

Ultra-Low Capacitance TVS Protection

◆ **DESCRIPTIONS**

CMTLDF02C2R5AFE is a low-capacitance Transient Voltage Suppressor (TVS) designed to provide electrostatic discharge (ESD) protection for high-speed data interfaces. With typical capacitance of 0.35pF only, CMTLDF02C1R8AFE is designed to protect parasitic-sensitive systems against over-voltage and over-current transient events. It complies with IEC 61000-4-2 (ESD), Level 4 ($\pm 15\text{kV}$ air, $\pm 8\text{kV}$ contact discharge), IEC 61000-4-4 (electrical fast transient - EFT) (40A, 5/50 ns), very fast charged device model (CDM) ESD and cable discharge event (CDE), etc.

CMTLDF02C2R5AFE uses ultra-small uDFN-2L package. Each CMTLDF02C2R5AFE device can protect one high-speed data line. It offers system designers flexibility to protect single data line where space is a premium concern. The combined features of low capacitance, ultra-small size and high ESD robustness make CMTLDF02C2R5AFE ideal for high-speed data port and high-frequency line (e.g., USB 2.0 & antenna line) applications, such as cellular phones and HD visual devices.

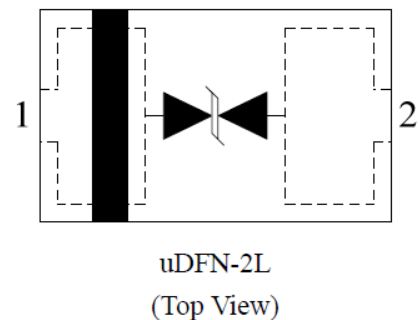
◆ **FEATURES**

- 1、Transient protection for high-speed data lines
IEC 61000-4-2 (ESD) $\pm 15\text{kV}$ (Air)
 $\pm 8\text{kV}$ (Contact)
IEC 61000-4-4 (EFT) 40A (5/50 ns)
Cable Discharge Event (CDE)
- 2、Package optimized for high-speed lines
- 3、Ultra-small package (1.0mm \times 0.6mm \times 0.4mm)
- 4、Protects one data, control or power line
- 5、Low capacitance: 1.8pF (Typical)
- 6、Low leakage current: 10nA @ V_{RWM} (Typical)
- 7、Low clamping voltage

◆ **Circuit Diagram**



◆ **Pin Configuration**



◆ **Applications**

- 1、10M / 100M / 1G Ethernet
- 2、PCI Express
- 3、PC / Note book
- 4、Cellular Phones
- 5、MDDI Ports
- 6、USB2.0 Power and Data Line Protection
- 7、Display Ports
- 8、HDMI/DVI ports

◆ **Mechanical Characteristics**

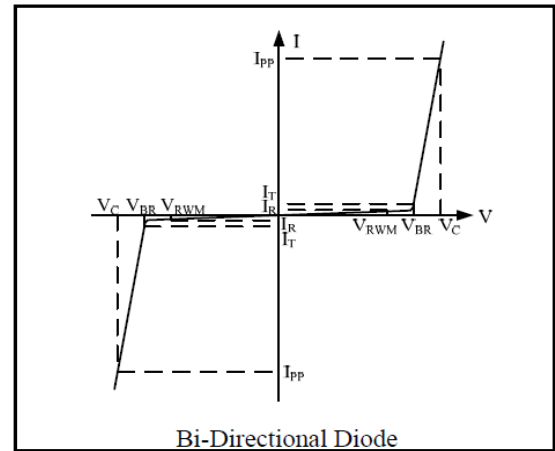
- 1、uDFN-2L package
- 2、Flammability Rating: UL 94V-0
- 3、Marking: Part number (S)
- 4、Packaging: Tape and Reel

◆ **Absolute Maximum Rating**

Symbol	Parameter	Value	Units
V _{ESD}	ESD per IEC 61000-4-2 (Air)	±17	kV
	ESD per IEC 61000-4-2 (Contact)	±12	
T _{OPT}	Operating Temperature	-55/+125	°C
T _{STG}	Storage Temperature	-55/+150	°C

◆ **Electrical Characteristics (T = 25°C)**

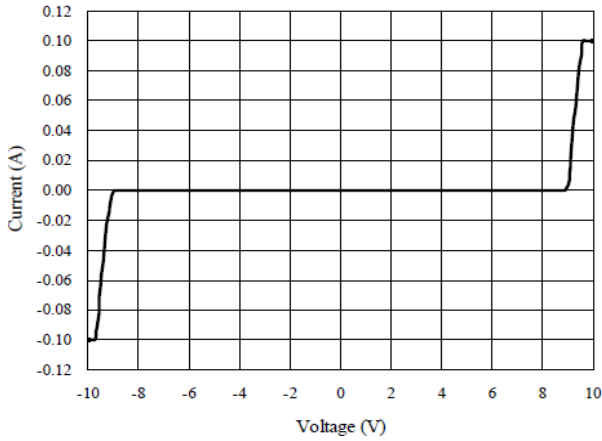
Symbol	Parameter
V _{RWM}	Nominal Reverse Working Voltage
I _R	Reverse Leakage Current @ V _{RWM}
V _{BR}	Reverse Breakdown Voltage @ I _T
I _T	Test Current for Reverse Breakdown
V _C	Clamping Voltage @ I _{PP}
I _{PP}	Peak Pulse Current
C _{ESD}	Parasitic Capacitance
V _R	Reverse Voltage
f	Small Signal Frequency



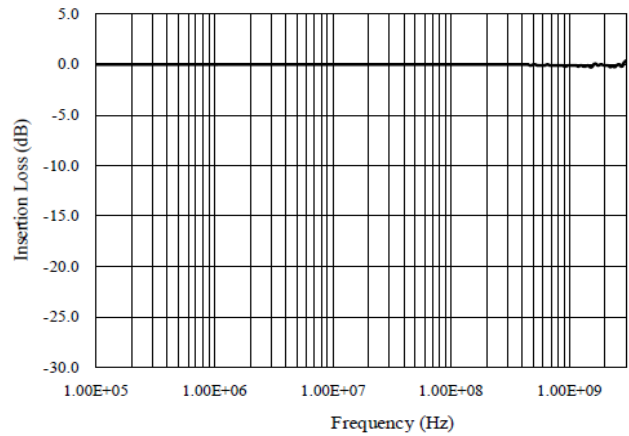
Symbol	Test Condition	Minimum	Typical	Maximum	Units
V _{RWM}				5.0	V
I _R	V _{RWM} = 5V, T = 25°C Between I/O and I/O		0.01	1.0	µA
V _{BR}	I _T = 1mA Between I/O and I/O	5.6		9.4	V
V _C	I _{PP} = 1A, tp = 8/20µs Between I/O and I/O			12	V
V _C	I _{PP} = 2A, tp = 8/20µs Between I/O and I/O			14	V
C _{ESD}	V _R = 0V, f = 1MHz Between I/O and I/O	2.0	2.5	3.5	pF

◆ **TYPICAL ELECTRICAL CHARACTERISTICS CURVE**

Voltage Sweeping of I/O to I/O

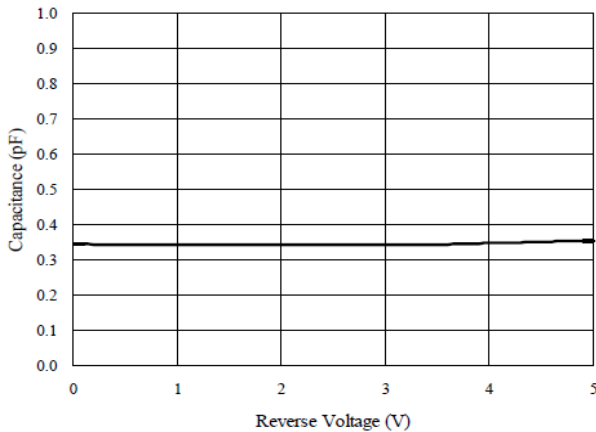


Insertion Loss S21 of I/O to I/O

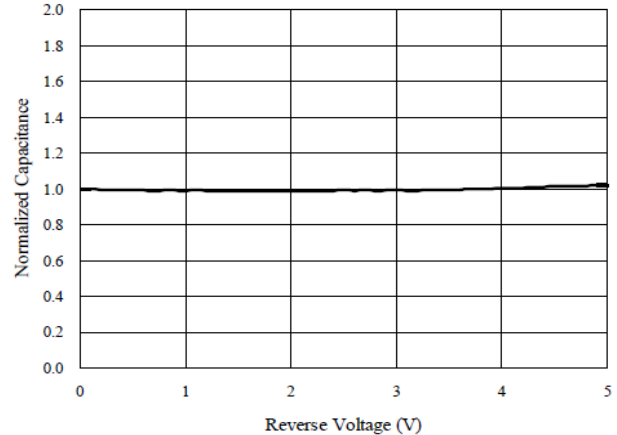


Capacitance vs. Voltage of I/O to I/O (f = 1MHz)

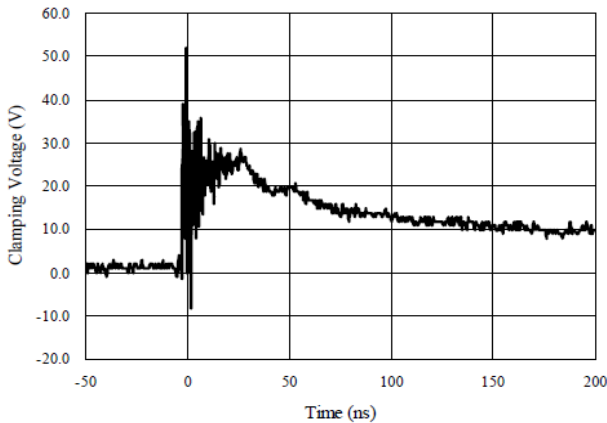
Capacitance vs. Reverse Voltage



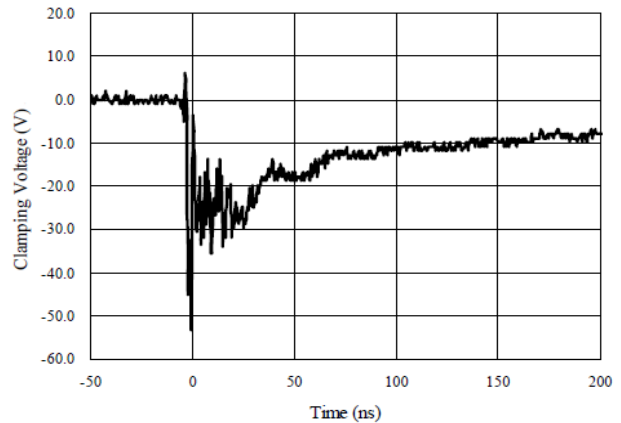
Normalized Capacitance vs. Reverse Voltage



**ESD Clamping of I/O to I/O
(+8kV Contact per IEC 61000-4-2)**

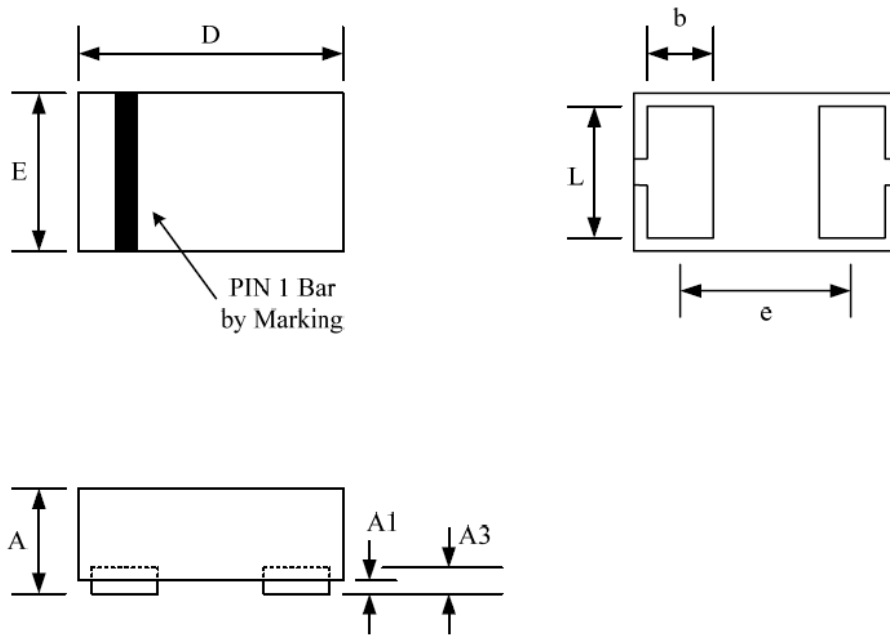


**ESD Clamping of I/O to I/O
(-8kV Contact per IEC 61000-4-2)**



◆ **PACKAGE OUTLINE**

- 1、uDFN-2L package
- 2、2 leads, very small package
- 3、Thermally-Enhanced



Package Dimensions (Controlling dimensions are in millimeters)

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Minimum	Maximum	Minimum	Maximum
A	0.400	0.550	0.016	0.022
A1	0.000	0.050	0.000	0.002
A3	0.125 REF		0.005 REF	
D	0.950	1.050	0.037	0.041
E	0.550	0.650	0.022	0.026
b	0.200	0.300	0.008	0.012
e	0.650 BSC		0.026 BSC	
L	0.450	0.550	0.018	0.022