

# M62342P/FP, M62343P/FP

R03DS0040EJ0500

Rev.5.00

Jun 03, 2011

## 8-Bit D/A Converter (Buffered)

### Description

The M62342 and M62343 are CMOS-structure semiconductor integrated circuits incorporating two or three 8-bit D/A converter channels with output buffer op-amps.

Serial data transfer type input can easily be used through a combination of three lines: DI, CLK, and LD.

Outputs incorporate buffer op-amps that have a drive capacity of 1 mA or above for both sink and source, and can operate over the entire voltage range from almost ground to  $V_{CC}$  (0 to 5 V), making peripheral elements unnecessary and enabling configuration of a system with few component parts.

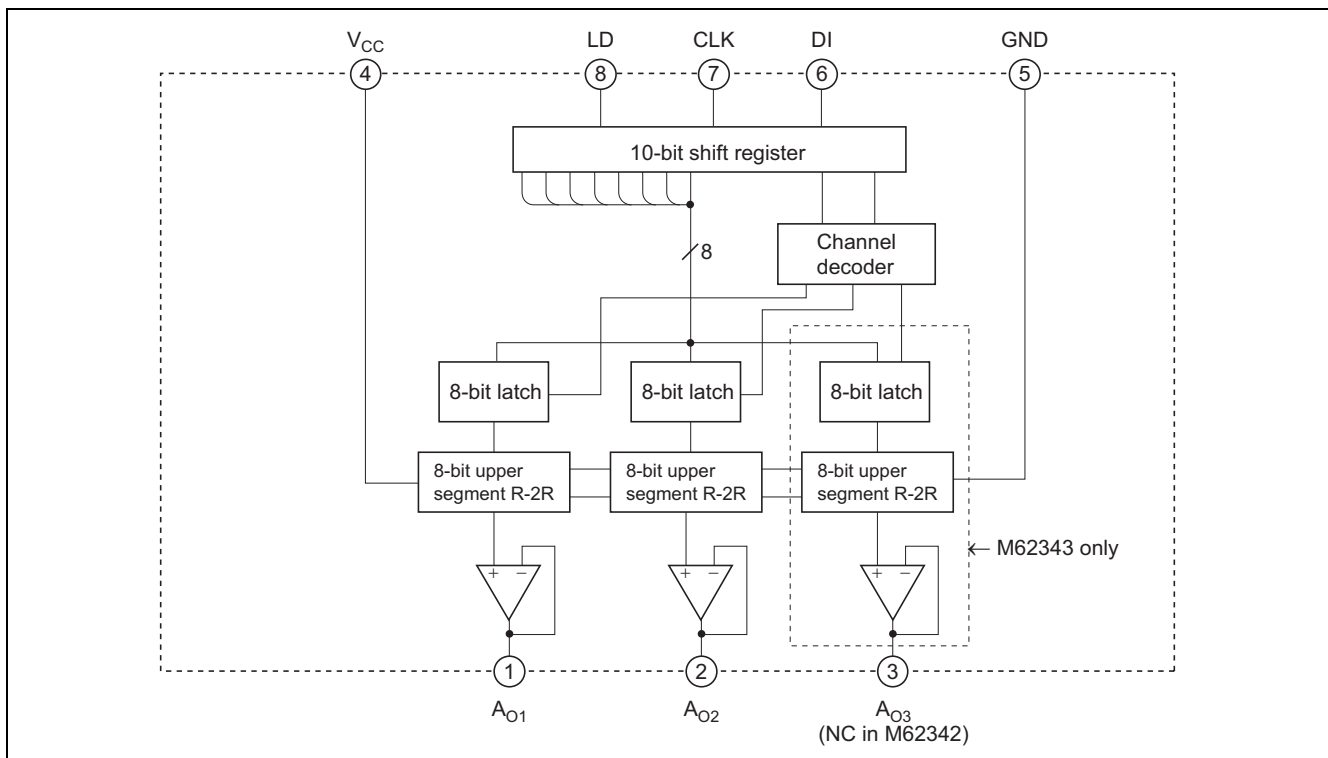
### Features

- Data transfer format  
10-bit serial data input type
- Output buffer op-amps  
Operable over entire voltage range from almost ground to  $V_{CC}$  (0 to 5 V)
- High output current capacity  
 $\pm 1$  mA or higher

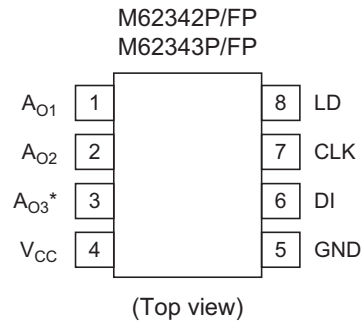
### Application

Signal gain setting and automatic adjustment in CTV, and display monitors, conversion from digital data to analog data in consumer and industrial products

### Block Diagram



## Pin Arrangement



Outline: PRDP0008AA-A (8P4) [P] (not recommend for new design)  
 PRSP0008DE-C [FP] (recommend)  
 PRSP0008DA-A (8P2S-A) [FP] (not recommend for new design)

Note: Pin 3 of the M62342 is a NC pin.

## Pin Description

Pin No.	Symbol	Function
6	DI	Serial data input pin. Inputs serial data with a 10-bit data length.
7	CLK	Serial clock input pin. Input signal from DI pin is input to 10-bit shift register at rise of shift clock.
8	LD	Load pin. When "H" level is input to LD pin, value in 10-bit shift register is loaded into decoder and D/A output register.
1	A <sub>O1</sub>	8-bit resolution D/A converter output pins (After power-on, all channels are reset and DAC data 00h is output.)
2	A <sub>O2</sub>	
3	A <sub>O3</sub> (M62343 only)	
4	V <sub>CC</sub>	Power supply voltage pin
5	GND	GND pin

## Absolute Maximum Ratings

Item	Symbol	Rated Value	Unit
Power supply voltage	$V_{CC}$	-0.3 to 7.0	V
Input voltage	$V_{in}$	-0.3 to $V_{CC}+0.3 \leq 7.0$	V
Output voltage	$V_O$	-0.3 to $V_{CC}+0.3 \leq 7.0$	V
Internal power consumption	$P_d$	417 (P) / 272 (FP)	mW
Operating ambient temperature	$T_{opr}$	-20 to +85	°C
Storage temperature	$T_{stg}$	-40 to +125	°C

## Electrical Characteristics

(Unless specified otherwise,  $V_{CC} = +5\text{ V} \pm 10\%$ ,  $GND = 0\text{ V}$ ,  $T_a = -20^\circ\text{C}$  to  $85^\circ\text{C}$ )

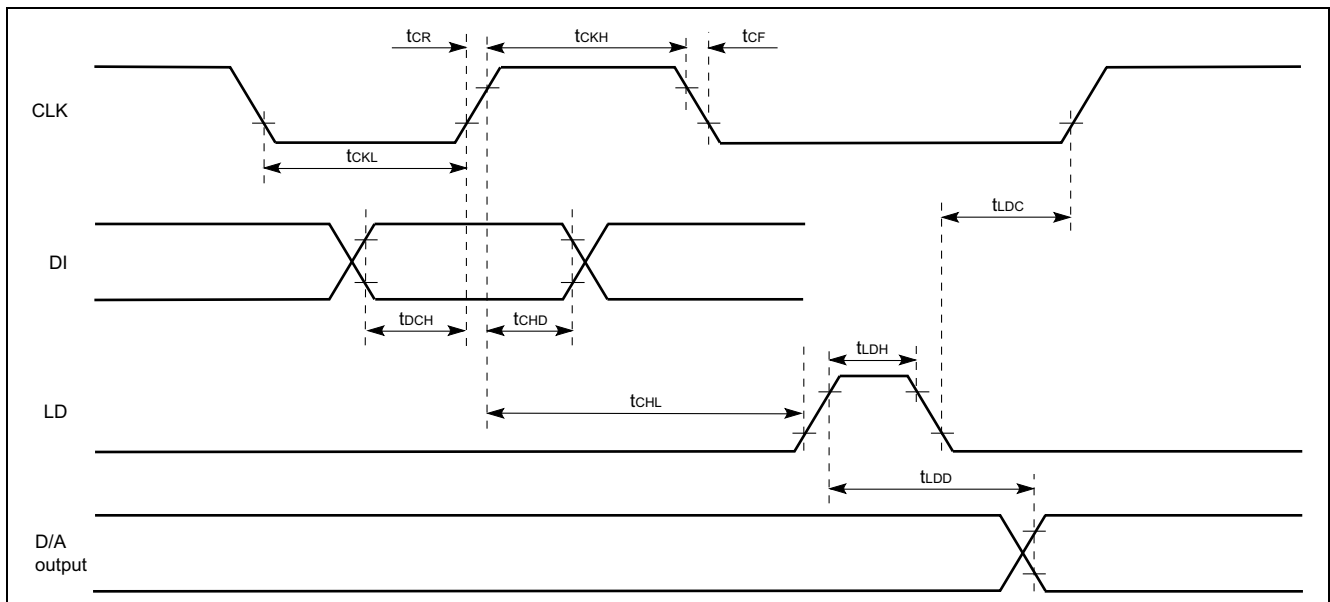
Item	Symbol	Specification Values			Unit	Test Conditions
		Min	Typ	Max		
Power supply voltage	$V_{CC}$	2.7	5.0	5.5	V	
Power supply current	$I_{CC}$	0	0.7 (M62342) 0.8 (M62343)	2.5 (M62342) 2.7 (M62343)	mA	At CLK = 1 MHz operation, $I_{AO} = 0\ \mu\text{A}$ D/A data: 6 Ah (at maximum current)
		0	0.5 (M62342) 0.6 (M62343)	1.6 (M62342) 1.8 (M62343)		DI = CLK = LD = GND, $I_{AO} = 0\ \mu\text{A}$
Input leakage current	$I_{ILK}$	-10	—	10	$\mu\text{A}$	$V_{IN} = 0$ to $V_{CC}$
Input voltage "L"	$V_{IL}$	0	—	$0.2V_{CC}$	V	
Input voltage "H"	$V_{IH}$	$0.5V_{CC}$	—	$V_{CC}$	V	
Buffer amp output voltage range	$V_{AO}$	0.1	—	$V_{CC}-0.1$	V	$I_{AO} = \pm 100\ \mu\text{A}$
		0.2	—	$V_{CC}-0.2$		$I_{AO} = \pm 500\ \mu\text{A}$
Buffer amp output drive range	$I_{AO}$	-1.0	—	1.0	mA	Upper saturation voltage = 0.3 V Lower saturation voltage = 0.2 V
Differential nonlinearity error	$S_{DL}$	-1.0	—	1.0	LSB	$V_{CC} = 5.12\text{ V}$ (20 mV/LSB) No load ( $I_{AO} = 0$ )
Nonlinearity error	$S_L$	-1.5	—	1.5	LSB	
Zero point error	$S_{ZERO}$	-2.0	—	2.0	LSB	
Full-scale error	$S_{FULL}$	-2.0	—	2.0	LSB	
Oscillation limit output capacitance	$C_O$	—	—	0.1	$\mu\text{F}$	
Buffer amp output impedance	$R_O$	—	5.0	—	$\Omega$	

## AC Characteristics

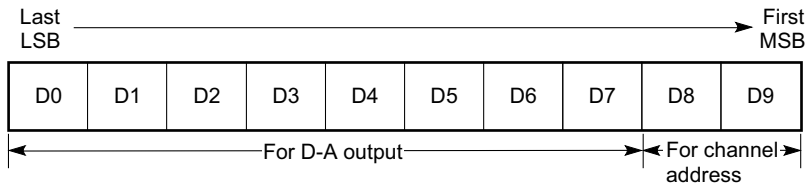
(Unless specified otherwise,  $V_{CC} = +5\text{ V} \pm 10\%$ ,  $GND = 0\text{ V}$ ,  $T_a = -20^\circ\text{C}$  to  $85^\circ\text{C}$ )

Item	Symbol	Specification Values			Unit	Test Conditions
		Min	Typ	Max		
Clock "L" pulse width	$t_{CKL}$	200	—		ns	
Clock "H" pulse width	$t_{CKH}$	200	—		ns	
Clock rise time	$t_{CR}$	—	—	200	ns	
Clock fall time	$t_{CF}$	—	—	200	ns	
Data setup time	$t_{DCH}$	30	—	—	ns	
Data hold time	$t_{CHD}$	60	—	—	ns	
Load setup time	$t_{CHL}$	200	—	—	ns	
Load hold time	$t_{LDC}$	100	—	—	ns	
Load "H" pulse width	$t_{LDH}$	100	—	—	ns	
D-A output settling time	$t_{LDD}$	—	—	300	$\mu\text{s}$	Until output reaches last 1/2 LSB

## Timing Chart



### Digital Data Format



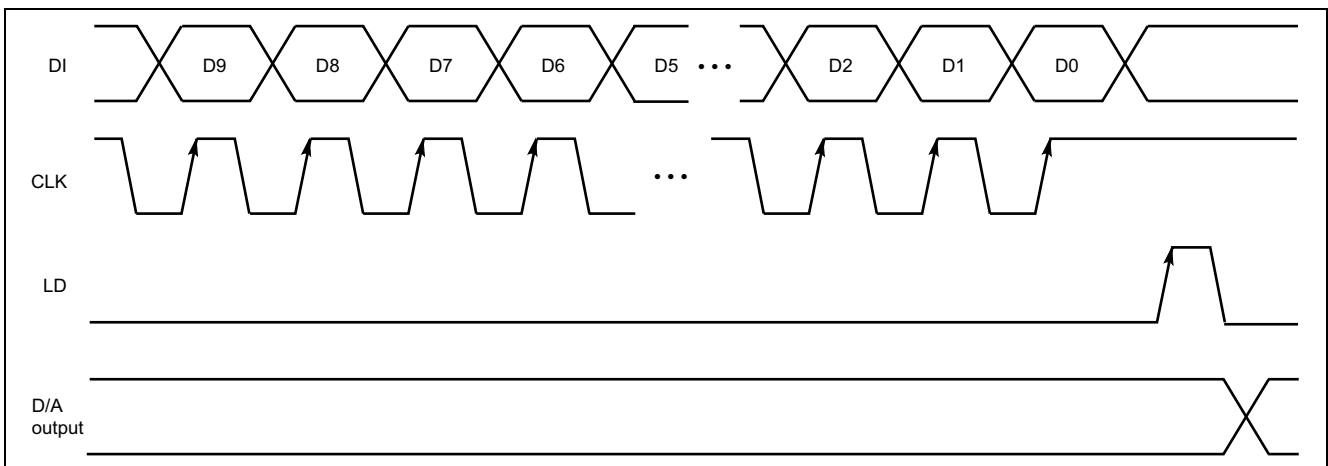
### Channel Select Data

D8	D9	Channel Selection
0	0	AO1 selected
1	0	AO2 selected
0	1	M62343 : AO3 selected M62343 Don't care
1	1	Don't care

### DAC Data

D0	D1	D2	D3	D4	D5	D6	D7	DAC output
0	0	0	0	0	0	0	0	$V_{CC}/256 \times 1$
1	0	0	0	0	0	0	0	$V_{CC}/256 \times 2$
0	1	0	0	0	0	0	0	$V_{CC}/256 \times 3$
1	1	0	0	0	0	0	0	$V_{CC}/256 \times 4$
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
0	1	1	1	1	1	1	1	$V_{CC}/256 \times 255$
1	1	1	1	1	1	1	1	$V_{CC}/256 \times 256$

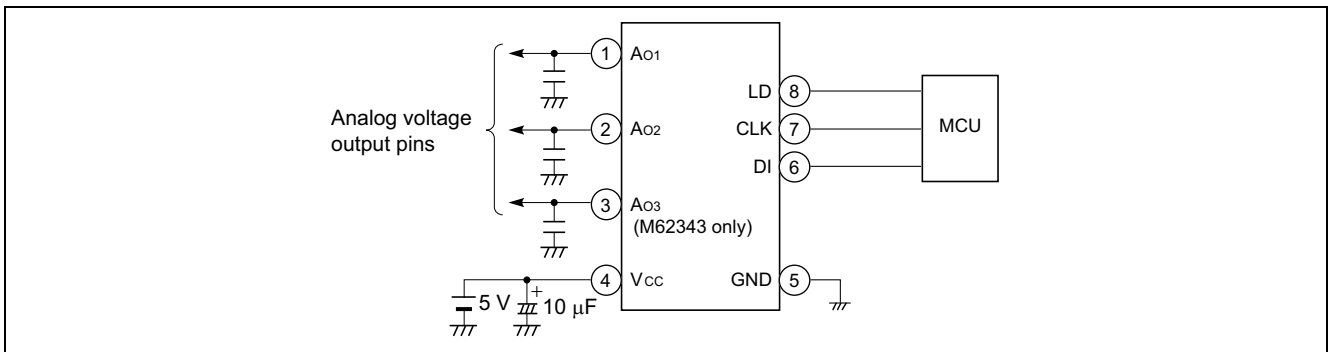
### Data Timing Chart (Model)



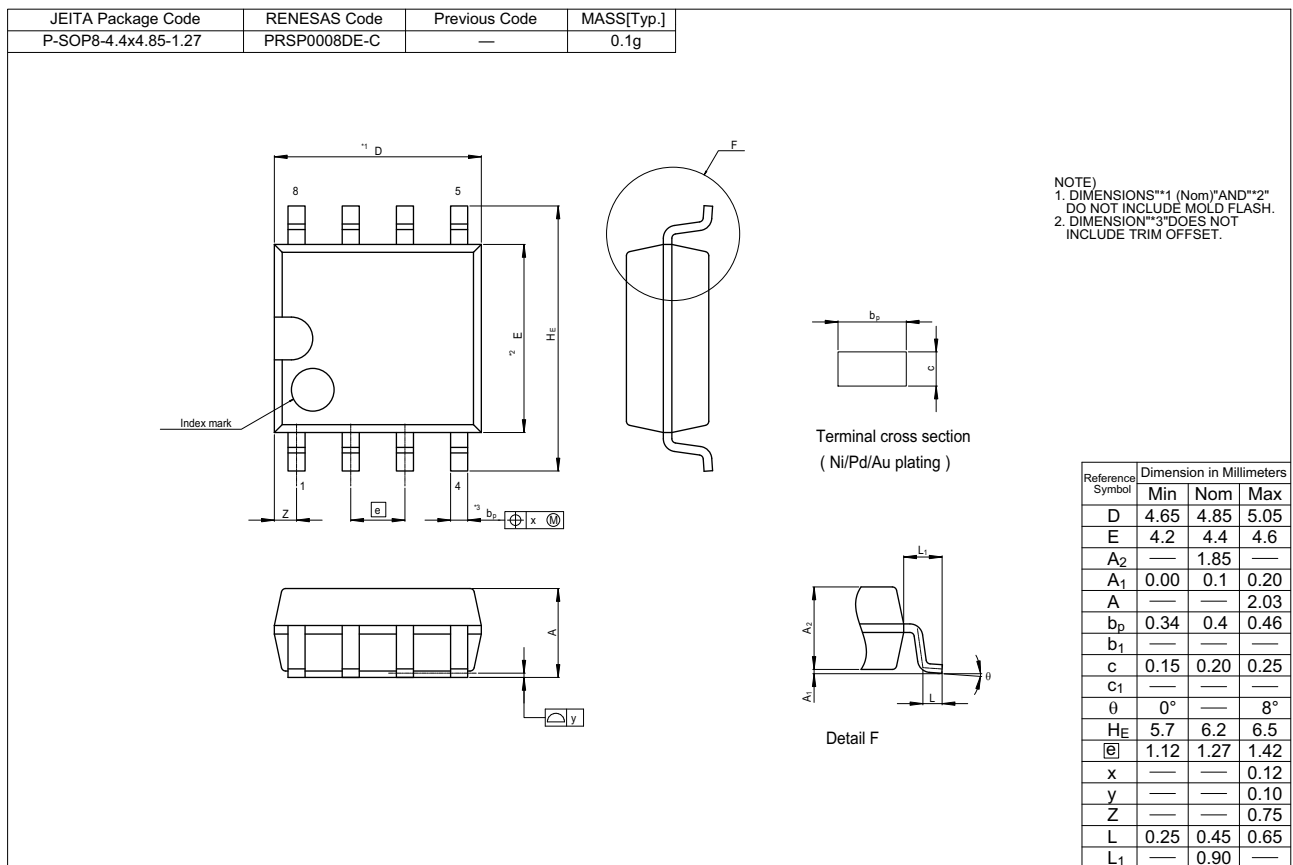
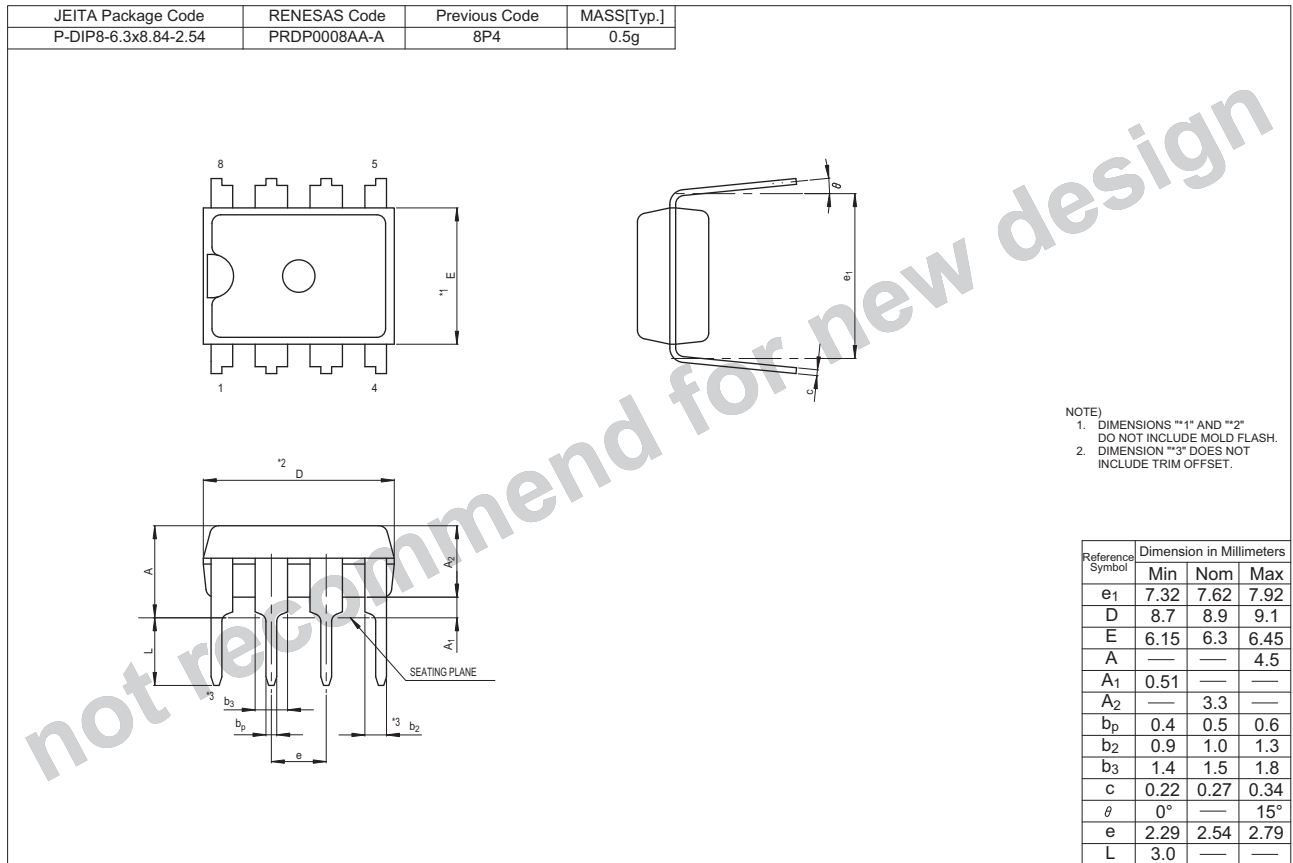
## Usage Notes

1. With this IC, D/A converter upper reference voltage setting is performed by means of the power supply voltage. If ripples or spikes are imposed on this pin, conversion accuracy may fall. When using this IC, a capacitor must be inserted between the power supply pin and GND in order to ensure stable D/A conversion.
2. The output buffer amps of this IC are highly tolerant of capacitive loads. Therefore, connecting capacitors (0.1  $\mu\text{F}$  max.) between the output pins and ground in order to eliminate jitter or noise due to output line wiring presents no problems whatever in terms of operation.

## Sample Standard Application Circuit

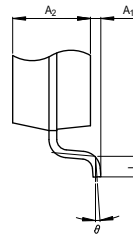
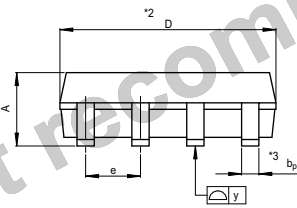
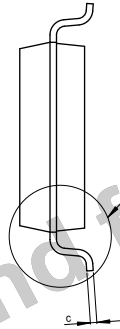
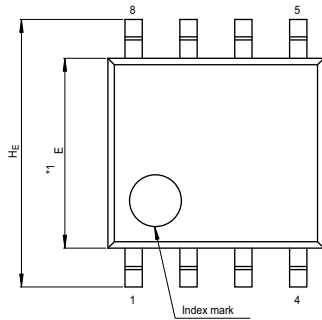


Package Dimensions



M62342P/FP, M62343P/FP

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP8-4.4x5-1.27	PRSP0008DA-A	8P2S-A	0.07g



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

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	4.8	5.0	5.2
E	4.2	4.4	4.6
A <sub>2</sub>	—	1.5	—
A <sub>1</sub>	0.05	—	—
A	—	—	1.9
b <sub>p</sub>	0.35	0.4	0.5
c	0.13	0.15	0.2
θ	0°	—	10°
H <sub>E</sub>	5.9	6.2	6.5
e	1.12	1.27	1.42
y	—	—	0.1
L	0.2	0.4	0.6



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