

PROTECTION PRODUCTS - RailClamp[®]

Description

The μ Clamp[®]3673P is a high-surge transient voltage suppressor (TVS) optimized for protection of sensitive digital sensors used in proximity switches and industrial control applications. The μ Clamp3673P protects the components from over-voltages caused by Electro-Static Discharge (ESD), Electrical Fast Transients (EFT), and Tertiary Lightning.

The μ Clamp3673P features a working voltage of 36 volts with a minimum breakdown voltage of 37 volts. They are rated to handle a continuous forward current of up to 300mA with a low forward voltage drop of less than 1 volt ($I_F = 300\text{mA}$). They are designed with high surge capability (2 Amps at $t_p=1.2/50\mu\text{s}$) and a low clamping voltage of $<50\text{V}$.

The μ Clamp3673P is in a 6-pin SGP3016N6 package. It measures $3.0 \times 1.6 \times 0.57\text{mm}$. The leads are spaced at a pitch of 1.0mm and are finished with lead-free NiPdAu. Each device will protect three lines operating at 36 volts. The small size and unique features of the μ Clamp3673P make it ideal for protection of DC high-side and low-side 3 wire proximity switches in industrial applications.

Features

- ◆ Transient protection for proximity sensors.
IEC 61000-4-2 (ESD)
IEC 61000-4-4 (EFT)
- ◆ Ultra-small package ($3.0 \times 1.6 \times 0.57\text{mm}$)
- ◆ Protects one three line sensor.
- ◆ Low clamping voltage
- ◆ High operating voltage: 36V
- ◆ Solid-state silicon-avalanche technology

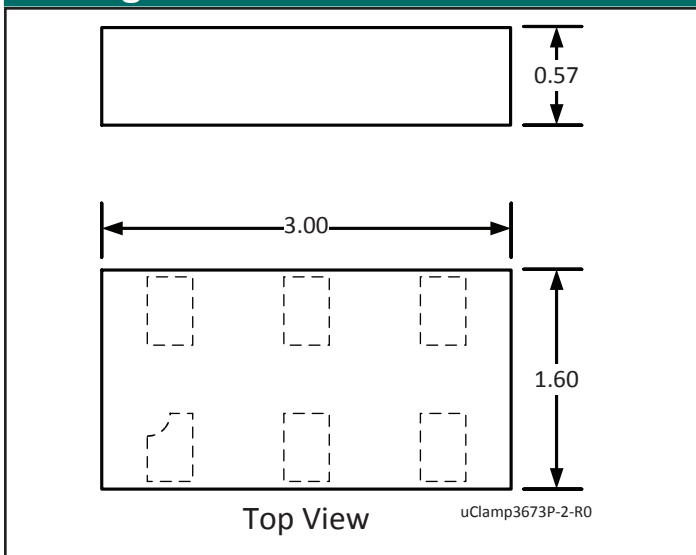
Mechanical Characteristics

- ◆ SGP3016N6 package
- ◆ Molding compound flammability rating: UL 94V-0
- ◆ Packaging : Tape and Reel
- ◆ Lead Finish: NiPdAu
- ◆ Pb-Free, Halogen Free, RoHS/WEEE Compliant

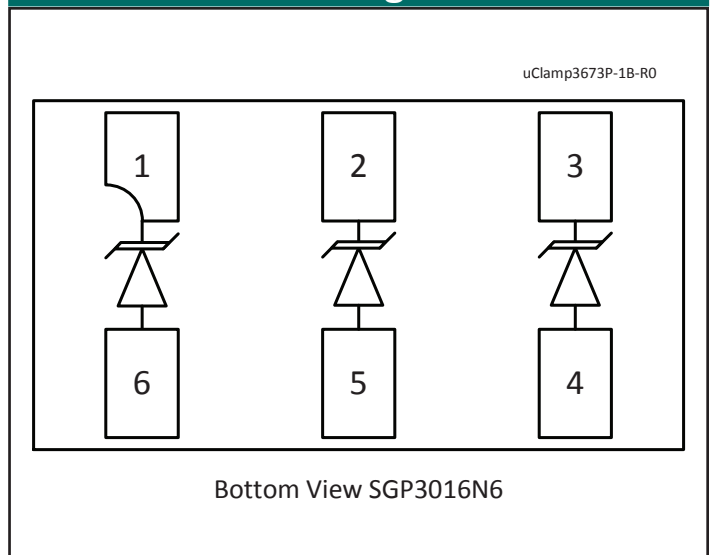
Applications

- ◆ Two and Three Wire DC High-Side and Low-Side Proximity Switches
- ◆ Digital Sensor Input Protection
- ◆ Industrial Controls
- ◆ 24V - 36V DC Supply Protection

Package Dimensions



Schematic & Pin Configuration



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Absolute Maximum Ratings

Rating	Symbol	Value	Units
Peak Pulse Power (tp = 1.2/50µs)	P_{PK}	140	W
Peak Pulse Current (tp = 1.2/50µs)	I_{PP}	2	A
Maximum Steady State Forward Current ⁽¹⁾	I_F	300	mA
ESD per IEC 61000-4-2 (Air) ⁽²⁾ ESD per IEC 61000-4-2 (Contact) ⁽²⁾	V_{ESD}	±30 ±30	kV
Maximum Thermal Impedance ⁽³⁾	$R_{\theta JA}$	100	°C/W
Operating Temperature	T_J	-40 to +125	°C
Storage Temperature	T_{STG}	-55 to +150	°C

Notes:

(1): If multiple diodes conduct in the forward direction at any instant, the sum of the currents must not exceed this rating.

(2): ESD Gun return path to Ground Reference Plane (GRP)

(3): Any one diode to ambient.

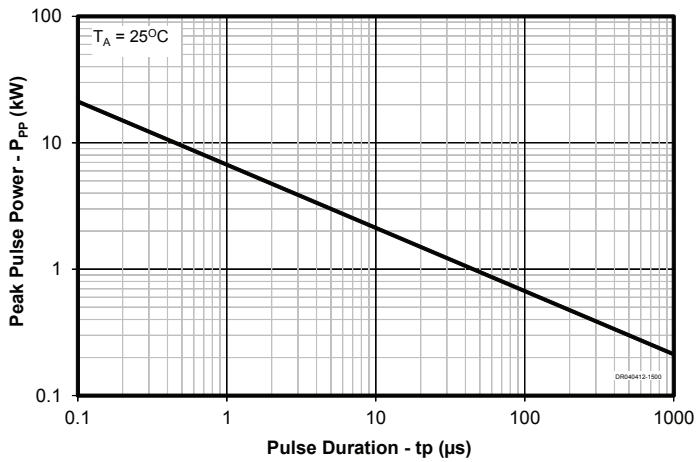
Electrical Characteristics (T=25°C unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Reverse Stand-Off Voltage	V_{RWM}				36	V
Reverse Breakdown Voltage	V_{BR}	$I_t = 1\text{mA};$	37		44	V
Reverse Leakage Current	I_R	$V_{RWM} = 36\text{V}$		10	100	nA
Forward Voltage Drop	V_F	$I_F = 300\text{mA}$			1.0	V
Clamping Voltage	V_C	$I_{PP} = 2\text{A}, t_p = 1.2/50\mu\text{s}$		45	50	V
Junction Capacitance	C_J	$V_R = 0\text{V}, f = 1\text{MHz}$		25	150	pF

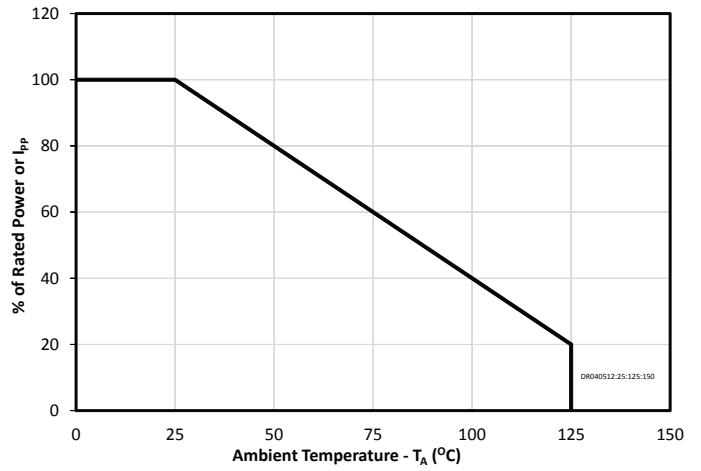
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Typical Characteristics

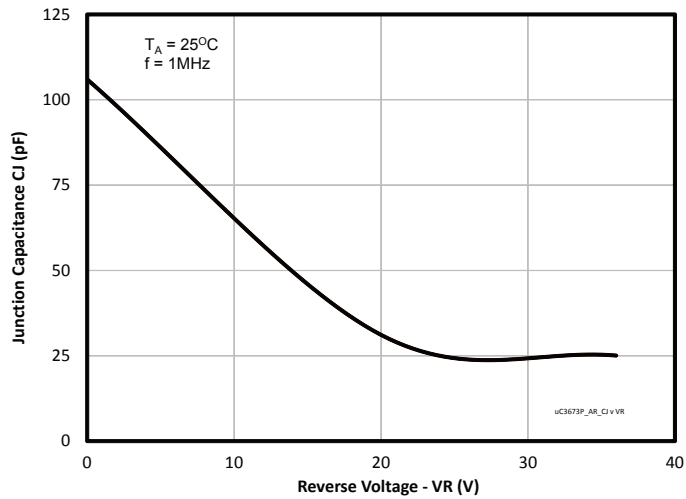
Non-Repetitive Peak Pulse Power vs. Pulse Time



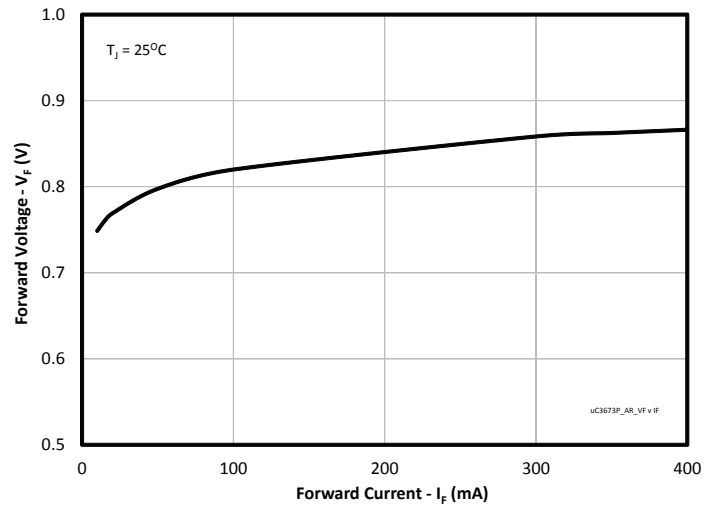
Power Derating Curve



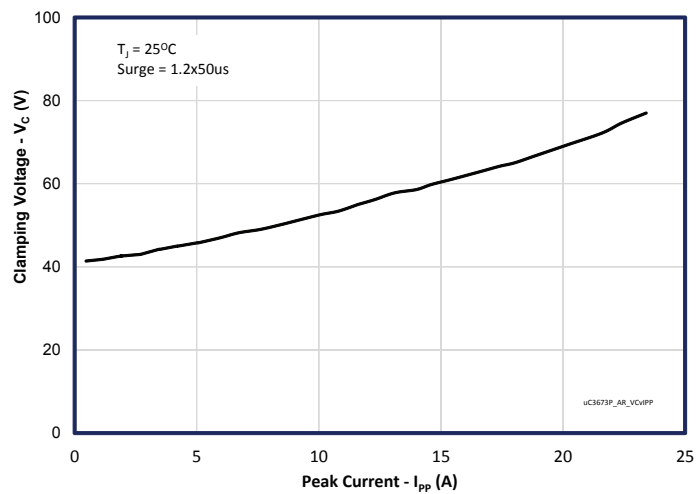
Junction Capacitance vs. Reverse Voltage



Forward Voltage Drop vs. Forward Current



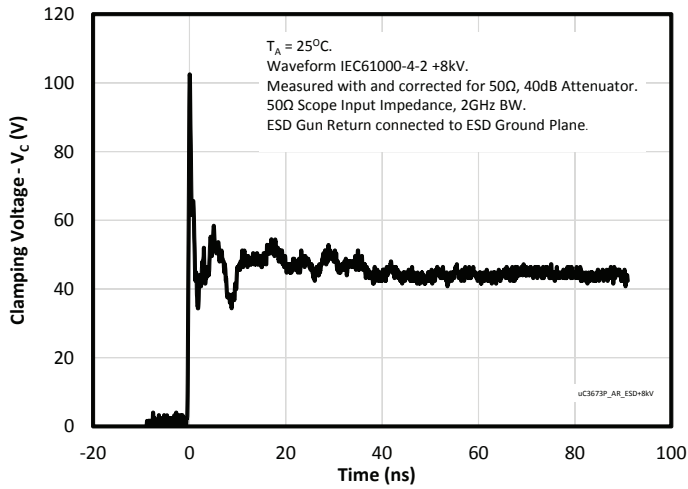
1.2x50us Clamping Voltage vs. Peak Current



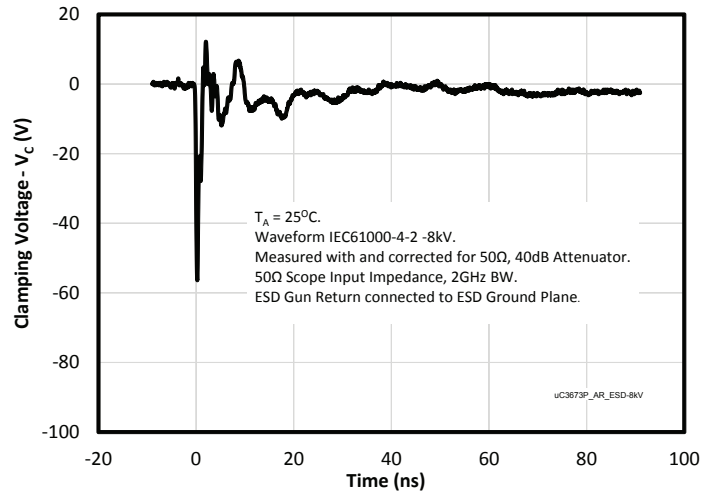
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Typical Characteristics (Continued)

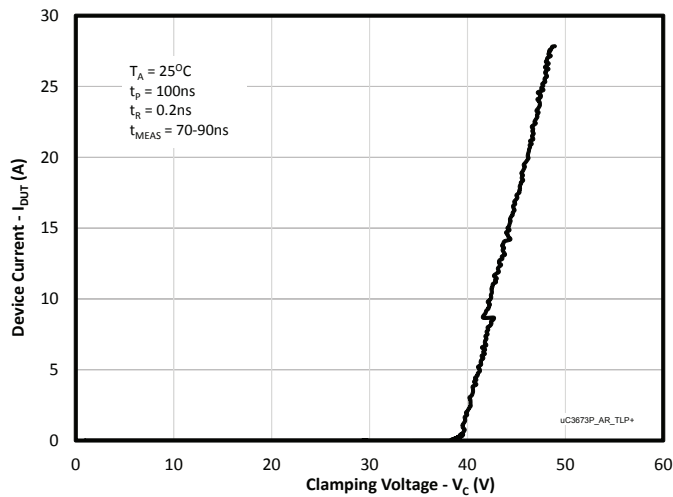
IEC61000-4-2 +8kV Clamping Waveform



IEC61000-4-2 -8kV Clamping Waveform



TLP Characteristic



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Applications Information

Device Connection for Protection of Two and Three Wire Proximity Switches

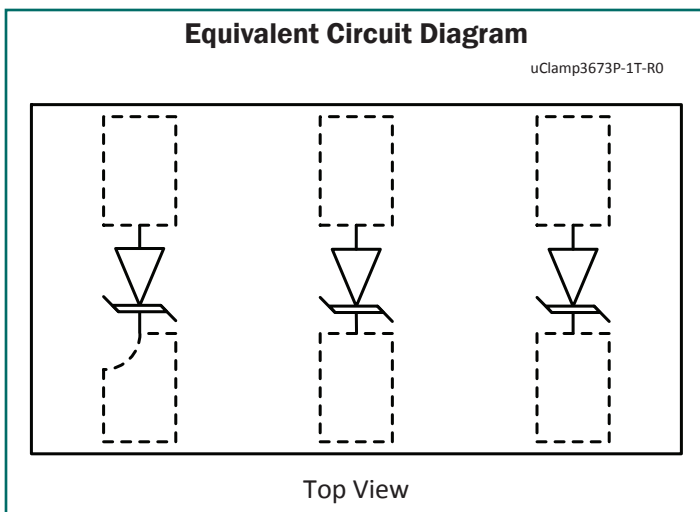
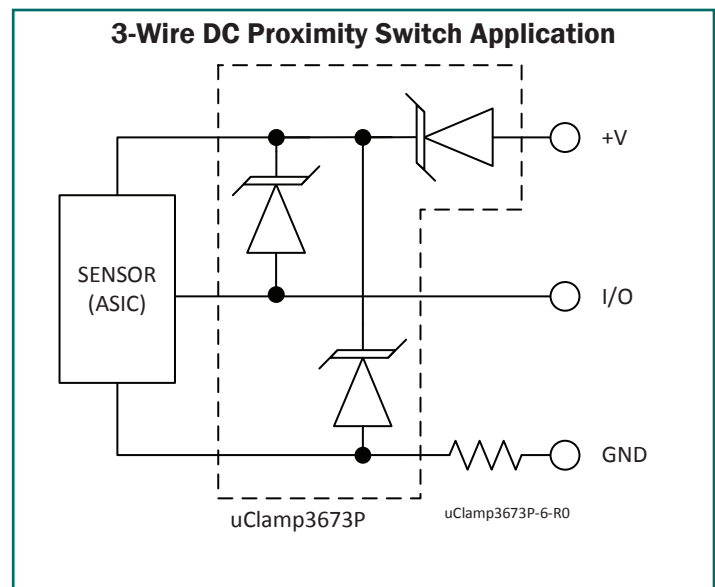
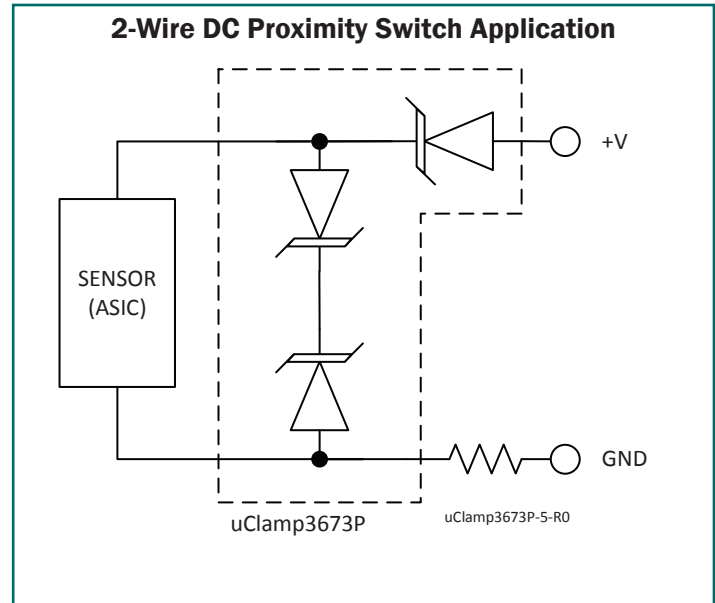
Digital sensors help to bridge the gap between the physical world and the digital world in applications such as computer controlled factory automation, automotive spark timing and throttle position sensing amongst others. In such environments, transient voltages can easily disrupt or damage sensitive sensor inputs. The uClamp3673P provides transient voltage protection for the digital sensors to ensure their operation is not disrupted by the physical world.

The uClamp3673P is designed to meet the high surge capability and low clamping voltage needed to protect the ASIC and control logic used in proximity switches. The uClamp3673P provides protection for the power and I/O lines. Typical configurations for the protection of two and three wire switches are illustrated:

Circuit Board Layout Recommendations for Suppression of ESD.

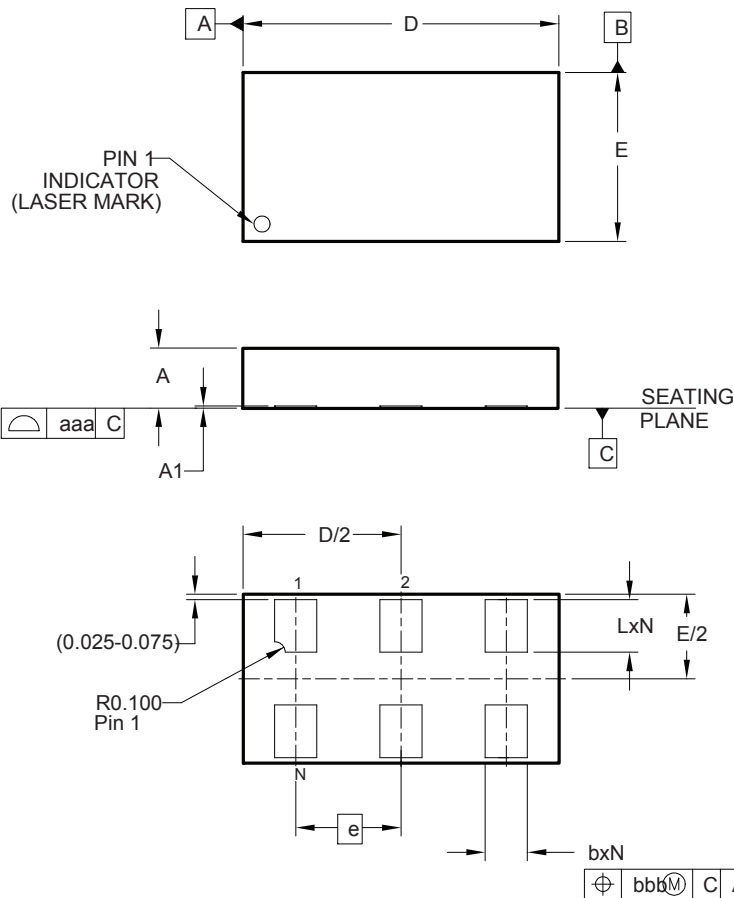
Good circuit board layout is critical for the suppression of ESD induced transients. The following guidelines are recommended:

- ◆ Place the TVS near the input terminals or connectors to restrict transient coupling.
- ◆ Minimize the path length between the TVS and the protected line.
- ◆ Minimize all conductive loops including power and ground loops.
- ◆ The ESD transient return path to ground should be kept as short as possible.
- ◆ Never run critical signals near board edges.
- ◆ Use ground planes whenever possible.



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Outline Drawing - SGP3016N6

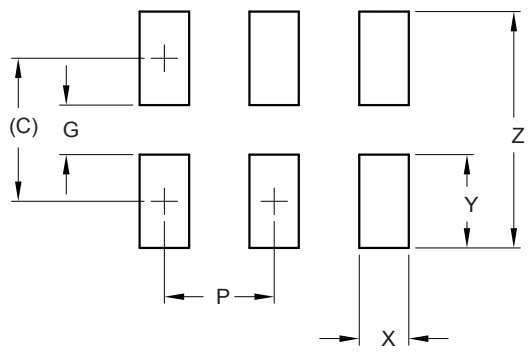


DIM	DIMENSIONS MILLIMETERS		
	MIN	NOM	MAX
A	0.52	0.57	0.62
A1	0.00	0.015	0.05
b	0.35	0.40	0.45
D	2.95	3.00	3.05
E	1.55	1.60	1.65
e	1.00 BSC		
L	0.45	0.50	0.55
N	6		
aaa	0.08		
bbb	0.10		

SGP3016N6-1-R0

- NOTES:
 1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).

Land Pattern - SGP3016N6



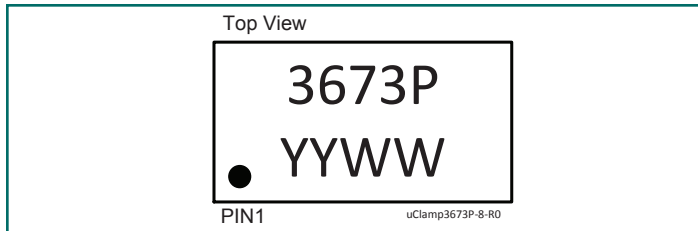
DIM	MILLIMETERS
C	(1.30)
G	0.45
P	1.00
X	0.45
Y	0.85
Z	2.15

SGP3016N6-2-R0

- 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.

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Marking



Notes: YYWW = Date Code

Ordering Information

Part Number	Qty per Reel	Reel Size
uClamp3673P.TCT	3000	7"

Note: Lead finish is lead-free NiPdAu.
MicroClamp and uClamp are marks of Semtech Corporation.

Tape and Reel Specification

FOR MACHINE REFERENCE ONLY INCLUDING DRAFT AND RADII CONCENTRIC AROUND B0

ALL DIMENSIONS IN mm

A0	B0	K0
1.78 ±0.05	3.18 ±0.05	0.76 ±0.05

SGP3016N6-3-R0

Tape Width	B1 (Max)	D	D1	E	F	K (Max)	P	P0	P2	t (Max)	W
8	4.2	1.5 ^{+0.1} _{-0.0}	0.8 ±0.05	1.75 ±0.1	3.5 ±0.05	2.4	4.0 ±0.1	4.0 ±0.1	2.0 ±0.05	0.4	8.0 ^{+0.3} _{-0.1}

Contact Information

Semtech Corporation
 Protection Products Division
 200 Flynn Rd., Camarillo, CA 93012
 Phone: (805)498-2111 FAX (805)498-3804