

NIKON Z8 & Z9 CF EXPRESS CARD SOLUTION

OK then I bought a Nikon Z8 and I liked the idea of continuous 20 frames per second raw shooting with no buffer limit. You can do this only if you have a VERY fast card. And if you choose to use the new practically lossless, HE RAW. It ALMOST keeps at max speed with HE* too, but with HE* or lossless compressed it eventually slows to around 16 fps. In both cases it just keeps going...

And in the case of the movie modes that this Z8 and the Z9 camera can do. you also need a crazy fast card.

The problem with that is that you need one that can write at a SUSTAINED speed of around 770MB per second continuously. Preferably a bit more for headroom. And do so long after the initial high speed write cache ON THE CARD has filled. Now not many cards can do this. There's a handful on Nikons approved list. And all are either too small or way, way too expensive. This is because the max movie quality and capability of this camera is insane. It can write 8.3K Nikon Raw, at high quality 12Bit, at 60 frames per second to the CF Express 2 card inside the camera. That means you will fill a 1TB card in 19 to 22 mins depending on scenes.

Now you don't HAVE to shoot at max quality. And you could use an external recorder. But it's nice to be able to do this in camera and start with 8K 60p NRAW and do slow motion, or pan, zoom etc inside the 8K footage as needed to produce a stabilised, properly edited 4K output.

So, what's the problem?

Well, how about the fact that all of the approved or tested CFe cards that will actually work at this speed, are around £500 each (or more) and are limited in size to say 325GB or at best 650GB, at around £650 and upwards? Cheaper ones simply cannot write fast enough, or they will do so for a few seconds or possibly a minute or so but then fail with a write error as the card slows down. Inadequate minimum sustained write speed. Or it overheats and slows down causing the same error.

How would you like a 1TB card that can allow you to write RAW, 8.3K 60P for approx. 600GB without problem at the Z9 / Z8 highest possible data rate and 1TB total capacity, and 20fps photos in raw HE, continuously? As good as the £600 plus cards for £100?

I researched things very carefully. A CF Express card is nothing but a 2230 NVMe PCIe SSD as used in portable devices and PCs. Of these 2230 drives most are not fast enough at SUSTAINED write at the Z9/Z8 highest data rate. The Sabrent 2230 1TB rocket NVMe SSD can do this however. But only until it is approximately 60 to 65% full. Cameras have buffers. But so do the NVMe drives and these are also used in all the "bought" fast CFe drives. The Sabrent Rocket 1TB drive is no different but its native write speed is much higher than almost all other 2230 SSDs.

It has a buffer that allows super-fast initial write speed. Of around 4.3GB per second. And like most drives (or CFe cards) this buffer gets used up (as you write fast to the SSD). Then the drive slows to (in this case) 275MB per second as it writes to its quite fast TLC memory cells. But since we are not writing to the card at 3GB per sec, but at 770MB max (8K 60P Nraw and HQ worst case), this cache then never actually fully fills up because as we are writing to it, this cache is also emptying itself into the card's slower permanent storage memory at 275MB per sec continuously. Like trying to fill a bucket with a big hole in it. DON'T be tempted to use the smaller 512 version, or the 2TB version. Those will not work... One has too slow SLC memory. The other has too small cache. And as far as I know no other cards will work as well either.

But an NVMe drive isn't much use when we need a CF Express is it?

Enter AliExpress... They will sell you a case that you drop that Sabrent 2230 drive into that IS a CF Express card. What's more it looks EXACTLY the same as any other CF Express B card for around 6 to 8 UK pounds on AliExpress. You can also get a fully metal CNC machined one. But from experience some brands don't properly fit in the slot and feel insecure or are a too tight fit. Although they do work and probably cool better than the cheap £8 plastic and sheet metal ones. I will add a link to one that fits well and is all metal.

The Sabrent ricket 2230 drive is also one of the most thermally and electrically efficient 2230 drives out there. So unlike some NVMe drives it's not going to overload your cameras 3.3V supply and damage it. And better still it's not going to get as hot even writing at these crazy speeds.

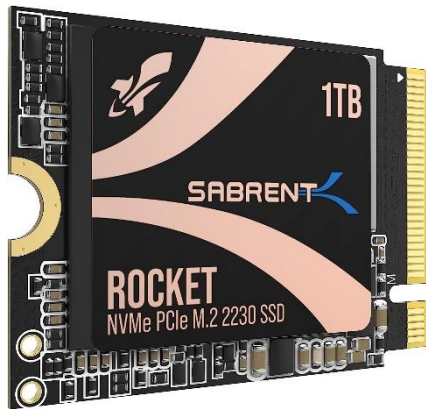
That's all you really need to know to make this work well. BUT some extra info is useful. Have you ever wondered why all the super expensive CF Express cards have non multiples of the usual memory amounts? We usually see memory in 32, 64, 128, 256, 512, 1TB, 2TB etc. Same with all types of PC or memory hardware. This isn't the case for the super fast CF Express cards. These are odd numbers. So 325GB or 640 and 660GB etc. The reason for this is because just like the Sabrent SSD we are talking about here they have a limited amount of fast cache before the card writes out to the slower memory. So they will take a 512 CFe card or a 1TB card and LIMIT the visible amount of writable space to 325GB or to 660GB from the actual 512 or 1024GB that is ACTUALLY available.

They do this so that as you write at high speed with the Z9/Z8 camera the write speed continues at the same high speed until the card is "full". The fast cache never actually fills. This is called OVERPROVISIONING. It serves several purposes. 1, stops the card slowing after 325 or 660GB has been written so they can sell it as continuous minimum write speed card for VIDEO etc. It also allows the unused part of the cards memory to be used as cache for the rapid write. And for wear levelling to make it last better. They do this anyway but this cache is the cards memory (shared) so gets ever smaller as the card fills.

So, with the Sabrent 1TB SSD inside a CFe housing you actually have exactly the same physical arrangement as a 650GB expensive CFe card. The only difference is that while both will write the full 650GB at Z8/9 speeds, they will stop writing for 2 different reasons.

The Sabrent 1TB will begin to exhaust its fast cache at this point (between 600 and 650GB tested) and the camera will stop recording and give an error. But the expensive cards stop because the card is “full”. Due to having the overprovisioned space that you can’t actually see. So you don’t see a card speed problem. Just a space problem.

If you prefer that, you can OVERPROVISION your 1TB Sabrent Rocket 3 NVMe 2230 SSD card in exactly the same way. Just make the partition 600GB or whatever. Leave the rest unpartitioned. Or make a new hidden partition in the unused part using some disk partitioning utility Then you have a 600, 660, or whatever TB you choose card. This is exactly the same thing as the card you buy.

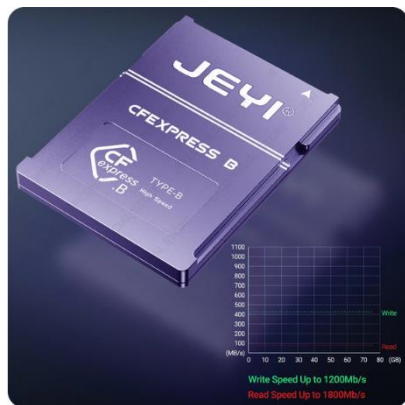


However, it is actually better to leave the capacity at 1TB as long as you understand what is happening. Because yes at the highest data rates on the crazy Z9/8 which most people will never use (or do so only for a few second or maybe a couple of mins at a time) this is never going to impact you. And at lower rates like 8K 30P NRAW or less or photos etc then you still have almost the full 1TB of storage to use.

This is available on Amazon for £89 current prices. These go up and down.

<https://www.amazon.co.uk/SABRENT-Internal-Compatible-surface-SB-2130-1TB/dp/B0BQG6JCRP>

The best card adapter that actually fits properly. Includes 7 screws (a spare for when you lose the microscopic ones) a screwdriver, some thermal paste etc. A 4-minute job to fit the card inside the adapter. But you need good eyes...



<https://www.aliexpress.com/item/1005005800646040.html> £18 delivered. Many sellers.

IMPORTANT. When you have screwed the card together, in windows create a partition. Either a smaller one like 550GB so its overprovisioned or the full 1TB space. Make it an MBR partition. Format it to exFAT. When in the camera reformat it, using the SLOW option. Then test.

Nikon Write Speeds tested and measured.

In red = I use...

Nikon Raw HQ 12bit @ 8K

NRAW 8.3k FX high quality 60fps 11 mins 512MB or 22 minutes per Terabyte, or 757MB per SECOND!

NRAW 8.3k FX high quality 50fps 13 mins 512MB

NRAW 8.3k FX high quality 30fps 19 mins 512MB

NRAW 8k.3 FX high quality 25fps 23 mins 512MB

NRAW 8.3k FX high quality 24fps 24 mins 512MB

Nikon Raw HQ 12bit @ 4k

NRAW 4.1K FX high quality 120fps 18 mins 512MB

NRAW 4.1k FX high quality 100fps 22 mins 512MB

NRAW 4.1k FX high quality 60fps 37 mins 512MB

NRAW 4.1k FX high quality 50fps 45 mins 512MB

NRAW 4.1k FX high quality 30fps 1h 15m 512MB

NRAW 4.1k FX high quality 25fps 1h 29m 512MB

NRAW 4.1k FX high quality 24fps 1h 33m 512MB

Nikon Raw HQ 12bit @ 5.4k DX Crop Mode

NRAW 5.4k DX high quality 60fps 22 mins 512MB

NRAW 5.4k DX high quality 50fps 26 mins 512MB

NRAW 5.4k DX high quality 30fps 45 mins 512MB

NRAW 5.4k DX high quality 25fps 55 mins 512MB

Nikon Raw HQ 12bit @ 3.8k 2:2 Crop Mode

NRAW 3.8k 2.2 high quality 120fps 21 mins 512MB

NRAW 3.8k 2.2 high quality 100fps 25 mins 512MB

PRORES HQ 12-BIT 4k

ProRes 4.1K 60fps 14 mins 512MB

ProRes 4.1K 50fps 17 mins 512MB

ProRes 4.1K 30fps 29 mins 512MB

ProRes 4.1K 25fps 34 mins 512MB

ProRes 4.1K 54fps 36 mins 512MB

PRORES HQ 12-BIT 5.4k DX Crop Mode

ProRes 5.4K DX 30fps 17 mins 512MB

ProRes 5.4K DX 25fps 20 mins 512MB

ProRes 5.4K DX 24fps 21 mins 512GB

ProRes 3.8K DX 60fps 16 mins 512GB

ProRes 3.8K DX 50fps 20 mins 512GB

PRORES 422 HQ 10-BIT

ProRes 4.1K 60fps 33 mins 512GB

ProRes 4.1K 50fps 39 mins 512GB

ProRes 4.1K 30fps 1h 6m 512GB

ProRes 4.1K 25fps 1h 19m 512GB

ProRes 4.1K 24fps 1h 22m 512GB

ProRes 1080p 120fps 1h 6m 512GB

ProRes 1080p 100fps 1h 19m 512GB

ProRes 1080p 60fps 2h 12m 512GB

ProRes 1080p 50fps 2h 37m 512GB

H.265 10-BIT 8K

H.265 8.4K 30FPS 2h 21m 512GB

H.265 8.4K 25FPS 2h 21m 512GB

H.265 8.4K 30FPS 2h 21m 512GB

H.265 10-BIT 4K

H.265 4.1K 120FPS 2h 21m 512GB

H.265 4.1K 100FPS 2h 21m 512GB

H.265 4.1K 60FPS 2h 49m 512GB

H.265 4.1K 50FPS 2h 49m 512GB

H.265 4.1K 30FPS 5h 512GB

H.265 4.1K 24FPS 5h 512GB