

# MPS-U51 (SILICON)

## MPS-U51A

### PNP SILICON ANNULAR TRANSISTORS

... designed for complementary symmetry audio circuits to 5 Watts output.

- 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 @  $T_A = 25^\circ\text{C}$

### MAXIMUM RATINGS

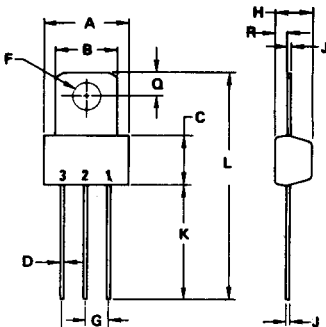
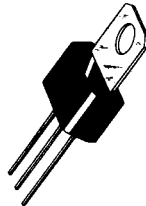
Rating	Symbol	MPS-U51	MPS-U51A	Unit
Collector-Emitter Voltage	$V_{CEO}$	30	40	Vdc
Collector-Base Voltage	$V_{CB}$	40	50	Vdc
Emitter-Base Voltage	$V_{EB}$	5.0		Vdc
Collector Current – Continuous	$I_C$	2.0		Adc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D^{(1)}$	1.0	8.0	Watt mW/°C
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D^{(1)}$	10	80	Watts mW/°C
Operating and Storage Junction Temperature Range	$T_J, T_{stg}^{(1)}$	-55 to +150		°C

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	12.5	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}^{(1)}$	125	°C/W

(1)  $R_{\theta JA}$  is measured with the device soldered into a typical printed circuit board.

### PNP SILICON AUDIO TRANSISTORS



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	5.88	0.213	0.223
D	0.38	0.53	0.015	0.021
E	3.18	3.33	0.125	0.131
F	2.54 BSC		0.100 BSC	
G	3.94	4.18	0.155	0.165
H	0.36	0.41	0.014	0.016
I	12.07	12.70	0.475	0.500
J	25.02	25.53	0.985	1.005
K	5.08 BSC		0.200 BSC	
L	2.39	2.59	0.094	0.106
M	1.14	1.40	0.045	0.055

CASE 152-02

Uniwatt packages can be To-5 lead formed by adding -5 to the device title and tab formed for flush mounting by adding -1 to the device title.

# MPS-U51,MPS-U51A (continued)

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

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector-Emitter Breakdown Voltage ( $I_C = 1.0\text{ mAdc}$ , $I_B = 0$ )	$BV_{CEO}$	30 40	—	Vdc
Collector-Base Breakdown Voltage ( $I_C = 100\text{ }\mu\text{Adc}$ , $I_E = 0$ )	$BV_{CBO}$	40 50	—	Vdc
Emitter-Base Breakdown Voltage ( $I_E = 100\text{ }\mu\text{Adc}$ , $I_C = 0$ )	$BV_{EBO}$	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	$\mu\text{Adc}$
Emitter Cutoff Current ( $V_{BE} = 3.0\text{ Vdc}$ , $I_C = 0$ )	$I_{EBO}$	—	0.1	$\mu\text{Adc}$

## ON CHARACTERISTICS(1)

DC Current Gain ( $I_C = 10\text{ mAdc}$ , $V_{CE} = 1.0\text{ Vdc}$ ) ( $I_C = 100\text{ mAdc}$ , $V_{CE} = 1.0\text{ Vdc}$ ) ( $I_C = 1.0\text{ Adc}$ , $V_{CE} = 1.0\text{ Vdc}$ )	$h_{FE}$	55 60 50	— — —	—
Collector-Emitter Saturation Voltage ( $I_C = 1.0\text{ Adc}$ , $I_B = 0.1\text{ Adc}$ )	$V_{CE(sat)}$	—	0.7	Vdc
Base-Emitter On Voltage ( $I_C = 1.0\text{ Adc}$ , $V_{CE} = 1.0\text{ Vdc}$ )	$V_{BE(on)}$	—	1.2	Vdc

## DYNAMIC CHARACTERISTICS

Current-Gain-Bandwidth Product(1) ( $I_C = 50\text{ mAdc}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 20\text{ MHz}$ )	$f_T$	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  $\leq 2.0\%$ .

FIGURE 1 — DC CURRENT GAIN

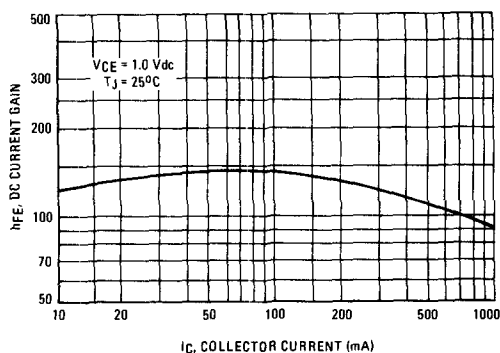


FIGURE 2 — "ON" VOLTAGES

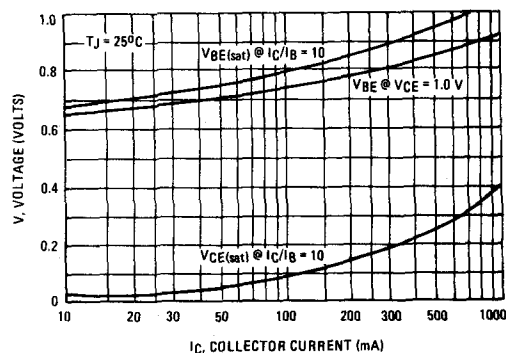
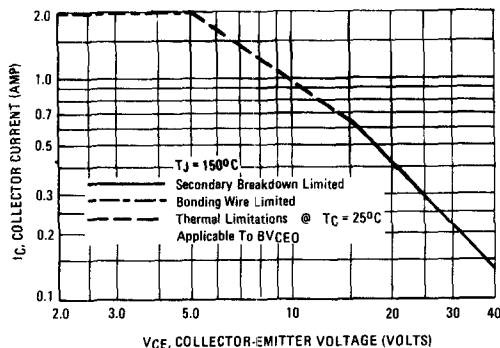


FIGURE 3 — DC SAFE OPERATING AREA



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  $T_{J(pk)} = 150^\circ\text{C}$ ;  $T_C$  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.