

# HD74LS42

## BCD-to-Decimal Decoder

REJ03D0409-0300

Rev.3.00

Jul.22.2005

This monolithic decimal decoder consists of eight inverters and ten four-input NAND gates. The inverters are connected in pairs to make BCD input data available for decoding by NAND gates. Full decoding of valid input logic ensures that all outputs remain off for all invalid input conditions.

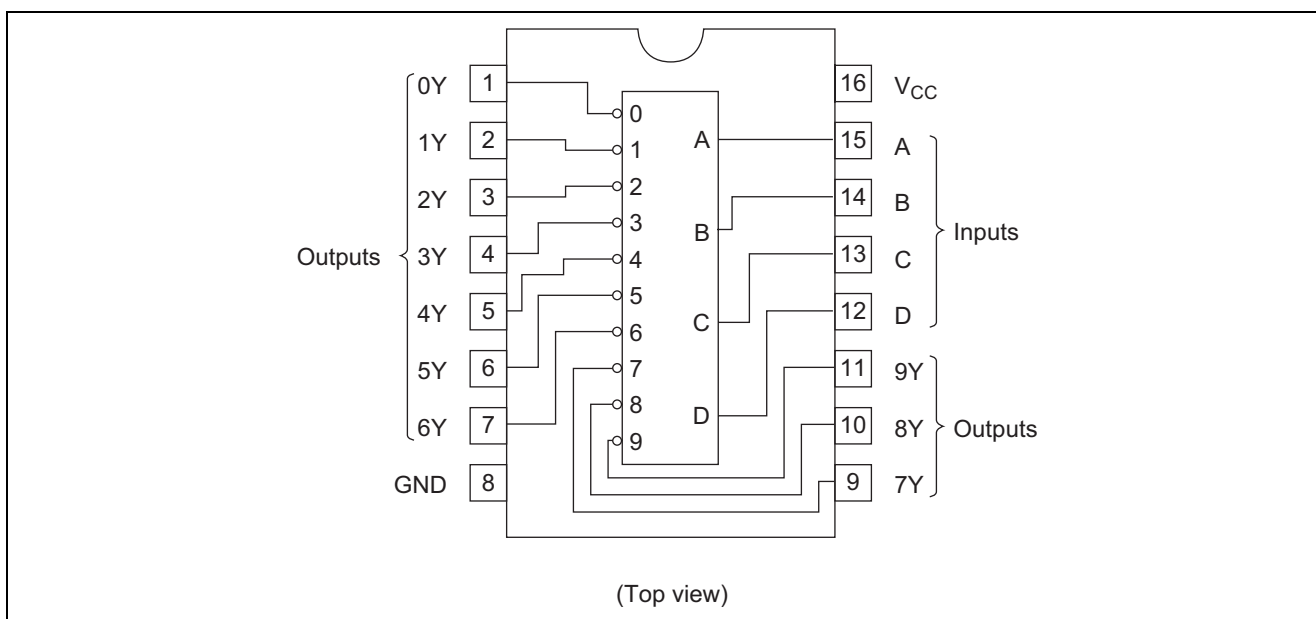
### Features

- Ordering Information

Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
HD74LS42P	DILP-16 pin	PRDP0016AE-B (DP-16FV)	P	—
HD74LS42FPEL	SOP-16 pin (JEITA)	PRSP0016DH-B (FP-16DAV)	FP	EL (2,000 pcs/reel)
HD74LS42RPEL	SOP-16 pin (JEDEC)	PRSP0016DG-A (FP-16DNV)	RP	EL (2,500 pcs/reel)

Note: Please consult the sales office for the above package availability.

### Pin Arrangement

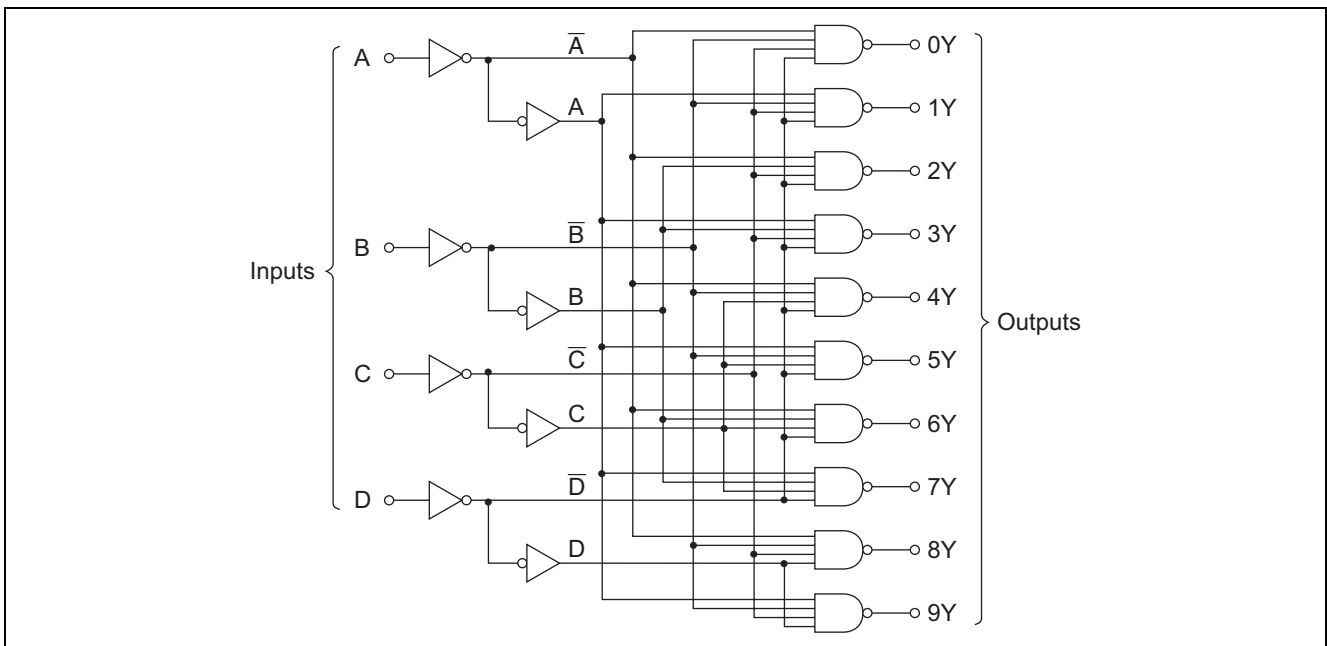


**Function Table**

No.	BCD input				Decimal output									
	D	C	B	A	0	1	2	3	4	5	6	7	8	9
0	L	L	L	L	L	H	H	H	H	H	H	H	H	H
1	L	L	L	H	H	L	H	H	H	H	H	H	H	H
2	L	L	H	L	H	H	L	H	H	H	H	H	H	H
3	L	L	H	H	H	H	H	L	H	H	H	H	H	H
4	L	H	L	L	H	H	H	H	L	H	H	H	H	H
5	L	H	L	H	H	H	H	H	H	L	H	H	H	H
6	L	H	H	L	H	H	H	H	H	H	L	H	H	H
7	L	H	H	H	H	H	H	H	H	H	H	L	H	H
8	H	L	L	L	H	H	H	H	H	H	H	H	L	H
9	H	L	L	H	H	H	H	H	H	H	H	H	H	L
Invalid	H	L	H	L	H	H	H	H	H	H	H	H	H	H
	H	L	H	H	H	H	H	H	H	H	H	H	H	H
	H	H	L	L	H	H	H	H	H	H	H	H	H	H
	H	H	L	H	H	H	H	H	H	H	H	H	H	H
	H	H	H	L	H	H	H	H	H	H	H	H	H	H

H; high level, L; low level

**Block Diagram**



**Absolute Maximum Ratings**

Item	Symbol	Ratings	Unit
Supply voltage	$V_{CC}$	7	V
Input voltage	$V_{IN}$	7	V
Power dissipation	$P_T$	400	mW
Storage temperature	$T_{stg}$	-65 to +150	°C

Note: Voltage value, unless otherwise noted, are with respect to network ground terminal.

### Recommended Operating Conditions

Item	Symbol	Min	Typ	Max	Unit
Supply voltage	$V_{CC}$	4.75	5.00	5.25	V
Output current	$I_{OH}$	—	—	-400	$\mu A$
	$I_{OL}$	—	—	8	mA
Operating temperature	$T_{opr}$	-20	25	75	$^{\circ}C$

### Electrical Characteristics

( $T_a = -20$  to  $+75^{\circ}C$ )

Item	Symbol	min.	typ.*	max.	Unit	Condition
Input voltage	$V_{IH}$	2.0	—	—	V	
	$V_{IL}$	—	—	0.8	V	
Output voltage	$V_{OH}$	2.7	—	—	V	$V_{CC} = 4.75 V, V_{IH} = 2 V, V_{IL} = 0.8 V, I_{OH} = -400 \mu A$
	$V_{OL}$	—	—	0.5	V	
—		—	0.4			
Input current	$I_{IH}$	—	—	20	$\mu A$	$V_{CC} = 5.25 V, V_I = 2.7 V$
	$I_{IL}$	—	—	-0.4	mA	$V_{CC} = 5.25 V, V_I = 0.4 V$
	$I_I$	—	—	0.1	mA	$V_{CC} = 5.25 V, V_I = 7 V$
Short-circuit output current	$I_{OS}$	-20	—	-100	mA	$V_{CC} = 5.25 V$
Supply current	$I_{CC}^{**}$	—	7	13	mA	$V_{CC} = 5.25 V$
Input clamp voltage	$V_{IK}$	—	—	-1.5	V	$V_{CC} = 4.75 V, I_{IN} = -18 mA$

Notes: \*  $V_{CC} = 5 V, T_a = 25^{\circ}C$

\*\*  $V_{CC}$  is measured with all outputs and all inputs grounded.

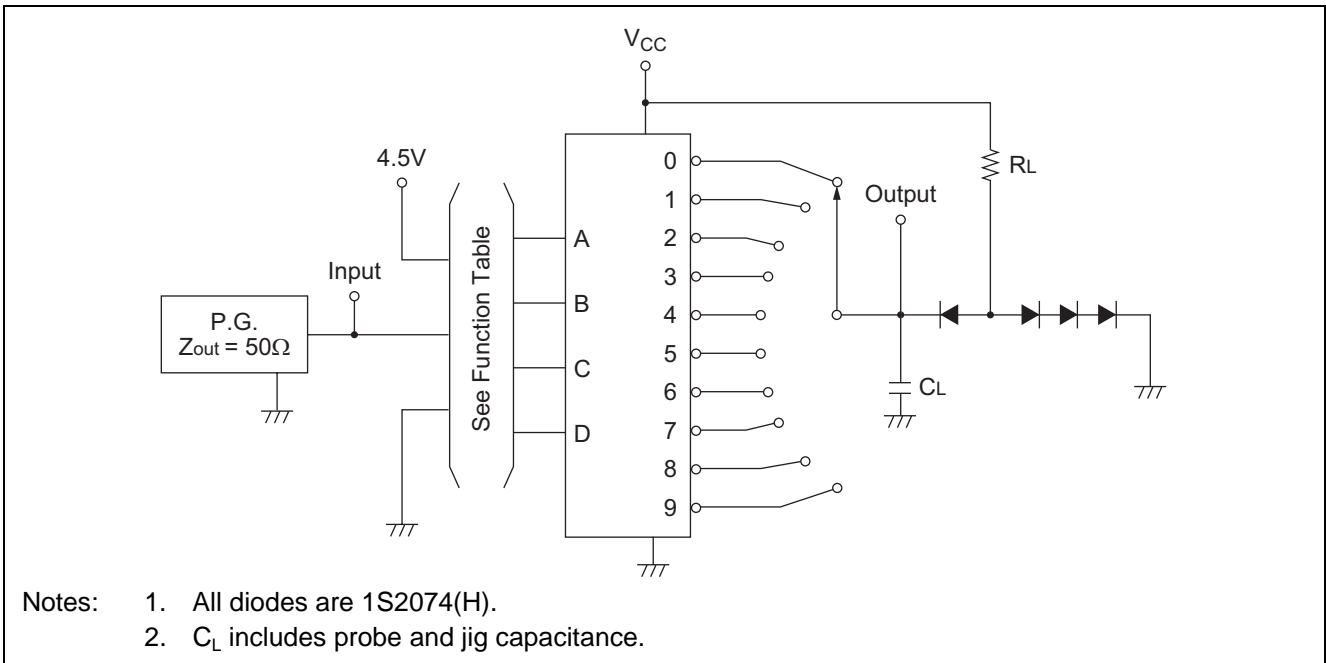
### Switching Characteristics

( $V_{CC} = 5 V, T_a = 25^{\circ}C$ )

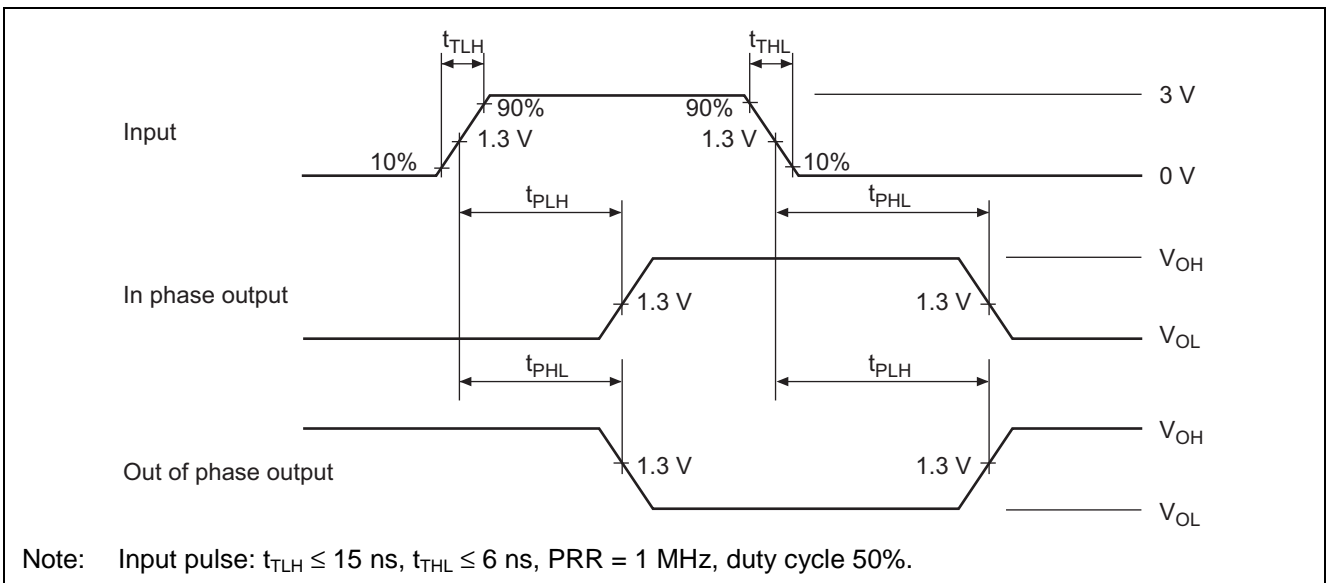
Item	Symbol	min.	typ.	max.	Unit	Condition
Propagation delay time	$t_{PLH}$	2 Stage	—	15	25	$C_L = 15 pF, R_L = 2 k\Omega$
		3 Stage	—	20	30	
	$t_{PHL}$	2 Stage	—	15	25	
		3 Stage	—	20	30	

## Testing Method

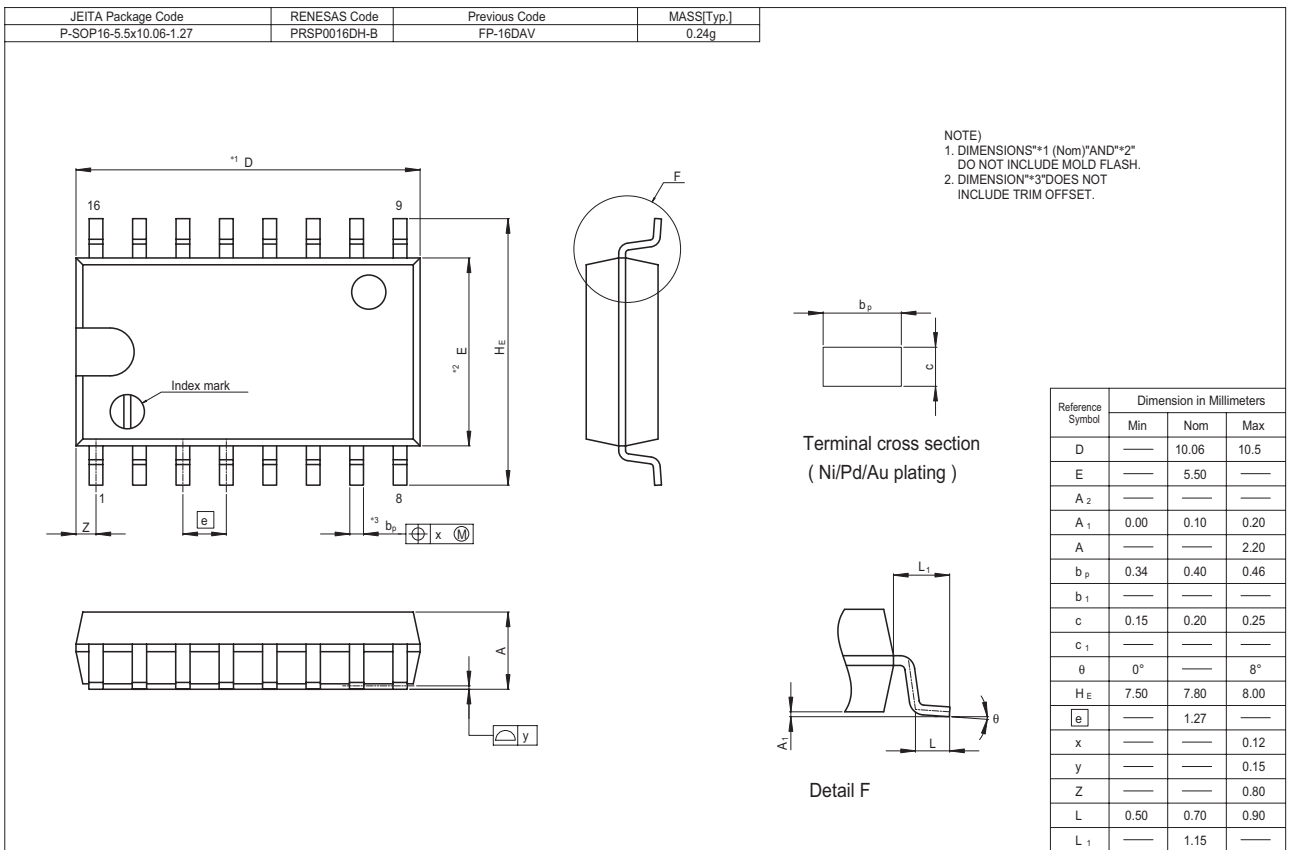
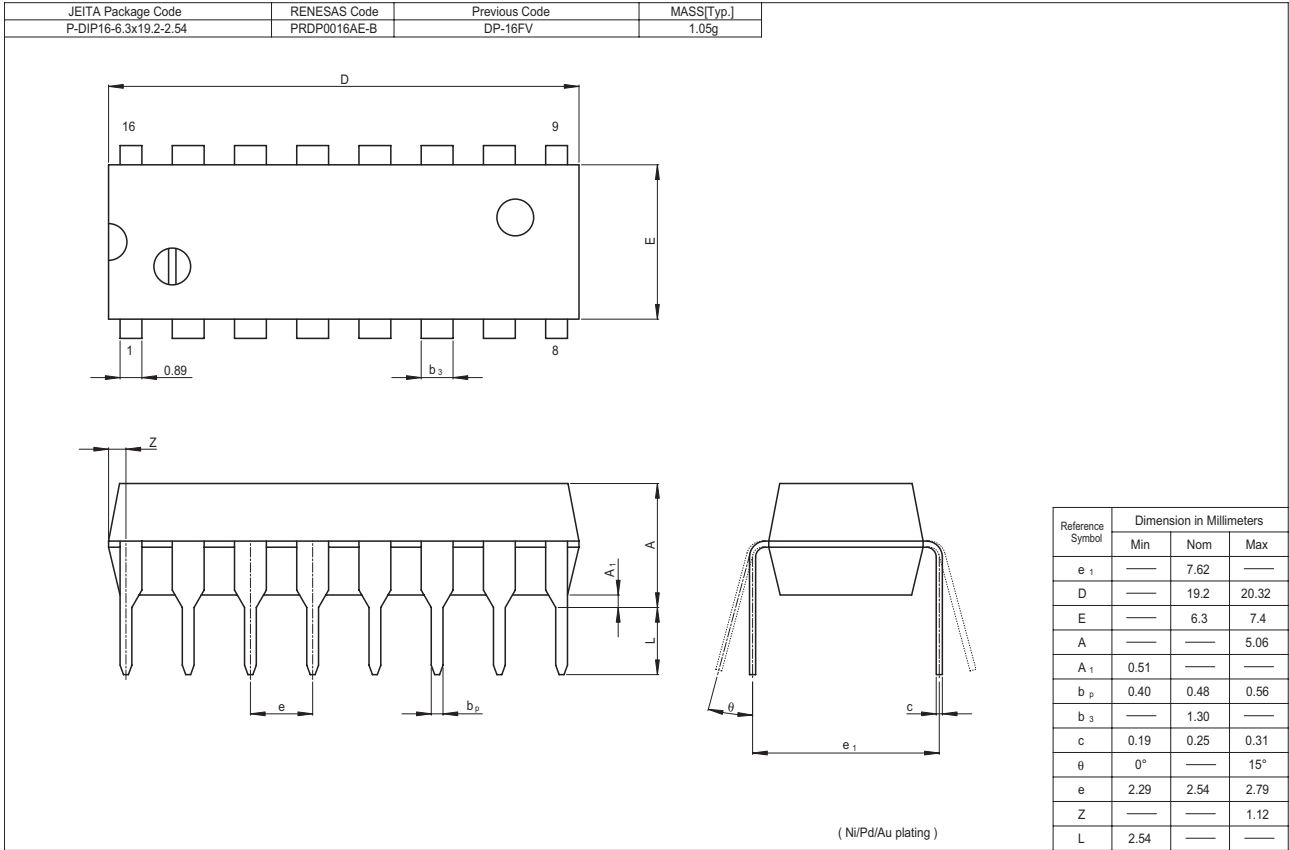
### Test Circuit



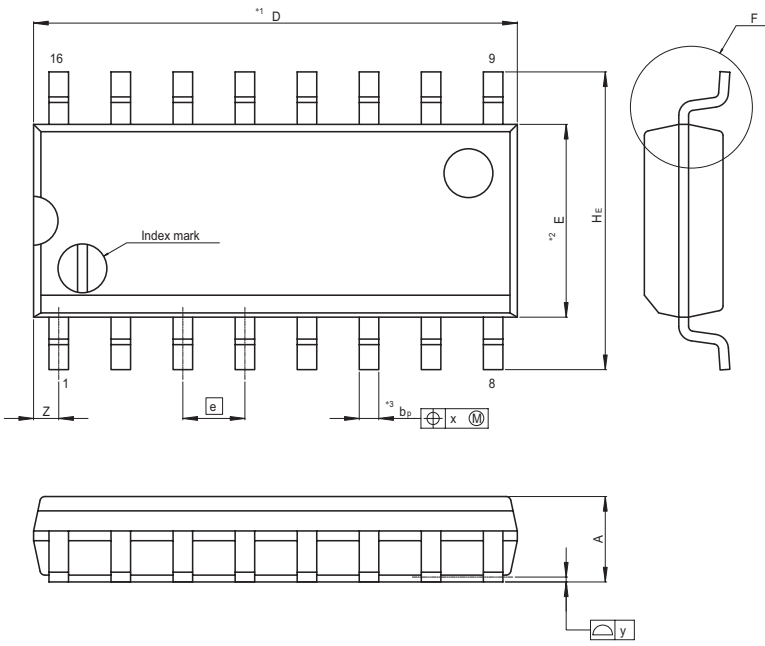
### Waveform



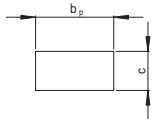
Package Dimensions



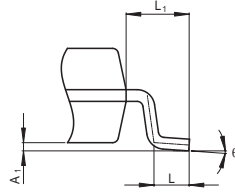
JEITA Package Code P-SOP16-3.95x9.9-1.27	RENESAS Code PRSP0016DG-A	Previous Code FP-16DNV	MASS[Typ.] 0.15g
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NOTE  
 1. DIMENSIONS\*1 (Nom)\*AND\*2\*  
 DO NOT INCLUDE MOLD FLASH.  
 2. DIMENSION\*3\*DOES NOT  
 INCLUDE TRIM OFFSET.



Terminal cross section  
( Ni/Pd/Au plating )



Detail F

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	9.90	10.30
E	—	3.95	—
A <sub>2</sub>	—	—	—
A <sub>1</sub>	0.10	0.14	0.25
A	—	—	1.75
b <sub>p</sub>	0.34	0.40	0.46
b <sub>1</sub>	—	—	—
c	0.15	0.20	0.25
c <sub>1</sub>	—	—	—
θ	0°	—	8°
H <sub>E</sub>	5.80	6.10	6.20
e	—	1.27	—
x	—	—	0.25
y	—	—	0.15
Z	—	—	0.635
L	0.40	0.60	1.27
L <sub>1</sub>	—	1.08	—

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