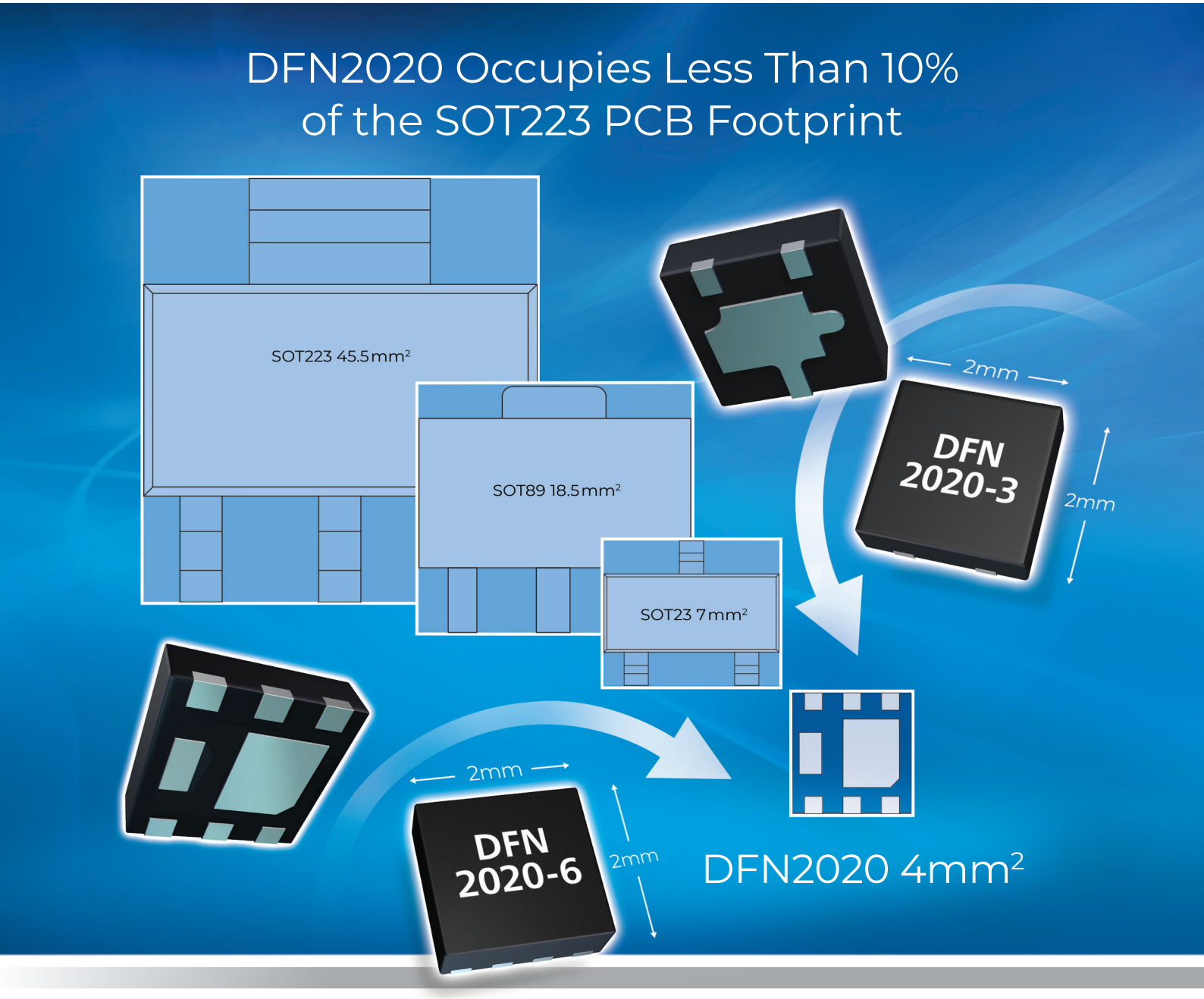
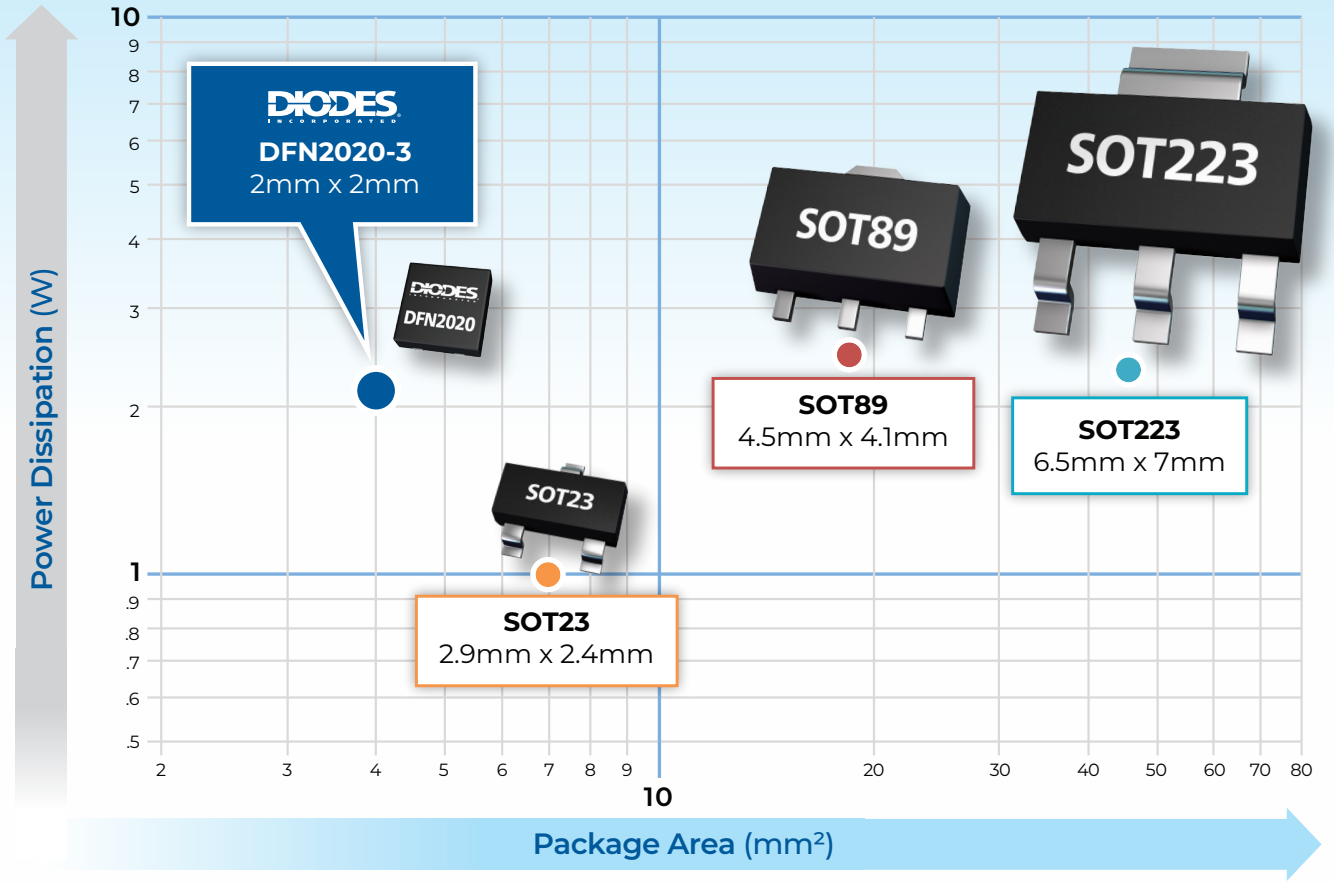
DIODES INCORPORATED | Analog & Power Solutions



ADVANCED DFN PACKAGING

BIPOLAR JUNCTION TRANSISTORS AND MOSFETS
PACKAGED IN HIGH-PERFORMANCE DFN2020

diodes.com



Mounted on a 10mm x 10mm 2oz Cu, double-sided 1.6mm FR-4 PCB

DFN Packaged High-Performance Bipolar Junction Transistors and MOSFETs Pack a Powerful Punch

Diodes Incorporated's (Diodes) broad portfolio of DFN2020 packaged bipolar junction transistors and MOSFETs provides design engineers with small but powerful solutions that can increase the power density and efficiency of designs where space saving is paramount. They deliver this without compromising electrical or thermal performance when compared to larger small-outline transistor (SOT) packaged solutions.

At just 2mm × 2mm (4mm²), the DFN2020 package is redefining what's possible in compact power design.

Despite its tiny PCB footprint, this package delivers exceptional thermal and electrical performance, thanks to its rear-mounted heatsink, achieving junction-to-case thermal resistance ($R_{\theta JC}$) as low as 13°C/W and enabling DFN2020 packaged devices to deliver the same performance as much larger small-outline packages such as SOT89 and SOT223

The performance of DFN2020 is best illustrated by a real world example: the BCP5316Q is a 80V 1A PNP bipolar junction transistor packaged in SOT223 that is widely used in linear applications.

The thermal and electrical performance of this device can now be matched by the DFN2020 packaged BC53-16PAWQ whilst occupying less than 10 percent of the PCB area.

Diodes Incorporated provides its high-temperature automotive-compliant MOSFET and bipolar junction transistors in the sidewall plated DFN2020(SWP).

The sidewall plating improves solder wettability and improves the visibility of the solder fillet, allowing solder joint quality to be confirmed using Automated Optical Inspection (AOI) and enabling the high safety and stringent quality requirements of Automotive to be met.

The Diodes DFN2020 Advantage

Feature	Benefit
4mm² footprint	PCB area reduction
Low R_{thjc}	Higher power density
0.6mm off board height	Lower profile designs
Sidewall plating	Enables automated optical inspection

A Selection of Diodes High-Performance DFN2020 packaged MOSFETs

Polarity	V_{DS}	V_{GS}	I_{DS} (A)	P_D (W)	$R_{DS(ON)}$ (mΩ max) at V_{GS}=				$V_{GS(TH)}$ (V)		Q_G Typ @ V_{GS} = 4.5V	C_{ISS} Typ	ESD Diodes	Automotive	Part Number	Tj
	(V)	(±V)	@T_A = +25°C	@T_A = +25°C	10V	4.5V	2.5V	1.8V	Min.	Max.	(nC)	(pF)	(Y/N)			°C
N	12	8	22	2.2	-	3	4	-	0.3	1	27	2551	Yes	-	DMN1003UFDE	150
N	12	8	14.1	1.8	-	6	10	-	0.3	1	29.7	2014	No	-	DMN1005UFDF	150
N	12	8	12.2	1.7	-	8	11.6	-	0.3	1	13.6	995	No	Y	DMN1008UFDF	150
N	12	8	8	1.7	-	16	25	-	-	1	6.4	515	No	-	DMN1014UFDF	150
N	12	8	11	2.17	-	10	12	14	0.35	0.8	27.3	2480	Yes	-	DMN1019UFDE	150
N	12	8	14.7	1.9	-	6	9	-	-	1.2	14.6	1246	No	-	DMN14M8UFDF	150
N	20	12	11.7	1.97	-	9.5	11	20	0.4	1	24	2248	Yes	-	DMN2011UFDE	150
N	20	8	10.5	2.3	-	11	13	30	0.5	1.1	28.7	2508	Yes	Y	DMN2013UFDEW	150
N	20	8	7.9	2.03	-	22	26	36	0.5	1	9.8	907	Yes	-	DMN2022UFDF	150
N	20	12	1.2	1.39	-	600	800	1000	0.45	1	0.7	52	Yes	Y	DMN2451UFDFW	150
N	20	12	11	2	-	13.5	15.5	-	-	1.2	7.3	855	Yes	-	DMN29M9UFDF	150
N	24	12	14.1	1.8	6	7.2	12.5	-	0.55	1.45	29.6	1683	No	-	DMT2004UFDF	150
N	30	20	10.8	2	12	16	-	-	1.4	2	10	1130	No	-	DMN3011LFDF	150
N	30	12	10.4	2.03	-	19	25	40	-	1	15	1304	Yes	Y	DMN3020UFDF	150
N	30	20	9.3	2.03	15	20	-	-	-	2.2	6.7	706	No	-	DMN3021LFDF	150
N	30	20	8.3	2.1	20.5	30	-	-	-	2	6	641	No	-	DMN3025LFDF	150
N	30	12	7	2.1	28	32	50	-	-	1.4	6.1	570	No	-	DMN3042LFDF	150
N	30	20	14.1	2.1	7	10	-	-	-	3	8.4	1320	No	Y	DMT3006LFDF	150
N	30	20	12	2.1	10	16	-	-	-	3	5.8	886	No	-	DMT3008LFDF	150
N	30	20	8.4	1.8	17	28	-	-	1	2.5	3.6	393	No	-	DMT3020LFDFW	150
N	30	20	19	2.2	4	7.25	-	-	1	2.5	7.3	1024	No	-	DMT34M8LFDE	150
N	30	20	13	1.7	6	10.5	-	-	-	2.5	8.1	1009	No	-	DMT35M4LFDF	150
N	40	20	8	2.03	20	28	-	-	-	2.4	8.8	1060	No	Y	DMN4020LFDE	150
N	40	20	11.6	2.35	11.5	18	-	-	1	3	6.8	1030	No	Y	DMTH4008LFDFW	175
N	60	20	5.3	2.03	38	47	-	-	-	3	10.4	1287 @ 25V	No	Y	DMN6040SFDE	150
N	60	20	9.5	1.9	14	21	-	-	-	2.3	7.3	785	No	Y	DMT6012LFDF	150
N	60	20	9.4	2.3	18	27.5	-	-	-	3	7.5	925	No	Y	DMTH6016LFDFW	175
N	60	20	17.5	2.1	29	-	-	-	1	2.5	5.1	452	No	Y	DMTH6030LFDFW	175
N	80	20	5	2.5	29	46	-	-	1.3	2.5	5.6	591	No	Y	DMTH8022LFDFW	175
N	80	20	6.5	2.1	25	38	-	-	1.2	2.5	5.4	641	No	Y	DMTH8030LFDFW	175
N	100	20	2.9	2	160	200	-	-	-	3	4.9	1167	No	-	DMN10H170SFDE	150
N	100	20	2.2	1.6	225	290	-	-	-	2.5	3.7	384	No	-	DMN10H220LFDF	150
N	100	20	6	1.6	32	46	-	-	-	2.5	6.3	683	No	-	DMT10H032LFDF	150
N	100	20	5	1.9	52	75	-	-	-	2.5	2.9	258	No	-	DMT10H052LFDF	150
N	100	20	4	1.8	62	110	-	-	-	3	2.5	266	No	Y	DMT10H072LFDF	150
N	100	20	6.3	2.5	29	46	-	-	1.3	2.5	6	619	No	Y	DMTH10H029LFDFW	175
N	115	8	4.4	2	-	65	70	-	0.5	1.4	7.8	475	Yes	-	DMT12H060LFDF	150
N	300	20	0.55	1.98	4000	4000	-	-	-	2.8	-	187.3	No	-	DMN30H4D0LFDE	150
N+N	12	10	6.9	1.7	-	25	30	38	0.4	1	12.6	917	Yes	-	DMN1025UFDB	150
N+N	20	10	6	1.4	-	25	31	-	0.5	1	5.9	486	Yes	-	DMN2025UFDB	150
N+N	20	12	4.7	1.4	-	40	65	-	0.35	1.4	8	713	Yes	-	DMN2041UFDB	150
N+N	20	12	4.6	1.1	-	35	43	56	-	1	3.6		No	Y	DMN2053UFDB	150
N+N	30	20	5.5	1.37	30	42	-	-	-	2	5	500	No	Y	DMN3032LFDBW	150
N+N	30	20	7.7	1.8	20	32	-	-	-	2.5	3.6	393	No	-	DMT3020LFDB	150
N+N	30	12	6.5	1.3	21	30	-	-	-	1.7	4.6	-	Yes	-	DMT3020UFDB	150
N+N	100	20	0.27	1	6000	10000	-	-	-	2	0.6	-	Yes	-	DMN10H6D2LFDB	150
P	12	8	12.8	2.1	-	8.5	12	18.5	0.3	1	28	2475	Yes	-	DMP1005UFDF	150
P	12	8	10	1.8	11	14 (@ 3.7V)	19	30	0.3	1	26	1860	No	-	DMP1009UFDFW	150
P	12	8	12.6	2.11	-	15	30	40	0.3	0.9	19.5	1344	No	-	DMP1012UFDF	150
P	20	8	14	2.4	-	9	12	-	0.4	1.5	16	1686	Yes	-	DMP2012UFDE	150
P	20	10	9	1.9	-	16	22	40	0.35	1	34	2760	No	-	DMP2021UFDE	150
P	20	12	6.1	1.8	-	32	53		0.6	1.5	8.6	834	No	-	DMP2040UFDFW	150
P	20	12	6.2	2.03	-	36	56	75	0.4	1.1	14.4	1537	No	-	DMP2066UFDE	150
P	250	40	0.26	1.4	14000	18000 (@3.5V)	-	-	-	2.5	-	81	No	-	DMP25H18DLFDE	150
P	30	25	11.4	2.2	13.5	35	35		1.2	2.6	9	1015	Yes	-	DMP3015SFDE	150
P	30	25	8.7	2	19	45	-	-	-	3	9.2	1204	Yes	-	DMP3026SFDE	150
P	30	20	6.8	2.03	25	38	-	-	-	2.4	10.9	1241	No	Y	DMP3028LFDE	150
P	40	20	6	2.1	33	50	-	-	-	2.2	11.2	1382	No	Y	DMP4047LFDE	150
P	60	20	3.5	1.97	110	130	-	-	-	3	8.2	969	No	Y	DMP6110SFDF	150
P	60	20	2.5	1.8	155	240	-	-	1	3	4.3	612	No	Y	DMP6250SFDFW	150
P+P	12	8	3.9	1.4	-	59	81	115	0.4	1	13	1028	Yes	-	DMP1055UFDB	150
P+P	20	8	3.1	1.29	-	90	120	-	0.3	1	6.8	634	Yes	-	DMP2045UFDB	150
P+P	20	12	4.5	1.54	-	50	100	150	0.4	1	9.1	752	No	-	DMP2065UFDB	150
P+P	20	8	3.8	1.4	-	75	137	-	0.35	1.4	8.8	642	No	-	DMP2075UFDB	150
P+P	20	8	3.2	1.39	-	90	120	-	0.3	1	6.8	634	Yes	-	DMP2090UFDB	150
P+P	20	12	3.1	1.1	-	75	110	168	-	1	6	-	No	Y	DMP2110UFDB	150
N+P	12, 12	8, 8	5.1, 3.9	1.36	-	34, 59	40, 81	50, 115	0.4, 0.4	1, 1	12.2, 13	1003, 1028	Yes	-	DMC1030UFDB	150
N+P	20, 20	10, 8	6, 3.5	1.4	-	25, 75	35, 140	-	0.5, 0.5	1, 1.4	5.9, 8.8	486, 642	Yes	Y	DMC2025UFDB	150
N+P	20, 20	12, 12	4.6, 3.1	1.1	-	35, 75	43, 110	56, 168	0.4, 0.5	1, 1	3.6, 5.9	369, 440	No	Y	DMC2053UFDB	150
N+P	30, 30	20, 20	5.3, 3.4	1.28	30, 70	42, 100	-	-	1.0, 1.0	2.0, 2.1	5.0, 4.0	500, 336	No	Y	DMC3032LFDB	150
N+P	60, 20	20, 12	0.39, 2.9	0.89	4000	4100, 72	-	-	-	2.5, 1.25	0.4, 7.3	41, 443	Yes	-	DMC67D8UFDB	150

Note: W suffix indicates sidewall plated package. Automotive parts identified with a Y will have a Q suffix

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A Selection of Diodes High-Performance DFN2020 Packaged Bipolar Junction Transistors

Polarity	V_{CEO}, V_{CES} (V)	I_C (A)	I_{CM} (A)	P_D (W)	h_{FE} (Min.)	h_{FE} (@ IC) (A)	h_{FE} (Min.2)	h_{FE} (@ IC2) (A)	$V_{CE(SAT)}$ Max. (mV)	$V_{CE(SAT)}$ (@ IC/IB) (A/mA)	$V_{CE(SAT)}$ (Max.2) (mV)	$V_{CE(SAT)}$ (@ IC/IB2) (A/mA)	fT (MHz)	Compliance	Part Number
NPN	10	3	5	0.7	325	0.5	250	3	55	1/10	110	3/30	100	Automotive	DSS4310FJAWQ
NPN	12	6	8	0.7	300	1	200	6	55	1/10	110	3/30	100	Standard	DXTN58012DJAW
NPN	15	4.5	15	1.5	300	0.2	150	5	14	0.1/10	310	4.5/50	120	Standard	ZXTN617MA
NPN	20	4.5	12	1.5	300	0.2	100	6	15	0.1/10	135	2/50	140	Standard	ZXTN618MA
NPN	20	4.5	12	1.5	300	0.2	100	6	15	0.1/10	135	2/50	140	Automotive	ZXTN618FDBWQ
NPN	20	6	8	1.25	280	0.5	180	6	30	0.5/50	275	6/300	80	Standard	DXTN5820DFDB
NPN	40	5	7	1.25	200	0.5	180	3	145	1/10	275	4/400	150	Standard	DXTN5840CFDB
NPN	50	4	6	1.5	300	0.2	100	2	20	0.1/10	220	2/50	165	Standard	ZXTN619MA
NPN	60	4	6	1.8	340	0.2	140	2	20	0.1/10	200	2/50	125	Automotive	DXTN10060DFJBQ
NPN	60	4	6	1.8	340	0.2	140	2	20	0.1/10	200	2/50	125	Automotive	DXTN10060DFJBWQ
NPN	60	6	7	1.25	280	0.5	170	2	30	0.5/50	315	6/300	115	Standard	DXTN5860DFDB
NPN	80	1	2	0.52	100	0.15	25	0.5	500	0.5/50	-	-	125	Standard	BC56-16PA
NPN	80	1	2	0.5	100	0.15	40	0.5	500	0.5/50	-	-	150	Automotive	BC56-16PAWQ
NPN	80	3.5	5	1.5	300	0.2	60	1.5	20	0.1/10	200	1.5/50	160	Standard	ZXTN620MA
NPN	100	4	6	1.25	180	0.5	80	2	45	0.5/50	260	4/400	150	Standard	DXTN58100CFDB
NPN + NPN	60	1	1.5	1.6	290	0.1	150	0.5	120	0.5/50	240	1/50	175	Standard	DSS4160FDB
NPN + NPN	60	1	1.5	1.6	290	0.1	150	0.5	120	0.5/50	240	1/50	175	Automotive	DSS4160FDBQ
NPN + NPN	120	1	1.5	0.88	300	0.1	80	0.5	120	0.5/50	260	1/50	195	Standard	DSS4112FDB
NPN + NPN	120	1	1.5	0.88	240	0.1	80	0.5	100	0.5/50	240	1/50	100	Standard	DXTN81120DFDB
PNP	80	1	2	0.52	100	0.15	25	0.5	500	0.5/50	-	-	125	Standard	BC53-16PA
PNP	80	1	2	0.5	100	0.15	40	0.5	500	0.5/50	-	-	150	Automotive	BC53-16PAWQ
PNP	12	4	12	1.5	300	0.1	60	8	17	0.1/10	300	3/50	110	Standard	ZXTP717MA
PNP	20	3.5	6	1.5	300	0.1	150	2	30	0.1/10	250	1.5/50	180	Standard	ZXTP718MA
PNP	20	6	8	1.25	200	0.5	110	6	40	0.5/50	350	6/300	140	Standard	DXTP5820CFDB
PNP	40	3	4	1.5	300	0.1	60	1.5	40	0.1/10	220	1/50	190	Standard	ZXTP720MA
PNP	40	4.8	8	1.25	240	0.5	150	3	130	1/10	260	4/400	135	Standard	DXTP5840CFDB
PNP	40	4.8	8	1.75	240	0.5	150	3	80	1/100	370	3/50	135	Automotive	DXTP5840CFJAWQ
PNP	60	4	8	1.25	170	0.5	50	5	55	0.5/50	450	5/250	130	Standard	DXTP5860CFDB
PNP	70	2.5	3	1.5	300	0.1	175	1	50	0.1/10	200	0.5/20	180	Standard	ZXTP722MA
PNP	70	2.5	3	1.5	300	0.1	175	1	50	0.1/10	200	0.5/20	180	Automotive	ZXTP722FDBWQ
PNP	100	2	4	1.25	160	0.5	15	3	70	0.5/50	185	2/200	135	Standard	DXTP58100CFDB
PNP + PNP	20	2	3	2.47	250	0.1	160	1	110	0.5/50	200	0.7/7	N/A	Automotive	ZXTP56020FDBQ
PNP + PNP	60	2	3	2.47	170	0.1	110	1	120	0.5/50	420	0.7/7	N/A	Automotive	ZXTP56060FDBQ
PNP + PNP	60	1	1.5	1.6	170	0.1	70	1	180	0.5/50	550	1/50	65	Standard	DSS5160FDB
NPN + PNP	60	1	1.5	1.6	290, 170	0.1	70	1	120, 180	0.5/50	240, 550	1/50	90, 65	Standard	DSS45160FDB
Special Function Avalanche BJTs															
NPN	80	5	-	1.8	100	0.01	-	-	100	0.01/0.001	-	-	80	Standard	FMMT411FDBW
NPN	80	5	-	1.8	100	0.01	-	-	100	0.01/0.001	-	-	80	Automotive	FMMT411FDBWQ

Note: W suffix indicates sidewall plated package.

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