

CMOS Low Voltage, 4Ω Four-Channel Switch

PRODUCT DESCRIPTION

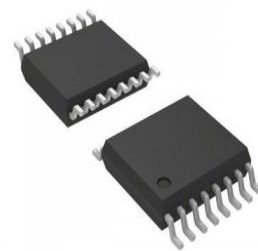
The MS713/MS713T is a CMOS optional four-channel switch with several features, such as low power dissipation, high switch speed, low on-resistance, low leakage current and wide bandwidth. The operating voltage ranges from 1.8V to 5.5V. The MS713/MS713T can be widely used in battery-powered devices, new generation DAC and ADC systems. The wide bandwidth feature makes it ideal for USB1.1 signal and video signal processing systems.

The logic control of the MS713/MS713T is that when two channels are low level, the switch is turned on and the other two are opposite On-resistance is matched well when the switch is turned on.

The MS713/MS713T has lead SOP16 and TSSOP16 packages respectively.



SOP16



TSSOP16

FEATURES

- Operating Voltage : 1.8V to 5.5V
- Low On-resistance : 2.5Ω Typ
- Low On-resistance Flatness
- -3dB Bandwidth : 200MHz
- Low Power Dissipation
- Fast On and Off Time
- Package : SOP16, TSSOP16

APPLICATIONS

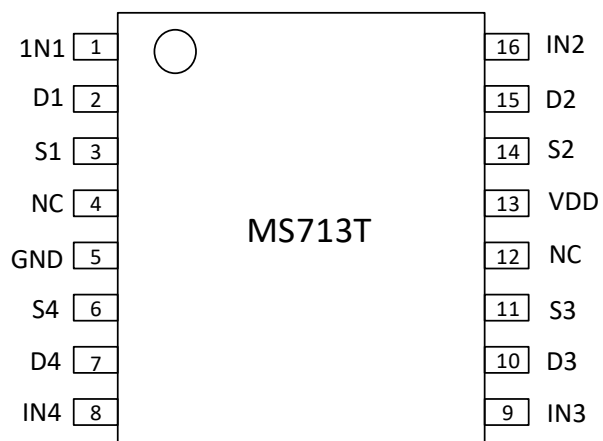
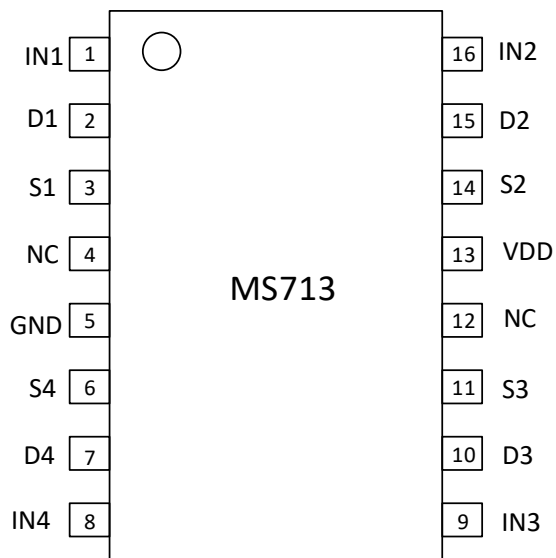
- USB1.1 Signal Switching System
- Earphone
- PDAs
- Battery-powered System
- Sample Hold Circuit
- Audio System
- Video Switching System

PRODUCT SPECIFICATION

Part Number	Package	Marking
MS713T	TSSOP16	MS713T
*MS713	SOP16	MS713

*The package is not available temporarily. If necessary, please contact Hangzhou Ruimeng Sales Department Center.

PIN CONFIGURATION



PIN DESCRIPTION

Pin	Name	Type	Description
1	IN1	I	Digital Control Input, control switch S1-D1
2	D1	IO	Drain Pin, can be used as input or output
3	S1	IO	Source Pin, can be used as input or output
4	NC	-	Not Connection
5	GND	-	Ground
6	S4	IO	Source Pin, can be used as input or output
7	D4	IO	Drain Pin, can be used as input or output
8	IN4	I	Digital Control Input, control switch S4-D4
9	IN3	I	Digital Control Input, control switch S3-D3
10	D3	IO	Drain Pin, can be used as input or output
11	S3	IO	Source Pin, can be used as input or output
12	NC	-	Not Connection
13	VDD	-	Power Supply
14	S2	IO	Source Pin, can be used as input or output
15	D2	IO	Drain Pin, can be used as input or output
16	IN2	I	Digital Control Input, control switch S2-D2

Logic Control

Logic Control Input	MS713/MS713T
IN1/IN2/IN3/IN4	High Level, Switch S1-D1, S4-D4 On; Low Level, Switch S1-D1, S4-D4 Off
	High Level, Switch S2-D2, S3-D3 Off; Low Level, Switch S2-D2, S3-D3 On

ABSOLUTE MAXIMUM RATINGS

Any exceeding absolute maximum rating application causes permanent damage to device. Because long-time absolute operation state affects device reliability. Absolute ratings just conclude from a series of extreme tests. It doesn't represent chip can operate normally in these extreme conditions.

Parameter	Symbol	Ratings	Unit
Power Supply	VDD	-0.3 ~ +6	V
Continuous Current on Source, Drain Pin	I	30	mA
Analog Digital Input Voltage	VIN	-0.3 ~ VDD+0.3	V
Operating Temperature	TA	-40 ~ +85	°C
Storage Temperature	Tstg	-65 ~ +150	°C
Maximum Junction Temperature	Jt	150	°C
Lead Temperature (10s)		260	°C
ESD(HBM)		3000	V

ELECTRICAL CHARACTERISTICS

VDD=5V±10%, GND=0V

Parameter	Symbol	Condition	TA (°C)	Min	Typ	Max	Unit
Analog Switch							
Analog Signal Range	VIS		-40~85	0		VDD	V
On-resistance	RON	VDD=5.0V, VIS=0~VDD,ID=10mA	+25		2.5	4	Ω
			-40~85			4.5	
On-resistance Match for Channel-to-Channel	ΔRON	VDD=5.0V, VIS=0~VDD,ID=10mA	+25				Ω
			-40~85		0.05	0.3	
On-resistance Flatness	RFLAT(ON)	VDD=5.0V, VIS=0~VDD,ID=10mA	+25		0.5		Ω
			-40~85			1.0	
Leakage Current							
Leakage Current on Source Pin (Off)	IS(off)	VDD=+5.5V, VD=1V/4.5V, VS=4.5V/1V	+25		±0.01	±0.1	μA
			-40~85			±0.2	
Leakage Current on Drain Pin (Off)	ID(off)	VDD=+5.5V, VD=1V/4.5V, VS=4.5V/1V	+25		±0.01	±0.1	μA
			-40~85			±0.2	
Leakage Current (On)	ID(ON)	VD=VS=1V/4.5V	+25		±0.01	±0.1	μA
	IS(ON)		-40~85			±0.2	
Digital Input							
Input High-level	VIH		-40~85	3.0			V
Input Low-level	VIL		-40~85			0.8	V
Input Leakage Current	IIN	VIN=VIL or VIH	+25		0.005		μA
			-40~85			±0.1	
Dynamic Performance							
On Time	tON	RL=300Ω, CL=50pF	+25		30		ns
			-40~85			40	
Off Time	tOFF	RL=300Ω, CL=50pF	+25		6		ns
			-40~85			10	
Off before On Delay Time	tD	RL=300Ω,CL=50pF, Vs1=Vs2=3V	+25		6		ns
			-40~85	1			
Charge Injection		Vs=2V,Rs=0Ω,CL=1nF	+25	3			pC

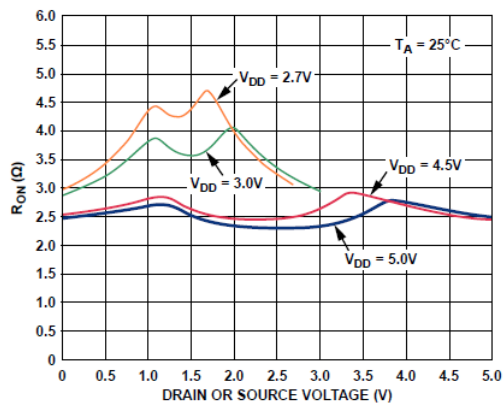
Parameter	Symbol	Condition	TA (°C)	Min	Typ	Max	Unit
Off Isolation	OISO	RL=50Ω, CL=5pF, f=10MHz	+25		-58		dB
		RL=50Ω, CL=5pF, f=1MHz	+25		-78		
Channel-to-Channel Crosstalk	XTALK	RL=50Ω, CL=5pF, f=10MHz	+25		-90		dB
-3dB Bandwidth	BW	RL=50Ω, CL=5pF	+25		200		MHz
Capacitance on Source Pin	CS		+25		10		pF
Capacitance on Drain Pin	CD		+25		10		pF
Capacitance on Source, Drain Pin	CS,CD(on)		+25		22		pF
Power Dissipation							
Current	IDD	VDD=5.5V,	+25		0.001		μA
		Digital Input 0V or 5V	-40~85			1	

VDD=3V±10%, GND=0V

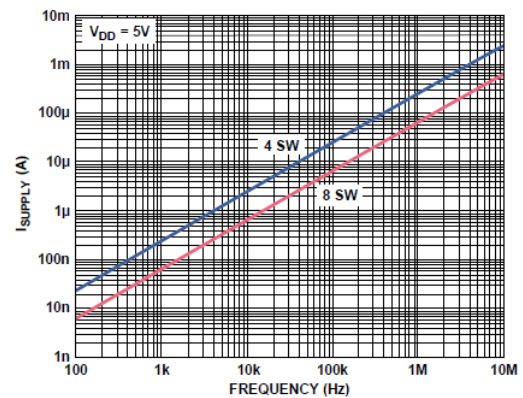
Parameter	Symbol	Condition	TA (°C)	Min	Typ	Max	Unit
Analog Switch							
Analog Signal Range	VIS		-40~85	0		VDD	V
On-resistance	RON	VDD=3.0V, VIS=0~VDD, ID=10mA	+25		5		Ω
			-40~85		5.5	8	
On-resistance Match for Channel-to-Channel	ΔRON	VDD=3.0V, VIS=0~VDD, ID=10mA	+25		0.1		Ω
			-40~85			0.3	
On-resistance Flatness	RFLAT(ON)	VDD=3.0V, VIS=0~VDD, ID=10mA	+25		2.5		Ω
			-40~85				
Leakage Current							
Leakage Current on Source Pin (Off)	IS(off)	VD=1V/3V, VS=3V/1V	+25		±0.01	±0.1	μA
			-40~85			±0.2	
Leakage Current on Drain Pin (Off)	ID(off)	VD=1V/3V, VS=3V/1V	+25		±0.01	±0.1	μA
			-40~85			±0.2	
Leakage Current (On)	ID(ON)	VD=VS=1V/3V	+25		±0.01	±0.1	μA
	IS(ON)		-40~85			±0.2	
Digital Input							
Input High-level	VIH		-40~85	2.0			V
Input Low-level	VIL		-40~85			0.4	V
Input Leakage Current	IIN	VIN=VIL or VIH	+25		0.005		μA
			-40~85			±0.1	
Dynamic Performance							
On Time	tON	RL=300Ω, CL=50pF	+25		30		ns
			-40~85			40	
Off Time	tOFF	RL=300Ω, CL=50pF	+25		7		ns
			-40~85			12	
Off before On Delay Time	tD	RL=300Ω, CL=50pF, Vs1=Vs2=3V	+25		7		ns
			-40~85	1			
Charge Injection		Vs=2V, Rs=0Ω, CL=1nF	+25	3			pC
Off Isolation	OISO	RL=50Ω, CL= 5pF, f=10MHz	+25		-58		dB
		RL=50Ω, CL=5pF, f=1MHz	+25		-78		

Parameter	Symbol	Condition	TA (°C)	Min	Typ	Max	Unit
Channel-to-Channel Crosstalk	XTALK	RL=50Ω, CL=5pF, f=10MHz	+25		-90		dB
-3dB Bandwidth	BW	RL=50Ω, CL=5pF	+25		200		MHz
Capacitance on Source Pin	CS		+25		10		pF
Capacitance on Drain Pin	CD		+25		10		pF
Capacitance on Source, Drain Pin	CS,CD(on)		+25		22		pF
Power Dissipation							
Current	IDD	VDD=5.5V, Digital Input 0V or 5V	+25		0.001		μA
			-40~85			1	

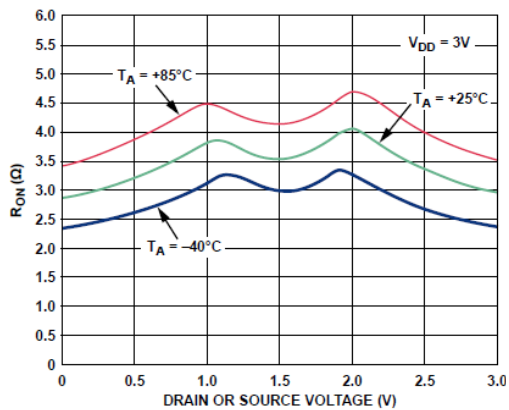
TYPICAL CURVES



On-resistance VS. Source or Drain Voltage

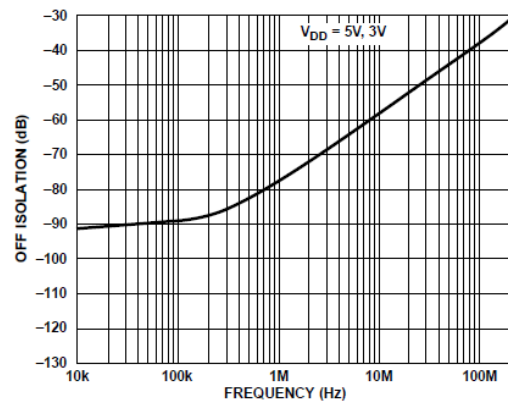


Power Supply Current VS. Switching Frequency

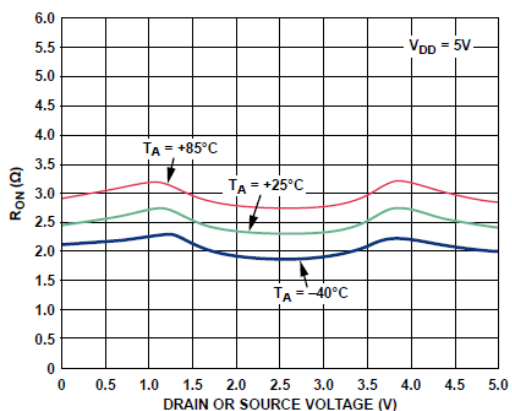


On-resistance VS. Source or Drain Voltage (Different Temperatures)

VDD=3V

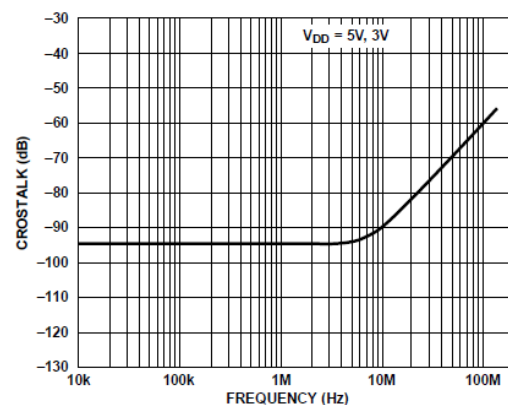


Off Isolation VS. Frequency

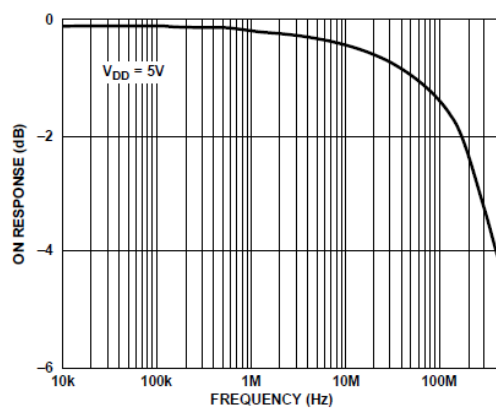


On-resistance VS. Source or Drain Voltage (Different Temperatures)

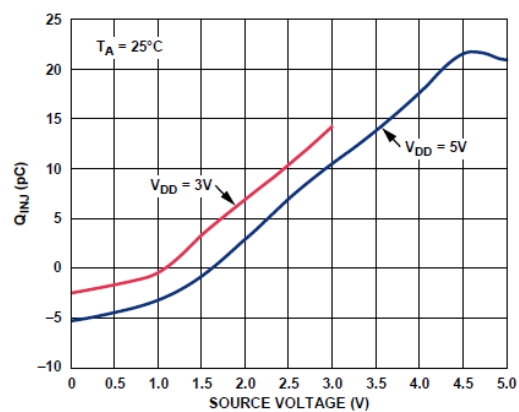
VDD=5V



Crosstalk VS. Frequency

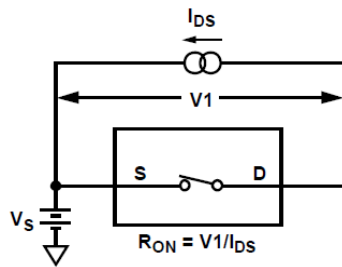


On Response VS. Frequency

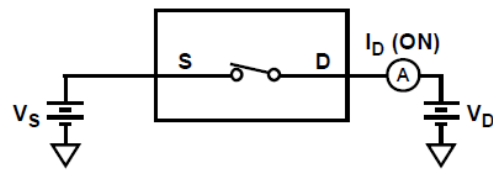


Charge Injection VS. Source Voltage

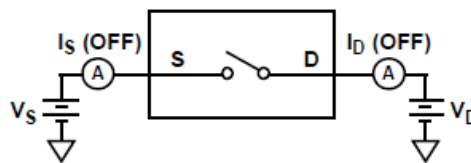
TEST CIRCUITS



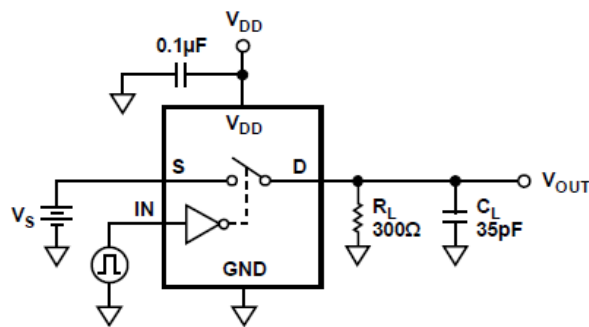
On-resistance Test Circuit



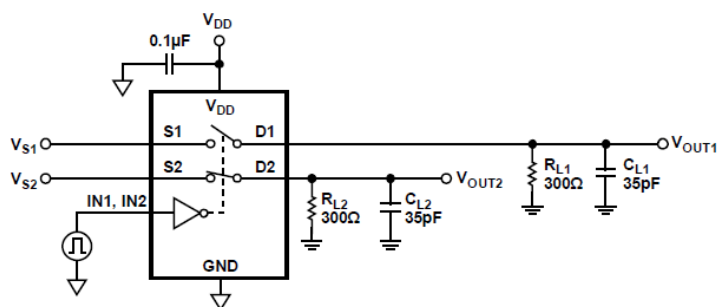
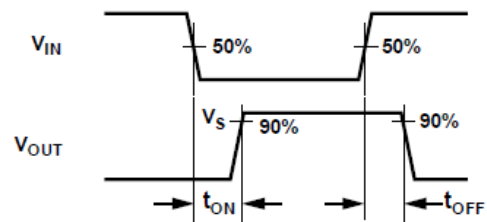
Leakage Current (On) Test Circuit



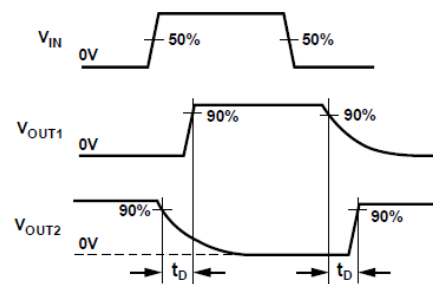
Leakage Current (Off) Test Circuit

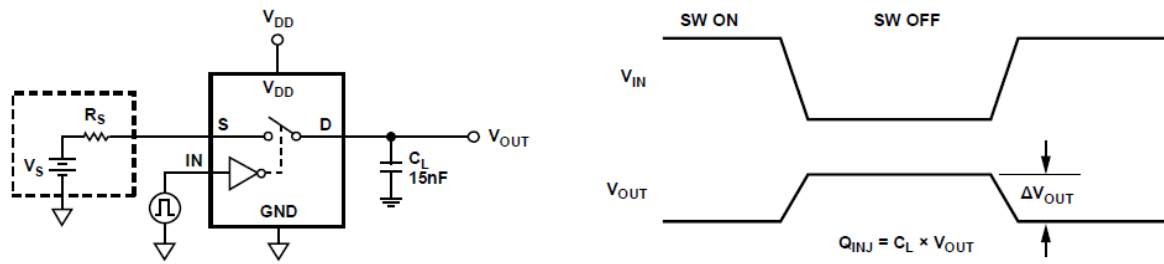


Switching Time Test Circuit

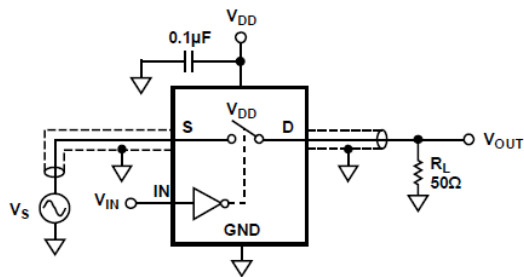


Off before On Delay Time Test Circuit

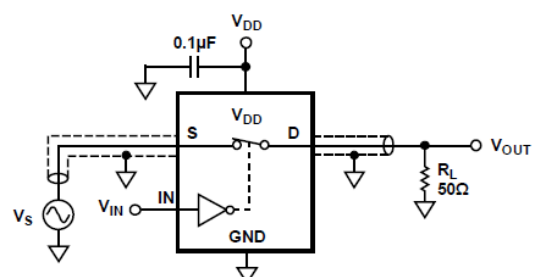




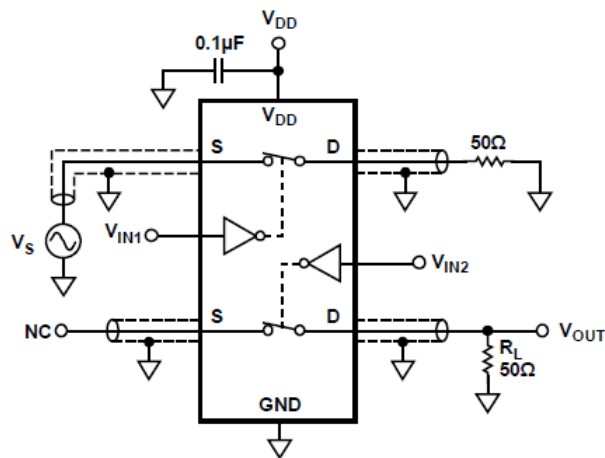
Charge Injection Test Circuit



Off Isolation Test Circuit



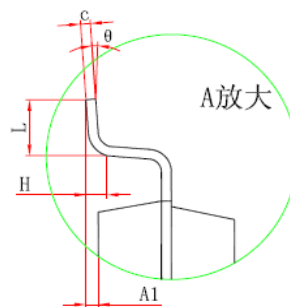
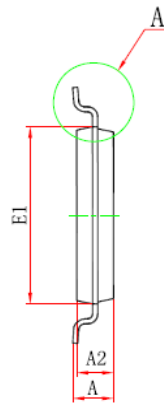
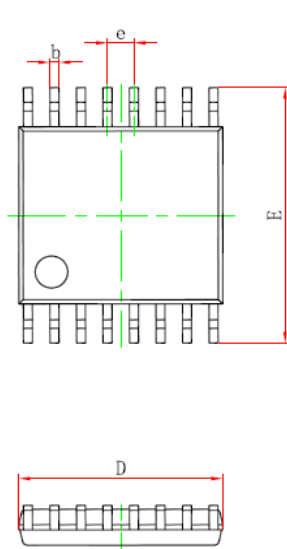
-3dB Bandwidth Test Circuit



Channel-to-Channel Crosstalk Test Circuit

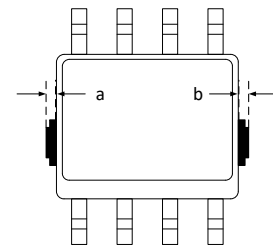
PACKAGE OUTLINE DIMENSIONS

TSSOP16



Note: In addition to the package size, a, b are allowed to have the maximum size of 0.15mm for waste glue simultaneously.

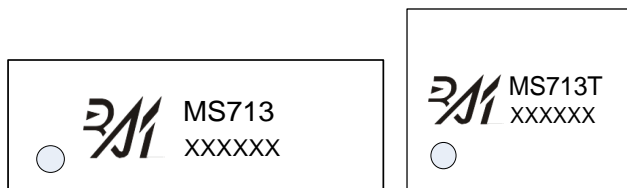
The diagram is as follows: taking SOP8 package as an example.



Symbol	Dimensions in Millimeters		Dimensions Inches	
	Min	Max	Min	Max
D	4.900	5.100	0.193	0.201
E	6.250	6.550	0.246	0.258
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
E1	4.300	4.500	0.169	0.177
A		1.200		0.047
A2	0.800	1.000	0.031	0.039
A1	0.050	0.150	0.002	0.006
e	0.65(BSC)		0.026(BSC)	
L	0.400	1.270	0.016	0.050
H	0.25(TYP)		0.01(TYP)	
θ	1°	7°	1°	7°

MARKING and PACKAGING SPECIFICATIONS

1. Marking Drawing Description



Product Name : MS713, MS713T

Product Code : XXXXXX

2. Marking Drawing Demand

Laser printing, contents in the middle, font type Arial.

3. Packaging Specifications

Device	Package	Piece/Reel	Reel/Box	Piece /Box	Box/Carton	Piece/Carton
MS713	SOP16	4000	1	4000	8	32000
MS713T	TSSOP16	3000	1	3000	8	24000

STATEMENT

- All Revision Rights of Datasheets Reserved for Ruimeng. Don't release additional notice.
Customer should get latest version information and verify the integrity before placing order.
- When using Ruimeng products to design and produce, purchaser has the responsibility to observe safety standard and adopt corresponding precautions, in order to avoid personal injury and property loss caused by potential failure risk.
- The process of improving product is endless. And our company would sincerely provide more excellent product for customer.

**MOS CIRCUIT OPERATION PRECAUTIONS**

Static electricity can be generated in many places. The following precautions can be taken to effectively prevent the damage of MOS circuit caused by electrostatic discharge:

1. The operator shall ground through the anti-static wristband.
2. The equipment shell must be grounded.
3. The tools used in the assembly process must be grounded.
4. Must use conductor packaging or anti-static materials packaging or transportation.



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