4.5Ω Dual Bilateral SPST Analog Switch

FEATURES

- **Bandwidth: 300MHz**
- **High Speed, Typically 30ns**
- **Supply Range: +1.8V to +5.5V**
- **Low ON-State Resistance:4.5Ω(TYP)**
- **Rail-to-Rail Operation**
- **TTL/CMOS Compatible**
- **Extended Industrial Temperature Range: -40°C to +125°C**
- **PACKAGES: DFN2*3-8, MSOP-8**

APPLICATIONS

- **Wireless Devices**
- **Audio and Video Signal Routing**
- **Portable Computing**
- **Wearable Devices**
- **Signal Gating, Chopping, Modulation or Demodulation (Modem)**
- **Cell Phones**

DESCRIPTION

The RS2266 is a bidirectional 2-channel single-pole single-throw (SPST) analog switch, which is designed to operate from 1.8V to 5.5V.

The RS2266 device can handle both analog and digital signals. It features bandwidth(300MHz) and low on-resistance (4.5Ω TYP).

Each switch section has its own enable-input control (SEL). A high-level voltage applied to SEL turns on the associated switch section.

Applications include signal gating, chopping, modulation or demodulation (modem), and signal multiplexing for analog-to-digital and digital-to-analog conversion systems.

Device Information [1]

PART NUMBER	PACKAGE	BODY SIZE(NOM)
RS2266	MSOP-8	3.00mm×3.00mm
	DFN2*3-8	2.00mm×3.00mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.
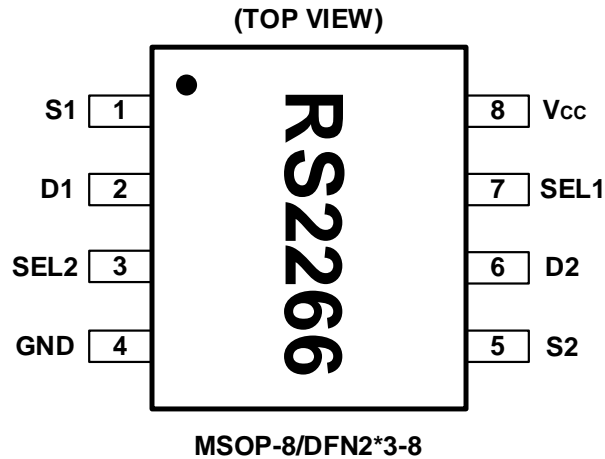
Functional Diagrams of RS2266
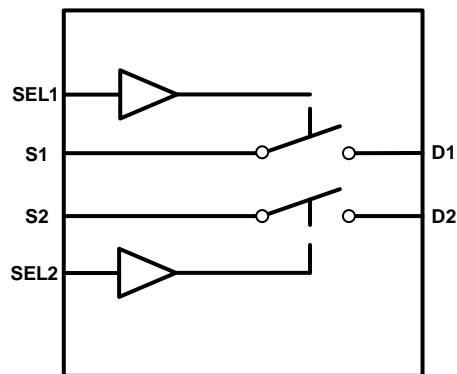
Revision History

Note: Page numbers for previous revisions may different from page numbers in the current version.

VERSION	Change Date	Change Item
A.1	2019.11	Initial version completed
A.2	2020.08	1) Change "Package Qty" in ordering information table for production management.
A.3	2020.12	1) Add DFN2*3-8 Package, remove SOIC8 Package

PIN CONFIGURATIONS

(TOP VIEW)

```
        ┌─────────────────┐
 S1  ┌─┤ 1   ●      RS2266 │  8 ├─ Vcc
 D1  ┌─┤ 2                 │  7 ├─ SEL1
SEL2 ┌─┤ 3                 │  6 ├─ D2
 GND ┌─┤ 4                 │  5 ├─ S2
        └─────────────────┘
```

MSOP-8/DFN2*3-8

PIN DESCRIPTION

NAME	PIN	I/O	DESCRIPTION
S1	1	I/O	Bidirectional signal to be switched
D1	2	I/O	Bidirectional signal to be switched
SEL2	3	I	Controls the switch (L = OFF, H = ON)
GND	4	-	Ground
S2	5	I/O	Bidirectional signal to be switched
D2	6	I/O	Bidirectional signal to be switched
SEL1	7	I	Controls the switch (L = OFF, H = ON)
Vcc	8	-	Power Supply

FUNCTION TABLE

SELECT INPUTS	SWITCH STATUS
SEL1/SEL2	
High	All Switches ON
Low	All Switches OFF

NOTE: Input and output pins are identical and interchangeable. Any may be considered an input or output; signals pass equally well in both directions.

SPECIFICATIONS

Absolute Maximum Ratings

Over operating free-air temperature range (unless otherwise noted) [1]

SYMBOL	PARAMETER		MIN	MAX	UNIT
V_{CC}	Supply Voltage [2]		-0.3	6.0	V
V_{IN}	Input Voltage [2][3]		-0.3	6.0	
V_O	Switch I/O Voltage [2][3][4]		-0.3	V_{CC}+0.3	
I_{IK}	Control input clamp current	$V_I < 0$		-50	mA
$I_{I/OK}$	I/O port diode current	$V_{I/O} < 0$ or $V_{I/O} > V_{CC}$		-50	
I_T	On-state switch Current	V_{IO}=0 to V_{CC}	-50	50	
	Continuous current through V_{CC} or GND		-100	100	
T_J	Junction Temperature			150	°C
T_{stg}	Storage temperature		-65	150	

(1) Stresses above these ratings may cause permanent damage. Exposure to absolute maximum conditions for extended periods may degrade device reliability. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those specified is not implied.
(2) All voltages are with respect to ground, unless otherwise specified.
(3) The input and output negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
(4) This value is limited to 5.5 V maximum.

ESD Ratings

			VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human-body model (HBM)	±2000	V
		Machine Model (MM)	±300	V

Recommended Operating Conditions

Over operating free-air temperature range (unless otherwise noted) [3]

SYMBOL	PARAMETER	MIN	MAX	UNIT
V_{CC}	Supply Voltage	1.8	5.5	V
T_A	Operating temperature	-40	+125	°C

Thermal Information

THERMAL METRIC		RS2266		UNIT
		8PINS		
		MSOP-8	DFN2*3-8	
$R_{\Theta JA}$	Junction-to-ambient thermal resistance	165	212.1	°C/W
$R_{\Theta JC(top)}$	Junction-to-case(top) thermal resistance	53	76.5	°C/W
$R_{\Theta JB}$	Junction-to-board thermal resistance	87	90.8	°C/W
Ψ_{JT}	Junction-to-top characterization parameter	4.9	6.8	°C/W
Ψ_{JB}	Junction-to-board characterization parameter	85	92.3	°C/W
$R_{\Theta JC(bot)}$	Junction-to-case(bottom) thermal resistance	NA	N/A	°C/W

PACKAGE/ORDERING INFORMATION

PRODUCT	ORDERING NUMBER	TEMPERATURE RANGE	PACKAGE LEAD	PACKAGE MARKING[1]	PACKAGE OPTION
RS2266	RS2266XM	-40°C ~+125°C	MSOP-8	RS2266	Tape and Reel,4000
	RS2266XTDB8-B	-40°C ~+125°C	DFN2*3-8	2266B	Tape and Reel,3000

NOTE:

(1) There may be additional marking, which relates to the lot trace code information(data code and vendor code)，the logo or the environmental category on the device.

ELECTRICAL CHARACTERISTICS

V_{CC} = 5.0 V or 3.3V, FULL= –40°C to +125°C, Typical values are at T_A = +25°C. (unless otherwise noted)

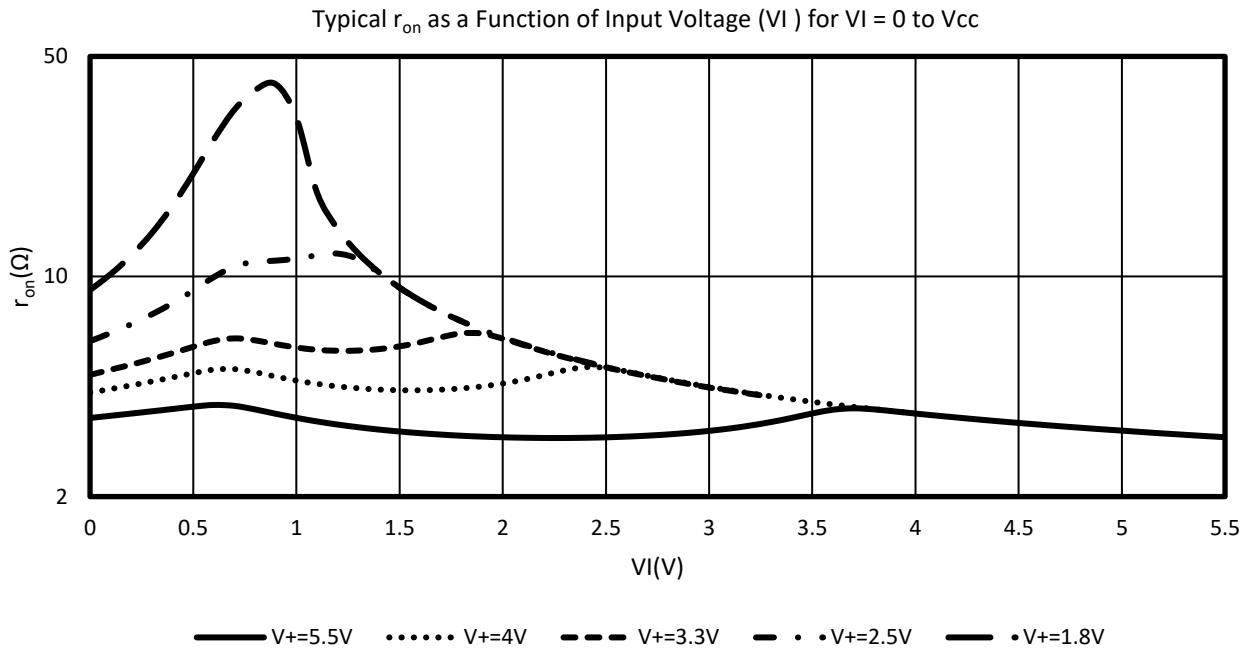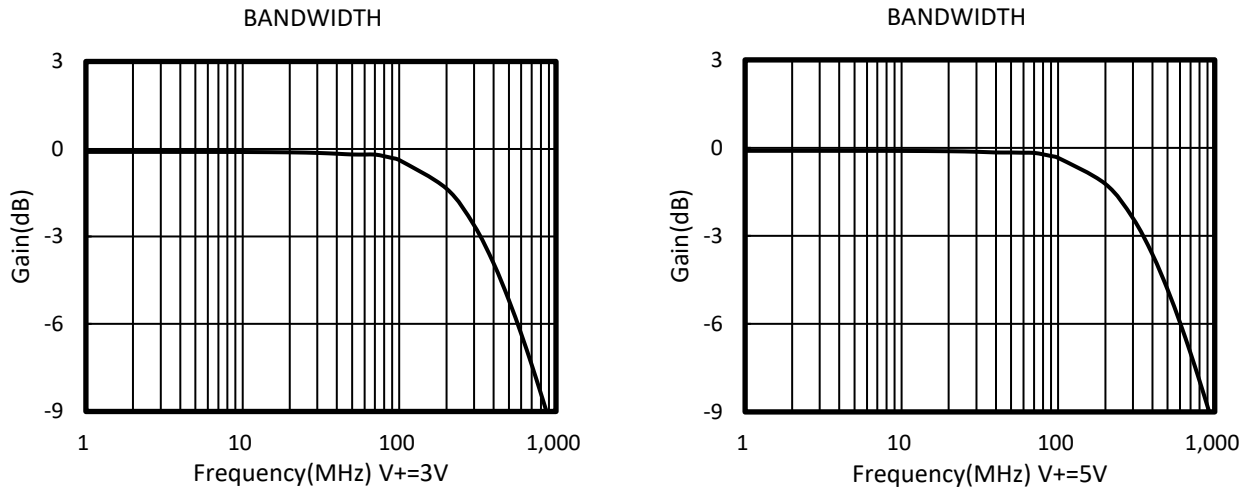| PARAMETER	SYMBOL	CONDITIONS	VDD	T_A	MIN	TYP	MAX	UNITS
ANALOG SWITCH								
Analog Signal Range	V_S, V_D			FULL	0		V_{CC}	V
On-Resistance	R_{ON}	V_S = V_{CC} /2, I_{SD}= -10mA, Switch ON, See Figure 1	5V	+25°C		4.5	8	Ω
				FULL			8.5	Ω
			3.3V	+25°C		7	10	Ω
				FULL			10.5	Ω
On-Resistance Match Between Channels	ΔR_{ON}	V_S = V_{CC} /2, I_{SD} = -10mA, Switch ON, See Figure 1	5V	+25°C		0.15	0.3	Ω
				FULL			0.4	Ω
			3.3V	+25°C		0.15	0.3	Ω
				FULL			0.4	Ω
On-Resistance Flatness	$R_{FLAT(ON)}$	0 ≤ (V_S) ≤V_{CC} /2, I_{SD} = -10mA, Switch ON, See Figure 1	5V	+25°C		2	3	Ω
				FULL			3.3	Ω
			3.3V	+25°C		3	4	Ω
				FULL			4.3	Ω
Source, Drain OFF Leakage Current	$I_{D(OFF)}$, $I_{S(OFF)}$	V_D = 0.3V, V_{CC} /2, V_S = V_{CC} /2, 0.3V See Figure 2	1.8 to 5.5V	FULL			1	µA
Channel ON Leakage Current	$I_{D(ON)}$, $I_{S(ON)}$	V_D = 0.3V, Open V_S = Open, 0.3V See Figure 3	1.8 to 5.5V	FULL			1	µA
DIGITAL CONTROL INPUTS [1]								
Input High Voltage	V_{IH}		5V	FULL	1.5			V
			3.3V	FULL	1.3			V
Input Low Voltage	V_{IL}		5V	FULL			0.6	V
			3.3V	FULL			0.5	V
Input Leakage Current	I_{IN}	V_{IN} = V_{IO} or 0	1.8 to 5.5V	FULL			1	µA

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

ELECTRICAL CHARACTERISTICS (continued)

V_{CC}= 5.0 V or 3.3V, FULL= –40°C to +125°C, Typical values are at T_A = +25°C (unless otherwise noted)

PARAMETER	SYMBOL	CONDITIONS		V+	TEMP	MIN	TYP	MAX	UNITS
DYNAMIC CHARACTERISTICS									
Turn-On Time	t_{ON}	$V_S = V_{CC}$, $R_L = 300\Omega$, $C_L = 35pF$, See Figure 4		5V	+25°C		30		ns
				3.3V			40		
Turn-Off Time	t_{OFF}	$V_S = V_{CC}$, $R_L = 300\Omega$, $C_L = 35pF$, See Figure 4		5V	+25°C		25		ns
				3.3V			30		
Break-Before-Make Time Delay	t_{BBM}	$V_S = 3V$, $R_L = 300\Omega$, $C_L = 35pF$, See Figure 5		5V	+25°C		5		ns
				3.3V			8		
-3dB Bandwidth	BW	Switch ON, $R_L = 50\Omega$, See Figure 6		5V	+25°C		300		MHz
Off Isolation	O_{ISO}	$R_L = 50\Omega$, Switch OFF, See Figure 7	f = 10MHz		+25°C		-52		dB
			f = 1MHz		+25°C		-71		dB
Source, Drain OFF Capacitance	$C_{S(OFF)}$, $C_{D(OFF)}$	$V_S= V_{CC}$ /2 or GND, Switch OFF			+25°C		5		pF
Source, Drain ON Capacitance	$C_{S(ON)}$, $C_{D(ON)}$	$V_S= V_{CC}$ /2 or GND, Switch ON			+25°C		15		pF
POWER REQUIREMENTS									
Power Supply Range	V_{CC}				FULL	1.8		5.5	V
Power Supply Current	I_{CC}	V_{IN} = GND or V_{CC}		5.5V	FULL			1	µA

TYPICAL CHARACTERISTICS

BANDWIDTH

BANDWIDTH

Typical r_{on} as a Function of Input Voltage (VI) for VI = 0 to Vcc

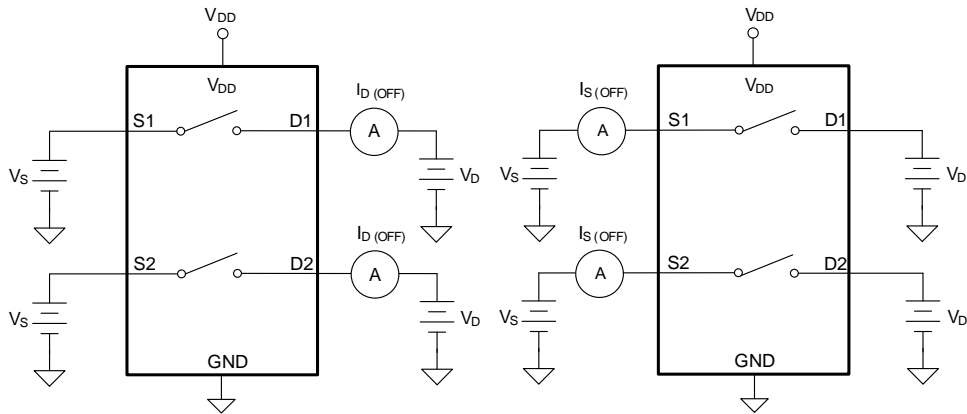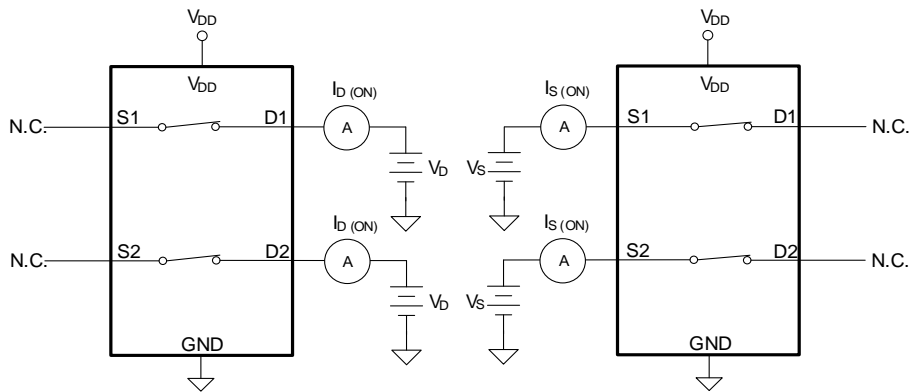——— V+=5.5V   ••••••V+=4V   ▬ ▬ ▬V+=3.3V   ▬ • ▬ •V+=2.5V   ▬ •▬ •V+=1.8V

Parameter Measurement Information
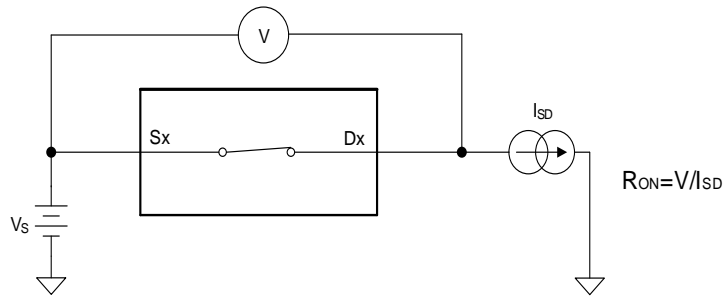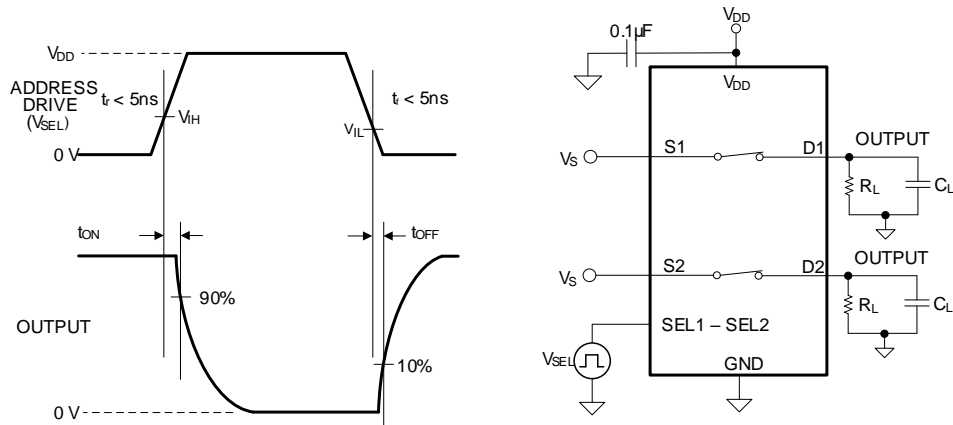

Figure 1. ON-State Resistance (R_{ON})

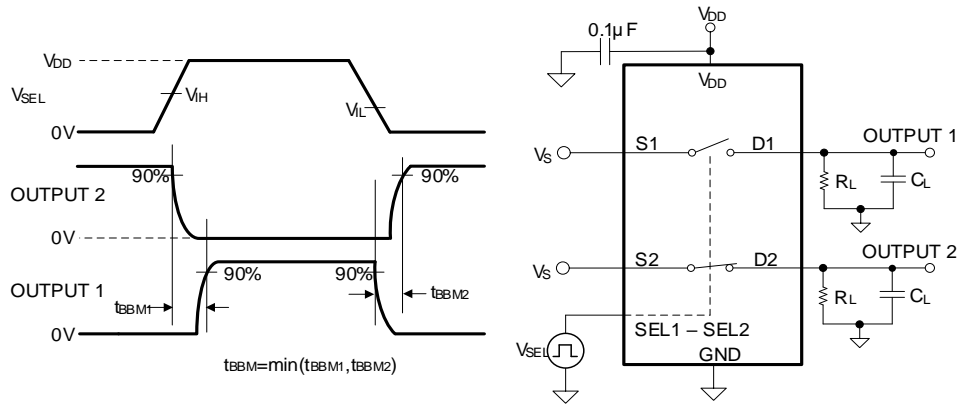**Figure 2.OFF-State Leakage Current ($I_{D(OFF)}$, $I_{S(OFF)}$)**

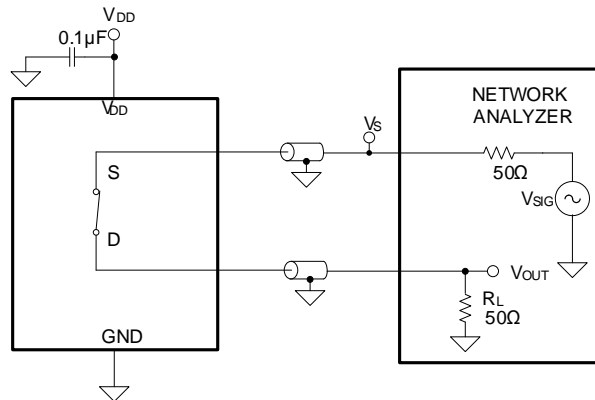**Figure 3. ON-State Leakage Current ($I_{D(ON)}$, $I_{S(ON)}$)**

Parameter Measurement Information(continued)

Figure 4. Turn-On (t$_{ON}$) and Turn-Off Time (t$_{OFF}$)

Figure 5. Break-Before-Make Time (t$_{BBM}$)

Figure 6. Bandwidth (BW)

Parameter Measurement Information(continued)

Off Isolation=20*Log(V_{OUT}/V_S)
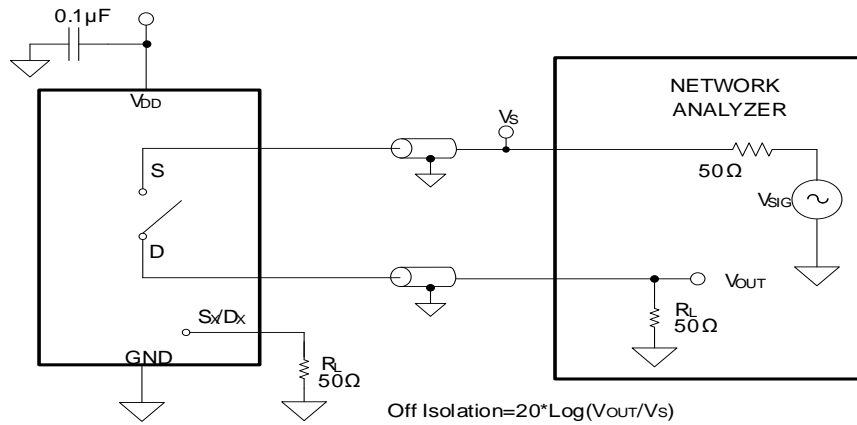
Figure 7.OFF Isolation (O$_{ISO}$)

Channel-to-Channel Crosstal=20*Log(V_{OUT}/V_S)
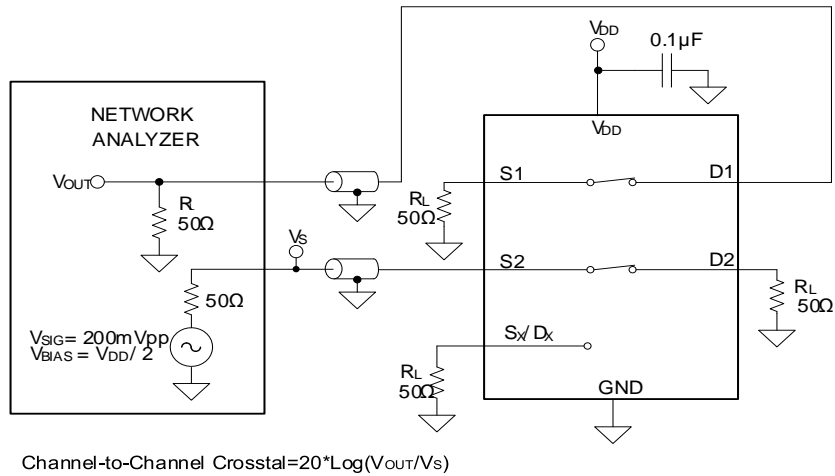
Figure 8. Crosstalk (X$_{TALK}$)

$Q_C = C_L \times \Delta V_{OUT}$
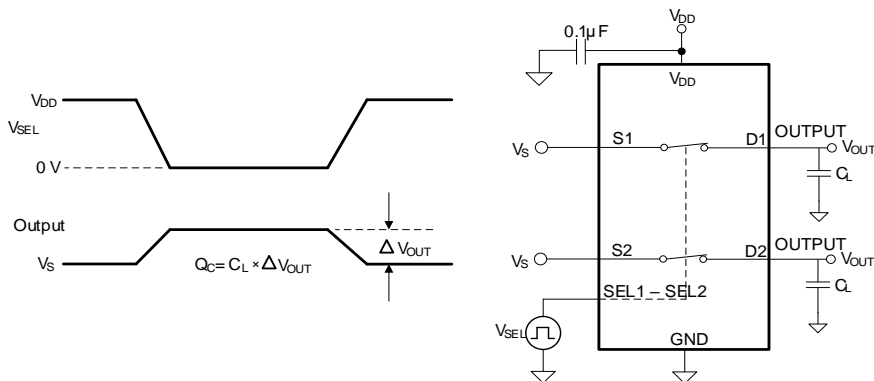
Figure 9. Charge Injection (Q$_C$)

TYPICAL APPLICATION

The RS2266 can be used in any situation where a Dual SPST switch would be used and a solid-state, voltage-controlled version is preferred. The RS2266 allows on/off control of analog and digital signals with a digital control signal. All input signals should remain between 0V and Vcc for optimal operation.
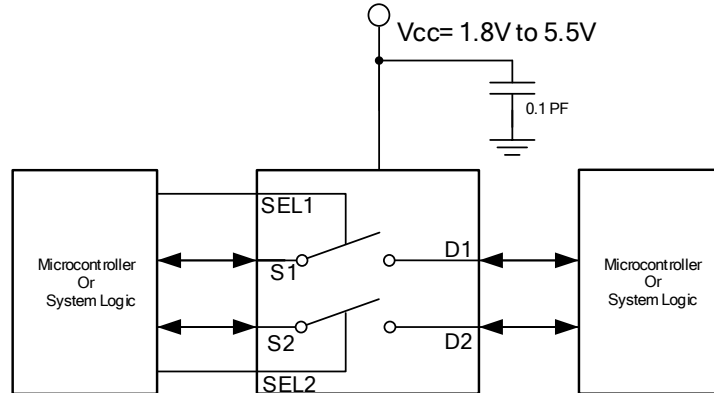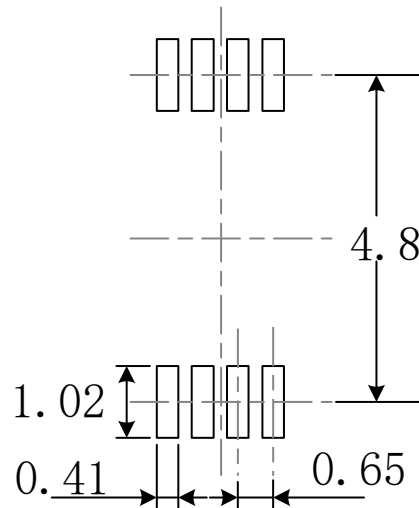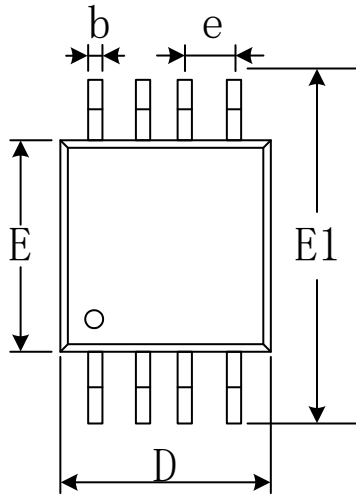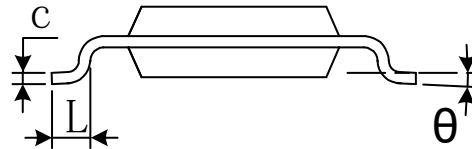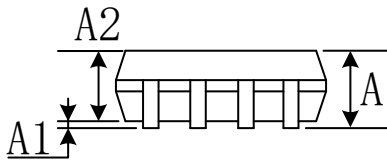

Figure 10. Typical Application Schematic
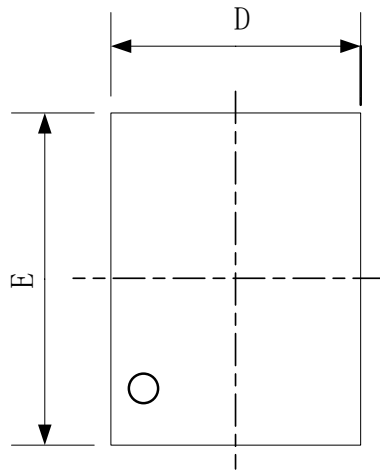
PACKAGE OUTLINE DIMENSIONS
MSOP-8

RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.820	1.100	0.032	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.250	0.380	0.010	0.015
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
e	0.650(BSC)		0.026(BSC)	
E	2.900	3.100	0.114	0.122
E1	4.750	5.050	0.187	0.199
L	0.400	0.800	0.016	0.031
θ	0°	6°	0°	6°

DFN2*3-8

TOP VIEW
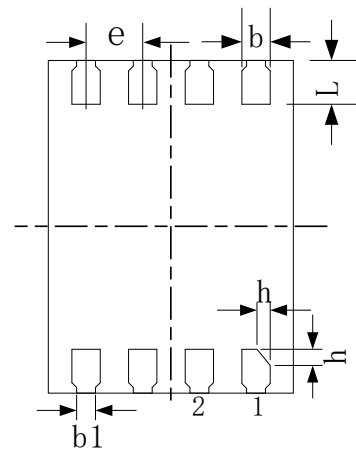
BOTTOM VIEW
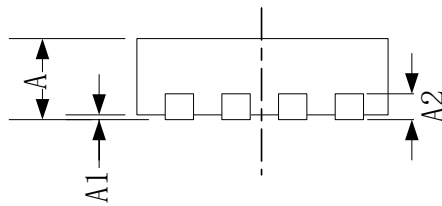
SIDE VIEW

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A2	0.180	0.250	0.007	0.010
b	0.180	0.300	0.007	0.012
b1	0.16 REF		0.006 REF	
D	1.900	2.100	0.075	0.083
E	2.900	3.100	0.114	0.122
e	0.500 TYP		0.019 TYP	
L	0.350	0.450	0.014	0.018
h	0.075	0.175	0.003	0.007

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