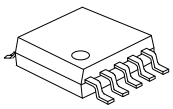
10-Ω SPDT Analog Switch



MSOP-10

■ DESCRIPTION

The **UTC U7SB3157** is a dual, single-pole, double-throw(SPDT) analog switch or 2:1 multiplexer/de-multiplexer bus switch which can handle both digital and analog signals.This device operates from 1.65V to 5.5V.

■ FEATURES

*Useful in Both Analog and Digital Applications
*Specified Break-Before-Make Switching
*Low ON-State Resistance:10Ω
*Wide Single-Supply Operation:1.65V to 5.5V

■ ORDERING INFORMATION

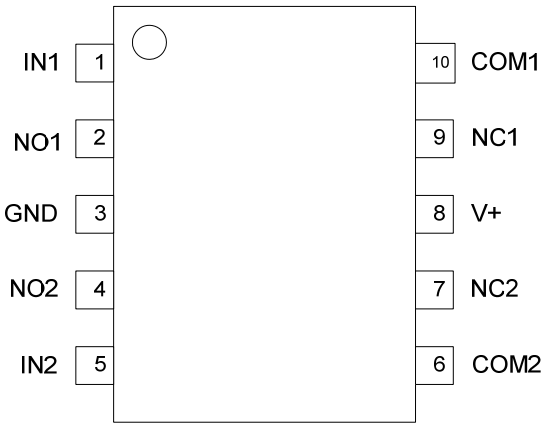
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U7SB3157L-SM2-R	U7SB3157G-SM2-R	MSOP-10	Tape Reel

U7SB3157L-SM2-R
(1)Packing Type
(2)Package Type
(3)Lead Free

(1) R: Tape Reel
(2) SM2: MSOP-10
(3) G: Halogen Free, L: Lead Free

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■ PIN CONFIGURATION

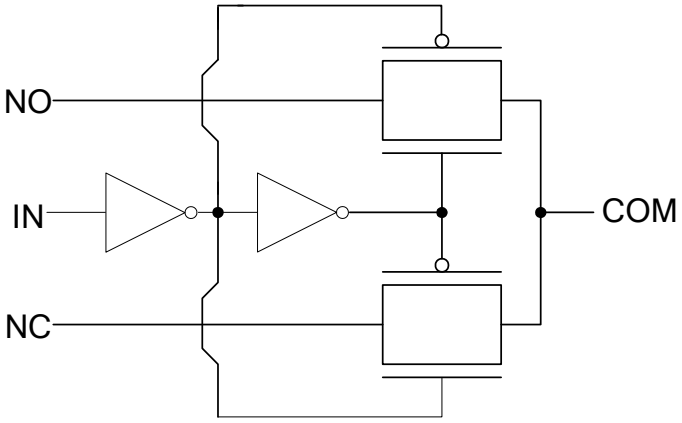


■ FUNCTION TABLE

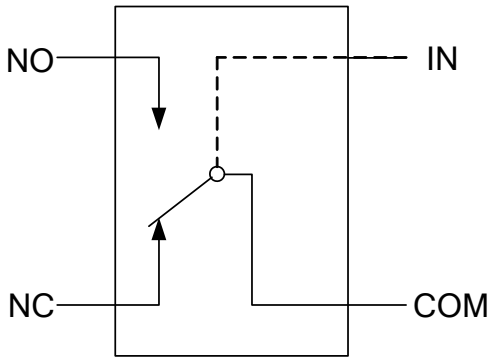
INPUTS(IN)	FUNCTION
H	NO Connected to COM
L	NC Connected to COM

Note:H: HIGH voltage level; L: LOW voltage level.

■ LOGIC DIAGRAM (each channel)



Logic Symbol



Analog Symbol

■ ABSOLUTE MAXIMUM RATING(Ta = 25°C, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_+	-0.5 ~ +6.5	V
Analog Voltage(NC,NO,COM)	V_{NC} V_{NO} V_{COM}	-0.5 ~ V_+ + 0.5V	V
Analog Port Diode Current (V_{NC} V_{NO} V_{COM}<0 or V_{NC} V_{NO} V_{COM}> V_+)	$I_{I/OK}$	±50	mA
On-State Switch Current (V_{NC} V_{NO} V_{COM}=0 to V_+)	I_{NC} I_{NO} I_{COM}	±50	mA
Digital Input Voltage	V_{IN}	-0.5 ~ +6.5	V
Digital Input Clamp Current (V_{IN}<0)	I_{IK}	-50	mA
V_+ or GND Current	I_+	±100	mA
Operating Temperature	T_{OPR}	-40 ~ + 85	°C
Storage Temperature	T_{STG}	-65 ~ + 150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ OPERATING RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_+	1.65 ~ 5.5	V
Analog Signal Voltage	V_{NC} V_{NO} V_{COM}	0 ~ V_+	V

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	165	°C/W

■ ELECTRICAL CHARACTERISTICS(Ta = 25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
ANALOG SWITCH							
Switch On Resistance	R_{ON}	V_+=1.65V	V_{NO} or V_{NC}=0~V_+ I_{COM}=-4mA			140	Ω
		V_+=2.3V	V_{NO} or V_{NC}=0~V_+ I_{COM}=-8mA			45	Ω
		V_+=3V	V_{NO} or V_{NC}=0~V_+ I_{COM}=-24mA			18	Ω
		V_+ = 4.5V	V_{NO} or V_{NC}=0~V_+ I_{COM}=-30mA			10	Ω
On Resistance Match Between Channel	ΔR_{ON}	V_+=1.65V	V_{NO} or V_{NC}=1.15V, I_{COM}=-4mA		1		Ω
		V_+=2.3V	V_{NO} or V_{NC}=1.6V, I_{COM}=-8mA		0.5		Ω
		V_+=3V	V_{NO} or V_{NC}=2.1V, I_{COM}=-24mA		0.2		Ω
		V_+ = 4.5V	V_{NO} or V_{NC}=3.15V,I_{COM}=-30mA		0.15		Ω
On Resistance Flatness	R_{ON}(flat)	V_+=1.65V	V_{NO} or V_{NC}=0~V_+ I_{COM}=-4mA		110		Ω
		V_+=2.3V	V_{NO} or V_{NC}=0~V_+ I_{COM}=-8mA		27		Ω
		V_+=3V	V_{NO} or V_{NC}=0~V_+ I_{COM}=-24mA		9		Ω
		V_+ = 4.5V	V_{NO} or V_{NC}=0~V_+ I_{COM}=-30mA		4		Ω
NC,NO OFF Leakage Current	I_{NC}(OFF) I_{NO}(OFF)	V_+=1.95V	V_{NO} or V_{NC}=0~V_+ , V_{COM}=0~V_+	-1	0.05	1	uA
		V_+=2.7V	V_{NO} or V_{NC}=0~V_+ , V_{COM}=0~V_+	-1	0.05	1	uA
		V_+=3.6V	V_{NO} or V_{NC}=0~V_+ ,V_{COM}=0~V_+	-1	0.05	1	uA
		V_+ = 5.5V	V_{NO} or V_{NC}=0~V_+ , V_{COM}=0~V_+	-1	0.05	1	uA
NC,NO ON Leakage Current	I_{NC}(ON) I_{NO}(ON)	V_+=1.95V	V_{NO} or V_{NC}=0~V_+ ,V_{COM}=OPEN	-0.1		0.1	uA
		V_+=2.7V	V_{NO} or V_{NC}=0~V_+ ,V_{COM}=OPEN	-0.1		0.1	uA
		V_+=3.6V	V_{NO} or V_{NC}=0~V_+ ,V_{COM}=OPEN	-0.1		0.1	uA
		V_+ = 5.5V	V_{NO} or V_{NC}=0~V_+ , V_{COM}=OPEN	-0.1		0.1	uA
COM ON Leakage Current	I_{COM}(ON)	V_+=1.95V	V_{NO} or V_{NC}=OPEN, V_{COM}=0~V_+	-0.1		0.1	uA
		V_+=2.7V	V_{NO} or V_{NC}=OPEN, V_{COM}=0~V_+	-0.1		0.1	uA
		V_+=3.6V	V_{NO} or V_{NC}=OPEN, V_{COM}=0~V_+	-0.1		0.1	uA
		V_+ = 5.5V	V_{NO} or V_{NC}=OPEN,V_{COM}=0~V_+	-0.1		0.1	uA
DIGTAL INPUTS(IN1,IN2)							
Input Logic High	V_{IH}	V_+=1.65V~5.5V		0.7V_+			V
Input Logic Low	V_{IL}	V_+=1.65V~5.5V				0.3V_+	V
Input Leakage Current	I_{IH},I_{IL}	V_+=1.65V~5.5V	V_{IN}=5.5V or 0	-1	0.05	1	uA
SUPPLY							
Quiescent Supply Current	I_+	V_+=1.65V~5.5V	V_{IN}= V_+ or GND			1	μA
Additional Quiescent Supply Current	$\triangle I_+$	V_+=1.65V~5.5V	V_{IN}= V_+ - 0.6V			500	uA

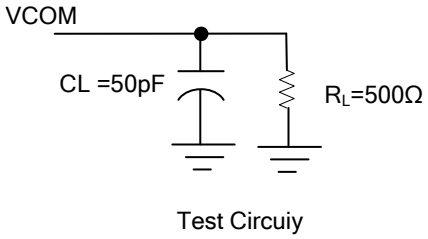
■ SWITCHING CHARACTERISTICS (Ta = 25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Turn ON Time	t_{ON}	V_+=1.65 ~ 1.95V	C_L=50pF, R_L=500Ω	7		24	ns
		V_+=2.3 ~ 2.7V		3.5		14	ns
		V_+=3.0 ~ 3.6V		2.5		7.6	ns
		V_+=4.5 ~ 5.5V		1.7		5.7	ns
Turn OFF Time	t_{OFF}	V_+=1.65 ~ 1.95V	C_L=50pF, R_L=500Ω	3		13	ns
		V_+=2.3 ~ 2.7V		2		7.5	ns
		V_+=3.0 ~ 3.6V		1.5		5.3	ns
		V_+=4.5 ~ 5.5V		0.8		3.8	ns
Break-Before-Make Time	t_{BBM}	V_+=1.65 ~ 1.95V	C_L=35pF, R_L=50Ω	0.5			ns
		V_+=2.3 ~ 2.7V		0.5			ns
		V_+=3.0 ~ 3.6V		0.5			ns
		V_+=4.5 ~ 5.5V		0.5			ns
Charge Injection	Q_C	V_+=3.3V	C_L=0.1nF, R_L=1MΩ		3		pC
		V_+=5V			7		pC
Bandwith	BW	V_+=1.65 ~ 5.5V	R_L=50Ω		220		MHz
OFF Isolation	O_{ISO}	V_+=1.8V	R_L=50Ω, f=10MHz		-60		dB
		V_+=2.3V			-65		dB
		V_+=3V			-65		dB
		V_+=4.5V			-65		dB
Crosstalk	X_{TALK}	V_+=1.8V	R_L=50Ω, f=10MHz		-66		dB
		V_+=2.3V			-66		dB
		V_+=3V			-66		dB
		V_+=4.5V			-66		dB
Total Harmonic Distortion	THD	V_+=1.8V	C_L=50pF, R_L=600Ω, f=600Hz~20kHz		0.015		%
		V_+=2.3V			0.025		%
		V_+=3V			0.015		%
		V_+=4.5V			0.01		%

■ CAPACITANCE CHARACTERISTICS (T_a=25°C)

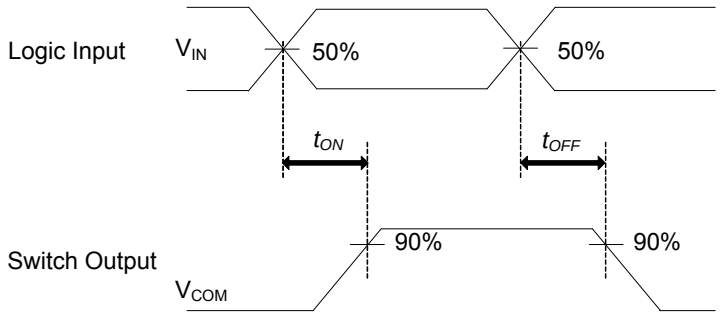
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
NC,NO OFF Capacitance	C_{NC}(OFF) C_{NO}(OFF)	V_+ = 5V V_{NO} or V_{NC}= V_+ or GND		5.5		pF
NC,NO ON Capacitance	C_{NC}(ON) C_{NO}(ON)	V_+ = 5V V_{NO} or V_{NC}= V_+ or GND		17.5		pF
COM ON Capacitance	C_{COM}(ON)	V_+ = 5V V_{COM} = V_+ or GND		17.5		pF
Digital Input Capacitance	C_{IN}	V_+ = 5V V_{IN} = V_+ or GND		2.8		pF

■ TEST CIRCUIT AND WAVEFORMS

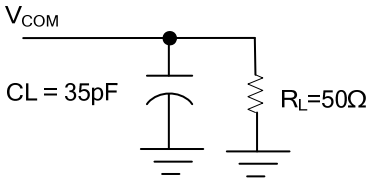


Test Circuiy

TEST	V_{IN}	V_{NC}	V_{NO}
t_{ON}	L->H	GND	V+
	H->L	V+	GND
t_{OFF}	H->L	GND	V+
	L->H	V+	GND

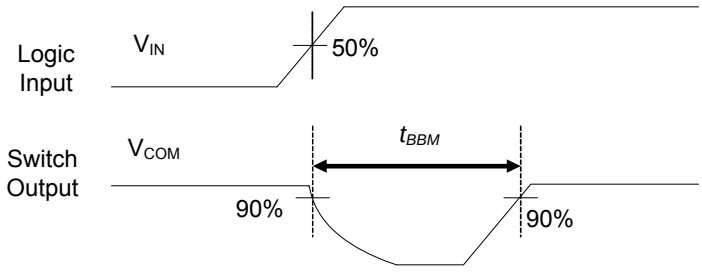


Voltage Waveforms
T_{ON} & T_{OFF} Times



Test Circuit

TEST	V_{IN}	V_{NC}	V_{NO}
t_{BBM}	L->H	V+/2	V+/2



Voltage Waveforms

T_{BBM} Time

Note: CL includes probe and jig capacitance.
PRR ≤1MHz, Z_O = 50Ω, tr ≤5ns, tf ≤5ns.

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