



1.0 Design Specifications

Inputs	Outputs #1
VinMin=-57	Vout1=5.0
VinMax=-36	Iout1=1.4

2.0 Design Description

This design utilizes the LM5070 configured in a non-synchronous, flyback topology and operating in continuous conduction mode (CCM), to offer a low-cost, high efficiency solution for Power-over-Ethernet (PoE) applications*. The LM5070 is a dedicated PoE powered device (PD) interface/PWM controller that integrates all the power sequencing, control mode, and fault protection necessary to comply with the IEEE 802.3af specification for power sourcing equipment (PSE).

This isolated PoE design operates at 260kHz and uses a custom PoE transformer to convert the input voltage, via flyback

action, to an output voltage level of 5V at 1.4A (7W). The primary side bias is derived from an auxiliary winding after successful start-up occurs. The secondary side feedback components are selected appropriately to ensure proper gain and phase margins for stable operation and quick transient response.

* Refer to POWER Designer, No. 104 (<http://www.national.com/an/AN/AN-1358.pdf>) or the LM5070 Evaluation Board - Application Note 1358 (http://www.national.com/appinfo/power/files/PowerDesigner_104.pdf) for more information on Power Supply Design for PoE Applications.

3.0 Schematic

FIGURE 1. Example Schematic Showing Connection for all Components.

4.0 Bill Of Materials

Part	Manufacturer	Part#	Attributes
C1	TDK	C4532X7R2A225	2.2u F
C10	Vitramon	VJ0805Y102KXAAT	1n F
C14	TDK	C3216X5R0J106K	10u F
C15	TDK	C3216X5R0J106K	10u F
C16	Sanyo	6CV390EX	390u F
C18	Vitramon	VJ0805Y101KXAAT	100p F
C19	Vitramon	VJ0805Y473KXAAT	4.7n F
C2	TDK	C4532X7R2A225	2.2u F
C21	TDK	C2012X5R1A105K	1u F
C22	Vitramon	VJ0805Y103KXAAT	10n F
C23	SYFER	1808JA250102KXBSY2	1n F
C3	TDK	C4532X7R2A225	2.2u F
C4	Vitramon	VJ0805Y104KXAAT	0.1u F
C5	Vitramon	VJ0805Y224KXAAT	0.22u F
C6	Vitramon	VJ0805Y104KXAAT	0.1u F
C7	Vitramon	VJ0805Y473KXAAT	47n F
C9	TDK	C2012X5R1A105K	1u F
D1	Diodes	HD01	1 V
D2	Diodes	HD01	1 V
D3	Fairchild	MMSD4148	1 V
D5	IR	12CWQ03	0.47 V
DZ1	Diodes	SMAJ60A	
J1	SAMTEC	MODS-A-8P8C-X	
L1	Coilcraft	DO1813P-181HC	0.18u H, 0.003 Ohms
M1	Vishay	SI4848DY	
R1	Dale	CRCW08051001FRT6	1k Ohms
R10	Dale	CRCW08051073FRT6	107k Ohms
R13	Dale	CRCW080520R0FRT6	20 Ohms
R14	Dale	CRCW08051212FRT6	12.1k Ohms
R16	Dale	CRCW080510R0FRT6	10 Ohms
R17	Dale	CRCW08052212FRT6	22.1k Ohms
R18	Dale	CRCW08057321FRT6	7.32k Ohms
R19	Dale	CRCW08055112FRT6	51.1k Ohms
R2	Dale	CRCW08055903FRT6	590k Ohms
R20	Dale	CRCW08055900FRT6	590 Ohms
R23	Dale	CRCW08051001FRT6	1k Ohms
R3	Dale	CRCW08053322FRT6	33.2k Ohms
R5	Dale	CRCW08052492FRT6	24.9k Ohms
R6	OPEN	OPEN	
R7	Dale	CRCW08051000FRT6	100 Ohms
R8	Dale	CRCW12060R60FRT6	0.6 Ohms
T1	Coilcraft	C1588-A	
U1	National Semiconductor	LM5070	
U2	NEC	PS2501L-1-H	
U3	National Semiconductor	LMV431	

5.0 Layout

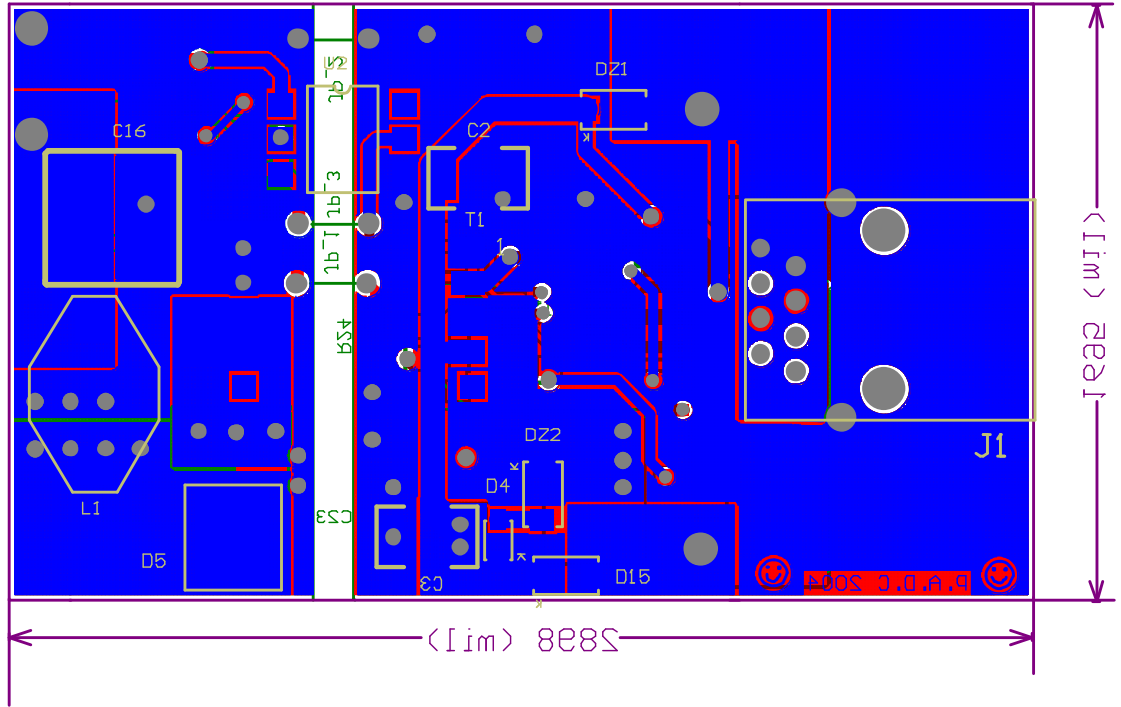


FIGURE 2. Board's Bottom View

PADC_POE_5V_7W_ISO

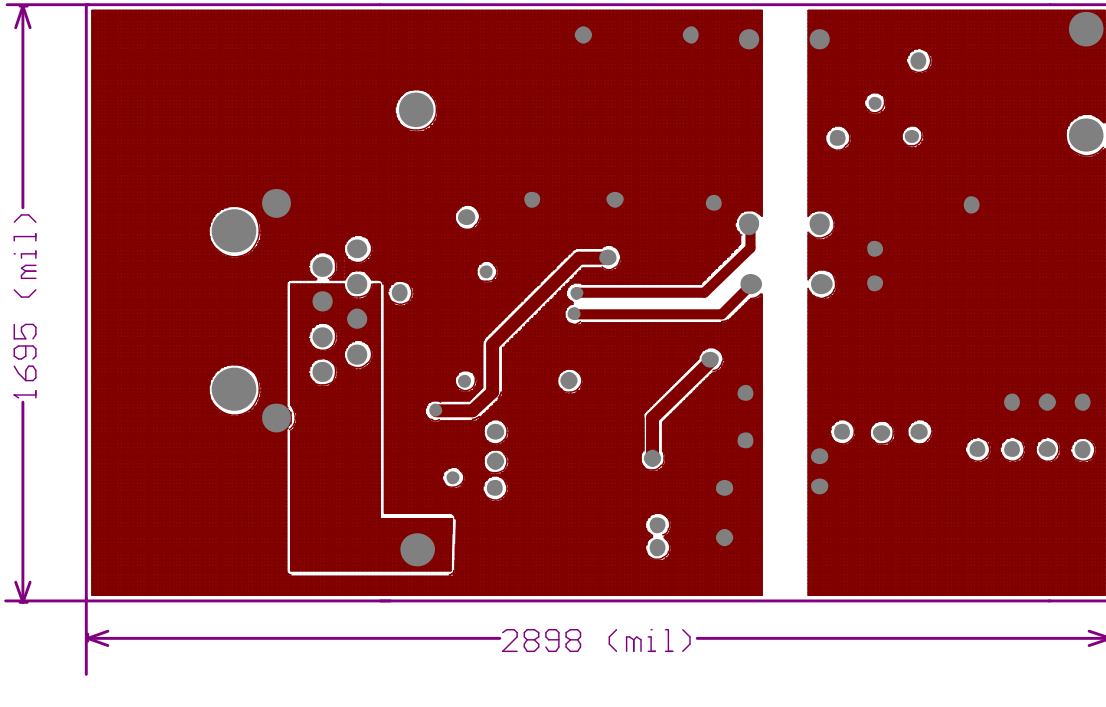


FIGURE 3. LM5070_PoE_pcb_mid1

PADC_POE_5V_7W_ISO_lo_2

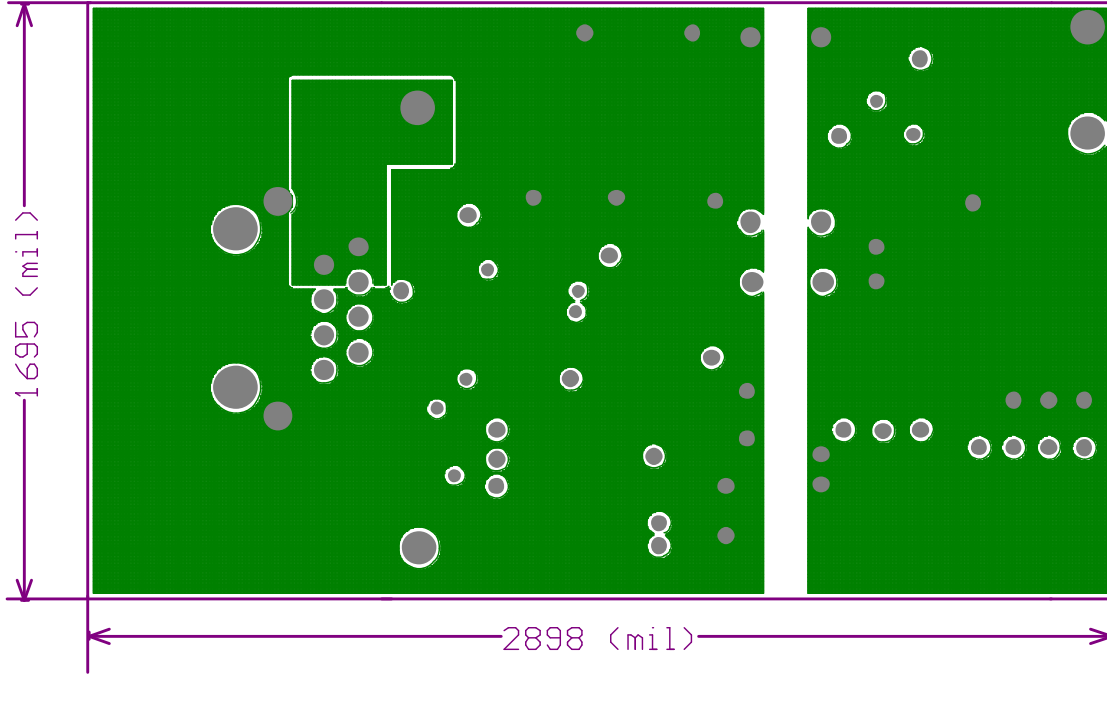


FIGURE 4. LM5070_PoE_pcb_mid2

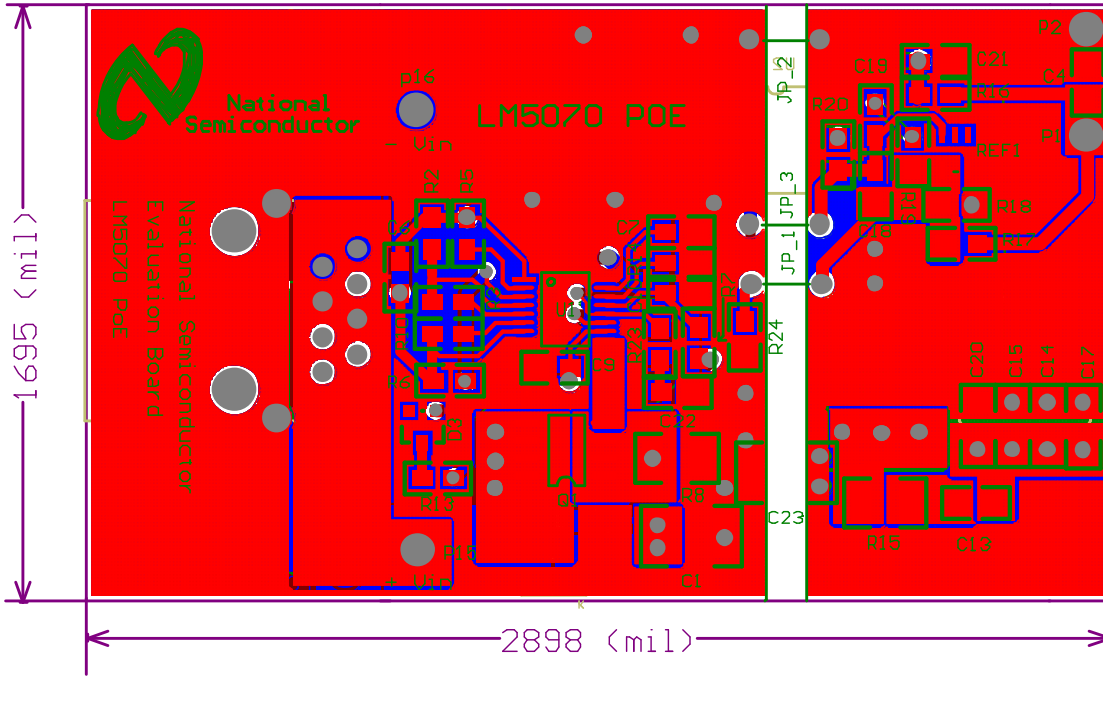
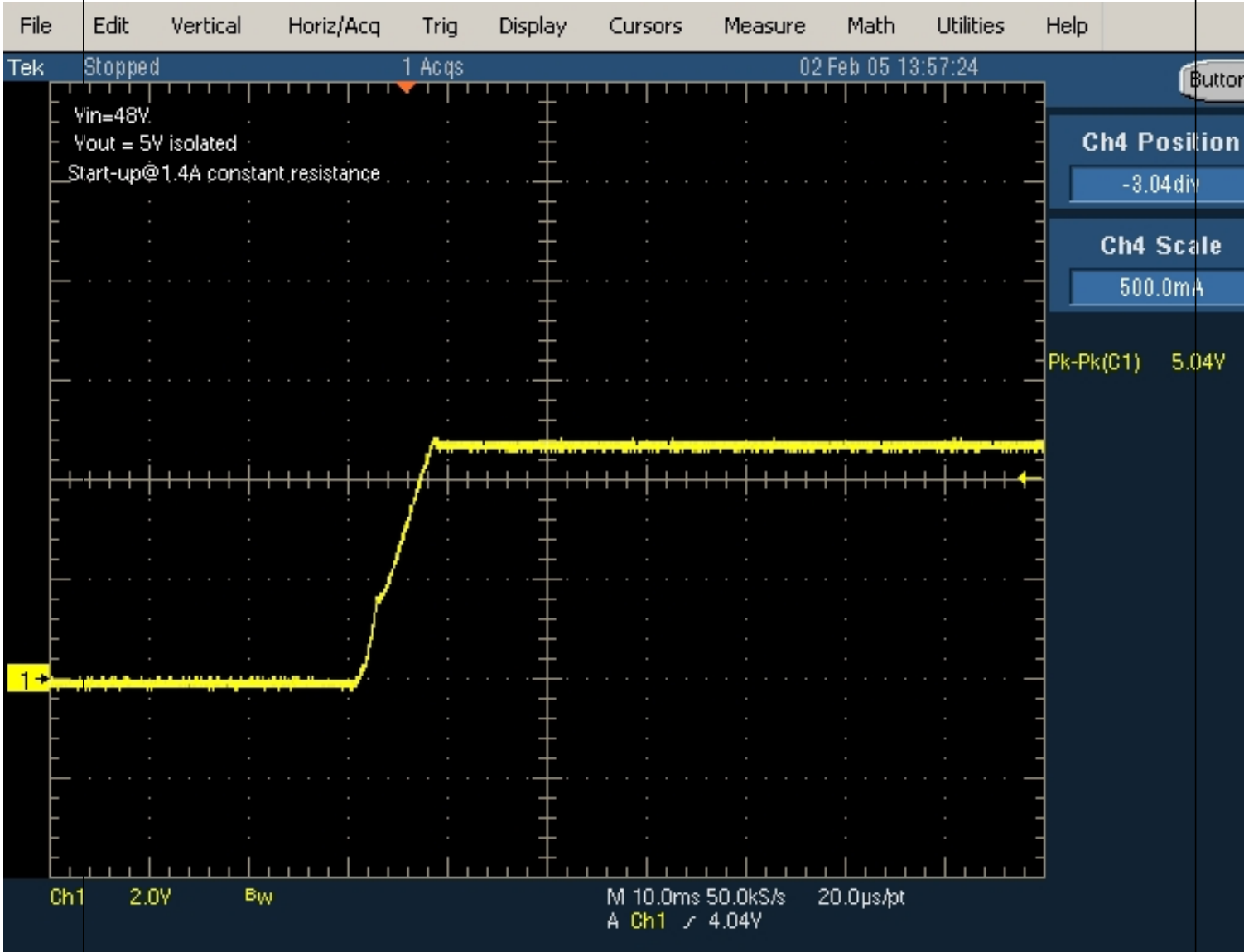


FIGURE 5. Board's Top View

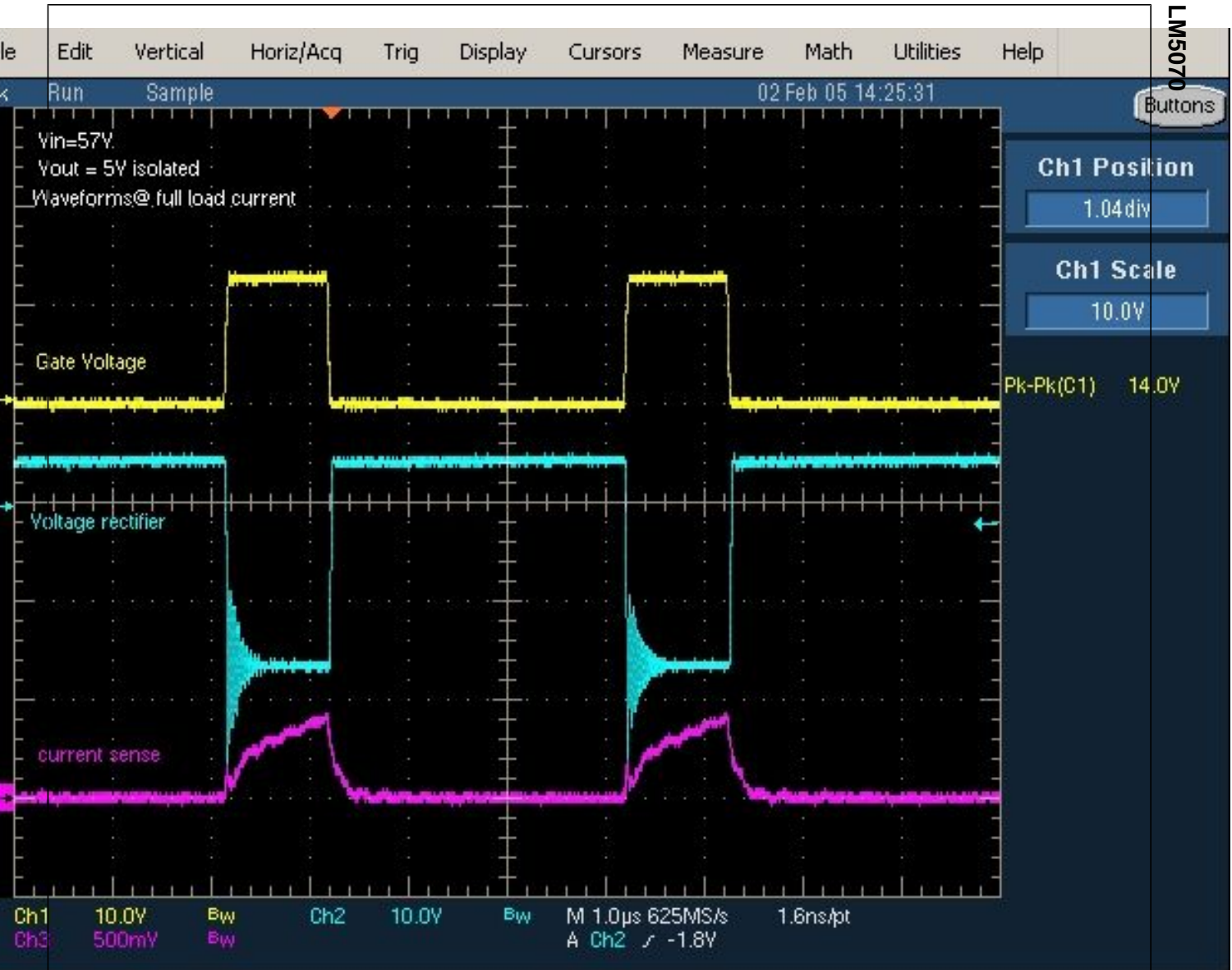
PADC_POE_5V_7W_ISO_0_4

6.0 Waveforms



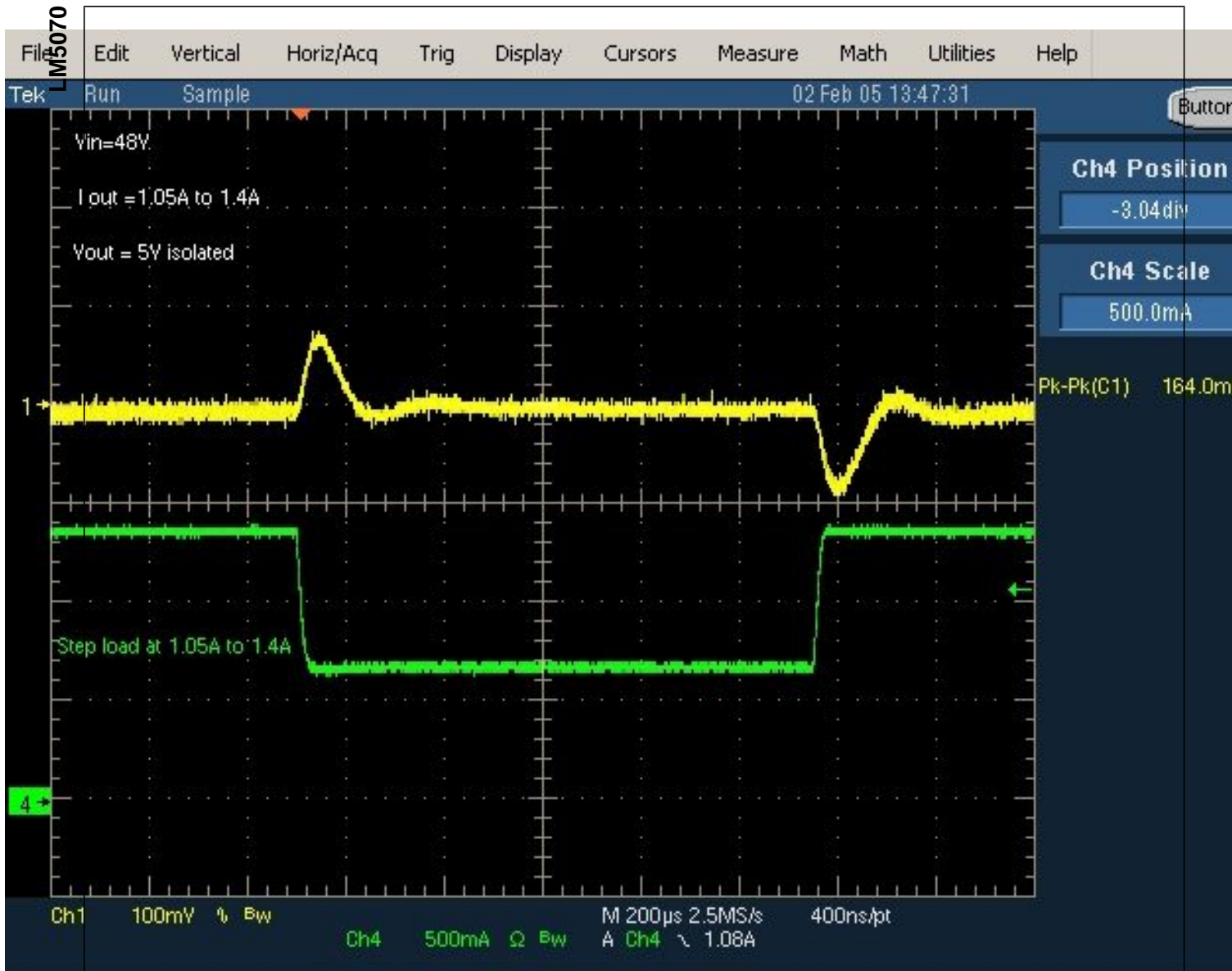
PADC_POE_5V_7W_ISO

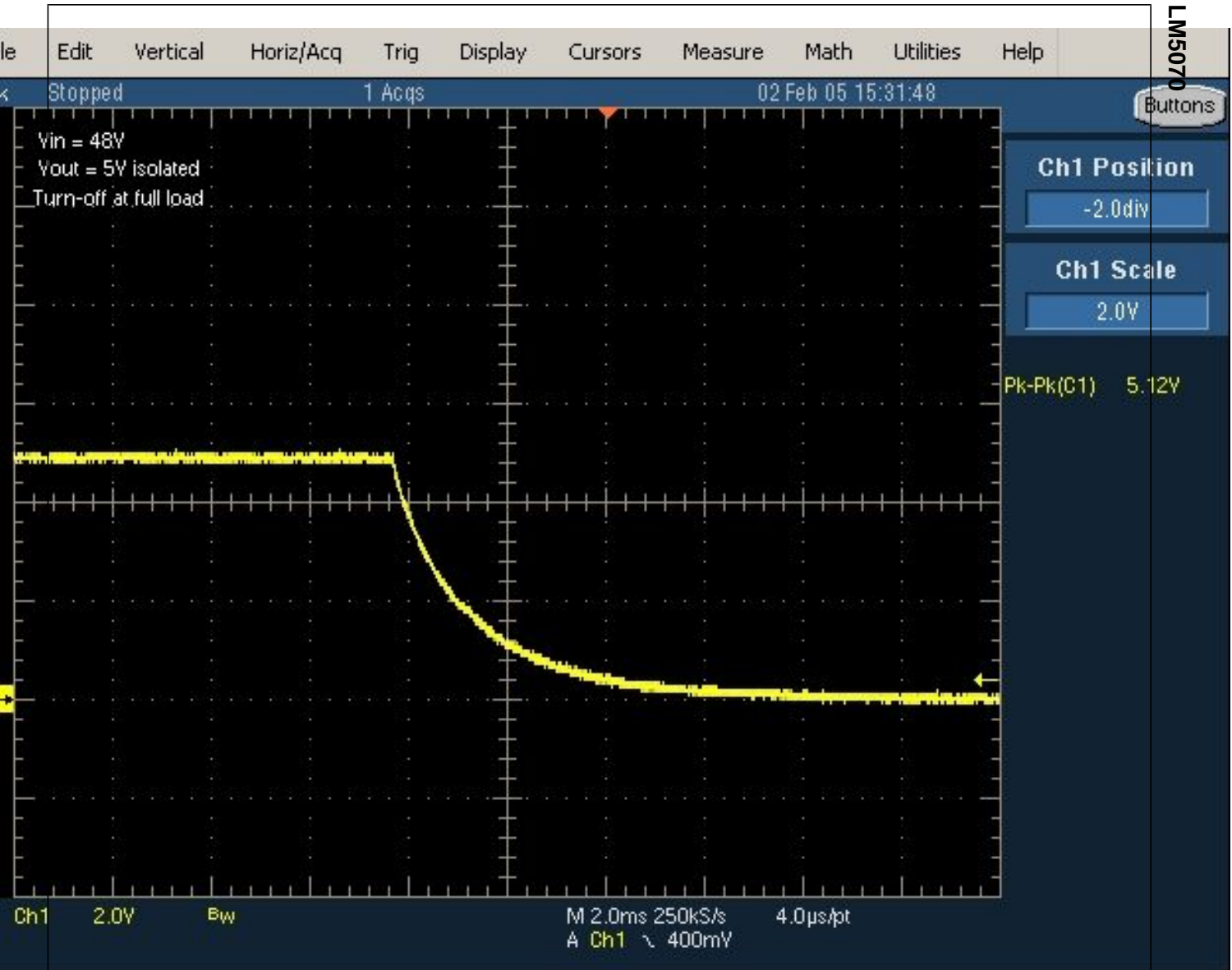
FIGURE 6. Start-up@full load constant resistance



PADC_POE_5V_7W_ISO_wf_6

FIGURE 7. Sw pin waveforms





PADC_POE_5V_7W_ISO_wf_8

FIGURE 9. Turn-off at full load constant resistance load

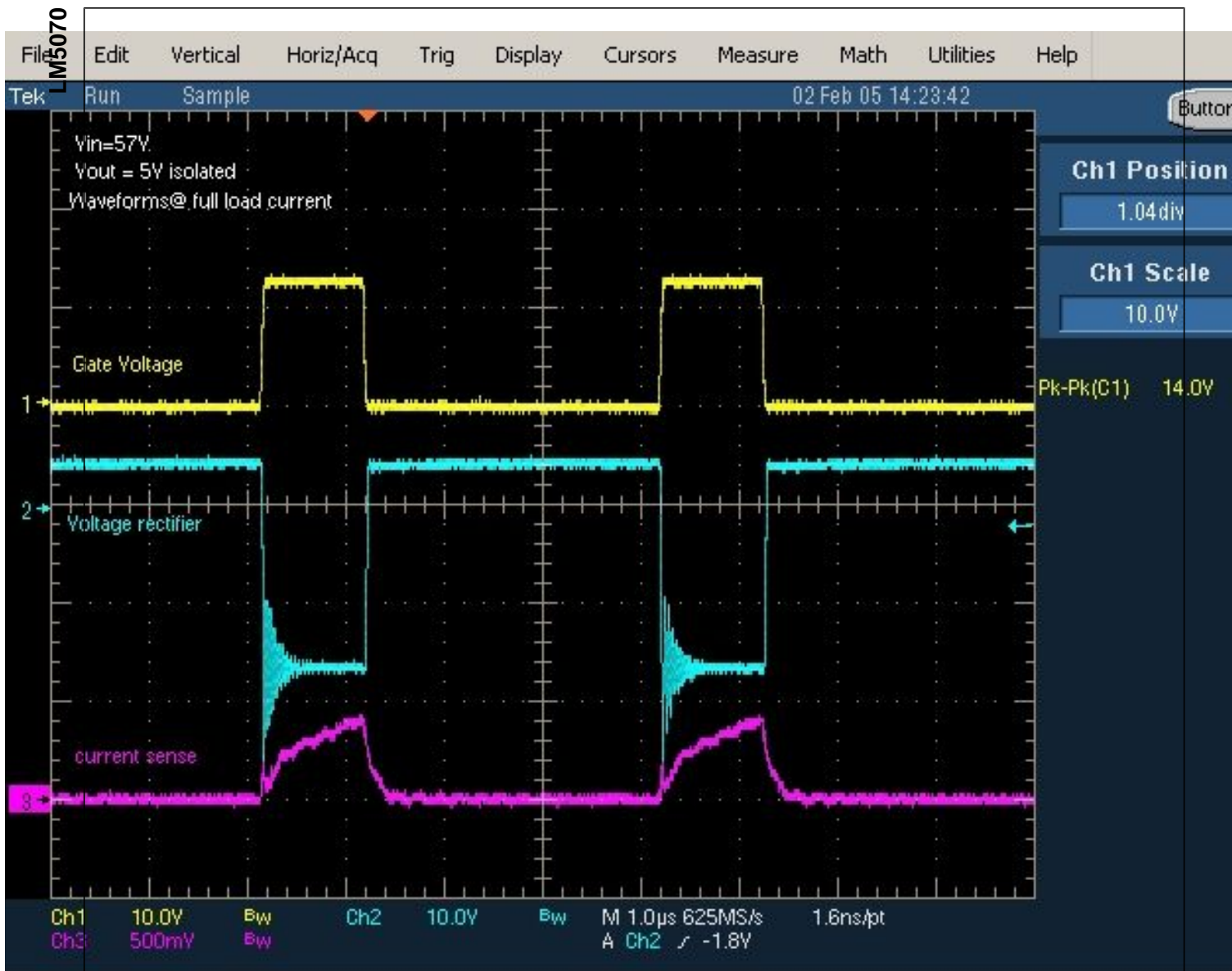
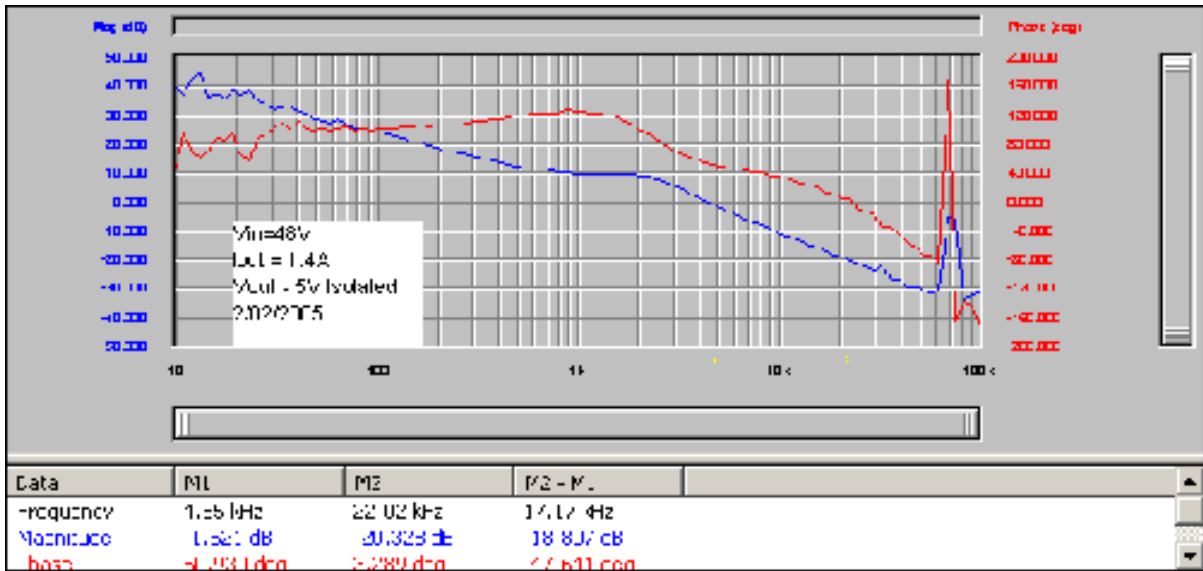


FIGURE 10. Vin = 57V waveforms

PADC_POE_5V_7W_ISC



PADC_POE_5V_7W_ISO_wf_10

FIGURE 11. bode plot

Notes

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