CM1457

Praetorian III® 4-, 6-, 8-Channel EMI Filter Array with ESD Protection

Description

The CM1457 is an inductor-based (L-C) EMI filter array with ESD protection, which integrates four, six, or eight filters in a CSP form factor with 0.40 mm pitch. Each EMI filter channel of the CM1457 is implemented with the component value of 6 pF − 35 nH − 4.7 pF − 35 nH − 1.8 pF. The cut-off frequency at −3 dB attenuation is 300 MHz and can be used in applications where the data rates are as high as 160 Mbps, while providing greater than −35 dB attenuation over the 800 MHz to 2.7 GHz frequency range. The parts include ESD diodes on every I/O pin and provide a high level of protection against electrostatic discharge (ESD). The ESD protection diodes connected to the external filter ports are designed and characterized to safely dissipate ESD strikes of ±15 kV, which is beyond the maximum requirement of the IEC61000−4−2 international standard.

This device is particularly well suited for wireless handsets, mobile LCD modules and PDAs because of its small package format and easy-to-use pin assignments. In particular, the CM1457 is ideal for EMI filtering and protecting data and control lines for the LCD display and camera interface in mobile handsets.

The CM1457 incorporates *OptiGuard*™ which results in improved reliability at assembly. It is manufactured with a 0.40 mm pitch and 0.25 mm CSP solder ball to provide up to 28% board space savings vs. competing CSP devices with 0.50 mm pitch and 0.30 mm CSP solder ball.

Features

- Four, Six or Eight Channels of EMI Filtering
- ±15 kV ESD Protection (IEC 61000−4−2, Contact Discharge) at External Pins
- Greater than −40 dB of Attenuation at 1 GHz MIL−STD−883 International ESD Standard
- Chip Scale Package (CSP) with 0.40 mm Pitch and 0.25 mm CSP Solder Ball which Features Extremely Low Parasitic Inductance for Optimum Filter and ESD Performance
- *OptiGuard*™ Coating for Improved Reliability at Assembly
- These Devices are Pb−Free and are RoHS Compliant

Applications

- LCD and Camera Data Lines in Mobile Handsets
- I/O Port Protection for Mobile Handsets, Notebook Computers, PDAs, etc.
- EMI Filtering for Data Ports in Cell Phones, PDAs or Notebook Computers
- Wireless Handsets
- Handheld PCs/PDAs
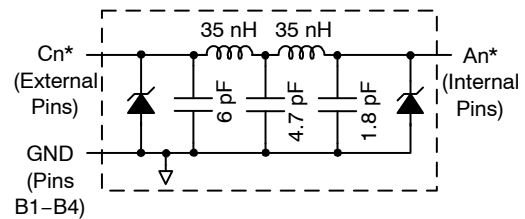- LCD and Camera Modules

ON Semiconductor®

http://onsemi.com

WLCSP10
CP SUFFIX
CASE 567BJ

WLCSP15
CP SUFFIX
CASE 567BR

WLCSP20
CP SUFFIX
CASE 567BV

BLOCK DIAGRAM

Cn* (External Pins) — 35 nH — 35 nH — An* (Internal Pins)
6 pF | 4.7 pF | 1.8 pF
GND (Pins B1−B4)

MARKING DIAGRAM

| N57 w | N57 yww | N57 yyww |
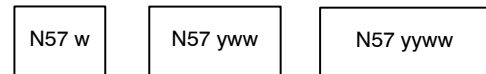
CM1457−04
10−Bump CSP

CM1457−06
15−Bump CSP

CM1457−08
20−Bump CSP

N57	= CM1457−04CP
N57	= CM1457−06CP
N57	= CM1457−08CP
w/yww/yyww	= date code

ORDERING INFORMATION

Device	Package	Shipping†
CM1457−04CP	CSP−10 (Pb−Free)	3500/Tape & Reel
CM1457−06CP	CSP−15 (Pb−Free)	3500/Tape & Reel
CM1457−08CP	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.
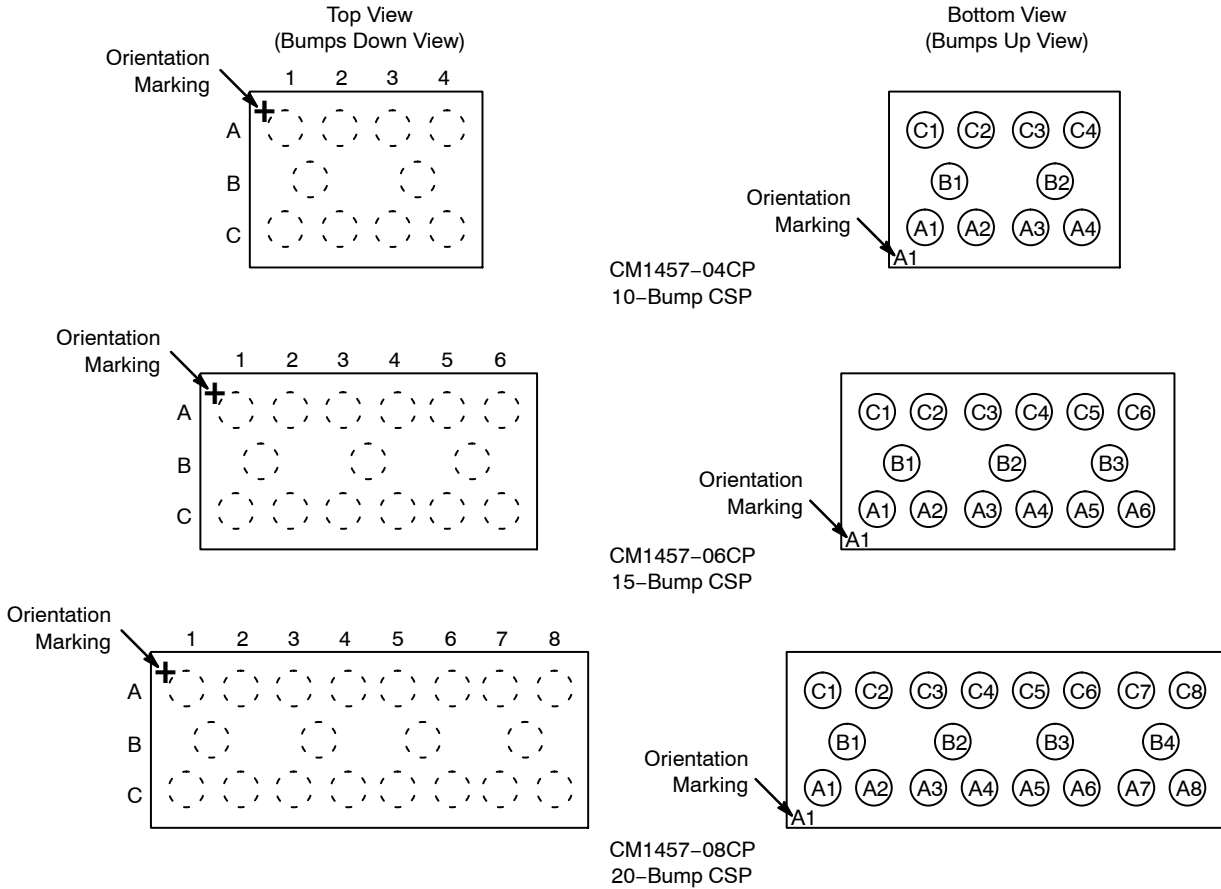
CM1457

PACKAGE / PINOUT DIAGRAMS

Top View
(Bumps Down View)

Orientation Marking

Bottom View
(Bumps Up View)

Orientation Marking

CM1457−04CP
10−Bump CSP

Orientation Marking

Orientation Marking

CM1457−06CP
15−Bump CSP

Orientation Marking

Orientation Marking

CM1457−08CP
20−Bump CSP

Table 1. PIN DESCRIPTIONS

Pin Number			Pin Description	Pin Number			Pin Description
−04	−06	−08		−04	−06	−08	
A1	A1	A1	Filter #1 (Internal)	C1	C1	C1	Filter #1 (External)
A2	A2	A2	Filter #2 (Internal)	C2	C2	C2	Filter #2 (External)
A3	A3	A3	Filter #3 (Internal)	C3	C3	C3	Filter #3 (External)
A4	A4	A4	Filter #4 (Internal)	C4	C4	C4	Filter #4 (External)
–	A5	A5	Filter #5 (Internal)	–	C5	C5	Filter #5 (External)
–	A6	A6	Filter #6 (Internal)	–	C6	C6	Filter #6 (External)
–	–	A7	Filter #7 (Internal)	–	–	C7	Filter #7 (External)
–	–	A8	Filter #8 (Internal)	–	–	C8	Filter #8 (External)
B1, B2	B1−B3	B1−B4	GND				

CM1457

SPECIFICATIONS

Table 2. ABSOLUTE MAXIMUM RATINGS

Parameter	Rating	Units
Storage Temperature Range	−65 to +150	°C
DC current per Inductor	15	mA
DC Package Power Rating	0.5	W

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
L_{TOT}	Total Channel Inductance			70		nH
R_{TOT}	Total Channel DC Resistance			45		Ω
C_{TOT_0V}	Total Channel Capacitance, 0 V bias	0 V dc; 1 MHz, 30 mV rms		20	24	pF
$C_{TOT\_2.5V}$	Total Channel Capacitance, 2.5 V bias	2.5 V dc; 1 MHz, 30 mV rms		12.5		pF
V_{ST}	Stand−off Voltage	I = 10 μA	5.5			V
I_{LEAK}	Diode Leakage Current	V_{IN} = +3.3 V		0.1	0.5	μA

V_{SIG}	Signal Clamp 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) Contact Discharge per IEC 61000−4−2 standard, Level 4 **(External Pins)**
	  b) Contact Discharge per IEC 61000−4−2 standard, Level 4 **(Internal Pins)**
		(Notes 2 and 3)	±15
			
			±2
						kV

f_C	Cut−off Frequency Z_{SOURCE} = 50 Ω, Z_{LOAD} = 50 Ω			300		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.
3. Unused pins are left open.

APPLICATION INFORMATION

Refer to Application Note "The Chip Scale Package", for a detailed description of Chip Scale Packages offered by ON Semiconductor.
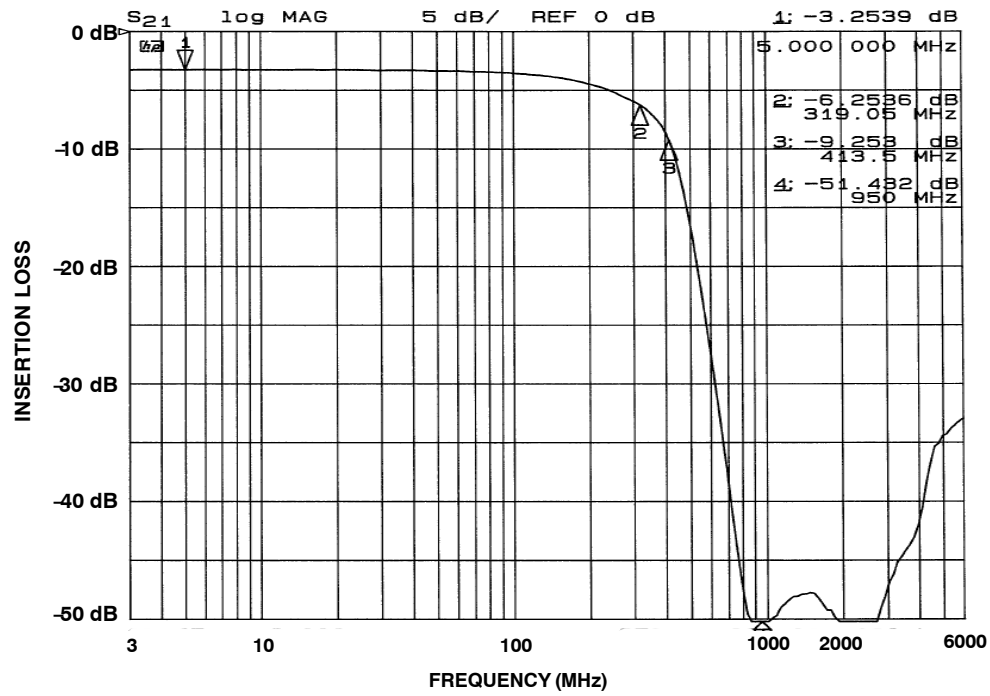
CM1457

PERFORMANCE INFORMATION

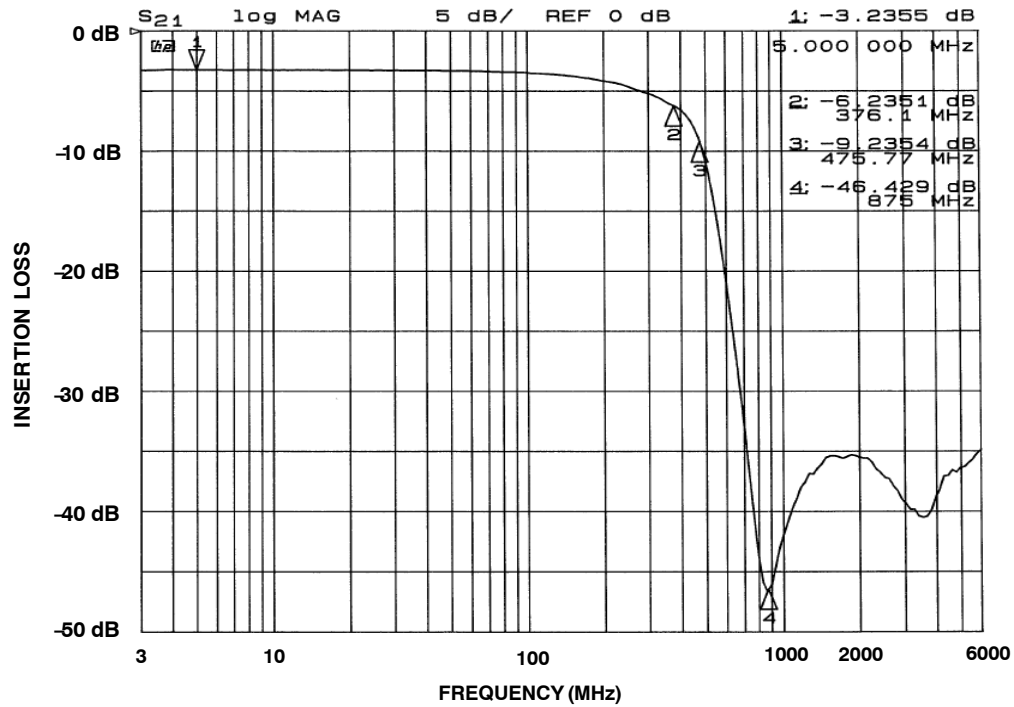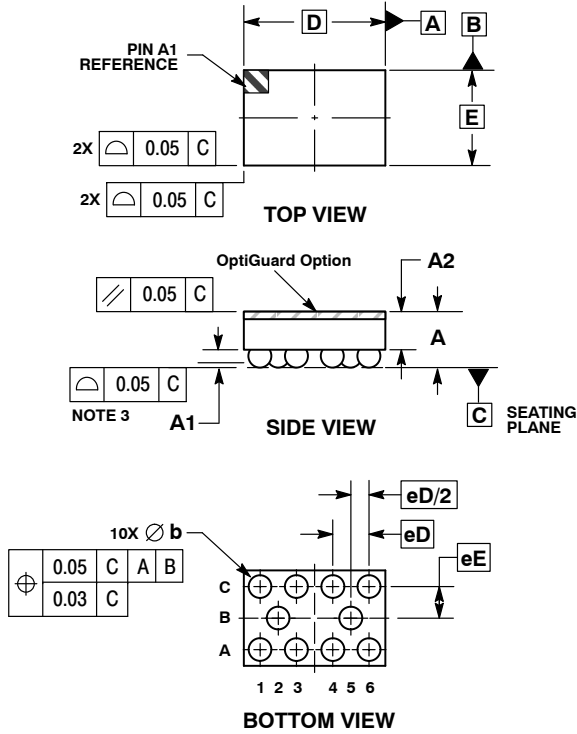Figure 1. Insertion Loss vs. Frequency (0 V Bias)

Figure 2. Insertion Loss vs. Frequency (2.5 V Bias)

CM1457

PACKAGE DIMENSIONS
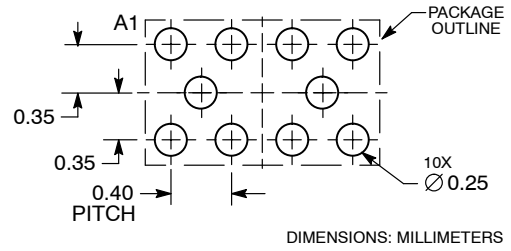
WLCSP10, 1.67x1.05
CASE 567BJ−01
ISSUE O

TOP VIEW

PIN A1
REFERENCE

2X ⌒ 0.05 C

2X ⌒ 0.05 C

D → A B

E

SIDE VIEW

OptiGuard Option

A2

⫽ 0.05 C

A

⌒ 0.05 C

NOTE 3   A1

C SEATING PLANE

BOTTOM VIEW

10X ⌀ b

⊕ 0.05 C A B
  0.03 C

eD/2
eD

eE

C
B
A

1 2 3   4 5 6

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

DIM	MILLIMETERS	
	MIN	MAX
A	0.54	0.69
A1	0.17	0.24
A2	0.42 REF	
b	0.24	0.29
D	1.67 BSC	
E	1.05 BSC	
eD	0.400 BSC	
eE	0.347 BSC	

RECOMMENDED SOLDERING FOOTPRINT*

A1

PACKAGE OUTLINE

0.35

0.35

10X
⌀ 0.25

0.40
PITCH

DIMENSIONS: MILLIMETERS

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.
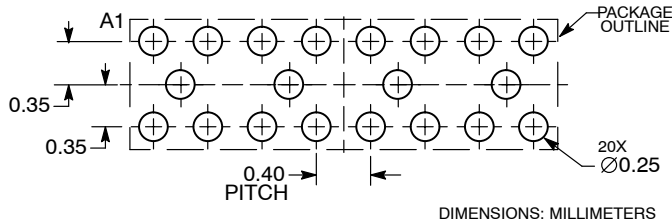
CM1457

PACKAGE DIMENSIONS

WLCSP15, 2.47x1.05
CASE 567BR−01
ISSUE O
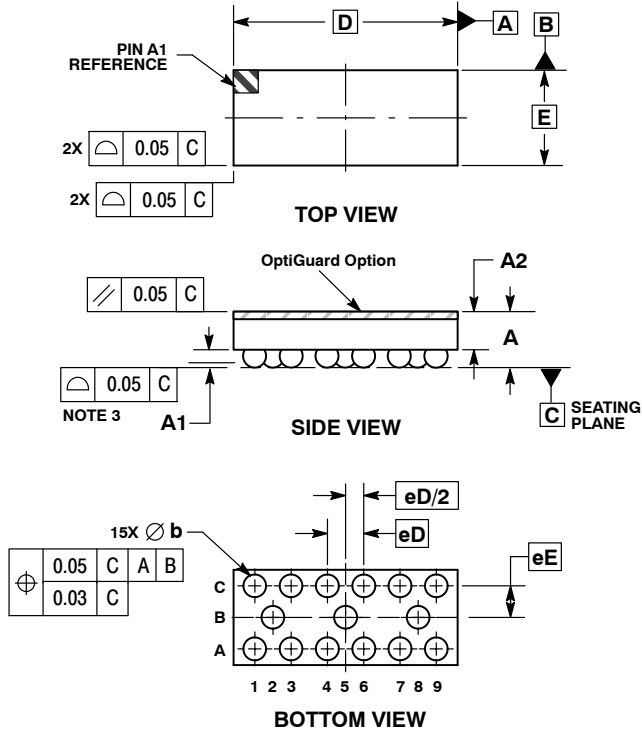
TOP VIEW

SIDE VIEW

BOTTOM VIEW

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

DIM	MILLIMETERS	
	MIN	MAX
A	0.54	0.69
A1	0.17	0.24
A2	0.42 REF	
b	0.24	0.29
D	2.47 BSC	
E	1.05 BSC	
eD	0.400 BSC	
eE	0.347 BSC	

RECOMMENDED SOLDERING FOOTPRINT*

DIMENSIONS: MILLIMETERS

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PACKAGE DIMENSIONS

WLCSP20, 3.27x1.05
CASE 567BV–01
ISSUE O
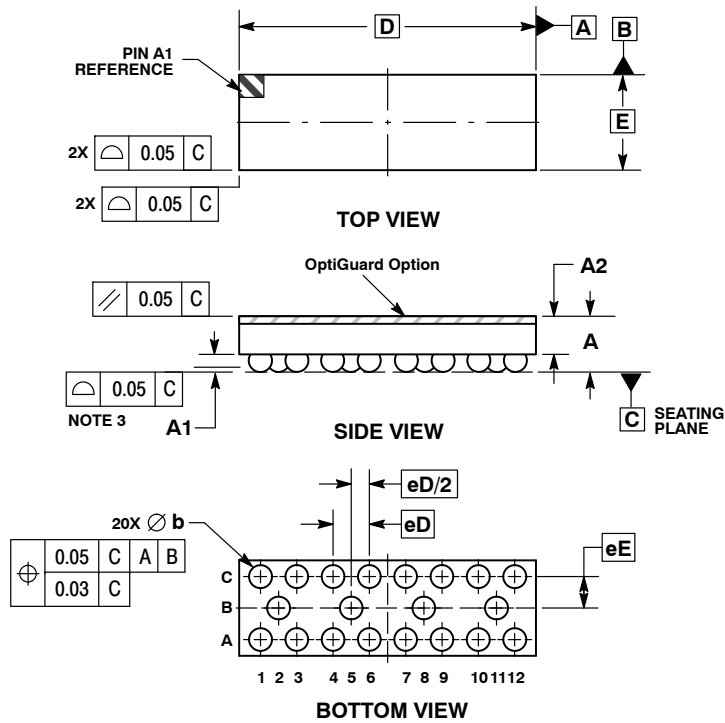
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. COPLANARITY APPLIES TO SPHERICAL CROWNS OF SOLDER BALLS.

DIM	MILLIMETERS	
	MIN	MAX
A	0.54	0.69
A1	0.17	0.24
A2	0.42 REF	
b	0.24	0.29
D	3.27 BSC	
E	1.05 BSC	
eD	0.400 BSC	
eE	0.347 BSC	

TOP VIEW

OptiGuard Option

SIDE VIEW

SEATING PLANE

NOTE 3

BOTTOM VIEW

RECOMMENDED SOLDERING FOOTPRINT*

PACKAGE OUTLINE

0.35
0.35
0.40 PITCH
20X ⌀0.25
DIMENSIONS: MILLIMETERS

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

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CM1457/D