DESCRIPTION

The A4715 is a Dual Wide-Bandwidth, fast single-pole double-throw (SPDT) CMOS switch featuring an On-Resistance of 2.7 ohm at V_{DD}=5.0V and wide power supply range from 1.8V to 5.5V. It can be used as an analog switch or as a low-delay bus switch.

The 300MHz high bandwidth performance supports the high frequency application.

Break-before-make function for both parts eliminates signal disruption during switching from preventing both switches being enabled simultaneously.

The A4715 is available in MSOP10 Package

ORDERING INFORMATION

Package Type	Part Number	
MSOP10 SPQ: 3,000pcs/Reel	MS10	A4715MS10R
		A4715MS10VR
Note	V: Halogen free package R: Tape & Reel	
AiT provides all RoHS products,		

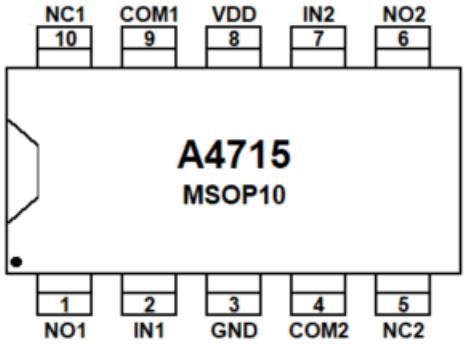
FEATURES

- Wide Power Supply Range: 1.8V to 5.5V
- High Bandwidth: 300MHz
- High Off-Isolation:
  84dB at 1MHz
  51dB at 10MHz
- Low Crosstalk: 80dB at 1MHz
- On-Resistance: 2.7Ω(typ) at 5.0V
- Fast Switching Time
  t_{on} = 12.0ns; t_{off} = 5.0ns
- TTL/CMOS Compatible
- Break-Before-Make Switching
- Rail-to-Rail Signal Range
- Operation Temperature Range:
  -40℃ to 85℃
- Available in MSOP10 Package

APPLICATION

- Wireless Handsets
- MP3 Players
- Portable Electronic Devices
- Relay Replacement
- PDAs
- Audio & Video Signal Routing
- PCMCIA Cards
- Computer Peripherals
- Modems

PIN DESCRIPTION



Top View

Pin #	Symbol	Type	Function
1,6	NO1, NO2	Input/Output	Data Port
2,7	IN1,IN2	Input	Logic Cuntrol Singnal
3	GND	Ground	Ground
8	V_{DD}	Power	Power Supply
4,9	COM2,COM1	Input/Output	Data Port
5,10	NC2, NC1	Input/Output	Data Port

FUNCTION TABLE

IN_X	Function
0	NC_X Connected to COM_X
1	NO_X Connected to COM_X

ABSOLUTE MAXIMUM RATINGS

V_{DD}, DC Supply Voltage	-0.3V ~ 6V
V_{NO}/ V_{NC}/ V_{COM}, DC Switch Voltage	-0.3V ~ V_{SUP}+0.3V
V_{IN}, DC Input Voltage	-0.3V ~ V_{SUP}+0.3V
$I_{(NO/NC/COM)}$, Continuous Current	-200mA ~ +200mA
$I_{PEAK(NO/NC/COM)}$, Peak Current[NOTE1]	-300mA ~ +300mA
T_A, Operating Temperature Range	-40℃ ~ 85℃

Stresses above may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated in the Electrical Characteristics are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

NOTE1: Pulsed at 1ms, 50% duty circle

NOTE2: Stress beyond above listed “Absolute Maximum Ratings” may lead permanent damage to the device.
These are stress ratings only and operations of the device at these or any other conditions beyond those indicated in the operational sections of the specifications are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

NOTE3: Control input(V_{IN}) must be held HIGH or LOW, and mustn’t be floated.

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
DC Supply Voltage	V_{DD}		1.8	-	5.5	V
Switch Input Voltage	V_S		0	-	V_{DD}	V
Control Input Voltage	V_{IN}		0	-	V_{DD}	V
Operation Temperature	T_A		-40	-	+85	℃

DC ELECTRICAL CHARACTERISTICS @ +2.7V Supply

Parameter	Symbol	Conditions	Guaranteed Limit			Unit
			Min.	Typ. NOTE1	Max.	
Analog Switch						
Analog Signal Range	V_{NO}, V_{NC}, V_{COM}		0	-	V_{DD}	V
NO On-Resistance	$R_{ON(NO)}$	V_{DD} = 2.7V; I_{COM} =-10mA ; V_{NO}=1.5V	-	6.5	-	Ω
NC On-Resistance	$R_{ON(NC)}$	V_{DD} = 2.7V; I_{COM} =-10mA ; V_{NC} =1.5V	-	6.5	-	Ω
NO On-Resistance Flatness NOTE2	$R_{FLAT(NO)}$	V_{DD} = 2.7V; I_{COM} =-10mA ; V_{NO}=1.5V	-	2.3	-	Ω
NC On-Resistance Flatnes NOTE2	$R_{FLAT(NC)}$	V_{DD} = 2.7V; I_{COM} =-10mA ; V_{NC} =1.5V	-	2.3	-	Ω
On-Resistance Match Between Channels NOTE3	ΔR_{ON}	V_{DD} = 2.7V; I_{COM} =-10mA ; V_{NO} /V_{NC}=1.5V	-	0.15	1	Ω
NO or NC Off Leakage Current	$I_{OFF\ (NO)}$ or $I_{OFF\ (NC)}$	V_{DD} = 3.6V; V_{NO} or V_{NC} = 3V, 0.3V; V_{COM} = 0.3V, 3V	-	0.01	1	uA
COM On Leakage Current	$I_{ON(COM)}$	V_{DD} = 3.6V; V_{NO} or V_{NC} = 3.3V, 0.3V; V_{COM} = 0.3V, 3.3 V or floating	-	0.01	1	uA
Digital I/O						
Input Voltage High	V_{IH}	Minimum High Level Input Voltage	1	-	-	V
Input Voltage Low	V_{IL}	Maximum Low Level Input Voltage	-	-	0.5	V
Input Leakage Current	I_{IN}	V_{IN} = 0V or V_{DD}	-	0.01	1	uA

NOTE1: Typical characteristics are at +3V supply and +25°C

NOTE2: Flatness is defined as the difference between the maximum and minimum value of on resistance as measured over the specified analog signal ranges.

NOTE3: ΔR_{ON}= $R_{ON(MAX)}$ - $R_{ON(MIN)}$, between NO and NC .

DYNAMIC CHARACTERISTICS @ +2.7V Supply

Parameter	Symbol	Conditions		Guaranteed Limit			Unit
				Min.	Typ. NOTE1	Max.	
AC ELECTRICAL CHARACTERISTICS							
Turn-On Time	t_{ON}	V_{DD} = 2.7V; V_{NO} or V_{NC} = 1.5V, R_L = 300Ω; C_L = 35pF, V_{IH}=1.5V,V_{IL}=0V		-	17.0	-	ns
Turn-Off Time	t_{OFF}	V_{DD} = 2.7V; V_{NO} or V_{NC} = 1.5V, R_L = 300Ω; C_L = 35pF, V_{IH}=1.5V,V_{IL}=0V		-	9.0	-	ns
Break-Before-Make Time	t_{BBM}	V_{DD} = 2.7V; V_{NO} or V_{NC} = 1.5V, R_L = 300Ω; C_L = 35pF		-	15.0	-	ns
NC OFF Capacitance	$C_{OFF(NC)}$	f = 1MHz		-	5.5	-	pF
NO OFF Capacitance	$C_{OFF(NO)}$	f = 1MHz		-	5.5	-	pF
NC ON Capacitance	$C_{ON(NC)}$	f = 1MHz		-	15.5	-	pF
NO ON Capacitance	$C_{ON(NO)}$	f = 1MHz		-	15.5	-	pF
ADDITIONAL APPLICATION CHARACTERISTICS							
3dB Bandwidth	f_{3dB}	Signal = 0dBm, R_L = 50Ω, C_L = 5pF		-	300	-	MHz
Off Isolation NOTE2	V_{Iso}	R_L = 50Ω, C_L = 5pF, Signal = 0dBm	f = 1MHz	-	-84	-	dB
			f =10MHz	-	-51	-	dB
Crosstalk	XTALK	R_L = 50Ω, C_L = 5pF	f = 1MHz	-	-80	-	dB
			f = 10MHz	-	-78	-	dB
Supply							
Power Supply Range	V_{DD}			1.8	-	5.5	V

NOTE1: Typical characteristics are at +3V supply and 25°C

NOTE2: Off Channel Isolation = $20\log_{10}[(V_{NO\backslash NC})/V_{COM}]$

DC ELECTRICAL CHARACTERISTICS @ +5.0V Supply

Parameter	Symbol	Conditions	Guaranteed Limit			Unit
			Min.	Typ. NOTE1	Max.	
Analog Switch						
Analog Signal Range	V_{NO}, V_{NC}, V_{COM}		0	-	V_{DD}	V
NO On-Resistance	$R_{ON(NO)}$	V_{DD} = 5.0V; I_{COM} =-10mA ; V_{NO}=3.5V	-	2.7	-	Ω
NC On-Resistance	$R_{ON(NC)}$	V_{DD} = 5.0V; I_{COM} =-10mA ; V_{NC} =3.5V	-	2.7	-	Ω
NO On-Resistance Flatness NOTE2	$R_{FLAT(NO)}$	V_{DD} = 5.0V; I_{COM} =-10mA ; V_{NO}=3.5V	-	0.8	-	Ω
NC On-Resistance Flatnes NOTE2	$R_{FLAT(NC)}$	V_{DD} = 5.0V; I_{COM} =-10mA ; V_{NC} =3.5V	-	0.8	-	Ω
On-Resistance Match Between Channels NOTE3	ΔR_{ON}	V_{DD} = 5.0V; I_{COM} =-10mA ; V_{NO} /V_{NC}=3.5V	-	0.15	-	Ω
NO or NC Off Leakage Current	$I_{OFF\ (NO)}$ or $I_{OFF\ (NC)}$	V_{DD} = 5.5V; V_{NO} or V_{NC} = 4.5V, 1.0V; V_{COM} = 1.0V, 4.5V	-	0.01	1	uA
COM On Leakage Current	$I_{ON(B)}$	V_{DD} = 5.5V; V_{NO} or V_{NC} = 4.5V, 1.0V; V_{COM} = 1.0V, 4.5 V or floating	-	0.01	1	uA
Digital I/O						
Input Voltage High	V_{IH}	Minimum High Level Input Voltage	1	-	-	V
Input Voltage Low	V_{IL}	Maximum Low Level Input Voltage	-	-	0.5	V
Input Leakage Current	I_{IN}	V_{IN} = 0V or V_{DD}	-	0.01	1	uA

NOTE1: Typical characteristics are at +5.0V supply and +25°C

NOTE2: Flatness is defined as the difference between the maximum and minimum value of on resistance as measured over the specified analog signal ranges.

NOTE3: ΔR_{ON}= $R_{ON(MAX)}$ - $R_{ON(MIN)}$, between NO and NC .

DYNAMIC CHARACTERISTICS @ +5.0V Supply

Parameter	Symbol	Conditions		Guaranteed Limit			Unit
				Min.	Typ. NOTE1	Max.	
AC ELECTRICAL CHARACTERISTICS							
Turn-On Time	t_{ON}	V_{DD} = 5.0V; V_{NO} or V_{NC} = 3.0V, R_L = 300Ω; C_L = 35pF, V_{IH}=1.5V,V_{IL}=0V		-	12.0	-	ns
Turn-Off Time	t_{OFF}	V_{DD} = 5.0V; V_{NO} or V_{NC} = 3.5V, R_L = 300Ω; C_L = 35pF, V_{IH}=1.5V,V_{IL}=0V		-	5.0	-	ns
Break-Before-Make Time	t_{BBM}	V_{DD} = 5.0V; V_{NO} or V_{NC} = 3.5V, R_L = 300Ω; C_L = 35pF		-	8.5	-	ns
NC OFF Capacitance	$C_{OFF(NC)}$	f = 1MHz		-	5.5	-	pF
NO OFF Capacitance	$C_{OFF(NO)}$	f = 1MHz		-	5.5	-	pF
NC ON Capacitance	$C_{ON(NC)}$	f = 1MHz		-	15.5	-	pF
NO ON Capacitance	$C_{ON(NO)}$	f = 1MHz		-	15.5	-	pF
ADDITIONAL APPLICATION CHARACTERISTICS							
3dB Bandwidth	f_{3dB}	Signal = 0dBm, R_L = 50Ω, C_L = 5pF		-	300	-	MHz
Off Isolation NOTE2	V_{Iso}	R_L = 50Ω, C_L = 5pF, Signal = 0dBm	f = 1MHz	-	-84	-	dB
			f =10MHz	-	-51	-	dB
Crosstalk	XTALK	R_L = 50Ω, C_L = 5pF	f = 1MHz	-	-78	-	dB
			f = 10MHz	-	-80	-	dB
Supply							
Power Supply Range	V_{DD}			1.8	-	5.5	V

NOTE1: Typical characteristics are at +5.0V supply and 25°C

NOTE2: Off Channel Isolation = $20\log_{10}[(V_{NO\backslash NC})/V_{COM}]$

TEST SETUP CIRCUITS

Figure1. Test Circuit for On Resister

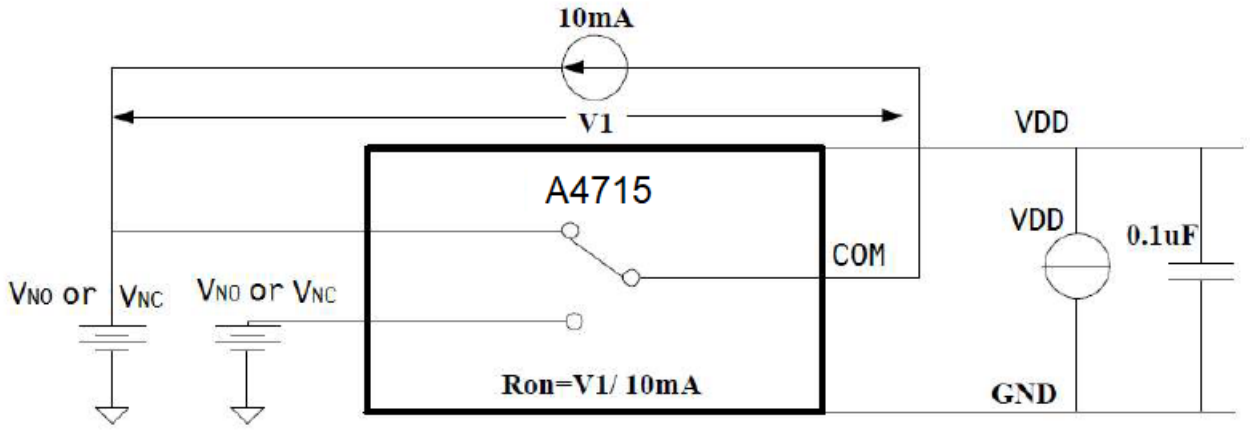


Figure2. Test Circuit for Bandwidth

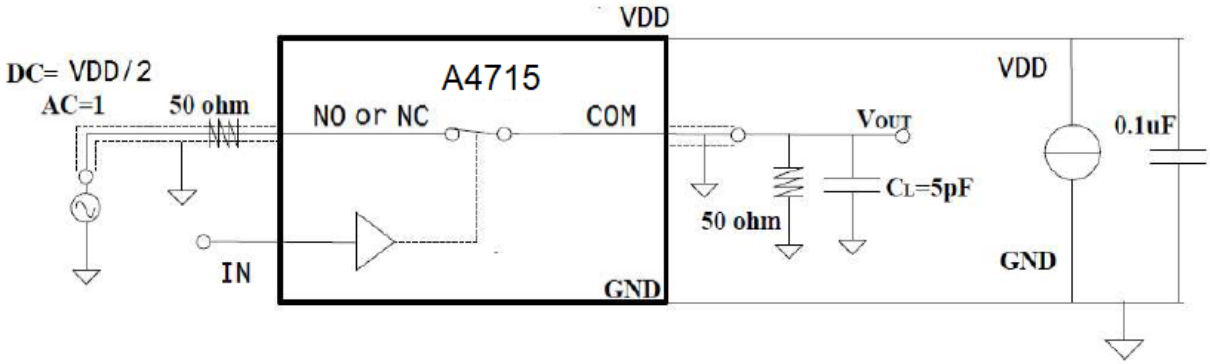
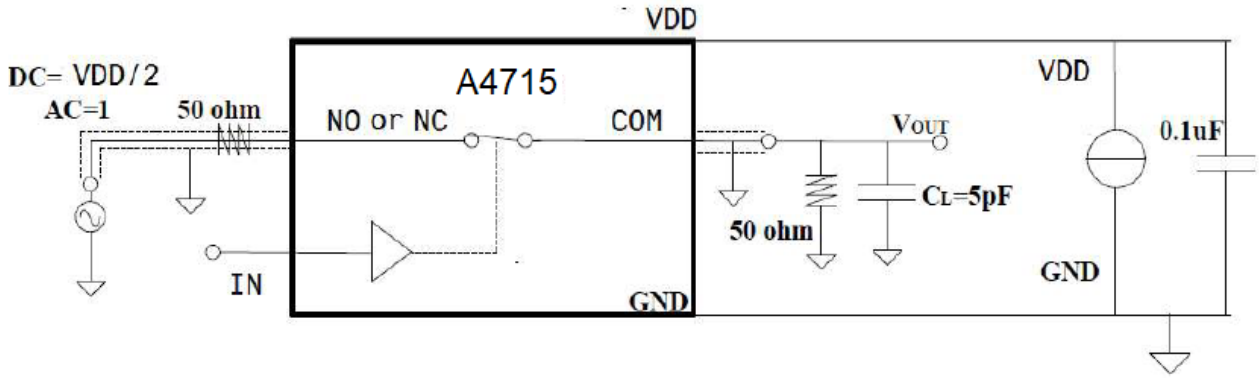
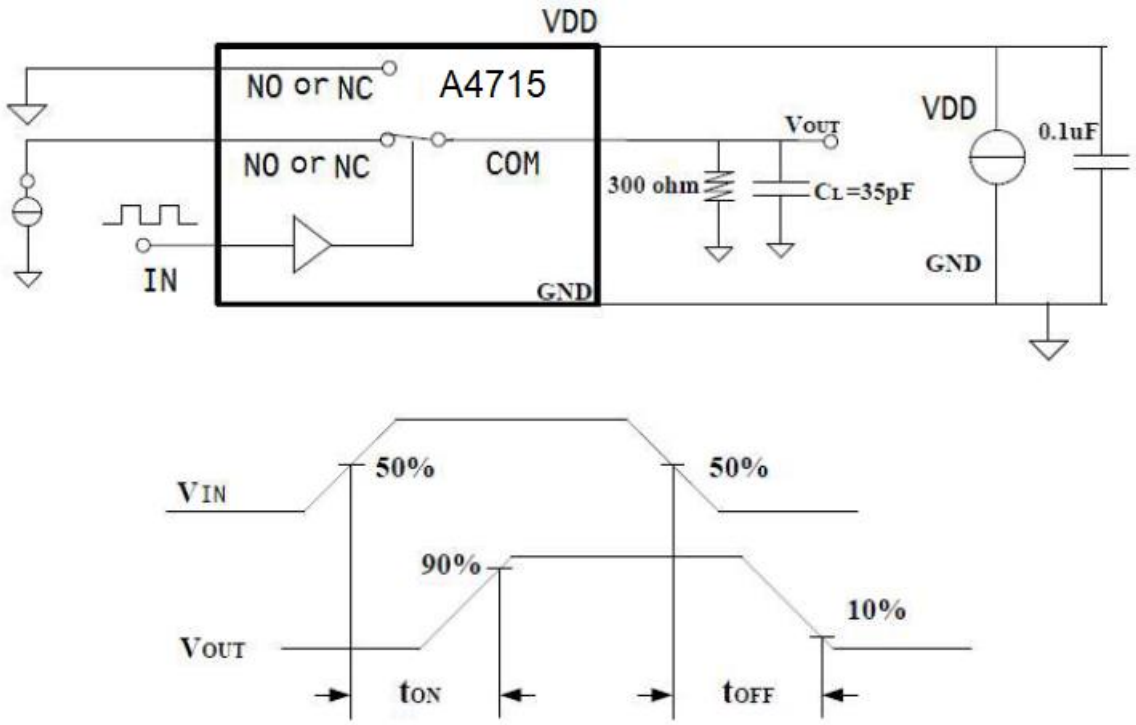


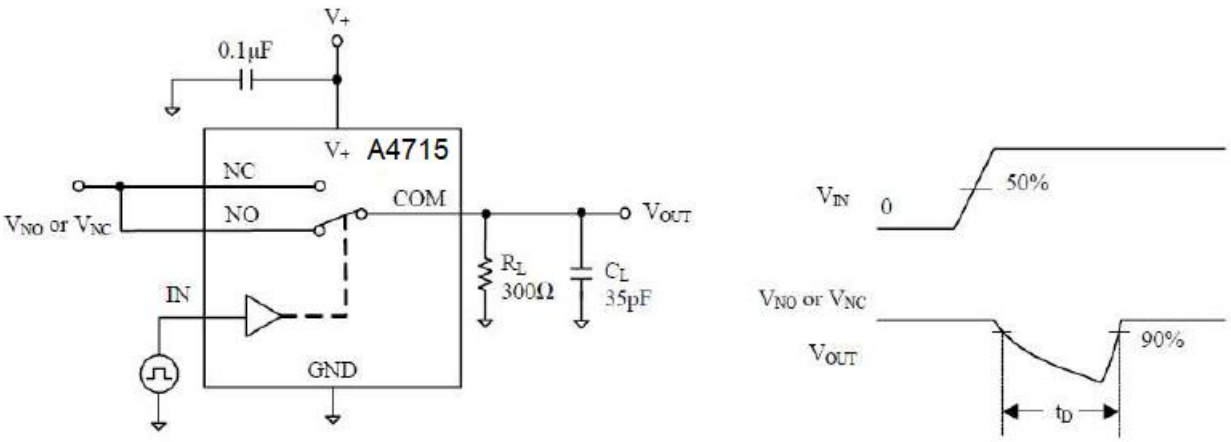
Figure3. Test Circuit for Off Isolation



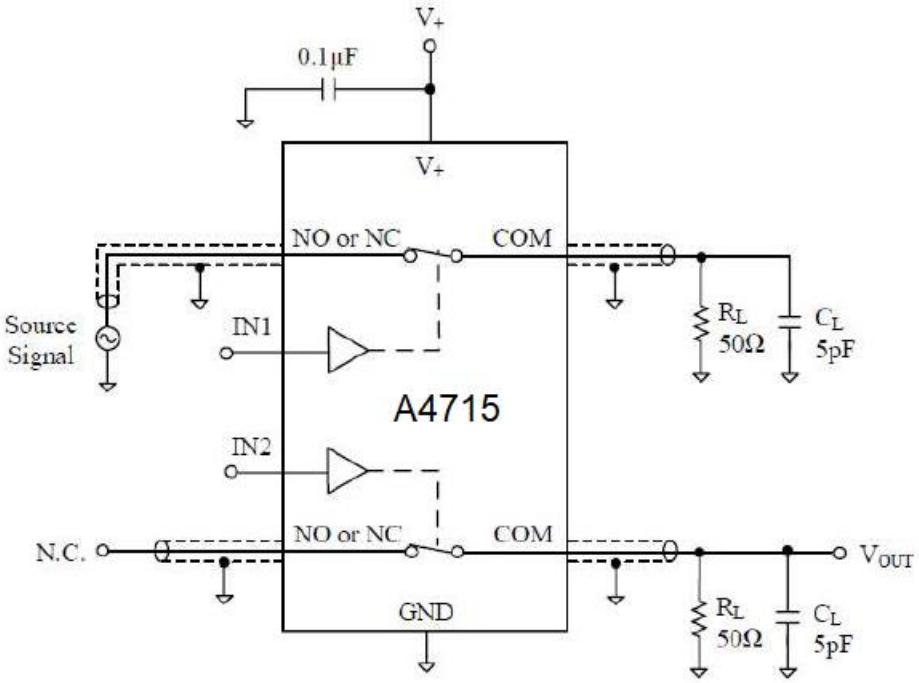
Test Circuit 4. Test Circuit for Switch Times



Test Circuit 5. Test Circuit for Break-Before-Make Time Delay, t_D

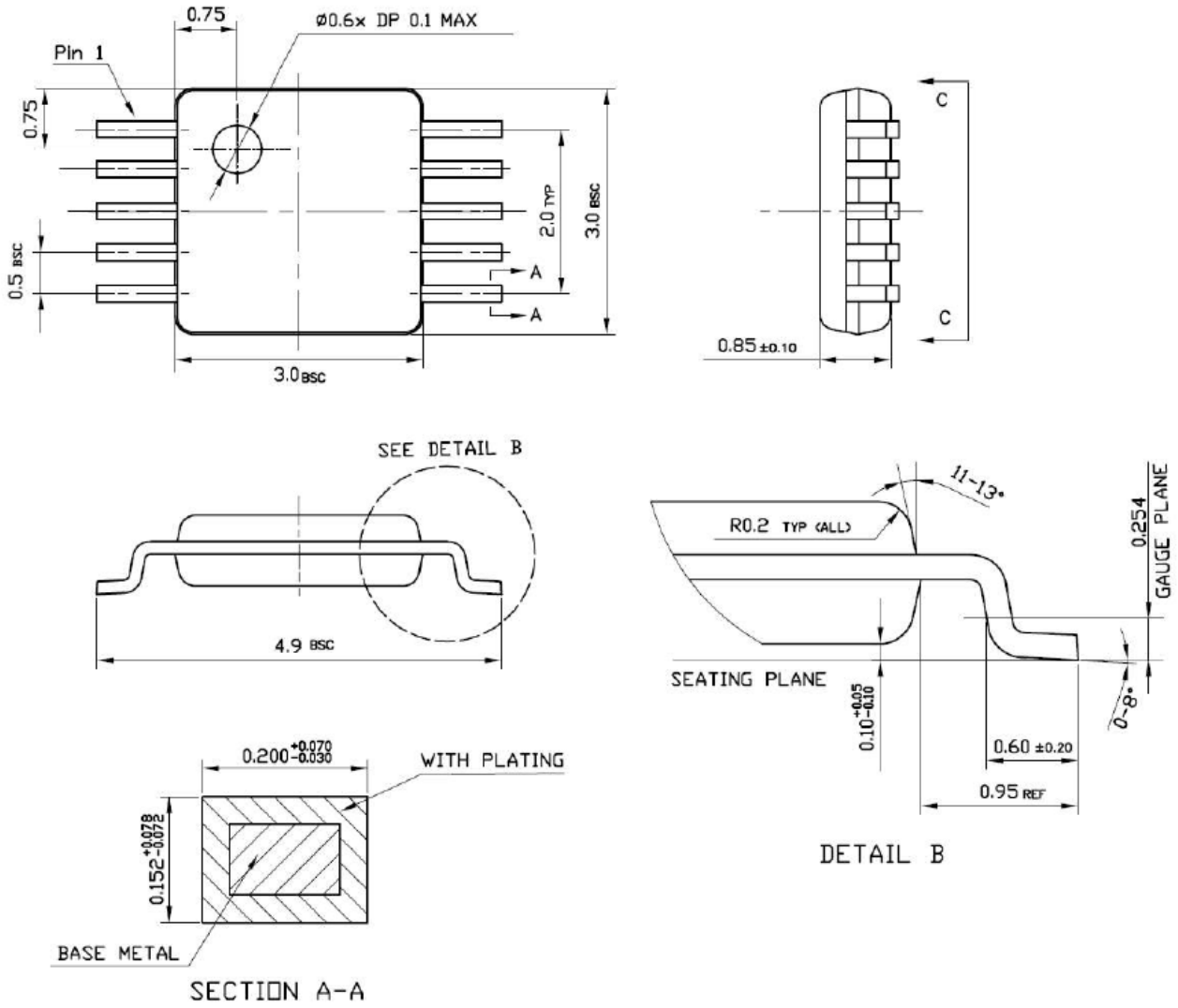


Test Circuit 6. Test Circuit for Crosstalk



PACKAGE INFORMATION

Dimension in MSOP10 Package (Unit: mm)



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