



Descriptions

The TS5A23157DGSR is a dual SPDT low on-resistance analog switch. It can operate from a single 1.5V to 5.5V power supply. The device offers low ON-state resistance and excellent ON-state resistance matching with break-before-make feature, to prevent signal distortion during the transferring of a signal from one channel to another. The device is capable of true isolation.

Even when COMx overrides VCC, very little current will flow back to the supply.

Order Information

Package		Part Number	Top-Side Marking
MSOP-10	Tape and Reel	TS5A23157DGSR	A23157 TYW

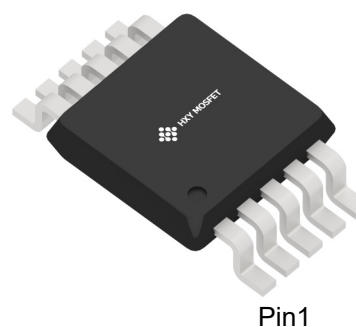
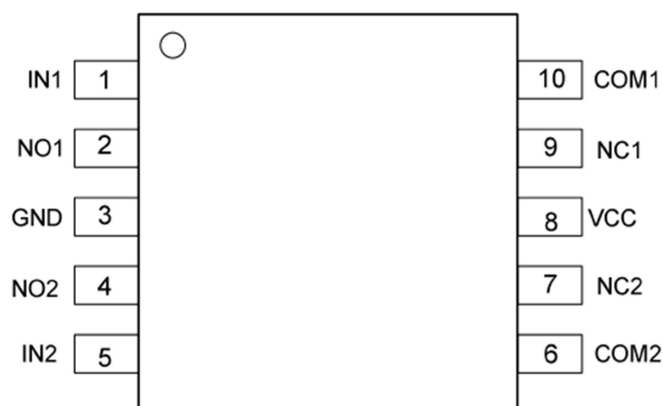
Features

- Pin-to-Pin TMUX1072, TS5A23157, DIA231570, and SGM3001, MSOP-10 Package
- Low On-resistance, $R_{on}=1.5\Omega$ when $COMx=5V$
- 1.8V Logic Compatible Control Pin
- COMx Overrides VCC to Achieve True Isolation Even When Supply Is Dead
- High Off-Isolation: $-100dB @ 100KHz$
- Low Channel-to-Channel Crosstalk: $-97dB @ 100KHz$
- High Bandwidth ($-3dB @ 700MHz$) Suitable For USB2.0 High-Speed Routing
- Low Quiescent Current ($<2\mu A$) With Very Wide Supply Range (1.5V ~ 5.5V)

Applications

- Audio, Video, UART, USB2.0 Signal and Supply Routing
- Cell phones and TWS headset

Pin Configuration





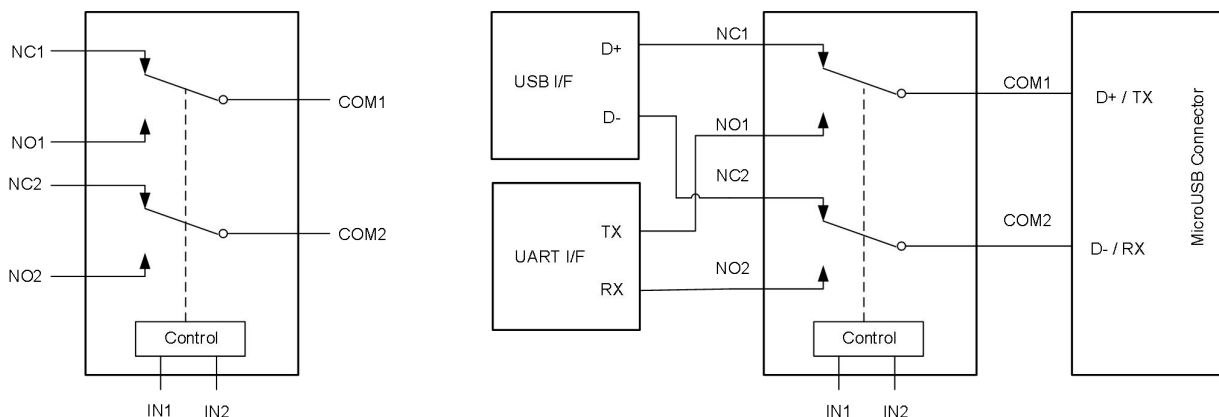
Functions and Pin Configuration

Pin Number	Symbol	Descriptions
1,5	IN _x	Logic Input Control
2,4	NO _x	Analog/Digital Signal Ports (Normally open)
3	GND	Ground
6,10	COM _x	Common Signal Ports
7,9	NC _x	Analog/Digital Signal Ports (Normally closed)
8	VCC	Single Power Supply

Function Descriptions

Logic Input(IN _x)	Function
0	NC1=COM1 and NC2=COM2
1	NO1=COM1 and NO2=COM2

Note: X= 1 or 2



Typical Application: Configured as USB2.0 Mux

Absolute Maximum Ratings ⁽¹⁾

Parameter	Symbol	Value	Unit
Supply Voltage	V _{CC}	-0.3 ~ 6.5	V
Control Input Voltage	V _{IN}	-0.3 ~ 6.5	V
Continuous Current Through NO, NC, COM		±100	mA
Peak Current Through NO, NC, COM (pulsed at 1ms 50% duty cycle)		±200	mA
Storage Temperature Range	T _{STG}	-55 ~ 150	°C
Junction Temperature under Bias	T _J	150	°C
Lead Temperature (Soldering, 10 seconds)	T _L	260	°C
Power Dissipation	P _D	250	mW



Recommend operating ratings ⁽²⁾

Parameter	Symbol	Value	Unit
Supply Voltage Operating	V_{CC}	1.5 ~ 5.5	V
Control Input Voltage	V_{IN}	-0.3 ~ 5.5	V
Input Signal Voltage	V_{COM}	-0.3 ~ 5.5	V
Operating Temperature	T_A	-40 ~ 85	°C
Thermal Resistance	$R_{\theta JA}$	360	°C/W

Note:

1. "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied.

DC Electronics Characteristics ($T_a=25^\circ\text{C}$, $V_{CC}=3.3\text{V}$, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input logic high level	V_{IH}	$V_{CC}: 3.3 \sim 5.5\text{V}$	1.6			V
		$V_{CC}: 1.5 \sim 3.3\text{V}$	1.4			V
Input logic low level	V_{IL}	$V_{CC}: 3.3 \sim 5.5\text{V}$			0.6	V
		$V_{CC}: 1.5 \sim 3.3\text{V}$			0.4	V
Supply quiescent current	I_{CC}	$I_{COM}=0$, $V_{IN}=0$ or $V_{IN}=V_{CC}$			1.0	uA
Increase in I_{CC} per input	I_{CCT}	$I_{COM}=0$, $V_{CC}=4.5\text{V}$ $V_{IN}>1.8$ or $V_{IN}<0.5$			1.0	uA
Off state leakage from COM_x to NC_x (or NO_x)	I_{COMx}	$V_{COM} = 5.5\text{V}$, $V_{NC(or NO)} = 0\text{V}$		± 20	± 40	nA
On-Resistance	R_{ON1}	$V_{COM}=0 \sim 0.5\text{V}$, $I_{COM}=30\text{mA}$		3.0	3.5	Ω
	R_{ON2}	$V_{COM}=0.5 \sim 2.0\text{V}$, $I_{COM}=30\text{mA}$		3.6	3.9	Ω
	R_{ON3}	$V_{COM}=2.0 \sim 4.0\text{V}$, $I_{COM}=30\text{mA}$		2.5	3.5	Ω
	R_{ON4}	$V_{COM}=4.0 \sim 5.5\text{V}$, $I_{COM}=30\text{mA}$		1.5	1.8	Ω
On-Resistance Flatness	R_{FLAT1}	$V_{COM}=0 \sim 0.5\text{V}$, $I_{COM}=30\text{mA}$		0.7		Ω
	R_{FLAT2}	$V_{COM}=0.5 \sim 2.0\text{V}$, $I_{COM}=30\text{mA}$		0.5		Ω
	R_{FLAT3}	$V_{COM}=2.0 \sim 4.0\text{V}$, $I_{COM}=30\text{mA}$		1.6		Ω
	R_{FLAT4}	$V_{COM}=4.0 \sim 5.5\text{V}$, $I_{COM}=30\text{mA}$		0.3		Ω
On-Resistance Matching Between Channels	ΔR_{ON}	$V_{COM}=0 \sim 5.5\text{V}$, $I_{COM}=30\text{mA}$,		0.1	0.2	Ω



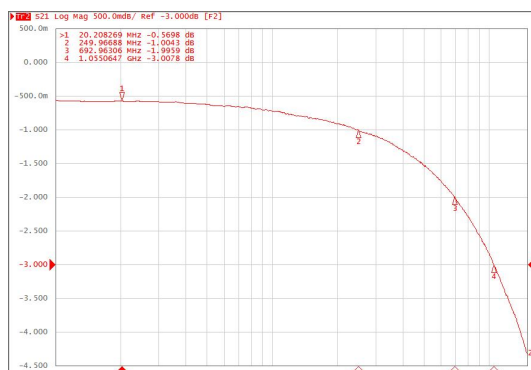
AC Electronics Characteristics (Ta=25°C, VCC=3.3V, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Turn-On Time	T _{ON}	V _{COM} =1.5V, C _L =35pF, R _L =50Ω		200		ns
Turn-Off Time	T _{OFF}	V _{COM} =1.5V, C _L =35pF, R _L =50Ω		200		ns
Break-Before-Make time	T _{BBM}	V _{COM} =1.5V, C _L =35pF, R _L =50Ω		500		ns
-3dB Bandwidth	BW	R _L =50Ω, C _L =0pF		850		MHz
Off isolation	OIRR	F=1KHz, R _L =50Ω		-81		dB
		F=10KHz, R _L =50Ω		-80		dB
Crosstalk	Xtalk	F=1KHz, R _L =50Ω		-83		dB
		F=10KHz, R _L =50Ω		-82		dB
Total Harmonic Distortion	THD	F=20Hz to 20KHz		-80		dB
		V _{COM} =600mVp-p @R _L =32Ω,				

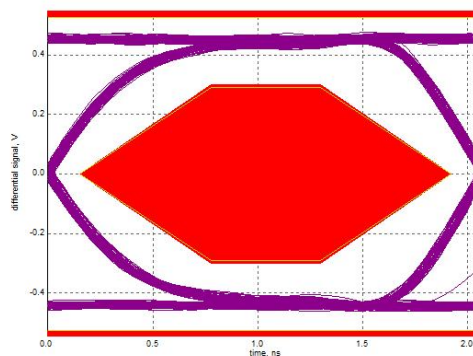
Capacitance (Ta=25°C, VCC=3.3V, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Off capacitance	C _{OFF}	F=100KHz		5		pF
On capacitance	C _{ON}	F=100KHz		7		pF

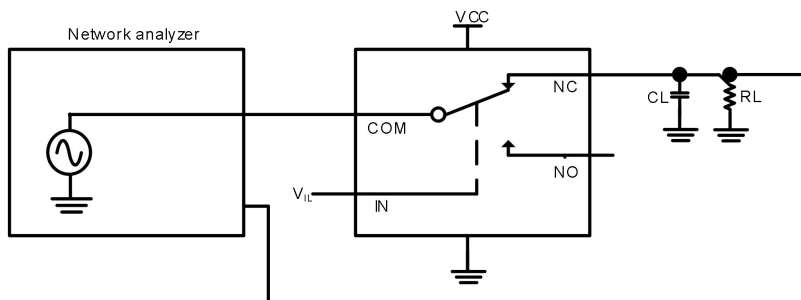
Typical Characteristics (Ta=25°C, VCC=3.3V, unless otherwise noted)



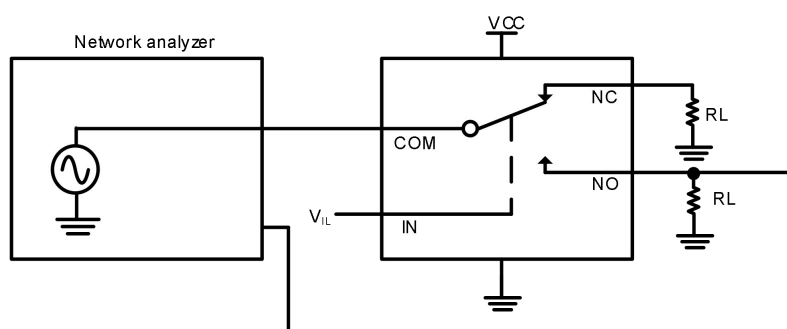
Bandwidth



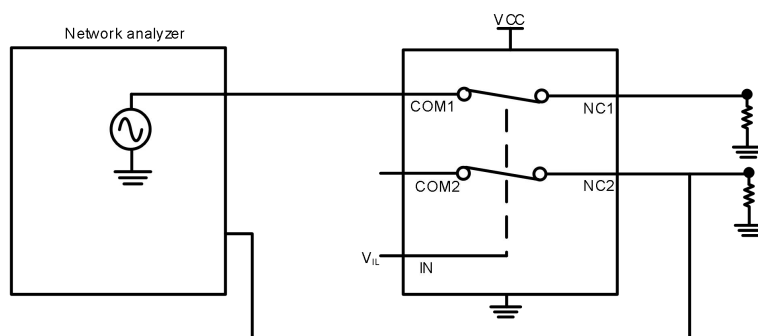
Eye Diagram (480Mbps)



Bandwidth



Off isolation

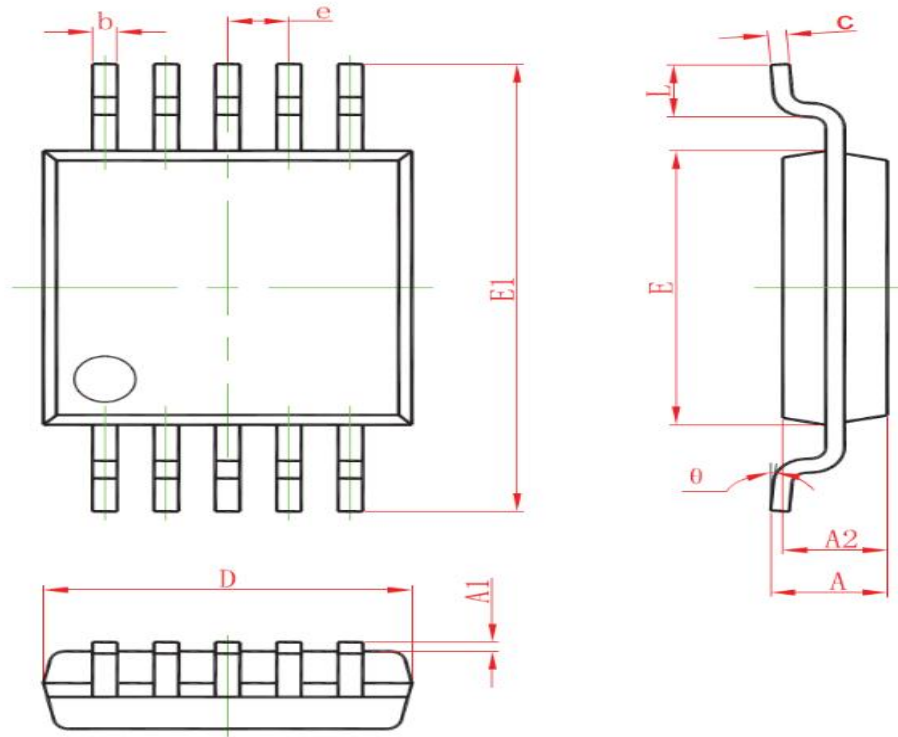


Crosstalk



Package Outline Dimensions

MSOP-10



Symbol	Dimension in Millimeters	
	Min.	Max.
A	0.820	1.100
A1	0.020	0.150
A2	0.750	0.950
b	0.180	0.280
c	0.090	0.230
D	2.900	3.100
e	0.50(BSC)	
E	2.900	3.100
E1	4.750	5.050
L	0.400	0.800
θ	0°	6°



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