

To our customers,

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## Old Company Name in Catalogs and Other Documents

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On April 1<sup>st</sup>, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

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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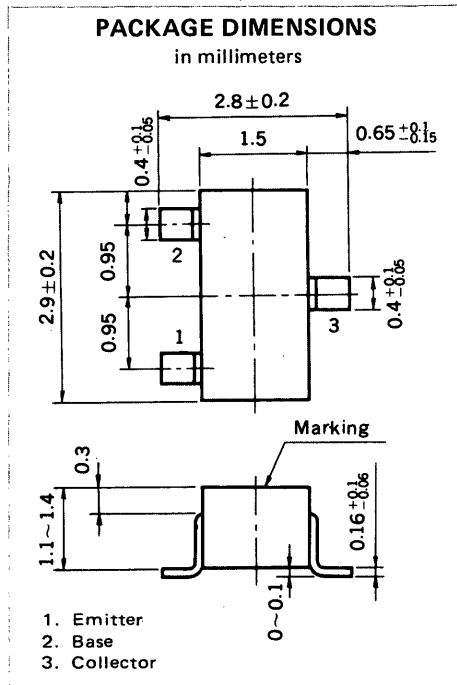
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HIGH FREQUENCY AMPLIFIER AND SWITCHING  
NPN SILICON EPITAXIAL TRANSISTOR  
MINI MOLD



**FEATURES**

- High Gain Bandwidth Product:  $f_T = 200$  MHz MIN.
- Complementary to 2SA1464

**ABSOLUTE MAXIMUM RATINGS**

Maximum Voltages and Current ( $T_a = 25^\circ\text{C}$ )

Collector to Base Voltage	$V_{CBO}$	60	V
Collector to Emitter Voltage	$V_{CEO}$	40	V
Emitter to Base Voltage	$V_{EBO}$	5.0	V
Collector Current (DC)	$I_C$	500	mA

Maximum Power Dissipation

Total Power Dissipation at $25^\circ\text{C}$ Ambient Temperature	$P_T$	200	mW
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Maximum Temperatures

Junction Temperature	$T_j$	150	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-55 to +150	$^\circ\text{C}$

**ELECTRICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )**

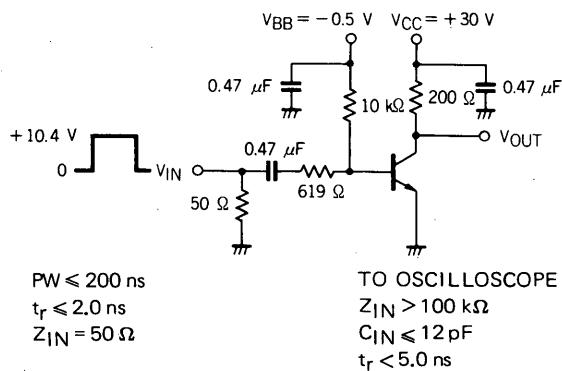
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Collector Cutoff Current	$I_{CBO}$			100	nA	$V_{CB} = 40\text{ V}, I_E = 0$
Emitter Cutoff Current	$I_{EBO}$			100	nA	$V_{EB} = 4.0\text{ V}, I_C = 0$
DC Current Gain	$h_{FE1}$	75	150	300		$V_{CE} = 1.0\text{ V}, I_C = 150\text{ mA}$
DC Current Gain	$h_{FE2}$	20	75			$V_{CE} = 2.0\text{ V}, I_C = 500\text{ mA}$
Collector Saturation Voltage	$V_{CE(sat)}$		0.25	0.75	V	$I_C = 500\text{ mA}, I_B = 50\text{ mA}$
Base Saturation Voltage	$V_{BE(sat)}$		1.0	1.2	V	$I_C = 500\text{ mA}, I_B = 50\text{ mA}$
Gain Bandwidth Product	$f_T$	200	400		MHz	$V_{CE} = 10\text{ V}, I_E = -20\text{ mA}$
Output Capacitance	$C_{ob}$		3.5	8.0	pF	$V_{CB} = 10\text{ V}, I_E = 0, f = 1.0\text{ MHz}$
Turn-on Time	$t_{on}$			35	ns	$V_{CC} = 30\text{ V}$
Storage Time	$t_{stg}$			225	ns	$I_C = 150\text{ mA}$
Turn-off Time	$t_{off}$			275	ns	$I_{B1} = -I_{B2} = 15\text{ mA}$

\* Pulsed:  $PW \leq 350\ \mu\text{s}$ , Duty Cycle  $\leq 2\%$

**$h_{FE}$  Classification**

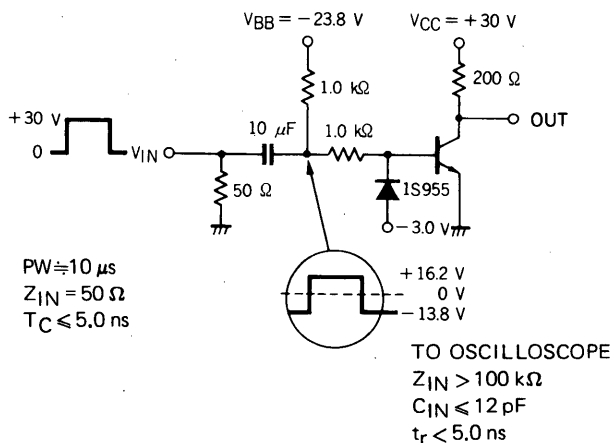
Marking	B12	B13	B14
$h_{FE1}$	75 to 150	100 to 200	150 to 300

SWITCHING TIME TEST CIRCUIT



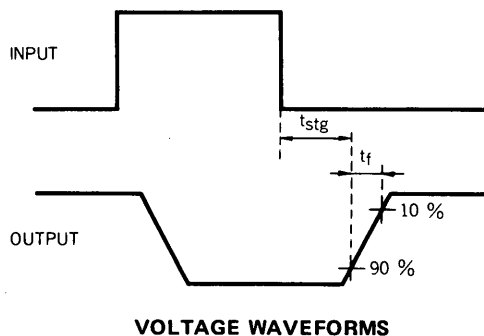
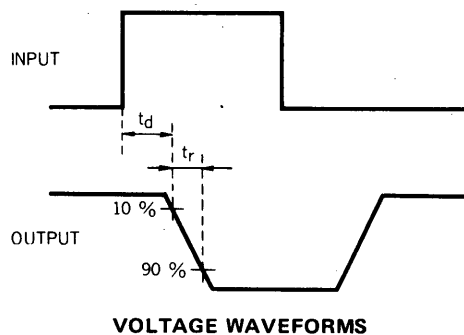
$PW \leq 200 \text{ ns}$   
 $t_r \leq 2.0 \text{ ns}$   
 $Z_{IN} = 50 \Omega$

$t_{on}$  SWITCHING

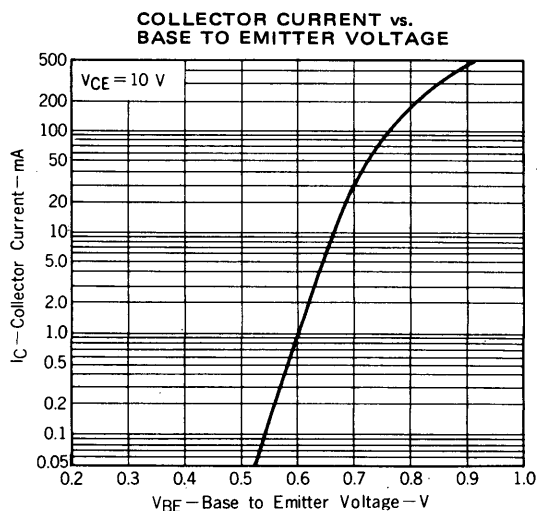
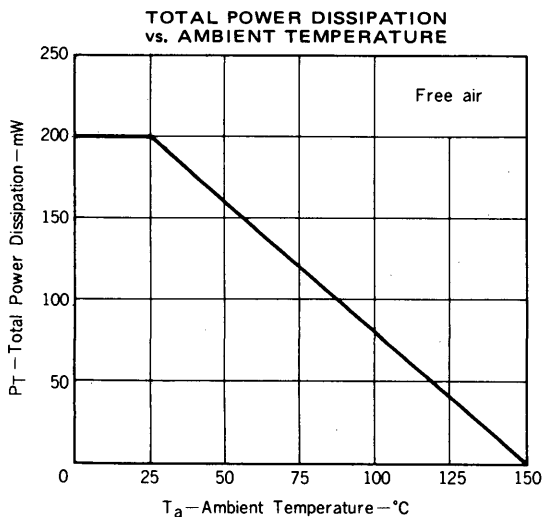


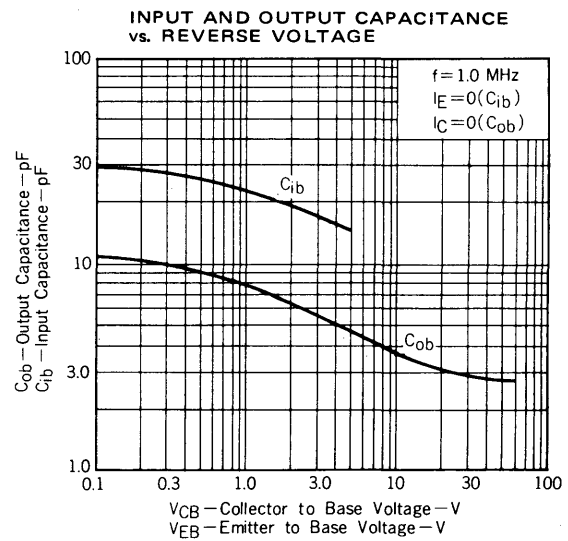
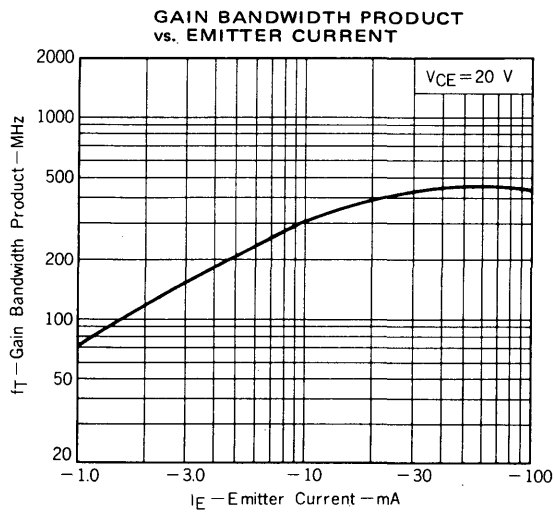
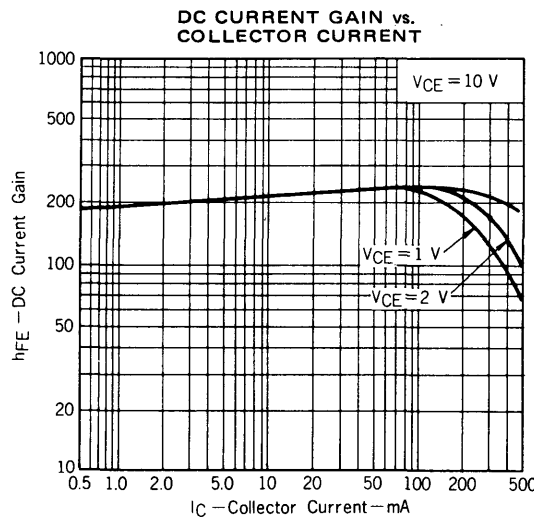
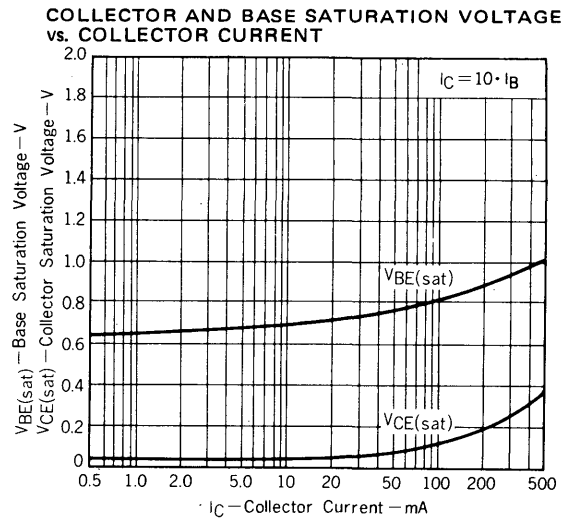
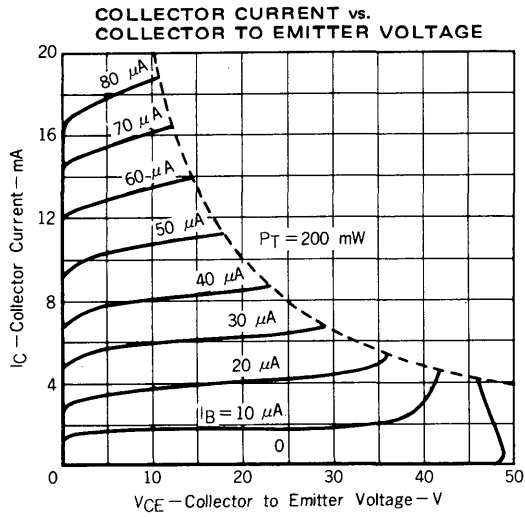
$PW \approx 10 \mu\text{s}$   
 $Z_{IN} = 50 \Omega$   
 $T_C \leq 5.0 \text{ ns}$

$t_{off}$  SWITCHING

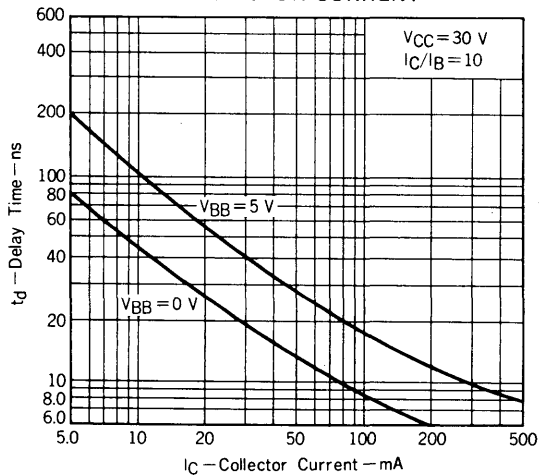


TYPICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )

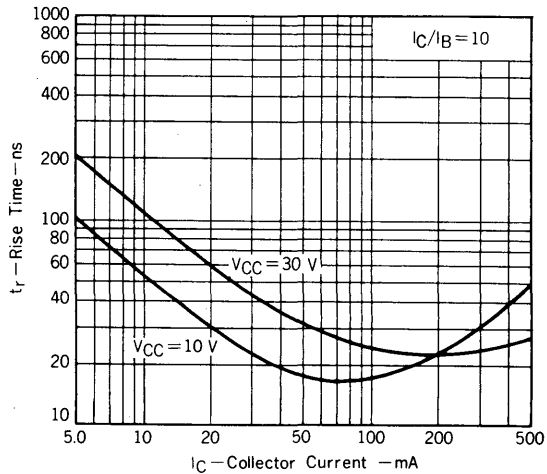




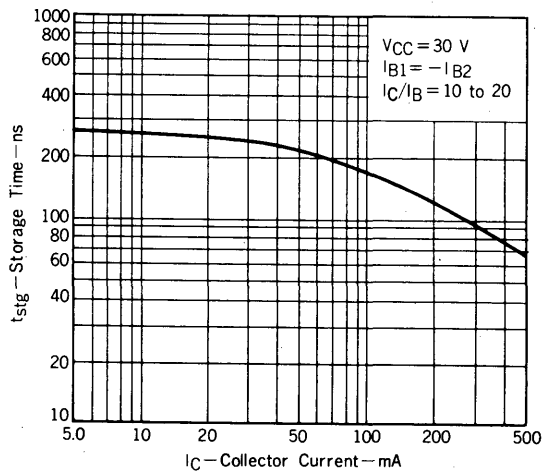
DELAY TIME vs. COLLECTOR CURRENT



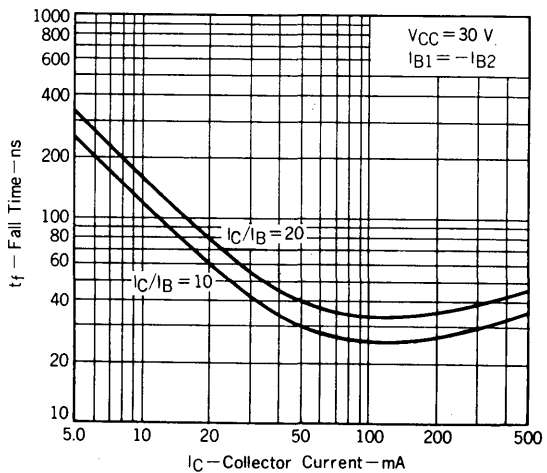
RISE TIME vs. COLLECTOR CURRENT



STORAGE TIME vs. COLLECTOR CURRENT



FALL TIME vs. COLLECTOR CURRENT





**[MEMO]**

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