FAIRCHILD™

April 2015

74LCX157
Low Voltage Quad 2-Input Multiplexer
with 5 V Tolerant Inputs

Features

- 5 V Tolerant Inputs
- 2.3 V – 3.6 V, V_{CC} Specifications Provided
- 5.8 ns t_{PD} max. (V_{CC} = 3.3 V), 10 µA I_{CC} max.
- Power Down High Impedance Inputs and Outputs
- ±24 mA Output Drive (V_{CC} = 3.0 V)
- Implements Patented Noise/EMI Reduction Circuitry
- Latch-Up Performance Exceeds 500 mA
- ESD Performance:
  Human Body Model > 2000 V
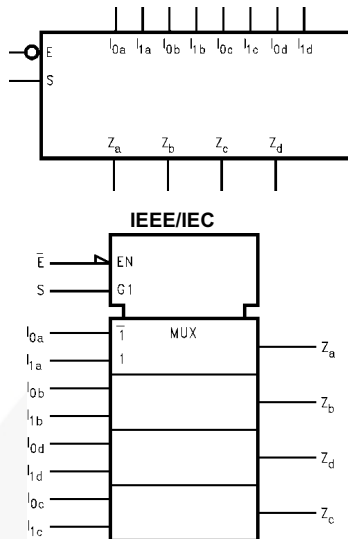 Machine Model > 200 V

General Description

The LCX157 is a high-speed quad 2-input multiplexer. Four bits of data from two sources can be selected using the common Select and Enable inputs. The four outputs present the selected data in the true (noninverted) form.

The LCX157 can also be used as a function generator.

The 74LCX157 is fabricated with advanced CMOS technology to achieve high speed operation while maintaining CMOS low power dissipation.
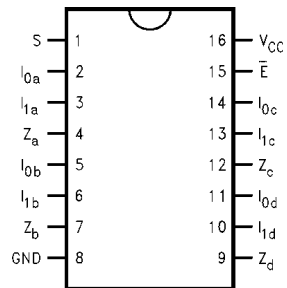
Ordering Information

Part Number	Top Mark	Package	Packing Method
74LCX157M	LCX157	SOIC 16L	Rail
74LCX157MX	LCX157	SOIC 16L	Tape and Reel
74LCX157MTC	LCX157	TSSOP 16L	Rail
74LCX157MTCX	LCX157	TSSOP 16L	Tape and Reel

Logic Symbols

IEEE/IEC

Connection Diagram

Pin Descriptions

Pin Names	Description
I_{0a}–I_{0d}	Source 0 Data Inputs
I_{1a}–I_{1d}	Source 1 Data Inputs
$\overline{E}$	Enable Input
S	Select Input
Z_a–Z_d	Outputs

Functional Description

The LCX157 is a quad 2-input multiplexer. It selects four bits of data from two sources under the control of a common Select input (S). The Enable input ($\overline{E}$) is active-LOW. When $\overline{E}$ is HIGH, all of the outputs (Z) are forced LOW regardless of all other inputs. The LCX157 is the logic implementation of a 4-pole, 2-position switch where the position of the switch is determined by the logic levels supplied to the Select input. The logic equations for the outputs are shown below:

$$Z_a = \overline{E} \bullet (I_{1a} \bullet S + I_{0a} \bullet \overline{S})$$
$$Z_b = \overline{E} \bullet (I_{1b} \bullet S + I_{0b} \bullet \overline{S})$$
$$Z_c = \overline{E} \bullet (I_{1c} \bullet S + I_{0c} \bullet \overline{S})$$
$$Z_d = \overline{E} \bullet (I_{1d} \bullet S + I_{0d} \bullet \overline{S})$$

A common use of the LCX157 is the moving of data from two groups of registers to four common output busses. The particular register from which the data comes is determined by the state of the Select input. A less obvious use is as a function generator. The LCX157 can generate any four of the sixteen different functions of two variables with one variable common. This is useful for implementing gating functions.

Truth Table

Inputs				Outputs
$\overline{E}$	S	I_0	I_1	Z
H	X	X	X	L
L	H	X	L	L
L	H	X	H	H
L	L	L	X	L
L	L	H	X	H

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial

www.fairchildsemi.com
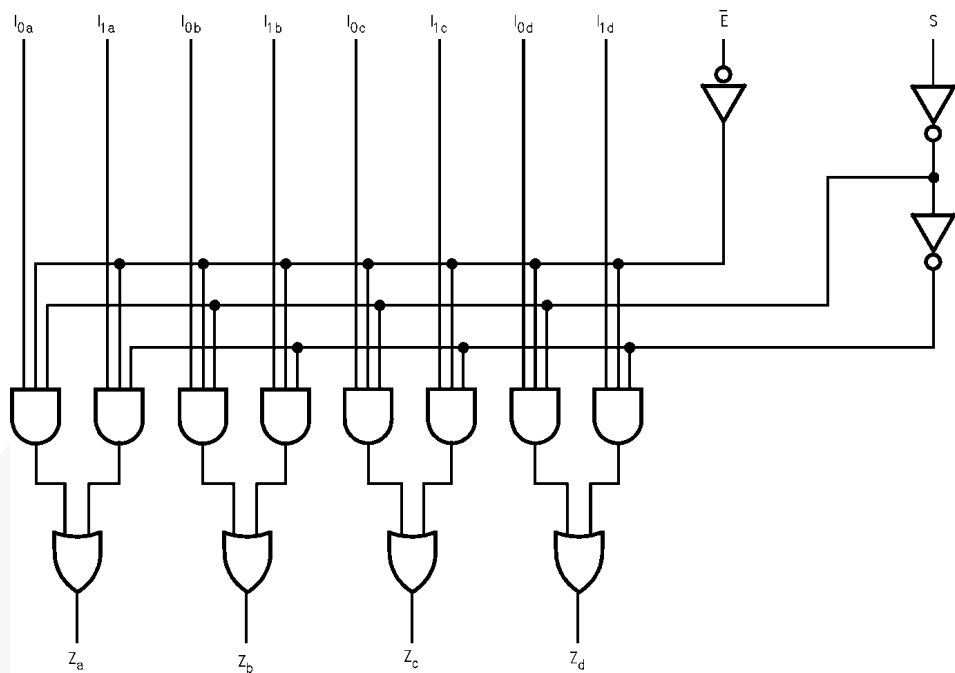
Logic Diagram[1]

Note:

1. Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

Absolute Maximum Ratings[2]

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	Value	Conditions	Unit
V_{CC}	Supply Voltage	-0.5 to +7.0		V
V_I	DC Input Voltage	-0.5 to +7.0		V
V_O	DC Output Voltage	-0.5 to V_{CC}+0.5	Output in HIGH or LOW State[3]	V
I_{IK}	DC Input Diode Current	-50	$V_I <$ GND	mA
I_{OK}	DC Output Diode Current	-50	$V_O <$ GND	mA
		+50	$V_O > V_{CC}$	
I_O	DC Output Source/Sink Current	±50		mA
I_{CC}	DC Supply Current per Supply Pin	±100		mA
I_{GND}	DC Ground Current per Ground Pin	±100		mA
T_{STG}	Storage Temperature	-65 to +150		°C

Notes:

2. The Absolute Maximum Ratings are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the Absolute Maximum Ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

3. I_O Absolute Maximum Rating must be observed.

Recommended Operating Conditions[4]

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		Min.	Max.	Unit
V_{CC}	Supply Voltage	Operating	2.0	3.6	V
V_{IN}	Input Voltage		0	5.5	V
V_{OUT}	Output Voltage	HIGH or LOW State	0	V_{CC}	V
I_{OH}/I_{OL}	Output Current	V_{CC} = 3.0 V - 3.6 V		±24	mA
		V_{CC} = 2.7 V - 3.0 V		±12	
		V_{CC} = 2.3 V - 2.7 V		±8	
T_A	Free-Air Operating Temperature		-40	85	°C
$\Delta t/\Delta V$	Input Edge Rate, V_{IN} = 0.8 V - 2.0 V, V_{CC} = 3.0 V		0	10	ns/V

Note:

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

DC Electrical Characteristics

Symbol	Parameter	Conditions	V_{CC} (V)	T_A = -40 to +85°C Min.	T_A = -40 to +85°C Max.	Unit
V_{IH}	HIGH Level Input Voltage		2.3 - 2.7	1.7		V
			2.7 - 3.6	2.0		
V_{IL}	LOW Level Input Voltage		2.3 - 2.7		0.7	V
			2.7 - 3.6		0.8	
V_{OH}	HIGH Level Output Voltage	I_{OH} = -100 µA	2.3 - 3.6	V_{CC} - 0.2		V
		I_{OH} = -8 mA	2.3	1.8		
		I_{OH} = -12 mA	2.7	2.2		
		I_{OH} = -18 mA	3.0	2.4		
		I_{OH} = -24 mA	3.0	2.2		
V_{OL}	LOW Level Output Voltage	I_{OL} = 100 µA	2.3 - 3.6		0.2	V
		I_{OL} = 8 mA	2.3		0.6	
		I_{OL} = 12 mA	2.7		0.4	
		I_{OL} = 16 mA	3.0		0.4	
		I_{OL} = 24 mA	3.0		0.55	
I_I	Input Leakage Current	$0 \leq V_I \leq 5.5$ V	2.3 - 3.6		±5.0	µA
I_{OFF}	Power-Off Leakage Current	V_I or V_O = 5.5 V	0		10	µA
I_{CC}	Quiescent Supply Current	$V_I = V_{CC}$ or GND	2.3 - 3.6		10	µA
		3.6 V $\leq V_I \leq 5.5$ V	2.3 - 3.6		±10	
ΔI_{CC}	Increase in I_{CC} per Input	$V_{IH} = V_{CC}$ - 0.6 V	2.3 - 3.6		500	µA

AC Electrical Characteristics

Symbol	Parameter	T_A = -40 to +85°C, R_L = 500 Ω						Unit
		V_{CC} = 3.3 V ± 0.3 V		V_{CC} = 2.7 V		V_{CC} = 2.5 V ± 0.2 V		
		C_L = 50 pF		C_L = 50 pF		C_L = 30 pF		
		Min.	Max.	Min.	Max.	Min.	Max.	
t_{PHL}	Propagation Delay	1.5	7.0	1.5	8.0	1.5	8.4	ns
t_{PLH}	S -> Z_n	1.5	7.0	1.5	8.0	1.5	8.4	
t_{PHL}	Propagation Delay	1.5	7.0	1.5	8.0	1.5	8.4	ns
t_{PLH}	$\overline{E}$ -> Z_n	1.5	7.0	1.5	8.0	1.5	8.4	
t_{PHL}	Propagation Delay	1.5	5.8	1.5	6.3	1.5	7.0	ns
t_{PLH}	I_n -> Z_n	1.5	5.8	1.5	6.3	1.5	7.0	
t_{OSHL}	Output to Output Skew[5]		1.0					ns
t_{OSLH}			1.0					

Note:

5. Skew is defined as the absolute value of the difference between the actual propagation delay for any two separate outputs of the same device. The specification applies to any outputs switching in the same direction, either HIGH-to-LOW (t_{OSHL}) or LOW-to-HIGH (t_{OSLH}). Parameter guaranteed by design.

Dynamic Switching Characteristics

Symbol	Parameter	Conditions	V_{CC} (V)	T_A = 25°C Typical	Unit
V_{OLP}	Quiet Output Dynamic Peak V_{OL}	C_L = 50 pF, V_{IH} = 3.3 V, V_{IL} = 0 V	3.3	0.8	V
		C_L = 30 pF, V_{IH} = 2.5 V, V_{IL} = 0 V	2.5	0.6	
V_{OLV}	Quiet Output Dynamic Valley V_{OL}	C_L = 50 pF, V_{IH} = 3.3 V, V_{IL} = 0 V	3.3	-0.8	V
		C_L = 30 pF, V_{IH} = 2.5 V, V_{IL} = 0 V	2.5	-0.6	

Capacitance

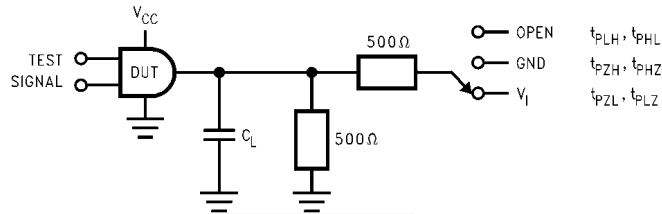| Symbol	Parameter	Conditions	Typical	Unit
C_{IN}	Input Capacitance	V_{CC} = Open, V_I = 0 V or V_{CC}	7	pF
C_{OUT}	Output Capacitance	V_{CC} = 3.3 V, V_I = 0 V or V_{CC}	8	pF
C_{PD}	Power Dissipation Capacitance	V_{CC} = 3.3 V, V_I = 0 V or V_{CC}, f = 10 MHz	25	pF

AC Loading and Waveforms Generic for LCX Family

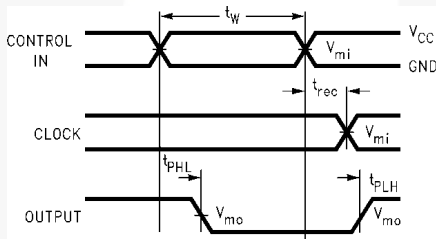**Figure 1. AC Test Circuit (C$_L$ includes probe and jig capacitance)**

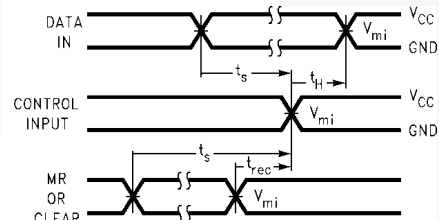| Test	Switch
t$_{PLH}$, t$_{PHL}$	Open
t$_{PZL}$, t$_{PLZ}$	6V at V$_{CC}$ = 3.3 ± 0.3V V$_{CC}$ x 2 at V$_{CC}$ = 2.5 ± 0.2V
t$_{PZH}$, t$_{PHZ}$	GND
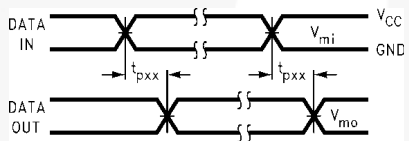
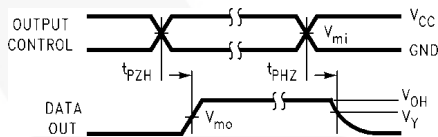**Waveform for Inverting and Non-Inverting Functions**
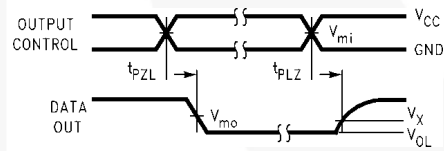
3-STATE Output Low Enable and Disable Times for Logic

Propagation Delay. Pulse Width and t$_{rec}$ Waveforms

Setup Time, Hold Time and Recovery Time for Logic

3-STATE Output High Enable and Disable Times for Logic

t$_{rise}$ and t$_{fall}$
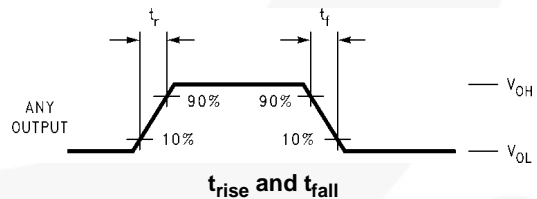
Figure 2. Waveforms
(Input Characteristics; f = 1 MHz, t$_r$ = t$_f$ = 3 ns)

Symbol	V$_{CC}$		
	3.3V ± 0.3V	**2.7V**	**2.5V ± 0.2V**
V$_{mi}$	1.5V	1.5V	V$_{CC}$/2
V$_{mo}$	1.5V	1.5V	V$_{CC}$/2
V$_x$	V$_{OL}$ + 0.3V	V$_{OL}$ + 0.3V	V$_{OL}$ + 0.15V
V$_y$	V$_{OH}$ − 0.3V	V$_{OH}$ − 0.3V	V$_{OH}$ − 0.15V

Schematic Diagram Generic for LCX Family

Physical Dimensions

10.00
9.80

8.89

A

16   9

B

1.75

6.00

4.00
3.80

5.6

PIN ONE
INDICATOR

1

8

1.27

0.51
0.35

1.27

0.65

(0.30)

$\oplus$ | 0.25 Ⓜ | C | B | A

LAND PATTERN RECOMMENDATION

1.75 MAX
1.50
1.25

0.25
0.10

C

SEE DETAIL A

0.25
0.19

$\bigcap$ | 0.10 | C

0.50
0.25   X 45°

(R0.10)

(R0.10)

GAGE PLANE

8°
0°

0.36

0.90
0.50

SEATING PLANE

(1.04)

DETAIL A
SCALE: 2:1

NOTES: UNLESS OTHERWISE SPECIFIED

A) THIS PACKAGE CONFORMS TO JEDEC
   MS-012, VARIATION AC, ISSUE C.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD
   FLASH AND TIE BAR PROTRUSIONS
D) CONFORMS TO ASME Y14.5M-1994
E) LANDPATTERN STANDARD: SOIC127P600X175-16AM
F) DRAWING FILE NAME: M16AREV12.

Figure 3. 16-LEAD, SOIC, JEDEC MS-012, 0.150 INCH, NARROW BODY

Physical Dimensions (Continued)

5.00±0.10

4.55

16   9

6.4

3.2

4.4±0.1

◯ 0.2 C B A
ALL LEAD TIPS

1   8

PIN #1 IDENT.

0.11

ALL LEAD TIPS
◯ 0.1 C

1.1 MAX

(0.90)

-C-

0.65   0.19 - 0.30

0.10±0.05

⊕ 0.10 Ⓜ A BⓈ CⓈ

5.90

4.45   7.35

0.65

1.45

5.00

LAND PATTERN RECOMMENDATION (F)

SEE DETAIL A

0.09-0.20

12° TOP AND BOTTOM

GAGE PLANE

0.25

0°-8°

0.6±0.1

SEATING PLANE

DETAIL A

NOTES:

A. CONFORMS TO JEDEC REGISTRATION MO-153, VARIATION AB,
B. DIMENSIONS ARE IN MILLIMETERS
C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH,
   AND TIE BAR EXTRUSIONS
D. DIMENSIONING AND TOLERANCES PER ANSI Y14.5M, 1994
E. DRAWING FILE NAME: MTC16REV4
F. LAND PATTERN RECOMMENDATION PER IPC7351 - ID#
   TSOP65P640X110-16N

MTC16rev4

Figure 4. 16-LEAD, TSSOP, JEDEC MO-153, 4.4 MM WIDE

TRADEMARKS

The following includes registered and unregistered trademarks and service marks, owned by Fairchild Semiconductor and/or its global subsidiaries, and is not intended to be an exhaustive list of all such trademarks.

AccuPower™	F-PFS™	OPTOPLANAR®	**SYSTEM GENERAL**®*
AttitudeEngine™	FRFET®		
Awinda®	Global Power Resource℠	®	TinyBoost®
AX-CAP®*	GreenBridge™	Power Supply WebDesigner™	TinyBuck®
BitSiC™	Green FPS™	PowerTrench®	TinyCalc™
Build it Now™	Green FPS™ e-Series™	PowerXS™	TinyLogic®
CorePLUS™	G*max*™	Programmable Active Droop™	TINYOPTO™
CorePOWER™	GTO™	QFET®	TinyPower™
CROSSVOLT™	IntelliMAX™	QS™	TinyPWM™
CTL™	ISOPLANAR™	Quiet Series™	TinyWire™
Current Transfer Logic™	Making Small Speakers Sound Louder and Better™	RapidConfigure™	TranSiC™
DEUXPEED®		™	TriFault Detect™
Dual Cool™	MegaBuck™	Saving our world, 1mW/W/kW at a time™	TRUECURRENT®*
EcoSPARK®	MICROCOUPLER™	SignalWise™	µSerDes™
EfficientMax™	MicroFET™	SmartMax™	
ESBC™	MicroPak™	SMART START™	**μ SerDes**™
F®	MicroPak2™	Solutions for Your Success™	UHC®
Fairchild®	MillerDrive™	SPM®	Ultra FRFET™
Fairchild Semiconductor®	MotionMax™	STEALTH™	UniFET™
FACT Quiet Series™	MotionGrid®	SuperFET®	VCX™
FACT®	MTi®	SuperSOT™-3	VisualMax™
FAST®	MTx®	SuperSOT™-6	VoltagePlus™
FastvCore™	MVN®	SuperSOT™-8	XS™
FETBench™	mWSaver®	SupreMOS®	Xsens™
FPS™	OptoHiT™	SyncFET™	仙童™
	OPTOLOGIC®	Sync-Lock™	

* Trademarks of System General Corporation, used under license by Fairchild Semiconductor.

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION, OR DESIGN. TO OBTAIN THE LATEST, MOST UP-TO-DATE DATASHEET AND PRODUCT INFORMATION, VISIT OUR WEBSITE AT HTTP://WWW.FAIRCHILDSEMI.COM. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.

2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

ANTI-COUNTERFEITING POLICY

Fairchild Semiconductor Corporation's Anti-Counterfeiting Policy. Fairchild's Anti-Counterfeiting Policy is also stated on our external website, www.fairchildsemi.com, under Sales Support.

Counterfeiting of semiconductor parts is a growing problem in the industry. All manufacturers of semiconductor products are experiencing counterfeiting of their parts. Customers who inadvertently purchase counterfeit parts experience many problems such as loss of brand reputation, substandard performance, failed applications, and increased cost of production and manufacturing delays. Fairchild is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. Fairchild strongly encourages customers to purchase Fairchild parts either directly from Fairchild or from Authorized Fairchild Distributors who are listed by country on our web page cited above. Products customers buy either from Fairchild directly or from Authorized Fairchild Distributors are genuine parts, have full traceability, meet Fairchild's quality standards for handling and storage and provide access to Fairchild's full range of up-to-date technical and product information. Fairchild and our Authorized Distributors will stand behind all warranties and will appropriately address any warranty issues that may arise. Fairchild will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources. Fairchild is committed to combat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.

Rev. I74

AMEYA360
Components Supply Platform

Authorized Distribution Brand :

ROHM	Sunlord	SSM SUSUMU	AVERLOGIC	NXP	Elprotronic
2Pai Semi	Ambarella	CanaanTek	Firstohm	GigaDevice	Vanguard Semiconductor

Website :

Welcome to visit   www.ameya360.com

Contact Us :

➤ Address :

  401 Building No.5, JiuGe Business Center, Lane 2301, Yishan Rd
  Minhang District, Shanghai , China

➤ Sales :

  Direct   +86 (21) 6401-6692

  Email   amall@ameya360.com

  QQ   800077892

  Skype   ameyasales1 ameyasales2

➤ Customer Service :

  Email   service@ameya360.com

➤ Partnership :

  Tel   +86 (21) 64016692-8333

  Email   mkt@ameya360.com