

MOTOROLA

SEMICONDUCTOR

TECHNICAL DATA

MJ12003

HORIZONTAL DEFLECTION TRANSISTOR

... specifically designed for use in CRT deflection circuits.

- Collector-Emitter Voltage — $V_{CEX} = 1500$ Volts
- Glassivated Base-Collector Junction
- Forward Bias Safe Operating Area @ $50 \mu s = 20$ A, 300 V
- Switching Times with Inductive Loads —
 $t_f = 0.5 \mu s$ (Typ) @ $I_C = 3.0$ A

4 AMPERE

NPN SILICON POWER TRANSISTOR

1500 VOLTS 100 WATTS

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	750	Vdc
Collector-Emitter Voltage	V_{CEX}	1500	Vdc
Emitter-Base Voltage	V_{EBO}	5.0	Vdc
Collector Current — Continuous	I_C	4.0	Adc
Base Current — Continuous	I_B	3.0	Adc
Emitter Current — Continuous	I_E	7.0	Adc
Total Power Dissipation @ $T_C = 25^\circ C$ $T_C = 100^\circ C$	P_D	100 40	Watts Watts
Derate above $25^\circ C$		0.8	W/ $^\circ C$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +150	$^\circ C$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.25	$^\circ C/W$
Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 5 Seconds	T_L	275	$^\circ C$

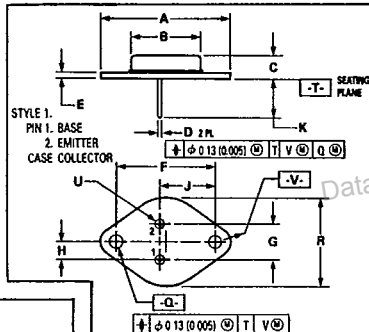
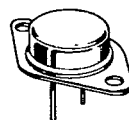
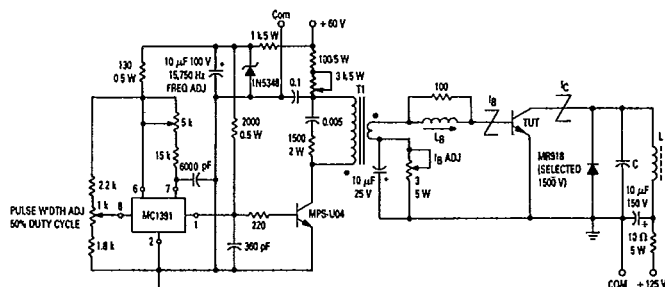


FIGURE 1 — TEST CIRCUIT



DRIVER TRANSFORMER (T1)

- Ferrite cube pot core #425F-400-308
- Adjust gap for primary inductance $L_p = 70$ mH (approximately 5 mil spacer)
- Primary 230T #28 AWG (5 layer)
- Secondary 15T #22 AWG (1 layer)
- Secondary leakage inductance should be less than 3 μH
- Use 3 mil mylar tape between each winding layer

I_C	L	C
3.0	1.00	0.012

NOTES

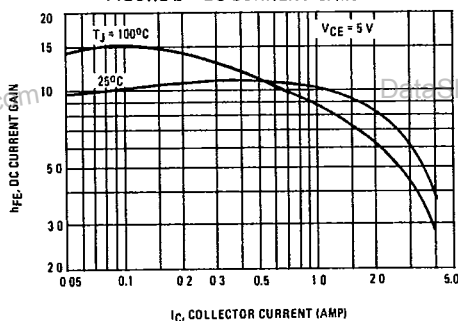
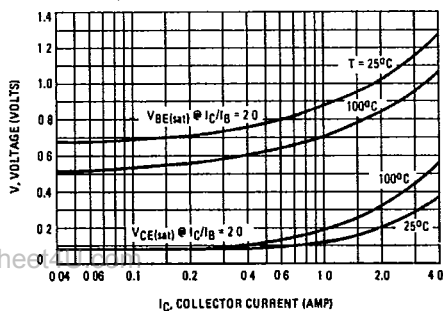
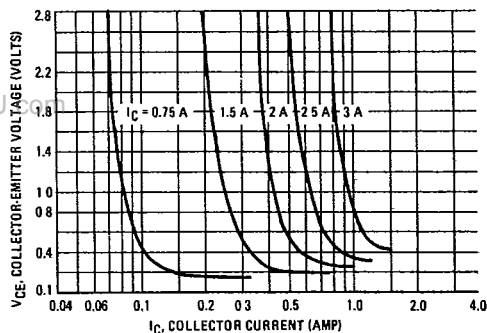
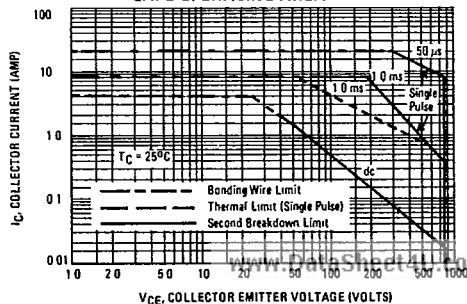
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. ALL RULES AND NOTES ASSOCIATED WITH REFERENCED TO-244AA OUTLINE SHALL APPLY.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	—	39.37	—	1.550
B	—	21.08	—	0.830
C	6.35	8.25	0.250	0.325
D	0.97	1.09	0.038	0.043
E	1.40	1.77	0.055	0.070
F	30.15 BSC		1.187 BSC	
G	10.92 BSC		0.430 BSC	
H	5.46 BSC		0.215 BSC	
J	16.89 BSC		0.665 BSC	
K	11.18	12.19	0.440	0.480
Q	3.84	4.19	0.151	0.165
R	26.69		1.050	
U	4.83	5.33	0.190	0.210
V	3.84	4.19	0.151	0.165

CASE 1-06
TO-244AA
(TO-3)

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS (1)					
Collector-Emitter Sustaining Voltage ($I_C = 50\text{ mAdc}$, $I_B = 0$)	$V_{CE(sus)}$	750	—	—	Vdc
Collector Cutoff Current ($V_{CE} = 1500\text{ Vdc}$, $V_{BE} = 0$)	I_{CES}	—	—	1.0	mAdc
Emitter Cutoff Current ($V_{BE} = 5.0\text{ Vdc}$, $I_C = 0$)	I_{EBO}	—	—	1.0	mAdc
ON CHARACTERISTICS (1)					
Collector-Emitter Saturation Voltage ($I_C = 3.0\text{ Adc}$, $I_B = 1.2\text{ Adc}$)	$V_{CE(sat)}$	—	—	5.0	Vdc
Base-Emitter Saturation Voltage ($I_C = 3.0\text{ Adc}$, $I_B = 1.2\text{ Adc}$)	$V_{BE(sat)}$	—	—	1.5	Vdc
Second Breakdown Collector Current with Base Forward Biased	$I_{S/b}$	See Figure 5			—
DYNAMIC CHARACTERISTICS					
Current-Gain — Bandwidth Product ($I_C = 0.1\text{ Adc}$, $V_{CE} = 5.0\text{ Vdc}$, $f_{test} = 1.0\text{ MHz}$)	f_T	—	4	—	MHz
Output Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $f = 0.1\text{ MHz}$)	C_{ob}	—	90	—	pF
SWITCHING CHARACTERISTICS					
Fall Time ($I_C = 3.0\text{ Adc}$, $I_{B1} = 1.2\text{ Adc}$, $L_B = 8.0\text{ }\mu\text{H}$, See Figure 1)	t_f	—	0.5	1.0	μs

(1) Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle = 2%.**FIGURE 2 — DC CURRENT GAIN****FIGURE 4 — "ON" VOLTAGES****FIGURE 3 — COLLECTOR SATURATION REGION****FIGURE 5 — MAXIMUM FORWARD BIAS SAFE OPERATING AREA****NOTE:**

There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate I_C — V_{CE} limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The 50 μs and 1 ms curves are beyond the thermal limits of this part. However, the parts will survive a transient that remains within these SB limits without failing.