

# 2N4400

## NPN General Purpose Amplifier

### Features

- Lead Free Finish/RoHS Compliant ("P" Suffix designates RoHS Compliant. See ordering information)
- This device is designed for use as general purpose amplifiers and switches requiring collector currents to 500mA
- Epoxy meets UL 94 V-0 flammability rating
- Moisture Sensitivity Level 1
- Halogen free available upon request by adding suffix "-HF"

### Maximum Ratings\*

Symbol	Rating	Rating	Unit
$V_{CE0}$	Collector-Emitter Voltage	40	V
$V_{CBO}$	Collector-Base Voltage	60	V
$V_{EBO}$	Emitter-Base Voltage	6.0	V
$I_C$	Collector Current, Continuous	600	mA
$T_J$	Operating Junction Temperature	-55 to +150	°C
$T_{STG}$	Storage Temperature	-55 to +150	°C

### Thermal Characteristics

Symbol	Rating	Max	Unit
$P_D$	Total Device Dissipation Derate above 25°C	625 5.0	mW mW/°C
$R_{JC}$	Thermal Resistance, Junction to Case	83.3	°C/W
$R_{JA}$	Thermal Resistance, Junction to Ambient	200	°C/W

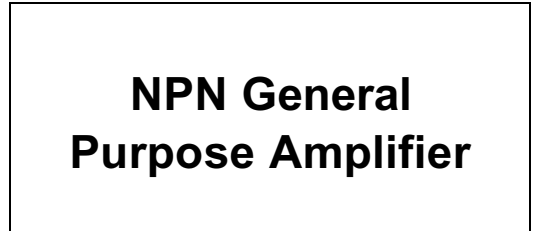
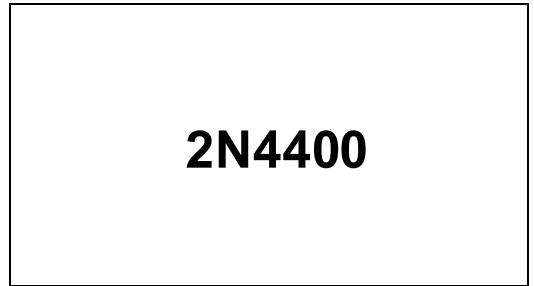
### Electrical Characteristics @ 25°C Unless Otherwise Specified

Symbol	Parameter	Min	Max	Units
--------	-----------	-----	-----	-------

#### OFF CHARACTERISTICS

$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage* ( $I_C=1.0mA$ , $I_E=0$ )	40	---	Vdc
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage ( $I_C=100\mu A$ , $I_E=0$ )	60	---	Vdc
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage ( $I_E=100\mu A$ , $I_C=0$ )	6.0	---	Vdc
$I_{CEX}$	Collector Cutoff Current ( $V_{CE}=35Vdc$ , $V_{EB}=0.4Vdc$ )	---	0.1	$\mu A$
$I_{BL}$	Base Cutoff Current ( $V_{CE}=35Vdc$ , $V_{EB}=0.4Vdc$ )	---	0.1	$\mu A$

\* These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.  
Notes: 1. These ratings are based on a maximum junction temperature of 150 degrees C.  
2. These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.



TO-92

STRAIGHT LEAD BULK PACK    BENT LEAD AMMO PACK

DIMENSIONS					
DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	.175	.185	4.45	4.70	
B	.175	.185	4.45	4.70	
C	.500	---	12.70	---	
D	.016	.020	0.41	0.63	
E	.135	.145	3.43	3.68	
G	.095	.105	2.42	2.67	Straight Lead
	.173	.220	4.40	5.60	

\* For ammo packing detailed specification, click here to visit our website of product packaging for details.

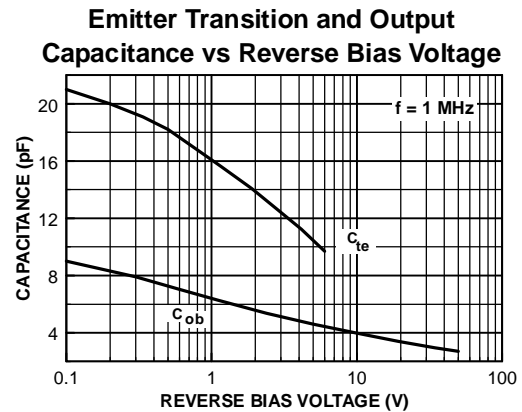
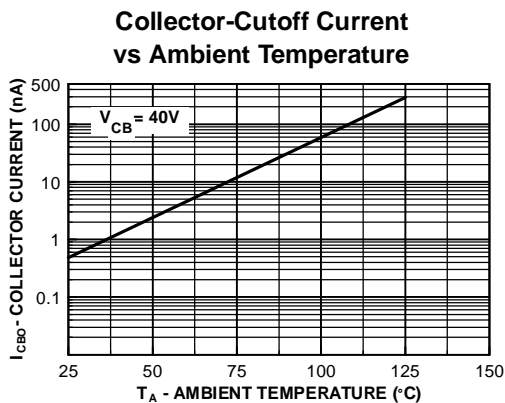
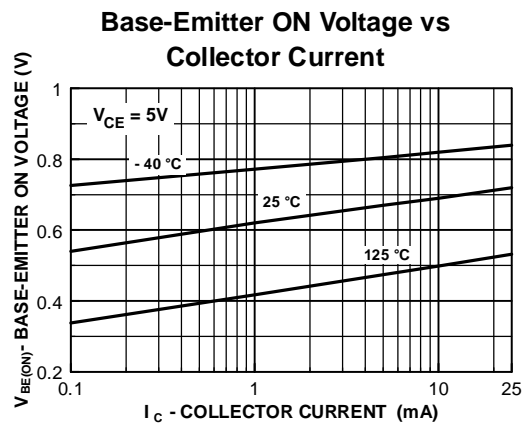
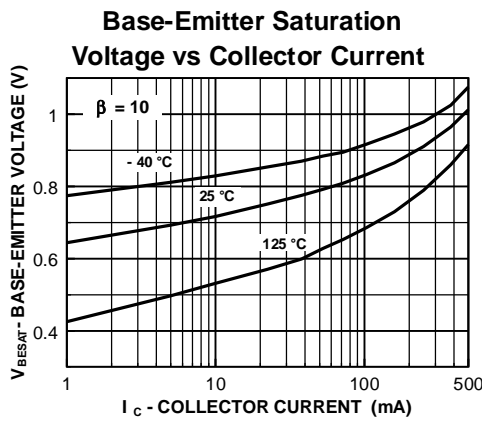
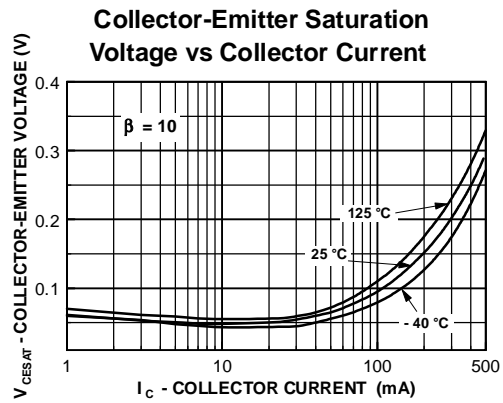
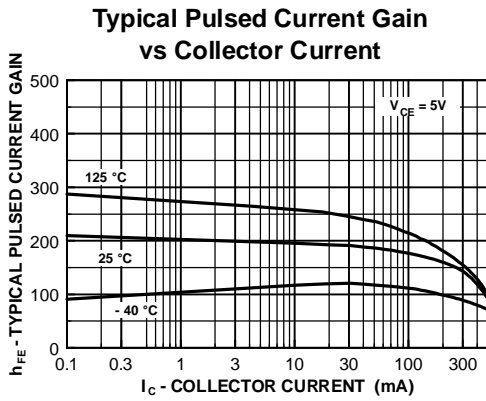
2N4400

Symbol	Parameter	Min	Max	Units
<b>ON CHARACTERISTICS</b>				
$h_{FE}$	DC Current Gain ( $V_{CE}=1.0Vdc, I_C=1.0mA$ )	40		
	( $V_{CE}=1.0Vdc, I_C=10mA$ )	40		---
	( $V_{CE}=1.0Vdc, I_C=150mA$ )	50	150	
	( $V_{CE}=2.0Vdc, I_C=500mA$ )	20		
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage ( $I_C=150mA, I_B=15mA$ )	---	0.40	Vdc
	( $I_C=500mA, I_B=50mA$ )	---	0.75	Vdc
$V_{BE(sat)}$	Base-Emitter Saturation Voltage ( $I_C=150mA, I_B=15mA$ )	0.75	0.95	Vdc
	( $I_C=500mA, I_B=50mA$ )		1.20	Vdc

<b>SMALL-SIGNAL CHARACTERISTICS</b>				
$C_{OB}$	Output Capacitance ( $V_{CB}=5.0Vdc, f=140KHz$ )	---	6.5	pF
$C_B$	Input Capacitance ( $V_{EB}=0.5Vdc, f=140KHz$ )	---	30	pF
$h_{fe}$	Small-Signal Current Gain ( $I_C=20mA, V_{CE}=10Vdc, f=100MHz$ )	2.0	---	---
$h_{fe}$	Small-Signal Current Gain ( $I_C=1.0mA, V_{CE}=10Vdc, f=1.0KHz$ )	150	200	---
$h_{ie}$	Small-Signal Current Gain ( $I_C=1.0mA, V_{CE}=10Vdc, f=1.0KHz$ )	0.5	7.5	KOHM
$h_{re}$	Small-Signal Current Gain ( $I_C=1.0mA, V_{CE}=10Vdc, f=1.0KHz$ )	0.10	8.0	$\times 10^4$
$h_{oe}$	Small-Signal Current Gain ( $I_C=1.0mA, V_{CE}=10Vdc, f=1.0KHz$ )	1.0	30	umhos

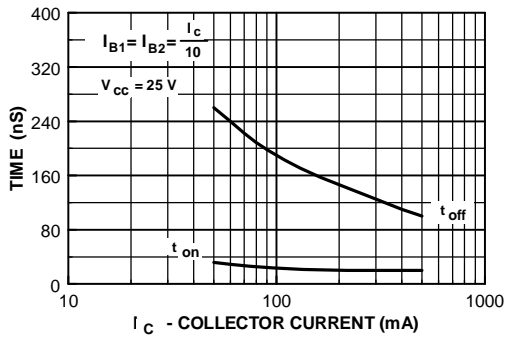
<b>SWITCHING CHARACTERISTICS</b>					
$T_d$	Delay Time	$V_{CC}=30Vdc, I_C=150mA, I_{B1}=15mA, V_{BE(off)}=2.0Vdc$	---	15	ns
$t_r$	Rise Time		---	20	ns
$t_s$	Storage Time	$V_{CC}=30Vdc, I_C=150mA, I_{B1}=I_{B2}=15mA$	---	225	ns
$t_f$	Fall Time		---	30	ns

\* Pulse Test: Pulse Width<300us, Duty Cycle<2.0%

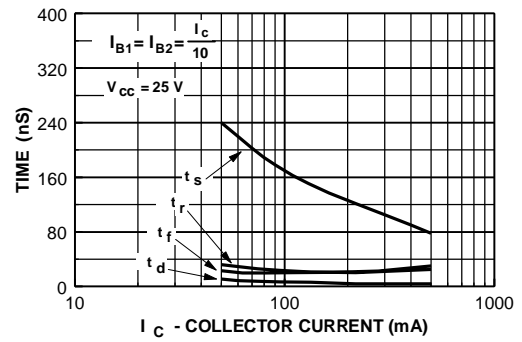


# 2N4400

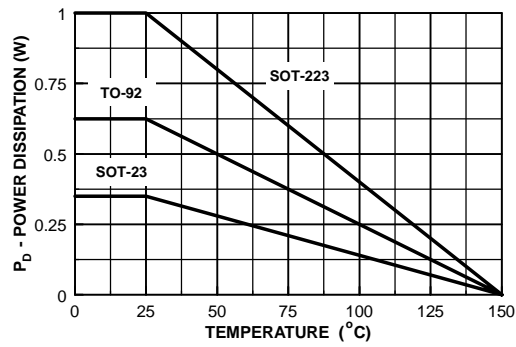
### Turn On and Turn Off Times vs Collector Current



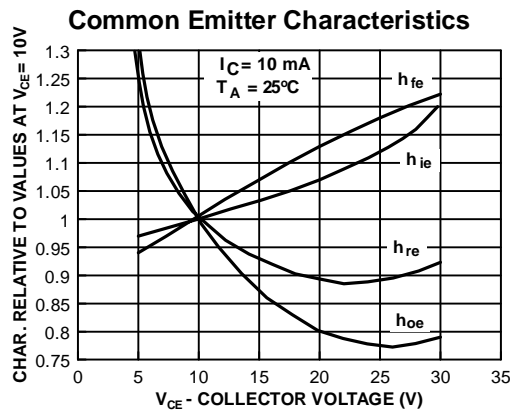
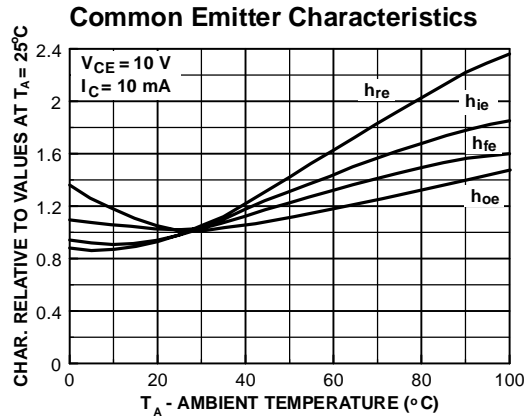
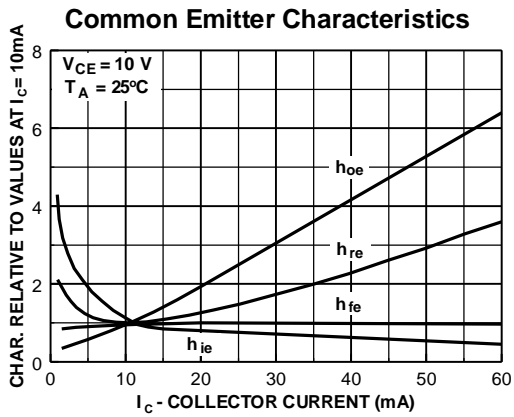
### Switching Times vs Collector Current



### Power Dissipation vs Ambient Temperature



2N4400





Micro Commercial Components

Ordering Information :

Device	Packing
Part Number-AP	Ammo Packing: 20Kpcs/Carton
Part Number-BP	Bulk: 100Kpcs/Carton

Note : Adding "-HF" suffix for halogen free, eg. Part Number-AP-HF

\*\*\*IMPORTANT NOTICE\*\*\*

Micro Commercial Components Corp. reserves the right to make changes without further notice to any product herein to make corrections, modifications, enhancements, improvements, or other changes. Micro Commercial Components Corp. does not assume any liability arising out of the application or use of any product described herein; neither does it convey any license under its patent rights, nor the rights of others. The user of products in such applications shall assume all risks of such use and will agree to hold Micro Commercial Components Corp. and all the companies whose products are represented on our website, harmless against all damages.

\*\*\*LIFE SUPPORT\*\*\*

MCC's products are not authorized for use as critical components in life support devices or systems without the express written approval of Micro Commercial Components Corporation.

\*\*\*CUSTOMER AWARENESS\*\*\*

Counterfeiting of semiconductor parts is a growing problem in the industry. Micro Commercial Components (MCC) is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. MCC strongly encourages customers to purchase MCC parts either directly from MCC or from Authorized MCC Distributors who are listed by country on our web page cited below. Products customers buy either from MCC directly or from Authorized MCC Distributors are genuine parts, have full traceability, meet MCC's quality standards for handling and storage. MCC will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources. MCC is committed to combat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors.

www.mccsemi.com