TAIWAN SEMICONDUCTOR

RoHS COMPLIANCE

TS13009

High Voltage NPN Transistor

TO-220

Pin Definition:
1. Base
2. Collector
3. Emitter

PRODUCT SUMMARY

BV_{CEO}	400V
BV_{CBO}	700V
I_C	12A
$V_{CE(SAT)}$	1.5V @ I_C / I_B = 12A / 3A

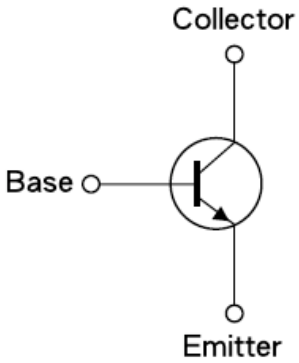
Features

- High Voltage
- High Speed Switching

Structure

- Silicon Triple Diffused Type
- NPN Silicon Transistor

Block Diagram



Ordering Information

Part No.	Package	Packing
TS13009CZ C0	TO-220	50pcs / Tube

Absolute Maximum Rating (Ta = 25°C unless otherwise noted)

Parameter		Symbol	Limit	Unit
Collector-Base Voltage		V_{CBO}	700V	V
Collector-Emitter Voltage		V_{CEO}	400V	V
Emitter-Base Voltage		V_{EBO}	9	V
Collector Current	DC	I_C	12	A
	Pulse		24	
Base Current	DC	I_B	6	A
	Pulse		12	
Total Power Dissipation		P_D	100	W
Operating Junction Temperature		T_J	+150	°C
Operating Junction and Storage Temperature Range		T_{STG}	- 55 to +150	°C

Note: Single Pulse. P_W = 300uS, Duty ≤2%

TS13009

High Voltage NPN Transistor

Electrical Specifications (Ta = 25°C unless otherwise noted)

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Collector-Base Voltage	I_C =1mA, I_B =0	BV_{CBO}	700	--	--	V
Collector-Emitter Breakdown Voltage	I_C =10mA, I_E =0	BV_{CEO}	400	--	--	V
Emitter-Base Breakdown Voltage	I_E =1mA, I_C =0	BV_{EBO}	9	--	--	V
Collector Cutoff Current	V_{CE} =400V, I_B=0	I_{CEO}	--	--	1	mA
Collector Cutoff Current	V_{CB} =700V, I_E =0	I_{CBO}	--	--	1	mA
Emitter Cutoff Current	V_{EB} = 9V, I_C =0	I_{EBO}	--	--	1	mA
Collector-Emitter Saturation Voltage	I_C=5A, I_B =1A I_C=8A, I_B =1.6A I_C=12A, I_B =3A	$V_{CE(SAT)1}$ $V_{CE(SAT)2}$ $V_{CE(SAT)3}$	-- -- --	-- -- --	1 1.5 3	V
Base-Emitter Saturation Voltage	I_C=5A, I_B =1A I_C=8A, I_B =1.6A	$V_{BE(SAT)1}$ $V_{BE(SAT)2}$	-- --	-- --	1.2 1.6	V
DC Current Gain	V_{CE} =5V, I_C = 5A V_{CE} =5V, I_C = 8A	h_{FE}	8 6	-- --	40 30	
Dynamic						
Frequency	V_{CE} =10V, I_C =0.5A	f_T	4	--	--	MHz
Output Capacitance	V_{CB} =10V, f =0.1MHz	Cob	--	180	--	pF
Resistive Load Switching Time (Ratings)						
Delay Time	V_{CC} =125V, I_C =8A, I_{B1} =I_{B2}=1.6A, t_P =25uS Duty Cycle ≤1%	t_d	--	0.06	0.1	uS
Rise Time		t_r		0.45	1	uS
Storage Time		t_{STG}	--	2.8	3.3	uS
Fall Time		t_f	--	0.3	0.5	uS

Note: pulse test: pulse width ≤300uS, duty cycle ≤2%

TS13009
High Voltage NPN Transistor

Electrical Characteristics Curve (Ta = 25°C, unless otherwise noted)

Figure 1. Static Characteristics

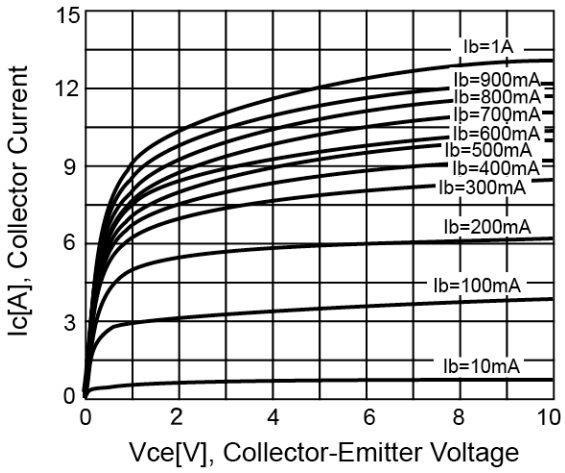


Figure 2. DC Current Gain

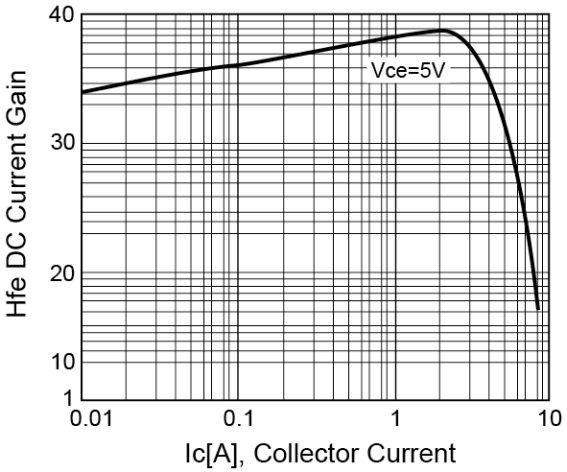


Figure 3. $V_{CE(SAT)}$ v.s. $V_{BE(SAT}$

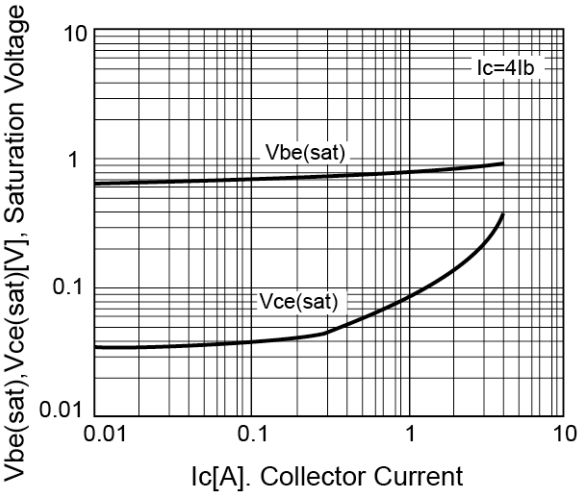
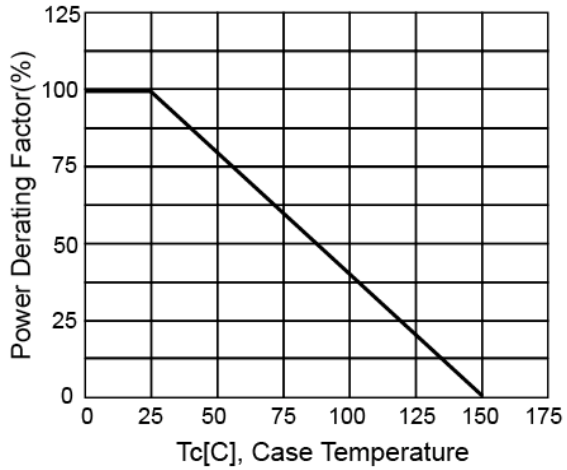


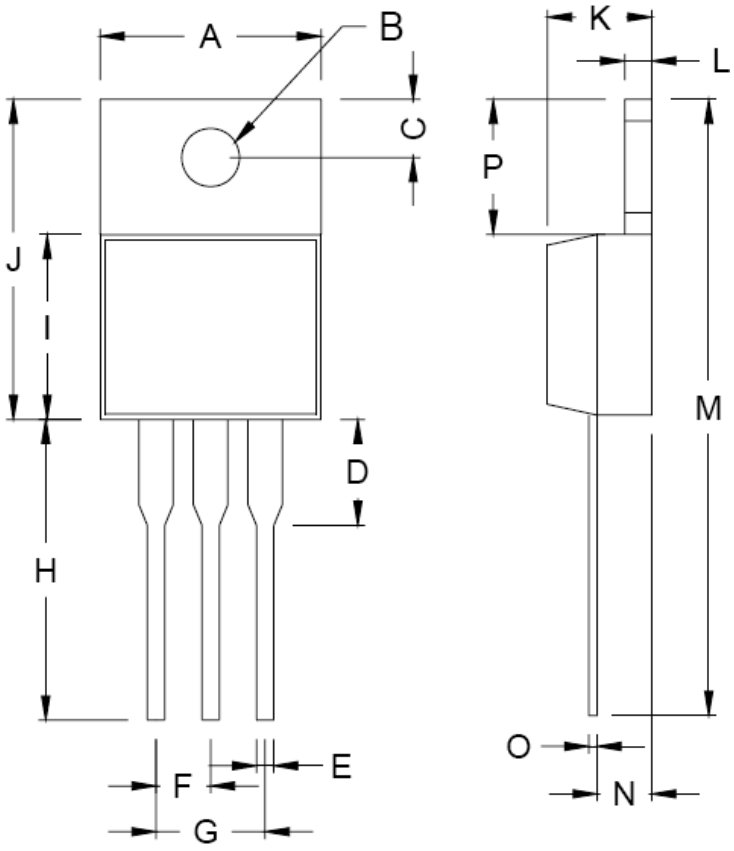
Figure 4. Power Derating



TS13009

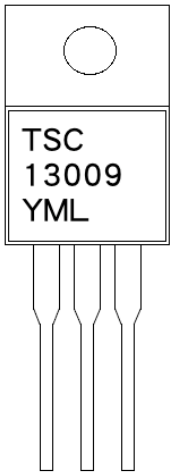
High Voltage NPN Transistor

TO-220 Mechanical Drawing



TO-220 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	10.000	10.500	0.394	0.413
B	3.740	3.910	0.147	0.154
C	2.440	2.940	0.096	0.116
D	-	6.350	-	0.250
E	0.381	1.106	0.015	0.040
F	2.345	2.715	0.092	0.058
G	4.690	5.430	0.092	0.107
H	12.700	14.732	0.500	0.581
J	14.224	16.510	0.560	0.650
K	3.556	4.826	0.140	0.190
L	0.508	1.397	0.020	0.055
M	27.700	29.620	1.060	1.230
N	2.032	2.921	0.080	0.115
O	0.255	0.610	0.010	0.024
P	5.842	6.858	0.230	0.270

Marking Diagram



Y = Year Code
M = Month Code
(**A**=Jan, **B**=Feb, **C**=Mar, **D**=Apl, **E**=May, **F**=Jun, **G**=Jul, **H**=Aug, **I**=Sep, **J**=Oct, **K**=Nov, **L**=Dec)
L = Lot Code

Notice

Specifications of the products displayed herein are subject to change without notice. TSC or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, to any intellectual property rights is granted by this document. Except as provided in TSC's terms and conditions of sale for such products, TSC assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of TSC products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify TSC for any damages resulting from such improper use or sale.