

# HD74HC139

## Dual 2-to-4-line Decoders/Demultiplexers

REJ03D0571-0300

Rev.3.00

Mar 25, 2009

### Description

The HD74HC139 contains two independent two-to-four-line decoders each with a single active low enable input (1G or 2G). Data on the select inputs (1A and 1B or 2A and 2B) cause one of the four normally high outputs to go low.

### Features

- High Speed Operation:  $t_{pd}$  (A, B to Y, 4 levels) = 14 ns typ ( $C_L = 50$  pF)
- High Output Current: Fanout of 10 LSTTL Loads
- Wide Operating Voltage:  $V_{CC} = 2$  V to 6 V
- Low Input Current: 1  $\mu$ A max
- Low Quiescent Supply Current:  $I_{CC}$  (static) = 4  $\mu$ A max ( $T_a = 25^\circ\text{C}$ )
- Ordering Information

Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
HD74HC139P	DILP-16 pin	PRDP0016AE-B (DP-16FV)	P	—
HD74HC139FPEL	SOP-16 pin (JEITA)	PRSP0016DH-B (FP-16DAV)	FP	EL (2,000 pcs/reel)
HD74HC139RPEL	SOP-16 pin (JEDEC)	PRSP0016DG-A (FP-16DNV)	RP	EL (2,500 pcs/reel)
HD74HC139TELL	TSSOP-16 pin	PTSP00016JB-A (TTP-16DAV)	T	ELL (2,000 pcs/reel)

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

### Function Table

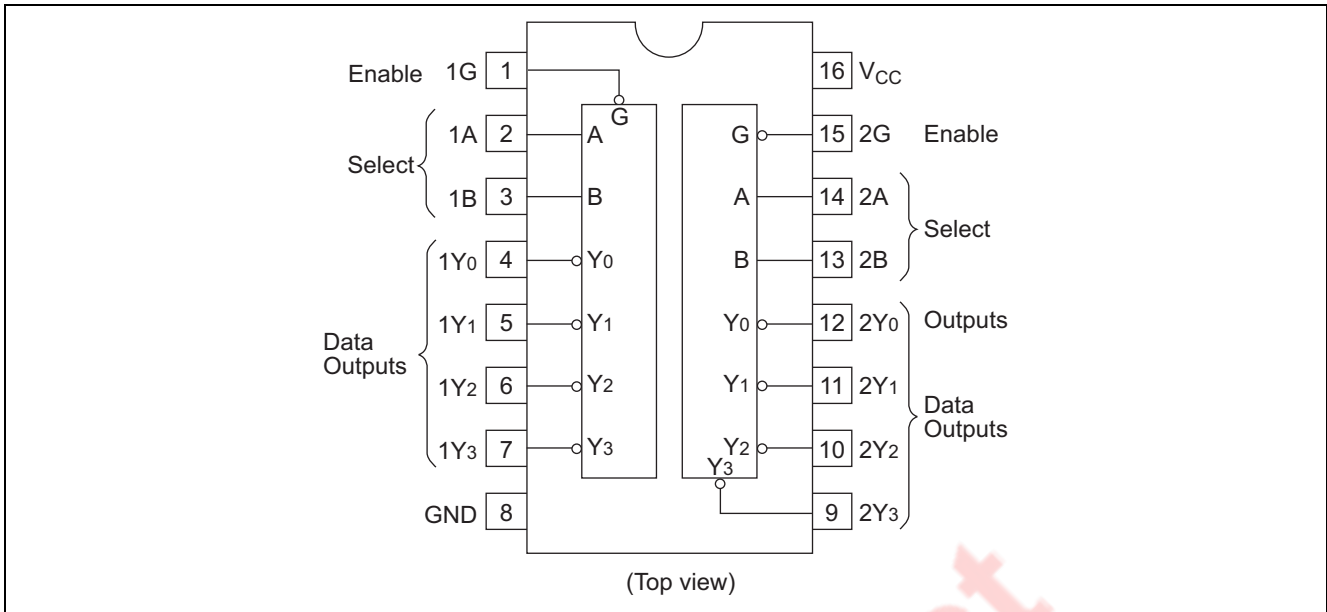
Inputs			Outputs			
Enable	Select					
G	B	A	$Y_0$	$Y_1$	$Y_2$	$Y_3$
H	X	X	H	H	H	H
L	L	L	L	H	H	H
L	L	H	H	L	H	H
L	H	L	H	H	L	H
L	H	H	H	H	H	L

H : High level

L : Low level

X : Irrelevant

Pin Arrangement



Absolute Maximum Ratings

Item	Symbol	Rating	Unit
Supply voltage range	$V_{CC}$	-0.5 to +7.0	V
Input voltage	$V_{IN}$	-0.5 to $V_{CC} + 0.5$	V
Output voltage	$V_{OUT}$	-0.5 to $V_{CC} + 0.5$	V
Output current	$I_{OUT}$	±25	mA
DC current drain per $V_{CC}$ , GND	$I_{CC}$ , $I_{GND}$	±50	mA
DC input diode current	$I_{IK}$	±20	mA
DC output diode current	$I_{OK}$	±20	mA
Power dissipation per package	$P_T$	500	mW
Storage temperature	$T_{stg}$	-65 to +150	°C

Note: The absolute maximum ratings are values, which must not individually be exceeded, and furthermore, no two of which may be realized at the same time.

Recommended Operating Conditions

Item	Symbol	Ratings	Unit	Conditions
Supply voltage	$V_{CC}$	2 to 6	V	
Input / Output voltage	$V_{IN}$ , $V_{OUT}$	0 to $V_{CC}$	V	
Operating temperature	$T_a$	-40 to 85	°C	
Input rise / fall time <sup>*1</sup>	$t_r$ , $t_f$	0 to 1000	ns	$V_{CC} = 2.0\text{ V}$
		0 to 500		$V_{CC} = 4.5\text{ V}$
		0 to 400		$V_{CC} = 6.0\text{ V}$

Note: 1. This item guarantees maximum limit when one input switches.  
Waveform: Refer to test circuit of switching characteristics.

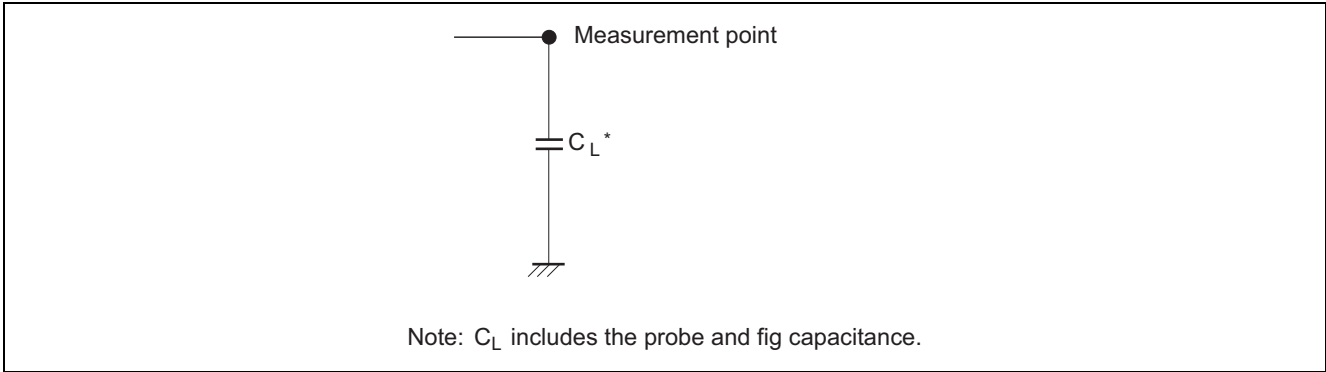
**Electrical Characteristics**

Item	Symbol	V <sub>CC</sub> (V)	Ta = 25°C			Ta = -40 to +85°C		Unit	Test Conditions	
			Min	Typ	Max	Min	Max			
Input voltage	V <sub>IH</sub>	2.0	1.5	—	—	1.5	—	V		
		4.5	3.15	—	—	3.15	—			
		6.0	4.2	—	—	4.2	—			
	V <sub>IL</sub>	2.0	—	—	0.5	—	0.5	V		
		4.5	—	—	1.35	—	1.35			
		6.0	—	—	1.8	—	1.8			
Output voltage	V <sub>OH</sub>	2.0	1.9	2.0	—	1.9	—	V	V <sub>in</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -20 μA
		4.5	4.4	4.5	—	4.4	—			I <sub>OH</sub> = -4 mA
		6.0	5.9	6.0	—	5.9	—			I <sub>OH</sub> = -5.2 mA
		4.5	4.18	—	—	4.13	—			
		6.0	5.68	—	—	5.63	—			
	V <sub>OL</sub>	2.0	—	0.0	0.1	—	0.1	V	V <sub>in</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 20 μA
		4.5	—	0.0	0.1	—	0.1			I <sub>OL</sub> = 4 mA
		6.0	—	0.0	0.1	—	0.1			I <sub>OL</sub> = 5.2 mA
		4.5	—	—	0.26	—	0.33			
		6.0	—	—	0.26	—	0.33			
Input current	I <sub>in</sub>	6.0	—	—	±0.1	—	±1.0	μA	V <sub>in</sub> = V <sub>CC</sub> or GND	
Quiescent supply current	I <sub>CC</sub>	6.0	—	—	4.0	—	40	μA	V <sub>in</sub> = V <sub>CC</sub> or GND, I <sub>out</sub> = 0 μA	

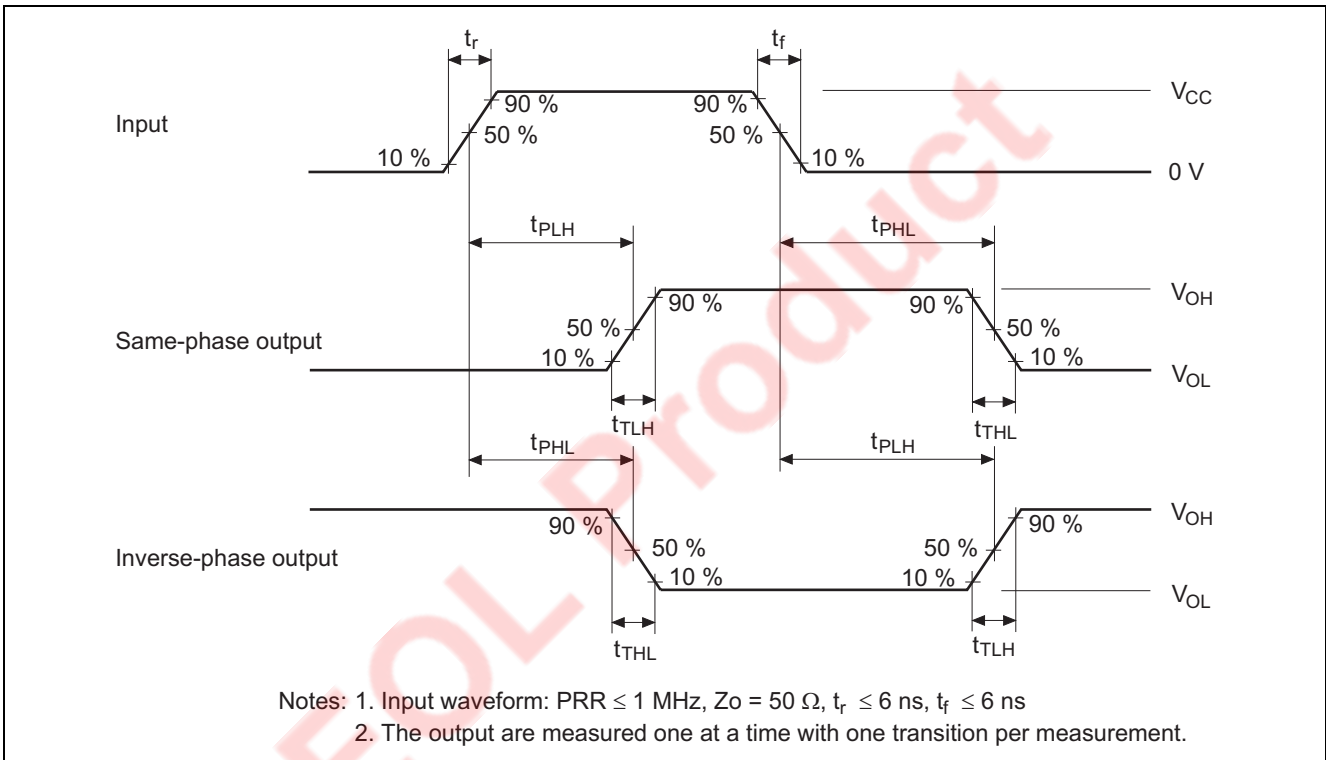
**Switching Characteristics (C<sub>L</sub> = 50 pF, Input t<sub>r</sub> = t<sub>f</sub> = 6 ns)**

Item	Symbol	V <sub>CC</sub> (V)	Ta = 25°C			Ta = -40 to +85°C		Unit	Test Conditions		
			Min	Typ	Max	Min	Max				
Propagation delay time	t <sub>PHL</sub>	2.0	—	—	150	—	190	ns	Select to any Y (4 levels)		
		4.5	—	15	30	—	38				
		6.0	—	—	26	—	33				
	t <sub>PLH</sub>	2.0	—	—	150	—	190	ns			
		4.5	—	13	30	—	38				
		6.0	—	—	26	—	33				
	t <sub>PHL</sub>	t <sub>PHL</sub>	2.0	—	—	150	—	190	ns	Select to any Y (5 levels)	
			4.5	—	18	30	—	38			
			6.0	—	—	26	—	33			
		t <sub>PLH</sub>	2.0	—	—	150	—	190			
			4.5	—	18	30	—	38			
			6.0	—	—	26	—	33			
	t <sub>PHL</sub>	t <sub>PHL</sub>	2.0	—	—	160	—	220	ns	Enable to any Y	
			4.5	—	19	32	—	40			
			6.0	—	—	27	—	34			
		t <sub>PLH</sub>	2.0	—	—	160	—	200			
			4.5	—	16	32	—	40			
			6.0	—	—	27	—	34			
Output rise/fall time	t <sub>TLH</sub> , t <sub>THL</sub>	2.0	—	—	75	—	95	ns			
		4.5	—	5	15	—	19				
		6.0	—	—	13	—	16				
Input capacitance	C <sub>in</sub>	—	—	5	10	—	10	pF			

Test Circuit

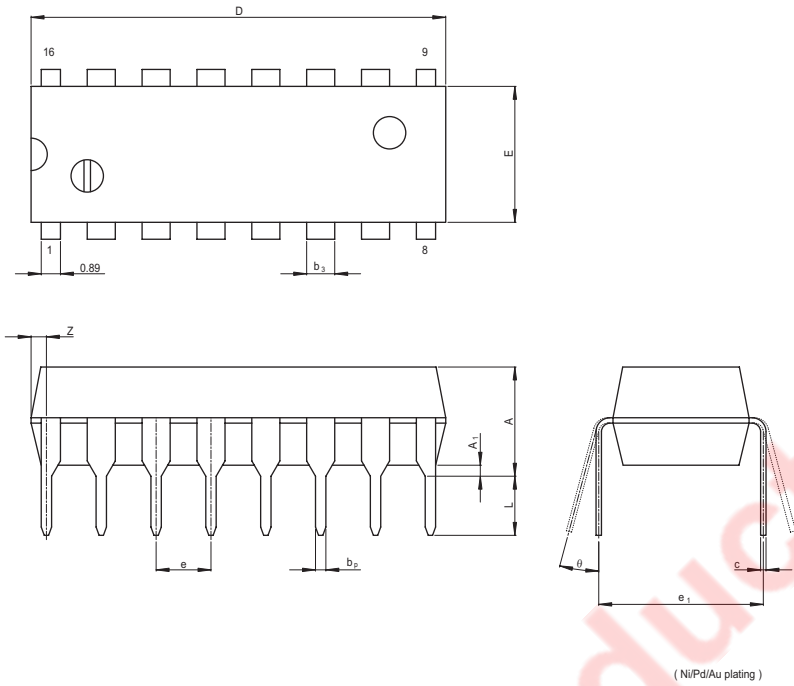


Waveforms



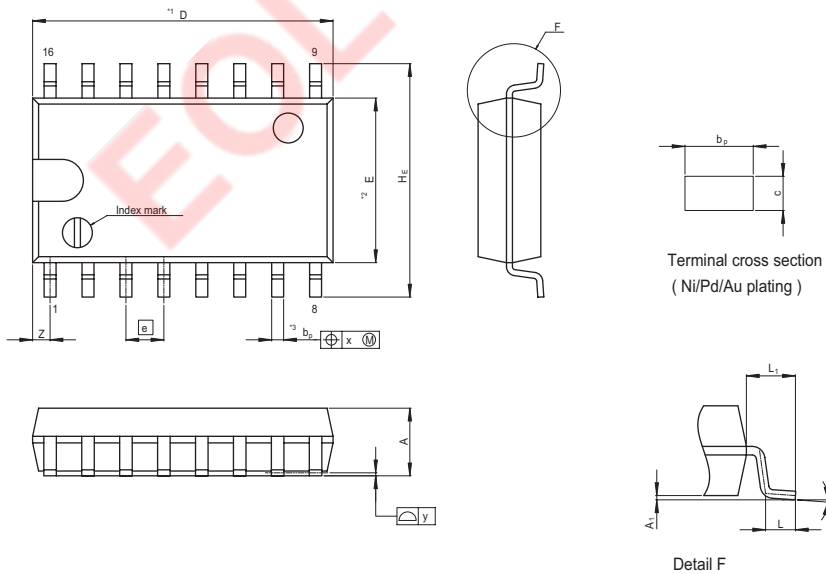
Package Dimensions

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-DIP16-6.3x19.2-2.54	PRDP0016AE-B	DP-16FV	1.05g



Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
e <sub>1</sub>	—	7.62	—
D	—	19.2	20.32
E	—	6.3	7.4
A	—	—	5.06
A <sub>1</sub>	0.51	—	—
b <sub>p</sub>	0.40	0.48	0.56
b <sub>3</sub>	—	1.30	—
c	0.19	0.25	0.31
θ	0°	—	15°
e	2.29	2.54	2.79
Z	—	—	1.12
L	2.54	—	—

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP16-5.5x10.06-1.27	PRSP0016DH-B	FP-16DAV	0.24g

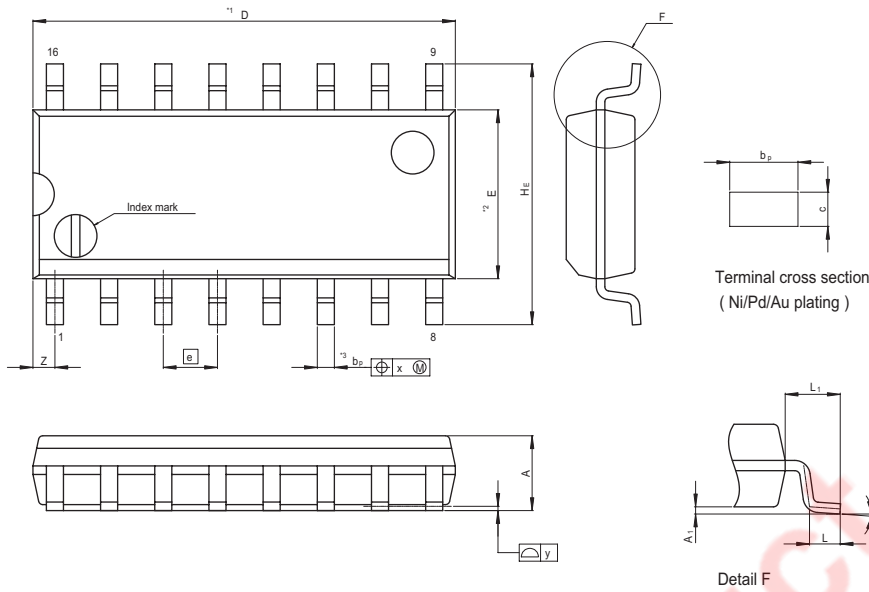


NOTE:  
 1. DIMENSIONS\*\*1 (Nom)\*\*AND\*\*2\* DO NOT INCLUDE MOLD FLASH.  
 2. DIMENSION\*\*3\*DOES NOT INCLUDE TRIM OFFSET.

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	10.06	10.5
E	—	5.50	—
A <sub>2</sub>	—	—	—
A <sub>1</sub>	0.00	0.10	0.20
A	—	—	2.20
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>	7.50	7.80	8.00
⊙	—	1.27	—
x	—	—	0.12
y	—	—	0.15
Z	—	—	0.80
L	0.50	0.70	0.90
L <sub>1</sub>	—	1.15	—

# HD74HC139

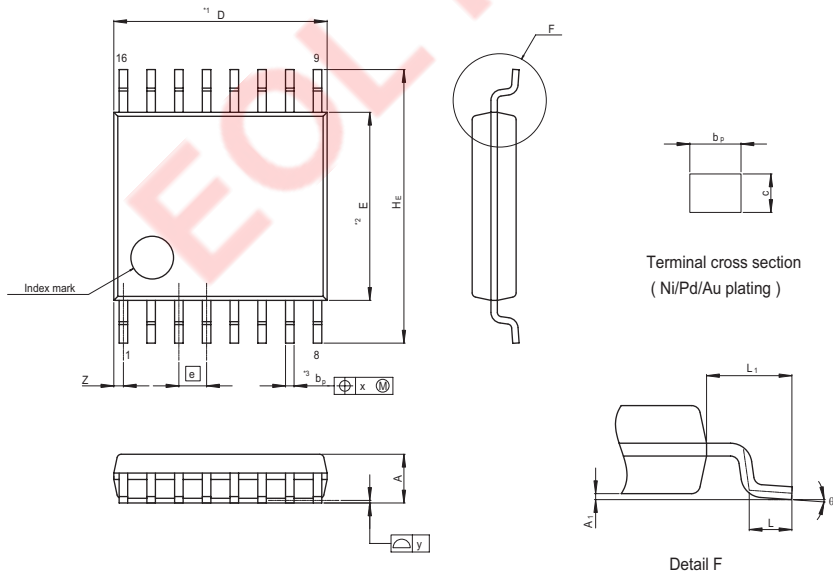
JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP16-3.95x9.9-1.27	PRSP0016DG-A	FP-16DNV	0.15g



NOTE)  
1. DIMENSIONS\*\*1 (Nom)\*\*AND\*\*2\*  
DO NOT INCLUDE MOLD FLASH.  
2. DIMENSION\*\*3\*DOES NOT  
INCLUDE TRIM OFFSET.

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
Ⓜ	—	1.27	—
x	—	—	0.25
y	—	—	0.15
Z	—	—	0.635
L	0.40	0.60	1.27
L <sub>1</sub>	—	1.08	—

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-TSSOP16-4.4x5-0.65	PTSP0016JB-A	TTP-16DAV	0.05g



NOTE)  
1. DIMENSIONS\*\*1 (Nom)\*\*AND\*\*2\*  
DO NOT INCLUDE MOLD FLASH.  
2. DIMENSION\*\*3\*DOES NOT  
INCLUDE TRIM OFFSET.

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	5.0	5.3
E	—	4.40	—
A <sub>2</sub>	—	—	—
A <sub>1</sub>	0.03	0.07	0.10
A	—	—	1.10
b <sub>p</sub>	0.15	0.20	0.25
b <sub>1</sub>	—	—	—
c	0.10	0.15	0.20
c <sub>1</sub>	—	—	—
θ	0°	—	8°
H <sub>E</sub>	6.20	6.40	6.60
Ⓜ	—	0.65	—
x	—	—	0.13
y	—	—	0.10
Z	—	—	0.65
L	0.4	0.5	0.6
L <sub>1</sub>	—	1.0	—

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**Renesas Technology Europe Limited**  
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.  
Tel: <44> (1628) 585-100, Fax: <44> (1628) 585-900

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Unit 204, 205, AZIACenter, No.1233 Lujiazui Ring Rd, Pudong District, Shanghai, China 200120  
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1 Harbour Front Avenue, #06-10, Keppel Bay Tower, Singapore 098632  
Tel: <65> 6213-0200, Fax: <65> 6278-8001

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Kukje Center Bldg. 18th Fl., 191, 2-ka, Hangang-ro, Yongsan-ku, Seoul 140-702, Korea  
Tel: <82> (2) 796-3115, Fax: <82> (2) 796-2145

**Renesas Technology Malaysia Sdn. Bhd**  
Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No.18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia  
Tel: <603> 7955-9390, Fax: <603> 7955-9510