

# M5Stack drives 16x64 LED matrix with HT16K33

M5Stack User Meeting Vol.6  
Tokyo, 2019/10/30

# 16x64 LED matrix



I.  
What is  
HT16K33  
?

# HT16K33

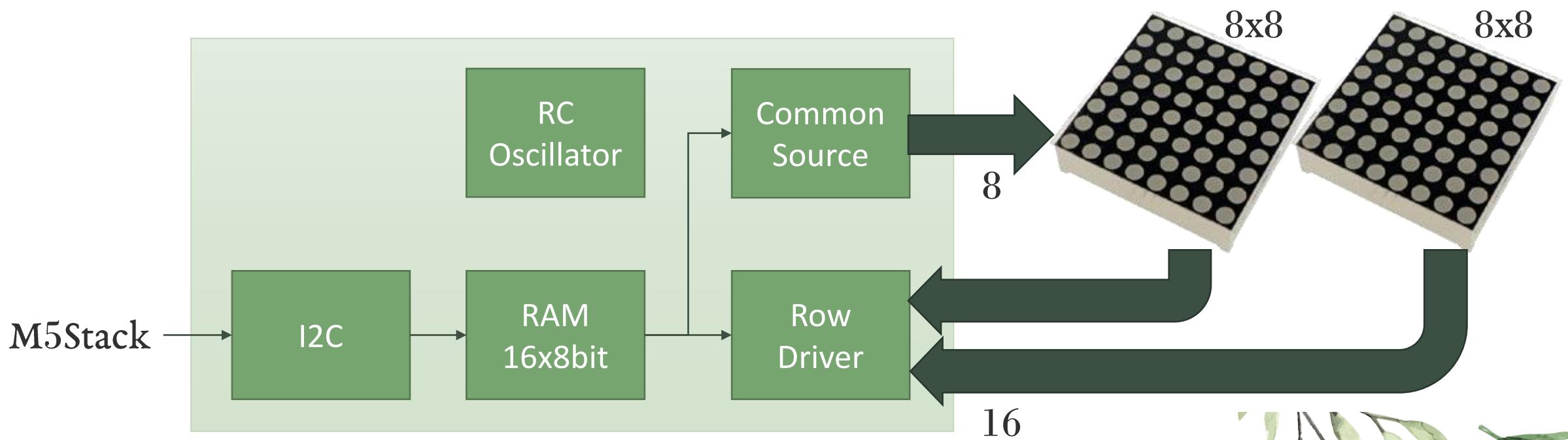


SOP28



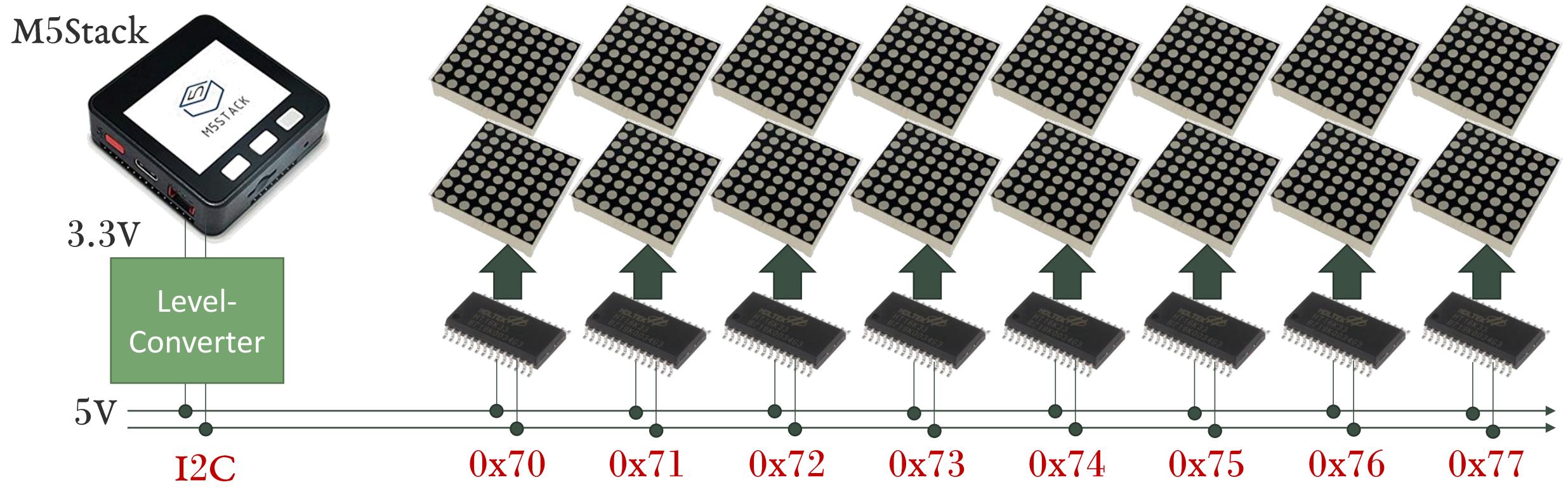
- RAM Mapping 16\*8
- Very few additional parts

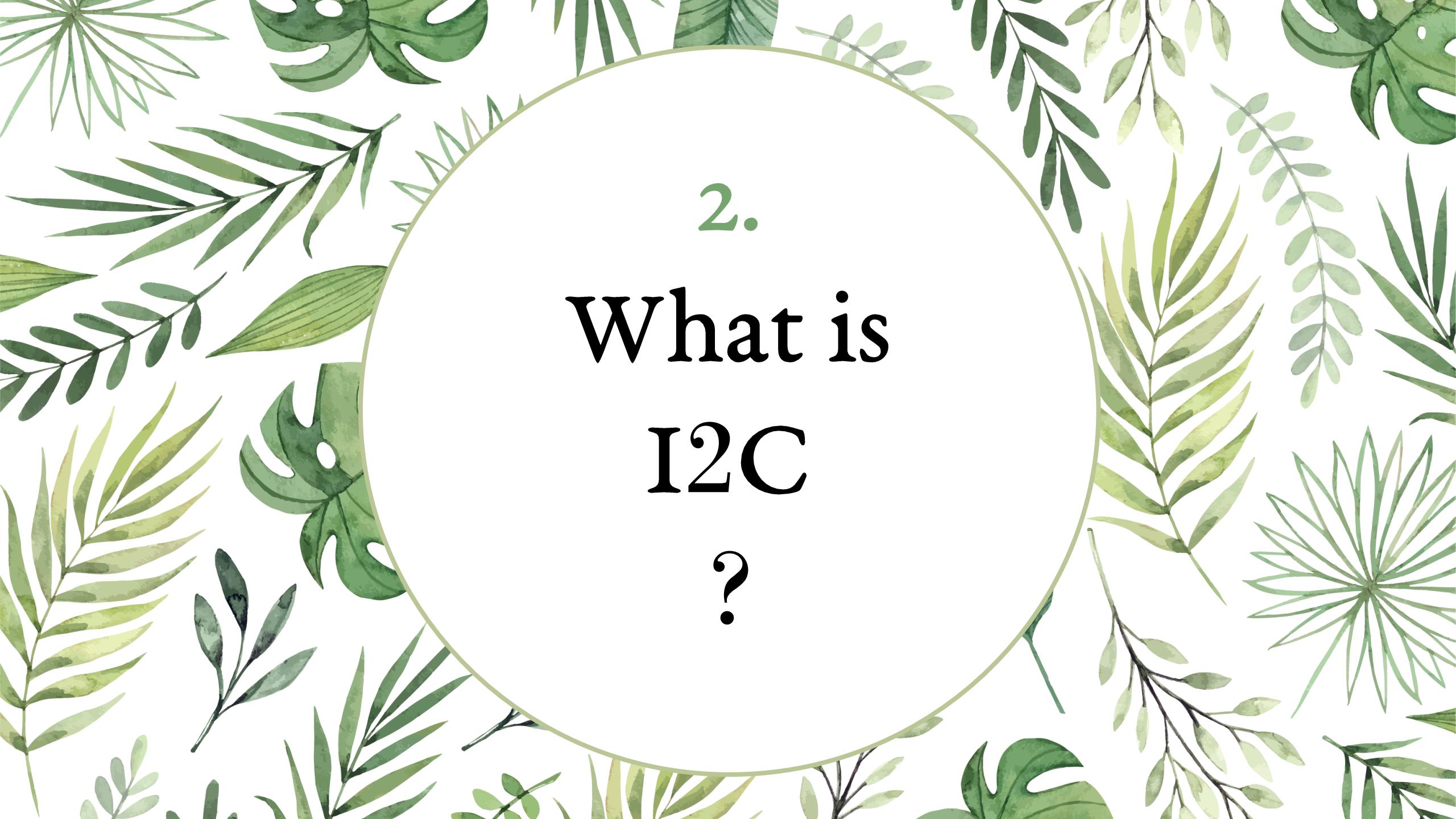
¥120 at aitendo



# Configuration - 16x64 LED Matrix

- HT16K33 x 8 on an I2C
- Voltage Level Conversion

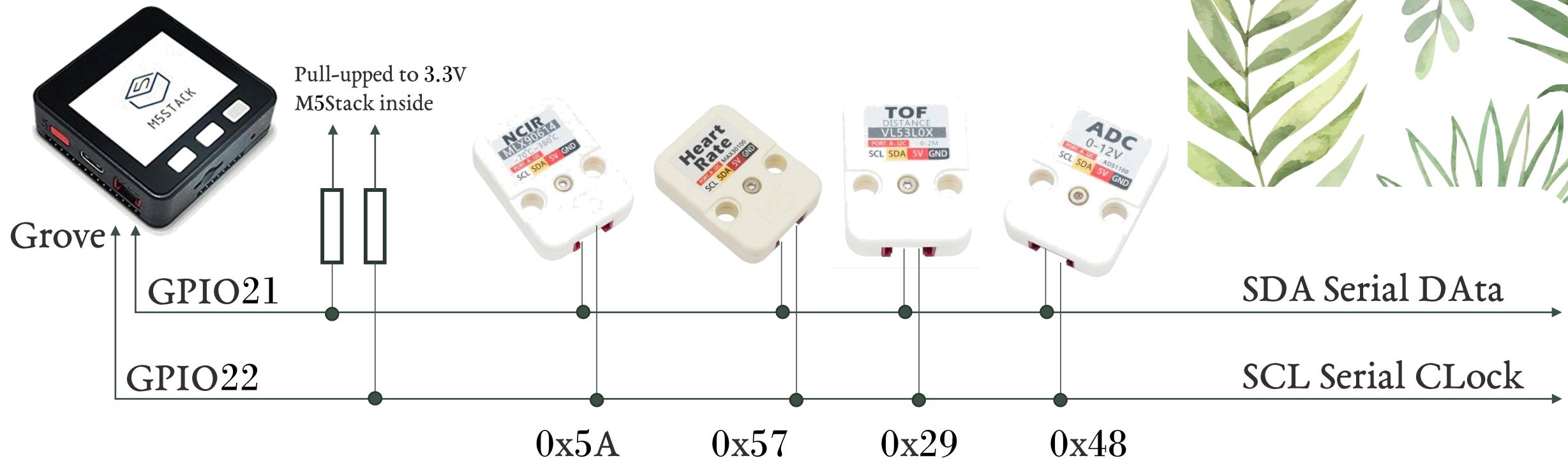




2.  
What is  
I<sup>2</sup>C  
?

# Inter-Integrated Circuit

- I-Squared-C, IIC, I2C
- Addressable (7bits) 0x08 – 0x77



# I2C Address Map of M5Stack

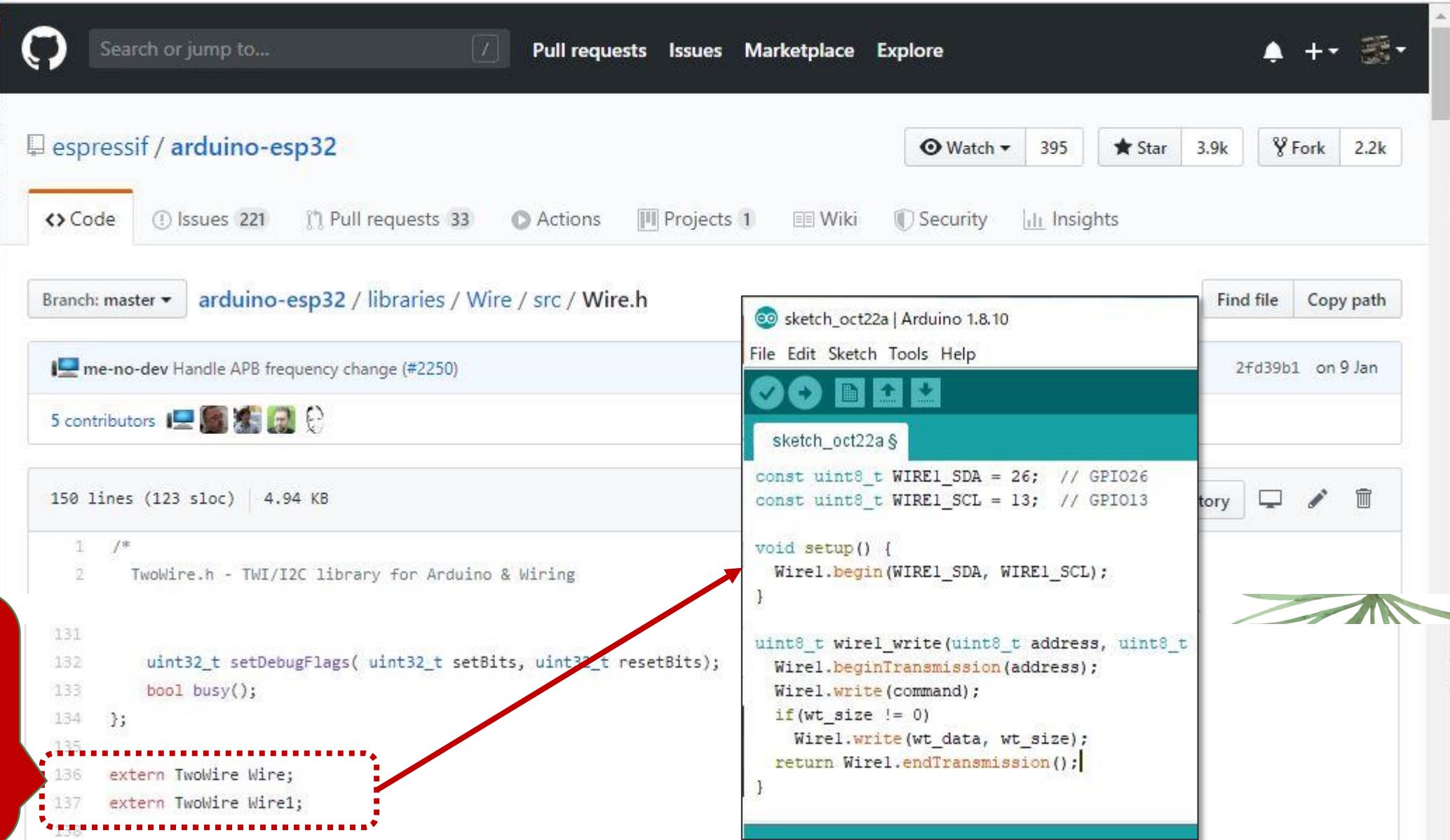
Conflict  
with  
HT16K33

Core		
Device	Address	IC
M5Core	0x75	IP5306
	0x68	MPU6886
	0x6C	SH200Q
	0x10	BMM150
M5Stick	0x75	IP5306
	0x68	MPU9250
M5Stick-C	0x34	AXP192
	0x6C	SH200Q
	0x51	BM8563

Module		
Device	Address	IC
PLUS	0x62	
Go-PLUS	0x61	
Step-Motor	0x70	
Servo	0x53	
LEGO-Motor	0x56	
Faces-Encoder	0x5E	MEGA328P
Faces-Joystick	0x5E	
Faces-Keyboard	0x78	
Faces-Calculator	0x78	
Faces-GameBoy	0x78	
Faces-RFID	0x28	

Unit		
Device	Address	IC
ENV	0x5C、0x76	DHT12、BMP280
NCIR	0x5A	MLX90614
Thermal	0x33	MLX90640
Color	0x29	TCS3472
ToF	0x29	VL53L0X
Heart	0x57	MAX30110
ADC	0x48	ADS1100
Makey	0x51	MEGA328P
Trace	0x5A	MEGA328P
ACCEL	0x53	ADXL345
Joystick	0x52	MEGA328P
CardKB	0x5F	MEGA328P
EXT.IO	0x27	PCA9554PW
DAC	0x60	MCP4725
PaHUB	0x70	TCA9548A
PbHUB	0x40	MEGA328P
RFID	0x28	MFRC522
HAT-ENV	0x5C、0x77、0x10	DHT12、BMP280、 BMM150
ESP32-CAM		
M5Camera		
M5Camera-F	0x68、0x76	MPU6050、BME280
M5Camera-X		

# Look into Wire.h of Arduino-ESP32



The image shows a GitHub repository page for `espressif / arduino-esp32`. The `Wire.h` file is displayed, showing its 150 lines of code. A red callout box highlights the line `extern TwoWire Wire;` at line 136, which is circled with a red dashed box. A red arrow points from this line to an open Arduino IDE window showing a sketch named `sketch_oct22a`. The sketch code includes the line `Wire1.begin(WIRE1_SDA, WIRE1_SCL);`, indicating that the `Wire1` object is defined in the `Wire.h` header. The GitHub interface includes a search bar, navigation tabs (Pull requests, Issues, Marketplace, Explore), and repository statistics (Watch: 395, Star: 3.9k, Fork: 2.2k). The Arduino IDE window shows the sketch code and a toolbar with standard IDE icons.

```
const uint8_t WIRE1_SDA = 26; // GPIO26
const uint8_t WIRE1_SCL = 13; // GPIO13

void setup() {
  Wire1.begin(WIRE1_SDA, WIRE1_SCL);
}

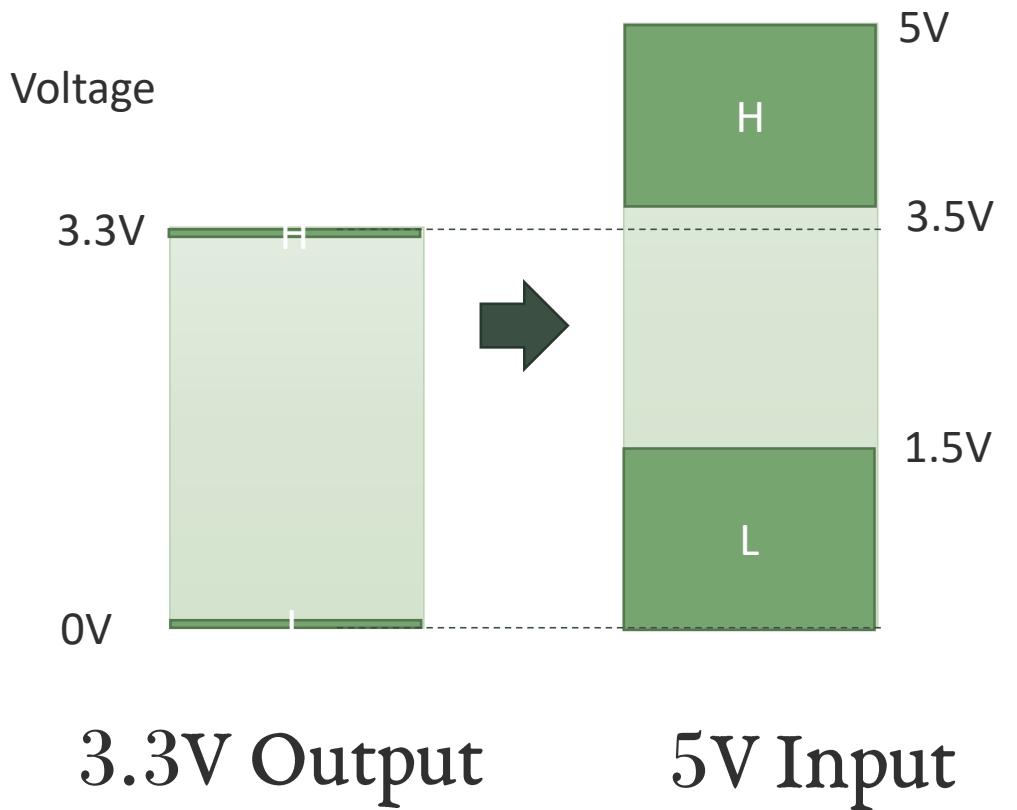
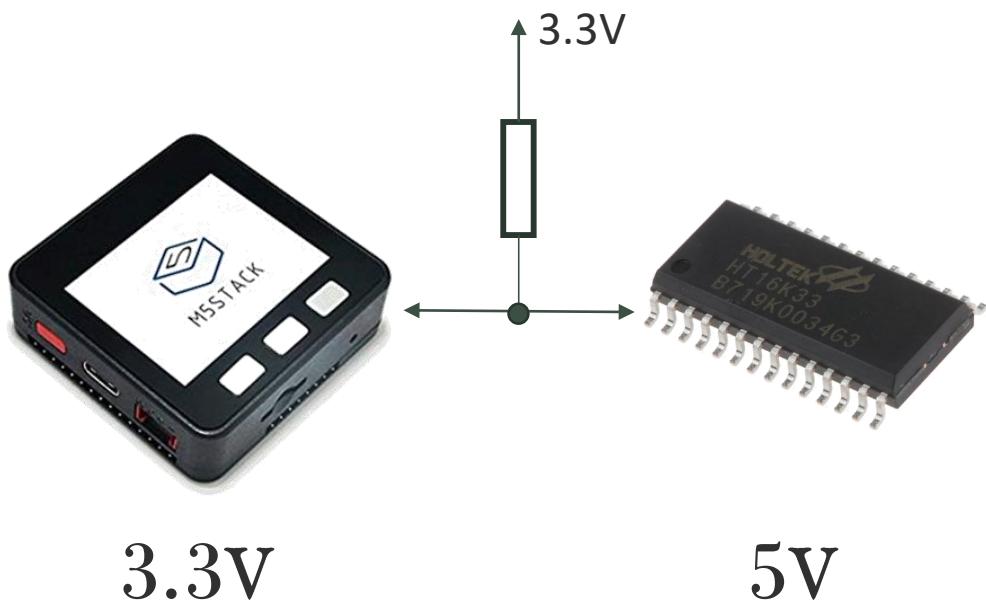
uint8_t wire1_write(uint8_t address, uint8_t
  Wire1.beginTransmission(address);
  Wire1.write(command);
  if(wt_size != 0)
    Wire1.write(wt_data, wt_size);
  return Wire1.endTransmission();
}
```

Wire1  
is  
Available



# 3. Level Converter

# Voltage of I2C



# Level Converter for I2C

**秋月電子通商**

マイページ 注文書 お問い合わせ かごの中身 トランジスタ広告 回路

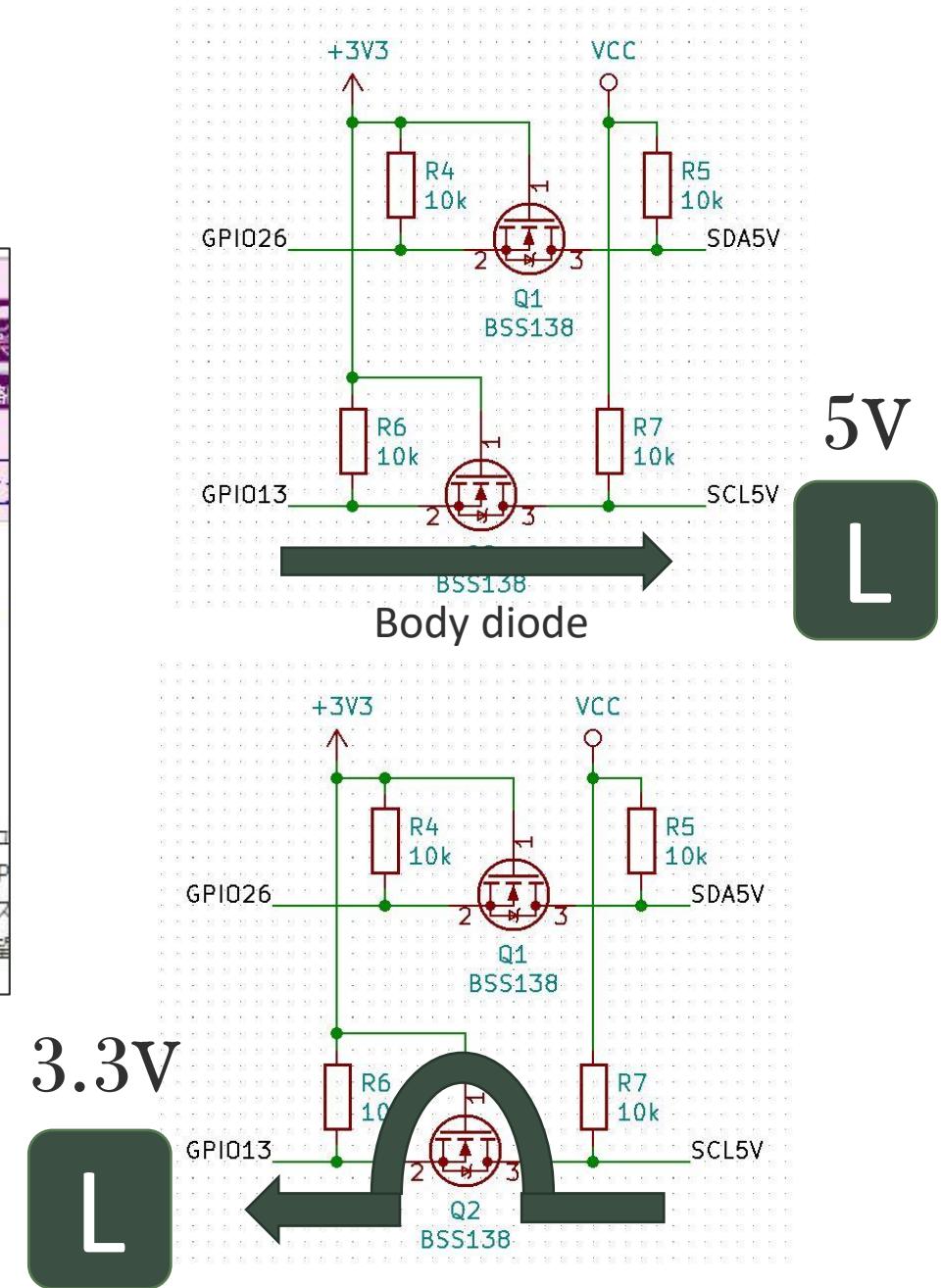
トップページ | 商品カタログ | 新商品 | お知らせ | 注文方法 | 搬入先 | よくある質問 | ダウンロード | 配送状況確認 | ログイン

トップ > 半導体 > インターフェースIC > レベル変換 > 4ビット双方向ロジックレベル変換モジュール BSS138 使用

**4ビット双方向ロジックレベル変換モジュール**  
[AE-LCNV4-MOSFET]  
通販コード K-13837  
発売日 2018/12/20  
メーカーカテゴリ 株式会社秋月電子通商

NチャネルMOSFETを使用したロジックレベル変換モジュールが定められています。双方向に変換できますのでI2CやSPIする必要がありません。こちらはお客様から個別部品(ディス)を頂き販売開始いたしました。キット・モジュール等のご要望

Built-in pull-ups



# Strapping Pins

- Be careful of external pull-up / pull-down

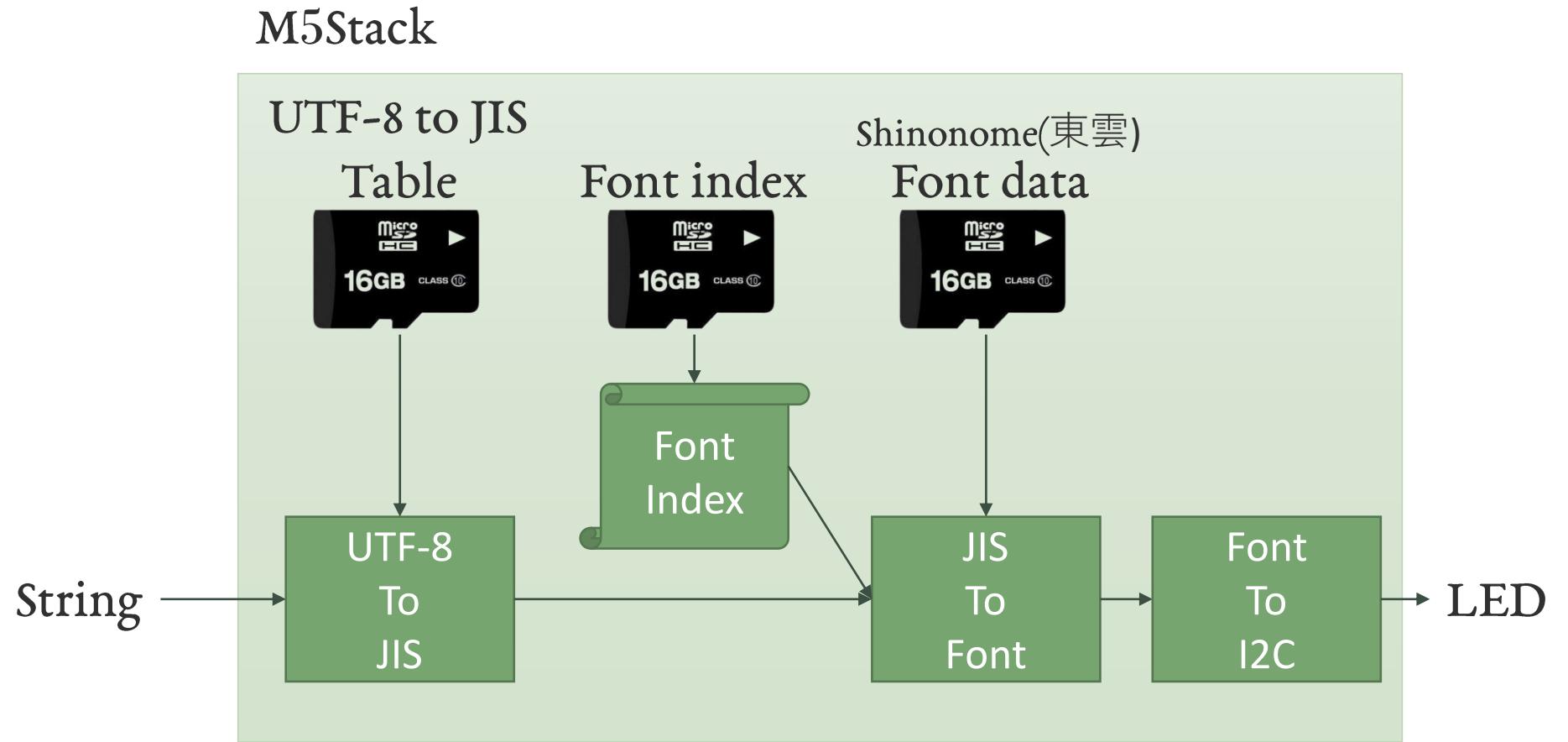
Table 3: Strapping Pins

		Voltage of Internal LDO (VDD_SDIO)			
		Pin	Default	3.3 V	1.8 V
GPIO12	MTDI	Pull-down			0 1
	Booting Mode				
GPIO00	GPIO00	Pull-up	SPI Boot		Download Boot
	GPIO2	Pull-down	Don't-care		0
Enabling/Disabling Debugging Log Print over U0TXD During Booting					
GPIO15	MTDO	Pull-up	U0TXD Toggling		U0TXD Silent
	Timing of SDIO Slave				
GPIO5	Pin	Default	Falling-edge Sampling	Falling-edge Sampling	Rising-edge Sampling
			Falling-edge Output	Rising-edge Output	Falling-edge Output
GPIO5	MTDO	Pull-up	0	0	1
	GPIO5	Pull-up	0	1	0
GPIO5	Rising-edge Sampling				
	Rising-edge Output				



# 4. Signage in Japanese

# UTF-8 to Japanese-Font





# 6. Conclusion

# Conclusion

## Utilize M5Stack

- Wire1 is available in addition to Wire
- Be careful of the strapping pins
- The microSD is useful for Japanese fonts

## Next Steps

- Some Web API or so, for text contents
- Movies and animations
- Full color or gray scale by modern devices



# Thanks!

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2019/10/30

MsStack User Meeting #6

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