



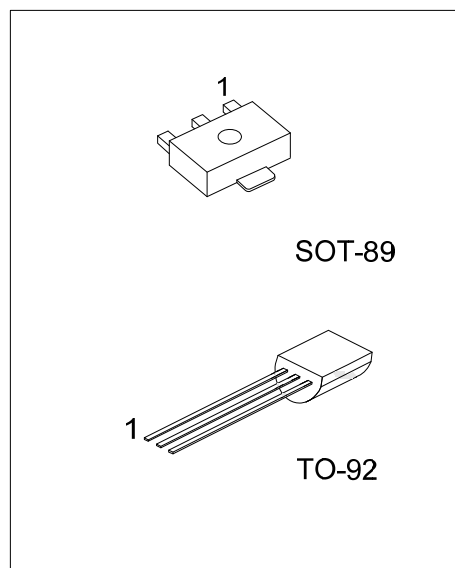
PN2222A

NPN 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.



■ ORDERING INFORMATION

Ordering Number			Package	Pin Assignment			Packing
Normal	Lead Free Plating	Halogen Free		1	2	3	
PN2222A-AB3-R	PN2222AL-AB3-R	PN2222AG-AB3-R	SOT-89	B	C	E	Tape Reel
PN2222A-T92-B	PN2222AL-T92-B	PN2222AG-T92-B	TO-92	E	B	C	Tape Box
PN2222A-T92-K	PN2222AL-T92-K	PN2222AG-T92-K	TO-92	E	B	C	Bulk

PN2222AL-AB3-R	(1)Packing Type (2)Package Type (3)Lead Plating	(1) B: Tape Box, K: Bulk, R: Tape Reel (2) AB3: SOT-89, T92: TO-92 (3) G: Halogen Free, L: Lead Free Plating, Blank: Pb/Sn
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■ ABSOLUTE MAXIMUM RATING ($T_A=25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Collector-Base Voltage		V_{CBO}	75	V
Collector-Emitter Voltage		V_{CEO}	40	V
Emitter-Base Voltage		V_{EBO}	6	V
Collector Current		I_C	0.6	A
Total Device Dissipation	SOT-89	P_C	1.2	W
	TO-92		0.6	
Junction Temperature		T_J	+150	$^\circ\text{C}$
Storage Temperature		T_{STG}	-55 ~ +150	$^\circ\text{C}$

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

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

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-89	θ_{JA}	104	$^\circ\text{C/W}$
	TO-92		200	

■ ELECTRICAL CHARACTERISTICS ($T_A=25^\circ\text{C}$, unless otherwise specified)

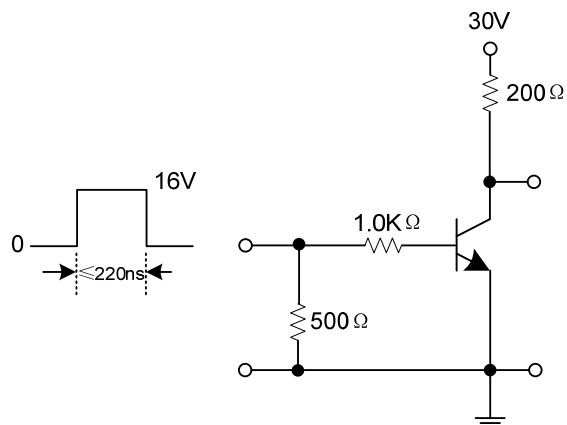
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	BV _{CBO}	I _C =10μA, I _E =0	75			V
Collector-Emitter Breakdown Voltage	BV _{CEO}	I _C =10mA, I _B =0	40			V
Emitter-Base Breakdown Voltage	BV _{EBO}	I _E =10μA, I _C =0	6			V
Collector Cut-off Current	I _{CEO}	V _{CE} =60V, V _{EB(OFF)} =3.0V			10	nA
Collector Cut-Off Current	I _{CBO}	V _{CB} =60V, I _E =0			0.01	μA
Emitter Cut-Off Current	I _{EBO}	V _{EB} =3.0V, I _C =0			10	nA
Base Cut-Off Current	I _{BL}	V _{CE} =60V, V _{EB(OFF)} =3.0V			20	nA
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 =150mA, V _{CE} =10V (Note)	100			
		I _C =150mA, V _{CE} =1.0V (Note)	50		300	
		I _C =500mA, V _{CE} =10V (Note)	40			
Collector-Emitter Saturation Voltage (Note)	V _{CE(SAT)}	I _C =150mA, I _B =15mA			0.3	V
		I _C =500mA, I _B =50mA			1.0	
Base-Emitter Saturation Voltage (Note)	V _{BE(SAT)}	I _C =150mA, I _B =15mA	0.6		1.2	V
		I _C =500mA, I _B =50mA			2.0	
SMALL SIGNAL CHARACTERISTICS						
Transition Frequency	f _T	I _C =20mA, V _{CE} =20V, f=100MHz	300			MHz
Output Capacitance	C _{obo}	V _{CB} =10V, I _E =0, f=100kHz			8.0	pF
Input Capacitance	C _{ibo}	V _{EB} =0.5V, I _C =0, f=100kHz			25	pF
Collector Base Time Constant	τ _{b'c}	I _C =20mA, V _{CB} =20V, f=31.8MHz			150	pS
Noise Figure	NF	I _C =100μA, V _{CE} =10V, R _S =1.0kΩ, f=1.0kHz			4.0	dB
Real Part of Common-Emitter High Frequency Input Impedance	Re(h _{je})	I _C =20mA, V _{CB} =20V, f=300MHz			60	Ω

■ ELECTRICAL CHARACTERISTICS ($T_A=25^{\circ}\text{C}$, unless otherwise specified)

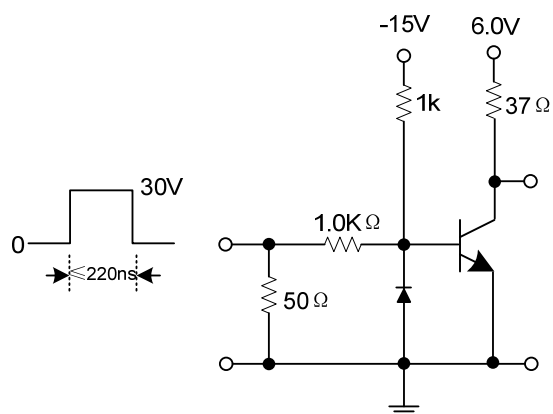
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
SWITCHING CHARACTERISTICS						
Delay time	t_D	$V_{CC}=30\text{V}$, $V_{BE(OFF)}=0.5\text{V}$			10	ns
Rise time	t_R	$I_C=150\text{mA}$, $I_{B1}=15\text{mA}$			25	ns
Storage time	t_S	$V_{CC}=30\text{V}$, $I_C=150\text{mA}$			225	ns
Fall time	t_F	$I_{B1}=I_{B2}=15\text{mA}$			60	ns

Note: Pulse test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2.0\%$

■ TEST CIRCUIT

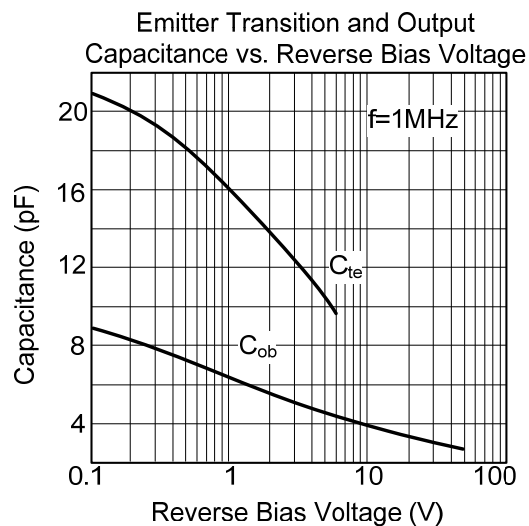
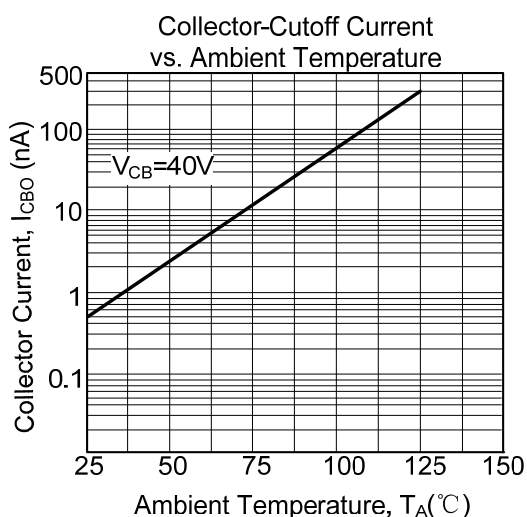
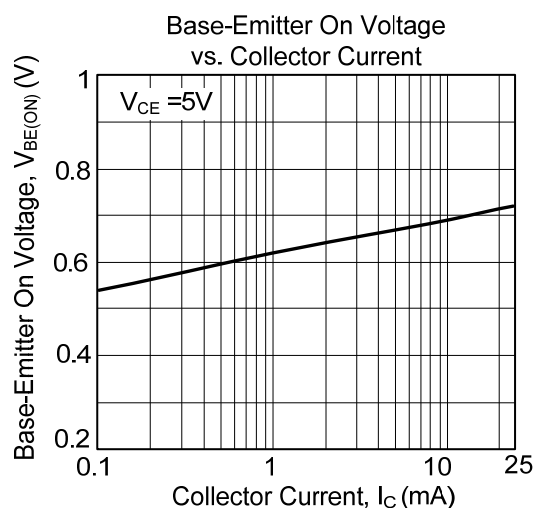
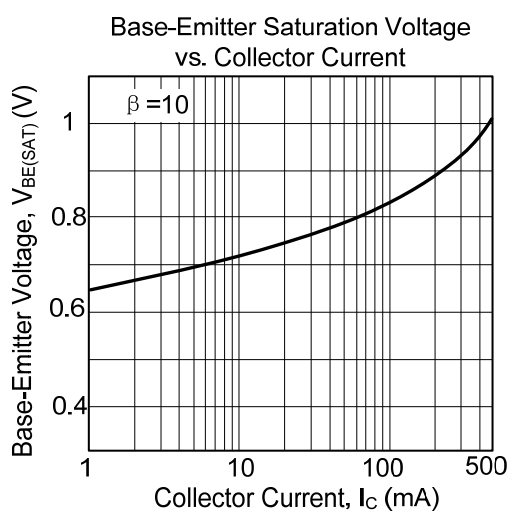
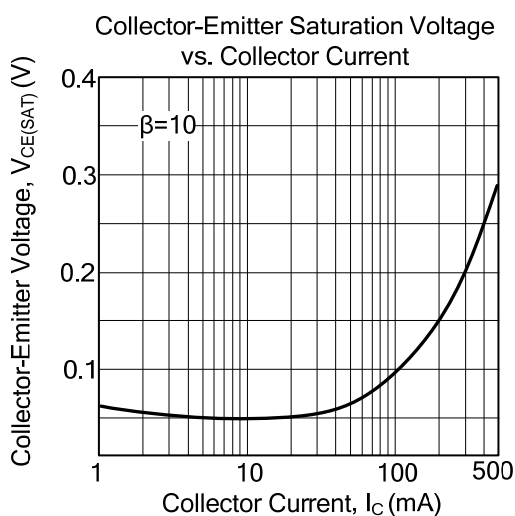
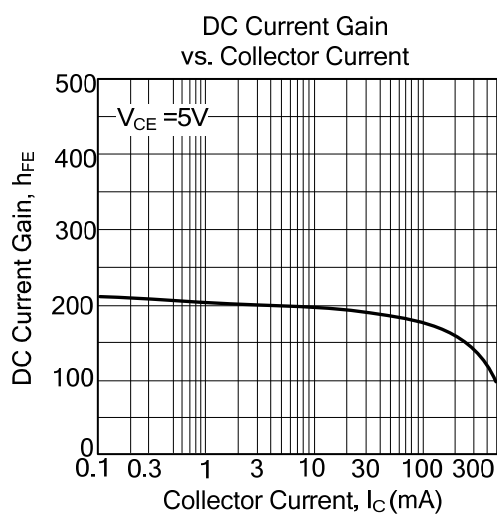


Saturated Turn-On Switching Time

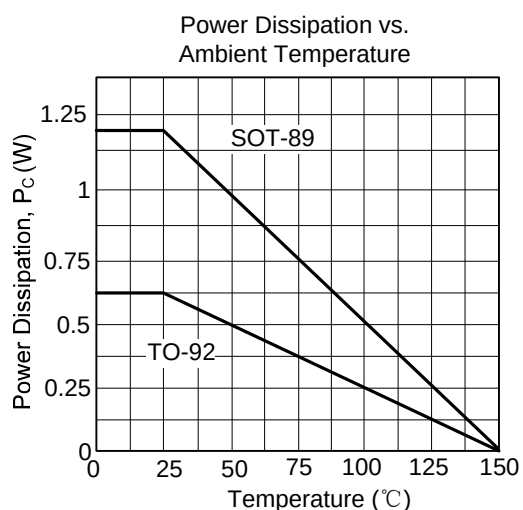
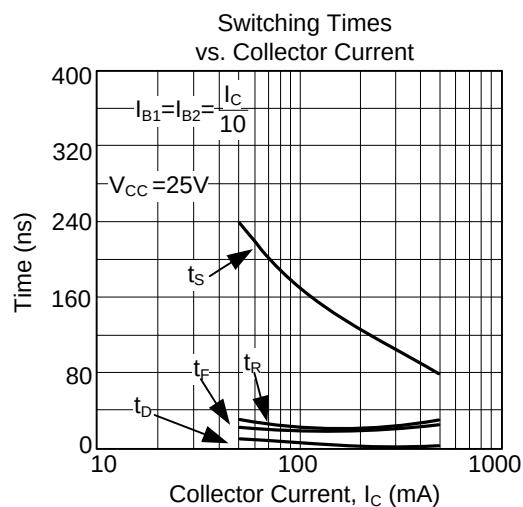
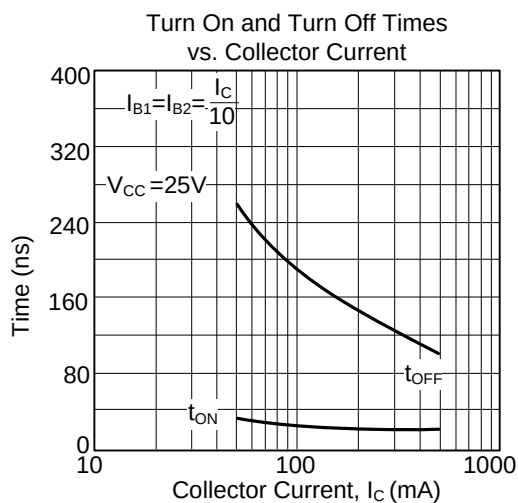


Saturated Turn-Off Switching Time

■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS(Cont.)



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