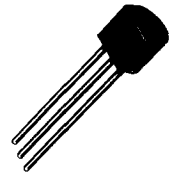
MPS3640 (SILICON)

PNP SILICON ANNULAR TRANSISTOR

. . . designed for general-purpose, low-level switching applications.

- Low Collector-Emitter Saturation Voltage –
  $V_{CE(sat)}$ = 0.2 Vdc @ I_C = 10 mAdc
- Output Capacitance –
  C_{ob} = 3.5 pF (Max) @ V_{CB} = 5.0 Vdc
- Fast Switching Time @ I_C = 50 mAdc
  t_{on} = 25 ns (Max)
  t_{off} = 35 ns (Max)

PNP SILICON SWITCHING TRANSISTOR



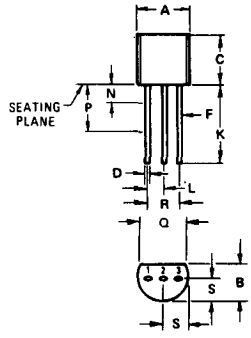
MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	12	Vdc
Collector-Base Voltage	V_{CB}	12	Vdc
Emitter-Base Voltage	V_{EB}	4.0	Vdc
Collector Current – Continuous	I_C	80	mAdc
Total Power Dissipation @ T_A = 25°C Derate above 25°C	P_D	350 2.8	mW mW/°C
Total Power Dissipation @ T_C = 25°C Derate above 25°C	P_D	1.0 8.0	Watt mW/°C
Operating and Storage Junction Temperature Range	T_J,T_{stg}	-55 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$(1)	357	°C/W
Thermal Resistance, Junction to Case	$R_{\theta JC}$	125	°C/W

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



STYLE 1:
PIN 1. EMITTER
2. BASE
3. COLLECTOR

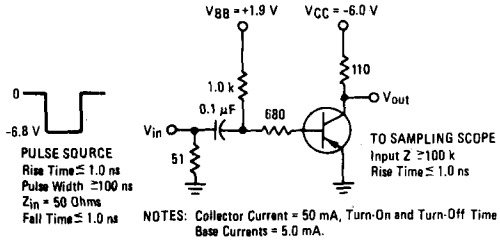
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	4.450	5.200	0.175	0.205
B	3.180	4.190	0.125	0.165
C	4.320	5.330	0.170	0.210
D	0.407	0.533	0.016	0.021
F	0.407	0.482	0.016	0.019
K	12.700	–	0.500	–
L	1.150	1.390	0.045	0.055
N	–	1.270	–	0.050
P	6.350	–	0.250	–
Q	3.430	–	0.135	–
R	2.410	2.670	0.095	0.105
S	2.030	2.670	0.080	0.105

CASE 29-02
TO-92

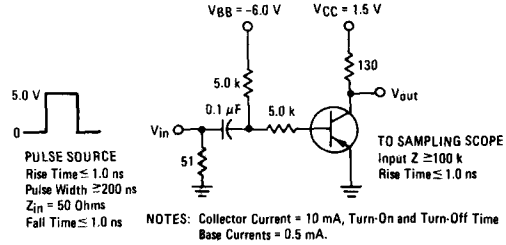
ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Sustaining Voltage (1) (I_C = 10 mAdc, I_B = 0)	$V_{CEO(sus)}$	12	–	Vdc
Collector-Emitter Breakdown Voltage (I_C = 100 μAdc, V_{BE} = 0)	BV_{CES}	12	–	Vdc
Collector-Base Breakdown Voltage (I_C = 100 μAdc, I_E = 0)	BV_{CBO}	12	–	Vdc
Emitter-Base Breakdown Voltage (I_E = 100 μAdc, I_C = 0)	BV_{EBO}	4.0	–	Vdc
Collector Cutoff Current (V_{CE} = 6.0 Vdc, V_{BE} = 0) (V_{CE} = 6.0 Vdc, V_{BE} = 0, T_A = 65°C)	I_{CES}	– –	0.01 1.0	μAdc
Reverse Base Current (V_{CE} = 6.0 Vdc, V_{BE} = 0)	I_B	–	10	nAdc
ON CHARACTERISTICS (1)				
DC Current Gain (I_C = 10 mAdc, V_{CE} = 0.3 Vdc) (I_C = 50 mAdc, V_{CE} = 1.0 Vdc)	h_{FE}	30 20	120 –	–
Collector-Emitter Saturation Voltage (I_C = 10 mAdc, I_B = 1.0 mAdc) (I_C = 50 mAdc, I_B = 5.0 mAdc) (I_C = 10 mAdc, I_B = 1.0 mAdc, T_A = 65°C)	$V_{CE(sat)}$	– – –	0.2 0.6 0.25	Vdc
Base-Emitter Saturation Voltage (I_C = 10 mAdc, I_B = 0.5 mAdc) (I_C = 10 mAdc, I_B = 1.0 mAdc) (I_C = 50 mAdc, I_B = 5.0 mAdc)	$V_{BE(sat)}$	0.75 0.8 –	0.95 1.0 1.5	Vdc
DYNAMIC CHARACTERISTICS				
Current-Gain–Bandwidth Product (I_C = 10 mAdc, V_{CE} = 5.0 Vdc, f = 100 MHz)	f_T	500	–	MHz
Output Capacitance (V_{CB} = 5.0 Vdc, I_E = 0, f = 140 kHz)	C_{ob}	–	3.5	pF
Input Capacitance (V_{BE} = 0.5 Vdc, I_C = 0, f = 140 kHz)	C_{ib}	–	3.5	pF
SWITCHING CHARACTERISTICS				
Turn-On Time (V_{CC} = 6.0 Vdc, I_C = 50 mAdc, $V_{BE(off)}$ = 1.9 Vdc, I_{B1} = 5.0 mAdc) (Figure 1) (V_{CC} = 1.5 Vdc, I_C = 10 mAdc, I_{B1} = 0.5 mAdc) (Figure 2)	t_{on}	– –	25 60	ns
Delay Time	t_d	–	10	ns
Rise Time (V_{CC} = 6.0 Vdc, I_C = 50 mAdc, $V_{BE(off)}$ = 1.9 Vdc, I_{B1} = 5.0 mAdc)(Figure 1)	t_r	–	30	ns
Turn-Off Time (V_{CC} = 6.0 Vdc, I_C = 50 mAdc, I_{B1} = I_{B2} = I_{B1} = I_{B2} = 5.0 mAdc) (Figure 1) (V_{CC} = 1.5 Vdc, I_C = 10 mAdc, I_{B1} = I_{B2} = 0.5 mAdc) (Figure 2)	t_{off}	– –	35 75	ns
Storage Time (V_{CC} = 6.0 Vdc, I_C = 50 mAdc, I_{B1} = I_{B2} = 5.0 mAdc) (Figure 1)	t_s	–	20	ns
Fall Time	t_f	–	12	ns

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



NOTES: Collector Current = 50 mA, Turn-On and Turn-Off Time
Base Currents = 5.0 mA.



NOTES: Collector Current = 10 mA, Turn-On and Turn-Off Time
Base Currents = 0.5 mA.

FIGURE 3 – DC CURRENT GAIN

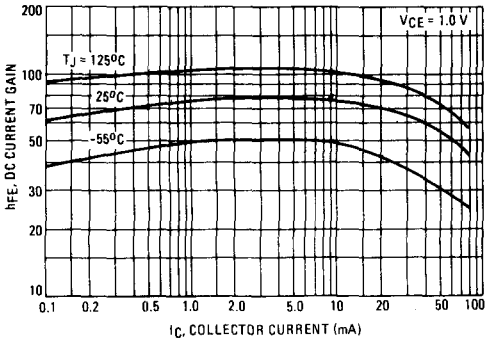


FIGURE 4 – "ON" VOLTAGES

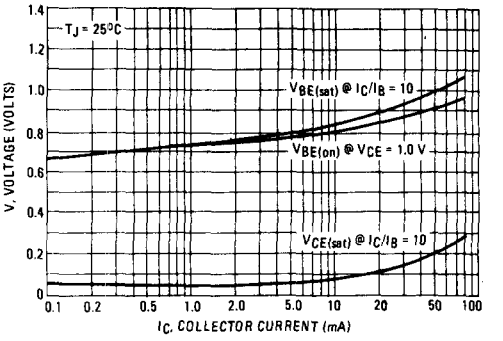


FIGURE 5 – COLLECTOR SATURATION REGION

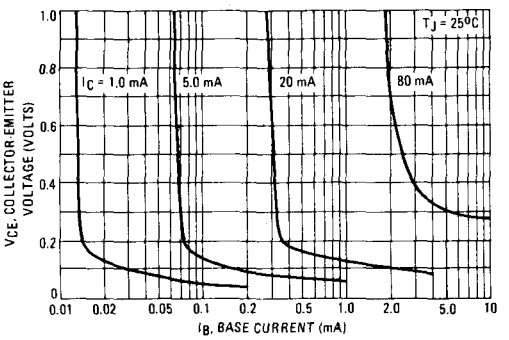


FIGURE 6 – TEMPERATURE COEFFICIENTS

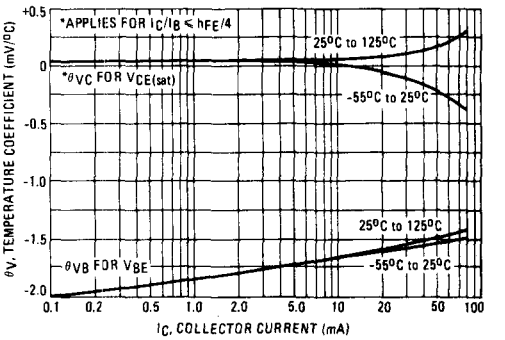


FIGURE 7 – CURRENT-GAIN–BANDWIDTH PRODUCT

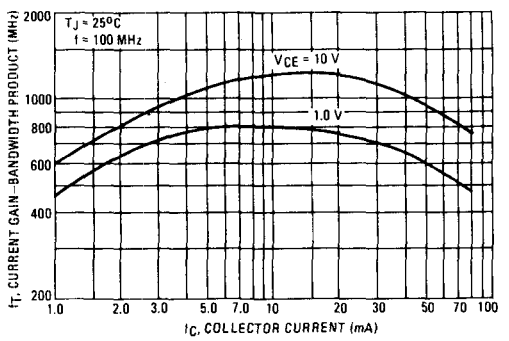


FIGURE 8 – CAPACITANCE