DESCRIPTION

The A4733-Q is a CMOS analog IC configured as an 8-channel multiplexer. This CMOS device can operate from 1.8 V to 5.5 V.

The select (IN) input controls the data flow. The FET multiplexers/demultiplexers are disabled when the output-enable (OE) input is high.

The A4733-Q device are digitally controlled analog switches. It has low on-resistance (8Ω TYP) and low crosstalk (-60dB at 10MHz TYP).

The A4733-Q operates over an ambient temperature range of -40°C ~ +125°C.

The A4733-Q is available in TSSOP16 Package.

ORDERING INFORMATION

Package Type	Part Number	
TSSOP16 SPQ: 4,000pcs/Reel	TMX16	A4733TMX16R-Q
		A4733TMX16VR-Q
Note	V: Halogen free Package R: Tape & Reel Q: AEC-Q Qualified	
AiT provides all RoHS products		

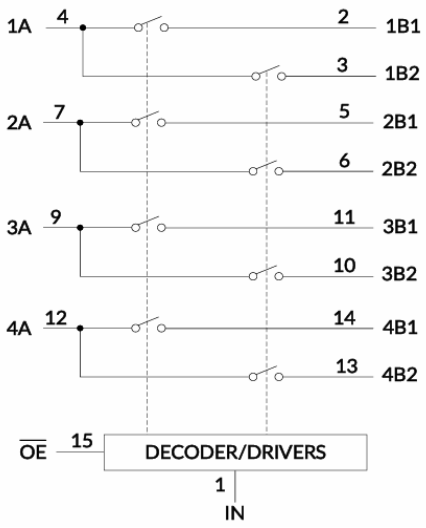
FEATURES

- Qualified for Automotive Applications
- AEC-Q Qualified
- -3dB Bandwidth: 220MHz
- Single Supply Operation: +1.8V to +5.5V
- Low ON Resistance: 8Ω(TYP)
  Low Crosstalk: -60dB at 10MHz (TYP.)
- Rail-to-Rail Operation
- Fast Switching Time
- Operating Temperature Range: -40°C ~ +125°C
- Available in TSSOP16 Package.

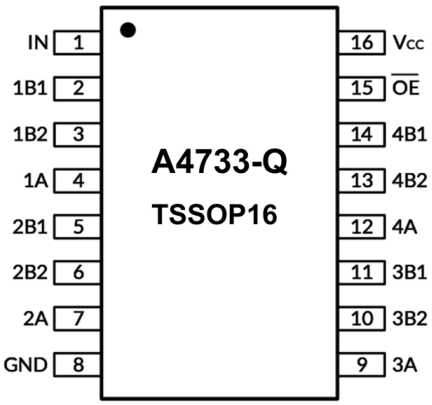
APPLICATION

- Automotive Infotainment and Cluster
- HEV/EV Battery Management System (BMS)

TYPICAL CIRCUIT



PIN DESCRIPTION



TSSOP16, TMX16
Top View

Pin #	Symbol	Function
1	IN	Channel selection Input
2	1B1	Analog Video I/O
3	1B2	Analog Video I/O
4	1A	Analog Video I/O
5	2B1	Analog Video I/O
6	2B2	Analog Video I/O
7	2A	Analog Video I/O
8	GND	Ground
9	3A	Analog Video I/O
10	3B2	Analog Video I/O
11	3B1	Analog Video I/O
12	4A	Analog Video I/O
13	4B2	Analog Video I/O
14	4B1	Analog Video I/O
15	$\overline{OE}$	Switch-Enable Input. Low enabled
16	VCC	Power Supply

FUNCTION TABLE

INPUTS		FUNCTION
$\overline{OE}$	IN	
L	L	A port =B1 port
L	H	A port =B2 port
H	X	Disconnect

X=Don't care , H=high level voltage , L= low level voltage

NOTE: Input and output pins are identical and inter-changeable. Either may be considered an input or output; signals pass equally well in either direction.

ABSOLUTE MAXIMUM RATINGS

Over operating free-air temperature range (unless otherwise noted)(1)

V_{CC}, Supply Voltage		0.3V ~ +6.0V
V_{IN}, Input Voltage (All Inputs)		-0.3V~V_{CC}+0.3V
I_{IK}, Input Clamp Current	V_{IO} < 0	-50mA
T_{STG}, Storage Temperature		-65℃ ~ +150℃
T_J, Junction Temperature (3)		-40℃ ~ +150°C
θ_{JA}, Package Thermal Resistance (2)	TSSOP16	45°C/W
V(ESD) Electrostatic discharge	Human-Body Model (HBM), per AEC Q100-002 (4)	±2000V
	Charged-Device Model (CDM), per AEC Q100-011	±1000V
	Latch-Up (LU), per AEC Q100-004	±100V

(1) Stresses above these ratings may cause permanent damage. Exposure to absolute maximum conditions for extended periods may degrade device reliability. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those specified is not implied.
(2) The package thermal impedance is calculated in accordance with JESD-51.
(3) The maximum power dissipation is a function of $T_{J(MAX)}$, $R_{\theta JA}$, and TA. The maximum allowable power dissipation at any ambience temperature is PD = ($T_{J(MAX)}$ - T_A) / $R_{\theta JA}$. All numbers apply for packages soldered directly onto a PCB.
(4) AEC Q100-002 indicates that HBM stressing shall be in accordance with the ANSI/ESDA/JEDEC JS-001 specification.

ABSOLUTE MAXIMUM RATINGS

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

SYMBOL	PARAMETER	MIN	MAX	UNIT
V_{CC}	Supply Voltage	1.8	5.5	V
T_A	Operating Temperature	-40	+125	°C

ELECTRICAL CHARACTERISTICS

V_{CC} = +1.8V to +5.5 V, FULL= -40°C to +125°C, Typical values are at T_A = +25°C. (unless otherwise noted)

Parameter	Symbol	Conditions	V_{CC}	TEMP	Min. (1)	Typ. (2)	Max. (1)	Unit
DC CHARACTERISTICS								
On-Resistance	R_{ON}	I_A=13mA	5V	+25°C	-	8	11	Ω
				- 40°C to +150°C	-	-	14	
On-Resistance Match Between Channels	ΔR_{ON} (3)	I_A=13mA	5V	+25°C	-	0.05	0.20	Ω
				- 40°C ~+150°C	-	-	0.25	
On-Resistance Flatness	$R_{FLAT(ON)}$ (4)	-	5V	+25°C	-	4.50	6	Ω
				- 40°C ~+150°C	-	-	8	
High-level control input Voltage	V_{IH}		1.8V	- 40°C ~+150°C	1.10	-	-	V
			2.5V ~ 5.5V	- 40°C ~+150°C	2	-	-	
Low-level control input Voltage	V_{IL}		1.8V	- 40°C ~+150°C	-	-	0.40	V
			2.5V ~ 5.5V	- 40°C ~+150°C	-	-	0.50	
Input High Current	I_{IH}	V_{IN} = V_{OE} = V_{CC}	5.5V	+25°C	-	-	±1	µA
				- 40°C ~+150°C	-	-	±2	
Input Low Current	I_{IL}	V_{IN} = V_{OE} = V_{CC}	5.5V	+25°C	-	-	±1	µA
				- 40°C ~+150°C	-	-	±2	
Analog Output Leakage Current	I_O	V_{B1} or V_{B2} =3.3V/0.3V V_A= 0.3V/3.3V	5.5V	+25°C	-	-	±1	µA
				- 40°C ~+150°C	-	-	±2	
Clamp Diode Voltage	V_{IK}	I_I = -18mA	5.5V	+25°C	-	-0.90	-	V
POWER REQUIREMENTS								
Power Supply Range	V_{CC}	-		- 40°C ~+150°C	1.8	-	5.5	V
Power Supply Current	I_{CC}	V_{IN} and V_{OE} = 5V/0V	5.5V	+25°C	-	0.1	1	µA
				- 40°C ~+150°C	-	-	2	
Supply Current per Input at TTL HIGH	ΔI_{CC}	V_{IN} or V_{OE} = 3.4V	5.5V	+25°C	-	-	100	µA
				- 40°C ~+150°C	-	-	200	

Parameter	Symbol	Conditions	V_{CC}	TEMP	Min. (1)	Typ. (2)	Max.(1)	Unit
DYNAMIC CHARACTERISTICS								
Turn-On Time	t_{ON}	R_L = 75Ω, C_L = 20pF, Test Circuit 1	5.5V	+25°C	-	13	20	ns
				- 40°C ~+150°C	-	-	23	
			3.3V	+25°C	-	19	29	
				- 40°C ~+150°C	-	-	32	
Turn-Off Time	t_{OFF}	R_L = 75Ω, C_L = 20pF, Test Circuit 1	5.5V	+25°C	-	30	55	ns
				- 40°C ~+150°C	-	-	60	
			3.3V	+25°C	-	40	60	
				- 40°C ~+150°C	-	-	68	
Propagation Delay	t_{PD}	R_L = 75Ω, C_L = 20pF, Test Circuit 2	5.5V	+25°C	-	0.4	1	ns
				- 40°C ~+150°C	-	-	1.5	
			3.3V	+25°C	-	0.5	1.5	
				- 40°C ~+150°C	-	-	2	
-3dB Bandwidth	BW	R_L = 150Ω, Test Circuit 4	5.5V	+25°C	-	220	-	MHz
Channel-to-Channel Crosstalk	X_{TALK}	R_{IN} = 10Ω, R_L = 150Ω, f = 10MHz, Test Circuit 5	5.5V	+25°C	-	-60	-	dB
Off Isolation	O_{IRR}	R_L = 150Ω, f = 10MHz, Test Circuit 6	5.5V	+25°C	-	-52	-	dB
Input/Enable Capacitance	C_{IN}	f = 1MHz, Test Circuit 6	5.5V	+25°C	-	5	-	pF
Switch OFF Capacitance	C_{OFF}	f = 1MHz, Test Circuit 6	5.5V	+25°C	-	9	-	pF
Switch ON Capacitance	C_{ON}	f = 1MHz, Test Circuit 6	5.5V	+25°C	-	18	-	pF
Differential Gain	D_G	R_L = 150Ω, f = 3.58MHz, Test Circuit 3	5.5V	+25°C	-	0.5	-	%
Differential Phase	D_P	R_L = 150Ω, f = 3.58MHz, Test Circuit 3	5.5V	+25°C	-	0.05	-	°

(1) Limits are 100% production tested at 25°C. Limits over the operating temperature range are ensured through correlations using statistical quality control (SQC) method.

(2) Typical values represent the most likely parametric norm as determined at the time of characterization. Actual typical values may vary over time and will also depend on the application and configuration.

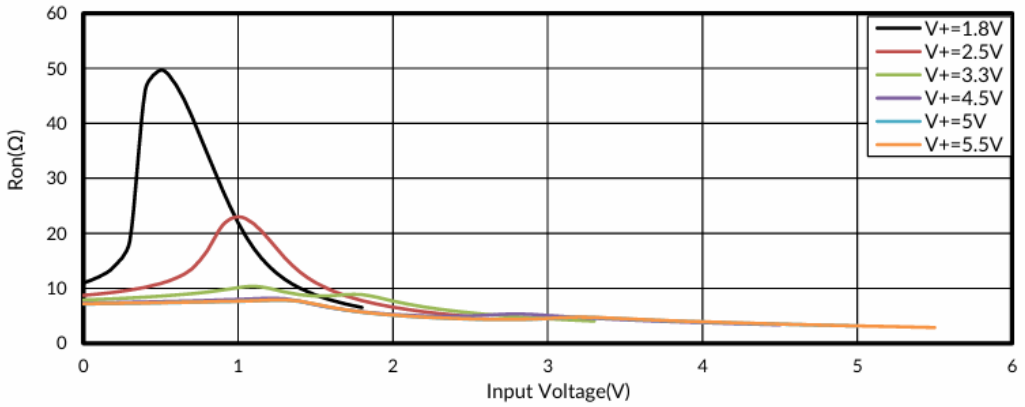
(3) This parameter is ensured by design and/or characterization and is not tested in production.

(4) Flatness is defined as the difference between the maximum and minimum values of ON-state resistance over the specified range of conditions.

(5) All unused digital inputs of the device must be held at VCC or GND to ensure proper device operation.

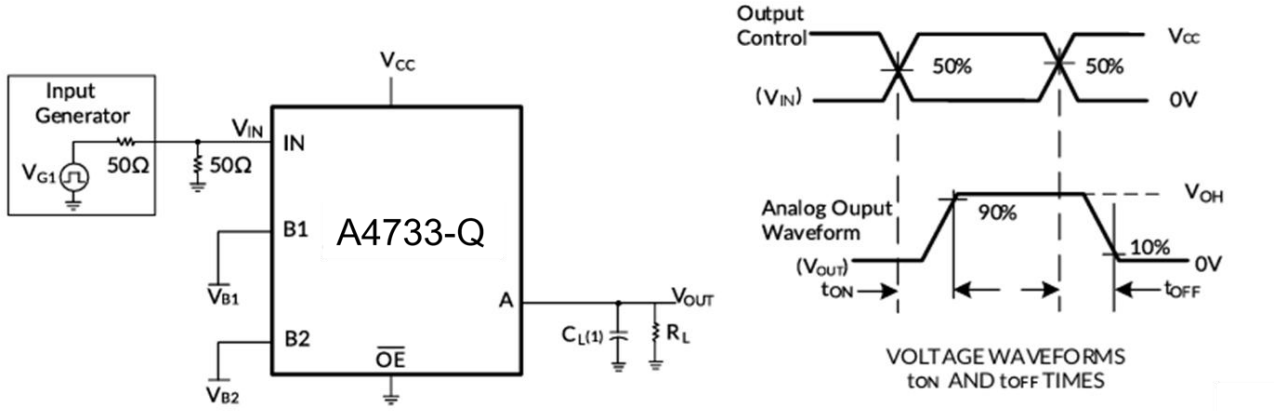
TYPICAL PERFORMANCE CHARACTERISTICS

Fig 1. Typical Ron as a Function of Input Voltage



Parameter Measurement Information

Test Circuit 1. Circuit for Voltage Waveform and Switch Time



Test	VCC	R_L	C_L	VB1	VB2
t_{ON}	5V±0.5V	75Ω	20pF	GND	3V
	5V±0.5V	75Ω	20pF	3V	GND
t_{OFF}	5V±0.5V	75Ω	20pF	GND	3V
	5V±0.5V	75Ω	20pF	3V	GND

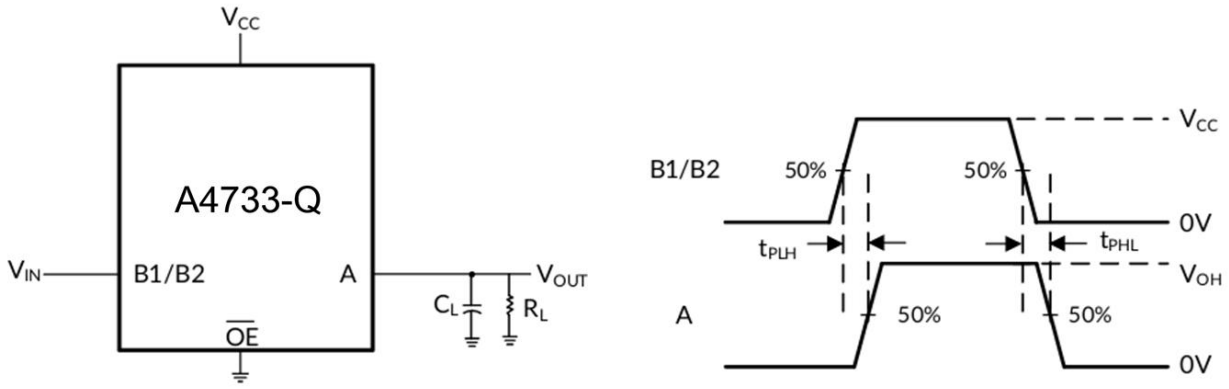
NOTES:

1.C_L includes probe and jig capacitance.

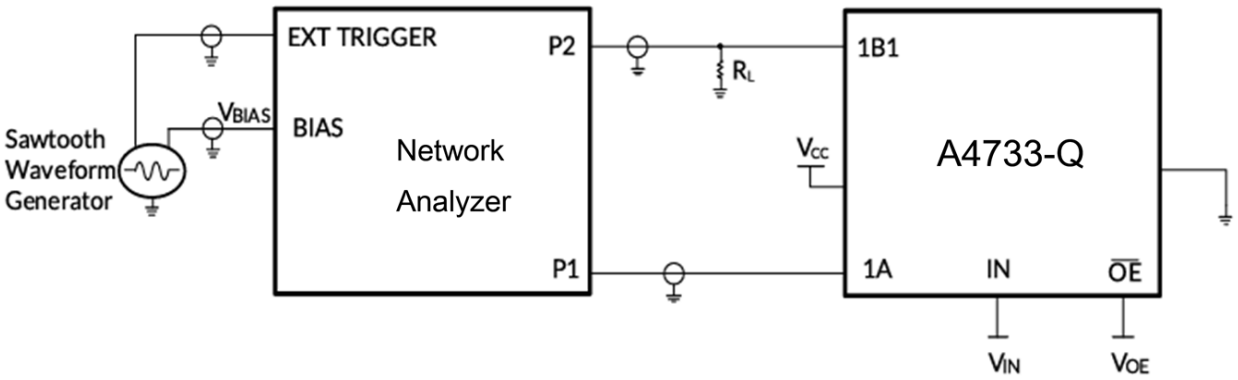
2.All input pulses are supplied by generators having the following characteristics: PRR≤10MHz,Z_O=50Ω，t_r≤2.5ns,t_f≤2.5ns.

3. The outputs are measured one at a time, with one transition per measurement.

Test Circuit 2. Test Circuit for Propagation Delay

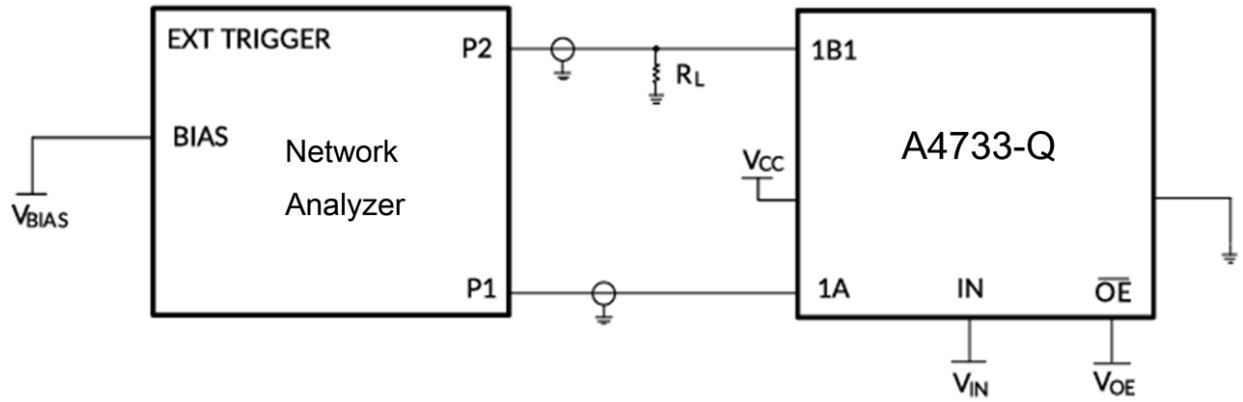


Test Circuit 3. Test Circuit for Differential Gain/Phase Measurement



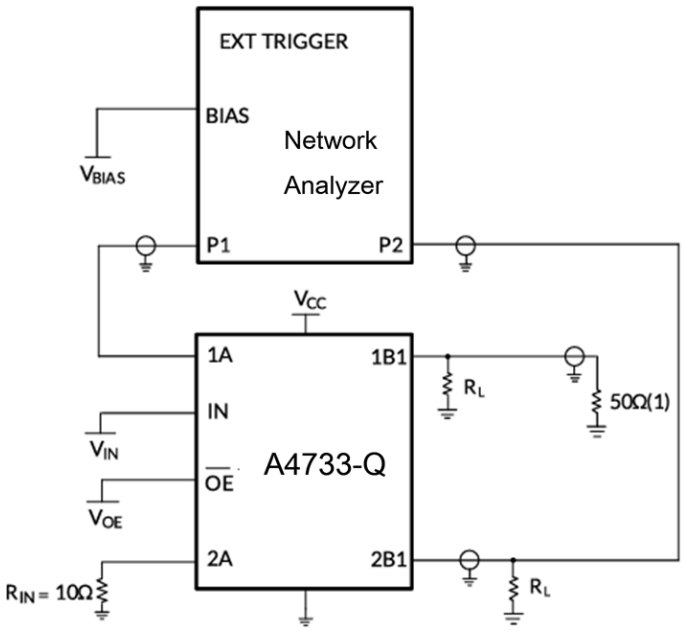
NOTES: Differential gain and phase are measured at the output of the ON channel. For example, when V_{IN} = 0, V_{OE} = 0, and 1A is the input, the output is measured at 1B1.

Test Circuit 4. Test Circuit for Frequency Response (BW)



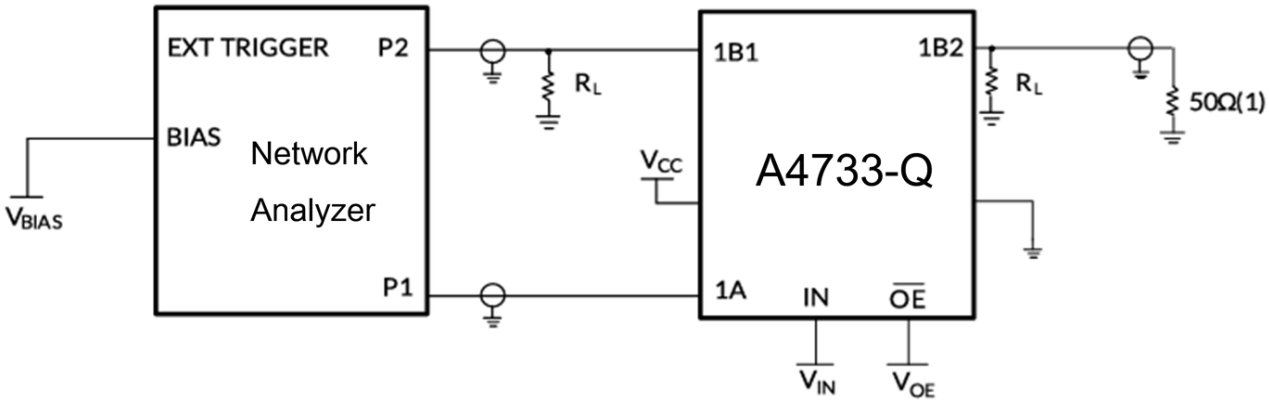
NOTES: Frequency response is measured at the output of the ON channel. For example, when V_{IN} = 0, V_{EN} = 0, and 1A is the input, the output is measured at 1B1. All unused analog I/O ports are left open.

Test Circuit 5. Test Circuit for Crosstalk (XTALK)



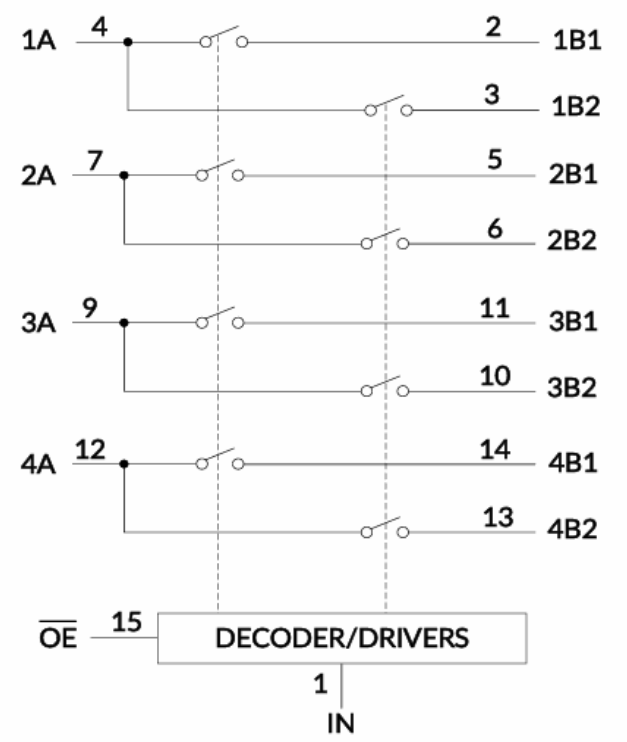
NOTE: A 50Ω termination resistor is needed for the network analyzer.

Test Circuit 6. Test Circuit for Off Isolation (O_{IRR})



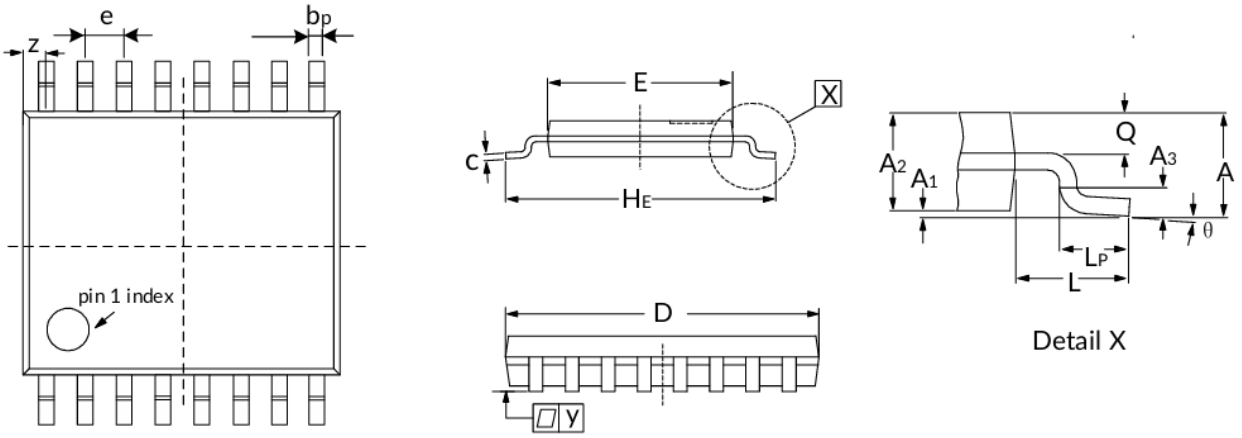
NOTE: A 50Ω termination resistor is needed for the network analyzer.

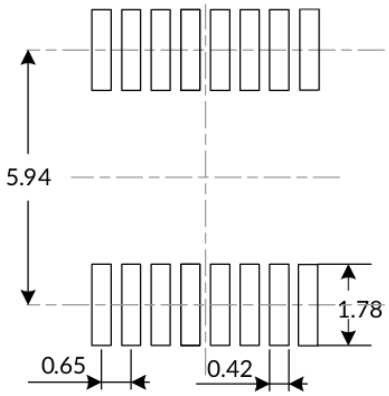
BLOCK DIAGRAM



PACKAGE INFORMATION

Dimension in TSSOP16 (Unit: mm)





RECOMMENDED LAND PATTERN

Symbol	Millimeters	
	Min	Max
A	-	1.100
A1	0.050	0.150
A2	0.800	0.950
A3	0.250	
bp	0.190	0.300
c	0.100	0.200
D	4.900	5.100
E	4.300	4.500
HE	6.200	6.600
e	0.650 BSC.	
L	1.000	
Lp	0.500	0.750
Q	0.300	0.400
Z	0.060	0.400
Y	0.100	
θ	0°	8°

IMPORTANT NOTICE

AiT Semiconductor Inc. (AiT) reserves the right to make changes to any its product, specifications, to discontinue any integrated circuit product or service without notice, and advises its customers to obtain the latest version of relevant information to verify, before placing orders, that the information being relied on is current.

AiT Semiconductor Inc.'s integrated circuit products are not designed, intended, authorized, or warranted to be suitable for use in life support applications, devices or systems or other critical applications. Use of AiT products in such applications is understood to be fully at the risk of the customer. As used herein may involve potential risks of death, personal injury, or servere property, or environmental damage. In order to minimize risks associated with the customer's applications, the customer should provide adequate design and operating safeguards.

AiT Semiconductor Inc. assumes to no liability to customer product design or application support. AiT warrants the performance of its products of the specifications applicable at the time of sale.