EPITAXIAL-BASE N-P-N & P-N-P POWER TYPES

I_C to 15 A . . . P_T to 200 W . . . V_{CE} to 125 V

I_c = −3.5 max. P_T = 10 W max. (TO-39)	I_c = 6 A max. P_T = 40 W max. (TO-66)**	I_c = −6 A max. P_T = 40 W max. (TO-66)**	I_c = 7 A max. P_T = 40 W max. VERSAWATT (TO-220)	I_c = −7 A max. P_T = 40 W max. VERSAWATT (TO-220)	I_c = 15 A max. P_T = 125 W max. (TO-3)	I_c = −15 A max. P_T = 125 W max. (TO-3)	I_c = 15 A max. P_T = 75 W max. VERSAWATT (TO-220)	I_c = −15 A max. P_T = 75 W max. VERSAWATT (TO-220)
90 x 90▲	90 x 90	90 x 90	90 x 90	90 x 90	150 x 150	150 x 150	150 x 150	150 x 150
Family Designation								
2N5781 [P-N-P]	**2N6372** [N-P-N]	**2N5954** [P-N-P]	**2N6292** [N-P-N]	**2N6107** [P-N-P]	**2N6472** [N-P-N]	**2N6248** [P-N-P]	**2N6488** [N-P-N]	**2N6491** [P-N-P]
2N5783 $V_{CER(SUS)}$ = −45 V h_{FE} = 20-100 @ −1.6 A f_T = 8 MHz min. CT File No. 413E	**2N6374** $V_{CER(SUS)}$ = 45 V h_{FE} = 20-100 @ 3 A f_T = 4 MHz min. File No.675	**2N5956** $V_{CER(SUS)}$ = −45 V h_{FE} = 20-100 @ −3 A f_T = 5 MHz min. CT File No.675	**2N6288** **2N6289** $V_{CER(SUS)}$ = 40 V h_{FE} = 30-150 @ 3 A f_T = 4 MHz min. File No.676	**2N6110** **2N6111** $V_{CER(SUS)}$ = −40 V h_{FE} = 30-150 @ −3 A f_T = 10 MHz min. CT File No.676	**2N6470** $V_{CER(sus)}$=45V h_{FE}=20-150 @ 5 A f_T=5 MHz typ. File No. 677	**2N6469** $V_{CER(sus)}$= −45V h_{FE}=20-150 @ −5 A f_T=6 MHz min. CT File No. 677	**2N6486** $V_{CER(sus)}$=50V h_{FE}=20-150 @ 5 A f_T=5 MHz typ. File No. 678	**2N6489** $V_{CER(sus)}$= −50V h_{FE}=20-150 @ −5A f_T= 5 MHz typ. File No. 678
2N5782 $V_{CER(SUS)}$ = −65 V h_{FE} = 20-100 @ −1.2 A f_T = 8 MHz min. CT 413E	**2N6373** $V_{CER(SUS)}$ = 65 V h_{FE} = 20-100 @ 2.5 A f_T = 4 MHz min. 675	**2N5955** $V_{CER(SUS)}$ = −65 V h_{FE} = 20-100 @ −2.5 A f_T = 5 MHz min. CT 675	**2N6290** **2N6291** $V_{CER(SUS)}$ = 60 V h_{FE} = 30-150 @ 2.5 A f_T = 4 MHz min. 676	**2N6108** **2N6109** $V_{CER(SUS)}$ = −60 V h_{FE} = 30-150 @ −2.5 A f_T = 10 MHz min. CT 676	**2N6471** $V_{CER(sus)}$=65V h_{FE}=20-150 @ 5A f_T= 5MHz typ. 677	**2N6246** $V_{CER(SUS)}$ = −65 V h_{FE} = 20-150 @ −5 A f_T = 6 MHz min. 677	**2N6487** $V_{CER(sus)}$=70V h_{FE}=20-150 @ 5A f_T= 5 MHz typ. 678	**2N6490** $V_{CER(sus)}$= −70V h_{FE}=20-150 @ −5A f_T= 5 MHz typ. 678
2N5781 $V_{CER(SUS)}$ = −80 V h_{FE} = 20-100 @ −1 A f_T = 8 MHz min. CT 413E	**2N6372** $V_{CER(SUS)}$ = 85 V h_{FE} = 20-100 @ 2 A f_T = 4 MHz min. 675	**2N5954** $V_{CER(SUS)}$ = −85 V h_{FE} = 20-100 @ −2 A f_T = 5 MHz min. 675	**2N6292** **2N6293** $V_{CER(SUS)}$ = 80 V h_{FE} = 30-150 @ 2 A f_T = 4 MHz min. 676	**2N6106** **2N6107** $V_{CER(SUS)}$ = −80 V h_{FE} = 30-150 @ −2 A f_T = 10 MHz min. CT 676	**2N6472** $V_{CER(sus)}$=85V h_{FE}=20-150 @ 5A f_T= 5 MHz typ. 677	**2N6247** $V_{CER(SUS)}$ = −85 V h_{FE} = 20-150 @ 5 A f_T = 6 MHz min. CT 677	**2N6488** $V_{CER(sus)}$=90V h_{FE}=20-150 @ 5A f_T= 5 MHz typ. 678	**2N6491** $V_{CER(sus)}$= −90V h_{FE}= 20-150 @ −5A f_T= 5 MHz typ. 678
			2N6473 $V_{CER(sus)}$=110V h_{FE}=30-150 @ 1.5A f_T=5 MHz typ. 676	**2N6475** $V_{CER(sus)}$=110V h_{FE}=30-150 @ −1.5A f_T=5 MHz typ. 676		**2N6248** $V_{CER(SUS)}$ = −105 V h_{FE} = 20-100 @ −5 A f_T = 6 MHz min. CT 677		
			2N6474 $V_{CER(sus)}$=130V h_{FE}=30-150 @ 1A f_T= 5 MHz typ. 676	**2N6476** $V_{CER(sus)}$=130V h_{FE}=30-150 @ −1A f_T= 5 MHz typ. 676				

▲Pellet size—values shown are edge dimensions in thousands-of-an-inch (mils).

**Available with free-air radiator $R_{\theta JA}$ = 30° C/W

"TA" designations (e.g. TA8662) in this booklet are Developmental-type devices.

File No. (e.g. File No.413E), where shown, relates to the data bulletin.

CT—Complementary Type available, see matrix on Complementary-Pair Power Types.

COMPLEMENTARY-PAIR POWER TYPES

Hometaxial-Base/Epitaxial-Base

I_C 1.5 to 2 A		I_C = 2.5 A		I_C 3 to 3.5 A		I_C 4 to 6 A		I_C 12 to 17 A	
N-P-N	**P-N-P**	**N-P-N**	**P-N-P**	**N-P-N**	**P-N-P**	**N-P-N**	**P-N-P**	**N-P-N**	**P-N-P**
2N5293 **2N5294** $V_{CER}(SUS)$ = 75 V I_C = 1.5 A VERSAWATT (TO-220) **File No. 322**	**2N6106** **2N6107** $V_{CER}(SUS)$ = −80 V I_C = −1.5 A VERSAWATT (TO-220) File No.676	**2N5786** $V_{CER}(SUS)$ = 45 V I_C = 2.5 A (TO-39) File No.413E	**2N5783** $V_{CER}(SUS)$ = −45 V I_C = −2.5 A (TO-39) 413E	**2N3054** $V_{CER}(SUS)$ = 60 V I_C = 3 A (TO-66) **File No. 527**	**2N5955** $V_{CER}(SUS)$ = −65 V I_C = −3 A (TO-66) 675	**2N5495** **2N5494** $V_{CER}(SUS)$ = 50 V I_C = 4 A VERSAWATT (TO-220) **File No. 353**	**2N6110** **2N6111** $V_{CER}(SUS)$ = −40 V I_C = −4 A VERSAWATT TO-220) File No.676	**2N3055** $V_{CER}(SUS)$ = 70 V I_C = 12 A (TO-3) **File No. 524**	**2N6247** $V_{CER}(SUS)$ = −90V I_C = −12 A (TO-3) File No.677
2N5295 **2N5296** $V_{CER}(SUS)$ = 50 V I_C = 2 A VERSAWATT (TO-220) **322**	**2N6106** **2N6107** $V_{CER}(SUS)$ = −80 V I_C = −2 A VERSAWATT (TO-220) 676	**2N5297** **2N5298** $V_{CER}(SUS)$ = 70 V I_C = 2.5 A VERSAWATT (TO-220) **322**	**2N6106** **2N6107** $V_{CER}(SUS)$ = −80 V I_C = −2.5 A VERSAWATT (TO-220) 676	**2N5491** **2N5490** $V_{CER}(SUS)$ = 50 V I_C = 3 A VERSAWATT (TO-220) **353**	**2N6106** **2N6107** $V_{CER}(SUS)$ = −80 V I_C = −3 A VERSAWATT (TO-220) 676	**2N4347** $V_{CEV}(SUS)$ = 140 V I_C = 4 A (TO-3) **528**	**2N5954*** $V_{CER}(SUS)$ = −85 V I_C = −4 A (TO-66) 675	**2N4348** $V_{CEV}(SUS)$ = 140 V I_C = 14 A (TO-3) **526**	**2N6248** $V_{CER}(SUS)$ = −110 V I_C = −14 A (TO-3) 677
2N3441 $V_{CER}(SUS)$ = 150 V I_C = 2 A (TO-66) **529**	**(2N6468)†** $V_{CER}(SUS)$ = −125 V I_C = −2 A (TO-66)	**2N5785** $V_{CER}(SUS)$ = 65 V I_C = 2.5 A (TO-39) **413 E**	**2N5782** $V_{CER}(SUS)$ = −65 V I_C = −2.5 A (TO-39) **413 E**	**40250** $V_{CER}(SUS)$ = 50 V I_C = 3.5 A (TO-66) **112**	**2N5956** $V_{CER}(SUS)$ = −45 V I_C = −3.5 A (TO-66) **435**	**2N6371** $V_{CEV}(SUS)$ = 50 V I_C = 6 A (TO-3) **607**	**2N5956** $V_{CER}(SUS)$ = −45 V I_C = −6 A (TO-66) 675	**2N3772** $V_{CER}(SUS)$ = 70 V I_C = 17 A (TO-3) **525**	**2N6247** $V_{CER}(SUS)$ = −90 V I_C = −17 A (TO-3) 677
		2N5784 $V_{CER}(SUS)$ = 80 V I_C = 2.5 A (TO-39) **413 E**	**2N5781** $V_{CER}(SUS)$ = −80 V I_C = −2.5 A (TO-39) **413 E**	**2N5493** **2N5492** $V_{CER}(SUS)$ = 65 V I_C = 3.5 A VERSAWATT (TO-220) **353**	**2N6108** **2N6109** $V_{CER}(SUS)$ = −60 V I_C = −3.5 A VERSAWATT (TO-220) 676	**2N3055** $V_{CER}(SUS)$ = 70 V I_C = 6 A (TO-3) **524**	**2N5955** $V_{CER}(SUS)$ = −65 V I_C = −6 A (TO-66) 675		

* Or higher voltage type 2N6248.

High-Voltage

I_C = 0.2 A		I_C = 2 A	
N-P-N	**P-N-P**	**N-P-N**	**P-N-P**
2N3440 $V_{CEO}(SUS)$ = 250 V I_C = 0.2 A (TO-39) File No.64E	**2N5415** $V_{CEO}(SUS)$ = −200 V I_C = −0.2 A (TO-39) File No.336E	**2N3584** $V_{CER}(SUS)$ = 350 V I_C = 2 A (TO-66) **File No. 138**	**2N6212** $V_{CER}(SUS)$ = −325 V I_C = −2 A (TO-66) **File No. 507**
2N6175 $V_{CER}(SUS)$ = 300 V I_C = 0.2 A (Plastic TO-5) 508 E	**BFT19A** $V_{CER}(sus)$ = −300 V I_C = −0.2 A (TO-39) 683	**2N3585** $V_{CER}(SUS)$ = 400 V I_C = 2 A (TO-66) 138	**2N6213** $V_{CER}(SUS)$ = −375 V I_C = −2 A (TO-66) 507
2N3439 $V_{CEO}(SUS)$ = 350 V I_C = 0.2 A (TO-39) 64 E	**2N5416** $V_{CER}(SUS)$ = −350 V I_C = −0.2 A (TO-39) 336	**BUX67** $V_{CER}(sus)$ = 175V I_C = 2A (TO−66) 871	**BUX66** $V_{CER}(sus)$ = −175V I_C = −2A (TO−66) 870
2N6176 $V_{CER}(SUS)$ = 350 V I_C = 0.2 A (Plastic TO-5) 508 E	**BFT19B** $V_{CER}(SUS)$ = −400V I_C = −0.2 A (TO-39) 683	**BUX67A** $V_{CER}(sus)$ = 275V I_C = 2A (TO−66) 871	**BUX66A** $V_{CER}(sus)$ = −275V I_C = −2A (TO−66) 870
		BUX67B $V_{CER}(sus)$ = 350V I_C = 2A (TO−66) 871	**BUX66B** $V_{CER}(sus)$ = −350V I_C = −2A (TO−66) 870
		BUX67C $V_{CER}(sus)$ = 400V I_C = 2A (TO−66) 871	**BUX66C** $V_{CER}(sus)$ = −400V I_C = −2A (TO−66) 870

Note: The collector current (I_C) value shown is for h_{FE} of 10 min.

High-Speed

I_C = 1 A			
N-P-N	**P-N-P**	**N-P-N**	**P-N-P**
2N3053 $V_{CER}(SUS)$ = 50 V I_C = 1 A (TO-39) **File No. 432 E**	**2N4037** $V_{CER}(SUS)$ = −60 V I_C = −1 A (TO-39) File No.216E	**2N6179** $V_{CER}(SUS)$ = 65 V I_C = 1 A (Plastic TO-5) **File No. 562**	**2N6181** $V_{CER}(SUS)$ = −65 V I_C = −1 A (Plastic TO-5) 562
2N2102 $V_{CER}(SUS)$ = 80 V I_C = 1 A (TO-39) 106E	**2N4036** $V_{CER}(SUS)$ = −85 V I_C = −1 A (TO-39) 216 E	**2N6178** $V_{CER}(SUS)$ = 90 V I_C = 1 A (Plastic TO-5) 562	**2N6180** $V_{CER}(SUS)$ = −90 V I_C = −1 A (Plastic TO-5) 562
2N5321 $V_{CER}(SUS)$ = 65 V I_C = 1 A (TO-39) 325 E	**2N5323** $V_{CER}(SUS)$ = −65 V I_C = −1 A (TO-39) 325 E		
2N5320 $V_{CER}(SUS)$ = 90 V I_C = 1 A (TO-39) 325 E	**2N5322** $V_{CER}(SUS)$ = −90 V I_C = −1A (TO-39) 325 E		

File No. (e.g. File No. 322), where shown, relates to data bulletin.

See Epitaxial-Base and Monolithic Darlington Matrices for additional Complementary-Pair Power Types.

APPLICATION INFORMATION. . .

Power Types [N-P-N & P-N-P] for Inverter/Switching Regulator Service

Frequency Range	Peak Voltage Required	Peak Primary Current Requirement				
		Up to 0.2 A	0.2 to 1 A	1 to 4 A	4 to 20 A	>20 A
60 Hz to 50 kHz	10 to 60V	2N3053 2N4037	2N5321 2N5323 2N6179 2N6181	2N3054 2N5497▲	2N3055 2N3772	-
	60 to 150V	2N1486 2N2102 2N4036	2N1486 2N3441 2N5298 2N5781 2N5784	2N3442 2N3879 2N5293▲ 2N5954●	2N3265 2N3773 2N5039 2N5672 2N6248● 41012 41013	2N5671 2N6032
	150 to 450V	2N3440 2N5416 BFT 19 A,B,C	-	2N3585 2N6212● 40850 40851	2N5805 2N5840 2N6251 410 411 413 423 40852 431 40853 2N6514 40854 BUX 18	-
		BFT 28 A,B,C 2N6177▲				
	Off Line 220V (Rectifier 400-800V)				TA8764 2N5240 TA8900 BUX 16,A,B,C 2N6513 BUX 18,C	

●P-N-P types
▲Plastic-packaged types

$V_{PEAK} = V_{CEX}$ value

V_{PEAK} = 2.2 V (V_{CC}) for push-pull inverters
= 1.1 V (V_{CC}) for bridge inverters
= 1.1 V (Source) for switching regulators

2N5786 FAMILY [n-p-n] (silicon) [cont'd]

f_T = 1 MHz min; P_T = 10 W max

DESCRIPTION	$V_{CEO(sus)}$ V	$V_{CER(sus)}$ V	$V_{CEV(sus)}$ V	h_{FE}	I_C A	V_{CE} V	I_{CER}–mA Temp.–°C 25	150	V_{CE} V	$V_{CE(sat)}$–V I_C A	I_B A	V_{BE}–V I_C A
AUDIO TYPES												
40610 Output, 3-W Audio Ampli.	25	–	–	20-100	1.2	1	1▲	–	25	–	–	–	–	–
40615 Output, 5-W Audio Ampli.	30	–	–	20-100	1.2	1	1▲	–	25	–	–	–	–	–
40620 Output, 7-W Audio Ampli.	32	–	–	20-100	1.5	1	1▲	–	25	–	–	–	–	–

▲I_{CER}–μA

TO-39

2N5840 FAMILY [n-p-n] (silicon)

f_T = 5 MHz min; P_T = 100 W max

2N TYPES													
2N5838 High Voltage, Fast Switch	250	275	275	8-40	3	2	5●	8■	265	1	3	0.375	2	3
2N5839 High Voltage, Fast Switch	275	300	300	10-50	2	3	2●	5■	290	1.5	2	0.2	2	2
2N5840 High Voltage, Fast Switch	350	375	375	10-50	2	3	2●	5■	360	1.5	2	0.2	2	2
AUDIO TYPES													
41016 Output, 70-W Amplifier	**100**	**120**	-	**10-50**	**4**	**4**	**1**	–	**90**	**2**	**4**	**0.8**	**2**	**4**
OTHER TYPES													
410 † High Voltage, Inverter Applications	200	–	–	**30-90**	1	5	0.25*	0.5▲	200	0.8	1	0.1	1.5	1
411 † High Voltage, Inverter Applications	300	–	–	**30-90**	1	5	0.25	0.5▲	300	0.8	1	0.1	1.5	1
413 † High Voltage, Inverter Applications	325	–	–	20-80	0.5	5	0.25	0.5▲	400	0.8	0.5	0.05	1.5	0.5
423 † High Voltage, Inverter Applications	325	–	–	30-90	1	5	0.25	0.5▲	400	0.8	1	0.1	1.5	1
431 † High Voltage, Inverter Applications	325	–	–	15-35	2.5	5	2.5	5▲	400	0.7	2.5	0.5	1.5	2.5
40852 Off-Line Switching-Regulator for Power Supplies	350	375	–	12 min.	1.2	1	0.5●	5▲	450	3	4	0.8	2	4

●I_{CEV} ■I_{CEV} @ 100°C *I_{CEO} ▲I_{CEV} @ 125°C † Not recommended as replacement types.

TO-3

2N5954 FAMILY [p-n-p] (silicon)

f_T = 5 MHz min; P_T = 40 W max

2N TYPES													
2N5956 General Purpose, Medium Power	-40	-45	-50▲	20-100	-3	-4	-100●		-35	-1	-3	-0.3	-2	-3
2N5955 General Purpose, Medium Power	-60	-65	-70▲	20-100	-2.5	-4	-100●		-55	-1	-2.5	-0.25	-2	-2.5
2N5954 General Purpose, Medium Power	-80	-85	-90▲	20-100	-2	-4	-100●		-75	-1	-2	-0.2	-2	-2

▲$V_{CEX(sus)}$ ●I_{CER}–μA

TO-66