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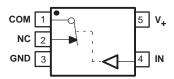
### **Description**

The TS5A4595 is a single-pole single-throw (SPST) analog switch that is designed to operate from 2 V to 5.5 V. This device can handle both digital and analog signals, and signals up to  $V_{+}$  can be transmitted in either direction.

### **Applications**

- Sample-and-Hold Circuit
- Battery-Powered Equipment (Cellular Phones, PDAs)
- Audio and Video Signal Routing
- Communication Circuits
- PCMCIA Cards

## SOT-23 OR SC-70 PACKAGE (TOP VIEW)



#### **FUNCTION TABLE**

IN	NC TO COM, COM TO NC
L	ON
Н	OFF

#### **Features**

- Low ON-State Resistance (8 Ω)
- ON-State Resistance Flatness (1.5 Ω)
- Control Inputs Are 5.5-V Tolerant
- Low Charge Injection (5 pC Max)
- 450-MHz –3-dB Bandwidth at 25°C
- Low Total Harmonic Distortion (THD) (0.04%)
- 2-V to 5.5-V Single-Supply Operation
- -82-dB OFF-Isolation at 1 MHz
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II
- 0.5-nA Max OFF Leakage
- ESD Performance Tested Per JESD 22
  - 2000-V Human-Body Model (A114-B, Class II)
  - 1000-V Charged-Device Model (C101)
- TTL/CMOS-Logic Compatible

#### **Summary of Characteristics**

 $V_{+} = 5 \text{ V}, T_{A} = 25^{\circ}\text{C}$ 

Configuration	Single Pole Single Throw (SPST)
Number of channels	1
ON-state resistance (ron)	8 Ω
ON-state resistance flatness (ron(flat))	1.5 Ω
Turn-on/turn-off time (tON/tOFF)	17 ns/14 ns
Charge injection (Q <sub>C</sub> )	5 pC
Bandwidth (BW)	450 MHz
OFF isolation (O <sub>ISO</sub> )	-82 dB at 1 MHz
Total harmonic distortion (THD)	0.04%
Leakageoument(ICOM(OFF)/INC(OFF))	±0.5 nA
Power-supply current (I+)	0.25 μΑ
Package option	5-pin SOT-23 or SC-70

#### ORDERING INFORMATION

TA	PACKAGE(1)		ORDERABLE PART NUMBER	TOP-SIDE MARKING(2)
4000 1- 0500	SOT (SOT-23) – DBV	Tape and reel	TS5A4595DBVR	JSB_
-40°C to 85°C	SOT (SC-70) - DCK	Tape and reel	TS5A4595DCKR	JT_

(1) Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package. (2) DBV/DCK: The actual top-side marking has one additional character that designates the assembly/test site.

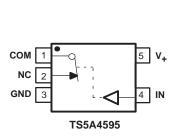


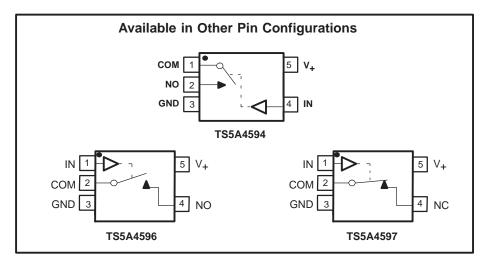
Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

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#### **Pin Configurations**





#### Absolute Minimum and Maximum Ratings(1)(2)

over operating free-air temperature range (unless otherwise noted)

			MIN	MAX	UNIT
V <sub>+</sub>	Supply voltage range(3)		-0.3	6	V
V <sub>NC</sub>	Analog voltage range(3)(4)		-0.3	V <sub>+</sub> + 0.3	V
ΙK	Analog port diode current	V <sub>NC</sub> , V <sub>COM</sub> < 0	-50		mA
I <sub>NC</sub>	On-state switch current	$V_{NC}$ , $V_{COM} = 0$ to $V_{+}$	-20	20	mA
VI	Digital input voltage range(3)(4)		-0.3	6	V
lik	Digital input clamp current	V <sub>I</sub> < 0	-50		mA
l <sub>+</sub>	Continuous current through V+			100	mA
IGND	Continuous current through GND		-100		mA
	5 (5)	DBV package		206	^ <b>Q44</b> /
θ <sub>JA</sub> Package thermal impedance(5)		DCK package		252	°C/W
T <sub>stg</sub>	Storage temperature range		-65	150	°C

<sup>(1)</sup> 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.

<sup>(2)</sup> The algebraic convention, whereby the most negative value is a minimum and the most positive value is a maximum

<sup>(3)</sup> All voltages are with respect to ground, unless otherwise specified.

<sup>(4)</sup> The input and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed.

<sup>(5)</sup> The package thermal impedance is calculated in accordance with JESD 51-7.



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## Electrical Characteristics for 5-V Supply<sup>(1)</sup> $V_+ = 4.5 \text{ V}$ to 5.5 V, $V_{IH} = 2.4 \text{ V}$ , $V_{IL} = 0.8 \text{ V}$ $T_A = -40^{\circ}\text{C}$ to 85°C (unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITION	IS	TA	٧+	MIN	TYP	MAX	UNIT
Analog Switch									
Analog signal range	V <sub>COM</sub> , V <sub>NC</sub>					0		٧+	V
ON-state	r	$V_{+} = 4.5 \text{ V}, V_{NC} = 3.5 \text{ V},$	Switch ON,	25°C	4.5 V		5	8	Ω
resistance	r <sub>on</sub>	I <sub>COM</sub> = 10 mA,	See Figure 13	Full	4.5 V			10	52
ON-state resistance		V <sub>NC</sub> = 1.5 V, 2.5 V, 3.5 V,	Switch ON,	25°C	4.5 V		0.5	1.5	
flatness	ron(flat)	I <sub>COM</sub> = 10 mA,	See Figure 13	Full	4.5 V			2	Ω
NC OFF lealware		V <sub>NC</sub> = 1 V, V <sub>COM</sub> = 4.5 V,	Switch OFF,	25°C	5.51/	-0.5	0.01	0.5	
OFF leakage current	INC(OFF)	$V_{NC} = 4.5 \text{ V}, V_{COM} = 1 \text{ V},$	See Figure 14	Full	5.5 V	-5		5	nA
COM		V <sub>COM</sub> = 1 V, V <sub>NC</sub> = 4.5 V,	Switch OFF,	25°C	5.5 V	-0.5	0.01	0.5	
OFF leakage current	ICOM(OFF)	$V_{COM} = 4.5 \text{ V}, V_{NC} = 1 \text{ V},$	See Figure 14	Full		-5		5	nA
NC ON leakage	V <sub>NC</sub> = 1 V, V <sub>COM</sub> = 1 V,		Switch ON,	25°C	5.57/	-1	0.01	1	
current	INC(ON)	$V_{NC} = 4.5 \text{ V}, V_{COM} = 4.5 \text{ V},$ or $V_{NC} = 1 \text{ V}, 4.5 \text{ V}, V_{COM} = \text{Open},$	See Figure 15	Full	5.5 V	-10		10	nA
СОМ		$V_{COM} = 1 \text{ V}, V_{NC} = 1 \text{ V},$ or	Switch ON,	25°C		-1	0.01	1	
ON leakage current	ICOM(ON)	VCOM = 4.5 V, V <sub>NC</sub> = 4.5 V, See Figure 1 VCOM = 1 V, 4.5 V, V <sub>NC</sub> = Open,		Full	5.5 V	-10		10	nA
Digital Control In	put (IN)								
Input logic high	VIH			Full		2.4		5.5	V
Input logic low	V <sub>IL</sub>			Full		0		0.8	V
Input leakage	lu i lu	$V_I = V_+ \text{ or } 0$		25°C	5.5 V	-0.5	0.01	0.5	μА
current	I <sub>IH</sub> , I <sub>IL</sub>		Full	J.J v	-5		5	jμA	

<sup>(1)</sup> The algebraic convention, whereby the most negative value is a minimum and the most positive value is a maximum





# Electrical Characteristics for 5-V Supply<sup>(1)</sup> (continued) $V_+ = 4.5 \text{ V to } 5.5 \text{ V}, T_A = -40 ^{\circ}\text{C} \text{ to } 85 ^{\circ}\text{C} \text{ (unless otherwise noted)}$

PARAMETER	SYMBOL	TEST CON	DITIONS	TA	٧+	MIN	TYP	MAX	UNIT
Dynamic									
Turn-on time	4	V <sub>NC</sub> = 3 V,	C <sub>L</sub> = 35 pF,	25°C	5 V		12	17	
rum-on ume	tON	$R_L = 300 \Omega$ ,	See Figure 17	Full	4.5 V to 5.5 V			19	ns
Turn-off time	torr	V <sub>NC</sub> = 3 V,	$C_L = 35  pF$ ,	25°C	5 V		9	14	ns
rum-on ume	tOFF	$R_L = 300 \Omega$ ,	See Figure 17	Full	4.5 V to 5.5 V			17	115
Charge injection	QC	V <sub>GEN</sub> = 0, R <sub>GEN</sub> = 0, C <sub>L</sub> = 1 nF,	See Figure 20	25°C	4.5 V to 5.5 V		2	5	pC
NC OFF capacitance	C <sub>NC(OFF)</sub>	V <sub>NC</sub> = 0, f = 1 MHz, Switch OFF,	See Figure 16	25°C	5 V		6.5		pF
COM OFF capacitance	CCOM(OFF)	V <sub>COM</sub> = 0, f = 1 MHz, Switch OFF,	See Figure 16	25°C	5 V		6.5		pF
NC ON capacitance	C <sub>NC(ON))</sub>	V <sub>NC</sub> = 0, f = 1 MHz, Switch ON,	See Figure 16	25°C	5 V		13		pF
COM ON capacitance	C <sub>COM(ON)</sub>	V <sub>COM</sub> = GND, f = 1 MHz, Switch ON,	See Figure 16	25°C	5 V		13		pF
Digital input capacitance	CI	$V_I = V_+$ or GND,	See Figure 16	25°C	5 V		3		pF
Bandwidth	BW	$R_L = 50 \Omega$ , Switch ON, Signal = 0 dBm	See Figure 18	25°C	5 V		450		MHz
OFF isolation	O <sub>ISO</sub>	$R_L = 50 \Omega$ , $V_{NC} = 1 V_{RMS}$ $f = 1 MHz$ , $C_L = 5 pF$	Switch OFF, See Figure 19	25°C	5 V		-82		dB
Total harmonic distortion	THD	$R_L = 600 \Omega$ , $C_L = 50 pF$ , $V_{SOURCE} = 5 V_{p-p}$ ,	f = 20 Hz to 20 kHz, See Figure 21	25°C	5 V		0.04		%
Supply				•					
Positive supply		W. W. an CND		25°C	551/		0.01	0.25	^
current	I <sub>+</sub>	$V_I = V_+ \text{ or GND},$	Switch ON or OFF	Full	5.5 V			0.5	μΑ

<sup>(1)</sup> The algebraic convention, whereby the most negative value is a minimum and the most positive value is a maximum



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## Electrical Characteristics for 3-V Supply<sup>(1)</sup> $V_+ = 2.7 \text{ V to } 3.6 \text{ V}, T_A = -40 ^{\circ}\text{C} \text{ to } 85 ^{\circ}\text{C} \text{ (unless otherwise noted)}$

PARAMETER	SYMBOL	TEST CONDITION	IS	TA	٧+	MIN	TYP	MAX	UNIT
Analog Switch						-			
Analog signal range	V <sub>COM</sub> , V <sub>NC</sub>					0		٧+	V
ON-state resistance	ron	V <sub>+</sub> = 3 V, V <sub>NC</sub> = 1.5 V, I <sub>COM</sub> = 10 mA,	Switch ON, See Figure 13	25°C Full	2.7 V		9.5	16 20	Ω
ON-state				25°C			1.8	6	
resistance flatness	ron(flat)	V <sub>NC</sub> = 1.5 V, 2.5 V, I <sub>COM</sub> = 10 mA,	Switch ON, See Figure 13	Full	2.7 V			7	Ω
NC OFF leakage		V <sub>NC</sub> = 1 V, V <sub>COM</sub> = 3 V,	Switch OFF,	25°C	0.01/	-0.5	0.01	0.5	A
OFF leakage current	INC(OFF)	$V_{NC} = 3 \text{ V}, V_{COM} = 1 \text{ V},$	See Figure 14	Full	3.6 V	-5		5	nA
COM OFF leakage		V <sub>COM</sub> = 1 V, V <sub>NC</sub> = 3 V,	Switch OFF,	25°C	261/	-0.5	0.01	0.5	^
current	ICOM(OFF)	V <sub>COM</sub> = 1 V, V <sub>NC</sub> = 3 V,	See Figure 14	Full	3.6 V	-5		5	nA
NC ON lookage	$V_{NC} = 1 \text{ V}, V_{COM} = 1 \text{ V},$ or		Switch ON,	25°C	201	-1	0.01	1	A
ON leakage current	INC(ON)	$V_{NC} = 3 \text{ V, } V_{COM} = 3 \text{ V,}$ or $V_{NC} = 1 \text{ V, } 3 \text{ V, } V_{COM} = \text{Open,}$	See Figure 15	Full	3.6 V	-10		10	nA
СОМ		V <sub>COM</sub> = 1 V, V <sub>NC</sub> = 1 V, or	Switch ON,	25°C		-1	0.01	1	
ON leakage current	ICOM(ON)	V <sub>COM</sub> = 3 V, V <sub>NC</sub> = 3 V, or V <sub>COM</sub> = 1 V, 3 V, V <sub>NC</sub> = Open,	See Figure 15	Full	3.6 V	-10		10	nA
Digital Control Inp	out (IN)	119							
Input logic high	VIH			Full		2		5.5	V
Input logic low	V <sub>IL</sub>			Full		0		0.8	V
Input leakage current	I <sub>IH</sub> , I <sub>IL</sub>	V <sub>I</sub> = V <sub>+</sub> or 0		25°C Full	3.6 V	-0.5 -5	0.01	0.5	nA

<sup>(1)</sup> The algebraic convention, whereby the most negative value is a minimum and the most positive value is a maximum



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# Electrical Characteristics for 3-V Supply<sup>(1)</sup> (continued) $V_+ = 2.7 \text{ V to } 3.6 \text{ V}, T_A = -40 ^{\circ}\text{C to } 85 ^{\circ}\text{C}$ (unless otherwise noted)

PARAMETER	SYMBOL	TEST COND	DITIONS	TA	٧+	MIN	TYP	MAX	UNIT
Dynamic									
Turn-on time		V <sub>NC</sub> = 2 V,	C <sub>L</sub> = 35 pF,	25°C	3 V		20	30	
Turn-on time	tON	$R_L = 300 \Omega$ ,	See Figure 17	Full	2.7 V to 3.6 V			35	ns
Turn-off time	4	V <sub>NC</sub> = 2 V,	C <sub>L</sub> = 35 pF,	25°C	3 V		15	25	2
Turri-oii tiirie	tOFF	$R_L = 300 \Omega$ ,	See Figure 17	Full	2.7 V to 3.6 V			30	ns
Charge injection	QC	$V_{GEN} = 0$ , $R_{GEN} = 0$ , $C_L = 1$ nF,	See Figure 20	25°C	3 V		1	4	рС
NC OFF capacitance	C <sub>NC(OFF)</sub>	V <sub>NC</sub> = 0, f = 1 MHz, Switch OFF,	See Figure 16	25°C	3 V		6.5		pF
COM OFF capacitance	CCOM(OFF)	V <sub>COM</sub> = 0, f = 1 MHz, Switch OFF,	See Figure 16	25°C	3 V		6.5		pF
NC ON capacitance	C <sub>NC(ON)</sub>	V <sub>NC</sub> = 0, f = 1 MHz, Switch ON,	See Figure 16	25°C	3 V		13		pF
COM ON capacitance	C <sub>COM(ON)</sub>	V <sub>COM</sub> = 0, f = 1 MHz, Switch ON,	See Figure 16	25°C	3 V		13		pF
Digital input capacitance	CI	$V_I = V_+ \text{ or GND},$	See Figure 16	25°C	3 V		3		pF
Bandwidth	BW	$R_L = 50 \Omega$ , Signal = 0 dBm,	Switch ON, See Figure 18	25°C	3 V		450		MHz
OFF isolation	O <sub>ISO</sub>	$R_L = 50 \Omega$ , $C_L = 5 pF$ , $f = 1 MHz$ , $V_{NC} = 1 V_{RMS}$ ,	Switch OFF, See Figure 19	25°C	3 V		-82		dB
Total harmonic distortion	THD	R <sub>L</sub> = 600 Ω, C <sub>L</sub> = 50 pF, V <sub>SOURCE</sub> = 3 V <sub>p-p</sub> ,	f = 20 Hz to 20 kHz, See Figure 21	25°C	3 V		0.09		%
Supply									
Positive supply	,	W. W. an CND	Contab ON as OFF	25°C	261/		0.01	0.25	^
current	1+	$V_I = V_+ \text{ or GND},$	Switch ON or OFF	Full	3.6 V			0.5	μΑ

<sup>(1)</sup> The algebraic convention, whereby the most negative value is a minimum and the most positive value is a maximum



#### **TYPICAL PERFORMANCE**

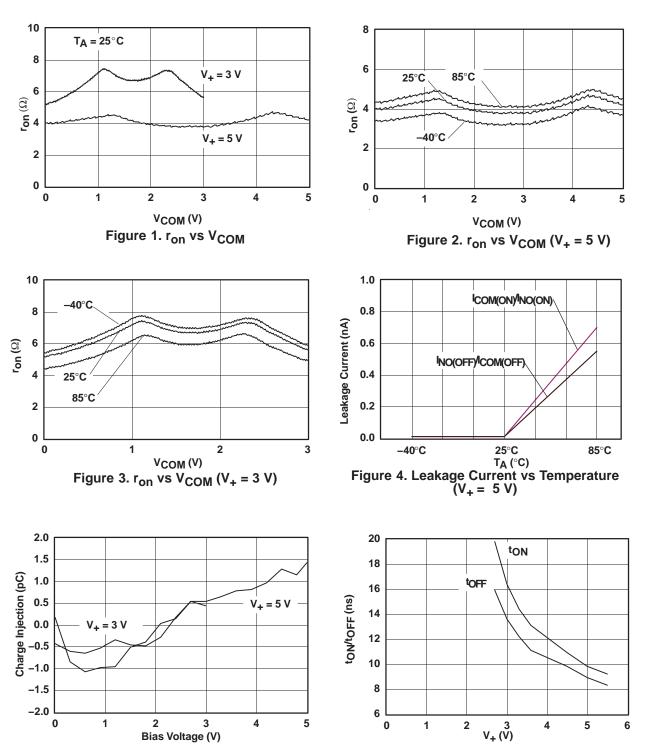


Figure 5. Charge-Injection (Q<sub>C</sub>) vs V<sub>COM</sub>

Figure 6. t<sub>ON</sub> and t<sub>OFF</sub> vs Supply Voltage



#### **TYPICAL PERFORMANCE (continued)**

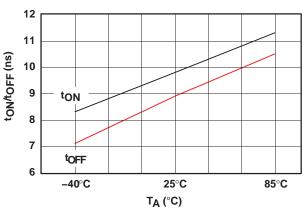


Figure 7.  $t_{ON}$  and  $t_{OFF}$  vs Temperature (V<sub>+</sub> = 5 V)

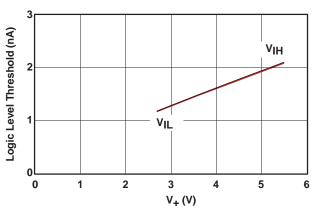


Figure 8. Logic-Level Threshold vs V<sub>+</sub>

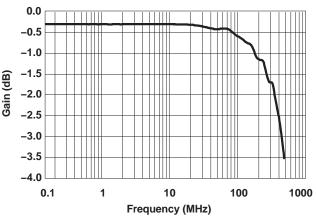


Figure 9. Bandwidth (Gain vs Frequency)  $(V_+ = 5 V)$ 

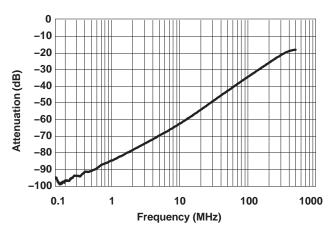


Figure 10. OFF Isolation vs Frequency

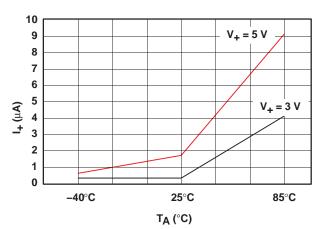


Figure 11. Power-Supply Current vs Temperature

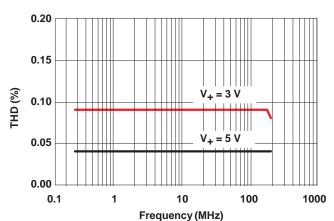


Figure 12. Total Harmonic Distortion vs Frequency



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#### PIN DESCRIPTION

PIN NUMBER	NAME	DESCRIPTION
1	COM	Common
2	NC	Normally closed
3	GND	Digital ground
4	IN	Digital control pin to connect COM to NC
5	٧+	Power supply

#### PARAMETER DESCRIPTION

SYMBOL	DESCRIPTION
VCOM	Voltage at COM
V <sub>NC</sub>	Voltage at NC
r <sub>on</sub>	Resistance between COM and NC ports when the channel is ON
ron(flat)	Difference between the maximum and minimum value of ron in a channel over the specified range of conditions
INC(OFF)	Leakage current measured at the NC port, with the corresponding channel (NC to COM) in the OFF state
INC(ON)	Leakage current measured at the NC port, with the corresponding channel (NC to COM) in the ON state and the output (COM) open
ICOM(OFF)	Leakage current measured at the COM port, with the corresponding channel (COM to NC) in the OFF state
ICOM(ON)	Leakage current measured at the COM port, with the corresponding channel (COM to NC) in the ON state and the output (NC) open
VIH	Minimum input voltage for logic high for the control input (IN)
V <sub>IL</sub>	Maximum input voltage for logic low for the control input (IN)
VI	Voltage at the control input (IN)
I <sub>IH</sub> , I <sub>IL</sub>	Leakage current measured at the control input (IN)
toN	Turn-on time for the switch. This parameter is measured under the specified range of conditions and by the propagation delay between the digital control (IN) signal and analog output (COM or NC) signal when the switch is turning ON.
tOFF	Turn-off time for the switch. This parameter is measured under the specified range of conditions and by the propagation delay between the digital control (IN) signal and analog output (COM or NC) signal when the switch is turning OFF.
QC	Charge injection is a measurement of unwanted signal coupling from the control (IN) input to the analog (NC or COM) output. This is measured in coulomb (C) and measured by the total charge induced due to switching of the control input. Charge injection, $Q_C = C_L \times \Delta V_{COM}$ , $C_L$ is the load capacitance, and $\Delta V_{COM}$ is the change in analog output voltage.
C <sub>NC(OFF)</sub>	Capacitance at the NC port when the corresponding channel (NC to COM) is OFF
C <sub>NC(ON)</sub>	Capacitance at the NC port when the corresponding channel (NC to COM) is ON
CCOM(OFF)	Capacitance at the COM port when the corresponding channel (COM to NC) is OFF
C <sub>COM(ON)</sub>	Capacitance at the COM port when the corresponding channel (COM to NC) is ON
Cl	Capacitance of control input (IN)
O <sub>ISO</sub>	OFF isolation of the switch is a measurement of OFF-state switch impedance. This is measured in dB in a specific frequency, with the corresponding channel (NC to COM) in the OFF state.
BW	Bandwidth of the switch. This is the frequency in which the gain of an ON channel is -3 dB below the DC gain.
THD	Total harmonic distortion describes the signal distortion caused by the analog switch. This is defined as the ratio of root mean square (RMS) value of the second, third, and higher harmonic to the absolute magnitude of the fundamental harmonic.
l <sub>+</sub>	Static power-supply current with the control (IN) pin at V <sub>+</sub> or GND



#### PARAMETER MEASUREMENT INFORMATION

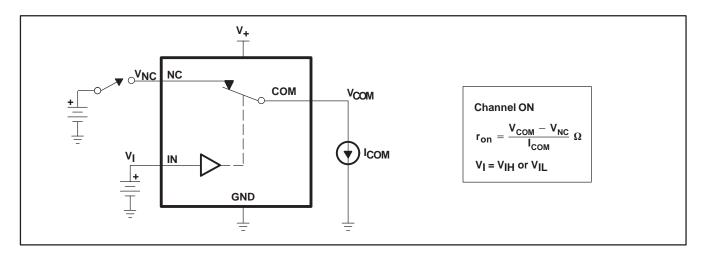


Figure 13. ON-State Resistance (ron)

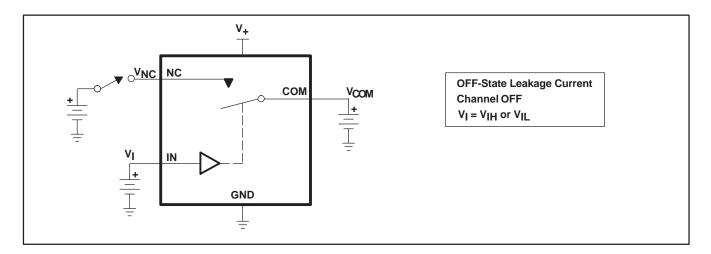


Figure 14. OFF-State Leakage Current ( $I_{COM(OFF)}$ ,  $I_{NC(OFF)}$ )

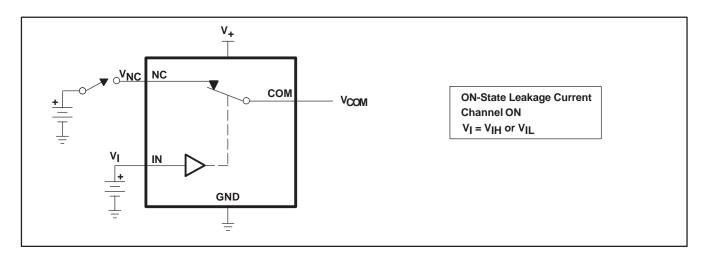


Figure 15. ON-State Leakage Current ( $I_{COM(ON)}$ ,  $I_{NC(ON)}$ )



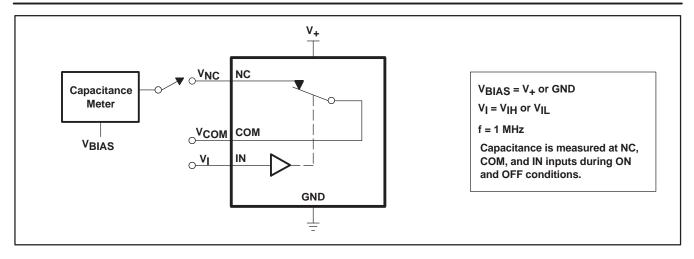
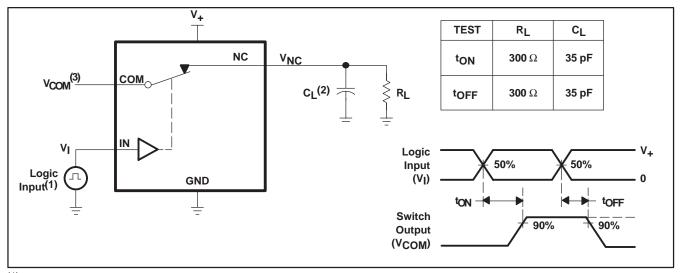


Figure 16. Capacitance (C<sub>I</sub>, C<sub>COM(OFF)</sub>, C<sub>COM(ON)</sub>, C<sub>NC(OFF)</sub>, C<sub>NC(ON)</sub>)



- (1) All input pulses are supplied by generators having the following characteristics: PRR  $\leq$  10 MHz,  $Z_O$  = 50  $\Omega$ ,  $t_f$  < 5 ns.
- (2) C<sub>L</sub> includes probe and jig capacitance.
- (3) See Electrical Characteristics for V<sub>COM</sub>.

Figure 17. Turn-On (t<sub>ON</sub>) and Turn-Off Time (t<sub>OFF</sub>)

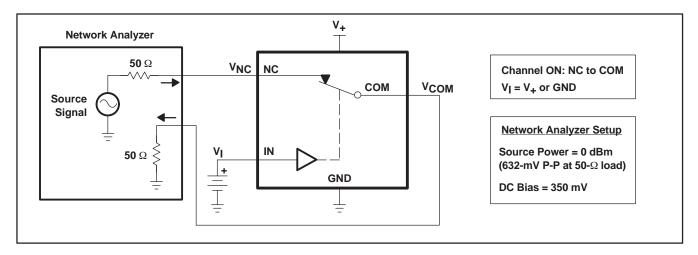


Figure 18. Bandwidth (BW)

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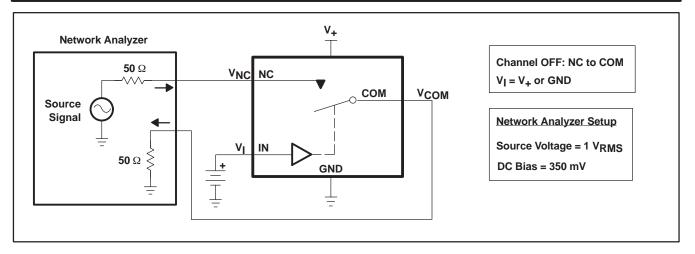
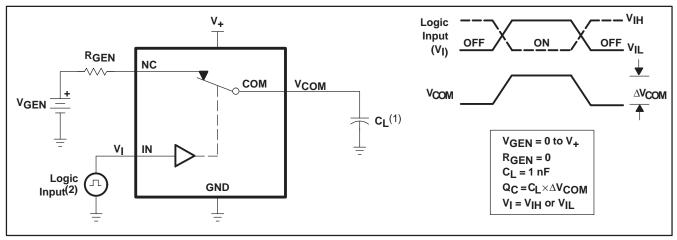
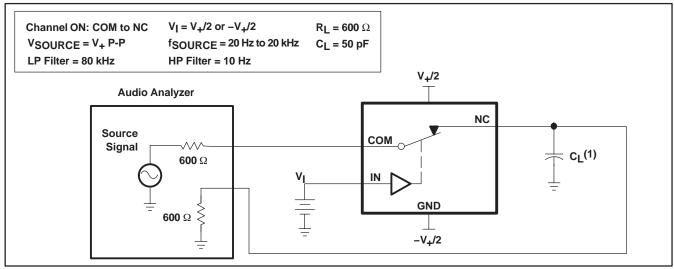


Figure 19. OFF Isolation (O<sub>ISO</sub>)



- (1) C<sub>L</sub> includes probe and jig capacitance.
- (2) All input pulses are supplied by generators having the following characteristics: PRR  $\leq$  10 MHz,  $Z_O = 50 \Omega$ ,  $t_f < 5 \text{ ns}$ ,  $t_f < 5 \text{ ns}$ .

Figure 20. Charge Injection (Q<sub>C</sub>)



(1) C<sub>I</sub> includes probe and jig capacitance.

Figure 21. Total Harmonic Distortion (THD)

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#### PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan	Lead finish/ Ball material	MSL Peak Temp	Op Temp (°C)	Device Marking (4/5)	Samples
TS5A4595DBVR	ACTIVE	SOT-23	DBV	5	3000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	JSBR	Samples
TS5A4595DCKR	ACTIVE	SC70	DCK	5	3000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	(JT5, JTF, JTR)	Samples

(1) The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

(2) RoHS: TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

Green: TI defines "Green" to mean the content of Chlorine (CI) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

- (3) MSL, Peak Temp. The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.
- (4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.
- (5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.
- (6) Lead finish/Ball material Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

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## PACKAGE MATERIALS INFORMATION

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#### TAPE AND REEL INFORMATION





A0	Dimension designed to accommodate the component width
В0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

#### QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



### \*All dimensions are nominal

All dimensions are nomina												
Device		Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
TS5A4595DBVR	SOT-23	DBV	5	3000	180.0	8.4	3.23	3.17	1.37	4.0	8.0	Q3
TS5A4595DCKR	SC70	DCK	5	3000	178.0	9.2	2.4	2.4	1.22	4.0	8.0	Q3
TS5A4595DCKR	SC70	DCK	5	3000	180.0	8.4	2.47	2.3	1.25	4.0	8.0	Q3
TS5A4595DCKR	SC70	DCK	5	3000	178.0	9.0	2.4	2.5	1.2	4.0	8.0	Q3



## PACKAGE MATERIALS INFORMATION

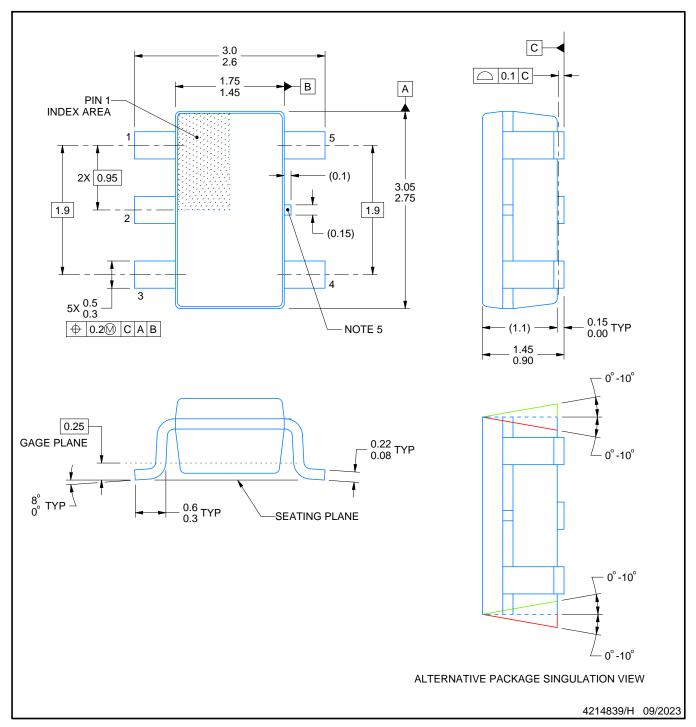
www.ti.com 24-Apr-2020



#### \*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TS5A4595DBVR	SOT-23	DBV	5	3000	202.0	201.0	28.0
TS5A4595DCKR	SC70	DCK	5	3000	180.0	180.0	18.0
TS5A4595DCKR	SC70	DCK	5	3000	202.0	201.0	28.0
TS5A4595DCKR	SC70	DCK	5	3000	180.0	180.0	18.0



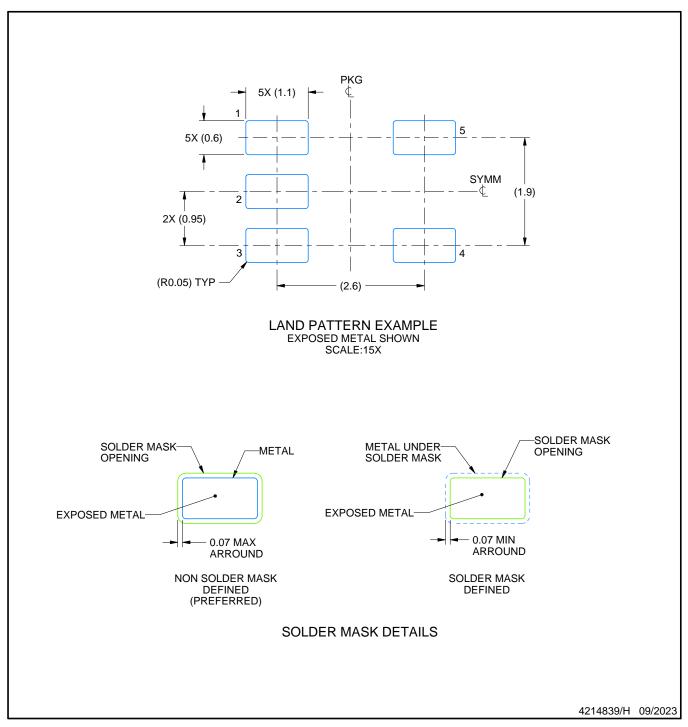


#### NOTES:

- 1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
  2. This drawing is subject to change without notice.
  3. Reference JEDEC MO-178.

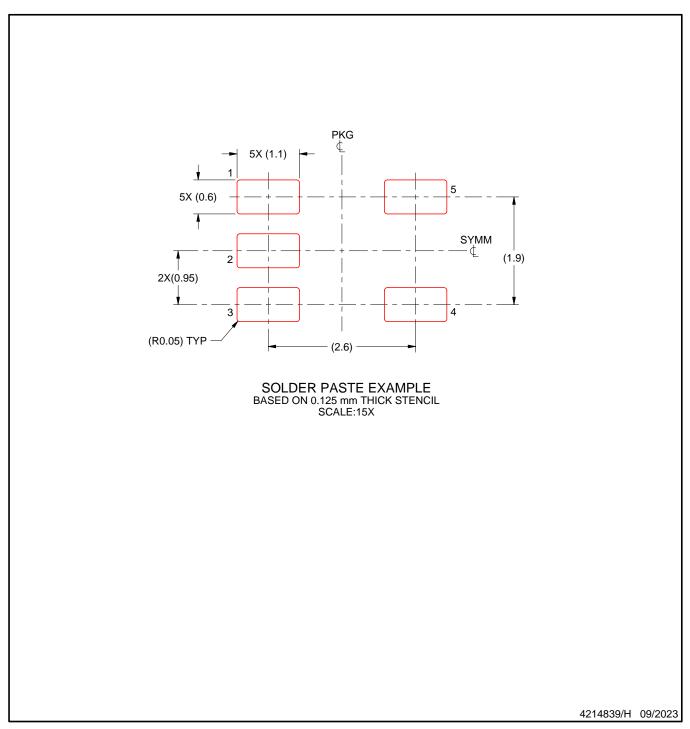
- 4. Body dimensions do not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.25 mm per side.
- 5. Support pin may differ or may not be present.





NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

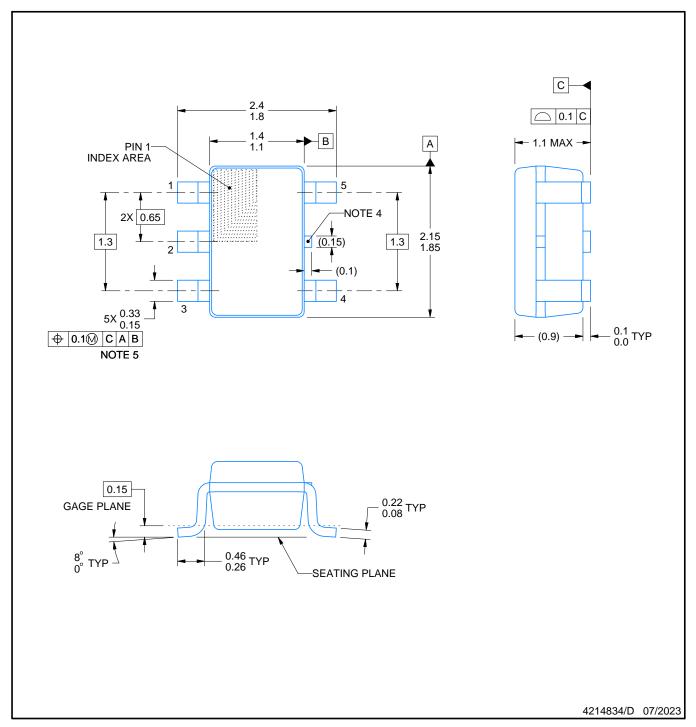


NOTES: (continued)

- 8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
- 9. Board assembly site may have different recommendations for stencil design.







#### NOTES:

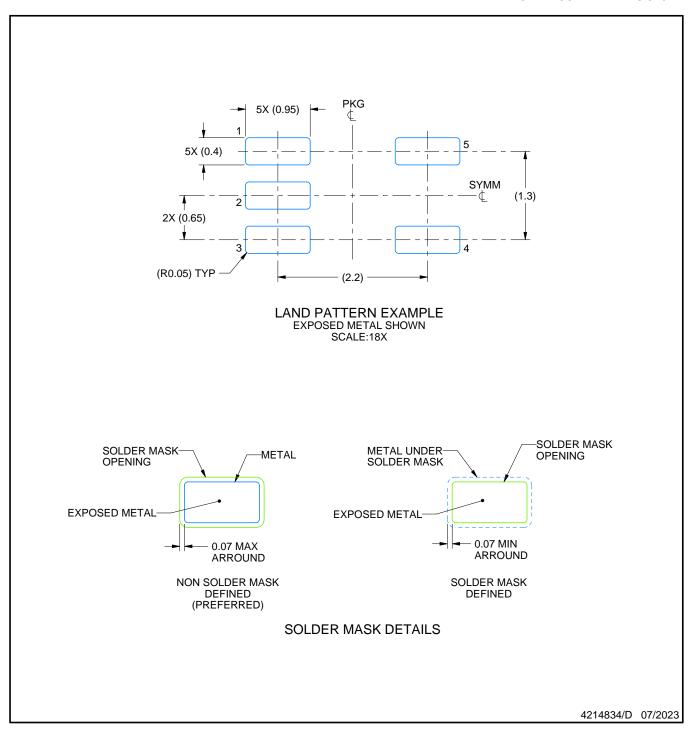
- 1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.

  2. This drawing is subject to change without notice.

  3. Reference JEDEC MO-203.

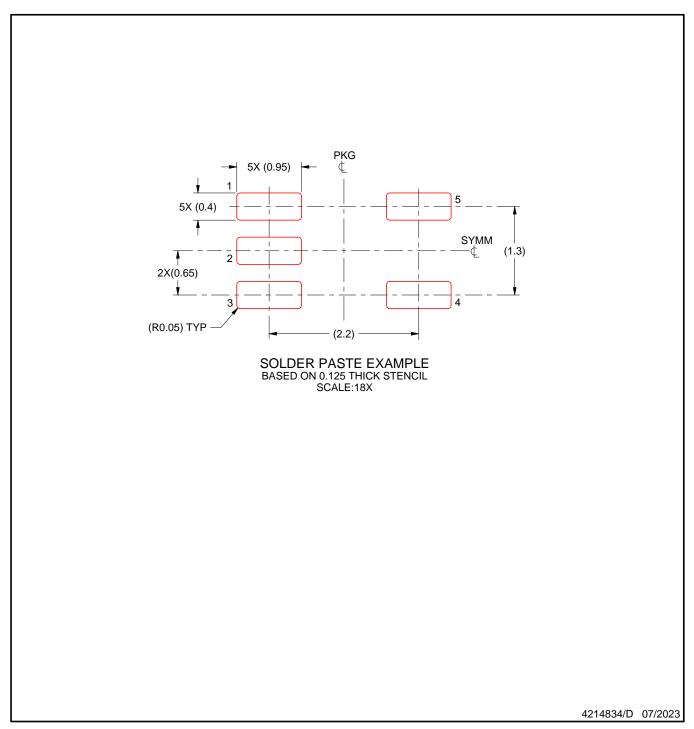
- 4. Support pin may differ or may not be present.5. Lead width does not comply with JEDEC.





NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.



NOTES: (continued)

- 8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
- 9. Board assembly site may have different recommendations for stencil design.



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