

# RD3CYD08

## IGBT Driver

R04DS0040EJ0700

Rev.7.00

Jan 10, 2014

### Description

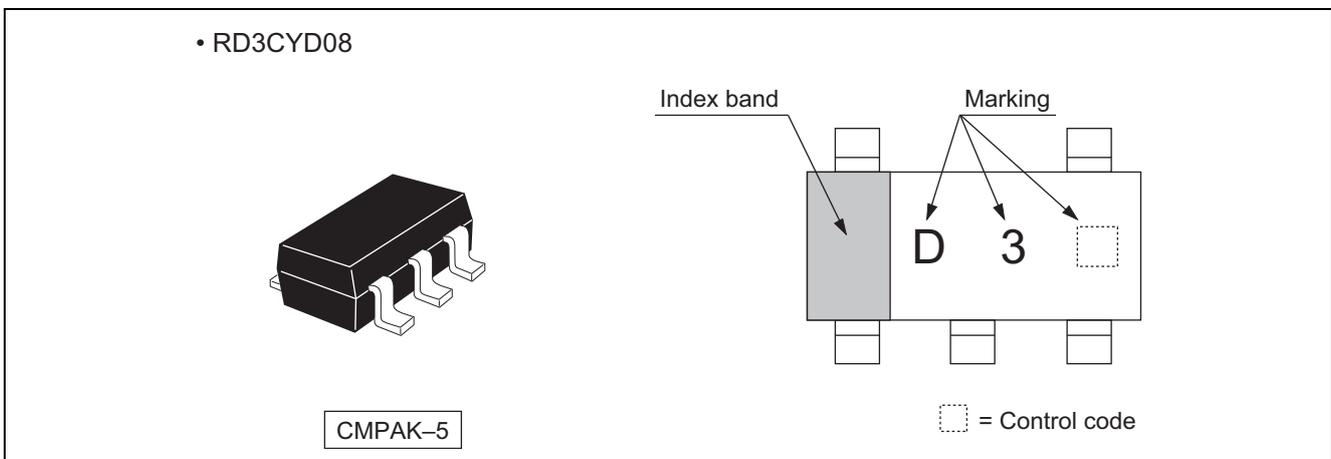
The RD3CYD08 has two-input AND gate in a 5 pin package. This product is suited as IGBT Driver IC for the strobe.

### Features

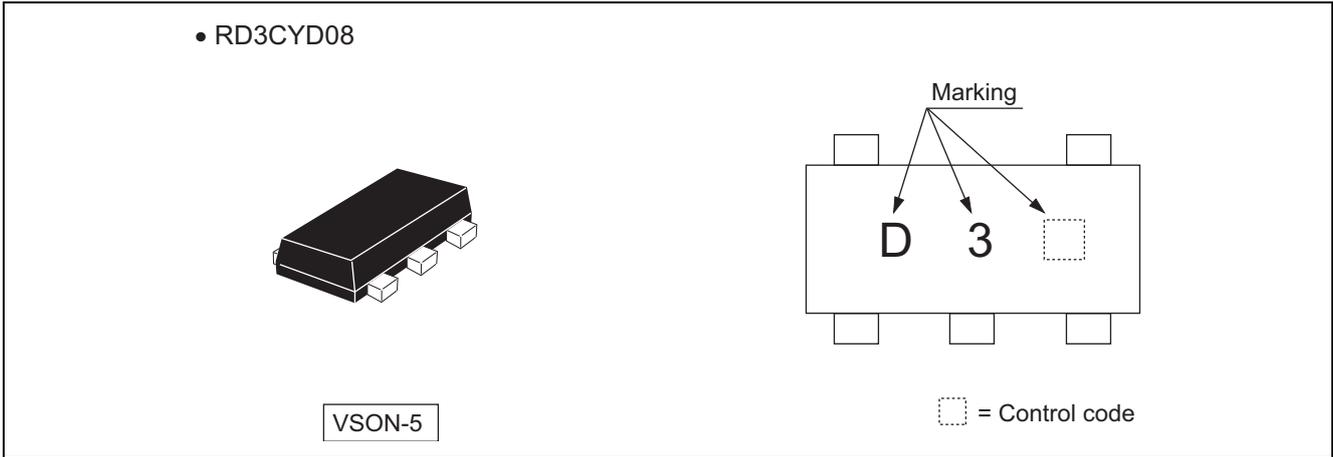
- Supplied on emboss taping for high-speed automatic mounting.
- Supply voltage range : 2.0 to 3.6 V
- Operating temperature range : -40 to +85°C
- High drive current  
 $I_{OH\ short} = -130\text{ mA (typ) (@}V_{CC} = 3.3\text{ V)}$
- Low sink current  
 $I_{OL\ short} = 45\text{ mA (typ) (@}V_{CC} = 3.3\text{ V)}$
- Ordering Information

Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
RD3CYD08CME	CMPAK-5 pin	PTSP0005ZC-A (CMPAK-5V)	CM	E (3,000 pcs/reel)
RD3CYD08VSE	VSON-5pin	PUSN0005KA-A (TNP-5DV)	VS	E (3,000 pcs/reel)

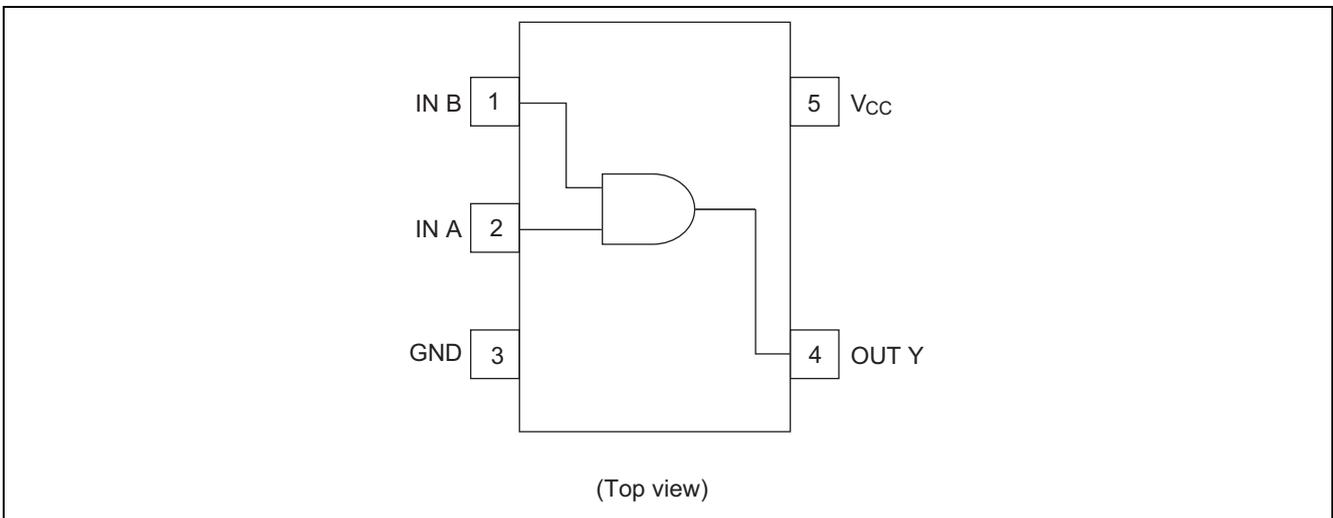
### Outline and Article Indication



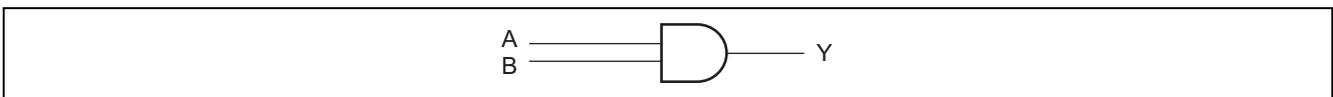
**Outline and Article Indication**



**Pin Arrangement**



**Logic Diagram**



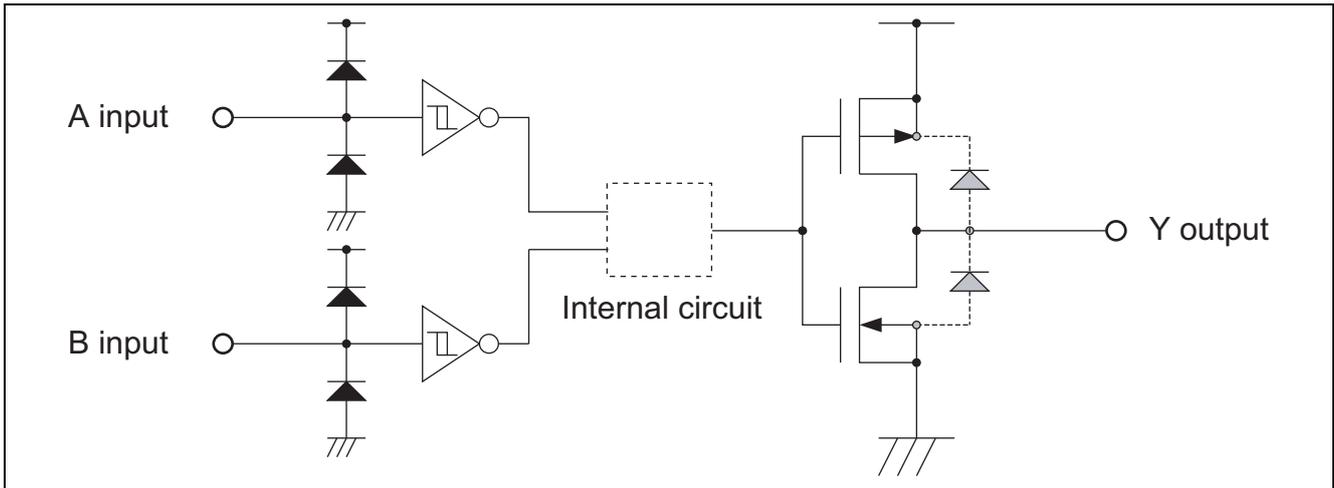
**Function Table**

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

H : High level

L : Low level

## Block Diagram



## Absolute Maximum Ratings

Item	Symbol	Ratings	Unit	Test Conditions
Supply voltage range	$V_{CC}$	-0.5 to 4.6	V	
Input voltage range <sup>*1</sup>	$V_I$	-0.5 to $V_{CC} + 0.5$	V	
Output voltage range <sup>*1, 2</sup>	$V_O$	-0.5 to $V_{CC} + 0.5$	V	
Input clamp current	$I_{IK}$	$\pm 50$	mA	$V_I < 0$ or $V_I > V_{CC}$
Output clamp current	$I_{OK}$	$\pm 50$	mA	$V_O < 0$ or $V_O > V_{CC}$
Continuous output current	$I_O$	-200	mA	$V_O = 0$
		100		$V_O = V_{CC}$
Continuous current through $V_{CC}$ or GND	$I_{CC}$ or $I_{GND}$	$\pm 200$	mA	
Maximum power dissipation at $T_a = 25^\circ\text{C}$ (in still air) <sup>*3</sup>	$P_T$	200	mW	
Storage temperature	$T_{stg}$	-65 to 150	$^\circ\text{C}$	

Notes: 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.

1. The input and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed. When Over shoot / Under shoot pulse width is under 10 ns, input and output voltage permit to -1.5 V or  $V_{CC} + 1.5\text{V}$ .
2. This value is limited to 4.6 V maximum.
3. The maximum package power dissipation was calculated using a junction temperature of 150 $^\circ\text{C}$ .

## Recommended Operating Conditions

Item	Symbol	Min	Max	Unit	Conditions
Supply voltage range	$V_{CC}$	2.0	3.6	V	
Input voltage range	$V_I$	0	$V_{CC}$	V	
Output voltage range	$V_O$	0	$V_{CC}$	V	
Operating free-air temperature	$T_a$	-40	85	$^\circ\text{C}$	

Note: Unused or floating inputs must be held high or low.

## Electrical Characteristics

 $T_a = -40 \text{ to } 85^\circ\text{C}$ 

Item	Symbol	V <sub>CC</sub> (V)	Min	Typ	Max	Unit	Test condition
Input voltage	V <sub>IH</sub>	2.5	1.7	—	—	V	
		3.0 to 3.6	2.0	—	—		
	V <sub>IL</sub>	2.5	—	—	0.7		
		3.0 to 3.6	—	—	0.8		
	V <sub>H</sub>	2.5	—	0.35	—		
		3.3	—	0.40	—		
Output current	I <sub>OH</sub> short	2.5	-55	-75	-95	mA	V <sub>O</sub> = 0 V
		3.3	-100	-130	-160		
	I <sub>OL</sub> short	2.5	20	30	40		V <sub>O</sub> = V <sub>CC</sub>
		3.3	30	45	60		
Input current	I <sub>IN</sub>	3.6	—	—	±5	μA	V <sub>IN</sub> = 3.6 V or GND
Quiescent supply current	I <sub>CC</sub>	3.6	—	—	10	μA	V <sub>IN</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0
Input capacitance	C <sub>IN</sub>	3.3	—	2.5	—	pF	V <sub>IN</sub> = V <sub>CC</sub> or GND

## Switching Characteristics

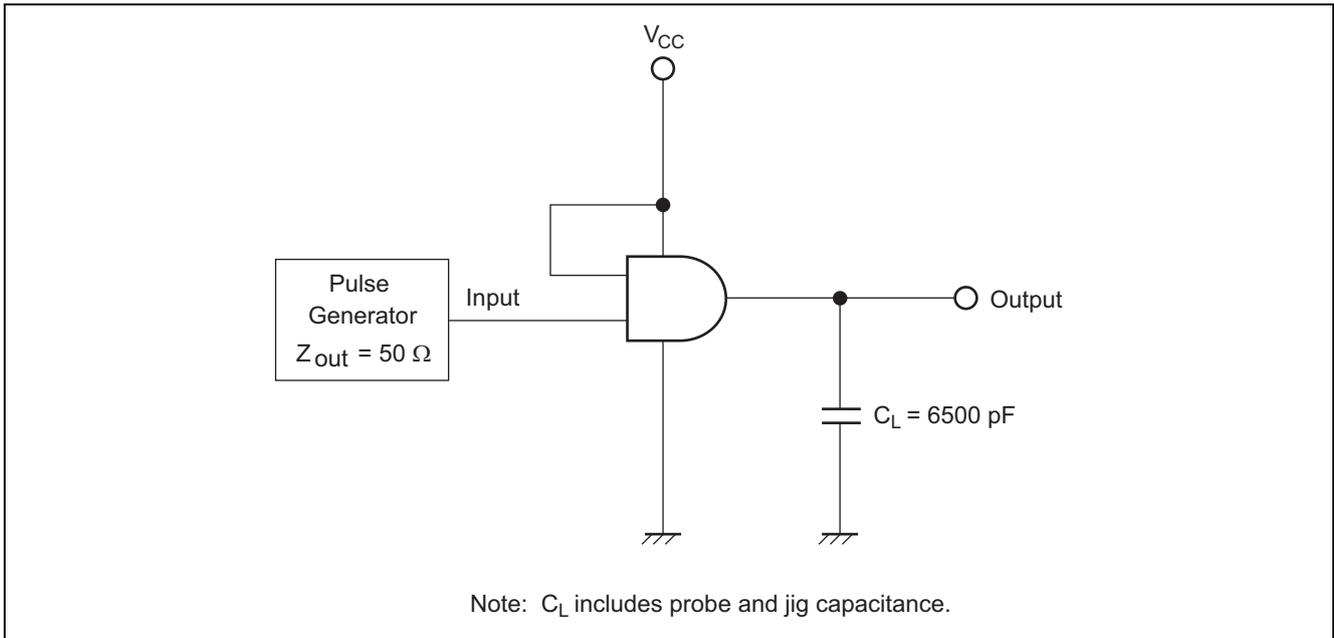
 $V_{CC} = 2.5 \text{ V}$ 

Item	Symbol	T <sub>a</sub> = -40 to 85°C			Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max				
Propagation delay time	t <sub>d(ON)</sub>	—	—	65	ns	C <sub>L</sub> = 6500 pF	A or B	Y
	t <sub>d(OFF)</sub>	—	—	200				
Output rise time	t <sub>r</sub>	—	—	700				
Output fall time	t <sub>f</sub>	—	—	2000				

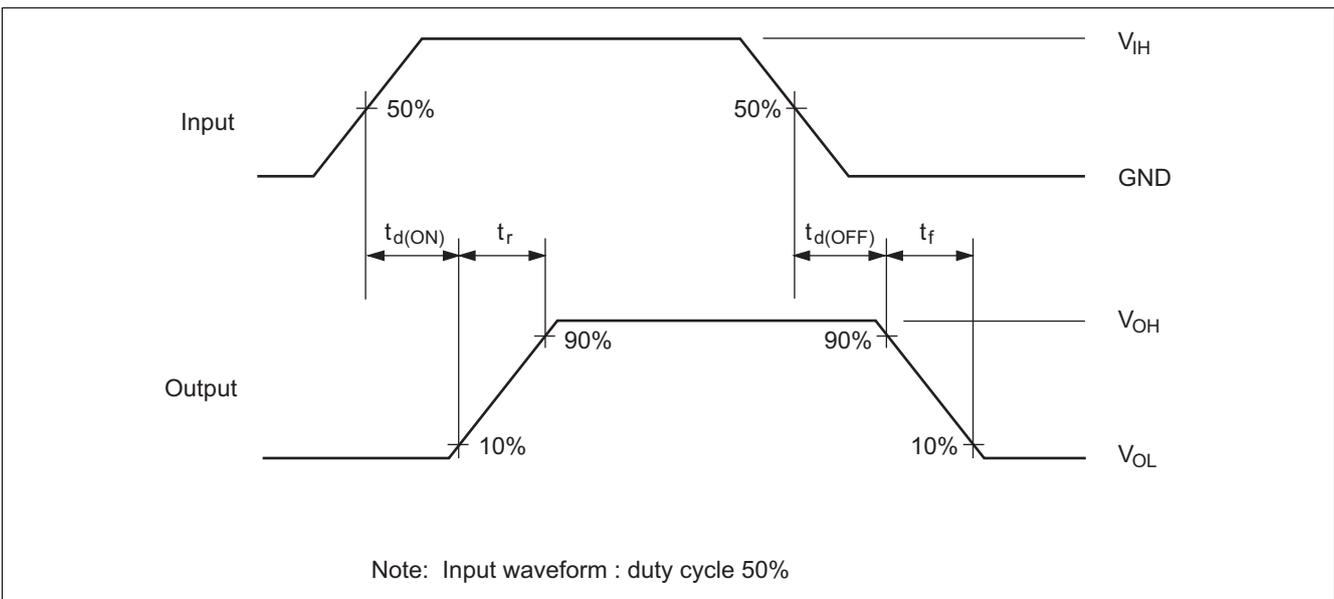
 $V_{CC} = 3.3 \pm 0.3 \text{ V}$ 

Item	Symbol	T <sub>a</sub> = -40 to 85°C			Unit	Test Conditions	FROM (Input)	TO (Output)
		Min	Typ	Max				
Propagation delay time	t <sub>d(ON)</sub>	—	—	50	ns	C <sub>L</sub> = 6500 pF	A or B	Y
	t <sub>d(OFF)</sub>	—	—	160				
Output rise time	t <sub>r</sub>	—	—	500				
Output fall time	t <sub>f</sub>	—	—	1500				

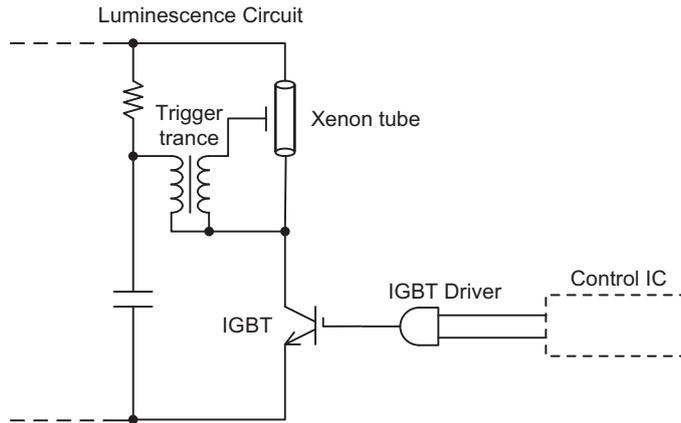
## Test Circuit



## Waveforms



## Application Note (Strobe circuit)



### Combination example

SYSTEM	IGBT	IGBT Driver	Control IC
3.3 V	RJP4002ANS RJP4002ASA	RD3CYD08 RD3CYDT08	3.3 V signal
5.0 V	RJP4003ANS RJP4003ASA	RD5CYD08 RD5CYDT08	5.0 V signal 3.3 V signal

### IGBT Driver Lineup

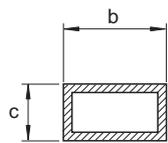
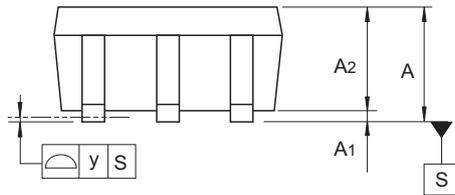
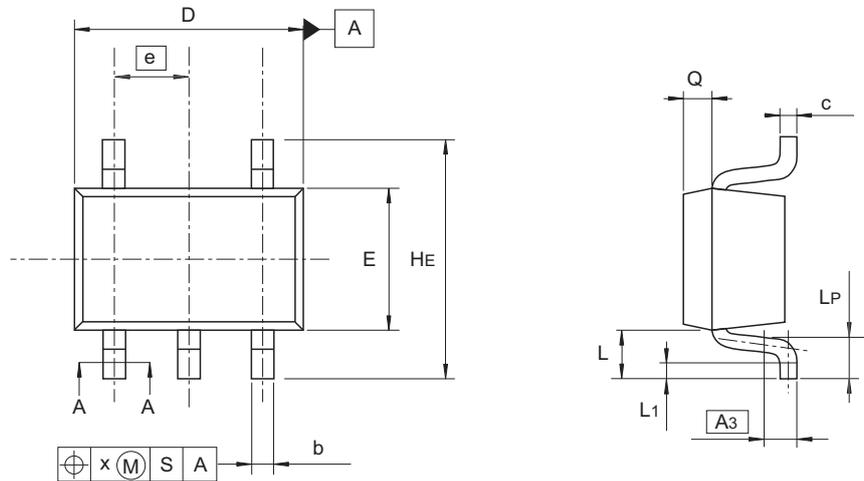
TYPE No.	Specification	Package
RD3CYD08	$V_{CC} = 2.0$ to $3.6V$ CMOS lever input $I_{OH}(\text{short}) = -130\text{mA}(\text{typ}) @ V_{CC} = 3.3V$ $I_{OL}(\text{short}) = 45\text{mA}(\text{typ}) @ V_{CC} = 3.3V$	CMPAK-5 VSON-5
RD3CYDT08	$V_{CC} = 2.0$ to $3.6V$ CMOS lever input $I_{OH}(\text{short}) = -130\text{mA}(\text{typ}) @ V_{CC} = 3.3V$ $I_{OL}(\text{short}) = 45\text{mA}(\text{typ}) @ V_{CC} = 3.3V$	CMPAK-5
RD5CYD08	$V_{CC} = 4.0$ to $6.0V$ CMOS lever input $I_{OH}(\text{short}) = -130\text{mA}(\text{typ}) @ V_{CC} = 5.0V$ $I_{OL}(\text{short}) = 40\text{mA}(\text{typ}) @ V_{CC} = 5.0V$	CMPAK-5
RD5CYDT08	$V_{CC} = 4.0$ to $6.0V$ TTL lever input $I_{OH}(\text{short}) = -130\text{mA}(\text{typ}) @ V_{CC} = 5.0V$ $I_{OL}(\text{short}) = 40\text{mA}(\text{typ}) @ V_{CC} = 5.0V$	

### IGBT Lineup

TYPE No.	Specification	Package
RJP4002ANS	$V_{CES} = 400V(\text{max})$ , $I_{CP} = 150A(\text{max})$ , 2.5V drive	VSON-8
RJP4002ASA	$V_{CES} = 400V(\text{max})$ , $I_{CP} = 150A(\text{max})$ , 2.5V drive	TSSOP-8
RJP4003ANS	$V_{CES} = 400V(\text{max})$ , $I_{CP} = 150A(\text{max})$ , 4V drive	VSON-8
RJP4003ASA	$V_{CES} = 400V(\text{max})$ , $I_{CP} = 150A(\text{max})$ , 4V drive	TSSOP-8

## Package Dimensions

JEITA Package Code	RENESAS Code	Previous Code	MASS (Typ) [g]
SC-88A	PTSP0005ZC-A	CMPAK-5 / CMPAK-5V	0.006

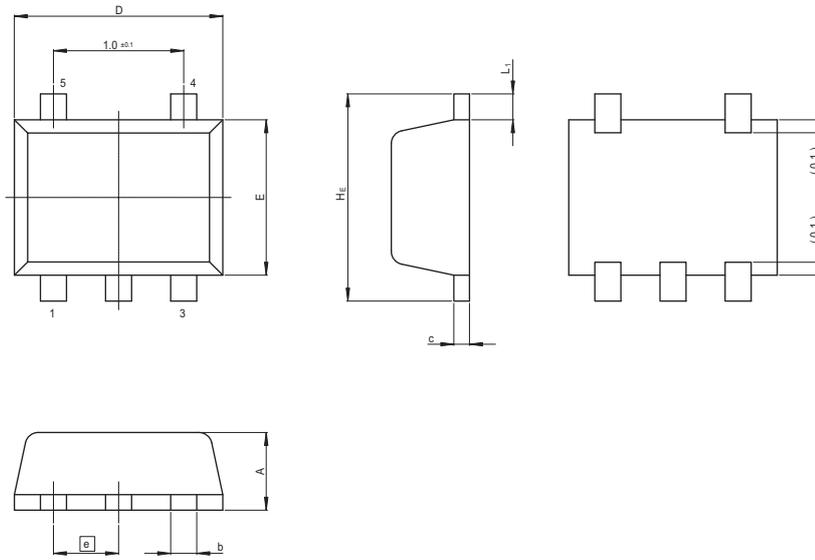


A-A Section

Reference Symbol	Dimensions in millimeters		
	Min	Nom	Max
A	0.8	—	1.1
A <sub>1</sub>	0	—	0.1
A <sub>2</sub>	0.8	0.9	1.0
A <sub>3</sub>	—	0.25	—
b	0.15	0.22	0.3
c	0.1	0.13	0.15
D	1.8	2.0	2.2
E	1.15	1.25	1.35
e	—	0.65	—
H <sub>E</sub>	1.8	2.1	2.4
L	0.3	—	0.7
L <sub>1</sub>	0.1	—	0.5
L <sub>P</sub>	0.2	—	0.6
x	—	—	0.05
y	—	—	0.05
Q	—	0.25	—

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JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-USON5-1.2x1.6-0.50	PUSN0005KA-A	TNP-5D/TNP-5DV	0.002g



Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	1.55	1.6	1.65
E	1.1	1.2	1.3
A	—	—	0.6
A <sub>1</sub>	—	—	—
A <sub>2</sub>	—	—	—
b	0.15	0.2	0.3
b <sub>1</sub>	—	—	—
Ⓜ	—	0.5	—
L <sub>p</sub>	—	—	—
x	—	—	—
y	—	—	—
Z <sub>D</sub>	—	—	—
c	0.07	0.12	0.22
c <sub>1</sub>	—	—	—
H <sub>E</sub>	1.55	1.6	1.65
L <sub>1</sub>	—	0.2	—

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