

Protection devices and integrated EMI filtering



ESD Protection and EMI filtering interface conditioning



Content

ESD protection	2
General-purpose ESD protection	2
High-speed port protection	7
USB protection	8
Integrated EMI filtering and ESD protection (IPAD™) ..	9
Audio and video ipad™ (EMI FILTERS WITH ESD PROTECTION)	9
Display, camera and keypad IPAD™: Common mode filter	10
Display, camera and keypad IPAD™: EMI filter and ESD protection ..	11
Memory and SIM cards: EMI FILTERS and ESD PROTECTION	12
Standard multiline bus IPAD™ : EMI FILTERS and ESD PROTECTION ..	13
USB IPAD™ : Single ended EMI filter or common mode filter	14
ECMIF™ and CMF series: Common mode filter and ESD protection ..	15
HDMI series	16
Automotive protection devices	17
Automotive grade general purpose ESD protection	17
Automotive grade Communication bus protection	18



ESD protection

GENERAL-PURPOSE ESD PROTECTION

Part number	Directionality	Number of lines	IEC 61000-4-2 contact/air	Stand-off voltage (V_{RM})	Leakage current (I_{RM}) @ V_{RM}	Breakdown voltage V_{BR} @ $I_R = 1\text{ mA}$	Capacitance I to GND @ 0 V bias
			(kV)	(V)	max (μA)	min (V)	typ (μF)
ESDAXLC5-1U2 ^(*)	Unidirectional	1	> 16/30	3.6	0.1	5	0.55
ESDZL5-1F4 ^(*)	Unidirectional	1	> 12/30	5.5	0.1	5.8	10
ESDAULC6-1U2	Unidirectional	1	> 8/15	3	0.1	6	0.8
ESDAVLC6-1V2	Unidirectional	1	> 12/15	3	0.05	6	7.5
ESDAXLC6-1MY2	Unidirectional	1	> 8/15	3	0.1	6	0.35 max
ESDA6V1-1J ^(*)	Unidirectional	1	> 8/15	5	0.5	6.1	210
ESDALC6-1U2	Unidirectional	1	> 8/15	3	0.1	6.1	12
ESDALC6V1-1M2	Unidirectional	1	> 8/15	3	0.1	6.1	22
ESDALC6V1-1U2	Unidirectional	1	> 8 / -	3	0.1	6.1	12
ESDA7P60-1U1M	Unidirectional	1	> 8/15	5	0.2	6.4	450
ESDA8V2-1J	Unidirectional	1	> 8/15	5	0.5	8.2	210
ESDA8V2-1MX2	Unidirectional	1	> 8/15	5	0.5	8.2	350
ESDA12-1K	Unidirectional	1	> 8/15	10	0.5	12	200
ESDALC12-1T2	Unidirectional	1	> 8/15	10	0.2	12	15
ESDA13P70-1U1M	Unidirectional	1	> 8/15	12	0.2	12.5	400
ESDA15P60-1U1 ^(*)	Unidirectional	1	> 8/15	13	0.1	13.6	335
ESDAVLC14-1V2	Unidirectional	1	> 12/15	12	0.1	14	7.5
ESDALC14V2-1U2	Unidirectional	1	> 8/16	3	0.1	14.2	6
ESDAVLC14-1U2	Unidirectional	1	> 8/15	12	0.1	14.2	6
ESDA17P60-1U1M ^(*)	Unidirectional	1	> 8/15	15	0.2	15.5	290
ESDA18-1F2	Unidirectional	1	> 8/15	10	0.5	16	230

GENERAL-PURPOSE ESD PROTECTION

Part number	Directionality	Number of lines	IEC 61000-4-2 contact/air	Stand-off voltage (V_{RM})	Leakage current (I_{RM}) @ V_{RM}	Breakdown voltage V_{BR} @ $I_R = 1$ mA	Capacitance C_A to GND @ 0 V bias
			(kV)	(V)	max (μ A)	min (V)	typ (pF)
ESDA18-1F4	Unidirectional	1	> 8/15	12	0.02	16	120
ESDA18-1K	Unidirectional	1	> 8/15	16	0.5	18	200
ESDA25P35-1U1M ^(*)	Unidirectional	1	> 8/15	22	0.2	23.3	190
ESDA8P80-1U1M ^(*)	Unidirectional	1	> 8/15	6	0.2		480
ESDARF01-1BF4	Bidirectional	1	> 8/15	0.1	0.3	0.6	3
ESDARF01-1BM2	Bidirectional	1	> 8/15	0.1	1	0.7	3
ESDAXLC4-1BF3	Bidirectional	1	> 8/8	3	0.1	4	0.35
ESDALC5-1BM2	Bidirectional	1	> 8/15	5	0.1	5	27
ESDALC5-1BT2	Bidirectional	1	> 8/15	5	0.06	5	27
ESDALCL5-1BM2	Bidirectional	1	> 8/15	1	0.001	5	26
ESDARF02-1BU2CK	Bidirectional	1	> 8/20	3.6	0.1	5	0.2
ESDA5-1BF4	Bidirectional	1	> 8/15	5	0.1	5.8	45
ESDALC5-1BF4	Bidirectional	1	> 8/15	5	0.1	5.8	10
ESDAULC5-1BF4	Bidirectional	1	> 30/30	3	0.07	5.8	1.5
ESDAVLC5-1BF4	Bidirectional	1	> 8/15	5.3	0.1	5.8	7
ESDZV5-1BF4 ^(*)	Bidirectional	1	> 18/30	5.5	0.1	5.8	7
ESDARF02-1BU2	Bidirectional	1	> 8/15	3	0.07	6	0.24
ESDARF03-1BF3	Bidirectional	1	> 8/15	3	1	6	0.6
ESDAVLC6-1BF4	Bidirectional	1	> 8/15	3	0.1	6	6
ESDAVLC6-1BV2	Bidirectional	1	> 12/15	3	0.05	6	7.5
ESDAXLC6-1BT2	Bidirectional	1	> 8/15	6	0.07	6	0.4
ESDAXLC6-1BU2	Bidirectional	1	> 8/15	3	0.07	6	0.4
ESDAXLC6-1BU2K	Bidirectional	1	> 8/20	3	0.07	6	0.24

GENERAL-PURPOSE ESD PROTECTION

Part number	Directionality	Number of lines	IEC 61000-4-2 contact/air	Stand-off voltage (V_{RM})	Leakage current (I_{RM}) @ V_{RM}	Breakdown voltage V_{BR} @ $I_R = 1$ mA	Capacitance C_A to GND @ 0 V bias
			(kV)	(V)	max (μ A)	min (V)	typ (pF)
ESDALC6V1-1BU2	Bidirectional	1	> 8/15	3	0.1	6.1	5
ESDALC8-1BF4	Bidirectional	1	> 8/15	6	0.05	7	30
ESDAVLC8-1BM2	Bidirectional	1	> 8/15	3	0.05	8.5	4.5
ESDAVLC8-1BT2	Bidirectional	1	> 8/15	3	0.05	8.5	4.5
ESDAVLC8-1BU2	Bidirectional	1	> 8/15	3	0.1	8.5	5
ESDAVLC12-1BV2	Bidirectional	1	> 8/15	10.5	0.07	12	7
ESDALC14-1BF4	Bidirectional	1	> 8/15	12	0.1	14	22
ESDA14V2-1BF3	Bidirectional	1	> 8/15	12	0.5	14.2	10
ESDAXLC18-1BF4 ^(*)	Bidirectional	1	> 10/30	18	0.03	18	0.45
ESDALC20-1BF4	Bidirectional	1	> 20/30	20	0.01	22	1.5
ESDA5V3L	Unidirectional	2	> 8/15	3	2	5.3	220
ESDALC6-2SC6	Unidirectional	2	> 8/15	1	0.001	6	2.5
ESDA6V1L	Unidirectional	2	> 8/15	5.25	20	6.1	140
ESDALC6V1M3	Unidirectional	2	> 8/15	5	0.5	6.1	11
ESDALC6V1M3R	Unidirectional	2	> 8/15	5	0.5	6.1	11
ESDA14V2L	Unidirectional	2	> 8/15	12	5	14.2	90
ESDA25L	Unidirectional	2	> 8/15	24	1	25	50
ESDA25W	Unidirectional	2	> 8/15	24	1	25	65
ESDA14V2-2BF3	Bidirectional	2	> 8/15	12	0.5	14.2	12
ESDAULC6-3BP6	Bidirectional	3	> 8/15	5	0.5	6	1
ESDA5V3SC5	Unidirectional	4	> 8/15	3	2	5.3	280
ESDA5V3SC6	Unidirectional	4	> 8/15	3	2	5.3	280
ESDALC6-4P6A	Unidirectional	4	> 8/15	1	0.001	6	2.5

GENERAL-PURPOSE ESD PROTECTION

Part number	Directionality	Number of lines	IEC 61000-4-2 contact/air	Stand-off voltage (V_{RM})	Leakage current (I_{RM}) @ V_{RM}	Breakdown voltage V_{BR} @ $I_R = 1$ mA	Capacitance C_A to GND @ 0 V bias
			(kV)	(V)	max (μ A)	min (V)	typ (pF)
ESDA6V1P6	Unidirectional	4	> 8/15	3	0.5	6.1	70
ESDA6V1SC5	Unidirectional	4	> 8/15	5.25	20	6.1	190
ESDA6V1SC6	Unidirectional	4	> 8/15	5.25	20	6.1	190
ESDA6V1W5	Unidirectional	4	> 8/15	3	1	6.1	90
ESDALC6-4N4	Unidirectional	4	> 8/15	3	0.1	6.1	9.5
ESDALC6V1P5	Unidirectional	4	> 8/15	3	0.1	6.1	12
ESDALC6V1P6	Unidirectional	4	> 8/15	3	0.1	6.1	12
ESDALC6V1W5	Unidirectional	4	> 8/15	3	0.1	6.1	12
ESDA14V2SC5	Unidirectional	4	> 8/15	12	5	14.2	100
ESDA14V2SC6	Unidirectional	4	> 8/15	12	5	14.2	100
ESDA19SC6	Unidirectional	4	> 8/15	15	0.1	19	80
ESDA25SC6	Unidirectional	4	> 8/15	24	1	25	60
ESDA25W5	Unidirectional	4	> 8/15	24	1	25	30
ESDALC5-4BN4	Bidirectional	4	> 8/15	5	0.06	5.5	13
ESDAVLC5-4BX4	Bidirectional	4	> 8/15	3	0.05	5.5	10
ESDA6V1-4BC6	Bidirectional	4	> 8/15	3	1	6.1	45
ESDA6V1BC6	Bidirectional	4	> 8/15	5	1	6.1	20
ESDAVLC8-4BN4	Bidirectional	4	> 8/15	3	0.05	8.5	4.5
DALC208SC6	Bidirectional	4	> 8/15	5	1	9	7
ESDA14V2-4BF2	Bidirectional	4	> 8/15	12	1	14.2	15
ESDA14V2-4BF3	Bidirectional	4	> 8/15	12	0.5	14.2	15 (max)
ESDA14V2BP6	Bidirectional	4	> 8/15	12	1	14.2	20
DA108S1	Bidirectional	4	> 8/15	15	2	18	34

GENERAL-PURPOSE ESD PROTECTION

Part number	Directionality	Number of lines	IEC 61000-4-2 contact/air	Stand-off voltage (V_{RM})	Leakage current (I_{RM}) @ V_{RM}	Breakdown voltage V_{BR} @ $I_R = 1$ mA	Capacitance I to GND @ 0 V bias
			(kV)	(V)	max (μ A)	min (V)	typ (pF)
ESDA25-4BP6	Bidirectional	4	> 8/15	24	1	25	22
ESDA6V1-5M6	Unidirectional	5	> 8/15	3	0.5	6.1	70
ESDA6V1-5P6	Unidirectional	5	> 8/15	3	0.5	6.1	70
ESDA6V1-5SC6	Unidirectional	5	> 8/15	3	1	6.1	50
ESDA6V1-5T6	Unidirectional	5	> 8/15	3	0.1	6.1	12
ESDA6V1-5W6	Unidirectional	5	> 8/15	3	1	6.1	50
ESDALC6-5T6	Unidirectional	5	> 8/15	3	0.1	6.1	7
ESDALC6V1-5M6	Unidirectional	5	> 8/15	3	0.07	6.1	12
ESDALC6V1-5P6	Unidirectional	5	> 8/15	3	0.07	6.1	12
ESDALC6V1-5P6M	Unidirectional	5	> 8/15	3	0.07	6.1	12
ESDALC6V1-5T6	Unidirectional	5	> 8/15	3	0.1	6.1	12
ESDA17-5SC6	Unidirectional	5	> 8/15	14	0.075	17	35
ESDAVLC7-5BU6	Bidirectional	5	> 8/15	6	0.03	7	5
ESDA6V1U1	Unidirectional	6	> 8/15	5	2	6.1	100
DA112S1	Bidirectional	6	> 8/15	15	2	18	34
DALC112S1	Bidirectional	6	> 6/8	15	2	18	7
ESDA25B1	Bidirectional	6	> 8/15	24	2	25	15
ESDAULC6-8F3	Unidirectional	8	> 8/15	3	0.1	6	1
ESDA6V1S3	Unidirectional	18	> 8/15	5	2	6.1	120

Notes: (*) Available in Q1/2016

(1) Under development 2016

HIGH-SPEED PORT PROTECTION

Part number	Directionality	Number of lines	IEC 61000-4-2 contact/air	Stand-off voltage (V_{RM})	Leakage current (I_{RM}) à V_{RM}	Breakdown voltage V_{BR} @ IR= 1 mA	Capacitance I/O to GND @ 0 V bias
			(kV)	(V)	max (µA)	min (V)	typ (pF)
HSP061-2M6	Unidirectional	2	> 8/15	5	0.5	6	0.85
HSP061-2N4	Unidirectional	2	> 8/15	3	0.1	6	0.6
HSP061-2P6	Unidirectional	2	> 8/15	5	0.5	6	0.6
HSP062-2M6	Unidirectional	2	> 8/15	5	0.5	6	0.8
HSP062-2P6	Unidirectional	2	> 8/15	5	0.5	6	0.8
HSP051-4M5(*)	Unidirectional	4	> 15/30	3.6	0.1	4.5	0.35
DSILC6-4F2	Unidirectional	4	> 8/15	5	0.5	6	2.5
DSILC6-4P6	Unidirectional	4	> 8/15	5	0.5	6	2
DSILC6-4SC6	Unidirectional	4	> 8/ -	5	0.5	6	4.1
DVIULC6-4SC6	Unidirectional	4	> 8/15	5	0.5	6	0.85
HDMIULC6-4F3	Unidirectional	4	> 8/15	3	0.1	6	0.7
HDMIULC6-4SC6	Unidirectional	4	> 8/15	5	0.5	6	0.85
HSP051-4M10	Unidirectional	4	> 8/15	3	0.07	6	0.5
HSP051-4N10	Unidirectional	4	> 8/15	3	0.07	6	0.5
HSP061-4M10	Unidirectional	4	> 8/15	3	0.07	6	0.6
HSP061-4NY8	Unidirectional	4	> 8/15	5	0.1	6	0.5
HSP051-6BM14	Bidirectional	6	> 8/15	3	0.07	6	0.5
HSP061-8M16	Unidirectional	8	> 8/15	5	0.5	6	0.6

Note: (*) Available in Q1/2016

USB PROTECTION

Part number	Protected lines	Directionality	Number of lines	IEC 61000-4-2 contact/air	Stand-off voltage (V_{RM})	Leakage current (I_{RM}) à V_{RM}	Breakdown voltage V_{BR} @ IR= 1 mA
				(kV)	(V)	max (µA)	min (V)
ESDA7P60-1U1M	V_{BUS} protection	Unidirectional	1	> 8/15	5	0.2	6.4
ESDA13P70-1U1M	V_{BUS} protection	Unidirectional	1	> 8/15	12	0.2	12.5
ESDA15P60-1U1(*)	V_{BUS} protection	Unidirectional	1	> 8/15	13	0.1	13.6
ESDA17P60-1U1M(*)	V_{BUS} protection	Unidirectional	1	> 8/15	15	0.2	15.5
ESDA25P35-1U1M(*)	V_{BUS} protection	Unidirectional	1	> 8/15	22	0.2	23.3
ESDA8P80-1U1M(*)	V_{BUS} protection	Unidirectional	1	> 8/15	6	0.2	
USBLC6-2P6	D+/D-	Unidirectional	2	> 8/15	5	1	6
USBLC6-2SC6	D+/D-	Unidirectional	2	> 8/15	5	1	6
USBULC6-2F3	D+/D-	Unidirectional	2	> 8/15	3	0.1	6
USBULC6-2M6	D+/D-	Unidirectional	2	> 8/15	5	0.5	6
USBULC6-2N4	D+/D-	Unidirectional	2	> 8/15	3	0.1	6
USBULC6-2P6	D+/D-	Unidirectional	2	> 8/15	5	0.5	6
USBULC6-3F3	D+/D-/ID	Unidirectional	3	> 8/15	3	0.1	4
USB6B1RL	D+/D-	Unidirectional	4	> 8/15	5.25	10	6
USBLC6-4SC6	D+/D- (double port)	Unidirectional	4	> 8/15	5	2	6

Note: (*) Available in Q1/2016

Integrated EMI filtering and ESD protection (IPAD™)

AUDIO AND VIDEO IPAD™ (EMI FILTERS WITH ESD PROTECTION)

Part number	Application	Number of lines	Package	Pin count	
EMIF02-010ABRY	Video BroadR Reach™ AEC-Q101 compliant	2	Wettable flanks QFN 3.0 x 3.0	5	
EMIF08-VID1F3	Video	8	WLCSP 400μ	20	
EMIF07-KB01F7	Video	7	WLCSP 350μ	20	
EMIF02-AV01F3	Audio and Video	2	WLCSP 400μ	5	
EMIF04-EAR02M8	Audio and Microphones	4	μQFN-8L	8	
EMIF05-AUD02F3	Audio and Microphone	2	WLCSP 400μ	12	
EMIF02-MIC03M6	Microphones	2	μQFN-6L	6	
EMIF02-MIC06F3	Microphones	2	WLCSP 400μ	8	
EMIF02-MIC02F2	Microphones	2	WLCSP 400μ	5	
EMIF02-MIC02F3	Microphones	2	WLCSP 400μ	5	
EMIF02-MIC03F2	Microphones	2	WLCSP 500μ	5	
EMIF02-SPK02F2	Speaker	2	WLCSP 500μ	5	
EMIF02-SPK03F2	Speaker	2	WLCSP 500μ	5	

DISPLAY, CAMERA AND KEYPAD IPAD™: COMMON MODE FILTER

Serial interface camera and display IPAD

Part number	Application	ESD protection		Number of package lines		Pin count	700
		Datalines	Vbus				
ECMF02-3HSM6	MIPI D-PHY	Yes	-	3	μQFN-6L	6	-2
ECMF04-4AMX12	MIPI D-PHY	Yes	-	4	μQFN-12L	12	-1
ECMF04-4HSM10	MIPI D-PHY	Yes	-	4	μQFN-10L	10	-2
ECMF06-6AM16	MIPI D-PHY	Yes	-	6	μQFN-16L	16	-1
ECMF06-6HSM16	MIPI D-PHY	Yes	-	6	μQFN-16L	16	-2
CMF2-0650A09H3	MIPI D-PHY	-	-	2	CSP - 5 microbumps	5	-2
CMF2-24A60H3	MIPI D-PHY	-	-		CSP - 4 microbumps	4	
ECMF4-20A42N10	USB 3.1 Gen 1 and HDMI 2.0	Yes	-		μQFN-10L	10	-1
ECMF04-4HSM10	USB 3.1 Gen 1 and HDMI 2.0	Yes	-		μQFN-10L	10	
ECMF02-2HSMX6	USB 3.1 Gen 1 and HDMI 2.0	Yes	-		μQFN-6L	6	-2
ECMF02-2BF3	USB 2.0	Yes	-		WLCSP 400μ	5	-1
ECMF02-3BF3	USB 2.0	Yes	-		WLCSP 400μ	6	
ECMF02-4CMX8	USB 2.0	Yes	Yes		μQFN-8L	8	-1
ECMF2-0730V12M12	USB 2.0	Yes	Yes		μQFN -12L	12	-1
ECMF02-2AMX6	USB 2.0 and MIPI D-PHY/MDDI	Yes	-		μQFN-6L	6	-1

DISPLAY, CAMERA AND KEYPAD IPAD™: EMI FILTER AND ESD PROTECTION

Serial interface camera and display IPAD and keypad IPAD

Part number	General description	Number of lines	Package	Pin count	
EMIF08-VID1F3	Video	8	WLCSP 400μ	20	
EMIF06-VID01F2	Video	6	WLCSP 500μ	12	
EMIF08-VID01F2	Video	8	WLCSP 500μ	19	
EMIF07-KB01F7	Video	7	WLCSP 350μ	20	
EMIF10-COM01F2	Display	10	WLCSP 500μ	23	
EMIF10-LCD02F3	Display	10	WLCSP 400μ	25	
EMIF07-LCD02F3	Display	7	WLCSP 400μ	19	
EMIF08-LCD04M16	Display	8	μQFN-16L	16	
EMIF10-1K010F2	Keypads	10	WLCSP 500μ	23	
EMIF06-1005MX12Y	General purpose < 200MHz AEC-Q101 compliant	12	μQFN-12L	12	
EMIF04-1005M8	General purpose < 200MHz	4	μQFN-8L	8	
EMIF06-1005M12	General purpose < 200MHz	6	μQFN-12L	12	
EMIF06-1005N12	General purpose < 200MHz	6	μQFN-12L	12	
EMIF08-1005M16	General purpose < 200MHz	8	μQFN-16L	16	
EMIF08-1005T16	General purpose < 200MHz	8	μQFN-16L	16	
EMIF06-1502M12	General purpose < 300MHz	6	μQFN-12L	12	
EMIF04-1502M8	General purpose < 300MHz	4	μQFN-8L	8	
EMIF08-1502M16	General purpose < 300MHz	8	μQFN-16L	16	
EMIF05-SK01F3	General purpose < 400MHz	5	WLCSP 400μ	11	
EMIF08-0402T16	General purpose < 400MHz	8	μQFN-16L	16	

MEMORY AND SIM CARDS: EMI FILTERS AND ESD PROTECTION

Part number	Application	Number of lines	Package	Pin count	Specific application	Bandwidth (@ -3 dB)
						(MHz)
EMIF03-SIM02F2	SIM card	3	WLCSP 500μ	8	3 lines + Vcc	200
EMIF03-SIM02M8	SIM card	3	μQFN-8L	8	3 lines + Vcc	280
EMIF03-SIM03F3	SIM card	3	WLCSP 400μ	8	3 lines + Vcc	350
EMIF03-SIM04F3	SIM card	3	WLCSP 400μ	12	3 lines + ESD	400
EMIF03-SIM05F3	SIM card	4	WLCSP 400μ	8	3 lines + ESD + NFC	300
EMIF03-SIM06F3	SIM card	3	WLCSP 400μ	11	3 lines + ESD + pull-up	400
EMIF06-MSD02N16	mini- and micro-SD card	6	μQFN-16L	16	With pull-up resistor	350
EMIF06-MSD04F3	mini- and micro-SD card	6	WLCSP 400μ	12	With pull-up resistor	550
EMIF06-mSD01F2	mini- and micro-SD card	6	WLCSP 500μ	12	With pull-up resistor	300
EMIF09-SD01F3	mini- and micro-SD card	9	WLCSP 400μ	25	With pull-up resistor	300
EMIF06-HSD03F3	mini- and micro-SD card	6	WLCSP 400μ	17	Without pull-up resistor	3000
EMIF06-HSD04F3	mini- and micro-SD card	6	WLCSP 400μ	15	With pull-up resistor	2000
EMIF06-USD05F3	mini- and micro-SD card	6	WLCSP 400μ	15	Without pull-up resistor	300
EMIF06-USD04F3	mini- and micro-SD card	6	WLCSP 400μ	15	Without pull-up resistor	600
EMIF06-USD14F3	mini- and micro-SD card	6	WLCSP 400μ	15	With pull-up resistor	600
EMIF06-HMC02F2	high speed multimedia card	6	WLCSP 500μ	16	With pull-up resistor	400

STANDARD MULTILINE BUS IPAD™ : EMI FILTERS AND ESD PROTECTION

Part number	Number of lines	Package	Pin count	Bandwidth (@ -3 dB)	
				(MHz)	
EMIF01-10005W5	2	SOT323-5L	5	150	
EMIF01-1003M3	1	SOT-883	3	180	
EMIF02-1003M6	2	μQFN-6L	6	180	
EMIF04-1005M8	4	μQFN-8L	8	110	
EMIF04-1502M8	4	μQFN-8L	8	210	
EMIF06-1002F2	6	WLCSP 500μ	12	280	
EMIF06-1005M12	6	μQFN-12L	12	110	
EMIF06-1502M12	6	μQFN-12L	12	210	
EMIF08-1005M16	8	μQFN-16L	16	110	
EMIF08-1502M16	8	μQFN-16L	16	210	
EMIF08-1005T16	8	μQFN-16L	16	110	

USB IPAD™ : SINGLE ENDED EMI FILTER OR COMMON MODE FILTER

Part number	Application	ESD Protection		Number of package lines		Pin count	S _{21cc} or S _{21dd}
		Datalines	Vbus				
ECMF4-20A42N10	USB 3.1 Gen 1	Yes	-	4	μQFN-10L	10	S21cc
ECMF04-4HSWM10	USB 3.1 Gen 1	Yes	-	4	μQFN-10L	10	S21cc
ECMF02-2HSMX6	USB 3.1 Gen 1	Yes	-	2	μQFN-6L	6	S21cc
ECMF02-2BF3	USB 2.0	Yes	-	2	WLCSP 400μ	5	S21cc
ECMF02-3BF3	USB 2.0	Yes	-	3	WLCSP 400μ	6	S21cc
ECMF02-4CMX8	USB 2.0	Yes	Yes	2	μQFN-8L	8	S21cc
ECMF2-0730V12M12	USB 2.0	Yes	Yes	2	μQFN -12L	12	S21cc
ECMF02-2AMX6	USB 2.0	Yes	-	2	μQFN-6L	6	S21cc
EMIF02-USB01F2	USB 2.0 Low Speed	Yes	Yes	2	WLCSP 500μ	6	S21dd
EMIF02-USB01F2	USB 2.0 Low Speed	Yes	Yes	2	WLCSP 500μ	6	S21dd
EMIF02-USB03F2	USB 2.0 Low Speed	Yes	Yes	2	WLCSP 500μ	5	S21dd
USBDF01W5	USB 2.0 Low Speed	Yes	-	2	SOT323-5L	5	S21dd
USBDF02W5	USB 2.0 Low Speed	Yes	-	2	SOT323-5L	5	S21dd
USBUF01W6	USB 2.0 Low Speed	Yes	-	2	SOT323-6L	6	S21dd
USBUF02W6	USB 2.0 Low Speed	Yes	-	2	SOT323-6L	6	S21dd
USBUF01P6	USB 2.0 Low Speed	Yes	-	2	SOT-666	6	S21dd

ECMF™ AND CMF SERIES: COMMON MODE FILTER AND ESD PROTECTION

Part number	Application	ESD protection		Number of package lines		Pin count
		Datalines	Vbus			
ECMF02-3HSM6	MIPI D-PHY	Yes	-	3	μQFN-6L	6
ECMF04-4AMX12	MIPI D-PHY	Yes	-	4	μQFN-12L	12
ECMF04-4HSM10	MIPI D-PHY	Yes	-	4	μQFN-10L	10
ECMF06-6AM16	MIPI D-PHY	Yes	-	6	μQFN-16L	16
ECMF06-6HSM16	MIPI D-PHY	Yes	-	6	μQFN-16L	16
CMF2-0650A09H3	MIPI D-PHY	-	-	2	CSP - 5 microbumps	5
CMF2-24A60H3	MIPI D-PHY	-	-	2	CSP - 4 microbumps	4
ECMF4-20A42N10	USB 3.1 Gen 1 and HDMI 2.0	Yes	-	4	μQFN-10L	10
ECMF04-4HSM10	USB 3.1 Gen 1 and HDMI 2.0	Yes	-	4	μQFN-10L	10
ECMF02-2HSMX6	USB 3.1 Gen 1 and HDMI 2.0	Yes	-	2	μQFN-6L	6
ECMF02-2BF3	USB 2.0	Yes	-	2	WLCSP 400μ	5
ECMF02-3BF3	USB 2.0	Yes	-	3	WLCSP 400μ	6
ECMF02-4CMX8	USB 2.0	Yes	Yes	2	μQFN-8L	8
ECMF2-0730V12M12	USB 2.0	Yes	Yes	2	μQFN -12L	12
ECMF02-2AMX6	USB 2.0 and MIPI D-PHY/MDDI	Yes	-	2	μQFN-6L	6

HDMI SERIES

Part number	General description	HDMI standard	Interface type	Package size	Package	
HDMI2C1-5DIJ	Signal conditioning and ESD protection for HDMI control line interfaces	HDMI 1.4 and 2.0	Source	5.0 mm x 4.0 mm	DFN-16L	5
HDMI2C1-6C1	Signal conditioning and ESD protection for HDMI control line interfaces	HDMI 1.4 and 2.0	Source	3.5 mm x 3.5 mm	QFN-18L	5
HDMI2C1-14HD	Signal conditioning and ESD protection for HDMI control and TMDS line interfaces	HDMI 1.4 and 2.0	Source	6.5 mm x 3.5 mm	μQFN-36L	5
HDMI2C2-14HD	Signal conditioning and ESD protection for HDMI control and TMDS line interfaces	HDMI 1.4 and 2.0	Sink	6.5 mm x 3.5 mm	μQFN-36L	5
HDMI2C1-14HDS	Signal conditioning and ESD protection for HDMI control and TMDS line interfaces	HDMI 1.4 and 2.0	Source	4.0 mm x 4.0 mm	μQFN-36L	5
HDMI2C2-5F2	Signal conditioning and ESD protection for HDMI control line interfaces	HDMI 1.4 and 2.0	Source	2.0 mm x 1.35 mm	WLCSP-12b	5
HDMI2C3-5F2	Signal conditioning and ESD protection for HDMI control line interfaces	HDMI 1.4 and 2.0	Source	2.1 mm x 1.5 mm	WLCSP-12b	5
HDMI2C4-5F2	Signal conditioning and ESD protection for HDMI control line interfaces	HDMI 1.4 and 2.0	Sink	2.1 mm x 1.5 mm	WLCSP-10b	5
HDMI05-CL01F3	ESD protection for HDMI control line with pull-up resistor on DDC bus and pull-down on HPD	HDMI 1.4 and 2.0	Source and sink	1.1 mm x 1.1 mm	WLCSP-8b	4
HDMI05-CL02F3	ESD protection for HDMI control line with pull-up resistor on DDC bus/CEC and pull-down on HPD	HDMI 1.4 and 2.0	Source and sink	1.1 mm x 1.1 mm	WLCSP-9b	4

Automotive protection devices

AUTOMOTIVE GRADE GENERAL PURPOSE ESD PROTECTION

Part number	Directionality	Number of lines	IEC 61000-4-2 contact/air	ISO 7637-2 pulse compliance	Stand-off voltage (V_{RM})	Leakage current (I_{RM}) @ V_{RM}	Breakdown voltage V_{BR} @ I_{BR}
			(kV)		(V)	max (μA)	min (V)
ESDALC5-1BT2Y	Unidirectional	1	> 8/15	3a, 3b	3	1	5
ESDAXLC6-1BT2Y	Bidirectional	1	> 8/15	3a, 3b	6	0.07	6
ESDAVLC8-1BT2Y	Bidirectional	1	> 8/15	3a, 3b	3	0.05	8.5
ESDAXLC18-1BF4Y(*)	Bidirectional	1	> 8/30	3a, 3b	18	0.03	18
ESDA5V3LY	Unidirectional	2	> 8/15	3a, 3b	3	2	5.3
ESDA6V1LY	Unidirectional	2	> 8/15	3a, 3b	5.2	20	6.1
ESDA14V2LY	Unidirectional	2	> 8/15	1, 2, 3a, 3b	12	5	14.2
ESDA25LY	Unidirectional	2	> 8/15	1, 2, 3a, 3b	24	1	25
USBLC6-2SC6Y	Unidirectional	2	> 8/15	3a, 3b	5.25	0.15	6
HSP061-2P6Y	Unidirectional	2	> 8/15	3a, 3b	5	0.5	6
ESDA5V3SC6Y	Unidirectional	4	> 8/15	3a, 3b	3	2	5.3
ESDA6V1SC6Y	Unidirectional	4	> 8/15	3a, 3b	5.2	20	6.1
DALC208SC6Y	Unidirectional	4	> 8/15	3a, 3b	5	1	9
ESDA14V2SC5Y	Unidirectional	4	> 8/15	1, 2, 3a, 3b	12	5	14.2
ESDA25SC6Y	Unidirectional	4	> 8/15	1, 2, 3a, 3b	24	1	25
USBLC6-4SC6Y	Unidirectional	4	> 8/15	3a, 3b	5.25	0.15	6
DVIULC6-4SC6Y	Unidirectional	4	> 8/15	3a, 3b	5	0.5	6
HDMIULC6-4SC6Y	Unidirectional	4	> 8/15	3a, 3b	5	0.5	6
HSP061-4M10Y	Unidirectional	4	> 8/15	3a, 3b	5	0.5	6

Note: (*) New products, available in Q2-2016

AUTOMOTIVE GRADE COMMUNICATION BUS PROTECTION

Part number	Number of protected lines	ISO 7637-2 pulse compliance	ISO 10605 - C=330 pF, R=330 Ω contact/air	Peak pulse power 8/20 μs	Stand-off voltage (V _{RM})	Leakage current (I _{RM}) @ V _{RM}	Breakdown voltage (V _{BR}) @ I _R		Capacitance (C _{int}) @ 0 V	Junction temperature (T)	Package
			(kV)	(W)	(V)	(μA)	V _{BR} + / V _{BR} - min (V)	(mA)	max (pF)	max (°C)	
LIN bus protection											
ESDLIN1524BJ	1	3a, 3b	> 8/15	160/200	15/- 24	0.5	17.1 / -25.4	5	20	125	SOD323
ESDLIN03-1BWY	1	3a, 3b	> 8/15	160/200	24/- 24	0.5	17.1 / -25.4	5	20	125	SOD323
CAN bus protection											
ESDCAN24-2BLY	2	3a, 3b	> 30/30	230	24	0.1	27 / -27	1	30	150	SOT23-3L
ESDCAN01-2BLY	2	3a, 3b	> 30/30	230	24	0.1	25 / -25	1	30	150	SOT23-3L
ESDCAN02-2BWY	2	3a, 3b	> 30/30	250	26.5	0.01	28.5 / -28.5	1	3.5	175	SOT323-3L
ESDCAN03-2BWY	2	3a, 3b	> 30/30	250	24	0.01	26.5 / -26.5	1	3.5	175	SOT323-3L
ESDCAN04-2BWY(*)	2	3a, 3b	> 30/30	250	24	0.01	26.5 / -26.5	1	17	175	SOT323-3L
ESDCAN05-2BWY(*)	2	3a, 3b	> 30/30	250	36	0.01	37 / -37	1	3.5	175	SOT323-3L
ESDCAN06-2BWY(*)	2	3a, 3b	> 30/30	250	35	0.01	36 / -36	1	15	175	SOT323-3L

Note: (*) New products, available in Q2-2016

life.augmented



© STMicroelectronics - May 2016 - Printed in United Kingdom - All rights reserved
The STMicroelectronics corporate logo is a registered trademark
of the STMicroelectronics group of companies
All other names are the property of their respective owners

Order code: SGPROTIPAD0516

For more information on ST products and solutions, visit www.st.com