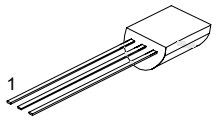
UTC PN2222A NPN EPITAXIAL SILICON TRANSISTOR

NPN GENERAL PURPOSE AMPLIFIER

FEATURES

*This device is for use as a medium power amplifier and switch requiring collector currents up to 500mA. Sourced from Process 19.



TO-92

1:EMITTER 2:BASE 3:COLLECTOR

ABSOLUTE MAXIMUM RATINGS (Ta=25°C, unless otherwise specified)

PARAMETER	SYMBOL	RATING	UNIT
Collector-base voltage	V_{CBO}	75	V
Collector-emitter voltage	V_{CEO}	40	V
Emitter-base voltage	V_{EBO}	6	V
Collector current	Ic	1	A
Collector dissipation	Pc	625	mW
Junction Temperature	T_j	150	°C
Storage Temperature	T_{STG}	-55 ~ +150	°C

Note: These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

ELECTRICAL CHARACTERISTICS (Ta=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Collector-base breakdown voltage	$V_{(BR)CBO}$	I_C=10μA, I_E=0	75			V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	I_C=10mA, I_B=0	40			V
Emitter-base breakdown voltage	$V_{(BR)EBO}$	I_E=10μA, I_C=0	6			V
Collector cutoff current	I_{CEX}	V_{CE}=60V,$V_{EB(OFF)}$=3.0V			10	nA
Collector cutoff current	I_{CBO}	V_{CB}=60V,I_E=0			0.01	μA
		V_{CB}=60V,I_E=0, T_A=150°C			10	μA
Emitter cutoff current	I_{EBO}	V_{EB}=3.0V,I_C=0			10	nA
Base cutoff current	I_{BL}	V_{CE}=60V, $V_{EB(OFF)}$=3.0V			20	nA

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
ON CHARACTERISTICS						
DC current gain	h_{FE}	I_C=0.1mA, V_{CE}=10V	35			
		I_C=1.0mA, 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	300			MHz
Output capacitance	Cobo	V_{CB}=10V, I_E=0, f=100kHz			8.0	pF
Input capacitance	Cibo	V_{EB}=0.5V, I_C=0, f=100kHz			25	pF
Collector base time constant	rb'Cc	I_C=20mA, V_{CB}=20V, f=31.8MHz			150	pS
Noise figure	NF	I_C=100μA, V_{CE}=10V, Rs=1.0kΩ, f=1.0kHz			4.0	dB
Real part of common-emitter high frequency input impedance	Re(hje)	I_C=20mA, V_{CB}=20V, f=300MHz			60	Ω
SWITCHING CHARACTERISTICS						
Delay time	td	Vcc=30V, $V_{BE(OFF)}$=0.5V,			10	ns
Rise time	tr	I_C=150mA, I_{B1}=15mA			25	ns
Storage time	ts	Vcc=30V, I_C=150mA,			225	ns
Fall time	tf	I_{B1}= I_{B2}=15mA			60	ns
THERMAL CHARACTERISTICS (TA=25°C, unless otherwise noted)						
Total Device Dissipation	P_D				625	mW
Derate above 25°C					5.0	mW/°C
Thermal resistance, junction to Case	$R_{\theta JC}$				83.3	°C/W
Thermal resistance, junction to Ambient	$R_{\theta JA}$				200	°C/W

*Pulse test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2.0%

TEST CIRCUITS

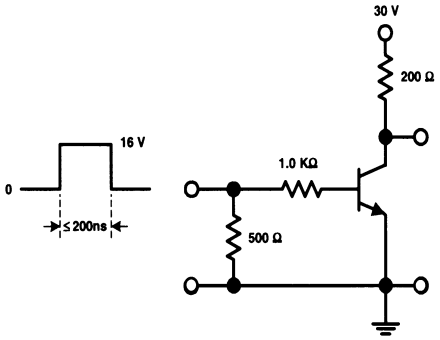


FIG.1 Saturated Turn-On Switching Time

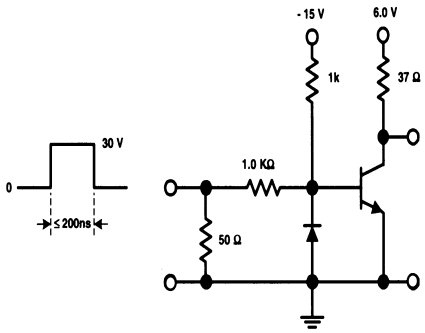
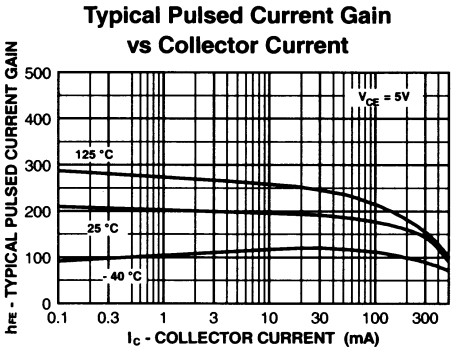
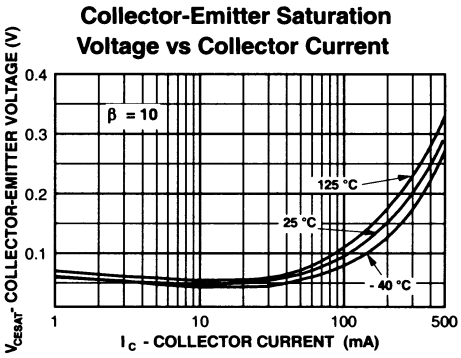
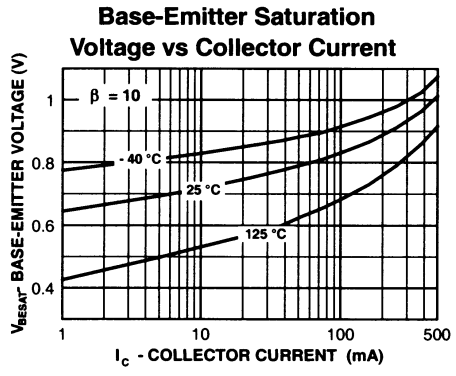


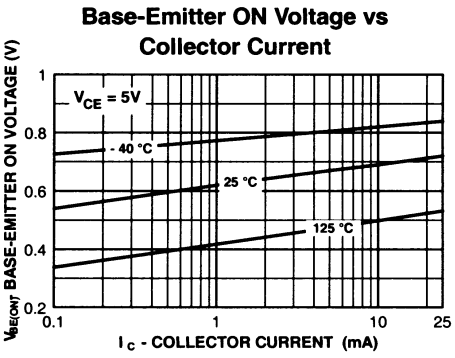
FIG.2 Saturated Turn-Off Switching Time

TYPICAL CHARACTERISTICS

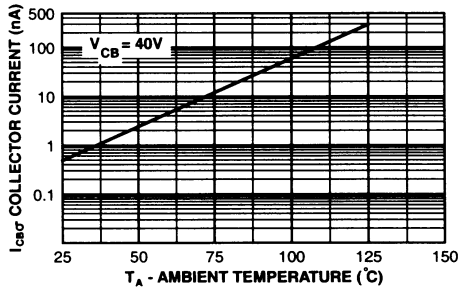




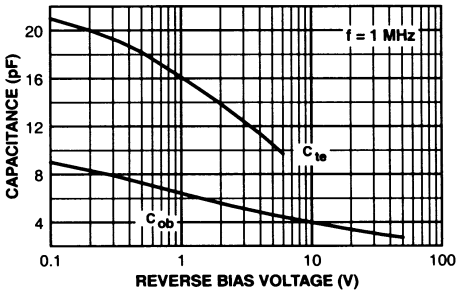




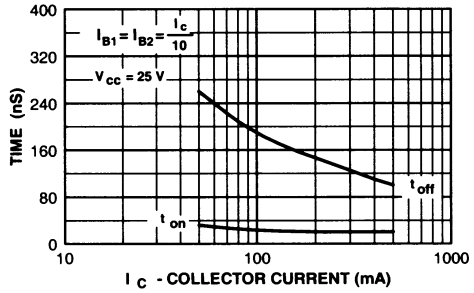
Collector-Cutoff Current vs Ambient Temperature



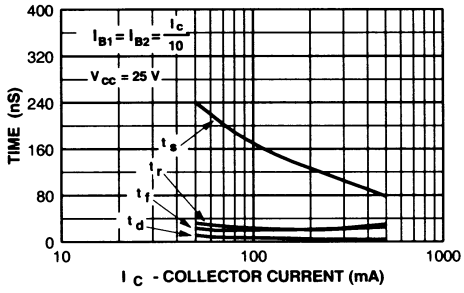
Emitter Transition and Output Capacitance vs Reverse Bias Voltage



Turn On and Turn Off Times vs Collector Current



Switching Times vs Collector Current



Power Dissipation vs Ambient Temperature