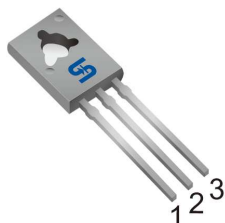


# TS13005CK/RCK

## High Voltage NPN Transistor

TO-126



Pin Definition:

**TS13005CK**

1. Base
2. Collector
3. Emitter

**TS13005RCK**

1. Emitter
2. Collector
3. Base

### PRODUCT SUMMARY

$BV_{CEO}$	400V
$BV_{CBO}$	700V
$I_C$	3A
$V_{CE(SAT)}$	0.17V @ $I_C=1A, I_B=0.2A$

### Features

- Low spread of dynamic parameters
- High switching speed
- Low base drive requirement

### Application

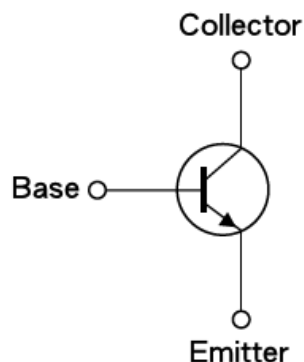
- Ballast Lighting
- Charger

### Ordering Information

Part No.	Package	Packing
TS13005CK C0G	TO-126	50pcs / Tube
TS13005RCK C0G	TO-126	50pcs / Tube

**Note:** "G" denotes for Halogen- and Antimony-free as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds

### Block Diagram



### Absolute Maximum Ratings ( $T_A=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Collector-Base Voltage	$V_{CBO}$	700	V
Collector-Emitter Voltage @ $V_{BE}=0V$	$V_{CES}$	700	V
Collector-Emitter Voltage	$V_{CEO}$	400	V
Emitter-Base Voltage	$V_{EBO}$	9	V
Collector Current	$I_C$	3	A
Collector Peak Current (tp <5ms)	$I_{CM}$	6	A
Base Current	$I_B$	1.5	A
Base Peak Current (tp <5ms)	$I_{BM}$	3	A
Power Total Dissipation @ $T_C=25^{\circ}C$	$P_{DTOT}$	20	W
Maximum Operating Junction Temperature	$T_J$	+150	$^{\circ}C$
Storage Temperature Range	$T_{STG}$	-55 to +150	$^{\circ}C$

### Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance - Junction to Case	$R_{\theta JC}$	6.25	$^{\circ}C/W$

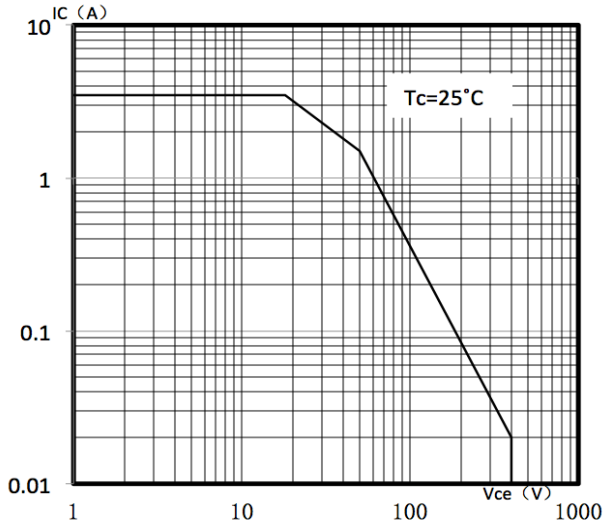
### Electrical Specifications (T<sub>A</sub>=25°C unless otherwise noted)

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
<b>Static</b>						
Collector-Base Voltage	I <sub>C</sub> = 1mA, I <sub>B</sub> = 0	BV <sub>CBO</sub>	700	--	--	V
Collector-Emitter Breakdown Voltage	I <sub>C</sub> = 10mA, I <sub>E</sub> = 0	BV <sub>CEO</sub>	400	--	--	V
Emitter-Base Breakdown Voltage	I <sub>E</sub> = 1mA, I <sub>C</sub> = 0	BV <sub>EBO</sub>	9	--	--	V
Collector Cutoff Current	V <sub>CB</sub> = 700V, I <sub>E</sub> = 0	I <sub>CBO</sub>	--	--	10	μA
Collector Cutoff Current	V <sub>CE</sub> = 400V, I <sub>B</sub> = 0	I <sub>CEO</sub>	--	--	10	μA
Emitter Cutoff Current	V <sub>EB</sub> = 7V, I <sub>C</sub> = 0	I <sub>EBO</sub>	--	--	10	μA
Collector-Emitter Saturation Voltage	I <sub>C</sub> = 0.4A, I <sub>B</sub> = 0.1A	V <sub>CE(SAT)1</sub>	--	0.10	0.7	V
	I <sub>C</sub> = 1A, I <sub>B</sub> = 0.2A	V <sub>CE(SAT)2</sub>	--	0.17	1.0	
	I <sub>C</sub> = 2.5A, I <sub>B</sub> = 0.5A	V <sub>CE(SAT)3</sub>	--	0.55	1.5	
Base-Emitter Saturation Voltage	I <sub>C</sub> = 1A, I <sub>B</sub> = 0.2A	V <sub>BE(SAT)1</sub>	--	--	1.1	V
	I <sub>C</sub> = 2A, I <sub>B</sub> = 0.5A	V <sub>BE(SAT)2</sub>	--	--	1.2	
DC Current Gain	V <sub>CE</sub> = 5V, I <sub>C</sub> = 10mA	h <sub>FE</sub>	10	--	--	
	V <sub>CE</sub> = 5V, I <sub>C</sub> = 1A		15	--	30	
	V <sub>CE</sub> = 5V, I <sub>C</sub> = 2A		5	--	--	
	V <sub>CE</sub> = 2V, I <sub>C</sub> = 0.425A		24	--	--	
Forward Voltage Drop	I <sub>F</sub> = 2A	V <sub>F</sub>	--	--	2.0	V
Turn On Time	V <sub>CC</sub> = 250V, I <sub>C</sub> = 1A,	t <sub>ON</sub>	--	0.2	0.6	μs
Storage Time	I <sub>B1</sub> = I <sub>B2</sub> = 0.2A, t <sub>p</sub> = 25μs	t <sub>STG</sub>	--	2.7	4.5	μs
Fall Time	Duty Cycle < 1%	t <sub>f</sub>	--	0.16	0.3	μs

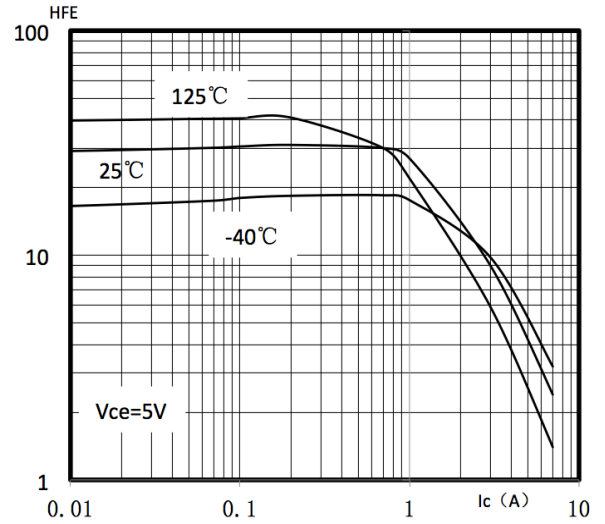
Notes: Pulsed duration ≤ 380μs, duty cycle ≤ 2%

### Electrical Characteristics Curves

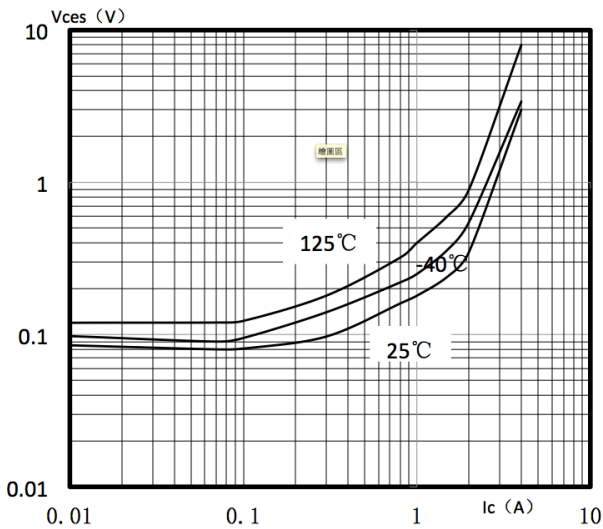
**Figure 1. Safe Operation Area**



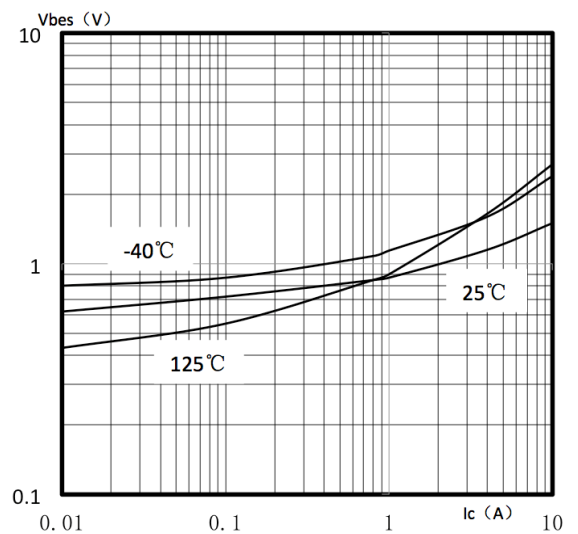
**Figure 2. DC Current Gain**



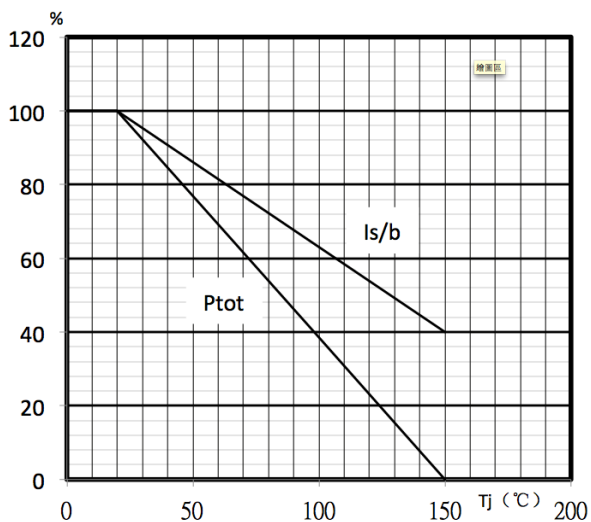
**Figure 3. Vce(sat) vs. IC**



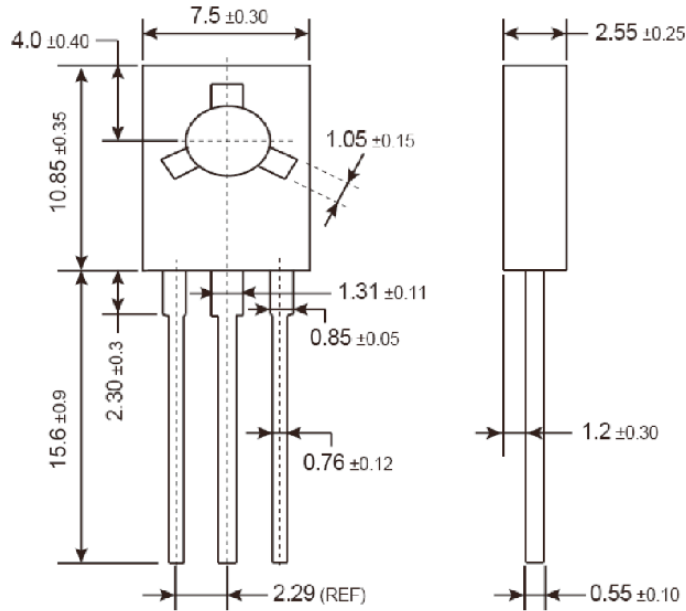
**Figure 4. Vbe(sat) vs. IC**



**Figure 5. Power Derating**



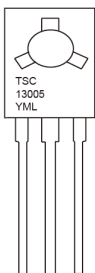
## TO-18 Mechanical Drawing



Unit: Millimeters

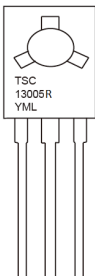
## Marking Diagram

TS13005CK



- Y** = Year Code
- M** = Month Code for Halogen Free Product  
(**O**=Jan, **P**=Feb, **Q**=Mar, **R**=Apr, **S**=May, **T**=Jun, **U**=Jul, **V**=Aug, **W**=Sep, **X**=Oct, **Y**=Nov, **Z**=Dec)
- L** = Lot Code

TS13005RCK



# TS13005CK/RCK

## High Voltage NPN Transistor

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