

### Features

- Transient protection for super-speed data lines  
IEC 61000-4-2 (ESD)  $\pm 15\text{kV}$  (Air)  
 $\pm 15\text{kV}$  (Contact)  
IEC 61000-4-5 (Surge) 6A (8/20  $\mu\text{s}$ )
- ESD protection for super-speed differential signal (above 10Gb/s) channels
- Fast turn-on and low clamping voltage
- Protects eight data lines
- Ultra-low capacitance: 0.42pF@ 1.65V (Typical)
- Low leakage current: 0.01 $\mu\text{A}$  @ 3.6V (Typical)
- Each I/O pin can withstand over 1000 ESD strikes for  $\pm 8\text{kV}$  contact discharge

### Description

SYT18A03SFC is an ultra-low capacitance Transient Voltage Suppressor (TVS) designed to provide electrostatic discharge (ESD) protection for super-speed data interfaces. With typical capacitance of 0.42pF only, SYT18A03SFC is designed to protect parasitic-sensitive systems against over-voltage and over-current transient events. It complies with IEC 61000-4-2 (ESD), ( $\pm 15\text{kV}$  air,  $\pm 15\text{kV}$  contact discharge), IEC 61000-4-5 (Surge) 6A (8/20  $\mu\text{s}$ ), etc.

SYT18A03SFC uses DFN3.8\*1.0-9 package. Each SYT18A03SFC device can protect eight super-speed data lines. The combined features of ultra-low capacitance, small size and high ESD robustness make SYT18A03SFC ideal for super-speed data ports and high-frequency lines (e.g., HDMI & USB3.x) applications. The low clamping voltage of the SYT18A03SFC guarantees a minimum stress on the protected IC.

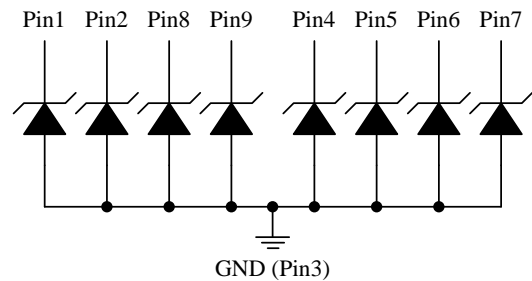
### Applications

- USB3.1/3.0 Data Line Protection
- USB3.1/3.0 Type-C
- HDMI 1.3, 1.4 and 2.0

### Mechanical Characteristics

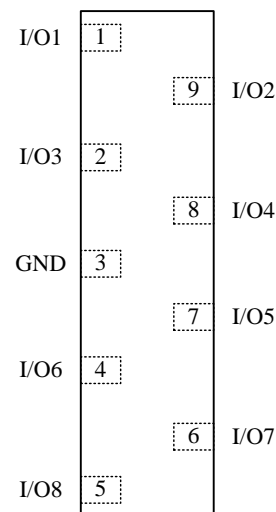
- DFN3.8\*1.0-9 package
- Marking: Device code, date code
- Packaging: Tape and Reel

### Circuit Diagram



SYT18A03SFC (DFN3.8\*1.0-9)

### Pin Configuration



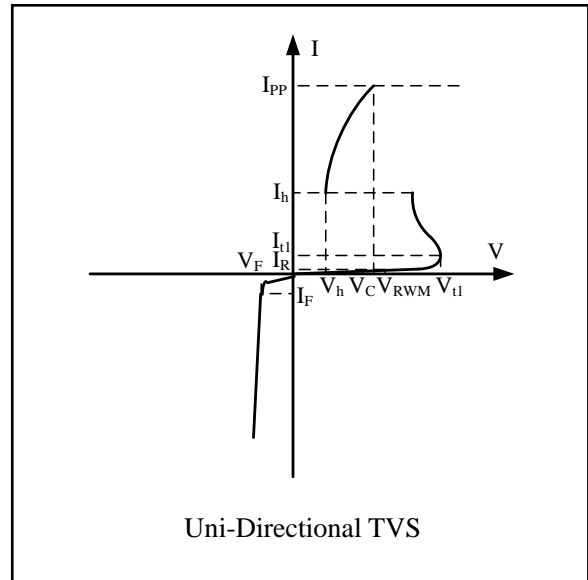
SYT18A03SFC  
DFN3.8\*1.0-9 (Top View)

**Absolute Maximum Rating**

Symbol	Parameter	Value	Units
$I_{PP}$	Maximum Peak Pulse Current (8/20 $\mu$ s)	6	A
$P_{PK}$	Maximum Peak Pulse Power (8/20 $\mu$ s)	30	Watts
$V_{ESD}$	ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	$\pm 15$ $\pm 15$	kV
$T_{OPT}$	Operating Temperature	-40 to +125	$^{\circ}$ C
$T_{STG}$	Storage Temperature	-55 to +150	$^{\circ}$ C

**Electrical Characteristics ( $T_A = 25^{\circ}$ C)**

Symbol	Parameter
$V_{RWM}$	Nominal Reverse Working Voltage
$I_R$	Reverse Leakage Current @ $V_{RWM}$
$V_{t1}$	Reverse Triggering Voltage @ $I_T$
$I_{t1}$	Test Current for Reverse Triggering
$V_C$	Clamping Voltage @ $I_{PP}$
$I_{PP}$	Maximum Peak Pulse Current
$C_{ESD}$	Parasitic Capacitance
$V_R$	Reverse Voltage
$f$	Small Signal Frequency
$I_h$	Holding Current
$V_h$	Holding Voltage @ $I_h$



Symbol	Test Condition	Minimum	Typical	Maximum	Units
$V_{RWM}$				3.6	V
$I_R$	$V_{RWM} = 3.6V, T_A = 25^{\circ}C$		0.01	0.1	$\mu$ A
$V_{t1}$	$I_{t1} = 1mA$	3.7	4.5	6	V
$V_h$	$I_h = 100mA$	0.8			V
$V_C^1$	$I_{PP} = 6A, t_p = 8/20\mu s$		4.5		V
$V_C^1$	$I_{PP} = 16A, t_p = 10/100ns$		6.0		V
$R_{DYN}^{1,2}$	$t_p = 10/100ns$		0.30		$\Omega$
$C_{ESD}^1$	$V_R = 1.65V, f = 1MHz$		0.42	0.55	pF

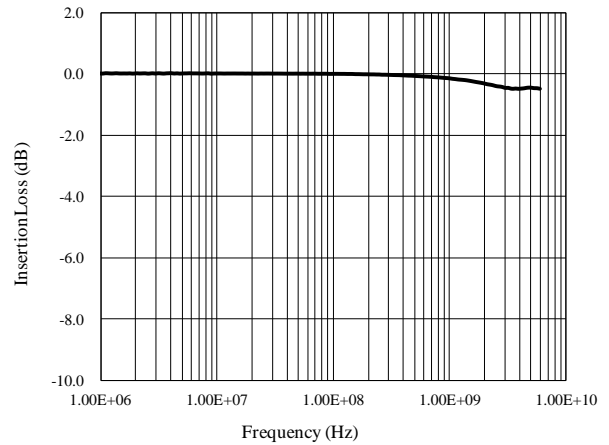
**NOTES**
<sup>1</sup>Guaranteed by design and not subject to production test.

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

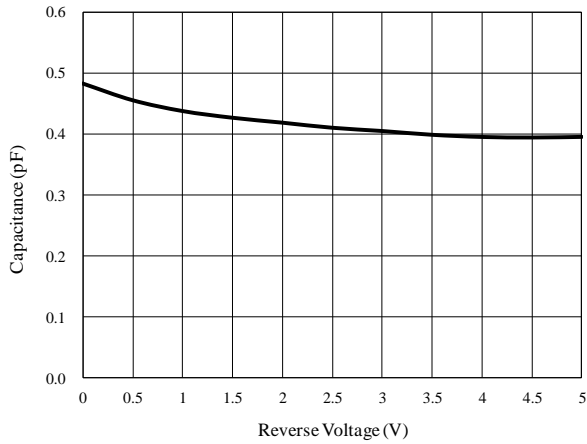
## TLP Testing of I/O to GND



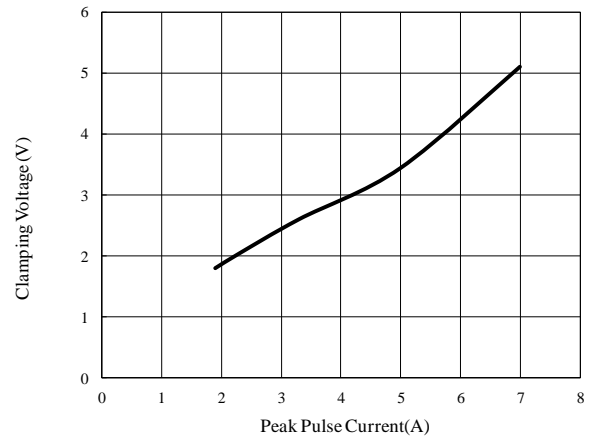
## Insertion Loss S21 of I/O to GND



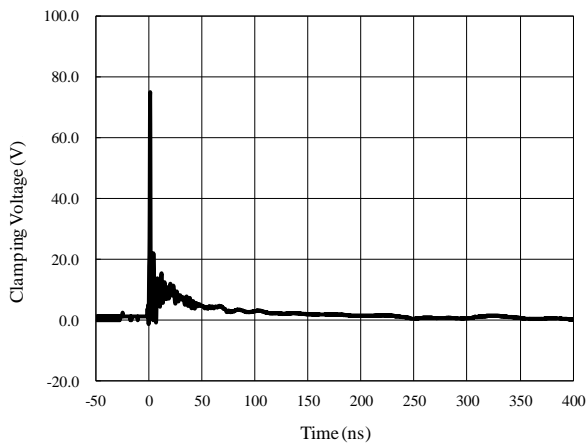
## Capacitance vs. Voltage of I/O to GND



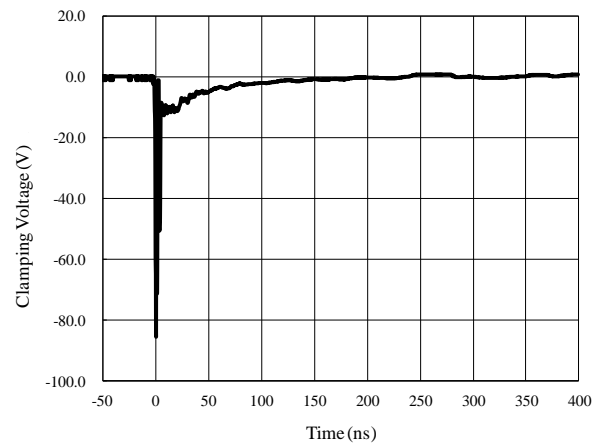
## Clamping Voltage vs. Peak Pulse Current (8/20μs)



## 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

SYT18A03SFC provides ESD protection for eight data lines simultaneously. The pin connection of SYT18A03SFC is shown in Figure 1 and Figure 2. Eight parallel data lines, from inner IC to I/O port connector, could connect to SYT18A03SFC eight I/O

pins directly.

Pin3 of SYT18A03SFC is GND pin, the GND pin of should be connected to the GND of PCB. The wire should be as short as possible in order to minimize the parasitic.

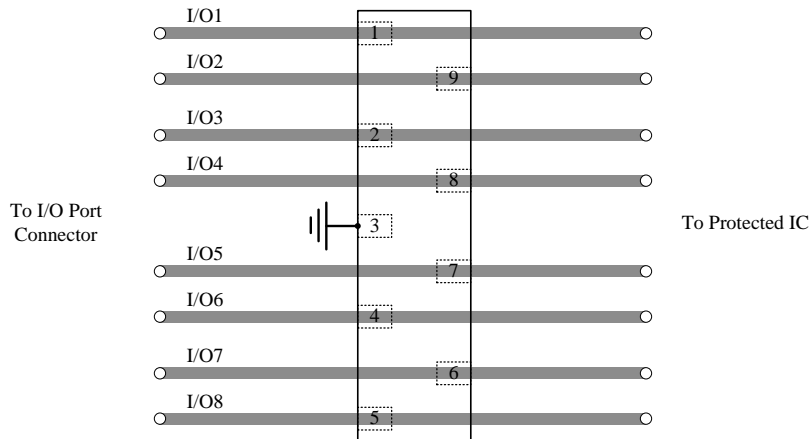
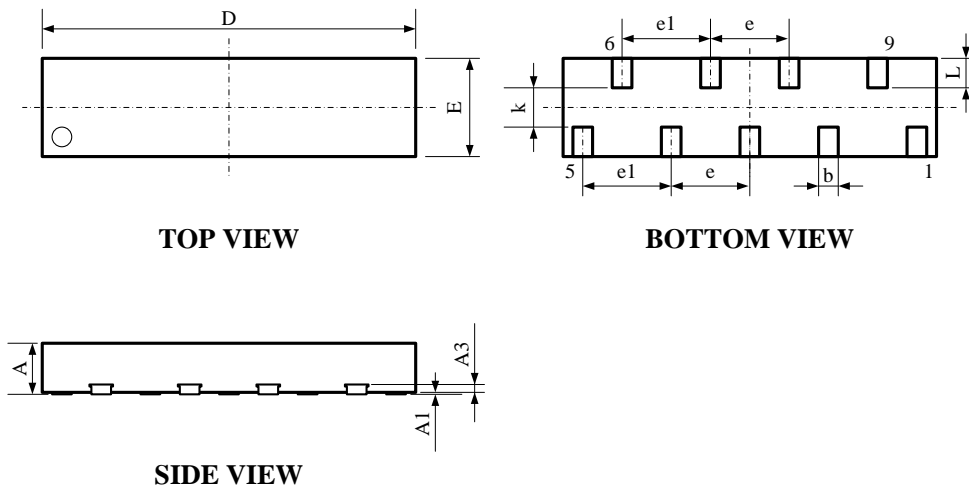


Figure 1 SYT18A03SFC pin connection in PCB providing 8 data lines protection.

## Package Outline

- DFN3.8\*1.0-9 package



Package Dimensions (Controlling dimensions are in millimeters)

SYMBOL	Millimeter			Inches		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.450	0.500	0.550	0.018	0.020	0.022
A1	-	0.020	0.050		0.001	0.002
A3	0.110 REF.			0.004 REF.		
b	0.150	0.200	0.250	0.006	0.008	0.010
k	0.200 MIN.			0.008 MIN.		
D	3.700	3.800	3.900	0.146	0.150	0.154
e	0.800 TYP.			0.031 TYP		
e1	0.900 TYP.			0.035 TYP		
E	0.900	1.000	1.100	0.035	0.039	0.043
L	0.200	0.300	0.400	0.008	0.012	0.016

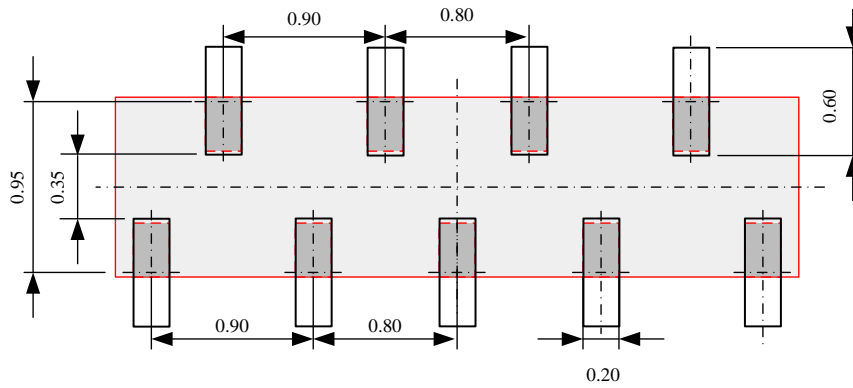
**Notes:** All dimension in mm and exclude mold flash & metal burr.



**SILERGY**

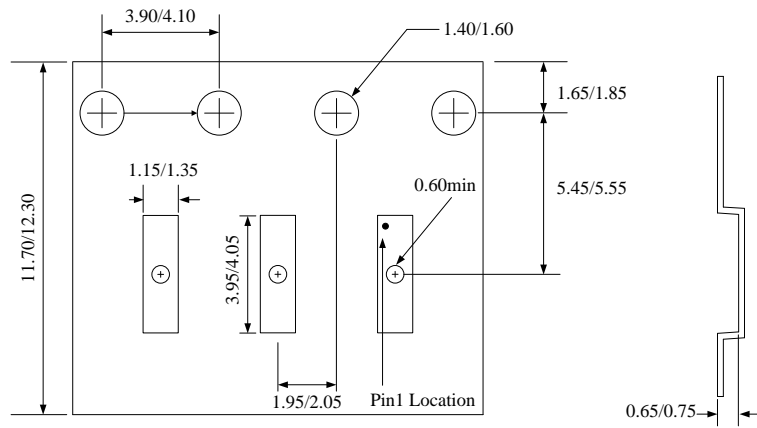
**PCB Layout Pattern**

**SYT18A03SFC**



Notes: All dimension in millimeter

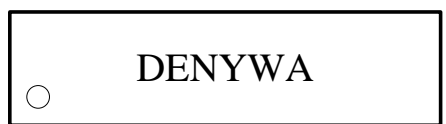
**Tape and Reel Specification**



Feeding direction →

Package types	Tape width (mm)	Pocket pitch(mm)	Reel size (Inch)	Qty per reel (pcs)
DFN3.8*1.0-9	12	4	7"	3000

**Marking Codes**



**Note:**

- (1) "DEN" is the device code.
- (2) "YWA" is date code.

**Ordering Information**

Part Number	Working Voltage	Quantity Per Reel	Reel Size
SYT18A03SFC	3.6V	3,000	7 Inch

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