

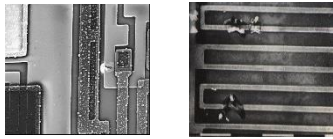


ESD, Surge and EMI

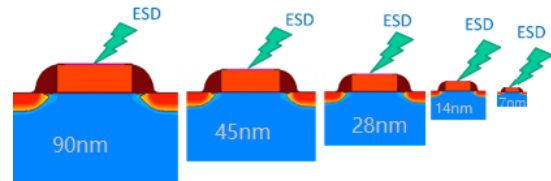
SILERGY – *POWERING THE FUTURE*

ESD Hazards

➤ Typical IC damaged without Protection



➤ Small geometry devices are more sensitive to ESD and surge damage



Silergy provides devices to protect against ESD and surge damage and also filters to reduce EMI

◆ ESD Protection

Application: Protection for industry standard interfaces USB-C, HDMI, VGA, DVI, RS232, RS485 as well as microphone, speaker and Antenna connections



- ✓ Ultra Small Capacitance (<math><0.2\text{pF}</math>)
- ✓ Industry Leading Low Clamping Voltage (<math><10\text{V}</math> per IEC61000-4-2 8kV)
- ✓ Very High ESD Protection Level (>IEC61000-4-2 15kV)

◆ Surge Protection

Application: RJ45



- ✓ Low Capacitance ($\sim 0.6\text{pF}$)
- ✓ Industry Leading Low Clamping Voltage ($\sim 10\text{V}$ per IEC61000-4-5 30A(8/20 μs))
- ✓ Very High Surge Protection Level (IEC61000-4-5 60A(8/20 μs))

◆ EMI Filter

Application: LCD Module, Camera, and industry standard interfaces: MIPI, HDMI, USB, MHL, microphone, speaker, SIM Card, SD Card

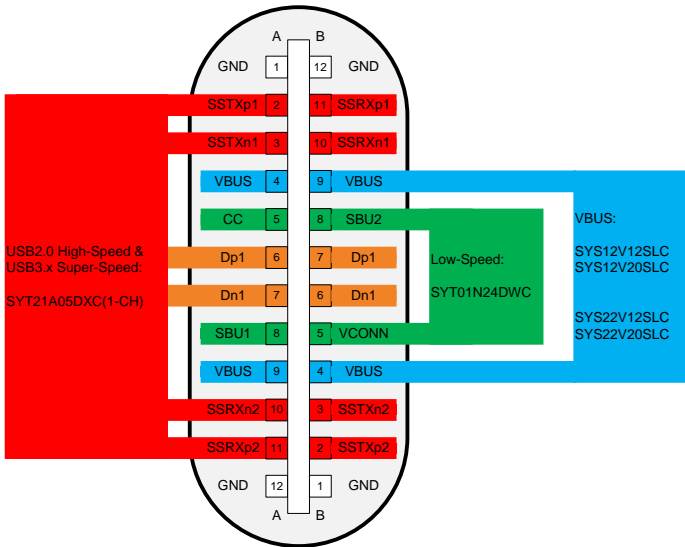


- ✓ Ultra Low Clamping Voltage ($\sim 10\text{V}$ per IEC61000-4-2 8kV)
- ✓ High Cut-off Frequency (as high as 4GHz)
- ✓ Excellent attenuation of Smart Phone Frequencies (>25dB@700MHz~3GHz)

Applications

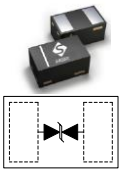


USB-C ESD Protection



The latest update to the widely adopted Universal Serial Bus (USB) standard for power and communications, USB3.1 greatly extends the speed and power and also introduces the type-C connector. This combination is challenging to protect without compromising signal integrity and interface speed, while also delivering up to 100W of power.

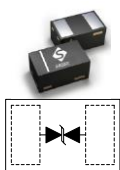
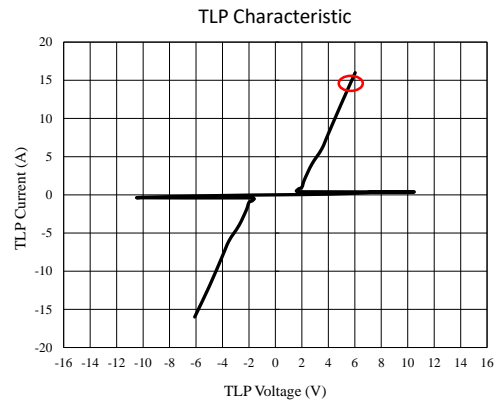
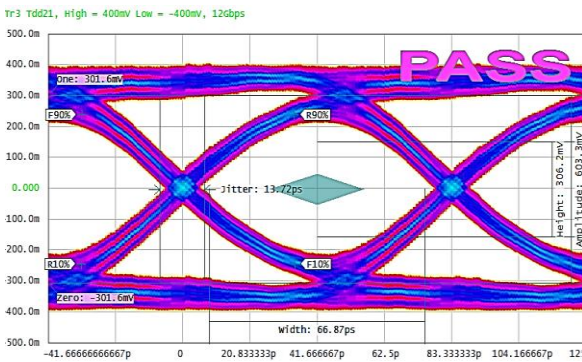
With this in mind, Silergy has developed ESD and Surge protection devices that feature extremely low capacitances and inductances, while delivering the highest levels of ESD protection (IEC61000-4-2 AIR & CONTACT ESD and IEC61000-4-5 Surge test standards). Very small packages (from 2.5mmx1.0mm to 0.6mmx0.3mm) provide easy integration into systems designed for high-speed, high-power USB-C applications.



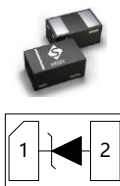
USB2.0 High-Speed & USB3.x Super-Speed				ESD Protection for Data(D, SSR&SSTX)			
Part Number	V _{RWM}	V _h	C, V _R =0V	ESD	V _c @ 16A (TLP)	V _c @ IPP (8/20μs)	Package
SYT21A05DXC	Bi 5V	>1.2V	Ultra Low 0.2pF	±20kV	Ultra Low 6V	6V@9A	DFN0.6*0.3-2

Technical Advantage

HDMI2.1 12Gbps Eye Diagram w/ SYT21A05DXC

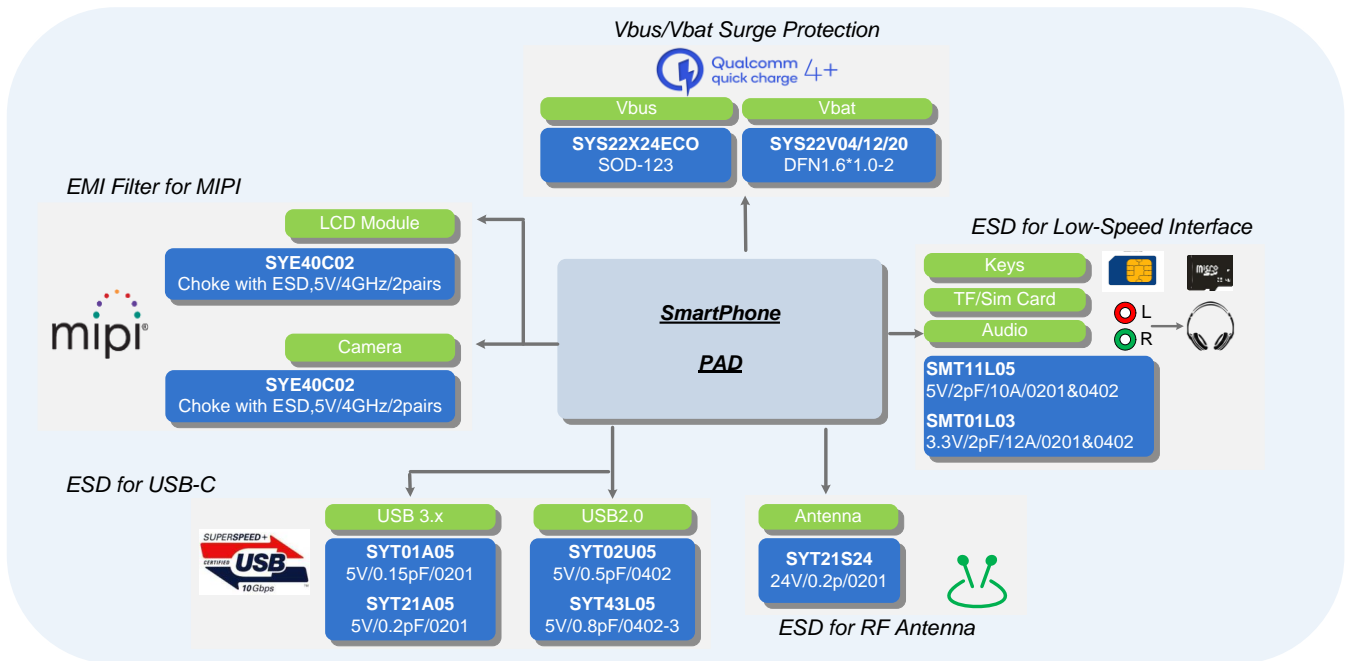


Low-Speed Interface				ESD Protection for CC, SBU and VCONN			
Part Number	V _{RWM}	V _h	C, V _R =0V	ESD	V _c @ 16A (TLP)	V _c @ IPP (8/20μs)	Package
SYT01N24DWC	Bi 24V	>26.5V	12pF	±30kV	34V	42V @ 4A	DFN1.0*0.6-2

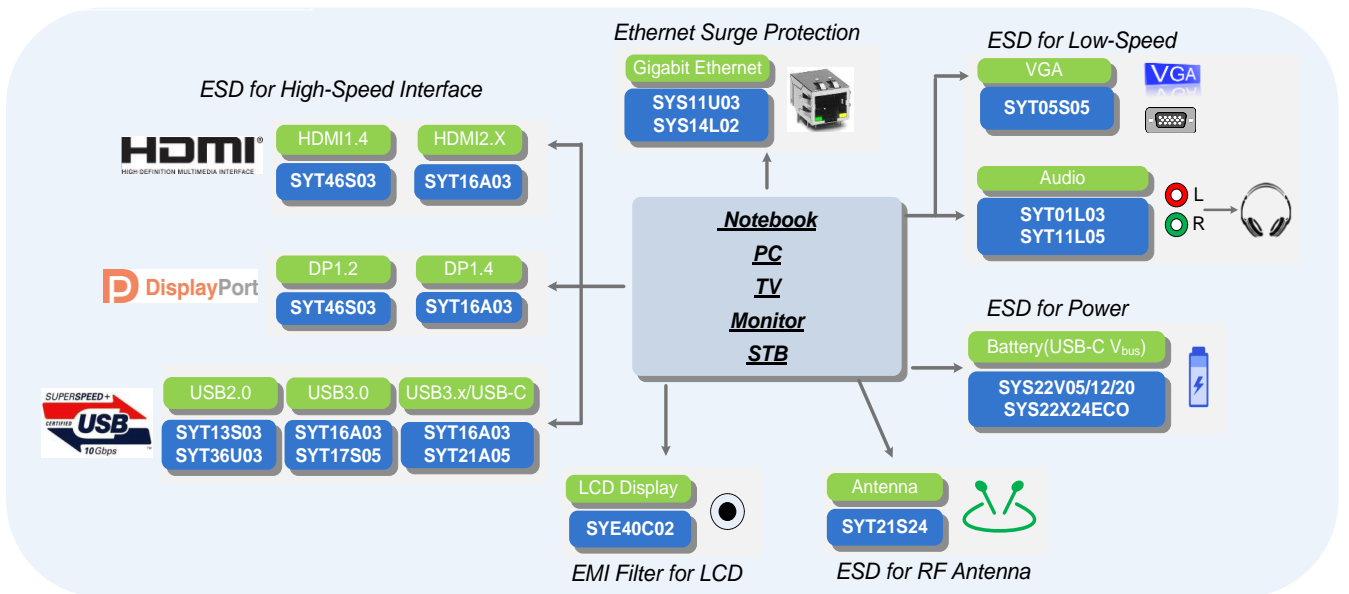


Surge Solution for VBUS						
Part Number	V _{RWM}	C, V _R =0V	Surge VPP (8/20μs)	V _c @ IPP (8/20μs)	Package	
SYS12V12SLC	Uni 12V	400pF	120V	22V @ 52A	DFN1.6*1.0-2	
SYS12V20SLC	Uni 20V	210pF	80V	35V @ 25A	DFN1.6*1.0-2	
SYS22V12SLC	Uni 12V	680pF	200V	20V @ 100A	DFN1.6*1.0-2	
SYS22V20SLC	Uni 20V	320pF	100V	32V @ 55A	DFN1.6*1.0-2	

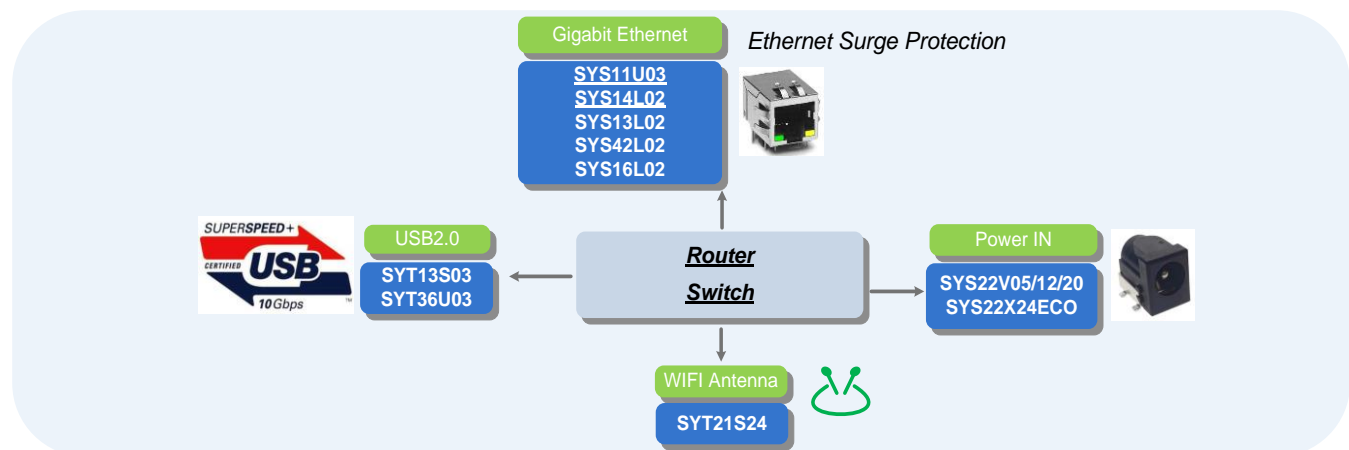
◆ ESD for Smart Phone/PAD




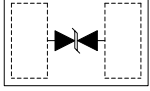


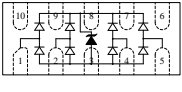
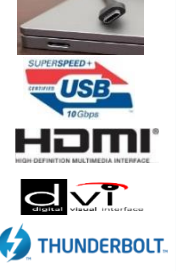

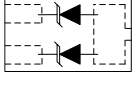

◆ ESD for Notebook




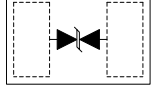


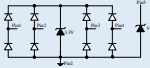
◆ ESD for Networks



High-Speed Interface ESD Solutions

Product	Profile	Device Schematic	V _{RWM}	V _h	C, V _R =0V	ESD	V _c @ 16A (TLP)	V _c @ IPP (8/20μs)	Package	Application
SYT01A05DXC			Bi 5V	>5.5V	0.15pF	±15kV	18V	14V @ 4A	DFN0.6*0.3-2	
SYT21A05DXC			Bi 5V	>1.2V	0.2pF	±20kV	6V	6V @ 9A		
SYT11S05DWC			Bi 5V	NA	0.3pF	±25kV	14V	15V @ 4A	DFN1.0*0.6-2	
SYT21S03DWC			Bi 3.3V	>3.3V	0.4pF	±30kV	8.5V	8V @ 7A		
SYT02U05DWC			Uni 5V	NA	0.5pF	±20kV	12V	12.5V @ 4A		
SYT06U05DVC			Uni 5V	NA	0.6pF	±20kV	12.5V	12V @ 3A	DFN2.5*1.0-10	
SYT46S03DVD			Uni 3.3V	>3.3V	0.4pF	±30kV	8.5V	8V @ 7A		
SYT16A03DVC			Uni 3.3V	>1.2V	0.3pF	±15kV	6.5V	4.5V @ 6A		
SYT26A03DVC			Uni 3.3V	>1.2V	0.28pF	±15kV	4.3V	7V @ 7A		
SYT13S03SMD			Uni 3.3V	>0.8V	0.42pF	±19kV	6V	5V @ 7A	DFN1.0*0.6-3	
SYT43L05SMD			Uni 5V	>5.5V	0.8pF	±30kV	9V	10V @ 11A		

Low-Speed Interface ESD Solutions

Product	Profile	Device Schematic	V _{RWM}	V _h	C, V _R =0V	ESD	V _c @ 16A (TLP)	V _c @ IPP (8/20μs)	Package	Application
SYT01L03 DX/DW/ANC			Bi 3.3V	>3.7V	3pF	±30kV	7.5V	10V @ 12A	DFN0.6*0.3-2 (DX, 0201)	
SYT01N03 DX/DW/ANC			Bi 3.3V	>3.7V	27pF	±30kV	8V	10V @ 14A		
SYT11L05 DX/DWC			Bi 5V	NA	2pF	±30kV	9V	9.5V @ 10A	DFN1.0*0.6-2 (DW, 0402)	
SYT01N05 DW/ANC			Bi 5V	NA	30pF	±30kV	11V	10V @ 12A	SOD523 (AN, 0603) (1.6*0.8)	
SYT01N12 DW/ANC			Bi 12V	>13.3	25pF	±30kV	20V	25V @ 7.5A		
SYT01N24 DW/ANC			Bi 24V	>26.5V	12pF	±30kV	34V	42V @ 4A		
SYT36U03ABT			5V/3.3V	>1.2V	0.5pF	±30kV	4.3V	4.5V @ 10A	SOT23-6	

Power Interface Surge Solutions

Product	Profile	Device Schematic	V_{RWM}	V_h	C, $V_R=0V$	Surge VPP (8/20 μ s)	V_c @ IPP (8/20 μ s)	Package	Application
SYS12V05SLC SYS12V12SLC SYS12V20SLC			Uni 5V 12V 20V	NA	600pF 400pF 210pF	210V 120V 80V	13.5V @ 100A 22V @ 52A 35V @ 25A	DFN1.6*1.0-2	
SYS22V04SLC SYS22V05SLC SYS22V12SLC SYS22V20SLC			Uni 4.5V 5V 12V 20V	>4.6V NA NA NA	1100pF 2100pF 680pF 320pF	500V 400V 200V 100V	13V @ 240A 10.5V @ 200A 20V @ 100A 32V @ 55A	DFN1.6*1.0-2	
SYS22X24ECO			Uni 24V	NA	750pF	350V	30V @ 170A	SOD-123FL	

Telecom & Ethernet Surge Solutions

Product	Profile	Device Schematic	V_{RWM}	V_h	C, $V_R=0V$	IPP (8/20 μ s) (IEC61000-4-5)	Package	Application
SYS11U03AMC ~ SYS11U24AMC			Bi 3.3 ~ 24V	>3.7V NA	0.6pF	25A ~ 6A	SOD323 (1.7*1.3)	 Router
SYS11L03SEC			Uni 3.3V	>3.7V	3pF	25A	DFN2.6*2.6-10	 Switch
SYS42L02FAC SYS04L02FAC			Bi 2.8V	>3V	1.2pF	50A	SO-8 (4.9*6.0)	 PC
SYS14L02DHC			Uni 2.5V	>3V	3pF	40A	DFN3.0*2.0-10	 RJ45