CM1423

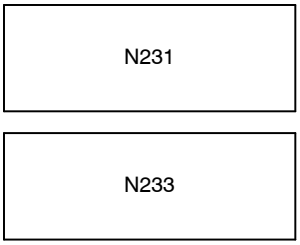
Secure Digital (SD) Card EMI Filter Array with ESD Protection

ON Semiconductor®

http://onsemi.com

WLCSP20
CP SUFFIX
CASE 567BZ

MARKING DIAGRAM



N231 = CM1423−01CP
N233 = CM1423−03CP

ORDERING INFORMATION

Device	Package	Shipping†
CM1423−01CP	CSP−20 (Pb−Free)	3500/Tape & Reel
CM1423−03CP	CSP−20 (Pb−Free)	3500/Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

Product Description

The CM1423 is an EMI filter array with ESD protection, which integrates six Pi− filters (C−R−C) and four channels of ESD protection. The CM1423's filters have component values of 12 pF − 100 Ω − 12 pF. The part includes ESD protection diodes on every pin, which provide a very high level of protection for sensitive electronic components that may be subjected to electrostatic discharge (ESD). All the ESD diodes safely dissipate ESD strikes of ±15 kV, beyond the maximum requirement of the IEC 61000−4−2 international standard. Using the MIL−STD−883 (Method 3015) specification for Human Body Model (HBM) ESD, the pins are protected for contact discharges at greater than ±30 kV.

This device is particularly well−suited for portable electronics (e.g. mobile handsets, PDAs, notebook computers) because of its small package and easy−to−use pin assignments. In particular, the CM1423 is ideal for EMI filtering and protecting data lines from ESD for the Secure Digital (SD) Card interface slot in mobile handsets. The CM1423 is an all−inclusive solution for the SD card interface since its EMI filters provide the proper cut−off frequency to attenuate unwanted signals.

The CM1423 is manufactured in a space−saving, low−profile, chip−scale package, and is optionally available with *OptiGuard*™ coating for improved reliability. It is available with RoHS compliant lead−free finishing.

Features

- Provides EMI Filtering and ESD Protection for an SD Port on a Mobile Device
- Six Channels of EMI Filtering with ESD Protection
- Four Channels of ESD Protection
- ±15 kV ESD Protection on All I/O Pins (IEC 61000−4−2, Contact Discharge)
- ±30 kV ESD Protection (HBM)
- Better than 25 dB of Attenuation at 1 GHz for 12 pF − 100 Ω − 12 pF Filter Configuration
- Integrates 34 Components Into Mall form Factor CSP Solution
- 20−Bump, 4.000 mm X 1.458 mm Footprint Chip Scale Package
- Chip Scale Package Features Extremely Low Lead Inductance for Optimum Filter and ESD Performance
- Available with *OptiGuard*™ Coating for Improved Reliability at Assembly
- These Devices are Pb−Free and are RoHS Compliant

Applications

- Secure Digital (SD) Card Data Lines in Mobile Handsets
- SD Card Interface Protection for Other Mobile Electronics such as MP3 Players, PDAs and Digital Cameras
- I/O Port Protection for Mobile Handsets, Notebook Computers, PDAs, etc.
- EMI Filtering for Data Ports in Cell Phones, PDAs or Notebook Computers

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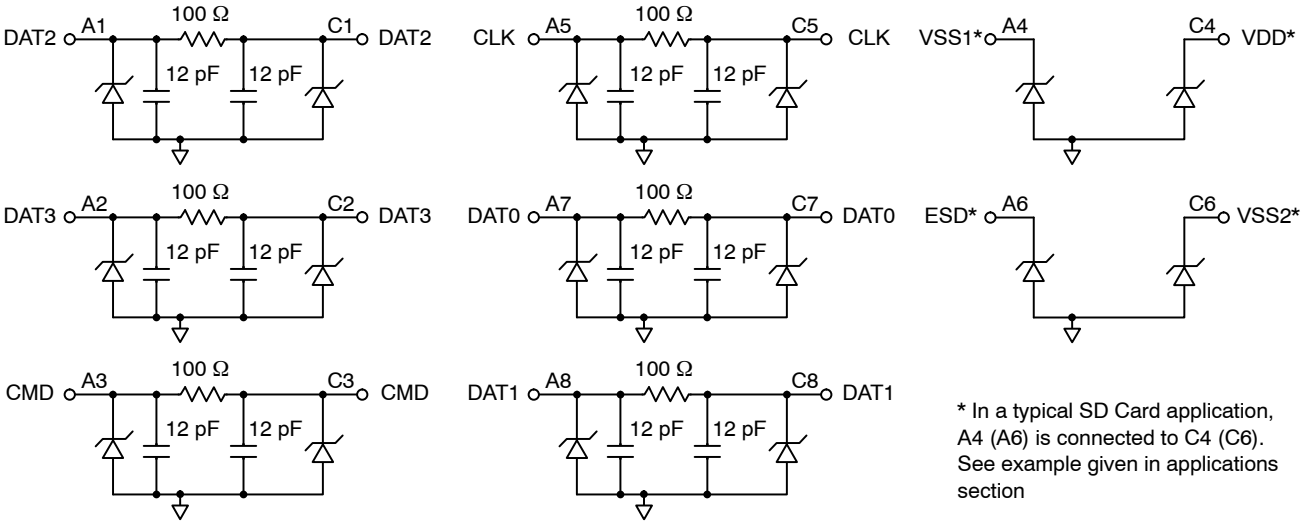
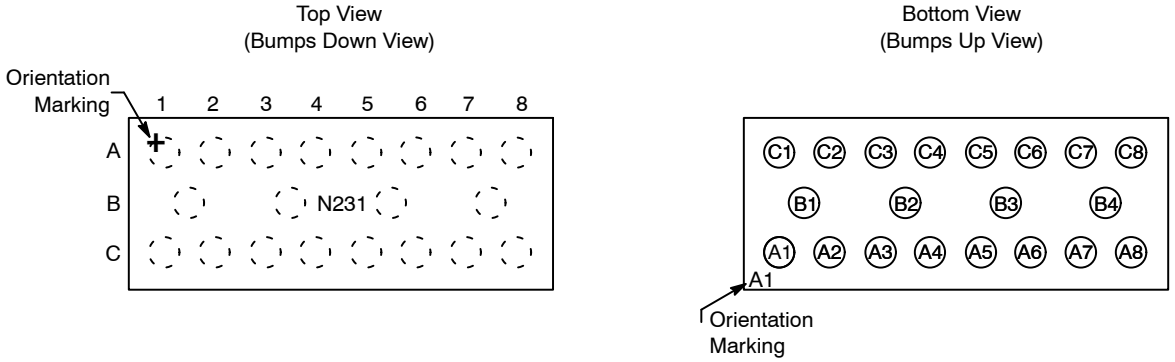
BLOCK DIAGRAM

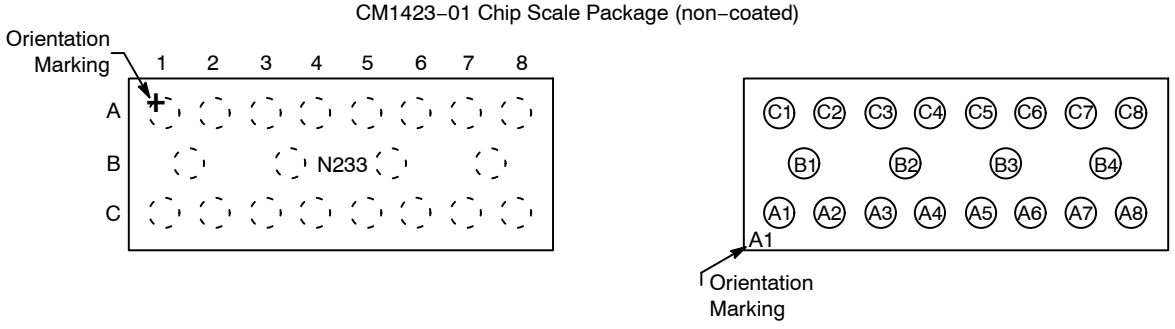


* In a typical SD Card application, A4 (A6) is connected to C4 (C6). See example given in applications section

PACKAGE / PINOUT DIAGRAMS



CM1423−01 Chip Scale Package (non−coated)



CM1423−03 Chip Scale Package (*OptiGuard*™ coated)

Table 1. PIN DESCRIPTIONS

Pin(s)	Name	Description	Pin(s)	Name	Description
A1	DAT2	DATA2 Filter + ESD Channel, System Side	C1	DAT2	DATA2 Filter + ESD Channel, SD Card Side
A2	DAT3	DATA3 Filter + ESD Channel, System Side	C2	DAT3	DATA3 Filter + ESD Channel, SD Card Side
A3	CMD	CMD Signal Filter + ESD Channel, System Side	C3	CMD	CMD Signal Filter + ESD Channel, SD Card Side
A4	VSS1	ESD − only Channel, Supply Voltage Ground	C4	VDD	ESD − only Channel, Supply Voltage
A5	CLK	Clock Filter + ESD Channel	C5	CLK	Clock Filter + ESD Channel
A6	ESD	ESD − only Channel	C6	VSS2	ESD − only Channel, Supply Voltage Ground
A7	DAT0	DATA0 Filter + ESD Channel, System Side	C7	DAT0	DATA0 Filter + ESD Channel, SD Card Side
A8	DAT1	DATA1 Filter + ESD Channel, System Side	C8	DAT1	DATA1 Filter + ESD Channel, SD Card Side
B1−B4	GND	Device Ground			

SPECIFICATIONS

Table 2. ABSOLUTE MAXIMUM RATINGS

Parameter	Rating	Units
Storage Temperature Range	−65 to +150	°C
DC Power per Resistor	100	mW
DC Package Power Rating	500	mW

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Table 3. STANDARD OPERATING CONDITIONS

Parameter	Rating	Units
Operating Temperature Range	−40 to +85	°C

Table 4. ELECTRICAL OPERATING CHARACTERISTICS (Note 1)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
R	Resistance		80	100	120	Ω
C	Capacitance	At 2.5 V DC, 1 MHz, 30 mV AC	9	12	15	pF
V_{DIODE}	Diode Stand−off Voltage	I_{DIODE} = 10 μA		6.0		V
I_{LEAK}	Diode Leakage Current (Reverse Bias)	V_{DIODE} = 3.3 V		100	300	nA
V_{SIG}	Signal Voltage Positive Clamp Negative Clamp	 I_{LOAD} = 10 mA I_{LOAD} = −10 mA	 5.6 −1.5	 6.8 −0.8	 9.0 −0.4	V
V_{ESD}	In−system ESD Withstand Voltage a) Human Body Model, MIL−STD−883, Method 3015 b) Contact Discharge per IEC 61000−4−2 Level 4	(Note 2)	 ±30 ±15			kV
R_{DYN}	Dynamic Resistance Positive Negative			 1.6 0.4		Ω
f_C	Cut−off Frequency, Z_{SOURCE} = 50 Ω, Z_{LOAD} = 50 Ω	R = 100 Ω, C = 12 pF		145		MHz

1. T_A = 25°C unless otherwise specified.
2. ESD applied to input and output pins with respect to GND, one at a time.

PERFORMANCE INFORMATION

Typical Filter Performance (nominal conditions unless specified otherwise, 50 Ω Environment)

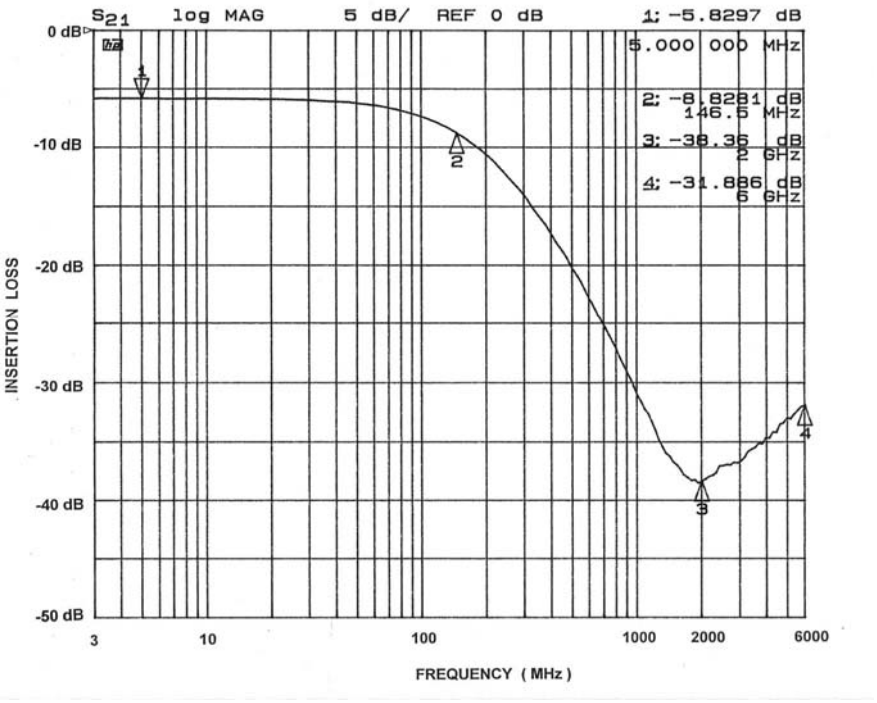


Figure 1. A1−C1 EMI Filter Performance

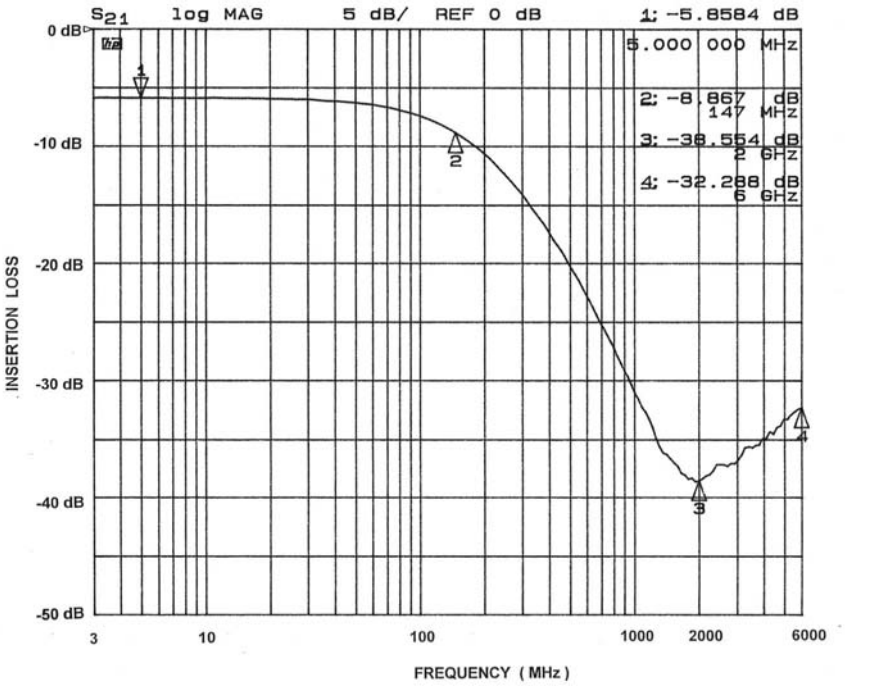


Figure 2. A2−C2 EMI Filter Performance

PERFORMANCE INFORMATION (Cont'd)

Typical Filter Performance (nominal conditions unless specified otherwise, 50 Ω Environment)

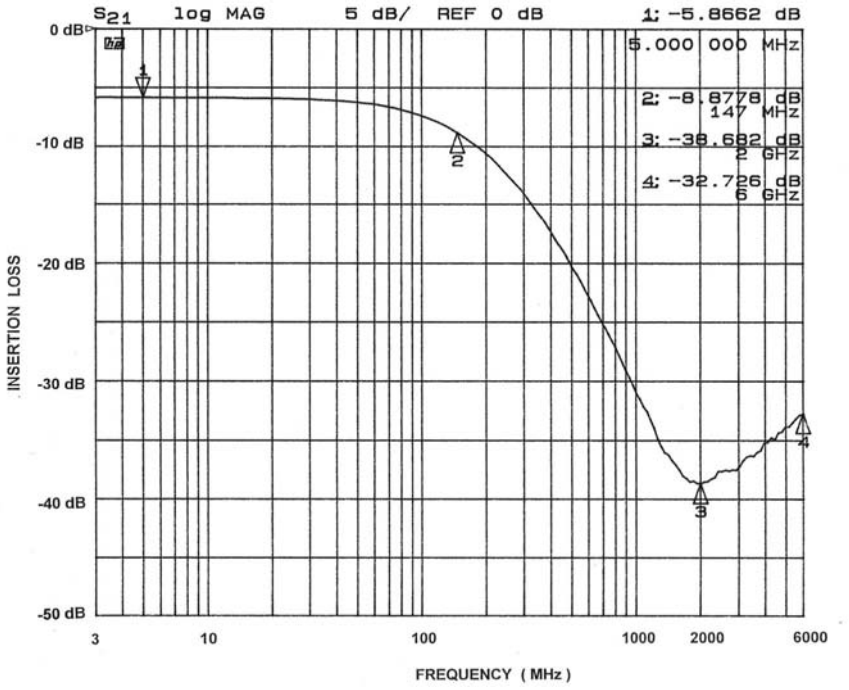


Figure 3. A3−C3 EMI Filter Performance

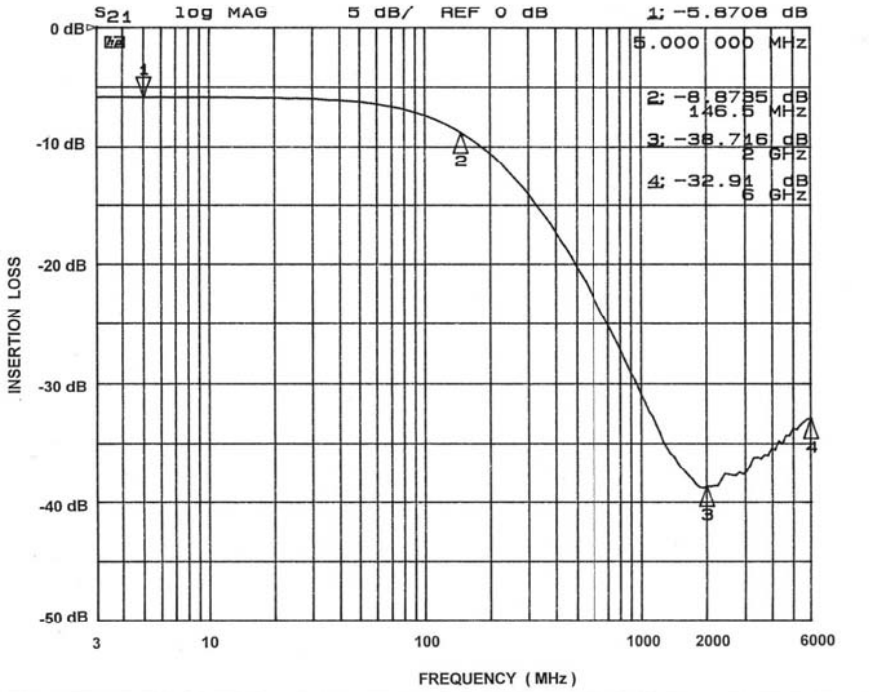


Figure 4. A5−C5 EMI Filter Performance

PERFORMANCE INFORMATION (Cont'd)

Typical Filter Performance (nominal conditions unless specified otherwise, 50 Ω Environment)

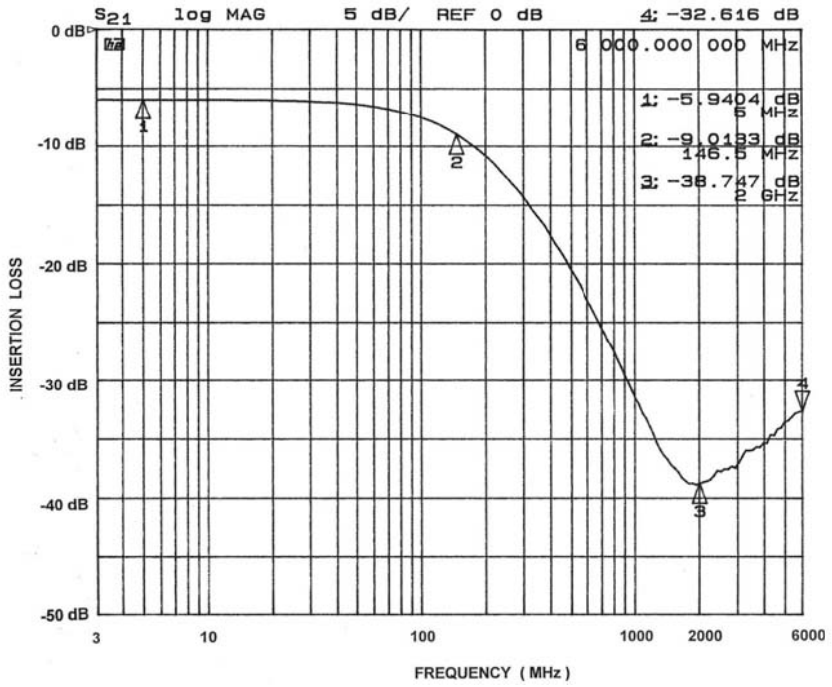


Figure 5. A7−C7 EMI Filter Performance

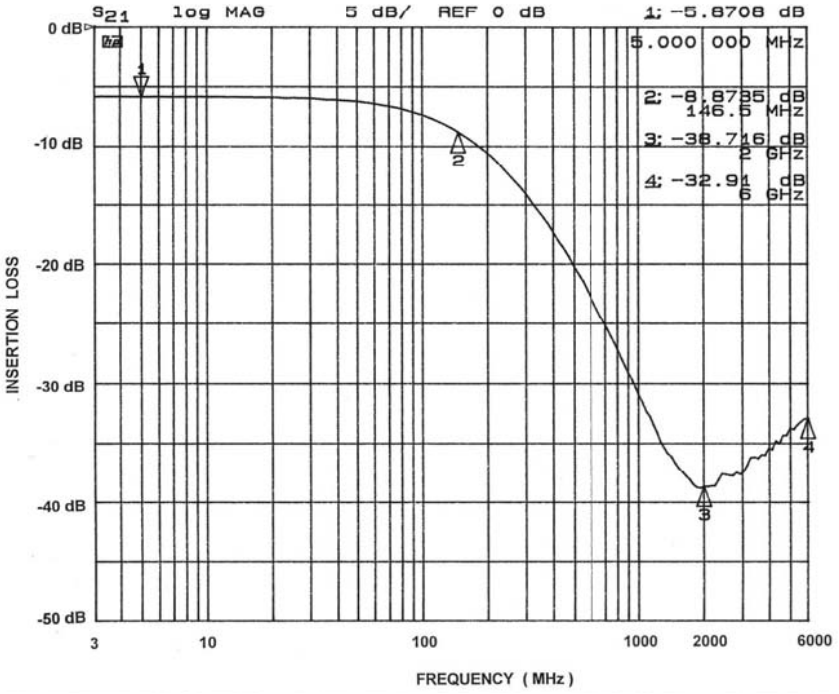


Figure 6. A8−C8 EMI Filter Performance

PERFORMANCE INFORMATION (Cont'd)

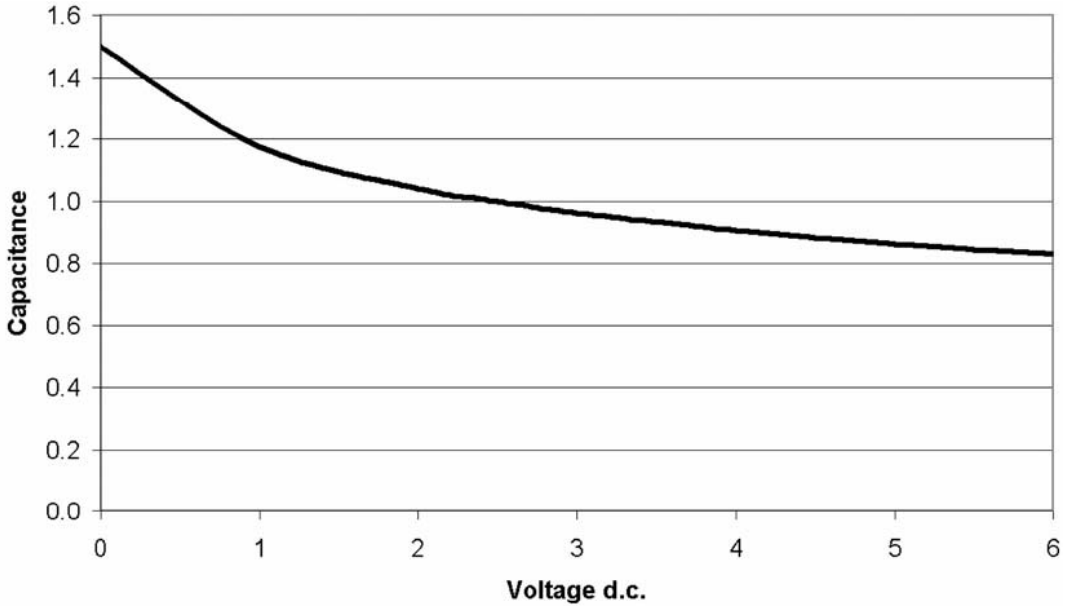
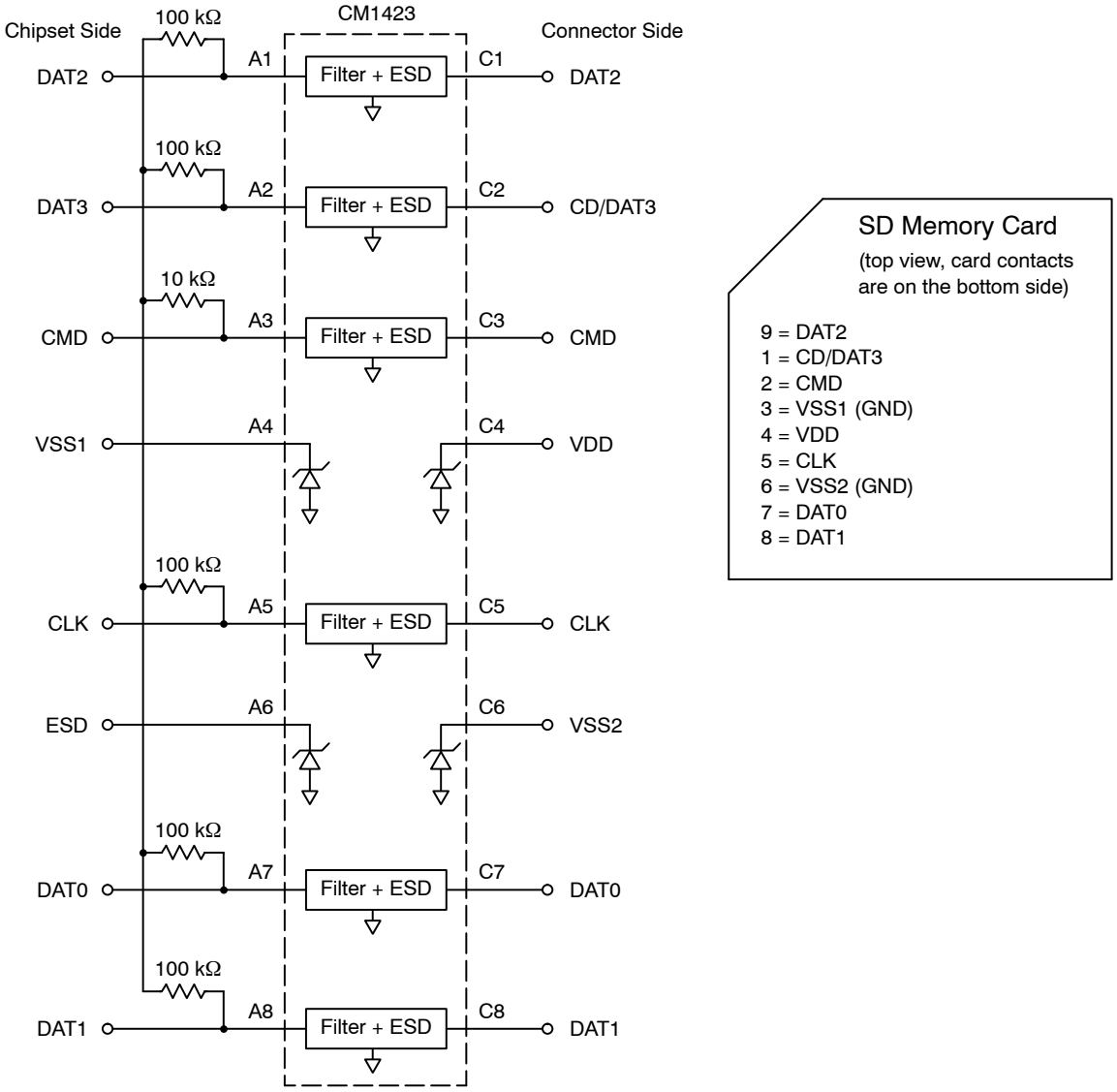


Figure 7. Filter Capacitance vs. Input Voltage over Temperature (normalized to capacitance at 2.5 V DC and 25°C)

APPLICATION INFORMATION



Note: 100 kΩ and 10 kΩ pull−up resistors are not included in CM1423. Designer will need to determine the appropriate pull−up resistor value for each design.

Figure 8. Typical SD Card Application

APPLICATION INFORMATION (Cont'd)

Parameter	Value
Pad Size on PCB	0.240 mm
Pad Shape	Round
Pad Definition	Non−Solder Mask defined pads
Solder Mask Opening	0.290 mm Round
Solder Stencil Thickness	0.125 mm − 0.150 mm
Solder Stencil Aperture Opening (laser cut, 5% tapered walls)	0.300 mm Round
Solder Flux Ratio	50/50 by volume
Solder Paste Type	No Clean
Pad Protective Finish	OSP (Entek Cu Plus 106A)
Tolerance − Edge To Corner Ball	±50 μm
Solder Ball Side Coplanarity	±20 μm
Maximum Dwell Time Above Liquidous	60 seconds
Maximum Soldering Temperature for Lead−free Devices using a Lead−free Solder Paste	260°C

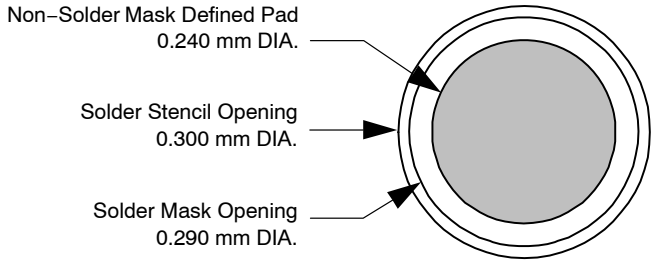


Figure 9. Recommended Non−Solder Mask Defined Pad Illustration

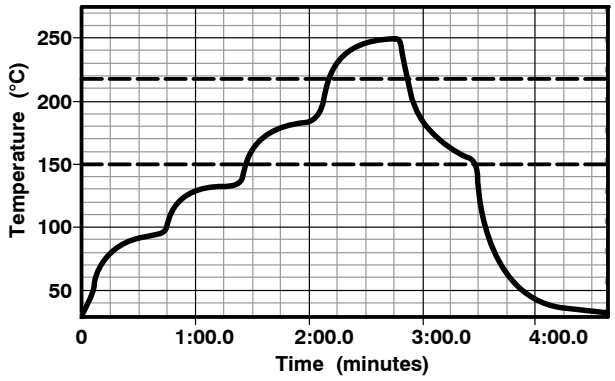


Figure 10. Lead−free (SnAgCu) Solder Ball Reflow Profile

OptiGuard is a trademark of Semiconductor Components Industries, LLC (SCILLC).

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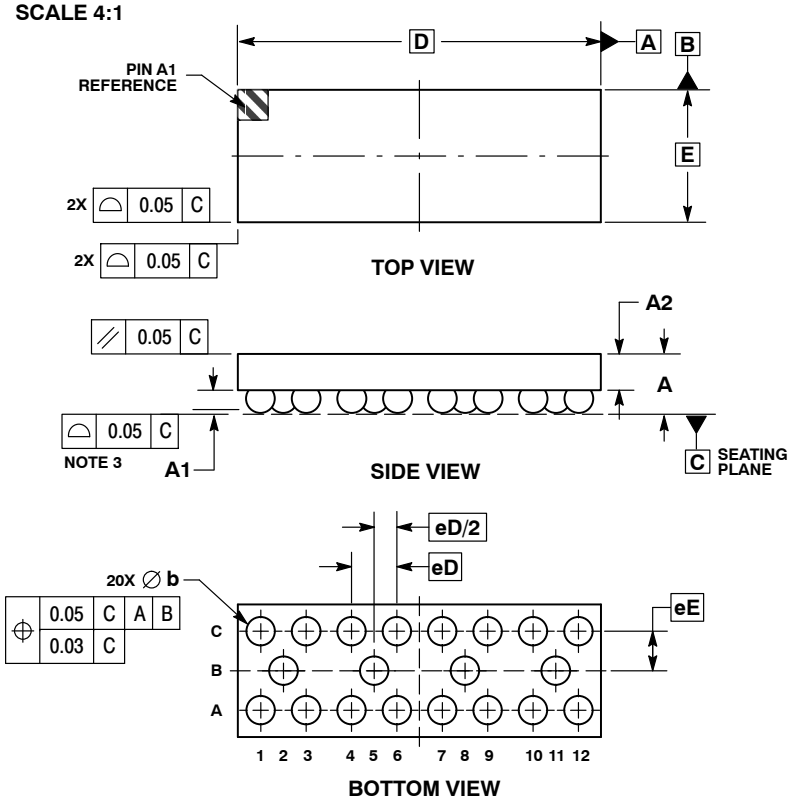
DATE 26 JUL 2010

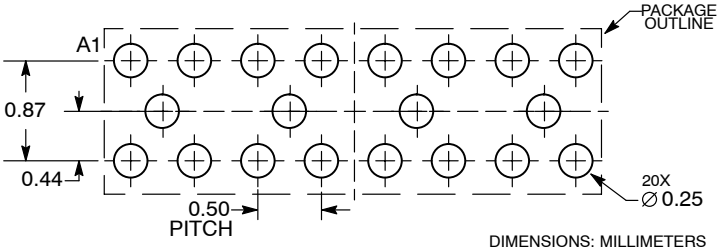
SCALE 4:1



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. COPLANARITY APPLIES TO SPHERICAL CROWNS OF SOLDER BALLS.

	MILLIMETERS	
DIM	MIN	MAX
A	0.56	0.65
A1	0.21	0.27
A2	0.40 REF	
b	0.29	0.35
D	4.00 BSC	
E	1.46 BSC	
eD	0.50 BSC	
eE	0.435 BSC	

RECOMMENDED
SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

*For additional information on our Pb−Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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