

High Speed Quad Channel Digital Isolator

GENERAL DESCRIPTION

The SiLM574x-AQ devices are high performance, quad channel digital isolator with 5.0 kV_{RMS} (SOP16W) isolation rating per UL1577. The SiLM574x-AQ devices provide high electromagnetic immunity and low emissions at low power consumption.

The SiLM5740-AQ device has all channels in the same direction, the SiLM5741-AQ device has three channels in forward direction and one channel in reverse direction, and the SiLM5742-AQ device has two channels in forward direction and two channels in reverse direction. In the event of input power or signal loss, the default output is high for devices without suffix F and low for devices with suffix F.

APPLICATION

- Isolated line receiver
- Microprocessor system interface
- Digital isolation for A/D, D/A conversion
- PLC, ATE input/output isolation
- Power transistor isolation in motor drives
- Isolation of high-speed logic systems

FEATURES

- AEC-Q100 qualified for automotive application
 - Temperature grade 1: -40°C to +125°C, T_A
- Data rate 100Mbps
- Propagation delay 12ns (Typ)
- CMTI 100kV/us (Min)
- Low power consumption: 1.5mA/Channel (Typ) at 1Mbps
- Wide supply voltage: 2.25V to 5.5V
- 2.25V to 5.5V level translation
- Default output High (SiLM574x-AQ) and Low (SiLM574xF-AQ) Options
- Robust electromagnetic compatibility (EMC)
 - System Level ESD, EFT, and surge immunity
 - ±8 kV IEC 61000-4-2 contact discharge protection across isolation barrier
 - Low emissions
- Operation temperature: -40°C to +125°C
- Safety certifications:
 - 5.0kV_{RMS} isolation for 1 minute per UL 1577
 - CQC certification per GB4943.1-2022
 - TUV certification per IEC 61010-1: 2010+A1 and IEC 62368-1: 2018
 - DIN VDE 0884-17: 2021-10 (Pending)

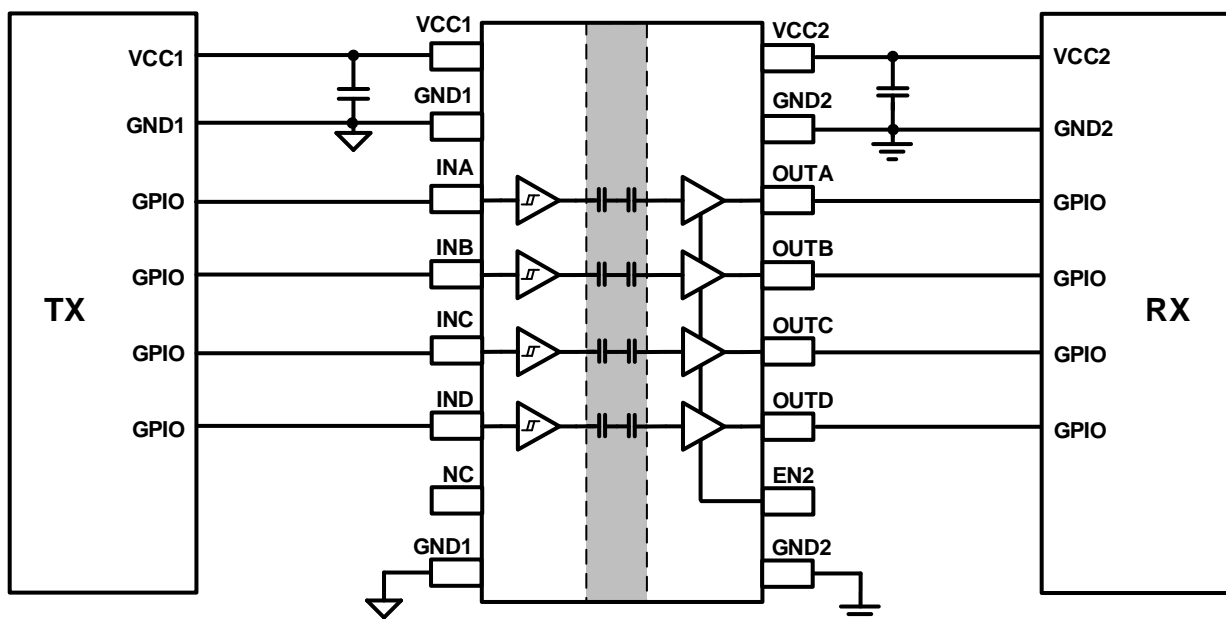


Figure 1. SiLM5740-AQ Typical Application Circuit

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PIN CONFIGURATION

Package	Pin Configuration (Top View)	
	SOP16W	
SiLM5740-AQ	<p> VCC1 1 16 VCC2 GND1 2 15 GND2 INA 3 14 OUTA INB 4 13 OUTB INC 5 12 OUTC IND 6 11 OUTD NC 7 10 EN2 GND1 8 9 GND2 </p>	
SiLM5741-AQ	<p> VCC1 1 16 VCC2 GND1 2 15 GND2 INA 3 14 OUTA INB 4 13 OUTB INC 5 12 OUTC OUTD 6 11 IND EN1 7 10 EN2 GND1 8 9 GND2 </p>	
SiLM5742-AQ	<p> VCC1 1 16 VCC2 GND1 2 15 GND2 INA 3 14 OUTA INB 4 13 OUTB OUTC 5 12 INC OUTD 6 11 IND EN1 7 10 EN2 GND1 8 9 GND2 </p>	

PIN DESCRIPTION

Table 1. SiLM5740-AQ SOP16W Pin Description

No.	Pin Name	Description
1	VCC1	Input power supply
2	GND1	Input power ground
3	INA	Channel A input
4	INB	Channel B input
5	INC	Channel C input
6	IND	Channel D input
7	NC	No connection
8	GND1	Input power ground
9	GND2	Output power ground
10	EN2	Output enable 2
11	OUTD	Channel D output
12	OUTC	Channel C output
13	OUTB	Channel B output
14	OUTA	Channel A output
15	GND2	Output power ground
16	VCC2	Output power supply

Table 2. SiLM5741-AQ SOP16W Pin Description

No.	Pin Name	Description
1	VCC1	Input power supply
2	GND1	Input power ground
3	INA	Channel A input
4	INB	Channel B input
5	INC	Channel C input
6	OUTD	Channel D output
7	EN1	Output enable 1
8	GND1	Input power ground
9	GND2	Output power ground
10	EN2	Output enable 2
11	IND	Channel D input
12	OUTC	Channel C output

No.	Pin Name	Description
13	OUTB	Channel B output
14	OUTA	Channel A output
15	GND2	Output power ground
16	VCC2	Output power supply

Table 3. SiLM5742-AQ SOP16W Pin Description

No.	Pin Name	Description
1	VCC1	Input power supply
2	GND1	Input power ground
3	INA	Channel A input
4	INB	Channel B input
5	OUTC	Channel C output
6	OUTD	Channel D output
7	EN1	Output enable 1
8	GND1	Input power ground
9	GND2	Output power ground
10	EN2	Output enable 2
11	IND	Channel D input
12	INC	Channel C input
13	OUTB	Channel B output
14	OUTA	Channel A output
15	GND2	Output power ground
16	VCC2	Output power supply

FUNCTIONAL BLOCK DIAGRAM

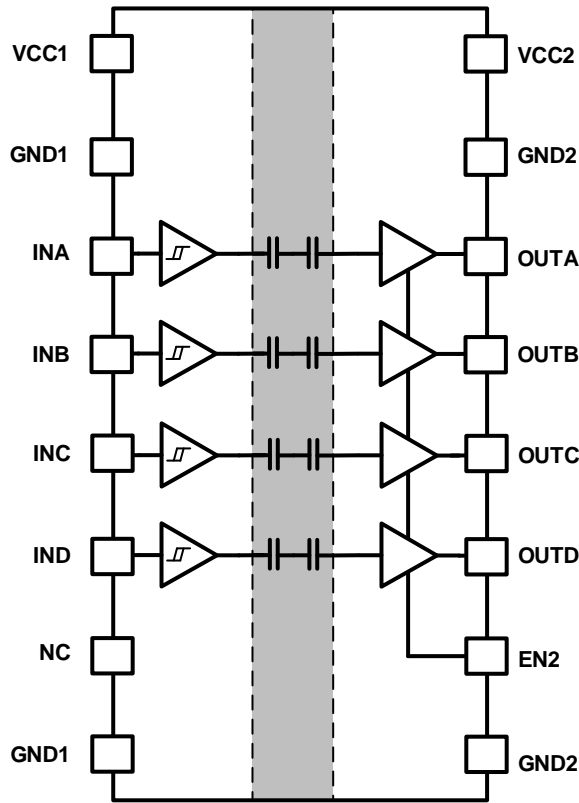


Figure 2. SiLM5740-AQ Functional Block

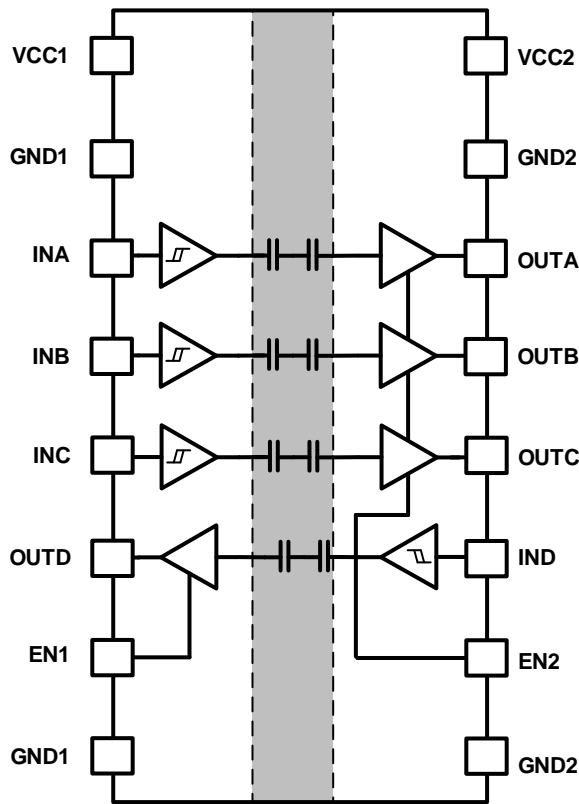


Figure 3. SiLM5741-AQ Functional Block

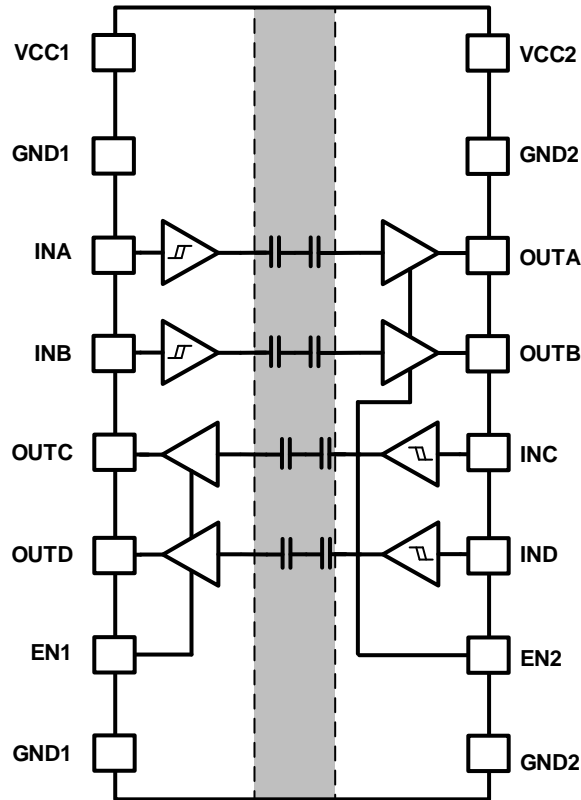


Figure 4. SiLM5742-AQ Functional Block

ORDERING INFORMATION

Order Part No.	Package	QTY
SiLM5740CG-AQ	SOP16W, Pb-Free	1500/Reel
SiLM5740FCG-AQ	SOP16W, Pb-Free	1500/Reel
SiLM5741CG-AQ	SOP16W, Pb-Free	1500/Reel
SiLM5741FCG-AQ	SOP16W, Pb-Free	1500/Reel
SiLM5742CG-AQ	SOP16W, Pb-Free	1500/Reel
SiLM5742FCG-AQ	SOP16W, Pb-Free	1500/Reel

ABSOLUTE MAXIMUM RATINGS

Symbol	Definition	Min.	Max.	Units
V _{CC1} , V _{CC2}	Supply voltage, V _{CC1} and V _{CC2}	-0.3	6	V
V _I	Voltage at Inx, referenced to input side ground	-0.3	V _{CC} +0.3	V
V _{OUT}	Voltage at OUTx, reference to output side ground	-0.3	V _{CC} +0.3	V
I _O	Output Current	-15	15	mA
T _J	Junction temperature	-55	150	°C
T _S	Storage temperature	-65	150	°C

Note:

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 condition beyond those indicated in the Recommended Operation Conditions is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. All voltage parameters are referenced to local ground terminal, GND1 or GND2.

RECOMMENDED OPERATION CONDITIONS

Symbol	Definition	Min.	Max.	Units
V _{CC1} , V _{CC2}	Supply voltage	2.25	5.5	V
I _{OH}	High level output current @ V _{CCO} ⁽¹⁾ =5V	-4		mA
	High level output current @ V _{CCO} =3.3V	-2		mA
	High level output current @ V _{CCO} =2.5V	-1		mA
I _{OL}	Low level output current @ V _{CCO} =5V		4	mA
	Low level output current @ V _{CCO} =3.3V		2	mA
	Low level output current @ V _{CCO} =2.5V		1	mA
V _{IH}	High Level Input Voltage	0.7 × V _{CCI}	V _{CCI} ⁽¹⁾	V
V _{IL}	Low Level Input Voltage	0	0.3 × V _{CCI}	V
DR	Data Rate	0	100	Mbps
T _A	Ambient temperature	-40	125	°C

(1) V_{CCI} =Input side V_{CC}, V_{CCO}=Output side V_{CC}

ESD RATINGS

Symbol	Definition	Value	Units
V _{ESD}	HBM	±8000	V
	CDM	±2000	V

THERMAL INFORMATION

Symbol	Definition	Value	Unit
R _{θJA}	Junction to ambient thermal resistance	83.5	°C/W
R _{θJC}	Junction to case (top) thermal resistance	40	°C/W

PACKAGE SPECIFICATIONS

Symbol	Definition	Min.	Typ.	Max.	Units
R _{IO}	Resistance (Input Side to Output Side)		10 ¹²		Ω
C _{IO}	Capacitance (Input Side to Output Side)		0.95		pF

INSULATION SPECIFICATIONS

Symbol	Definition	Test Condition	Value	Units
CLR	External clearance	Shortest terminal to terminal distance through air	>8.0	mm
CPG	External creepage	Shortest terminal to terminal distance across the package surface	>8.0	mm
DTI	Distance through the insulation	Minimum internal gap	>16	um
CTI	Comparative tracking index	DIN EN 60112 (VDE 0303-11), IEC 60112	>600	V
	Material Group		I	
	Overtoltage category	Rated mains voltage ≤150V _{RMS}	I-IV	
		Rated mains voltage ≤300 V _{RMS}	I-IV	
		Rated mains voltage ≤600 V _{RMS}	I-III	
		Rated mains voltage ≤1000 V _{RMS}	I-II	
DIN V VDE 0884-11 ⁽¹⁾				
V _{IORM}	Maximum repetitive peak isolation voltage		1414	V _{PK}
V _{IOWM}	Maximum isolation working voltage		1000	V _{RMS}
V _{IOTM}	Maximum transient isolation voltage	60s	7000	V _{PK}
V _{IOSM}	Maximum surge isolation voltage	Test method per IEC62368, 1.2/50us waveform, V _{TEST} =1.6 x V _{IOSM}	6250	V _{PK}
q _{pd}	Apparent charge		≤5	pC
	Climatic Category		40/125/21	
	Pollution Degree		2	
UL1577				
V _{ISO}	Withstand Isolation Voltage	V _{TEST} =V _{ISO} , t=60s (qualification), V _{TEST} =1.2 x V _{ISO} , t=1s (100% production)	5000	V _{RMS}

Note1: Certification pending

SAFETY RELATED CERTIFICATIONS

VDE	UL	CQC	TUV
DIN VDE 0884-17: 2021-10	UL 1577 component recognition program	Certified according to GB4943.1-2022	Certified according to IEC 61010-1: 2010+A1 and IEC 62368-1: 2018
Reinforced Insulation	Single protection, 5000 V_{RMS}	Reinforced insulation, Altitude \leq 5000m, Tropical climate	5000Vrms reinforced insulation, 800Vrms maximum working voltage
Pending	File number: E521801	File number: CQC23001379622	Ref.Certif.No: DE 2-039417 Ref.Certif.No: JPTUV-148965

SAFETY LIMITING VALUES

Symbol	Parameter	Condition	Value	Unit
I_s	Safety input, output, or supply current	$R_{\theta JA}=83.5^{\circ}\text{C/W}$, $V_{CC1}=V_{CC2}=5\text{V}$, $T_J=150^{\circ}\text{C}$, $T_A=25^{\circ}\text{C}$	299	mA
P_s	Safety input, output, or total power	$R_{\theta JA}=83.5^{\circ}\text{C/W}$, $V_{CC1}=V_{CC2}=5\text{V}$, $T_J=150^{\circ}\text{C}$, $T_A=25^{\circ}\text{C}$	1496	mW
T_s	Maximum safety temperature		150	$^{\circ}\text{C}$

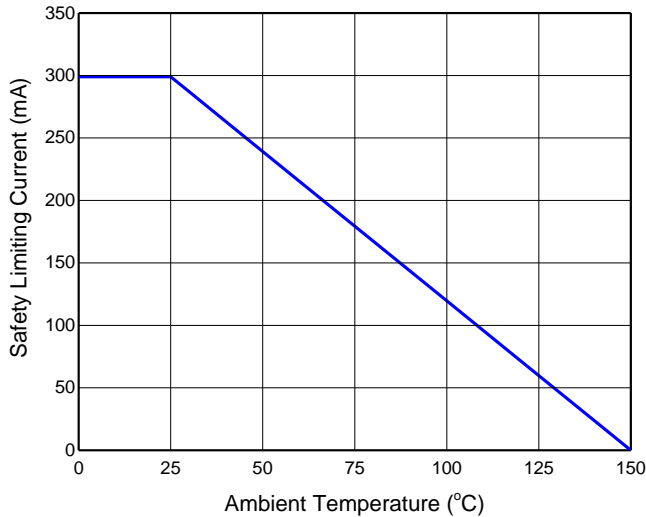


Figure 5. Thermal Derating Curve for Limiting Current per VDE

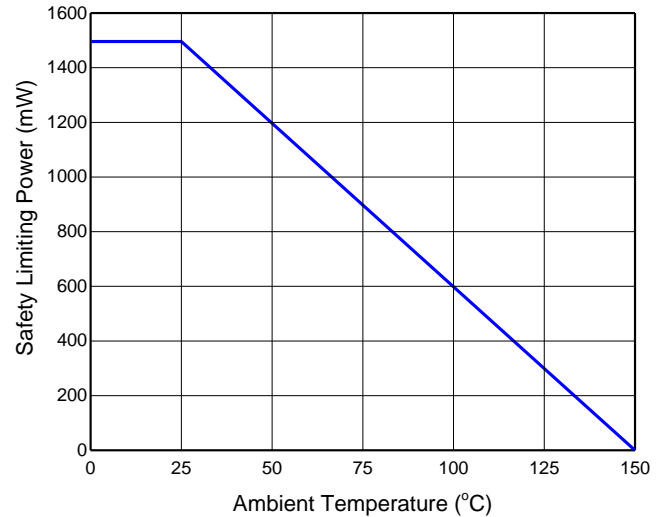


Figure 6. Thermal Derating Curve for Limiting Power per VDE

ELECTRICAL CHARACTERISTICS (DC) WITH 5V SUPPLY
 $V_{CC1} = V_{CC2} = 5V \pm 10\%$ (over recommended operating conditions unless otherwise specified.)

Symbol	Parameter	Condition	Min	Typ.	Max.	Unit
Power Supply UVLO						
UVLO _R	Under Voltage Lockout	V_{CCx} rising		2.05	2.25	V
UVLO _F	Under Voltage Lockout	V_{CCx} falling	1.7	1.9		V
UVLO _{HYS}	Under Voltage Lockout Hysteresis			0.15		V
Power Supply Current (SiLM5740-AQ)						
I _{CC1_Q1}	Current on VCC1 with DC Signal	$V_I = V_{CC1}$ (SiLM5740-AQ), $V_I = 0$ V (SiLM5740F-AQ), EN2 = 0 V		0.5	0.8	mA
I _{CC1_Q2}		$V_I = 0$ V (SiLM5740-AQ), $V_I = V_{CC1}$ (SiLM5740F-AQ), EN2 = 0V		5.0	7.0	mA
I _{CC1_Q3}		$V_I = V_{CC1}$ (SiLM5740-AQ), $V_I = 0$ V (SiLM5740F-AQ), EN2 = V_{CC2}		0.5	0.8	mA
I _{CC1_Q4}		$V_I = 0$ V (SiLM5740-AQ), $V_I = V_{CC1}$ (SiLM5740F-AQ), EN2 = V_{CC2}		5.0	7.0	mA
I _{CC2_Q1}	Current on VCC2 with DC Signal	$V_I = V_{CC1}$ (SiLM5740-AQ), $V_I = 0$ V (SiLM5740F-AQ), EN2 = 0 V		0.6	0.8	mA
I _{CC2_Q2}		$V_I = 0$ V (SiLM5740-AQ), $V_I = V_{CC1}$ (SiLM5740F), EN2 = 0 V		0.6	0.8	mA
I _{CC2_Q3}		$V_I = V_{CC1}$ (SiLM5740-AQ), $V_I = 0$ V (SiLM5740F-AQ), EN2 = V_{CC2}		2.5	3.8	mA
I _{CC2_Q4}		$V_I = 0$ V (SiLM5740-AQ), $V_I = V_{CC1}$ (SiLM5740F-AQ), EN2 = V_{CC2}		2.6	3.9	mA
I _{CC1_OP_1M}	Current on VCC1 with AC Signal. All channel switching with square wave clock input	1 Mbps, $C_L = 15$ pF		2.6	3.7	mA
I _{CC1_OP_10M}		10 Mbps, $C_L = 15$ pF		2.6	3.6	mA
I _{CC1_OP_100M}		100 Mbps, $C_L = 15$ pF		2.8	4.3	mA
I _{CC2_OP_1M}	Current on VCC2 with AC Signal. All channel switching with square wave clock input	1 Mbps, $C_L = 15$ pF		3.1	4.9	mA
I _{CC2_OP_10M}		10 Mbps, $C_L = 15$ pF		7.2	10	mA

Symbol	Parameter	Condition	Min	Typ.	Max.	Unit
I _{CC2_OP_100M}		100 Mbps, C _L = 15pF		28.6	38	mA
Power Supply Current (SiLM5741-AQ)						
I _{CC1_Q1}	Current on VCC1 with DC Signal	V _I = V _{CC1} (SiLM5741-AQ), V _I = 0 V (SiLM5741F-AQ), EN1 = EN2 = 0 V		0.5	0.8	mA
I _{CC1_Q2}		V _I = 0 V (SiLM5741-AQ), V _I = V _{CC1} (SiLM5741F-AQ), EN1 = EN2 = 0V		3.8	5.2	mA
I _{CC1_Q3}		V _I = V _{CC1} (SiLM5741-AQ), V _I = 0 V (SiLM5741F-AQ), EN1 = V _{CC1} , EN2 = V _{CC2}		1.0	1.5	mA
I _{CC1_Q4}		V _I = 0 V (SiLM5741-AQ), V _I = V _{CC1} (SiLM5741F-AQ), EN1 = V _{CC1} , EN2 = V _{CC2}		4.3	5.9	mA
I _{CC2_Q1}	Current on VCC2 with DC Signal	V _I = V _{CC1} (SiLM5741-AQ), V _I = 0 V (SiLM5741F), EN1 = EN2 = 0 V		0.6	0.8	mA
I _{CC2_Q2}		V _I = 0 V (SiLM5741-AQ), V _I = V _{CC1} (SiLM5741F), EN1 = EN2 = 0 V		1.7	2.4	mA
I _{CC2_Q3}		V _I = V _{CC1} (SiLM5741-AQ), V _I = 0 V (SiLM5741F), EN1 = V _{CC1} , EN2 = V _{CC2}		2.0	3.0	mA
I _{CC2_Q4}		V _I = 0 V (SiLM5741-AQ), V _I = V _{CC1} (SiLM5741F), EN1 = V _{CC1} , EN2 = V _{CC2}		3.2	4.6	mA
I _{CC1_OP_1M}	Current on VCC1 with AC Signal. All channel switching with square wave clock input	1 Mbps, C _L = 15pF		2.7	3.9	mA
I _{CC1_OP_10M}		10 Mbps, C _L = 15pF		3.7	5.2	mA
I _{CC1_OP_100M}		100 Mbps, C _L = 15pF		8.9	12	mA
I _{CC2_OP_1M}	Current on VCC2 with AC Signal. All channel switching with square wave clock input	1 Mbps, C _L = 15pF		3.0	4.4	mA
I _{CC2_OP_10M}		10 Mbps, C _L = 15pF		6.0	8.2	mA
I _{CC2_OP_100M}		100 Mbps, C _L = 15pF		22.2	30	mA
Power Supply Current (SiLM5742-AQ)						
I _{CC1_Q1}	Current on VCC1 with DC Signal	V _I = V _{CC1} (SiLM5742-AQ), V _I = 0 V (SiLM5742F-AQ), EN1 = EN2 = 0 V		0.6	0.8	mA
I _{CC1_Q2}		V _I = 0 V (SiLM5742-AQ), V _I = V _{CC1} (SiLM5742F-AQ),		2.7	3.7	mA

Symbol	Parameter	Condition	Min	Typ.	Max.	Unit
		EN1 = EN2 = 0V				
I _{CC1_Q3}		V _I = V _{CC1} (SiLM5742-AQ), V _I = 0 V (SiLM5742F-AQ), EN1 = V _{CC1} , EN2 = V _{CC2}		1.5	2.2	mA
I _{CC1_Q4}		V _I = 0 V (SiLM5742-AQ), V _I = V _{CC1} (SiLM5742F-AQ), EN1 = V _{CC1} , EN2 = V _{CC2}		3.7	5.1	mA
I _{CC2_Q1}	Current on VCC2 with DC Signal	V _I = V _{CC1} (SiLM5742-AQ), V _I = 0 V (SiLM5742F-AQ), EN1 = EN2 = 0 V		0.6	0.8	mA
I _{CC2_Q2}		V _I = 0 V (SiLM5742-AQ), V _I = V _{CC1} (SiLM5742F-AQ), EN1 = EN2 = 0 V		2.7	3.7	mA
I _{CC2_Q3}		V _I = V _{CC1} (SiLM5742-AQ), V _I = 0 V (SiLM5742F-AQ), EN1 = V _{CC1} , EN2 = V _{CC2}		1.5	2.2	mA
I _{CC2_Q4}		V _I = 0 V (SiLM5742-AQ), V _I = V _{CC1} (SiLM5742F-AQ), EN1 = V _{CC1} , EN2 = V _{CC2}		3.8	5.2	mA
I _{CC1_OP_1M}	Current on VCC1 with AC Signal. All channel switching with square wave clock input	1 Mbps, C _L = 15pF		2.8	4.2	mA
I _{CC1_OP_10M}		10 Mbps, C _L = 15pF		4.7	6.5	mA
I _{CC1_OP_100M}		100 Mbps, C _L = 15pF		15	21	mA
I _{CC2_OP_1M}	Current on VCC2 with AC Signal. All channel switching with square wave clock input	1 Mbps, C _L = 15pF		2.8	4.2	mA
I _{CC2_OP_10M}		10 Mbps, C _L = 15pF		4.7	6.5	mA
I _{CC2_OP_100M}		100 Mbps, C _L = 15pF		15	21	mA
Input Logic Interface						
V _{IH}	Rising input threshold voltage			0.6× V _{CC1}	0.7× V _{CC1}	V
V _{IL}	Falling input threshold voltage		0.3× V _{CC1}	0.4× V _{CC1}		V
V _{IHYS}	Input threshold voltage hysteresis			0.2× V _{CC1}		V
I _{IH}	High level input current	IN _x = V _{CC1}			15	uA
I _{IL}	Low level input current	IN _x = 0V	-15			uA
Output Logic Interface						

Symbol	Parameter	Condition	Min	Typ.	Max.	Unit
V _{OH}	High level output voltage	I _{OH} = -4mA	V _{CCO} -0.4	4.8		V
V _{OL}	Low level output voltage	I _{OL} = 4mA		0.12	0.3	V
CMTI						
CMTI _H	Output High Level Common Mode Transient Immunity	V _I = V _{CC1} , V _{CM} =1200V, C _L =15pF	100	150		kV/us
CMTI _L	Output Low Level Common Mode Transient Immunity	V _I = 0V, V _{CM} =1200V, C _L =15pF	100	150		kV/us

SWITCHING CHARACTERISTICS (AC) WITH 5V SUPPLY

V_{CC1} = V_{CC2}=5V±10% (over recommended operating conditions unless otherwise specified.)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
t _{PLH}	Propagation delay, Low to High	C _L =15pF		12	20	ns
t _{PHL}	Propagation delay, High to Low	C _L =15pF		12	20	ns
t _r	Turn on rise time	C _L =15pF		2		ns
t _f	Turn off fall time	C _L =15pF		2		ns
t _{PWD}	Pulse Width Distortion	C _L =15pF			10	ns
t _{SKO}	Channel to Channel Output Skew Time	C _L =15pF, same direction in single device			8	ns
t _{SKP}	Part to Part Skew Time	C _L =15pF, same direction			8	ns
t _{PHZ}	Disable propagation delay, high to high impedance output			8		ns
t _{PLZ}	Disable propagation delay, low to high impedance output			8		ns
t _{PZH}	Enable propagation delay, high impedance to high output for SiLM574x			4		ns
	Enable propagation delay, high impedance to high output for SiLM574xF			1		us
t _{PZL}	Enable propagation delay, high impedance to low output for SiLM574x			1		us
	Enable propagation delay, high impedance to low output for SiLM574xF			7		ns

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
t_{DO}	Default output delay time from input power loss	Measured from the time V_{CC1} goes below 1.7V		0.05		us

ELECTRICAL CHARACTERISTICS (DC) WITH 3.3V SUPPLY
 $V_{CC1} = V_{CC2} = 3.3V \pm 10\%$ (over recommended operating conditions unless otherwise specified.)

Symbol	Parameter	Condition	Min	Typ.	Max.	Unit
Power Supply UVLO						
UVLO _R	Under Voltage Lockout	V_{CCx} rising		2.05	2.25	V
UVLO _F	Under Voltage Lockout	V_{CCx} falling	1.7	1.9		V
UVLO _{HYS}	Under Voltage Lockout	Hysteresis		0.15		V
Power Supply Current (SiLM5740-AQ)						
I _{CC1_Q1}	Current on VCC1 with DC Signal	$V_I = V_{CC1}$ (SiLM5740-AQ), $V_I = 0$ V (SiLM5740F-AQ), EN2 = 0 V		0.5	0.8	mA
I _{CC1_Q2}		$V_I = 0$ V (SiLM5740-AQ), $V_I = V_{CC1}$ (SiLM5740F-AQ), EN2 = 0V		4.9	6.8	mA
I _{CC1_Q3}		$V_I = V_{CC1}$ (SiLM5740-AQ), $V_I = 0$ V (SiLM5740F-AQ), EN2 = V_{CC2}		0.5	0.8	mA
I _{CC1_Q4}		$V_I = 0$ V (SiLM5740-AQ), $V_I = V_{CC1}$ (SiLM5740F-AQ), EN2 = V_{CC2}		4.9	6.9	mA
I _{CC2_Q1}	Current on VCC2 with DC Signal	$V_I = V_{CC1}$ (SiLM5740-AQ), $V_I = 0$ V (SiLM5740F-AQ), EN2 = 0 V		0.6	0.8	mA
I _{CC2_Q2}		$V_I = 0$ V (SiLM5740-AQ), $V_I = V_{CC1}$ (SiLM5740F-AQ), EN2 = 0 V		0.6	0.8	mA
I _{CC2_Q3}		$V_I = V_{CC1}$ (SiLM5740-AQ), $V_I = 0$ V (SiLM5740F-AQ), EN2 = V_{CC2}		2.5	3.7	mA
I _{CC2_Q4}		$V_I = 0$ V (SiLM5740-AQ), $V_I = V_{CC1}$ (SiLM5740F-AQ), EN2 = V_{CC2}		2.7	3.9	mA
I _{CC1_OP_1M}	Current on VCC1 with AC Signal. All channel switching with square wave clock input	1 Mbps, $C_L = 15$ pF		2.6	3.7	mA
I _{CC1_OP_10M}		10 Mbps, $C_L = 15$ pF		2.5	3.6	mA
I _{CC1_OP_100M}		100 Mbps, $C_L = 15$ pF		2.7	4.6	mA
I _{CC2_OP_1M}	Current on VCC2 with AC Signal. All channel switching with square wave clock input	1 Mbps, $C_L = 15$ pF		2.8	4.6	mA
I _{CC2_OP_10M}		10 Mbps, $C_L = 15$ pF		4.6	6	mA

Symbol	Parameter	Condition	Min	Typ.	Max.	Unit
I _{CC2_OP_100M}		100 Mbps, C _L = 15pF		18.3	24	mA
Power Supply Current (SiLM5741-AQ)						
I _{CC1_Q1}	Current on VCC1 with DC Signal	V _I = V _{CC1} (SiLM5741-AQ), V _I = 0 V (SiLM5741F-AQ), EN1 = EN2 = 0 V		0.5	0.8	mA
I _{CC1_Q2}		V _I = 0 V (SiLM5741-AQ), V _I = V _{CC1} (SiLM5741F-AQ), EN1 = EN2 = 0V		3.7	5.1	mA
I _{CC1_Q3}		V _I = V _{CC1} (SiLM5741-AQ), V _I = 0 V (SiLM5741F-AQ), EN1 = V _{CC1} , EN2 = V _{CC2}		1.0	1.5	mA
I _{CC1_Q4}		V _I = 0 V (SiLM5741-AQ), V _I = V _{CC1} (SiLM5741F-AQ), EN1 = V _{CC1} , EN2 = V _{CC2}		4.2	5.8	mA
I _{CC2_Q1}	Current on VCC2 with DC Signal	V _I = V _{CC1} (SiLM5741-AQ), V _I = 0 V (SiLM5741F-AQ), EN1 = EN2 = 0 V		0.5	0.8	mA
I _{CC2_Q2}		V _I = 0 V (SiLM5741-AQ), V _I = V _{CC1} (SiLM5741F-AQ), EN1 = EN2 = 0 V		1.7	2.3	mA
I _{CC2_Q3}		V _I = V _{CC1} (SiLM5741-AQ), V _I = 0 V (SiLM5741F-AQ), EN1 = V _{CC1} , EN2 = V _{CC2}		2.0	3.0	mA
I _{CC2_Q4}		V _I = 0 V (SiLM5741-AQ), V _I = V _{CC1} (SiLM5741F-AQ), EN1 = V _{CC1} , EN2 = V _{CC2}		3.2	4.5	mA
I _{CC1_OP_1M}	Current on VCC1 with AC Signal. All channel switching with square wave clock input	1 Mbps, C _L = 15pF		2.6	3.8	mA
I _{CC1_OP_10M}		10 Mbps, C _L = 15pF		3.0	4.3	mA
I _{CC1_OP_100M}		100 Mbps, C _L = 15pF		6.7	9.2	mA
I _{CC2_OP_1M}	Current on VCC2 with AC Signal. All channel switching with square wave clock input	1 Mbps, C _L = 15pF		2.7	4.2	mA
I _{CC2_OP_10M}		10 Mbps, C _L = 15pF		3.9	5.5	mA
I _{CC2_OP_100M}		100 Mbps, C _L = 15pF		14.7	20	mA
Power Supply Current (SiLM5742-AQ)						
I _{CC1_Q1}	Current on VCC1 with DC Signal	V _I = V _{CC1} (SiLM5742-AQ), V _I = 0 V (SiLM5742F-AQ), EN1 = EN2 = 0 V		0.5	0.8	mA
I _{CC1_Q2}		V _I = 0 V (SiLM5742-AQ), V _I = V _{CC1} (SiLM5742F-AQ),		2.7	3.6	mA

Symbol	Parameter	Condition	Min	Typ.	Max.	Unit
		EN1 = EN2 = 0V				
I _{CC1_Q3}		V _I = V _{CC1} (SiLM5742-AQ), V _I = 0 V (SiLM5742F-AQ), EN1 = V _{CC1} , EN2 = V _{CC2}		1.5	2.1	mA
I _{CC1_Q4}		V _I = 0 V (SiLM5742-AQ), V _I = V _{CC1} (SiLM5742F-AQ), EN1 = V _{CC1} , EN2 = V _{CC2}		3.7	5.1	mA
I _{CC2_Q1}	Current on VCC2 with DC Signal	V _I = V _{CC1} (SiLM5742-AQ), V _I = 0 V (SiLM5742F-AQ), EN1 = EN2 = 0 V		0.5	0.8	mA
I _{CC2_Q2}		V _I = 0 V (SiLM5742-AQ), V _I = V _{CC1} (SiLM5742F-AQ), EN1 = EN2 = 0 V		2.7	3.6	mA
I _{CC2_Q3}		V _I = V _{CC1} (SiLM5742-AQ), V _I = 0 V (SiLM5742F-AQ), EN1 = V _{CC1} , EN2 = V _{CC2}		1.5	2.1	mA
I _{CC2_Q4}		V _I = 0 V (SiLM5742-AQ), V _I = V _{CC1} (SiLM5742F-AQ), EN1 = V _{CC1} , EN2 = V _{CC2}		3.7	5.1	mA
I _{CC1_OP_1M}	Current on VCC1 with AC Signal. All channel switching with square wave clock input	1 Mbps, C _L = 15pF		2.6	3.9	mA
I _{CC1_OP_10M}		10 Mbps, C _L = 15pF		3.4	4.9	mA
I _{CC1_OP_100M}		100 Mbps, C _L = 15pF		10.4	13.2	mA
I _{CC2_OP_1M}	Current on VCC2 with AC Signal. All channel switching with square wave clock input	1 Mbps, C _L = 15pF		2.6	3.9	mA
I _{CC2_OP_10M}		10 Mbps, C _L = 15pF		3.4	4.9	mA
I _{CC2_OP_100M}		100 Mbps, C _L = 15pF		10.4	13.2	mA
Input Logic Interface						
V _{IH}	Rising input threshold voltage			0.6× V _{CC1}	0.7× V _{CC1}	V
V _{IL}	Falling input threshold voltage		0.3× V _{CC1}	0.4× V _{CC1}		V
V _{IHYS}	Input threshold voltage hysteresis			0.2× V _{CC1}		V
I _{IH}	High level input current	I _{Nx} = V _{CC1}			12	uA
I _{IL}	Low level input current	I _{Nx} = 0V	-12			uA
Output Logic Interface						

Symbol	Parameter	Condition	Min	Typ.	Max.	Unit
V _{OH}	High level output voltage	I _{OH} = -2mA	V _{CCO} -0.3	3.2		V
V _{OL}	Low level output voltage	I _{OL} = 2mA		0.07	0.2	V
CMTI						
CMTI _H	Output High Level Common Mode Transient Immunity	V _I = V _{CC1} , V _{CM} =1200V, C _L =15pF	100	150		kV/us
CMTI _L	Output Low Level Common Mode Transient Immunity	V _I = 0V, V _{CM} =1200V, C _L =15pF	100	150		kV/us

SWITCHING CHARACTERISTICS (AC) WITH 3.3V SUPPLY

V_{CC1} = V_{CC2}=3.3V±10% (over recommended operating conditions unless otherwise specified.)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
t _{PLH}	Propagation delay, Low to High	C _L =15pF		12	25	ns
t _{PHL}	Propagation delay, High to Low	C _L =15pF		12	25	ns
t _r	Turn on rise time	C _L =15pF		2		ns
t _f	Turn off fall time	C _L =15pF		2		ns
t _{PWD}	Pulse Width Distortion	C _L =15pF			10	ns
t _{SKO}	Channel to Channel Output Skew Time	C _L =15pF, same direction in single device			8	ns
t _{SKP}	Part to Part Skew Time	C _L =15pF, same direction			8	ns
t _{PHZ}	Disable propagation delay, high to high impedance output			14		ns
t _{PLZ}	Disable propagation delay, low to high impedance output			14		ns
t _{PZH}	Enable propagation delay, high impedance to high output for SiLM574x			4		ns
	Enable propagation delay, high impedance to high output for SiLM574xF			1		us
t _{PZL}	Enable propagation delay, high impedance to low output for SiLM574x			1		us
	Enable propagation delay, high impedance to low output for SiLM574xF			7		ns

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
t_{DO}	Default output delay time from input power loss	Measured from the time V_{CC1} goes below 1.7V		0.05		us

ELECTRICAL CHARACTERISTICS (DC) WITH 2.5V SUPPLY
 $V_{CC1} = V_{CC2} = 2.5V \pm 10\%$ (over recommended operating conditions unless otherwise specified.)

Symbol	Parameter	Condition	Min	Typ.	Max.	Unit
Power Supply UVLO						
UVLO _R	Under rising Voltage Lockout	V_{CCx}		2.05	2.25	V
UVLO _F	Under falling Voltage Lockout	V_{CCx}	1.7	1.9		V
UVLO _{HYS}	Under Voltage Lockout Hysteresis			0.15		V
Power Supply Current (SiLM5740-AQ)						
I _{CC1_Q1}	Current on VCC1 with DC Signal	$V_I = V_{CC1}$ (SiLM5740-AQ), $V_I = 0$ V (SiLM5740F-AQ), EN2 = 0 V		0.5	0.7	mA
I _{CC1_Q2}		$V_I = 0$ V (SiLM5740-AQ), $V_I = V_{CC1}$ (SiLM5740F-AQ), EN2 = 0V		4.9	6.8	mA
I _{CC1_Q3}		$V_I = V_{CC1}$ (SiLM5740-AQ), $V_I = 0$ V (SiLM5740F-AQ), EN2 = V_{CC2}		0.5	0.7	mA
I _{CC1_Q4}		$V_I = 0$ V (SiLM5740-AQ), $V_I = V_{CC1}$ (SiLM5740F-AQ), EN2 = V_{CC2}		4.9	6.8	mA
I _{CC2_Q1}	Current on VCC2 with DC Signal	$V_I = V_{CC1}$ (SiLM5740-AQ), $V_I = 0$ V (SiLM5740F-AQ), EN2 = 0 V		0.6	0.8	mA
I _{CC2_Q2}		$V_I = 0$ V (SiLM5740-AQ), $V_I = V_{CC1}$ (SiLM5740F-AQ), EN2 = 0 V		0.6	0.8	mA
I _{CC2_Q3}		$V_I = V_{CC1}$ (SiLM5740-AQ), $V_I = 0$ V (SiLM5740F-AQ), EN2 = V_{CC2}		2.5	3.7	mA
I _{CC2_Q4}		$V_I = 0$ V (SiLM5740-AQ), $V_I = V_{CC1}$ (SiLM5740F-AQ), EN2 = V_{CC2}		2.7	3.9	mA
I _{CC1_OP_1M}	Current on VCC1 with AC Signal. All channel switching with square wave clock input	1 Mbps, $C_L = 15$ pF		2.5	3.6	mA
I _{CC1_OP_10M}		10 Mbps, $C_L = 15$ pF		2.4	3.5	mA
I _{CC1_OP_100M}		100 Mbps, $C_L = 15$ pF		2.7	4.6	mA
I _{CC2_OP_1M}	Current on VCC2 with AC Signal. All channel switching with square wave clock input	1 Mbps, $C_L = 15$ pF		2.7	4.3	mA
I _{CC2_OP_10M}		10 Mbps, $C_L = 15$ pF		3.8	5.6	mA

Symbol	Parameter	Condition	Min	Typ.	Max.	Unit
I _{CC2_OP_100M}		100 Mbps, C _L = 15pF		14.3	20	mA
Power Supply Current (SiLM5741-AQ)						
I _{CC1_Q1}	Current on VCC1 with DC Signal	V _I = V _{CC1} (SiLM5741-AQ), V _I = 0 V (SiLM5741F-AQ), EN1 = EN2 = 0 V		0.5	0.7	mA
I _{CC1_Q2}		V _I = 0 V (SiLM5741-AQ), V _I = V _{CC1} (SiLM5741F-AQ), EN1 = EN2 = 0V		3.6	5.0	mA
I _{CC1_Q3}		V _I = V _{CC1} (SiLM5741-AQ), V _I = 0 V (SiLM5741F-AQ), EN1 = V _{CC1} , EN2 = V _{CC2}		1.0	1.4	mA
I _{CC1_Q4}		V _I = 0 V (SiLM5741-AQ), V _I = V _{CC1} (SiLM5741F-AQ), EN1 = V _{CC1} , EN2 = V _{CC2}		4.1	5.8	mA
I _{CC2_Q1}	Current on VCC2 with DC Signal	V _I = V _{CC1} (SiLM5741-AQ), V _I = 0 V (SiLM5741F-AQ), EN1 = EN2 = 0 V		0.5	0.8	mA
I _{CC2_Q2}		V _I = 0 V (SiLM5741-AQ), V _I = V _{CC1} (SiLM5741F-AQ), EN1 = EN2 = 0 V		1.7	2.3	mA
I _{CC2_Q3}		V _I = V _{CC1} (SiLM5741-AQ), V _I = 0 V (SiLM5741F-AQ), EN1 = V _{CC1} , EN2 = V _{CC2}		2.0	2.9	mA
I _{CC2_Q4}		V _I = 0 V (SiLM5741-AQ), V _I = V _{CC1} (SiLM5741F-AQ), EN1 = V _{CC1} , EN2 = V _{CC2}		3.1	4.5	mA
I _{CC1_OP_1M}	Current on VCC1 with AC Signal. All channel switching with square wave clock input	1 Mbps, C _L = 15pF		2.6	3.8	mA
I _{CC1_OP_10M}		10 Mbps, C _L = 15pF		2.9	4.1	mA
I _{CC1_OP_100M}		100 Mbps, C _L = 15pF		5.8	8.6	mA
I _{CC2_OP_1M}	Current on VCC2 with AC Signal. All channel switching with square wave clock input	1 Mbps, C _L = 15pF		2.7	4.0	mA
I _{CC2_OP_10M}		10 Mbps, C _L = 15pF		3.5	4.9	mA
I _{CC2_OP_100M}		100 Mbps, C _L = 15pF		11.4	15	mA
Power Supply Current (SiLM5742-AQ)						
I _{CC1_Q1}	Current on VCC1 with DC Signal	V _I = V _{CC1} (SiLM5742-AQ), V _I = 0 V (SiLM5742F-AQ), EN1 = EN2 = 0 V		0.5	0.7	mA
I _{CC1_Q2}		V _I = 0 V (SiLM5742-AQ), V _I = V _{CC1} (SiLM5742F-AQ),		2.6	3.6	mA

Symbol	Parameter	Condition	Min	Typ.	Max.	Unit
		EN1 = EN2 = 0V				
I _{CC1_Q3}		V _I = V _{CC1} (SiLM5742-AQ), V _I = 0 V (SiLM5742F-AQ), EN1 = V _{CC1} , EN2 = V _{CC2}		1.4	2.1	mA
I _{CC1_Q4}		V _I = 0 V (SiLM5742-AQ), V _I = V _{CC1} (SiLM5742F-AQ), EN1 = V _{CC1} , EN2 = V _{CC2}		3.6	4.9	mA
I _{CC2_Q1}	Current on VCC2 with DC Signal	V _I = V _{CC1} (SiLM5742-AQ), V _I = 0 V (SiLM5742F-AQ), EN1 = EN2 = 0 V		0.5	0.7	mA
I _{CC2_Q2}		V _I = 0 V (SiLM5742-AQ), V _I = V _{CC1} (SiLM5742F-AQ), EN1 = EN2 = 0 V		2.6	3.6	mA
I _{CC2_Q3}		V _I = V _{CC1} (SiLM5742-AQ), V _I = 0 V (SiLM5742F-AQ), EN1 = V _{CC1} , EN2 = V _{CC2}		1.5	2.1	mA
I _{CC2_Q4}		V _I = 0 V (SiLM5742-AQ), V _I = V _{CC1} (SiLM5742F-AQ), EN1 = V _{CC1} , EN2 = V _{CC2}		3.7	4.9	mA
I _{CC1_OP_1M}	Current on VCC1 with AC Signal. All channel switching with square wave clock input	1 Mbps, C _L = 15pF		2.6	3.9	mA
I _{CC1_OP_10M}		10 Mbps, C _L = 15pF		3.2	4.6	mA
I _{CC1_OP_100M}		100 Mbps, C _L = 15pF		8.5	11.9	mA
I _{CC2_OP_1M}	Current on VCC2 with AC Signal. All channel switching with square wave clock input	1 Mbps, C _L = 15pF		2.6	3.9	mA
I _{CC2_OP_10M}		10 Mbps, C _L = 15pF		3.2	4.6	mA
I _{CC2_OP_100M}		100 Mbps, C _L = 15pF		8.5	11.9	mA
Input Logic Interface						
V _{IH}	Rising input threshold voltage			0.6× V _{CC1}	0.7× V _{CC1}	V
V _{IL}	Falling input threshold voltage		0.3× V _{CC1}	0.4× V _{CC1}		V
V _{IHYS}	Input threshold voltage hysteresis			0.2× V _{CC1}		V
I _{IH}	High level input current	INx = V _{CC1}			10	uA
I _{IL}	Low level input current	INx = 0V	-10			uA
Output Logic Interface						

Symbol	Parameter	Condition	Min	Typ.	Max.	Unit
V _{OH}	High level output voltage	I _{OH} = -1mA	V _{CCO} -0.2	2.45		V
V _{OL}	Low level output voltage	I _{OL} = 1mA		0.04	0.1	V
CMTI						
CMTI _H	Output High Level Common Mode Transient Immunity	V _I = V _{CC1} , V _{CM} =1200V, C _L =15pF	100	150		kV/us
CMTI _L	Output Low Level Common Mode Transient Immunity	V _I = 0V, V _{CM} =1200V, C _L =15pF	100	150		kV/us

SWITCHING CHARACTERISTICS (AC) WITH 2.5V SUPPLY

V_{CC1} = V_{CC2}=2.5V±10% (over recommended operating conditions unless otherwise specified.)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
t _{PLH}	Propagation delay, Low to High	C _L =15pF		14	27	ns
t _{PHL}	Propagation delay, High to Low	C _L =15pF		14	27	ns
t _r	Turn on rise time	C _L =15pF		2		ns
t _f	Turn off fall time	C _L =15pF		2		ns
t _{PWD}	Pulse Width Distortion	C _L =15pF			10	ns
t _{SKO}	Channel to Channel Output Skew Time	C _L =15pF, same direction in single device			8	ns
t _{SKP}	Part to Part Skew Time	C _L =15pF, same direction			8	ns
t _{PHZ}	Disable propagation delay, high to high impedance output			18		ns
t _{PLZ}	Disable propagation delay, low to high impedance output			18		ns
t _{PZH}	Enable propagation delay, high impedance to high output for SiLM574x			6		ns
	Enable propagation delay, high impedance to high output for SiLM574xF			1		us
t _{PZL}	Enable propagation delay, high impedance to low output for SiLM574x			1		us
	Enable propagation delay, high impedance to low output for SiLM574xF			8		ns

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
t_{DO}	Default output delay time from input power loss	Measured from the time V_{CC1} goes below 1.7V		0.05		us

PARAMETER MEASUREMENT INFORMATION

Switching Characteristics Test Timing

Figure 7 shows the timing of propagation delay, rise and fall time

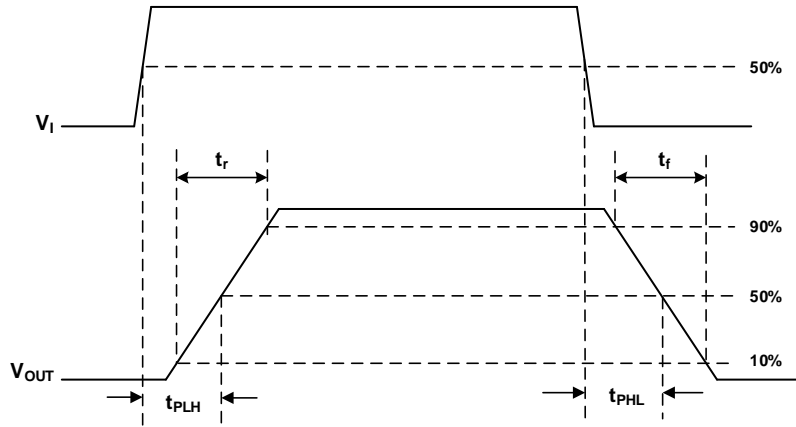


Figure 7. Propagation Delay, Rise Time and Fall Time

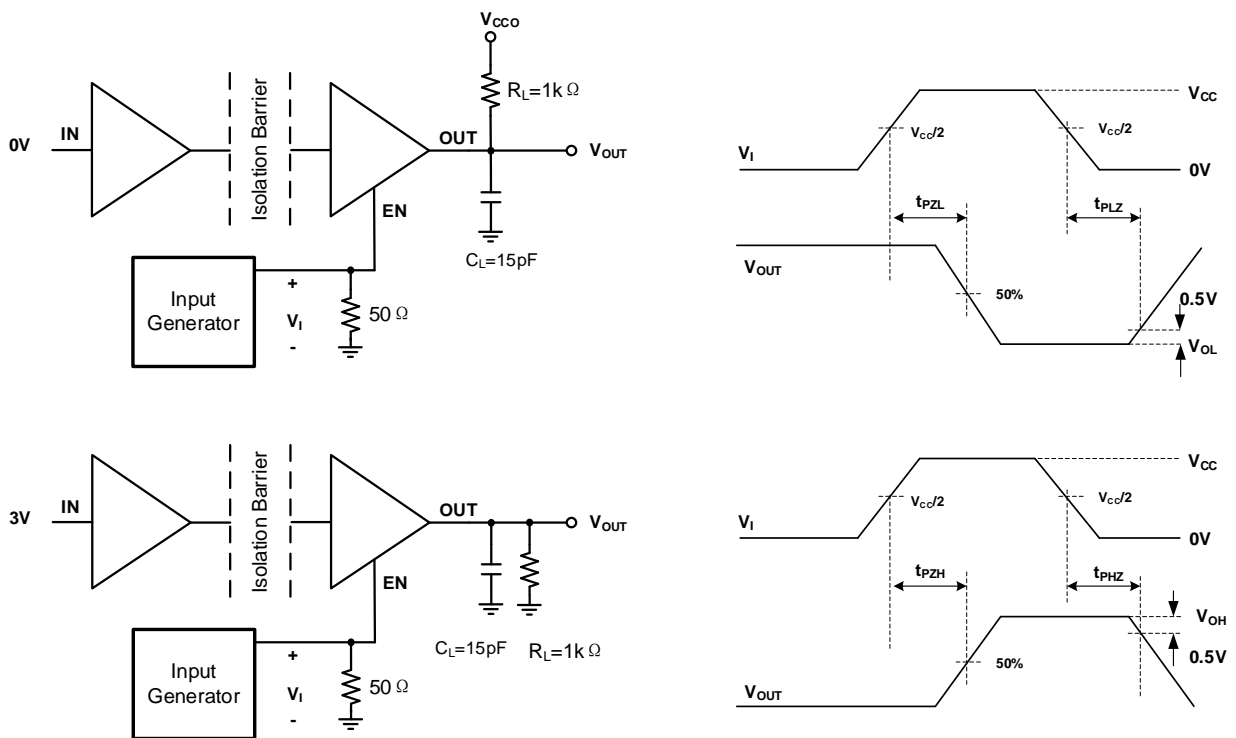


Figure 8. Enable/Disable Propagation Delay Time

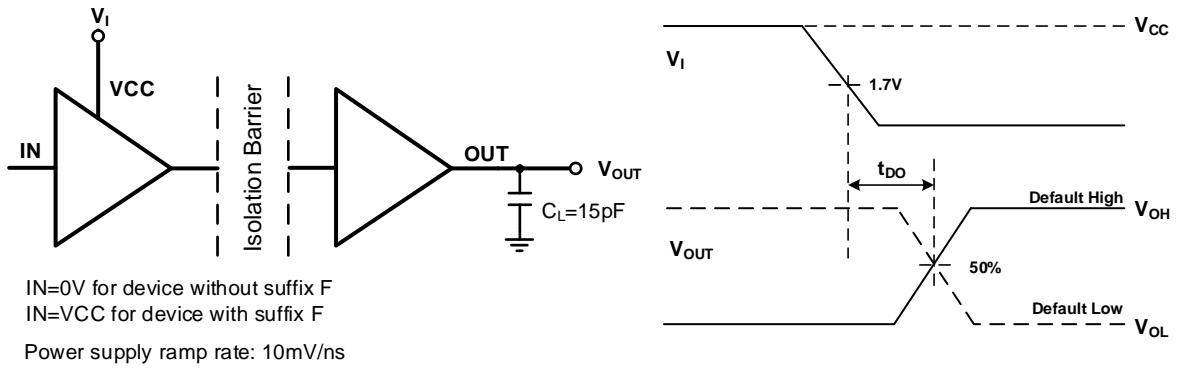


Figure 9. Default Output Delay Time Test

CMTI Testing

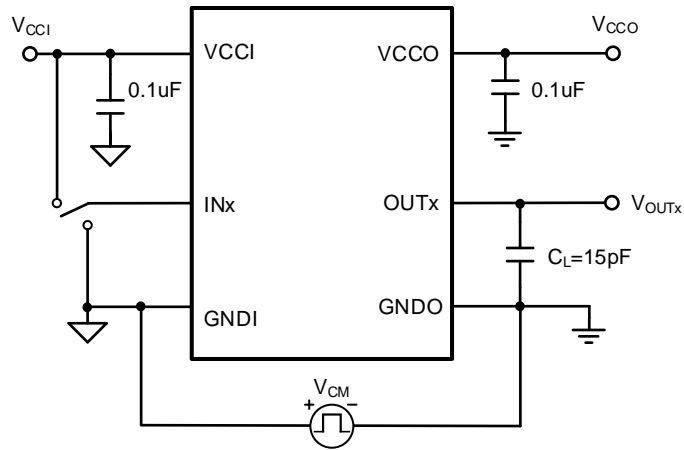


Figure 10. CMTI Test Configuration

FEATURE DESCRIPTION

The SiLM574x-AQ devices are high-performance, four-channel digital isolators with default output state options to enable a variety of application uses. The supply voltage range is from 2.25 V to 5.5 V for both supplies, V_{CC1} and V_{CC2} . With innovative chip design and layout techniques, the electromagnetic compatibility of the SiLM574x-AQ devices has been significantly enhanced to improve the robustness of overall system.

Device Functional Modes

The Table 4 shows the functional modes of the SiLM574x-AQ.

Table 4. Function Table

$V_{CC1}^{(1)}$	$V_{CCO}^{(1)}$	Input (INx)	Output Enable (ENx)	Output (OUTx)	Function Description
PU ⁽²⁾	PU	H	H or open	H	Normal operation. The output is controlled by the input
		L	H or open	L	
		Open	H or open	Default	Default mode. When INx is open, the corresponding output goes to the default logic. The default is high for SiLM574x-AQ and low for SiLM574xF-AQ.
X	PU	X	L	Z	A low value of output enable causes the outputs to be high-impedance.
PD ⁽²⁾	PU	X	H or open	Default	Default mode. When VCCI is unpowered, channel output based on the default option. The default is high for SiLM574x-AQ and low for SiLM574xF-AQ.
X	PD	X	X	Undetermined ⁽³⁾	When VCCO is unpowered, channel output is undermined.

(1) V_{CC1} =Input side V_{CC} , V_{CCO} =Output side V_{CC} .

(2) PU=Powered up, $V_{CC} \geq 2.25V$; PD=Powered down, $V_{CC} \leq 1.7V$

(3) The outputs are in undermined state when $1.7 < V_{CC1}$, $V_{CCO} < 2.25V$

Power Supply Recommendation

A 0.1 μ F bypass capacitor is recommended at the input and output supply pins (V_{CC1} and V_{CC2}) to help ensure reliable operation. The capacitors should be placed as close to the supply pins as possible.

PACKAGE CASE OUTLINES

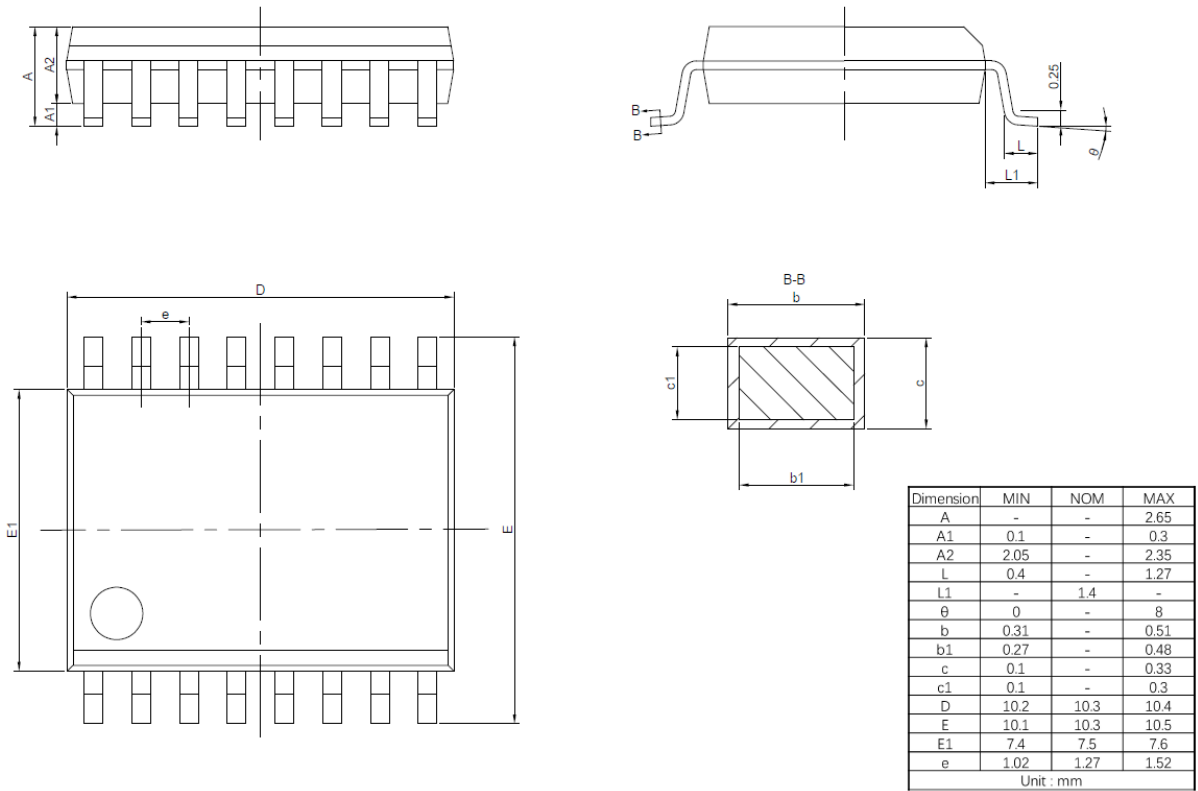


Figure 11. SOP16W Package Outline Dimensions

REVISION HISTORY

Note: page numbers for previous revisions may differ from page numbers in current version

Page or Item	Subjects (major changes since previous revision)
Rev1.0 Datasheet: 2023-05-30	
Whole document	Initial datasheet release
Rev1.1 Datasheet: 2023-06-30	
Page 1 and Page 10	Add TUV certification