

HIGH-VOLTAGE N-P-N & P-N-P POWER TYPES

I_C to 30 A . . . f_T to 20 MHz . . . P_T to 175 W

$I_C = 1$ A max. $P_T = 20$ W max. (Plastic TO-5)	$I_C = 1$ A max. $P_T = 10$ W max. (TO-39)*	$I_C = -1$ A max. $P_T = 10$ W max. (TO-39)*	I_C peak = 5 A $P_T = 35$ W max. (TO-66)	I_C peak = -5 A $P_T = 35$ W max. (TO-66)	$I_C = 10$ A peak $P_T = 45$ W max. (TO-66)**	$I_C = 10$ A peak $P_T = 125$ W max. (TO-3)		
32 x 32 ^A	42 x 42	42 x 42	103 x 103	124 x 124	130 x 130	130 x 130		
Family Designation								
2N6177 [N-P-N]	2N3439 [N-P-N]	2N5415 [P-N-P]	2N3585 [N-P-N]		2N6213 [P-N-P]	2N6079 [N-P-N]	2N5840 [N-P-N]	
2N6175 "Plastic 2N3440" $V_{CE(sus)} = 300$ V $h_{FE} = 30-190$ @ 20 mA $f_T = 20$ MHz min.	2N3440 $V_{CE(sus)} = 300$ V $h_{FE} = 40-160$ @ 20 mA $f_T = 15$ MHz min.	2N5415 $V_{CE(sus)} = -200$ V $h_{FE} = 30-150$ @ -50 mA $f_T = 15$ MHz min.	BUX67 $V_{CE(sus)} = 175$ V $h_{FE} = 10-150$ @ 1 A $f_T = 15$ MHz	2N3583 $V_{CE(sus)} = 250$ V $h_{FE} = 40$ min. @ 100 mA $h_{FE} = 10$ min. @ 1 A $f_T = 15$ MHz min.	BUX66 $V_{CE(sus)} = -175$ V $h_{FE} = 10-150$ @ -1 A $f_T = 15$ MHz	2N6211 $V_{CE(sus)} = -250$ V $h_{FE} = 10-100$ @ -1 A $f_T = 20$ MHz min.	2N6078 $V_{CE(sus)} = 275$ V $h_{FE} = 12-70$ @ 1.2 A $t_r = 0.3 \mu s$ typ. $t_f = 0.3 \mu s$ typ.	RCA 410# $V_{CE(sus)} = 200$ V $h_{FE} = 30-90$ @ 1 A $t_r = 0.35 \mu s$ typ. $t_f = 0.15 \mu s$ typ.
CT File No. 508 E	CT File No. 64 E	CT File No. 336 E	871	File No. 138	870	File No. 507	File No. 492	File No. 509
2N6176 $V_{CE(sus)} = 350$ V $h_{FE} = 30-150$ @ 20 mA $f_T = 20$ MHz min.	2N3439 $V_{CE(sus)} = 400$ V $h_{FE} = 40-160$ @ 20 mA $f_T = 15$ MHz min.	2N5416 $V_{CE(sus)} = -350$ V $h_{FE} = 30-120$ @ -50 mA $f_T = 15$ MHz min.	BUX67A $V_{CE(sus)} = 275$ V $h_{FE} = 10-150$ @ 1 A $f_T = 15$ MHz	2N3584 $V_{CE(sus)} = 300$ V $h_{FE} = 40$ min. @ 100 mA $h_{FE} = 25-100$ @ 1 A $f_T = 15$ MHz min.	BUX66A $V_{CE(sus)} = -275$ V $h_{FE} = 10-150$ @ -1 A $f_T = 15$ MHz	2N6212 $V_{CE(sus)} = -325$ V $h_{FE} = 10-100$ @ -1 A $f_T = 20$ MHz min.	2N6077 $V_{CE(sus)} = 300$ V $h_{FE} = 12-70$ @ 1.2 A $t_r = 0.3 \mu s$ typ. $t_f = 0.3 \mu s$ typ.	RCA 411# $V_{CE(sus)} = 300$ V $h_{FE} = 30-90$ @ 1 A $t_r = 0.35 \mu s$ typ. $t_f = 0.15 \mu s$ typ.
CT 508 E	CT 64 E	CT 336 E	871	CT 138	870	CT 507	492	510
2N6177 "Plastic 2N3439" $V_{CE(sus)} = 400$ V $h_{FE} = 30-150$ @ 50 mA $f_T = 20$ MHz min.	BF257 $V_{CE(sus)} = 160$ V $h_{FE} = 25$ min. @ 30 mA	BFT19,A,B $V_{CE(sus)} = 200-400$ V $h_{FE} = 25$ min. @ 30 mA/10 V $f_T = 15$ MHz $P_T = 5$ W	BUX67B $V_{CE(sus)} = 325$ V $h_{FE} = 10-150$ @ 1 A $f_T = 15$ MHz	2N3585 $V_{CE(sus)} = 400$ V $h_{FE} = 40$ min. @ 100 mA $h_{FE} = 25-100$ @ 1 A $f_T = 15$ MHz min.	BUX66B $V_{CE(sus)} = -325$ V $h_{FE} = 10-150$ @ -1 A $f_T = 15$ MHz	2N6213 $V_{CE(sus)} = -375$ V $h_{FE} = 10-100$ @ -1 A $f_T = 20$ MHz min.	2N6079 $V_{CE(sus)} = 375$ V $h_{FE} = 12-50$ @ 1.2 A $t_r = 0.3 \mu s$ typ. $t_f = 0.3 \mu s$ typ.	RCA 413# $V_{CE(sus)} = 325$ V $h_{FE} = 20-80$ @ 0.5 A $t_r = 0.35 \mu s$ typ. $t_f = 0.15 \mu s$ typ.
508 E		683	871	CT 138	870	CT 507	492	511
	BF258 $V_{CE(sus)} = 250$ V $h_{FE} = 25$ min. @ 30 mA	BFT28,A,B,C $V_{CE(sus)} = 150-300$ V $h_{FE} = 20$ min. @ 10 mA/10 V $f_T = 15$ MHz $P_T = 5$ W	BUX67C $V_{CE(sus)} = 375$ V $h_{FE} = 10-150$ @ 1 A $f_T = 15$ MHz	2N4240 $V_{CE(sus)} = 400$ V $h_{FE} = 40$ min. @ 100 mA $h_{FE} = 30-150$ @ 750 mA $f_T = 15$ MHz min.	BUX66C $V_{CE(sus)} = -375$ V $h_{FE} = 10-150$ @ -1 A $f_T = 15$ MHz	2N6214 $V_{CE(sus)} = -425$ V $h_{FE} = 10-100$ @ -1 A $f_T = 20$ MHz min.	40851 $V_{CE(sus)} = 375$ V $h_{FE} = 12$ min. @ 1.2 A $t_r = 0.3 \mu s$ typ. $t_f = 0.3 \mu s$ typ.	RCA 423# $V_{CE(sus)} = 325$ V $h_{FE} = 30-90$ @ 1 A $t_r = 0.35 \mu s$ typ. $t_f = 0.15 \mu s$ typ.
		815	871	138	870	507	498	512
	BF259 $V_{CE(sus)} = 300$ V $h_{FE} = 25$ min. @ 30 mA			40850 $V_{CE(sus)} = 400$ V $h_{FE} = 25$ min. @ 750 mA $f_T = 15$ MHz min.				RCA 431# $V_{CE(sus)} = 325$ V $h_{FE} = 15-35$ @ 2.5 A $t_r = 0.35 \mu s$ typ. $t_f = 0.4 \mu s$ typ.
				498				513

^APellet size—values shown are edge dimensions in thousands-of-an-inch (mils)

* Available with:

- a. flange for easy heat sinking $R_{\theta JC} = 15^\circ$ C/W
- b. free-air radiator $R_{\theta JA} = 45^\circ$ C/W

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

♣ Type with a factory-attached heat clip

File No. (e.g. File No 508 E), where shown, relates to the data bulletin.

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

For new equipment design only—not recommended for retrofit.

APPLICATION INFORMATION . . .

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

Frequency Range	Peak Voltage Required	Peak Primary Current Requirement				> 20 A
		Up to 0.2 A	0.2 to 1 A	1 to 4 A	4 to 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 2N6251 410 411 413 423 431 2N6514 BUX 18 2N5840 410 413 40852 40853 40854	-
		BFT 28 A,B,C 2N6177▲				
	Off Line 220V (Rectifier 400- 800V)				TA8764 TA8900 2N6513	2N5240 BUX 16,A,B,C 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

DESCRIPTION

HIGH-RELIABILITY TYPES

40385 Hi-Rel Version of 2N3439

2N TYPES

2N6263 120-V, 20-W Hometaxial-Base
 2N3441● 140-V, 25-W Hometaxial-Base
 2N6264 150-V, 50-W Hometaxial-Base

OTHER TYPES

40373 2N3441 with Heat Radiator*
 40912 2N6263 with Heat Radiator*
 40913 2N6264 with Heat Radiator*

2N TYPES

2N4347 120-V, 100-W Hometaxial-Base
 2N3442● 140-V, 117-W Hometaxial-Base
 2N6262 150-V, 150-W Hometaxial-Base

2N & PRO-ELECTRON TYPES

BUX67 High-Breakdown Voltage, Fast Switch
 BUX67A High-Breakdown Voltage, Fast Switch
 BUX67B High-Breakdown Voltage, Fast Switch
 BUX67C High-Breakdown Voltage, Fast Switch
 2N3583 High-Breakdown Voltage, Fast Switch
 2N3584● High-Breakdown Voltage, Fast Switch
 2N3585● High-Breakdown Voltage, Fast Switch
 2N4240 High-Breakdown Voltage, Fast Switch

AUDIO TYPES

40991 Class B Predriver, 200-W Amplifier
 40313 Output, 5-W Class A AC/DC Amplifier
 40318 Output, 10-W Class B AC/DC Amplifier
 40322 Output, 25-W Class B AC/DC Amplifier
 40328 Output, 35-W Class B AC/DC PA Amplifier

OTHER TYPES

40374 2N3583 with Heat Radiator*
 40850 Switching-Regulator for Power Supplies

2N3439 FAMILY [n-p-n] (silicon) [cont'd]

$f_T = 15 \text{ MHz min}; P_T = 10 \text{ W max}$

$V_{CE0(sus)}$ V	$V_{CER(sus)}$ V	$V_{CEV(sus)}$ V	h_{FE}		I_{CEV} -mA			$V_{CE(sat)}$ -V			V_{BE} -V		
			I_C A	V_{CE} V	Temp.-°C	V_{CE} V	I_C A	I_B A	I_C A				
350	-	-	40-160	20†	10	500■	-	450	0.5	50†	4†	1.3	50†

tmA

2N3441 FAMILY [n-p-n] (silicon)

$f_T = 1.2 \text{ MHz typ}; P_T \text{ up to } 50 \text{ W max}$

120	130	140	20-100	0.5	4	2	10	120	1.2	0.5	0.05	2	0.5
140	150	160	25-100	0.5	4	1	5	140	1	0.5	0.05	1.7	0.5
150	160	170	20-60	1	2	0.05	1	150	0.5	1	0.1	1.5	1

140	150	160	25-100	0.5	4	1	5	140	1	0.5	0.05	1.7	0.5
120	130	140	20-100	0.5	4	2	10	120	1.2	0.5	0.05	2	0.5
150	160	170	20-60	1	2	0.05	1	150	0.5	1	0.1	1.5	1

●JAN type available *Radiator improves $R_{\theta JA}$ from 65°C/W to 30°C/W

2N3442 FAMILY [n-p-n] (silicon)

$f_T = 0.8 \text{ MHz typ}; P_T \text{ up to } 150 \text{ W max}$

120	130	140	15-60	2	4	2	10	120	1	2	0.2	2	2
140	150	160	20-70	3	4	5	30	140	1	3	0.3	1.7	3
150	160	170	20-70	3	2	0.1	2	150	0.5	3	0.3	1	3

●JAN type available

2N3585 FAMILY [n-p-n] (silicon)

$f_T = 15 \text{ MHz min}; P_T = 35 \text{ W max}$

150	175	-	10-150	1	5	8	10**	200	1.5	1	0.15	2.5	1
250	275	-	10-150	1	5	8	10**	300	1.5	1	0.15	2.5	1
300	325	-	10-150	1	5	8	10**	350	1.5	1	0.15	2.5	1
350	375	-	10-150	1	5	8	10**	400	1.5	1	0.15	2.5	1
175	250	-	40 min.	0.1	10	1	3	225	5	1	0.125	1.4	1
250	300	-	40 min.	0.1	10	1	3	300	0.75	1	0.125	1.4	1
300	400	-	40 min.	0.1	10	1	3▲	400	0.75	1	0.125	1.4	1
300	400	-	30-150.	0.75	10	2	5▲	400	1	0.75	0.075	1.8	0.75

175	200	-	30-150	0.3	2	0.1▼	-	120	-	-	-	1	0.3
-	300	-	40-250	0.1	10	10	10	300	-	-	-	1.5	0.1
-	300	-	40 min.	0.02	10	5	10	150	-	-	-	1.5	0.5
-	300	-	40 min.	0.02	10	10	10	150	-	-	-	1.5	1
-	300	-	40 min.	0.02	10	10	10	150	-	-	-	1.5	1

175	250	-	40 min.	0.1	10	1	3	225	5	1	0.125	1.4	1
300	400	-	25 min.	0.75	10	0.2	2■	450	2	2	0.4	2	2

●JAN types available. ▲ I_{CEV} @ $V_{CE} = 300 \text{ V}$. *Radiator improves $R_{\theta JA}$ from 70°C/W to 30°C/W. ■ $A_t T_C = 125^\circ\text{C}$.

† I_{CER} ▼ I_{CER} **At $T_C = 100^\circ\text{C}$

