

To our customers,

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## Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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NPN SILICON EPITAXIAL TRANSISTOR  
FOR LOW-FREQUENCY POWER AMPLIFIERS AND LOW-SPEED SWITCHING

The 2SD2164 is a single power transistor developed especially for high  $h_{FE}$ . This transistor is ideal for simplifying drive circuits and reducing power dissipation because its  $h_{FE}$  is as high as that of Darlington transistors, but it is a single transistor.

In addition, this transistor features a small resin insulated package, thus contributing to high-density mounting and mounting cost reduction.

FEATURES

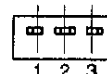
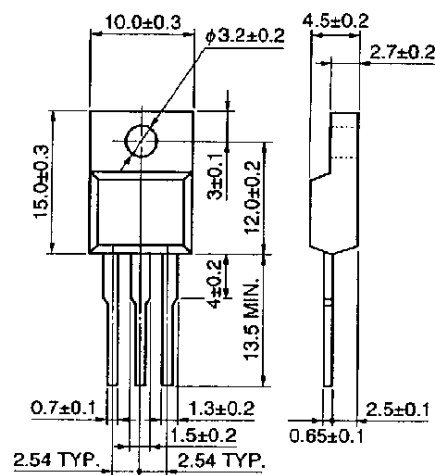
- High  $h_{FE}$  and low  $V_{CE(sat)}$ :  
 $h_{FE} \cong 1,300$  TYP. ( $V_{CE} = 5.0$  V,  $I_C = 0.5$  A)  
 $V_{CE(sat)} \cong 0.3$  V TYP. ( $I_C = 2.0$  A,  $I_B = 20$  mA)
- Full mold package that does not require an insulating board or insulation bushing

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )

Parameter	Symbol	Ratings	Unit
Collector to base voltage	$V_{CBO}$	60	V
Collector to emitter voltage	$V_{CEO}$	60	V
Emitter to base voltage	$V_{EBO}$	7.0	V
Collector current (DC)	$I_{C(DC)}$	3.0	A
Collector current (pulse)	$I_{C(pulse)}$	5.0 <sup>Note</sup>	A
Base current (DC)	$I_{B(DC)}$	0.5	A
Total power dissipation	$P_T$ ( $T_C = 25^\circ\text{C}$ )	20	W
Total power dissipation	$P_T$ ( $T_A = 25^\circ\text{C}$ )	2.0	W
Junction temperature	$T_j$	150	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$

Note  $PW \leq 300 \mu\text{s}$ , duty cycle  $\leq 10\%$

PACKAGE DRAWING (UNIT: mm)



Electrode Connection  
1. Base  
2. Collector  
3. Emitter

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**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)**

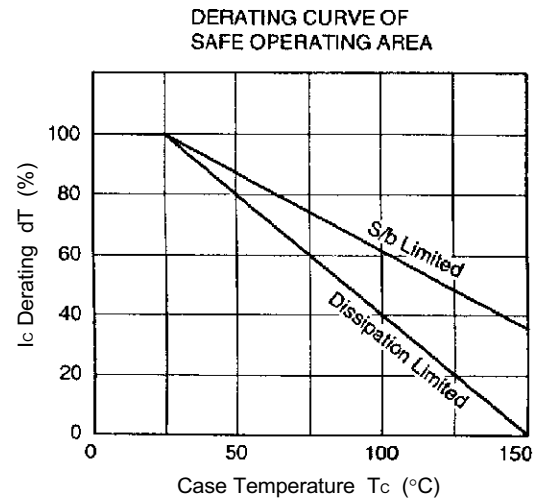
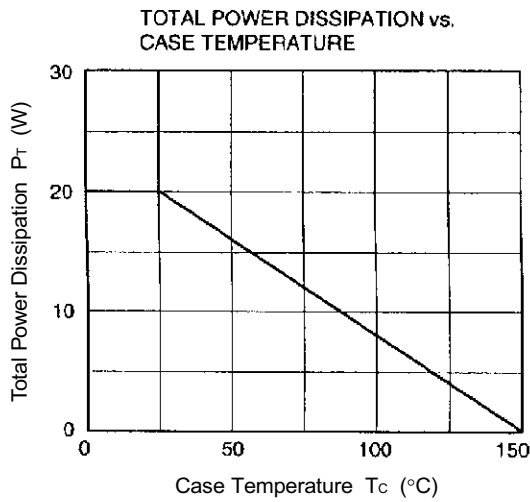
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I <sub>CB0</sub>	V <sub>CB</sub> = 60 V, I <sub>E</sub> = 0 A			10	μA
Emitter cutoff current	I <sub>EB0</sub>	V <sub>EB</sub> = 7.0 V, I <sub>C</sub> = 0 A			10	μA
DC current gain	h <sub>FE1</sub>	V <sub>CE</sub> = 5.0 V, I <sub>C</sub> = 0.5 A <sup>Note</sup>	800	1,300	3,200	
DC current gain	h <sub>FE2</sub>	V <sub>CE</sub> = 5.0 V, I <sub>C</sub> = 3.0 A <sup>Note</sup>	500	1,000		
Collector saturation voltage	V <sub>CE(sat)</sub>	I <sub>C</sub> = 2.0 A, I <sub>B</sub> = 20 mA <sup>Note</sup>		0.3	0.5	V
Base saturation voltage	V <sub>BE(sat)</sub>	I <sub>C</sub> = 2.0 A, I <sub>B</sub> = 20 mA <sup>Note</sup>			1.2	V
Gain bandwidth product	f <sub>T</sub>	V <sub>CE</sub> = 5.0 V, I <sub>C</sub> = 0.1 A		110		MHz
Collector capacitance	C <sub>ob</sub>	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0 A, f = 1.0 MHz		50		pF

**Note** Pulse test PW ≤ 350 μs, duty cycle ≤ 2%

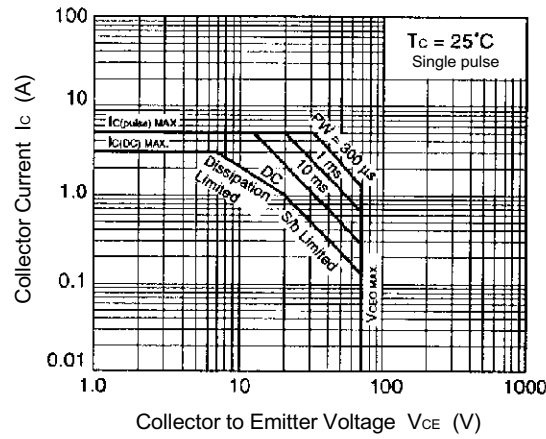
**h<sub>FE1</sub> CLASSIFICATION**

Marking	M	L	K
h <sub>FE1</sub>	800 to 1,600	1,000 to 2,000	1,600 to 3,200

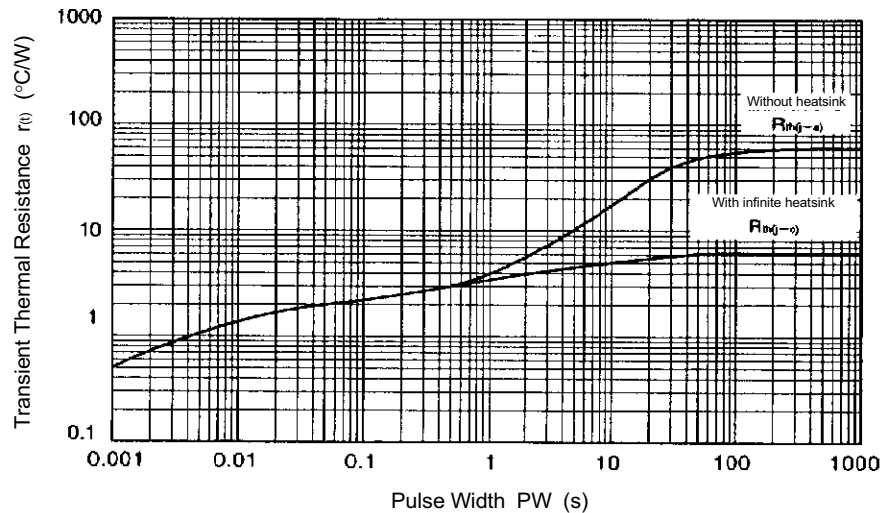
TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )



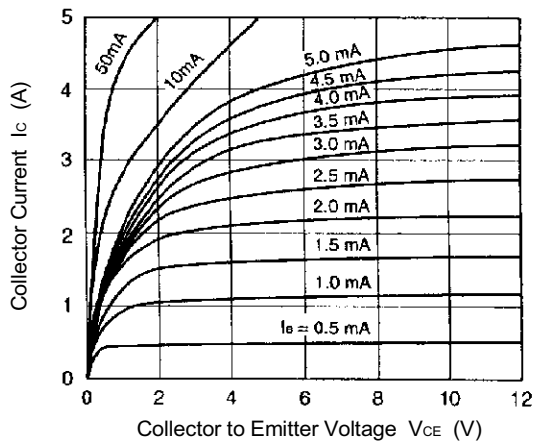
FORWARD BIAS SAFE OPERATING AREA



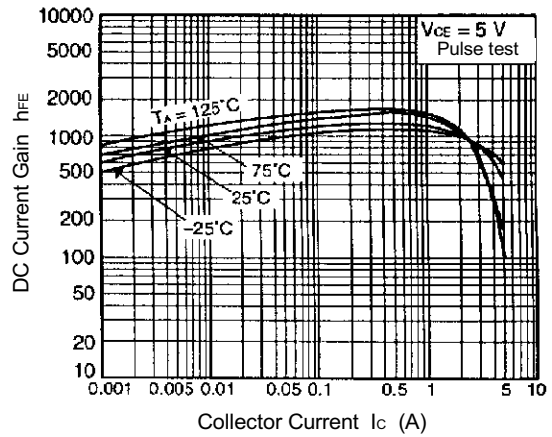
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



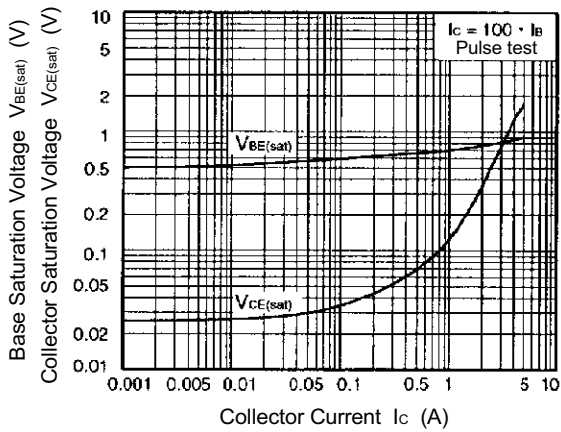
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



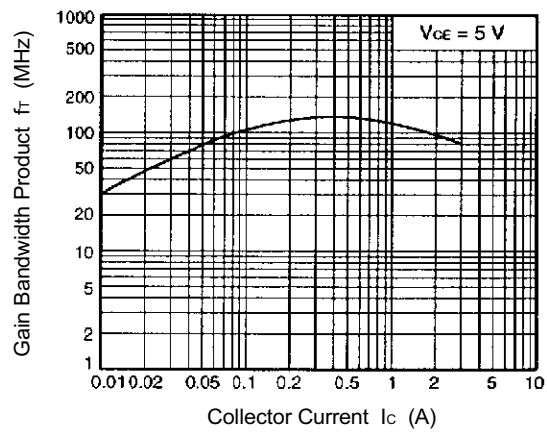
DC CURRENT GAIN vs. COLLECTOR CURRENT



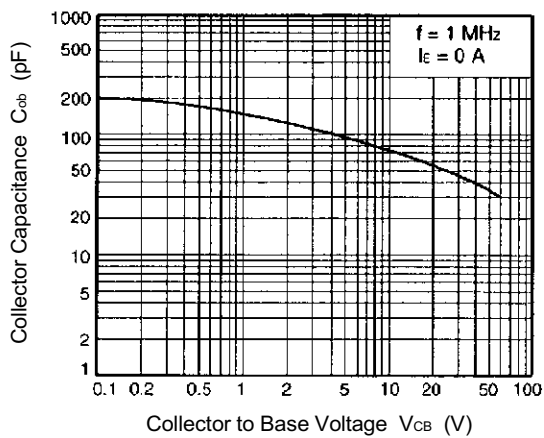
COLLECTOR AND BASE SATURATION VOLTAGE vs. COLLECTOR CURRENT



GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



OUTPUT CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



[MEMO]

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