
PULSE IV SYSTEM

(AM3100 SERIES 3)



www.amcad-mw.com

SYSTEM CATEGORY :

COST EFFECTIVE PULSED SMU

System description

The AM3100 is a standalone Pulsed IV system for Pulsed Load Pull and general-purpose test pulsed applications. AM3100 PIV systems are used to bias transistors or circuits in pulsed conditions to avoid self-heating and ensure quasi-isothermal conditions during the measurements.



MAIN FEATURES

- Compact and efficient design
- Embedded power supplies
- Cost effective pulsed DC supply and measurement solution
- Synchronization capabilities for multiple instruments measurements
- Pulsed or DC operation, pulse width down to 1.1s from the generators.
- Extended stop conditions and built-in protection for enhanced safety.
- Long pulses into the tens of seconds for trapping and thermal characterization.
- External synchronization for precise control with third party instruments.
- Multi-stage device testing by connecting systems in series for synchronizing pulses and measurements.
- Remote control through LAN or USB
- Direct hardware programmability
- Plug and Play with IVCAD Suite (Dassault Systèmes software)

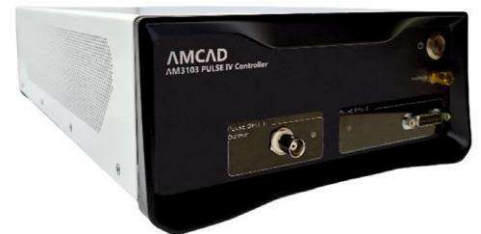
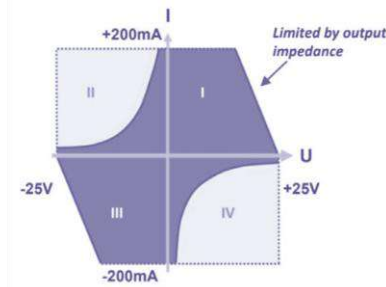
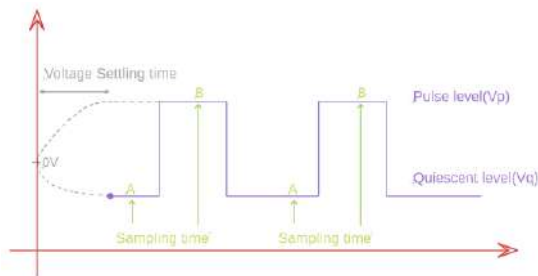
TYPICAL APPLICATIONS

- Basic Pulsed IV
- Pulsed S-Parameters
- Long Pulses
- Pulsed Load Pull

AM3111 PULSE SMU $\pm 25V \pm 0.2A$

Embedded inside the AM3103 main controller, the Gate Pulse SMU presents the following characteristics:

- **4-quadrant DC or Pulsed voltage source.**
- **Simultaneous voltage and current sampling.**
- **Pulse and Quiescent level sampling time points can be chosen automatically by the source or manually by the user.**
- **1 voltage range: $\pm 25V$**
- **2 current ranges: $\pm 5mA$ and $\pm 200mA$**
- **No transient when powering on/off or switching on/off**
- **Output on isolated BNC connector**
- **Operating range: DC = dark area, Pulsed = dark + light areas**



Parameters	Conditions	Min	Max
Voltage programming Range (V_p = Pulse voltage V_q = Quiescent voltage)	$ V_p - V_q \leq 30V$	-25V	+25V
Output Current	Threshold current breaker @ 260mA	-200mA	+200mA
Output Power	Source, DC		3W
	Sink, DC		0.5W
Voltage programming resolution	16 bits	1mV	
Voltage programming accuracy		50mV+0.2%	
Voltage settling time (pulse or quiescent level change)	Full step	100ms	

Timing Specifications

Parameters	Conditions	Min	Max
Pulse frequency		0.1Hz	200KHz*
Duty Cycle		0%	100%
Pulse width		1.1µs	10s
Pulse Voltage settling time	No Load 0% to 95% pulse	100ns	
Time resolution		20ns	
Current breaker timing	Threshold ±260mA (if exceeded, stops the system)	60ns	

* Maximum Frequency of the system also depends on the maximum frequency of the Drain probe (worst case of both)

Measurement Specifications

Parameters	Conditions	25V range	200mA range	5mA range
Resolution	16 bit	0.9mV	7µA	170nA
Noise floor, no load, 1 sample	C-C	±2mV	±30µA	±5µA
Settlingtime	95%	0.5µs	0.5µs	1µs
	To ADC resolution	2µs	2µs	4µs
Accuracy	Offset + % of reading 2years	7.5mV + 0.1%	100µA + 0.2%	10µA + 0.2%

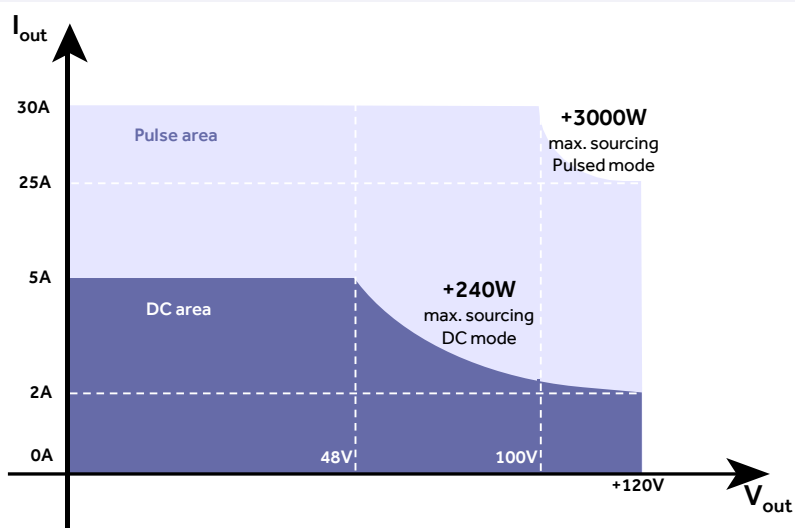
Internal RCL elements specifications

Parameters	Conditions	Value
Output impedance	Source ON	50Ω
	Source OFF	50mΩ
Resistance between GND and Earth		50KΩ
Capacitance between GND and Earth		100nF
Voltage isolation between GND and Earth		±50V MAX

AM3121 PULSE SMU +120V +30A

The AM3121 Pulse SMU is a power probe dedicated to bias the transistor drain (Positive voltages). Optimized for high power pulsed measurements applications (120V, 30A), this probe head embeds a current breaker and can be used either for Load Pull applications or general-purpose pulsed SMU. The S_{trig} signal performs overall synchronization of start, stop, and emergency stop. Using either constant level or pulsed mode, the P_{trig} signal performs overall synchronization of the power pulse, the measurement sampling time and the transient mask.

- **Isolated DC voltage source**
- **Fast toggling current and power limitation**
- **2-quadrant, source & sink operating area**
- **18-bit voltage programming, no missing code**
- **Safe charging and discharging of any load capacitor**
- **No transient when powering on/off**



Parameters	Conditions	Min	Max
Pulse Voltage programming range	Quiescent voltage = 0V	0	+120V
Current	Pulsed		30A
	Average and DC		5A
Output Power	Pulsed		3000W
	DC		240W
Voltage programming resolution	18 bits	0.5mV	
Voltage programming accuracy		+/-40mV +/-0.1%	

Timing Specifications

Parameters	Conditions	Min	Max
Pulse frequency		0.1Hz	100KHz
Duty Cycle		0%	100%
Pulse width		1.1µs	10s
Pulse Voltage settling time	No Load 0% to 95% pulse	50ns	
Time resolution		20ns	
Voltage drop rate during pulse	30A	1.5V + 4V/ms	

Measurement Specifications

Parameters	Conditions	125V	33A
Resolution	16 bit	2.1mV	550µA
Noise floor, no load, 1 sample		+/-15mV	+/-2mA
Settlingtime	95%	0.5µs	0.5µs
	To ADC resolution	2µs	2µs
Accuracy	Offset + % of reading 2years	20mV + 0.1%	20mA + 0.3%

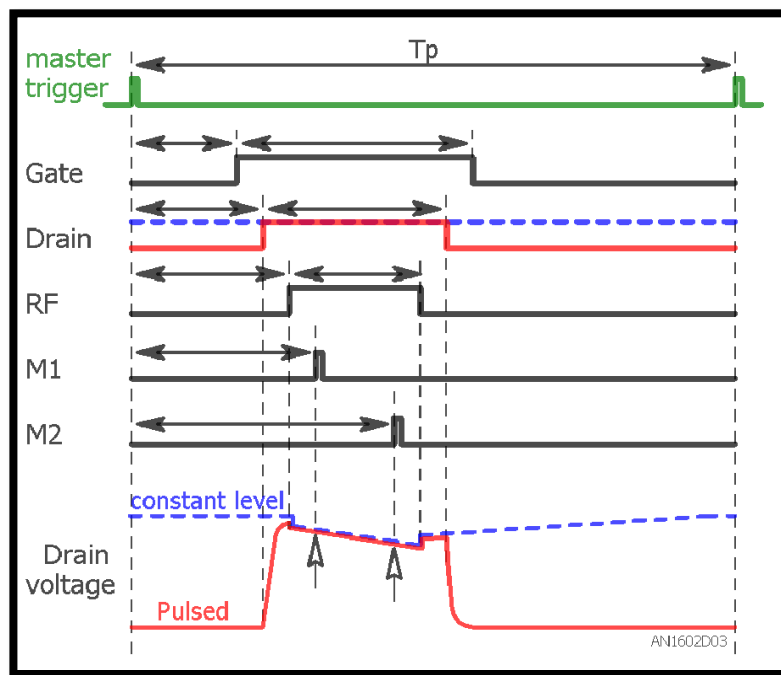
Internal RCL elements specifications

Parameter	Conditions	Value
Output impedance		0.1Ω
Storage Capacitor		6.8mF
Resistance between GND and Earth		220KΩ
Capacitance between GND and Earth		100nF
Voltage isolation between GND and Earth		120V MAX

Protections - Current breaker

Parameter	Conditions	Value
Response time		100ns
Current breaker programming range thresholds		1A to 33A
Current setting resolution	12 bits	10mA
Current setting accuracy	Offset + % of current	200mA + 0.5%

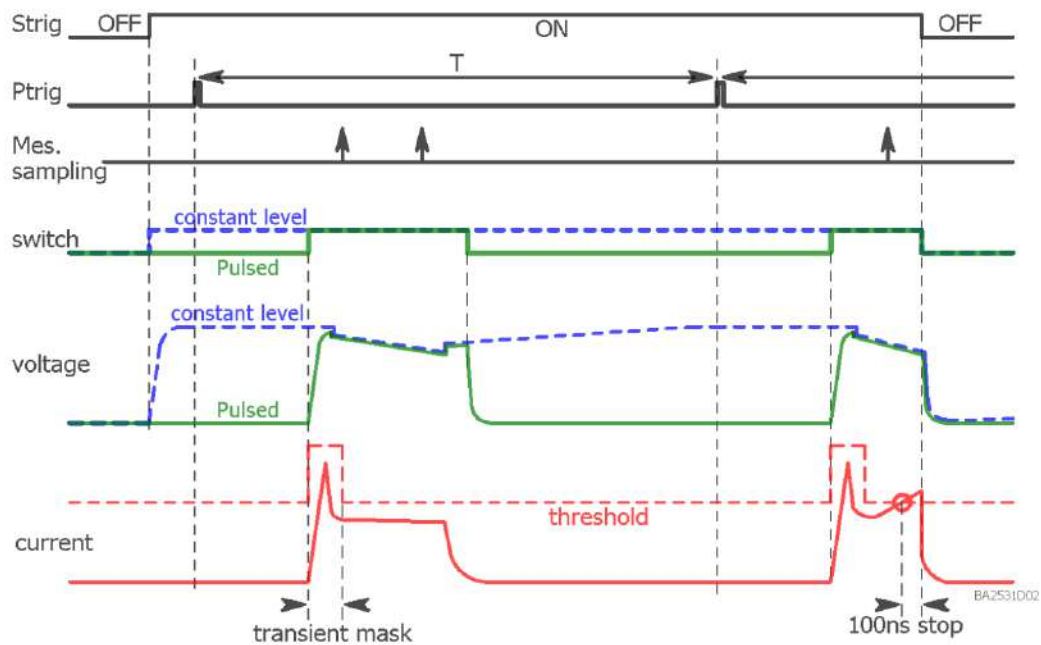
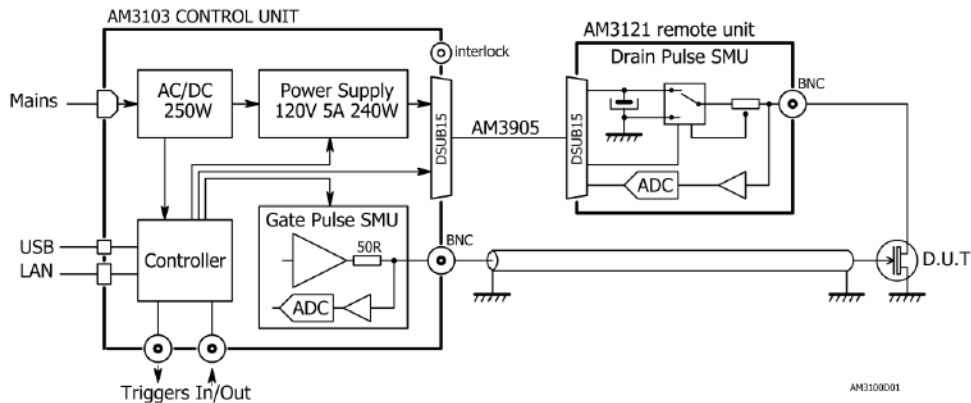
Measurement principle



Two measurements are performed per period (M1 & M2). The measurement times are configurable according to certain conditions :

- **$M2 > M1$**
- **$M2 - M1 > 2\mu s$**
- **$M2 \leq \text{Period} - 2\mu s$**

System Schematic and timing specifications

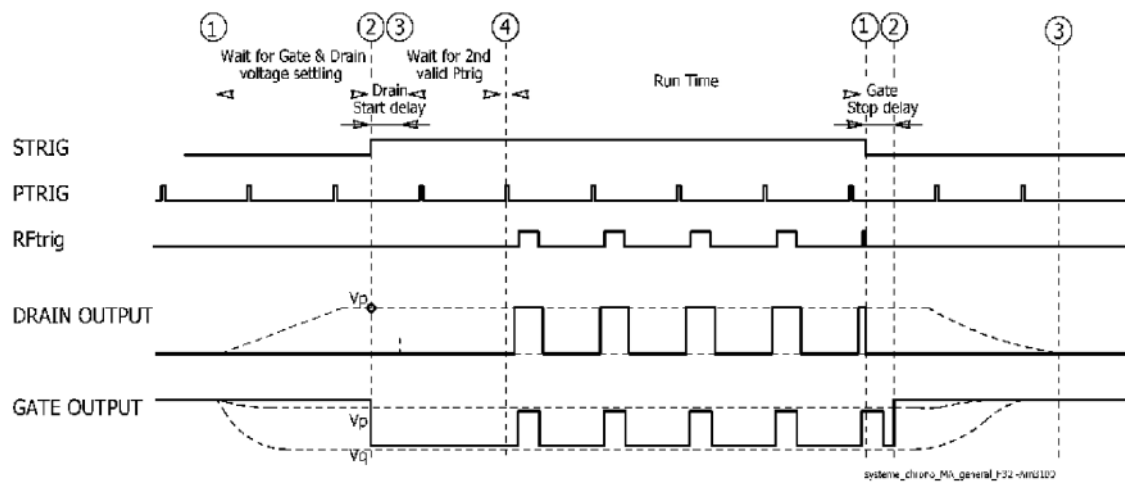


Parameter	Conditions	Min	Max
Period range (T)		0.1Hz	200KHz*
Period resolution			1μs
Pulse and Delay resolution			20ns
Time Delay from Ptrig		190ns	210ns
Update rate between 2 measurements		>>15ms	

* Maximum Frequency of the system also depends on the maximum frequency of the Drain probe (worst case of both)

SYSTEM SPECIFICATIONS - synchronization

SYNCHRONIZATION	
Pulse Trigger Input (Ptrig-in)	Starts the internal pulse generator (Ptrig) using external instrument
Pulse Trigger Output (Ptrig-out)	Generates a pulse ($>2\mu s$) from Ptrig. Used to synchronize external instrument.
Measurement Trigger Input (Mtrig-In)	n.a
Measurement Trigger Output (Mtrig-Out)	Generates a pulse corresponding to the measurement window from Mtrig. Used to synchronize external instrument.
Synchronization Trigger Input (Strig-In)	Triggers an alarm if Strig-In=0 when output ON.
Synchronization Trigger Output (Strig-out)	Image of internal Strig. Used to synchronize multiple connected systems.
RF Trigger Output	Generates TTL configurable width pulse in order to drive RF modulator



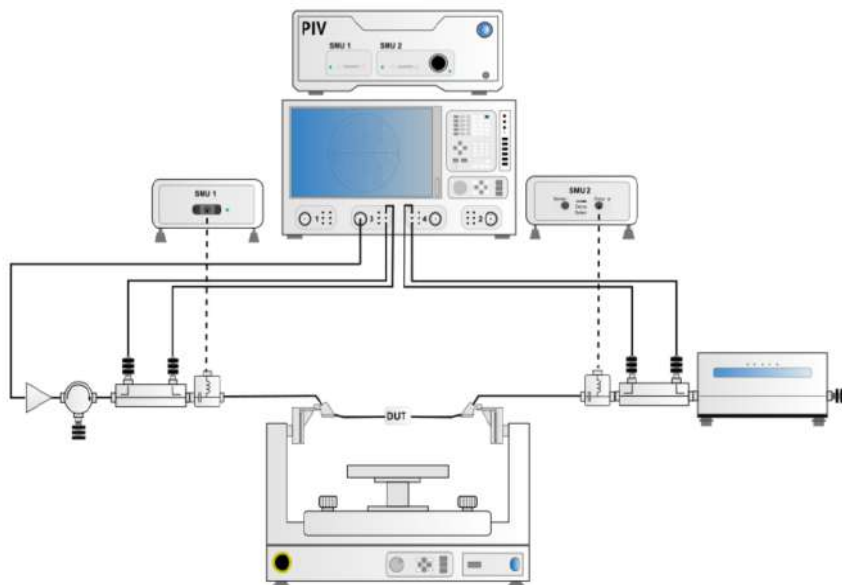
Start and Stop phases chronogram

Pulsed DC and RF Load Pull bench architecture

Power amplifiers are often driven by pulsed RF signal combined with continuous or pulsed DC bias conditions. This brings some complexity to the bench configuration. Indeed, even when continuous DC voltages supplies are used, the pulsed RF signal magnitude will drive the transistor consumption in pulsed mode also, if the PA operates in saturated area.

In order to measure the peak current and evaluate the peak efficiency, there is a need for synchronized pulsed IV and pulsed RF measurements.

In terms of measurement speed and system integration, the AM3100 PIV system will replace advantageously complex measurement architectures made of DC multimeters or external oscilloscope combined with external DC supplies.



Load pull bench with probe station - IVCAD

Warranty

Any AMCAD product comes with a two-year parts and labor warranty, when returned to our workshops. A phone support service is also available for the same period.

At the end of the initial two-year period, a further contract can be subscribed, including:

- a preventive functional check and calibration of the modules (onsite or in our workshop)
- a further two-year warranty period

Quality Regulations & Environment

The PIV System and all modules are compliant to the applicable European directive and hold the CE mark.

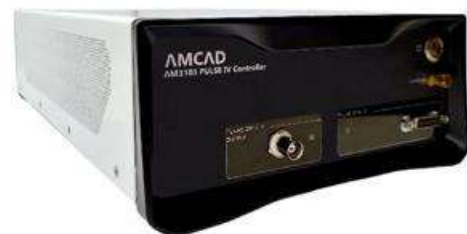
- ISO/CEI 17025 compliant calibration for any DC source or measurement module, calibration certificate provided.
- Serial number-based life cycle management
- All products are 100% tested (test reports provided)

- AMCAD only uses RoHS compliant components and does not use substances banned by the COSHH regulation.
- AMCAD complies with the relevant national regulations related to the safety and health of its employees against hazardous substances.
- The protection degree of the PIV system is IP20 according to CEI 60529.

Probe dimensions (mm)

AM3103 + AM3111 (integrated in the AM3103)

- Weight : 4.58kg (10.097 lb.)
- Length : 355.6mm (14")
- Width : 220.98mm (8.7")
- Height : 85.09mm (3.35")

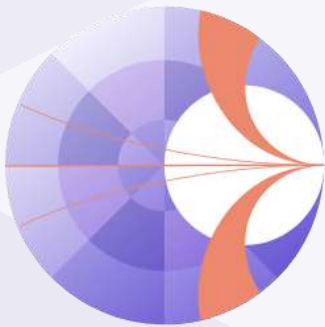


AM3121

- Weight : 1.58kg (3.483 lb.)
- Length : 190.5mm (7.5")
- Width : 139.7mm (5.5")
- Height : 76.2mm (3") without legs



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