TAIWAN SEMICONDUCTOR

RoHS COMPLIANCE

TS13003MV

High Voltage NPN Transistor

TO-92

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

PRODUCT SUMMARY

BV_{CEO}	400V
BV_{CBO}	800V
I_C	1.5A
$V_{CE(SAT)}$	0.8V @ I_C / I_B = 1A / 0.25A

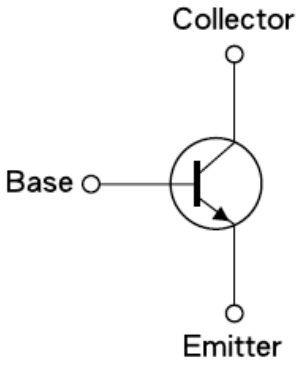
Features

- High Voltage
- High Speed Switching

Structure

- Silicon Triple Diffused Type
- NPN Silicon Transistor

Block Diagram



Ordering Information

Part No.	Package	Packing
TS13003MVCT B0	TO-92	1Kpcs / Bulk
TS13003MVCT A3	TO-92	2Kpcs / Ammo
TS13003MVCT B0G	TO-92	1Kpcs / Bulk
TS13003MVCT A3G	TO-92	2Kpcs / Ammo

Note: “G” is denote Halogen Free Product.

Absolute Maximum Rating (Ta = 25ºC unless otherwise noted)

Parameter		Symbol	Limit	Unit
Collector-Base Voltage		V_{CBO}	800	V
Collector-Emitter Voltage (V_{BE}=0)		V_{CES}	800	V
Collector-Emitter Voltage		V_{CEO}	400	V
Emitter-Base Voltage		V_{EBO}	9	V
Collector Current	DC	I_C	1.5	A
	Pulse		3	
Total Power Dissipation Tc=25ºC		P_D	5.8	W
Operating Junction Temperature		T_J	+150	ºC
Operating Junction and Storage Temperature Range		T_{STG}	- 55 to +150	ºC
Thermal Resistance Junction to Case		$R\theta_{JC}$	21.5	ºC/W

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Electrical Specifications (Tc = 25ºC unless otherwise noted)

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Collector-Base Voltage	I_C = 1mA, I_E = 0, t=300uS	BV_{CBO}	800	--	--	V
	I_C = 1mA, I_E = 0, Tc=125ºC, t=2uS		830	--	--	
Collector-Emitter Sustaning Voltage	I_C = 1mA, I_B = 0, t=300uS	BV_{CES}	830	--	--	V
	I_C = 1mA, I_B = 0, Tc=125ºC, t=2uS		830	--	--	
Collector-Emitter Breakdown Voltage	I_C = 10mA, I_B = 0	BV_{CEO}	400	--	--	V
Emitter-Base Breakdown Voltage	I_E = 1mA, I_C = 0	BV_{EBO}	9	--	--	V
Collector-Emitter Cutoff Current	V_{CE} = 400V, I_B = 0	I_{CEO}	--	--	1	uA
Collector Cutoff Current	V_{CB} = 800V, I_E = 0	I_{CBO}	--	--	1	uA
Emitter Cutoff Current	V_{EB} = 9V, I_C = 0	I_{EBO}	--	0.1	1	uA
Collector-Emitter Saturation Voltage	I_C / I_B = 0.5A / 0.1A	$V_{CE(SAT)1}$	--	0.2	0.5	V
	I_C / I_B = 1.0A / 0.25A	$V_{CE(SAT)2}$	--	0.35	0.8	
	I_C / I_B = 1.5A / 0.5A	$V_{CE(SAT)3}$	--	0.6	1.5	
Base-Emitter Saturation Voltage	I_C / I_B = 0.5A / 0.1A	$V_{BE(SAT)1}$	--	--	1.1	V
	I_C / I_B = 1.0A / 0.25A	$V_{BE(SAT)2}$	--	--	1.3	
DC Current Gain	V_{CE} = 2V, I_C = 10mA	$h_{FE}1$	15	--	--	
	V_{CE} = 2V, I_C = 400mA	$h_{FE}2$	20	--	40	
	V_{CE} = 2V, I_C = 1A	$h_{FE}3$	6	--	20	
DC Current Gain	V_{CE} = 2V, I_C = 400mA, Tc=120ºC	$h_{FE}4$	15	--	25	
Dynamic						
Frequency	V_{CE} = 10V, I_C = 0.1A	f_T	4	--	--	MHz
Output Capacitance	V_{CB} = 10V, f = 0.1MHz	Cob	--	21	--	pF
Resistive Load Switching Time (Ratings)						
Delay Time	V_{CC} = 125V, I_C = 1A, I_{B1} = I_{B2} = 200mA, t_p = 25uS, Tc=25ºC Duty Cycle ≤1%	t_d	--	0.1	0.2	uS
Rise Time		t_r	--	0.6	1	uS
Storage Time		t_{STG}	--	2	4	uS
Fall Time		t_f	--	0.2	0.6	uS
Delay Time	V_{CC} = 125V, I_C = 0.4A, I_{B1} = 15mA, I_{B2} = 150mA, t_p = 25uS, Tc=25 ºC Duty Cycle ≤ 1%	t_d	--	0.10	0.13	uS
Rise Time		t_r	--	0.38	0.51	uS
Storage Time		t_{STG}	--	0.34	0.43	uS
Fall Time		t_f	--	0.03	0.05	uS
Delay Time	V_{CC} = 125V, I_C = 0.4A, I_{B1} = 15mA, I_{B2} = 150mA, t_p = 25uS, Tc=120 ºC Duty Cycle ≤ 1%,	t_d	--	0.13	--	uS
Rise Time		t_r	--	0.66	--	uS
Storage Time		t_{STG}	--	0.25	--	uS
Fall Time		t_f	--	0.05	--	uS

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

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

Figure 1. Static Characteristics

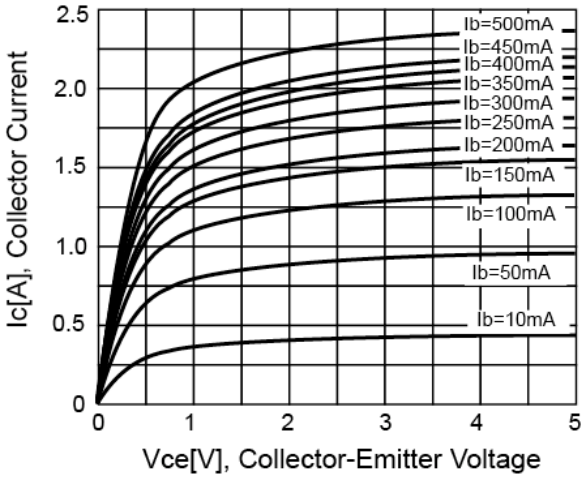


Figure 2. DC Current Gain

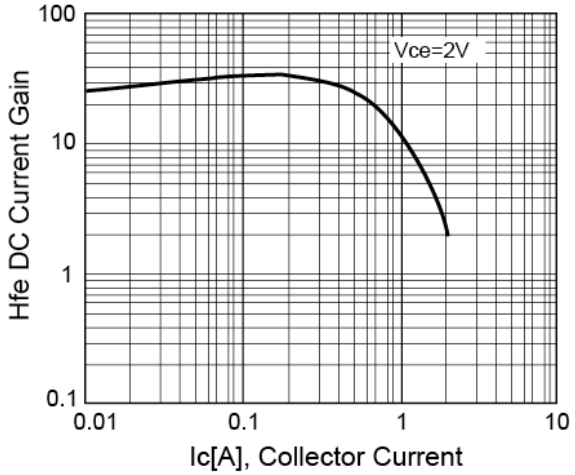


Figure 3. $V_{CE(SAT)}$ v.s. $V_{BE(SAT}$

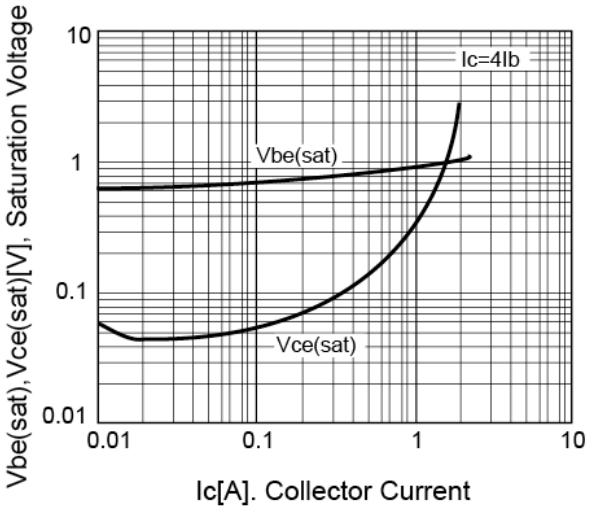


Figure 4. Power Derating

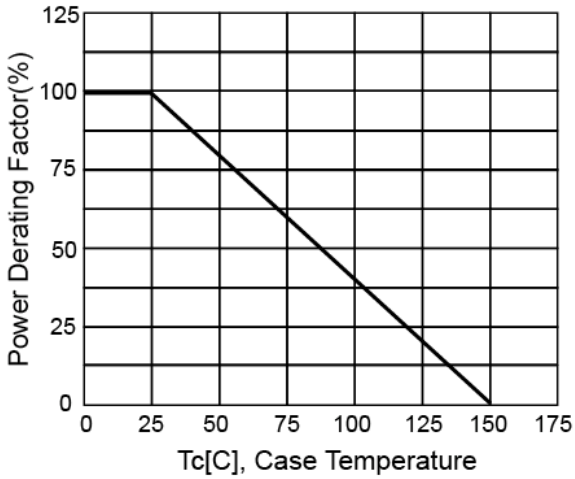


Figure 5. Reverse Bias SOA

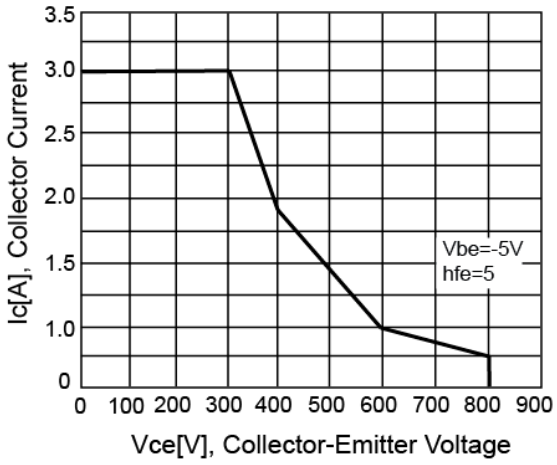
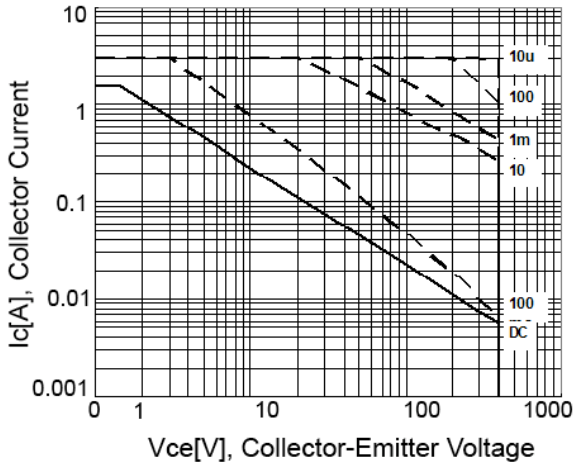
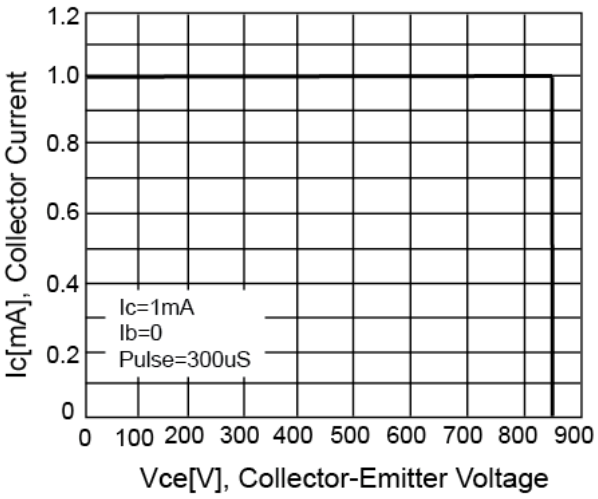


Figure 6. Safety Operating Area

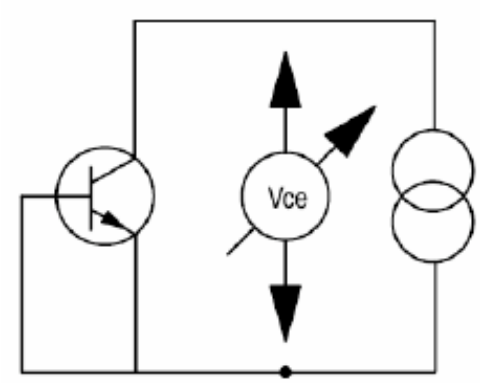


Electrical Characteristics Curve (Tc = 25°C)

Figure 7. Vces Curve



Vces Test Circuit



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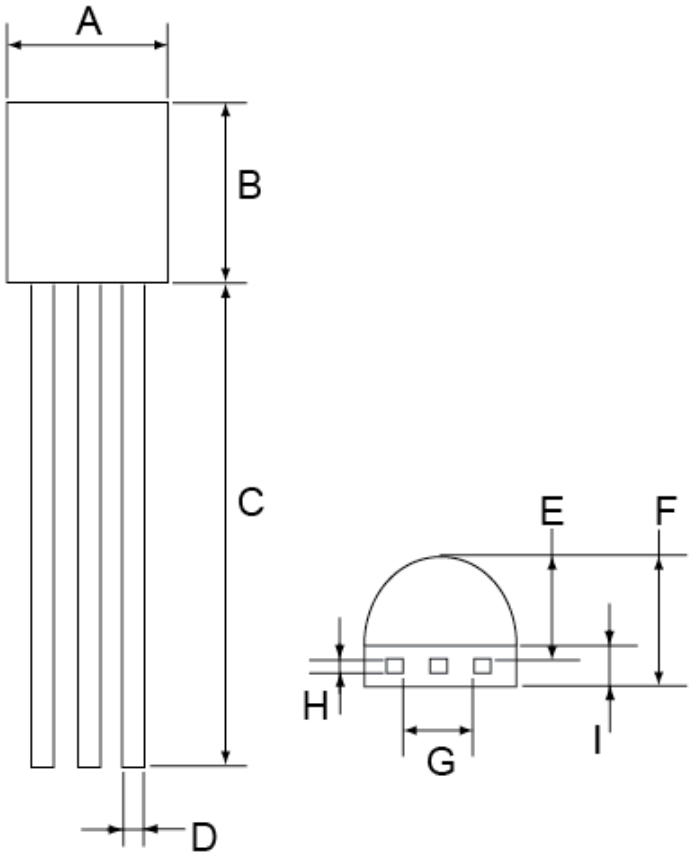
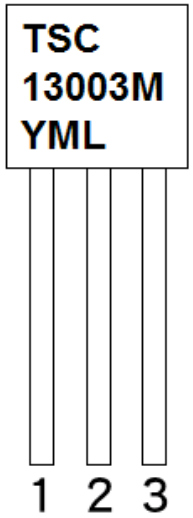
TO-92 Mechanical Drawing



TO-92 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.30	4.70	0.169	0.185
B	4.30	4.70	0.169	0.185
C	14.30(typ)		0.563(typ)	
D	0.43	0.49	0.017	0.019
E	2.19	2.81	0.086	0.111
F	3.30	3.70	0.130	0.146
G	2.42	2.66	0.095	0.105
H	0.37	0.43	0.015	0.017
I	1.10	1.30	0.043	0.051

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

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