

高速 UART USB2.0 (480 Mbps) 双刀双掷 (DPDT) 开关**UM7227QA QFN10 1.8×1.4****UM7227MA MSOP10****描述**

UM7227QA/UM7227MA 是一款双通道、高速、低功耗数据开关，针对 USB2.0 信号切换进行了优化。UM7227QA/UM7227MA 开关配置为双刀双掷 (DPDT)。它可处理双向信号流，其-3dB 带宽为 750 MHz，在传输 250MHz 信号时端口间串扰和隔离度为-42dB。

UM7227QA/UM7227MA 采用 +2.7V 至 +5.5V 单电源供电，电流消耗小于 1 μ A。

UM7227QA/UM7227MA 具有宽带宽和低位到位偏移的特点，因此能够以良好的信号完整性传递高速差分信号，输出端的高速信号衰减很小或没有衰减。其抑制通道间串扰能力强，可将接口噪声降至最低。其带宽足以通过高速 USB2.0 差分信号 (480Mbps)。该器件保证控制逻辑阈值与 1.8V 逻辑兼容。

UM7227QA 采用无铅 QFN10 封装 (1.4mm×1.8mm×0.55mm)，UM7227MA 采用无铅 MSOP10 封装。它们是便携式高速混合信号开关应用的理想之选。

应用

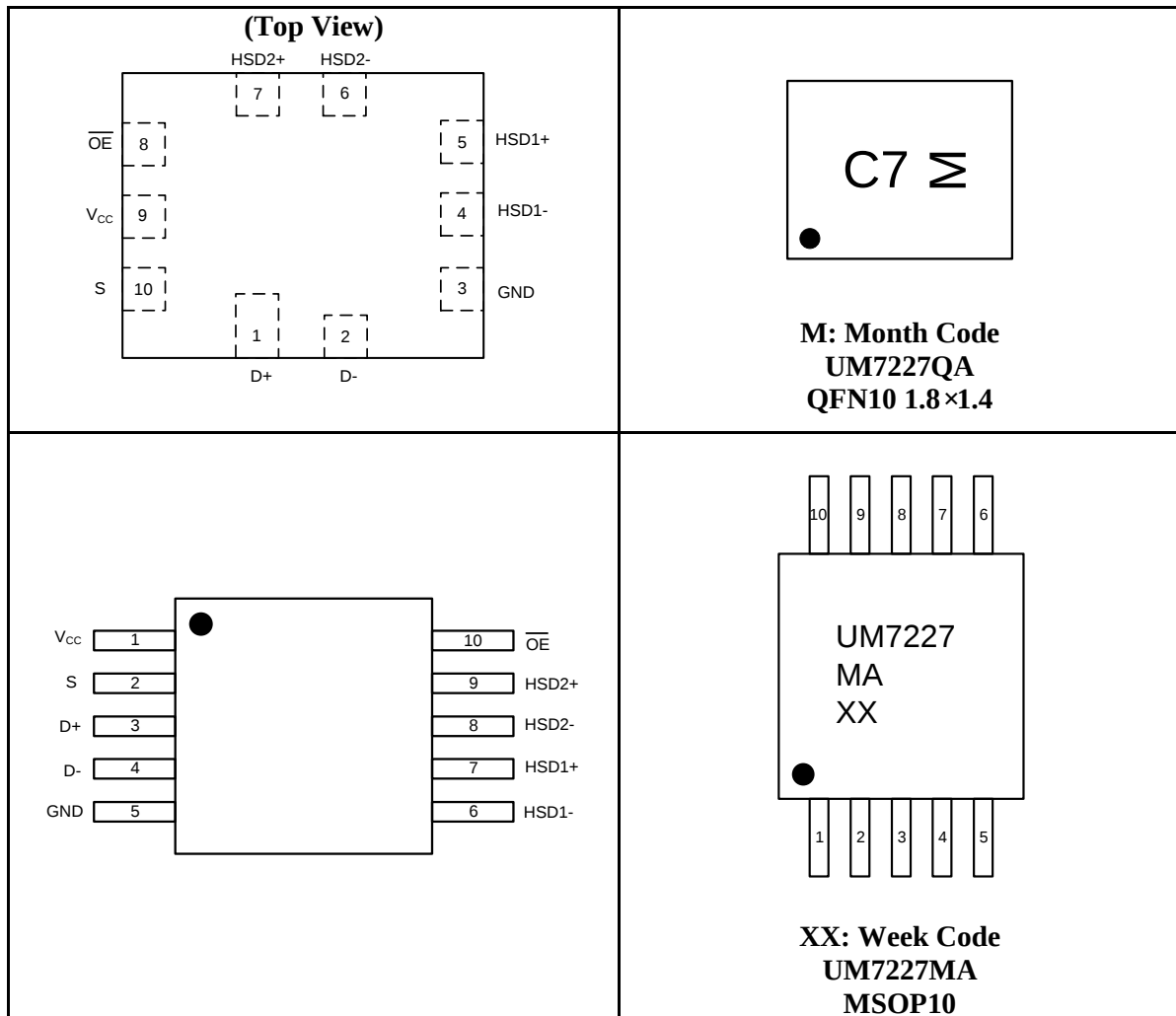
- 差分信号数据路由
- USB2.0 信号路由
- 手机、PDA、数码相机和笔记本
- LCD 显示器、电视和机顶盒
- MIPI 信号路由

特性

- $V_{CC}=3.6V$ 时典型导通电阻为 9.9 Ω
- D+和 D-耐压高达 5.5V
- 断电保护：
当 $V_{CC}=0V$ 时，D+ 和 D- 可承受高达 5.5V 的电压
- 低串扰: -42dB (250MHz)
- 低电流消耗: <1 μ A
- 接近零传播延迟: 250ps
- 通道导通电容: 6.5pF(典型值)
- V_{CC} 工作电压范围: +2.7V 至 +5.5V
- 550MHz 带宽 (或数据频率)
- 无铅 (Pb) QFN10 封装
- 无铅 MSOP10 封装
- ESD 等级: $\pm 5kV$, I/O 对地

Pin Configurations

Top View



Pin Description

Pin		Name	Function
UM7227QA	UM7227MA		
1	3	D+	Data Ports
2	4	D-	Data Ports
3	5	GND	Ground Connection
4	6	HSD1-	Data Ports
5	7	HSD1+	Data Ports
6	8	HSD2-	Data Ports
7	9	HSD2+	Data Ports
8	10	$\overline{\text{OE}}$	Output Enable
9	1	V _{CC}	Positive Supply Voltage
10	2	S	Select Input

Ordering Information

Part Number	Packaging Type	Marking Code	Shipping Qty
UM7227QA	QFN10 1.8×1.4	C7	3000pcs/7 Inch Tape & Reel
UM7227MA	MSOP10	UM7227MA	3000pcs/13 Inch Tape & Reel

Function Table

$\overline{\text{OE}}$	S	HSD1+, HSD1-	HSD2+, HSD2-
1	X	OFF	OFF
0	0	ON	OFF
0	1	OFF	ON

Absolute Maximum Ratings

Symbol	Parameter	Limit	Unit
V_{CC}	Supply Voltage	-0.5 to +6.5	V
V_{IS}	Analog Switch Input Voltage	-0.5 to +6.5	
V_{IN}	Digital Select Input Voltage	-0.5 to +6.5	
I_D	Continuous DC Current	50	mA
P_D	Power Dissipation	0.5	W
T_O	Operating Temperature Range	-40 to +85	°C
T_{STG}	Storage Temperature Range	-65 to +150	

DC Electrical Characteristics

(Typical: $T_A = +25^{\circ}\text{C}$, unless otherwise noted.)

Symbol	Parameter	Test Conditions	V_{CC} (V)	Min	Typ	Max	Unit
I_{IN}	Input Leakage Current	$0 \leq V_{IS} \leq V_{CC}$	3.6	-1.0		1.0	μA
I_{OFF}	Power Off Leakage Current	$0 \leq V_{IS} \leq V_{CC}$	0	-1.0		1.0	μA
I_{CCT}	Increase in I_{CC} per Control Voltage	$V_{IN}=2.6\text{V}$	3.6			10	μA
I_{OZ}	OFF State Leakage Current	$0 \leq V_{IS} \leq V_{CC}$	3.6	-1.0		1.0	μA
I_{CC}	Quiescent Supply Current	$V_{IS}=V_{CC}$ or GND	3.6			1.0	μA
V_{IH}	Input High Voltage		3.0 to 3.6	1.3			V
V_{IL}	Input Low Voltage		3.0 to 3.6			0.5	V
V_{IK}	Clamp Diode Voltage	$I_{IS}=-18\text{mA}$	3.0			-1.2	V
R_{ON}	On-Resistance (Note 1)	$V_{IS}=0$ to 0.4V $I_D=8\text{mA}$	3.0		9.8	13	Ω
ΔR_{ON}	On Resistance Match Between Channels (Note 1, 2)	$V_{IS}=0$ to 0.4V $I_D=8\text{mA}$	3.0		0.35		Ω
R_{FLAT}	On Resistance Flatness (Note 1, 2)	$V_{IS}=0$ to 1.0V $I_D=8\text{mA}$	3.0		2		Ω

Note 1: Guaranteed by design. Resistance measurements do not include test circuit or package resistance.

Note 2: Parameter is characterized but not tested in production.

AC Electrical Characteristics

(Typical: $T_A = +25^{\circ}\text{C}$, unless otherwise noted.)

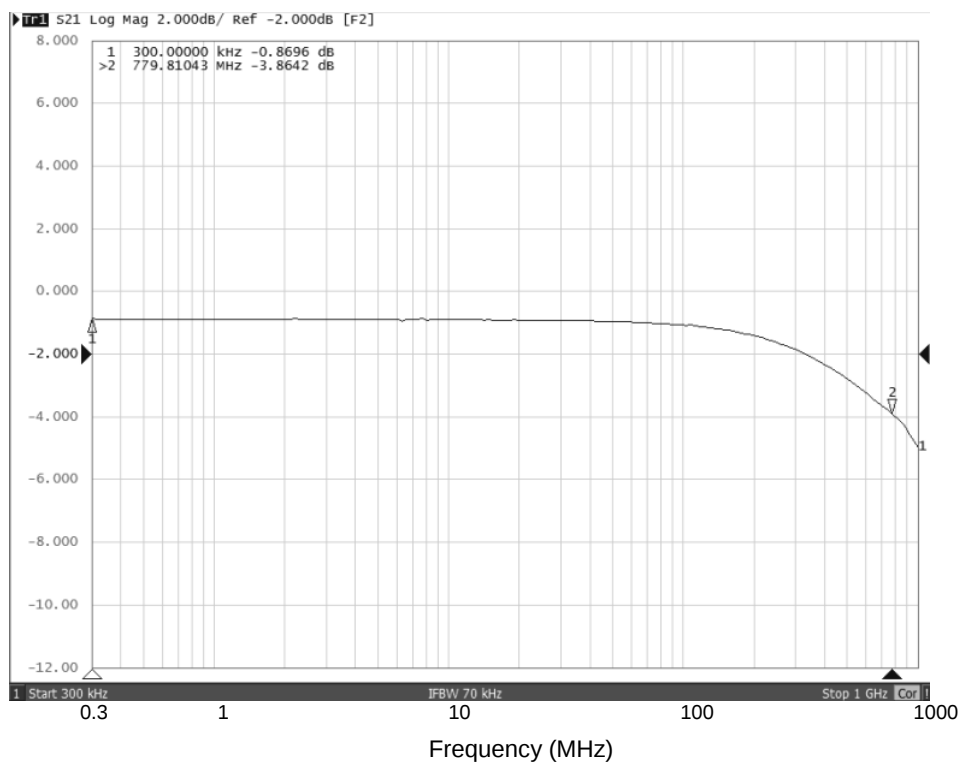
Symbol	Parameter	Test Conditions	V _{CC} (V)	Min	Typ	Max	Unit
t _{ON}	Turn On Time	V _{IS} =0.8V	3.0 to 3.6		13	30	ns
t _{OFF}	Turn Off Time	V _{IS} =0.8V	3.0 to 3.6		12	25	ns
t _{BBM}	Break Before Make Time (Note 3)	V _{IS} =0.8V	3.0 to 3.6	2	4.7	6.5	ns
t _{PD}	Propagation Delay	C _L =10pF	3.0 to 3.6		0.25		ns
t _{SK(O)}	Channel to Channel Skew	C _L =10pF	3.0 to 3.6		0.05		ns
O _{IRR}	Off Isolation	R _L =50Ω, f=250MHz	3.0 to 3.6		-42		dB
X _{TALK}	Crosstalk	R _L =50Ω, f=250MHz	3.0 to 3.6		-42		dB
BW	-3dB Bandwidth	R _L =50Ω C _L =0pF	3.0 to 3.6		750		MHz
		R _L =50Ω C _L =5pF	3.0 to 3.6		550		MHz
USB High-Speed-Related AC Electrical Characteristics							
t _{SK(P)}	Skew of Opposite Transitions of the Same Output (Note 3)	C _L =5pF R _L =50Ω			20		ps
t _J	Total Jitter (Note 3)	C _L =5pF R _L =50Ω t _R =t _F =500ps(10-90%) at 480Mbps(PRBS=2 ¹⁵ -1)			200		ps
Capacitance							
C _{IN}	Control Pin Input Capacitance (Note 4)	V _{CC} =0V			2.5		pF
C _{OFF}	HSD+ HSD- Off Capacitance (Note 4)	V _{CC} =V _{IS} =3.3V, OE=3.3V			4.5		pF
C _{ON}	HSD+ HSD- ON Capacitance (Note 4)	V _{CC} =3.3V, OE=0V			7.0		pF

Note 3: Guaranteed by design.

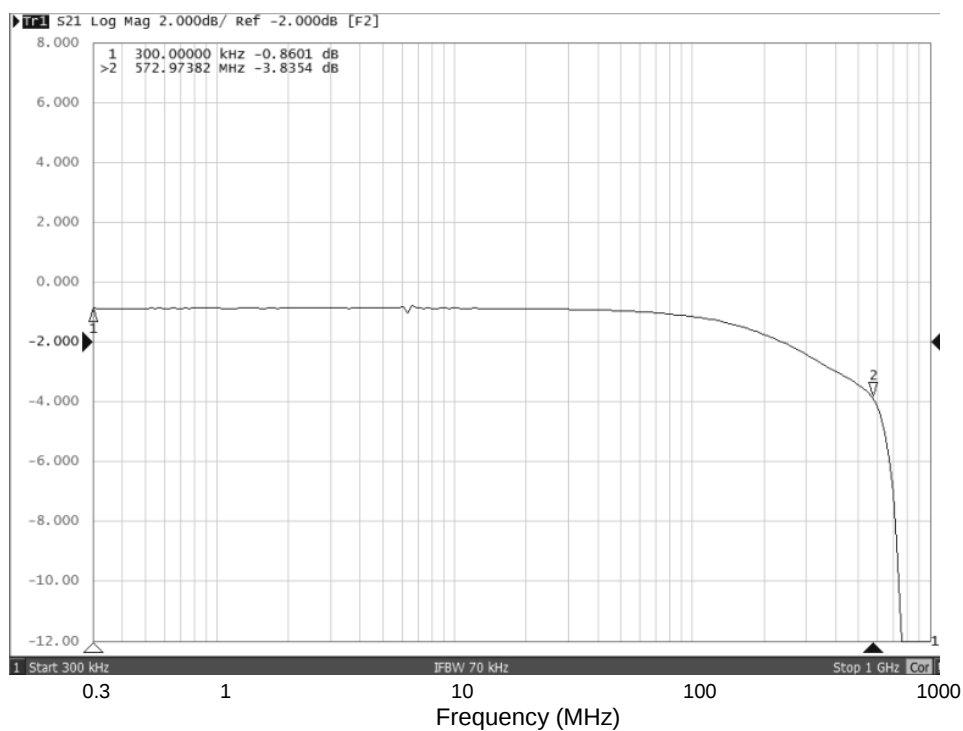
Note 4: $T_A=+25^{\circ}\text{C}$, $f=1\text{MHz}$, Capacitance is characterized but not tested in production.

Typical Performance Characteristics

Bandwidth ($C_L=0pF$)

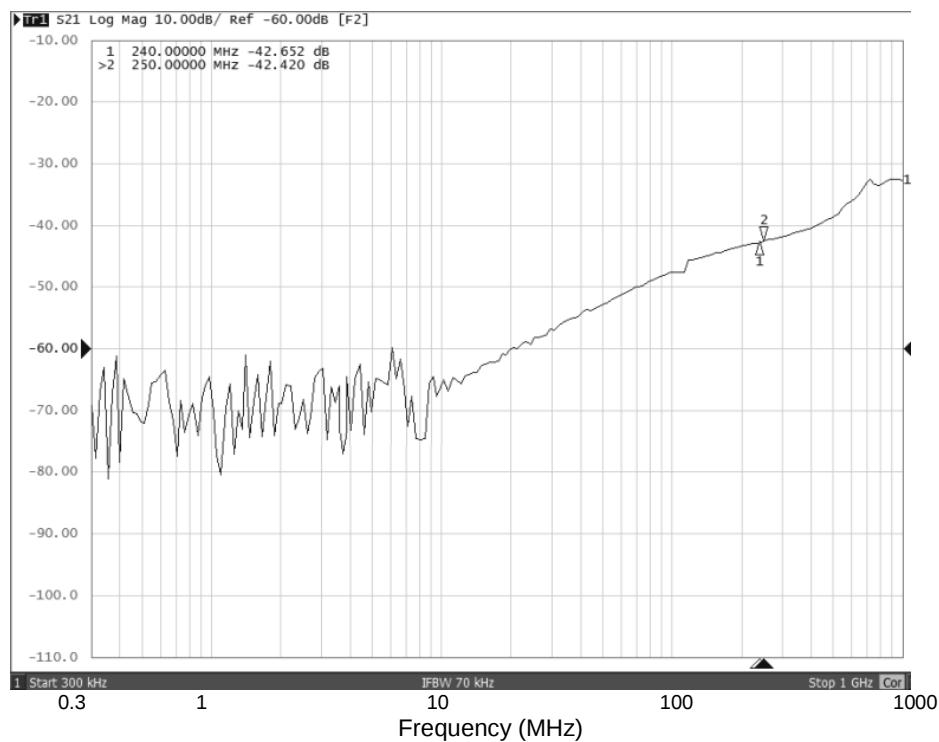


Bandwidth ($C_L=5pF$)

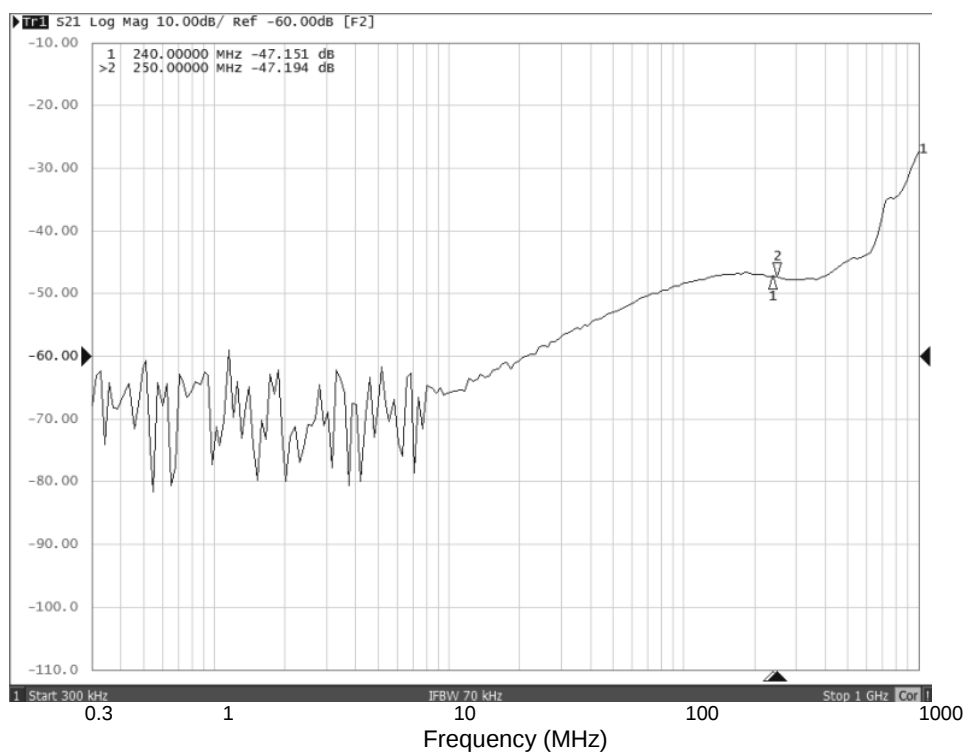


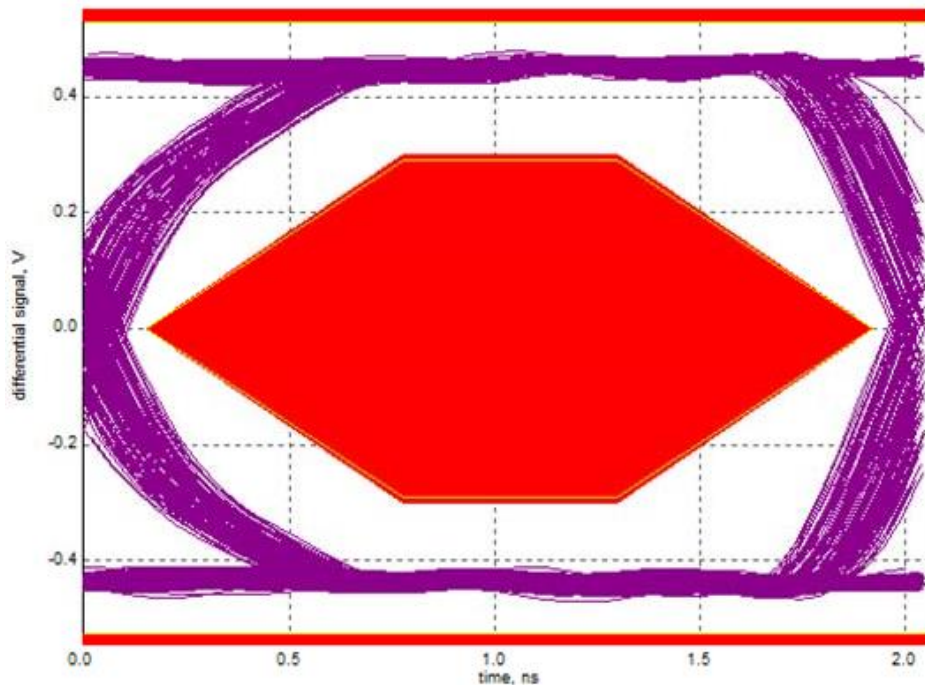
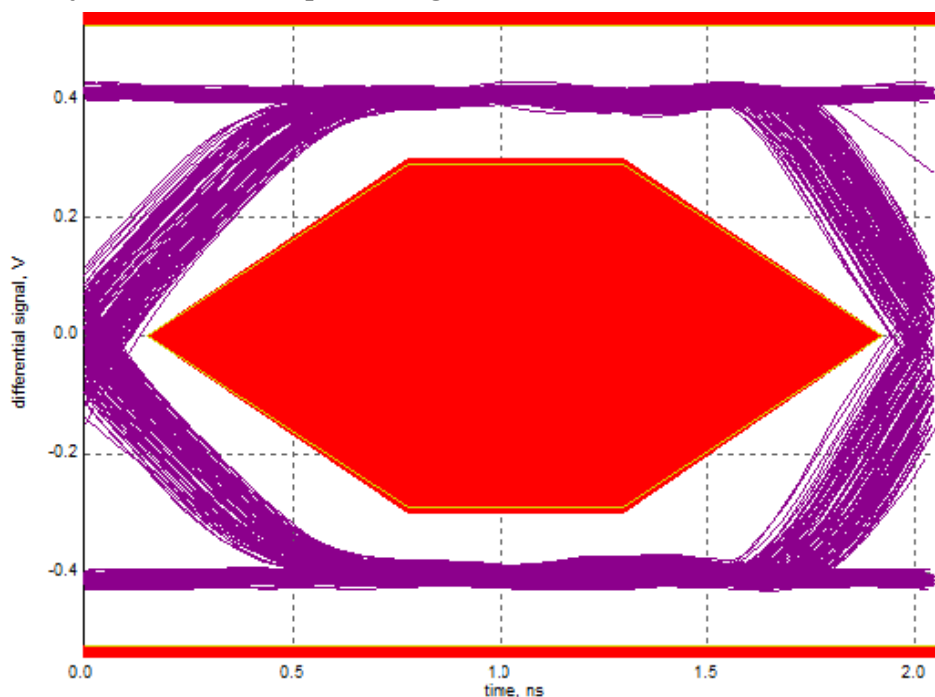
Typical Performance Characteristics (Continued)

Off Isolation



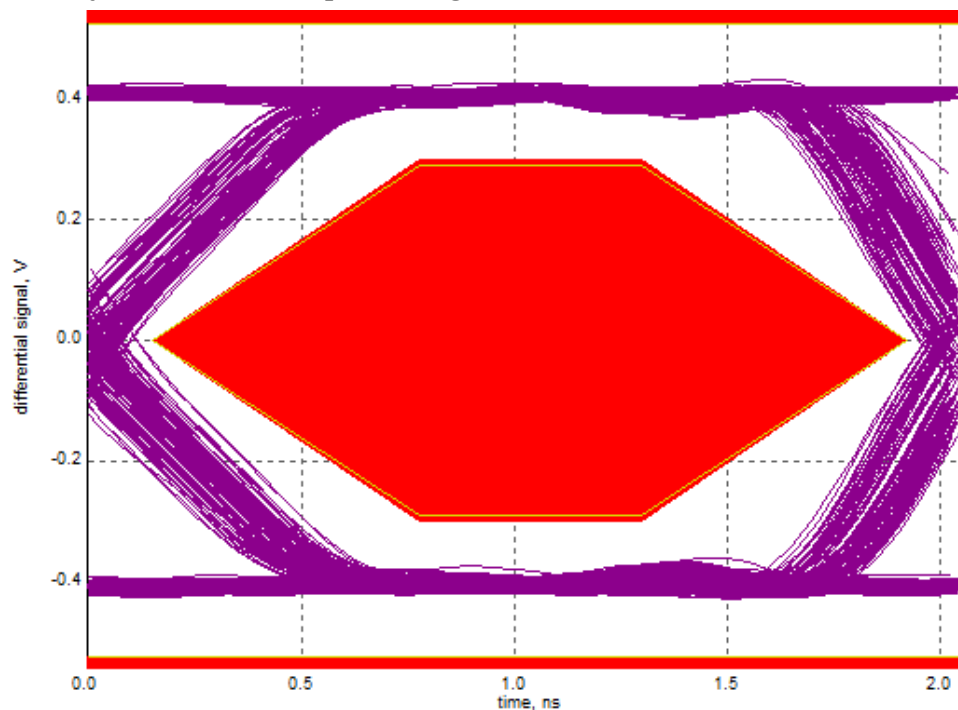
Crosstalk



Typical Performance Characteristics (Continued)
Eye Pattern: 480Mbps USB Signal with No Switch (Through Path)

Eye Pattern: 480Mbps USB Signal with Switch HSD1+ and HSD1- Path


Typical Performance Characteristics (Continued)

Eye Pattern: 480Mbps USB Signal with Switch HSD2+ and HSD2- Path



Test Diagrams

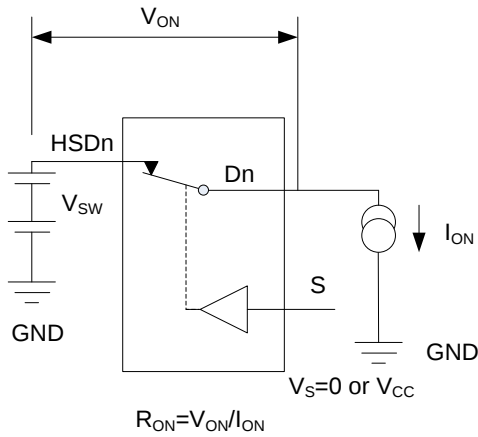


Figure 1 On Resistance

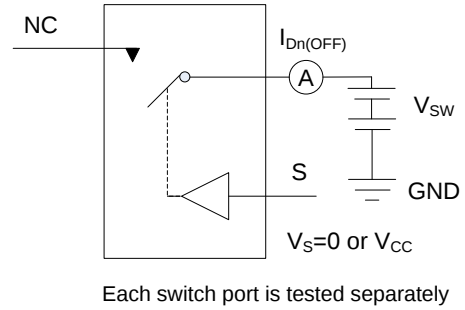


Figure 2 Off Leakage

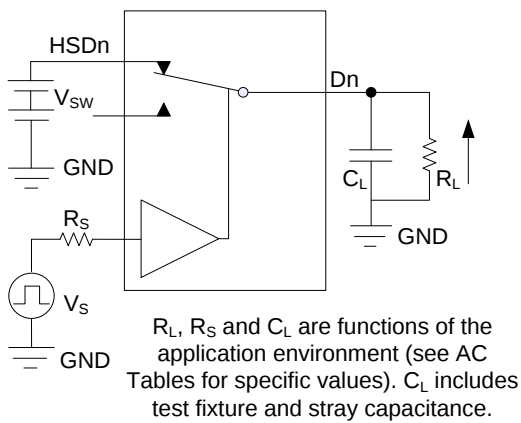


Figure 3 AC Test Circuit Load

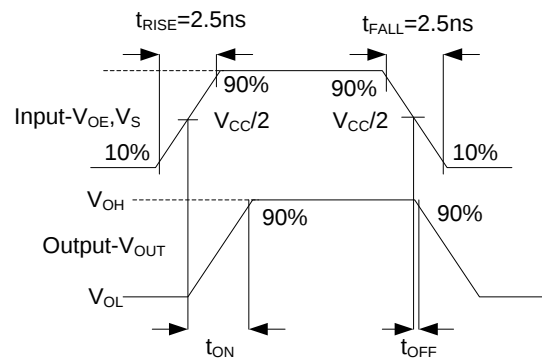


Figure 4 Turn-On/Turn-Off Waveforms

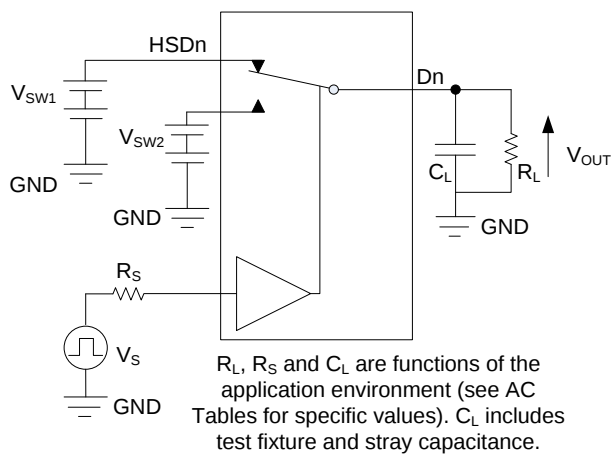
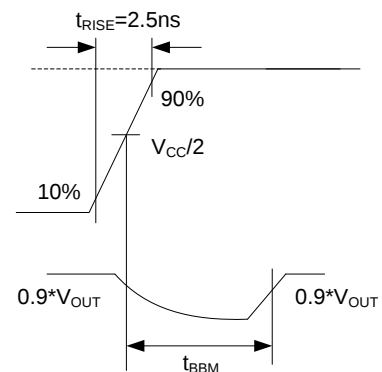


Figure 5 Break-Before-Make Interval Timing



Test Diagrams (Continued)

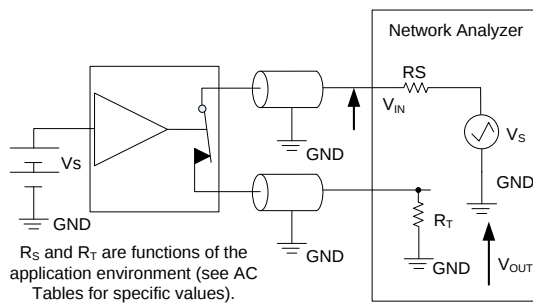


Figure 6 Bandwidth

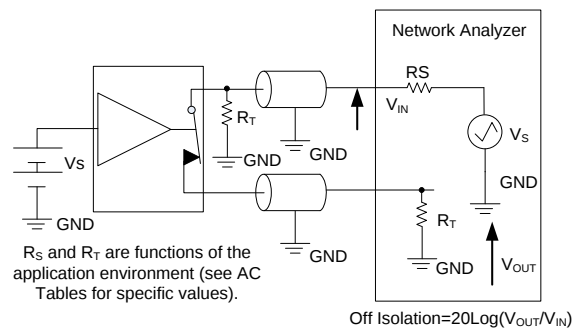


Figure 7 Channel Off Isolation

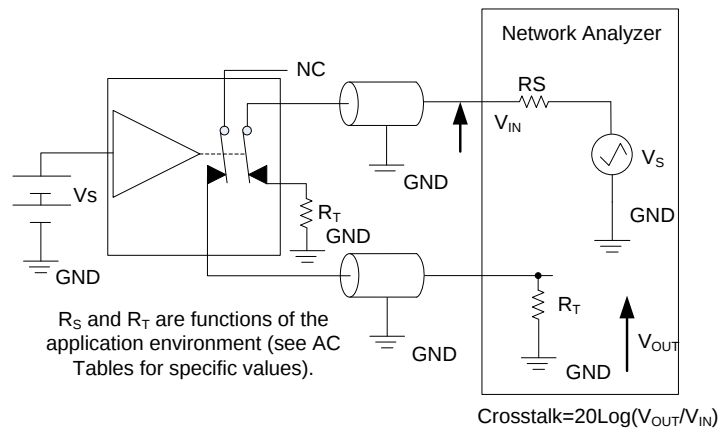


Figure 8 Non-Adjacent Channel-to-Channel Crosstalk

Applications Information

Power-Off Protection

For a VBUS short circuit, the switch is expected to withstand such a condition for at least 24 hours. The UM7227QA/UM7227MA has specially designed circuitry which prevents unintended signal bleed through as well as guaranteed system reliability during a power-down, over-voltage condition. The protection has been added to the common pins (D+, D-).

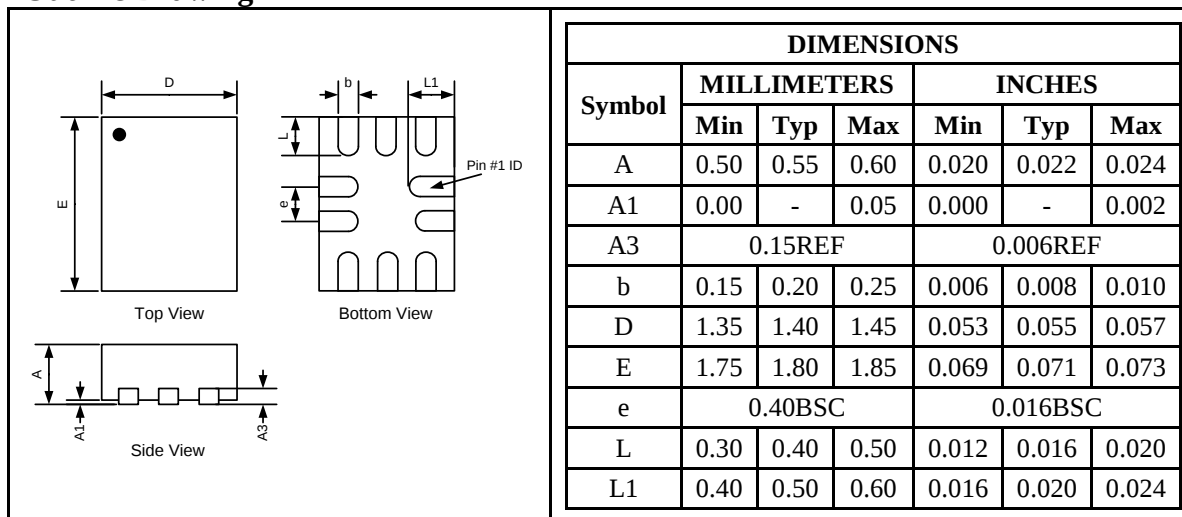
Power-On Protection

The USB 2.0 specification also notes that the USB device should be capable of withstanding a VBUS short during transmission of data. This modification works by limiting current flow back into the V+ rail during the over-voltage event so current remains within the safe operating range. In this application, the switch passes the full 5.25V input signal through to the selected output while maintaining specified off isolation on the un-selected pins.

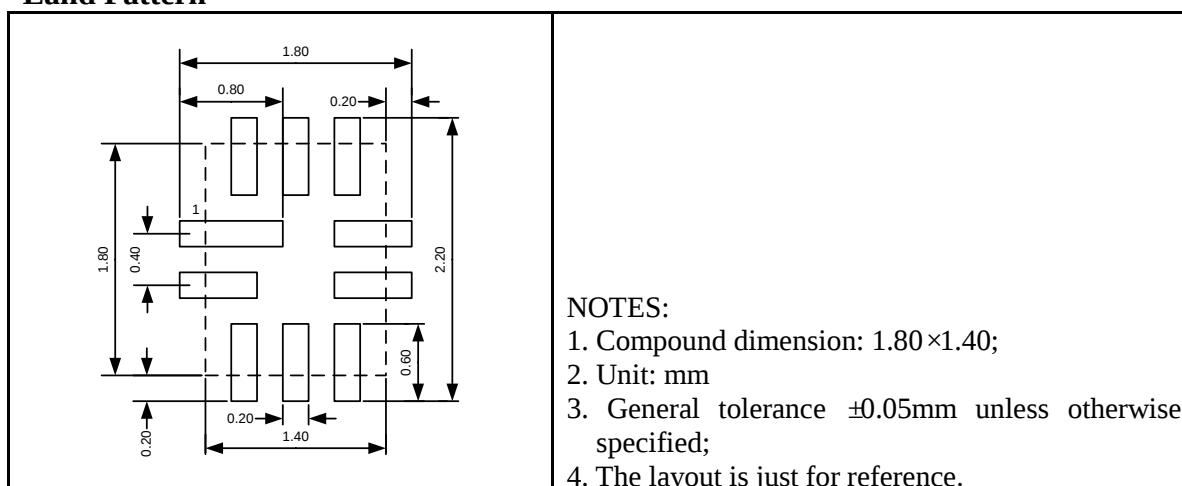
Package Information

UM7227QA QFN10 1.8×1.4

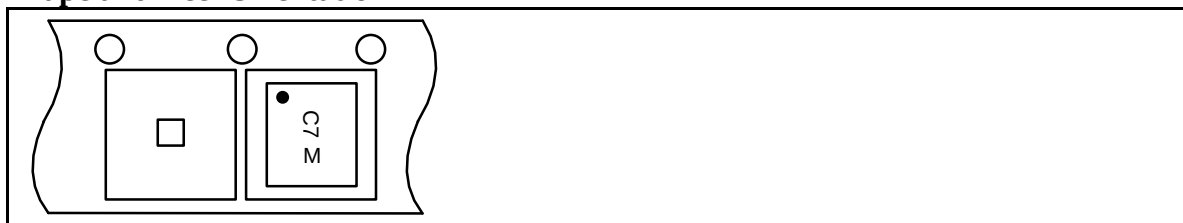
Outline Drawing



Land Pattern

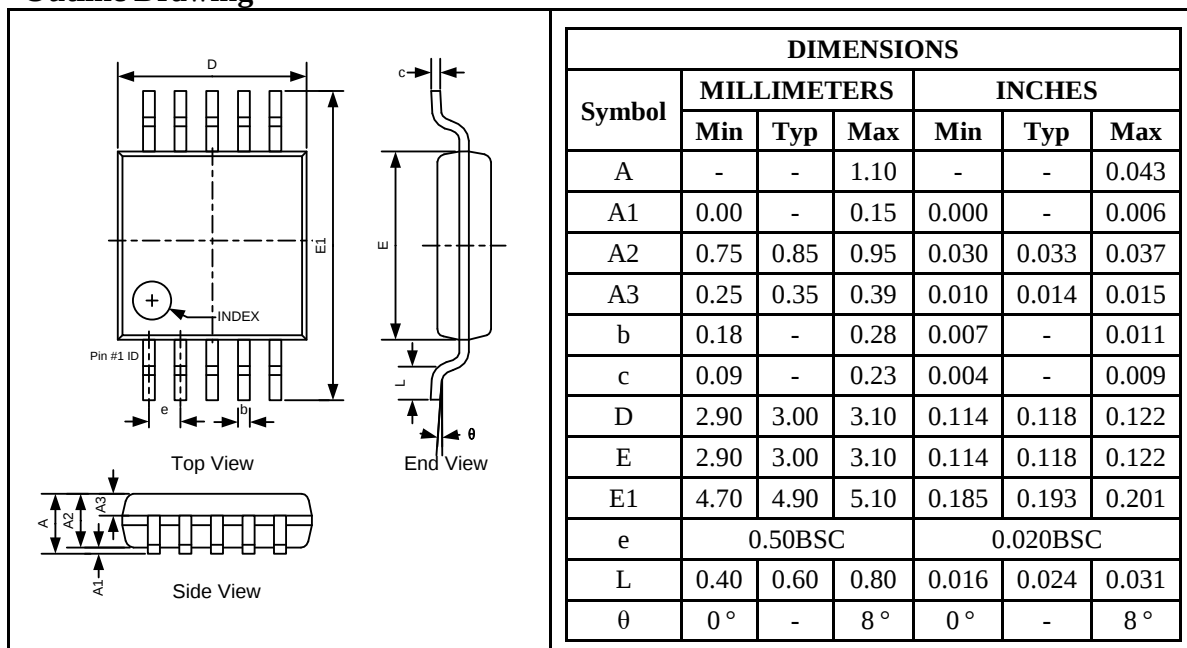


Tape and Reel Orientation

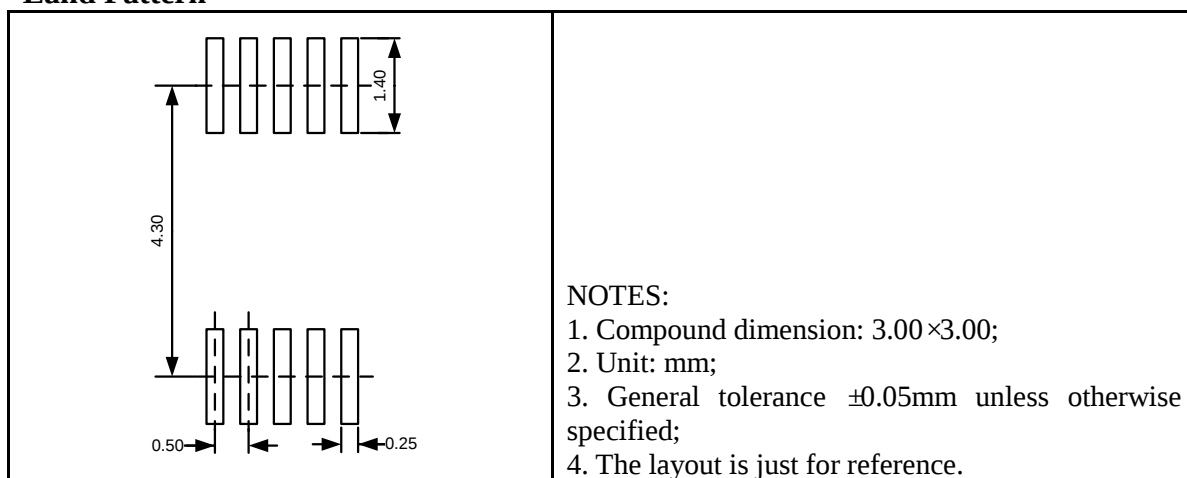


UM7227MA MSOP10

Outline Drawing



Land Pattern



Tape and Reel Orientation



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