T-33-13
T-33-23

January 1990
Edition 1.0

FUJITSU

PRODUCT PROFILE

2SA1041, 2SA1042, 2SC2431, 2SC2432

Silicon High Speed Power Transistor

DESCRIPTION

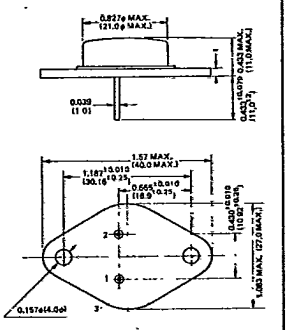
This series are silicon PNP/NPN planer general purpose, high power switching transistors fabricated with Fujitsu's unique Ring Emitter Transistor (RET) technology. RET devices are constructed with multiple emitters connected through diffused ballast resistors which provide uniform current density. This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

This series are especially well-suited for high speed/high voltage switching systems or other applications where large SOA is required.

Features

	2SA1041, 2SA1042	2SC2431, 2SC2432
★ f_T :	60MHz (typ.)	80MHz (typ.)
★ t_r :	0.15 μs (typ.)	0.20 μs (typ.)
★ t_s :	0.24 μs (typ.)	0.70 μs (typ.)
★ t_f :	0.08 μs (typ.)	0.12 μs (typ.)
★ Excellent Safe Operating Area :		2SA1041–2SC2431
★ Complements:		2SA1042–2SC2432

OUTLINE DIMENSION
JEDEC TO-3



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

ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value		Value		Unit
		2SA1041	2SA1042	2SC2431	2SC2432	
Collector to Base Voltage	V_{CBO}	-120	-70	120	70	V
Emitter to Base Voltage	V_{EBO}	-5	-5	5	5	V
Collector to Emitter Voltage	V_{CEO}	-120	-70	120	70	V
Collector Current	I_C	-15	-15	15	15	A
Base Current	I_B	-5	-5	5	5	A
Collector Power Dissipation (T_C = 25°C)	P_C	100	100	100	100	W
Junction Temperature	T_j	+175		+175		°C
Storage Temperature Range	T_{stg}	-65 ~ +175		-65 ~ +175		°C

ELECTRICAL CHARACTERISTICS (T_a = 25°C)

2SA1041, 2SA1042

Parameter	Symbol	Test Conditions	Limits 2SA1041 Min.	2SA1041 Typ.	2SA1041 Max.	2SA1042 Min.	2SA1042 Typ.	2SA1042 Max.	Unit
Collector Cutoff Current	I_{CBO}	V_{CB} = −120V, I_E = 0	–	−50	–	–	–	–	μA
Collector Cutoff Current	I_{CBO}	V_{CB} = −70V, I_E = 0	–	–	–	–	–	−50	μA
Emitter Cutoff Current	I_{EBO}	V_{EB} = −4V, I_C = 0	–	–	−50	–	–	−50	μA
Collector Cutoff Current	I_{CEO}	V_{CE} = −120V, I_B = 0	–	–	−1	–	–	–	mA
Collector Cutoff Current	I_{CEO}	V_{CE} = −70V, I_B = 0	–	–	–	–	–	−1	mA
Collector to Base Breakdown Voltage	$V_{(BR)CBO}$	I_C = −50μA, I_E = 0	−120	–	–	−70	–	–	V
Emitter to Base Breakdown Voltage	$V_{(BR)EBO}$	I_E = −1mA, I_C = 0	−5	–	–	−5	–	–	V
Collector to Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C = −10mA, R_{BE} = ∞	−120	–	–	−70	–	–	V
DC Current Gain	h_{FE1}	V_{CE} = −5V, I_C = −1.5A *	35	–	200	35	–	200	–
DC Current Gain	h_{FE2}	V_{CE} = −5V, I_C = −15A *	7	–	–	10	–	–	–
Collector to Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = −7A, I_B = −0.7A *	–	−0.6	−1.5	–	−0.6	−1.5	V
Base to Emitter Saturation Voltage	$V_{BE(sat)}$		–	−1.2	−1.8	–	−1.2	−1.8	V
Gain-Bandwidth Product	f_T	V_{CE} = −10V, I_C = −1A	–	60	–	–	60	–	MHz
Output Capacitance	C_{ob}	V_{CB} = −10V, I_E = 0, f = 1MHz	–	350	–	–	350	–	pF
Rise Time	t_r	I_C = −7.5A, R_L = 4Ω, I_{B1} = −I_{B2} = −0.75A	–	0.15	0.8	–	0.15	0.8	μs
Storage Time	t_{stg}		–	0.24	1.0	–	0.24	1.0	μs
Fall Time	t_f		–	0.08	0.8	–	0.08	0.8	μs

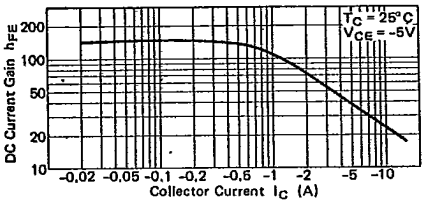
2SC2431, 2SC2432

Parameter	Symbol	Test Conditions	Limits 2SC2431 Min.	2SC2431 Typ.	2SC2431 Max.	2SC2432 Min.	2SC2432 Typ.	2SC2432 Max.	Unit
Collector Cutoff Current	I_{CBO}	V_{CB} = 120V, I_E = 0	–	–	50	–	–	–	μA
Collector Cutoff Current	I_{CBO}	V_{CB} = 70V, I_E = 0	–	–	–	–	–	50	μA
Emitter Cutoff Current	I_{EBO}	V_{EB} = 4V, I_C = 0	–	–	50	–	–	50	μA
Collector Cutoff Current	I_{CEO}	V_{CE} = 120V, I_B = 0	–	–	1	–	–	–	mA
Collector Cutoff Current	I_{CEO}	V_{CE} = 70A, I_B = 0	–	–	–	–	–	1	mA
Collector to Base Breakdown Voltage	$V_{(BR)CBO}$	I_C = 50 μA, I_E = 0	120	–	–	70	–	–	V
Emitter to Base Breakdown Voltage	$V_{(BR)EBO}$	I_E = 1mA, I_C = 0	5	–	–	5	–	–	V
Collector to Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C = 10mA, R_{BE} = ∞	120	–	–	70	–	–	V
DC Current Gain	h_{FE1}	V_{CE} = 5V, I_C = 1.5A *	35	–	200	35	–	200	–
DC Current Gain	h_{FE2}	V_{CE} = 5V, I_C = 15A *	7	–	–	10	–	–	–
Collector to Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 7A, I_B = 0.7A *	–	0.4	1.5	–	0.4	1.5	V
Base to Emitter Saturation Voltage	$V_{BE(sat)}$		–	1.2	1.8	–	1.2	1.8	V
Gain-Bandwidth Product	f_T	V_{CE} = 10V, I_C = 1A	–	80	–	–	80	–	MHz
Output Capacitance	C_{ob}	V_{CB} = 10V, I_E = 0, f = 1MHz	–	200	–	–	200	–	pF
Rise Time	t_r	I_C = 7.5A, R_L = 4Ω, I_{B1} = −I_{B2} = 0.75A	–	0.20	0.8	–	0.20	0.8	μs
Storage Time	t_{stg}		–	0.70	1.0	–	0.70	1.0	μs
Fall Time	t_f		–	0.12	0.8	–	0.12	0.8	μs

* Pulsed $P_W \leq 300\,\mu$, Duty Ratio ≦ 6%

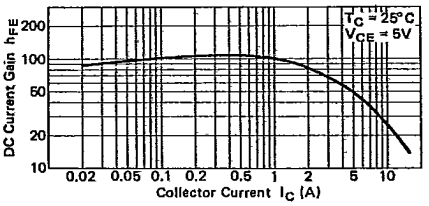
2SA1041, 2SA1042

DC CURRENT GAIN

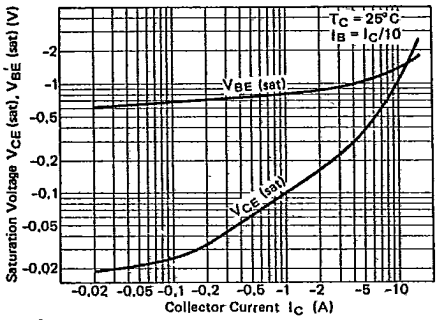


2SC2431, 2SC2432

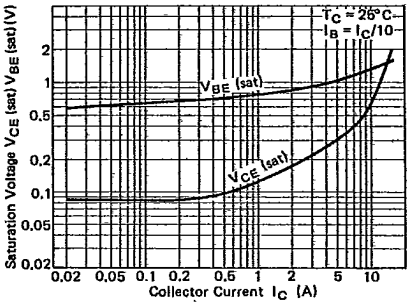
DC CURRENT GAIN



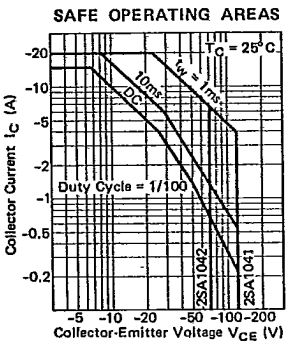
SATURATION VOLTAGE



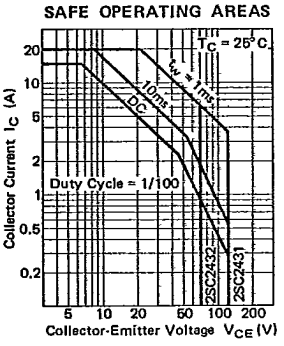
SATURATION VOLTAGE



SAFE OPERATING AREAS

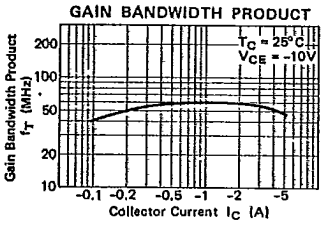


SAFE OPERATING AREAS

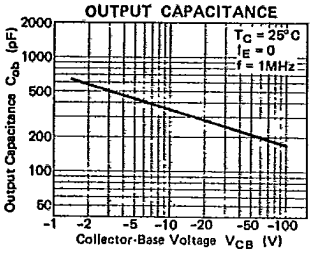


2SA1041, 2SA1042

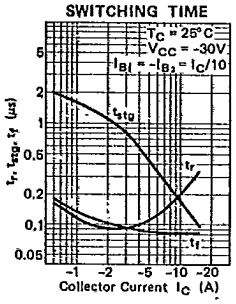
GAIN BANDWIDTH PRODUCT



OUTPUT CAPACITANCE

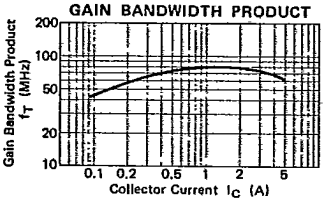


SWITCHING TIME

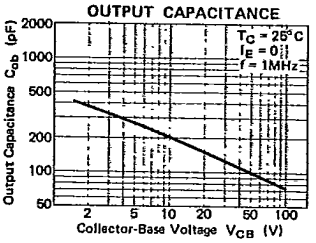


2SC2431, 2SC2432

GAIN BANDWIDTH PRODUCT



OUTPUT CAPACITANCE



SWITCHING TIME