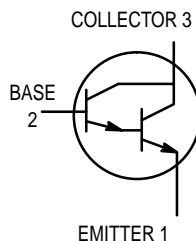
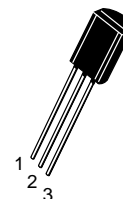


# One Watt Darlington Transistors

## NPN Silicon



**MPS6724**  
**MPS6725**



CASE 29-05, STYLE 1  
TO-92 (TO-226AE)

### MAXIMUM RATINGS

Rating	Symbol	MPS6724	MPS6725	Unit
Collector–Emitter Voltage	$V_{CES}$	40	50	Vdc
Collector–Base Voltage	$V_{CBO}$	50	60	Vdc
Emitter–Base Voltage	$V_{EBO}$	12		Vdc
Collector Current — Continuous	$I_C$	1000		mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	1.0	8.0	Watts mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	2.5	20	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 Ambient	$R_{\theta JA}$	125	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	50	$^\circ\text{C}/\text{W}$

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

Characteristic	Symbol	Min	Max	Unit
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### OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage (1) ( $I_C = 1.0 \text{ mAdc}, I_E = 0$ )	MPS6724 MPS6725	$V_{(BR)CES}$	40 50	— —	Vdc
Collector–Base Breakdown Voltage ( $I_C = 1.0 \mu\text{Adc}, I_E = 0$ )	MPS6724 MPS6725	$V_{(BR)CBO}$	50 60	— —	Vdc
Emitter–Base Breakdown Voltage ( $I_E = 10 \mu\text{Adc}, I_C = 0$ )		$V_{(BR)EBO}$	12	—	Vdc
Collector Cutoff Current ( $V_{CB} = 30 \text{ Vdc}, I_E = 0$ ) ( $V_{CB} = 40 \text{ Vdc}, I_E = 0$ )	MPS6724 MPS6725	$I_{CBO}$	— —	100 100	nAdc
Emitter Cutoff Current ( $V_{EB} = 10 \text{ Vdc}, I_C = 0$ )		$I_{EBO}$	—	100	nAdc

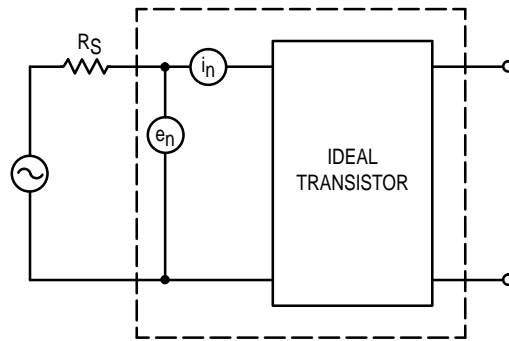
1. Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ ; Duty Cycle  $\leq 2.0\%$ .

**MPS6724 MPS6725**

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

Characteristic	Symbol	Min	Max	Unit
<b>ON CHARACTERISTICS(1)</b>				
DC Current Gain ( $I_C = 200\text{ mA dc}$ , $V_{CE} = 5.0\text{ V dc}$ ) ( $I_C = 1000\text{ mA dc}$ , $V_{CE} = 5.0\text{ V dc}$ )	$h_{FE}$	25,000 4,000	— 40,000	—
Collector–Emitter Saturation Voltage ( $I_C = 1000\text{ mA dc}$ , $I_B = 2.0\text{ mA dc}$ )	$V_{CE(sat)}$	—	1.5	Vdc
Base–Emitter On Voltage ( $I_C = 1000\text{ mA dc}$ , $V_{CE} = 5.0\text{ V dc}$ )	$V_{BE(on)}$	—	2.0	Vdc
<b>SMALL–SIGNAL CHARACTERISTICS</b>				
Current–Gain – Bandwidth Product ( $I_C = 200\text{ mA dc}$ , $V_{CE} = 5.0\text{ V dc}$ , $f = 100\text{ MHz}$ )	$f_T$	100	1000	MHz
Collector–Base Capacitance ( $V_{CB} = 10\text{ V dc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )	$C_{cb}$	—	10	pF

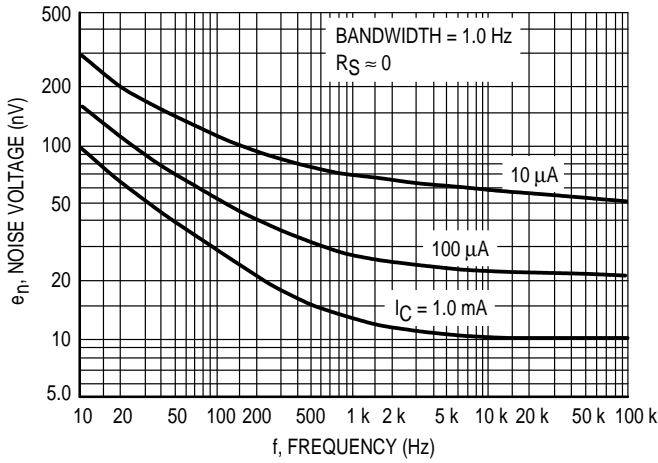
1. Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ ; Duty Cycle  $\leq 2.0\%$ .



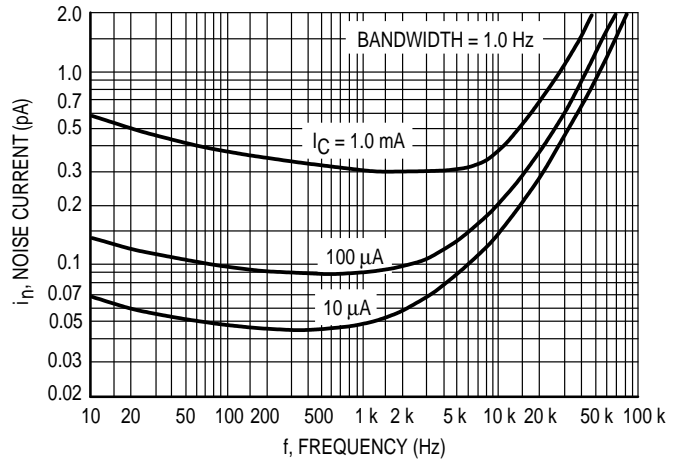
**Figure 1. Transistor Noise Model**

**NOISE CHARACTERISTICS**

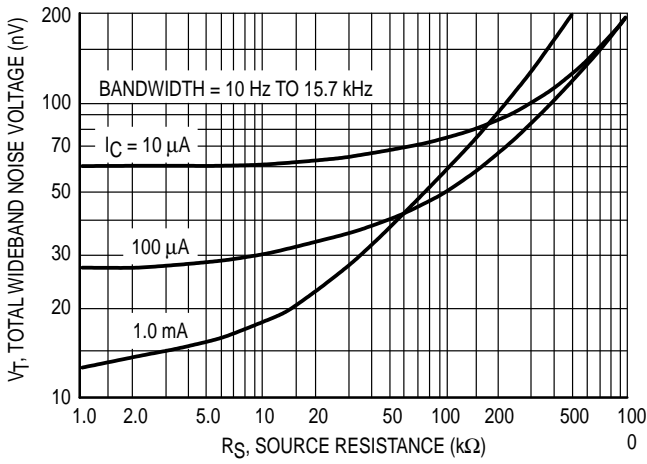
( $V_{CE} = 5.0 \text{ Vdc}$ ,  $T_A = 25^\circ\text{C}$ )



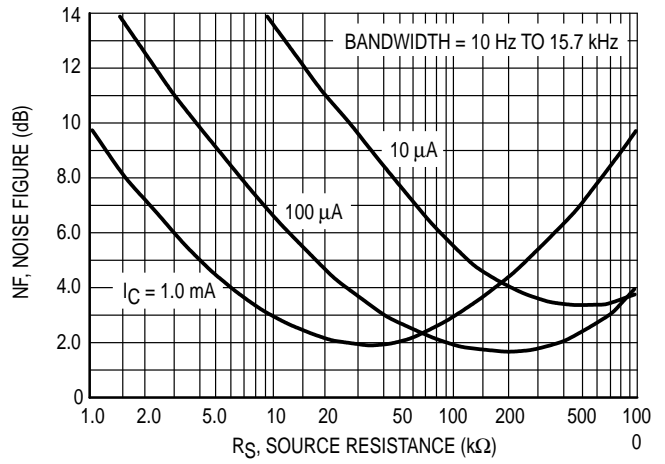
**Figure 2. Noise Voltage**



**Figure 3. Noise Current**



**Figure 4. Total Wideband Noise Voltage**



**Figure 5. Wideband Noise Figure**

SMALL-SIGNAL CHARACTERISTICS

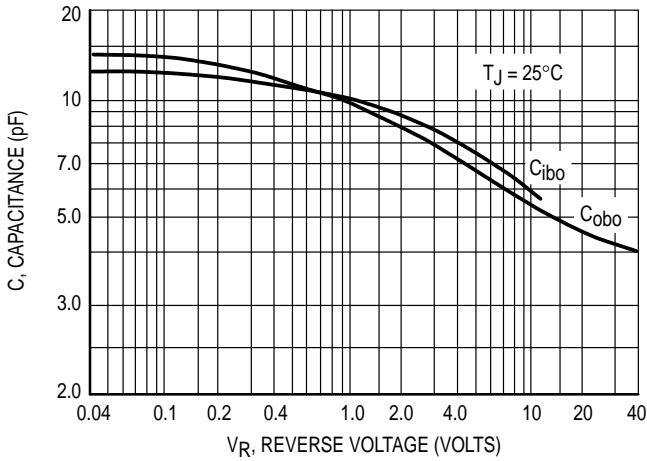


Figure 6. Capacitance

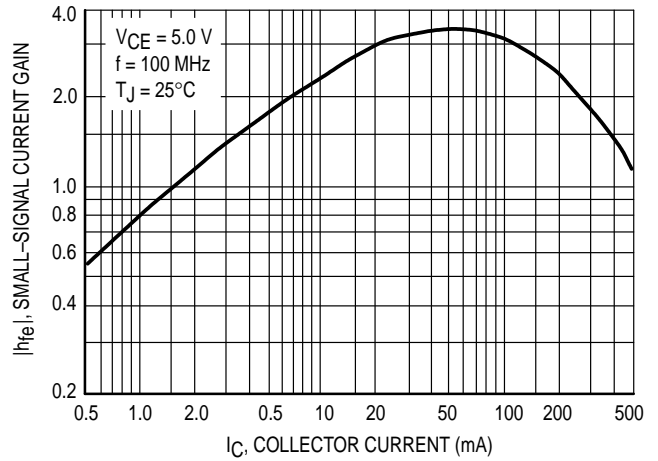


Figure 7. High Frequency Current Gain

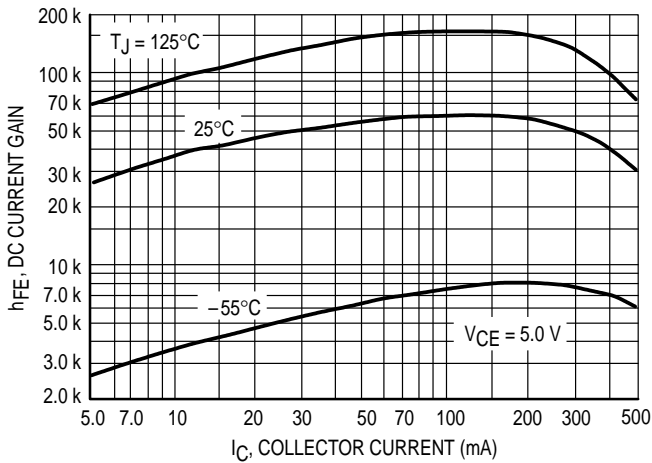


Figure 8. DC Current Gain

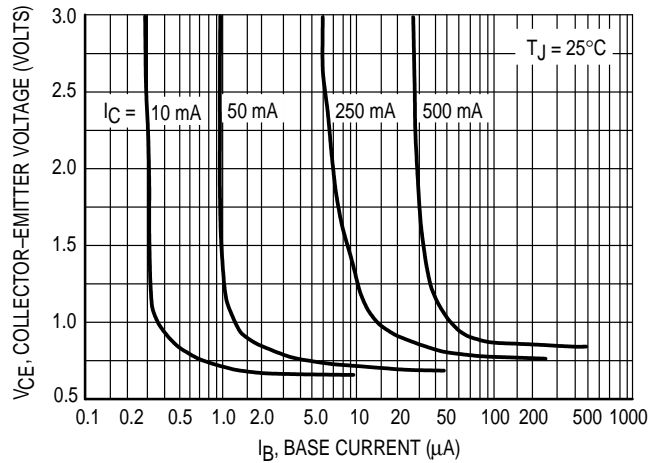


Figure 9. Collector Saturation Region

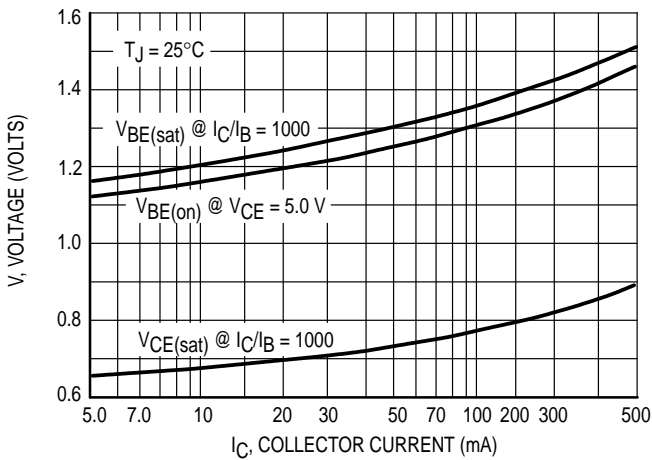


Figure 10. "On" Voltages

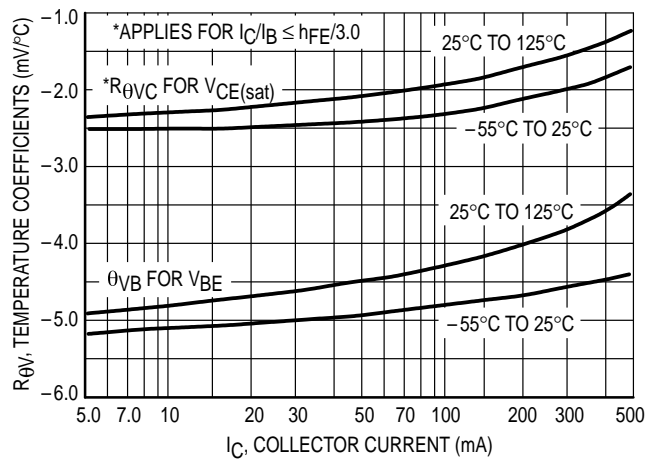


Figure 11. Temperature Coefficients

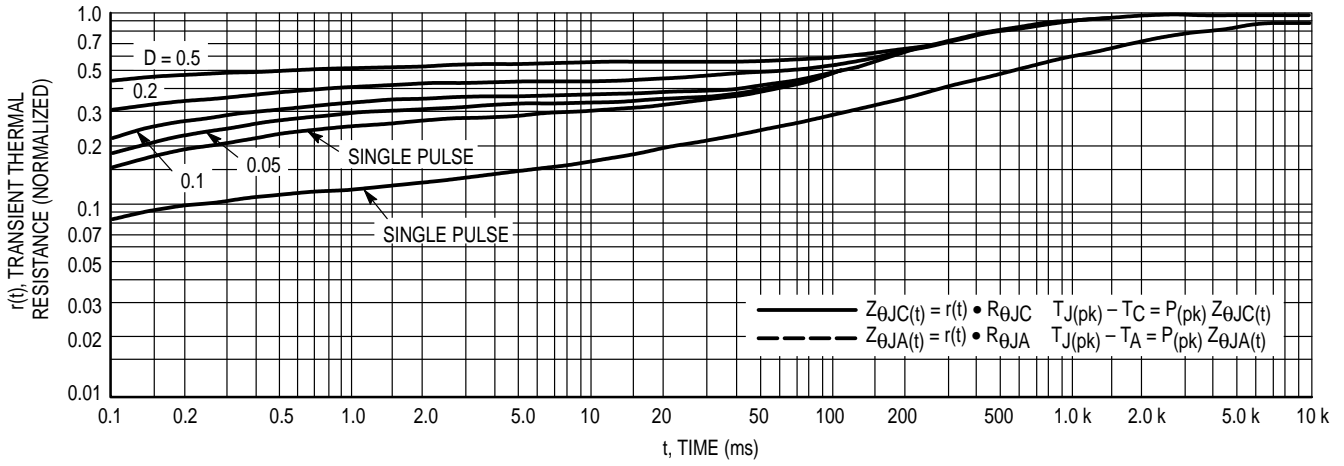


Figure 12. Thermal Response

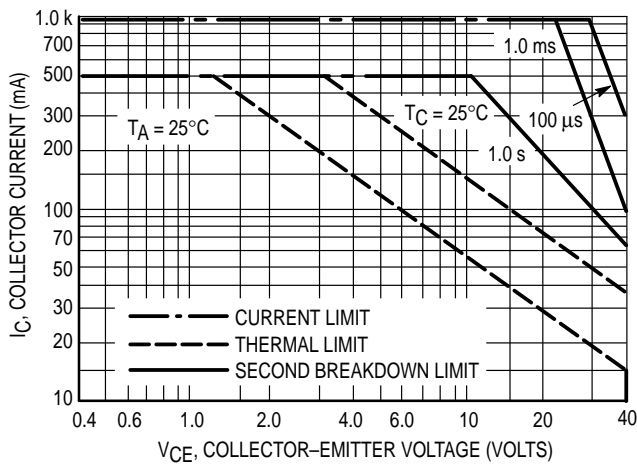
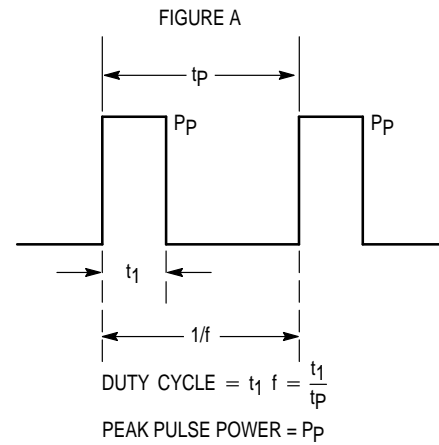
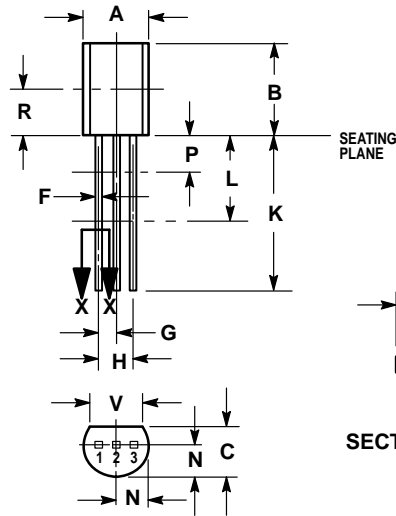


Figure 13. Active Region Safe Operating Area



Design Note: Use of Transient Thermal Resistance Data

PACKAGE DIMENSIONS



SECTION X-X

CASE 029-05  
(TO-226AE)  
ISSUE AD

NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. DIMENSION F APPLIES BETWEEN P AND L. DIMENSIONS D AND J APPLY BETWEEN L AND K MINIMUM. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.175	0.205	4.44	5.21
B	0.290	0.310	7.37	7.87
C	0.125	0.165	3.18	4.19
D	0.018	0.022	0.46	0.56
F	0.016	0.019	0.41	0.48
G	0.045	0.055	1.15	1.39
H	0.095	0.105	2.42	2.66
J	0.018	0.024	0.46	0.61
K	0.500	—	12.70	—
L	0.250	—	6.35	—
N	0.080	0.105	2.04	2.66
P	—	0.100	—	2.54
R	0.135	—	3.43	—
V	0.135	—	3.43	—

STYLE 1:

- PIN 1. EMITTER
2. BASE
3. COLLECTOR

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MFAX: RMFA0@email.sps.mot.com - TOUCHTONE 602-244-6609  
INTERNET: http://Design-NET.com

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