ND MIATA BRAKE COOLING KIT TESTING

A0114A INFORMATIVE PACKET

OVERVIEW

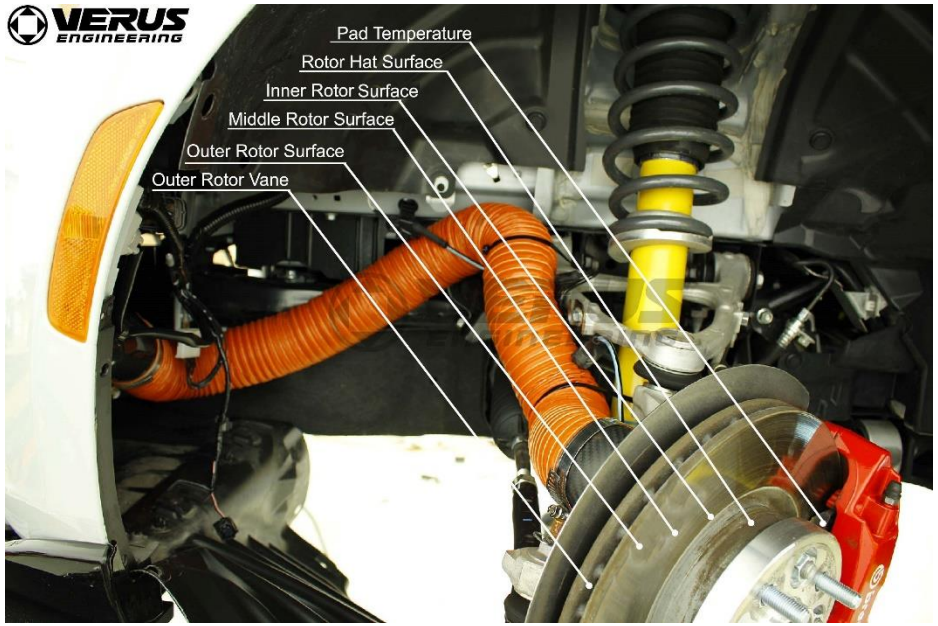
This is an informative packet on the Verus Engineering brake cooling kit, with information on testing and data gathering.

DATA GATHERING/EQUIPMENT

Digital Laser Infrared Thermometer

- **Accuracy:** +/- 1.5%
- **Scale:** -50 Deg. C to 380 Deg. C
- **Repeatability:** +/- 1 Deg. C

- Temperatures were taken at specific locations on the rotor/pads at a repeatable distance for accuracy.



Infrared Thermal Imaging

- 32,000 thermal pixels
- 36 Degree Field Of View
- -40 Deg. C to 330 Deg. C

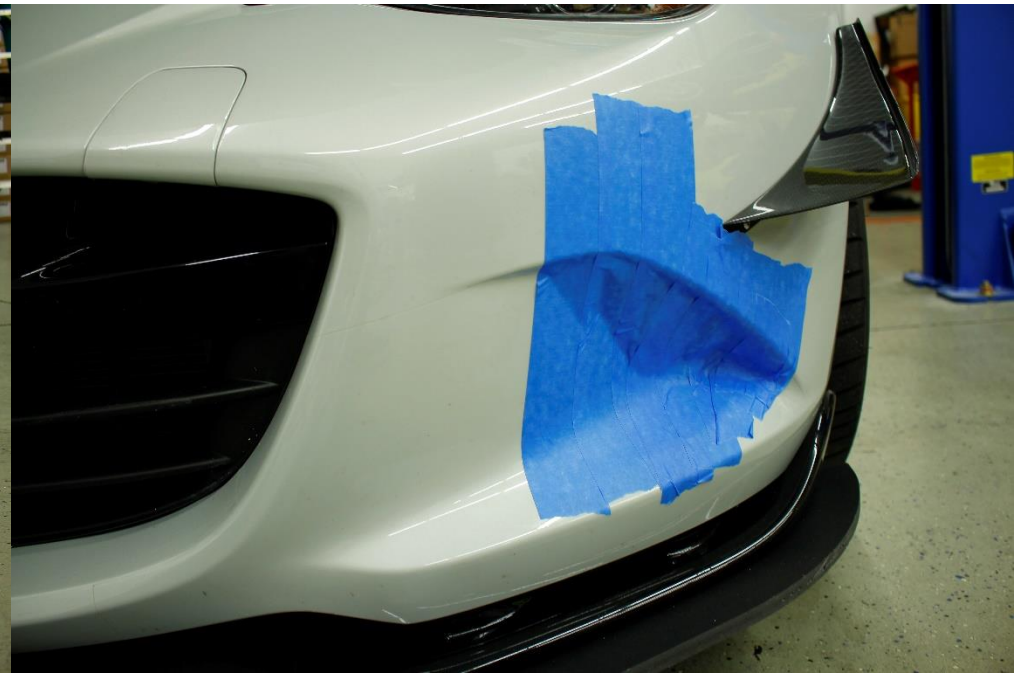
- Thermal imager was set to automatically detect max and min temperatures during testing, allowing us to spot the hottest locations on the rotor surface even if they were in different locations from side to side.

- Thermal imager automatically adjusts scale based on field of view temperature min/max.

TESTING CONDITIONS

We tested the ND Miata brake cooling kit on a local backroad location we frequent. The speeds range from upwards of 60, down to 20; resulting in a decent bit of heat build up and not a lot of airflow. At higher rates of speed, we could expect to see larger temperature deltas between no-ducting and ducting as the cooling is related to airspeed.

With the full brake cooling kit installed, we blocked off the fog light inlet on the driver's side of the vehicle and left the passenger side open. This allows us to test the difference between no cooling and cooling.



INFRARED THERMAL TESTING

HOT TEST

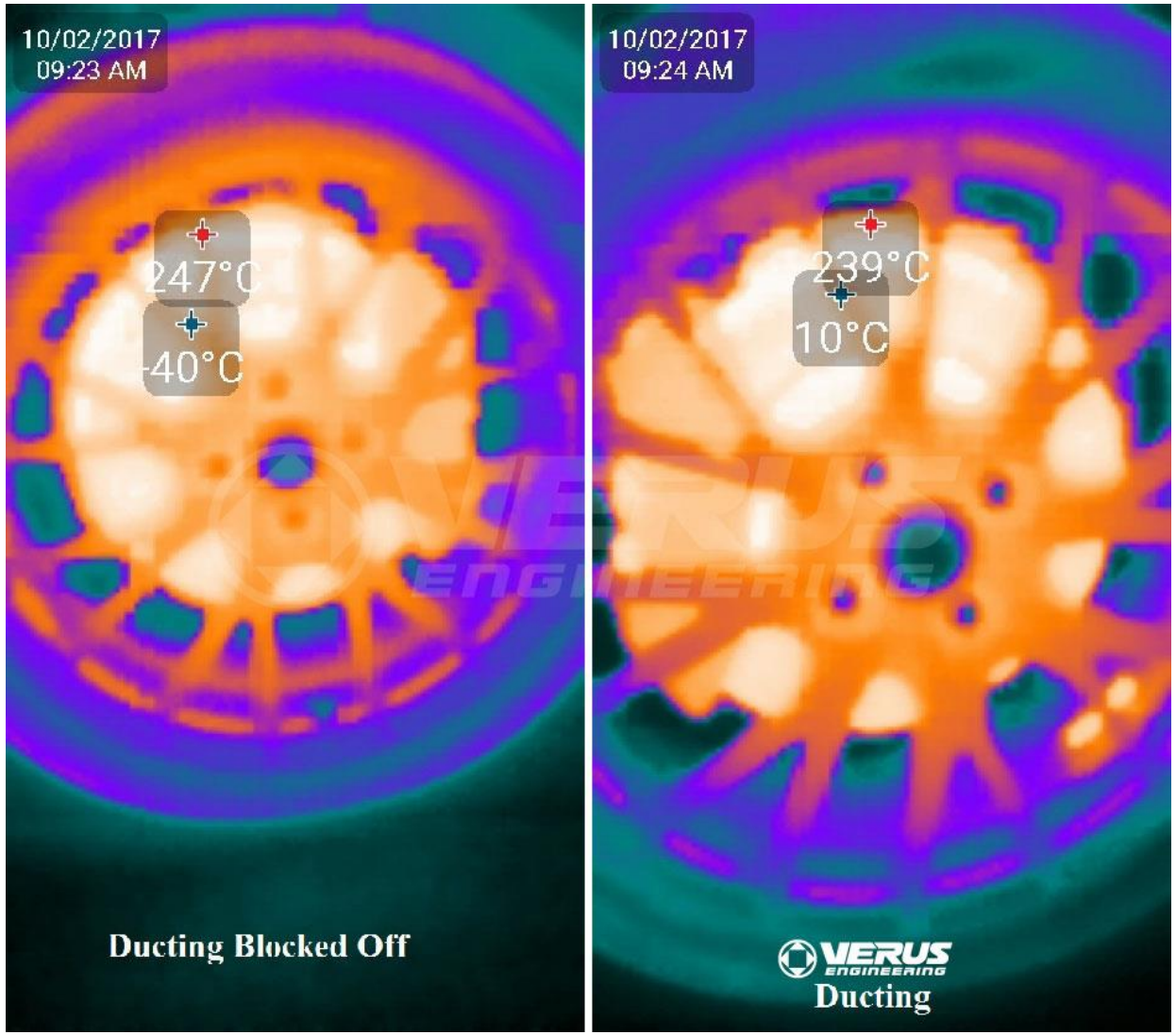


Photo was taken directly after testing a hard braking event from 60MPH to 0.

INFRARED THERMAL TESTING

COOL DOWN 1

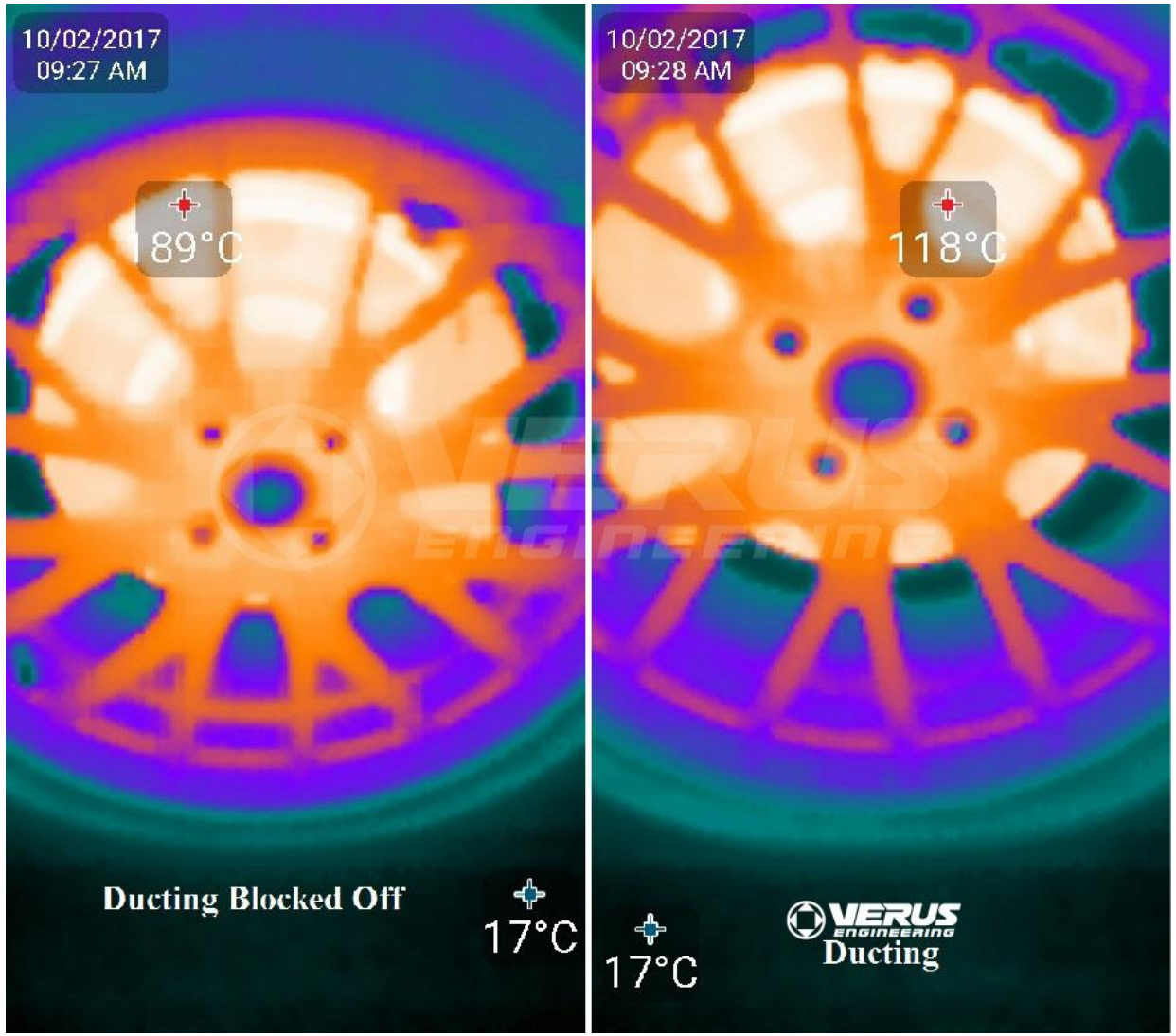


Photo was taken after a short cool down driving at a moderate pace. Similar to that of a cool-down lap, no hard braking was used.

INFRARED THERMAL TESTING

COOL DOWN 2

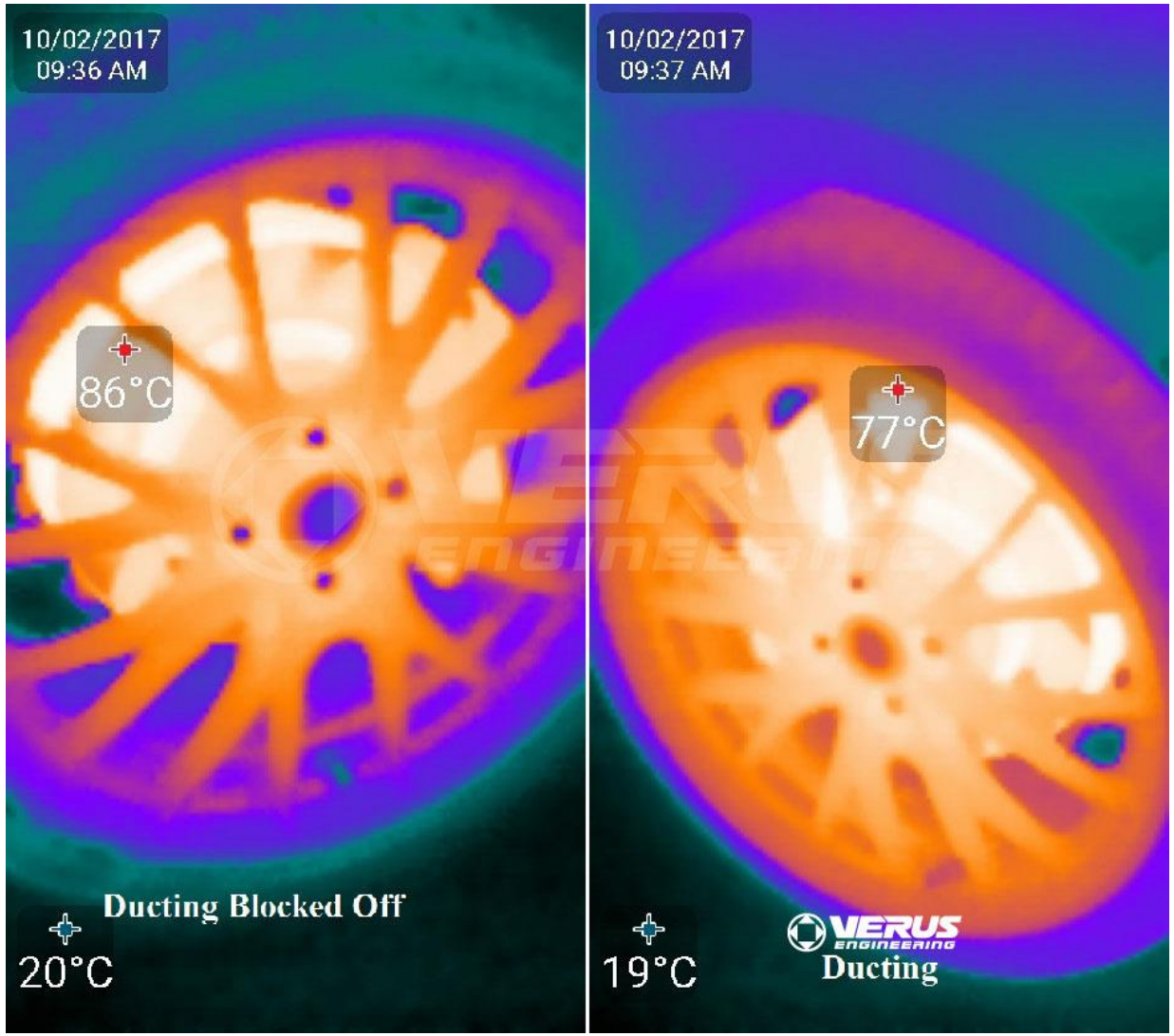
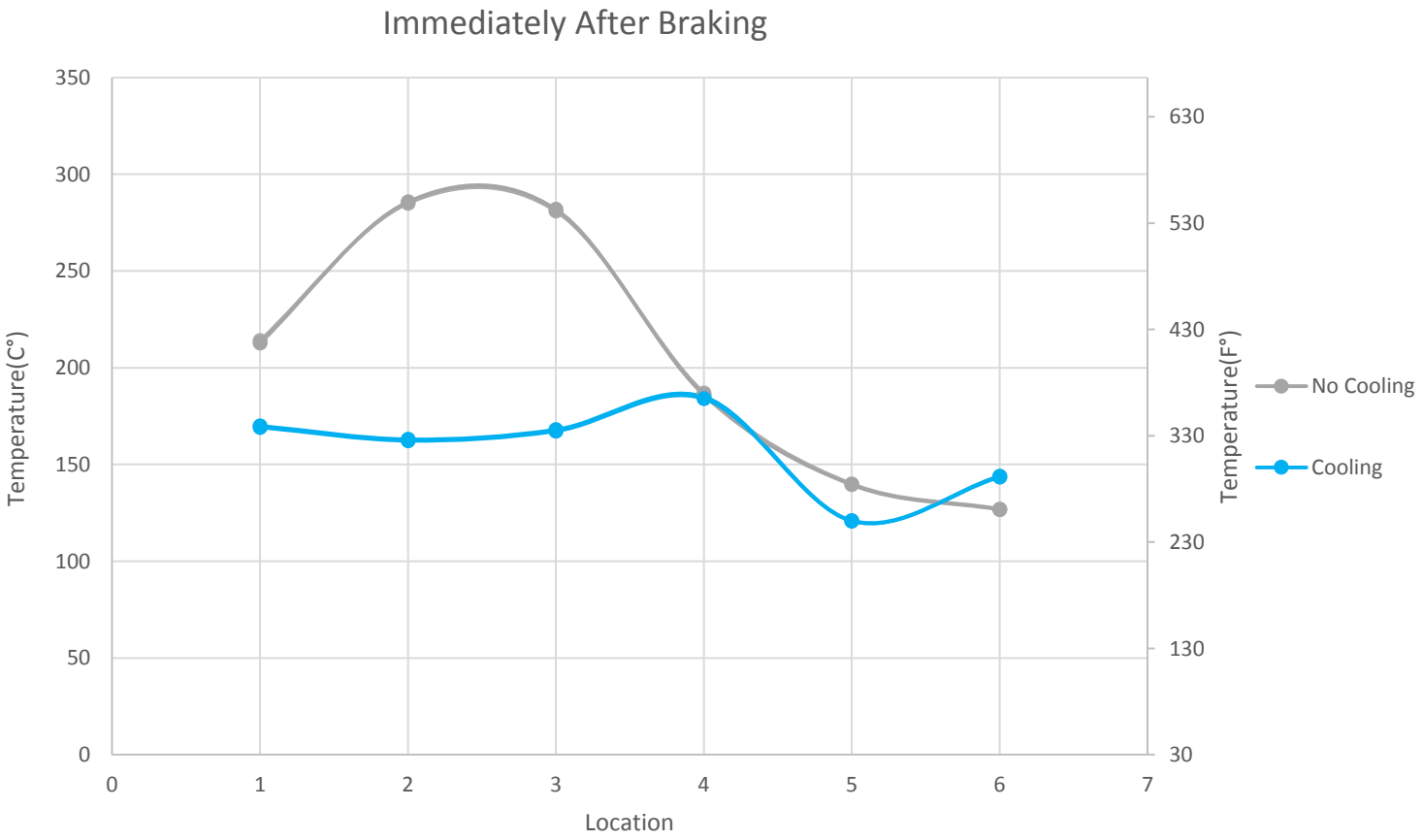


Photo was taken after the drive back to the shop, very little braking was used.

DIGITAL LASER INFRARED TESTING

HOT RESULTS

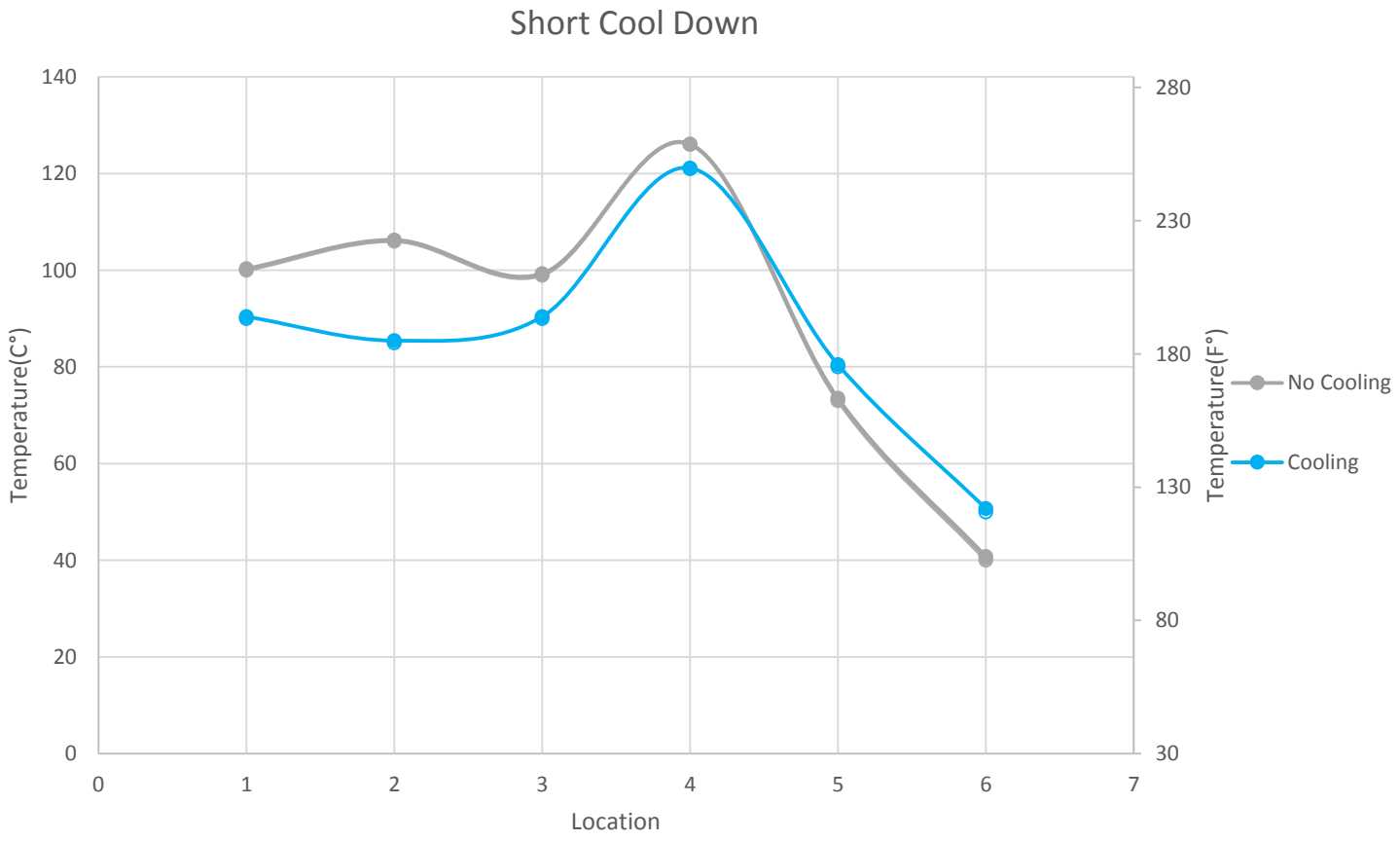


Immediately After Braking					
No Cooling			Cooling		
Driver Side	Location	Temperature(C°)	Passenger Side	Location	Temperature(C°)
outer rotor vane	1	214	outer rotor vane	1	170
outer rotor surface	2	285	outer rotor surface	2	163
middle rotor surface	3	281	middle rotor surface	3	168
inner rotor surface	4	187	inner rotor surface	4	185
rotor hat surface	5	140	rotor hat surface	5	121
pad temperature	6	127	pad temperature	6	144

Immediately After Braking					
No Cooling			Cooling		
Driver Side	Location	Temperature(F°)	Passenger Side	Location	Temperature(F°)
outer rotor vane	1	417.2	outer rotor vane	1	338
outer rotor surface	2	545	outer rotor surface	2	325.4
middle rotor surface	3	537.8	middle rotor surface	3	334.4
inner rotor surface	4	368.6	inner rotor surface	4	365
rotor hat surface	5	284	rotor hat surface	5	249.8
pad temperature	6	260.6	pad temperature	6	291.2

DIGITAL LASER INFRARED TESTING

COOLDOWN RESULTS



Short Cool Down					
No Cooling			Cooling		
Driver Side	Location	Temperature(C°)	Passenger Side	Location	Temperature(C°)
outer rotor vane	1	100	outer rotor vane	1	90
outer rotor surface	2	106	outer rotor surface	2	85
middle rotor surface	3	99	middle rotor surface	3	90
inner rotor surface	4	126	inner rotor surface	4	121
rotor hat surface	5	73	rotor hat surface	5	80
pad temperature	6	40	pad temperature	6	50

Short Cool Down					
No Cooling			Cooling		
Driver Side	Location	Temperature(F°)	Passenger Side	Location	Temperature(F°)
outer rotor vane	1	212	outer rotor vane	1	194
outer rotor surface	2	222.8	outer rotor surface	2	185
middle rotor surface	3	210.2	middle rotor surface	3	194
inner rotor surface	4	258.8	inner rotor surface	4	249.8
rotor hat surface	5	163.4	rotor hat surface	5	176
pad temperature	6	104	pad temperature	6	122

SUMMARY

From the data gathered during our testing, it is evident the brake cooling kit reduces rotor temperatures at even moderate speeds. The rotor was at an immediate reduced temperature directly after a hard braking event; as well as being lower temperatures overall after a short cool down.

On tracks seeing 100+ MPH speeds, the difference (or delta) between cooling and no cooling will be more significant. This would happen as a result of more air flow making its way through the brake cooling kit and aiding rotor venting from the higher rates of speed.