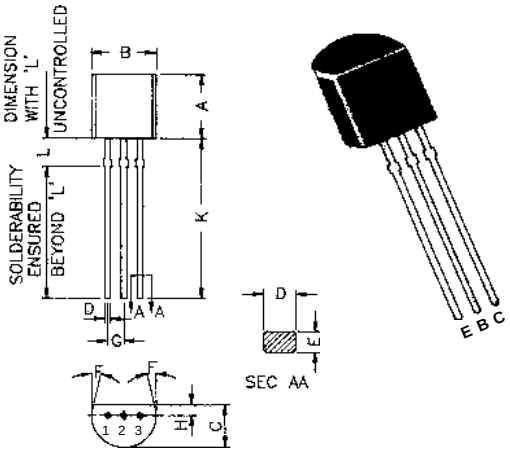
TO-92 Plastic Package

2N4400, 2N4401
2N4402, 2N4403

2N4400,4401 NPN SILICON PLANAR EPITAXIAL TRANSISTORS
2N4402,4403 PNP SILICON PLANAR EPITAXIAL TRANSISTORS
General Purpose Switching Applications



1 = EMITTER
2 = BASE
3 = COLLECTOR

DIM	MIN	MAX
A	4,32	5,33
B	4,45	5,20
C	3,18	4,19
D	0,41	0,55
E	0,35	0,50
F	5 DEG	
G	1,14	1,40
H	1,14	1,53
K	12,70	–
L	1.982	2.082

ALL DIMENSIONS IN M.M.

ABSOLUTE MAXIMM RATINGS

Rating	Symbol	*2N4400/01*	*2N4402/03*	Units
Collector-Emitter Voltage	V_{CEO}	*40*	*40*	*V*
Collector-Base Voltage	V_{CBO}	*60*	*40*	*V*
Emitter-Base Voltage	V_{EBO}	*6*	*5*	*V*
Collector Current Continuous	I_C	*600*	*600*	*mA*
Power Dissipation At Ta=25 ºC	P_D	*625*	*625*	*mW*
Derate Above 25 ºC		*5.0*	*5.0*	*mW/ºC*
Power Dissipation At Tc=25 ºC	P_D	*1.5*	*1.5*	*W*
Derate Above 25 ºC		*12*	*12*	*mW/ºC*
Operating & Storage Junction Temperature Range	T_j, T_{stg}	*-55 to +150*		*ºC*

THERMAL RESISTANCE

Junction to Case	$R_{th\,(j\text{-}c)}$	*83.3*	*83.3*	*ºC/W*
Junction to Ambient	$R_{th\,(j\text{-}a)}$	*200*	*200*	*ºC/W*

ELECTRICAL CHARACTERISTICS *(Ta =25 ºC unless otherwise specified)*

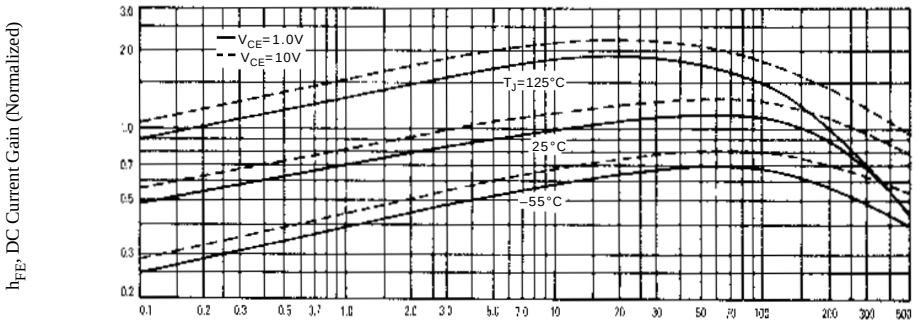
Characteristic	Symbol	2N4400/01	2N4402/03	Unit
Collector Emitter Voltage				
I_C=1mA, I_B=0	BV_{CEO}*	>40	>40	V
Collector Base Voltage				
I_C=100µA, I_E=0	BV_{CBO}	>60	>40	V
Emitter Base Voltage				
I_E=100µA, I_C=0	BV_{EBO}	>6	>5	V
Base Cutoff Current				
V_{CE}=35V, V_{BE}=0.4V	I_{BEV}	<0.1	<0.1	µA
Collector Cutoff Current				
V_{CE}=35V, V_{BE}=0.4V	I_{CEX}	<0.1	<0.1	µA
Collector-Emitter				
Saturation Voltage				
I_C=150mA, I_B=15mA	$V_{CE\ (sat)}$*	<0.4	<0.4	V
I_C=500mA, I_B=50mA		<0.75	<0.75	V
Base-Emitter				
Saturation Voltage				
I_C=150mA, I_B=15mA	$V_{BE\ (sat)}$*	0.75 to 0.95	0.75 to 0.95	V
I_C=500mA,I_B=50mA		<1.2	<1.3	V

Characteristic	Symbol	2N4400	2N4401	2N4402	2N4403	Unit
D C Current Gain						
I_C=0.1mA,V_{CE}=1V	h_{FE}	-	>20	-	>30	
I_C=1mA,V_{CE}=1V		>20	>40	>30	>60	
I_C=10mA,V_{CE}=1V		>40	>80	>50	>100	
I_C=150mA,V_{CE}=1V*		50-150	100-300	-	-	
I_C=150mA,V_{CE}=2V*		-	-	50-150	100-300	
I_C=500mA,V_{CE}=2V*		>20	>40	>20	>20	
DYNAMIC CHARACTERISTICS						
Small Signal Current Gain						
I_C=1mA, V_{CE}=10V, f=1KHz	h_{fe}	20-250	40-500	30-250	60-500	
Input Impedance						
I_C=1mA, V_{CE}=10V, f=1KHz	h_{ie}	0.5-7.5	1.0-15	0.75-7.5	1.5-15	KΩ

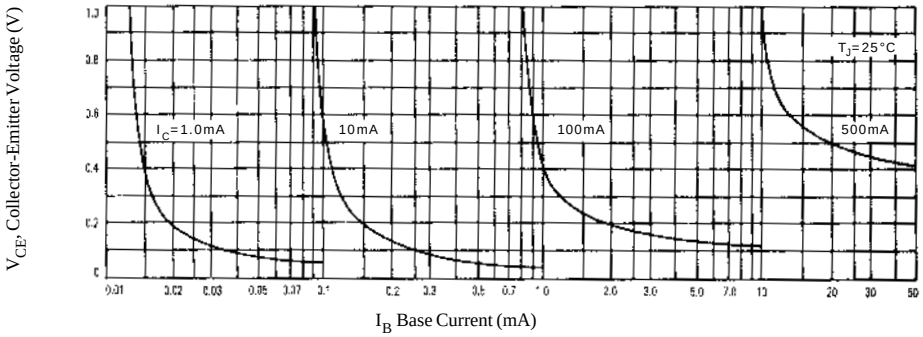
Characteristic	Symbol	2N4400	2N4401	2N4402	2N4403	Unit
Voltage Feedback Ratio	h_{re} **ALL**			*0.1-8.0*		$x10^{-4}$
I_C=1mA, V_{CE}=10V, f=1KHz						
Output Admittance						
I_C=1mA, V_{CE}=10V, f=1KHz	h_{oe}	*1.0-30*	*1.0-30*	*1.0-100*	*1.0-100*	μ℧
Collector-Base Capacitance						
V_{CB}=5V, I_E=0, f=100KHz	C_{cb}	*<6.5*	*<6.5*	-	-	*pF*
V_{CB}=10V, I_E=0, f=140KHz		-	-	*<8.5*	*<8.5*	*pF*
Emitter-Base Capacitance						
V_{EB}=0.5V, I_C=0, f=100KHz	C_{eb}	*<30*	*<30*	-	-	*pF*
V_{EB}=0.5V, I_C=0, f=140KHz		-	-	*<30*	*<30*	*pF*
Transition Frequency						
I_C=20mA, V_{CE}=10V f=100MHz	f_T	*>200*	*>250*	*>150*	*>200*	*MHz*
SWITCHING CHARACTERISTICS						
V_{CC}=30V, V_{EB}=2V, I_C=150mA, I_{B1}=15mA						
Delay time	t_d **ALL**			*<15*		*ns*
Rise time	t_r **ALL**			*<20*		*ns*
V_{CC}=30V, I_C=150mA, I_{B1}=I_{B2}=15mA						
Storage time	t_s **ALL**			*<225*		*ns*
Fall time	t_f **ALL**			*<30*		*ns*

**Pluse Test : Pluse width ≤ 300μs, duty ≤ 2.0%.*

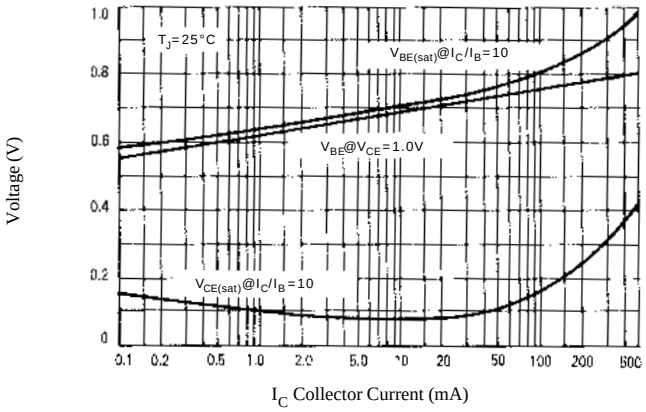
DC Current Gain



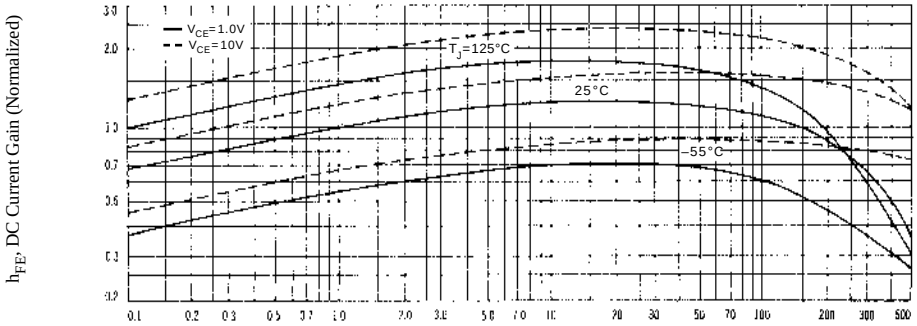
DC Current Gain



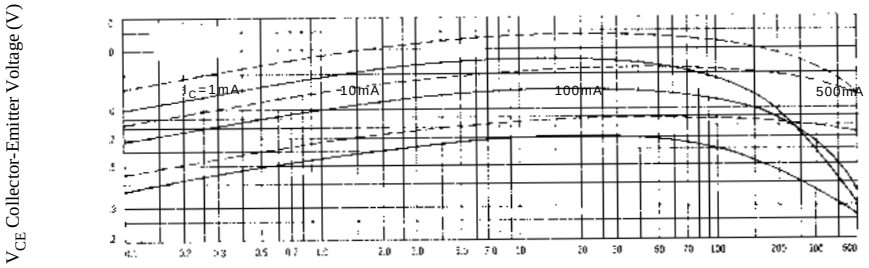
On Voltages



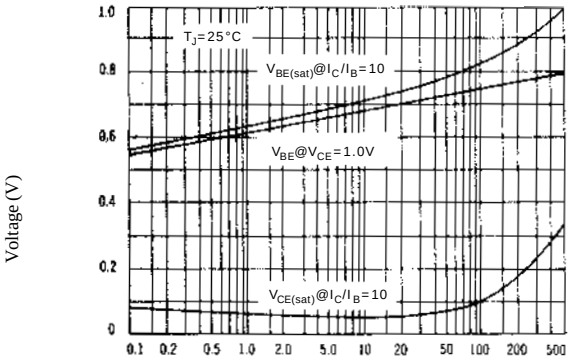
DC Current Gain



Collector Saturation Region



On Voltages



Notes

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Continental Device India Limited
C-120 Naraina Industrial Area, New Delhi 110 028, India.
Telephone + 91-11-2579 6150, 5141 1112 Fax + 91-11-2579 5290, 5141 1119
email@cdil.com www.cdilsemi.com