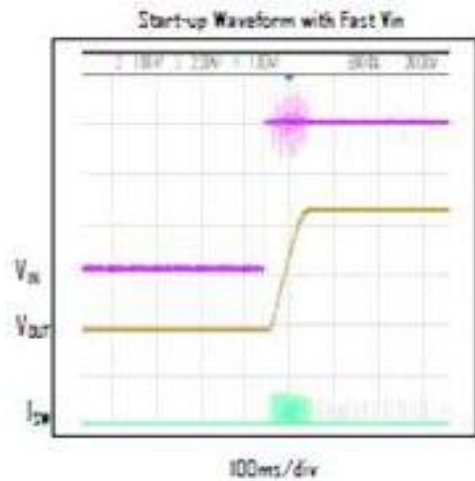
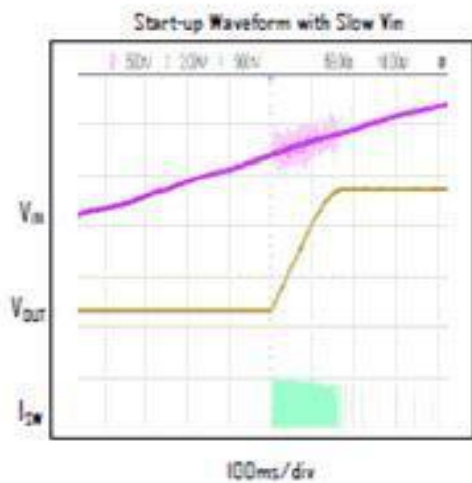
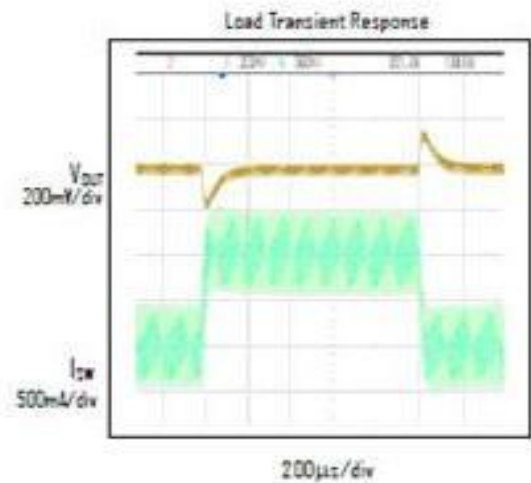
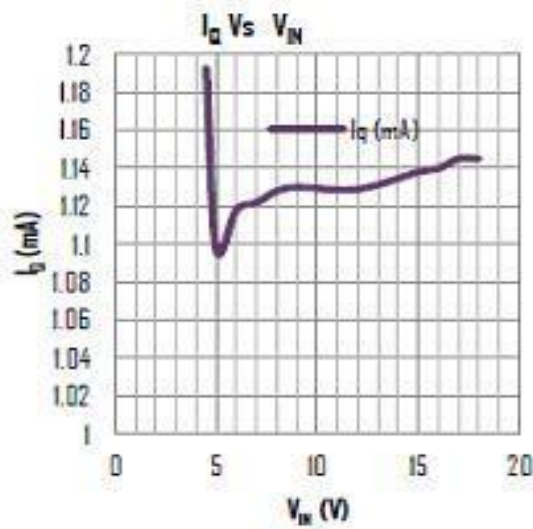
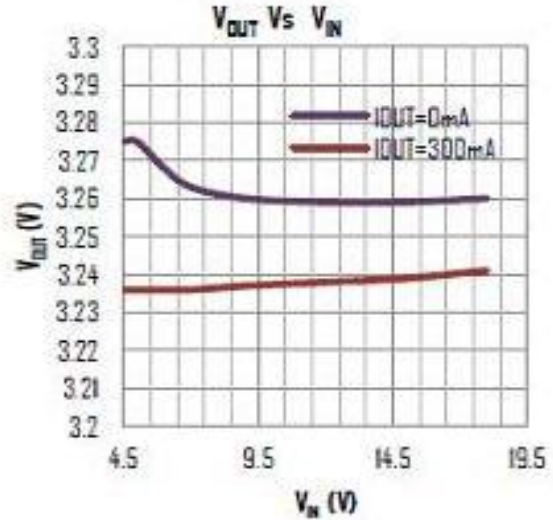
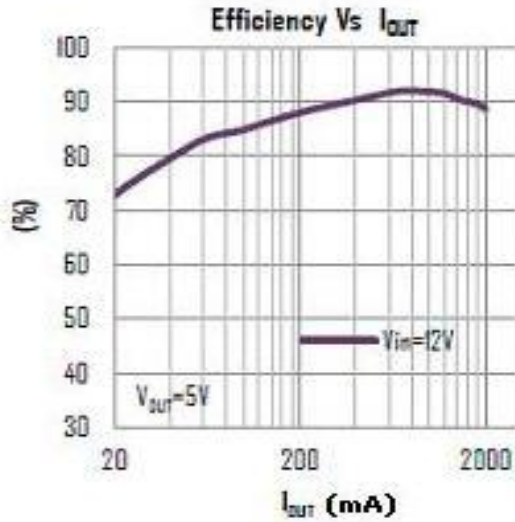
Parameters	Condition	Min	Typ	Max	Units
Input Voltage Range		4.5 <small>Note 2</small>		18	V
Input UVLO	Rising, Hysteresis=100mV		3.55		V
Input Over Voltage Lockout		18.5	20	22	V
Input Supply Current	$V_{FB} = 0.85V$		1		mA
Input Shutdown Current			6		μA
FB Feedback Voltage		0.904	0.923	0.942	V
FB Input Current			0.01		μA
Error Amp Transconductance			800		μS
Current Sense Transresistance			0.2		Ω
Switching Frequency			340		kHz
High side Switch On Resistance	$I_{SW} = 200mA$		130		m Ω
Low side Switch On Resistance	$I_{SW} = 200mA$		110		m Ω
High side Switch Current Limit		2.5	3		A
SW Leakage Current	$V_{IN} = 12V, V_{SW} = 0$ or $12V, EN = GND$			10	μA
EN Input Current				1	μA
EN Input Low Voltage		1			V
EN Input High Voltage				3	V
Thermal Shutdown	Hysteresis=40 $^\circ C$		150		$^\circ C$

Note 1: Stresses listed as the above "Absolute Maximum Ratings" may cause permanent damage to the device. These are for stress ratings. Functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may remain possibility to affect device reliability.

Note 2: When $V_{IN} = 4.5V$, $V_{OUT} = 3.3V$, maximum load current is about 0.5A.

Typical Operating Characteristics

(Typical values are at $T_A = 25^\circ\text{C}$ otherwise specified)



Applications Information

FUNCTION DESCRIPTION

Loop Operation

The iD8783 is a wide input range, high-efficiency, DC-to-DC step-down switching regulator, capable of delivering up to 2A of output current, integrated with a 130m Ω synchronous MOSFET, eliminating the need for external diode. It uses a PWM current-mode control scheme. An error amplifier integrates error between the FB signal and the internal reference voltage.

The output of the integrator is then compared to the sum of a current-sense signal and the slope compensation ramp. This operation generates a PWM signal that modulates the duty cycle of the power MOSFETs to achieve regulation for output voltage.

Current Limit

There is a cycle-by-cycle current limit on the high-side MOSFET of 3A (typ). When the current flowing out of SW exceeds this limit, the high-side MOSFET turns off and the synchronous rectifier turns on. Unlike the traditional method of current limiting by limiting the voltage at the compensation pin, which usually has large variation due to duty cycle variance, this type of peak current limiting scheme provides a relatively more accurate limit for output current, thereby lowering the requirements for system design.

Light Load Operation

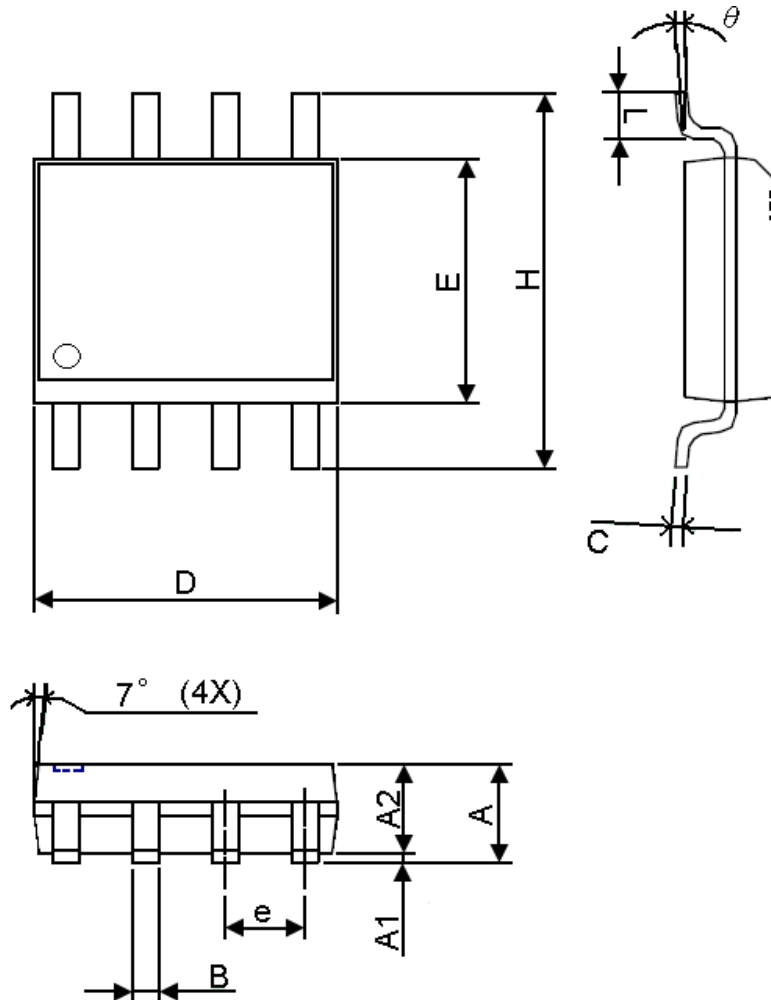
Traditionally, a fixed constant frequency PWM DC-DC regulator always switches even when the output load is small. When energy is shuffling back and forth through the power MOSFETs, power is lost due to the finite RDSONs of the MOSFETs and parasitic capacitances. At light load, this loss is prominent and efficiency is therefore very low. iD8783 employs a proprietary control scheme that improves efficiency in this situation by enabling the device into a power save mode during light load, thereby extending the range of high efficiency operation.

Components Selection

V_{OUT} (V)	C_{OUT} (μ F)	L (μ H)
8	22x2	22
5	22x2	15
3.3	22x2	10
2.5	22x2	6.8
1.8	22x2	4.7
1.2	22x2	3.3

Packaging

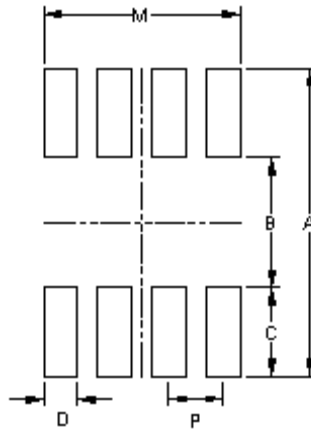
SOP-8



SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.35	1.60	1.75	0.053	0.063	0.069
A1	0.10	---	0.25	0.004	---	0.010
A2	---	1.45	---	---	0.057	---
B	0.33	---	0.51	0.013	---	0.020
C	0.19	---	0.25	0.007	---	0.010
D	4.80	---	5.00	0.189	---	0.197
E	3.80	---	4.00	0.150	---	0.157
e	---	1.27	---	---	0.050	---
H	5.80	---	6.20	0.228	---	0.244
L	0.40	---	1.27	0.016	---	0.050
y	---	---	0.10	---	---	0.004
θ	0°	---	8°	0°	---	8°

Footprints

SOP-8



Package	Number of Pin	Footprint Dimension (mm)								Tolerance
		P	A	B	C	D	Sx	Sy	M	
SOP-8	8	1.27	6.80	4.20	1.30	0.70	--	--	4.51	±0.10