

To all our customers

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Renesas Technology Corp.  
Customer Support Dept.  
April 1, 2003

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Keep safety first in your circuit designs!

1. Renesas Technology Corporation puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage.

Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

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# BRC144EMP Series

NPN Built-in Resistor Transistor MPAK Series  
Inverter, Driver, Switching

**RENESAS**

ADE-208-1443B (Z)

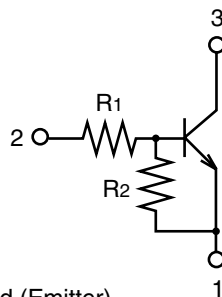
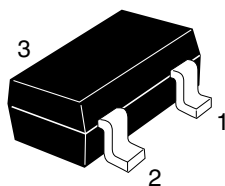
Rev.2  
Sep. 2001

## Features

- Built-in Resistor Type
- Simplifies Circuit Design
- Reduces Board Space
- Complementary pair with BRA144EMP series

## Outline

MPAK



1. Ground (Emitter)
2. Input (Base)
3. Output (Collector)

Note: Marking is shown in below.

Device	Marking	R1 (k $\Omega$ )	R2 (k $\Omega$ )
BRC144EMP	BG	47	47
BRC124EMP	DG	22	22
BRC114EMP	FG	10	10
BRC143EMP	HG	4.7	4.7
BRC123EMP	KG	2.2	2.2

**Absolute Maximum Ratings**

(Ta = 25°C)

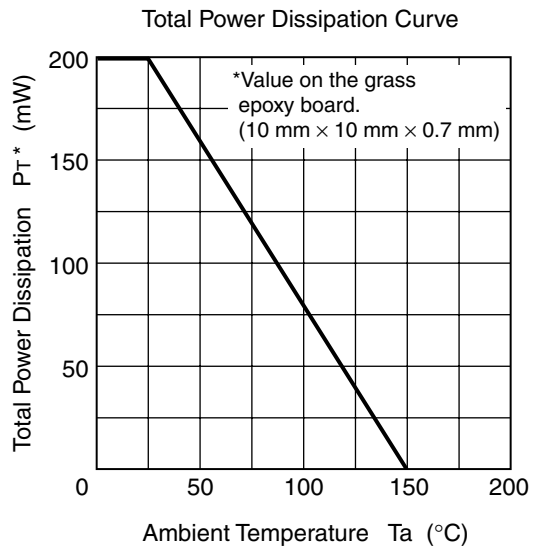
Item		Symbol	Ratings	Unit
Supply voltage		$V_{CC}$	50	V
Input voltage	BRC144EMP	$V_I$	-10 to +40	V
	BRC124EMP		-10 to +30	
	BRC114EMP		-10 to +20	
	BRC143EMP		-10 to +15	
	BRC123EMP		-10 to +12	
Output current		$I_O$	100	mA
Total power dissipation		$P_T^{*1}$	200	mW
Junction temperature		$T_j$	150	°C
Storage temperature		$T_{stg}$	-55 to +150	°C

\*Value on the glass epoxy board. (10 mm × 10 mm × 0.7 mm)

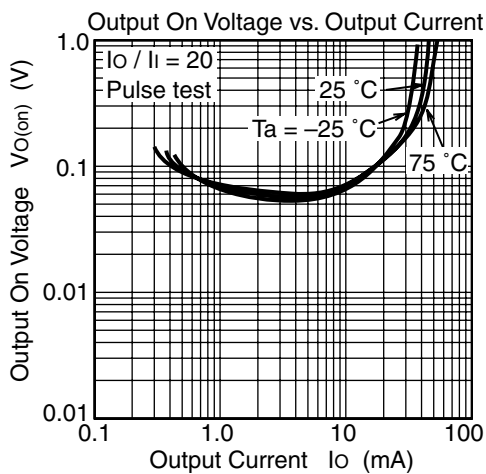
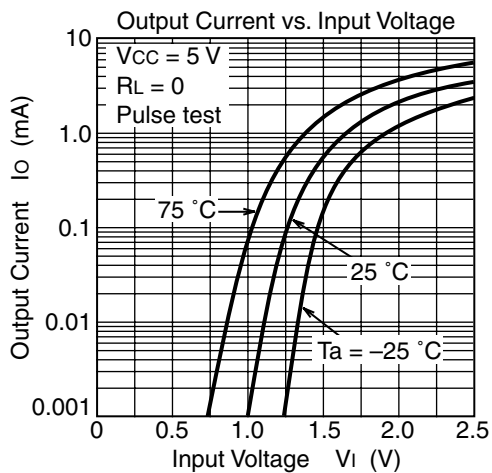
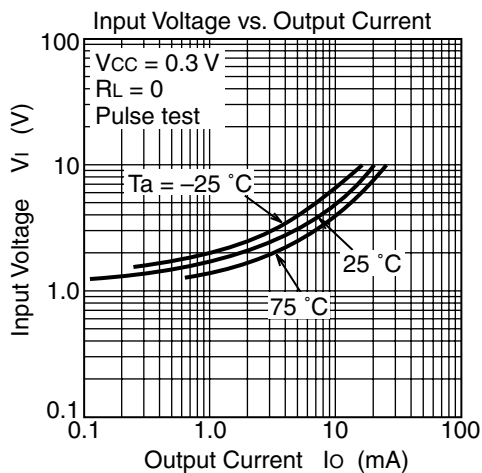
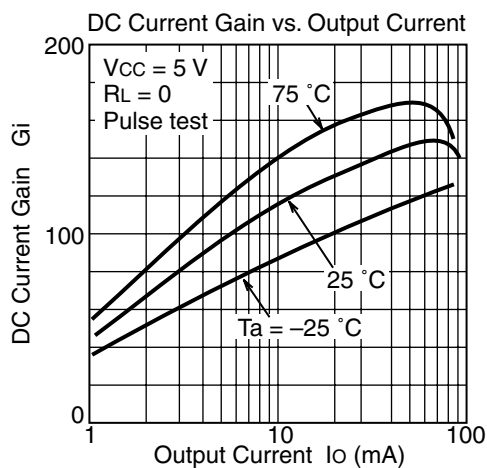
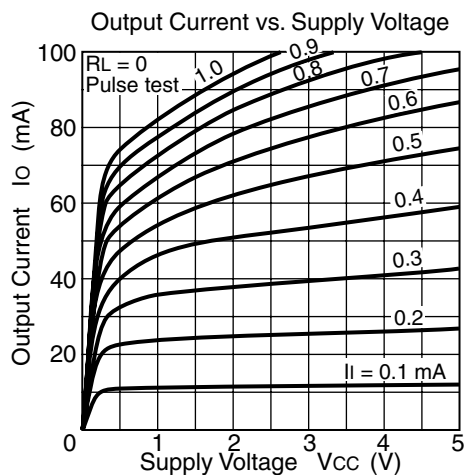
## Electrical Characteristics

(Ta = 25°C)

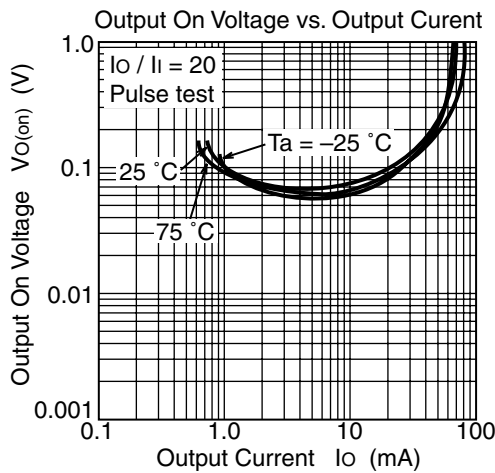
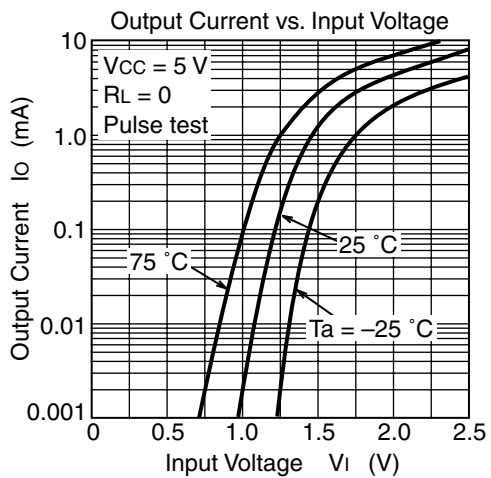
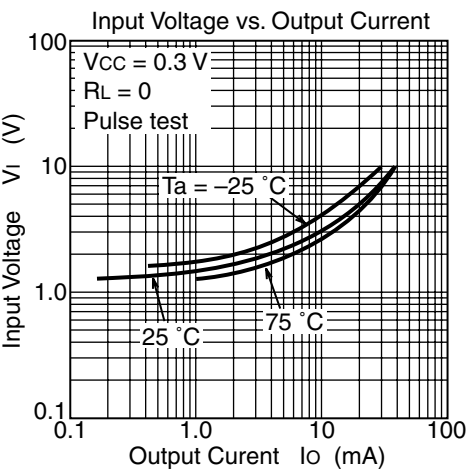
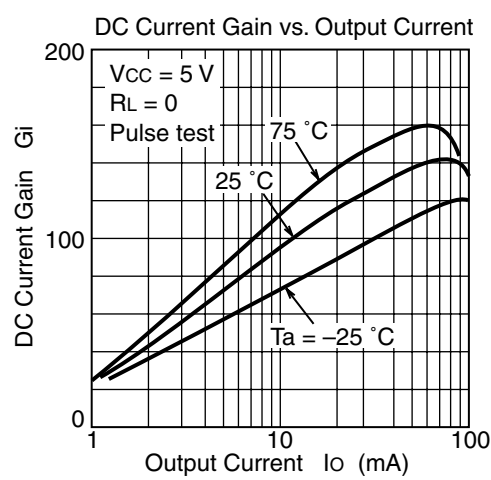
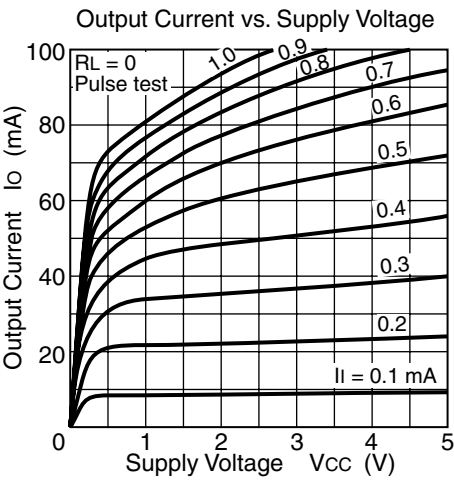
Item		Symbol	Min	Typ	Max	Unit	Test conditions
Input on voltage	BRC144EMP	$V_{I(on)}$	1.5	—	4.5	V	$V_{CC} = 0.3\text{ V}$ , $I_O = 5\text{ mA}$
	BRC124EMP		1.3	—	3.0		
	BRC114EMP		1.2	—	2.4		
	BRC143EMP		1.1	—	2.0		
	BRC123EMP		1.1	—	1.8		
Input off voltage	BRC144EMP	$V_{I(off)}$	1.0	—	1.5	V	$V_{CC} = 5\text{ V}$ , $I_O = 100\text{ }\mu\text{A}$
	BRC124EMP		1.0	—	1.5		
	BRC114EMP		1.0	—	1.5		
	BRC143EMP		1.0	—	1.5		
	BRC123EMP		1.0	—	1.5		
Output saturation voltage		$V_{O(on)}$	—	—	0.3	V	$I_O = 10\text{ mA}$ , $I_I = 0.5\text{ mA}$
Output cutoff current		$I_{O(off)}$	—	—	0.5	$\mu\text{A}$	$V_{CC} = 50\text{ V}$ , $I_I = 0$
DC current transfer ratio	BRC144EMP	$G_i$	70	—	—		$V_{CC} = 5\text{ V}$ , $I_O = 5\text{ mA}$
	BRC124EMP		56	—	—		
	BRC114EMP		30	—	—		
	BRC143EMP		20	—	—		$V_{CC} = 5\text{ V}$ , $I_O = 10\text{ mA}$
	BRC123EMP		20	—	—		$V_{CC} = 5\text{ V}$ , $I_O = 20\text{ mA}$
Input resistance	BRC144EMP	$R_i$	33	47	61	$\text{k}\Omega$	
	BRC124EMP		15	22	28		
	BRC114EMP		7	10	13		
	BRC143EMP		3.3	4.7	6.1		
	BRC123EMP		1.5	2.2	2.8		
Resistance ratio		$R_1/R_2$	0.8	1.0	1.2		



## Main Characteristics (BRC144EMP)

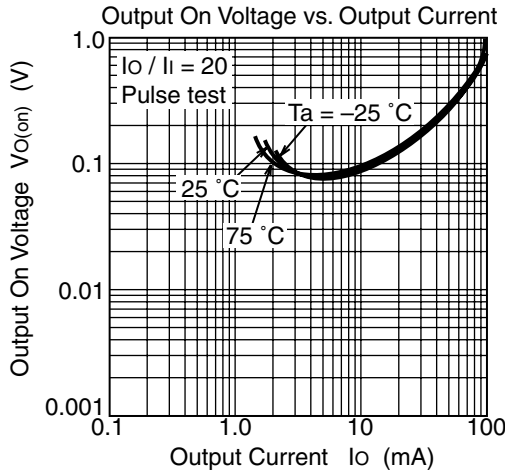
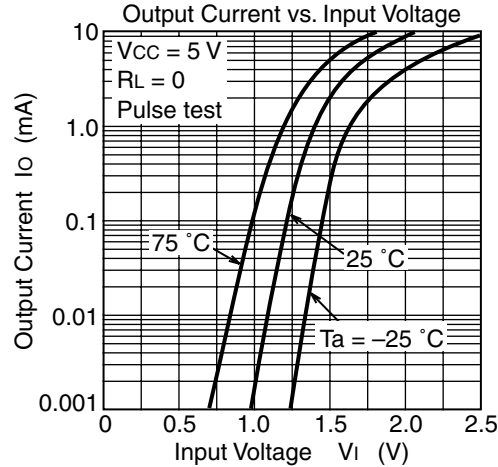
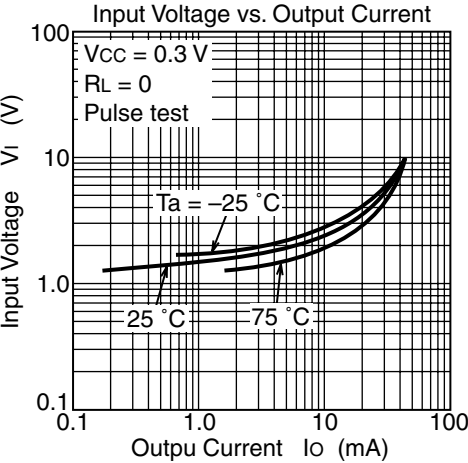
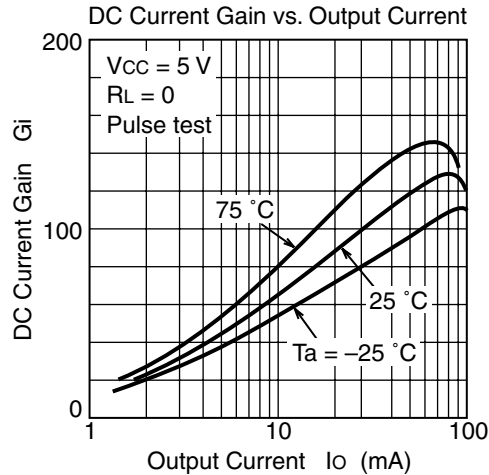
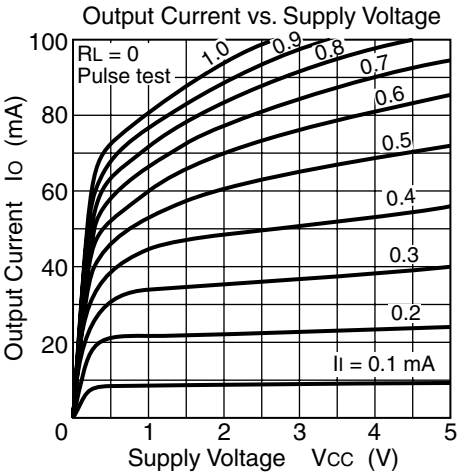


Main Characteristics (BRC124EMP)

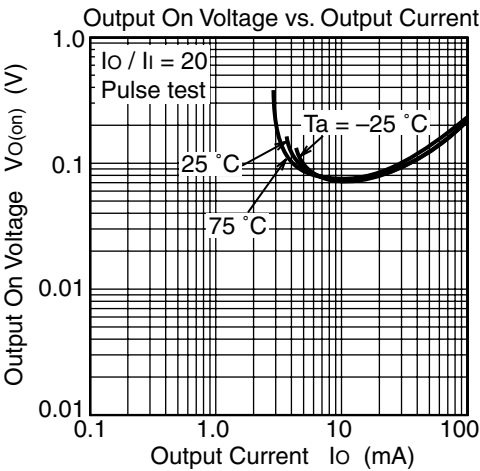
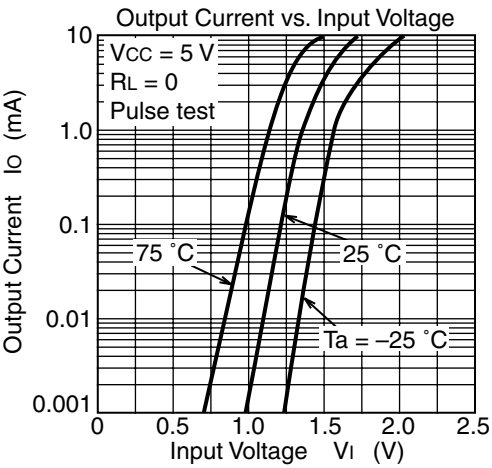
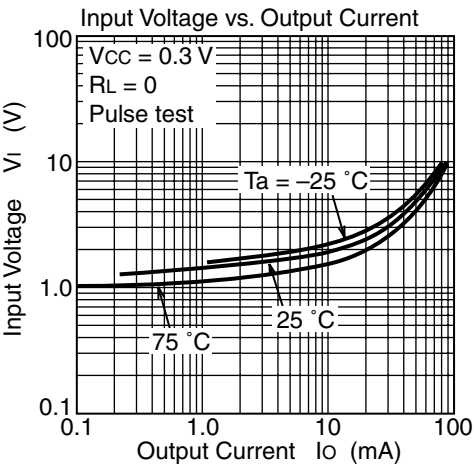
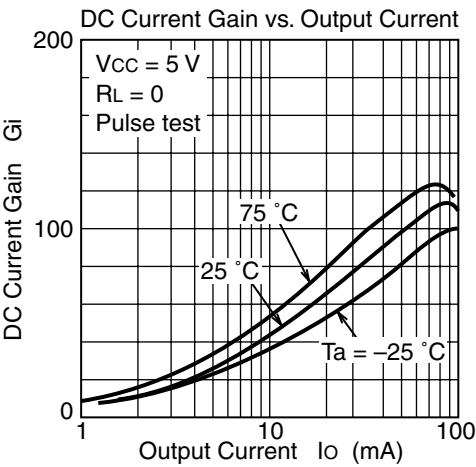
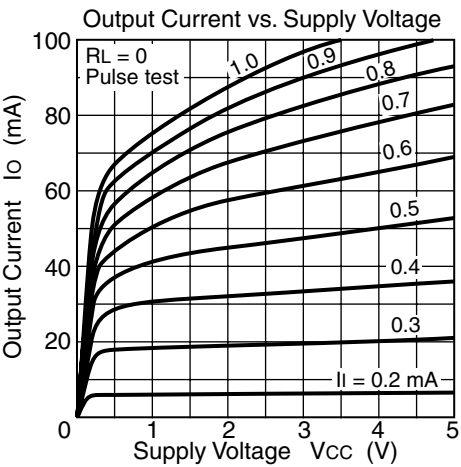




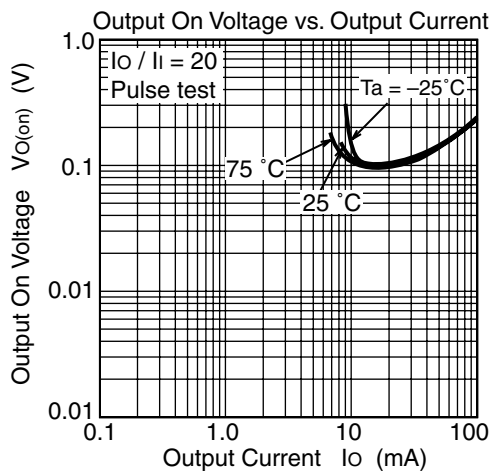
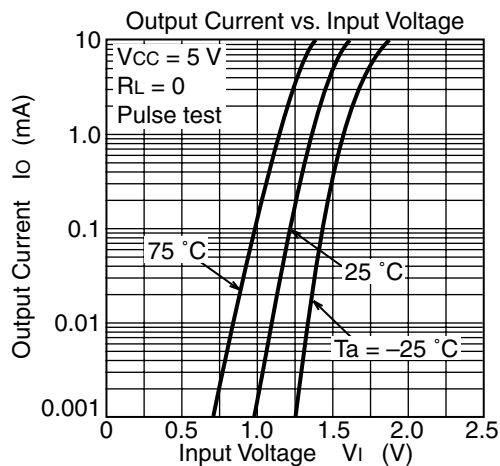
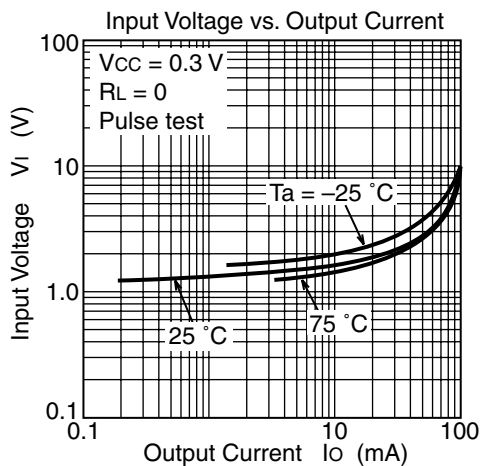
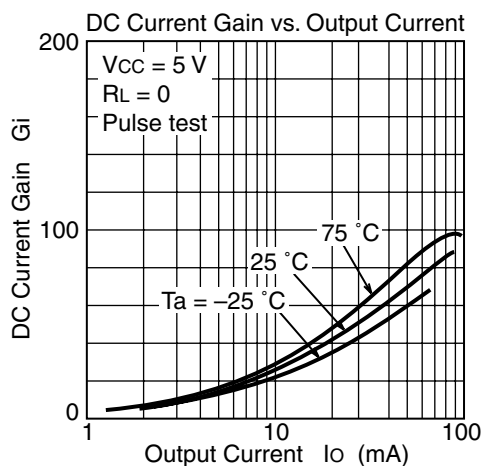
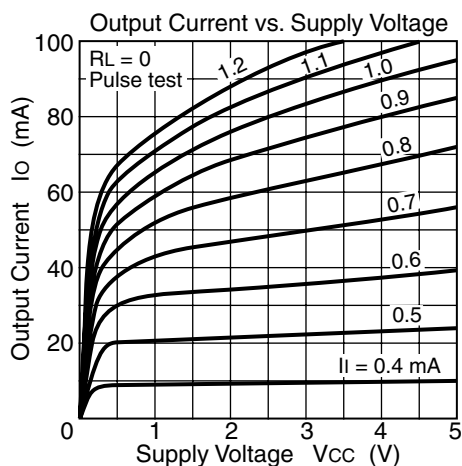
Main Characteristics (BRC114EMP)



Main Characteristics (BRC143EMP)



## Main Characteristics (BRC123EMP)



## Taping Specification

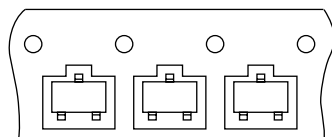
There are two different size reels in MPAK packaging.

Packing to “Left” direction

Purchasing Identification Code

Standard Reel    3000 pcs/reel: Type No. + Mark **TL**

Large Reel        12000 pcs/reel: Type No. + Mark **UL**



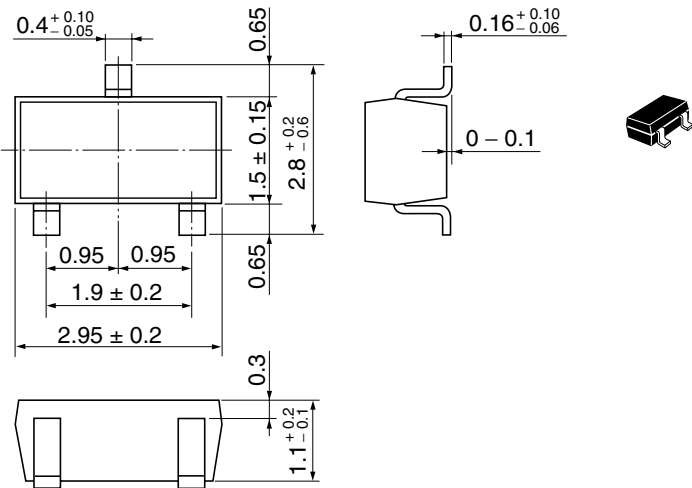
Marking face is up.  
Center lead goes to left.

Direction of feed



Package Dimensions

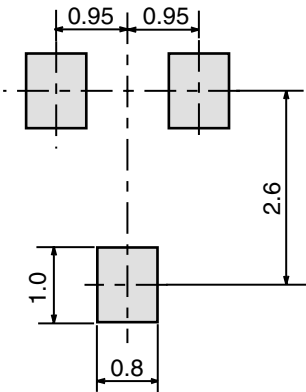
Unit: mm



Hitachi Code	MPAK
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.011 g

Footprint

MPAK



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