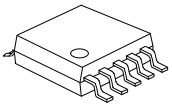
HIGH-SPEED USB 2.0 (480-MBPS) 1:2 MULTIPLEXER/DEMULTIPLEXER SWITCH



MSOP-10

■ DESCRIPTION

The UTC **UMX8228** is a high-speed, low-power double-pole/double-throw (DPDT) analog switch with single Enable. It is designed to operate from 1.8V to 5.5V.

The UTC **UMX8228** has a bus-switch enable pin, $\overline{OE}$, that can place the signal paths in high impedance. This allows the user to isolate the bus when it is not in use and consume less current.

The UTC **UMX8228** is a high-bandwidth switch specially designed for the switching of high-speed USB2.0 signals in handset and consumer applications, such as cell phones, digital cameras, and notebooks with hubs or controllers with limited USB I/Os.

■ FEATURES

* Supply Range: 1.8V ~ 5.5V
* -3dB Bandwidth: 550MHz
* R_{ON} is Typically 6Ω
* Low Power Consumption (1μA Maximum)
* Break-Before-Make Switching
* Rail-to-Rail Input and Output Operation
* Extended Industrial Temperature Range: -40°C ~ +85°C

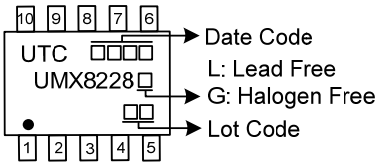
■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
UMX8228L-SM2-R	UMX8228G-SM2-R	MSOP-10	Tape Reel

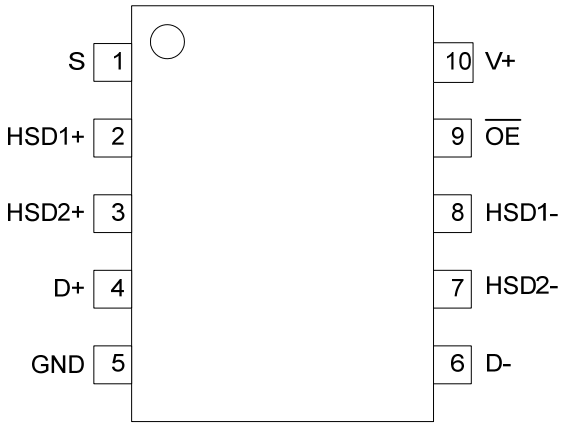
UMX8228G-SM2-R
- (1)Packing Type
- (2)Package Type
- (3)Green Package

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

■ MARKING



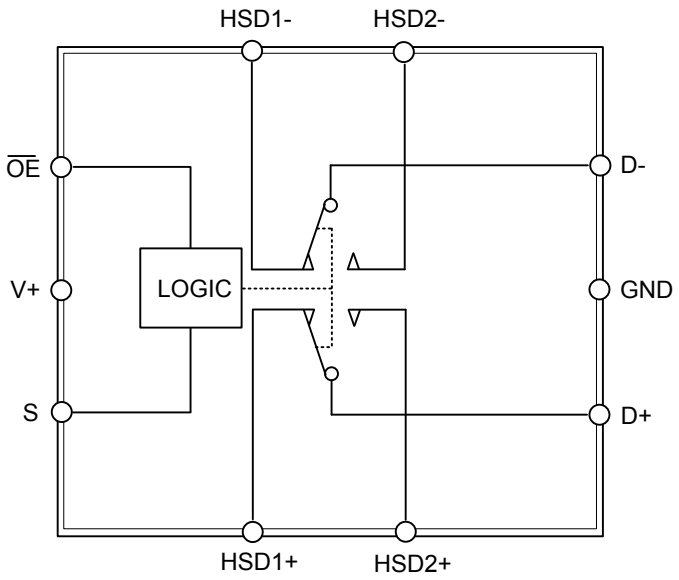
■ PIN CONFIGURATION



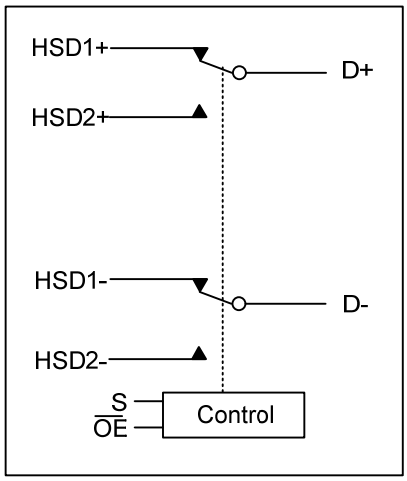
■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	S	Select Input
2	HSD1+	Data Port
3	HSD2+	Data Port
4	D+	Data Port
5	GND	Ground
6	D-	Data Port
7	HSD2-	Data Port
8	HSD1-	Data Port
9	$\overline{OE}$	Output Enable
10	V+	Power Supply

■ BLOCK DIAGRAM



■ FUNCTIONAL BLOCK DIAGRAM



■ FUNCTION TABLE

$\overline{OE}$	S	HSD1+, HSD1-	HSD2+, HSD2-
L	L	ON	OFF
L	H	OFF	ON
H	X	OFF	OFF

Note: H: High voltage level, L: Low voltage level, X =Don't care.

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

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	0 ~ 6	V
Input Voltage	V_{IN}	-0.3 ~ (V+)+0.3	V
Continuous Current HSDn or Dn		±100	mA
Peak Current HSDn or Dn		±150	mA
Junction Temperature	T_J	+150	°C
Operating Temperature	T_{OPR}	-40 ~ +85	°C
Storage Temperature	T_{STG}	-65 ~ +150	°C

Notes: 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.

■ RECOMMENDED OPERATING COMDITIONS (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}		1.8		5.5	V
Control Input Voltage (S, $\overline{OE}$)	V_{IN}		0		V_{CC}	V
Switch I/O Voltage	V_{SW}		-0.5		5.5	V
Operating Temperature	T_A		-40		+85	°C

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input High Voltage	V_{IH}		1.6			V
Input Low Voltage	V_{IL}				0.4	V
On-Resistance	R_{ON}	V+ =3.0V, V_{IS}=0V~0.4V,I_D =8mA Figure 1		7	10	Ω
On-Resistance Match Between Channels	ΔR_{ON}	V+=3.0V, V_{IS}=0V~0.4V, I_D=8mA Figure 1		0.25	0.6	Ω
On-Resistance Flatness	$R_{FLAT(ON)}$	V+ =3.0V, V_{IS}=0V~1.0V, I_D=8mA Figure 1		4	7	Ω
Power Off Leakage Current (All I/O Ports)	I_{OFF}	V+ =0V, V_D=0V~3.6V, V_S, $V_{\overline{OE}}$ = 0V or 3.6V			300	μA
Quiescent Supply Current	I_{CC}	V+=3.6V, V_S or $V_{\overline{OE}}$ = 0 or 3.6V, I_{OUT}=0V			1	μA
Increase in I_{CC} per Control Voltage V_{CC}	I_{CCT}	V+ =3.6V, V_S or $V_{\overline{OE}}$ = 2.6V			40	μA
Source Off Leakage Current	$I_{HSD2(OFF)}$ $I_{HSD1(OFF)}$	V+ =3.6V, V_{IS} =3.3V/ 0.3V, V_D = 0.3V/ 3.3V			1	μA
Channel On Leakage Current	$I_{HSD2(ON)}$ $I_{HSD1(ON)}$	V+ =3.6V, V_{IS}=3.3V/ 0.3V, V_D= 0.3V/ 3.3V or Floating			1	μA
Input Leakage Current	I_{IN}	V+ =3.0V, V_S, $V_{\overline{OE}}$ =0V or V+			1	μA
DYNAMIC CHARACTERISTICS						
Turn-On Time	t_{ON}	V_{IS}=0.8V, R_L=50Ω, C_L =10pF, Figure 2		27		ns
Turn-Off Time	t_{OFF}			28		ns
Break-Before-Make Time Delay	t_D	V_{IS}=0.8V, R_L=50Ω, C_L =10pF, Figure 3		9		ns
Propagation Delay	t_{PD}	R_L =50Ω, C_L=10pF		0.35		ns
Off Isolation	O_{IRR}	Signal =0dBm, R_L =50Ω, f=250MHz, Figure 4		-30		dB
Channel-to-Channel Crosstalk	X_{TALK}	Signal =0dBm, R_L =50Ω, f=250MHz, Figure 5		-40		dB
-3dB Bandwidth	BW	Signal =0dBm, R_L=50Ω, C_L=5pF, Figure 6		550		MHz

■ ELECTRICAL CHARACTERISTICS (Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Control Pin Input Capacitance	C_{IN}	V_{CC}=0V		5		pF
D+/D- On Capacitance	C_{ON}	V_{CC}=3.3V, $\overline{OE}$ =0V, f=1MHz, Figure 8		20		pF
D1n, O2n off Capacitance	C_{OFF}	V_{CC} and $\overline{OE}$ =3.3V, Figure 9		7		pF

Note: All unused digital inputs of the device must be held at V_{IO} or GND to ensure proper device operation.

■ TEST CIRCUIT

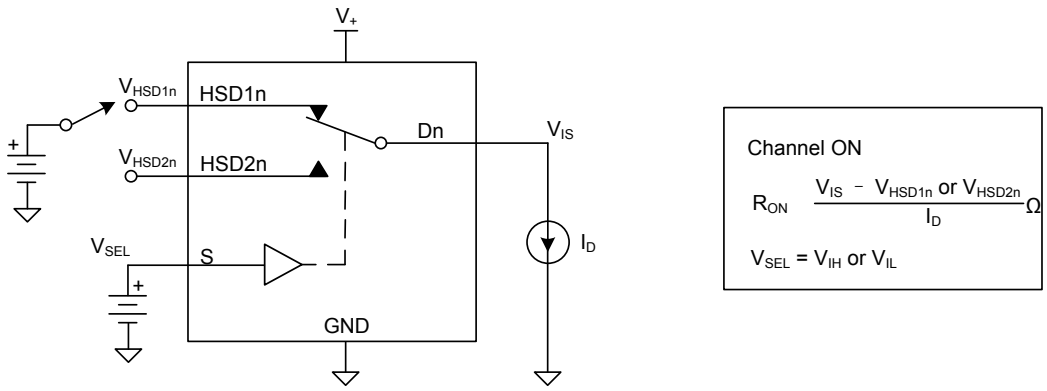


Figure 1. ON-State Resistance (R_{ON})

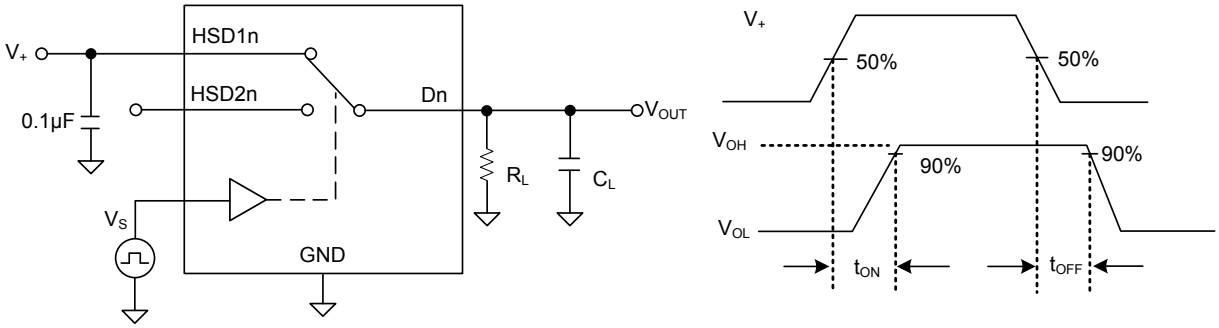


Figure 2. Turn-On (t_{ON}) and Turn-Off Time (t_{OFF})

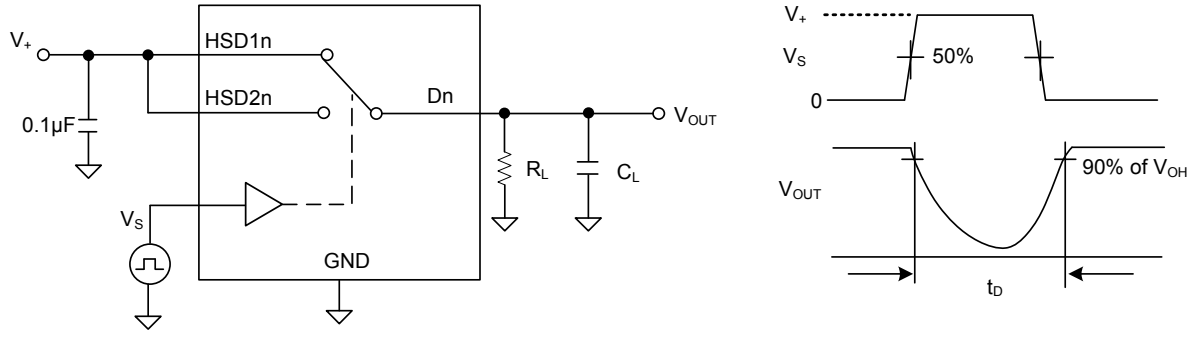


Figure 3. Break-Before-Make Time (t_D)

■ TEST CIRCUIT (Cont.)

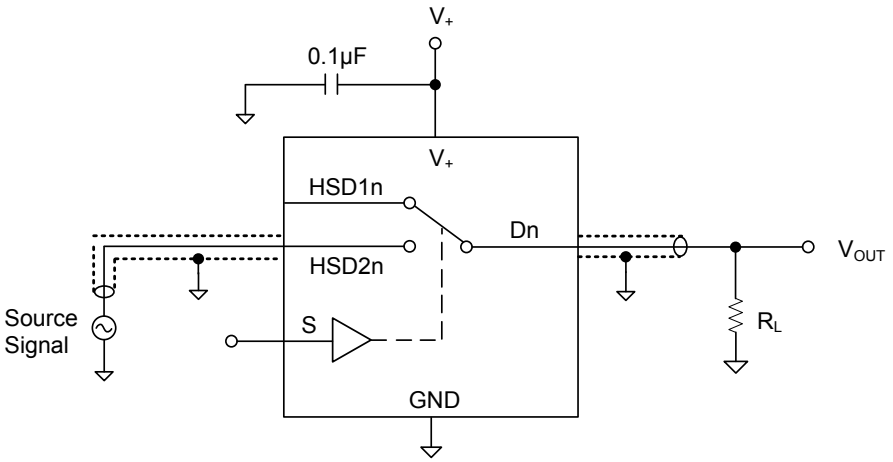
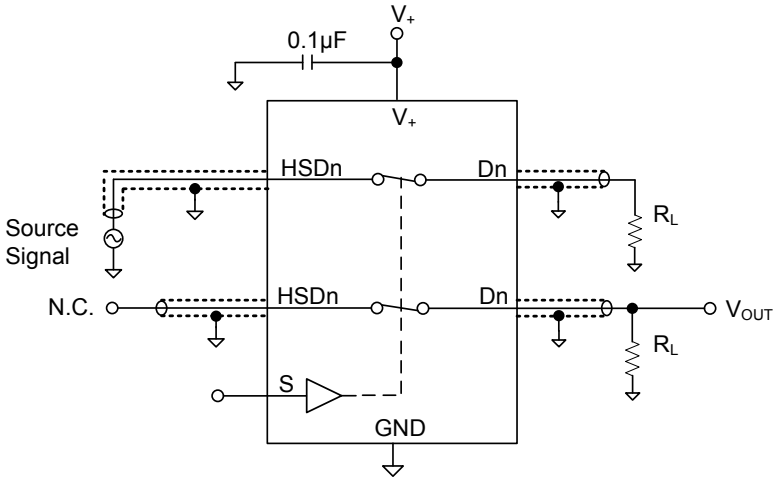


Figure 4. OFF Isolation (O_{ISO})



$$\text{Channel To Channel Crosstalk} = -20\times\log\frac{V_{HSDn}}{V_{OUT}}$$

Figure 5. Channel-to-Channel Crosstalk

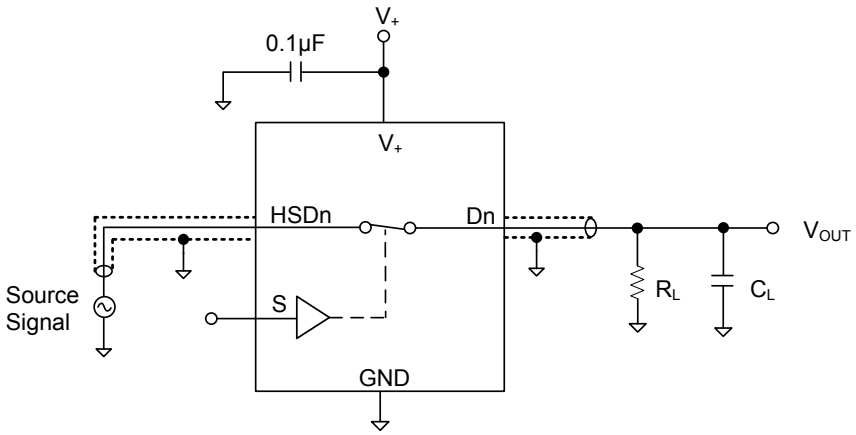


Figure 6. -3dB Bandwidth

■ TEST CIRCUIT (Cont.)

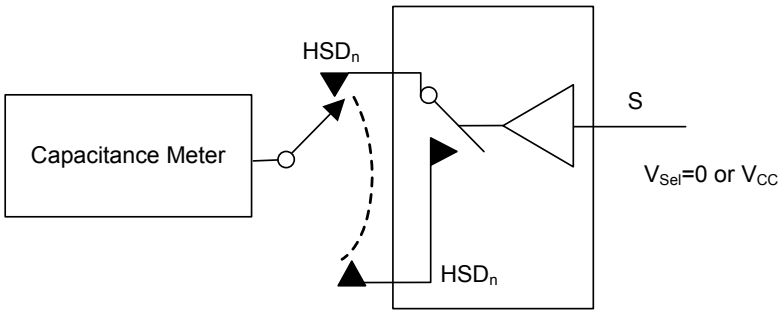


Figure 7. Channel Off Capacitance

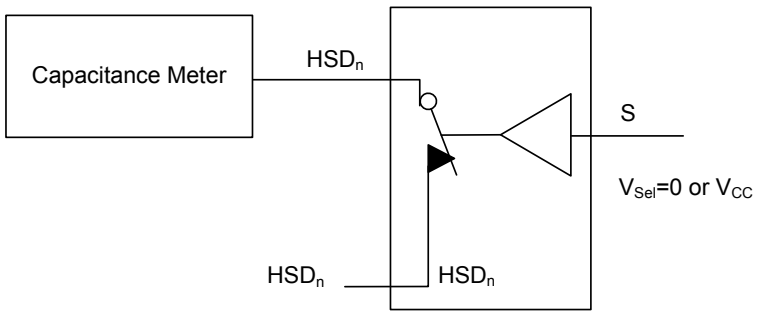


Figure 8. Channel On Capacitance

■ TYPICAL APPLICATION CIRCUIT