

7SB385

Bus Switch

The 7SB385 Bus Switch is an advanced high-speed line switch in ultra-small footprint.

Features

- High Speed: $t_{PD} = 0.25 \text{ ns (Max) @ } V_{CC} = 4.5 \text{ V}$
- 3Ω Switch Connection Between 2 Ports
- Power Down Protection Provided on Inputs
- Ultra-Small Packages
- These are Pb-Free Devices



Figure 1. Logic Diagram

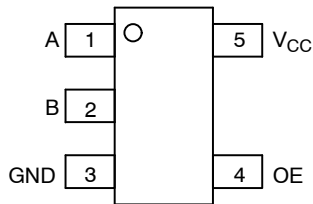


Figure 2. TSOP-5/SC-88A (Top View)

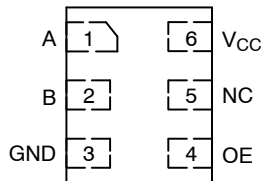


Figure 3. ULLGA6/UDFN6 (Top View)

Function Table

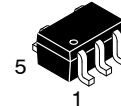
Input OE	Function
L	Disconnect
H	B = A



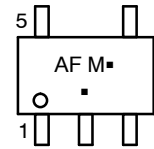
ON Semiconductor®

<http://onsemi.com>

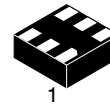
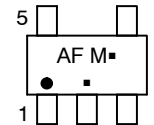
MARKING DIAGRAMS



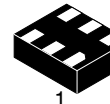
SOT-353/SC70-5/SC-88A
DF SUFFIX
CASE 419A



SOT23-5/TSOP-5/SC59-5
DT SUFFIX
CASE 483



ULLGA6
1.0 x 1.0
CASE 613AD



ULLGA6
1.2 x 1.0
CASE 613AE



ULLGA6
1.45 x 1.0
CASE 613AF



UDFN6
1.2 x 1.0
CASE 517AA



AF, 4, V, J, F = Specific Device Code
M = Date Code
▪ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

Table 1. MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	DC Supply Voltage	-0.5 to +7.0	V
V_{IN}	Control Pin Input Voltage	-0.5 to +7.0	V
$V_{I/O}$	Switch Input / Output Voltage	-0.5 to +7.0	V
I_{IK}	Control Pin DC Input Diode Current $V_{IN} < GND$	-50	mA
I_{OK}	Switch I/O Port DC Diode Current $V_{I/O} < GND$	-50	mA
I_O	On-State Switch Current	± 128	mA
	Continuous Current Through V_{CC} or GND	± 150	mA
I_{CC}	DC Supply Current per Supply Pin	± 150	mA
I_{GND}	DC Ground Current per Ground Pin	± 150	mA
T_{STG}	Storage Temperature Range	-65 to +150	$^{\circ}C$
T_L	Lead Temperature, 1 mm from Case for 10 Seconds	260	$^{\circ}C$
T_J	Junction Temperature Under Bias	150	$^{\circ}C$
θ_{JA}	Thermal Resistance SC70-5/SC-88A (Note 1) TSOP-5 ULLGA6/UDFN6	350 230 496	$^{\circ}C/W$
P_D	Power Dissipation in Still Air at 85 $^{\circ}C$ SC70-5/SC-88A (Note 1) TSOP-5 ULLGA6/UDFN6	150 200 252	mW
MSL	Moisture Sensitivity	Level 1	
F_R	Flammability Rating Oxygen Index: 28 to 34	UL 94 V-0 @ 0.125 in	
V_{ESD}	ESD Withstand Voltage Human Body Mode (Note 2) Machine Mode (Note 3) Charged Device Mode (Note 4)	>2000 >200 N/A	V
$I_{LATCHUP}$	Latchup Performance Above V_{CC} and Below GND at 85 $^{\circ}C$ (Note 5)	± 100	mA

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Measured with minimum pad spacing on an FR4 board, using 10 mm-by-1 inch, 2 ounce copper trace no air flow.
2. Tested to EIA/ JESD22-A114-A
3. Tested to EIA/ JESD22-A115-A
4. Tested to JESD22-C101-A
5. Tested to EIA / JESD78.

Table 2. RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{CC}	Positive DC Supply Voltage	4.0	5.5	V
V_I	Control Pin Input Voltage	0	5.5	V
$V_{I/O}$	Switch Input / Output Voltage	0	5.5	V
T_A	Operating Free-Air Temperature	-55	+125	$^{\circ}C$
$\Delta t / \Delta V$	Input Transition Rise or Fall Rate Control Input Switch I/O	0 0	5 DC	nS/V

Table 3. DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V _{CC} (V)	T _A = 25°C			T _A = -55°C to +125°C		Unit
				Min	Typ	Max	Min	Max	
V _{IK}	Clamp Diode Voltage	I _{IN} = -18 mA	4.5			-1.2		-1.2	V
V _{IH}	High-Level Input Voltage (Control)		4.0 to 5.5	2.0			2.0		V
V _{IL}	Low-Level Input Voltage (Control)		4.0 to 5.5			0.8		0.8	V
I _{IN}	Input Leakage Current	0 ≤ V _{IN} ≤ 5.5 V	5.5			±0.1		±1.0	μA
I _{OFF}	Power Off Leakage Current	V _{I/O} = 0 to 5.5 V	0			±0.1		±1.0	μA
I _{CC}	Quiescent Supply Current	I _O = 0, V _{IN} = V _{CC} or 0 V	5.5			±0.1		±1.0	μA
ΔI _{CC}	Increase in Supply Current (Control Pin)	One input at 3.4 V; Other inputs at V _{CC} or GND	5.5					2.5	mA
R _{ON}	Switch ON Resistance	V _{I/O} = 0, I _{I/O} = 64 mA I _{I/O} = 30 mA	4.5		3 3	7 7		7 7	Ω
		V _{I/O} = 2.4, I _{I/O} = 15 mA	4.5		6	15		15	
		V _{I/O} = 2.4, I _{I/O} = 15 mA	4.0		10	20		20	

Table 4. AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	V _{CC} (V)	Test Condition	T _A = 25°C			T _A = -55°C to +125°C		Unit
				Min	Typ	Max	Min	Max	
t _{PD}	Propagation Delay, A to B or B to A	4.0 to 5.5	See Figure 3			0.25		0.25	ns
					0.25		0.25		
t _{EN}	Output Enable Time	4.5 to 5.5		0.8	2.5	4.2	0.8	4.2	ns
		4.0		0.8	3.0	4.6	0.8	4.6	
t _{DIS}	Output Disable Time	4.5 to 5.5		0.8	3.1	4.8	0.8	4.8	ns
		4.0		0.8	2.9	4.4	0.8	4.4	
C _{IN}	Control Input Capacitance	5.0	V _{IN} = 3 V or 0		2.0			pF	
C _{IO(ON)}	Switch On Capacitance	5.0	Switch ON		10			pF	
C _{IO(OFF)}	Switch Off Capacitance	5.0	Switch OFF		3.5			pF	

AC Loading and Waveforms



LOAD CIRCUIT



VOLTAGE WAVEFORMS PROPAGATION DELAY TIMES

TEST	S1
t_{PD}	Open
t_{PLZ}/t_{PZL}	7 V
t_{PHZ}/t_{PZH}	GND



VOLTAGE WAVEFORMS ENABLE AND DISABLE TIMES

- A. C_L includes probe and jig capacitance.
- B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
- C. All input pulses are supplied by generators having the following characteristics: PRR \leq 10 MHz, $Z_O = 50 \Omega$, $t_r \leq 2.5$ ns, $t_f \leq 2.5$ ns.
- D. The output is measured with one input transition per measurement.
- E. t_{PLZ} and t_{PHZ} are the same as t_{dis} .
- F. t_{PZL} and t_{PZH} are the same as t_{en} .
- G. t_{PLH} and t_{PHL} are the same as t_{pd} .

Figure 4. Load Circuit and Voltage Waveforms

DEVICE ORDERING INFORMATION

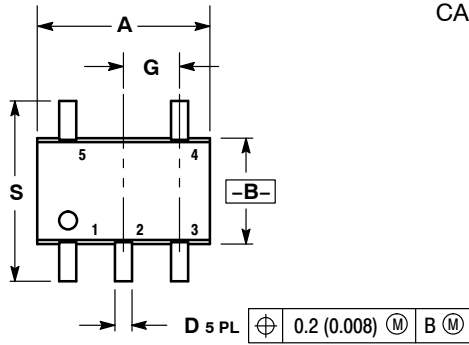
Device	Package	Shipping†
7SB385DTT1G	TSOP-5 (Pb-Free)	3000 / Tape & Reel
7SB385DFT2G	SC-88A (Pb-Free)	3000 / Tape & Reel
7SB385AMX1TCG	ULLGA6 – 0.5 mm Pitch (Pb-Free)	3000 / Tape & Reel
7SB385BMX1TCG	ULLGA6 – 0.4 mm Pitch (Pb-Free)	3000 / Tape & Reel
7SB385CMX1TCG	ULLGA6 – 0.35 mm Pitch (Pb-Free)	3000 / Tape & Reel
7SB385MUTCG	UDFN6 – 0.4 mm Pitch (Pb-Free)	3000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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PACKAGE DIMENSIONS

SC-88A, SOT-353, SC-70
CASE 419A-02
ISSUE J



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419A-01 OBSOLETE. NEW STANDARD 419A-02.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.071	0.087	1.80	2.20
B	0.045	0.053	1.15	1.35
C	0.031	0.043	0.80	1.10
D	0.004	0.012	0.10	0.30
G	0.026 BSC		0.65 BSC	
H	---	0.004	---	0.10
J	0.004	0.010	0.10	0.25
K	0.004	0.012	0.10	0.30
N	0.008 REF		0.20 REF	
S	0.079	0.087	2.00	2.20

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PACKAGE DIMENSIONS

TSOP-5 CASE 483-02 ISSUE H



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.
5. OPTIONAL CONSTRUCTION: AN ADDITIONAL TRIMMED LEAD IS ALLOWED IN THIS LOCATION. TRIMMED LEAD NOT TO EXTEND MORE THAN 0.2 FROM BODY.

MILLIMETERS		
DIM	MIN	MAX
A	3.00	BSC
B	1.50	BSC
C	0.90	1.10
D	0.25	0.50
G	0.95	BSC
H	0.01	0.10
J	0.10	0.26
K	0.20	0.60
L	1.25	1.55
M	0°	10°
S	2.50	3.00

SOLDERING FOOTPRINT*

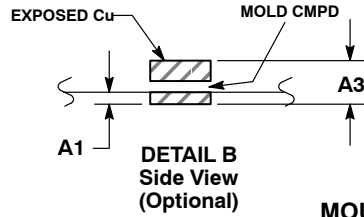
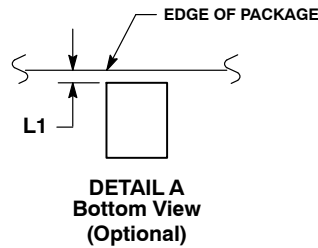


*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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PACKAGE DIMENSIONS

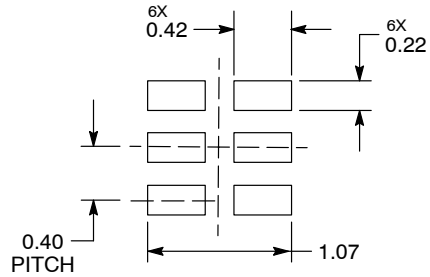
UDFN6 1.2x1.0, 0.4P
CASE 517AA-01
ISSUE C



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
 2. CONTROLLING DIMENSION: MILLIMETERS.
 3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.25 AND 0.30 mm FROM TERMINAL.
 4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

MILLIMETERS		
DIM	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A3	0.127	REF
b	0.15	0.25
D	1.20	BSC
E	1.00	BSC
e	0.40	BSC
L	0.30	0.40
L1	0.00	0.15
L2	0.40	0.50

MOUNTING FOOTPRINT*



DIMENSIONS: MILLIMETERS

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PACKAGE DIMENSIONS

ULLGA6 1.0x1.0, 0.35P CASE 613AD-01 ISSUE A

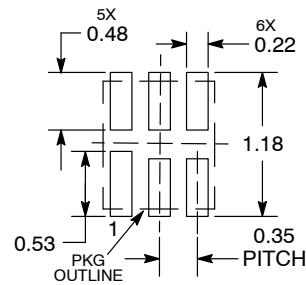


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM THE TERMINAL TIP.
4. A MAXIMUM OF 0.05 PULL BACK OF THE PLATED TERMINAL FROM THE EDGE OF THE PACKAGE IS ALLOWED.

MILLIMETERS		
DIM	MIN	MAX
A	---	0.40
A1	0.00	0.05
b	0.12	0.22
D	1.00 BSC	
E	1.00 BSC	
e	0.35 BSC	
L	0.25	0.35
L1	0.30	0.40

MOUNTING FOOTPRINT SOLDERMASK DEFINED*



DIMENSIONS: MILLIMETERS

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PACKAGE DIMENSIONS

ULLGA6 1.2x1.0, 0.4P
CASE 613AE-01
ISSUE A



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM THE TERMINAL TIP.
4. A MAXIMUM OF 0.05 PULL BACK OF THE PLATED TERMINAL FROM THE EDGE OF THE PACKAGE IS ALLOWED.

MILLIMETERS		
DIM	MIN	MAX
A	---	0.40
A1	0.00	0.05
b	0.15	0.25
D	1.20 BSC	
E	1.00 BSC	
e	0.40 BSC	
L	0.25	0.35
L1	0.35	0.45

**MOUNTING FOOTPRINT
SOLDERMASK DEFINED***



DIMENSIONS: MILLIMETERS

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PACKAGE DIMENSIONS

ULLGA6 1.45x1.0, 0.5P
CASE 613AF-01
ISSUE A

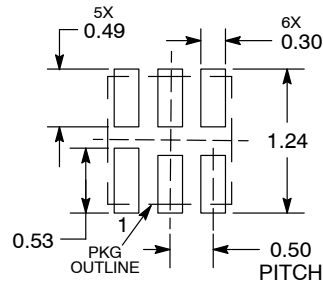


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4. A MAXIMUM OF 0.05 PULL BACK OF THE PLATED TERMINAL FROM THE EDGE OF THE PACKAGE IS ALLOWED.

DIM	MILLIMETERS	
	MIN	MAX
A	---	0.40
A1	0.00	0.05
b	0.15	0.25
D	1.45 BSC	
E	1.00 BSC	
e	0.50 BSC	
L	0.25	0.35
L1	0.30	0.40

MOUNTING FOOTPRINT SOLDERMASK DEFINED*



DIMENSIONS: MILLIMETERS

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