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 new innovative 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**:

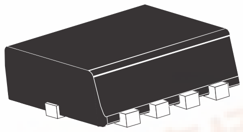
Performance capability equivalent to much larger packages

Improved circuit efficiency & power levels

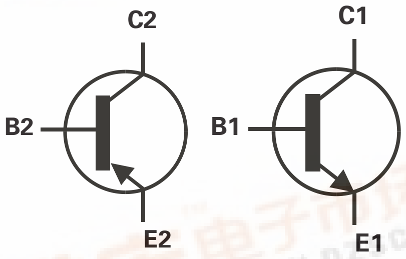
PCB area and device placement savings

Lower package height (0.9mm nom)

Reduced component count



3mm x 2mm Dual Die MLP



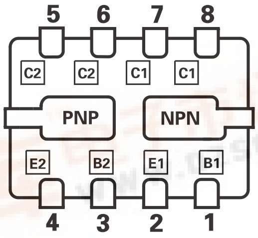
FEATURES

- 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

PINOUT



3mm x 2mm Dual MLP
underside view

ORDERING INFORMATION

DEVICE	REEL	TAPE WIDTH	QUANTITY PER REEL
ZXTD4591AM832TA	7′′	8mm	3000
ZXTD4591AM832TC	13′′	8mm	10000

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 TA=25°C (a)(f) Linear Derating Factor	P_D	1.5 12		W mW/°C
Power Dissipation at TA=25°C (b)(f) Linear Derating Factor	P_D	2.45 19.6		W mW/°C
Power Dissipation at TA=25°C (c)(f) Linear Derating Factor	P_D	1 8		W mW/°C
Power Dissipation at TA=25°C (d)(f) Linear Derating Factor	P_D	1.13 9		W mW/°C
Power Dissipation at TA=25°C (d)(g) Linear Derating Factor	P_D	1.7 13.6		W mW/°C
Power Dissipation at TA=25°C (e)(g) Linear Derating Factor	P_D	3 24		W mW/°C
Storage Temperature Range	T_{stg}	-55 to +150		°C
Junction Temperature	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.

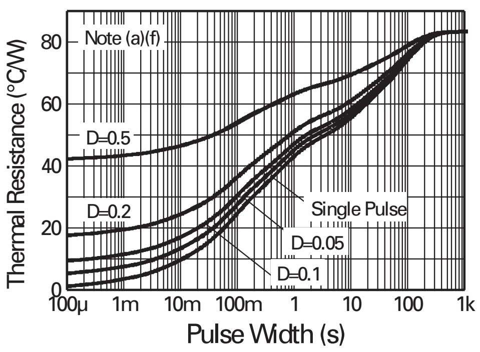
TYPICAL CHARACTERISTICS

AWAITING GRAPH

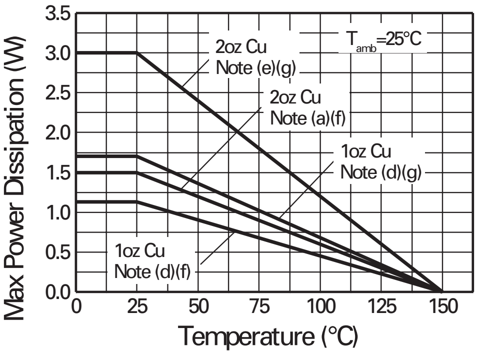
NPN Safe Operating Area

AWAITING GRAPH

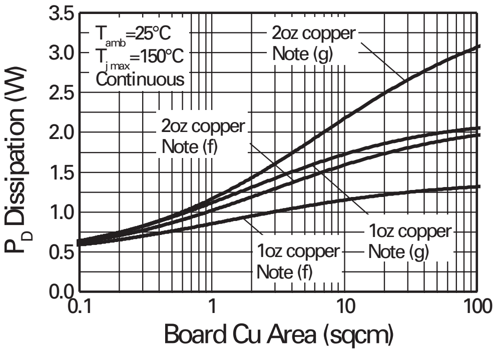
PNP Safe Operating Area



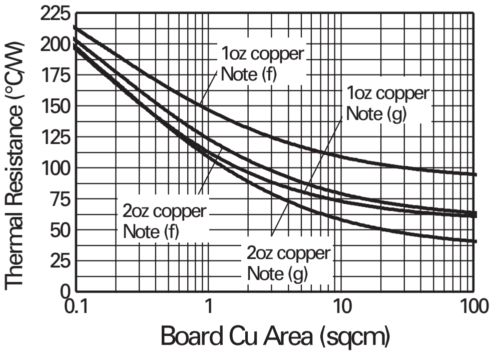
Transient Thermal Impedance



Derating Curve



Power Dissipation v Board Area



Thermal Resistance v Board Area

ZXTD4591AM832

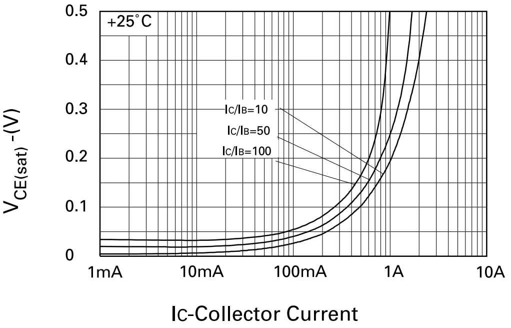
NPN TRANSISTOR

ELECTRICAL CHARACTERISTICS (at T_{amb} = 25°C unless otherwise stated).

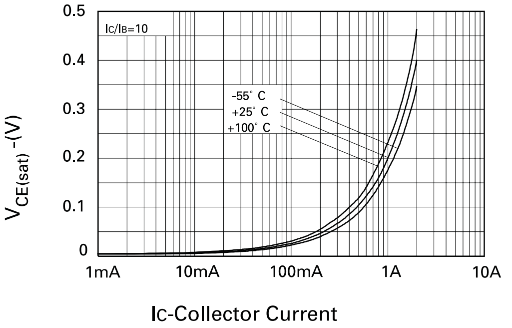
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	40			V	I_C=100μA
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	40			V	I_C=10mA*
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	5			V	I_E=100μA
Collector Cut-Off Current	I_{CBO}			100	nA	V_{CB}=30V
Emitter Cut-Off Current	I_{EBO}			100	nA	V_{EB}=4V
Collector Emitter Cut-Off Current	I_{CES}			100	nA	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

*Measured under pulsed conditions.

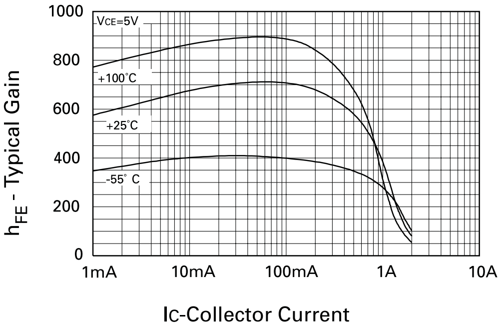
NPN TYPICAL CHARACTERISTICS



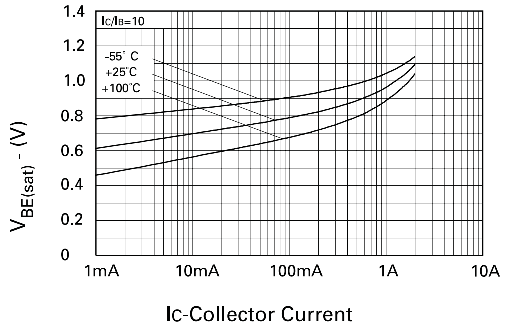
$V_{CE(sat)}$ v I_C



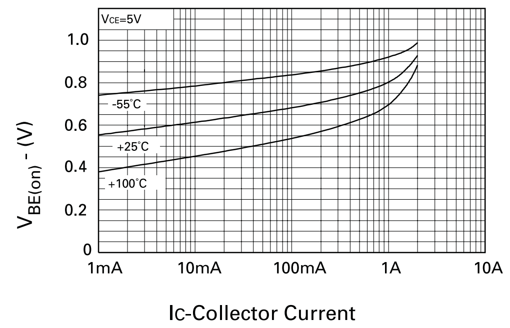
$V_{CE(sat)}$ v I_C



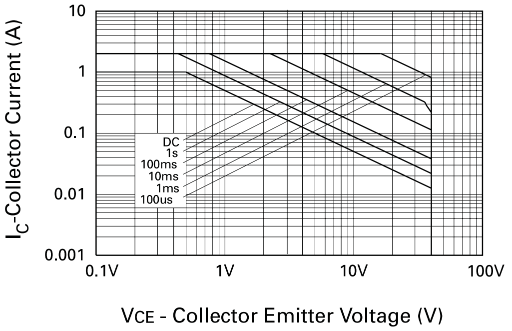
h_{FE} v I_C



$V_{BE(sat)}$ v I_C



$V_{BE(on)}$ v I_C



Safe Operating Area

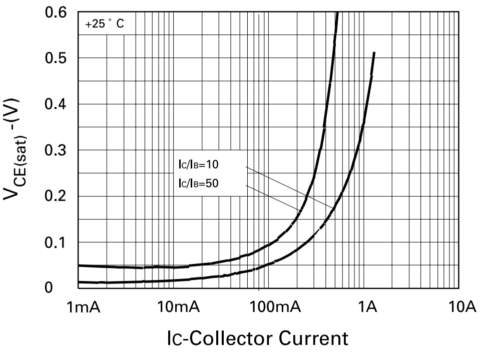
PNP TRANSISTOR

ELECTRICAL CHARACTERISTICS (at T_{amb} = 25°C unless otherwise stated).

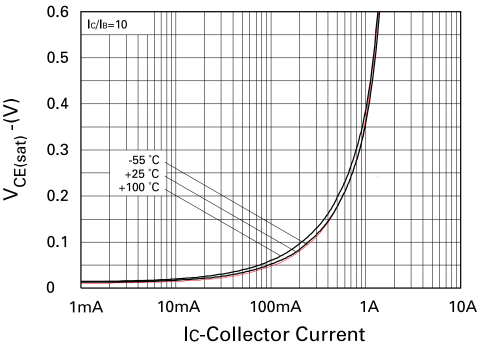
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	-40			V	I_C=-100μA
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	-40			V	I_C=-10mA*
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	-5			V	I_E=-100μA
Collector Cut-Off Current	I_{CBO}			-100	nA	V_{CB}=-30V
Emitter Cut-Off Current	I_{EBO}			-100	nA	V_{EB}=-4V
Collector Emitter Cut-Off Current	I_{CES}			-100	nA	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

*Measured under pulsed conditions.

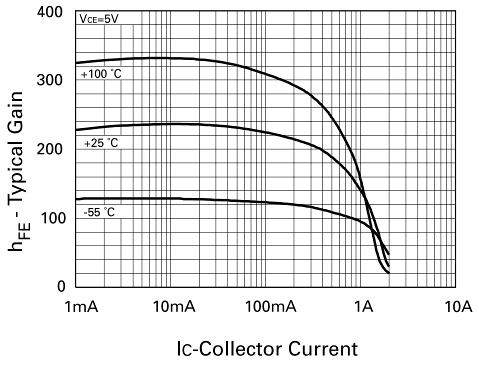
PNP TYPICAL CHARACTERISTICS



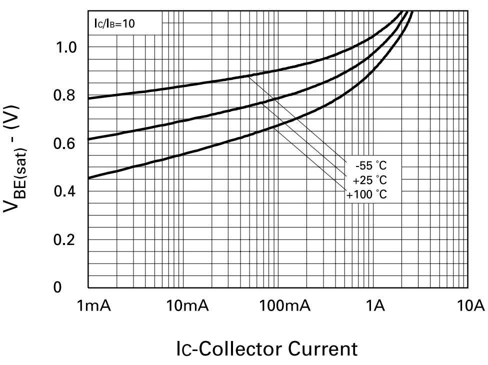
VCE(sat) v IC



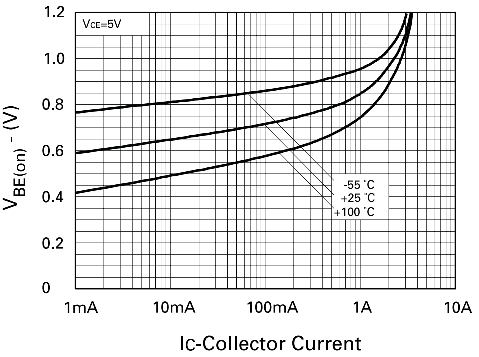
VCE(sat) v IC



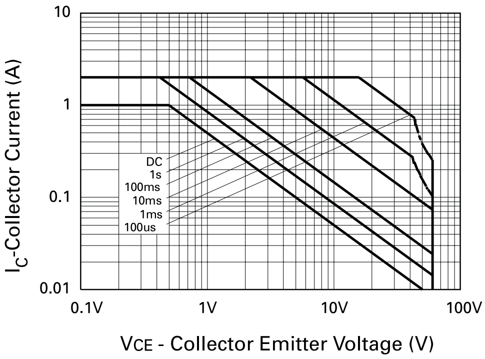
hFE V IC



VBE(sat) v IC

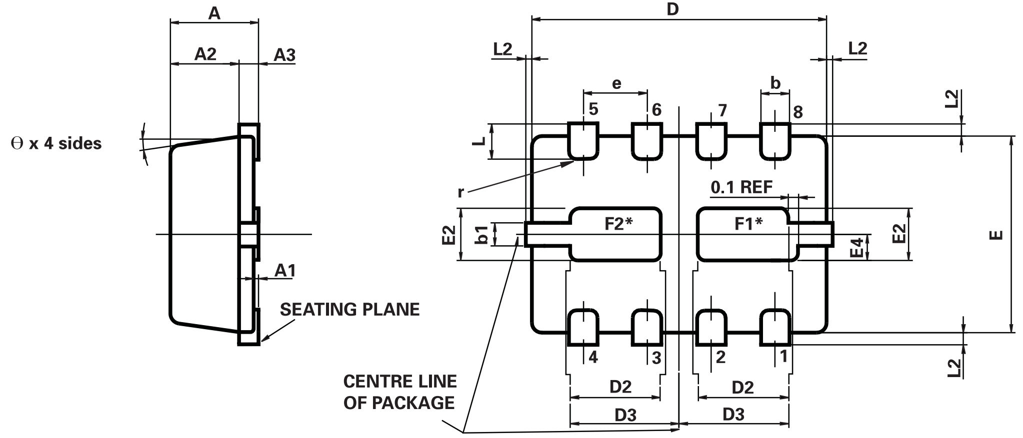


VBE(on) v IC



Safe Operating Area

MLP832 PACKAGE OUTLINE (3mm x 2mm Micro Leaded Package)



***Exposed Flags. Solder connection to improve thermal dissipation is optional.**
F1 at collector 1 potential
F2 at collector 2 potential

CONTROLLING DIMENSIONS IN MILLIMETRES
APPROX. CONVERTED DIMENSIONS IN INCHES

MLP832 PACKAGE DIMENSIONS

DIM	MILLIMETRES		INCHES		DIM	MILLIMETRES		INCHES	
	MIN.	MAX.	MIN.	MAX.		MIN.	MAX.	MIN.	MAX.
A	0.80	1.00	0.031	0.039	e	0.65 REF		0.0256 BSC	
A1	0.00	0.05	0.00	0.002	E	2.00 BSC		0.0787 BSC	
A2	0.65	0.75	0.0255	0.0295	E2	0.43	0.63	0.017	0.0249
A3	0.15	0.25	0.006	0.0098	E4	0.16	0.36	0.006	0.014
b	0.24	0.34	0.009	0.013	L	0.20	0.45	0.0078	0.0157
b1	0.17	0.30	0.0066	0.0118	L2	—	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	0.032	0.040	Θ	0°	12°	0°	12°
D3	1.01	1.21	0.0397	0.0476					

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