74HC4067Q/74HCT4067Q Automotive, 16-Channel Analog Multiplexer/Demultiplexer

GENERAL DESCRIPTION

The 74HC4067Q and 74HCT4067Q devices are digitally controlled analog switches that include four address inputs (S0 to S3), sixteen individual I/O channels (Y0 to Y15), a common I/O pin (Z) and an active-low enable control input ($\overline{EN}$).

The 74HC4067Q and 74HCT4067Q are single-pole/16-throw (SP16T) analog switches, where one terminal is linked to an individual input/output (Y0 to Y15), and the other pins are connected to the common input/output (Z).

When pin $\overline{EN}$ is active low, one of the sixteen switches is chosen through the configuration of pins S0 to S3, setting it in a low-impedance on-state. All other unselected switches are in a high-impedance off-state. Conversely, when pin $\overline{EN}$ is active high, all switches are in the high-impedance off-state, regardless of the state of pins S0 to S3.

The analog inputs/outputs (Y0 to Y15 and Z) can vary between V_{CC} as the upper limit and GND as the lower limit.

These devices are AEC-Q100 qualified (Automotive Electronics Council (AEC) standard Q100 Grade 1) and they are suitable for automotive applications.

The 74HC4067Q and 74HCT4067Q are available in Green TSSOP-24 and TQFN-3.5×5.5-24BL packages. They operate over an ambient temperature range of -40℃ to +125℃.

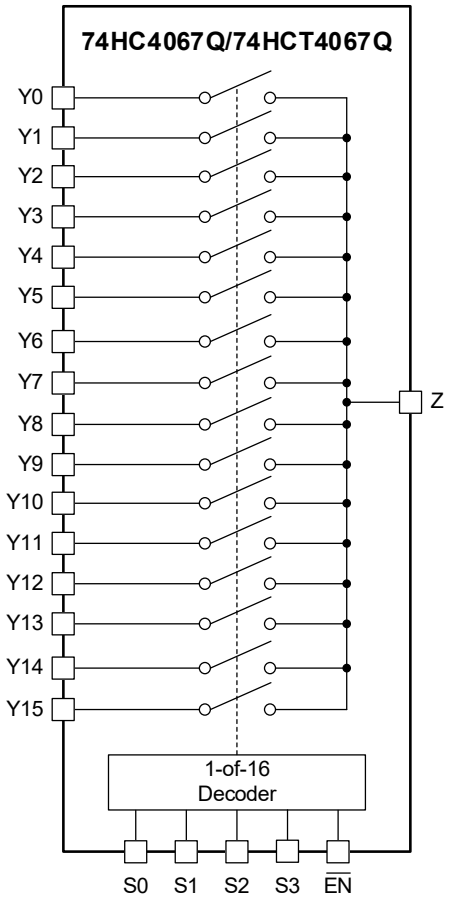
APPLICATIONS

Automotive Applications
Telecom and Medical Equipment
Computing Equipment

FEATURES

- **AEC-Q100 Qualified for Automotive Applications**
  Device Temperature Grade 1
  T_A = -40℃ to +125℃
- **Wide Supply Voltage Range:**
  - **74HC4067Q: 2V to 12V**
  - **74HCT4067Q: 4.5V to 5.5V**
- **Low On-Resistance:**
  - **220Ω (TYP) at V_{CC} = 2V**
  - **86Ω (TYP) at V_{CC} = 5V**
  - **60Ω (TYP) at V_{CC} = 10V**
- **Integrated Break-Before-Make Function**
- **-40℃ to +125℃ Operating Temperature Range**
- **Available in Green TSSOP-24 and TQFN-3.5×5.5-24BL Packages**

LOGIC DIAGRAM

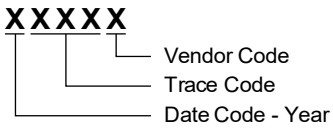


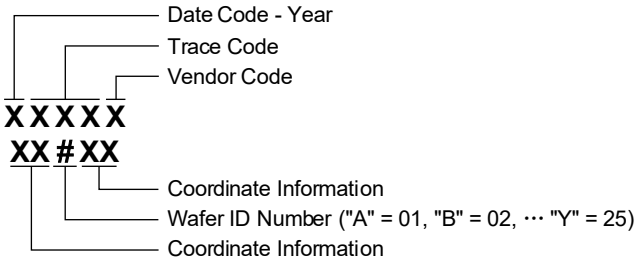
PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
74HC4067Q	TSSOP-24	-40℃ to +125℃	74HC4067QTS24G/TR	23FTS24 XXXXX	Tape and Reel, 4000
	TQFN-3.5×5.5-24BL	-40℃ to +125℃	74HC4067QTWJ24G/TR	23GTWJ24 XXXXX XX#XX	Tape and Reel, 3000
74HCT4067Q	TSSOP-24	-40℃ to +125℃	74HCT4067QTS24G/TR	2DZTS24 XXXXX	Tape and Reel, 4000
	TQFN-3.5×5.5-24BL	-40℃ to +125℃	74HCT4067QTWJ24G/TR	2E0TWJ24 XXXXX XX#XX	Tape and Reel, 3000

MARKING INFORMATION

NOTE: XXXXX = Date Code, Trace Code and Vendor Code. XX#XX = Coordinate Information and Wafer ID Number.





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.

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.

ABSOLUTE MAXIMUM RATINGS

Supply Voltage Range, V_{CC} ..... -0.5V to 13.2V
Input Voltage Range, V_I ..... -0.5V to MIN(13.2V, V_{CC} + 0.5V)
Switch Voltage Range, V_{SW} -0.5V to MIN(13.2V, V_{CC} + 0.5V)
Input Clamp Current, I_{IK} (1) (V_I < -0.5V or V_I > V_{CC} + 0.5V) ..... ±20mA
Switch Clamp Current, I_{SK} (1) (V_{SW} < -0.5V or V_{SW} > V_{CC} + 0.5V) ..... ±20mA
Switch Current, I_{SW} (V_{SW} = -0.5V to V_{CC} + 0.5V) ..... ±25mA
Supply Current, I_{CC} 50mA
Ground Current, I_{GND} ..... -50mA
Junction Temperature (2) ..... +150℃
Storage Temperature Range ..... -65℃ to +150℃
Lead Temperature (Soldering, 10s) ..... +260℃
ESD Susceptibility (3) (4)
HBM ..... ±6000V
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

For 74HC4067Q

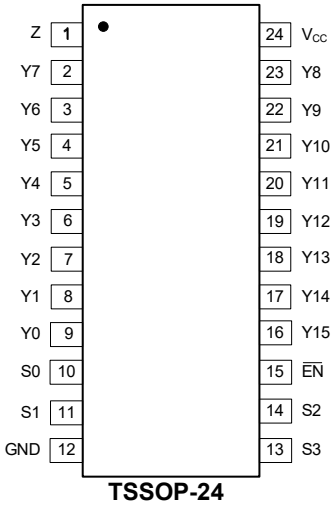
Supply Voltage Range, V_{CC} ..... 2V to 12V, 5V (TYP)
Input Voltage Range, V_I ..... 0V to V_{CC}
Switch Voltage Range, V_{SW} ..... 0V to V_{CC}
Rise Time, t_R
V_{CC} = 2V ..... 1000ns (MAX)
V_{CC} = 5V ..... 500ns (MAX), 6.0ns (TYP)
V_{CC} = 10V ..... 250ns (MAX)
Fall Time, t_F
V_{CC} = 2V ..... 1000ns (MAX)
V_{CC} = 5V ..... 500ns (MAX), 6.0ns (TYP)
V_{CC} = 10V ..... 250ns (MAX)
Operating Ambient Temperature Range ..... -40℃ to +125℃

For 74HCT4067Q

Supply Voltage Range, V_{CC} ..... 4.5V to 5.5V, 5V (TYP)
Input Voltage Range, V_I ..... 0V to V_{CC}
Switch Voltage Range, V_{SW} ..... 0V to V_{CC}
Rise Time, t_R
V_{CC} = 5V ..... 500ns (MAX), 6.0ns (TYP)
Fall Time, t_F
V_{CC} = 5V ..... 500ns (MAX), 6.0ns (TYP)
Operating Ambient Temperature Range ..... -40℃ to +125℃

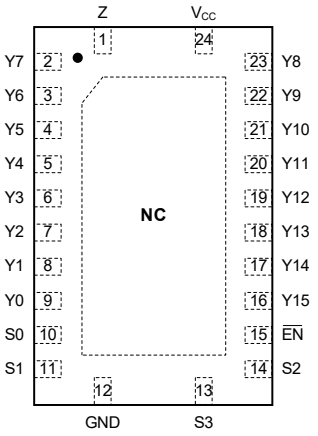
PIN CONFIGURATIONS

(TOP VIEW)



TSSOP-24

(TOP VIEW)



TQFN-3.5×5.5-24BL

PIN DESCRIPTION

PIN	NAME	FUNCTION
1	Z	Common Input/Output.
2 – 9	Y7 – Y0	Individual Input/Output 7 – 0.
10	S0	Address Input 0.
11	S1	Address Input 1.
12	GND	Ground.
13	S3	Address Input 3.
14	S2	Address Input 2.
15	$\overline{EN}$	Enable Control Input (Active-Low).
16 – 23	Y15 – Y8	Individual Input/Output 15 – 8.
24	V_{CC}	Power Supply Voltage.
Exposed Pad	NC	No Connection. TQFN-3.5×5.5-24BL package only.

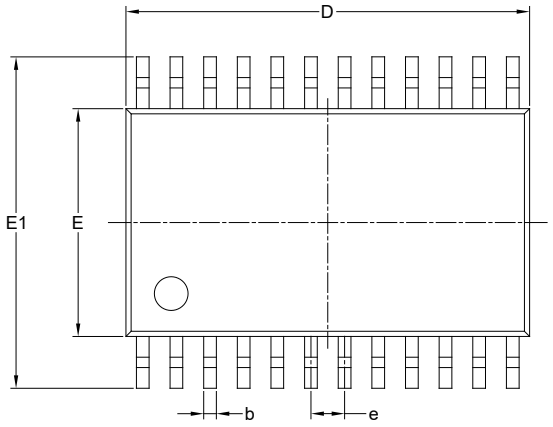
FUNCTION TABLE

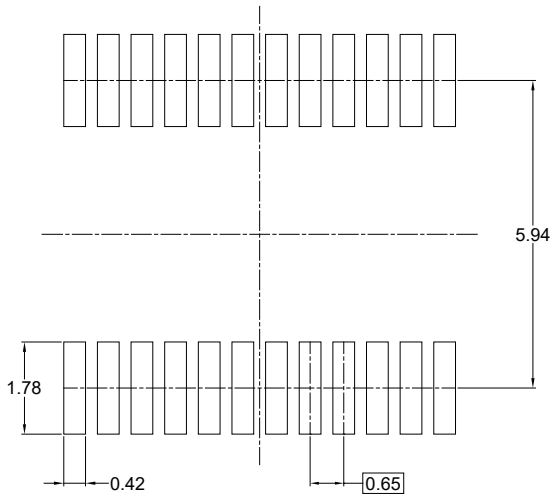
INPUTS					CHANNEL ON
$\overline{EN}$	S3	S2	S1	S0	
L	L	L	L	L	Y0 to Z
L	L	L	L	H	Y1 to Z
L	L	L	H	L	Y2 to Z
L	L	L	H	H	Y3 to Z
L	L	H	L	L	Y4 to Z
L	L	H	L	H	Y5 to Z
L	L	H	H	L	Y6 to Z
L	L	H	H	H	Y7 to Z
L	H	L	L	L	Y8 to Z
L	H	L	L	H	Y9 to Z
L	H	L	H	L	Y10 to Z
L	H	L	H	H	Y11 to Z
L	H	H	L	L	Y12 to Z
L	H	H	L	H	Y13 to Z
L	H	H	H	L	Y14 to Z
L	H	H	H	H	Y15 to Z
H	*X*	*X*	*X*	*X*	—

NOTE: H = High Voltage Level, L = Low Voltage Level, *X* = Don't Care.

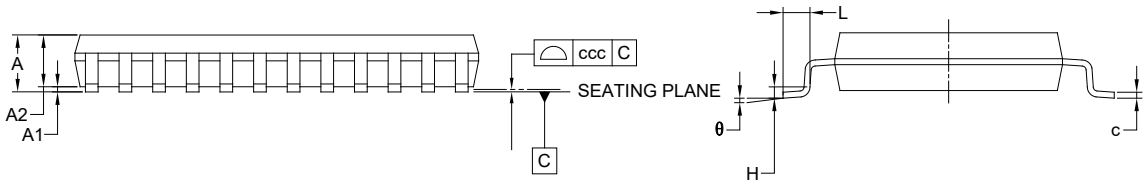
PACKAGE OUTLINE DIMENSIONS

TSSOP-24





RECOMMENDED LAND PATTERN (Unit: mm)

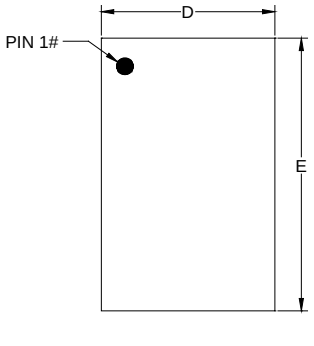


Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	-	-	1.200
A1	0.050	-	0.150
A2	0.800	-	1.050
b	0.190	-	0.300
c	0.090	-	0.200
D	7.700	-	7.900
E	4.300	-	4.500
E1	6.200	-	6.600
e	0.650 BSC		
L	0.450	-	0.750
H	0.250 TYP		
θ	0°	-	8°
ccc	0.100		

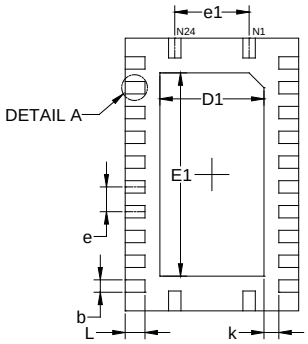
NOTES:
1. This drawing is subject to change without notice.
2. The dimensions do not include mold flashes, protrusions or gate burrs.
3. Reference JEDEC MO-153.

PACKAGE OUTLINE DIMENSIONS

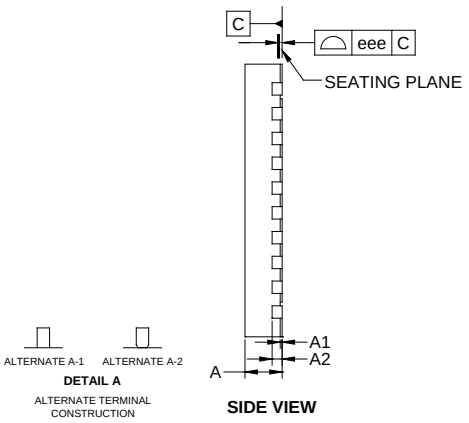
TQFN-3.5×5.5-24BL



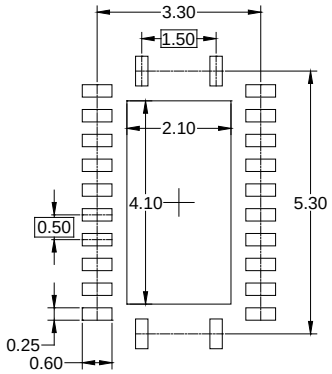
TOP VIEW



BOTTOM VIEW



SIDE VIEW



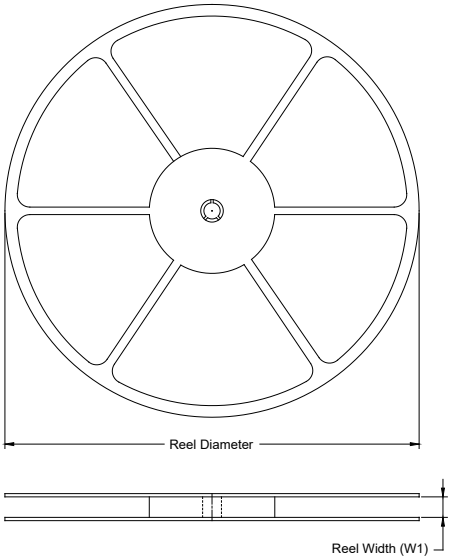
RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	0.700	-	0.800
A1	0.000	-	0.050
A2		0.203 REF	
b	0.200	-	0.300
D	3.400	-	3.600
D1	2.000	-	2.200
E	5.400	-	5.600
E1	4.000	-	4.200
e		0.500 BSC	
e1		1.500 BSC	
L	0.300	-	0.500
k		0.300 REF	
eee		0.080	

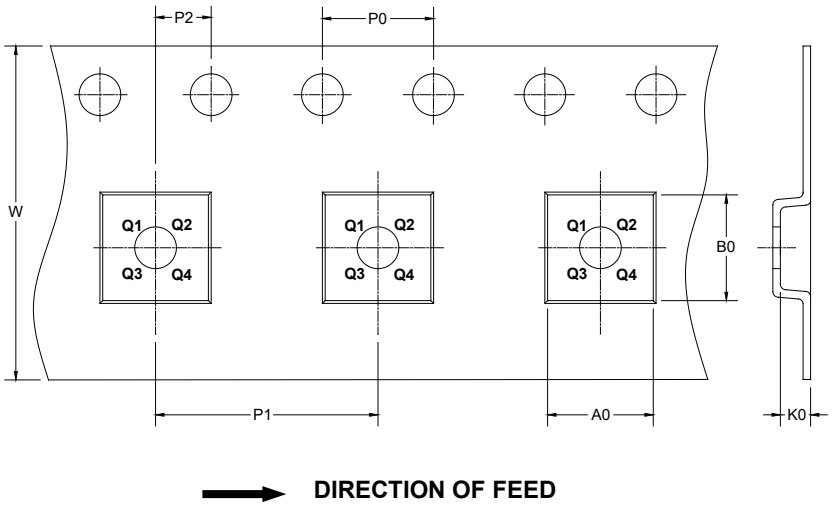
NOTE: This drawing is subject to change without notice.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



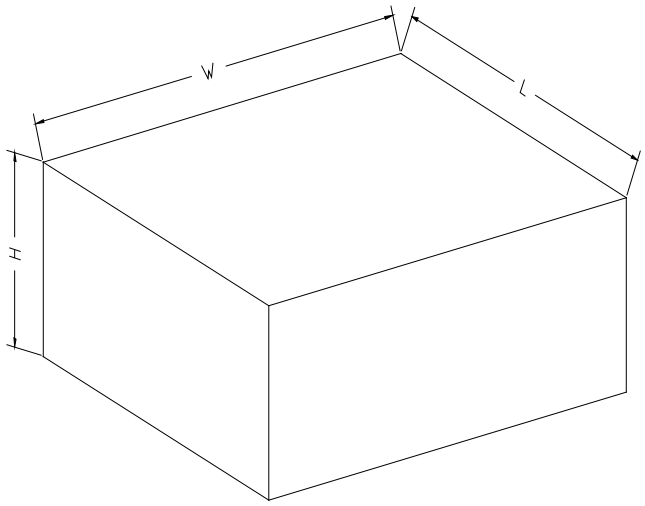
NOTE: The picture is only for reference. Please make the object as the standard.

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
TSSOP-24	13"	16.4	6.80	8.30	1.60	4.0	8.0	2.0	16.0	Q1
TQFN-3.5×5.5-24BL	13"	12.4	3.80	5.80	1.00	4.0	8.0	2.0	12.0	Q1

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
13″	386	280	370	5

DD0002