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## 2N5685

### Silicon NPN Transistor

### High Power, High Current Switch

### TO-3 Type Package

**Description:**

The 2N5685 is a NPN power transistor a TO-3 type case designed for use in high power amplifier and switching circuit applications.

**Features:**

- High Current Capability:  $I_C = 50A$  (Continuous)
- DC Current Gain:  $h_{FE} = 15$  to  $60$  @  $I_C = 25A_{dc}$
- Low Collector-Emitter Saturation Voltage:  $V_{CE(sat)} = 1V$  Max @  $I_C = 25A_{dc}$

**Absolute Maximum Ratings:**

Collector-Emitter Voltage, $V_{CEO}$ .....	60V
Collector-Base Voltage, $V_{CB}$ .....	60V
Emitter-Base Voltage, $V_{EB}$ .....	5V
Continuous Collector Current, $I_C$ .....	50A
Base Current, $I_B$ .....	15A
Total Device Dissipation ( $T_C = +25^\circ C$ ), $P_D$ .....	300W
Derate Above $25^\circ C$ .....	1.715W/ $^\circ C$
Operating Junction Temperature Range, $T_J$ .....	$-65^\circ$ to $+200^\circ C$
Storage Temperature Range, $T_{stg}$ .....	$-65^\circ$ to $+200^\circ C$
Thermal Resistance, Junction-to-Case, $R_{thJC}$ .....	0.584 $^\circ C/W$

**Electrical Characteristics:** ( $T_C = +25^\circ C$  unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>OFF Characteristics</b>						
Collector-Emitter Sustaining Voltage	$V_{CEO(sus)}$	$I_C = 0.2A, I_B = 0,$	60	-	-	V
Collector Cutoff Current	$I_{CEO}$	$V_{CE} = 30V, I_B = 0$	-	-	1	mA
		$V_{CE} = 60V, V_{EB(off)} = 1.5V$	-	-	2	mA
	$V_{CE} = 60V, V_{EB(off)} = 1.5V, T_C = +150^\circ C$	-	-	10	mA	
	$I_{CBO}$	$V_{CB} = 60V, I_E = 0$	-	-	2	mA
Emitter Cutoff Current	$I_{EBO}$	$V_{BE} = 5V, I_C = 0$	-	-	5	mA

**Electrical Characteristics (Cont'd):** ( $T_C = +25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>ON Characteristics</b>						
DC Current Gain	$h_{FE}$	$I_C = 25\text{A}, V_{CE} = 2\text{V}, \text{Note 1}$	15	-	60	
		$I_C = 50\text{A}, V_{CE} = 5\text{V}, \text{Note 1}$	5	-	-	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 25\text{A}, I_B = 2.5\text{A}, \text{Note 1}$	-	-	1	V
		$I_C = 50\text{A}, I_B = 10\text{A}, \text{Note 1}$	-	-	5	V
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = 25\text{A}, I_B = 2.5\text{A}$	-	-	2	V
Base-Emitter ON Voltage	$V_{BE(on)}$	$I_C = 25\text{A}, V_{CE} = 2\text{V}$	-	-	2	V
<b>Dynamic Characteristics</b>						
Current Gain-Bandwidth Product	$f_T$	$I_C = 5\text{A}, V_{CE} = 10\text{V}, f = 1\text{MHz}$	2	-	-	MHz
Output Capacitance	$C_{ob}$	$V_{CB} = 10\text{V}, I_E = 0, f = 0.1\text{MHz}$	-	-	2000	pF
Small-Signal Current Gain	$h_{fe}$	$I_C = 10\text{A}, V_{CE} = 5\text{V}, f = 1\text{kHz}$	15	-	-	

Note 1. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

