

2N6386, 2N6387, 2N6388

File Number 610

## 10-Ampere N-P-N Darlington Power Transistors

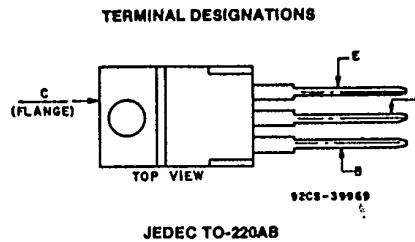
•40-60-80 Volts, 65 Watts  
Gain of 1000 at 5 A (2N6387, 2N6388)  
Gain of 1000 at 3 A (2N6386)

**Features:**

- Operates from IC without predriver

**Applications:**

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



The 2N6386, 2N6387, and 2N6388<sup>®</sup> are monolithic silicon n-p-n Darlington transistors designed for low- and medium-frequency power applications. The high gain of these devices make it possible for them to be driven directly from integrated circuits. The 2N6386 is complementary to the 2N6666, the 2N6387 is complementary to the 2N6667, and the 2N6388 is complementary to the 2N6668. These devices are supplied in the JEDEC TO-220AB (VERSA-WATT) plastic package.

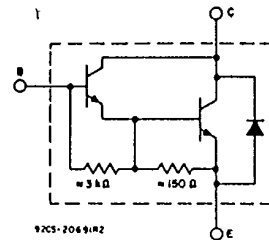


Fig. 1 - Schematic diagram for all types.

**MAXIMUM RATINGS, Absolute-Maximum Values:**

	2N6386	2N6387	2N6388	
* VCBO . . . . .	40	60	80	V
VCER(sus)				
RBE = 100 Ω . . . . .	40	60	80	V
VCEO(sus) . . . . .	40	60	80	V
* VCEV(sus)				
VBE = -1.5 V . . . . .	40	60	80	V
* VEBO . . . . .	5	5	5	V
* IC . . . . .	8	10	10	A
ICM . . . . .	15	15	15	A
* IB . . . . .	0.25	0.25	0.25	A
* PT				
TC < 25°C . . . . .	65	65	65	W
TC > 25°C . . . . .	See Fig. 2			
* Tstg, TJ . . . . .	-65 to +150			°C
* TL . . . . .	235			°C
At distances > 1/8 in. (3.17 mm) from case for 10 s max.				

\* In accordance with JEDEC registration data format JS-6 RDF-2.

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ELECTRICAL CHARACTERISTICS, At Case Temperature ( $T_C$ ) = 25°C Unless Otherwise Specified

CHARACTERISTIC SYMBOL	TEST CONDITIONS				LIMITS						UNITS
	VOLTAGE V <sub>dc</sub>		CURRENT A <sub>dc</sub>		2N6386		2N6387		2N6388		
	V <sub>CE</sub>	V <sub>BE</sub>	I <sub>C</sub>	I <sub>B</sub>	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
* I <sub>CEO</sub>	80			0	-	-	-	-	-	1	mA
	60			0	-	-	-	1	-	-	
	40			0	-	1	-	-	-	-	
* I <sub>CEV</sub>	80	-1.5			-	-	-	-	-	0.3	
	60	-1.5			-	-	-	0.3	-	-	
	40	-1.5			-	0.3	-	-	-	-	
T <sub>C</sub> = 125°C	80	-1.5			-	-	-	-	-	3	
	60	-1.5			-	-	-	3	-	-	
	40	-1.5			-	3	-	-	-	-	
* I <sub>EBO</sub>		5	0		-	5	-	5	-	5	mA
* V <sub>CEO(sus)</sub>			0.2 <sup>a</sup>	0	40	-	60	-	80	-	V
V <sub>CEV(sus)</sub> R <sub>BE</sub> = 100 Ω			0.2 <sup>a</sup>		40	-	60	-	80	-	
V <sub>CEV(sus)</sub>		-1.5	0.2 <sup>a</sup>		40	-	60	-	80	-	
* h <sub>FE</sub>	3		3 <sup>a</sup>		1000	20,000	-	-	-	-	
	3		5 <sup>a</sup>		-	-	1000	20,000	1000	20,000	
	3		8 <sup>a</sup>		100	-	-	-	-	-	
	3		10 <sup>a</sup>		-	-	100	-	100	-	
* V <sub>BE</sub>	3		3 <sup>a</sup>		-	2.8	-	-	-	-	V
	3		5 <sup>a</sup>		-	-	-	2.8	-	2.8	
	3		8 <sup>a</sup>		-	4.5	-	-	-	-	
	3		10 <sup>a</sup>		-	-	-	4.5	-	4.5	
* V <sub>CE(sat)</sub>			3 <sup>a</sup>	0.006 <sup>a</sup>	-	2	-	-	-	-	V
			5 <sup>a</sup>	0.01 <sup>a</sup>	-	-	-	2	-	2	
			8 <sup>a</sup>	0.08 <sup>a</sup>	-	3	-	-	-	-	
			10 <sup>a</sup>	0.1 <sup>a</sup>	-	-	-	3	-	3	
V <sub>F</sub>			-8 <sup>a</sup>		-	4	-	-	-	4	V
* h <sub>fe</sub> f = 1 kHz	5		1		1000	-	1000	-	1000	-	
*  h <sub>fe</sub>   f = 1 MHz	5		1		20	-	20	-	20	-	
* C <sub>ob</sub> V <sub>CB</sub> = 10 V, f = 1 MHz					-	200	-	200	-	200	pF
I <sub>S/b</sub> t = 1 s, nonrep.	25				2.6	-	2.6	-	2.6	-	A
R <sub>θJC</sub>					-	1.92	-	1.92	-	1.92	°C/W

<sup>a</sup> Pulsed: Pulse duration = 300 μs, duty factor = 1.8%.  
\* In accordance with JEDEC registration data format JS-6 RDF-2.

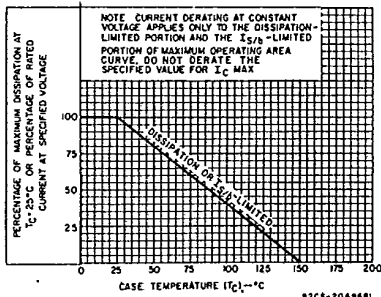


Fig. 2 - Derating curve for all types.

Fig. 3 - Typical dc-beta characteristics for all types.

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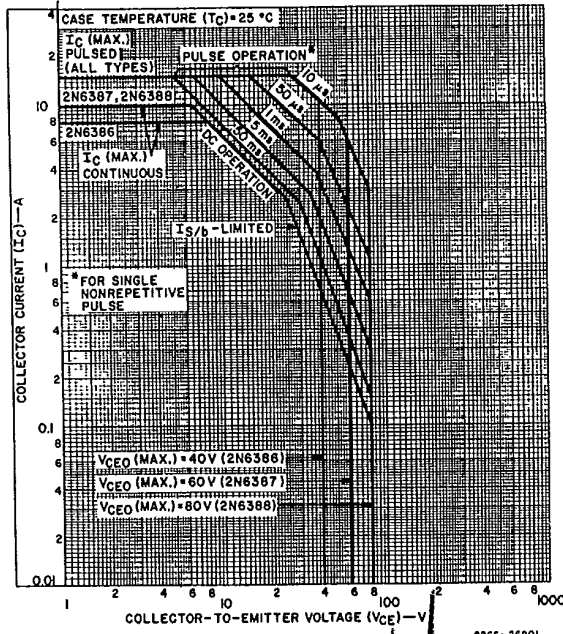


Fig. 4 — Maximum operating areas for all types.

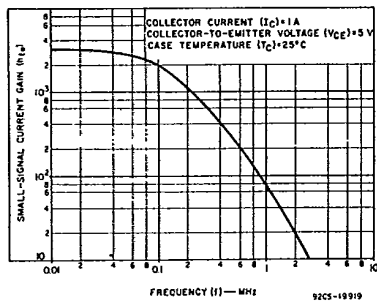


Fig. 5 — Typical small-signal gain for all types.

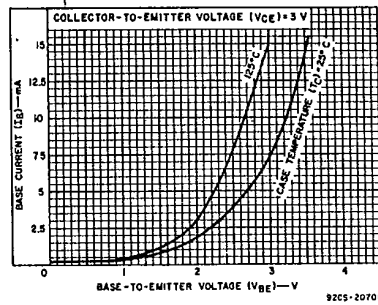


Fig. 6 — Typical input characteristics for all types.

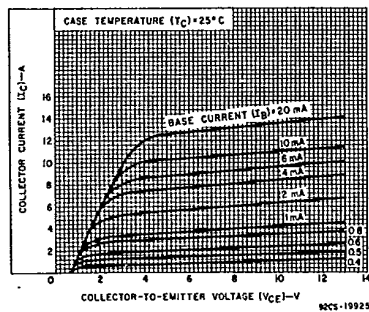


Fig. 7 — Typical output characteristics for all types.

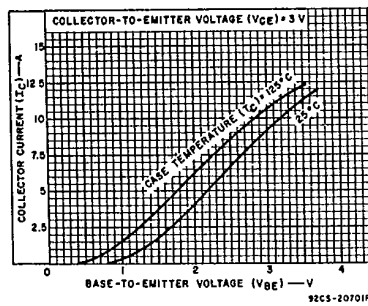


Fig. 8 — Typical transfer characteristics for all types.

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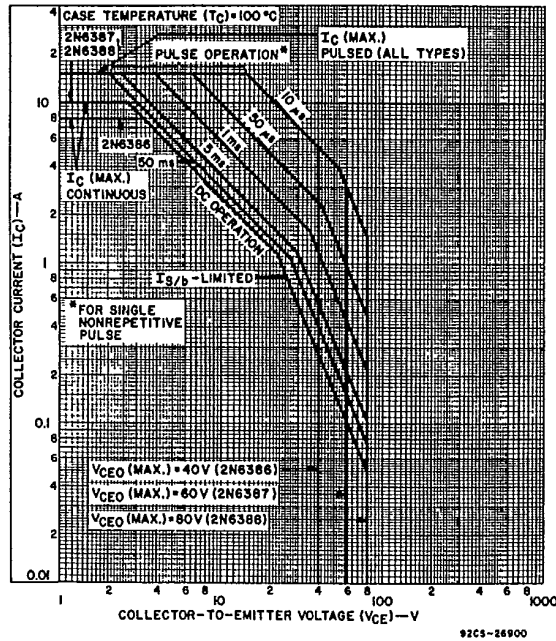


Fig. 9 — Maximum operating areas for all types at  $T_c = 100^\circ\text{C}$ .

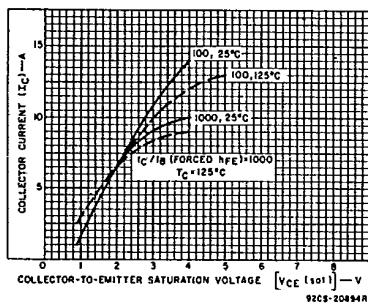


Fig. 10 — Typical saturation characteristics for all types.

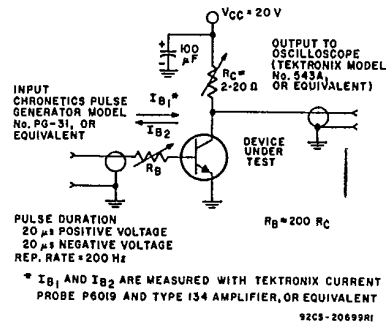


Fig. 11 — Circuit used to measure saturated switching-times.

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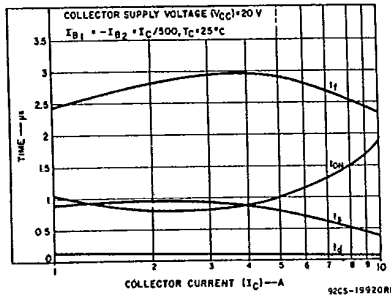


Fig. 12 — Typical saturated switching-time characteristics for all types.

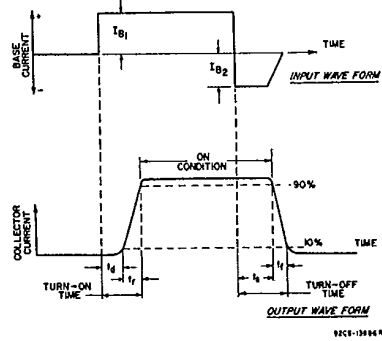


Fig. 13 — Phase relationship between input current and output current showing reference points for specification of switching-times.