

Benchmark entre Nvidia GTX 1060 evga Superclocked

y

Nvidia GTX 960 MSI.

Integrantes

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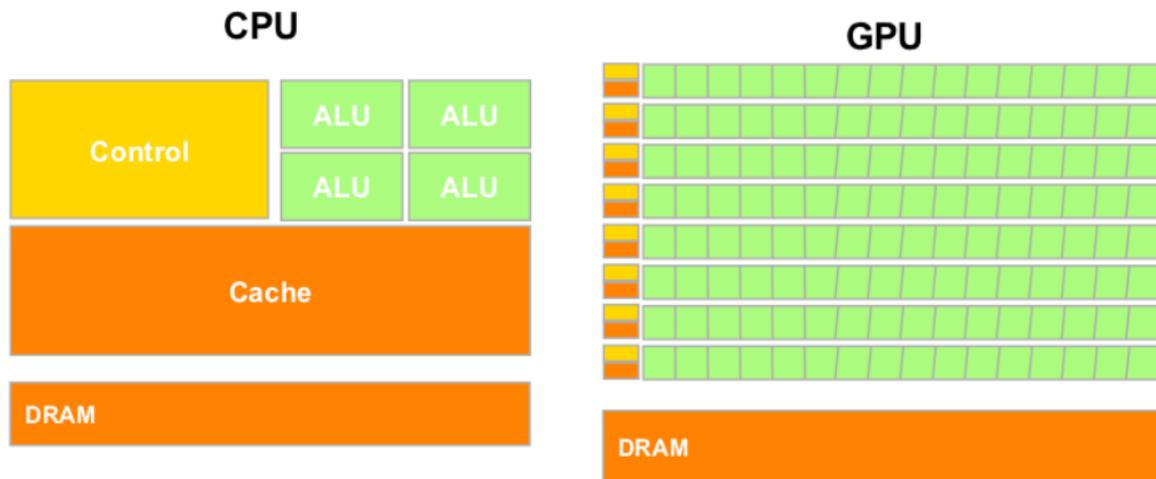
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Para comenzar analizaremos que es una arquitectura de procesador y las diferencias entre la

arquitectura Pascal y Maxwell.

Una arquitectura en informática refiere a como está conformada la placa para ajustarse a las necesidades del componente, ya que distintos componentes de la computadora hacen distintas cosas por ende estos deben tener distintas arquitecturas.



Por ejemplo la diferencia entre los CPU (Unidad Central de Procesamiento) y los GPU (Unidad de Procesamiento Gráfico). Los mismos se encargan de cosas distintas, donde uno esta especializado en el cómputo numérico (GPU) y el otro se especializa en operaciones secuenciales (CPU).

Pero también las arquitecturas varían en el mismo componente, ya sea por distintas marcas, o cambios tecnológicos. En este trabajo compararemos dos placas de video, una con arquitectura Pascal (EVGA 1060 NVIDIA) y su antecesora la arquitectura Maxwell (MSI 960 NVIDIA).

La arquitectura Pascal aumentó la cantidad de TeraFLOPS<sup>8</sup> así como unifica el procesamiento y los datos en el mismo lugar. Aumentó tres veces el rendimiento del ancho de banda de la memoria (comparado con la arquitectura Maxwell). Por otro lado implementó la nueva tecnología llamada Nvlink que permite compartir información a través del puerto PCI entre 5 y 12 veces más rápido que con la arquitectura predecesora.

Aunque la arquitectura no sea lo más importante, es relevante marcar la diferencia entre ambas ya que la arquitectura Pascal supera los límites de la arquitectura Maxwell.



**Las principales diferencias además de la arquitectura que afectan el rendimiento son:**

- la EVGA 1060 SC cuenta con una frecuencia<sup>4</sup> base de 1607MHz en el GPU, mientras que la MSI 960 cuenta con 1126MHz.
- la EVGA 1060 SC cuenta con 1280 Cuda<sup>1</sup> cores mientras que la MSI con 1024.
- la EVGA 1060 SC cuentaSI 960 c con 6Gb de memoria GDDR5 mientras que la MSI con 2Gb.
- la EVGA 1060 SC cuenta con una frecuencia<sup>4</sup> base de 2GHz, mientras que la MSI 960 cuenta con 7GHz.
- la EVGA 1060 SC cuenta un ancho de banda de 192Gbps, mientras que la MSI 960 con 105.6Gbps.
- Cabe destacar que ambas tarjetas de video poseen el mismo consumo energetico de 120w. Con alimentación del socket PCI más un conector de 6 pines.
- La 1060 fue lanzada en 2016.
- la 960 fue lanzada en 2015.
- La EVGA 1060 SC posee 1 ventilador.
- La MSI 960 tiene 2.
- Actualmente el precio de la EVGA 1060 SC ronda los 270Usd.
- Actualmente el precio de la MSI 960 ronda los 150Usd.

GPU		
Arquitectura	Pascal	Maxwell
Nombre código	GP106 "Pascal"	GM206 "Maxwell"
Transistores	4.4 mil millones	2.94 mil millones
Tamaño de die	200mm <sup>2</sup>	227mm <sup>2</sup>
Nodo	16nm	28nm
Frecuencia Base	1607MHz	1,126MHz
Frecuencia Boost	1,835MHz	1,178MHz
CUDA Cores	1,280	1024
Unidades de Teselado	10	8
Texture Units	80	64
ROPs	48	32
Memoria		
Cantidad	6GB GDDR5	2GB GDDR5
Frecuencia	2GHz (8Gbps efectivos)	7 GHz
Interfaz	192-bit	128-bits
Ancho de banda	192GB/sec	105.6 GB/s
Consumo de energía	120W	120W

**Las especificaciones del ordenador utilizado para realizar las pruebas de rendimiento son:**

Procesador: Intel Core I5 4460 con

Placa madre: ASUSTeK B85M-G R2.0

RAM: 2 modulos DDR3 de 4GBytes con una frecuencia<sup>4</sup> de 1600MHz trabajando en dual channel<sup>10</sup>

Discos rigidos: -Samsung SSD 850 EVO 250GB

-Western Digital WB10EZEX-00BN5A0 1TB

Los programas utilizados para realizar las pruebas de rendimiento fueron:

-FurMark (link: <http://www.geeks3d.com/dl/show/533> )

-MSI Afterburner (link: <https://es.msi.com/page/afterburner> )

-TechPowerUp GPU-Z (link: <https://www.techpowerup.com/download/techpowerup-gpu-z/> )

Y los juegos fueron (todos en ultra):

-Thief

-Tekken 7

- Counter Strike Global Offensive

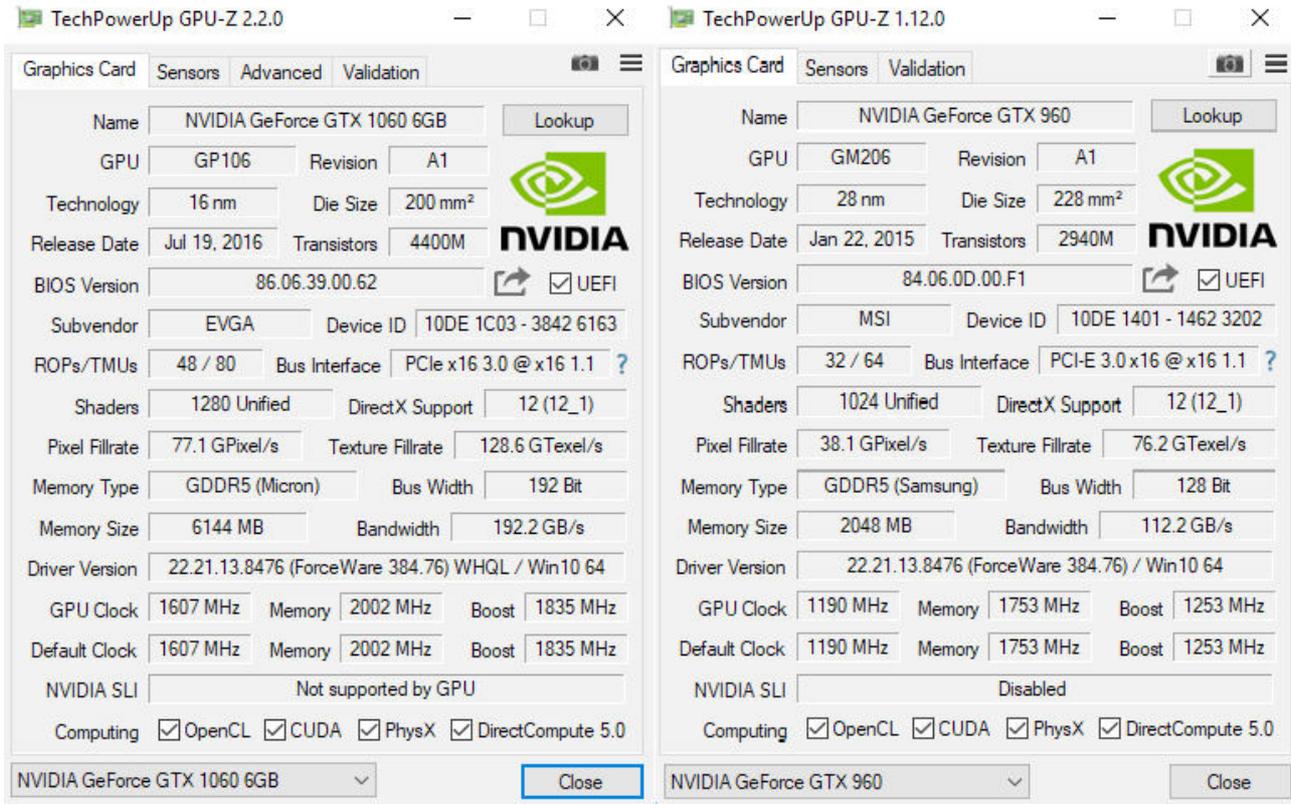
## Comparación utilizando FurMark:

The image displays two side-by-side screenshots of the FurMark v1.18.2.0 benchmark interface. Both windows show the same system information, including the CPU (Intel(R) Core(TM) i5-4460 CPU @ 3.20GHz), OS (Windows 10 64-bit build 15063), and system memory (8097 MB). The left window shows a score of 4500 points (75 FPS, 60000 ms) for a GeForce GTX 1060 6GB/PCIe/SSE2 (10DE-1C03) GPU. The right window shows a score of 2484 points (42 FPS, 60000 ms) for a GeForce GTX 960/PCIe/SSE2 (10DE-1401) GPU. Both windows also display the maximum GPU temperature (65°C) and resolution (1920x1080 (FS) - AA:0 samples). The left window shows FPS: min:73, max:77, avg:75 - OPTIONS: DynBkg. The right window shows FPS: min:41, max:43, avg:42 - OPTIONS: DynBkg. Both windows have a 'Submit' button and a '[ Online scores ]' link.

Segun este stress test podemos ver que ambas placas de video trabajan en un maximo de 65° de temperatura con una resolución de 1920x1080p, teniendo 75 FPS<sup>3</sup> de promedio con la 1060 y 42 FPS<sup>3</sup> de promedio con la 960.

Por otro lado nos muestra que el GPU de la EVGA Nvidia 1060 cuenta con a 1733MHz y su memoria (GDDR5) con 4006MHz; mientras que el GPU de la MSI Nvidia 960 cuenta con 1316MHz y su memoria con3505MHz.

## Comparación usando TechPowerUp GPU-Z:



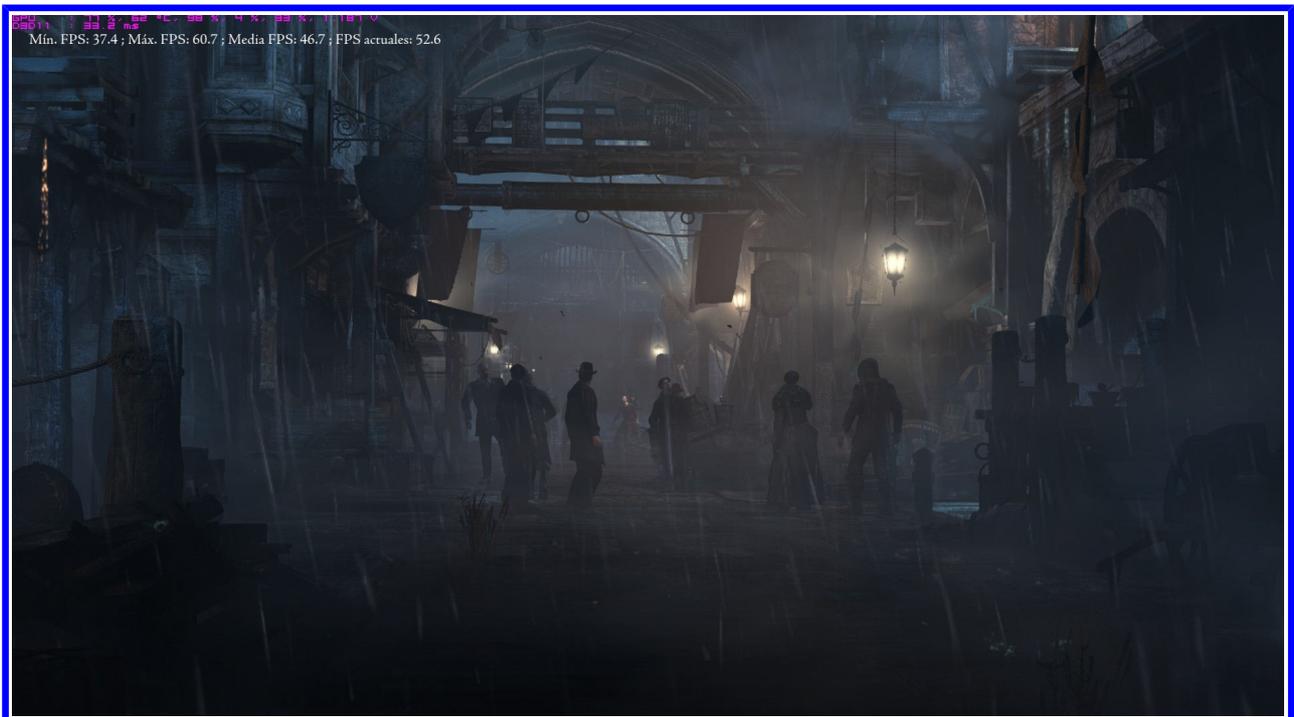
**Las principales diferencias que se destacan entre las placas de video guiandonos por los resultados de este programa son:**

EVGA NVIDIA 1060		MSI NVIDIA 960	
Modelo de GPU	GP106	Modelo de GPU	GM206
Transistores	4400M	Transistores	2940M
Shaders <sup>5</sup>	1280	Shaders <sup>5</sup>	1024
Filtrado de Pixeles	77,1GPixel/s	Filtrado de Pixeles	38,1GPixel/s
Filtrado de Texturas	128,6G Texel/s	Filtrado de Texturas	76,2G Texel/s
Ancho de Bus <sup>6</sup>	192 bits	Ancho de Bus <sup>6</sup>	128 bits
Tamaño de Memoria	6144 MB	Tamaño de Memoria	2048 MB
Ancho de Banda	192,2 GB/s	Ancho de Banda	112,2 GB/s
Frecuencia GPU	1607 MHz	Frecuencia GPU	1190 MHz
Frecuencia de memoria	2002 MHz	Frecuencia de memoria	1753 MHz
Nvidia SLI <sup>7</sup>	No soportado	Nvidia SLI <sup>7</sup>	Desabilitado

**Thief y MSI Afterburner (arriba a la izquierda) EVGA 1060 SC:**



**Thief y MSI Afterburner (arriba a la izquierda) EVGA 960 SC:**



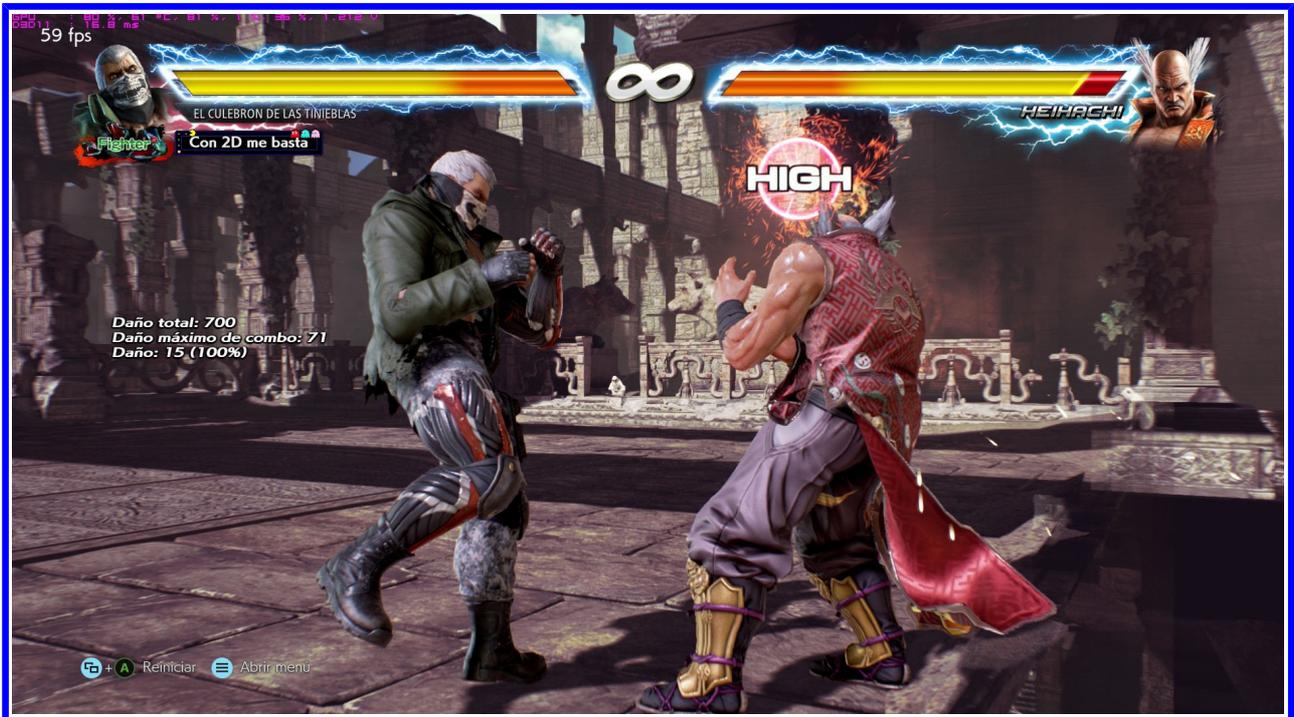
**Tekken 7 y MSI Afterburner (arriba a la izquierda) EVGA 1060 SC:**



**Acercamiento de MSI afterburner ( uso de GPU, temperatura, FPS<sup>3</sup>, uso de energía).**



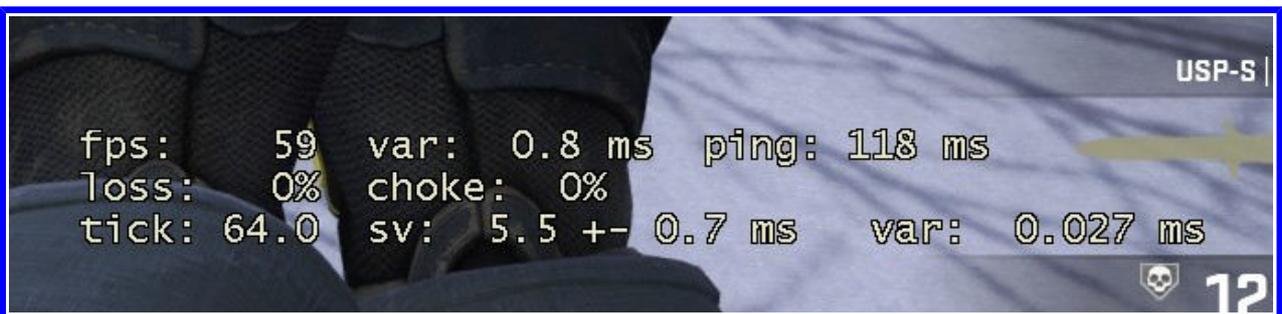
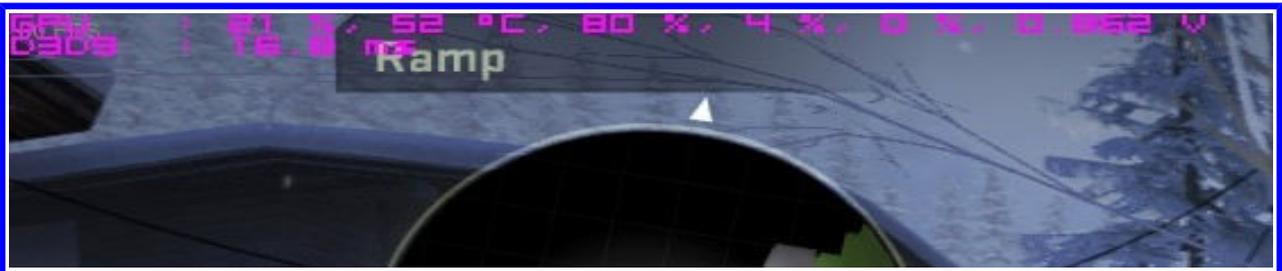
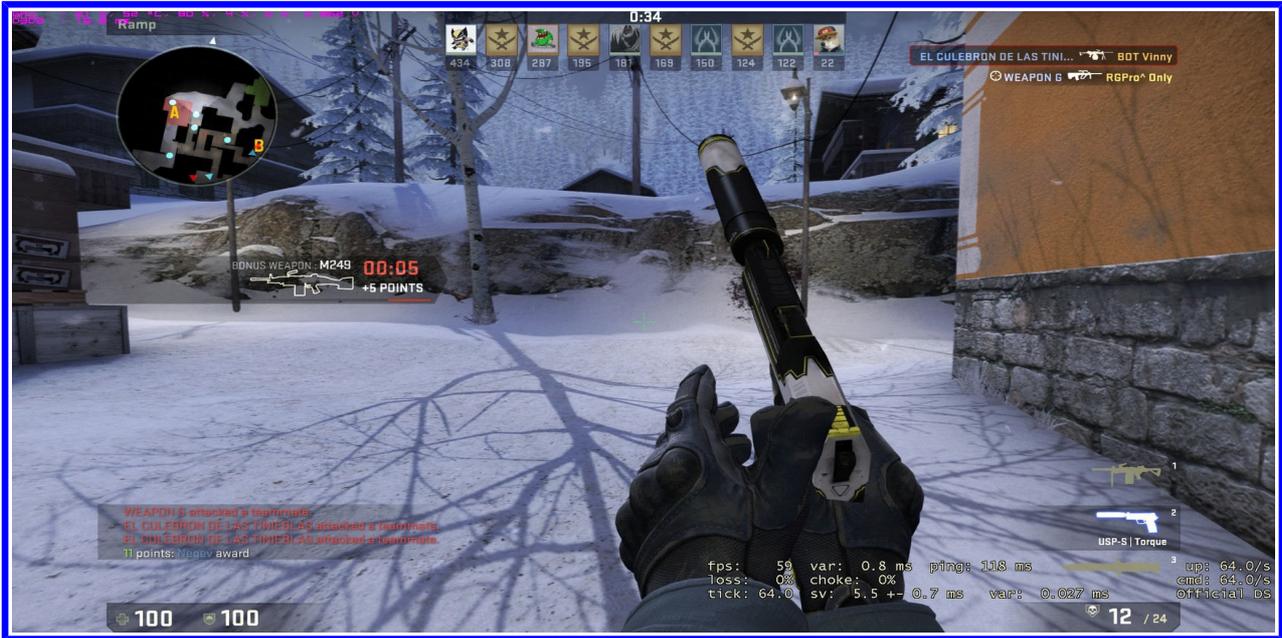
**Tekken 7 y MSI Afterburner (arriba a la izquierda) MSI 960:**



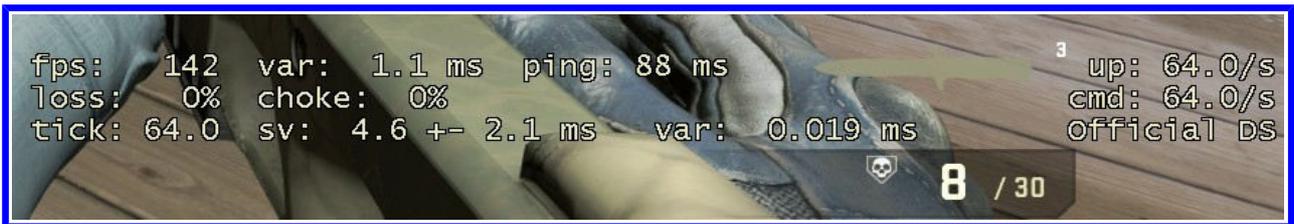
**Acercamiento de MSI afterburner ( uso de GPU, temperatura, FPS<sup>3</sup>, uso de energía).**



## Counter Strike Global Offensive con MSI Afterburner en MSI 960:



# Counter Strike Global Offensive con MSI Afterburner en EVGA 1060 SC:



## **Conclusión:**

En conclusión podemos visualizar que cuando se le realiza un stress test a las placas de video la 1060 brinda mucha mayor fluidez en cuestión de FPS<sup>3</sup> habiendo una diferencia de mas de 30, sin embargo ambas trabajan a la misma temperatura de 65° lo cual resulta interesante ya que la 1060 es mas compacta y posee un solo ventilador, mientras que las 960 posee 2.

En juegos como Thief o Tekken podemos ver que el uso de los gpu nunca superó el 80% y que aunque en Tekken el propio juego limite los FPS<sup>3</sup> la 960 presentó una mayor exigencia en cuestión de GPU y temperatura a que la 1060.

Hace años años la placa de video Nvidia 960, ocupaba el mismo lugar en el mercado que la Nvidia 1060 en este momento. Sin embargo luego de este trabajo podemos ver la superioridad de potencia de la Nvidia 1060. Aún así pensamos que para una persona con usos cotidianos o inclusive un gamer, que no busque jugar todos los juegos en 1080p y gráficos en ultra, la placa de video Nvidia 960 alcanza y sobra.

## Glosario:

- **Cuda<sup>1</sup> Cores**: es una tecnología que permite hacer computos en paralelo. Si no tiene Cuda Cores la información se procesa en serie (Es más rápido si se realiza una única acción) .  
Por ende los “Cuda Cores” permite que todos los nucleos trabajen al mismo tiempo para realizar distintas operaciones.
- **Cache<sup>2</sup> (L2)**: Se encarga de almacenar datos de uso frecuente. Se encuentra en el procesador.
- **FPS<sup>3</sup>**: Son imagenes por segundo. Y nos permite saber la cantidad de imagenes que procesa el GPU por segundo.
- **Frecuencia<sup>4</sup>**: unidad de medida de trabajo de un dispositivo, medida en Mhz.
- **Shaders<sup>5</sup>**: Unidad de sombreado que se puede compilar independientemente, se utilizan para crear efectos especiales. Tales como fuego, iluminación o sombra.
- **Ancho de Bus<sup>6</sup>**: cantidad de información que se puede transferir por segundo
- **Nvidia SLI<sup>7</sup>**: tecnología que permite utilizar dos tarjetas gráficas conectadas en una placa madre, con el fin de obtener mayor rendimiento.
- **TeraFLOPS<sup>8</sup>**: unidad en la que se miden los FLOPS.
- **FLOPS<sup>9</sup>**: Unidad para medir el rendimiento basada en el uso de “coma flotante”.
- **Dual channel<sup>10</sup>**: Tecnología que permite el incremento del rendimiento de las memorias en el caso de que se use un número par de las mismas.

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