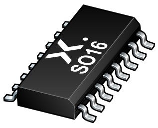


74HCT4316-Q100

Quad single-pole single-throw analog switch

Rev. 2 — 26 March 2024 **Product data sheet**

1. General description

The 74HCT4316-Q100 is a quad single pole, single throw analog switch (SPST). Each switch features two input/output terminals (nY and nZ) and an active HIGH enable input (nS). When nS is LOW, the analog switch is turned off. When $\overline{E}$ is HIGH all four 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}.

This product has been qualified to the Automotive Electronics Council (AEC) standard Q100 (Grade 1) and is suitable for use in automotive applications.

2. Features and benefits

- Automotive product qualification in accordance with AEC-Q100 (Grade 1)
  - Specified from -40 °C to +85 °C and from -40 °C to +125 °C
- High noise immunity
- Input levels $\overline{E}$ and nS inputs: TTL level
- Low ON resistance:
  - 160 Ω (typical) at V_{CC} - V_{EE} = 4.5 V
  - 120 Ω (typical) at V_{CC} - V_{EE} = 6.0 V
  - 80 Ω (typical) at V_{CC} - V_{EE} = 9.0 V
- Logic level translation:
  - To enable 5 V logic to communicate with ±5 V analog signals
- Typical break-before-make built in
- Latch-up performance exceeds 100 mA per JESD 78 Class II Level B
- ESD protection:
  - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 2000 V
  - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V

3. Applications

- Signal gating
- Modulation
- Demodulation
- Chopper

4. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74HCT4316D-Q100	-40 °C to +125 °C	SO16	plastic small outline package; 16 leads; body width 3.9 mm	SOT109-1

nexperia

5. Functional diagram

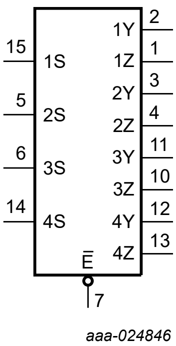


Fig. 1. Logic symbol

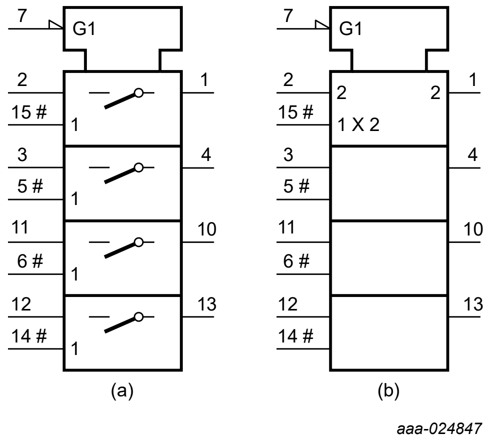


Fig. 2. IEC logic symbol

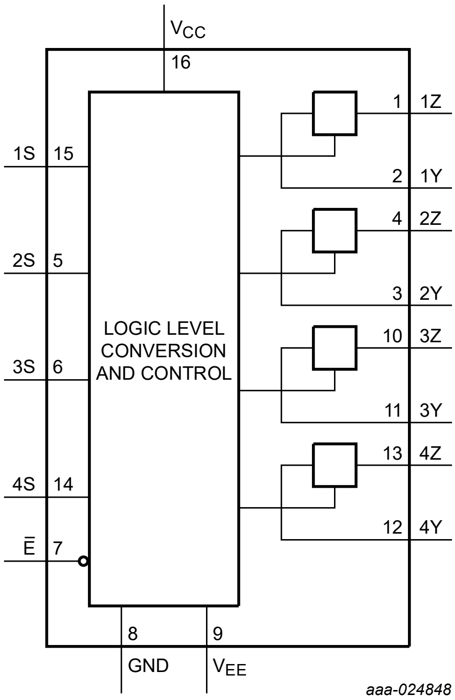


Fig. 3. Functional diagram

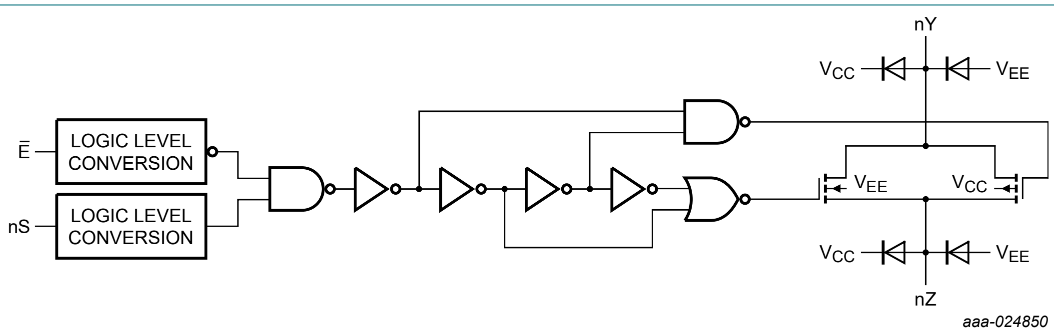
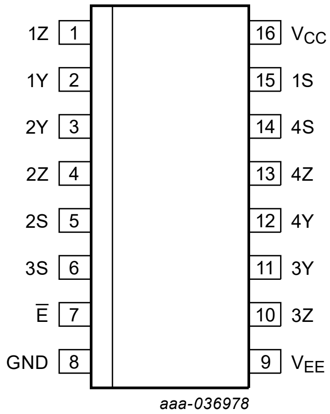


Fig. 4. Schematic diagram (one switch)

6. Pinning information

6.1. Pinning

D package
SOT109-1 (SO16)



6.2. Pin description

Table 2. Pin description

Symbol	Pin	Description
1Z, 2Z, 3Z, 4Z	1, 4, 10, 13	independent input or output
1Y, 2Y, 3Y, 4Y	2, 3, 11, 12	independent input or output
$\overline{E}$	7	enable input (active LOW)
GND	8	ground (0 V)
V_{EE}	9	negative supply voltage
1S, 2S, 3S, 4S	15, 5, 6, 14	select input (active HIGH)
V_{CC}	14	positive supply voltage

7. Functional description

Table 3. Function table
H = HIGH voltage level; L = LOW voltage level; X = don't care.

Input		Switch
$\overline{E}$	nS	
L	L	OFF
L	H	ON
H	X	OFF

8. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CC}	supply voltage		-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	V_{SW} = -0.5 V to V_{CC} + 0.5 V [1]	-	±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 nZ, when switch current flows in terminals nY, the voltage drop across the bidirectional switch must not exceed 0.4 V. If the switch current flows into terminal nZ, no V_{CC} current will flow out of terminals nY. In this case there is no limit for the voltage drop across the switch, but the voltages at nY and nZ may not exceed V_{CC} or V_{EE}.

[2] For SOT109-1 (SO16) package: P_{tot} derates linearly with 12.4 mW/K above 110 °C.

9. Recommended operating conditions

Table 5. Recommended operating conditions

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CC}	supply voltage	see Fig. 5				
		V_{CC} - GND	4.5	5.0	5.5	V
		V_{EE} - GND	2.0	5.0	10.0	V
V_I	input voltage		GND	-	V_{CC}	V
V_{SW}	switch voltage		V_{EE}	-	V_{CC}	V
T_{amb}	ambient temperature		-40	+25	+125	°C
Δt/ΔV	input transition rise and fall rate	V_{CC} = 4.5 V	-	1.67	139	ns/V

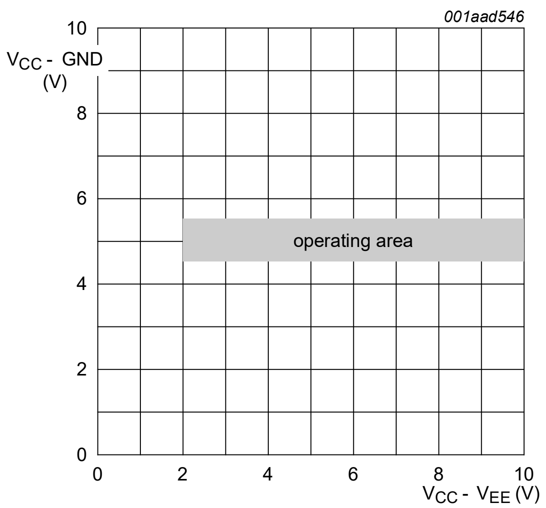


Fig. 5. Guaranteed operating area as a function of the supply voltages

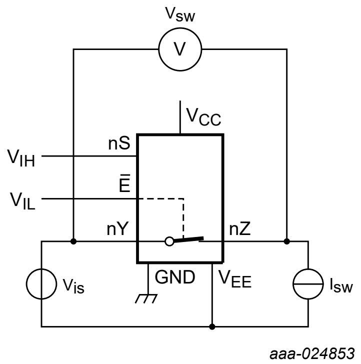
10. Static characteristics

Table 6. R_{ON} resistance per switch

$V_I = V_{IH}$ or V_{IL}; for test circuit see Fig. 6.
V_{is} is the input voltage at a nY or nZ terminal, whichever is assigned as an input.
V_{os} is the output voltage at a nY or nZ terminal, whichever is assigned as an output.
V_{CC} - GND = 4.5 V and 5.5 V; V_{CC} - V_{EE} = 2.0 V, 4.5 V, 6.0 V and 9.0 V.

Symbol	Parameter	Conditions	25 °C		-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Typ	Max	Min	Max	Min	Max	
$R_{ON(peak)}$	ON resistance (peak)	$V_{is} = V_{CC}$ to V_{EE} [1]							
		V_{CC} = 2.0 V; V_{EE} = 0 V; I_{SW} = 100 μA	-	-	-	-	-	-	Ω
		V_{CC} = 4.5 V; V_{EE} = 0 V; I_{SW} = 1000 μA	160	320	-	400	-	480	Ω
		V_{CC} = 6.0 V; V_{EE} = 0 V; I_{SW} = 1000 μA	120	240	-	300	-	360	Ω
		V_{CC} = 4.5 V; V_{EE} = -4.5 V; I_{SW} = 1000 μA	85	170	-	215	-	255	Ω
$R_{ON(rail)}$	ON resistance (rail)	$V_{is} = V_{EE}$ [1]							
		V_{CC} = 2.0 V; V_{EE} = 0 V; I_{SW} = 100 μA	160	-	-	-	-	-	Ω
		V_{CC} = 4.5 V; V_{EE} = 0 V; I_{SW} = 1000 μA	80	160	-	200	-	240	Ω
		V_{CC} = 6.0 V; V_{EE} = 0 V; I_{SW} = 1000 μA	70	140	-	175	-	210	Ω
		V_{CC} = 4.5 V; V_{EE} = -4.5 V; I_{SW} = 1000 μA	60	120	-	150	-	180	Ω
		$V_{is} = V_{CC}$ [1]							
		V_{CC} = 2.0 V; V_{EE} = 0 V; I_{SW} = 100 μA	170	-	-	-	-	-	Ω
		V_{CC} = 4.5 V; V_{EE} = 0 V; I_{SW} = 1000 μA	90	180	-	225	-	270	Ω
		V_{CC} = 6.0 V; V_{EE} = 0 V; I_{SW} = 1000 μA	80	160	-	200	-	240	Ω
		V_{CC} = 4.5 V; V_{EE} = -4.5 V; I_{SW} = 1000 μA	65	135	-	170	-	205	Ω
ΔR_{ON}	ON resistance mismatch between channels	$V_{is} = V_{CC}$ to V_{EE} [1]							
		V_{CC} = 2.0 V; V_{EE} = 0 V	-	-	-	-	-	-	Ω
		V_{CC} = 4.5 V; V_{EE} = 0 V	16	-	-	-	-	-	Ω
		V_{CC} = 6.0 V; V_{EE} = 0 V	9	-	-	-	-	-	Ω
		V_{CC} = 4.5 V; V_{EE} = -4.5 V	6	-	-	-	-	-	Ω

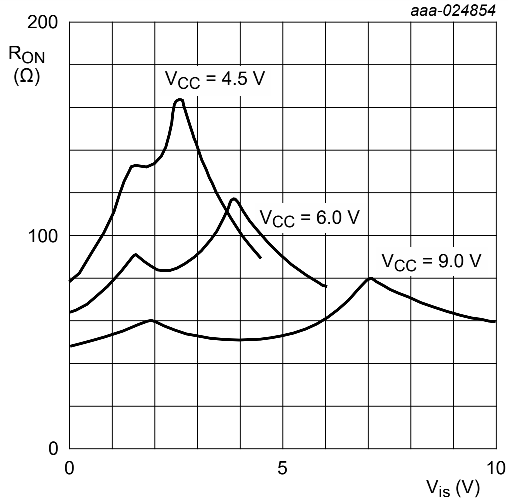
[1] When supply voltages (V_{CC} - V_{EE}) near 2.0 V the analog switch ON resistance becomes extremely non-linear. When using a supply of 2 V, it is recommended to use these devices only for transmitting digital signals.



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

$$R_{ON} = \frac{V_{SW}}{I_{SW}}$$

Fig. 6. Test circuit for measuring R_{ON}



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

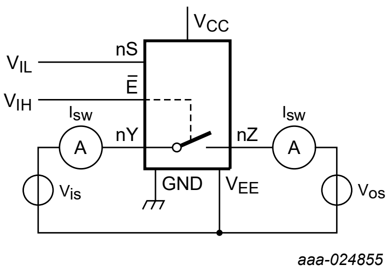
Fig. 7. Typical R_{ON} as a function of input voltage V_{is}

Table 7. Static characteristics 74HCT4316

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).
V_{is} is the input voltage at a nY or nZ terminal, whichever is assigned as an input.
V_{os} is the output voltage at a nY or nZ terminal, whichever is assigned as an output.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
T_{amb} = 25 °C						
V_{IH}	HIGH-level input voltage	V_{CC} = 4.5 V to 5.5 V	2.0	1.6	-	V
V_{IL}	LOW-level input voltage	V_{CC} = 4.5 V to 5.5 V	-	1.2	0.8	V
I_I	input leakage current	V_I = V_{CC} or GND; V_{CC} = 5.5 V; V_{EE} = 0 V	-	-	±0.1	μA
$I_{S(OFF)}$	OFF-state leakage current	V_{CC} = 10 V; V_{EE} = 0 V; V_I = V_{IH} or V_{IL}; $\lvert V_{SW} \rvert$ = V_{CC} - V_{EE}; see Fig. 8	-	-	±0.1	μA
$I_{S(ON)}$	ON-state leakage current	V_{CC} = 10 V; V_{EE} = 0 V; V_I = V_{IH} or V_{IL}; $\lvert V_{SW} \rvert$ = V_{CC} - V_{EE}; see Fig. 9	-	-	±0.1	μA
I_{CC}	supply current	V_I = V_{CC} or GND; V_{is} = V_{EE} or V_{CC}; V_{os} = V_{CC} or V_{EE}				
		V_{CC} = 5.5 V; V_{EE} = 0 V	-	-	8.0	μA
		V_{CC} = 5.0 V; V_{EE} = -5.0 V	-	-	16.0	μA
ΔI_{CC}	additional supply current	nS and $\overline{E}$; per input pin; V_I = V_{CC} - 2.1 V; other inputs at V_{CC} or GND; V_{CC} = 4.5 V to 5.5 V; V_{EE} = 0 V	-	50	180	μA
C_I	input capacitance		-	3.5	-	pF
C_{sw}	switch capacitance		-	5	-	pF

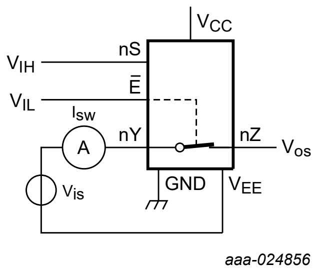
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
T_{amb} = -40 °C to +85 °C						
V_{IH}	HIGH-level input voltage	V_{CC} = 4.5 V to 5.5 V	2.0	-	-	V
V_{IL}	LOW-level input voltage	V_{CC} = 4.5 V to 5.5 V	-	-	0.8	V
I_I	input leakage current	$V_I = V_{CC}$ or GND; V_{CC} = 5.5 V; V_{EE} = 0 V	-	-	±1.0	µA
$I_{S(OFF)}$	OFF-state leakage current	V_{CC} = 10 V; V_{EE} = 0 V; $V_I = V_{IH}$ or V_{IL}; $\|V_{SW}\| = V_{CC} - V_{EE}$; see Fig. 8	-	-	±1.0	µA
$I_{S(ON)}$	ON-state leakage current	V_{CC} = 10 V; V_{EE} = 0 V; $V_I = V_{IH}$ or V_{IL}; $\|V_{SW}\| = V_{CC} - V_{EE}$; see Fig. 9	-	-	±1.0	µA
I_{CC}	supply current	$V_I = V_{CC}$ or GND; $V_{is} = V_{EE}$ or V_{CC}; $V_{os} = V_{CC}$ or V_{EE}				
		V_{CC} = 5.5 V; V_{EE} = 0 V	-	-	80	µA
		V_{CC} = 5.0 V; V_{EE} = -5.0 V	-	-	160	µA
ΔI_{CC}	additional supply current	nS and $\overline{E}$; per input pin; $V_I = V_{CC}$ - 2.1 V; other inputs at V_{CC} or GND; V_{CC} = 4.5 V to 5.5 V; V_{EE} = 0 V	-	-	225	µA
T_{amb} = -40 °C to +125 °C						
V_{IH}	HIGH-level input voltage	V_{CC} = 4.5 V to 5.5 V	2.0	-	-	V
V_{IL}	LOW-level input voltage	V_{CC} = 4.5 V to 5.5 V	-	-	0.8	V
I_I	input leakage current	$V_I = V_{CC}$ or GND; V_{CC} = 5.5 V; V_{EE} = 0 V	-	-	±1.0	µA
$I_{S(OFF)}$	OFF-state leakage current	V_{CC} = 10 V; V_{EE} = 0 V; $V_I = V_{IH}$ or V_{IL}; $\|V_{SW}\| = V_{CC} - V_{EE}$; see Fig. 8	-	-	±1.0	µA
$I_{S(ON)}$	ON-state leakage current	V_{CC} = 10 V; V_{EE} = 0 V; $V_I = V_{IH}$ or V_{IL}; $\|V_{SW}\| = V_{CC} - V_{EE}$; see Fig. 9	-	-	±1.0	µA
I_{CC}	supply current	$V_I = V_{CC}$ or GND; $V_{is} = V_{EE}$ or V_{CC}; $V_{os} = V_{CC}$ or V_{EE}				
		V_{CC} = 5.5 V; V_{EE} = 0 V	-	-	160	µA
		V_{CC} = 5.0 V; V_{EE} = -5.0 V	-	-	320	µA
ΔI_{CC}	additional supply current	nS and $\overline{E}$; per input pin; $V_I = V_{CC}$ - 2.1 V; other inputs at V_{CC} or GND; V_{CC} = 4.5 V to 5.5 V; V_{EE} = 0 V	-	-	245	µA



$V_{is} = V_{CC}$ and $V_{os} = V_{EE}$

$V_{is} = V_{EE}$ and $V_{os} = V_{CC}$

Fig. 8. Test circuit for measuring OFF-state leakage current



$V_{is} = V_{CC}$ and V_{os} = open

$V_{is} = V_{EE}$ and V_{os} = open

Fig. 9. Test circuit for measuring ON-state leakage current

11. Dynamic characteristics

Table 8. Dynamic characteristics

GND = 0 V; t_r = t_f = 6 ns; C_L = 50 pF unless specified otherwise; for test circuit see Fig. 12.
V_{is} is the input voltage at a nY or nZ terminal, whichever is assigned as an input.
V_{os} is the output voltage at a nY or nZ terminal, whichever is assigned as an output.

Symbol	Parameter	Conditions	25 °C		-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Typ	Max	Min	Max	Min	Max	
t_{pd}	propagation delay	nY to nZ or nZ to nY; R_L = ∞ Ω; see Fig. 10 [1]							
		V_{CC} = 4.5 V; V_{EE} = 0 V	6	12	-	15	-	18	ns
		V_{CC} = 4.5 V; V_{EE} = -4.5 V	4	8	-	10	-	12	ns
t_{PZH}	OFF-state to HIGH propagation delay	$\overline{E}$ to nY or nZ; see Fig. 11							
		V_{CC} = 4.5 V; V_{EE} = 0 V	22	44	-	55	-	66	ns
		V_{CC} = 5.0 V; V_{EE} = 0 V; C_L = 15 pF	19	-	-	-	-	-	ns
		V_{CC} = 4.5 V; V_{EE} = -4.5 V	21	42	-	53	-	63	ns
		nS to nY or nZ; see Fig. 11							
		V_{CC} = 4.5 V; V_{EE} = 0 V	20	40	-	53	-	60	ns
		V_{CC} = 5.0 V; V_{EE} = 0 V; C_L = 15 pF	17	-	-	-	-	-	ns
		V_{CC} = 4.5 V; V_{EE} = -4.5 V	17	34	-	43	-	51	ns
t_{PZL}	OFF-state to LOW propagation delay	$\overline{E}$ to nY or nZ; see Fig. 11							
		V_{CC} = 4.5 V; V_{EE} = 0 V	28	56	-	70	-	84	ns
		V_{CC} = 5.0 V; V_{EE} = 0 V; C_L = 15 pF	24	-	-	-	-	-	ns
		V_{CC} = 4.5 V; V_{EE} = -4.5 V	21	42	-	53	-	63	ns
		nS to nY or nZ; see Fig. 11							
		V_{CC} = 4.5 V; V_{EE} = 0 V	25	50	-	63	-	75	ns
		V_{CC} = 5.0 V; V_{EE} = 0 V; C_L = 15 pF	21	-	-	-	-	-	ns
		V_{CC} = 4.5 V; V_{EE} = -4.5 V	17	34	-	43	-	51	ns
t_{off}	turn-off time	$\overline{E}$ to nY or nZ; see Fig. 11 [2]							
		V_{CC} = 4.5 V; V_{EE} = 0 V	25	50	-	63	-	75	ns
		V_{CC} = 5.0 V; V_{EE} = 0 V; C_L = 15 pF	21	-	-	-	-	-	ns
		V_{CC} = 4.5 V; V_{EE} = -4.5 V	23	46	-	58	-	69	ns
		nS to nY or nZ; see Fig. 11 [2]							
		V_{CC} = 4.5 V; V_{EE} = 0 V	22	44	-	55	-	66	ns
		V_{CC} = 5.0 V; V_{EE} = 0 V; C_L = 15 pF	19	-	-	-	-	-	ns
		V_{CC} = 4.5 V; V_{EE} = -4.5 V	20	40	-	50	-	60	ns
C_{PD}	power dissipation capacitance	per switch; V_I = GND to (V_{CC} - 1.5 V) [3]	14	-	-	-	-	-	pF

[1] t_{pd} is the same as t_{PHL} and t_{PLH}.
[2] t_{off} is the same as t_{PHZ} and t_{PLZ}.
[3] C_{PD} is used to determine the dynamic power dissipation (P_D in μW). $P_D = C_{PD} \times V_{CC}{}^2 \times f_i + \sum((C_L + C_{sw}) \times V_{CC}{}^2 \times f_o)$ where:
f_i = input frequency in MHz; f_o = output frequency in MHz;
$\sum((C_L + C_{sw}) \times V_{CC}{}^2 \times f_o)$ = 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

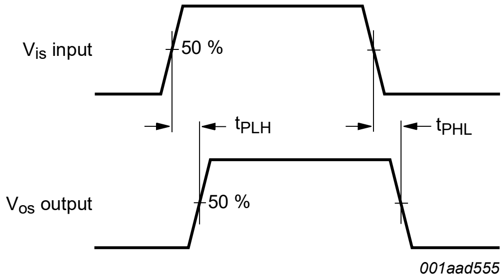
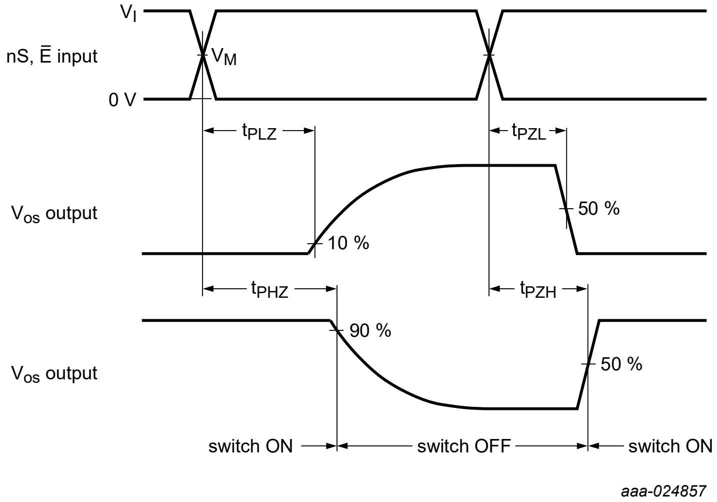


Fig. 10. Input (V_{is}) to output (V_{os}) propagation delays

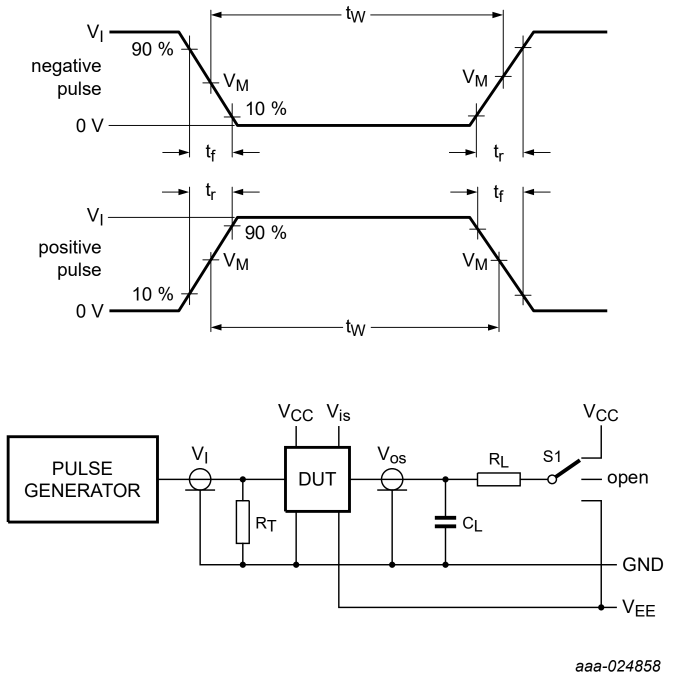


Measurement points are shown in Table 9.

Fig. 11. Turn-on and turn-off times

Table 9. Measurement points

Type	V_I	V_M
74HCT4316-Q100	3.0 V	1.3 V



Test data is given in Table 10.

Definitions test circuit:

R_T = Termination resistance should be equal to 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. 12. Test circuit for measuring switching times

Table 10. Test data

Test	Input					Output		S1 position
	$\overline{E}$	nS	Switch nY (nZ)	t_r, t_f		Switch nZ (nY)		
	V_I		V_{is}	at f_{max}	other [1]	C_L	R_L	
t_{PHL}, t_{PLH}	V_I = 3 V		GND to V_{CC}	< 2 ns	6 ns	50 pF	-	open
t_{PHZ}, t_{PZH}	V_I = 3 V		V_{CC}	< 2 ns	6 ns	50 pF, 15 pF	1 kΩ	V_{EE}
t_{PLZ}, t_{PZL}	V_I = 3 V		V_{EE}	< 2 ns	6 ns	50 pF, 15 pF	1 kΩ	V_{CC}

[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.

11.2. Additional dynamic characteristics

Table 11. Additional dynamic characteristics

Recommended conditions and typical values; GND = 0 V; T_{amb} = 25 °C; C_L = 50 pF.
V_{is} is the input voltage at a nY or nZ terminal, whichever is assigned as an input.
V_{os} is the output voltage at a nY or nZ terminal, whichever is assigned as an output.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
THD	total harmonic distortion	f_i = 1 kHz; R_L = 10 kΩ; see Fig. 13				
		V_{is} = 4.0 V (p-p); V_{CC} = 2.25 V; V_{EE} = -2.25 V	-	0.80	-	%
		V_{is} = 8.0 V (p-p); V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	0.40	-	%
		f_i = 10 kHz; R_L = 10 kΩ; see Fig. 13				
		V_{is} = 4.0 V (p-p); V_{CC} = 2.25 V; V_{EE} = -2.25 V	-	2.40	-	%
		V_{is} = 8.0 V (p-p); V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	1.20	-	%
$f_{(-3dB)}$	-3 dB frequency response	R_L = 50 Ω; C_L = 10 pF; see Fig. 14 [1]				
		V_{CC} = 2.25 V; V_{EE} = -2.25 V	-	150	-	MHz
		V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	160	-	MHz
α_{iso}	isolation (OFF-state)	R_L = 600 Ω; f_i = 1 MHz; see Fig. 15 [2]				
		V_{CC} = 2.25 V; V_{EE} = -2.25 V	-	-50	-	dB
		V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	-50	-	dB
V_{ct}	crosstalk voltage	between digital input and switch (peak to peak value); R_L = 600 Ω; f_i = 1 MHz; $\overline{E}$ or nS square wave between V_{CC} and GND; t_r = t_f = 6 ns; see Fig. 16				
		V_{CC} = 4.5 V; V_{EE} = 0 V	-	110	-	mV
		V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	220	-	mV
Xtalk	crosstalk	between switches; R_L = 600 Ω; f_i = 1 MHz; see Fig. 17 [2]				
		V_{CC} = 2.25 V; V_{EE} = -2.25 V	-	-60	-	dB
		V_{CC} = 4.5 V; V_{EE} = -4.5 V	-	-60	-	dB

[1] Adjust input voltage V_{is} to 0 dBm level at V_{os} for 1 MHz (0 dBm = 1 mW into 50 Ω).
[2] Adjust input voltage V_{is} to 0 dBm level (0 dBm = 1 mW into 600 Ω).

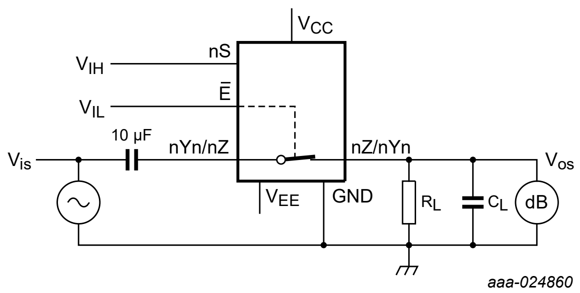
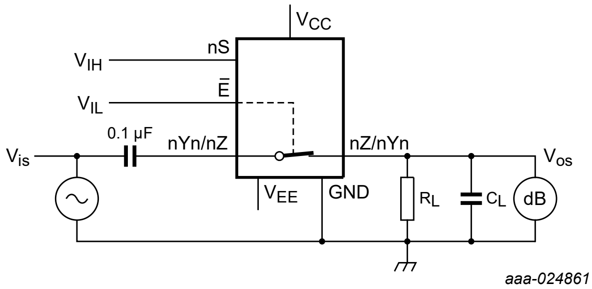
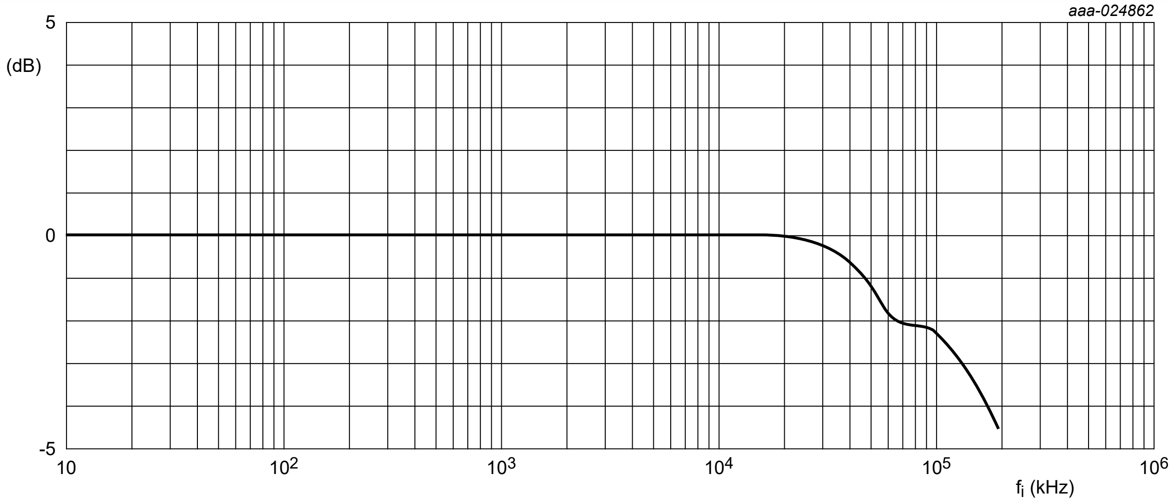


Fig. 13. Test circuit for measuring total harmonic distortion



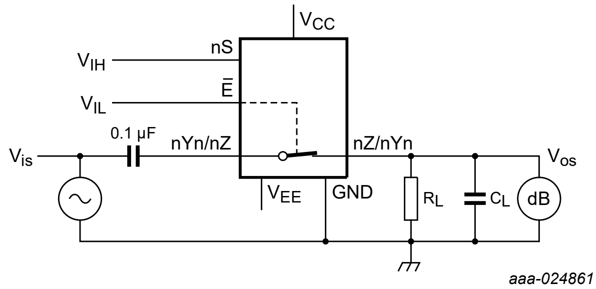
V_{CC} = 4.5 V; GND = 0 V; V_{EE} = -4.5 V; R_L = 50 Ω; R_S = 1 kΩ.

a. Test circuit



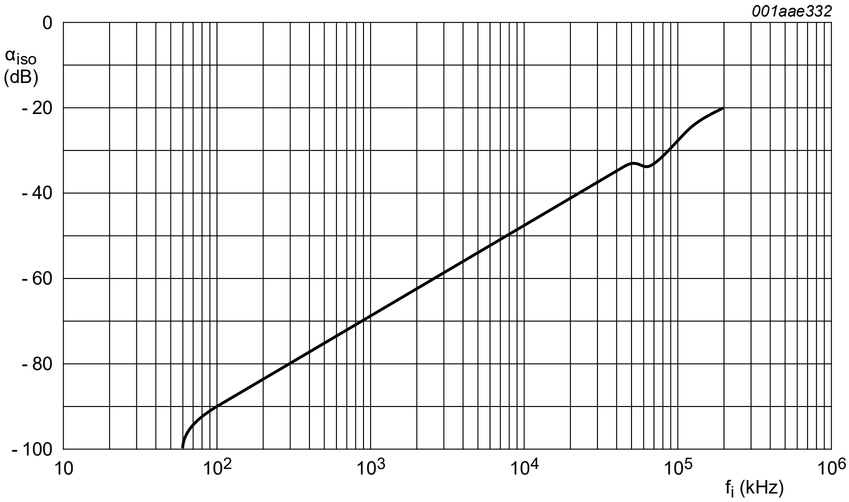
b. Typical -3 dB frequency response

Fig. 14. -3 dB frequency response



V_{CC} = 4.5 V; GND = 0 V; V_{EE} = -4.5 V; R_L = 600 Ω; R_S = 1 kΩ.

a. Test circuit



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

Fig. 15. Isolation (OFF-state) as a function of frequency

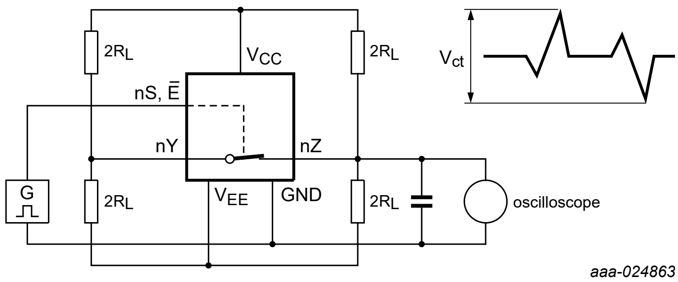


Fig. 16. Test circuit for measuring crosstalk voltage (between the digital input and the switch)

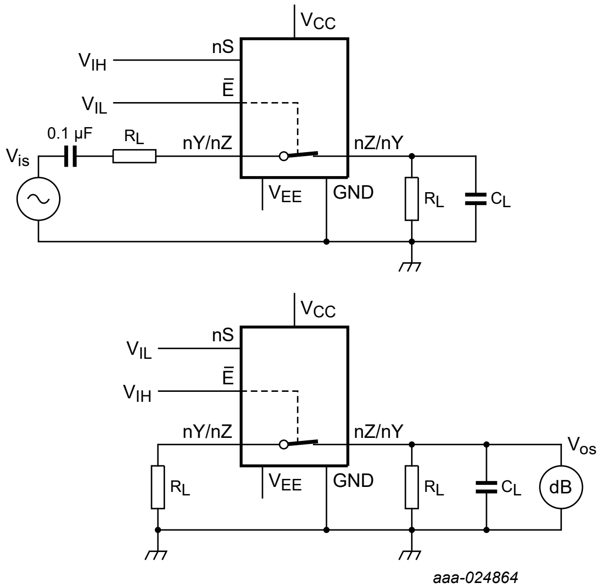
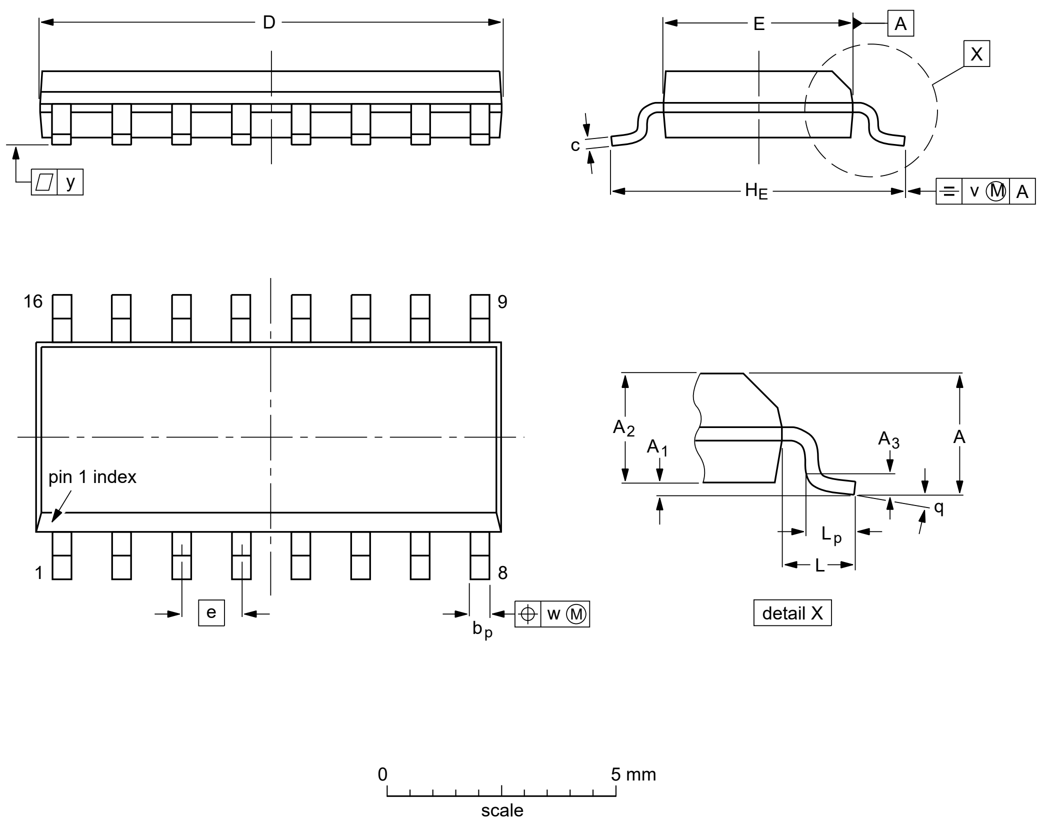


Fig. 17. Test circuit for measuring crosstalk (between the switches)

12. Package outline

SO16: plastic small outline package; 16 leads; body width 3.9 mm **SOT109-1**



Dimensions (inch dimensions are derived from the original mm dimensions)

Unit		A	A_1	A_2	A_3	b_p	c	D[(1)]	E[(1)]	e	H_E	L	L_p	v	w	y	θ
mm	max	1.75	0.25			0.51	0.25	10.0	4.0		6.2		1.27				8°
	nom				0.25					1.27		1.05		0.2	0.25	0.1	
	min		0.10	1.25		0.31	0.10	9.8	3.8		5.8		0.4				0°
inches	max	0.069	0.010			0.020	0.010	0.394	0.16		0.244		0.05				8°
	nom				0.01					0.05		0.041		0.008	0.01	0.004	
	min		0.004	0.049		0.012	0.004	0.386	0.15		0.228		0.016				0°

Note
1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.

sot109-1_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT109-1		MS-012				~~03-02-19~~ 23-10-27

Fig. 18. Package outline SOT109-1 (SO16)

13. Abbreviations

Table 12. Abbreviations

Acronym	Description
CDM	Charged Device Model
CMOS	Complementary Metal-Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
TTL	Transistor-Transistor Logic

14. Revision history

Table 13. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74HCT4316_Q100 v.2	20240326	Product data sheet	-	74HCT4316_Q100 v.1
Modifications:	• Fig. 18: Aligned SO package outline drawing to JEDEC MS-012. • Section 2: ESD specification updated according to the latest JEDEC standard.			
74HCT4316_Q100 v.1	20231018	Product data sheet	-	-

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.

Definitions

Draft — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. Nexperia does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

Short data sheet — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local Nexperia sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

Product specification — The information and data provided in a Product data sheet shall define the specification of the product as agreed between Nexperia and its customer, unless Nexperia and customer have explicitly agreed otherwise in writing. In no event however, shall an agreement be valid in which the Nexperia product is deemed to offer functions and qualities beyond those described in the Product data sheet.

Disclaimers

Limited warranty and liability — Information in this document is believed to be accurate and reliable. However, Nexperia does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. Nexperia takes no responsibility for the content in this document if provided by an information source outside of Nexperia.

In no event shall Nexperia be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Notwithstanding any damages that customer might incur for any reason whatsoever, Nexperia's aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the Terms and conditions of commercial sale of Nexperia.

Right to make changes — Nexperia reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

Suitability for use in automotive applications — This Nexperia product has been qualified for use in automotive applications. Unless otherwise agreed in writing, the product is not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of an Nexperia product can reasonably be expected to result in personal injury, death or severe property or environmental damage. Nexperia and its suppliers accept no liability for inclusion and/or use of Nexperia products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Quick reference data — The Quick reference data is an extract of the product data given in the Limiting values and Characteristics sections of this document, and as such is not complete, exhaustive or legally binding.

Applications — Applications that are described herein for any of these products are for illustrative purposes only. Nexperia makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Customers are responsible for the design and operation of their applications and products using Nexperia products, and Nexperia accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the Nexperia product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

Nexperia does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using Nexperia products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). Nexperia does not accept any liability in this respect.

Limiting values — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) will cause permanent damage to the device. Limiting values are stress ratings only and (proper) operation of the device at these or any other conditions above those given in the Recommended operating conditions section (if present) or the Characteristics sections of this document is not warranted. Constant or repeated exposure to limiting values will permanently and irreversibly affect the quality and reliability of the device.

Terms and conditions of commercial sale — Nexperia products are sold subject to the general terms and conditions of commercial sale, as published at http://www.nexperia.com/profile/terms, unless otherwise agreed in a valid written individual agreement. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. Nexperia hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of Nexperia products by customer.

No offer to sell or license — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

Export control — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.

Translations — A non-English (translated) version of a document is for reference only. The English version shall prevail in case of any discrepancy between the translated and English versions.

Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

Contents