2N6050, 2N6051, 2N6052, 2N6057, 2N6058, 2N6059 File Number **1185**

12-Ampere Complementary P-N-P and N-P-N Monolithic Darlington Power Transistors

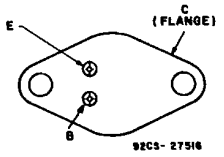
60-80-100 Volts, 150 Watts
Gain of 7000 (Typ.) at 5 A (2N6050, 2N6051, 2N6052)
Gain of 4000 (Typ.) at 5 A (2N6057, 2N6058, 2N6059)

Features:

- **Operates from IC without predriver**
- **Monolithic construction**
- **High voltage ratings:**

$V_{CEO(sus)}$ = 60 V Min. – 2N6050•, 2N6057
= 80 V Min. – 2N6051•, 2N6058
= 100 V Min. – 2N6052•, 2N6059

TERMINAL DESIGNATIONS



JEDEC TO-204AA

The RCA-2N6050, 2N6051, and 2N6052 p-n-p types and the 2N6057, 2N6058, and 2N6059 n-p-n types are complementary monolithic silicon Darlington transistors designed for general-purpose amplifier and low-speed switching applications. The high gain of these devices makes it possible for them to be driven directly from integrated circuits. These devices are supplied in the JEDEC TO-204AA hermetic steel package.

Applications:

- **Power switching**
- **Hammer drivers**
- **Series and shunt regulators**
- **Audio amplifiers**

MAXIMUM RATINGS, *Absolute-Maximum Values:*

	2N6050• 2N6057	2N6051• 2N6058	2N6052• 2N6059	
* V_{CBO}	60	80	100	V
* $V_{CEO(sus)}$	60	80	100	V
* V_{EBO}		5		V
* I_C		12		A
* I_{CM}		20		A
* I_B		0.2		A
* P_T				
$T_C \leq 25°C$		150		W
$T_C > 25°C$ Derate linearly		0.857		W/°C
* T_{stg}, T_J		−65 to 200		°C
* T_L				
At distances ≥ 1/16 in. (1.58 mm) from case for 10 s max.		235		°C

* In accordance with JEDEC registration data. • For p-n-p devices, voltage and current values are negative.

2N6050, 2N6051, 2N6052, 2N6057, 2N6058, 2N6059

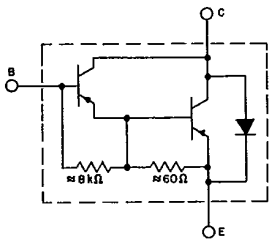


Fig. 1 – Schematic diagram for 2N6050, 2N6051, and 2N6052.

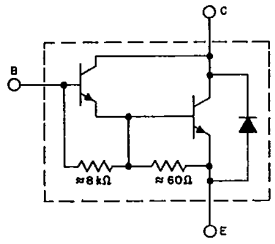


Fig. 2 – Schematic diagram for 2N6057, 2N6058, and 2N6059.

ELECTRICAL CHARACTERISTICS, *at Case Temperature (T_C) = 25°C Unless Otherwise Specified*

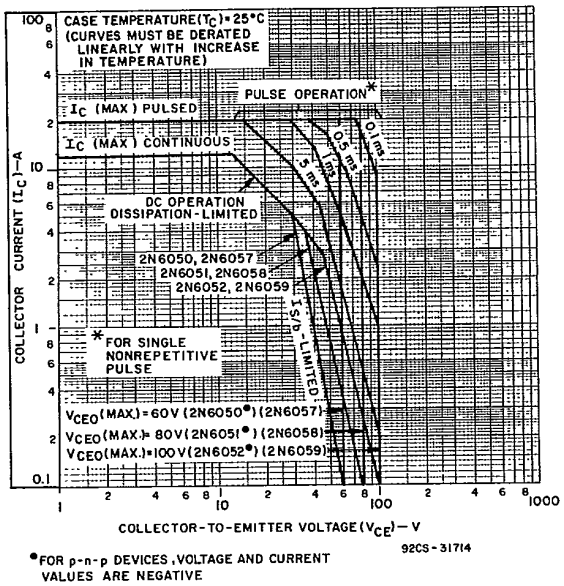
	CHARACTERISTIC	TEST CONDITIONS				LIMITS						UNITS
		VOLTAGE V dc		CURRENT A dc		2N6050● 2N6057		2N6051● 2N6058		2N6052● 2N6059		
		V_{CE}	V_{BE}	I_C	I_B	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
*	I_{CEO}	30			0	–	1	–	–	–	–	mA
		40			0	–	–	–	1	–	–	
		50			0	–	–	–	–	–	1	
*	I_{CEX}	60	−1.5			–	0.5	–	–	–	–	
		80	−1.5			–	–	–	0.5	–	–	
		100	−1.5			–	–	–	–	–	0.5	
	T_C = 150°C	60	−1.5			–	5	–	–	–	–	
		80	−1.5			–	–	–	5	–	–	
		100	−1.5			–	–	–	–	–	5	
*	I_{EBO}		−5	0		–	2	–	2	–	2	mA
*	$V_{CEO(sus)}$			0.1[a]	0	60	–	80	–	100	–	V
*	h_{FE}	3		12[a]		100	–	100	–	100	–	
		3		6[a]		750	18,000	750	18,000	750	18,000	
*	$V_{CE(sat)}$			12[a]	0.12	–	3	–	3	–	3	V
				6[a]	0.024	–	2	–	2	–	2	
*	V_{BE}	3		6[a]		–	2.8	–	2.8	–	2.8	V
*	$V_{BE(sat)}$			12[a]	0.12	–	4	–	4	–	4	V
*	h_{fe} f = 1 kHz	3		5		300	–	300	–	300	–	
*	$\|h_{fe}\|$ f = 1 MHz	3		5		4	–	4	–	4	–	
*	C_{ob} V_{CB} = 10 V, I_E 0, f = 0.1 MHz											
	2N6050-52					–	500	–	500	–	500	pF
	2N6057-59					–	300	–	300	–	300	
	$I_{S/b}$ t = 1 s, nonrep.	30				5	–	5	–	5	–	A
	$R_{\theta JC}$						1.17	–	1.17	–	1.17	°C/W

[a] Pulsed: Pulse duration = 300 μs, duty factor = 1.8%.

● For p-n-p devices, voltage and current values are negative.

* In accordance with JEDEC registration data.

2N6050, 2N6051, 2N6052, 2N6057, 2N6058, 2N6059



*FOR p-n-p DEVICES, VOLTAGE AND CURRENT VALUES ARE NEGATIVE

Fig. 3 — Maximum operating areas for all types.

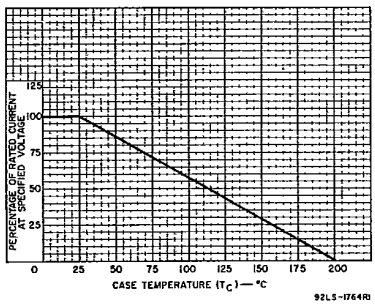


Fig. 4 — Current derating curve for all types.

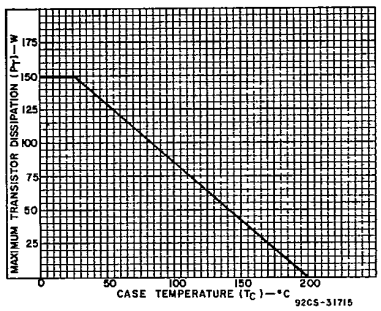


Fig. 5 — Power derating curve for all types.

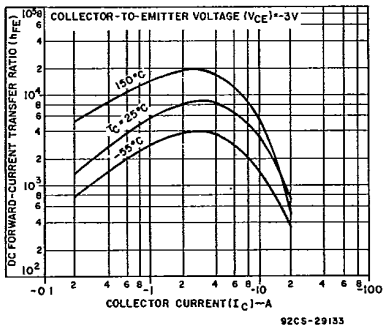


Fig. 6 — Typical dc beta characteristics for 2N6050, 2N6051, and 2N6052.

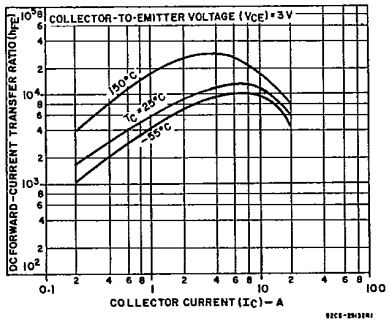


Fig. 7 — Typical dc beta characteristics for 2N6057, 2N6058, and 2N6059.

2N6050, 2N6051, 2N6052, 2N6057, 2N6058, 2N6059

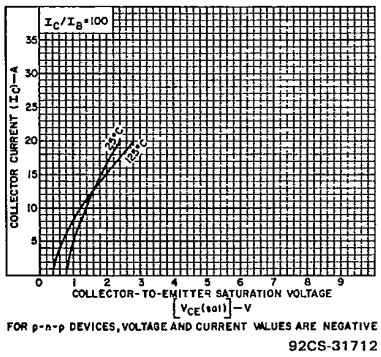


Fig. 8 — Typical saturation characteristics for all types.

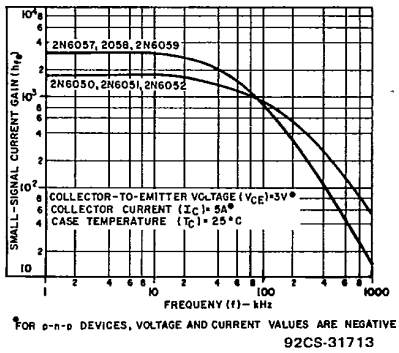


Fig. 9 — Typical small-signal current gain for all types.

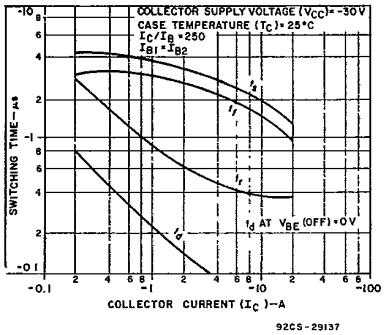


Fig. 10 — Typical switching times for 2N6050, 2N6051, and 2N6052.

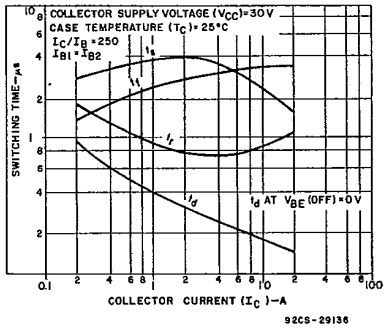


Fig. 11 — Typical switching times for 2N6057, 2N6058, and 2N6059.

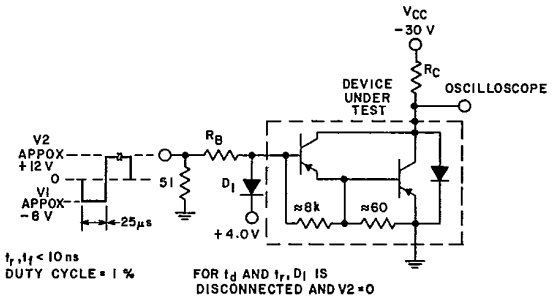


Fig. 12 — Switching times test circuit.