MPPS™ Miniature Package Power Solutions
DUAL 15V NPN & 12V PNP LOW SATURATION TRANSISTOR COMBINATION

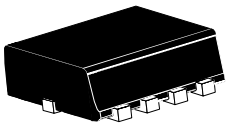
SUMMARY

NPN Transistor — V_{CEO} = 15V; R_{SAT} = 45mΩ; I_C = 4.5A

PNP Transistor — V_{CEO} = -12V; R_{SAT} = 60mΩ; I_C = -4A

DESCRIPTION

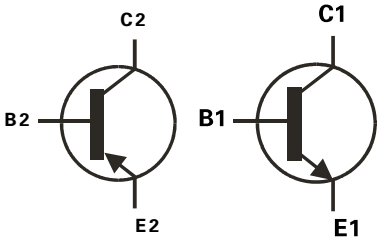
Packaged in the new innovative 3mm x 2mm MLP (Micro Leaded Package), these low saturation NPN / PNP combination dual transistors offer lower on state losses making them ideal for use in DC-DC circuits and various driving and power-management functions.



3mm x 2mm Dual Die MLP

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**



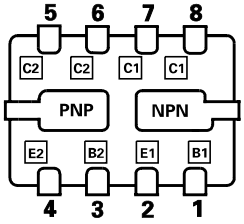
FEATURES

- Low Equivalent On Resistance
- Extremely Low Saturation Voltage **(100mV max @1A--NPN)**
- H_{FE} specified up to 12A
- I_C = 4.5A Continuous Collector Current
- 3mm x 2mm MLP

APPLICATIONS

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

PINOUT



3mm x 2mm Dual MLP
underside view

ORDERING INFORMATION

DEVICE	REEL	TAPE WIDTH	QUANTITY PER REEL
ZXTDA1M832TA	7''	8mm	3000
ZXTDA1M832TC	13''	8mm	10000

DEVICE MARKING

DA1

ISSUE 1 - JUNE 2002

ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	NPN	PNP	UNIT
Collector-Base Voltage	V_{CBO}	40	-20	V
Collector-Emitter Voltage	V_{CEO}	15	-12	V
Emitter-Base Voltage	V_{EBO}	7.5	-7.5	V
Peak Pulse Current	I_{CM}	15	-12	A
Continuous Collector Current (a)(f)	I_C	4.5	-4	A
Continuous Collector Current (b)(f)	I_C	5	-4.4	A
Base Current	I_B	1000		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 8		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.

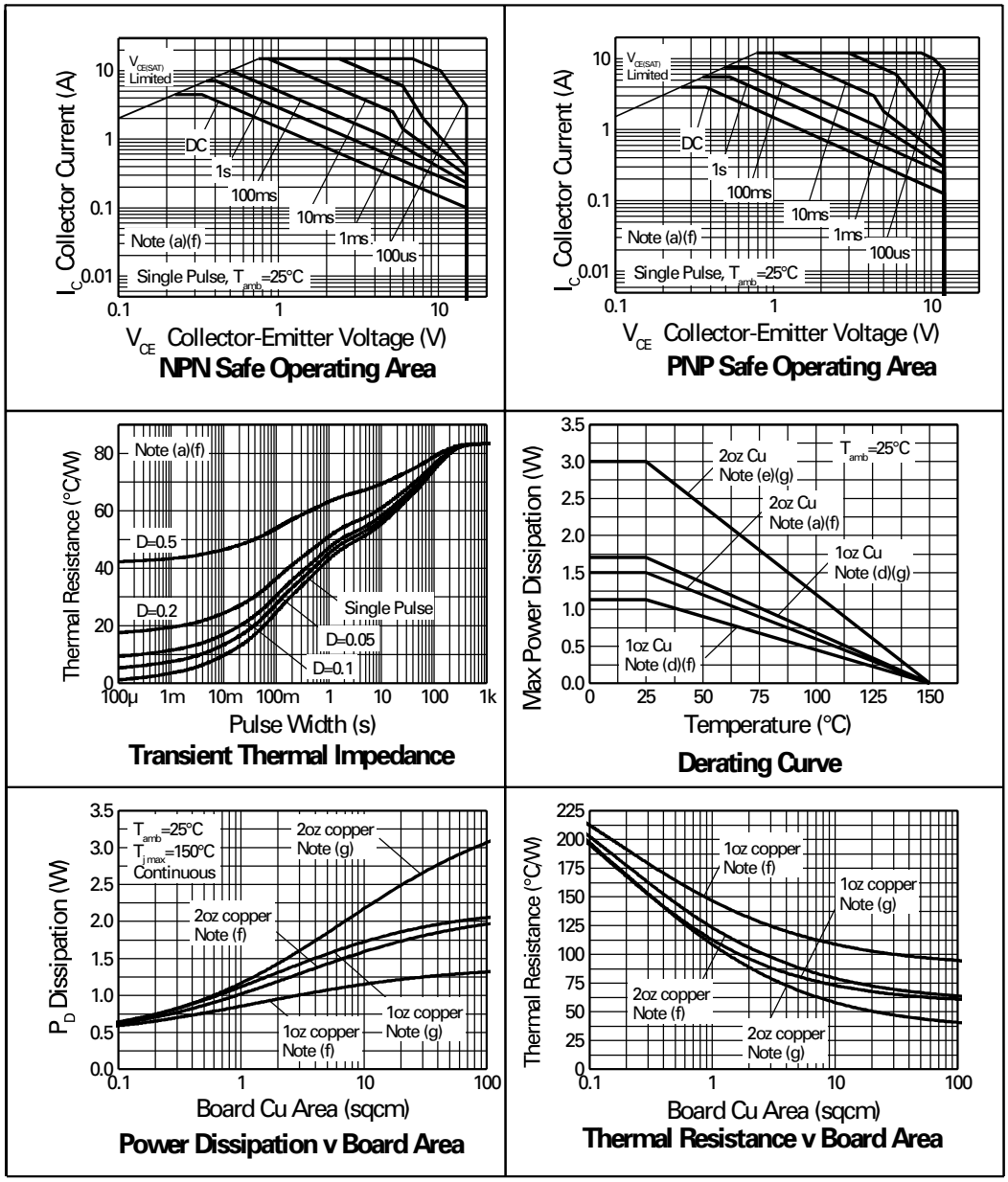
(f) For a dual device with one active die.

(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



ZXTDA1M832

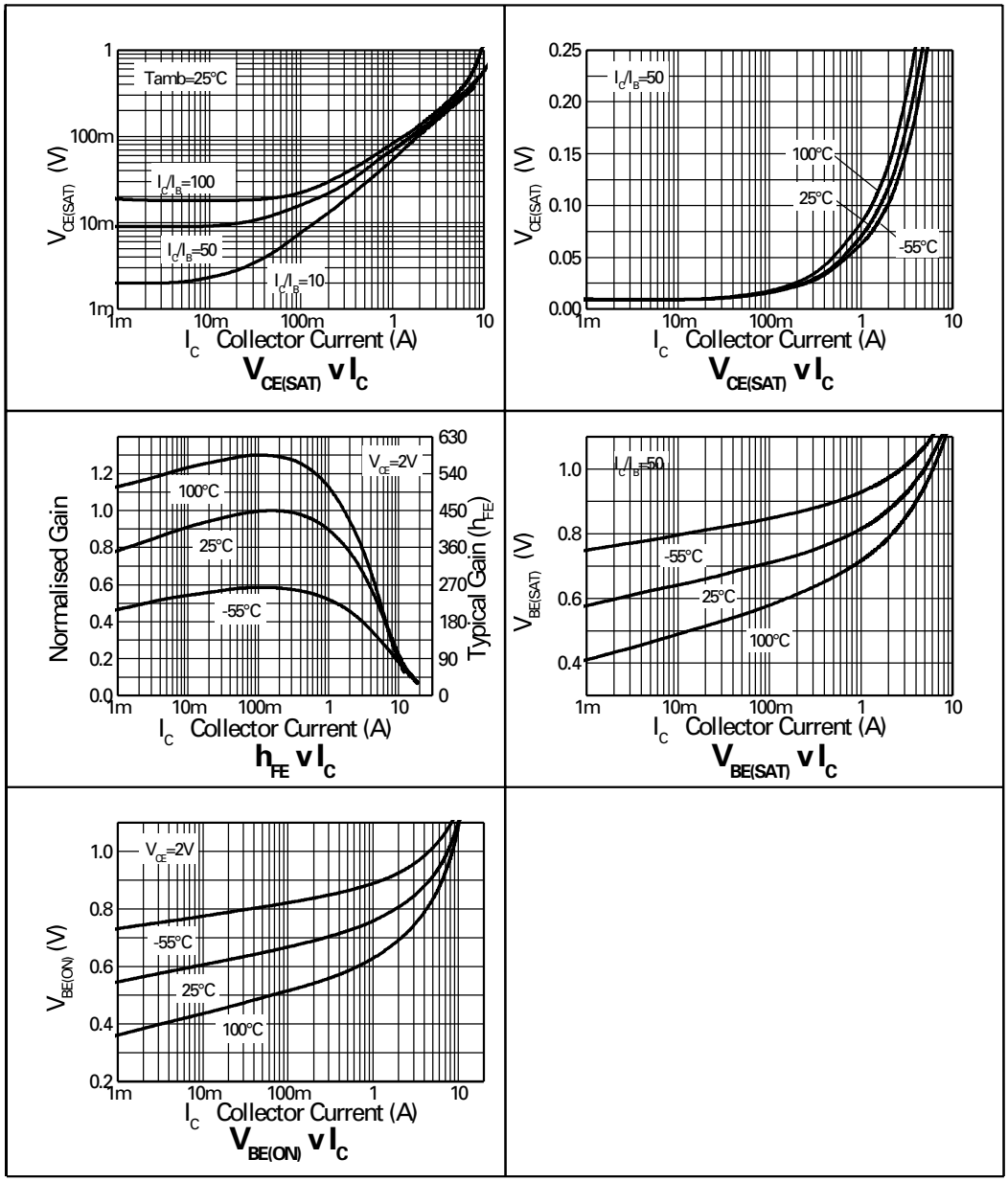
NPN TRANSISTOR

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	70		V	I_C=100μA
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	15	18		V	I_C=10mA*
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	7.5	8.2		V	I_E=100μA
Collector Cut-Off Current	I_{CBO}			25	nA	V_{CB}=32V
Emitter Cut-Off Current	I_{EBO}			25	nA	V_{EB}=6V
Collector Emitter Cut-Off Current	I_{CES}			25	nA	V_{CE}=12V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$		8 70 165 240	14 100 200 280	mV mV mV mV	I_C=0.1A, I_B=10mA* I_C=1A, I_B=10mA* I_C=3A, I_B=50mA I_C=4.5A, I_B=50mA
Base-Emitter Saturation Voltage	$V_{BE(sat)}$		0.94	1.00	V	I_C=4.5A, I_B=50mA*
Base-Emitter Turn-On Voltage	$V_{BE(on)}$		0.88	0.95	V	I_C=4.5A, V_{CE}=2V*
Static Forward Current Transfer Ratio	h_{FE}	200 300 200 150	415 450 320 240 80			I_C=10mA, V_{CE}=2V* I_C=200mA, V_{CE}=2V* I_C=3A, V_{CE}=2V* I_C=5A, V_{CE}=2V* I_C=12A, V_{CE}=2V*
Transition Frequency	f_T	80	120		MHz	I_C=-50mA, V_{CE}=-10V f=100MHz
Output Capacitance	C_{obo}		30	40	pF	V_{CB}=-10V, f=1MHz
Turn-On Time	$t_{(on)}$		120		ns	V_{CC}=-6V, I_C=-1A I_{B1}=I_{B2}=-10mA
Turn-Off Time	$t_{(off)}$		160		ns	

*Measured under pulsed conditions.

NPN CHARACTERISTICS



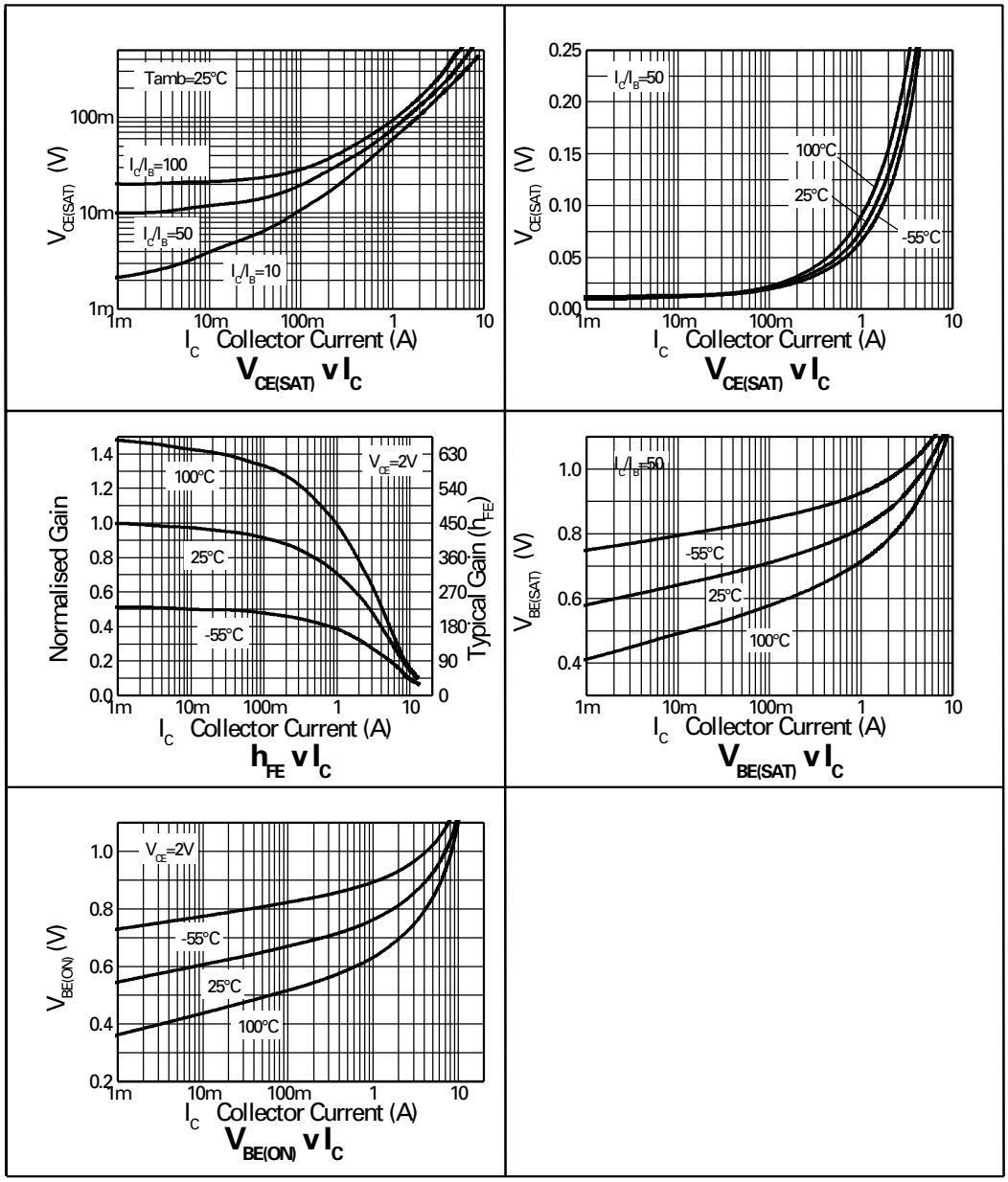
PNP TRANSISTOR

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

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	-20	-35		V	I_C=-100μA
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	-12	-25		V	I_C=-10mA*
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	-7.5	-8.5		V	I_E=-100μA
Collector Cut-Off Current	I_{CBO}			-25	nA	V_{CB}=-16V
Emitter Cut-Off Current	I_{EBO}			-25	nA	V_{EB}=-6V
Collector Emitter Cut-Off Current	I_{CES}			-25	nA	V_{CE}=-10V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$		-10 -100 -100 -195 -240	-17 -140 -150 -300 -300	mV mV mV mV mV	I_C=-0.1A, I_B=-10mA* I_C=-1.0A, I_B=-10mA* I_C=-1.5A, I_B=-50mA* I_C=-3A, I_B=-50mA* I_C=-4A, I_B=-150mA*
Base-Emitter Saturation Voltage	$V_{BE(sat)}$		-0.97	-1.050	V	I_C=-4A, I_B=-150mA*
Base-Emitter Turn-On Voltage	$V_{BE(on)}$		-0.87	-0.950	V	I_C=-4A, V_{CE}=-2V*
Static Forward Current Transfer Ratio	h_{FE}	300 300 180 60 45	475 450 275 100 70			I_C=-10mA, V_{CE}=-2V* I_C=-100mA, V_{CE}=-2V* I_C=-2.5A, V_{CE}=-2V* I_C=-8A, V_{CE}=-2V* I_C=-10A, V_{CE}=-2V*
Transition Frequency	f_T	100	110		MHz	I_C=-50mA, V_{CE}=-10V f=100MHz
Output Capacitance	C_{obo}		21	30	pF	V_{CB}=-10V, f=1MHz
Turn-On Time	$t_{(on)}$		70		ns	V_{CC}=-10V, I_C=-1A I_{B1}=I_{B2}=-50mA
Turn-Off Time	$t_{(off)}$		130		ns	

*Measured under pulsed conditions.

PNP CHARACTERISTICS



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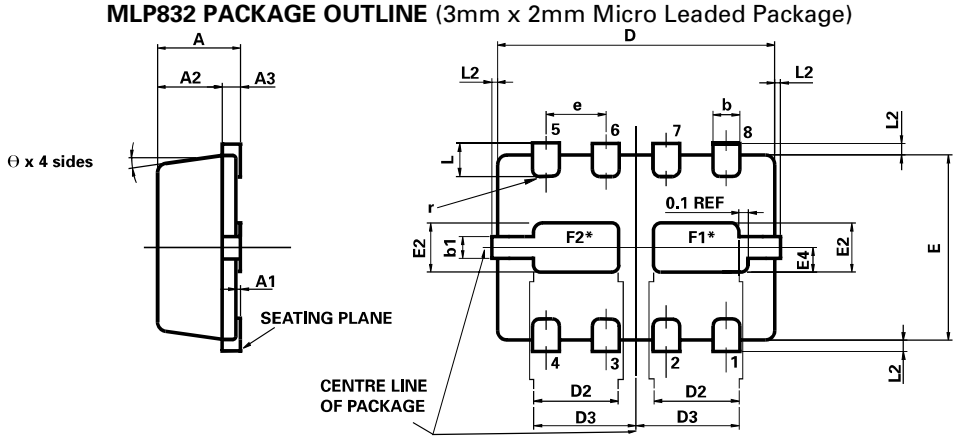
MLP832 PACKAGE OUTLINE (3mm x 2mm Micro Leaded Package)



***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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