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# Protections and Filters application book for: Blood Glucose Meters



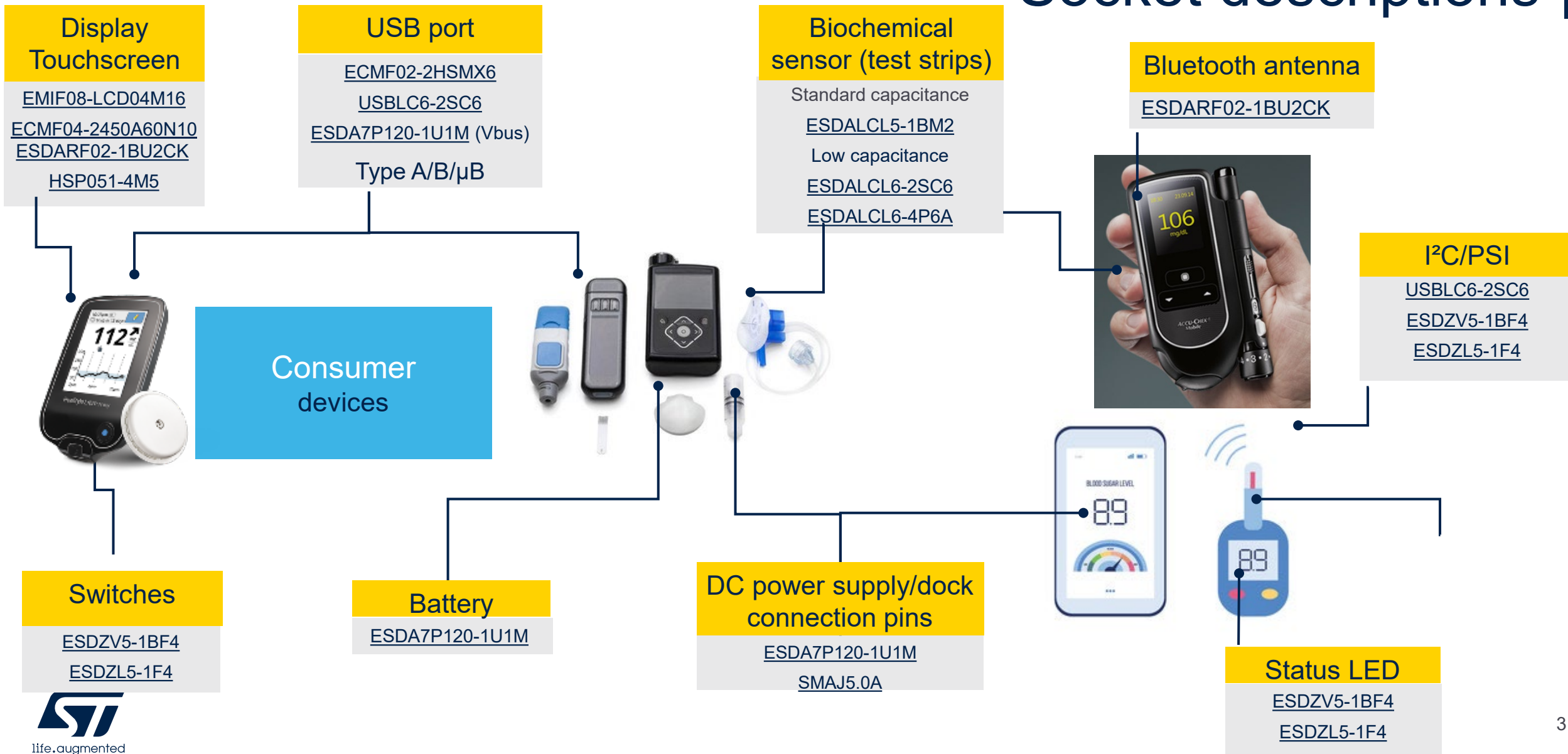
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# Blood glucose monitoring systems

## Socket descriptions

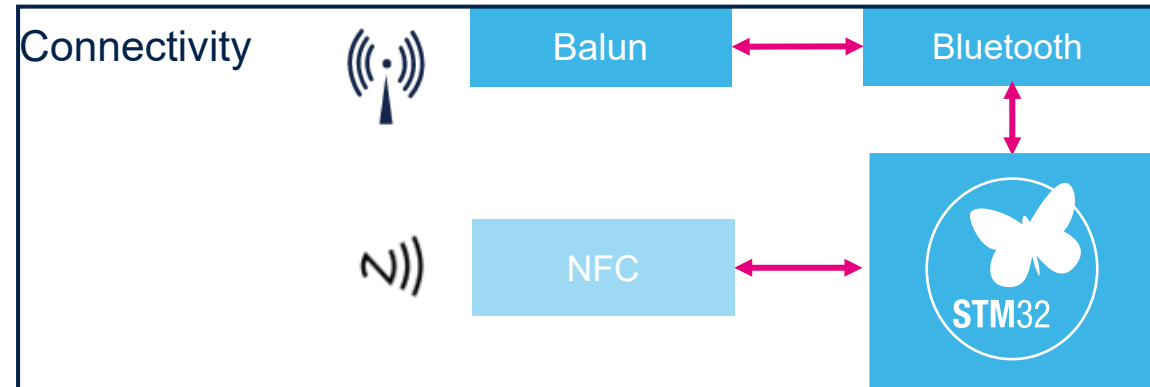


# Blood glucose meters

## Antennas

Antennas are ESD protected according to IEC 61000-4-2 level 4

Needs for Bluetooth antenna	Product key parameters	ST solutions
RF power=20 dBm ( $V_{PEAK}=3.2$ V with 50 $\Omega$ load)	$V_{RM} \geq 3.6$ V	<u>ESDARF02-1BU2CK</u>
Alternative signal	Bidirectional device	
f=2.4 GHz	Extra low capacitance ( $\leq 0.2$ pF) Bandwidth=24 GHz	
Very low harmonic	H3= 41.8 dBm at 20 dBm power; f=2.4 GHz	
IEC 61000-4-2 level 4-8kV contact / 15 kV air	Contact discharge: 12 kV Air discharge: 20 kV	

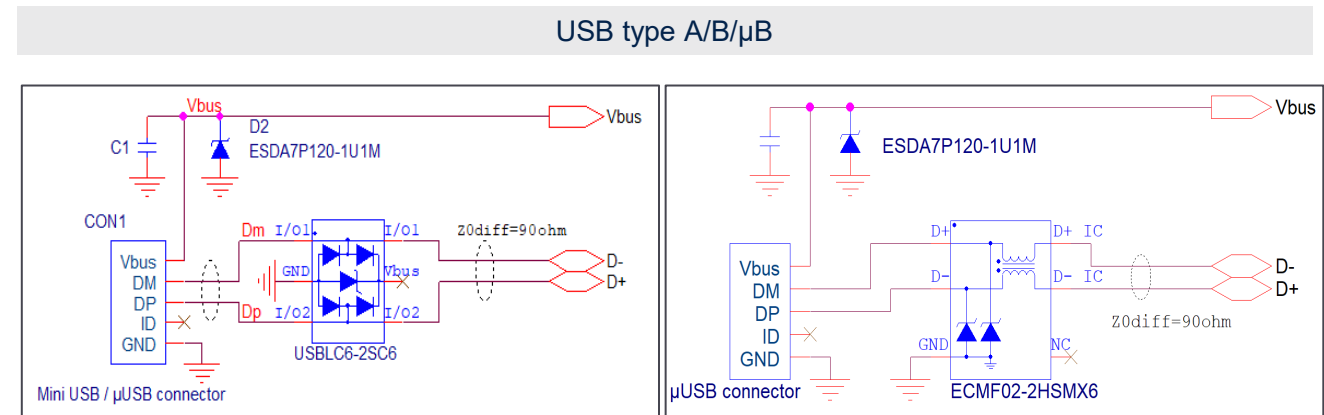


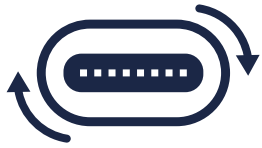
# Blood glucose meters USB 2.0 port

Complete portfolio for USB granting flexibility in design; all sockets are ESD protected according to IEC 61000-4-2 level 4

Needs for USB2.0 (D+/ D-)	Product key parameters	ST solutions
Voltage $\leq 3.0V$	$V_{RM} = 5.25V$	<b>USBLC6-2SC6</b> (dual lines)
Positive signal	Unidirectional	
Data rate: 480 Mbps Maximum equivalent frequency 240 MHz	Bandwidth 2.6 GHz	<b>ECMF02-2HSMX6</b>
Avoid to disturb Wifi antenna (2.4GHz / 5GHz)	CMF Rejection $\geq -20dB$ (700 MHz to 2.4 GHz and 5 GHz )	
IEC 61000-4-2 level 4 – 8kV contact / 15 kV air	Contact discharge: $\geq 8$ kV Air discharge: $\geq 15$ kV	-

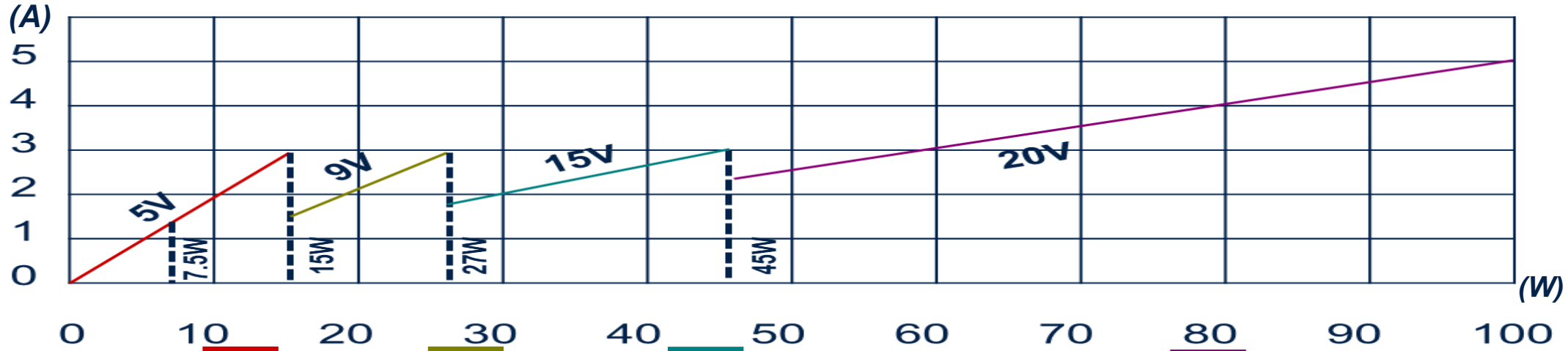
Needs for USB2.0 (Vbus)	Product key parameters	ST solutions
Voltage $\leq 5.5V$	$V_{RM} = 5.5V$	<b>ESDA7P120-1U1M</b>
Positive signal	Unidirectional	
Need to withstand 8/20 $\mu s$ surge (IEC 61000-4-5)	$I_{PP}$ up to 120A	
IEC 61000-4-2 level 4 – 8kV contact / 15 kV air	Contact discharge: $>30$ kV Air discharge: $>30$ kV	





# Blood glucose meters USB 3.x Type C PD

USB Power Delivery standard (5, 9, 15, 20 V).



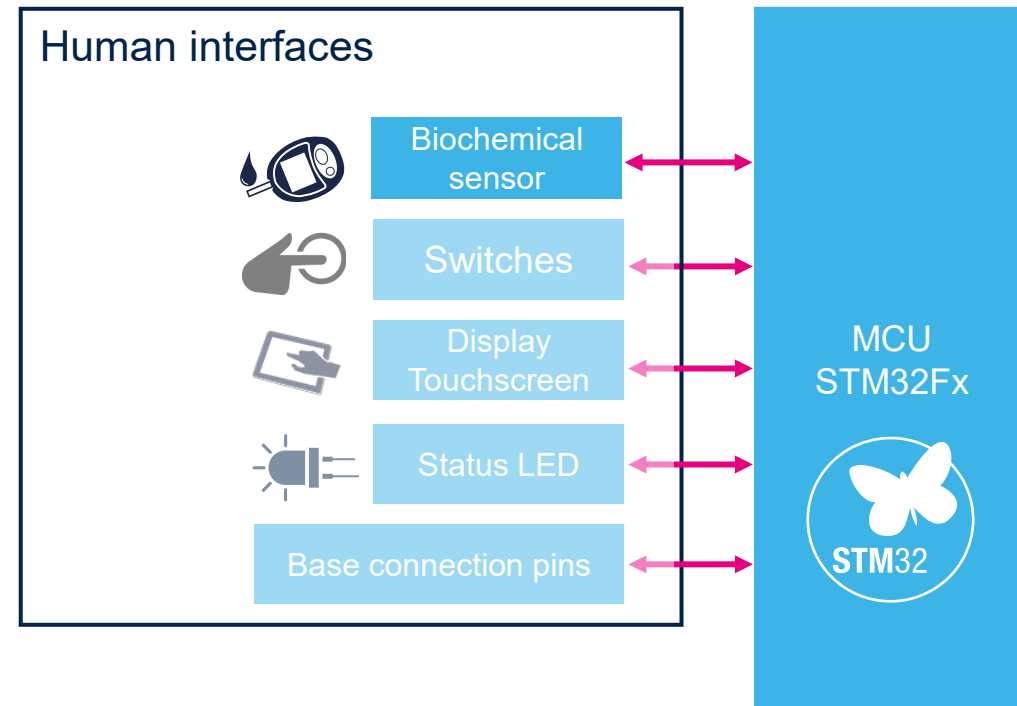
Type	Application STM32 based	Pins	5V-15 W		9V-27 W		15 V-45 W		20 V-100 W	
All	With or without STM32	D+/D-	ESDAXLC5-1U2		ESDAXLC5-1U2		ESDAXLC5-1U2		ESDAXLC5-1U2	
		SSRx/SSTx	ESDARF02-1BU2CK		ESDARF02-1BU2CK		ESDARF02-1BU2CK		ESDARF02-1BU2CK	
		CC1/CC2	ESDZV5-1BF4		ESDALC14-1BF4		ESDZV18-1BF4		ESDZV201-1BF4 ESDL20-1BF4	
		SBU1/SBU1	ESDA6V1L		ESDA14V2L		ESDA25L		ESDA25L	
		Vbus	ESDA7P60-1U1M ESDA7P120-1U1M ESDA8P30-1T2 ESDA8P80-1U1M ESDA9P25-1T2 SMAJ6.0A		ESDA13P70-1U1M ESDA15P60-1U1M SMAJ10A		ESDA17P20-1F2 ESDA17P50-1U1M ESDA17P100-1U2M SMAJ18A		ESDA22P150-1U3M ESDA24P140-1U3M ESDA25P35-1U1M SMAJ22A	
Sink	YES					TCPP01-M12				
Source	YES					TCPP02-M18				
DRP	YES					TCPP03-M20				

# Blood glucose meters

## Biochemical sensor

Exceeds IEC 61000-4-2 level 4:  $\pm 30$  kV air discharges with extremely low leakage current; flexibility through multiline product solutions

Needs for biochemical sensors	Product key parameters	ST solutions
MCU power supply, usually 3 V or less	$V_{RM} \geq 3.0$ V	
Digital positive signal	Unidirectional (bidirectional also suitable)	
Low frequency application	Capacitance < 30 pF to reduce consumption Multiline solutions with very low capacitance < 3.5 pF	<b><u>ESDALCL5-1BM2</u></b> (single line) <b><u>ESDALCL6-2SC6</u></b> (dual line)
Avoid to disturb glucose's measurement	Very low leakage is needed to avoid disturbances - $I_r @ 1V < 1$ nA	<b><u>ESDALCL6-4P6A</u></b> (multiline)
IEC 61000-4-2 level 4: 8 kV contact / 15 kV air	Contact discharge: $\geq 15$ kV Air discharge: $> 30$ kV	

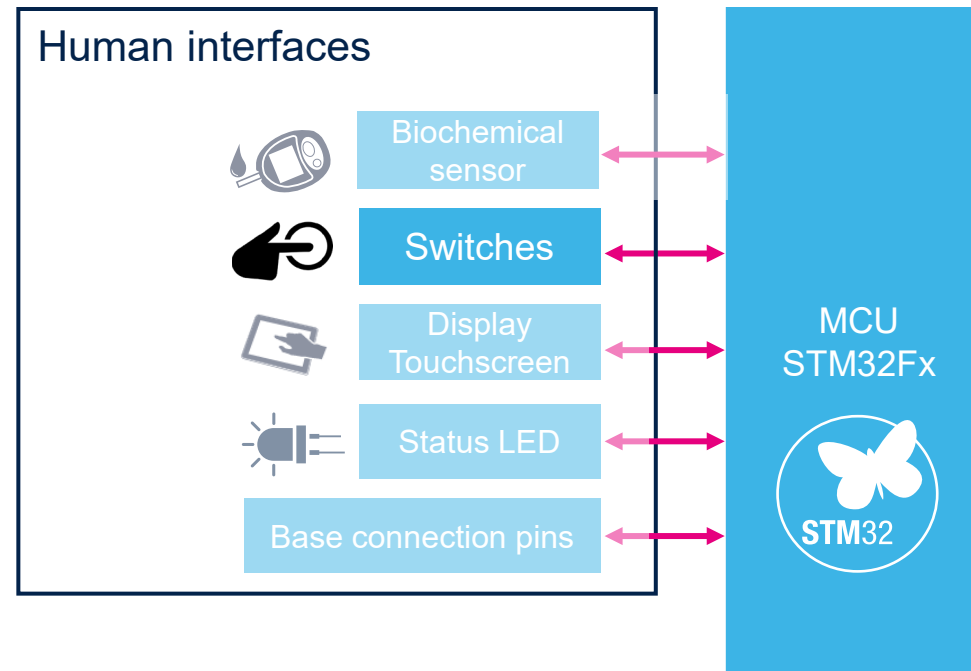


# Blood glucose meters

## Switches

All sockets are ESD protected according to IEC 61000-4-2 level 4  
 Very low clamping thanks to soft snapback type protection

Needs for switches	Product key parameters	ST solutions
MCU power supply, usually 3.3 V or less	$V_{RM} \geq 5.5 \text{ V}$	<b><u>ESDZV5-1BF4</u></b> (single line)
Digital positive signal	Unidirectional (bidirectional also suitable)	
Low frequency application	No constraints on capacitance Cline < 9.5 pF	<b><u>ESDZL5-1F4</u></b> (single line)
IEC 61000-4-2 level 4–8kV contact / 15 kV air	Contact discharge: $\geq 15 \text{ kV}$ Air discharge: $\geq 30 \text{ kV}$	



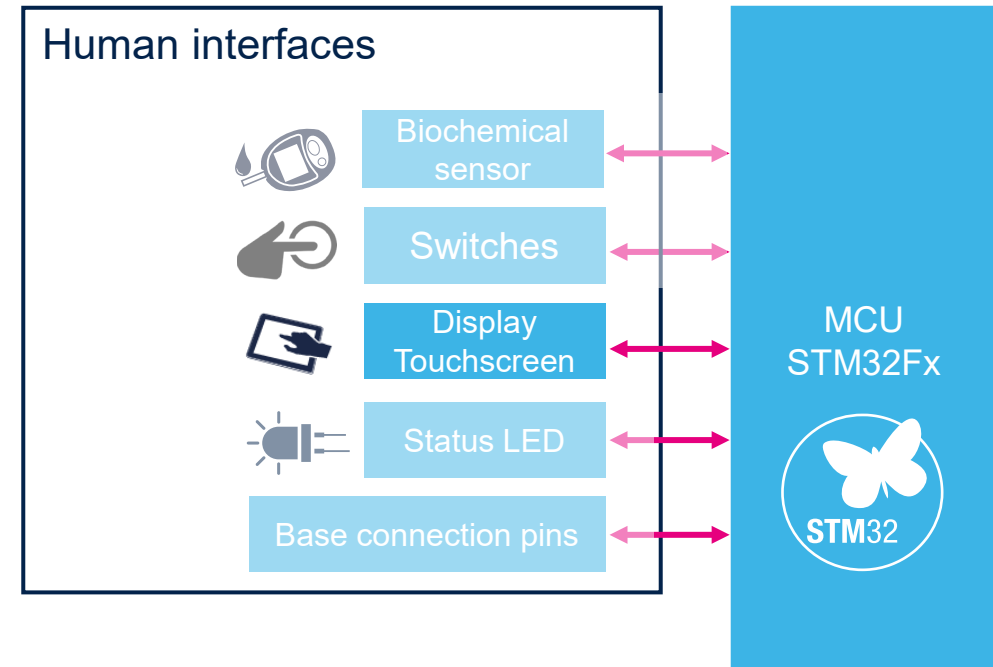


# Blood glucose meters

## Display

High efficiency in EMI filtering; all sockets ESD protected according to IEC 61000-4-2 level 4; 8 kV contact discharge & 15 kV air discharge

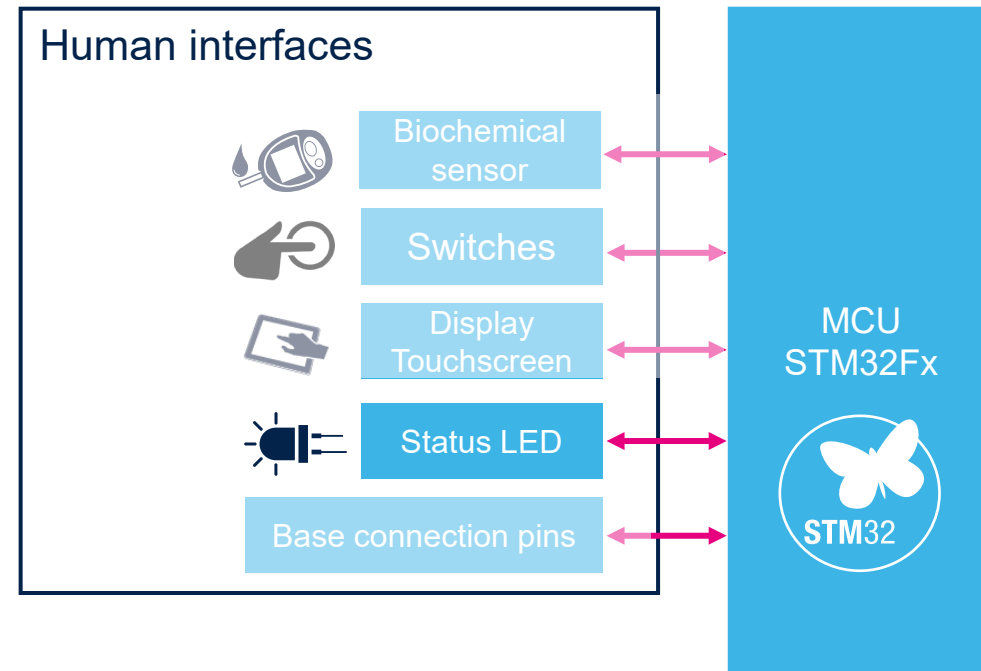
Needs for parallel interface	Product key parameters	ST solutions
Voltage $\leq 3.3$ V (high-speed HS)	$V_{RM} \geq 3.3$ V	<u><a href="#">EMIF08-LCD04M16</a></u>
Positive signal	Unidirectional (bidirectional also suitable)	
Clock frequency $< 33$ MHz	Bandwidth $> 400$ MHz (-6 dB)	
Avoid to disturb Bluetooth reception @2.4GHz	Rejection of 700 MHz to 2.4 GHz $> -25$ dB	
Needs for MIPI (data/clock)	Product key parameters	ST solutions
Voltage $\leq 385$ mV (high-speed HS)	$V_{RM} \geq 3.6$ V	<u><a href="#">ESDARF02-1BU2CK</a></u> <u><a href="#">HSP051-4M5</a></u>
Voltage $\leq 1.3$ V (low-power LP)		
Positive signal	Unidirectional (bidirectional also suitable)	
Data rate up to 1.5 Gbps	Bandwidth $> 11.5$ GHz	<u><a href="#">ECMF4-2450A60N10</a></u>
Maximum frequency: 2.5 GHz		
Avoid to disturb Bluetooth reception @2.4GHz	CMF rejection of 2.4 GHz $> -30$ dB	
Needs for I <sup>2</sup> C	Product key parameters	ST solutions
Line voltage range: 0 to 3.3 V	$V_{RM} \geq 5.25$ V	<u><a href="#">USBLC6-2SC6</a></u> <u><a href="#">ESDZV5-1BF4</a></u> <u><a href="#">ESDZL5-1F4</a></u>
Positive signal	Unidirectional (bidirectional also suitable)	
Small consumption on digital communication	Capacitance $< 10$ pF to reduce consumption	
Data rate: 3.4 Mbps; maximum frequency: 20 MHz	Bandwidth $> 700$ MHz	



# Blood Glucose Meters Status LED

Same product as switches socket  
All sockets are ESD protected according to IEC 61000-4-2 level 4

Needs for status LED	Product key parameters	ST solutions
$V_{RM} > V_{BAT}$ (usually 3.3 V or less)	$V_{RM} \geq 5.5$ V $V_{Hold} \geq 4.0$ V	<b><u>ESDZV5-1BF4</u></b> (single line)
Positive signal to drive the LED	Unidirectional (bidirectional also suitable)	<b><u>ESDZL5-1F4</u></b> (single line)
IEC 61000-4-2 level 4: 8 kV contact / 15 kV air	Contact discharge: $\geq 15$ kV Air discharge: $\geq 30$ kV	

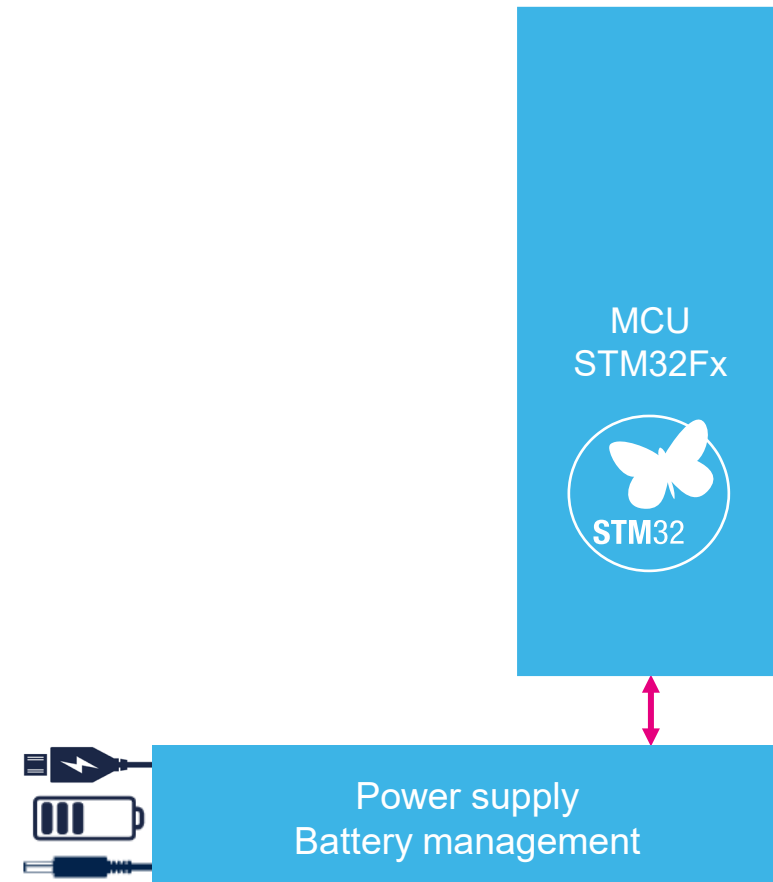


# Blood glucose meters

## Charging connector and battery

Wide range of Ipp surge capabilities  
Flexibility with various voltages and package sizes

Needs for DC power supply	Product key parameters	ST solutions
Voltage according to battery or specification	$V_{RM} \geq V_{bat}$ (generally $V_{bat}=3.3\text{ V}$ )	<b><u>ESDA7P120-1U1M</u></b> (USB port)  <b><u>SMAJ5.0A</u></b> (plug)
Positive signal	Unidirectional	
Need to withstand 8/20 $\mu$ s surge IEC 61000-4-5	$I_{pp}$ up to 120A	
IEC 61000-4-2 level 4: 8 kV contact / 15 kV air	Contact discharge: 30 kV Air discharge: 30 kV	



# Glossary

- **CMF:** Common-mode filter
  - **CMU:** cell management unit
  - **DRP:** Dual Role Power
  
  - **ESD:** electrostatic discharge
  - **EOS:** electrical overstress
  - **MCU:** microcontroller
  - **T CPP:** USB Type-C Port Protection
  - **TVS:** transient voltage suppressor diode
- **CGM:** continuous glucose monitoring
  - **SMBG:** self-monitoring of blood glucose

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