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FUJITSU

PRODUCT PROFILE

2SC3044, 2SC3044A**Silicon High Speed Power Transistor****DESCRIPTION**

The 2SC3044/2SC3044A are silicon NPN planar general purpose, high power switching transistors fabricated with Fujitsu's unique Ring Emitter Transistor (RET) technology. RET devices are constructed with multiple emitters connected through diffused ballast resistors which provide uniform current density. This structure permits the design of high power transistors with superior switching characteristics and frequency response in high current applications.

The 2SC3044/2SC3044A are especially well-suited for high speed/high voltage switching systems or other applications where large SOA is required.

Features

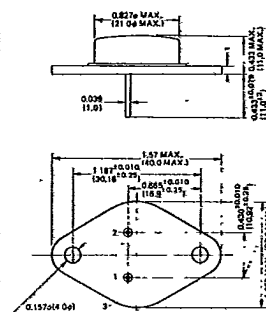
- ★ High voltage
- ★ Ultra-fast switching
- ★ Large safe operating area

Applications

- ★ Switching regulators
- ★ Motor controls
- ★ Ultrasonic oscillators
- ★ Class C and D amplifiers
- ★ Deflection circuits

ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value		Unit
		3044	3044A	
Collector to Emitter Voltage	V_{CEO}	400	450	V
Collector to Base Voltage	V_{CBO}		450	V
Emitter to Base Voltage	V_{EBO}	7		V
Collector Current-Continuous	I_C	6		A
Collector Current-Pulsed $P_W \leq 10\text{ms}$, D.R. $\leq 2\%$	I_{CP}	15		A
Base Current-Continuous	I_B	4		A
Collector Power Dissipation ($T_C = 25^\circ\text{C}$)	P_C	100		W
Junction Temperature	T_J	+175		$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-65 ~ +175		$^\circ\text{C}$

**OUTLINE DIMENSION
JEDEC TO-3**

1: Base 2: Emitter 3: Collector (Case)
Dimension in inches and (millimeters)

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

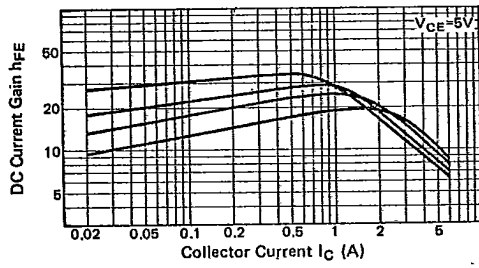
Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Collector to Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C = 1\text{mA}$, $I_E = 0$	450	—	—	V
Emitter to Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E = 1\text{mA}$, $I_C = 0$	7	—	—	V
Collector to Emitter Sustaining Voltage	$V_{CEO(sus)}$	$I_C = 0.8\text{A}$, $R_{BE} = \infty\Omega$	400	450	—	V
Collector to Emitter Sustaining Voltage	$V_{CEX(sus)}$	$I_C = 2\text{A}$, $I_{B2} = -1\text{A}$, $L = 200\mu\text{H}$ (*1)	450	—	—	V
Collector Cutoff Current	I_{CBO}	$V_{CB} = 450\text{V}$, $I_E = 0$	—	—	100	μA
Collector Cutoff Current	I_{CBO}	$V_{CB} = 400\text{V}$, $I_E = 0$, $T_C = 100^\circ\text{C}$	—	—	1	mA
Emitter Cutoff Current	I_{EBO}	$V_{EB} = 6\text{V}$, $I_C = 0$	—	—	100	μA
DC Current Gain	h_{FE}	$V_{CE} = 5\text{V}$, $I_C = 3\text{A}$ (*2)	10	15	40	—
Collector to Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 3\text{A}$, $I_B = 0.6\text{A}$ (*2)	—	0.33	1.0	V
Base to Emitter Saturation Voltage	$V_{BE(sat)}$		—	1.0	1.5	V
Output Capacitance	C_{ob}	$V_{CB} = 10\text{V}$, $I_E = 0$, $f = 1\text{MHz}$	—	100	—	pF
Gain Bandwidth Product	f_T	$V_{CE} = 10\text{V}$, $I_C = 1\text{A}$	—	30	—	MHz
Rise Time	t_r	$V_{CC} = 150\text{V}$ (*1) $I_C = 3\text{A}$, $I_{B1} = -I_{B2} = 0.6\text{A}$	—	0.05	0.5	μs
Storage Time	t_{stg}		—	1.25	1.5	μs
Fall Time	t_f		—	0.09	0.3	μs

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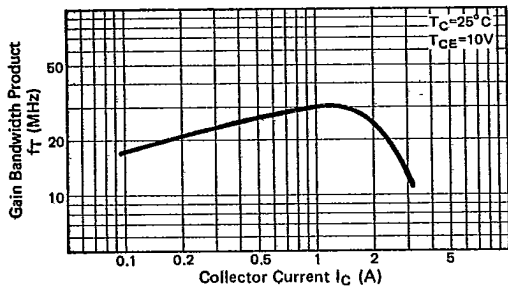
*1 Test Circuit *2 Pulsed $P_W \leq 300\mu\text{s}$, Duty Ratio $\leq 6\%$

2SC3044, 2SC3044A

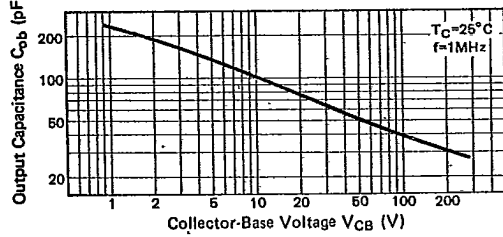
DC CURRENT GAIN



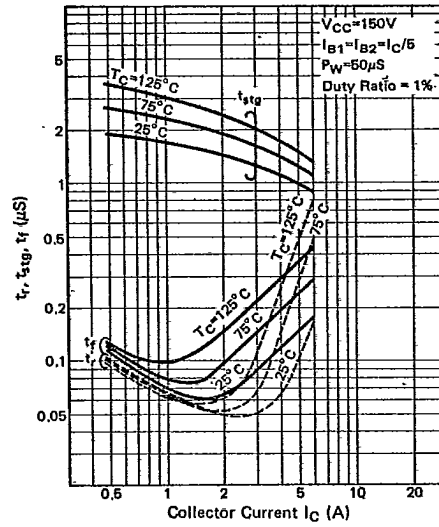
GAIN BANDWIDTH PRODUCT



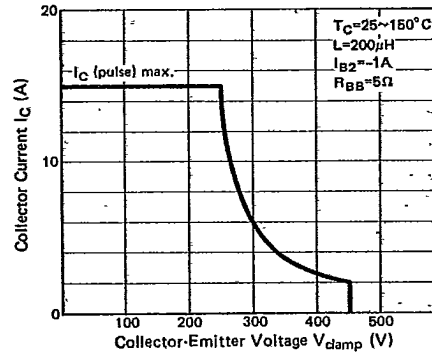
OUTPUT CAPACITANCE



SWITCHING TIME



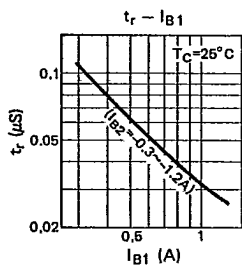
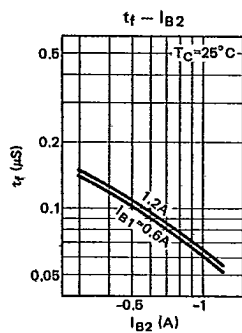
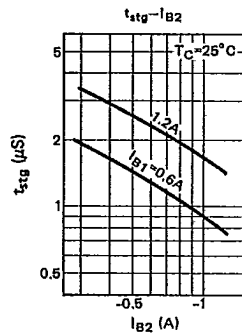
REVERSE BIAS SAFE OPERATING AREA



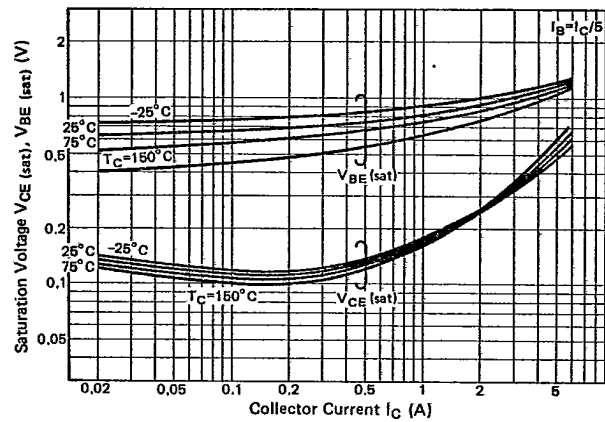
2SC3044, 2SC3044A

SWITCHING TIME

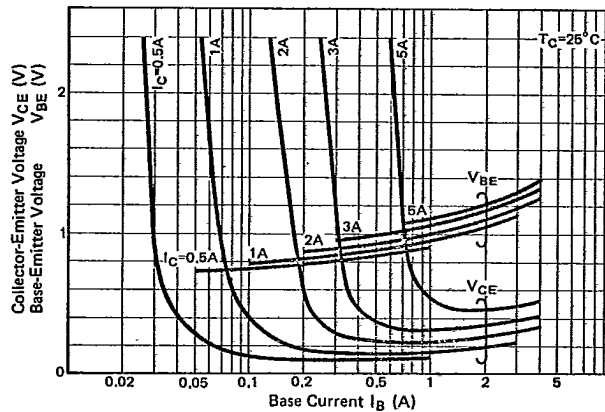
$V_{CC}=150V$
 $I_C=3A$
 $P_W=50\mu S$
 Duty Ratio = 1%



SATURATION VOLTAGE

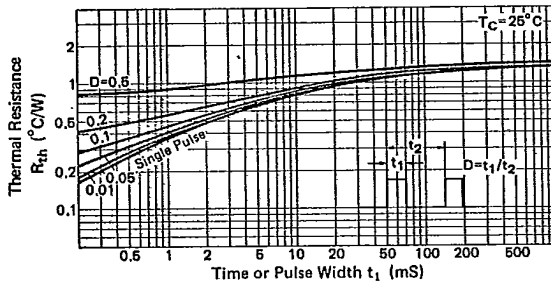
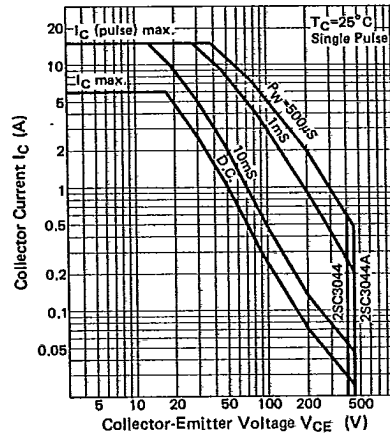
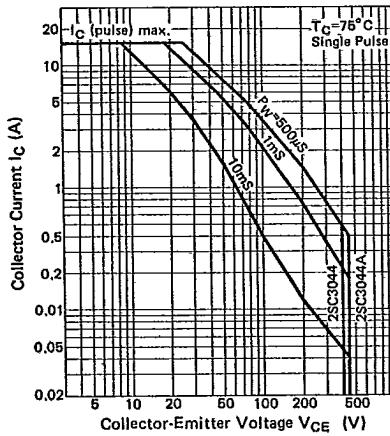
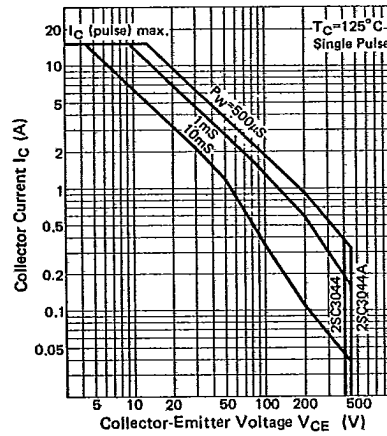


COLLECTOR SATURATION REGION



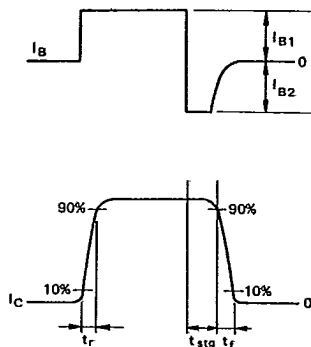
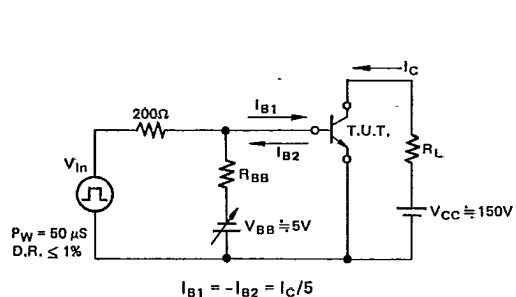
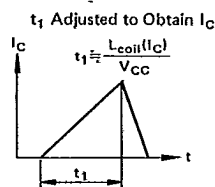
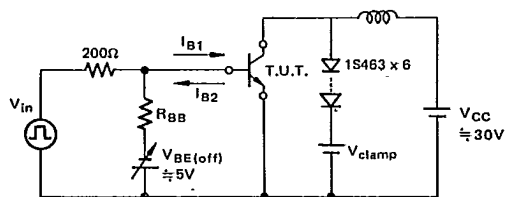
2SC3044, 2SC3044A

THERMAL RESPONSE

FORWARD BIAS SAFE
OPERATING AREAFORWARD BIAS SAFE
OPERATING AREAFORWARD BIAS SAFE
OPERATING AREA

2SC3044, 2SC3044A

TEST CIRCUIT USED FOR MEASUREMENT OF SWITCHING TIME (RESISTIVE)


TEST CIRCUIT USED FOR MEASUREMENT OF $V_{CEX(SUS)}$ AND REVERSE BIAS SAFE OPERATING AREA


- (a) $V_{CEX(SUS)}$
 $I_C = 2A, I_{B1} = 1A, I_{B2} = -1A, R_{BB} = 5\Omega, V_{clamp} = 450V$
- (b) Reverse Bias Safe Operating Area
 $I_{B1} \leq 4A, I_{B2} = -1A, R_{BB} = 5\Omega$