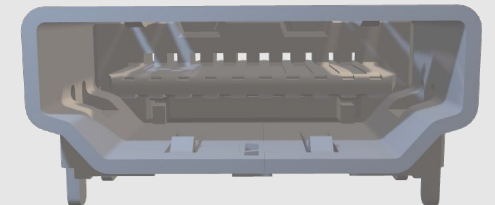
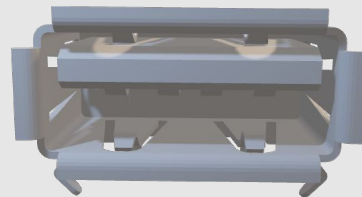
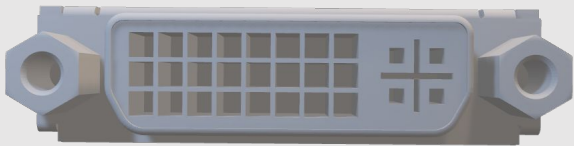
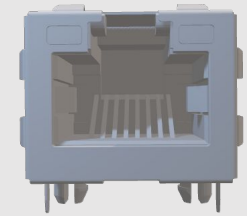


# ESD Protection USB INTERFACE

**Comchip**  
SMD Diode Specialist

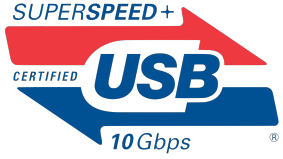




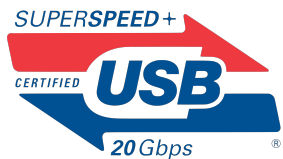
480 Mbps



5 Gbps



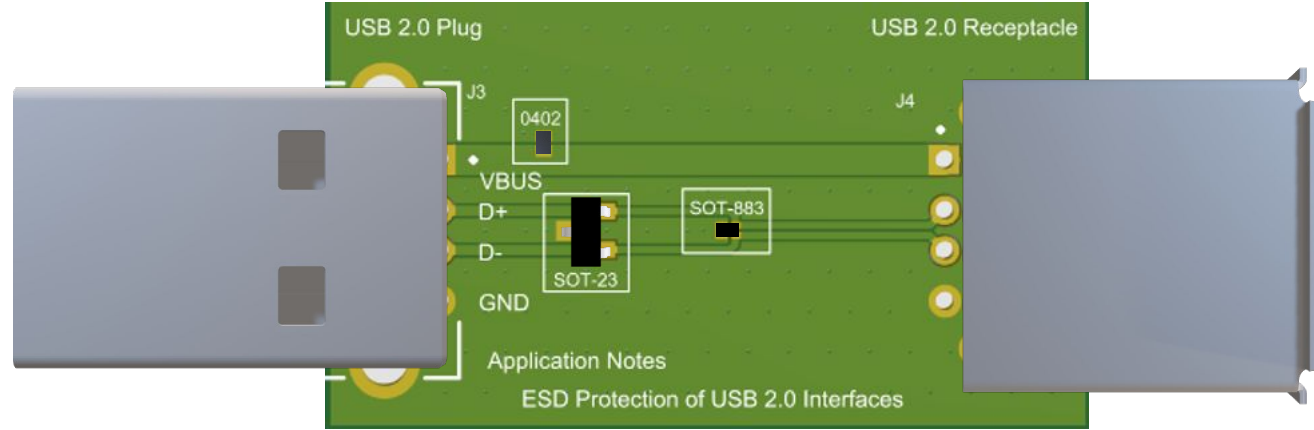
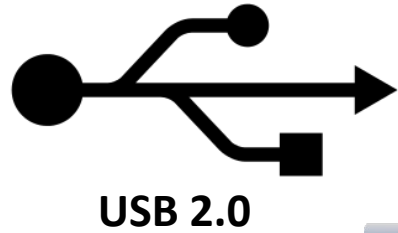
10 Gbps



20 Gbps



40 Gbps



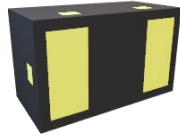
## Vbus

- The operating voltage is 5V. An ESD diode with a working voltage greater than or equal to 5V is recommended.

## D+ and D-

- USB 2.0 support Low Speed (1.5Mbps), Full Speed (12Mbps), and High Speed (480Mbps).
- A low-capacitance ESD diode with less than 5pF is recommended to support the signal speed.

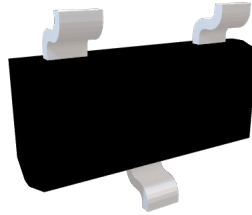
# Vbus



High Surge Component :

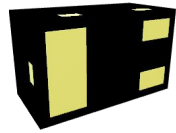
Comchip P/N	VRWM(V)	IPP(A)	VC(V)	ESD(kV)	Cj(pF)	Uni/Bi	Package
CPDWL5V0MHT-HF	5	13	9	30 / 30	14	Bi	01005
CPDZC5V0CHT-HF	5	17	18	30 / 30	20	Bi	0201
CPDQ5V5MUHT-HF	5.5	50	9	30 / 30	160	Uni	0402
CPDQ5V0MAHT-HF	5	90	12	30 / 30	200	Bi	0402
ESD5VDH-HF	5	120	12.5	30 / 30	1000	Uni	0603
CPDUT5VMHT-HF	5	140	13	30 / 30	396	Uni	0603

## D+ and D-



Low-capacitance Component :

Comchip P/N	VRWM(V)	IPP(A)	VC(V)	ESD(kV)	Cj(pF)	Uni/Bi	Package
CPDT-5V0LPC-HF	5	10	15	30 / 30	1.5	Bi	SOT-23
CPDT-5V0USP-HF	5	4	19	8 / 15	0.6	Uni	SOT-23



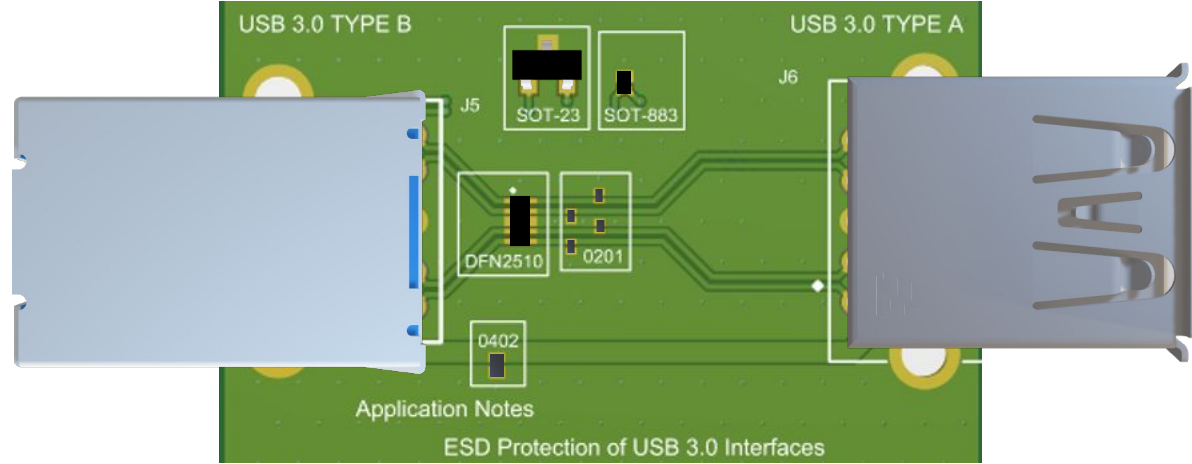
Area Reduce by 84 %

Miniaturization Component :

Comchip P/N	VRWM(V)	IPP(A)	VC(V)	ESD(kV)	Cj(pF)	Uni/Bi	Package
CPDQ03C5V0AU-HF	5	4	15	18 / 18	0.45	Uni	SOT-883
CPDQ03C5V0USP-HF	5	3	16	10 / 15	0.45	Uni	SOT-883



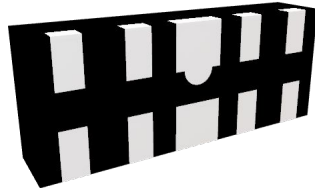
USB 3.0



SSTX-、SSTX+、SSRX-、SSRX+

- The signal speeds can reach up to 5Gbps, a low-capacitance ESD diode with less than 0.5pF is recommended to support the signal speed.

## SSTX、SSTX+、SSRX-、SSRX+



Ultra Super Low-capacitance Component :

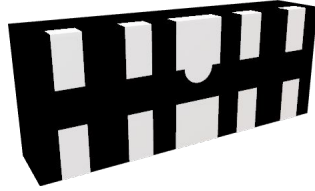
Comchip P/N	VRWM(V)	IPP(A)	VC(V)	ESD(kV)	Cj(pF)	Uni/Bi	Package
CPDA10R3V3U-HF	3.3	5	11	15 / 15	0.5	Uni	DFN2510
CPDA10R5V0U-HF	5	5	18	15 / 15	0.5	Uni	DFN2510
CPDVR0524P-HF	5	4	14	20 / 25	0.45	Uni	DFN2510
CPDVR103V3UA-HF	3.3	4	14	20 / 25	0.4	Uni	DFN2510



Super Low-capacitance Component :

Comchip P/N	VRWM(V)	IPP(A)	VC(V)	ESD(kV)	Cj(pF)	Uni/Bi	Package
CPDZC3V3AU-HF	3.3	4	14	20 / 20	0.45	Uni	0201
CPDZC5V0BU-HF	5	4	14	20 / 20	0.45	Uni	0201
CPDZC5V0B-HF	5	4	25	20 / 20	0.23	Bi	0201
CPDZC3V3A-HF	3.3	4	25	20 / 20	0.2	Bi	0201
CPDZC5V0SPC-HF	5	2	14	15 / 15	0.15	Bi	0201

## SSTX、SSTX+、SSRX-、SSRX+



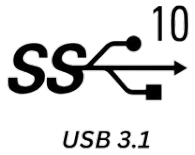
Super Low Capacitance Component & Low Clamping Voltage :

Comchip P/N	VRWM(V)	IPP(A)	VC(V)	ESD(kV)	Cj(pF)	Uni/Bi	Package
CPDVR103V3USBP-HF	3.3	5	2.9	10 / 15	0.32	Uni	DFN2510



Super Low Capacitance Component & Low Clamping Voltage :

Comchip P/N	VRWM(V)	IPP(A)	VC(V)	ESD(kV)	Cj(pF)	Uni/Bi	Package
CPDZ5V0SB-HF	5	3	5	8 / 17	0.5	Bi	0201
CPDWZ5V0MSBPA-HF	5	10	7	16 / 16	0.48	Bi	0201
CPDWZ5V0MSBP-HF	5	6	5	12 / 12	0.45	Bi	0201
CPDWZ5V0SBPB-HF	5	5	6	12 / 18	0.29	Bi	0201
CPDWZ3V3MSBP-HF	3.3	4	2.9	12 / 12	0.25	Bi	0201
CPDWZ5V0SBP-HF	5	2.5	6	8 / 10	0.15	Bi	0201

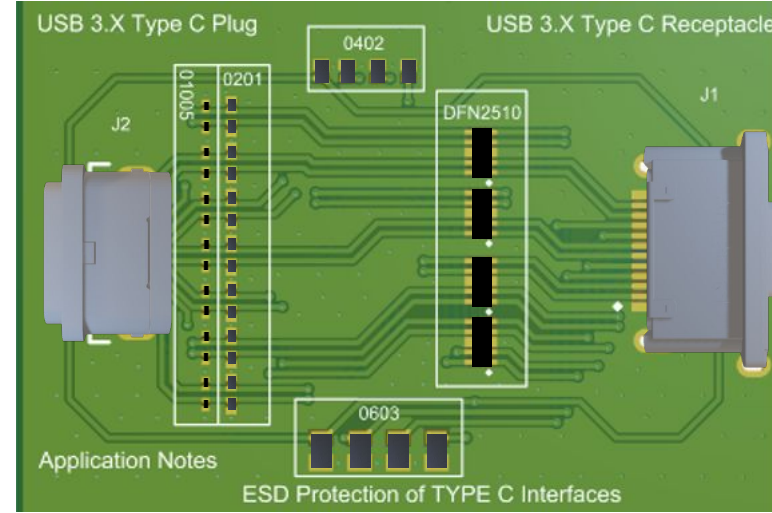
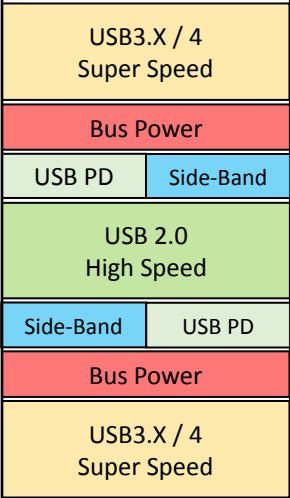


## USB Type-C Plug

B1	GND	GND	A12
B2	TX2+	RX2+	A11
B3	TX2-	RX2-	A10
B4	VBUS	VBUS	A9
B5	CC2	SBU1	A8
B6	D+	D-	A7
B7	D-	D+	A6
B8	SBU2	CC1	A5
B9	VBUS	VBUS	A4
B10	RX1-	TX1-	A3
B11	RX1+	TX1+	A2
B12	GND	GND	A1

## Receptacle

B12	GND	GND	A1
B11	RX1+	TX1+	A2
B10	RX1-	TX1-	A3
B9	VBUS	VBUS	A4
B8	SBU2	CC1	A5
B7	D-	D+	A6
B6	D+	D-	A7
B5	CC2	SBU1	A8
B4	VBUS	VBUS	A9
B3	TX2-	RX2-	A10
B2	TX2+	RX2+	A11
B1	GND	GND	A12



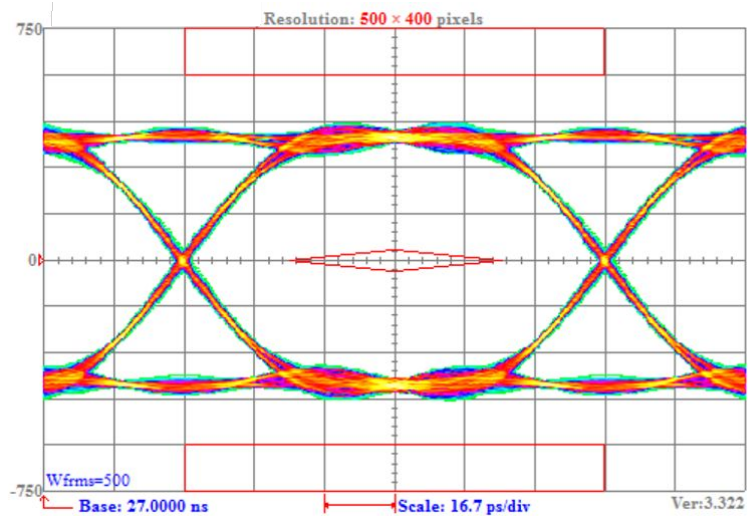
- USB 3.X for 10Gbps per lane, the capacitance is recommended to be less than 0.3pF.
- USB 4.0 for 20Gbps per lane, the capacitance is recommended to be less than 0.25pF.
- The typical operating voltage for the CC pins can reach up to 5V but CC/SBU pin are next to the VBUS pin. IF a short circuit condition occurs, the CC/VCONN pin and SBU pins will be exposed to 20V.

4-Channel ESD Protection Device

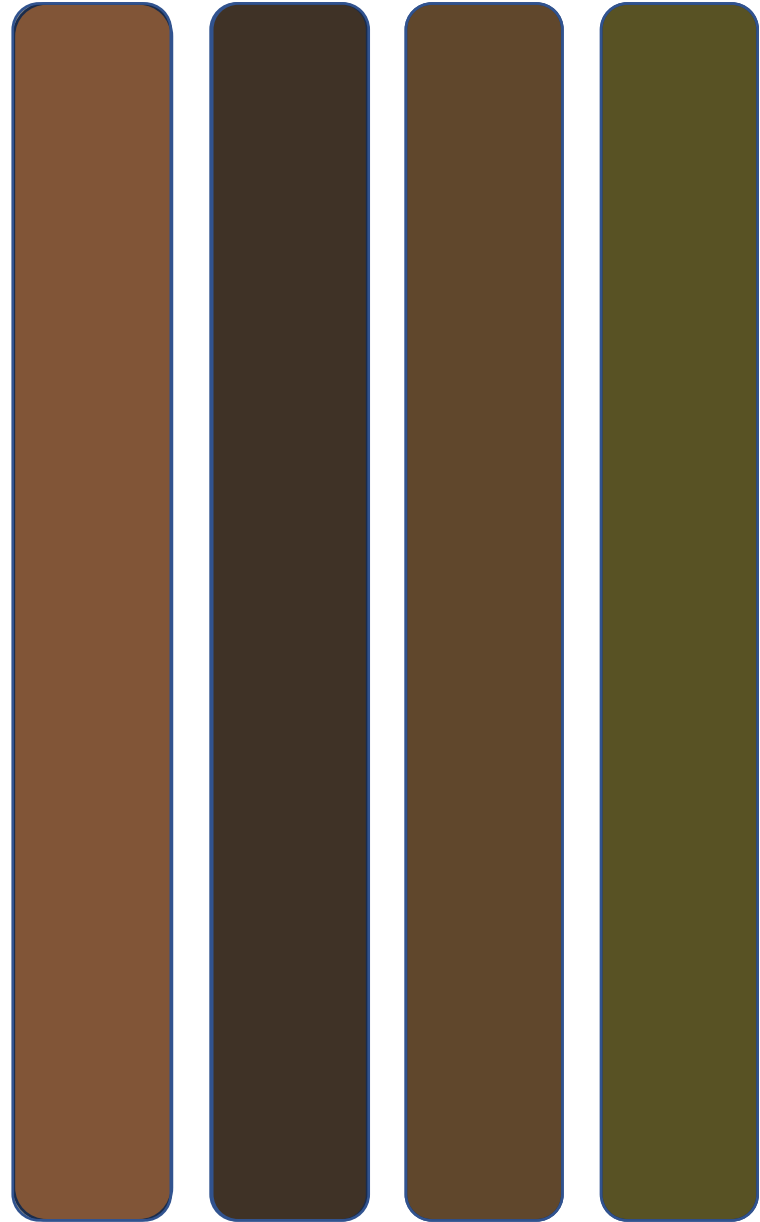
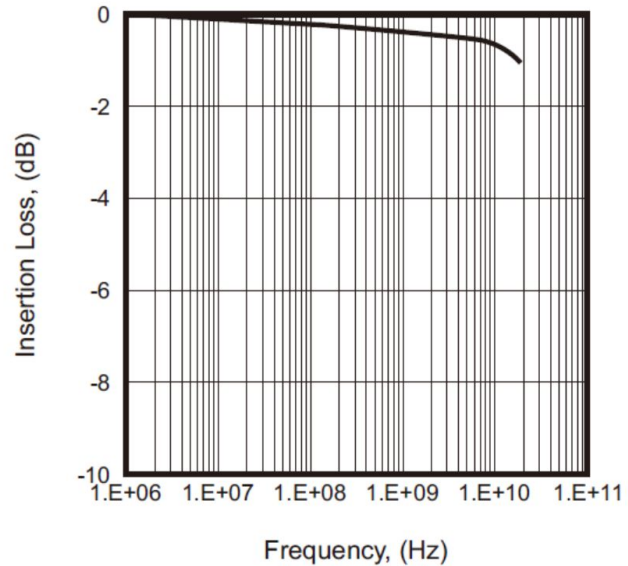
Single ESD Protection Device

Ultra-Small Single ESD Protection Device 01005 Package

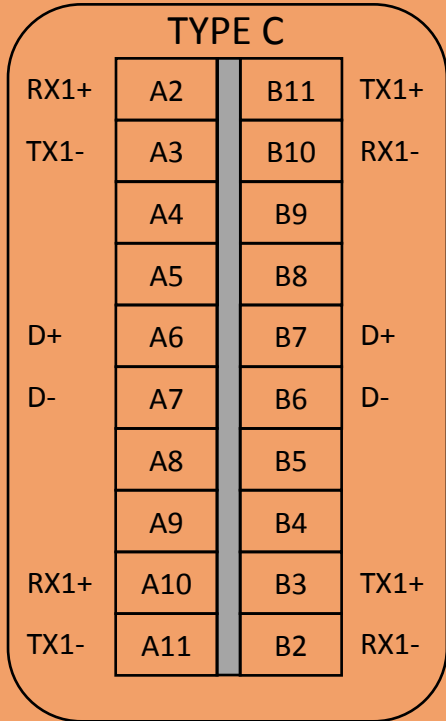
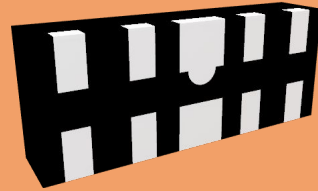
VBUS ESD Protection Device



20GHZ  $\approx$  -1 db



## 4-Channel ESD Protection Device

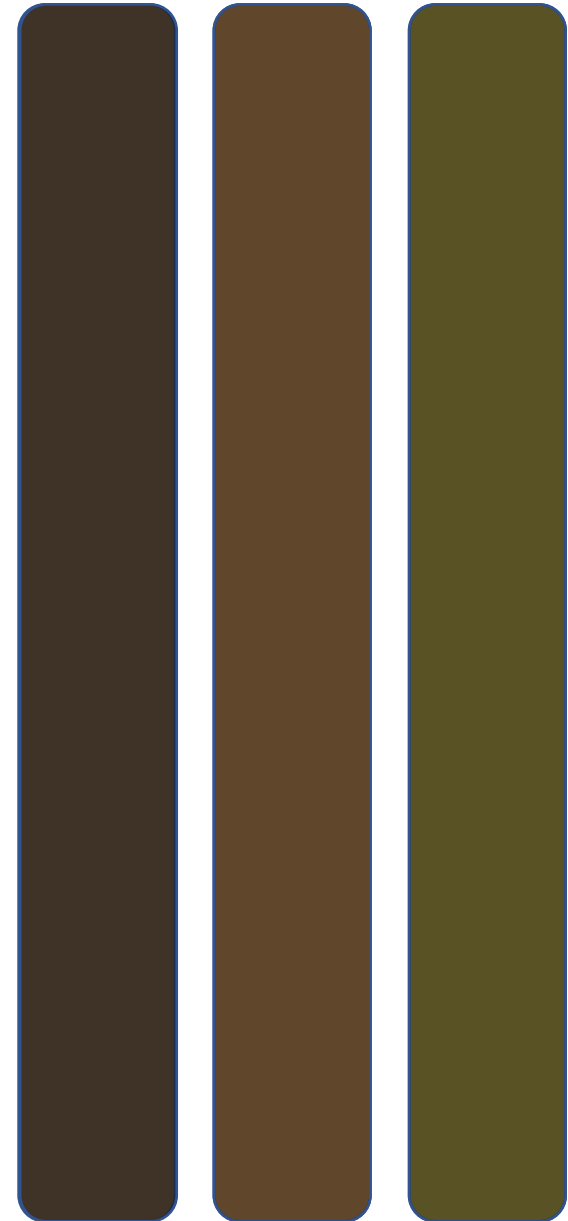


### Ultra Super Low-capacitance Component :

Comchip P/N	VRWM(V )	IPP(A)	VC(V)	ESD(kV)	Cj(pF)	Uni/Bi	Package
CPDA10R5V0SCP-HF	5	3	18	14 / 16	0.15	Uni	DFN2510
CPDA10R5V0SC-HF	5	3	18	14 / 15	0.25	Uni	DFN2510

### Ultra Super Low Capacitance Component & Low Clamping Voltage :

Comchip P/N	VRWM(V )	IPP(A)	VC(V)	ESD(kV)	Cj(pF)	Uni/Bi	Package
CPDVR103V3USBP-HF	3.3	5	2.9	10 / 15	0.32	Uni	DFN2510



## Single ESD Protection Device



### Ultra Super Low-capacitance Component :

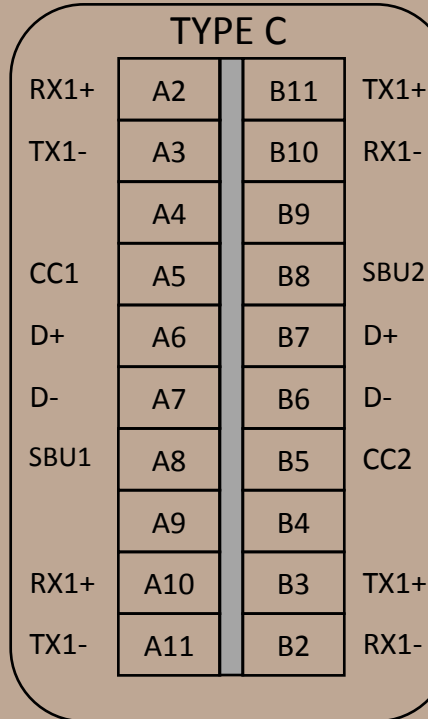
Comchip P/N	VRWM(V)	IPP(A)	VC(V)	ESD(kV)	Cj(pF)	Uni/Bi	Package
CPDZC3V3A-HF	3.3	4	25	20 / 20	0.2	Bi	0201
CPDZC5V0SPC-HF	5	2	14	15 / 15	0.15	Bi	0201
CPDZC5V0B-HF	5	4	25	20 / 20	0.23	Bi	0201

### Low-Clamping Voltage Component :

Comchip P/N	VRWM(V)	IP(A)	VC(V)	ESD(kV)	Cj(pF)	Uni/Bi	Package
CPDWZ3V3MSBP-HF	3.3	2.9	4	12 / 12	0.25	Bi	0201
CPDWZ5V0SBP-HF	5	2.5	8	8 / 10	0.15	Bi	0201
CPDWZ5V0SBPB-HF	5	5	8	12 / 18	0.29	Bi	0201
CPDQ5V0SBPA-HF	5	5.5	8	12 / 15	0.3	Bi	0402

### Short-to-VBUS tolerance for the CC/SBU pins :

Comchip P/N	VRWM(V)	IP(A)	VC(V)	ESD(kV)	Cj(pF)	Uni/Bi	Package
CPDWZ24VMSBP-HF	24	4	5	15 / 15	0.4	Bi	0201



## Ultra-Small Single ESD Protection Device 01005 Package

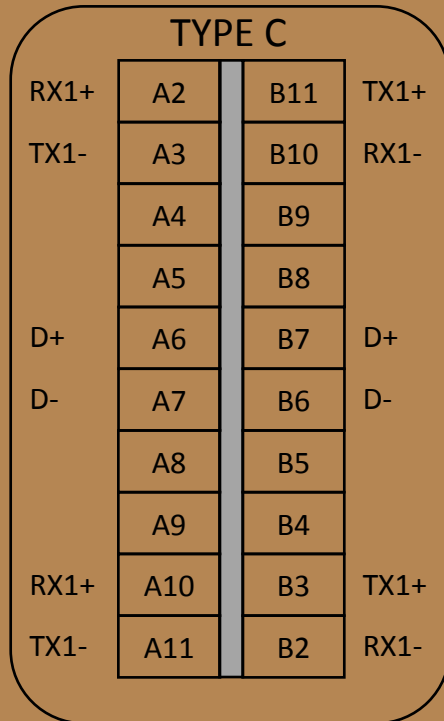


High Surge Component :

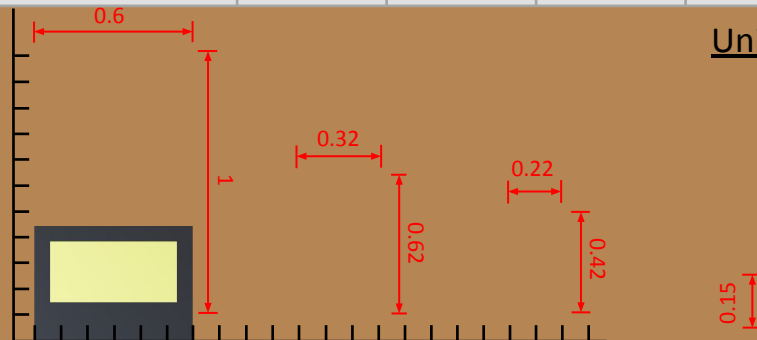
Comchip P/N	VRWM(V )	IPP(A)	VC(V)	ESD(kV)	Cj(pF)	Uni/Bi	Package
CPDWL3V3MHT-HF	3.3	13	7	30 / 30	14	Bi	01005
CPDWL5V0MHT-HF	5	13	7	30 / 30	14	Bi	01005
CPDWL5V0-HF	5	5	10.5	18 / 18	30	Bi	01005

Ultra Super Low-capacitance Component :

Comchip P/N	VRWM(V )	IPP(A)	VC(V)	ESD(kV)	Cj(pF)	Uni/Bi	Package
CPDWL5V0SPC-HF	5	2.5	14	12 / 15	0.2	Bi	01005
CPDWL3V3ACP-HF	3.3	3	20	14 / 18	0.28	Bi	01005
CPDWL5V0ACP-HF	5	4	25	14 / 18	0.42	Bi	01005

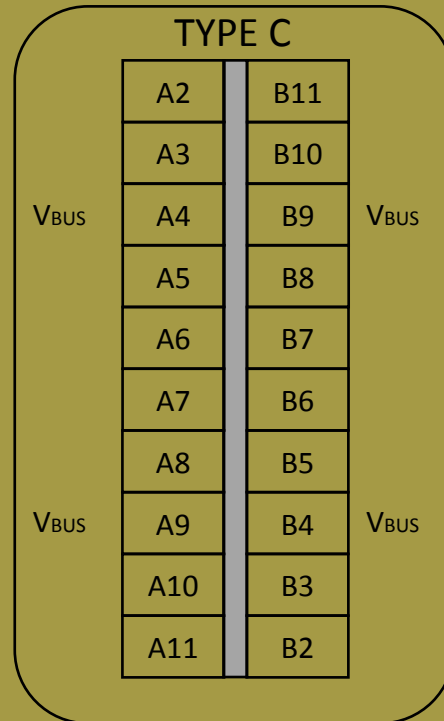


Unit : mm



**Comchip**  
SMD Diode Specialist

## VBUS ESD Protection Device



### 5 Voltage :

Comchip P/N	VRWM(V )	IP(A)	VC(V)	ESD(kV)	Cj(pF)	Uni/Bi	Package
CPDWL5V0MHT-HF	5	13	7	30 / 30	14	Bi	01005
CPDZC5V0CHT-HF	5	17	14	30 / 30	20	Bi	0201
CPDQ5V5MUHT-HF	5	50	8	30 / 30	160	Uni	0402
CPDQ5V0MAHT-HF	5	90	10	30 / 30	200	Bi	0402
ESD5VDH-HF	5	120	12.5	30 / 30	1000	Uni	0603
CPDUT5VMHT-HF	5	140	11	30 / 30	396	Uni	0603

### 20 Voltage :

Comchip P/N	VRWM(V )	IP(A)	VC(V)	ESD(kV)	Cj(pF)	Uni/Bi	Package
CPDUT20VMUHT-HF	20	40	33	30 / 30	247	Uni	0603
CPDQ20VMUA-HF	20	30	27	30 / 30	86	Uni	0603