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2N2405

Silicon NPN Transistor

General Purpose, Medium Power

TO-39 Type Package

Description:

The 2N2405 is a silicon NPN transistor in a TO-39 type package designed for use in high current, fast switching applications and for power amplifiers.

Features:

- For Operation at Junction Temperature up to +200°C
- Planar Construction for Low Noise and Low Leakage
- Low Output Capacitance

Absolute Maximum Ratings:

Collector-Base Voltage, V_{CBO}	120V
Collector-Emitter Voltage, V_{CEO}	90V
Emitter-Base Voltage, V_{EBO}	7V
Collector-Emitter Sustaining Voltage, V_{CER}	140V
Collector Current, I_C	1A
Total Power Dissipation, P_T	
$T_C \leq +25^\circ\text{C}$	5W
$T_A \leq +25^\circ\text{C}$	1W
Operating Junction Temperature Range, T_J	-65° to +200°C
Storage Temperature Range, T_{stg}	-65° to +200°C
Thermal Resistance, Junction-to-Case, R_{thJC}	35°C/W
Thermal Resistance, Junction-to-Ambient, R_{thJA}	175°C/W

Electrical Characteristics: ($T_C = +25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector-Emitter Sustaining Voltage	$V_{CEO(sus)}$	$I_C = 30\text{mA}, I_B = 0$	90	—	—	V
		$I_C = 100\text{mA}, I_B = 0$	90	—	—	V
	$V_{CER(sus)}$	$I_C = 100\text{mA}, R_{BE} = 10\Omega$, Note 1	140	—	—	V
		$I_C = 100\text{mA}, R_{BE} = 500\Omega$, Note 1	120	—	—	V
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C = 0.1\text{mA}, I_E = 0$, Note 1	120	—	—	V
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	$I_C = 0.1\text{mA}, I_C = 0$, Note 1	7	—	—	V
Collector Cutoff Current	I_{CBO}	$V_{CB} = 90\text{V}, I_E = 0$	—	—	0.01	μA
		$V_{CB} = 90\text{V}, I_E = 0, T_C = +150^\circ\text{C}$	—	—	10	μA
Emitter Cutoff Current	I_{EBO}	$V_{BE} = -5\text{V}, I_C = 0$	—	—	0.01	μA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 150\text{mA}, I_B = 15\text{mA}$	—	—	0.5	V
		$I_C = 50\text{mA}, I_B = 5\text{mA}$	—	—	0.2	V
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = 150\text{mA}, I_B = 15\text{mA}$	—	—	1.1	V
		$I_C = 50\text{mA}, I_B = 5\text{mA}$	—	—	0.9	V

Note 1. Pulse Test: Pulse Duration = 300 μs , Duty Cycle $\leq$ 2%.

Electrical Characteristics (Cont'd): ($T_C = +25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
DC Current Gain	h_{FE}	$I_C = 10\text{mA}$, $V_{CE} = 10\text{V}$, Note 1	35	–	–	
		$I_C = 150\text{mA}$, $V_{CE} = 10\text{V}$, Note 1	60	–	200	
		$I_C = 10\text{mA}$, $V_{CE} = 10\text{V}$, $T_C = -55^{\circ}\text{C}$, Note 1	20	–	–	
Dynamic Characteristics						
Small-Signal Current Gain	h_{fe}	$V_{CE} = 5\text{V}$, $I_C = 5\text{mA}$, $f = 1\text{kHz}$	50	275	–	
		$V_{CE} = 10\text{V}$, $I_C = 50\text{mA}$, $f = 20\text{MHz}$	6	–	–	
	h_{ib}	$V_{CB} = 5\text{V}$, $I_C = 1\text{mA}$, $f = 1\text{KHz}$	24	34	–	Ω
		$V_{CB} = 10\text{V}$, $I_C = 5\text{mA}$, $f = 1\text{KHz}$	4	8	–	Ω
	h_{rb}	$V_{CB} = 5\text{V}$, $I_C = 1\text{mA}$, $f = 1\text{KHz}$	–	–	3×10^4	
		$V_{CB} = 10\text{V}$, $I_C = 5\text{mA}$, $f = 1\text{KHz}$	–	–	3×10^4	
	h_{ob}	$V_{CB} = 5\text{V}$, $I_C = 1\text{mA}$, $f = 1\text{KHz}$	–	–	0.5	μmho
		$V_{CB} = 10\text{V}$, $I_C = 5\text{mA}$, $f = 1\text{KHz}$	–	–	0.5	μmho
Output Capacitance	C_{obo}	$V_{CB} = 10\text{V}$, $I_E = 0$	–	–	15	pF
	C_{ib}	$V_{BE} = -0.5\text{V}$, $I_C = 0$	–	–	80	pF

Note 1. Pulse Test: Pulse Duration = $300\mu\text{s}$, Duty Cycle $\leq 2\%$.

