

TO-220



ITO-220



Pin Definition:

1. Base
2. Collector
3. Emitter

PRODUCT SUMMARY

BV_{CEO}	400V
BV_{CBO}	700V
I_C	4A
$V_{CE(SAT)}$	1V @ $I_C / I_B = 4A / 1A$

Features

- High Voltage
- High Speed Switching

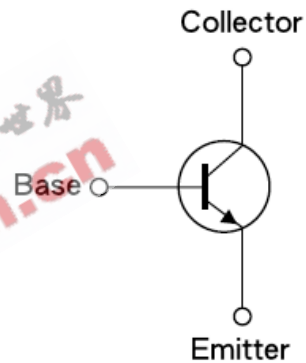
Structure

- Silicon Triple Diffused Type
- NPN Silicon Transistor

Ordering Information

Part No.	Package	Packing
TS13005CZ C0	TO-220	50pcs / Tube
TS13005CI C0	ITO-220	50pcs / Tube

Block Diagram



Absolute Maximum Rating ($T_a = 25^{\circ}C$ 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	4	A
	Pulse	8	
Base Current	DC	2	A
	Pulse	4	
Total Power Dissipation	TO-220	75	W
	ITO-220	30	
Operating Junction Temperature	T_J	+150	$^{\circ}C$
Operating Junction and Storage Temperature Range	T_{STG}	- 55 to +150	$^{\circ}C$

Note: Single Pulse. $P_w = 300\mu S$, Duty $\leq 2\%$

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

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Collector-Base Voltage	$I_C = 1\text{mA}, I_B = 0$	BV_{CBO}	700	--	--	V
Collector-Emitter Breakdown Voltage	$I_C = 10\text{mA}, I_E = 0$	BV_{CEO}	400	--	--	V
Emitter-Base Breakdown Voltage	$I_E = 0.1\text{mA}, I_C = 0$	BV_{EBO}	9	--	--	V
Collector Cutoff Current	$V_{CE} = 400\text{V}, I_B = 0$	I_{CEO}	--	--	250	uA
Collector Cutoff Current	$V_{CB} = 700\text{V}, I_E = 0$	I_{CBO}	--	--	1	mA
Emitter Cutoff Current	$V_{EB} = 9\text{V}, I_C = 0$	I_{EBO}	--	--	1	mA
Collector-Emitter Saturation Voltage	$I_C = 1\text{A}, I_B = 0.2\text{A}$	$V_{CE(SAT)1}$	--	--	0.5	V
	$I_C = 2\text{A}, I_B = 0.5\text{A}$	$V_{CE(SAT)2}$	--	--	0.6	
	$I_C = 4\text{A}, I_B = 1\text{A}$	$V_{CE(SAT)3}$	--	--	1	
Base-Emitter Saturation Voltage	$I_C = 1\text{A}, I_B = 0.2\text{A}$	$V_{BE(SAT)1}$	--	--	1.2	V
	$I_C = 2\text{A}, I_B = 0.5\text{A}$	$V_{BE(SAT)2}$	--	--	1.6	
DC Current Gain	$V_{CE} = 5\text{V}, I_C = 1\text{A}$	h_{FE}	15	--	32	
	$V_{CE} = 5\text{V}, I_C = 2\text{A}$		8	--	40	
Dynamic						
Frequency	$V_{CE} = 10\text{V}, I_C = 0.5\text{A}$	f_T	4	--	--	MHz
Output Capacitance	$V_{CB} = 10\text{V}, f = 0.1\text{MHz}$	C_{ob}	--	65	--	pF
Resistive Load						
Turn On Time	$V_{CC} = 125\text{V}, I_C = 2\text{A},$ $I_{B1} = I_{B2} = 0.4\text{A}, t_P = 25\mu\text{s}$ Duty Cycle $\leq 1\%$	t_{ON}	--	0.3	0.7	uS
Storage Time		t_{STG}	--	2.2	3	uS
Fall Time		t_f	--	0.3	0.5	uS

Note: pulse test: pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$

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

Figure 1. Static Characteristics

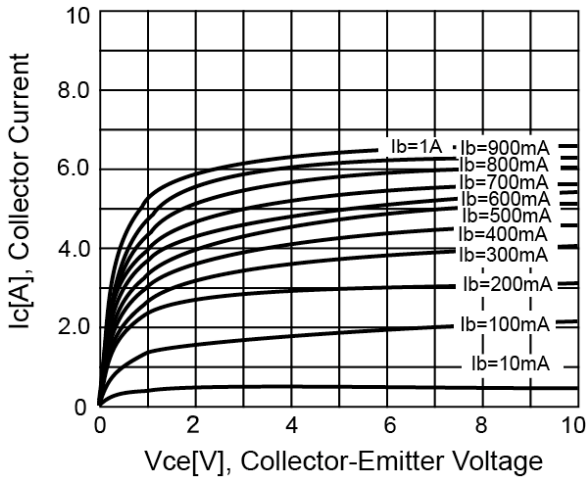


Figure 2. DC Current Gain

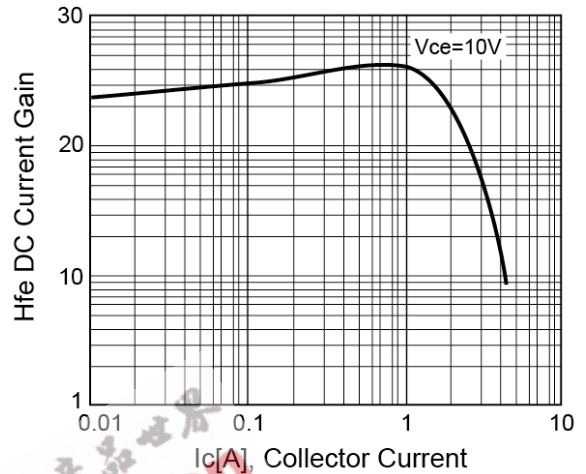


Figure 3. VCE(SAT) V.S. VBE(SAT)

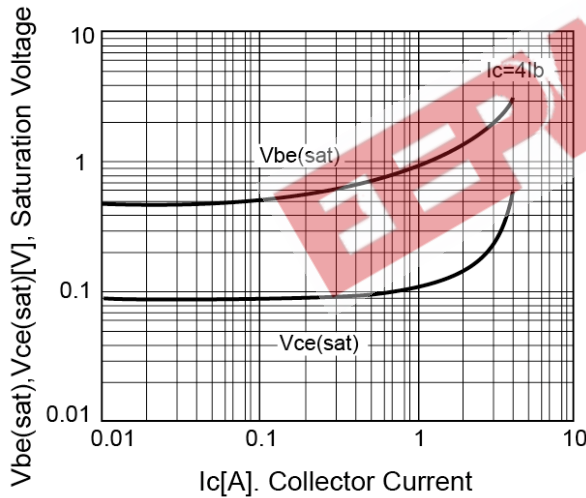


Figure 4. Power Derating

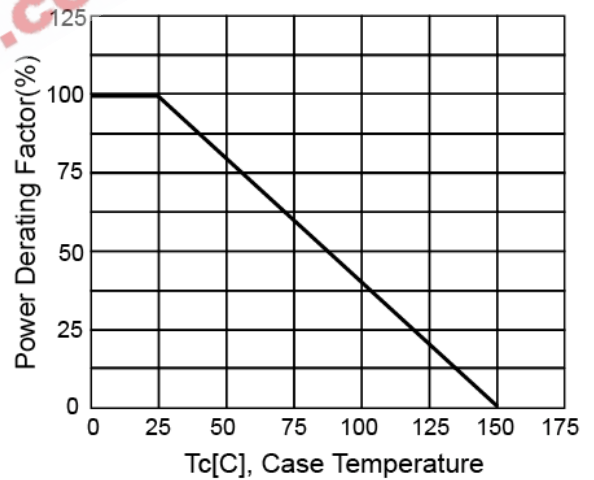


Figure 5. Reverse Bias SOA

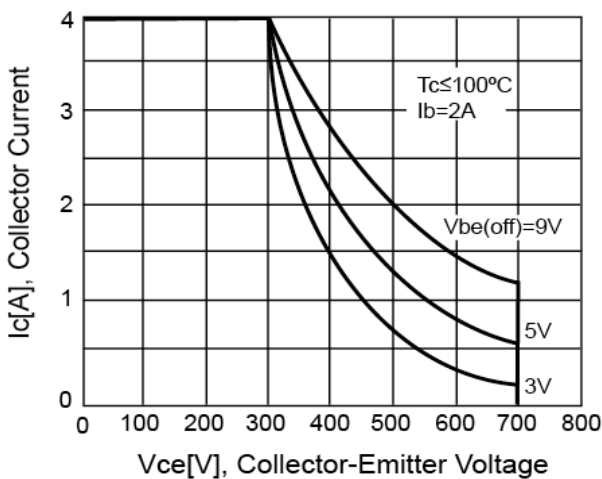
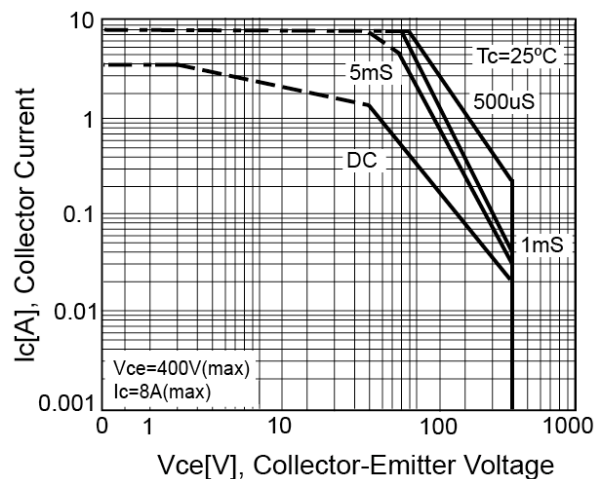
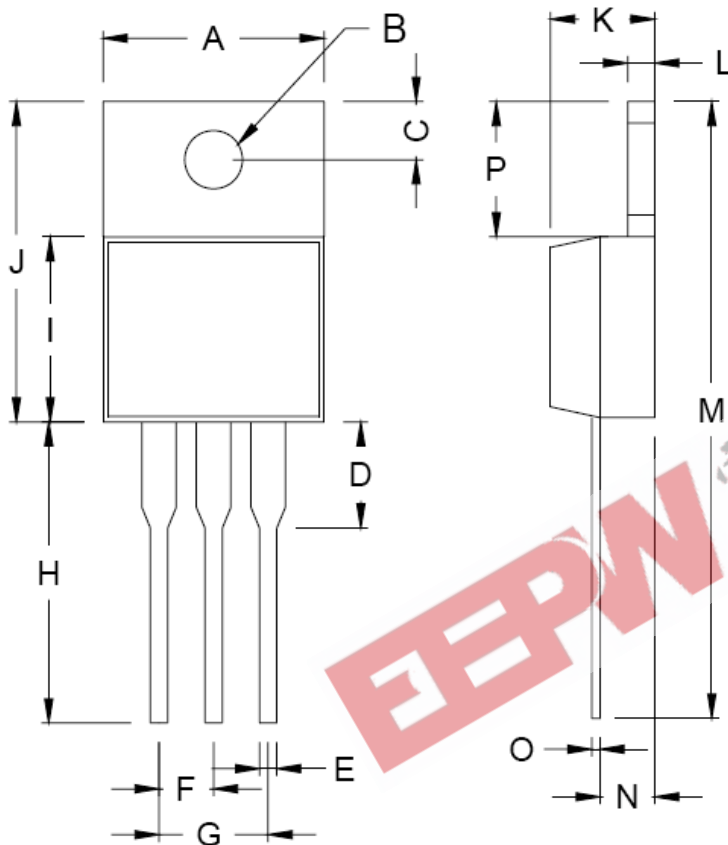


Figure 6. Safety Operating Area

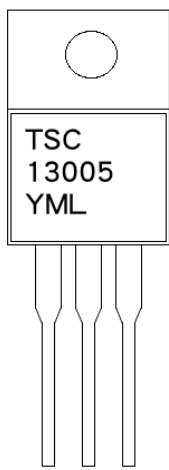


TO-220 Mechanical Drawing



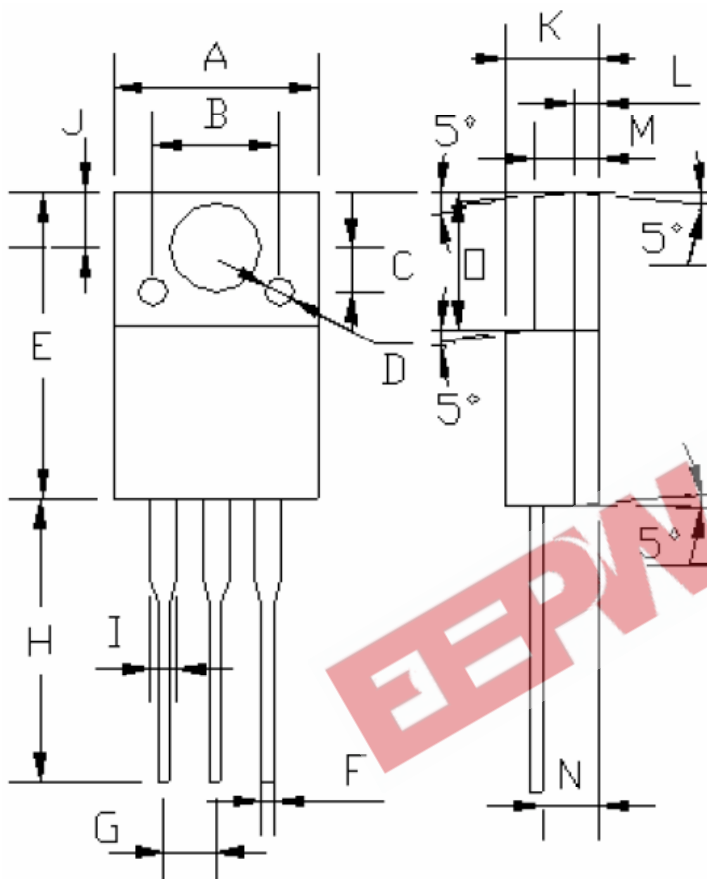
TO-220 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.31	10.550	0.366	0.415
B	3.740	3.910	0.147	0.154
C	2.440	2.940	0.096	0.116
D	2.22	3.22	0.087	0.127
E	0.78	0.98	0.030	0.038
F	2.34	2.65	0.092	0.104
G	4.69	5.31	0.184	0.209
H	12.32	13.88	0.485	0.546
I	8.74	9.26	0.344	0.364
J	15.07	16.07	0.593	0.632
K	4.35	4.65	0.171	0.183
L	1.16	1.40	0.045	0.055
M	27.39	30.35	1.078	1.194
N	1.785	2.675	0.070	0.105
O	1.50	1.75	0.059	0.068
P	5.75	7.65	0.226	0.301

Marking Diagram



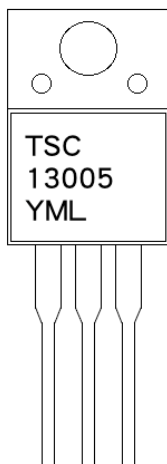
- Y** = Year Code
- M** = Month Code
(A=Jan, B=Feb, C=Mar, D=Apr, E=May, F=Jun, G=Jul, H=Aug, I=Sep, J=Oct, K=Nov, L=Dec)
- L** = Lot Code

ITO-220 Mechanical Drawing



ITO-220 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	10.04	10.07	0.395	0.396
B	6.20 (typ.)		0.244 (typ.)	
C	2.20 (typ.)		0.087 (typ.)	
D	φ 1.40 (typ.)		φ 0.055 (typ.)	
E	15.0	15.20	0.591	0.598
F	0.52	0.54	0.020	0.021
G	2.35	2.73	0.093	0.107
H	13.50	13.55	0.531	0.533
J	1.11	1.49	0.044	0.058
J	2.60	2.80	0.102	0.110
K	4.49	4.50	0.176	0.177
L	1.15 (typ.)		0.045 (typ.)	
M	3.03	3.05	0.119	0.120
N	2.60	2.80	0.102	0.110
O	6.55	6.65	0.258	0.262

Marking Diagram



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