

SN54ABT863, SN74ABT863 9-BIT BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

SCBS201E – FEBRUARY 1991 – REVISED JULY 1998

- State-of-the-Art **EPIC-IITM** BiCMOS Design Significantly Reduces Power Dissipation
- Typical V_{OLP} (Output Ground Bounce) < 1 V at $V_{CC} = 5$ V, $T_A = 25^\circ\text{C}$
- High-Impedance State During Power Up and Power Down
- High-Drive Outputs ($-32\text{-mA } I_{OH}$, $64\text{-mA } I_{OL}$)
- Latch-Up Performance Exceeds 500 mA Per JESD 17
- ESD Protection Exceeds 2000 V Per MIL-STD-883, Method 3015; Exceeds 200 V Using Machine Model ($C = 200$ pF, $R = 0$)
- Package Options Include Plastic Small-Outline (DW), Shrink Small-Outline (DB) Packages, and Thin Shrink Small-Outline (PW), Ceramic Chip Carriers (FK), Plastic (NT), and Ceramic (JT) DIPs

description

The 'ABT863 devices are 9-bit transceivers designed for asynchronous communication between data buses. The control-function implementation allows for maximum flexibility in timing.

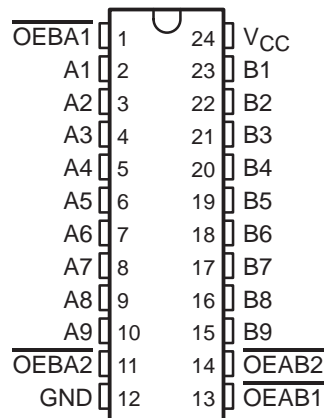
These devices allow noninverted data transmission from the A bus to the B bus or from the B bus to the A bus, depending on the logic levels at the output-enable ($\overline{\text{OEAB}}$ and $\overline{\text{OEBA}}$) inputs.

The outputs are in the high-impedance state during power up and power down. The outputs remain in the high-impedance state while the device is powered down.

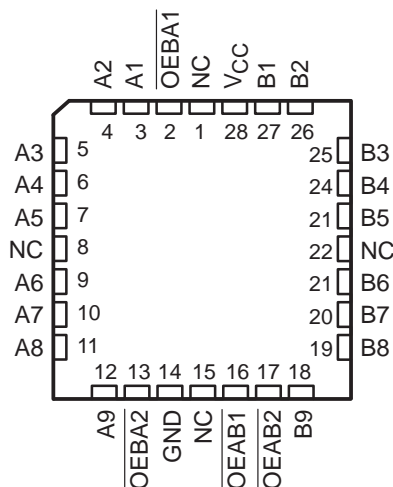
When V_{CC} is between 0 and 2.1 V, the device is in the high-impedance state during power up or power down. However, to ensure the high-impedance state above 2.1 V, $\overline{\text{OE}}$ should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

The SN54ABT863 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ABT863 is characterized for operation from -40°C to 85°C .

SN54ABT863 . . . JT PACKAGE
SN74ABT863 . . . DB, DW, NT, OR PW PACKAGE
(TOP VIEW)



SN54ABT863 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection



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**TEXAS
INSTRUMENTS**

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SN54ABT863, SN74ABT863

9-BIT BUS TRANSCEIVERS

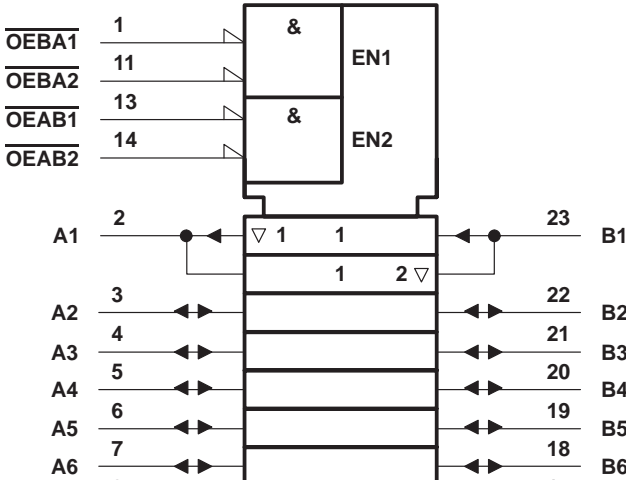
WITH 3-STATE OUTPUTS

SCBS201E – FEBRUARY 1991 – REVISED JULY 1998

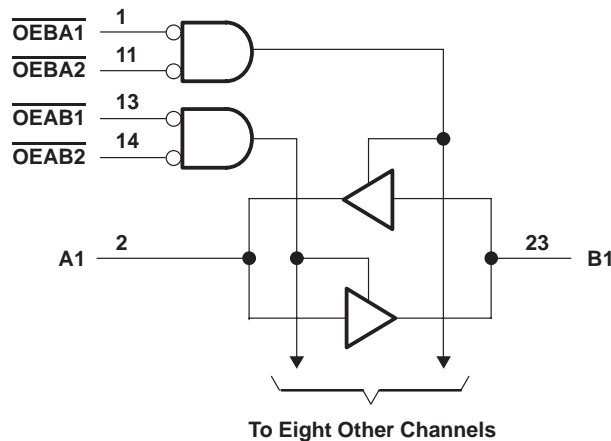
FUNCTION TABLE

INPUTS				OPERATION
OEAB1	OEAB2	OEBA1	OEBA2	
L	L	L	L	Latch A and B
L	L	H	X	A to B
L	L	X	H	
H	X	L	L	B to A
X	H	L	L	
H	X	H	X	Isolation
H	X	X	H	
X	H	X	H	
X	H	H	X	

logic symbol†



logic diagram (positive logic)



Pin numbers shown are for the DB, DW, JT, NT, and PW packages.

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)[†]

Supply voltage range, V_{CC}	–0.5 V to 7 V
Input voltage range, V_I (except I/O ports) (see Note 1)	–0.5 V to 7 V
Voltage range applied to any output in the high or power-off state, V_O	–0.5 V to 5.5 V
Current into any output in the low state, I_O : SN54ABT863	96 mA
SN74ABT863	128 mA
Input clamp current, I_{IK} ($V_I < 0$)	–18 mA
Output clamp current, I_{OK} ($V_O < 0$)	–50 mA
Package thermal impedance, θ_{JA} (see Note 2): DB package	104°C/W
DW package	81°C/W
NT package	67°C/W
PW package	120°C/W
Storage temperature range, T_{stg}	–65°C to 150°C

[†] 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 conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES: 1. The input and output negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
2. The package thermal impedance is calculated in accordance with JESD 51, except for through-hole packages, which use a trace length of zero.

SN54ABT863, SN74ABT863

9-BIT BUS TRANSCEIVERS

WITH 3-STATE OUTPUTS

SCBS201E – FEBRUARY 1991 – REVISED JULY 1998

recommended operating conditions (see Note 3)

		SN54ABT863		SN74ABT863		UNIT
		MIN	MAX	MIN	MAX	
V_{CC}	Supply voltage	4.5	5.5	4.5	5.5	V
V_{IH}	High-level input voltage	2		2		V
V_{IL}	Low-level input voltage		0.8		0.8	V
V_I	Input voltage	0	V_{CC}	0	V_{CC}	V
I_{OH}	High-level output current		–24		–32	mA
I_{OL}	Low-level output current		48		64	mA
$\Delta t/\Delta v$	Input transition rise or fall rate	Outputs enabled			5	ns/V
$\Delta t/\Delta V_{CC}$	Power-up ramp rate		200		200	$\mu s/V$
T_A	Operating free-air temperature	–55	125	–40	85	°C

NOTE 3: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

SN54ABT863, SN74ABT863
9-BIT BUS TRANSCEIVERS
WITH 3-STATE OUTPUTS

SCBS201E – FEBRUARY 1991 – REVISED JULY 1998

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS	T _A = 25°C			SN54ABT863		SN74ABT863		UNIT
		MIN	TYP†	MAX	MIN	MAX	MIN	MAX	
V _{IK}	V _{CC} = 4.5 V, I _I = –18 mA			–1.2		–1.2		–1.2	V
V _{OH}	V _{CC} = 4.5 V, I _{OH} = –3 mA	2.5			2.5		2.5		V
	V _{CC} = 5 V, I _{OH} = –3 mA	3			3		3		
	V _{CC} = 4.5 V	I _{OH} = –24 mA	2		2				
		I _{OH} = –32 mA	2*				2		
V _{OL}	V _{CC} = 4.5 V	I _{OL} = 48 mA		0.55	0.55				V
		I _{OL} = 64 mA		0.55*			0.55		
V _{hys}			100						mV
I _I	Control inputs	V _{CC} = 0 to 5.5 V, V _I = V _{CC} or GND		±1	±1		±1		μA
	A or B ports	V _{CC} = 2.1 V to 5.5 V, V _I = V _{CC} or GND		±20	±20		±20		
I _{OZPU}	V _{CC} = 0 to 2.1 V, V _O = 0.5 V to 2.7 V, OE = * don't care			±50	±50**		±50		μA
I _{OZPD}	V _{CC} = 2.1 V to 0, V _O = 0.5 V to 2.7 V, OE = * don't care			±50	±50**		±50		μA
I _{OZH} ‡	V _{CC} = 2.1 V to 5.5 V, V _O = 2.7 V, OE ≥ 2 V			10	10		10		μA
I _{OZL} ‡	V _{CC} = 2.1 V to 5.5 V, V _O = 0.5 V, OE ≥ 2 V			–10	–10		–10		μA
I _{off}	V _{CC} = 0, V _I or V _O ≤ 4.5 V			±100*			±100		μA
I _{CEX}	V _{CC} = 5.5 V, V _O = 5.5 V	Outputs high		50	50		50		μA
I _O §	V _{CC} = 5.5 V, V _O = 2.5 V			–50 –100 –225	–50 –225		–50 –225		mA
I _{CC}	A or B ports	V _{CC} = 5.5 V, I _O = 0, V _I = V _{CC} or GND	Outputs high	1 250	250		250		μA
			Outputs low	24 30	38		38		mA
			Outputs disabled	0.5 250	250		250		μA
ΔI _{CC} ¶	Data inputs	V _{CC} = 5.5 V, One input at 3.4 V, Other inputs at V _{CC} or GND	Outputs enabled	1.5	1.5		1.5		mA
			Outputs disabled	0.05	0.05		0.05		
	Control inputs	V _{CC} = 5.5 V, One input at 3.4 V, Other inputs at V _{CC} or GND		1.5	1.5		1.5		
C _i	Control inputs	V _I = 2.5 V or 0.5 V		4					pF
C _{io}	A or B ports	V _O = 2.5 V or 0.5 V		7					pF

* On products compliant to MIL-PRF-38535, this parameter does not apply.

** On products compliant to MIL-PRF-38535, this parameter is not production tested.

† All typical values are at V_{CC} = 5 V.

‡ The parameters I_{OZH} and I_{OZL} include the input leakage current.

§ Not more than one output should be tested at a time, and the duration of the test should not exceed one second.

¶ This is the increase in supply current for each input that is at the specified TTL voltage level rather than V_{CC} or GND.

SN54ABT863, SN74ABT863

9-BIT BUS TRANSCEIVERS

WITH 3-STATE OUTPUTS

SCBS201E – FEBRUARY 1991 – REVISED JULY 1998

switching characteristics over recommended ranges of supply voltage and operating free-air temperature, $C_L = 50$ pF (unless otherwise noted) (see Figure 1)

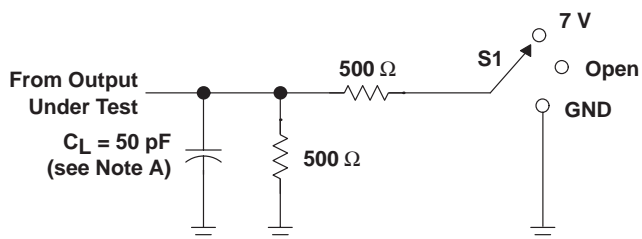
PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 5$ V, $T_A = 25^\circ\text{C}$			SN54ABT863		SN74ABT863		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	A or B	B or A	1	2.6	4.1	1	7	1	5.7	ns
t_{PHL}			1	2.3	3.3	1	3.9	1	3.9	
t_{PZH}	\overline{OEAB} or \overline{OEBA}	B or A	1	3.2	4.3	1	5.4	1	5.5	ns
t_{PZL}			1	3.3	4.4	1	5.5	1	5.4	
t_{PHZ}	\overline{OEAB} or \overline{OEBA}	B or A	2.5	4.8	6	2.5	6.8	2.5	6.7	ns
t_{PLZ}			1.5	4.4	5.9	1.5	7.8	1.5	6.9	

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PARAMETER MEASUREMENT INFORMATION



TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	7 V
t_{PHZ}/t_{PZH}	Open

LOAD CIRCUIT

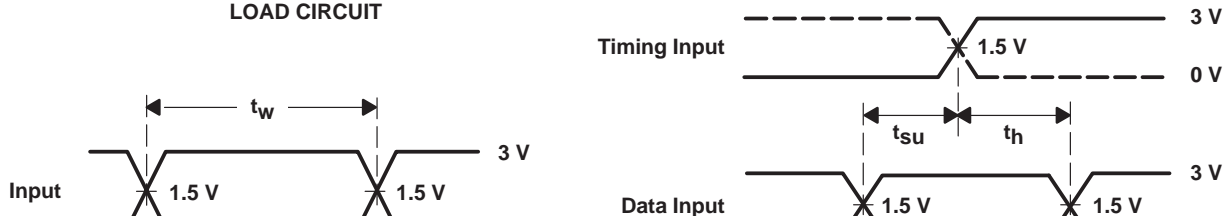


Figure 1. Load Circuit and Voltage Waveforms

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
SN74ABT863DW	Active	Production	SOIC (DW) 24	25 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT863
SN74ABT863DW.B	Active	Production	SOIC (DW) 24	25 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT863
SN74ABT863DWR	Active	Production	SOIC (DW) 24	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT863
SN74ABT863DWR.B	Active	Production	SOIC (DW) 24	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT863

⁽¹⁾ **Status:** For more details on status, see our [product life cycle](#).

⁽²⁾ **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

⁽³⁾ **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

⁽⁴⁾ **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

⁽⁵⁾ **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

⁽⁶⁾ **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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TAPE AND REEL INFORMATION



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74ABT863DWR	SOIC	DW	24	2000	330.0	24.4	10.75	15.7	2.7	12.0	24.0	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74ABT863DWR	SOIC	DW	24	2000	350.0	350.0	43.0

TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
SN74ABT863DW	DW	SOIC	24	25	506.98	12.7	4826	6.6
SN74ABT863DW.B	DW	SOIC	24	25	506.98	12.7	4826	6.6

DW (R-PDSO-G24)

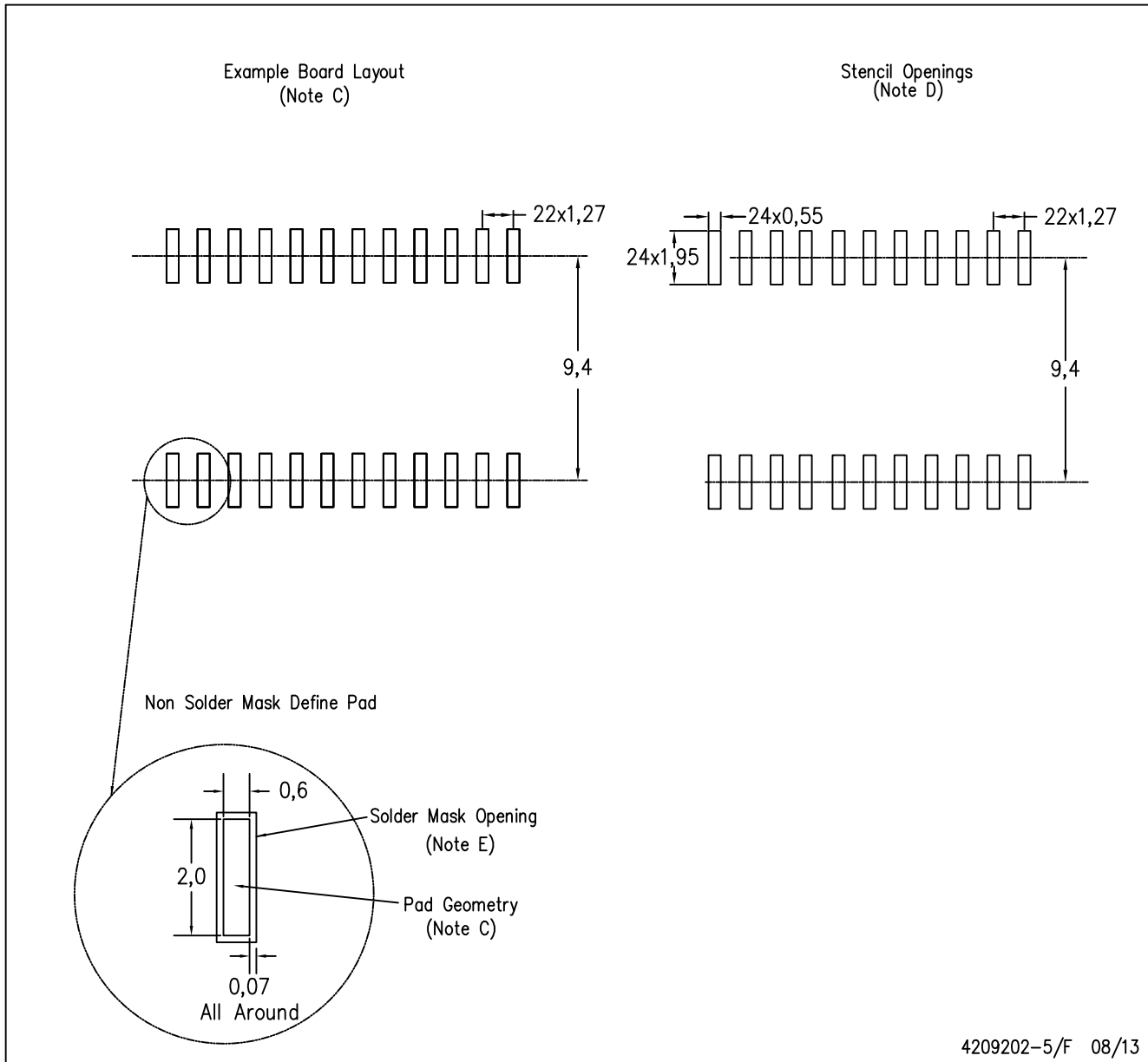
PLASTIC SMALL OUTLINE



- NOTES:
- All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M-1994.
 - This drawing is subject to change without notice.
 - Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
 - Falls within JEDEC MS-013 variation AD.

DW (R-PDSO-G24)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Refer to IPC7351 for alternate board design.
 - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525
 - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

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