

MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

T-33-17

MPS-U51
MPS-U51A

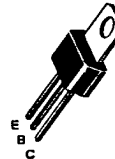
NOT RECOMMENDED FOR NEW DESIGNS

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

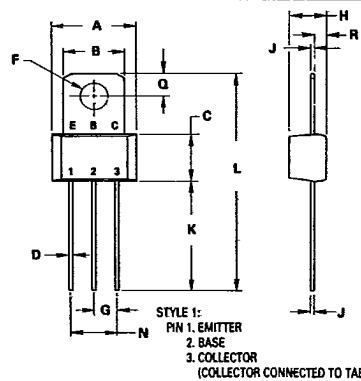


MAXIMUM RATINGS

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		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	3.23	0.125	0.131
G	2.54 BSC		0.100 BSC	
H	3.54	4.19	0.155	0.165
J	0.36	0.41	0.014	0.016
K	11.63	12.70	0.460	0.500
L	24.60	25.53	0.968	1.006
N	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

MPS-U51, MPS-U51A

T-33-17

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage (I _C = 1.0 mA, I _B = 0)	MPS-U51 MPS-U51A V _{(BR)CEO}	30 40	— —	V _{dc}
Collector-Base Breakdown Voltage (I _C = 100 μA, I _E = 0)	MPS-U51 MPS-U51A V _{(BR)CBO}	40 50	— —	V _{dc}
Emitter-Base Breakdown Voltage (I _E = 100 μA, I _C = 0)	V _{(BR)EBO}	5.0	—	V _{dc}
Collector Cutoff Current (V _{CB} = 30 V, I _E = 0)	MPS-U51 MPS-U51A I _{CBO}	—	0.1	μA _{dc}
(V _{CB} = 40 V, I _E = 0)		—	0.1	
Emitter Cutoff Current (V _{BE} = 3.0 V, I _C = 0)	I _{EBO}	—	0.1	μA _{dc}
ON CHARACTERISTICS(1)				
DC Current Gain (I _C = 10 mA, V _{CE} = 1.0 V) (I _C = 100 mA, V _{CE} = 1.0 V) (I _C = 1.0 A, V _{CE} = 1.0 V)	h _{FE}	55 60 50	— — —	—
Collector-Emitter Saturation Voltage (I _C = 1.0 A, I _B = 0.1 A)	V _{CE(sat)}	—	0.7	V _{dc}
Base-Emitter On Voltage (I _C = 1.0 A, V _{CE} = 1.0 V)	V _{BE(on)}	—	1.2	V _{dc}
DYNAMIC CHARACTERISTICS				
Current-Gain-Bandwidth Product (I _C = 50 mA, V _{CE} = 10 V, f = 20 MHz)	f _T	50	—	MHz
Output Capacitance (V _{CB} = 10 V, I _E = 0, f = 100 kHz)	C _{ob}	—	30	pF

(1) Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

FIGURE 1 - DC CURRENT GAIN

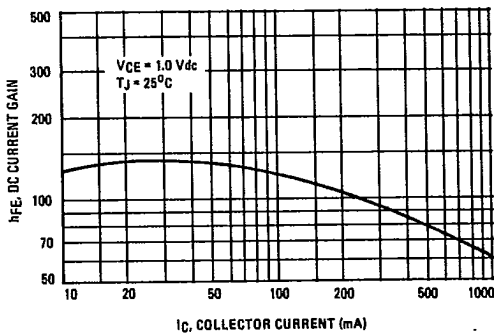


FIGURE 2 - "ON" VOLTAGES

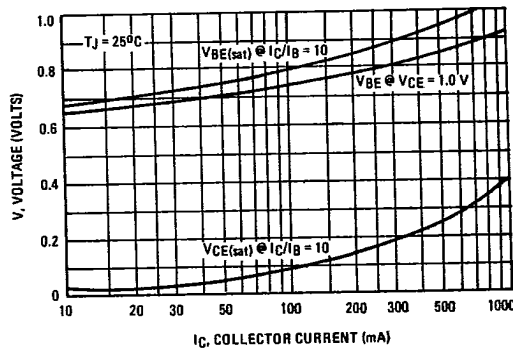
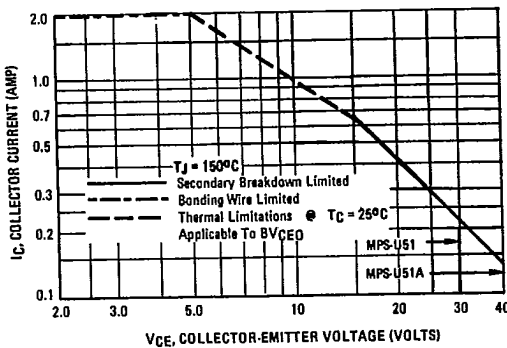


FIGURE 3 - DC SAFE OPERATING AREA



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°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.

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