INPAQ Products for

Automotive



INPAQ

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AEC-Q200 RoHS HALOGEN HF FREE

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Specification Range.....3-4

ESD Suppressor- EGA AM Series 5-6

Multilayer Varistor- MLVS AM Series 7-8

Chip Ferrite Bead- MCB & MHC W Series..... 9-10

Application Matrix

Classifications	Product Name	Series	Page	Powertrain					Safety						
				ECU	HEV.EV	AT/CVT	EPS	Cruise Control	ESC/ABS	Air Bag	TPMS	ADAS	HID	LED Lamp	AFS
ESD Protection	Multilayer Varistor	MLVS AM series	7-8	V		V	V	V	V	V	V	V	V	V	V
Noise Suppression	Chip Ferrite Bead	MCB, MHC W series	9-10	V	V	V	V	V	V	V	V	V	V	V	V

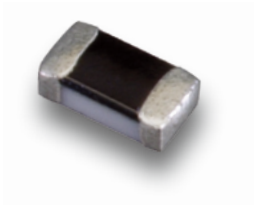
Classifications	Product Name	Series	Page	Body/Comfort						Information				
				RKE	Immo-bilizer	Power Window	Air Condi-tioner	Meter	Burglar Alarm	Navigation	Audio	ETC/DSRC	Connec-tivity	Ethernet
ESD Protection	ESD Suppressor	EGA AM series	5-6							V				
	Multilayer Varistor	MLVS AM series	7-8	V	V	V	V		V	V	V	V	V	V
Noise Suppression	Chip Ferrite Bead	MCB, MHC W series	9-10	V	V	V	V	V	V	V	V	V	V	V

Specification Range

Picture	Description	Series	Size (EIA)	Size (EIAJ)	Part Number	Rated Voltage (V_{DC})	Varistor Voltage	Clamping Voltage [1A]	Capacitance [1Kz] (pF)	Peak Current (A)
	Multilayer Varistor	MLVS	0603	1608	MLVS 0603 AM14 150	16	23 34.2	70	15 [1MHz]	5
					MLVS 0603 AM14 121	16	22 28	46	120	30
					MLVS 0603 AM14 300	17	21.6 34.4	70 [2A]	30	2
					MLVS 0603 AM14 101	18	19.8 25.2	44	100	30
					MLVS 0603 AM14 161	19	24 32	64 [2A]	160	20
					MLVS 0603 AM17 750	22	25 41	54	75 [1MHz]	30
					MLVS 0603 AM17 500	22	24.3 30.7	54	50 [1MHz]	10
					MLVS 0603 AM17 101	22	24.3 30.7	50	100	30
					MLVS 0603 AM17 161	22	24.3 30.7	50	160	30
					MLVS 0603 AM20 800	26	30 43	67	80 [1MHz]	30
					MLVS 0603 AM25 900	31	35 43.9	71	90	30
					MLVS 0603 AM25 120	32	51.9 71	124	12 [1MHz]	5
			0805	2012	MLVS 0805 AM14 401	16	22 28	46	400	120
					MLVS 0805 AM14 351	18	19.8 25.2	44	350	120
					MLVS 0805 AM17 101	22	25 34	54	100	30
					MLVS 0805 AM17 401	22	24.3 30.7	50	400	120
					MLVS 0805 AM20 221	26	29.7 37.3	56	220	80
					MLVS 0805 AM25 251	31	35.1 43.9	71	250	80
					MLVS 0805 AM30 201	38	42.3 52.7	81	200	80
			1206	3216	MLVS 1206 AM14 801	16	22 28	44	800	200
					MLVS 1206 AM14 701	16	19.8 25.2	42	700	200
					MLVS 1206 AM17 651	22	24.3 30.7	48	600	200
					MLVS 1206 AM17 841	22	24.3 29.7	50	840	100
					MLVS 1206 AM20 601	26	29.7 37.3	58	600	200
					MLVS 1206 AM25 551	31	35.1 43.9	69	550	200
					MLVS 1206 AM30 501	38	42.3 52.7	81	500	200

Picture	Description	Series	Size (EIA)	Size (EIAJ)	Impedance (Ω) @ 100MHz	Rated Current (mA)
	Chip Ferrite Bead	MCB W Series	0402	1005	120Ω 1800Ω	200 ~ 600
			0603	1608	120Ω 2500Ω	50 ~ 500
			0805	2012	120Ω 1000Ω	500 ~ 800
			1206	3216	600Ω	200
	Chip Ferrite Bead **For High Speed**	MCB W_H Series	0402	1005	75Ω	300
			0603	1608	75Ω 1000Ω	100 ~ 500
			0805	2012	120Ω 2200Ω	200
	High Current Chip Ferrite Bead	MHC W Series	0402	1005	10Ω	10
			0603	1608	30Ω 470Ω	1000 ~ 2000
			0805	2012	31Ω 330Ω	1500 ~ 4000
			1206	3216	50Ω 600Ω	1500 ~ 4000
			1806	4516	60Ω	6000

ESD Suppressor - EGA AM Series



Feature

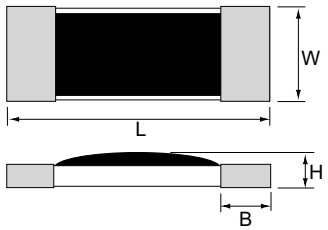
- Qualified based on AEC-Q200
- RoHS compliant
- Meet IEC61000-4-2 Level 4 standard
- Extremely quick response time (<1ns)
- Extremely low capacitance (0.2pF typical)
- Extremely low leakage current
- Bi-directional protection
- More than 1000 pulses ESD withstand capability
- Compact size for EIA 0402 and EIA0603

How to Order

EGA	1	0603	V24	AM	_	□
1	2	3	4	5		6

1. ESD GUARD Series
2. Single element
3. Chip size, EIA 0402, 0603
4. Max Rated Voltage, V_{DC}
5. "AM": Model Code (Meet AECQ-200)
6. Suffix for Special Code

Construction & Dimension



Circuit Symbol



Unit: mm

Size Code EIA (EIAJ)	0402 (1005)	0603 (1608)
L	1.00±0.10	1.60±0.10
W	0.50±0.10	0.85±0.15
H	0.34±0.10	0.51±0.05
B	0.20±0.15	0.30±0.20

Specification

Characteristic	Symbol	Unit	EGA10402			EGA10603		
			V05	V12	V24	V05	V12	V24
Rated voltage	V_{DC}	V	5	12	24	5	12	24
Leakage current	I_L	μA	0.01 typ.			0.01 typ.		
Peak voltage	Vp	V	300 typ.			300 typ.		
Trigger voltage	Vt	V	300 typ.			300 typ.		
Clamping voltage	Vc	V	30 typ.			30 typ.		
Capacitance, @1MHz	Cp	pF	0,2 typ.			0,2 typ.		
Response time		ns	<1			<1		
ESD voltage capability,		Pulses	1000 typ.			1000 typ.		
Contact discharge mode		KV	8			8		
ESD voltage capability, Air discharge mode		KV	15			15		

Vp –The peak voltage value shall be measured under the following conditions. ESD test conditions : IEC61000-4-2, 8 KV contact discharge
Vt – measurement by using Transmission Line Pulse (TLP)
Vc –measurement by using Transmission Line Pulse (TLP)
Cp – Device capacitance measured with 1Vrms

General Technical Data

Operating Temperature: -55°C ~ +125°C
Storage Temperature: -55°C ~ +125°C
Storage Condition: 5 to 40°C and 65% Max. RH
Storage Time: 12 months max

Package

Size EIA (EIAJ)	0402 (1005)	0603 (1608)
Standard Packing Quantity (pcs/reel)	10,000	5,000

Multilayer Varistor - MLVS AM Series



Feature

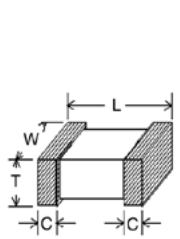
- Qualified based on AEC-Q200
- RoHS compliant
- Meet IEC 61000-4-2 standard
- SMD type zinc oxide based ceramic chip
- Insulator over coat keeps excellent low and stable leakage current
- Quick response time (<0.5ns)
- High transient current capability
- High reliability
- Compact size for EIA0603/0805/1206

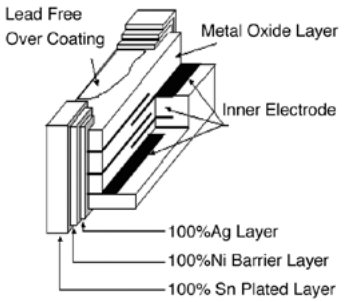
How to Order

MLV	S	0603	AM	14	150
1	2	3	4	5	6

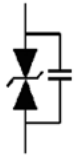
1. Series Type: MLV-Multilayer Varistor
2. Type: S=Single, A=Array
3. Chip size(EIA): 0603, 0805, 1206
4. AM: Automotive Series
5. Max. AC Voltage
6. Typical Capacitance: Value—XX x 10^N,
   ex: 15pF=15x10^0 →150

Construction & Dimension





Circuit Symbol



Unit: mm

Size Code EIA (EIAJ)	0603 (1608)	0805 (2012)	1206 (3216)
L	1.60±0.15	2.0±0.20	3.20±0.3
W	0.80±0.1	1.25±0.15	1.60±0.2
T	0.80±0.1	0.9±0.10	1.7 max.
C	0.30±0.20	0.5±0.25	0.50±0.25

Specification

	Working Voltage		Varistor Voltage	Clamping Voltage	Capacitance	Peak Current	Transient Energy
Symbol	V_{RMS}	V_{DC}	V_V	Vc	Cp	i_{max}	W_{max}
Units	Volts (Max.)	Volts (Max.)	Volts	Volts (Max.)	pF (Typ.)	Amps (Max.)	Joules (Max.)
Test Condition		< 10 mA	1mA DC	1A 8/20ms	1KHz	8/20ms	10/1000ms
MLVS0603AM14150	14	16	23~34.2	70	15 [1MHz]	5	0.03
MLVS0603AM14121	14	16	22~28	46	120	30	0.2
MLVS0603AM14300	14	17	21.6~34.4	70 [2A]	30	2	0.05
MLVS0603AM14101	14	18	19.8~25.2	44	100	30	0.2
MLVS0603AM14161	14	19	24~32	64 [2A]	160	20	0.1
MLVS0603AM17750	17	22	25~41	54	75[1MHz]	30	0.075
MLVS0603AM17500	17	22	24.3~30.7	54	50 [1MHz]	10	0.1
MLVS0603AM17101	17	22	24.3~30.7	50	100	30	0.2
MLVS0603AM17161	17	22	24.3~30.7	50	160	30	0.2
MLVS0603AM20800	20	26	30~43	67	80 [1MHz]	30	0.1
MLVS0603AM25900	25	31	35~43.9	71	90	30	0.2
MLVS0603AM25120	25	32	51.9~71	124	12 [1MHz]	5	--
MLVS0805AM14401	14	16	22~28	46	400	120	0.3
MLVS0805AM14351	14	18	19.8~25.2	44	350	120	0.3
MLVS0805AM17101	17	22	25~34	54	100	30	0.1
MLVS0805AM17401	17	22	24.3~30.7	50	400	120	0.3
MLVS0805AM20221	20	26	29.7~37.3	56	220	80	0.4
MLVS0805AM25251	25	31	35.1~43.9	71	250	80	0.3
MLVS0805AM30201	30	38	42.3~52.7	81	200	80	0.3
MLVS1206AM14801	14	16	22~28	44	800	200	0.6
MLVS1206AM14701	14	16	19.8~25.2	42	700	200	0.5
MLVS1206AM17651	17	22	24.3~30.7	48	650	200	0.3
MLVS1206AM17841	17	22	24.3~29.7	50	840	100	0.4
MLVS1206AM20601	20	26	29.7~37.3	58	600	200	0.7
MLVS1206AM25551	25	31	35.1~43.9	69	550	200	1
MLVS1206AM30501	30	38	42.3~52.7	81	500	200	1.1
MLVS1206AM40181	40	56	63~77	110	180	200	1.0

V_{RMS} – Maximum AC operating voltage the varistor can maintain and not exceed 10μA leakage current
V_{DC} – Maximum DC operating voltage the varistor can maintain and not exceed 10μA leakage current
V_V – Voltage across the device measured at 1mA DC current.
EquiValent to Vb, "Breakdown Voltage".

Vc – Maximum peak voltage across the varistor measured at 8/20us waveform and 1A pulse current
Cp – Device capacitance measured with zero volt bias 1Vrms.
i_{max} – Maximum peak current which may be applied with 8/20us waveform without device failure
W_{max} – Maximum energy that may be dissipated with the 10/1000us waveform without device failure

General Technical Data

Operating Temperature: -55°C ~ +125°C
Storage Temperature (on board) : -55… +150°C
Storage Condition: 5 to 40°C and 65% Max. RH
Storage Time: 12 months max

Package

Size EIA (EIAJ)	0603 (1608)	0805 (2012)	1206 (3216)
Standard Packing Quantity (pcs/reel)	4,000		

Chip Ferrite Bead - MCB & MHC W Series



Feature

- Monolithic inorganic material construction
- Closed magnetic circuit avoids crosstalk
- SMD Type & suitable for reflow and wave soldering
- Available in various sizes
- Excellent solderability and heat resistance
- High reliability
- Effectively filtering capability over a wide range of frequency

How to Order

MCB	1608	W	12	1	H	B	P	—
1	2	3	4	5	6	7	8	9

1 Series Name

2 Size Code: the first two digitals : length (mm), the last two digitals : width (mm)

3 W : for Automotive

4 Impedance(Ω) ± 25%

5 Fixed Decimal Point

ex. : 121=120Ω

6 Rated Current Code

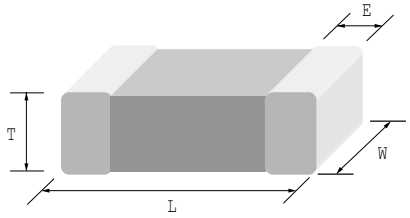
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H=500mA	I=600mA	J=700mA	K=800mA	L=1000mA	M=1500mA	N=2000mA
P=2500mA	Q=3000mA	R=4000mA	U=5000mA	W=6000mA		

7 Soldering: Green Parts: B—Lead-Free for whole chip

8 Packaging: P— Embossed paper tape, 7" reel.
E—Embossed plastic tape, 7" reel.

9 Material Code

Construction & Dimension



Unit: mm

Size Code EIAJ (EIA)	1005 (0402)	1608 (0603)	2012 (0805)	3216 (1206)	4516 (1806)
L	1.00±0.10	1.60±0.15	2.00±0.20	3.20±0.20	4.50±0.25
W	0.50±0.10	0.80±0.15	1.25±0.20	1.60±0.20	1.60±0.20
T	0.50±0.10	0.80±0.15	0.90±0.20	1.10±0.20	1.60±0.20
E	0.25±0.10	0.30±0.20	0.50±0.30	0.50±030	0.60±0.40

Specification

■ Chip Ferrite Bead

Part No.	Impedance(Ω) +/-25%	Test Freq. (MHz)	DCR(Ω) (Max.)	Rated Current (mA)
MCB1005 Series				
MCB1005W121HBP	120	100	0.25	500
MCB1005W241FBP	240	100	0.35	300
MCB1005W601EBPB	600	100	0.65	200
MCB1005W102EBP	1000	100	1.00	200
MCB1005W102EBPB	1000	100	0.90	200
MCB1005W182EBPB	1800	100	1.40	200
MCB1608 Series				
MCB1608W121HBP	120	100	0.18	500
MCB1608W221HBP	220	100	0.25	500
MCB1608W471HBP	470	100	0.35	500
MCB1608W601HBP	600	100	0.38	500
MCB1608W102GBP	1000	100	0.50	400
MCB1608W182ABP	1800	100	1.50	50
MCB1608W222ABP	2200	100	1.50	50
MCB1608W252ABP	2500	100	1.50	50
MCB2012 Series				
MCB2012W121EBP	120	100	0.15	200
MCB2012W151EBP	150	100	0.15	200
MCB2012W221EBP	220	100	0.20	200
MCB2012W601EBP	600	100	0.30	200
MCB2012W102EBP	1000	100	0.45	200
MCB3216 Series				
MCB3216W601EBE	600	100	0.90	200

■ Chip Ferrite Bead For High Speed

Part No.	Impedance(Ω) +/-25%	Test Freq. (MHz)	DCR(Ω) (Max.)	Rated Current (mA)
MCB1005 Series				
MCB1005W750FBPH	75	100	0.40	300
MCB1608 Series				
MCB1608W750HBPH	75	100	0.30	500
MCB1608 Series				
MCB1608W121EBPH	120	100	0.40	200
MCB1608W241EBPH	240	100	0.45	200
MCB1608W601EBPH	600	100	0.65	200
MCB1608W102CBPH	1000	100	0.85	100
MCB2012 Series				
MCB2012W121EBPH	120	100	0.25	200
MCB2012W151EBPH	150	100	0.25	200
MCB2012W221EBPH	220	100	0.25	200
MCB2012W601EBPH	600	100	0.35	200
MCB2012W222EBPH	2200	100	0.60	200

■ High Current Chip Ferrite Bead

Part No.	Impedance(Ω) +/-25%	Test Freq. (MHz)	DCR(Ω) (Max.)	Rated Current (mA)
MHC1005 Series				
MHC1005W100LBP	10	100	0.05	1000
MHC1608 Series				
MHC1608W300LBP	30	100	0.05	1000
MHC1608W600LBP	60	100	0.10	1000
MHC1608W121NBP	120	100	0.05	2000
MHC1608W181MBP	180	100	0.09	1500
MHC1608W221MBP	220	100	0.10	1500
MHC1608W301MBP	300	100	0.15	1500
MHC1608W471LBP	470	100	0.20	1000
MHC2012 Series				
MHC2012W310QBP	31	100	0.015	3000
MHC2012W600QBP	60	100	0.026	3000
MHC2012W221NBP	220	100	0.050	2000
MHC2012W331MBP	330	100	0.090	1500
MHC3216 Series				
MHC3216W500QBE	50	100	0.025	3000
MHC3216W121QBE	120	100	0.025	3000
MCB3216 Series				
MHC3216W601MBE	600	100	0.090	1500
MHC4516 Series				
MHC4516W600WBE	60	100	0.010	6000

General Technical Data

Operating temperature range : - 55°C ~ +125°C
Storage temperature range : - 20°C ~ +60°C
Storage Condition : Less than 40°C and 70% RH
Storage Time: 6 months (Size:1005)
12 months (Size:1608 above)

Package

Size EIAJ (EIA)	1005 (0402)	1608 (0603)	2012 (0805)	3216 (1206)	4516 (1806)
Standard Packing Quantity (pcs/reel)	10,000	4,000	4,000	3,000	2,000