

# 74HC4351; 74HCT4351

## 8-channel analog multiplexer/demultiplexer with latch

Rev. 4 — 4 August 2021

Product data sheet

### 1. General description

The 74HC4351; 74HCT4351 is a single-pole octal-throw analog switch (SP8T) suitable for use in analog or digital 8:1 multiplexer/demultiplexer applications. The switch features three digital select inputs (S0 to S2), eight independent inputs/outputs (Yn), a common input/output (Z) and two digital enable inputs (E1 and E2). With E1 LOW and E2 HIGH, one of the eight switches is selected (low impedance ON-state) by S0 to S2. The data at the select inputs may be latched by using the latch enable input ( $\overline{LE}$ ). When  $\overline{LE}$  is HIGH the latch is transparent. When  $\overline{E1}$  is HIGH or E2 is LOW all 8 analog switches are turned off. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of  $V_{CC}$ .

### 2. Features and benefits

- Wide analog input voltage range from -5 V to +5 V
- Complies with JEDEC standard no. 7A
- Low ON resistance:
  - 80  $\Omega$  (typical) at  $V_{CC} - V_{EE} = 4.5$  V
  - 70  $\Omega$  (typical) at  $V_{CC} - V_{EE} = 6.0$  V
  - 60  $\Omega$  (typical) at  $V_{CC} - V_{EE} = 9.0$  V
- Logic level translation: to enable 5 V logic to communicate with  $\pm 5$  V analog signals
- Typical 'break before make' built-in
- Address latches provided
- ESD protection:
  - HBM JESD22-A114F exceeds 2000 V
  - MM JESD22-A115-A exceeds 200 V
  - CDM JESD22-C101E exceeds 1000 V
- Specified from -40 °C to +85 °C and -40 °C to +125 °C

### 3. Applications

- Analog multiplexing and demultiplexing
- Digital multiplexing and demultiplexing
- Signal gating

### 4. Ordering information

Table 1. Ordering information

Type number	Package			Version
	Temperature range	Name	Description	
74HC4351D	-40 °C to +125 °C	SO20	plastic small outline package; 20 leads; body width 7.5 mm	SOT163-1
74HCT4351D				
74HC4351DB	-40 °C to +125 °C	SSOP20	plastic shrink small outline package; 20 leads; body width 5.3 mm	SOT339-1
74HC4351PW	-40 °C to +125 °C	TSSOP20	plastic thin shrink small outline package; 20 leads; body width 4.4 mm	SOT360-1

5. Functional diagram

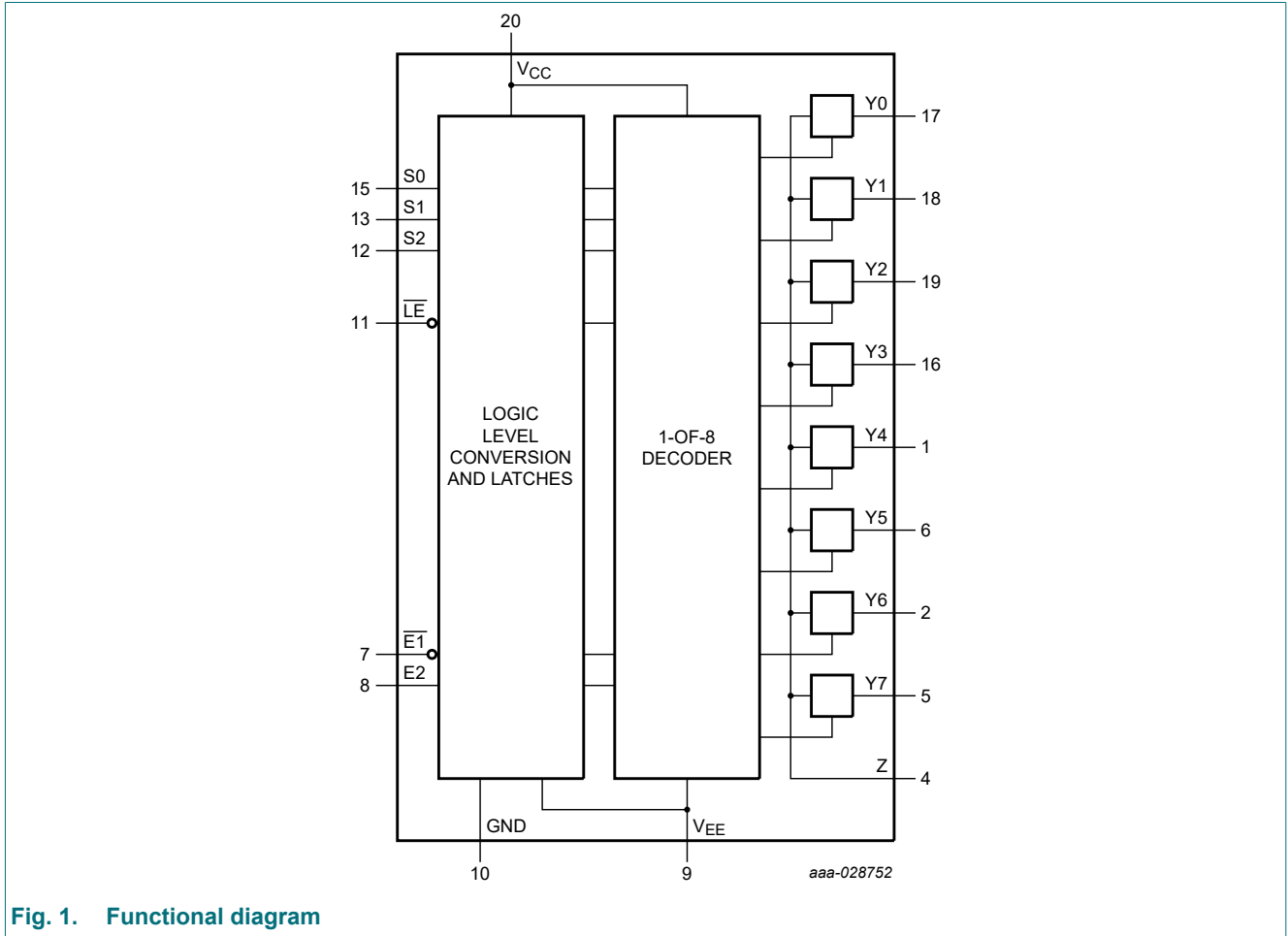


Fig. 1. Functional diagram

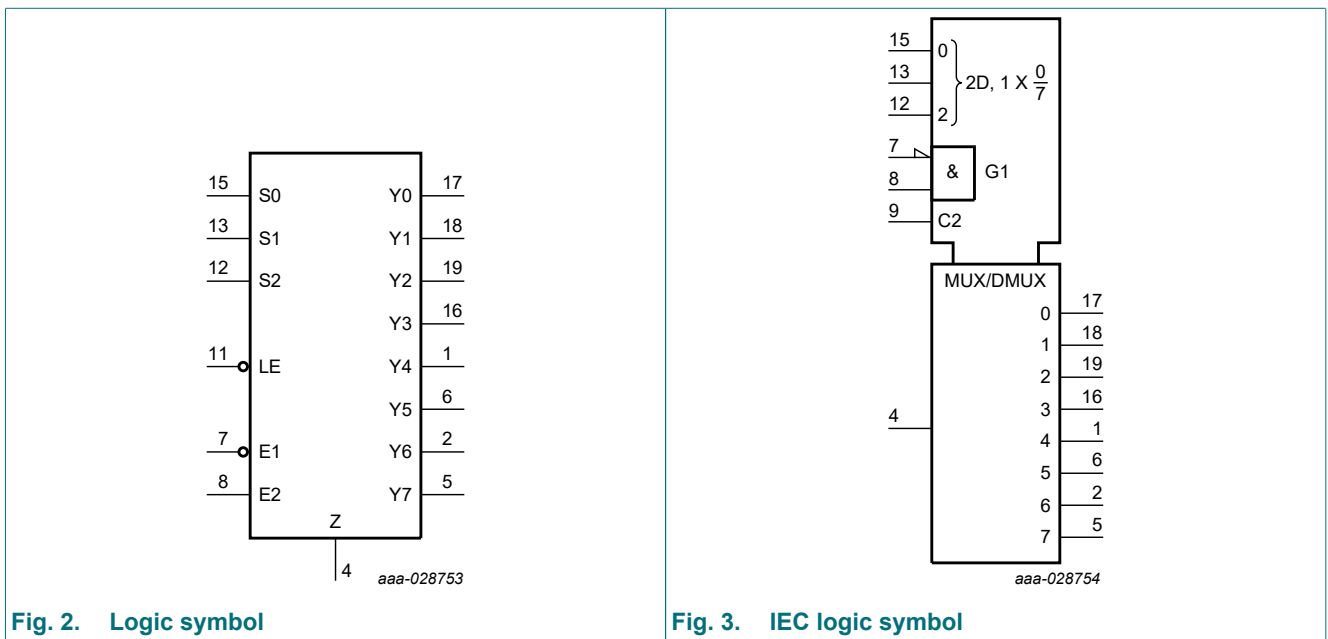


Fig. 2. Logic symbol

Fig. 3. IEC logic symbol

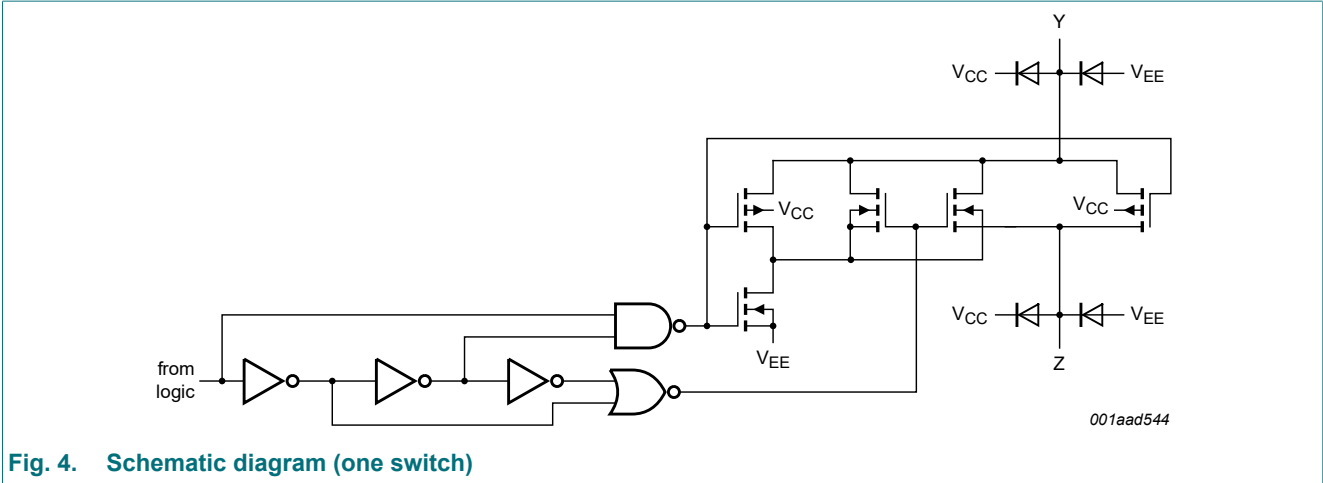


Fig. 4. Schematic diagram (one switch)

## 6. Pinning information

### 6.1. Pinning

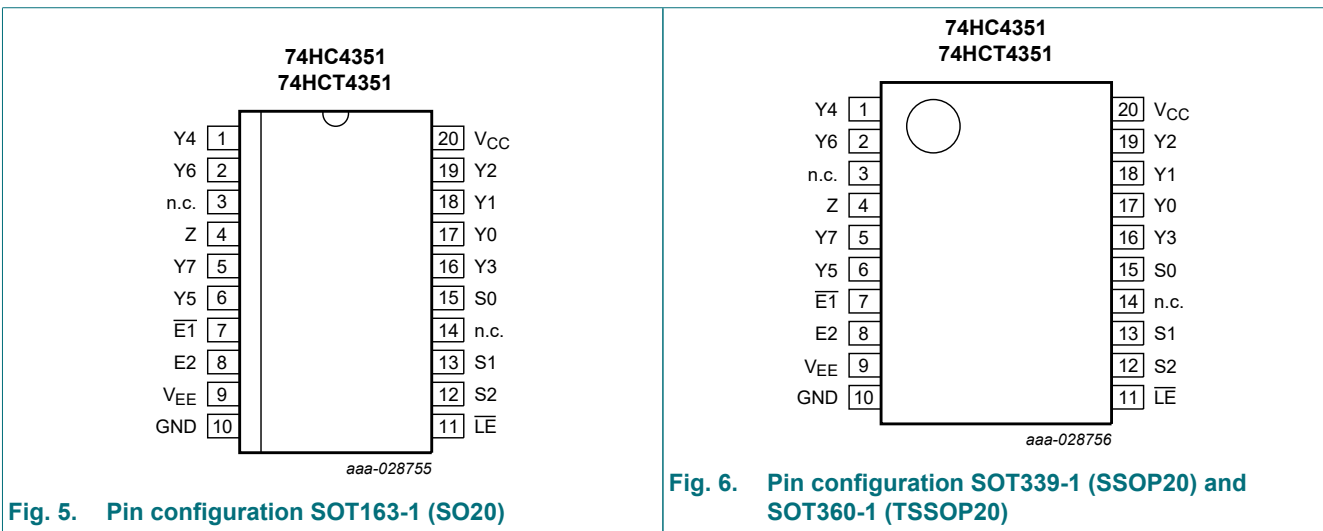


Fig. 5. Pin configuration SOT163-1 (SO20)

Fig. 6. Pin configuration SOT339-1 (SSOP20) and SOT360-1 (TSSOP20)

### 6.2. Pin description

Table 2. Pin description

Symbol	Pin	Description
$\overline{E}1$	7	enable input (active LOW)
E2	8	enable input (active HIGH)
$\overline{L}E$	11	latch enable input (active LOW)
S0, S1, S2	15, 13, 12	select inputs
Y0, Y1, Y2, Y3, Y4, Y5, Y6, Y7	17, 18, 19, 16, 1, 6, 2, 5	independent input or output
Z	4	common output or input
V <sub>EE</sub>	9	supply voltage
GND	10	ground (0 V)
V <sub>CC</sub>	20	supply voltage
n.c.	3, 14	not connected

## 7. Functional description

**Table 3. Function table**

H = HIGH voltage level; L = LOW voltage level; X = don't care; ↓ = HIGH-to-LOW LE transition.

Input						Channel ON
E1	E2	LE	S2	S1	S0	
H	X	X	X	X	X	none
X	L	X	X	X	X	none
L	H	H	L	L	L	Y0
L	H	H	L	L	H	Y1
L	H	H	L	H	L	Y2
L	H	H	L	H	H	Y3
L	H	H	H	L	L	Y4
L	H	H	H	L	H	Y5
L	H	H	H	H	L	Y6
L	H	H	H	H	H	Y7
L	H	L	X	X	X	last selected channel "ON"
X	X	↓	X	X	X	select channels latched

## 8. Limiting values

**Table 4. Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to  $V_{SS} = 0$  V (ground).

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CC}$	supply voltage	[1]	-0.5	+11.0	V
$I_{IK}$	input clamping current	$V_I < -0.5$ V or $V_I > V_{CC} + 0.5$ V	-	±20	mA
$I_{SK}$	switch clamping current	$V_{SW} < -0.5$ V or $V_{SW} > V_{CC} + 0.5$ V	-	±20	mA
$I_{SW}$	switch current	$-0.5$ V < $V_{SW} < V_{CC} + 0.5$ V	-	±25	mA
$I_{EE}$	supply current		-	±20	mA
$I_{CC}$	supply current		-	50	mA
$I_{GND}$	ground current		-50	-	mA
$T_{stg}$	storage temperature		-65	+150	°C
$P_{tot}$	total power dissipation	$T_{amb} = -40$ °C to +125 °C [2]	-	500	mW
P	power dissipation	per switch	-	100	mW

[1] To avoid drawing  $V_{CC}$  current out of terminal Z, when switch current flows into terminals Yn, the voltage drop across the bidirectional switch must not exceed 0.4 V. If the switch current flows into terminal Z, no  $V_{CC}$  current will flow out of terminals Yn. In this case there is no limit for the voltage drop across the switch, but the voltages at Yn and Z may not exceed  $V_{CC}$  or  $V_{EE}$ .

[2] For SOT163-1 (SO20) package:  $P_{tot}$  derates linearly with 12.3 mW/K above 109 °C.  
 For SOT339-1 (SSOP20) package:  $P_{tot}$  derates linearly with 10.0 mW/K above 100 °C.  
 For SOT360-1 (TSSOP20) package:  $P_{tot}$  derates linearly with 10.0 mW/K above 100 °C.

## 9. Recommended operating conditions

Table 5. Recommended operating conditions

Symbol	Parameter	Conditions	74HC4351			74HCT4351			Unit
			Min	Typ	Max	Min	Typ	Max	
V <sub>CC</sub>	supply voltage	see Fig. 7 and Fig. 8							
		V <sub>CC</sub> - GND	2.0	5.0	10.0	4.5	5.0	5.5	V
		V <sub>CC</sub> - V <sub>EE</sub>	2.0	5.0	10.0	2.0	5.0	10.0	V
V <sub>I</sub>	input voltage		GND	-	V <sub>CC</sub>	GND	-	V <sub>CC</sub>	V
V <sub>SW</sub>	switch voltage		V <sub>EE</sub>	-	V <sub>CC</sub>	V <sub>EE</sub>	-	V <sub>CC</sub>	V
T <sub>amb</sub>	ambient temperature		-40	+25	+125	-40	+25	+125	°C
Δt/ΔV	input transition rise and fall rate	V <sub>CC</sub> = 2.0 V	-	-	625	-	-	-	ns/V
		V <sub>CC</sub> = 4.5 V	-	1.67	139	-	1.67	139	ns/V
		V <sub>CC</sub> = 6.0 V	-	-	83	-	-	-	ns/V
		V <sub>CC</sub> = 10.0 V	-	-	31	-	-	-	ns/V

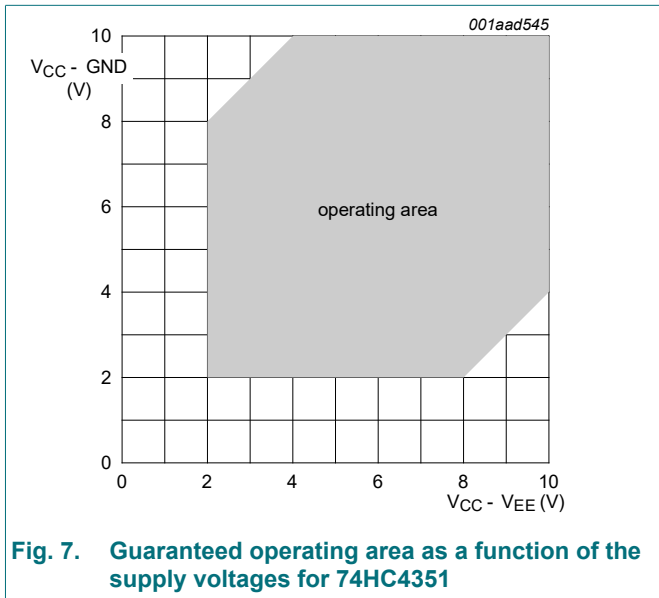


Fig. 7. Guaranteed operating area as a function of the supply voltages for 74HC4351

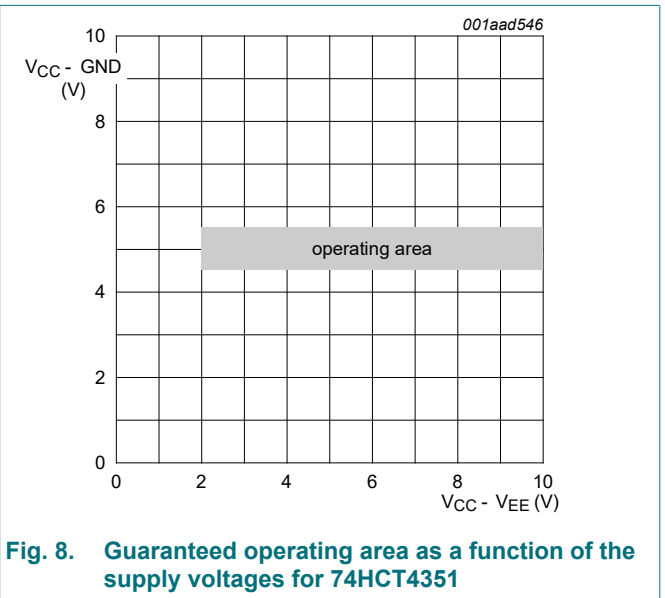


Fig. 8. Guaranteed operating area as a function of the supply voltages for 74HCT4351

## 10. Static characteristics

**Table 6.  $R_{ON}$  resistance per latch for 74HC4351 and 74HCT4351**

For test circuit, see Fig. 9

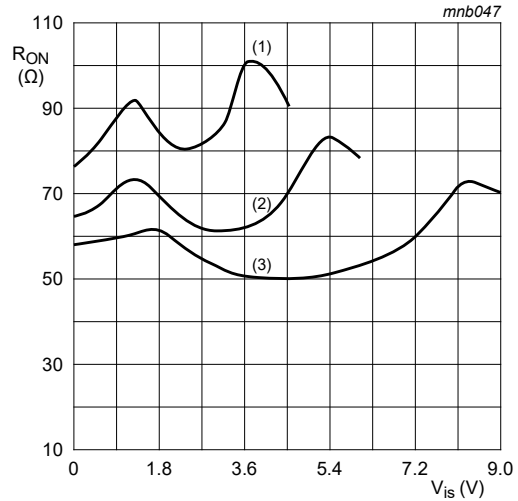
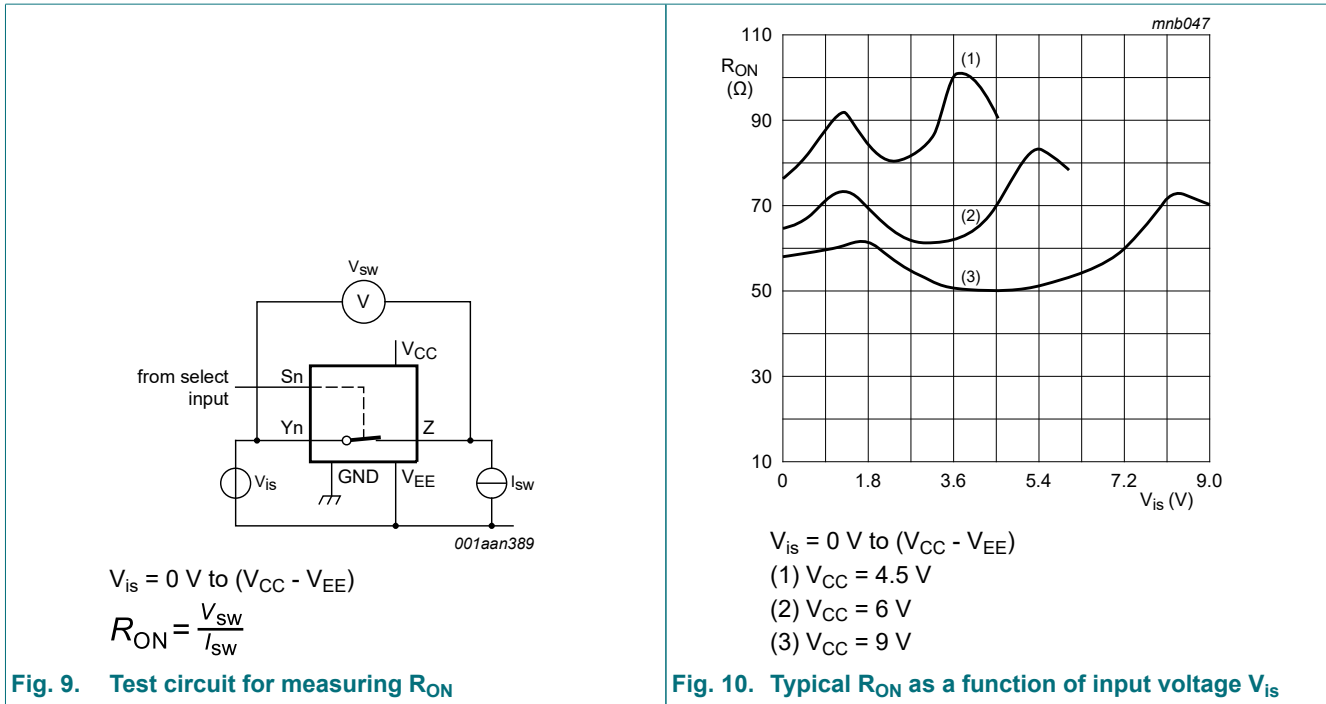
For 74HC4351:  $V_I = V_{IH}$  or  $V_{IL}$ ;  $V_{CC} - GND$  or  $V_{CC} - V_{EE} = 2.0\text{ V}$ ,  $4.5\text{ V}$ ,  $6.0\text{ V}$  and  $9.0\text{ V}$ .

For 74HCT4351:  $V_I = V_{IH}$  or  $V_{IL}$ ;  $V_{CC} - GND = 4.5\text{ V}$  and  $5.5\text{ V}$ ,  $V_{CC} - V_{EE} = 2.0\text{ V}$ ,  $4.5\text{ V}$ ,  $6.0\text{ V}$  and  $9.0\text{ V}$ .

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
$R_{ON(peak)}$	ON resistance (peak)	$V_{is} = V_{CC}$ to $V_{EE}$ [1]								
		$V_{CC} = 2.0\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $I_{SW} = 100\text{ }\mu\text{A}$ [2]	-	-	-	-	-	-	-	$\Omega$
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $I_{SW} = 1000\text{ }\mu\text{A}$	-	100	180	-	225	-	270	$\Omega$
		$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $I_{SW} = 1000\text{ }\mu\text{A}$	-	90	160	-	200	-	240	$\Omega$
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$ ; $I_{SW} = 1000\text{ }\mu\text{A}$	-	70	130	-	165	-	195	$\Omega$
$R_{ON(rail)}$	ON resistance (rail)	$V_{is} = V_{EE}$ [1]								
		$V_{CC} = 2.0\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $I_{SW} = 100\text{ }\mu\text{A}$ [2]	-	150	-	-	-	-	-	$\Omega$
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $I_{SW} = 1000\text{ }\mu\text{A}$	-	80	140	-	175	-	210	$\Omega$
		$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $I_{SW} = 1000\text{ }\mu\text{A}$	-	70	120	-	150	-	180	$\Omega$
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$ ; $I_{SW} = 1000\text{ }\mu\text{A}$	-	60	105	-	130	-	160	$\Omega$
		$V_{is} = V_{CC}$ [1]								
		$V_{CC} = 2.0\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $I_{SW} = 100\text{ }\mu\text{A}$ [2]	-	150	-	-	-	-	-	$\Omega$
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $I_{SW} = 1000\text{ }\mu\text{A}$	-	90	160	-	200	-	240	$\Omega$
		$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$ ; $I_{SW} = 1000\text{ }\mu\text{A}$	-	80	140	-	175	-	210	$\Omega$
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$ ; $I_{SW} = 1000\text{ }\mu\text{A}$	-	65	120	-	150	-	180	$\Omega$
$\Delta R_{ON}$	ON resistance mismatch between channels	$V_{is} = V_{CC}$ to $V_{EE}$ [1]								
		$V_{CC} = 2.0\text{ V}$ ; $V_{EE} = 0\text{ V}$ [2]	-	-	-	-	-	-	-	$\Omega$
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	9	-	-	-	-	-	$\Omega$
		$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	8	-	-	-	-	-	$\Omega$
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	-	6	-	-	-	-	-	$\Omega$

[1]  $V_{is}$  is the input voltage at a Yn or Z terminal, whichever is assigned as an input.

[2] When supply voltages ( $V_{CC} - V_{EE}$ ) near 2.0 V the analog switch ON resistance becomes extremely non-linear. When using a supply of 2 V, it is recommended to use these devices only for transmitting digital signals.



$V_{is} = 0 \text{ V to } (V_{CC} - V_{EE})$

- (1)  $V_{CC} = 4.5 \text{ V}$
- (2)  $V_{CC} = 6 \text{ V}$
- (3)  $V_{CC} = 9 \text{ V}$

Fig. 9. Test circuit for measuring  $R_{ON}$

Fig. 10. Typical  $R_{ON}$  as a function of input voltage  $V_{is}$

Table 7. Static characteristics

Voltages are referenced to GND (ground = 0 V);

$V_{is}$  is the input voltage at pins  $Y_n$  or  $Z$ , whichever is assigned as an input;

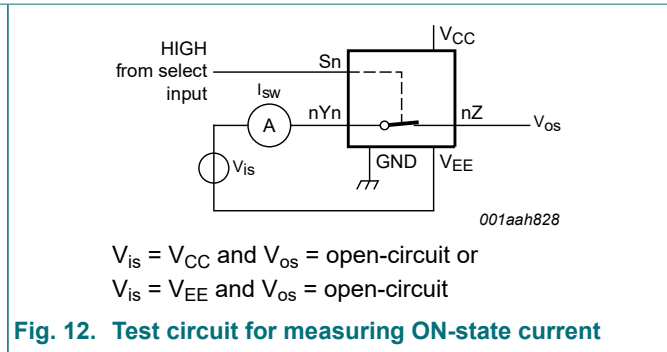
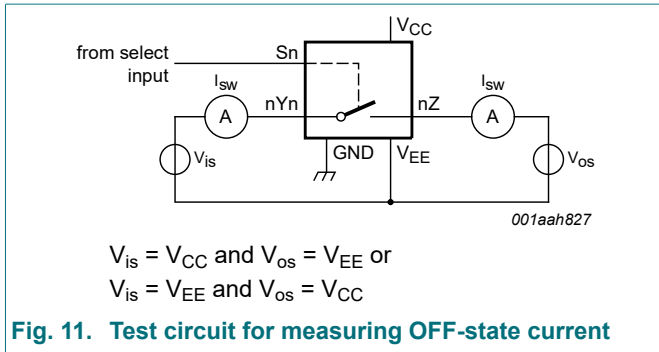
$V_{os}$  is the output voltage at pins  $Z$  or  $Y_n$ , whichever is assigned as an output.

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
<b>74HC4351</b>										
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 2.0 \text{ V}$	1.5	1.2	-	1.5	-	1.5	-	V
		$V_{CC} = 4.5 \text{ V}$	3.15	2.4	-	3.15	-	3.15	-	V
		$V_{CC} = 6.0 \text{ V}$	4.2	3.2	-	4.2	-	4.2	-	V
		$V_{CC} = 9.0 \text{ V}$	6.3	4.7	-	6.3	-	6.3	-	V
$V_{IL}$	LOW-level input voltage	$V_{CC} = 2.0 \text{ V}$	-	0.8	0.5	-	0.5	-	0.5	V
		$V_{CC} = 4.5 \text{ V}$	-	2.1	1.35	-	1.35	-	1.35	V
		$V_{CC} = 6.0 \text{ V}$	-	2.8	1.8	-	1.8	-	1.8	V
		$V_{CC} = 9.0 \text{ V}$	-	4.3	2.7	-	2.7	-	2.7	V
$I_I$	input leakage current	$V_{EE} = 0 \text{ V}; V_I = V_{CC} \text{ or } \text{GND}$								
		$V_{CC} = 6.0 \text{ V}$	-	-	$\pm 0.1$	-	$\pm 1.0$	-	$\pm 1.0$	$\mu\text{A}$
		$V_{CC} = 10.0 \text{ V}$	-	-	$\pm 0.2$	-	$\pm 2.0$	-	$\pm 2.0$	$\mu\text{A}$
$I_{S(OFF)}$	OFF-state leakage current	$V_{CC} = 10.0 \text{ V}; V_{EE} = 0 \text{ V}; V_I = V_{IH} \text{ or } V_{IL};  V_{SW}  = V_{CC} - V_{EE};$ see Fig. 11								
		per channel	-	-	$\pm 0.1$	-	$\pm 1.0$	-	$\pm 1.0$	$\mu\text{A}$
		all channels	-	-	$\pm 0.4$	-	$\pm 4.0$	-	$\pm 4.0$	$\mu\text{A}$
$I_{S(ON)}$	ON-state leakage current	$V_{CC} = 10.0 \text{ V}; V_{EE} = 0 \text{ V}; V_I = V_{IH} \text{ or } V_{IL};  V_{SW}  = V_{CC} - V_{EE};$ see Fig. 12	-	-	$\pm 0.4$	-	$\pm 4.0$	-	$\pm 4.0$	$\mu\text{A}$

## 8-channel analog multiplexer/demultiplexer with latch

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
I <sub>CC</sub>	supply current	V <sub>EE</sub> = 0 V; V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>is</sub> = V <sub>EE</sub> or V <sub>CC</sub> ; V <sub>os</sub> = V <sub>CC</sub> or V <sub>EE</sub>								
		V <sub>CC</sub> = 6.0 V	-	-	8.0	-	80.0	-	160.0	μA
		V <sub>CC</sub> = 10.0 V	-	-	16.0	-	160.0	-	320.0	μA
C <sub>I</sub>	input capacitance		-	3.5	-	-	-	-	-	pF
C <sub>sw</sub>	switch capacitance	independent pins Yn	-	5	-	-	-	-	-	pF
		common pins Z	-	25	-	-	-	-	-	pF
<b>74HCT4351</b>										
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 4.5 V to 5.5 V	2.0	1.6	-	2.0	-	2.0	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 4.5 V to 5.5 V	-	1.2	0.8	-	0.8	-	0.8	V
I <sub>I</sub>	input leakage current	V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V; V <sub>EE</sub> = 0 V	-	-	±0.1	-	±1.0	-	±1.0	μA
I <sub>S(OFF)</sub>	OFF-state leakage current	V <sub>CC</sub> = 10.0 V; V <sub>EE</sub> = 0 V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ;  V <sub>SW</sub>   = V <sub>CC</sub> - V <sub>EE</sub> ; see Fig. 11								
		per channel	-	-	±0.1	-	±1.0	-	±1.0	μA
		all channels	-	-	±0.4	-	±4.0	-	±4.0	μA
I <sub>S(ON)</sub>	ON-state leakage current	V <sub>CC</sub> = 10.0 V; V <sub>EE</sub> = 0 V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ;  V <sub>SW</sub>   = V <sub>CC</sub> - V <sub>EE</sub> ; see Fig. 12	-	-	±0.4	-	±4.0	-	±4.0	μA
I <sub>CC</sub>	supply current	V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>is</sub> = V <sub>EE</sub> or V <sub>CC</sub> ; V <sub>os</sub> = V <sub>CC</sub> or V <sub>EE</sub>								
		V <sub>CC</sub> = 5.5 V; V <sub>EE</sub> = 0 V	-	-	8.0	-	80.0	-	160.0	μA
		V <sub>CC</sub> = 5.0 V; V <sub>EE</sub> = -5.0 V	-	-	16.0	-	160.0	-	320.0	μA
ΔI <sub>CC</sub>	additional supply current	per input; other inputs at V <sub>CC</sub> or GND; V <sub>I</sub> = V <sub>CC</sub> - 2.1 V; V <sub>CC</sub> = 4.5 V to 5.5 V; V <sub>EE</sub> = 0 V								
		inputs $\bar{E}1$ , E2 and Sn	-	50	180	-	225	-	245	μA
		input LE	-	150	540	-	675	-	735	μA
C <sub>I</sub>	input capacitance		-	3.5	-	-	-	-	-	pF
C <sub>sw</sub>	switch capacitance	independent pins Yn	-	5	-	-	-	-	-	pF
		common pins Z	-	25	-	-	-	-	-	pF





## 11. Dynamic characteristics

**Table 8. Dynamic characteristics**

$GND = 0\text{ V}$ ;  $t_r = t_f = 6\text{ ns}$ ;  $C_L = 50\text{ pF}$ ; for test circuit see Fig. 16.

$V_{is}$  is the input voltage at pins Yn or Z, whichever is assigned as an input;

$V_{os}$  is the output voltage at pins Z or Yn, whichever is assigned as an output.

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
<b>74HC4351</b>										
$t_{pd}$	propagation delay	$V_{is}$ to $V_{os}$ ; $R_L = \infty\ \Omega$ ; see Fig. 13 [1]								
		$V_{CC} = 2.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	14	60	-	75	-	90	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	5	12	-	15	-	18	ns
		$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	4	10	-	13	-	15	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	-	4	8	-	10	-	12	ns
$t_{on}$	turn-ON time	$E1$ to $V_{os}$ ; $R_L = 1\text{ k}\Omega$ ; see Fig. 14								
		$V_{CC} = 2.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	85	300	-	375	-	450	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	31	60	-	75	-	90	ns
		$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	25	51	-	64	-	77	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	-	28	55	-	69	-	83	ns
		$E2$ to $V_{os}$ ; $R_L = 1\text{ k}\Omega$ ; see Fig. 14								
		$V_{CC} = 2.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	85	300	-	375	-	450	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	31	60	-	75	-	90	ns
		$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	25	51	-	64	-	77	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	-	25	55	-	69	-	83	ns
		$\overline{LE}$ to $V_{os}$ ; $R_L = 1\text{ k}\Omega$ ; see Fig. 14								
		$V_{CC} = 2.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	91	300	-	375	-	450	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	33	60	-	75	-	90	ns
		$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	26	51	-	64	-	77	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	-	27	55	-	69	-	83	ns
		$Sn$ to $V_{os}$ ; $R_L = 1\text{ k}\Omega$ ; see Fig. 14								
$V_{CC} = 2.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	88	300	-	375	-	450	ns		
$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	32	60	-	75	-	90	ns		
$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	26	51	-	64	-	77	ns		
$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	-	25	50	-	63	-	75	ns		

## 8-channel analog multiplexer/demultiplexer with latch

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
$t_{off}$	turn-OFF time	$\overline{E1}$ to $V_{os}$ ; $R_L = 1\text{ k}\Omega$ ; see Fig. 14								
		$V_{CC} = 2.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	69	250	-	315	-	375	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	25	50	-	63	-	75	ns
		$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	20	43	-	54	-	64	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	-	20	40	-	50	-	60	ns
		$E2$ to $V_{os}$ ; $R_L = 1\text{ k}\Omega$ ; see Fig. 14								
		$V_{CC} = 2.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	72	250	-	315	-	375	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	26	50	-	63	-	75	ns
		$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	21	43	-	54	-	64	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	-	19	40	-	50	-	60	ns
		$\overline{LE}$ to $V_{os}$ ; $R_L = 1\text{ k}\Omega$ ; see Fig. 14								
		$V_{CC} = 2.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	83	275	-	345	-	415	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	30	55	-	69	-	83	ns
		$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	-	24	47	-	59	-	71	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	-	26	45	-	56	-	68	ns
		$t_{su}$	set-up time	$S_n$ to $\overline{LE}$ ; $R_L = 1\text{ k}\Omega$ ; see Fig. 15						
$V_{CC} = 2.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	60			17	-	-	75	-	90	ns
$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	12			6	-	-	15	-	18	ns
$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	10			5	-	-	13	-	15	ns
$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	18			9	-	-	23	-	27	ns
$t_{hold}$	hold time	$S_n$ to $\overline{LE}$ ; $R_L = 1\text{ k}\Omega$ ; see Fig. 15								
		$V_{CC} = 2.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	5	-8	-	-	5	-	5	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	5	-3	-	-	5	-	5	ns
		$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	5	-2	-	-	5	-	5	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	5	-4	-	-	5	-	5	ns
$t_{WH(min)}$	minimum pulse width HIGH	$\overline{LE}$ ; $R_L = 1\text{ k}\Omega$ ; see Fig. 15								
		$V_{CC} = 2.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	100	11	-	-	125	-	150	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = 0\text{ V}$	20	1	-	-	25	-	30	ns
		$V_{CC} = 6.0\text{ V}$ ; $V_{EE} = 0\text{ V}$	17	3	-	-	21	-	26	ns
		$V_{CC} = 4.5\text{ V}$ ; $V_{EE} = -4.5\text{ V}$	25	7	-	-	31	-	38	ns
$C_{pd}$	power dissipation capacitance	per switch; $V_I = \text{GND to } V_{CC}$ [2]	-	25	-	-	-	-	-	pF
$C_{sw}$	switch capacitance	maximum								
		independent ( $Y_n$ )	-	5	-	-	-	-	-	pF
		common ( $Z$ )	-	25	-	-	-	-	-	pF

8-channel analog multiplexer/demultiplexer with latch

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
<b>74HCT4351</b>										
t <sub>pd</sub>	propagation delay	V <sub>is</sub> to V <sub>os</sub> ; R <sub>L</sub> = ∞ Ω; see <a href="#">Fig. 13</a> [1]								
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = 0 V	-	6	12	-	15	-	18	ns
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = -4.5 V	-	4	8	-	10	-	12	ns
t <sub>on</sub>	turn-ON time	E1 to V <sub>os</sub> ; R <sub>L</sub> = 1 kΩ; see <a href="#">Fig. 14</a>								
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = 0 V	-	40	75	-	94	-	113	ns
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = -4.5 V	-	31	60	-	75	-	90	ns
		E2 to V <sub>os</sub> ; R <sub>L</sub> = 1 kΩ; see <a href="#">Fig. 14</a>								
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = 0 V	-	35	70	-	88	-	105	ns
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = -4.5 V	-	26	50	-	63	-	75	ns
		LE to V <sub>os</sub> ; R <sub>L</sub> = 1 kΩ; see <a href="#">Fig. 14</a>								
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = 0 V	-	42	75	-	94	-	113	ns
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = -4.5 V	-	37	60	-	75	-	90	ns
		Sn to V <sub>os</sub> ; R <sub>L</sub> = 1 kΩ; see <a href="#">Fig. 14</a>								
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = 0 V	-	39	75	-	94	-	113	ns
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = -4.5 V	-	30	60	-	75	-	90	ns
t <sub>off</sub>	turn-OFF time	E1 to V <sub>os</sub> ; R <sub>L</sub> = 1 kΩ; see <a href="#">Fig. 14</a>								
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = 0 V	-	27	55	-	69	-	83	ns
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = -4.5 V	-	20	40	-	50	-	60	ns
		E2 to V <sub>os</sub> ; R <sub>L</sub> = 1 kΩ; see <a href="#">Fig. 14</a>								
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = 0 V	-	32	60	-	75	-	90	ns
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = -4.5 V	-	26	50	-	63	-	75	ns
		LE to V <sub>os</sub> ; R <sub>L</sub> = 1 kΩ; see <a href="#">Fig. 14</a>								
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = 0 V	-	33	60	-	75	-	90	ns
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = -4.5 V	-	30	55	-	69	-	83	ns
		Sn to V <sub>os</sub> ; R <sub>L</sub> = 1 kΩ; see <a href="#">Fig. 14</a>								
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = 0 V	-	33	65	-	81	-	98	ns
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = -4.5 V	-	29	55	-	69	-	83	ns
t <sub>su</sub>	set-up time	Sn to LE; R <sub>L</sub> = 1 kΩ; see <a href="#">Fig. 15</a>								
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = 0 V	12	6	-	-	15	-	18	ns
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = -4.5 V	14	7	-	-	18	-	21	ns
t <sub>hold</sub>	hold time	Sn to LE; R <sub>L</sub> = 1 kΩ; see <a href="#">Fig. 15</a>								
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = 0 V	5	-1	-	-	5	-	5	ns
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = -4.5 V	5	-2	-	-	5	-	5	ns
t <sub>WH(min)</sub>	minimum pulse width HIGH	LE; R <sub>L</sub> = 1 kΩ; see <a href="#">Fig. 15</a>								
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = 0 V	25	13	-	-	31	-	38	ns
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = -4.5 V	25	13	-	-	31	-	38	ns
C <sub>pd</sub>	power dissipation capacitance	per switch; V <sub>I</sub> = GND to V <sub>CC</sub> - 1.5 V [2]	-	25	-	-	-	-	-	pF

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
C <sub>sw</sub>	switch capacitance	maximum								
		independent (Yn)	-	5	-	-	-	-	-	pF
		common (Z)	-	25	-	-	-	-	-	pF

- [1]  $t_{pd}$  is the same as  $t_{PHL}$  and  $t_{PLH}$ .
- [2]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu W$ ).  
 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma\{(C_L + C_{sw}) \times V_{CC}^2 \times f_o\}$  where:  
 $f_i$  = input frequency in MHz;  
 $f_o$  = output frequency in MHz;  
 $N$  = number of inputs switching;  
 $\Sigma\{(C_L + C_{sw}) \times V_{CC}^2 \times f_o\}$  = sum of outputs;  
 $C_L$  = output load capacitance in pF;  
 $C_{sw}$  = switch capacitance in pF;  
 $V_{CC}$  = supply voltage in V.

### 11.1. Waveforms and test circuit

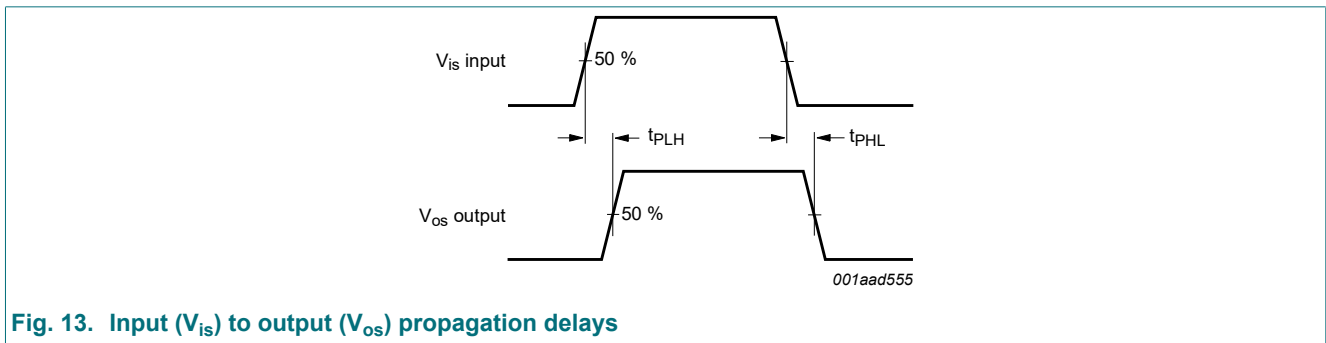
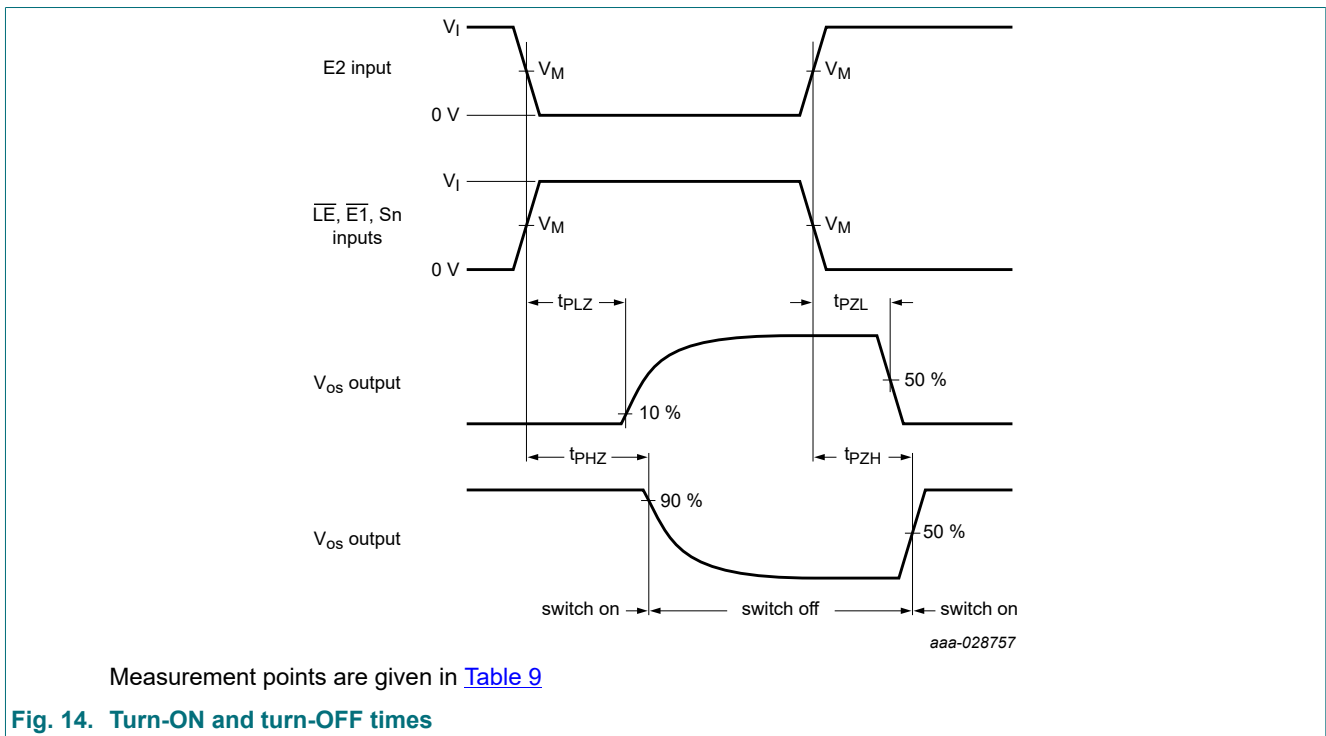
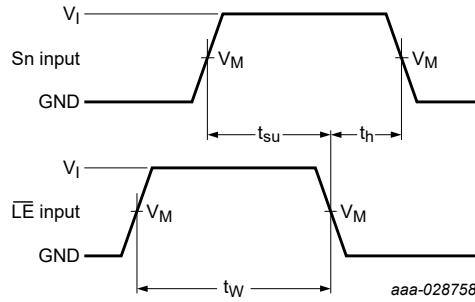


Fig. 13. Input ( $V_{is}$ ) to output ( $V_{os}$ ) propagation delays



Measurement points are given in [Table 9](#)

Fig. 14. Turn-ON and turn-OFF times

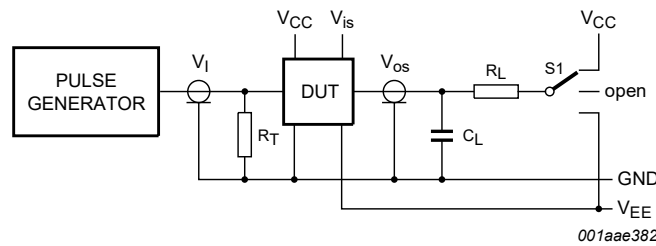
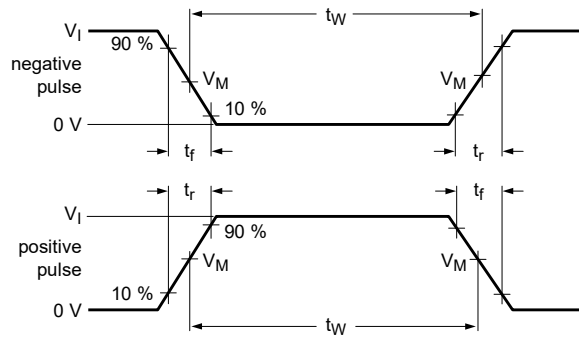


Measurement points are given in [Table 9](#)

**Fig. 15. Set-up and hold times from Sn inputs to LE input, and minimum pulse width of LE.**

**Table 9. Measurement points**

Type	Input		Output
	$V_I$	$V_M$	$V_M$
74HC4351	GND to $V_{CC}$	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
74HCT4351	GND to 3 V	1.3 V	1.3 V



Definitions for test circuit; see [Table 10](#):

$R_T$  = Termination resistance should be equal to the output impedance  $Z_o$  of the pulse generator.

$C_L$  = Load capacitance including jig and probe capacitance.

$R_L$  = Load resistance.

S1 = Test selection switch.

**Fig. 16. Test circuit for measuring switching times**

Table 10. Test data

Test	Input				Load		S1 position
	$V_I$	$V_{is}$	$t_r, t_f$		$C_L$	$R_L$	
			at $f_{max}$	other [1]			
$t_{PZH}, t_{PHZ}$	[2]	$V_{CC}$	< 2 ns	6 ns	50 pF	1 k $\Omega$	$V_{EE}$
$t_{PZL}, t_{PLZ}$	[2]	$V_{EE}$	< 2 ns	6 ns	50 pF	1 k $\Omega$	$V_{CC}$
Other	[2]	pulse	< 2 ns	6 ns	50 pF	1 k $\Omega$	open

[1]  $t_r = t_f = 6$  ns; when measuring  $f_{max}$ , there is no constraint to  $t_r$  and  $t_f$  with 50 % duty factor.

[2]  $V_I$  values:

For 74HC4351:  $V_I = V_{CC}$

For 74HCT4351:  $V_I = 3$  V

11.2. Additional dynamic characteristics

Table 11. Additional dynamic characteristics

Recommended conditions and typical values; GND = 0 V; T<sub>amb</sub> = 25 °C; C<sub>L</sub> = 50 pF unless stated otherwise.

V<sub>is</sub> is the input voltage at pins Yn or Z, whichever is assigned as an input.

V<sub>os</sub> is the output voltage at pins Yn or Z, whichever is assigned as an output.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
d <sub>sin</sub>	sine-wave distortion	f <sub>i</sub> = 1 kHz; R <sub>L</sub> = 10 kΩ; see Fig. 17					
		V <sub>is</sub> = 4.0 V (p-p); V <sub>CC</sub> = 2.25 V; V <sub>EE</sub> = -2.25 V	-	0.04	-	%	
		V <sub>is</sub> = 8.0 V (p-p); V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = -4.5 V	-	0.02	-	%	
		f <sub>i</sub> = 10 kHz; R <sub>L</sub> = 10 kΩ; see Fig. 17					
		V <sub>is</sub> = 4.0 V (p-p); V <sub>CC</sub> = 2.25 V; V <sub>EE</sub> = -2.25 V	-	0.12	-	%	
		V <sub>is</sub> = 8.0 V (p-p); V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = -4.5 V	-	0.06	-	%	
α <sub>iso</sub>	isolation (OFF-state)	R <sub>L</sub> = 600 Ω; f <sub>i</sub> = 1 MHz; see Fig. 18					
		V <sub>CC</sub> = 2.25 V; V <sub>EE</sub> = -2.25 V	[1]	-	-50	-	dB
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = -4.5 V	[1]	-	-50	-	dB
V <sub>ct</sub>	crosstalk voltage	between control and any switch (peak-to-peak value); R <sub>L</sub> = 600 Ω; f <sub>i</sub> = 1 MHz; E1, E2 or Sn square wave between V <sub>CC</sub> and GND; t <sub>r</sub> = t <sub>f</sub> = 6 ns; see Fig. 19					
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = 0 V	-	120	-	mV	
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = -4.5 V	-	220	-	mV	
f <sub>(-3dB)</sub>	-3 dB frequency response	R <sub>L</sub> = 50 Ω; C <sub>L</sub> = 10 pF see Fig. 20					
		V <sub>CC</sub> = 2.25 V; V <sub>EE</sub> = -2.25 V	[2]	-	160	-	MHz
		V <sub>CC</sub> = 4.5 V; V <sub>EE</sub> = -4.5 V	[2]	-	170	-	MHz

- [1] Adjust input voltage V<sub>is</sub> to 0 dBm level (0 dBm = 1 mW into 600 Ω).
- [2] Adjust input voltage V<sub>is</sub> to 0 dBm level at V<sub>os</sub> for 1 MHz (0 dBm = 1 mW into 50 Ω).

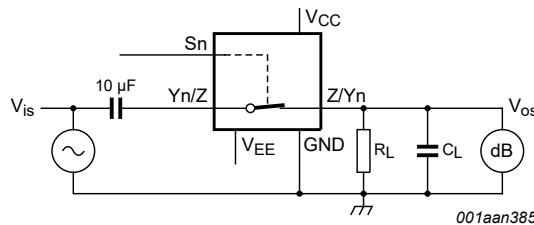
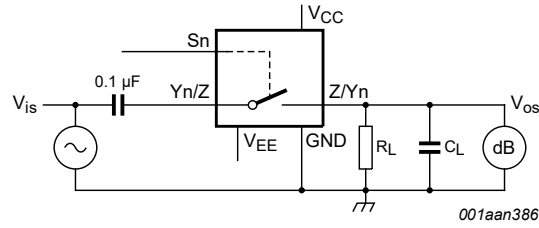
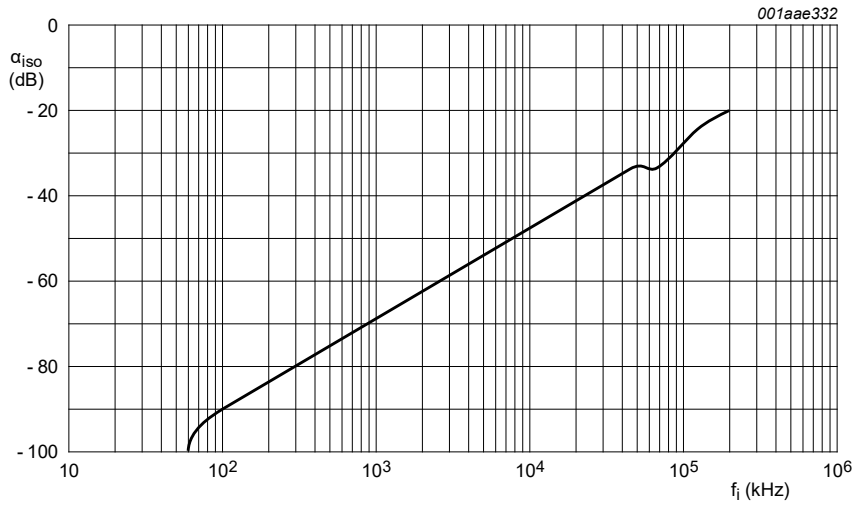


Fig. 17. Test circuit for measuring sine-wave distortion



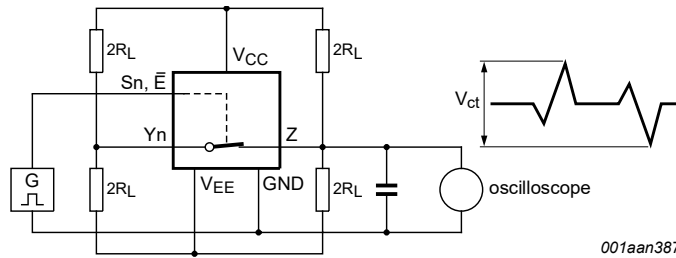
$V_{CC} = 4.5\text{ V}$ ;  $GND = 0\text{ V}$ ;  $V_{EE} = -4.5\text{ V}$ ;  $R_L = 600\ \Omega$ ;  $R_S = 1\text{ k}\Omega$

a. Test circuit



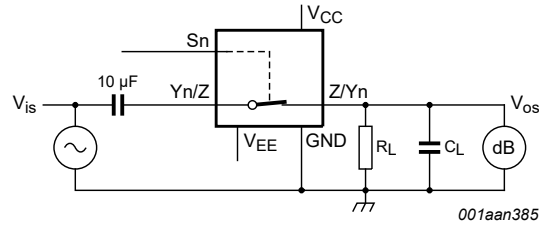
b. Isolation (OFF-state) as a function of frequency

**Fig. 18. Test circuit for measuring isolation (OFF-state)**



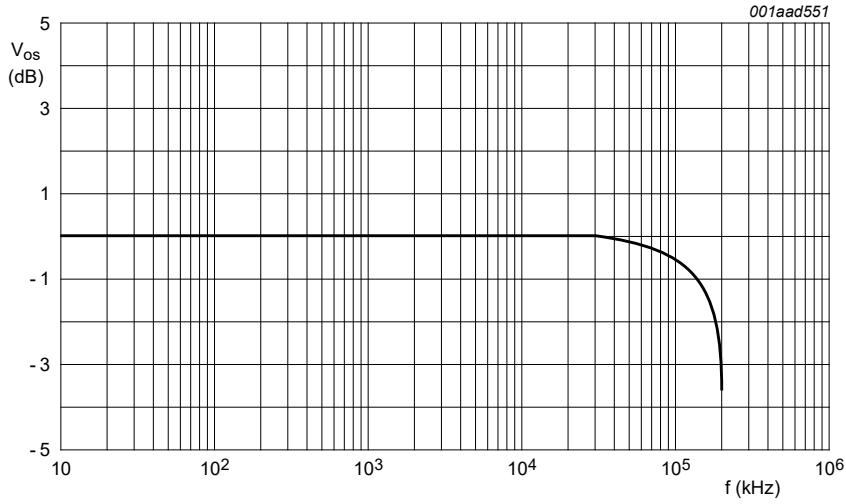
**Fig. 19. Test circuit for measuring crosstalk between control input and any switch**





$V_{CC} = 4.5 \text{ V}$ ;  $GND = 0 \text{ V}$ ;  $V_{EE} = -4.5 \text{ V}$ ;  $R_L = 50 \Omega$ ;  $R_S = 1 \text{ k}\Omega$

a. Test circuit



b. Typical frequency response

**Fig. 20. Test circuit for frequency response**

12. Package outline

SO20: plastic small outline package; 20 leads; body width 7.5 mm

SOT163-1



Fig. 21. Package outline SOT163-1 (SO20)

SSOP20: plastic shrink small outline package; 20 leads; body width 5.3 mm

SOT339-1

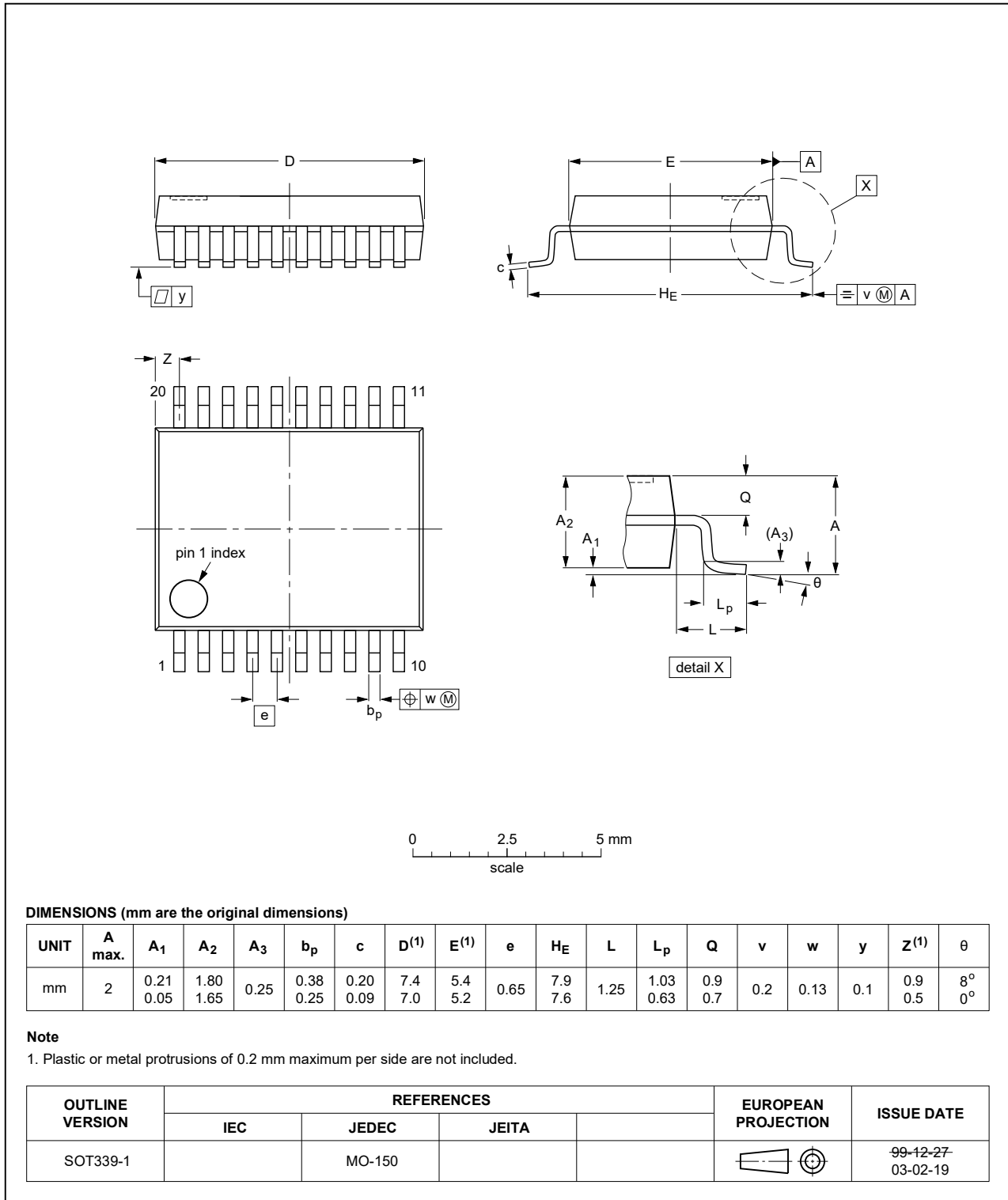


Fig. 22. Package outline SOT339-1 (SSOP20)

TSSOP20: plastic thin shrink small outline package; 20 leads; body width 4.4 mm

SOT360-1

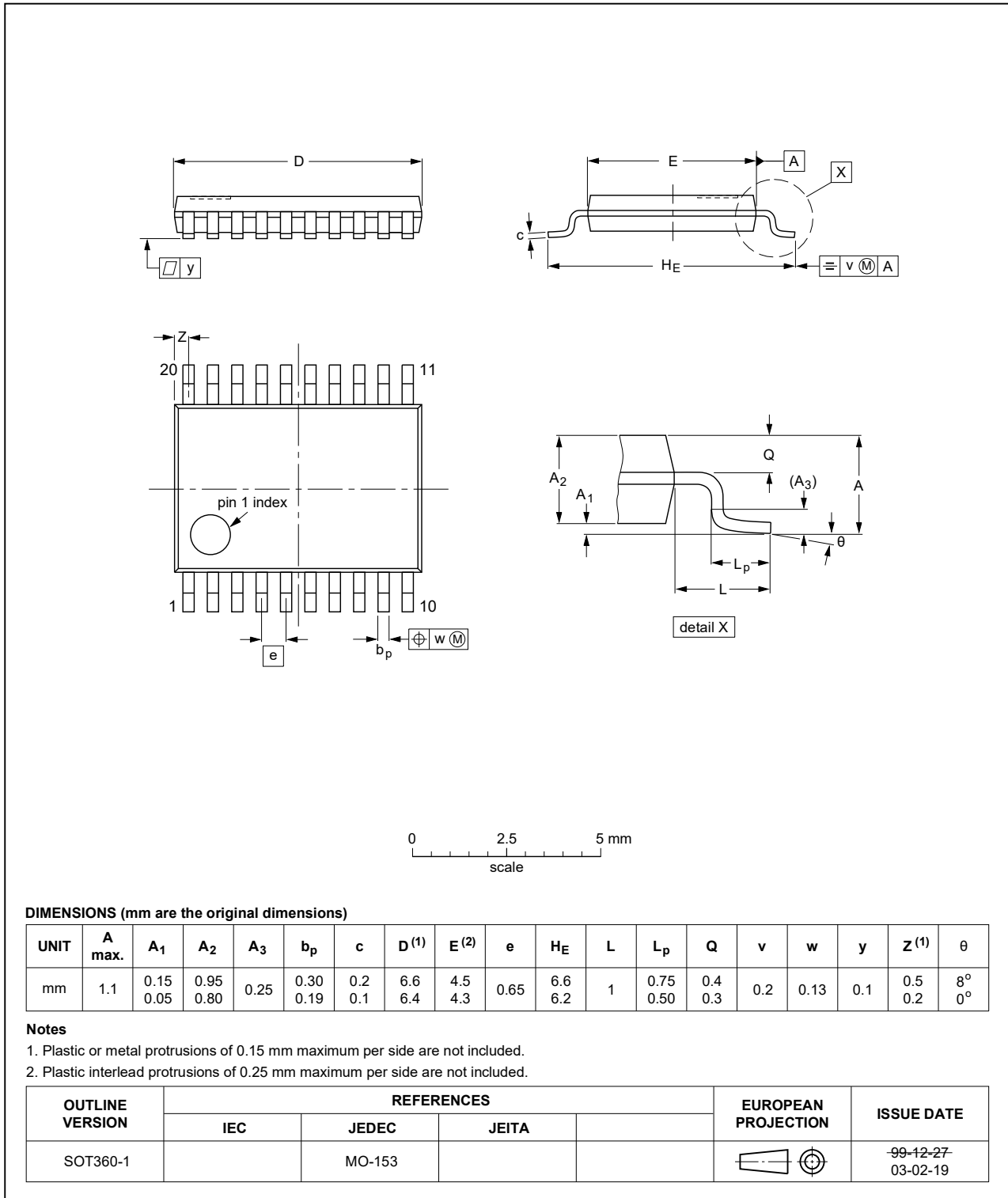


Fig. 23. Package outline SOT360-1 (TSSOP20)

## 13. Abbreviations

Table 12. Abbreviations

Acronym	Description
CDM	Charged Device Model
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
MM	Machine Model

## 14. Revision history

Table 13. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74HC_HCT4351 v.4	20210804	Product data sheet	-	74HC_HCT4351 v.3
Modifications:	<ul style="list-style-type: none"> <li>Type number 74HC4351PW (SOT360-1/TSSOP20) added.</li> <li>Type number 74HCT4351DB (SOT339-1/SSOP20) removed.</li> <li><a href="#">Section 8</a>: Derating values for <math>P_{tot}</math> total power dissipation updated.</li> </ul>			
74HC_HCT4351 v.3	20180709	Product data sheet	-	74HC_HCT4351 v.2
Modifications:	<ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> <li>Type numbers 74HC4351N (SOT146-1) and 74HCT4351N (SOT146-1) removed.</li> </ul>			
74HC_HCT4351 v.2	19901201	Product specification	-	74HC_HCT4351 v.1

## 15. Legal information

### Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
- [3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at <https://www.nexperia.com>.

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