74LVC1T45Q
Automotive, Single-Bit Dual-Supply Bus Transceiver with Configurable Voltage Translation

GENERAL DESCRIPTION

The 74LVC1T45Q is a single-bit, dual-supply bus transceiver with configurable voltage translation. The device has two separate configurable power-supply rails. The A and B ports track the V_{CCA} supply and V_{CCB} supply respectively. The supply voltage pins accept voltage range from 1.65V to 5.5V, which makes the device suitable for low voltage bidirectional translation voltage nodes of 1.8V, 2.5V, 3.3V and 5.0V.

The 74LVC1T45Q features that two data buses can communicate asynchronously. Either the A port output or the B port output can be activated by DIR logic levels. The DIR input circuit is supplied by V_{CCA}. When B port output is activated, the device allows the data to transmit from A bus to B bus. On the contrary, when A port output is activated, the device allows the data to transmit from B bus to A bus. The input circuit is always active on the two ports. A logic level of high or low must be set to avoid excessive supply current.

The device is AEC-Q100 qualified (Automotive Electronics Council (AEC) standard Q100 Grade 1) and it is suitable for automotive applications.

The 74LVC1T45Q is available in a Green SC70-6 package. It operates over an operating temperature range of -40℃ to +125℃.

FEATURES

- **AEC-Q100 Qualified for Automotive Applications**
  Device Temperature Grade 1
  T_A = -40℃ to +125℃
- **V_{CCA} Supply Voltage Range: 1.65V to 5.5V**
- **V_{CCB} Supply Voltage Range: 1.65V to 5.5V**
- **Inputs Accept Voltages Higher than the Supply Voltage and up to 5.5V**
- **+32mA/-32mA Output Current**
- **DIR Input Circuit Referenced to V_{CCA}**
- **Typical Data Rates:**
  - **420Mbps (3.3V to 5.0V Translation)**
  - **210Mbps (Translate to 3.3V)**
  - **140Mbps (Translate to 2.5V)**
  - **75Mbps (Translate to 1.8V)**
- **Outputs in High-Impedance State when V_{CCA} or V_{CCB} = 0V**
- **-40℃ to +125℃ Operating Temperature Range**
- **Available in a Green SC70-6 Package**

APPLICATIONS

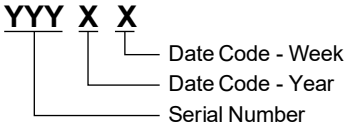
Automotive Applications
Personal Electronic Devices
Enterprise Devices
Telecommunications

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
74LVC1T45Q	SC70-6	-40℃ to +125℃	74LVC1T45QC6G/TR	14DXX	Tape and Reel, 3000

MARKING INFORMATION

NOTE: XX = Date Code.



Green (RoHS & HSF): SG Micro Corp defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your SGMICRO representative directly.

ABSOLUTE MAXIMUM RATINGS

Supply Voltage Range, V_{CCA} ..... -0.5V to 6.5V
Supply Voltage Range, V_{CCB} ..... -0.5V to 6.5V
Input Voltage Range, V_I (1) ..... -0.5V to 6.5V
Output Voltage Range, V_O (1)
High-Impedance State ..... -0.5V to 6.5V
High-State or Low-State
A Port ..... -0.5V to MIN(6.5V, V_{CCA} + 0.5V)
B Port ..... -0.5V to MIN(6.5V, V_{CCB} + 0.5V)
Input Clamp Current, I_{IK} (V_I < 0V) ..... -50mA
Output Clamp Current, I_{OK} (V_O < 0V) ..... -50mA
Continuous Output Current, I_O ..... ±50mA
Continuous Current through $V_{CCA/B}$ or GND ..... ±100mA
Junction Temperature (2) ..... +150℃
Storage Temperature Range ..... -65℃ to +150℃
Lead Temperature (Soldering, 10s) ..... +260℃
ESD Susceptibility (3) (4)
HBM ..... ±5000V
CDM ..... ±1000V

NOTES:

1. The input and output voltage ratings may be exceeded if the input and output clamp current ratings are observed.

2. The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability.

3. For human body model (HBM), all pins comply with AEC-Q100-002 specification.

4. For charged device model (CDM), all pins comply with AEC-Q100-011 specification.

RECOMMENDED OPERATING CONDITIONS

Supply Voltage Range, V_{CCA} ..... 1.65V to 5.5V
Supply Voltage Range, V_{CCB} ..... 1.65V to 5.5V
Input Voltage Range, V_I ..... 0V to 5.5V
Output Voltage Range, V_O
High-Impedance State ..... 0V to 5.5V
High-State or Low-State
A Port ..... 0V to V_{CCA}
B Port ..... 0V to V_{CCB}
High-State or Low-State Output Current, I_O ..... ±32mA
Input Transition Rise or Fall Rate, Δt/ΔV
Data Inputs
V_{CCI} = 1.65V to 1.95V ..... 20ns/V (MAX)
V_{CCI} = 2.3V to 2.7V ..... 20ns/V (MAX)
V_{CCI} = 3.0V to 3.6V ..... 10ns/V (MAX)
V_{CCI} = 4.5V to 5.5V ..... 5ns/V (MAX)
Control Input
V_{CCI} = 1.65V to 5.5V ..... 5ns/V (MAX)
Operating Temperature Range ..... -40℃ to +125℃

OVERSTRESS CAUTION

Stresses beyond those listed in Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect reliability. Functional operation of the device at any conditions beyond those indicated in the Recommended Operating Conditions section is not implied.

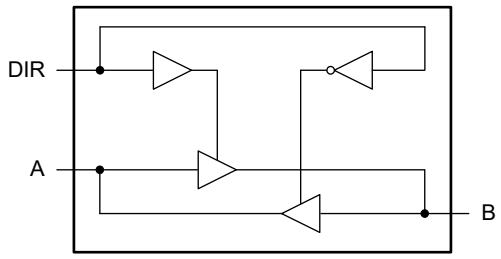
ESD SENSITIVITY CAUTION

This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because even small parametric changes could cause the device not to meet the published specifications.

DISCLAIMER

SG Micro Corp reserves the right to make any change in circuit design, or specifications without prior notice.

LOGIC DIAGRAM



FUNCTION TABLE

SUPPLY VOLTAGE	CONTROL INPUT	INPUT/OUTPUT (1)	
V_{CCA}, V_{CCB}	DIR (2)	A	B
1.65V to 5.5V	L	A = B	Input
1.65V to 5.5V	H	Input	B = A
GND (3)	*X*	Z	Z

H = High Voltage Level

L = Low Voltage Level

Z = High-Impedance State

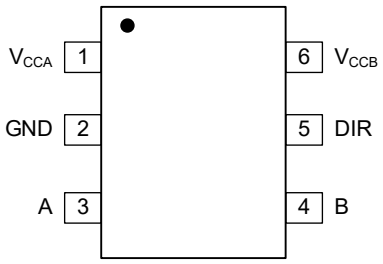
X = Don't Care

NOTES:

1. The input circuit of the data I/O is always active.
2. The DIR input circuit is referenced to V_{CCA}.
3. If at least one of V_{CCA} or V_{CCB} is at GND level, the outputs are in high-impedance state.

PIN CONFIGURATION

(TOP VIEW)



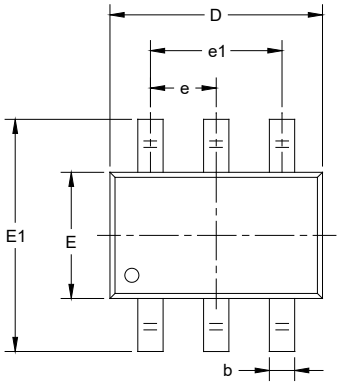
SC70-6

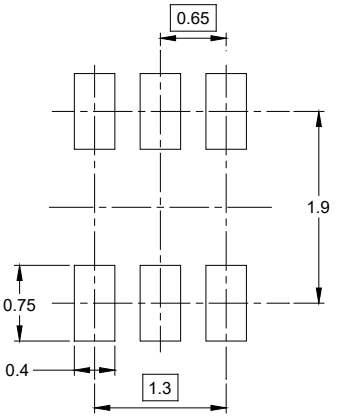
PIN DESCRIPTION

PIN	NAME	FUNCTION
1	V_{CCA}	Supply Voltage on A Port.
2	GND	Ground.
3	A	Input/Output. It tracks the V_{CCA} supply.
4	B	Input/Output. It tracks the V_{CCB} supply.
5	DIR	Direction Control Input. It tracks the V_{CCA} supply.
6	V_{CCB}	Supply Voltage on B Port.

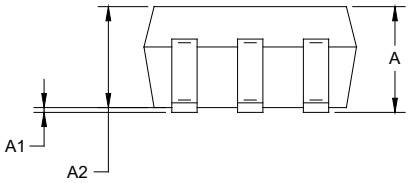
PACKAGE OUTLINE DIMENSIONS

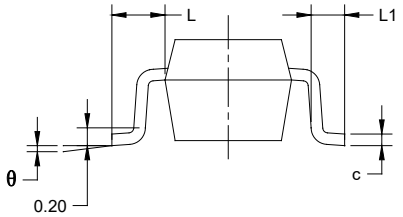
SC70-6





RECOMMENDED LAND PATTERN (Unit: mm)



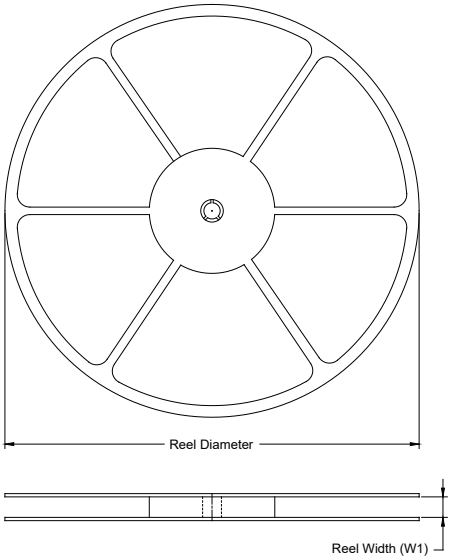


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.800	1.100	0.031	0.043
A1	0.000	0.100	0.000	0.004
A2	0.800	1.000	0.031	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.220	0.003	0.009
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.65 TYP		0.026 TYP	
e1	1.300 BSC		0.051 BSC	
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

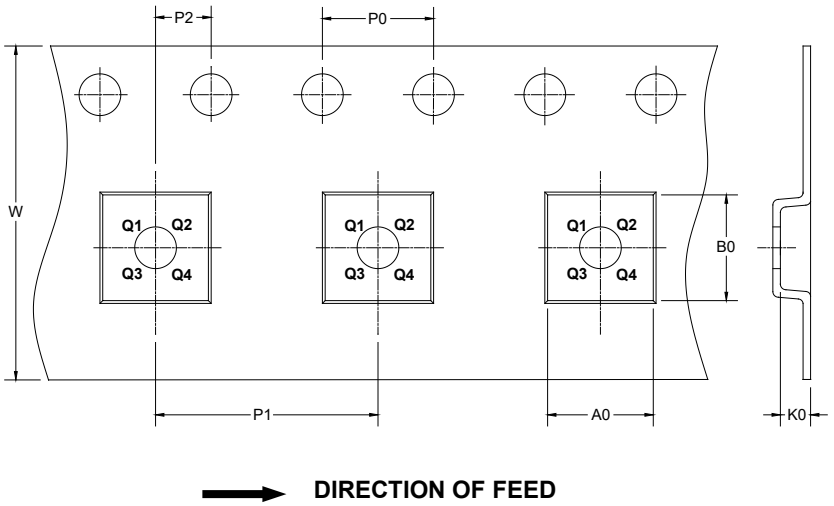
NOTES:
1. Body dimensions do not include mode flash or protrusion.
2. This drawing is subject to change without notice.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



DIRECTION OF FEED

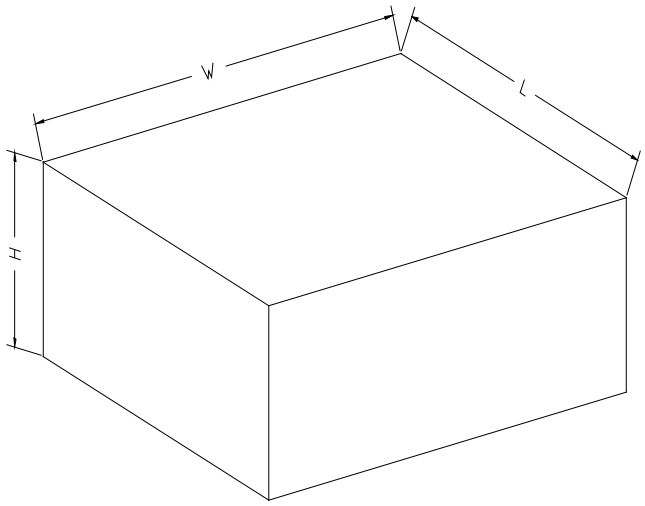
NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
SC70-6	7″	9.5	2.40	2.50	1.20	4.0	4.0	2.0	8.0	Q3

DD0001

CARTON BOX DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF CARTON BOX

Reel Type	Length (mm)	Width (mm)	Height (mm)	Pizza/Carton
7″ (Option)	368	227	224	8
7″	442	410	224	18

DD0002