

TVS Automotive Solutions



AEC-Q100 qualified TVS solutions featuring industry leading clamping voltage performance, high ESD immunity and low capacitance TVS arrays



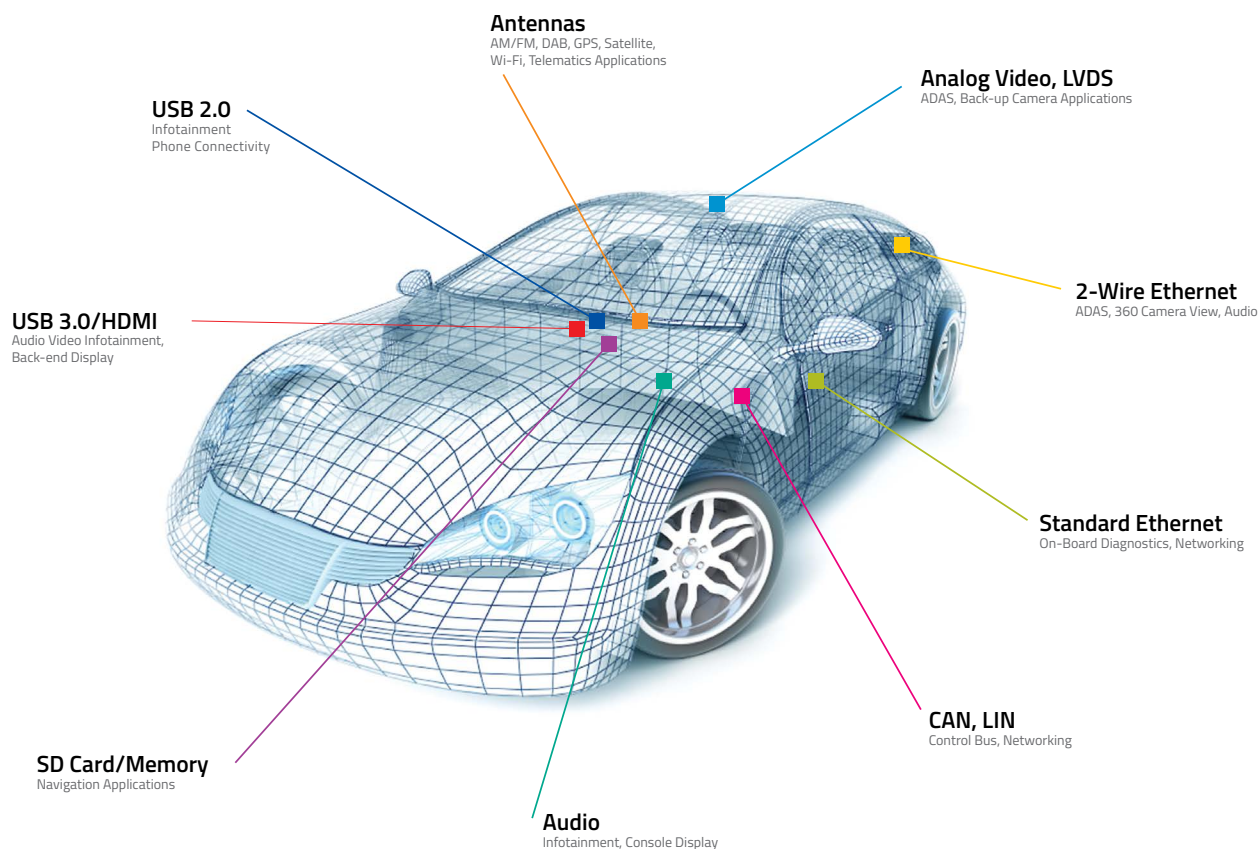
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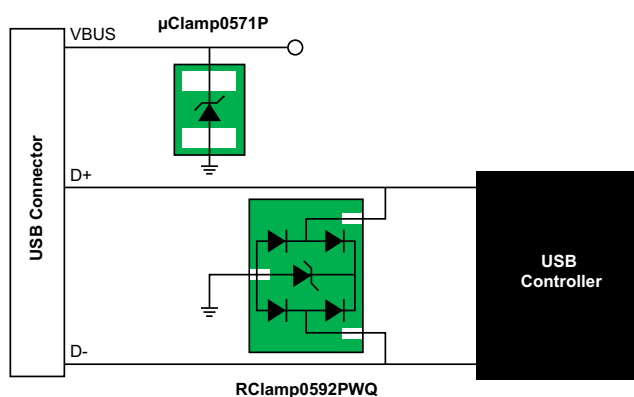
High Performance

Circuit Protection Automotive Products

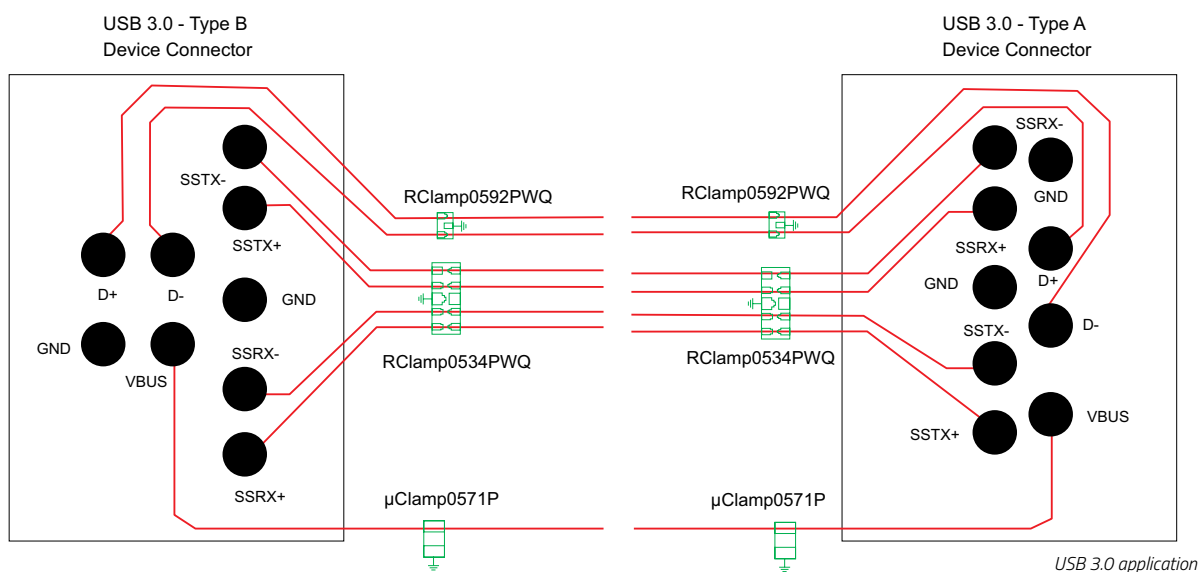
Semtech's industry leading TVS protection devices safeguard automotive data-line circuits from ESD and other overvoltage transients. With leading edge process technologies and applications expertise, Semtech is leading the way in automotive circuit protection.



USB Protection

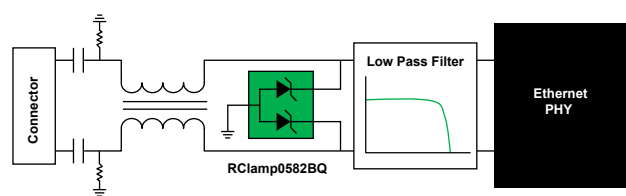


USB 2.0							
Interface to Protect	Part Number	V_{RWM} (V)	Lines	ESD Rating (air/contact)	Surge (8x20μs)	Cap (pF)	Pkg Size (mm)
USB 2.0	RClamp0592PWQ	5	2	±30kV / ±30kV	10A	1	1.0 x 0.6 x 0.55
	RClamp0531TQ	5	1	±20kV / ±12kV	4A	0.5	1.0 x 0.6 x 0.4
	RClamp0582BQ	5	2	±30kV / ±25kV	15A	1.2	1.6 x 1.6 x 0.75

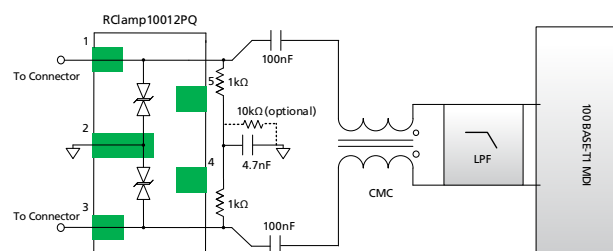


USB 3.0							
Interface to Protect	Part Number	V_{RWM} (V)	Lines	ESD Rating (air/contact)	Surge (8x20μs)	Cap (pF)	Pkg Size (mm)
USB 3.0	RClamp3552TQ	3.5	2	±20kV / ±17kV	4A	0.3	1.0 x 0.6 x 0.4
	RClamp0592PWQ	5	2	±30kV / ±30kV	10A	1	1.0 x 0.6 x 0.55
	RClamp0534PWQ	5	4	±15kV / ±10kV	4A	0.14	2.5 x 1.0 x 0.55

Ethernet Protection



2-Wire Ethernet application



2-Wire Ethernet (Line Side) application with RClamp10012PQ
*(Contact Semtech for more details)

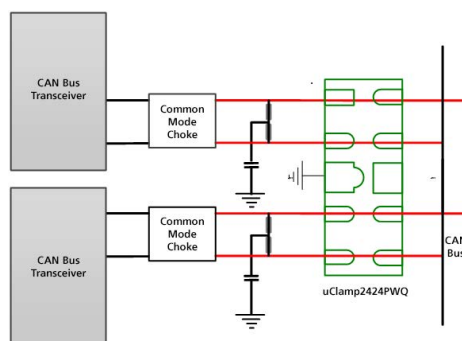
2-Wire Ethernet (PHY Side)

Interface to Protect	Part Number	V_{RWM} (V)	Lines	ESD Rating (air/contact)	Surge (8x20 μ s)	Cap (pF)	Pkg Size (mm)
2-Wire Ethernet Single Twisted Pair	RClamp*Q1892PWQ	1.8	2	NA / ± 8 kV	2.5A	0.3	1.0 x 0.60 x 0.55
	RClamp0592PWQ	5	2	± 30 kV / ± 30 kV	10A	1	1.0 x 0.6 x 0.55
	RClamp0582BQ	5	2	± 30 kV / ± 25 kV	15A	1.2	1.6 x 1.6 x 0.75

2-Wire Ethernet (Line side)

Interface to Protect	Part Number	V_{RWM} (V)	Lines	ESD Rating (air/contact)	Surge (8x20 μ s)	Cap (pF)	Pkg Size (mm)
2-Wire Ethernet Single Twisted Pair	EClamp10012PQ	30	2	± 17 kV / ± 12 kV	3A	1.2	2.0 x 1.0 x 0.60
	RClamp10012PQ	30	2	± 17 kV / ± 12 kV	3A	1.2	2.0 x 1.0 x 0.60
	RClamp10022PWQ	30	2	± 25 kV / ± 15 kV	6A	0.3	2.0 x 1.0 x 0.55

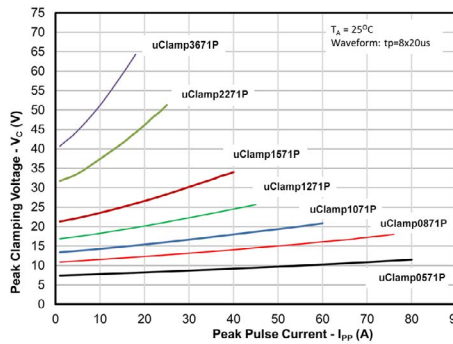
CAN Bus Protection



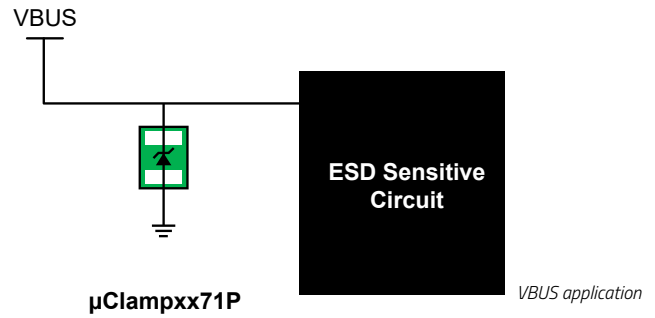
CAN BusProtection

Part Number	V_{RWM} (V)	Lines	ESD Rating (air/contact)	Surge (8x20 μ s)	Cap (pF)	Pkg Size (mm)
RClamp1631PQ	16	1	± 30 kV / ± 30 kV	8A	0.33	1.6 x 1.0 x 0.53
RClamp2831PQ	28	1	± 30 kV / ± 30 kV	7A	0.35	1.6 x 1.0 x 0.53
uClamp*2482PWQ	24	2	± 30 kV / ± 30 kV	5A	15	1.3 x 0.8 x 0.55
uClamp2424PWQ	24	4	± 30 kV / ± 30 kV	5A	15	2.5 x 1.0 x 0.55

VBUS/DC and SD Card Protection

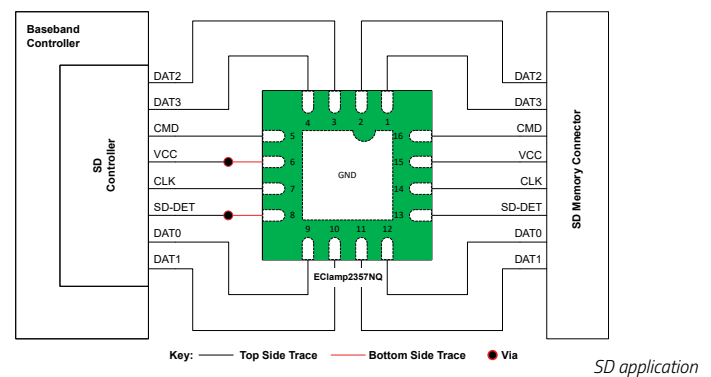
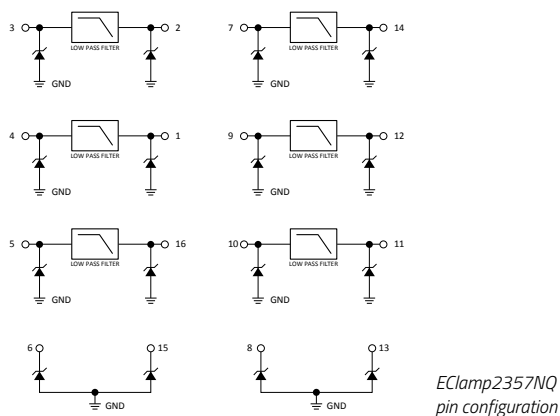


ESD surge
clamping performance



Qualified Single-line DC Bus Protection

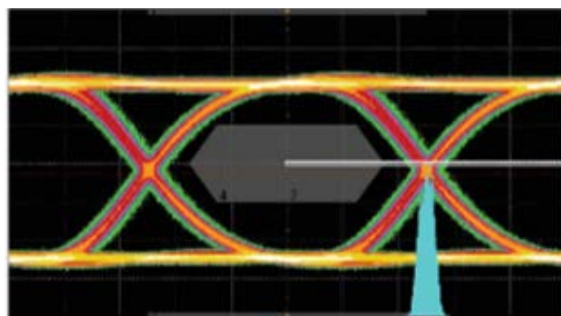
Type Application	Part Number	V_{RWM} (V)	Lines	ESD Rating (air/contact)	Surge (8x20 μs)	Cap (pF)	Pkg Size (mm)
VBUS Protection	uClamp0571P	5	1	$\pm 30\text{kV} / \pm 30\text{kV}$	80A	675	1.6 x 1.0 x 0.5
	uClamp0871P	8	1	$\pm 30\text{kV} / \pm 30\text{kV}$	65A	475	1.6 x 1.0 x 0.5
	uClamp1071P	10	1	$\pm 30\text{kV} / \pm 30\text{kV}$	60A	350	1.6 x 1.0 x 0.5
	uClamp1271P	12	1	$\pm 30\text{kV} / \pm 30\text{kV}$	45A	275	1.6 x 1.0 x 0.5
	uClamp1571P	15	1	$\pm 30\text{kV} / \pm 30\text{kV}$	40A	220	1.6 x 1.0 x 0.5
	uClamp1871P	18	1	$\pm 30\text{kV} / \pm 30\text{kV}$	35A	220	1.6 x 1.0 x 0.5
	uClamp2271P	22	1	$\pm 30\text{kV} / \pm 30\text{kV}$	25A	165	1.6 x 1.0 x 0.5
	uClamp2671P	26	1	$\pm 30\text{kV} / \pm 30\text{kV}$	23A	155	1.6 x 1.0 x 0.5
	uClamp3671P	36	1	$\pm 30\text{kV} / \pm 30\text{kV}$	18A	150	1.6 x 1.0 x 0.5
	TDS2211P	22	1	$\pm 30\text{kV} / \pm 30\text{kV}$	40A	175	1.6 x 1.6 x 0.55
	TDS2201P	22	1	$\pm 30\text{kV} / \pm 8\text{kV}$	16A	58	1.0 x 0.6 x 0.25



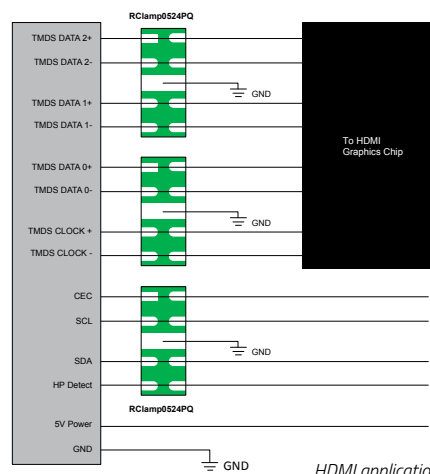
Filter Devices - TVS + EMC Filter

Type Application	Part Number	V_{RWM} (V)	Lines	ESD Rating (air/contact)	Filter Type	Cap (pF)	Pkg Size (mm)
SD Card	EClamp2410PQ	5	6	$\pm 17\text{kV} / \pm 12\text{kV}$	SD Card termination	15	4.0 x 1.6 x 0.58
	EClamp2357NQ	5	6	$\pm 20\text{kV} / \pm 12\text{kV}$	RC filter SD Card termination	20	3.0 x 3.0 x 0.6

HDMI Protection



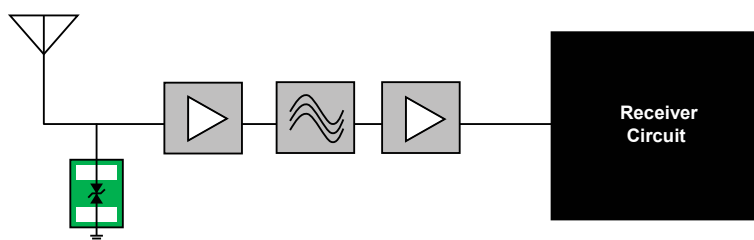
HDMI 1.4 eye pattern



HDMI application

HDMI, MIPI, MHL							
Interface to Protect	Part Number	V_{RWM} (V)	Lines	ESD Rating (air/contact)	Surge (8x20 μ s)	Cap (pF)	Pkg Size (mm)
HDMI, MIPI, MHL	RClamp[®]0524PQ	5	4	$\pm 25\text{kV} / \pm 20\text{kV}$	5A	0.6	2.5 x 1.0 x 0.5
	RClamp0534PWQ	5	4	$\pm 15\text{kV} / \pm 10\text{kV}$	4A	0.14	2.5 x 1.0 x 0.55

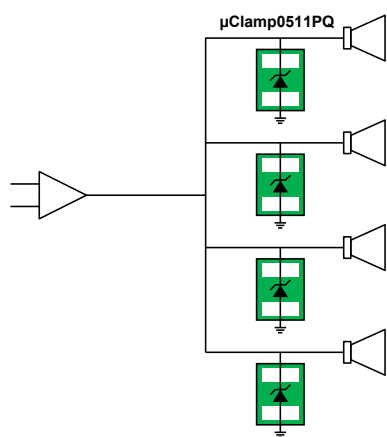
Antenna/RF Protection



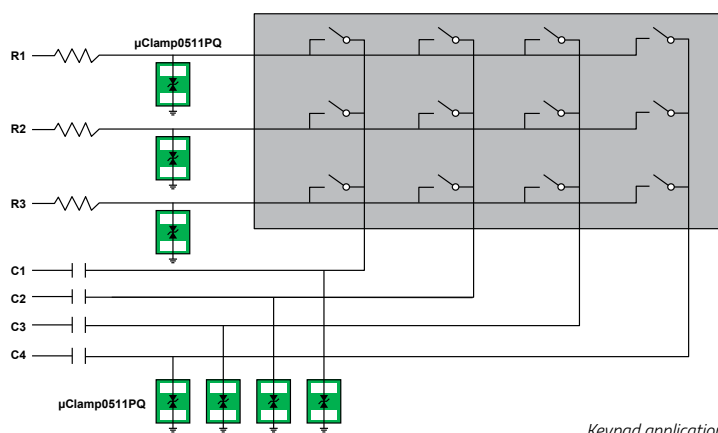
Antenna application

Antenna/RF							
Interface to Protect	Part Number	V_{RWM} (V)	Lines	ESD Rating (air/contact)	Surge (8x20 μ s)	Cap (pF)	Pkg Size (mm)
Antenna Interfaces	RClamp3331PQ	3.3	1	$\pm 30\text{kV} / \pm 30\text{kV}$	10A	0.35	1.0 x 0.6 x 0.5
	RClamp0531TQ	5	1	$\pm 20\text{kV} / \pm 12\text{kV}$	4A	0.8	1.0 x 0.6 x 0.4
	RClamp0551PQ	5	1	$\pm 25\text{kV} / \pm 25\text{kV}$	3A	0.45	1.0 x 0.6 x 0.5
	RClamp0561PQ	5.5	1	$\pm 18\text{kV} / \pm 15\text{kV}$	2A	0.14	1.0 x 0.6 x 0.5
	RClamp0582BQ	5	2	$\pm 30\text{kV} / \pm 25\text{kV}$	15A	1.2	1.6 x 1.6 x 0.75
	RClamp1521PQ	15	1	$\pm 15\text{kV} / \pm 8\text{kV}$	4A	0.5	1.0 x 0.6 x 0.5
	RClamp1561PQ	15	1	$\pm 15\text{kV} / \pm 10\text{kV}$	2A	0.25	1.0 x 0.6 x 0.5
	RClamp1631PQ	16	1	$\pm 30\text{kV} / \pm 30\text{kV}$	8A	0.33	1.6 x 1.0 x 0.53
	RClamp2431TQ	24	1	$\pm 15\text{kV} / \pm 8\text{kV}$	2A	0.5	1.0 x 0.6 x 0.4
	RClamp2831PQ	28	1	$\pm 30\text{kV} / \pm 30\text{kV}$	7A	0.35	1.6 x 1.0 x 0.53

Audio and Touchkey/Keypad Protection



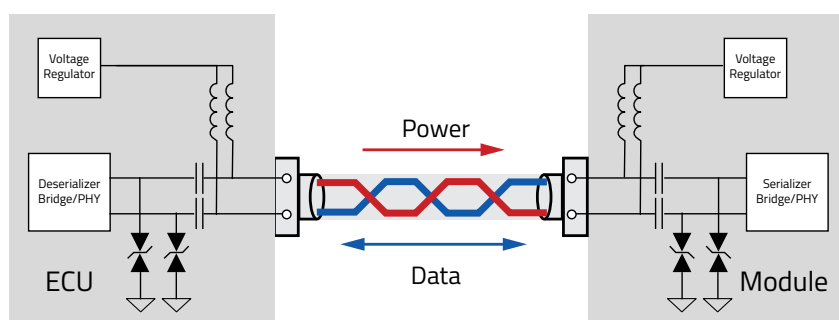
Audio application



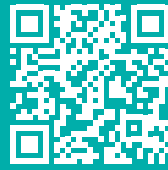
Keypad application

Touchkey/keypad/Audio Protection							
Interface to Protect	Part Number	V _{RWM} (V)	Lines	ESD Rating (air/contact)	Surge (8x20μs)	Cap (pF)	Pkg Size (mm)
Audio	μClamp[®]0511PQ	5	1	±30kV / ±30kV	12A	75	1.0 x 0.6 x 0.5
Keypads, Touchbuttons, Control Lines	μClamp0301PQ	3.0	1	±30kV / ±25kV	5A	25	1.0 x 0.6 x 0.5
	μClamp3311PQ	3.3	1	±25kV / ±20kV	5A	12	1.0 x 0.6 x 0.5
	μClamp0511PQ	5	1	±30kV / ±30kV	12A	75	1.0 x 0.6 x 0.5

High speed SERDES



GMSL, FPD-Link, APIX, MIPI A-Phy, ASA							
Interface to Protect	Part Number	V _{RWM} (V)	Lines	ESD Rating (air/contact)	Surge (8x20μs)	Cap (pF)	Pkg Size (mm)
ADAS, Collision Avoidance, Break Assist; Emergency Breaking	RClamp[®]3331PQ	3.3	1	±30kV / ±30kV	10A	0.38	1.0 x 0.6 x 0.5
	RClamp3552TQ	3.5	2	±20kV / ±17kV	4A	0.35	1.0 x 0.6 x 0.4
	RClamp0534PWQ	5	4	±15kV / ±10kV	4A	0.14	2.5 x 1.0 x 0.55
	RClamp1561PQ	15	1	±15kV / ±10kV	2A	0.25	1.0 x 0.60 x 0.50
	RClamp1561PWQ	15	1	±15kV / ±10kV	2A	0.15	1.0 x 0.60 x 0.55
	RClamp1631PQ	16	1	±30kV / ±30kV	8A	0.33	1.6 x 1.0 x 0.53
	RClamp2831PQ	28	1	±30kV / ±30kV	7A	0.35	1.6 x 1.0 x 0.53



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