

NPN SILICON EPITAXIAL TRANSISTOR  
FOR LOW-FREQUENCY POWER AMPLIFIERS

The 2SD2230 is an element realizing ultra low  $V_{CE(sat)}$ . This transistor is ideal for muting such as stereo recorders, VCRs, and TVs.

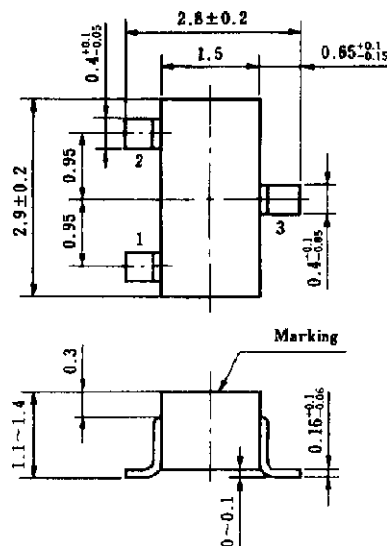
FEATURES

- Low  $V_{CE(sat)}$ :  
 $V_{CE(sat)1} = 33 \text{ mV TYP. @ } I_c = 100 \text{ mA, } I_B = 10 \text{ mA}$   
 $V_{CE(sat)2} = 150 \text{ mV TYP. @ } I_c = 500 \text{ mA, } I_B = 20 \text{ mA}$
- High  $h_{FE}$  and high current

QUALITY GRADES

- Standard  
 Please refer to "Quality Grades on NEC Semiconductor Devices" (Document No. C11531E) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

PACKAGE DRAWING (UNIT: mm)



Electrode connection  
 1. Emitter (E)  
 2. Base (B)  
 3. Collector (C)  
 Marking: D46

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

Parameter	Symbol	Ratings	Unit
Collector to base voltage	$V_{CBO}$	16	V
Collector to emitter voltage	$V_{CEO}$	16	V
Emitter to base voltage	$V_{EBO}$	5	V
Collector current (DC)	$I_{D(DC)}$	500	mA
Total power dissipation	$P_T$	200	mW
Junction temperature	$T_j$	150	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$

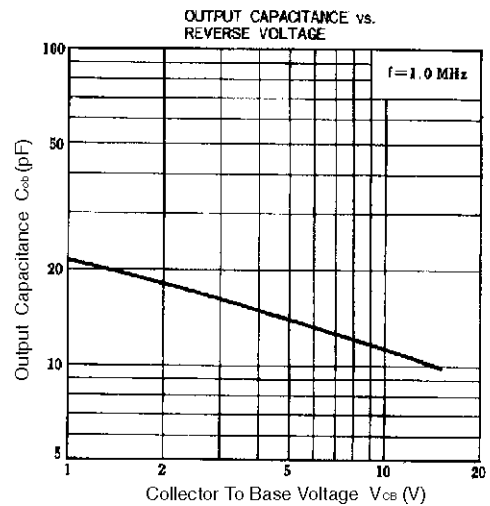
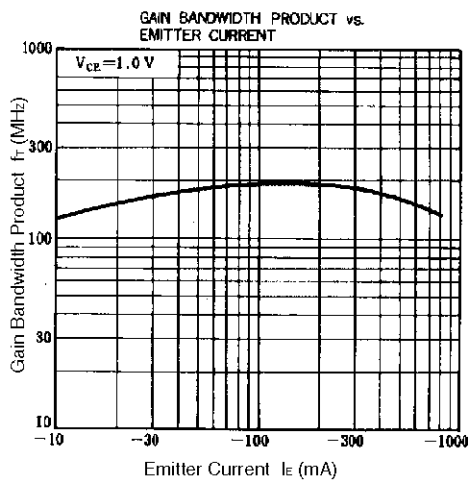
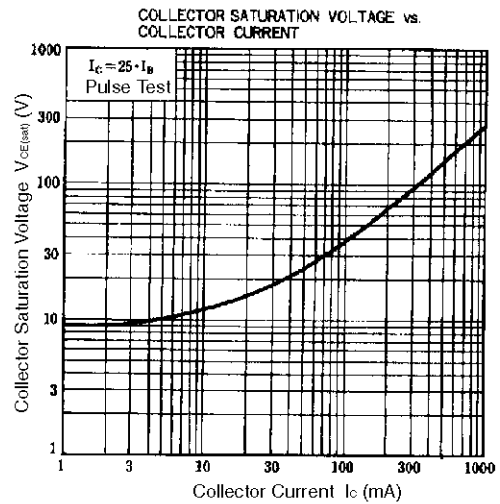
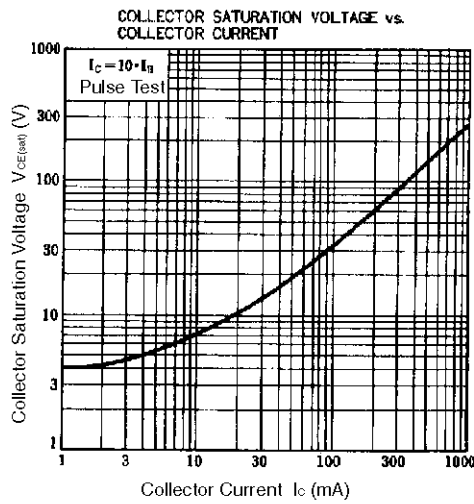
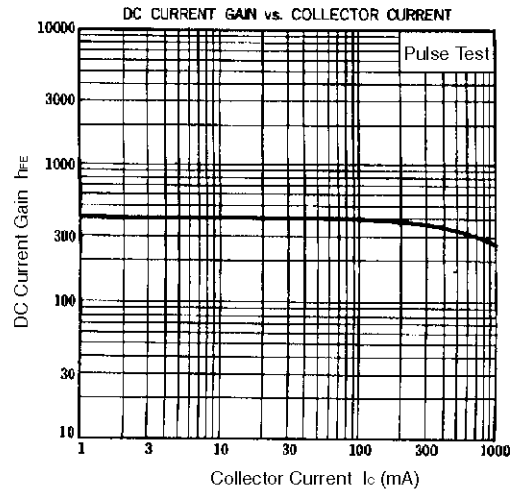
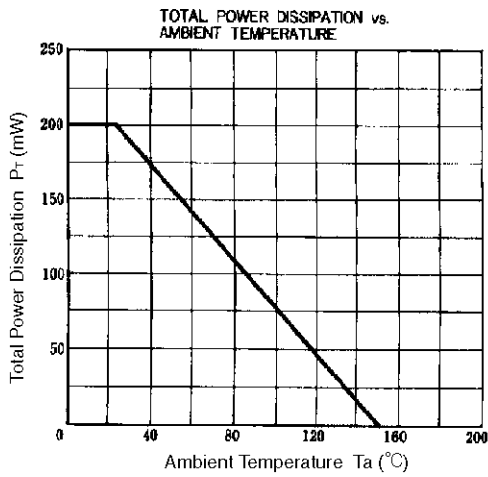
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 Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

**ELECTRICAL CHARACTERISTICS (Ta = 25°C)**

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	$I_{CBO}$	$V_{CB} = 16\text{ V}, I_E = 0$			100	nA
Emitter cutoff current	$I_{EBO}$	$V_{EB} = 6.0\text{ V}, I_C = 0$			100	nA
DC current gain	$h_{FE1}^*$	$V_{CE} = 1.0\text{ V}, I_C = 100\text{ mA}$	200			–
DC current gain	$h_{FE2}^*$	$V_{CE} = 1.0\text{ V}, I_C = 500\text{ mA}$	200			–
DC base voltage	$V_{BE}^*$	$V_{CE} = 1.0\text{ V}, I_C = 10\text{ mA}$	550		700	mV
Collector saturation voltage	$V_{CE(sat)1}$	$I_C = 100\text{ mA}, I_B = 10\text{ mA}$		33	50	mV
Collector saturation voltage	$V_{CE(sat)2}$	$I_C = 500\text{ mA}, I_B = 20\text{ mA}$		150	200	mV
Output capacitance	$C_{ob}$	$V_{CB} = 10\text{ V}, I_E = 0, f = 1.0\text{ MHz}$			15	pF
Gain bandwidth product	$f_T$	$V_{CE} = 1.0\text{ V}, I_E = -100\text{ mA}$	50			MHz

\* Pulse test  $PW \leq 350\ \mu s$ , duty cycle  $\leq 2\%$

TYPICAL CHARACTERISTICS (Ta = 25°C)



**RECOMMENDED SOLDERING CONDITIONS**

This product should be soldered and mounted under the following recommended conditions.  
 For soldering methods and conditions other than those recommended below, contact an NEC sales representative.

**Surface Mounting Type**

For details of the recommended soldering conditions, refer to the document **Semiconductor Device Mounting Technology Manual (C10535E)**.

Soldering Method	Soldering Conditions	Recommended Condition Symbol
Infrared reflow	Package peak temperature: 230°C, Time: 30 sec. max. (at 210°C or higher), Count: Once, Exposure limit: None*	IR30-00
VPS	Package peak temperature: 215°C, Time: 40 sec. max. (at 200°C or higher), Count: Once, Exposure limit: None*	VP15-00
Partial heating	Pin temperature: 300°C max., Time: 10 sec. max. Exposure limit: None*	O

\* After opening the dry pack, store it at 25°C or less and 65% RH or less for the allowable storage period.

**Caution Do not use different soldering methods together (except for partial heating).**

[MEMO]

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