

S1F77310M0A

Technical Manual

Preliminary

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1. OVERVIEW

The S1F77310 series is the bus switch suitable for USB applications. The adopted CMOS process technology characterizes the S1F77310 series by low power consumption. The compact PLP-8 adopted for the package enables the S1F77310 series to be mounted on high-density assemblies.

The built-in level shift circuit eliminates the need of external level shift circuitry for the input to this IC.

1.1 Features

•Input voltage range	: 3.0V to 3.6V
•Low-current consumption	: 14 μ A (MAX)
•Static current	: 1 μ A (MAX)
•Bus switch ON resistance	: 5.3 Ω (typ)
•Bus switch OFF capacitance	: 1.7pF (typ)

1.2 Application

- Mobile communication equipment (mobile phones, cordless phones, and wireless communication devices)
- Mobile AV equipment
- Home appliances
- Cameras, and video equipment
- Portable game devices
- Battery-based equipment

1.3 Package

- PLP-8 (1.60mm \times 1.60mm)

1.4 Application Circuit Example

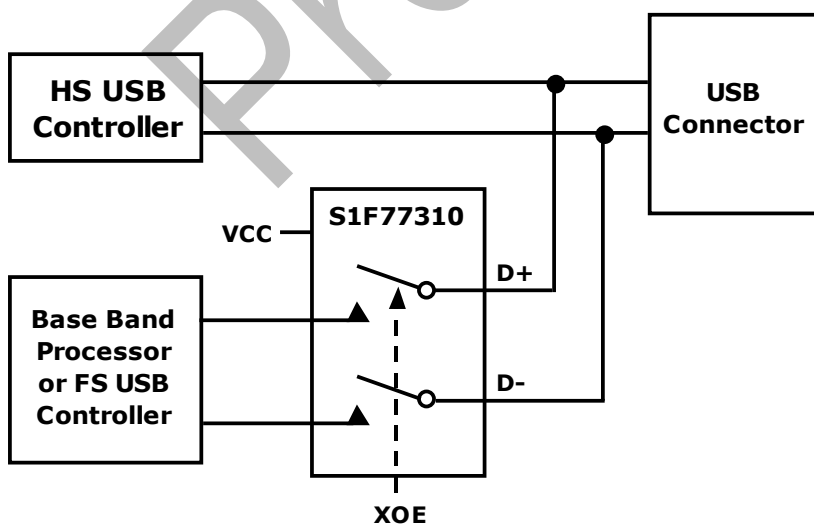
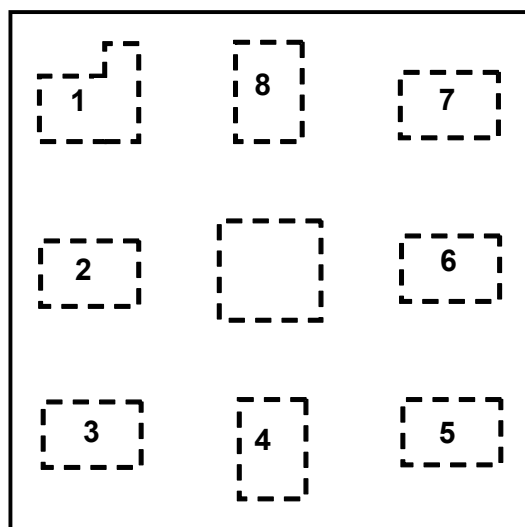


Fig.1 Application Circuit Example

1. OVERVIEW

1.5 Pin Assignment



(TOP VIEW)

Fig.2 Pin Assignment

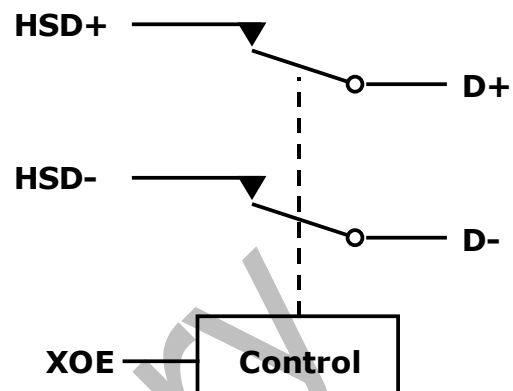


Fig.3 Bus switch symbol

* Central land area in this IC is not used. Do not mount any pin.

1.6 Pin Description

Pin No.	Pin Name	Pin Description
1	XOE	Bus switch enable input pin
2	HSD+	Data port (+)
3	D+	Data port (+)
4	GND	GND pin
5	D-	Data port (-)
6	HSD-	Data port (-)
7	(NC)	Nc pin
8	Vcc	Power supply pin

1.7 Truth Table

XOE	Bus Switch status
HIGH	Disconnected
LOW	HSD+ =D+, HSD- =D-

1.8 Block Diagram

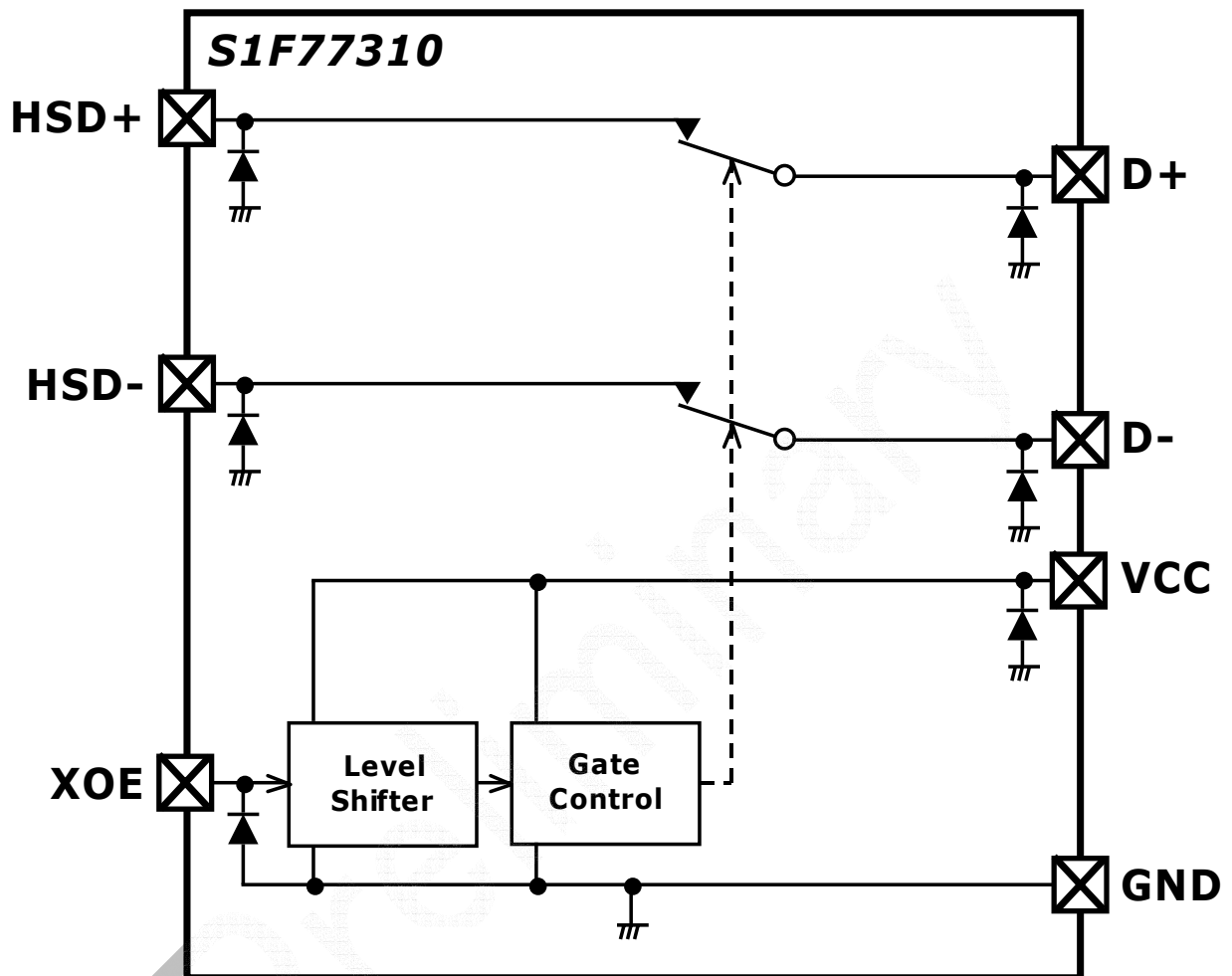


Fig.4 Block diagram

2. ELECTRICAL CHARACTERISTICS

2. ELECTRICAL CHARACTERISTICS

2.1 Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Supply voltage	V _{CC}	-0.3	4.6	V
Input pin voltage	XOE V _{IN}	-0.3	7.0	V
Switch input voltage	HSD+,HSD-,D+,D- V _{SW}	-0.3	7.0	V
Storage temperature	T _{STG}	-65	150	°C

2.2 Recommended Operating Conditions

Item	Symbol	Min.	Max.	Unit
Supply voltage	V _{CC}	3.0	3.6	V
Input pin voltage	XOE V _{IN}	0.0	5.5	V
Switch input voltage	HSD+,HSD-,D+,D- V _{SW}	0.0	5.5	V
Operating temperature	T _a	-40	85	°C

2.3 DC Electrical Characteristics

(Unless otherwise specified: T_a=-40°C to 85°C)

Item	Symbol	Conditions	V _{CC} [V]	Min.	Typ.	Max.	Unit
Clamp diode voltage	V _{IK}	I _L =18mA	3.0			-1.2	V
High Level Input voltage	V _{IH}		3.0 to 3.6	1.2			V
Low Level Input voltage	V _{IL}		3.0 to 3.6			0.4	V
Input Leakage current	I _{IN}	0V ≤ V _{IN} ≤ V _{CC}	3.6 *	-1.0		1.0	μA
OFF Stage Leakage current	I _{OZ}	0V ≤ V _{SW} ≤ V _{CC}	3.6 *	-1.0		1.0	μA
Power off Leakage current (D+, D-)	I _{OFF}	0V ≤ V _{SW} ≤ V _{CC} , V _{CC} =0V	0.0	-2.0		2.0	μA
Switch ON resistance	R _{ON}	V _{SW} =0.4V, I _{ON} = -8mA	3.0		5.3	8.0	Ω
ΔON resistance	ΔR _{ON}	V _{SW} =0.4V, I _{ON} = -8mA	3.0		0.35		Ω
ON resistance flatness	R _{ON} (Flat)	0V ≤ V _{SW} ≤ 1V, I _{ON} = -8mA	3.0		2		Ω
Quiescent current	I _{CC}	V _{IN} =3.6V	3.6			1.0	μA
Current consumption	I _{CC} T	V _{IN} =0V, V _{SW} =2.6V	3.6			14.0	μA

* Describe the value based on the USB full speed standard.

2. ELECTRICAL CHARACTERISTICS

2.4 AC Electrical Characteristics

(Unless otherwise specified: Ta=-40°C to 85°C)

Item	Symbol	Conditions	Vcc[V]	Min.	Typ.	Max.	Unit
Turn ON Time	t _{ON}	RL=50Ω, CL=5pF	3.0 to 3.6		5	20	μs
Turn OFF Time	t _{OFF}	RL=50Ω, CL=5pF	3.0 to 3.6		21	40	ns
Propagation Delay	t _{PD}	RL=50Ω, CL=5pF	3.3		0.25		ns
OFF Isolation	O _{IRR}	RL=50Ω, CL=0pF, f=240MHz	3.0 to 3.6		-35		dB
Crosstalk	X _{talk}	RL=50Ω, f=240MHz	3.0 to 3.6		-40		dB
-3dB Bandwidth	BW	RL=50Ω, CL=0pF, f=240MHz	3.0 to 3.6		1000		MHz
Channel to Channel Skew	t _{SK(O)}	RL=50Ω, CL=5pF	3.0 to 3.6		50		ps
Skew of Opposite Transitions of the Same Output	t _{SK(P)}	RL=50Ω, CL=5pF	3.0 to 3.6		20		ps
Total Jitter	t _j	RL=50Ω, CL=5pF, t _r =t _f =500ps at 480Mbps	3.0 to 3.6		200		ps

2.5 Capacitance

(Unless otherwise specified: Ta=-40°C to 85°C)

Item	Symbol	Conditions	Vcc[V]	Min.	Typ.	Max.	Unit
Control input pin capacitance	C _{IN}	V _{CC} =0V, f=1MHz	0.0		7.0		pF
Bus switch ON capacitance	C _{ON}	V _{IN} =0V, f=1MHz	3.3		3.7		pF
Bus switch OFF capacitance	C _{OFF}	V _{CC} =0V, f=1MHz	0.0		1.7		pF

3. TYPICAL CHARACTERISTICS DIAGRAMS

3. TYPICAL CHARACTERISTICS DIAGRAMS

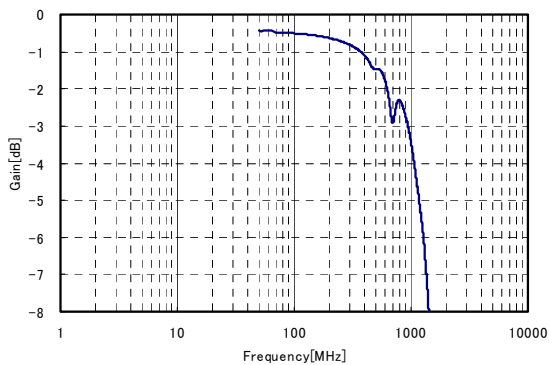


Fig.5 Gain-frequency characteristic

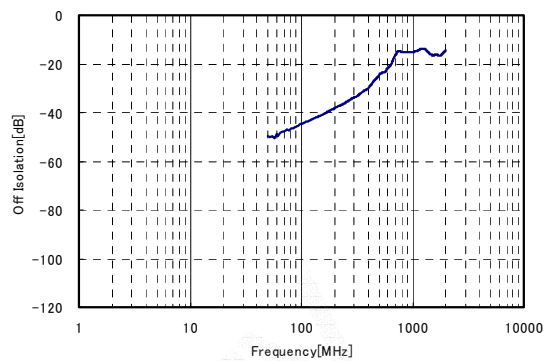


Fig.6 OFF Isolation

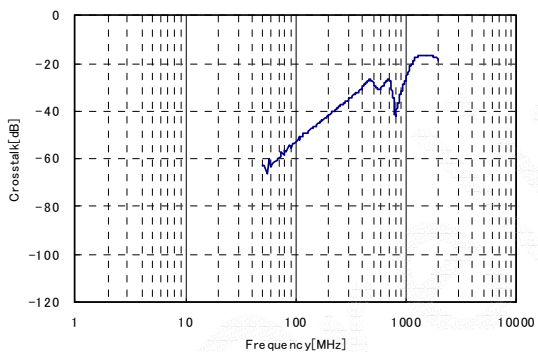


Fig.7 Crosstalk

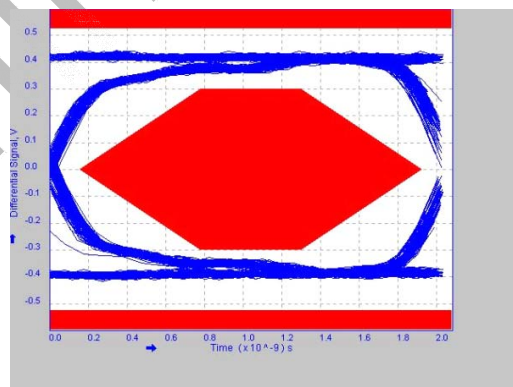


Fig.8 HS-Eye characteristic

4. TEST DIAGRAMS

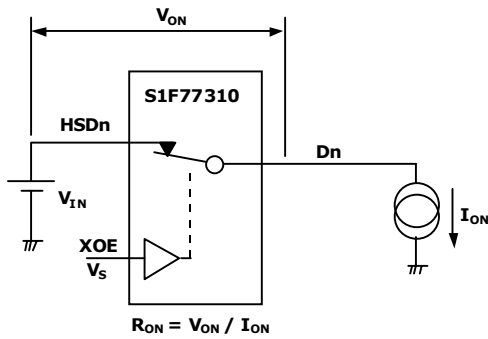


Fig.9 ON resistance

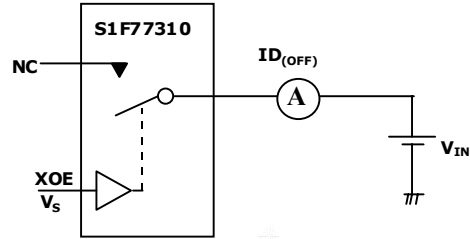


Fig.10 OFF-leakage

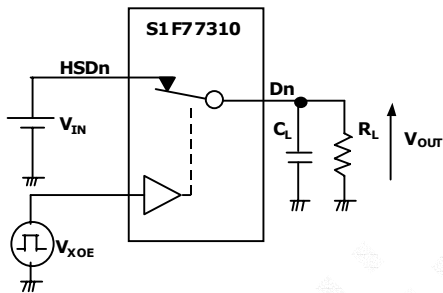


Fig.11 AC characteristic

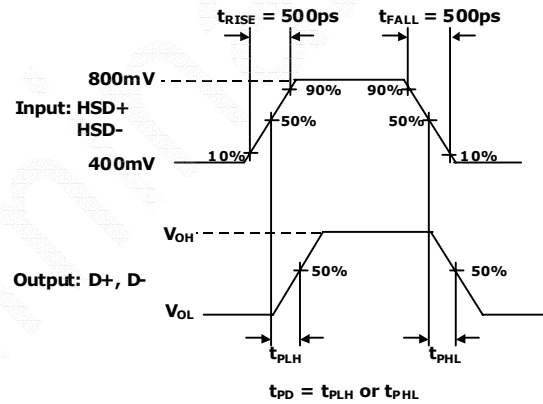


Fig.12 Switch Propagation delay waveform

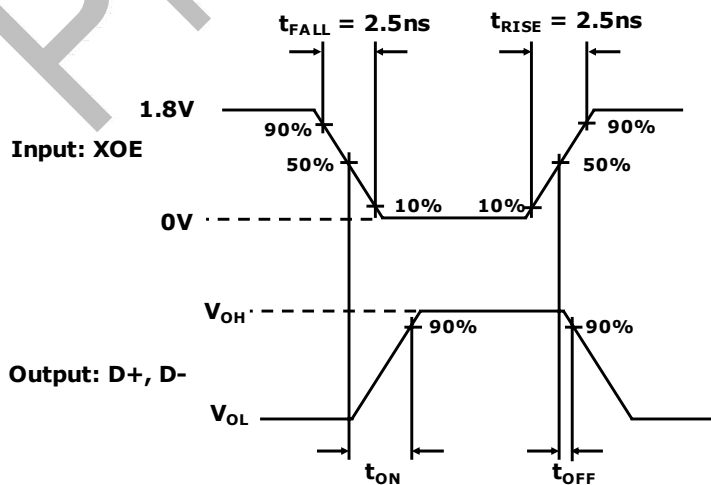


Fig.13 Turn on/Turn off waveform

4. TEST DIAGRAMS

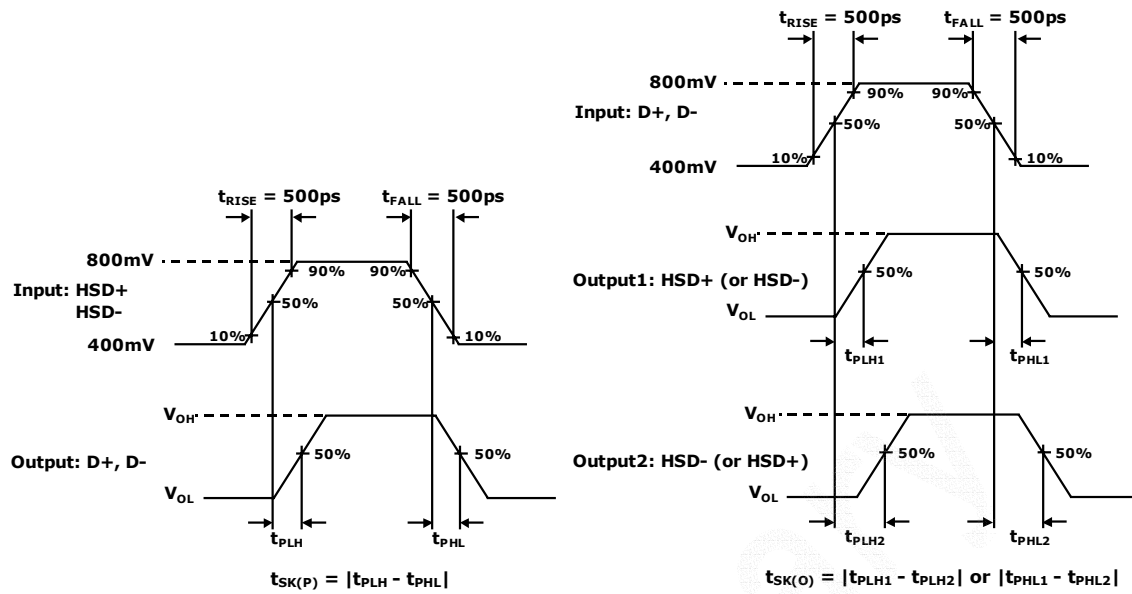


Fig.14 Switch skew test waveform

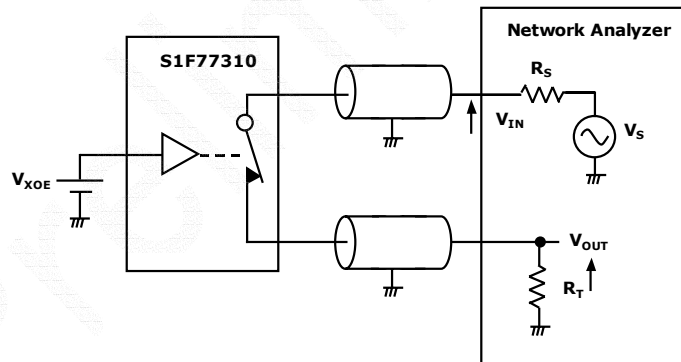


Fig.15 Bandwidth measurement circuit

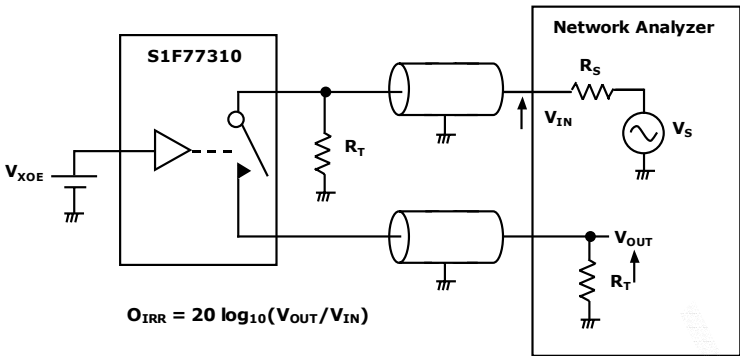


Fig.16 OFF isolation

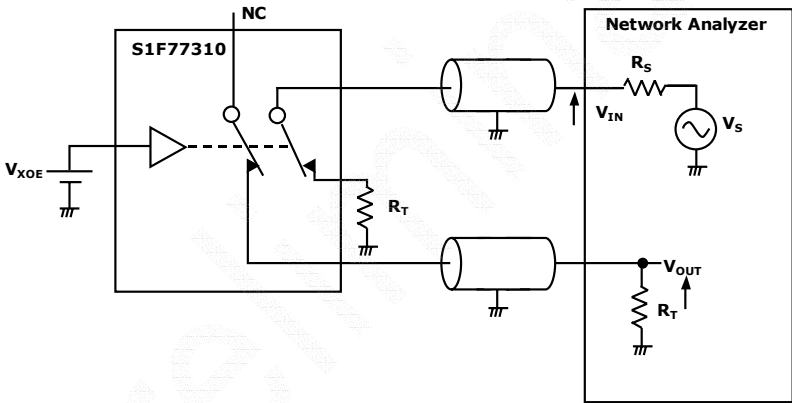


Fig.17 Crosstalk

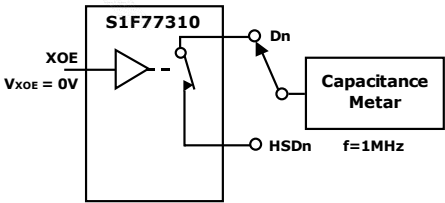


Fig.18 ON capacitance

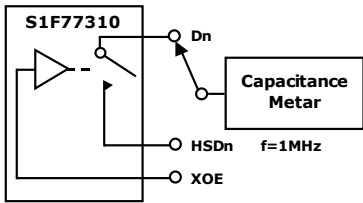


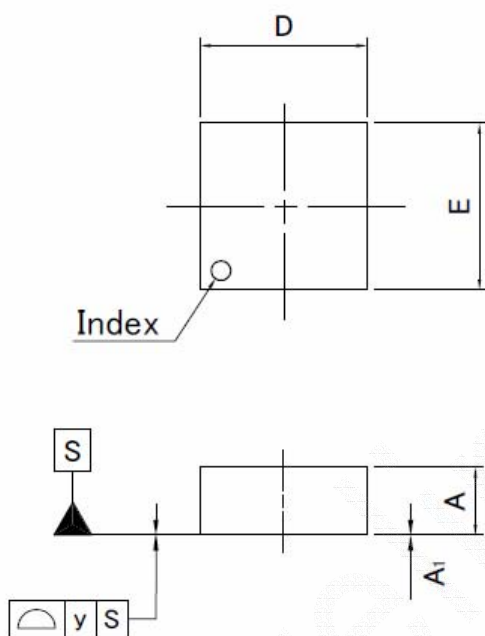
Fig.19 OFF Capacitance

5. PACKAGE INFORMATION

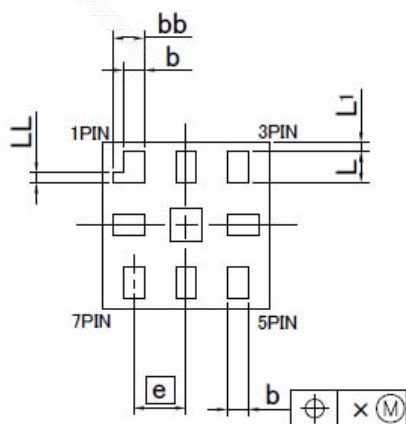
5. PACKAGE INFORMATION

5.1 Package Outline

Top View



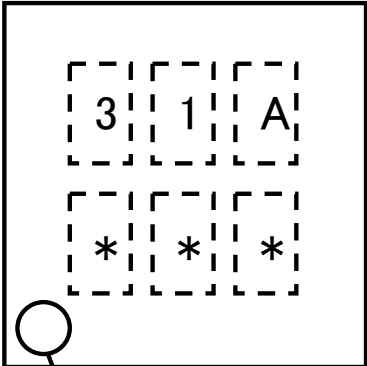
Bottom View



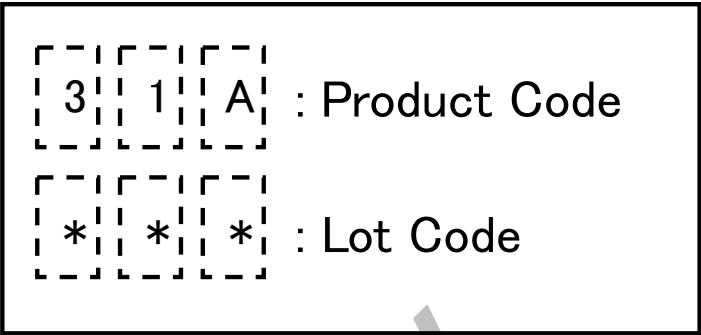
(unit:mm)

Symbol	Dimension in Millimeters		
	Min.	Nom.	Max.
D	—	1.6	—
E	—	1.6	—
A	—	—	0.65
A ₁	0	—	—
e	—	0.5	—
b	0.1	—	0.3
bb	0.2	—	0.4
L	0.2	—	0.4
L ₁	—	0.09	—
LL	—	0.1	—
x	—	—	0.1
y	—	—	0.08

5.2 Marking



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