



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



## NPN POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/464

### DEVICES

**2N5685**

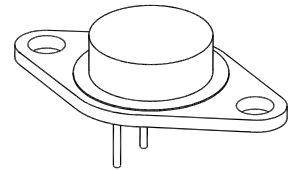
**2N5686**

### LEVELS

**JAN  
 JANTX  
 JANTV**

### ABSOLUTE MAXIMUM RATINGS ( $T_C = +25^\circ\text{C}$ unless otherwise noted)

Parameters / Test Conditions	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	5.0	Vdc
Base Current	$I_B$	15	15	Adc
Collector Current	$I_C$	50	50	Adc
Total Power Dissipation @ $T_C = +25^\circ\text{C}$ <sup>(1)</sup> @ $T_C = +100^\circ\text{C}$ <sup>(1)</sup>	$P_T$	300	300	W
		171	171	W
Operating & Storage Junction Temperature Range	$T_J, T_{stg}$	-55 to +200		$^\circ\text{C}$



**TO-3 (TO-204AE)**

### THERMAL CHARACTERISTICS

Parameters / Test Conditions	Symbol	Max.	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	.0584	$^\circ\text{C}/\text{W}$

### Note:

- Derate linearly 1.715 W/ $^\circ\text{C}$  between  $T_C = 25^\circ\text{C}$  and  $T_C = 200^\circ\text{C}$

### ELECTRICAL CHARACTERISTICS ( $T_A = +25^\circ\text{C}$ , unless otherwise noted)

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
<b>OFF CHARACTERISTICS <sup>(1)</sup></b>				
Collector-Emitter Breakdown Voltage $I_C = 100\text{mA}$	$V_{(BR)CEO}$	60 80		Vdc
Collector-Emitter Cutoff Current $V_{CE} = 30\text{Vdc}$ $V_{CE} = 40\text{Vdc}$	$I_{CEO}$		500 500	$\mu\text{Adc}$
Collector-Emitter Cutoff Current $V_{CE} = 60\text{Vdc}, V_{BE} = 1.5\text{Vdc}$ $V_{CE} = 80\text{Vdc}, V_{BE} = 1.5\text{Vdc}$	$I_{CEX}$		10 10	$\mu\text{Adc}$
Collector-Base Cutoff Current $V_{CE} = 60\text{Vdc}$ $V_{CE} = 80\text{Vdc}$	$I_{CBO}$		2.0 2.0	mAdc
Emitter-Base Cutoff Current $V_{EB} = 5.0\text{Vdc}$	$I_{EBO}$		1.0	mAdc

## ELECTRICAL CHARACTERISTICS ( $T_A = +25^\circ\text{C}$ , unless otherwise noted)

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
<b>ON CHARACTERISTICS <sup>(2)</sup></b>				
Forward-Current Transfer Ratio $I_C = 5.0\text{A dc}$ , $V_{CE} = 2.0\text{V dc}$ $I_C = 25\text{A dc}$ , $V_{CE} = 2.0\text{V dc}$ $I_C = 50\text{A dc}$ , $V_{CE} = 5.0\text{V dc}$	$h_{FE}$	30 15 5.0	60	
Collector-Emitter Saturation Voltage $I_C = 25\text{A dc}$ , $I_B = 2.5\text{A dc}$ $I_C = 50\text{A dc}$ , $I_B = 10\text{A dc}$	$V_{CE(sat)}$		1.0 5.0	Vdc
Base-Emitter Saturation Voltage $I_C = 25\text{A dc}$ , $I_B = 2.5\text{A dc}$	$V_{BE(sat)}$		2.0	Vdc
Base-Emitter Voltage $I_C = 25\text{A dc}$ , $V_{CE} = 2.0\text{A dc}$	$V_{BE(ON)}$		2.0	Vdc

## DYNAMIC CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Magnitude of Common Emitter Small-Signal Short-Circuit, Forward Current Transfer Ratio $I_C = 5.0\text{A dc}$ , $V_{CE} = 10\text{V dc}$ , $f = 1.0\text{MHz}$	$ h_{fe} $	2.0	20	
Small-Signal Short-Circuit Forward Current Transfer Ratio $I_C = 10\text{A dc}$ , $V_{CE} = 5.0\text{V dc}$ , $f = 1.0\text{kHz}$	$h_{fe}$	15		
Output Capacitance $V_{CB} = 10\text{V dc}$ , $I_E = 0$ , $0.1\text{MHz} \leq f \leq 1.0\text{MHz}$	$C_{obo}$		1200	pF

## SWITCHING CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Turn-On Time $V_{CC} = 30\text{V dc}$ ; $I_C = 25\text{A dc}$ ; $I_{B1} = 2.5\text{A dc}$	$t_{on}$		1.5	$\mu\text{s}$
Turn-Off Time $V_{CC} = 30\text{V dc}$ ; $I_C = 25\text{A dc}$ ; $I_{B1} = -I_{B2} = 2.5\text{A dc}$	$t_{off}$		3.0	$\mu\text{s}$

## SAFE OPERATING AREA

### DC Tests

$T_C = +25^\circ\text{C}$ , 1 Cycle,  $t = 1.0\text{s}$

### Test 1

$V_{CE} = 6.0\text{V dc}$ ,  $I_C = 50\text{A dc}$

### Test 2

$V_{CE} = 30\text{V dc}$ ,  $I_C = 10\text{A dc}$

### Test 3

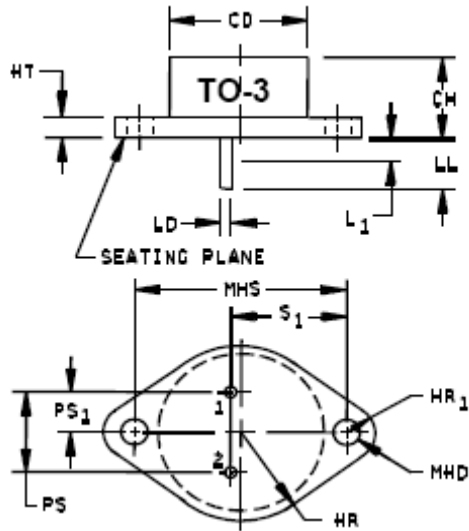
$V_{CE} = 50\text{V dc}$ ,  $I_C = 560\text{mA dc}$                       2N5685

$V_{CE} = 60\text{V dc}$ ,  $I_C = 640\text{mA dc}$                       2N5686

(2) Pulse Test: Pulse Width =  $300\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$



## PACKAGE DIMENSIONS



Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD		.875		22.22	3
CH	.250	.450	6.35	11.43	
HR	.495	.525	12.57	13.34	
HR <sub>1</sub>	.131	.188	3.33	4.78	6
HT	.060	.135	1.52	3.43	
LD	.057	.063	1.45	1.60	4, 5, 9
LL	.312	.500	7.92	12.70	4, 5, 9
L <sub>1</sub>		.050		1.27	5, 9
MHD	.151	.165	3.84	4.19	7
MHS	1.177	1.197	29.90	30.40	
PS	.420	.440	10.67	11.18	
PS <sub>1</sub>	.205	.225	5.21	5.72	5
S <sub>1</sub>	.655	.675	16.64	17.15	

### NOTE:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Body contour is optional within zone defined by CD.
4. These dimensions shall be measured at points .050 inch (1.27 mm) to .055 inch (1.40 mm) below seating plane. When gauge is not used, measurement shall be made at seating plane.
5. Both terminals.
6. At both ends.
7. Two holes.
8. The collector shall be electrically connected to the case.
9. LD applies between L<sub>1</sub> and LL. Lead diameter shall not exceed twice LD within L<sub>1</sub>.
10. In accordance with ASME Y14.5M, diameters are equivalent to  $\phi x$  symbology.
- \* 11. Terminal 1 is emitter; terminal 2 is base; case is collector.

\* **FIGURE 1.** Physical dimensions (TO-3)