



life.augmented



Protections and filters Application book for : Blood Pressure Monitors

Power & Discrete Sub-Group
APMS PRODUCT GROUP



Disclaimer

Unless expressly approved in writing by an authorized ST representative, ST products are not recommended, authorized, or warranted for use in life saving, or life-sustaining applications, nor in products or systems where failure or malfunction may result in personal injury, death, or severe property or environmental damage.





Blood pressure monitoring socket descriptions

Consumer type device

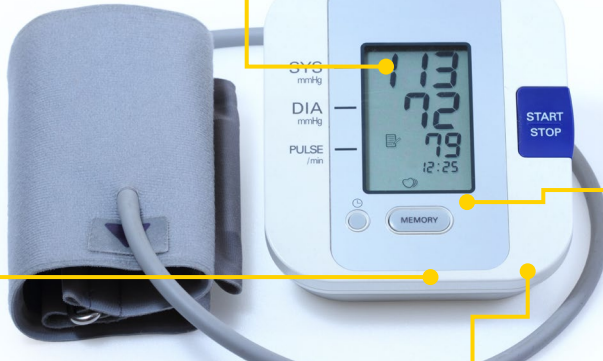
Arm and wrist

EMIF08-LCD04M16
ECMF04-2450A60N10
ESDARF02-1BU2CK
HSP051-4M5

Touchscreen display

Bluetooth

ESDARF02-1BU2CK



Switches

ESDZV5-1BF4
ESDZL5-1F4

USB port

ECMF02-2HSMX6
USBLC6-2SC6
ESDA7P120-1U1M (Vbus)
Type A/B/μB

Battery protection

ESDA7P120-1U1M

Consumer type device

Home devices

Bluetooth

ESDARF02-1BU2CK

Switches

ESDZV5-1BF4
ESDZL5-1F4

Touchscreen display

EMIF08-LCD04M16
ECMF04-2450A60N10
ESDARF02-1BU2CK
HSP051-4M5



USB port

ECMF02-2HSMX6
USBLC6-2SC6
ESDA7P120-1U1M (Vbus)
Type A/B/μB

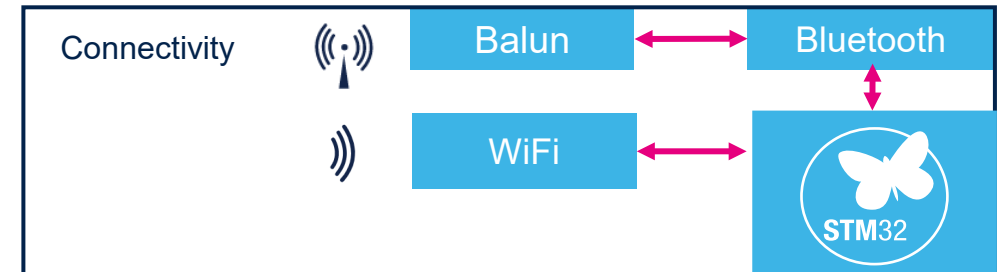
Charging socket

ESDAxP series
SMAJ series

Blood pressure monitoring Antenna

Antennas are ESD protected according to IEC 61000-4-2 level 4
 Very low harmonics generation ensures no disturbance in application

Needs for Bluetooth and WiFi antenna	Product key parameters	ST solutions
RF power = 20dBm ($V_{PEAK} = 3.2\text{ V}$ with 50Ω load)	$V_{RM} \geq 3.6\text{V}$	<u>ESDARF02-1BU2CK</u>
Alternative signal	Bidirectional device	
f = 2.4 GHz	Extra low capacitance ($\leq 0.3\text{ pF}$) Bandwidth = 24 GHz	
Very low harmonic generation	H3= 41.8 dBm at 20 dBm power; f=2.4GHz Compliant with WiFi and Bluetooth regulation	
IEC 61000-4-2 level 4 8kV contact / 15 kV air	Contact discharge: 12 kV Air discharge: 20 kV	

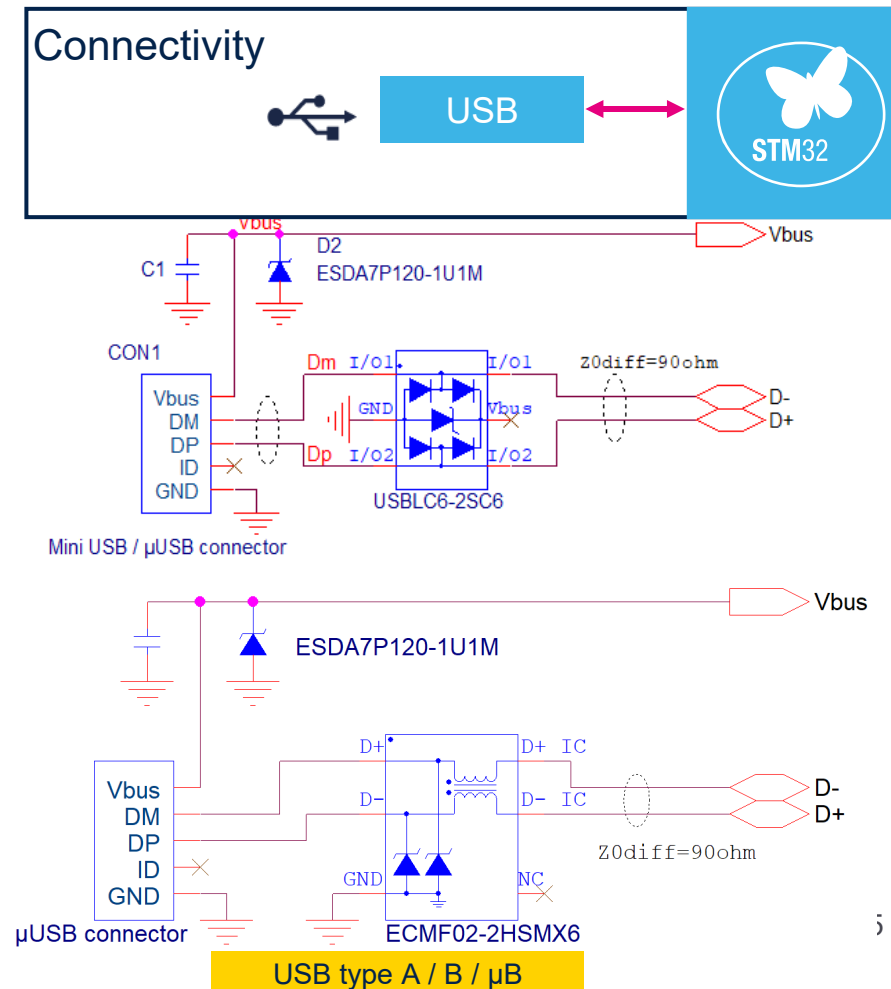


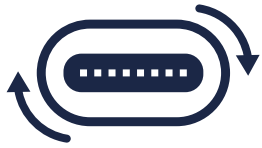
Blood pressure monitoring USB port

Complete portfolio for USB, offering design flexibility
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 $\leq 3.0V$	$V_{RM} = 5.25V$	USBLC6-2SC6 (dual lines)
Positive signal	Unidirectional	
Data rate: 480 Mbps Maximum equivalent frequency 240 MHz	Bandwidth 2.6 GHz	ECMF02-2HSMX6
Avoid to disturb Bluetooth reception @2.4GHz and Wi-Fi reception @2.4GHz & 5.0GHz	CMF rejection $\geq -20dB$ (700 MHz to 2.4 GHz and 5.0 GHz)	
IEC 61000-4-2 level 4–8kV contact / 15 kV air	Contact discharge: $\geq 8 kV$ Air discharge: $\geq 15 kV$	USBLC6-2SC6 ECMF02-2HSMX6

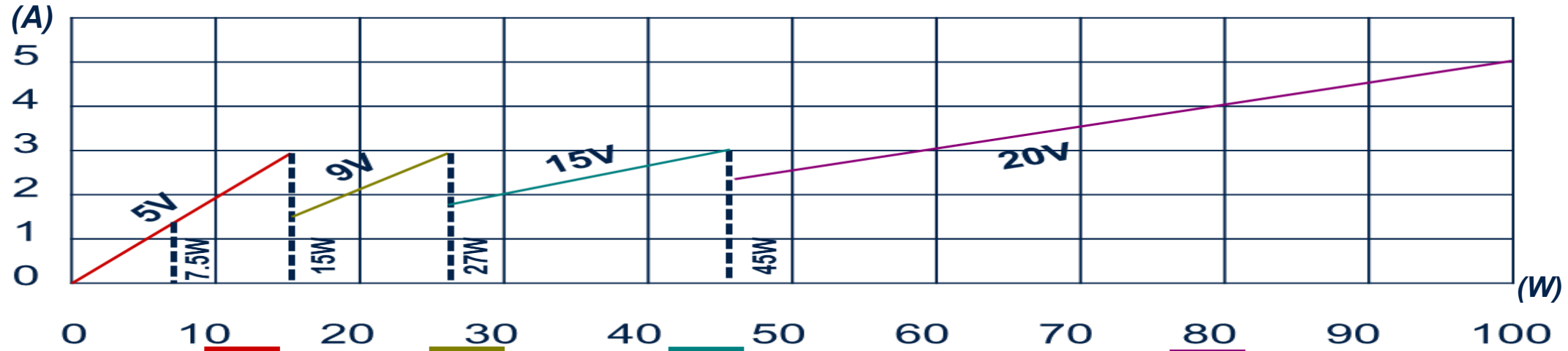
Needs for USB2.0 (Vbus)	Product key parameters	ST solutions
Voltage $\leq 5.5V$	$V_{RM} = 5.5V$	ESDA7P120-1U1M
Positive signal	Unidirectional	
Need to withstand 8/20 μs surge (IEC 61000-4-5)	I_{PP} up to 120A	
IEC 61000-4-2 level 4–8kV contact / 15 kV air	Contact discharge: $>30 kV$ Air discharge: $>30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





Blood pressure monitors USB 3.x Type C PD

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

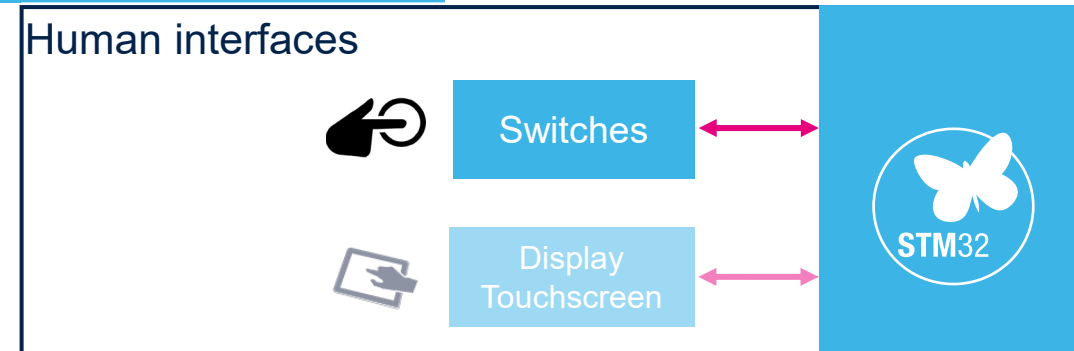


Type	Application STM32 based	Pins	5V-15 W	9V-27 W	15 V-45 W	20 V-100 W
All	With or without STM32	D+/D-	ESDAXLC5-1U2	ESDAXLC5-1U2	ESDAXLC5-1U2	ESDAXLC5-1U2
		SSRx / SSTx	<u>ESDARF02-1BU2CK</u>	<u>ESDARF02-1BU2CK</u>	<u>ESDARF02-1BU2CK</u>	<u>ESDARF02-1BU2CK</u>
		CC1 / CC2	ESDZV5-1BF4	ESDALC14-1BF4	ESDZV18-1BF4	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					TCP01-M12
Source	YES					TCP02-M18
DRP	YES					TCP03-M20

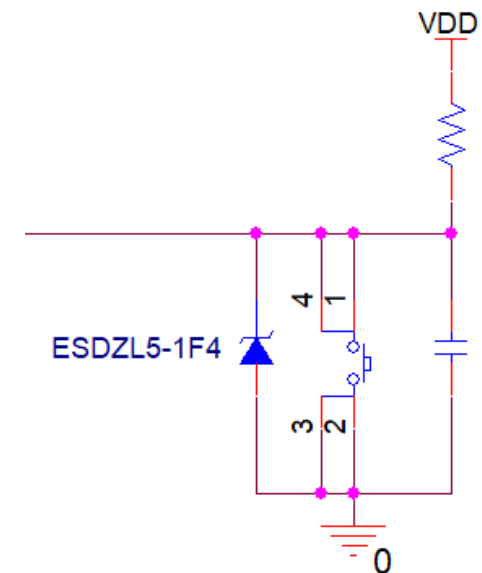
Blood pressure monitoring: switches

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 3.3V or less	$V_{RM} \geq 5.5V$	
Digital positive signal	Unidirectional (bidirectional also suitable)	ESDZV5-1BF4 (single line)
Low frequency application	No constraints on capacitance $C_{line} < 9.5pF$	ESDZL5-1F4 (single line)
IEC 61000-4-2 level 4–8 kV contact / 15 kV air	Contact discharge: ≥ 15 kV Air discharge: ≥ 30 kV	



0201 package



Blood pressure monitoring Display

High efficiency in EMI filtering

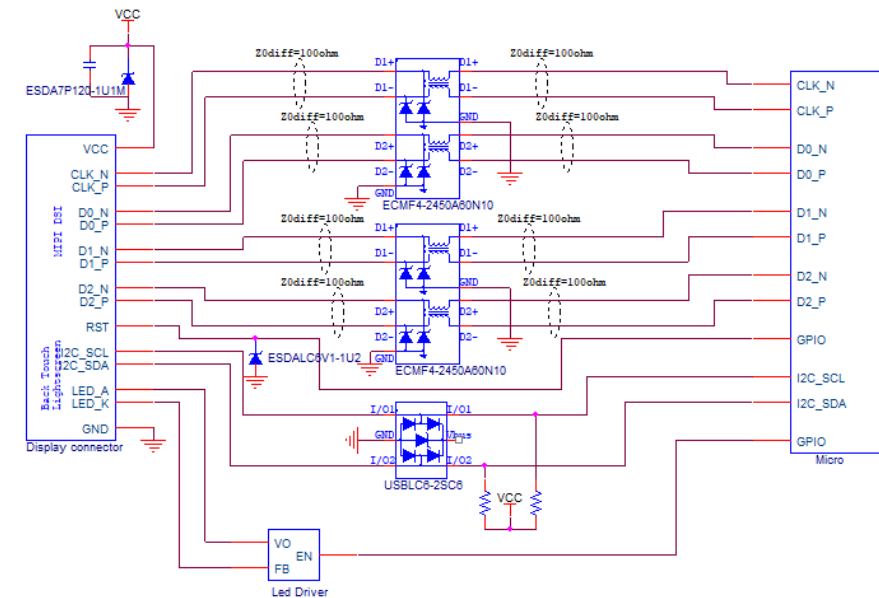
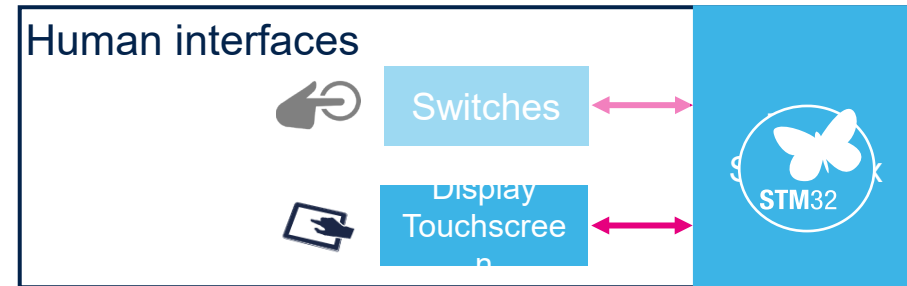
All sockets are ESD protected according to IEC 61000-4-2 level 4

8 kV contact discharge and 15 kV air discharge

Needs for parallel interface	Product key parameters	ST solutions
Voltage $\leq 3.3V$ (high speed)	$V_{RM} \geq 3.3V$	EMIF08-LCD04M16
Positive signal	Unidirectional (bidirectional also suitable)	
Clock frequency < 33 MHz	Bandwidth $> 400MHz$ (-6dB)	
Avoid to disturb Bluetooth reception @2.4GHz and Wi-Fi reception @2.4GHz & 5.0GHz	Rejection @2.4 GHz $> -35dB$ Rejection @5.0 GHz $> -45dB$	

Needs for MIPI (data / clock)	Product key parameters	ST solutions
Voltage ≤ 385 mV (high-speed HS) Voltage $\leq 1.3V$ (low-power LP)	$V_{RM} \geq 3.6V$	ESDARF02-1BU2CK
Positive signal	Unidirectional (bidirectional also suitable)	HSP051-4M5
Data rate up to 1.5 Gbps maximum frequency: 2.5GHz	Bandwidth > 11.5 GHz	ECMF4-2450A60N10
Avoid to disturb Bluetooth reception @2.4GHz and Wi-Fi reception @2.4GHz & 5.0GHz	CMF rejection of 2.4 GHz $> 30dB$ CMF rejection of 5.0 GHz $> 15dB$	

Needs for I ² C	Product key parameters	ST solutions
Line voltage range: 0 to 3.3V	$V_{RM} \geq 5.25V$	USBLC6-2SC6 ESDZV5-1BF4 ESDZL5-1F4
Positive signal	Unidirectional (bidirectional also suitable)	
Small consumption on digital communication	Capacitance < 10 pF to reduce consumption	
Data rate: 3.4 Mbps–Maximum frequency: 20MHz	Bandwidth: > 700 MHz	

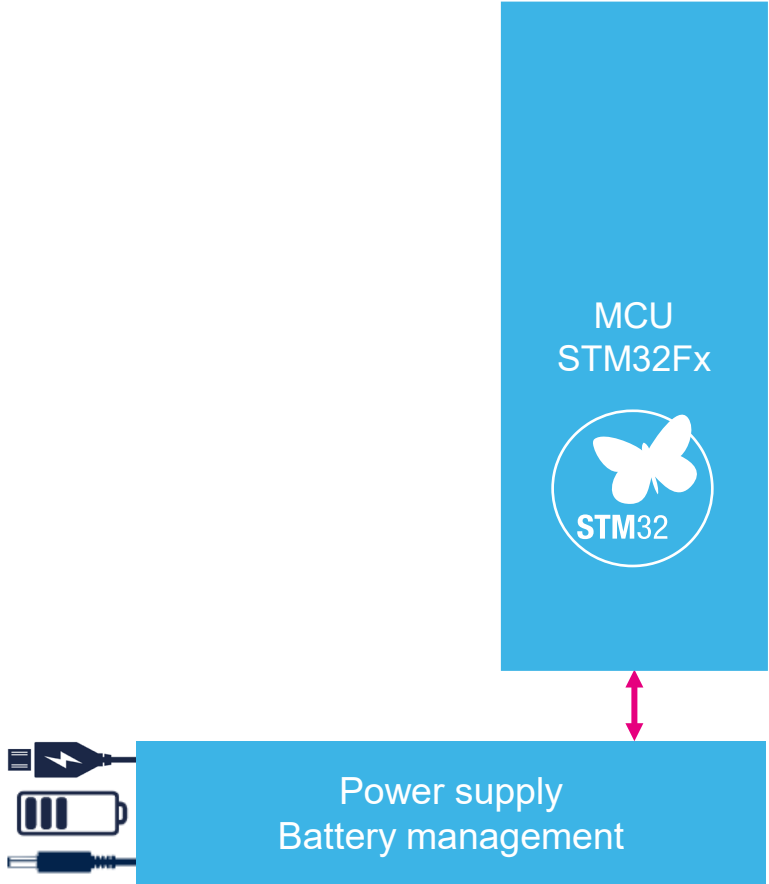


Blood pressure monitoring

Charging connectors 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	$V_{RM} \geq V_{bat}$	<u>ESDA7P120-1U1M</u> (USB port) <u>SMAJ5.0A</u> (plug)
Positive signal	Unidirectional	
Need to withstand 8/20µs 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	



- **CMF**: Common-mode filter
- **DRP**: Dual Role Power
- **ESD**: Electrostatic discharge
- **EOS**: Electrical overstress
- **MCU** : microcontroller
- **T CPP**: USB Type-C Port Protection
- **TVS**: Transient voltage suppressor diode

Our technology starts with You



Find out more at www.st.com

© STMicroelectronics - All rights reserved.

ST logo is a trademark or a registered trademark of STMicroelectronics International NV or its affiliates in the EU and/or other countries.

For additional information about ST trademarks, please refer to www.st.com/trademarks.

All other product or service names are the property of their respective owners.



life.augmented