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NC7SVL08 TinyLogic® Low- I_{CCT} Two-Input AND Gate

Features

- 0.9V to 3.6V V_{CC} Supply Operation
- 3.6V Over-Voltage Tolerant I/Os at V_{CC} from 0.9V to 3.6V
- Power-Off High-Impedance Inputs and Outputs
- Proprietary Quiet Series™ Noise / EMI Reduction Circuitry
- Ultra-Small MicroPak™ Packages
- Ultra-Low Dynamic Power

Description

The NC7SVL08 is a single two-input AND gate with a low- I_{CCT} input design from Fairchild's Ultra-Low Power (ULP-A) series of TinyLogic®. The NC7SVL08 features very low quiescent current, even when the input voltage is lower than the V_{CC} supply. This feature services mobile handset applications very well, allowing for direct interface with baseband processor general-purpose I/Os. Since mobile devices rely on a battery supply, the NC7SVL08 facilitates lower power consumption in mixed-voltage rail environments.

This product is designed on an advanced CMOS technology for a wide low-voltage operating range (0.9V to 3.6V V_{CC}), high drive needs (up to 24mA), and speed (maximum propagation delay of 3.5ns, V_{CC} =3.3V). It achieves this performance while maintaining low CMOS power dissipation.

Ordering Information

Part Number	Top Mark	Package	Packing Method
NC7SVL08P5X	L08	5-Lead SC70, EIAJ SC-88a, 1.25mm Wide	3000 Units on Tape & Reel
NC7SVL08L6X	CE	6-Lead MicroPak™, 1.00mm Wide	5000 Units on Tape & Reel
NC7SVL08FHX	CE	6-Lead, MicroPak2™, 1x1mm Body, .35mm Pitch	5000 Units on Tape & Reel

Connection Diagrams



Figure 1. Logic Symbol

Pin Configurations

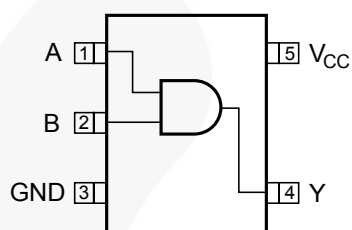


Figure 2. SC70 (Top View)

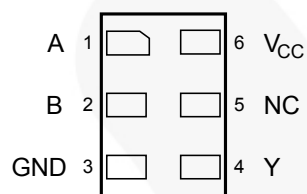


Figure 3. MicroPak™ (Top Through View)

Pin Definitions

Pin # SC70	Pin # MicroPak™	Name	Description
1	1	A	Input
2	2	B	Input
3	3	GND	Ground
4	4	Y	Output
	5	NC	No Connect
5	6	V _{CC}	Supply Voltage

Function Table

$Y = AB$

Inputs		Output
A	B	Y
L	L	L
L	H	L
H	L	L
H	H	H

L = Low Logic Level
H = High Logic Level

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameter		Min.	Max.	Unit
V _{CC}	Supply Voltage		-0.5	4.6	V
V _{IN}	DC Input Voltage		-0.5	4.6	V
V _{OUT}	DC Output Voltage	HIGH or LOW State ⁽¹⁾	-0.5	V _{CC} to +0.5	V
		V _{CC} =0V	-0.5	4.6	V
I _{IK}	DC Input Diode Current	V _{IN} < 0V		-50	mA
I _{OK}	DC Output Diode Current	V _{OUT} < 0V		-50	mA
		V _{OUT} > V _{CC}		+50	
I _{OH} / I _{OL}	DC Output Source/Sink Current			±50	mA
I _{CC} or I _{GND}	DC V _{CC} or Ground Current per Supply Pin			±50	mA
T _{STG}	Storage Temperature Range		-65	+150	°C
T _J	Junction Temperature Under Bias			+150	°C
T _L	Junction Lead Temperature (Soldering, 10 Seconds)			+260	°C
P _D	Power Dissipation at +85°C	SC70-5		150	mW
		MicroPak™-6		130	
		MicroPak2™-6		120	
ESD	Human Body Model	JEDEC: JESD22-A114		4000	V
	Charged Device Model	JEDEC: JESD22-C101		2000	

Note:

1. The I_O maximum rating must be observed.

Recommended Operating Conditions

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. Fairchild does not recommend exceeding them or designing to Absolute Maximum Ratings.

Symbol	Parameter	Conditions	Min.	Max.	Unit
V _{CC}	Supply Voltage		0.9	3.6	V
V _{IN}	Input Voltage ⁽²⁾		0	3.6	V
V _{OUT}	Output Voltage	HIGH or LOW State	0	V _{CC}	V
		V _{CC} =0V	0	3.6	
I _{OH} / I _{OL}	Output Current in I _{OH} / I _{OL}	V _{CC} =3.0V to 3.6V		±24.0	mA
		V _{CC} =2.3V to 2.7V		±18.0	
		V _{CC} =1.65V to 1.95V		±6.0	
		V _{CC} =1.40V to 1.60V		±4.0	
		V _{CC} =1.10V to 1.30V		±2.0	
		V _{CC} =0.9V		±0.1	µA
T _A	Free Air Operating Temperature		-40	+85	°C
Δt / ΔV	Minimum Input Edge Rate	V _{IN} =0.8V to 2.0V, V _{CC} =3.0V		10	ns/V
θ _{JA}	Thermal Resistance	SC70-5		425	°C/W
		MicroPak™-6		500	
		MicroPak2™-6		560	

Note:

2. Unused inputs must be held HIGH or LOW. They may not float.

DC Electrical Characteristics

Symbol	Parameter	V _{CC}	Conditions	T _A =25°C		T _A =-40 to 85°C		Units
				Min.	Max.	Min.	Max.	
V _{IH}	HIGH Level Input Voltage	0.90		0.65 x V _{CC}		0.65 x V _{CC}		V
		1.10 ≤ V _{CC} ≤ 1.30		0.65 x V _{CC}		0.65 x V _{CC}		
		1.40 ≤ V _{CC} ≤ 1.60		0.65 x V _{CC}		0.65 x V _{CC}		
		1.65 ≤ V _{CC} ≤ 1.95		0.9		0.9		
		2.30 ≤ V _{CC} ≤ 2.70		1.5		1.5		
		2.70 ≤ V _{CC} ≤ 3.60		1.5		1.5		
V _{IL}	LOW Level Input Voltage	0.90			0.25 x V _{CC}		0.25 x V _{CC}	V
		1.10 ≤ V _{CC} ≤ 1.30			0.25 x V _{CC}		0.25 x V _{CC}	
		1.40 ≤ V _{CC} ≤ 1.60			0.25 x V _{CC}		0.25 x V _{CC}	
		1.65 ≤ V _{CC} ≤ 1.95			0.25 x V _{CC}		0.25 x V _{CC}	
		2.30 ≤ V _{CC} ≤ 2.70			0.7		0.7	
		2.70 ≤ V _{CC} ≤ 3.60			0.8		0.8	
V _{OH}	HIGH Level Output Voltage	0.90	I _{OH} =-100μA	V _{CC} - 0.1		V _{CC} - 0.1		V
		1.10 ≤ V _{CC} ≤ 1.30		V _{CC} - 0.1		V _{CC} - 0.1		
		1.40 ≤ V _{CC} ≤ 1.60		V _{CC} - 0.2		V _{CC} - 0.2		
		1.65 ≤ V _{CC} ≤ 1.95		V _{CC} - 0.2		V _{CC} - 0.2		
		2.30 ≤ V _{CC} ≤ 2.70		V _{CC} - 0.2		V _{CC} - 0.2		
		2.70 ≤ V _{CC} ≤ 3.60		V _{CC} - 0.2		V _{CC} - 0.2		
		1.10 ≤ V _{CC} ≤ 1.30	I _{OH} =-2mA	0.75 x V _{CC}		0.75 x V _{CC}		
		1.40 ≤ V _{CC} ≤ 1.60	I _{OH} =-4mA	0.75 x V _{CC}		0.75 x V _{CC}		
		1.65 ≤ V _{CC} ≤ 1.95	I _{OH} =-6mA	1.25		1.25		
		2.30 ≤ V _{CC} ≤ 2.70		2.0		2.0		
		2.30 ≤ V _{CC} ≤ 2.70	I _{OH} =-12mA	1.8		1.8		
		2.70 ≤ V _{CC} ≤ 3.60		2.2		2.2		
		2.30 ≤ V _{CC} ≤ 2.70	I _{OH} =-18mA	1.7		1.7		
		2.70 ≤ V _{CC} ≤ 3.60		2.4		2.4		
		2.70 ≤ V _{CC} ≤ 3.60	I _{OH} =-24mA	2.2		2.2		
V _{OL}	LOW Level Output Voltage	0.90	I _{OL} =100μA		0.10		0.10	V
		1.10 ≤ V _{CC} ≤ 1.30			0.10		0.10	
		1.40 ≤ V _{CC} ≤ 1.60			0.20		0.20	
		1.65 ≤ V _{CC} ≤ 1.95			0.20		0.20	
		2.30 ≤ V _{CC} ≤ 2.70			0.20		0.20	
		2.70 ≤ V _{CC} ≤ 3.60			0.20		0.20	
		1.10 ≤ V _{CC} ≤ 1.30	I _{OL} =2mA		0.25 x V _{CC}		0.25 x V _{CC}	
		1.40 ≤ V _{CC} ≤ 1.60	I _{OL} =4mA		0.25 x V _{CC}		0.25 x V _{CC}	
		1.65 ≤ V _{CC} ≤ 1.95	I _{OL} =6mA		0.30		0.30	
		2.30 ≤ V _{CC} ≤ 2.70	I _{OL} =12mA		0.40		0.40	
		2.70 ≤ V _{CC} ≤ 3.60			0.40		0.40	
		2.30 ≤ V _{CC} ≤ 2.70	I _{OL} =18mA		0.60		0.60	
		2.70 ≤ V _{CC} ≤ 3.60			0.40		0.40	
		2.70 ≤ V _{CC} ≤ 3.60	I _{OL} =24mA		0.55		0.55	
I _{IN}	Input Leakage Current	0.90 to 3.60	0 ≤ V _{IN} ≤ 3.6V		±0.1		±0.5	μA
I _{OFF}	Power Off Leakage Current	0	0 ≤ (V _{IN} , V _O) ≤ 3.6V		0.5		0.5	μA
I _{CC}	Quiescent Supply Current	0.90 to 3.60	V _{IN} =V _{CC} or GND		0.9		0.9	μA
			V _{CC} ≤ V _{IN} ≤ 3.6V				±0.9	
I _{CCT}	Increase in I _{CC} per Input	1.95	V _{IN} =0.9V		6		8	μA
		3.6	V _{IN} =1.5V		6		8	

AC Electrical Characteristics

Symbol	Parameter	V _{CC}	Conditions	T _A =25°C			T _A =-40 to 85°C		Units	Figure
				Min.	Typ.	Max.	Min.	Max.		
t _{PHL} , t _{PLH}	Propagation Delay	0.90	C _L =15pF, R _L =1MΩ		45.0				ns	Figure 4, Figure 5
		1.10 ≤ V _{CC} ≤ 1.30	C _L =15pF, R _L =2kΩ	3.5	8.2	17.5	3.0	30.5		
		1.40 ≤ V _{CC} ≤ 1.60		1.5	4.0	7.0	1.5	7.5		
		1.65 ≤ V _{CC} ≤ 1.95	C _L =30pF, R _L =500Ω	1.1	3.0	5.5	1.0	6.0		
		2.30 ≤ V _{CC} ≤ 2.70		0.6	2.2	4.0	0.6	4.5		
		2.70 ≤ V _{CC} ≤ 3.60		0.5	1.6	3.5	0.5	4.0		
C _{IN}	Input Capacitance	0			3				pF	
C _{PD}	Power Dissipation Capacitance	0.90 to 3.60	V _{IN} =0V or V _{CC} , f=10MHz		5				pF	

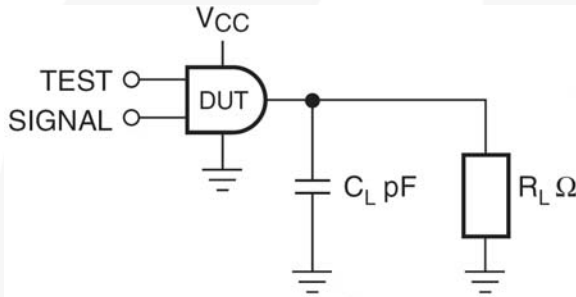


Figure 4. AC Test Circuit

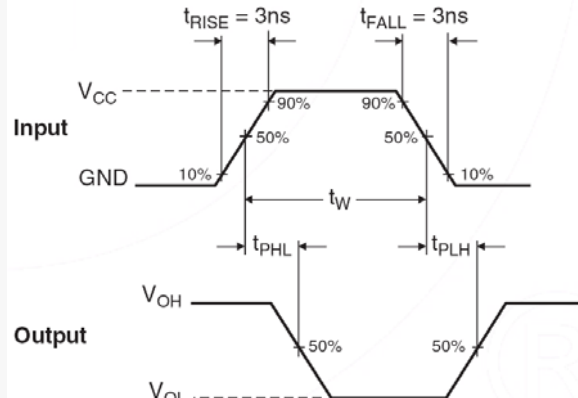


Figure 5. AC Waveforms

Symbol	V _{CC}					
	3.3V ± 0.3V	2.5V ± 0.2V	1.8V ± 0.15V	1.5V ± 0.1V	1.2V ± 0.1V	0.9V
V _{mi}	1.5V	V _{CC} / 2	V _{CC} / 2	V _{CC} / 2	V _{CC} / 2	V _{CC} / 2
V _{mo}	1.5V	V _{CC} / 2	V _{CC} / 2	V _{CC} / 2	V _{CC} / 2	V _{CC} / 2

Physical Dimensions

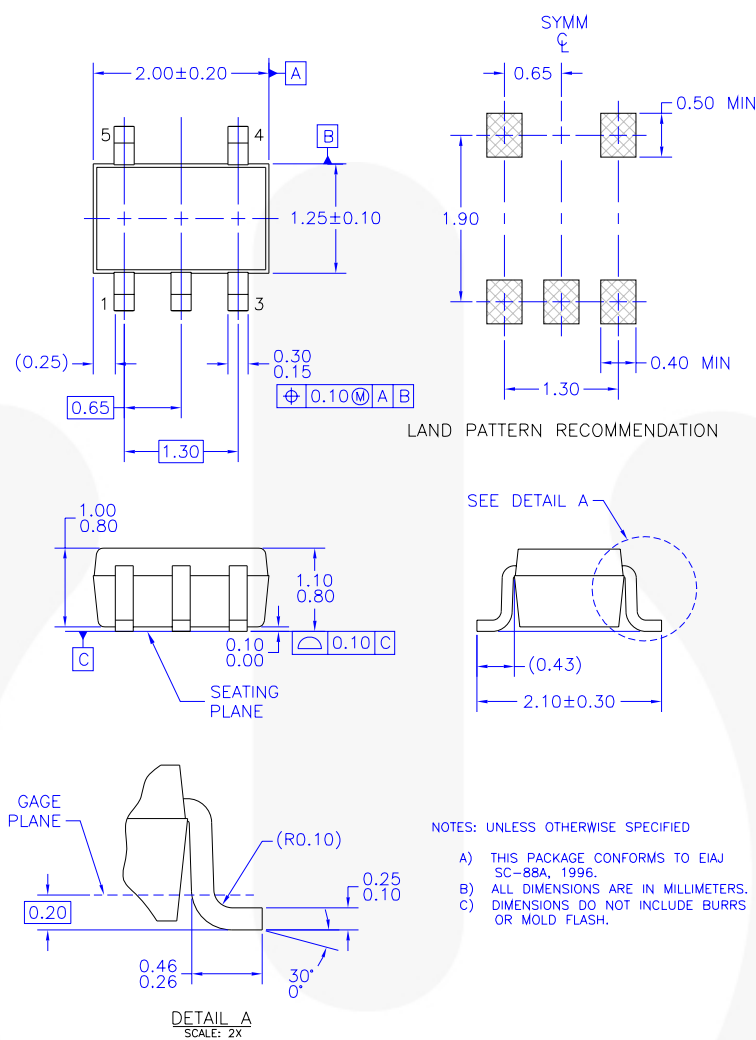


Figure 6. 5-Lead, SC70, EIAJ SC-88a, 1.25mm Wide

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Tape and Reel Specifications

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http://www.fairchildsemi.com/products/analog/pdf/sc70-5_tr.pdf

Package Designator	Tape Section	Cavity Number	Cavity Status	Cover Type Status
P5X	Leader (Start End)	125 (Typical)	Empty	Sealed
	Carrier	3000	Filled	Sealed
	Trailer (Hub End)	75 (Typical)	Empty	Sealed

Physical Dimensions

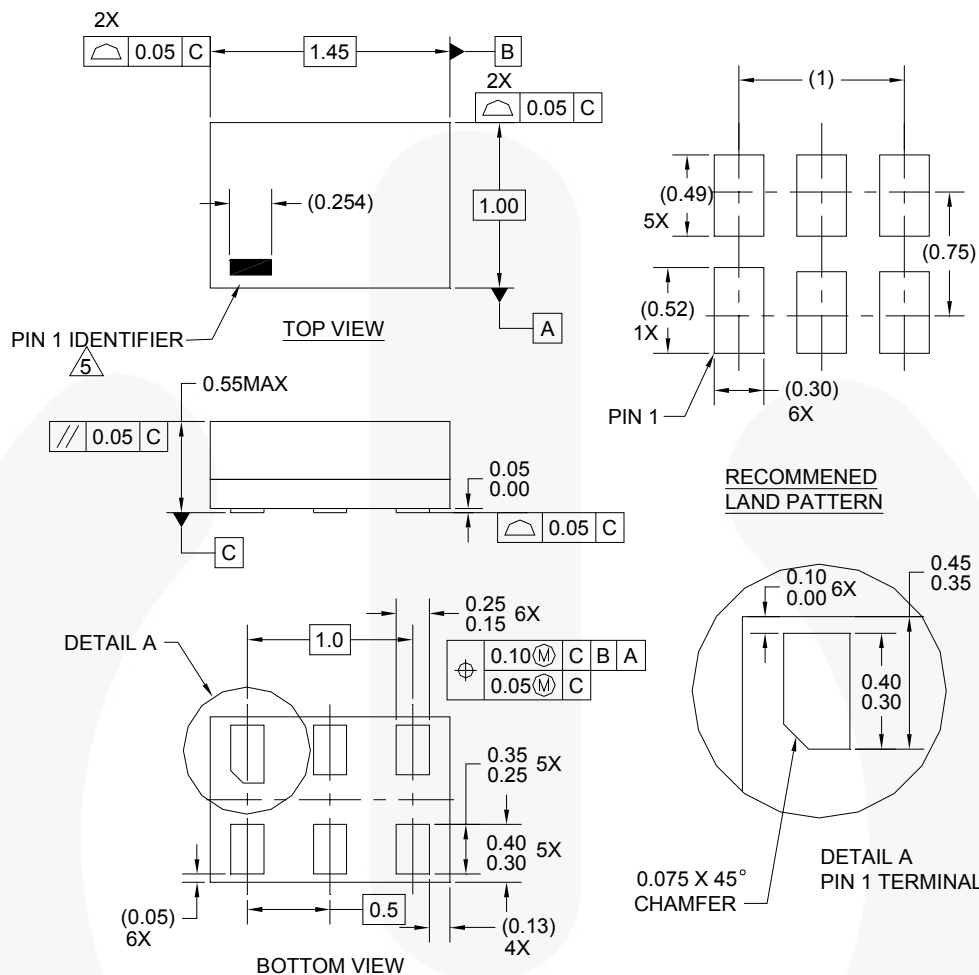


Figure 7. 6-Lead, MicroPak™, 1.0mm Wide

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http://www.fairchildsemi.com/products/logic/pdf/micropak_tr.pdf

Package Designator	Tape Section	Cavity Number	Cavity Status	Cover Type Status
L6X	Leader (Start End)	125 (Typical)	Empty	Sealed
	Carrier	5000	Filled	Sealed
	Trailer (Hub End)	75 (Typical)	Empty	Sealed

Physical Dimensions

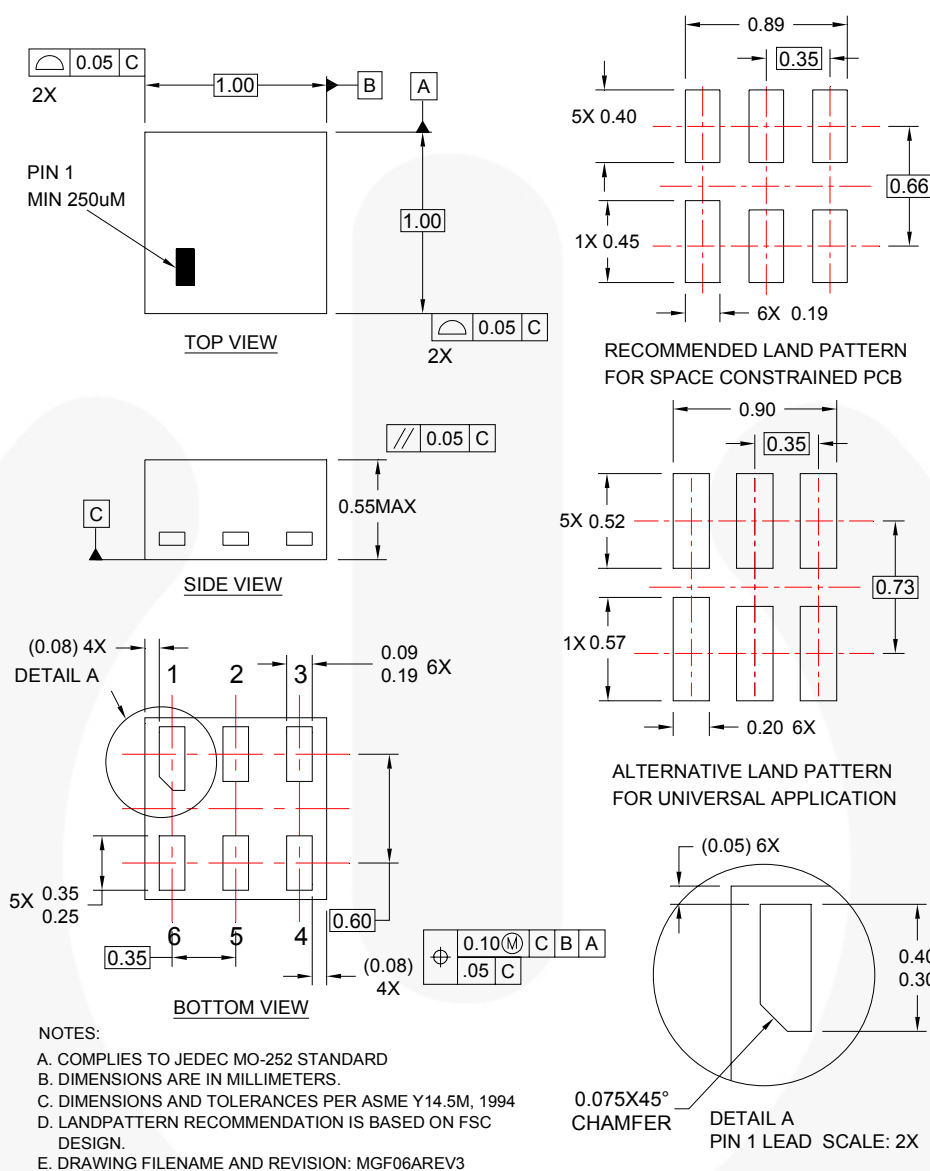


Figure 8. 6-Lead, MicroPak™2, 1x1mm Body, .35mm Pitch

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Tape and Reel Specifications

Please visit Fairchild Semiconductor's online packaging area for the most recent tape and reel specifications:

http://www.fairchildsemi.com/packaging/MicroPAK2_6L_tr.pdf

Package Designator	Tape Section	Cavity Number	Cavity Status	Cover Type Status
FHX	Leader (Start End)	125 (Typical)	Empty	Sealed
	Carrier	5000	Filled	Sealed
	Trailer (Hub End)	75 (Typical)	Empty	Sealed



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