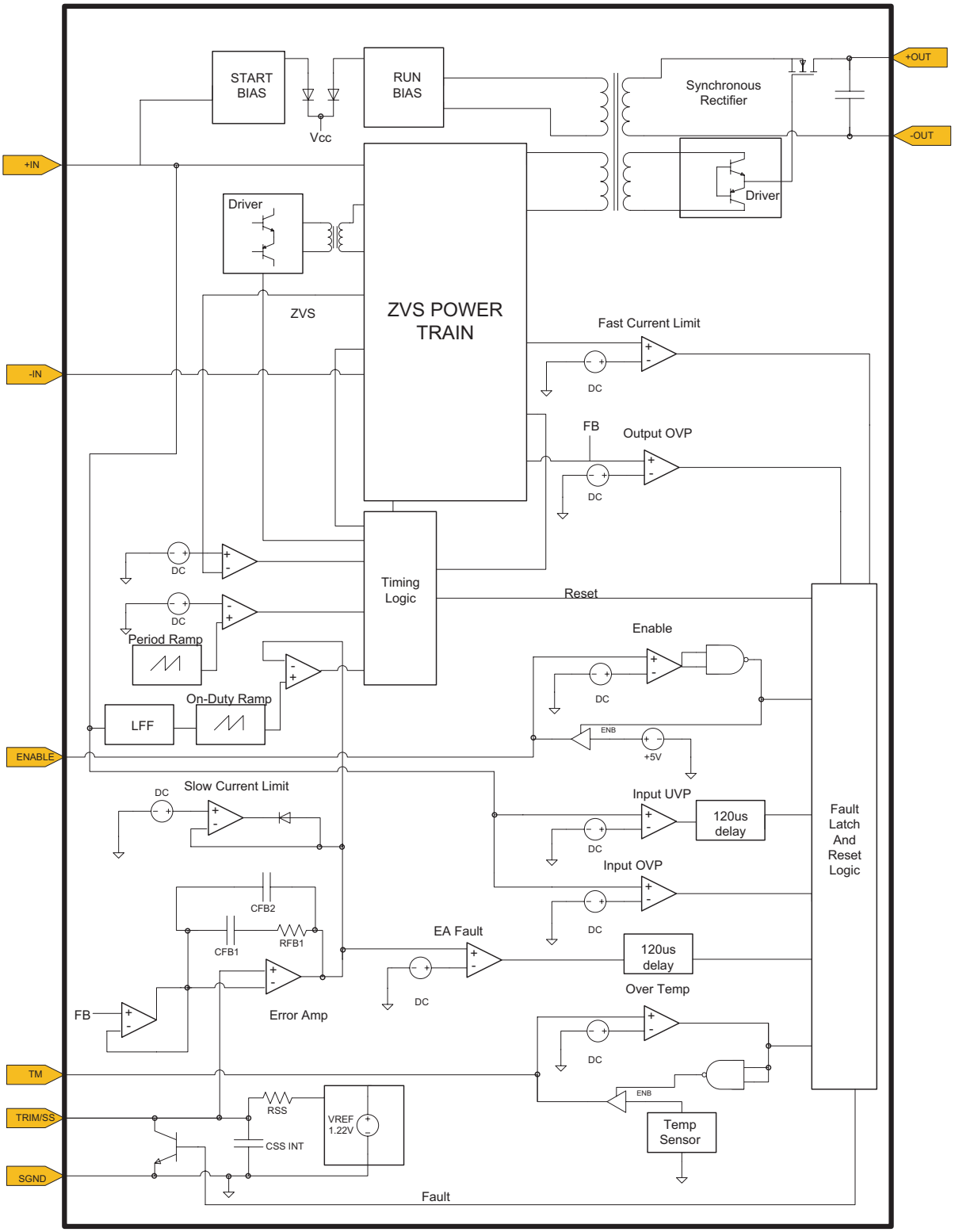
Order Information

Part Number	V_{IN}	V_{OUT}	I_{OUT} Max	Package	Transport Media
PI3109-01-HVIZ	18 – 36V	5V	10A	0.87″ x 0.65″ x 0.265″	TRAY
PI3106-01-HVIZ	18 – 36V	12V	4.2A	0.87″ x 0.65″ x 0.265″	TRAY
Also Available					
PI3101-00-HVIZ	36 – 75V	3.3V	18A	0.87″ x 0.65″ x 0.265″	TRAY
PI3105-00-HVIZ	36 – 75V	12V	5A	0.87″ x 0.65″ x 0.265″	TRAY
PI3110-01-HVIZ	41 – 57V	18V	3.3A	0.87″ x 0.65″ x 0.265″	TRAY
PI3109-00-HVMZ	16 – 50V	5V	10A	0.87″ x 0.65″ x 0.265″	TRAY
PI3106-00-HVMZ	16 – 50V	12V	4.2A	0.87″ x 0.65″ x 0.265″	TRAY
PI3111-00-HVMZ	16 – 50V	15V	3.33	0.87″ x 0.65″ x 0.265″	TRAY

Absolute Maximum Ratings

Name	Rating
+IN to –IN Max Operating Voltage	-1.0 to 36V_{DC} (operating)
+IN to –IN Max Peak Voltage	45V_{DC} (non-operating, 100ms)
ENABLE to –IN	-0.3 to 6.0V_{DC}
TM to –IN	-0.3 to 6.0V_{DC}
TRIM/SS to –IN	-0.3 to 6.0V_{DC}
+OUT to –OUT	See relevant model output section
Continuous Output Current	See relevant model output section
Peak Output Current	See relevant model output section
Operating Junction Temperature	-40 to 125°C
Storage Temperature	-50 to 125°C
Case Temperature During Reflow	245°C

Functional Block Diagram



Pin Description

Pin Name	Description
+IN	Primary side positive input voltage terminals.
–IN	Primary side negative input voltage terminals.
ENABLE	Converter enable option, functions as 5V reference and on / off control pin. Pull low for off.
TRIM/SS	External soft start pin and trim function. Connect to SGND or ENABLE through resistor for trim up or trim down.
TM	Temperature measurement output pin.
SGND	Signal ground, primary side referenced.
+OUT	Isolated secondary DC output voltage positive terminals.
–OUT	Isolated secondary DC output voltage negative terminals.

Package Pin-Out

PI3109-01-HVIZ Electrical Characteristics

Unless otherwise specified: 18V < V_{IN} < 36V, 0A < I_{OUT} < 10A, -40°C < T_{CASE} < 100°C [1]

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Input Specifications						
Input Voltage Range	V_{IN}		18	24	36	V_{DC}
Input dV/dt [1]	V_{INDVDT}	V_{IN} = 36V			1.0	V/µs
Input Undervoltage Turn-on	V_{UVON}	I_O = 10A	16.2	17.0	17.8	V_{DC}
Input Undervoltage Turn-off	V_{UVOFF}	I_O = 10A	15.1	16.0	16.7	V_{DC}
Input Undervoltage Hysteresis	V_{UVH}	I_O = 10A		1.0		V_{DC}
Input Overvoltage Turn-on	V_{OVON}	I_O = 10A	37.8	40.0	41.7	V_{DC}
Input Overvoltage Turn-off	V_{OVOFF}	I_O = 10A	38.6	40.7	42.6	V_{DC}
Input Overvoltage Hysteresis	V_{OVH}	I_O = 10A		0.7		V_{DC}
Input Quiescent Current	I_Q	V_{IN} = 24V, ENABLE = 0V		2		mA_{DC}
Input Idling Power	P_{IDLE}	V_{IN} = 24V, I_{OUT} = 0A		2.8		W
Input Standby Power	P_{SBY}	V_{IN} = 24V, ENABLE = 0V		0.048		W
Input Current Full Load	I_{IN}	T_{CASE} = 100°C, I_{OUT} = 10A, η_{FL} = 88.0% typical, V_{IN} = 24V		2.36		A_{DC}
Input Reflected Ripple Current	I_{INRR}	L_{IN} = 0.47µH C_{IN} = 100µF 63V electrolytic + 2 x 4.7µF 50V X7R ceramic		13		mApp
Recommended Ext Input Capacitance	C_{IN}	C_{IN} = 100µF 50V electrolytic + 2 x 4.7µF 50V X7R ceramic C_{IN} = Cbulk + Chf		109.4		µF
Output Specifications						
Output Voltage Set Point	V_{OUT}	I_{OUT} = 5A		5.0		V_{DC}
Total Output Accuracy	V_{OA}	-0°C < T_{CASE} < 100°C	-3		+3	%
		-40°C < T_{CASE} < 0°C	-4		+3	%
Output Voltage Trim Range	V_{OADJ}		-20		10	%
Output Current Range	I_{OUT}				10	A_{DC}
Overcurrent Protection	I_{OCP}		10.8	15	20	A_{DC}
Efficiency – Full Load	η_{FL}	T_{CASE} = 100°C, V_{IN} = 24V	86.0	88.0		%
Efficiency – Half Load	η_{HL}	T_{CASE} = 100°C, V_{IN} = 24V	83.5	85.5		%
Output OVP Set Point	V_{OVP}		6	6.3	6.6	V_{DC}
Output Ripple Voltage	V_{ORPP}	C_{OUT} = 6 x 10µF 10V X7R DC-20MHz		140		mVpp
Switching Frequency	f_{SW}			900		kHz
Output Turn-on Delay Time	t_{ONDLY}	V_{IN} = V_{UVON} to ENABLE = 5V		80		ms
Output Turn-off Delay Time	t_{OFFDLY}	V_{IN} = V_{UVOFF} to ENABLE < 1.8V		10		µs
Soft-Start Ramp Time	t_{SS}	ENABLE = 5V to 90% V_{OUT} C_{REF} = 0		230		µs
Maximum Load Capacitance	C_{OUT}	C_{REF} = 0.39µF, C_{OUT} = Al Electrolytic			4700	µF
Load Transient Deviation	V_{ODV}	I_{OUT} = 25% step 0.1A/µS C_{OUT} = 6 x 10µF 10V X7R		120		mV
Load Transient Recovery Time	t_{OVR}	I_{OUT} = 25% step 0.1A/µS C_{OUT} = 6 x 10µF 10V X7R V_{OUT} - 1%		100		µs
Maximum Output Power	P_{OUT}			50		W

Absolute Maximum Output Ratings	
Name	**Rating**
+OUT to –OUT	-0.5V to $6.8V_{DC}$
Continuous Output Current	$10A_{DC}$
Peak Output Current	$20A_{DC}$

[1] These parameters are not production tested but are guaranteed by design, characterization and correlation with statistical process control. Unless otherwise specified, ATE tests are completed at room temperature.

[2] Current flow sourced by a pin has a negative sign.

PI3109-01-HVIZ Electrical Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
ENABLE						
DC Voltage Reference Output	V_{ERO}		4.65	4.9	5.15	V_{DC}
Output Current Limit [2]	I_{ECL}	ENABLE = 3.3V	-3.3	-2.6	-1.9	mA_{DC}
Start Up Current Limit [2]	I_{ESL}	ENABLE = 1V	-120	-90	-60	µA
Module Enable Voltage	V_{EME}		1.95	2.5	3.05	V_{DC}
Module Disable Voltage	V_{EMD}		1.8	2.35	2.9	V_{DC}
Disable Hysteresis	V_{EDH}			150		mV
Enable Delay Time	t_{EE}			10		µs
Disable Delay Time	t_{ED}			10		µs
Maximum Capacitance	C_{EC}				1500	pF
Maximum External Toggle Rate	f_{EXT}				1	Hz
TRIM/SS						
Trim Voltage Reference	V_{REF}			1.232		V_{DC}
Internal Capacitance	C_{REFI}			10		nF
External Capacitance	C_{REF}				0.39	µF
Internal Resistance	R_{REFI}			10		kΩ
TM (Temperature Monitor)						
Temperature Coefficient [1]	TM_{TC}			10		mV/ºK
Temperature Full Range Accuracy [1]	TM_{ACC}		-5		5	ºK
Drive Capability	I_{TM}		-100			µA
TM Output Setting	V_{TM}	Ambient Temperature = 300ºK		3.00		V
Thermal Specification						
Junction Temperature Shutdown [1]	T_{MAX}		130	135	140	°C
Junction-to-Case Thermal Impedance	$R\Theta_{J-C}$			3		°C/W
Case-to-Ambient Thermal Impedance	$R\Theta_{C-A}$	Mounted on 9in² 1oz. Cu 6 layer PCB 25°C		9.6		°C/W
Regulatory Specification						
IEC 60950-1:2005 (2nd Edition)						
EN 60950-1:2006						
IEC 61000-4-2						
UL60950-1:2007						
CAN/CSA C22.2 NO. 60950-1-07						
Recommended Input Fuse Rating	I_{FUSE}	Fast acting LITTLEFUSE Nano² Series Fuse	4		10	A

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PI3109-01-HVIZ Electrical Characteristics

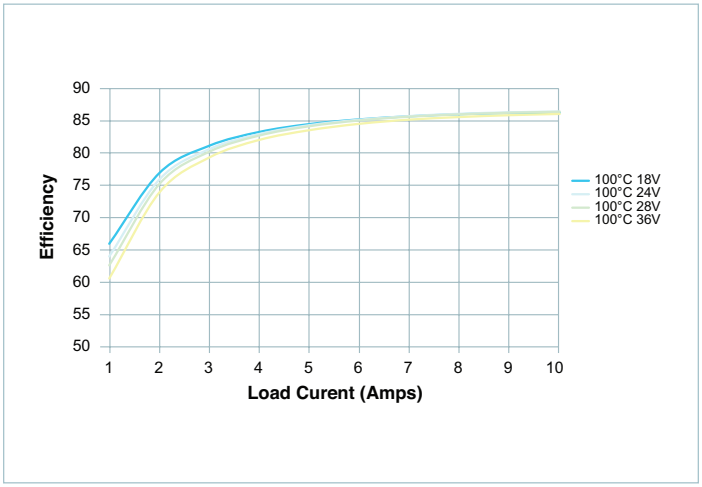


Figure 1 — *Conversion Efficiency*

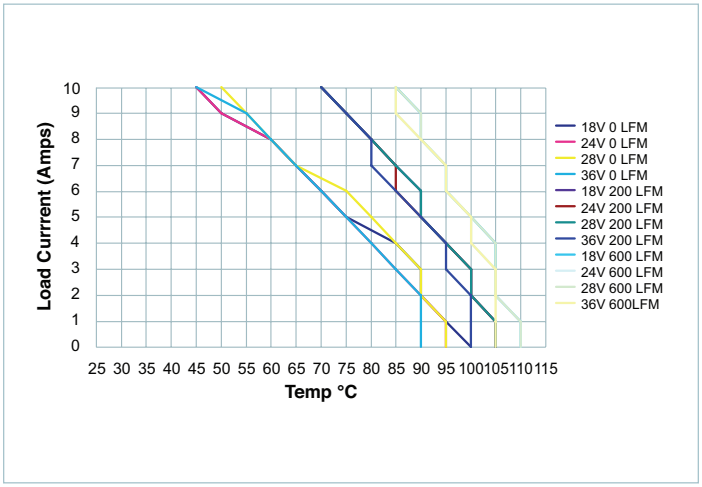


Figure 4 — *Load Currrent vs Ambient Temperature (11mm Heat Sink)*

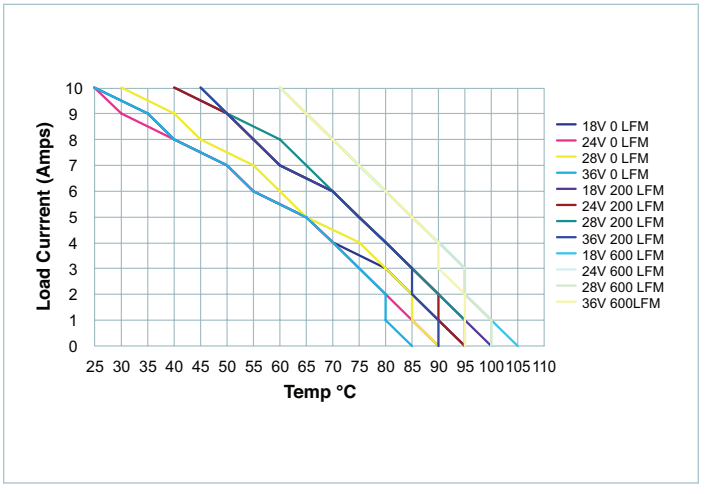


Figure 2 — *Load Currrent vs Temperature (without Heat Sink)*

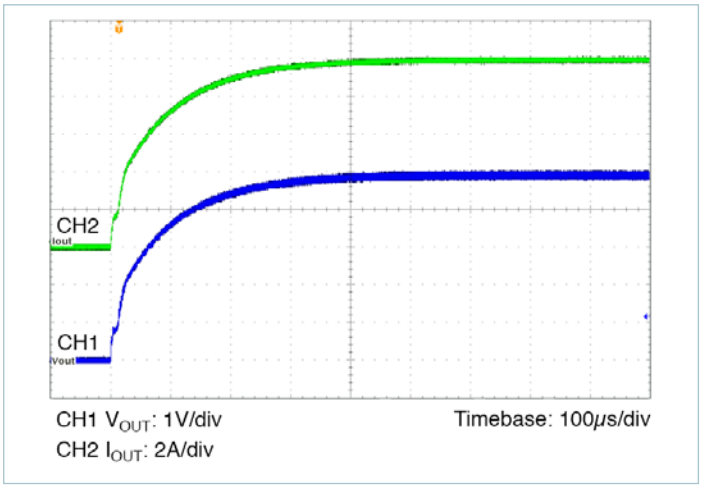


Figure 5 — *Start Up C_{REF} = 0 (V_{IN} = 18V, I_{OUT} = 10A, CR, C_{OUT} = 6 X 10µF X7R Ceramic)*

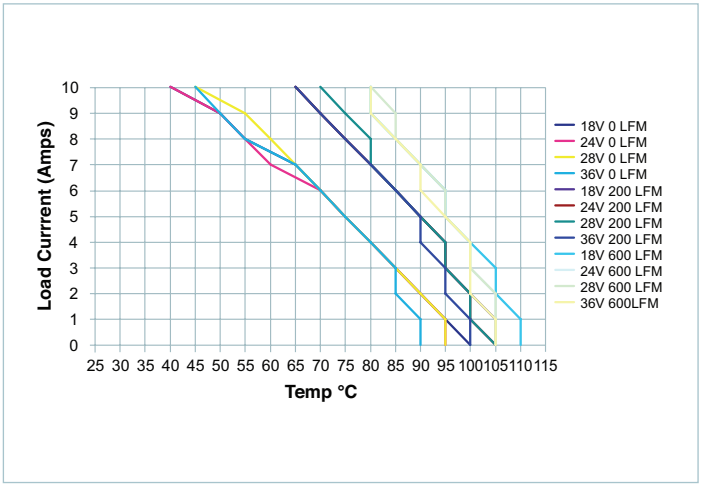


Figure 3 — *Load Currrent vs Temperature (6.3mm Heat Sink)*

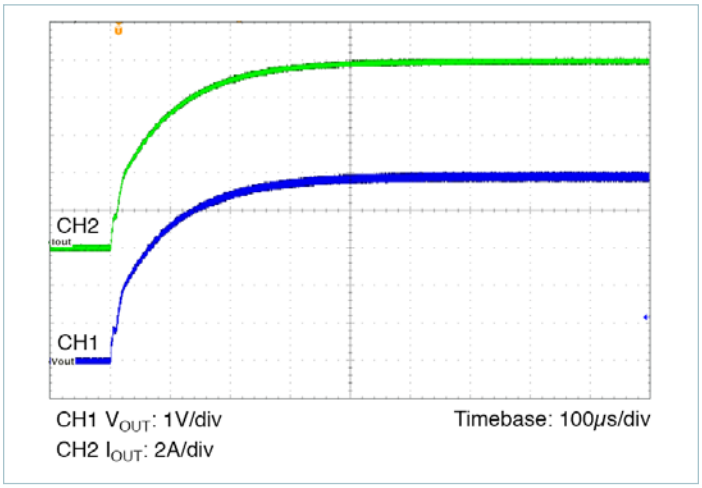


Figure 6 — *Start Up C_{REF} = 0 (V_{IN} = 24V, I_{OUT} = 10A, CR, C_{OUT} = 6 X 10µF X7R Ceramic)*

PI3109-01-HVIZ Electrical Characteristics

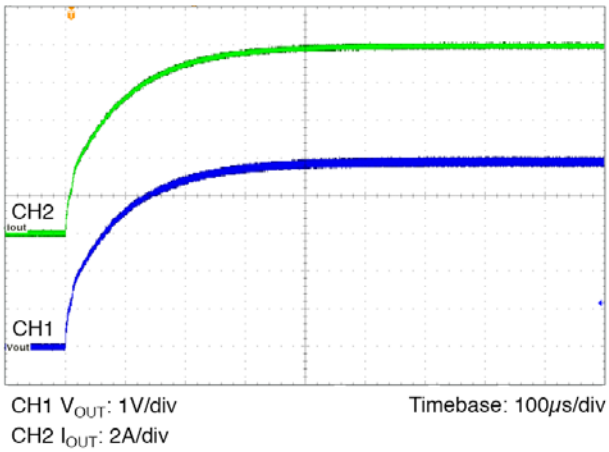
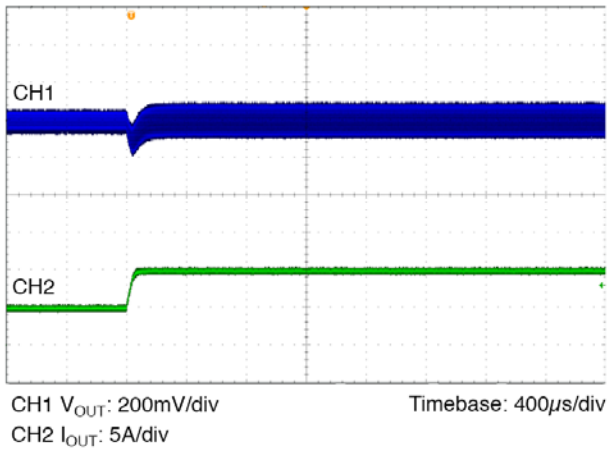


Figure 7 — *Start Up C_{REF} = 0 (V_{IN} = 36V, I_{OUT} = 10A, CR, C_{OUT} = 6 X 10µF X7R Ceramic)*



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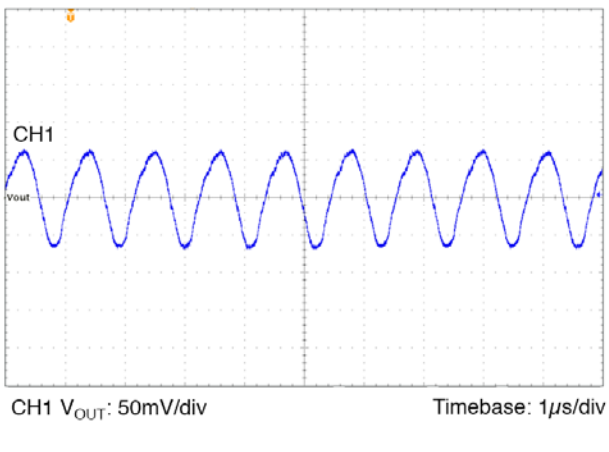

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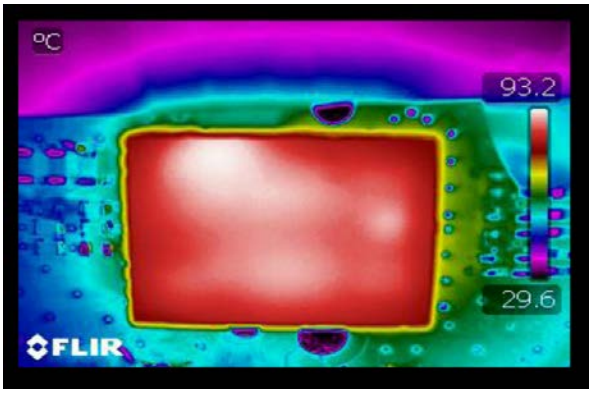
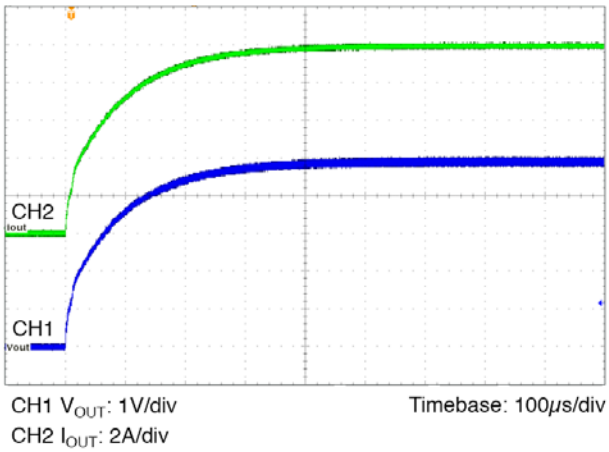


Figure 10 — *Thermal Image (V_{IN} = 24V, I_{OUT} = 10A, CR, 0LFM Evaluation PCB)*

PI3109-01-HVIZ Electrical Characteristics



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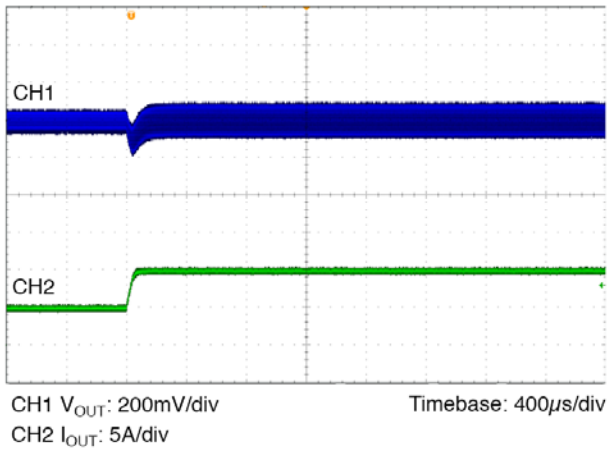

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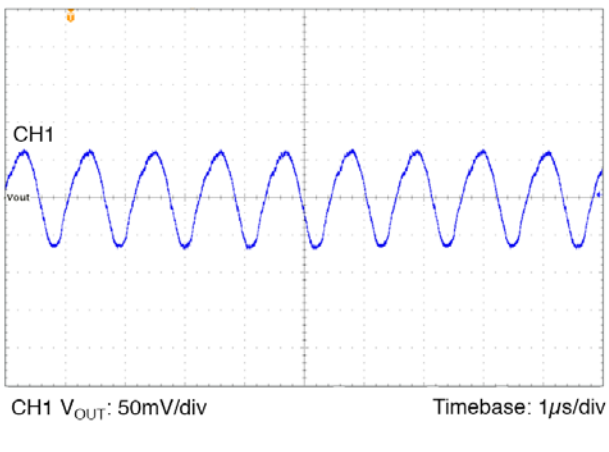

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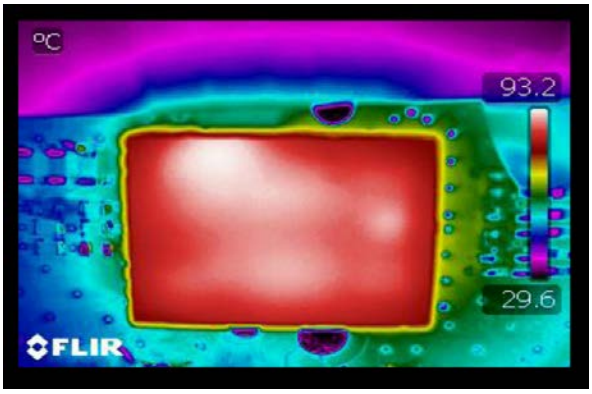

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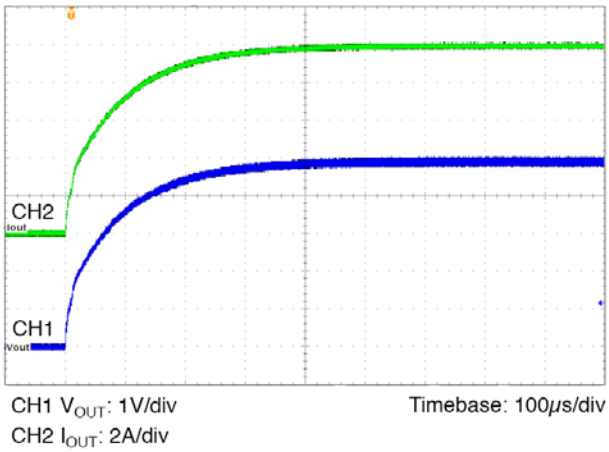

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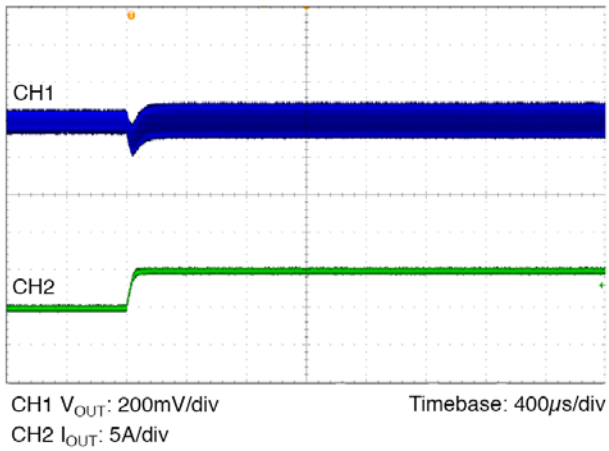

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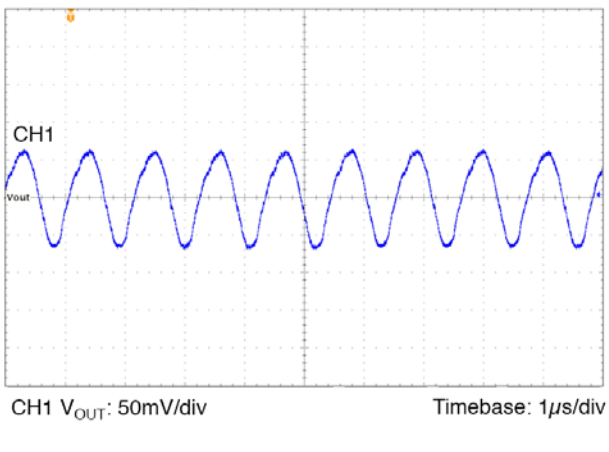

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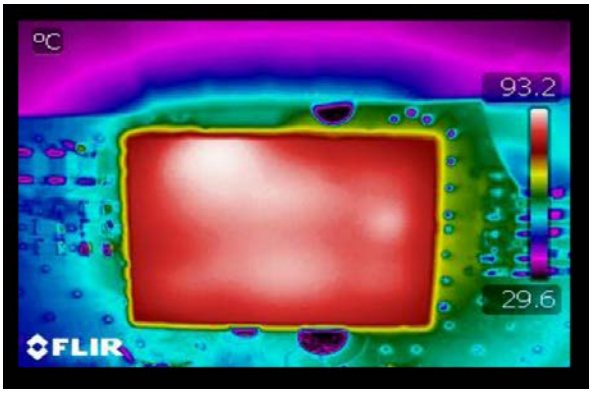

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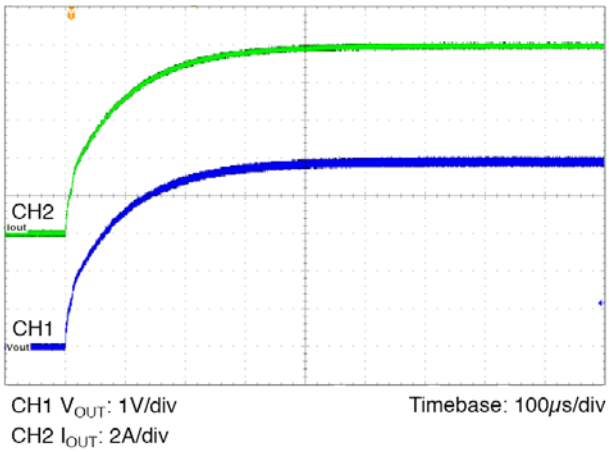
PI3109-01-HVIZ Electrical Characteristics



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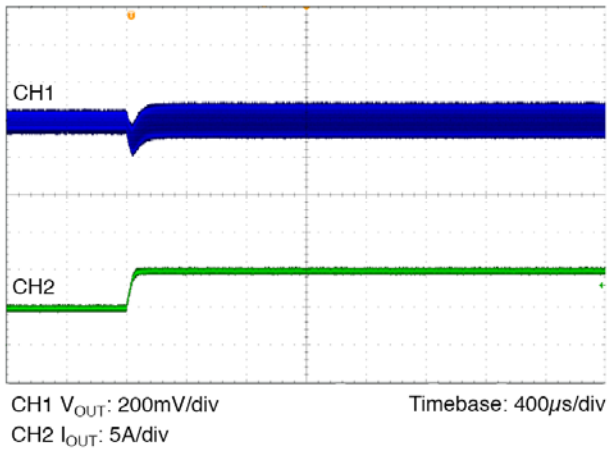

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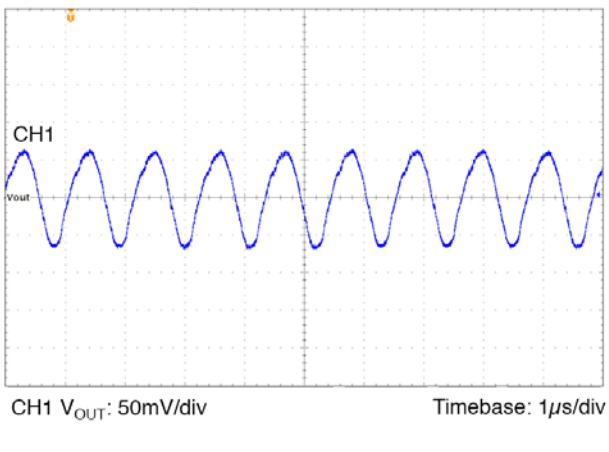

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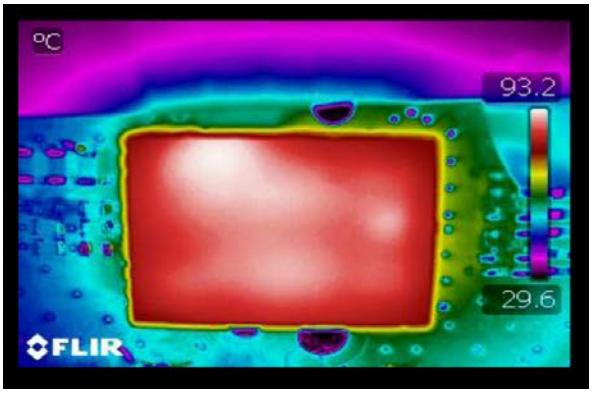

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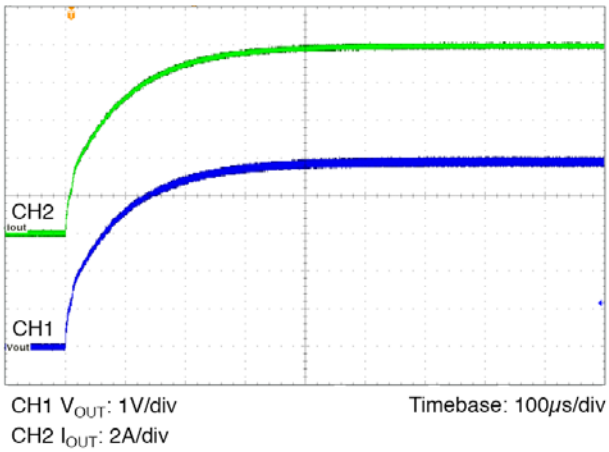
PI3109-01-HVIZ Electrical Characteristics



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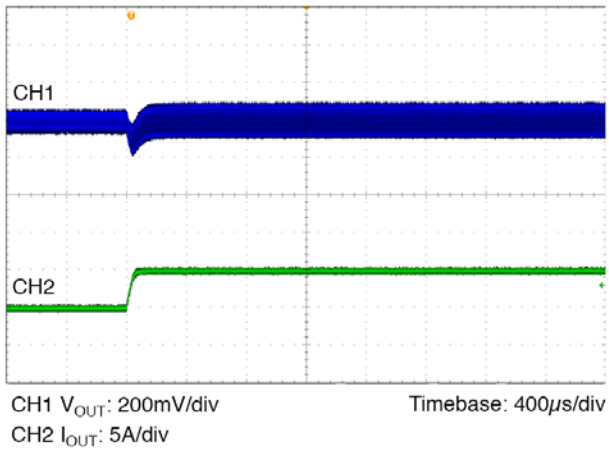

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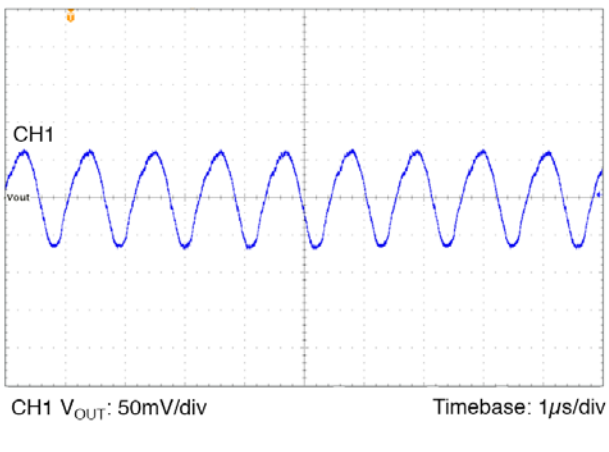

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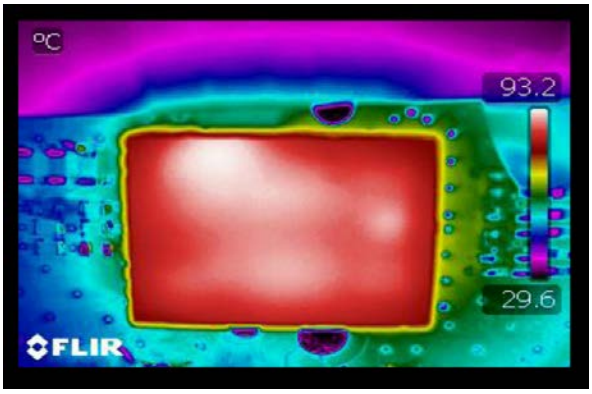

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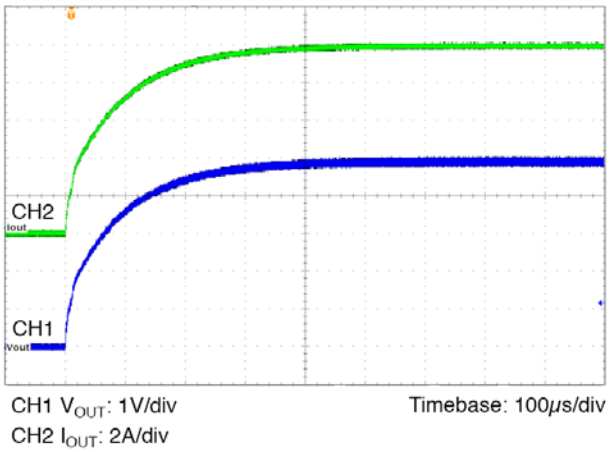
PI3109-01-HVIZ Electrical Characteristics



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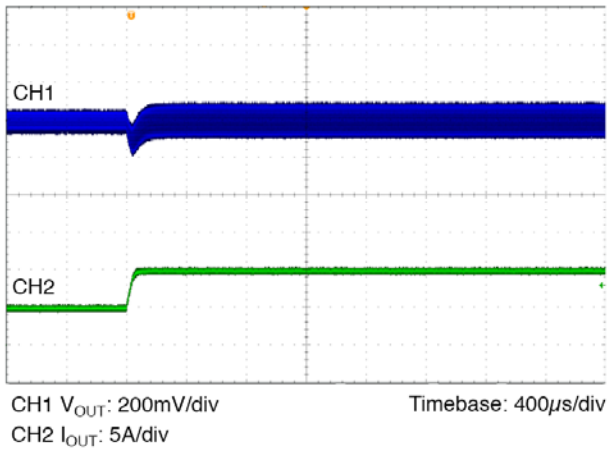

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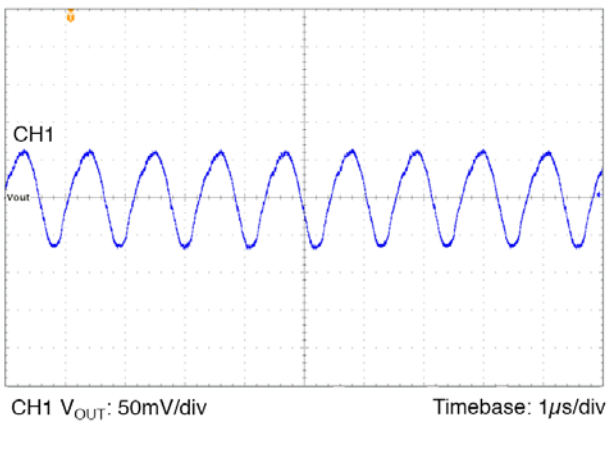


Figure 9 — *Output Ripple (V_{IN} = 24V, I_{OUT} = 10A, CR, C_{OUT} = 6 X 10µF X7R Ceramic)*

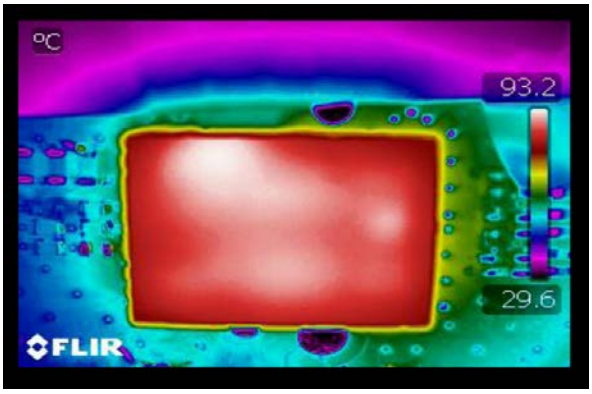


Figure 10 — *Thermal Image (V_{IN} = 24V, I_{OUT} = 10A, CR, 0LFM Evaluation PCB)*

PI3109-01-HVIZ Electrical Characteristics

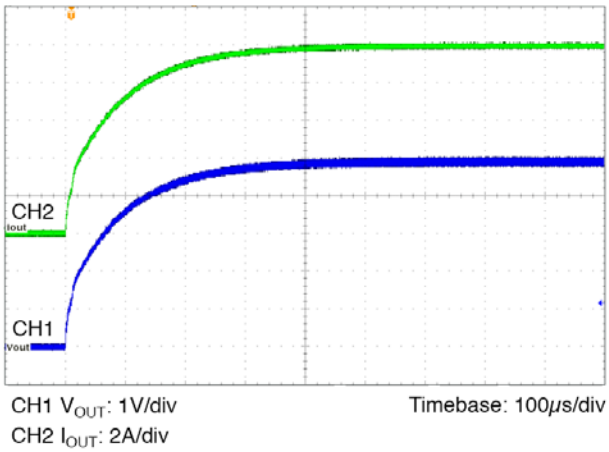
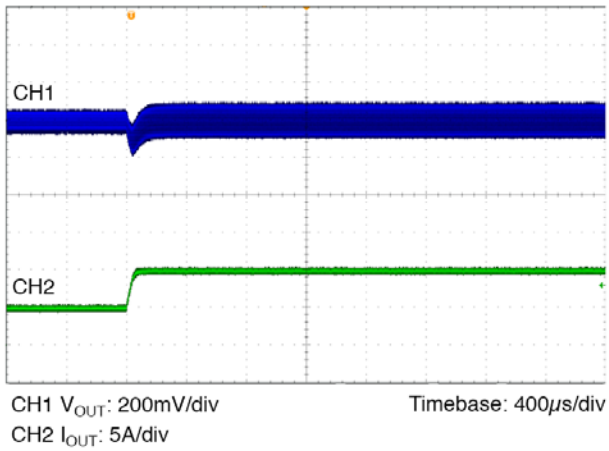


Figure 7 — *Start Up C_{REF} = 0 (V_{IN} = 36V, I_{OUT} = 10A, CR, C_{OUT} = 6 X 10µF X7R Ceramic)*



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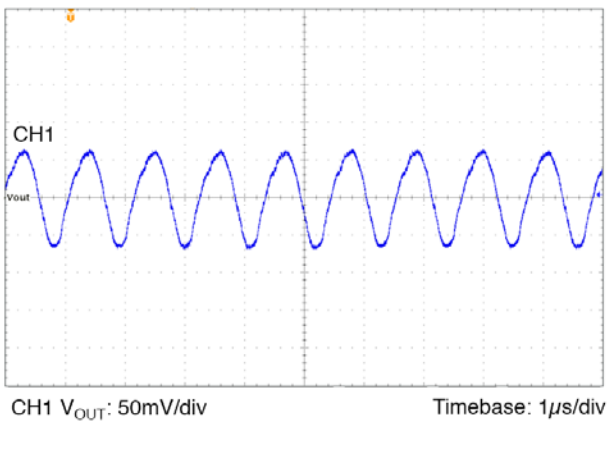

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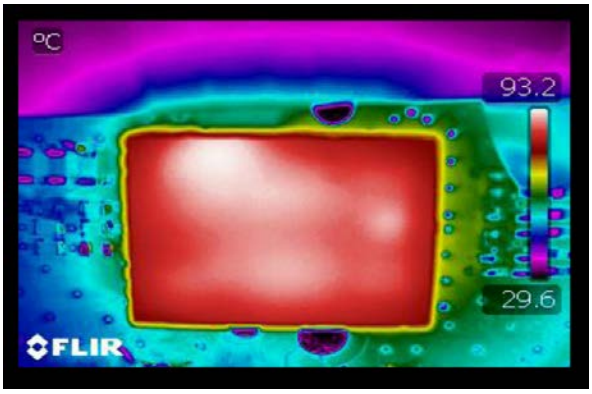

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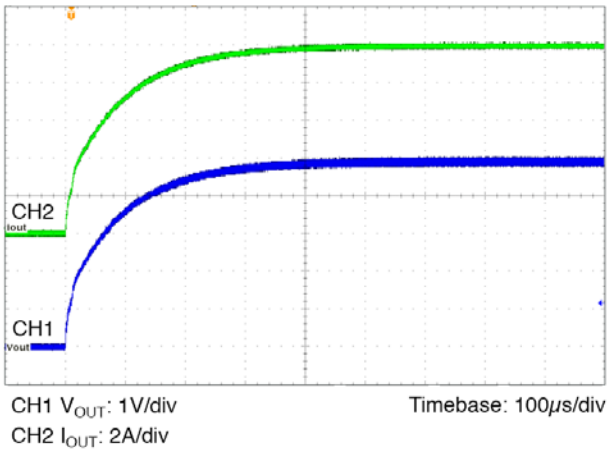
PI3109-01-HVIZ Electrical Characteristics



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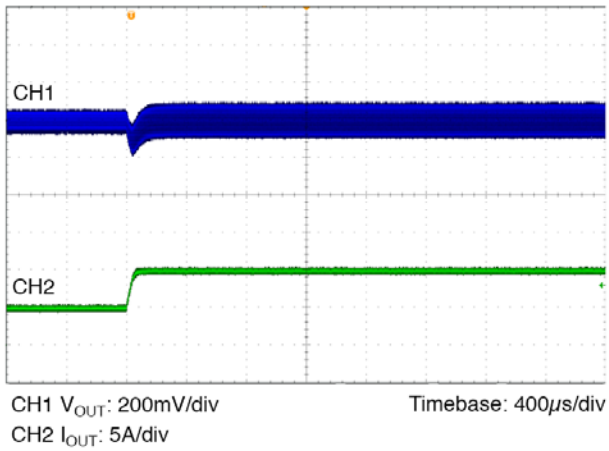

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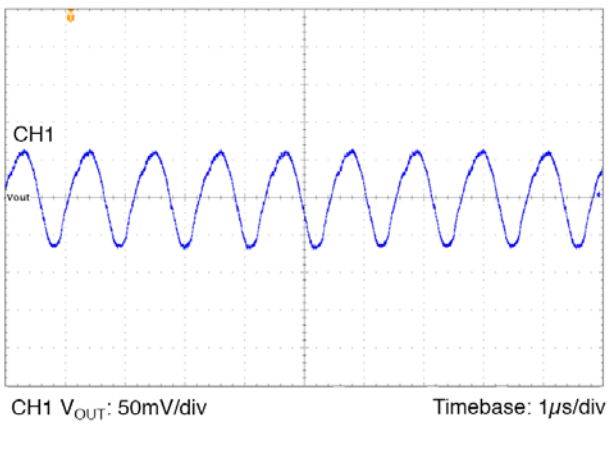

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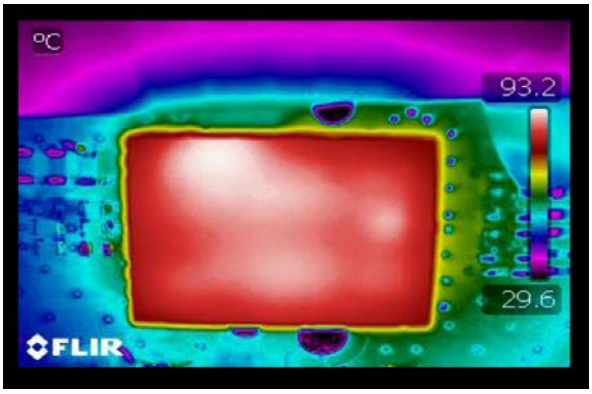

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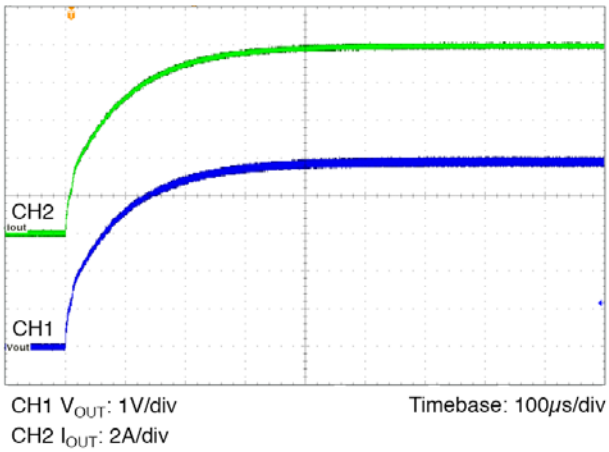
PI3109-01-HVIZ Electrical Characteristics



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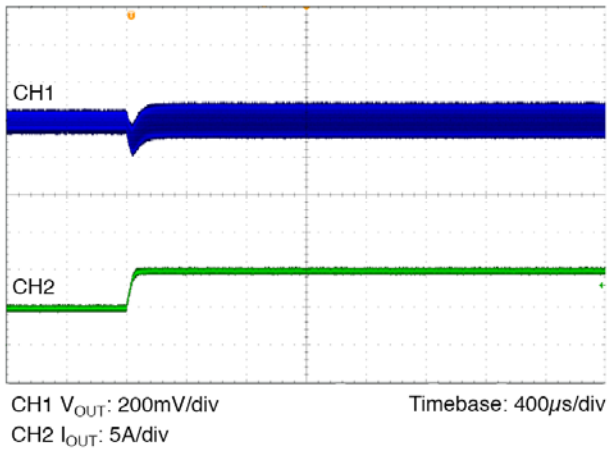

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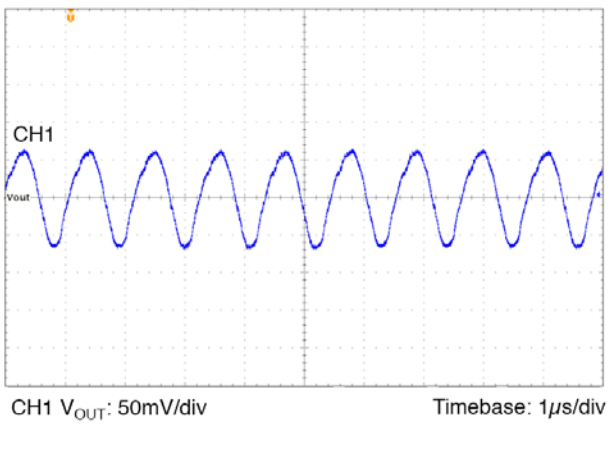

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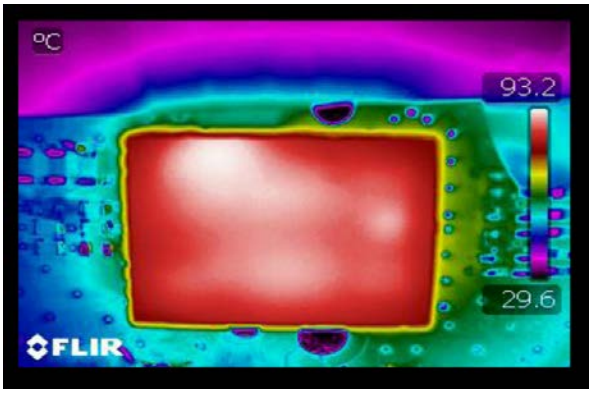

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