



## UC8383

CMOS IC

### STEP-UP DC/DC CONVERTER

#### DESCRIPTION

The UTC **UC8383** is a high efficiency VFM controlled step-up DC/DC converter. The UTC **UC8383** is designed to have low start up voltage and low quiescent current: The UTC **UC8383** can realize the conversion from the input voltage to the selected output voltage (2.5V ~ 5.0V) only using an inductor, a diode and an output capacitor.

Its typical applications include: cellular telephones, pagers, video camera, PDA and hand held instruments, palmtop, notebook computer, portable equipment and battery powered equipment.

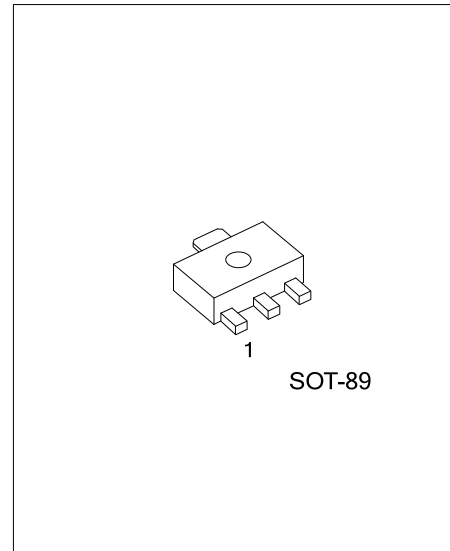
#### FEATURES

- \* 0.8V Start-Up Voltage
- \* Low Supply Current of Typical be18 $\mu$ A
- \* Wide Output Voltage Range of 2.5V~5.0V
- \* Output Voltage Accuracy  $\pm$ 2%
- \* Output Current Up to 100mA
- \* Low Ripple and Low Noise
- \* High Efficiency Up to 85%
- \* Low Profile and Minimum External Components

#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UC8383L-xx-AB3-R	UC8383G-xx-AB3-R	SOT-89	V <sub>SS</sub>	V <sub>OUT</sub>	L <sub>X</sub>	Tape Reel

<p>UC8383L-xx-AB3-R</p>	<p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Voltage Code</p> <p>(4)Lead Free</p>	<p>(1) R: Tape Reel</p> <p>(2) AB3: SOT-89</p> <p>(3) xx: refer to Marking Information</p> <p>(4) G: Halogen Free, L: Lead Free</p>
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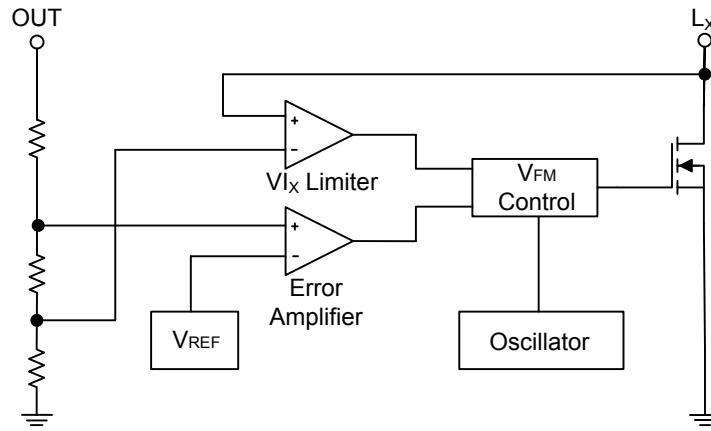
■ MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
SOT-89	25:2.5V 27:2.7V 28:2.8V 30:3.0V 33:3.3V 36:3.6V 50:5.0V	

■ PIN DESCRIPTION

PIN NO	PIN NAME	DESCRIPTION
1	V <sub>SS</sub>	GND.
2	V <sub>OUT</sub>	Output voltage monitor, IC internal supply voltage
3	L <sub>x</sub>	Switch pin

■ BLOCK DIAGRAM



### ■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Output Voltage	$V_{OUT}$	5.5	V
Input Voltage	$V_{IN}$	5.5	V
LX Pin Voltage	$V_{LX}$	5.5	V
LX Pin Output Current	$I_{LX}$	Internally limited	
Power Dissipation ( $T_a=25^\circ\text{C}$ )	$P_D$	170	mW
Derating Rate over $T_a=25^\circ\text{C}$		1.7	$^\circ\text{C}/\text{mW}$
Operating Junction Temperature	$T_J$	-25 ~ +85	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-55 ~ +125	$^\circ\text{C}$

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

### ■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Case	$\theta_{JC}$	17	$^\circ\text{C}/\text{W}$

### ■ ELECTRICAL CHARACTERISTICS ( $I_{OUT} = 10\text{mA}$ , $T_a = 25^\circ\text{C}$ , unless otherwise specified.)

#### UC8383-2.5V ( $V_{IN} = 1.5\text{V}$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$		2.45	2.5	2.55	V
Start-up Voltage ( $V_{IN}-V_F$ ) (Note 1)	$V_{START}$	$I_{OUT} = 1\text{mA}$		0.8	1.2	V
Hold-on Voltage	$V_{HOLD}$	$I_{OUT} = 1\text{mA}$	0.6			V
Supply Current	$I_{SUPPLY}$	$I_{OUT} = 0$		18		$\mu\text{A}$
Internal Switch $R_{DS(ON)}$	$R_{LX}$	$I_{LX} = 150\text{mA}$		850		$\text{m}\Omega$
Internal Leakage Current	$I_{LX(LEAK)}$	$V_{LX} = 4\text{V}$ , $V_{OUT} = 3\text{V}$			0.5	$\mu\text{A}$
Maximum Oscillator Frequency	$f_{OSC}$			120		KHz
Oscillator Duty Cycle	$D_{ty}$			80		%
Efficiency	$\eta$	$I_{OUT} = 50\text{mA}$		82		%

#### UC8383-2.7V ( $V_{IN} = 1.6\text{V}$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$		2.646	2.7	2.754	V
Start-up Voltage ( $V_{IN}-V_F$ ) (Note)	$V_{START}$	$I_{OUT} = 1\text{mA}$		0.8	1.2	V
Hold-on Voltage	$V_{HOLD}$	$I_{OUT} = 1\text{mA}$	0.6			V
Supply Current	$I_{SUPPLY}$	$I_{OUT} = 0$		18		$\mu\text{A}$
Internal Switch $R_{DS(ON)}$	$R_{LX}$	$I_{LX} = 150\text{mA}$		850		$\text{m}\Omega$
Internal Leakage Current	$I_{LX(LEAK)}$	$V_{LX} = 4\text{V}$ , $V_{OUT} = 3.3\text{V}$			0.5	$\mu\text{A}$
Maximum Oscillator Frequency	$f_{OSC}$			120		KHz
Oscillator Duty Cycle	$D_{ty}$			80		%
Efficiency	$\eta$	$I_{OUT} = 50\text{mA}$		82		%

#### UC8383-2.8V ( $V_{IN} = 1.7\text{V}$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$		2.744	2.8	2.856	V
Start-up Voltage ( $V_{IN}-V_F$ ) (Note)	$V_{START}$	$I_{OUT} = 1\text{mA}$		0.8	1.2	V
Hold-on Voltage	$V_{HOLD}$	$I_{OUT} = 1\text{mA}$	0.6			V
Supply Current	$I_{SUPPLY}$	$I_{OUT} = 0$		18		$\mu\text{A}$
Internal Switch $R_{DS(ON)}$	$R_{LX}$	$I_{LX} = 150\text{mA}$		850		$\text{m}\Omega$
Internal Leakage Current	$I_{LX(LEAK)}$	$V_{LX} = 4\text{V}$ , $V_{OUT} = 3.3\text{V}$			0.5	$\mu\text{A}$
Maximum Oscillator Frequency	$f_{OSC}$			120		KHz
Oscillator Duty Cycle	$D_{ty}$			80		%
Efficiency	$\eta$	$I_{OUT} = 50\text{mA}$		82		%

■ ELECTRICAL CHARACTERISTICS(Cont.)

**UC8383-3.0V** ( $V_{IN} = 1.8V$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$		2.94	3	3.06	V
Start-up Voltage ( $V_{IN}-V_F$ ) (Note)	$V_{START}$	$I_{OUT} = 1mA$		0.8	1.2	V
Hold-on Voltage	$V_{HOLD}$	$I_{OUT} = 1mA$	0.6			V
Supply Current	$I_{SUPPLY}$	$I_{OUT} = 0$		18		$\mu A$
Internal Switch $R_{DS(ON)}$	$R_{LX}$	$I_{LX} = 150mA$		850		$m\Omega$
Internal Leakage Current	$I_{LX(LEAK)}$	$V_{LX} = 4V, V_{OUT} = 3.5V$		0.1	0.5	$\mu A$
Maximum Oscillator Frequency	$f_{OSC}$			120		KHz
Oscillator Duty Cycle	$D_{ty}$			80		%
Efficiency	$\eta$	$I_{OUT} = 50mA$		82		%

**UC83830-3.3V** ( $V_{IN} = 2V$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$		3.234	3.3	3.366	V
Start-up Voltage ( $V_{IN}-V_F$ ) (Note)	$V_{START}$	$I_{OUT} = 1mA$		0.8	1.2	V
Hold-on Voltage	$V_{HOLD}$	$I_{OUT} = 1mA$	0.6			V
Supply Current	$I_{SUPPLY}$	$I_{OUT} = 0$		18		$\mu A$
Internal Switch $R_{DS(ON)}$	$R_{LX}$	$I_{LX} = 150mA$		850		$m\Omega$
Internal Leakage Current	$I_{LX(LEAK)}$	$V_{LX} = 4V, V_{OUT} = 3.8V$			0.5	$\mu A$
Maximum Oscillator Frequency	$f_{OSC}$			120		KHz
Oscillator Duty Cycle	$D_{ty}$			80		%
Efficiency	$\eta$	$I_{OUT} = 50mA$		84		%

**UC83830-3.6V** ( $V_{IN} = 2V$ )

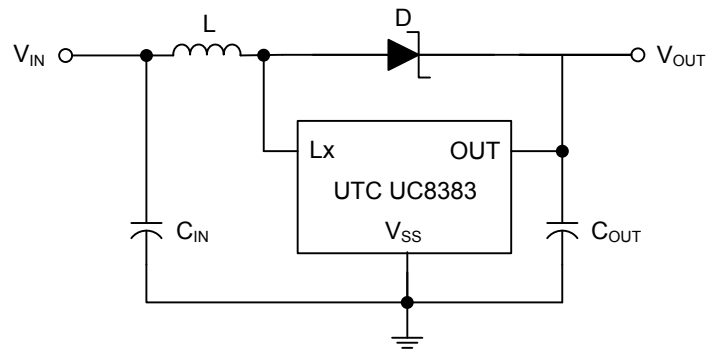
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$		3.528	3.6	3.672	V
Start-up Voltage ( $V_{IN}-V_F$ ) (Note)	$V_{START}$	$I_{OUT} = 1mA$		0.8	1.2	V
Hold-on Voltage	$V_{HOLD}$	$I_{OUT} = 1mA$	0.6			V
Supply Current	$I_{SUPPLY}$	$I_{OUT} = 0$		18		$\mu A$
Internal Switch $R_{DS(ON)}$	$R_{LX}$	$I_{LX} = 150mA$		850		$m\Omega$
Internal Leakage Current	$I_{LX(LEAK)}$	$V_{LX} = 4V, V_{OUT} = 3.8V$			0.5	$\mu A$
Maximum Oscillator Frequency	$f_{OSC}$			120		KHz
Oscillator Duty Cycle	$D_{ty}$			80		%
Efficiency	$\eta$	$I_{OUT} = 50mA$		84		%

**UC83830-5.0V** ( $V_{IN} = 3V$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$		4.9	5.0	5.1	V
Start-up Voltage ( $V_{IN}-V_F$ ) (Note)	$V_{START}$	$I_{OUT} = 1mA$		0.8	1.2	V
Hold-on Voltage	$V_{HOLD}$	$I_{OUT} = 1mA$	0.6			V
Supply Current	$I_{SUPPLY}$	$I_{OUT} = 0$		18		$\mu A$
Internal Switch $R_{DS(ON)}$	$R_{LX}$	$I_{LX} = 150mA$		700		$m\Omega$
Internal Leakage Current	$I_{LX(LEAK)}$	$V_{LX} = 4V, V_{OUT} = 5.5V$		0.1	0.5	$\mu A$
Maximum Oscillator Frequency	$f_{OSC}$			120		KHz
Oscillator Duty Cycle	$D_{ty}$			80		%
Efficiency	$\eta$	$I_{OUT} = 50mA$		85		%

Note: The minimum value of the device start-up voltage is strictly a function of the forward voltage ( $V_F$ ) of the diode.

## ■ TYPICAL APPLICATION

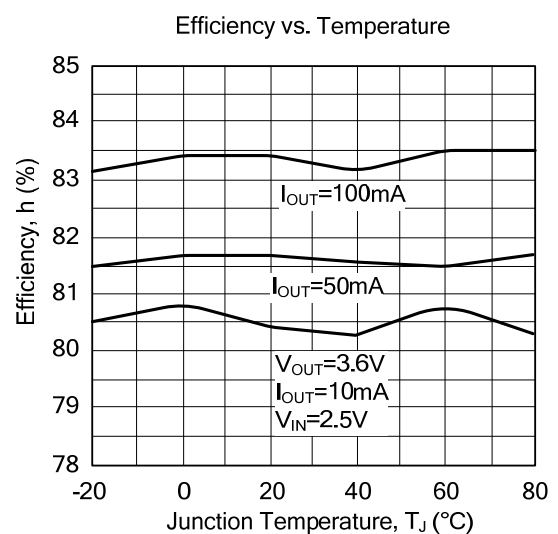
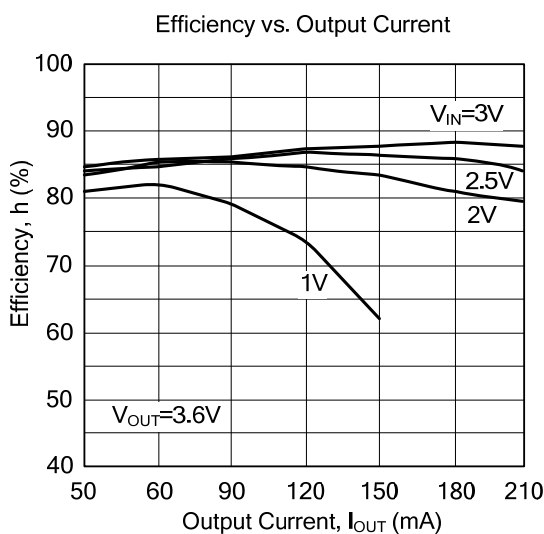
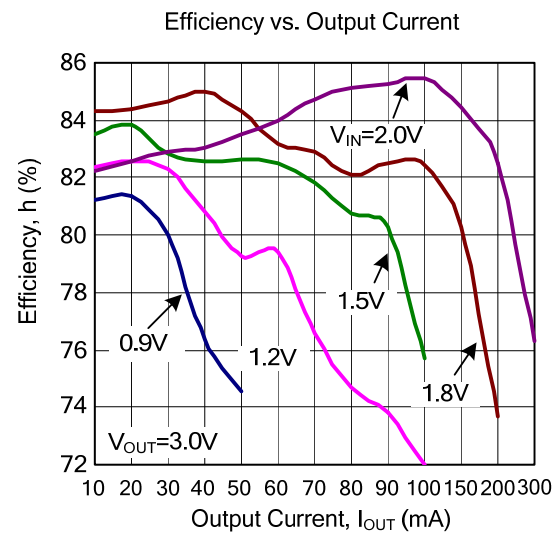
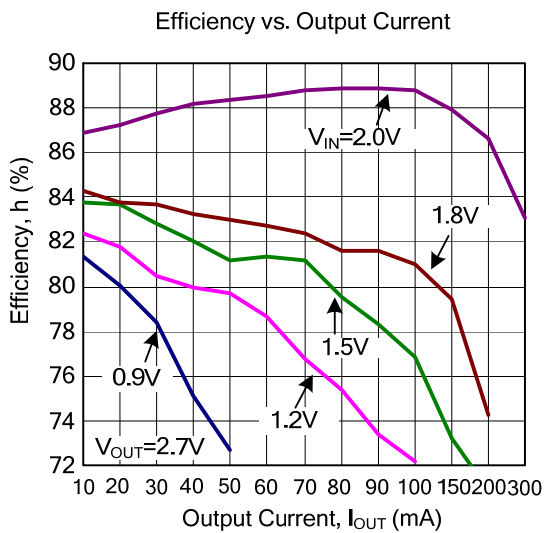
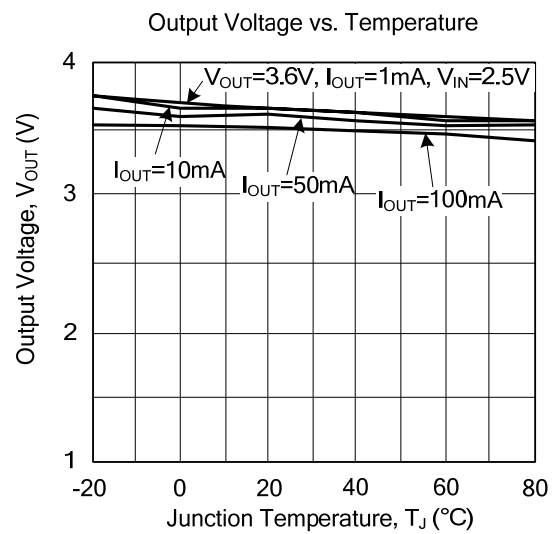
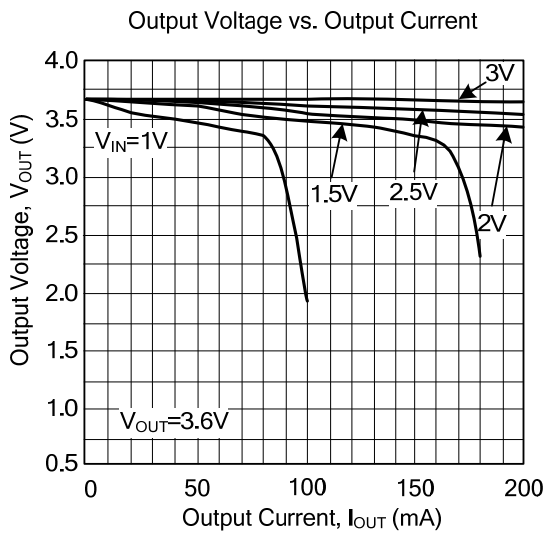


Application Circuit

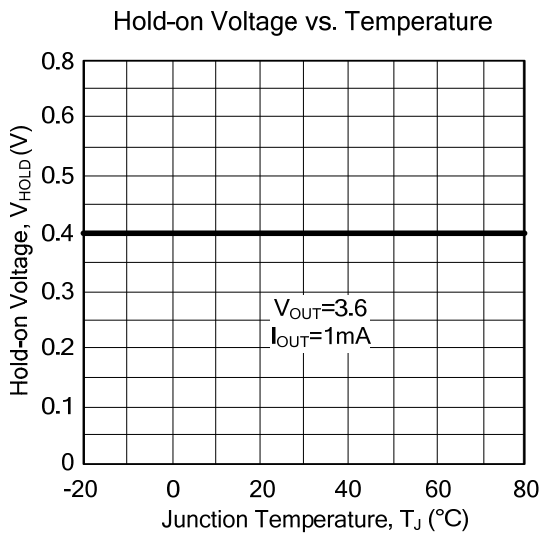
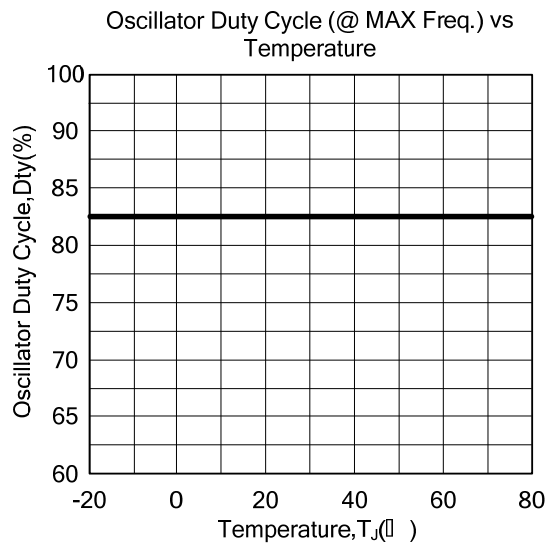
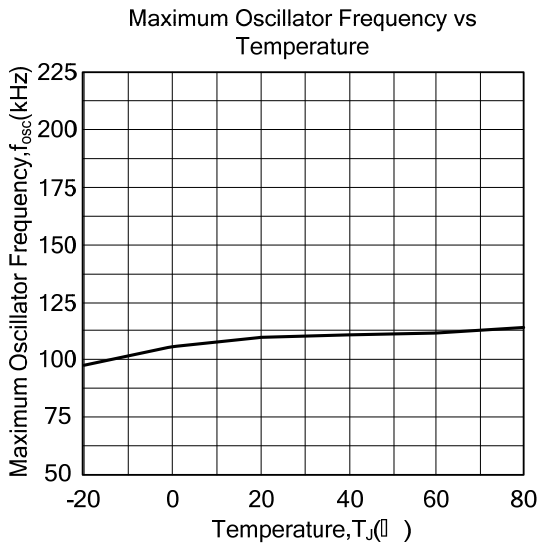
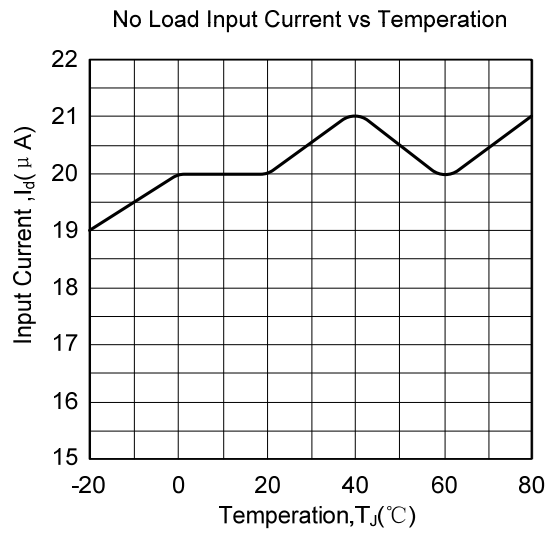
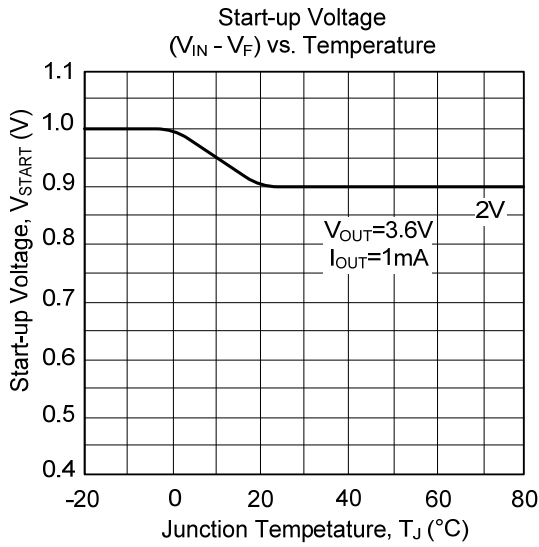
## Application Circuit Notes:

1. The inductors: an inductor value of  $47\mu\text{H}$  performs well in this application.
2. The diode: an high switching speed and low forward voltage diode.
3. The input capacitor: A value of  $4.7\mu\text{F}$  tantalum capacitor is enough to guarantee stability.
4. The output capacitor: The best choice for the value of the output capacitance is  $47\mu\text{F}$  tantalum capacitor. And the capacitance value should be in the range of about  $10\mu\text{F}$ - $100\mu\text{F}$ .

■ TYPICAL CHARACTERISTICS



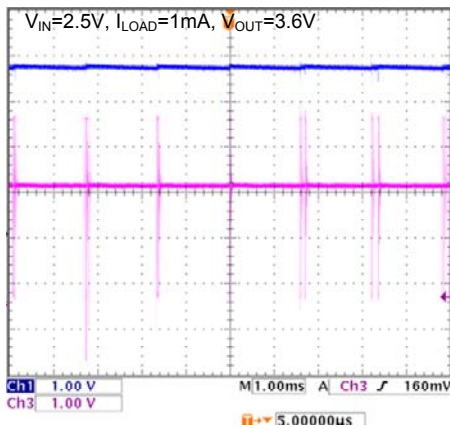
■ TYPICAL CHARACTERISTICS(Cont.)





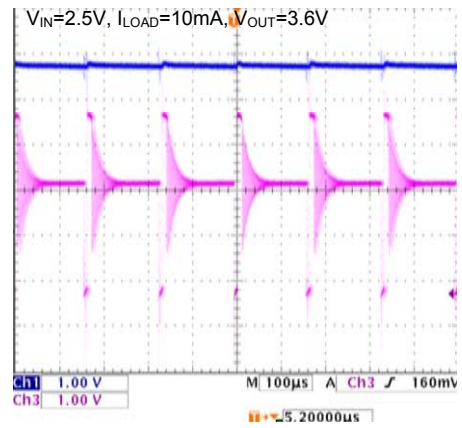
■ TYPICAL CHARACTERISTICS(Cont.)

Output Waveform of LX



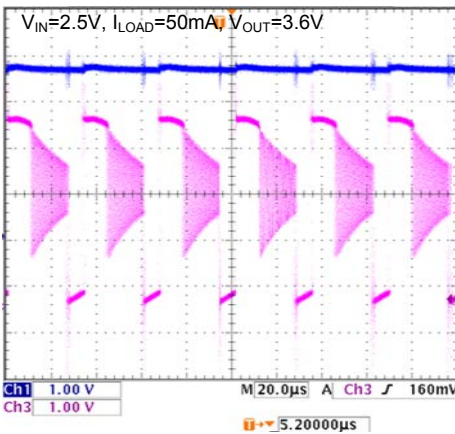
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Lower Trace: LX Mode Voltage, 1V/Division

Output Waveform of LX



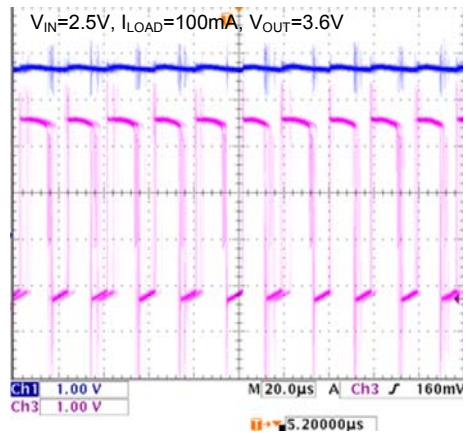
Upper Trace: Output Voltage, 1V/Division  
Lower Trace: LX Mode Voltage, 1V/Division

Output Waveform of LX



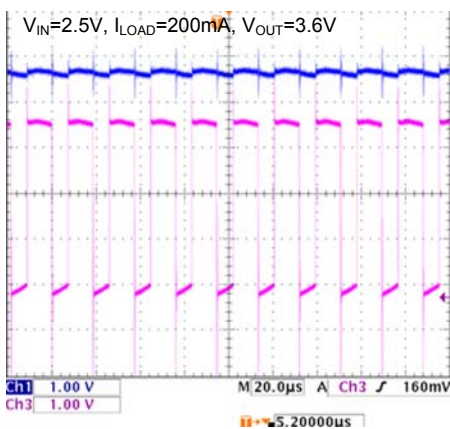
Upper Trace: Output Voltage, 1V/Division  
Lower Trace: LX Mode Voltage, 1V/Division

Output Waveform of LX



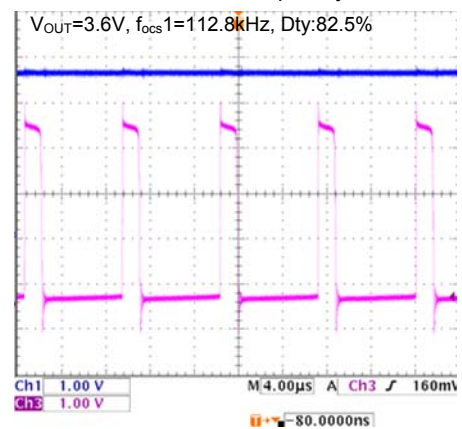
Upper Trace: Output Voltage, 1V/Division  
Lower Trace: LX Mode Voltage, 1V/Division

Output Waveform of LX



Upper Trace: Output Voltage, 1V/Division  
Lower Trace: LX Mode Voltage, 1V/Division

Output Waveform of LX Under Maximum Frequency



Upper Trace: Output Voltage, 1V/Division  
Lower Trace: LX Mode Voltage, 1V/Division

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