

# SMS05C, SMS12C, SMS15C, SMS24C

## 5-Line Transient Voltage Suppressor Array

This 5-line voltage transient suppressor array is designed for application requiring transient voltage protection capability. It is intended for use in over-transient voltage and ESD sensitive equipment such as computers, printers, automotive electronics, networking communication and other applications. This device features a monolithic common anode design which protects five independent lines in a single TSOP-6 package.

### Features

- Protects up to 5 Lines in a Single TSOP-6 Package
- Peak Power Dissipation – 350 W (8 × 20 μs Waveform)
- ESD Rating of Class 3B (Exceeding 8.0 kV) per Human Body Model and Class C (Exceeding 400 V) per Machine Model
- Compliance with IEC 61000-4-2 (ESD) 15 kV (Air), 8.0 kV (Contact)
- Flammability Rating of UL 94 V-0
- These are Pb-Free Devices

### Applications

- Hand-Held Portable Applications
- Networking and Telecom
- Automotive Electronics
- Serial and Parallel Ports
- Notebooks, Desktops, Servers

### MAXIMUM RATINGS (T<sub>J</sub> = 25°C unless otherwise specified)

Symbol	Rating	Value	Unit
P <sub>PK</sub> 1	Peak Power Dissipation 8 × 20 μs Double Exponential Waveform (Note 1)	350	W
T <sub>J</sub>	Operating Junction Temperature Range	-40 to 150	°C
T <sub>STG</sub>	Storage Temperature Range	-55 to 150	°C
T <sub>L</sub>	Lead Solder Temperature (10 s)	260	°C
ESD	Human Body Model ( HBM) Machine Model (MM) IEC 61000-4-2 Air (ESD) IEC 61000-4-2 Contact (ESD)	>8000 >400 >15000 >8000	V

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Non-repetitive current pulse per Figure 3.

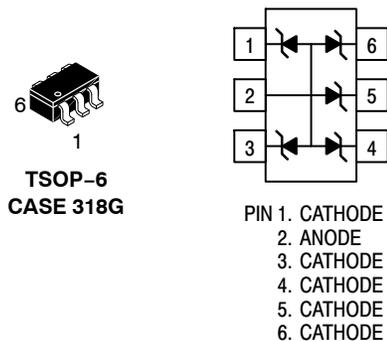


ON Semiconductor®

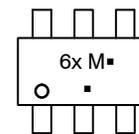
<http://onsemi.com>

## TSOP-6 FIVE TRANSIENT VOLTAGE SUPPRESSOR 350 W PEAK POWER

### PIN ASSIGNMENT



### MARKING DIAGRAM



- x = SMS05C:J
- = SMS12C:K
- = SMS15C:L
- = SMS24C:M
- M = Date Code
- = Pb-Free Package

(Note: Microdot may be in either location)

### ORDERING INFORMATION

Device	Package	Shipping†
SMS05CT1G	TSOP-6 (Pb-Free)	3000/Tape & Reel
SMS12CT1G		
SMS15CT1G		
SMS24CT1G		

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

## SMS05C, SMS12C, SMS15C, SMS24C

### SMS05C ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	$V_{RWM}$	(Note 2)			5.0	V
Breakdown Voltage	$V_{BR}$	$I_T = 1.0\text{ mA}$ (Note 3)	6.2		7.2	V
Reverse Leakage Current	$I_R$	$V_{RWM} = 5.0\text{ V}$			5.0	$\mu\text{A}$
Clamping Voltage	$V_C$	$I_{PP} = 5.0\text{ A}$ ( $8 \times 20\ \mu\text{s}$ Waveform)			9.8	V
Clamping Voltage	$V_C$	$I_{PP} = 24\text{ A}$ ( $8 \times 20\ \mu\text{s}$ Waveform)			14.5	V
Maximum Peak Pulse Current	$I_{PP}$	$8 \times 20\ \mu\text{s}$ Waveform			24	A
Capacitance	$C_J$	$V_R = 0\text{ V}$ , $f = 1.0\text{ MHz}$ (Line to GND)		260	400	pF

### SMS12C ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	$V_{RWM}$	(Note 2)			12	V
Breakdown Voltage	$V_{BR}$	$I_T = 1.0\text{ mA}$ (Note 3)	13.3		15	V
Reverse Leakage Current	$I_R$	$V_{RWM} = 12\text{ V}$		0.001	1.0	$\mu\text{A}$
Clamping Voltage	$V_C$	$I_{PP} = 5.0\text{ A}$ ( $8 \times 20\ \mu\text{s}$ Waveform)			19	V
Clamping Voltage	$V_C$	$I_{PP} = 15\text{ A}$ ( $8 \times 20\ \mu\text{s}$ Waveform)			23	V
Maximum Peak Pulse Current	$I_{PP}$	$8 \times 20\ \mu\text{s}$ Waveform			15	A
Capacitance	$C_J$	$V_R = 0\text{ V}$ , $f = 1.0\text{ MHz}$ (Line to GND)		120	150	pF

### SMS15C ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ , unless otherwise specified) (See Note 4)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	$V_{RWM}$	(Note 2)			15	V
Breakdown Voltage	$V_{BR}$	$I_T = 1.0\text{ mA}$ (Note 3)	17		19	V
Reverse Leakage Current	$I_R$	$V_{RWM} = 15\text{ V}$		0.05	1.0	$\mu\text{A}$
Clamping Voltage	$V_C$	$I_{PP} = 5.0\text{ A}$ ( $8 \times 20\ \mu\text{s}$ Waveform)			24	V
Clamping Voltage	$V_C$	$I_{PP} = 12\text{ A}$ ( $8 \times 20\ \mu\text{s}$ Waveform)			29	V
Maximum Peak Pulse Current	$I_{PP}$	$8 \times 20\ \mu\text{s}$ Waveform			12	A
Capacitance	$C_J$	$V_R = 0\text{ V}$ , $f = 1.0\text{ MHz}$ (Line to GND)		95	125	pF

### SMS24C ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	$V_{RWM}$	(Note 2)			24	V
Breakdown Voltage	$V_{BR}$	$I_T = 1.0\text{ mA}$ (Note 3)	26.7		32	V
Reverse Leakage Current	$I_R$	$V_{RWM} = 24\text{ V}$		0.001	1.0	$\mu\text{A}$
Clamping Voltage	$V_C$	$I_{PP} = 5.0\text{ A}$ ( $8 \times 20\ \mu\text{s}$ Waveform)			40	V
Clamping Voltage	$V_C$	$I_{PP} = 8\text{ A}$ ( $8 \times 20\ \mu\text{s}$ Waveform)			44	V
Maximum Peak Pulse Current	$I_{PP}$	$8 \times 20\ \mu\text{s}$ Waveform			8.0	A
Capacitance	$C_J$	$V_R = 0\text{ V}$ , $f = 1.0\text{ MHz}$ (Line to GND)		60	75	pF

2. TVS devices are normally selected according to the working peak reverse voltage ( $V_{RWM}$ ), which should be equal or greater than the DC or continuous peak operating voltage level.
3.  $V_{BR}$  is measured at pulse test current  $I_T$ .
4. Parametrics are the same for the Pb-Free packages, which are suffixed with a "G".

# SMS05C, SMS12C, SMS15C, SMS24C

## TYPICAL PERFORMANCE CURVES ( $T_J = 25^\circ\text{C}$ unless otherwise specified)

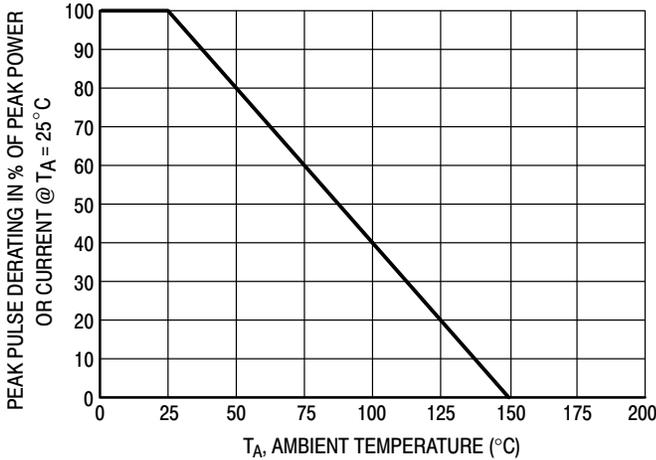


Figure 1. Pulse Derating Curve

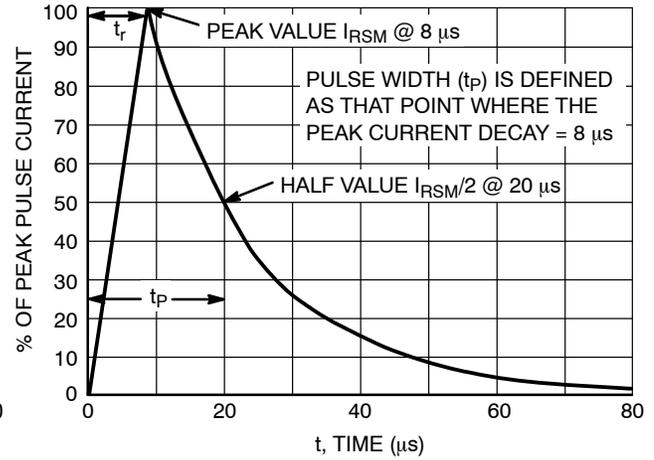


Figure 2.  $8 \times 20 \mu\text{s}$  Pulse Waveform

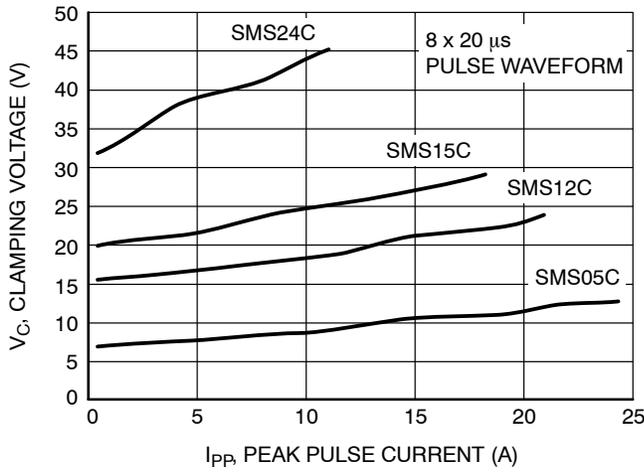


Figure 3. Clamping Voltage vs. Peak Pulse Current

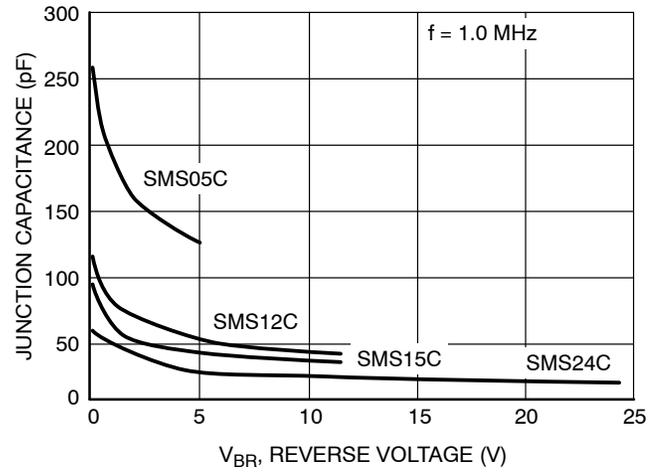


Figure 4. Junction Capacitance vs. Reverse Voltage

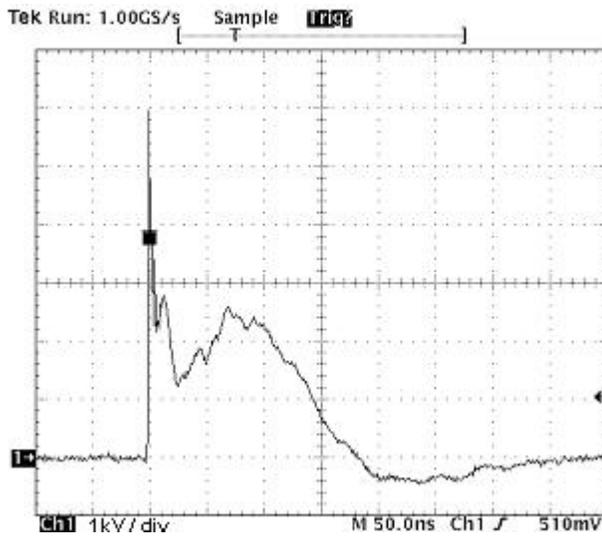


Figure 5. ESD Pulse IEC 61000-4-2 (8.0 kV Contact)

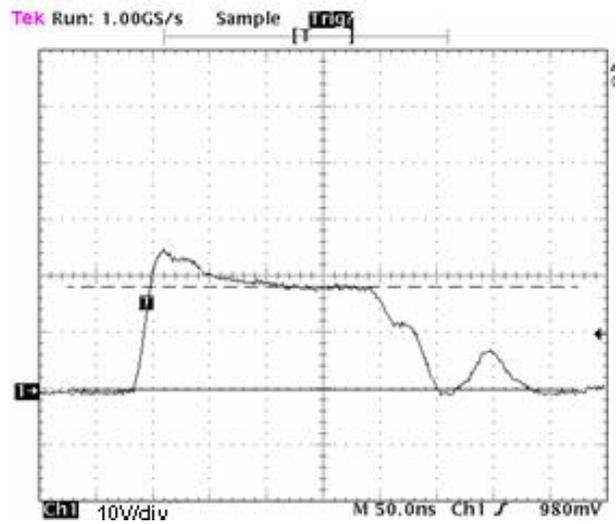


Figure 6. SMS15CT1 ESD Response for IEC 61000-4-2 (+8.0 kV Contact)

# SMS05C, SMS12C, SMS15C, SMS24C

## TYPICAL COMMON ANODE APPLICATIONS

A 5 TVS junction common anode design in a TSOP-6 package protects four separate lines using only one package. This adds flexibility and creativity to PCB design especially

when board space is at a premium. A simplified example of SMS05C Series Device applications is illustrated below.

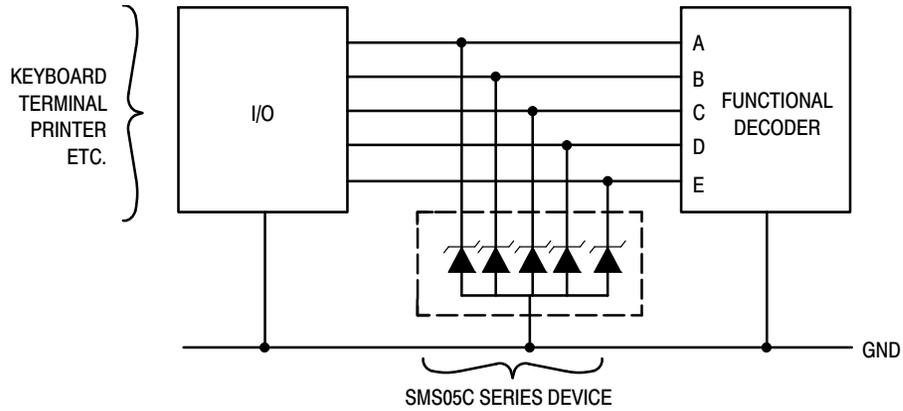


Figure 7. Computer Interface Protection

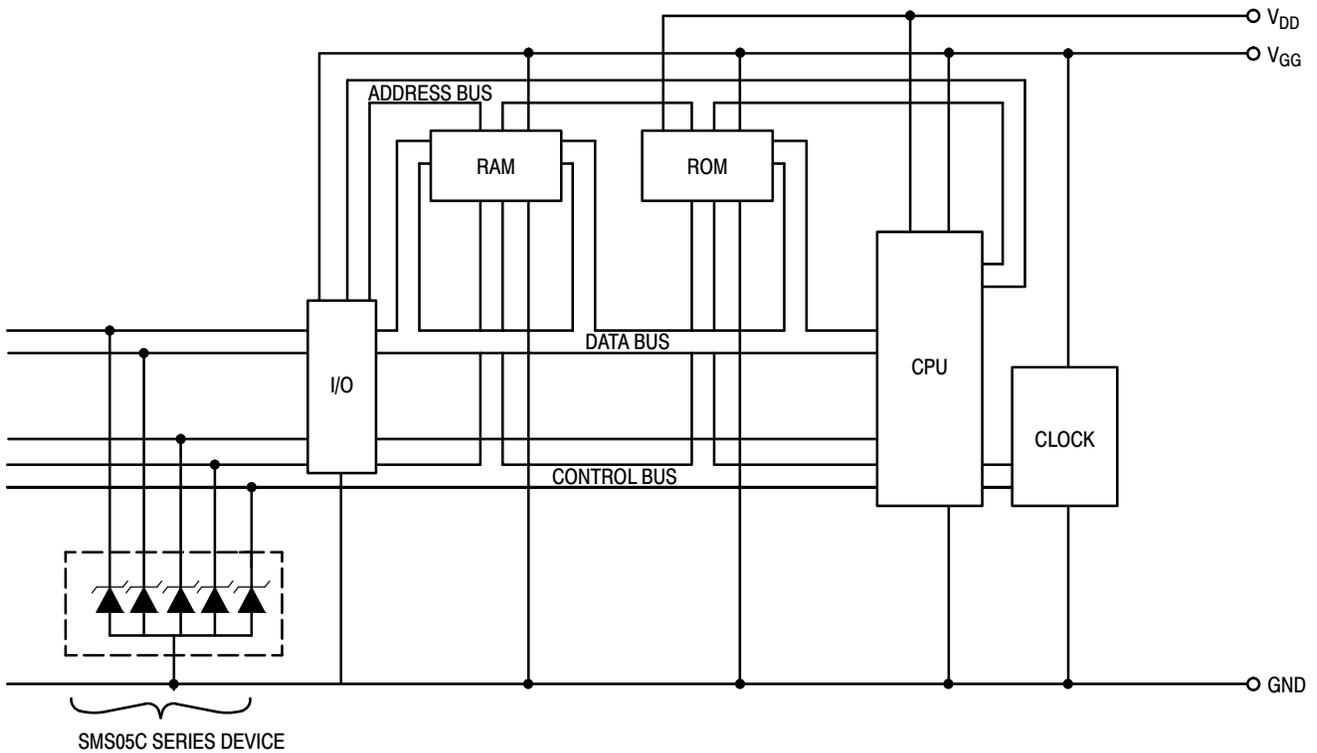
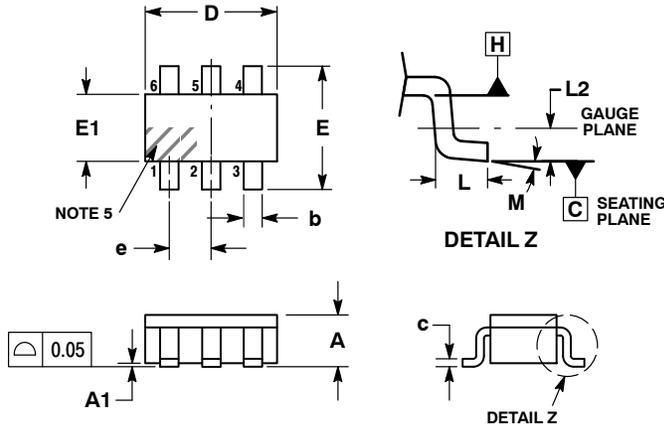


Figure 8. Microprocessor Protection

# SMS05C, SMS12C, SMS15C, SMS24C

## PACKAGE DIMENSIONS

### TSOP-6 CASE 318G-02 ISSUE U

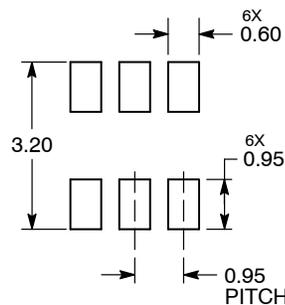


#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE. DIMENSIONS D AND E1 ARE DETERMINED AT DATUM H.
5. PIN ONE INDICATOR MUST BE LOCATED IN THE INDICATED ZONE.

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	0.90	1.00	1.10
A1	0.01	0.06	0.10
b	0.25	0.38	0.50
c	0.10	0.18	0.26
D	2.90	3.00	3.10
E	2.50	2.75	3.00
E1	1.30	1.50	1.70
e	0.85	0.95	1.05
L	0.20	0.40	0.60
L2	0.25 BSC		
M	0°	-	10°

### RECOMMENDED SOLDERING FOOTPRINT\*



DIMENSIONS: MILLIMETERS

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

ON Semiconductor and are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

#### PUBLICATION ORDERING INFORMATION

**LITERATURE FULFILLMENT:**  
Literature Distribution Center for ON Semiconductor  
P.O. Box 5163, Denver, Colorado 80217 USA  
**Phone:** 303-675-2175 or 800-344-3860 Toll Free USA/Canada  
**Fax:** 303-675-2176 or 800-344-3867 Toll Free USA/Canada  
**Email:** orderlit@onsemi.com

**N. American Technical Support:** 800-282-9855 Toll Free  
USA/Canada  
**Europe, Middle East and Africa Technical Support:**  
Phone: 421 33 790 2910  
**Japan Customer Focus Center**  
Phone: 81-3-5817-1050

**ON Semiconductor Website:** [www.onsemi.com](http://www.onsemi.com)

**Order Literature:** <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative

# AMEYA360

## Components Supply Platform

Authorized Distribution Brand :



Website :

Welcome to visit [www.ameya360.com](http://www.ameya360.com)

Contact Us :

➤ Address :

401 Building No.5, JiuGe Business Center, Lane 2301, Yishan Rd  
Minhang District, Shanghai , China

➤ Sales :

Direct +86 (21) 6401-6692

Email [amall@ameya360.com](mailto:amall@ameya360.com)

QQ 800077892

Skype [ameyasales1](#) [ameyasales2](#)

➤ Customer Service :

Email [service@ameya360.com](mailto:service@ameya360.com)

➤ Partnership :

Tel +86 (21) 64016692-8333

Email [mkt@ameya360.com](mailto:mkt@ameya360.com)