

NPN SILICON EPITAXIAL TRANSISTOR  
FOR HIGH-SPEED SWITCHING

DESCRIPTION

The 2SC4336 is a mold power transistor developed for high-speed switching and features a very low collector-to-emitter saturation. This transistor is ideal for use in switching power supplies, DC/DC converters, motor drivers, solenoid drivers, and other low-voltage power supply devices, as well as for high-current switching.

FEATURES

- Mold package that does not require an insulating board or insulation bushing
- Fast switching speed
- Low collector-to-emitter saturation voltage

$$V_{CE(sat)} \leq 0.3 \text{ V MAX. (I}_c = 6.0 \text{ A)}$$

ORDERING INFORMATION

PART NUMBER	PACKAGE
2SC4336	Isolated TO-220 (MP-45)

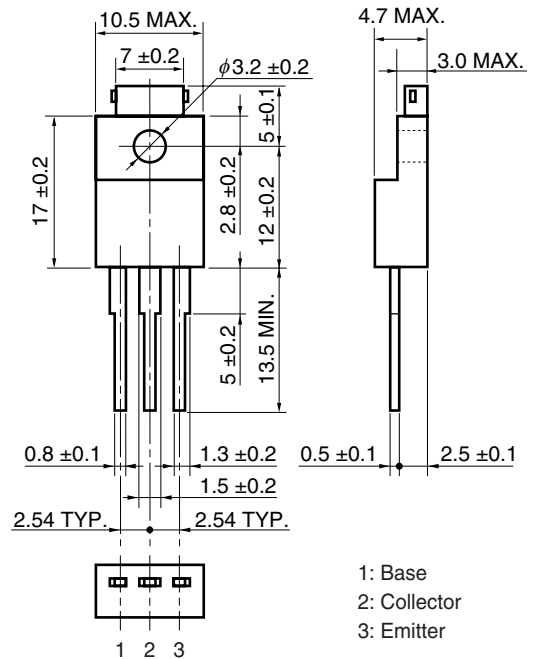
ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C)

Collector to base voltage	V <sub>CB0</sub>	100	V
Collector to emitter voltage	V <sub>CE0</sub>	100	V
Emitter to base voltage	V <sub>EB0</sub>	7.0	V
Collector current (DC)	I <sub>C(DC)</sub>	10	A
Collector current (pulse) <sup>Note</sup>	I <sub>C(pulse)</sub>	20	A
Base current (DC)	I <sub>B(DC)</sub>	6.0	A
Total power dissipation (T <sub>c</sub> = 25°C)	P <sub>T</sub>	30	W
Total power dissipation (T <sub>A</sub> = 25°C)	P <sub>T</sub>	2.0	W
Junction temperature	T <sub>j</sub>	150	°C
Storage temperature	T <sub>stg</sub>	-55 to +150	°C

Note PW ≤ 300 μs, Duty Cycle ≤ 10%

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PACKAGE DRAWING (Unit: mm)



1: Base  
2: Collector  
3: Emitter

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

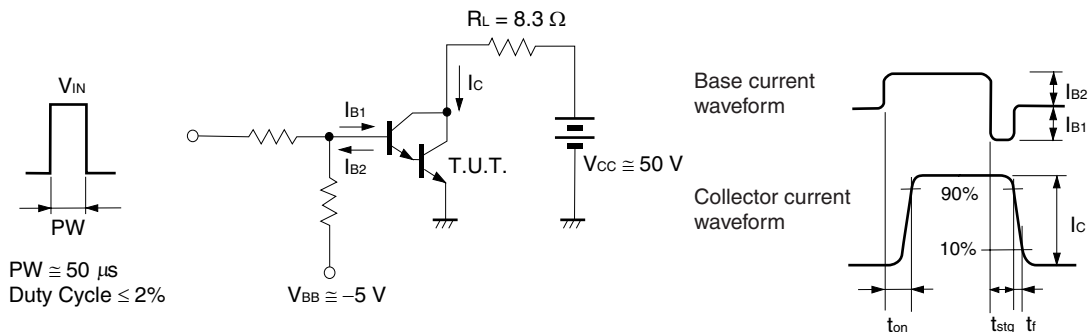
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector to Emitter Voltage	V <sub>CEQ(SUS)</sub>	I <sub>C</sub> = 5.0 A, I <sub>B</sub> = 0.6 A, L = 1 mH	100			V
	V <sub>CES(SUS)</sub>	I <sub>C</sub> = 5.0 A, I <sub>B1</sub> = -I <sub>B2</sub> = 0.6 A, V <sub>BE(OFF)</sub> = -1.5 V, L = 180 μH, clamped	100			V
Collector Cut-off Current	I <sub>CBO</sub>	V <sub>CB</sub> = 100 V, I <sub>E</sub> = 0			10	μA
	I <sub>CER</sub>	V <sub>CE</sub> = 100 V, R <sub>BE</sub> = 50 Ω, T <sub>A</sub> = 125°C			1.0	mA
	I <sub>CES1</sub>	V <sub>CE</sub> = 100 V, V <sub>BE(OFF)</sub> = -1.5 V			10	μA
	I <sub>CES2</sub>	V <sub>CE</sub> = 100 V, V <sub>BE(OFF)</sub> = -1.5 V, T <sub>A</sub> = 125°C			1.0	mA
Emitter Cut-off Current	I <sub>EBO</sub>	V <sub>EB</sub> = 5.0 V, I <sub>C</sub> = 0			10	μA
DC Current Gain <sup>Note</sup>	h <sub>FE1</sub>	V <sub>CE</sub> = 2.0 V, I <sub>C</sub> = 1.0 A	100			
	h <sub>FE2</sub>	V <sub>CE</sub> = 2.0 V, I <sub>C</sub> = 2.0 A	100	200	400	
	h <sub>FE3</sub>	V <sub>CE</sub> = 2.0 V, I <sub>C</sub> = 6.0 A	60			
Collector Saturation Voltage <sup>Note</sup>	V <sub>CE(sat)1</sub>	I <sub>C</sub> = 6.0 A, I <sub>B</sub> = 0.3 A			0.3	V
	V <sub>CE(sat)2</sub>	I <sub>C</sub> = 8.0 A, I <sub>B</sub> = 0.4 A			0.5	V
Base Saturation Voltage <sup>Note</sup>	V <sub>BE(sat)1</sub>	I <sub>C</sub> = 6.0 A, I <sub>B</sub> = 0.3 A			1.2	V
	V <sub>BE(sat)2</sub>	I <sub>C</sub> = 8.0 A, I <sub>B</sub> = 0.4 A			1.5	V
Collector Capacitance	C <sub>ob</sub>	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0, f = 1.0 MHz		120		pF
Gain Bandwidth Product	f <sub>T</sub>	V <sub>CE</sub> = 10 V, I <sub>C</sub> = 0.5 A		150		MHz
Turn-on Time	t <sub>on</sub>	I <sub>C</sub> = 6.0 A, R <sub>L</sub> = 8.3 Ω, I <sub>B1</sub> = -I <sub>B2</sub> = 0.3 A, V <sub>CC</sub> ≅ 50 V Refer to the test circuit.			0.3	μs
Storage Time	t <sub>stg</sub>				1.5	μs
Fall Time	t <sub>f</sub>				0.3	μs

**Note** Pulsed: PW ≤ 350 μs, Duty Cycle ≤ 2%

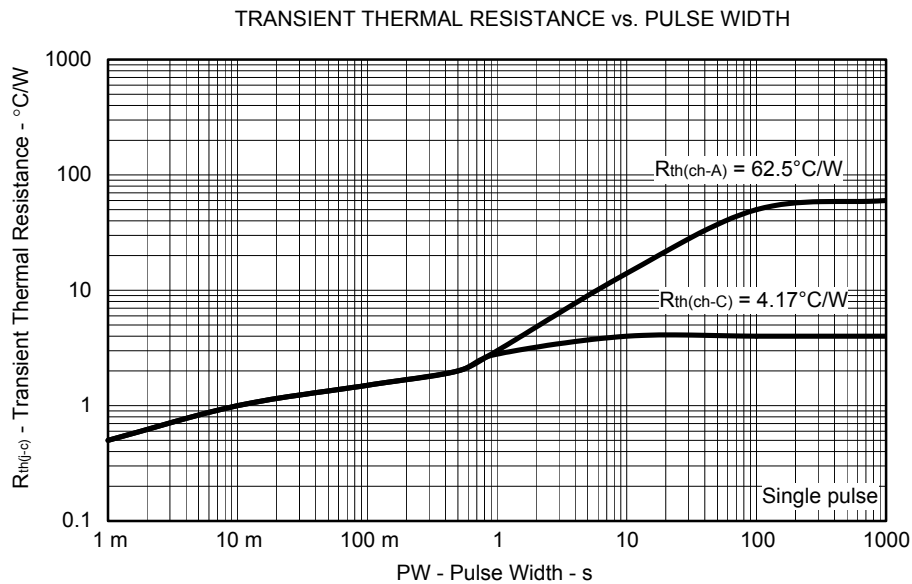
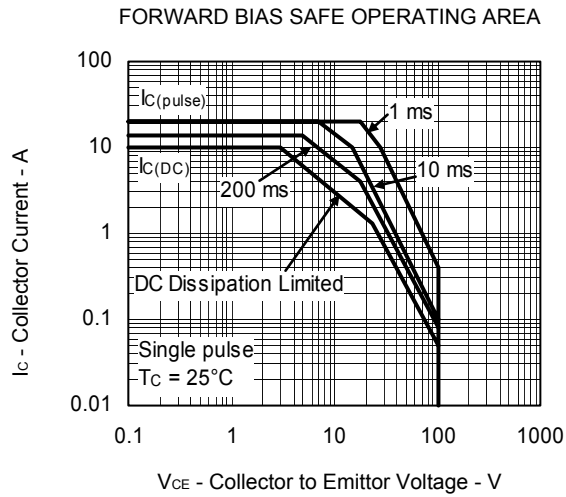
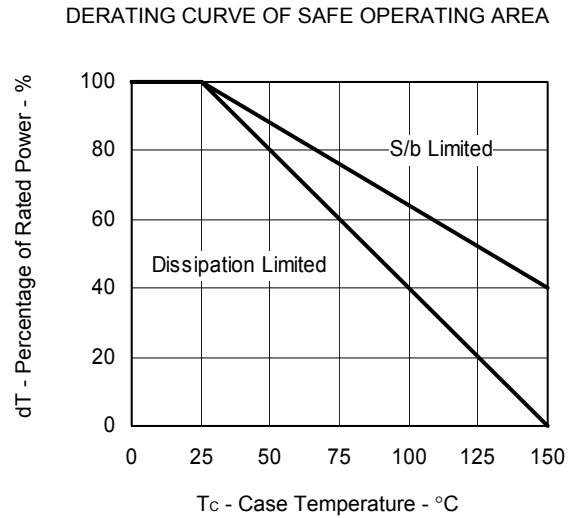
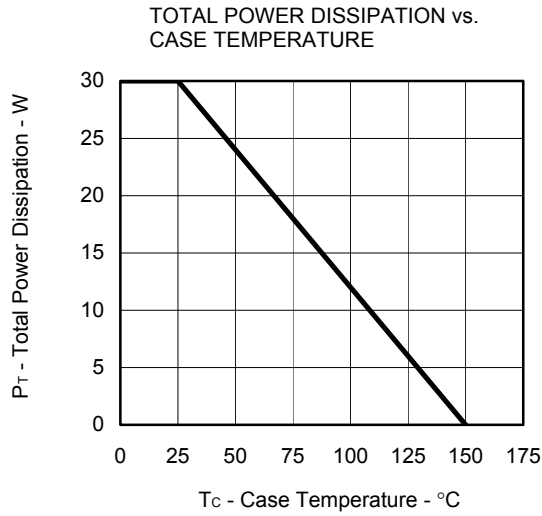
**h<sub>FE</sub> CLASSIFICATION**

Marking	M	L	K
h <sub>FE2</sub>	100 to 200	150 to 300	200 to 400

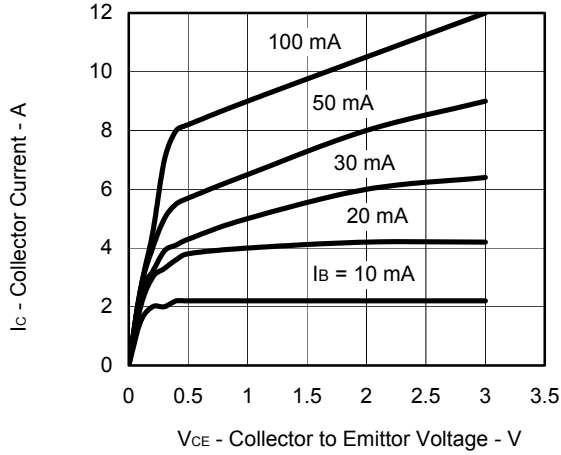
**SWITCHING TIME (t<sub>on</sub>, t<sub>stg</sub>, t<sub>f</sub>) TEST CIRCUIT**



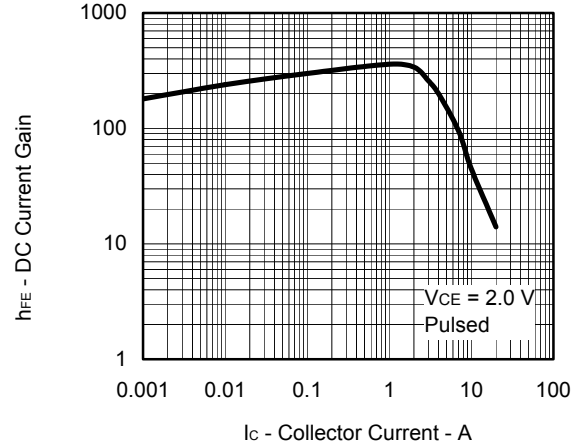
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)



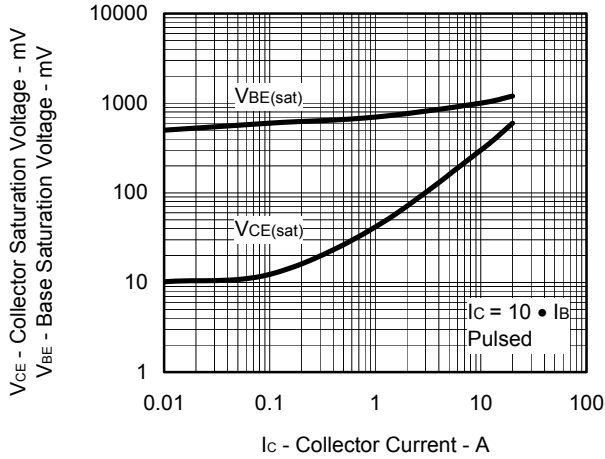
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



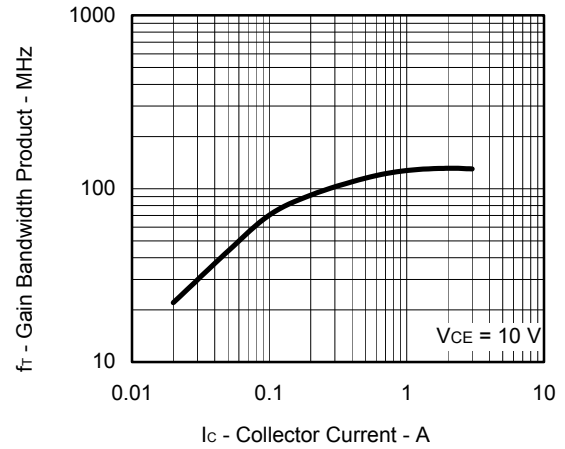
DC CURRENT GAIN vs. COLLECTOR CURRENT



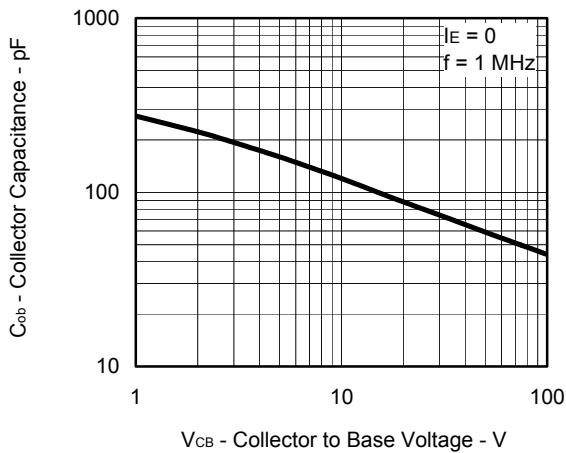
COLLECTOR SATURATION VOLTAGE AND BASE SATURATION VOLTAGE vs. COLLECTOR CURRENT



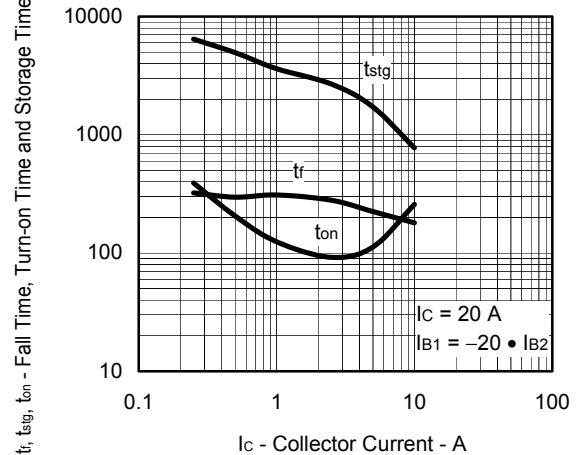
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



COLLECTOR CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



TURN ON TIME, STORAGE TIME AND FALL TIME vs. COLLECTOR CURRENT



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