2N2219A
Silicon NPN Transistor
General Purpose Audio Amplifier, Switch
TO−39 Type Package

Absolute Maximum Ratings:

Collector−Emitter Voltage, V_{CEO} 40V

Collector−Base Voltage, V_{CBO} 75V

Emitter−Base Voltage, V_{EBO} 6V

Continuous Collector Current, I_C 800mA

Total Device Dissipation (T_A = +25°C), P_D 800mW

       Derate Above 25°C . . . . 5.33mW/°C

Total Device Dissipation (T_C = +25°C), P_D 3.0W

       Derate Above 25°C . . . . 20mW/°C

Operating Junction Temperature Range, T_J . . . . −65° to +200°C

Storage Temperature Range, T_{stg} . . . . −65° to +200°C

Electrical Characteristics: (T_A = +25°C unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF Characteristics						
Collector−Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C = 10mA, I_B = 0	40	−	−	V
Collector−Base Breakdown Voltage	$V_{(BR)CBO}$	I_C = 10μA, I_E = 0	75	−	−	V
Emitter−Base Breakdown Voltage	$V_{(BR)EBO}$	I_E = 10μA, I_C = 0	6	−	−	V
Collector Cutoff Current	I_{CBO}	V_{CE} = 60V, I_E = 0	−	−	0.01	μA
		V_{CE} = 60V, I_E = 0, T_A = +150°C	−	−	10	μA
	I_{CEX}	V_{CE} = 60V, $V_{EB(off)}$ = 3V	−	−	10	nA
Emitter Cutoff Current	I_{EBO}	V_{EB} = 3V, I_C = 0	−	−	10	nA
Base Cuttoff Current	I_{BL}	V_{CE} = 60V, $V_{EB(off)}$ = 3V	−	−	20	nA

Electrical Characteristics (Cont'd): $(T_A = +25°C$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
ON Characteristics (Note 1)						
DC Current Gain	h_{FE}	$I_C = 0.1mA$, $V_{CE} = 10V$	35	–	–	
		$I_C = 1mA$, $V_{CE} = 10V$	50	–	–	
		$I_C = 10mA$, $V_{CE} = 10V$	75	–	–	
		$I_C = 10mA$, $V_{CE} = 10V$, $T_A = -55°C$	35	–	–	
		$I_C = 150mA$, $V_{CE} = 10V$	100	–	300	
		$I_C = 150mA$, $V_{CE} = 1.0V$	50	–	–	
		$I_C = 500mA$, $V_{CE} = 10V$	40	–	–	
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 150mA$, $I_B = 15mA$	–	–	0.3	V
		$I_C = 500mA$, $I_B = 50mA$	–	–	1.0	V
Base–Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = 150mA$, $I_B = 15mA$	0.6	–	1.2	V
		$I_C = 500mA$, $I_B = 50mA$	–	–	2.0	V
Small–Signal Characteristics						
Current Gain–Bandwidth Product	f_T	$I_C = 20mA$, $V_{CE} = 20V$, f = 100MHz, Note 2	300	–	–	MHz
Output Capacitance	C_{obo}	$V_{CB} = 10V$, $I_E = 0$, f = 100kHz	–	–	8	pF
Input Capacitance	C_{ibo}	$V_{EB} = 0.5V$, $I_C = 0$, f = 100kHz	–	–	25	pF
Input Impedance	h_{ie}	$I_C = 1mA$, $V_{CE} = 10V$, f = 1kHz	2.0	–	8.0	$k\Omega$
		$I_C = 10mA$, $V_{CE} = 10V$, f = 1kHz	0.25	–	1.25	$k\Omega$
Voltage Feedback Ratio	h_{re}	$I_C = 1mA$, $V_{CE} = 10V$, f = 1kHz	–	–	8	$\times 10^{-4}$
		$I_C = 10mA$, $V_{CE} = 10V$, f = 1kHz	–	–	4	$\times 10^{-4}$
Small–Signal Current Gain	h_{fe}	$I_C = 1mA$, $V_{CE} = 10V$, f = 1kHz	50	–	300	
		$I_C = 10mA$, $V_{CE} = 10V$, f = 1kHz	75	–	375	
Output Admittance	h_{oe}	$I_C = 1mA$, $V_{CE} = 10V$, f = 1kHz	5.0	–	35	µmhos
		$I_C = 10mA$, $V_{CE} = 10V$, f = 1kHz	25	–	200	µmhos
Collector–Base Time Constant	$rb'C_c$	$I_E = 20mA$, $V_{CB} = 20V$, f = 31.8MHz	–	–	150	ps
Noise Figure	NF	$I_C = 100\mu A$, $V_{CE} = 10V$, $R_S = 1k\Omega$, f = 1kHz	–	–	4	dB
Real Part of Common–Emitter High Frequency Input Impedance	$Re(h_{ie})$	$I_C = 20mA$, $V_{CE} = 20V$, f = 300MHz	–	–	60	Ω
Switching Characteristics						
Delay Time	t_q	$V_{CC} = 30V$, $V_{BE(off)} = 0.5V$, $I_C = 150mA$, $I_{B1} = 15mA$	–	–	10	ns
Rise Time	t_r		–	–	25	ns
Storage Time	t_s	$V_{CC} = 30V$, $I_C = 150mA$, $I_{B1} = I_{B2} = 15mA$	–	–	225	ns
Fall Time	t_f		–	–	60	ns
Active Region Time Constant	T_A	$I_C = 150mA$, $V_{CE} = 30V$	–	–	2.5	ns

Note 1. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.

Note 2. f_T is defined as the frequency at which $|h_{fe}|$ extrapolates to unity.

.370 (9.39) Dia Max

.355 (9.03) Dia Max

.260
(6.6)
Max

.500
(12.7)
Min

.018 (0.45)

Base

Emitter

Collector/Case

45°

.031 (.793)