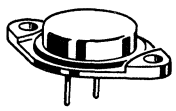
2N3713 thru 2N3716 (SILICON)

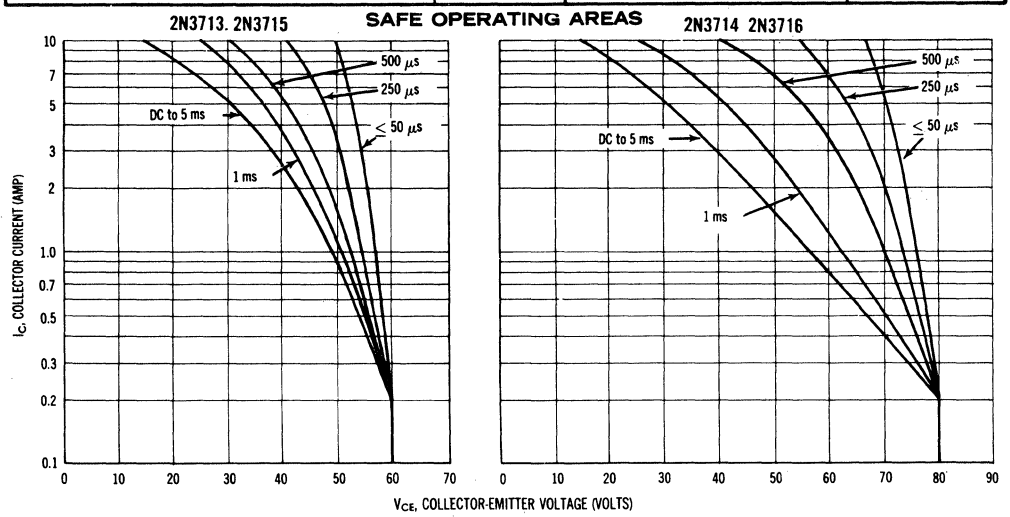


NPN silicon power transistors for medium-speed switching and amplifier applications. Complement to PNP types 2N3789 thru 2N3792.

CASE 11
(TO-3)

MAXIMUM RATINGS

Rating	Symbol	2N3713 2N3715	2N3714 2N3716	Unit
Collector-Base Voltage	V_{CB}	80	100	Volts
Collector-Emitter Voltage	V_{CEO}	60	80	Volts
Emitter-Base Voltage	V_{EB}	7.0	7.0	Volts
Collector Current	I_C	10	10	Amp
Base Current	I_B	4.0	4.0	Amp
Power Dissipation	P_D	150	150	Watts
Thermal Resistance	Θ_{JC}	1.17	1.17	°C/W
Operating Junction and Storage Temperature Range	T_J and T_{stg}	-65 to +200		°C



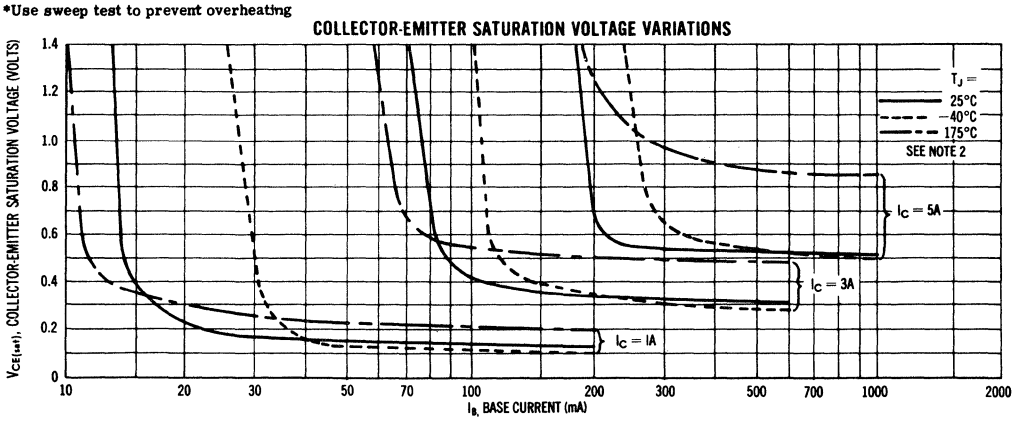
The Safe Operating Area Curves indicate I_C — V_{CE} limits below which the device will not go into secondary breakdown. Collector load lines for specific circuits must fall within the applicable Safe Area to avoid causing a collector-emitter short. (Duty cycle of the excursions make no significant change in these safe areas.) To insure operation below the maximum T_J, the power-temperature derating curve must be observed for both steady state and pulse power conditions.

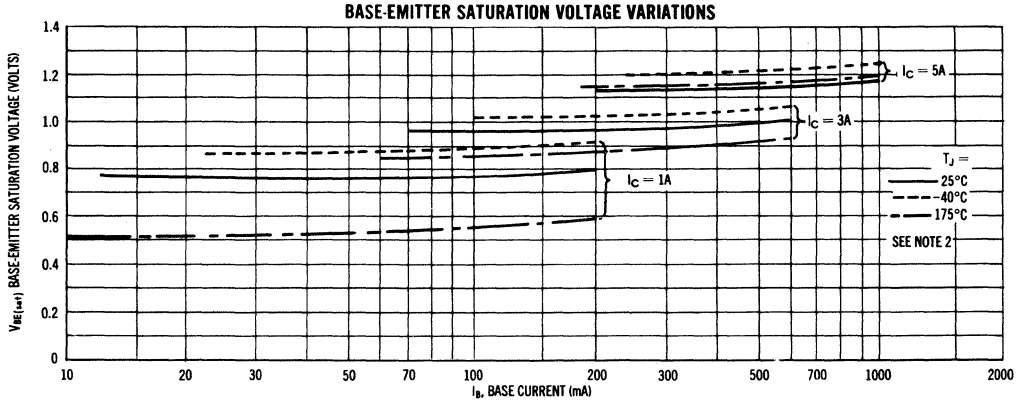
2N3713 thru 2N3716 (continued)

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic	Types	Symbol	Min	Max	Unit
Emitter-Base Cutoff Current (V_{EB} = 7 Vdc)		I_{EBO}	—	5.0	mAdc
Collector-Emitter Cutoff Current		I_{CEX}			mAdc
(V_{CE} = 80 Vdc, V_{BE} = -1.5 Vdc)	2N3713, 2N3715		—	1.0	
(V_{CE} = 100 Vdc, V_{BE} = -1.5 Vdc)	2N3714, 2N3716		—	1.0	
(V_{CE} = 60 Vdc, V_{BE} = -1.5 Vdc, T_C = 150°C)	2N3713, 2N3715		—	10	
(V_{CE} = 80 Vdc, V_{BE} = -1.5 Vdc, T_C = 150°C)	2N3714, 2N3716		—	10	
Collector-Emitter Sustaining Voltage*		$V_{CEO(sus)}$*			Vdc
(I_C = 200 mAdc, I_B = 0)	2N3713, 2N3715		60	—	
	2N3714, 2N3716		80	—	
DC Current Gain*		h_{FE}*			—
(I_C = 1 Adc, V_{CE} = 2 Vdc)	2N3713, 2N3714		25	90	
	2N3715, 2N3716		50	150	
(I_C = 3 Adc, V_{CE} = 2 Vdc)	2N3713, 2N3714		15	—	
	2N3715, 2N3716		30	—	
Collector-Emitter Saturation Voltage*		$V_{CE(sat)}$*			Vdc
(I_C = 5 Adc, I_B = 0.5 Adc)	2N3713, 2N3714		—	1.0	
	2N3715, 2N3716		—	0.8	
Base-Emitter Saturation Voltage*		$V_{BE(sat)}$*			Vdc
(I_C = 5 Adc, I_B = 0.5 Adc)	2N3713, 2N3714		—	2.0	
	2N3715, 2N3716		—	1.5	
Base-Emitter Voltage*		V_{BE}*			Vdc
(I_C = 3 Adc, V_{CE} = 2 Vdc)			—	1.5	
Small Signal Current Gain		h_{fe}			—
(V_{CE} = 10 Vdc, I_C = 0.5 Adc, f = 1 MHz)			4.0	—	
Switching Times			Typ		μs
(I_C = 5A, I_{B1} = I_{B2} = 0.5 A)					
Rise Time		t_r	0.45		
Storage Time		t_s	0.3		
Fall Time		t_f	0.4		

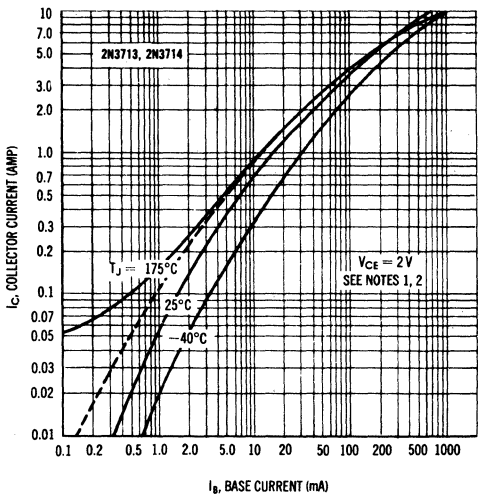
*Use sweep test to prevent overheating

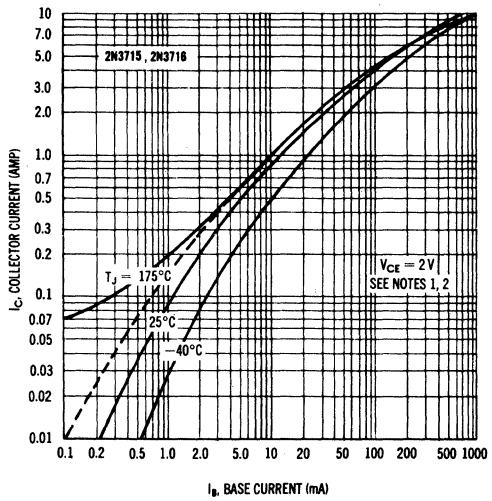




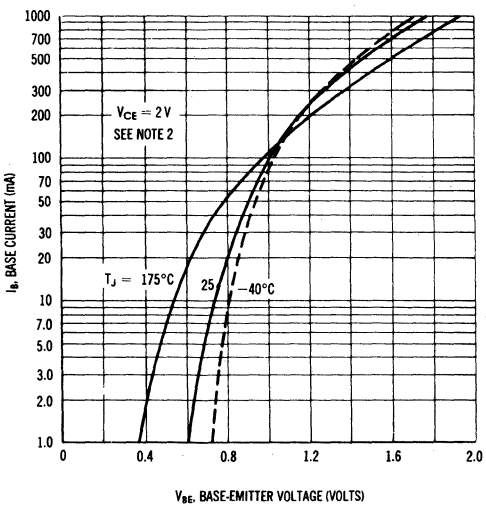
2N3713 thru 2N3716 (continued)

COLLECTOR CURRENT versus BASE CURRENT

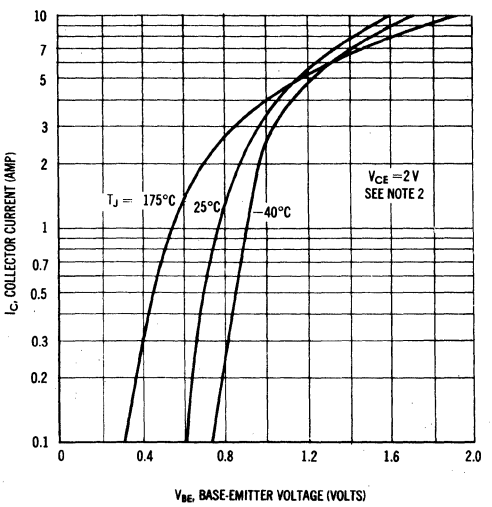




BASE CURRENT-VOLTAGE VARIATIONS

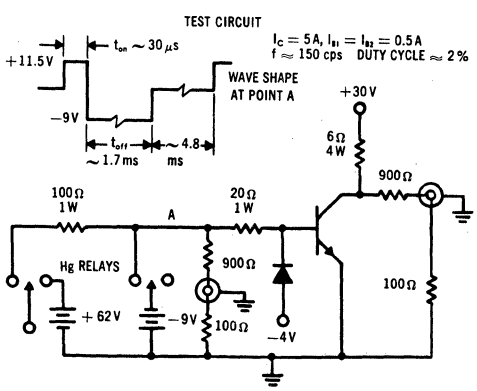


COLLECTOR CURRENT-VOLTAGE VARIATIONS

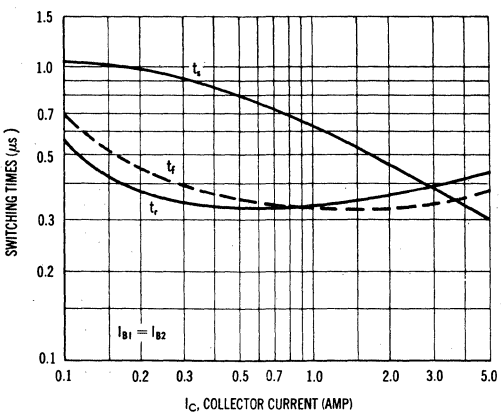


NOTE 1. Dotted line indicates metered base current plus the I_{CBO} of the transistor at 175°C.

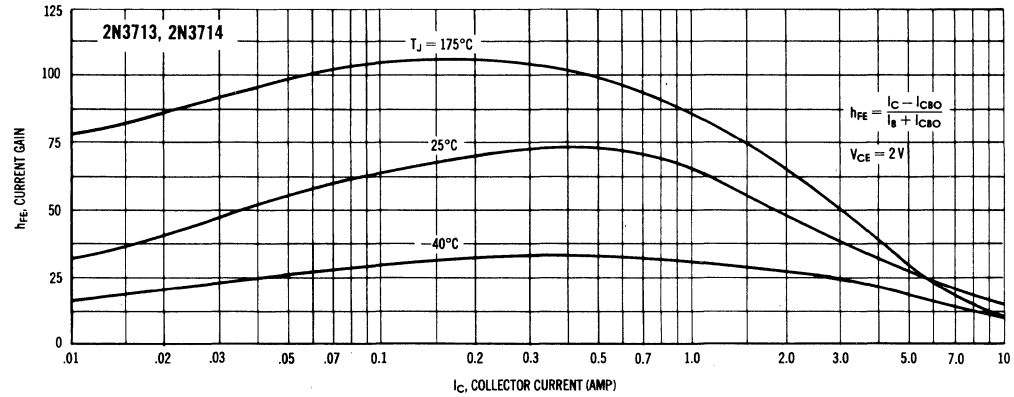
NOTE 2. Pulse test: pulse width ≈ 200 μs, duty cycle ≈ 1.5%

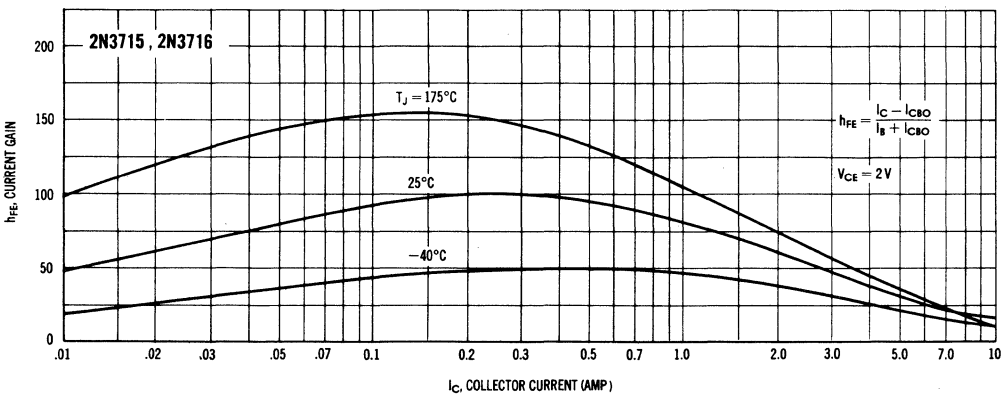


TYPICAL SWITCHING TIMES



CURRENT GAIN VARIATIONS





CURRENT-GAIN—BANDWIDTH PRODUCT versus COLLECTOR CURRENT