

MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

T-33-17

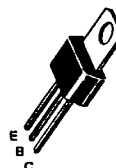
MPS-U51
MPS-U51A

**NOT RECOMMENDED
FOR NEW DESIGNS**

PNP SILICON ANNULAR TRANSISTORS

Designed for complementary symmetry audio circuits to 5 Watts out.

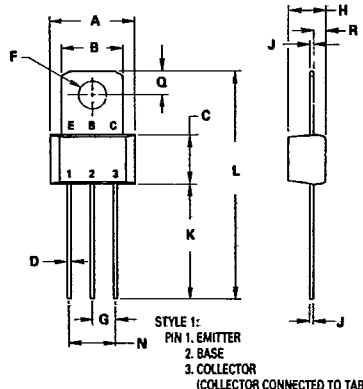
- Excellent Current Gain Linearity — 1.0 mAdc to 1.0 Adc
- Low Collector-Emitter Saturation Voltage —
 $V_{CE(sat)} = 0.7 \text{ Vdc (Max) @ } I_C = 1.0 \text{ Adc}$
- Complements to NPN MPS-U01 and MPS-U01A
- Uniwatt Package for Excellent Thermal Properties —
1.0 Watt @ $T_A = 25^\circ\text{C}$

PNP SILICON
AUDIO TRANSISTORS

MAXIMUM RATINGS

Rating	Symbol	MPS-U51	MPS-U51A	Unit
Collector-Emitter Voltage	V_{CEO}	30	40	Vdc
Collector-Base Voltage	V_{CB}	40	50	Vdc
Emitter-Base Voltage	V_{EB}		5.0	Vdc
Collector Current — Continuous	I_C		2.0	Adc
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	1.0	8.0	Watt mW/ $^\circ\text{C}$
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	10	80	Watts mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-55 to +150		$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	12.5	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	125	$^\circ\text{C/W}$



NOTE:

1. LEADS WITHIN 0.15 mm (0.006) TOTAL OF TRUE POSITION AT CASE, AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.14	9.53	0.360	0.375
B	6.60	7.24	0.260	0.285
C	5.41	5.66	0.213	0.223
D	0.38	0.53	0.015	0.021
F	3.18	3.33	0.125	0.131
G	2.54 BSC		0.100 BSC	
H	3.94	4.19	0.155	0.165
J	0.36	0.41	0.014	0.016
K	11.63	12.70	0.458	0.500
L	24.58	25.53	0.968	1.005
M	5.08 BSC		0.200 BSC	
Q	2.39	2.69	0.094	0.106
R	1.14	1.40	0.045	0.055

CASE 152-02

3-1058

MPS-U51, MPS-U51A

T-33-17

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage ($I_C = 1.0\text{ mA}$, $I_B = 0$)	$V_{(BR)CEO}$	30 40	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 100\text{ }\mu\text{A}$, $I_E = 0$)	$V_{(BR)CBO}$	40 50	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 100\text{ }\mu\text{A}$, $I_C = 0$)	$V_{(BR)EBO}$	5.0	—	Vdc
Collector Cutoff Current ($V_{CB} = 30\text{ Vdc}$, $I_E = 0$) ($V_{CB} = 40\text{ Vdc}$, $I_E = 0$)	I_{CBO}	—	0.1 0.1	μA
Emitter Cutoff Current ($V_{BE} = 3.0\text{ Vdc}$, $I_C = 0$)	I_{EBO}	—	0.1	μA
ON CHARACTERISTICS(1)				
DC Current Gain ($I_C = 10\text{ mA}$, $V_{CE} = 1.0\text{ Vdc}$) ($I_C = 100\text{ mA}$, $V_{CE} = 1.0\text{ Vdc}$) ($I_C = 1.0\text{ A}$, $V_{CE} = 1.0\text{ Vdc}$)	h_{FE}	55 60 50	—	—
Collector-Emitter Saturation Voltage ($I_C = 1.0\text{ A}$, $I_B = 0.1\text{ A}$)	$V_{CE(sat)}$	—	0.7	Vdc
Base-Emitter On Voltage ($I_C = 1.0\text{ A}$, $V_{CE} = 1.0\text{ Vdc}$)	$V_{BE(on)}$	—	1.2	Vdc
DYNAMIC CHARACTERISTICS				
Current-Gain-Bandwidth Product ($I_C = 50\text{ mA}$, $V_{CE} = 10\text{ Vdc}$, $f = 20\text{ MHz}$)	f_T	50	—	MHz
Output Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $f = 100\text{ kHz}$)	C_{ob}	—	30	pF

(1) Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2\%$.

FIGURE 1 — DC CURRENT GAIN

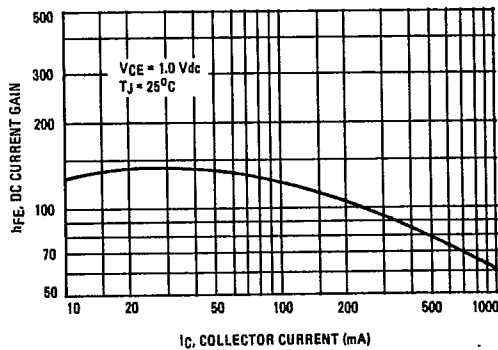


FIGURE 2 — "ON" VOLTAGES

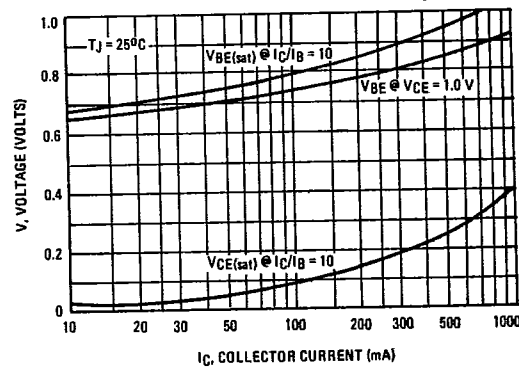
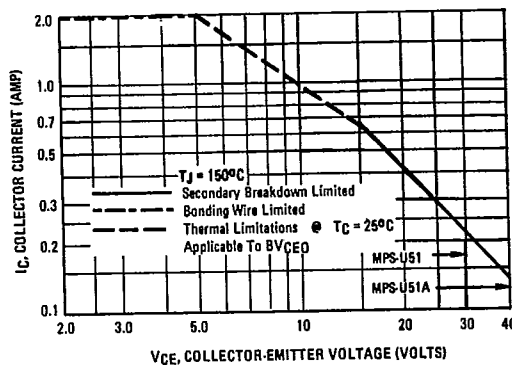


FIGURE 3 — DC SAFE OPERATING AREA



There are two limitations on the power handling ability of a transistor: 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 data of Figure 3 is based on $T_{J(pk)} = 150^\circ\text{C}$; T_C is variable depending on conditions. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.