Goal

2.2 Efficiency

The efficiency of this EVM peaks at a load current of about 1.2 A with V_{IN} = 12 V, and then decreases as the load current increases towards full load. Figure 1 shows the efficiency for the EVM. Figure 2 shows the light-load efficiency for the EVM using a semi log scale. Figure 3 and Figure 4 show the efficiency with VOUT adjusted to 3.3V and a 300kHz switching frequency. Measurements are taken at ambient temperature of 25°C. The efficiency may be lower at higher ambient temperatures due to temperature variation in the drain-to-source resistance of the internal MOSFET.

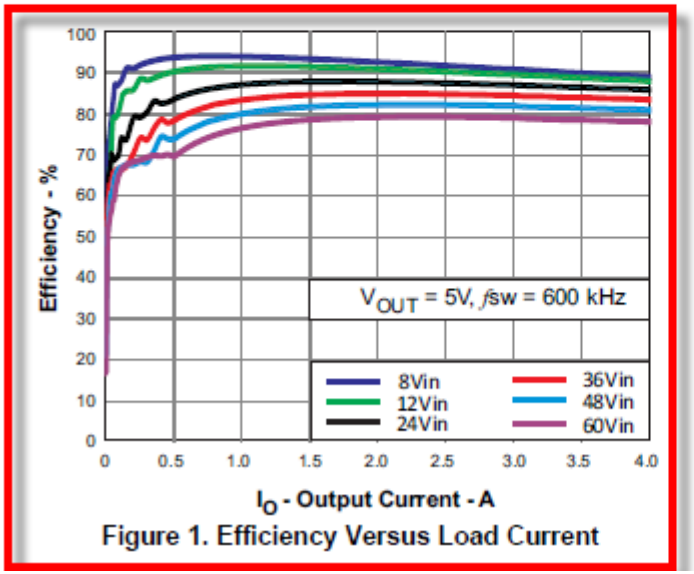


Figure 1. Efficiency Versus Load Current

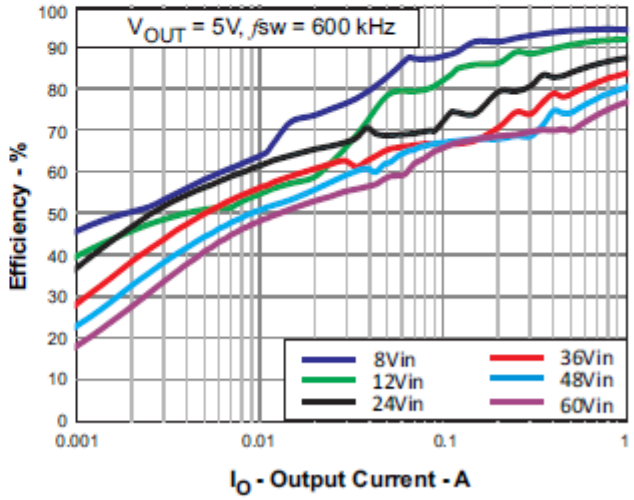
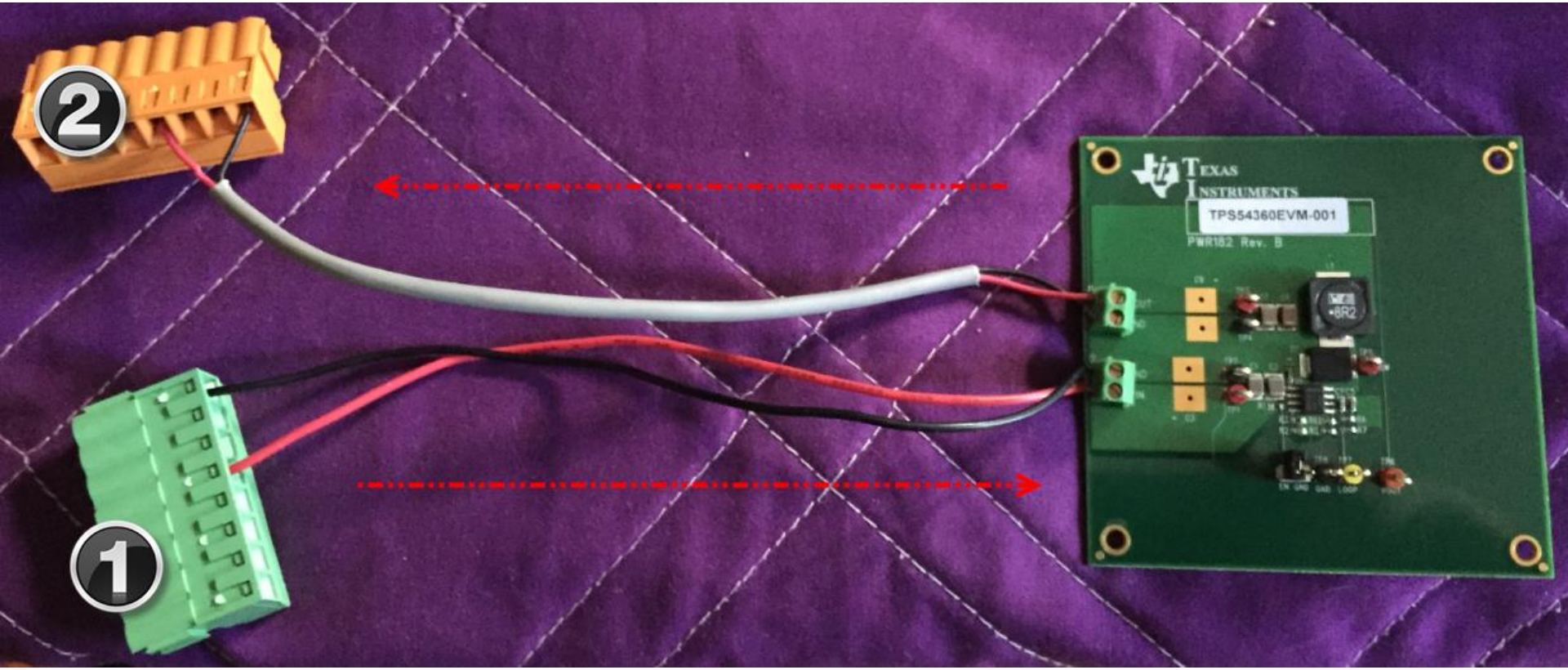
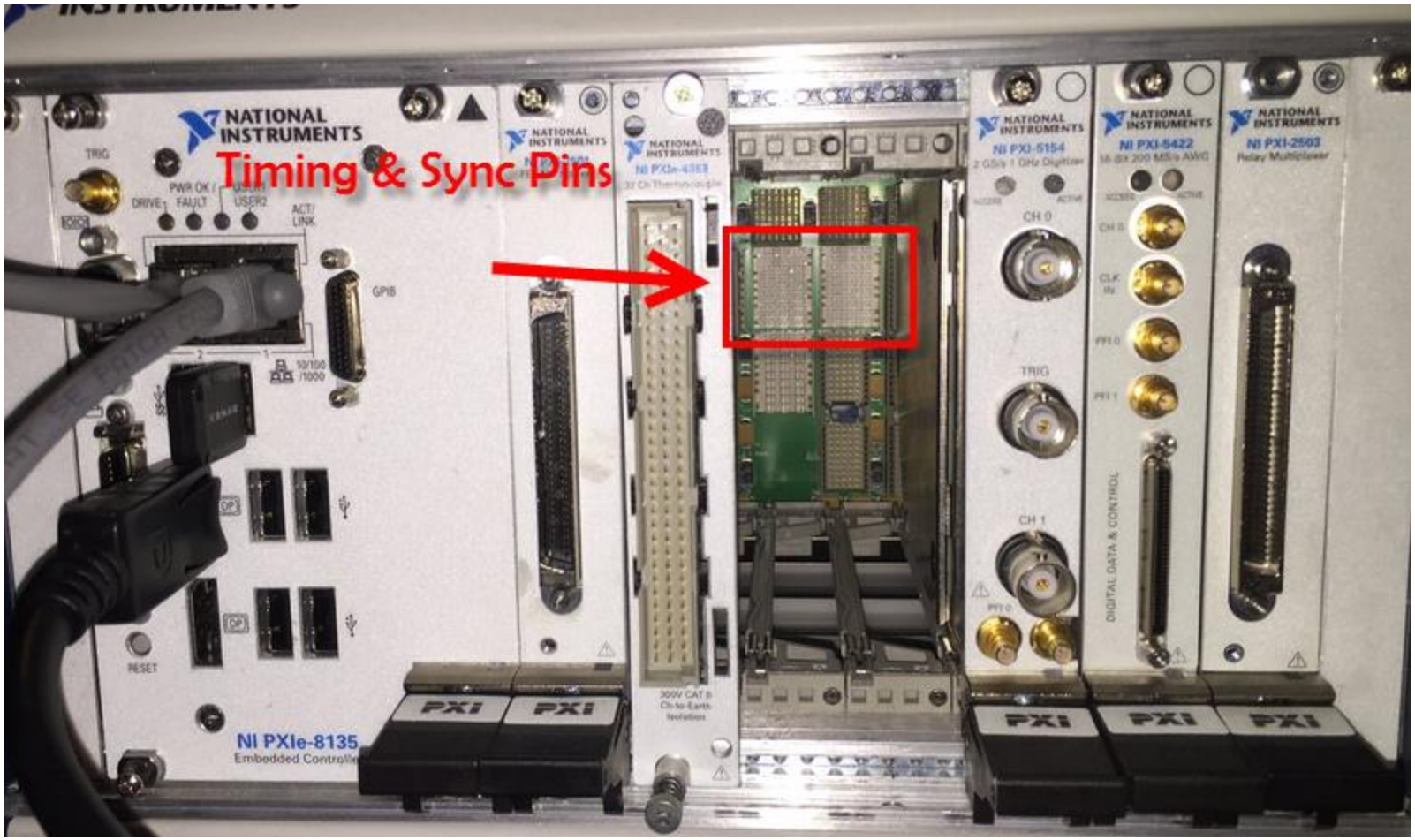


Figure 2. Light-Load Efficiency

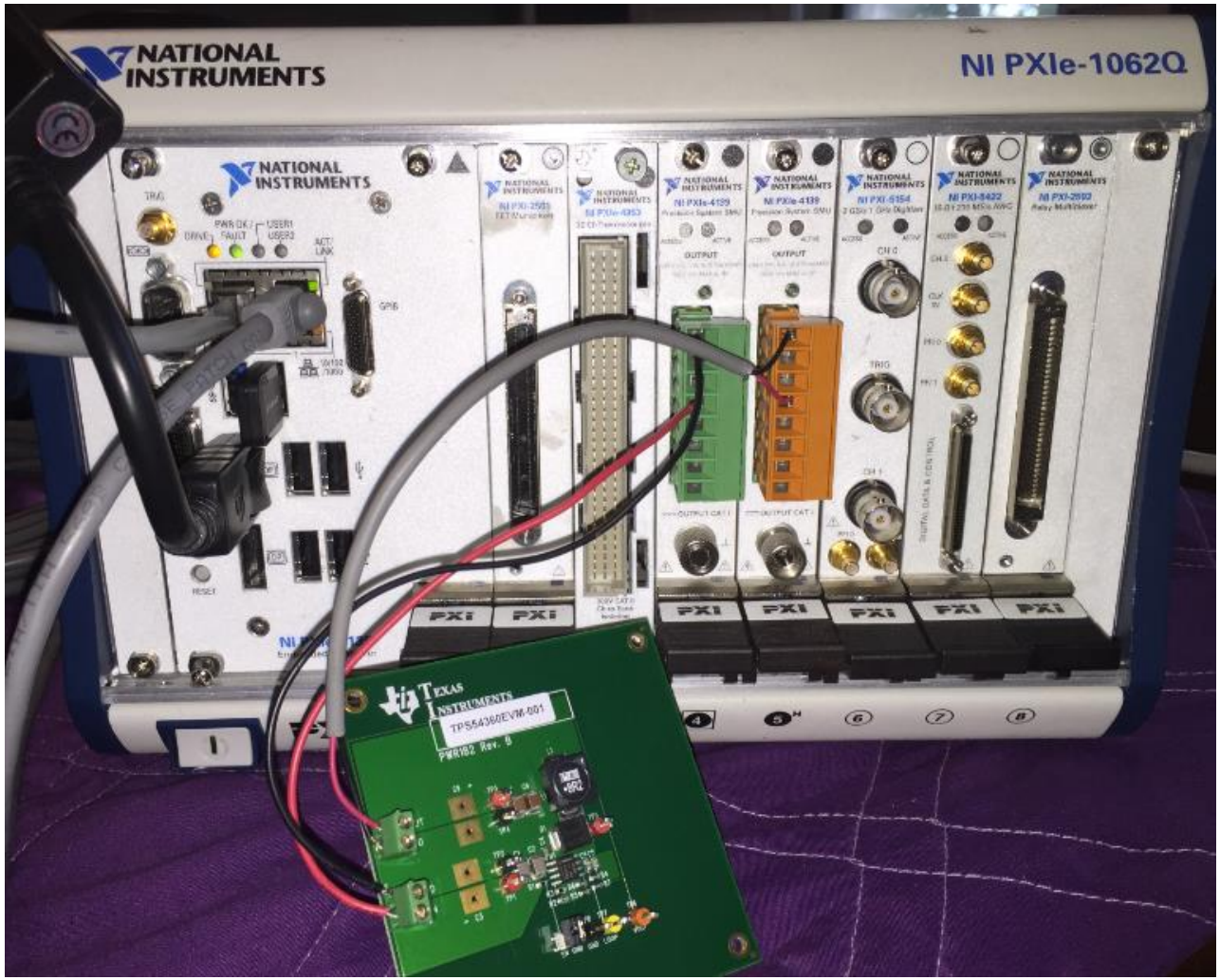
DUT – Not Connected to Instrumentation



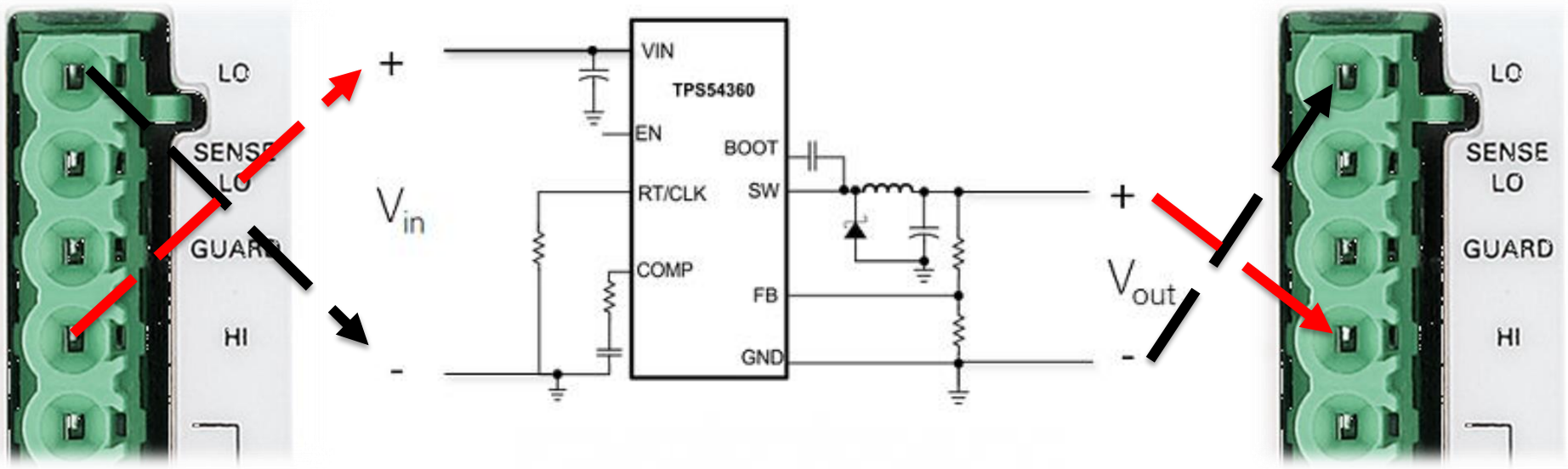
Triggering Backplane - Photo



DUT – Connected to Instrumentation



Wiring to TPS54360



V_{IN} = 8V – 60V

I_{OUT} = 0A – 3A

V_{OUT} = 5V

Components of an Automated Test System

SOFTWARE

HARDWARE

Test Management Software

Test Development Software

Drivers, Services, Hardware Abstraction

NI-DCPOWER

PC or Embedded Controller

PXI Chassis

Switching

Signal Generation

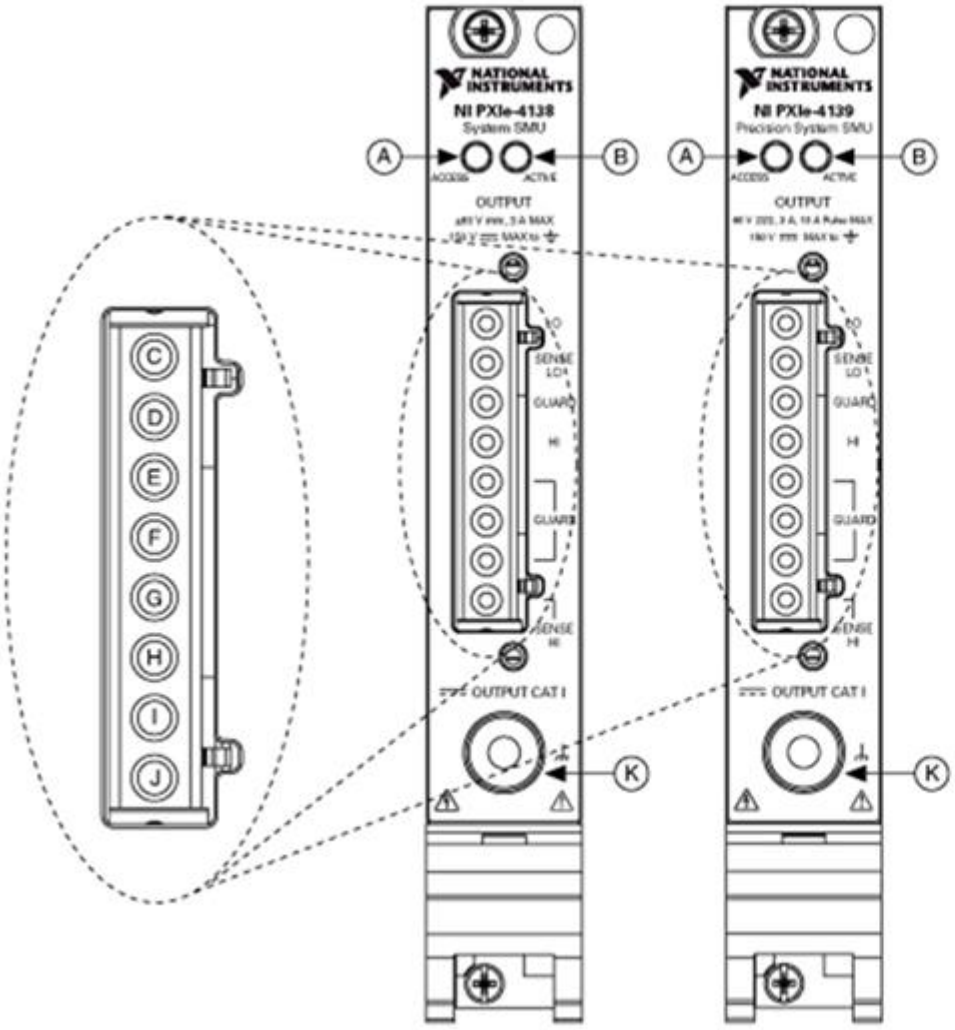
RF Measurements

Bus Interfaces (GPIB/LXI/Serial)

Fixturing/
Mass Interconnects

Appendix

PXIe-4138/9 Connections Break-out



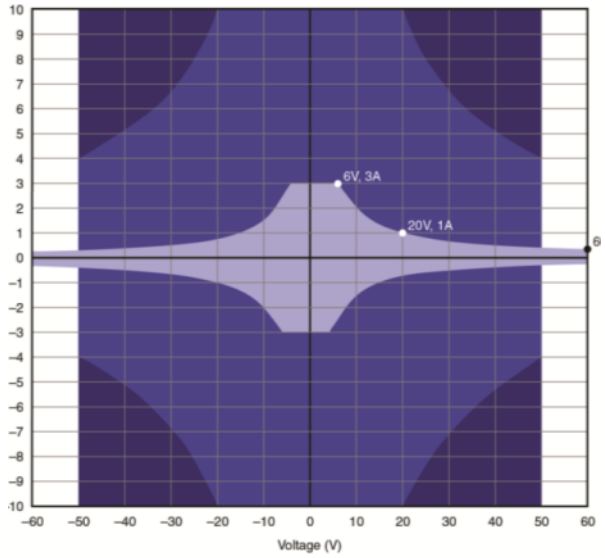
	Item	Description
A	Status Indicator	LED
B	Sense Status Indicator	LED
C	Output Connector, Terminal 0	Output LO
D	Output Connector, Terminal 1	Sense LO
E	Output Connector, Terminal 2	Guard
F	Output Connector, Terminal 3	Output HI
G	Output Connector, Terminal 4	Guard
H	Output Connector, Terminal 5	Guard
I	Output Connector, Terminal 6	Guard
J	Output Connector, Terminal 7	Sense HI
K	Binding Post	Chassis Ground

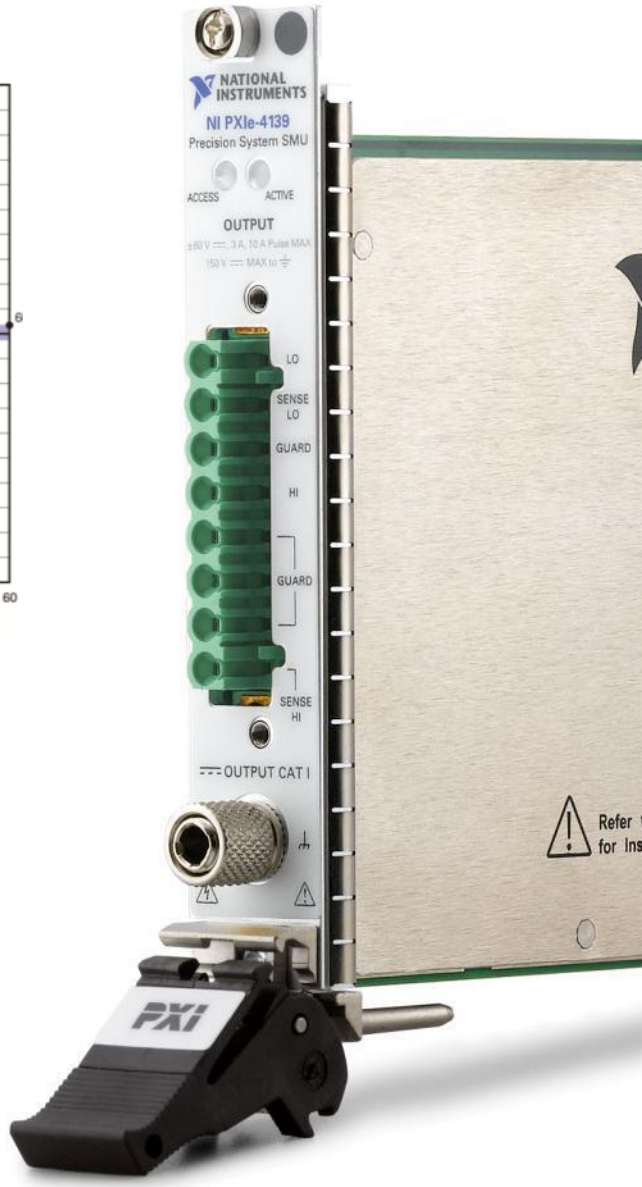
NI 4138/9 System SMUs

High Power, High Precision, High Speed

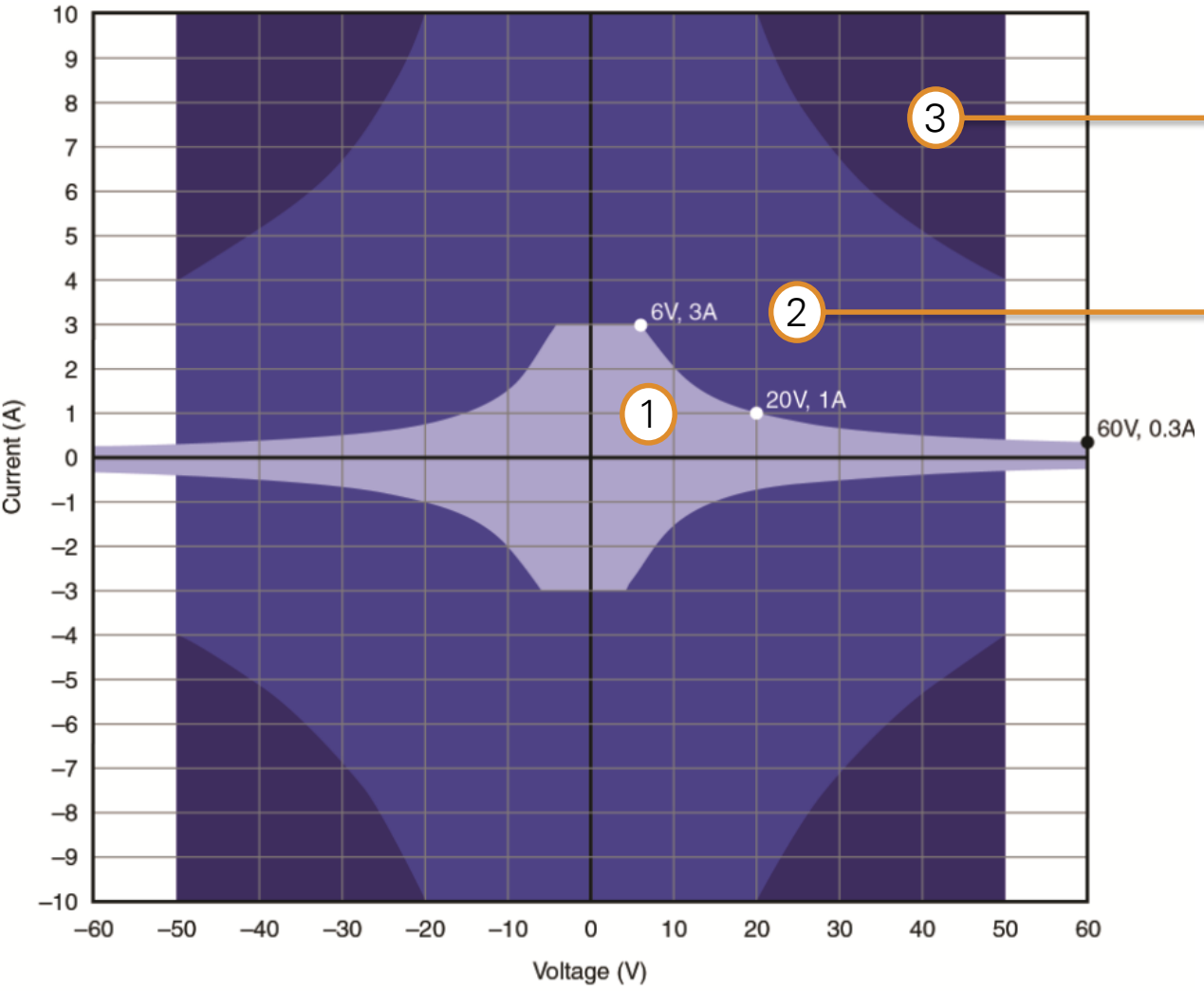
- Max Power:
  - 20 W DC (60 V or 3 A)
  - 500 W Pulse*
- Max Sensitivity:
  - 100 fA*
  - 100 nV*
- Max Speed:
  - Sampling 1.8 MS/s
  - Update: 100 kS/s
- NI SourceAdapt™ Technology*
- Extended Range Pulsing*
- Hardware timing & triggering

*only available on 4139





NI 4139 Extended Range Pulsing



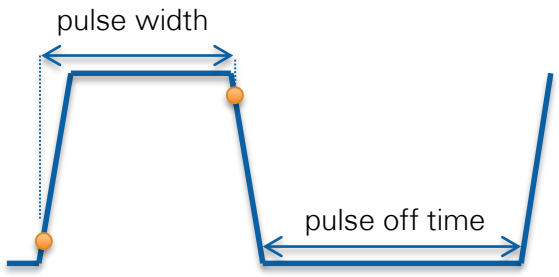
1 DC region

2 3 Pulse only

Max instantaneous power: **500 W**

Note duty cycle limitations in specs

Max instantaneous power: **200 W**



Min pulse width: **50 µs**

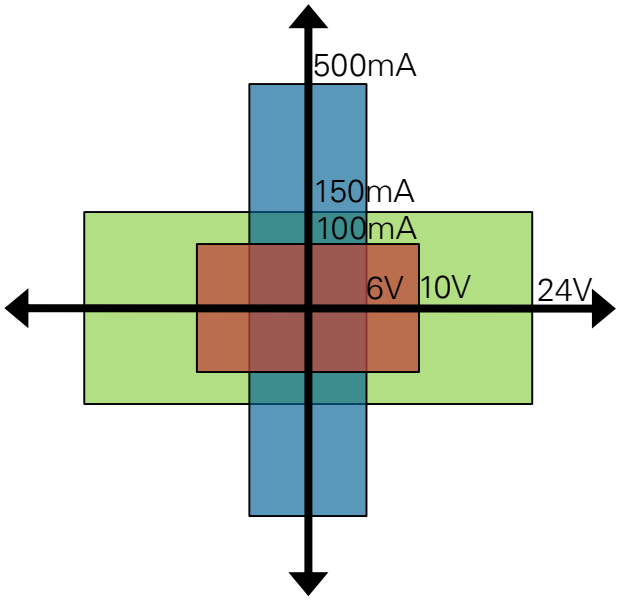
NATIONAL INSTRUMENTS

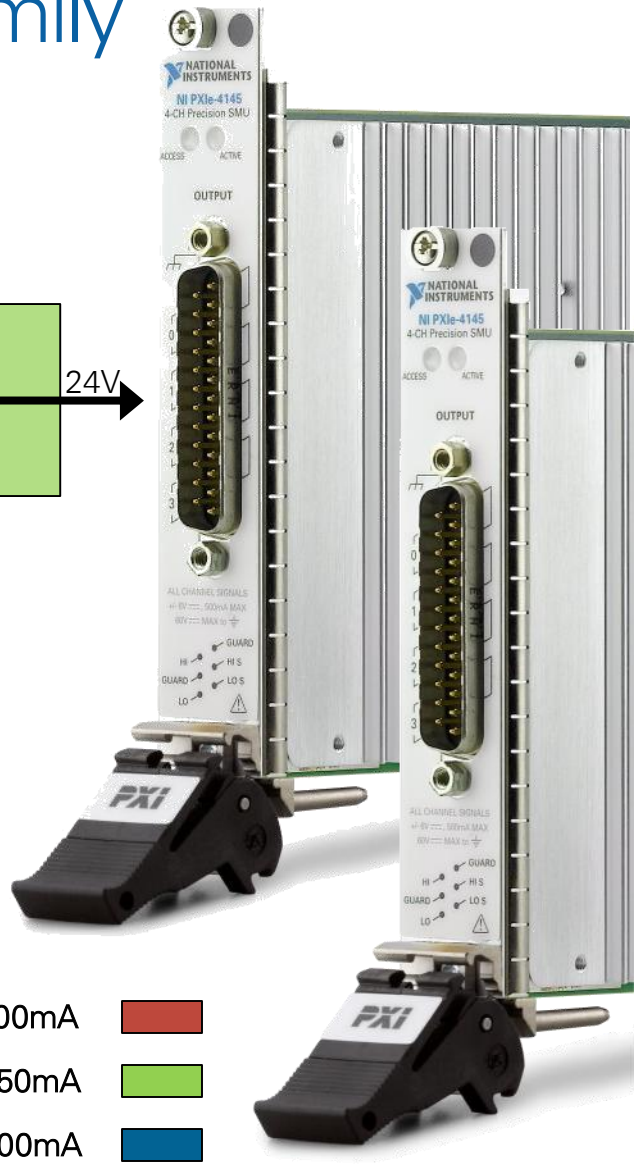



	NI PXI-4130 Power SMU	NI PXI-4132 Precision SMU	NI PXIe-414x Low Cost SMUs	NI PXIe-414x Precision SMUs	NI PXIe-4138/9 System SMUs
Description / Applications	– High power IV sweeps – Component characterization – General purpose SMU	– Low-power leakage test – Semiconductor characterization	– 4-SMU Channels – Semiconductor High pin count test	– 4-SMU Channels – Semiconductor High pin count test	– Wide IV sweeps – High power pulsing – High precision measurements
Max Voltage	± 20V	± 100V	± 10 V – 24 V	± 24V	± 60 V
Max Current	± 2A	± 100mA	± 100 mA – 500 mA	± 150mA	± 3 A, 10 A Pulse*
Max Power	40 W	2 W	1-3 W	1-3 W	20 W, 500 W Pulse*
Max Sampling	3 kS/s	4.2 kS/s	600 kS/s	600 kS/s	1.8 MS/s
Max Update	3 kS/s	3.5 kS/s	100 kS/s	100 kS/s	100 kS/s
Current Sensitivity	1 nA	10pA	100-150 pA	10-15 pA	100 fA*
Guarding	No	Yes	Yes	Yes	Yes
Timing/Triggering	Software Only	SW or HW	SW or HW	SW or HW	SW or HW
SourceAdapt?	No	No	No	Yes	*PXIe-4139 only
Channel Density	17	17	68	68	17
Output Disconnect	No	Yes	No	No	Yes

PXIe-414x High Density SMU Family

- 4-channel Precision SMUs
- IV boundary
  - 10 V, 100 mA (4140/1)
  - 24 V, 150 mA (4142/3)
  - 6 V, 500 mA (4144/5)
- Current Sensitivity
  - 10-15 pA for 4141/3/5
  - 100-150 pA for 4140/2/4
- Speed
  - 600 kS/s maximum sampling
  - 100 kS/s update rate
- SourceAdapt Technology
- 68 channels in a PXI chassis





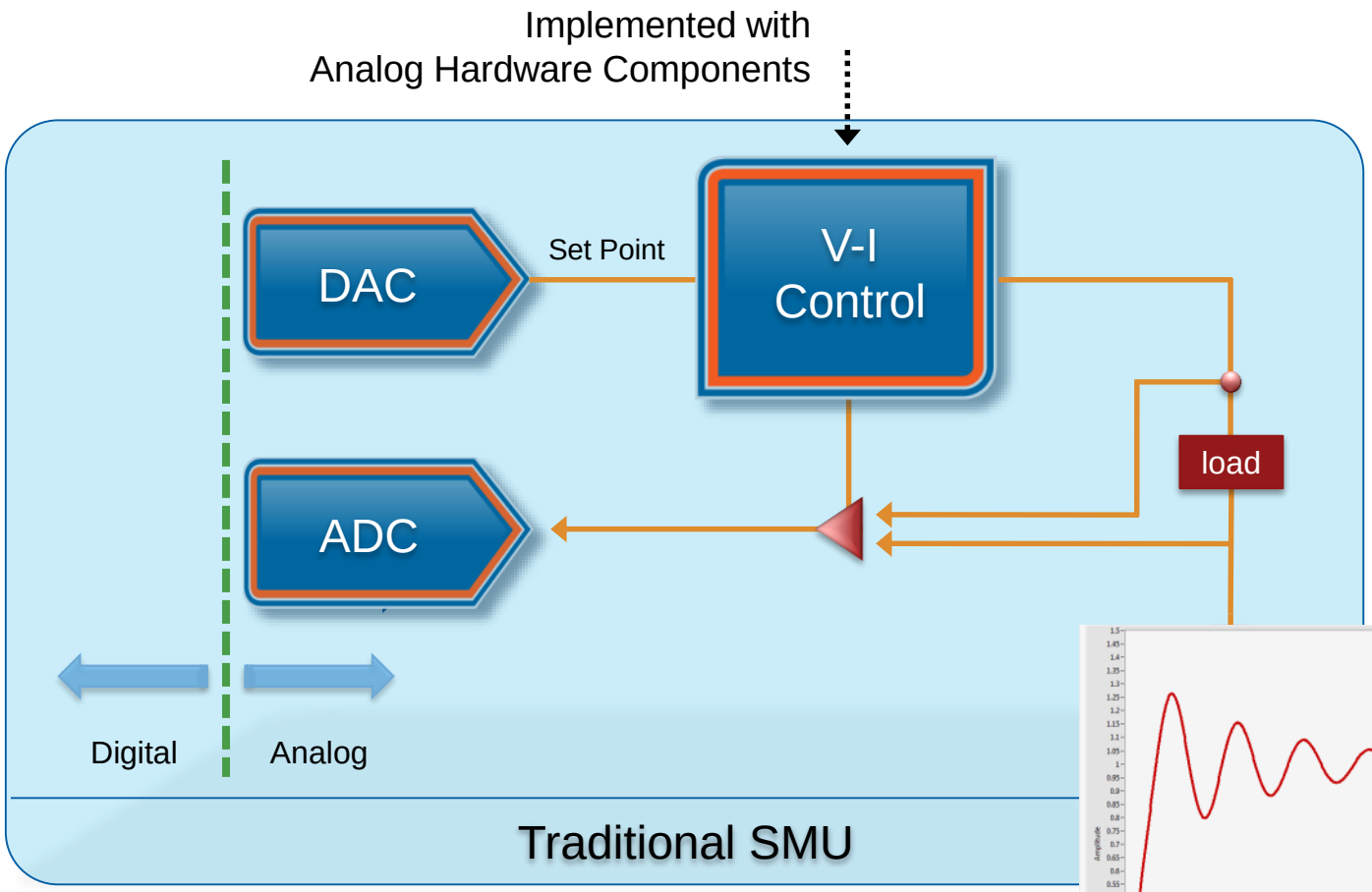
PXIe-4141 10V, 100mA

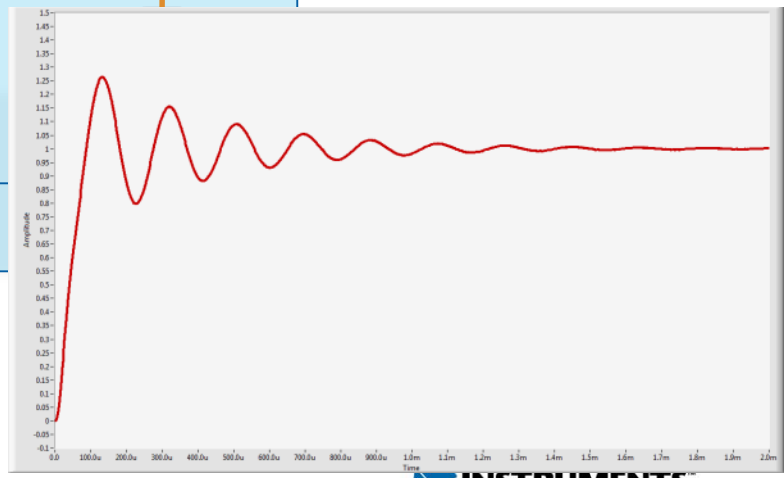
PXIe-4143 24V, 150mA

PXIe-4145 6V, 500mA

NI SourceAdapt™ Technology

Limitations of Traditional SMUs





NI SourceAdapt™ Technology