

Features

- Transient protection for high-speed data lines
IEC 61000-4-2 (ESD) $\pm 20\text{kV}$ (Air)
 $\pm 20\text{kV}$ (Contact)
IEC 61000-4-5 (Surge) 3A (8/20 μs)
- For 5V and below operating voltage
- Small package (2.9mm \times 2.8mm \times 1.4mm)
- Protects four data lines
- Low capacitance: 0.6pF Typical (I/O-GND)
- Low leakage current: 0.1 μA @ V_{RWM} (Typical)
- Low clamping voltage
- Each I/O pin can withstand over 1000 ESD strikes for $\pm 8\text{kV}$ contact discharge
- Green Part

Description

SYT06U05ABC is a low capacitance Transient Voltage Suppressor (TVS) designed to provide electrostatic discharge (ESD) protection for high-speed data interfaces. With typical capacitance of 0.6pF only, SYT06U05ABC is designed to protect parasitic-sensitive systems against over-voltage and over-current transient events. It complies with IEC 61000-4-2 (ESD) ($\pm 20\text{kV}$ air, $\pm 20\text{kV}$ contact discharge), IEC 61000-4-5 (Surge) (3A, 8/20 μs), etc.

SYT06U05ABC uses small SOT23-6 package. Each SYT06U05ABC device can protect four high-speed data lines. The combined features of low capacitance, small size and high ESD robustness make SYT06U05ABC ideal for high-speed data ports and high-frequency lines (e.g., HDMI & DVI) applications. The low clamping voltage of the SYT06U05ABC guarantees a minimum stress on the protected IC.

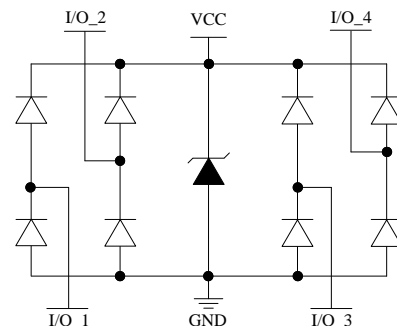
Applications

- Serial ATA
- PCI Express
- Desktops, Servers and Notebooks
- MDDI Ports
- USB2.0 Power and Data Line Protection
- Display Ports
- High Definition Multi-Media Interface (HDMI)
- Digital Visual Interfaces (DVI)

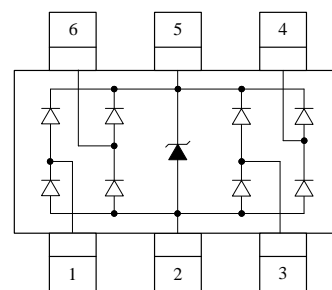
Mechanical Characteristics

- SOT23-6 package
- Flammability Rating: UL 94V-0
- Marking: Part number, Date
- Packaging: Tape and Reel

Circuit Diagram



Pin Configuration



SOT23-6

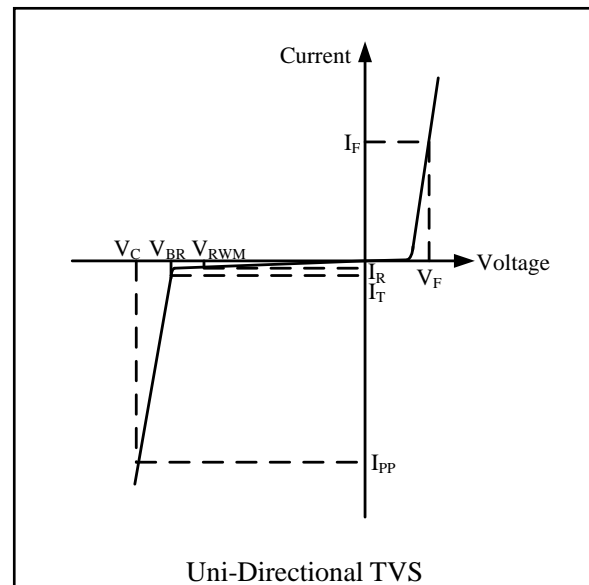
(Top View)

Absolute Maximum Rating

Symbol	Parameter	Value	Units
I_{PP}	Peak Pulse Current (8/20 μ s)	3	A
P_{PK}	Peak Pulse Power (8/20 μ s)	36	Watts
V_{ESD}	ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	± 20 ± 20	kV
T_{OPT}	Operating Temperature	-40/+125	$^{\circ}$ C
T_{STG}	Storage Temperature	-55/+150	$^{\circ}$ C

Electrical Characteristics (T = 25 $^{\circ}$ 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}	Maximum Peak Pulse Current
C_{ESD}	Parasitic Capacitance
V_R	Reverse Voltage
f	Small Signal Frequency
I_F	Forward Current
V_F	Forward Voltage @ I_F



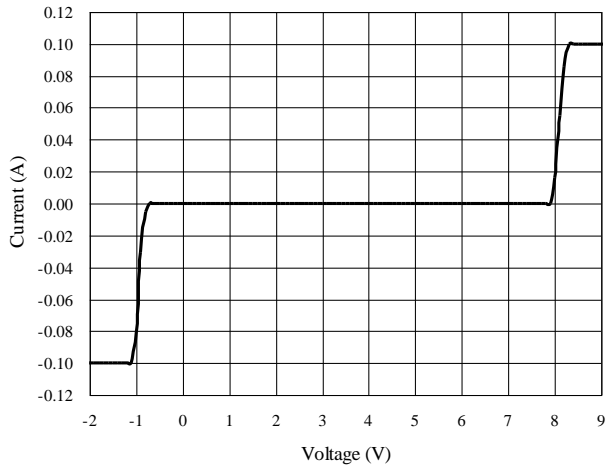
Symbol	Test Condition	Minimum	Typical	Maximum	Units
V_{RWM}				5.0	V
I_R	$V_{RWM} = 5V, T = 25^{\circ}C$ Between I/O and GND		0.1	1.0	μ A
V_{BR}	$I_T = 1mA$ Between I/O and GND	6.0	8.0	10.0	V
V_C^1	$I_{PP} = 3A, t_p = 8/20\mu s$ Between I/O and GND		10	12	V
V_C^1	$I_{PP} = 16A, t_p = 10/100ns$ Between I/O and GND		10.5	12.5	V
$R_{DYN}^{1,2}$	$t_p = 10/100ns$ Between I/O and GND		0.2		Ω
C_{ESD}^1	$V_R = 0V, f = 1MHz$ Between I/O and GND		0.6	0.8	pF
C_{ESD}^1	$V_R = 0V, f = 1MHz$ Between I/O and I/O		0.25	0.4	pF

NOTES

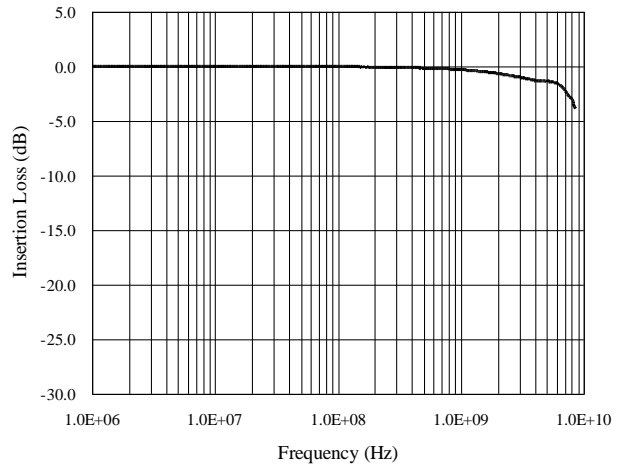
¹Guaranteed by design and not subject to production test.

² R_{DYN} calculated based on $I_{PP}=8A$ to $I_{PP}=16A, t_p = 10/100ns$.

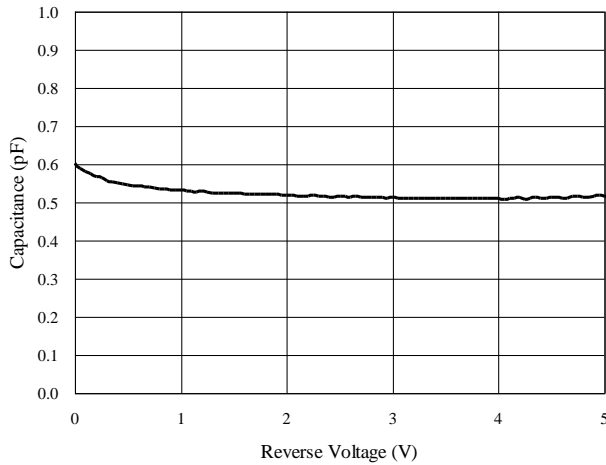
Voltage Sweeping of I/O to GND



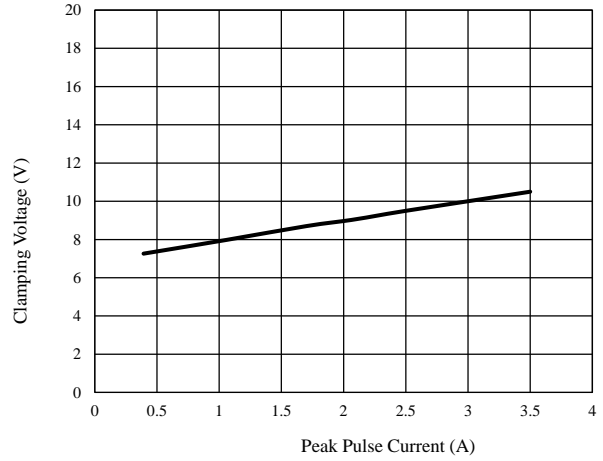
Insertion Loss S21 of I/O to GND



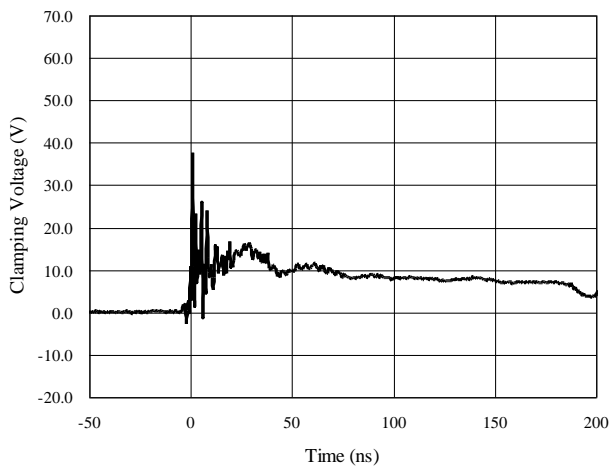
**Capacitance vs. Voltage of I/O to GND
(f = 1MHz)**



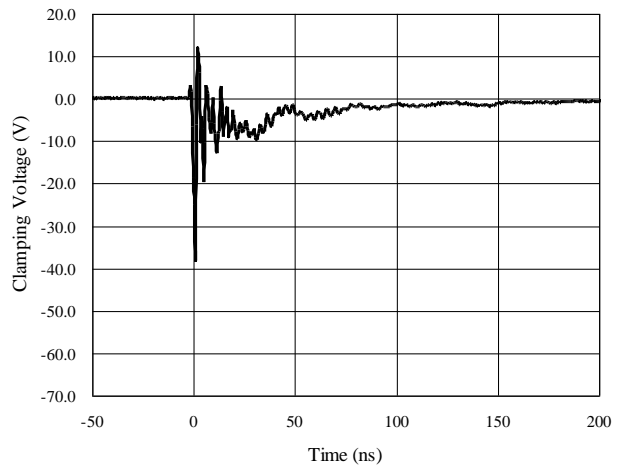
**Clamping Voltage vs. Peak Pulse Current
(8/20μs)**



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



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



Application Information

Pin Connection in PCB

SYT06U05ABC is capable to provide ESD protection for four data lines simultaneously. The pin connection is shown in Figure 1.

Four parallel data lines, from inner IC to I/O port connector, could connect to SYT06U05ABC four I/O pins directly. Pin 2 of SYT06U05ABC is the negative reference pin, which should connect to the GND of PCB. The connection wires should be as short as possible in order to minimize the parasitic inductance.

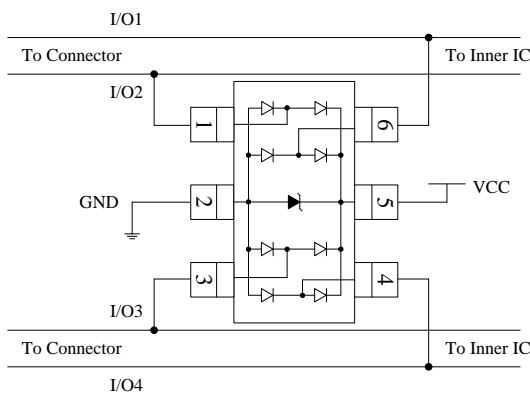


Figure 1 SYT06U05ABC pin connection in PCB

PCB Layout Guidelines

For optimum ESD protection and the whole circuit performance, the following PCB layout guidelines are recommended:

- SYT06U05ABC GND pin to the PCB GND rail path should be as short as possible. It could reduce the ESD transient return path to GND.
- The vias connecting SYT06U05ABC VCC & GND pins to the PCB VCC & GND should be wide.
- Place SYT06U05ABC as close to the connector port as possible. It could reduce the parasitic inductance and restrict ESD coupling into adjacent traces.
- Avoid running critical signals near board edges.

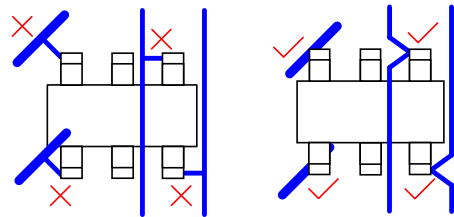
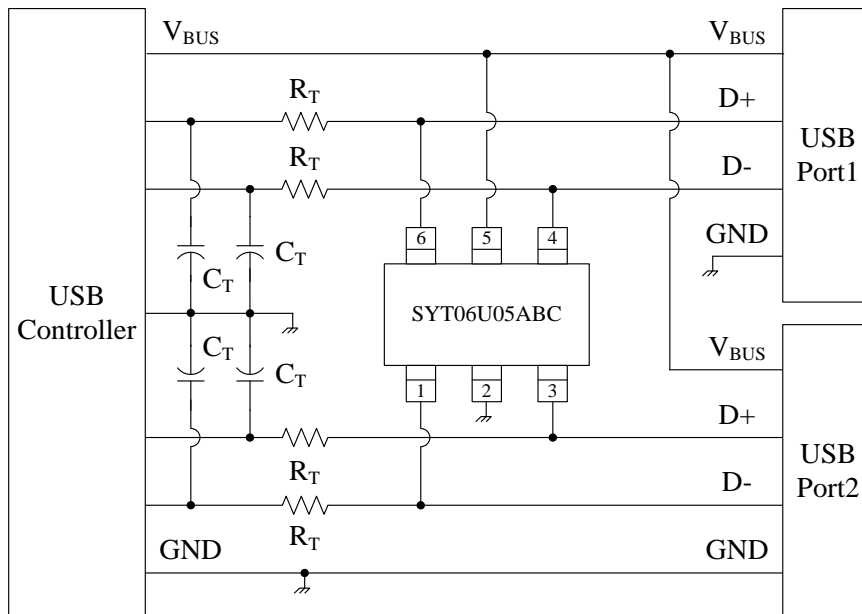
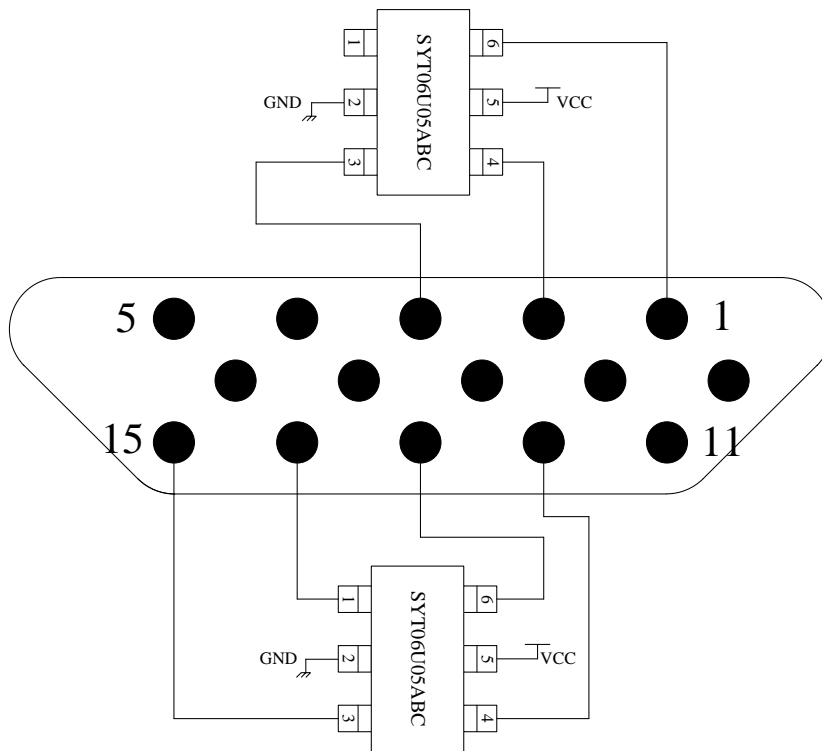


Figure 2 SYT06U05ABC Layout Guideline

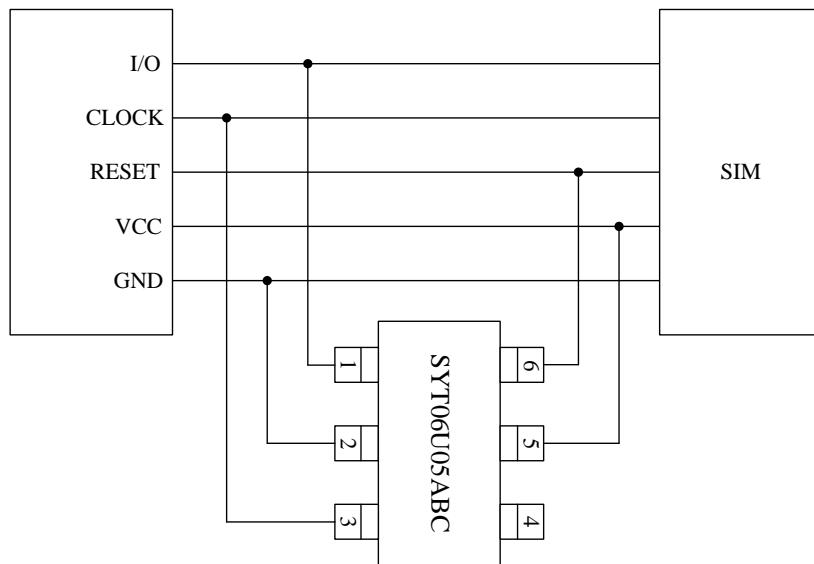
Universal Serial Bus ESD Protection



Application Information (continued)



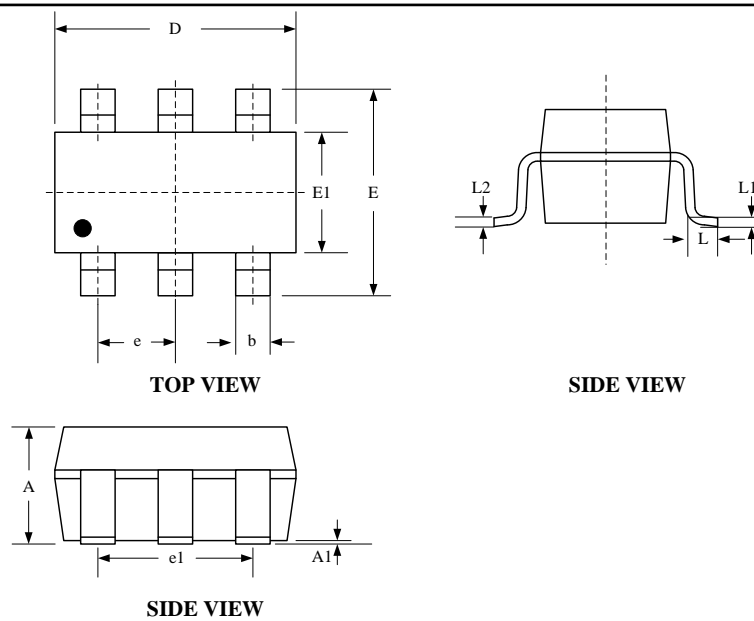
Layout Top View for Video (VGA) Interface with SYT06U05ABC



Layout Top View for SIM Port with SYT06U05ABC

Package Outline

- SOT23-6 package

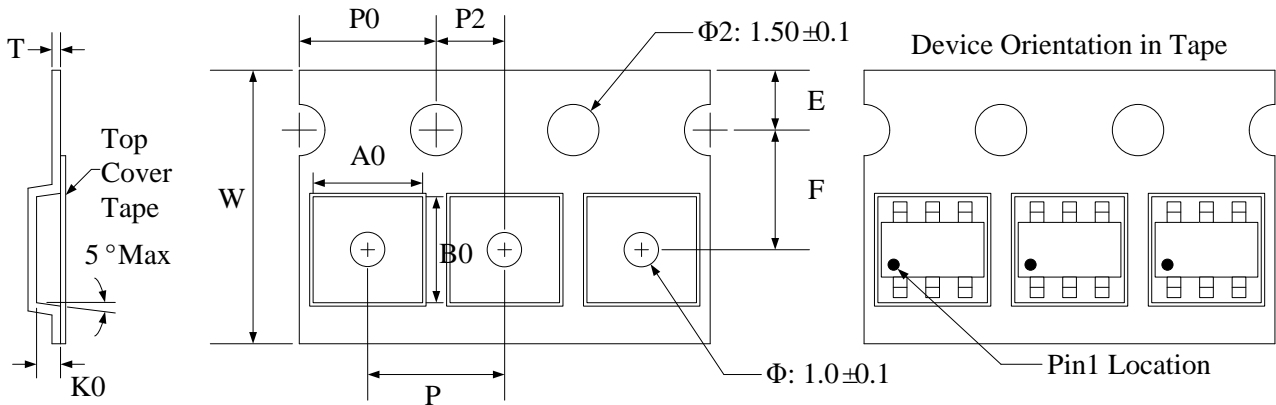


Package Dimensions

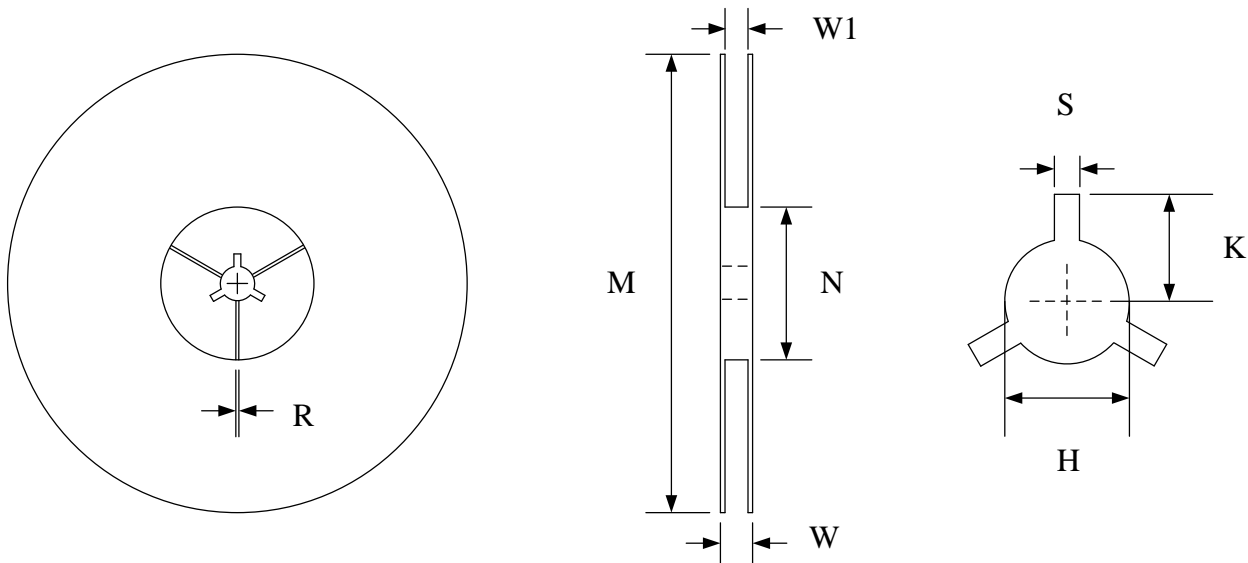
Symbol	Dimensions In Millimeters	
	Minimum	Maximum
A	1.00	1.30
A1	0.01	0.10
D	2.80	3.10
E	2.70	3.00
E1	1.50	1.70
b	0.30	0.50
e	0.95 TYP	
e1	1.90 TYP	
L	0.30	0.60
L1	0.25 TYP	
L2	0.10	0.15

Notes: All dimension in millimeter and exclude mold flash & metal burr.

Tape and Reel Specification

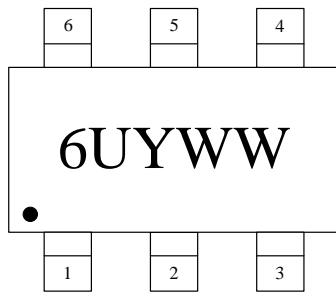


Symbol	W	A0	B0	K0	E	F	P	P0	P2	T
Dimensions (mm)	8.00 ± 0.3 -0.1	3.23 ± 0.05	3.17 ± 0.05	1.37 ± 0.05	1.75 ± 0.1	3.5 ± 0.05	4.0 ± 0.1	4.0 ± 0.1	2.0 ± 0.05	0.25 ± 0.02



Symbol	Reel Size	M	N	W	W1	H	S	K	R
Dimensions (mm)	$\Phi 178$	178.0 ± 1.0	60.0 ± 1.0	11.5 ± 0.5	9.0 ± 0.5	13.0 ± 0.5	2.0 ± 0.1	11.0 ± 0.2	1.0 ± 0.05

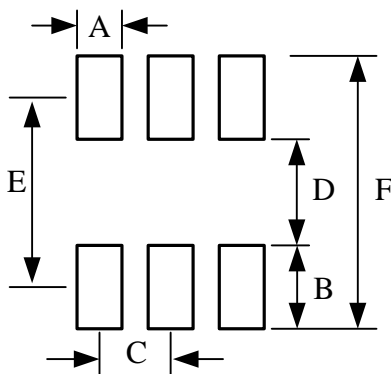
Marking Codes



Note:

- (1) “6U” is part number, fixed.
- (2) “YWW” is date code. “Y” is the assembly year (2011 is “1”); while “WW” is the assembly week in a year.

Footprint: SOT23-6



Symbol	Dimensions	
	Millimeter	Inches
A	0.60	0.024
B	1.10	0.043
C	0.95	0.037
D	1.40	0.055
E	2.50	0.098
F	3.60	0.141

Ordering Information

Part Number	Working Voltage	Quantity Per Reel	Reel Size
SYT06U05ABC	5V	3,000	7 Inch



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