Základy počítačov: prednáška č.11

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#ZPOC

1

Skúška

Riadny termín

~~18. 12. 2024 – CPU~~

21. 12. 2024 – CPU
11:00 – 14:00

Opravný termín

18. 1. 2024 v CPU
11:00 – 14:00

Pred skúškou
pokusná písomka v AISe

nesprávna odpoveď -1b.

Po skúške
hodnotenie predmetu – dotazník

2

3

Náhradné testy

```
1   0010                        .ORG   0010h
2   0010   01 02 03 04 25       DB    01,02,03,04,37
3   0000                        .ORG   0000h
4
5   0000   3A 10 00             LDA    0010h
6   0003   47                   MOV    B, A
7   0004   3A 11 00             LDA    0011h
8   0007   80                   ADD    B
9   0008   32 12 00             STA    0012h
10  000B   76                   HLT
11
```

Na poslednom cvičení budú otvorené znova všetky testy pre tých študentov, ktorí ich nepísali.

Druhýkrát sa písať nedá.

Ako náhrada za vymeškané cvičenie sa dá akceptovať aj 13. prednáška (bude prezenčka)

4

micro:bit v letnom semestri

```
void setup() {
  Serial.begin(9600);

  mag.initialize(); //Initializes the mag sensor
  mag.start();      //Puts the sensor in active mode
}

void loop() {

  int x, y, z;
  //Only read data when it's ready
  if(mag.dataReady()) {
    //Read the data
    mag.readMag(&x, &y, &z);

    Serial.print("X: ");
    Serial.print(x);
    Serial.print(", Y: ");
    Serial.print(y);
    Serial.print(", Z: ");
    Serial.println(z);

    Serial.println("--------");
  }
}
```

5

Bonusy dnes o 20:00

Pozor: limit 5+ bodov na bonusy

6

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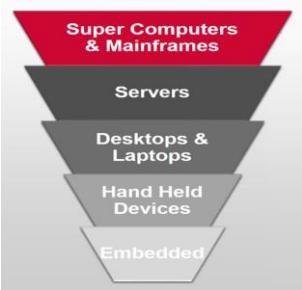
Triedy počítačov

- Supercomputer
- Mainframe
- Workstation
- Personal Computer PC
- Handheld
- Embedded



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Supercomputer

Najvýkonnejšie počítače danej doby.

Súčasné využitie:

- Predpovede počasia
- Simulácie jadrových výbuchov :(
- Časticová fyzika
- Tvorba nových molekúl
- Simulácie (modely) komplexných systémov:
  aerodynamika,
  ropné polia,
  spoločenské systémy
  ...

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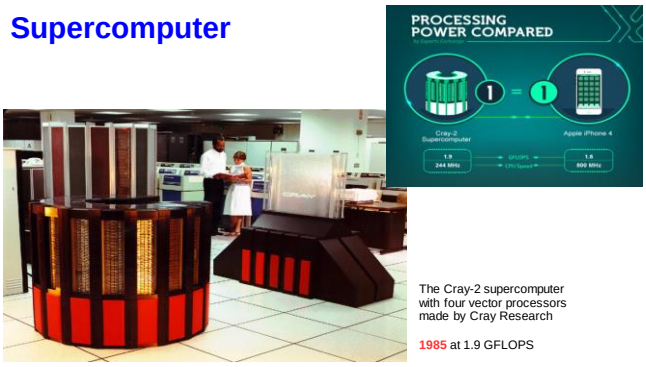
Supercomputer



The Cray-2 supercomputer with four vector processors made by Cray Research

1985 at 1.9 GFLOPS

10

Supercomputer

1. National Supercomputing Center in Wuxi (China)

Sunway TaihuLight

10 649 600 jadier 15 371 kW
93 014 Tflop/s max 125 435 Tflops/s peak

T = 10^{12}

november 2017

11

Frontier

HPE Cray EX Supercomputer

-- Oak Ridge National Laboratory

9 472 64-core AMD
= **606 208** jadier

37 888 GPU Radeon
= **8 335 360** jadier

výkon 1,102 ExaFlops

spotreba 21 MW

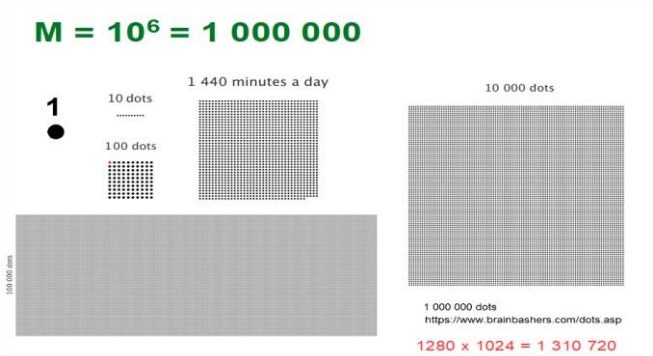
cena 600 miliónov $

1. miesto aj v Green500
= 62,68 GFlops/Watt

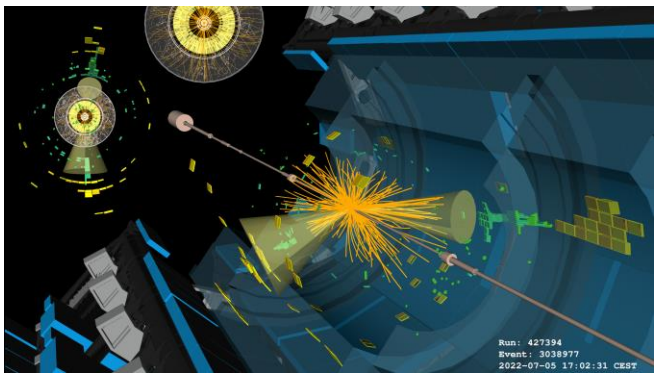
E = 10^{18} -- trilión

máj 2022

12



13



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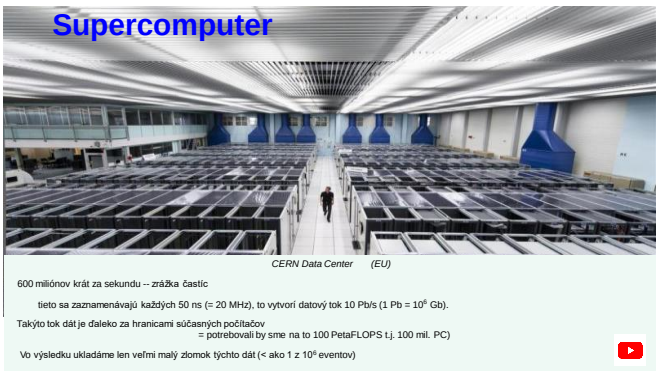

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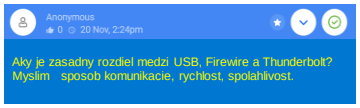
Q&A



Vlastnosť	USB	FireWire	Thunderbolt
Rýchlosť prenosu dát	Rôzne (480 Mbps až 10 Gbps)	400 Mbps 800 Mbps	10 Gbps (Thb 1) až 20 Gbps (T 2) 40 Gbps (T 3, 4)
Topológia siete	Pripojenie periférií	Audio, video, externé disky	Rôzne zariadenia vrátane externých diskov, monitorov, vysokovýkonných periférií
Možnosti napájania (Power Delivery)	Áno	Nie	Áno
Hot-swapping	Áno	Áno	Áno
Prípojnica (Connector)	Rôzne (USB-A, USB-B, microUSB, USB-C)	6-pin, 4-pin (FireWire 400) 9-pin (FW 800)	USB-C (Thb 3, 4) Mini DisplayPort (Thunderbolt 1,2)

done by ChatGPT

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Superpočítač Aurel

po vylepšení v roku 2014

3 100 kg
a ďalšie potrebné technológie takmer 2 000 kg

2 m vysoký, 80 cm široký, 1,8 m hlboký

3072 procesorových jadier, po rozšírení
sa ich počet zvýšil o ďalších 1024 na celkovo 4096

na každé jadro CPU pripadá 8 GB RAM pamäte
-- spolu 32 TB RAM

128 TFLOP/s

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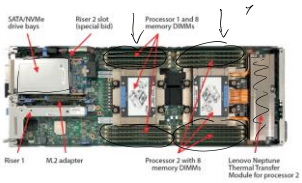
Superpočítač Devana štart r. 2023

38 TB RAM
1 PB diskové úložisko
130 kW príkon

~~Aurel~~ ⇒ Devana ⇒ Perun
128 ⇒ 800 TFLOP/s
4096 + 0 ⇒ 9472 + 221184 jadier



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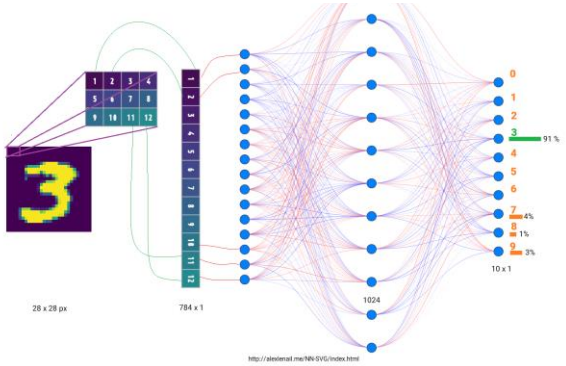

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Demo 0: cmd a https://status.devana.nscc.sk

Demo 1: https://ood.devana.nscc.sk/pun/sys/dashboard

Demo 2: https://senzor.robotika.sk/zp/cnn/

Demo 3: https://cs.stanford.edu/people/karpathy/convnetjs/demo/mnist.html

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Exkurzia SAV

History

Supercomputer

~~**Aurel**~~ ⇒ **Devana** ⇒ Perun

128 ⇒ 800 TFLOP/s

4096 + 0 ⇒ 9472 + 221184 jadier

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Streda 21. 12. @ 14:30 Exkurzia SAV

Záujem?
- Classroom

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Mainframe

Banky, poisťovne
Letecké spoločnosti
Sklady, distribučné spoločnosti

Veľké množstvo dát
Obsluha veľkého množstva užívateľov súčasne

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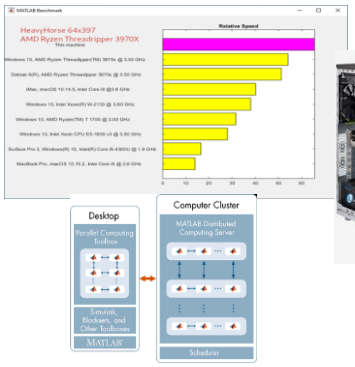
Workstation



HeavyHorse 256x754
procesor AMD Epyc 9754, 128 jader/256 vlákien, 2.25/3.1 GHz
384 GB pamäť DDR5, NVIDIA Quadro RTX A4000 16GB, SSD NVMe 4 TB

nov. 2023: 23 553 €

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Personal computer

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Handheld / mobile devices

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Handheld / mobile devices

The Osborne 1 was the first commercially successful portable computer, launched by Osborne Computer Corporation on April 3, 1981. It weighs **24.5 pounds (11.1 kg), costs $1,795**, and runs the CP/M 2.2 operating system.

Zanco Tiny T2 is the world's smallest G3 mobile phone. The Tiny T2 measures 61mm x 30mm x 16.5mm and weighs *only* ***31 grams.*** Its price varies between **$50-60.**

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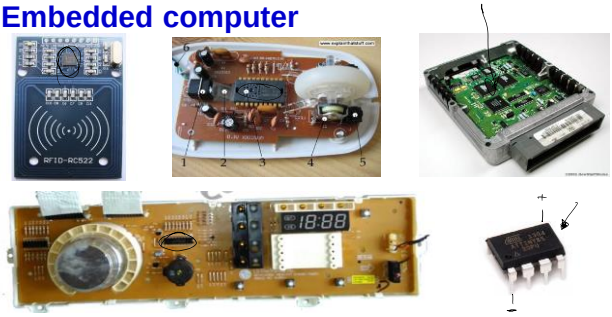
Embedded computer



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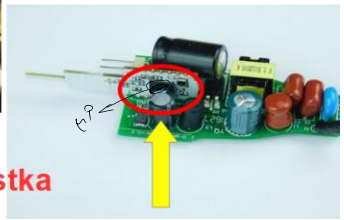
Embedded Computing / vnorené systémy



počítač = súčiastka

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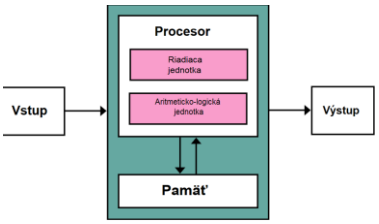
Von Neumann – Princeton



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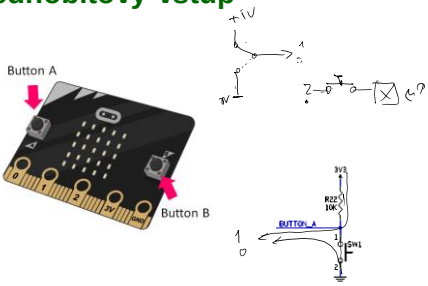
Jednobitový vstup



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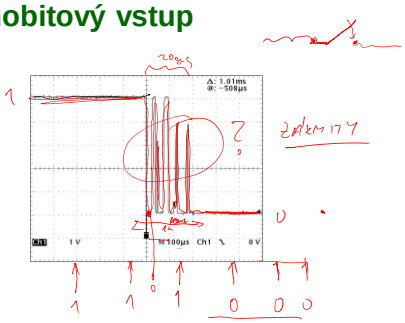
Jednobitový vstup



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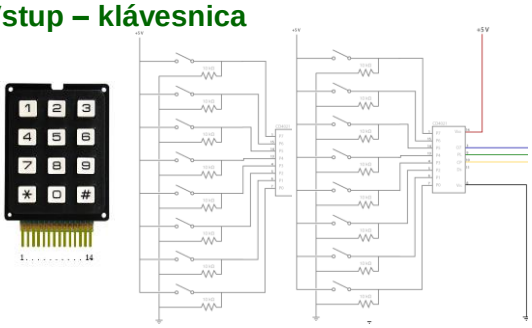
Vstup – klávesnica



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Maticová klávesnica

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PC klávesnica

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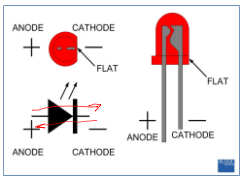
Jednobitový výstup



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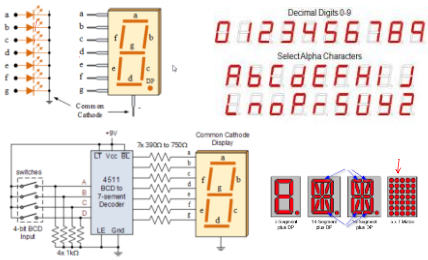
7-segmentový



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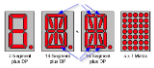
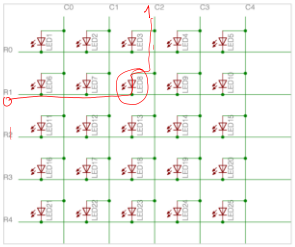
Maticový displej





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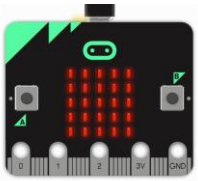
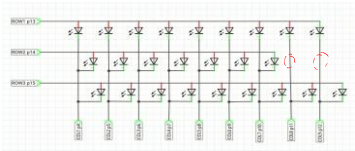
Maticový displej





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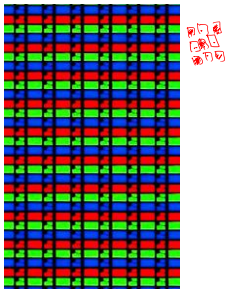
Maticový displej



Full HD 1920 x 1080 = 2 073 600 pixelov → 82 944 mikrobitov Pozn.:RGB = x 3 ? (nie)

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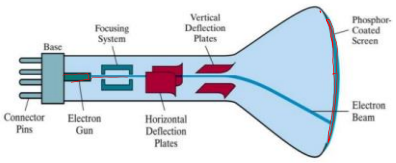
Obrazovka

CRT – Cathode Ray Tube



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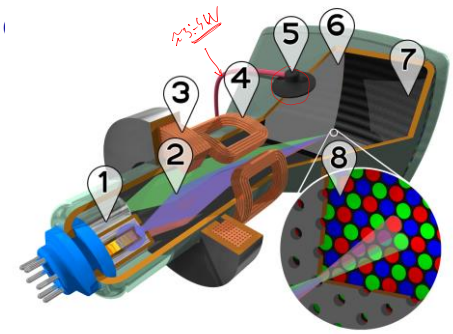

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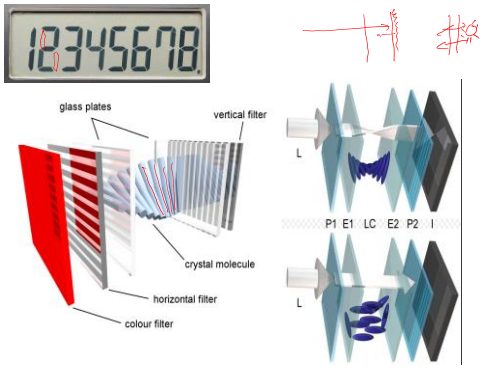

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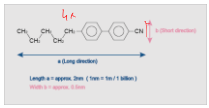
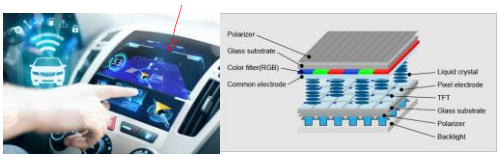


An example of a liquid crystal molecule



Structure of a TFT LCD

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4 colours CGA / 16 colours EGA / 256 colours VGA

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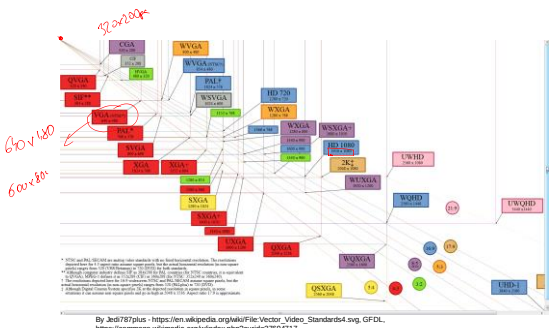

By Jedi787plus - https://en.wikipedia.org/wiki/File:Vector_Video_Standards4.svg, GFDL, https://commons.wikimedia.org/w/index.php?curid=37694717

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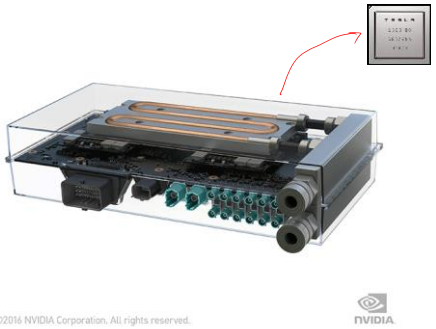

The Nvidia Drive PX 2 is based on one or two Tegra X2 SoCs
-- each contains 2 Denver cores, 4 ARM A57 cores and a GPU Pascal

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ROBORACE

https://youtu.be/zuzaabZLVSo

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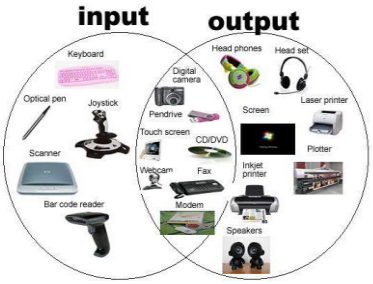
Vstupno/výstupné jednotky



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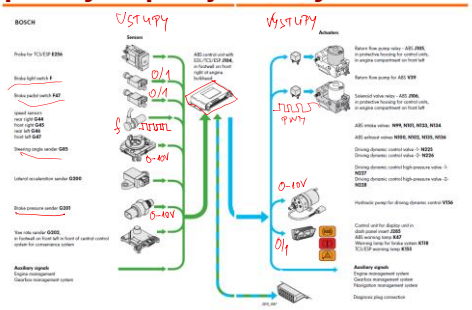
Vstupno/výstupné jednotky – v aute



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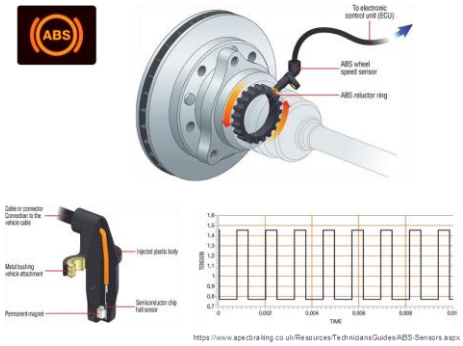

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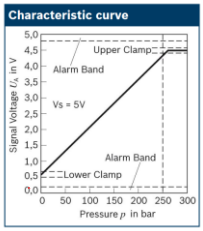
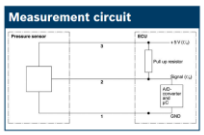
Automotive pressure sensor

Measurement up to 25 MPa

BOSCH Invented for life





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sli.do #ZPOC

Otázky?

Ohodnoťte dnešnú prednášku, prosím.

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