SGM6533
High-Bandwidth (350MHz), 3-Channel, 3:1 Video Switch

GENERAL DESCRIPTION

The SGM6533 is an ultra-low power, high-bandwidth video switch specially designed for switching three analog video signals, including computer RGB and high-definition YPbPr signals. The wide bandwidth (350MHz) of the switch allows signal passage with minimum edge and phase distortion, while -60dB nonadjacent channel crosstalk generates negligible image noise between active channels. Optimized differential gain and phases maintain the image integrity of video applications, while low on resistance offers low signal insertion loss.

The SGM6533 is available in Green TQFN-3×3-20L and TSSOP-20 packages. It operates over an ambient temperature range of -40°C to +85°C.

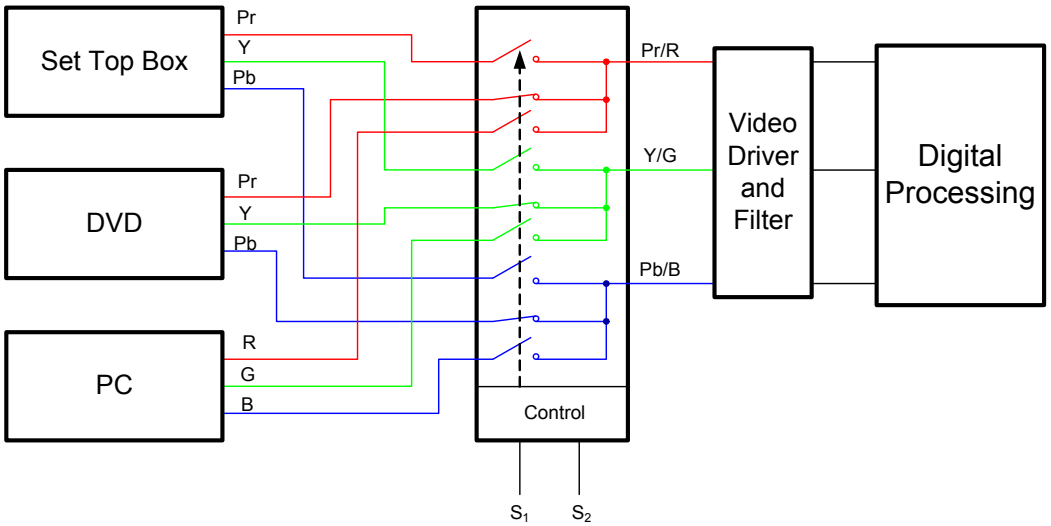
FEATURES

- **Supply Range: 2.5V to 5.5V**
- **On-Resistance: 7Ω (TYP) at 5.0V**
- **High -3dB Bandwidth: 350MHz**
- **High Off-Isolation: -47dB at 30MHz**
- **Non-Adjacent Channel Crosstalk: -60dB at 30MHz**
- **Ground between Channels to Optimize Isolation and Reduce Hostile Crosstalk**
- **Available in Green TQFN-3×3-20L and TSSOP-20 Packages**

APPLICATIONS

RGB Video Switch in LCD, Plasma and Projector Displays
DVD-RW

TYPICAL APPLICATION DIAGRAM



PACKAGE/ORDERING INFORMATION

MODEL	PIN-PACKAGE	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKAGE OPTION
SGM6533	TSSOP-20	-40°C to +85°C	SGM6533YTS20G/TR	SGM6533YTS20	Tape and Reel, 3000
	TQFN-3×3-20L	-40°C to +85°C	SGM6533YTQG20G/TR	SGM6533QG	Tape and Reel, 3000

ABSOLUTE MAXIMUM RATINGS

Supply Voltage…… -0.3V to 6.0V
DC Switch Voltage…….. -0.3V to 6.0V
DC Input Voltage (1)…… -0.3V to 6.0V
DC Input Diode Current, V_{IN} < 0V……..... -50mA (MIN)
DC Output Sink Current……..……. 100mA (MAX)
Storage Temperature Range……..…… -65℃ to +150℃
Junction Temperature……..…150℃
Operating Temperature Range ……..... -40℃ to +85℃
Lead Temperature Range (Soldering, 10s)
…… 260℃
ESD Susceptibility
HBM (TQFN-3×3-20L)……6000V
HBM (TSSOP-20)……8000V
MM…….. 400V

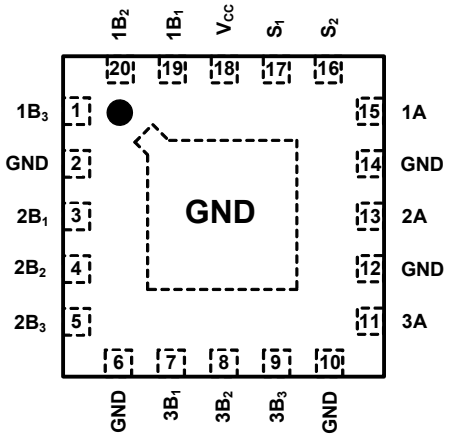
NOTES:
1. The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.
2. Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

CAUTION

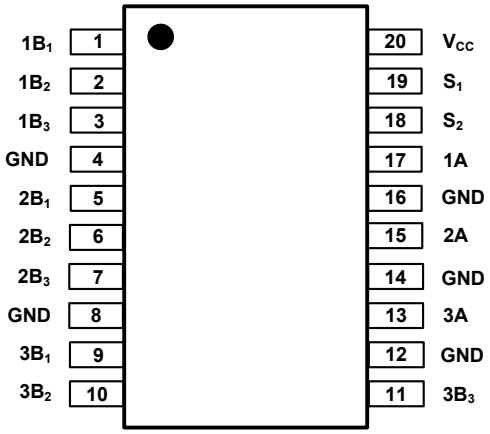
This integrated circuit can be damaged by ESD if you don’t pay attention to ESD protection. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

SGMICRO reserves the right to make any change in circuit design, specification or other related things if necessary without notice at any time. Please contact SGMICRO sales office to get the latest datasheet.

PIN CONFIGURATIONS (TOP VIEW)



TQFN-3×3-20L

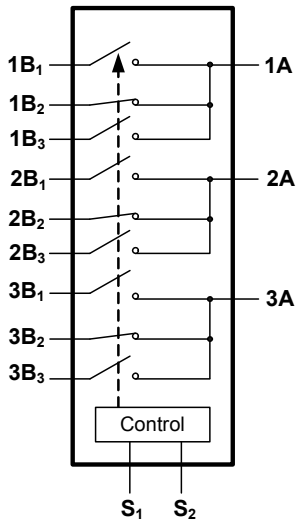


TSSOP-20

PIN DESCRIPTION

PIN		NAME	FUNCTION
TSSOP-20	TQFN-3×3-20L		
1, 2, 3, 5, 6, 7, 9, 10, 11	19, 20, 1, 3, 4, 5, 7, 8, 9	$1B_1$, $1B_2$, $1B_3$, $2B_1$, $2B_2$, $2B_3$, $3B_1$, $3B_2$, $3B_3$	Bus B.
4, 8, 12, 14, 16	2, 6, 10, 12, 14	GND	Ground.
13, 15, 17	11, 13, 15	3A, 2A, 1A	Bus A.
18, 19	16, 17	S_2, S_1	Select Input.
20	18	V_{CC}	Supply Voltage.
—	Exposed Pad	GND	Exposed pad should be soldered to PCB board and connected to GND or left floating.

BLOCK DIAGRAM



Analog Symbol

FUNCTION TABLE

S_1	S_2	FUNCTION
LOW	LOW	Disconnected
LOW	HIGH	$A = B_1$
HIGH	LOW	$A = B_2$
HIGH	HIGH	$A = B_3$

ELECTRICAL CHARACTERISTICS

(T_A = -40°C to +85°C. Typical values are at T_A = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
GENERAL							
Power Supply Range (3)	V_{CC}			2.5		5.5	V
Input Voltage (3)	V_{IN}			0		V_{CC}	V
DC PERFORMANCE							
Analog Signal Range	V_{ANALOG}	V_{CC} = 2.5V to 5.0V		0		V_{CC}	V
Clamp Diode Voltage	V_{IK}	V_{CC} = 4.5V, I_B = -18mA			-0.8		V
High-Level Input Voltage	V_{IH}	V_{CC} = 2.5V to 5.0V		1.6			V
Low-Level Input Voltage	V_{IL}	V_{CC} = 2.5V to 5.0V				0.6	V
Input Leakage Current	I_I	V_{CC} = 5.0V, 0 ≤ V_{SEL} ≤ 5.0V		-1		1	μA
Off-State Leakage Current	I_{OFF}	V_{CC} = 5.0V, V_A = 0V and V_B = V_{CC}, or V_A = V_{CC} and V_B = 0V, Test Circuit 3		-1		1	μA
On-Resistance (4)	R_{ON}	V_B = 1.0V, I_{ON} = 13mA, Test Circuit 1	V_{CC} = 3.3V		8.5	13	Ω
			V_{CC} = 5.0V		7	9.5	
		V_B = 2.0V, I_{ON} = 26mA, Test Circuit 1	V_{CC} = 3.3V		8.5	15	
			V_{CC} = 5.0V		6	9	
Quiescent Supply Current	I_{CC}	V_{CC} = 5.0V, V_{SEL} = V_{CC} or GND			0.5	20	μA
Increase in I_{CC} per Input	I_{CCT}	V_{CC} = 5.0V, One Control Input at 2.8V, Other Inputs at V_{CC} or GND				60	μA
AC PERFORMANCE							
Turn On Time S to Bus A	t_{ON}	V_{CC} = 3.0V to 5.0V, V_B = 2V, Test Circuit 2			10		ns
Turn Off Time S to Bus A	t_{OFF}	V_{CC} = 3.0V to 5.0V, V_B = 2V, Test Circuit 2			7		ns
Differential Gain	DG	V_{CC} = 3.0V to 5.0V, R_L = 75Ω, f = 3.58MHz			0.7		%
Differential Phase	DP	V_{CC} = 3.0V to 5.0V, R_L = 75Ω, f = 3.58MHz			0.1		°
-3dB Bandwidth	BW	V_{CC} = 3.0V to 5.0V, R_L = 50Ω	Test Circuit 5		350		MHz
		V_{CC} = 3.0V to 5.0V, R_L = 75Ω			260		
Off Isolation	O_{ISO}	V_{CC} = 3.0V to 5.0V, R_L = 75Ω, f = 30MHz, Test Circuit 6			-47		dB
Non-Adjacent Channel Crosstalk	X_{TALK}	V_{CC} = 3.0V to 5.0V, R_L = 75Ω, f = 30MHz	Test Circuit 7		-60		dB
Adjacent Channel Crosstalk			Test Circuit 8		-42		
CAPACITANCE							
Control Pin Input Capacitance	C_{IN}	V_{CC} = 0V			4		pF
A/B On Capacitance	C_{ON}	V_{CC} = 3.3V/5.0V, Test Circuit 9			15		pF
Port B Off Capacitance	C_{OFF}	V_{CC} = 3.3V/5.0V, Test Circuit 10			4		pF

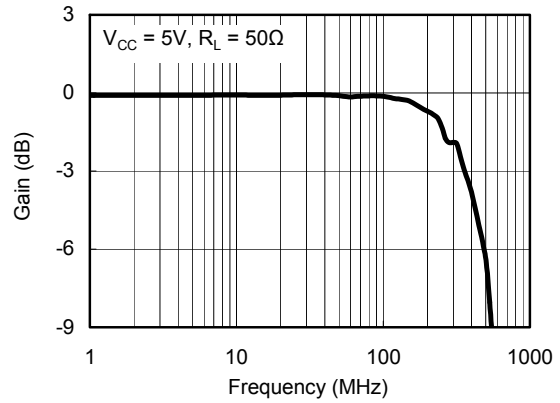
NOTES:

3. Unused control inputs must be held HIGH or LOW; they may not float.

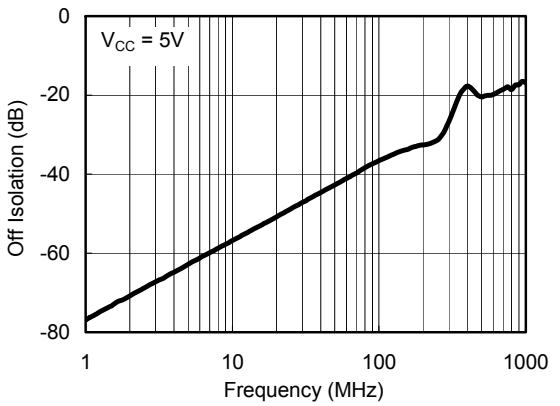
4. Measured by the voltage drop between the A and B pins at the indicated current through the switch. On resistance is determined by the lower of the voltages on the A or B pins.

TYPICAL PERFORMANCE CHARACTERISTICS

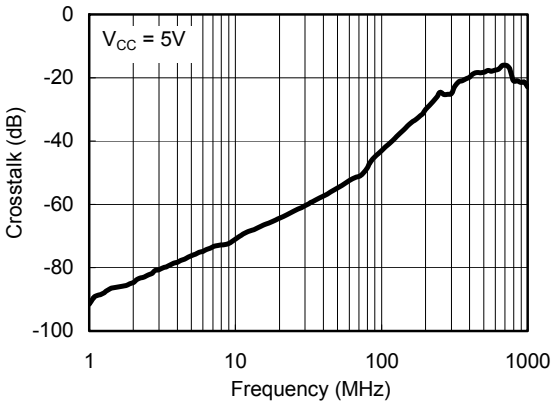
Gain vs. Frequency



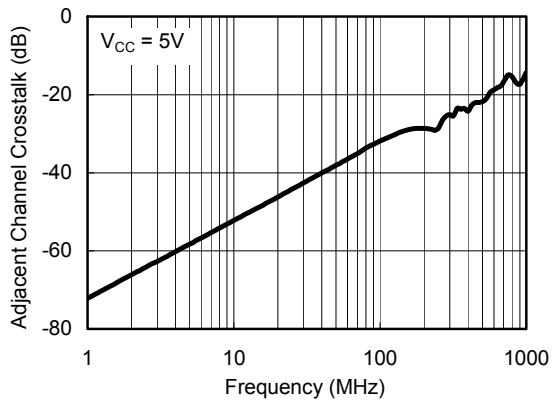
Off Isolation vs. Frequency



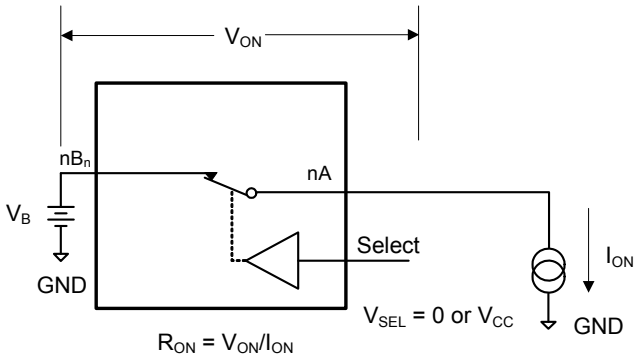
Crosstalk vs. Frequency



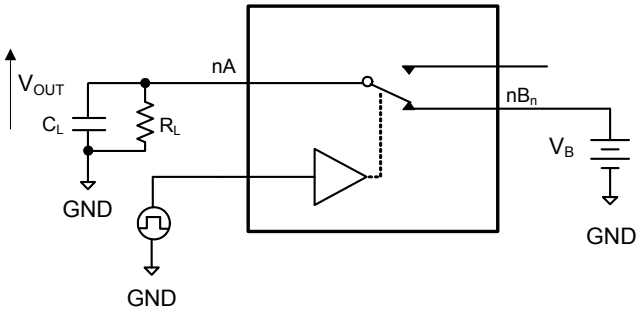
Adjacent Channel Crosstalk vs. Frequency

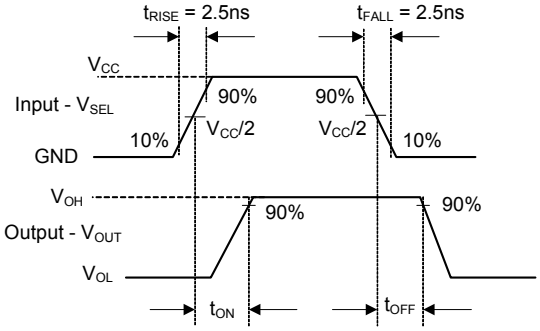


TEST CIRCUITS



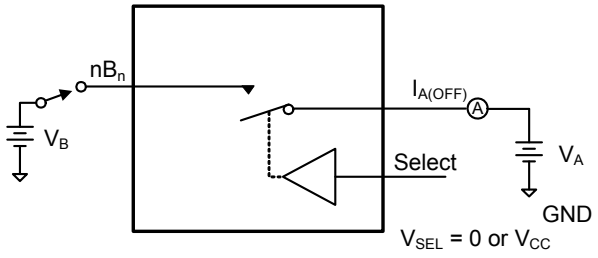
Test Circuit 1. On Resistance



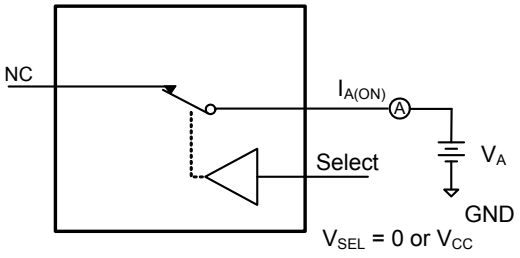


RL and CL are functions of application environment (50Ω, 75Ω, or 100Ω).
CL includes test fixture and stray capacitance.

Test Circuit 2. Switching Times (t_{ON}, t_{OFF})

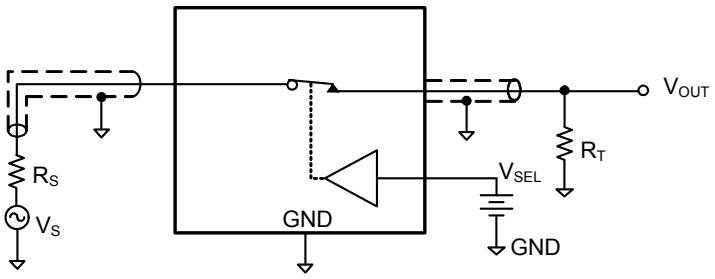


Test Circuit 3. Off Leakage



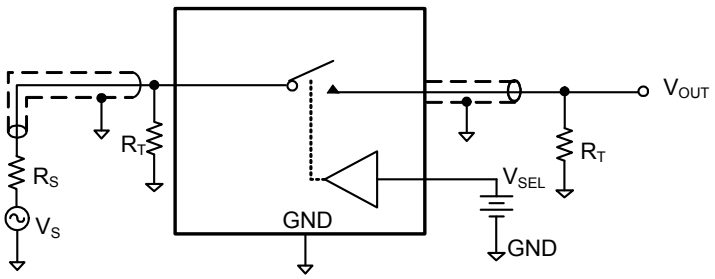
Test Circuit 4. On Leakage

TEST CIRCUITS (Cont.)



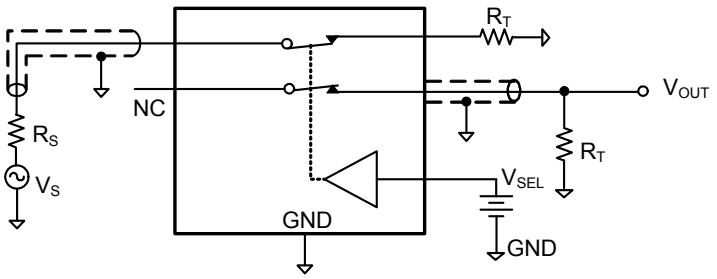
R_S and R_T are functions of the application environment (50Ω, 75Ω, or 100Ω).

Test Circuit 5. -3dB Bandwidth



R_S and R_T are functions of the application environment (50Ω, 75Ω, or 100Ω).
Off-Isolation = 20Log (V_{OUT}/V_{IN})

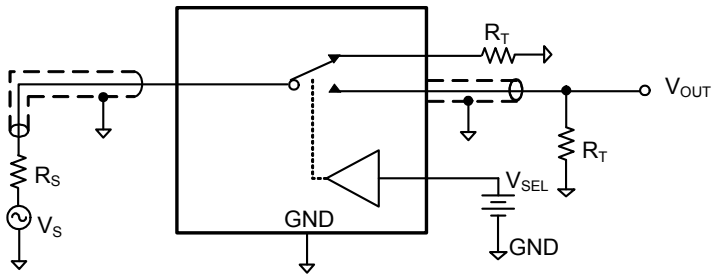
Test Circuit 6. Off Isolation



R_S and R_T are functions of the application environment (50Ω, 75Ω, or 100Ω).
Crosstalk = 20Log (V_{OUT}/V_{IN})

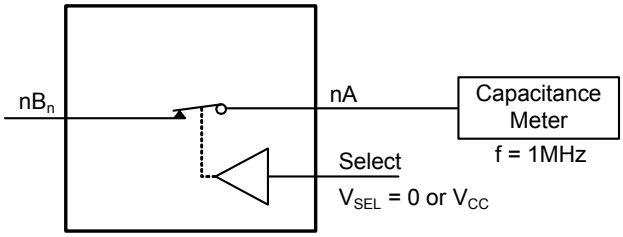
Test Circuit 7. Non-Adjacent Channel-to-Channel Crosstalk

TEST CIRCUITS (Cont.)

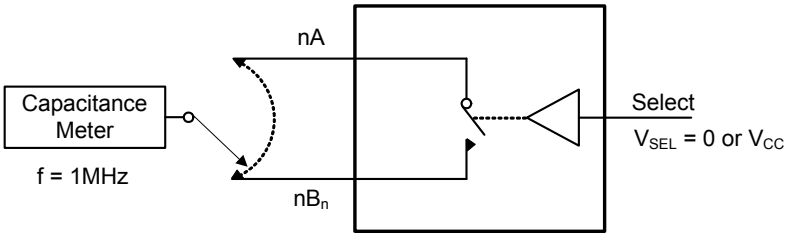


R_S and R_T are functions of the application environment (50Ω, 75Ω, or 100Ω).
Crosstalk = 20Log (V_{OUT}/V_{IN})

Test Circuit 8. Adjacent Channel Crosstalk



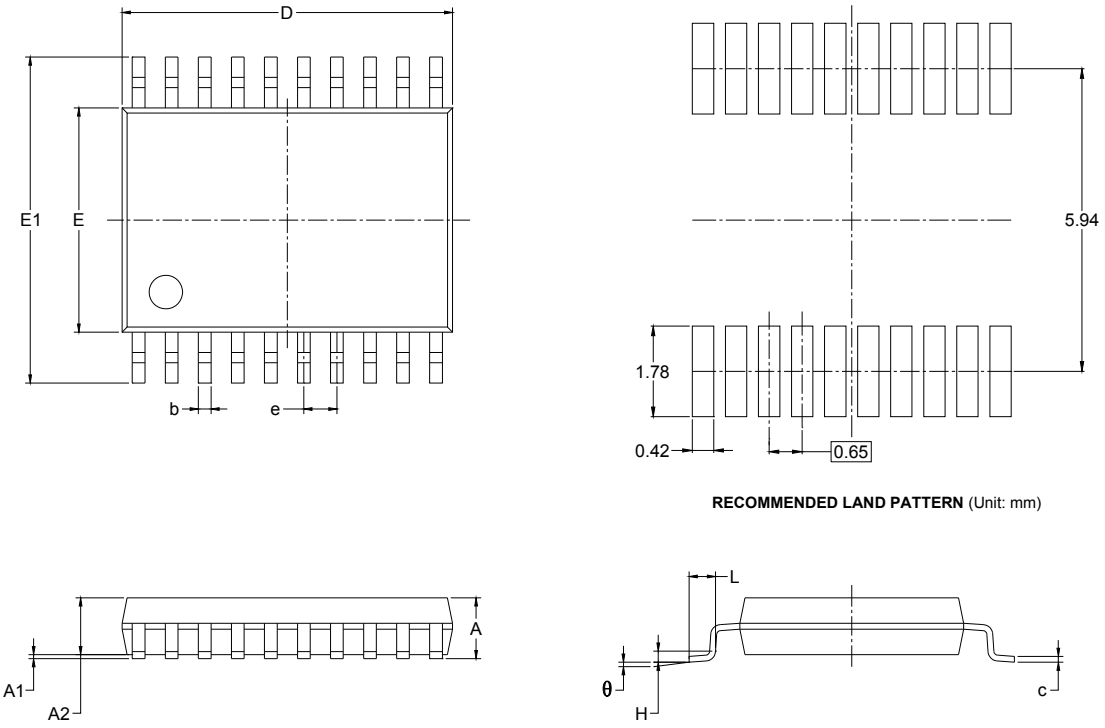
Test Circuit 9. Channel On Capacitance



Test Circuit 10. Channel Off Capacitance

PACKAGE OUTLINE DIMENSIONS

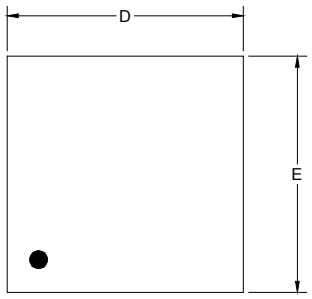
TSSOP-20



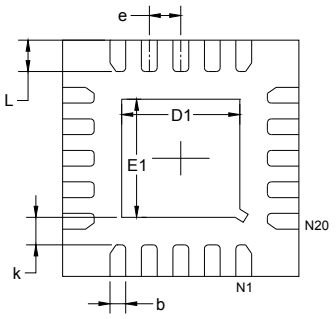
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A		1.100		0.043
A1	0.050	0.150	0.002	0.006
A2	0.800	1.000	0.031	0.039
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
D	6.400	6.600	0.252	0.259
E	4.300	4.500	0.169	0.177
E1	6.250	6.550	0.246	0.258
e	0.650 BSC		0.026 BSC	
L	0.500	0.700	0.02	0.028
H	0.25 TYP		0.01 TYP	
θ	1°	7°	1°	7°

PACKAGE OUTLINE DIMENSIONS

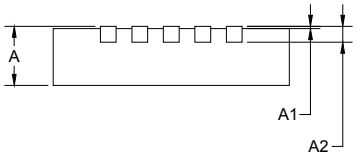
TQFN-3×3-20L



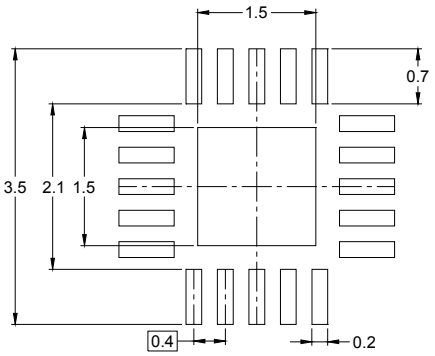
TOP VIEW



BOTTOM VIEW



SIDE VIEW

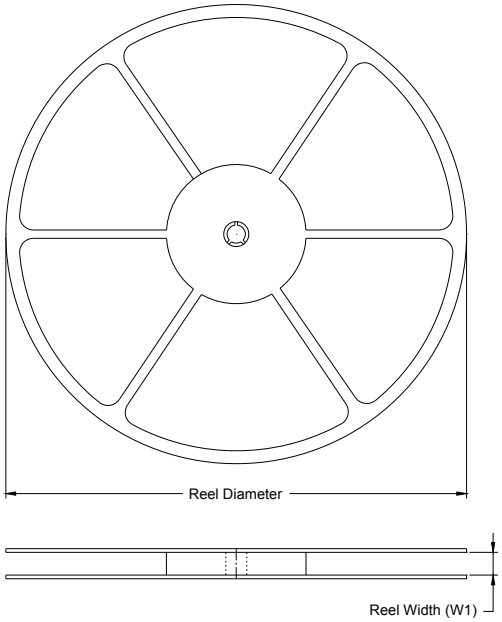


RECOMMENDED LAND PATTERN (Unit: mm)

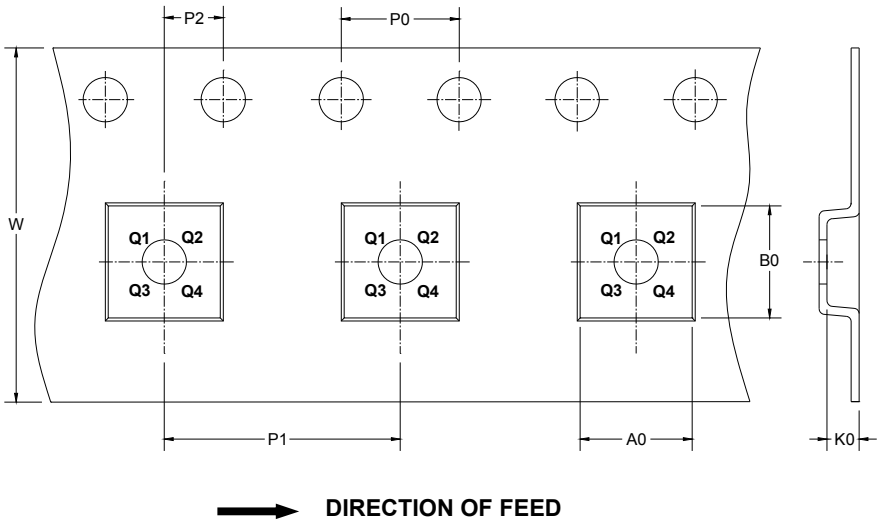
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A2	0.203 REF		0.008 REF	
D	2.924	3.076	0.115	0.121
D1	1.400	1.600	0.055	0.063
E	2.924	3.076	0.115	0.121
E1	1.400	1.600	0.055	0.063
k	0.200 MIN		0.008 MIN	
b	0.150	0.250	0.006	0.010
e	0.400 TYP		0.016 TYP	
L	0.324	0.476	0.013	0.019

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS

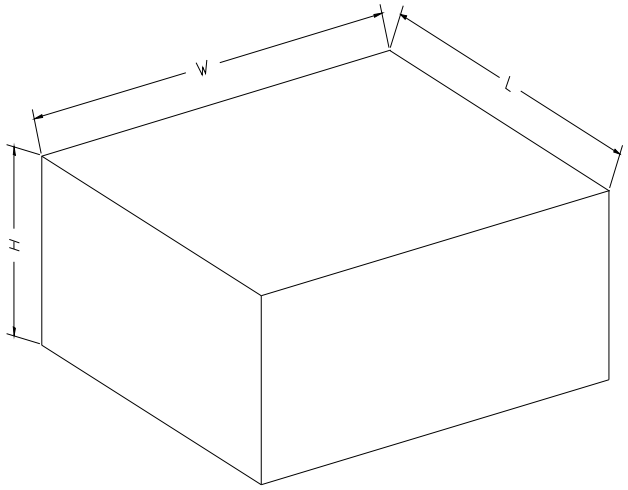


NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
TQFN-3×3-20L	13″	12.4	3.3	3.3	1.1	4.0	4.0	2.0	12.0	Q1
TSSOP-20	13″	12.4	6.8	6.85	1.7	4.0	8.0	2.0	12.0	Q1

CARTON BOX DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF CARTON BOX

Reel Type	Length (mm)	Width (mm)	Height (mm)	Pizza/Carton
13″	386	280	370	5