

# Bipolar Transistor

20 V, 5 A, Low  $V_{CE(sat)}$ ,  
 NPN Single TP/TP-FA

## 2SD1805

### Features

- Low Saturation Voltage
- Large Current Capacity
- Fast Switching Time
- Small and Slim Package Making it Easy to Make 2SD1805–Applied Sets Smaller
- This is a Pb–Free Device

### Applications

- Strobes
- Voltage Regulators
- Relay Drivers
- Lamp Drivers

### Specifications

#### ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

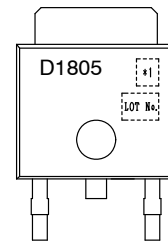
Symbol	Rating	Value	Unit
$V_{CBO}$	Collector–to–Base Voltage	60	V
$V_{CEO}$	Collector–to–Emitter Voltage	20	V
$V_{EBO}$	Emitter–to–Base Voltage	6	V
$I_C$	Collector Current	5	A
$I_{CP}$	Collector Current (Pulse)	8	A
$P_C$	Collector Dissipation	1	W
	Collector Dissipation	$T_C = 25^\circ\text{C}$	15
$T_j$	Junction Temperature	150	°C
$T_{stg}$	Storage Temperature	–55 to +150	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

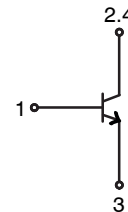


DPAK / TP-FA  
 CASE 369AH

### MARKING DIAGRAM



### ELECTRICAL CONNECTION



### ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

## 2SD1805

### ELECTRICAL CHARACTERISTICS (Ta = 25°C)

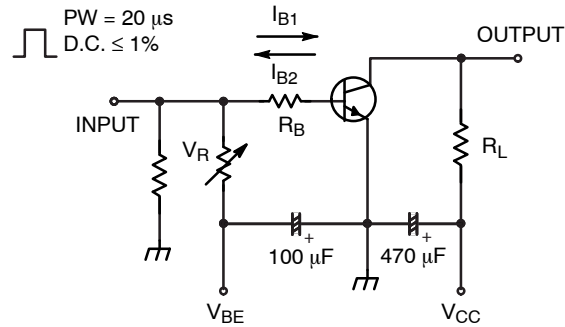
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Collector Cutoff Current	$I_{CBO}$	$V_{CB} = 50 \text{ V}, I_E = 0 \text{ A}$	-	-	100	nA
Emitter Cutoff Current	$I_{EBO}$	$V_{EB} = 5 \text{ V}, I_C = 0 \text{ A}$	-	-	100	nA
DC Current Gain	$h_{FE1}$	$V_{CE} = 2 \text{ V}, I_C = 500 \text{ mA}$	120*	-	560*	
	$h_{FE2}$	$V_{CE} = 2 \text{ V}, I_C = 3 \text{ A}$	95	-	-	
Gain-Bandwidth Product	$f_T$	$V_{CE} = 10 \text{ V}, I_C = 50 \text{ mA}$	-	120	-	MHz
Output Capacitance	$C_{ob}$	$V_{CB} = 10 \text{ V}, f = 1 \text{ MHz}$	-	45	-	pF
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 3 \text{ A}, I_B = 60 \text{ mA}$	-	220	500	mV
Base-to-Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = 3 \text{ A}, I_B = 60 \text{ mA}$	-	-	1.5	V
Collector-to-Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C = 10 \mu\text{A}, I_E = 0 \text{ A}$	60	-	-	V
Collector-to-Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C = 1 \text{ mA}, R_{BE} = \infty$	20	-	-	V
Emitter-to-Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E = 10 \mu\text{A}, I_C = 0 \text{ A}$	6	-	-	V
Turn-On Time	$t_{on}$	See specified Test Circuit		30	-	ns
Storage Time	$t_{stg}$			300	-	ns
Fall Time	$t_f$			40	-	ns

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

\* The 2SD1805 is classified by 500 mA  $h_{FE}$  as follows.

Rank	E	F	G
$h_{FE}$	120 to 200	160 to 320	280 to 560

### Switching Time Test Circuit



$$I_C = 10I_{B1} = -10I_{B2} = 2 \text{ A}, V_{CC} = 10 \text{ V}$$

**Figure 1. Test Circuit**

TYPICAL CHARACTERISTICS

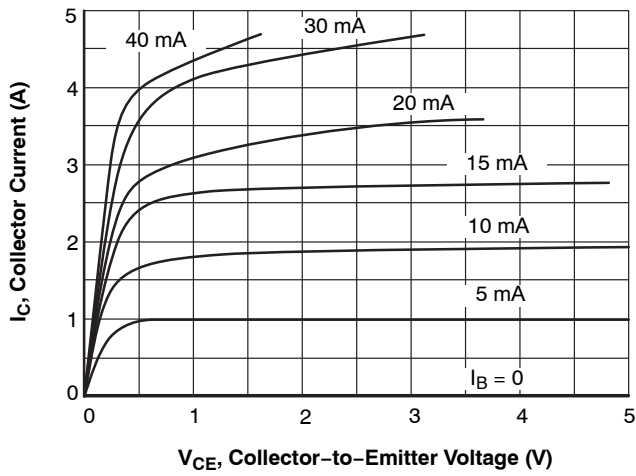


Figure 2.  $I_C - V_{CE}$

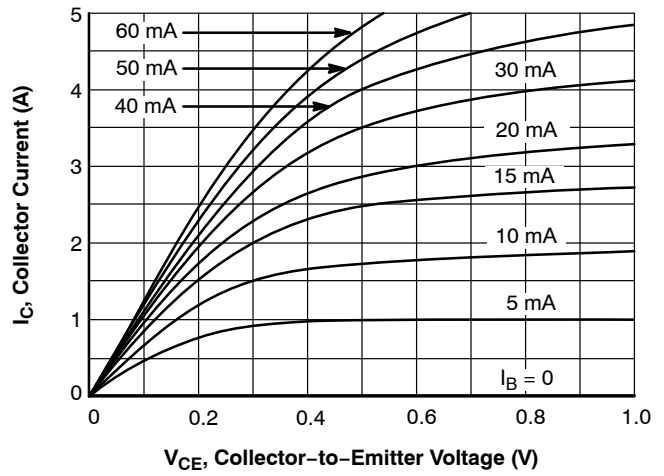


Figure 3.  $I_C - V_{CE}$

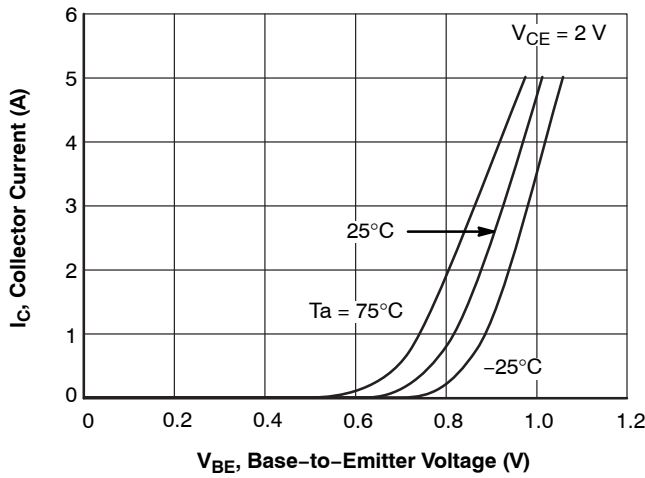


Figure 4.  $I_C - V_{BE}$

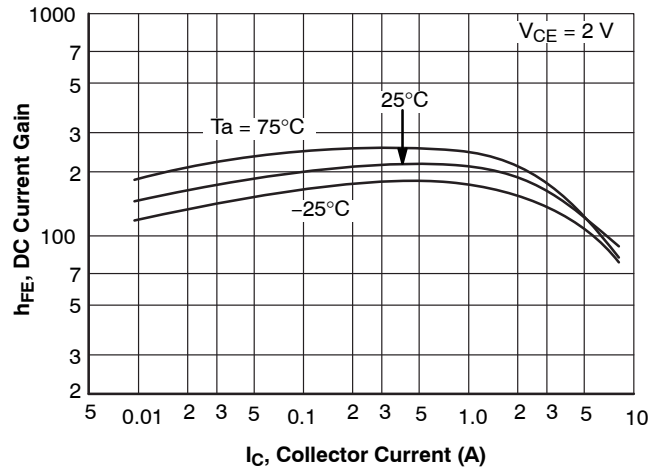


Figure 5.  $h_{FE} - I_C$

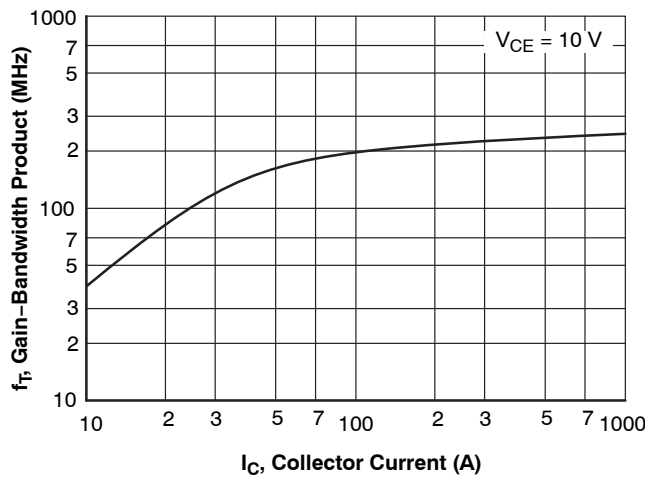


Figure 6.  $f_T - I_C$

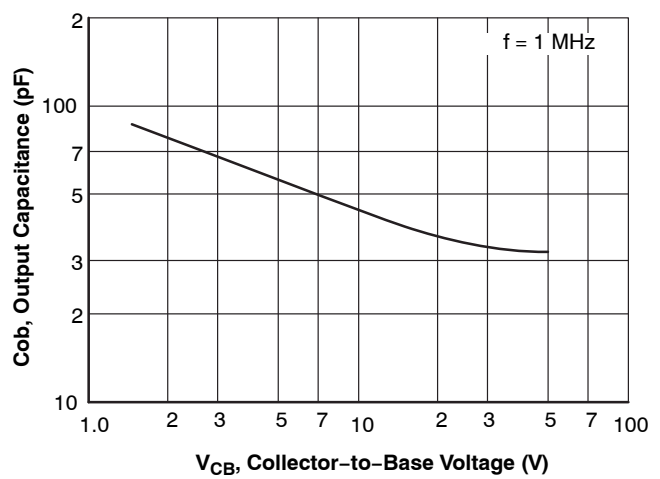
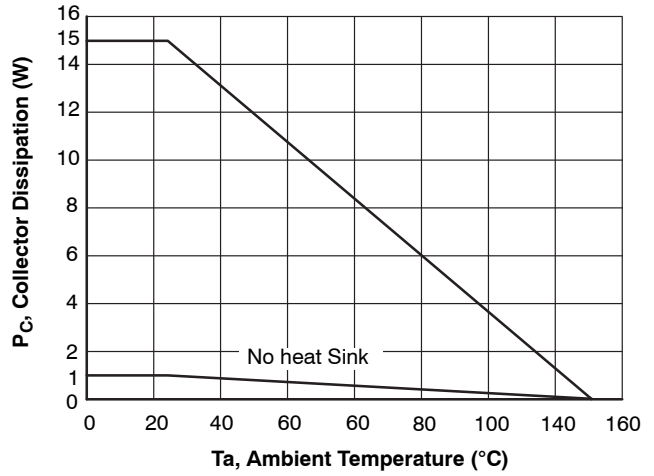
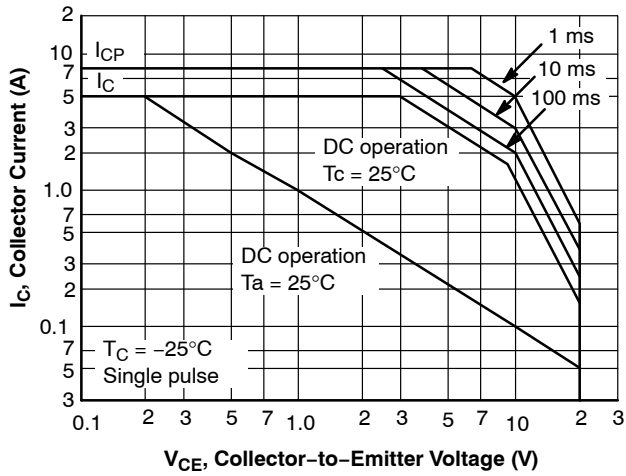
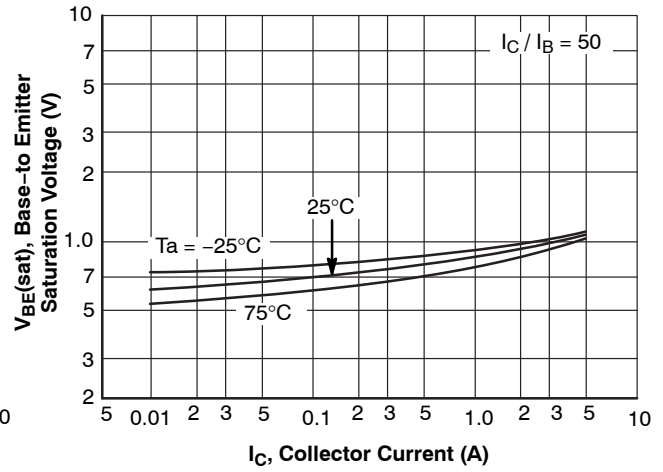
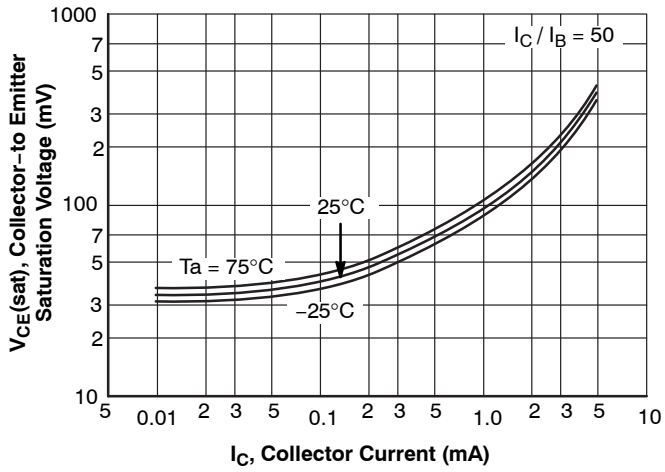


Figure 7.  $C_{ob} - V_{CB}$

TYPICAL CHARACTERISTICS (continued)



## 2SD1805

### ORDERING INFORMATION

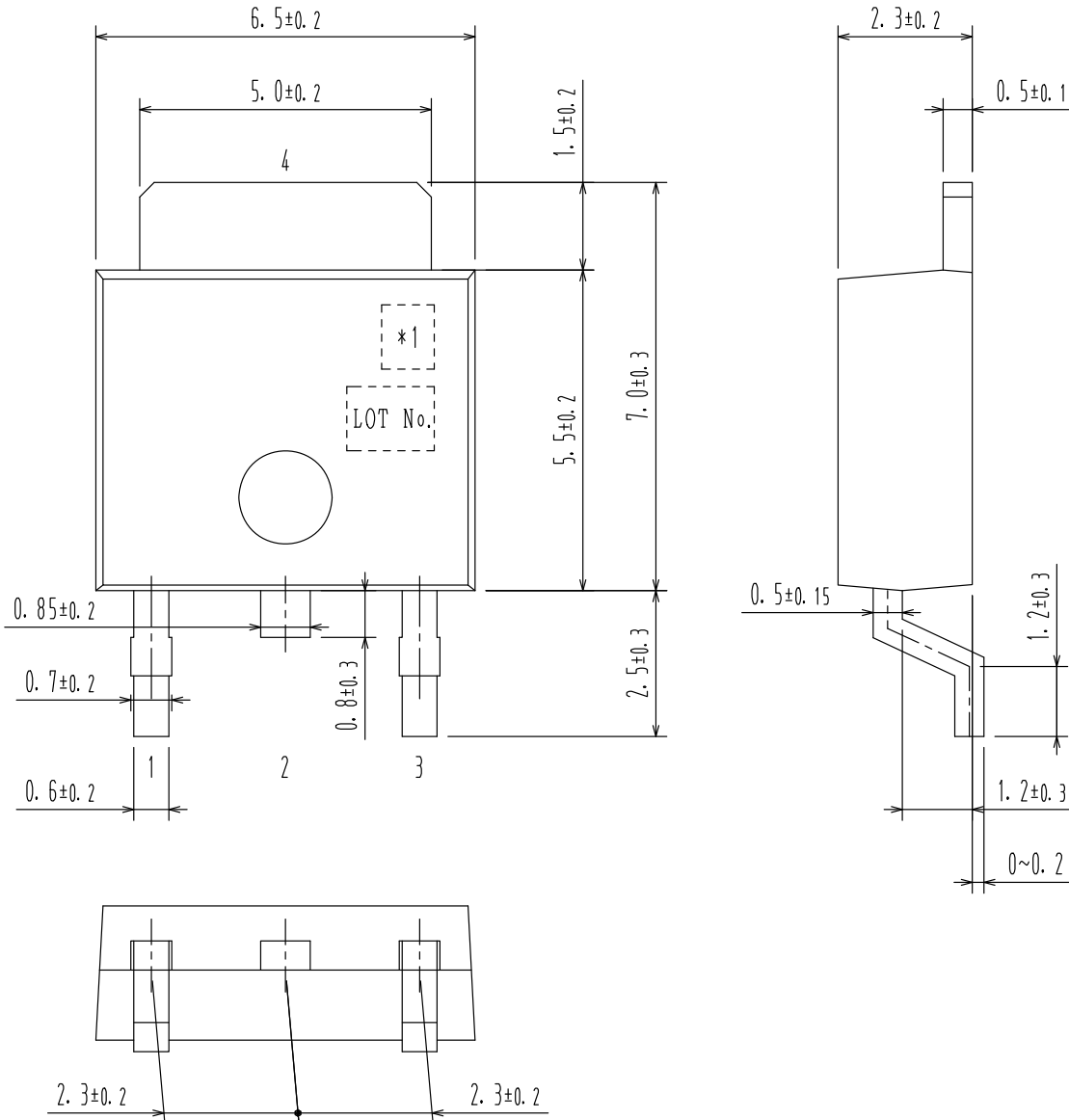
Device Order Number	Package Type	Shipping†
2SD1805F-TL-E	DPAK / TP-FA (Pb-Free)	700 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, [BRD8011/D](#).

**MECHANICAL CASE OUTLINE**  
**PACKAGE DIMENSIONS**

**DPAK / TP-FA**  
**CASE 369AH**  
**ISSUE O**

DATE 30 JAN 2012



Pin 2 is idle pin with electrical designation only carried.

- 1:
- 2:
- 3:
- \*1: Lot indication 4:

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