CAS325M12HM2 Short Circuit

November 2019

Short Circuit Test Summary

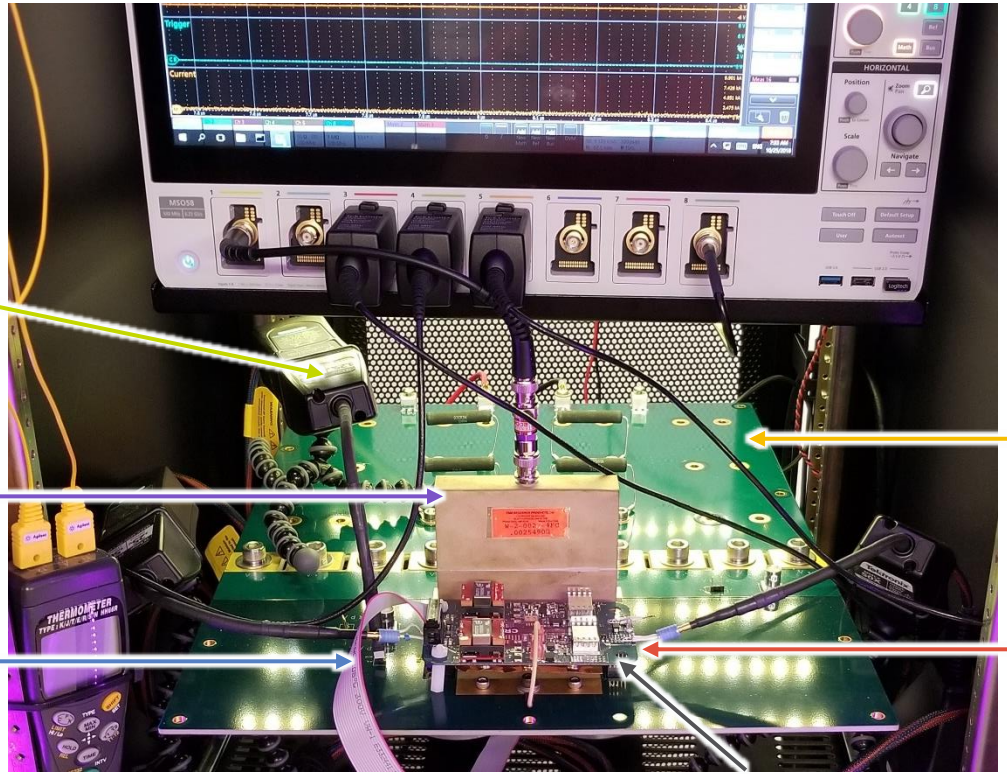
- Paired CAS325M12HM2 module with unmodified CGD15HB62LP gate driver.
- Placed copper sheet across high-side position on short circuit, clamped inductive load test fixture
- Conducted 10 short circuit events on six modules:
  - Three modules at 600 V bus
  - Three modules at 800 V bus
- Compared module parameters before and after short circuit testing
- No parameter shift observed after 10 short circuit events when paired with CGD15HB62LP.

Short Circuit Test Setup

High-Bandwidth, Optically Isolated Probe (Tektronix IsoVu)

T&M Research Current Shunt

Driver input cable (Differential signal until it reaches controller)

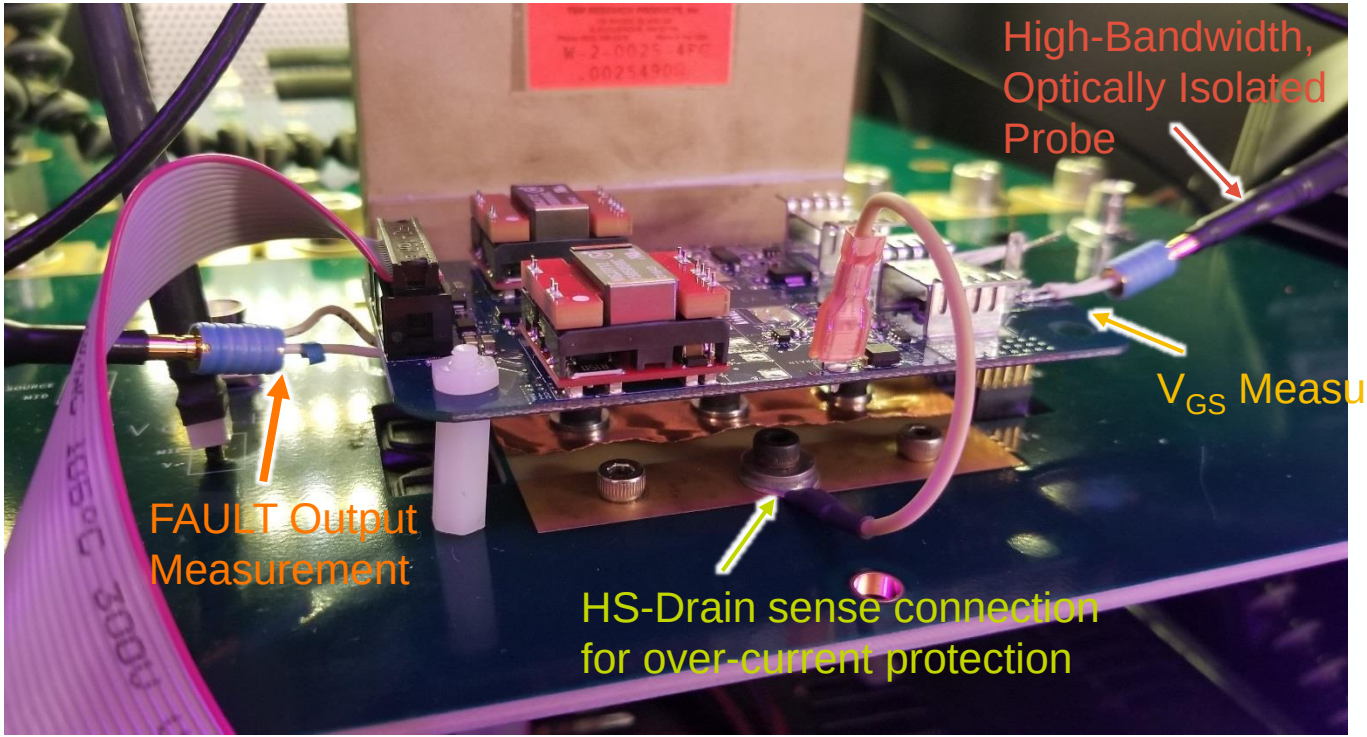


Capacitor Bank

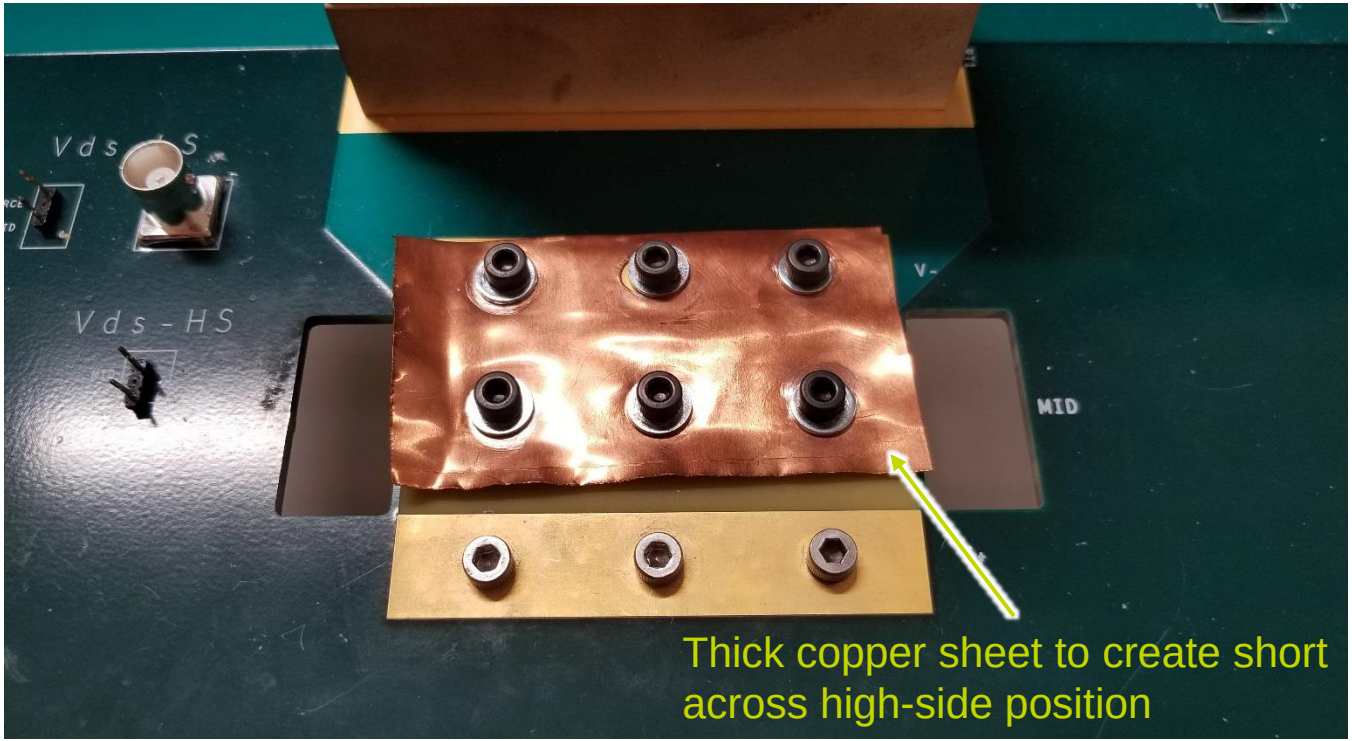
Gate Driver

DUT (under PCB)

Gate Driver Connections



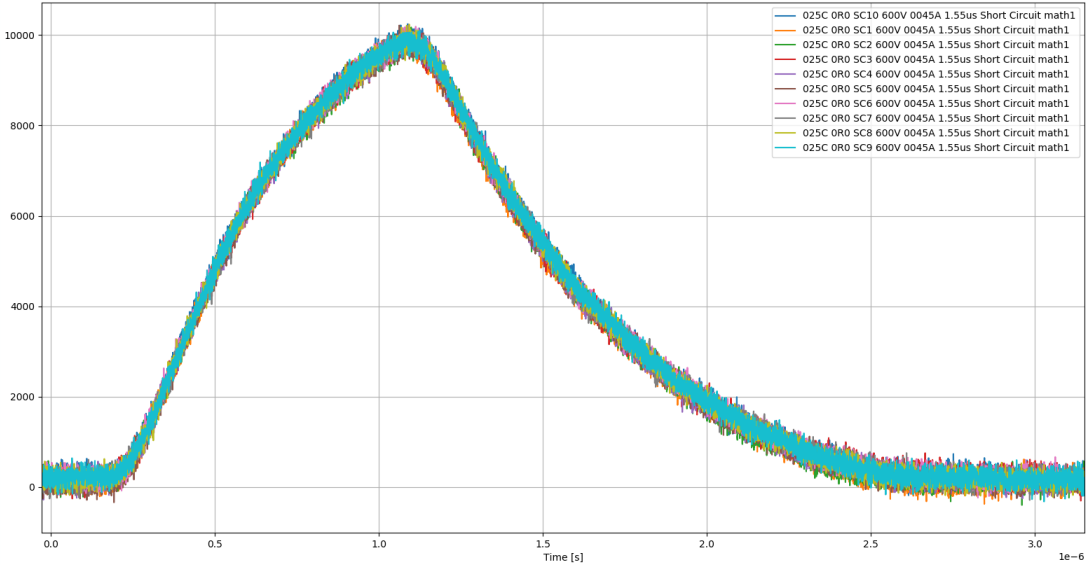
Short Circuit Condition



Short Circuit Test Plan

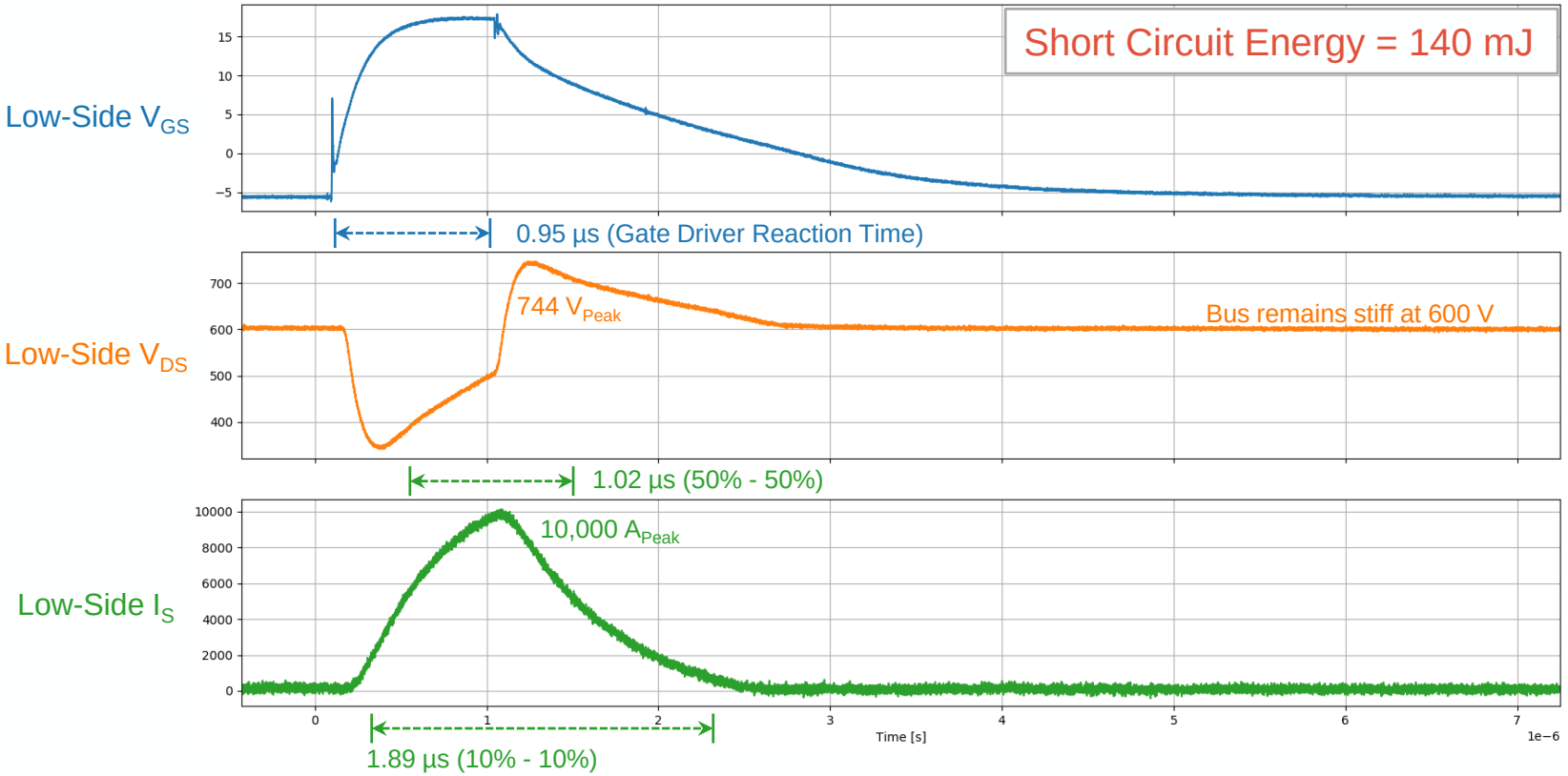
Test Flow

1. Characterize six CAS325M12HM2
2. Conduct 10 short circuit events on three of the modules at 600 V
3. Conduct 10 short circuit events the other three modules at 800 V
4. Re-characterize the six modules
5. Compare parameter variation

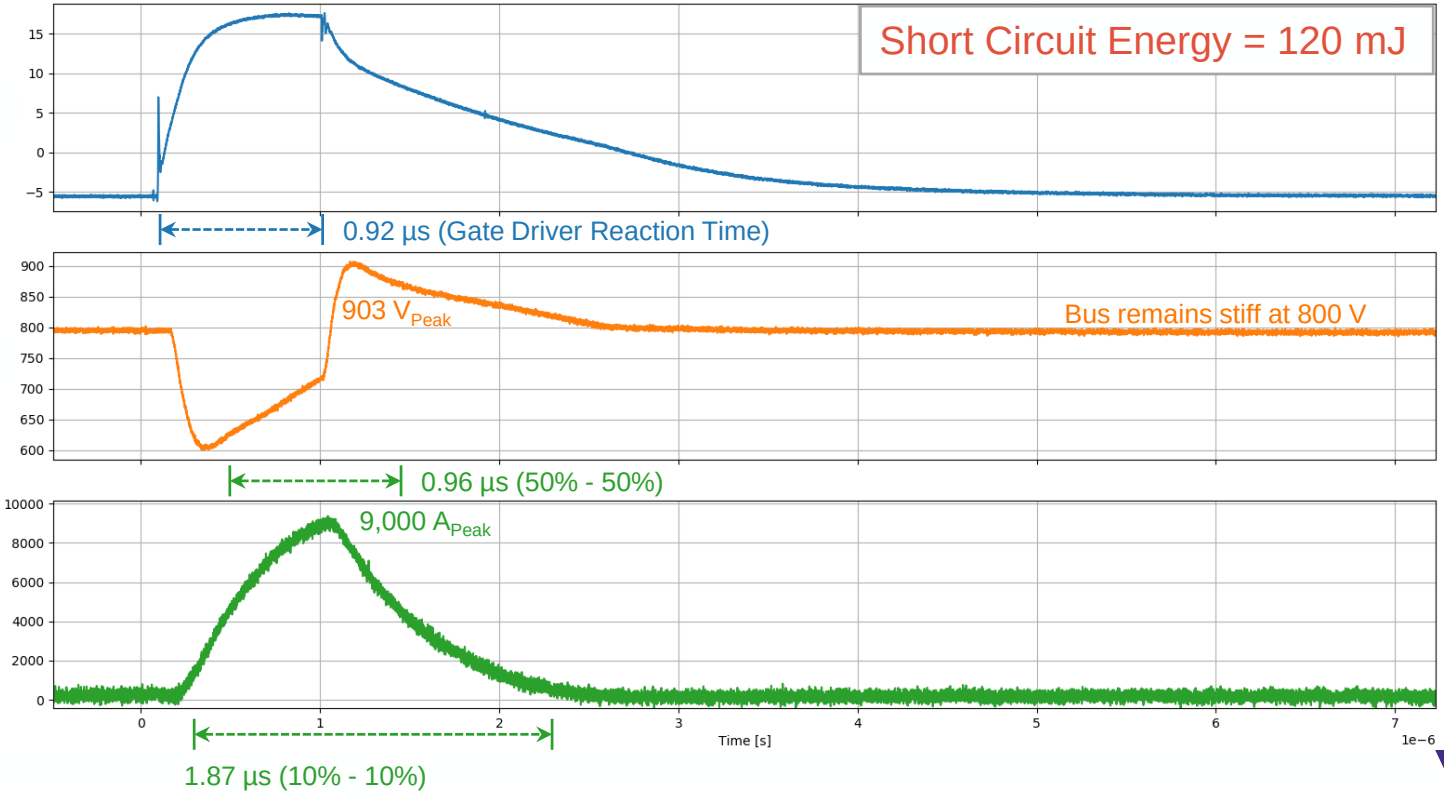


10 Short Circuit Events on one CAS325M12HM2

Short Circuit Timing (600 V)



Short Circuit Timing (800 V)



Module Parameter Comparison

- Almost no change is observed after ten short circuit events are performed on each module.

Before				After					
Diode Connected Threshold				Diode Connected Threshold					
Device	Vds	Threshold	Pass/Fail	Device	Vds	Threshold	Pass/Fail	Difference	% Difference
5349417017_SW1	10	2.82	PASS	5349417017_SW1	10	2.82	PASS	3.16E-03	0%
5349417017_SW2	10	2.62	PASS	5349417017_SW2	10	2.63	PASS	7.82E-03	0%
5349417047_SW1	10	2.89	PASS	5349417047_SW1	10	2.89	PASS	1.52E-03	0%
5349417047_SW2	10	2.76	PASS	5349417047_SW2	10	2.76	PASS	-3.16E-03	0%
5349417070_SW1	10	2.60	PASS	5349417070_SW1	10	2.60	PASS	-4.76E-03	0%
5349417070_SW2	10	2.42	PASS	5349417070_SW2	10	2.42	PASS	-2.98E-03	0%
Rdson				Rdson					
Device	Id	Rdson	Pass/Fail	Device	Id	Rdson	Pass/Fail		
5349417017_SW1	338.27	3.76E-03	PASS	5349417017_SW1	338.29	3.74E-03	PASS	-2.39E-05	-1%
5349417017_SW2	338.23	3.87E-03	PASS	5349417017_SW2	338.328	3.85E-03	PASS	-1.44E-05	0%
5349417047_SW1	338.134	3.78E-03	PASS	5349417047_SW1	338.312	3.76E-03	PASS	-2.21E-05	-1%
5349417047_SW2	338.244	3.80E-03	PASS	5349417047_SW2	338.28	3.78E-03	PASS	-1.16E-05	0%
5349417070_SW1	338.296	3.74E-03	PASS	5349417070_SW1	338.244	3.73E-03	PASS	-1.69E-05	0%
5349417070_SW2	338.328	3.67E-03	PASS	5349417070_SW2	338.33	3.65E-03	PASS	-1.27E-05	0%
Diode On-state				Diode On-state					
Device	Is	Vsd	Pass/Fail	Device	Is	Vsd	Pass/Fail		
5349417017_SW1	348.17	1.58	PASS	5349417017_SW1	349.92	1.58	PASS	-8.00E-04	0%
5349417017_SW2	348.4	1.58	PASS	5349417017_SW2	350.146	1.58	PASS	1.70E-03	0%
5349417047_SW1	348.678	1.63	PASS	5349417047_SW1	349.77	1.63	PASS	-1.00E-03	0%
5349417047_SW2	347.43	1.64	PASS	5349417047_SW2	348.978	1.64	PASS	2.80E-03	0%
5349417070_SW1	347.864	1.61	PASS	5349417070_SW1	349.69	1.61	PASS	5.00E-04	0%
5349417070_SW2	347.348	1.63	PASS	5349417070_SW2	349.818	1.63	PASS	9.00E-04	0%
1200V Rev Leakage				1200V Rev Leakage					
Device	Vds	Id	Pass/Fail	Device	Vds	Id	Pass/Fail		
5349417017_SW1	1200	1.73E-05	PASS	5349417017_SW1	1200	1.70E-05	PASS	-3.42E-07	-2%
5349417017_SW2	1200	2.39E-05	PASS	5349417017_SW2	1200	2.19E-05	PASS	-1.99E-06	-9%
5349417047_SW1	1200	1.87E-05	PASS	5349417047_SW1	1200	1.85E-05	PASS	-1.35E-07	-1%
5349417047_SW2	1200	2.15E-05	PASS	5349417047_SW2	1200	2.12E-05	PASS	-3.09E-07	-1%
5349417070_SW1	1200	5.63E-05	PASS	5349417070_SW1	1200	5.86E-05	PASS	2.32E-06	4%
5349417070_SW2	1200	1.70E-04	PASS	5349417070_SW2	1200	1.70E-04	PASS	-2.55E-07	0%