



SANYO Semiconductors

# DATA SHEET

An ON Semiconductor Company

## LV5071M — Bi-CMOS IC DC/DC Converter IC

### Overview

The SANYO LV5071M is a DC/DC converter IC that has a step-down DC/DC converter output and an externally-controllable GPO output for discharging the output capacitor.

### Features

- One channel of synchronous rectifying PWM controlled step-down DC/DC converter output (0.8V to 3.3V/1A)
- One channel of externally controllable GPO output for discharging the output capacitor
- Built-in thermal shutdown circuit
- Built-in hiccup recovery

### Specifications

Maximum Ratings at  $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{IN}$	$V_{IN}, PV_{IN}$	-0.3 to 6.0	V
Input pin voltage	$V_{INC}$	GPI, ENDCO	-0.3 to 6.0	V
Output pin voltage	$V_{OUT}$	LX, GPO	-0.3 to 6.0	V
Allowable Power dissipation	$P_d \text{ max}$	$T_a \leq 25^\circ\text{C}$ Mounted on a circuit board.*	1.5	W
Operating temperature	$T_{opr}$		-20 to +85	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-40 to +125	$^\circ\text{C}$

\* Specified circuit board : 50.0mm × 50.0mm × 1.6mm, 2-layer glass epoxy printed circuit board, Wiring density on the backside = 54%

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## Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	VIN	VIN = PVIN, 0.8V ≤ VOUT ≤ 1.3V	2.95 to 5.5	V
		VIN = PVIN, 1.3V ≤ VOUT ≤ 1.9V	3.2 to 5.5	V
		VIN = PVIN, 1.9V ≤ VOUT ≤ 3.3V	4.5 to 5.5	V
Input pin voltage	VINC	GPI, ENDCO	-0.3 to VIN	V

## Electrical Characteristics, Current drain, unless otherwise specified at Ta = 25°C, VIN = 5.0V, no load

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Standby current drain	ICCSB	GPI = ENDCO = Low		0.5	10	μA
Current drain DCDC ON	ICCFL	GPI = ENDCO = High, VOUT = 1.8V		12	16	mA

## DC/DC, unless otherwise specified at Ta = 25°C, VIN = 5.0V, VOUT = 1.8V, no load

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
FB voltage	VFB	IO = 10mA	0.49	0.50	0.51	V
Current limit peak value	CLIMIT		1.5			A
Efficiency 1	EF1	IO = 0.5A, VOUT = 3.3V		90		%
Efficiency 2	EF2	IO = 0.5A, VOUT = 1.8V		82		%
Load regulation	VL	IO = 1mA to 1A		15	45	mV
Frequency	Fosc		1.7	2.2	2.7	MHz
LX ON resistance	RLXP	IOH = -300mA, Pch		0.15		Ω
	RLXN	IOL = 300mA, Nch		0.15		Ω

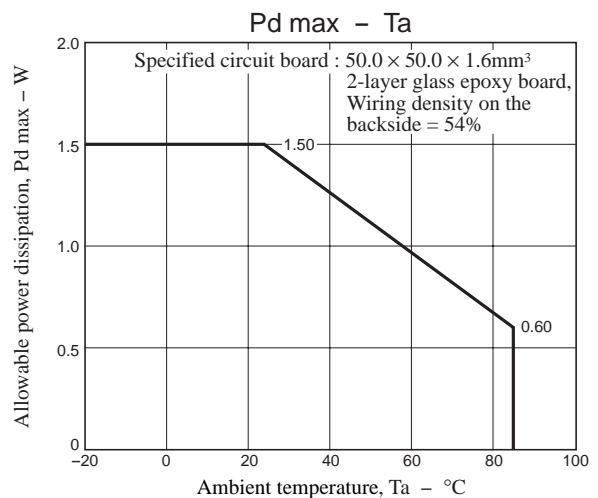
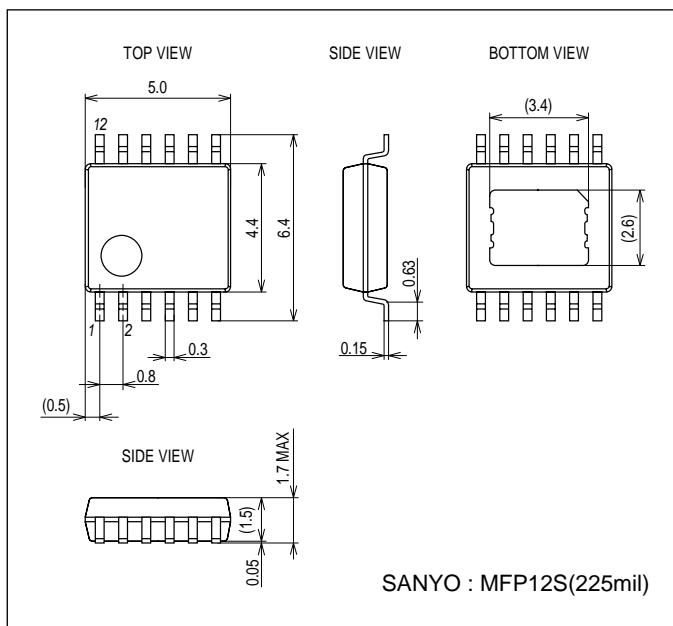
## GPI, ENDCO Input, GPO Output, unless otherwise specified at Ta = 25°C, VIN = 5.0V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
GPO Output current	Igpo	GPI = 0V, GPO = 1.5V	7.5	15	37.5	mA
GPO output voltage Low-level	VOL	GPI = 0V, IOL = 5mA		0.5	1	V
GPO output leakage current	ILK	GPO		0	10	μA
GPI/ENDCO input voltage High-level	VINH	Input High-level GPI, ENDCO	1.5			V
GPI/ENDCO input voltage Low-level	VINL	Input Low-level GPI, ENDCO	0		0.3	V

## Package Dimensions

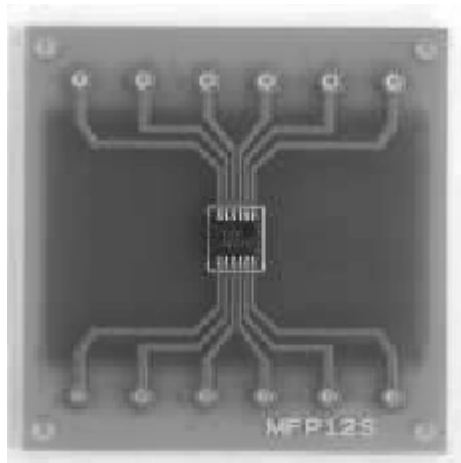
unit : mm (typ)

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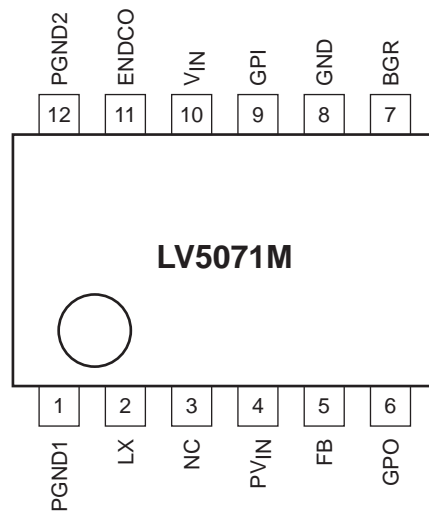


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Specified board for Pd max measurement

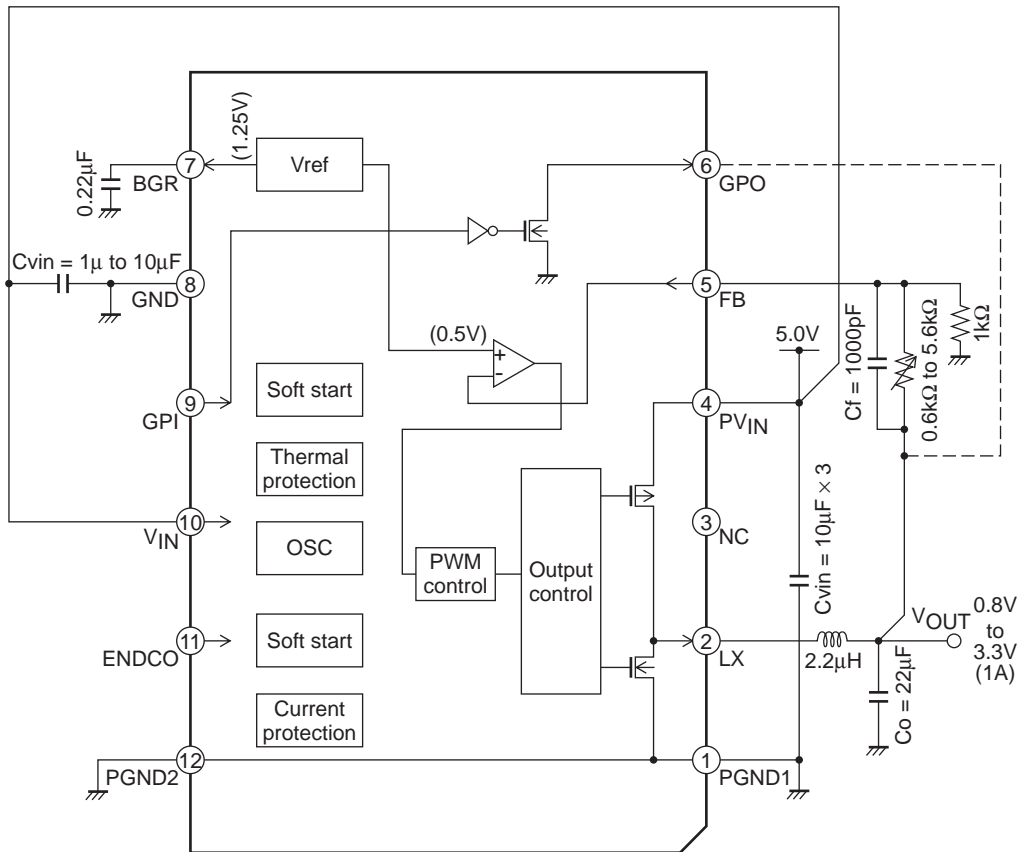


## Pin Assignment



Top view

Block Diagram



Pin Descriptions

Pin No.	Pin name	Description
1	PGND1	DC/DC power-dedicated ground
2	LX	Switching regulator PWM output pin
3	NC	NC
4	PVIN	DC/DC power dedicated power pin
5	FB	DC/DC feedback voltage input pin
6	GPO	GPO output for discharging the output capacitor
7	BGR	Internal reference voltage output pin
8	GND	Signal ground
9	GPI	GPO output control pin. L : Output capacitor discharge
10	VIN	Signal system power supply
11	ENDCO	DC/DC output control pin. Low : OFF, High : ON
12	PGND2	DC/DC power dedicated ground

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## Pin Functions

Pin No.	Pin Name	Pin function	Equivalent Circuit
2	LX	Switching regulator PWM signal output	
5	FB	Switching regulator Feedback voltage input	
6	GPO	GPO output for discharging the output capacitor	
7	BGR	Reference voltage output	

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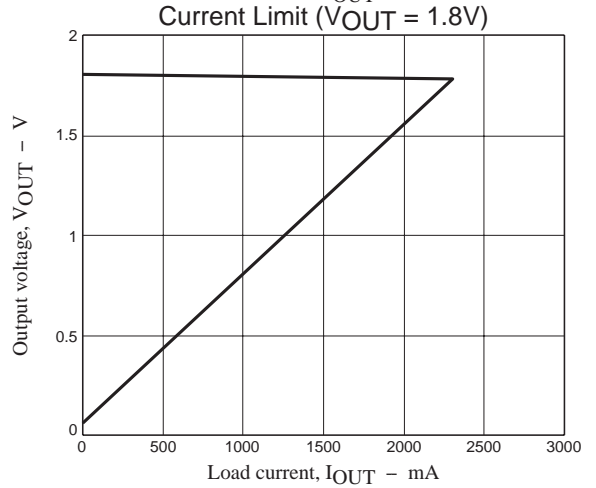
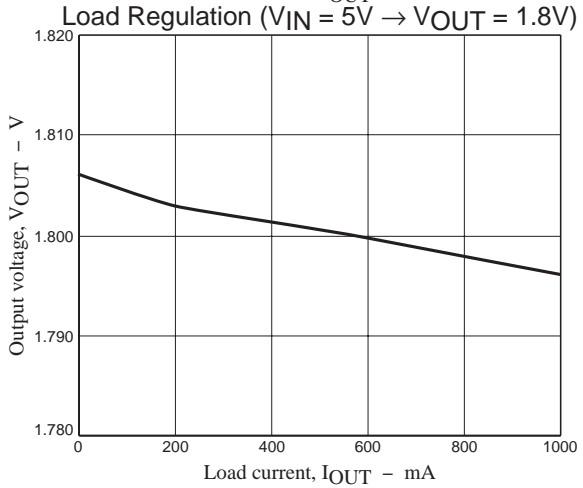
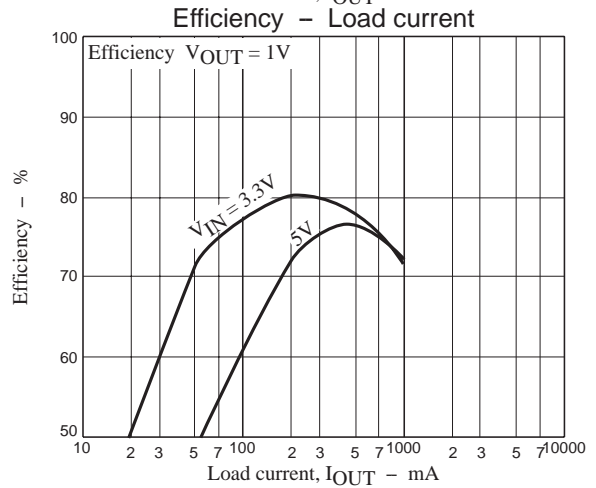
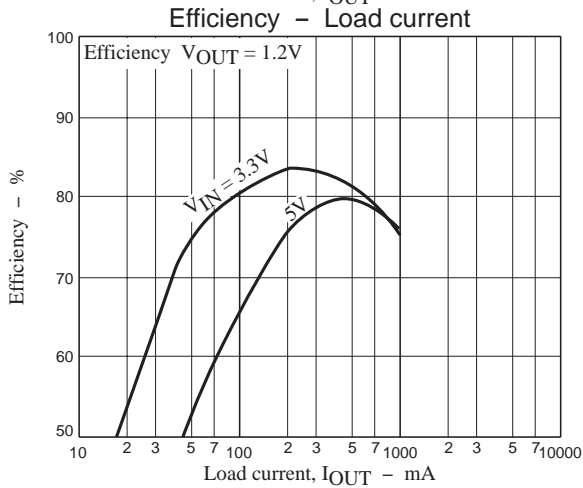
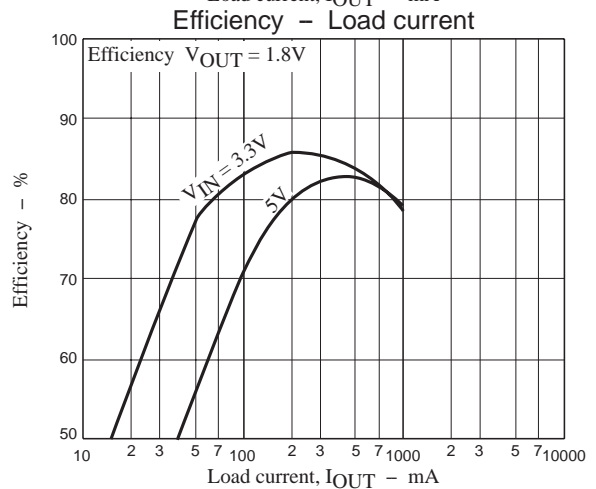
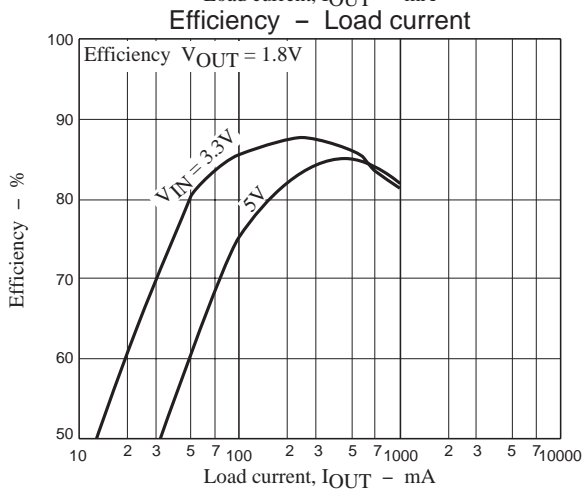
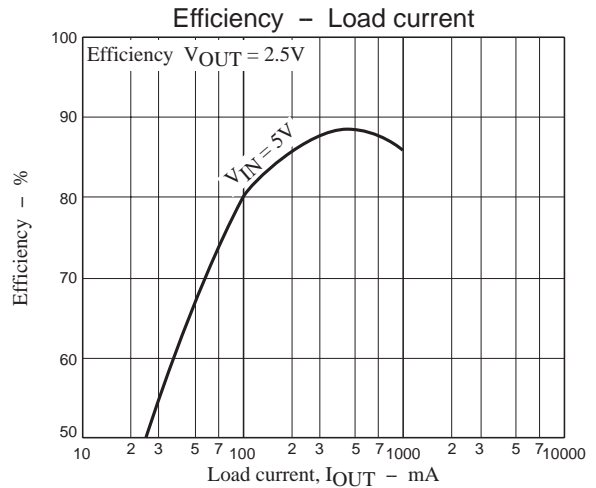
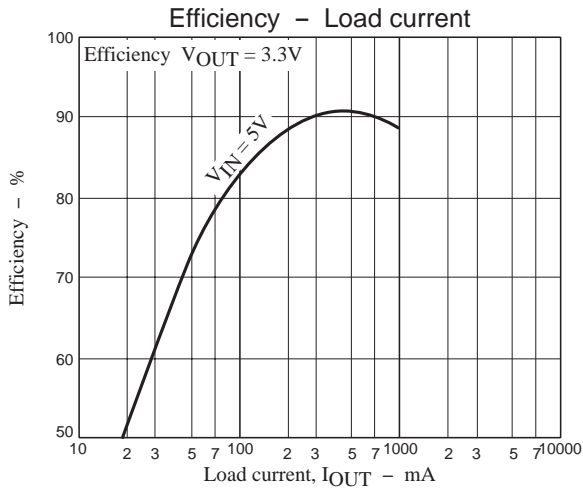
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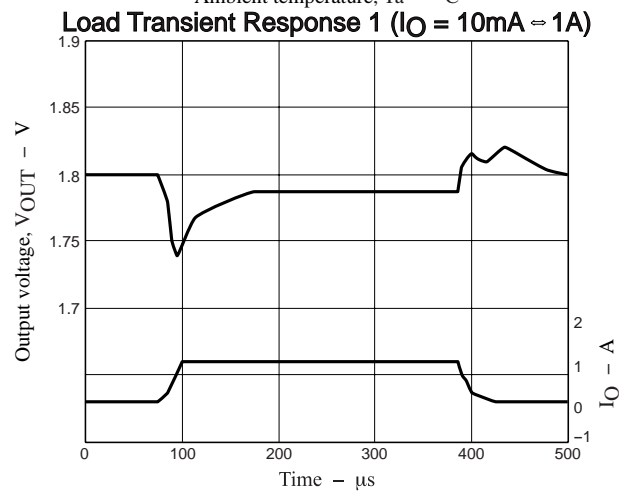
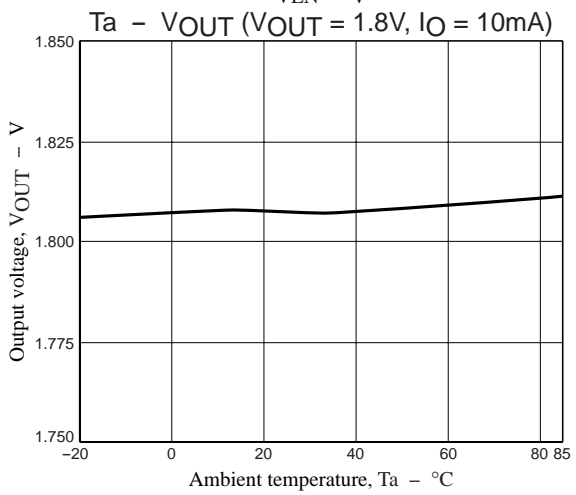
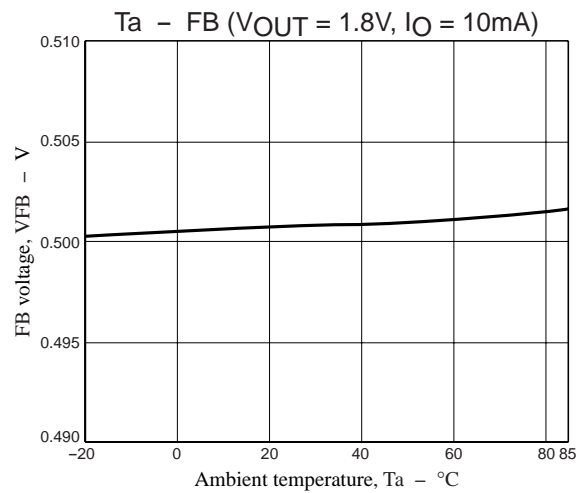
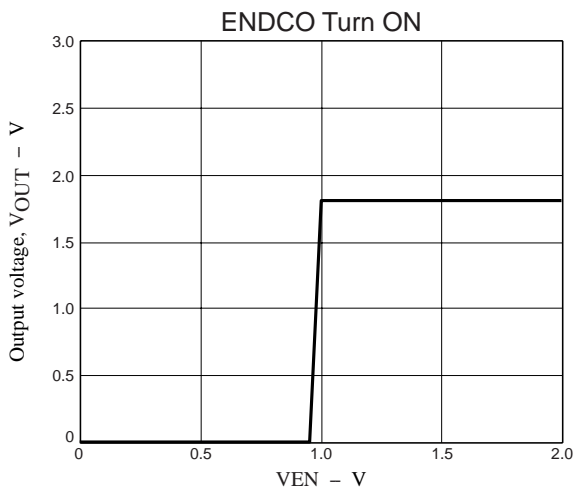
Pin No.	Pin Name	Pin function	Equivalent Circuit
9	GPI	GP0 output control pin (Low : Discharging the output capacitor)	<p>The diagram shows the equivalent circuit for the GPI pin. It features a pull-up resistor connected to the <math>V_{IN}</math> supply. The GPI pin is connected to the base of a transistor. A <math>10\text{k}\Omega</math> resistor is connected between the GPI pin and the base. A <math>500\text{k}\Omega</math> resistor is connected between the base and GND. A diode is connected from the GPI pin to GND, with its cathode pointing towards the pin.</p>
11	ENDCO	DC/DC on/off control (High : Converter ON)	<p>The diagram shows the equivalent circuit for the ENDCO pin. It features a pull-up resistor connected to the <math>V_{IN}</math> supply. The ENDCO pin is connected to the base of a transistor. A <math>10\text{k}\Omega</math> resistor is connected between the ENDCO pin and the base. A <math>500\text{k}\Omega</math> resistor is connected between the base and GND. A diode is connected from the ENDCO pin to GND, with its cathode pointing towards the pin.</p>

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## Evaluation Board



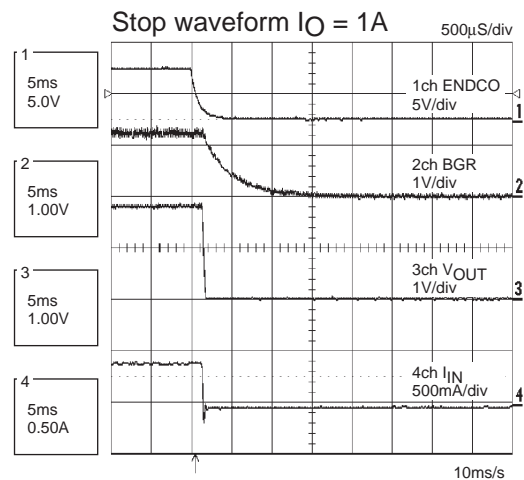
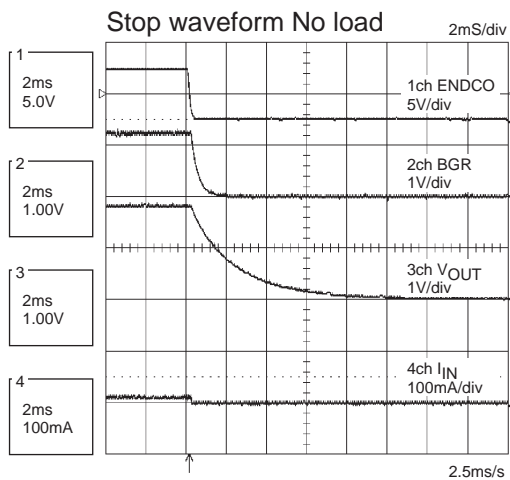
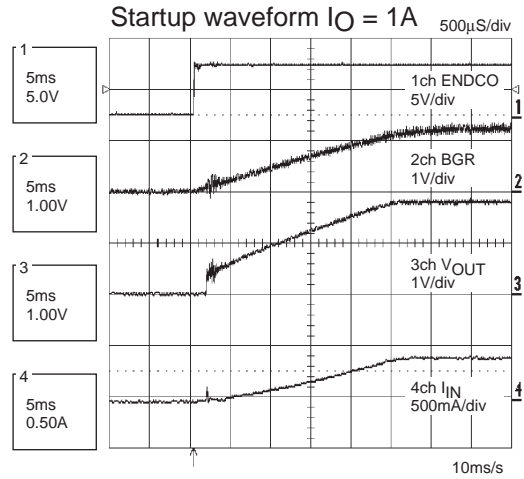
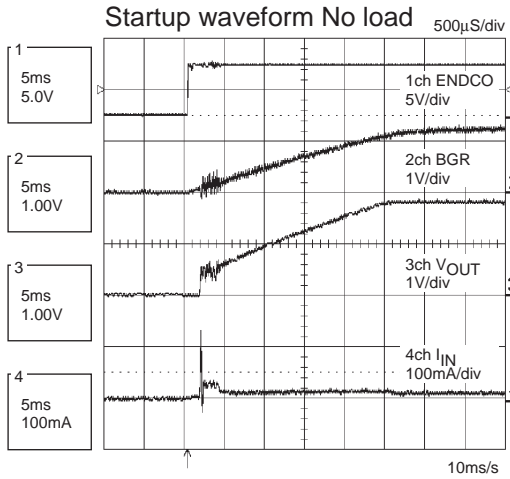
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ENDCO ON Waveforms. ( $V_{OUT} = 1.8V$ ,  $C_o = 22\mu F$ ,  $C_{vin} = 1\mu F$ ,  $C_{pvin} = 10\mu F \times 3$ ,  $CBGR = 0.22\mu F$ )



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