DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

2N5685-2N5686

NPN SILICON POWER TRANSISTORS

FEATURES:

- Available as "HR" (high reliability) screened per MIL-PRF-19500, JANTX level. Add "HR" suffix to base part number
- Available Non-RoHS (standard) or RoHS compliant (add PBF suffix)

MAXIMUM RATINGS

Ratings	Symbol	2N5685	2N5686	Unit
Collector-emitter voltage	V_{CEO}	60	80	Vdc
Collector-base voltage	V_{CBO}	60	80	Vdc
Emitter-base voltage	V_{EBO}	5.0		Vdc
Base current	I_B	15		Adc
Collector current	I_C	50		Adc
Total power dissipation @ T_C = 25°C[1] **@ T_C = 100°C**[1]	P_T	300 171		W
Operating & storage junction temperature range	T_J, T_{STG}	-55 to +200		°C
Maximum thermal resistance, junction-to-case	$R_{\theta JC}$	0.0584		°C/W

Note 1: Derate linearly 1.715 W/°C between T_C = 25°C and T_C = 200°C

ELECTRICAL CHARACTERISTICS @ 25°C unless otherwise noted

Characteristics		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector-emitter breakdown voltage (I_C = 100mAdc)	2N5685 2N5686	$V_{(BR)CEO}$	60 80		Vdc
Collector-emitter cutoff current (V_{CE} = 30Vdc) (V_{CE} = 40Vdc)	2N5685 2N5686	I_{CEO}		500 500	µAdc
Collector-emitter cutoff current (V_{CE} = 60Vdc, V_{BE} = 1.5Vdc) (V_{CE} = 80Vdc, V_{BE} = 1.5Vdc)	2N5685 2N5686	I_{CEX}		500 500	µAdc
Collector-base cutoff current (V_{CB} = 60Vdc) (V_{CB} = 80Vdc)	2N5685 2N5686	I_{CBO}		2.0 2.0	mAdc
Emitter-base cutoff current (V_{EB} = 5.0Vdc)		I_{EBO}		1.0	mAdc
ON CHARACTERISTICS[2]					
Forward-current transfer ratio (I_C = 5.0Adc, V_{CE} = 2.0Vdc) (I_C = 25Adc, V_{CE} = 2.0Vdc) (I_C = 50Adc, V_{CE} = 5.0Vdc)		h_{FE}	30 15 5.0	60	
Collector-emitter saturation voltage (I_C = 25Adc, I_B = 2.5Adc) (I_C = 50Adc, I_B = 10Adc)		$V_{CE(sat)}$		1.0 5.0	Vdc
Base-emitter saturation voltage (I_C = 25Adc, I_B = 2.5Adc)		$V_{BE(sat)}$		2.0	Vdc
Base-emitter voltage (I_C = 25Adc, V_{CE} = 2.0Vdc)		$V_{BE(on)}$		2.0	Vdc

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Characteristics	Symbol	Min	Max	Unit
DYNAMIC CHARACTERISTICS				
Magnitude of common emitter small signal short circuit forward current transfer ratio (I_C = 5.0Adc, V_{CE} = 10Vdc, f = 1.0MHz)	$\|h_{fe}\|$	2.0	20	
Small signal short circuit forward current transfer ratio (I_C = 10Adc, V_{CE} = 5.0Vdc, f = 1.0kHz)	h_{fe}	15		
Ouput capacitance (V_{CB} = 10Vdc, I_E = 0, 0.1MHz ≤ f ≤ 1.0MHz)	C_{obo}	-	1200	pF
SWITCHING CHARACTERISTICS				
Turn-on time (V_{CC} = 30Vdc, I_C = 25Adc, I_{B1} = 2.5Adc)	ton	-	1.5	µs
Turn-off time (V_{CC} = 30Vdc, I_C = 25Adc, I_{B1} = -I_{B2} = 2.5Adc)	toff	-	3.0	µs
SAFE OPERATING AREA				
DC Tests (T_C = 25°C, 1 cycle, t = 1.0s)				
Test 1 (V_{CE} = 6.0Vdc, I_C = 50Adc)				
Test 2 (V_{CE} = 30Vdc, I_C = 10Adc)				
Test 3				
(V_{CE} = 50Vdc, I_C = 560mAdc)	2N5685			
(V_{CE} = 60Vdc, I_C = 640mAdc)	2N5686			

Note 2: Pulse width = 300µs, duty cycle≤ 2.0%.

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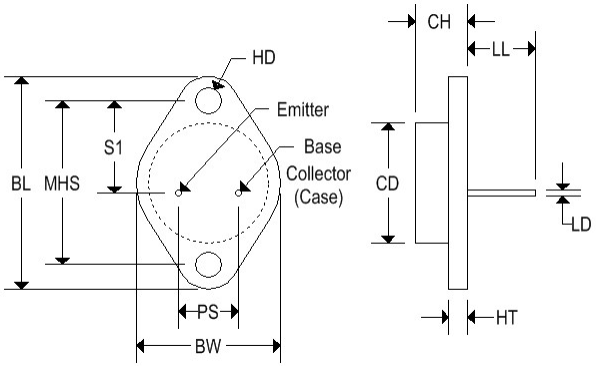
MECHANICAL CHARACTERISTICS

Case	TO-3
Marking	Alpha-numeric
Pin out	See below



	Dimensions			
	TO-3			
	Inches		Millimeters	
	Min	Max	Min	Max
BL	1.526	1.573	38.750	39.960
CD	0.759	0.875	19.280	22.230
CH	0.313	0.365	7.960	9.280
LL	0.440	0.480	11.180	12.190
BW	0.992	1.050	25.200	26.670
LD	0.036	0.043	0.920	1.090
HT	0.054	0.064	1.380	1.620
MHS	1.177	1.197	29.900	30.400
SI	0.655	0.681	16.640	17.300
HD	0.153	0.172	3.880	4.360
PS	0.420	0.440	10.670	11.180

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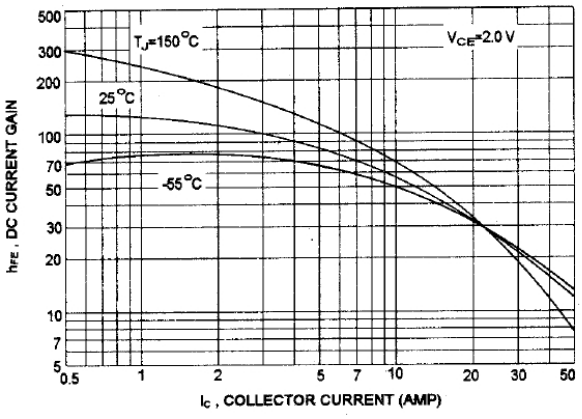
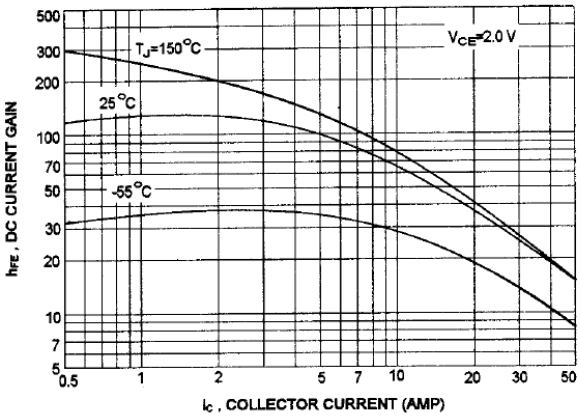
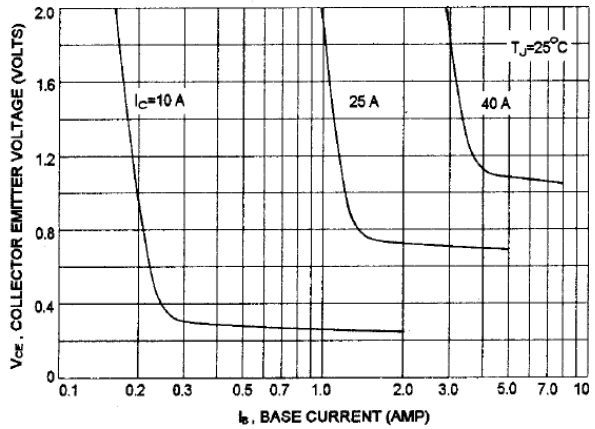


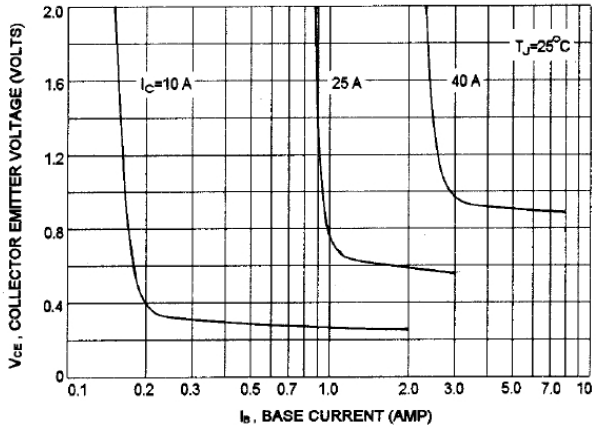
DC CURRENT GAIN



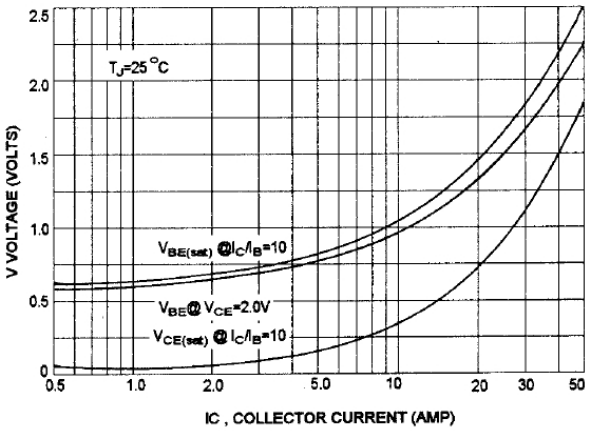
DC CURRENT GAIN



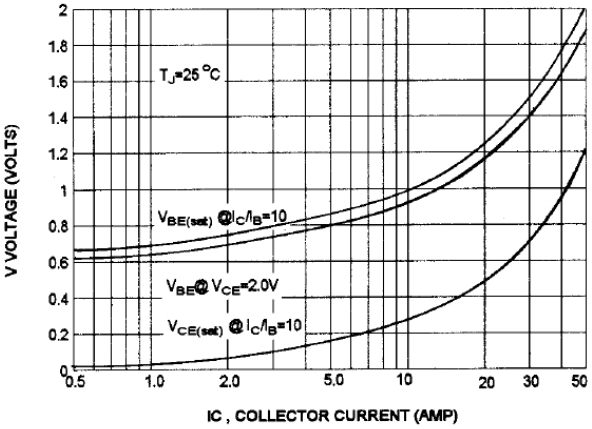
COLLECTOR SATURATION REGION



COLLECTOR SATURATION REGION



"ON" VOLTAGES



"ON" VOLTAGES

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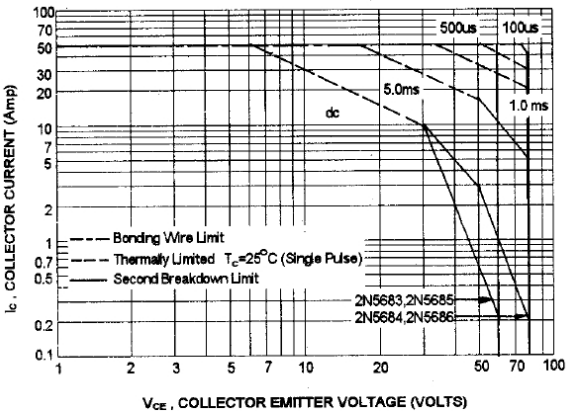
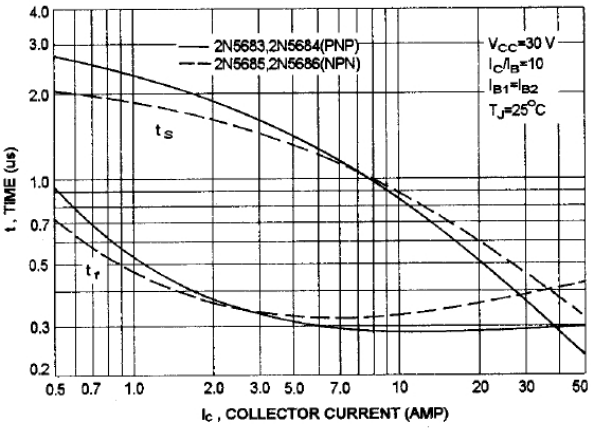
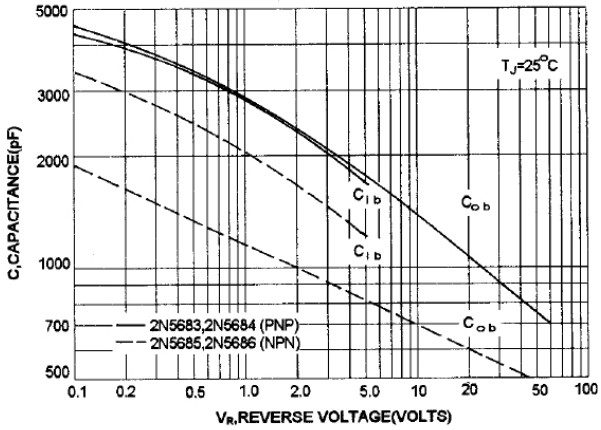


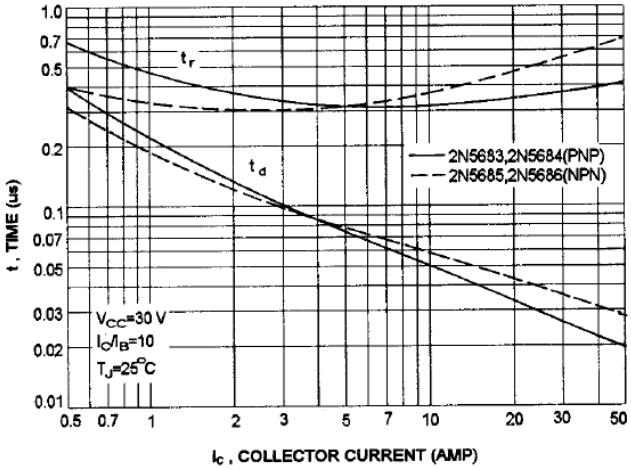
ACTIVE REGION SAFE OPERATING AREA



TURN-OFF TIME



CAPACITANCES



TURN-ON TIME