ZXTD4591AM832

MPPS™ Miniature Package Power Solutions
Complementary dual 40V high performance transistor

Summary

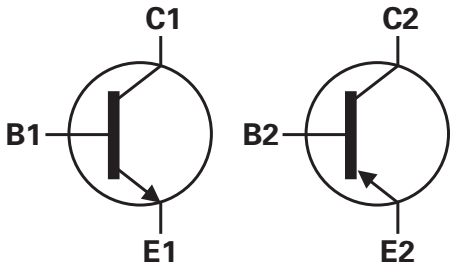
NPN Transistor - V_{CEO} = 40V; R_{SAT} = 195mΩ; I_C = 2.5A
PNP Transistor - V_{CEO} = -40V; R_{SAT} = 350mΩ; I_C = -2A

Description

Packaged in the 3mm x 2mm MLP (Micro Leaded Package), these high performance NPN / PNP combination dual transistors offer lower on state losses making them ideal for use in DC-DC circuits and various driving and power-management functions.

Users will also gain several other key benefits:

- Performance capability equivalent to much larger packages
- Improved circuit efficiency & power levels
- PCB area and device placement savings
- Lower package height (0.9mm nom)
- Reduced component count

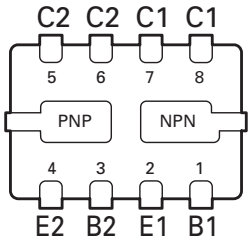


Features

- Low Saturation Voltage (500mV max @1A)
- H_{FE} specified up to 2A
- I_C = 2.5A Continuous Collector Current
- 3mm x 2mm MLP

Applications

- DC - DC Converters
- Power switches
- Motor control
- LED Backlighting circuits



Bottom view

Ordering information

Device	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTD4591AM832TA	7	8	3,000
ZXTD4591AM832TC	13	8	10,000

Device marking

91A

Absolute maximum ratings

Parameter	Symbol	NPN	PNP	Unit
Collector-Base voltage	V_{CBO}	40	-40	V
Collector-Emitter voltage	V_{CEO}	40	-40	V
Emitter-Base voltage	V_{EBO}	5	-5	V
Peak pulse current	I_{CM}	3	-3	A
Continuous collector current[a][f]	I_C	2	-1.5	A
Continuous collector current[b][f]	I_C	2.5	-2.0	A
Base current	I_B	300		mA
Power dissipation at T_A =25°C[a][f]	P_D	1.5		W
Linear derating factor		12		mW/°C
Power dissipation at T_A =25°C[b][f]	P_D	2.45		W
Linear derating factor		19.6		mW/°C
Power dissipation at T_A =25°C[c][f]	P_D	1		W
Linear derating factor		8		mW/°C
Power dissipation at T_A =25°C[d][f]	P_D	1.13		W
Linear derating factor		9		mW/°C
Power dissipation at T_A =25°C[d][g]	P_D	1.7		W
Linear derating factor		13.6		mW/°C
Power dissipation at T_A =25°C[e][g]	P_D	3		W
Linear derating factor		24		mW/°C
Storage temperature range	T_{stg}	-55 to +150		°C
Junction temperature range	T_j	150		°C

Thermal resistance

Parameter	Symbol	Value	Unit
Junction to ambient[a][f]	$R_{\theta JA}$	83.3	°C/W
Junction to ambient[b][f]	$R_{\theta JA}$	51	°C/W
Junction to ambient[c][f]	$R_{\theta JA}$	125	°C/W
Junction to ambient[d][f]	$R_{\theta JA}$	111	°C/W
Junction to ambient[d][g]	$R_{\theta JA}$	73.5	°C/W
Junction to ambient[e][g]	$R_{\theta JA}$	41.7	°C/W

NOTES:

(a) For a dual device surface mounted on 8 sq cm single sided 2oz copper on FR4 PCB, in still air conditions **with all exposed pads attached**. The copper area is split down the centre line into two separate areas with one half connected to each half of the dual device.

(b) Measured at t<5 secs for a dual device surface mounted on 8 sq cm single sided 2oz copper on FR4 PCB, in still air conditions **with all exposed pads attached**. The copper area is split down the centre line into two separate areas with one half connected to each half of the dual device.

(c) For a dual device surface mounted on 8 sq cm single sided 2oz copper on FR4 PCB, in still air conditions **with minimal lead connections only**.

(d) For a dual device surface mounted on 10 sq cm single sided 1oz copper on FR4 PCB, in still air conditions **with all exposed pads attached attached**. The copper area is split down the centre line into two separate areas with one half connected to each half of the dual device.

(e) For a dual device surface mounted on 85 sq cm single sided 2oz copper on FR4 PCB, in still air conditions **with all exposed pads attached attached**. The copper area is split down the centre line into two separate areas with one half connected to each half of the dual device.

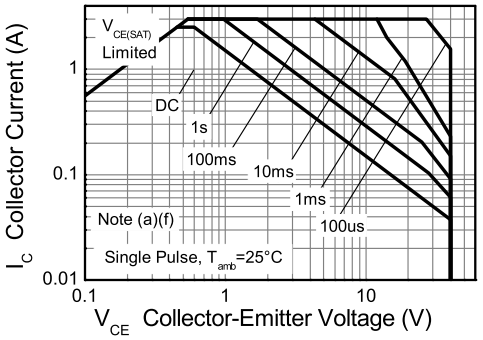
(f) For a dual device with one active die.

(g) For dual device with 2 active die running at equal power.

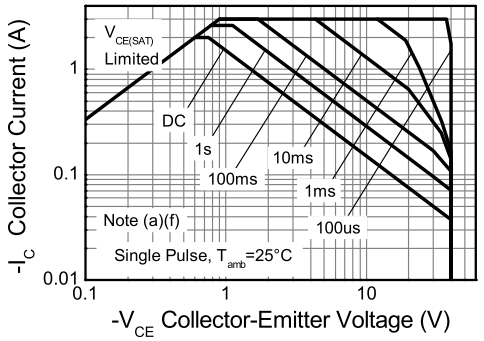
(h) Repetitive rating - pulse width limited by max junction temperature. Refer to Transient Thermal Impedance graph.

(i) The minimum copper dimensions required for mounting are no smaller than the exposed metal pads on the base of the device as shown in the package dimensions data. The thermal resistance for a dual device mounted on 1.5mm thick FR4 board using minimum copper 1 oz weight, 1mm wide tracks and one half of the device active is Rth = 250°C/W giving a power rating of Ptot = 500mW.

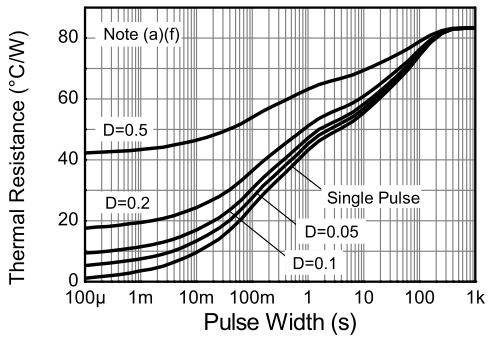
Typical characteristics



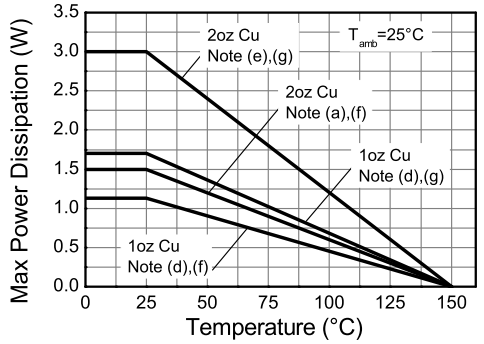
NPN Safe Operating Area



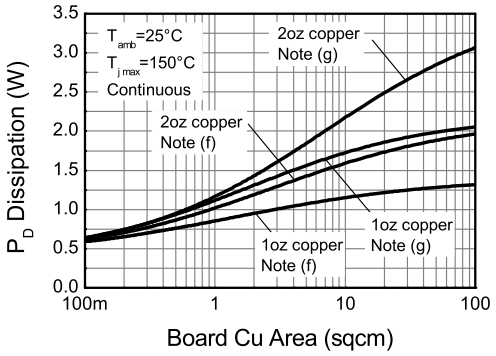
PNP Safe Operating Area



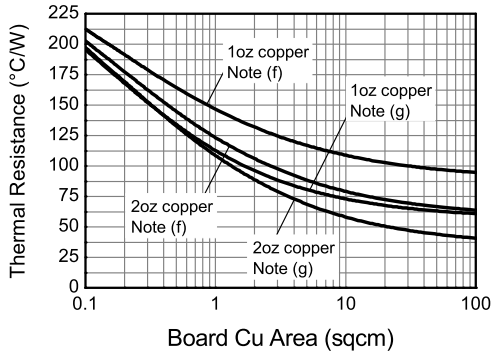
Transient Thermal Impedance



Derating Curve



Power Dissipation v Board Area



Thermal Resistance v Board Area

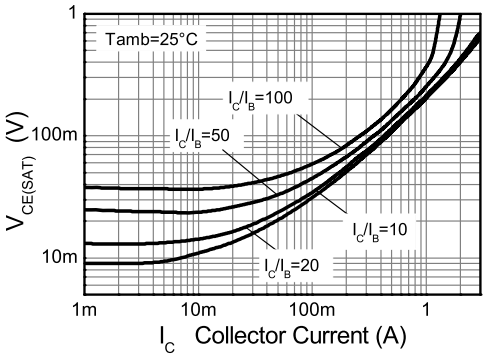
NPN Transistor

Electrical characteristics (at T_{amb} = 25°C unless otherwise stated).

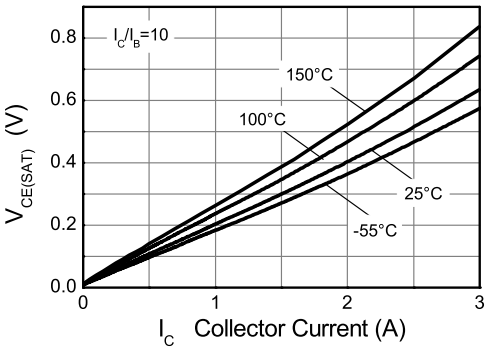
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-Base breakdown voltage	$V_{(BR)CBO}$	40			V	I_C = 100μA
Collector-Emitter breakdown voltage	$V_{(BR)CEO}$	40			V	I_C = 10mA (*)
Emitter-Base breakdown voltage	$V_{(BR)EBO}$	5			V	I_E = 100μA
Collector cut-off current	I_{CBO}			100	nA	V_{CB} =30V
Emitter cut-off current	I_{EBO}			100	nA	V_{EB} = 4V
Collector Emitter cut-off current	I_{CES}			100	nV	V_{CE} = 30V
Collector Emitter saturation voltage	$V_{CE(sat)}$			300 500	mV mV	I_C = 0.5A, I_B = 50mA(*) I_C = 1A, I_B = 100mA(*)
Base-Emitter saturation voltage	$V_{BE(sat)}$			1.1	V	I_C = 1A, I_B = 100mA(*)
Base-Emitter turn-on voltage	$V_{BE(on)}$			1.0	V	I_C = 1A, V_{CE} = 5V(*)
Static forward current transfer ratio	h_{FE}	300 300 200 35		900		I_C = 1mA, V_{CE} = 5V(*) I_C = 0.5A, V_{CE} = 5V(*) I_C = 1A, V_{CE} = 5V(*) I_C = 2A, V_{CE} = 5V(*)
Transition frequency	f_T	150			MHz	I_C = -50mA, V_{CE} = -10V f = 100MHz
Output capacitance	C_{OBO}			10	pF	V_{CB} = -10V, f = 1MHz

NOTES:
(*) Measured under pulsed conditions.

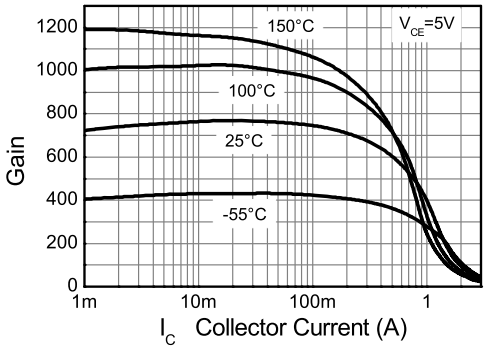
NPN Typical characteristics



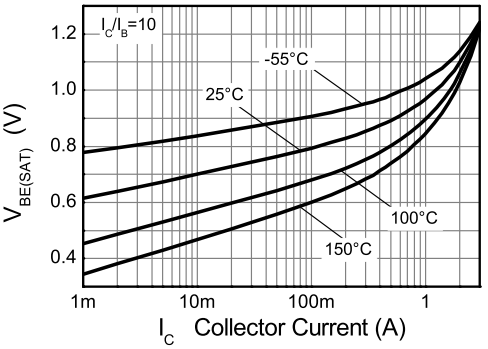
$V_{CE(SAT)}$ v I_C



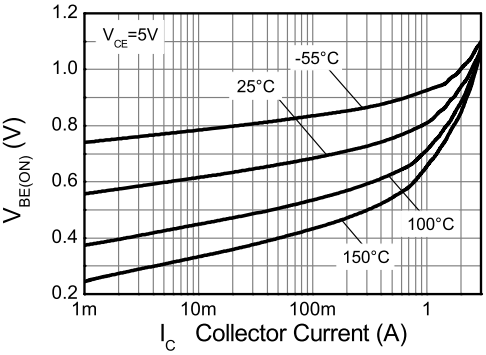
$V_{CE(SAT)}$ v I_C



h_{FE} v I_C



$V_{BE(SAT)}$ v I_C



$V_{BE(ON)}$ v I_C

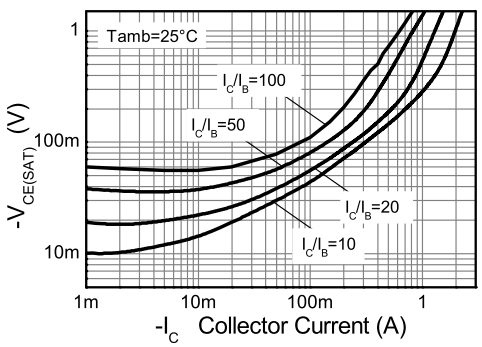
PNP Transistor

Electrical characteristics (at T_{amb} = 25°C unless otherwise stated).

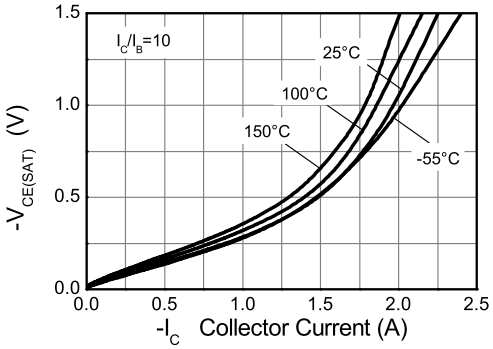
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-Base breakdown voltage	$V_{(BR)CBO}$	-40			V	I_C = -100μA
Collector-Emitter breakdown voltage	$V_{(BR)CEO}$	-40			V	I_C = -10mA (*)
Emitter-Base breakdown voltage	$V_{(BR)EBO}$	-5			V	I_E = -100μA
Collector cut-off current	I_{CBO}			-100	nA	V_{CB} = -30V
Emitter cut-off current	I_{EBO}			-100	nA	V_{EB} = -4V
Collector Emitter cut-off current	I_{CES}			-100	nV	V_{CE} = -30V
Collector Emitter saturation voltage	$V_{CE(sat)}$			-200 -350 -500	mV mV mV	I_C = -0.1A, I_B = -1mA(*) I_C = -0.5A, I_B = -20mA(*) I_C = -1A, I_B = -100mA(*)
Base-Emitter saturation voltage	$V_{BE(sat)}$			-1.1	V	I_C = -1A, I_B = -50mA(*)
Base-Emitter turn-on voltage	$V_{BE(on)}$			-1.0	V	I_C = -1A, V_{CE} = -5V(*)
Static forward current transfer ratio	h_{FE}	300 300 250 160 30		800		I_C = -1mA, V_{CE} = -5V(*) I_C = -0.1A, V_{CE} = -5V(*) I_C = -0.5A, V_{CE} = -5V(*) I_C = -1A, V_{CE} = -5V(*) I_C = -2A, V_{CE} = -5V(*)
Transition frequency	f_T	150			MHz	I_C = -50mA, V_{CE} = -10V f = 100MHz
Output capacitance	C_{OBO}			10	pF	V_{CB} = -10V, f = 1MHz

NOTES:
(*) Measured under pulsed conditions.

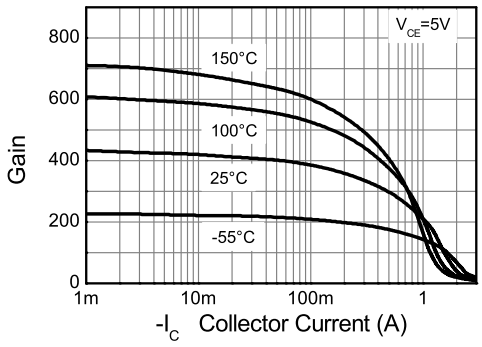
PNP electrical characteristics



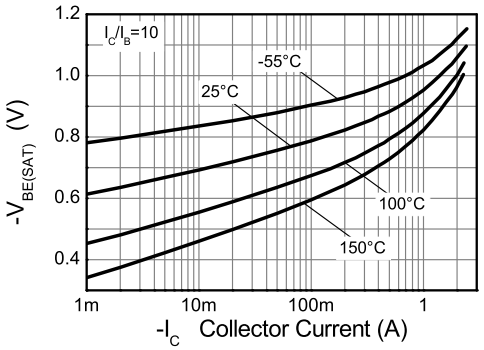
$V_{CE(SAT)}$ v I_C



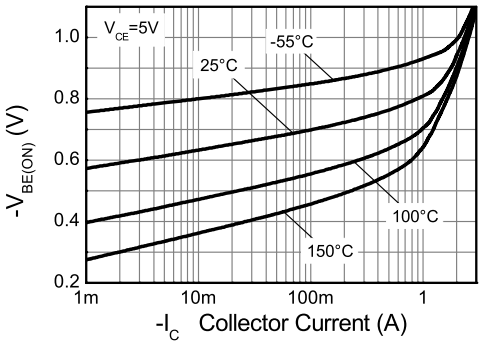
$V_{CE(SAT)}$ v I_C



h_{FE} v I_C

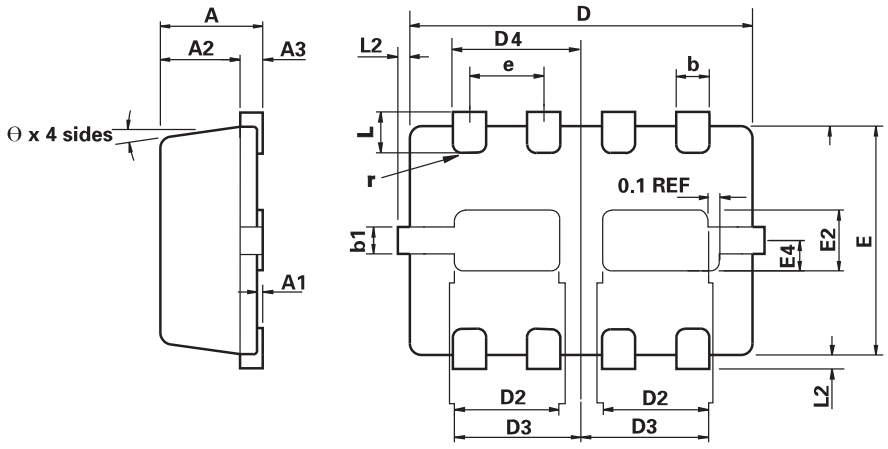


$V_{BE(SAT)}$ v I_C



$V_{BE(ON)}$ v I_C

Package outline MLP832



Dim.	Millimeters		Inches		Dim.	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.80	1.00	0.0315	0.0394	e	0.65 BSC		0.0256 BSC	
A1	0.00	0.05	0.00	0.002	E	2.00 BSC		0.0787 BSC	
A2	0.65	0.75	0.0256	0.0295	E2	0.43	0.63	0.017	0.0248
A3	0.15	0.25	0.006	0.0098	E4	0.16	0.36	0.006	0.014
b	0.24	0.34	0.0095	0.0134	L	0.20	0.45	0.0079	0.0177
b1	0.17	0.30	0.0068	0.0118	L2	0.00	0.125	0.00	0.005
D	3.00 BSC		0.118 BSC		r	0.075 BSC		0.0029 BSC	
D2	0.82	1.02	0.0323	0.0402	θ	0°	12°	0°	12°
D3	1.01	1.21	0.0398	0.0476	-	-	-	-	-

Note: Controlling dimensions are in millimeters. Approximate dimensions are provided in inches

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"Preview"	Future device intended for production at some point. Samples may be available
"Active"	Product status recommended for new designs
"Last time buy (LTB)"	Device will be discontinued and last time buy period and delivery is in effect
"Not recommended for new designs"	Device is still in production to support existing designs and production
"Obsolete"	Production has been discontinued

Datasheet status key:

"Draft version"	This term denotes a very early datasheet version and contains highly provisional information, which may change in any manner without notice.
"Provisional version"	This term denotes a pre-release datasheet. It provides a clear indication of anticipated performance. However, changes to the test conditions and specifications may occur, at any time and without notice.
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