NEC

SILICON POWER TRANSISTOR
2SC4336

NPN SILICON EPITAXIAL TRANSISTOR FOR HIGH-SPEED SWITCHING

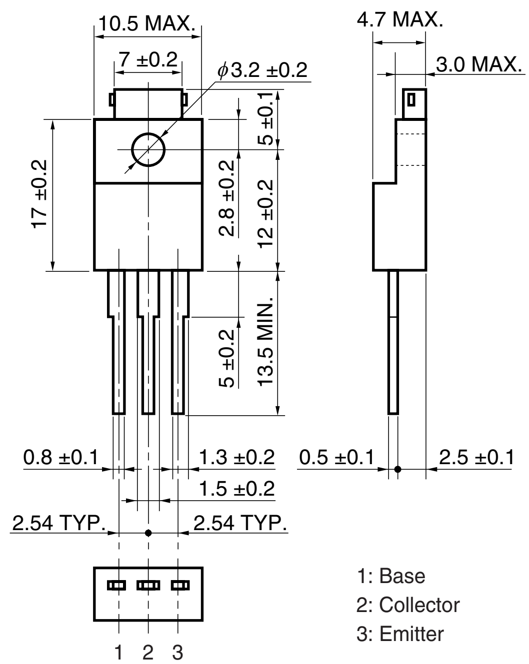
DESCRIPTION

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

PACKAGE DRAWING (Unit: mm)



ORDERING INFORMATION

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

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Collector to base voltage	V_{CBO}	100	V
Collector to emitter voltage	V_{CEO}	100	V
Emitter to base voltage	V_{EBO}	7.0	V
Collector current (DC)	$I_{C(DC)}$	10	A
Collector current (pulse) Note	$I_{C(pulse)}$	20	A
Base current (DC)	$I_{B(DC)}$	6.0	A
Total power dissipation (T_C = 25°C)	P_T	30	W
Total power dissipation (T_A = 25°C)	P_T	2.0	W
Junction temperature	T_j	150	°C
Storage temperature	T_{stg}	–55 to +150	°C

Note PW ≤ 300 μs, Duty Cycle ≤ 10%

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ELECTRICAL CHARACTERISTICS (T_A = 25°C)

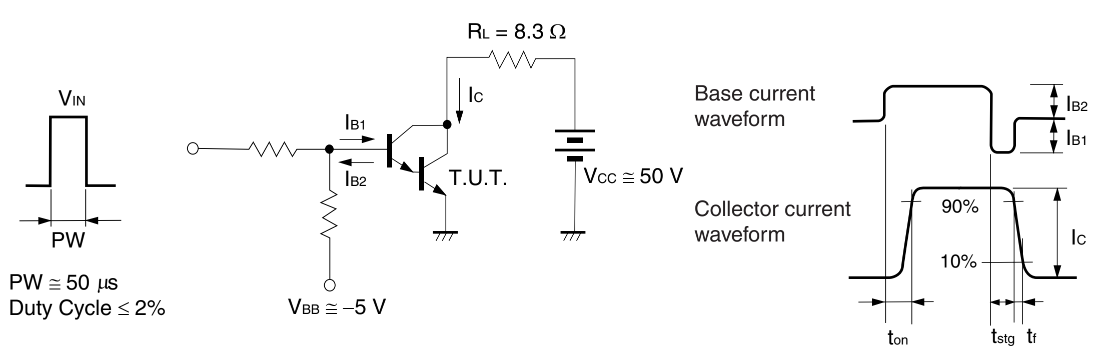
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector to Emitter Voltage	$V_{CEO(SUS)}$	I_C = 5.0 A, I_B = 0.6 A, L = 1 mH	100			V
	$V_{CEX(SUS)}$	I_C = 5.0 A, I_{B1} = $-I_{B2}$ = 0.6 A, $V_{BE(OFF)}$ = –1.5 V, L = 180 μH, clamped	100			V
Collector Cut-off Current	I_{CBO}	V_{CB} = 100 V, I_E = 0			10	μA
	I_{CER}	V_{CE} = 100 V, R_{BE} = 50 Ω, T_A = 125°C			1.0	mA
	I_{CEX1}	V_{CE} = 100 V, $V_{BE(OFF)}$ = –1.5 V			10	μA
	I_{CEX2}	V_{CE} = 100 V, $V_{BE(OFF)}$ = –1.5 V, T_A = 125°C			1.0	mA
Emitter Cut-off Current	I_{EBO}	V_{EB} = 5.0 V, I_C = 0			10	μA
DC Current Gain Note	h_{FE1}	V_{CE} = 2.0 V, I_C = 1.0 A	100			
	h_{FE2}	V_{CE} = 2.0 V, I_C = 2.0 A	100	200	400	
	h_{FE3}	V_{CE} = 2.0 V, I_C = 6.0 A	60			
Collector Saturation Voltage Note	$V_{CE(sat)1}$	I_C = 6.0 A, I_B = 0.3 A			0.3	V
	$V_{CE(sat)2}$	I_C = 8.0 A, I_B = 0.4 A			0.5	V
Base Saturation Voltage Note	$V_{BE(sat)1}$	I_C = 6.0 A, I_B = 0.3 A			1.2	V
	$V_{BE(sat)2}$	I_C = 8.0 A, I_B = 0.4 A			1.5	V
Collector Capacitance	C_{ob}	V_{CB} = 10 V, I_E = 0, f = 1.0 MHz		120		pF
Gain Bandwidth Product	f_T	V_{CE} = 10 V, I_C = 0.5 A		150		MHz
Turn-on Time	t_{on}	I_C = 6.0 A, R_L = 8.3 Ω, I_{B1} = $-I_{B2}$ = 0.3 A, V_{CC} ≅ 50 V Refer to the test circuit.			0.3	μs
Storage Time	t_{stg}				1.5	μs
Fall Time	t_f				0.3	μs

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

h_{FE} CLASSIFICATION

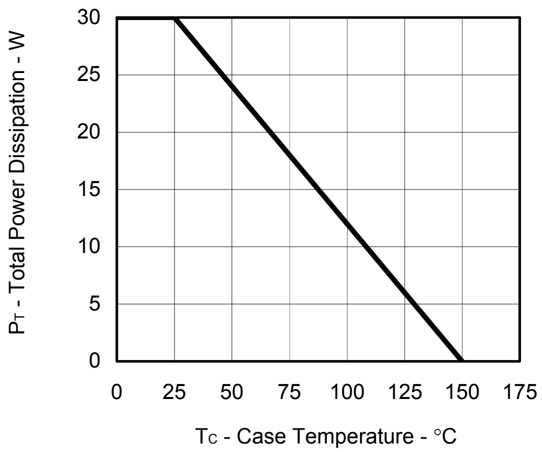
Marking	M	L	K
h_{FE2}	100 to 200	150 to 300	200 to 400

SWITCHING TIME (t_{on}, t_{stg}, t_f) TEST CIRCUIT

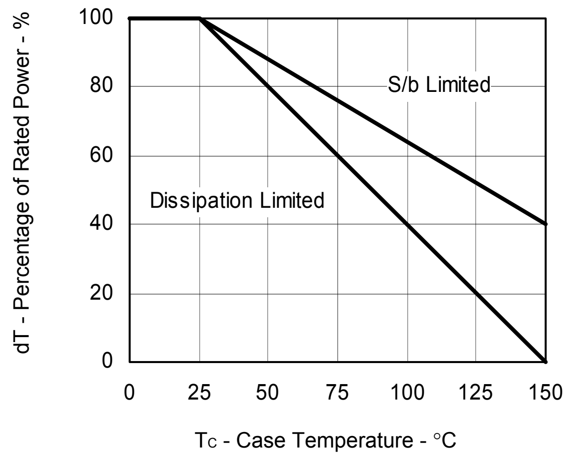


TYPICAL CHARACTERISTICS (T_A = 25°C)

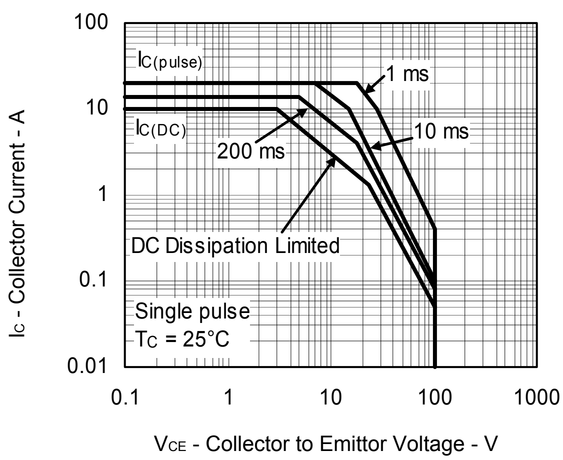
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



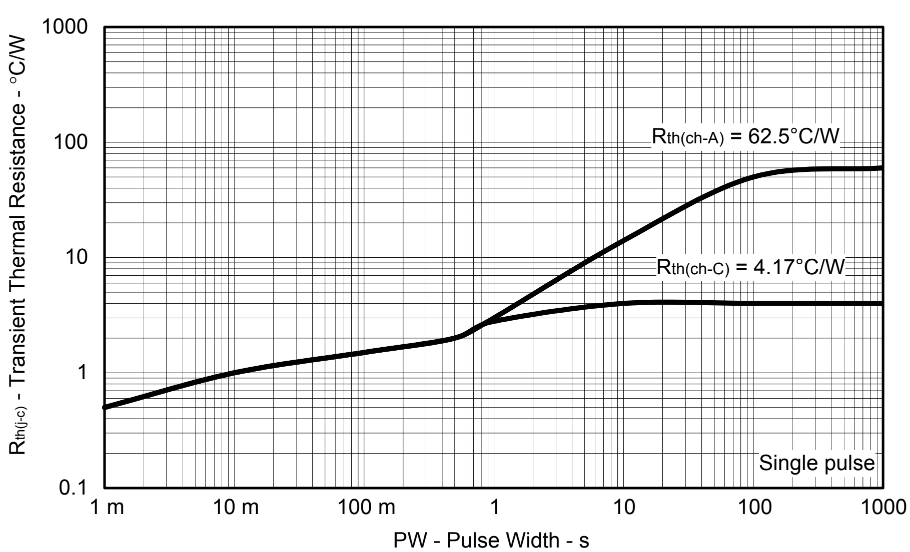
DERATING CURVE OF SAFE OPERATING AREA



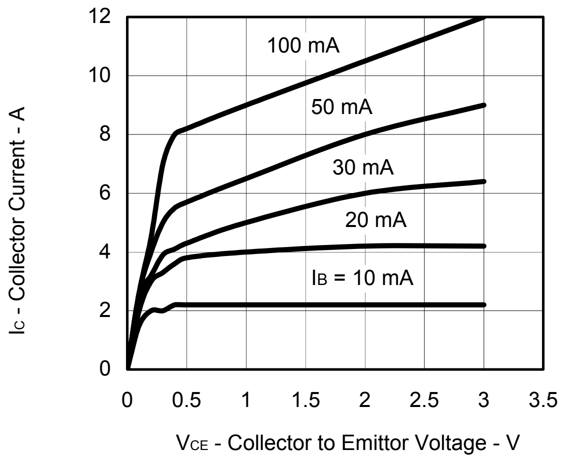
FORWARD BIAS SAFE OPERATING AREA



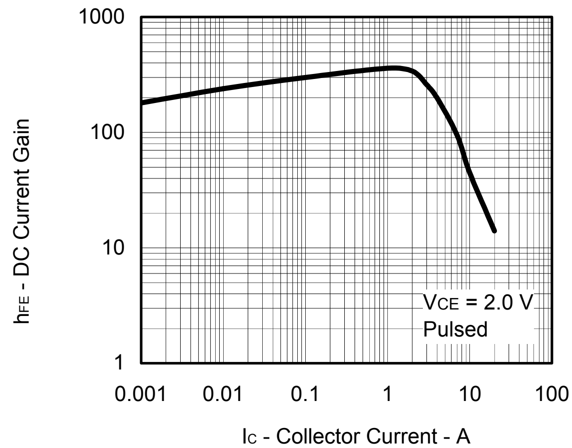
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



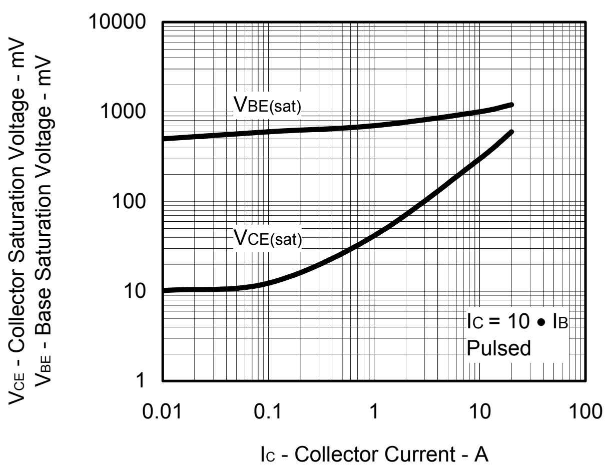
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



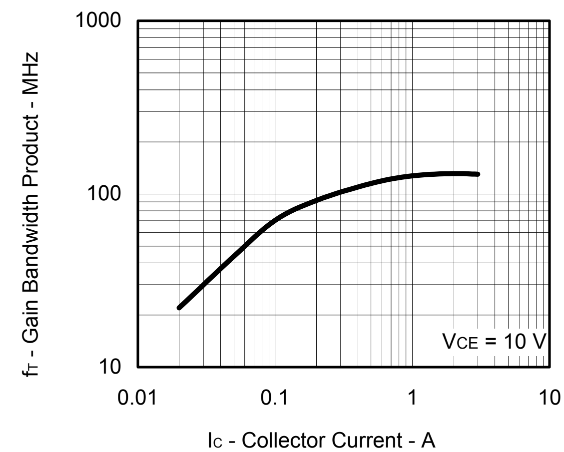
DC CURRENT GAIN vs.
COLLECTOR CURRENT



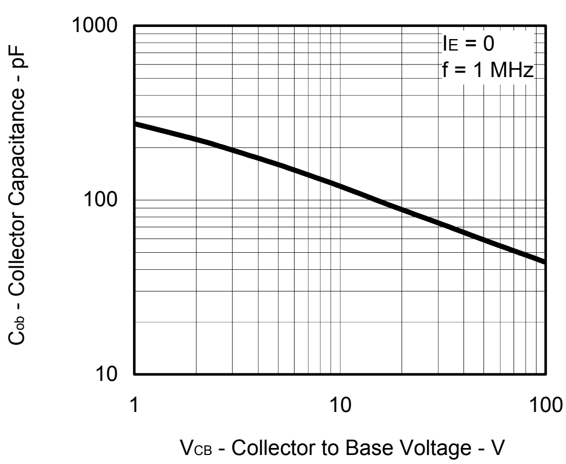
COLLECTOR SATURATION VOLTAGE AND BASE SATURATION VOLTAGE vs. COLLECTOR CURRENT



GAIN BANDWIDTH PRODUCT vs.
COLLECTOR CURRENT



COLLECTOR CAPACITANCE vs.
COLLECTOR TO BASE VOLTAGE



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