

# MICRO ELECTRONICS

2N2222  
PN2222  
2N2222A  
PN2222A

THE 2N2222, 2N2222A, PN2222, PN2222A ARE NPN SILICON PLANAR EPITAXIAL TRANSISTORS FOR GENERAL PURPOSE AMPLIFIERS AND MEDIUM SPEED SWITCHING APPLICATIONS. THEY ARE COMPLEMENTARY TO THE PNP TYPE 2N2907, 2N2907A, PN2907, PN2907A RESPECTIVELY. THE 2N2222, 2N2222A ARE PACKED IN TO-18. THE PN2222, PN2222A ARE PACKED IN TO-92A.

CASE TO-18



CBE

2N2222  
2N2222A

CASE TO-92A



EBC

PN2222  
PN2222A

ABSOLUTE MAXIMUM RATINGS

		2N2222	2N2222A	PN2222	PN2222A
Collector-Base Voltage	V <sub>CB0</sub>	60V	75V	60V	75V
Collector-Emitter Voltage	V <sub>CEO</sub>	30V	40V	30V	40V
Emitter-Base Voltage	V <sub>EB0</sub>	5V	6V	5V	6V
Collector Current	I <sub>C</sub>	0.8A	0.8A	0.8A	0.8A
Total Power Dissipation (T <sub>C</sub> ≤ 25°C)	P <sub>tot</sub>	1.8W	1.8W	1.2W	1.2W
	(T <sub>A</sub> ≤ 25°C)	500mW	500mW	500mW	500mW
Junction Temperature	T <sub>j</sub>	175°C	175°C	150°C	150°C
Storage Temperature Range	T <sub>stg</sub>	-65 to 200°C		-55 to 150°C	

ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C unless otherwise noted)

PARAMETER	SYMBOL	2N2222	2N2222A	UNIT	TEST CONDITIONS
		PN2222	PN2222A		
		MIN	MAX		
Collector-Base Breakdown Voltage	BV <sub>CB0</sub>	60	75	V	I <sub>C</sub> =0.01mA I <sub>E</sub> =0
Collector-Emitter Breakdown Voltage	LV <sub>CEO</sub> *	30	40	V	I <sub>C</sub> =10mA I <sub>B</sub> =0
Emitter-Base Breakdown Voltage	BV <sub>EB0</sub>	5	6	V	I <sub>E</sub> =0.01mA I <sub>C</sub> =0
Collector Cutoff Current	I <sub>CB0</sub>	10		nA	V <sub>CB</sub> =50V I <sub>E</sub> =0
				nA	V <sub>CB</sub> =60V I <sub>E</sub> =0
				μA	V <sub>CB</sub> =50V I <sub>E</sub> =0 T <sub>A</sub> =150°C
				μA	V <sub>CB</sub> =60V I <sub>E</sub> =0 T <sub>A</sub> =150°C
Collector Cutoff Current	I <sub>CEV</sub>			10 nA	V <sub>CE</sub> =60V V <sub>EB</sub> =3V
Emitter Cutoff Current	I <sub>EB0</sub>	10	10	nA	V <sub>EB</sub> =3V I <sub>C</sub> =0
Base Cutoff Current	I <sub>BL</sub>		20	nA	V <sub>CB</sub> =60V V <sub>EB</sub> =3V

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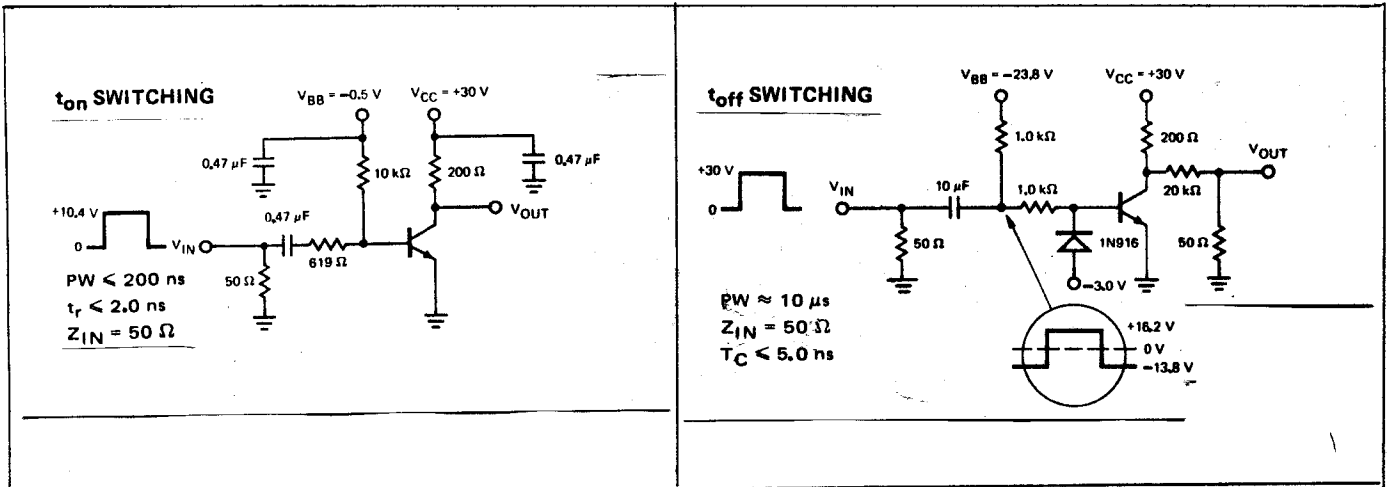
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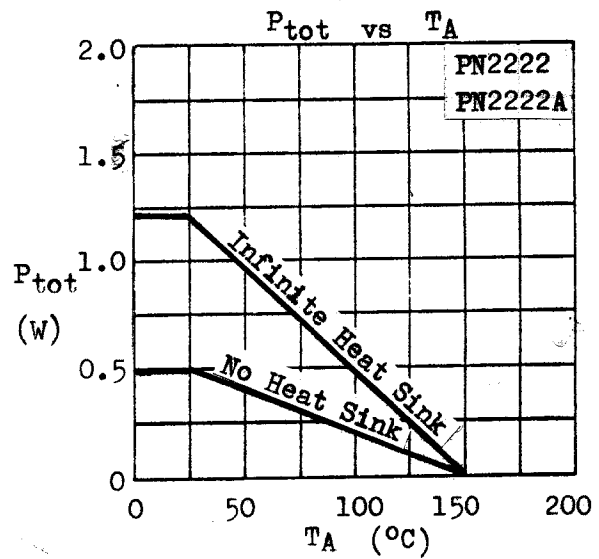
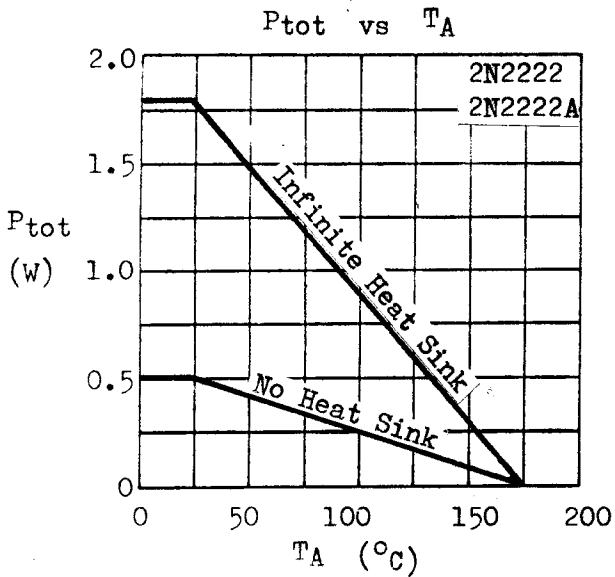
PARAMETER	SYMBOL	2N2222 PN2222		2N2222A PN2222A		UNIT	TEST CONDITIONS	
		MIN	MAX	MIN	MAX			
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$ *		0.4		0.3	V	$I_C=150mA$ $I_B=15mA$	
			1.6		1.0	V	$I_C=500mA$ $I_B=50mA$	
Base-Emitter Saturation Voltage	$V_{BE(sat)}$ *		1.3	0.6	1.2	V	$I_C=150mA$ $I_B=15mA$	
			2.6		2.0	V	$I_C=500mA$ $I_B=50mA$	
D.C. Current Gain	$H_{FE}$ *		35		35		$I_C=0.1mA$ $V_{CE}=10V$	
			50		50		$I_C=1mA$ $V_{CE}=10V$	
			75		75		$I_C=10mA$ $V_{CE}=10V$	
			100	300	100	300		$I_C=150mA$ $V_{CE}=10V$
			30		40			$I_C=500mA$ $V_{CE}=10V$
			50		50			$I_C=150mA$ $V_{CE}=1V$
					35		$I_C=10mA$ $V_{CE}=10V$ $T_A=-55^\circ C$	
Current Gain-Bandwidth Product	$f_T$		250		300	MHz	$I_C=20mA$ $V_{CE}=20V$	
Collector-Base Capacitance	$C_{ob}$		8		8	pF	$V_{CB}=10V$ $I_E=0$ $f=100kHz$	
Emitter-Base Capacitance	$C_{ib}$		25		25	pF	$V_{EB}=0.5V$ $I_C=0$ $f=100kHz$	
Collector-Base Time Constant	$C_{orb}'$				150	pS	$I_C=20mA$ $V_{CE}=20V$ $f=31.8MHz$	
Noise Figure	NF				4	dB	$I_C=0.1mA$ $V_{CE}=10V$ $f=1kHz$ $R_G=1k\Omega$	
Input Impedance	$h_{ie}$			2	8	$K\Omega$	$I_C=1mA$ $V_{CE}=10V$ $f=1kHz$	
				0.25	1.25	$K\Omega$	$I_C=10mA$ $V_{CE}=10V$ $f=1kHz$	
Voltage Feedback Ratio	$h_{re}$				8	$\times 10^{-4}$	$I_C=1mA$ $V_{CE}=10V$ $f=1kHz$	
					4	$\times 10^{-4}$	$I_C=10mA$ $V_{CE}=10V$ $f=1kHz$	
Small Signal Current Gain	$h_{fe}$			50	300		$I_C=1mA$ $V_{CE}=10V$ $f=1kHz$	
				75	375		$I_C=10mA$ $V_{CE}=10V$ $f=1kHz$	
Output Admittance	$h_{oe}$			5	35	$\mu S$	$I_C=1mA$ $V_{CE}=10V$ $f=1kHz$	
				25	200	$\mu S$	$I_C=10mA$ $V_{CE}=10V$ $f=1kHz$	
Delay Time	$t_d$				10	nS	$I_C=150mA$ $I_{B1}=15mA$ $V_{CC}=30V$	
Rise Time	$t_r$				25	nS	$I_C=150mA$ $I_{B1}=15mA$ $V_{CC}=30V$	
Storage Time	$t_s$				225	nS	$I_C=150mA$ $I_{B1}=-I_{B2}=15mA$ $V_{CC}=30V$	
Fall Time	$t_f$				60	nS	$I_C=150mA$ $I_{B1}=-I_{B2}=15mA$ $V_{CC}=30V$	

\* Pulse Test : Pulse Width=0.3mS, Duty Cycle=1%

SWITCHING TIME TEST CIRCUITS



All waveforms are monitored on an oscilloscope with  $R_{in} \geq 100 \text{ k}\Omega$ ,  
 $C_{in} \leq 12 \text{ pF}$ ,  $t_r \leq 5 \text{ nS}$ .



TYPICAL CHARACTERISTICS

( $T_A=25^\circ\text{C}$  unless otherwise noted)

