

PROTECTION PRODUCTS - EMIClamp®

Description

EClamp®8052P integrates common mode filtering with low capacitance ESD protection and is designed specifically for MIPI, MHL, and HDMI interfaces. Each device provides filtering and ESD protection for one high-speed differential pair.

EClamp8052P is an easily implemented solution for replacing discrete common mode chokes and ESD protection devices in a single package. These devices utilize silicon avalanche technology for superior ESD and TLP clamping performance. They feature high maximum ESD withstand voltage of +/- 25kV contact, +/-30kV air discharge per IEC 61000-4-2. The integrated common-mode choke has a typical differential mode cutoff frequency >3GHZ and typical common mode suppression of 10dB at 500MHz and 15dB from 1GHz to 2.8GHz. Each channel series resistance is 1.8 Ohms maximum.

EClamp8052P is in a 7-pin SGP1917N5 package, measuring 1.9 x 1.7mm with a nominal height of 0.55mm. The leads have a nominal pin-to-pin pitch of 0.50mm. Flow- through package design simplifies PCB layout and maintains signal integrity on high-speed lines.

Features

- ◆ ESD protection for high-speed data lines to **IEC 61000-4-2 (ESD) ±30kV (air), ±25kV (contact)**
- ◆ **IEC 61000-4-5 (Lightning) 6A (8/20µs)**
- ◆ **IEC 61000-4-4 (EFT) 40A (5/50ns)**
- ◆ Package design optimized for high speed lines
- ◆ ESD protection and common mode filtering for two high-speed lines
- ◆ High differential bandwidth cutoff frequency
- ◆ Qualified to AECQ-100
- ◆ Low ESD clamping voltage
- ◆ Low dynamic resistance: 0.50 Ohms (Typ)
- ◆ Solid-state silicon-avalanche technology

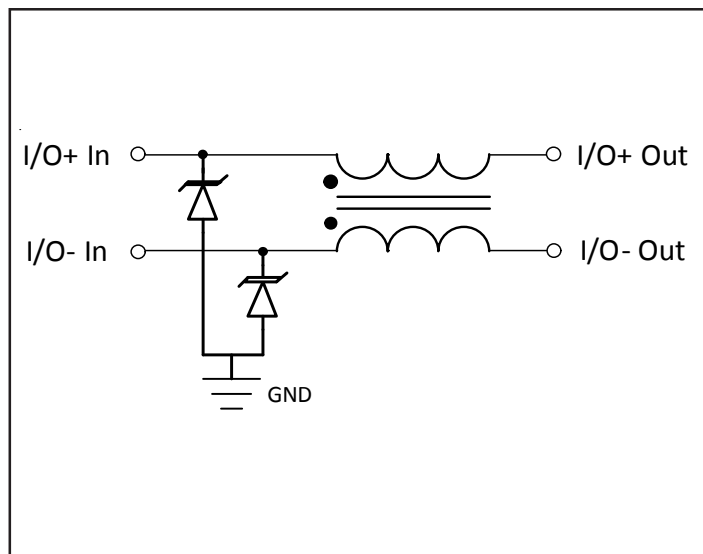
Mechanical Characteristics

- ◆ SGP1917N5 package
- ◆ Pb-Free, Halogen Free, RoHS/WEEE Compliant
- ◆ Molding compound flammability rating: UL 94V-0
- ◆ Marking: Marking code + date code
- ◆ Packaging: Tape and Reel

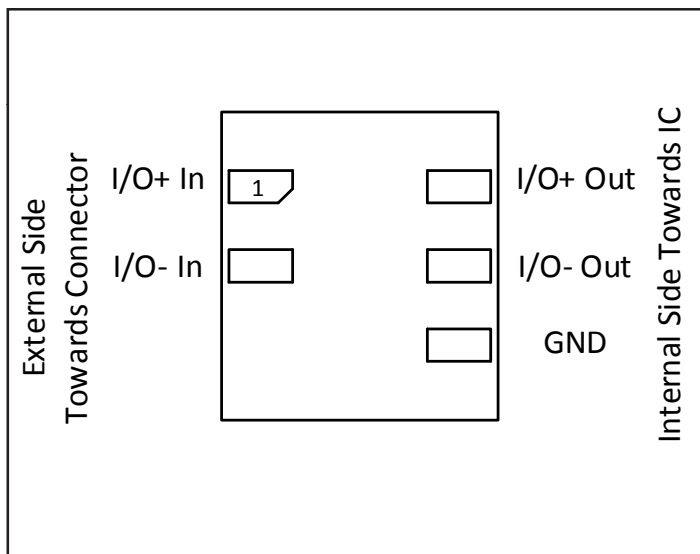
Applications

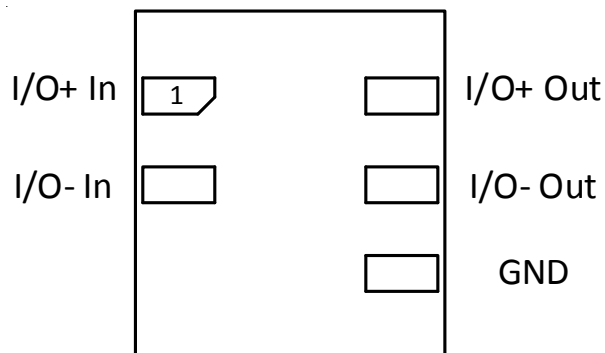
- ◆ MIPI Camera Serial Interface (CSI)
- ◆ MIPI Display Serial Interface (DSI)
- ◆ HDMI Interfaces
- ◆ MHL Interfaces
- ◆ USB 2.0 Interfaces

Circuit Diagram



Pin Configuration (Top View)



PROTECTION PRODUCTS
Pin Identification


Pin	Symbol	Identification
1	I/O+ In	Line+ In from Connector (External) Side
2	I/O- In	Line- In from Connector (External) Side
3	GND	Ground
4	I/O- Out	Line- Out to Chip (Internal) Side
5	I/O+ Out	Line+ Out to Chip (Internal) Side

Pin Configuration (Top View)
Absolute Maximum Rating

Rating	Symbol	Value	Units
Peak Pulse Current ($t_p = 8/20\mu s$)	I_{PP}	6	A
ESD per IEC 61000-4-2 (Air) ¹ ESD per IEC 61000-4-2 (Contact) ¹	V_{ESD}	+/- 30 +/- 25	kV
Operating Temperature	T_J	-55 to +125	°C
Storage Temperature	T_{STG}	-55 to +150	°C

PROTECTION PRODUCTS
Electrical Characteristics (T=25°C unless otherwise specified)

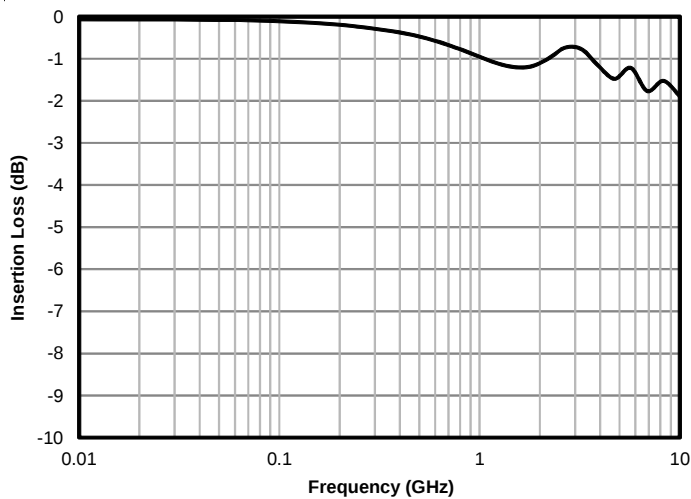
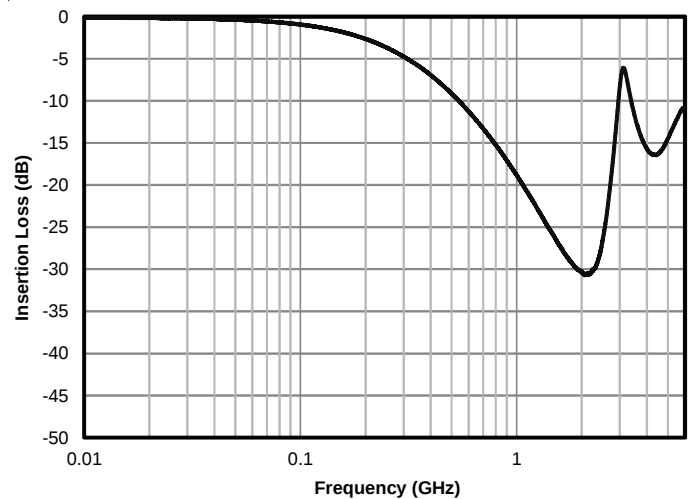
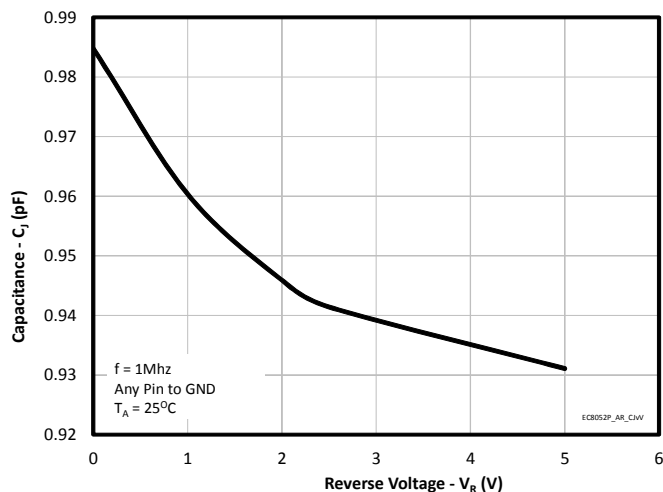
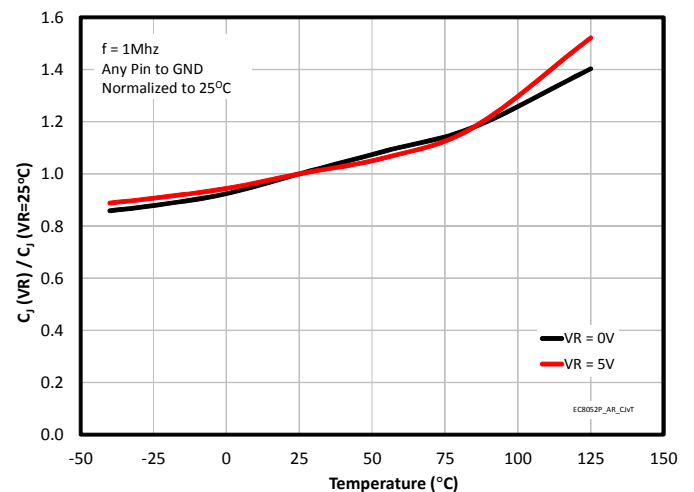
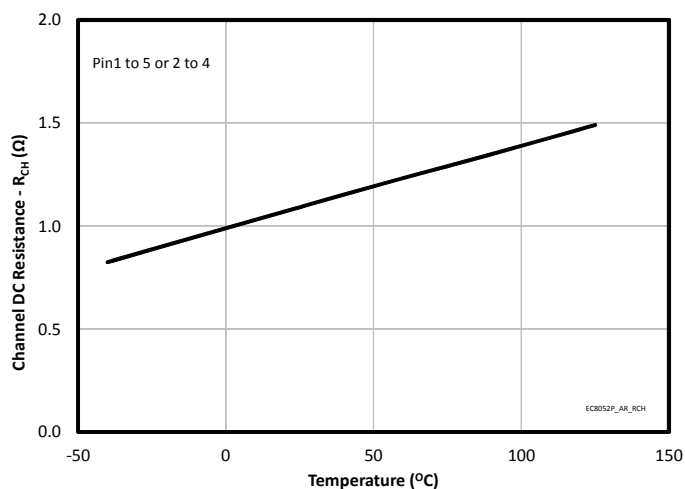
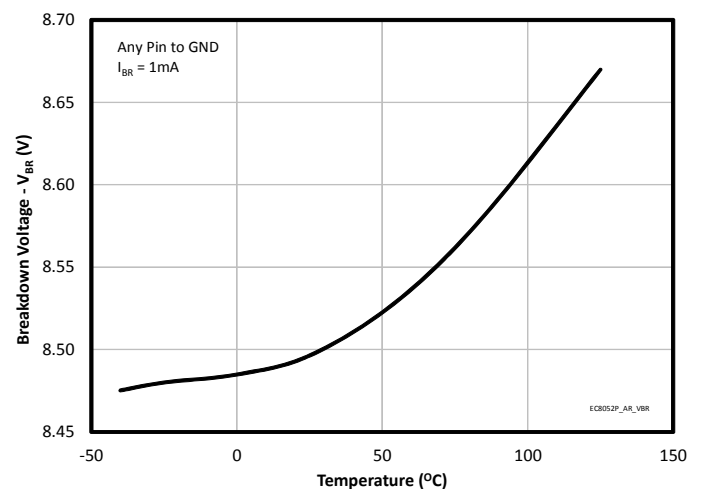
Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Stand-Off Voltage	V_{RWM}	Pin 1 or Pin 2 to GND			5	V
Reverse Breakdown Voltage	V_{BR}	$I_t = 1mA$, Pin 1 or Pin 2 to GND	6.5	9	11	V
Reverse Leakage Current	I_R	$V_{RWM} = 5.0V$, Pin 1 or Pin 2 to GND		0.005	0.100	μA
Clamping Voltage	V_C	$I_{pp} = 1A$, $t_p = 8/20\mu s$ Pin 1 or Pin 2 to GND			12	V
Clamping Voltage	V_C	$I_{pp} = 6A$, $t_p = 8/20\mu s$ Pin 1 or Pin 2 to GND			17	V
ESD Clamping Voltage ²	V_C	$I_{pp} = 4A$, $t_{lp} = 0.2/100ns$		11		V
ESD Clamping Voltage ²	V_C	$I_{pp} = 16A$, $t_{lp} = 0.2/100ns$		17		V
Dynamic Resistance ³	R_D	$t_p = 100ns$		0.50		Ohm
Total Channel Capacitance	C_{IN}	$V_R = 0V$, $f = 1MHz$, Pin 1 or Pin 2 to GND		0.95	1.2	pF
Differential (SDD21) Cut-Off Frequency	f_{3dB}	50 Ohm Source and Load Termination		3		GHz
Common Mode (SCC21) Attenuation	f_{ATT}	$f=75MHz$		3		dB
		$f=500MHz$		10		dB
		$f=1GHz - 2.8GHz$		15		dB
Channel Resistance	R_{CH}	Input to Output		1.3	1.8	Ohm

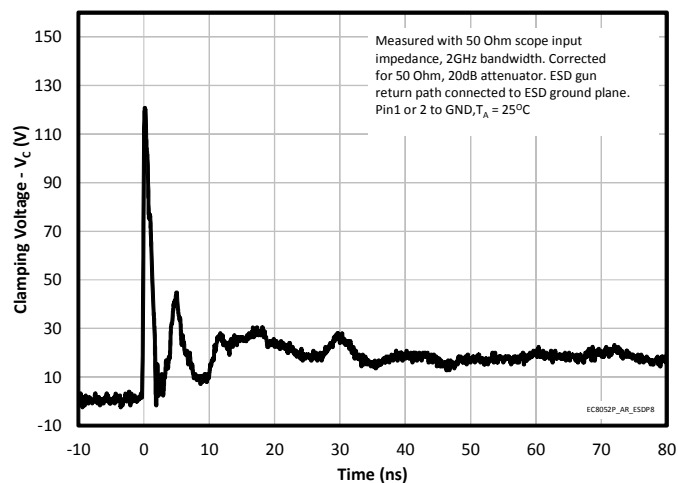
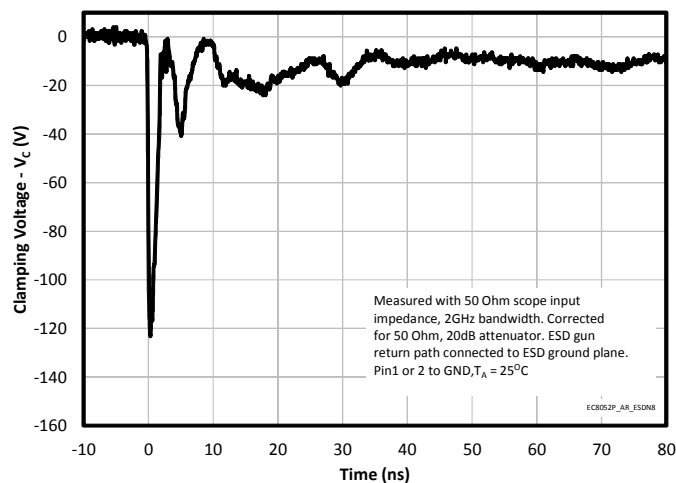
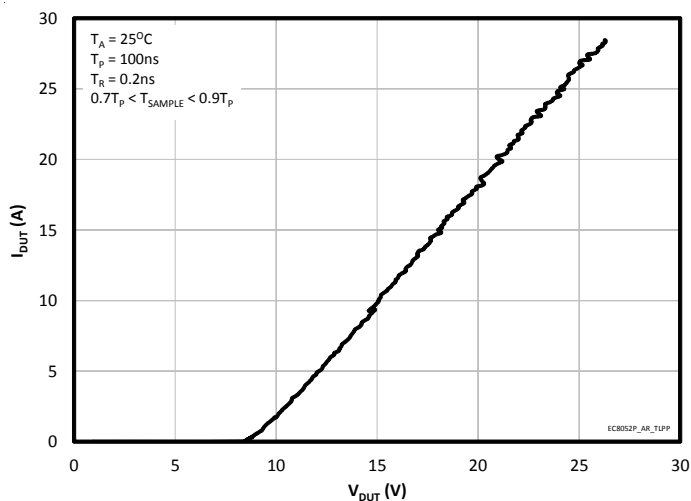
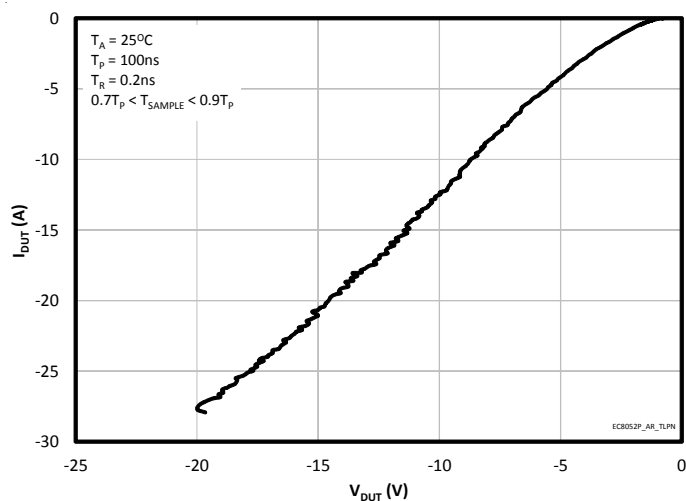
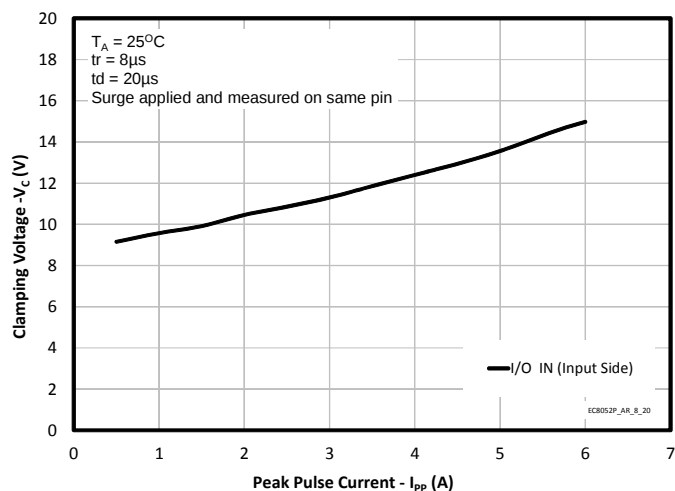
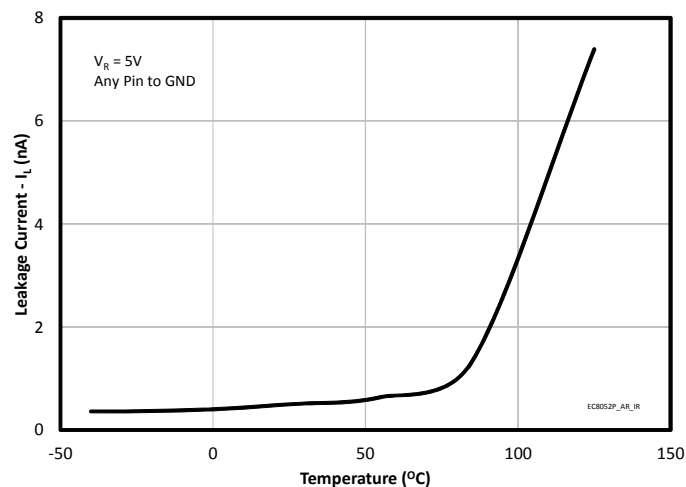
Notes

1)ESD gun return path connected to ESD ground reference plane. ESD discharge between pin 1 and pin 3 or pin 2 and pin 3 with pin 3 connected to ground.

2)Transmission Line Pulse Test (TLP) Settings: $t_p = 100ns$, $t_r = 0.2ns$, I_{TLP} and V_{TLP} averaging window: $t_1 = 70ns$ to $t_2 = 90ns$.

3) Dynamic resistance calculated from $I_{pp} = 4A$ to $I_{pp} = 16A$

PROTECTION PRODUCTS
Typical Characteristics
Differential Mode Attenuation vs. Frequency

Common Mode Attenuation vs. Frequency

Junction Capacitance vs. Reverse Voltage

Junction Capacitance vs. Temperature (Normalized to $T=25^\circ\text{C}$)

Channel DC Resistance vs. Temperature

Breakdown Voltage (V_{BR}) vs. Temperature


PROTECTION PRODUCTS
Typical Characteristics
ESD Clamping (+8kV Contact per IEC 61000-4-2)

ESD Clamping (-8kV Contact per IEC 61000-4-2)

TLP Characteristic (Positive)

TLP Characteristic (Negative)

Clamping Voltage vs. Peak Pulse Current (tp=8/20us)

Reverse Leakage vs. Temperature


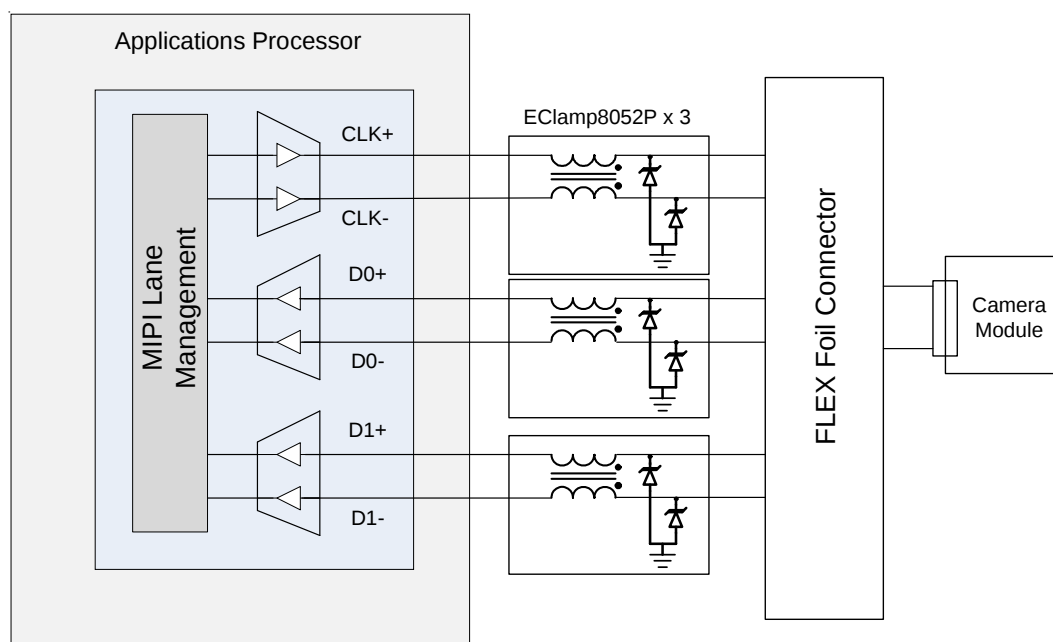
PROTECTION PRODUCTS
Application Examples


Figure 1 - MIPI Camera Serial Interface Protection

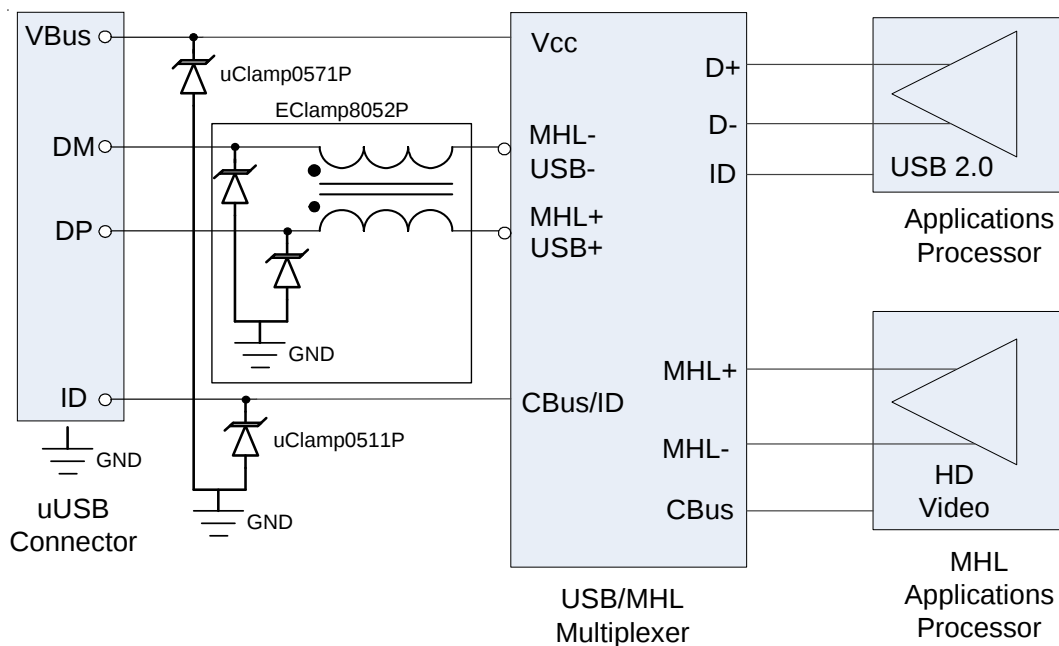
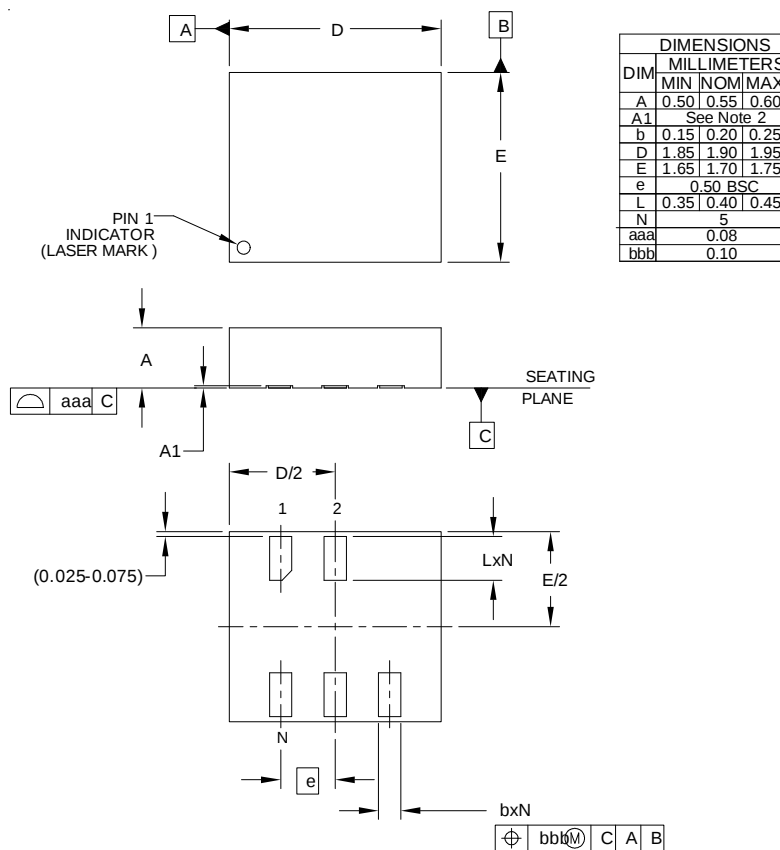
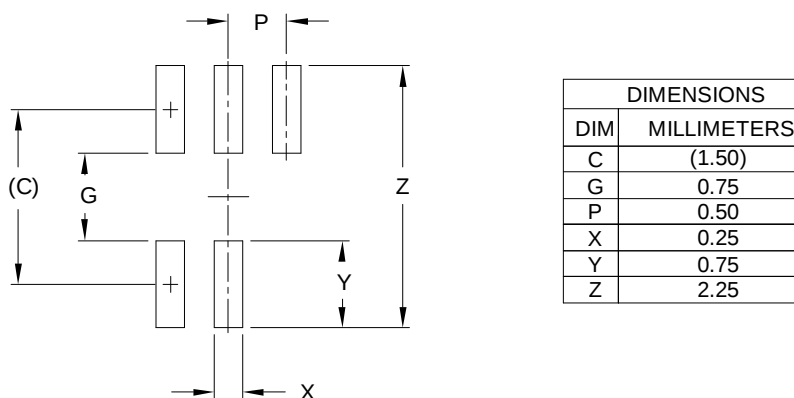


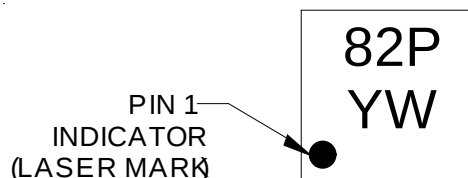
Figure 2 - MHL/USB2.0 Interface Protection

PROTECTION PRODUCTS
Outline Drawing - SGP1917N5


- NOTES:
1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
 2. A1 BOTTOM SOLDER MASK (0.020+/-0.007)
SOLDER PAD (0.018+/-0.005)

Land Pattern - SGP1917N5


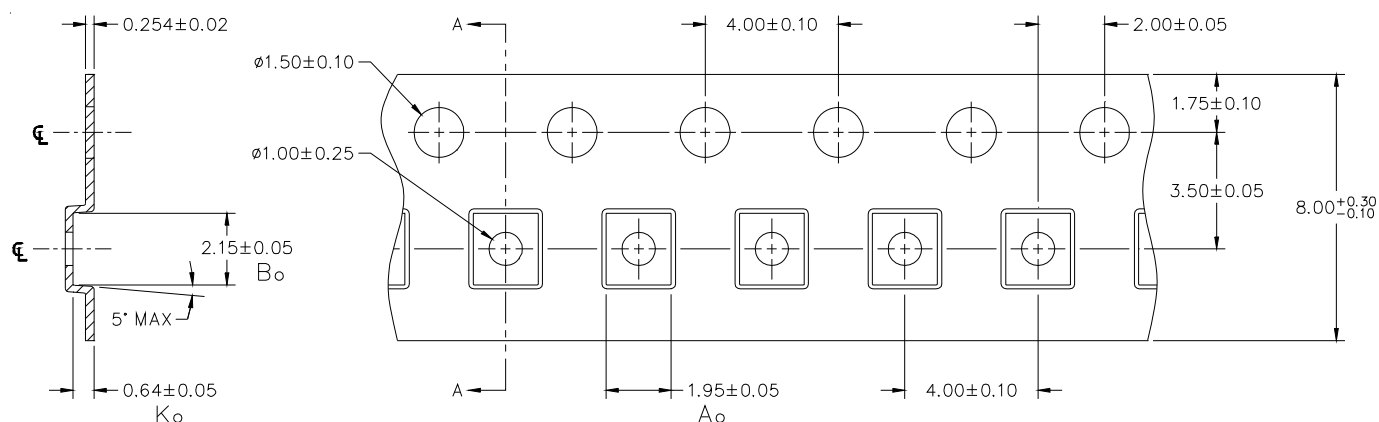
- NOTES:
1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
 2. THIS LAND PATTERN IS FOR REFERENCE PURPOSES ONLY.
CONSULT YOUR MANUFACTURING GROUP TO ENSURE YOUR
COMPANY'S MANUFACTURING GUIDELINES ARE MET.

PROTECTION PRODUCTS
Marking Codes

Ordering Information

Part Number	Qty per Reel	Reel Size
EClamp8052P.TCT	3,000	7 Inch

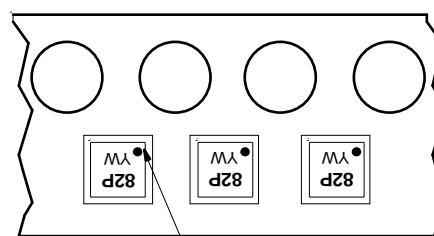
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YW = Alphanumeric character Date Code

Carrier Tape Specification


SECTION A-A

NOTE: ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.



Pin 1 Location
(Towards Sprocket Holes)

Device Orientation in Tape

Contact Information

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