EClamp2465T
Low Capacitance ESD/EMI Protection for SIM Card

PROTECTION PRODUCTS - EMIClamp™

Description

The EClamp™2465T is a combination EMI filter and line termination device with integrated TVS diodes for use on SIM Card interfaces on cellular phones and other portable electronics. This state-of-the-art device utilizes solid-state silicon-avalanche technology for superior clamping performance and DC electrical characteristics.

The device consists of three circuits that include series impedance matching resistors for proper termination of the SIM card interface. Termination resistor value of 100 Ohms is included on the Reset and Data lines and 47 Ohms on the CLK line. TVS diodes are also included on each line for ESD protection in excess of ±15kV (air discharge) and ±8kV (contact discharge) per IEC 61000-4-2, level 4. An additional TVS diode connection is included for protection of the voltage (Vcc) bus.

The EClamp2465T is in a 8-pin, RoHS/WEEE compliant, SLP1713P8T package. It measures 1.7 x 1.3 mm with a nominal height of only 0.4mm. The leads are spaced at a pitch of 0.4mm and are finished with lead-free NiPdAu. The small package makes it ideal for use in portable electronics such as cell phones and digital still cameras.

Features

- Bidirectional EMI/RFI filter with integrated TVS for ESD protection
- ESD protection to **IEC 61000-4-2 (ESD) Level 4, ±15kV (air), ±8kV (contact)**
- TVS working voltage: 5V
- Termination Resistors: 100 Ohms & 47 Ohms
- Capacitance: 10pF (Typical at VR = 0V)
- Protection and filtering for four lines
- Solid-state technology

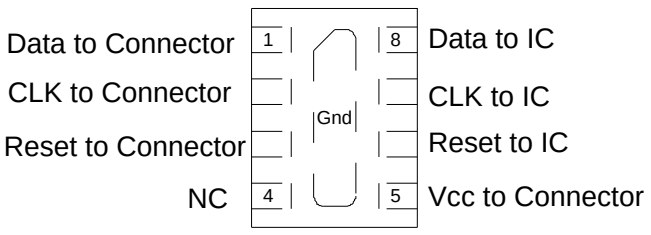
Mechanical Characteristics

- SLP1713P8T 8-pin package
- RoHS/WEEE Compliant
- Nominal Dimensions: 1.7 x 1.3 x 0.40 mm
- Lead Pitch: 0.4mm
- Lead finish: NiPdAu
- Marking: Marking Code + Date Code
- Packaging: Tape and Reel

Applications

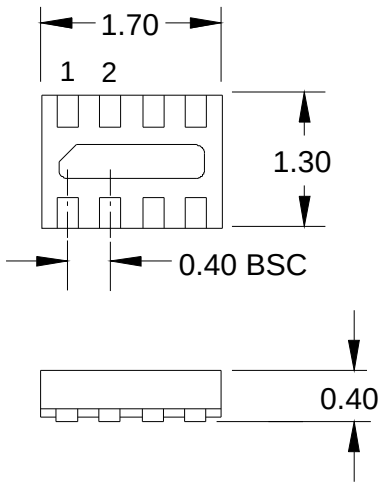
- SIM Card
- Cell Phone
- PDAs and Smartphones

Pin Configuration



Pin Identification and Configuration (Top Side View)

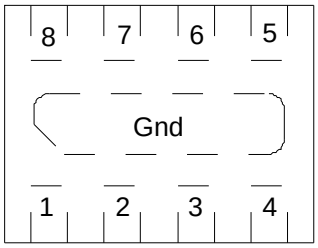
Package Configuration



8 Pin SLP package (Bottom Side View) Nominal Dimensions in mm

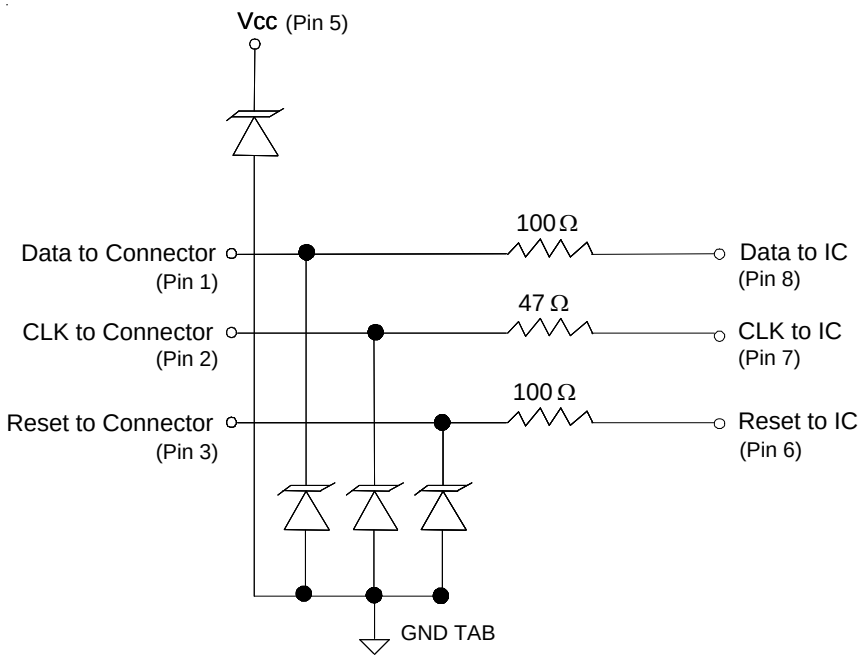
Pin Identification and Configuration

Pin	Symbol	Identification
1	Data	Data Input (SIM Connector Side)
2	CLK	Clock Input (SIM Connector Side)
3	Reset	Reset Input (SIM Connector Side)
4	NC	No Connect
5	Vcc	Power Supply ESD Protection (SIM Connector Side)
6	Reset	Reset Output (IC Side)
7	CLK	Clock input (IC Side)
8	Data	Data Output (IC Side)
Center tab	GND	Ground connection



Pin Configuration (Top View)

Schematics & Component Values



Maximum Ratings

Rating	Symbol	Value	Units
ESD per IEC 61000-4-2 (Air)[1] ESD per IEC 61000-4-2 (Contact)	V_{ESD}	+/- 18 +/- 10	kV
Junction Temperature	T_J	125	°C
Operating Temperature	T_{op}	-40 to +85	°C
Storage Temperature	T_{STG}	-55 to +150	°C

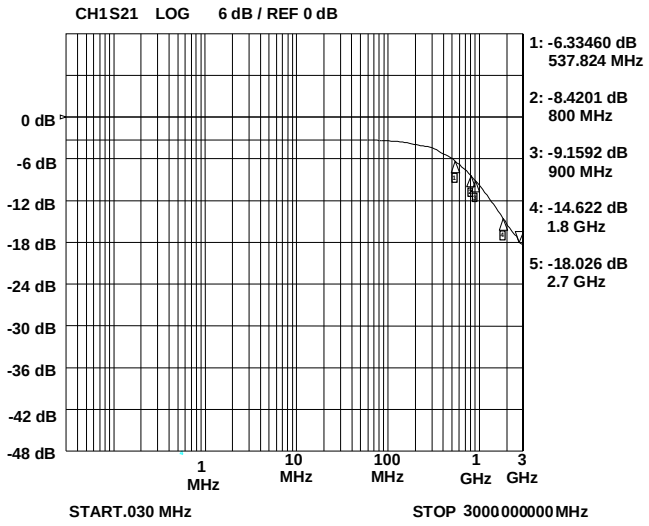
Electrical Characteristics (T=25°C)

Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
TVS Reverse Stand-Off Voltage	V_{RWM}				5	V
TVS Reverse Breakdown Voltage	V_{BR}	I_t = 1mA	6	8	10	V
TVS Reverse Leakage Current	I_R	V_{RWM} = 5.0V			0.5	µA
Reset Series Resistors	R_{RST}	Each Line	85	100	115	Ohms
Clk Series Resistors	R_{CLK}	Each Line	40	47	55	Ohms
Data Series Resistors	R_{DATA}	Each Line	85	100	115	Ohms
Total Capacitance	C_{in}	Input to Gnd, Each Line V_R = 0V, f = 1MHz	8	10	12	pF

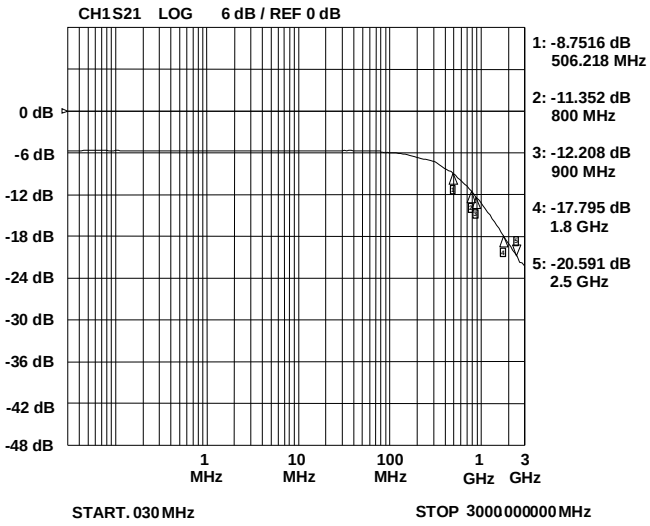
Note: 1) ESD input at Pins 1, 2, 3, 5

Typical Characteristics

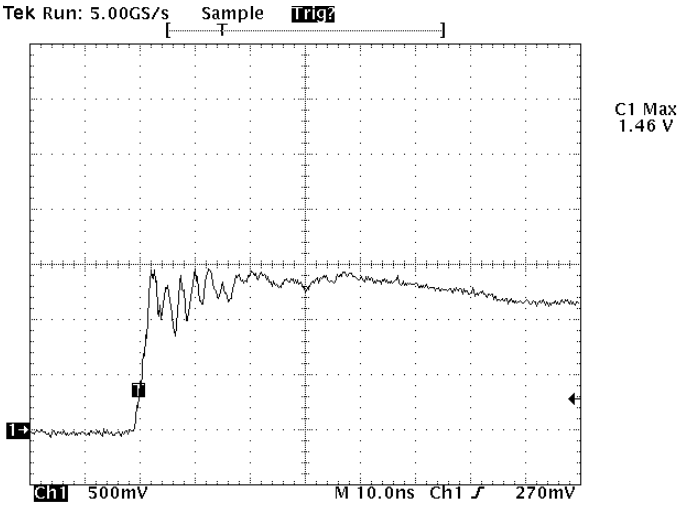
Typical Insertion Loss S21 (Pin 2 to 7)



Typical Insertion Loss S21 (Pin 1 to 8 and Pin 3 to 6)

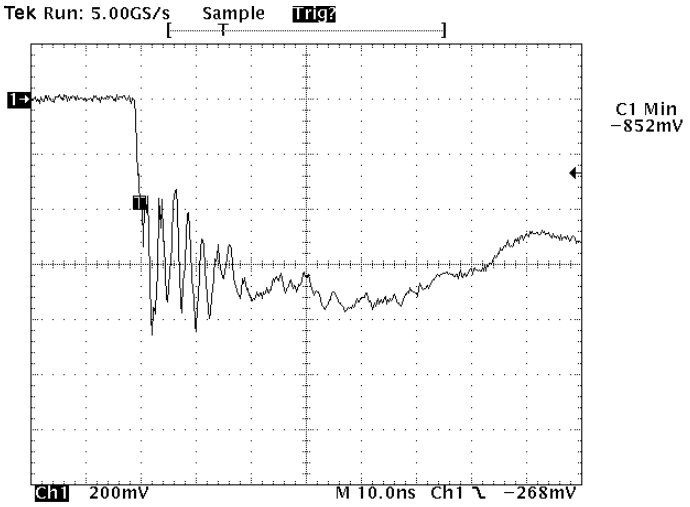


ESD Clamping (+8kV Contact)



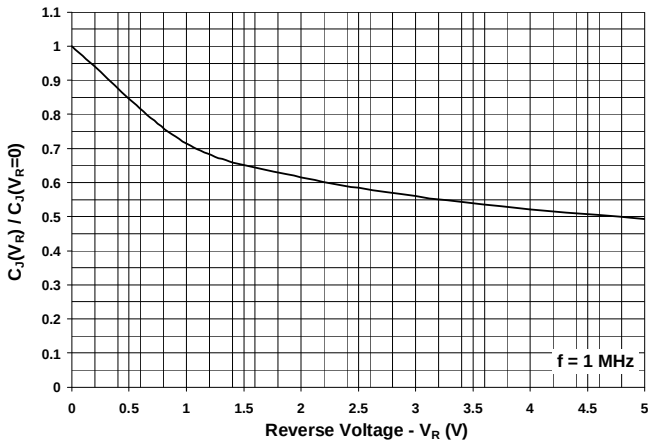
Note: Data is taken with a 10x attenuator

ESD Clamping (-8kV Contact)



Note: Data is taken with a 10x attenuator

Normalized Capacitance vs. Reverse Voltage



Device Connection

The EClamp2465T designed with ease of layout in mind. The package has flow through design which allows the designer to route the signals straight in and out between the SIM port connector and the SIM controller. The device is in a 8-pin SLP package. Electrical connection is made to the 8 pins located at the bottom of the device. A center tab serves as the ground connection. Pin connections are noted in Figure 1. Note that the ESD protection diodes are located at pins 1 - 3 for the data and clock lines. This means the device is directional. Therefore, Pins 1 - 3 must be routed to the SIM connector while pins 6 - 8 are routed to the protected IC. Pin 5 is routed to the Vcc pin of the SIM connector. Typical layout examples are shown in Figure 3. All path lengths should be kept as short as possible to minimize the effects of parasitic inductance in the board traces. The center tab should be connected directly to the ground plane. Multiple micro-vias are recommended in the device ground pad as shown in Figure 2. Multiple vias in the device ground pad will result in a lower inductive ground loop, increasing the ESD effectiveness of the device.

Figure 1 - Pin Identification and Configuration (Top Side View)

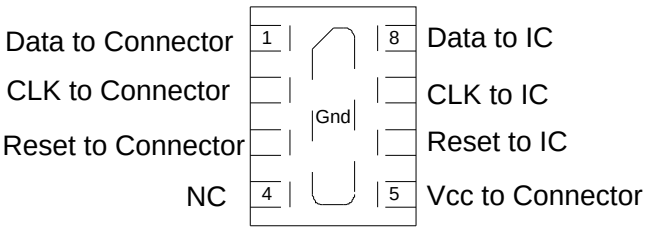
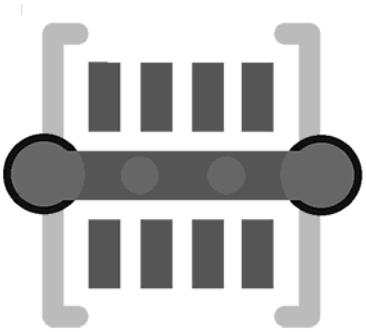


Figure 2 - Recommended Layout Using Ground Vias



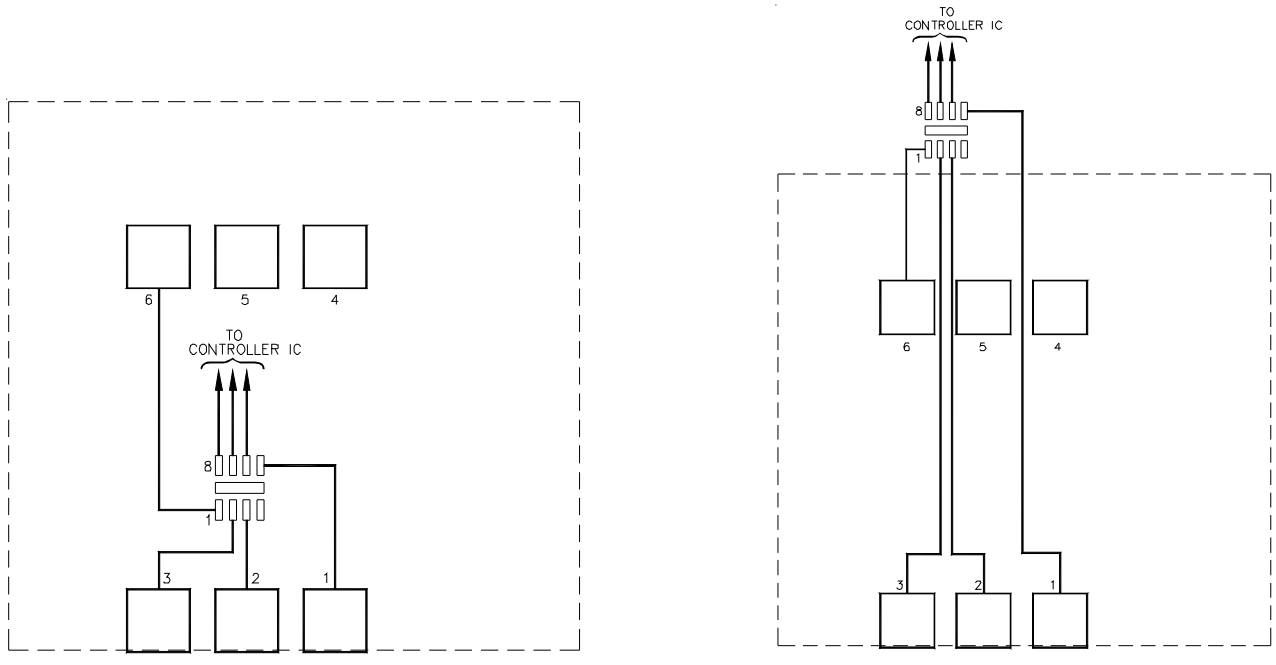
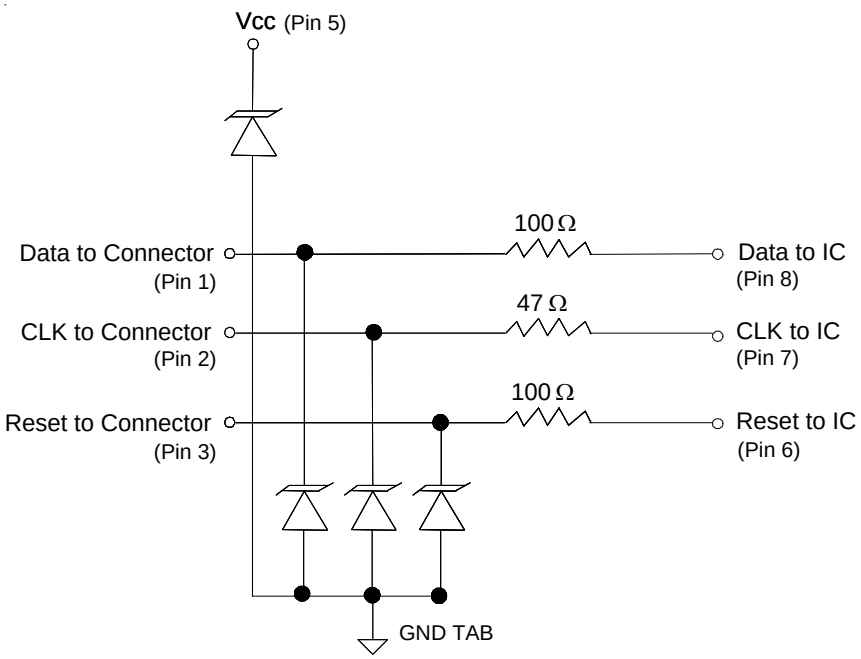


Figure 3 - SIM Protection Layout Examples



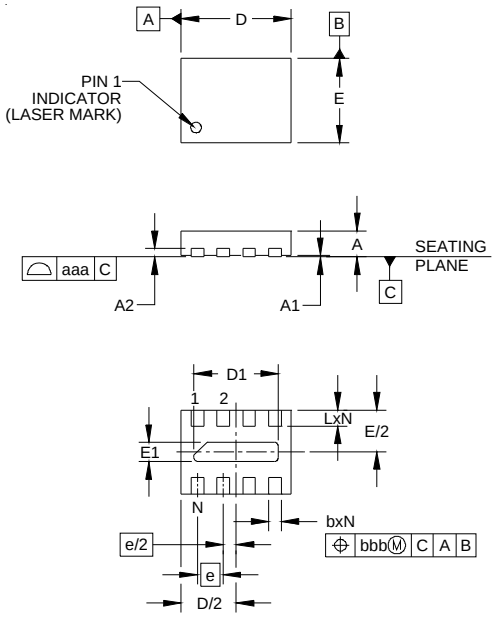
EClamp2465T Spice Model

Note: All TVS shown in the circuit use D1 Parameters

Table 1 - EClamp2465T Spice Parameters

Parameter	Unit	D1 (TVS)
IS	Amp	2E-15
BV	Volt	7.5
VJ	Volt	0.775
RS	Ohm	1.05
IBV	Amp	1E-3
CJO	Farad	9E-12
TT	sec	2.541E-9
M	--	0.246
N	--	1.1
EG	eV	1.11

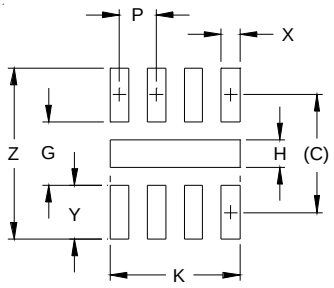
Outline Drawing - SLP1713P8T



DIMENSIONS						
DIM	INCHES			MILLIMETERS		
	MIN	NOM	MAX	MIN	NOM	MAX
A	.015	.016	.017	0.37	0.40	0.43
A1	.000	.001	.002	0.00	0.02	0.05
A2		(.005)			(0.13)	
b	.006	.008	.010	0.15	0.20	0.25
D	.065	.067	.070	1.65	1.70	1.78
D1	.047	.051	.055	1.20	1.30	1.40
E	.049	.051	.054	1.25	1.30	1.38
E1	.008	.012	.016	0.20	0.30	0.40
e		.016 BSC			0.40 BSC	
L	.008	.010	.012	0.20	0.25	0.30
N		8			8	
aaa		.003			0.08	
bbb		.004			0.10	

NOTES:
1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
2. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

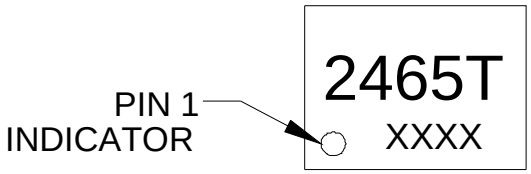
Land Pattern - SLP1713P8T



DIMENSIONS		
DIM	INCHES	MILLIMETERS
C	(.050)	(1.27)
G	.027	0.69
H	.012	0.30
K	.055	1.40
P	.016	0.40
X	.008	0.20
Y	.023	0.58
Z	.073	1.85

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.
3. THERMAL VIAS IN THE LAND PATTERN OF THE EXPOSED PAD SHALL BE CONNECTED TO A SYSTEM GROUND PLANE. FAILURE TO DO SO MAY COMPROMISE THE THERMAL AND/OR FUNCTIONAL PERFORMANCE OF THE DEVICE.

Marking



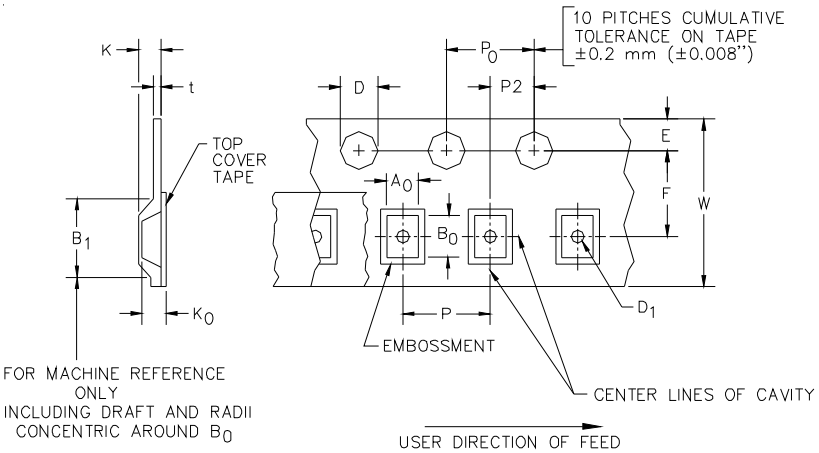
XXXX = Date Code

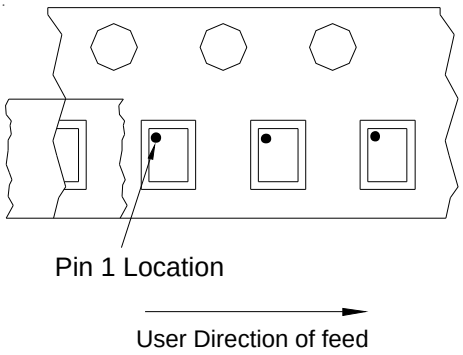
Ordering Information

Part Number	Qty per Reel	Reel Size
EClamp2465T.TCT	3000	7 Inch

This is a lead-free RoHS/WEEE Compliant Device
EMIClamp and EClamp are marks of Semtech Corporation

Tape and Reel Specification





Device Orientation in Tape

A0	B0	K0
1.51 +/-0.10 mm	1.91 +/-0.10 mm	0.66 +/-0.10 mm

Tape Width	B, (Max)	D	D1	E	F	K (MAX)	P	P0	P2	T(MAX)	W
8 mm	4.2 mm (.165)	1.5 + 0.1 mm - 0.0 mm (0.59 +.005 - .000)	0.8 mm ±0.05 (.031)	1.750±.10 mm (.069±.004)	3.5±0.05 mm (.138±.002)	2.4 mm (.094)	4.0±0.1 mm (.157±.00-4)	4.0±0.1 mm (.157±.00-4)	2.0±0.05m-m (.079±.002)	0.4 mm (.016)	8.0 mm + 0.3 mm - 0.1 mm (.312±.012)

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